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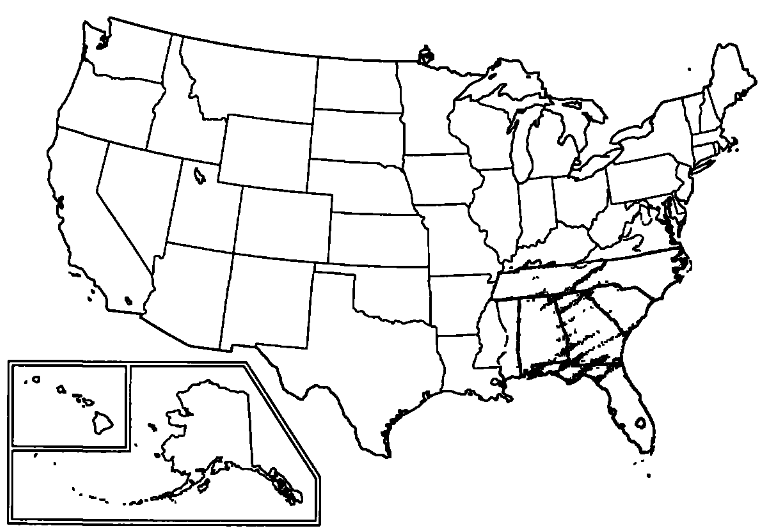
National Hydroelectric Power Resources Study

Volume XVI
September 1981

Regional Assessment: Southeastern Electric Reliability Council and Puerto Rico



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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This volume briefly describes existing conditions (physical, social, economic) affecting electric supply and demand in the Southeastern Electric Reliability Council and Puerto Rico. It discusses the existing electric energy system and the role of hydropower therein. Projections of electrical supply and demand through the year 2000 are discussed. The hydropower resources, developed and undeveloped, of the region are evaluated and a regional ranking of specific projects and sites which are recommended to be studied in further detail is presented. The public involvement in the planning process is described.

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U.S. ARMY CORPS OF ENGINEERS NATIONAL HYDROELECTRIC POWER RESOURCES STUDY

REGIONAL REPORT: VOLUME XVI SOUTHEASTERN ELECTRIC RELIABILITY COUNCIL AND PUERTO RICO

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PREFACE

The economic success and standard of living in this country have been achieved, in part, at the expense of abundant supplies of low cost, non-renewable, energy sources. In recent years however, diminishing reserves of the preferred non-renewable energy sources, i.e. oil and natural gas, have prompted a national energy policy which emphasizes conservation and the development of new and renewable sources of energy. This report is a direct result of the national energy policy as it focuses on our major existing renewable energy resource, hydroelectric power.

Congress, in the Water Resources Development Act of 1976 (P. L. 94-587), authorized and directed the Secretary of the Army, acting through the Chief of Engineers, to undertake a National Hydroelectric Power Resources Study (NHS). The primary objectives of the NHS were (1) to determine the amount and the feasibility of increasing hydroelectric capacity by development of new sites, by the addition of generation facilities to existing water resources projects, and by increasing the efficiency and reliability of existing hydroelectric power systems; and (2) to recommend to Congress a national hydroelectric power development program.

The final NHS report consists of 23 volumes. Volumes I and II are the Executive Summary and National Reports respectively. Volumes III and IV evaluate the existing and projected electric supply and demand in the United States. Volumes V through XI discuss various generic policy and technical issues associated with hydroelectric power development and operation. Volumes XII and XIII describe the procedures used to develop the data base and include a complete listing of all sites. Volumes XIV through XXII are regional reports defined by Electric Reliability Council (ERC) regions. The index map at the inside back cover defines the ERC regions. Alaska and Hawaii are presented in Volume XXIII.

This volume, number XVI, describes the hydroelectric power potential in the Southeastern Electric Reliability Council and Puerto Rico (SERC) region. A map depicting all sites described in the text is located in the jacket, inside back cover.

NATIONAL HYDROPOWER STUDY

VOLUME XVI

PART I

SOUTHEASTERN ELECTRIC RELIABILITY COUNCIL

NATIONAL HYDROPOWER STUDY
SOUTHEASTERN ELECTRIC RELIABILITY COUNCIL

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Chapter 1

REGIONAL OBJECTIVES

This portion of the report presents the results of a study of the potential for hydroelectric power development within the Southeastern Electric Reliability Council (SERC) which is described in Chapter 2 and shown on Figure 2-1.

To assess the hydropower potential of the United States, Congress enacted legislation in 1976 requiring the U.S. Army Corps of Engineers to conduct a National Hydropower Study. The objective of the study, authorized by PL 94-587, Section 167, are:

- To analyze and define the Nation's need for hydroelectric power;

- To assess the potential for increasing hydroelectric power capacity and generation;

- To analyze the current institutional and policy setting of hydroelectric power planning, development, marketing, and utilization;

- To estimate the feasibility of increasing hydroelectric generation capacity through development of new sites, by addition of generation facilities to existing water resource projects, and by increasing the efficiency and reliability of existing hydropower systems;

- To assess the general environmental and socio-economic impacts of hydropower development;

- To recommend to Congress a National Hydropower Development Program and any institutional and policy modifications which would increase the effectiveness of existing and future hydropower planning; and

- To make the study results available to private and public hydropower developers.

The results of this regional study impinge on each and every one of these objectives with the primary thrust directed toward defining the hydropower demand and supply in the region, evaluating the feasibility and impacts of development, identifying which potential developments warrant more detailed investigation, and making this information available to developers.

Development of the hydroelectric power potential within SERC would contribute to the national objectives of reducing the use of non-renewable energy resources and reducing dependency on imports of foreign oil. The welfare and security of the nation would be improved. Low cost electrical energy would be provided to the public, primarily within the region.

Study concepts and limitations are as follows:

- Within the SERC region additional hydropower developments of less than 1 MW capacity were not evaluated due to time and resources limitations. Also, only those new sites that had been identified by some planning entity were considered.

- The study provides only a cursory estimate of the power potential, the economic feasibility, and the non-economic impacts and constraints of potential power developments. The analyses of sites are based on readily available data which have not been verified in the field. This level of detail will not support an immediate move to the detailed design and construction of hydropower at these sites. While the study will likely result in a recommendation to expand the pace of hydropower development in this country to confront the energy crisis, the preliminary results emphasize the need to conduct further studies to verify the overall viability of hydro development at each site.

- The retrofitting of existing dams with hydropower facilities is emphasized because of the expediency of placing power on line, the economic merits, and the relatively benign environmental impacts associated with most retrofit projects. The national plan will request streamlining for planning and development procedures for retrofit projects, but such a streamlined system would have to preserve existing safeguards which deter infeasible or unjustifiable development.

- Inasmuch as detailed studies have not been made, the incremental power estimates overstate the potential in most cases, particularly at existing projects because of the need to maintain satisfactory water levels and releases for other vital water resources purposes. No attempt was made to evaluate the feasibility of increasing the height of existing dams at this stage.

Chapter 2

EXISTING CONDITIONS (Reliability Council Profile)

2.1 SERC REGIONAL BACKGROUND

The Southeastern Electric Reliability Council (SERC) power planning region is one of nine regional groups of bulk power suppliers serving the United States and Canada. The region includes all of the States of Alabama, Georgia, Florida, North Carolina, South Carolina and Tennessee, and parts of Mississippi, Kentucky and Virginia. This council is divided into four subregions: VACAR (Virginia Carolinas), TVA (Tennessee Valley Authority), SOUTHERN (basically the four Southern Companies), and FLORIDA. The SERC region represents about 10 percent of the nation's contiguous area but accounts for about 20 percent of the nation's electric energy. Figure 2-1 is a map of the SERC area.

SERC was formed on January 24, 1970, to further augment the reliability and adequacy of bulk power supplies in areas served by member systems. Membership is open to all power utilities in the region. Its membership consists primarily of investor-owned and municipal utilities, but includes participation by locally owned cooperatives, Federal agencies, and state and county operated utilities. The members of SERC in each subregion are as follows:

FLORIDA

Florida Power & Light Company
Florida Power Corporation
Fort Pierce Utilities Authority
Gainesville/Alachua County Regional Utilities Board
Jacksonville Electric Authority
City of Lakeland
Orlando Utilities Commission
City of Tallahassee
Tampa Electric Company
City of Vero Beach

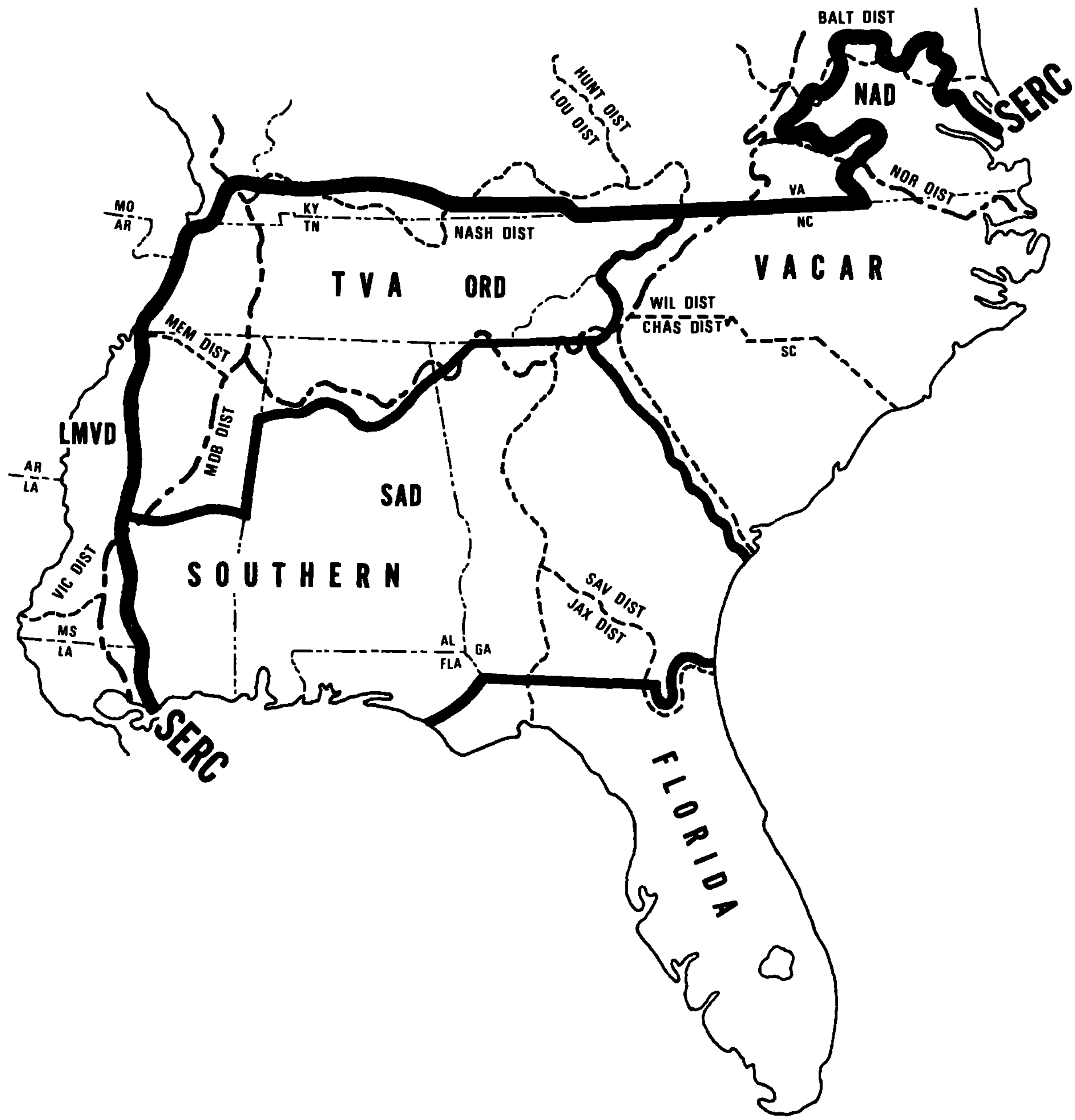

Figure 2-1
SERC SUBREGIONS

SOUTHERN

Alabama Electric Cooperative, Inc.
Alabama Power Company
Crisp County Power Commission
Georgia Power Company
Gulf Power Company
Mississippi Power Company
Savannah Electric & Power Company
Southeastern Power Administration
South Mississippi Electric Power Association
Southern Electric Generation Company

TVA

Nantahala Power & Light Company
Tapoco, Inc.
Tennessee Valley Authority

VACAR

Carolina Power & Light Company
Duke Power Company
South Carolina Electric & Gas Company
South Carolina Public Service Authority
Southeastern Power Administration
Virginia Electric & Power Company
Yadkin, Inc.

2.2 PHYSIOGRAPHY

As shown on Figure 2-1, SERC covers the southeastern part of the United States from the mouth of Chesapeake Bay on the Atlantic Ocean to the confluence of the Pearl River with the Mississippi Sound on the Gulf Coast. The SERC boundary follows the western shore of Chesapeake Bay to the Potomac River, where it continues upstream until it meets the Blue Ridge Mountains. It turns southwestward along the eastern slope of these mountains to the head of the Tennessee Valley, where it bends westward along the northern reaches of the Tennessee River Basin to its confluence with the Mississippi River. The boundary then bends south abruptly, running through the middle of the State of Mississippi to the Gulf Coast.

SERC power systems operate in an area of 345,636 square miles that encompass the Blue Ridge and Great Smokies ranges of the Appalachian Mountain System. These form land divides for some of the major river basins in the region. At the southern tip of the Blue Ridge Mountains a more subdued divide continues southward through the Piedmont and Coastal Plains provinces of western Georgia.

Elevations range from about 5,500 feet in the mountains to 1,200 feet in the Piedmont foothills to 200 feet near the Fall Line to sea level along the coast. The rugged, densely wooded mountains have well defined, narrow valleys in the higher elevations, changing to the hilly terrain of the Piedmont foothills, and then to the rolling terrain of the Coastal Plain at the Fall Line, which divides the Piedmont and Coastal Plain from southeastern Virginia, southward to the northern end of the Alabama-Mississippi state line. All of Mississippi lies in the Coastal Plain. The Piedmont lies east of the Blue Ridge Mountains and extends in a southward curving broad belt ending at the Appalachian Plateau in northwestern Alabama.

The crystalline bedrock of the Blue Ridge and Piedmont provinces consists of gneisses, schists, quartzites, and granites. Throughout much of the Piedmont, however, this bedrock is overlain by a thick mantle of weathered rock and sediments with granite intrusions that appear as large outcrops in some locations, such as Stone Mountain in Georgia. The predominant sediments consist of red soils having sandy clay and silty clay textures. The Appalachian Plateau is underlain by horizontal coal-bearing sandstone rocks.

The rivers flowing southeastward to the Atlantic Ocean rise in the higher elevations along the eastern slopes of the Blue Ridge Mountains from Virginia to Georgia. Rivers rising in northwest Georgia, beyond the southern tip of the Blue Ridge Mountains, flow southwestward to the Gulf of Mexico. The rivers in the Tennessee Valley area and in most of northern Mississippi flow into the Mississippi River and thence southward to the Gulf of Mexico.

Hydropower projects in the Coastal Plain generally operate on a run-of-river basis. Hydropower plants located above the Fall Line in the Piedmont and mountain areas are most often constructed as peaking units. Pumped storage units are built in steep terrain to compensate for the limited storage capacity of the reservoirs.

2.3 METEOROLOGY AND HYDROLOGY

Average annual rainfall generally ranges from 41 inches in small areas of the interiors of Georgia and South Carolina to 80 inches in the mountains of northeast Georgia and western South Carolina. This high mountain barrier stops much of the potential rainfall that might otherwise extend farther to the east and south. The early spring peaks are a product of the frontal storms that migrate with the change of seasons. Summer peaks are produced by passing thunderstorms. Rains occur on an average of 100 to 120 days each year. The National Weather Service estimates that 10 to 15 percent of the June through October precipitation in some coastal regions results from tropical cyclones or hurricanes.

Because of high evaporation rates and relatively low rainfall in late summer throughout most of the region, the lowest stream flows occur in September and October. The highest stream flows occur in February and March.

The average flow represents the total water resource of the river basin and also represents the potential for hydroelectric power. This flow depends mostly on the size of the drainage basin and fall per mile of the river channel. The average flow in the Southeastern states can generally be categorized in relation to four geographical regions: the Blue Ridge Province, the Piedmont Province, the Coastal Plain, and the Lower Coastal Plain. The runoff is greatest in the mountains of the Blue Ridge Province, averaging about 3 to 4 cubic feet per second (cfs) per square mile of drainage area. In the Piedmont Province the steeper land slopes, underlain by impervious rocks, tend to produce higher flood flows than in the Coastal Plain, with the flow estimated about 2 cfs per square mile. The streams that lie wholly within the Lower Coastal Plain have less runoff because the flood water is stored by the flatter and broader flood plains. The Lower Coastal Plain average flow ranges from 0.6 cfs to 1.0 cfs per square mile.

Mean monthly temperatures range from 50°F in January to 90°F in August. The marked seasonal variations in temperature create a high energy demand for residential heating and cooling. Winter temperatures vary more from north to south than summer temperatures. All the states experience freezing temperatures, but snow melt and associated runoff are not important factors.

2.4 EXISTING DEMOGRAPHIC AND ECONOMIC CONDITIONS

Table 2-1 summarizes the significant demographic and economic data for SERC and its subregions as of 1970. The population of the region has been growing at the average annual rate of 1.7 percent between the years 1950 and 1970. During this period, the regional population percentage of the national total population has increased to 16.4 percent. The VACAR subregion contained 38.2 percent of the 1970 SERC population, SOUTHERN contained 25.6 percent, FLORIDA contained 19.9 percent and TVA 16.3 percent. The FLORIDA subregion had an unusually high annual growth rate of 4.5 percent between 1950 and 1970.

Total earnings within the SERC region have increased 5.2 percent annually. This has been significantly higher than the national growth rate. The government, followed by manufacturing, has represented the largest earnings sector in SERC. The government and agricultural sectors in SERC represent 20 and 16.7 percent of the respective national sector earnings. The VACAR subregion had the highest subregional earnings totals. The TVA subregion had the lowest earnings.

Per capita income in SERC increased 3.5 percent annually. In 1970, the SERC per capita income of $3,002 was 86 percent of the national average. This disparity has been decreasing. Within SERC, the 1970 per capita income was highest in the VACAR and FLORIDA subregions.

Table 2-1

SERC
ECONOMIC INDICATORS
1970

Sector Earnings[1/] (Million $)	VACAR	TVA	SOUTHERN	FLORIDA	SERC
Agriculture	1,089	616	863	705	3,273
Mining	52	91	138	63	344
Construction	2,003	611	1,043	1,424	5,082
Manufacturing	7,336	3,490	5,103	2,257	18,186
Transpo Utilities	1,911	573	1,380	1,309	5,173
Trade	4,901	1,812	3,226	3,116	13,056
Finance	1,429	458	883	1,036	3,807
Services	4,976	1,086	2,383	2,937	11,383
Government	10,642	2,147	4,170	2,855	19,814
Total Earnings (Million $)[1/] [2/]	34,341	11,524	19,189	15,703	80,756
Population (Thousands)	12,741	5,431	8,552	6,619	33,344
Per Capita Income ($)[1/]	3,211	2,624	2,741	3,246	3,002
Per Capita Income Relative to the U.S.	0.924	0.755	0.789	0.934	0.864

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, April 1979.

[1/] Constant 1967 dollars.

[2/] The sum of sector earnings may not equal total earnings since some data were deleted to avoid disclosure of data pertaining to a particular establishment. Due to rounding, the sum of parts may not exactly equal totals.

2.5 FUTURE DEMOGRAPHIC AND ECONOMIC CONDITIONS

The 1970 SERC population of about 33.3 million people is projected to increase to about 38.6 million in 1980 and about 50 million people by the year 2000, according to the 1972 Series E projections by OBERS. This represents an increase from 16.4 percent of the national population in 1970 to a projected 18.7 percent in 2000. The breakdown by subregion is shown in Table 2-2.

Table 2-2

PERCENT OF SERC POPULATION

Subregion	1970	1980	2000
VACAR	38.2	37.3	37.3
TVA	16.3	16.0	15.2
SOUTHERN	25.6	24.1	22.3
FLORIDA	19.9	22.6	25.2

The 1972 OBERS Series E projected population and earnings for SERC and its subregions are shown in Tables 2-3 through 2-7.

The FLORIDA subregion is projected to have the highest annual population growth rate within SERC, about 1.8 percent for the 1980-2000 period. The other three subregions should parallel the projected growth rate for the total region, which is about 1.2 percent.

Total earnings for the region are expected to grow at a 4.1 percent average annual rate between 1980 and 1990, then slow to 3.8 percent. Historically, the region has shared an ever increasing proportion of the national market and is expected to grow from the 14 percent of the national earnings it had in 1970, to about 16.5 percent in 2000.

Government and services are projected to become the largest growth sectors in SERC. Manufacturing, the second largest industrial sector, is projected to diminish in its share of total earnings. Government and agriculture should continue to maintain their large percentages of national earnings.

Table 2-3

PROJECTED POPULATION, INCOME AND MAJOR SECTOR EARNINGS (OBERS)

(Earnings and Income in constant 1967 $)

SERC

SECTOR EARNINGS (Million $)	YEAR 1980	1985	1990	2000
Agriculture	3,807	3,976	4,155	4,695
Mining	450	496	549	666
Construction	8,207	9,896	11,937	16,826
Manufacturing	28,237	33,818	40,519	56,308
Transpo Utilities	8,345	10,207	12,491	18,204
Trade	20,100	23,981	28,624	40,373
Finance	6,984	8,889	11,320	17,541
Services	21,779	27,963	35,914	56,958
Government	28,929	35,456	43,489	63,679
Total Earnings (Million $)1/	126,851	154,808	189,012	275,264
Total Personal Income (Million $)	160,986	198,421	244,690	362,556
Total Population (Thousands)	38,607	41,529	44,714	49,379
Per Capita Income ($)	4,170	4,778	5,472	7,342
Per Capita Income Relative to U.S.	.87	.88	.89	.90

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, March 1980.

1/Sum of sector earnings may not equal the total earnings since some data were deleted to avoid disclosure of data pertaining to a particular establishment. Due to rounding, the sum of the parts may not exactly equal the totals.

Table 2-4

PROJECTED POPULATION, INCOME AND MAJOR SECTOR EARNINGS (OBERS)

(Earnings and Income in constant 1967 $)

VACAR

SECTOR EARNINGS (Million $)	YEAR 1980	1985	1990	2000
Agriculture	1,123	1,165	1,210	1,358
Mining	70	79	90	112
Construction	3,208	3,871	4,673	6,618
Manufacturing	11,410	13,663	16,368	22,758
Transpo Utilities	2,967	3,628	4,440	6,482
Trade	7,305	8,719	10,412	14,718
Finance	2,580	3,260	4,121	6,304
Services	9,041	11,636	14,980	23,839
Government	15,123	18,371	22,329	32,274
Total Earnings (Million $)	52,832	64,438	78,628	114,472
Total Personal Income (Million $)	63,515	78,101	96,080	141,769
Total Population (Thousands)	14,416	15,496	1,669	18,413
Per Capita Income ($)	4,406	5,040	5,764	7,699
Per Capita Income Relative to U.S.	.92	.93	.93	.94

Source: See Table 2-3 footnotes.

Table 2-5

PROJECTED POPULATION, INCOME AND MAJOR SECTOR EARNINGS (OBERS)

(Earnings and Income in constant 1967 $)

TVA

SECTOR EARNINGS (Million $)	YEAR 1980	1985	1990	2000
Agriculture	823	846	869	962
Mining	121	133	146	177
Construction	982	1,190	1,441	2,056
Manufacturing	5,507	6,636	7,997	11,219
Transpo Utilities	909	1,108	1,350	1,970
Trade	2,801	3,330	3,961	5,566
Finance	839	1,061	1,341	2,055
Services	2,866	3,687	4,744	7,556
Government	3,257	4,032	4,990	7,400
Total Earnings (Million $)	18,107	22,045	26,844	38,964
Total Personal Income (Million $)	22,631	27,724	33,972	49,794
Total Population (Thousands)	6,171	6,554	6,962	7,502
Per Capita Income ($)	3,667	4,230	4,879	6,637
Per Capita Income Relative to U.S.	.77	.78	.79	.81

Source: See Table 2-3 footnotes.

Table 2-6

PROJECTED POPULATION, INCOME AND MAJOR SECTOR EARNINGS (OBERS)
(Earnings and Income in constant 1967 $)
SOUTHERN

SECTOR EARNINGS (Million $)	YEAR 1980	1985	1990	2000
Agriculture	1,005	1,062	1,122	1,285
Mining	71	186	204	243
Construction	1,698	2,033	2,435	3,398
Manufacturing	7,654	9,065	10,739	14,667
Transpo Utilities	2,136	2,577	3,110	4,432
Trade	4,822	5,701	6,742	9,356
Finance	1,544	1,938	2,434	3,737
Services	4,110	5,227	6,653	10,418
Government	5,808	7,074	8,625	12,473
Total Earnings (Million $)	28,952	34,891	42,068	60,013
Total Personal Income (Million $)	35,716	4,327	52,585	75,817
Total Population (Thousands)	9,314	9,816	10,353	11,018
Per Capita Income ($)	3,835	4,414	5,079	6,881
Per Capita Income Relative to U.S.	.80	.81	.82	.84

Source: See Table 2-3 footnotes.

Table 2-7

PROJECTED POPULATION, INCOME AND MAJOR SECTOR EARNINGS (OBERS)

(Earnings and Income in constant 1967 $)

FLORIDA

SECTOR EARNINGS (Million $)	1990	YEAR 1985	1990	2000
Agriculture	857	904	953	1,090
Mining	88	98	109	133
Construction	2,318	2,802	3,388	4,754
Manufacturing	3,665	4,453	5,414	7,663
Transpo Utilities	2,333	2,895	3,591	5,319
Trade	5,172	6,231	7,509	10,732
Finance	2,020	2,630	3,423	5,445
Services	5,763	7,413	9,537	15,145
Government	4,741	5,980	7,545	11,532
Total Earnings (Million $)	26,959	33,435	41,472	61,815
Total Personal Income (Million $)	39,125	49,269	62,053	95,177
Total Population (Thousands)	8,707	9,663	10,729	12,445
Per Capita Income ($)	4,494	5,099	5,784	7,648
Per Capita Income Relative to U.S.	.94	.94	.94	.94

Source: See Table 2-3 footnotes.

Sectoral earnings for the subregions generally are projected to follow growth patterns similar to those for SERC. VACAR should continue to produce the largest share, about 40 percent of total SERC earnings. Manufacturing will remain the largest economic sector in the TVA and SOUTHERN subregions, and services will remain the largest sector in the FLORIDA subregion.

SERC per capita income is expected to increase at an annual rate of 2.8 percent until 1990, then jump to 3.0 percent through 2000. Although per capita income has been below the national average historically, this disparity should decrease. By the year 2000, SERC is expected to be at a per capita income that will equal about 90 percent of the national level. TVA and SOUTHERN, the two subregions with the lowest per capita income, should experience the highest growth rates.

Future electric power needs are related to the projected increases in population and earnings in the region.

2.6 MAJOR ENERGY USERS

The major electrical energy users in the SERC region include residential, commercial, and industrial users. Table 2-8 shows the relative share of each major user for some representative power suppliers in SERC. As shown, the distribution of electrical use varies widely throughout the SERC region. Residential use varies from 22.3 percent to 50.9 percent of total use with an overall average of about 30 percent. Commercial use varies from 17.2 percent to 34.3 percent with an average of about 25 percent. Industrial use varies from 7.3 percent to 43.0 percent with an average of about 25 percent. Other uses account for about 20 percent of the total.

Table 2-9 shows the annual growth rates of energy consumption for residential, commercial, and industrial users from 1971 through 1977. Growth rates are comparable for the three major users during this period, with commercial use showing a slightly higher rate.

Table 2-8

SERC
ELECTRICAL ENERGY CONSUMPTION BY CONSUMER CATEGORIES
FOR SOME REPRESENTATIVE POWER SUPPLIERS
1977 (Percent of Total)

	Residential	Commercial	Industrial	Others	Sale For Resale	Total
VACAR						
Duke Power Company	25.5	17.7	39.3	17.5	-	100.0
Virginia Electric & Power Company	33.5	24.7	17.0	24.8	-	100.0
TVA						
Tennessee Valley Authority	32.0	28.7	19.3	20.0	-	100.0
SOUTHERN						
Alabama Power Company	29.5	17.2	43.0	8.3	2.0	100.0
Gulf Power Company	39.9	22.3	27.6	10.2	-	100.0
Mississippi Power Company	22.3	18.4	39.7	1.1	18.5	100.0
FLORIDA						
Florida Power & Light Company	50.9	34.3	7.3	2.1	5.4	100.0
Florida Power Corporation	40.0	22.1	17.7	20.2	-	100.0
Tampa Electric Company	32.7	19.8	41.7	5.8	-	100.0

Source: 1977 Annual Reports of the above listed utilities.

Table 2-9

SERC
ANNUAL GROWTH RATES OF ENERGY CONSUMPTION BY CONSUMER CATEGORIES FOR SOME REPRESENTATIVE POWER SUPPLIERS

(Percentage)

Representative Utilities	RESIDENTIAL							COMMERCIAL							INDUSTRIAL							TOTAL						
	1971	1972	1973	1974	1975	1976	1977	1971	1972	1973	1974	1975	1976	1977	1971	1972	1973	1974	1975	1976	1977	1971	1972	1973	1974	1975	1976	1977
FLORIDA SUBREGION																												
• Florida Power & Light Company	-	-	14.8	(0.1)	3.0	1.8	8.2	-	-	21.3	8.5	7.3	2.2	6.3	-	-	11.6	(4.0)	(4.2)	2.4	6.2	-	-	15.9	3.1	3.9	2.0	7.3
• Florida Power Corporation	-	-	-	(8.8)	2.4	6.3	10.8	-	-	-	3.5	8.6	3.5	6.9	-	-	-	3.1	2.4	8.5	4.6	-	-	-	(3.1)	4.1	6.0	8.3
• Tampa Electric Company	9.0	9.8	17.7	(0.6)	2.8	0.2	7.6	12.0	14.6	14.2	7.5	7.8	2.1	5.6	(2.0)	2.5	7.9	3.3	6.3	8.1	12.5	9.4	7.4	12.8	2.7	5.3	3.9	9.3
SOUTHERN COMPANY SUBREGION																												
• Alabama Power Company	6.2	9.0	10.3	(0.3)	5.8	5.1	8.2	5.8	11.9	10.4	2.7	7.1	3.9	6.8	(1.7)	10.8	5.7	1.1	(2.3)	10.5	8.2	4.5	7.8	8.1	1.0	2.1	7.4	7.9
• Georgia Power Company	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.9	6.5	6.0	4.0	5.3
• Gulf Power Company	14.8	9.1	12.4	1.9	2.9	8.4	5.4	10.7	14.4	10.0	2.4	7.4	8.4	7.0	9.0	12.4	5.6	(4.1)	1.1	7.2	4.1	9.4	12.9	9.5	0.0	3.4	8.0	5.4
• Mississippi Power Company	7.6	13.1	5.9	(4.7)	3.5	1.1	8.2	11.5	14.8	7.0	(2.6)	4.3	4.7	4.5	8.4	0.8	6.1	2.7	4.8	8.6	3.9	8.8	7.4	6.2	(0.1)	4.3	5.6	5.2
TENNESSEE VALLEY AUTHORITY SUBREGION																												
• Tennessee Valley Authority	1.7	0.1	11.5	0.0	3.9	0.1	17.7	4.7	8.8	8.6	2.2	(3.5)	5.8	12.9	(3.3)	(7.9)	11.6	8.8	(8.3)	(8.6)	14.0	1.1	0.1	10.5	3.1	(2.2)	0.0	15.1
VIRGINIA CAROLINA SUBREGION																												
• Carolina Power & Light Company	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• Duke Power Company	-	-	-	1.4	4.7	4.8	10.0	-	-	-	(3.2)	7.3	5.6	8.0	-	-	-	(5.1)	(6.4)	10.0	4.2	-	-	-	(2.9)	0.0	7.5	6.7
• South Carolina Public Service Authority	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• South Carolina Electric & Gas Company	-	-	13.7	(1.1)	4.6	5.7	9.7	-	-	13.9	1.1	6.7	6.7	7.1	-	-	-	-	-	-	-	-	-	10.1	0.1	1.3	8.7	8.4
• Virginia Electric & Power Company	3.2	8.1	12.9	(0.6)	5.3	7.4	6.6	6.5	8.2	13.3	(0.3)	9.1	6.1	3.6	5.1	9.7	7.8	2.2	(4.5)	11.2	0.2	4.7	8.5	11.7	0.0	4.0	7.8	4.1

Source: The 1977 Annual Report for each utility in the council.

Chapter 3

EXISTING ENERGY SYSTEM

3.1 OVERALL SYSTEM CAPABILITY

The existing electrical energy producing system within the SERC region is very diverse, containing a total winter production capability of 109,038 megawatts (MW) as of 31 January 1979 (National Electric Reliability Council, NERC Report, July 1979). This is distributed among the four subregions as shown on Table 3-1. The FLORIDA subregion contains 22,426 MW of capacity, or about 21 percent of the SERC total. The SOUTHERN subregion contains 24,652 MW of capacity, or about 23 percent. The TVA and VACAR subregions contain 26,599 MW, or 24 percent, and 35,361 MW, or 32 percent of the SERC total, respectively.

Table 3-2 shows the total energy production for 1978 for the SERC region. Of the total 444,819 million kilowatt hours (KWH) generated, 85,065 million KWH (19 percent) was produced in the FLORIDA subregion, 101,306 million KWH (23 percent) was produced in the SOUTHERN subregion, 115,216 million KWH (26 percent) was produced in the TVA subregion, and 143,232 million KWH (32 percent) was produced in the VACAR subregion.

The TVA subregion is a winter peaking area while the SOUTHERN subregion is a summer peaking region. The FLORIDA subregion can peak in either summer or winter as can the VACAR subregion. Due to the proximity of the SOUTHERN, TVA, and VACAR subregions to the Appalachian coal mines, the fuel mixes of these subregions are similar. These subregions are heavily dependent upon coal for electric power generation. Most of the generating capacity in the FLORIDA subregion was originally designed to burn natural gas as a primary fuel with oil as an alternate fuel. The sudden attrition of natural gas supplies coupled with the expiration of natural gas supply contracts have left the FLORIDA subregion heavily dependent upon high cost oil for electric generation.

Geographical location has not only affected the fuel mixes but has influenced the pattern of transmission development within and between each of these subregions. The TVA subregion is very close to the geographical center of the seven eastern interconnected reliability council areas and is perhaps the key link between these areas. Consequently, a high capacity 500 KV transmission network has been developed in the TVA subregion. There is a significant amount of 500 KV in the VACAR subregion, some 500 KV in the SOUTHERN subregion, and isolated segments of 500 KV in the FLORIDA subregion. Therefore, the opportunities to interconnect at 500 KV tend to diminish with distance from the TVA subregion, particularly in a southward direction. Nevertheless, it is generally important for each subregion to maintain an intraregional transmission import capability equal to the composite spinning reserve for the total council area, over and above firm scheduled purchases and sales. The current spinning reserve of the SERC is approximately 3,500 MW.

Table 3-1
SERC
EXISTING GENERATING CAPABILITY
(Winter - MW)
(as of 31 January 1979)

Type	Subregion				Total SERC
	FLORIDA	SOUTHERN	TVA	VACAR	
Nuclear	2,968	1,575	3,201	7,317	15,061
Hydro	36	2,748 1/	4,060 1/	2,463	9,307
Pumped Storage	0	147	325	1,122	1,594
Steam-Coal	2,042	16,684	16,529	17,245	52,500
Steam-Oil	12,101	1,694	0	4,267	18,063
Steam-Gas	0	413	0	0	413
Combustion-Turbine Oil	4,742	1,374	2,484	2,400	11,000
CT-Gas	0	16	0	265	281
Combined Cycle	537	0	0	282	819
Total	22,426	24,652 1/	26,599 1/	35,361	109,038

Source: Data obtained from 1979 Summary of Projected Peak Load, Generating Capability, and Fossil Fuel Requirements, National Electric Reliability Council, July 1979.

1/ Data from NERC report modified to reflect SERC reporting data.

Table 3-2
SERC
EXISTING ENERGY PRODUCTION
(Calendar Year 1978)
(Million KWH)

Type	Subregion FLORIDA	SOUTHERN	TVA	VACAR	Total SERC
Nuclear	15,763	10,197	16,911	43,894	86,765
Hydro	224	6,900	17,023	7,052	31,199
Pumped Storage (input)	0	653	25	710	1,388
(output)	0	457	0	558	1,015
Steam-Coal	10,369	74,509	78,469	72,509	235,856
Steam-Oil	40,468	7,016	0	18,917	66,401
Steam-Gas	15,322	2,015	0	0	17,337
Combustion-Turbine CT Oil	1,607	594	2,383	833	5,872
CT-Gas	497	271	0	109	877
Combined Cycle	817	0	0	70	885
Total	85,065	101,306	115,216	143,232	444,819

Source: See Table 3-1.

Generating unit forced outages varied from a low average of 12 percent of peak demand in the FLORIDA subregion to a high average of 21 percent in VACAR and TVA subregions during the 1977 through 1979 period. Generating unit forced outages averaged 16 percent of the peak demand in the SOUTHERN subregion. Generating unit maintenance outages during the peak season varied from a low average of 3 percent in the SOUTHERN subregion to a high average of 16 percent in the FLORIDA subregion during this period. Maintenance outages in the TVA and VACAR subregions averaged 6 and 10 percent, respectively.

Table 3-3 provides a breakdown showing the relative magnitude of existing capacity based on the ownership of the facility. Overall, the Federal Government owns about 26 percent of the existing generating capability within SERC. Most of this is in the TVA subregion. Municipalities and electrical cooperatives who produce power own about 6 percent of the SERC total while private utilities own 68 percent of the total.

The emergency transfer of power from one region to another may be needed for various reasons. SERC has interties with four neighboring councils:

ECAR - East Central Area Reliability Coordination Agreement
MAAC - Mid-Atlantic Area Council
MAIN - Mid-America Interpool Network
SWPP - Southwest Power Pool

Emergency transfer capabilities existing between SERC and other regions in 1978 were as follows:

FROM	TO	CAPABILITY (MW)
SERC	ECAR	3,900
SERC	MAAC	2,700
SERC	MAIN	2,500
SERC	SWPP	4,000
ECAR	SERC	3,850
MAAC	SERC	1,050
MAIN	SERC	3,000
SWPP	SERC	3,500

Electric utilities within different councils may agree to construct a single large unit (or a plant with several large units) and share the output. Also, electric utilities within different councils may arrange for scheduled purchases and sales of capacity from each other. SERC power transfers historically have resulted in a net export in the summer and a net import in the winter.

Table 3-3

SERC OWNERSHIP OF GENERATION SOURCES[1]

(as of 1 January 1978)

	Investor-Owned	Municipal	Cooperative	State	Federal	Total[2/]
VACAR						
No. of Utilities	5	-	-	1	1	7
Capacity (MW)	31,956	-	-	1,416	515	33,887
%	94.3	-	-	4.2	1.5	100.0
TVA						
No. of Utilities	2	-	-	-	2	4
Capacity (MW)	408	-	-	-	25,866	26,274
%	1.6	-	-	-	98.4	100.0
SOUTHERN						
No. of Utilities	6	-	2	1	1	10
Capacity (MW)	22,334	-	348	26	1,419	24,127
%	92.6	-	1.4	0.1	5.9	100.0
FLORIDA						
No. of Utilities	3	9	1	-	-	13
Capacity (MW)	18,103	4,496	14	-	-	22,613
%	80.0	19.9	0.11	-	-	100.0
SERC						
No. of Utilities	16	9	3	2	4	34
Capacity (MW)	72,801	4,496	362	1,442	27,800	106,901
%	68.1	4.2	0.3	1.4	26.0	100.0

Source: DOE, FERC order 383-4, Docket R-362, April 1978, as compiled in the Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, April 1979.

1/Based on winter capability.

2/Totals differ slightly from those on Table 3-1 because of time difference in data.

3.2 EXISTING SYSTEMS EXCLUDING HYDROPOWER

Nuclear

Nuclear-powered plants in the SERC region comprise 15,061 MW, or about 14 percent of the total generating capability. They produce nearly 20 percent of the total annual electric energy produced within SERC. These units are normally very large, ranging from around 700 MW per unit, such as those at the Turkey Point reactor in Florida, to nearly 1,100 MW per unit, such as those at Brown's Ferry in Tennessee. These units are operated as base load units for continuous operation. As shown on Table 3-1 the VACAR subregion contains nearly 50 percent of the existing nuclear capability within SERC.

The annual average capacity factor for nuclear plants within SERC is about 66 percent, the highest for any type generation. Generally, resources within each subregion are sufficient to offset the loss of a unit when the outage is scheduled. However, since one 700 MW unit is equal to between 2 and 3 percent of a subregion's total capability, an unscheduled outage can severely tax a system and result in temporary power interruptions.

The use of nuclear power has increased significantly in recent years within the SERC region. Future growth is expected to continue as plants presently in various stages of construction are completed. Table 3-4 shows the probable generation mix for the SERC region for selected future years. Tables 3-5 through 3-8 contain a similar listing for each subregion. By 1985, the installed nuclear capacity in the SERC region is estimated to reach 45,011 MW (NERC, July 1979), about 28 percent of the total. This represents an increase of about 300 percent over that existing on 31 January 1979. However, as shown on Table 3-4, the relative share of the total production attributed to nuclear power generation will eventually level off or decline slightly. This is primarily due to the completion of those plants presently under construction and anticipation of continued caution relating to the planning and construction of more nuclear plants, in addition to their high initial investment costs.

Major environmental concerns associated with the use of nuclear fuel are the dangers of radioactive materials at all stages: mining, milling, fuel processing, power generation, transportation, and waste disposal. Specific points of possible contamination include human exposure to radioactive gas and dust in mining and milling, atmospheric releases of radioactive gases in fuel processing and power generation, disposal of long-life radioactive wastes, and accidents at all stages. Impacts on land use are felt at mining, generation, and disposal sites. Water pollution is a concern in the disposal of mine drainage water and in thermal pollution from the release of cooling water. Additionally, water is consumptively used in cooling processes. In addition to radioactive gases, fluorides, sulfides, and nitrides are released into the atmosphere during fuel fabrication. The sitings of nuclear plants and of waste disposal operations are of physical, environmental, and political concern.

Table 3-4
SERC
GENERATION MIX
(Percent of Total Capability)

Generation Mix	1985	1990	1995	2000
Base				
Nuclear	26-28	24-26	22-26	22-26
Coal	32-33	35-37	38-40	38-42
Oil	5-6	3-5	2-4	1-3
Conv. Hydro	0-1	0-1	0-1	0-1
Intermediate				
Coal	10-12	11-13	14-16	15-18
Oil	7-8	6-8	5-7	4-6
Conv. Hydro	2-3	2-3	1-3	1-3
Other	0	0-1	0-1	1-2
Peaking				
Coal[1/]	-	-	-	-
Oil	7-8	6-8	4-6	3-5
Conv. Hydro	3-4	3-4	2-4	2-4
Pumped Storage	3-4	3-4	2-4	2-4
Other	0	0-1	0-1	1-2
Total Capacity (GW)	157.9	195.2	234.5	280.1

Source: As compiled in The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

[1/]All coal-fired plants are classified as either base or intermediate, although some intermediate cycling coal-fired plants will be capable of operating near the top of the load curve.

Table 3-5
VACAR SUBREGION
GENERATION MIX
(Percent of Total Capability)

Generation Mix	1985	1990	1995	2000
Base				
Nuclear	32-34	30-35	30-35	30-35
Coal	36-37	35-40	35-40	35-40
Conv. Hydro	0-1	0-1	0-1	0-1
Intermediate				
Coal	6-8	8-10	10-12	10-12
Oil	8-10	6-8	5-8	4-8
Conv. Hydro	2-3	2-3	1-3	1-3
Other	0	0-1	0-1	1-2
Peaking				
Coal[1/]	-	-	-	-
Oil	3-5	3-5	2-4	1-4
Conv. Hydro	2-3	2-3	2-3	2-3
Pumped Storage	6	5	4-6	3-6
Other	0	0-1	0-1	1-2
Total Capacity (GW)	49.5	62.9	75.9	92.6

Source: See Table 3-4

[1/] All coal-fired plants are classified as either base or intermediate, although some intermediate cycling coal-fired plants will be capable of operating near the top of the load curve.

Table 3-6
TVA SUBREGION
GENERATION MIX
(Percent of Total Capability)

Generation Mix	1985	1990	1995	2000
Base				
Nuclear	43-45	38-42	35-40	35-40
Coal	22-24	28-30	30-33	30-35
Conv. Hydro	1-2	1-2	1-2	0-1
Intermediate				
Coal	15-17	16-18	18-20	18-20
Conv. Hydro	3-4	3-4	2-3	2-3
Other	0	0-1	0-1	1-2
Peaking				
Coal1/	-	-	-	-
Oil	5-6	4-6	3-5	2-4
Conv. Hydro	4-5	3-4	3-4	2-3
Pumped Storage	3	2-4	2-4	2-4
Other	0	0-1	0-1	1-2
Total Capacity (GW)	40.7	48.2	56.1	63.8

Source: See Table 3-4

1/All coal-fired plants are classified as either base or intermediate, although some intermediate cycling coal-fired plants will be capable of operating near the top of the load curve.

Table 3-7
SOUTHERN SUBREGION
GENERATION MIX
(Percent of Total Capability)

Generation Mix	1985	1990	1995	2000
Base				
Nuclear	11-13	10-15	10-15	10-15
Coal	46-48	45-50	45-50	45-50
Conv. Hydro	1-2	1-2	0-1	0-1
Intermediate				
Coal	18-20	18-20	18-20	20-22
Conv. Hydro	4-5	3-5	3-5	2-4
Other	0	0-1	0-1	1-2
Peaking				
Coal1/	-	-	-	-
Oil	7-8	5-8	4-7	3-5
Conv. Hydro	4-5	4-5	3-5	3-5
Pumped Storage	4	3-4	2-4	2-5
Other	0	0-1	0-1	1-2
Total Capacity (GW)	34.8	42.4	53.1	64.2

Source: See Table 3-4

1/All coal-fired plants are classified as either base or intermediate, although some intermediate cycling coal-fired plants will be capable of operating near the top of the load curve.

Table 3-8.
FLORIDA SUBREGION
GENERATION MIX
(Percent of Total Capability)

Generation Mix	1985	1990	1995	2000
Base				
Nuclear	11-13	10-15	10-15	10-15
Coal	20-22	25-30	28-32	30-35
Oil	26-28	22-25	15-20	10-15
Intermediate				
Coal	-	0-5	0-5	0-5
Oil	20-22	18-22	28-20	18-20
Other	0	0-1	0-1	1-2
Peaking				
Oil	18-20	18-20	17-20	17-20
Other	0	0-1	1-2	1-3
Total Capacity (GW)	32.9	41.7	49.4	59.5

Source: See Table 3-4

Ownership of nuclear power plants largely reflects the financial capability of utilities to construct such plants. In the past, only very large companies or the Federal Government (TVA) could obtain sufficient financing to construct nuclear plants. However, there has been a recent trend for smaller utilities (co-ops, etc.) to buy into a nuclear plant that was constructed or is under construction by a large utility company. This trend will probably continue if the smaller utilities can continue to find initial funding for such purposes.

Coal

Coal-fired plants in the SERC region comprise about 52,500 MW or 48 percent, of the region's total generating ability. They also produce about 53 percent of the total electricity produced in the SERC region. Table 3-1 shows that, except for the FLORIDA subregion, coal-fired plants are the primary sources for energy in the SERC region. All of the coal-fired plants are steam-turbine units and range in size from a small 30 MW unit to the large 1,275 MW units installed at the Cumberland plant in the TVA subregion. The average size unit is in the 100-300 MW range.

As shown in Table 3-4 coal-fired plants are used mainly as base load plants. Because of their prevalence throughout most of the SERC region, they are also used for intermediate loading and sometimes even as peaking units. The SERC region annual average capacity factor for coal-fired generation is about 51 percent. The range throughout the various subregions is from about 48 percent in the VACAR subregion to 58 percent in the FLORIDA subregion.

Although coal-fired generation is by far the largest source of electrical energy, its relative share of production has decreased over the last decade for two main reasons. The first reason is the development and construction of nuclear plants which are taking over some of the base load operations. The second reason is an indirect result of increased environmental emphasis. Coal-fired plants have drawn much criticism from an environmental standpoint because of the impacts from extraction operations on human health and safety, air quality, and land use, and because of the by-products of combustion, namely solid wastes (fly ash), airborne wastes (fly ash, sulfur), and heat. Pollutants released into the atmosphere can be transported several hundred miles and washed out in acid rain, impacting adversely on plant and animal life. Since oil-fired units could replace coal for power generation with substantially less environmental impacts, some existing coal-fired units were converted to oil-fired, and emphasis was placed on oil-fired generation for new plant construction. These factors have contributed to a decline in the relative share of production of coal-fired generation. However, recent concern for availability of oil and problems with nuclear generation have again placed the emphasis on coal. Therefore, coal-fired generation is expected to eventually begin to increase its overall share of the power generation within the SERC region. However, this is not expected to occur until after 1985. Nuclear plants presently under construction will continue to decrease coal's share for the near future. By 1985, coal-fired generation capacity will probably fall to about 43 percent of the region's total. Energy production will fall to about 46 percent of the SERC total. After 1985, coal's relative share is expected to increase as noted on Table 3-4.

Ownership of coal-fired plants within the SERC region is primarily either Federal or private utility, even though some are owned by municipalities or cooperatives. Due to their lower investment costs and smaller size, some plants are also owned entirely by smaller utilities.

Oil

Oil-fired plants in the SERC region comprise a total of about 29,880 MW, or about 27 percent of the existing SERC capacity. They also produce about 16 percent of the total generation within SERC. Electrical generation using oil is provided by three basic types of plants as shown on Table 3-1, steam-turbine, combustion-turbine, and combined-cycle plants. Steam-turbine production accounts for about 60 percent (18,063 MW) of the total oil-fired capacity and 91 percent of the total oil-fired generation. Combustion turbines account for about 37 percent (11,000 MW) of the total oil-fired capacity and 8 percent of the energy production. The remainder of the oil-fired capacity (819 MW) and energy is provided by combined-cycle plants.

Table 3-1 shows the varied use of oil throughout the SERC region. The FLORIDA subregion has about 77 percent of its capacity and 50 percent of its energy provided by oil-fired plants. TVA has less than 10 percent of its capacity and about 2 percent of its energy provided by oil-fired plants. Unit size also varies significantly throughout the SERC region. The largest oil-fired units are the 820 MW steam-turbine units at Possum Point and Yorktown in the VACAR subregion. The average size steam-turbine unit is around 100 MW. Combustion turbines are generally smaller, normally less than 60-75 MW, with an average size of 20-40 MW. Combined-cycle plants are similar to combustion-turbine plants in size, although some larger ones (such as the Putnam Plant in Florida with a total capacity of 259 MW) are operating. Combined-cycle plants use combustion turbines for primary generation and steam turbines utilizing waste heat for secondary generation.

As shown on Table 3-4, the use of oil in the generation mix is fairly evenly distributed throughout the load cycle for the SERC region as a whole. This distribution does vary significantly for each subregion. In the TVA and SOUTHERN subregions, oil is used only for peaking operations. In the VACAR subregion oil is used for intermediate and peak operation. However, in the FLORIDA subregion, where oil is the principal fuel, it is used for base, intermediate, and peaking operations, as shown on Table 3-8. This varied use results in an annual average capacity factor of 42 percent for the steam turbines (reflecting their use as base units), 6 percent for combustion turbines, and 12 percent for combined-cycle plants.

As noted above under coal-fired plants, oil-fired production has increased considerably during the past decade. This resulted from environmental considerations, the previously lower price of fuel, and the increased need for quick-start peaking units. However, the large increases in oil prices and problems with availability have resulted in a decreased emphasis on oil-fired generation. Another major factor in the future reduction of oil-fired and also gas-fired generation is the Power Plant and Industrial Use Act of 1978. The Act prohibits use of oil or natural gas in new electric utility generation facilities or in new industrial boilers with a fuel heat input rate of 100 million Btu's per hour or greater, unless exemptions are granted by DOE. The Act requires existing coal-capable facilities to use coal and to require non-coal-capable units to use coal-oil mixtures. The Act limits the use of natural gas by existing utility power plants to the proportion of total fuel used during 1974-1976, and requires that there be no switches from oil to gas. There is also a requirement that natural gas use in such facilities cease by 1990 (with certain exceptions). By 1985, oil-fired plants will represent only 19 percent of the total SERC capacity and 11 percent of the total energy produced. As shown on Table 3-4, this trend is expected to continue through the year 2000 with oil generation representing a smaller and smaller share of the SERC total.

Conventional oil is considered a clean fuel. Oil production that requires enhanced recovery methods and draws on shale oil and sand tar sources incurs more environmental impacts due to air and water pollution.

Because of their considerable size range and generally low initial investment cost, oil-fired plants are widely owned and operated by most utility companies. Ownership is fairly well distributed between the larger and smaller utilities, both private and public.

Gas

Gas-fired plants in the SERC region comprise about 694 MW, less than 1 percent, of the total capacity. They produce about 4 percent of the total electrical energy generation within SERC. Gas-fired plants are similar to oil-fired plants and can be steam-turbine, combustion-turbine, or combined-cycle.

Table 3-1 shows the limited use of gas throughout the SERC region. These units are usually small (less than 30 MW) and used only for peaking. Table 3-2 shows energy production using natural gas. It should be noted that natural gas is often used as a substitute fuel for oil. Therefore, Table 3-2 shows an energy production of 15,322 million KWH for steam-gas generation units for the FLORIDA subregion even though Table 3-1 does not list any capacity. The gas generation is accomplished using capacity listed under steam-oil generation. This is also noticeable for combustion turbines where they may be fired by either oil or gas.

The use of natural gas in power generation has been sharply curtailed as a result of shortages in natural gas supplies. Also, implementation of the Power Plant and Industrial Use Act of 1978 curtails the use of oil- and gas-fired plants as explained before. Current projections indicate the use of gas will continue to decrease and it will only be used as a standby fuel or phased out altogether.

The existing gas-fired units are generally owned by the smaller utilities since the units are generally small and relatively inexpensive from an initial investment standpoint.

Natural gas is a clean fuel. Its use as projected would not include additional environmental impacts.

Other

The only other fossil-fueled type of power generation within the SERC region is through utilization of internal combustion units. These are normally very small (less than 5-10 MW) and generally only used as standby power sources. Available capacity and energy production are often included as part of the combustion turbine capability.

Other types of generation, such as geothermal, solar, etc., have not been developed for commercial operation within the SERC region. They may become an important part of the energy system in the long term power planning process; however, they will probably not provide any significant contribution before the year 2000.

3.3 EXISTING HYDROPOWER DEVELOPMENT

As noted in Table 3-1, in January 1979 hydropower provided about 10,900 MW, or 10 percent, of the SERC region's total capacity. Of this, 9,307 MW were provided by conventional hydropower, with 1,594 MW provided by pumped storage hydropower. Table 3-2 notes that the conventional hydropower units produced about 31,200 million KWH of energy in 1978, or about 7 percent of the SERC total. The pumped storage units required an input of 1,388 million KWH of energy to produce 1,015 million KWH of peaking energy.

Hydropower

Table 3-9 provides a detailed breakdown of the hydropower capacity available in the various power producing areas within SERC in January 1979. As noted in the table, the VACAR subregion contained 2,463 MW of conventional hydropower and 1,122 MW of pumped storage, or about 25 percent and 65 percent, respectively, of the SERC totals. The TVA subregion contained 4,060 MW of conventional hydropower and 325 MW of pumped storage, or about 44 percent and 19 percent, respectively. The SOUTHERN subregion contained 2,748 MW of conventional hydropower and 278 MW of pumped storage, or about 30 percent and 16 percent, respectively. The FLORIDA subregion only had one plant operated by SEPA providing 36 MW of conventional hydropower.

Energy production in the SERC region is shown on Table 3-2 for the various subregions. Of the total 31,199 million KWH produced by conventional hydropower units within the SERC region during 1978, 7,052 million KWH, or about 23 percent of the total, was produced in the VACAR subregion. The TVA

Table 3-9
SERC
HYDROPOWER CAPABILITY
(Winter - MW)
(as of 31 January 1979)

Subregion	Conventional Hydro	Pumped Storage
VACAR		
Carolina Power & Light Company	211	-
Duke Power Company	842	610
Southeastern Power Administration (SEPA)	515	-
South Carolina Public Service Authority	124	-
South Carolina Electric & Gas Company	244	512
Virginia Electric Power Company	326	-
Yadkin, Inc.	200	-
Subtotal	2,463	1,122
TVA		
Tennessee Valley Authority	2,948	325
SEPA	704	-
Tapoco, Inc.	316	-
Nantahala Power & Light	92	-
Subtotal	4,060	325
SOUTHERN		
Alabama Electric Cooperative	4	-
Alabama Power Company	1,134	-
Crisp County Power Commission	13	-
Georgia Power Company	456	-
SEPA	1,141	278
Subtotal	2,748	278
FLORIDA		
SEPA	36	-
Total	9,307	1,725

subregion produced 17,023 million KWH, or about 55 percent of the total. The SOUTHERN subregion produced 6,900 million KWH, or about 22 percent, and the FLORIDA subregion produced 224 million KWH, well under 1 percent.

The existing hydropower units within the SERC region presently range in size from less than 1 MW to 325 MW for one turbine unit. The larger units, over 100 MW, are usually pumped storage units. The conventional units found in the SERC region average around 20-40 MW each. Total plant size varies considerably within the region and is dependent on the specific site and operational design. Most of the conventional plants have from 1 to 6 units with a total plant capacity of usually less than 200-300 MW. The largest conventional hydroplant in SERC is TVA's Wilson Dam on the Tennessee River with 21 units providing a total capacity of about 630 MW. The largest pumped storage facility in the SERC region in 1978 was Duke Power Company's Jocassee project in South Carolina with an installed plant capacity of 610 MW. This was surpassed by TVA's Raccoon Mountain pumped storage project in 1979 which has a plant capacity of 1,530 MW.

Role of Hydropower

Table 3-4 shows the relative distribution of the hydropower resources across the load curve for selected future years for the SERC region. Tables 3-5 through 3-8 show the relative distribution and generation mix for each subregion. As shown in the tables, hydropower is primarily used in the intermediate and peak part of the load curve. Base load operation of hydroplants is normally confined to those that either lack storage and are run-of-river plants or must be run continually to meet downstream flow requirements.

The load variation in the SERC region (discussed later in Chapter 4) requires a large amount of intermediate and peaking capacity above the base load capacity. Therefore, hydropower plants, due to their suitability for peaking operations, are most often designed, built, and operated in the SERC region as peaking units. Recently constructed hydroplants reflect this use as peaking units by their operational design plant factor of usually less than 20 percent. The recent and continuing construction of large pumped storage units also emphasizes the importance placed on hydropower for peaking energy. A pumped storage plant generates power for peak load, but, at off peak, water is pumped from the tailwater pool to the headwater pool for future use. The pumps are powered with secondary power from some other plant in the system. Pumped storage serves to increase the load factor of other plants in the system and provides added capacity to meet peak loads.

The distribution of power generated at hydroplants in the SERC region depends mainly on plant ownership and location. Hydropower generated by municipalities or cooperatives is usually for use on grid in the immediate vicinity of the site. Power produced at Federal projects and marketed by the Southeastern Power Administration (SEPA) is often carried through major transmission lines, or "wheeled" to distant users. Other hydropower may be placed directly on grid or wheeled to another area depending on the plant size and location.

Ownership

Table 3-9 shows the hydropower capability of each power producer in the SERC region which has hydro facilities. In the VACAR subregion, 1,824 MW, or 74 percent, of the subregion's conventional hydropower capacity is owned by investor-owned companies. The State of South Carolina operates 124 MW of capacity and the Federal Government owns the remaining 515 MW, or 21 percent of the total. All of the pumped storage facilities are owned by investor-owned utilities.

In the TVA subregion, 3,652 MW, or 90 percent of the subregion's total conventional hydropower capability, is owned by the Federal Government. Investor-owned utilities own the remaining 408 MW, or 10 percent of the subregion's total. All of the pumped storage facilities are owned by the Federal Government.

In the SOUTHERN subregion, 1,594 MW, or about 58 percent, of the subregion's total conventional hydropower capacity is owned by investor-owned utilities. One municipal utility owns 13 MW of conventional hydropower. The remaining 1,141 MW, or 42 percent, is owned by the Federal Government. Prior to 1980, all of the existing pumped storage facilities were owned by the Federal Government. Georgia Power placed 162 MW of pumped storage in operation at its Wallace Dam in 1980. In the FLORIDA subregion, the Federal Government owns the existing hydropower capacity of 36 MW.

In the total SERC region, 3,826 MW, or 41 percent, of the region's total conventional hydropower capability is owned by investor-owned utilities. The Federal Government owns 5,344 MW, or 57 percent of the total. States or municipalities own the remaining 137 MW. Of the pumped storage facilities in service in January 1979, the Federal Government owned 603 MW, or 35 percent. Investor-owned utilities owned the remaining 1,122 MW of pumped storage.

Federal Marketing Agencies

Federally produced power in the SERC region is marketed by two agencies, the Tennessee Valley Authority (TVA) and the Southeastern Power Administration (SEPA). TVA is a corporate agency of the Federal Government created in 1933 by Congress. TVA is the major producer of power in the TVA subregion. It generates power at hydroelectric plants as well as fossil-fuel-fired and nuclear plants. About 40 percent of the power sold by TVA is sold directly to consumers. The remainder is sold to municipal and cooperative power supply systems who, in turn, sell the power to their customers. TVA is solely responsible for the generation, transmission, and distribution of power to its customers.

SEPA is a Federal power marketing agency within the Department of Energy. SEPA is responsible for the sale of power produced at Federal hydroelectric projects, excluding TVA, in the Southeast. The territory administered by SEPA is somewhat larger than the SERC region and includes all or part of Mississippi, Alabama, Georgia, Florida, South Carolina, North Carolina, Virginia, West Virginia, Kentucky, and Tennessee. All Federal projects in the SEPA area were constructed by the Corps of Engineers and TVA. SEPA markets the power produced at these projects at a price sufficient to repay the cost of constructing and operating the hydropower facilities within 50 years. Rates are adjusted periodically to reflect changes in operation and maintenance costs.

SEPA does not have transmission facilities of its own and, therefore, depends on "wheeling" agreements for marketing the power. The power marketed by SEPA is divided into four major power supply systems:

- The Cumberland River Basin System;
- The Kerr-Philpott Projects;
- The Alabama-Georgia-Carolina System; and
- The Jim Woodruff Project.

The marketing arrangements are established for each system depending on capability and power needs. In general, agreements are established between SEPA and the major power suppliers in each system area whereby the power produced at the Corps projects is either put on the major supplier's grid or wheeled to a preference customer. This agreement is usually based on firm or dependable capacity and energy from the system with adjustments made to reflect at-site requirements, temporary deficiencies, wheeling, and secondary energy production. The agreements vary from system to system depending on the characteristics of the Federal system and the requirements of the power customers.

Parameters Governing Use of Existing Hydropower

As previously noted, hydropower facilities in the SERC region are primarily used as intermediate and peaking facilities. There are several parameters which affect the use and operation of existing hydro facilities. These parameters depend to a large extent on ownership and location of the facilities. Some of the more prominent parameters are discussed below.

Institutional

Hydropower use in the SERC region is highly regulated by Federal law and policy. The Federally constructed plants operate under established criteria in accordance with the overall project plan authorized by Congress. The operation of the power systems marketed by SEPA is established under contract with the power users in accordance with the authorized plan. The use of the system operation by SEPA allows considerable flexibility at individual projects by allowing selective generation during critical periods.

The "preference clause" governing the sale of Federally-produced power has considerable impact on the use of hydropower. By law, SEPA is directed to give preference to municipalities, cooperatives, and other publicly-owned utilities. In the past, much of the hydropower marketed by SEPA has gone to the larger privately-owned utilities who could readily use the power. However, in recent years, with rapid increases in alternative electrical energy costs, an increasing number of public utilities have requested low cost power from the Federal projects. As new Federal power sources come on line, they are used to meet the new requests.

TVA is the major power supplier in its subregion. Its primary sources of power are from its own fossil-fired, nuclear, and hydro plants, purchases of power from SEPA, and hydropower obtained from the Aluminum Company of America through exchange power arrangements. TVA sells power at wholesale rates to 160 publicly-owned municipal and cooperative systems in its region, commonly referred to as distributors. TVA's wholesale rates to its distributors reflect the benefits of hydro sources. The distributors, through their resale rates, pass the benefits of hydropower on to residential customers. TVA also sells power at retail rates, exclusive of hydro benefits, directly to 50 industrial customers with large or unusual power requirements and several Federal installations in its region.

The remaining hydroplants in the SERC region are operated in accordance with their Federal Energy Regulatory Commission (FERC) licenses. Once established, the operating procedures may only be changed through petition to FERC. The operating procedures are established, or later changed, only after detailed consideration of all impacts, particularly the impacts on other hydro projects or downstream water users. Within the procedures set forth in the license, the power company is free to operate the plant as necessary to meet power demands.

In addition to the factors noted above, the state in which the project is located may require the project operation be modified in order to meet state standards for downstream water needs. Many projects have operating procedures that reflect state standards or restrictions, particularly in the area of environmental and social impacts.

Social

The social parameters that affect the operation of hydropower facilities are often reflected in the institutional arrangements noted above for the operating procedures. Occasionally, power production at a hydropower facility is curtailed due to impacts on reservoir users or downstream water users. Recreational use of existing reservoirs is extremely heavy in the SERC region resulting in a public demand for a fairly constant pool level with minimal fluctuation or drawdown. Therefore, even though the original project planning may have adjusted the operating procedures to enhance recreational use, additional temporary adjustments may be required at times due to limited water and heavy recreational use.

Social considerations may also tend to increase power generation over short periods at hydro projects. During periods of unusually high electricity demand, such as periods of very hot weather, the hydropower facilities may be operated at a higher plant factor than normal to help meet the demand. This reduces the possibility of power service curtailment or outages.

Other social impacts relate to downstream water use. Additional releases may be desired during the normal nongenerating times in order to meet certain downstream needs, such as water quality or water supply. Temporary needs can often be handled under normal project operation even though it may have negative impacts on power generations by changing peak releases to off-peak releases. Long term needs have occasionally resulted in permanent modifications to existing project operation procedures.

Economic

Economic parameters governing the use of hydropower in the Southeast are generally related to the higher value placed on peak power than off-peak power. As such, hydropower plants are generally designed as peaking units where possible, with primary emphasis placed on the installed capacity. Operation procedures are then based on a low (less than 20 percent) plant factor in order to operate at full capacity. This provides the maximum energy during periods of peak demand.

Another major economic factor that governs the use of existing hydropower plants, particularly the Federal plants, is the pricing policies established for hydropower. Power marketed by SEPA is sold only to repay construction costs allocated to the hydro facilities with interest and operation and maintenance costs. As such, this power is usually considerably less expensive than alternative power. Therefore, the demand for this power is high. Considering the preference given to publicly-owned utilities and the recent increase in the requests for Federal power, the power produced at new Federal hydropower plants is being divided up and wheeled to the public utilities.

Physical

The most significant physical parameter affecting the use of existing hydropower facilities is generally the availability of water for generation. During periods of excess water, the hydroplant must often generate during off-peak periods just to pass excess water. Then, during dry periods, peak power production may have to be curtailed because of a lack of water. Downstream needs may also impact plant operation by requiring water releases when not desired for power production. These needs may be accented by varying hydrologic conditions such as either water shortage or flooding. The severity of these impacts due to water availability depends on the original planning and design of the project. Power production at storage projects is generally impacted less by short-term water shortage or excess than run-of-river projects.

The impact of the terrain and physical setting around the existing hydroplant on power production is usually taken into account in the original design. Projects located in steep or mountainous terrain usually have higher energy heads for power production, but less storage. Therefore, while the high heads favor high capacity, the lower storage requires greater dependence on the hydrologic cycle. Older hydroplants in this region were usually designed for higher plant factors which tended to reduce the installed capacity. However, more recently constructed plants have attempted to fully utilize the high heads involved to maximize capacity for peaking purposes. This is evident by the construction of the high capacity pumped storage plants in steep terrain areas.

Projects located in the relatively flat areas of the coastal plains usually have low heads and low storage. They are often designed on a run-of-river basis in order to pass the streamflow. Projects in the Piedmont area have been able to achieve good combinations of energy head (100-300 feet) and storage capacity. These projects provide good sources of intermediate and peaking power. While older projects were designed for higher plant factors at a cost to capacity, the more recently constructed projects have maximized capacity for peaking purposes.

The competing demands for water also impact the operation of existing hydroplants. The increasing requirement for water supply in the growing SERC region has often focused on existing reservoir projects as readily available sources. New requirements for water supply from a power reservoir usually have a direct adverse impact on power production by removing water otherwise used for power generation. As noted earlier, increased recreational use of power related reservoirs has created social demands for decreased pool fluctuations and drawdowns. This loss in operational flexibility, whether as originally designed or considered as a result of increased use, could adversely impact power production. Downstream requirements for water supply, water quality, or navigation also tends to adversely affect power production by requiring water release during normal minimal discharge periods. While some of these requirements were included in the original project planning, changing emphasis on items like environmental quality have placed additional restraints on hydropower plant operation. Many of these impacts are reflected in the institutional parameters governing hydropower production.

Environmental

The major environmental impacts of hydropower development are the disruption of the habitats of riverine and terrestrial plants, animals, and humans and disruption of existing recreation activities, such as canoeing, river boating, and fishing.

Hydropower Resources Under Construction

In addition to the existing hydropower resources noted earlier as being operational on 31 January 1979, there were two hydropower projects placed on line in 1980, and there are several new plants under construction which will become operational in the immediate future or the next few years. The Raccoon Mountain Pumped Storage project was completed in 1979 and added 1530 MW of pumped storage power to the system in the TVA subregion. In the Southern subregion 113 MW of conventional power and 212 MW of pump turbine power were added at the Wallace Dam project. Table 3-10 lists those units or plants which are under construction. As shown on the table, the FLORIDA subregion has the Jackson Bluff hydro facility under construction.

The SOUTHERN subregion has several projects still under construction. Two projects are Federally owned and will be marketed by SEPA. These are the Hartwell 5th Unit and the Richard B. Russell project, conventional and pumped storage. Although marketing arrangements are not complete, the capacity of these is shown as equally divided between the SOUTHERN and VACAR subregions with 80 MW total capacity at Hartwell and 300 MW conventional and 300 MW pumped storage capacity at Richard B. Russell. Four other projects, privately owned, are also under construction in the SOUTHERN subregion. These will add 612.5 MW of conventional hydropower and 1,029 MW of pumped storage hydropower to the system.

The VACAR subregion has 3 Federal projects listed in Table 3-10, the Hartwell and Richard B. Russell projects discussed above and the St. Stephen project with 84 MW of capacity. A large pumped storage project, Bath County, is under construction by a privately owned utility and will add 2,100 MW of capacity to the system.

In all, approximately 113 MW of conventional hydropower and 1,692 MW of pumped storage hydropower have been added to the existing capacities noted on Table 3-1, and 760 MW of conventional and 3,129 MW of pumped storage will be added by units under construction.

Table 3-10
HYDROPOWER FACILITIES UNDER CONSTRUCTION
(as of 31 January 1979)

Subregion	Plant or Unit Name	Owner & FERC Licence No.	Capacity (MW)	Completion Date
FLORIDA	Jackson Bluff #1, 2, 3	City of Tallahassee (FERC No. 2891)	11	October 1983
SOUTHERN	Harris #1, 2	Alabama Power Co. (FERC No. 2628)	135	August 1983
	Mitchell #1, 2, 3	Alabama Power Co. (FERC No. 82)	150[1/]	August 1985
	Rocky Mountain #1, 2, 3 (Pump turbine)	Georgia Power Co. (FERC No. 2725)	675	April 1987
	Hartwell #5	U.S. Army Corps of Engineers	40[2/]	August 1983
	Richard B. Russell	U.S. Army Corps of Engineers	150[2/]	December 1984
	Richard B. Russell (Pump turbine)	U.S. Army Corps of Engineers	150[2/]	[3/]
VACAR	Hartwell #5	U.S. Army Corps of Engineers	40[2/]	August 1983
	Richard B. Russell	U.S. Army Corps of Engineers	150[2/]	December 1984
	Richard B. Russell (Pump turbine)	U.S. Army Corps of Engineers	150[2/]	[3/]
	St. Stephen #1, 2, 3	U.S. Army Corps of Engineers	84	January 1985
	Bath County #1, 2, 3 (Pump turbine)	VEPCO (FERC No. 2716)	1,050	September 1985
	Bath County #4, 5, 6 (Pump turbine)	VEPCO (FERC No. 2716)	1,050	October 1986

1/ A new power house is to be constructed which will contain three 50 MW conventional units. The three existing 17.5-MW units will be retired and a fourth existing 20-MW unit will be retained in service.
2/ Total capacity split between SOUTHERN & VACAR.
3/ No completion date shown. Project scheduling in process.

Chapter 4

DEMAND SUMMARY

4.1 HISTORICAL DEMAND

The historical demand for electricity in the SERC region is shown on Table 4-1. As noted in the table, the annual demand for electrical energy has more than tripled during the period from 1960 to 1979, indicating an average annual growth rate of 6.2 percent. During this period, the peak demand has also tripled with an average annual growth rate of about 6.3 percent. The impact of the recent energy crisis and the effects of conservation measures implemented are shown by the much lower rates of average annual energy growth and peak demand growth in 1978 and 1979. The annual load factor on the SERC system has averaged about 64 percent of the peak demand.

Electrical demand data for 1979 is shown on Table 4-2 for the SERC subregions. As can be seen in the table, January-February, and July-August periods are the peak months for electrical use in the SERC region. Table 4-2 shows the monthly demands and average load factors for these subregions. The load factor ranges from about 56 percent to nearly 80 percent of the peak demand. The average load factor for the SERC region expressed as a percentage of the peak demand was 63.0 percent. The average load factor expressed as a percentage of the available capacity was about 47 percent.

Table 4-3 shows the peak demand, available resources, and annual energy demand for 1979. The reserve margin shown is based on the total available resources and does not reflect any transfers or outages. The load factor shown is based on the peak demand.

Table 4-1
SERC
ANNUAL ENERGY, PEAK DEMAND AND LOAD FACTOR

Calendar Year	Annual Energy: Thousands of GWh	Annual Energy: Average Growth	Annual Energy: Annual Rate (%)	Peak Demand: Peak (GW)	Peak Demand: Average Growth	Peak Demand: Annual Rate (%)	Annual Load Factor (%)
1960	147.5	-	-	25.9	-	-	64.8[1/]
1965	203.1	-	6.6	33.8	-	5.5	68.6
1970	299.1	-	8.0	52.9	-	9.4	64.5
1973	382.8	-	-	67.6	-	-	64.6
1974	381.0	(0.4)	-	69.5	2.8	-	62.6
1975	389.8	2.3	5.4	71.8	3.3	6.3	62.0
1976	414.0	6.2	-	74.2	3.3	-	63.5[1/]
1977	442.2	6.8	-	79.9	7.7	-	63.2
1978	452.8	2.4	-	80.5	0.7	-	64.1
1979	459.1	1.4	6.2	83.1	3.2	6.3	63.0

Sources:
1. Federal Power Commission, The 1970 National Power Survey - Part II, Washington, DC, 1979.
2. Department of Energy, Energy Information Report on annual report of monthly comparisons of peak demands and energy loads - 1973 to 1977, Washington, DC, May 1978.
3. SERC Coordinated Bulk Power Supply Program, FERC ERA-411, Docket R-362, April 1, 1978, 1979, and 1980.

[1/] Load factor was computed using 8774 hours to reflect leap year and expressed as a percent of peak demand.

Table 4-2
SERC
MONTHLY ENERGY, PEAK DEMAND AND LOAD FACTOR
(1979)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1979
VACAR													
Peak Hour Demand (MW)	26,104	25,984	22,638	19,201	20,320	25,515	22,517	27,540	24,432	20,287	23,296	24,845	27,540
Net Energy (GWh)	13,959	12,881	11,706	10,437	11,126	11,475	12,809	13,913	11,457	11,360	11,239	12,572	144,934
Load Factor 1/	71.8	73.8	69.5	75.5	73.6	70.8	67.5	67.9	65.1	75.3	67.0	68.0	60.1
TVA													
Peak Hour Demand (MW)	21,540	21,179	18,226	16,698	16,463	17,975	18,270	18,795	17,372	16,768	19,586	19,529	21,540
Net Energy (GWh)	12,659	10,873	10,302	9,409	9,743	9,596	10,202	10,508	9,072	9,856	10,292	10,857	123,369
Load Factor 1/	79.0	76.4	76.0	78.3	79.5	74.1	75.1	75.1	72.5	79.0	73.0	74.7	65.4
SOUTHERN													
Peak Hour Demand (MW)	17,001	16,698	13,996	13,008	15,425	18,880	19,463	20,163	18,560	14,891	15,648	16,101	20,163
Net Energy (GWh)	9,370	8,043	7,883	7,324	8,292	9,132	9,980	10,458	8,404	8,002	7,788	8,390	103,066
Load Factor 1/	74.1	71.7	75.7	78.2	72.3	67.2	68.9	69.7	62.9	72.2	69.1	70.0	58.4
FLORIDA													
Peak Hour Demand (MW)	16,952	17,302	13,009	12,737	13,972	16,331	16,762	16,630	16,268	14,544	14,480	13,828	17,302
Net Energy (GWh)	7,134	6,593	6,378	6,547	6,915	8,239	8,797	8,692	8,242	7,031	6,519	6,642	87,729
Load Factor 1/	56.5	56.7	65.9	71.4	66.5	70.1	70.5	70.3	70.4	65.0	62.5	64.6	57.9
SERC													
Peak Hour Demand (MW)	81,597	81,163	67,869	61,644	66,180	75,701	80,012	83,128	78,632	66,490	73,010	74,303	83,128
Net Energy (GWh)	43,122	38,390	36,269	33,717	36,076	38,442	41,788	43,571	37,175	36,249	35,838	38,461	459,098
Load Factor 1/	70.6	70.4	71.8	75.9	73.2	70.6	70.2	70.4	65.7	73.2	68.1	69.6	63.0

Source: SERC Coordinated Bulk Power Program, FERC ERA-411, Docket R-362, April 1, 1980.

1/ Expressed as percentage of peak demand.

Table 4-3
SERC
DEMAND AND AVAILABLE RESOURCES
(1979)

Subregion	Peak Demand (MW)	Available[1] Resources (MW)	Reserve Margin (%)	Annual Energy (GWh)	Load[2] Factor (%)
VACAR	27,540	34,000	23	144,934	60
TVA	21,540	27,574	28	123,369	65
SOUTHERN	20,163	26,978	34	103,066	58
FLORIDA	17,302	23,005	33	87,729	58
SERC	83,128[3]	111,557	34	459,098	63

Source: SERC report of 1980.

[1]As of 1 January 1980.
[2]Expressed as percentage of peak demand.
[3]Sum of subregional peaks is greater than SERC total because subregional peaks occur in different seasons.

4.2 LOAD DISTRIBUTION

Table 4-4 presents a breakdown of the system load (base, intermediate, and peak) for representative utilities of each subregion. As defined in this study, base load is the mean of the Monday-Friday minimum loads, plus 10 percent.[1/] The 10 percent addition provides for the fact that base load can be cycled, and that maximum efficiency occurs at less than full load. Peak load is defined as the greatest difference between the Monday-Friday daily peak and the daily load equaled or exceeded 12 hours a day. The intermediate load is that portion between base load and peak load. The intermediate load begins in the early morning and lasts until late afternoon, a period of 12 to 14 hours usually.

The percentages given in Table 4-4 are representative of each season. However, during each season the loads may vary by several percent. The VACAR and TVA subregions have similar load distribution, both having a high annual base load of about 70 percent of their system peak. The SOUTHERN and FLORIDA subregions have higher peak load ranges, especially in summer, due to a higher demand for air-conditioning. This range of load distribution is expected to remain nearly constant throughout the demand projection period, but there will probably be a slight shift (less than 10 percent) of the demand from intermediate to base as more utilities try to flatten the demand curves and encourage peak reductions.

Weekly composite load curves representing peak load seasons for selected utilities in the subregions of SERC are shown on Figures 4-1 through 4-4, with peak, intermediate, and base loads designated.

[1/] The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

Table 4-4
LOAD DISTRIBUTION IN SERC
(Percent of Annual Peak Load)

Subregion Representative Utility	Base	Intermediate	Peak
VACAR			
Duke Power Company			
Off Season	55	20	9
Summer	66	20	12
Winter	70	18	12
Annual	70	18	10
TVA			
Tennessee Valley Authority			
Off Season	60	10	8
Summer	62	14	9
Winter	70	20	10
Annual	70	20	10
SOUTHERN			
Southern Companies System			
Off Season	46	14	5
Summer	60	22	18
Winter	57	15	10
Annual	60	22	18
FLORIDA			
Florida Power & Light Company			
Off Season	38	24	10
Summer	60	18	18
Winter	58	24	18
Annual	60	22	18

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

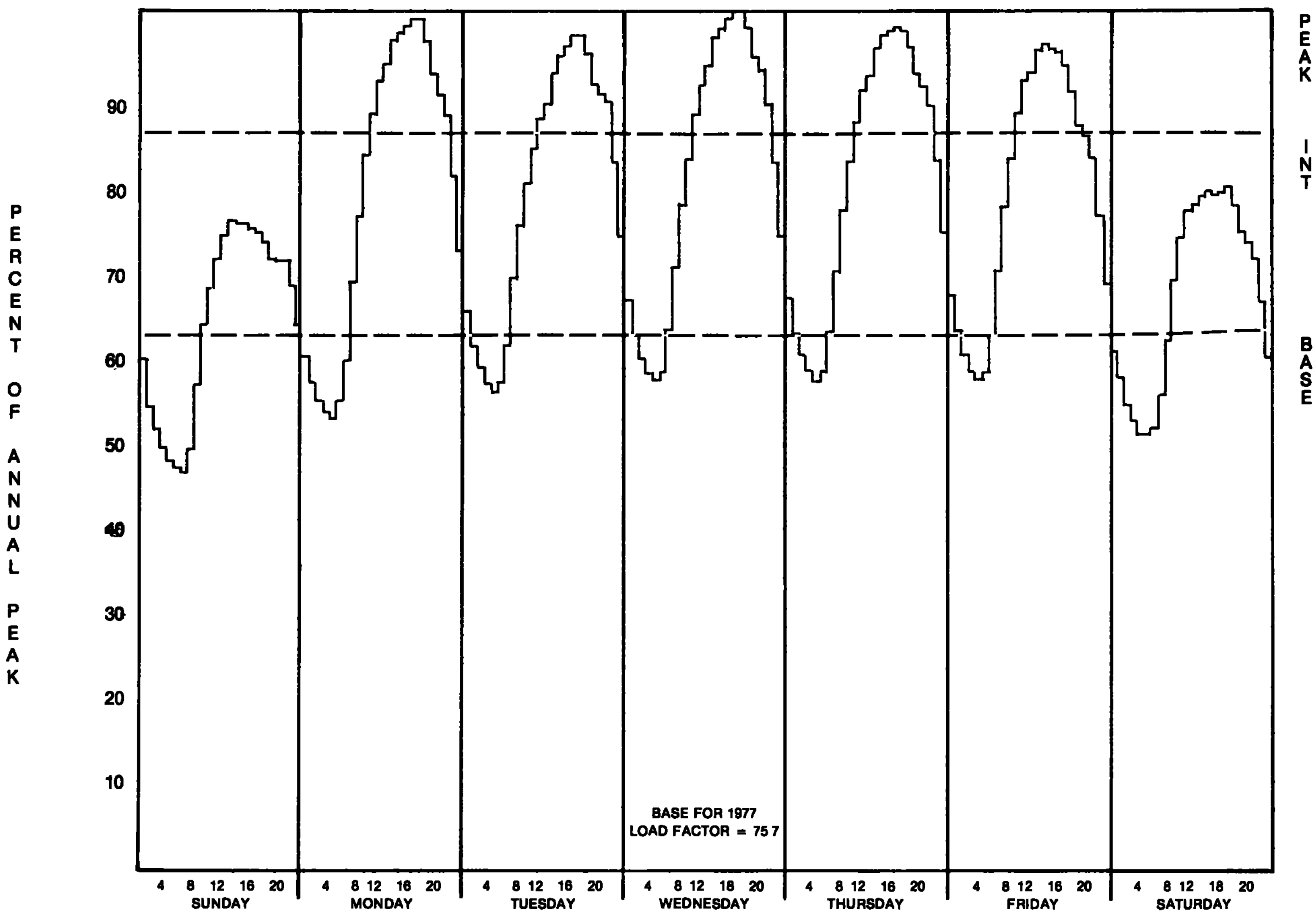

Figure 4-1
WEEKLY SUMMER LOAD CURVE
VACAR

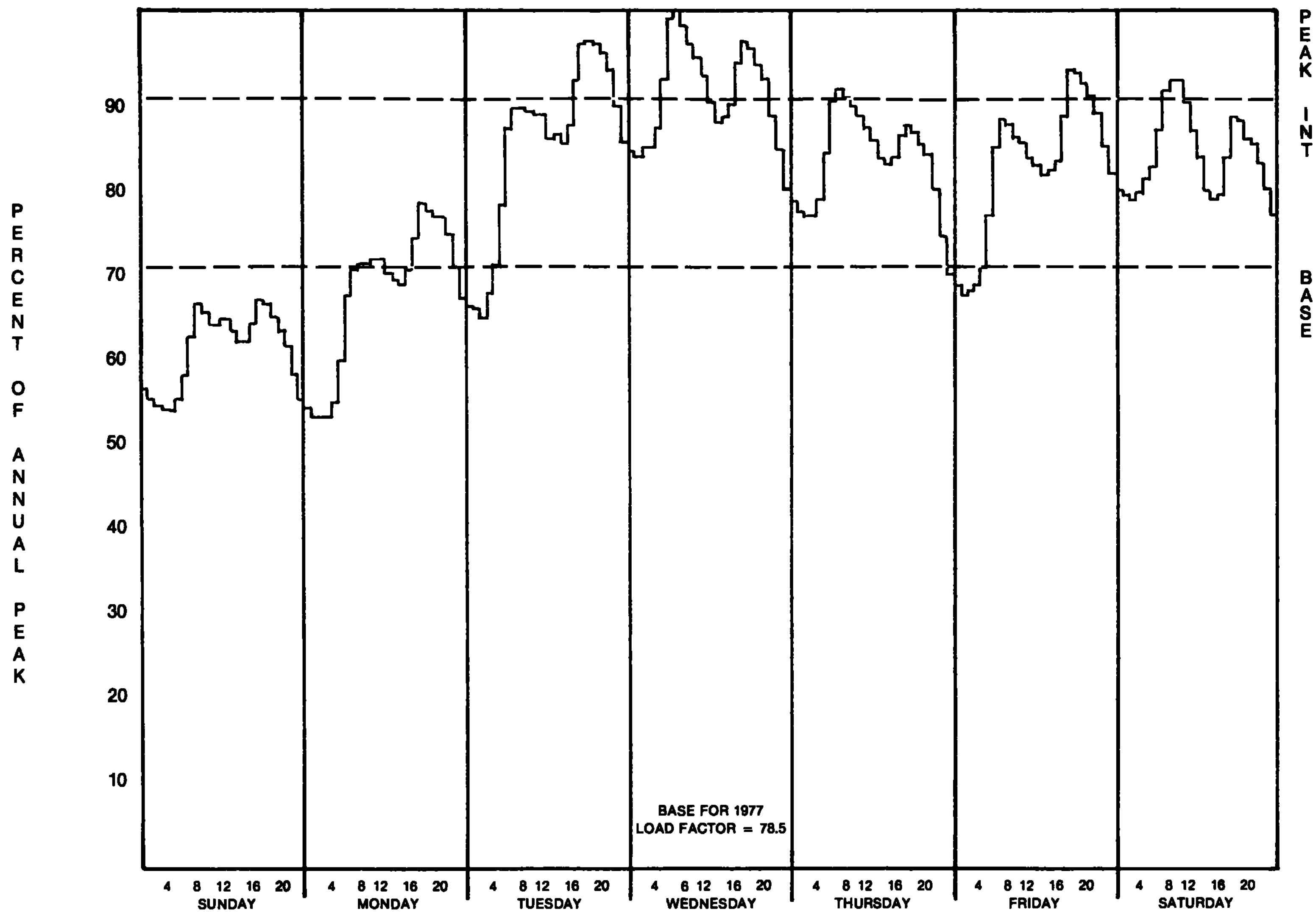

Figure 4-2
WEEKLY WINTER LOAD CURVE
TVA

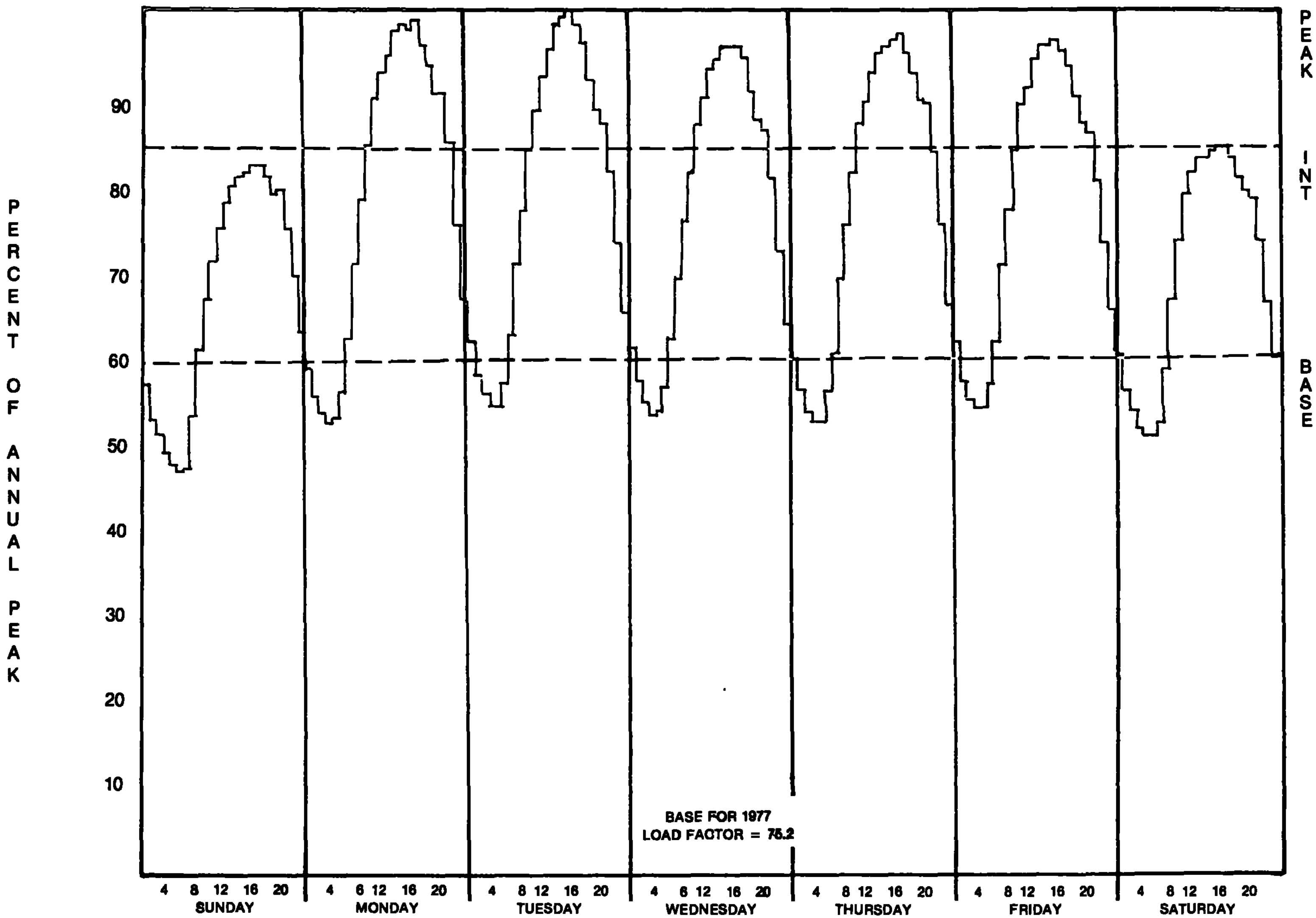

Figure 4-3
WEEKLY SUMMER LOAD CURVE
SOUTHERN

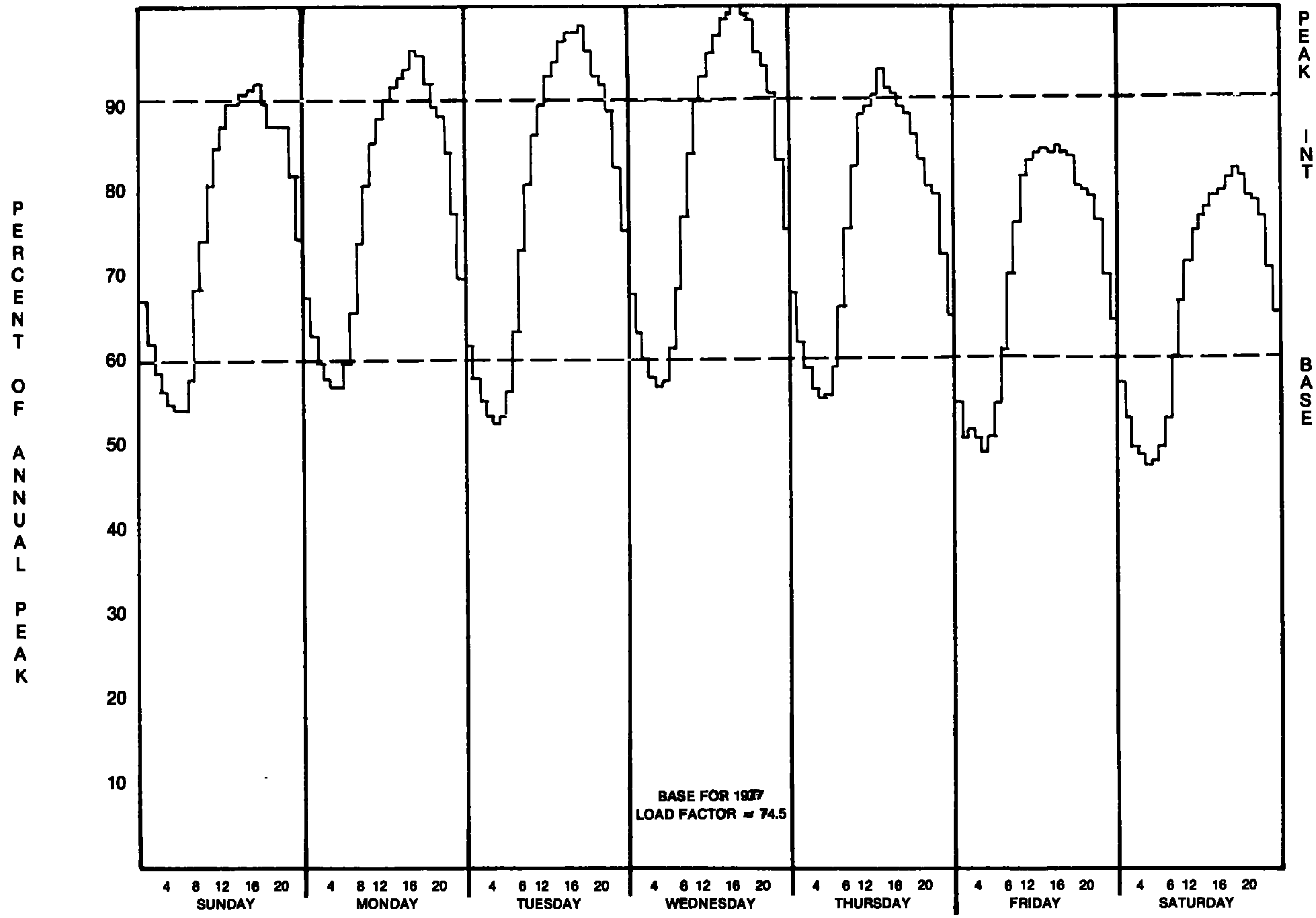

Figure 4-4
WEEKLY SUMMER LOAD CURVE
FLORIDA

4.3 FUTURE DEMAND FOR ELECTRICAL POWER

Projections for future power demands are highly dependent on increases in population and other socio-economic data. Table 4-5 shows projections for 1980 through 2000 for some of the leading indicators. Population in the SERC region is expected to increase at an annual rate of about 1.2 percent based on 1972 OBERS projections.

To define a reasonable range of future electricity demands which reflect different assumptions such as population and economic growth rates, impact of various conservation programs, load management, and energy pricing policies, three electricity projections (Projections I, II, and III) were developed from published and readily available information and data on electricity demand forecasts by the Harza Engineering Company for the National Hydropower Study. The results of Harza's study are shown in Volumes III and IV of the NHS report and are summarized below for the SERC region. Harza's projections are shown in Tables 4-6 through 4-10 for SERC and the subregions.

Projection I was derived from the utilities. It was chosen to reflect the plans of the electric industry. Annually, each NERC region is required to forecast electric demand and supply for the next ten years, and provide a "conceptual planning" projection for the subsequent eleven to twenty years. The reports filed by the utilities through NERC to the Department of Energy on April 1, 1979, were the latest available for Harza's study. The projections of the utilities are based on widely varying methodologies and assumptions. However, the methods and assumptions used by the utilities are based on past experiences in their particular power supply areas. The projections are modified as necessary by the utilities to account for recent trends in electrical use as well as predictable changes in future use. This includes the effects of conservation measures currently being implemented or those that will be implemented, based on reliable forecasts, in the planning future. Projection I results in an annual growth rate in demand of 5.1 percent as noted on Table 4-6.

Projection II was derived from forecasts made by the Institute for Energy Analysis (IEA) at the Oak Ridge Associated Universities in September 1976. The IEA study is a well recognized independent study of the Nation's future energy demand. The IEA forecast reflects a low growth rate for both the Nation's future energy demands and the Gross National Product (GNP). It was chosen to represent the expected lower range of the electric energy forecasts. The forecasts assume a large, nationwide move to energy conservation. From this study, the annual growth rate in demand for the SERC region was projected to be 4.2 percent for the period 1978-2000.

Projection III was based on the "Consensus Forecast of U.S. Electricity Demand."[1/] The electricity demand in the Consensus Forecast was derived

[1/] J. A. Lane, "Consensus Forecast of U.S. Electricity Supply and Demand to the Year 2000," Oak Ridge National Laboratory, May 1977.

Table 4-5
SOCIO-ECONOMIC INDICATORS
SERC

Subregion/Category	1980	1985	1990	2000
VACAR				
Population (thousands)	14,416	15,496	16,669	18,413
Total Earnings (million $)	52,832	64,438	78,628	114,472
Total Personal Income (million $)	63,515	78,101	96,080	141,769
Per Capita income ($)	4,406	5,040	5,764	7,699
TVA				
Population (thousands)	6,171	6,554	6,962	7,502
Total Earnings (million $)	18,107	22,045	26,844	38,964
Total Personal Income (million $)	22,631	27,724	33,972	49,794
Per Capita Income ($)	3,667	4,230	4,879	6,637
SOUTHERN				
Population (thousands)	9,314	9,816	10,353	11,018
Total Earnings (million $)	28,952	34,891	42,068	60,013
Total Personal Income (million $)	35,716	43,327	52,585	75,817
Per Capita Income ($)	3,835	4,414	5,079	6,881
FLORIDA				
Population (thousands)	8,707	9,663	10,729	12,445
Total Earnings (million $)	26,959	33,435	41,472	61,815
Total Personal Income (million $)	39,125	49,269	62,053	95,177
Per Capita Income ($)	4,494	5,099	5,784	7,684
SERC				
Population (thousands)	38,607	41,529	44,714	49,379
Total Earnings (million $)	126,851	154,808	189,012	275,264
Total Personal Income (million $)	160,986	198,421	244,690	362,556
Per Capita Income ($)	4,170	4,778	5,472	7,342

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

Table 4-6
ELECTRICAL DEMAND PROJECTIONS
SERC

Projection	YEAR 1978	1985	1990 (1000'S)	1995	2000	Annual Growth Rate (%)
I						
Peak Demand (MW)	80.5	125.5	157.7	195.8	242.8	5.1
Energy Demand (GWh)	453.2	673.4	838.0	1,040.2	1,289.7	4.9
II						
Peak Demand (MW)	80.5	112.7	139.0	165.7	197.5	4.2
Energy Demand (GWh)	453.2	604.5	738.8	880.1	1,048.9	3.9
III						
Peak Demand (MW)	80.5	128.1	169.2	208.6	255.9	5.4
Energy Demand (GWh)	453.2	687.3	898.9	1,108.0	1,359.5	5.1

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

Table 4-7
ELECTRICAL DEMAND PROJECTIONS
VACAR SUBREGION

Projection	YEAR 1978	1985	1990 (1000'S)	1995	2000	Annual Growth Rate (%)
I						
Peak Demand (MW)	25.9	40.7	53.2	68.7	88.3	5.7
Energy Demand (GWh)	143.0	220.4	287.5	371.3	477.3	5.6
II						
Peak Demand (MW)	25.9	34.8	42.7	51.1	61.0	4.0
Energy Demand (GWh)	143.0	188.6	231.1	276.1	329.9	3.9
III						
Peak Demand (MW)	25.9	39.6	52.0	64.3	79.1	5.2
Energy Demand (GWh)	143.0	214.5	281.1	347.6	427.6	5.1

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

Table 4-8
ELECTRICAL DEMAND PROJECTIONS
TVA SUBREGION

Projection	YEAR 1978	1985	1990 (1000'S)	1995	2000	Annual Growth Rate (%)
I						
Peak Demand (MW)	21.5	33.0	39.5	46.0	52.3	4.1
Energy Demand (GWh)	122.8	185.3	219.4	255.5	290.5	4.0
II						
Peak Demand (MW)	21.5	28.6	35.0	41.2	48.5	3.8
Energy Demand (GWh)	122.8	160.9	194.1	228.6	269.1	3.6
III						
Peak Demand (MW)	21.5	32.6	42.5	51.8	62.8	5.0
Energy Demand (GWh)	122.8	182.9	236.2	287.7	348.8	4.9

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

Table 4-9
ELECTRICAL DEMAND PROJECTIONS
SOUTHERN SUBREGION

Projection	YEAR 1978	1985	1990 (1000'S)	1995	2000	Annual Growth Rate (%)
I						
Peak Demand (MW)	20.3	29.0	36.2	45.4	57.1	4.8
Energy Demand (GWh)	102.5	150.3	188.0	235.8	296.6	4.9
II						
Peak Demand (MW)	20.3	25.7	30.8	36.1	42.3	3.4
Energy Demand (GWh)	102.5	133.4	160.1	187.6	219.8	3.5
III						
Peak Demand (MW)	20.3	29.3	37.5	45.5	54.8	4.6
Energy Demand (GWh)	102.5	151.6	194.9	236.2	284.8	4.8

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

Table 4-10
ELECTRICAL DEMAND PROJECTIONS
FLORIDA SUBREGION

Projection	YEAR 1978	1985	1990 (1000'S)	1995	2000	Annual Growth Rate (%)
I						
Peak Demand (MW)	16.9	25.4	31.1	38.6	49.0	5.0
Energy Demand (GWh)	84.9	117.4	143.0	177.5	225.4	4.5
II						
Peak Demand (MW)	16.9	26.3	33.4	40.9	50.0	5.1
Energy Demand (GWh)	84.9	121.6	153.4	187.9	230.1	4.6
III						
Peak Demand (MW)	16.9	29.9	40.6	51.4	64.9	6.3
Energy Demand (GWh)	84.9	138.3	186.7	236.5	298.3	5.9

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

from the energy demand, which represents an average of 15 forecasts made by private and Federal economists in the post-embargo period. The forecasts are conservation oriented and not the historical growth forecasts that usually were made in the pre-embargo period. The Consensus Forecast was included for use in this study because it represents an average, or "middle ground," forecast of electric energy. Based on this study, the annual growth rate for demand is expected to be 5.4 percent between 1978 and 2000.

From Projections I, II, and III, a "median" electricity projection for each year was selected to represent the most probable future demand throughout the period and is summarized in Table 4-11. As indicated, the future annual "median" electric peak and energy demands are expected to grow from 80,500 MW and 453,200 GWh, respectively, in 1978 to about 232,100 MW and 1,233,000 GWh, respectively, in 2000, at an average annual average growth rate of about 4.7 percent.

The regional energy growth rate is projected to decrease from an average annual growth rate of 5.7 percent between 1977 and 1985 to about 3.7 percent between 1995 and 2000. The VACAR subregion has the largest share of the regional energy. The annual energy demand in VACAR is projected to grow from 143,000 GWh in 1978 to about 427,600 GWh in 2000, at an average annual growth rate of 5.1 percent. Having one of the country's highest population growth rates, the FLORIDA subregion is projected to increase its energy demand from 84,900 GWh in 1978 to 230,100 GWh in 2000, at an average annual growth rate of 4.6 percent. The energy demand is projected to increase at 4.8 percent in the SOUTHERN subregion, and 4.0 percent in the TVA subregion.

The projected trends in peak demand are similar to the trends in energy growth discussed above. The peak demand for SERC is projected to grow from 80,500 MW in 1978 to about 232,100 MW in 2000, representing an average annual growth rate of 4.7 percent. The SERC peak demand is projected to be in winter, but should only be slightly greater than the summer peak. The TVA subregion has a winter peak projected to be about 15 percent greater than the summer peak, throughout the study period. However, current TVA load forecasts project that the subregion will become a summer peaking system in the mid-1980's. The VACAR and FLORIDA subregions each have summer and winter peaks of about the same magnitude. The SOUTHERN subregion has a summer peak slightly greater than the winter peak.

The Harza projections of future electric demand and supply presented in this chapter are based on numerous factors, each of which is sensitive to public opinion, economics of energy use, and changes in domestic or international policies. The number of variations that could be analyzed is nearly infinite. Variations in population growth rate will directly affect projections II and III, since they are based upon per capita energy consumption. Projection I would be indirectly affected as it is based on an aggregation of utility forecasts, each of which may have a different underlying forecast methodology. Changes in projected economic growth, rate of implementation of conservation measures, Federal and state regulations, and other regional factors are

Table 4-11
MEDIAN DEMAND PROJECTIONS
SERC

Projection	YEAR 1978	1985	1990 (1000's)	1995	2000	Annual Growth Rate (%)
VACAR						
Peak Demand (MW)	25.9	39.6	52.0	64.3	79.1	5.2
Energy Demand (GWh)	143.0	214.5	281.1	347.6	427.6	5.1
TVA						
Peak Demand (MW)	21.5	32.6	39.5	46.0	52.3	4.1
Energy Demand (GWh)	122.8	182.9	219.4	255.5	290.5	4.0
SOUTHERN						
Peak Demand (MW)	20.3	29.0	36.2	45.4	54.8	4.6
Energy Demand (GWh)	102.5	150.3	188.0	235.8	284.8	4.8
FLORIDA						
Peak Demand (MW)	16.9	26.3	33.4	40.9	50.0	5.1
Energy Demand (GWh)	84.9	121.6	153.4	187.9	230.1	4.6
SERC						
Peak Demand (MW)	80.5	124.7	158.4	193.3	232.1	4.7
Energy Demand (GWh)	453.2	669.3	842.0	1,026.8	1,233.0	4.7

Source: The Magnitude and Regional Distribution of Needs for Hydropower, The Harza Engineering Company, July 1980.

difficult to gauge, but will no doubt affect all of the projections. The effect of the most recent energy crisis on the demand projections is described below.

The ten year (1978-88 and 1979-89) energy and peak demand growth rates projected by SERC in its 1979 and 1980 reports reflect the following declines in anticipated growth:

	1978-88	1979-89
Annual Energy	4.8	4.6
Peak Demand, Summer	4.8	4.5
Peak Demand, Winter	4.8	4.4

The 1980 SERC report projects an annual growth rate in peak demand from 1979 to 2000 of 4.2 percent vs. the 5.1 percent shown in Table 4.7 for Projection I, which is based on the 1979 SERC report.

The staff of the U.S. Department of Energy's Economic Regulatory Administration, Division of Power Supply and Reliability, has projected a much slower growth rate for the 1980-83 period's increase in energy demand using the following bases:1/

- Current economic conditions do not appear conducive to a large increase in electric energy use in the near future. Consideration is being given to large-scale electrification strategies to reduce the use of oil and gas. Such strategies would have a major impact on future growth.

- Continuing and increasing emphasis on conservation will tend to decrease energy use.

- The increased cost of producing electric power, resulting in an increase in the general level of rates, has a negative effect on consumption of electric energy.

- According to the Edison Electric Institute's Electric Output Report for the week ending May 31, 1980, net electric energy distributed by the total electric industry of the contiguous U.S. for the first 22 weeks of 1980 was 1.2 percent less than the net electric energy for the corresponding period of 1979.

- The aggregate of the Council projections has been higher than the actual energy requirement in each of the years 1976 through 1979, with an increasing percentage of error.

Using the above bases, the Division of Power Supply and Reliability staff's estimate of the average annual increase in energy demand for 1980-83

1/DOE/RG-0036 (Rev. 1), "Electric Power Supply and Demand for the Contiguous United States 1980-1989," July 1980.

is only 1.02 percent for the SERC region. Also, based on the assumption that demand and energy will increase at the same rate, the Division of Power Supply and Reliability staff estimates the annual increase in summer peak demand to be 1.02 percent during the 1980-83 period.

The DOE's Office of Applied Analysis in its 1979 Annual Report to Congress[1/] projected an annual growth rate in electric supply and demand through 1995 of 3.8 percent for DOE Region IV, which corresponds to the SERC region, except for Virginia.

The 1980 session of the Florida Legislature passed the "Florida Energy Efficiency and Conservation Act," which requires utilities to take steps to reduce the growth of electricity usage and peak demand. The implementing agency, the Florida Public Service Commission, recently adopted an emergency rule establishing goals that demand and energy consumption in 1985 do not exceed that of 1984 by 2.212 percent and 2.6 percent, respectively.

4.4 FUTURE DEMAND FOR HYDROPOWER

The demand projections previously shown in Table 4-11 are divided into base, intermediate, and peaking load requirements for each subregion and for the total SERC region in Table 4-12. These are based on the projected generation mixes displayed earlier in Tables 3-4 through 3-8 which have been consolidated and tabulated in a footnote to the table. The 1978 base demand of 53,100 MW is expected to increase to 82,300 MW by 1985 and 153,200 MW by year 2000. The 1978 intermediate demand of 16,100 MW is projected to increase to 24,900 MW in 1985 and 48,700 MW in the year 2000. The demand for peaking power of 11,300 MW in 1978 is projected to increase to 17,500 MW in 1985 and 30,200 MW in year 2000. These demand projections are shown graphically in Figures 4-5 through 4-9.

The resources in operation as of January 1979 and projected requirements through year 2000 are shown in Table 4-13. The 1985 projections reflect future additions to the system as shown in the 1979 SERC and NERC reports. The 1990-2000 projected resource requirements are based on the projected demands shown in Table 4-12 plus the reserve requirements projected by DOE and Harza. The resources are divided into base, intermediate, and peak load requirements in accordance with the projected generation mix shown in Table 4-12. These projections are shown graphically in Figures 4-5 through 4-9.

It should be noted that the 1985 utility projections used in Table 4-13 reflect an increase in nuclear capability of 29.95 GW over January 1979 resources. The DOE/IEA-0173 (79)/3 Annual Report to Congress for 1979 projects nuclear capability additions for Region IV of only 16.98 GW. The hydropower demand projections assume that other thermal base load plants would be constructed if the nuclear power is not available.

[1/]DOE/EIA-0173 (79/3), Volume 3 of 3, Annual Report to Congress, 1979/ EIA.

For this analysis, the resources supply is reasonably expected to increase to that shown for 1985 in the 1979 NERC report because most of the additions are either under construction or well along in the planning and design stages. However, after 1985, the supply will level off unless new plants are constructed. The additional resources required to maintain adequate supplies through the year 2000 are given in Table 4-14. The dashed lines on Figures 4-5 through 4-9 show the total resources needed to meet the projected demand and maintain reserve requirements. The increasing difference between this dashed supply line and the level supply line shown beyond 1985 represents the new sources of electricity that must be constructed to meet future demands, as given in Table 4-14.

The above analysis does not consider the reduction in available resources resulting from retirements. This factor, which may be significant in future years, would increase the demand for power resources.

Table 4-12
DEMAND
BASE, INTERMEDIATE, PEAKING
(1000MW)

REGION	1978				1985				1990				1995				2000			
	B	I	P	T [1]	B	I	P	T	B	I	P	T	B	I	P	T	B	I	P	T
VACAR	18.1	4.7	3.1	25.9	27.7	7.1	4.8	39.6	36.4	9.4	6.2	52.0	45.0	12.2	7.1	64.3	55.4	15.0	8.7	79.1
SOUTHERN	12.2	4.9	3.2	20.3	17.4	7.0	4.6	29.0	22.4	8.3	5.5	36.2	28.1	11.4	5.9	45.4	34.0	13.7	7.1	54.8
FLORIDA	10.1	3.6	3.2	16.9	15.8	5.5	5.0	26.3	20.0	7.0	6.4	33.4	24.5	8.6	7.8	40.9	28.5	11.5	10.0	50.0
TVA	14.4	4.3	2.8	21.5	21.8	6.5	4.3	32.6	26.9	7.9	4.7	39.5	31.3	9.7	5.0	46.0	36.1	11.0	5.2	52.3
SERC [2]	53.1	16.1	11.3	80.5	82.3	24.9	17.5	124.7	104.5	31.7	22.2	158.4	127.6	40.6	25.1	193.3	153.2	48.7	30.2	232.1

[1] Total demand is divided into percent base (B), intermediate (I), and peaking (P) based on the following projected generation mix (Harza, July 1980):

REGION	1978-85			1990			1995			2000		
	B	I	P	B	I	P	B	I	P	B	I	P
VACAR	70	18	12	70	18	12	70	19	11	70	19	11
SOUTHERN	60	24	16	62	23	15	62	25	13	62	25	13
FLORIDA	60	21	19	60	21	19	60	21	19	57	23	20
TVA	67	20	13	68	20	12	68	21	11	69	21	10
SERC	66	20	14	66	20	14	66	21	13	66	21	13

[2] The totals for SERC are less than the sum of the subregions since the peaks vary from summer to winter.

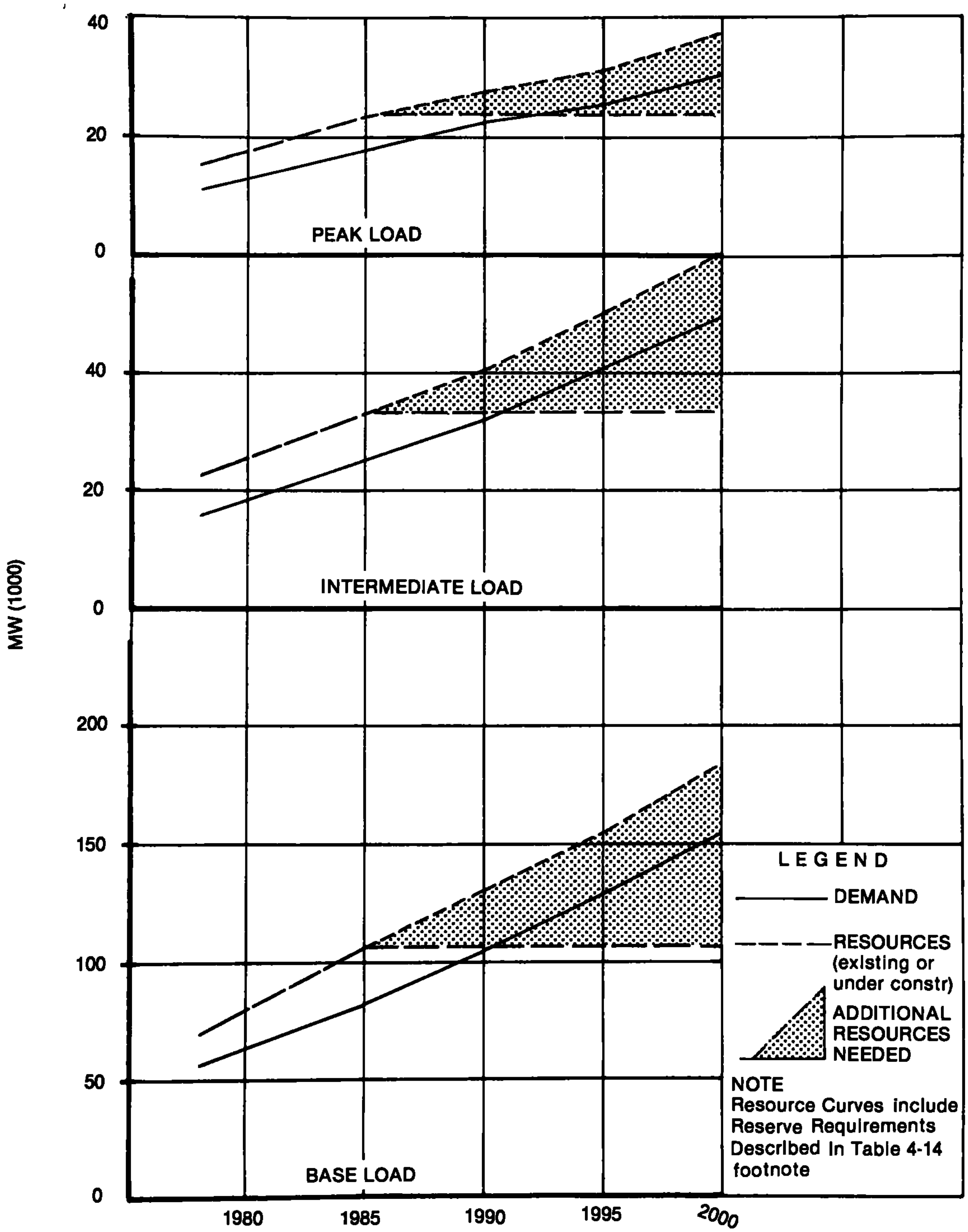

Figure 4-5
SERC REGION DEMAND

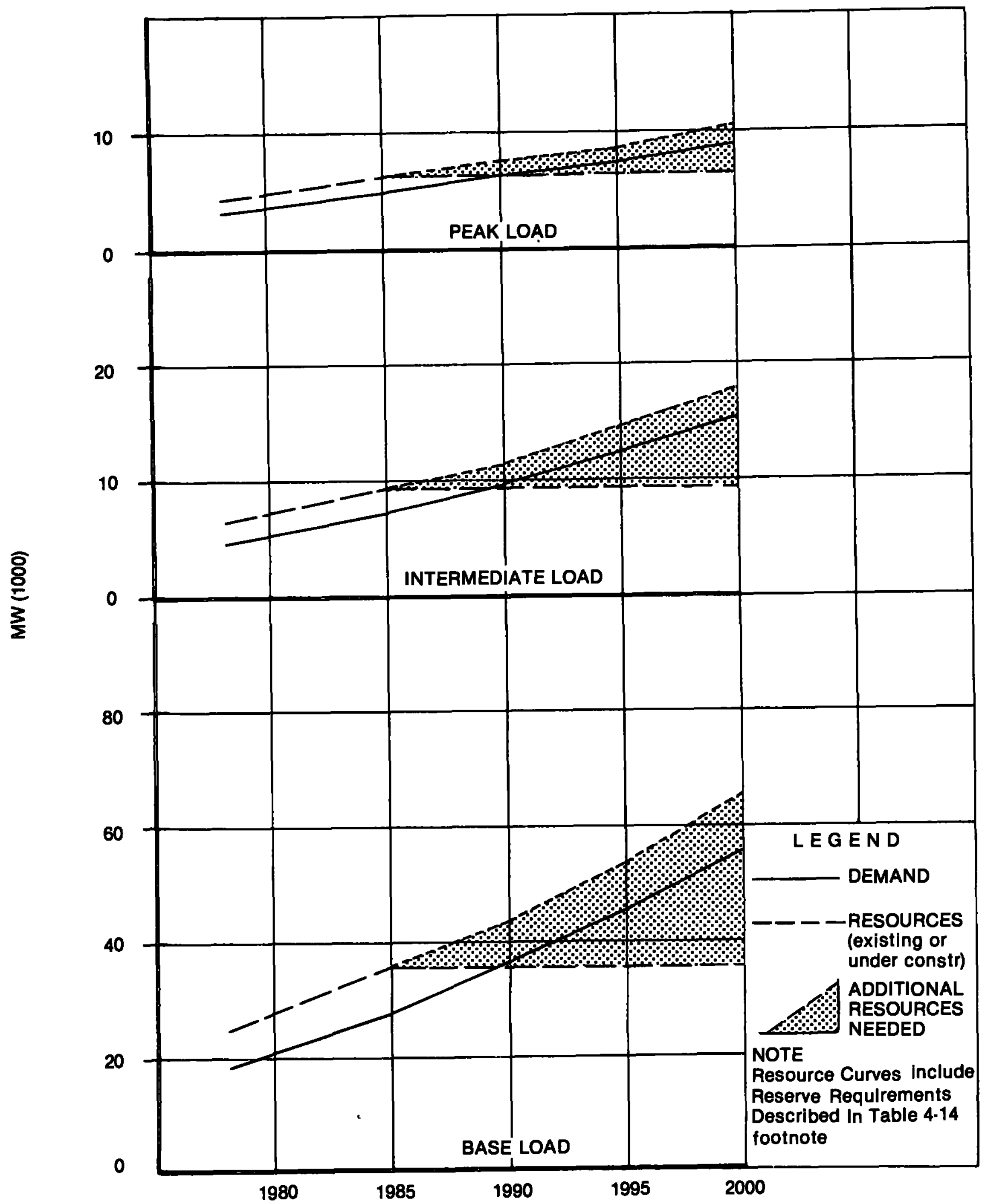

Figure 4-6
VACAR SUBREGION DEMAND

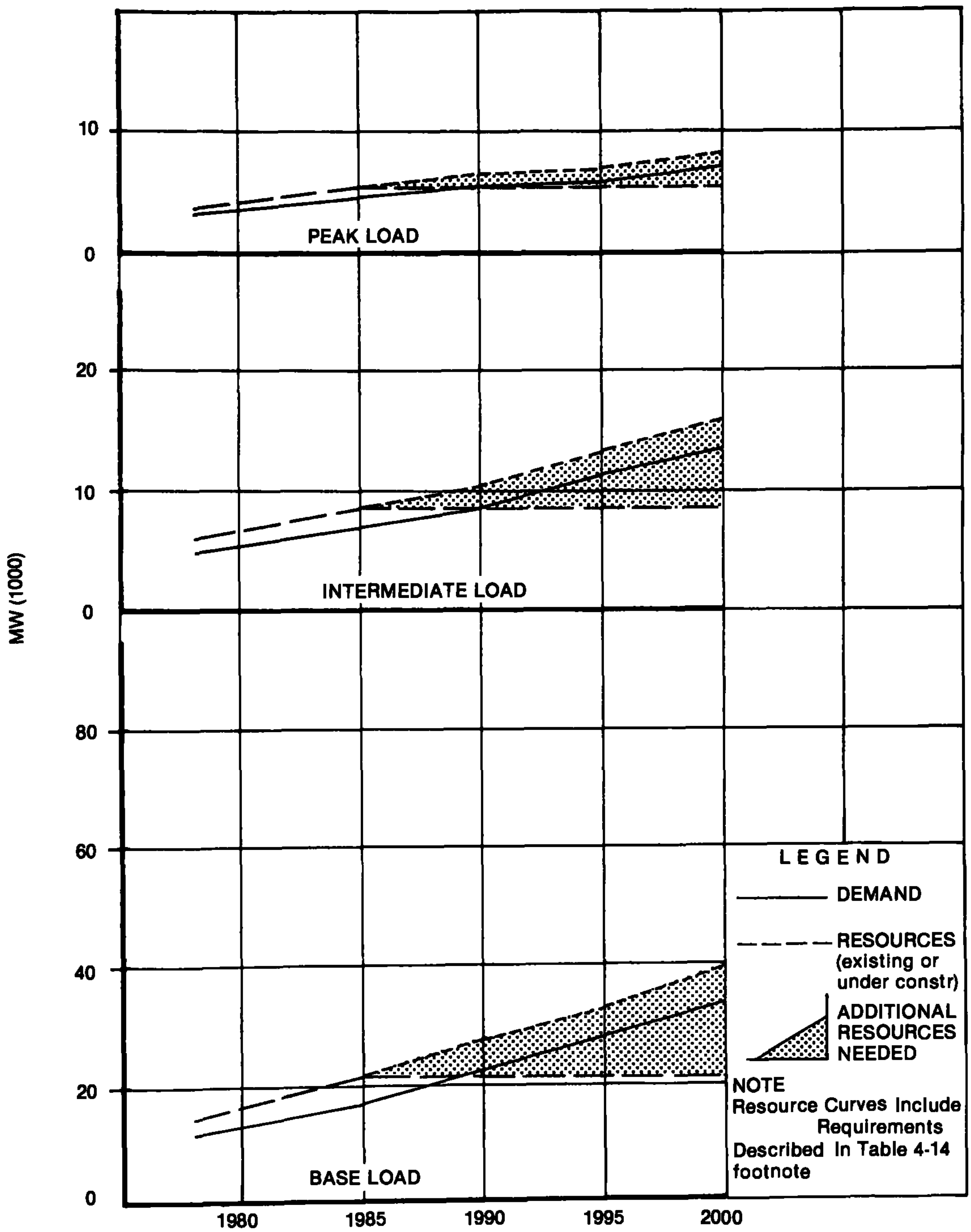

Figure 4-7
SOUTHERN SUBREGION DEMAND

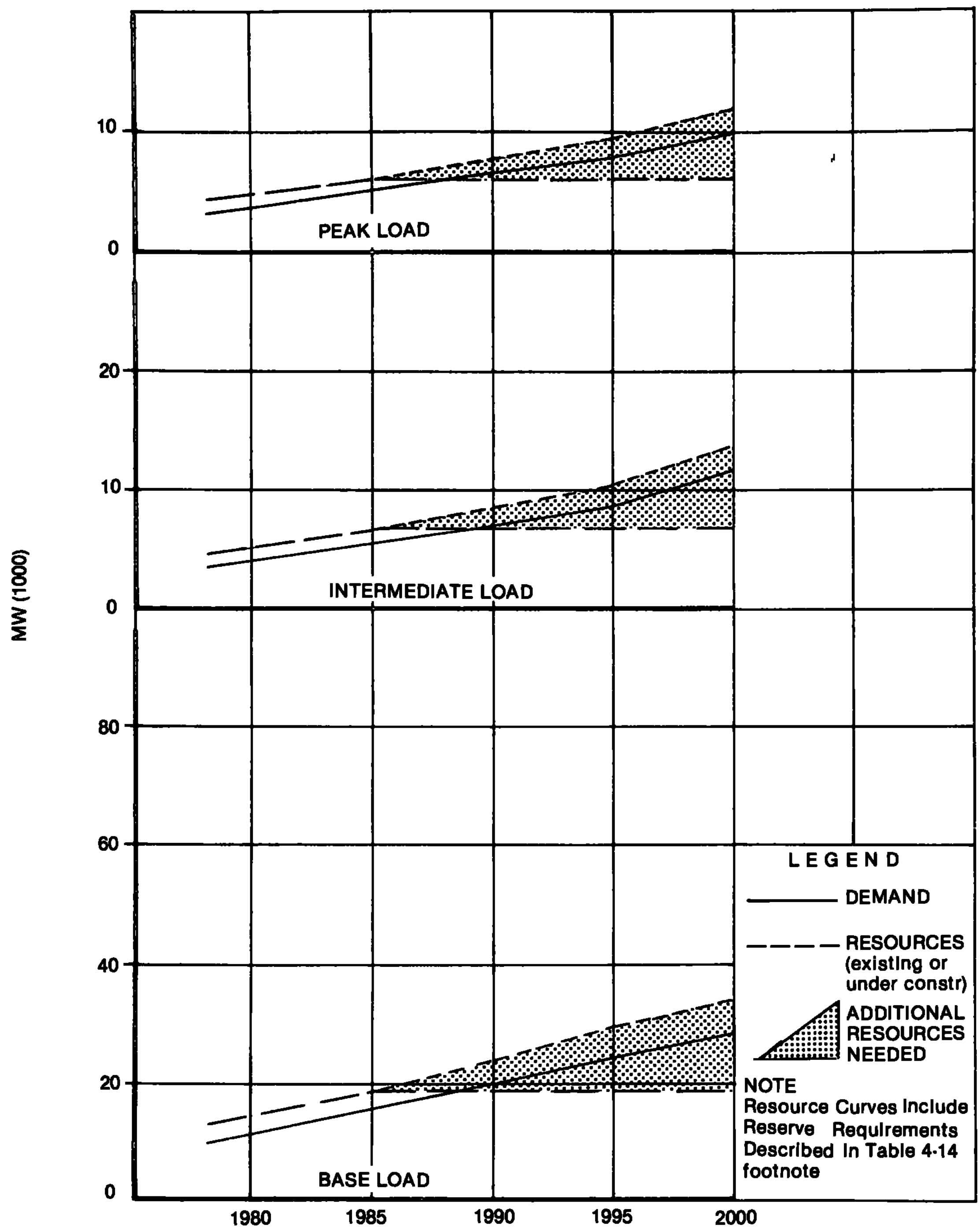

Figure 4-8
FLORIDA SUBREGION DEMAND

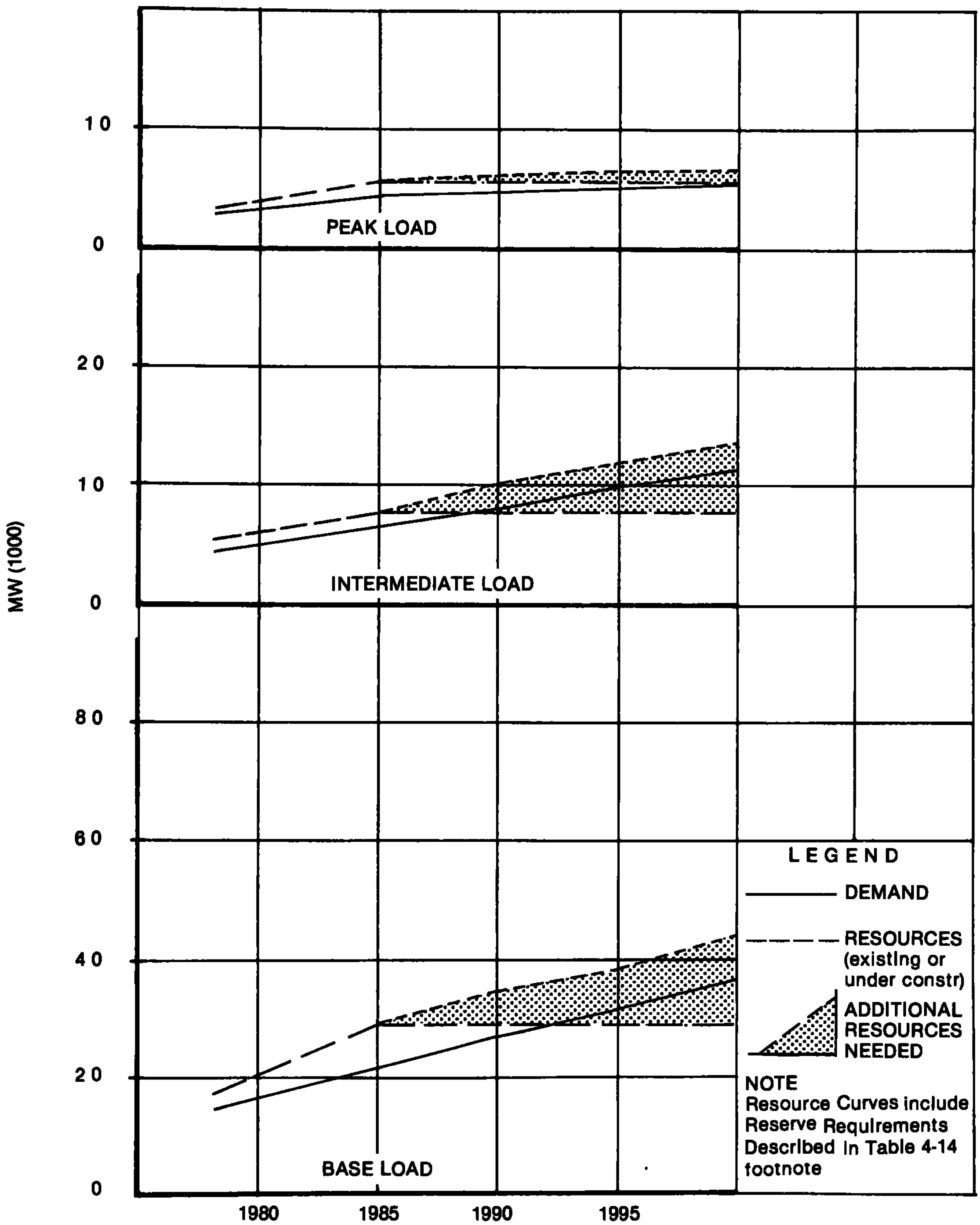

Figure 4-9
TVA SUBREGION DEMAND

Table 4-13
RESOURCES
BASE, INTERMEDIATE, PEAKING
(1000 MW)

REGION	1978				1985				1990				1995				2000			
	B	I	P	T 1/	B	I	P	T 1/	B	I	P	T 2/	B	I	P	T 2/	B	I	P	T 2/
VACAR	24.8	6.4	4.2	35.4	35.9	9.2	6.2	51.3	43.3	11.2	7.4	61.9	53.1	14.4	8.4	75.9	64.8	17.6	10.2	92.6
SOUTHERN	14.9	6.0	3.9	24.8	21.7	8.7	5.7	36.1	27.9	10.3	6.7	44.9	32.9	13.3	6.9	53.1	39.8	16.0	8.3	64.1
FLORIDA	13.4	4.7	4.3	22.4	18.8	6.6	6.0	31.4	24.0	8.4	7.6	40.0	29.6	10.4	9.4	49.4	33.9	13.7	11.9	59.5
TVA	17.7	5.3	3.4	26.4	29.0	8.6	5.6	43.2	34.2	10.0	6.0	50.2	38.1	11.8	6.2	56.1	44.0	13.4	6.4	63.8
SERC	70.8	22.4	15.8	109.0	105.4	33.1	23.5	162.0	129.4	39.9	27.7	197.0	153.7	49.9	30.9	234.5	182.5	60.7	36.8	280.0

1/ Total resources existing in 1978 and projected for 1985 are from the 1979 NERC Report.

2/ Total resources for 1990, 1995 and 2000 are based on the projected demand shown in Table 4-12 plus the following expected percent reserve margins from DOE/RG-0036(Rev. 1), July 1980 and Harza, July 1980:

REGION	1990	1995	2000
VACAR	19	18	17
SOUTHERN	24	17	17
FLORIDA	20	21	19
TVA	27	22	22

3/ The base (B), intermediate (I), and peaking (P) resource amounts are derived using the generation mix given in Table 4-12.

Table 4-14
ADDITIONAL RESOURCES REQUIRED
BEYOND 1985
(1000 MW)

REGION	1990				1995				2000			
	B	I	P	T	B	I	P	T	B	I	P	T
VACAR	7.4	2.0	1.2	10.6	17.2	5.2	2.2	24.6	28.9	8.4	4.0	41.3
SOUTHERN	6.2	1.6	1.0	8.8	11.2	4.6	1.2	17.0	18.1	7.3	2.6	28.0
FLORIDA	5.2	1.8	1.6	8.6	10.8	3.8	3.4	18.0	15.1	7.1	5.9	28.1
TVA	5.2	1.4	0.4	7.0	9.1	3.2	0.6	12.9	15.0	4.8	0.8	20.6
SERC	24.0	6.8	4.2	35.0	48.3	16.8	7.4	72.5	77.1	27.6	13.3	118.0

The peak demand for SERC is recomputed in Table 4-15 based on annual growth rates of from 1 to 5 percent. The actual 1979 peak hour demand of 83,100 MW was used in the computation. The resources required to meet these peak demands and maintain adequate reserve margins are given in Table 4-16. Assuming that the resource supply will increase to that projected for 1985 in the 1980 SERC report, the additional resources required to meet electrical demands within the SERC region are shown in Table 4-17. As shown, additional resources will be needed by year 1990 for an annual growth rate of between 3 and 4 percent, by 1995 for an annual growth rate between 2 and 3 percent, and by 2000 for an annual growth rate between 1 and 2 percent.

Table 4-15
SERC PEAK DEMAND PROJECTIONS

ANNUAL GROWTH RATE (%)	PEAK DEMAND (1,000 MW)[1]			
	1985	1990	1995	2000
1	88.2	92.7	97.4	102.4
2	93.6	103.3	114.1	126.0
3	99.2	115.0	133.4	154.6
4	105.1	127.9	155.6	189.4
5	111.4	142.1	181.4	231.5

[1]Based on peak hour demand of 83,100 MW for 1979 (SERC Report, April 1980).

Table 4-16
SERC RESOURCE REQUIREMENTS TO MEET PEAK DEMAND

ANNUAL GROWTH RATE (%)	RESOURCES REQUIRED (1,000 MW)[1]															
	1985				1990				1995				2000			
	B	I	P	T [2]	B	I	P	T	B	I	P	T	B	I	P	T
1	71.0	21.5	15.1	107.6	74.6	22.6	15.9	113.1	76.5	24.3	15.1	115.9	80.5	25.6	15.8	121.9
2	75.4	22.8	16.0	114.2	83.2	25.2	17.6	126.0	89.6	28.5	17.7	135.8	98.9	31.5	19.5	149.9
3	79.9	24.2	16.9	121.0	92.6	28.1	19.6	140.3	104.7	33.3	20.7	158.7	121.4	38.6	24.0	184.0
4	84.6	25.6	18.0	128.2	103.0	31.2	21.8	156.0	122.2	38.9	24.1	185.2	148.8	47.3	29.3	225.4
5	89.7	27.2	19.0	135.9	114.4	34.7	24.3	173.4	142.5	43.3	28.1	215.9	181.8	57.9	35.8	275.5

1/ Peak demand from Table 4-15 plus reserve requirements of 22% for 1985-90 (DOE/RG-0036 (Rev.1) and 19% for 1995-2000 (Harza, July 1979)

2/ Total demand divided into base (B), intermediate (I), and peaking (P) based on percentages given in Table 4-12 footnote.

Table 4-17
SERC ADDITIONAL RESOURCES REQUIRED

PEAK DEMAND ANNUAL GROWTH RATE (%)	(1,000 MW) 1990				1995				2000			
	B	I	P	T	B	I	P	T	B	I	P	T
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	2.1	2.1	-	4.2
3	-	-	-	-	7.9	3.9	0.2	12.0	24.6	9.2	3.5	37.3
4	6.2	1.8	1.3	9.3	25.4	9.5	3.6	38.5	52.0	17.9	8.8	78.7
5	17.6	5.3	3.8	26.7	45.7	13.9	7.6	69.2	85.0	28.5	15.3	128.8

Chapter 5

METHODOLOGY FOR EVALUATION OF POTENTIAL HYDROPOWER DEVELOPMENT

The evaluation of potential hydropower developments was accomplished in four screening stages which served to eliminate those developments which did not meet progressively more stringent evaluation criteria from further study. The initial screening criterion was a physical potential of providing 1 MW or more of additional hydropower capacity. The second major criterion was a development's economic feasibility; and the third stage criterion was a judgement regarding the likelihood of non-economic impacts.

The evaluation was based on a very cursory analysis of best available data with no site visits performed. Generalized power benefits and empirical cost curves were used to estimate economic feasibility.

Inasmuch as detailed estimates were not made, the potential incremental capacity and energy estimates overstate the actual power which can be developed in most cases, particularly at existing projects. This results from the need to maintain satisfactory water levels and releases for other vital project purposes such as flood control, water supply, navigation, base flow stabilization, recreation, fish and wildlife, and environmental values.

Detailed consideration of the social, economic, institutional, and environmental constraints associated with hydropower development was not included in the analysis.

The value of non-power benefits foregone and/or the cost of mitigation due to changes in the operation of existing projects for additional hydropower production were not determined. Also, additional benefits for other potential project purposes were not determined.

No consideration was given to elevating existing dams to increase the hydropower potential of.

New pumped storage sites, other than those included in current Corps studies, were not identified because of time and resource constraints on the study.

Details of the evaluation and screening procedure are given in Appendix A. The results of the screening activities are given in Chapter 7.

Chapter 6

PUBLIC INVOLVEMENT

Throughout the data collection and screening process described in Chapter 5 and Appendix A, information on physical, environmental, social, and institutional aspects of potential hydropower development was solicited from the general public; private and public power companies; marketing agents and regulating agencies; special interest groups; contractors and consultants; and local, state, and Federal water resources agencies.

Public involvement activities consisted of two public meetings and distribution of associated public notices and information packages; meetings with state agencies, special interest groups, power companies and private citizens; distribution of a draft report for comment; and correspondence and telephone conversations with interested parties.

Data on potential hydropower developments in the inventory have been furnished on request in response to inquiries from various individuals, consultants, research organizations, government agencies, and utilities. Data for the study inventory were obtained from numerous private and public sources as time and resources permitted.

The results of the public involvement activities are discussed in Appendix B.

Chapter 7

INVENTORY

As explained in Chapter 5 and Appendix A, the evaluation of the undeveloped hydropower potential was accomplished through a series of computation and screening stages.

Initially, data for sites to be included in the National Hydropower Study were collected on the basis of Corps of Engineers district boundaries without regard to electric reliability council regional boundaries. Therefore, the number of sites initially considered in SERC can only be estimated. It is estimated that a total of 12,100, consisting of 11,500 existing projects and 600 undeveloped sites, was considered.

The results of the screening and evaluation for all developments having a potential of 1 MW or more are shown in Appendix C. Those developments which passed the screening process are designated with a numeral 2 below the site identification (ID) number. Developments having overriding adverse non-economic constraints are designated with a numeral 6 below the ID number. Potential non-economic constraints are identified in the last column of the tabulation. (Correspondence describing non-economic impacts of hydropower developments is included in Appendix B.) Further studies are needed to determine the significance of these constraints which became known from readily available information sources and coordination with others. Data on all known operational hydropower plants have been included in Appendix C regardless of the amount of their additional potential. The locations of the potential developments which have passed the screening process, and the existing hydropower developments are shown on the map insert.

The number of existing projects and undeveloped sites remaining after each of the screening steps is shown in Table 7-1. As shown, 100 existing sites, including 17 operational power projects, and 83 undeveloped sites, remain.

Table 7-1
SERC SCREENING RESULTS

State/ Commonwealth	Remaining Potential Developments							
	Stage 1		Stage 2		Stage 3 Phase 1		Stage 3 Phase 2	
	Exist.	Undev.	Exist.	Undev.	Exist.	Undev.	Exist.	Undev.
Alabama	82	21	53	18	14	4	14	1
Florida	19	3	17	4	4	1	2	1
Georgia	94	73	33	80	10	24	9	18
Kentucky	6	2	4	2	0	1	0	1
Mississippi	46	15	9	3	3	0	3	0
North Carolina	207	62	85	61	29	22	29	21
South Carolina	108	22	47	36	26	27	26	22
Tennessee	91	35	31	37	3	19	3	7
Virginia	95	115	26	87	14	12	14	12
Totals	755	350	305	328	103	110	100	83

The total potential capacity and energy of these developments are shown in Table 7-2. The developments are summarized by amount of additional capacity in Table 7-3. A total of 165 operational hydropower plants are identified in Appendix C. As shown in Table 7-2, the computer results indicate that 32 of the existing hydropower plants have a total potential additional capacity of about 1,037 MW and incremental energy of about 1,019,000 MWH. Also, the computer results show that 68 existing projects which are not presently developed for hydropower, have a total potential incremental capacity and energy of about 475.9 MW and 1,396,900 MWH, respectively. The largest source of additional potential is shown to be undeveloped sites. Eighty-three sites are shown to have a cumulative potential of about 5,234 MW and about 11,103,000 MWH.

Table 7-2
SERC POTENTIAL CAPACITY AND ENERGY

State	Existing W/Power[1]	Existing W/O Power[2]	Undeveloped	Total
Alabama				
No. Sites	3	11	1	15
Capacity (MW)	161.9	128.6	24.0	314.5
Energy (GWH)	301.6	421.2	82.8	805.6
Florida				
No. Sites	1	1	1	3
Capacity (MW)	19.4	2.0	9.0	30.4
Energy (GWH)	71.9	13.9	22.9	108.7
Georgia				
No. Sites	4	5	18	27
Capacity (MW)	196.6	31.2	421.6	649.4
Energy (GWH)	196.8	105.0	1,333.5	1,635.3
Kentucky				
No. Sites	-	-	1	1
Capacity (MW)	-	-	108.0	108.0
Energy (GWH)	-	-	280.0	280.0
Mississippi				
No. Sites	-	3	-	3
Capacity (MW)	-	52.4	-	52.4
Energy (GWH)	-	164.3	-	164.3
North Carolina				
No. Sites	5	24	21	50
Capacity (MW)	368.9	107.0	2,328.4	2,804.3
Energy (GWH)	149.2	268.0	3,998.7	4,415.9
South Carolina				
No. Sites	16	10	22	48
Capacity (MW)	253.2	38.6	1,471.8	1,763.6
Energy (GWH)	228.3	100.4	2,898.3	3,227.0
Tennessee				
No. Sites	-	3	7	10
Capacity (MW)	-	31.2	463.2	494.4
Energy (GWH)	-	79.1	1,469.2	1,548.3
Virginia				
No. Sites	3	11	12	26
Capacity (MW)	37.3	84.9	408.4	530.6
Energy (GWH)	71.5	245.0	1,017.2	1,333.7
Total				
No. Sites	32	68	83	183
Capacity (MW)	1,037.3	475.9	5,234.4	6,747.6
Energy (GWH)	1,019.3	1,396.9	11,102.6	13,518.8

NOTES: 1/Existing hydroelectric power facilities currently generating power with the potential for additional hydroelectric capacity.
2/Existing dams and/or other water resources projects with the potential for new hydroelectric capacity.
3/Undeveloped sites where no dams or other engineering structure presently exists.

Table 7-3
SUMMARY OF POTENTIAL HYDROPOWER DEVELOPMENT CAPACITY ADDITIONS

	Under 15 MW	15-25 MW	Over 25 MW	Total
	Existing with Power			
Number	15	7	10	32
Capacity (MW)	99.1	142.0	796.2	1,037.3
Energy (GWH)[1/]	90.3	201.1	727.9	1,019.3
	Existing without Power			
Number	56	11	1	69
Capacity (MW)	232.2	213.7	30.0	475.9
Energy (GWH)[1/]	665.1	631.8	100.0	1,396.9
	Undeveloped Sites			
Number	19	23	41	83
Capacity (MW)	194.5	460.9	4,579.0	5,234.4
Energy (GWH)[1/]	661.3	1,651.2	8,790.1	11,102.6
	Totals			
Number	90	41	52	183
Capacity (MW)	525.8	816.6	5,405.2	6,747.6
Energy (GWH)[1/]	1,416.7	2,484.1	9,759.4	13,518.8

[1/]Average annual

Chapter 8
EVALUATION

The additional electric power resources needed to fulfill demands projected through year 2000 are described in Chapter 4. Table 4-14 shows the resources required based on the most probable future demand compiled by the Harza Engineering Company for the National Hydropower Study. The average annual growth rate in electrical power demand projected by Harza for the SERC Region is 4.7 percent. Table 4-17 shows the additional resources needed to meet the demand assuming average annual growth rates ranging from 1 to 5 percent.

The potential hydropower resources which appear cost competitive to other alternatives, based on very cursory analyses, are summarized in Chapter 7. The results of the computer analyses are shown in Appendix C. Those developments which have passed the screening process are designated with a numeral 2 below the site identification number.

The additional potential power at existing projects, with and without operational power, could be placed on line by year 1990, unless there are problems which would require extensive study for resolution. The remaining potential, primarily undeveloped sites, could be placed on line by the year 2000.

Those additional power developments which could be operational by year 1990, hereafter called near-term developments, are shown in Table 8-1. Those additional developments which could be operational by year 2000, hereafter called long-term developments, are shown in Table 8-2. The reasons that some existing projects are placed in the long-term development time frame are identified in the last column of the table in Appendix C.

The base, intermediate, and peaking power potential of power developments in the near-term and long-term time frames are given in Table 8-3 for each subregion in SERC.

A comparison of the additional hydropower potential with the additional electrical power demands compiled by Harza, as given in Table 4-14, shows that the near-term additional hydropower potential could provide less than 4 percent of the additional electrical power needed by the year 1990. Also, development of the near- and long-term potential could provide less than 6 percent of the total additional electrical power needed by year 2000.

Comparison of the potential resources with the demands in Table 4-17 for various rates of growth of electrical power demand shows the following:

- For a 2 percent growth rate in demand, at least half of the potential could be used by year 2000;
- For a 3 percent growth rate, most of the near-term potential could be used by year 1995 and all the potential could be used by year 2000; and

- For somewhere between a 3 and 4 percent growth rate, all the potential could be used as soon as it can be developed.

The above load-resources analysis does not consider the reduction in power production of existing plants due to retirements. Also, the analysis does not consider the substitution of hydropower for the increasingly higher cost thermal power production. The latter factor may be very significant due to the rising cost of non-renewable resources.

Based on the above, all the potential hydropower developments listed in Tables 8-1 and 8-2 are worthy of more detailed analysis and of serious consideration as candidates for development as a portion of our renewable energy resources. As shown, 83 sites could be developed by year 1990 which have a potential capacity of about 1,332 MW and annual energy of about 2,033 An additional 100 sites could be developed by year 2000 which have a potential capacity of about 5,415 MW and an annual energy of about 11,486 GWH. The total potential capacity and annual energy of the 183 developments are about 6,748 MW and 13,519 GWH, respectively.

Further information on these potential developments is given in Appendix C. Those developments which could assist in meeting the year 1990 electrical power demand are designated by the numeral 1990 in the penultimate column of the table. Those developments which could come on line by year 2000 are designated by the numeral 2000. Field verification of the physical data should be made prior to conducting additional feasibility studies.

No attempt has been made to rank or to place a priority on the potential developments identified as near-term and long-term developments. The information presented on the physical aspects, power potential, economics, and non-economic impacts indicates the relative value of each development in terms of power potential. However, as previously discussed, the cursory nature of the study analyses may contribute to erroneous results for some individual sites when all factors are considered.

A prime factor, which has not generally been considered, is the use of the developments for other project purposes. This would, in most cases, deflate the power potential and economics of existing projects. Conversely, multipurpose development would enhance the power economics of undeveloped sites.

Detailed studies of the social, institutional, and environmental impacts and constraints of the potential developments were not made. The development of electric power at existing projects would generally impact less on the human and natural environment. This factor would deflate the value of new projects relative to existing projects for power development. Similarly, new run-of-river projects would be less detrimental on the human and natural environment than new storage projects.

The analysis of the value of the power potential of storage projects is generally more accurate than run-of-the-river projects. The amount of dependable (load following) power was determined by the flow available 85 percent of the time based on historical records. Power which could be produced at lesser frequency flows was termed interruptible power. The value of interruptible capacity was assumed to be one-half the value of dependable capacity. However, the value of the dependable capacity (and energy) was based on the capacity factor of the total dependable plus interruptible capacity. Therefore, the alternative costs on which the benefits are based reflect much higher dependability and flexibility than actually could be achieved by a single hydropower project. It may be that, through inclusion of a number of these hydropower developments in a large system, the dependability assumed could be achieved through scheduling of the use of the interruptible capacity.

The above analysis, using alternative costs based on low capacity factors and the criterion of maximizing net benefits over costs, tends to maximize the amount of capacity which can be justified at a site. This also reduces the amount of spill and lost energy.

The optimum installation is highly dependent on the interest rate that must be paid by different classes of developers and the cost of fuel for alternative thermal plants. The costs used in this study are computed using a 6-5/8 percent interest rate and 1978 price levels. The benefits are based on FERC generalized power values derived using a 10 percent interest rate and 1978 price levels. The cost of fuel for thermal plant alternatives was not escalated to account for the projected high increases in cost of non-renewable resources required for operation relative to other costs.

Increased emphasis on the national goals of conservation of non-renewable resources and independence from foreign oil imports would greatly enhance the demand for development of the hydropower potential. Non-economic constraints and, to some extent, economics may become secondary in importance to achievement of these goals. Appendix C contains information on the developments which have 1 MW or more potential capacity, but which have been screened out and are not proposed for further study based on current evaluation criteria.

Table 8-1
SERC NEAR TERM POTENTIAL HYDROPOWER DEVELOPMENTS

SITE ID NUMBER 1/	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	($/KW)
ALMSAM0722	PEA RIVER DAM	COFFEE	7867	24687	23.659	706.63
ALISAM0031	LAKE MITCHELL	COOSA	96500	176900	37. 38	836.85
ALISAM0032	GANTT LAKE	COVINGTON	1110	9839	18.641	1214.4
ALCORN0003	BEAR CK RESERVOIR	FRANKLIN	2066	5754	40.129	841.51
ALCORN0005	CEDAR CK. RESERVOIR	FRANKLIN	4032	11817	33.335	878.72
ALCSAM0044	GEORGE W ANDREWS LAKE	HOUSTON	17000	60000	28.927	1191.4
ALCSAM0047	BAYVIEW LAKE	JEFFERSON	1184	3052	43.800	589.42
ALCSAM0054	CLAIBORNE LAKE	MONROE	15000	50373	37. 50	1461.1
ALCSAM0075	LAKE TUSCALOOSA	TUSCALOOSA	17504	38163	36.203	909.45
ALISAM0083	WILLIAM #BILL# DANNELLY LAKE	WILCOX	64307	114844	33.132	715. 9
FLISAM0086	JIM WOODRUFF LOCK + DAM + PD	GADSDEN	19387	71916	17.667	708.41
FLCSAM0084	DEAD LAKES DAM	GULF	2004	13898	23.785	1503.7
GAISAM0101	FLINT RIVER RESERVOIR	DOUGHERTY	2000	7166	33.361	926.90
GAISAM0095	GOAT ROCK LAKE	HARRIS	67000	79090	63.849	926. 9
GAISAM0119	LAKE HARDING	HARRIS	100000	44000	84.842	441.22
GACSAM0122	WATERSHED NO. 26 ETOWAH RIVE	LUMPKIN	1095	3494	43.739	880.30
GACSAM0129	REREGULATION POOL	MURRAY	2961	10827	30.210	973.14
GAGSAM0507	EAGLE-PHENIX	MUSCOGEE	27582	66535	35.596	1034.6
MSCLMK0082	GRENADA DAM	GRENADA	17796	57977	14.138	453.14
MSCLMK0101	SARDIS DAM	PANOLA	23746	80806	12.382	425.19
MSCLMK0111	ENID DAM	YALOBUSHA	10830	25530	20.733	431.45
NCMSAW0011	SAXAPAHAW	ALAMANCE	5089	13032	29.542	649. 4
NCASAW0013	LOCK AND DAM NO 1	BLADEN	800	5785	40.352	2608.7
NCASAW0014	LOCK AND DAM NO 2	BLADEN	450	2568	67.926	3283.8

1/ SEE APPENDIX C FOR EXPLANATION OF SITE ID NUMBER.

Table 8-1
SERC NEAR TERM
POTENTIAL HYDROPOWER DEVELOPMENTS
(Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	($/KW)
NCASAW0015	WILLIAM O HUSKE LOCK AND DAM	BLADEN	640	3845	54.365	2852.3
NCCSAW0026	B EVERETT JORDAN LAKE	CHATHAM	15872	44959	15.610	417.85
NCASAW0022	BYNUM 5/	CHATHAM	1508	6300	43.463	1588.0
NCMSAW0019	LOCKVILLE	CHATHAM	23545	37847	27.218	445.21
NCCSAC0018	BUFFALO CREEK DAM	CLEVELAND	1466	5563	34. 18	908.23
NCISAC0421	HIGH ROCK	DAVIDSON	24922	14550	67.813	395.68
NCOSAW0030	LAKE MICHIE DAM	DURHAM	2199	3753	51.289	558. 6
NCMSAC0031	CAROLINIAN HIGHSCOALS DAM	GASTON	4021	10939	30.450	689.51
NCMSAC0029	MCADENVILLE DAM	GASTON	3164	9013	39.998	1019.1
NCMSAW0043	BUCKHORN FALLS	HARNETT	6698	17696	44.561	1233.3
NCMSAW0048	MT. PLEASANT	HOKE-MOORE	1000	2850	81.910	2010.8
NCISAC0037	LOOKOUT SHOALS	IREDELL	8646	7393	87. 77	724.16
NCMSAW0050	CARBONTON	LEE	1505	5142	47.677	1349.7
NCMSAW0052	HIGH FALLS	MOORE	1090	3093	86. 44	2225.4
NCCSAW0059	TAR RIVER DAM	NASH	6136	12556	35.798	654.46
NCCSAW0062	LAKE HYCO DAM	PERSON	1265	2010	95.915	1128.5
NCMSAW9993	AVALON DAM	ROCKINGHAM	1428	4661	46.869	1198.0
NCCSAW0073	BELEWS LAKE	ROCKINGHAM	2346	8188	29.160	762.21
NCOSAW0077	SPRAY	ROCKINGHAM	3711	4341	71.742	683.16
NCPSAC0047	COOLEEMEE DAM $BURLINGTON MI	ROWAN	3249	8735	38.289	887.72
NCISAC0056	NARROWS DAM $BADIN LAKE®	STANLY	284076	87987	75.581	271.61
NCISAC0055	YADKIN FALLS DAM (FALLS RESE	STANLY	16906	9885	79.256	451.56
NCCSAW0083	FALLS LAKE N.C.	WAKE	8389	24202	29.298	847.33
NCMSAW0085	MILBURNIE LAKE DAM	WAKE	3957	7861	56. 92	1048.6

Table 8-1
SERC NEAR TERM
POTENTIAL HYDROPOWER DEVELOPMENTS
(Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	($/KW)
NCCSAC0071	W. KERR SCOTT	WILKES	7470	23092	27.870	849.20
SCGSAC0077	LOWER PELZER	ANDERSON	3217	1621	172.50	681.95
SCMSAC0086	CHEROKEE FALLS	CHEROKEE	8473	27606	27.938	931.33
SCISAC0088	GREAT FALLS-DEARBORN	CHESTER	8229	3658	179.24	782.92
SCISAC0087	ROCKY CREEK-CEDAR CREEK	CHESTER	20787	2243	365. 1	382.14
SCISAC0090	SPILLWAY (LAKE MARION)	CLARENDON	68379	87021	42.790	655.48
SCCSAC0093	SCNONAME16033 LAKE ROBINSON	DARLINGTON	1683	4860	41.601	861.42
SCGSAS0097	STEVENS CREEK RESERVOIR	EDGEFIELD	23804	32835	58.923	960.78
SCMSAC0743	FORK SHOALS DAM	GREENVILLE	2025	5278	37.144	643.72
SCJSAC0099	HOLIDAYS BRIDGE	GREENVILLE	4838	2956	109.37	527. 4
SCISAC0100	SALUDA	GREENVILLE	5195	2572	133. 9	529.52
SCISAC0103	BUZZARDS ROOST-LAKE GREENWOO	GREENWOOD	14292	1927	352.86	449. 2
SCISAC0106	LAKE WATEREE	KERSHAW	26349	16234	150.67	1118.8
SCISAC0107	FISHING CREEK	LANCASTER	27653	25910	116.23	1332.1
SCGSAC0112	BOYDS MILL	LAURENS	3538	3334	77. 93	527.59
SCJSAC0113	WARE SHOALS	LAURENS	9720	5365	119.65	660. 5
SCISAC0119	PARR SHOALS.	NEWBERRY	18898	23799	41.195	532.72
SCPSAC0130	BERRY SHOALS DAM	SPARTANBURG	2104	6365	38.169	895.47
SCMSAC0136	CLIFTON NO 3	SPARTANBURG	2638	7454	38.406	889.95
SCCSAC0761	PACOLET RIVER DAM	SPARTANBURG	6619	15963	21.130	384.16
SCMSAC0138	PRINT CRASH	SPARTANBURG	1101	3178	42.722	677.33
SCCSAC0132	SCNONAME42006 (W.C. BOWEN LA	SPARTANBURG	1549	4030	41. 60	652.99
TNCORN0200	NORMANDY DAM	COFFEE	4256	11908	35.741	920.59
TNCORN0125	WOODS RESERVOIR	FRANKLIN	5167	14455	36.842	1000.2

Table 8-1
SERC NEAR TERM
POTENTIAL HYDROPOWER DEVELOPMENTS
(Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	($/KW)
VACNA00006	SOUTH RIVANNA DAM	ALBERMARLE	1407	4428	41.931	924.54
VACNA00016	GATHRIGHT DAM	ALLEGHANEY	14779	32177	27. 53	596.26
VAGNA00024	CUSHAW DAM	AMHERST	14755	14941	63.372	662.99
VACNA00050	GEORGE F. BRASFIELD	CHESTERFIELD	14529	28697	26.309	506.47
VAONA00078	EMPORIA DAM	GREENSVILLE	7000	14189	28.482	478.89
VAOSAW0098	HALIFAX DAM	HALIFAX	1581	5452	41.577	1126.3
VAGNAB0158	OCCOQUAN MAIN DAM	PRINCE WILLIAM	5246	10715	47.611	929.46
VAGNA00109	HOLLYWOOD 5/	RICHMOND	17327	45873	32. 82	943.92
VANNA00107	PARK 51	RICHMOND	4176	24547	11.548	509.38
VANNA00110	12TH STREET	RICHMOND CITY	22738	83425	19.937	834.96
VACNA00123	NORTH ANNA DAM	SPOTSYLVANIA	4139	7379	35.977	459.13
VANNA00128	EMBREY	STAFFORD	12913	37923	23.946	766.19

Table 8-2
SERC LONG TERM POTENTIAL HYDROPOWER DEVELOPMENTS

SITE ID NUMBER 1/	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	INCREMENTAL COST ($/KW)
ALCSAM0019	COFFEEVILLE LAKE	CHOCTAW	9000	39000	22.335	1013.4
AL4SAM0038	WALLAHATCHEE	ELMORE	23984	82795	42.445	1912.9
ALCSAM0042	WARRIOR LAKE	HALE	10000	34339	29.609	1121.6
ALCSAM0500	DEMOPOLIS LOD	MARENGO	30000	100000	22.633	898.14
ALCSAM0079	WILLIAM BACON OLIVER LAKE	TUSCALOOSA	15000	54037	22.406	906.38
FL6SAS0001	MACCLENNY	BAKER	8970	22870	233.67	8287.0
GA4SAS0006	MILLEDGEVILLE	BALDWIN	11257	36984	103. 0	4582.1
GACSAS0009	LAKE TOBESOFKEE	BIBB	1229	3738	41.956	797.30
GA4SAS0011	STEEL CREEK	BURKE	22244	87349	99.979	5413.5
GA6SAS0013	LAMAR FERRY	BUTTS	11693	38463	62.541	2709.7
GABSAS0019	AUGUSTA CANAL DIVERSION	COLUMBIA	1822	14817	24. 24	1852.2
GA4SAS0022	LOW STOKES BLUFF	EFFINGHAM	13306	82844	65.400	5565.3
GA6SAS0026	TALLOW HILL	ELBERT	68549	97635	68.485	1310.4
GA6SAS0035	CURRY CREEK	JACKSON	2992	7442	535. 4	18746
GA6SAS0042	DAMES FERRY	JONES	14578	40049	73.320	2654.8
GA6SAS0043	DUBLIN	LAURENS	29942	97738	97.818	4450.6
GA0SAS0049	HIGH FALLS LAKE	MONROE	1474	4152	43.795	837.88
GA6SAS0052	CYPRESS BRANCH	MONTGOMERY	27389	91514	80.464	3693.9
GA4SAM0130	COLUMBUS	MUSCOGEE	35126	118698	39.991	1782.4
GA4SAS0076	EAGLE POINT	RICHMOND	21489	84418	71.616	3796.1
GAASAS0069	NEW SAVANNAH BLUFF POOL	RICHMOND	23737	71465	33.667	1176.8
GA4SAS0074	BULL PEN POINT	SCREVEN	12772	80762	49.459	4187.1
GA4SAS0075	DICKS LOOKOUT POINT	SCREVEN	24919	97899	63.223	3330.2
GA4SAS0073	LOW JOHNSONS LANDING	SCREVEN	23291	91511	56.458	2935.7

1/ SEE APPENDIX C FOR EXPLANATION OF SITE ID NUMBER.

Table 8-2
SERC LONG TERM
POTENTIAL HYDROPOWER DEVELOPMENTS
(Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	INCREMENTAL COST ($/KW)
GA6SAM0120	FRANKLIN	TROUP	43757	120393	56.508	2108.8
GA6SAS0084	TOOMSBORO	WASHINGTON	20015	67396	94.233	4391.2
GA6SAM0144	TILTON	WHITFIELD	13416	27426	66.592	1730.8
GA6SAS0087	ANTHONY SHOALS	WILKES	24815	64940	78.950	2755.7
KY4ORN0040	CELINA DAM	MONROE	108000	280000	75.465	2683.8
NC1SAC0002	BLEWETT FALLS	ANSON	34344	29407	71.215	715.91
NC4ORN0049	NEWFOUND CREEK	BUNCOMBE	124973	229254	26.460	619.14
NC6SAW0024	BYNUM	CHATHAM	17312	50318	86.549	3403.1
NC6SAW0021	MANDALE	CHATHAM	23424	46473	151.60	4137.8
NC6SAW0020	MOORES MILL	CHATHAM	15734	42134	66.389	2300.9
NC6SAW0044	LILLINGTON	HARNETT	26986	68849	72.599	2507.3
NC4SAW0045	SMILEY FALLS	HARNETT	48953	91238	50.767	1230.2
NC7SAS0088	UPPER WHITEWATER	JACKSON	7333	20089	97.644	3519.2
NC5ORN0083	BRUSH CREEK	MADISON	159163	291974	22.885	529.13
NC5ORN0082	PINE CREEK	MADISON	208002	381566	25.280	602.92
NC6SAW0053	HOWARDS MILL LAKE	MOORE	7133	13194	462.95	12080
NC6SAC0445	GREATER BLEWETT FALLS	RICHMOND	150874	350358	61.439	1951.0
NC4SAC0046	MORVEN	RICHMOND	47085	126785	61.132	2213.8
NC9SAW0075	MAYO	ROCKINGHAM	600000	841000	0	0
NC4SAW0074	STONEVILLE	ROCKINGHAM	3993	13159	162.98	7240.4
NC9SAW0079	DANBURY	STOKES	525000	735000	0	0
NC4SAW0078	WALNUT COVE	STOKES	10524	26249	149.11	5070.2
NC6ORN0086	NEEDMORE	SWAIN	43079	102623	49.836	1589.2

Table 8-2
SERC LONG TERM
POTENTIAL HYDROPOWER DEVELOPMENTS
(Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	INCREMENTAL COST ($/KW)
NC7SAS0089	HORSEPASTURE	TRANSYLVANIA	49112	90746	46.270	1126.1
NC7ORN0090	BEECH CREEK	WATUGA	55780	92136	44.151	950.96
NC6SAC0473	LOWER DONNAHA	YADKIN	113475	212792	76.968	2005.8
NC6SAC0072	UPPER DONNAHA	YADKIN	90469	172710	66.466	1740.5
SC6SAC0074	UPPER WARE SHOALS	ABBEVILLE	20217	34367	93.947	2127.2
SC9SAC0757	ROCKY SPRINGS	AIKEN	500000	438000	51.631	596.11
SC1SAC0085	GASTON SHOALS	CHEROKEE	7206	3701	122. 3	546.17
SC6SAC0081	GREATER CHEROKEE FALLS	CHEROKEE	14950	47811	55. 52	2302.2
SC6SAC0082	GREATER GASTON SHOALS	CHEROKEE	115820	177861	73.838	1553.3
SC6SAC0760	BLAIRS A	FAIRFIELD	63104	161743	54.445	1894.1
SC6SAC0749	LYLES FORD	FAIRFIELD	25004	90900	65.560	3256.6
SC6SAC0095	THE FORKS	GREENVILLE	18294	37010	174.93	4889.7
SC6SAC0729	COURTNEY ISLAND	LANCASTER	50589	164301	42.762	1876.5
SC4SAC0766	LOWER SALUDA	LEXINGTON	20000	48000	71.320	2262.4
SC6SAC0118	BLAIR	NEWBERRY	108907	235166	98.517	2952.9
SC7SAS0101	LOWER WHITEWATER	OCONEE	16698	30778	72.492	1719.6
SCMSAS0300	NO. 1 DAN RIVER INC.	PICKENS	6879	14852	25.242	435.14
SCMSAS0301	NO. 2 DAN RIVER INC.	PICKENS	5501	10856	32.848	527.41
SC6SAC0120	FROST SHOALS	RICHLAND	177349	268159	63. 53	1267.1
SC4SAC0763	LOCK/DAM =1	RICHLAND	21460	90107	58.511	3290.2
SC4SAC0764	LOCK/DAM =2	RICHLAND	9336	62692	68.201	6253.0
SC4SAC0765	LOCK/DAM =3	RICHLAND	19527	81988	63.377	3574.5
SC6SAC0728	REREGULATOR	RICHLAND	56522	179009	35.541	1481.2
SC6SAC0125	BURNT FACTORY	SPARTANBURG	9484	26835	116.87	4450.3

Table 8-2
SERC LONG TERM
POTENTIAL HYDROPOWER DEVELOPMENTS
(Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	INCREMENTAL COST ($/KW)
SC6SAC0133	PACOLET	SPARTANBURG	2793	4368	68.451	891.57
SC6SAC0127	TROUGH	SPARTANBURG	6896	18362	109.41	3873.8
SC1SAC0139	NEAL SHOALS	UNION	8321	10714	67. 53	869. 4
SC6SAC0759	TYGER RIVER	UNION	21227	61024	131.99	5278.3
SC6SAC0748	WHITMIRE	UNION	20420	80519	130.79	7250.8
SC6SAC0141	GREATER LOCKHART	YORK	149568	232911	114.72	2505.3
SC6SAC0730	SUGAR CREEK	YORK	26392	88722	55.899	2526.9
TN7ORN0101	PINE CAMP	CARTER	11822	32408	53.429	1844.9
TN4ORN0109	CUMBERLAND GAP	CLAIBORNE	71389	117129	68. 49	1517.5
TN6ORN0108	WAR RIDGE	CLAIBORNE	113289	209420	51.751	1302.2
TN6ORN0114	LONG CREEK	COOKE	86113	217496	24.688	800.83
TN6ORN0129	BEAVER CREEK	GRAINGER	50854	161315	36.636	1545.9
TN6ORN0131	BUCKINGHAM FERRY	GREENE	43313	114701	34.445	1180.6
TN6ORN0143	RIVERDALE	KNOX	71422	227379	25.838	1064.0
TN5LMM0020	BESSIE CUT-OFF	LAKE	58304	504086	33.160	3904.3
TNCORN0201	COLUMBIA DAM	MAURY	21780	52742	17.167	412.76
VA4NA00001	HATTON	ALBERMARLE	17332	56560	59.263	2535.7
VA4NA00009	KING DAM	ALLEGHANEY	13620	30710	67.342	1966.5
VA6NA00034	EAGLE ROCK DAM	BOTETOURT	86265	157906	65.537	1641.1
VA6SAW0094	MELROSE	CAMPBELL	18980	50159	75. 47	2662.2
VA6SAW0095	TABER	CAMPBELL	15403	42564	88.527	3302.6
VA6NA00999	SEVEN ISLANDS NO 1	FLUVANNA	35231	107413	41.929	1679.9
VACNAB0152	GOOSE CR DAM	LOUDOUN	893	3521	45.227	1242.9
VA4NA00103	MAIDENS PROJECT	POWHATAN	62992	209023	27.612	1205.9

Table 8-2
SERC LONG TERM
POTENTIAL HYDROPOWER DEVELOPMENTS
(Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	INCREMENTAL COST ($/KW)
VAMNAB0159	LAKE JACKSON DAM	PRINCE WILLIAM	798	3245	47.882	1374.4
VA4NA00105	BELLE ISLE	RICHMOND	10389	32990	132.16	5691.5
VA4NA00106	BOULEVARD	RICHMOND	41424	122913	46.514	1840.3
VA6NA00116	VARNEY FALLS	ROCKBRIDGE	18723	42160	82.538	2468.2
VA6NA00125	FREDERICKSBURG DAM	STAFFORD	15334	38619	69.132	2291.6
VA6NA00126	SALEM CHURCH	STAFFORD	72682	126196	79.213	1889.6

Table 8-3
ADDITIONAL HYDROPOWER POTENTIAL
(MW)

	Near-Term Potential				Long-Term Potential				Total Potential			
	Base	Inter.	Peak	Total	Base	Inter.	Peak	Total	Base	Inter.	Peak	Total
VACAR	0.8	403.3	418.6	322.7	9.4	1,359.9	2,981.1	4,350.4	10.2	1,763.2	3,399.3	5,173.1
SOUTHERN	4.0	418.0	-	422.0	1.8	349.4	68.5	419.7	5.8	767.4	68.5	841.7
FLORIDA	19.8	-	-	19.8	-	9.0	-	9.0	19.8	9.0	-	28.8
TVA	-	67.9	-	67.9	58.3	464.5	113.3	636.1	58.3	532.4	113.3	704.0
SERC	24.6	889.2	418.6	1,332.4	69.5	2,182.8	3,162.9	5,415.2	94.1	3,072.0	3,581.5	6,747.6

GLOSSARY OF TERMS

AVERAGE LOAD - the hypothetical constant load over a specified time period that would produce the same energy as the actual load would produce for the same period.

BENEFIT-COST RATIO (B/C) - the ratio of the present value of the benefit stream to the present value of the project cost stream computed for comparable price level assumptions.

BENEFITS (ECONOMIC) - the increase in economic value produced by the hydropower addition project, typically represented as a time stream of value produced by the generation of hydroelectric power. In small hydro projects this is often limited for analysis purposes to the stream of costs that would be representative of the least costly alternative source of equivalent power.

CAPABILITY - maximum kilowatt capability of the system with all power sources available, with no allowance for outages, and with sufficient kilowatt-hours to supply the requirements of the system.

CAPACITY - the maximum power output or load for which a turbine-generator station or system is rated.

CAPACITY VALUE - that part of the market value of electric power which is assigned to dependable capacity.

COSTS (ECONOMIC) - the value required to produce the hydroelectric power.

DEMAND - SEE LOAD.

DEPENDABLE CAPACITY - the load carrying ability of a hydropower plant under adverse hydrologic conditions for the time interval and period specified of a particular system load.

ENERGY - the capacity for performing work. The electrical energy term generally used is kilowatt-hours and represents power (kilowatts) operating for some time (hours).

ENERGY VALUE - that part of the market value of electric power which is assigned to energy generated.

FEASIBILITY STUDY - an investigation performed to formulate a hydropower project and definitively assess its desirability for implementation.

FEDERAL ENERGY REGULATORY COMMISSION (FERC) - an agency in the Department of Energy which licenses non-Federal hydropower projects and regulates interstate transfer of electric energy. Formerly the Federal Power Commission (FPC).

FIRM ENERGY - the energy generation ability of a hydropower plant under adverse hydrologic conditions for the time interval and period specified of a particular system load.

FOSSIL FUELS - refers to coal, oil, and natural gas.

GIGAWATT (GW) - one million kilowatts.

HEAD, GROSS (H) - the difference in elevation between the headwater surface above and the tailwater surface below a hydroelectric power plant, under specified conditions.

HYDROELECTRIC PLANT OR HYDROPOWER PLANT - an electric power plant in which the turbine-generators are driven by falling water.

INSTALLED CAPACITY - the total of the capacities shown on the nameplates of the generating units in a hydropower plant.

KILOWATT (KW) - one thousand watts.

KILOWATT-HOUR (KWH) - the amount of electrical energy involved with a one kilowatt demand over a period of one hour. It is equivalent to 3,143 BTU of heat energy.

LOAD - the amount of power needed to be delivered at a given point on an electric system.

LOAD CURVE - a curve showing power (kilowatts) supplied, plotted against time of occurrence, and illustrating the varying magnitude of the load during the period covered.

LOAD FACTOR - the ratio of the average load during a designated period to the peak or maximum load occurring in that period.

MEGAWATT (MW) - one thousand kilowatts.

MEGAWATT-HOURS (MWH) - one thousand kilowatt-hours.

NUCLEAR ENERGY - energy produced largely in the form of heat during nuclear reactions, which, with conventional generating equipment, can be transferred into electric energy.

NUCLEAR POWER - power released from the heat of nuclear reactions, which is converted to electric power by a turbine-generator unit.

PEAKING CAPACITY - that part of a system's capacity which is operated during the hours of highest power demand.

PEAK LOAD - the maximum load in a stated period of time.

PLANT FACTOR - ratio of the average load to the installed capacity of the plant, expressed as an annual percentage.

POWER (ELECTRIC) - the rate of generation or use of electric energy, usually measured in kilowatts.

POWER POOL - two or more electric systems which are interconnected and coordinated to a greater or lesser degree to supply, in the most economical manner, electric power for their combined loads.

PREFERENCE CUSTOMERS - publicly-owned systems and non-profit cooperatives which by law have preference over investor-owned systems for the purchase of power from Federal projects.

PROJECT SPONSOR - the entity controlling the small hydro site and promoting construction of the facility.

PUMPED STORAGE - an arrangement whereby electric power is generated during peak load periods by using water previously pumped into a storage reservoir during off-peak periods.

RECONNAISSANCE STUDY - a preliminary feasibility study designed to ascertain whether a full feasibility study is warranted.

SECONDARY ENERGY - all hydroelectric energy other than FIRM ENERGY.

SPINNING RESERVE - generating units operating at no load or at partial load with excess capacity readily available to support additional load.

STEAM-ELECTRIC PLANT - a plant in which the prime movers (turbines) connected to the generators are driven by steam.

SURPLUS POWER - generating capacity which is not needed on the system at the time it is available.

SYSTEM, ELECTRIC - the physically connected generation, transmission, distribution, and other facilities operated as an integral unit under one control, management or operating supervision.

THERMAL PLANT - a generating plant which uses heat to produce electricity. Such plants may burn coal, gas, oil, or use nuclear energy to produce thermal energy.

THERMAL POLLUTION - rise in temperature of water such as that resulting from heat released by a thermal plant to the cooling water when the effects on other uses of the water are detrimental.

TRANSMISSION - the act or process of transporting electric energy in bulk.

TURBINE - the part of a generating unit which is spun by the force of water or steam to drive an electric generator. The turbine usually consists of a series of curved vanes or blades on a central spindle.

WATT - the rate of energy transfer equivalent to one ampere under a pressure of one volt at unity power factor.

WHEELING - transportation of electricity by a utility over its lines for another utility; also includes the receipt from and delivery to another system of like amounts, but not necessarily the same energy.

APPENDICES

NATIONAL HYDROPOWER STUDY
VOLUME XVII
EAST CENTRAL AREA ELECTRIC RELIABILITY COUNCIL

Appendix A
METHODOLOGY FOR EVALUATION OF POTENTIAL HYDROPOWER DEVELOPMENT

CONTENTS

LIST OF TABLES

Appendix A
METHODOLOGY FOR EVALUATION OF POTENTIAL HYDROPOWER DEVELOPMENT

A.1 GENERAL PROCEDURE

The evaluation of potential hydropower sites was accomplished through a series of computation and screening stages. These stages were designed to apply more detailed and accurate analyses to a successively smaller number of potential sites. However, it is important to note that the evaluations for this study were preliminary reconnaissance level; therefore, evaluations are based on a very cursory analysis of best available data with no site visits performed. Liberal assumptions were employed throughout the process to avoid eliminating potentially feasible hydropower additions, as discussed below.

Inasmuch as detailed estimates were not made, the potential incremental capacity and energy estimates overstate the actual power which can be developed in most cases, particularly at existing projects. This results from the need to maintain satisfactory water levels and releases for other vital project purposes such as flood control, water supply, navigation, base flow stabilization, recreation, fish and wildlife, and environmental values.

Cost estimates were based on empirical cost curves and power benefits were based on generalized power values for the region furnished by the Federal Energy Regulatory Commission (FERC). The capacity factor of the potential hydropower development was used to select the most likely alternative. The computation of the hydropower plant factor assumed that the water would be available and could be released when needed to fulfill the power demand. Unless storage is available in the system which would allow the capacity to be used when needed, this assumption overstates the benefits of low capacity factor developments.

The economic analysis technique of maximizing net benefits over costs resulted in low plant factor operation. A peaking power operation could require more reservoir storage than is available for regulating power flows or could cause fluctuations in the surface elevation of the reservoir or downstream flow that would not be acceptable.

Detailed consideration of the social, economic, institutional, and environmental constraints associated with hydropower development was not included in the analysis.

The value of non-power benefits foregone and/or the cost of mitigation due to changes in the operation of existing projects for additional hydropower production were not determined. Also additional benefits for other potential project purposes were not determined.

No consideration was given to elevating existing dams to increase the hydropower potential of existing sites.

New pumped storage sites, other than those included in current Corps studies, were not identified because of time and resource constraints on the study. There are numerous potential pumped storage sites within the mountainous areas of the Southeastern United States. The FERC regional office in Atlanta, Georgia has made preliminary studies to identify the better sites in some areas.

A.2 FIRST STAGE SCREENING

The first stage of analysis and screening was based only on the physical power potential at the site and was used essentially to determine which sites would be included in the National Hydropower Study (NHS) preliminary computer data base.

In the first stage, extensive use was made of the existing computer data base developed by the Corps in a National Program of Inspection of Dams. For purposes of the National Hydropower Program, the earlier data base provided name, location, maximum storage capacity, and maximum hydraulic height of dam for some 11,500 existing dams within the SERC region. Since drainage area and flow data were not given, some assumptions had to be made which would allow a relative assessment of the potential at each site. The assumptions used were based on the rationale that height of dam and storage capacity provided in the construction of the dam would give some indication of the flow at the dam. The assumptions used were: that continuous flow would be available sufficient to refill the maximum storage capacity of the reservoir in each 24-hour period; that this flow could be converted to power with a net head equal to the maximum hydraulic height of the dam; and that the combined efficiency of this conversion would be 85 percent. Thus the equation:

$$KW = \frac{QHE}{11.8} = 0.072\ QH$$

where KW = power in kilowatts
Q = flow in cubic feet per second
H = net power head in feet
E = efficiency
11.8 = conversion factor

Since one acre-foot yields approximately 0.5 cubic feet per second for a 24-hour period,

$$KW = 0.072 \times 0.5\ SH = 0.36\ SH$$

where S = storage in acre-feet

This computation, with its associated assumptions, gave an extremely optimistic estimate of power potential for most dams. The screening level based on these results was 1,000 KW (1 MW). Data on all existing dams which met this screening criterion were transferred by machine to the National Hydropower data base.

The above storage equation does not properly evaluate the power potential of dams with little storage but located on streams with large flows. Therefore, these sites were retained in the inventory for further evaluation. Also, all projects with existing or retired power plants were retained.

Data on undeveloped sites which met this screening criterion were coded by field personnel, keypunched, and added to the National Hydropower data base.

A.3 STAGE 2 SCREENING

The second stage provided for a hydrologic, power, energy, and economic analysis and a screening on both power potential and benefit-to-cost ratio. During this stage, only the specific power facilities (i.e., turbines, generators, powerhouse, etc.) were considered in the economic analysis. A minimum capacity of 1 MW and a BCR of 1.0, based on the costs of specific power facilities only, were required to retain the sites in the active inventory.

Information required for the second stage screening consisted of the following: power potential in kilowatts; average annual energy in kilowatt-hours; annual costs for construction, operation and maintenance of the power features of the projects; and annual benefits from the power potential.

Annual benefits were computed in each case based on the power potential, the average annual energy, the average annual plant factor, and regionalized unit benefit values provided by FERC.

These benefits were derived using a 10 percent interest rate and July 1978 price levels. Annual costs were computed in each case based on parametric cost estimating curves developed for this purpose which related construction costs of the power features to power potential in kilowatts and design head for the project. Allowances for contingencies, engineering, design, supervision, and administration were added to the construction costs to determine a total investment cost. Costs were based on July 1978 price levels.

The total investment was annualized assuming a 50-year life and an interest rate of 6-5/8 percent. Estimated annual costs of operation, maintenance, and major replacement were then added to the annual investment cost to determine the total annual project cost.

In order for the computer program to compute the costs, benefits, power potential, and the average annual energy, the average net power head (assumed to be the design head) and the FERC regionalized benefit were determined. The field personnel were given three options for providing this information. First, information from a previous study could be entered into the data base. Second, an estimate, performed specifically for this study could be entered. Third, sufficient basic data to allow machine computation of this required information could be entered into the data base along with a coded request for machine computation.

Basic data required for the third option included drainage area above the site, the average net power head, and a selected representative U.S. Geological Survey (USGS) streamflow gauge. Field office determination of the drainage area was mandatory. However, options were given on the other two items. In the event the average net power head was not estimated by the field, a machine determination was made based on either the maximum hydraulic height of dam (mandatory) or on the height to normal retention (optional). Assumptions made in the machine selection resulted in an average net head equal to 85 percent of the height to normal retention, when given, or to 72.25 percent of the maximum hydraulic height of dam when the height to normal retention was not given. In the event that field personnel opted not to select a representative USGS flow gauge, the latitude and longitude of the dam site were required as input data. Given drainage area, latitude, and longitude, the computation routines automatically selected a gauge representative of the dam site.

Given an average net power head and a representative streamflow gauge, the machine computations proceeded as follows: historical daily flows at the representative gauge site were converted to a flow-duration curve; the gauge flow-duration curve was transferred to the dam site by a simple drainage area ratio; and the resulting dam-site flow-duration curve was converted to a power-duration curve by multiplying each flow ordinate by the average net power head and a conversion factor of 1/11.8 or 0.08475.

For each of 10 points on the power-duration curve, ranging from the value exceeded 95 percent of time to 5 percent of time, the following computations were performed: average annual energy was assumed to be equal to the area of the power-duration curve below the selected power ordinate; dependable capacity was taken to be that available 85 percent of the time; average annual plant factor was computed using the selected power capacity and the average annual energy; unit capacity and energy values were selected from the FERC power benefit curves and multiplied by the selected power capacity and average annual energy to obtain annual benefits; total annual power costs were computed, as stated above, based on the selected power capacity and the average net head; and finally the benefit-to-cost ratio and annual net benefits were calculated.

A curve was fitted to the 10 values of annual net benefits obtained above and the point of maximum net benefits within the range of investigation (values exceeded 5 to 95 percent of the time) was determined.

The power potential and average annual energy computed at this point of maximum net benefits were selected for subsequent screening and were printed in a Corps report entitled "National Hydroelectric Power Resources Study - Preliminary Inventory of Hydropower Resources" in July 1979 for those projects with power potential greater than 50 kilowatts and a benefit-to-cost ratio greater than one.

Table A-1 shows the regionalized benefit rates for the SOUTHERN and VACAR subregions of SERC as provided by FERC on 23 June 1978.

Tables A-2 and A-3 show the parametric cost data for power features which were used in the second stage computer analyses.

A.4 STAGE 3 SCREENING

The third stage consisted of two distinct phases. The first phase allowed for a much improved physical analysis of the power potential at each site as well as an improved cost analysis. During this phase, the total cost of development (i.e., dams, reservoirs, relocations, etc.) was estimated for each undeveloped site based on best available data with no site visits performed. Field office personnel were given considerable latitude in judgement during this phase; hydrologic analysis could be specified as either a flow-duration technique or as a sequential analysis using average monthly inflows; capacity selection could be based on maximum net benefits, minimum cost per unit of energy, average annual plant factor, or as the result of some previous study of power potential at the site; and cost estimates could be refined by field input of certain specific cost items unique to the site.

Within the SERC region, the project hydropower capacity was selected on the basis of maximum net benefits. A BCR of 1.0 or better was required to retain existing projects in the active inventory (sites proposed for further study). A BCR of 0.7 was required to retain undeveloped single purpose hydropower sites on the basis that there would most likely be other project purposes sharing in the project cost. A BCR of less than 0.7 for undeveloped sites was permitted in cases where there was sufficient study data available to show that the benefits to other project purposes might justify a project.

The cost estimating and computation procedures were refined for stage three. This is explained in detail in Volume XIII of the NHS report.

Second Phase

The second phase of stage three involved the collection of available information on the environmental, social, and institutional impacts and the general public attitude toward development of sites remaining after the first phase screening.

Sites remaining in the inventory after the third screening were coordinated with states in the region, and public meetings were held to present the results of screening activities and to solicit comments from interested parties, as discussed in Chapter 6. Much information was received in correspondence resulting from the public meetings. Each site was examined by personnel with expertise in environmental, social, and institutional areas to determine the impacts of hydropower development.

Table A-1
FERC REGIONAL POWER VALUES
SERC
(June 1978)

	SOUTHERN		VACAR	
APF[1]	Capacity ($/KW-Yr)	Energy (mills/KWH)	Capacity ($/KW-Yr)	Energy (mills/KWH)
0	30.10	45.0	25.10	45.3
10	21.20	45.0	25.50	45.3
20	12.30	45.0	25.90	45.3
30	45.00	35.7	40.90	35.7
40	43.10	35.7	31.00	35.7
50	109.50	9.1	120.10	11.0
60	111.80	9.1	121.80	11.0
70	170.70	4.8	179.00	4.8
80	175.50	4.8	184.30	4.8
90	180.40	4.8	189.60	4.8
100	185.30	4.8	194.90	4.8

1/Annual plant factor.
2/July 1978 price level, 10 percent financing.

Table A-2
SINGLE UNIT POWER PLANT COST
($1,000)

Installed Capacity (MW)	Design Head (ft)									
	10	20	30	40	50	60	70	80	90	100
.1	145	90	64	44	41	38	36	33	30	26
.2	185	130	80	52	49	46	42	39	36	32
.3	230	150	95	61	57	53	49	45	41	37
.4	300	180	115	71	67	62	57	53	49	44
.5	370	210	135	84	77	70	64	59	54	50
.6	470	260	160	98	91	84	77	71	65	60
.7	600	300	180	110	103	96	90	83	74	69
.8	760	340	210	131	122	113	105	96	87	79
.9	960	390	250	160	147	134	122	113	105	97
1.0	1,200	440	280	180	167	153	140	131	122	114
2.0	1,450	1,000	810	640	582	526	470	441	413	385
3.0	1,800	1,550	1,450	1,400	1,306	1,213	1,120	1,040	966	890
4.0	2,300	2,100	2,100	2,100	2,040	1,970	1,900	1,800	1,700	1,600
5.0	3,200	3,100	3,100	3,100	2,980	2,870	2,750	2,630	2,500	2,400
6.0	4,600	4,100	4,100	4,100	3,983	3,870	3,750	3,600	3,450	3,300
7.0	5,800	5,300	5,300	5,300	5,170	5,030	4,900	4,730	4,570	4,400
8.0	7,000	6,700	6,700	6,700	6,530	6,370	6,200	6,000	5,800	5,600
9.0	8,700	8,200	8,200	8,200	7,970	7,730	7,500	7,270	7,030	6,800
10.0	10,000	10,000	10,000	10,000	9,570	9,130	8,700	8,430	8,170	7,900

1/July 1978 price level

Table A-2 (Continued)
SINGLE UNIT POWER PLANT COST
($1,000)

Installed Capacity (MW)	Design Head (ft)																		
	10	20	30	40	50	60	70	80	90	100	200	300	400	500	600	700	800	900	1,000
10	10,000	10,000	10,000	10,000	9,570	9,130	8,700	8,430	8,170	7,900	6,400	5,600	5,400	5,300	5,200	5,100	5,000	5,000	5,000
20	-	15,000	15,000	15,000	14,400	13,800	13,200	12,400	11,600	10,800	7,400	6,700	6,500	6,200	6,100	6,000	5,900	5,600	5,600
30	-	-	18,500	18,500	17,530	16,570	15,600	14,500	13,400	12,300	8,800	8,000	7,200	7,200	7,000	7,000	6,700	6,600	6,600
40	-	-	-	20,000	19,170	18,330	17,500	16,330	15,170	14,000	10,000	9,300	8,500	8,100	8,000	8,000	7,900	7,900	7,900
50	-	-	-	25,000	23,170	21,330	19,500	18,170	16,830	15,500	11,400	10,200	9,500	9,000	8,900	8,700	8,600	8,500	8,300
60	-	-	-	28,500	26,270	24,033	21,800	20,370	18,930	17,500	13,000	11,000	10,400	10,000	9,900	9,700	9,100	9,100	8,900
70	-	-	-	31,500	29,000	26,500	24,000	22,600	21,200	19,800	14,100	12,800	11,500	11,000	10,800	10,400	10,200	10,000	9,900
80	-	-	-	35,000	32,170	29,333	26,500	25,000	23,500	22,000	13,500	13,500	12,500	11,900	11,200	11,000	10,900	10,500	10,500
90	-	-	-	38,000	35,000	32,000	29,000	27,330	25,670	24,000	17,000	14,500	13,000	12,700	12,100	12,000	11,800	11,500	11,400
100	-	-	-	41,000	37,830	34,670	31,500	29,660	27,830	26,000	18,100	15,500	14,000	13,300	12,900	12,600	12,200	12,000	11,800
120	-	-	-	47,000	44,000	41,000	38,000	36,300	34,670	33,000	21,000	18,000	16,000	15,000	14,600	14,000	13,500	13,100	13,000
140	-	-	-	55,000	50,000	47,000	44,000	42,000	40,000	38,000	24,000	20,000	17,800	16,700	16,000	15,300	15,000	14,500	14,200
160	-	-	-	-	-	-	-	-	-	43,000	26,800	21,600	19,000	17,500	17,000	16,500	16,000	15,500	15,000
180	-	-	-	-	-	-	-	-	-	48,000	29,500	23,500	20,800	19,400	18,300	17,800	17,000	16,700	16,500
200	-	-	-	-	-	-	-	-	-	53,000	32,000	25,500	22,500	20,800	19,700	18,700	18,100	17,800	17,300

1/July 1978 price level.

Data collected on environmental impacts were generally qualitative rather than quantitative. However, data on social impacts (relocation, inundations, etc.) were generally easier to identify in quantitative terms. Institutional (political, social support/opposition) was the most easily identified factor. Identified impacts were recorded in the computer inventory on each site for future reference.

The following categories were eliminated from the list of sites recommended for further study:

- Sites on designated National Wild and Scenic Rivers.
- Sites on streams qualified as National Wild and Scenic Rivers.
- Sites on designated State Scenic Rivers.
- Sites on designated Outstanding State Waters.
- Sites which would impact large areas of natural protective habitat.
- Sites opposed by state governments.
- Sites which would require excessive relocations of homes, businesses, roads.
- Sites located in national military parks or installations.
- Sites located in national recreational areas.

Sites which have been recommended for study under the provisions of Section 5(a) of the Wild and Scenic Rivers Act will not be given further study for hydropower development until the potential conflict in use is resolved. Similarly, sites with other significant environmental/social/institutional conflicts which are not expected to be resolved in the near future will not be proposed for near-term study.

It should be noted that the screening of projects during the second phase of stage 3 was essentially by judgement of Corps district personnel based on information available, the response from public meetings, comments received during coordination of the draft report, meetings with state agencies, and the experience of working intimately in the development of water resources within the region. On-site cultural resources assessments and other detailed studies will be necessary if and when further studies are made.

The results of the screening activities are given in Chapter 7.

NATIONAL HYDROPOWER STUDY
VOLUME XVI
SOUTHEASTERN ELECTRIC RELIABILITY COUNCIL

Appendix B
PUBLIC INVOLVEMENT

Appendix B
PUBLIC INVOLVEMENT

Two public meetings were held in Atlanta, Georgia, to discuss regional aspects of the National Hydropower Study. The first public meeting was held at the Civic Center on 10 April 1980. Colonel Marvin W. Rees presided over the meeting. About 6,200 notices were mailed to public and private interests and individuals believed to have an interest in hydropower development. The purposes of the meeting were to explain the study authority, objectives, organization, procedures, limitations, schedule, progress, and preliminary results of the economic screening, and to solicit public input to the study. Public comments were requested regarding the validity of the physical data and operational assumptions used in the computation of potential hydropower, and on the environmental, social, and institutional aspects of development of listed sites for hydropower.

Seventy-two persons attended the meeting including Corps of Engineers staff members. A cross section of representatives attended.

Nine statements were made at the meeting concerning the study. Spokesmen for the Florida Department of Environmental Regulation, Florida Defenders of the Environment, and the Florida Audubon Society requested that the Cross Florida Barge Canal, the Yellow River, and the Dead Lakes areas not be considered for hydropower development because of proposed restoration plans and environmental impacts. A spokesman for the Georgia Wildlife Federation opposed destruction of natural resources for hydropower development.

A spokesman for the Putnam County Development Authority in Florida expressed support for development of hydropower to reduce oil imports. A spokesman for Charles T. Main, Inc., also encouraged and supported the National Hydropower Study. A spokesman for D&H Construction Company in North Carolina asked that updated inventory data be made available on request.

A spokesman for the U.S. Department of Energy (DOE) related current DOE programs for research, study, and financing construction of small hydropower developments by non-Federal developers.

The North Carolina State Level B study manager requested that the legal and institutional aspects of getting hydropower developed be addressed. He requested that the study recommend who should study and evaluate the worthwhile sites further. Also, he suggested that the study recommend policy changes, including incentives, which would encourage study and expedite development of sites. This will be included in another volume of the national study report being prepared under the direction of the Institute for Water Resources.

A spokesman for the Municipal Energy Agency of Mississippi requested clarification of the Corps' policy regarding non-Federal development of existing Corps projects. The Corps of Engineers is committed to sound hydropower development, in the interest of promoting national energy self-sufficiency. The Corps continues to encourage non-Federal development at Corps dams, as long as the integrity of the structure and the operation for authorized project purposes is maintained. In addition, hydropower should be developed to its potential at each site, compatible with project operation for other project purposes. The Corps stands ready to provide necessary assistance to potential nonfederal hydropower developers, in furtherance of these requirements, and in support of the President's Rural Energy Inititative.

Fifty official written responses regarding the study of the SERC region were received in response to the public meeting in addition to the nine prepared statements presented at the meeting. These are appended to the record of minutes of the meeting which is available for public review in the South Atlantic Division, Corps of Engineers office at 30 Pryor Street, S.W., Atlanta, Georgia.

Correspondence describing the non-economic impacts of hydropower developments has been attached to this appendix to the report. Numerous letters were received in opposition to development of the Salem Church dam site on the Rappahannock River in Virginia and the Goose Creek dam site on the Altamaha River. Since these sites have been deleted from the inventory this correspondence has not been included.

The second public meeting was also held at the Civic Center in Atlanta, on 26 August 1980. Colonel Pleasant H. West presided at the meeting. Over 6,000 notices were mailed for this meeting. The purpose of this meeting was to present the preliminary findings of the study, including the load-resources analysis, to show the use made of information provided by citizens as a result of the previous public meeting, and to provide an opportunity for further public comment. About 1,000 copies of a draft report were distributed on 22 August 1980. Additional copies were available to those attending the public meeting.

Seventy-seven persons recorded their attendance at the public meeting, representing a cross section of private citizens, private business, and local, state, and Federal agencies having an interest in potential hydropower developments and impacts. Five persons made public statements at the meeting. Two of these expressed opposition to developments on the Broad River. A spokesman for the Appalachian Council of Governments expressed support for hydropower development. A representative of Charles T. Main, Inc., stated that the Corps capacity estimates are overstated. A spokesman for the U.S. Fish and Wildlife Service requested that the latest technology be used to reduce the mortality of fish passing through penstocks and to maintain acceptable water quality and dissolved oxygen levels required to perpetuate fisheries.

Sixty-seven official written responses were received in response to the second public meeting and the draft report. These are appended to the record of the public meeting which is available for public review in the South Atlantic Division, Corps of Engineers office. Those letters which give an insight into the non-economic impacts and problems associated with hydropower development are attached to this appendix to the report.

Data on potential hydropower developments in the inventory have been furnished on request in response to inquiries from various individuals, consultants, research organizations, government agencies, and utilities. Data for the study inventory were obtained from numerous private and public sources as time and resources permitted.

Appendix B
ATTACHMENT
CORRESPONDENCE ON NON-ECONOMIC COSTS AND BENEFITS OF HYDROPOWER DEVELOPMENTS

TABLE OF CONTENTS

J. E. Autry, Jr., Chairman
D. Jack Baker, Vice Chairman
Frank S. Twitty, Sr., Attorney
Joel T. Faircloth, Warden
Camilla Clinic, County Physicians
Clifford Lee, County Agent

BOARD of COMMISSIONERS ROADS and REVENUES MITCHELL COUNTY

Phone 336-5352 - P. O. Box 187

DeLena B. Davidson, Clerk

CAMILLA, GA.

Members of Board

J. E. Autry, Jr., Hinsonton
D. Jack Baker, Sale City
J. Harry Collins, Camilla
Howard Davis, Hopeful
Walter Pollock, Pelham

April 8, 1980

Southwest Georgia Planning & Development Commission
Post Office Box 346
Camilla, Georgia 31730

Gentlemen:

Please find enclosed a resolution unanimously adopted by the Mitchell County Board on this date, April 8th, 1980. The Mitchell County Board of Commissioners are definitely against a dam being constructed at said location as it will be detrimental to the farming, wildlife, also buildings and roads.

Yours truly,

J. E. Autry, Jr., Chairman
MITCHELL COUNTY BOARD OF COMMISSIONERS

WHEREAS, it was brought to the attention of the Board of Commissioners of Mitchell County that the Army Corps of Engineers will hold a public hearing in Atlanta on Thursday, April 10, 1980, concerning the construction of a dam on the Flint River and to be known as the Vada Dam and Locks, and

WHEREAS, many concerned citizens of Mitchell County have expressed their opposition to the construction of said dam because of their fear to the disturbance to the river and its distruction of wildlife, the flooding of farm lands, roads and highways, and

WHEREAS, the Board of Commissioners has been requested to go on record as officially opposing the construction of said dam as now proposed;

NOW THEREFORE, AFTER DUE CONSIDERATION, BE IT RESOLVED that the Board of Commissioners go on record as opposing the erection of the proposed dam because of its adverse effect upon the Flint River and the environmental impact, the flooding of roads, farm property and highways, and

BE IT FURTHER RESOLVED that a copy of this resolution be spread upon the minutes of the Board and a copy immediately forwarded to the Army Corps of Engineers and to all other interested parties.

Unanimously adopted this _____ day of April, 1980.

BOARD OF COMMISIONERS OF
MITCHELL COUNTY

By ______________________

Attest:

Clerk

FLORIDA SOLAR COALITION

935 ORANGE AVE • WINTER PARK, FLORIDA 32789 • TEL. (305) 644-5377

April 20, 1980

U. S. Army Engineer Division,
South Atlantic
510 Title Building
30 Pryor Street, S. W.
Atlanta, Georgia 30303

Gentlemen:

I write to express the views of the Florida Solar Coalition with respect to certain proposed hydroelectric facilities in Florida. We understand that a public meeting was held in Atlanta on April 10. and that th record is being held open until April 25. We ask that our statement be included in that record.

While we heartily favor renewable energy sources, we have strong reservations about three potential Florida sites: Rodman Dam, Buckman Lock and Inglis Bypass. Our reasons are as follows.

Florida's low and relatively flat physiography requires large and shallow reservoirs with high rates of evaporation. Trapped nutrients produce nuisance water weeds. Frequent draw-downs are necessary to control weeds and to restore water quality. This also interrupts power generation.

The net energy gain from these low-potential sites is small and probably negative if we consider construction, operation and transmission.

In many cases, natural energies can better be used to maintain natural and self-maintaining ecosystems. These provide benefits in water purification, flood control, fisheries, wildlife and recreation. We believe that to be the case at these sites where, again, potential power output is small.

We trust that many sites in the nation identified by the Corps will become renewable energy souces. We believe that these three should not.

Sincerely,

John O. Blackburn
Florida Solar Coalition

United States Department of the Interior

OFFICE OF THE SECRETARY

Southeast Region / Suite 1412 / Atlanta, Ga. 30303
Richard B. Russell Federal Building
75 Spring Street, S. W.

April 24, 1980

Major General Joseph K. Bratten
South Atlantic Division
U. S. Army Corps of Engineers
30 Pryor Street, S. W.
510 Title Building
Atlanta, Georgia 30303

ATTENTION: Colonel Marvin W. Rees

Dear General Bratten:

This letter provides comments on the National Hydroelectric Power Study as we were invited to do by your Notice of 17 March 1980. We note that hydropower sites will be dropped from your list if facts are presented which would make the site objectionable.

The Heritage Conservation and Recreation Service (HCRS) and Fish and Wildlife Service (FWS) within this Department have reviewed the information in your fact sheet and list of hydropower sites. We recommend deletion of certain sites and offer comments as follows:

There are numerous sites that are within or near river segments that appear in our Nationwide Rivers Inventory. On August 2, 1979, President Carter directed that:

> Each federal agency shall, as part of its normal planning and environmental review process, take care to avoid or mitigate adverse effects on rivers identified in the Nationwide Inventory, prepared by the Heritage Conservation and Recreation Service in the Department of the Interior. Agencies shall, as part of their normal environmental review processes, consult with the Heritage Conservation and Recreation Service prior to taking actions which could effectively foreclose wild, scenic, or recreational river status on rivers in the Inventory.

The Nationwide Inventory is a preliminary screening process being conducted by the Heritage Conservation and Recreation Service to identify potential future additions to the National Wild and Scenic Rivers System. The resulting lists form a pool of rivers likely to qualify for inclusion in the System, and from which rivers may be selected for state or local action or recommended for Congressional action.

Those sites that would affect river segments included in the Inventory are underlined on the enclosed list. While these rivers are definitely high quality river resources having potential for Wild and Scenic River designation, we are not requesting deletion of all the identified hydropower sites at this time. We do, however, expect the Corps to take appropriate notice of our interest in these particular river segments.

Among the sites identified by the Corps, there are a number that are of particular concern since they would affect certain river segments in our Inventory warranting special attention and treatment. These are as follows:

Site TN60RN0156 on the Obed River would adversely affect the existing Obed National Wild and Scenic River, and we therefore request that this site be deleted.

Site TN60RN0157 on the Buffalo River would adversely affect a portion of the river found qualified for National Wild and Scenic River designation, and we therefore request that this site be deleted.

Sites NC50RN0085, TN60RN0131, and TN70RN0130 on the Nolichuckey River would adversely affect the existing recreational significance of the river, and we therefore request that these sites be deleted.

There are additional sites that are within or would otherwise adversely affect river segments that we have identified from our Inventory as having exceptional potential for Wild and Scenic River designation and have specifically recommended for study under the provisions of Section 5(a) of the Wild and Scenic Rivers Act. Therefore, we request that the following sites be deleted:

FLCSAJ0009	Moss Bluff	Oklawaha River
FLASAJ0016	Rodman Dam	"
FLCSAM0084	Dead Lakes	Chipola River
GA6SAS0013	Lamar Ferry	Ocmulgee River
GA6SAS0042	Dames Ferry	"
GAMSAS0050	Juliette Dam	"
NC9SAW0079	Danbury	Dan River
NC4SAW0078	Walnut Cove	"
NC40RN0049	Newfound Creek	French Broad River
NC50RN0082	Pine Creek	"
NC50RN0083	Brush Creek	"
TN50RN0114	Long Creek	"

We wish to call your attention especially to site FLASAJ0016, Rodman Dam. The Cross Florida Barge Canal Project (of which Rodman Dam is a part) has been recommended for deauthorization, and, in some cases, the disassembly of certain facilities, including Rodman Dam, has been proposed by the Secretaries of Agriculture and Army and endorsed by this Department.

Should any additional sites be considered by the Corps for listing in the hydropower study as a result of recent public meetings, we request that the Heritage Conservation and Recreation Service be contacted for information on the nationwide power inventory. For the southeast region that address is:

Heritage Conservation and Recreation Service
U. S. Department of the Interior
Rm. 1176 Richard B. Russell Federal Building
75 Spring Street, S. W.
Atlanta, Georgia 30303

For Virginia, the address is:

Heritage Conservation and Recreation Service
U. S. Department of the Interior
Rm. 9310 Federal Office Building
600 Arch Street
Philadelphia, Pennsylvania 19106

We should like to receive copies of your revised site list when it is completed.

Sincerely yours,

Roy K. Wood
Special Assistant to the Secretary
Southeast Region

Enclosure

The list of underlined sites contained in the inclosure to the DOI letter of 24 April 1980 has been retyped for legibility and brevity as follows:

SITE ID	STATE	COUNTY	STREAM	PROJECT
FL6SAS0001	FL	Baker	St. Marys	MacClenny
FLCSAM0084	FL	Gulf	Chipola	Dead Lakes
FLCSAJ0009	FL	Marion	Oklawaha	Moss Bluff
FL6SAM0085	FL	Okaloosa	Yellow	Crestview
FLASAJ0016	FL	Putnam	Oklawaha	Redman
GAISAS0007	GA	Baldwin	Oconee	Lake Sinclair
GA4SAS0006	GA	Baldwin	Oconee	Milledgville
GA4SAS0011	GA	Burke	Savannah	Steel Creek
GA6SAS0013	GA	Butts	Ocmulgee	Lamar Ferry
GA4SAM0092	GA	Cherokee	Etowah	Canton
GAISAM0096	GA	Crisp	Flint	Lake Blackshear
GA6SAM0100	GA	Dooly	Flint	Mountain Creek
GAISAM0101	GA	Dougherty	Flint	Flint River
GA4SAS0022	GA	Effingham	Savannah	Low Stokes
GA6SAS0026	GA	Elbert	Broad	Tallow Hill
GAISAS0038	GA	Jasper	Ocmulgee	Lloyd Shoals
GA6SAS0042	GA	Jones	Ocmulgee	Dames Ferry
GA6SAS0043	GA	Laurens	Oconee	Dublin
GACSAM0122	GA	Lumpkin	Etowah	Watershed 26
GA6SAM0126	GA	Macon	Flint	Hightower
GA6SAM0125	GA	Macon	Flint	Miona
GA6SAM0128	GA	Mitchell	Flint	Lower Vada
GAMSAS0050	GA	Monroe	Ocmulgee	Juliette Dam
GA6SAS0052	GA	Montgomery	Oconee	Cypress Branch
GA4SAS0076	GA	Richmond	Savannah	Eagle Point
GAASAS0069	GA	Richmond	Savannah	New Savannah Bluff
GA4SAS0074	GA	Screven	Savannah	Bull Pen
GA4SAS0075	GA	Screven	Savannah	Dicks Lookout
GA4SAS0073	GA	Screven	Savannah	Low Johnson
GA6SAS0084	GA	Washington	Oconee	Toomsboro
GA6SAS0085	GA	Wayne	Altamaha	Goose Creek
GA6SAS0087	GA	Wilkes	Broad	Anthony Shoals
NCMSAW0011	NC	Alamance	Haw	Saxapahaw
NCISAC0002	NC	Anson	Pee Dee	Blewett Falls
NC6SAW0019	NC	Chatham	Deep	Lockville
NCISAC0021	NC	Davidson	Yadkin	High Rock
NCGSAC0027	NC	Forsyth	Yadkin	Idols
NC6SAW0032	NC	Granville	Tar	Grey Rock
NC6SAW0040	NC	Halifax	Fishing	White Oak
NCMSAW0043	NC	Harnett	Cape Fear	Buckhorn Falls
NC6SAW0044	NC	Harnett	Cape Fear	Lillington
NC6SAW0045	NC	Harnett	Cape Fear	Smiley Falls
NC6SAW0046	NC	Harnett	Cape Fear	Smiley Falls
NC6SAW9995	NC	Johnston	Neuse	Smithfield
NC6SAW0049	NC	Johnston	Neuse	Wilson Mills
NCMSAW0050	NC	Lee	Deep	Carolina Power
NCMSAW0052	NC	Moore	Deep	High Falls
NC6SAW0053	NC	Moore	Deep	Howards Mill
NC6SAW0058	NC	Nash	Tar	Spring Hope
NCCSAW0059	NC	Nash	Tar	Tar River

SITE ID	STATE	COUNTY	STREAM	PROJECT
NC6SAC0045	NC	Richmond	Pee Dee	Greater Blewett
NC4SAC0046	NC	Richmond	Pee Dee	Morven
NC9SAW0079	NC	Stokes	Dan	Danbury
NC4SAW0078	NC	Stokes	Dan	Walnut Cove
NC40RN0049	NC	Buncombe	French Broad	Newfound Creek
NC50RN0082	NC	Madison	French Broad	Pine Creek
NC50RN0083	NC	Madison	French Broad	Brush Creek
NC50RN0085	NC	Mitchell	Nolichucky	Poplar
NC70RN0090	NC	Watuga	Watuga	Beech Creek
SCISAC0090	SC	Clarendon	Santee	Spillway
SC6SAC0749	SC	Fairfield	Broad	Lyles Ford
SCISAC0106	SC	Kershaw	Wateree	Lake Wateree
SC6SAC0118	SC	Newberry	Broad	Blair
SCISAC0119	SC	Newberry	Broad	Parr Shoals
SC6SAC0728	SC	Richland	Congaree	Reregulator
SCISAC0128	SC	Spartanburg	Enoree	Van Patton
SC6SAC0125	SC	Spartanburg	Tyger	Burnt Factory
SCISAC0129	SC	Union	Broad	Neal Shoals
SCJSAC0140	SC	Union	Broad	Lockhart
SC6SAC0748	SC	Union	Enoree	Whitmire
TNCORN0201	TN	Maury	Duck	Columbia
TN40RN0093	TN	Bedford	Duck	County Line
TN40RN0109	TN	Claiborne	Powell	Cumberland Gap
TN40RN0113	TN	Cooke	French Broad	Old Town
TN60RN0108	TN	Claiborne	Clinch	War Ridge
TN60RN0114	TN	Cooke	French Broad	Long Creek
TN60RN0131	TN	Greene	Nolichucky	Buckingham Ferry
TN60RN0140	TN	Hickman	Duck	Totty
TN60RN0156	TN	Morgan	Obed	Nemo
TN60RN0157	TN	Perry	Buffalo	Sinking Creek
TN70RN0130	TN	Greene	Nolichucky	L. Nolichucky

SADPD-P

29 MAY 1980

Mr. Roy K. Wood
Special Assistant to the Secretary
Southeast Region
U.S. Department of the Interior
Suite 1412
Richard B. Russell Federal Building
75 Spring Street, SW
Atlanta, Georgia 30303

Dear Mr. Wood:

We have your letter of 24 April 1980 regarding our National Hydropower Study inventory of dam sites with undeveloped hydroelectric power potential. A copy will be included in the record of the public meeting held in Atlanta, Georgia, on 10 April 1980.

By copy of this letter we are referring your letter to our Corps District representatives for consideration in the continuing evaluation and screening of potential hydropower developments.

Sites which are located on or which would adversely affect designated or qualified National Wild and Scenic Rivers will be deleted from our active inventory of sites with undeveloped hydropower potential.

However, we prefer to retain in our active inventory those sites on streams which have not been so designated, recognizing the potential for Wild and Scenic River designation. This information will be considered in ranking the sites to be proposed for further study to meet the short and long term energy needs of the nation.

We should not make further hydropower studies on those sites which you have specifically recommended for study under the provisions of Section 5(a) of the Wild and Scenic Rivers Act until your studies are complete and the status of these rivers is adjudicated.

The existing projects on the Cross Florida Barge Canal were included in our preliminary physical hydropower potential and economic screenings. However, based

29 MAY 1980

on the request of Governor Bob Graham of Florida and the unresolved authorization and restoration questions, these sites will be deleted from the active inventory.

We will keep you advised of changes in our inventory of active sites. Thank you for your interest in the study.

[illegible]

Sincerely,

MARVIN W. REES
Colonel, Corps of Engineers
Deputy Division Engineer

CF: (w cy DOI ltr, 24 Apr 80)
NADDE
ORDDE
LMVDE
SAWDE
SACDE
SASDE
SAJDE
SAMDE

Department of Natural Resources
270 WASHINGTON ST., S.W.
ATLANTA, GEORGIA 30334
(404) 656-3500

Joe D. Tanner
COMMISSIONER

April 24, 1980

Colonel Marvin W. Rees
Deputy Division Engineer for Civil Works
U. S. Army Engineer Division
South Atlantic
Corps of Engineers
510 Title Building
30 Pryor Street, S.W.
Atlanta, GA 30303

Dear Colonel Rees:

The Department of Natural Resources appreciates the presentation on the National Hydropower Study that the Corps of Engineers made for this department on March 28, 1980. We recognize the need to investigate all alternative energy sources, including hydropower, for their potential contribution to Georgia's future energy needs and support the objectives of the National Hydropower Study. In order to assist the Corps of Engineers to accomplish these objectives the Department offers the following comments.

The objectives of identifying and assessing environmental impacts in the study process is of particular importance and concern to DNR. The costs of environmental impacts and the costs of mitigating for these impacts need to be included in project and program analysis in order to obtain a true picture of project costs and benefits. We believe these costs should be identified early in the planning process and incorporated even in the most fundamental analysis of benefits and costs. The following topics outline general environmental concerns that may be included in analysis of environmental impacts and which may result in subsequent mitigation costs.

Wildlife Habitat

Hydropower projects by necessity are located on major drainages, and as a result bottomland habitat is lost. These areas flooded are considered to be the second most productive ecosystem known. An estimated 300,000 acres of wildlife habitat is lost each year in Georgia. Pressure from sportsmen will continue to grow. Careful consideration should be given to any projects that accelerate habitat losses, especially ones near metropolitan areas where demand is greatest for hunting and non-consumptive uses.

The focus of the Department of Natural Resources wildlife management land acquisition program is to acquire bottomland habitat along major drainages. The possibility of conflict between State wildlife management goals and Federal hydropower goals should be considered. To illustrate this point, a potential dam site has been identified as a part of this study on Lazer Creek where DNR is actively engaged in land acquisition for an existing Wildlife Management Area.

Fisheries

Fisheries impacts associated with hydropower projects include the destruction of important riverine fisheries habitat and recreation resources, further obstruction of the movements of anadromous and catadromous fish populations, and the deterioration of downstream water quality and resultant alteration of the aquatic ecosystem. In some instances, data is available to assess these impacts and, in other cases, new research is needed for an adequate assessment.

On existing dams, changes in present practices of maintaining reservoir water levels and tailwater flow regimes due to the addition of hydropower units can lead to additional detrimental effects on fisheries resources. In assessing this impact, needed is good baseline data prior to initial construction and subsequent assessment of effects from this construction.

Recreation

The creation of new dam and reservoir sites will cause the reduction of riverine-oriented recreation and stream fishing opportunities and this loss should be considered a cost in analysis of recreational costs and benefits. The addition of hydropower facilities to existing dams may also impact the recreational uses of reservoirs and should be viewed as a project cost. Further, there are projects which were once considered multi-purpose but now primarily provide benefits of a recreational nature. Reestablishment of multiple use, emphasizing power production at these sites, would result in conflicts and in associated costs. For example, converting High Falls State Park Lake which is primarily a recreation lake into a hydropower facility will adversely affect the recreation uses of this lake.

Cultural Resources

In general, construction of new dam and reservoir sites or changes in existing lake levels and flows may impact identified and as yet unidentified historic and archaeological resources. The costs of assessing and mitigating for these resources should also be included early in project analysis.

Environmental Quality

Hydropower projects are well known for having problems meeting downstream water quality standards (State and Federal). The "state of the art" in ensuring that these standards are met still does not appear to offer environmentally and economically viable solutions all of the time. Water quality standards downstream of hydropower projects continues to be an issue that deserves careful attention.

Further, when a hydropower project is proposed to be built on a designated trout streams there would be significant cost implications. On trout streams, the requirements for meeting the temperature mandates would probably be very expensive to incorporate into a hydropower project. At a minimum, these costs should be incorporated into the benefit/cost analysis and could mean the difference between a cost-effective project and no project. We suggest that further coordination with our Game and Fish Division and Environmental Protection Division to identify designated trout streams and their water quality requirements would be beneficial at this stage in the planning process.

Summary

The Department of Natural Resources is of the opinion that with thorough analysis and mitigation of environmental impacts, the addition of hydropower facilities in Goergia is one alternative to help meet future energy needs. In the past mitigation efforts for similar type projects have been inadequate. The Department of Natural Resources agrees with the President's proposal in his Water Policy to incorporate mitigation as part of the original project and authorization whereby a full accounting of environmental costs and impacts may be incorporated in project decision-making. The Department, as further support to this policy, recommends a cautious approach to new developments and a full accounting of environmental costs early in project planning and decision-making. As development pressures reduce the supply of wildlife habitat, it becomes more costly and more critical to mitigate for and preserve existing habitats. The importance of the free-flowing riverine habitat and its attendant floodplain life support functions cannot be underestimated.

Sincerely,

Jerry Lohla
Chief of Special Projects

SADPD-P 12 May 1980

Mr. Jerry Lohla
Chief of Special Projects
Department of Natural Resources
270 Washington Street, SW
Atlanta, Georgia 30334

Dear Mr. Lohla:

We have your letter of 24 April 1980 regarding our National Hydropower Study. A copy will be included in the record of the public meeting held in Atlanta, Georgia, on 10 April 1980.

The study was designed to put the role of hydropower in focus through a very abridged appraisal of the need, potential, cost effectiveness, and environmental and social impacts of future hydropower development; and the legal and institutional constraints on development. The end product will be a report back to Congress on which sites should be given further study to meet the short and long term energy needs of the nation.

Due to the volume of potential hydropower sites being screened, time and funding constraints do not permit assessment of the costs of environmental impacts and mitigation during the national study. However, environmental and social impact information is being gathered on each site remaining in our inventory. This information will be considered in ranking the sites to be proposed for further study.

By copy of this letter we are referring your letter to the Savannah and Mobile District Engineers for consideration in the continuing evaluation and screening of potential hydropower developments.

Thank you for your interest in the study.

Sincerely,

C. G. WHITE
Chief, Planning Division

CF: (w cy DNR ltr, 24 Apr 80)
SASPD-P
SAMPD-F
WRSC-IWR

STATE OF FLORIDA
Office of the Governor
THE CAPITOL
TALLAHASSEE 32301

BOB GRAHAM
GOVERNOR

April 29, 1980

Colonel Marvin W. Rees
Deputy Division Engineer for
Civil Works
Corps of Engineers
510 Title Building
30 Pryor Street, Southwest
Atlanta, Georgia 30303

Dear Colonel Rees:

Thank you for the notice of March 14 about the National Hydroelectric Power Study being done by the U.S. Army Corps of Engineers.

Although the Corps' efforts are commendable, we are concerned about the lack of recognition of existing planning and study efforts for a number of the sites covered in your survey.

In February 1978, the Secretary of the Army, in a letter to the President, recommended alternatives for restoration of the Oklawaha River and disposal of facilities of the Cross Florida Barge Canal. Three of the recommendations involve modification or removal of structures; nevertheless, the Hydroelectric Power Study lists these structures as potential sources of additional electrical power.

The Florida Department of Environmental Regulation, Georgia and Alabama are working with the Corps on a proposed Level B study of the Apalachicola, Flint and Chattahoochee River systems. The upriver portions of this system are heavily impacted by structural modifications. The Level B study should provide useful information about the condition, capacity, benefits and competing demands associated with these water resources.

The Yellow River has been considered for designation as an Outstanding Florida Water due to its almost pristine condition and inclusion in the Florida Canoe Trail. Also, the Yellow River is the habitat for two rare animal species, the One-toed Amphiuma (a salamander) and the Alabama Map Turtle and is the source of fresh water for the Yellow River Marsh Aquatic Preserve.

It would therefore seem prudent at this point to:

1. Remove from the list of potential hydroelectric projects those facilities associated with the Cross Florida Barge Canal.

2. Assure that any consideration of hydroelectric facilities on the Apalachicola, Flint and Chattahoochee Rivers includes the current planning and study efforts of the involved states and the Corps. Further structural alterations to this system should be deferred until the comprehensive study is completed.

3. Carefully evaluate the environmental desirability of the Yellow River as a potential site for power generation.

We will be pleased to provide you with additional information about potential hydroelectric project sites. Your inquiries should be addressed to Scott Hoffman, Chief, Bureau of Water Management, Department of Environmental Regulation, 2600 Blair Stone Road, Tallahassee, Florida 32301.

With kind regards,

Sincerely,

Bob Graham

Governor

BG/bb

cc: Jacob D. Varn

SADPD-P

16 MAY 1980

Honorable Bob Graham
Governor of Florida
The Capitol
Tallahassee, Florida 32301

Dear Governor Graham:

A copy of your 29 April 1980 letter regarding our National Hydropower Study will be included in the record of the public meeting held in Atlanta, Georgia, on 10 April 1980.

The study was designed to provide a very abridged appraisal of the need, potential, cost effectiveness, and environmental and social impacts of future hydropower development; and the legal and institutional constraints on development. The end product will be a report back to Congress on which sites should be given further study to meet the short and long term energy needs of the nation.

Due to the number of potential hydropower sites being screened, time and funding constraints have not permitted evaluation of environmental and social impacts. The purpose of our initial public meeting was to elicit such information and other readily available data on each site. As environmental and social impact information is gathered in our inventory, this will be used in ranking the sites to be proposed for further study or as the basis for removing sites from further consideration.

The existing projects on the Cross Florida Barge Canal were included in our preliminary physical hydropower potential and economic screenings. However, based on your request and the unresolved authorization and restoration questions, these sites will be deleted from the active inventory.

Information in your letter on other sites will be referred to the Jacksonville and Mobile District Engineers for consideration in the continuing evaluation and screening of potential hydropower developments.

16 MAY 1980

SADPD-P
Honorable Bob Graham

Thank you for your interest in the study.

Sincerely,

MARVIN W. REES
Colonel, Corps of Engineers
Deputy Division Engineer

CF: (w cy Gov Graham ltr, 29 Apr 80)
SAJDE
SAMDE
WRSC-IWR

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2288
MOBILE, ALABAMA 36628
Meader/br/205/690-2773

REPLY TO
ATTENTION OF:

SAMPD-N

30 May 1980

CF: SADPD-P

Honorable Bob Graham
Governor of Florida
The Capitol
Tallahassee, Florida 32301

Dear Governor Graham:

A copy of your 29 April 1980 letter regarding our National Hydropower Study was forwarded to this office by Colonel Rees. I appreciate your desire to defer the construction of additional hydropower structures within the Apalachicola, Chattahoochee and Flint (ACF) River system until a comprehensive study is conducted.

We look forward to participating in the states' Level B study by providing input wherever possible. I expect the results of the National Hydropower Study, which should be completed prior to the Level B study, will provide useful information and contribute to the comprehensiveness of the Level B study.

We intend to use the Level B study, when completed in 1983, as a guide for management decisions affecting the water resources on the ACF. I feel confident that consideration of additional hydropower on the ACF will be done in conjunction with this study and current planning activities of the three states as well as Federal agencies.

Sincerely yours,

EARLE E. KING, JR.
LTC, Corps of Engineers
Acting District Engineer

CF: Mr. Scott Hoffman
Dept of Environmental Regulation

TENNESSEE CITIZENS for WILDERNESS PLANNING

For The Preservation and Enjoyment of Our Wild Lands and Waters

130 Tabor Road
Oak Ridge, Tenn. 37830
Telephone 615-482-2153

May 22, 1980

U.S. Department of the Army
Engineering Division
South Atlantic Corps of Engineers
510 Title Bldg.
30 Pryor St., S.W.
Atlanta, Georgia 30303

Attn: Merlin Foreman

Dear Mr. Foreman:

As I mentioned in our phone conversation of last week, I was somewhat confused by the fact that no Tennessee sites were listed on the public notice of March 17, 1980 for the public hearing held April 10, 1980 to receive input from the public on the National Hydroelectric Power Study. I initially assumed that no sites in Tennessee were being considered. As you will recall, when I checked with you, you informed me that the Tennessee information had not been available at the time of mailing and had instead been distributed at the public meeting. As I said, at that time, we would certainly have had a representative at the meeting if we had known that Tennessee sites were being considered.

I would like to thank you for agreeing to hold the comment period open until we had time to submit our comments. I would also like to thank you for sending the Tennessee information which I received today (5/21/80). I have included our comments as attached and I would like to thank you again for agreeing to see that they are added to the record and given consideration in the decision process.

Sincerely,

Dr. T. M. Johnson
Executive Director

TMJ/bpm

cc: (see attached sheet)

Comments: National Hydroelectric Power Study Public Meeting - April 10, 1980
(for the record)

In response to paragraph 7 of the fact sheet stating: "If a . . . responsible group discloses facts which make a hydropower project objectionable, the facility will no doubt be dropped", we would like to point out that TCWP is an environmental organization with statewide membership which has been in existence for over 15 years. Our membership includes businessmen, scientists, attorneys, politicians, professors, and environmental professionals from all walks of life. We have taken the lead role in having the Obed River system included in the National Wild and Scenic River system. TCWP members helped write the Tennessee Scenic River Act. We are currently plaintiffs in a suit involving the Duck River. We feel, therefore, that we not only qualify as a "responsible group", but as having unique expertise and knowledge of these areas.

SPECIFIC PROJECTS:

1. TN60RN0156: Obed River in Morgan County. The proposed site is on one of the original seven National Wild and Scenic Rivers. In addition, the Ohio muskellunge, an endangered species in Tennessee, lives here. The spotfin chub* has been listed here and the Obed designated as its critical habitat.

2. TNCORN0200
TNCORN0201
TN4ORN0093
TN60RN0140
Duck River

Until and unless the present uncertainty regarding the Columbia Dam is resolved, it would appear to be counter-productive to attempt to evaluate these sites. Mitigation and transplantation of the endangered species remain unsolved problems. The project is currently awaiting appeal of the "401" water quality certification and issuance of a "404" permit. There is an additional question on the endangered species* situation. The "old mill" sites on shoals are the most important habitats for these species.

Endangered species* include:

1.) _Quadrula sparsa_

2.) _Villosa trabalis_

3. TN40RN0109 - Clinch River, Claiborne County
TN60RN0108 - Powell River, Claiborne County

Projects on the Powell or Clinch Rivers will potentially impact the following endangered species:*

1.) _Quadrula sparsa_

2.) _Conradilla caelata_

3.) _Quadrula intermedia_

4.) _Dromas dromas_

5.) _Fusconaia cuneolus_

6.) _Epioblasma torulosa gubernaculum_

7.) _Plethobasus cooperianus_

8.) _Noturus flavipinnis_

4. TN40R0113 - French Broad River in Cooke County

The French Broad River is part of the Tennessee Scenic River System. While its water quality is not as likely to be adversely affected by a hydroproject as is the Obed, recreation and fishing would be adversely affected.

5. NC50RN0085 - Nolichuckey River in Mitchell County, North Carolina

This river is regarded by many as the finest white water river in the southeast. Poplar, North Carolina is the "put-in" for the excellent "gorge" trip. While this site is not in Tennessee, the "gorge" is half in this state and a diversion in North Carolina could potentially prevent access to the river. In addition, silt problems on this river during times of high water may well reduce the utility of any strucrure as happened to Davy Crockett reservoir near Greeneville, Tennessee on a lower segment of the river.

6. TN60RN0153 - Hiwassee River, McMinn County
TN60RN0159 - Hiwassee River, Polk County

The Hiwassee River is part of the Tennessee Scenic River system and is also the transplant site for the snail darter.* The critical habitat for the snail darter is designated as the Hiwassee River since the Little Tennessee River habitat has been destroyed by the Tellico reservoir.

7. TN70RN0130 - Nolichucky River, Greene County
TN70RN0131 - Nolichucky River, Greene County

The Nolichucky River in Greene and Hamblin Counties is listed as critical habitat for the endangered species,* Epioblasma torulosa gubernaculum.

*For listing of endangered species and critical habitats see:
Parker, W. and Dixon, L., Endangered and Threatened Wildlife of Kentucky, North Carolina, South Carolina, and Tennessee, U.S. Fish and Wildlife Service, February, 1980. (AG-185: North Carolina Agricultural Extension.)

GENERAL COMMENTS:

Generic evaluations of small scale hydro power (the impetus for this study) indicate that the economics of these projects are clearly only marginally favorable even where suitable existing structures are already in place. We have no objection to the projects on page 7 of the listing. These projects are potentially economically viable options, with significant power output. A preliminary calculation using the study figures shows that the three projects on the existing Mississippi River locks and dams are capable of producing over 15 times the total output of the 14 projects we have commented on. The environmental and recreational impacts of these 14 projects can not be set-off against the miniscule benefits. In addition several of the projects are clearly illegal. It would be a waste of taxpayer dollars to pursue evaluations of these projects further.

Thank you for this opportunity to express our views.

putnam county development authority
P.O. BOX 1766 • PALATKA, FL 32077 • (904) 325-7340
RAYMOND B. BUNTON
Executive Director

May 22, 1980

Division Engineer
South Atlantic Division
U. S. Army Corps of Engineers
510 Title Building, 30 Pryor St., S.W.
Atlanta, Georgia 30303

Dear Sir:

We have recently learned of a meeting conducted by your headquarters on April 10, 1980 in Atlanta, Georgia, which was a National Hydroelectric Power Study Public Meeting. Perhaps through oversight or lack of public notice, we were not aware that this meeting was to be held.

The Putnam County Development Authority is interested and involved in the total development of Putnam County, Florida, which includes the eastern most sections of the Cross Florida Barge Canal. It is our understanding that at least two potential low head hydroelectric dam sites were selected in our area on the Cross Florida Barge Canal. For many obvious reasons, we think this is entirely appropriate and wish to go on record as supporting the construction of hydroelectric power plants wherever feasible in our community.

As you are well aware, the cost of electrical power for the future will be one of the heaviest crosses we have to bear. Anything that will assist in alleviating this problem should certainly be given every consideration.

We hope our remarks can be included in the record of this public meeting. We would also like to know the current status of the hydroelectric site selection process as it effects Florida.

Very truly yours,

Leon S. Conlee
Chairman

LSC:paa

GILES L. EVANS, JR
EXECUTIVE SECRETARY

THE CROSS FLORIDA CANAL NAVIGATION DISTRICT
2643 Park Street
XXXXXXXXXXXXX
JACKSONVILLE, FLORIDA 32204

COMMISSIONERS
David Langer
XXXXXXX, CHAIRMAN
INGLIS, FLORIDA
CHAUNCEY MOORE
GREEN COVE SPRINGS, FLORIDA
R G. WILLIAMS
PALATKA, FLORIDA
GEORGE R. REGISTER, JR
JACKSONVILLE, FLORIDA
XXXXXXXXXX
XXXXXXXXXX

May 27, 1980

Division Engineer
South Atlantic Division
U. S. Army Corps of Engineers
510 Title Building
30 Pryor Street, S. W.
Atlanta, Georgia 30303

Dear Sir:

We have just learned about the meeting your office held on April 10, 1980 in Atlanta, Georgia--a National Hydroelectric Power Study Public Meeting. We had no advance notice that the meeting would take place.

The Cross Florida Canal Navigation District is interested and involved in the development of the Cross Florida Barge Canal. We understand that at least two potential low head hydroelectric dam sites were selected on the Cross Florida Barge Canal. For many obvious reasons, we think this is completely logical, and want to go on record as supporting the construction of hydroelectric power plants wherever feasible on the Canal project.

The cost of electrical power for the future will be one of our heaviest economic crosses. Anything that will help this problem should be pursued agressively.

Please include our comments in your record of this public meeting. We would like to know the current status of the hydroelectric site selection process as it affects Florida.

Sincerely yours,

David Langer

David Langer
Chairman

The Georgia Conservancy

COASTAL OFFICE 4405 PAULSEN STREET SAVANNAH, GEORGIA 31405 (912) 355-4840

May 28, 1980

Colonel Marvin W. Rees
Deputy Division Engineer for Civil Works
South Atlantic Division
U.S. Army Corps of Engineers
510 Title Building
30 Pryor Street, S.W.
Atlanta, Georgia 30303

Dear Colonel Rees,

On behalf of the Georgia Conservancy, I would like to submit some comments on the preliminary findings of the National Hydropower Study. Please make these comments part of the official record of the April 10, 1980 public meeting held in Atlanta.

All hydropower projects have negative environmental consequences, whether they involve the retrofitting of existing dams with more advanced and efficient technology or the construction of new dams where none previously existed. The scope of the potential impacts are elaborated upon in a paper by Neuhauser ("Potential Environmental Impacts of Small-scale Hydropower") presented at the Small-scale Hydroelectric Power in the Southeast Conference, Atlanta, Georgia, June 14, 1979. As a general rule, the magnitude of the environmental impacts is far greater for new dams than for retrofit projects. It would therefore be prudent for the Corps in its continuing analysis to apply a higher value of environmental risk to new projects and a lesser value to those facilities already in existence.

Some hydroelectric projects may be justified if their negative impacts are adequately mitigated. An assesment of their feasibility should include both the mitigation costs and the unavoidable loss costs. Other projects, however, are so destructive that mitigation could never make up for the losses incurred. Scenic vistas, cultural resources and endangered species are among the resources that are difficult if not impossible to adequately mitigate.

The limited information available to us on the specifics of each potential project makes comment on many projects difficult at this time. As more information does become available, we would like to submit additional comments. There are some projects, however, for which the anticipated negative environmental impacts would be so excessive that we can raise vehement objections to them now. We recommend that the following potential projects be deleted from further study. A brief synopsis of some of our principal objections to these projects is included.

Mcclenny (St. Marys River) The St. Marys River is a potential Class B Wild and Scenic River. According to Johnson's (1971) "Georgia Scenic Rivers Report", "Its black water, white sandbars and near-wild surroundings make it an ideal boating and fishing stream." The impoundment of the River near Mcclenny will drown extensive fresh water wetlands and important farmland. The project may also adversely impact the threatened species, Bartram's Ixia (Sphenostigma coelestinum). Without further detail, we cannot determine whether the impoundment would back up into the Okefenokee National Wildlife Refuge. Most of the Refuge is a Congressionally-designated Wilderness area. Such modification of the Wilderness would be contrary to the Wilderness Act of 1964. We also note that the Corps' preliminary analysis indicates a most unfavorable cost/benefit ratio (0.07) and a requirement that 1462 people be displaced by the project.

Goose Creek (Altamaha River) The Altamaha River is a potential Class A Wild and Scenic River. The Georgia Department of Natural Resources has developed a plan for the Altamaha River Park, incorporating the Altamaha and adjacent lands from the Atlantic Ocean to a point upstream of the Goose Creek confluence with the Altamaha. The impoundment of Goose Creek will have a direct and significant negative impact on the environment of the proposed Altamaha River Park. Many of the area's resources and functions of the river flood plain are dependent on the naturally fluctuating water levels of the Altamaha. This natural fluctuation will not continue if the project is constructed, thus jeopardizing the River's resources. A detailed summary of the structure, functions and values of this ecosystem are provided by Wharton (1978) "The Natural Environments of Georgia".

It is clear at this time that the Goose Creek project includes the Ohoopee Reservoir. The Goose Creek Reservoir and the Ohoopee Reservoir were identified as a single project in the 1963 Southeast River Basins Study (Appendix 3, page 4-34). Such a combined project would require the diversion of the Altamaha River into a man-made canal. The construction of the dam would jeopardize the integrity of the Phillips Tract, a natural area immediately downstream. The Phillips Tract contains the largest concentration of the endangered species, the Georgia plume (Elliottia racemosa) known to exist. It also appears that the Ohoopee Reservoir would flood the Georgia State Prison at Reidsville. The Ohoopee impoundment would also impact the Cretaceous dunes community, whose "antiquity and rarity alone make it worth protecting" (C.H. Wharton, 1978, "The Natural Environments of Georgia").

The impoundment of the Altamaha would also jeopardize the endangered short-nosed sturgeon and several endemic mussels and could very easily eliminate the commercial shad fishery.

Steel Creek, Low Stokes Bluff, Low Johnson's Landing, Bull Pen Point, Dick's Lookout Point and Eagle Point (Savannah River) The portion of the Savannah River that would be impacted by these projects is among the most important natural river areas in the State. The Georgia Scenic Rivers Report (Johnson 1971) ranked the Savannah River between the Augusta Lock and Dam and the Atlantic Ocean as the second most scenic river in Georgia, ranking only one half a point lower than the first ranked Flint River (118.5 points for the Flint, 118 for the Savannah). This portion of the Savannah River contains the highest bluffs of any Georgia river and offers a wealth of outstanding historical and geological sites. The impoundment of the Savannah River at Bull Pen Point would also threaten the river status of Briar Creek. Near the confluence of Briar Creek with the Savannah are some of the largest cypress trees seen anywhere.

The land inundated by these projects would total about 23,500 acres or about 36 square miles. Of this, almost all would be bottomland hardwood. The flooding of this forest would "destroy the entire species-rich swamp ecosystem" (Wood et al., 1973, "Economic Benefits and Environmental Issues related to Channel Improvements on the Savannah River"). Anandramous species (shad, herring) and catadromous species (American eel) would be eliminated, as would many other wildlife resources.

The structural modifications may also influence the patterns of water flow and the volume and force of river discharge through the mouth of the Savannah, thus affecting the estuary and the barrier islands.

Increased river activity would disturb and possibly prevent any nesting by adult bald eagles. Other endangered species would also be jeopardized by these projects.

Watershed, Canton and Kingston (Etowah River), Armuchee (Oostanaula River) and Tilton (Conasauga River) According to Professor D.C. Scott (Professor of Zoology at the University of Georgia and acknowledged expert on Georgia's fishes), the Coosa River system in which these projects are proposed contains a number of endemic species of fish. Among these are some very rare darters (eg. *Percina antesella*, *P. linticula*, *Ethiostoma tricella*) and some undescribed species. The presence of one or more dams on this river would endanger and possibly extinguish one or more of these fish species.

Tallow Hill and Anthony Shoals (Broad River) According to the Georgia Scenic Rivers Report (Johnson 1971), the Broad River is "probably the wildest and most rugged of all Piedmont streams...scenic shoal areas and rugged topography provide a memorable canoeing experience." The river is "heavily used by canoeists and offers good fishing" (Dr. D.C. Scott, pers. comm.). The Georgia Heritage Trust Commission have plans for the Anthony Shoals area (Dr. G. Rogers, Commission Member, pers. comm.).

Dublin, Cypress Branch and Toomsboro (Oconee River) The Georgia Heritage Trust Commission has plans to protect these sites on the Oconee River because of their scenic and ecological values (Dr. G. Rogers, Commission Member, pers. comm.). The impoundments on the Oconee and the subsequent regulation of water flows would have a negative impact on the natural functioning of the downstream river swamp(Dr. C.H. Wharton, pers. comm.).

Thank you for the opportunity to comment on these potential projects at this time. We will look forward to participating in further opportunities to guide the results of the study.

Sincerely,

Hans Neuhauser
Director

HN/vh

JUN 12 1980

Major General Joseph K. Bratton
Division Engineer
Attn: Colonel Marvin W. Rees
U.S. Army Corps of Engineers
30 Pryor Street, SW
510 Title Building
Atlanta, Georgia 30303

Dear General Bratton:

This is a followup response to Mr. Roy K. Wood's letter dated April 24 recommending Interior (FWS & HCRS) concerns and requesting deletion of certain lowhead hydroelectric sites on rivers either designated under or being studied for designation under provisions of Section 5(a) of the Wild and Scenic Rivers Act.

FWS field staff has evaluated the listed sites further and have registered concerns on additional sites. We request that your office delete the below sites from the master list.

SITE ID	COUNTY	RIVER	PROJECT NAME
FL6SAS0001	Nassau	St. Marys	McClenny
GAHSA0011	Burke	Savannah	Steal Creek
GA6SAS0085	Wayne	Altamaha	Goose Creek
GA6SA0088	Effingham	Savannah	Low Stokes
GA6SAS0075	Screven	Savannah	Low Johnson
GA4SAS0074	Screven	Savannah	Bull Pen
GA4SAS0075	Screven	Savannah	Dicks Lock
GA4SAS0076	Screven	Savannah	Eagle Point
GA6SAS0087	Wilkes	Broad	Anthony Shoals

Construction of lowhead hydroelectric dams and impoundments at the above listed sites would severly impede migration of anadromous and potamodromous species in these rivers. The steady decline of anadromous fish on the Atlantic Coast is due, in part, to obstructions such as these.

The latter site, GA6SAS0087, is located in the CE-2, Broad River tract, which is currently being considered for mitigation under the Richard B. Russell Reservoir Project. In addition to exceptionally high fish and wildlife resources value, the site is uniquely beautiful and has a very high recreational value on the lower river area.

Sincerely yours,

Walter O. Stieglitz

Acting Regional Director

SADPD-P

30 JUN 1980

Mr. Walter O. Stieglitz
Acting Regional Director
U.S. Department of the Interior
Fish and Wildlife Service
75 Spring Street, S.W.
Atlanta, Georgia 30303

Dear Mr. Stieglitz:

Thank you for your letter of 12 June 1980 regarding our National Hydropower Study inventory of dam sites with undeveloped hydroelectric power potential.

By copy of this letter, we are referring your concerns to our Savannah District Engineer for consideration in the continuing evaluation and screening of potential hydropower developments.

We prefer to retain in our active inventory those sites which are not located on designated wild and scenic rivers. However, your comments on the fisheries and scenic values of these rivers will be included in the environmental impacts data gathered on each site. This information will be considered in ranking the sites to be proposed for further study to meet the short and long term energy needs of the nation.

Sincerely,

MARVIN W. REES
Colonel, Corps of Engineers
Deputy Division Engineer

CF: w cy F&WL ltr, 12 Jun 80
District Engineer, Savannah

Homosassa Springs Area Chamber of Commerce

Post Office Box 1098
Homosassa Springs, Florida 32647
TELEPHONE (904) 628-2666

HOMOSASSA - HOMOSASSA SPRINGS - OZELLO - LECANTO - CHASSAHOWITZKA

June 25, 1980

Division Engineer
South Atlantic Division
U.S. Army Corps of Engineers
510 Title Building
30 Pryor Street, S.W.
Atlanta, Georgia 30303

Dear Sir:

We have just learned through Mr. David Langer, Chairman of the Cross Florida Canal, Navigation District, of your National Hydroelectric Power Studies and meetings on the subject.

We further understand that there are several potential low head hydroelectric dam sites on the completed portions of the Cross Florida Barge Canal.

In this period of time where we are searching for all undeveloped sources of energy we should not overlook any potential for supplementing our electric power production.

Accordingly this Chamber of Commerce would like to have your records reflect that this Chamber unanimously supports the construction of hydroelectric power plants wherever feasible on the Cross Florida Barge Canal.

Please keep us informed on the current status of your studies as they affect this area of Florida.

Sincerely,

John T. Barnes, President

JTB/kb

July 7, 1980

Division Engineer
South Atlantic Division
U.S. Army Corps of Engineers
510 Title Building
30 Pryor Street, S.W.
Atlanta, Georgia 30303

Re: National Hydroelectric Power Study

Dear Sir:

We understand that your office is a focal point relative to the ongoing National Hydroelectric Power Studies being conducted by the Federal Government. The purpose of these studies, we are told, is to explore, analyze and study all possible and feasible sources of hydropower in order that this country fully utilize all alternate sources of energy to offset the use of oil and rapidly escalating oil prices on the world market.

Such a study and consequent development is, we believe, long overdue. This Authority is in full support of the concept and objectives. No source of hydropower should be overlooked in your search and assessment for additional energy sources to meet the needs of the people of this country.

In furtherance of your studies there exists within the geographic area of the Withlacoochee Regional Water Supply Authority several apparent areas for such study. The area of Florida which we serve comprises Marion, Sumter, Hernando, Citrus and Levy Counties.

Within the geographical area is a considerable portion of the Cross Florida Barge Canal which has been completed including locks and dams, such as Inglis Lock and Dam, Lake Rousseau, Rodman Dam, just to identify a few areas.

We do understand fully that the State of Florida has withdrawn its official support for the Cross Florida Barge Canal Project and this Authority has no wish to address that issue in any way in this presentation. Our sole interest is in existing completed areas of the project which we believe should be looked at, reviewed and studied as to their potential for development of low head hydropower sites. We do not know what your criteria is but certainly 500 to 1000 KWH of power which is clean, non-polluting, and for which potential for development exists should be studied. Such sources, if developed, could be incorporated into the national power grid system to alleviate the national contingencies that already occur all too frequently.

We therefore, ask that you include in your studies the entire completed area of the Cross Florida Barge Canal for the sole purpose of determining how many potential sites presently exist for development of low head hydropower. Of course, such development, if feasible would augment to some degree the available potable water supply of this area as an additional interest of our Authority. The present energy crunch, the ongoing energy crisis, the need for complete honesty between government and our citizens dictate no less, of a prudent course than a complete inventory of all existing potential site sources and thorough evaluation as to feasibility.

Please keep this Authority informed on the progress of your efforts and any meetings being conducted in the future.

Very truly yours,

WILBUR H. LANGLEY, SR.
Chairman Withlacoochee Regional
Water Supply Authority

lv/JMH/WHL

cc: Honorable Bob Graham, Governor
Representative Bill Chappell
Senator Richard Stone
Senator Lawton M. Chiles

LAWTON CHILES
FLORIDA

COMMITTEES:
APPROPRIATIONS
BUDGET
GOVERNMENTAL AFFAIRS
SPECIAL COMMITTEE ON AGING
DEMOCRATIC STEERING COMMITTEE

United States Senate

WASHINGTON, D.C. 20510

August 1, 1980

Brig. General James N. Ellis
Division Engineer, South Atlantic Div.
U. S. Army Corps of Engineers
510 Title Building, 30 Pryor St., SW
Atlanta, Georgia 30303

Dear General Ellis:

I have recently received the enclosed correspondence regarding a matter involving your agency, and because of my desire to be responsive to all inquiries, I would appreciate having your comments and views.

Your early consideration of this matter will be appreciated and, if convenient, I would like to have your reply in duplicate directed to my State Office, Federal Building, Lakeland, Florida 33801. In your communication, please return the enclosure and make reference to this letter as indicated below.

Most sincerely,

LAWTON CHILES

LC/rob
Enclosure

RE: In reply, please refer to: Withlacoochee Regional Water Supply Authority

OFFICE OF CITY COUNCIL

DAVID E. HARRELL
PRESIDENT 1979
PRESIDENT PRO-TEMPORE 1978-1979
COUNCILMAN AT LARGE
(904) 633-3721

220 E BAY STREET
JACKSONVILLE FLORIDA
32202

July 16, 1980

Honorable Lawton Chiles
U. S. Congressman
Room 2107 New Senate Office Bldg.
Washington, D. C. 20510

Dear Lawton:

Enclosed is correspondence from the Withlacoochee Regional Water Supply Authority concerning the National Hydroelectric Power Study.

In the Federal Government's effort to find an alternate source of power to create energy independence, it appears as though the Withlacoochee Water Management District may have come upon a possible source of power using the Barge Canal movement of water that may be beneficial to us.

I would certainly appreciate your reviewing the matter and seeing if there might be some input from local government with regard to the above.

With warmest regards, I am

Yours very truly,

David

David E. Harrell
President, City Council

DEH:pe
Enc.
cc: All Council Members

WITHLACOOCHEE REGIONAL WATER SUPPLY AUTHORITY

July 7, 1980

Division Engineer
South Atlantic Division
U.S. Army Corps of Engineers
510 Title Building
30 Pryor Street, S.W.
Atlanta, Georgia 30303

Re: National Hydroelectric Power Study

Dear Sir:

We understand that your office is a focal point relative to the ongoing National Hydroelectric Power Studies being conducted by the Federal Government. The purpose of these studies, we are told, is to explore, analyze and study all possible and feasible sources of hydropower in order that this country fully utilize all alternate sources of energy to offset the use of oil and rapidly escalating oil prices on the world market.

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We do understand fully that the State of Florida has withdrawn its official support for the Cross Florida Barge Canal Project and this Authority has no wish to address that issue in any way in this presentation. Our sole interest is in existing completed areas of the project which we believe should be looked at, reviewed and studied as to their potential for development of low head hydropower sites. We do not know what your criteria is but certainly 500 to 1000 KWH of power which is clean, non-polluting, and for which potential for development exists should be studied. Such sources, if developed, could be incorporated into the national power grid system to alleviate the national contingencies that already occur all too frequently.

We therefore, ask that you include in your studies the entire completed area of the Cross Florida Barge Canal for the sole purpose of determining how many potential sites presently exist for development of low head hydropower. Of course, such development, if feasible would augment to some degree the available potable water supply of this area as an additional interest of our Authority. The present energy crunch, the ongoing energy crisis, the need for complete honesty between government and our citizens dictate no less, of a prudent course than a complete inventory of all existing potential site sources and thorough evaluation as to feasibility.

Please keep this Authority informed on the progress of your efforts and any meetings being conducted in the future.

Very truly yours,

WILBUR H. LANGLEY, SR.
Chairman Withlacoochee Regional
Water Supply Authority

lv/JMH/WHL

cc: Honorable Bob Graham, Governor
Representative Bill Chappell
Senator Richard Stone
Senator Lawton M. Chiles

SADPD-P

21 AUG 1980

Honorable Lawton Chiles
United States Senator
State Office
Federal Building
Lakeland, Florida 33801

Dear Senator Chiles:

Your letter of 1 August 1980 inclosed correspondence from Mr. David E. Harrell, President, Jacksonville City Council, and from Mr. Wilbur H. Langley, Sr., Chairman, Withlacoochee Regional Water Supply Authority, regarding the inclusion of the Cross Florida Barge Canal in the National Hydropower Study.

The preliminary inventory of hydroelectric power sites, prepared during the initial phase of the National Hydropower Study, included the existing projects on the Cross Florida Barge Canal. Subsequently, the Governor of Florida requested that these projects be deleted from the active inventory of sites being considered for further study. Therefore, based on the Governor's request and the unresolved authorization and restoration questions on the Cross Florida Barge Canal, these sites were deleted from the active inventory. We have elected to maintain only those sites in the active inventory with a reasonable opportunity for implementation. We determined this was not the case for the Cross Florida Barge Canal projects inasmuch as it has been a long standing Corps policy not to recommend implementation of a project wholly within and impacting only one state when the Governor opposed the project. These sites will be included in the report as a part of the inactive inventory and as a representation of the potential at the sites.

The next public meeting on the National Hydropower Study for the Southeastern United States will be held in Atlanta, Georgia, on 26 August 1980. Mr. Harrell and Mr. Langley have been placed on our mailing list to receive further information on the National Hydropower Study.

A similar letter has been furnished Senator Stone in response to his inquiry concerning this subject.

SADPD-P
Honorable Lawton Chiles

21 AUG 1980

Thank you for your interest in the study.

Sincerely,

1 Incl
Ltr fm Jax City Council,
16 Jul 80, w Incl

JAMES N. ELLIS
Brigadier General, USA
Division Engineer

CF:
SAJEN-DA
DAEN-CWP-E

BILL CHAPPELL
4TH DISTRICT, FLORIDA

2353 RAYBURN OFFICE BUILDING
WASHINGTON, D.C. 20515
(202) 225-4035

COMMITTEE:
APPROPRIATIONS

SUBCOMMITTEES:
DEFENSE
ENERGY AND WATER
DEVELOPMENT
DISTRICT OF COLUMBIA

Congress of the United States
House of Representatives
Washington, D.C. 20515

DISTRICT OFFICES:
258 FEDERAL BUILDING
OCALA, FLORIDA 32670
(904) 629-0039

523 NORTH HALIFAX
DAYTONA BEACH, FLORIDA 32018
(904) 253-7632

8829 SAN JOSE BOULEVARD
JACKSONVILLE, FLORIDA 32217
(904) 733-4288

August 11, 1980

MG Joseph E. Bratton
District Engineer
South Atlantic Division
510 Title Building
30 Pryor Street, S.W.
Atlanta, Georgia 30303

RE: National Hydroelectric Power Study - Corps

Dear General:

It has come to my attention that at the request of the State of Florida, the completed portions of the Cross-Florida Barge Canal are not being considered as part of the ongoing National Hydroelectric Power Study.

Inasmuch as funds for the study were provided by the Congress under Section 167 of P.L. 94-587, the Water Resources Development Act, for the purpose of evaluating Federal projects, I wish to point out that the Cross-Florida Barge Canal is a qualified Federal project which ought to be included. I was not informed by the Corps that the Canal had been deleted. Completed components of the Cross-Florida Barge Canal represent potentially valuable sources of low head hydroelectric power. A comprehensive inventory of potential site sources demands inclusion of all qualified projects.

Therefore, at your earliest convenience, I would appreciate a reply as to the extent of the Study in Florida and the criteria applied in determining which projects are included as well as plans for evaluation of the Cross-Florida Barge Canal.

With kind regards,

Sincerely,

Bill Chappell

Bill Chappell
Congressman

BC:tnh

PLEASE RESPOND TO:

☒ WASHINGTON ☐ OCALA ☐ DAYTONA BEACH ☐ JACKSONVILLE

SADPD-P

21 AUG 1980

Honorable Bill Chappell
House of Representatives
Washington, D.C. 20515

Dear Mr. Chappell:

I am happy to respond to your letter of 11 August 1980 to General Joseph K. Bratton requesting information concerning the National Hydropower Study and the inclusion of projects on the Cross Florida Barge Canal. As you know, General Bratton was recently reassigned to our headquarters in Washington, D.C. and will become the next Chief of Engineers on 1 October 1980.

The preliminary inventory of potential hydroelectric power sites, prepared during the first stage of the National Hydropower Study, included the existing projects on the Cross Florida Barge Canal. This listing was presented for comments at our initial public meeting in Atlanta on 10 April 1980. Subsequently, the Governor of Florida requested that these projects be deleted from the active inventory of sites being considered for further study. Therefore, based on the Governor's request and the unresolved authorization and restoration questions on the Cross Florida Barge Canal, these sites were deleted from the active inventory. We have elected to maintain only those sites in the active inventory with a reasonable opportunity for implementation. We determined this was not the case for the Cross Florida Barge Canal projects inasmuch as it has been a long standing Corps policy not to recommend implementation of a project wholly within and impacting only one state when the Governor opposed the project. These sites will be included in the report as a part of the inactive inventory and as a representation of the potential at the sites.

The next public meeting on the National Hydropower Study for the Southeastern United States will be held in Atlanta, Georgia, on 26 August 1980. A copy of the draft report covering this region and including the State of Florida will be furnished your office within the next 10 days.

I hope the above information and forthcoming draft report will be responsive to your concerns. Should you need or desire further information, I will be happy to respond.

Sincerely,

JAMES N. ELLIS
Brigadier General, USA
Division Engineer

CF:
SAJEN-DA
DAEN-CWP-E
DAEN-CWM-A

ATT-42

North Carolina Department of Natural Resources & Community Development

[illegible] Governor [illegible] Lee Secretary

[illegible]

August 27, 1980

Corps of Engineers
510 Title Building
30 Pryor Street, S.W.
Atlanta, Georgia 30303

SUBJECT: Public Meeting on National Hydroelective Power Study

Dear Meeting Manager:

The Division of Parks and Recreation, Department of Natural Resources and Community Development, N. C. is concerned about your power study as it relates to impacts on existing and planned recreation facilities at or along the water bodies listed below.

Our comments are generally the same for each catagory of water course involved.

a) At Corps Lakes where recreation is existing or planned, and changes in present water levels or fluctuation time-table will effect the amount of service our Division can provide the public. Existing launch ramps and waterside facilities such as beaches, picnic sites, and marinas will either be inundated or left high and dry with any new criteria placed on existing operating lake fluctuation curve.

b) New impoundments proposals on natural river runs now used by canoeists and rafters and advertised in reference whitewater guides, would remove considerable stretches of whitewater available for this activity.

The above general comments apply to the specific uses existing or proposed on each of the following water bodies:

VAISAW0100	John H. Kerr Reservoir	1) heavily developed with recreation facilities
NC45AW0045	Cape Fear River	1) proposed Natural and Scenic River, N.C. Water Resources Framework Study (NCWRFS) 2) priority for State recreation trail designation Preliminary Analysis of Water Trails, 1979

NC4SAW0074	Mayo River 1) proposed Natural and Scenic River, NCWRFS 2) used by canoeists in N. C. (listed in Benner's book)
NC4SAW0078	Dan River 1) proposed Natural and Scenic River, NCWRFS 2) priority for State recreation trail designation 3) Region I Canoe Trail
NC6SAC0046	Pee Dee River
NC6SAC0072	Yadkin River 1) proposed Water Trail, NCWRFS
NC6SAC0073	Yadkin River 1) proposed Water Trail, NCWRFS
NC6SAW0020 NC6SAW0021 NC6SAW0024	Haw River Haw River] 1) heavily used by local canoeists Haw River
NC6SAW0044	Cape Fear 1) proposed Natural and Scenic River, NCWRFS
NC6SAW0053	Deep River 1) proposed Water Trail, NCWRFS 2) priority water trail - State trail designation Preliminary Analysis of Water Trails, 1979
NC7SAS0088	Whitewater River
NC7SAS0089	Horsepasture River
NC9SAW0075	Mayo River 1) proposed Natural and Scenic River, NCWRFS 2) used by canoeists in N.C. (listed in Benner's book)
NC9SAW0079	Dan River 1) proposed Water Trail, NCWRFS 2) priority for State recreation trail designation Preliminary Analysis of Water Trail, 1979 3) used by canoeists in NC (Benner's book) 4) existing State Park

NC70RN0090	Watauga River 1) proposed Natural and Scenic River, NCWRFS 2) used by canoeists in N.C. (Benner's book)
NCCSAW0026	B. Everett Jordan 1) indense recreation development underway including all boat ramps in initial phase
NCCSAW0083	Falls Lake 1) indense recreation development underway including all boat ramps in initial phase
	Green River - Polk County - Duke Power Project 1) proposed Natural and Scenic River, NCWRFS 2) study for designation as Natural and Scenic River underway 3) heavily used by canoeists (Benner's book) 4) State Park potential
NCISAC0021	High Rock Lake 1) Legislative study committee proposing State Park on lake

If you have any questions about the above information, call me at (919) 733-5245.

Sincerely,

Fred P. Hagenberger
Assistant Chief, Design and Development
Division of Parks and Recreation

FPH/esm

T.O.I. Associates
P. O. Box 545
Elberton, Georgia 30635
"The Granite Capital of the World"

U.S. ARMY ENGINEER DIV., S. ATLANTIC
CORPS OF ENGINEERS
ATLANTA, GA.

August 29,1980

REF: August 26,1980 Meeting-Civic Center-Atlanta
Hydro-electro Power

STATEMENT: Opposition To "Tallow Hill Dam Project"

Donnie L. Moon-Spokesman

I am Donnie L. Moon of Bowman, Georgia. As spokesman, I represent a group of concerned citizens called "Friends of the Broad River" who are opposed to any future study or project on The Broad River specifically The Tallow Hill Project in Elbert and Madison counties. We want to keep this last river of our area in its natural state. We feel that the wildlife, plant life, and scenic beauty out weighs any other gains this project could ever offer. We are much opposed and will continue our efforts to stop The Tallow Hill Project. Elbert County has enough of its land underwater.

Signed
Donnie Moon

"STOP THE TALLOW HILL PROJECT..LET THE RIVER FLOW"

August 29, 1980

Department of the Army

U.S. Army Engineer Division, S. Atlantic

Corps of Engineers

510 Title Bldg.

30 Pryor Street, S.W.

Atlanta, Georgia 30303

Re: National Hydroelectric Power Study

Dear Sirs:

Please include this letter as part of public comment on the above-referenced Hydroelectric Power Study, regional report: due 9-30-80, as I understand it.

I want to express my general opposition to further hydroeleetric dam-building. I feel that our best hope for meeting future electric power demands (which seem to be leveling-off, by the way) is in reducing demand through conservation. It is predicted that overcapacity in the U.S. may reach 43% this year and continue to rise. If so, this will be well over the established and prudent 15% reserve margin.

In addition, the general energy crunch results primarily from a shortage of oil used in transportation, direct generation of electric power, chemical feedstocks, etc. We should not continue to damn and inundate every foot of our free-flowing streams rather than address the real cause of our problem.

Finally, a study has shown that a great number of existing damns could be used in hydroelectric generation if we need them. I suggest the Corps consider this existing potential before initiating new and expensive water projects that may not be needed, anyway.

Tri-County Electric Cooperative

P.O. Box 1320 · Leesburg, Virginia 22075 · Phone (703) 777-2041

September 3, 1980

Department of the Army
U.S. Army Engineer Division, South Atlantic
Corps of Engineers
510 Title Bldg, 30 Pryor St., S.W.
Atlanta, Georgia 30303

Dear Sirs:

We at Tri-County Electric Cooperative have nominated and are very much interested in seeing Goose Creek dam developed as a hydroelectric source.

Since we are without the 150 mile radius set for preferred customers of the Kerr-Philpott hydro plant, we are the only Cooperative in Virginia not receiving some SEPA power. We must purchase all of our power from the Virginia Electric and Power Company.

The notice of the Power Study Meeting on August 26, 1980 was received by us on August 28, 1980, and precluded attendance at the meeting or comment on the subject. Goose Creek Dam is located in Loudoun County, but owned by the City of Fairfax. If Tri-County could develop this source, it would supply approximately 6% of our needs at this time, according to the Study results (see VACNAB 0152).

We urge you to continue the study of this dam, and hope that in the future, Tri-County Electric Cooperative will be the recipient of some hydro power to relieve our consumers of paying more for their energy than members of any other Cooperative in Virginia, Maryland, or Delaware.

Your kind attention to this request will be greatly appreciated.

Sincerely yours,

John W. Fiske
Plant Engineer

JWF:ahh

cc: Ronald M. Borofski
NRECA Field Representative

BILL CHAPPELL
4TH DISTRICT, FLORIDA

2353 RAYBURN OFFICE BUILDING
WASHINGTON, D.C. 20515
(202) 225-4035

COMMITTEE:
APPROPRIATIONS

SUBCOMMITTEES
DEFENSE
ENERGY AND WATER DEVELOPMENT
DISTRICT OF COLUMBIA

Congress of the United States
House of Representatives
Washington, D.C. 20515

DISTRICT OFFICES:
258 FEDERAL BUILDING
OCALA, FLORIDA 32670
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523 NORTH HALIFAX
DAYTONA BEACH, FLORIDA 32018
(904) 253-7632

6829 SAN JOSE BOULEVARD
JACKSONVILLE, FLORIDA 32217
(904) 733-4288

September 11, 1980

Brigadier General James N. Ellis, U.S. Army
Division Engineer
South Atlantic Division, Corps of Engineers
510 Title Building
30 Pryor Street, S.W.
Atlanta, Georgia 30303

RE: National Hydroelectric Power Study - Cross-Florida Barge Canal

Dear General:

Thank you for your recent letter concerning the exclusion of completed portions of the Cross-Florida Barge Canal from the National Hydroelectric Power Study.

While I am well aware of the policy decisions made by the governor and the current administration regarding completion of the Cross-Florida Barge Canal, notwithstanding their opposition the fact remains that the Canal is an authorized Federal project. Therefore, I would appreciate a definitive statement of the reasons for exclusion of these potential low-head energy sources considering the directive of Section 167 of Public Law 94-587 (42 U.S.C.A. §1962d-5g), which reads, in part: "(a) The Secretary of the Army, acting through the Chief of Engineers, is authorized and directed to conduct a study of the most efficient methods of utilizing the hydroelectric power resources at water resources development projects under the jurisdiction of the Secretary of the Army and to prepare a plan based upon the findings of such study..."

In enacting P.L. 94-587, the Congress determined to obtain an inventory of hydro-power potential. By eliminating various projects along completed portions of the Cross-Florida Barge Canal from the study, vital information will be withheld from the Congress concerning their ultimate fate. It is estimated that Rodman Dam alone could provide electrical power for tens of thousands of homes.

Therefore, your further comment on this situation would be most sincerely appreciated.

With warm regards,

Sincerely,

Bill Chappell

Bill Chappell
Congressman

PLEASE RESPOND TO:

☒ WASHINGTON ☐ OCALA ☐ DAYTONA BEACH ☐ JACKSONVILLE

SADPD-P

19 SEP 1980

Honorable Bill Chappell
House of Representatives
Washington, D.C. 20515

Dear Mr. Chappell:

In the absence of General Ellis, I am responding to your letter of 11 September 1980 concerning the inclusion of projects constructed on the Cross-Florida Barge Canal.

The National Hydropower Study will include potential sites in two categories. These are designated as the active and inactive inventories. Our regional report will cover the active and inactive inventories and provide the results, including potential capacity and energy, of all existing projects and undeveloped sites with an additional physical potential of 1 megawatt or more capacity, including projects on the Cross-Florida Barge Canal. The active inventory will include those sites which appear economically feasible based on a cursory analysis and do not have overriding non-economic constraints. Those not meeting the above criteria will be included in the inactive inventory; thus, all sites inventoried will be reported to the Congress.

The potential at the sites on the Cross-Florida Barge Canal will be specified, and development would provide power for many homes in the area as you indicate. However, for reasons cited in our letter to you of 21 August 1980, sites on the Cross-Florida Barge Canal are not considered developable at this time. As required by PL 94-587, we are to prepare a plan based on our findings. Due to the requested exclusion of the Cross-Florida Barge Canal sites by the Governor and the Administration's proposed legislation concerning deauthorization and restoration, we do not believe it appropriate to plan further studies under these circumstances. The Cross-Florida Barge Canal sites would meet all other requirements for active consideration. We believe the report will be sufficiently inclusive to permit consideration of the potential for development at any of the sites reported.

Further information on this matter will be provided at your request.

Sincerely,

PLEASANT H. WEST
Colonel, Corps of Engineers
Acting Division Engineer

CF: (w cy Chappell ltr)
DAEN-CWP-E
DAEN-CWM-A
WRSC - IWR
SAJEN-DA

Office of Planning and Budget

Executive Department

Clark T. Stevens
Director

GEORGIA STATE CLEARINGHOUSE MEMORANDUM

O: Colonel P.H. West
Deputy Division Engineer
Department of the Army
510 Title Building, 30 Pryor St.
Atlanta, Georgia 30303

ROM: Charles H. Badger, Administrator
Georgia State Clearinghouse
Office of Planning and Budget

ATE: September 22, 1980

UBJECT: RESULTS OF STATE LEVEL REVIEW

Applicant: U.S. Department of the Army. Corps of Engineers

Project: Draft Regional Report Volume XVI, National Hydroelectric Power Resources Study

State Application Identifier: 80-08-26-05

The Department of Natural Resources (DNR) has reviewed the Draft Regional Report: Volume XVI, Southeastern Electric Reliability Council and Puerto Rico, of the U. S. Army Corp of Engineers, National Hydroelectric Power Resources Study and additional information provided by the Corps in the form of computer printouts for each site. The comments offered at this time are a follow-up to comments transmitted by DNR correspondence of April 24, 1980 to the Corps, and are constrained by the very generalized nature of project descriptions and boundaries. As this study proceeds and specific projects come under consideration for hydropower development, the Department of Natural Resources would be pleased to offer appropriate information and assistance to the Corps of Engineers.

The Department is extremely concerned with the energy problems facing the Nation, and supports the development of hydropower, a renewable source of energy, as long as it is economically justified and has acceptable environmental, social, and institutional impacts. We strongly recommend, therefore, that the narrative of this report emphasize that this is only an abridged appraisal of inventory sites, and that much more analysis would be necessary before any of these sites could be justified economically and environmentally. Of particular importance to this Department is the need to recognize and fully weigh all environmental impacts and the cost of mitigating these impacts; which, of course, is not included in the economic analysis that has taken place to date. Failure to include such costs in subsequent analysis would result in understatement of project costs and an overstatement of the net project benefits. Any report presented to Congress, even for informational purposes, should acknowledge that realistic costs and benefits for these potential sites are not possible until project details are much more refined to include the above considerations; this point is important to ensuring that current data is not misinterpreted and feasible hydropower potential is not overstated.

Further, the Corps should clarify the significance assigned to benefits for other project purposes in cases where hydropower benefits alone cannot justify the project. For example, the Tallow Hill and Anthony Shoals projects presently have very low rough benefit cost ratios assigned by the Corps of Engineers for hydropower, .39 and .28 respectively. Therefore, it is assumed the benefits to be derived from other project purposes would provide major justification for these projects. This assumption should be addressed in the report since it is critical for the public to understand the assumptions upon which Corps justification of these projects would be based. Using the above mentioned projects as an example, the only other significant project benefit mentioned for these sites is recreation. Given the proximity of Hartwell, Russell and Clark Hill Lakes, however, the value of additional recreational at the Tallow Hill and Anthony Shoals sites would appear marginal, which raises questions concerning the validity of some of the assessment work accomplished for these projects at this time.

Also the six undeveloped projects on the Savannah River (Eagle Point, Steel Creek, Johnson's Landing, Dick's Lookout Point, Bull Pen Point, and Stokes Bluff) have low benefit-cost ratios for hydropower, with the other major project benefit assigned to these projects being assumed navigation benefits. It would be helpful if the Corps would further explain the marginal nature of the benefits of both hydropower and navigation at these proposed Savannah River projects since they have strong public support as well as strong public opposition.

The addition of hydropower to an existing project currently serving other purposes may negate a portion of the original project benefits which were used to justify the project. The affect such changes have on the total project benefits should be considered and explained in future project analysis.

The following topics outline general environmental concerns in order to further assist the Corps of Engineers.

Wildlife Habitat

Hydropower projects, by necessity, are located on major drainage basins, and, as a result, highly productive bottomland habitat with its resident wildlife species, both game and non-game are lost. An estimated 300,000 acres of wildlife habitat are lost each year in Georgia as a result of various development activities. This loss of habitat results in a decrease in available man-days of hunting and trapping and an increase in pressure on remaining acreage from sportsmen. Careful consideration should be given to any projects that accelerate habitat loss in areas where such habitat is at a premium. For example, the Tilton project could flood a vast area of bottomland hardwood habitat which is at a minimum in the northwest portion of Georgia. Also, the indigenous Savannah River wildlife already has been displaced by many impoundments, and additional impoundments have increasingly serious impacts on turkey, deer, waterfowl and furbearer populations. The Savannah River area also contains the possibility of the occurrence of protected species such as Red-cockaded woodpeckers, Bald Eagle, and the American Alligator. Among other concerns is the potential for siltation of prime wood duck habitat on the Ocmulgee River.

Fisheries

From the standpoint of fisheries resources, the proposed potential hydropower sites in Georgia can be segregated into four broad categories. Following is a brief description of each category with associated impacts on fisheries resources that can be expected to occur.

(1) New projects located below existing dams on big river systems; particularly on the Savannah, Altamaha and Oconee Rivers:

This category represents the greatest concern for fisheries resources since projects of this type occur in relatively undisturbed areas. These projects can partially or completely block the movements of anadromous fish species (striped bass, American shad, hickory shad, Atlantic sturgeon, shortnose sturgeon), thus impeding their access to upstream spawning areas. Negative impacts to important sport and commercial fisheries as well as to endangered species (shortnose sturgeon) would be expected, since the Altamaha and Savannah River systems represent a significant portion of the habitat suitable for these anadromous species in Georgia. Additionally, the developing commercial fishery for the American eel, a catadromous species, could be negatively impacted.

Impoundment and further development of improved navigation channels on the Altamaha and Savannah Rivers would destroy a significant portion of the remaining unobstructed, free-flowing, and largely unaltered river mileage in Georgia along with its associated productive hardwood bottomland. This would also eliminate important riverine fisheries - possibly of the highest quality and most diverse in the state. Elimination of ox-bow swamps would also destroy high quality fishery habitat.

The projects proposed near the mouths of large rivers should be examined for impacts to Georgia's valuable and productive estuarine areas. Nutrient and sediment transport, salinity regimes, and other aspects of estuarine ecology could be adversely affected.

(2) Other new project sites located on free-flowing, unaltered streams:

This category is next in importance in terms of potential detrimental effects on fisheries resources. The concern for these projects is due to the destruction of present riverine fish populations and habitat, and the elimination of free-flowing streams which provide unique and irreplaceable recreational opportunities.

(3) Other new project sites:

These sites, located on streams with existing dams, are not as potentially damaging as the above two categories. These sites can, however, result in adverse effects on fisheries resources due to further alterations in the hydrologic regime. In addition to destroying riverine fisheries habitat, these projects are often just upstream of an existing reservoir, a situation which creates potential water quality problems associated with hypolimnial release dams. Also, if constructed with pump-storage capabilities, these proposed projects may result in further damage to fisheries resources due to entrainment and impingment, severe water level fluctuations, and other related problems. At some locations, these new dams can block the upstream spawning movements of white bass and severely damage important local fisheries.

(4) Modifications to existing projects:

This category of projects would probably have the least adverse environmental impacts compared to the other types but, in certain situations, can also result in damage to fisheries resources. Modifications to existing hydro-projects, resulting in an increased emphasis on power production, potentially conflicts with recreation and fisheries objectives.

Changes in present practices of maintaining existing reservoir water levels and tailwater flow regimes due to the addition of hydropower units can lead to additional detrimental effects on fisheries resources. In assessing this impact, good baseline data is needed prior to initial construction and the subsequent assessment of effects from this construction.

Recreation

The creation of new dam and reservoir sites will cause the reduction of riverine-oriented recreation and stream fishing opportunities and this loss should be considered a project cost in analysis of recreational costs and benefits. The addition of hydropower facilities to existing dams may also impact the recreational uses of reservoirs and should be viewed as a project cost. Further, certain projects which were once considered multi-purpose now primarily provide benefits of a recreational nature. Reestablishment of hydropower production at these sites, would result in use conflicts and in associated costs. For example, modifying High Falls State Park Lake, which is primarily a recreation lake, into a hydropower facility could significantly affect the recreation value of this public facility.

Environmental Quality

Hydropower projects have traditionally had problems meeting downstream water quality standards. The "state of the art" of hydropower design has not been able to guarantee that projects will be environmentally viable as well as economically viable over project life. Meeting state and federal water quality standards downstream of hydropower projects continues to be a major issue that needs more attention.

When a hydropower project is proposed to be built on a designated trout stream there are even more significant concerns and cost implications. On trout streams, the requirements for meeting the temperature mandates would likely be very expensive if not impossible to incorporate into a hydropower project; however, these costs must be incorporated into the benefit/cost analysis.

Earliest coordination with DNR's Game and Fish Division and Environmental Protection Division to identify designated trout streams and their water quality requirements is strongly encouraged.

Cultural Resources

Feasibility studies for new hydropower sites and modification of existing facilities should take into account potential impacts to identified, and as yet unidentified, cultural resources. For example, the following existing hydropower facilities are of an age which might qualify them for the National Register of Historic Places, and should be assessed for potential National Register eligibility: Barnett Shoals; Juliette Dam; Goat Rock Dam; Tugaloo Dam; Lloyd Shoals; Nacoochee; Lake Burton; Mathis-Terrora; High Falls Lake; and Tallulah Falls Lake. Also the following existing facilities are in the area of identified cultural resources and potential impacts to these cultural resources should be assessed:

New Savannah Bluff - at the site of New Savannah Plantation, a potentially eligible archaeological district;

Augusta Canal Diversion - is within the Augusta Canal National Register Historic District; and

Reregulation Pool at Carter's Lake - at the location of "Bell Field," "Sixtoes Mound" and "Little Egypt" archaeological sites. These sites have been investigated by the University of Georgia.

Further, modification of existing facilities may involve construction of new support facilities or changes in existing reservoir levels and/or river flows which may impact identified and as yet unidentified historic and archaeological resources.

The Corps of Engineers is familiar with the procedures necessary to identify, assess and mitigate impacts to cultural resources. As the Corps begins the process, the DNR Historic Preservation Section can make available field surveys for historic structures and/or archaeological survey information for the counties in which the following proposed projects are located: Columbus; Milledgeville; Steel Creek; Low Stokes Bluff; Low Johnson's Landing; Bull Pen Point; Dick's Lookout Point; Eagle Point; Franklin; Tilton; Tallow Hill; Curry Creek; Dublin; Cypress Branch; Toomsboro; and Anthony Shoals. Information is also available for the counties in which the existing Lake Sinclair project is located.

Projects Potentially Affecting State or Federally Designated Areas: Georgia Heritage Trust Hallmark Status Sites, State Parks, State Wildlife Management Areas, and National Natural Landmarks

The following information should be taken into account by the Corps of Engineers in further project studies, screening, and resultant recommendations.

Tugalo Lake- This site is near Tallulah Gorge, a Georgia Heritage Trust Hallmark Status Site. It is also downstream from the portion of the Chattooga designated a National Wild and Scenic River. Any modifications to this existing project should consider potential impacts to these designations.

Mathis-Terrora, Tallulah Falls Lakes - These projects are also in the vicinity of Tallulah Gorge.

Lake Burton - Lake Burton Fish Hatchery and Moccasin Creek State Park are located on Lake Burton. Potential impacts to the hatchery and park should be assessed.

Lloyd Shoals - The Georgia Heritage Trust Program has designated three areas on the Upper Ocmulgee below State Route 16 as areas important to acquire boating access for public recreational use of the river.

Juliette Dam - The Rum Creek Wildlife Management Area is located just south of the town of Juliette.

Lamar Ferry - DNR has a boat ramp in the vicinity.

Dames Ferry - This project is in the vicinity of the Rum Creek Wildlife Management Area and the proposed property acquisition for the Jarrell Plantation, a State Historic Site.

Tallow Hill - Victoria Bryant State Park may be affected by this project.

Anthony Shoals - This project is at the site of the Anthony Shoals, a Georgia Heritage Trust Hallmark Site.

Cypress Branch - DNR has two boat ramps on this stretch of the Oconee.

Dublin, Toomsboro - DNR has three boat ramps between these two proposed projects.

Toomsboro, Milledgeville - The Georgia Heritage Trust Commission has designated an 18,000 acre tract of land between Toomsboro and Milledgeville on the Ocmulgee River as a Hallmark Status Site. This site is proposed to be acquired as a State Wildlife Management Area; if acquired this site would provide much needed hunting opportunity and could be adversely impacted by these two projects.

Low Stokes Bluff - Below this project and the five proposed with it as a navigation system are Ebenezer Creek, a National Natural Landmark and Georgia Heritage Trust Hallmark Site, and Bear Island, a Georgia Heritage Trust Hallmark Status Site and part of the Savannah National Wildlife Refuge. Changes in seasonal levels of the Savannah River could potentially have an adverse affect on these sites.

Goose Creek - Big Hammock Natural Area is both a National Natural Landmark, a State of Georgia Natural Area, and a Heritage Trust Hallmark Status Site. This site could be adversely affected by this project. Further, Big Hammock contains the largest known colony of Elliottia racemosa, an endangered plant species.

High Falls - DNR operates High Falls State Park at this site, including the existing dam, and would be opposed to any hydropower development which would significantly affect the recreation values and cultural resources values of the State.

The following State agencies have been offered the opportunity to review and comment on this project:

- Department of Natural Resources
- Georgia Ports Authority
- Department of Transportation
- Office of Planning and Budget, Executive Dept.

cc: Barbara Hogan, DNR

SADPD-P 8 October 1980

Mr. Charles H. Badger, Administrator
Georgia State Clearinghouse
Office of Planning and Budget
270 Washington Street, SW
Atlanta, Georgia 30334

Dear Mr. Badger:

A copy of your 22 September 1980 memorandum regarding our National Hydropower Study draft report will be included in the record of the public meeting held in Atlanta, Georgia, on 26 August 1980.

We will review the draft report to determine where to reinforce the preliminary nature of the analyses to prevent misinterpretation of the results.

Any site with reasonable potential for feasible development was retained in our inventory for further study. Undeveloped sites with a benefit cost ratio (BCR) of at least 0.7 but less than 1.0 based on power benefits alone were assumed justifiable by additional benefits from other project purposes. Also, some undeveloped sites with a BCR less than 0.7 were retained if benefits to other purposes were believed to be sufficient to justify development. We will clarify this procedure and expand on the descriptive data of applicable sites in the final report.

Section 7.1 of the draft report recognizes that there would be benefits foregone to other existing project purposes if power is added. This would be evaluated when and if further studies of the projects are made.

We are referring your letter to the Savannah and Mobile District Engineers for consideration of your comments regarding the non-economic impacts of power development at existing projects and undeveloped sites in our inventory.

We appreciate your thorough review of our draft report. Thank you for your interest in the study.

Sincerely,

DAN M. MAULDIN
Acting Chief, Planning Division

CF: (w cy OPB memo, 22 Sep 80)
SASPD-P/Leroy Crosby
SAMPD-F/Jim Tamblyn

Environmental and Technical Services Division
Environmental Assessment Branch
Oxford, Maryland 21654

September 22, 1980

Col. Pleasant H. West
Deputy Division Engineer
South Atlantic Division
Corps of Engineers
510 Title Building
30 Pryor Street, S.W.
Atlanta, Georgia 30303

Dear Colonel West:

This letter is in regard to the draft report on the National Hydroelectric Power Resources Study for the Southeastern Electric Reliability Council and Puerto Rico, Volume XVI, that accompanied your letter dated August 20, 1980.

The Environmental Assessment Branch of the Northeast Region of the National Marine Fisheries Service (NMFS) has reviewed the subject document only for the projects located within the boundaries of the state of Virginia. The primary concern of the NMFS are the impacts of the projects proposed for continued study on the migration of anadromous fish. While the vast majority of the projects proposed for continued study are above existing structures which presently block fish migration, most of the structures fall within the boundaries of historical migration routes for these species. The NMFS is presently involved in a program to develop a restoration plan for anadromous species in Virginia and the Chesapeake Bay in general.

Any program which would result in the construction of new blockages (impoundments) or the modification of existing structures that would have an impact on the success of our restoration effort will be of concern to our agency. Therefore, the NMFS requests that anadromous fish passage facilities be made a part of the design of any project recommended for continued study. We also recommend that the feasibility of anadromous fish passage, including flows through fish ladders during critical periods, be utilized as a screening criteria for the selection of projects for further study. If projects, especially new construction, cannot accommodate fish passage facilities then we request that they be dropped from consideration for further study.

We hope that these comments will be of assistance to you in preparing your final report. If we can be of additional help, please feel free to contact Mr. Edward W. Christoffers of my staff at (301)226-5771.

Sincerely,

Robert L. Lippson

Robert L. Lippson, Ph.D.
Research Coordinator

SADPD-P 8 October 1980

Mr. Robert L. Lippson
Environmental and Technical Services Division
Environmental Assessment Branch
National Oceanic & Atmospheric Administration
National Marine Fisheries Service
Oxford, Maryland 21654

Dear Mr. Lippson:

A copy of your 22 September 1980 letter regarding our National Hydropower Study draft report will be included in the record of the public meeting held in Atlanta, Georgia, on 26 August 1980.

Time and resources available for this study to not permit an evaluation of the requirement for fish passage facilities at each site. We could not screen sites from the inventory on the premise that these facilities would be required. The need for site specific facilities, such as fish ladders, will be evaluated when and if further studies of the sites are made.

We appreciate your comments. Thank you for your interest in the study.

Sincerely,

DAN M. MAULDIN
Acting Chief, Planning Division

CF: w cy NOAA ltr, 22 Sep 80
WRSC-IWR/Dick McDonald

State of South Carolina

LAND RESOURCES CONSERVATION COMMISSION

September 22, 1980

Colonel Pleasant H. West
U. S. Army Corps of Engineers
510 Title Building, 30 Pryor St., S.W.
Atlanta, GA 30303

Dear Colonel West:

The National Hydroelectric Power Resources Study for the Southeastern Electric Reliability Council and Puerto Rico, Volume XVI, has been reviewed by our staff. In general, the study appears to be comprehensive in scope and complete in content. We noted that no mention was made of the Retired Hydropower Plants Listing maintained by FERC which is a valuable data source for this type study.

We have not attempted to make specific comments concerning the National Power Study. We have, however, enclosed a copy of a Small Scale Hydropower Resource Assessment Report for South Carolina recently prepared by the Commission for the U. S. Department of Energy. Inconsistencies between this report and the National Power Study are inevitable since both are based on unverified data and the fact that the scope of the reports is differenct. Hopefully, however, the information contained in the enclosed report for South Carolina will enhance the data contained in the National Power Study.

Thank you for the opportunity of reviewing the National Hydroelectric Power Resources Study. If we can be of further assistance, please advise.

Sincerely yours,

Henry P. Fulmer
Deputy Director

HPF/ml
enclosure

2221 DEVINE STREET, SUITE 222 • COLUMBIA, S.C. 29205 • (803) 758-2823

SADPD-P 8 October 1980

Mr. Henry P. Fulmer
Deputy Director
Land Resources Conservation Commission
State of South Carolina
2221 Devine Street
Suite 222
Columbia, SC 29205

Dear Mr. Fulmer:

A copy of your 22 September 1980 letter regarding our National Hydropower Study draft report will be included in the record of the public meeting held in Atlanta, Georgia, on 26 August 1980.

We are obtaining a copy of an unpublished listing of retired hydropower plants from the Federal Energy Regulatory Commission regional office in Atlanta, Georgia. We will check our data with this listing.

We are referring your Small Scale Hydropower Resource Assessment Report for South Carolina to the Charleston District Engineer for consideration in the continuance of the National Hydropower Study. Please furnish us one additional copy of your report for the Savannah District Engineer who also has some responsibility in our study for South Carolina.

We note in your report that you have assumed an available stream flow of 25 percent of the flow duration curve. Since our analysis is based on the most economical design utilizing the total available flow, we would not expect congruent results.

Thank you for your comments and interest in the study.

Sincerely,

DAN M. MAULDIN
Acting Chief, Planning Division

BCF:
SACEN-PH/Ted Hauser, w SC ltr & incl
SASPD-P/Leroy Crosby, w SC ltr only
WRSC-XWR/Dick McDonald, w SC ltr only

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 23 1980

Mr. Pleasant H. West
Colonel, Corps of Engineers
Deputy Division Engineer
Department of the Army
South Atlantic Division
510 Title Building
30 Pryor Street, SW
Atlanta, Georgia 30303

Dear Mr. West:

This is in response to your request for comments on the Draft National Hydroelectric Power Resources Study, Regional Report: Volume XVI concerning "Southern Electric Reliability Council and Puerto Rico".

We have reviewed the report and determined that the proposed action has no significant radiological health and safety impact, nor will it adversely affect any activities subject to regulation by the Nuclear Regulatory Commission. However, we would like to bring to your attention that your initial screening criterion for evaluating potential hydropower resources should specifically reflect the potential adverse impact on the operation and safety of existing nuclear power plants.

The adverse effects of reduced water supply on nuclear power plants should be factored into the criterion. The criterion should also include consideration of the potential failure of all upstream reservoirs and its impact on the nuclear power plants which are downstream from the proposed projects.

The cost and benefit analysis should include the negative aspects (public safety, downtime cost, cost for modification) of upgrading the flood protection of nuclear power plants due to accidents at hydroprojects.

Thank you for providing us with the opportunity to review this Draft of the National Hydroelectric Power Study.

Sincerely,

Daniel R. Muller, Assistant Director
for Environmental Technology
Division of Engineering

SADPD-P 8 October 1980

Mr. Daniel R. Muller
Assistant Director for Environmental Technology
Division of Engineering
United States Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Muller:

A copy of your 23 September 1980 letter regarding our National Hydropower Study draft report will be included in the record of the public meeting held in Atlanta, Georgia, on 25 August 1980.

Time and resources available for our cursory analysis of hydropower potential and feasibility do not permit an evaluation of the adverse impacts on the operation and safety of existing nuclear power plants. These impacts will be evaluated when and if further studies of the sites are made.

We appreciate your comments. Thank you for your interest in the study.

Sincerely,

DAN M. MAULDIN
Acting Chief, Planning Division

CF:
WRSC-IWR/Dick McDonald

STATE OF ALABAMA

ALABAMA HISTORICAL COMMISSION

725 MONROE STREET

MONTGOMERY, ALABAMA 36130

F. LAWERENCE OAKS
EXECUTIVE DIRECTOR

TELEPHONE NUMBER
832 6621

September 23, 1980

Colonel Pleasant H. West
Department of the Army
Corps of Engineers
South Atlantic Division
510 Title Building, 30 Pryor Street, S.W.
Atlanta, Georgia 30303

Re: Draft Report on the National Hydroelectric Power Resources Study for the Southeastern Electric Reliability Council and Puerto Rico, Corps of Engineers

Dear Colonel West:

A review of the above referenced draft report indicates that a literature search of archaeological and historical sites was conducted of each of the possible hydroelectric sites. While this is a necessary procedure in developing site plans, it does not constitute the total measures necessary to determine that a project will not have an adverse impact upon cultural resources. An on-site cultural resource assessment will be necessary for each site chosen for the construction of a hydroelectric plant. It is our opinion that the draft report should acknowledge this responsibility.

Thank you for your efforts in this matter. If our office can be of further assistance, please call upon us.

Sincerely,

Milo B. Howard, Jr.
State Historic Preservation Officer

BMB/jg

STATE OF FLORIDA

Office of the Governor

THE CAPITOL
TALLAHASSEE 32301

BOB GRAHAM
GOVERNOR

September 26, 1980

Pleasant H. West, Colonel
South Atlantic Division
Corps of Engineers
Department of the Army
20 Pryor Street, S.W.
Atlanta, Georgia 30303

Dear Colonel West:

In response to your request dated August 20, 1980 for review and comments on the National Hydroelectric Power Resources Study, Draft Regional Report: Volume XVI, enclosed for your consideration is a response to this document from the Florida Department of Environmental Regulation.

We appreciate the opportunity to review and comment on this report. We would like to also have the chance to review the final document when it is completed.

Sincerely,

Walter O. Kolb
Senior Governmental Analyst
Office of Planning & Bugeting

WK/mew

Enclosure

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301

RECEIVED
SEP 30 1980
Natural Resources and Public
Safety Policy Unit
Office of ...

BOB GRAHAM
GOVERNOR

JACOB D. VARN
SECRETARY

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

September 19, 1980

Mr. Walt Kolb
State Planning and Development
Clearinghouse
Office of the Governor
The Capitol
Tallahassee, Florida 32301

Dear Walt:

National Hydroelectric Power Resources
Study, Draft Regional Report: Volume XVI,
U. S. Army Corps of Engineers

The referenced draft report includes a compilation of data and preliminary analyses of existing and potential facilities capable of generating hydroelectric power. The site listings are grouped into near term and long term categories depending on the probable feasibility for power generation before or after 1990, respectively. Each site has also been ranked numerically which reflects the time frame for potential development. The ranking will prioritize subsequent developmental studies.

Two sites are identified in Florida: the Dead Lake Dam (Chipola River) and the St. Marys River north of Macclenny. The former site is considered to have near term development potential since there is already a structure in place; reservoir development on the St. Marys River is categorized as a long term project. Both appear to have been designated relatively low priority rankings. The Department of Environmental Regulation, Division of Environmental Permitting has reviewed the study and offers the following comments for consideration:

We assume from the data presented in Appendix A-1, p. A-2 that only the modification and use of the existing Dead Lake Dam is contemplated and that an expansion of the present impoundment by constructing a larger dam is not being considered. The construction of the Dead Lake Dam has resulted in some adverse impacts to habitat and water quality in the lake, such that it may be environmentally advantageous to consider dam removal at some future time. If the dam is to remain, the use of its discharge to generate electricity does not seem objectionable unless operational requirements would create or exacerbate environmental problems in or downstream of the impoundment. Downstream impacts of proposed system modifications would affect project acceptability under Chapters 253 and 403, Florida Statutes, and Section 401 of Public Law 92-500. The Chipola and Apalachicola Rivers are specially designated as Outstanding Florida Waters and, as such, are afforded the highest protection under these laws. Further, this drainage basin sustains the State's most important shellfishery, Apalachicola Bay, which includes a variety of state and federal special designations and legal protections.

Hydroelectric development of this site may also be affected by other institutional interests in the Apalachicola Basin. Dead Lake is formally managed by the Dead Lake Water Management District with advisory assistance from state agencies, mainly the Department of Natural Resources and the Northwest Florida Water Management District. Local fishing interests are an important consideration of present management practices. Management of the lake has not been simple because of its water supply is so heavily affected by Jim Woodruff Dam releases in response to navigational requirements on the Apalachicola River.

The St. Marys River project would require intense scrutiny of probable environmental impacts to the Okeefenokee National Wildlife Refuge, the river itself and receiving estuarine waters. The construction of dams and the creation of impoundments result in pervasive and permanent environmental damage to the entire system influenced by a stream's flow. Affirmative recommendations for permitting such a facility pursuant to the referenced statutes are unlikely. Attached is a comprehensive list of known impacts characteristic of impounded flowing systems, a few of which may not be applicable to Florida. The tables are exerpted from the EPA Ecological Research Series publication 600/3-76-045, April, 1979, entitled "Impacts of Construction Activities in Wetlands of the United States" by Rezneat M. Darnell. Aside from numerous other environmentally damaging consequences of such structures, their contribution to decreased water quantity, degraded water quality, and salt water intrusion is counterproductive to sound water resources management. Considering this, the narrow spread between the economic and non-economic ranking numbers displayed on page 1 of Table 8.2 is surprising.

We appreciate the opportunity to comment on this draft report and would like to review the final document when it is completed. Interagency coordination on possible subsequent studies is recommended.

Cordially,

Lynn F. Griffin
Environmental Specialist
Intergovernmental Programs
Review Section

LFG/bs

Enclosure

cc: Robert V. Kriegel
Doug Dutton

TENNESSEE CITIZENS for WILDERNESS PLANNING

For The Preservation and Enjoyment of Our Wild Lands and Waters

130 Tabor Road
Oak Ridge, Tenn. 37830
Telephone 615-482-2153

Pleasant H. West
Colonel, Corps of Engineers
Deputy Division Engineer
Department of the Army
510 Title Building,
30 Pryor st, S.W.
Atlanta, Georgia 30303

RE: The National Hydroelectirc Power Resources Study for the Southeastern Electric Reliability Council

Gentlemen,

Our comments on the study document will be rather brief. In general we believe that in so far as Tennessee is concerned, very little can be accomplished by additional hydropower construction. Tennessee already has more lake shoreline than the Great Lakes combined. There is no free flowing large river habitat remaining in the state with the exception of the French Broad River above Douglas Lake, short sections of the Clinch and Powell above Norris Lake, the Nolichucky above Douglas Lake, the Emory above Watts Bar Lake and the Big South Fork of the Cumberland. The latter two are protected from development. These habitats are made increasingly valuable by their very rarity.

We believe the review document very seriously overestimates electric power demand in the TVA region. TVA has historically had cheap power so that residential customers heated almost exclusively by electricity and insulation was inadequate. Consequently use of electricity by residential consumers is far above the national average. This built-in cushion has permitted Tennesseans to reduce their power consumption rather than increase it at the 4 to 5 percent per annum rate cited in the study. The TVA Power Annual Report 1979 shows the following relationship:

Residential Average Annual Use

1979 -	14,680
1978 -	16,190
1977 -	16,400

You will note that the power consumption is still approximately twice the national average

In fact TVA has experienced such a marked decline in power use that it has had to reevaluate its entire power planning strategy. Enclosed you will find the most recent figures available for the TVA system. The enclosure is part of the documemtation supplied to the plaintiffs in the TVA Clean Air Act settlement case and is dated 9/4/80. You will note that: (1) recent years (1976 to present) show an overall <u>decline</u> in power useage; and (2) TVA's sales projection show an overall 2.3% annual growth rate.

In addition, it is logical to assume that the current rate increases will lead to even greater reduction in demand. Assuming an elasticity of 0.1% (which is extremely conservative) the present rate increase of 26% would lead to a annual rate of consumption decline of 2.6%.

TVA has made a decision to press ahead with its nuclear program. The Authority, rightly or wrongly, has invested immense amounts of capital and resources into the program which can not be recovered. The result will be an overcapacity. TVA is currently attempting unsuccessfully to either expand its service area or obtain commitments for the extra capacity.

For these reasons it seems that development of Tennessee's few remaining rivers will not be necessary to meet any bona fide power needs and that such unnecessary development stands to threaten the small amount of remaining free-flowing river habitat along with the fauna associated with that habitat.

Thank you for the opportunity to express our views.

Sincerely,

Thomas M. Johnson

Thomas M. Johnson
River Committee

SADPD-P 7 October 1980

Mr. Thomas M. Johnson
Tennessee Citizens for Wilderness Planning
130 Tabor Road
Oak Ridge, TN 37830

Dear Mr. Johnson:

A copy of your recent letter regarding our National Hydropower Study draft report will be included in the record of the public meeting held in Atlanta, Georgia, on 26 August 1980.

The utilities projections of peak power demand filed by the utilities through the Southeastern Electric Reliability Council to the Department of Energy on 1 April 1979 were the latest projections available for this study report. At that time the utilities projected an annual growth rate in peak demand of 4.1 percent through year 2000, as shown by PROJECTION I in Table 4.8 of the report. Based on the utilities projections filed on 1 April 1980, the projected annual growth rate in peak demand through year 2000 is about three percent. This difference in the projections would not alter our findings regarding potential hydropower developments proposed for further study.

You may be assured that the demand for hydropower would be given much more detailed analysis should any of the sites be funded for further study by the Federal Government, or investigated by non-Federal interests.

Thank you for your comments and your interest in the study.

Sincerely,

DAN M. MAULDIN
Acting Chief, Planning Division

BCF: w TCWP ltr
ORDPD/Mr. Mickey Stritt
ORNED-P/Mr. Harry Blazek

Colonel Pleasant H. West
U.S. Army Corps of Engineers
South Atlantic Division
510 Title Building
30 Pryor Street
Atlanta, Georgia 30303

Dear Colonel West:

These comments are provided as per your August 20, 1980, request for our review of the draft report entitled National Hydroelectric Power Resources Study for the Southeastern Reliability Council and Puerto Rico, Volume XVI, August 20, 1980. The Fish and Wildlife Service (FWS) previously made comments on the listed sites at the public meetings held on April 10 and August 26, 1980. Copies of our statements presented at those meetings are attached. Comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

General Comments

The document appears to cover the important aspects of growth and demand, existing resources, various constraints and other factors pertaining to hydropower resources and development. However, we note that this study has only superficially addressed environmental/ecological issues, largely through the elimination of potential development sites with significant environmental controversy. The sites, passing screening criteria, were grouped into a near-term plan and a long-term plan. Ranking for those sites in each plan was established, with a number of assumptions made in establishing this ranking. No reference is made to instream flow requirements or management for selected aquatic species or their vulnerable life stages. Some of these assumptions may result in misleading rankings in terms of providing a meaningful portrayal of the likelihood of any particular site being developed in either the near- or long-term plan. Due to the brief time afforded for analysis, we are concerned that fish and wildlife resource problems may not be apparent on any particular project. Such problems could have been raised through a full and deliberate review. Accordingly, we request the earliest opportunity, as per provisions of the Council of Environmental Quality (CEQ) Guidelines, for input into planning and decisionmaking relating to feasible sites. When practical, a more detailed review should be undertaken of those near-term listed sites to determine site specific problems related to fish and wildlife.

We strongly urge the adoption of the Fish and Wildlife Service Hydropower Site Assessment Form (copy attached) which was developed in cooperation with water management and regulatory agencies. Because facilities are operational or possess the potential of retrofitting, it should not be assumed that fish and wildlife problems related to the further development of a facility would be inconsequential. In fact, unresolved problems such as instream flow requirements and management for target species caused by initial facility development may have to be addressed and corrected through lengthy field investigations and arbitration before future compatible development could proceed.

The dissolved oxygen (DO) content of water is a critical factor to aquatic species, especially fisheries and other aquatic resources. Dissolved oxygen concentrations generally decrease from surface to bottom and can be affected by temperature, flow rates and water quality. At certain facilities, biologists have found that the generation of electricity drastically reduces DO concentrations of some streams, especially during low flow and high temperature situations. This is caused by the location of intakes near the bottom of the forebay where DO content is extremely low. To reduce impacts on fisheries and other aquatic species, we recommend that all future installations of hydroelectric projects be designed to withdraw water from forebays at multilevel locations to minimize potential low DO problems. In addition, we recommend that sites with operational facilities be retrofitted with best available technology to assure optimum DO in discharge waters.

During the Spring season, when reservoir levels are usually at or near yearly peak levels, fish utilize the littoral areas for spawning and nursery habitat. The fishery resources can be drastically impacted by water fluctuations during the spawning period. Therefore, we also recommend that water levels be stabilized during the peak spawning season (March through May) to reduce adverse impacts on reservoir fisheries.

The following projects were identified by a cursory review to have potential impact on extensive areas of palustrine forested wetlands. These wetlands are valuable fish and wildlife habitat and careful consideration should be given to their values in future planning.

Project	River	County	State
Eagle Point	Savannah	Richmond	Georgia
Steal Creek	Savannah	Burke	Georgia
Bull Pen Point	Savannah	Screven	Georgia
Dicks Lookout Point	Savannah	Screven	Georgia
Low Johnson's Landing	Savannah	Screven	Georgia
Low Stokes Bluff	Savannah	Effingham	Georgia
Goose Creek	Altamaha	Wayne	Georgia
Cypress Branch	Oconee	Montgomery	Georgia
Dublin	Oconee	Laurens	Georgia
Tommsboro	Oconee	Washington	Georgia
McClenny	St. Marys	Baker	Florida

These projects also have a high potential to have a significant adverse impact on the following important anadromous fish species: striped bass, American shad, hickory shad, blueback herring and Atlantic sturgeon.

Probability of impacts on endangered and threatened species also is relatively high for the identified projects above. We understand that the Goose Creek site has been recently deleted from study for economic and environmental reasons.

The unique resource values (fish, wildlife and recreation) of the Anthony Shoals site on the Broad River, Wilkes County, Georgia, were expressed in our letter of June 12, 1980, to the Corps, in which a recommendation was made that this site and others be deleted from further consideration.

Hydropower generation on Gantt Lake, ALISAM0032, on the Conecuh River in Covington County, Alabama, and the George Andrews Lake, ALCSAM0044, on the Chattahoochee River in Houston County, Alabama, would probably pose no immediate problems as long as proper flows and DO are maintained and reservoir water levels are stabilized during spawning season. The dusky shiner and the bluestripe shiner, listed by Alabama as special concern, are found within the Chattahoochee River.

Bear Creek Reservoir, ALCORN003, and Cedar Creek Reservoir, ALCORN005, in Franklin County, Alabama, were constructed by the Tennessee Valley Authority to control late winter and spring flooding. The summer flows have been measured at less than 10 cubic feet per second (cfs) and will require special consideration to assure minimum flow during manpower operations. Fisheries in Bear and Cedar Creeks are excellent, primarily due to the successful stocking of smallmouth bass, Florida bass, striped bass, black crappie, and threadfin shad by the Alabama Department of Conservation and Natural Resources. To reduce the impacts of hydropower generation on indigenous fisheries in this drainage, the reservoirs should not be drawn down during the peak spawning season and stream flow should be maintained at levels equal to those prior to project construction. Also, this drainage is inhabited by the American brook lamprey (Alabama designated endangered) and the brindled madtom (Alabama designated special concern). Both species require riverine habitats.

The Wallahatchee site, AL48SAM0038, Tallapoosa River, Elmore County, Alabama, is sensitive from a fish and wildlife standpoint. Important riparian habitat would be lost to an impoundment, while riverine habitat would change to lacustrine habitat. Riverine species such as the crystal darter (Alabama designated threatened), would be extirpated.

Hydropower generation on the Tombigbee and Alabama Rivers would not result in the impoundment of additional areas according to this report. Problems develop with extremely low flows during the summer, especially at William "Bill" Dannelly Lake, ALISAM0083, Alabama River, and Coffeeville Lake, ALCSAM0019, Tombigbee River. A minimum flow should be maintained at these and other facilities regardless of electrical demands, and water level of the reservoirs should be maintained during spawning seasons.

Lake Mitchell, ALISAM0031, Coosa River, Coosa County, Alabama, is an operational project and has potential for additional units. Any expansion should include best available technology to accommodate multilevel withdrawal to maintain acceptable DO levels for downstream fisheries. Also during spawning season, appropriate reservoir levels should be stabilized.

The blue sucker, trispot darter, southern cavefish, as well as 93 species of snails, require riverine environments and are designated in various status categories by the State of Alabama. The following riverine species are currently undergoing status review by our agency: Alabama shovelnose sturgeon, freckled darter, frecklebelly madtom, five different naiad mollusks, and the flattened musk turtle.

Specific Comments

Page 22, Table 2.7. The numbers for the Georgia Power Company appear incomplete. Other electric utility tables should be double checked.

Page 23, Table 2.8. The numbers for the Georgia Power Company are shown only in the "total" column. Other electric utility tables should be checked.

Page 80. The last sentence states: "A BCR of 0.7 or less was permitted for undeveloped sites depending on the significance of benefits to other project purposes." The significance of benefits to other project purposes should be identified or quantified.

Page 95. We recommend adding the following sentence after the first sentence under Step 3: "Funding for detailed fish and wildlife studies by DOI/FWS would be sought by the Corps of Engineers as specific sites are considered for authorization."

Pages 95 and 96. The ranking procedure described is partially based on information obtained by data collection and screening procedures as described on pages 81 and 82. Data collection and screening procedures were often based on cursory reviews of very general information. Therefore, the ranking procedure described can only result in a rough approximation of site desirability.

Summary

While classification of a river as Wild and Scenic (Appendix C) would provide for some protection of fish and wildlife resources, other sites also may contain important resources. Detailed fish and wildlife studies of each candidate site should be a component part of any further Corps screening of the sites for near-term study, including those referenced earlier. Instream flow management must accommodate the biological needs of target species and their sensitive life stages.

We urge the adoption of the attached FWS Hydropower Site Assessment Form to develop necessary data that will provide an objective evaluation to provide the legitimate needs of fish and wildlife resources influenced by these projects. The provision for funding of detailed fish and wildlife studies by the Fish and Wildlife Service should be included as a part of any proposed authorization.

Sincerely yours,

Walter O. Stieglitz

Acting Regional Director

Attachments (3)

SADPD-P 28 October 1980

Mr. Walter O. Stieglitz
Acting Regional Director
Fish and Wildlife Service
U.S. Department of the Interior
75 Spring Street, S.W.
Atlanta, Georgia 30303

Dear Mr. Stieglitz:

A copy of your 15 October 1980 letter regarding our National Hydropower Study draft report will be included in the record of the public meeting held in Atlanta, Georgia, on 26 August 1980.

Time and resources available for this study do not permit a detailed assessment of non-economic impacts and problems associated with the potential hydropower developments. This will be done when and if further studies of the sites are made.

We are referring your letter to the Savannah, Mobile, and Nashville District Engineers for consideration of your comments regarding the non-economic impacts of power development at sites within their areas of study.

We appreciate your comments on the specific sites under consideration and your comments on our draft report. Thank you for your interest in our study.

Sincerely,

DAN M. MAULDIN
Acting Chief, Planning Division

CF: w cy F&WL ltr, 15 Oct 80,
w Incl
DE, Savh, ATTN: Leroy Crosby
DE, Mob, ATTN: Jim Tamblyn
DE, Nash, ATTN: Harry Blazek
Div Engr, ORD, ATTN: Mickey Stritt

United States Department of the Interior

FISH AND WILDLIFE SERVICE

ROOM [illegible] FEDERAL BUILDING

ASHEVILLE, NORTH CAROLINA 28801

December 9, 1980

Division Engineer
Department of the Army
South Atlantic Division, Corps of Engineers
570 Title Building, 30 Prior St., S.W.
Atlanta, Ga. 30303

Dear Sir:

We have reviewed the Draft Report on the National Hydroelectric Power Resources Study for the Southeastern Electric Reliability Council and Puerto Rico, Volume XVI, and have the following comments.

We have identified 19 near-term projects and 17 long-term projects in North Carolina that will have potential adverse impacts on fish and wildlife resources. These projects would have significant adverse impacts on fish and wildlife resources, especially major game and migratory fishes adjacent to the project and for some distance in the downstream section. Mitigation for fish and wildlife resources thus impacted should be viewed as one of the major considerations in the planning of potential hydroelectric generating facilities.

We note with concern that the economic factors governing the operation of hydroelectric power plants in the southeast are generally related to their high value as peaking plants. Such a plan for operations severely stresses both the upstream and downstream sections of the stream as a result of wide fluctuations in both flow and water levels. Both the stream flora and fauna evolved under stream stage conditions that reflect variations in stage and velocity. Except for freshets resulting from local meteorological conditions, the fluctuations in stage and velocity were characterized by peaks whose duration may have lasted during an entire season of the year. The operation of hydroelectric facilities as peaking plants creates stream flow conditions quite unlike natural conditions. With some operational designs, it is possible, even likely, that the downstream section may experience a range of conditions equivalent to both flood and drought equivalents in streamflow during each daily interval.

Such a flow regime could severely stress the stream's invertebrate fauna. Most of the larva of aquatic insects lack sufficient powers of locomotion to cope with widely fluctuating water levels. This is especially true as regards rapidly retreating waters. Many of the stream's invertebrate fauna dislodged by the high velocity flow during natural freshets generally attach themselves in areas of the stream bed that will be exposed to direct sunlight and air as the flow diminishes. These will be lost as a food source for the resident fish population. The flexible growth rate of fishes provides a measure of protection for annual or seasonal fluctuations in food resources in naturally functioning aquatic environs. Daily fluctuations of significant magnitude, however, will result in a greatly diminished fish population.

We sincerely hope that more serious and effective consideration can be given to both the near-term and long range adverse effects of single purpose projects on the streams under consideration. As you may know, the Department of the Interior, acting under the provisions of the Migratory Bird Treaty Act, regulates the taking of migratory game birds and other birds and provides limited amounts of wetland habitat through a refuge system. The fate of other wetlands, such as those presently under consideration, is regulated by the Corps of Engineers, Tennessee Valley Authority, Federal Energy Regulatory Commission, and other agencies. We realize that it would be unrealistic to expect that all wetlands should remain undisturbed. However, the conversion of many streams to single purpose use such as navigation, flood control and power generation has significantly changed the historic characteristics of the streamside vegetation as well as the stream itself. Therefore, each stream section converted to a single purpose use significantly reduces our management options as regards fish and wildlife generally, and migratory birds and fishes specifically.

Federal agencies authorizing, funding, or carrying out any of these projects must meet their responsibilities under Section 7 of the Endangered Species Act of 1973, as amended, to insure that their actions are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of Critical Habitat of such species, 16 U.S.C., 1531-1543.

We appreciate the opportunity to review the sites under consideration, and we hope that the above considerations will assist you in fulfilling your role in this important work.

Sincerely yours,

Bob Pacific

Robert D. Pacific
Acting Area Manager

NATIONAL HYDROPOWER STUDY
VOLUME XVI
SOUTHEASTERN ELECTRIC RELIABILITY COUNCIL

Appendix C
INVENTORY

FOOTNOTES

(1) Project Identification Number:

```
           Example:  AL  C         SAM     0019
         State Code__|   |          |       |________Sequential Number
Type & Status Code ______|          |________________District Code
(Table Below)
```

Type of Operation

Status of Waterway	Run of River	Diversion	Reservoir	Reservoir With Diversion	Irrigation Canal	Pumped Storage
Existing	A	B	C	D	E	F
Existing with Power	G	H	I	J	K	L
Existing with Retired Power Plant	M	N	O	P	Q	R
Breached	S	T	U	V	W	X
Breached with Retired Power Plant	Y	Z	Ø	1	2	3
Undeveloped	4	5	6	7	8	9

(2) These estimates are based on readily available data which have generally not been verified in the field. Inasmuch as detailed studies have not been made, the potential incremental capacity and energy estimates overstate the actual power which can be developed in most cases, particularly at existing projects, because of the need to maintain satisfactory water levels and releases for other vital project purposes such as flood control, water supply, navigation, base flow stabilization, recreation, fish and wildlife, and environmental values.

(3) Data Item: Active in Inventory

Categories:

2 - Potential hydropower developments which warrant further study. A BCR of 1.0 or better was required to retain existing projects. A BCR of 0.7 was required to retain undeveloped sites on the basis that there would most likely be other project purposes to share in the project cost. A BCR of less than 0.7 for undeveloped sites was permitted where there was sufficient study data available to show that the benefits to other project purposes might justify a project.

5 - Potential hydropower developments screened out for economic reasons, or existing hydropower projects with less than 1,000 KW additional potential.

6 - Potential hydropower developments screened out for non-economic reasons.

(4) Data Item: Purposes

Categories:

I - Irrigation
H - Hydroelectric
C - Flood Control
N - Navigation
S - Water Supply
R - Recreation
D - Debris Control
P - Farm Pond
O - Other

(5) Data Item: Status

Categories:

IS - Identified Site
SP - Study Proposed
SA - Authorized for Study
FP - Feasibility Study in Progress
SI - Study Inactive
PA - Project Authorized
DM - GDM in Progress
UC - Under Construction
OP - Project in Operation

(6) Data Item: Study Program

Categories:

0 - Not recommended for further study at this time
1990 - Potential near term development (power on line by year 1990)
2000 - Potential long term development (power on line by year 2000)

(7) Data Item: Potential non-economic constraints

Categories:
E - 1 Designated National Wild & Scenic River
- 2 Qualified for National Wild & Scenic River
- 3 Under study for National Wild & Scenic River
- 4 National Rivers Inventory
- 5 Designated State Scenic River
- 6 Designated Outstanding State Waters
- 7 Considered for Outstanding State Waters
- 8 Designated National Endangered Species Habitat
- 9 Designated State Endangered Species Habitat
- 10 Potential Endangered Species Habitat
- 11 Federal Wildlife Management Lands
- 12 State Wildlife Management Lands
- 13 National Forest
- 14 Anadromous fish movement
- 15 Backwater fishery
- 16 Wetland inundation
- 17 Large area natural protective habitat
- 18 Important riparian habitat
- 19 Source of water for marsh aquatic preserve
- 20 Fishery habitat
- 21 Waterfowl area
- 22 State Forest
- 23 Divert flow from river channel
- 24 Fish hatchery

I - 1 Organized opposition
- 2 Disrupt restoration plans
- 3 Inundate existing power plants
- 4 Excessive relocations of homes, businesses, roads
- 5 Town relocation
- 6 Impact existing impoundments
- 7 Impact proposed SCS impoundments
- 8 Prime farmland
- 9 Germanna Community College
- 10 Horseshoe Bend National Military Park
- 11 Holston Ordinance, Phipps Bend Nuclear Plant
- 12 Flow lost to other purposes

C - 1 National Register of Historic Places Property
- 2 Potential National Register of Historic Places Property

(7) Data Item: Potential non-economic constraints (continued)

Categories: R - 1 National Recreation Area
- 2 Canoe Trail
- 3 Proposed Water Trail
- 4 High Recreation Use
- 5 High Fishing Interest
- 6 Golf Course
- 7 State Park
- 8 National Park

(8) July 1978 price level. 6-5/8% interest rate. 50 year life.

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA	PROJ.PURP. STATUS AVE. Q	DAM HT MX.STOR. PWR. HD.	EXIST.CAP. INC. CAP. TOT.CAP.	EXIST.ENRG INC.ENERGY TOT.ENERGY	ANUL. COST ENERGY COST INVEST.COST	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
		(D M.M)		(FT)	(KW)	(MWH)	(1000 $)		
		(D M.M)		(AC FT)	(KW)	(MWH)	($/MWH)		
		(SQ.MI)	(CFS)	(FT)	(KW)	(MWH)	($/KW)		
AL4SAM0004	AUSTIN CREEK	34 0.0	H	91.0	0	0	1967.0	0	E-4
5	BLOUNT - LOCUST FORK	87 0.0	IS	0	4576	14385	136.74		
		295	567.3	69.9	4576	14385	5731.4		
AL6SAM0003	BLOUNTSVILLE	34 0.0	H,S,R,C	156.0	0	0	2831.0	0	E-4
5	BLOUNT - LOCUST FORK	86 0.6	IS	393000	7126	22858	123.85		
		274	416.2	119.8	7126	22858	5370.3		
ALCSAM0005	INLAND LAKE	33 50.1	S R	70.0	0	0	139.54	0	
5	BLOUNT - BLACKBURN FOR	86 33.0	OP	72000	1028	2781	50.168		
	CITY OF BIRMINGHAM	69	109.3	55.0	1028	2781.6	804.96		
AL6SAM0002	SMITHS FORD	34 0.0	H,S,R,C	167.0	0	0	4052.7	0	I-4
6	BLOUNT - LOCUST FORK	87 0.0	IS	517000	51681	81368	49.808		I-5
		575	1105.8	153.1	51681	81368	1015.4		E-4
ALISAM0011	HENRY RESERVOIR	33 46.9	H R	104.0	72900	210700	0	0	
5	CALHOUN - COOSA RIVER	86 3.1	OP	109000	0	0	0		
	ALABAMA POWER CO	6600	10918.8	43.2	72900	210700	0		
ALISAM0016	WEISS RESERVOIR	34 10.2	HCR	90.0	87750	215500	0	0	
5	CHEROKEE - COOSA	85 45.2	OP	1433300	0	0	0		
	ALABAMA POWER CO	5270	8718.5	55.9	87750	215500	0		
ALISAM0018	LAY LAKE	32 57.8	H R	129.6	177000	581400	0	0	
5	CHILTON - COOSA	86 30.7	OP	265000	0	0	0		
	ALABAMA POWER CO	9087	15170.7	82.4	177000	581400	0		
AL4SAM0017	WAXAHATCHEE	33 0.0	H	90.0	0	0	1601.5	0	
5	CHILTON - WAXAHATCHEE C	87 0.0	IS	0	1638	5235	305.87		
		174	275.5	39.9	1638	5235.9	13322		
ALCSAM0019	COFFEEVILLE LAKE	31 45.3	N R	47.0	0	0	871. 6	2000	E-20
2	CHOCTAW - TOMBIGBEE RIV	88 7.7	OP	190800	9000	39000	22.335		
	DAEN SAM	18600	25915.4	16.4	9000	39000	1013.4		

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
AL4SAM0020	OAKFUSKEE	33 34.3	H	110.0	0	0	2960.1	0	
5	CLEBURNE - TALLAPOOSA RI	85 35.5	IS	0	10403	33370	88.705		
		640	972.3	74.9	10403	33370	3788.1		
ALMSAM0722	PEA RIVER DAM	31 21.8	HP	32.0	0	0	584. 9	1990	
2	COFFEE - PEA RIVER	86 06.4	OP	950	7867	24687	23.659		
	AL WATER SER CO	1120	1550.0	29.2	7867	24687	706.63		
AL4SAM0029	HATCHET	33 0.0	H	150.0	0	0	3250.2	0	E-4
5	COOSA - HATCHET CREEK	86 0.0	IS	0	14870	37147	87.495		
		359	559.6	120.0	14870	37147	2912.5		
ALISAM0031	LAKE MITCHELL	32 46.9	HRCN	106.0	72500	354500	6552.0	1990	E-20
2	COOSA - COOSA	86 30.0	OP	177000	96500	176900	37. 38		
	ALABAMA POWER COMPANY	9778	15762.5	59.0	169000	531400	836.85		
AL4SAM0030	WEOGUFKA	33 0.0	H	98.0	0	0	1650.9	0	
5	COOSA - WEOGUFKA CREE	86 0.0	IS	0	1966	6572	251.19		
		111	185.0	74.9	1966	6572.4	11380		
ALISAM0032	GANTT LAKE	31 24.3	H R	30.0	2400	6546	183.41	1990	
2	COVINGTON - CONECUH RIVER	86 28.8	OP	13600	1110	9839	18.641		
	ALABAMA ELECTRIC COOP	617	895.4	24.6	3510	16385	1214.4		
ALISAM0718	POINT A LAKE	31 22.0	H R	38.0	5200	21000	0	0	
5	COVINGTON - CONECUH RIVER	86 31.1	OP	8000	0	0	0		
	ALA ELEC COOP INC	662	935.1	34.8	5200	21000	0		
AL4SAM0034	ARKADELPHIA	34 0.0	H	103.0	0	0	2592.4	0	
5	CULLMAN - MULBERRY FORK	87 0.0	IS	0	9336	29862	86.812		
		550	1057.7	78.9	9336	29862	3674.7		
AL6SAM0033	DORSEY CREEK	33 50.5	H,S,R,C	130.0	0	0	3546.7	0	
5	CULLMAN - MULBERRY FORK	87 0.0	IS	420000	17679	44374	79.926		
		550	1057.7	99.9	17679	44374	2669.8		

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
ALISAM0040	JORDAN LAKE DIVERSION	32 34.5	H	150.0	225000	822000	0	0	
5	ELMORE - COOSA	86 16.6	UC	230000	0	0	0		
	ALABAMA PWR CO	10165	16306.0	116.0	225000	822000	0		
ALISAM0041	JORDAN LAKE	32 37.1	H R	125.0	100000	195500	4271.5	0	
5	ELMORE - COOSA	86 15.4	OP	231000	50902	30757	138.87		
	ALABAMA POWER CO	10092	16268.7	98.0	150902	226257	1030.3		
ALISAM0721	LAKE MARTIN	32 40.8	HRC	157.0	154200	395652	0	0	
5	ELMORE - TALLAPOOSA	85 54.7	OP	1622000	0	0	0		
	ALABAMA POWER CO	2471	3658.4	119.0	154200	395652	0		
AL4SAM0038	WALLAHATCHEE	32 32.0	H	69.0	0	0	3514.3	2000	E-9
2	ELMORE - TALLAPOOSA RI	86 0.0	IS	0	23984	82795	42.445		E-18
		3320	5003.2	29.4	23984	82795	1912.9		
ALCORN0003	BEAR CK RESERVOIR	34 23.8	CRSO	68.0	0	0	230.91	1990	E-20
2	FRANKLIN - BEAR CK	87 59.2	OP	40040	2066	5754	40.129		E-9
	TVA	231	411.8	30.9	2066	5754.3	841.51		
ALCORN0005	CEDAR CK. RESERVOIR	34 32.7	CRO	96.0	0	0	393.94	1990	E-20
2	FRANKLIN - CEDAR CK.	87 58.4	OP	111500	4032	11817	33.335		E-9
	TVA	179	342.6	74.9	4032	11817	878.72		
ALCORN0004	LITTLE BEAR CK. RESERV.	34 27.2	CRO	84.0	0	0	118.37	0	
5	FRANKLIN - LITTLE BEAR C	87 58.5	OP	52500	826	2650	44.657		
	TVA	61	103.2	54.9	826	2650.8	746.15		
ALCSAM0042	WARRIOR LAKE	32 46.7	N R	51.0	0	0	1016.7	2000	
2	HALE - BLACK WARRIOR	87 50.5	OP	58650	10000	34339	29.609		
	DAEN SAM	5800	9581.9	18.9	10000	34339	1121.6		
ALISAM0043	LAKE EUFAULA	31 37.5	NHRC	113.0	130000	436000	0	0	
5	HENRY - CHATTAHOOCHEE	85 3.8	OP	1028100	0	0	0		
	DAEN SAM	7364	9723.9	83.7	130000	436000	0		

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
ALCSAM0044 2	GEORGE W ANDREWS LAKE HOUSTON - CHATTAHOOCHEE DAEN SAM	31 15.5 85 6.6 8210	N R OP 10841.0	55.0 18180 17.9	0 17000 17000	0 60000 60000	1735.6 28.927 1191.4	1990	
ALCSAM0047 2	BAYVIEW LAKE JEFFERSON - VILLAGE CREEK T. C. I., US STEEL CO.	33 34.3 86 59.2 69	S R OP 119.2	74.0 49100 59.9	0 1184 1184	0 3052 3052.8	133.71 43.800 589.42	1990	
AL4SAM0046 5	OAK GROVE JEFFERSON - VALLEY CREEK	34 0.0 87 0.0 190	H IS 365.4	176.0 0 134.8	0 5347 5347	0 17402 17402	2658.9 152.79 6767.6	0	
AL4SAM0045 5	SAYRE JEFFERSON - LOCUST FORK	33 42.8 87 0.0 150	H IS 259.3	85.0 0 64.9	0 2433 2433	0 6903 6903.4	1521.6 220.41 8340.9	0	E-4
ALIORN0007 5	WHEELER LAKE LAUDERDALE - TENNESSEE RIV TVA	34 47.9 87 22.8 29590	NCHR OP 50229.9	72.0 1071000 48.0	356400 0 356400	1712500 0 1712500	0 0 0	0	
ALIORN0006 5	WILSON LAKE LAUDERDALE - TENNESSEE RIV TVA	34 47.7 87 37.5 30750	NCHR OP 52199.0	137.0 641000 94.0	629800 0 629800	3099900 0 3099900	0 0 0	0	
AL6ORN0010 5	SUGAR CREEK LIMESTONE - ELK RIVER	34 53.0 87 6.2 1949	H IS 2974.0	85.0 1360000 76.9	0 46147 46147	0 126600 126600	18809 148.57 5728.7	0	
ALCSAM0052 5	JONES BLUFF LAKE LOWNDES - ALABAMA RIVER DAEN SAM	32 19.3 86 46.9 16300	NHR OP 25204.3	70.5 234200 30.2	68000 0 68000	329600 0 329600	0 0 0	0	
ALCSAM0500 2	DEMOPOLIS LOD MARENGO - BLACK WARRIOR DAEN SAM	32 31.2 87 52.8 15300	NR OP 22926.9	54.0 120000 30.1	0 30000 30000	0 100000 100000	2263.3 22.633 898.14	2000	

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
ALIOPN0012	GUNTERSVILLE LAKE	34 25.2	NCHR	94.0	97200	799700	0	0	
5	MARSHALL - TENNESSEE RIV	86 23.6	OP	1052000	0	0	0		
	TVA	24450	42046.4	39.0	97200	799700	0		
ALCSAM0054	CLAIBORNE LAKE	31 36.9	N R	50.0	0	0	1866.3	1990	
2	MONROE - ALABAMA RIVER	87 33.0	OP	96360	15000	50373	37. 50		
	DAEN SAM	21520	32395.2	11.0	15000	50373	1461.1		
AL6SAM0055	EAGLE CREEK	33 0.0	H,S,R,C	110.0	0	0	6037.0	0	I-10
6	RANDOLPH - TALLAPOOSA RI	86 0.0	IS	300000	40558	138454	43.603		
		2036	3229.6	83.9	40558	138454	1970.7		
ALCSAM0800	HARRIS	33 15.5	HR	137.0	135000	169400	0		
5	RANDOLPH - TALLAPOOSA	85 37.0	UC	431000	0	0	0		
	AL POWER	1453	2090.0	121.0	135000	169400	0		
AL4SAM0056	MALONE FERRY	33 0.0	H	50.0	0	0	2870.9	0	
5	RANDOLPH - TALLAPOOSA RI	86 0.0	IS	11600	15300	42316	67.843		
		1615	2561.8	31.4	15300	42316	2469.5		
ALISAM0063	LOGAN MARTIN RESERVOIR	33 25.8	HCR	97.0	128200	400200	0	0	
5	STCLAIR - COOSA	86 20.1	OP	642200	0	0	0		
	ALABAMA POWER CO	7770	12971.9	64.0	128200	400200	0		
AL4SAM0068	BRIDGEVIEW	34 0.0	H	35.0	0	0	5499.4	0	C-2
5	TALLAPOOSA - TALLAPOOSA RI	89 0.0	IS	77000	21840	67269	81.752		I-8
		4637	6854.0	30.2	21840	67269	3437.0		
AL4SAM0069	EMUCKFAW	33 0.0		111.0	0	0	6270.8	0	I-10
6	TALLAPOOSA - TALLAPOOSA RI	86 0.0	IS	0	44729	147640	42.473		
		2123	3367.6	84.9	44729	147640	1852.5		
ALISAM0720	THURLOW RESERVOIR	32 32.1	H R	100.0	50000	231140	0	0	
5	TALLAPOOSA - TALLAPOOSA	85 53.2	OP	11000	0	0	0		
	ALABAMA PWR CO	3297	4881.4	52.7	50000	231140	0		

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
ALISAM0070	YATES RESERVOIR	32 34.5	H R	87.0	32000	124200	0	0	
5	TALLAPOOSA - TALLAPOOSA	85 53.9	OP	0	0	0	0		
	ALABAMA PWR CO	3265	4778.I	53.9	32000	124200	0		
ALISAM0077	HOLT LAKE	33 15.1	NHR	97.0	40000	164500	0	0	
5	TUSCALOOSA - BLACK WARRIOR	87 26.9	OP	117990	0	0	0		
	DAEN SAM	4248	7017.9	61.7	40000	164500	0		
ALISAM0078	LAKE BANKHEAD	33 27.4	NHR	97.0	45500	160000	0	0	
5	TUSCALOOSA - BLACK WARRIOR	87 21.3	OP	296000	0	0	0		
	DAEN SAM	3990	6591.7	68.7	45500	160000	0		
ALCSAM0075	LAKE TUSCALOOSA	33 16.3	SCR	132.0	0	0	1381.6	1990	
2	TUSCALOOSA - NORTH RIVER	87 30.7	OP	325000	17504	38163	36.203		
	CITY OF TUSCALOOSA	418	609.0	110.0	17504	38163	909.45		
AL6SAM0071	NORTH RIVER	33 0.0	H.S.R.C	150.0	0	0	3420.3	0	R-4
5	TUSCALOOSA - NORTH RIVER	87 0.0	IS	500000	19335	38100	89.772		
		418	693.8	114.8	19335	38100	2348.0		
ALCSAM0079	WILLIAM BACON OLIVER LAKE	33 12.6	N R	49.0	0	0	1210.7	2000	
2	TUSCALOOSA - BLACK WARRIOR	87 35.1	OP	13800	15000	54037	22.406		
	DAEN SAM	4830	7979.4	27.2	15000	54037	906.38		
AL4SAM0080	BOLDO	34 0.0	H	130.0	0	0	2735.0	0	
5	WALKER - BLACKWATER CR	87 0.0	IS	0	7457	18717	146.11		
		232	446.1	99.9	7457	18717	4950.8		
ALISAM0719	LEWIS SMITH RESERVOIR	33 56.2	HCR	260.0	157500	208900	0	0	
5	WALKER - SIPSEY FORK	87 6.3	OP	2203000	0	0	0		
	ALABAMA POWER CO	944	1565.8	195.8	157500	208900	0		
ALCSAM0082	LITTLE CREEK MINE LAKE	33 48.7	O	40.0	0	0	191.67	0	
5	WALKER - LITTLE CREEK	87 2.6	OP	2000	1250	3782	50.678		
	PEABODY MINE COMPANY	127	235.6	32.0	1250	3782.1	1158.9		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID / NUMBER / ACTV. INV.	PROJECT NAME / PRIMARY CO. -NAME OF STREAM / OWNER	LATITUDE (D M.M) / LONGITUDE (D M.M) / DR.AREA (SQ.MI)	PROJ.PURP. / STATUS / AVE. Q (CFS)	DAM HT (FT) / MX.STOR. (AC FT) / PWR. HD. (FT)	EXIST.CAP. (KW) / INC. CAP. (KW) / TOT.CAP. (KW)	EXIST.ENRG (MWH) / INC.ENERGY (MWH) / TOT.ENERGY (MWH)	ANUL. COST (1000 $) / ENERGY COST ($/MWH) / INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
ALISAM0083	WILLIAM #BILL# DANNELLY LAKE	32 6.1	NHR	78.0	75000	429333	3805.0	1990	E-20
2	WILCOX - ALABAMA RIVER	87 24.0	OP	331800	64307	114844	33.132		
	DAEN SAM	20700	32007.9	37.3	139307	544177	715. 9		
FL6SAS0001	MACCLENNY	30 21.6	HRSC	82.0	0	0	5344.3	2000	E-15,4
2	BAKER - ST MARYS RIVE	82 5.1	IS	970000	8970	22870	233.67		E-10,19
		720	700.0	69.0	8970	22870	8287.0		E-14
FLASAJ1004	INGLIS RESTOR.-PLUG ALT.	29 0.5	NR	40.0	0	0	444. 0	0	I-1 2/
6	CITRUS - WITHLACOOCHEE	82 37.0	OP	34800	4979	15393	28.843		
	DAEN SAJ	2020	1488.0	22.0	4979	15393	816. 9		
FLASAJ0001	INGLIS SPILLWAY AND DAM	29 0.5	NR	40.0	0	0	165.89	0	E-23
5	CITRUS - WITHLACOOCHEE	82 37.1	OP	34800	859	2100	78.988		I-1,2 2/
	DAEN SAJ	2020	1488.0	25.3	859	2100.2	1403.5		I-12
FLISAM0086	JIM WOODRUFF LOCK + DAM + PO	30 42.5	NHR	77.0	30000	232400	1270.6	1990	E-4
2	GADSDEN - APALACHICOLA	84 51.8	OP	367320	19387	71916	17.667		
	DAEN SAM	17150	21800.0	27.0	49387	304316	708.41		
FLCSAJ0002	STRUCTURE 77	26 50.3	ICSR	47.5	0	0	536.76	0	I-12
5	GLADES - CALOOSAHATCHE	81 5.1	OP	8519000	3446	10457	51.329		
	DAEN SAJ	5000	2700.0	6.3	3446	10457	1574.7		
FLCSAM0084	DEAD LAKES DAM	30 7.5	RP	22.0	0	0	330.57	1990	
2	GULF - CHIPOLA RIVER	85 10.6	OP	42800	2004	13898	23.785		R-5
	DEAD LAKES WATER MANAGEM	1206	2358.3	14.9	2004	13898	1503.7		I-1,2 1/
FLGSAM0600	MARIANNA	30 52.0	H.R	25.0	168	500	0	0	
5	JACKSON - BLUE SPRINGS	85 13.0	OP	5363	0	0	0		
	FL PUBLIC UTILITIES	20	160.0	14.0	168	500. 0	0		
FLISAM0998	JACKSON BLUFF DAM	30 23.2	HG	61.0	11556	39175	0	0	
5	LEON - OCHLOCKONEE R	84 38.8	OP	258000	0	0	0		
	STATE OF FLORIDA	1699	1750.0	45.7	11556	39175	0		

1/ State of FL ltr. Sep 26, 1980 (see Appendix B).
2/ FL office of Governor ltr. April 29, 1980 (see Appendix B).

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
FLASAJ0702 6	INGLIS BYPASS SPILLWAY LEVY - WITHLACOOCHEE DAEN SAJ	29 1.4 82 37.1 2020	NRP OP 1488.0	40.0 34800 26.0	0 4681 4681	0 12151 12151	390.94 32.172 731.97	0	I-2 I-1 1/
FLCSAJ0009 5	MOSS BLUFF LOCK AND SPILLWAY MARION - OKLAWAHA R SJRWMD	29 4.0 81 52.8 879	ICNR OP 319.0	33.0 60000 22.4	0 1309 1309	0 4342 4342.0	214.91 49.496 1296.1	0	
FLOSAJ0010 6	STRUCTURE 80 ST/LUCIE LOCK + MARTIN - ST LUCIE CANA DAEN SAJ	27 6.5 80 17.3 5225	IHCNSR OP 2900.0	33.2 8519000 14.3	0 6398 6398	0 23324 23324	734.97 31.511 1189.6	0	I-12 2/ R-2
FL6SAS0002 5	ST GEORGE NASSAU - ST MARYS RIVE	30 28.5 82 1.0 863	HRC IS 790.0	28.0 22500 19.0	0 1767 1767	0 6080 6080.5	2295.3 377.49 17938	0	E-15 E-4
FL6SAM0085 5	CRESTVIEW OKALOOSA - YELLOW RIVER	30 0.0 87 0.0 616	H.S.R.C IS 1473.2	100.0 1580000 84.9	0 47000 47000	0 53000 53000	20523 387.24 6152.9	0	E-4,8 E-19 R-2
FLASAJ0701 6	HENRY H BUCKMAN LOCK PUTNAM - CROSS FLORIDA DAEN SAJ	29 32.5 81 43.4 2747	NR OP 1630.0	40.5 130000 16.9	0 2722 2722	0 9130 9130.4	381.13 41.743 1300.8	0	I-1,2 1/ E-4 E-8,23
FLASAJ0016 5	RODMAN DAM PUTNAM - OKLAWAHA R DAEN SAJ	29 30.4 81 48.6 2747	NR OP 1630.0	43.0 130000 13.3	0 3217 3217	0 12285 12285	468.66 38.147 1426.8	0	I-2 I-1 1/
GA6SAS0004 5	AXSON ATKINSON - SATILLA RIVER	31 18.4 82 42.3 400	IR IS 470.0	41.0 125000 24.0	0 1058 1058	0 3432 3432.0	3578.1 1042.5 47897	0	E-4
GA6SAS0005 5	PEARSON ATKINSON - SATILLA RIVER	31 20.0 82 46.1 355	H IS 993.0	39.0 44000 25.1	0 982 982	0 3197 3197.0	3150.1 985.33 45313	0	E-4

1/ FL office of Gov. ltr. April 29, 1980 (see Appendix B)
2/ Lake Okeechobee more valuable for water supply (see Appendix B)

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
GAISAS0007	LAKE SINCLAIR	33 8.4	HR	105.0	45000	160000	0	0	E-4
5	BALDWIN - OCONEE	83 12.2	OP	334000	0	0	0		
	GEORGIA POWER CO	2900	3300.0	96.0	45000	160000	0		
GA4SAS0006	MILLEDGEVILLE	33 8.0	H	28.0	0	0	3809.7	2000	E-4
2	BALDWIN - OCONEE RIVER	83 10.2	IS	9000	11257	36984	103. 0		
		3059	3460.0	20.0	11257	36984	4582.1		
GAISAM0088	ALLATOONA LAKE	34 9.8	CHR	200.0	74000	169000	0	0	R-4
5	BARTOW - ETOWAH RIVER	84 4.3	OP	670000	0	0	0		
	DAEN SAM	1110	1654.0	139.8	74000	169000	0		
GAGSAM0504	CARTERSVILLE	34 08.0	H	20.0	625	3500	0	0	
5	BARTOW - ETOWAH	84 50.0	OP	300	0	0	0		
	THOMPSON WEINMAN	930	1390.0	14.0	625	3500.0	0		
GA6SAM0087	KINGSTON	34 14.0	H,S,R,C	87.0	0	0	35148	0	E-10
5	BARTOW - ETOWAH RIVER	84 55.9	IS	88000	30067	105569	332.93		
		1687	2995.6	67.4	30067	105569	16750		
GACSAS0009	LAKE TOBESOFKEE	32 49.9	SRO	54.0	0	0	156.84	2000	R-4
2	BIBB - TOBESOFKEE CR	83 46.0	OP	46300	1229	3738	41.956		
	BIBB COUNTY	180	200.0	41.0	1229	3738.1	797.30		
GA4SAS0012	SHELL BLUFF	33 13.2	NH	34.0	0	0	8352.4	0	E-14,16
5	BURKE - SAVANNAH RIVE	81 48.5	IS	92000	24730	97130	85.991		E-4,10
		8227	10800.0	16.0	24730	97130	4639.6		
GA4SAS0011	STEEL CREEK	33 5.5	NH	32.0	0	0	8733.0	2000	E-14,16
2	BURKE - SAVANNAH RIVE	81 36.6	IS	12000	22244	87349	99.979		E-10,4
		8457	11000.0	14.0	22244	87349	5413.5		
GA6SAS0013	LAMAR FERRY	33 14.4	H	60.0	0	0	2405.5	2000	E-21
2	BUTTS - OCMULGEE RIVE	83 48.9	IS	20000	11693	38463	62.541		E-4
		1514	1800.0	38.0	11693	38463	2709.7		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
GA6SAS0014 5	MCKAY CREEK BUTTS - SOUTH RIVER	33 26.0 83 54.9 557	HR IS 650.0	78.5 130000 52.0	0 8031 8031	0 20371 20371	4069.0 199.73 7025.2	0	
GA6SAS0016 5	BURNT FORK CAMDEN - SATILLA RIVER	30 57.0 81 53.5 3070	H IS 2790.0	55.0 1790000 40.0	0 19179 19179	0 51986 51986	27823 535.21 20860	0	E-4
GA6SAM0089 5	CEDAR CREEK CARROLL - CHATTAHOOCHEE	33 29.6 84 52.8 2430	H,S,R,C IS 4088.1	87.0 297000 59.9	0 45201 45201	0 145788 145788	9722.7 66.690 2984.0	0	
GA6SAS0017 5	SATILLA ST.MARY CHARLTON - SATILLA ST.MA	30 52.0 81 54.9 4450	H IS 2790.0	55.0 3700000 37.0	0 26537 26537	0 70431 70431	55532 788.46 30206	0	E-4
GA4SAM0092 5	CANTON CHEROKEE - ETOWAH RIVER	34 18.0 84 27.0 590	H IS 1006.1	70.0 45000 61.6	0 12063 12063	0 35889 35889	3428.9 95.541 3788.8	0	E-4,10
GA6SAM0091 5	GILMER CHEROKEE - ETOWAH RIVER	34 20.0 84 18.0 395	H,S,R,C IS 537.6	169.0 370000 129.8	0 14338 14338	0 37719 37719	3245.6 86.48 3021.3	0	E-4,10
GA4SAM0093 5	SHOAL CREEK CHEROKEE - SHOAL CREEK	34 14.0 84 35.0 200	H IS 340.3	104.0 0 79.9	0 4317 4317	0 12113 12113	2101.1 173.44 6555.3	0	
GA4SAM0094 5	VININGS COBB - CHATTAHOOCHEE	33 52.2 84 28.9 1451	H IS 2935.2	45.0 12000 27.5	0 5376 5376	0 31682 31682	3025.3 95.489 7735.2	0	R-1
GABSAS0019 2	AUGUSTA CANAL DIVERSION COLUMBIA - SAVANNAH RIVE CITY OF AUGUSTA	33 33.1 82 2.2 7174	SO OP 9900.0	15.0 3000 5.0	0 1822 1822	0 14817 14817	355.98 24.24 1852.2	2000	C-1

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

(Continued)

SITE ID NUMBER / ACTV. INV.	PROJECT NAME / PRIMARY CO. -NAME OF STREAM / OWNER	LATITUDE (D M.M) / LONGITUDE (D M.M) / DR.AREA (SQ.MI)	PROJ.PURP. / STATUS / AVE. Q (CFS)	DAM HT (FT) / MX.STOR. (AC FT) / PWR. HD. (FT)	EXIST.CAP. (KW) / INC. CAP. (KW) / TOT.CAP. (KW)	EXIST.ENRG (MWH) / INC.ENERGY (MWH) / TOT.ENERGY (MWH)	ANUL. COST (1000 $) / ENERGY COST ($/MWH) / INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
GAISAS0020	CLARK HILL LAKE	33 39.6	CNHOR	200.0	280000	735000	0	0	R-4
5	COLUMBIA - SAVANNAH RIVE	82 11.8	OP	3850000	0	0	0		
	DAEN SAS	6144	8860.0	109.4	280000	735000	0		
GAISAM0096	LAKE BLACKSHEAR	31 51.0	HR	41.0	15200	44650	1052.8	0	E-4
5	CRISP - FLINT	83 56.5	OP	145000	16815	357	2943.6		
	CRISP COUNTY PWR COMM	3600	4346.0	27.6	32015	45007	657.48		
GA6SAS0021	ABBEYVILLE	32 1.3	HRN	88.0	0	0	28010	0	E-21
5	DODGE - OCMULGEE RIVE	83 2.3	IS	1940000	35946	113957	245.79		E-4
		4450	5100.0	40.0	35946	113957	11151		
GA6SAM0100	MOUNTAIN CREEK	33 0.0	H,S,R,C	40.0	0	0	3043.1	0	E-4
6	DOOLY - FLINT RIVER	84 0.0	IS	194000	20343	55113	55.216		I-1 1/
		3192	4053.0	24.9	20343	55113	1937.7		
GAISAM0101	FLINT RIVER RESERVDIR	31 36.1	H R	50.0	5400	40486	239. 6	1990	E-4
2	DOUGHERTY - FLINT RIVER	84 0.7	OP	33000	2000	7166	33.361		
	GEORGIA POWER CO	4180	5065.4	27.4	7400	47652	926.90		
GA4SAS0024	HIGH STOKES BLUFF	32 33.3	NH	71.0	0	0	42437	0	E-14,16
5	EFFINGHAM - SAVANNAH RIVE	81 16.9	IS	1000000	263654	385212	110.16		E-4
		9850	12100.0	46.0	263654	385212	2233.5		E-10
GA4SAS0022	LOW STOKES BLUFF	32 33.3	NH	32.0	0	0	5418.1	2000	E-14,16
2	EFFINGHAM - SAVANNAH RIVE	81 16.5	IS	7000	13306	82844	65.400		E-4,10
		9850	12100.0	14.0	13306	82844	5565.3		
GA4SAS0023	MEDIUM STOKES BLUFF	32 33.3	NH	44.0	0	0	15797	0	E-14,16
5	EFFINGHAM - SAVANNAH RIVE	81 16.9	IS	62000	70067	202180	78.133		E-10,4
		9850	12100.0	26.0	70067	202180	3105.8		
GAISAS0025	RICHARD B RUSSELL LAKE	34 1.5	HCNR	195.0	600000	788400	0	0	
5	ELBERT - SAVANNAH RIVE	82 35.6	UC	1488200	0	0	0		
	DAEN SAS	2900	5100.0	161.0	600000	788400	0		

1/ State and local opposition

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
GA6SAS0026	TALLOW HILL	34 5.5	HR	215.0	0	0	6686.6	2000	R-2,7
2	ELBERT - BROAD RIVER	83 1.6	IS	1600000	68549	97635	68.485		I-1
		749	760.0	170.0	68549	97635	1310.4		E-4
GAIORN0014	LAKE TOCCOA	34 53.0	HR	167.0	20000	35000	0	0	
5	FANNIN - TOCCOA RIVER	84 16.8	OP	195900	0	0	0		
	TVA	232	620.8	48.0	20000	35000	0		
GA6SAM0103	ARMUCHEE	34 22.3	H,S,R,C	63.0	0	0	8026.6	0	E-10
5	FLOYD - OOSTANAULA RI	85 7.1	IS	345000	5847	35131	228.47		
		1900	3373.8	31.0	5847	35131	19544		
GA9SAM0506	ROCKY MOUNTAIN	34 21.0	H	140.0	0	0	0	0	
5	FLOYD - HEATH CREEK	85 18.0	UC	15500	675000	1052500	0		
	GA POWER CO.	14	26.0	115.0	675000	1052500	0		
GAISAM0105	LAKE SIDNEY LANIER	34 9.6	CHR	184.0	86000	170000	0	0	R-4
5	FORSYTH - CHATTAHOOCHEE	84 4.3	OP	2554000	0	0	0		
	DAEN SAM	1040	2024.0	148.5	86000	170000	0		
GAISAM0106	MORGAN FALLS RESERVOIR	33 58.0	HSR	43.0	16800	68000	0	0	
5	FULTON - CHATTAHOOCHEE	84 23.1	OP	3200	0	0	0		
	GEORGIA PWR CO	1370	2714.1	39.0	16800	68000	0		
GA6SAM0107	CARTECAY	35 0.0	H,S,R,C	221.0	0	0	3235.0	0	
5	GILMER - CARTECAY RIVE	84 0.0	IS	160000	19246	34565	93.592		
		136	346.7	169.8	19246	34565	2227.9		
GAGSAM0505	HABERSHAM	34 36.0	H	30.0	1660	9775	0	0	
5	HABERSHAM - SOQUE	83 31.0	OP	100	0	0	0		
	HABERSHAM MILLS	114	260.0	84.0	1660	9775.0	0		
GA6SAM0116	IRWINS BRIDGE	35 0.0	H,S,R,C	111.0	0	0	2179.0	0	E-4
5	HABERSHAM - CHATTAHOOCHEE	84 0.0	IS	24000	6534	18392	118.47		
		152	387.5	84.9	6534	18392	4435.2		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
GAISAS0029	TUGALO LAKE	34 42.8	HR	150.0	45000	108000	0	0	C-2
5	HABERSHAM - TUGALO RIVER	83 21.2	OP	24000	0	0	0		E-4
	GEORGIA PWR CO	464	1150.0	142.0	45000	108000	0		
GA6SAM0117	MUD CREEK	34 0.0	H,S,R,C	118.0	0	0	2913.8	0	
5	HALL - MUD CREEK	84 0.0	IS	87000	9424	26097	111.64		
		377	513.1	94.9	9424	26097	4142.9		
GAISAM0095	GOAT ROCK LAKE	32 36.5	HR	75.0	26000	130137	5049.8	1990	C-2
2	HARRIS - CHATTAHOOCHEE	85 4.7	OP	11000	67000	79090	63.849		
	GEORGIA PWR CO	4520	6664.5	66.0	93000	209227	926. 9		
GAISAM0119	LAKE HARDING	32 39.8	HR	126.0	65000	416911	3733.0	1990	
2	HARRIS - CHATTAHOOCHEE	85 5.4	OP	182000	100000	44000	84.842		
	GEORGIA POWER COMPANY	4240	6251.7	108.4	165000	460911	441.22		
GAGSAM0503	LANGDALE	32 50.0	H	26.0	1040	10700	0	0	
5	HARRIS - CHATTAHOOCHEE	85 12.0	OP	0	0	0	0		
	GA POWER CO.	3630	5680.0	13.4	1040	10700	0		
GA4SAM0118	NEW RIVERVIEW	32 46.5	H	60.0	0	0	3006.4	0	
5	HARRIS - CHATTAHOOCHEE	85 12.2	IS	0	6522	46243	65. 13		
		3660	5914.2	25.1	6522	46243	6301.0		
GAGSAM0502	RIVERVIEW	32 45.0	H	12.0	480	3600	1661.2	0	
5	HARRIS - CHATTAHOOCHEE	85 08.0	OP	0	10665	28079	59.163		
	GA POWER CO.	3660	5730.0	9.4	11145	31679	1860.1		
GAISAS0031	HARTWELL LAKE	34 21.3	CNHOR	204.0	344000	453000	0	0	R-4
5	HART - SAVANNAH RIVE	82 49.3	OP	3439000	0	0	0		
	DAEN SAS	2088	4200.0	171.7	344000	453000	0		
GA6SAS0032	PEACHSTONE	33 36.9	HR	90.0	0	0	6312.6	0	E-4
5	HENRY - SOUTH RIVER	84 6.7	IS	230000	12284	28335	222.78		
		372	500.0	106.0	12284	28335	7165.6		

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
GA6SAS0035 2	CURRY CREEK JACKSON - NORTH OCONEE	34 4.7 83 27.7 181	CSR IS 300.0	85.0 249000 53.9	0 2992 2992	0 7442 7442.6	3982.1 535. 4 18746	2000	
GA7SAS0036 5	TALASSEE JACKSON - MIDDLE OCONEE	34 0.3 83 31.9 364	HR IS 490.0	100.0 262000 97.0	0 9858 9858	0 26282 26282	5095.5 193.87 7168.6	0	
GAISAS0038 5	LLOYD SHOALS JASPER - OCMULGEE RIVE GA POWER CO	33 19.3 83 50.5 1400	HR OP 1700.0	102.0 107000 100.0	14400 0 14400	67000 0 67000	0 0 0	0	C-2 E-21 E-4
GA6SAS0039 5	COOPERS FERRY JEFF DAVIS - OCMULGEF RIVE	31 49.5 82 48.5 5000	HR IS 5500.0	91.0 2265000 42.0	0 46830 46830	0 137031 137031	35716 260.64 10927	0	E-21
GA6SAS0042 2	DAMES FERRY JONES - OCMULGEE RIVE	33 1.5 83 43.4 2118	H IS 3000.0	39.0 29000 27.0	0 14578 14578	0 40049 40049	2936.4 73.320 2654.8	2000	E-21,4 E-12
GA6SAS0043 2	DUBLIN LAURENS - OCONEE RIVER	32 36.9 82 54.9 4380	H IS 5000.0	42.0 256000 35.0	0 29942 29942	0 97738 97738	9560.6 97.818 4450.6	2000	E-10,14 E-16,19 E-4
GA6SAM0121 5	NEW BRIDGE LUMPKIN - CHESTATEE RIV	35 0.0 84 0.0 232	H,S,R,C IS 540.9	150.0 250000 119.8	0 14378 14378	0 38555 38555	3254.5 84.411 3019.8	0	E-4
GA6SAM0125 6	MIONA MACON - FLINT RIVER	32 0.0 84 0.0 2366	H,S,R,C IS 3002.7	51.0 414000 38.9	0 24029 24029	0 67620 67620	2741.5 40.543 1460.1	0	E-4 I-1 1/

1/ State and local opposition

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
GA6SAM0128	LOWER VADA	31 0.0	H,S,R,C	70.0	0	0		0	E-4
5	MITCHELL - FLINT RIVER	84 0.0	IS	200000	28000	167000			I-1
		7112	8344.7	34.6	28000	167000			
GA0SAS0049	HIGH FALLS LAKE	33 5.9	R	35.0	0	0	181.84	2000	R-4,7
2	MONROE - TOWALIGA RIVE	83 47.8	OP	20461	1474	4152	43.795		C-2
	STATE PARK	128	214.0	36.2	1474	4152.0	837.88		E-4
GA6SAS0047	JACKSON BRIDGE	33 7.1	HR	94.0	0	0	3207.3	0	E-4
5	MONROE - TOWALIGA RIVE	83 54.7	IS	92000	5945	16321	196.51		
		322	440.0	73.0	5945	16321	7394.0		
GAGSAS0050	JULIETTE DAM	33 5.9	H	20.0	1063	1800	0	0	E-21,4
5	MONROE - OCMULGEE RIVE	83 47.7	OP	2000	0	0	0		C-2
	TRIO MANUFACTURING	1960	2100.0	18.0	1063	1800.0	0		E-12
GA6SAS0052	CYPRESS BRANCH	32 2.5	H	34.0	0	0	7363.6	2000	E-10,14
2	MONTGOMERY - OCONEE RIVER	82 36.2	IS	124000	27389	91514	80.464		E-16,19
		5350	5770.0	27.0	27389	91514	3693.9		E-4
GA7SAS0051	ROCKLEDGE	32 17.7	H	27.0	0	0	13480	0	E-10,14
5	MONTGOMERY - OCONEE RIVER	82 39.4	IS	134000	31126	107346	125.57		E-16,19
		4900	5600.0	35.0	31126	107346	6106.4		E-4
GA1SAM0726	CARTERS LAKE	34 36.7	CHR	420.0	500000	424522	0	0	
5	MURRAY - COOSAWATTEE R	84 41.0	OP	472800	0	0	0		
	DAEN SAM	376	420.0	363.3	500000	424522	0		
GA6SAM0115	JACKS	35 0.0	H,S,R,C	180.0	0	0	2697.7	0	E-4
5	MURRAY - JACKS RIVER	84 42.0	IS	49000	5374	17882	150.85		
		87	191.1	159.8	5374	17882	6840.3		
GACSAM0129	REREGULATION POOL	34 36.1	OH C	56.0	0	0	327.11	1990	C-1
2	MURRAY - COOSAWATTEE R	84 41.5	OP	19000	2961	10827	30.210		
	DAEN SAM	530	937.8	28.6	2961	10827	973.14		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
GA4SAM0130 2	COLUMBUS MUSCOGEE - CHATTAHOOCHEE	32 25.6 85 0.0 4640	 IS 6841.4	60.0 1200 33.2	0 35128 35128	0 118698 118698	4746.8 39.991 1782.4	2000	
GAGSAM0507 2	EAGLE-PHENIX MUSCOGEE - CHATTAHOOCHEE REEVES BROS.	32 27.0 85 00.0 4640	H OP 6940.0	30.0 0 26.2	4260 27582 31842	22070 66535 88605	2368.3 35.596 1034.6	1990	
GAISAM0501 5	NORTH HIGHLAND MUSCOGEE - CHATTAHOOCHEE GA POWER CO.	32 28.0 85 00.0 4630	H OP 6450.0	64.0 510 36.5	29600 0 29600	147900 0 147900	0 0 0	0	
GAISAM0131 5	OLIVER LAKE MUSCOGEE - CHATTAHOOCHEE GEORGIA PWR CO	32 30.9 85 0.0 4630	HR OP 6826.7	81.0 6000 66.3	60000 0 60000	254800 0 254800	0 0 0	0	
GA7SAS0055 5	FACTORY SHOALS NEWTON - ALCOVY RIVER	33 31.5 83 50.0 254	HR IS 350.0	74.0 62000 106.0	0 8568 8568	0 24286 24286	4737.3 195. 5 7662.3	0	
GA6SAS0056 5	LEE SHOALS NEWTON - YELLOW RIVER	33 25.4 83 52.9 453	HR IS 530.0	57.0 60000 33.0	0 3796 3796	0 9869 9869.1	2418.4 245. 5 8727.8	0	
GAGSAS0057 5	PORTERDALE NEWTON - YELLOW RIVER BIBB MANUFACTURING CO	33 34.1 83 54.0 413	H OP 498.0	50.0 900 47.0	1600 0 1600	5800 0 5800.0	0 0 0	0	
GAGSAS0418 5	BARNETT SHOALS OCONEE - OCONEE RIVER GEORGIA POWER CO	33 50.3 83 18.4 835	HR OP 1200.0	50.0 3000 49.0	2800 0 2800	15000 0 15000	0 0 0	0	C-2
GA7SAS0058 5	HIGH SHOALS OCONEE - APALACHEE RIV	33 48.9 83 31.0 151	HR IS 260.0	69.0 34000 110.0	0 3477 3477	0 11655 11655	1752.7 150.38 6750.2	0	

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
GA6SAS0059	HURRICANE CREEK	31 7.0	H	37.0	0	0	10828	0	E-4
5	PIERCE - SATILLA RIVER	82 15.4	IS	284000	5857	18218	594.34		
		1930	993.0	25.0	5857	18218	26426		
GA6SAS0060	MURDER CREEK	33 14.2	HR	136.0	0	0	4179.4	0	
5	PUTNAM - MURDER CREEK	83 27.2	IS	900000	8467	21663	192.92		
		226	340.0	128.0	8467	21663	6802.1		
GALSAS0062	WALLACE	33 20.5	HR	117.0	325000	341000	0	0	
5	PUTNAM - OCONEE	83 9.0	UC	470000	0	0	0		
	GEORGIA PWR CO	1830	2420.0	94.0	113000	341000	0		
GAISAS0067	LAKE BURTON	34 47.5	HR	135.0	6120	20150	0	0	C-2
5	RABUN - TALLULAH	83 32.3	OP	108000	0	0	0		R-7
	GEORGIA PWR CO	115	340.0	112.0	6120	20150	0		E-24
GAJSAS0065	MATHIS-TERRORA	34 45.9	HR	80.0	16000	46300	0	0	C-2
5	RABUN - TALLULAH	83 24.9	OP	31200	0	0	0		
	GEORGIA PWR CO	151	410.0	187.0	16000	46300	0		
GAISAS0066	NACOOCHEE	34 45.1	HR	90.0	4800	12000	0	0	C-2
5	RABUN - TALLULAH	83 30.0	OP	7000	0	0	0		
	GEORGIA PWR CO	136	380.0	62.0	4800	12000	0		
GA7SAS0063	SAND BOTTOM	34 50.7	HR	105.0	0	0	2155.3	0	E-1 1/
6	RABUN - CHATTOOGA RIV	83 15.2	IS	5600	21073	49852	43.235		
		178	590.0	139.0	21073	49852	1279.6		
GAJSAS0064	TALLULAH FALLS LAKE	34 44.2	HR	110.0	72000	170600	0	0	C-2
5	RABUN - TALLULAH RIVE	83 22.5	OP	2000	0	0	0		
	GEORGIA PWR CO	186	480.0	598.0	72000	170600	0		
GA4SAS0076	EAGLE POINT	33 16.5	NH	33.0	0	0	6045.7	2000	E-14,16
2	RICHMOND - SAVANNAH RIVE	81 50.5	IS	15000	21489	84418	71.616		E-10,4
		8170	10800.0	14.0	21489	84418	3796.1		

1/ P.L. 95-625, Nov. 10, 1978

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
GAASAS0069 2	NEW SAVANNAH BLUFF POOL RICHMOND - SAVANNAH RIVE DAEN SAS	33 22.4 81 56.4 7420	N OP 10200.0	67.5 10720 12.2	0 23737 23737	0 71465 71465	2406.0 33.667 1176.8	2000	E-14 C-2
GA6SAS0071 5	NEW BETHEL ROCKDALE - YELLOW RIVER	33 43.0 84 2.4 191	R IS 290.0	85.0 39000 68.0	0 2318 2318	0 8087 8087.7	2210.9 273.37 13099	0	
GA4SAS0074 2	BULL PEN POINT SCREVEN - SAVANNAH RIVE	32 36.9 81 24.3 9705	NH IS 12000.0	31.0 12000 14.0	0 12772 12772	0 80762 80762	3994.4 49.459 4187.1	2000	E-14,16 E-10,4
GA4SAS0072 5	BURTONS LANDING SCREVEN - SAVANNAH RIVE	32 59.8 81 29.6 8650	NH IS 11000.0	65.0 870000 41.0	0 80728 80728	0 265428 265428	29105 109.65 5084.9	0	E-14,16 E-10,4
GA4SAS0075 2	DICKS LOOKOUT POINT SCREVEN - SAVANNAH RIVE	32 51.1 81 27.5 9474	NH IS 11800.0	32.0 14000 14.0	0 24919 24919	0 97899 97899	6189.5 63.223 3330.2	2000	E-14,16 E-10,4
GA4SAS0079 5	HIGH JOHNSONS LANDING SCREVEN - SAVANNAH RIVE	32 59.8 81 24.4 8855	NH IS 13000.0	54.0 260000 31.0	0 75103 75103	0 216448 216448	18918 87.403 3497.9	0	E-14,16 E-4,10
GA4SAS0073 2	LOW JOHNSONS LANDING SCREVEN - SAVANNAH RIVE	32 57.0 81 30.5 8855	NH IS 11300.0	32.0 15000 14.0	0 23291 23291	0 91511 91511	5166.6 56.458 2935.7	2000	E-14,16 E-10,4
GA4SAS0078 5	MEDIUM JOHNSONS LANDING SCREVEN - SAVANNAH RIVE	32 59.8 81 24.4 8855	NH IS 11300.0	43.0 165000 25.0	0 65068 65068	0 176209 176209	17867 101.40 3815.0	0	E-14,16 E-4,10
GA4SAS0077 5	PFEIFFERS LANDING SCREVEN - SAVANNAH RIVE	32 45.9 81 24.8 9626	NH IS 11900.0	39.0 140000 19.0	0 50038 50038	0 144306 144306	14400 99.789 3974.9	0	E-14,16 E-10,4

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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
GAISAS0081	YONAH LAKE	34 40.8	HR	70.0	22500	50800	0	0	
5	STEPHENS - TUGALO RIVER	83 20.5	OP	9000	0	0	0		
	GEORGIA PWR CO	470	1160.0	69.0	22500	50800	0		
GA6SAM0126	HIGHTOWER SHOALS	32 44.0	H,S,R,C	72.0	0	0	2385.1	0	E-4
6	TALBOT - FLINT RIVER	84 23.0	IS		20142	49164	48.513		I-1 1/
		1231	1672.7	54.9	20142	49164	1524.8		
GA6SAM0139	SPEWRELL BLUFF	33 0.0	H,S,R,C	177.0	0	0		0	E-4
6	TALBOT - FLINT RIVER	84 0.0	IS	360690	114000	121200			I-1 1/
		1210	1644.2	115.8	114000	121200			
GA6SAM0140	LOWER AUCHUMPKEE	32 30.0	H,S,R,C	122.0	0	0		0	E-4 1/
5	TAYLOR - FLINT RIVER	84 0.0	IS	124000	81000	122800			I-1
		1970	2677.0	66.9	81000	122800			
GA6SAM0120	FRANKLIN	33 0.0	H,S,R,C	88.0	0	0	6803.2	2000	
2	TROUP - CHATTAHOOCHEE	85 10.0	IS	176000	43757	120393	56.508		
		2680	4330.6	49.3	43757	120393	2108.8		
GAISAM0141	WEST POINT LAKE	32 55.0	CHR	95.0	73400	191000	0	0	R-4
5	TROUP - CHATTAHOOCHEE	85 11.3	OP	711000	0	0	0		
	DALN SAM	3380	5417.4	67.9	73400	191000	0		
GAIORN0018	NOTTELY LAKE	34 57.4	CHNR	184.0	15000	57900	0	0	
5	UNION - NOTTELY RIVER	84 5.4	OP	174300	0	0	0		
	TVA	214	572.6	127.0	15000	57900	0		
GA6SAM0142	LAZER CREEK	33 0.0	H,S,R,C	135.0	0	0		0	E-4, 12
6	UPSON - FLINT RIVER	84 0.0	IS	60800	83000	127500			I-1 1/
		1410	1790.3	99.9	83000	127500			
GA6SAS0082	WAYCROSS	31 17.9	H	40.0	0	0	10347	0	E-4
5	WARE - SATILLA RIVER	82 27.7	IS	326000	4971	12419	833.14		
		1100	993.0	26.0	4971	12419	29776		

1/ State and local opposition

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
GA6SAS0084 2	TOOMSBORO WASHINGTON - OCONEE RIVER	32 53.3 83 1.5 3308	H IS 3800.0	41.0 260000 34.0	0 20015 20015	0 67396 67396	6350.9 94.233 4391.2	2000	E-10,14 E-16,19 E-12,4
GA6SAM0144 2	TILTON WHITFIELD - CONASAUGA RIV	34 39.4 84 55.9 650	H,R IS 1174.4	68.0 840000 47.2	0 13416 13416	0 27426 27426	1826.4 66.592 1730.8	2000	E-10,17
GA6SAS0087 2	ANTHONY SHOALS WILKES - BROAD RIVER	33 59.0 82 39.0 1490	HR IS 1860.0	77.0 320000 63.0	0 24815 24815	0 64940 64940	5127.1 78.950 2755.7	2000	E-11,12 E-14,4 R-4,C-2
GA4SAM0145 5	ABRAMS CREEK WORTH - FLINT RIVER	31 41.1 84 0.0 4037	H IS 4892.1	20.0 0 15.9	0 13063 13063	0 44656 44656	3086.9 69.125 3092.5	0	E-4 I-1[1]
KYIORN0037 5	LAKE BARKLEY LYON - CUMBERLAND DAEN ORN	37 1.3 88 13.3 17598	HNCR OP 28693.3	109.0 2082000 55.0	130000 0 130000	761600 0 761600	0 0 0	0	
KYIOPN0038 5	KENTUCKY LAKE MARSHALL - TENNESSEE R. TVA	37 0.7 88 16.1 40200	NCHR OP 65545.5	206.0 6129000 56.0	175000 0 175000	112530 0 112530	0 0 0	0	
KY4ORN0040 2	CELINA DAM MONROE - CUMBERLAND RI	36 36.3 85 30.2 6308	HR PA 10106.3	78.0 357950 59.1	0 108000 108000	0 280000 280000	21130 75.465 2683.8	2000	E-10 E-4 I-1
KYIORN0044 5	LAKE CUMBERLAND RUSSELL - CUMBERLAND R. DAEN ORN	36 52.2 85 8.6 5789	HCR OP 8937.2	258.0 6089000 169.0	270000 0 270000	1317900 0 1317900	0 0 0	0	E-4
MSCLMK0082 2	GRENADA DAM GRENADA - YALOBUSHA RIV DAEN LMK	33 48.5 89 46.2 1320	CR OP 1672.0	102.0 2722100 46.9	0 17796 17796	0 57977 57977	819.68 14.138 453.14	1990	

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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. OWNER	NAME OF STREAM	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
MSCLMK0101 2	SARDIS DAM PANOLA DAEN LMK	LITTLE TALLAH	34 24.0 89 47.3 1545	CR OP 2207.0	117.0 3016500 52.9	0 23746 23746	0 80806 80806	1000.5 12.382 425.19	1990	
MS6SAM0160 5,6	BENNDALE STONE	BLACK CREEK	31 0.0 89 0.0 530	H,S,R,C IS 823.1	55.0 153000 49.9	0 11617 11617	0 22581 22581	1603.9 71. 29 1736.5	0	E-1[1]
MS6SAM0165 5	BUCKATUNNA WAYNE	BUCKATUNNA RI	32 0.0 89 0.0 495	H,S,R,C IS 688.9	65.0 156000 49.9	0 6656 6656	0 14578 14578	1400.2 96. 46 2693.7	0	
MS6SAM0164 5	WAYNESBORO WAYNE	CHICKASAWHAY	32 0.0 89 0.0 1640	H,S,R,C IS 2285.9	65.0 227000 41.7	0 16862 16862	0 37731 37731	5865.6 155.45 4826.3	0	
MSCLMK0111 2	ENID DAM YALOBUSHA DAEN LMK	YOCONA RIVER	34 9.4 89 54.0 560	CR OP 844.0	99.0 1213500 53.9	0 10830 10830	0 25530 25530	529.33 20.733 431.45	1990	
NCMSAW0011 2	SAXAPAHAW ALAMANCE SELLARS MFG CO	HAW RIVER	35 56.8 79 19.6 1024	R OP 1024.0	29.0 420 27.9	0 5089 5089	0 13032 13032	384.99 29.542 649. 4	1990	E-4
NCGSAC0003 5	MILLERSVILLE ALEXANDER RHODES WHITNER MILLS	LOWER LITTLE	35 50.9 81 10.9 79	H OP 120.0	40.0 335 34.3	320 0 320	200 0 200. 0	0 0 0	0	
NC4ORH0011 5,6	UDP ALLEGHANY	NEW RIVER	36 30.0 81 20.9 630	CH IS 1034.0	220.0 0 204.7	0 79818 79818	0 134626 134626	5463.4 40.542 897.96	0	E-1[1]
NC4ORH0012 5	UDP ALLEGHANY	NORTH FORK NE	36 29.0 81 26.0 216	CH IS 354.0	250.0 0 224.7	0 30991 30991	0 62111 62111	4790.6 77.129 2088.6	0	

1/ P.L. 95-625, Nov. 10, 1978

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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NC4ORH0013	UOP	36 17.9	CH	170.0	0	0	3342.1	0	
5	ALLEGHANY - SOUTH FORK NE	81 24.0	IS	0	20023	40129	83.284		
		200	405.0	156.8	20023	40129	2214.9		
NC4ORH0014	UOP	36 17.9	CH	170.0	0	0	2975.9	0	
5	ALLEGHANY - SOUTH FORK NE	81 28.0	IS	0	8929	28638	103.91		
		148	300.0	154.8	8929	28638	4485.5		
NC4ORH0015	UOP	36 17.9	CH	320.0	0	0	6289.1	0	
5	ALLEGHANY - SOUTH FORK NE	81 24.0	IS	0	34594	69332	90.710		
		175	354.0	309.6	34594	69332	2497.5		
NC4ORH0016	UOP	36 24.0	CH	250.0	0	0	5054.9	0	
5	ALLEGHANY - SOUTH FORK NE	81 20.0	IS	0	42708	85595	59. 56		
		285	577.0	234.7	42708	85595	1589.7		
NCISAC0002	BLEWETT FALLS	34 59.2	HR	51.0	24600	134000	2094.2	2000	
2	ANSON - PEE DEE RIVER	79 52.8	OP	100000	34344	29407	71.215		
	CAROLINA POWER AND LIGHT	6847	7940.0	40.0	58944	163407	715.91		
NC6SAC0001	CRUMPS FORD	35 10.4	H	151.0	0	0	12105	0	
5	ANSON - ROCKY RIVER	80 8.9	IS	690000	73506	85150	142.16		
		1375	1335.0	132.4	73506	85150	2283.4		
NCASAW0013	LOCK AND DAM NO 1	34 24.2	N	23.0	0	0	233.44	1990	
2	BLADEN - CAPE FEAR RIV	78 17.6	OP	20000	800	5785	40.352		
	DAEN-SAW	5220	5220.0	6.5	800	5785.0	2608.7		
NCASAW0014	LOCK AND DAM NO 2	34 37.6	N	24.5	0	0	174.43	1990	
2	BLADEN - CAPE FEAR RIV	78 34.6	OP	15000	450	2568	67.926		
	DAEN-SAW	4980	5115.0	2.9	450	2568.0	3283.8		
NCASAW0015	WILLIAM O HUSKE LOCK AND DAM	34 50.1	N	30.2	0	0	209. 3	1990	
2	BLADEN - CAPE FEAR RIV	78 49.3	OP	13000	640	3845	54.365		
	DAEN SAW	4810	4941.0	4.3	640	3845.0	2852.3		

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NC40RN0049	NEWFOUND CREEK	35 39.6	H	170.0	0	0	6066.2	2000	E-4
2	BUNCOMBE - FRENCH BROAD	82 37.4	IS	0	124973	229254	26.460		
		1054	1980.0	156.8	124973	229254	619.14		
NCCORN0051	NORTH FORK RESERVOIR	35 39.6	S	140.0	0	0	119.69	0	
5	BUNCOMBE - NORTH FORK SW	82 20.6	OP	15600	816	2690	44.483		
	CITY OF ASHEVILLE	22	45.4	119.8	816	2690.8	780.98		
NCISAC0007	BRIDGEWATER-LAKE JAMES	35 45.0	H	157.0	20000	48900	0	0	
5	BURKE - CATAWBA RIVER	81 50.0	OP	288800	0	0	0		
	DUKE POWER COMPANY	380	650.0	133.7	20000	48900	0		
NCGSAC0008	HENRY RIVER	35 42.0	HS	38.0	90	500	0	0	
5	BURKE - HENRY FORK	81 25.5	OP	77	0	0	0		
	HENRY RIVER MILLS CO.	80	127.0	35.0	90	500. 0	0		
NC6SAC0004	MORGANTON	35 47.1	H	85.0	0	0	5308.4	0	
5	BURKE - CATAWBA RIVER	81 37.8	IS	178871	12423	46089	115.17		
		593	926.5	69.8	12423	46089	5888.1		
NCISAC0006	RHODHISS	35 46.5	H	79.0	25500	56700	0	0	
5	BURKE - CATAWBA RIVER	81 26.0	OP	113886	0	0	0		
	DUKE POWER COMPANY	1088	1700.0	60.0	25500	56700	0		
NCISAC0015	OXFORD-LAKE HICKORY	35 49.3	H	105.0	36000	93900	0	0	
5	CATAWBA - CATAWBA RIVER	81 11.5	OP	366840	0	0	0		
	DUKE POWER CO.	1310	2025.0	89.9	36000	93900	0		
NCCSAW0026	B EVERETT JORDAN LAKE	35 31.3	CRSO	116.5	0	0	701.85	1990	R-4
2	CHATHAM - HAW RIVER	79 4.2	OP	1562500	15872	44959	15.610		
	DAEN-SAW	1690	1690.0	59.7	15872	44959	417.85		
NC6SAW0024	BYNUM	35 46.5	HCR	90.0	0	0	4355.0	2000	R-2
2	CHATHAM - HAW	79 8.7	IS	237000	17312	50318	86.549		
		1290	1290.0	89.9	17312	50318	3403.1		

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SITE ID / NUMBER / ACTV. INV.	PROJECT NAME / PRIMARY CO. -NAME OF STREAM / OWNER	LATITUDE (D M.M) / LONGITUDE (D M.M) / DR.AREA (SQ.MI)	PROJ.PURP. / STATUS / AVE. Q (CFS)	DAM HT (FT) / MX.STOR. (AC FT) / PWR. HD. (FT)	EXIST.CAP. (KW) / INC. CAP. (KW) / TOT.CAP. (KW)	EXIST.ENRG (MWH) / INC.ENERGY (MWH) / TOT.ENERGY (MWH)	ANUL. COST (1000 $) / ENERGY COST ($/MWH) / INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NCASAW0022	BYNUM 5/	35 46.5	0	14.0	0	0	273.82	1990	
2	CHATHAM - HAW RIVER	79 8.9	OP	0	1508	6300	43.463		
	ODELL J M MFG CO	1290	1290.0	14.3	1508	6300.0	1588.0		
NCMSAW0019	LOCKVILLE	35 37.4	H	49.0	0	0	1030.1	1990	E-4
2	CHATHAM - DEEP RIVER	79 5.9	IS	0	23545	37847	27.218		
	WOLF SUMMIT COAL CO	1420	1462.0	48.9	23545	37847	445.21		
NC6SAW0021	MANDALE	35 51.5	H	80.0	0	0	7045.7	2000	R-2
2	CHATHAM - HAW	79 15.0	IS	237000	23424	46473	151.60		
		1170	1170.0	79.9	23424	46473	4137.8		
NC6SAW0020	MOORES MILL	35 44.2	HCR	70.0	0	0	2797.2	2000	R-2
2	CHATHAM - HAW	79 6.6	IS	8700	15734	42134	66.389		
		1350	1350.0	69.9	15734	42134	2300.9		
NCIORN0059	APALACHIA LAKE	35 10.0	H	150.0	78900	599900		0	
5	CHEROKEE - HIWASSEE R.	84 17.7	OP	69360	0	0			
	TVA	1018	2410.2	430.0	78900	599900			
NC4ORN0058	GOLD BRANCH	35 0.1	H	75.0	0	0	1417.1	0	
5	CHEROKEE - NOTTELY RIVER	84 6.7	IS	0	6787	20083	70.563		
		242	470.0	49.9	6787	20083	2674.6		
NCIORN0060	HIWASSEE LAKE	35 9.0	HC	307.0	117000	404700		0	
5	CHEROKEE - HIWASSEE R.	84 10.6	OP	434000	0	0			
	TVA	968	2291.8	174.0	117000	404700			
NC4OPN0057	MURPHY	35 4.7	H	135.0	0	0	9593.9	0	
5	CHEROKEE - HIWASSEE RIVE	84 1.5	IS	0	22053	68768	139.50		
		416	930.0	119.8	22053	68768	6115.3		
NCIORN0063	CHATUGA LAKE	35 0.9	H	144.0	10000	44400		0	
5	CLAY - HIWASSEE R.	83 47.4	OP	247800	0	0			
	TVA	189	464.3	102.9	10000	44400			

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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS	AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NCIORN0064	MISSION LAKE	35 3.9	H		50.0	18000	10300	0	0	
5	CLAY - HIWASSEE R.	83 55.6	OP		5433	0	0	0		
	NANTAHALA POWER + LIGHT	292		660.4	35.0	18000	10300	0		
NC4ORN0062	SWEETWATER	35 3.9	H		120.0	0	0	2194.9	0	
5	CLAY - HIWASSEE RIVE	83 53.6	IS		0	15254	40903	53.660		
		284		640.0	103.8	15254	40903	1829.2		
NCCSAC0018	BUFFALO CREEK DAM	35 16.5	S		100.0	0	0	189.27	1990	
2	CLEVELAND - BUFFALO CREEK	81 27.1	OP		53280	1466	5563	34. 18		
	USDA SCS	70		112.0	74.1	1466	5563.6	908.23		
NCMSAC0016	LAWNDALE (HARRISON SHOALS DA	35 23.6	H		30.0	0	0	197.32	0	
5	CLEVELAND - FIRST BROAD R	81 33.1	OP		180	1531	4337	45.497		
	CLEVLAND MILL + POWER CO	189		266.0	29.9	1531	4337.0	926.63		
NCGSAC0019	STICE SHOALS	35 13.4	H		25.0	600	1800	0	0	
5	CLEVELAND - FIRST BROAD R	81 35.4	OP		134	0	0	0		
	DUKE POWER COMPANY	323		420.0	22.1	600	1800.0	0		
NCISAC0421	HIGH ROCK	35 35.9	HR		74.0	33000	115000	986.71	1990	R-7
2	DAVIDSON - YADKIN RIVER	80 14.1	OP		386179	24922	14550	67.813		
	YADKIN INC	3980		4667.0	58.9	57922	129550	395.68		
NC6SAC0024	COOLEEMEE	35 49.3	H		105.0	0	0	10564	0	E-4
5	DAVIE - SOUTH YADKIN	80 35.5	IS		625000	7741	23094	457.42		
		534		596.0	83.3	7741	23094	19446		
NC6SAC0023	JUNCTION	35 45.5	H		89.0	0	0	14138	0	E-4
5	DAVIE - YADKIN RIVER	80 27.2	IS		400000	43058	121868	116. 1		
		2430		2887.0	67.8	43058	121868	4566.9		
NC6SAC0022	STYERS	36 2.9	H		84.0	0	0	9530.5	0	E-4
5	DAVIE - YADKIN RIVER	80 27.5	IS		325000	18966	84990	112.13		
		1870		2654.0	66.1	18966	84990	7025.5		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER / ACTV. INV.	PROJECT NAME / PRIMARY CO. -NAME OF STREAM / OWNER	LATITUDE (D M.M) / LONGITUDE (D M.M) / DR.AREA (SQ.MI)	PROJ.PURP. / STATUS / AVE. Q (CFS)	DAM HT (FT) / MX.STOR. (AC FT) / PWR. HD. (FT)	EXIST.CAP. (KW) / INC. CAP. (KW) / TOT.CAP. (KW)	EXIST.ENRG (MWH) / INC.ENERGY (MWH) / TOT.ENERGY (MWH)	ANUL. COST (1000 $) / ENERGY COST ($/MWH) / INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NCOSAW0030	LAKE MICHIE DAM	36 9.0	HSR	81.0	0	0	192.52	1990	
2	DURHAM - FLAT RIVER-NE	78 49.6	OP	2100	2199	3753	51.289		
	CITY OF DURHAM	167	157.0	52.6	2199	3753.6	558. 6		
NCGSAC0027	IDOLS	35 58.4	HS	15.0	1411	6100	0	0	
5	FORSYTH - YADKIN RIVER	80 23.9	OP	210	0	0	0		
	DUKE POWER COMPANY	1876	2383.0	10.0	1411	6100.0	0		
NCMSAC0031	CAROLINIAN HIGHSCOALS DAM	35 23.8	H	30.0	0	0	333.11	1990	
2	GASTON - SOUTH FORK CA	81 12.3	OP	181	4021	10939	30.450		
	MCNEIL INDUSTRIES	509	670.0	29.9	4021	10939	689.51		
NCMSAC0030	DALLAS	35 22.8	S	20.0	0	0	319.13	0	
5	GASTON - SOUTH FORK CA	81 11.4	OP	77	2564	7304	43.689		
	HARDINS MANUFACTURING CO	513	675.0	19.9	2564	7304.5	1081.2		
NCMSAC0029	MCADENVILLE DAM	35 15.7	S	18.0	0	0	360.51	1990	
2	GASTON - SOUTH FORK CA	81 4.6	OP	52	3164	9013	39.998		
	PHARR YARNS INC	633	796.0	19.9	3164	9013.1	1019.1		
NCISAC0028	MOUNTAIN ISLAND	35 20.1	H	91.0	60000	104100	0	0	
5	GASTON - CATAWBA RIVER	80 59.1	OP	116460	0	0	0		
	DUKE POWER CO	1860	2700.0	75.9	60000	104100	0		
NCJSAC0032	SPENCER MOUNTAIN	35 18.5	HS	12.6	640	4100	0	0	
5	GASTON - SOUTH FORK CA	81 6.7	OP	3000	0	0	0		
	DUKE POWER COMPANY	550	707.0	23.2	640	4100.0	0		
NCIORN0065	CHEOAH LAKE	35 26.8	H	230.0	110000	678900	0	0	
5	GRAHAM - LITTLE TENNES	83 56.1	OP	42000	0	0	0		
	TAPOCO INC.	1608	3733.8	190.0	110000	678900	0		
NCIORN0067	FONTANA LAKE	35 27.0	H	480.0	225000	1229300	0	0	
5	GRAHAM - LITTLE TENNES	83 48.2	OP	58732	0	0	0		
	TVA	1571	3682.7	303.0	225000	1229300	0		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NCIORN0066	SANTEETLAH LAKE	35 22.6	H	200.0	45000	219800	0	0	E-4
5	GRAHAM - CHEOAH R	83 52.5	OP	271320	0	0	0		
	TAPOCO	176	432.3	664.0	45000	219800	0		
NCISAW0041	GASTON DAM	36 30.1	H	105.0	177920	340000	0	0	
5	HALIFAX - ROANOKE RIVER	77 48.6	OP	536000	0	0	0		
	VEPCO	8340	8340.0	71.9	177920	340000	0		
NCISAW0042	ROANOKE RAPIDS DAM	36 29.0	H	72.0	100080	325500	0	0	
5	HALIFAX - ROANOKE RIVER	77 40.2	OP	216384	0	0	0		
	VEPCO	8400	8400.0	21.2	100080	325500	0		
NCMSAW0043	BUCKHORN FALLS	35 31.9	HO	14.0	0	0	788.56	1990	E-4
2	HARNETT - CAPE FEAR RIV	78 58.9	OP	1600	6698	17696	44.561		
	CAROLINA POWER AND LIGHT	3196	3196.0	11.9	6698	17696	1233.3		
NC6SAW0044	LILLINGTON	35 26.0	H	45.0	0	0	4998.4	2000	I-6
2	HARNETT - CAPE FEAR RIV	78 52.0	SI	142000	26986	68849	72.599		R-7
	IDENTIFIED BY FERC	3410	3410.0	43.2	26986	68849	2507.3		E-4
NC4SAW0045	SMILEY FALLS	35 16.9	H	50.0	0	0	4631.9	2000	E-4
2	HARNETT - CAPE FEAR RIV	78 41.0	IS	7900	48953	91238	50.767		R-3
	SITE EVALUATED BY FERC AND C	3700	3700.0	47.8	48953	91238	1230.2		
NC6ORN0068	JONATHANS CREEK	35 37.5	H	190.0	0	0	4328.3	0	
5	HAYWOOD - PIGEON RIVER	82 59.8	IS	134300	21628	55155	78.476		
		282	580.0	164.8	21628	55155	2707.6		
NCIORN0071	WATERVILLE LAKE	35 41.6	H	185.0	108000	467000	0	0	
5	HAYWOOD - PIGEON RIVER	83 3.0	OP	30000	0	0	0		
	CAROLINA LIGHT + POWER	455	879.3	858.0	108000	467000	0		
NC7SAC0033	SALUDA	35 16.9	HR	210.0	0	0	2169.9	0	
5	HENDERSON - GREEN RIVER	82 21.3	IS	17200	8034	49590	43.757		
		78	170.0	688.3	8034	49590	3571.9		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-F CON CON-STRAINTS
NCISAC0034	TUXEDO DAM (LAKE SUMMIT)	35 14.0	HR	130.0	5000	21300	0	0	
5	HENDERSON - GREEN RIVER	82 23.9	OP	14520	0	0	0		
	DUKE POWER COMPANY	42	90.0	285.5	5000	21300	0		
NCMSAW0048	MT. PLEASANT	35 10.4	H	15.0	0	0	233.44	1990	
2	HOKE-MOORE - LOWER LITTLE	79 6.3	OP	0	1000	2850	81.910		
	WILLIAM DALTON FLOWERS JR.	299	299.0	12.9	1000	2850.0	2010.8		
NCIOPN0074	WOLF CK LAKE	35 13.2	H	180.0	0	0	203.99	0	
5	HYDE - WOLF CK.	83 0.0	OP	14361	1918	5731	35.588		
	NANTHALA POWER + LIGHT	15	61.3	164.8	1918	5731.9	742.71		
NCISAC0037	LOOKOUT SHOALS	35 45.1	H	96.5	18720	83400	643.80	1990	
2	IREDELL - CATAWBA	81 5.1	OP	37440	8646	7393	87. 77		
	DUKE POWER CO.	1449	2300.0	76.8	27366	90793	724.16		
NCIOPN0077	BEAR CK RESERVOIR	35 14.4	H	215.0	9000	28800	0	0	
5	JACKSON - TUCKASEGEE R	83 4.3	OP	34711	0	0	0		
	NANTAHALA POWER + LIGHT	75	192.5	190.0	9000	28800	0		
NCIORN0073	LAKE CEDAR CLIFF	35 15.1	H	173.0	6375	20800	0	0	
5	JACKSON - TUCKASGGEE R.	83 5.9	OP	7000	0	0	0		
	NANTAHALA POWER + LIGHT	80	205.3	143.0	6375	20800	0		
NCIORN0075	THORPE LAKE	35 11.8	H	150.0	21600	119000	0	0	
5	JACKSON - WEST FORK TUC	83 9.1	OP	70800	0	0	0		
	NANTAHALA POWER + LIGHT	37	118.7	1172.0	21600	119000	0		
NCIORN0076	TUCKASEGEE LAKE	35 14.4	H	61.0	3000	10600	0	0	
5	JACKSON - WEST FORK TUC	83 7.5	OP	183	0	0	0		
	NANTAHALA POWER + LIGHT	55	141.1	55.0	3000	10600	0		
NC7SAS0088	UPPER WHITEWATER	35 2.1	HR	203.0	0	0	1961.5	2000	R-4
2	JACKSON - WHITEWATER RI	83 1.1	IS	8100	7333	20089	97.644		
		13	60.0	780.0	7333	20089	3519.2		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NCMSAW0050	CARBONTON	35 31.1	H	21.0	0	0	245.18	1990	E-4
2	LEE - DEEP RIVER	79 20.9	OP	0	1505	5142	47.677		
	CAROLINA POWER AND LIGHT	970	970.0	18.1	1505	5142.5	1349.7		
NCISAC0039	COWANS FORD-LAKE NORMAN	35 26.0	HR	125.5	350000	140000	0	0	
5	LINCOLN - CATAWBA RIVER	80 57.5	OP	1093600	0	0	0		
	DUKE POWER CO	1790	2600.0	110.3	350000	140000	0		
NC6SAC0038	LINCOLNTON	35 28.6	HC	85.0	0	0	7718.4	0	
5	LINCOLN - SOUTH FORK CA	81 16.9	IS	310800	5504	14204	543.38		
		300	390.0	73.3	5504	14204	19908		
NCMSAC0040	LONG SHOALS	35 24.8	H	19.0	0	0	174.93	0	
5	LINCOLN - SOUTH FORK CA	81 14.3	OP	960	700	4010	43.624		
	CONSOLIDATED KNIT MILLS	472	621.0	15.9	700	4010.0	1956.9		
NCIORN0081	FRANKLIN RESERVOIR	35 13.2	H	35.0	1040	7600	0	0	
5	MACON - LITTLE TN RIV	83 22.2	OP	2282	0	0	0		
	NANTAHALA POWER + LIGHT	310	712.6	30.0	1040	7600.0	0		
NCIORN0079	NANTAHALA RESERVOIR	35 11.8	H	250.0	43200	298000	0	0	E-4
5	MACON - NANTAHALA RIV	83 39.3	OP	138730	0	0	0		
	NANTAHALA POWER + LIGHT	91	223.5	973.0	43200	298000	0		
NC5ORN0078	WESSER	35 16.5	H	40.0	0	0	1912.4	0	E-4
5	MACON - NANTAHALA RIV	83 40.7	IS	0	6109	37053	51.613		
		133	460.0	279.7	6109	37053	4132.6		
NC5ORN0083	BRUSH CREEK	35 50.7	H	15.0	0	0	6681.9	2000	E-4
2	MADISON - FRENCH BROAD	82 45.4	IS	0	159163	291974	27.885		
		1405	2400.0	149.8	159163	291974	529.13		
NCIORN0084	MARSHALL RESERVOIR	35 47.5	H	39.0	3000	20000	0	0	E-4
5	MADISON - FRENCH BROAD	82 42.6	OP	250	0	0	0		
	CAROLINA POWER + LIGHT	1343	2985.0	35.0	3000	20000	0		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NC5ORN0082	PINE CREEK	35 47.7	H	30.0	0	0	9646.0	2000	
2	MADISON - FRENCH BROAD	82 43.8	IS	0	208002	381566	25.280		
		1391	2570.0	197.8	208002	381566	602.92		
NC5ORN0085	POPLAR	36 4.7	H	65.0	0	0	4649.8		R-4
6	MITCHELL - NOLICHUCKY RI	82 21.4	IS	0	104731	174733	26.611		E-1[1]
		619	1080.0	269.7	104731	174733	562.16		
NC0SAC0042	FURY DAM	35 15.1	R	45.0	0	0	1106.7	0	
5	MONTGOMERY - LITTLE RIVER	79 54.5	OP	1068	2876	5402	204.84		
	MONTGOMERY CO HUNT CLUB	243	254.0	44.9	2876	5402.6	4979.7		
NC6SAC0733	MARTINS BRIDGE	35 14.0	HC	167.0	0	0	3901.2	0	
5	MONTGOMERY - LITTLE RIVER	79 54.5	IS	122269	11200	20210	193. 3		
		272	284.0	156.3	11200	20210	4748.5		
NC6SAC0734	UWHARRIE	35 23.1	HC	85.0	0	0	3190.1	0	
5	MONTGOMERY - UWHARRIE RIVE	80 2.5	IS	77675	4320	9966	320.10		
		355	332.0	74.4	4320	9966.0	10204		
NCMSAW0052	HIGH FALLS	35 28.2	O	13.5	0	0	266.13	1990	
2	MOORE - DEEP RIVER	79 31.5	OP	0	1090	3093	86. 44		
	JOHN M. CURRIE, CARTHAGE NC	748	748.0	11.9	1090	3093.0	2225.4		
NC6SAW0053	HOWARDS MILL LAKE	35 29.0	CSRO	115.0	0	0	6108.3	2000	R-3
2	MOORE - DEEP RIVER	79 34.8	PA	341000	7133	13194	462.95		E-4
		639	620.0	42.0	7133	13194	12080		
NCCSAW0059	TAR RIVER DAM	35 52.8	SR	27.0	0	0	449.51	1990	E-4
2	NASH - TAR RIVER	77 53.3	OP	13440	6136	12556	35.798		
	CITY OF ROCKY MOUNT	777	777.0	28.0	6136	12556	654.46		
NCCSAW0062	LAKE HYCO DAM	36 30.5	HSR	55.0	0	0	192.79	1990	
2	PERSON - HYCO RIVER	79 2.4	OP	77000	1265	2010	95.915		
	CAROLINA POWER AND LIGHT	172	146.0	25.4	1265	2010.0	1128.5		

1/ P.L. 93-621, Jan 3, 1975

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NC6SAC0735 5	FOSTER POLK - GREEN RIVER	35 19.5 82 14.3 108	H IS 197.0	120.0 40000 114.3	0 3975 3975	0 12609 12609	2174.6 172.45 7416.0	0	E-3 R-2
NCISAC0043 5	TURNER SHOALS DAM (LAKE ADGE POLK - GREEN RIVER DUKE POWER COMPANY	35 20.1 82 11.1 126	HR OP 280.0	90.0 11927 84.3	5500 0 5500	14600 0 14600	0 0 0	0	E-3 R-2
NC6SAC0738 5	DROWNING CREEK DAM NO. 1 RICHMOND - DROWNING CREE	35 8.9 79 36.4 75	CHSRO IS 111.0	83.0 103800 56.7	0 1647 1647	0 3654 3654.5	3354.8 917.98 28727	0	
NC6SAC0445 2	GREATER BLEWETT FALLS RICHMOND - PEE DEE RIVER	34 59.2 79 52.8 6860	H IS 7940.0	94.0 354900 76.6	0 150874 150874	0 350358 350358	21525 61.439 1951.0	2000	
NC4SAC0046 2	MORVEN RICHMOND - PEE DEE RIVER	34 49.9 79 54.9 7240	H IS 8073.0	51.0 45000 27.5	0 47085 47085	0 126785 126785	7750.7 61.132 2213.8	2000	C-2 E-4
NCMSAW9993 2	AVALON DAM ROCKINGHAM - MAYO RIVER WASHINGTON MILLS	36 15.3 79 34.0 310	H OP 372.0	22.0 1586 21.9	0 1428 1428	0 4661 4661.2	218.47 46.869 1198.0	1990	
NCCSAW0073 2	BELEWS LAKE ROCKINGHAM - BELEWS CR-DAN DUKE POWER CO	36 19.5 80 1.9 80	O OP 96.0	35.0 226544 139.8	0 2346 2346	0 8188 8188.9	238.79 29.160 762.21	1990	R-3
NC9SAW0075 2	MAYO ROCKINGHAM - MAYO RIVER	36 31.9 79 58.9 260	CHRO FP 313.0	237.0 1432669 212.0	0 600000 600000	0 841000 841000	0 0 0	2000	E-7 R-2 E-4
NCOSAW0077 2	SPRAY ROCKINGHAM - SMITH RIVER SPRAY WATER POWER AND LAND C	36 30.0 79 45.1 539	HO OP 615.5	15.0 0 32.0	0 3711 4711	0 4341 4341.4	311.43 71.742 683.16	1990	

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NC4SAW0074	STONEVILLE	36 28.0	HO	94.0	0	0	2144.7	2000	E-4
2	ROCKINGHAM - MAYO RIVER	79 56.9	FP	51900	3993	13159	162.98		R-2
		294	354.0	65.2	3993	13159	7240.4		E-7
NCPSAC0047	COOLEEMEE DAM *BURLINGTON MI	35 48.7	HS	24.0	0	0	334.48	1990	
2	ROWAN - SOUTH YADKIN	80 34.2	OP	172	3249	8735	38.289		
	DAVIE COUNTY	569	639.0	23.9	3249	8735.6	887.72		
NCGSAC0051	CLIFFSIDE	35 14.2	H	32.0	1625	2900	0	0	
5	RUTHERFORD - SECOND BROAD	81 46.1	OP	77	0	0	0		
	CONE MILL CORP	211	295.0	27.8	1625	2900.0	0		
NC6SAC0049	CLINCHFIELD DAM	35 12.0	HCSR	150.0	0	0	15143	0	
5	RUTHERFORD - BROAD RIVER	81 51.3	SI	1156000	46849	72762	208.11		
		571	980.0	130.0	46849	72762	4561.4		
NCISAC0050	LAKE LURE	35 25.4	HR	120.0	3600	10000	0	0	
5	RUTHERFORD - BROAD RIVER	82 11.0	OP	77040	0	0	0		
	TOWN OF LAKE LURE	95	170.0	111.1	3600	10000	0		
NC6SAC0740	DROWNING CREEK DAM NO.2	35 0.0	CO	51.0	0	0	4173.7	0	
5	SCOTLAND - DROWNING CREE	79 24.5	IS	147000	1224	2892	1443.0		
		302	445.0	10.5	1224	2892.2	48279		
NCISAC0056	NARROWS DAM *BADIN LAKE*	35 25.2	H	207.0	96500	437600	6650.2	1990	
2	STANLY - YADKIN RIVER	80 5.6	OP	142000	284076	87987	75.581		
	YADKIN INC	4180	4911.0	169.8	380576	525587	271.61		
NCISAC0054	TILLERY	35 12.4	H	89.0	84000	202000	0	0	
5	STANLY - PEE DEE RIVER	80 3.9	OP	168000	0	0	0		
	CAROLINA POWER AND LIGHT	4600	5390.0	72.9	84000	202000	0		
NCISAC0057	TUCKERTOWN	35 29.2	H	82.0	42000	130400	0	0	
5	STANLY - YADKIN RIVER	80 10.6	OP	51600	0	0	0		
	YADKIN INC	4080	4785.0	54.7	42000	130400	0		

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(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NCISAC0055 2	YADKIN FALLS DAM (FALLS RESE STANLY - YADKIN RIVER YADKIN INC	35 23.6 80 4.4 4190	H OP 4923.0	64.0 6171 48.2	29500 16906 46406	115000 9885 124885	783.47 79.256 451.56	1990	
NC9SAW0079 2	DANBURY STOKES - DAN RIVER	36 26.0 80 13.9 261	CHRO FP 313.0	207.0 566130 169.0	0 525000 525000	0 735000 735000	0 0 0	2000	R-2,3 I-4 E-4
NC4SAW0078 2	WALNUT COVE STOKES - DAN RIVER	36 20.9 80 7.9 342	HO FP 411.0	128.0 128256 106.9	0 10524 10524	0 26249 26249	3914.2 149.11 5070.2	2000	E-4 R-2 R-3
NC6SAC0062 5	FISHER RIVER RESERVOIR SURRY - FISHER RIVER	36 19.3 80 41.5 135	CRSO SI 202.0	175.0 224000 126.7	0 4802 4802	0 16588 16588	4524.6 272.75 13204	0	
NC6SAC0061 5	MITCHELL RIVER RESERVOIR SURRY - MITCHELL RIVE	36 19.0 80 48.5 77	CPSO 123.0	190.0 73500 132.4	0 2426 2426	0 9385 9385.7	2751.0 293.10 15766	0	E-4
NC6ORN0087 5	BRYSON SWAIN - TUCKASEGEE RI	35 25.8 83 24.9 603	H IS 1600.0	210.0 530000 153.8	0 53478 53478	0 139956 139956	7395.4 52.840 1887.2	0	
NC6ORN0086 2	NEEDMORE SWAIN - LITTLE TENNES	35 20.9 83 30.7 439	H IS 1040.0	190.0 140000 154.8	0 43079 43079	0 102623 102623	5114.3 49.836 1589.2	2000	
NCIORN0088 5	OCONALUFTEE LAKE SWAIN - OCONALUFTEE R NANTHALA POWER + LIGHT	35 26.6 83 22.5 188	H OP 432.1	36.0 530 30.0	1000 0 1000	6600 0 6600.0	0 0 0	0	
NCIORN0089 5	CASCADE LAKE TRANSYLVANIA- LITTLE RIVER CASCADE POWER CO	35 13.0 82 38.3 41	H OP 131.6	60.0 2304 50.0	1000 0 1000	4300 0 4300.0	0 0 0	0	

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
NC7SAS0089 2	HORSEPASTURE TRANSYLVANIA- HORSEPASTURE	35 5.5 82 58.1 25	HR IS 93.0	190.0 68000 1780.0	0 49112 49112	0 90746 90746	4198.8 46.270 1126.1	2000	R-4
NC6SAC0064 5	LOVES FORD UNION - ROCKY RIVER	35 9.8 80 27.2 675	H IS 653.0	122.0 170000 104.7	0 22689 22689	0 30014 30014	7171.1 238.92 4387.6	0	
NC6SAC0063 5	NANCES FORD UNION - ROCKY RIVER	35 10.0 80 21.3 760	H IS 728.0	81.0 28000 55.9	0 13211 13211	0 19753 19753	2364.1 119.68 2354.8	0	
NCCSAW0083 2	FALLS LAKE N.C. WAKE - NEUSE RIVER DAEN-SAW	35 56.2 78 34.4 760	HCR OP 951.0	91.5 1128100 62.7	0 8389 8389	0 24202 24202	709. 9 29.298 847.33	1990	R-4
NCMSAW0085 2	MILBURNIE LAKE DAM WAKE - NEUSE RIVER HOWARD TWIGGS	35 47.9 78 32.3 875	R IS 934.0	21.0 1 16.9	0 3957 3957	0 7861 7861.0	440.94 56. 92 1048.6	1990	C-2
NC7ORN0090 2	BEECH CREEK WATUGA - WATAUGA RIVER	36 15.9 81 53.6 147	H IS 250.0	200.0 23000 620.3	0 55780 55780	0 92136 92136	4067.9 44.151 950.96	2000	E-7,4 R-2
NC6SAC0067 5	ELKIN WILKES - YADKIN RIVER	36 14.6 80 52.4 844	H IS 1438.0	90.0 180000 73.7	0 18703 18703	0 61192 61192	5958.7 97.377 4364.6	0	
NC6SAC0069 5	REDDIES RIVER LAKE WILKES - REDDIES RIVER	36 10.2 81 10.0 94	CSRO DM 145.0	165.0 99740 97.4	0 2468 2468	0 8151 8151.9	3092.0 379.30 17502	0	
NC6SAC0070 5	ROARING RIVER LAKE WILKES - ROARING RIVER	36 13.8 81 1.9 127	CSRO SI 199.0	187.0 170500 138.1	0 8941 8941	0 18107 18107	4819.6 266.16 7473.0	0	

NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
NCCSAC0071	W. KERR SCOTT	36 9.0	CRS	147.5	0	0	643.59	1990	E-4
2	WILKES - YADKIN RIVER	81 13.9	OP	303000	7470	23092	27.870		R-4
	DAEN SAC	348	580.0	66.9	7470	23092	849.20		
NC6SAC0473	LOWER DONNAHA	36 12.6	H	163.0	0	0	16378	2000	R-3
2	YADKIN - YADKIN RIVER	80 25.3	IS	945772	113475	212792	76.968		E-4
		1620	2487.0	143.5	113475	212792	2005.8		
NC6SAC0072	UPPER DONNAHA	36 15.1	H	138.0	0	0	11479	2000	R-3
2	YADKIN - YADKIN RIVER	80 29.5	IS	400000	90469	172710	66.466		E-4
		1560	2410.0	119.6	90469	172710	1740.5		
NC6ORN0092	HIGGINS	35 58.0	H	85.0	0	0	1053.1	0	
5	YANCEY - CANE RIVER	82 23.2	IS	4800	2441	7410	142.11		
		125	235.0	61.9	2441	7410.3	5517.2		
NC6ORN0091	LANGFORD BRANCH	35 56.4	H	120.0	0	0	1194.4	0	
5	YANCEY - CANE RIVER	82 23.5	IS	57000	3077	9008	132.58		
		109	210.0	85.9	3077	9008.9	5021.0		
SCJSAS0091	ROCKY RIVER	34 15.5	HRO	60.0	2800	9200	0	0	
5	ABBEVILLE - ROCKY RIVER	82 36.6	OP	31200	0	0	0		
	CITY OF ABBEVILLE	196	450.0	78.0	2800	9200.0	0		
SC6SAC0074	UPPER WARE SHOALS	34 26.0	HC	83.0	0	0	3228.7	2000	
2	ABBEVILLE - SALUDA RIVER	82 16.0	IS	53700	20217	34367	93.947		
		530	976.0	59.4	20217	34367	2127.2		
SC9SAC0757	ROCKY SPRINGS	33 40.9	H	170.0	0	0	22614	2000	
2	AIKEN - ROCKY SPRINGS	81 33.1	SI	390000	500000	438000	51.631		
		198	242.0	189.8	500000	438000	596.11		
SC6SAC0756	SHAW CREEK	33 33.9	CRSO	70.0	0	0	5073.4	0	E-4
5	AIKEN - SOUTH FORK ED	81 30.2	SI	291000	4717	9362	541.89		
		364	423.0	34.9	4717	9362.4	15168		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
SCGSAC0077 2	LOWER PELZER ANDERSON - SALUDA RIVER THE KENDALL COMPANY	34 37.1 82 27.2 414	H OP 800.0	44.0 273 35.1	3280 3217 6497	10000 1621 11621	279.79 172.50 681.95	1990	
SCJSAC0078 5	UPPER PELZER ANDERSON - SALUDA RIVER THE KENDALL COMPANY	34 39.8 82 27.7 409	H OP 790.0	27.0 963 24.9	1650 2514 4164	6000 2093 8093.8	285.46 136.33 935.29	0	
SCISAC0080 5	JEFFERIES BERKELEY - DIVERSION CAN S C PUBLIC SERV ARTH	33 16.7 79 58.7 15000	HRNC OP 15600.0	80.8 1110000 67.4	132615 0 132615	129000 0 129000	0 0 0	0	
SCJSAC0079 5	ST. STEPHEN BERKELEY - SANTEE COOPER DAEN SAC	33 24.0 79 54.9 15000	H UC 15229.0	16.0 1110000 69.9	84000 0 84000	418000 0 418000	0 0 0	0	E-4
SCMSAC0086 2	CHEROKEE FALLS CHEROKEE - BROAD RIVER BROAD RIVER ELECT. COOP.	35 3.7 81 33.2 1500	H OP 2350.0	15.0 1275 18.9	0 8473 8473	0 27606 27606	771.28 27.938 931.33	1990	
SCISAC0085 2	GASTON SHOALS CHEROKEE - BROAD DUKE POWER COMPANY	35 8.4 81 36.3 1250	HR OP 2030.0	64.0 4000 37.3	9140 7206 16346	30100 3701 33801	451.76 122. 3 546.17	2000	
SC6SAC0081 2	GREATER CHEROKEE FALLS CHEROKEE - BROAD RIVER	35 4.1 81 34.3 1495	H IS 2342.0	36.0 8460 33.4	0 14950 14950	0 47811 47811	2632.1 55. 52 2302.2	2000	C-2
SC6SAC0082 2	GREATER GASTON SHOALS CHEROKEE - BROAD RIVER	35 6.3 81 34.3 1420	HC IS 2357.0	142.0 733460 127.0	0 115820 115820	0 177861 177861	13133 73.838 1553.3	2000	I-3
SCISAC0084 5	NINETY-NINE ISLANDS CHEROKEE - BROAD DUKE POWER COMPANY	35 1.7 81 29.6 1550	HP OP 2400.0	86.1 19000 65.5	18000 12232 30232	65600 8342 73942	1051.7 126. 6 918.52	0	

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
SCISAC0088	GREAT FALLS-DEARBORN	34 33.5	H	81.5	69000	167500	655.77	1990	
2	CHESTER - CATAWBA	80 53.6	OP	23650	8229	3658	179.24		
	DUKE PWR CO	4100	5150.0	71.3	77229	171158	782.92		
SCISAC0087	ROCKY CREEK-CEDAR CREEK	34 32.3	HR	80.9	73000	143100	819. 6	1990	
2	CHESTER - CATAWBA	80 52.5	OP	38650	20787	2243	365. 1		
	DUKE PWR CO	4360	5425.0	58.8	93787	145343	382.14		
SCISAC0090	SPILLWAY (LAKE MARION)	33 28.8	HCR	61.0	1920	12000	3723.6	1990	
2	CLARENDON - SANTEE RIVER	80 9.9	OP	1500000	68379	87021	42.790		
	S C PUBLIC SERV AUTH	14700	18000.0	41.8	70299	99021	655.48		
SCCSAC0093	SCNONAME16033 LAKE ROBINSON	34 24.2	HRO	40.0	0	0	202.18	1990	
2	DARLINGTON - BLACK CREEK	80 9.0	OP	31000	1683	4860	41.601		
	CAROLINA POWER COMPANY	173	242.0	32.6	1683	4860.0	861.42		
SC6SAC0754	CATTLE CREEK	33 8.5	HCNO	43.0	0	0	7031.0	0	E-4
5	DORCHESTER - EDISTO RIVER	80 41.7	SI	79000	16568	47021	149.52		
		1830	2170.0	34.9	16568	47021	5926.4		
SC6SAC0094	WALTERBORO	33 4.5		35.0	0	0	10306	0	E-4
5	DORCHESTER - EDISTO	80 33.7	IS	246980	13914	40520	254.34		
		1970	2340.0	29.7	13914	40520	10490		
SCGSAS0097	STEVENS CREEK RESERVOIR	33 37.4	HRO	30.0	18880	90000	1934.7	1990	
2	EDGEFIELD - SAVANNAH RIVE	82 3.0	OP	17700	23804	32835	58.923		
	S C ELECTRIC + GAS CO	7173	9900.0	28.0	42684	122835	960.78		
SC6SAC0760	BLAIRS A	34 23.8	H	65.0	0	0	8806.2	2000	E-13
2	FAIRFIELD - BROAD RIVER	81 23.7	SI	171560	63104	161743	54.445		
		4480	5745.0	49.9	63104	161743	1894.1		
SCLSAC0762	FAIRFIELD $MONTICELLO RESERV	34 17.9	HR	180.0	518400	1276000	0	0	
5	FAIRFIELD - FREES CREEK	81 19.9	OP	431050	0	0	0		
	S CAR ELECT AND GAS	4750	5600.0	180.0	518400	1276000	0		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
SC6SAC0749 2	LYLES FORD FAIRFIELD - BROAD RIVER	34 27.1 81 25.3 4140	HC IS 5310.0	50.0 81250 32.5	0 25004 25004	0 90900 90900	5959.5 65.560 3256.6	2000	E-13,4
SC6SAC0747 5	MARS BLUFF FLORENCE - PEE DEE RIVER	34 13.3 79 32.6 8829	HC IS 9656.0	53.0 1940000 40.2	0 60951 60951	0 215707 215707	46660 216.31 10978	0	E-4
SCMSAC0743 2	FORK SHOALS DAM GREENVILLE - REEDY RIVER VIRGINIA MFG. CO.	34 36.7 82 17.8 133	O OP 210.0	25.0 638 44.7	0 2025 2025	0 5278 5278.8	196. 8 37.144 643.72	1990	
SCJSAC0099 2	HOLIDAYS BRIDGE GREENVILLE - SALUDA RIVER DUKE POWER COMPANY	34 31.5 82 22.5 531	HS OP 880.0	48.2 7384 38.2	3500 4838 8338	12700 2956 15656	323.35 109.37 527. 4	1990	
SC6SAC0751 5	NORTH SALUDA SITE 1 GREENVILLE - NORTH SALUDA	35 4.9 82 27.5 44	CO SI 97.5	95.0 34960 42.0	0 800 800	0 2511 2511.7	1191.6 474.40 20248	0	
SCJSAC0102 5	PIEDMONT GREENVILLE - SALUDA J P STEVENS CO INC	34 42.0 82 27.6 375	HR OP 740.0	26.0 600 23.9	1000 2665 3665	6700 3301 10001	301.77 91.406 953. 4	0	
SCISAC0100 2	SALUDA GREENVILLE - SALUDA RIVER DUKE POWER COMPANY	34 51.1 82 29.1 315	HSR OP 685.0	50.7 7519 37.0	2400 5195 7595	7800 2572 10372	342.35 133. 9 529.52	1990	
SCCSAC0098 5	SCNONAME23003 (NORTH SALUDA GREENVILLE - NORTH SALUDA GREENVILLE WATER SYSTEM	35 8.4 82 24.4 26	S OP 57.7	175.0 76000 156.9	0 903 903	0 2171 2171.9	125.38 57.729 748.46	0	
SC6SAC0095 2	THE FORKS GREENVILLE - SALUADA RIVER	34 55.4 82 31.1 300	HC IS 655.0	111.0 348480 93.4	0 18294 18294	0 37010 37010	6474.5 174.93 4889.7	2000	

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
SC1SAC0103	BUZZARDS ROOST-LAKE GREENWOO	34 10.4	HSR	82.0	15000	47000	680. 0	1990	
2	GREENWOOD - SALUDA RI VER	81 54.3	OP	270000	14292	1927	352.86		
	GREENWOOD COUNTY	1150	1650.0	50.3	29292	48927	449. 2		
SC1SAC0106	LAKE WATEREE	34 19.9	HSR	106.5	56000	221200	2446.1	1990	
2	KERSHAW - WATEREE RIVER	80 41.9	OP	338000	26349	16234	150.67		
	DUKE POWER CO.	4750	5825.0	71.1	82349	237434	1118.8		
SC6SAC0729	COURTNEY ISLAND	34 43.2	H	52.0	0	0	7025.8	2000	C-1
2	LANCASTER - CATAWBA RIVER	80 52.1	IS	86000	50589	164301	42.762		
		3620	5148.0	51.8	50589	164301	1876.5		
SC1SAC0107	FISHING CREEK	34 35.9	HR	73.4	36720	138800	3011.7	1990	
2	LANCASTER - CATAWBA RIVER	80 53.2	OP	60000	27653	25910	116.23		
	DUKE POWER CO.	3810	4860.0	61.3	64373	164710	1332.1		
SCGSAC0112	BOYDS MILL	34 27.2	H	50.0	960	5200	257. 6	1990	
2	LAURENS - REEDY RIVER	82 11.7	OP	3000	3538	3334	77. 93		
	DUKE POWER CO.	224	315.0	47.4	4498	8534.4	527.59		
SCJSAC0113	WARE SHOALS	34 24.0	HR	23.0	5000	19000	641.99	1990	
2	LAURENS - SALUDA RIVER	82 14.6	OP	100	9720	5365	119.65		
	RIEGEL TEXTILE CORP	564	1000.0	51.0	14720	24365	660. 5		
SC4SAC0766	LOWER SALUDA	34 0.6	H	49.5	0	0	3423.3	2000	C-2
2	LEXINGTON - SALUDA RIVER	81 4.8	SP	1140	20000	48000	71.320		
	S C ELECTRIC AND GAS CO.	2520	2900.0	31.1	20000	48000	2262.4		
SC1SAC0116	SALUDA-LAKE MURRAY	34 2.9	HR	204.0	197500	225000	0	0	
5	LEXINGTON - SALUDA RIVER	81 13.0	OP	2096000	0	0	0		
	S CAR ELECTRIC AND GAS	2400	2700.0	185.3	197500	225000	0		
SC6SAC0118	BLAIR	34 25.4	HR	100.0	0	0	23167	2000	E-13,4
2	NEWBERRY - BROAD RIVER	81 24.4	IS	945000	108907	235166	98.517		I-3
		4475	5520.0	74.3	108907	235166	2952.9		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

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SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
SCISAC0119	PARR SHOALS.	34 15.5	HRC .	50.0	14880	88000	980.42	1990	
2	NEWBERRY - BROAD RIVER	81 20.0	OP	51200	18898	23799	41.195		
	S CAR ELEC AND GAS	4750	6090.0	35.8	33778	111799	532.72		
SC7SAS0100	CAMP CREEK	34 45.5	HR	126.0	0	0	3004.8	0	E-1 1/
6	OCONEE - CHATTOOGA RIV	83 19.3	IS	5500	35482	91759	32.747		
		258	760.0	177.0	35482	91759	1081.9		
SCLSAS0105	LAKE JOCASSE	34 57.6	H	365.0	612000	374000	0	0	
5	OCONEE - KEOWEE RIVER	82 55.2	OP	1315670	0	0	0		
	DUKE POWER	148	300.0	307.0	612000	374000	0		
SC7SAS0101	LOWER WHITEWATER	35 0.9	HR	190.0	0	0	2231.2	2000	
2	OCONEE - WHITEWATER RI	82 59.6	IS	12000	16698	30778	72.492		
		17	70.0	890.0	16698	30778	1719.6		
SC7SAS0098	ROGUES FORD	34 48.9	HR	133.0	0	0	3511.4	0	E-1 1/
6	OCONEE - CHATTOOGA RIV	83 18.0	IS	12800	36441	94257	37.254		
		193	620.0	243.0	36441	94257	1258.5		
SC6SAS0099	WAR WOMAN	34 52.6	HR	195.0	0	0	4450.9	0	E-1 1/
6	OCONEE - CHATTOOGA RIV	83 13.9	IS	161500	20769	58730	75.785		
		163	550.0	179.0	20769	58730	2910.2		
SC6SAC0755	TRACKSTON	33 30.7	CRSO	60.0	0	0	4938.7	0	
5	ORANGEBURG - NORTH FORK ED	80 55.6	SI	286000	4536	11963	412.81		
		590	671.0	27.9	4536	11963	15333		
SCISAS0109	LAKE KEOWEE	34 47.9	HRO	160.0	157500	84000	0	0	
5	PICKENS - KEOWEE RIVER	82 53.2	OP	960000	0	0	0		
	DUKE POWER COMPANY	451	650.0	138.0	157500	84000	0		
SCMSAS0300	NO. 1 DAN RIVER INC.	34 45.9	H	49.0	0	0	374.90	2000	
2	PICKENS - TWELVE MILE C	82 47.5	OP	0	6879	14852	25.242		
	DAN RIVER INC.	150	230.0	49.0	6879	14852	435.14		

1/ P.L. 95-625, Nov. 10,1978

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
SCMSAS0301	NO. 2 DAN RIVER INC.	34 46.5	H	43.0	0	0	356.62	2000	
2	PICKENS - TWELVE MILE C	82 46.8	OP	0	5501	10856	32.848		
	DAN RIVER INC.	130	150.0	37.0	5501	10856	527.41		
SCJSAC0124	COLUMBIA	34 1.9	H	14.0	10600	50500	0	0	
5	RICHLAND - BROAD	81 4.2	OP	1100	0	0	0		
	S C ELECT AND GAS CO	5230	6695.0	32.0	10600	50500	0		
SC6SAC0750	COLUMBIA	34 1.8	HC	100.0	0	0	16958	0	I-4
6	RICHLAND - BROAD RIVER	81 4.1	IS	478340	145154	322799	52.534		
		5240	6695.0	83.4	145154	322799	1576.6		
SC6SAC0120	FROST SHOALS	34 1.7	H	95.0	0	0	16908	2000	
2	RICHLAND - BROAD RIVER	81 4.0	IS	333750	177349	268159	63. 53		
		5130	6565.0	70.3	177349	268159	1267.1		
SC4SAC0763	LOCK/DAM =1	33 44.5	N	29.0	0	0	5272.2	2000	E-4
2	RICHLAND - CONGAREE RIVE	80 37.7	IS	21000	21460	90107	58.511		
		8500	10140.0	15.9	21460	90107	3290.2		
SC4SAC0764	LOCK/DAM =2	33 45.8	N	26.0	0	0	4275.7	2000	E-4
2	RICHLAND - CONGAREE RIVE	80 46.5	IS	17000	9336	62692	68.201		
		8440	10070.0	13.9	9336	62692	6253.0		
SC4SAC0765	LOCK/DAM =3	33 49.9	N	33.0	0	0	5196.1	2000	E-4
2	RICHLAND - CONGAREE RIVE	80 54.9	IS	30000	19527	81988	63.377		
		8250	9840.0	14.9	19527	81988	3574.5		
SC6SAC0728	REREGULATOR	33 57.4	HN	42.0	0	0	6362.2	2000	C-2
2	RICHLAND - CONGAREE	81 2.4	IS	24000	56522	179009	35.541		
		7710	9329.0	34.7	56522	179009	1481.2		
SCPSAC0130	BERRY SHOALS DAM	34 53.2	O	46.0	0	0	242.97	1990	
2	SPARTANBURG - SOUTH TYGER R	82 6.2	OP	744	2104	6365	38.169		
	STARTEX MILLS	100	140.0	73.9	2104	6365.5	895.47		

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
SC6SAC0125 2	BURNT FACTORY SPARTANBURG - TYGER RIVER	34 41.6 81 49.8 420	HC IS 588.0	95.0 79000 83.9	0 9484 9484	0 26835 26835	3136.2 116.87 4450.3	2000	E-4
SCMSAC0134 5	CLIFTON NO 1 SPARTANBURG - PACOLET RIVER DAN RIVER MILLS INC	34 58.8 81 49.3 319	HR OP 486.5	24.0 100 20.9	0 1857 1857	0 5854 5854.7	257.19 43.928 1137.6	0	
SCMSAC0135 5	CLIFTON NO 2 SPARTANBURG - PACOLET RIVER DAN RIVER MILLS INC	34 58.8 81 48.9 320	HR OP 488.0	18.0 100 16.9	0 1400 1400	0 5000 5000.0	242.61 48.522 1446.9	0	
SCMSAC0136 2	CLIFTON NO 3 SPARTANBURG - PACOLET DAN RIVER MILS INC	34 59.7 81 50.1 318	HR OP 485.0	34.5 400 26.5	0 2638 2638	0 7454 7454.9	286.32 38.406 889.95	1990	
SC6SAC0742 5	FINGERVILLE RESERVOIR SPARTANBURG - NORTH PACOLET	35 0.8 82 0.0 104	SO SI 190.0	94.5 134900 70.6	0 2332 2332	0 7119 7119.0	2451.4 344.34 14523	0	
SC6SAC0126 5	NESBIT SPARTANBURG - TYGER RIVER	34 45.1 81 55.5 365	HC IS 511.0	103.0 103000 92.2	0 9056 9056	0 25364 25364	4725.1 186.29 7222.1	0	E-4
SCGSAC0133 2	PACOLET SPARTANBURG - PACOLET RIVER PACOLET INDUSTRIES INC	34 55.2 81 44.2 460	HR OP 620.0	23.0 95 26.0	800 2793 3593	2700 4368 7068.9	299. 6 68.451 891.57	2000	
SCCSAC0761 2	PACOLET RIVER DAM SPARTANBURG - PACOLET RIVER SPARTANBURG WATER WORKS	35 3.3 81 51.9 276	S UC 453.0	72.0 36480 59.9	0 6619 6619	0 15963 15963	337.31 21.130 384.16	1990	
SCMSAC0138 2	PRINT CRASH SPARTANBURG - MIDDLE TYGER STARTEX MILLS	34 55.8 82 6.2 72	H OP 108.5	54.0 864 53.9	0 1101 1101	0 3178 3178.5	135.79 42.722 677.33	1990	

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
SCISAC0137	R B SIMMS IS PACOLET RIVER R	35 6.5	SH	58.0	1000	4400	0	0	
5	SPARTANBURG - SOUTH PACOLET	81 58.1	OP	4462	0	0	0		
	SPARTANBURG WATER WORKS	93	150.0	56.1	1000	4400.0	0		
SCCSAC0132	SCNONAME42006 (W.C. BOWEN LA	35 6.5	SRO	55.0	0	0	165.50	1990	
2	SPARTANBURG - SOUTH PACOLET	82 1.0	OP	32000	1549	4030	41. 60		
	SPARTANBURG WATER WORKS	90	145.0	48.9	1549	4030.6	652.99		
SC6SAC0127	TROUGH	34 55.2	H	45.0	0	0	2009.2	2000	
2	SPARTANBURG - PACOLET RIVER	81 45.0	IS	16500	6896	18362	109.41		
		460	701.5	44.9	6896	18362	3873.8		
SCISAC0128	VAN PATTON	34 45.1		48.0	0	0	903.91	0	E-4
5	SPARTANBURG - ENOREE RIVER	82 6.4		570	3465	7818	115.59		
	DUKE POWER COMPANY	170	231.0	56.9	3465	7818.9	3262.6		
SC6SAC0731	BUCKINGHAM LANDING	33 39.1	HN	80.0	0	0	82958	0	E-17
6	SUMTER - SANTEE RIVER	80 33.0	IS	1160000	237426	582498	142.41		
		14500	14703.0	54.4	237426	582498	4966.8		
SC6SAC0758	ENOREE RIVER	34 31.0	H	100.0	0	0	5173.1	0	E-4
5	UNION - ENOREE RIVER	81 36.9	SI	247200	12033	29973	172.58		
		440	643.0	82.9	12033	29973	5935.2		
SCJSAC0140	LOCKHART	34 47.9	H	25.0	12300	70000	0	0	
5	UNION - BROAD RIVER	81 27.6	OP	2400	0	0	0		
	LOCKHART POWER COMPANY	2600	3640.0	52.0	12300	70000	0		
SCISAC0139	NEAL SHOALS	34 39.8	HR	32.7	5200	30000	718.44	2000	
2	UNION - BROAD	81 26.8	OP	6000	8321	10714	67. 53		
	S C ELECTRIC AND GAS CO	2730	3975.0	20.8	13521	40714	869. 4		
SC6SAC0759	TYGER RIVER	34 32.9	H	110.0	0	0	8055.0	2000	E-13
2	UNION - TYGER RIVER	81 33.9	SI	519360	21227	61024	131.99		E-4
		750	1235.0	91.9	21227	61024	5278.3		

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
SC6SAC0748	WHITMIRE	34 33.0	HC	107.0	0	0	10531	2000	E-13,4
2	UNION - ENOREE AND TY	81 33.9	IS	748850	20420	80519	130.79		
		1110	1200.0	84.8	20420	80519	7250.8		
SC6SAC0141	GREATER LOCKHART	34 48.3	HCR	130.0	0	0	26720	2000	I-3
2	YORK - BROAD RIVER	81 28.1	IS	2250000	149568	232911	114.72		
		2600	3640.0	110.8	149568	232911	2505.3		
SC1SAC0143	LAKE WYLIE	35 1.3	HR	89.8	60000	136700	0	0	
5	YORK - CATAWBA	81 0.4	OP	281900	0	0	0		
	DUKE POWER CO.	3020	4100.0	67.3	60000	136700	0		
SC6SAC0730	SUGAR CREEK	34 56.6	H	36.5	0	0	4959.5	2000	
2	YORK - CATAWBA RIVER	80 52.1	IS	17000	26392	88722	55.899		
		3340	4863.0	31.5	26392	88722	2526.5		
TN4ORN0093	COUNTY LINE	35 34.7	H	65.0	0	0	4821.8	0	E-4,8
5	BEDFORD - DUCK RIVER	86 39.0	IS	0	19490	33046	145.90		
		717	1150.0	52.9	19490	33046	3393.0		
TN1ORN0097	CALDERWOOD LAKE	35 29.4	HR	232.0	121500	756300	0	0	E-4
5	BLOUNT - LITTLE TENNES	83 58.8	OP	55000	0	0	0		
	TAPOCO INC.	1856	4309.7	230.0	121500	756300	0		
TN1ORN0096	CHILHOWEE LAKE	35 32.7	HR	75.0	50000	256800	0	0	E-4
5	BLOUNT - LITTLE TENNES	84 3.0	OP	40000	0	0	0		
	TAPOCO INC	1977	4590.7	50.0	50000	256800	0		
TN6ORN0095	MOUNT NEBO	35 44.0	H	155.0	0	0	1775.8	0	
5	BLOUNT - LITTLE RIVER	83 49.0	IS	190000	5310	17496	101.49		
		188	380.0	113.8	5310	17496	4398.4		
TN6ORN0094	NALE CREEK	35 48.1	H	70.0	0	0	1168.8	0	
5	BLOUNT - LITTLE RIVER	83 53.5	IS	71000	5067	12147	96.224		
		268	510.0	50.9	5067	12147	2928.5		

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. OWNER	NAME OF STREAM	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
TNAORN0098	NORRIS LAKE		36 13.4	CHNR	265.0	100800	655300	0	0	
5	CAMPBELL	CLINCH RIVER	84 5.5	OP	2552000	0	0	0		
	TVA		2912	4336.1	136.0	100800	655300	0		
TN70RN0103	ELK MILLS		36 15.3	H	140.0	0	0	1304.6	0	
5	CARTER	ELK RIVER	81 59.3	IS	9500	5392	15782	82.666		
			69	100.0	237.7	5392	15782	3070.9		
TN70RN0102	HAMPTON		36 17.7	H	330.0	0	0	3749.0	0	
5	CARTER	DOE RIVER	82 10.5	IS	205000	20417	56738	66. 75		
			126	225.0	464.5	20417	56738	2471.8		
TN70RN0101	PINE CAMP		36 13.4	H	155.0	0	0	1731.5	2000	
2	CARTER	ELK RIVER	81 58.1	IS	23000	11822	32408	53.429		
			49	90.0	547.4	11822	32408	1844.9		
TNIORN0104	WATAUGA LAKE		36 19.3	CHNR	318.0	50000	194000	0	0	
5	CARTER	WATAUGA RIVER	82 7.2	OP	677000	0	0	0		
	TVA		468	733.3	271.0	50000	194000	0		
TNIORN0105	WILBUR LAKE		36 20.5	HR	77.0	10700	33300	0	0	
5	CARTER	WATAUGA RIVER	82 7.5	OP	715	0	0	0		
	TVA		471	738.0	64.0	10700	33300	0		
TNGORN0107	CHEATHAM		36 18.9	HNR	70.0	36000	166000	0	0	
5	CHEATHAM	CUMBERLAND	87 13.1	OP	104000	0	0	0		
	DAEN ORN		14159	22267.6	19.9	36000	166000	0		
TN60RN0106	THREE ISLANDS DAM		36 15.1	HCR	142.0	0	0	3724.5	0	E-4
5	CHEATHAM	HARPETH RIVER	87 11.3	PA	715000	18226	46516	80. 71		
	DAEN-ORN		854	1190.0	86.9	18226	46516	2713.8		
TN40RN0109	CUMBERLAND GAP		36 32.5	H	195.0	0	0	7970.5	2000	E-4
2	CLAIBORNE	POWELL RIVER	83 38.2	IS	0	71389	117129	68. 49		E-10
			685	1130.0	171.8	71389	117129	1517.5		

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE OR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
TN6ORN0108 2	WAR RIDGE CLAIBORNE - CLINCH RIVER	36 24.6 83 26.4 1480	H IS 2058.0	185.0 620000 169.8	0 113289 113289	0 209420 209420	10837 51.751 1302.2	2000	E-4 E-10
TN1ORN0110 5	DALE HOLLOW CLAY - OBEY DAEN ORN	36 32.3 85 27.1 936	HCR OP 1921.8	178.0 1706000 147.6	54000 0 54000	195300 0 195300	0 0 0	0	
TNCURN0200 2	NORMANDY DAM COFFEE - DUCK RIVER TVA	35 27.1 86 14.1 195	C OP 320.0	115.0 134000 69.9	0 4256 4256	0 11908 11908	425.63 35.741 920.59	1990	E-8
TN5ORN0115 5	HARTFORD COOKE - PIGEON RIVER	35 48.3 83 8.3 546	H IS 990.0	135.0 0 371.6	0 61001 61001	0 219109 219109	5138.0 23.449 1118.7	0	
TN6ORN0114 2	LONG CREEK COOKE - FRENCH BROAD	35 56.6 83 3.8 1842	H IS 3400.0	160.0 350000 117.8	0 86113 86113	0 217496 217496	5369.5 24.688 800.83	2000	E-4 R-4,5
TN4ORN0113 6	OLD TOWN COOKE - FRENCH BROAD	35 58.8 83 8.1 1856	H IS 2822.0	80.0 0 71.9	0 42727 42727	0 129992 129992	5419.6 41.692 1644.0	0	E-5,4 R-4,5
TN6ORN0116 5	DADDYS CREEK CUMBERLAND - DADDYS CREEK	36 2.3 84 48.5 168	H IS 320.0	295.0 233000 259.7	0 22768 22768	0 38073 38073	3175.0 83.392 1839.3	0	E-4
TN1OPN0121 5	J PERCY PRIEST DAVIDSON - STONES DAEN ORN	36 9.4 86 37.1 892	CRH OP 1320.5	130.0 652000 99.9	28000 0 28000	85200 0 85200	0 0 0	0	
TNGORN0120 5	OLD HICKORY DAVIDSON - CUMBERLAND DAEN ORN	36 17.7 86 39.3 11673	HNCR OP 18357.9	98.0 545000 60.0	100000 0 100000	621100 0 621100	0 0 0	0	

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
TNIORN0122 5	CENTER HILL DEKALB - CANEY FORK DAEN ORN	36 5.7 85 49.6 2174	CHR OP 4463.7	226.0 2092000 170.3	135000 324420 459420	512000 77348 589348	7376.9 95.372 263.51	0	
TNIURN0124 5	TIMS FORD LAKE FRANKLIN - ELK RIVER TVA	35 11.8 86 16.6 529	CHSRO OP 929.2	175.0 608000 123.0	45000 0 45000	98900 0 98900	0 0 0	0	
TNCORN0125 2	WOODS RESERVOIR FRANKLIN - ELK RIVER DOD USAF	35 17.9 86 5.8 263	SCR OP 490.9	90.0 88110 62.9	0 5167 5167	0 14455 14455	532.56 36.842 1000.2	1990	
TN6ORN0129 2	BEAVER CREEK GRAINGER - HOLSTON RIVER 	36 5.9 83 37.8 3550	H IS 4920.0	55.0 68000 49.9	0 50854 50854	0 161315 161315	5909.9 36.636 1545.9	2000	
TN6ORN0131 6	BUCKINGHAM FERRY GREENE - NOLICHUCKY RI 	36 8.6 82 45.0 1096	H IS 1710.0	110.0 77000 102.8	0 43313 43313	0 114701 114701	3950.9 34.445 1180.6	0	R-4 E-1[1] E-10
TN7ORN0130 6	LOWER NOLICHUCKY GREENE - NOLICHUCKY RI 	36 10.2 83 10.1 1630	H IS 2150.0	120.0 1361100 114.8	0 74265 74265	0 187570 187570	6103.0 32.537 1081.7	0	R-4 E-1[1]
TNIURN0134 5	CHICKAMAUGA LAKE HAMILTON - TENNESSEE RIV TVA	35 6.1 85 13.7 20790	NCHR OP 36504.1	129.0 739000 49.0	108000 0 108000	867300 0 867300	0 0 0	0	
TNFORN0202 5	RACCOON MT. PUMP STORAGE HAMILTON - TENNESSEE RIV T.V.A.	35 03.5 85 24.4 	H OP 0		1530000 0 1530000			0	
TNIORN0136 5	PICKWICK LAKE HARDIN - TENNESSEE RIV TVA	35 4.3 88 15.0 38820	NCHR OP 65025.3	113.0 1105000 55.0	220000 0 220000	1363200 0 1363200	0 0 0	0	

1/ P.L. 93-621, Jan. 3, 1975

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOP. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
TN6ORN0137 6	SURGOINSVILLE HAWKINS - HOLSTON RIVER	36 28.2 82 50.8 2870	H IS 3560.0	75.0 226500 70.9	0 53271 53271	0 167402 167402	9375.4 56. 5 2371.7	0	I-11
TN6ORN0140 5	TOTTY HICKMAN - DUCK RIVER	35 47.3 87 23.2 1820	H IS 2820.0	105.0 720000 95.9	0 51614 51614	0 129123 129123	14392 111.46 3876.8	0	E-4,8
TNIORN0141 5	CHEROKEE LAKE JEFFERSON - HOLSTON RIVER TVA	36 10.0 83 29.9 3429	CHNR OP 5070.2	175.0 1541000 96.0	120000 0 120000	535000 0 535000	0 0 0	0	
TN4ORN0142 5	HOPPER CREEK JOHNSON - ROAN CREEK	36 23.6 81 54.4 106	H IS 170.0	165.0 0 149.8	0 5220 5220	0 15280 15280	1572.6 102.91 3916.8	0	
TN6ORN0143 2	RIVERDALE KNOX - FRENCH BROAD	35 57.4 83 45.7 5100	H IS 7562.0	55.0 172000 49.9	0 71422 71422	0 227379 227379	5875.2 25.838 1064.0	2000	
TN5LMM0020 2	BESSIE CUT-OFF LAKE - MISSISSIPPI R	36 25.0 89 30.0 923225	H IS 78956.5	10.0 0 9.9	0 58304 58304	0 504086 504086	16715 33.160 3904.3	2000	
TN4ORN0148 5	KELSO LINCOLN - ELK RIVER	35 7.8 86 26.5 697	H IS 1190.0	75.0 0 56.9	0 17477 17477	0 38576 38576	4856.3 125.88 3824.5	0	
TNIORN0150 5	FORT LOUDON LAKE LOUDON - TENNESSEE RIV TVA	35 47.5 84 14.6 9550	NCHR OP 14071.7	122.0 393000 72.0	135600 0 135600	803900 0 803900	0 0 0	0	
TNIORN0149 5	MELTON HILL LAKE LOUDON - CLINCH RIVER TVA	35 53.0 84 18.0 3343	NHR OP 7762.6	103.0 126000 55.0	72000 0 72000	264500 0 264500	0 0 0	0	

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
TNIORN0151 5	NICKAJACK LAKE MARION - TENNESSEE RIV TVA	35 0.1 85 37.1 21870	NCHO OP 38400.5	81.0 252400 39.0	97200 0 97200	668400 0 668400	0 0 0	0	
TNCORN0201 2	COLUMBIA DAM MAURY - DUCK RIVER TVA	35 36.0 87 0.0 1181	C UC 1870.0	100.0 36100 59.9	0 21780 21780	0 52742 52742	905.47 17.167 412.76	2000	E-8,4
TN6ORN0153 6	CHARLESTON MCMINN - HIWASSEE RIVE	35 15.3 84 43.9 2189	H IS 4650.0	65.0 238000 49.9	0 43081 43081	0 140260 140260	4285.7 30.555 1294.8	0	E-5,8
TNIORN0154 5	WATTS BAR LAKE MEIGS - TENNESSEE RIV TVA	35 37.1 84 46.9 17310	NCHR OP 30393.8	112.0 1175000 58.0	153300 0 153300	1061800 0 1061800	0 0 0	0	
TN4ORN0155 5	ROSSVIEW DAM MONTGOMERY - RED RIVER	36 33.1 87 12.3 955	C PA 1420.0	152.0 372000 98.9	0 23055 23055	0 60724 60724	3472.6 57.186 1964.0	0	E-4
TN6ORN0156 6	NEMO MORGAN - OBED RIVER	36 5.7 84 41.0 517	H IS 950.0	340.0 410600 334.6	0 240720 240720	0 191911 191911	8320.2 43.354 439.38	0	E-1 1/ E-8
TN6ORN0157 5,6	SINKING CREEK PERRY - BUFFALO RIVER	35 31.1 87 50.5 449	H IS 710.0	160.0 700000 133.8	0 24652 24652	0 52262 52262	3529.5 67.534 1890.3	0	E-2 1/
TN6ORN0159 5	AUSTRAL POLK - HIWASSEE RIVE	35 13.4 84 31.6 1223	H IS 2620.0	145.0 158000 102.8	0 61113 61113	0 155973 155973	4710.9 30.203 995.39	0	E-5,8 E-13
TNIORN0161 5	OCOEE NUMBER 3 LAKE POLK - OCOEE RIVER TVA	35 2.3 84 28.0 492	HR OP 1164.8	110.0 4040 288.0	27000 0 27000	238500 0 238500	0 0 0	0	

1/ P.L. 90-542 Nov. 2, 1968

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID / NUMBER / ACTV. INV.	PROJECT NAME / PRIMARY CO. -NAME OF STREAM / OWNER	LATITUDE (D M.M) / LONGITUDE (D M.M) / DR.AREA (SQ.MI)	PROJ.PURP. / STATUS / AVE. Q (CFS)	DAM HT (FT) / MX.STOR. (AC FT) / PWR. HD. (FT)	EXIST.CAP. (KW) / INC. CAP. (KW) / TOT.CAP. (KW)	EXIST.ENRG (MWH) / INC.ENERGY (MWH) / TOT.ENERGY (MWH)	ANUL. COST (1000 $) / ENERGY COST ($/MWH) / INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
TNIORN0162	OCOEE NUMBER 2 LAKE	35 4.9	H	30.0	21000	45500	0	0	
5	POLK - OCOEE RIVER	84 29.5	OP	50	0	0	0		
	TVA	512	1212.2	282.0	21000	45500	0		
TNIORN0160	PARKSVILLE LAKE	35 5.7	HR	135.0	18000	65000	0	0	
5	POLK - OCEE RIVER	84 38.9	OP	86500	0	0	0		
	TVA	595	1339.0	102.0	18000	65000	0		
TN6ORN0158	TODD MOUNTAIN	35 7.5	H	130.0	0	0	4479.1	0	
5	POLK - OCOEE RIVER	84 40.3	IS	271000	44427	103430	43.306		
		615	1260.0	119.8	44427	103430	1325.1		
TN4ORN0164	DEVILS JUMPS DAM	36 38.8	HR	476.0	0	0	17652	0	R-1
6	SCOTT - BIG SOUTH FOR	84 32.2	SI	4136000	393939	406719	43.402		
		957	1756.0	424.5	393939	406719	596.76		
TN6ORN0165	HELENWOOD DAM	36 26.4	H	299.0	0	0	8332.4	0	R-1
6	SCOTT - BIG SOUTH FOR	84 38.6	IS	587000	293639	213741	38.983		
		684	1410.1	278.7	293639	213741	351.62		
TNIORN0166	DOUGLAS LAKE	35 57.6	CHNR	202.0	115000	522800	0	0	
5	SEVIER - FRENCH BROAD	83 32.3	OP	1475000	0	0	0		
	TVA	4541	6714.4	68.0	115000	522800	0		
TNGORN0167	CORDELL HULL	36 17.3	HNCR	87.0	100000	398200	0	0	
5	SMITH - CUMBERLAND	85 56.7	OP	310900	0	0	0		
	DAEN ORN	8095	13380.5	58.5	100000	398200	0		
TNIORN0169	BOONE LAKE	36 26.4	CHNR	160.0	75000	258800	0	0	
5	SULLIVAN - SOUTH FORK HO	82 26.3	OP	193400	0	0	0		
	TVA	1840	2471.8	67.4	75000	258800	0		
TNIORN0171	FORT PATRICK HENRY LAKE	36 29.9	HR	95.0	36000	156400	0	0	
5	SULLIVAN - SOUTH FORK HO	82 30.4	OP	26900	0	0	0		
	TVA	1903	2556.4	66.0	36000	156400	0		

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
TN60RN0168	MORRILL SPRING	36 28.0	H	100.0	0	0	2402.2	0	
5	SULLIVAN - SOUTH FORK HO	82 14.2	IS	80000	17056	57639	41.676		
		788	1100.0	93.9	17056	57639	1794.3		
TN10RN0170	SOUTH HOLSTON LAKE	36 31.3	CHNR	285.0	35000	208800	0	0	
5	SULLIVAN - SOUTH FORK HO	82 5.2	OP	764000	0	0	0		
	TVA	703	1001.7	188.0	35000	208800	0		
TN10RN0173	GREAT FALLS LAKE	35 48.3	HR	92.0	31900	175900	0	0	
5	WARREN - CANEY FORK	85 37.8	OP	51300	0	0	0		
	TVA	1677	3256.5	39.0	31900	175900	0		
TN70RN0175	ERWIN	36 11.2	H	200.0	0	0	4972.8	0	R-4
5,6	WASHINGTON - NOLICHUCKY RI	82 31.6	IS	366000	24424	124819	39.840		E-1[1]
		851	1390.0	169.8	24424	124819	2772.0		
TN40RN0174	INDIAN BEND	36 23.4	H	105.0	0	0	3506.1	0	
5	WASHINGTON - WATAUGA RIVER	82 18.9	IS	0	12948	41328	84.834		
		800	1220.0	64.9	12948	41328	3611.4		
TNC0RN0178	WHEATS CURVE LAKE	35 54.6	R	30.0	0	0	218.71	0	E-4
5	WHITE - CALFKILLER RI	85 28.5	OP	96	1479	4014	54.482		
	FD KNOWLES	175	384.8	22.9	1479	4014.4	1150.8		
TN60RN0179	UDPTN90000	35 52.4	C	58.0	0	0	1037.1	0	E-4
5	WILLIAMSON - HARPETH RIVER	86 46.5	IS	63900	1738	3919	264.60		
		142	198.0	44.9	1738	3919.6	7826.5		
VA6NA00003	ADVANCED MILLS	38 10.6	HC	70.0	0	0	2523.1	0	E-20
5	ALBERMARLE - RIVANNA RIVER	78 26.4	IS	78000	1499	3267	772.11		
		109	117.0	57.6	1499	3267.8	23530		
VA4NA00001	HATTON	37 45.3	H	31.0	0	0	3351.9	2000	C-2
2	ALBERMARLE - JAMES RIVER	78 31.1	IS	0	17332	56560	59.263		E-20
		4503	5004.0	20.9	17332	56560	2535.7		R-4,5

1/ P.L. 93-621, Jan. 3, 1975

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
VA6NA00004	RIO MILLS	38 5.9	H	50.0	0	0	1300.2	0	I-6
5	ALBERMARLE - RIVANNA RIVER	78 28.3	IS	7500	1916	5649	230.14		
		263	281.0	39.6	1916	5649.7	9057.6		
VACNA00006	SOUTH RIVANNA DAM	38 5.9	S	70.0	0	0	185.68	1990	
2	ALBERMARLE - SOUTH FORK RI	78 28.0	OP	17800	1407	4428	41.931		
	CITY OF CHARLOTTFSVILLE	263	281.0	31.7	1407	4428.2	924.54		
VA6NA00008	FALLING SPRING	37 52.4		64.0	0	0	1674.5	0	R-4
5	ALLEGHANEY - JACKSON RIVER	79 58.1	IS	4700	7239	15267	109.67		E-20
		410	479.0	56.2	7239	15267	3013.9		
VACNA00016	GATHRIGHT DAM	37 57.2	RC	257.0	0	0	870.51	1990	R-5
2	ALLEGHANEY - JACKSON RIVER	79 57.2	OP	203600	14779	32177	27. 53		E-20
	DAEN-NAO	344	407.0	145.3	14779	32177	596.26		
VA6NA00010	GRIFFITH DAM	37 52.6	CH	198.0	0	0	7101.4	0	E-4,13
5	ALLEGHANEY - COWPASTURE RI	79 44.8	IS	545000	20010	38092	186.42		E-20
		376	425.0	175.6	20010	38092	4947.5		I-5
VA6NA00011	HAYS	37 44.4	H	183.0	0	0	3264.0	0	E-20
5	ALLEGHANEY - POTTS CREEK	80 1.8	IS	143000	5479	13751	237.36		C-2
		163	188.0	152.2	5479	13751	8205.2		
VA4NA00009	KING DAM	37 46.7	H	65.0	0	0	2068.1	2000	E-13
2	ALLEGHANEY - JACKSON RIVER	79 55.6	IS	8700	13620	30710	67.342		C-2
		812	958.0	57.9	13620	30710	1966.5		E-20
VA6NA00012	STACKMINE	37 45.3	H	135.0	0	0	2279.6	0	E-13,20
5	ALLEGHANEY - DUNLAP CREEK	80 5.9	IS	58000	1397	4774	477.46		
		103	103.0	92.5	1397	4774.5	22724		
VA6NA00017	GENITO DAM	37 27.4	CH	112.0	0	0	15601	0	E-12
5	AMELIA - APPOMATTOX RI	77 52.1	IS	790000	15649	27907	559. 3		R-4
		716	712.0	85.1	15649	27907	14214		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
VAGNA00025 5	BIG ISLAND AMHERST - JAMES RIVER REDFORD PULP + PAPER CO.	37 32.1 79 21.4 3100	HN OP 3376.0	14.0 1100 11.0	480 5756 6236	1500 15610 17110	694.59 44.495 1244.5	0	
VAGNA00024 2	CUSHAW DAM AMHERST - JAMES RIVER VEPCO	37 35.5 79 22.9 3060	H OP 3333.0	27.0 1800 27.0	7500 14755 22255	28000 14941 42941	946.91 63.372 662.99	1990	
VA6NAB0163 5	STAUNTON AUGUSTA - S FORK SHENAN	38 11.0 78 54.9 325	ROS IS 275.0	97.0 143000 83.1	0 4786 4786	0 12766 12766	4578.7 358.66 13409	0	
VA9NA00200 5	BATH COUNTY UPPER RESERVOIR BATH - LITTLE BACK C VEPCO	38 13.9 79 49.0 2	HCR UC 0	425.0 37300 1170.0	0 2100000 2100000	0 3780000 3780000	0 0 0	0	
VA6NA0002B 5	MCCLUNG BATH - COWPASTURE RI	38 0.0 77 39.9 218	H IS 246.0	125.0 56000 115.6	0 4769 4769	0 13566 13566	2267.1 167.11 6420.0	0	E-13,20
VA6NA00029 5,6	WILLIAMSVILLE NO1 BATH - BULLPASTURE R	38 12.2 79 34.4 108	HC IS 139.0	215.0 39000 178.6	0 3985 3985	0 12414 12414	2899.6 233.56 10046	0	E-5,12 E-20
VA4ORH0060 5	UDP BLAND - KIMBERLING CR	37 10.0 80 54.0 96	CH IS 144.0	280.0 0 259.7	0 5971 5971	0 17366 17366	1286.2 74. 63 2708.2	0	
VA4ORH0061 5	UDP BLAND - LITTLE WALKER	37 5.9 80 52.0 46	H IS 69.0	120.0 0 174.8	0 2386 2386	0 7978 7978.3	1287.8 161.41 7133.9	0	
VA6NA00034 2	EAGLE ROCK DAM BOTETOURT - JAMES RIVER	37 38.4 79 48.2 1830	HC IS 2123.0	164.0 625000 135.0	0 86265 86265	0 157906 157906	10348 65.5?7 1641.1	2000	E-13 E-20 R-5

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
VA6NA00038 5	HIPES BOTETOURT - CRAIG CREEK	37 38.4 79 55.1 327	CR IS 379.0	172.0 304700 142.0	0 14323 14323	0 27212 27212	6267.6 230.32 6091.4	0	E-7,8 E-13,20 C-1
VA7NA00037 5	LYLE BOTETOURT - JAMES RIVER	37 35.1 79 44.2 1980	H IS 2351.0	73.0 6000 30.0	0 6696 6696	0 29147 29147	2313.7 79.379 4632.5	0	E-7,20
VA6NA00035 5	STONE HOUSE BOTETOURT - CATAWBA CREEK	37 35.7 79 47.8 114	HC IS 131.0	130.0 203000 110.9	0 2433 2433	0 5971 5971.0	3738.2 626. 6 21611	0	
VA6ORH0062 5	DISMAL CREEK RESERVOIR BUCHANAN - DISMAL CREEK	37 27.0 81 56.0 74	HC IS 111.0	220.0 33500 89.9	0 862 862	0 2774 2774.2	1799.3 648.59 28971	0	
VA6NA00041 5	ARVONIA BUCKINGHAM - SLATE RIVER	37 42.2 78 23.3 231	H IS 229.0	85.0 62000 71.8	0 2207 2207	0 7205 7205.3	2755.0 382.35 17365	0	E-20 I-7
VA7NA00998 5	SEVEN ISLANDS NO 3 BUCKINGHAM - SLATE RIVER	37 42.8 78 21.4 228	 IS 228.0	90.0 0 89.9	0 2727 2727	0 9235 9235.2	1501.6 162.59 7335.1	0	E-7,12 E-20 I-7
VA6NA00040 5	SLATE RIVER NO 1 BUCKINGHAM - SLATE RIVER	37 42.8 78 21.6 237	CH IS 229.0	128.0 160000 111.2	0 3896 3896	0 11137 11137	4474.1 401.70 16144	0	E-7, 20 I-7
VA6NA00042 5	SLATE RIVER BUCKINGHAM - SLATE RIVER	37 35.5 78 31.9 158	HC IS 160.0	82.0 120000 60.6	0 1231 1231	0 3829 3829.1	3768.1 984. 7 43328	0	E-7,12 E-20 I-7
VA6SAW0094 2	MELROSE CAMPBELL - ROANOKE RIVER	37 0.0 79 3.2 2389	HCR SI 2389.0	87.0 23300 36.9	0 18980 18980	0 50159 50159	3764.3 75. 47 2662.2	2000	

SERC
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
VA6SAW0095 2	TABER CAMPBELL - ROANOKE RIVER	37 0.0 79 12.2 2249	HCR SI 2160.0	50.0 53000 33.4	0 15403 15403	0 42564 42564	3768.1 88.527 3302.6	2000	
VA6NA00047 5	DILLARDS MILL CAROLINE - NORTH ANNA	37 56.2 77 33.6 427	HC IS 374.0	70.0 235000 56.2	0 5189 5189	0 9578 9578.7	5735.9 598.82 15643	0	E-20
VA6NA00046 5	ROCK FALLS CAROLINE - NORTH ANNA	37 53.8 77 29.6 436	H IS 382.0	74.0 250000 64.0	0 3673 3673	0 11131 11131	1947.9 174.99 7113.2	0	E-20
VA40RH0063 5	UDP CARROLL - BIG REED ISLA	36 54.0 80 41.9 260	HC IS 369.0	280.0 0 244.7	0 17075 17075	0 39234 39234	3167.2 80.725 2469.0	0	
VA40PH0064 5	UDP CARROLL - LITTLE REED I	36 50.9 80 46.9 60	CH IS 90.0	230.0 0 204.7	0 3646 3646	0 12190 12190	2297.2 188.44 8605.9	0	
VACNA00050 2	GEORGE F. BRASFIELD CHESTERFIELD- APPOMATTOX RI APPOMAT RI WATER AUTH	37 13.0 77 31.9 1336	SR OP 1310.0	59.0 79500 40.3	0 14529 14529	0 28697 28697	755.2 26.309 506.47	1990	
VA6NA00057 5	HAZEL RIVER CULPEPER - HAZEL RIVER	38 33.9 77 54.7 311	HC IS 359.0	146.0 310500 111.7	0 8948 8948	0 20261 20261	7114.6 351.13 11188	0	E-7,20 R-2
VA6NA00058 5	RAPIDAN CULPEPER - RAPIDAN RIVER	38 18.5 78 4.0 445	H IS 487.0	53.0 22000 33.7	0 2702 2702	0 8589 8589.9	2082.9 242.49 10539	0	E-7,20 C-1
VA6NA00061 5	CA-IRA CUMBERLAND - WILLIS RIVER	37 29.0 78 19.3 111	HC IS 105.0	76.0 102000 55.4	0 1148 1148	0 2477 2477.1	3571.7 1441.8 44084	0	E-20

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
VA6NA00060 5	UPPER CARTERSVILLE CUMBERLAND - WILLIS RIVER	37 41.6 78 6.7 263	HC IS 248.0	96.0 422500 88.9	0 3761 3761	0 8298 8298.1	8489.3 1023.0 32235	0	E-20 E-22 R-4,I-5
VA6NA00063 5	ELLIS MILL FAUQUIER - RAPPAHANNOCK	38 25.2 77 41.9 791	H SI 518.0	74.0 103000 57.7	0 11923 11923	0 26887 26887	4286.2 159.41 4961.7	0	E-7,12 E-20 C-1,R-2
VA6NA00064 5	FAUQUIER SPRINGS FAUQUIER - RAPPAHANNOCK	38 36.7 77 51.7 238	HC IS 234.0	142.0 213600 120.0	0 5867 5867	0 14119 14119	5559.5 393.73 13327	0	E-7,20 R-6
VA6NA00065 5	KELLYS FORD FAUQUIER - RAPPAHANNOCK	38 29.2 77 46.9 629	H IS 670.0	40.0 2500 30.3	0 4352 4352	0 11191 11191	1507.0 134.65 4541.3	0	E-7,20
VA6NA00071 5	BREMO BLUFF FLUVANNA - JAMES RIVER	37 42.6 78 18.1 5010	H IS 5634.0	26.0 8000 17.7	0 15330 15330	0 50267 50267	3938.9 78.359 3430.1	0	E-7,20 C-1
VA6NA00070 5,6	PALMYRA FLUVANNA - RIVANNA RIVER	37 54.8 78 17.8 641	H IS 686.0	67.0 84100 49.0	0 7807 7807	0 17646 17646	3580.7 202.91 6319.6	0	E-5,20
VA6NA00067 5,6	ROUNDABOUT CREEK FLUVANNA - RIVANNA RIVER	37 47.7 78 11.5 768	CH IS 822.0	128.0 430000 90.4	0 16595 16595	0 37859 37859	8923.3 235.69 7554.2	0	E-5,20 C-1
VA6NA00997 5	SEVEN ISLANDS NO 2 FLUVANNA - HARDWARE RIVE	37 45.1 78 25.0 136	 IS 144.0	125.0 124.8	0 2707 2707	0 9368 9368.5	1480.1 157.98 7282.2	0	E-12 E-20
VA6NA00999 2	SEVEN ISLANDS NO 1 FLUVANNA - JAMES RIVER	37 43.6 78 21.4 5171	 IS 5815.0	35.0 34.9	0 35231 35231	0 107413 107413	4503.8 41.929 1679.9	2000	E-12,20 C-2 R-4,5

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER / ACTV. INV.	PROJECT NAME / PRIMARY CO. -NAME OF STREAM / OWNER	LATITUDE (D M.M) / LONGITUDE (D M.M) / DR.AREA (SQ.MI)	PROJ.PURP. / STATUS	AVE. Q (CFS)	DAM HT (FT) / MX.STOR. (AC FT) / PWR. HD. (FT)	EXIST.CAP. / INC. CAP. / TOT.CAP. (KW)	EXIST.ENRG / INC.ENERGY / TOT.ENERGY (MWH)	ANUL. COST (1000 $) / ENERGY COST ($/MWH) / INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
VA4NA00068	SHORES	37 43.8	HC		24.0	0	0	2775.9		E-7,20
5	FLUVANNA - JAMES RIVER	78 22.4	IS		0	4742	27851	99.669		C-1
		4741		5263.0	13.9	4742	27851	7972.1		
VA60RH0067	PEARISBURG	37 27.0	CRO		254.0	0	0	5563.2	0	
5	GILES - WALKER LAKE	80 45.0	IS		275000	22133	43886	126.76		
		303		321.0	197.8	22133	43886	3457.8		
VA40RH0068	UDP	37 16.9	CH		280.0	0	0	4423.8	0	
5	GILES - WALKER CREEK	80 41.9	IS		0	58402	64144	68.966		
		303		293.0	259.7	58402	64144	990.41		
VA40RH0069	UDP	37 15.0	HC		320.0	0	0	3118.7	0	
5	GILES - WOLF CREEK	80 20.1	IS		0	15139	39941	78. 81		
		190		251.0	294.7	15139	39941	2748.8		
VA6NA00075	PEMBERTON	37 40.2	HC		133.0	0	0	47701	0	E-7,20
5	GOOCHLAND - JAMES RIVER	78 6.0	IS		3250000	276961	429547	111. 5		
		6240		7017.0	108.1	276961	429547	2424.2		
VA6NA00076	ROCK HILL	38 16.7	H		130.0	0	0	4419.8	0	E-7,20
5	GREENE - RAPIDAN RIVER	78 20.4	IS		105250	3406	8261	535. 1		
		113		144.0	109.0	3406	8261.1	18266		
VA0NA00078	EMPORIA DAM	36 41.8	SH		42.5	0	0	404.14	1990	
2	GREENSVILLE - MEHERRIN RIVE	77 33.5	OP		9500	7000	14189	28.482		
	CITY OF EMPORIA	743		661.0	40.7	7000	14189	478.89		
VA6NA00077	PADIUM	36 42.4	CRH		82.0	0	0	8960.9	0	E-7,17
5	GREENSVILLE - MEHERRIN RIVE	77 37.5	IS		260000	5995	17989	498.13		E-20
		738		656.0	62.5	5995	17989	21251		
VA0SAW0098	HALIFAX DAM	36 46.9	S		25.0	0	0	226.68	1990	R-4
2	HALIFAX - BANISTER RIVE	78 55.5	OP		6000	1581	5452	41.577		
	COUNTY OF HALIFAX,VA.	507		460.0	22.9	1581	5452.1	1126.3		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
VA6NA00081 5	BLUNTS BRIDGE HANOVER - SOUTH ANNA	37 48.1 77 30.4 406	H IS 373.0	45.0 6000 36.3	0 3872 3872	0 7499 7499.3	1583.3 211.12 5427.3	0	E-7,17 E-20
VA6NA00080 5	GOODALL HANOVER - SOUTH ANNA	37 48.1 77 34.6 384	CH IS 353.0	100.0 105000 82.7	0 8141 8141	0 15453 15453	4815.6 311.62 8227.2	0	E-7,20
VA6NA00082 5	ROSHER PROJECT HENRICO - JAMES RIVER	37 33.5 77 34.6 6750	H IS 7740.0	76.0 542000 36.2	0 54449 54449	0 131232 131232	16755 127.67 4317.6	0	E-7 C-1 R-4
VA5NA00083 5	RICHMOND HENRICO - JAMES RIVER	37 31.9 77 26.2 834	H IS 834.0	20.0 0 71.9	0 3691 3691	0 30229 30229	1844.3 61. 12 6686.1	0	C-1
VACNAB0152 2	GOOSE CR DAM LOUDOUN - GOOSE CREEK CITY OF FAIRFAX	39 2.9 77 31.5 358	S OP 300.0	27.0 3000 26.8	0 893 893	0 3521 3521.0	159.24 45.227 1242.9	2000	
VA6NA00087 5	HANKLEY-HIGH DAM LUNENBERG - MEHERRIN	36 51.5 78 21.8 324	HC IS 280.0	98.0 42000 81.0	0 3457 3457	0 9839 9839.7	2403.8 244.29 9517.5	0	E-20
VA6NA00091 5	LOCUST DALE MADISON - ROBERTSON RIV	38 22.4 78 8.5 142	H IS 169.0	101.0 8500 67.1	0 1641 1641	0 5900 5900.9	1377.7 233.47 11272	0	E-7,20
VAISAW0100 5	JOHN H KERR MECKLENBURG - ROANOKE RIVER DAEN-SAW	36 35.9 78 18.1 7800	HCSR OP 7749.0	138.0 3293600 99.8	204000 0 204000	420000 0 420000	0 0 0	0	
VA6ORH0070 5	UDP MONTGOMERY - LITTLE RIVER	37 0.5 80 24.0 198	CH IS 238.0	155.0 127.8	0 6240 6240	0 17839 17839	1839.9 103.13 3859.2	0	

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
VA6NA00132	ROCKFISH	37 48.3	HC	130.0	0	0	3534.0	0	E-20
5	NELSON - ROCKFISH RIVE	78 45.7	IS	112000	5082	12350	286.15		
		144	213.0	114.0	5082	12350	9631.3		
VA6NA00096	GERMANNA BRIDGE	38 22.6	H	85.0	0	0	4016.7	0	E-4,20
5	ORANGE - RAPIDAN RIVER	77 47.2	SI	87000	7467	24369	164.83		C-1
		633	675.0	71.5	7467	24369	7418.2		I-9
VA6NA00098	MADISON MILLS	38 16.5	H	73.0	0	0	2599.5	0	E-7,20
5	ORANGE - RAPIDAN RIVER	78 8.5	IS	53000	3034	7404	351. 8		
		233	255.0	54.5	3034	7404.4	11870		
VA6NA00097	WOODBERRY FOREST	38 16.9	H	78.0	0	0	2991.6	0	E-7,20
5	ORANGE - RAPIDAN RIVER	78 7.3	IS	68750	2366	8028	372.64		
		241	264.0	62.4	2366	8028.0	17600		
VAGNAB0156	LURAY	38 40.6	H	18.5	1600	7400	222.81	0	
5	PAGE - S FK SHENANDO	78 30.0	OP	50	1138	3095	71.992		
	POTOMAC EDISON CO OF VA	1377	1300.0	15.9	2738	10495	1617.7		
VAGNAB0155	NEWPORT	38 34.1	H	24.0	1400	7800	272. 2	0	
5	PAGE - S FK SHENANDO	78 35.5	OP	50	2080	5100	53.338		
	POTOMAC EDISON CO OF VA	1300	1250.0	21.5	3480	12900	1085.5		
VAGNAB0154	SHENANDOAH	38 28.8	H	15.0	862	4800	154.53	0	
5	PAGE - S FK SHENANDO	78 37.5	OP	125	428	985	156.88		
	POTOMAC EDISON CO OF VA	1250	1200.0	12.6	1290	5785.0	2888.6		
VA4NA00101	BENLOMOND	37 38.8	H	23.0	0	0	3573.9	0	E-7,20
5	POWHATAN - JAMES RIVER	77 56.9	IS	0	12212	40522	88.196		
		6387	7182.0	10.9	12212	40522	3871.4		
VA4NA00100	BOSCOBEL	37 36.1	H	29.0	0	0	3666.7	0	E-7,20
5	POWHATAN - JAMES RIVER	77 44.6	IS	0	13925	43266	84.747		
		6610	7300.0	12.9	13925	43266	3477.6		

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NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
VA4NA00103 2	MAIDENS PROJECT POWHATAN - JAMES RIVER	37 40.2 77 53.5 6040	H IS 6792.0	63.0 0 59.9	0 62992 62992	0 209023 209023	5771.7 27.612 1205.9	2000	C-2 E-20 R-5
VAMNAB0159 2	LAKE JACKSON DAM PRINCE WILLI- OCCOQUAN RIVE PRINCE WILLIAM CO	38 42.2 77 26.8 343	RH OP 340.0	25.0 4500 24.9	0 798 798	0 3245 3245.0	155.37 47.882 1374.4	2000	
VAGNAB0158 2	OCCOQUAN MAIN DAM PRINCE WILLI- OCCOQUAN RIVE FAIRFAX WATER AUTHORITY	38 41.6 77 16.5 594	S OP 594.0	70.0 178200 67.4	1000 5246 6246	3000 10715 13715	510.15 47.611 929.46	1990	
VA4NA00105 2	BELLE ISLE RICHMOND - JAMES RIVER	37 31.9 77 27.2 6790	H IS 7463.0	50.0 4000 10.1	0 10389 10389	0 32990 32990	4360.0 132.16 5691.5	2000	E-4 C-2
VA4NA00106 2	BOULEVARD RICHMOND - JAMES RIVER	37 31.9 77 29.1 6782	H IS 7490.0	69.0 10400 36.4	0 41424 41424	0 122913 122913	5717.2 46.514 1840.3	2000	E-4 C-2
VAANA00108 5	BYRD PARK 5/ RICHMOND - KANAWHA CANAL CITY OF RICHMOND	37 32.3 77 29.5 845	H OP 845.0	14.0 80 11.9	1125 0 1125	7600 0 7600.0	0 0 0	0	C-1
VAGNA00109 2	HOLLYWOOD 5/ RICHMOND - TR-JAMES RIVE CITY OF RICHMOND	37 31.9 77 27.5 6840	H OP 7554.0	16.0 158 18.0	2124 17327 19451	21400 45873 67273	1471.7 32. 82 943.92	1990	
VANNA00107 2	PARK 51 RICHMOND - JAMES RIVER CITY OF RICHMOND	37 31.9 77 27.2 847	O IS 847.0	10.0 0 45.9	0 4176 4176	0 24547 24547	283.49 11.548 509.38	1990	
VANNA00110 2	12TH STREET RICHMOND CIT- JAMES RIVER VEPCO	37 31.9 77 26.7 6840	H IS 7463.0	10.0 0 25.9	0 22738 22738	0 83425 83425	1663.2 19.937 834.96	1990	

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SITE ID NUMBER ACTIV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
VA5NA00118 5	BALCONY FALLS ROCKBRIDGE - JAMES RIVER	37 36.9 79 26.4 2930	H IS 3192.0	45.7 6000 18.9	0 5777 5777	0 26372 26372	2993.9 113.52 7068.7	0	E-7,13
VA6NA00111 5	KERR CREEK ROCKBRIDGE - MAURY RIVER	37 49.1 79 26.0 450	SR IS 498.0	84.0 6000 47.4	0 6756 6756	0 12411 12411	1473.3 118.70 2806.9	0	E-7 E-20
VA6NA00117 5	LEXINGTON PROJECT ROCKBRIDGE - MAURY RIVER	37 49.9 79 24.9 449	H IS 497.0	67.0 5000 46.1	0 6772 6772	0 12327 12327	1527.1 123.87 2914.4	0	E-7,20
VA6NA00119 5	MAURY ROCKBRIDGE - MAURY RIVER	37 56.6 79 27.5 322	HC IS 356.0	15.0 100 117.7	0 11694 11694	0 20732 20732	5148.9 248.34 6088.5	0	E-7,12 E-20 I-5
VA6NA00115 5	MURAT ROCKBRIDGE - BUFFALO CREEK	37 45.0 79 32.7 80	HC IS 80.0	122.0 12000 91.4	0 1047 1047	0 3319 3319.2	1477.5 445.13 19318	0	E-20
VA6NA00114 5	ROCK BRIDGE BATHS ROCKBRIDGE - HAYS CREEK	37 54.2 79 23.6 82	H IS 91.0	89.0 15000 55.4	0 1402 1402	0 2620 2620.6	1259.0 480.43 12043	0	E-20
VA6NA00116 2	VARNEY FALLS ROCKBRIDGE - JAMES RIVER	37 35.3 79 34.4 2150	H IS 2553.0	42.0 4000 31.0	0 18723 18723	0 42160 42160	3479.8 82.538 2468.2	2000	E-13 C-2,R-5 E-20
VA6NA00113 5	WHITE SAL ROCKBRIDGE - CALFPASTURE R	38 0.0 79 29.2 138	H IS 151.0	67.0 18000 38.9	0 1602 1602	0 2925 2925.7	1519.6 519.39 12879	0	E-7,20
VA6NAB0165 5	BROCKS GAP ROCKINGHAM - N FORK SHENAN	38 38.0 78 54.9 214	RO IS 185.0	142.0 187000 117.5	0 4010 4010	0 9847 9847.3	4367.0 443.48 15290	0	

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(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
VACNA00123 2	NORTH ANNA DAM SPOTSYLVANIA- NORTH ANNA RI VEPCO	38 0.9 77 42.5 343	SCR OP 300.0	73.0 373000 54.9	0 4139 4139	0 7379 7379.1	265.48 35.977 459.13	1990	
VANNA00128 2	EMBREY STAFFORD - RAPPAHANNOCK CITY OF FREDERICKSBURG	38 19.3 77 29.3 1604	S OP 1650.0	22.0 400 45.9	0 12913 12913	0 37923 37923	908.12 23.946 766.19	1990	
VA6NA00125 2	FREDERICKSBURG DAM STAFFORD - RAPPAHANNOCK	38 19.3 77 29.3 1604	H SI 1650.0	80.0 3600 44.5	0 15334 15334	0 38619 38619	2669.8 69.132 2291.6	2000	C-2 R-4
VA6NA00126 2	SALEM CHURCH STAFFORD - RAPPAHANNOCK	38 18.7 77 31.5 1598	HSRC SI 1643.0	140.0 1048000 137.3	0 72682 72682	0 126196 126196	9996.4 79.213 1889.6	2000	C-2 E-20 R-4
VA40RH0072 5	UDP WYTHE - REED CREEK	36 55.0 81 7.0 120	CH IS 129.0	100.0 0 69.9	0 1366 1366	0 4709 4709.9	1081.5 229.63 10486	0	
VA40RH0073 5	UDP WYTHE - REED CREEK	36 56.0 80 50.9 258	CH IS 277.0	120.0 0 84.9	0 3694 3694	0 12398 12398	1374.4 110.85 4846.3	0	

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PART II

PUERTO RICO PLAN

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Chapter 1
REGIONAL OBJECTIVES

This portion of the report presents the results of a study of the potential for hydroelectric power development within Puerto Rico.

To assess the hydropower potential of the United States and the Commonwealth of Puerto Rico, Congress enacted Legislation in 1976 requiring the U.S. Army Corps of Engineers to conduct a National Hydropower Study. The objectives of the study, authorized by PL 94-587, Section 167, are:

- To analyze and define the Nation's need for hydroelectric power;

- To assess the potential for increasing hydroelectric power capacity and generation;

- To analyze the current institutional and policy setting of hydroelectric power planning, development, marketing, and utilization;

- To estimate the feasibility of increasing hydroelectric generation capacity through development of new sites, by addition of generation facilities to existing water resource projects, and by increasing the efficiency and reliability of existing hydropower systems;

- To assess the general environmental and socio-economic impacts of hydropower development;

- To recommend to Congress a National Hydropower Development Program and any institutional and policy modifications which would increase the effectiveness of existing and future hydropower planning; and

- To make the study results available to private and public hydropower developers.

The results of this regional study impinge on each and every one of these objectives with the primary thrust directed toward defining the hydropower demand and supply in the region, evaluating the feasibility and impacts of development, identifying which potential developments warrant more detailed investigation, and making this information available to developers.

Development of the hydroelectric power potential within Puerto Rico would contribute to the national objectives of reducing the use of non-renewable energy resources and reducing dependency on imports of foreign oil. The welfare and security of the Commonwealth would be improved. Low cost electrical energy would be provided to the public.

Some of the concepts and limitations of the study are as follows:

Within Puerto Rico additional hydropower developments of less than 1 MW capacity were not evaluated due to time and resources limitations. Also, only those new sites that had been identified by some planning entity were considered.

The study provides only a cursory estimate of the power potential, the economic feasibility, and the non-economic impacts and constraints of potential power developments. The analyses of sites are based on readily available data which have not been verified in the field. This level of detail will not support an immediate move to the detailed design and construction stages of developing hydropower at these sites. While the study will likely result in a recommendation to expand the pace of hydropower development in Puerto Rico to confront the energy crisis, the preliminary results emphasize the need to conduct further studies to verify the overall viability of hydro development at each site.

The retrofitting of existing dams with hydropower facilities is emphasized because of the expediency of placing power on line, the economic merits, and the relatively benign environmental impacts associated with most retrofit projects. The national plan will request streamlining for planning and development procedures for retrofit projects, but such a streamlined system would have to preserve existing safeguards which deter infeasible or unjustifiable development.

Inasmuch as detailed studies have not been made, the incremental power estimates overstate the potential in most cases, particularly at existing projects because of the need to maintain satisfactory water levels and releases for other vital water resources purposes. No attempt was made to evaluate the feasibility of increasing the height of existing dams at this stage.

Chapter 2
EXISTING CONDITIONS

2.1 BACKGROUND

Puerto Rico is an island in the West Indies which forms a boundary between the Atlantic Ocean and the Carribean Sea. It is located about 1,000 miles southeast of Miami, Florida. The Puerto Rico Electric Power Authority (PREPA) supplies about 99 percent of the electrical power consumed in the Commonwealth. There are no power transmission interconnections outside the island, except for a submarine cable to the small adjacent islands of Vieques and Culebra.

The content of this chapter is based on data contained in the September 1980 draft of the Islandwide Water Supply Study for Puerto Rico prepared by the San Juan Area Office, Jacksonville District, U.S. Army Corps of Engineers.

2.2 PHYSIOGRAPHY

Puerto Rico is a mass of volcanic and intrusive rock rising to a crest along the Cordillera Central, an east-west mountain range extending almost the length of the island in a northward curving crescent. This extensively eroded island is thickly overlaid by sedimentary and clastic rocks on its less steeply sloped edges.

Its central mountain range averages more than 3,500 feet in elevation; the highest peak is 4,389 feet. Extensively faulted and folded, this range forms a complex system of steep mountain valleys and drainage patterns along its slopes. Over half of the island's 3,421 square miles consists of mountainous terrain with slopes of 45 or more degrees.

The foothill regions adjoining this range were formed by limestone deposits deeply eroded by river valleys. These hills taper from 1,800 feet in elevation near the central range to 250 feet near the coast. The northern foothills make up about 22 percent of the island's area, whereas the southern foothills zone averages 5 miles in width for about 80 miles. The karst formations that characterize the northwest part of the island are underlaid by extensive caves and underground waterways.

The southern lowland is composed of coalescing alluvial formations beginning at the boundary of the southern foothills. In the north, the coastal lowland is about five miles wide and extends the full length of the island.

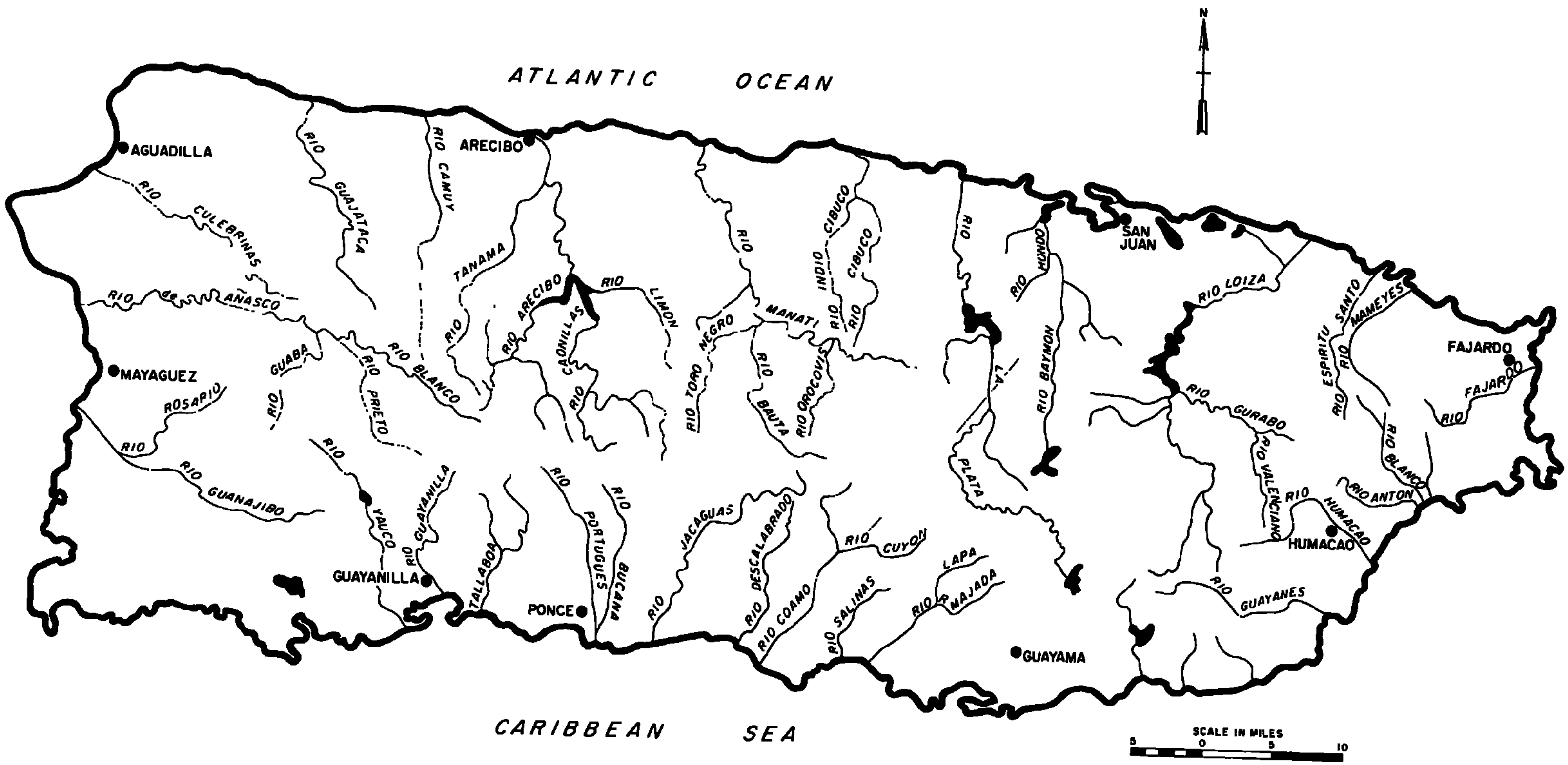


Figure 2-1
MAJOR RIVERS
AND RESERVOIRS

2.3 METEOROLOGY AND HYDROLOGY

Puerto Rico has a tropical marine climate. Average annual temperatures vary between 86°F maximum and 65°F minimum. The major rivers originate high in the Cordillera Central. Of the 67 rivers and creeks that discharge into the surrounding sea, only 25 have drainage areas over 20 square miles and only seven rivers have drainage areas greater than 100 square miles. Figure 2-1 shows the major rivers.

The rivers running north are longer and have larger drainage areas. Four of the seven principal rivers flow down the northern slope of the divide into the Atlantic Ocean, cutting narrow canyons and gorges in the limestone foothills. Rivers in the south are characterized by steeply graded headwaters discharging to the Caribbean Sea through wide valleys and alluvial deposits. Southern river slopes tend to be greater than in the north because the basins are shorter and there is less erosion.

The south coast extending from the Rio Grande de Patillas to the Rio Guanajibo watershed is an area of exceptionally low stream flow that includes many intermittent streams. This condition can be attributed to the east-west axis of the Cordillera Central mountain range, which influences the pattern of rainfall. The rainfall is produced by cooling of the moisture in the prevailing easterly trade winds as they rise against the Cordillero Central. As a result, the trade winds release the major portions of their moisture on the north side of the crest. The areas to the north of the crest may receive as much as 300 days of rain per year, while areas lying in the "rain shadow" to the south may receive as little as 100 days rain per year. Average annual rainfall is 75 inches with the heaviest concentrations over the Sierra de Luquillo in the east and over the western mountains.

The island has a high demand for water supply. Hydropower production would be secondary to water supply needs in the operation of future reservoir projects.

2.4 DEMOGRAPHIC AND ECONOMIC CONDITIONS

The island's Gross Domestic Product (GDP) rose from $724 million in 1950 to nearly $8 billion in 1974, an annual growth rate of 9.6 percent. This growth was due to outside investment, labor growth, technological changes, and other factors.

A shift from the more labor-intensive agricultural economy to manufacturing types of industries, relatively more capital-intensive, contributed to the major migration to the mainland in the early 1950s. Population increased from 2.2 million in 1950 to an estimated 3 million in 1975, but would have been about 4.2 million, without this massive migration.

Urban areas along the north and south coastal plains began to grow in the 1960s as the economic activity associated with new labor-intensive industries began to concentrate in the metropolitan areas and their hinterlands, using the primary highways as growth corridors. This economic shift created an unbalanced polarization of population. For example, the island's principal city of San Juan on the north coast has a population four to five times that of Ponce on the south coast, which is the island's second largest metropolitan area. This pattern of imbalance is repeated in each municipio containing marked industrial activity.

2.5 MAJOR ENERGY USERS

As of 30 June 1976, the Puerto Rico Electric Power Authority (PREPA), formerly the Puerto Rico Water Resources Authority, had a total of 837,168 customers. Table 2-1 shows the average number of customers, the electric energy sales and the revenues therefrom by class of service for the fiscal year ended 30 June 1976.

Table 2-1
CUSTOMERS, ELECTRIC ENERGY SALES AND REVENUES
(Fiscal Year Ended June 30, 1976)

Class of Service	Average Number of Customers	Electric Energy Sales (KWH) (in thousands)	Percent of Total Electric Energy Sales (KWH)	Revenues from Electric Energy Sales (in thousands)	Percent of Total Revenues from Electric Energy Sales
Residential.............	746,982	3,276,521	31.0	$177,979	33.8
Commercial..............	83,923	2,352,383	22.2	145,017	27.6
Industrial..............	4,834	4,557,956	43.1	173,304	32.9
Other...................	1,429	388,067	3.7	29,691	5.7
	837,168	10,574,927	100.0	$525,991	100.0

Source: Ponce Regional Water Resources Management Study, Appendix D, Part Part VI, Hydroelectric Power Potential, September 1979.

Chapter 3
EXISTING ENERGY SYSTEM

3.1 OVERALL CAPABILITY

A description of the electric system of Puerto Rico and its growth potential is provided in the review report on the Ponce Region hydroelectric power potential referenced in Table 2-1. The major considerations in that report are repeated in this and the following chapters and updated as required.

The majority of energy is generated by oil-fired steam electric units. PREPA, the principal supplier, is dependent on foreign oil imports. The escalating cost of oil is encouraging substituting coal or gas imported from the mainland for oil as a base load fuel. Other alternative energy sources, such as solar and thermal, would require development of new technology to become feasible and would be limited in usefulness as base load energy sources.

The PREPA supplies 99 percent of the electric power consumed in the Commonwealth. The remaining electric power is generated by certain industries for their own use.

As shown in Table 3-1, as of June 30, 1976, PREPA had generating facilities with a total nameplate rating of 4,037 MW and a dependable generating capacity of 4,094 MW of which 98 percent was composed of oil-fired generating units. The electric system included 19 hydroelectric units with a total dependable capacity of 98 MW with unit sizes ranging from 1,440 KW to 25,000 KW capacity. Not included in the above stated dependable generating capacity is 202 MW of capacity available from combustion turbine units which the Authority was planning to sell. An additional 200 MW of capacity is available from the heat recovery steam turbines of the combined cycle plant at Aguirre.

A detailed list of the rated, dependable and maximum peak capacity, and installation date of each of the generating units in operation in the PREPA integrated system as of October 1975, both in thermal plants and in hydroelectric plants, is shown in Exhibit 3-1. The total islandwide system rated dependable capacity by June 30, 1976, was 4,295.98 MW, and by June 30, 1977, 4,495.98 MW, with the additional 200 MW placed in operation in the heat recovery steam turbines of the combined cycle plant at Aguirre.

Table 3-1
PREPA GENERATING FACILITIES
(as of June, 1976)

Generating Stations	Total Nameplate Rating (72 Units)	Dependable Generating Capacity (MW) Total (72 Units)	Steam Electric (21 Units)	Gas Turbines[1/] (29 Units)	Jet Turbine [2/] (3 Units)	Hydro (19 Units)
San Juan [3/]	508	514	498	-	16	-
South Coast..............	1,113	1,148	1,110	38	-	-
Palo Seco.................	667	696	620	76	-	-
Mayaguez..................	120	114	-	114	-	-
Aguirre...................	1,340	1,358	920[4/]	438[5/]	-	-
Other.....................	279	264	1[6/]	133	32	98
Total.....................	4,037	4,094	3,149	799	48	98

Source: Same as Table 2-1.

[1/] Excludes six gas turbine units with an aggregate dependable generating capacity of 114,000 KW which the Authority presently plans to sell.

[2/] Excludes eight jet turbine units with an aggregate dependable generating capacity of 88,000 KW which the Authority presently plans to sell.

[3/] Excludes four steam-electric units with an aggregate dependable capacity of 80,000 KW retired during June 1975. Includes two additional steam-electric units with an aggregate dependable capacity of 88,000 KW which the Authority is considering retiring.

[4/] Includes Aguirre Unit 1 (460,000 KW dependable capacity), which was under repair and estimated to be on line during late 1976.

[5/] Excludes heat recovery units scheduled to be placed in commercial operation during 1977 which were to add to an additional 200,000 to the existing 400,000 kw combined cycle unit.

[6/] Includes three diesel units with an aggregate dependable generating capacity of 800 KW.

The transmission facilities include 137 miles of 230 KV lines, 675 miles of 115 KV lines, and 1,160 miles of 38 KV lines. The system has 163 transmission substations, 22 of which are located at generating plants. A diagram of the integrated generation and transmission system is shown in Figure 3-1, demonstrating the integration of the system.

3.2 ROLE OF EXISTING HYDROPOWER

Relationships

As shown in Figure 4-4, hydropower energy accounted for as much as 66 percent of Puerto Rico's total generation during fiscal year 1936 (July 1935-June 1936) but declined to 1 percent by fiscal year 1976, for two reasons: the more attractive dam sites were developed during this period, and the increase in demand justified use of larger and more economical thermal units. This increase was due to the shift in development of the island from predominantly agricultural to industrial during the latter part of this time period.

Magnitude

There are 14 reservoirs with facilities for hydropower generation. Table 3-2 provides general information on the reservoirs associated with power generation. Not included in the table is the Loiza Reservoir, a non-generating hydroelectric plant that is owned by the Puerto Rico Aqueduct and Sewer Authority.

Detailed information on 18 of the 19 hydroelectric power plants of the electric system supplied by the reservoirs is presented in Table 3-3, including the date on which each plant was completed, number of units, operating head, installed capacity, and dependable capacity. The total capacity of the hydropower plants is 98 MW as compared to 4,495.98 MW in the total islandwide system by June 1977.

How Hydropower Fits into System

The capacity factors for the hydropower plants in Puerto Rico varied from 6 percent to 26 percent during the 12 months ending 30 June 1976. The average capacity factor was 17 percent. Therefore, the existing hydropower is generally used for peaking.

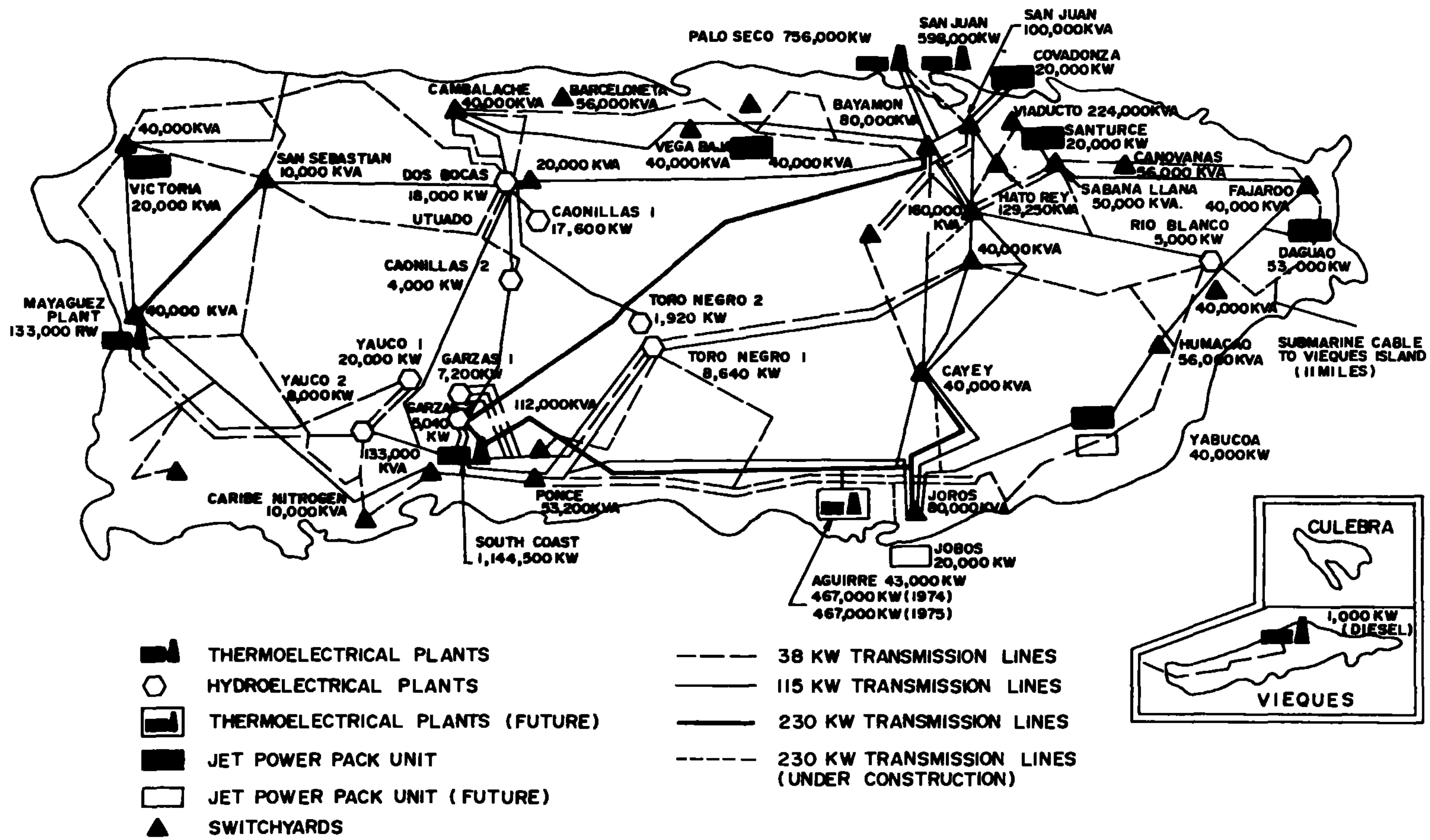


Figure 3-1
PREPA INTEGRATED SYSTEM
as of June 1976

Source: Same as Table 2.1

Table 3-2
RESERVOIR DATA

Reservoir	Date Constructed		Drainage Area (Sq. Miles)	Spillway Elevation (ft.)	Usable Storage (Ac. Ft.)	Ave. Kwhrs. Per Ac. Ft.	Stored Energy Average with Lake Full (KWH)	Yearly Inflows (Ac. Ft.)	Max. Power Pool Elevations (with flash-boards)	Supplies Water power to
Carite	Dec.	1918	7.92	1,783.6	9,537	1,080	10,299,960	29,959	-	Carite Plants
Matrullas	March	1937	4.42	2,415	2,945	1,320	3,887,400	14,913	-	Toro Negro 1
Guineo	May	1931	1.57	2,960	1,810	1,800	3,258,000	7,026	-	T.N. I-T. N.2
Garzas	Jan.	1943	6.25	2,415	4,213	1,560	6,572,280	21,094	-	Garzas Plants
Dos Bocas	June	1942	170.00	295	24,072	100	2,407,200	278,920	297.50	Dos Bocas Pl.
Caonillas	July	1948	50.10	826	46,708	490	22,886,920	123,556[2/]	830	Caonillas Pl.1
Guajataca		1928	25.00	646	28,000	200	5,600,000	55,000	-	Isabela Pls.
Lucchetti	Sept.	1953	17.3	570	13,850	254	3,540,000	95,049[3/]	576	Yauco Pl. 2
Guayo	Sept.	1955	9.6	1,460	15,150	656	10,332,600	76,849[4/]	1,465	Yauco Pl. 1
Prieto	Dec.	1955	9.6	1,485	580	693	423,710	24,551	1,490	Yauco Pl. 1
Yahuecas		1956	17.4	1,471	1,580	656[1/]	1,036,480	38,121	1,475	Yauco Pl. 1
Adjuntas	Aug.	1950	14.7	1,245	400	163[5/]	65,200	-	1,250	Caonillas Pl.2
Vivi	March	1950	6.5	1,065	217	165	35,400	-	1,070	Caonillas Pl.2

Source: Same as Table 2-1.

[1/] Same as Guayo, Yahuecas inflows are diverted to Guayo Reservoir from where the Power Plant is fed.

[2/] Inflows at Caonillas proper 84,621 Ac. Ft. Figure shown includes the water diverted by Caonillas Extension (38,935 Ac. Ft.).

[3/] Inflow at Antonio Lucchetti Reservoir proper 18,200 Ac. Ft. Figure shown includes the Yauco Power Plant No. 1 discharge (76,849).

[4/] Inflow at Guayo proper 14,177 Ac. Ft. Figure shown includes the water diverted from Yaheucas (38,121 Ac. Ft.) and Prieto (24,551 Ac. Ft.).

[5/] Same as Vivi, Adjuntas inflows are diverted to Vivi Reservoir from where the Power Plant is fed.

Table 3-3
HYDROELECTRIC POWER PLANT DATA

Power Plant	Installed Capacity (KW)	No. of Units	Net Operating Head	Type of Unit	Controlled From	Dependable Capacity (KW)	Reservoir Supplied From	Control	Tailrace Elevation (Normal)	Date Completed	Date Withdrawn From Service
Carite 1	3,360	4	742	Horizontal-Impulse	Locally	2,000	Carite	Manual	985	1915	Jul '72
Carite 2	640	1	385	Horizontal-Impulse	Carite 1	500	Carite	Remote	-	1922	Jul '72
Carite 3	640	1	217	Horizontal-Reaction	Carite 1	500	Carite	Remote	355.00	1937	Jul '72
Toro Negro 1	8,610	4	1,596	Horizontal-Impulse	Locally	8,640	Matrullas & Guineo	Manual	521.50	1929	
Toro Negro 2	1,920	1	630	Horizontal-Impulse	T. N. No. 1	1,900	Guineo	Remote	2,247.50	1937	
Garzas 1	7,200	2	1,210	Horizontal-Impulse	S. C. Plant	7,200	Garzas	Manual	1,153.03	1941	
Garzas 2	5,040	1	798	Horizontal-Impulse	S. C. Plant	5,040	Garzas	Remote	338.75	1941	
Dos Bocas	18,000	3	145	Vertical-Francis	Locally	15,000	Dos Bocas	Manual	146.00	1942	
Caonillas 1	17,600	2	470	Vertical-Franics	Dos Bocas	17,600	Caonillas	Remote	290.00	1949	
Caonillas 2	4,000	1	190	Vertical-Francis	Dos Bocas	4,000	Vivi	Remote	857.00	1952	
Comerio 1	2,040	3	190	Horizontal-Reaction	Plant 1	1,000	Comerio	Manual	223.09	1907	Jul '70
Comerio 2	3,200	2	185	Horizontal-Reaction	Locally	1,600	Comerio	Manual	429.09	1913	Jul '70
Rio Blanco	5,000	2	1,300	Horizontal-Impulse	Locally	3,000	Hicaco	Manual	103.00	1930	
Yauco Pl. 1	20,000	1	800	Vertical-Impulse	S. C. Plant	25,000	Guayo	Remote	587.00	1956	
Yauco Pl. 2	8,000	2	310	Vertical-Francis	S. C. Plant	10,000	Luchetti	Remote	230.00	1954	
Isabela 1	1,408	2	100	Vertical-Francis	Locally	500	Guajataca	Manual	-	1927	Jan '66
Isabela 2	800	2	104	Vertical-Francis	Locally	800	Guajataca	Manual	308.00	1940	Jan '66
Isabela 3	1,000	1	132	Horizontal-Reaction	Plant No. 2	1,000	Guajataca	Remote	165.00	1947	Jan '66

Source: Islandwide Water Supply Study for Puerto Rico, Volume III, Other Related Functions, September 1980.

Use, Ownership, and Marketing

As stated in Section 3.1, PREPA markets 99 percent of the electric power consumed in the Commonwealth. The remaining electric power is generated by certain industries for their own use.

PREPA users are classified in Table 2-1. There are no power transmission interconnections outside the island except for a submarine cable to both Vieques and Culebra Islands.

Parameters Governing Use of Existing Hydropower

Due to escalating operation and maintenance costs, it has been found that many of the small hydroelectric plants in the system were not economical to operate. In past years, of the hydro plants listed in Table 3-2, the three Isabela plants, the two Comerio plants, and the three Carite plants have been retired from service because their generating costs were considered too high when compared to the average generating costs and generating capacities from the other plants in the system. It must be recognized that many of these hydro plants were old, mostly between 20 to 40 years. Demand for more water to supply the domestic and industrial sectors has forced modification in the operating rules for the hydropower plants. This, combined with the high load factor of the island, the relatively small size and power production of the hydropower plants, and the large economy of scales from the large thermal plants, has reduced the importance of hydropower within the island's system. However, as the cost of fuel continues to rise, these retired plants could be placed back into operation.

High priced oil is the only base load power available. This makes pumped storage uneconomical.

Exhibit 3-1
PREPA GENERATING PLANT CAPACITIES

I. THERMAL PLANTS	Rated* Capacity (KW)	Dependable** Capacity (KW)	Maximum*** Peak (KW)	Installation Date
A. San Juan Steam Plant				
Unit No. 1 1/	20,000	20,000	20,000	Sep. 1950
Unit No. 2 1/	20,000	20,000	20,000	Nov. 1950
Unit No. 3 1/	20,000	20,000	20,000	Oct. 1951
Unit No. 4 1/	20,000	20,000	20,000	Dec. 1952
Unit No. 5 2/	44,000	50,000	50,000	Feb. 1956
Unit No. 6 2/	44,000	50,000	50,000	Feb. 1957
Unit No. 7	100,000	110,000	115,000	May 1966
Unit No. 8	100,000	110,000	115,000	Aug. 1966
Unit No. 9	100,000	110,000	115,000	Jun. 1968
Unit No. 10	100,000	110,000	115,000	Aug. 1969
Jet No. 1 (B.B.)	10,000	9,500	9,500	Aug. 1965
Jet No. 2 (B.B.)	20,000	19,000	19,000	May 1969
TOTALS S.J.	598,000	648,500	670,500	
B. South Coast Steam Plant				
Unit No. 1	44,000	50,000	52,000	Feb. 1958
Unit No. 2	44,000	50,000	52,000	Feb. 1959
Unit No. 3	82,500	90,000	90,000	Mar. 1962
Unit No. 4	82,500	90,000	90,000	Dec. 1963
Unit No. 5	410,000	410,000	430,000	Sep. 1972
Unit No. 6	410,000	410,000	430,000	Sep. 1973
Jet Unit (B.B.)	10,000	9,500	9,500	Nov. 1965
Gas Turb.No. 1-1 (JB)	20,000	19,500	21,525	May 1972
Gas Turb.No. 1-2 (JB)	20,000	17,500	21,625	May 1972
TOTALS S.C.	1,123,000	1,144,500	1,196,750	
C. Palo Seco Steam Plant				
Unit No. 1	82,500	90,000	90,000	Jun. 1960
Unit No. 2	82,500	90,000	90,000	Mar. 1961
Unit No. 3	216,000	230,000	236,000	Feb. 1970
Unit No. 4	216,000	230,000	236,000	Jul. 1970
Jet No. 1 (B.B.)	10,000	9,000	9,500	Feb. 1965
Jet No. 2 (W)	20,000	19,000	19,000	Mar. 1970
Gas Turb.No. 1-1 (H)	20,000	17,500	21,625	Dec. 1972
Gas Turb.No. 1-2 (H)	20,000	17,500	21,625	Dec. 1972
Gas Turb.No. 2-1 (H)	20,000	17,500	21,625	Dec. 1972
Gas Turb.No. 2-2 (H)	20,000	17,500	21,625	Dec. 1972
Gas Turb.No. 3-1 (H)	20,000	17,500	21,625	Feb. 1973
Gas Turb.No. 3-2 (H)	20,000	17,500	21,625	Feb. 1973
TOTALS P.S.	747,000	773,000	810,250	

Exhibit 3-1 (Continued)

I. THERMAL PLANTS (Continued)	Rated* Capacity (KW)	Dependable** Capacity (KW)	Maximum*** Peak (KW)	Installation Date
D. Aguirre Steam Plant				
Unit No. 1 (B.B)	450,000	450,000	460,000	May 1975
Unit No. 2 (B.B.)	450,000	450,000	460,000	Oct. 1975
Gas Turb. No. 1-1 (JB)	20,000	17,500	21,625	Aug. 1972
Gas Turb. No. 1-2 (JB)	20,000	17,500	21,625	Aug. 1972
Gas Turb. No. 2-1 (H)	20,000	17,500	21,625	Jul. 1972
Gas Turb. No. 2-2 (H)	20,000	17,500	21,625	Jul. 1972
TOTALS Aguirre	530,000	520,000	546,500	
E. Vieques Diesel				
Unit No. 1	500	400	400	1966
Unit No. 2	250	200	200	1966
Unit No. 3	250	200	200	1966
TOTALS Vieques	1,000	800	800	
F. Mayaguez Gas Plant				
Gas Turb. No. 1 (B.B)	20,000	20,000	20,000	Jun. 1959
Gas Turb. No. 2 (B.B)	20,000	20,000	20,000	Sep. 1960
Gas Turb. No. 3-1 (JB)	20,000	17,500	21,625	Sep. 1972
Gas Turb. No. 3-2 (JB)	20,000	17,500	21,625	Sep. 1972
Gas Turb. No. 4-1 (H)	20,000	17,500	21,625	Oct. 1972
Gas Turb. No. 4-2 (H)	20,000	17,500	21,625	Oct. 1972
Jet Unit (B.B.)	10,000	9,500	9,500	Mar. 1966
Victoria Jet (B.B.)	20,000	19,000	19,000	Jun. 1969
TOTALS Mayaguez	150,000	138,500	155,000	
G. Other Gas and Jet Units				
1. Daguao Units:				
Jet Unit (W)	10,000	9,500	9,500	Oct. 1967
Gas Turb. No. 1-1 (H)	20,425	17,500	21,625	Aug. 1972
Gas Turb. No. 1-2 (H)	20,425	17,500	21,625	Aug. 1972
TOTALS Daguao	50,850	44,500	52,750	
2. Yabucoa Units:				
Gas Turb.No. 1-1 (GE)	20,425	17,500	21,625	Nov. 1971
Gas Turb.No. 1-2 (GE)	20,425	17,500	21,625	Nov. 1971
Gas Turb.No. 2-1 (H)	20,425	17,500	21,625	May 1973
Gas Turb.No. 2-2 (H)	20,425	17,500	21,625	May 1973
TOTALS Yabucoa	81,700	70,000	86,500	

Exhibit 3-1 (Continued)

I. THERMAL PLANTS (Continued)	Rated* Capacity (KW)	Dependable** Capacity (KW)	Maximum*** Peak (KW)	Installation Date
3. Jobos Gas Units:				
Jet Unit (W)	20,000	19,000	19,000	Apr. 1971
Gas Turb. No. 1-1 (H)	20,425	17,500	21,625	Apr. 1973
Gas Turb. No. 1-2 (H)	20,425	17,500	21,625	Apr. 1973
TOTALS Jobos	60,850	54,000	62,250	
4. Vega Baja Gas Units:				
Gas Turb. No. 1-1 (GE)	20,425	17,500	21,625	Oct. 1971
Gas Turb. No. 1-2 (GE)	20,425	17,500	21,625	Oct. 1971
TOTALS Vega Baja	40,850	35,000	43,250	
5. Santurce Jet Units:				
Jet Unit No. 1 (W)	20,000	19,000	19,000	May 1969
6. Covadonga Jet Units:				
Jet Unit No. 1 (W)	20,000	19,000	19,000	Jan. 1968
TOTAL THERMAL PLANTS	3,423,250	3,466,800	3,662,550	

1/ Retired to cold reserve status as of June 1975.
2/ Retirement to cold reserve status is presently under evaluation.

Exhibit 3-1 (Continued)

II. HYDROELECTRIC PLANTS	Rated* Capacity (KW)	Dependable** Capacity (KW)	Maximum*** Peak (KW)	Installation Date
A. Toro Negro No. 1				
Unit No. 1	1,440	1,440	1,440	Jan. 1937
Unit No. 2	1,440	1,440	1,440	Jan. 1937
Unit No. 3	1,440	1,440	1,440	Jan. 1937
Unit No. 4	4,320	4,320	4,320	Jan. 1937
TOTAL	8,640	8,640	8,640	
B. Toro Negro No. 2				
Unit No. 1	1,920	1,700	1,920	Feb. 1937
C. Garzas No. 1				
Unit No. 1	3,600	3,600	3,600	Feb. 1941
Unit No. 2	3,600	3,600	3,600	Feb. 1941
TOTAL	7,200	7,200	7,200	
D. Garzas No. 2				
Unit No. 1	5,040	5,040	5,040	Mar. 1941
E. Caonillas No. 1				
Unit No. 1	8,800	9,000	10,500	Jan. 1949
Unit No. 2	8,800	9,000	10,500	Jan. 1949
TOTAL	17,600	18,000	21,000	
F. Caonillas No. 2				
Unit No. 1	4,000	3,600	4,000	Sep. 1952
G. Dos Bocas				
Unit No. 1	6,000	5,000	6,000	Aug. 1942
Unit No. 2	6,000	5,000	6,000	Nov. 1944
Unit No. 3	6,000	5,000	6,000	Nov. 1945
TOTAL	18,000	15,000	18,000	
H. Rio Blanco				
Unit No. 1	2,500	2,500	2,500	1930
Unit No. 2	2,500	2,500	2,500	1930
TOTAL	5,000	5,000	5,000	
I. Yauco No. 1				
Unit No. 1	20,000	25,000	26,000	Feb. 1956

Exhibit 3-1 (Continued)

II. HYDROELECTRIC PLANTS (Cont)	Rated 1/ Capacity (KW)	Dependable 2/ Capacity (KW)	Maximum 3/ Peak (KW)	Installation Date
J. Yauco No. 2				
Unit No. 1	4,000	4,500	5,000	Apr. 1954
Unit No. 2	4,000	4,500	5,000	Apr. 1954
TOTAL	8,000	9,000	10,000	
Total Hydro Plants	95,400	98,180	106,800	
Total Thermal Plants	3,423,500	3,466,800	3,662,550	
GRAND TOTAL	3,518,650	3,564,980	3,769,350	

Source: See Table 2-1.

1/ Rated Capacity is the nameplate capacity.
2/ Dependable Capacity is the maximum capacity at which the unit can operate safely.
3/ Maximum Peak is the capacity which could be obtained from the units for short periods of time, which is not recommended.

Chapter 4
DEMAND SUMMARY

4.1 HISTORICAL DEMAND

A characteristic of the island's power system is its unusually high load factor. The system's annual load factor in fiscal year 1974 was 76 percent, as indicated by the system load duration curve shown in Figure 4-1. The highest peak load achieved by the system during that period was 1,940.1 MW in November 1976. The projected load factor for the fiscal year ending June 1980 was 75.7 percent with a peak load of 2,097 MW.

The projected hourly load variations during the peak day, the average weekday, Saturday, and Sunday during a week in June 1977 are shown in Figure 4-2. It will be noticed that the daily load factor during the average weekday is 89 percent. This unusually high load factor is mainly due to the use of bedroom air conditioners at night.

The marked seasonal variations prevalent in the continental United States are practically absent in the all-year-round summer weather conditions in Puerto Rico. The 13 monthly (or rather, four-week periods used to schedule maintenance) load variations during the year are very small, as can be seen from Figure 4-3, which indicates the load variations in the Authority's system (as ratios to the annual load peak) during the 13 four-week periods projected for the year 1981. It may be noted that all period peaks are expected to surpass 88 percent of the annual peak. Also shown in this figure are the comparative variations for the Long Island Electric System (with an annual load factor of 54.7 percent) and for a typical electric system in the eastern states.

The uniformity in weekly and yearly load variations results in problems peculiar to the island's electric system with reference to reserve capacity requirements, maintenance schedule, etc. Since the night valleys are smaller than in typical systems on the mainland, the pumped storage capability is much less.

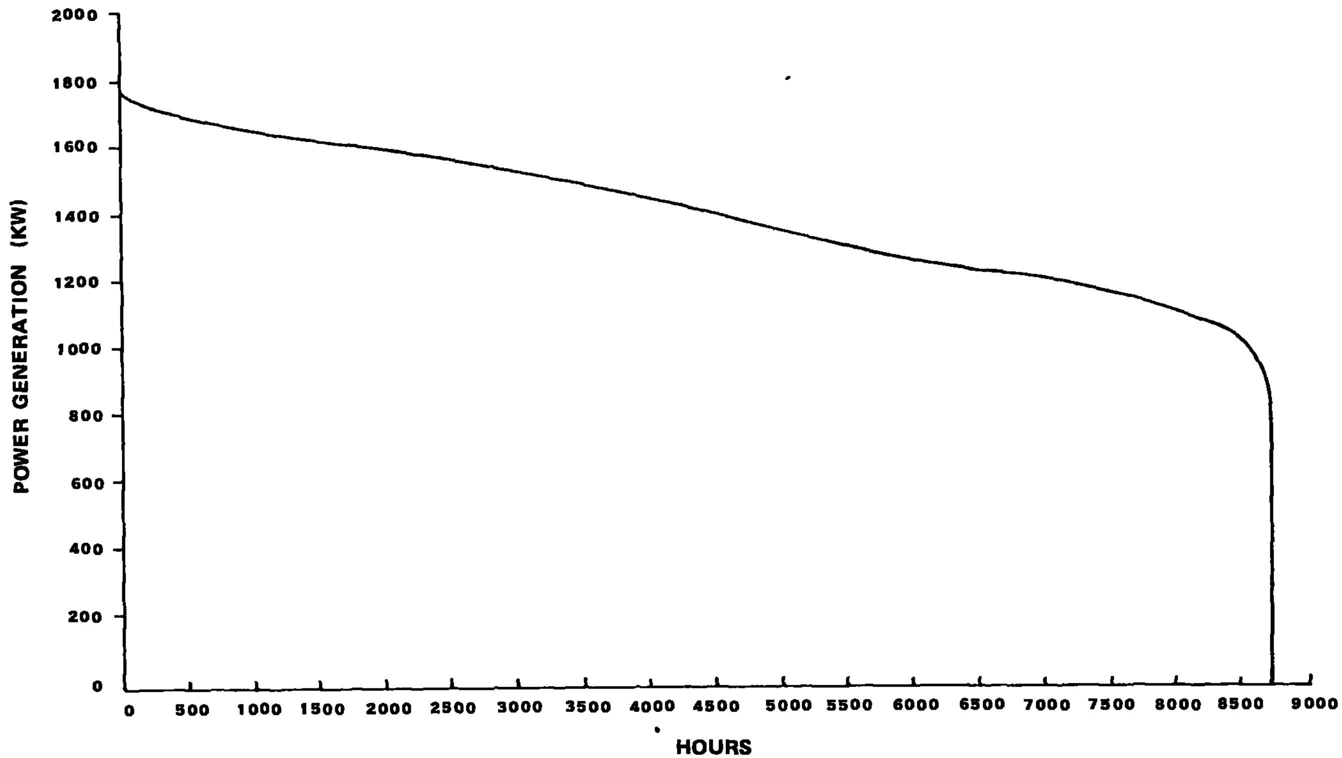
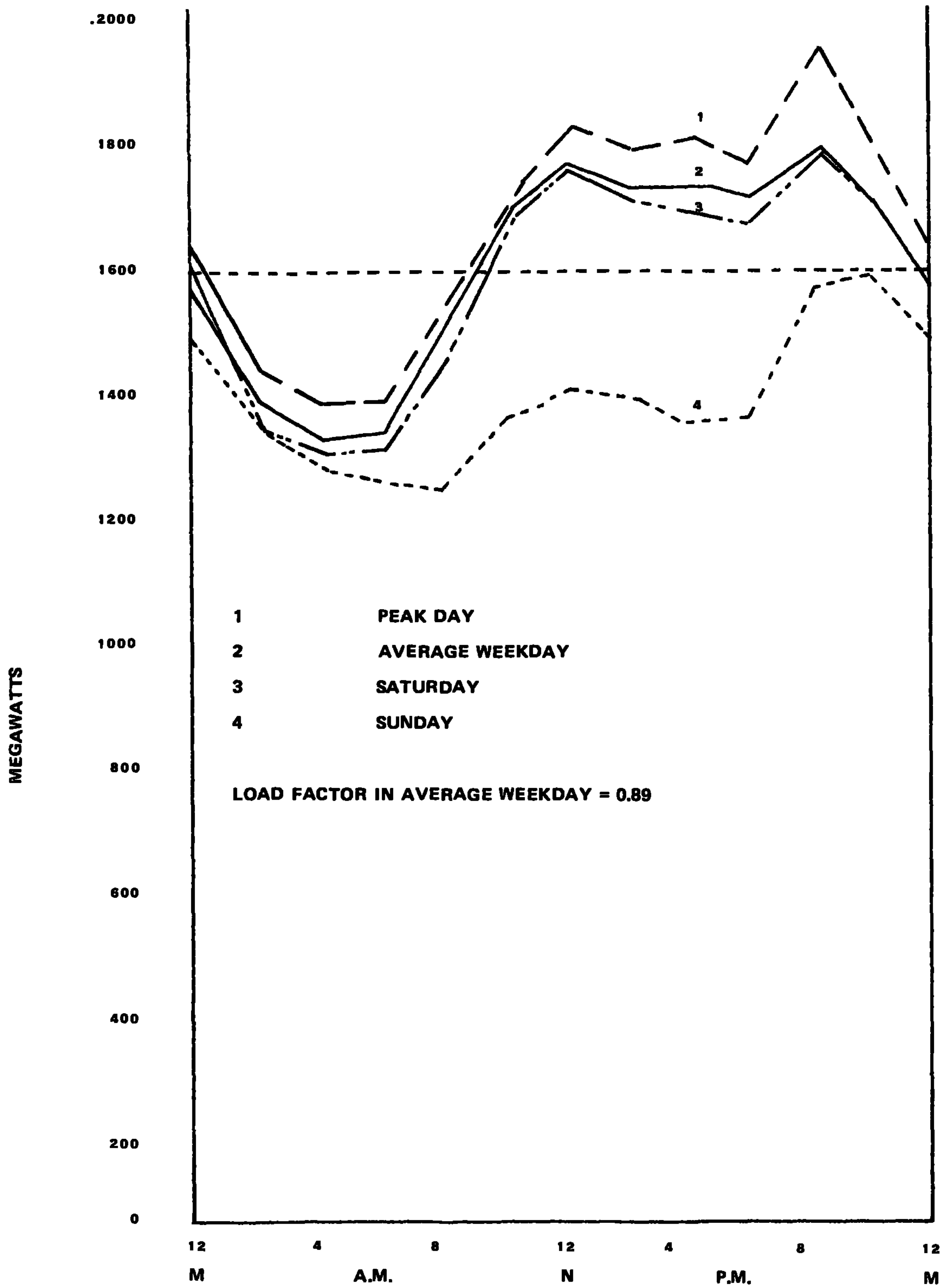


Figure 4-1
SYSTEM LOAD DURATION CURVE
FISCAL YEAR 1973-74 (LOAD FACTOR = 0.76)

Source: Same as Table 2 1



Source: Same as Table 2.1

Figure 4-2
PROJECTED HOURLY LOAD VARIATIONS
During Week in June 1977

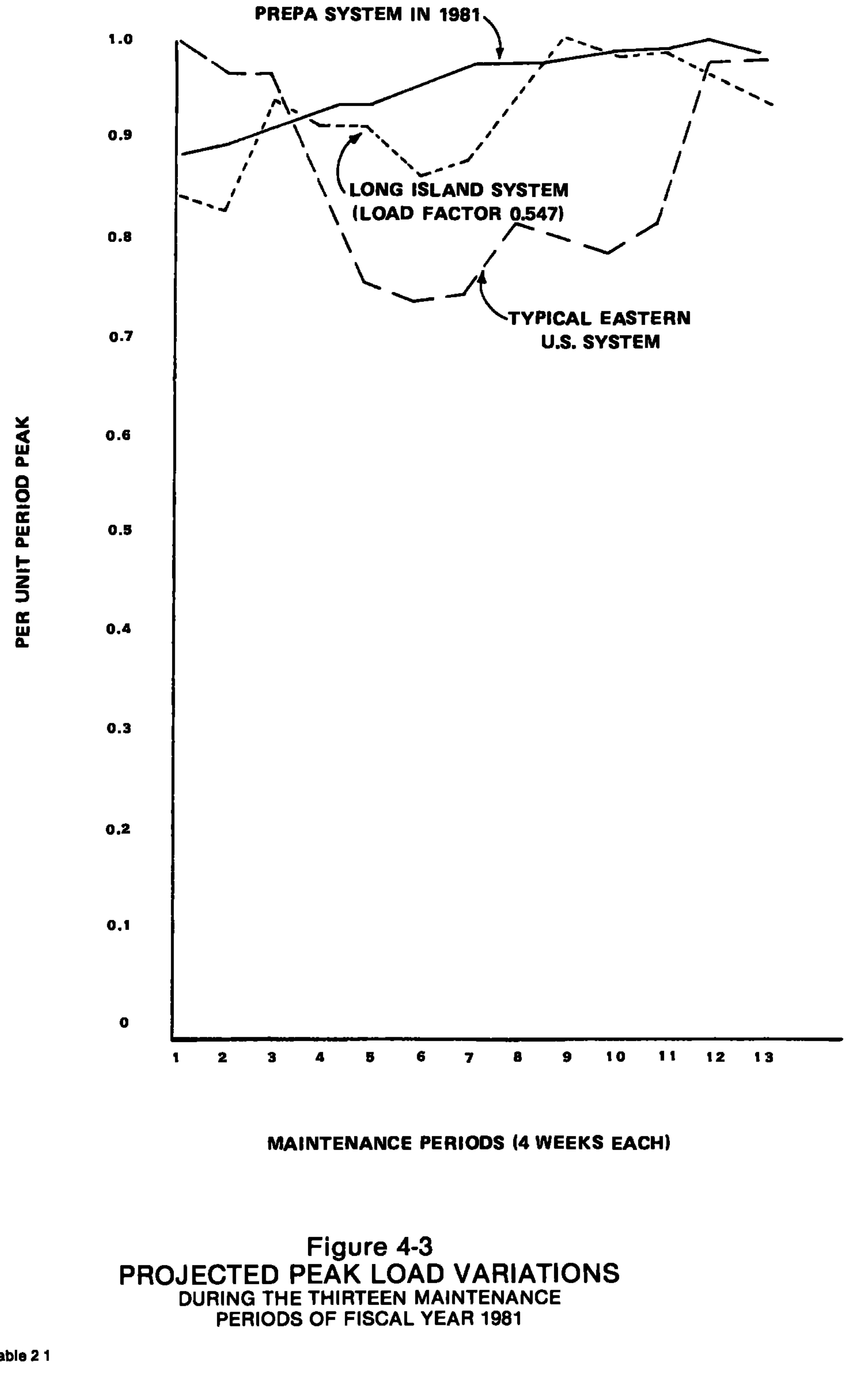


Figure 4-3
PROJECTED PEAK LOAD VARIATIONS
DURING THE THIRTEEN MAINTENANCE
PERIODS OF FISCAL YEAR 1981

Source: Same as Table 2 1

The trend of electric energy growth for the period of 1935 through 1980 is shown in Figure 4-4. Total electric energy generated as well as hydroelectric energy are shown in the same figure. It may be observed that while hydroelectric energy accounted for 66 percent of the total generation during fiscal year 1936, as the more attractive dam and reservoir sites were developed and the increase in demand justified the use of larger and correspondingly more economical thermal units, hydropower development declined; and by the fiscal year 1976, the contribution of hydroelectric to total energy generation was of the order of one percent. It may also be observed from Figure 4-4 that the rate of increase in energy generation during the period from 1935 to 1973 was very large, mainly due to the industrial development of the island. The annual rate of increase varied from nine to 20 percent, with an average rate of increase during the entire period of about 14 percent, which represented a doubling of the energy generation about every five years.

The yearly peak load and the total installed capacity of the electric system during this same period are shown in Figure 4-5. Since the time lapse between the starting of planning of additional units to the system and the placing of them in operation is around seven years, the ever increasing demand by industry required the gradual increase in size of the generating units in order to keep pace with the demand. The latest fossil-fueled units installed were of 460,000 KW capacity and the nuclear units that were being planned would have added another 613,000 KW capacity.

This has a bearing on the future development of hydroelectric power. The relatively huge size of the system (present installed capacity 4,495,980 KW) and large size of the latest units installed, with their correspondingly high efficiencies, make the small hydroelectric plants which can be developed in Puerto Rico economically unattractive when the power and energy production has to bear all the costs of the development. Also, at the rate at which the system was growing (the 1970 projections of growth in electric energy demand, in yearly peak load and in required installed capacity, are shown by dotted lines in Figures 4-4 and 4-5), and with the sudden reduction in growth of demand experienced in 1973 due to the recession in the economy, the electric system has, at present, a surplus of capacity. The actual 1979-80 electrical generation and maximum demand, also shown in Figures 4-4 and 4-5, indicate the magnitude of this surplus. This is dramatically shown in Table 4-1, prepared by PREPA, showing installed capacity, peak load, reserve margin in percent of peak load, and loss of load probability (LOLP) during the period from 1974-75 to 1980-81. It should be noted that the LOLP value is expected to increase from 0.00381 days per year in 1976-77 to 0.02774 in 1980-81 by not installing any additional generating units, and that it can increase to 0.15 days per year and still be considered acceptable.

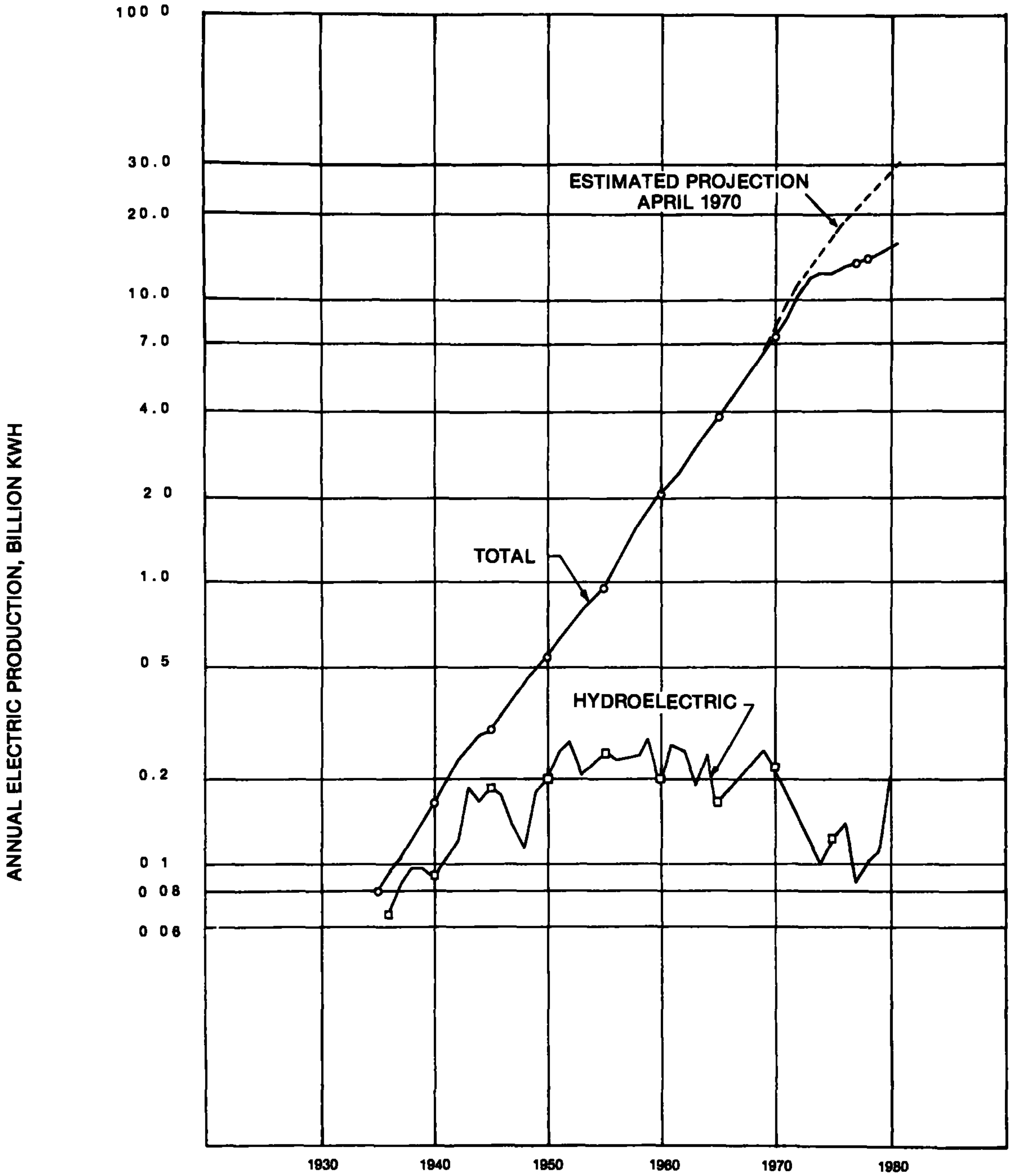


Figure 4-4
PREPA ANNUAL PRODUCTION
1935 - 1980

Source· Same as Table 2.1

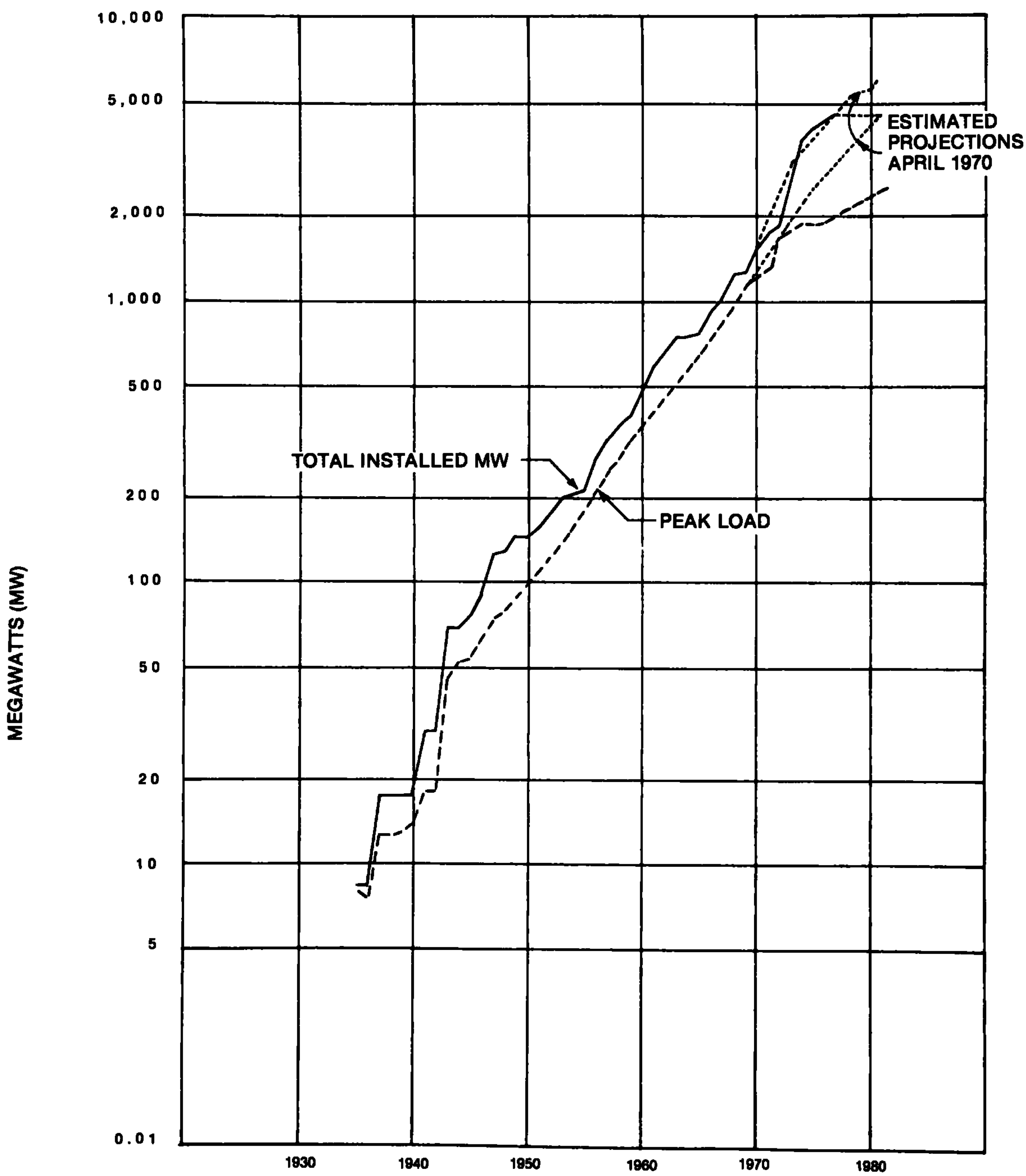


Figure 4-5
PREPA YEARLY PEAK LOAD
AND TOTAL INSTALLED CAPACITY
1935 - 1980

Source· Same as Table 2.1

Table 4-1
PREPA INTEGRATED ELECTRIC SYSTEM

CAPACITY MARGINS

Fiscal Year	Peak Load (MW)	Installed Capacity (MW)	Reserve Margin[1/] (%)	LOLP[2/] (Days/Year)
1974-75	1808.3	3895.98	115.45	
1975-76	1853.9	4295.98	131.73	
1976-77	1905.8	4495.98	135.91	0.00381
1977-78	1983.6	4495.98	126.66	0.00148
1978-79	2097.7	4495.98	114.33	0.00248
1979-80	2199.6	4495.98	104.40	0.00510
1980-81	2311.8	4495.98	94.48	0.02774

Source: See Table 2.1

[1/]Reserve Margin = $\frac{\text{Installed Capacity}-\text{Peak Load}}{\text{Peak Load}} \times 100$

[2/]LOLP = Loss of Load Probability

4.2 FUTURE DEMAND

It is estimated that it will not be necessary to add any additional capacity to the system until after the year 1983. As a matter of fact, PREPA now has for sale six gas turbine units and eight jet turbine units, with aggregate dependable generating capacities of 114,000 KW and 88,000 KW, respectively (see footnotes 1 and 2 in Table 3-1). This means that the only value of any new hydroelectric plant prior to that year would be the savings in fuel oil costs resulting from its energy generation, and no value could be assigned before that year to its KW capacity.

The Authority expects that peak load will grow at a compound annual rate of 3.5 percent from fiscal 1979 through fiscal 2000. This projection is based in part on estimated socio-economic indicators for Puerto Rico prepared by the Planning Board of Puerto Rico, including government and personal consumption expenditures, gross product, population, exports, and personal disposable income. It takes into consideration the current reduction in industrial demand in Puerto Rico (due mainly to the closing of PPG Industries, Inc.), Federal and local energy conservation measures, and expected reductions in the previously projected growth rates of the United States mainland and Puerto Rico economies.

Table 4-2 summarizes the Authority's peak load and required and actual dependable generating capacity projections through fiscal year 2000.

Based on projected load growth in Puerto Rico, the Authority believes that new generating facilities will be required to provide additional capacity of up to 900 MW over approximately the next ten years. The Authority believes that, of such additional capacity, 300 MW will be required by fiscal 1986, 300 MW by fiscal 1987, and 300 MW by fiscal 1989. Minimum lead time required for construction of new generating facilities is six to seven years and the Authority is reviewing various alternatives which will provide the additional capacity, including the alternative of coal and oil dual-fired units. PREPA is currently planning a large coal-fired power plant at Rincon. Final decisions have not been made with respect to the construction of additional generating facilities or their financing.

An additional 1,354 MW capacity would be required by the year 2000, assuming the same reserve percentage requirement as used for the year 1990.

Table 4-2
ELECTRICAL GENERATION & MAXIMUM DEMANDS FORECAST

Years Ending June 30	Peak Load (MW)	Required Reserve (MW)	Required Capacity (MW)	Additional Capacity (MW) Existing	Additional	Total	Generation (GWH)	Load Factor (%)
1980	2,097	1,845	3,942	4,207	-	4,207	13,942	75.70
1981	2,208	1,789	3,997	4,207	-	4,207	14,687	75.94
1982	2,287	1,732	4,019	4,207	-	4,207	15,209	75.90
1983	2,374	1,682	4,056	4,207	-	4,207	15,781	75.88
1984	2,465	1,657	4,122	4,207	-	4,207	16,387	75.67
1985	2,556	1,632	4,188	4,207	-	4,207	16,991	75.88
1986	2,647	1,694	4,341	4,207	300	4,507	17,593	75.88
1987	2,737	1,805	4,542	4,507	300	4,807	18,193	75.88
1988	2,827	1,855	4,682	4,807	-	4,807	18,790	75.67
1989	2,916	1,903	4,819	4,807	300	5,107	19,385	75.88
1990	3,006	1,992	4,998	5,107	-	5,107	19,978	75.88
1991	3,095						20,570	75.88
1992	3,184						21,160	75.67
1993	3,272						21,748	75.88
1994	3,360						22,336	75.88
1995	3,448						22,921	75.88
1996	3,536						23,505	75.67
1997	3,624						24,088	75.88
1998	3,711						24,669	75.88
1999	3,799						25,248	75.88
2000	3,886	2,575 1/	6,461	5,107	1,354 1/	6,461	25,827	75.67

Sources: 1. September 1979, Power Revenue Bonds Prospectus, PREPA.
2. A Generation Expansion Plan for Puerto Rico, PREPA, September 1979.

1/ Projection based on reserve percentage requirement for 1990.

Chapter 5
METHODOLOGY FOR EVALUATION OF POTENTIAL HYDROPOWER DEVELOPMENT

The methology used to evaluate the potential hydropower development in Puerto Rico is the same as that used for the SERC region as given in Chapter 5 and Appendix A of Part I of this volume. The power benefits were based on generalized power values for the Southern Companies Subarea as given in Table A-1 of Appendix A of Part I since power values were not available for Puerto Rico.

Reservoir sites proposed for water supply in the Island-Wide Water Supply Study[1/] were evaluated for hydropower potential as a part of that study. The analyses considered that water supply was the primary function of the reservoirs. The results of the water supply study and the NHS differ significantly because of this difference in project formulation. Also, the water supply study included the power plants in diversion tunnels proposed for interbasin transfers of water, whereas the NHS assumed that the power plants would be constructed at the damsites. The findings of the water supply study are provided in footnotes to the NHS inventory in Appendix B.

[1/] Island-Wide Water Supply Study for Puerto Rico, Volume III, Sep. 1980, a cooperative effort between the Commonwealth of Puerto Rico and the Jacksonville District Corps of Engineers.

Chapter 6
PUBLIC INVOLVEMENT

The Puerto Rico study was included in the information presented at the two public meetings held in Atlanta, Georgia, on 10 April 1980 and 26 August 1980, as discussed in Chapter 6 and Appendix B of Part I of this volume of the report. The Jacksonville District Engineer wrote to PREPA on 19 March 1980 advising them of the authority and status of the study. The draft report, which was distributed on 22 August 1980, also discussed the study of Puerto Rico.

Seven written responses regarding the study of Puerto Rico were received in response to the information furnished to the public. These letters are included as Appendix A of this part of the report.

Chapter 7
INVENTORY

As explained in Chapter 5 the evaluation of the undeveloped hydropower potential was accomplished through a series of computations and screening stages. The initial screening criterion was a physical potential of one MW, or more, of additional hydropower capacity. The second major criterion was economic feasibility; and the third criterion was a judgement of non-economic impacts.

Forty-two existing projects and 25 undeveloped sites were initially considered in Puerto Rico. The results of the screening and evaluation are shown in Appendix B for all developments having a potential of about one MW or more. Those developments which have passed the screening process are designated with a numeral 2 below the site identification (ID) number. No developments with a potential of one MW or more capacity have been rejected for non-economic reasons during this brief study of Puerto Rico. Potential non-economic constraints to hydropower development are identified in the last column of the tabulation. Further studies are needed to determine the significance of these constraints which are based on readily available information sources and coordination with others. Correspondence describing non-economic aspects of hydropower developments is included in Appendix A. Data on all known operational hydropower plants have been included in Appendix B regardless of the amount of additional potential. The locations of the potential developments which have passed the screening process and the existing hydropower developments are shown on the map insert.

The number of existing projects and undeveloped sites remaining after the screening steps is shown in Table 7-1. As shown, 13 existing projects and four undeveloped sites remain. Nine of the existing sites contain retired hydropower plants which may warrant reactivation.

The total potential capacity and energy of the remaining potential power developments are shown in Table 7-2. Each of the developments has a potential incremental capacity less than 15 MW. None of the nine existing hydropower production projects was found to have potential additional capacity. Thirteen other existing projects were found to have a total potential capacity and energy of about 34.9 MW and 108,800 MWH, respectively. Four undeveloped sites were found to have a potential of about 24.2 MW and 70,800 MWH.

Table 7-1
PUERTO RICO SCREENING RESULTS

Remaining Potential Developments							
				Stage 3			
Stage 1		Stage 2		Phase 1		Phase 2	
Exist.	Undev.	Exist.	Undev.	Exist.	Undev.	Exist.	Undev.
42	25	25	25	13	4	13	4

Table 7-2
PUERTO RICO POTENTIAL CAPACITY AND ENERGY

	Existing w/Power[1/]	Existing w/o Power[2/]	Undeveloped[3/]	Total
No. Sites	-	13	4	17
Capacity (MW)	-	34.9	24.2	59.1
Energy (GWH)	-	108.8	70.8	179.6

[1/]Existing hydroelectric power facilities currently generating power with the potential for additional hydroelectric capacity.
[2/]Existing dams or other water resources projects with the potential for new hydroelectric capacity.
[3/]Undeveloped sites where no dams or other engineering structure presently exists.

Chapter 8
EVALUATION

The additional electric power resources needed to fulfill demands projected through year 2000 are shown in Table 4-2. As shown, an additional electric power capacity of 791 MW will be needed by the year 1990, and an additional capacity of 2,254 MW will be needed by the year 2000.

The potential hydropower resources which appear cost competitive to other alternatives based on very cursory analyses are summarized in Chapter 7. The results of the computer analyses are shown in Appendix B. Those developments which have passed the screening process are designated with a numeral 2 below the site identification number.

The additional potential power at existing projects could be placed on line by year 1990. The undeveloped sites could be placed on line by the year 2000. Those additional power developments which could be operational by year 1990, hereafter called near-term developments, are shown in Table 8-1. Those additional developments which could be operational by year 2000, hereafter called long-term developments, are shown in Table 8-2.

The capacity factors for the additional potential hydropower developments shown in Tables 8-1 and 8-2 vary from 25 percent to 42 percent, except for one long-term site (the 7-5 site) which would have over a 90 percent capacity factor. The system load duration curve shown on Figure 4-1 is not expected to change appreciably over time. Therefore, there will be a continuing need for power in the full range of capacity factors as the demand increases. About 5.5 percent of the current demand is in the 25-42 percent capacity factor range. Therefore, of the 791 MW additional capacity needed by year 1990, about 43 MW would operate at a 25-42 percent capacity factor; and of the 2,254 MW additional capacity needed by year 2000, about 124 MW would operate in this capacity factor range.

The total potential capacity of the near-term developments is estimated at 34.9 MW; and the total potential of the near-term plus long-term developments, exclusive of the 7-5 site, is estimated at 57.7 MW. Thus, all the potential developments listed in Tables 8-1 and 8-2 could be used in the system when developed and are worthy of more detailed analysis and of serious consideration as candidates for developments as a portion of Puerto Rico's renewable energy resources. As shown, 13 could be developed by year 1990 which have a potential capacity of about 35 MW and annual energy of about 109 GWH. An additional four sites could be developed by year 2000 which have a potential capacity of about 24 MW and annual energy of about 71 GWH. The total potential capacity and annual energy of the 17 developments are about 59 MW and 180 GWH, respectively.

The above load-resources analysis does not consider the reduction in power production of existing plants due to retirements. Also, the analysis does not consider the substitution of hydropower for the increasingly high cost of thermal power production. The latter factor may be very significant due to the rising cost of non-renewable resources.

Further information on the potential developments is given in Appendix B. Those developments which could assist in meeting the year 1990 electrical power demand are designated by the numeral 1990 in the penultimate column of the table. Those developments which could be placed on line by year 2000 are designated by the numeral 2000. Field verification of the physical data should be made prior to conducting additional feasibility studies.

No attempt has been made to rank or to place a priority on the potential developments identified as near-term and long-term developments. The information presented on the physical aspects, power potential, economics, and noneconomic impacts indicate the relative value of the developments for power development. However, as previously discussed, the cursory nature of the study analyses may contribute to erroneous results for some individual sites when all factors are considered.

A prime factor which has not generally been considered is the use of the developments for other project purposes. This would in most cases deflate the power potential and economics of existing projects. Conversely, multipurpose development would enhance the power economics of undeveloped sites. None of the undeveloped sites in Puerto Rico are feasible for power development alone. All would require water supply to share in the project costs.

Detailed studies for consideration of the social, institutional, and environmental impacts and constraints of the potential developments were not made. The development of electric power at existing projects would generally impact less on the human and natural environment. This factor would deflate the value of new projects relative to existing projects for power development. Similarly, new run-of-river projects would be less detrimental on the human and natural environment than new storage projects.

The computer analysis of the value of the power potential of storage projects is generally more accurate than run-of-river projects. The amount of dependable (load following) power was based on the flow available 85 percent of the time based on historical records. Power which could be produced at lesser frequency flows was termed interruptible power. The value of interruptible capacity was assumed to be one-half the value of dependable capacity. However, the value of the dependable capacity (and energy) was based on the capacity factor of the total dependable plus interruptible capacity. Therefore, the alternative cost on which the benefits are based reflect much higher dependability and flexibility than could be achieved by a single hydropower project. It may be that through inclusion of a number of these hydropower developments in a large system that the dependability assumed could be achieved through scheduling of the use of the interruptible capacity.

The above analysis, using alternative costs based on low capacity factors and the criterion of maximizing net benefits over costs, tends to maximize the amount of capacity which can be justified at a site. This also reduces the amount of spill and lost energy.

The optimum installation is highly dependent on the interest rate that must be paid by different classes of developers and the cost of fuel for alternative thermal plants. The costs used in this study are computed using a 6-5/8 percent interest rate and 1978 price levels. The benefits are based on FERC generalized power values for the Southern Companies Subarea which were derived using a 10 percent interest rate and 1978 price levels. The costs of fuel for thermal plant alternatives were not escalated to account for the projected high increases in cost of non-renewable resources required for operation relative to other costs.

Increased emphasis on the national goals of conservation of non-renewable resources and independence from foreign oil imports would greatly enhance the demand for development of the hydropower potential. Non-economic constraints and, to some extent, economics may become secondary in importance to achievement of these goals.

Table 8-1
PUERTO RICO NEAR TERM POTENTIAL HYDROPOWER DEVELOPMENTS
NATIONAL HYDROPOWER STUDY

SITE ID NUMBER	PROJECT NAME	MUNICIPIO	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	INCREMENTAL COST ($/KW)
PROSAJ0803	ISABELA PLANT 2	AGUADILLA	903	3289	43.537	998.53
PROSAJ0804	ISABELA PLANT 3	AGUADILLA	1199	4217	40.278	961.66
PRMSAJ0024	COMERIO 1	COMERIO	7970	23682	30.268	907.95
PRMSAJ0714	COMERIO 2	COMERIO	7703	22901	30.503	911.77
PROSAJ0801	CARITE PLANT 2	GUAYAMA	1708	5697	34.703	812.20
PRDSAJ0802	CARITE PLANT 3	GUAYAMA	918	3175	43.119	889.11
PROSAJ0709	LAGO CARITE	GUAYAMA	3482	11131	27.882	732.31
PROSAJ0710	LAGO LOIZA	GURABO	2667	7954	40.699	1056.6
PRCSAJ0025	LAGO GUAYABAL	JUANA DIAZ	1556	4938	41.864	985.70
PRCSAJ0026	LAGO TOA VACA	JUANA DIAZ	1627	5605	36.121	900. 0
PRCSAJ0029	LAGO PATILLAS	PATILLAS	978	3451	43.640	989.90
PROSAJ0703	GUAJATACA LAGO	QUEBRADILLAS	963	3386	44.127	995.53
PRCSAJ0031	LAGO LA PLATA	TOA ALTA	3191	9415	37.585	983.21

Table 8-2
PUERTO RICO LONG TERM POTENTIAL HYDROPOWER DEVELOPMENTS
NATIONAL HYDROPOWER STUDY

SITE ID NUMBER	PROJECT NAME	MUNICIPIO	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	INCREMENTAL COST ($/KW)
PR6SAJ2005	CE-26	CIALES	2079	7330	434.97	21502
PR6SAJ2006	7-5 SITE	CIALES	1378	12070	202.94	24819
PR6SAJ0027	8-2 SITE	LAS MARIAS	14276	31272	146.29	4378.1
PR6SAJ2016	CE-24 SITE	MOROVIS	6457	20091	237.84	10326

PUERTO RICO
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY

SITE ID NUMBER ACTV. INV.	PROJECT NAME MUNICIPIO -NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
PRISAJ0017	LAGO GARZAS[1/]	18 8.2	HS	1279.0	7200	11500		0	
5	ADJUNTAS - VACAS	66 44.6	OP	5500	0	0			
	PREPA	6	14.3	1210.0	7200	11500			
PROSAJ0803	ISABELA PLANT 2	18 28.7	HIS .	212.0	0	0	143.22	1990	
2	AGUADILLA - DIVERSION CAN	67 4.1	OP	49200	903	3289	43.537		
	PREPA	24	100.0	103.8	903	3289.7	998.53		
PROSAJ0804	ISABELA PLANT 3	18 29.3	HIS	212.0	0	0	169.86	1990.	
2	AGUADILLA - QUEBRADA DE L	67 4.3	OP	49200	1199	4217	40.278		
	PREPA	24	100.0	131.8	1199	4217.3	961.66		
PRISAJ0019	LAGO DOS BOCAS	18 20.1	H	188.0	18000	28375		0	
5	ARECIBO - ARECIBO	66 40.0	OP	50000	0	0			
	PREPA	170	345.0	154.1	18000	28375			
PR6SAJ2005	CE-26[2/]	18 14.5	HS	416.7	0	0	3188.4	2000	E-22
2	CIALES - RIO TORO NEGR	66 30.5	FP	44400	2079	7330	434.97		
		15	63.0	384.4	2079	7330.0	21502		
PRISAJ0021	LAGO EL GUINEO	18 9.5	HI	727.0	1920	1736		0	
5	CIALES - TORO NEGRO	66 31.6	OP	2180	0	0			
	PREPA	1	4.5	629.3	1920	1736.0			
PR6SAJ2006	7-5 SITE[3/]	18 19.0	HS	206.0	0	0	2449.5	2000	E-4
2	CIALES - RIO GRANDE DE	66 27.4	FP	130000	1378	12070	202.94		
		127	284.4	169.8	1378	12070	24819		
PRMSAJ0024	COMERIO 1	18 16.1	H	47.0	0	0	716.82	1990	
2	COMERIO - LA PLATA	66 12.4	OP	500	7970	23682	30.268		
	PREPA	136	308.0	189.8	7970	23682	907.95		
PRMSAJ0714	COMERIO 2	18 15.7	H	128.0	0	0	698.56	1990	
2	COMERIO - LA PLATA	66 12.4	OP	1825	7703	22901	30.503		
	PREPA	135	308.0	184.8	7703	22901	911.77		

1/ ADDITIONAL 5,040 KW CAPACITY DOWNSTREAM WITH ADDITIONAL ANNUAL ENERGY OF 9,000 MWH.
2/ THE DESIGN CAPACITY DETERMINED IN THE ISLAND-WIDE WATER SUPPLY STUDY WAS 4,332 KW, AND ANNUAL ENERGY WAS 15,820 MWH.
3/ THE DESIGN CAPACITY DETERMINED IN THE ISLAND-WIDE WATER SUPPLY STUDY WAS 1,378 KW, AND ANNUAL ENERGY WAS 12,070 MWH.

PUERTO RICO
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME / MUNICIPIO -NAME OF STREAM / OWNER		LATITUDE / LONGITUDE / DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. / STATUS	AVE. Q (CFS)	DAM HT / MX.STOR. / PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. / INC. CAP. / TOT.CAP. (KW) (KW) (KW)	EXIST.ENRG / INC.ENERGY / TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST / ENERGY COST / INVEST.COST (1000 $) ($/MWH) ($/KW)	STUDY PROG.	POTENT. NON-ECON CON- STRAINTS
PROSAJ0801	CARITE PLANT 2		18 2.1	HIS		821.0	0	0	197.71	1990	
2	GUAYAMA	- PENSTOCK DIVE	66 6.4	OP		14960	1708	5697	34.703		
	PREPA		7		18.3	384.6	1708	5697.1	812.20		
PROSAJ0802	CARITE PLANT 3		18 0.8	HIS		821.0	0	0	136.91	1990	
2	GUAYAMA	- PENSTOCK DIVE	66 6.9	OP		14960	918	3175	43.119		
	PREPA		7		18.3	216.7	918	3175.3	889.11		
PROSAJ0709	LAGO CARITE		18 4.6	HIS		821.0	0	0	310.36	1990	
2	GUAYAMA	- LA PLATA	66 6.4	OP		14960	3482	11131	27.882		
	PREPA		7		18.3	741.2	3482	11131	732.31		
PROSAJ0710	LAGO LOIZA		18 19.6	HS		95.0	0	0	323.74	1990	
2	GURABO	- LOIZA	66 0.8	OP		30000	2667	7954	40.699		
	PRASA		206		491.0	83.5	2667	7954.5	1056.6		
PRCSAJ0025	LAGO GUAYABAL		18 5.4	IS		117.0	0	0	206.76	1990	
2	JUANA DIAZ	- JACAGUAS	66 30.1	OP		8248	1556	4938	41.864		
	COMMENWEALTH OF P. R.		49		70.8	112.7	1556	4938.8	985.70		
PRCSAJ0026	LAGO TOA VACA		18 6.1	IS		215.0	0	0	202.47	1990	
2	JUANA DIAZ	- TOA VACA	66 29.2	OP		60143	1627	5605	36.121		
	PRASA		21		46.5	200.6	1627	5605.4	900. 0		
PR6SAJ0027	8-2 SITE [1]		18 16.9	HS		259.5	0	0	4575.0	2000	
2	LAS MARIAS	- RIO GRANDE DE	67 1.5	FP		224000	14276	31272	146.29		
			127		486.0	228.9	14276	31272	4378.1		
PRISAJ0704	PRIETO		18 11.2	HI		911.0	20000	7805		0	
5	MARICAO	- PRIETO	66 51.8	OP		880	0	0			
	PREPA		36		101.4	800.0	20000	7805.0			
PR6SAJ2016	CE-24 SITE		18 17.4	HS		393.3	0	0	4778.6	2000	
2	MOROVIS	- RIO GRANDE DE	66 25.5	FP		120000	6457	20091	237.84		
			62		64.0	355.4	6457	20091	10326		

1/ THE DESIGN CAPACITY DETERMINED IN THE ISLAND-WIDE WATER SUPPLY STUDY WAS 2,119 KW, AND ANNUAL ENERGY WAS 30,040 MWH.

PUERTO RICO
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME MUNICIPIO -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
PRISAJ0800	HICACO	18 15.8	H		5000	17800		0	
5	NAGUABO - RIO ICACOS	65 47.0	OP		0	0			
	PREPA				5000	17800			
PRISAJ0708	LAGO DE MATRULLAS	18 12.7	HI	120.0	8640	15678		0	
5	OROCOVIS - MATRULLAS	66 28.8	OP	3590	0	0			
	PREPA	4	9.0	1594.4	8640	15678			
PRCSAJ0029	LAGO PATILLAS	18 1.4	I	126.6	0	0	150.62	1990	
2	PATILLAS - PATILLAS	66 1.2	OP	17073	978	3451	43.640		
	COMM P.R.	25	76.9	109.7	978	3451.4	989.90		
PR6SAJ0713	RIO PORTUGUES	18 3.7	CSRD	265.0	0	0	2328.8	0	
5	PONCE - RIO PORTUGUES	66 38.0	DM	28000	831	2925	796. 5		
	DAEN SAJ	11	20.0	213.7	831	2925.5	39330		
PROSAJ0703	GUAJATACA LAGO	18 23.9	HIS	212.0	0	0	149.44	1990	
2	QUEBRADILLAS- GUAJATACA	66 55.3	OP	49200	963	3386	44.127		
	PREPA	24	100.0	105.8	963	3386.6	995.53		
PRASAJ0030	LAGO COAMO	18 1.0	I	65.0	0	0	150.41	0	
5	SANTA ISABEL- COAMO	66 23.3	OP	1500	1078	3194	47. 93		
	COMMENWEALTH OF P. R.	66	121.0	52.9	1078	3194.0	868.55		
PRCSAJ0031	LAGO LA PLATA	18 21.0	S	131.1	0	0	353.89	1990	
2	TOA ALTA - LA PLATA	66 14.5	OP	38545	3191	9415	37.585		
	PRASA	175	399.0	114.5	3191	9415.7	983.21		
PRISAJ0032	LAGO CAONILLAS	18 16.6	HR	575.0	17600	26078			
5	UTUADO - CAONILLAS	66 39.1	OP	65800	0	0			
	PREPA	80	248.0	469.5	17600	26078			
PRISAJ0707	LAGO VIVI	18 13.9	H	205.0	4000	3939		0	
5	UTUADO - VIVI	66 40.8	OP	380	0	0			
	PREPA	29	73.0	190.0	4000	3939.0			

PUERTO RICO
NATIONAL HYDROELECTRIC POWER STUDY INVENTORY
(Continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME MUNICIPIO -NAME OF STREAM OWNER	LATITUDE (D M.M) LONGITUDE (D M.M) DR.AREA (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT (FT) MX.STOR. (AC FT) PWR. HD. (FT)	EXIST.CAP. (KW) INC. CAP. (KW) TOT.CAP. (KW)	EXIST.ENRG (MWH) INC.ENERGY (MWH) TOT.ENERGY (MWH)	ANUL. COST (1000 $) ENERGY COST ($/MWH) INVEST.COST ($/KW)	STUDY PROG.	POTENT. NON-ECON CON-STRAINTS
PRISAJ0033	LAGO LUCCHETTI	18 6.0	HI	369.0	8000	13528		0	
5	YAUCO - YAUCO	66 52.0	OP	20800	0	0			
	PREPA	56	136.0	309.6	8000	13528			
PRCSAJ0034	PRESADA LOCO	18 2.7	I	76.0	0	0	203.53	0	
5	YAUCO - LOCO	66 53.2	OP	2500	1212	3851	52.844		
	PREPA	65	151.0	65.9	1212	3851.4	1300.6		

NATIONAL HYDROPOWER STUDY
VOLUME XVI
PUERTO RICO

Appendix A
CORRESPONDENCE

CONTENTS

Commonwealth of Puerto Rico
PUERTO RICO AQUEDUCT & SEWER AUTHORITY
P. O. Box 7066 - Barrio Obrero Station
San Juan, Puerto Rico

October 1, 1980

Department of the Army
South Atlantic Division
Corps of Engineers
510 Title Bldg
30 Pryor St. S. W.
Atlanta, Georgia 30303

Re: Regional Report Volume XVI
Southeastern Electric Reliability
Council and Puerto Rico

Gentlemen:

Reference is made to the above captioned document submitted to the Puerto Rico Aqueduct and Sewer Authority (PRASA) for comments.

We have made a preliminary review of the document and found that it does not recommend construction of projects; its main purpose is for further study of the hydroelectric power potential in the region.

Actually, in Puerto Rico we have limited hydroelectric plants in operation and therefore, the experience in how it can affect our systems is not clear enough. Based on the information submitted, our comment is, that in case the hydroelectric projects are developed, care should be taken in order to avoid interference with our existing water sources and supplies.

Should you have any question concerning our comments, feel free to contact us at this office.

Cordially yours,

José A. Alonso
Chief, Planning Department

PUERTO RICO ELECTRIC POWER AUTHORITY

SAN JUAN, PUERTO RICO

CABLE ADDRESS
PREPA

G P O BOX 4267
SAN JUAN, PUERTO RICO 00936

September 22, 1980

Mr. Pleasant H. West
South Atlantic Division
Corps of Engineers
510 Title Building
30 Pryor Street, S. W.
Atlanta, Georgia 30303

Re.: Regional Report-Volume XVI
National Hydroelectric Power
Resources Study

Dear Colonel West:

We have evaluated the contents of the report of reference and as per your request some comments and inputs to it are included. Although our findings are of a general nature at deadline we will continue evaluating your results. We will restrict these observations to Chapter II of the report.

The write-up included is certainly well focused on the energy problems and solutions of Puerto Rico. We suggest, however, that the whole text be revised in order to up-date the data and statistics and to eliminate some contradictory statements and information caused by differences in data timings. These corrections will not change the results of this report, but are responsive to the proposed date of publication of this document. For example, initially the report states that we have not considered alternative fuels while further on an expansion plan of generation capacity with coal-fired units is widely discussed and included in a table.

CN 084-08167

In relation to the proposed increment of hydropower, we must inform you that PREPA is already doing investments toward the rehabilitation of the Comerío and Carite plants and in the construction of a new plant at Patillas. We are also undertaking the necessary evaluations to rehabilitate the Guajataca and the Loíza hydropower systems.

We are also very pleased with your proposed undertaking of feasibility studies for building new dams at eleven other locations here in Puerto Rico. Please let us know of the schedule and results of these evaluations. If you need our assistance in any pertinent matter, please do not hesitate to call on us.

Yours truly,

José Marina

José Marina, Director
Planning and Engineering

SADPD-B 7 October 1980

Mr. Jose Marina
Director, Planning and Engineering
Puerto Rico Electric Power Authority
GPO Box 4267
San Juan, Puerto Rico 00936

Dear Mr. Marina:

A copy of your 22 September 1980 letter regarding our National Hydropower Study draft report will be included in the record of the public meeting held in Atlanta, Georgia, on 26 August 1980.

We will review the text for any contradictory statements and data as you suggested. We have used the latest power demand and supply information available to us. If you have more current information, we would be pleased to update the report.

The purpose of our study is to select sites that warrant further study based on our cursory analysis. No authority or funding has been provided to continue the study of these sites.

Thank you for your comments and interest in the study.

Sincerely,

DAN M. MAULDIN
Acting Chief, Planning Division

BCF:
SAJEN-RF/Mr. Noble Enge, w cy
PREPA ltr, 22 Sep 80

PORTS AUTHORITY
COMMONWEALTH OF PUERTO RICO

September 22, 1980

ENG. WILSON M. LOUBRIEL
EXECUTIVE DIRECTOR

Mr. Pleasant H. West
Colonel, Corps of Engineers
Deputy Division Engineer
Department of the Army
South Atlantic Division
510 Title Building, 30 Pryor St., S. W.
Atlanta, Georgia 30303

Attention: SADPD-P

Re: Report Volume Number XVI

Dear Col. West:

In regard to the National Hydroelectric Power Resources Study for the Southeastern Electric Reliability Council and Puerto Rico, Volume XVI, we have no further comment than saying that we consider it complete and excellent.

Thank you for sending us one copy of said report.

Sincerely,

Wilson M. Loubriel
Executive Director

G.P.O. BOX 2829, SAN JUAN, PUERTO RICO 00936

ADMINISTRACION DE TERRENOS
ESTADO LIBRE ASOCIADO DE PUERTO RICO

Dirija toda su correspondencia al
Director Ejecutivo
JOSE A. SANTIAGO PADRO

Col. Pleasant H. West
Deputy Division Engineer
South Atlantic Division
Corps of Engineers
510 Title Building
30 Pryor Street, S.W. 30303

Dear Colonel West:

Reference is made to your letter dated August 20, 1980 which included the draft report on the National Hydroelectric Power Resources Study for the Southeastern Electric Reliability Council and Puerto Rico.

Subject study was reviewed and no comments on it are submitted.

Cordially,

Edna M. Acosta Sepúlveda
Administrative Assistant

avenida chardón num 916. urbanización tres monjitas, hato rey, apartado 3767, san juan, p.r. 00936 - tel. 756-5555

DEPARTMENT
OF NATURAL
RESOURCES

September 15, 1980

Mr. Pleasant H. West
Colonel, Corps of Engineers
Deputy Division Engineer
510 Title Building, 30 Pryor Street, S.W.
Atlanta, Georgia 30303

Subject: Draft Report on the National Hydroelectric Power Resources Study for the Southeastern Electric Reliability Council and Puerto Rico

Dear Colonel West:

Reference is made to the subject mentioned report received in this Department of Natural Resources on August 25, 1980.

We agree with the Chapter II of the report, related with Puerto Rico.

For more comments you should contact Eng. Alberto Bruno, Executive Director of the Electric Energy Authority.

Cordially yours,

Gabriel del Toro
Assistant Secretary
for Planning

Commonwealth of Puerto Rico, Department of Natural Resources
OFFICE: Muñoz Rivera Avenue, Stop 3, San Juan, Puerto Rico
MAILING ADDRESS: Box 5887, Puerta de Tierra, Puerto Rico 00906

1979 YEAR OF THE PAN AMERICAN GAMES

COMMONWEALTH OF PUERTO RICO
OFFICE OF THE GOVERNOR
PUERTO RICO PLANNING BOARD

MINILLAS GOVERNMENT CENTER
NORTH BLDG.. DE DIEGO AVE.
P.O. BOX 41119 SAN JUAN. P.R. 00940
TELEX — 385-9176 JP.OP.

September 4, 1980

Colonel Pleasant H. West
Deputy Division Engineer
Corps of Engineers
510 Title Building
30 Pryar St. S.W.
Atlanta, Georgia

Dear Colonel West:

In regard to your letter, dated 20 August, 1980, we are pleased to inform you that the National Hydroelectric Power Resources Study you performed has been of great help to us in the formulation of the land use policies being proposed by this Planning Board for the Land Use Plan of Puerto Rico.

In your report you include a map showing the potential sites for reservoirs. Please revise feasibility of Site CE-5, among those shown, due to the fact that quarry activities, adjacent and to the east of the proposed site, have already eliminated the eastern support for the dam.

We appreciate the information already sent to us and look forward to receive the final report once it is completed.

Sincerelly,

Miguel A. Rivera Ríos
Chairman

United States Department of the Interior
FISH AND WILDLIFE SERVICE
75 SPRING STREET S.W.
ATLANTA GEORGIA 30303

August 26, 1980

Colonel Marvin W. Rees
U.S. Army Corps of Engineers
South Atlantic Division
510 Title Building
30 Pryor St., SW
Atlanta, Georgia 30303

Dear Colonel Rees:

This is in response to your announcement of a second public meeting on the National Hydroelectric Power Study scheduled for Tuesday, August 26, 1980, at the Atlanta Civic Center. The announcement specifically requests comments on the feasibility of the listed sites which remain within the Corps' active inventory. The U.S. Fish and Wildlife Service previously made comments (June 12 and April 16, 1980) on the listed sites presented at the first public meeting on April 10.

Conversations between Service and Corps representatives stationed in Puerto Rico have revealed that the 21 potential sites identified in Puerto Rico are not feasible because of excessively high siltation and other hydrological problems. We were further informed that one project could not be economically operated and was eventually abandoned when the forebay filled in.

In addition, our agency has site-specific concerns which will be presented in subsequent evaluations of and comments on certain Corps and electric utility industry, small-scale hydro projects which are being planned, particularly in the Alabama, Tombigbee, Apalachicola and Savannah Rivers drainages. Official agency comments and recommendations will be presented under established Federal permit, CEQ and NEPA review procedures. These generic concerns relate to reduced water quality and dissolved oxygen levels, diminished water and deep water withdrawals for power generation during critical biological periods which could adversely impact anadromous and resident fisheries. As Corps and electric utility projects are retrofitted with new generating units, we strongly recommend that best available technologies be utilized to reduce mortality of fish passing through penstocks in addition to maintaining acceptable water quality and dissolved oxygen levels to perpetuate fisheries. Where feasible, the Service will participate in field inspections and preproject planning similar to the requirements for DOE/FERC hydroelectric licensing. With further development and refinement to the

Incremental Flow Methodologies being developed by our agency, modes of operation will be recommended that will accommodate instream flow requirements of critical life stage requirements for target fish species.

Sincerely yours,

Walter O. Stieglitz

Acting
Regional Director

SADPD-P 30 September 1980

Mr. Walter O. Stieglitz
Acting Regional Director
United States Department
of the Interior
Fish and Wildlife Service
75 Spring Street, SW
Atlanta, Georgia 30303

Dear Mr. Stieglitz:

A copy of your 26 August 1980 letter regarding our National Hydropower Study draft report will be included in the record of the public meeting held in Atlanta, Georgia, on 26 August 1980.

Serious siltation has occurred in many reservoirs in Puerto Rico. As you may know, some reservoirs on the island have been completely filled or essentially have no usable storage and support only a blanket of water hyacinths.

In theory, lack of storage does not necessarily preclude hydropower, as a run-of-the-river type operation might be feasible, depending upon the duration and magnitude of flow and head differential. In practice, serious siltation and small storage would probably cause severe complications at any specific site. Measures to maintain intakes open, and with effective screening, might or might not be feasible in such a case. For any undeveloped site, adequate sedimentation storage is essential.

The National Hydropower Study has not been conducted with sufficient detail to categorically cover reservoir siltation history and projection. The individual sites have not even been visited.

The purpose of the National Hydropower Study is to identify hydroelectric power potential. The results will be only a potential which has not been proven. Detailed sedimentation study and a careful evaluation of reservoir storage life would be necessary parts of any follow-up feasibility studies that may occur.

We appreciate your comments concerning the general impacts of hydropower development on anadromous and resident fisheries. You can be assured that we will give adequate consideration to your concerns when and if further planning of specific sites is implemented.

Sincerely,

DAN M. MAULDIN
Acting Chief, Planning Division

BCF:
SAJEN-RF

NATIONAL HYDROPOWER STUDY
VOLUME XVI
PUERTO RICO

Appendix B
INVENTORY

FOOTNOTES

(1) Project Identification Number:

```
            Example:   AL  C        SAM    0019
          State Code___|   |         |       |________Sequential Number
Type & Status Code ________|         |________________District Code
(Table Below)
```

Type of Operation

Status of Waterway	Run-of-River	Diversion	Reservoir	Reservoir With Diversion	Irrigation Canal	Pumped Storage
Existing	A	B	C	D	E	F
Existing with Power	G	H	I	J	K	L
Existing with Retired Power Plant	M	N	O	P	Q	R
Breached	S	T	U	V	W	X
Breached with Retired Power Plant	Y	Z	Ø	1	2	3
Undeveloped	4	5	6	7	8	9

(2) These estimates are based on readily available data which have generally not been verified in the field. Inasmuch as detailed studies have not been made, the potential incremental capacity and energy estimates overstate the actual power which can be developed in most cases, particularly at existing projects, because of the need to maintain satisfactory water levels and releases for other vital project purposes such as flood control, water supply, navigation, base flow stabilization, recreation, fish and wildlife, and environmental values.

(3) Data Item: Active in Inventory

Categories:

2 - Potential hydropower developments which warrant further study. A BCR of 1.0 or better was required to retain existing projects. A BCR of 0.7 was required to retain undeveloped sites on the basis that there would most likely be other project purposes to share in the project cost. A BCR of less than 0.7 for undeveloped sites was permitted where there was sufficient study data available to show that the benefits to other project purposes might justify a project.

5 - Potential hydropower developments screened out for economic reasons, or existing hydropower projects with less than 1,000 KW additional potential.

6 - Potential hydropower developments screened out for non-economic reasons.

(4) Data Item: Purposes

Categories:

I - Irrigation
H - Hydroelectric
C - Flood Control
N - Navigation
S - Water Supply
R - Recreation
D - Debris Control
P - Farm Pond
O - Other

(5) Data Item: Status

Categories:

IS - Identified Site
SP - Study Proposed
SA - Authorized for Study
FP - Feasibility Study in Progress
SI - Study Inactive
PA - Project Authorized
DM - GDM in Progress
UC - Under Construction
OP - Project in Operation

(6) Data Item: Study Program

Categories:

0 - Not recommended for further study at this time
1990 - Potential near-term development (power on line by year 1990)
2000 - Potential long-term development (power on line by year 2000)

(7) Data Item: Potential non-economic constraints

Categories:

E - 1 Designated National Wild & Scenic River
- 2 Qualified for National Wild & Scenic River
- 3 Under study for National Wild & Scenic River
- 4 National Rivers Inventory
- 5 Designated State Scenic River
- 6 Designated Outstanding State Waters
- 7 Considered for Outstanding State Waters
- 8 Designated National Endangered Species Habitat
- 9 Designated State Endangered Species Habitat
- 10 Potential Endangered Species Habitat
- 11 Federal Wildlife Management Lands
- 12 State Wildlife Management Lands
- 13 National Forest
- 14 Anadromous fish movement
- 15 Backwater fishery
- 16 Wetland inundation
- 17 Large area natural protective habitat
- 18 Important riparian habitat
- 19 Source of water for marsh aquatic preserve
- 20 Fishery habitat
- 21 Waterfowl area
- 22 State Forest
- 23 Divert flow from river channel
- 24 Fish hatchery

I - 1 Organized opposition
- 2 Disrupt restoration plans
- 3 Inundate existing power plants
- 4 Excessive relocations of homes, businesses, roads
- 5 Town relocation
- 6 Impact existing impoundments
- 7 Impact proposed SCS impoundments
- 8 Prime farmland
- 9 Germanna Community College
- 10 Horseshoe Bend National Military Park
- 11 Holston Ordinance, Phipps Bend Nuclear Plant
- 12 Flow lost to other purposes

C - 1 National Register of Historic Places Property
- 2 Potential National Register of Historic Places Property

(7) <u>Data Item</u>: Potential non-economic constraints (continued)

<u>Categories</u>:

R - 1 National Recreation Area
- 2 Canoe Trail
- 3 Proposed Water Trail
- 4 High Recreation Use
- 5 High Fishing Interest
- 6 Golf Course
- 7 State Park
- 8 National Park

(8) July 1978 price level. 6-5/8% interest rate. 50 year life.

☆ U.S. GOVERNMENT PRINTING OFFICE. 1982 — 371-456

NHS MAPS

Two maps are inserted into the adjacent pocket. One is an index map and one is a site location map. The primary purpose of the index map is to show the National Electric Reliability Council (NERC) regions, the Corps of Engineers division and district boundaries, and Corps office locations. A separate regional report and accompanying site location map has been prepared for each of the NERC regions depicted on the index map.

The second map shows existing and potential hydroelectric site locations for the subject region and is intended to provide general information to the reader about the sites. The size of a project is depicted by the diameter of the circle and the type of project by color. Each site symbol on the map is labeled with a four digit number which corresponds to a ten character National Hydroelectric Power Resources Study site identification code. Each part of the 10 character ID code helps to narrow down the source of information for that site. For example, a typical site identification code is shown below:

```
                 O R   A   N P P   9 9 9 9
      State ──────┘    │    │        └──── Site ID Number
Type of Project ───────┘    └──── Corps Division and District
```

Consequently, for more information about a site, one needs to determine from the map a site's state and county, the Corps division and district, and the four digit number. With the site ID number, the site can then be located in the list of sites in the regional report or in Volume XII of the NHS final report. If more detailed information is desired, the appropriate Corps division and/or district office may be contacted.

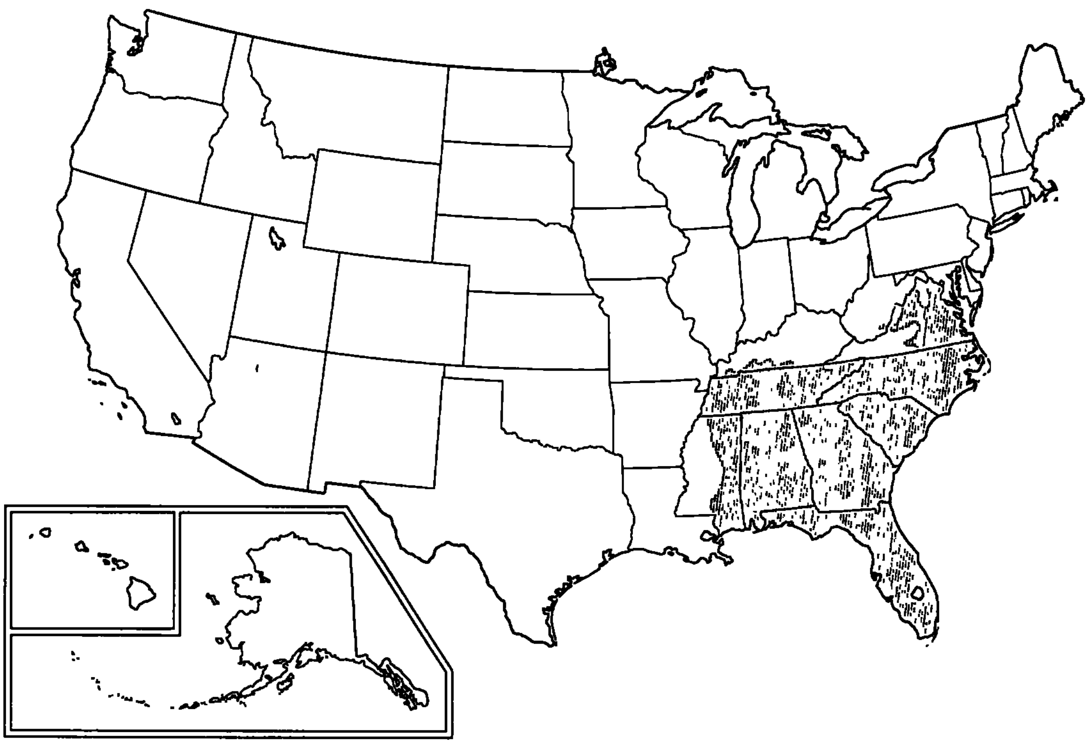
NATIONAL HYDROELECTRIC POWER
RESOURCES STUDY

INDEX TO NATIONAL ELECTRIC RELIABILITY COUNCIL REGIONS


ELECTRIC RELIABILITY COUNCIL REGIONS
OF THE UNITED STATES
Prepared for the U. S. Army Engineer Institute for Water Resources as a part of the National Hydroelectric Power Resources Study by the U. S. Geological Survey, 1980
Albers Equal Area Projection
SCALE 1:7,500,000
ELECTRIC RELIABILITY COUNCILS
NPCC Northeast Power Coordinating Council
MAAC Mid Atlantic Area Electric Reliability Coordination Agreement
ECAR East Central Area Reliability Coordination Agreement
SERC Southeastern Electric Reliability Council
MAIN Mid American Interpool Network
MARCA Mid Continent Area Reliability Coordination Agreement
SWPP Southwest Power Pool
ERCOT Electric Reliability Council of Texas
WSSC Western Systems Coordinating Council
Region boundary
Electric Reliability Council regions may overlap as a result of transmission line interties
CORPS OF ENGINEERS
Division boundary; office
District boundary; office
Division and district office
Puerto Rico is included within the SERC Region
WSCC
MARCA
MAIN
ECAR
NPCC
MAAC
SWPP
ERCOT
SERC
NORTH PACIFIC
SOUTH PACIFIC
MISSOURI RIVER
NORTH CENTRAL
NEW ENGLAND
NORTH ATLANTIC
OHIO RIVER
SOUTHWESTERN
LOWER MISSISSIPPI VALLEY
SOUTH ATLANTIC
PACIFIC OCEAN
ATLANTIC OCEAN
ALASKA

NATIONAL HYDROELECTRIC POWER RESOURCES STUDY

SOUTHEASTERN ELECTRIC RELIABILITY COUNCIL (SERC)




KENTUCKY
TENNESSEE
VIRGINIA
NORTH CAROLINA
TENNESSEE
MISSISSIPPI
GEORGIA
ALABAMA
MISSISSIPPI
ALABAMA
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
FLORIDA
W. VA.
GULF OF MEXICO
ATLANTIC OCEAN
ATLANTIC OCEAN
CARIBBEAN SEA
PUERTO RICO
SERC REGION
SOUTHEASTERN
ELECTRIC RELIABILITY COUNCIL
Subregion boundary
Electric Reliability Council regions may overlap as a result of transmission line interties
HYDROELECTRIC SITES
Existing dam: power potential fully developed
Existing dam: power potential partially developed
Existing dam: power potential undeveloped
Potential site: further study recommended
GENERATING CAPACITY
25 megawatts and greater
Less than 25 megawatts
CORPS OF ENGINEERS
Division boundary; office
District boundary; office
Division and district office
Albers Equal Area Projection
SCALE 1:2,000,000
Prepared for the U. S. Army Engineer Institute for Water Resources as a part of
the National Hydroelectric Power Resources Study by the U. S. Geological Survey, 1980
INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1981