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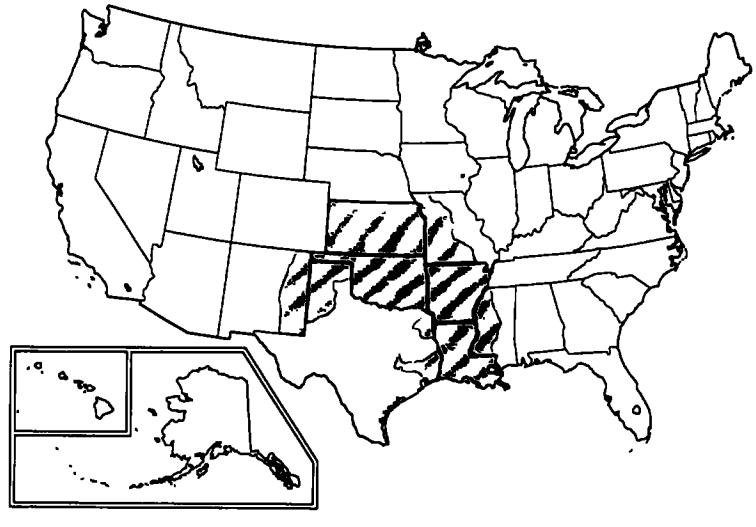
of Engineers

National Hydroelectric Power Resources Study

Volume XX
September 1981

Regional Assessment: Southwest Power Pool



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This volume briefly describes existing conditions (physical, social, economic) affecting electric supply and demand in the Southwest Power Pool. It disucsses 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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US ARMY CORPS OF ENGINEERS
NATIONAL HYDROELECTRIC POWER RESOURCES STUDY

REGIONAL REPORT: VOLUME XX
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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 XX, describes the hydroelectric power potential in the Southwest Power Pool (SWPP) region. A map depicting all sites described in the text is located in the jacket, inside back cover.

CONTENTS

CONTINUATION OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

REGIONAL OBJECTIVES

This report describes information developed during the course of the National Hydroelectric Power Resources Study and is particularly related to the developable hydropower resources within the geographic boundaries of the Southwest Power Pool (SWPP).

SWPP was organized by 11 utilities in 1942 to serve national defense loads. Currently, there are 41 members of SWPP: 23 investor-owned utilities; 11 municipal systems; 5 generation and transmission cooperative systems; a State Authority; and the Southwestern Power Administration (SWPA), a Federal marketing agency. Since 1969, SWPP has operated under a coordinating agreement which provides that each member is responsible for supplying reliable service to its customers and to minimize inadvertent power flows into and out of its system. Member utilities coordinate among themselves and, additionally, have interconnections and power exchange agreements with neighboring utilities.

There are no unique objectives for developing hydroelectric power potential within SWPP. However, development of the potential within SWPP would contribute to the National objectives of reducing dependency on imports of foreign oil and the general improvement of the welfare and security of the Nation.

The presentation is structured to show the current and projected electrical energy requirements; the physical potential for developing hydropower; the economic, environmental, political, social, and institutional constraints to developing the physical potential; and the probable use and impacts associated with developing the identified power potential within the region.

Informational listings have been presented with ranking numbers which indicate the probable order of interest which will be given to potential developments within SWPP. Detailed studies on the sites have not been made. In some cases the potential capacity and energy estimates overstate the actual power which can be developed. At existing projects, this is particularly true because of upstream diversions, releases for fish and wildlife preservation and enhancement, flood control, water supply, navigation, and recreation. Recommendations of the Secretary of the Army will be presented to the Congress along with the final report.

Chapter 2
EXISTING CONDITIONS

(RELIABILITY COUNCIL PROFILE)

2.1 TOPOGRAPHY

The streams in the Southwest Power Pool have their sources in the Sangre de Cristo, Sawatch, and Front Ranges of the Southern Rocky Mountains in Colorado and New Mexico where general mountain elevations are between 8,000 and 10,000 feet above mean sea level and some peaks rise above 14,000 feet. East of the higher ranges, there is a piedmont and plains belt which extends from 50 to 100 miles and includes linear hills, and valleys parallel with and close to the mountains and, farther east, moderately dissected plains and plateaus above which rise scattered volcanic peaks. Streams which flow through canyons and gorges at higher elevations emerge onto the adjoining plains as meandering rivers. Figure 2-1 shows major river basins in SWPP.

From eastern New Mexico and Colorado the nearly unbroken surface of the High Plains extends for many miles. Elevations diminish gradually from 5,000 feet to less than 2,500 feet at the eastern edge. The Arkansas, Cimarron, Canadian, and North Canadian Rivers flow generally eastward across the High Plains, while the Red River rises in this area where most tributary streams have intermittent flows.

To the east the High Plains becomes more dissected by stream valleys and give way to the Central Lowland in central Kansas and east of the panhandle areas of Oklahoma and Texas. Elevations gradually decrease from about 2,000 feet to between 500 and 1,000 feet in eastern Kansas, Oklahoma, and Texas. The Arbuckle and Wichita Mountains in south central and southwestern Oklahoma, the Flint Hills in southeastern Kansas, and Sandstone Hills in eastern Oklahoma provide minor relief in the lowland plains. Within the Central Lowland, drainage courses become more numerous and streamflows increase notably. In particular, the Verdigris, Grand (Neosho), and Canadian Rivers contribute large flows to the main stem of the Arkansas River.

The Ozark-Ouachita Highlands in Arkansas, Missouri, and extreme eastern Oklahoma flank the Arkansas River. The Ozark plateaus north of the Arkansas Valley and the Ouachita Mountains to the south are quite rugged with steep slopes and narrow valleys. The White River and its major tributaries, the Kings, James, Buffalo, North Fork, Black, and Little Red Rivers, which drain the Ozark area, are clear streams with rapid flows. Minor tributaties to the Arkansas River which rise in the Ozark-Ouachita Highlands are also swift flowing streams.

As the Red River emerges from the Central Lowland, it passes through the low and gently rolling Coastal Plain where elevations are generally less

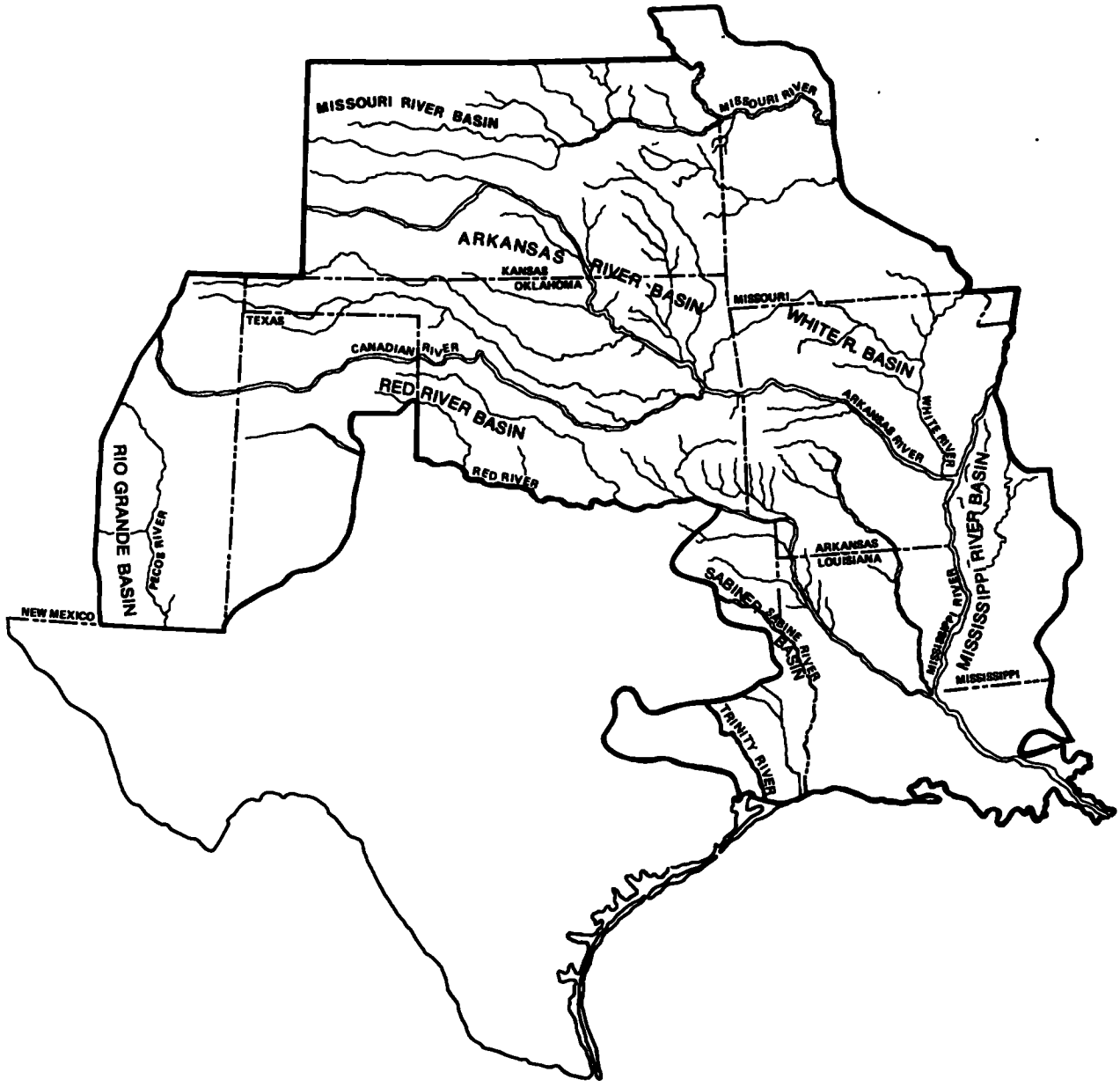


Figure 2-1
MAJOR RIVER BASINS IN SWPP

than 500 feet. The main stem of the river has a slight gradient and flows through an alluvial plain 2 to 12 miles wide. Numerous tributaries which rise in the southern Ouachitas and the hilly areas to the west, including Boggy Creek, the Kiamichi River, and Little River, contribute to the substantially increased flows of the Red River in eastern Oklahoma and western Arkansas. The Ouachita River, the major downstream tributary, rises in the Ouachita Mountains and flows through the hilly uplands of southeastern Arkansas and the alluvial valley of the Mississippi River before entering the Red River just above its mouth.

The lower Arkansas, White, and Red Rivers meander through a wide belt of alluvial flood plains in eastern Arkansas and Louisiana. The alluvial plains are broken by an occasional old riverbank and stream terraces. Elevations range from about 500 feet on Crowley Ridge, the low north-south divide between the White and Mississippi River Basins, to less than 100 feet near the mouth of the Red River in Louisiana.

The southeasterly portion of the SWPP area is composed of the flood plain of the Mississippi River plus the Gulf outlet streams such as the Sabine, Atchafalaya, and Pearl Rivers. The smaller tributaries on the east and west banks of the Mississippi River rise in the low, undulating hills which define the watershed.

Thus, the principal surface features of the SWPP area are: a relatively small extent of high mountains in the west, a large area of low mountains which rise abruptly from the Coastal and Mississippi Alluvial Plains in the east, and between the two mountain areas a broad expanse of interior lowland sloping gradually from west to east broken locally by escarpments, hills, and the relics of old, eroded mountains. Rivers with sources in areas of precipitous slopes change from swiftly flowing to slow and sluggish streams meandering through wide alluvial valleys. During the extended droughts that are characteristic of the western half of the basins, only major rivers maintain continuous flows, while in the humid eastern lowlands, recurring floods frequently spread waters over wide expanses of adjacent lowlands.

2.2 CLIMATE AND WATER RESOURCES

The climate of the area ranges from humid in the east to semiarid in the west and is characterized by long, hot summers and short, cold winters. The western half experiences temperature extremes and moisture deficiencies associated with its interior continental location. In the winter there are frequent intrusions of cold, dry continental air from the north; and in summer, hot dry winds blow from interior Mexico. Temperature extremes range between 120°F and -30°F. The climate of the eastern part of the area is influenced primarily by the warm, moist air from the Gulf of Mexico.

Annual precipitation averages about 55 inches in southeast Arkansas to eastern Louisiana, decreases rather uniformly westward to about 12 inches in the western Great Plains, then increases to 34 inches in the mountains of New Mexico. In the Great Plains both monthly and annual rainfall are low.

Severe rainstorms lasting several days are characteristic in the southeastern half of the area. Localized floods in the central and western sections result from infrequent but intense rainstorms of short duration. With the exception of the higher elevations of the Rocky Mountains, the western half of the area suffers from moisture deficiencies so that the major concern in developing the water resources is to provide supplies for agricultural, domestic, and industrial uses, although periodic floods damage numerous developed valley areas. In the eastern half of the basins, water runoff is large, the Arkansas River increasing from an average annual flow of 323,000 acre-feet near Great Bend, Kansas, to 27 million acre-feet at the Oklahoma-Arkansas boundary, and 35 million acre-feet near Little Rock; the Red River increasing from an average annual flow of 2 1/2 million acre-feet at Gainesville, Texas, to 21 million acre-feet near Shreveport, Louisiana; and the White River having an average annual flow of about 22 million acre-feet near Clarendon, Arkansas. In this eastern area floods constitute a serious problem. Figure 2-2 depicts a flow duration curve typical of semi-arid regions like the western portion of the study area, and Figure 2-3 shows a flow duration curve representative of wet regions such as the eastern portion of the study area.

Although precipitation is low in the western headwaters areas, the steep, rocky terrain produces a high runoff coefficient and lends itself to the use of long offstream conduits potentially favorable to high-head hydroelectric development. Depending upon availability of adequate storage, both high-load factor and peaking plants may be developed. On principal tributaries in the lower Arkansas Basin, the terrain and the irregular but heavy runoff generally are favorable to the development of medium-head, low-load factor peaking plants at storage reservoirs. However, several of the mainstem plants located at navigation dams could be operated as high-load factor plants. In the White River Basin, large amounts of regulatory power storage are required, particularly in the upstream reservoirs, in order to regulate effectively the high variable flows. Similarly, in the Red River Basin the hydroelectric plants require a large amount of reservoir storage to regulate flows in order to provide economical peaking-power generation.

2.3 ECONOMICS OF AREA

Economic analysis for the National Hydropower Study is based on OBERS Projections, 1972: Regional Economic Activity in the US (1974). The seven volume report was prepared jointly by the Bureau of Economic Analysis (Department of Commerce) and the Economic Research Service (Department of Agriculture). These projections have been designated by the US Water Resources Council for use in water resource planning studies. The SWPP region is approximated by the following 19 Economic Areas:

109 Salina, Kansas
110 Wichita, Kansas
111 Kansas City, Missouri - Kansas
115 Paducah, Kentucky
116 Springfield, Missouri

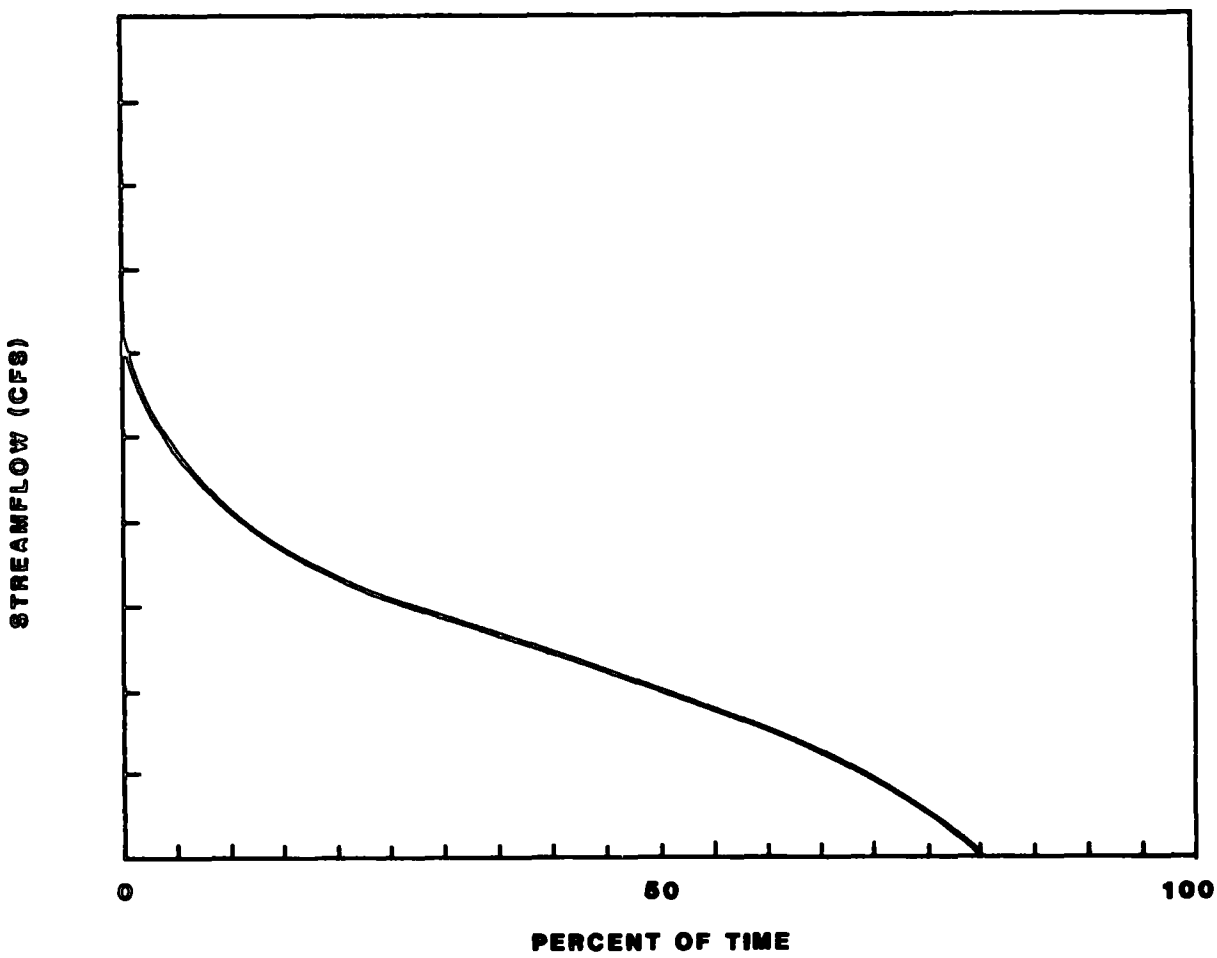


Figure 2-2

FLOW DURATION CURVE (SEMI-ARID REGION)

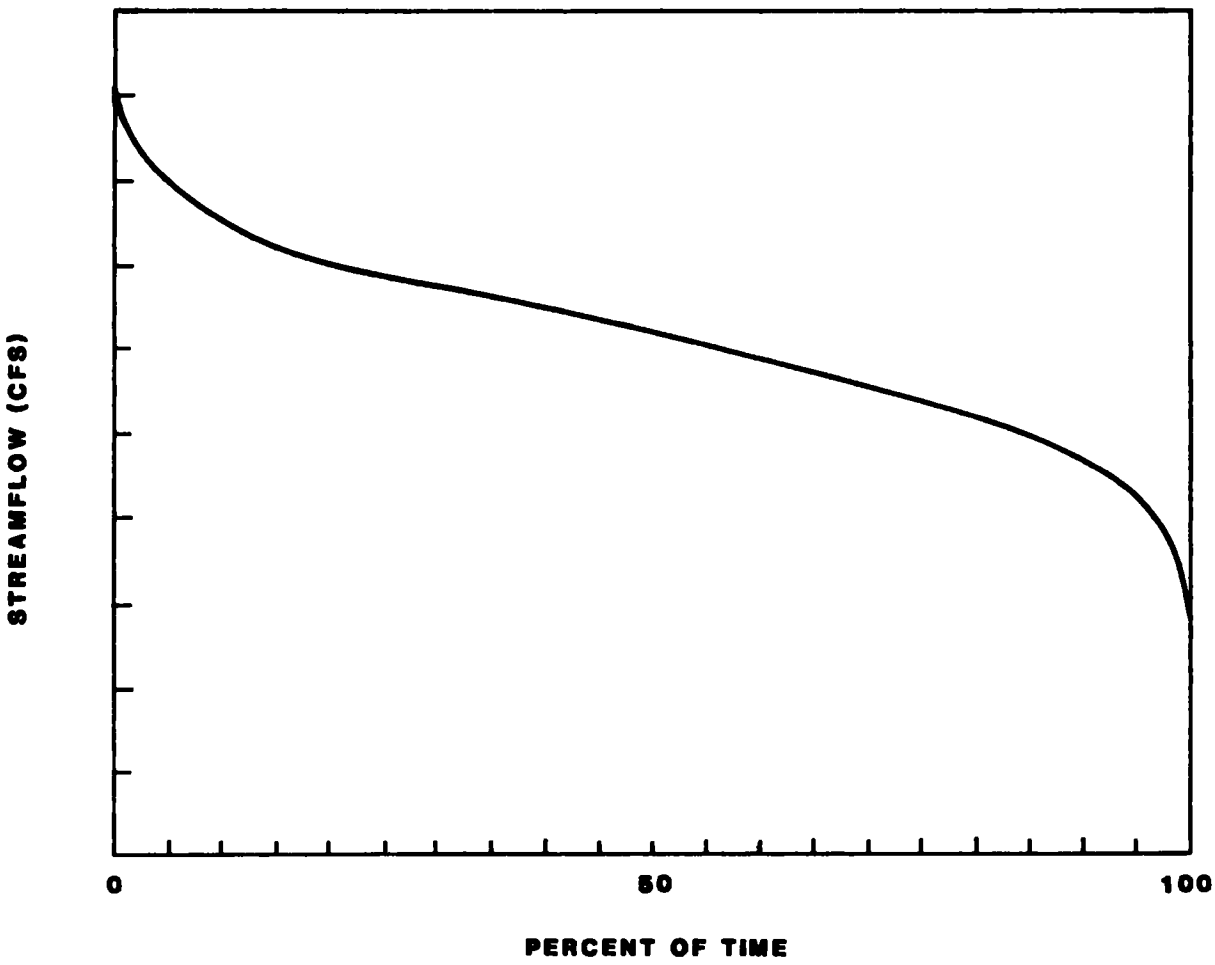
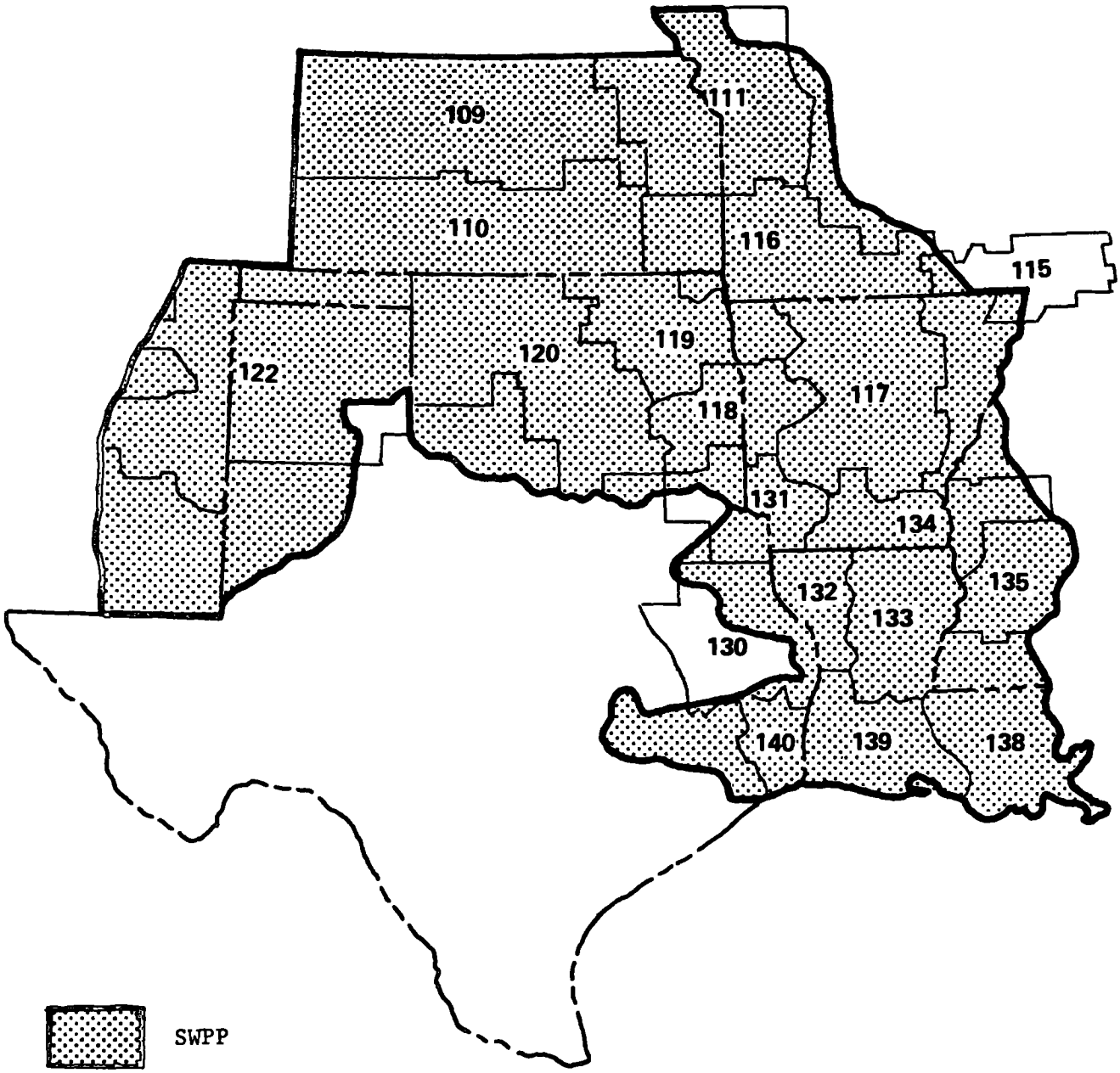


Figure 2-3
FLOW DURATION CURVE (WET REGION)



NOTE: Numbers Represent BEA Economic Areas

Figure 2-4

BEA ECONOMIC AREA APPROXIMATING SWPP

117 Little Rock - North Little Rock, Arkansas
118 Fort Smith, Arkansas - Oklahoma
119 Tulsa, Oklahoma
120 Oklahoma City, Oklahoma
122 Amarillo, Texas
130 Tyler, Texas
131 Texarkana, Texas - Arkansas
132 Shreveport, Louisiana
133 Monroe, Louisiana
134 Greenville, Mississippi
135 Jackson, Mississippi
138 New Orleans, Louisiana
139 Lake Charles, Louisiana
140 Beaumont - Port Arthur - Orange, Texas

Figure 2-4 shows the economic areas and the SWPP region. The economic areas are outlined, and those included in the SWPP analysis are identified. The shaded area represents the SWPP region. In 1978, the estimated population of the Southwest Power Pool region was 16,038,000.

In 1970, combined earnings for the economic areas were $32.5 billion (1967 dollars). Total earnings in the SWPP Region accounted for 5.8% of 1970 national earnings. SWPP's share of national earnings has decreased since 1950. For the 20-year period 1950-1970, SWPP earnings increased at an average annual rate of 3.7%, compared to 4% for the nation. Lower population growth accounts for the slower total earnings growth. Table 2-1 shows total earnings by industry for the SWPP Region.

In 1970, manufacturing produced 21.5% of total earnings. Manufacturing earnings increased 5% annually from 1950 to 1970. Government, trade, and service sectors also contributed significantly to earnings. Agricultural earnings represented 7.7% of total earnings in SWPP, a relatively high percent compared to national averages. In 1970, agricultural earnings accounted for 3.4% of total national earnings. SWPP accounted for 13% of the nation's $19.6 million in agricultural earnings. Mining earnings in SWPP represented 18% of national mining earnings, although accounting for only 3.1% of SWPP's total 1970 earnings.

Earnings accounted for 77% of personal income in SWPP in 1970. Total personal income was $42.3 billion. Per capita income (PCPI) in SWPP was $2,879 in 1970, increasing from $1,571 in 1950. The region improved its relative position in PCPI in the 20-year period, increasing from 76% to national PCPI in 1950 to 83% in 1970. The average annual growth rate of PCPI was 3.3% from 1950 to 1970.

2.4 FUTURE DEVELOPMENT

Regional economic projections developed for the US Water Resources Council and published in OBERS Projections, 1972: Regional Economic Activity in the US are the basic projections of economic and demographic

Table 2-1

TOTAL EARNINGS AND EARNINGS BY INDUSTRY - 1970 (MILLIONS OF 1967 DOLLARS)

	VALUE	% OF TOTAL
Agriculture	2,510	7.7
Mining	996	3.1
Construction	2,086	6.4
Manufacturing	6,978	21.5
Transportation Utilities	2,774	8.5
Trade	5,575	17.2
Finance	1,438	4.4
Services	4,452	13.7
Government	5,697	17.5
TOTAL	32,507	100

NOTE: SWPP Region approximated by BEA Areas 109, 110, 111, 115, 116, 117, 118, 119, 120, 122, 130, 131, 132, 133, 134, 135, 138, 139, 140.

Source: Harza, Phase I, p. VII-4.

growth used in this study (US Water Resources Council, 1974). The OBERS projections show expected growth in population, employment, personal income, and earnings. Employment and earnings by industry are projected for the United States and earnings by industry are projected for economic areas.

The OBERS projections used in this study are developed from the Bureau of the Census Series E population projections.[1/] While the national growth rate under the OBERS series E assumption is considered valid for NHS planning purposes, regional projections of population have been revised to reflect regional growth experience for the 1970-78 period. Regional growth in earnings has not been adjusted to reflect the change in population.

Commercial and Industrial Development

Table 2-2 shows projected industrial and commercial growth for the SWPP region for the years 1980, 1985, 1990, and 2000. Industrial growth is based on projected growth in manufacturing earnings, and commercial growth is indicated by growth in earnings in transportation, utilities, trade, finance services, and government. OBERS projections of these earnings for the US are also shown for comparison.

Manufacturing earnings for the SWPP region are projected to be $10.6 billion in 1980 and $20.6 billion in 2000, representing an average annual growth rate of 3.4%. Nationally, manufacturing earnings are projected to increase at a lower rate, around 2.9% annually.

Projected growth rates in commercial and related earnings are higher for the nation than for the SWPP region. Commercial earnings in SWPP are projected at $29.7 billion in 1980, increasing to $60.7 billion in 2000, representing an average annual growth rate of 3.64%. US commercial earnings are projected to increase at an average annual rate of 3.81%, increasing from a projected $538 billion in 1980 to a projected $1,137 billion in 2000. All values are in 1967 dollars.

Population

Estimated population for 1978 for the combined BEA Economic Areas approximating the SWPP region is 16,083,000. This represents a 9% increase from 1970, exceeding the national increase of 8% for the same period. Table 2-3 shows historic and projected population for the United States and the SWPP region. Two sets of projections are shown for each area.

For the United States, projections from OBERS and a summation of regional electric reliability council projections from Harza, Phase II are shown. Harza, Phase II projections differ from OBERS by less than .2% in any projection year and are considered Series E population projections. United States population is projected to increase 29% over the 30-year period.

Harza's adjusted projections for SWPP are higher than OBERS projections by 7% for each projection year. The higher growth reflects the 1970-78 growth experience and a revision of the OBERS projection to 1985. OBERS projected growth rates from 1985 to 2000 are retained in the revised projection. Population in SWPP is forecast at 18,363,000 in 2000, representing a 25% increase from 1970. Analysis of future electric power needs for SWPP are related to this population projection.

2.5 MAJOR ENERGY USERS

Annual electric energy generation in SWPP for the years 1970-78 is shown in Table 2-4. Energy generation has grown from 98,800 GWH in 1970 to 191,200 GWH in 1978, an average annual growth rate of 8.7%.

Electric energy consumption by consumer class is shown in Figure 2-5. Consumption distribution is estimated for SWPP, based on data for representative utilities.[2/] The distribution shows that residential use accounted for 24% of total use in 1977; commercial use accounted for 20%; industrial use 51%.

Growth rates in electric consumption by consumer class are shown in Table 2-5 for several utilities. Growth rates are compiled from annual growth rates for each utility by consumer class. These utilities account for 43% of total electric generation in SWPP. Middle South Utilities, Inc., is the largest electric company shown, accounting for 28% of total generation. Lowest growth rates are reported for Kansas City Power and Light and Kansas Gas and Electric Company. The highest total growth rate is reported by Central Louisiana. The higher growth rate is attributable to industrial growth.

Residential

Table 2-6 shows residential energy consumption and residential electric energy consumption by end use for SWPP. Data are estimated using 1977 residential electric use, and 1970 total residential and end use distribution. Major total energy uses are space heating, water heating, and air conditioning.

Space heating accounts for over half of total residential energy use; however, only 3.8% is supplied by electricity. Space heating accounts for only 9% of total residential electric consumption. Water heating is also supplied mainly by other energy sources, with only 5.5% from electricity.

In total electric energy use, air conditioning, refrigeration, and lighting are the major residential end uses, accounting for 36%, 21%, and 14%, respectively, of the estimated 43,100 GWH of electric energy consumed for residential purposes in SWPP in 1977.

Commercial

Commercial usage in SWPP in 1977 was 38,240 GWH, around 20% of total electric consumption. Nationally, commercial use accounted for 24% of electric energy consumption. The principal commercial uses of electric energy are for lighting, space heating and cooling, ventilation, and water heating. As shown in Table 2-5, commercial use growth rates from 1969 to 1977 have ranged from 4.74% for Kansas City Power and Light to 8.47% for Southwestern Electric Power.

Industrial

As noted earlier, industrial electric use in SWPP accounts for around 51% of total electric energy. Major electric energy using industries located in SWPP are organic and inorganic chemicals, petroleum refining, and paper and allied products. Louisiana is one of the 15 largest industrial electricity using states. In 1977, the state accounted for 3.4% of US industrial energy consumption. Total industrial energy consumption in 1977 in SWPP was 97,500 GWH.

Table 2-2

COMMERCIAL AND INDUSTRIAL EARNINGS PROJECTIONS (MILLIONS OF 1967 DOLLARS)

	INDUSTRIAL EARNINGS[1/]		COMMERCIAL EARNINGS[2/]	
	US	SWPP	US	SWPP
1980	$219,486	$10,574	$ 538,332	$29,667
1985	252,985	12,557	649,138	35,442
1990	291,595	14,920	783,434	42,428
2000	388,479	20,637	1,137,011	60,694
	FACTOR OF CHANGE FROM 1980			
1980	1.00	1.00	1.00	1.00
1985	1.15	1.19	1.21	1.19
1990	1.33	1.41	1.46	1.43
2000	1.77	1.95	2.11	2.05

1/ Manufacturing earnings projections.

2/ Transportation, utilities, trade, finance, services, and government earnings projections.

Source: US Water Resources Council. OBERS Projections, 1972: Regional Economic Activity in the US, Series E Population. Washington, April 1974. SWPP projections are summed for BEA Economic Areas shown in Section 2.3 of this report.

Table 2-3

HISTORIC AND PROJECTED POPULATION - US AND SWPP
1970 2000
(THOUSANDS)

	UNITED STATES		SWPP REGION	
	OBERS SERIES E	HARZA, ADJ	OBERS SERIES E	HARZA, ADJ
1970	203,858	203,858	14,689	14,689
1978	-	219,170[1/]	-	16,083
1980	223,532	NA	15,491	NA
1985	234,517	234,210	15,982	17,124
1990	246,039	245,826	16,497	17,644
2000	263,830	263,710	17,116	18,363
	FACTORS OF CHANGE FROM 1970			
1970	1.00	1.00	1.00	1.00
1978	1.07	1.08	-	1.09
1980	1.10	NA	1.05	NA
1985	1.15	1.15	1.09	1.17
1990	1.21	1.21	1.12	1.20
2000	1.29	1.29	1.17	1.25

1/ As reported in Harza, Phase II, Exhibit 1-4. Current Population Reports. Series P-25, No. 799, April 1979, quoted as the source of the 1978 population estimate, shows US population for 1978 at 218,059,000.

SOURCE: US Water Resources Council. OBERS Projetions, 1972, Series E Population, April 1974. ERCOT projections as shown in Harza, Phase I p. IX-5, and Phase II, Exhibits IX-1 and IX-2.

Table 2-4

ANNUAL ELECTRIC ENERGY GENERATION - SWPP

YEAR	GWH
1970	98,800[1/]
1971	109,000
1972	134,800
1973	139,900
1974	141,400
1975	154,200
1976	161,800
1977	179,500
1978	191,200

1/ Estimated SWPP using load factors.

Sources: 1970-77 Harza Phase I, Part II, Exhibit VIII-3. NERC, "8th Annual Review of Overall Reliability and Adequacy of the North American Bulk Power System," August 1978.

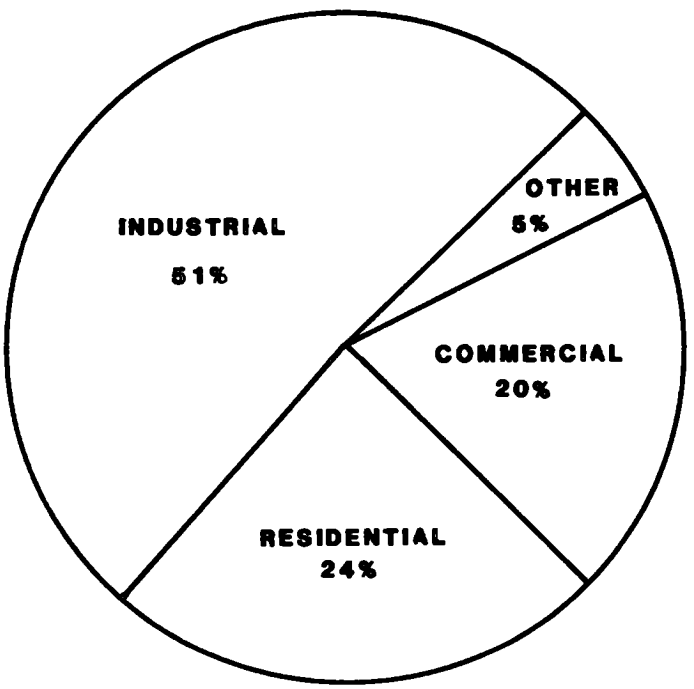


Figure 2-5

MAJOR ENERGY USERS BY CONSUMER CLASS

Table 2-5

GROWTH IN ENERGY COMSUMPTION BY CLASS
SELECTED UTILITIES
AVERAGE ANNUAL GROWTH RATES, 1969-77

UTILITY	AVERAGE ANNUAL GROWTH BY CONSUMER CLASS				NET ENERGY 1977 (GWH)
	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	TOTAL	
Central Louisiana	8.44	8.29	14.0	10.4	4,703
Kansas City Power & Light	5.01	4.74	3.89	3.87 1/	8,276
Kansas Gas & Electric	6.48	5.99	4.17	5.30	6,789
Middle South 2/ Utilities Co.	7.86	7.59	3.62	7.17	51,085
Southwestern Electric	8.64	8.47	7.84	8.38	11,487

1/ Reported

2/ Growth Rate shown to 1976 only, 1977 extrapolated

Source: Compiled from Harza, Phase I, Part II, Exhibits VIII-4, VIII-5

Table 2-8

RESIDENTIAL ENERGY USE - SWPP
(1970 DISTRIBUTION--1977 ENERGY USE)

END USE	TOTAL RESIDENTIAL ENERGY USE: GWH EQUIVALENTS	PERCENT OF TOTAL RESIDENTIAL ENERGY USE	ELECTRIC RESIDENTIAL ENERGY USE: (GWH)	PERCENT OF TOTAL RESIDENTIAL ELECTRIC ENERGY	ELECTRIC ENERGY AS A PERCENT OF TOTAL RESIDENTIAL ENERGY USE:
Space Heating	102,000	51.1	3,879	9	3.8
Water Heating	31,000	16.4	1,724	4	5.5
Cooking	7,000	6.5	862	2	12.1
Clothes Drying	2,000	1.1	1,293	3	63.0
Refrigeration	9,000	4.4	9,051	21	100.0
Lighting	6,000	3.1	6,034	14	100.0
Air Conditioning	15,500	7.8	15,500	36	100.0
Other	20,000	9.6	4,741	11	23.8
TOTAL	192,500[1/]	100.0	43,100	100	21.9

1/ 192,500 GWH = 656 trillion Btu's.

Source: Computed from Harza, Phase I, Part II, Exhibits VIII-3, VIII-5; Part 1, Table VIII-4, p. VIII-7. Harza, Phase 2, Table C-1, p. C-5, Table C-2, p. C-7.

Residential energy use data are for West South Central Census Region, Arkansas, Louisiana, Oklahoma, and Texas

FOOTNOTES

1/ US Bureau of the Census. Current Population Reports, P-25, No. 493, December 1972, plus unpublished tabulations.

2/ Representative Utilities are: Gulf States Utilities Co., Kansas City Power and Light Co., Southwestern Public Service Co., Central Louisiana Electric Co., Kansas Gas and Electric Co., and Board of Public Utilities of Kansas City. This list of utilities differs from that shown in Table 2-5. Energy consumption by consumer class was not shown for all utilities.

REFERENCES

Harza Engineering Company, 1979, "The Magnitude and Regional Distribution of Needs for Hydropower," Phase I, 1978 Electric Power Demand and Supply, Parts I and II. Draft Report: National Hydropower Study, Chicago, January 1979.

Harza Engineering Company, 1980, Phase II - Future Electric Power Demand and Supply, Draft Report: Chicago, March 1980.

US Water Resources Council, 1974, OBERS Projections, 1972: Regional Economic Activity in the US, Vols. 1 and 2: Washington, April 1974.

Chapter 3
EXISTING ENERGY SYSTEMS

As noted in the preceding chapter, in 1978 the SWPP system generated 191,200 GWH of electric energy. Capacity for generating power was 43,900 MW, as of January 1, 1978. Fuel mix was 65.2% gas, 11.8% coal, 12% oil, 5.7% hydroelectric (includes pumped storage), 3.4% combined cycle, and 1.9% nuclear.[3/] Generating capacity by fuel type is considered below.

3.1 EXISTING ENERGY EXCLUDING HYDROPOWER

Nuclear

Nuclear capability in the Southwest Power Pool region currently operating is at Arkansas Nuclear Plant Number One in Pope County, Arkansas. The 836 MW plant had a plant factor of .72 in 1978. An additional unit has been completed at the same location. The second plant adds 912 MW, giving SWPP 1,748 MW capability in nuclear power. Estimated generation for 1980 was 11,500 GWH. Nuclear power is used as base load in SWPP, and existing plants are investor-owned.

Table 3-1 shows scheduled nuclear additions in SWPP through 1987. Six additional plants are scheduled which would add 6,655 MW capability. Units are planned by investor-owned utilities.

The major favorable impact associated with nuclear power production is the assurances of a sufficient domestic energy source to permit continued high energy based economic growth in the US.

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. Impact 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, fluoride, 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.[4/]

Oil

In 1978, oil fired summer generating capability in SWPP was 10,630 MW, representing 23% of total generating capability, while in 1977 it was 5,593 MW, or 13% of total generating capability. The large increase in oil generating capability resulted primarily from gas fired plants being converted to oil as the primary fuel. Gas fired summer capability decreased from 29,771 MW in 1977 to 23,689 MW in 1978, a net reduction of 6,082 MW. Most fossil fueled plants in SWPP can use alternative fuels, which permits considerable variation in fuel source capability from year to year. Major interchange is between oil and gas fired steam plants.

Oil fired generating capability in SWPP region is used primarily for intermediate and peak load operations. Oil is considered a "swing" fuel in that it is expected to meet needs for power generation while the system is converting to more abundant and/or renewable fuel sources. Projections for its use are more uncertain than other sources. Projections of oil fired capability to 1987 for SWPP that were published in the NERC 1978 report were revised considerably in the organization's 1979 report. The projections are shown in Table 3-2. The 1979 report projects a net addition of 1,020 MW of oil fired generating capability over the 10-year period.

Projections shown in Table 4-2, page 4-8, taken from the Harza report, show less oil generating capability than the 1979 NERC projections. These projections were made before the revised NERC projections were available. Major discrepancies are between oil and gas fired capability. Overall, there is little difference in total planned oil and gas plant additions and in scheduled retirements.

Conventional oil is considered a clean fuel and is a major fuel for energy needs other than electric power. Oil produced by enhanced recovery methods and from shale oil and sand tars incur more environmental impacts than conventional production. Oil is produced extensively in the SWPP region, and enhanced oil recovery methods could be used in increasing production in existing fields. All enhanced oil recovery processes contribute to air pollution by emitting toxic substances to the atmosphere. The thermal steam drive process also releases particulates. All methods are water intensive. Several enhanced recovery methods could impact adversely on water quality through improper waste water treatment and contamination of ground water. Potential dangers to human health exist from air and water pollution. Processes with the greatest potential for damaging human health are steam injection, micellarpolymer injection, and gas miscible flooding.

Oil shale and sand tars are located in the SWPP, but their production is not considered economic at this time. A number of environmental impacts are associated with these sources at all stages: mining, processing, storing, transporting, power generating, and disposing of waste materials. Adverse impacts would be on air quality, water quality, human health, land use, and ecology. Additionally, processes are water intensive and pose particular occupational hazards.[5/] Oil fired generating capability is 94% investor-owned and 6% municipal-owned.

Table 3-1

NEW NUCLEAR PLANTS SCHEDULED TO BE COMPLETED 1981 - 1987

PLANT NAME (LOCATION)	SUMMER CAPABILITY (MW)	SCHEDULED COMPLETION
WATERFORD(3) St. Charles Parish, LA	1165	February 1982
GRAND GULF (1) Claiborne County, MS	1250	April 1982
WOLF CREEK (1) Coffee County, KS	1150	April 1983
RIVER BEND (1) West Feliciana Parish, LA	940	April 1984
GRAND GULF (2) Claiborne County, MS	1250	April 1985
BLACK FOX (1) Rogers County, OK	900[1/]	April 1987

NOTE - Number following plant name is unit number.

1/ 1150 MW capacity for this plant; balance allocated to MAIN.

Source: Southwestern Power Pool. "Regional Reliability Council Coordinated Bulk Power Supply Program," A Report to the Economic Regulatory Administration DOE, April, 1979. Updated based on data in NERC, "1980 Summary of Projected Peak Demand, Generating Capability, and Fossil Fuel Requirements for the Regional Reliability Councils of NERC," July 1980.

Table 3-2

HISTORICAL AND PROJECTED OIL GENERATING CAPABILITY - SWPP (MW)

YEAR	NATIONAL ELECTRIC RELIABILITY COUNCIL, 1978 PROJECTIONS			NATIONAL ELECTRIC RELIABILITY COUNCIL, 1979 PROJECTIONS		
	STEAM	OTHER[1]	TOTAL	STEAM	OTHER[1]	TOTAL
1977[2]	3,898	1,695	5,593	--	--	--
1978[3]	3,843	1,884	5,727	8,685	1,945	10,630
1979	4,323	1,769	6,092	8,685	2,003	10,688
1980	4,306	2,113	6,419	9.165	2,003	11,168
1981	4,262	2,329	6,591	9,165	2,111	11,276
1982	4,262	2,209	6.471	9,165	2,100	11,265
1983	4,182	2,284	6,466	9,085	2,210	11,295
1984	4,182	2,236	6,418	9,035	2,380	11,415
1985	4,164	2,248	6,412	9,035	2,378	11,413
1986	4,038	2,419	6,457	9,015	2,468	11,483
1987	4,011	2,415	6.426	9,015	2,664	11,679

1/ Combustion turbine and combined cycle.
2/ Actual.
3/ Actual as shown for 1979; projected as shown for 1978.

NOTE - Projections reflect projects where gas (rather than oil) is expected to be burned 50% or more of the time.

Source: National Electric Reliability Council "Eighth Annual Review of Overall Reliability and Adequacy of the North American Bulk Power Systems," August 1978: "Summary of Projected Peak Load, Generating Capability, and Fossil Fuel Requirements for the Regional Reliability Councils of NERC, 1979," July 1979.

Table 3-3

HISTORICAL AND PROJECTED GAS GENERATING CAPABILITY - SWPP (MW)

YEAR	NATIONAL ELECTRIC RELIABILITY COUNCIL, 1978 PROJECTIONS			NATIONAL ELECTRIC RELIABILITY COUNCIL, 1979 PROJECTIONS		
	STEAM	OTHER[1/]	TOTAL	STEAM	OTHER[1/]	TOTAL
1977[2/]	27,963	1,808	29,771	--	--	--
1978[3/]	27,923	1,808	29,731	22,028	1,661	23,689
1979	27,824	1,858	29,682	22,028	1,711	23,739
1980	27,760	1,858	29,618	22,018	1,711	23,729
1981	27,760	1,858	29,618	21,965	1,689	23,654
1982	27,707	1,858	29,565	21,871	1,689	23,560
1983	27,612	1,858	29,470	21,766	1,689	23,455
1984	27,488	1,858	29,346	21,580	1,689	23,269
1985	27,379	1,858	29,237	21,438	1,689	23,127
1986	26,983	1,858	28,841	21,227	1,689	22,916
1987	26,964	1,859	28,822	21,036	1,689	22,725
1988	--	--	--	20,611	1,689	22,300

1/ Combustion turbine and combined cycle.
2/ Actual.
3/ Actual as shown for 1979; projected as shown for 1978.

NOTE - Projections reflect projects where gas (rather than oil) is expected to be burned 50% or more of the time.

Source: National Electric Reliability Council "Eighth Annual Review of Overall Reliability and Adequacy of the North American Bulk Power Systems," August 1978: "Summary of Projected Peak Load, Generating Capability, and Fossil Fuel Requirements for the Regional Reliability Councils of NERC, 1979," July 1979.

Gas

Gas generating plants provide over half of the generating capability in SWPP. Total gas generating capability in 1978 was 23,689 MW, 93% of which was steam generating capability. Gas plants generated 113,143 GWH in 1978, representing 60% of total electric power. Gas is used for base, intermediate and peaking loads.

While gas is the major generating fuel in SWPP now, its importance is expected to decline in future years. Federal policy restrains the use of natural gas for power generation. Utilities in SWPP have recently revised their projections of gas generating capability over the next 10 years. Table 3-3 shows projections from the 1978 and 1979 reports, which show a reduction in planned gas capacity. Gas fired capacity was reduced from 1977 to 1978 as some units were converted to oil.

Projections from the Harza report, shown in Table 4-2, page 4-8, were made before the later NERC projections were available. As noted in the section on oil, oil and gas generating capability in SWPP is highly interchangeable, and the lower projection for gas is offset by higher projections for oil.

Natural gas is a clean fuel and is produced in SWPP from conventional sources. Its use as projected would not involve additional environmental impacts. Use of natural gas from Alaska and Canada would require the construction of pipelines which have the potential to cause significant environmental damage. Production of natural gas from unconventional sources in the Gulf Coast incurs possible contamination of groundwater sources and possible subsidence resulting from withdrawals of large volumes of geopressured brines.[6/]

Over 90% of gas fired generating capability is investor-owned. Municipals own around 5%, and cooperatives own around 4% of generating capability. Less than 1% is owned by state and Federal agencies.

Coal

Coal generating capability increased from 5,200 MW in 1977 to 8,602 MW in 1978. Net electrical energy generated from coal increased from 22,763 GWH to 32,042 GWH for the same period. Coal is used primarily for base and intermediate loads.

Coal is expected to increase its share of total generating capability over the next 20 years. As shown in Table 4-2, page 4-8, total coal generating capability of from 58,000 to 65,000 MW is projected in 2000, representing from 49% to 55% of total capability.

SWPP utilities have scheduled 39,042 MW of new coal fired generating capability through 1988. Of this new coal fired generating capability,

5,840 MW will be fired by lignite coal. Federal policy encourages the use of coal over other fossil fuels because there are abundant domestic reserves and its use would reduce dependence on foreign energy sources.

Although coal reserves in the SWPP region are estimated at over 40 billion tons, most are of high sulfur content, and coal for electric generation in SWPP is expected to be shipped in from western states where water supplies are limited. Other impacts from extraction operations are on human health and safety, air quality, water quality, and land use. The latter is affected in mining operations and in the need to dispose of waste materials.

Transporting of coal by rail contributes to noise and congestion in developed areas. Transporting slurry through proposed pipelines raises a number of questions on environmental, land use, social, legal, and political issues.

Power generation through direct coal burning is expected to account for 90% of coal power production through the year 2000. Coal gasification, liquefaction, and other advanced technologies are not expected to be developed extensively until after that time.

The major environmental concern with direct coal combustion is air pollution. Pollutants released into the atmosphere include sulfur dioxide, nitrogen oxides, particulates, hydrocarbons, and carbon monoxides. Sulfur dioxide and particulates can form sulfates, which can be transported several hundred miles in the atmosphere and washed out in acid rain, impacting adversely on plant and animal life. Additionally, there is some concern for continued long-term emissions of carbon dioxide which could cause global climate changes. Large quantities of fly ash and flue gas sludge result from coal combustion and create waste disposal problems.[7/]

Coal generating capability in the SWPP region is 89% investor-owned and 11% municipal-owned.

Other

Fuel sources discussed above and hydropower account for virtually all of electric generation in the SWPP region. Other sources are not projected to account for more than 1% or 2% of SWPP intermediate and peak capability by 2000.

3.2 ROLE OF HYDROPOWER WITHIN THE EXISTING ENERGY SYSTEM

Hydropower comprises around 5.7% of total generating capability in SWPP. Conventional hydropower accounts for 5% of total generating capability, and pumped storage accounts for the remaining percentage. In 1978, the SWPP system reported 2,207 MW of conventional hydropower generation. Net energy generated for 1978 was 5,185 GWH from conventional hydro, representing 2.7%

of net electric generation in SWPP. Hydropower in SWPP is primarily low load factor peaking power.

Existing hydropower plants are somewhat concentrated in the Ozark Plateaus and Ouachita Mountains, in southern Missouri, Northeastern Arkansas, and eastern Oklahoma. Plants in these regions account for 87% of conventional hydropower generating capability in SWPP.

Table 3-4 shows hydropower plants in SWPP. Plants are listed by ownership class. Hydroelectric generating capability is predominantly Federally owned; 78% belongs to the US Army Corps of Engineers. Grand River Dam Authority (GRDA), and agency of the State of Oklahoma, owns 18%; the remaining percentage belongs to private utilities. Arkansas Power and Light, a subsidiary of Middle South Utilities, Inc., owns 69 MW of hydro capability. This represents less than 1% of MSUI's total capability. Empire District has 16 MW of hydro capability located on the White River in Missouri. This represents 3.5% of the utility's total capability. The plant operates with an average annual plant factor of .67 which is unusually high for hydro plants in SWPP. All private plants listed have been in operation since the 1930's or earlier.

GRDA is a cost-of-service agency providing electric service to customers in 24 counties in northeastern Oklahoma. Currently, 90% of its owned generating capability is hydroelectric, and over half is pumped storage. Hydroelectric power provides less than 20% of GRDA's total power needs. Additional power is purchased from Public Service Company of Oklahoma. The extra power is supplied through an agreement which provides for the optimum utilization of the generating capability of both GRDA and Public Service Company.

Federal capability in the SWPP region is located at 20 Corps of Engineers projects in Arkansas, Missouri, Oklahoma, and Texas. Total capability at these plants is 1,935 MW. An additional 160 MW of pumped storage is nearing completion at Harry S. Truman in Missouri. Clarence Cannon, also in Missouri, is scheduled to have 58 MW of generating capability on line in 1982. Harry S. Truman and Clarence Cannon are also Corps of Engineers projects.

Power from Corps of Engineers projects is marketed through the Southwestern Power Administration (SWPA), a Federal agency under the Department of Energy. SWPA's marketing area covers the States of Arkansas, Louisiana, Missouri, Oklahoma, Kansas, and Texas. The agency markets four basic classes of power to its customers: firm power, peaking power, interruptable capacity, and excess energy. The agency is phasing out firm power services as contracts expire since hydropower production marketed by SWPA is not well suited to such service. Peaking power contracts typically guarantee a minimum yearly usage of 1,200 hours per KW of peaking power. Interruptable capacity service generally involves a guaranteed capacity within a time range, but not for a specific time of production. Energy produced from water that would otherwise spill at reservoirs is marketed as excess energy. It is not a dependable source of power for customers and is marketed at an energy rate only, since the power does not reduce their capacity requirements.

Table 3 - 4

HYDROELECTRIC GENERATING CAPACITY IN SWPP

SITE, STREAM, STATE	YEAR COMPLETED	PROJECT PURPOSES[1/]	TYPE STORAGE[2/]	DRAINAGE AREA (SQ MI)	EFFECTIVE HEAD (FEET)	CAPACITY MW	AVERAGE ANNUAL ENERGY (GWH)	PLANT FACTOR
FEDERALLY OWNED PROJECTS: CORPS OF ENGINEERS:								
Beaver, White R., AR	1963	CH	RES	1,186	218	112	172.0	0.17
Broken Bow, Mountain Fork, OK	1968	CRHSO	RES	754	166	100	129.0	0.14
Bull Shoals, White R., AR	1951	CH	RES	6,036	243	340	785.0	0.26
Dardanelle, Arkansas R., AR	1969	NH	RR	153,703	49	124	613.0	0.56
DeGray, Caddo R., AR	1972	HCSRO	RES	453	175	40	90.0	0.15
Denison, Red R., OK-TX[3/]	1944	CSHNO	RES	39,719	92	70	244.0	0.39
Eufaula, Canadian R., OK	1964	CSHN	RES	47,522	77	90	260.3	0.33
Fort Gibson, Grand R., OK	1979	CH	RES	12,492	58	45	190.5	0.48
Greers Ferry, Little Red R., AR	1962	CH	RES	1,446	184	96	189.0	0.22
Lake Greeson, Little Missouri R., AR	1950	HCR	RES	273	132	25.5	31.6	0.14
Keystone, Arkansas R., OK	1964	CSHNRO	RES	74,506	74.5	70	228.0	0.37
Norfork, North Fork R., AR	1944	CH	RES	1,806	175.5	80	184.0	0.30
Lake Ouachita, Ouachita R., AR	1953	HCR	RES	1,105	168	75	165.8	0.25
Ozark Lock and Dam, Arkansas, R., AR	1969	NH	RR	151,820	34	100	429.0	0.48
Robert S. Kerr, Arkansas R., OK	1970	NHRO	RR	147,756	40.5	110	459.0	0.47
Sam Rayburn, Angelina R., TX	1965	CSRH	RES	3,449	72	52	127.6	0.28
Stockton, Sac R., MO	—	CH	RES	1,160	91	45.2	55.0	0.13
Table Rock, White R., MO	1959	CH	RES	4,020	204	200	495.0	0.28
Tenkiller, Illinois R., OK	1952	CH	RES	1,610	133	36	95.1	0.31
Webbers Falls, Arkansas R., OK	1970	NHRO	RR	97,033	26.5	60	213.3	0.40
FEDERAL PROJECTS UNDER CONSTRUCTION: CORPS OF ENGINEERS:								
Clarence Cannon, Salt R., MO	1981	CHRSO	RES	2,318	128	58		
Harry S. Truman, Osage R., MO (pumped storage)	1980	CHR	RES	-	-	160		

Table 3 - 4 (continued)

SITE, STREAM, STATE	YEAR COMPLETED	PROJECT PURPOSES[1/]	TYPE STORAGE[2/]	DRAINAGE AREA (SQ MI)	EFFECTIVE HEAD (FEET)	CAPACITY MW	AVERAGE ANNUAL ENERGY (GWH)	PLANT FACTOR
STATE OWNED PROJECTS:								
OK - GRAND RIVER DAM AUTHORITY:								
Markum Ferry, Grand R., OK	1964	HC	RR	11,533	52	100	190.0	0.21
Pensacola, Grand R., OK	1940	HC	RES	10,298	121	90	340.6	0.43
Salina, Grand R., OK (pumped storage)			RES			260		
LA-TX, SABINE RIVER AUTHORITY:								
Toledo Bend, Sabine R., LA-TX[4/]	1969	IHRC	RES	7,178	72	81	215.0	0.30
INVESTOR-OWNED PROJECTS:								
MIDDLE SOUTH UTILITIES:								
L. Catherine, Ouachita R., AR	1932	HRO	RES	1,548	55	11	43.2	0.44
L. Hamilton, Ouachita R., AR	1924	HRCS	RES	1,458	95	58	89.2	0.17
EMPIRE DISTRICT ELECTRIC:								
Ozark Beach, White R., MO	1913	H	RES	4,500	62	16	94.4	0.67
OTHER:								
Bowersock, Kansas R., KS	NA	H	RR	58,420	20	2.4	9.3	.44
Niangua Dam, Niangua R., MO	NA	H	RR	627	30	3.0	10.0	.38

1/ I = Irrigation, H = Hydroelectric, C = Flood Control, N = Navigation, S = Water Supply, R = Recreation, O = Other

2/ RES = Reservoir, RR = Run of river

3/ 1/2 of capacity in ERCOT system

4/ Not a member of SWPP, located in area

SWPA owns transmission facilities in SWPP which are integrated with other utilities in the region. All Federal projects except Lake Greeson (Narrows) and Sam Rayburn are operated as a part of SWPA's integrated system.[8/] SWPA operates through contracts and agreements with other utilities to effectively use electric production in the region. Power is placed on grid, and interchange and some wheeling arrangements are used to provide service to customers. Power from isolated projects is marketed locally.

PARAMETERS GOVERNING USE OF EXISTING HYDROPOWER

Hydroelectric power plants can be brought on line quickly and can be easily utilized to meet varying power demand levels, the most efficient uses of the limited hydropower capability in the SWPP region would be for peaking and for smoothing the remaining intermediate and base-load power demand. A number of factors, however, prevent hydroelectric plants from being operated to optimize their contribution to the total electric power system.

Approximately 80% of the hydroelectric power capability in the SWPP region has been developed at Corps of Engineers projects as a part of a multiple purpose project. Corps projects are planned, justified, and authorized to serve specific purposes, e.g., flood control, water supply, navigation, recreation, etc. Reservoirs are operated to serve all authorized purposes. It is seldom possible to operate to optimize all project purposes at once. Balancing of operating procedures is further complicated by additional beneficial uses such as lake shore, lake surface, and downstream recreation which have developed subsequent to authorization and construction of many projects.

Multiple purpose operating procedures are usually developed and implemented which assure long-term balanced benefits to the authorized project purposes and also consider the needs of the additional beneficial uses of the water resources. Needs for authorized project purposes, however, have precedence over nonauthorized beneficial uses, and at times nonauthorized beneficial uses are not well served by required operating procedures. Conflicts of interest are frequently expressed during times of low flows when pool levels are drawn down to supply water demands, and also when release fluctuations adversely affect navigation or instream recreation uses.

Management of reservoir storage to supply water for any demand such as hydropower, water supply, or irrigation requires fluctuations of both the reservoir, pool elevation and the downstream releases. Fluctuations are wider if hydroelectric power plants are operated at higher production levels over shorter time periods to serve peak loads. Matching hydroelectric power generation to the varying electric power demands would also require significant reservoir storage.

The Southwestern Power Administration (SWPA) markets all power produced at Corps of Engineers projects. It is the major hydroelectric power marketing entity in the region. SWPA's authority to market power from Corps projects is derived from Section 5 of the Flood Control Act of 1944. Congress

requires the power to be marketed "in such a manner to encourage the most widespread use thereof at the lowest possible rates to consumers, consistent with sound business practices."[9/]

The availability of relatively inexpensive alternative energy sources (e.g., oil and gas) within the region during past years placed significant marketing pressure on SWPA to offer as much "firm" or dependable peaking power as possible from the Corps projects in order to obtain sufficient revenues to repay the costs of production. Since the relative price of the alternative energy sources has increased, SWPA should be able to alter marketing procedures to sell power and energy as available rather than on a "firm" schedule. While these revisions in marketing arrangements would not optimize hydropower's contribution to the region's electric power system, these revisions should ease some of the strains on multiple purpose operations at many Corps projects.

3.3 POWER EXCHANGES AND INTERTIES

SWPP has interties with three neighboring councils:

- MAIN - Mid-America Interpool Network
- MARCA - Mid-Continent Area Reliability Council
- SERC - Southeastern Electric Reliability Council

Power exchanges exist between systems within SWPP and the neighboring councils. Power exchanged between councils varies from year to year. During 1977 these power exchanges with the neighboring councils were as follows:

FROM			TO
MAIN	883	Net GWH	SWPP
MARCA	669	Net GWH	SWPP
SWPP	660	Net GWH	SERC

Possibilities of new interconnections between systems in SWPP and SERC have been investigated. Interconnections between SWPP and ERCOT are being negotiated. Further interconnection and exchange of power between systems in SWPP and MARCA have also been studied. Figure 3-1 shows projected emergency transfer capabilities between SWPP and neighboring electric reliability councils. While no capability level has been established between SWPP and ERCOT, interconnections between these two reliability councils are being negotiated.[11/] No transfer capability between SWPP and WSCC is planned.

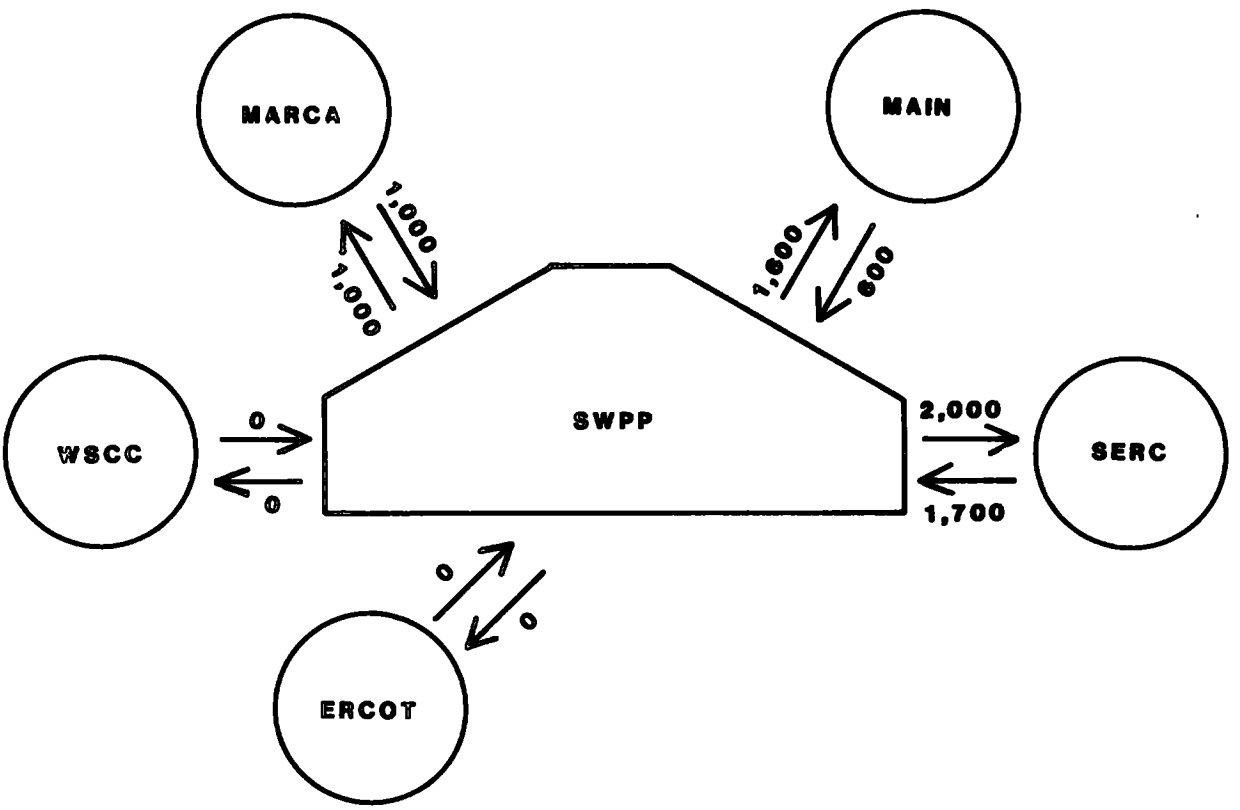


Figure 3-1

EMERGENCY TRANSFER CAPABILITIES
BETWEEN RELIABILITY COUNCILS (MW)

SUMMER 1988

FOOTNOTES

3/ Harza, Phase 1, Part II, Exhibit VIII-7. Does not include Toledo Bend, Sabine Parish, LA, property of Sabine River Authorities of Louisiana and Texas, nonmembers of SWPP. The plant has 81 MW of generating capability.

4/ US Department of Energy. "National Energy Plan II," Appendix, Environmental Trends and Impacts. Washington, DC, 1979.

5/ Ibid.

6/ Ibid.

7/ Ibid.

8/ DeGray and Lake Ouachita (Blakely Mountains) are operated under exchange agreements with Arkansas Power and Light.

9/ Federal Register, Volume 44, No. 150, August 2, 1979, p. 45468. Statutory authority is Section 5 of the Flood Control Act of 1944. (58 Statute 890, 16 USCA 825s).

10/ Federal Register, Volume 44, No. 242, December 14, 1979, Water Resources Council, "Procedures for Evaluation of National Economics Development (NED) Benefits and Costs in Water Resources Planning (Level C); Final Rule."

11/ Letter from SWPP, dated 22 October, 1980.

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Harza Engineering Company, 1979, "The Magnitude and Regional Distribution of Needs for Hydropower," Phase I, 1978 Electric Power Demand and Supply, Parts I and II. DRAFT REPORT: National Hydropower Study, Chicago, January 1979.

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US Department of Energy, National Energy Plan II, Appendix II. Environmental Trends and Impacts, May 1979.

Chapter 4

DEMAND SUMMARY

To define a reasonable range of future electricity demands, three electricity projections (Projections I, II, and III) are developed from published and readily available information and data on electricity demand forecasts.

Projection I is derived from member utilities of SWPP. Each NERC region is required to forecast annual electric demand and supply for the next 10 years, and provide a "conceptual planning" projection for the following 10 years. The conceptual planning projection is for peak demand. The reports filed by the utilities through NERC to the Department of Energy on April 1, 1979 were used in this study.

Projection II is derived from forecasts made by the Institute for Energy Analysis (IEA) at the Oak Ridge Associated Universities in September 1976. The main finding of the IEA study is that both the Gross National Product (GNP) and energy demand are likely to grow significantly more slowly than has been assumed in most analyses of energy policy. From this study, the annual per capita electric energy consumption growth rate in the United States is projected to be 2.6% for the period 1978-2000.[13/]

Projection III is based on the "Consensus Forecast of US Electricity Demand." The electricity demand in the "Consensus Forecast" was derived from an average of 15 forecasts made by private and Federal economists in the post-embargo period.[14/] The forecasts are conservation oriented and do not reflect historical growth trends of the pre-embargo period. Based on this study, average annual growth in per capita electric energy consumption will increase at a decreasing rate over the projection period. The rate of increase from 1978 to 1985 is 4.5%; it declines to 4.0% from 1985 to 1990; to 3.3% from 1990 to 1995; and to 3.2% for the 1995-2000 period.

Projections II and III are based on per capita electric energy growth rates. Adjusted OBERS population projections in Table 2-3, page 2-13, are used with Projections II and III to project total electric energy demand in SWPP. Projection I is projected as total electric energy demand to 1988. To project total electric energy demand to 2000 for the utility projection, peak load projections to 1998 are related to the projected 1985-88 load factor, and extrapolated to 2000.

A summary of the alternative projections is shown in Table 4-1. From these projections, the median forecast for each year is selected as representative of future demand throughout the projection period. This convention of using the median of the three alternative projections presented

Table 4-1

ALTERNATIVE ELECTRIC ENERGY DEMAND 1978 AND PROJECTED 1985-2000

	PROJECTION I		PROJECTION II		PROJECTION III*	
	TOTAL DEMAND (1000 GWH)	PER CAPITA DEMAND (MWH)	TOTAL DEMAND (1000 GWH)	PER CAPITA DEMAND (MWH)	TOTAL DEMAND (1000 GWH)	PER CAPITA DEMAND (MWH)
1978	191.6	11.9	191.6	11.9	191.6	11.9
1985	293.2	17.1	244.2	14.3	277.6	16.2
1990	390.1	22.1	286.0	16.2	348.0	19.7
1995	511.0	28.4	331.7	18.4	417.6	23.2
2000	652.3	35.5	384.8	21.0	498.7	27.2
			FACTORS OF CHANGE FROM 1978			
1978	1.00	1.00	1.00	1.00	1.00	1.00
1985	1.53	1.44	1.27	1.20	1.45	1.36
1990	2.04	1.86	1.49	1.36	1.82	1.66
1995	2.67	2.39	1.73	1.55	2.18	1.95
2000	3.40	2.98	2.01	1.76	2.60	2.29

*Representative growth rate for SWPP.

Source: Harza, "The Magnitude and Regional Distribution of Needs for Hydropower," Phase II, Exhibit VIII-2, March 1980.

for each ERC region as the projections for analysis, is adopted for the National Hydropower Study to present a reasonably coordinated scenario of the demand for hydroelectric power among the regional electric reliability councils. It is not intended as a planning projection, but rather as a representative projection to show the relations of developable hydropower to future capacity needs. In SWPP, Projection III is the median projection for the total period.

4.1 CAPACITY

Figure 4-1 presents alternative peak demand projections for SWPP to 2000. Projection I is derived from the utilities forecasts. Peak demand for 2000 is extrapolated at the 1995-1998 peak demand projection rate. Peak demand projections for Projections II and III are estimated from total demand projections and from projected load factors. Load factors projected by the utilities are used to project peak demand from total demand for Projections I and II. The load factor for 1985 is forecast at 56.6%, and for subsequent years, 56.8%.

Projection I is the highest forecast. Under this projection, peak demand will increase to 131,100 MW in 2000, from 39,200 MW in 1978, an average annual 5.6% increase. This is considerably lower than peak demand growth in the 1970's. From 1970 to 1978, peak demand increased from 20,100 MW to 39,200 MW, an average annual growth of 9.4%.

Under Projection II assumptions, peak demand would increase only to 77,300 MW in 2000, at an averge annual rate of 3.1% from 1978. This projection assumes that considerable effort will be made to reduce electric energy demand through technologic improvements and economic incentives.

Projection III forecasts peak demand at 100,200 MW in 2000, increasing at an average annual rate of 4.4% from 1978. As a consensus forecast, this represents an average of the projections of a number of forecasters. This is the median projection for 11 years shown, and is the projection used in the analysis of the role that hydropower can play in future electric energy demand.

Reserve margins for SWPP are 19% for 1985, and at 18% for the remaining projection years. Under the median projection, resources needed to serve demand will increase to 118,300 MW in 2000.

4.2 ENERGY

Total energy demand from the alternative projections are shown in Figure 4-2. Total energy demand in 1978 was 191,600 GWH. Projected growth in energy demand ranges from 384,800 GWH under the lower projection to 632,300 GWH under the highest projection. The median projection shows energy demand increasing to 498,700 GWH in 2000. As noted earlier, this is the projection used to analyze the need for hydropower development.

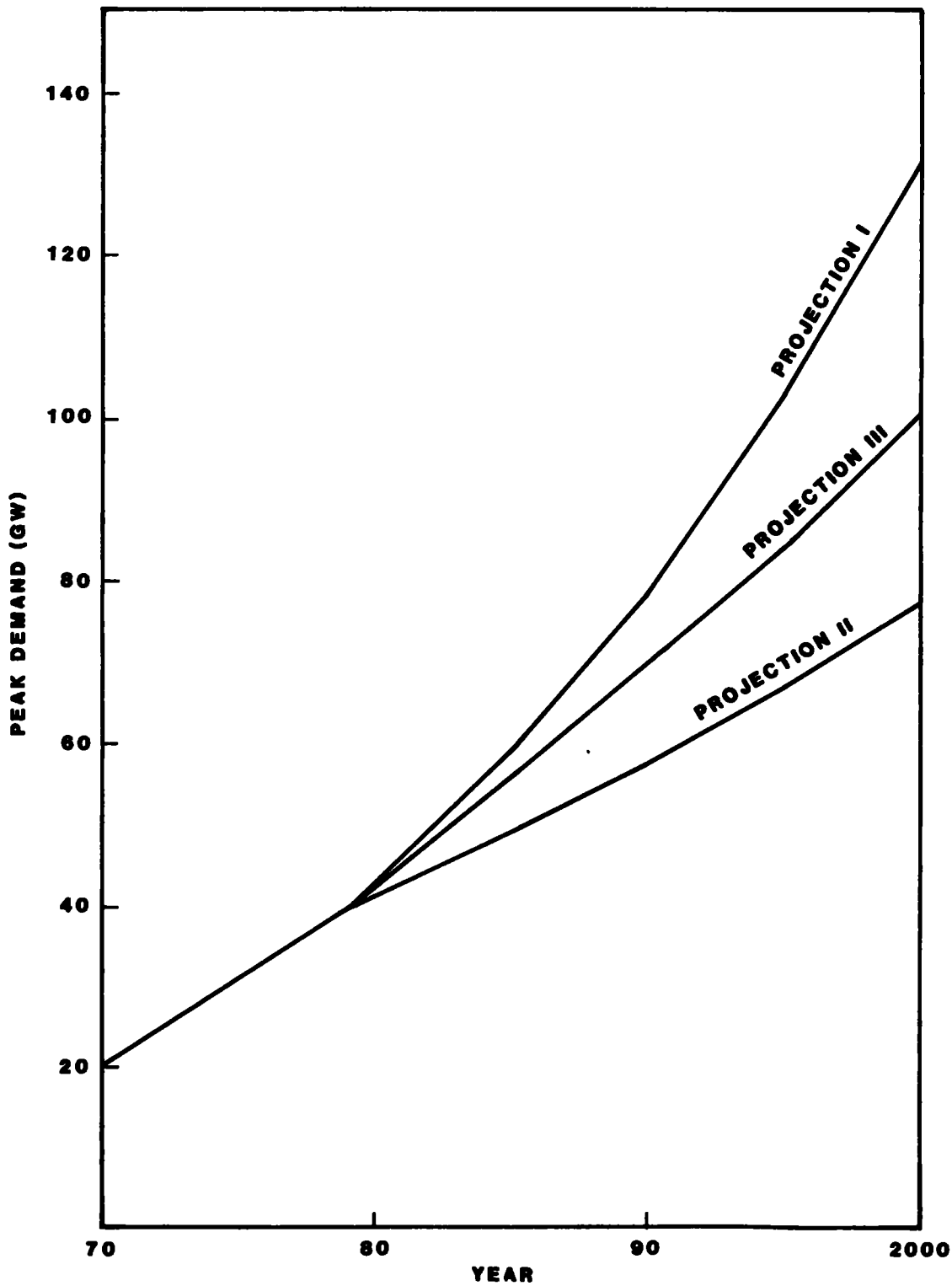


Figure 4-1
PEAK DEMAND

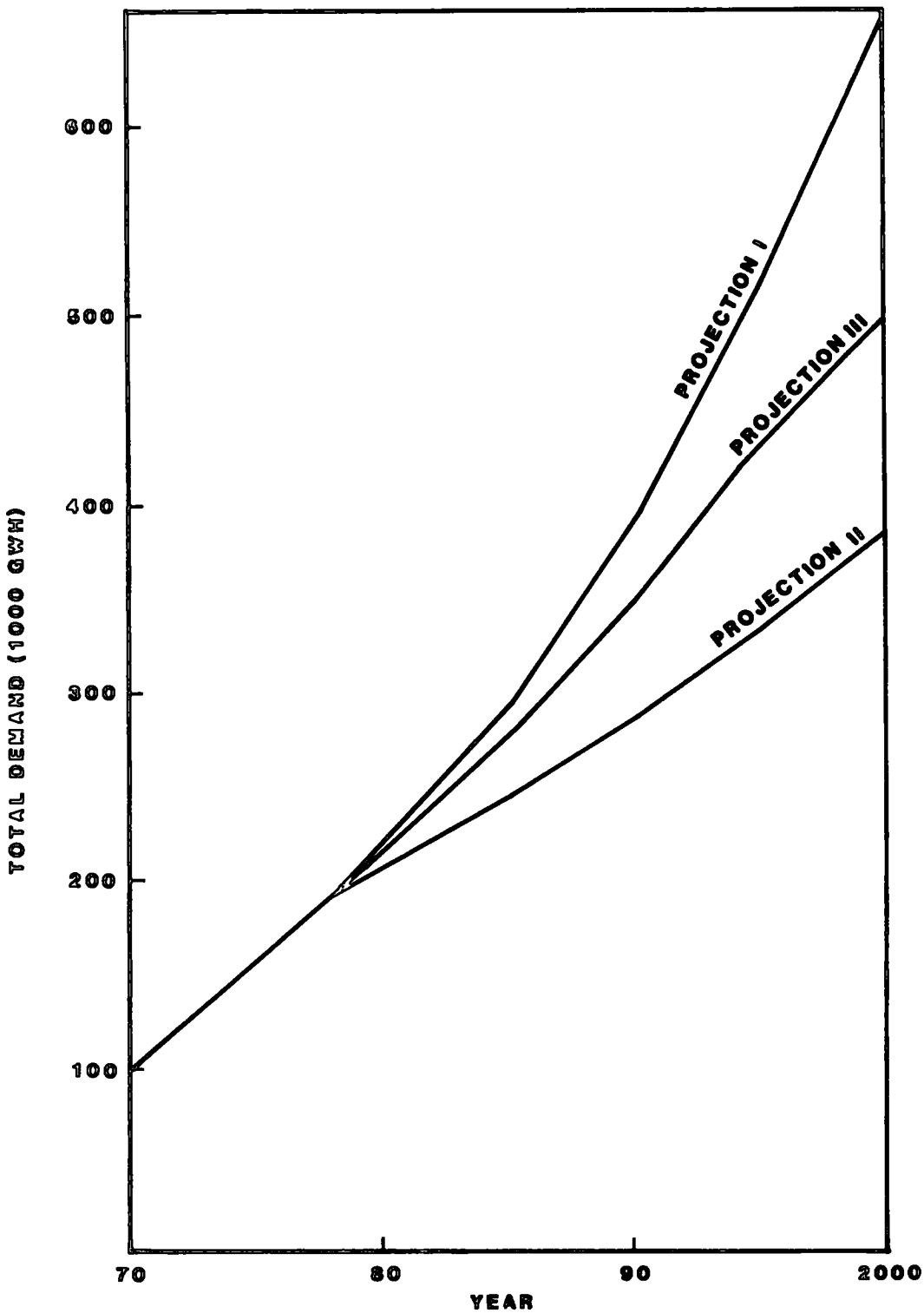


Figure 4-2
TOTAL DEMAND

Demand for electric energy varies over the day, week, and year. Annual seasonal variations are represented by a summer peak, winter peak, and off-season. Seasonal peak varies by region, but most regions, including SWPP, experience the highest peak load in summer.

Figure 4-3 shows weekly load curve representing summer peak load in SWPP. Peak, intermediate, and base loads are designated on the figure. As defined for this study, base load is the mean of the Monday-Friday minimum load's, plus 10%.[15/] 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. It usually lasts from 12 to 14 hours, beginning in the early morning and lasting until late afternoon. As shown in Figure 4-3, base load in SWPP for 1977 is estimated at around 65% of the load demand, intermediate load at around 23%, and peak load the remaining 12%.

4.3 PROJECTED GENERATION MIX

Projected generating capability, fuel, and load mix to 2000 are shown in Table 4-2. Based on the median projection, total capability needs for SWPP will increase from 46,500 MW in 1978 to 66,600 MW in 1985, to 82,500 MW in 1990, to 97,900 MW in 1995, and to 118,300 in 2000. Over the 22-year period, an additional 71,800 MW of net capability will be needed. While only ranges are projected for fuel and load mixes, the table shows that base load is projected to account for a higher percentage of total load than it currently does, and that coal is expected to be the major base load fuel in 2000. Peak load is also projected to increase its share of total load, while intermediate load shows a small decline. Coal is also projected to be used more extensively in intermediate load generation. The changing pattern of generating fuel mix is depicted more graphically in Figure 4-4.

Conventional hydropower is projected to account for from 3% to 5% of total generating capability in 1985, and from 2% to 4% of generating capability for subsequent years. As noted earlier, conventional hydropower capability in SWPP is currently 2,207 MW. Additional hydropower capability could contribute to future needs in SWPP. Assessment of developable hydropower is accomplished using an evaluation procedure developed for the nation. Chapter 5 describes the methodologies used in the national study. Variations pertinent to the SWPP region are covered in Chapter 7.

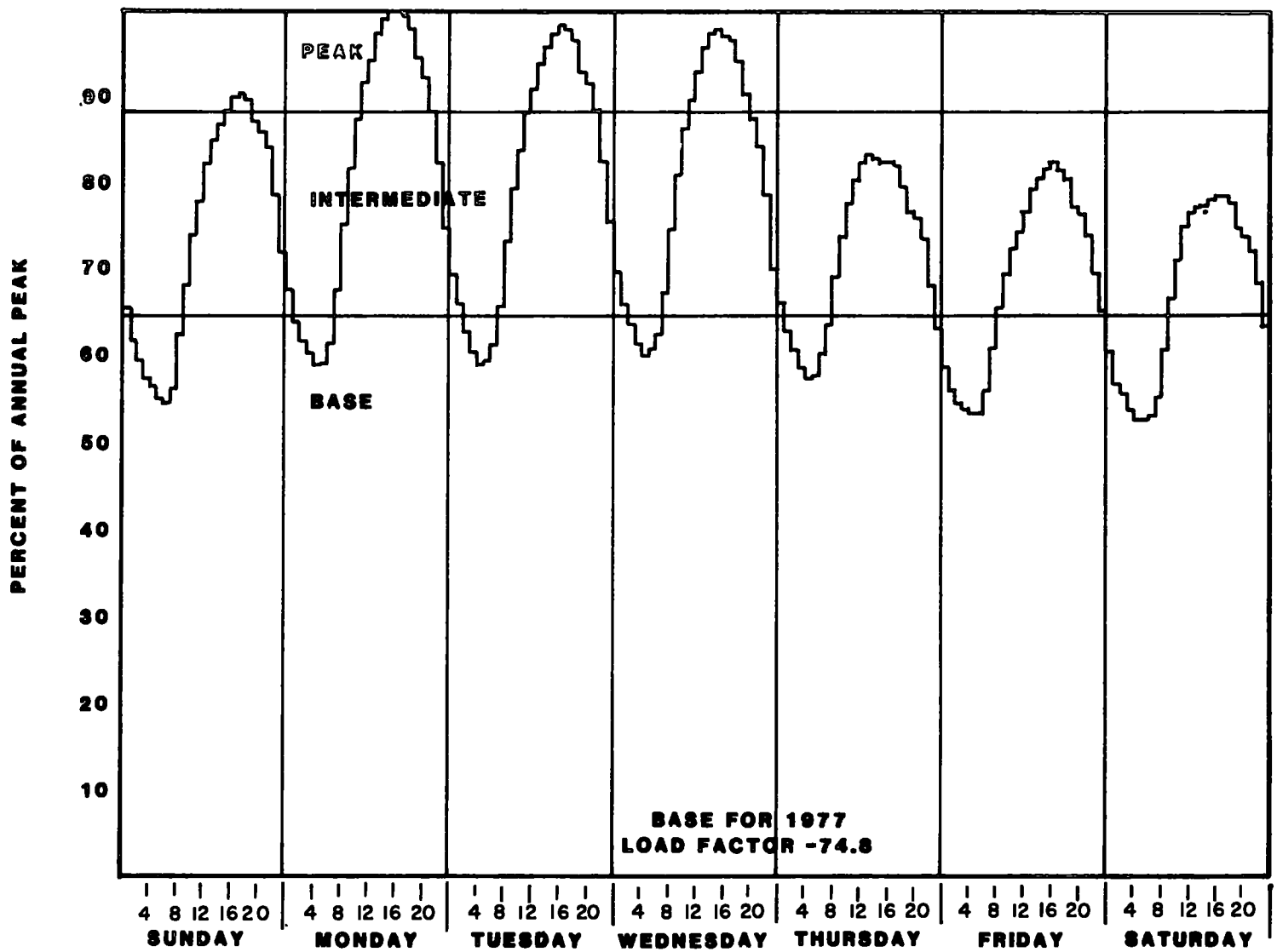


Figure 4-3

WEEKLY SUMMER LOAD CURVE

COMPOSITE FOR SELECTED UTILITIES IN SWPP

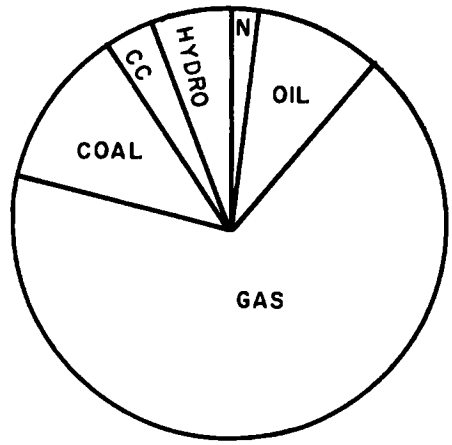
Table 4-2

SWPP
PROJECTED GENERATION MIX
(PERCENT OF TOTAL CAPABILITY)

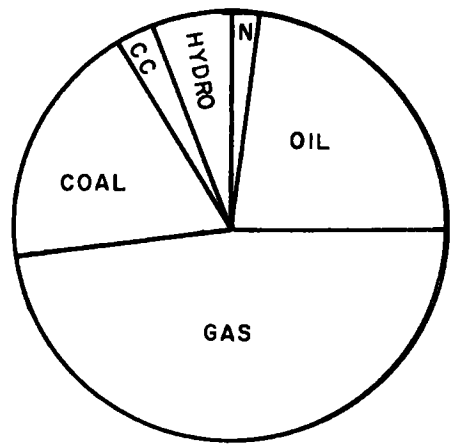
Generation Mix	1985 %	1990 %	1995 %	2000 %
BASE				
Nuclear	10-12	10-12	11-13	12-15
Coal	24-26	30-32	32-35	36-40
Gas	22-24	18-20	13-16	10-12
INTERMEDIATE				
Coal	8-10	10-12	11-13	13-15
Oil	4-6	3-5	2-4	2-4
Gas	8-10	8-10	7-9	6-9
Conv. Hydro	1-2	1-2	1-2	1-2
Other	0	0-1	0-1	1-2
PEAK				
Coal[1/]	-	-	-	-
Oil	6-8	5-7	3-5	2-3
Gas	7-8	7-8	6-8	4-8
Conv. Hydro	2-3	1-2	1-2	1-2
Pumped Storage	0.7	0.5	0-1	0-3
Other	0	0-1	0-1	1-2
TOTAL CAPABILITY (MW)	66,600	82,500	97,900	118,300

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.

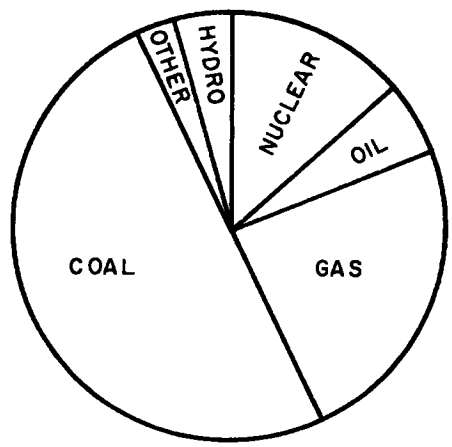
Source: Harza Engineering, "The Magnitude and Regional Distribution of the Needs for Hydropower," Phase II, page VIII-12.



1977



1978



2000

Figure 4 - 4

GENERATING CAPACITY BY FUEL SOURCE - SWPP
1977, 1978 AND PROJECTED 2000

FOOTNOTES

12/ This section is adapted from pages 4 and 5 of Harza Engineering, "The Magnitude and Regional Distribution of Needs for Hydropower, The National Hydropower Study," Phase II. The source of Projection I is "Regional Electric Reliability Council," Reply to Appendix A-2 of Order No. 383-5. Docket R-362, April 1, 1979. Source for Projection II is Institute for Energy Analysis, "US Electricity Supply and Demand to the Year 2000," Oak Ridge National Laboratory, May 1977. Source for Projection III is J.A. Lane, "Consensus Forecast of US Electricity Supply and Demand to the Year 2000," Oak Ridge National Laboratory, May 1977.

13/ This is the lower of two forecasts made in the IEA study.

14/ Forecasters are: NASA/ASEE TERRASTAR (1973); EPA (1973), US Atomic Energy Commission (D.L. Ray) (1973); Ford Foundation technical fix (1974); Ford Foundation (zero energy growth) (1974); US Atomic Energy Commission (Office of Planning and Analysis) (February 1974); L.T. Blank and R.I. Riley (1974); Council on Environmental Quality (1974); MIT (Hudson Jorgenson) (1974); MIT (judgmental) (1974); National Academy of Engineering (1974); NASA/ASEE MEGASTAR (1974); Federal Energy Administration Project Independence (1974); ERDA (Office of Planning and Analysis) (1975); E. Teller (1975). Source: Harza, Phase II, p I-13.

15/ The 10% addition provides for the fact that baseload can be cycled, and that maximum efficiency occurs at less than full load. Harza, II, p I-121.

Chapter 5
METHODOLOGY

5.1 PROCEDURES AND CRITERIA

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. 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 NHS preliminary computer data base. The second stage provided for a hydrologic, power, energy, and economic analysis and a screening based 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. The third stage consisted of two distinct phases. The first phase allowed for much improved power, cost, and benefit analyses. The second phase of stage three involved collection of available information on the environmental, social, and institutional impacts and the general public attitude toward development of the hydropower potential at sites remaining after the first phase screening.

The final stage of preparation for presentation of information on hydropower potential in the regional report consisted of three major elements: first, identification of that potential which might be developed in the near future (by 1990) as opposed to that which might be developed thereafter; second, ranking of projects by several criteria which might indicate the relative merit or probability of development; and third, showing how this potential might be utilized in meeting the projected power and energy needs of the region.

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 49,500 existing dams. 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%. Thus the equation:

$$KW = QHE = \frac{0.85}{11.8} = 0.072\ QH$$

where KW = power of kilowatts

Q = flow in cubic feet per second

H = net power head in feet

E = efficiency

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

$$KW = 0.072 \times 0.5\ SH = 0.036\ SH$$

where S = storage in acre-feet

This computation, with its associated assumptions, gave an extremely optimistic estimate on power potential for most dams. Therefore, the screening level based on these results was 1,000 KW. Data on all existing dams which met these screening criteria were transferred by machine to the National Hydropower data base. Data on undeveloped sites which met these screening criteria were coded by field personnel, keypunched, and added to the National Hydropower data base. Undeveloped sites were identified from previous studies by local, State, and Federal water resources agencies.

Information required for the second stage screening were: power potential in KW; average annual energy in KWH; 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 the Federal Energy Regulatory Commission. Annual benefits 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 KW and design head for the project. Allowances for contingencies, engineering, design, supervision, and administration were added to the construction cost to determine a total investment cost. The total investment was annualized assuming a 50-year life and an interest rate of 6-5/8%. 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 benefit region must be 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, a field 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 US Geological Survey streamflow gage. Field 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% of the height to normal retention, when given, or to 72.25% 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 gage, 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 gage representative of the dam site.

Given an average net power head and a representative streamflow gage, the machine computations proceeded as follows: historical daily flows at the representative gage site were converted to a flow-duration curve; the gage 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 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% of time to 5% 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; average annual plant factor was computed using the selected power value and the average annual energy; unit capacity and energy values were selected from the FERC power benefit curves and multiplied by the selected power value and average annual energy to obtain annual benefits; total annual power costs were computed, as stated above, based on the selected power and the average net head; and 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 (5% to 95% exceedance) 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 our report "National Hydroelectric Power Resources Study - Preliminary Inventory of Hydropower Resources" (July 1979) for those projects with power potential greater than 50 KW and a benefit-to-cost ratio greater than one.

Table 5-1 shows the regionalized benefit rates for SWPP as provied by FERC on 23 June 1978.

Table 5-1

FERC REGIONAL POWER VALUES

SWPP

APF[1/]	CAPACITY[2/]	ENERGY[3/]
0	30.8	-
10	30.4	35.2
20	30.4	34.9
30	68.9	23.3
40	68.9	22.1
50	125.1	12.0
60	125.1	11.9
70	125.1	11.9
80	125.1	11.9
90	125.1	11.8
100	125.1	11.8

1/ Annual plant factor.

2/ Capacity benefit in dollars per KW.

3/ Energy benefit in mills per KWH.

Source: Data furnished by FERC. See Attachment A. Data are for January, 1978.

Table 5-2

PRELIMIMIARY COST CURVES
SINGLE UNIT POWER PLANT COST DATA (.1-10 MW)

($1,000)

DESIGN HEAD (FEET)

INSTALLED CAPACITY (MW)	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

NOTE: Cost items vary somewhat with type of unit. Cost items considered include excavation, bulkheads, turbine, generators, accessory electrical equipment, auxiliary mechanical systems, and contractor mobilization and preparation, intake works, and if applicable, intake and tailrace gantry crane and powerhouse bridge crane.

Table 5 - 3

SINGLE UNIT POWER PLANT COST DATA (10-200 MW)

($1,000)

DESIGN HEAD (FEET)

INSTALLED CAPACITY (MW)	10	20	30	40	50	60	70	80	90	100	200	300	400	500	600	700	800
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
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
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
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
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
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
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
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
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
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
120	-	-	-	47,000	44,000	41,000	38,000	36,330	34,670	33,000	21,000	18,000	16,000	15,000	14,600	14,000	13,500
140	-	-	-	53,000	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
160	-	-	-	-	-	-	-	-	-	43,000	26,800	21,600	19,000	17,500	17,000	16,500	16,000
180	-	-	-	-	-	-	-	-	-	48,000	29,500	23,500	20,800	19,400	18,300	17,800	17,000
200	-	-	-	-	-	-	-	-	-	53,000	32,000	25,500	22,500	20,800	19,700	18,700	18,100

Note: Cost items vary somewhat with type of unit. Cost items considered include excavation, bulkheads, turbine, generators, accessory electrical equipment, auxiliary mechanical systems, contractor mobilization and preparation, intake works, and, if applicable, intake and tailrace gantry cranes and powerhouse bridge crane. Curve for larger (Francis) units do not include intake works.

Tables 5-2 and 5-3 show the parametric cost data for power features which were used in the second stage computer analyses.

Additional data were gathered for sites passing stage two screening to permit more refined estimates of costs, energy potential, and benefits associated with hydropower development. Additional physical data gathered permitted a more accurate estimate of water surface evaporation losses, storage, and elevation relationships, and tail water elevation and discharge relationships. In this stage, diversions for other uses were also considered to more accurately estimate flow for hydropower production. Added physical data on undeveloped sites also permitted more complete cost estimates.

Dependable capacity benefits were taken for capacity for which flow was available 85% of the time. The remaining capacity was assigned a benefit of one-half the value per KW of dependable capacity.

During this phase, the total cost of development (i.e., dams, reservoirs, relocations, etc.) was estimated for each undeveloped site. Field office personnel were given considerable latitude in judgment 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.

Field judgment was also used in this stage to screen projects based on size, since interest in smaller size potential projects varies in different regions of the country.

The second phase of stage three involved collection of available information on the environmental, social, and institutional impacts and the general public attitude toward development of the hydropower potential at sites remaining after the first phase screening. Public meetings were held throughout the country as well as meetings with interested individuals, groups, and representatives of state governments.

The screening of projects during the second phase of stage three was essentially by judgment of Corps district personnel based on the information available, the response from public meetings, the recommendations of state agencies, and the experience of working intimately in the development of water resources of the region.

The computation procedures for stage three are covered in detail in Volumes XII and XIII of the final NHS report.

5.2 REGIONAL DEMAND ASSESSMENT

The primary objectives for assessment of the current and projected demands for power and energy within the Southwest Power Pool were to show

that the production from potential hydropower development could be used to meet specific segments of the projected need and to indicate the type and amounts of alternative fuel consumption which might be foregone.

Presentation of needs is based on the information developed for this report under contract for the National Hydropower Study. Complete documentation of this contract effort will be included as Volumes III and IV of the NHS report.

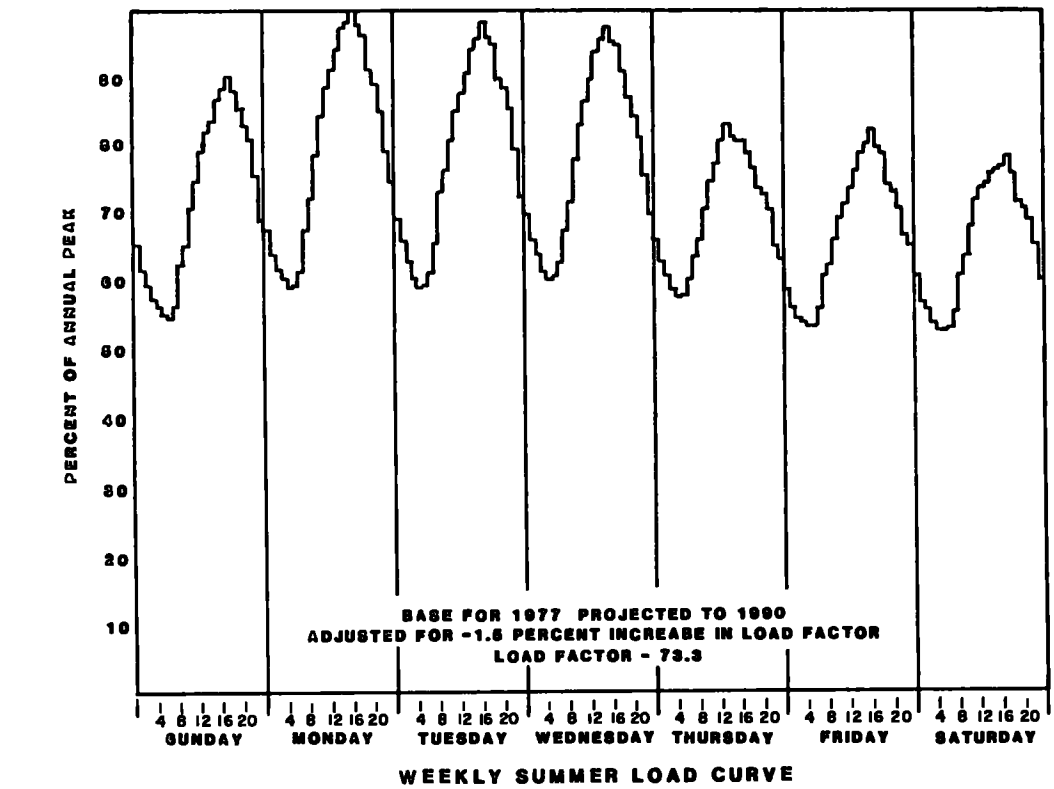
Specific contract products include: hourly loads for representative weeks (weekly load shapes) for representative utilities within each ERC; cumulative ERC projections of annual peak loads and annual load factors; suggested techniques for adjusting current load shapes to represent future load shapes (primarily an adjustment of annual load factor); and suggested techniques for "placing" potential hydropower potential within the future load shape.

The first three products have been utilized in our assessment of the SWPP demands. However, the technique suggested for placing potential hydropower on the future load shape, as suggested by the contractor, depends too heavily on the availability of data on the seasonal characteristics of the available power production.

The flow-duration technique developed for analysis of power potential for the NHS provides average annual characteristics. Consequently, a method for indicating annual demand characteristics has been developed which utilizes the basic load shape data furnished by the contractor. For the SWPP region, hourly loads presented for the representative utilities have been added to produce composite load shapes for three representative weeks of the year. These hourly load shapes were then converted to weekly load-duration curves. Figures 5-1 through 5-3 show hourly load shapes and weekly load- duration curves for representative summer, winter, and off-season weeks, respectively. The weekly load-duration curves were then combined to represent an annual load-duration curve by weighting each weekly curve by the duration of the season for which that week represents (i.e., x-weeks of summer, y-weeks of winter, and z-weeks off-season).

The resulting annual load-duration curve was then adjusted to match the projected regional peak and annual load factor for 1990 and 2000. In this form, the annual characteristics of existing, near-term, and long-term potential power developments can be indicated in relation to their placement on the future load shapes. Figure 5-4 shows the 1990 load shape with existing projects and near-term potential projects occupying the upper peaking and intermediate portions of the load shape. Figure 5-5 shows the projected load shape for 2000 with existing plus near-term and long-term potential occupying the upper portion of the load. In this figure it is assumed that near-term potential will be a part of the existing by the year 2000.

This presentation should only be considered as a rough indication of the placement of potential hydropower on the projected future load shape since



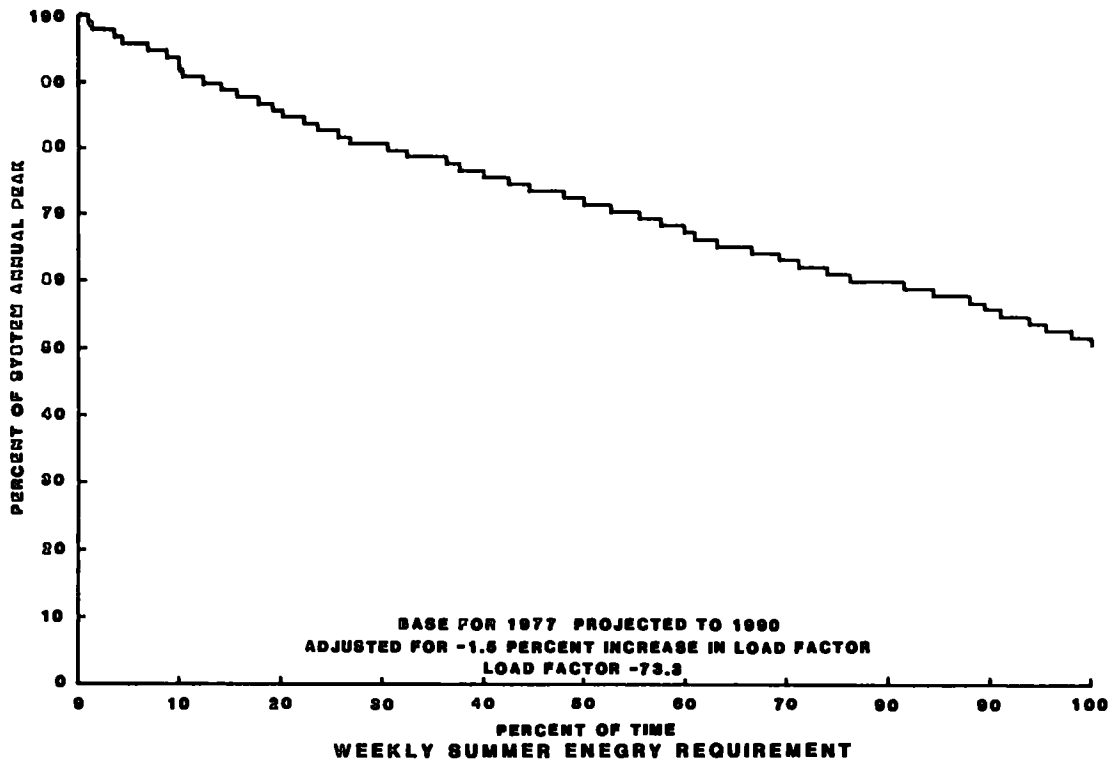


Figure 5-1

WEEKLY SUMMER LOAD CURVE AND ENERGY REQUIREMENT

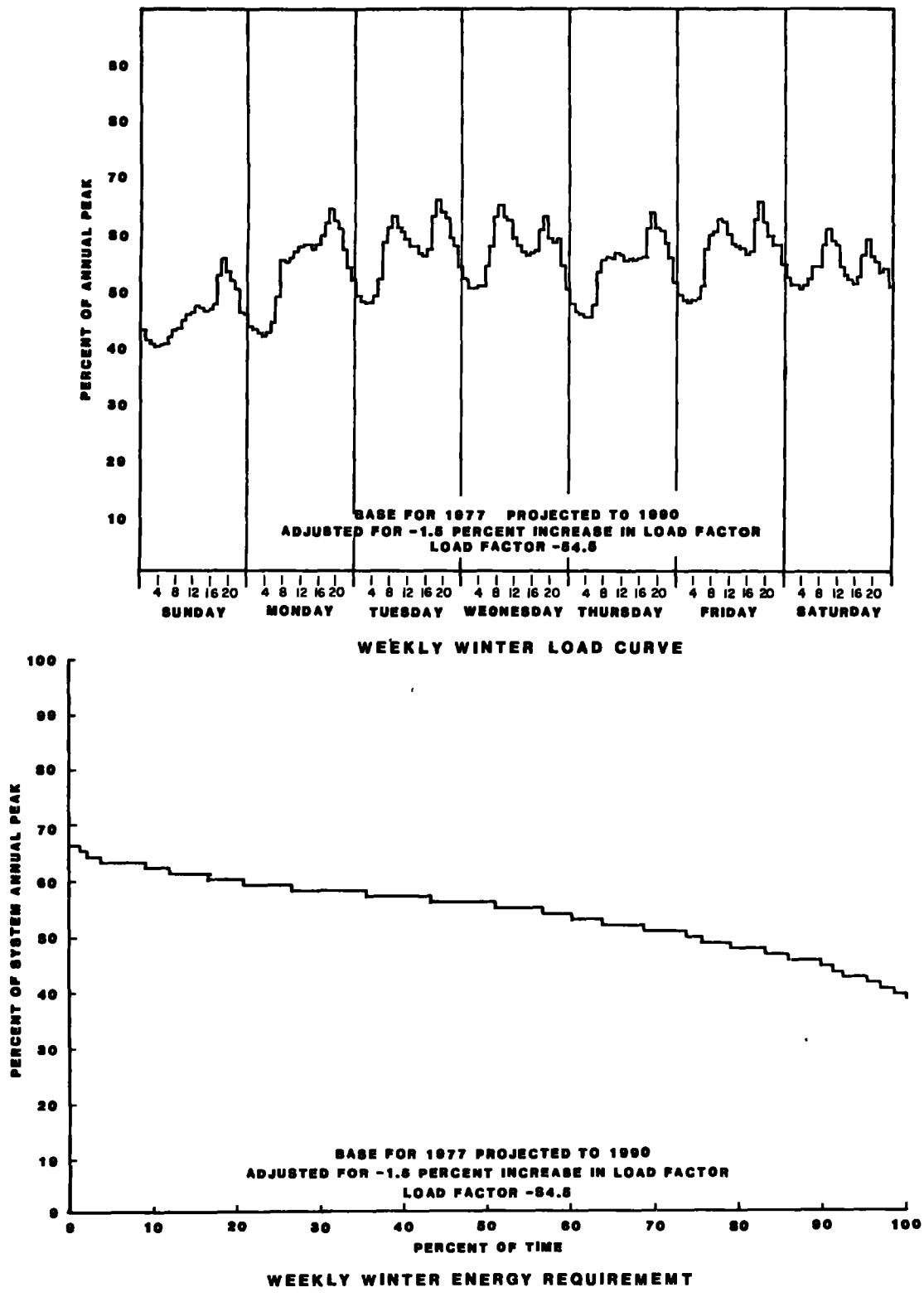
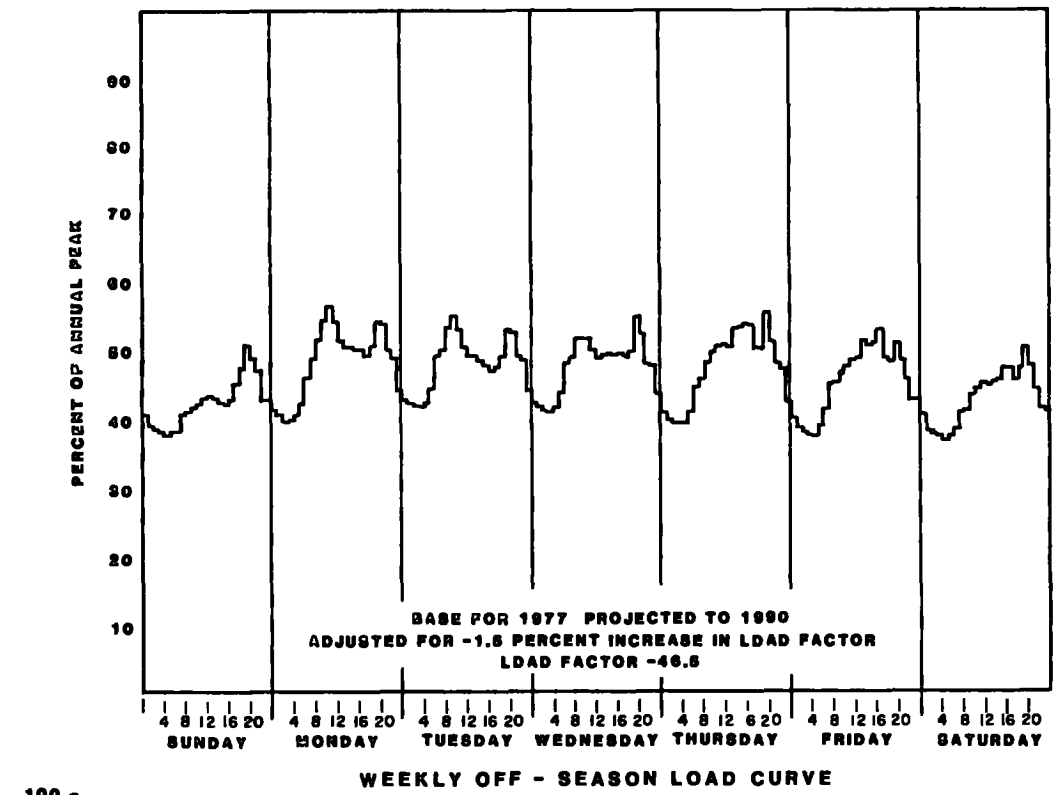


Figure 5-2

WEEKLY WINTER LOAD CURVE AND ENERGY REQUIREMENT



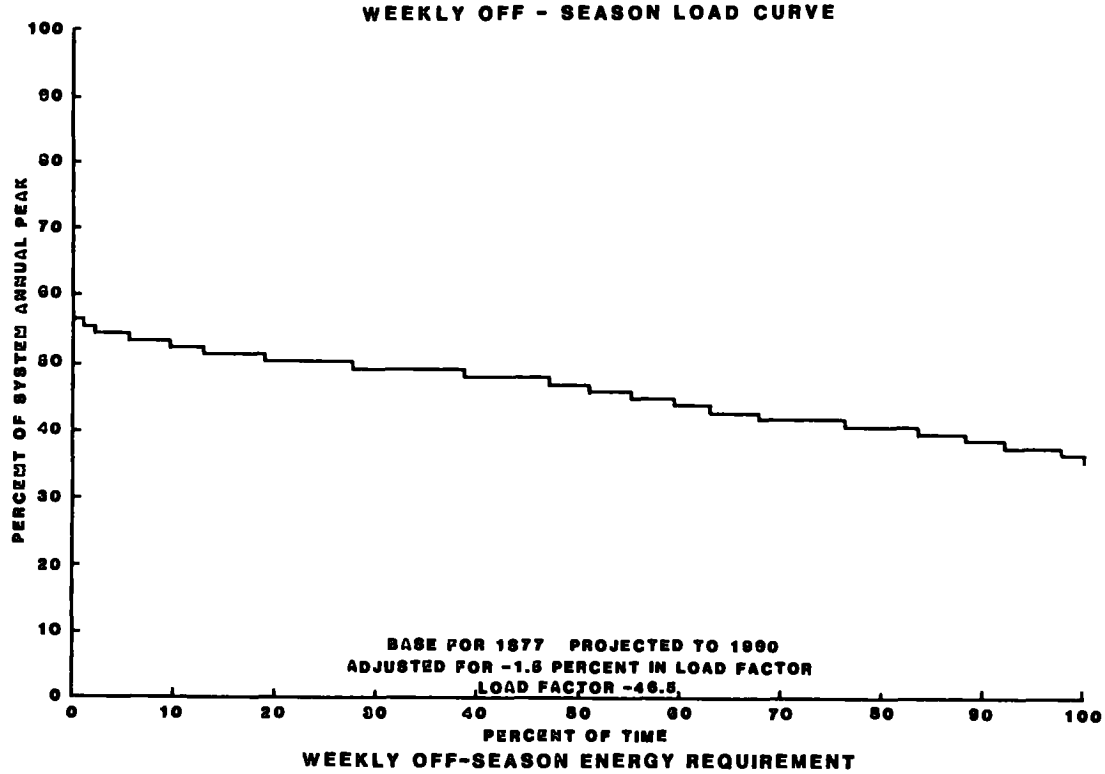


Figure 5-3

WEEKLY OFF-SEASON LOAD CURVE AND ENERGY REQUIREMENT

actual placement can only be determined by detailed operational studies which are clearly beyond the scope of detail utilized in the National Hydropower Study.

5.3 PRESENTATION OF SPECIFIC PROJECT DATA

Pertinent information on all projects which passed the second stage screening is given in Attachment C to this report. Those sites which survived both phases of the stage three screening process are shown in Table 5-4. A map showing the locations of these sites is found in Appendix D, back pocket.

Ranking numbers have been given to each of the remaining projects in order to indicate the relative unit cost of potential energy; the relative adversity of impacts associated with project development; and the relative probability of development of projects within two time frames (i.e., near-term and long-term). Projects with existing hydropower have not been included in numerical rankings. These projects are treated separately.

The first of these rankings (the economic ranking by mills/KWH or $/MWH) was based on the assumptions that only retrofit of existing dams or additional provisions at dams currently under construction could be achieved within the next 10 years (near-term) and that potential developers would be interested in developing this resource at projects where the unit cost of energy is shown to be 50 mills/KWH or less. The selection of 50 mills/KWH is based on alternative costs of developing power in SWPP. Attachment A shows the equivalent total power value of hydro at various capacity factors, as of January 1978. Consequently, the near-term economic ranking applies to those existing or under construction projects where the indicated cost of energy is less than 50 mill/KWH. The long-term economic ranking applies to undeveloped sites and for existing projects where the cost of retrofit is indicated to exceed 50 mills/KWH. There are 47 projects in the near-term economic ranking with numbers 1001 through 1047. There are 47 projects in the long-term economic ranking with numbers 2001 through 2047. Computer results on average annual cost and average annual energy were used in this ranking process.

The "noneconomic" ranking is essentially the same as the economic ranking. However, projects with moderate environmental or social impacts have been moved to the bottom of the near-term and long-term lists. Projects with significant impacts were screened out in the second phase of stage three. Indications of moderate impacts were given by district representatives during a project ranking workshop held in the Southwestern Division Office on 9 July 1980.

The "composite" ranking was developed during the project ranking workshop in the following manner. First, each district with projects within the SWPP region developed a district priority ranking of their projects based on economics, impacts, status of project study, and public or political interest in the particular project. A competitive process was then established

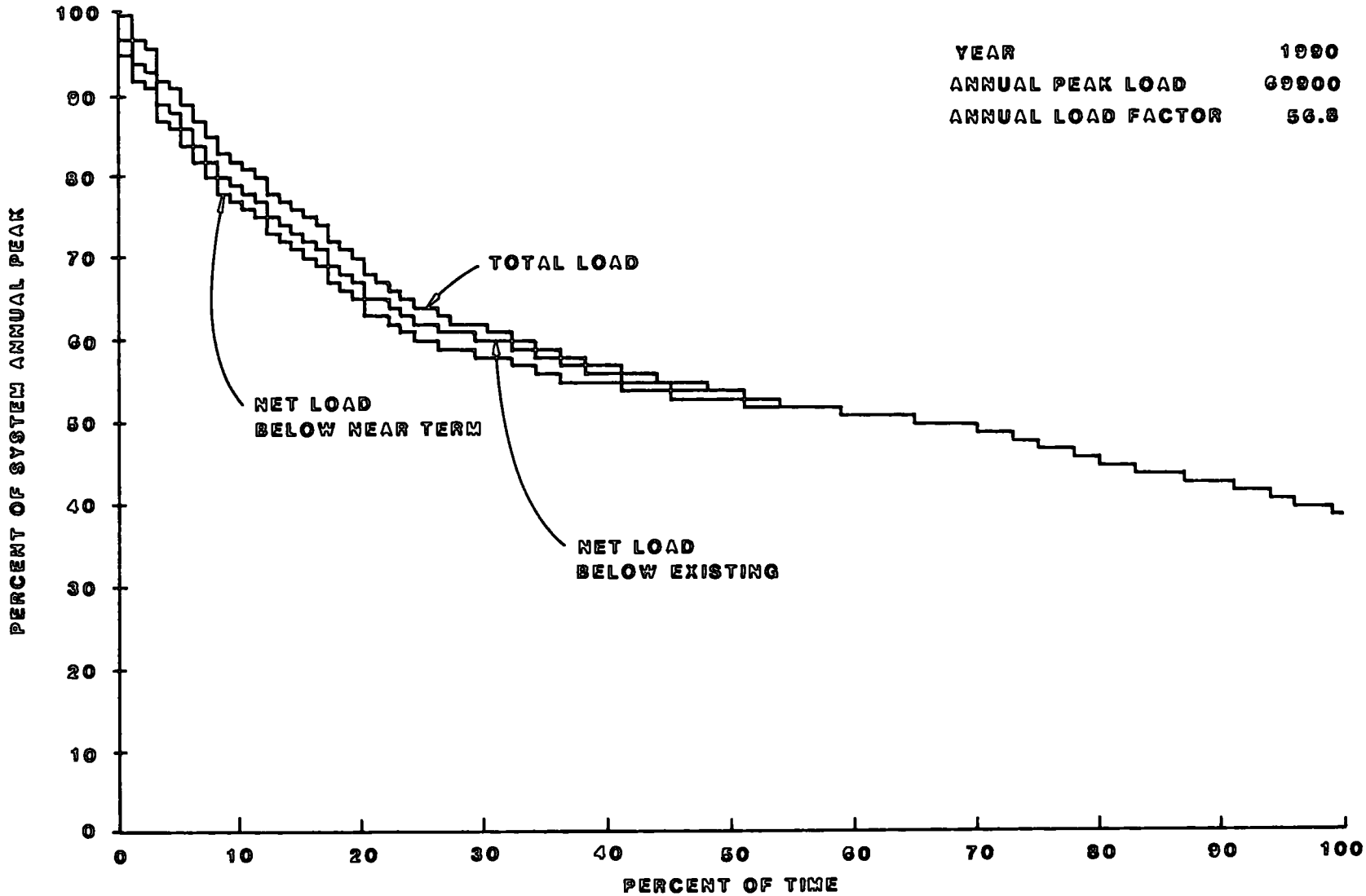


Figure 5-4
YEARLY ENERGY REQUIREMENT (LOAD SHAPE) - 1990
COMPOSITE FOR SELECTED UTILITIES IN SWPP

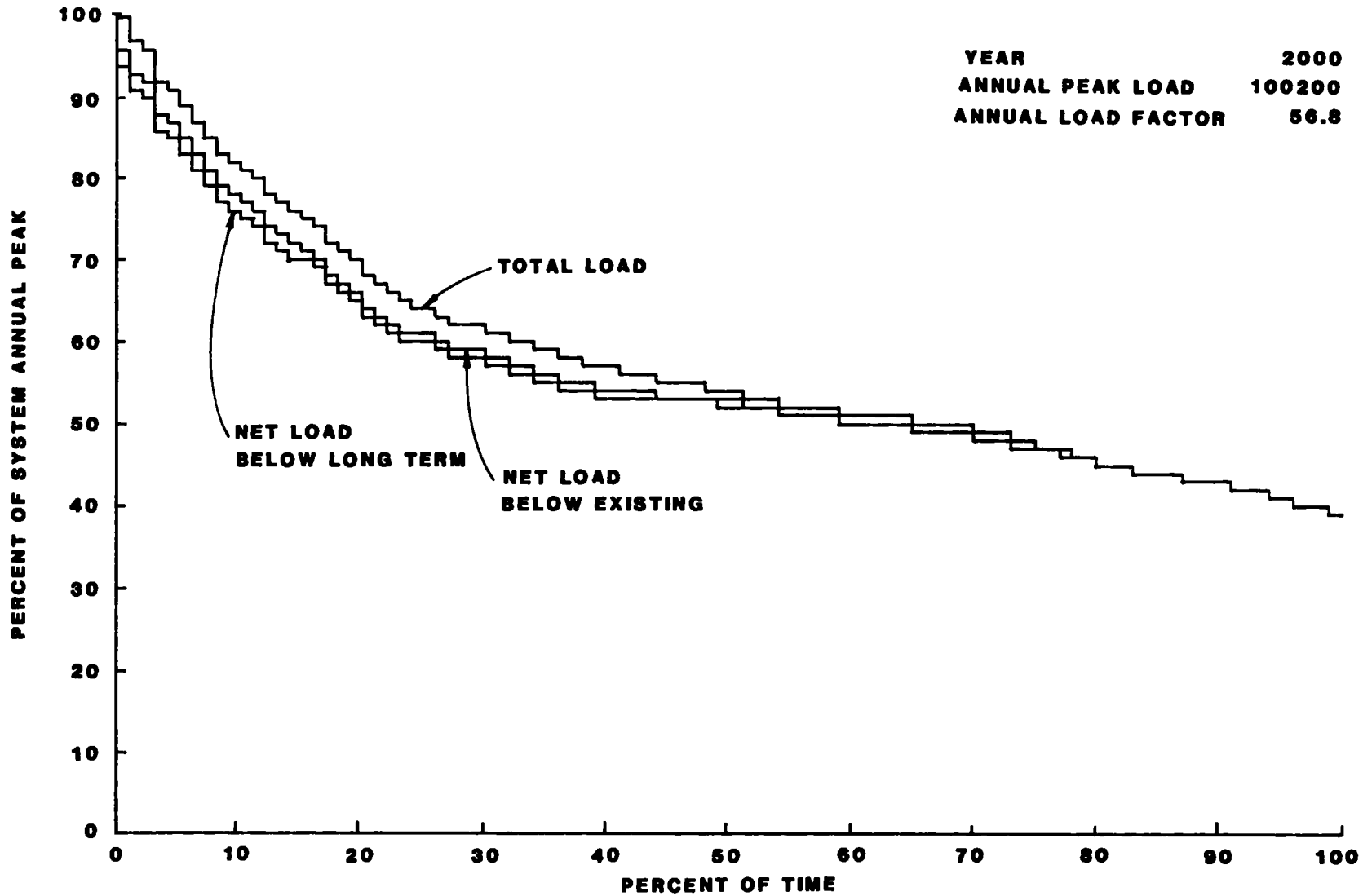


Figure 5-5
YEARLY ENERGY REQUIREMENT (LOAD SHAPE) - 2000
COMPOSITE FOR SELECTED UTILITIES IN SWPP

where each district matched its first priority project against the others. This group of projects was discussed and a "winner" selected. The winning district then matched its second priority project against the remaining first priority projects of the other districts and a second "winner" was selected. This process continued until all projects were selected in order, and the order represents the composite ranking. The principal selection criterion in each successive "winner" was based on the individual project's energy production potential.

The ranking procedures were developed as a means of presenting information to potential developers of the hydropower resources in the region.

Table 5-4

SITES WITH POTENTIAL FOR HYDROPOWER DEVELOPMENT
NATIONAL HYDROELECTRIC POWER STUDY

SITE ID NUMBER FOOTNOTE 1	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW) FOOTNOTE 2	INCREMENTAL ENERGY (MWH) FOOTNOTE 2	INCREMENTAL COST ($/MWH)	RANKING NUMBER ERC REGION ECON	NON-ECON	COMP
AR4SWL5002	DAM NO 2	ARKANSAS	111741	383677	19.807	1011	1011	1001
AR6SWL0002	BUFFALO CITY	BAXTER	55882	147823	44.347	2003	2009	2019
AR6SWL0003	CHARTAIN	BAXTER	58823	197684	42.319	2002	2008	2020
AR4SWL0001	COTTER	BAXTER	62239	186051	35.745	2001	2007	2018
AR6SWL0012	QUARRY	CLEBURNE	19076	49395	69.255	2017	2022	2012
AR4SWL5015	L&D #9	CONWAY	18052	88077	21.163	1013	1013	1014
AR4SWL0026	TOAD SUCK FERRY LOCKAND DAM	FAULKNER	15836	68972	26.992	1022	1022	1015
AR4SWT0003	FULTON LOCK. & DAM	HEMPSTEAD	17988	98136	56. 20	2006	2013	2002
ARCSWT0005	GILLHAM RESERVOIR	HOWARD	2900	9389	35.278	1036	1034	1035
AR4SWL5006	L&D #1	INDEPENDENCE	18096	91981	19.266	1008	1008	1016
AR6SWL0036	WOLF BAYOU	INDEPENDENCE	125000	347059	46.398	2007	2012	2023
AR6SWL0038	WOLF BAYOURE-REGULA TION	INDEPENDENCE	13829	82082	58. 41	2010	2015	2024
AR6SWL0042	BRASWELL	IZARD	50315	169092	48.233	2005	2011	2022
AR4SWL0043	GUION	IZARD	56887	187952	45.657	2004	2010	2021
AR4SWL5001	L&D #3	JEFFERSON	20454	100870	20.522	1012	1012	1003
AR4SWL5008	L&D #8	JEFFERSON	13389	72566	22.888	1016	1016	1009
AR4SWL0049	L&D #5	JEFFERSON	15186	84010	19.431	1010	1010	1013
ARCSWT0007	MILLWOOD LAKE	LITTLE RIVER	13283	50939	21.397	1018	1014	1019
AR4SWL0075	DAVID D TERRY LOCK AND DAM	PULASKI	16183	88484	19.817	1009	1009	1012
AR4SWL0074	MURRAY LOCK AND DAM	PULASKI	18048	106945	17.371	1004	1004	1010
AR4SWL00P3	L&D #13	SEBASTIAN	10553	78039	18. 36	1005	1005	1011
ARCSWT0030	DEQUEEN RESERVOIR	SEVIER	1225	3930	49.568	1046	1043	1042
ARCSWT0032	DIERKS RESERVOIR	SEVIER	1178	3719	44.539	1042	1039	1041
ARCSWL0100	BLUE MOUNTAIN	YELL	6966	12473	31.755	1032	1031	1031
ARCSWL0101	NIMROD	YELL	5813	12485	31. 84	1030	1030	1032

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	RANKING NUMBER ERC REGION ECON	NON-ECON	COMP
KSCSWT0113	JOHN REDMOND RESERVOIR	COFFEY	9003	17338	35.816	1038	1036	1036
KSCMRK0020	KANOPOLIS LAKE	ELLSWORTH	2276	4395	44.597	1043	1040	1039
KSCMRK0026	MILFORD LAKE	GEARY	7891	19734	35.435	1037	1035	1022
KSCMRK0048	TUTTLE CREEK LAKE	RILEY	21847	57256	30.587	1028	1028	1018

Table 5-4 (Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	RANKING NUMBER ERC REGION ECON	NON-ECON	COMP
LACLMN0005	LAKE BISTINEAU	BOSSIER	9366	20779	31.608	1031	1047	2017
LAALMK0039	COLUMBIA LOCK AND DAM	CALDWELL	18615	98760	18.362	1006	1006	1008
LAALMK0040	JONESVILLELOCK AND DAM	CATAHOULA	13313	85083	12.681	1001	1001	1004
LACLMN0019	ALLEN-CHIVERY	NATCHITOCHES	6223	15247	33.879	1035	1046	2025
LAALMN0017	RED RIVER WATERWAY LOCK + DA	NATCHITOCHES	20241	92640	19.237	1007	1007	1005
LAALMN0023	RED RIVER WATERWAY LOCK + DA	RAPIDES	30000	194810	21.538	1015	1015	1007
LAALMN0024	RED RIVER WATERWAY LOCK + DA	RAPIDES	18071	73359	25.830	1020	1020	1006
LAALMN0025	RED RIVER WATERWAY LOCK + DA	RED RIVER	7968	37039	27.893	1024	1024	1025
LACLMK0044	LAKE DARBONNE	UNION	3902	11098	40.744	1041	1045	2027
LASLMN0027	OLD RIVER CONTROL STRUCTURE	WEST FELICIANA	90955	666911	28.186	1025	1025	1026

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	RANKING NUMBER ERC REGION ECON	NON-ECON	COMP
MOCMRK0076	POMME DE TERRE LAKE	HICKORY	3604	9638	40.357	1040	1038	1040

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	RANKING NUMBER ERC REGION ECON	NON-ECON	COMP
MSCLMK0081	ARKABUTLA DAM	DESOTO	17113	33636	24.545	1019	1019	1021
MSCSAM0197	PROW DAM	RANKIN	11958	39254	16.144	1002	1002	1020

Table 5-4 (Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	RANKING NUMBER ERC REGION ECON	NON-ECON	COMP
NMCSWA0060	LAKE SUMNER	DEBACA	856	3092	46.247	1044	1041	1044
NM6SWA0061	BRANTLEY	EDDY	1395	4394	435. 2	2036	2035	2048
NMCSWA0065	LCS ESTEROS DAM	GUADALUPE	93	250	164.31	2030	2006	2047
NMCSWA0088	CONCHAS DAM	SAN MIGUEL	2078	4781	48.387	1045	1042	1038

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	RANKING NUMBER ERC REGION ECON	NON-ECON	COMP
OKOSWT0267	LAKE FRANCES ,SILOAMSPRINGS	ADAIR	4669	9671	37.126	1039	1037	1037
OKCSWT0305	HUGO LAKE	CHOCTAW	5531	15095	26.962	1021	1021	1027
OKCSWT0312	FLCHA LAKE	DELAWARE	1985	8043	32.293	1033	1032	1033
OKCSWT0343	WISTER LAKE	LE FLORE	12867	23157	30.599	1029	1029	1030
OKASWT4280	W. D. MAYOLOCK + DA M	LE FLORE	20116	92209	22.552	1017	1017	1023
OKASWT0420	SPAVINAW LAKE	MAYES	2620	7250	32.467	1034	1033	1030
OKCSWT0417	PINE CREEKLAKE	MCCURTAIN	11248	20408	29. 29	1027	1027	1029
OKCSWT0460	KAW RESERVOIR	OSAGE	15227	53553	23.295	1018	1018	1024
OK6SWT0480	TUSKAHOMA RESERVOIR	PUSHMATAHA	5742	12464	576.70	2038	2037	2026
OKCSWT0486	OOLOGAH LAKE	ROGERS	17349	47687	27.876	1023	1023	1028

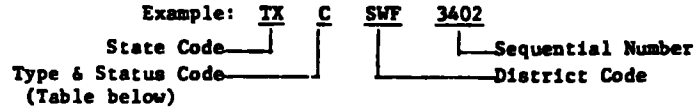
Table 5-4 (Continued)

SITE ID NUMBER	PROJECT NAME	PRIMARY COUNTY	INCREMENTAL CAPACITY (KW)	INCREMENTAL ENERGY (MWH)	INCREMENTAL COST ($/MWH)	RANKING NUMBER ERC REGION ECON	NON-ECON	COMP
TX6SWT3560	DEKALB LOCK & DAM	BOWIE	12227	73534	71.190	2018	2023	2018
TX4SWT3404	INDEX LOCK& DAM	BOWIE	23717	93069	57.642	2009	2014	2003
TX4SWT3563	LANESPORT LOCK & DAM	BOWIE	88390	195039	75.820	2020	2025	2011
TX6SWF9009	NAPLES RESERVOIR	BOWIE	13590	20666	1291.3	2041	2041	2043
TX4SWT3565	NEW BOSTONLOCK & DAM	BOWIE	94889	181809	99.356	2027	2029	2019
TXCSWF9010	TEXARKANA DAM	BOWIE	3310	9400	146.63	2029	2030	2032
TX6SWF0016	FERGUSON NO 3 DAM	BRAZOS	6313	9391	1172.9	2040	2040	2042
TXCSWF0019	SOMERVILLEDAM	BURLESON	820	1491	95.775	2025	2004	2031
TX4SWT3598	BLUE RIVERLOCK & DAM	FANNIN	17596	70311	59.641	2012	2017	2005
TX4SWT3403	CARPENTERSBLUFF LOCK & DAM	FANNIN	10114	38480	88.248	2022	2027	2013
TX6SWT3405	KEMP RESERVOIR	FANNIN	17458	36792	96.362	2026	2026	2014
TX4SWT3566	SCALES BLUFF LOCK & DAM	FANNIN	13606	83722	171.57	2031	2031	2016
TX6SWT3409	WADE LAKE	FANNIN	86257	231390	65.726	2013	2018	2006
TXCSWF0067	CHEROKEE DAM	GREGG	700	1669	90.759	2023	2002	2036
TX6SWF9012	MARSHALL RESERVOIR	HARRISON	8506	8203	922.56	2039	2039	2041
TX4SWF4020	DAM A	JASPER	16149	38040	79.932	2021	2026	2039
TX6SWT3557	ARTHUR CITY LAKE	LAMAR	52536	130116	67.136	2018	2019	2007
TX6SWT3562	GARRETTS BLUFF LAKE	LAMAR	87951	233963	69.208	2016	2021	2009
TX6SWG0569	CAPERS RIDGE RES	LIBERTY	77806	202370	204.27	2033	2038	2001
TX4RWG0567	LOCK AND DAM NO. 9	LIBERTY	181	1458	1730.1	2045	2045	2049
TX6SWF0114	BEDIAS DAM	MADISON	865	893	1399.8	2043	2043	2045
TX6SWF9015	BLACK CYPRESS RESERVOIR	MARION	3571	7408	1302.6	2042	2042	2044
TXCSWF9013	FERRELLS BRIDGE DAM	MARION	540	2900	136.10	2028	2005	2033
TXCSWG0562	CONROE DAM	MONTGOMERY	1051	3220	89.947	1047	1044	1043
TX6SWG0561	HUMBLE RES	MONTGOMERY	5358	10061	538.32	2037	2036	2028
TX6SWG0560	LAKE CREEKRES	MONTGOMERY	126	509	60703	2047	2047	2050
TX4SWF0136	ACN WIER DAM	NEWTON	17637	68410	199.40	2032	2032	2038
TX6SWF0102	CARTHAGE DAM	PANOLA	19260	60492	270.67	2034	2033	2039
TX6SWF0103	STATELINE DAM	PANOLA	77188	169530	298.31	2035	2034	2040
TX4SWT3559	BRYARLY LOCK & DAM	RED RIVER	15002	89100	58.614	2011	2016	2004
TX6SWT3567	VALLIANT LAKE	RED RIVER	48121	141104	68.107	2015	2020	2008
TXCSWG0566	LIVINGSTONDAM	SAN JACINTO	109920	255203	28.933	1026	1026	1002
TXCSWF9016	TITUS COUNTY RESERVOIR	TITUS	1934	3742	52.908	2006	2001	2030
TX4SWF4012	LOCK AND DAM NO.6	TRINITY	18040	61301	72.566	2019	2024	2034
TXCSWF3004	TOWN BLUFFDAM	TYLER	16155	60306	16.739	1003	1003	1017
TX4SWG0570	HARMONS RES	WALKER	1376	4046	1506.2	2044	2044	2029
TX6SWF0208	BIG SANDY DAM	WOOD	932	2944	1948.9	2046	2046	2046
TXCSWF0214	LAKE FORK DAM	WOOD	2400	3264	95. 33	2024	2003	2037

Table 5-4 (Continued)

FOOTNOTES

(1) Project Identification Number



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 some cases. At existing projects, this is particularly true because of upstream diversions, releases for fish and wildlife preservation and enhancement, flood control, water supply, navigation, and recreation.

(3) Data Item: Purposes

Purpose: To identify authorized purposes at existing projects.
Probable purposes at potential projects.

Source: Existing in Inventory of Dams. From available sources.

Requirements: Yes

Categories: I = Irrigation
H = Hydroelectric
C = Flood Control
N = Navigation
S = Water Supply
R = Recreation
D = Debris Control
P = Farm Pond
O = Other

Example: CH

(4) Data Item: Status

Purpose: Indication of project status.

Source: From available sources.

Requirement: Yes. When added to data base.

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

NOTE: All dams in the Inventory of Dams were coded as OP by SWD-ADP.

Example: OP

Chapter 6

PUBLIC INVOLVEMENT

Public involvement activities in SWPP included public meetings, meetings with state and local groups, speeches to public and civic organizations, and responses to individual inquiries.

Two public meetings were held in Little Rock, Arkansas, to discuss regional aspects of the National Hydropower Study. The first public meeting was held at the Camelot Inn on 15 April 1980. Brigadier General James C. Donovan presided over the meeting. Over 5,000 notices were mailed to public and private groups and individuals believed to have an interest in hydropower development. The purposes of the meeting were to present study progress, outline planned future efforts, and solicit public views.

Ninety persons attended the meeting including Corps of Engineers staff members. Attendees represented public and private utilities, Federal and non-Federal agencies, commissions, and private citizens. US Congressman Beryl Anthony of Arkansas' Fourth Congressional District was also present.

Views expressed at the meeting included support for the current practice of giving preferential treatment to public power groups (municipals and cooperatives) in distributing power from Federal projects and continued pricing of Federal power to customers at cost of production. Representatives of city utilities expressed an interest in developing power at Corps dams for their own use rather than having it marketed through Federal marketing agencies. A representative of the Committee on Power for the Southwest spoke for more Federal committment to hydropower development. A representative of the Arkansas Department of Energy stated that his agency would be considering small (10 KW) sites and expressed an interest in cooperating with municipalities and other groups. Some concern for new reservoir construction was expressed.

The favorable public response to hydroelectric power development expressed at the meeting was noted. In response to the interest of municipal representatives in directly receiving power produced at Corps projects, the Corps acknowledges that marketing arrangements are the responsibility of the Department of Energy and that, currently, provisions under the Flood Control Act of 1944 (PL 534, 78th Congress) govern disposition of power produced at Corps projects.

The second public meeting was also held at the Camelot Inn in Little Rock, on 27 August 1980. Brigadier General Hugh G. Robinson presided at the meeting. Over 6,000 notices were mailed for this meeting. The purpose of this meeting was to present the findings of the study and to provide the public with an opportunity to specifically comment on sites recommended for further study and, more generally, on hydropower development in SWPP.

One hundred and thirty persons recorded their attendance at the public meeting. Attendees represented the electric power industry, cooperative utility associations, elected representatives, local governments, Federal and state agencies, environmental groups, engineering firms, and the general public. Twelve persons made public statements at the meeting. Concern was expressed because sites along the Buffalo and Current Rivers were identified as potential hydropower sites. These sites were erroneously included since the Buffalo was established as a National Wild and Scenic River by PL 92-237 (1972) and PL 88-492 (1964), establishing the Ozark National Scenic Riverways in the State of Missouri, protects portions of the Current and Jacks Fork Rivers.

A representative of the National Park Service objected to dams being built at two sites along the White, because the dams could back up water along Buffalo River in high water periods. Objection to the development of any new dams was expressed since it would alter free-flowing streams and consume too much productive land. Several dock owners and fishermen expressed opposition to further development of hydropower along the White River.

A representative of the Committee on Power for the Southwest supported maximum hydropower development. He also supported continued preference customer status for cooperatives and public bodies. These entities receive preference in the sale of power from Corps of Engineers projects.

Meetings with public and private groups included meetings with state officials and other interested parties in Austin, Texas; Oklahoma City, Oklahoma; and Little Rock, Arkansas. The President's Energy for Rural America Initiative Program was also discussed at these meetings. A meeting with SWPP personnel in Little Rock was also held. A meeting was held with officials from the State Clearinghouse Agency and the Fuel and Energy Board of Mississippi.

A number of inquiries have been received from various public and private groups and individuals. Interest has been expressed by Congressmen, public and private utility groups, research organizations, public officials, and private citizens.

Data from the study have been furnished to several Federal and state agencies and private utilities. Since mailing of the notices for the second public meeting, over 200 copies of the list of potential hydropower sites in SWPP have been requested by interested parties. The list has been furnished as requested.

A draft of this regional report was distributed to various public and private groups and individuals with an interest in hydropower and/or water resources management in the SWPP region. Letters and comments from these interested parties, and the responses are shown in Appendix C.

Chapter 7

INVENTORY

Initial data for sites to be included in the National Hydropower Study were grouped by Corps of Engineers' district boundary areas. Regional electric reliability council location was not considered in early data collection, and as a result, the number of sites originally considered in SWPP can only be estimated. An attempt was made to identify all possible potential sites at the first stage of the study and to document the improbable sites along with the good. It is estimated that 8,000 sites were considered by the districts with jurisdiction within SWPP and that approximately 4,000 of these sites were identified within the NHS data base (i.e., passed first stage screening). The second stage screening reduced the estimated number of sites from 4,000 to approximately 2,400 sites. Approximately 1,500 of these sites are located within the SWPP region.

The first phase in stage three screening reduced the number of projects under active consideration in SWPP from 1,500 to 208. The primary screening criterion used in SWPP during this phase was indication of physical potential of 1 MW. Economic screening for existing projects was based on an indicated benefit-to-cost ratio of 1.0. Economic screening for undeveloped sites was based on field judgment of that portion of the nonspecific power costs which might be allocated to other project purposes.

The second phase screening during stage three reduced the number of projects within the SWPP from 208 to 102. This screening was based on field judgment of environmental and social impacts related to project development. Of these 102 projects, eight are existing projects with power, 54 are existing projects without power, and 40 are undeveloped sites.

7.1 EXISTING PROJECTS, WITH POWER

As shown in Table 3-4, there are 29 existing hydropower plants in operation in SWPP. Machine computations and criteria for sizing of projects utilized during the first phase of stage three indicated that the installed capacity at 14 of these existing hydroelectric power projects could be increased. This determination was based primarily on the economic benefits associated with peaking power production. The machine results indicated potential for incremental capacity of 1,350 MW and additional average annual energy of 670 GWH.

The economic optimization techniques used in stage three could not take into consideration operational constraints and other special problems associated with powerhouse expansion at existing projects. Consequently, an

independent assessment of these projects has been made. Results of this assessment are given in Table 7-1. The revised assessment indicates a potential for 205 MW and 280 GWH at eight of the existing projects.

7.2 EXISTING PROJECTS, WITHOUT POWER

During stage three, 42 developed (without power) sites were identified for inclusion in the inventory of potential hydropower in SWPP by the NHS.

Further analysis of existing developed sites was made after the stage three, first phase screening was made public in April 1980.[16/] As a result of in-house review and public comment, eight additional existing sites were added to the active inventory. Two existing sites were removed from the active inventory by the last screening: Caddo Dam, Caddo Parish, Louisiana; and Perry Lake, Jefferson County, Kansas. These projects were considered economically infeasible on more detailed analyses. Also, Lake Francis, a breached site in Oklahoma, and five sites under construction in Louisiana were added. The number of existing sites remaining in the active inventory after adjustments is 54. Table 7-2 shows the number of existing sites in SWPP inventory by capacity class. Four sites were identified in the last screening with power potential of over 25 MW capacity; Livingston, Dam 2 on the Arkansas River, Old River Control Structure on the Mississippi River, and Red River Waterway Lock and Dam No. 3. In total, an estimated 822 MW capacity and 3,322 GWH energy could be added at existing nonpower projects.

7.3 UNDEVELOPED SITES

The stage three, first phase screening identified 149 presently undeveloped sites for inclusion in the active inventory of potential sites for hydropower development in SWPP.

The capacity breakdown of these sites is:

	Under 15 MW	15-25 MW	Over 25 MW
Number of sites	85	31	33

The stage three, second phase screening reduced the number of undeveloped sites to 40. A large number of sites were eliminated because it was considered unlikely that these particular sites would be developed as multipurpose projects, and it is not economically feasible to develop the sites for hydropower only.

Finally, seven sites were removed from active consideration during the second phase of stage three because of their location on a Wild and Scenic River or in the National Park system. These projects are listed in Table 7-3.

The capacity breakdown of the remaining sites is:

Table 7-1

REASSESSMENT OF EXISTING HYDROPOWER PROJECTS

ID #	NAME	OWNER	STREAM	EXISTING CAPACITY(KW)	MACHINE ESTIMATE INCREMENTAL CAPACITY (KW)	MACHINE ESTIMATE INCREMENTAL ENERGY (MWH)	REASSESSMENT INCREMENTAL CAPACITY (KW)	REASSESSMENT INCREMENTAL ENERGY (MWH)	REMARKS (1)
KSG MRK 0019	Bowersock	Bowersock	Kansas River	2,423	1,850	573	-	-	1
✓ ARG SWL 0102	Dardanelle	DAEN SWL	Arkansas River	124,000	201,400	220,161	45,000	93,700	6
✓ OKI SWT 0281	Denison	DAEN SWT	Red River	70,000	21,809	-30,898	35,000	14,600	
✓ OKI SWT 0513	Fort Gibson	DAEN SWT	Grand River	45,000	96,318	78,239	11,250	19,850	5
ARI SWL 0013	Greers Ferry	DAEN SWL	Little Red	96,000	252,895	47,876	-	-	1,2
✓ ARI LMK 0015	Lake Catherine	Arkansas P&L	Ouachita River	11,000	10,438	19,020	22,105	20,782	
ARI LMK 0008	Lake Ouachita	DAEN LMK	Ouachita River	75,000	99,130	-2,969	-	-	1
OKG SWT 0404	Markham Ferry	GRDA*	Grand River	100,000	31,341	64,592	-	-	4,5
ARI SWL 0004	Norfork	DAEN SWL	North Fork	70,000	93,000	18,600	-	-	1,3
✓ MOI SWL 0125	Ozark Beach	Empire Dist	White River	16,000	-	-	7,247	20,111	
✓ OKI SWT 0405	Pensacola	GRDA*	Grand River	90,000	170,102	125,821	45,000	63,700	5
✓ OKG SWT 4280	Robert S. Kerr	DAEN SWT	Arkansas River	110,000	100,926	-3,621	25,842	32,673	6
✓ MOI SWL 0121	Table Rock	DAEN SWL	White River	200,000	220,338	50,096	-	-	1,2
OKI SWT 0302	Tenkiller Ferry	DAEN SWT	Illinois River	34,000	24,477	19,338	-	-	2,4
LAI SWF 0001	Toledo Bend	SRA**	Sabine River	81,000	27,162	62,409	13,824	14,536	

* Grand River Dam Authority

** Sabine River Authorities of Louisiana and Texas

REMARKS:
1 - Removed from active consideration for lack of additional (or very minor (K)WH/KW) energy potential. No reassessment performed.
2 - Development of additional capacity is considered unlikely due to operational constraints at the project.
3 - Ongoing District study indicates that additional capacity development should be with reversible units. Potential reversible capacity of 85,000 KW is not included in totals.
4 - Reanalysis on single project basis indicates that capacity addition would not be economically sound.
5 - This project should be restudied as part of system analysis of projects in Grand-Neosho basin.
6 - This project should be restudied as part of system analysis of projects on the Arkansas River.

Table 7-2

EXISTING SITES IN INVENTORY BY CAPACITY CLASS

	Under 15 MW	15-25 MW	OVER 25 MW	TOTAL
No. Sites	34	16	4	54
MW Capacity	188	287	347	822
Annual Energy (GWH)	622	1,239	1,461	3,322

Table 7-3

UNDEVELOPED SITES SCREENED DURING PHASE 2 OF STAGE 3 BECAUSE OF LOCATION

PROJECT NAME	STREAM NAME	CAPACITY (KW)	ENERGY (MWH)	PROJECT ID NUMBER
Gilbert	Buffalo	181,207	117,974	AR 6 SWL 0082
Lone Rock	Buffalo	131,560	161,224	AR 6 SWL 0062
Blair Creek	Current	120,727	153,030	MO 6 SWL 0133
Carter Creek	Current	24,567	92,974	MO 6 SWL 0108
Doniphan	Current	50,057	156,912	MO 6 SWL 0129
Hollow	North Fork	62,914	88,630	MO 6 SWL 0118
Tahlequah	Illinois	46,887	81,814	OK 6 SWT 4974

Table 7-4

SUMMARY OF POTENTIAL HYDROPOWER DEVELOPMENT

	Under 15 MW	15-25 MW	OVER 25 MW	TOTAL
		EXISTING, WITH POWER		
Number	-	1	7	8
Capacity (MW)[1/]	-	7	198	205
Energy[2/]	-	20	260	280
		EXISTING, WITHOUT POWER		
Number	34	16	4	54
Capacity (MW)	188	287	347	822
Energy[2/]	621	1,240	1,461	3,322
		UNDEVELOPED SITES		
Number	16	10	14	40
Capacity (MW)	93	182	942	1,217
Energy[2/]	320	685	2,742	3,747
		TOTAL - ALL SITES		
Number	50	27	25	102
Capacity	281	476	1,487	2,244
Energy[2/]	941	1,945	4,463	7,349

1/ Existing projects are classified by total capacity class, not incremental, but capacity and energy given is incremental.

2/ Average Annual, in Gigawatt Hours (GWH)

	Under 15 MW	15-25 MW	Over 25 MW
Number of sites	16	10	14

Development of the 40 sites identified would add 1,217 MW capacity and 3,747 GWH energy to the SWPP system.

7.4 SUMMARY OF ACTIVE SITES

Table 7-4 presents a summary of potential hydropower identified in SWPP for the NHS. Potential is shown by site characteristics (e.g., existing, with power, etc.) and by capacity class. Total potential incremental capacity from existing hydropower projects is 205 GWH, and incremental energy is 208 GWH. For existing projects the potential capacity is 821 MW, and potential energy is 3,332 GWH. Potential power identified at undeveloped sites is 1,217 MW with potential energy of 3,747 GWH. The accompanying map shows sites identified by the study. Existing and undeveloped sites are identified by status and by capacity class.

FOOTNOTES

16/ In addition to the added sites, a number of sites were shifted between ERC's. Additionally, one site was removed as a result of reanalysis of the power potential and economic feasibility.

Chapter 8

EVALUATION

As shown in the previous chapter, potential for hydropower development in SWPP was identified at 102 sites with an energy potential of 7,349 GWH. An evaluation of hydropower potential is presented below, considering estimated costs for development and near-term and long-term rankings. Ranking procedures are described in Chapter 5, section 5.3. Existing hydropower sites with incremental potential are not included in the rankings; however, estimated costs for additions at these sites are discussed. Sites included in the rankings are listed in Table 5.4. Existing sites with incremental power potential are shown in Table 7.1.

8.1 NEAR-TERM DEVELOPMENT POTENTIAL

Economic Ranking

There are 47 existing nonpower producing projects indicated in the SWPP region as having near term development potential. These are existing reservoir and run-of-river type projects, where the average cost of new energy potential at the project has been estimated at or less than 50 mills/KWH. The estimated unit costs range from 12.7 mills/KWH at Jonesville Lock and Dam on the Black River in Louisiana to 49.9 mills/KWH at Conroe Dam on the West Fork of the San Jacinto River in Texas. Annual costs in terms of dollars per kilowatt of installed capacity range from approximately $20 per KW per year to $200 per KW per year. This range is indicative of the wide range of design head and installed capacity among potential developments within SWPP.

Total development of the projects designated as having near-term potential is estimated to cost $631 million (1978 cost data) and would create 811 MW of additional capacity with an average annual energy potential of 3,298 GWH. This is the equivalent of approximately six million barrels of oil per year.

"Noneconomic" Ranking

Of the 47 nonpower projects designated for near-term potential, three projects have been specifically identified as having moderate environmental, social, and/or institutional impacts. Lake D'Arbonne is located on one of Louisiana's Natural and Scenic Rivers. Operations for power would be limited to protect downstream natural flows. Development of power on Lake Bistineau and Allen-Chivery could have significant impacts on fish and wildlife resources. Additionally, opposition to distribution of power from

Lake Bistineau away from the local area has been expressed. These projects are listed in Table 8-1. Combined power and energy potential for these three projects are estimated at 19 MW and 47 GWH.

The three projects have been retained in the near-term noneconomic ranking; however, they have been moved to the end of the list. The final decisions regarding development of any of the near-term potential projects and especially those projects where moderate impacts have been identified should not be made until more detailed studies have been accomplished and the trade-offs inherent to their development have been carefully weighed in the public forum.

"Composite" Ranking

The composite ranking of near-term potential development includes 44 projects. Projects are ranked on average annual energy potential and on field estimation of probable development scheduling. These projects are all worthy of more detailed analysis and serious consideration as candidates for development as a portion of our Nation's renewable energy resources.

The near-term composite ranking includes all projects in the near-term economic ranking except the three projects shown in Table 8-1. These projects were moved to the long-term potential development category during the composite ranking process based on field judgment. While these three sites are economically feasible for near-term development and noneconomic factors are not now seen as significantly limiting, field personnel knowledgeable of the projects consider it unlikely that these projects would be developed in the near-term.

Existing Hydropower Projects

Although existing hydropower projects in SWPP were removed from the ranking process because of the special reassessment performed on these projects, eight of these show that serious consideration should be given to expediting assessment of additional development at the sites within the near future. As discussed in Section 7.1 above, these sites could add 205 MW of incremental capacity and 280 GWH of incremental energy. This potential could displace the electric energy potential of approximately 500,000 barrels of oil annually.

8.2 LONG-TERM DEVELOPMENT POTENTIAL

Economic Ranking

There are 47 sites indicated in the SWPP region as having long-term development potential; seven of these are existing reservoir type projects

Table 8-1

PROJECTS WITH MODERATE ENVIRONMENTAL OR SOCIAL IMPACTS

PROJECT NAME/NUMBER	STREAM NAME	CAPACITY MW	ENERGY GWH	CONSTRAINT
L. D'Arbonne LAC LMK 0044	Bayou D'Arbonne	3.8	11.1	Social
Allen-Chivery LAC LMN 0019	Bayou Bourbeux	6.2	15.2	Environmental
L. Bistineau LAC LMN 0005	Loggy Bayou	9.4	20.8	Environmental/ Institutional
TOTAL		19.4	47.1	

where the estimated average cost of new energy exceeds 50 mills/KWH. The remaining are undeveloped sites. Cost of energy for the existing projects ranges from 52.90 to 164.31 mills/KWH. Annual costs in terms of dollars per KW of installed capacity range from approximately $100 per KW to $730 per KW per year.

Cost of energy data for undeveloped sites within the SWPP region are misleading in that total project development costs (including dams, reservoirs, relocations, etc.) are included. Since none of the undeveloped sites in this region could be economically justified as single purpose, power only developments, the costs which might be allocated to other project purposes must be subtracted from total development costs in order to determine the actual rate of cost for energy from these sites.

Results of previous studies and judgment of field personnel have been used to decide which of the undeveloped sites should be investigated for power potential in more detailed multipurpose studies of these sites.

Total development of the long-term potential at the seven existing projects is estimated to cost $21 million (1978 cost data) and would create 10 MW of additional capacity with an average annual energy potential of 22 GWH. Development of the potential at designated undeveloped sites would create 1,217 MW of additional capacity with an average annual energy potential of 3,747 GWH.

"Noneconomic" and "Composite" Rankings

The noneconomic ranking of long-term development potential is essentially the same as the economic ranking except that all existing projects were moved to the top of the list.

The composite ranking of long-term potential was performed in the same manner as that for the near-term potential, giving primary consideration to the relative energy potential within district priority rankings.

8.3 SUMMARY OF HYDROPOWER POTENTIAL

Table 8-2 shows a summary of hydropower potential by the various ranking procedures. Also shown is the fuel displacement associated with annual production. Development of the sites considered economically likely to be developed in the near-term could displace around 5.5 million barrels of oil annually. Development of the sites in the long-term economic ranking could displace approximately 6.2 million barrels annually. Development of potential at existing power sites could displace another 1/2 million barrels of oil. Thus, development of the 102 sites identified with hydropower potential in SWPP could displace a total of 12.2 million barrels of oil annually.

Table 8-2
HYDROPOWER POTENTIAL BY RANKINGS

Number of Sites	Capacity (MW)	Average Annual Energy (GWH)	Annual Fuel Displacement[2/] (million barrels)
		ECONOMIC and NONECONOMIC RANKINGS[1/]	
		Near-Term	
Existing - 47	881	3,298	5.5
		Long-Term	
Existing - 7	10	22	*
Undeveloped - 40	1,217	3,747	6.2
Subtotal	1,227	3,769	6.2
		COMPOSITE RANKING	
		Near-Term	
Existing - 44	792	3,251	5.4
		Long-Term	
Existing - 10	29	69	.1
Undeveloped - 40	1,217	3,747	6.2
Subtotal	1,246	3,816	6.3

*Around 40,000 barrels annually.
Note: Total may not add because of rounding.

1/ Economic and noneconomic rankings are identical with respect to projects in near-term and long-term classifications; differences are in site rankings within classifications.

2/ Displacements estimated at 1 barrel oil = 600 KWH

GLOSSARY

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 peformed 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.

KILOVOLT (KV) - one thousand volts.

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 3,413 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.

MARGIN - difference between net system capacity and system maximum load requirements.

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 FACTOR - the percentage ratio of the amount of power, measured in kilowatts, used by a consuming electric facility to the apparent power measured in kilovolt-amperes.

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 nonprofit 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 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 superivsion.

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.

ATTACHMENT A

(FERC POWER VALUES)

ATTACHMENT A

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D. C. 20426

JUN 23 1978

Mr. Augustine J. Fredrich
Director, Institute for Water Resources
Corps of Engineers
Kingman Building
Fort Belvoir, Virginia 22060

Dear Mr. Fredrich:

In reference to your letter of February 21, 1978, and in accordance with instructions received from Mr. Donald Gund of your office, our regional offices have developed preliminary generalized power values (shown in the enclosed Appendix tables) to be used in the analysis of the relative economic merits of projects for the National Hydropower Study.

The enclosed preliminary power values are developed based on a range of hydroelectric plant factors from zero to one-hundred percent, in increments of ten-percent. For each hydro capacity factor level, the individual component power values ($/kW-yr and mills/kWh) are shown in addition to an equivalent total annual value expressed both in $/kW-yr and in mills/kWh. These values are based on January 1978 cost levels and are to be applied "at-market" unless otherwise stated. Additional assumptions and rationale for the generalized power values are shown in the individual tables. These assumptions include: type of financing assumed; characteristics and costs (including fuel costs) of thermal alternatives; suggested "mix" of base-load alternatives -- for example, in areas where coal-fired steam and nuclear plants are both considered viable base-load alternatives -- and estimated pumping energy cost. The power values which are derived from base-load steam-electric alternatives reflect the added cost of environmental control facilities. The tables are arranged by regional office according to one of the following sub-groups: (1) regional electric reliability council, (2) state, and (3) power system group. A Regional Electric Reliability Council map and electric power system facilities map are also enclosed in order to identify the geographical boundaries involved.

As reflected in the enclosed tables, natural gas is considered to be an alternative fuel for peaking and intermediate duty operation in

Mr. Augustine J. Fredrich

the Anchorage area of Alaska. Alaska, however, is considered to be a different situation from the lower 48-states. Several years ago, the FPC's Bureau of Power issued instructions to its regional offices to discontinue consideration of natural gas in power value calculations for projects within the contiguous United States. The Office of Electric Power Regulation continues this policy of excluding natural gas from power value studies in the 48-states, including those states which are located in the southwestern portion of the country.

We will modify the enclosed preliminary power value data through detailed computer methodologies to reflect the final generalized power values. We anticipate that a new production costing program will be implemented for this effort prior to September 1978, the date which Mr. Gund indicated for completion of the final values. In the meantime, the enclosed values are appropriate for the preliminary screening of all hydroelectric developments (including low-head developments) within the respective study areas.

We will be happy to answer any questions regarding these values.

Sincerely,

William W. Lindsay
Director, Office of
Electric Power Regulation

Enclosures

FORT WORTH REGIONAL OFFICE

Southwest Power Pool (SWPP)

Hydro Capacity Factor %	Capacity Value ($/kW-yr)	Energy Value (mills/kWh)	Equivalent Total Power Value 1/ ($/kW-yr)	(mills/kWh)
		Combustion Turbine Alternative		
0	30.80	-	30.80	-
10	30.40	35.2	61.20	69.9
20	30.40	34.9	91.60	52.3
		Combined Cycle Alternative		
30	68.90	23.3	130.10	49.5
40	68.90	22.1	146.40	41.8
		Nuclear Alternative		
50	197.70	3.0	210.70	48.1
60	197.70	4.4	220.80	42.0
70	197.70	5.4	230.90	37.7
80	197.70	6.2	241.00	34.4
90	197.70	6.8	251.10	31.8
100	197.70	7.2	261.20	29.8
		Coal Fired Alternative		
50	125.10	12.0	177.40	40.5
60	125.10	11.9	187.70	35.7
70	125.10	11.9	197.90	32.3
80	125.10	11.9	208.10	29.7
90	125.10	11.8	218.40	27.7
100	125.10	11.8	228.60	26.1

1/ Example: Component power values of $30.40/kW-yr and 35.2 mills/kWh at 10 percent hydro capacity factor are equivalent to a total annual value of either $61.20/kW-yr or 69.9 mills/kWh (but not both).

Pumping Energy Cost 11.4 mills/kWh

ATTACHMENT A (Continued)

- 17 -

FORT WORTH REGIONAL OFFICE

Southwest Power Pool (SWPP)

TYPE OF ALTERNATIVE:	Coal-fired
NUMBER AND SIZE OF UNITS:	2-700 MW units
ALTERNATIVE INVESTMENT COST:	$550/kW
ALTERNATIVE HEAT RATE:	9,600 Btu/kWh
ALTERNATIVE FUEL COST:	120¢/10^6 Btu

TYPE OF ALTERNATIVE:	Nuclear
NUMBER AND SIZE OF UNITS:	2-1200 MW units
ALTERNATIVE INVESTMENT COST:	$850/kW
ALTERNATIVE HEAT RATE:	---
ALTERNATIVE FUEL COST:	$75/kW and 4.75 mills/kWh

TYPE OF ALTERNATIVE:	Combined cycle, oil-fired
NUMBER AND SIZE OF UNITS:	1-300 MW unit
ALTERNATIVE INVESTMENT COST:	$240/kW
ALTERNATIVE HEAT RATE:	9,500 Btu/kWh
ALTERNATIVE FUEL COST:	225¢/10^6 Btu

TYPE OF ALTERNATIVE:	Combustion turbine, oil-fired
NUMBER AND SIZE OF UNITS:	2-50 MW units
ALTERNATIVE INVESTMENT COST:	$160/kW
ALTERNATIVE HEAT RATE:	15,000 Btu/kWh
ALTERNATIVE FUEL COST:	225¢/10^6 Btu

TYPE OF FINANCING ASSUMED: Private (10 percent cost of money)

SUGGESTED MIX OF BASE LOAD ALTERNATIVES: 71% Coal-fired steam
29% Nuclear

ATTACHMENT B

PERTINENT CORRESPONDENCE
AND
PUBLIC VIEWS AND RESPONSES

ATTACHMENT B

PERTINENT CORRESPONDENCE
AND
PUBLIC VIEWS AND RESPONSES

TABLE OF CONTENTS

BOB DOLE
KANSAS

STANDING COMMITTEES
AGRICULTURE, NUTRITION, AND FORESTRY
FINANCE
JUDICIARY

United States Senate

WASHINGTON, D.C. 20510

October 29, 1980

Brigadier General Hugh G. Robinson
Southwestern Division
U.S. Army Corps of Engineers
1200 Main Street
Dallas, Texas 75202

SUBJECT: Draft Report, Volume XX, Southwest Power Pool, National Hydroelectric Power Resources Study

Dear General Robinson:

I am writing to make known my concerns relative to the position being taken by the Corps of Engineers as expressed in the above referenced report prepared by the Southwestern Division of the Corps as part of the National Hydroelectric Power Resources Study.

Specifically, I am concerned about the Corps' involving itself into the area of Marketing of hydroelectric power from federal water resource projects. Marketing of this power resource is the responsibility of the Department of Energy's Power Marketing Agencies, pursuant to the directives of the Congress of the United States.

Mr. Charles Ross, Executive Vice President, Kansas Electric Power Cooperative, Inc. (KEPCo), has provided me with a copy of the comments on your Report sent on October 27, 1980, by the Executive Director of the Committee on Power for the Southwest to Mr. Barry G. Rought of the Corps' Southwestern Division.

I generally concur with these comments and believe that the Corps should confine its activities to those matters within its assigned responsibility. I believe this will expedite the completion of the Report and the implementation of the resource developments recommended therein.

Sincerely yours,

ROB DOLE
United States Senate

BD/mvg

B-1

The Corps has no desire to take over marketing responsibilities. The text has been revised for clarification.

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON D C 20250

Mr. Barry G. Rought
Chief, Planning Division
Southwestern Division, Corps of Engineers
U.S. Department of the Army
1200 Main Street
Dallas, Texas 75202

November 28 1980

Dear Mr. Rought:

Thank you for providing the opportunity to review the draft report of the National Hydroelectric Power Resources Study, Volume XX, that discusses potential hydropower resources within the area of the Southwest Power Pool.

We have no comment.

Sincerely,

Bob Bergland
Secretary

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Ozark-St. Francis National Forests
P.O. Box 1008 - Russellville, AR 72801

1950
October 9, 1980

Barry G. Rought P.E.
Chief, Planning Division
Department of the Army
Southeastern Division, Corps of Engineers
Main Tower Building, 1200 Main Street
Dallas, Texas 75202

Dear Mr. Rought:

Thank you for the draft report on the potential hydroelectric resources within the area of the Southwest Power Pool. We have no comments at this time but would like a copy of the final report.

Sincerely,

JAMES R. [illegible]
Forest Supervisor

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
910 Milner Building
Jackson, Mississippi 39201

REPLY TO: 3560 - Interagency Programs October 22, 1980

SUBJECT: Draft report-"Potential Hydropower Resources Within the Area of the Electric Reliability Council of Texas".

TO: Joel F. Wilson, Acting Chief
Planning Division
Dept. of the Army
Southwestern Div, COE
Main Tower Bldg., 1200 Main St.
Dallas, Texas 75202

I have reviewed the Draft Report "National Hydroelectric Power Resources Study, Volume XXI with interest. It was very well done and with the exception of a misplaced decimal in Table 4-1, I can find no criticism. Thank you for the opportunity to comment.

Corrected.

Bruce L. Baldwin

Bruce L. Baldwin, Field Representative
Area Planning Staff

Department of Energy
Southwestern Power Administration
Post Office Box 1619
Tulsa, Oklahoma 74101

October 27, 1980

Mr. Barry G. Rought, P.E.
Chief, Planning Division
Corps of Engineers
1200 Main Street
Dallas, Texas 75202

Dear Mr. Rought:

This is in response to your letter of October 3, 1980, enclosing the Draft Report, Southwest Power Pool (SWPP), of the National Hydroelectric Power Resources Study (NHS). We realize the enormity of the task required to meet objectives of the NHS and limitations in scope are mandatory. However, we feel that certain phases of this report should be more specific and need more emphasis. These aspects will be discussed in the following comments on the report.

Page v of Preface - This paragraph states that pumped storage potential is not assessed for the SWPP yet it properly identifies one of the major values of pumped storage projects, that of displacing oil-fired generation with coal-fired generation. Considering this important aspect, it appears that a listing of potential pumped storage projects in the SWPP area would be appropriate.

Noted

Page 3-12 - Third Paragraph - Total capability listed in the second sentence should be changed from 1923 MW to 1835 MW. This change included an increase of 10 MW at Norfork to 80 MW and an increase of 2 MW at the Tenkiller Project to 36 MW made possible by generator re-windings.

Corrected

Page 3-14 - First Paragraph - It is suggested that the sentence commencing on the fourth line - "Flood control ....." be changed to "Flood control and hydroelectric power operations are made for mutual optimization; emergency operations, including those required for flood control or power will have priority."

Accomplished

Second Paragraph - It would be pointed out that the hydroelectric power purpose has made possible docks and trout fishing and that hydroelectric power should not be penalized for the benefits it has created.

Noted

Fourth Paragraph - first sentence - The concept that any commodity purchased without profit to the supplier results in a subsidy does not fit the accepted definition of a subsidy. This reasoning could deduce that power users supplied by coal-fired generators

Corps projects are funded from general revenues and the cost is borne by a large segment of the population, yet the benefits accrue to preference customers if the price is lower than that of alternative power supplies. The terms "subsidy" has been removed from the text.

enjoy a subsidy because they usually pay less than users supplied by oil-fired generators. As long as all costs of producing hydroelectric power are repaid, there is no subsidy. Second sentence - Selling electric power and energy at cost does not necessarily discourage conservation. Since Southwestern markets most hydroelectric power available as peaking, our customers must purchase the bulk of its electric requirements from other sources, any non-prudent use of hydroelectric power must ultimately be purchased from the non-federal source at the maximum incremental cost. Hence, there is incentive for conservation.

Page 3-15 - The capacity at Norfork should be changed from 70 MW to 80 MW and the capacity at Tenkiller should be changed from 34 MW to 36 MW. — Corrected

Page 4-1 - Last Paragraph - What is the source and identification of economists involved in the "Consensus Forecast of U.S. Electricity Demands." Were forecasts made specifically for the SWPP area? — See footnotes 12 and 14 in text

Page 4-5 - Fourth Paragraph - Again, the forecasters referred to in " a number of forecasters" in line three, should be identified. Why was not more weight given to forecasts by member utilities of the SWPP? Member utilities have the responsibility to meet these loads and the expertise to properly develop forecasts. — Noted

Page 8-1 - First Paragraph and
Page 8-3 - Second Paragraph - The referenced 47 non-power producing projects and the 44 projects with near term potential should be listed separately for easy reference. — Noted

We appreciate the opportunity to review this report.

for Walter M. Powers
Chief, Division of
Power Marketing

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

October 29, 1980

Mr. Barry G. Rought
Chief, Planning Division
Southwestern Division, COE
Main Tower Building
1200 Main Building
Dallas, Texas 75202

ATTN: SWDPL-M

Dear Mr. Rought:

We have completed our review of the draft report on the potential hydropower resources within the area of the Southwest Power Pool. The report was prepared in response to Section 167 of the Water Resources Development Act of 1976. The final report on this region will be included in the national report that is scheduled to be published in September 1981.

The draft report on this area primarily investigated hydroelectric power projects that showed an additional energy production potential with a corresponding reduction in fuel consumption. The report did not investigate pumped storage facilities.

The following comments are offered for your consideration:

1. The report refers to developing additional conventional hydroelectric power resources by retrofitting existing dams but how this would be done or what the environmental effects would be was not mentioned. The final report should explain if the water levels of the lakes would be raised or if the point of discharge from the dams would be moved which could change the channel down river.

2. It would have been helpful if the report had addressed the CEQ August 11, 1980 Memorandum for Heads of Agencies concerning the need to analyze agricultural land impacts more effectively in the project planning process and under NEPA. The final report should clearly state whether or not the projects will inundate prime farmland. If farmland will be inundated, the direct and indirect effects of the proposed action should be evaluated and adverse effects avoided or minimized to the extent possible, in agreement with the CEQ Memorandum.

Response: Data requested in these paragraphs will be provided during site specific feasibility studies.

3. On page 3-2 the draft report listed the nuclear power plant "Grand Gulf" as located in St. Charles Parish, Louisiana. Our records do not show this power plant in Louisiana.

Corrected.

We appreciated the opportunity to review the draft document.

Sincerely,

Clinton B. Spotts

Clinton B. Spotts
Regional EIS Coordinator (6ASAF)

FEDERAL ENERGY REGULATORY COMMISSION

REGIONAL OFFICE

819 Taylor Street, Room 9A05
Fort Worth, Texas 76102

November 7, 1980

In reply refer to: OEPR-FH

Mr. Barry G. Rought
Chief, Planning Division
Southwestern Division
Corps of Engineers
1200 Main Street
Dallas, Texas 75202

ATTN: SWDPL-H

Dear Mr. Rought:

In response to your letters of October 3 and 9, 1980, submitting, respectively, the Draft Report on the National Hydroelectric Power Resources Study on the Southwest Power Pool Area and on the Electric Reliability Council of Texas Area we offer the following comments.

In Table 5-1, page 5-8 the annual plant factor at zero percent should list a capacity value and a zero for the energy value.

Corrected

We also note that on Table 3-1 of the ERCOT area report the Abbott TP-3 plant is listed as being owned by the Texas Power Corporation. Our records indicate that the Guadalupe-Blanco River Authority is the owner of the Dunlap, McQueeny, Nolte, TP-4, H-4, and H-5 plants. The McQueeny plant is also known as the TP-3 plant.

We appreciate the opportunity of reviewing the draft reports.

Sincerely,

Lenard B. Young
Regional Engineer

By [signature]
Acting

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
DALLAS AREA OFFICE
2001 BRYAN TOWER FOURTH FLOOR
DALLAS, TEXAS 75201

REGION VI

October 16, 1980

IN REPLY REFER TO:
6.1SS:IJR:sp

Mr. Joel F. Wilson
Acting Chief, Planning Division
Southwestern Division, Corps of Engineers
Department of the Army
Main Tower Building - 1200 Main Street
Dallas, Texas 75202

Dear Mr. Wilson:

The draft report on National Hydroelectric Power Resources Study has been reviewed by this office and we offer no comments.

Sincerely,

I. J. Ramsbottom
Environmental Clearance Officer

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FORT WORTH REGIONAL OFFICE
221 WEST LANCASTER AVENUE
P O BOX 2905
FORT WORTH, TEXAS 76113

REGION VI

October 29, 1980

IN REPLY REFER TO

Mr. Barry G. Rought, Chief
Planning Division
Southwestern Division
U.S. Army Corps of Engineers
ATTN: SWDPL-M
Main Tower Building
1200 Main Street
Dallas, Texas 75202

Dear Mr. Rought:

This office has reviewed the Draft Regional Report for the Southwest Power Pool, Volume XX of the National Hydroelectric Power Resources Study, transmitted by your letter of October 2.

We are most enthusiastic about and highly supportive of this overall undertaking, and we agree that highest priority should be assigned to increasing the generating capacity of existing hydroelectric projects and to installing hydroelectric generators in existing reservoir projects which were constructed without power-production facilities. We are also of the opinion that high priority should be given to the installation of in-stream generating facilities at sites where impoundment is not required for power production.

For sites requiring new impoundments, we think that it is most important that a maximum effort be made to assign true and accurate values to all the factors involved in the necessary trade-off process. It is recognized that the same impoundment required for hydroelectric power production may possibly also provide benefits in the areas of flood control, municipal and industrial water supplies, water-oriented recreation, fish production, and waterfowl habitat. However, those positive or "plus" factors may in some situations be more than outweighed by such negative factors as destruction of free-flowing streams with unique and/or rare types of fauna and special recreational and scenic qualities, inundation of historic and/or scenic areas, loss of wildlife habitat and recreational lands, loss of agricultural and timber production, and disruption of established settlements. I wish to stress that we do not take a position in opposition to new impoundments, but are of the opinion that they should be subjected to a rigorous cost-benefit or trade-off assessment which takes into account both factors which can be assigned monetary values and those which cannot.

Sincerely,

Thomas J. Armstrong
Regional Administrator

AREA OFFICES
DALLAS, TEXAS LITTLE ROCK, ARKANSAS NEW ORLEANS, LOUISIANA OKLAHOMA CITY, OKLAHOMA SAN ANTONIO TEXAS

Sites considered for development will be subject to the detailed analysis.

IN REPLY REFER TO
Division of Resource Dev.
and Protection - 300

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
ALBUQUERQUE AREA OFFICE
P O BOX 8327
ALBUQUERQUE, NEW MEXICO 87108

NOV 03 1980

Barry G. Rought, P.E.
Chief, Planning Division
Department of the Army
SW Division, Corps of Engineers
Main Tower Building
1200 Main Street
Dallas, Texas 75202

Dear Mr. Rought:

My Area Office staff has reviewed your report on the potential hydropower resources within the area of the Southwest Power Pool. We do not have any comments to make concerning the report.

Thank you for providing a copy of the study to us.

Sincerely,

Kenneth L Pozzie

DEPUTY, Area Director

United States Department of the Interior

WATER AND POWER RESOURCES SERVICE
WASHINGTON, D.C. 20240

IN REPLY
REFER TO: 724
125.1

NOV 7 1980

Mr. Barry G. Rought
Chief, Planning Division, Attn: SWDPL-M
Department of the Army
Main Tower Building
1200 Main Street
Dallas, TX 75202

Dear Mr. Rought:

We have reviewed the draft report submitted with your letter of October 3, 1980, titled "National Hydroelectric Power Resources Study - Regional Report Southwest Power Pool" dated September 1980. The report is well prepared and provides substantial information and data on existing power supplies, existing and potential hydropower developments, and estimated future electric energy demands for the Southwest Power Pool area. It is a timely document that contains valuable reference material.

Technical comments on the report will be provided by our field offices in Denver, Colorado, and Amarillo, Texas. These offices have previously contributed data for the report and will continue to provide data as it becomes available.

We fully support the National Hydroelectric Power Resources Study and will cooperate in any way we can to assist in this effort. We appreciate the opportunity to review the draft report.

Sincerely yours,

Commissioner

United States Department of the Interior
WATER AND POWER RESOURCES SERVICE
SOUTHWEST REGION
COMMERCE BUILDING, 7145 TYLER, SUITE 201
AMARILLO, TEXAS 79101

IN REPLY
REFER TO: 720

NOV 0 4 1980

Mr. Barry G. Rought
Chief, Planning Division
U. S. Army Corps of Engineers
Southwest Division
Main Tower Building, 1200 Main Street
Dallas, TX 75202

Dear Mr. Rought:

We have reviewed the draft report on the potential hydropower resources within the area of the Southwest Power Pool, as requested by your letter of October 3, 1980. The report appears to adequately present information relative to the developable hydropower resources within the geographical boundaries of Southwest Power Pool. We would appreciate receiving a copy of the document when finalized.

Sincerely yours,

William A. Seth

William A. Seth
Regional Planning Officer

cc: Representative, Austin, Texas

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
400 ROYAL STREET
NEW ORLEANS 70130

JOSEPH V COLSON
SECRETARY

DAVID C TREEN
GOVERNOR

October 16, 1980

Southwestern Division
Corps of Engineers
Main Tower Bldg.
1200 Main St.
Dallas, TX 75202

RE: Draft Report Volume XX
National Hydroelectric Power
Resources Study

Dear Sir:

Personnel of the Louisiana Department of Wildlife and Fisheries have reviewed the above referenced report and offer the following comments.

Three of the potential sites in Louisiana are in environmentaly sensative areas. Site No. LACLMK0044, Lake D'Arbonne, is located on one of Louisiana's Natural and Scenic Streams. Site Nos.LACLMN0005, Lake Bistineau, and LACLMN0019, Allen-Chivery, require close review for possible significant impacts on fish and wildlife resources.

The text has been revised accordingly.

We appreciate the opportunity to review this report.

Sincerely,

Joseph V. Colson

Joseph V. Colson
Secretary

JVC:FOD:clg
Enclosure

OFFICE OF THE GOVERNOR

WILLIAM P. CLEMENTS, JR.
GOVERNOR

December 8, 1980

Mr. Barry G. Rought, P. E.
Chief, Planning Division, Southwestern Division
U. S. Corps of Engineers
Main Tower Building
1200 Main Street
Dallas, Texas 75202

Dear Mr. Rought:

The draft report pertaining to the Southwest Power Pool, prepared by your office, has been reviewed by the Budget and Planning Office and interested state agencies. Copies of the review comments are enclosed for your information and use. The State Environmental Impact Statement Identifier Number assigned to the project is 0-10-50-050.

The Budget and Planning Office appreciates the opportunity to review this project. If we can be of any further assistance during the environmental review process, please do not hesitate to call.

Sincerely,

F. R. Spies, Manager
General Government Section
Budget and Planning Office

mp

Enclosures: Comments by Railroad Commission of Texas
Texas Department of Water Resources
Texas Parks and Wildlife
Texas State Soil and Water Conservation Board
State Department of Highways and Public Transportation
General Land Office

SAM HOUSTON BUILDING • P O BOX 12428 CAPITOL STATION • AUSTIN TEXAS 78711

TEXAS
PARKS AND WILDLIFE DEPARTMENT

CHARLES D TRAVIS
EXECUTIVE DIRECTOR

4200 Smith School Road
Austin, Texas 78744

November 24, 1980

Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning Office
Attention: General Government Section
P. O. Box 12428
Austin, Texas 78711

Re: National Hydroelectric Power Resources Study,
Draft Report (SWDPL-M), Volume XX

Dear Mr. Wrotenbery:

The referenced document was revieved by this agency and the following comments are offered for your consideration.

This agency can appreciate the need for energy generation from hydropower projects such as those discussed in this document. This agency is also vitally interested in the preservation of the fisheries resources of the State's streams and rivers. It is believed that, with proper coordination, both objectives can be achieved in a satisfactory manner, and a discussion of such coordination would make a worthwhile addition to this document. Of particular importance for the protection of fisheries resources is the quality of water released (e.g., Hypolimnetic water can create a hazard to fish) and the quantity and timing of water releases that will maintain downstream fisheries. The pattern of brush and tree clearing in the reservoir site(s) should also be an important ingredient of early coordination.

Noted.

This agency will be happy to provide assistance in early planning and coordination on any of these specific projects.

Sincerely,

CHARLES D. TRAVIS
Executive Director

RECEIVED

NOV 17 1980

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

1002 First National Building
P O Box 658
Temple Texas 76501
Area Code 817 773 2350

November 12, 1980

Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning Office
Attention: General Government Section
411 West 13th Street
Austin, Texas 78701

Dear Mr. Wrotenbery:

We have reviewed the draft environmental impact statement for the Hydroelectric Power Resources Southwest Power Pool prepared by the U.S. Department of Army, Corps of Engineers.

We offer no comment on the statement.

Sincerely yours,

A. C. Spencer
Executive Director

ACS/JMM/vd

TEXAS DEPARTMENT OF WATER RESOURCES
1700 N. Congress Avenue
Austin, Texas

TEXAS WATER DEVELOPMENT BOARD
Louis A. Beecherl, Jr. Chairman
John H. Garrett, Vice Chairman
George W. McCleskey
Glen E. Roney
W. O. Bankston
Lonnie A. "Bo" Pilgrim

Harvey Davis
Executive Director

TEXAS WATER COMMISSION
Felix McDonald, Chairman
Dorsey B. Hardeman
Jon R. Carroll

November 20, 1980

Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning Office
Attention: General Government Section
P. O. Box 12428
Austin, Texas 78711

Dear Mr. Wrotenbery:

The National Hydroelectric Power Resource Study, Volume XX Draft Report (Southwest Power Pool Region), published by the U.S. Army Corps of Engineers has been reviewed by the staff of the Texas Department of Water Resources. Specific comments and concerns pertaining to the content of the report are presented below:

Chapter II. The economic analysis of the region is based on a 1972 OBERS Series E projection set. The problems inherent in using these outdated data should be clearly stated in the report. Also, the residential electrical energy use distribution patterns indicated in the last colum of Table 2-6 on Page 2-17 should be footnoted to indicate that these were taken from a multi-regional study and are applicable to more than the Southwest Power Pool Region of the United States.

Chapter V. In developing the methodology for evaluating potential projects, water rights were not considered. Likewise, at new reservoir sites, it was assumed that existing unimpounded flow patterns would still exist after impoundment. Also, possible direct diversions from the reservoirs were not taken into account. These three considerations have significant impact on the viability of a hydroelectric power project, yet these issues were not addressed. We realize that it is impossible to consider all of these factors in detail in such an analysis and do not propose that the methodology be changed. Nonetheless, the Texas Department of Water Resources considers it to be of great importance that these issues and their implications be more clearly addressed in the final reports. Failure to do so would be a serious omission.

On Page 5-3, second paragraph, we question the validity of the methodology used to estimate flows in streams where drainage areas and flow data were not given. Although we realize this assumption was used only in the preliminary

Response: The 1972 OBERS Series E projection set was the most recent set of national and regional projections made available by the Water Resources Council (WRC).

Response: Footnote added to Table 2-6.

Response:
1. Water rights are discussed in Volume V, "Legislative, Institutional," and Social Considerations," of the NHS Report.

2. Flow patterns are adjusted for effects of impoundments by adjusting evaporation rates.

3. The methodology does take into account direct diversions from stream flow.

screening, it is not accurate for areas of the United States such as Texas. On pages 5-7 and 5-9 and 5-10, which present preliminary cost data for single power units, we note that the draft study does not indicate if these data include cost for pen stocks, tail races, switching yards, or other facilities that must also be built. The costs which are included in these data should be clearly stated.

Noted.

Chapter VII. We believe that it is necessary to stress that many of the undeveloped sites presented in this report may never be built, and that many of the sites included are alternate sites for other projects on the list. We wish to again stress that water rights were not addressed in the methodology for arriving at these estimates.

Response: Tables revised to include list of items included in cost curves.

We appreciate the opportunity to review this document. We again emphasize that the assumptions of the study pertaining to water rights, hydrology, and to cost analysis should be more clearly stated. We hope that these comments will be helpful.

Sincerely yours,

Harvey Davis
Executive Director

Response: In evaluating undeveloped sites, those considered to be alternatives were compared, and only the most favorable site was retained in the inventory

OFFICE OF THE GOVERNOR

WILLIAM P. CLEMENTS, JR.
GOVERNOR

October 31, 1980

RECEIVED
NOV 18 1980

TRANSMITTAL MEMORANDUM

TO: Review Participants

DATE COMMENTS DUE Budget/Planning
BUDGET AND PLANNING OFFICE: 11/17/80

_ Aeronautics Commission	_ Industrial Commission
X Air Control Board	X Parks and Wildlife Department
_ Animal Health Commission	X Public Utilities Commission
_ Bureau of Economic Geology	X Railroad Commission
X Coastal and Marine Council	X Soil and Water Conservation Board
_ Department of Agriculture	X Texas Energy and Natural Resources Advisory Council
_ Department of Health	_ Governor's Office of Regional Development
X Department of Highways and Public Transportation	_ _____
X Department of Water Resources	_ _____
_ Texas Forest Service	_ _____
X General Land Office	_ _____
_ Historical Commission	

[X] Draft EIS [ ] Other _____ EIS Number 0-10-50-050

Project Title Draft Study: Hydroelectric Power Resources
Southwest Power Pool

Originating Agency U.S. Dept. of Army, Corps of Engineers

Pursuant to the National Environmental Policy Act of 1969, Office of Management and Budget Circular A-95, and the Texas Policy for the Environment (1975), the Governor's Budget and Planning Office is responsible for securing the comments and views of local and State agencies during the environmental impact statement review process.

Enclosed for your review and comment is a copy of the above cited document. This Office solicits your comments and asks that they be returned on or before the above due date. You may find the questions listed on the reverse side, useful in formulating your comments.

For questions on this project, contact Ward Goessling at (512) 475-6021.

Please address your agency's formal comments to: Mr. Paul T. Wrotenbery, Director
Governor's Budget and Planning Office
Attention: General Government Section
P.O. Box 12428
Austin, Texas 78711

SAM HOUSTON BUILDING • P O BOX 12428 CAPITOL STATION • AUSTIN TEXAS 78711

B-20

Suggested Questions to be Considered by Reviewing Agencies:

1. Does the proposed project impact upon and is it consistent with the plans, programs and statutory responsibilities of your agency?

2. What additional specific effects should be assessed?

3. What additional alternatives should be considered?

4. What better or more appropriate measures and standards should be used to evaluate environmental effects?

5. What additional control measures should be applied to reduce adverse environmental effects or to avoid or minimize the irreversible or irretrievable commitment of resources?

6. How serious would the environmental damage from this project be, using the best alternative and control measures?

7. What specific issues require further discussion or resolution?

8. Does your agency concur with the implementation of this project?

As a part of the environmental impact statement review process, the Budget and Planning Office forwards to the originating agency all substantive comments which are formally submitted. If, after analyzing this document, you conclude that substantive comments are unnecessary, you may wish to so indicate by checking the box below and forwarding the form to this office. This type of response will indicate receipt of this document by your agency and that no formal response will be prepared.

[X] No Comment.

Marcus L. Yancey Jr.

Name and Title of Reviewing Official
Marcus L. Yancey, Jr.
Deputy Engineer-Director, 11-12-80
State Department of Highways and Public Transportation Agency

Suggested Questions to be Considered by Reviewing Agencies:

1. Does the proposed project impact upon and is it consistent with the plans, programs and statutory responsibilities of your agency?

2. What additional specific effects should be assessed?

3. What additional alternatives should be considered?

4. What better or more appropriate measures and standards should be used to evaluate environmental effects?

5. What additional control measures should be applied to reduce adverse environmental effects or to avoid or minimize the irreversible or irretrievable commitment of resources?

6. How serious would the environmental damage from this project be, using the best alternative and control measures?

7. What specific issues require further discussion or resolution?

8. Does your agency concur with the implementation of this project?

As a part of the environmental impact statement review process, the Budget and Planning Office forwards to the originating agency all substantive comments which are formally submitted. If, after analyzing this document, you conclude that substantive comments are unnecessary, you may wish to so indicate by checking the box below and forwarding the form to this office. This type of response will indicate receipt of this document by your agency and that no formal response will be prepared.

[X] No Comment.

Jim B Claudt
Name and Title of Reviewing Official

Railroad Commission of Texas
Agency

Suggested Questions to be Considered by Reviewing Agencies:

1. Does the proposed project impact upon and is it consistent with the plans, programs and statutory responsibilities of your agency?

2. What additional specific effects should be assessed?

3. What additional alternatives should be considered?

4. What better or more appropriate measures and standards should be used to evaluate environmental effects?

5. What additional control measures should be applied to reduce adverse environmental effects or to avoid or minimize the irreversible or irretrievable commitment of resources?

6. How serious would the environmental damage from this project be, using the best alternative and control measures?

7. What specific issues require further discussion or resolution?

8. Does your agency concur with the implementation of this project?

As a part of the environmental impact statement review process, the Budget and Planning Office forwards to the originating agency all substantive comments which are formally submitted. If, after analyzing this document, you conclude that substantive comments are unnecessary, you may wish to so indicate by checking the box below and forwarding the form to this office. This type of response will indicate receipt of this document by your agency and that no formal response will be prepared.

[X] No Comment.

Stephen Minnick
Name and Title of Reviewing Official

GENERAL LAND OFFICE
Agency

Approved: Mike Nightower
Mike Nightower, Director
Coastal Division
Land Resources Program

RECEIVED
DEC 1 1980
Budget/Planning

NEW MEXICO INTERSTATE STREAM COMMISSION

BATAAN MEMORIAL BUILDING
STATE CAPITOL
SANTA FE, NEW MEXICO 87503

October 8, 1980

J. Phelps White III
Roswell

Mr. Barry G. Rought
Chief Planning Division
Department of the Army
Southwest Division Corps of Engineers
Main Tower Building
1200 Main Street
Dallas, Texas 75201

Dear Barry:

We have reviewed Volume XX of the National Hydroelectric Power Resource Study Draft Report, dated September 1980 and transmitted by your October 3, 1980 letter. We are not aware of any potential hydroelectric sites in the Southwest Power Pool Area that were not considered in your study.

New Mexico appreciates the opportunity to review your draft report.

Sincerely,

Philip B. Mutz
Interstate Stream Engineer

PBM:CLS:pt

Committee On Power For The Southwest

400 S. Broadway, Suite 3
P.O. Box 1360

Edmond, Okla. 73034
Phone 405-340-1900

October 27, 1980

U. S. Army Engineers
Southwestern Division
1200 Main Street
Dallas, Texas 75202

Attention: Mr. Barry G. Rought

Subject: Draft Report, Volume XX, Southwest Power Pool, National Hydroelectric Power Resources Study

The Committee on Power for the Southwest submits the following comments on the Draft Report. In general, the Corps of Engineers has done a good job in evaluating potential for further hydroelectric development at exsisting projects in the Southwest Power Pool. However, this report also contains unnecessary and totally unjustified comments on current federal pricing and marketing policies, which are the sole responsibilities of the Department of Energy and tne Congress.

I. At the bottom of page 3-14 of the Draft Report and extending over to page 3-17 the following statement is made:

> "The requirement that power from Federal projects be marketed at cost, and to preference customers results in a subsidy to the preference customers when the cost of Federal power is below the market price. It is argued also that selling energy below its value encourages the use of electric power and may conflict with national policy to encourage conservation energy sources. 10/
> Any changes in pricing and marketing power from Federal projects would require Congressional action."

This statement is unjustified, improper and, worse, untrue. There is no subsidy to preference customers when the government recovers its costs from the sale of power. "Market price" or other subjective considerations are not a part of federal power marketing. As long as the government recovers its costs within the repayment period provided by law - including interest at rates approved by Congress- there is no subsidy to preference customers.

See response to Southwestern Power Administration.

The statement that "it is argued also that selling of energy below its value ---- may conflict with national policy to encourage conservation ----. 10/, is without basis. If the reader checks footnote 10, he finds that the Corps is quoting itself as the source of the "argument." There is no reason to include such argumentative, unsubstantiated statements in this report. It represents only the continuation of an effort by certain Corps officials to repeal the preference status of rural electric cooperatives and municipalities.

Noted

II. Near the bottom of page 3-12 of the Draft Report, the following sentences are included in the last paragraph.

> "Customers also purchase secondary energy at reduced rates. In 1979, 41% of the energy sold from Federal projects was marketed at reduced rates."

This statement is simply not accurate. Rates for secondary energy sold by the Southwestern Power Administration are included in filed tariffs subject to approval by the Federal Regulatory Commission. The rates are established on the basis of detailed studies by SWPA. Secondary energy is, by its very nature, less valuable than primary energy. It has properly been evaluated as such for rate making purposes. The Draft Report should be corrected to reflect these facts. Use of the term "reduced rates" without clearly explaining the rate making process leaves the reader with a distorted view of rates charged to power users. References to "reduced rates" in the Draft Report should be removed if the Corps does not intend to provide complete factual information on how rates are established.

The statement was intended to point out that secondary power is of less value to customers than dependable energy. The text has been reworded to make this clarification.

Our members, which consist of 175 rural electric cooperatives and 65 municipal electric utilities in the region serving over six million persons, are ready to support the maximum development of the region's hydroelectric resources. The power requirements of these systems are

large enough to make effective use of all additional hydro development indentified in the Draft Report. This report can be made useful and acceptable by making the necessary modifications suggested in these comments.

Very Turly Yours,

Michael L. McDowell
Executive Director

MM/lc

Kansas Electric Power Cooperative, Inc.
6900 W. 21st • P O Box 4267 Gage Center Station • Topeka, Kansas 66604 • 913/272-6740
• CHARLES ROSS – EXECUTIVE VICE PRESIDENT
• JOSEPH W MULHOLLAND – MANAGER OF POWER SUPPLY AND ENGINEERING

October 30, 1980

Mr. Barry G. Rought, P.E.
Chief, Planning Division
Department of the Army
Southwestern Division, Corps of Engineers
Main Tower Building
Dallas, Texas 75202

Subject: National Hydroelectric Power Resources Study Draft Report--Volume XX -- Regional Report Southwest Power Pool

Dear Mr. Rought:

We have reviewed a copy of a letter which Mr. Mike McDowell, Executive Director, Committee on Power for the Southwest (COPSW) mailed to you with comments on the above referenced Report. By this letter, I advise you that the Kansas Electric Power Cooperative, Inc. (KEPCo) is in concurrence with Mr. McDowell's comments.

As to specifics, we believe the reports' references to subsidies, market values, reduced rates, etc., are improper and inconsistent with adopted federal policies governing the marketing of hydro power produced at federal projects. Certainly, these references are not contributing resources to additional developments of hydroelectric power in the southwest and we urge that such references be deleted, particularily because the Corps is not responsible for marketing federally developed hydroelectric power.

This statement has been revised to describe more precisely marketing practices of the Southwest Power Pool.

We also have other comments which we believe are relevant and need to be addressed. As an example, at the top of page 3-3 of the Report, the following statement is made:

> "The major favorable impact associated with nuclear power production is the assurances of a sufficient domestic energy source to permit continued high energy based economic growth in the U.S. through this century, allowing time to develop alternative renewable sources for use beyond 2000."

The last phase has been deleted, to acknowledge uncertainty concerning the role of nuclear power in the future, as well as uncertainty concerning role of renewable sources.

We do not accept this statement because we do not believe that nuclear power is just a "stopgap" measure to get this country through this century when alternative energy resources will supplant it. The statement contained in the Draft Report via the

Corps of Engineers, we believe, is misleading to the general public and is indeed out of place in a report as prepared by such a respected federal agency as the Corps of Engineers.

KEPCo strongly supports the continued research and development of fusion, solar, biomass, and other alternative renewable energy resources, however, to indicate in the Draft Report, as now written, that such alternative energy sources will be developed to a commercially viable level whereby they can economically replace nuclear power by the year 2000 is indeed misleading and should be corrected in the Southwest Division's final Report prior to its submission to Washington.

We have previously expressed to the Corps of Engineers that we believe that, to the maximum extent possible, the development of additional or new hydroelectric power from existing federal projects should be implemented by existing federal governmental institutions which are presently assigned such responsibilities. In this regard, we recently received some materials which came directly from sources at the White House and which contained the following statement:

> "To promote the development of hydroelectric power, the President, in a message from the Delta Queen on August 23, 1979, issued a statement calling for the expansion of hydroelectric power. To implement the hydro power initiative, President Carter recommended legislation in 1979 to authorize the Corps of Engineers and the Water and Power Resources Service to add turbines and generators at all existing dams where they found them economically, financially, and environmentally feasible. He also supported the enactment of S.1240, a bill to authorize the addition of generating facilities at several existing Water and Power Resources Service dams."
> (underlining supplied for emphasis)

Noted

The above statement seems to be quite clear in expressing a policy direct from the White House regarding federal development of hydroelectric power at existing dams. KEPCo supports the policy as noted in the White House statement and we believe the Corps should reference that particular statement in its final Report prior to presenting it to Washington. Application of that stated policy toward potentially additional hydro development in the southwest, as proposed in the Corps' Report, would assure that preference customers within the six-state area of the COPSW would have available to them the full benefits of such future hydroelectric power development.

On behalf of KEPCo, I express appreciation for this opportunity to provide our comments in regard to the Draft Report as prepared by your office. We have made, in this letter, several recommendations for changes in the language of the Report which we strongly believe are merited. But, we assure you that we further believe the Corps has done a reasonably good job in evaluating the potential for hydroelectric power development at existing projects in the southwest. By modifying your Draft Report in context with our recommendations as outlined in this letter, we believe the Report will enhance a positive

contribution toward the development of additional renewable hydro power resources in the Southwest Power Pool region.

Cordially,

Charlie

Charles Ross
Executive Vice President

jh
cc:
Senator Robert Dole
Senator Nancy Landon Kassebaum
Mike McDowell, Executive Director,COPSW
James Hammett, Administrator, SWPA
Charles Ellis, President, KEPCo
Joseph Mulholland, KEPCo

MUNICIPAL ELECTRIC SYSTEMS OF OKLAHOMA
201 n.e. 23 oklahoma city, oklahoma 73105
(405) 528-7664

October 23, 1980

Department of the Army
Southwestern Division, Corps of Engineers
Attention: SWDPL-M
Main Tower Building, 1200 Main Street
Dallas, Texas 75202

Dear Sirs:

I would like to issue the following comments on the draft report of the Corps' National Hydroelectric Power Resources Study for the Southwest Power Pool.

First, in general, the Corps of Engineers has done a sufficient job of covering the potential hydro sites in the SWPP. I feel that the Oklahoma sites were accurately judged as to feasibility.

Noted.

Secondly, I feel that the study provides valuable details for any individual entity seeking to develop a hydroelectric project in the Southwest Power Pool region.

I personally believe that the proper method of development would be for Corps development with power marketing done by the Southwest Power Administration.

One criticism of the report is the obvious "editorializing" by the Corps on pages 3-12, 3-14 and 3-17 on the federal marketing agencies and the preference clause. I do not feel that the Corps has any business addressing those items and the referenced comments should be stricken from the text.

With this one piece of action, I believe the study is a commendable document which will prove useful and functional in the National Plan.

Respectfully,
Chuck Smith
Chuck Smith
Executive Director

CS:mb

SOUTHWEST POWER POOL

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October 22, 1980

Mr. Barry G. Rought
Chief, Planning Division
Department of the Army
S. W. Division, Corps of Engineers
Main Tower Building, 1200 Main
Dallas, Texas 75202

Re: SWDPL-M

Dear Mr. Rought:

This is in response to your letter of October 3rd transmitting Volume XX of the National Hydroelectric Power Resources Study.

Following an initial briefing on January 8, 1980 in our offices by Messrs. Jerrell Sarter, J. G. Dalton and Ron Grimes, we supplied each of our 41 members with the "Public Meeting Notice" and a memo on our meeting and urged their attendance.

At this time, Southwest Power Pool has not elected to comment on the study as a council. Instead, those members who feel they have an interest will undoubtedly do so. Our comments will be limited to a review of the supporting data for accuracy.

On pages 3-18, there is a reference to interregional interconnections. The wording may be misleading with respect to SPP-ERCOT. It is in error with respect to SPP-WSCC.

Corrected.

First, there ar now several lower voltage ties in existence between West Texas Utilities and Public Service Company of Oklahoma. Also, there is one 138 Kv tie at Dayton, Texas between Gulf States Utilities Company-Houston Lighting and Power Company These are

-more-

normally open. (In fact, they cannot be closed since the Texas Utility Commission has issued an order forbidding it).

Plans are progressing for two DC interconnections between SWPP-ERCOT with service expected in 1984 or 1985. However, there are no plans that we know of for ties to WSCC.

Yours very truly,

B. C. Hulsey

BCH:mo

A
W
R
B
I
A
C

Arkansas-White-Red Basins
Inter-Agency Committee
714 S. Tyler, Suite 201
Amarillo, Texas 79101

October 14, 1980

STATES OF ARKANSAS, COLORADO, KANSAS, LOUISIANA, MISSOURI, NEW MEXICO, OKLAHOMA AND TEXAS

FEDERAL DEPARTMENTS OF AGRICULTURE, ARMY, COMMERCE, ENERGY, HOUSING AND URBAN DEVELOPMENT, INTERIOR, AND TRANSPORTATION, AND THE ENVIRONMENTAL PROTECTION AGENCY

Brigadier General Hugh G. Robinson
Division Engineer, Corps of Engineers
Main Tower Building, 1200 Main Street
Dallas, TX 75202

Dear General Robinson:

A draft report of the National Hydroelectric Power Resources Study, Volume XX, dated September, 1980, has been furnished by the Corps of Engineers to the AWRBIAC for comments. Only one copy was received. If you would like to review this report, please contact Barry G. Rought, Chief, Planning Division, Corps of Engineers, Main Tower Building, 1200 Main Street, Dallas, Texas 75202 to request a copy. Comments on this report should be forwarded to the Corps before October 31, 1980.

Sincerely yours,

William A. Seth
Executive Secretary, AWRBIAC

cc: Corps of Engineers (SWDPS-M)
Robert Sanchez, Chairman, AWRBIAC

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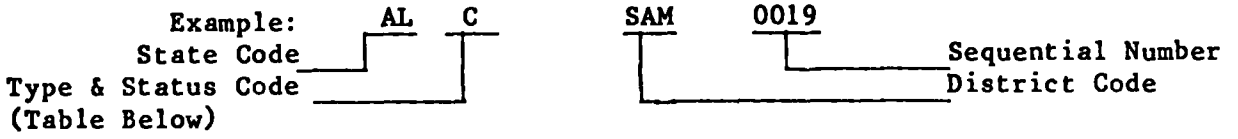
Dallas, TX 75202

ATTACHMENT C

(DETAILED DATA ON SWPP SITES IN NHS)

FOOTNOTES

(1) Project Identification Number:



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.

ATTACHMENT C

STATE ID NUMBER AGENCY ID.	PROJECT NAME POINT OF CONTACT CO. NAME OR STREAM OWNER	LATITUDE LONGITUDE DR. AREA (D M.M) (D M.M) (SQ.MI)	PROJ. PURP. STATUS AVE. Q (CFS)	DAM HT. STOR. PWR. MO. (FT) (AC FT)	EXIST. CAP. INC. CAP. TOT. CAP. (MW)	EXIST. ENRG ANUL. COST INC. ENERGY ENERGY COST TOT. ENERGY (MWH)	ERC ECONMIC (1000 $) (MWH)	ERC NONECONMIC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
Footnote 1			Footnote 3 & 4			Footnote 2		
AR0500L0002	DAM NO 2	33 58.8	N	70.0	0	0	7599.6	1011
2	ARKANSAS ARKANSAS RIVER	91 11.8	OP	133200	111701	383677	19.807	1011
	DAEN SWL	100427	-02399.9	20.0	111701	383677		1001
AR0500L0003	BUFFALO CITY	36 10.2	CM	82.0	0	0	6559.6	2003
2	BAXTER WHITE	92 26.0	IR	2500	95882	107823	20.347	2000
		6575	6750.0	66.0	95882	107823		2010
AR0500L0004	BULL SHOALS	36 21.7	CM	296.0	300000	705000	0	
5	BAXTER WHITE RIVER	92 36.3	CP	3000000	0	0	0	
	DAEN SWL	6036	-6248.6	191.6	300000	705000		
AR0500L0005	CHASTAIN	36 7.0	MM	80.0	0	0	8365.9	2002
2	BAXTER WHITE RIVER	92 13.0	IR	47500	98823	197684	42.319	2006
		6911	11200.0	35.9	98823	197684		2020
AR0500L0001	CCTYER	36 14.9	CM	70.0	0	0	6650.5	2001
2	BAXTER WHITE	92 32.2	IR	0	62239	104051	35.745	2007
		7070	6150.0	93.7	62239	104051		2010
AR0500L0006	NORFORK	36 19.0	CM	216.0	70000	100000	2925.0	0.
2	BAXTER NORTH FORKOP	92 14.3	OP	1983000	93000	10000	157.25	0.
	DAEN SWL	1006	-2208.9	171.5	163000	202000		0.
AR0500L0008	WAR EAGLE	36 11.0	CPR	100.0	0	0	8921.6	
5	BENTON WAR EAGLE CRE	93 57.2	IR	0	6029	13974	352.10	
		328	-399.9	99.9	6029	13974		
AR0500L0010	BEAVER	36 25.0	CM	228.0	112000	172000	0	
5	CARROLL WHITE RIVER	93 50.0	OP	1952000	0	0	0	
	DAEN SWL	1186	-1901.2	200.2	112000	172000		
AR0500L0008	GRANDVIEW	36 25.9	CPR	150.0	0	0	5852.8	
5	CARROLL KINGS RIVER	93 35.9	IR	250000	24022	48378	120.98	
		550	600.0	126.5	24022	48378		

ATTACHMENT C (continued)

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	DAM HT MAX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (KW) (KW) (KW)	EXIST.ENRG ANUL. COST INC.ENERGY ENERGY COST TOT.ENERGY (MWH) (1000 $) ($/MWH) (MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
AR08WL0028	CAMP CASS		35 37.0	CMR	120.0	0	0	2282.5	
5	FRANKLIN	MULBERRY RIVE	93 55.5	IB	0	6868	16526	135.68	
			270	-420.0	99.9	6868	16526		
AR08WL0027	KINGS FORD		35 35.9	CMR	205.0	0	0	5578.0	
5	FRANKLIN	MULBERRY RIVE	94 59.5	IB	0	25905	33933	184.38	
			360	-838.3	184.8	25905	33933		
AR08WL0029	OZARK LOCKAND DAM		35 28.8	NH	72.0	180000	429008	0	
5	FRANKLIN	ARKANSAS RIVE	93 48.5	OP	140000	0	0	0	
	DAEN SWL		151020	-12465.8	29.8	180000	429000		
AR08WL0033	MYATT CREEK		36 22.9		148.0	0	0	3402.2	
5	FULTON	MYATT CREEK	91 36.0		0	104	774	4392.6	
			182	-147.9	103.9	104	774		
AR08WL0034	WILD HORSE		36 19.9		160.0	0	0	6797.6	
5	FULTON	SOUTH FORK SPR	91 37.5		0	4299	10852	626.35	
			260	-276.2	124.8	4299	10852		
ARILMK0008	LAKE OUACHITA		34 34.3	MCR	205.0	75000	165800	2213.6	8.
2	GARLAND	OUACHITA RIVE	93 11.3	OP	3761500	99130	-2969	745.43	0.
	DAEN LMK		1105	1317.8	167.8	174130	162830		0.
AR08WT0043	FULTON LOCK & DAM		33 36.9	MA	61.0	0	0	5497.6	2008
2	HEMPSTEAD	RED RIVER	93 48.9	IB	300000	17988	98136	56.20	2813
	DAEN SWT		50856	-17498.2	19.9	17988	98136		2802
ARILMK0015	LAKE CATHERINE		34 25.6	M R O	75.0	11000	43160	389.73	8.
2	HOT SPRING	OUACHITA RIVE	92 53.2	OP	50000	10438	19020	20.490	0.
	ARKANSAS PWR & LIGHTCO		1548	-2826.3	56.9	21438	62180		0.
ARCSWT0005	GILLHAM RESERVOIR		34 14.0	CBO	160.0	8	0	331.24	1036
2	HOWARD	CODDATOT RIVE	94 13.9	OP	283300	2900	9389	35.278	1034
	DAEN SWT		271	-481.0	71.4	2900	9389		1035

SITE ID NUMBER ACTV. INV.	PROJECT NAME POTENTIAL CO. OWNER	LATITUDE LONGITUDE DA. AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS (CPD)	DAM HT DMN.STOR. DPHR. HD. (PT) (AC FT) (PT)	INST.CAP. INC. CAP. YRT. CAP. (MW) (MW) (MW)	ANNUL. ENERGY (MWH)	ANNUL. ENERGY (1000 $)	ANNUL. ENERGY (MILLS/KWH)	EAC ECONOMIC EAC COMPOSITE (SEQUENCE NUMBER) (SEQUENCE NUMBER) (SEQUENCE NUMBER)
ARO8WL0009	TRIGGER GAP	36 20.5	CHR	160.0	0	0	9349.7		
9	CARROLL MIDDLE FORK	93 39.0	IR	250000	13711	22612	236.61		
		311	-379.1	139.8	13711	22612			
ARIOWL0011	GREERS FERRY	35 31.5	CH	243.0	96000	189000	8882.9		
9	CLEBURNE LITTLE RED	92 0.0	OP	2000000	252895	69876	96.297		
	DAEN BWL	1006	-2312.8	198.6	300895	230876			
ARO8WL0012	QUARRY	35 27.0		00.0	0	0	3020.9	2017	
8	CLEBURNE LITTLE REDRIV	91 56.5		0	19876	69305	69.259	2022	
		1210	-1930.0	90.9	19876	69305			2012
ARO1WW0001	BAYOU BORGHEAT RESERVOIR	33 12.0	OOR	61.0	0	0	0012.5		
0	COLUMBIA BAYOU BORGHEA	93 24.0	SI	0795000	0	3	2522391		
	UNDEVELOPED SITE	239	289.0	17.9	0	3			
ARO8WL0015	L+D #9	35 7.5	N	95.0	0	0	1064.0	1013	
2	CONWAY ARKANSAS RIVE	92 07.2	OP	70000	10052	00077	21.163	1013	
	DAEN BWL	150999	-3795.6	10.2	10052	00077			1010
ARO8WL0014	SCLOOHACHIA	35 10.5		175.0	0	0	5926.7		
5	CONWAY EAST FORK POI	92 39.0		0	10008	25477	232.62		
		225	-379.2	104.9	10008	25477			
ARO8WL0020	NATURAL DAM	35 38.5	CHR	165.0	0	0	5010.7		
5	CRAWFORD LEE CREEK	94 25.0	IR	0	10006	27857	206.90		
		320	-807.0	120.0	10006	27857			
ARO8WL5005	PINE MOUNTAIN	35 22.0	COR	200.9	0	0	6320.8		
5	CRAWFORD LEE CREEK	94 13.1	DP	001100	20790	30762	124.51		
		100	-990.1	190.0	20790	30762			
ARO8WL0026	TOAD SUCK FERRY LOCKAND DAM	35 0.5	N	03.0	0	0	1001.7	1022	
2	FAULKNER ARKANSAS	92 32.3	DP	37300	15836	00972	26.992	1022	
	DAEN BWL	150300	-01331.5	9.5	15836	00972			1015

ATTACHMENT C (continued)

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 (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
AR88WL9006	L+D #1		35 45.0	NRS	31.0	0	0	1772.1	1008
2	INDEPENDENCE	WHITE RIVER	91 38.2	BP	0	18096	91981	19.266	1008
			11072	-12923.1	15.5	10096	91981		1016
AR88WL0837	POLK BAYOU		35 55.2	CRB	100.0	0	0	2037.7	
5	INDEPENDENCE	POLK BAYOU	91 41.0	IB	80000	3	25	78588	
			117	-121.9	81.9	3	25		
AR88WL0836	WOLF BAYOU		35 48.7	CHR	63.5	0	8	16103	2007
2	INDEPENDENCE	WHITE	91 52.0	BA	0	125000	367059	46.398	2012
			10796	-11199.8	49.7	125000	367059		2023
AR88WL0838	WOLF BAYOURE-REGULA TION		35 44.5	CH	45.0	0	0	4760.1	2018
2	INDEPENDENCE	WHITE RIVER	91 49.0	IB	5950	13829	82082	58. 41	2015
			10796	12300.0	21.9	13829	82082		2020
AR88WL0842	BOSWELL		36 3.4	NA	80.0	0	0	8155.9	2005
2	IZARD	WHITE RIVER	92 5.5	IB	80300	50315	169092	48.233	2011
			10173	11600.0	29.9	50315	169092		2022
ARCBWL0004	DINAND LAKE DAM		36 14.0	R	59.0	0	0	89.065	
5	IZARD	STRAWBERRYRIV	91 46.4	OP	3000	100	665	78.913	
			126	-131.2	53.9	100	665		
AR88WL8803	GUION		35 55.9	NH	80.0	0	0	8581.3	2004
2	IZARD	WHITE RIVER	91 58.0	NA	55000	96807	187952	45.657	2018
			10548	12000.0	31.9	96807	187952		2021
AR88WL0840	LOVE		36 9.0	CHR	140.0	0	0	6468.7	
5	IZARD	STRAWBERRYRIV	91 41.5	IB	0	1484	5286	1223.9	
			200	-212.8	99.9	1484	5286		
AR88WL0841	PINEY CREEK		36 8.0	CRB	160.0	0	0	3698.1	
5	IZARD	PINEY CREEK	92 4.4	IB	210000	1974	6870	538.29	
			173	-183.7	144.8	1974	6870		

ATTACHMENT C (continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. NAME OF STREAM COUNTY	LATITUDE LONGITUDE DR. AREA (D M.M) (D M.M) (SQ.MI)	PROJ. PURP. DAM HT STATUS MAX. STOR. AVE. Q PWR. HD. (CFS) (FT) (AC FT) (FT)	EXIST. CAP. INC. CAP. TOT. CAP. (KW) (KW) (KW)	EXIST. ENRG. INC. ENERGY TOT. ENERGY (MWH) (MWH) (MWH)	ANUL. COST (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
ARCSWL0047	WHITE OAK LAKE DAM	36 12.8	R 57.0	0	0	50.289	
3	IZARD STRAWBERRYRIV	91 05.6	OP 2000	99	670	74.962	
		180	109.8 51.9	99	670		
ARASWL5001	L+D #3	36 9.6	N 38.0	0	0	2078.0	1012
2	JEFFERSON ARKANSAS RIVE	91 40.6	OP 50400	20454	100870	20.922	1012
	DAEN SWL	150937	42009.7	13.6	20454	100870	1001
ARASWL5008	L+D #4	36 10.0	N 40.8	0	0	1631.9	1010
2	JEFFERSON ARKANSAS RIVE	91 54.1	OP 77000	13389	72566	22.488	1010
	DAEN SWL	158650	41931.9	10.2	13389	72566	1009
ARASWL0009	L+D #5	34 24.6	N 54.0	0	0	1632.8	1010
2	JEFFERSON ARKANSAS RIVE	92 6.2	OP 68500	15186	84010	19.431	1010
	DAEN SWL	150542	41901.3	12.5	15186	84010	1013
ARCSWT0007	MILLWOOD LAKE	33 41.4	CSO 88.0	0	0	1089.9	1010
2	LITTLE RIVER LITTLE RIVER	93 57.5	OP 2000000	13283	50939	21.397	1010
	DAEN SWT	4140	6610.0	21.9	13283	50939	1019
ARASWL0062	LONE ROCK	36 7.9	CHR 224.0	0	0	12099	0.
2	MARION BUFFALO	92 26.0	IB 699000	131560	161224	75.47	0.
		1331	1650.0	198.2	131560	161224	0.
ARASWL0079	VELIVILLE	36 13.8	CHR 175.0	0	0	7277.7	
3	MARION CROOKED CREEK	92 34.4	IB 303000	17756	31193	233.81	
		400	580.1	134.8	17756	31193	
ARASWL0080	REA	36 14.8	CHR 175.0	0	0	4311.1	
3	MARION,AR CROOKED CREEK	92 46.8	IB 0	22006	36478	118.18	
		460	621.1	134.8	22006	36478	
ARASWL0063	LITTLE BUFFALO	36 0.8	CH 170.0	0	0	7479.5	
3	NEWTON BUFFALO RIVER	93 5.9	IB 0	4391	14856	503.46	
		350	472.6	104.8	4391	14856	

ATTACHMENT C (continued)

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	DAM HT MX.STOR. AVE. Q PWR. HD. (FT) (AC FT) (CFS) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (KW) (KW) (KW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ENERGY COST (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
AR68WL0081	GRAVELLY		34 47.9		125.0	0	0	5321.7	
5	SCOTT	POURCHE LAFAV	93 49.4		0	3853	11364	468.27	
			330	-876.9	104.8	3853	11364		
AR68WL0082	GILBERT		35 59.0		220.0	0	0	18487	0.
2	SEARCY	BUFFALO RIVER	92 46.5		920000	181207	117894	156.81	0.
			825	-1114.0	212.7	181207	117894		0.
AR68WL0083	L+D #13		35 20.9	N	41.0	0	0	1407.6	1005
2	SEBASTIAN	ARKANSAS RIVE	94 17.4	OP	59100	14553	78039	18.36	1005
	DAEN SWL		150547	-32193.6	15.7	14553	78039		1011
ARC8WT0030	DEQUEEN RESERVOIR		34 3.5	C8RO	160.0	0	0	194.82	1046
2	SEVIER	ROLLING FORK	94 24.9	OP	370600	1225	3930	49.568	1043
	DAEN SWT		169	-282.1	62.2	1225	3930		1042
ARC8WT0032	DIERKS RESERVOIR		34 8.0	C8RO	153.0	0	0	165.68	1042
2	SEVIER	SALINE RIVER	94 5.9	OP	221600	1178	3719	44.539	1039
	DAEN SWT		114	-193.1	78.0	1178	3719		1041
AR68WL0085	BELL FOLEY		36 5.9	CR	135.0	0	0	7143.3	
5	SHARP	STRAWBERRY	91 22.9	SI	518200	8049	22475	317.83	
			519	954.0	98.7	8049	22475		
AR68WL0086	HARDY		36 19.7	CHR	165.0	0	0	10726	
5	SHARP	SPRING	91 30.3	IR	0	19701	59735	179.57	
			869	1130.0	124.8	19701	59735		
AR68WL0086	RAVENDEN		36 14.5	CHR	90.0	0	0	3630.4	
5	SHARP	SPRING RIVER	91 17.2	IR	0	9595	28431	127.69	
			1000	-1026.7	49.9	9595	28431		
AR68WL0087	SOUTH FORK		36 19.9		170.0	0	0	6179.5	
5	SHARP	SOUTH FORKSPR	91 36.7		0	12056	24359	253.67	
			326	-376.7	149.8	12056	24359		

ATTACHMENT C (continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CN. OWNER	NAME OF STREAM OWNER	LATITUDE LONGITUDE DR. AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. DAM HT STATUS AVE. H	EXIST.CAP. INC. CAP. TOT. CAP. (MW)	EXIST.ENRGY ANUL. COST INC.ENERGY ENERGY COST TOT.ENERGY (MWH)	ERC ECONOMIC ERC ACRECONOMIC ERC COMPOSITE (1000 $) ($/MWH)	(SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
ARKSWL0064	CEDAR		34 53.2	CMR 180.0	0	0	4219.4	
5	PERRY	SOUTH FOURCHE	93 3.0	IS 0	2398	7237	582.96	
			220	-522.8	114.8	2398	7237	
ARKSWL0066	DOVER		35 21.3	CMR 180.0	0	0	3609.6	
5	POPE	ILLINOIS BAYO	93 30.0	IS 0	7284	15718	229.64	
			320	-358.2	99.9	7284	15718	
ARKSWL0068	MAUPIN FLAT		35 27.4	CMR 160.0	0	0	4713.8	
5	POPE	PINEY CREEK	93 16.9	IS 0	8553	18076	260.74	
			275	-307.8	130.8	8553	18076	
ARKSWL0067	WHITE OAK		35 29.5	CMR 190.0	0	0	6102.6	
5	POPE	ILLINOIS,BAYO	93 1.0	IS 0	16767	30079	138.36	
			262	-466.1	149.8	16767	30079	
ARKSWL0075	DAVID D TERRY LOCK AND DAM		34 40.0	N 41.0	0	0	1718.1	1009
2	PULASKI	ARKANSAS RIVE	92 9.3	OP 99600	16183	88484	19.417	1009
	DAEN SWL		150288	-41834.1	13.1	16183	88484	1018
ARCSWL0073	LAKE MAUMELLE DAM		34 51.3	S 67.0	0	0	35.742	
5	PULASKI	BIG MAUMELLE	92 29.2	OP 220000	0	1	18989	
	CITY OF LITTLE ROCK		137	-281.0	41.9	0	1	
ARKSWL0074	MURRAY LOCK AND DAM		34 47.5	N 70.0	0	0	1857.8	1004
2	PULASKI	ARKANSAS RIVE	92 21.4	OP 108500	18444	106945	17.371	1004
	DAEN SWL		150030	-41766.0	14.5	18444	106945	1018
ARKSWL0077	JAMES CREEK		36 19.7	C 120.0	0	0	2823.9	
5	RANDOLPH	JAMES CREEK	91 14.5	IS 0	107000	2	22	126040
			82	-85.4	99.9	2	22	
ARKSWL0076	WATER VALLEY		36 16.5	CMR 120.0	0	0	9907.9	
5	RANDOLPH	ELEVEN POINT	91 4.4	IS 0	14165	56032	176.82	
			1152	-1150.0	90.8	14165	56032	

ATTACHMENT C (continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. OWNER	NAME OF STREAM	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (80.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. NO. PWR. NO. (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 (1000 $) ($/MWH)	ERC ECONOMIC SEQUENCE RANK) ERC NONECONOMIC (SEQUENCE RANK) ERC COMPOSITE (SEQUENCE RANK)
AR08WL0091	HALF MOON		35 44.2		240.0	0	0	3600.6	
5	STONE	MIDDLE FORK L	92 23.7	CH	0	14230	22926	157. 4	
			165	-278.1	199.8	14230	22926		
AR08WL0094	ARCHEY		35 37.5	CHR	200.0	0	0	2992.8	
5	VAN BUREN	ARCHEY FORK L	92 28.6	IR	0	2957	9026	331.51	
			115	-193.8	168.8	2957	9026		
AR08WL0093	RACCOON		35 39.1	CHRR	700.0	0	0	23922	
5	VAN BUREN	DEVILS FORK L	92 0.7	IR	0	18600	28124	850.57	
			200	-337.1	199.8	18600	28124		
AR08WL0092	SHIRLEY		35 40.8	CHR	249.0	0	0	7463.9	
5	VAN BUREN	MIDDLE FORK L	92 18.0	IR	0	19995	30033	248.52	
			200	-337.1	218.7	19995	30033		
AR08WL0099	JUDSONIA		35 20.9	CHR	112.0	0	8	8813.3	
5	WHITE	LITTLE RED	91 82.4	IR	250000	22601	66542	132.44	
			1463	2450.0	75.0	22601	66542		
ARC8WL0100	BLUE MOUNTAIN		35 6.1	C	115.0	8	0	396. 9	1032
2	YELL	PETIT JEAN	93 38.6	OP	258000	6966	12473	31.755	1031
	DAEN BWL		488	-546.3	47.5	6966	12473		1031
ARC8WL0102	DARDANELLBLOCK	AND DAM	35 15.0	NW	68.0	124000	613000	8519.1	0.
2	YELL	ARKANSAS RIVE	93 9.9	OP	486200	201400	220161	38.695	0.
	DAEN BWL		153703	-37155.8	46.6	325400	833161		8.
ARC8WL0101	NIMROD		34 57.0	C	97.0	0	0	388.10	1030
2	YELL	FOURCHE LAFAV	93 0.4	OP	336000	5813	12485	31. 88	1030
	DAEN BWL		680	-761.2	36.5	5813	12485		1032

ATTACHMENT C (continued)

SITE ID NUMBER DEV. INV.	PROJECT NAME PRIMARY CO. NAME OF RIVER OR OWNER	LATITUDE LONGITUDE DR. AREA (D M.M) (D M.M) (SQ.MI)	PROJ. PURP. STATUS OVE. B (CFS)	DAM HT PWR. STOR. MD. (FT) (AC FT) Footnote 3 (FT) & 4	EXIST. CAP. INC. CAP. TOT. CAP. (MW)	EXIST. ENERGY INC. ENERGY TOT. ENERGY (MWH) Footnote 2	ANNUAL COST ENERGY COST (1000 $)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)	
Footnote 1									
MS08MT0037	ICLA	37 57.2	S	74.0	0	0	10543		
5	ALLEN GRAND MEDOWS	95 27.5	SI	867000	11006	21252	496.10		
	DAEN BNT	3003	1008.1	35.2	11006	21252			
MS08MT0063	AETNA	37 2.9	SCROI	137.0	0	0	4367.6		
5	BARBER SALT FORK ARK	98 56.0	IS	775533	0	0	7030582		
	BUREC	632	80.0	64.9	0	0			
MO08LT0203	ELM CREEK LAKE	37 12.0	CS	120.5	0	0	3167.2		
5	BARBER ELM CREEK	97 11.7	SP	85000	0	0	9859950		
	DAEN BNT	180	98.0	65.3	0	0			
MS08MT0008	MEDICINE LODGE	37 16.7	S	138.0	0	0	5253.7		
5	BARBER MEDICINE LODG	98 37.0	SI	1032558	0	2	1993224		
		546	99.3	81.2	0	2			
MS08MT0055	OCUCLASS RESERVOIR	37 31.9	CSR	89.0	0	0	8528.8		
5	BUTLER LITTLE WALNUT	97 1.0	SI	288000	0	5	968703		
	DAEN BNT	238	180.2	93.9	0	5			
MSCBMT0093	EL DORADO RESERVOIR	37 50.9	CSRO	99.0	0	0	36.636		
5	BUTLER WALNUT RIVER	96 48.5	SP	456400	1	5	6800.3		
	DAEN BNT	234	145.7	63.4	1	5			
MS08MT0096	TOWANDA RESERVOIR WHITEWATER	37 50.9	CSRO	82.0	0	0	6288.9		
5	BUTLER WHITEWATERRIV	97 3.6	DP	319000	82	378	16608		
	DAEN BNT	422	210.6	44.2	82	378			
MS08MT0060	BAZAAR RESERVOIR	38 6.9	CS	113.5	0	0	3166.4		
5	CHASE SOUTH FORKCOT	96 32.4	SI	98000	0	0	3328118		
	DAEN BNT	80	20.9	72.9	0	0			
MS05MT0065	CEDAR POINT RESERVOIR	38 15.0	CSRO	125.0	0	0	6791.0		
5	CHASE CEDAR CREEK	96 54.0	DP	306200	0	3	1770168		
	DAEN BNT	119	74.1	89.9	0	3			

ATTACHMENT C (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 (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
K868WT0071	COTTONWOODRESERVIOR UPPER AE	38 23.0	IBC	24.0	0	0	6855.0	
5	CHASE COTTONWOODRIV	96 33.5	IB	757230	17	76	89201	
	BUREC	358	-183.7	60.9	17	76		
K868WT0866	DIAMOND RESERVOIR	38 28.0	CBRO	117.5	0	0	4209.7	
5	CHASE DIAMOND CREEK	96 41.9	BI	201500	0	3	1157005	
	DAEN BWT	135	-88.0	70.9	0	3		
K868WT0872	ELMDALE RESERVOIR UPPER NFOS	38 23.0	IBC	104.0	0	0	3807.5	
5	CHASE MIDDLE CREEK	96 38.5	IB	152005	7	33	114131	
	BUREC	108	-56.0	85.9	7	33		
K868WT0875	HYMER RESERVOIR	38 27.4	CBO	117.5	8	0	4145.9	
5	CHASE DIAMOND CREEK	96 40.3	BI	310000	0	3	1157371	
	DAEN BWT	133	-82.8	70.9	0	3		
K868WT0876	LOWER BAZAAR RESRVOIR	38 16.5	CBO	116.5	0	0	6510.8	
5	CHASE SOUTH FORKCOT	96 33.5	BI	414740	0	5	1252963	
	DAEN BWT	193	-120.2	68.9	0	5		
K868WT0873	STRONG CITY RESERVOIR UPPER	38 25.0	BC	112.0	0	0	3194.7	
5	CHASE FOX CREEK	96 33.0	IB	116152	0	0	9017796	
	BUREC	33	-20.5	76.9	0	8		
K868WT0826	CLOVERDALE	37 12.6	B	103.0	0	0	4365.2	
5	CHAUTAUQUA CANEY RIVER	96 28.8	IB	112095	0	0	9613548	
		119	-76.5	79.9	8	0		
K868WT0882	ELGIN RESERVOIR VERDIGRIS RI	37 0.9	BC	130.0	0	0	6809.0	
5	CHAUTAUQUA CHANEY RIVER	96 20.0	IB	510574	127	460	14779	
	BUREC	425	-273.5	110.8	127	460		
K868WT0849	COW CREEK RESERVOIR	37 14.8	CBRO	57.0	0	0	4340.2	
5	CHEROKEE COW CREEK	94 39.9	BI	217550	81	690	6206.0	
	DAEN BWT	246	-256.0	23.9	81	690		

ATTACHMENT C (continued)

SITE ID NUMBER ACTY. IAV.	PROJECT NAME PRIMARY CO. OWNER OR OTHER AUTH OWNED	LATITUDE LONGITUDE DR. AREA (D M.M) (D M.M) (80.MI)	PROJ. PURP. STATUS AVE. Q (CFS)	DAM HT MX. STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST. CAP. INC. CAP. TOT. CAP. (MW) (MW) (MW)	EXIST. ENRGY AVAL. INC. ENERGY TOT. ENERGY (MWH) (MWH) (MWH)	AAUL. CONST COST (1000 $) ($/PDH)	ENC ECONOMIC ENC NONECONOMIC ENC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
KS08WT0101	GALENA RESERVOIR	37 2.5	CSRA	130.0	0	0	6877.7	
9	CHEROKEE SHOAL CREEK	94 39.7	BI	358600	6439	10366	470.53	
	DAEN SWT	466	-683.0	45.2	6439	10366		
KS08WT0103	LAWTON RESERVOIR LOWER NEOSHO	37 13.4	IBC	70.0	0	0	7308.8	
9	CHEROKEE LOW CREEK	94 40.0	IB	290000	65	499	18037	
	BUREC	236	-104.8	39.9	65	499		
KS08WT0113	JOHN REDMOND RESERVOIR	38 14.4	C B D B	86.5	0	0	621.2	1038
2	COFFEY NEOSHO	95 45.3	BP	875000	9003	17338	35.816	1036 1038
	DAEN SWT	3015	-1309.8	34.4	9003	17338		
KS08WT0110	LEROY RESERVOIR MIDDLE NEOSHO	38 9.0	BC	79.0	0	0	4940.0	
9	COFFEY BIG CREEK	95 43.9	IB	204500	0	0	10995847	
	BUREC	125	-98.8	37.9	0	0		
KS08WT0112	LEROY RESERVOIR MIDDLE NEOSHO	38 9.9	BC	87.0	0	0	4227.8	
9	COFFEY BIG CREEK	95 43.9	BI	360000	8	0	8051010	
	DAEN SWT	138	-109.0	46.9	0	0		
KS08WT0114	EVANSVILLELAKE	37 12.0	CB	140.0	0	0	3879.8	
9	COWANCHE SALT FORK ARK	99 1.9	BI	392000	0	0	7727310	
	DAEN SWT	369	-86.9	89.8	0	0		
KS08WT0122	AKRON LAKE	37 19.9	CB	105.0	0	0	14224	
9	COWLEY WALNUT RIVER	97 2.0	BI	1297000	3873	8771	1621.6	
	DAEN SWT	1625	-748.8	91.7	3873	8771		
KS08WT0123	ARKANSAS CITY LAKE	37 5.7	BD	82.5	0	0	4720.4	
9	COWLEY WALNUT RIVER	97 1.8	BP	240000	5029	11576	407.76	
	DAEN SWT	1945	-895.8	58.7	5027	11576		
KS08WT0118	DEXTER LAKE	37 14.0	CB	127.0	0	0	3708.2	
9	COWLEY GROUSE CREEK	96 41.9	BI	335000	0	0	4915911	
	DAEN SWT	175	-112.6	96.8	0	0		

ATTACHMENT C (continued)

SITE ID NUMBER / ACTV. IND.	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 (1000 $) ($/MWH)	ERC ECONOMIC / ERC NONECONOMIC / ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
KS68WY0124	GROUSE CREEK	37 19.7	ISRD	140.0	0	0	4991.5	
5	COWLEY GROUSE CREEK	96 40.6	IS	430268	0	1	4989213	
		135	-97.0	89.9	8	1		
KS68WY0129	SILVERDALELAKE	37 14.0	CS	120.0	0	0	2498.3	
5	COWLEY GROUSE CREEK	96 41.9	IS	123000	0	0	4199926	
	DAEN SWT	72	-51.7	77.3	0	0		
KS68WY0128	WILMOT	37 21.9	CSR	100.0	0	8	4571.9	
5	COWLEY TIMBER CREEK	96 48.0		140000	0	8	8564021	
		64	-46.1	39.9	0	0		
KSCMRK0019	POWERSOCK	38 58.0	H	27.8	1850	10000	68.950	
5	DOUGLAS WAKARUSA RIVER	95 14.1	OP	100	0	0	0	
	SCHFROCK MILLS	58420	6924.0	7.1	0	9209		
KSCMRK0020	KANOPOLIS LAKE	38 37.3	CRI	106.9	0	0	196.1	1043
2	ELLSWORTH SMOKY HILLRIV	97 58.1	OP	869000	2276	4395	44.597	1040
	DAEN MRK	7860	259.0	99.5	2276	4395		1039
KS68WY0046	FOREST CITY	37 18.7	S	100.0	8	0	6772.1	
5	FOREST CITY MEDICINE LODG	98 39.9	SI	326656	8	1	3739115	
		524	-88.8	71.9	0	1		
KSCMRK0026	MILFORD LAKE	39 4.9	CS	143.0	0	0	699.29	1037
2	GEARY REPUBLICANRIV	96 53.3		753000	7891	19734	35.435	1038
	DAEN MRK	17380	1021.0	71.3	7891	19734		1022
KS68WY0158	CLIMAX RESERVIOR VIOOIOPIO R	37 41.8	ISC	120.0	0	0	5521.1	
5	GREENWOOD OTTER CREEK	96 17.8	IS	287816	8	3	1596612	
	BUREC	96	-94.6	61.9	0	3		
KSCSWY0160	FALL RIVERLAKE	37 38.8	CRD	94.0	0	8	35.963	
5	GREENWOOD FALL RIVER	96 3.9	OP	290700	0	4	7864.0	
	DAEN SWT	545	-420.3	38.2	0	4		

ATTACHMENT C (continued)

SITE ID / ACTV. INV.	PROJECT NAME / PRIMARY CO. OWNER	LATITUDE / LONGITUDE / DR. AREA (D M.M) / (D M.M) / (SQ.MI)	PROJ. PURP. / STATUS / AVG. H (CFS)	DAM HT / MAX. STOR. / PWR. HD. / TOT. CAP. (FT) / (AC FT) / (FT)	EXIST. CAP. / INC. CAP. / TOT. ENERGY (MW) / (MW) / (MWH)	EXIST. ENRG ANNL. COST / INC. ENERGY / ENERGY COST (1000 $) / ($/MWH)	ERC ECONOMIC / ERC NONECONOMIC / ERC COMPOSITE (SEQUENCE RANK) / (SEQUENCE RANK) / (SEQUENCE RANK)
NB08MT0190	MILLTOP RESERVOIR VERMILION	38 5.9	BC	90.0	0	0	1885.2
9	GREENWOOD VERMILION RIV	96 3.5	IR	170105	0	2	6479e1
	BLANC	270	-210.7	30.9	0	2	
NB08MA0850	MENCALL DAM	37 56.0	ICR	74.0	0	0	10247
1	HAMILTON ARKANSAS RIVE	101 33.9	BI	395000	1	0	1278007
	DAEN BHA	29900	-331.2	20.3	1	0	
NB08MA0851	SYRACUSE DAM	38 0.0		112.0	0	0	9310.6
1	HAMILTON ARKANSAS RIVE	101 51.6	IR	1822475	1558	3801	2424.7
	OOI USGS	25600	851.0	91.8	1558	3801	
NB08MT0150	DANVILLE LAKE	37 23.8	CD	100.0	0	0	6649.1
9	HARPER CHICKASHIA RIV	97 58.0	BI	065000	0	8	1356356
	DAEN BHT	501	-197.0	67.8	0	8	
NB08MT0179	KILLIAN RESERVOIR	37 37.8	C	110.0	0	0	4434.3
9	KINGMAN SOUTH FORKNIN	98 9.9	IR	105460	136	1160	3820.8
	DAEN BHT	918	-171.2	44.9	136	1160	
NB08MT0173	KINGMAN LAKE	37 38.0	CD	93.0	0	0	4685.9
9	KINGMAN SOUTH FORKNIN	98 9.9	BP	025000	542	2348	1995.2
	DAEN BHT	497	-139.6	60.1	542	2348	
NB08MT0168	MLPOOCK RES.	31 32.4	CBI	96.0	0	0	7198.1
9	KINGMAN SOUTH FORK RI	97 52.0	IR	161500	0	2	2974776
	DAEN BHT	870	-214.1	60.1	0	2	
NB08MT0172	MCRAICH LAKE	37 32.5	CD	88.0	0	0	5190.6
9	KINGMAN SOUTH FORKNIN	97 52.1	BI	340000	783	3502	1483.0
	DAEN BHT	560	-179.9	64.1	783	3502	
NB08MT0174	MCRAICH LAKE	37 32.9	LB	97.0	0	0	5728.8
9	KINGMAN SOUTH FORKNIN	97 50.9	IR	489000	943	4349	1317.2
	DAEN BHT	650	-216.5	64.1	943	4349	

ATTACHMENT C (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*ANUL. COST / INC.ENERGY / TOT.ENERGY (MWH) (MWH) (MWH)	ERC ECONOMIC / ERC NONECONOMIC / ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)	ENERGY COST (1000 $) ($/MWH)
K06SMT0177	BARTLETT RESERVOIR OF LOWER	37 5.9	SC	80.0	0	0		6260.7
5	LABETTE HACKBERY CREE	95 11.9	I8	269274	0	0		10867620
	BUREC	103	-85.2	54.9	0	0		
K06SMT0183	CLEARCREEK	38 23.2	S	54.0	0	0		2793.0
5	MARION CLEAR CREEK	96 59.6	SI	23300	0	0		15895732
	DAEN	74	-32.6	19.9	0	0		
K06SMT0191	DOYLE RES.	38 12.8	CSO	113.0	0	0		6578.9
5	MARION DOYLE CREEK	96 58.0	I8	193200	0	2		2249199
	DAEN SWT	127	-79.1	72.9	0	2		
K06SMT0184	LUTA	38 22.1	S	80.0	8	0		2330.4
5	MARION MUD CREEK	97 1.6	SI	30600	0	0		10573005
	DAEN	93	-40.9	19.9	0	0		
K06SMT0187	SEDAN RESERVOIR VERDIGRIS RI	37 9.8	SC	160.0	0	0		7297.2
5	MARION MIDDLE CHANEY	97 15.4	I8	394232	0	0		29352677
	BUREC	86	-59.3	66.9	0	0		
K0C8MT0202	ELK CITY LAKE	37 16.9	C S O	107.0	0	0		36. 82
5	MONTGOMERY ELK RIVER	96 46.9	OP	667000	0	4		8536.3
	DAEN SWT	634	-292.0	34.5	0	4		
K06SMT0201	SYCAMORE RES.	37 17.9	CS	103.0	0	0		8314.7
5	MONTGOMERY VERDIGRIS RIV	95 40.5	I8	750000	10041	17026		488.35
	DAEN SWT	2175	-1291.9	39.9	10041	17026		
K06SMT0205	BUSHONG RESERVIOR UPPER NEOS	37 27.0	SIC	130.0	0	0		8735.6
5	MORRIS ROCK CREEK	96 58.9	I8	712173	0	0		9044190
	BUREC	188	-135.1	54.9	0	0		
K0C8MT0209	COUNCIL GROVE LAKE	38 41.2	C S R O	96.0	0	0		35.466
5	MORRIS NEOSHO RI VER	96 30.0	OP	329800	0	1		32499
	DAEN SWT	246	-148.6	44.9	0	1		

ATTACHMENT C (continued)

SITE ID NUMBER ACTV.	PROJECT NAME OR STREAM OWNER	LATITUDE LONGITUDE DR. AREA (0 M.M) (0 M.M) (90.MI)	PROJ.PURP. STATUS AVE. B (CFS)	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (MW) (MW) (MW)	EXIST.ENRGY ANUL. COST INC. ENERGY TOT. ENERGY (MWH) (MWH) (MWH)	ERC ECONOMIC (1000 $) ($/MWH)	ERC NONECONOMIC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
KS00WT02004	UPPER BIGHORN RES.	38 38.4	CSO	98.0	0	0	4471.9	
S	MCHAIB BOCK CREEK	96 22.1	IS	177500	0	0	12041164	
	DAEN BWT	108	-89.2	56.9	0	0		
KS00WT02015	LCHFR EXTENSN.	37 35.3	CSO	85.5	0	0	4367.1	
S	NFOSHO CANVILLE CRFF	95 17.3	IS	203000	0	0	16359919	
	DAEN BWT	119	-98.8	69.9	0	0		
KS00WT02019	ARLINGTON LAKE	37 51.9	CS	96.0	0	0	4030.7	
S	RENO NORTH FORKNIN	98 2.4	OP	385000	110	357	13513	
	DAEN BWT	973	-104.9	59.8	110	357		
KS00WT02022	LYONS LAKE	38 23.0	SCO	68.5	0	0	4370.5	
S	RICE COW CREEK	98 18.0	IS	90000	1	7	580190	
	DAEN BWT	547	-83.3	24.0	1	7		
KSCMBK00004	TUTTLE CREEK LAKE	39 15.3	CON	139.0	0	0	1751.3	1020
2	RILEY BIG BLUE RIVE	96 35.4	OP	2366000	21847	57256	30.587	1020
	DAEN NRM	9620	772.0	71.9	21847	57256		1018
KS00WT02206	CLEARWATERLAKE	37 31.7	CIO	69.5	0	0	8030.8	
S	SEDGWICK NINNESCAH RIV	97 36.7	BI	351000	1511	9738	1399.4	
	BLREC	1964	-501.2	36.8	1511	9738		
KSCQWT02206	CHENEY RESERVOIR	37 43.6	CBRO	86.0	0	0	39.913	
S	REDGWICK NORTH FORKNIN	97 47.6		366500	11	35	1128.6	
	OCI USAR	535	-118.6	45.9	11	35		
KS00WT02027	VIOLA RESERVOIR NINNESCAH RI	37 30.9	OB	85.0	0	8	19048	
S	SEDGWICK NINNESCAH RIV	97 37.0	IB	1026862	7	33	563078	
	ALREC	398	-101.5	37.9	7	33		
KS00WT02165	CALDWELL LAKE	37 17.5	CS	110.0	0	0	5797.9	
S	SUMNER BLUFF CREEK	97 38.2	IB	516800	0	1	3494829	
	DAEN BWT	413	-70.0	72.8	0	1		

ATTACHMENT C (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 ANUL. COST INC.ENERGY ENERGY COST TOT.ENERGY (MWH) (MWH) (MWH)	ERC ECONOMIC (1000 $) ($/MWH)	ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
K868WT0244	NEOSHA RESERVOIR VERDIGRIS	37 26.0	CO	74.0	0	0	4070.6	
5	WILSON VERDIGRIS DIV	95 39.9	SI	205000	0	0	7465813	
	DAEN SWT	422	-289.7	14.4	0	0		
K8C8WT0247	TORONTO LAKE	37 44.2	C D	90.0	0	0	35,695	
5	WOODSON VERDIGRIS	95 56.0	OP	311200	0	2	17548	
	DAEN SWT	730	-578.2	32.7	0	2		
K868WT0245	YATES CENTER RES.	38 10.0	CS	78.0	0	0	5946.0	
5	WOODSON OWL CREEK	95 34.4	IS	318500	8	0	20875121	
	DAEN SWT	184	-153.9	47.9	0	0		

ATTACHMENT C (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. DAM HT STATUS MAX.STOR. AVE. S PWR. HD. (CFS) (FT) (AC FT)	EXIST.CAP. INC. CAP. TOT. CAP. (MW) (MW) (MW)	EXIST.ENRG INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST ERC ECONOMIC ENERGY COST (1000 $) ($/MWH)	ERC ECONOMIC ERC ACCECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
Footnote 1			Footnote 3 &4		Footnote 2		
LACLMN0003	BUNDICK CREEK	30 44.0	R 45.5	0	0	52.456	
0	BEAUREGARD RUNDICK CREEK	93 5.4	OP 9200	20	180	290.65	
	STATE OF LA	208	268.0 11.9	20	180		
LACLMN0004	KEPLER CREEK DAM	32 18.9	R 37.0	0	0	36.903	
0	RIENVILLE KEPLER CREEK	93 9.1	OP 90000	0	0	276048	
	STATE OF LA	86	87.0 24.7	0	0		
LACLMN0007	BAYOU BODCAU DAM	32 42.2	CR 70.0	0	0	35.547	
0	BOSSIER BAYOU BODCAU	93 30.7	OP 1107700	0	0	117983	
	DAEN LMN	656	591.0 2.9	0	0		
LACLMN0005	LAKE BISTINEAU	32 19.5	RCB 46.0	0	0	656.78	1031
2	BOSSIER LOGGY BAYOU	93 25.6	OP 318000	9366	20779	31.600	1047
	STATE OF LA	1443	1070.0 30.3	9366	20779		2017
LACLMN0008	BLACK BAYOU DAM	32 52.8	RCC 30.0	0	0	35.602	
0	CADDO BLACK BAYOU	93 53.6	OP 33800	0	0	87111	
	STATE OF LA	231	203.0 9.9	0	0		
LACLMN0010	CADDO DAM	32 42.4	NRB 30.0	0	0	38.998	
0	CADDO CYPRESS BAYOU	93 55.1	OP 390000	1	9	3988.4	
	CADDO LEVEE DISTRICT	2744	2089.0 9.9	1	9		
LACLMN0009	WALLACE LAKE DAM	32 18.9	CR 48.0	0	0	35.681	
0	CADDO CYPRESS BAYOU	93 40.2	OP 267700	0	0	50900	
	DAEN LMN	240	236.0 14.2	0	0		
LAALMN0039	COLUMBIA LOCK AND DAM	32 10.0	N 35.0	0	0	1813.5	1006
2	CALDWELL OUACHITA RIVE	92 6.6	OP 0	18615	98760	18.362	1006
	DAEN LMN	15630	-19273.7 15.3	18615	98760		1008
LAALMN0040	JONESVILLELOCK AND DAM	31 29.0	N 46.0	0	0	1078.9	1001
2	CATAHOULA BLACK RIVER	91 51.7	OP 0	13313	85083	12.681	1001
	DAEN LMN	24200	-29841.6 21.8	13313	85083		1004

ATTACHMENT C (continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. -NAME OF STREAM OWNED	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (MW) (MW) (MW)	EXIST.ENRG ANUL. COST INC.ENERGY ENERGY COST TOT.ENERGY (1000 $) ($/MWH) (MWH)	ERC ECONOMIC (SEQUENCE RANK)	ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK)
LAALMN0024	RED RIVER WATERWAY LOCK & DA	31 10.9	N	54.0	0	0	1098.9	1020
2	RAPIDES RED RIVER	92 18.0	OP	0	18071	73359	25.030	1020
	DAEN LMN	67498	31700.0	13.7	18071	73359		1006
LAALMN0025	RED RIVER WATERWAY LOCK & DA	32 13.0	N	34.0	0	0	1033.0	1024
2	RED RIVER RED RIVER	93 28.0	OP	0	7968	37035	27.893	1024
	DAEN LMN	64520	30600.0	11.0	7968	37035		1025
LAISMF0001	TOLEDO BEND	31 10.4	IMRC	112.0	81000	215000	1172.9	0.
5	SABINE SABINE	93 34.0	OP	5102000	27162	62409	18.793	0.
	SABINE RIVER AUTHORITY	7178	-5985.1	86.9	108162	277409		0.
LACLMN0044	LAKE CHARBONNE	32 42.6	R	31.5	0	0	452.21	1041
2	UNION BAYOU CHARBONN	92 20.4	OP	280000	3802	11098	40.744	1045
	STATE OF LA	1585	-1871.5	16.9	3802	11098		2027
LASLMN0027	OLD RIVER CONTROL STRUCTURE	31 6.0	M	117.5	0	0	18771	1025
2	WEST FELICIA MISSISSIPPI R	90 35.9	IB	0	90955	666911	28.146	1025
	UNDEVELOPED SITE.	282235	80000.0	11.9	90955	666911		1026

ATTACHMENT C (continued)

SITE ID NUMBER AGENCY INVENTORY	PROJECT NAME PRIMARY CONGRESSIONAL DISTRICT NO. NAME OF STREAM OWNER	LATITUDE LONGITUDE DRAINAGE AREA (D.M.P) (D.M.M) (SQ.MI)	PROJ. PURP. STATUS	DAM HT MAX. STOR. HGT. PWR. (FT) (AC FT) (FT)	EXIST. CAP. INC. CAP. TOT. CAP. (MW)	EXIST. ENRG. ANUL. INC. ENERGY ENERGY TOT. ENERGY (MWH)	COST (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
LA6LMN0011	RED RIVER WATERWAY LOCK & DA	31 15.0	N	90.0	0	0	12424	
0	CATAHOULA RED RIVER	91 57.5	OP	0	111192	197475	62.918	
	DAEN LMN	67530	30600.0	9.9	111192	197475		
LA6LMN0013	MCU SHOO TOO RESERVOIR	30 21.6	C	37.0	0	0	7179.6	
0	EAST BATONRO AMITE RIVER	90 57.2	IR	107000	12468	31014	351.49	
	UNDEVELOPED SITE	1370	2086.0	30.9	12468	31014		
LA6LMN0015	FELIXVILLERESERVOIR	30 57.3	CR	82.3	0	0	14308	
0	EAST FELICIA AMITE RIVER	90 50.9	IU	0	8824	17927	797.90	
	UNDEVELOPED SITE	551	870.0	42.9	8824	17927		
LA6LMN0016	DENHAM SPRINGS RESERVOIR	30 30.5	C	30.0	0	0	2793.5	
0	LIVINGSTON AMITE RIVER	90 58.0	IR	0	838	6250	446.66	
	UNDEVELOPED SITE	973	1373.0	21.1	838	6250		
LACLMN0019	ALLEN-CHIVERY	31 50.9	RC	37.0	0	0	516.58	1035
2	NATCHITOCHES BAYOU BOURREU	92 57.5	OP	280000	6223	15247	33.879	1046
	STATE OF LA	1325	1348.0	24.4	6223	15247		2025
LA6LMN0018	KISATCHIE BAYOU RESERVOIR	31 36.0	CIR	50.0	0	0	7450.2	
0	NATCHITOCHES KISATCHIE BAY	93 5.9	IR	267600	0	3	2167712	
	UNDEVELOPED SITE	277	280.0	37.9	0	3		
LA4LMN0017	RED RIVER WATERWAY LOCK & DA	31 51.0	N	41.0	0	8	1782.1	1007
2	NATCHITOCHES RED RIVER	93 5.9	OP	0	20241	92640	19.237	1007
	DAEN LMN	63407	30600.0	17.3	20241	92640		1085
LACLMN0020	SALINE LAKE DAM	31 51.5	RC	23.0	0	0	37.178	
0	NATCHITOCHES SALINE BAYOU	92 56.9	OP	122000	0	0	47142	
	STATE OF LA	820	1130.0	6.6	0	0		
LA4LMN0023	RED RIVER WATERWAY LOCK & DA	31 29.0	N	87.0	0	0	3334.3	1015
2	RAPIDES RED RIVER	92 41.0	OP	0	34000	154810	21.538	1015
	DAEN LMN	66860	31400.0	21.2	34000	154810		1007

ATTACHMENT C (continued)

SITE ID NUMBER ACTV. INV. Footnote 1	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) Footnote 3	DAM HT MX.STOR. PWR. HD. (FT) (AC FT) (FT) Footnote 3&4	EXIST.CAP. INC. CAP. TOT. CAP. (KW) (KW) (KW)	EXIST.ENRG ANUL. COST INC.ENERGY ENERGY COST TOT.ENERGY (MWH) (1000 $) (MWH) ($/MWH) Footnote 2	ERC ECONOMIC SEQUENCE RANK	ERC NONECONOMIC SEQUENCE RANK	ERC COMPOSITE SEQUENCE RANK
MO88WL0105	FLAT CREEK		36 44.5		120.0	0	0	4060.2		
5	BARRY	FLAT CREEK	93 40.5		0	3260	11050	367.81		
			290	-393.5	109.8	3260	11050			
MOINRK0060	HARRY S. TRUMAN DAM		38 15.9	CHR	96.0	160000	282000	0		
5	BENTON	OSAGE RIVER	93 23.8	UC	8120000	0	0	0		
	DAEN MAN		11500	7393.0	47.2	160000	282000			
MO88WL0107	HARVIELL		36 38.0	C	75.0	0	0	4484.9		
5	BUTLER	CANE CREEK	90 30.0	IB	111400	9703	8984	594.66		
			192	-321.8	54.9	9703	8984			
MO88WL0106	POPLAR BLUFF		36 48.9		110.0	0	0	6912.9		
5	BUTLER	BLACK RIVER	90 24.9		0	7959	34706	169.19		
			1202	-1285.8	66.9	7959	34706			
MOGMRK0063	NIANGUA DAM		37 56.2	H	20.0	3000	10000	8		
5	CAMDEN	NIANGUA RIVER	92 51.0	OP	600000	0	0	0		
	SMO NE POWER CORP		827	827.0	27.0	3000	10000			
MO88WL0108	CARTER CREEK		36 58.4		120.0	0	0	7273.0	0.	
2	CARTER	CURRENT RIVER	90 59.3		0	24567	92974	78.226	0.	0.
			1670	-1942.2	94.9	24567	92974			
MOINRK0067	STOCKTON LAKE		37 41.4	CH	132.0	85200	55000	0		
5	CEDAR	OAC RIVER	93 45.4	OP	1674000	0	0	0		
	DAEN MAN		1160	1049.8	102.8	85200	55000			
MO88WL0109	FINLEY CREEK		37 2.9	C R	125.0	0	0	3263.3		
5	CHRISTIAN	FINLEY CREEK	93 9.4	IB	108500	122	944	3455.8		
			143	-193.8	104.8	122	944			
MO88WL0111	KINSER BRIDGE		37 58.9	BR	130.0	0	0	5710.8		
5	GREENE	JAMES RIVER	93 19.9	IB	180000	2437	9580	596.10		
			245	-244.3	109.8	2437	9580			

ATTACHMENT C (continued)

SITE ID NUMBER / REGN. DIV. (Footnote 1)	PROJECT NAME / PRIMARY CO. / NAME OF STREAM / OWNER	LATITUDE / LONGITUDE / DR. AREA (D M.M) (D M.M) (SQ.MI)	PROJ. PURP. / STATUS / AVF. Q (CFS)	DAM HT / MX. STOR. / PWR. HD. (FT) (AC FT) (FT) (Footnote 3 &4)	EXIST. CAP. / INC. CAP. / TOT. CAP. (KW) (KW) (KW)	EXIST. ENRG / INC. ENERGY / TOT. ENERGY (MWH) (MWH) (MWH) (Footnote 2)	ANNL. COST / ENERGY COST (1000 $) ($/MWH)	NED ECONOMIC / NED NONECONOMIC / NED COMPOSITE (SEQUENCE RANK)
MO13-L0112	LAKE SPRINGFIELD	37 6.7	HSRO	49.0	0	0	47.150	
5	GREENE JAMES RIVER	93 15.7		2425	22	197	238.34	
	CITY OF SPRINGFIELD	270	-209.8	24.9	22	197		
MO08-L0110	TURNER STATION	37 12.0	S R	105.0	0	0	3425.0	
5	GREENE JAMES RIVER	93 9.0	IS	65500	1304	4783	715.97	
		200	1535.0	40.9	1304	4783		
MOCHDK0070	POMME DE TERRE LAKE	37 54.0	CHN	126.0	0	0	388.90	1000
8	HICKORY POMME DE TER	93 19.2	OP	650000	3604	9638	40.357	1030
	DAEN MRK	611	369.0	46.3	3604	9638		1000
MO06-T0253	NECK CITY	37 15.9	CSRO	49.0	0	0	14166	
5	JASPER NORTH FORKSPR	94 28.0	SI	1078000	5629	16243	872.18	
	DAEN SWT	948	-994.1	33.9	5629	16243		
MO06-T0254	PROSPERITYRESERVOIR	37 7.1	CSRO	109.0	0	0	5782.1	
5	JASPER CENTER CREEK	94 21.4	FP	433800	90	815	7087.4	
	DAEN SWT	207	-185.3	41.4	90	815		
MO06-T0256	WACO RESERVOIR	37 15.5	HCSR	49.0	0	0	16582	
5	JASPER SPRING RIVER	94 33.0	SI	992080	6149	14960	1108.4	
	DAEN SWT	1164	-909.0	47.2	6149	14968		
MO06-T0258	GRANBY RESERVOIR	36 56.4	CSRO	130.0	0	0	6633.8	
5	NEWTON SHOAL CREEK	94 15.0	SI	495000	1887	8391	790.59	
	DEAN SWT	250	-268.2	46.4	1887	8391		
MO06-T0259	JOPLIN RESERVOIR	37 2.5	HSRO	84.0	0	0	3804.6	
5	NEWTON SHOAL CREK	94 36.4	SI	75090	2975	11583	328.45	
	DAEN SWT	458	-470.7	65.7	2975	11583		
MO06-T0262	BLACKOUT RESERVOIR	36 54.0	CSRO	113.0	0	0	4850.6	
5	NEWTON SHOAL CREEK	94 7.9	SI	244800	904	4019	1206.7	
	DAEN SWT	141	-146.7	73.4	904	4019		

ATTACHMENT C (continued)

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. (MW) (MW) (MW)	EXIST.ENRG ANUL. ENERGY TOT.ENERGY (MWH) (MWH)	COST (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
MO68WL0115	LONG HOLLOW		36 48.9		110.0	0	0	3210.1	
5	OREGON	ELEVEN POINT	91 22.0		0	6903	27563	116.61	
			585	-986.2	89.9	6903	27563		
MO68WL0114	RIVERTON		36 42.0		145.0	0	0	5431.7	
5	OREGON	ELEVEN POINT	91 11.9		0	17970	54649	99.392	
			793	-794.7	124.8	17970	54649		
MO68WL0116	WARM FORK		36 37.0	C	130.0	0	0	5303.5	
5	OREGON	WARM FORK SPR	91 33.0	IS	137100	4686	15794	335.79	
			273	-322.3	108.8	4686	15794		
MO68WL0117	BRYANT CREEK		36 38.8		185.0	0	0	5628.8	
5	OZARK	BRYANT CREEK	92 39.7		0	17882	40082	140.26	
			570	-566.7	148.8	17882	40082		
MO68WL0118	HOLLOW		36 41.6		240.0	0	0	7226.4	0.
2	OZARK	NORTH FORKRIV	92 11.2		0	62914	88630	81.535	0. 0.
			561	-762.9	204.7	62914	88630		
MO68WL0120	LESTERVILLE		37 29.5		135.0	0	0	3275.2	
5	REYNOLDS	MIDDLE FORK B	90 58.4		0	3688	10076	203.72	
			320	-408.7	114.8	3688	10076		
MO68WL0119	RIVERSIDE		37 20.3		160.0	0	0	6367.7	
5	REYNOLDS	BLACK RIVER	90 46.9		0	15932	32753	194.41	
			494	-618.2	116.8	15932	32753		
MO68WL0129	DONIPHAN		36 40.0		147.0	0	0	12671	0.
2	RIPLEY	CURRENT RIVER	90 52.9		0	50056	156912	80.756	0. 0.
			2015	-2738.2	103.0	50056	156912		
MO68WL0130	FAIRDEALING		36 38.0	C	80.0	0	0	4141.9	
5	RIPLEY	LITTLE BLACK	90 35.0	IS	110300	816	4694	882.31	
			182	-321.4	65.9	816	4694		

ATTACHMENT C (continued)

SITE ID NUMBER / ACTV. INV.	PROJECT NAME / PRIMARY CO. NAME OF STREAM / BASIN	LATITUDE / LONGITUDE / DR. AREA (D M.M) (D M.M) (SQ.MI)	PROJ. PURP. / DAM HT / STATUS / AVE. Q (CFS)	DAM HT. / PWR. HD. (FT) (AC FT) (FT)	EXIST. CAP. / INC. CAP. / TOT. CAP. (KW)	EXIST. ENRGY / INC. ENERGY / TOT. ENERGY (MWH)	ANNUAL COST (1000 $) ($/MWH) ($)	ERC ECONOMIC / ERC NONECONOMIC / ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
MO88WL0128	GOOSE LAKE	36 30.3		100.0	0	0	7771.2	
5	RIPLEY CURRENT RIVER	90 48.5		0	20260	84100	92.808	
		2116	8879.9	98.9	20260	84100		
MO88WL0133	BLAIR CREEK	37 11.0		213.0	0	0	17146	0.
2	SHANNON CURRENT	91 12.5		1499000	120727	193030	112.4	0.
		1324	1500.6	173.8	120727	193030		0.
MO88WL0131	JACKS FORK	37 0.0		190.0	0	0	2069.1	
5	SHANNON JACKS FORK	91 31.0		0	4330	19307	147.98	
		282	205.7	169.8	4330	19307		
MO88WL0132	WELLSFORD	37 21.3		210.0	0	0	6603.6	
5	SHANNON CURRENT RIVER	90 29.2		0	24950	40121	164.59	
		408	523.2	169.8	24950	40121		
MO88WL0134	GALENA	36 49.0	CWSR	164.0	0	0	12534	
5	STONE JAMES	93 25.9	IR	560000	24122	63046	190.81	
		980	950.0	138.8	24122	63046		
MO88WL0129	LONE PILGRIM	36 40.0		170.0	0	0	5901.2	
5	TANEY BEAVER CREEK	93 1.9		0	4408	17376	339.60	
		375	979.9	129.8	4408	17376		
MO18WL0125	OZARK BEACH DAM	36 49.9	NR	58.0	16000	94400	0	
5	TANEY WHITE RIVER	93 0.4		20000	0	0	0	
	EMPIRE DISTRICT ELECT CO	4500	0650.8	61.9	16000	94400		
MO18WL0126	TABLE ROCKDAM	36 39.7	CM	252.0	200000	495000	0	
5	TANEY WHITE RIVER	93 10.5		3402000	0	0	0	
	CORP SWL	4020	3999.8	207.7	200000	495000		
MO88WL0127	EAGLE BLUFF	36 59.0		100.0	0	0	5333.0	
5	WAYNE BLACK RIVER	90 35.9		0	5468	27829	191.66	
		1101	1177.3	64.9	5468	27829		

ATTACHMENT C (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 (1000 $) ($/MWH)	ERC ECONOMIC SEQUENCE RANK / ERC NONECONOMIC COMPOSITE SEQUENCE RANK
MU88WL0135	COUNTY LINE	37 14.4		166.0	0	0	7932.0	
5	WEBSTER JAMES RIVER	93 5.0		0	1751	6290	1260.9	
		153	-148.4	145.8	1751	6290		

ATTACHMENT C (continued)

SITE ID NUMBER AGENCY DAM	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 PWR.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (MW)	EXIST.ENRGY ANNUL. COST INC. ENERGY TOT. ENERGY (MWH)	ERC ECONOMIC (1988 $)	ERC WO/ECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
Footnote 1			Footnote 3 &4			Footnote 2		
MSCLMK0001 2	ARKABUTLA DAM DESOTO COLDWATER RIV	34 45.3 90 7.4 1000	CR OP 1999.0	61.0 1303140 42.9	0 17113 17113	0 33636 33636	829.61 28.945	1019 1019 1021
MSGBAM0150 5	EPINAURE GEORGE PEARL RIVER	33 0.0 89 0.0 867	N,B,R,C IB -1116.9	90.0 450000 83.9	0 18525 18525	0 25694 25694	1071.9 72.858	
MSCBAM0157 2	PEARL RIVER VALLEY WATER	32 24.0 90 3.8 2970	RB -3644.2	45.0 400000 33.5	0 11958 11958	0 39254 39254	833.70 16.148	1002 1002 1020
MSGBAM0158 5	DOLA SIMPSON STRONG RIVER	32 0.0 89 0.0 360	N,B,R,C IB -501.8	91.0 313000 69.9	0 3605 3605	0 11528 11528	1061.2 161.46	
MSGBAM0159 5	LOWER STRONG SIMPSON STRONG RIVER	32 0.0 89 0.0 630	N,B,R,C IB -878.1	70.0 220000 53.9	0 13666 13666	0 24518 24518	1814.9 76.25	

ATTACHMENT C (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	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 (1000 $) ($/MWH)	ERC ECONOMIC / ERC NONECONOMIC / ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
Footnote 1			Footnote 3 &4			Footnote 2		
NMCSWA00060	LAKE SUMNER	34 36.5	IC	101.0	0	0	143.3	1048
2	DEMACA PECOS RIVER	104 23.1	OP	240000	856	3092	46.247	1041
	DOI USBR	4390	208.0	73.6	856	3092		1044
NMCSWA00062	AVALON	32 29.4	I	58.0	0	0	45.574	
1	ECDY PECOS RIVER	104 15.2	OP	36600	11	104	436.89	
	DOI USBR	10070	168.0	15.9	11	104		
NMCSWA00061	BRANTLEY	32 30.9	CI	106.0	0	0	1911.7	2036
2	ECDY PECOS RIVER	104 24.0	PA	836450	1395	4394	435.2	2033
	DOI USBR	16090	-153.6	59.9	1395	4394		2048
NMCSWA00063	MCMILLAN	32 35.7	I	57.0	0	0	37.827	
1	ECDY PECOS RIVER	104 20.8	OP	66600	2	20	1089.9	
	DOI USBR	16990	-388.0	25.9	2	20		
NMCSWA00065	LOS ESTEROS DAM	35 1.7	CIR	210.0	0	0	81.171	2038
2	GUADALUPE PECOS RIVER	104 41.4	OP	696800	93	250	164.31	2006
	DAEN SWA	2430	151.0	159.0	93	250		2047
NMCSWA00073	UTE RESERVOIR	35 20.9	R O	125.0	0	8	35.625	
1	QUAY CANADIAN RIVE	103 26.9	OP	109587	0	2	12484	
	NP INSTATESTREAM	11140	-310.4	80.9	0	2		
NMCSWA00028	CONCHAS DAM	35 23.2	C I R	200.0	0	8	231.37	1045
2	SAN MIGUEL CANADIAN RIVE	104 11.4	OP	709119	2078	4781	48.387	1042
	DAEN SWA	7409	-308.6	161.2	2078	4781		1038

ATTACHMENT C (continued)

STATE ID NUMBER	PROJECT NAME	LATITUDE LONGITUDE	PROJ.PUMP. DAM HT	EXIST.CAP. INC. CAP. YDT. CAP.	EXIST.ENRGY INC.ENERGY YDT.ENERGY	COST EAC ECONOMIC EAC NONECONOMIC EAC COMPOSITE
	COUNTY CO. STREAM OR DRAINAGE	DMS. AREA (D M.M) (CFS) (SQ.MI)	AVE. HD. (FT) (AC FT) Footnote 3 (FT) &4	(MW) (MW) (MW) Footnote 2	(MWH) (MWH) (MWH)	($/MWH) (SEQUENCE RANK) (SEQUENCE RANK)
Footnote 1						
OK0804702604	CHEROKEE LAKE	36 6.9	CWSR 177.0	0 0	0	8624.7
S	ARKANSAS ILLINOIS RIVE	94 54.0	IR 1083000	4627 11433	754.35	
	DAM OUT	816	-4299.9	34.9 4627 11433		
OK0804702607	LAKE FRANCES TAILRACE PORTAGE	35 7.6	O 46.0	0 0	359.7	1039
2	ARKANSAS ILLINOIS RIVE	94 33.8	OP 32150	0009 9671	37.126	1037 1037
	CITY OF TAILRACE PORTAGE	635	-4483.3	34.5 0009 9671		
OK0804702708	GREAT SALTPLAINS LA NE	36 05.0	CO 68.0	0 0	36.300	
S	ALFALFA SALT FORK OF	98 0.6	OP 998400	0 3	11856	
	DAM OUT	3200	-3683.9	22.8 0 3		
OK0804702709	ATOKA	34 85.2	OR 103.0	0 0	36.98	
S	ATOKA NORTH CANADIAN C	96 3.0	OP 430700	0 1	19194	
	OKLAHOMA CITY	176	-184.8	70.4 0 1		
OK0804702713	MCGEE CREEK	34 19.9	O 151.0	0 0	3344.4	
S	ATOKA MC GEE CREEK	95 52.7	PA 277200	0 0	8618161	
	DIRECT	178	-155.6	94.9 0 0		
OK0804702722	PARKER LAKE	34 85.0	COO 99.0	0 0	4827.3	
S	ATOKA MUDDY CANADIAN C	96 16.9	IR 1968000	0 0	12334623	
	DAM OUT	172	-198.3	56.9 0 0		
OK0804702727	EAGLETOWN RESERVOIR	34 56.4	ICR 160.0	0 0	12650	
S	BEAVER CIMARRON RIVE	100 2.4	IR 160000	783 2036	6210.8	
	DIRECT	10048	-139.2	80.9 783 2036		
OK0804702728	BRIDGEPORTRESERVOIR	35 32.9	RIC 200.0	0 0	89757	
S	BLAINE CANADIAN RIVE	98 22.9	IR 2175000	3315 7699	6462.3	
	DAM OUT	17268	819.0	167.6 3315 7699		
OK0804702729	CANYON LAKE	34 5.1	COI 68.0	0 0	35.543	
S	BLAINE NORTH CANADIA	98 35.9	OP 445100	0 0	78492	
	DAM OUT	7600	-120.8	21.1 0 0		

ATTACHMENT C (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 NX.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 (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
OK00WT0473	HYDRO	35 34.1	B	107.0	0	0	7603.3	
5	BLAINE CANADIAN R	98 30.0	BA	783429	1	6	1169081	
	BUREC	24187	-635.8	79.9	1	6		
OK00WT0454	ALBANY	33 51.1	B	75.0	0	0	6553.0	
5	BRYAN ISLAND BAYOU	96 9.8	BA	212000	4	14	452347	
	BUREC 132		-90.2	51.9	4	14		
OK18WT0281	DENTSON DAM	33 49.9	COMMO	165.0	70000	244000	637.89	8.
2	BRYAN RED RIVER	96 33.9	OP	9300000	21809	-30898	20.645	8. 8.
	DAEN BNT	39719	-3889.0	108.8	91809	213101		
OK00WT0464	DURANT	33 54.8	B	105.0	0	0	12050	
5	BRYAN BLUE RIVER	96 3.4	BA	904000	108	484	25712	
	BUREC 649		-443.9	72.9	108	484		
OK00WT0280	SANDY CREEK LAKE	34 8.0	CBR	79.0	0	0	3689.8	
5	BRYAN BLUE RIVER	96 24.0	BI	93000	507	1904	1937.2	
	DAEN 318		-217.5	83.9	507	1904		
OK00WT0488	UNION	35 21.7	B	104.0	0	0	13422	
5	CANADIAN CANADIAN RIVE	97 59.6	BA	1232000	1	4	2884973	
	BUREC 24837		-447.5	70.9	1	4		
OK00WT0289	UNION-ALTERNATE	35 23.4	CBI	123.0	0	0	25821	
5	CANADIAN B. CANADIAN	98 1.9	BA	2570000	1	2	9298839	
	BUR REC 17909		415.0	97.6	1	2		
OK00WT0292	DOUGHTERY LAKE	34 21.9	MC	125.0	0	0	8501.6	
5	CARTER WASHITA RIVER	97 7.5	BI	0	20545	48430	175.54	
	DAEN 6615		-1330.8	99.9	20545	48430		
OK00WT0401	CHELSEA	36 29.4	CBRO	60.0	0	0	2932.1	
5	CHEROKEE PRYOR CREEK	95 24.0	IB	62500	0	0	29363144	
	DAEN BNT 98		-64.6	21.9	0	0		

SITE ID NUMBER DSTA. INA.	PROJECT NAME PRIMARY CO. OWNED	NAME OF STREAM	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MN.STOR. DAM NO. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (MW) (MW) (MW)	EXIST.ENRGY INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANUL. COST (1000 $) ($/PWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
OK68WT0065	ELDON		35 55.0	S	170.0	0	0	5865.8	
5	CHEROKEE	BAR POOR CR	00 56.1	80	285000	2110	4975	1098.6	
	BUREC		307	-920.3	42.9	2110	4975		
OK68WT0075	TAHLEQUAH LAKE		35 50.4	C	206.0	0	0	4797.8	0.
2	CHEROKEE	ILLINOIS RIVE	94 53.7	SI	1800000	66887	81814	58.643	0. 0.
	BUREC		914	-920.8	107.0	66887	81814		
OK18WT0302	TENKILLER FERRY LAKE		35 35.9	CH	197.0	34000	95100	634.53	0.
2	CHEROKEE	ILLINOIS RIVE	95 1.9	OP	1342660	24477	19338	32.812	0. 0.
	DAEN SWT		1010	-1976.1	149.7	58477	114438		
OK68WT0305	BOSWELL RESERVOIR		34 1.9	CRO	95.0	0	0	17591	
5	CHOCTAW	MUDDY BOGGY C	95 45.0	SI	1285000	10098	16619	1058.6	
	DAEN SWT		2273	-1987.2	30.9	10098	16619		
OKC8WT0305	HUGO LAKE		34 0.9	CORO	101.0	0	0	428.56	1081
2	CHOCTAW	MIAMICHI RIVE	95 23.6	OP	1249800	5531	15895	26.962	1021
	DAEN SWT		1909	-2098.7	30.6	5531	15895		1027
OK68WT0311	TUPELO LAKE		34 30.0	CR	93.0	0	0	7264.6	
5	COAL	CLEAR BOGGY C	96 21.4	IR	805000	13	71	101383	
	DAEN SWT		380	-259.9	60.9	13	71		
OKC8WT0319	ELLSWORTH		34 47.7	S	96.0	0	0	38.335	
5	COMANCHE	CACHE CREEK	98 22.0	OP	211900	8	9	4068.7	
	CITY OF LAWTON		249	-28.8	68.9	8	9		
OK68WT0660	COOKIETOWN		34 16.7	IR	91.0	0	0	7509.5	
5	COTTON	DEEP RED RUN	98 32.3	SA	4.0940	0	0	16523225	
	BUREC		544	-112.4	60.9	0	0		
OK68WT0687	TEMPLE		34 12.2	S	89.0	0	0	14154	
5	COTTON	CACHE CREEK	98 18.2	SA	1008700	0	0	21097983	
	BUREC		1876	-387.9	65.9	0	0		

ATTACHMENT C (continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. OWNER	NAME OF STREAM	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 ANUL. COST INC.ENERGY ENERGY COST TOT.ENERGY (MWH) (1000 $) (MWH) ($/MWH) (MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
OK68WT0321	BRISTOW RES.		35 49.0	BRC	77.0	0	0 2700.7	
5	CREEK	LITTLE DEEP F	96 13.9	IB	245600	0	0 7663898	
	DAEN BWT		250	-103.4	20.7	8	0	
OKCBWT0332	ELCHA LAKE		36 22.5	BR	97.0	0	0 259.75	1833
2	DELAWARE	APAVINAW CREF	96 56.0	DP	119000	1985	8043 32.293	1832
	CITY OF TULSA		379	-368.8	70.9	1985	8043	1833
OK68WT0331	NOEL RESERVOIR		36 38.0	CB	95.0	8	0 5558.8	
5	DELAWARE	ELK RIVER	94 37.9	BI	285000	6756	13125 423.44	
	DAEN BWT		980	-963.2	29.9	6756	13125	
OK68WT0485	BIO		36 20.5	B	110.0	8	0 3257.8	
5	DELAWARE	APAVINAW CREE	96 45.4	BA	140000	8	2 1329112	
	BUREC		193	-155.9	78.9	8	2	
OK68WT0495	TALOGA		35 52.6	B	120.0	0	0 10616	
5	DEWEY	CANADIAN RIVE	99 5.0	BA	776000	1	5 2041624	
	BLREC		19693	-353.2	88.9	1	5	
OK68WT0470	HENNEPIN		34 32.1	B	96.0	8	0 6176.4	
5	GARVIN	WILDHORSE CR	97 17.3	BA	376000	0	2 2266160	
	BLREC		534	-187.4	78.9	0	2	
OK68WT0468	GREER		34 57.0	I	80.0	8	0 4705.2	
5	GREER	FLN FORK OF R	99 33.2	BA	235700	1	3 1217595	
	BLREC		1067	-148.8	53.9	1	3	
OK68WT0496	TRICO		35 5.3	B	120.0	0	0 14529	
5	GREER	NORTH FORKOF	99 23.1	BA	518500	0	0 34431067	
	BLREC		1992	-125.2	77.9	0	0	
OK68WT0469	HEADRICK		34 5.5	I	90.0	0	0 0	
5	JACKSON	N FORK OF RED	99 41.8	BA	547000	0	0 0	
	BLREC		3845	-289.8	-59.4	0		

ATTACHMENT C (continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. NAME OF OTHER OWNED	LATITUDE LONGITUDE STATUS DA. AREA (D M.M) (D P.M) (SQ.MI)	PRO.1.PURP. MX.STOR. AVE. Q (CFS)	DAM HT PWR. HD. (FT) (FT)	INSTOT.CAP. INC. CAP. TOT. CAP. (MW)	ANNUL. ENERGY ENERGY TOT.ENERGY (MWH)	CUST (1000 $)	ERC ECONOMIC SEQUENCE RANK	ERC MARGINAL COST (SEQUENCE RANK)	ERC COMPOSITE (SEQUENCE RANK)
OK68WT0076	MANGUM	34 49.3	ICR	130.0	0	0	7731.8			
5	JACKSON SALT FORK OF	99 36.7	IS	977000	0	0	29839310			
	ALREC	1299	-89.6	76.9	0	0				
OKCSWT0300	MAURICE RESERVOIR	35 11.2	CIRC	100.0	0	0	35.390			
5	JEFFERSON BEAVER CREEK	98 3.0	OP	908400	0	0	81393			
	DAEN SWT	562	-155.0	50.5	0	0				
OK68WT0307	DURWOOD LAKE	34 13.4	MC	75.0	0	0	9530.9			
5	JOHNSTON WASHITA RIVER	96 54.9	SI	660000	7050	15961	534.42			
	DAEN	7239	-1456.3	29.9	7050	15961				
OK68WT0082	RAVIA	34 15.9	S	142.0	0	0	6959.9			
5	JOHNSTON HILL CREEK	96 48.8	SA	86400	0	0	8257355			
	SUREC	88	-27.9	84.9	0	0				
OKCSWT0396	ALTUS 115	34 93.2	ICS	67.0	0	0	35.427			
5	KIOWA NORTH FORKRED	99 17.7	OP	168000	0	0	30390			
	USA	2515	-173.2	91.9	0	0				
OK68WT0072	WIGGINS	34 48.9	S	92.0	0	0	4073.7			
5	LATIMER RATNER CREEK	99 29.2	SA	272500	0	1	3044210			
	SUREC	128	-155.9	66.9	0	1				
OK68WT0379	BRAZIL LAKE	35 8.0	CSRO	77.0	0	0	3508.3			
5	LE FLORE BRAZIL CREEK	94 46.9	IS	283100	0	1	2947165			
	DAEN SWT	199	-229.7	35.1	0	1				
OKCSWT0383	WISTER LAKE	34 56.2	CSO	99.0	0	0	708.61	1029		
2	LE FLORE POTEAU RIVER	94 43.0	OP	1020000	12867	23157	30.599		1029	
	DAEN SWT	993	-1219.7	42.2	12867	23157				1030
OKASWT0284	W. O. MAYOLOCK DAM	35 18.9	NCR	69.0	0	0	2079.5	1017		
2	LE FLORE ARKANSAS RIVE	94 36.7	OP	1000	20116	92209	22.552		1017	
	DAEN SWT	149088	-26736.0	14.3	20116	92209				1023

ATTACHMENT C (continued)

STTE 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 MAX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (KW) (KW) (KW)	EXIST.ENRG ANLL. INC.ENERGY TOT.ENERGY (MWH) (MWH)	COST ENERGY COST (1000 $) ($/MWH)	ERC ECONOMIC ERC SEQUENCE RANK (SEQUENCE RANK) (SEQUENCE RANK)
OK68WT0462	CRESCENT	35 53.2	S	75.0	0	0	7397.4	
5	LOGAN CIMARRON R	97 35.4	SA	464000	0	1	4958085	
	BLREC	11529	-332.3	38.9	0	1		
OK68WT0464	NAVINA	35 49.3	S	23.0	0	0	3481.8	
5	LOGAN COTTONWOODCRE	97 27.9	SA	204768	0	1	2831175	
	BLREC	249	-81.7	47.9	0	1		
OKGBWT0404	MARKHAM FERRY DAM	36 14.0	H C	90.0	100000	190000	1149.0	0.
2	MAYES GRAND RIVER	95 10.9	OP	534060	31341	64592	17.790	0.
	GRAND RIVER DAN AUTHOR,	11533	-8139.7	60.2	131341	254592		0.
OK18WT0405	PENSACOLA DAM	36 28.8	H C	147.0	90000	340600	4647.3	0.
2	MAYES GRAND RIVER	95 1.9	OP	2233200	170102	125821	35.348	0.
	GRAND RIVER DAN AUTHOR,	10298	-7268.0	123.0	260102	466421		0.
OK48WT0420	SPAVINAW LAKE	36 23.0	SR	75.0	0	0	239.48	1038
2	MAYES SPAVINAW CREE	95 2.8	OP	72400	2624	7250	32.467	1033
	CITY OF TULSA	409	-398.0	47.9	2624	7250		1038
OK68WT0409	BEAR CREEKLAKE	34 16.9	HC	185.0	0	0	11726	
5	MCCURTAIN MOUNTAIN FORK	94 39.9	SI	0	67292	90377	129.73	
	DAEN	469	-1167.2	164.8	67292	90377		
OK18WT0418	BROKEN BOWLAKE	34 0.8	CRMBO	225.0	100000	129000	0	
5	MCCURTAIN MOUNTAIN FORK	94 41.1	OP	1002000	0	0	0	
	DAEN BWT	754	-1315.5	177.3	100000	129000		
OK68WT0410	IDABEL LAKE	33 56.4	INC	85.0	0	0	10136	
5	MCCURTAIN LITTLE RIVER	94 46.0	SI	1415000	16210	30756	524.66	
	DAEN BWT	1190	-1728.2	41.2	16210	30756		
OK68WT0411	LIMPATA RESERVOIR	34 0.4	CB	176.0	0	0	5223.6	
5	MCCURTAIN GLOVER CREEK	94 46.0	SI	507300	2274	7216	723.88	
	DAEN BWT	252	-392.0	80.3	2274	7216		

SITE ID NUMBER AGY. 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 MAX.STOR. PWR. HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (KW) (KW) (KW)	EXIST.ENRG TOT.ENERGY (MWH) (MWH)	ANUL. COST (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
OKC8WT0817	PINE CREEKLAKE	34 26.4	CBOR	124.0	0	0	542.65	1027
2	MCCURTAIN LITTLE RIVER	95 4.8	OP	968210	11248	20408	29.29	1027
	DAEN BWT	635	-984.0	52.9	11248	20408		1029
OK68WT0812	SHERWOOD LAKE	34 23.0	CBR	216.0	0	0	12275	
5	MCCURTAIN MOUNTAIN FORK	94 42.5	IB	1953400	15782	19853	618.30	
	DAEN	192	-334.9	155.8	15782	19853		
OKT8WT0819	EUFAULA LAKE	35 18.5	CBHR	114.0	90000	260300	0	
9	MCINTOSH CANADIAN RIVE	95 21.7	OP	5000000	0	0	0	
	DAEN BWT	87522	-5675.3	82.9	90000	260300		
OK68WT0825	ARBUCKLE 188	34 25.6	CBRO	142.0	0	0	3308.2	
5	MURRAY ROCK CREEK	97 1.5	OP	232000	2	15	218499	
	USA	126	-68.7	80.9	2	15		
OK68WT4325	TAFT RESERVOIR	35 46.9	CO	67.0	0	0	10089	
5	MUSKOGEE ARKANSAS RIVE	95 33.9	BI	112500	81019	174645	57.773	
	DAEN BWT	75810	-15955.3	36.6	81019	174645		
OKG8WT4283	WEBBERS FALLS LOCK &DAM	35 30.9	NWRO	100.8	60008	213300	0	
5	MUSKOGEE ARKANSAS RIVE	95 9.9	OP	760000	0	0	0	
	DAEN BWT	97033	-19918.0	28.6	60088	213300		
OK68WT0827	BLACK SPARLAKE	36 20.9		110.0	0	0	4309.3	
5	MCALE BLACK BEARCRE	97 22.0	IB	264993	0	1	3765356	
	DAEN BWT	237	-88.5	54.9	0	1		
OK68WT4326	WELFFTKA RESERVOIR	35 39.0	W	100.0	0	0	7201.3	
5	OKFUSKEE N. CANADIAN R	96 11.0	BI	810000	2028	6106	1179.3	
	DAEN-BWT	7180	-350.8	80.5	2028	6106		
OK69WT0810	WELTY RESERVOIR	35 38.0	ESOR	88.0	0	0	7227.9	
5	OKFUSKEE DEEP FORK CAN	96 23.5	IB	870000	2150	5150	1401.6	
	DAEN-BWT	1485	-417.4	33.3	2150	5150		

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 ANUL. COST INC.ENERGY ENERGY COST TOT.ENERGY (1000 $) (MWH) (MWH) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
OKOGWT0036	LAKE OVERHOLSER		35 29.0	SR	61.7	0	0	0
5	OKLAHOMA	NORTH CANADIA	97 39.9	OP	25000	0	0	0
	OKLAHOMA CITY		8338	-142.5	-36.9	0	**********	
OK6GWT0038	NUYAKA RESERVOIR		35 42.0	S	77.0	0	0	0
5	OKMULGEE	DEEP FK, CANA	96 7.0	SI	1067000	0	0	0
	DAEN-BWT		1898	-772.0	-56.9	0	**********	
OK6GWT0039	OKMULGEE RESERVOIR		35 39.0	CSROW	83.0	0	0	14020
5	OKMULGEE	DEEP FK RIVER	96 1.9	SI	1868000	9581	13390	1106.8
	DAEN BWT		2146	-921.1	51.5	9581	13390	
OK6GWT0043	AVANT RESERVOIR		36 29.8	CSI	69.0	8	0	2976.9
5	OSAGE	BIRD CREEK	96 5.5	SI	188200	8	0	6923179
	DAEN BWT		336	-203.8	29.1	0	0	
OK6GWT0045	CANEY RESERVOIR		36 30.0	CSR	103.0	0	0	3208.7
5	OSAGE	CANEY CREEK	96 1.9	SM	133200	0	0	6674609
	DAEN BWT		83	-87.9	64.8	0	0	
OKCGWT0058	MULAH LAKE		35 55.8	CSO	94.0	0	0	36.135
5	OSAGE	CANEY RIVER	96 22.9	OP	383700	0	3	11039
	DAEN BWT		732	-392.3	29.2	0	3	
OKCGWT0060	KAW RESERVOIR		36 42.0	CSRO	125.0	0	0	1207.5
2	OSAGE	ARKANSAS RIVE	96 55.5	OP	1034000	15227	53553	23.295
	DAEN BWT		40530	-2019.6	71.9	15227	53553	
OKIGWTC057	KEYSTONE LAKE		36 9.0	CSMNRO	121.0	70000	228000	0
5	OSAGE	ARKANSAS RIVE	96 14.6	OP	2593000	0	0	0
	DAEN BWT		74506	-6869.5	67.6	70000	228000	
OK6GWT0048	SAND RESERVOIR		36 48.0	CSRO	114.0	0	0	3224.9
5	OSAGE	SAND CREEK	96 9.0	ST	165000	0	0	4142888
	DAEN BWT		137	-81.7	57.9	0	0	

SITE ID NUMBER AGTY. INV.	PROJECT NAME PRIMARY CO. OWNER	NAME OF STREAM	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. (MW) (MW)	EXIST.ENRG ANUL. ENERGY TOT.ENERGY (MWH) (MWH)	ANUL. COST (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK)
OKCSWT0451	SKIATOOK RESERVOIR		36 20.9	CSRO	143.0	0	0	35,655	
5	OSAGE	HOMINY CREEK	96 5.9	UC	893000	0	1	29364	
	OAEN SWT		354	-204.0	98.0	0	1		
OKSSWT0492	LELA		36 20.5	S	81.0	0	0	4675.5	
5	PAWNEE	BLACK BEARCRE	96 50.5	SA	101000	0	0	0170516	
	UNKNOWN		545	-185.2	57.9	0	0		
OKSSWT0475	ANTLERS LAKE		34 10.9	HC	95.0	0	0	5130.3	
5	PUSHMATAHA	KIAMICHI RIVE	95 29.5	IS	0	14906	30693	167.40	
	OAEN		1410	-1741.3	53.9	14906	30693		
OKCSWT0482	CLAYTON LAKE		34 37.8	CSR	101.0	0	0	36.130	
5	PUSHMATAHA	JACKFORK CREE	95 20.4	UC	702100	0	2	12301	
	OAEN SWT		275	-335.0	65.9	0	2		
OKSSWT0478	FINLEY LAKE		34 15.0	HC	101.0	0	0	2956.2	
5	PUSHMATAHA	CEDAR CREEK	95 33.9	SI	99000	0	1	1950107	
	OAEN		172	-209.5	33.4	0	1		
OKSSWT0479	KELLMOND LAKE		34 10.5	CSRO	91.0	0	0	2402.2	
5	PUSHMATAHA	TENMILE CREEK	95 30.5	SI	59000	0	0	3201504	
	OAEN		103	-119.9	27.9	0	0		
OKSSWT0480	TUSKAHOMA RESERVOIR		34 38.0	CSRO	96.0	0	0	7100.2	2038
2	PUSHMATAHA	KIAMICHI RIVE	95 7.0	SI	800000	5742	12464	576.70	2037
	OAEN SWT		347	-791.8	51.9	5742	12464		2026
OKSSWT0481	UPPER ANTLERS LAKE		34 10.5	CSR	175.0	0	0	26110	
5	PUSHMATAHA	KIAMICHI RIVE	95 37.9	SI	5095000	92	127	204103	
	OAEN		152	-185.2	150.2	92	127		
OKCSWT0486	OCLOGAH LAKE		36 25.6	CSNRO	137.0	0	0	1329.3	1023
2	ROGERS	VERDIGRIS RIV	95 41.0	OP	2042500	17349	47607	27.876	1023
	OAEN SWT		4339	-2533.9	73.9	17349	47607		1020

ATTACHMENT C (continued)

SITE ID NUMBER / ACTV. INV.	PROJECT NAME / PRIMARY CO. 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 (1000 $) ($/MWH)	ERC ECONOMIC / ERC NONECONOMIC / ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
OKGSWT4280	PCBERT S KERR LOCK AND DAM	35 20.8	NNRO	83.0	110000	459000	4857.0	0.
2	SEQUOYAH ARKANSAS RIVE	94 46.2	OP	1735000	100926	-3621	1341.0	0.
	DAEN SWT	147756	-20676.8	41.0	210926	455378		0.
OKCSWT0510	OPTIMA RESERVOIR	36 40.0	CSRO	120.0	0	0	35.401	
5	TEXAS NORTH CANADIA	101 7.0	OP	618500	0	0	187212	
	DAEN SWT	5029	-86.8	63.1	0	0		
OKASWT4282	CHOUTEAU LOCK & DAM	35 51.9	NRO	50.5	0	0	36.993	
5	WAGONER VERDIGRIS RIV	95 21.7	OP	1000	1	0	0	
	DAEN SWT	4270	-4358.9	17.0	1	0		
OKISWT0913	FORT GIBSON LAKE	35 51.9	CH	110.0	45000	190500	5104.8	0.
2	WAGONER GRAND RIVER	95 13.9	OP	1284400	96318	78239	66 7	0.
	DAEN SWT	12492	-8913.4	61.4	141318	268739		0.
OKASWT4281	NRWT GRAHAM LOCK & DAM	36 3.9	NRO	47.0	0	0	37. 77	
5	WAGONER VERDIGRIS RIV	95 12.7	OP	1000	1	0	0	
	DAEN SWT	8030	-4232.4	16.7	1	0		
OKCSWT0514	COPAN RESERVOIR	36 53.0	CSRO	70.0	0	0	35.594	
5	WASHINGTON LITTLE CANEY	95 56.9	NUC	338500	0	0	42539	
	DAEN SWT	505	-295.5	24.8	0	0		
OKBSWT4477	MOUNTAIN VIEW	35 7.3	BI	84.0	0	0	6462.1	
5	WASHITA WASHITA RIVER	98 45.0	BA	364000	1754	3304	1955.3	
	BUREC	2635	-245.7	56.9	1754	3304		
OKBSWT4455	ALVA	36 55.6	IB	114.0	0	0	8582.8	
5	WOODS SALT FORK OF	98 41.8	BA	595700	0	1	8195409	
	BUREC	957	-177.0	80.9	0	1		

SITE ID NUMBER	PROJECT NAME PROJECT CO. NAME OR OTHER ID	LATITUDE LONGITUDE DRAINAGE AREA (D M.M) (D M.M) (SQ.MI)	PROJ. PUMP. STATUS AVE. H Footnote 3	DAM HT DAM, HD. (FT) (AC FT) (FT)	ENRGY. CAP. ENRGY. CAP. (MWH) (MWH)	EXIST. ENRG ANNL. COST EAC ENERGY COST (1000 $) ($/MWH)	EAC ECONOMIC EAC NONECONOMIC EAC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
Footnote 1				Footnote 3 &4	Footnote 2		
2010	LAKE DIAMOND	33 49.1	IS	45.0	0	0	59.052			
5	ARCHER DIAMOND DIVERSION	98 56.1	OP	07000	07	732	76. 0			
	CITY OF DIAMOND FALLS	2313	-200.5	34.9	07	732				
2020	DEVILS LOCK & DAM	33 01.0	HA	01.0	0	0	52.0	2010		
2	BOWIE DIVERTED	98 01.9	OI	000000	12227	73514	71.190		2020	
	DAEN DAM	00000	-1.0	19.9	12227	73514				2010
2009	FADEN LOCK & DAM	33 32.9	HA	60.0	0	0	5.00	2009		
2	BOWIE DIVERTED	98 3.0	OI	000000	23717	03069	57.648		2010	
	DAEN DAM	00000	-1.0	19.9	23717	03069				2009
2030	LANESPORT LOCK & DAM	33 38.0	HA	92.0	0	0	10707	2030		
2	BOWIE DIVERTED	98 28.0	OI	000000	00390	199039	75.820		2025	
	DAEN DAM	04209	-1.0	35.2	00390	105039				2011
2041	MAPLES CROSSROADS	33 17.1	OC	73.0	0	0	30019	2041		
2	DOUBLE	DOUPHUD DIVERTED	98 08.0	IC	2009600	13590	30000	1241.3		2041	
	DAEN DAM	2696	2009.0	29.9	13590	30000				2043
2027	NEW ROCKPORTLOCK & DA M	33 32.9	HCN	92.0	0	0	10000	2027		
2	BOWIE DIVERTED	98 19.0	OI	000000	00089	101009	99.390		2029	
	DAEN DAM	00524	-1.0	35.2	94089	101009				2015
2029	TERRAMONA DAM	33 10.3	OC	200.0	0	0	1370.0	2029		
2	BOWIE	GULPHUD DIVERTED	98 9.5	OP	0730000	3310	9400	100.03		2030	
	DAEN DAM	1400	2009.0	32.5	3310	9400				2032
2040	FERGUSON NO 3 DAM	33 38.9	CORH	93.0	0	0	11015	2040		
2	BRAZOS	NAVASOTA DIVERTED	96 11.0	IR	2009200	0313	9391	1172.0		2040	
	DAEN DAM	1754	-7.3	08.9	0313	9391				2042
2025	BOWEAVILLEDAM	30 20.0	CBR	00.0	0	0	102.80	2025		
2	BURLESON	VEGUA CREEK	96 31.9	OP	1028000	220	1491	95.775		2004	
	DAEN DAM	1006	311.0	37.9	220	1491				2031

ATTACHMENT C (continued)

SITE ID NUMBER / ACTV. INV.	PROJECT NAME / PRIMARY CO. / NAME OF STREAM / OWNER	LATITUDE / LONGITUDE / DR.AREA (D.M.) (D.M.) (SQ.MI)	PROJ.PURP. / STATUS / AVE. Q (CFS)	DAM HT / MX.STOR. / PNR. 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 (1000 $) / ENERGY COST ($/MWH)	ENG ECONOMIC / ERC NONECONOMIC / ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
TX08WG00005	WALLISVILLE RES	29 54.9	NAR	27.0	0	0	7436.5	
2	CHAMBERS TRINITY RIVER	94 50.0	UC	55700	43	206	36059	
	DAEN SWG	17845	7000.0	2.9	43	206		
TX08WT0521	GAINESVILLE	33 45.0	HCR	144.0	0	0	29045	
5	COOKE RED RIVER	97 11.0	IO	4220000	106078	127030	227.21	
	DAEN	30768	-2875.3	116.0	106078	127030		
TX08WT3558	BLUE RIVERLOCK & DA M	33 53.0	MN	45.0	0	0	4179.4	2012
2	FANNIN RED RIVER	95 56.0	BI	300000	17596	70311	59,441	2017
	DAEN SWT	39780	-7576.5	24.9	17896	70311		2005
TX08WT3603	CARPENTERSBLUFF LOC N & DAM	33 43.4	MN	35.0	0	0	3039.4	2022
2	FANNIN RED RIVER	96 32.0	BI	200000	10114	34444	88,248	2027
	DAEN SWT	38438	-3763.6	17.9	10114	34444		2013
TX08WT3605	KEMP RESERVOIR	33 45.9	IMB	60.0	0	0	5472.6	2026
2	FANNIN RED RIVER	96 18.0	BI	180000	17458	56792	96,302	2028
	DAEN SWT	38773	-3796.4	28.9	17458	56792		2010
TX08WT3566	BOWLES BLUFF LOCK & DAM	33 45.9	MN	46.0	0	0	7501.6	2031
2	FANNIN RED RIVER	96 11.0	BI	285700	13606	43722	171,57	2031
	DAEN SWT	38827	-3801.7	23.9	13606	43722		2010
TX08WT3609	WADE LAKE	33 50.9	MN	80.0	0	0	15207	2013
2	FANNIN RED RIVER	96 5.0	BI	0	86257	231390	65,724	2018
	DAEN	39036	-7434.0	80.0	86257	231390		2006
TXCBWP0067	CHEROKEE DAM	32 21.7	B	45.0	0	0	151.55	2023
2	GREGG CHEROKEE BAYO	94 56.3	OP	77750	700	1669	90.759	2002
	CHEROKEE WATER CO	158	-227.0	26.9	700	1669		2036
TX08WP9012	MARSHALL RESERVOIR	32 39.2	B	70.0	0	0	7560.0	2039
2	HARRISON LITTLE CYPRES	94 26.5	BP	981700	4506	8203	922.56	2039
	DAEN SWP	656	532.0	31.9	4506	8203		2041

ATTACHMENT C (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 ANUL. CORT INC.ENERGY ENERGY COST TOT.ENERGY (MWH) (1000 $) (MWH) (MWH) ($/MWH) (MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
TX68NF4420	DAM A	31 0.0	NC	89.0	0	0 3041.4	2021
2	JASPER NECHES RIVER	94 15.0	SI	30000	16149	38040 79.952	2026
	DAEN SWF	3778	2320.0	30.4	16149	38040	2035
TX1SNF0892	SAM RAYBURN DAM	31 4.0	CSRM	120.8	92080	127639 0	0.
5	JASPER ANGELINA RIVE	94 5.9	OP	5610000	0	0 0	8.
	DAEN SWF	3449	2714.0	82.9	92080	127639	0.
TX68NT3997	ARTHUR CITY LAKE	33 91.9	MA	65.0	0	0 18078	2014
2	LAMAR RED RIVER	95 26.9	SI	29000	52936	150116 67.136	2019
	DAEN SWT	43183	-8224.6	41.1	52936	150116	2007
TX68-T3962	GARRETTS BLUFF LAKE	33 54.8	MA	85.0	0	0 16192	2016
2	LAMAR RED RIVER	95 45.0	IR	1888000	87451	233963 69.208	2021
	DAEN	48397	-7894.8	67.0	87451	233963	2009
TX68-G0569	CAPERR RIDGE REB	30 24.9	MIXR	77.0	0	0 41338	2033
2	LIBERTY TRINITY RIVER	94 56.0	FP	1400000	77806	202370 284.27	2038
	DAEN SWB	17436	7376.1	61.0	77806	202370	2001
TX68-G0567	LOCK AND DAM NO. 3	30 12.3	NP	85.8	0	0 2524.0	2045
2	LIBERTY TRINITY RIVER	94 49.4	DP	5750	181	1450 1730.1	2045
	DAEN SWB	17436	-7410.9	11.9	181	1450	2049
TX68-G0568	LOCK AND DAM NO 4	30 25.7	NP	33.0	0	0 2403.8	0.
2	LIBERTY TRINITY RIVER	94 53.3	DP	5600	1	0 0	0.
	DAEN SWB	17215	-7316.9	2.7	1	0	0.
TX68NF0114	BEDIAS DAM	31 52.0	B	85.0	0	0 1250.0	2043
2	MADISON BEDIAS CREEK	95 49.7	IR	205000	465	893 1399.8	2043
	TRINITY RIVER AUTHORITY	321	232.0	34.9	465	893	2045
TX68NF9815	BLACK CYPRESS RESERVOIR	32 50.3	B	99.0	0	0 9695.2	2042
2	MARION BLACK CYPRESS	94 25.6	IR	1284200	3571	7408 1308.6	2042
	DAEN SWF	350	367.0	59.9	3571	7408	2044

ATTACHMENT C (continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	NAME OF STREAM	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 (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
TXCSWF9013	FERRELLS BRIDGE DAM	32 45.9	CYPRESS CREEK	CBRO	97.0	0	0	394.70	2028
2	MARION	94 29.7		OP	1856500	540	2900	136.18	2005
	DAEN SWF	880		825.0	15.5	540	2900		2033
TXCSWG0562	CONROE DAM	30 21.4		BI	82.0	0	0	160.80	1047
2	MONTGOMERY	95 33.5	WF SAN JACINT	OP	7100000	1091	3220	49.947	1044
	SJRA	445		270.0	72.7	1091	3220		1043
TX6SWG0561	HUMBLE REC	30 1.4		MBR	42.0	0	0	5016.2	2037
2	MONTGOMERY	95 15.4	W SAN JACINTO	FP	176000	5358	10061	536.32	2036
	UNKNOWN	1740		1102.9	30.7	5358	10061		2028
TX6SWG0560	LAKE CREEKREC	30 24.9		MICBR	136.0	0	0	30910	2047
2	MONTGOMERY	95 50.0	LAKE CREEK	FP	2960000	126	509	60705	2047
	UNKNOWN	255		125.0	108.8	126	509		2050
TX6SWF0135	BIG CON CREEK DAM	30 52.0		B	65.0	0	0	1276.5	0.
5	NEWTON	93 50.0	BIG CON CREEK	BI	70000	540	1738	734.56	0.
	SABINE RIVER AUTHORITY	128		-118.7	49.9	540	1738		0.
TX6SWF0136	SCN WIER DAM	30 49.0		MCNBRO	64.0	0	0	13641	2032
2	NEWTON	93 33.9	SABINE RIVER	EP	1177000	17637	68410	99.60	2032
	DAEN SWF	8047		-6597.6	26.0	17637	68410		2038
TX6SWF0162	CARTHAGE DAM	32 17.9		CBRH	86.0	0	0	10374	2034
2	PANOLA	94 20.9	SABINE RIVER	BI	1493000	19260	60492	270.07	2033
	DAEN SWF	8720		-2753.6	56.9	19260	60492		2039
TX6SWF0163	STATELINE DAM	32 0.1		CMBR	134.0	0	0	90372	2035
2	PANOLA	94 3.0	SABINE RIVER	BI	8931500	77188	169530	296.31	2034
		7144		-3261.7	107.8	77188	169530		2040
TX6SWT0553	BIG PINE RESERVOIR	33 51.9		CBRO	80.0	0	0	4316.1	
5	RED RIVER	95 11.9	BIG PINE CREE	OP	301100	0	0	11427859	
	DAEN SWT	95		-116.8	50.1	0	0		

ATTACHMENT C (continued)

SITE ID NUMBER ACTV. INV.	PROJECT NAME PRIMARY CO. / NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.S) (D M.S) (SQ.MI)	PROJ.PURP. STATUS AVG. Q (CFS)	DAM HT MAX.STOR. POWER HD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (KW) (KW) (KW)	EXIST.ENERGY INC.ENERGY TOT.ENERGY (MWH) (MWH) (MWH)	ANNUL. COST ENERGY COST (1000 $) ($/MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
TX05WT3550 2	OVARLY LOCK & DAM RED RIVER / RED RIVER CAEN SWT	33 40.9 90 50.0 65736	NA SI -12000.0	65.0 000000 23.9	0 15002 15002	0 49100 49100	5222.5 50.010	2011 2010 2000
TX00WT3907 2	VALLIANT LANE RED RIVER / RED RIVER CAEN	33 56.0 95 9.0 45209	NA OI -0020.9	50.0 0 37.1	0 40121 40121	0 101100 101100	9610.1 60.107	2015 2020 2000
TX05W60563 2	CLEVELAND RES SAN JACINTO / E SAN JACINTO UNKNOWN	30 30.0 95 15.0 320	HIGPR PR 210.1	90.0 1290000 40.1	0 39 39	0 107 107	17050 190701	0. 0. 0.
TX20W60500 2	LIVINGSTON DAM SAN JACINTO / TRINITY RIVER TRA	30 37.9 95 0.0 10010	O OP 0923.7	100.0 2969000 79.9	0 109920 109920	0 255203 255203	7303.0 20.931	1020 1026 1002
TX25WP9016 2	TITUS COUNTY RESERVOIR TITUS / BIG CYPRESS C TITUS	33 5.9 95 0.0 239	ISR OP 229.0	69.0 337307 00.2	0 1930 1930	0 3742 3742	197.90 52.900	2006 2001 2030
TX00WP6012 2	LOCK AND DAM NO.6 TRINITY / TRINITY RIVER CAEN SWF	30 56.0 95 32.0 10905	NN OU -0210.2	30.0 0 27.9	0 10000 10000	0 61301 61301	0000.0 70.560	2019 2020 2030
TX25WP3000 2	TOWN BLUFF DAM TYLER / NECHES RIVER CAEN SWF	30 46.9 94 9.9 7573	HEO OP 5015.0	45.0 306400 32.9	0 10159 10159	0 60306 60306	1009.4 16.739	1003 1003 1017
TX00W60570 2	HAMMONS RES WALKER / HARMON CREEK UNKNOWN	30 46.9 95 30.0 409	HISR PR 270.0	90.0 230000 91.3	0 1376 1376	0 4046 4046	0250.9 1500.0	2000 2000 2029
TX00WP0200 2	BIG SANDY DAM WOOD / BIG SANDY CK CAEN SWF	32 39.0 95 9.9 196	CSRH OW -160.2	94.5 690600 60.4	0 932 932	0 2984 2984	5005.4 1944.9	2046 2046 2046

ATTACHMENT C (continued)

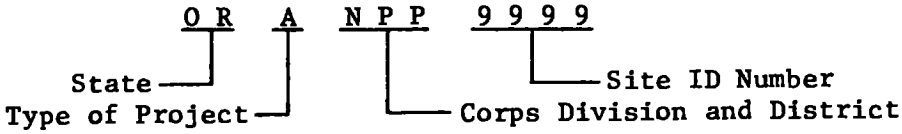
SITE ID NUMBER ACTV. IND.	PROJECT NAME PRIMARY CO. NAME OF STREAM OWNER	LATITUDE LONGITUDE DR.AREA (D M.M) (D M.M) (SQ.MI)	PROJ.PURP. STATUS AVE. Q (CFS)	DAM HT MX.STOR. PWR. MD. (FT) (AC FT) (FT)	EXIST.CAP. INC. CAP. TOT. CAP. (KW) (KW) (KW)	EXIST.ENRG ANUL. COST INC.ENERGY ENERGY COST TOT.ENERGY (MWH) (1000 $) ($/MWH) (MWH)	ERC ECONOMIC ERC NONECONOMIC ERC COMPOSITE (SEQUENCE RANK) (SEQUENCE RANK) (SEQUENCE RANK)
TXCS-F0214 2	LAKE FORK DAM WCOD SRA LAKE FORK CRE	32 46.5 95 30.0 507	S UC -398.1	106.5 16164400 67.9	0 2400 2400	0 3264 3264	310.20 2024 95.33 2003 2037

NUMBER OF SITES 344

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.

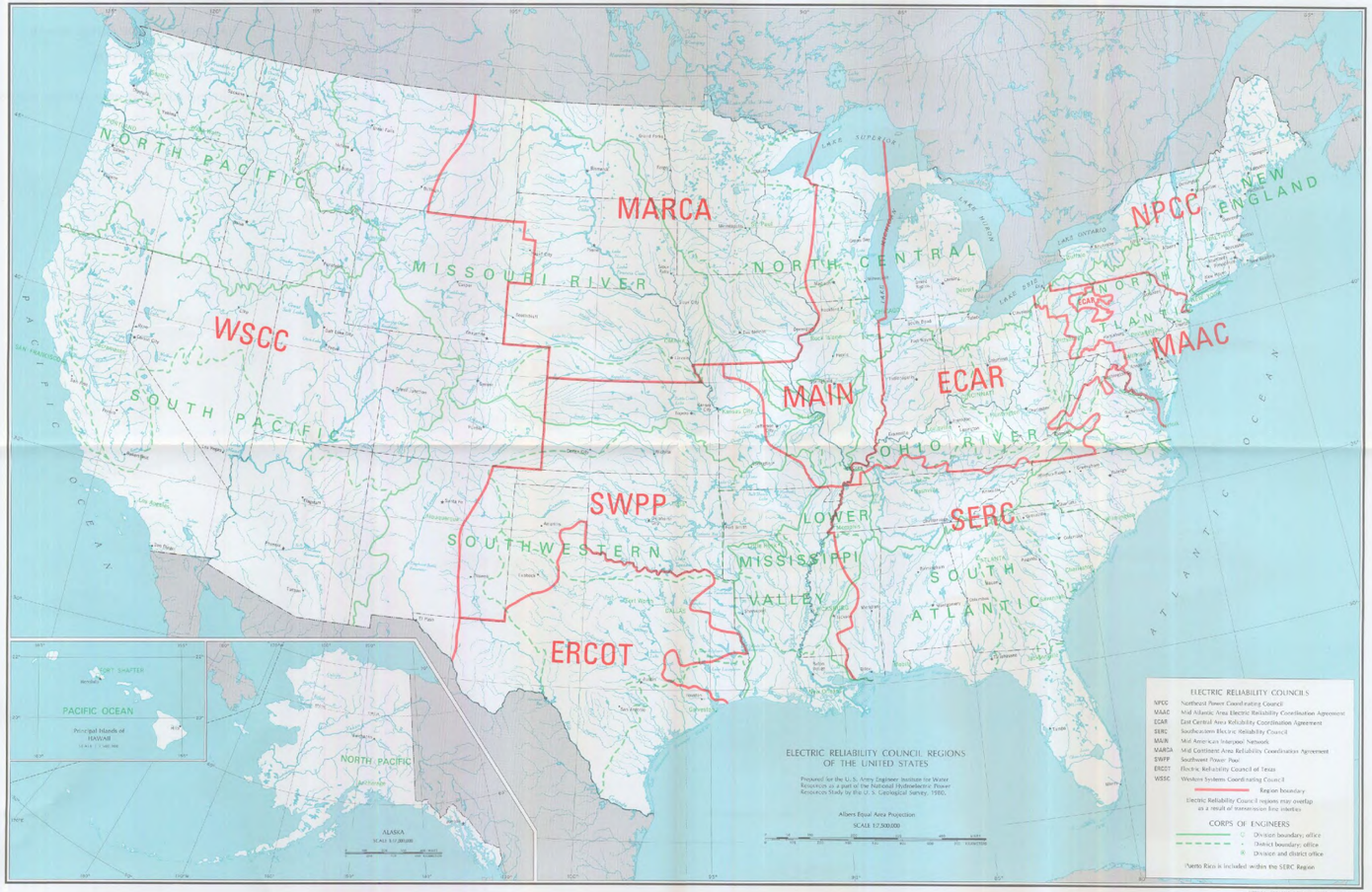
The second map shows existing and potential hydroelectric site locations for the subject region and is intended to provide general information to the reader about the sites. The size of a project is depicted by the diameter of the circle and the type of project by color. Each site symbol on the map is 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:



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.

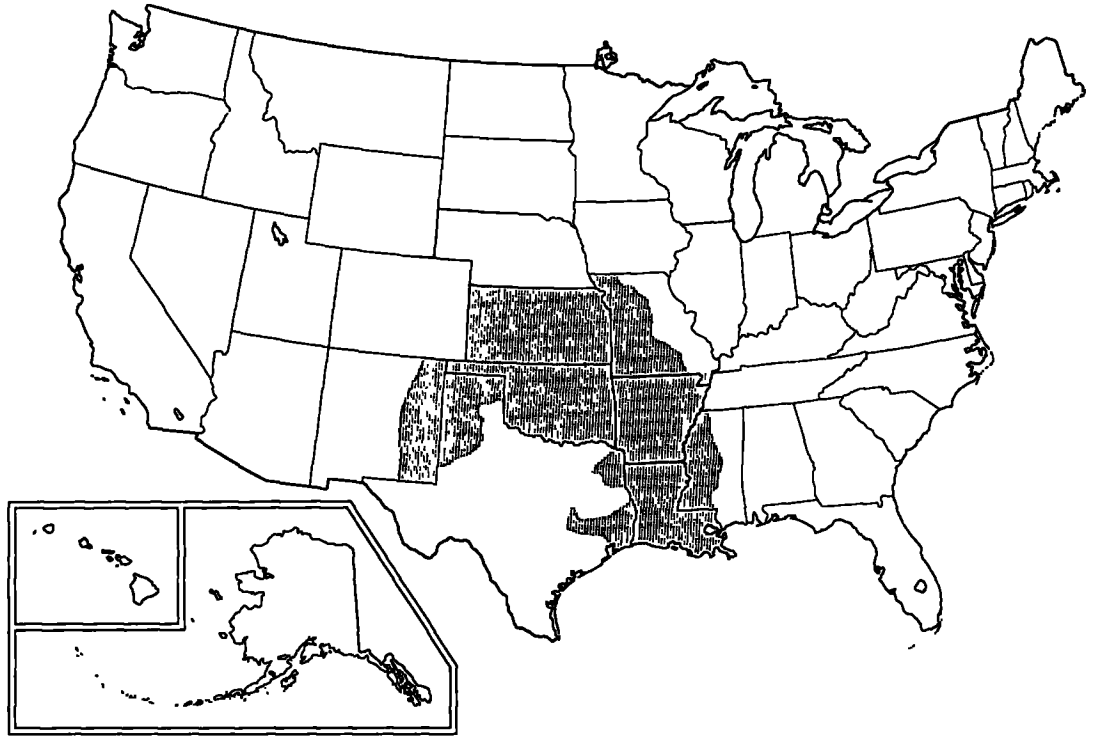
NATIONAL HYDROELECTRIC POWER RESOURCES STUDY

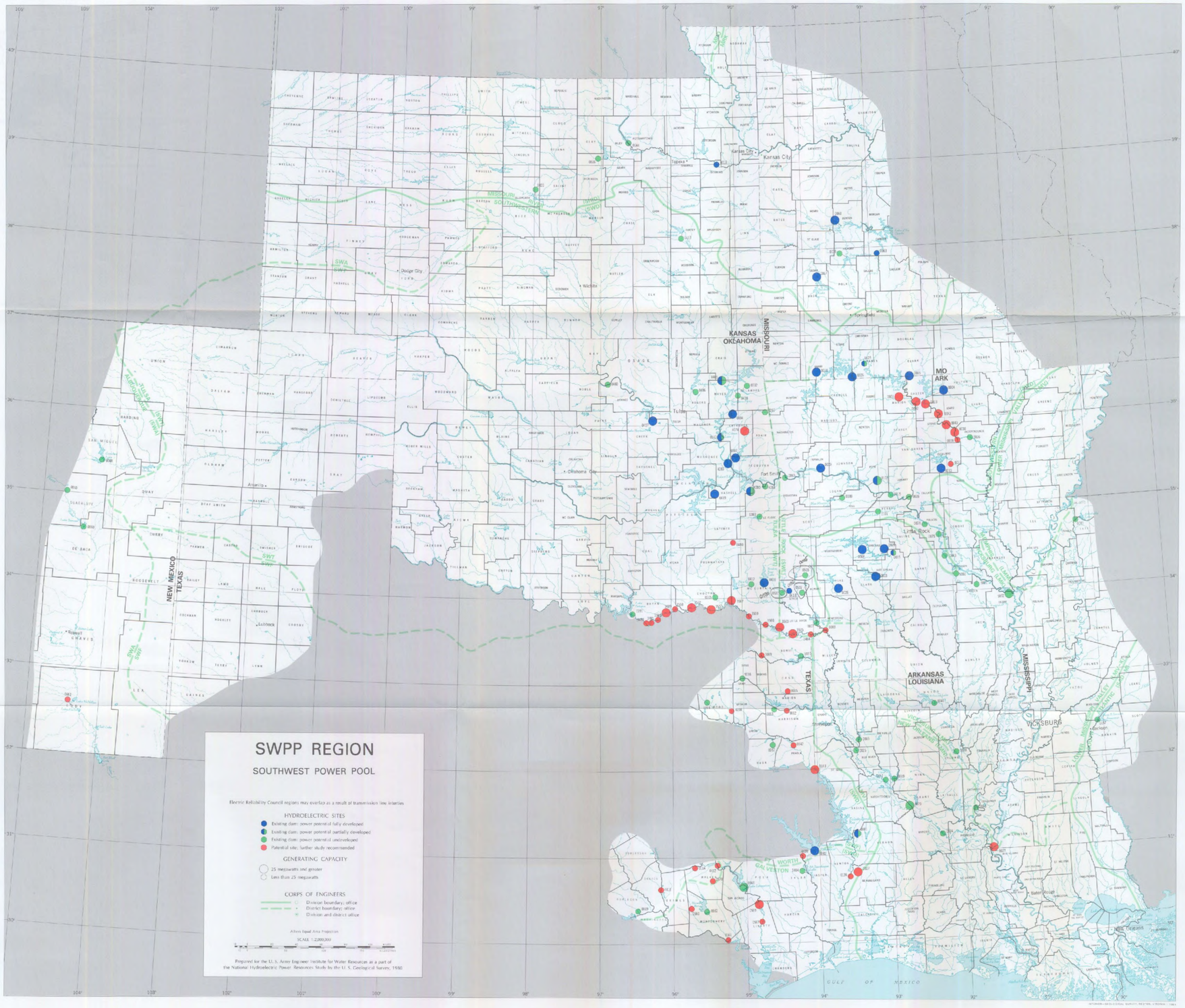
INDEX TO NATIONAL ELECTRIC RELIABILITY COUNCIL REGIONS


MARCA
WSCC
MAIN
ECAR
NPCC
MAAC
SWPP
SERC
ERCOT
NORTH PACIFIC
MISSOURI RIVER
NORTH CENTRAL
SOUTH PACIFIC
OHIO RIVER
LOWER MISSISSIPPI VALLEY
SOUTH ATLANTIC
NEW ENGLAND
NORTH ATLANTIC
SOUTH-WESTERN
PACIFIC OCEAN
ATLANTIC OCEAN
ELECTRIC RELIABILITY COUNCIL REGIONS OF THE UNITED STATES
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
Albers Equal Area Projection
SCALE 1:7,500,000
ALASKA
PACIFIC OCEAN
Principal Islands of HAWAII

NATIONAL HYDROELECTRIC POWER RESOURCES STUDY

SOUTHWEST POWER POOL
(SWPP)




KANSAS
OKLAHOMA
MISSOURI
MO
ARK
TEXAS
NEW MEXICO
ARKANSAS
LOUISIANA
MISSISSIPPI
Kansas City
Topeka
Wichita
Dodge City
Oklahoma City
Tulsa
Fort Smith
Little Rock
Amarillo
Lubbock
Roswell
VICKSBURG
Baton Rouge
New Orleans
GULF OF MEXICO
SWPP REGION
SOUTHWEST POWER POOL
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