"Just mention electricity and the most humdrum citizen immediately becomes a poet, and when we think of it, there is no other servamt of humanity that performs so many useful duties for us."
Towards an understanding of the history and material culture of Pre-TVA Hydroelectric Development in Tennessee, 1900 - 1933. PART I.
By James B. Jones, Jr.

The technology and design of electrical systems and the institutions formed to administer them matured together. In his book Networks of Power, Thomas P. Hughes, perhaps the foremost historian of the field, reveals three stages in the development of light and power in the United States from roughly 1890 to 1930. Varying with small differences in detail, the evolution of Tennessee's electrical supply system before the advent of the Tennessee Valley Authority (TVA) correspond to the delineations Hughes discerns. This is not to suggest, however, that the evolution of hydroelectric power generation occurred in a lock-step manner, o-ne phase leading inevitably, logically and instantaneously to the next in an orderly, chronological procession of pre-ordained events. Indeed, development was more spasmodic as circumscribed by the temporal limits of this narrative.
The main characteristic of the first stage was the emergence of low voltage, small, direct current (d.c.) lighting companies. As the forerunner of the contemporary electrical utility industry, these centrally located hydroelectric plants supplied light and electricity only to nearby municipalities. Because such low-voltage d.c. systems as these could serve only the small geographic areas to which they were confined by want of future developments in long distance electrical transmission, the number, not the size, of hydroelectric plants grew. By the end of the nineteenth century there were more d.c. than alternating - or polyphase - current (a.c.) hydroelectric stations in America. It was an era identified by consistency in transmission load and supply, as the term d.c. implies. The loads consisted almost entirely of incandescent lights, and power production elements utilized to provide a town with electricity were located at one site, while the allocation system was powered by a uniform voltage from the hydroelectric site to customers at the same standard voltage. Examples of this stage of development in Tennessee might best be illustrated by: Mullins Mill in Bedford County, on the Duck River, 1913; Newport, in Cocke County, in 1914; Manchester, in Coffee County, in 1915; The Loop, 1901, on the Elk River in Franklin County; in Greene County, on the Nolichucky in 1913; Harm's in 1922 and Bearden's in 1919 mills in Lincoln County, on the Elk River; the Lunn site in Verona in Marshall County, ca. 1925; Crawford's Mill, 1916, on the Roaring River in Overton County; in Sevier County in Sevierville 1912, on the Little Pigeon River and; in White County at Sparta on the Calfkiller River, 1909.
According to Hughes, 1893 marks the initiation of the second era, or the so-called "universal supply system" as introduced at the 1893 Chicago World's Fair. Although it did not occur in one quick and orderly convulsion, increased heterogeneity marked this era, with a wide range of transmission and generating capabilities, serving a market characterized by diversity and quick growth. Generators with different polar characteristics were interconnected within a single plant, and different outputs were connected into a single transmission system by means of synchronous generators, transformers and couplers. It was possible to serve a diversified load after the invention of the rotary converter, which allowed both a.c. and d.c. to be combined into a single system. Examples in Tennessee might include the Shelbyville site of 1925, in Bedford County and on the Duck River; Lillard's Mill, 1928, and its sister at Columbia, 1925, also on the Duck River; the McMinnville site, 1923, in Warren County and on the Barren Fork River; the Burgess Falls site, 1929, in Putnam County, on the Falling Water River; the Walter Hill site in Rutherford County on the East Fork of the Stones River, ca. 1920, and; the Estill Springs site, 1922, on the Elk River in Lincoln County.
Two rudimentary principles of management shaping the organization of electric companies resulted during this stage of "universal supply systems," namely the diversity factor and the load factor. The latter, which measured the efficiency with which the generating and transmission equipment was being used, was the ratio of an average to a maximum load over a specified period of time. The diversity factor, the ratio of the sum of the peaks of the separate loads to the actual peak load, indicated the amount of equipment and capital needed to operate the hydroelectric station. The application of these two comments, according to Hughes, would prove to be critical to growth of future planned electrical systems.
The third phase, according to Hughes, is marked by an even greater degree of heterogeneity as seen in the regional systems of the 1920s and 1930s. In the third stage:

different kinds of energy sources were combined according to the more recently articulated concept of economic mix. Turbines and high-voltage transmission stimulated the construction of far-flung systems, and the spread of these was so extensive as to include natural resources of various kinds. The engineers and managers of utilities took advantage of the presence of such varied energy sources as hard coal, bituminous coal, brown coal, high-head water, and low-head water in their supply areas to obtain an economic mix.1
Examples of this third stage would include the Hale's Bar complex in Marion County, 1913; Ocoee No. 1 and No. 2 on the Ocoee River, 1912, 1913 respectively; the Calderwood facilities in Blount County, 1930, and;

the Great Falls complex in Warren County, 1917.

The earliest commercial application of electricity in Tennessaee was in the City of Chattanooga on May 6, 1882, when a small steam-powered electrical generating plant lit some street lights. According to the Chattanooga Times for May 7, 1882: "The lights first appeared at 8 p.m., and the crowd at once surged to all points where...visible. The effect was grandly beautiful." This is significant in itself inasmuch as Thomas Edison initiated his system for lighting in New York City, at 257 Pearl Street, on September 4, 1882, four months after the Chattanooga experience. one public electrical industry source claims that "Chattanooga is universally credited with installing the first central station in the South." Nashville soon followed suit, but the production of electrical power was accomplished by the use of steam engines to drive the generators. one of the early dynamos used for street-lighting in Chattanooga was, as reported in 1933, "preserved by Henry Ford's shrine to Thomas Edison in the Edison Institute at Dearborn, Michigan." Electric power in Tennessee cities was created by steam power until early in the twentieth century. Chattanooga, Memphis, Knoxville, and Nashville shared this means of electrical production with other cities in America until technological improvements would allow the transmission of electrical power over greater distances. That is, until a means was be found to cheaply convey electricity over distances greater than those circumscribed by city limits without significant losses of voltage, hydroelectric power would remain an insular, individual, even eccentric, phenomenon in Tennessee as well as in the country and world at large. This problem would be largely solved by the development and wide acceptance of alternating current (a.c.) systems. Then the only way in which to transmit d.c. electricity over long distances was to reduce line resistance which required an unrealistic and enormous investment in copper overhead lines and conductors.

Although some alternatives were proposed, a.c. systems solved the dilemma, and it soon became possible to raise transmission voltage and thus reduce the line current and size of the conductors, with a minimum power loss. This was largely accomplished by the introduction, in 1891, of the electrolytic process of copper refining which speeded up the complete displacement of steel wire by copper wire in the conduction of electricity. The engineering breakthrough represented by "step-up" and "step-down" transformers likewise aided significantly in the evolution of electrical power systems. George Westinghouse was the first to demonstrate the possibilities of using a.c. in the United States, in 1893 at the Chicago World's Fair. By 1896 a.c. power was transmitted from Niagara Falls to Buffalo, New York, a distance of 26 miles, with a line voltage of 11,000 volts. By the end of the nineteenth century transmission lines in America had reached a maximum length of 86 miles with some line voltages approaching 40,000.2 Such developments in the Volunteer State would wait until the beginnings of the second decade of the twentieth century, however. Alternating current systems would be to hydroelectric power as the standard gauge had been to the railroad industry, providing the paradigm for future development in the industry. Moreover, the systems of production and delivery would remain local in both their physical proximity to large concentrations of population, prospective sites, and their public financial or private sector capitalistic venture parameters until a.c. systems were standard.3

The factor of consumer demand for electricity was also important, but was at first limited to lighting needs and public transportation in the cities. While all of Tennessee's major cities developed electric-trolley systems of transportation and so spurred the demand for electricity and its subsequent expansion, the best example can be found in the example of Chattanooga. By the late 1880s it became apparent to managers of electrical production facilities that business was not expanding as they would like. This was due to the fact that customers used electric lights only a few hours each evening, even though plants had the capacity to provide full service. Following the introduction of electrical traction street car systems and interurban lines, the energy sold by the central stations could be susbstantially inflated with only a small increase of capital investment. The potential economic gains associated with entering the traction business were intriguing to local capitalists. By the end of 1889 there were some 159 electric street railways in the United States, and by 1905, the traction movement had reached boom proportions. Throughout the years 1889-1905 the traction companies dominated the electric light and power industry. Events in Chattanooga provide a good example of this development in Tennessee, especially inasmuch as the first major hydroelectric facility in the state was largely aimed at providing power for the city's traction system.

Beginning in 1875 with the initiation of a mule powered street car system, the Chattanooga Street Rail Road expanded its routes until on June 22, 1889, the Chattanooga Electric Street Railroad Company provided services as competition to the animal powered trollies. Soon the electric trolley superseded and absorbed the older means of conveyance, but what is of more interest here is that there already existed a supply of electrical power, in the form of the Chattanooga Electric Light Company. By 1889 it and the Hauss Electric Lighting Company merged as the Chattanooga Electric Light Company. It provided electricity to the trolley company and built a new generating plant in 1896 which "continued to be the city's source of electricity until hydroelectricity form the Ocoee River was introduced in 1912." In 1909 the Chattanooga Railways Company and the Chattanooga Electric Light Company, in the spirit of American capitalism, merged to form a complete electrical power and public transportation monopoly as the Chattanooga Railway and Light Company (CR&L). It was no coincidence that the E.W. Clark & Company of Philadelphia, which then controlled electrical transportation properties in a number of American cities, purchased the new company.

Moreover, it was no coincidence that E. W. Clark & Company was the managing company of both CR&L as well as the Eastern Tennessee Power Company which would build the Parksville hydroelectric plant on the Ocoee River, also given the sobriquet Ocoee No. 1, in 1912.4 It was not just an accident that when the power from the Parksville facility was "turned on" in the city on January 27, 1912, the Chattanooga Times reported:

From 2:30 until after 4 o'clock yesterday an anxious company waited at the Ridgedale powerhouse of the Chattanooga and Light Company, which is the receiving and transforming station of the Eastern Tennessee Power Company, for the...current from the Ocoee River Dam.....5 [emphasis added]

In any event, the Tennessee Electric Power Company (TEPCO), the largest private-sector electrical power monopoly in Tennessee's early twentieth century history, was formed on May 27, 1922, when the Tennessee Power Company and CR&L and the Chattanooga and Tennessee River Power Company merged. Through outright absorption of smaller companies and stock ownership TEPCO controlled the Toccoa Electric Power Company, Blue Ridge Corporation, Nashville Railway and Light Company, Lookout Incline Railway Company, Lookout Mountain Railroad Company, and the Tennessee Transportation Company. In all TEPCO was composed of the assets of forty five different Tennessee companies, some formed in the nineteenth century. (See Appenidx A.)

The majority of the power production units with the TEPCO system were in operation when the merger took place in 1922. The Chattanooga and Tennessee River Power Company had begun construction in 1905 on the dam at Hales Bar on the Tennessee River, below Chattanooga and in Marion County. The Eastern Tennessee Power Company would construct Ocoee No. 1 and No. 2 , and the hydroelectric site at Great Falls on the Caney River all before 1916. A number of smaller, municipal plants in Middle Tennessee, built between 1901 and 1929, were controlled by either the Southern Cities Power Company (1918) or owned by the municipalities of Cookeville in Putnam County and Lawrenceburg in Lawrence County, and would be absorbed by TEPCO in 1929. TEPCO, in turn, would be absorbed by the TVA in 1939.6

Another private sector firm, the Tennessee Eastern Electric Company (TEEC) was incorporated in June of 1912. The company soon thereafter acquired the property and assets of the Watauga Electric Company, Greeneville Electric Company, and the Jonesboro Electric Company. TEEC was the sole electrical power provider for Washington, Greene, Unicoi, Carter, and Sullivan counties in East Tennessee, including Greeneville, Johnson City, and Jonesboro as the principal cities.

The East Tennessee Light and Power Company (ETL&PC) was organized in October 1929. on June 1, 1929, ETL&PC acquired the property and assets of a number of companies, including: Watauga Power Company, Bluff City Electric Light and Power Company, Butler Light and Power Company, and Roan's Creek Light and Power Company, all in Tennessee. ETL&PC, an interstate corporation, operated in two counties in Virginia, one county in North Carolina, and four counties in Tennessee, serving as its primary consumption centers Bristol, Tennessee and Virginia, Elizabethton, and Erwin, Tennessee. It would operate a number of facilities until 1945 when the TVA would purchase its assets and add them to its public jurisdiction.7

The record of pre-TVA hydroelectric development in the Volunteer State is not confined to the experiences illustrated by the corporate histories of TEPCO and ETL&PL. In Tennessee the areas possessing the proper geographic and geologic attributes for hydroelectric development are not found in West Tennessee, but exclusively in the Middle and Eastern sections of the state. [See Appendix D] Here stream flow and high hills or mountains created a positive environment for hydroelectric development. Even in these two sections, however, the use of rivers or nearby streams to produce electrical power was, at first, limited to small, private efforts. A Dr. F. P. Robinson's dairy farm near Greeneville utilized a small hydro-electric generator to light his home. At Cedar Hill, near Springfield, in Robertson County, Felix Grundy Ewing employed a Leffel water wheel, a Woodward governor, and a 35 horsepower generator to provide electricity for operating his farm and mill, and for lighting his house. Near Concord, in Knox County, at G. M. Smith's farm, a homemade undershot water wheel provided power that would be converted to produce d.c. electricity. The Readyville Grist Mill helped produce electric power for that rural settlement in Cannon County, while in Franklin County, near the small town of Belvidere, Falls Mill (1873), a water-powered textile mill also provided electricity to the small workers settlement that was a part of its operations. Yet, these efforts were small, idiosyncratic, and even frivolous in comparison to later developments when the pace of hydroelectric power development accelerated. Because the choice of locations for hydroelectric plants would be restricted to those with the proper volume and velocity of water, sites occurring only in particular areas within a given river system, they represent a critical connection between the conservation of cultural and natural non-renewable resources.

Other early hydroelectric developments in Tennessee shared one of the major characteristics of urban steam-powered electrical production, that is local production for local needs, provided generally by local private sector venture-capitalists and entrepreneurs. Just as early steam-powered electrical production was limited to cities where demand was high enough to insure profitability and transmission hurdles were

miniscule, initial hydroelectric site development was similarly restricted - except that they occurred in cities or towns located in very close proximity to geographic circumstances that had historically been the sites where hydropower had been utilized for milling or would allow for its facile development.

Winchester, in Franklin County, became the first Tennessee city to develop a hydro-electric power station. In 1898 the city floated a $15,000 bond issue in order to pay for the project. In 1900 the City of Winchester solicited William Jackson Dodge, a self-taught electrical engineer, of the Nashville Electric Steam Plant to build the premier hydroplant in volunteer state. Built on the Elk River, the "Loop Plant" was located some 6 1/2 miles from the city and was completed in 1901, fittingly the first year of the new twentieth century. "It consisted of a concrete dam 20 feet high in a narrow bend, or 'loop,' in the river from which the plant derived its name." A flume, which would become a familiar component to many plants in Tennessee, was cut through solid rock to carry water to a power house and a 100-kilowatt generator. The dynamo was driven by a "grist mill type waterwheel." The powerhouse itself was "one of the most unusual features of the project. It was of frame construction and was built upon hewn oak timers that were laid across the top of the cut....The building was 'split level' with one section of the floor about 3 feet higher than the rest." At first, the demand for electricity was not as great as had been anticipated; the hydro-electric plant was supplemented by a steam-powered plant in Winchester, and the entire load was "used almost entirely for street lights."

By 1909, however, popular confidence and consumption of electricity had grown to the point where the Loop Plant's capacity was expanded - a tunnel 70 feet long replaced the open canal, a project similar in conception to the work of Montgomery Bell on the Harpeth River in Dickson County, nearly a century earlier. The tunnel was driven through the loop ridge of the Elk River to a new concrete power house which held a single 148-kilowatt generator. This development was the first "direct [sic] connected waterwheel and generator designed as a hydro-electric unit to be placed in Tennessee." [emphasis added] The use of concrete for the construction of power houses would become common if not universal. Moreover, the new Loop-Plant-tunnel arrangement was so successful that it most likely served as a model for larger scale projects in Middle Tennessee, in Lawrenceburg, at Burgess Falls in Putnam County, and at Great Falls on the Caney Fork River in Warren County, and perhaps at Calderwood, in Blount County on the Little Tennessee River. A number of other modifications were made at the Loop Plant, namely a new generator in 1909 and a second unit in 1913, and especially after the 1929 flood which inundated the facility. By 1930 the operating cost at the second Loop Plant proved prohibitive, and it was abandoned while the dam was removed. Its remains ironically are beneath the TVA's Tims Ford Lake.

A few miles upstream another hydroelectric facility was constructed at Estill Springs, on the foundations of a razed factory, formerly the Tennessee Milling Company. It was reconstructed for use as a power plant by the Nashville firm of Foster & Creighton in 1922 for the Southern Cities Power Company. Its dam was of square masonry, 14 feet wide at the base and 5 feet at the top., and 300 feet long, spanning the Elk River. Water was diverted to the hydroelectric generators, expressing design continuity with the example of the nearby Loop Plant, just 6 miles downstream, through the narrow horseshoe bend in the Elk at the site. The dam is no longer extant, although remnants of the dam abutments and an earthen embankment are visible, as are the stone masonry head and tail race facilities and the foundation of the power plant. The dam was destroyed in the 1960s by the TVA to create Tims Ford Lake.

Other similar small-scale hydro-electric power stations, intended to serve the immediate localities of cities, were to develop shortly thereafter, and may be regarded as part of the general zeitgeist of municipal reform, boosterism and the idea of capitalistic/industrialist progress associated with the so-called Progressive Era in American history.10

Around 1915 a small hydro-plant was built at Manchester, on the Duck River. According to local historian Basil B. McMahan, a "race carried water down the south side of the river to generate the power." This race was really a penstock, and parts of the concrete supports are still visible at the dam. The Tennessee Power Company purchased the site in 1915, and by 1929 the Southern Cities Corporation sold the facility to TEPCO, and eventually ownership was shifted to the TVA and the site was abandoned. The dam remains extant today, impounding Lake Morton, while portions of the original concrete penstock supports can be seen along the Duck River.11

Although mystery exists concerning the exact date, about in 1898, 1901, 1912, 1918, 1920, or 1926, a small power station was built by the Murfreesboro Light and Power Company, 6 miles from Murfreesboro, at Walter Hill, on the East Fork of the Stones River, a mill site since 1804. After a flood in 1918 damaged the dam the Southern Cities Power Company purchased the site and built the extant power station soon thereafter. In 1926 the property was transferred to the Commonwealth Southern River Company. A photograph from around the same date shows a two story frame mill building with gable supported by a stone foundation as firmly abbuted against the hydroelectric station, most likely the housing for electrical transfer machinery. This helps explain the missing third wall of the structure. Likewise, a superintendents office stands nearby. The picture is a graphic representation of the moves toward modernization, and of the cultural lag seen often times in such periods of fundamental transition in mores and ways of doing things. The old mill building utilized with the new hydroelectric power. Power continued to be produced until 1934 until a subsidiary of Commonwealth Southern River Company, Murfreesboro Light and Power, shut down

the generator. 1939 marked the acquisition of the property by the TVA, which continued to produce power until 1941, when the site was sold to the city of Murfreesboro.12

According to Sevier County, Tennessee Historian, Mrs. Beulah D. Linn, initial interest in a hydroelectric facility was expressed in Sevierville in 1912. Two years later, on October 28, the concrete dam was finished, and within a month the facility began generating electricity. Local competition flourished and soon there were two hydroelectric stations on the Pigeon Forge River, one at the Newport Milling Company, the other at the Walker Mill site. By 1938 the TVA had purchased both sites and by 1940 sold them back to city of Sevierville which would buy its power from TVA and extend its own system to local rural areas. only the Walker Mill site is extant and occasionally in operation when the river level is adequately high.13

Early in the twentieth century, in 1902, four Sparta businessmen, J.T. Anderson, J.R. Tubb, O.H. Anderson, and S.B. Anderson formed the aptly named Anderson and Tubb Power Company . It was a peculiarly vernacular affair at first consisting of a direct current (single phase), 60 kilowatt generator from the Fayetteville steam generating plant, a waterwheel from Rome, Georgia, and an American Ball steam engine from the old Read House in Chattanooga. This arrangement operated for five years in an old mill site until 1907 when it burned. Construction on a new hydrostation was begun and was complete in 1909. The new plant was about a mile downstream on the Calfkiller River from the first station. "A 6 [sic] foot concrete dam diverted the river into an open canal [i.e. flume] which conveyed the water to the power house a quarter mile downstream." The dam (with the date 1909 plainly visible), concrete flume and power house, built by Boise & Foust, contractors from Chattanooga, provided for the electric power needs of Sparta. In 1917, according to TVA documents, the Tennessee Electric Power Company purchased the plant and operated it regularly until the early 1930's when the facility was placed on standby service. In the six years following 1926 "the plant output averaged 730,000 kWh annually at a production cost of approximately 2.5 mills/kWh." TVA purchased the site in 1939 and determined that it would continue operation would be too costly and so sold it in 1941 to Mr. R.J. Snodgrass the father of the present owner, Mr. Joe Snodgrass. After its sale the private owners removed most of its equipment for its salvage value, most likely enhanced by the exigencies of World War II.14

At McMinnville, in Warren County, electricity was supplied by a steam powered generator until 1907 when the Walling Light and Power Company "installed a generator in the Old Falcon Flour Mill on Barren Fork River...." It was, as in the example of Sparta, an impromptu affair and was utilized for only a few months until a new facility was built on the other side of the river later in 1907. After the floods of 1922 destroyed the facilities a new power house was constructed in 1923. It housed a "Leffel Francis -type turbine rated at 380 HP and 164 RPM which was connected to a 250kW generator manufactured by General Electric." TEPCO purchased the site in 1925 and it was transferred to TVA in 1939 ten years later and sold back to the city of McMinnville in 1949 when it was retired. It stands today on the north bank of the Barren River, and although abandoned a good example of what will be termed "early twentieth-century-vernacular-concrete-hydro style."15

Some six miles west of Livingston, in Overton County, was perhaps one of the more peculiar examples of early hydroelectric private-sector entrepreneurial development in Tennessee. In 1916, an electrical engineer from Knoxville, S.O. Kennedy, placed a generator in the old Heading Mill located on what is currently West Broad Street in Livingston. It was a steam powered device that produced electricity at night only; when demand for more current grew a hydrostation was built at Crawford's Mill about 6 miles west of Livingston. A dam (still extant) , and flume were built to convey water from the Roaring River to a steel penstock some 1,000 feet away. A small 75kW generator was installed, and power was transmitted to Livingston via iron conductors. The plant was said to be "modern and up to date for about five or six years." As the demand for electricity grew, the ability of the station to provide it was outstripped. In 1926, the Cumberland Power Company (later absorbed by TEPCO) bought the property and built a new diesel powered facility. TEPCO purchased the facility in 1927, and in 1939 the Cumberalnd Electric Membership Corporation was formed and bought the TEPCO facilities. Today the dam and portions of the race that lead to the flume, as well as the penstock supports and the ruins hydrostation building foundations are extant.16

In Lincoln County, about 5 miles southwest of Fayetteville, and on the Elk River, stand the remains of the Harms Mill hydroelectric powerhouse and dam. A frame textile mill was built on the location in 1870 by the Harms Brothers, and in 1905 a 75 HP electrical generator was installed to power the operation of textile production. In 1920 the factory was purchased by the Fayetteville Light and Power Company, and a new concrete dam (with a fish ladder) and powerhouse (extant today) were completed by 1922. TEPCO purchased the facilities in 1929. The plant was equipped with four turbines, three of which were 50-inch Leffel vertical shaft, single runner, Francis-types, with a 50 horsepower rating. The fourth was similar with a 45-inch runner that had a 45 horsepower rating. All four turbines drove a single electrical generator through a system of wooden bevel gears and a "lay" shaft. Perhaps no better example of the heterogeneity characteristic of the second and third eras of early electrical development Hughes speaks of can be found in Tennessee. Moreover, its horizontal design is contrary to other more vertically emphasized examples of "hydrostyle" distinctness, adding along with its peculiar turbine/generator alignment.17

Yet another hydroelectric site on the Elk River was located much closer to Fayetteville, namely Bearden's

Mill. It was constructed in 1919 by the Fayetteville Light and Power Company on an established mill site about one-and-one-half miles south of the city. Inasmuch as it contained one generating unit driven by a vertical shaft and three turbines, and had been constructed three years earlier, it most likely served as then example for Harms Mill. Bearden's Mills' description is much like that of Harms Mill, being a "two story concrete frame building 20 ft. X 64 ft in plan resting on the wall of the wheel chamber." The dam, powerhouse, and machinery were destroyed by the TVA in the 1940s as they had been determined to be "a menace to river navigation." Today the foundations of the mill and dam sidings are all that remain.18

Although evidence is slim, it is known that the City of Lawrenceburg, in Lawrence County, built and operated two hydroelectric sites in 1907 and 1915. Both are extant today, and both were examples of publicly financed and owned alternatives to private sector capitalist development of public utilities. Site No. 1, or Shoal Creek No. l, was built in 1907 after a municipal election in 1905 approved the sale of municipal bonds to finance the project. A Walter G. Kirkpatrick was the project engineer. Construction of the site began in 1905-06, at the Horseshoe bent on Shoal Creek, about 1.8 miles southwest of Lawrenceburg. A dam was built and water was impounded and diverted across the Horseshoe Bend through a tunnel to the powerhouse on the other side and then returned to Shoal Creek. (Water still flows through the tunnel.) According to a TVA study "the condition of the structure is poor." By 1915 Shoal Creek No. 1 could no longer supply the needs of the city and a second plant was built approximately 1.8 miles downstream. The powerhouse at No. 1 is a reinforced concrete structure situated on steep bank above Shoal Creek, and is nearly inaccessible. Shoal Creek No. 2 is in some ways a uniquely conceived structure. The dam straddling the creek is about 75-100 feet high and the power house sits on the south side of the dam. It sits upon a series of seven reinforced concrete stilts of varying lengths which rest upon the trapezoidal spillway section on the southern side of the dam. No.2's powerhouse is of steel-reinforced concrete and brick, and all machinery appears to be extant and capable of operation even today. The two plants operated as municipal public utilities until 1939 when the TVA began increasingly to provide electricity to the city. In the 1940s Shoal Creek No.1 ceased operation and the second plant was abandoned a few years later.19 Shoal Creek No. 2 is today owned by Union Carbide, Inc.

The other example of a publicly owned hydroelectric facility in Tennessee is that of the Cookeville plant at Burgess Falls. City ownership of such public utilities is a hallmark of the Progressive Era in American history. Cookeville had its first steam powered generator in 1904. In 1919 the city officials, realizing that more power was in demand, bought Burgess Falls for $6,500. Professor of Engineering at the University of Tennessee at Knoxville, John A Switzer, took a temporary position as City Engineer in 1921 to oversee the construction of the hydroelectric utility. By January, 1922, the system began operating and would continue to run until the floods of June, 1928, destroyed both the earthen dam and power house about a mile downstream. After a new steel-reinforced-concrete dam and power house were built in 1929 the plant operated continually until 1951, and its contents were sold for salvage. Water from the dam was conveyed downstream by means of a penstock, then to a wooden flume that was suspended over the river and through a tunnel in the opposing bank, thence to another penstock to the hydroelectric plant below Burgess Falls. In 1929 the arrangement changed slightly so that water was conveyed on the south side of the Falling Water River. Aside from the dam, penstock supports and the swinging bridge that supported the wooden flume, and the foundations of the 1922 and 1929 plants and some of the giant turbines - now half buried in the mud - are all that remain of the hydroelectric site. In 1973 the City of Cookeville sold its interests in the property to the State of Tennessee which has developed the domain as a state natural area.20

Another early hydroelectric site in Middle Tennessee is found in Bedford County, in Shelbyville. There is little extant information on the site, which is in ruins today. Aside from the cryptic impression bearing the name "Sam Bearden" and the date "Aug. 1913," it is known that the plant was constructed on an existing mill site on the Duck River about four miles east of the city of Shelbyville. In 1911 the Duck River Power Company was established in Shelbyville, and installed a 120 KW generator in Mullin's Mill (built or modified by S.A. Bearden) in 1913. Around 1913 it was purchased by the Public Light and Power Company and as a hydroelectric site was a one story frame building situated on a masonry concrete foundation. An unprocessed and therefore as yet unavailable rare photograph in the Jo Conn Guild Photographic collection shows the building whose ruins in the form of a tail race/drive shaft support exist on Mullins Mill Road in Shelbyville. Aside from Mullins Mill is the Shelbyville hydroelectric site just west of the city and on the Duck River. Early in 1915 the steam plant and old water mill at Shelbyville burned. A new hydroelectric plant was constructed at Shelbyville at the site of the old mill. A modern brick structure was built at the end of the old dam complete with a 240KW generator, driven by two vertical water wheels connected by crown wheels to the generator shaft, similar in concept to the future hydroelectric sites at Bearden's Mill and Harms Mill in near Fayetteville in Lincoln County. In 1925 the Shelbyville plant was replaced by a new concrete dam and power house, extant, along with the earlier 1915 steam plant foundations incorporated into the dam. The dam also shares a characteristic with Harms Mill in the form of a fish ladder. The Nashville engineering firm of Freeland and Roberts built the structure for the Southern Cities Power Company, a regional public utility firm. TEPCO acquired the property in 1929. The electrical equipment, which had been destroyed in the floods of 1929, was replaced in 1931 and the plant was run by TEPCO mainly for system voltage control

purposes until August 15, 1939, when the plant was purchased by TVA. It operated under TVA management until February 12, 1948, when it was withdrawn from service. The entire project was retired on July 6, 1949 and subsequently resold to the city of Shelbyville on November, 14, 1950.21

ENDNOTES FOR PART I

1 Thomas P. Hughes, Networks of Power: Electrification in Western Society, 1880-1930, (Baltimore: Johns Hopkins University Press, 1983), p. 366 (hereafter: Hughes, Networks). See also: Abram John Foster, The Coming of the Electrical Age to the United States, (N.Y.: Arno Press, 1979), pp.67-134, 194-223. (hereafter: Foster, Electrical Age.)

2 John D. Ryder, Donald G. Fink, Engineers and Electrons: A Century of Electrical Progress, (New York: Institute of Electrical and Electronics Engineers Press, 1984), pp. 35, 101-102, and; Thomas P. Hughes, "The Science-Technology Interaction: The Case of High-Voltage Power Transmission Systems," Technology and Culture, vol. 17 (1976), pp. 647-659, and; Hughes, Networks, p. 79-105, and; Richard B. Morris, ed., Encyclopedia of American History, 6th ed., (New York: Harper & Row, 1982), p. 725 (hereafter: Morris, Encyclopedia).

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4 "Early Electrical History of Chattanooga," SCN, July 1, 1972, No. 51, pp. 1-2; "The Parksville Dam," SCN, October 1, 1972, pp. 1-4; David H. Steinberg, And to Think It only Cost A Nickel! The Development of Public Transportation in the Chattanooga Area, (Chattanooga: by the author, 1975), pp. 5-30, 35. See also: Forrest McDonald, , Let There Be Light: The Electric Utility Industry in Wisconsin, 1881-1955, (Madison, Wisc.: American History Research Center), pp. 4-5. The ownership of transportation facilities in Tennessee by northeastern capitalists was not without precedent. For example, the Louisville & Nashville Railroad was controlled by New York financiers Jay Gould, Thomas Fortune Ryan, Jacob Schiff, and August Belmont, all members of the board of directors. Behind them stood English investors, represented by Belmont. See: Ray Ginger, Age of Excess: The United States from 1877 to 1914, 2d ed., (New York: Macmillan & Co., 1975), p 71. Generally overlooked is the fact that the Ocoee No. 1 dam impounds the first man-made recreational lake in Tennessee, which may have provided an object lesson for the TVA in later years.

5 Chattanooga Times, January 28, 1912.

6 "Tennessee Electric Power Company, 1922-1939," Accession 180, Local History Department, Chattanooga-Hamilton County Bicentennial Library, pp. 1-2. See also: "A History of the Tennessee Electric Power Company," Bedford County Historical Quarterly, Vol. IV, No. 2 (Summer 1978), pp. 32-40.

7 Norma Thomas, "East Tennessee Light and Power Company Records, 1898-1945," Accession Number 156, Archives of Appalachia, East Tennessee State University, Johnson City, Tennessee, pp. 1-2.

John A. Switzer, and George H. Ashby, "The Utilization of Small Water Powers in Tennessee," The Resources of Tennessee, vol. 1, no. 1 (July, 1911), pp. 6-7. National Register of Historic Places portfolios for Readyville Mill, and Falls Mill, on file at the Tennessee Historical Commission, Nashville, Tennessee, and interview with John Lovett, owner of Falls Mill, March 23, 1989, and; James B. Jones, Jr., "Pre-TVA Hydro-Electric Power Development in Tennessee, 1901-1933," The Courier, Vol. XXV, No. 2, February, 1987, pp. 4-6. See also: Fountain Green Hydroelectric Plant Historic District National Register of Historic Places Nomination, March 8, 1989, Utah SHPO, Section F, p.2.

A. W. Crouch, C. R. Matlock, "Small Hydro Plants Passing Into History," Electro Topics, vol. XVII, no. 1 (January/February, 1934), p. 12. See also: J. C. Crouch, "History of the Tennessee Electric Power Company" TEPCO Collection, box 1, folder 2, at the Tennessee State Library and Archives, Nashville. (Hereafter cited as: Crouch, "History.") [See also: A. W. Crouch, The Caney Fork of the Cumberland, (Nashville, Tennessee: 1973), pp. 53-61.] SCN, January 1, 1973, No. 57, pp. 1-4, and May 1, 1973, No. 61, pp. 3-10, and; "Preliminary Survey Generating Stations Southern Cities Power Company" ca. 1929, in the unprocessed Jo Conn Guild Photographic Collection held by TVA, [hereafter; "Preliminary Survey"] and; Mr. and Mrs. Richard Lowndes, "Early Hydroelectric Plants in Tennessee: The Loop and the Estill Springs Plants," Franklin County Historical Review, vol. III, No. 2 (June 1972), pp. 31-33, and; "The First Hydroelectric Plant in Tennessee," Franklin County Historical Review, Vol. XVIII, No. 1, (1987), pp. 39-47. [According to one knowledgeable source, an attempt at establishig subterranean dam with which to run a mill or a hydroelctric site was established in Franklin County in the early 1920s. The dam worked only too well and soon had to be destroyed as water was inundating surrounding farm land. See: Thomas C. Barr, Jr., Caves of Tennessee, (Nashville: Department of Conservation, 1961, rpt. 1972) p. 199, and;

correspondence from William Janey to James B. Jones, Jr. May 6, 1989.]
10 Gerald N. Grob, and George Athan Billias, Interpretations of American History: Patterns and Perspectives, vol. II, 4th ed., (New York: The Free Press, 1982), pp. 163-208, and; Morris, Encyclopedia, pp. 316-333, and; Richard N. Current, T. Harry Williams, Frank Freidel, Alan Brinkley, American History: A Survey, 6th ed.,(New York: Alfred A. Knopf, 1983), pp. 617-671.
11 Basil B. McMahan, Coffee County, Tennessee: Then and Now, 1983, (Manchester: by the author, 1983), pp. 388-389.
12 Small Hydro, Reconnaissance Report for Walter Hill Dam, Report No. WR28-2-510-112, p.2, and; Application for Preliminary Permit before the Federal Energy Regulatory Commission, submitted by the Middle Tennessee Electric Membership Corporation, Murfreesboro, Tennessee, October 17, 1980. See also: Carlton C. Sims, ed., A History of Rutherford County,(Murfreesboro, Tenn.: Carlton C. Sims, 1947), p. 217, and an unprocessed photograph of the Murfreesboro Light and Power Company on the Stones River at Walter Hill, ca. 1920-1929, in the Jo Conn Guild Collection, held currently by the TVA, in Norris, TN.
13 Correspondence from Sevier County Historian, Mrs. Beulah D. Linn, January 18, 1989, and her unpublished typed manuscript,"Sevierville Light and Power Company," pp. 1-5, and; Small Hydro, Reconnaissance Report for Walker Mill Dam, Report No. WR28-2-510-114.
14 SCN, January 1, 1973, No. 57, p. 5, and; A. W. Crouch, C. R. Matlock, "Small Hydro Plants Passing Into History," Electro Topics, vol. XVII, no. 1 (January/February, 1934), p. 12, (hereafter: "Small Hydro Plants Passing Into History," 1934, etc.) and; TVA, Small Hydro Feasibility Report for Sparta Dam, TVA/ONR/WR-82/11, WSDB Report No. WR28-1-510-133, February, 1982 (hereafter: Small Hydro Feasibility Report, etc.).
15 Correspondence from James A. Dillon, Jr., Warren County Historian, January 11, 1989, and his typed manuscript "History of Electricity in Warren County," pp. 1-4, and; SCN, January 1, 1973, No. 57, pp. 4-5, and; Small Hydro Feasibility Report for the Mcminnville Dam. [See also: Walter Womack, McMinnville at a Milestone, 1810-1960. A memento of the sesquicentennial year of McMinnville, Tennessee, 1960, and Warren County, 1958, (McMinnville, Tenn: Womack Printing Co. and Standard Publishing Co. 1960), pp. 96-101, for an entertaining account of a failed attempt at a hydroelectric facility in McMinnville in 1889.]
16 SCN, August 1, 1973, no. 64, pp. 1-6.
17 SCN, February 1, 1973, No. 58, pp. 2-4, and; "Preliminary Survey Generating Stations Southern Cities Power Company" ca. 1929, in unprocessed Jo Conn Guild Collection held by TVA, and; Small Hydro Program Reconnaissance Report for Harms Dam, TVA Report No. WR28-2-510-103, May, 1980, p. 2 correspondence with Dr. Reuben Crawford, Lincoln County Historian, January 27, 1989, and; Hughes, Networks, p. 366.
18 SCN, February 1, 1973, No, 58, p. 5, and; correspondence from Dr. Reuben Crawford, Lincoln County Historian, January 27, 1989, and; "Preliminary Survey Generating Stations Southern Cities Corporation," ca. 1929, as part of the unprocessed Jo Conn Guild Photographic Collection held by TVA. [A site survey and investigation of the Mullins Mill site in Shelbyville, in Bedford County, on March 28, 1989, revealed the following words pressed into the concrete tail race/drive shaft supports: "Sam Bearden, Aug. 1913." The identity of Bearden is not known, but he may have been the source for the name of the mill in Fayetteville and possibly an early vernacular hydroelectric plant designer in Middle Tennessee, basing his concepts on grist mill designs.]
19 Small Hydro Feasibility Report for Shoal Creek No. 1 Dam, and; correspondence with Marymaud Killen-Carter, Lawrence County Historian, March 3, 1987, and; Viola H. Carpenter and Marymaud Killen-Carter, Our Hometown, Lawrenceburg: Crossroads of Dixie, (Lawrenceburg, Tenn.: Lino-Litho Printers, 1986), pp. 92-94, 180, 182, 183.
20 Small Hydro Program Feasibility Report for Burgess Falls Dam, and; Kelly Thompson, "Burgess Falls Dam Revival Eyed Again," Cookeville Herald-Citizen, May 20, 1988, and Ibid., February 5, 1975, and; Carl F. Ledbetter, "Burgess Falls, Indians, Industry, Intrigue," Current Lines, the Newsletter of Upper Cumberland Electric Membership Corporation, Vol. 7, No. 1, January, 1989, pp. 1-3, and; Mary Jean DeLozier, Putnam County, Tennessee: 1850-1970, (Nashville, Tenn.; McQuiddy Printing Company, 1979), pp. 230-231. Also see, pp. 149-150.
21 Hydropower Planning Section, TVA, Small Hydro Feasibility Report, "Shelbyville Dam," pp. 1-2, and; SCN, January 1, 1973, No. 57, p. 5, and; Crouch,"History," pp. 12-15, and; "Preliminary Survey Generating Stations Southern Cities Power Company," ca. 1929 on file at TVA, Division of Cultural Resources, as part of the as yet unprocessed Jo Conn Guild Photographic Collection. See also: J. A. Switzer, "Conservation of the Water Powers of Tennessee," The Resources of Tennessee, vol III, no. 2, (April, 1913), pp. 74-79. See also: "Company Takes Over Southern Cities System," Electro Topics, vol. XII, no. 6 (November, 1929), pp. 2-5, and; SCN January 1, 1973, No. 57, p. 5, and; SCN, March 1, 1973, No. 59, p. 5, and; correspondence from Richard R. Poplin, Bedford County Historian, December 30 1988. on fish ladders or fishways see: Frank Koester, Hydroelectric Developments and Engineering: A Practical and Theoretical Treatise on the Development, Design, Construction, Equipment and Operation of Hydroelectric Transmission Plants, illus., (New York: D. Van Nostrand Company, 1909), p. 37.

Towards an Understanding of the History and Material Culture of Pre-TVA Hydroelectric Development in Tennessee, 1900 - 1933. PART II

By James B. Jones, Jr.

In 1915 the Public Light and Power Company was formed to consolidate the Stone Fort Power Company and the Duck River Power Company. The new company had as its object the development of hydroelectric power and its extension to a number of towns in the Duck River area. After entering the phosphate mining business in the Mt. Pleasant and Franklin areas the same business consortium formed the Southern Cities Power Company in March of 1918. A year later a 240 KW steam-powered generator was installed in an old mill on the Duck River in Columbia. As the demand for electric power increased the Southern Cities Company began a program of expansion, and built new stations on the Elk River at Estill Springs (1922) and in South Central Tennessee, on the Duck River, at Shelbyville, in Bedford County, and at Columbia, in Maury County (both in 1924-25). The Columbia station was built just below the old steam plant, and is quite similar in design to the hydroelectric site in Shelbyville. This is hardly surprising in that the same firm, Foster & Creighton built both facilities. In 1928 another hydrostation was constructed on the Duck River in Marshall County at Lillard's Mill, some ten miles north of Lewisburg. In 1982 the Keeper of the National Register of Historic Places determined that the Lillard's Mill hydroelectric site is eligible for listing in the National Register of Historic Places.22

One small and apparently vernacular hydroelectric site about which little is known is found in Verona, in Marshall County, on Big Rock Creek. A Roland Lunn, a local entrepreneur, presumably built a concrete one or two story hydroelectric generating station and dam at the site of a mill, to electrify the hamlet of Verona, probably in the late 1920s. It stands today, even after unsuccessful attempts by vandals to dynamite it. Inasmuch as it is apparently a rare example of small-business, private-sector capitalist initiative in the hydroelectric field its importance is greatly magnified in Tennessee history. It may well have been stimulated by the Federal Water Power Act of June 10, 1920 which encouraged development of water power on public lands of United States, and to navigable streams, including falls, rapids and shallows.23

A confident University of Tennessee professor of experimental engineering, John A. Switzer, optimistically reported in February, 1912, that the "year 1912 will be notable in the annals of Tennessee, because it marks the beginning of a new era - the era of water power development." Switzer claimed that "the inauguration of the Watauga Power Company's plant in Carter County, and of the Eastern Tennessee Power Company's in Polk [County] are of greater significance than we are likely to realize." This was because "it means the inevitable, and the prompt expansion of our manufacturing interests; since the certainty of obtaining power at a low cost will assuredly attract manufacturing enterprise." on a larger scale were the early hydro-electric power developments in East Tennessee, noted for its potential as a source for hydroelectric power production. By November 1911, the Watauga Power Company had completed its hydro-plant at the "horse-shoe" on the Watauga River, 6 miles above Elizabethton. The dam was described as "55 [sic] feet high above low water, 7 feet 3 inches wide at the crest, and 58 feet 6 inches at base." It utilized reaction-type turbines, while its power house was "of ornamental design [and] supported on heavy concrete piers and arches. The water, after leaving the wheels, was discharged through these arches into the trail race, excavated out of solid rock, and approximately 250 feet long." According to one contemporary account the Watauga Power company entertained guests at the dam site on opening day while "the people of Bristol and Elizabethton do not yet fully realize the magnitude and importance of the enterprise." By 1913 Lee F. Miller, one of the local backers and owners of the facility relinquished all local control and sold out his interest to the Doherty Syndicate of New York, which had earlier bought out his partners, W.E. and E. E. Hunter. The dam and site were later purchased by the TVA and revamped so that the structure has lost its historic integrity. Nevertheless, the hydroelectric site was in large measure responsible for attracting industry to the Elizabethton/Bristol area, in the form of woodworking, textile and copper refining plants. Indeed, boosters in Elizabethton advertised the town as "the City of Power" as a result of the development.24

Promoted in the early 1900s by J. W. Adams, a famous contractor in Chattanooga, this was the first hydroelectric facility to provide power to Chattanooga and other regional cities. Following quickly in December 1911, the Eastern Tennessee Power Company was nearing the completion of the first hydro-electric generating facility on the Ocoee River at Parksville, Tennessee. This dam would create Tennessee's first artificial lake, perhaps providing a model for future TVA activities. Company officials and financial backers visited the construction site in late 1911 and Vice President of the C.M. Clark Company confidently predicted in his statement that:

when we furnish electricity to help make Chattanooga grow...we are simply doing that which...will attract manufacturing enterprises....The future of Chattanooga must be in manufacturing lines....

The Clark interests formed the Eastern Tennessee Power Company to construct the project. Actual work began in 1910, and the first concrete was poured in 1911. The plant began operation on January 27, 1912, and had operated ever since. The dam is a gravity type, built of cyclopean concrete, and is 110 feet high at the spillway section and 840 feet long from bank to bank. There were three distinct labor camps, one for white workers on the north side of the river, a separate negro camp west of the quarry on the south side of the Ocoee, and a camp designated for foreign laborers. There was also a boarding house, rock crushing facility, and a concrete mixing plant. The project was designed and built by the J.G. White & Company of New York. Work began August, 1910, and the first power was delivered January 27, 1912. It was to serve the electrical demands of Cleveland, Chattanooga, Athens, Sweetwater, Loudon, Lenoir City, and Knoxville, Tennessee, as well as Rome and Dalton, Georgia.25

Then known as the "Caney Creek plant" of the Tennessee Power Company was the second Ocoee River hydroelectric facility, today known as Ocoee No. 2. Construction began on March 1, 1912,and production of electricity was started on October 23, 1913. Like Ocoee No. 1, it was constructed by the J.G. White Engineering Company of New York, under the direction of Hydraulic Engineer W. P. Creager, author of many books on hydroelectric design, most notably The Hydroelectric Handbook (1927). The entire complex, including a recreated 4.6-mile long wooden flume, has been placed on the National Register of Historic Places. All power produced at Ocoee No. 2 was, in 1914, "transmitted and sold to the reduction plant of the Aluminum Company of America, located near Maryville," although it helped, along with the Parksville facility, to furnish the needs of Chattanooga, Nashville, Knoxville, Cleveland, etc. According to one source the significance of this site lies in the fact that "at Ocoee No. 2 is an example of "a broad distribution through an integrated system tie line...[in what is]... one of the earliest examples of what today is a minimum standard for electrical power sharing."26

By 1914, three new hydro-electric plants were in operation on the Nolichucky, Ocoee, and Tennessee rivers. on the Nolichucky was the power plant of the Tennessee Eastern Electric Company, located nine miles from Greeneville. It was built by the Tennessee Eastern Electric Company in 1913, and was constructed in two phases. The original construction included a two unit power house with provision for two incremental units to be added later. In 1922 construction on the second stage was begun which included the third and fourth generators. It consisted of a concrete dam and a brick power house supported by a cement foundation. The power supplied the needs of Greeneville, Jonesboro, and Johnson City. TVA acquired the Nolichucky project in 1945.27

While the Ocoee River project provided the initial electrical needs for the aluminum reduction facilities of Alcoa in Maryville, the Aluminum Company of America (ALCOA) soon realized its needs eclipsed the capacity of both the Ocoee No. 1 and No. 2 plants. Not only would this major industry locate a reduction plant in Tennessee as a direct result of the Ocoee hydroplants, but it would create the town of Alcoa in Blount County, in the process of building the Calderwood Dam and Powerhouse on the Little Tennessee River. Construction began in August, 1928, and was finished with all three units in operation on June 22, 1930.

Additionally, ALCOA, it was reported, was "preparing to build some mammoth dams across the Little Tennessee River" as it wound its way through North Carolina. Construction on the Calderwood dam and powerhouse began in 1928 and the project was finished in 1930. The community of Calderwood, now largely abandoned, was created as a company town by ALCOA to house construction workers and later maintenance personnel. The dam is a massive engineering structure, of thin-section, concrete construction boasting twenty-four flood gates in a sweeping curvilinear design, variable radius, arch dam with a concrete gravity cushion pool below the main dam. The dam is 916 feet long and has a maximum height of 216 feet. Water is diverted through a sharp horseshoe bend in the Little Tennessee through three concrete lined tunnels, 2,071 and 2,147 feet in length, to three generators on the other side. The 210 X 47 X 98 foot power house is on the Blount County or East bank of the Little Tennessee River, with a substructure of steel reinforced concrete and superstructure of brick with design elements reminiscent of art nouveau style. It has been judged to be "one of the tallest arch dams in the eastern United States," by David C. Jackson.28 The dam has been included in a recent multiple resource nomination to the National Register of Historic Places.

Perhaps the largest pre-TVA hydroelectric development in Tennessee was the Chattanooga and Tennessee River Power Company's Hale's Bar lock and dam. Construction, which required as many as 5,000 workers, began in October 1905, and was planned to be completed in 1909 at a cost of four million dollars. Eight years (1913) and nine million dollars later, after labor difficulties and unforeseen construction problems, "in the presence of a distinguished party of visitors, the plant was formally placed in operation." Haletown-Ladds may well have had its origins in the construction of this hydro-electric facility, as the following excerpt from a 1912 report on the Hale's Bar development indicates:

The construction camp has a population of some three thousand people, where before were only scattered farm houses. Although the camp is but temporary, it has a complete waterworks system, sewerage [sic] system and electrical light installation; and there are churches and schools, and the inevitable moving pictures.29

The landscaping remains of the housing development associated with facility management personnel can still be seen, although there are no above ground resources save the skeleton of the power house and its out-building.
The Tennessee River Power Company would soon become the property of TEPCO, and soon after its formation in 1922 the electric power company began to expand its generating capacity so to meet the new heavy demand on its facilities.
In 1923 work began on a new steam plant at Hale's Bar. The project was completed in December 1924. Ever increasing demands called for the installation of new boilers, and by 1925 six boilers were in place at the site. Hales Bar Steam Plant was the only steam plant built by TEPCO. It serves as an example of the third phase of electrical systems evolution as described by Hughes, especially inasmuch as it shows the use of varying types of energy sources consolidated as a result of the then more recently enunciated notion of economic mix. The steam plant has been destroyed, however, by the Tennessee Department of Transportation sometime in the 1970s The old concrete power house, with an extension added by TVA in the 1950s, stands today with gaping cavities looking like empty tooth sockets where turbines and electrical generators once were housed. The power house's tail race and decorative arches were inundated and the dam destroyed by dynamite once the Nickajack dam was built by TVA in 1967.30
After reconnaissance surveys on the Caney Fork River had been completed in 1898, the Great Falls Power Company was established in March of 1901. After years of being unable to raise the necessary capital for the hydroelectric project, the promoters had by 1909 found the venture capital for investment in the H.M. Byllesby & Company of Chicago. Shortly thereafter the Chicago firm purchased controlling interest, much in the way the E.M.Clark Company of Philadelphia had assumed its interests in the Ocoee River projects.
On April 24, 1912, the Tennessee Power Company was organized, [see Appendix A] and it purchased the Great Falls Power Company and began buying land and developing plans for a power development. After initial work was stopped by floods, the Byllesby interests were sold to the E. M. Clark company, by this time the owner of the Nashville Railway and Light Company and guiding the Parksville project on the Ocoee River. There was spasmodic activity at the site until 1915 when construction began in earnest. By 1916-17 a dam was built, and a tunnel drilled through the narrows of the Collins and Caney Fork Rivers, penstocks, power house, and transmission equipment were in place. The first Great Falls site was placed in operation on New Year's Day, 1917. Extra construction completed in 1925 raised the height of the dam some 35 feet, augered a second tunnel, and placed a second, newer and higher capacity generator in the expanded power plant, essentially as it appears today. The floods of 1929, while devastating to many, were controlled by the men at the Great Falls plant, and the dam showed its usefulness as a flood control unit. The site was acquired by TEPCO soon after its formation in 1922, and sold to TVA in 1939.31 It is still operated by TVA today, although modernization efforts have compromised its historic integrity.
The introduction of cheap electrical power into the homes of the average Tennessean was not entirely accomplished until the Rural Electrification Program initiated by the TVA took place in the late 1930s and 1940s. Nevertheless, electricity had a definite impact upon everyday life as well as its noted effects in hastening the pace of industrialization. After nearly three decades of private sector hydroelectric development, perhaps nowhere else can one found a better contemporary summation of the effect of electrical power upon the everyday life of Tennesseans than in the Seventeenth Biennial Report of the Railroad and Public Utilities Commission of the State of Tennessee (1929):

In discussing public utility progress, naturally our...thoughts turn to electricity.
The major part of the utility investment in the State is for electric service.
If we think of the development of our water powers, we think only of hydro-electric [sic] development.
The building of a dam across a stream to create a reservoir for municipal water supply would create little or no public interest, while the building of a dam for hydro-electric [sic]development...would be announced in block letters on the front pages of all our newspapers.
No one ever enthuses over the water supply or gas supply in his home, but just mention electricity and the most humdrum citizen immediately becomes a poet, and when we think of it, there is no other servant of humanity that performs so many useful duties for us.
It lights our houses, operates our domestic refrigerators for us and manufactures ice, it may be used on the other extremes to cook our food or heat our water; it operates fans t keep us cool in summer and operates our fuel oil furnaces to keep us warm in winter. It operates our washing machines and our ice cream freezers, our sewing machines and our curling tongs.
It starts our automobiles and creates a pathway of light for them, so that it is almost as easy to travel by night as by day.
It operates gigantic motors and most delicate radio sets.
With all these wonderful characteristics it is little wonder that the great mass of the public looks upon electric development with the keenest interest....32
One TEPCO advertisement for 1933 refers to the good old days, when lighting meant coal oil with its "good ole [sic] smell, soot, shadows, smoke, and some more soot and smoke." Not only was it a fire hazard, but "a

nice business builder for the local optician." The potato-spigot oil can had to be kept handy so that when "a flicker told of a wick running dry" it could be refilled. "Of course, in her courtin' days maybe Mom and her lamp do just that on purposes of [sic] a Sunday evening after church." Clean electric lights eliminated the Saturday morning chore of having to clean the lamp chimneys with paper and cloth. "Children of today know nothing of this unpleasant task for electricity has banished it."33
A full spectrum of household conveniences were made possible by electricity. These devices were touted as ending much of the drudgery of life in the past and included: irons, coffee makers, toasters, waffle irons, electric clocks, baby-bottle warmers, curling irons, vacuum cleaners, radios, water heaters, room or space heaters, sun lamps, ranges, refrigerators, washing machines, and heating pads. Moreover, mining operations, water pumps, cabinet making equipment, dairy farms, and the family stove could not be operated electrically because of these hydroelctric sites. Certainly all these twentieth-century items are common place and passe today, but their insertion into everyday life were in large measure the result of hydroelectric development in the United States and Tennessee from 1901 to 1933.34

One of the major and more long-lasting federal bureaucracies established by the New Deal of Franklin D. Roosevelt in 1933 was the TVA. Reflecting a commonly held distrust of big business which was held responsible for the Great Depression, the TVA would have as its mandate the complete control of electrical power development in the seven state Tennessee River Valley area. This process, which absorbed TEPCO assets in 1939, would continue until just after World War II. As historian William A. Doran put it, this era, particularly 1910-1920:

saw private power companies recognize the potential for hydroelectric power in Tennessee, with enough sites developed to prove that potential. The issue became, not whether the power could be exploited, but how. Full development of these resources had to wait...until there was agreement that something could be done....The question of who should or could best do so is the sort of problem where accepting one answer precludes the possibility of exploring the other and adherents of either view can, after the fact, merely continue to assert the advantages of the one or the other without possibility of proof.35

The creation of the TVA, often controversial and certainly powerful, concluded private-sector initiatives in the business of hydroelectric development in Tennessee. The contemporary primacy of the TVA has tended to diminish and otherwise obscure the role and contributions of private sector enterprises as well as some significant examples of earlier public sector resourcefulness in the development of hydroelectricity in the Volunteer State. Thus the possibility of exploring and preserving pre-TVA hydroelectric sites became, as Doran stated, the "sort of problem where accepting one answer precludes the possibility of exploring the other...." The material culture reminders of these important activities are testaments to this era and kind of early twentieth century private and public endeavor to modernize their environment and conquer their surroundings. Their day has come and gone. That they ultimately did not prevail matters less than the fact that they were the first examples of Tennessee's participation in the process of electrification which provided the foundations for future development of the electric energy industry and to its largely public control. As such these sites, even though they vary as to size and current condition, are the kinds of resources that are at the very core of cultural resource management because of their ability "to serve as tangible links to the past from which they have survived, in a way that written or narrated histories cannot."36 Their physical authenticity becomes the foundation for precipitating within the modern viewer the introspective awareness that the past is real after all and has more to offer than pat interpretations obfuscating otherwise vibrant domains of human activity in American and Tennessee history.
ENDNOTES FOR PART II

22 "Small Hydro Plants Passing Into History," Electro Topics 1934, p. 13, and; SCN, February 1, 1973, No. 58, p. 4, and; "Preliminary Survey Generating Stations Southern Cities Power Company," ca. 1929, for Shelbyville, Columbia, and Lillard's Mill hydrostations, and; Small Hydro Program Feasibility Reports for Old Columbia Dam, and Shelbyville Dam, and; Federal Register, Part III, Department of the Interior, National Park Service, National Register of Historic Places; Annual Listing of Historic Places, Tuesday, Vol 47, No. 22, February 2, 1982, p. 4967, and; Samuel H. Shannon, "A Study of the Social and Economic History of the Columbia Reservoir Area, vol. II: 1890-1945, (1989), p. 160, and; Cultural Resources Program, Division of Land and Forest Resources, Preliminary Case Report: Columbia Dam and Reservoir Project, TVA, August 1981, pp. 30-31, and; Cultural Resources Program, Division of Land and Forest Resources, TVA, Request for a Determination of Eligibility for the Architectural Resources for the Proposed Columbia Dam and Reservoir, Columbia, Tennessee, January 20, 1981. Inasmuch as Lillard's Mill's counterparts in Columbia and Shelbyville exceed it in terms visual integrity - both retain the brick superstructure - design similarity, and share common corportate origins as well as the source for hydropower, it appears only correct and logical to extend National Register eligibility to them as well.
23 Telephone conversation with Mr. John Lunn, son of Roland, Capitol Building, Nashville, Tennessee,

March 30, 1989, and; Morris, Encyclopedia, p. 391.
24 John A. Switzer, "The Ocoee River Power Development," The Resources of Tennessee, vol. 11, no. 2 (February, 1912), p. 42, and; George Byrne, "Tennessee to Have Another Great Water Power," The Resources of Tennessee, vol. II, no. 1 (January, 1912), pp. 19-22, and; Francis R. Weller, "The Watauga Power Company's Hydro-Electric Development," The Resources of Tennessee, vol. 1, no. 5 (November, 1911), pp. 183-187, and; Frank Merritt, Later History of Carter County, 1865-1980, (Elizabethton, Tenn.: Homecoming '86 Heritage Project, 1987), pp. 36, 38, 40, 41, 105-106, 117-118, 120-122, 125, and; William A. Doran, "Early Hydro-Electric Power in Tennessee," Tennessee Historical Quarterly, Vol. XXVII, No. 1 (Spring 1968), pp. 76-77 (hereafter: Doran, "Early Hydro").
25 "Progress in Water Power Development," The Resources of Tennessee, vol. 1, no. 6 (December, 1911), pp. 238-241. See also: E. Raymond Evans, and Vicki Karhu, "Inventory of Historic Architecture in Polk County, Tennessee," October, 1984, pp. 17-20, Tennessee Historical Commission, and; Robert L. Johnson, "Comparative Evaluations and Proposals for Preservation of TVA's Oldest Hydroplants," December, 1988, and; TVA, Office of Natural Resources and Economic Development, Division of Water Resources, Water Systems Development Branch, Rehabilitation Studies, Ocoee No. 1, Report No. WR28-1-63-100, May, 1986, and; Chattanooga Times, May 11, 12, 1911, and; SCN, August 1, 1974, No. 76, and; "The Ocoee Hydro-Electric Development," Engineering Record, vol. 65, no. 25, pp. 676-679, and; Doran, "Early Hydro," pp. 73-74, and; John A. Switzer, "The Ocoee River Power Development," The Resources of Tennessee, vol. II, no. 2 (February, 1912), p. 42. [There could be opportunities for archaeological study comparing the material culture remains of the three separate worker subculture compounds.]
26 National Register of Historic Places Portfolio for Ocoee No. 2, on file at the Tennessee Historical Commission, and; Robert L. Johnson, "Comparative Evaluations and Proposals for Preservation of TVA's Oldest Hydroplants," December, 1988, and; J. A. Switzer, "Recent Water Power Developments in Tennessee," The Resources of Tennessee, vol. IV, no. 3 (July, 1914), p. 128.
27 TVA, Office of Natural Resources, Division of Water Resources, Water Systems Development Branch, Hydropower Rehabilitation Preliminary Feasibility Report, Nolichucky Project, Report No. WR28-2-62-100, April, 1982. See also: Ray Stahl, Greater Johnson City: A Pictorial History, (Norfolk, Va.; The Donning Co., 1983), p. 142.
28 Switzer,"The Ocoee," (Feb. 1912), p. 129, and; Inez E. Burns, History of Blount County, Tennessee: From War Trail to Landing Strip, 1795-1955, (Nashville, Tenn.: Tennessee Historical Commission, 1957), pp. 284-285, and; Aluminum Company of America, "CALDERWOOD PROJECT: Summary of Principal Features," March, 1970, and; "Blount County Architectural Survey, 1983-84," Tennessee Historical Commission, folders 4358 and 4359. See also: Donald C. Jackson, Great American Bridges and Dams, the Great American Places Series, (Washington, D.C.: Preservation Press, 1988), p. 185 [The state geologist, J. A. Switzer, was concerned about the development of Tennessee's rivers by "private monopoly." In an address to the State Legislature on February 3, 1913, he advocated a law to conserve these natural resources for the purposes of "prohibiting mergers and agreements in restraint of trade or for the...limiting output or controlling prices." His slogan was: "The water powers of Tennessee for the benefit of all the people of Tennessee!" See: John A. Switzer, "Conservation of the Water Powers of Tennessee," The Resources of Tennessee, vol. III, no. 2 (April, 1913), pp. 74-79, esp. pp. 77 and 79; the state never adopted any such law.]
29 J. A. Switzer, "The Power Development at Hale's Bar," The Resources of Tennessee, vol. II, no. 3 (March, 1912), p. 90. See also: James W. Livingood, A History of Hamilton County, Tennessee, (Memphis, Tenn.; Memphis State University Press, 1981), pp. 323-324, 388, 396. (For a comprehensive treatment of the corporate history see: Crouch, "History," and William A. Doran, "Early Hydroelectric Power in Tennessee," Tennessee Historical Quarterly, vol. XXVII, no. 1 (Spring, 1968), pp. 72-82.), and; SCN, November 1, 1972, No. 55, pp. 1-7, October 1, 1973, No. 66, pp. 1-5, and January 1, 1975, No. 81, pp. 2-10. (For an Agrarian's nostalgic and disapproving view of hydroelectric development along the Tennessee River see: Donald Davidson, The Tennessee: The New River, Civil War to TVA, vol. 2 of 2, illus. by Theresa Sherrer Davidson, (New York: Rinehart & Company, 1948), chapter XI, "The Uneasy Reign of King Kilowatt I," pp. 176-194.
30 SCN, November 1, 1973, No. 55, October 1, 1973, No. 66, January 1, 1975, No. 81, and; Davidson, The Tennessee, vol. 2, pp. 176-178, and; Chattanooga News Free-Press, March 19, 1966, and; Hughes, Networks, p. 366.
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33 "In the Good Old Days," advertisement in Electro Topics, Vol. VXI, no. 3 (May/June, 1933), p. 20
34 "How many electrical conveniences did you have in the 'good old days?'," Electro Topics, Vol. XV, no. 6 (Nov./Dec. 1932), p. 32.See also: Thomas W. Martin, "Hydro-Electric Development in the South," pp. 241-

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