PLANNING STATUS REPORT

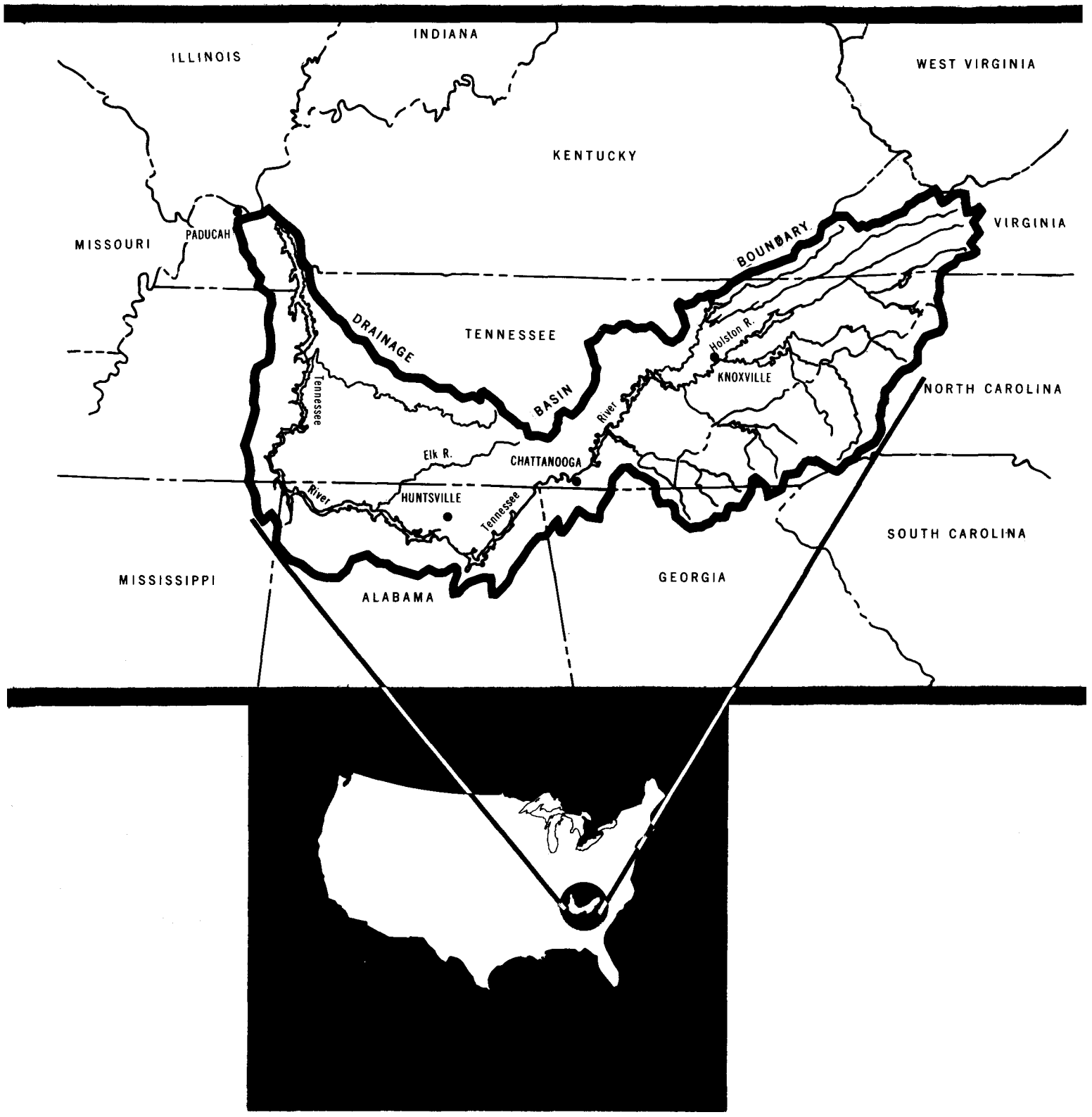
WATER RESOURCES APPRAISALS FOR HYDROELECTRIC LICENSING

This is one of a series of revised Planning Status Reports for major river basins in the United States. The original reports, which were prepared several years ago, are being revised as part of a program of Water Resources Appraisals for Hydroelectric Licensing. The revised reports provide updated information on water resources for use by the Federal Energy Regulatory Commission and its staff when considering hydroelectric licensing and other work. The reports present data on water resource developments, existing and potential, and on water use by existing and projected steam-electric generating facilities. The reports also summarize past and current planning studies. The information presented in these reports was abstracted from available sources and involved no new analyses. Information is current as of December 1980 unless otherwise indicated. The report is a staff effort which was not prepared for adoption or approval by the Commission, and does not commit or prejudice later Commission action.

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF ELECTRIC POWER REGULATION

Originally Issued 1966—Revised March 1981

THE TENNESSEE RIVER BASIN



DESCRIPTION OF THE BASIN

The headwater tributaries of the Tennessee River originate in southwestern Virginia, western North Carolina, and northern Georgia. The Tennessee River is formed by the confluence of the Holston and French Broad Rivers in eastern Tennessee, near Knoxville. It flows southwesterly into Alabama, then makes a long arc back to the north to join the Ohio River at Paducah, Kentucky. The length of the main stream to Paducah is about 650 miles. The total area of the watershed is 40,910 square miles. A stream profile, figure 1, and a basin map, figure 2, are included at the end of this report.

Major tributaries of the Tennessee River and the drainage area of each are as follows: Clinch River, 4,413 square miles; Holston River, 3,776 square miles; French Broad River, 5,124 square miles; Little Tennessee River, 2,627 square miles; Hiwassee River, 2,700 square miles; Elk River, 2,249 square miles, and Duck River, 3,500 square miles.

The basin lies in parts of six well defined physiographic provinces, commonly known as the Blue Ridge, Valley and Ridge, Cumberland Plateau, Highland Rim, Nashville and Central Basin, and the Mississippi Alluvial Plain. Its eastern boundary, in Virginia and North Carolina, is in the high rugged Appalachian Mountains where elevations range from about 700 to 6,650 feet. The basins western boundary, in Mississippi, Kentucky, and Tennessee, is characterized by numerous small ridges and drainage divides ranging in elevation from 300 to 600 feet.

Precipitation in the Tennessee River basin averages about 51.5 inches per year. October is usually the driest month with an average of approximately 2.9 inches, while July is normally the wettest with an average of 5.4 inches. The driest year of record was 1941 with 37.9 inches. The average discharge, as measured at the USGS gaging station near Paducah, Kentucky, for the 76 years (1889 to 1965) prior to opening of Barkley Kentucky canal was 64,060 cubic feet per second. For the 14 years (1965 to 1979) since the opening of the Barkley-Kentucky canal the average discharge has been 66,630 cubic feet per second or 22.5 inches per year. This runoff is about 44 percent of the average annual rainfall.

Economic activities in the basin are largely industrial. Manufacturing payrolls are about ten times farm income. Principal industries are chemicals, machinery, primary metals, transportation equipment, textiles, foods, and apparel. Abundant water supply, navigation along the Tennessee River, and adequate power are favorable items that have encouraged industrial expansion.

Agricultural production is about equally divided between field crops and livestock. Principal field crops are cotton, corn, tobacco, and hay. The basin also has a large lumber production.

Coal reserves are located in several areas of the basin but are more concentrated in the Virginia portion. Reserves of bituminous coal are estimated at 814 million tons. About one-half have sulfur content of less than 1 percent.

The western part of the basin is currently one of the Nation's major sources of phosphate, but mining is expected to decline because the phosphate reserves are being depleted. New zinc and copper deposits have been discovered in the eastern part of the basin. Talc, mica, limestone, sandstone, and other stones are of local commercial importance in various parts of the basin. The copper,

DESCRIPTION OF THE BASIN

iron, and zinc sulfides mined and processed in the Copperhill, Tennessee area provide employment in three States and are of importance to several manufacturing industries in the southeast part of the basin.

The population of the Tennessee River basin in 1970 was approximately 3,200,000. In 1978, the population estimate for the basin was 3,600,000 of which 58 percent were in Tennessee, 18 percent in Alabama, 11 percent in North Carolina, 7 percent in Virginia, 3 percent in Georgia, 2 percent in Kentucky, and 1 percent in Mississippi.

Knoxville, Tennessee is the largest city in the basin with a 1970 population of about 174,600. The 1970 populations of Huntsville, Alabama, and Chattanooga, Tennessee, were about 137,800 and 119,100, respectively. Knoxville, Huntsville, and Chattanooga are the only cities in the basin with populations greater than 100,000. The University of Tennessee and the engineering headquarters for Tennessee Valley Authority are located in Knoxville. Other major cities in the basin with a 1970 population greater than 25,000 are as follows: Decatur and Florence, in Alabama; Oak Ridge, Kingsport, and Johnson City in Tennessee; and Asheville in North Carolina.

The Tennessee River basin offers a wide variety of outdoor recreation attractions. These include numerous reservoirs, beautiful rivers and streams, scenic mountains (including the Great Smoky Mountains National Park), and Lookout Mountain at Chattanooga (a rock-faced promontory carved by the currents of the Tennessee River). Tennessee ranks fourth in the Nation for out-of-state fishing licenses, which is an indication of the attractiveness of this area for sportsmen.

Basin development is undertaken by the Tennessee Valley Authority (TVA), an agency set up by the TVA Act of May 18, 1933. The Act authorizes construction of water control projects for navigation, flood control, and production of electricity. It also provides for reforestation, marginal land use programs, agricultural and industrial development, certain national defense functions, and other purposes.

EXISTING WATER RESOURCE DEVELOPMENTS

There are 48 existing hydroelectric projects within the Tennessee River basin, providing a total installed capacity of 5,333,050 kilowatts. Table 1 summarizes data for these developments and their locations are shown on figure 2. Tennessee Valley Authority owns 29 of the projects with a total installed capacity of 4,794,250 kilowatts, and privately-owned utilities own 19 projects with a total installed capacity of 538,800 kilowatts. These developments plus storage capacity at the Tellico project provide a total usable hydroelectric power storage of capacity of about 9,045,000 acre-feet during the nonflood season. On January 1, which is considered the beginning of the major flood season, the storage capacity reserved for hydroelectric power is limited to about 2,137,000 acre-feet. TVA projects, operated primarily for flood control and navigation, produce over 16 billion kilowatt-hours of electrical energy annually.

EXISTING WATER RESOURCE DEVELOPMENTS

Table 1

Existing Hydroelectric Powerplants
Tennessee River Basin

FERC Project Number	Project	Owner Class 1/	Owner Name	River Name	River Mile	Drainage Area (sq. mi.)	Storage Capacity (1,000 acre-feet) Flood Control 2/	Hydro Power Total 2/	Hydro Power Seasonal 2/	Dead	Surface Area 2/ (acres)	Power Pool Elev. 2/ (ft)	Gross Head 2/ (ft)	Installed Capacity (kW)	Average Annual Energy (MWh)	Initial Operation Year
-	Kentucky	F	TVA	Tennessee	22	40,200	3,290 3/	718	(718)	2,121	160,300	359	59	175,000	1,136,000	1944
-	Pickwick Landing	F	TVA	Tennessee	207	32,820	181	236	(236)	688	43,100	414	59	220,040	1,114,000	1938
-	Wilson	F	TVA	Tennessee	259	30,750	6	47	(47)	587	15,500	508	98	629,840	1,971,000	1925
-	Wheeler	F	TVA	Tennessee	275	29,590	21	330	(330)	720	67,070	556	52	359,100	1,051,000	1936
-	Guntersville	F	TVA	Tennessee	349	24,450	34	138	(138)	880	67,900	595	45	115,200	684,000	1939
-	Nickajack	F	TVA	Tennessee	425	21,870	12	21	-	220	10,370	634	41	100,350	658,000	1968
-	Racoon Mountain 4/	F	TVA	Tennessee	445	1	-	36	-	NA	NA	1,672	1,040	1,530,000	1,530,000	1978
-	Chickamauga	F	TVA	Tennessee	471	20,790	111	236	(236)	392	35,400	682	50	120,000	729,000	1940
-	Watts Bar	F	TVA	Tennessee	530	17,310	165	214	(214)	796	39,000	741	66	166,500	883,000	1942
-	Fort Loudoun	F	TVA	Tennessee	602	9,550	30	81	(81)	282	14,600	813	78	139,140	569,000	1943
-	Tims Ford	F	TVA	Elk	133	529	78	205	(142)	325	10,600	888	146	45,000	91,000	1972
-	Apalachia	F	TVA	Hiwassee	66	1,018	-	9	-	49	1,100	1,280	442	82,800 5/	475,000	1943
-	Hiwassee	F	TVA	Hiwassee	76	968	12	294	(258)	128	6,120	1,524	252	117,100 5/	257,000	1940
2619	Mission	U	Nantahala P. & L. Co.	Hiwassee	106	292	-	6/	-	6/	60	1,658	44	1,800	10,000	1924
-	Chatuge	F	TVA	Hiwassee	121	189	7	116	(86)	118	7,050	1,928	126	10,000	28,000	1954
-	Ocoee #1	F	TVA	Ocoee	12	595	-	32	-	54	1,890	838	117	18,000	70,000	1912
-	Ocoee #2	F	TVA	Ocoee	24	512	7/	7/	-	7/	220	1,096	255	21,000	113,000	1913
-	Ocoee #3	F	TVA	Ocoee	29	496	-	3	-	-	480	1,435	320	28,800	191,000	1943
-	Blue Ridge	F	TVA	Toccoa (Ocoee)	53	232	3	181	-	12	3,290	1,690	150	20,000	38,000	1931
-	Nottely	F	TVA	Nottely	21	214	4	113	(96)	57	4,180	1,779	173	15,000	38,000	1956
-	Melton Hill	F	TVA	Clinch	23	3,343	6	26	-	94	5,690	795	60	72,000	167,000	1964
-	Norris	F	TVA	Clinch	80	2,912	512	1,410	(961)	630	34,200	1,020	199	100,800	379,000	1936
-	Tellico	F	TVA	Little Tenn.	0.3	2,627	33	93	(92)	321	17,300	815	80	8/	200,000	1980
2169	Chilhowee	U	Tapoco, Inc.	Little Tenn.	34	1,977	-	7	-	42	1,750	874	68	50,000	186,000	1957
2169	Calderwood	U	Tapoco, Inc.	Little Tenn.	44	1,856	-	2	-	39	536	1,087	213	121,500	558,000	1930
2169	Cheoah	U	Tapoco, Inc.	Little Tenn.	51	1,608	-	2	-	33	595	1,277	190	110,000	449,000	1919
-	Fontana	F	TVA	Little Tenn.	61	1,571	21	1,136	(750)	287	10,670	1,710	433	238,500	910,000	1945
2603	Franklin	U	Nantahala P. & L. Co.	Little Tenn.	113	310	-	6/	-	NA	210	2,000	26	1,040	7,600	1929
2169	Santeetlah	U	Tapoco, Inc.	Cheoah	9	176	-	133	-	25	2,860	1,940	663	45,000	164,000	1928
2694	Queens Creek	U	Nantahala P. & L. Co.	Queens Cr.	2	4	-	1	-	6/	37	3,027	999	1,440	6,000	1949
2692	Nantahala	U	Nantahala P. & L. Co.	Nantahala	14	108 9/	-	126	-	13	1,605	3,012	925 10/	43,200	236,600	1942
-	Estatoah	U	Ga. Pwr. Co.	Estatoah Cr.	2	5	-	-	-	-	NA	2,730	580	240	1,000	1928
2601	Bryson	U	Nantahala P. & L. Co	Oconaluftee	1	188	-	-	-	-	43	1,828	35	980	6,600	1925
2602	Dillsboro	U	Nantahala P. & L. Co.	Tuckasegee	32	290	-	-	-	-	NA	1,972	12	225	1,400	1913
2698	Cedar Cliff	U	Nantahala P. & L. Co.	E. Fork Tuckasegee	2	81	-	1	-	6	121	2,330	170 10/	6,375	23,200	1952
2698	Bear Creek	U	Nantahala P. & L. Co.	E. Fork Tuckasegee	5	75	-	5	-	30	476	2,560	230 10/	9,000	31,600	1954
2698	Tennessee Creek	U	Nantahala P. & L. Co.	E. Fork Tuckasegee	11	40 11/	-	9 12/	-	3	223	3,080	520 10/	10,800	41,600	1955
2686	Tuckasegee	U	Nantahala P. & L. Co.	W. Fork Tuckasegee	3	55	-	6/	-	6/	8	2,279	118 10/	3,000	11,300	1950
2686	Thorpe	U	Nantahala P. & L. Co.	W. Fork Tuckasegee	3.4	37	-	67	-	4	1,462	3,492	1,150 10/	21,600	83,300	1941
-	Douglas	F	TVA	French Broad	32	4,541	67	1,185	(1,185)	223	30,400	1,000	133	120,600	349,000	1943
2380	Marshall	U	Carolina P. & L. Co.	French Broad	125	1,346	-	-	-	NA	NA	1,624	33	3,000	17,000	1910
432	Walters	U	Carolina P. & L. Co.	Pigeon	38	470	-	20		5	340	2,258	861	108,600	359,200	1929
2541	Cascade (Brevard)	U	Cascade Pwr. Co.	Little	5	41	-	NA	-	NA	NA	2,200	90	1,000	5,100	1924
-	Cherokee	F	TVA	Holston	52	3,428	60	1,088	(951)	393	30,300	1,073	152	135,180	305,000	1942
-	Ft. Patrick Henry	F	TVA	S. Fork Holston	8	1,903	-	4	-	23	872	1,263	77	36,000	104,000	1953
-	Boone	F	TVA	S. Fork Holston	19	1,840	4	144	(88)	45	4,310	1,384	124	75,000	177,000	1953
-	S. Holston	F	TVA	S. Fork Holston	50	703	106 -	332	(184)	326	7,580	1,729	245	35,000	131,000	1951
-	Wilbur	F	TVA	Watauga	34	471	108	6/		6/	72	1,650	69	10,700	21,600	1912
-	Watauga	F	TVA	Watauga	37	468		246	(115)	323	6,430	1,959	312	57,600	122,000	1949
													Totals	5,333,050	16,690,100	

NA - Not available

1/ F - Federally-owned utility; U - privately-owned utility;

2/ For projects that are operated at varying elevations during the year for flood control, the values shown under flood control storage capacity, total hydroelectric power storage capacity, power pool elevation, gross head, and surface area are based on operations during the summer. During the winter, part or all of the total hydro power storage capacity is reserved for flood control; that portion of this storage capacity that is evacuated for flood control at the beginning of the major flood season is shown in parentheses under seasonal hydro power storage.

3/ To minimize flood damage to unprotected agricultural crops, only 1,044,000 acre-feet of this capacity is considered available for flood control for six months after June 1.

4/ Pumped-storage plant using Nickajack Lake as lower reservoir.

5/ Includes pumped-storage capacity of 59,500 kW installed in 1956.

6/ Less than 500 acre-feet.

7/ No useful storage; dam is for diversion purposes only.

8/ The Tellico project has no powerstation, diversion of water through a canal to Fort Loudoun Lake and powerstation increases average annual energy at the Fort Loudoun powerstation.

9/ Includes areas above diversions from White Oak and Dicks Creek.

10/ Design head.

11/ Includes 15 square miles of drainage area above Wolf Creek dam.

12/ Includes 8,000 acre-feet of storage capacity of Wolf Creek.

Storage of flood water is provided in the Tennessee River basin by a system of eight multiple-purpose reservoirs on the main stream and 14 multiple-purpose reservoirs on tributary streams. The large storage reservoirs on tributaries of the upper Tennessee River basin are operated during the flood season to reduce floods on lands lying between those dams and Chattanooga. The principal point of control, however, is Chattanooga since 90 percent of the potential damage within the reservoir service areas is concentrated in the vicinity of Chattanooga. Available flood-control storage capacity in the basin varies on a seasonal basis from 11,779,000 acre-feet in January to 2,625,000 acre-feet in the summer. Total storage capacity above Chattanooga reserved for flood control

is 6,546,000 acre-feet in January and 1,249,000 acre-feet in the summer. The Kentucky reservoir has the largest storage capacity in the basin with 4,008,000 acre-feet available for flood control in January and 1,044,000 acre-feet in the summer. Operation of the Kentucky reservoir is primarily for reduction of flood crests along the Ohio and Mississippi Rivers. The amount of storage capacity available in the Tennessee River system is enough to reduce large floods at Cairo, Illinois, by as much as 2 to 4 feet and by lesser amounts downstream on the Mississippi River.

Improvement of the Tennessee River for navigation is one of the fundamental objectives of the Tennessee Valley Authority Act. Slack water navigation is provided on the Tennessee River from the mouth to Knoxville, Tennessee, a distance of about 650 miles, by means of 9 dams and 13 locks. The original project depth of this channel was 9 feet. In 1952 the channel was improved to project dimensions of 11-foot depth and 300-foot width. The Tennessee Valley Authority operates and maintains the dams for power and flood control and makes all major capital improvements to the locks and dams. The Corps of Engineers operates and maintains the navigation locks and facilities.

The Tennessee River has become an important addition to the interconnected Inland Waterway System of the United States. The average annual waterborne commerce (1972-1976) exceeded 27,000,000 tons, consisting chiefly of grains, coal and coke, sand and gravel, petroleum products, forest and sawmill products, limestone, chemicals, and iron and steel products.

The Melton Hill project permits the navigation channel to be extended approximately 38 miles upstream on the Clinch River from the dam site to the vicinity of Clinton, Tennessee.

The Tennessee-Tombigbee Waterway Project which was authorized in the River and Harbor Act of 1946 will provide for a navigable waterway connection between the Tennessee and Tombigbee Rivers. Construction was initiated in 1972 and is scheduled for completion in September 1986. The waterway will extend from the Demopolis Lock and Dam, on the Tombigbee River, to the Pickwick Reservoir, on the Tennessee River, near the common boundary of Alabama, Tennessee, and Mississippi. This waterway will provide the basin with a more direct route to the Gulf of Mexico.

The operating data for the eight fossil-fueled steam-electric plants and the Browns Ferry nuclear plant that use surface water cooling sources on the Tennessee River basin are based on data from the Second National Water Assessment. The total generating capacity shown in table 2 for these plants is 10,315 megawatts and average annual energy generation was 44,260 gigawatt-hours. The estimated cooling water consumption values are average. The actual daily rates are dependent upon power demand, temperature of cooling water, and several other factors.

EXISTING WATER RESOURCE DEVELOPMENTS

Table 2

Existing Steam-Electric Generation
and Cooling Water Requirements - 1975
Tennessee River Basin

Plant Name[1]	Owner[2]	Owner Class[3]	Installed Capacity (MW)	Average Annual Energy (GWh)	Type Prime Mover[4]	Type Cooling[5]	Source of Cooling Water	Cooling Water Use: With-drawal (mgd)	Cooling Water Use: Consump-tion (mgd)
Colbert	TVA	F	1,397	4,631	F	OT	Tennessee R	604	4
Johnsonville	TVA	F	1,485	5,853	F	OT	Tennessee R	831	5
Widows Creek	TVA	F	1,978	8,427	F	OT	Tennessee R	880	6
Kingston	TVA	F	1,700	9,775	F	OT	Clinch R.	1,164	8
John Seivier	TVA	F	847	5,074	F	OT	Holston R.	537	4
Watts Bar	TVA	F	240	878	F	OT	Tennessee R.	221	1
Bull Run	TVA	F	950	4,800	F	OT	Clinch R.	368	3
Asheville	CAPO	U	414	2,100	F	CP	French Broad R.	3	2
Browns Ferry	TVA	F	1,304	2,722	Nu	OT	Tennessee R.	182	3
Totals			10,315	44,260				4,790	36

1/ *The Clinch River Breeder Reactor Plant is omitted because of an uncertain schedule.*
2/ *TVA - Tennessee Valley Authority; CAPO - Carolina Power and Light Company.*
3/ *F - Federally-owned utility; U - privately-owned utility.*
4/ *F - fossil; Nu - nuclear.*
5/ *OT - once through; CP - cooling pond.*

STATUS OF HYDROELECTRIC LICENSING

Current Status

As shown in table 3, there are six outstanding FERC licenses covering nine developments and eight applications pending covering ten developments. In addition, there are two applications pending for preliminary permits.

Twenty-nine of the 48 existing hydroelectric projects in the Tennessee River basin are operated by the Tennessee Valley Authority, which is the sole supplier of electricity for an area of about 80,000 square miles.

Prior Licensing Action

An application was filed July 3, 1950, by French Broad Electric Membership Corporation for a preliminary permit for the proposed Elk Shoal project (Project No. 2054) to be situated on Cane River, a tributary of the Nolichucky River. The installed capacity of the proposed powerplant was 10,000 kilowatts. A preliminary permit was issued November 23, 1951, but because the applicant failed to accept and return the permit to the Commission within 60 days from the date of issuance, an order, dated June 2, 1952, rescinded without prejudice the preliminary permit for proposed Project No. 2054.

The French Broad Electric Membership Corporation filed another application on August 18, 1950, for license of Project No. 2057 which would add two units to the existing Marshall hydroelectric plant located on the French Broad River at Marshall, North Carolina. A subsequent letter from the Membership Corporation,

dated June 28, 1951, requested deferring any action on the application until further notice. An order adopted by the Federal Power Commission on April 21, 1954, dismissed the application for Project No. 2057 without prejudice to the right of the applicant to file a new application for the same or similar project at a later date.

Table 3

Status of Hydroelectric Licensing
Tennessee River Basin

Project Name	FERC Project Number	Type of License or Permit and Status 1/	Expiration Date	Status of Project
Walters	432	MON	11/22/76 2/	Existing
Highlands	693	MOP	07/15/76 3/	Retired
Chilhowee	2169	MON	02/28/05	Existing
Calderwood	2169	MON	02/28/05	Existing
Cheoah	2169	MON	02/28/05	Existing
Santeetlah	2169	MON	02/28/05	Existing
Marshall	2380	MON	12/31/93	Existing
Cascade	2541	NON	12/31/93	Existing
Bryson	2601	NAN	07/31/05	Existing
Dillsboro	2602	NAN	07/31/05	Existing
Franklin	2603	NAN	07/31/05	Existing
Mission	2619	MAN	-	Existing
Tuckasegee	2686	MAN	-	Existing
Thorpe	2686	MAN	-	Existing
Nantahala	2692	MAN	-	Existing
Queens Creek	2694	NON	09/30/01	Existing
Cedar Cliff	2698	MAN	-	Existing
Bear Creek	2698	MAN	-	Existing
Tennessee Creek	2698	MAN	-	Existing
Jackson County	2698	-	4/	Potential
Brumley Gap	2812	PA	-	Potential
Powell Mountain	2813	PA	-	Potential

1/ *Type of License:*
MON - Major outstanding license non-public;
MOP - Major outstanding license public;
NAN - Minor license - application pending non-public;
MAN - Major license - application pending non-public;
NON - Minor license outstanding license non-public;
PA - Preliminary permit application pending.

2/ *Annual licenses being issued, application for license pending.*
3/ *Annual licenses being issued, application for relicense not received.*
4/ *Licensee surrendered preliminary permit on 01/12/75.*

WATER RESOURCES PLANNING

Prior Studies and Reports

The "308" report of the Corps of Engineers on the Tennessee River basin, published in 1930 as House Document No. 328, 71st Congress, 2nd Session, discussed a general plan of improvement in the basin considering navigation, flood control, and power developments. The report recommended a plan of improvement for navigation that would provide a nine-foot channel from the mouth to Knoxville, Tennessee. This plan consisted of a series of 32 locks and dams of relatively low lift. The Chief of Engineers concurred in the number and approximate location of the low dams provided that (1) under the provisions of the Federal Water Power Act, a high dam with locks might be substituted for any two or more of the low dams and constructed by private interests, states, or municipalities; and (2) in case high dams were built prior to construction of the projected low dams and locks, the United States shall contribute to the cost of the substituted structures an amount equal to the estimated cost of the works of navigation for which substitution is made.

In 1936 the Tennessee Valley Authority prepared a report titled "The Unified Development of the Tennessee River System." This report recommended raising Wilson dam, Hales Bar dam, and Lock No. 1 (just below Wilson dam), and construction of Gilbertsville (renamed Kentucky), Watts Bar, and Goulter Shoals (renamed Fort Loudoun) projects on the main stream. In addition to the main-river dams, construction of two tributary storage projects was proposed. These were the Fowler Bend (renamed Hiwassee) and Fontana projects. The projects in this recommended plan have been constructed. They provide an 11-foot navigation channel from the mouth to Knoxville; reduced water level fluctuations at the dams and river terminals; and a substantial amount of hydroelectric power.

A report by the Corps of Engineers, published in 1939 as House Document No. 269, 76th Congress, 1st Session, proposed the construction of a waterway in northeastern Mississippi to connect the Tennessee and Tombigbee Rivers by way of Yellow Creek, Mackeys Creek, and the East Fork of the Tombigbee River. Recommended in this report was a 9-foot depth slack-water navigation channel. In 1946 the Corps of Engineers reviewed the previous report in accordance with a resolution adopted by the Committee on Rivers and Harbors, House of Representatives, dated January 2, 1945. The review report, published as House Document No. 486, 79th Congress, 2nd Session, included a restudy of industry and commerce to determine the probable traffic and estimated savings which would accrue to the general public. The Tennessee-Tombigbee Waterway was again recommended in this report with a 9-foot depth slack-water navigation channel. The Tennessee Valley Authority concurred in the recommendations in that report and stated that the proposed diversion of approximately 400 cubic feet per second of water from the Tennessee River would not greatly affect the potentialities in the Tennessee River basin.

In 1950 the Federal Power Commission prepared a memorandum-report in response to a request dated March 20, 1950, from the President's Water Resources Policy Commission. The principal considerations discussed in that report concerned (1) the problems involved in the coordinated development of the lower Tennessee, Cumberland, and Ohio Rivers, and (2) the possibility of modifying the proposed Tennessee-Tombigbee Waterway to include hydroelectric power development by means of a high level canal and a series of reservoirs. Additional studies of the

WATER RESOURCES PLANNING

Tennessee-Tombigbee Waterway are discussed in the Commission's Planning Status Report on the Tombigbee-Warrior River basin.

The Water Resources Planning Act of 1965 (P.L. 89-80) authorizes the Water Resources Council to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. The Council reported its first national assessment in 1968, which put into nationwide perspective estimates of present and future regional water and related land requirements and supplies. The Second National Water Assessment, dated December 1978, presents nationally consistent current and projected water use and supplies information by regions and subregions for the United States. The second assessment found that significant achievements have been made in the past decade in preserving water and harnessing its power with a growing interest in water conservation and environmental protection; and that greater efforts are needed to insure careful management of our water resources and to solve the complex water and related land problems which still exist. A supplemental report to the second assessment, Water for Energy, provides information on energy and related water requirements at the region and subregion level for the years 1975, 1985, and 2000, including cooling water requirements for steam-electric generation.

The Obed River and tributaries and the Buffalo River were authorized for study under the National Wild and Scenic Rivers Act of 1968 (P.L. 90-542). Subsequent amendment (P.L. 94-486) to the Federal Act made the Obed and tributaries, except privately owned portions, a part of the National Wild and Scenic Rivers System; as such, the use of the Obed River is set, and is not available for development of multiple-purpose projects.

The Buffalo River studies found the river to be qualified from a resource standpoint, however the studies did not include a recommendation for Federal administration.

In 1978 the Tennessee Valley Authority, Tennessee River basin States, and other Federal agencies initiated preparation of a comprehensive and up-to-date inventory of all Federal and non-Federal water and related land resource projects and program activities which have been completed, are now ongoing or underway, or have been proposed for implementation in water-related plans and studies in the Tennessee River basin. The primary purpose of the inventory was to provide basic information and data on the basin's water-related project and program activities in a common format to facilitate increased coordination among the basin's local, State, and Federal agencies with water and related land resource management and conservation responsibilities. The first draft of this inventory, The Comprehensive Coordinated Joint Plan Baseline of Completed, Ongoing, and Proposed Water-Related Projects and Programs in the Tennessee River Basin, was circulated for review and comment in January 1980.

Ongoing Studies

The entire main stem of the Nolichucky River was authorized for study under the National Wild and Scenic Rivers Act by amendment (P.L. 95-625) to the Federal Act. The studies are complete and are being reviewed at the Federal level.

WATER RESOURCES PLANNING

The U.S. Army Corps of Engineers is currently conducting a detailed assessment of the nation's hydroelectric resources as part of the National Hydroelectric Power Study authorized by section 167 of the Water Resources Development Act of 1976 (P.L. 94-587). The study is designed to provide a current and comprehensive estimate of the potential for incremental or new generation at existing dams and other water resources projects, as well as for undeveloped sites in the United States. In addition, the study will address the demand for hydroelectric power, and will investigate various related policy and technical considerations to determine the incentives, constraints, and impacts of developing hydropower to meet a portion of our future energy demands. When complete in 1981, the effort will provide a more detailed evaluation of the nation's hydroelectric resources, and will serve as a framework for future planning and development of this important renewable energy source. Several potential sites in the Tennessee River basin have been evaluated in the Corps study.

The Federal Energy Regulatory Commission (FERC) has prepared an Appraisal Report on the Little Tennessee River basin. The primary purpose of that report is to provide information for use by the Commission and its staff pertaining to licensing of existing hydroelectric projects and the development of hydroelectric power potential. The report is expected to be available in March 1981.

In addition, FERC is preparing an Appraisal Report on the Pigeon River basin. Its primary purpose is to provide information for use by the Commission and its staff pertaining to the development of the hydroelectric power potential of the basin. The report is expected to be completed in April 1981.

POTENTIAL WATER RESOURCE DEVELOPMENTS

Potential water resource developments for flood control, hydroelectric power, and other water-related purposes are listed in table 4 and shown on figure 2.

The proposed 60,000-kilowatt Fines Creek project on the Pigeon River has been eliminated from further consideration by location of an interstate highway in the reservoir area.

The proposed 80,000-kilowatt Nemo project on the Obed River has been precluded from development by inclusion of the Obed River in the National Wild and Scenic Rivers System. The segment endpoints are the Obed River from the western edge of the Catoosa Wildlife Management Area to the confluence with the Emory River; Clear Creek from the Morgan County line to the confluence with the Obed River; and the Emory River from the confluence with the Obed River to the Nemo Bridge.

The Heritage Conservation and Recreation Service has identified several river reaches, including those already identified under section 5a, which appear to have potential for further consideration for the National Wild and Scenic Rivers System. The river reaches are 121 miles of the Buffalo River, 45 miles of Daddy's Creek, remainder of Clear Creek from Morgan County line to the headwaters, 26 miles of the Clinch River above Norris Lake, 118 miles of the Duck River, and an additional 39 miles of the Emory River.

POTENTIAL WATER RESOURCE DEVELOPMENTS

Table 4

Potential Water Resource Developments
Tennessee River Basin

Map No.[1]	Project	Stream Name	Stream Mile	Drainage Area (sq mi)	Total Storage Capacity (1000 ac-ft)	Power Pool Elevation (ft)	Gross Head (ft)	Potential Installed Capacity (kW)	Potential Average Annual Energy (MWh)
	Sugar Creek	Elk R.	17	1,949	1,545	635	85	100,000	140,000
	Austral	Hiwassee R.	45	1,223	159	840	121	70,000	170,000
	Nolichucky	Nolichucky R.	NA	1,630	1,250	NA	115	40,000	135,000
	Erwin	Nolichucky R.	73	851	627	1,628	268	65,000	160,000
	Elk Shoal	Cane R.	15	107	NA	2,800	410	10,000	29,000
	Hartford	Pigeon R.	22	546	NA	1,328	237	70,000	159,000
	Surgoinsville	Holston R.	119	2,870	226	1,165	75	72,000	172,000
	Jackson County	Caney Fork R.	NA	NA	NA	4,000/2,640[2]	1,398	1,000,000	2,100,000
	Brumley Gap	Brumley Creek	NA	NA	NA	3,720/1,880[2]	1,840	3,000,000	5,000,000
	Powell Mountain	Stony Creek	NA	NA	NA	3,200/1,410[2]	1,410	3,000,000	5,000,000
1	Columbia Dam	Duck R.	NA	1,181	36	NA	60	21,800	52,700
2	Normandy Dam	Duck R.	NA	195	134	NA	70	4,300	11,900
3	Bear Creek	Bear Creek	NA	231	40	NA	31	2,700	5,700
4	Cedar Creek	Bear Creek	NA	179	112	NA	75	4,300	11,800
5	Woods Reservoir	Elk R.	NA	263	88	NA	63	5,200	14,500
6	Needmore	Little Tennessee R.	NA	439	140	1,970	155	43,800	102,600
7	Riverdale	French Board R.	NA	5,100	1,720	NA	50	71,400	227,400
8	Long Creek	French Board R.	NA	1,842	350	NA	118	86,100	217,500
9	Brush Creek	French Board R.	NA	1,405	NA	NA	150	159,200	292,000
10	Pine Creek	French Board R.	NA	1,391	NA	NA	198	208,000	381,600
11	Newfound Creek	French Board R.	NA	1,054	NA	NA	157	125,000	229,300
12	Buckingham Ferry	Nolichucky R.	NA	1,096	77	NA	103	43,300	114,700
13	Popular	Nolichucky R.	NA	619	NA	NA	270	104,700	174,700
14	Beaver Creek	Holston R.	NA	3,550	68	NA	50	50,800	161,000
15	Beech Creek	Watauga R.	NA	147	23	NA	620	55,800	92,100
16	War Ridge	Clinch R.	NA	1,480	620	NA	170	113,200	209,400
17	Cumberland	Powell R.	NA	685	NA	NA	172	71,400	117,000
							Totals	8,598,000	15,480,900

NA - Not available

1/ Numbers in this column are used to identify potential sites shown on figure 2. These sites were identified in the "National Hydropower Resources Study," U.S. Army Corps of Engineers, Volume XVI, August 1980.

2/ Pumped storage plant, upper/lower reservoir elevation.

In addition to the potential hydroelectric developments shown in table 4, hydroelectric power development potential exists at the retired projects listed in table 5 where power was generated in the past.

The projected steam-electric generating capacity and cooling water needs in the basin area are listed in table 6. This data is based on projections from the Second National Water Assessment of the Water Resources Council for steam-electric generating plants with installed capacities of 25,000 kilowatts or more.

Authorized Plans

The only Congressional authorized plan affecting the basin that is not complete is the Tennessee-Tombigbee Waterway. It is scheduled for completion in 1986.

Table 5

Retired Hydropower Plants
Tennessee River Basin

Project Name	Latest Known Owner	Stream	Gross Head (ft)	Previously Installed Capacity (kW)	Average Annual Energy (MWh)	Initial Operation Year	Year Retired
Columbia	TVA	Duck R.	9	775	NA	NA	NA
Lillards Mill	TVA	Duck R.	NA	775	NA	NA	NA
Mullens Mill	Tenn. Elec. Pwr. Col	Duck R.	9	150	NA	NA	NA
Shelbyville	TVA	Duck R.	NA	432	NA	NA	1948
Lobelville	Lobelville Mills Co.	Buffalo R.	NA	124	NA	NA	NA
Shoal Cr. No. 2	City of Lawrenceburg	Shoal Creek	NA	440	NA	NA	NA
Shoal Cr. No. 1	City of Lawrenceburg	Shoal Creek	NA	600	NA	NA	NA
Bearden		Elk R.	NA	240	NA	NA	NA
Estill Springs	TVA	Elk R.	21	800	NA	NA	1949
Harms	TVA	Elk R.	7	192	NA	NA	NA
Loop	City of Winchester	Elk R.	21	296	NA	NA	NA
Victoria	Ketner Brothers	Sequatchie R.	NA	114	NA	NA	NA
Rockford Manuf.	Rockford Manuf. Co.	Little R.	NA	195	NA	NA	NA
Townsend Light	Townsend Light and Mill	Little R.	NA	75	NA	NA	NA
Alcoa	Alcoa	Little R.	NA	306	NA	NA	1943
Sevierville	TVA	Little Pigeon R.	NA	150	NA	NA	1941
Nolichucky	TVA	Nolichucky R.	72	10,640	40,000	1913	1973
Denton Mill	Rains, S.T.	Pigeon R.	NA	100	NA	NA	NA
Newport	Newport Cooperative	Pigeon R.	NA	262	NA	NA	NA
Rogersville	McDonald J.A. and Sons	Holston R.	NA	135	NA	NA	NA
Piney Flats	Piney Flats Elec. Lt. and Pwr. Co.	Watauga R.	NA	200	NA	NA	1940
Murphy	Southern States Pwr.	Nottely R.	NA	375	NA	NA	NA
Highlands	City of Highlands	Cullasaja R.	220	250	1,200	1925	1968
Burnsville	NW Carolina Utility Inc.	Cane R.	NA	472	NA	NA	NA
Marshall	NW Carolina Utility Inc.	French Broad R.	NA	200	NA	NA	NA
Weaver	Carolina Pwr. and Light	French Broad R.	23	2,500	10,000	1903	1963
Recreation Park	City of Ashville	Swannanoa R.	NA	220	NA	NA	NA
Blowing Rock	NW Carolina Utility Inc.	Watauga R.	NA	240	NA	NA	NA
Sowers Mill	Appalachian Elec. Pwr.	Little R.	NA	100	NA	NA	NA
Damascus	Appalachian Pwr. Co.	Laurel Creek	NA	190	NA	NA	1956
Edmundson	Edmundson Elec. Co.	M. Fk. Holston R.	NA	635	NA	NA	NA
Holston	Appalachian Pwr. Co.	M. Fk. Holston R.	34	550	NA	NA	1964
			Total	22,733			

NA - Not available

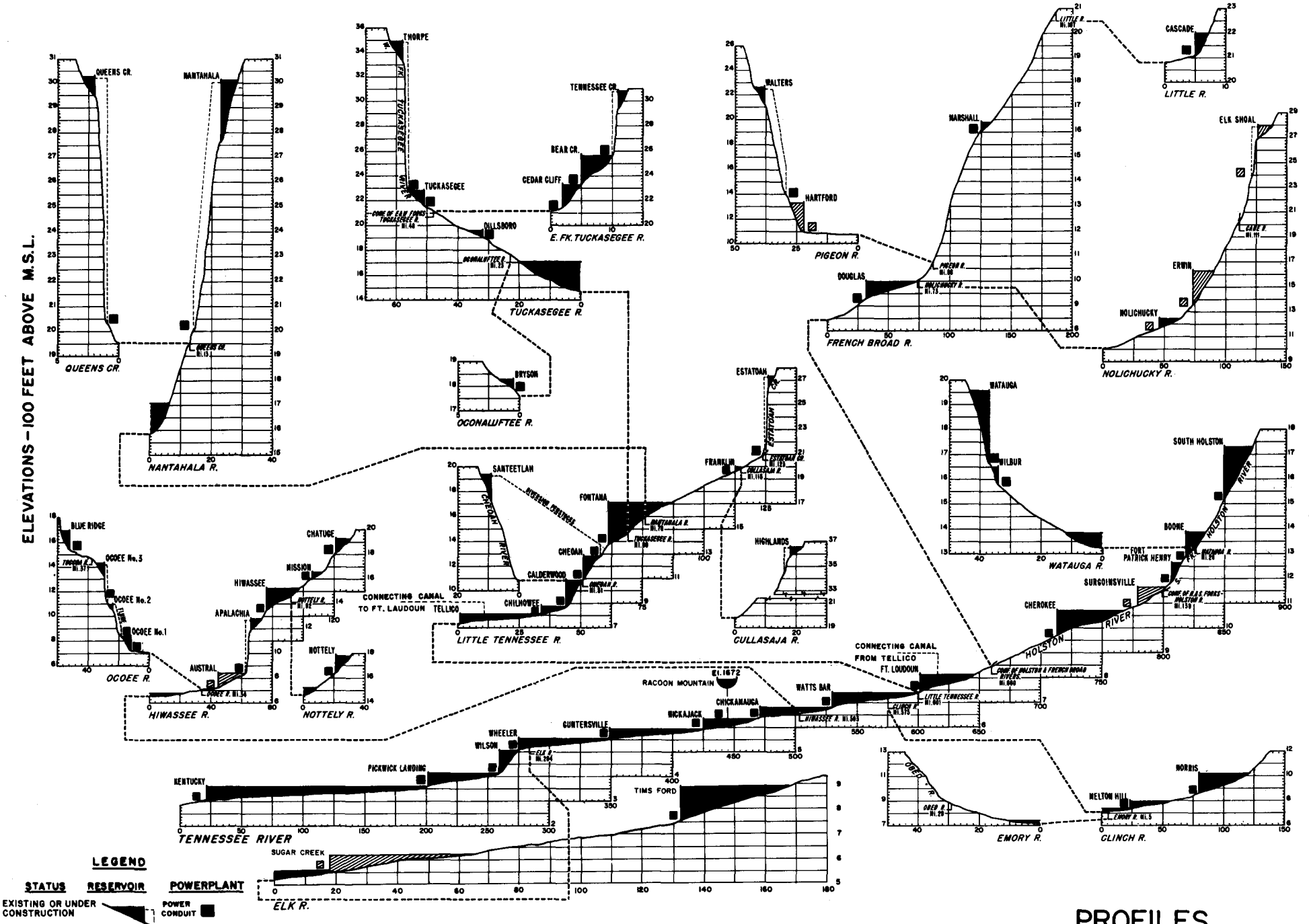
Table 6

Projected Cooling Water Requirements
Tennessee River Basin

Year	Capacity[1/] (MW)	Generation (GWh)	Cooling Water Use	
			Withdrawal (mgd)	Consumption (mgd)
1985	25,436[2/]	129,779	5,688	196
2000	25,850[2/]	117,361	4,294	182

1/ The Clinch River Breeder Reactor Plant is omitted because of an uncertain schedule.

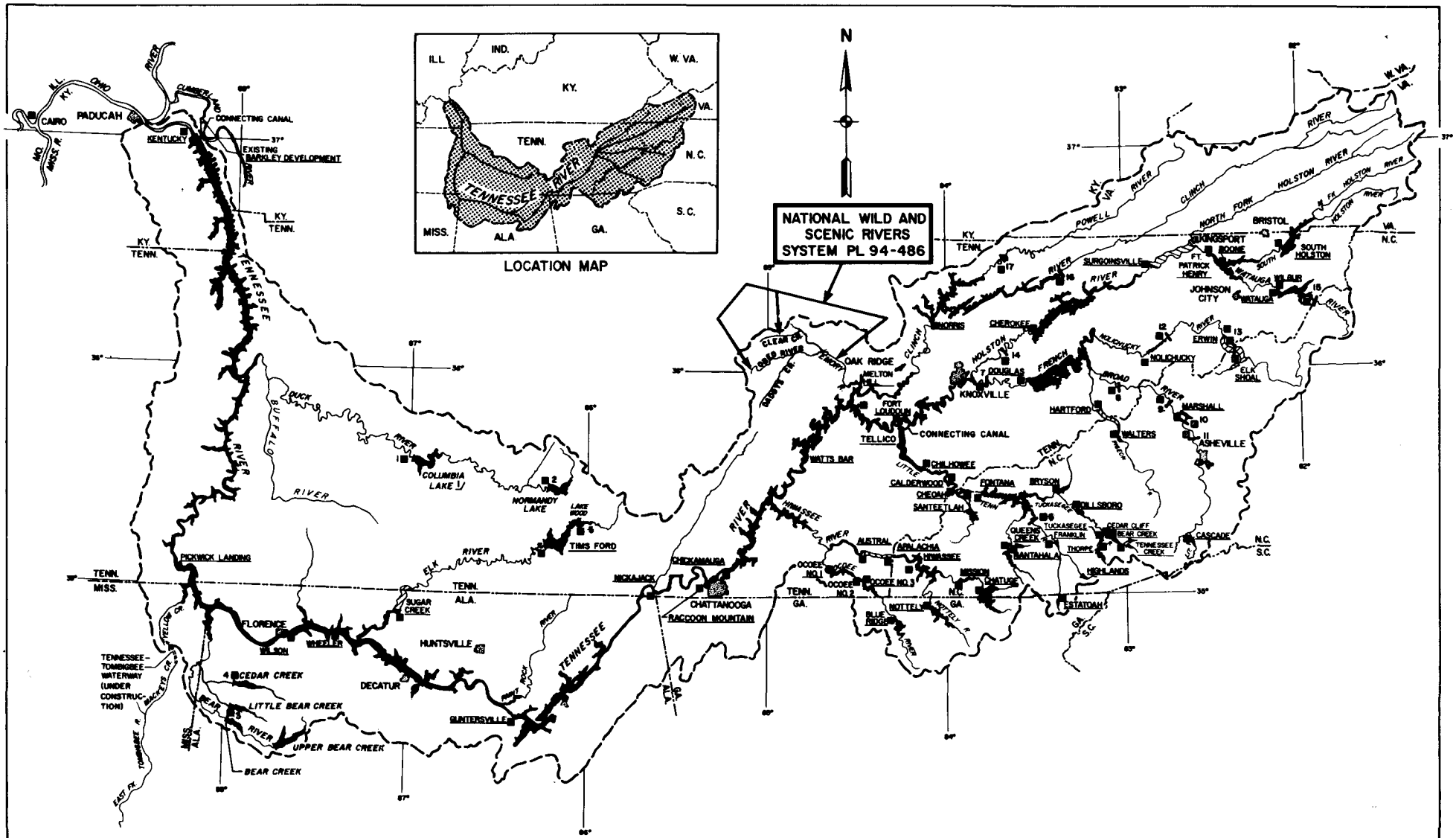
2/ 16,425 MW assumed nuclear



PROFILES

TENNESSEE RIVER BASIN

1980



FERC-WATER RESOURCES APPRAISALS FOR HYDROELECTRIC LICENSING

Figure 2