PDHonline Course C797 (12 PDH)

TVA: The Great Experiment

Instructor: Jeffrey Syken

2020

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TVA
The Great Experiment

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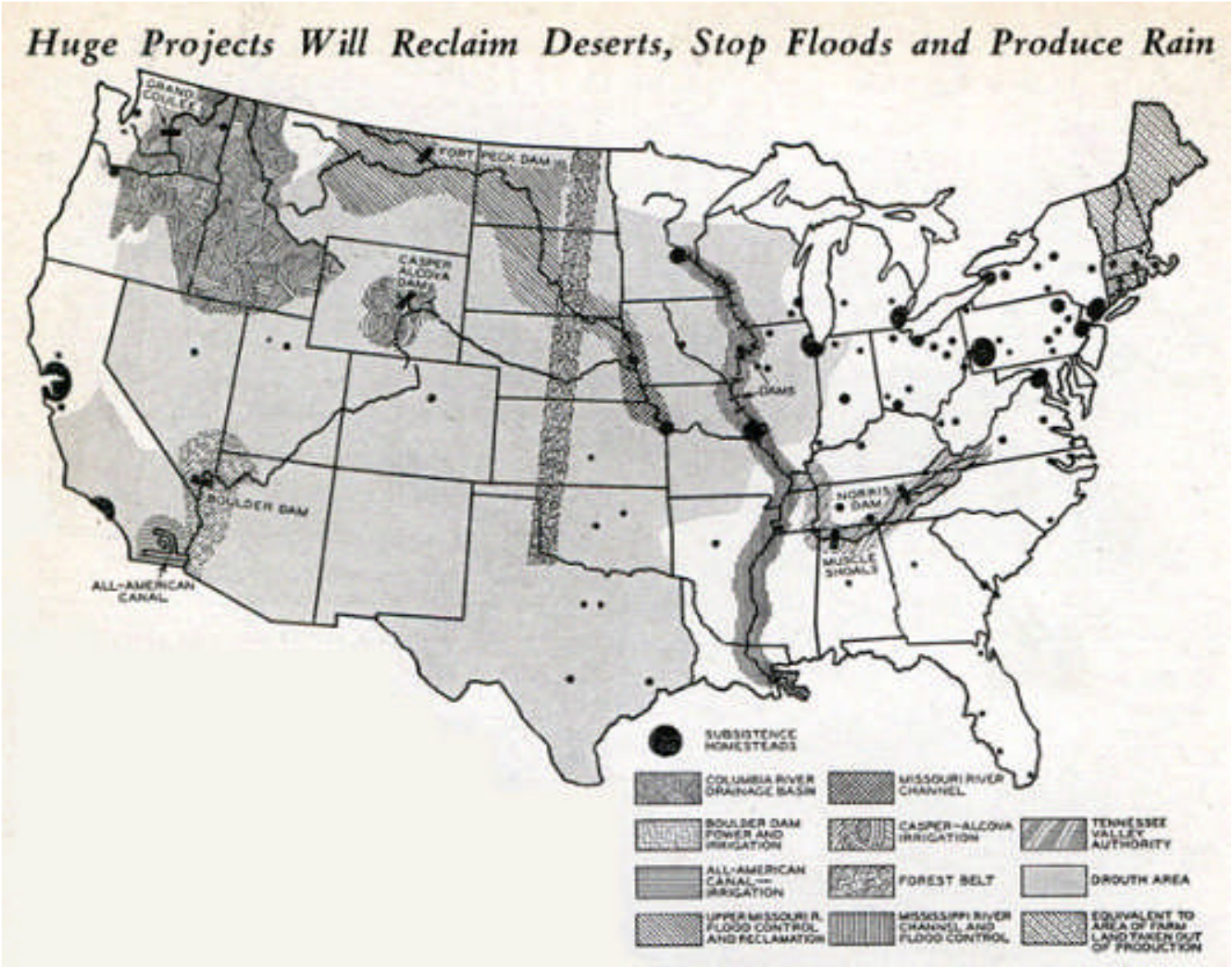
Part 1

Revising Geography

A Clear and Present Danger

"Disaster threatens the United States. Productive farm lands are becoming desolate deserts. Cleared lands, where once stood thick forests, are being ravaged by destructive floods. Uncle Sam is in danger of losing hundreds of thousands of acres that are now helping to feed his 125,000,000 citizens. To avert the threatened calamity the government is in effect revising the geography of the country. Where waste land now exists, happy farmers are expected to till a productive soil. Where flat prairies sweep to horizons on all sides, great forests will arise. Where rivers never existed, water will flow. Shallow, sluggish streams will become principal arteries of commerce. And, in some cases, where civilization rules to-day, a wilderness will exist tomorrow…"

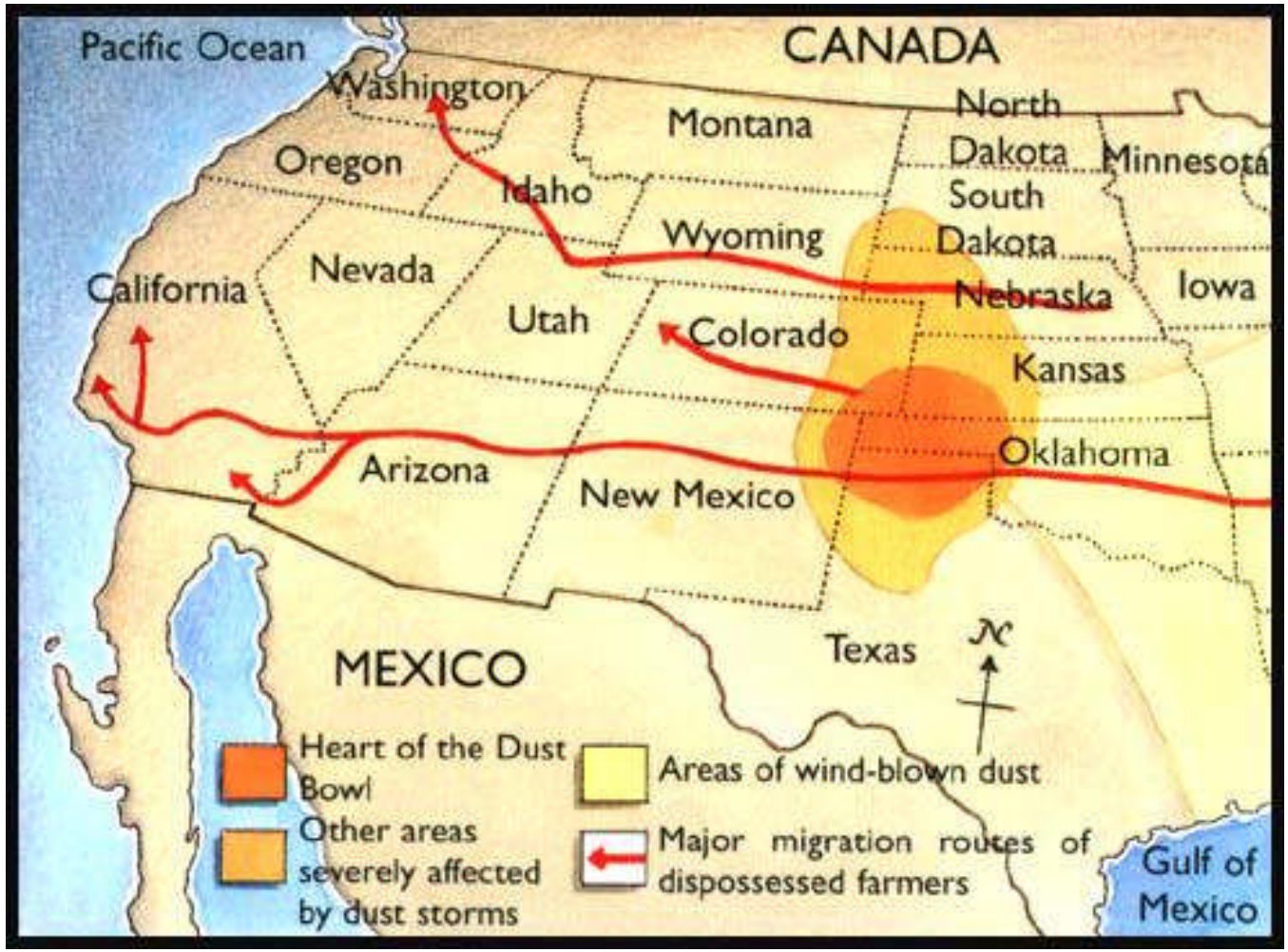
***Modern Mechanix*, November 1934**



<u>Above</u>: caption: "Map shows outstanding government projects which will change character of country in many sections. To control crop production farmers will be asked to stop tilling 50,000,000 acres, an area equal to all New England states."

"…The disaster creeping upon the country reached its climax in the tragic drought of last summer. Although more devastating than expected, the drought has been foreseen for years by government experts. They watched rich, black soil being carried away by cloudbursts, floods, and strong winds. They discovered that 75 per cent of the cultivated land in the country was seriously affected by this soil erosion, that in all 17,000,000 acres have been destroyed beyond salvation, that this erosion carries away 126,000,000 pounds of plant food a year, and that the annual loss to farmers is $200,000,000 annually. When the drought swept over the country, it left behind it damage amounting to $5,000,000,000. In all, 24 states, containing 27,000,000 persons and totaling 60 per cent of the entire area of the United States, suffered from the searing heat and the lack of rain. Thousands of acres of grain withered and died. Crops of corn, wheat, oats, barley, rye, flaxseed, and buckwheat were the smallest in 30 years…"

***Modern Mechanix*, November 1934**


Pacific Ocean
CANADA
Washington
Montana
North Dakota
Minnesota
Oregon
Idaho
South Dakota
Wyoming
Nevada
California
Nebraska
Iowa
Utah
Colorado
Kansas
Oklahoma
Arizona
New Mexico
Texas
MEXICO
Heart of the Dust Bowl
Other areas severely affected by dust storms
Areas of wind-blown dust
Major migration routes of dispossessed farmers
Gulf of Mexico

"…Streams dried up. The Mississippi, Colorado, and Missouri rivers sank to the lowest levels on record. Water became so scarce that farmers traveled miles to get water for their stock and families. To save the land from thirst the government shipped thousands of gallons to the stricken areas by pipe line and railroad tank cars. When pastures became dry tinder and cattle slowly starved…"

***Modern Mechanix*, November 1934**

"…the government stepped in to buy one-sixth of all the cattle and one out of every ten sheep in the land. Of the 67,532,000 cattle in the country, the government set out to buy 10,000,000 from suffering farmers. Thousands of these cattle were shipped to good pasture lands to be fattened for market. Thousands of others were in such condition that they were killed on the spot. In Texas alone cowboys shot 1,000 starved cattle a day. These were shipped to the nearest packing plants where the carcasses were converted into canned meat for the needy, in many cases the farmers who raised the cattle. Their crops and cattle gone, almost 4,000,000 people had to turn to the government for aid. In a few months the government had spent $160,000,000 of a $525,000,000 relief fund to help these sufferers…"

***Modern Mechanix,* November 1934**

Left: caption: "Burial of government purchased and condemned livestock, near Atkinson, Holt County, Nebraska"

"…To a certain extent the crop reduction program, instituted by the government last spring, was an attempt to forestall the danger that threatened American agriculture. Droughts may be phases in nature's cycle from plenty to scarcity, but their ravages are increased by man's lack of foresight. Dry land, that always should have remained range country, was tilled reducing its ability to hold moisture and support plant life. Laid bare to hot, dry winds it was robbed of the moisture that once created rains in the country and finally the land itself was carried away in the form of dust storms. There remained only shifting, desolate desert sands, unable even to support the buffalo grass that once covered the prairies…"

Modern Mechanix, **November 1934**

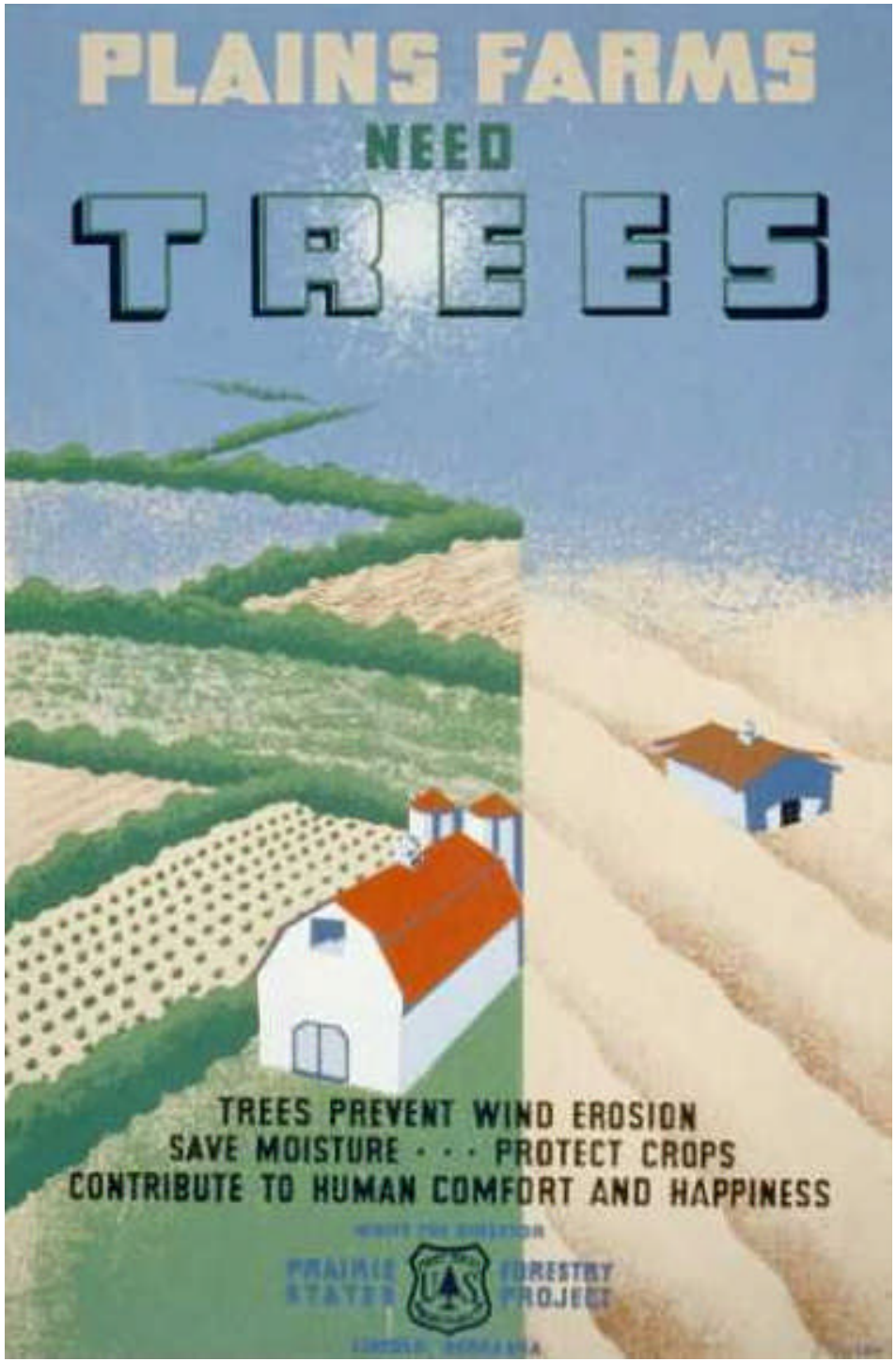
"…In many sections the most valuable crop was raised year after year on the same soil until its productiveness for any crop was ruined. The American domain was so vast that farmers, finding their soil becoming poor, simply cut down the forests on their land, planted it with corn, wheat or cotton, and renewed the process of soil destruction. The forest gone, the land was unable to hold back moisture and when spring rains came floods swept the country carrying away with them to the sea more valuable soil of the land. In Tennessee, government experts found that one rainstorm washed away thirty-nine tons to the acre…"

***Modern Mechanix,* November 1934**

"…To stop destruction of land and the decreasing price of staple products from these lands, the government instituted a crop reduction program. Of the total 350,000,000 acres of farm land, 43,750,000 acres, an area larger than all the New England states combined, was to be retired. The government paid farmers from $10 to $17 an acre for every parcel of land on which they stopped growing wheat, corn, cotton, or tobacco. Of the average wheat farm of 30 acres, four were to be retired…"

***Modern Mechanix*, November 1934**

<u>Left</u>: caption: "A Roosevelt County New Mexico farmer and a County Agricultural Conservation Committee representative review the provisions of the Agricultural Adjustment Act (AAA) farm program to determine how it can best be applied on that particular acreage in 1934." The AAA was a New Deal-era federal law which reduced agricultural production by paying farmers subsidies not to plant on part of their land and to kill off excess livestock. Its purpose was to reduce crop surplus, therefore effectively raising the value of crops.



"…In an effort to stop droughts and floods and to restore the fertility of the soil, farmers in the western corn and wheat states were advised to plant trees on the retired land; in the southern cotton states, they were urged to raise garden crops for the use of their families and to plant pulpwood trees near rivers; and in the tobacco sections to convert the land into pastures…"

***Modern Mechanix*, November 1934**

Left: a *Prairie States Forestry Project* poster (ca. 1936) promoting the planting of trees to prevent soil erosion

"…In addition the government is expected to retire an equal area, 50,000,000 acres, and let it become a wilderness. After a tour of inspection Reclamation Commissioner Elwood Mead declared that the western half of the Dakotas, eastern Montana and Wyoming should be abandoned and planted with buffalo grass. The government is ready to spend $25,-000,000 to move families from unproductive areas to better land…"

***Modern Mechanix,* November 1934**

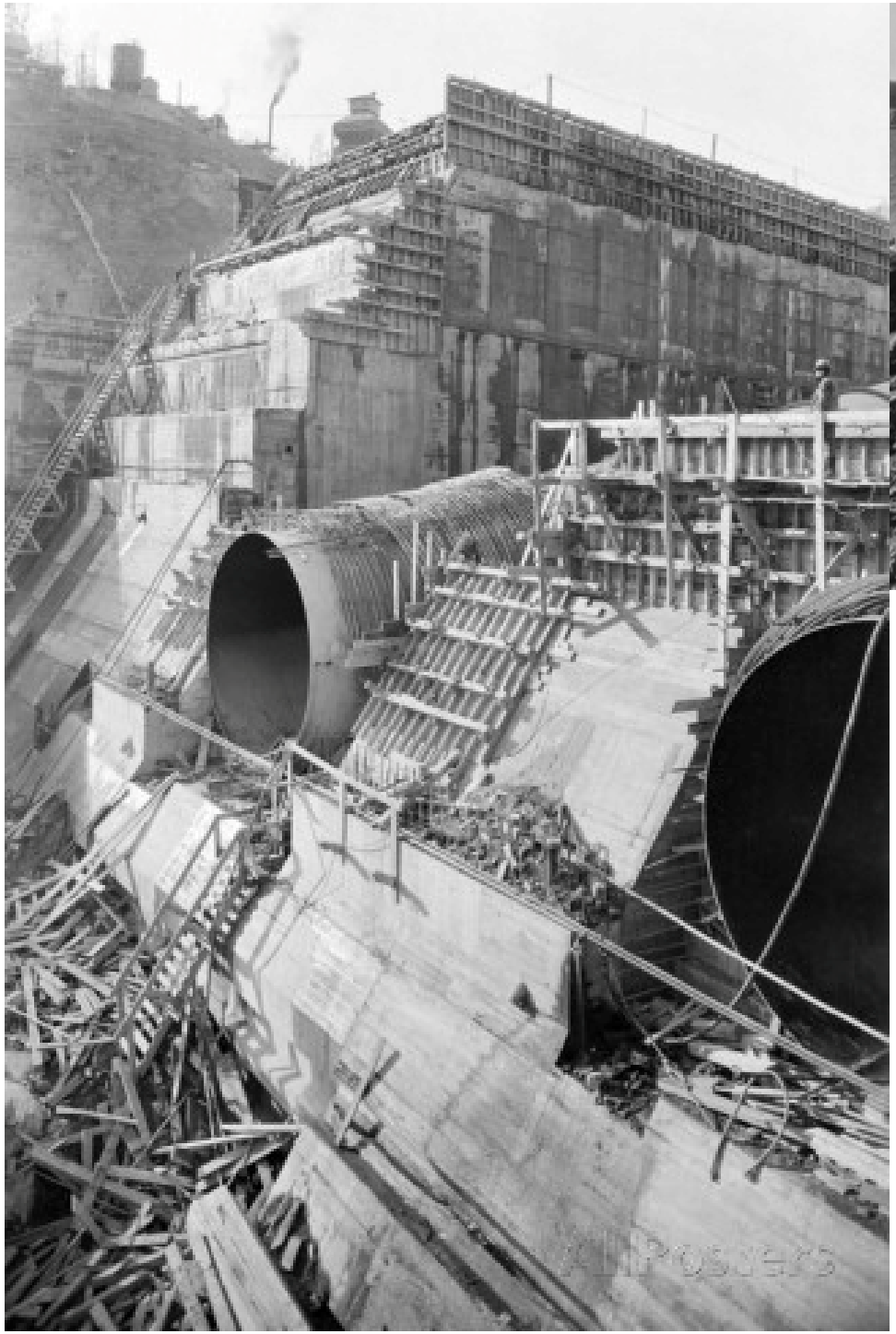
Realizing the Potential

"…Approximately one billion dollars is being spent by the federal government to develop the hydroelectric resources of the nation. This vast sum is split among nine vast plants. These plants stretch from northwest to southeast and from southwest to north central United States. The greatest is Muscle Shoals or the Tennessee Valley Development. Here the government has projected an outlay of some $300,-000,000…"

***Popular Mechanics,* January 1935**

The Forty-Ninth State

"…To accomplish this the government is creating new frontiers. Each of the government's reclamation projects will provide new land for these people. The most outstanding experiment is being conducted in the territory, sometimes called the forty-ninth state, under control of the Tennessee Valley Authority. This territory, comprising 40,000 square miles, an area as large as England and crossing seven states – Tennessee, Virginia, North Carolina, Georgia, Alabama, Mississippi and Kentucky - is the scene of engineering feats and a practical test of economic and social theories never witnessed outside of Soviet Russia…"
***Modern Mechanix*, November 1934**



"…For sheer magnitude of undertaking and results expected the TVA program surpasses all the other ventures. Two great dams are being built here in addition to the one already existing – the Wilson dam. Wheeler dam, located fifteen miles above Wilson dam, will provide a storage lake eighty miles long. Norris dam, 400 miles distant up the river, beyond Knoxville, will span the river 1,800-feet and contribute power by transmission line to the Muscle Shoals plant…"

***Popular Mechanics,* January 1935**

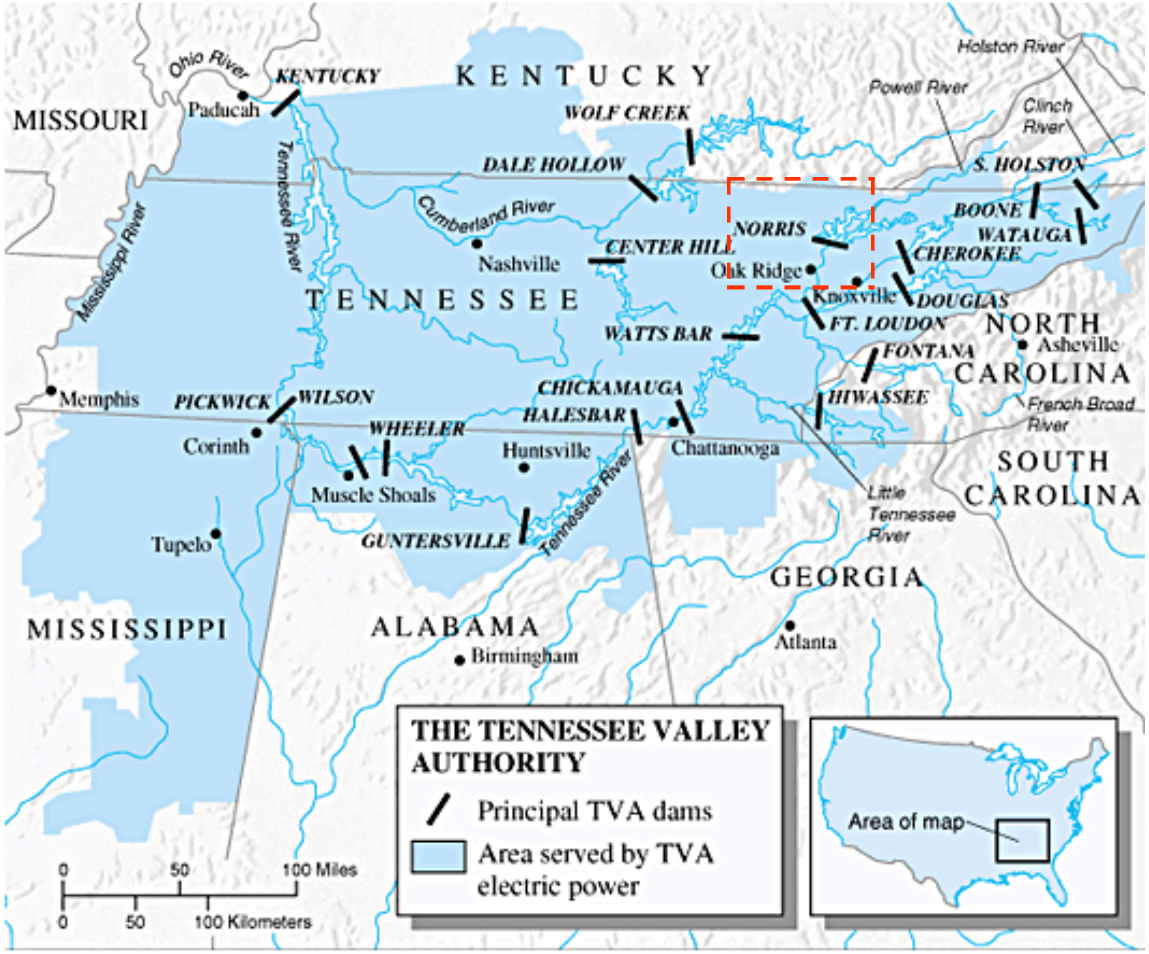
<u>Above</u>: caption: "Aerial View of the TVA's Wheeler Dam Construction site"

<u>Left</u>: caption: "Progress of construction at the TVA's Norris Dam"


TENNESSEE VALLEY
AUTHORITY
TRANSMISSION LINE
MUSCLE SHOALS to NORRIS DAM

"…In this valley, 700 miles long and 50 miles wide containing 6,000,000 persons, the TVA will conduct the government's initial drought experiments, for much of the land is in danger of becoming a desert. Under the TVA's domain are the Wheeler dam and the Muscle Shoals dam in Alabama. In less than two years the TVA is expected to complete the Norris dam, most important of the three dams, on the Clinch river, 80 miles above its entrance into the Tennessee. The main dam will be 20 stories high and will create a lake with a shore line of 900 miles. The size of the project can be realized when it is pointed out that the shore line of Lake Michigan is 1,000 miles long. With the aid of these dams the TVA will seek to improve agriculture, retard soil erosion, control floods, open the Tennessee river to navigation, and produce electric power…"

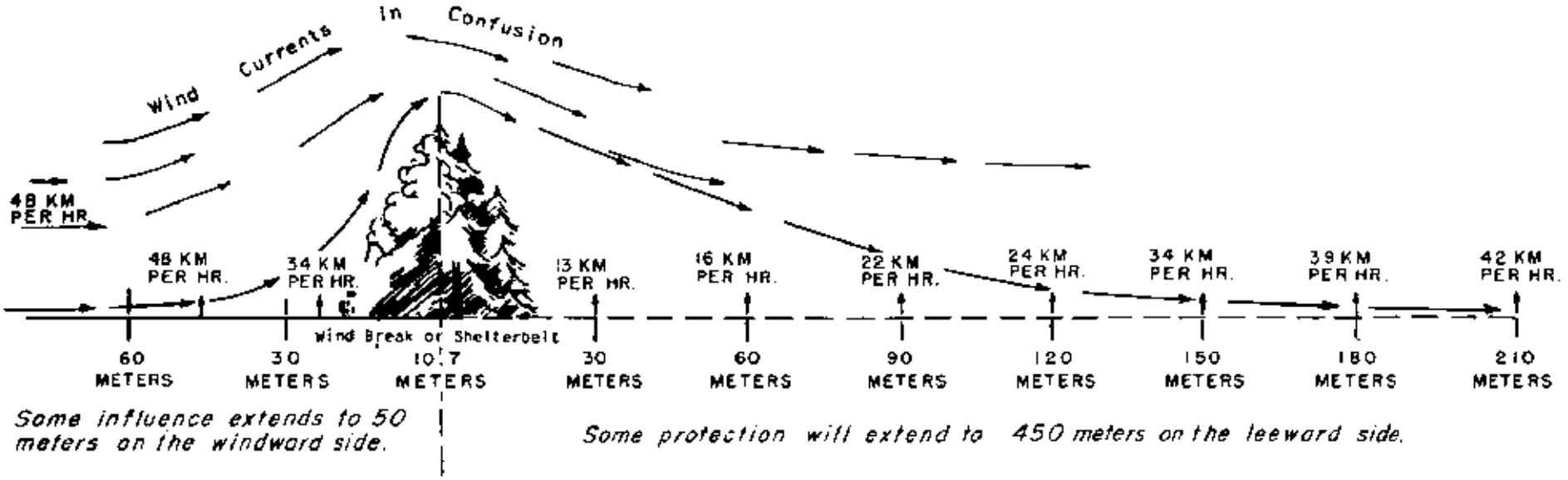
***Modern Mechanix,* November 1934**


KENTUCKY
MISSOURI
Ohio River
Paducah
KENTUCKY
WOLF CREEK
DALE HOLLOW
Tennessee River
Mississippi River
Cumberland River
Nashville
CENTER HILL
TENNESSEE
Memphis
PICKWICK
WILSON
WHEELER
Corinth
Muscle Shoals
Huntsville
Tupelo
GUNTERSVILLE
Tennessee River
MISSISSIPPI
ALABAMA
Birmingham
Holston River
Powell River
Clinch River
S. HOLSTON
BOONE
WATAUGA
CHEROKEE
NORRIS
Oak Ridge
Knoxville
DOUGLAS
FT. LOUDON
WATTS BAR
FONTANA
NORTH CAROLINA
Asheville
HIWASSEE
French Broad River
CHICKAMAUGA
HALESBAR
Chattanooga
Little Tennessee River
SOUTH CAROLINA
GEORGIA
Atlanta
THE TENNESSEE VALLEY AUTHORITY
Principal TVA dams
Area served by TVA electric power
Area of map
0 50 100 Miles
0 50 100 Kilometers

"…Most sensational of the government's drought projects is the planting of a forest 100 miles wide and 1,000 miles long across the states of North and South Dakota, Nebraska, Kansas, Oklahoma, and Texas. At a cost of $75,000,000 the government expects to increase rainfall in the drought stricken area and to cut down wind velocity that is responsible for carrying away rich soil in the form of dust storms. Three and one-half billion trees will be planted in strips 100-feet wide and a mile apart on the total area of 100,000 square miles. Experimental forest strips have shown that wind velocity can be reduced 25 per cent, evaporation 30 per cent, and rainfall increased three inches…"

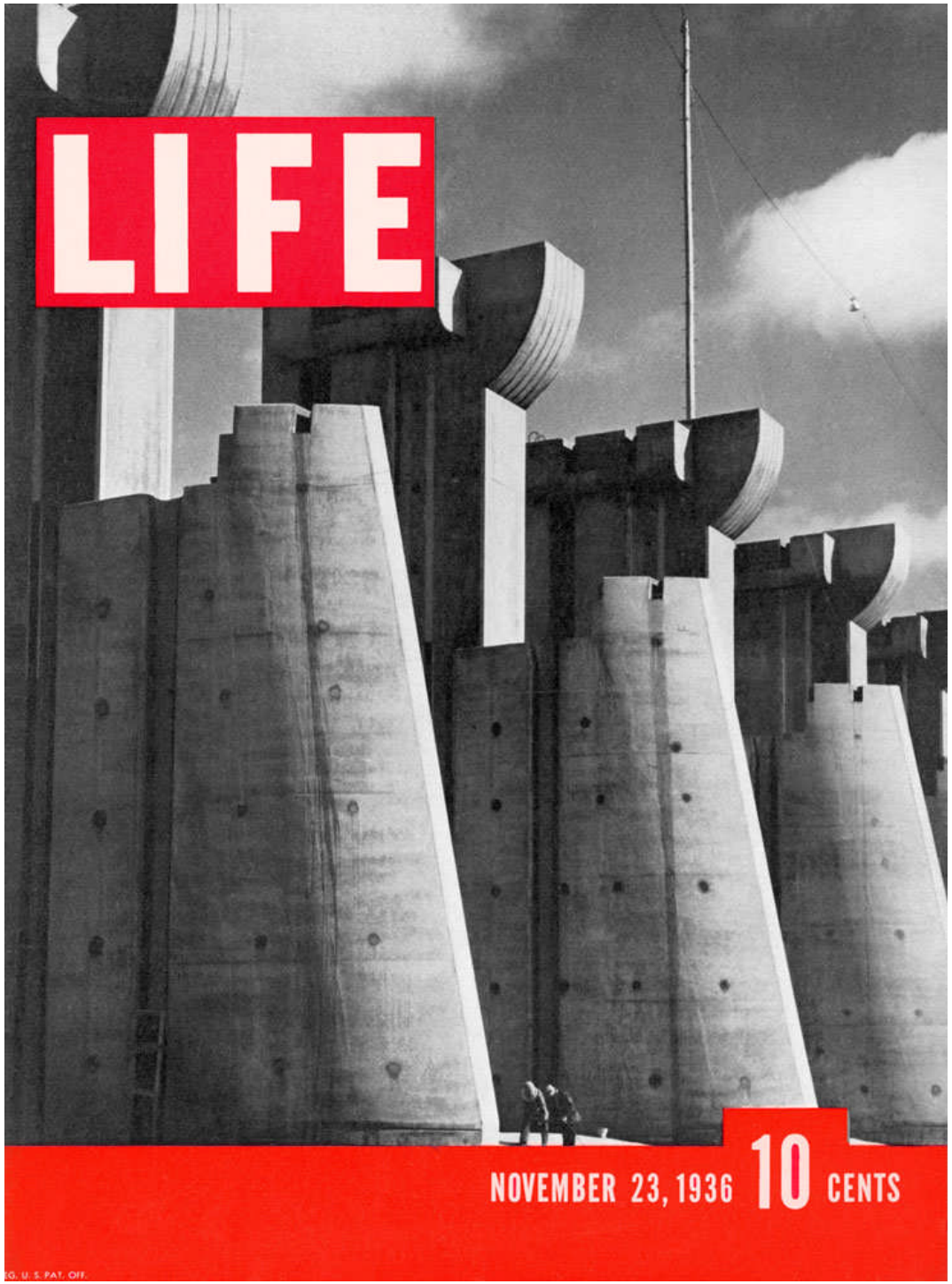
***Modern Mechanix,* November 1934**

<u>Left</u>: caption: "Major Planting Areas of the Prairie States Forestry (Shelterbelt) Project, 1935-42 USDA Forest Service"



<u>Above</u>: caption: "Tree plantings are used by farmers and landowners to protect their homes and livestock from cold and hot winds and to assist in the control of erosion on cultivated fields caused by high winds.

<u>Left</u>: caption: "A farm in Nebraska with shelterbelts around the farm buildings and the cultivated fields"



"…Other outstanding projects which will open streams to navigation, generate power, or put new lands into cultivation to replace abandoned areas include: the Mississippi river waterway at a cost of $100,000,000; the Columbia river reclamation and power dams, $100,000,000; Boulder Dam, $48,800,000; Fort Peck Dam, $175,000,000; Missouri river channel, $18,000,000; Casper-Alcova project, $22,700,000; the All-American canal, $6,000,000; and subsistence homesteads, $25,000,000…"

***Modern Mechanix,* November 1934**

<u>Left</u>: caption: "First cover of LIFE magazine, featuring Fort Peck Dam, November 23, 1936 – photograph by Margaret Bourke White"


DESERT-RANCH
H.J.MERSDORF-PROP
HAVE FAITH IN GOD
AND U.S. RECLAMATION

The Humanitarian Angle

"…The government has in mind with these great power plants to serve great sections of the United States with cheap electrical power, to furnish 'yardsticks' by which power production costs in private and public utility plants can be measured and to open up for exploitation hitherto unexplored areas of our national domain. The Tennessee Valley has an additional humanitarian angle – that of enlarging the social and economic outlook of thousands of folk in the valley…"

***Popular Mechanics*, January 1935**

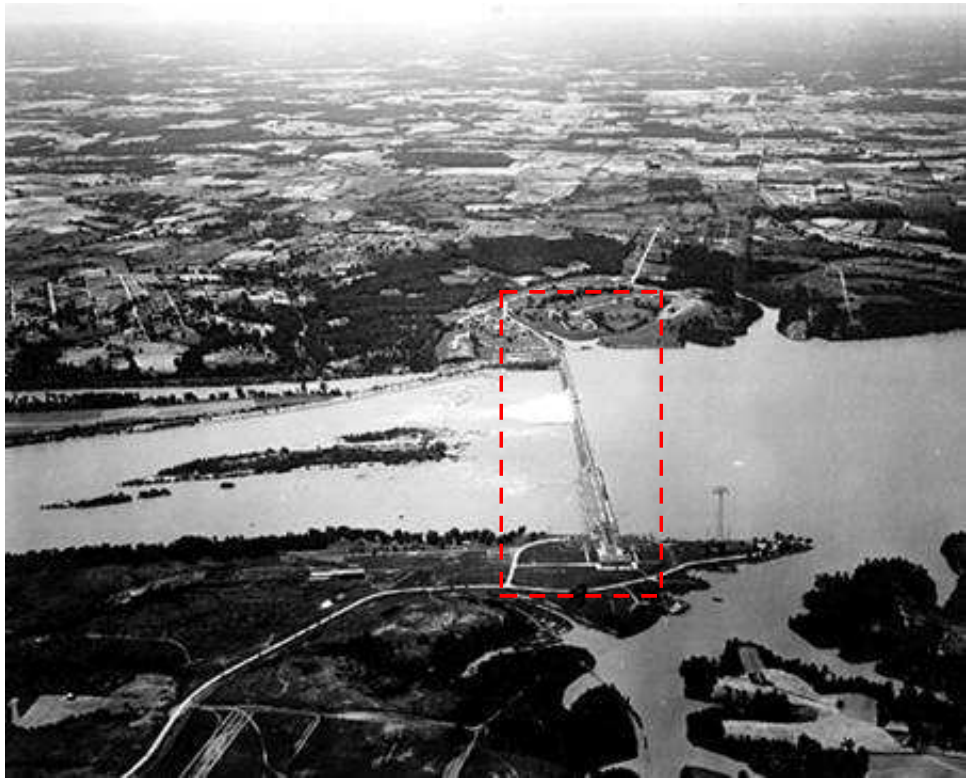
<u>Left</u>: caption: "A father in Hartsville, Alabama shows his children how to use an electric iron (ca. 1940s)"


SEAL OF THE TENNESSEE VALLEY AUTHORITY
TVA
1933

Part 2

The Valley of the Tennessee

A Great Experiment



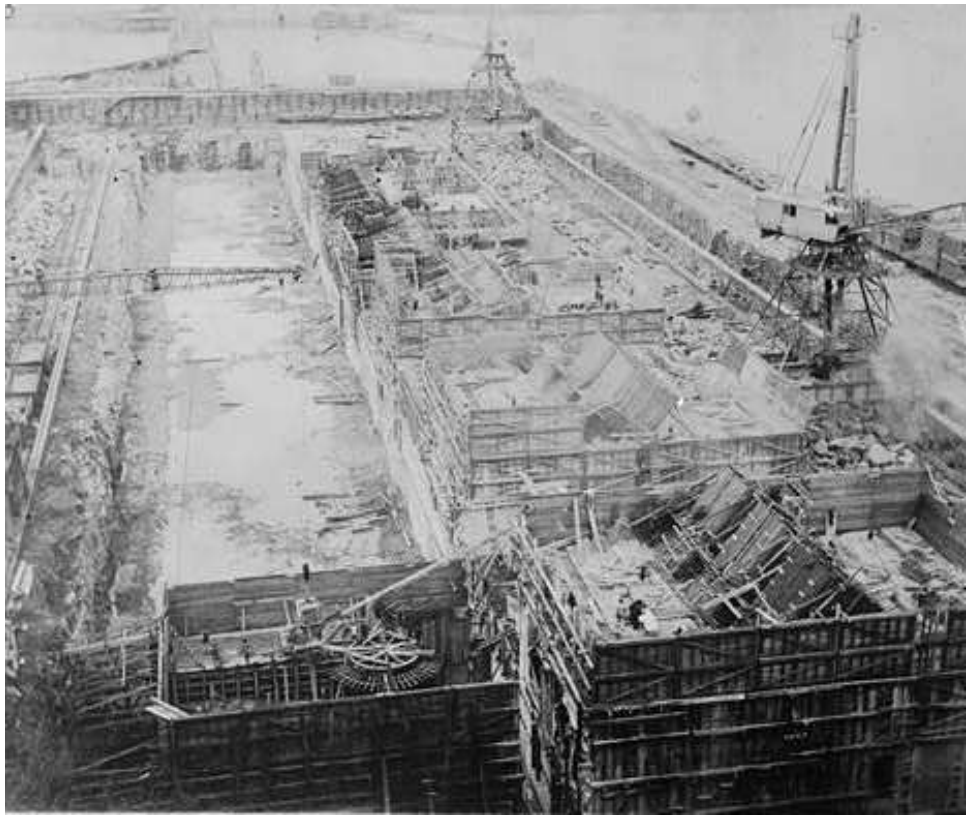
"Twenty-five years ago the Tennessee River Improvement Association was formed. The primary purpose of this organization was to improve conditions for river navigation; power development was a secondary aim. Extensive surveys were made of the entire Tennessee Valley and a considerable portion of these surveys were devoted to determining the feasibility of a dam at Muscle Shoals…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "Wilson (Muscle Shoals) Dam"

"…The World War period intervened and it produced a search for a suitable location and Wilson Dam was built. In the years following the World War Wilson Dam lay idle but the government spent $1,106,000 on surveys to determine and evaluate the potentialities of the Tennessee River Valley. A 734 page report accompanied and illustrated by a large number of charts and maps summarizing this work was compiled by the United States Corps of Engineers. This report forms House Document 328 and is one of the most thorough documents of its kind ever submitted to our government…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)



"…Considering these activities in the Tennessee Valley in this past twenty-five year period, one can readily understand why it and not some other section of the country was selected for the great experiment that now is being carried out by the Tennessee Valley Authority…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "General view looking North, showing the construction of the power generating facilities – Wilson Dam & Hydroelectric Plant, spanning the Tennessee River at Muscle Shoals, AL"

All Forms of Human Concern

"The continued idleness of a great national investment in the Tennessee Valley leads me to ask Congress for legislation necessary to enlist this project in the service of the people. It is clear that the Muscle Shoals development is but a small part of the potential public usefulness of the entire Tennessee River. Such use, if envisioned in its entirety, transcends mere power development: it enters the wide field of flood control, soil erosion, deforestation, elimination from agricultural use of marginal lands, and distribution and diversification of industry. In short, this power development of war days leads logically to national planning for a complete river watershed involving many states and the future lives and welfare of millions. It touches and gives life to all forms of human concerns..."

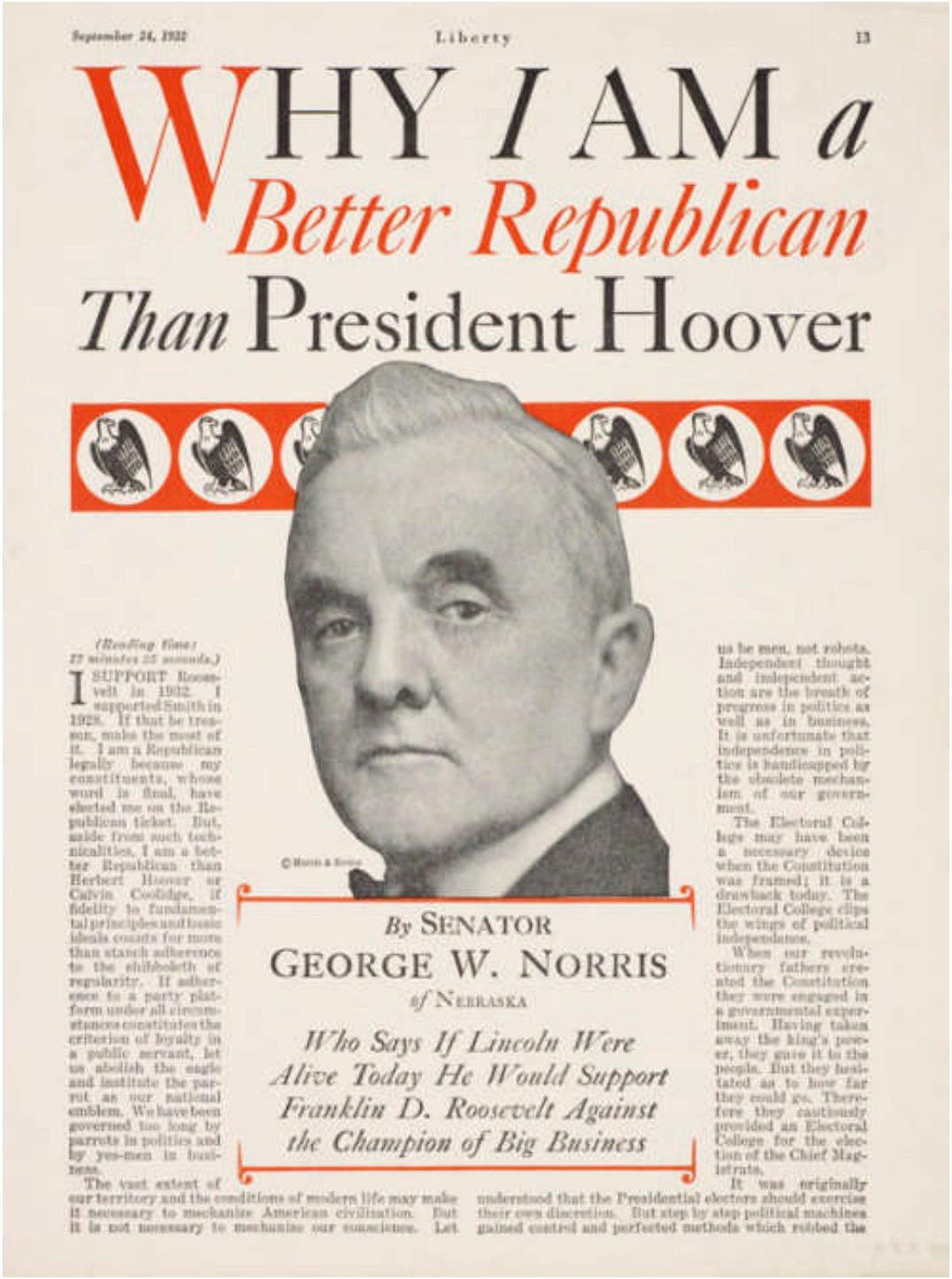
***Franklin Delano Roosevelt,* POTUS (ca. 1933)**

"…I, therefore, suggest to the Congress legislation to create a Tennessee Valley Authority - a corporation clothed with the power of a government but possessed of the flexibility and initiative of private enterprise. It should be charged with the broadest duty of planning for the proper use, conservation, and development of the natural resources of the Tennessee River drainage basin and its adjoining territory for the general, social and economic welfare of the nation. This authority should be clothed also with the necessary power to carry these plans into effect, Its duty should be the rehabilitation of the Muscle Shoals development and the coordination of it with the wider plan."

***Franklin Delano Roosevelt,* POTUS (ca. 1933)**

RE: the *Tennessee Valley Authority* (TVA) was created by an Act of Congress on May 18th 1933, from a Bill presented by Senator Norris, of Nebraska

<u>Left</u>: caption: "President Franklin D. Roosevelt signs the TVA Act on May 18, 1933. The president is surrounded by various members of Congress from the TVA region, and at his left shoulder is Senator George Norris (highlighted) of Nebraska, after whom Norris Dam is named."



September 24, 1932 Liberty 13

WHY I AM a Better Republican Than President Hoover

(Reading time: 27 minutes 25 seconds.)

I SUPPORT Roosevelt in 1932. I supported Smith in 1928. If that be treason, make the most of it. I am a Republican legally because my constituents, whose word is final, have elected me on the Republican ticket. But, aside from such technicalities, I am a better Republican than Herbert Hoover or Calvin Coolidge, if fidelity to fundamental principles and basic ideals counts for more than stanch adherence to the shibboleth of regularity. If adherence to a party platform under all circumstances constitutes the criterion of loyalty in a public servant, let us abolish the eagle and institute the parrot as our national emblem. We have been governed too long by parrots in politics and by yes-men in business.

The vast extent of our territory and the conditions of modern life may make it necessary to mechanize American civilization. But it is not necessary to mechanize our consciences. Let us be men, not robots. Independent thought and independent action are the breath of progress in politics as well as in business. It is unfortunate that independence in politics is handicapped by the obsolete mechanism of our government.

The Electoral Colleges may have been a necessary device when the Constitution was framed; it is a drawback today. The Electoral College clips the wings of political independence.

When our revolutionary fathers created the Constitution they were engaged in a governmental experiment. Having taken away the king's power, they gave it to the people. But they hesitated as to how far they could go. Therefore they cautiously provided an Electoral College for the election of the Chief Magistrate.

It was originally understood that the Presidential electors should exercise their own discretion. But step by step political machines gained control and perfected methods which robbed the

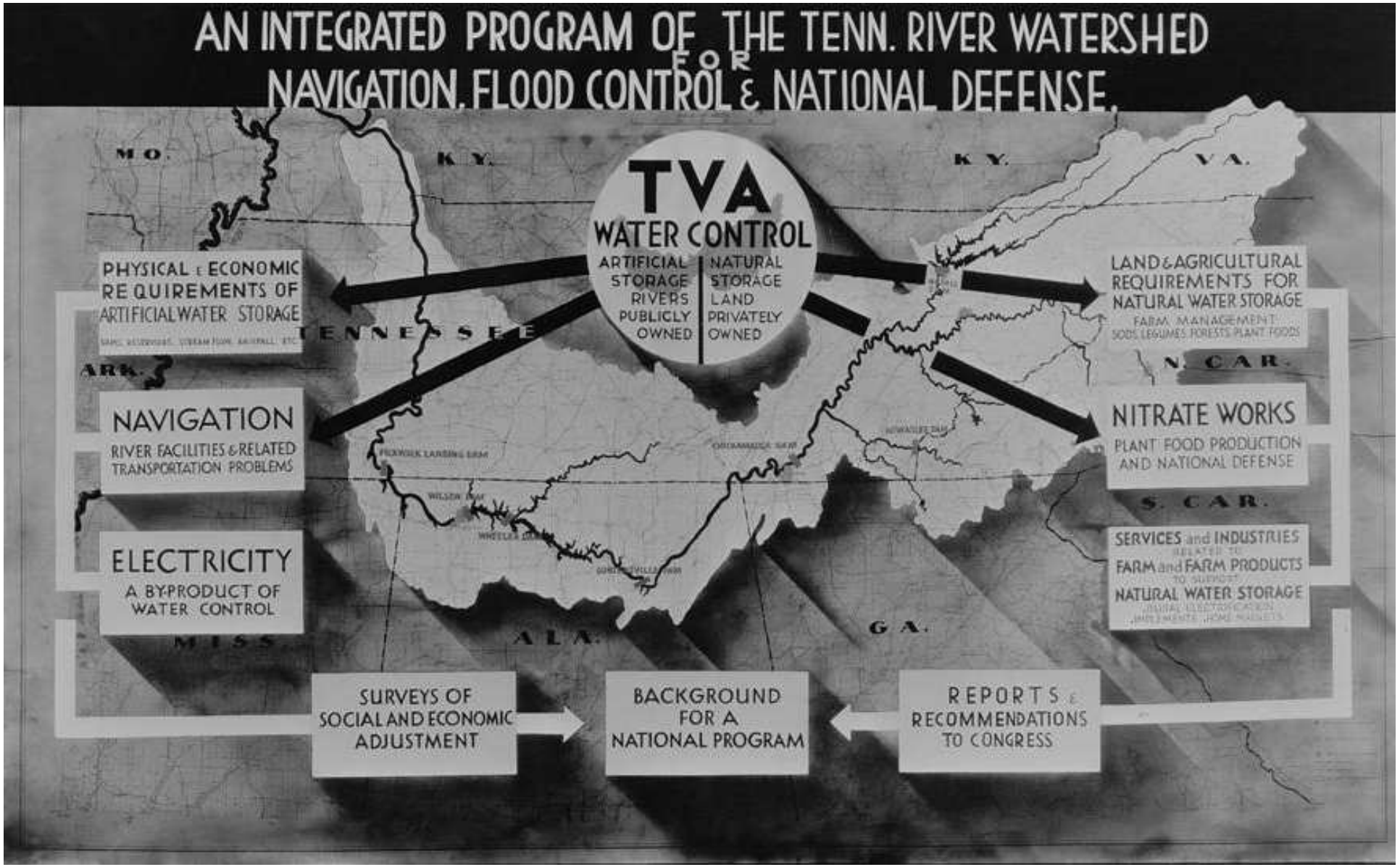
By SENATOR
GEORGE W. NORRIS
of NEBRASKA

Who Says If Lincoln Were Alive Today He Would Support Franklin D. Roosevelt Against the Champion of Big Business

The TVA was the brain-child of *George William Norris* (1861-1944), the eleventh child of a poor farming family who earned a law degree, moved to Nebraska and entered politics as a progressive liberal Republican. Norris helped found the *National Progressive Republican League* in 1911 and threw his support behind Theodore Roosevelt's insurgent *Progressive Party* candidacy in 1912. However, he refused to switch his party affiliation, maintaining his standing as a leading progressive Republican in the Senate. In the 1920s, Norris assumed chairmanship of the Agriculture and Forestry Committee/s and he became a leading advocate for Farmers and the labor movement. A true Republican maverick, Norris publicly challenged and opposed many of the measures promoted by the Harding, Coolidge and Hoover Administration/s, going so far as to publicly support Democratic presidential candidates in both 1928 and 1932.

"…To present the program of the Tennessee Valley Authority in all of its ramifications would defy description. However, the program may be presented as including navigation and flood control, the generation and sale of power, the building of dams, power plants and transmission lines, the development of fertilizers, and, under the immediate direction of the President, a program of social and economic planning with the aim of promoting the social and economic welfare of the region and of the nation. This more general program includes control of soil erosion, forestry, the balancing of agriculture and industry, the better and fuller use of natural resources, and such problems as the vocational adjustment of unemployed men and women to new or more productive fields of work…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)



<u>Above</u>: caption: "Display panel typical of the manner in which the Authority puts its case for comprehensive planning before the public. Explanatory material is placed at all powerhouse reception rooms, visitors' buildings and other public contact points. The increased understanding of natural resources, the techniques for their utilization and general planning for human welfare are considered valuable by-products of the Authority's program in themselves."

Fortune Favors the Bold

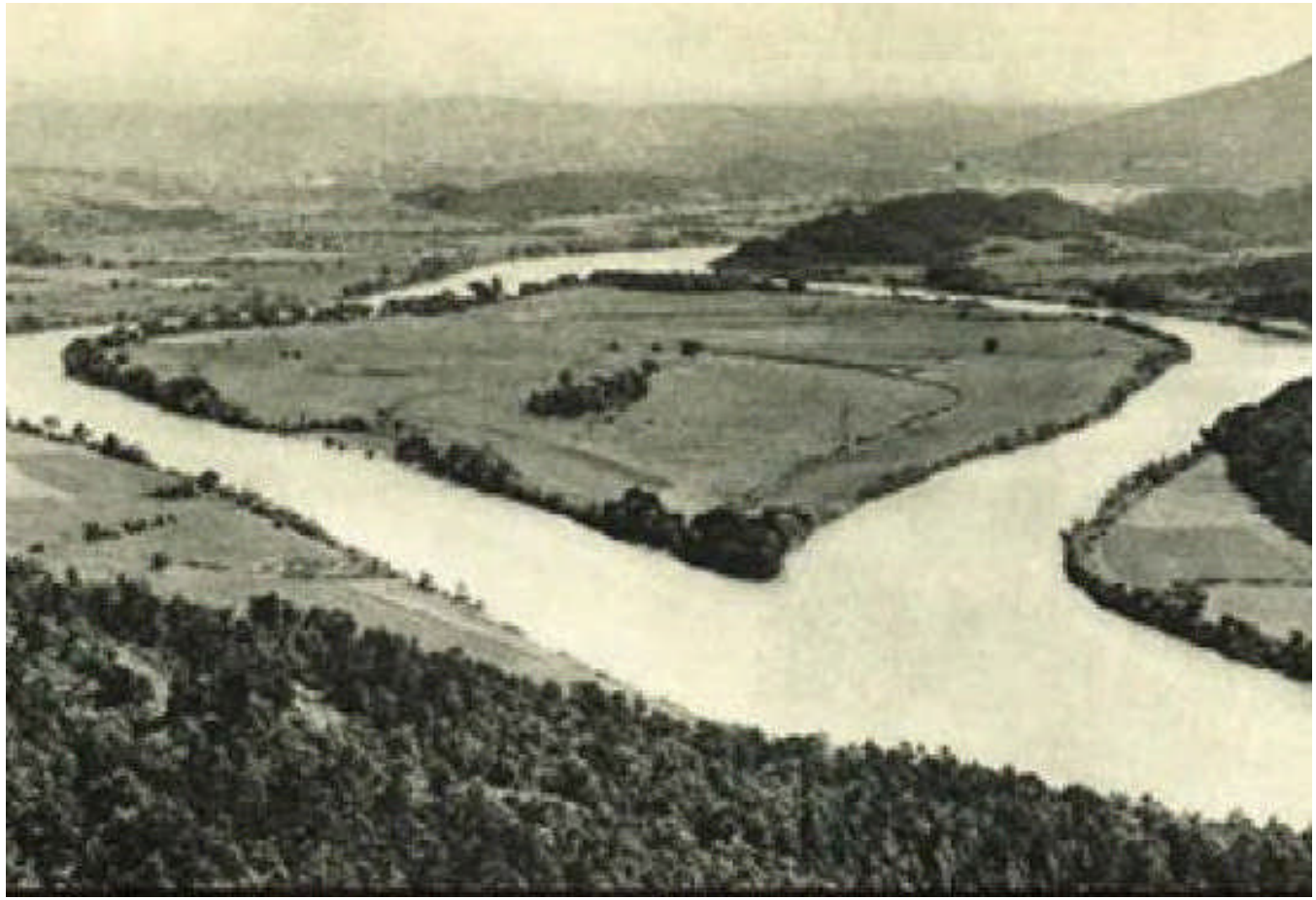
"…In this enormous machine the balance wheel is human…TVA has put a bold foot through a beehive of problems both practical and ethical…The U.S. government is in the power business but power, important though it is, is to be the mere spine of the whole living animal…"

***Fortune* magazine, October 1933**

RE: in the fall of 1933, *Fortune* magazine sent a then 23-year-old writer/poet named *James Agee*, fresh out of Harvard, to report on one of the biggest business stories of the century. The assignment was to cover FDR's complex and ambitious new program: the *Tennessee Valley Authority.* Agee - a native of Knoxville, TN, spent a week in the *Tennessee Valley* region doing research. When he returned to NYC, he filed an unforgettable story - unlike any other that had ever appeared in the business magazine. It began with a poetic 94-word sentence tracing the entire course of the Tennessee River. Eighteen months later, Agee returned to write a much longer follow-up entitled: "TVA: Work in the Valley." Agee didn't remain a business reporter for long, the TVA assignment/s having a decisive effect on his future career as one of the great writers of the 20th Century.

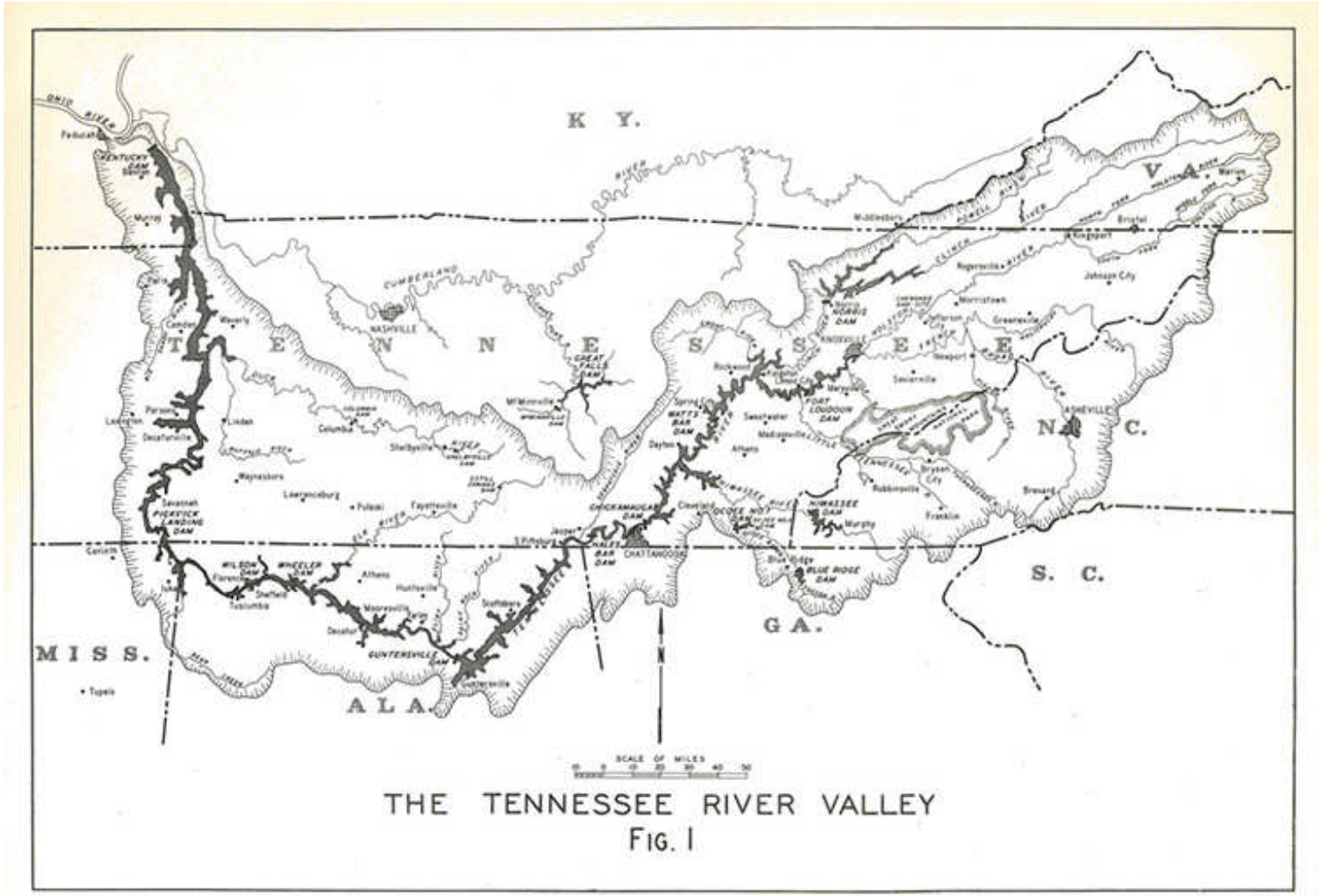
"The Tennessee River system begins on the worn magnificent crests of the southern Appalachians, among the earth's older mountains, and the Tennessee River shapes its valley into the form of a boomerang, bowing it to its sweep through seven states. Near Knoxville, the streams still fresh from the mountains are linked and thence the master stream spreads the valley most richly southward, swims past Chattanooga and bends down into Alabama to roar like blown smoke through the floodgates of Wilson Dam, to slide becalmed along the crop-cleansed fields of Shiloh, to march due north across the high diminished plains of Tennessee and through Kentucky spreading marshes toward the valley's end where finally, at the toes of Paducah, in one wide glassy golden swarm the water stoops forward and continuously dies into the Ohio…"

***Fortune* magazine, October 1933**



The Heart of the Southeast

"…The watershed encompasses some 44,000 square miles, a valley about the size of England, and within a day's journey of all between Boston, Duluth, Key West, a valley whose climate is excellently mild (the mean annual temperature is 60˚), a valley which is the heart of the Southeast…"
***Fortune* magazine, October 1933**
RE: the *Tennessee Basin* is an area of 40,600 square miles in Tennessee, North Carolina, Virginia, Georgia, Mississippi, Alabama, and Kentucky. Its longest measure east-west, is over 400 miles. Measured north-south, it varies from nearly 200 to less than 50 miles. In 1939, approximately 13.5 million acres of this area were wooded. Of the farmland, two million acres were badly gullied, one million more were headed in that direction and seven million acres were less seriously eroded. The area had a population estimated to be 2.5 million. The largest cities (as of 1939) were Chattanooga (119,798), Knoxville, (105,802) and Asheville (50,193). Numerous tributaries make the *Tennessee River* system one of the largest in the United States, although the river (measured from its junction with the *Ohio River* at Paducah to its source at the junction of the *Holston* and *French Broad River/s*) is only 648 miles long. Other principal tributaries are the *Powell, Clinch, Nolichucky, Pigeon, Little Tennessee, Hiwassee, Sequatchie, Elk, Buffalo, Duck* and *Big Sandy River/s*. The profile of the river shows an overall fall of 800-feet (200-feet in the *Muscle Shoals* section between Guntersville and Pickwick Landing).



THE TENNESSEE RIVER VALLEY

FIG. 1

"…Within that valley are a number of things. Four cities: Asheville - in the eastern mountainous land of summer resorts, a city which has never quite got over the shock of Mr. Thomas Wolfe's novel 'Look Homeward, Angel' (he was a local boy and should have done more kindly by them). Knoxville - at the head of the Tennessee, girdled with mines and quarries and timber, the first capital of the state of Tennessee, the seat of the University of Tennessee, the erstwhile (1931) twenty-eighth most murderous city, big or little, in the U.S. Chattanooga - self-styled Dynamo of Dixie and great center for religious publications, whose 400 factories, more or less, and hospitable attitude toward Yankee industrialists and whose strategic location as a distributor do much to give point to the Dynamic epithet but hardly explain the more typically native boast of more churches per capita than any other city in the U.S. Paducah - set among the western lands of Kentucky tobacco and among the great tobacco buyers (American Tobacco and Axton-Fisher have 'interests' there)…"

***Fortune* magazine, October 1933**

"…There are also the towns up-and-coming like Bristol and Kingsport and Johnson City and the villages down-at-heel like Dayton of blessed memory and Jacksboro and Tracy City. And but for the fine soft slur of speech in the streets, and the still goodly number of Model T Fords, and the few deciduous southern mansions with their hitching posts, and the 'niggertowns' with their clay beaten down by bare heels, and the whitewashed clapboard shacks, and the odd predilection of the valleyite for 'lawing' (valley vernacular for hanging about the courthouse on one's own - or others' - legal business. No dispute is too small to 'go to law over.' Of the valleyman's indoor sports, 'lawing' is among the most popular), these towns might as easily be in Massachusetts or Minnesota with Main Street much the same the country over…"

***Fortune* magazine, October 1933**


Marshall County Court House,
Guntersville, Ala.

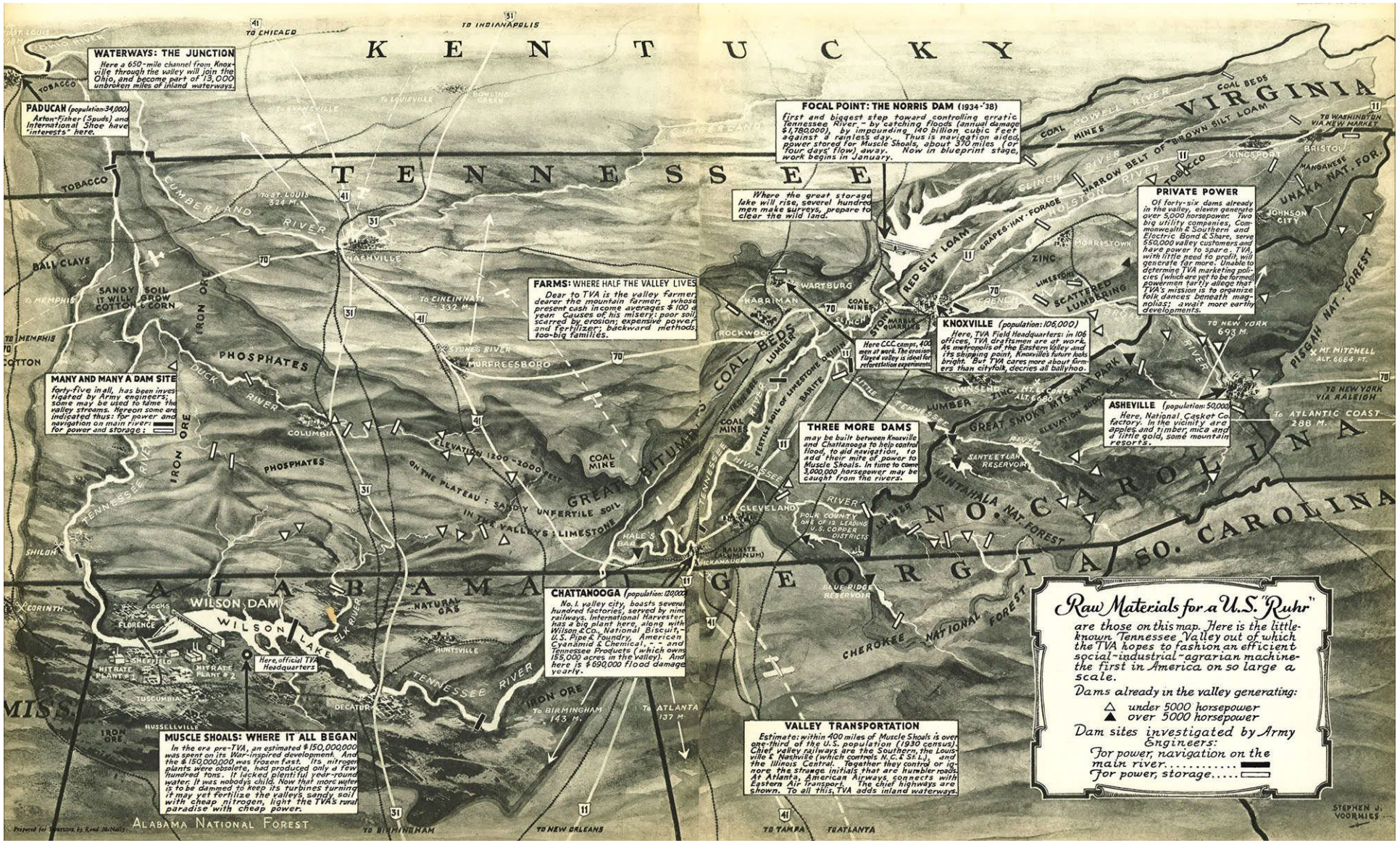
"…And there's the Negro, too, who might be better off in Charleston or in Harlem. And here and there a Southern Gentleman of the old school, who still nuzzles 'burbon' juleps and quotes Horace and talks 'hosses' and loves his country as the greatest battleground of all the war, next to Virginia. And here and there a farmer prosperous enough to spend five to ten thousand a year on fertilizer alone. And the mountaineer, of whom more later. And the crops, which are varied as the map will show and which are often as not poor into the bargain. And many a mine and knitting mill and lumber camp in the valley and a smattering of the outposts of big companies like International Harvester at Chattanooga and Aluminum Co. of America near Knoxville - all to remind you that in the past two generations men came in from the North and men came to in the South and a New South grew up and twisted its roots through the Old. These industries and these companies are of less significance to TVA by title and size and balance sheet than for what they have done for the valley. There are these things among many others and there is the open country itself by the millions of acres - some of the loveliest and most somber and some of the cruelest and most haggard you will find in all America. There are also, all told, some 2,000,000 people…"

***Fortune* magazine, October 1933**

An American Ruhr

"…This is the Tennessee Valley you might see as a visitor. It is more or less the valley you'd know if you lived there. It is the valley that is newly TVA's to have and to hold, for better, for worse. To TVA, there are things about the valley still more important and not so easily seen. The mountains are profoundly muscled with some forty of the minerals most useful to man. Coal and iron ore and limestone (which, properly handled, add up to spell 'Ruhr') are there in huge quantities and are convenient to the river; there is much copper and zinc and marble and bauxite (the ore of aluminum) and lead; immense deposits of manganese scarcely touched (the natives condition their rutty roads with it) and phosphate rock in huge abundance and asphalt rock; even traces of silver and gold. Of chestnut oak and oak pine there are excellent stands, billions of board feet, and there are dense forests of the temperate trees…"

***Fortune* magazine, October 1933**



<u>Above</u>: caption: "Raw Materials for a U.S. 'Ruhr' are those on this map. Here is the little known Tennessee Valley out of which the TVA is to fashion an efficient social-industrial-agrarian machine – the first in America on so large a scale."

"…The soil is as varied as the stones under it. The river is a powerful and far-falling river constant in its course, and its bed of limestone and tough clay is in general a good bed for big dams. Indeed, nature set the stage for something of a Utopia. And if you believed only the Chambers of Commerce and the first signs you saw on every road you might believe that 2,000,000 people haven't done so badly. From the forests of the seven states which the valley involves, 7,000,000,000 board feet are cut each year. In sixty years, Tennessee has produced nearly a quarter of a billion tons of coal. The yearly value of natural resources (exclusive of timber) in Tennessee alone is $38,500,000. Fine figures, these. You could paint the whole valley with such figures. You might find business pretty bad but they'd be nice figures just the same, and the picture a good clear-cut picture of the sort it is nice to look at…"

***Fortune* magazine, October 1933**

Where the Forests are No More

"…But here is the other side of the picture: careless fires and unregulated cutting have ruined and are ruining great stands of timber on watersheds where trees should have stood forever. Because natural resources, which should have sustained local industries indefinitely, have been shipped away in crude form and exhausted, whole communities have been and are being pauperized, abandoned. Where the forests are no more, where the farms are steep, where the land is light, where copper fumes wander, vast acreages of farmland are rapidly being totally laid waste by erosion. The waste land descends unimpeded into the river slowly but surely to choke the channels and to fill in great natural reservoirs that cannot be replaced…"

***Fortune* magazine, October 1933**

A Muscle-Bound White Elephant

"…Scarcely under control and highly capricious in its flow, the Tennessee River floods the bottom lands and does an estimated $1,780,000 damage every year and adds its more than mite to the springtime disorders of the Mississippi. The river is poorly developed for navigation. Its power possibilities have scarcely been touched. Muscle Shoals was a try; it cost the government some $150,000,000 and, as everyone knows, is now a muscle-bound white elephant…"

***Fortune* magazine, October 1933**

The Good Earth

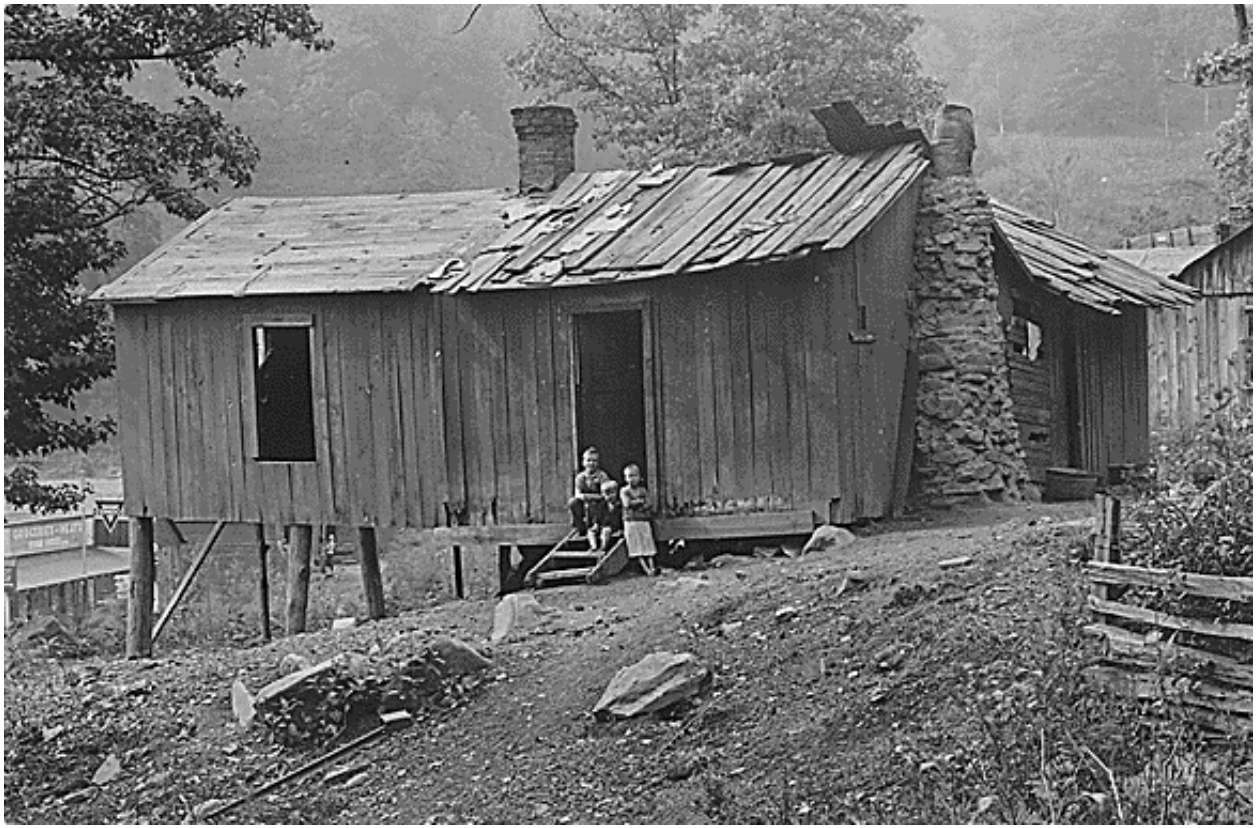
"…Of the 2,000,000 inhabitants, perhaps one in six lives in a large city. But more important to TVA are the small-towners, still more important are the farmers. Over half the people live on farms. Some of the soil is good. Some of the best is in danger of flood. Much more, thanks to erosion, is being slaked of its life. Still more is light and sandy and inherently unfit for cultivation. The farmer in the mountains who takes apart the long sick land between the tilted racks of stone calls eight bushels of wheat and ten of corn to the acre a right good crop (between 1918 and 1927, Iowa farmers averaged a yield of 39.8 bushels of corn to the acre; the average yield of Kansas wheat was thirteen bushels. Averages for Tennessee for the same period were: for corn, twenty-four bushels; for wheat, 10.6 bushels)…"

***Fortune* magazine, October 1933**

Some Hope for Mere Existence

"…The farmers are backward in their methods; machinery in these times even less used than ever; fertilizer is expensive; power is unavailable to the poorer people at reasonable prices, virtually unheard-of on many farms and for that matter in many communities; families are large; food is poor; pellagra and hookworm and dysentery are general among the mountain people. To these farms, from the factories of stricken midland cities, jobless prodigals have returned by the tens and scores of thousands in no hope of work but with some hope for mere existence…"

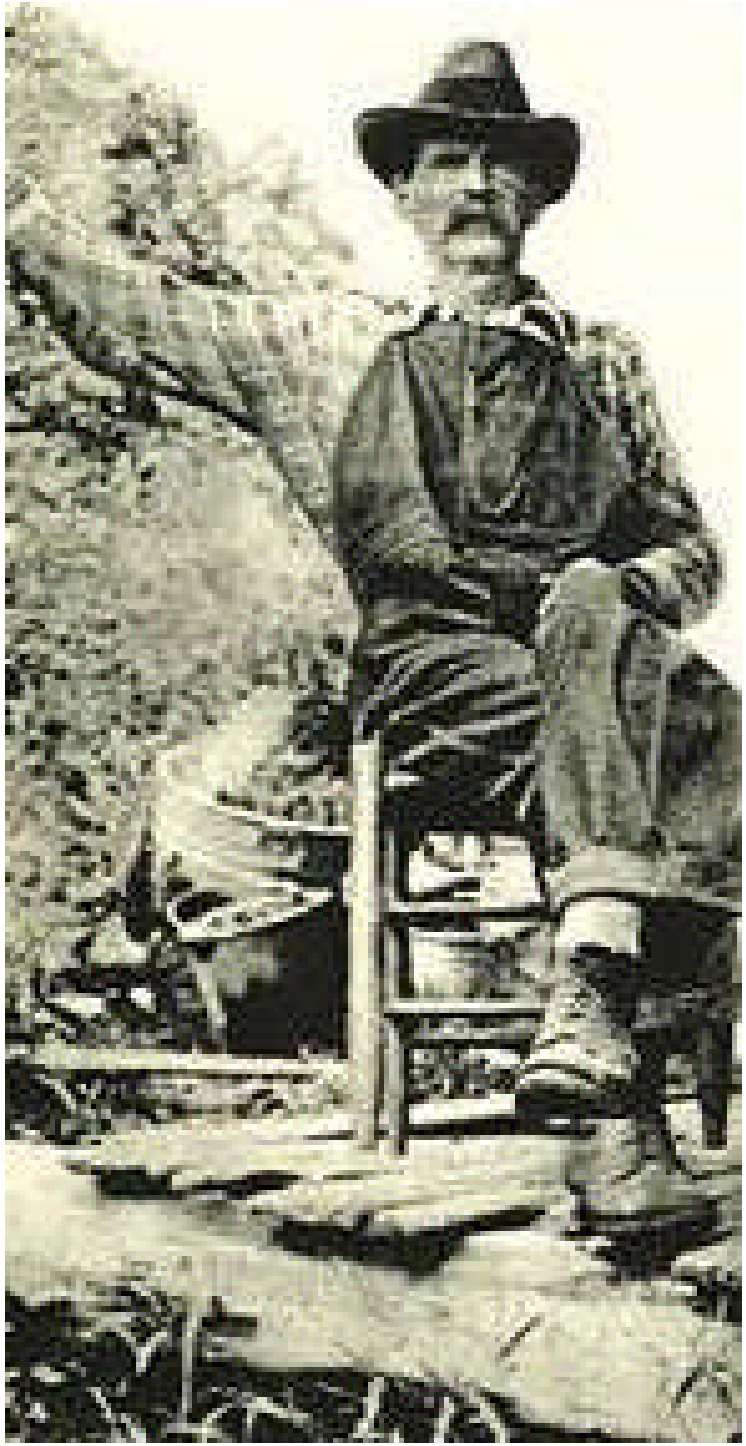
***Fortune* magazine, October 1933**



"…There are, to be sure, prosperous men who till good lands but where TVA has looked it has found the typical valley farmer and his family getting along on $100 cash a year…"

***Fortune* magazine, October 1933**

More and Less than a Farmer



"…When the farmer lives up the shadowy coves and deep among the mountains on farms so steep that, in native parlance, a man 'falls outen his own garden' and 'swings in his back door on a grapevine,' in country so wild that he 'keeps possums for house cats,' he is more and less than a farmer: he is a mountaineer. He is the strong backbone of the Tennessee Valley…"

***Fortune* magazine, October 1933**

Pure American Stock

"…His forefathers settled this country in the 1700's when the effete civilization east of the Alleghenies stuck in their craws. They whipped the Britishers and Loyalists at King's Mountain. They kept much to themselves and their great-grandsons do likewise and live in much the same way, while slowly the sawmills and the mines and the railways and the highways and now TVA burn seclusion from about them. Many of them are illiterate; many are lawless in the bad sense and the good of that word. They never heard of Margaret Sanger and they have little interest in Mazda bulbs and little respect for this 'Century of Progress'…"

***Fortune* magazine, October 1933**

Left: poster for the 1933 "Century of Progress" World's Fair


U.S. POSTAGE
CENTURY OF PROGRESS
CHICAGO
1833-1933
III
FEDERAL BUILDING
CENTS
III

"…Homespun and feuds and 'mountain dew' are not so rife among them as some dreamy souls would have you believe, but you would find them all if you looked around a bit. Their language is pidgin-Elizabethan and some of their songs are still of the sea and of England and strong in their blood is a species of rugged individualism which makes the Gary brand look more pallid than usual. In short, for all the cheap romancing the fact has had, they are of that incomparably pure American stock which produced such men as Lincoln and Chief Justice Marshall and, for that matter, Cordell Hull. TVA has a deep but realistic respect for what it calls the native culture of the valley and, far more directly than the citizen of Knoxville, the mountaineer is a part of TVA's plans…"

***Fortune* magazine, October 1933**

A Pioneer Development

"…Such is the laboratory for a great experiment. Such are the raw materials good and ill from which TVA prepares to fashion a civilization which, in a certain important way, is new and is significant to all the U.S. That important way is well enough known: the past four years have filled the air with it in various forms. Most simply, it is this: the Tennessee Valley and the continent as a whole had many riches in common when, in 1492, those riches began to be suspected. And the development of the valley up to the present has had much in common with the development of the U.S., the opening up of any rich, new land in the westward course of empire. It has been praised as a pioneer development…"

***Fortune* magazine, October 1933**

"…Other salient characteristics are these: it has been consistently shortsighted, wasteful, uncoordinated. Far and wide the opinion - sound, bad, and indifferent - grows that we are approaching a turning point in civilization, that among other things an ancient human habit must be corrected. Man must learn to cooperate with his surroundings instead of disemboweling and trampling and hoping to discard them. On the crest of this wave of talk and over-rapid action TVA is the first American attempt to tackle the problem specifically and bit by bit to build at the pace which scientific advancement requires…"

***Fortune* magazine, October 1933**

<u>Top</u>: caption: "Men from the WPA excavate a shell midden - a site composed largely of shellfish remains - on TVA land in Alabama"

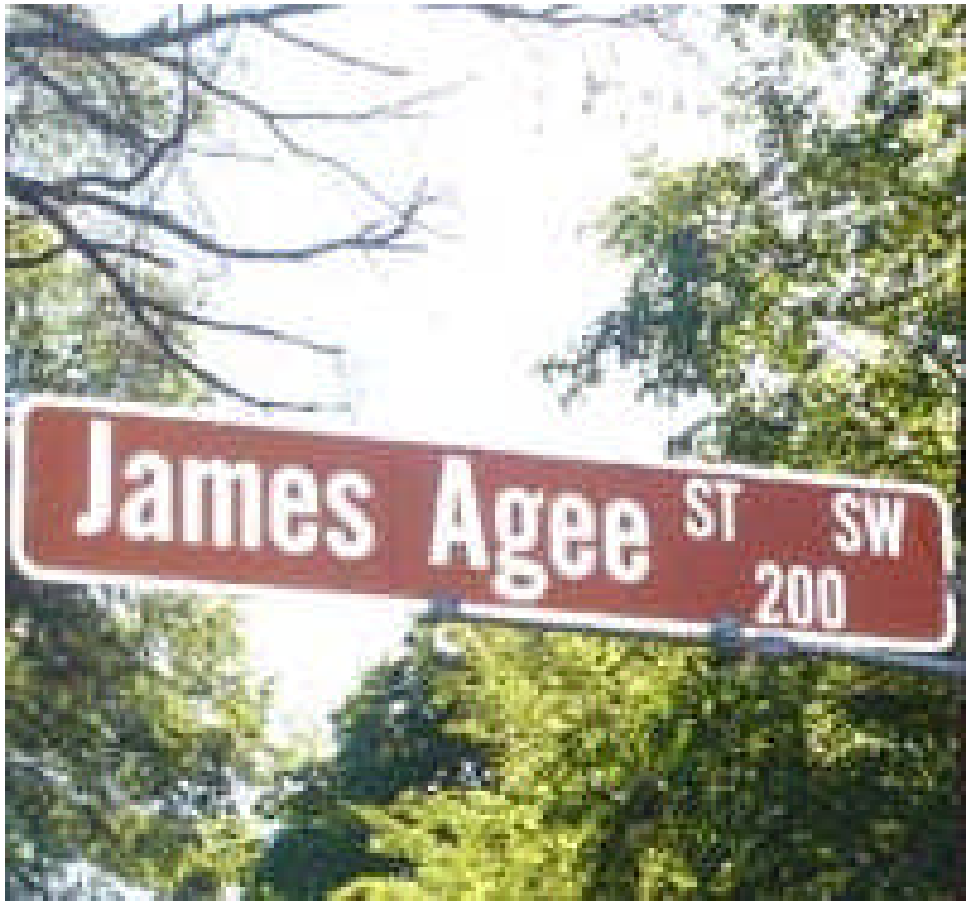
<u>Bottom</u>: "CCC workers clearing land, September 1937"

"…If TVA succeeds in its valley, it will be of significance not merely to the whole Southeast and not merely as a classic model for similar work in other valleys, but ultimately of importance to all the U.S. At least that is the way the Authority looks at it. The valleys of the great Columbia and Missouri rivers have been mentioned as eligible for similar treatment and last August California's Governor Rolph signed legislation establishing a state water project Authority which will have charge of a $170,000,000 development to which, it is expected, the federal government will contribute $48,000,000. Chief objectives: to build Kennett Dam (as great in bulk as Boulder Dam); to impound the flood waters of the Sacramento; to pump excess water into dryish San Joaquin Valley; to develop and sell electric power…"

***Fortune* magazine, October 1933**

Native Son

The city of Knoxville, TN did not forgot its native son, writer/poet *James Agee* (1909-1955). Early in 1999, the city renamed the old 15th Street "James Agee Street," in his honor. Down at the new waterfront development is a marble marker inscribed with a bit of Agee's fine prose. It's an excerpt from the long, sinuous description of the *Tennessee River* that began his first *Fortune* story about the TVA, back in 1933.


James Agee ST SW
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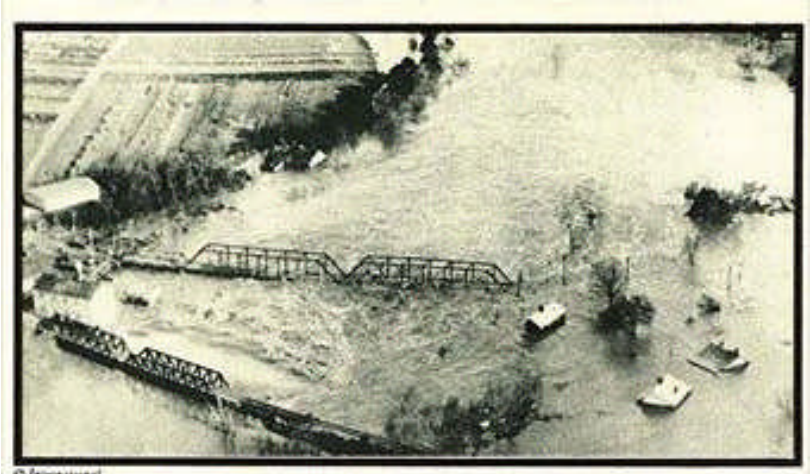
Part 3

The Prime Objectives

Social-Industrial-Agrarian



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SPRINGTIME IN THE VALLEY

Photograph by C. L. Castle. Courtesy U. S. Forest Service

THE GOOD EARTH

Photograph by U. S. Forest Service

THE FOREST PRIMEVAL

"…Of TVA's experiment, these, briefly stated, are the prime ultimate objectives: To regulate river flow. To develop navigation to a maximum. To eliminate flood. To develop and use electric power as a yardstick to gauge the practices of private power companies. To distribute as much power as possible as cheaply as possible to as many people as possible. To try to develop cheap fertilizers. To control soil erosion. To classify and improve the soil and put it to its best uses. To promote better farming methods. To conserve the forests. To develop all resources in the valley in good relation to one another…"

***Fortune* magazine, October 1933**

Left: caption: "Three valley views which TVA must retouch"

"…These are the outward and visible signs of something else again. Apparently, it isn't quite possible to undertake such comprehensive responsibilities without a somewhat Utopian gleam in the eye: at any rate, TVA has it. The coordination TVA seeks is social as well as industrial. In other words, it involves human beings. The TVA vision runs something like this: the natural forces and resources in the valley will be developed with one eye on the long future and the other on the immediate welfare of the people. Farmers will till only the good and tillable soil. The rich resources of the valley will be developed by relatively small industrial groups; production will be governed more by local than by outside demand…"

***Fortune* magazine, October 1933**

"…The factories will be not in the cities but in the open valley. The leaders, by preference, will be valley men - the workers must be - until unemployment is no more in the valley. Not only will farmers and villagers earn a prospering penny; people will move out from the cities and work the land and the machine as well. In short, a number of familiar phrases flow readily to mind: what TVA is after is a decentralization of industry, regional planning on a large scale, a well-wrought and well-controlled balance between the Jeffersonian dream of an agrarian democracy and the best characteristics of what so many people like to call the Power Age…"

***Fortune* magazine, October 1933**

The Native Culture

"…In this enormous machine the balance wheel is human. And here TVA becomes almost mystical in its earnestness and speaks of preserving and developing the native culture. These mountaineers must be raised and reconciled to such higher standards of living as obtain in more prosperous parts of the valley. They must also be taught responsibility to society. On the other hand, the more prosperous valleyites must be raised to that high standard of Americanism which is peculiarly the mountaineer's…"

***Fortune* magazine, October 1933**

<u>Top Left</u>: caption: "Mr. Robert Bacon with electric chick brooder"

<u>Top Right</u>: caption: "Mr. Bacon adjusts an electric fan for his wife who is using an electric iron. The Bacons use 500 kilowatt hours of TVA electricity a month"

<u>Left</u>: caption: "Mrs. Robert Bacon, farm wife, with some of her electric appliances: fan, ironer, radio"

<u>Above</u>: caption: "Mrs. Wiegel, farm wife, in her electric kitchen"

<u>Left</u>: caption: "Mrs. Wiegel uses electric vacuum cleaner"

No Easy Task

"…It is no easy task and it is not easily definable, but it is important to TVA and it is therefore to be considered. How seriously, if not indeed fanatically, TVA is taking these social issues its employment policies will serve to show…"

***Fortune* magazine, October 1933**

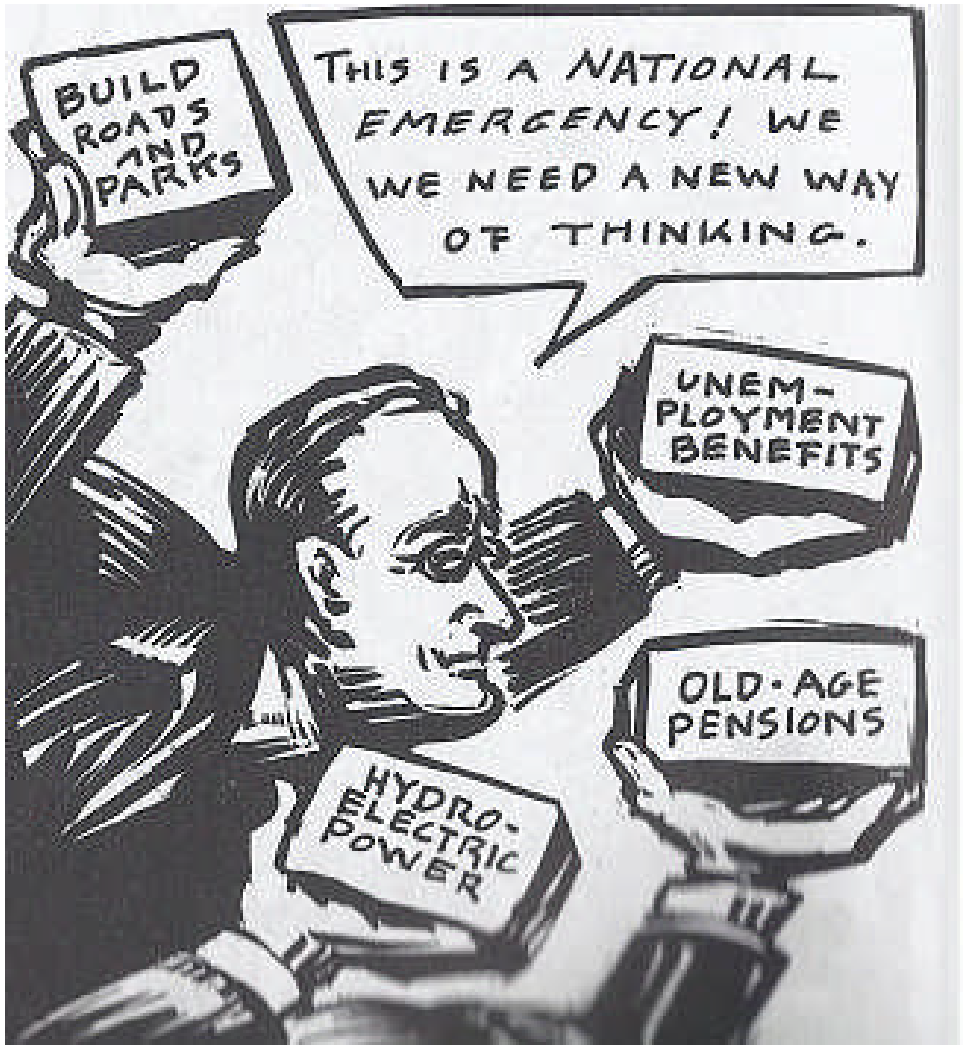
"…From the very first, the stand has been notably firm against political appointments, to the slight irritation of Post-master General Jim Farley, and just as firm, though more kindly, against unemployed 'outsiders.' TVA's work is indeed to be of, by, for the valley people. As for the valleyite who applies for work, he is faced with a peculiarly searching questionnaire, is asked much in detail about his schooling and his relationship with spirituous liquors during the past outlawed decade. To gather such strange if valuable data requires, to say the least, tact if you wish an independent countryman to take your job rather than starve in protest…"

***Fortune* magazine, October 1933**

"…Evidently, TVA has tact, too, for men are taking jobs. The men who build Norris Dam will live in the carefully pioneer-style model town which will rise at Cove Creek. They will work only three days a week. (Three days' wages will go far in mountain families used to getting along on $100 and less a year - and will go to twice as many families). On the free days these workmen may, if they like, attend vocational school and learn plumbing and masonry and carpentry and other crafts. Not, as TVA points out, for the purpose of annoying the trades unions, but primarily to supply good handymen to remote neighborhoods which have had none before…"

Fortune **magazine, October 1933**

A Rooseveltian Conception



"…All of which is very fine. It has an epic quality - and a quality more easily put in words than in deeds. Who are the men who are to translate it? They are more important to the plan than their titles suggest, for like many another Rooseveltian conception, the Tennessee Valley Authority can be visualized only in terms of the men he chose to administer it…"

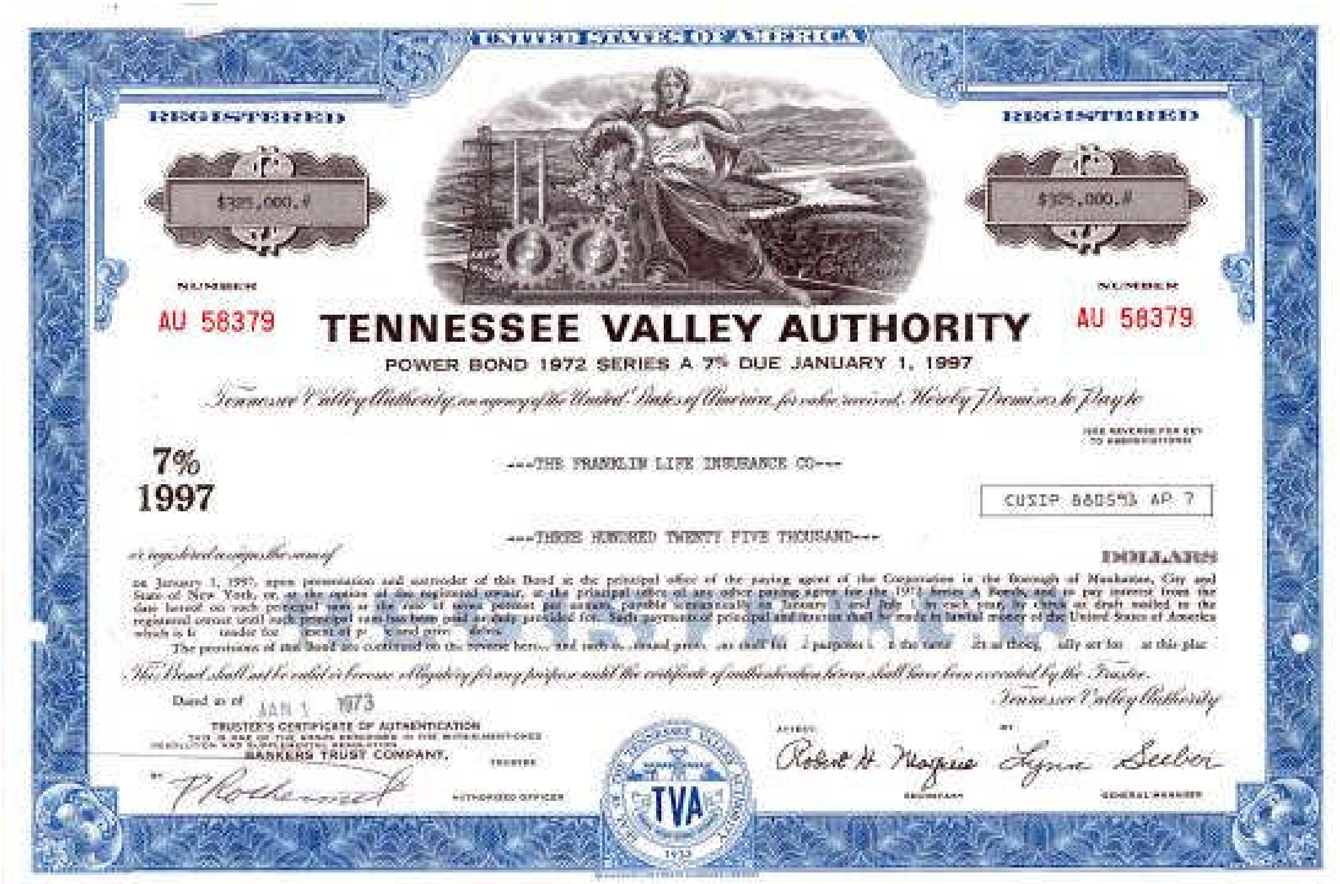
***Fortune* magazine, October 1933**

"…The TVA is a corporation created by the Tennessee Valley Authority Act, which in turn was created by warlike little Senator Norris of Nebraska and by a President who saw more in it than 'putting the Government into the power business' (which had brought two prompt Republican vetoes) and by careful study of the legal set-up of Port of New York Authority and - like any great and farsighted idea - by a number of men who also ran. To the extent of having a corporate name and seal, the right to sue and be sued, to make contracts, to adopt bylaws, to purchase or lease property, it is an independent corporation…"

***Fortune* magazine, October 1933**

"…It is under no government department but it is entitled to the help and advice of any federal office, including the Patent Office. It is armed with the right of eminent domain. Fifty million dollars of the President's $3,300,000,000 recovery program is at its disposal to begin with, and there are possibilities of additional income from the sale of power and fertilizer. For future work the Board is authorized to issue, on the credit of the U.S., $50,000,000 in 3.5 per cent bonds having a fifty-year maturity. So far as power is concerned, there will be no subsidy. TVA must sell its power at a rate which will not only return all operating costs but will also, over a term of years, retire the capital invested. The task has no deadline; TVA has only to submit an annual report to the President and to Congress. From time to time the President may recommend additional legislation. He it is who appoints and may at any time remove the Directors. The Directors are three: two elderly college presidents named Morgan and a very lively young lawyer named Lilienthal…"

***Fortune* magazine, October 1933**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1997
---THE FRANKLIN LIFE INSURANCE CO---
---THREE HUNDRED TWENTY FIVE THOUSAND---
DOLLARS
TRUSTEE'S CERTIFICATE OF AUTHENTICATION
BANKERS TRUST COMPANY,
TVA

Directors Three

"…As Chairman of the Board, Roosevelt promptly appointed Dr. Arthur Ernest Morgan, self-taught President of Antioch (Work-and-Study) College, which in ten years he has built up from an obscure experiment. His first official act was to submit a careful inventory of his personal properties, a thing no U.S. public officer had ever thought of doing before. Dr. Morgan is as well known among hydraulic engineers as among educators. It was he who put the wild Miami River in its place after the Dayton (Ohio) flood in 1913; it was he who lent an authoritative hand to the drafting of the drainage codes of half a dozen states. President Roosevelt was impressed by something more when he first read Dr. Morgan's Antioch Notes. Dr. Morgan's friends know him as a man of considerable human wisdom, of breadth and integrity, and originality of mind…"

***Fortune* magazine, October 1933**

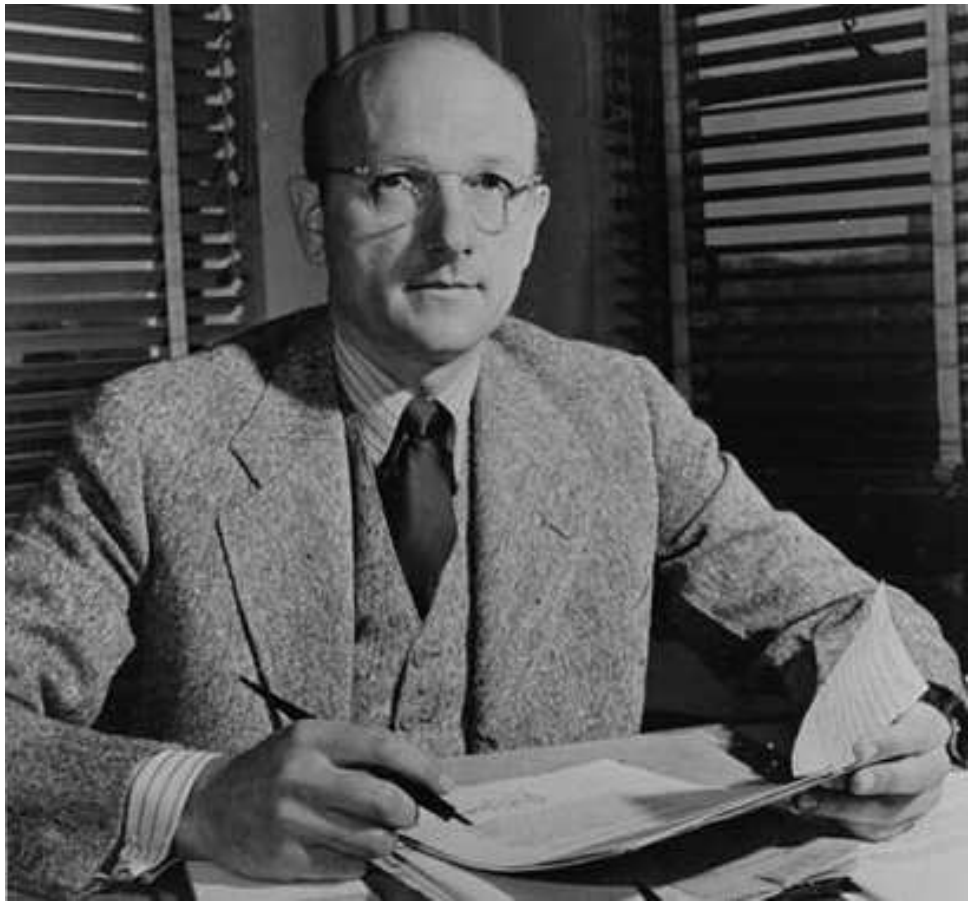
Left: caption: "Dr. Arthur E. Morgan"

"…The other Morgan is a college president, too. He is Dr. Harcourt Alexander (no kin to Dr. A.E.) Morgan, who leaves behind fourteen years' service as President of the University of Tennessee. He is an authority on artichokes, bugs, cats, dogs, eggs, fish, geraniums, hay, iguanas, jam, and so down the alphabet. He is also, by dint of years of study, an authority on agriculture and industry in his valley. To balance industry and agriculture is his assigned task…"

***Fortune* magazine, October 1933**

Left: caption: "John Harcourt Alexander Morgan, ca. 1942"

Wunderkind



"…David E. Lilienthal, Director and General Counsel, is more the 'wonder boy' type. He has a brilliant past at thirty-four, especially as legal authority on public utilities. At Harvard Law, he was (like a few other headliners today) one of Felix Frankfurter's star pupils. Later, he became the friend and associate of Donald Richberg, was Special Counsel for the city of Chicago in the tele-phone-rate controversy which Chicagoans will well remember. At thirty-two, he left Chicago to help Wisconsin's Governor Philip LaFollette reorganize the State Railroad Commission. His revision of the public-utility statutes of Wisconsin has already served as a model for several other states…"

***Fortune* magazine, October 1933**

Left: caption: "David E. Lilianthal, TVA Director"

"…The Directors serve nine-year terms (staggered to begin with at nine, six, and three) at a $10,000-a-year salary - less, for the time being, the government's 15 per cent cut in basic salaries. Each is entitled to one of the numerous empty government houses on the Muscle Shoals reservation where, by requirement of the creative act, official TVA headquarters must be. They also get traveling expenses…"

***Fortune* magazine, October 1933**

Left: caption: "Bird's-eye view of the Muscle Shoals Reservation"

Learning to Learn

"…Preliminaries are, if anything, harder than the job itself. It takes time to learn just where such a corporation stands in relation to the statutory framework of seven states and many municipalities. Late in August a situation arose which will force a definition of TVA's position and powers. Southern Industries & Utilities, Inc. applied to the Federal Power Commission for a fifty-year permit, against the issue of which Counsel Lilienthal, in the name of TVA, made formal protest. S. I. & U.'s proposed development: a dam and powerhouse at Aurora (near Paducah), an immense valley-gulfing reservoir 167 miles long. Grounds for protest: Congress granted TVA exclusive jurisdiction in all developments on the Tennessee. The matter is to be settled at a public hearing…"

***Fortune* magazine, October 1933**

"…It takes time to make your own definitive studies geological, social, and industrial; time to know all there is to know about every square mile of a great valley. Granting all these points, eyebrows have yet been raised at the record of the Authority's first months in its valley. TVA's reluctance to issue detailed statements, its practice of giving such items as employment figures in round and sometimes conflicting numbers (even when asked to specify), the fact that not until August 10 did TVA allocate specific duties to its three Directors to execute preliminary projects 'with the least possible delay' - at such small straws in a large wind, no few people have looked askance, have suggested that two elderly academicians, however at home with round phrase and round idea, have limitations when confronted with a mass of cold hard detail demanding stern organization. They have, at any rate, been less specific than gentlemen handling the public's money usually are. By the end of the summer, TVA had begun to assert itself as we shall presently see. But with much theory still to be translated into practice, it is perhaps as well to bear these criticisms in mind…"

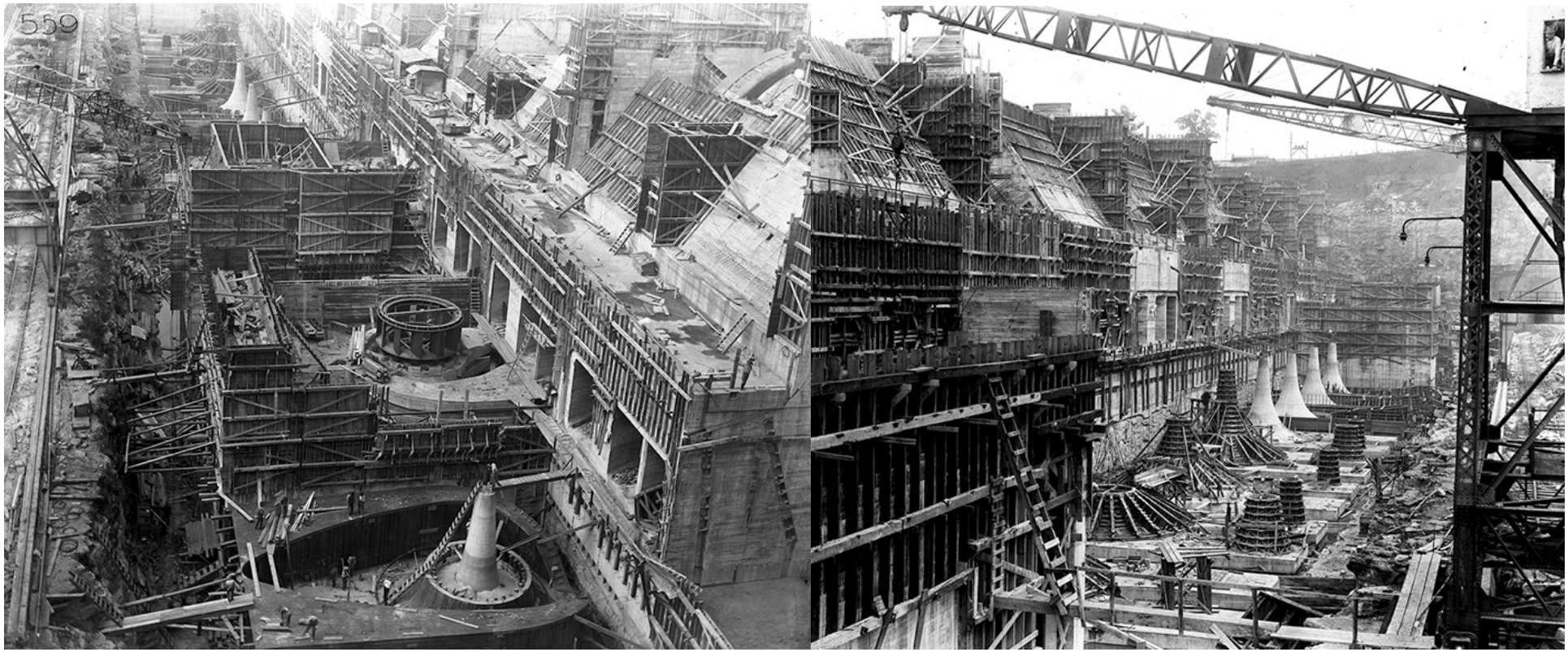
***Fortune* magazine, October 1933**

"…The critics, however, mislead if they imply that valley workers are idle, have no immediate plans. Many a valley venture hums. On September 1, after 200 men had spent the summer taking inventory, TVA inherited Muscle Shoals and sixty (sometimes called eighty) Shoals men from the War Department (and in all is absorbing between 400 and 600 men from the war and other departments). The Authority will arrive at its own valuation of this property through 'an appraisal by disinterested engineers.'…"

***Fortune* magazine, October 1933**

Left: caption: "President Franklin Delano Roosevelt sits in the rear of a touring sedan at the Wilson Dam hydroelectric plant on the Tennessee River at Muscle Shoals, Ala., Jan. 21, 1933"

Right: caption: "Finished View of Wilson Dam in Tennessee River. Between Muscle Shoals and Florence, Ala. Height, 120-feet; Length, 4,350-feet. Lock at North End. Power House at South End."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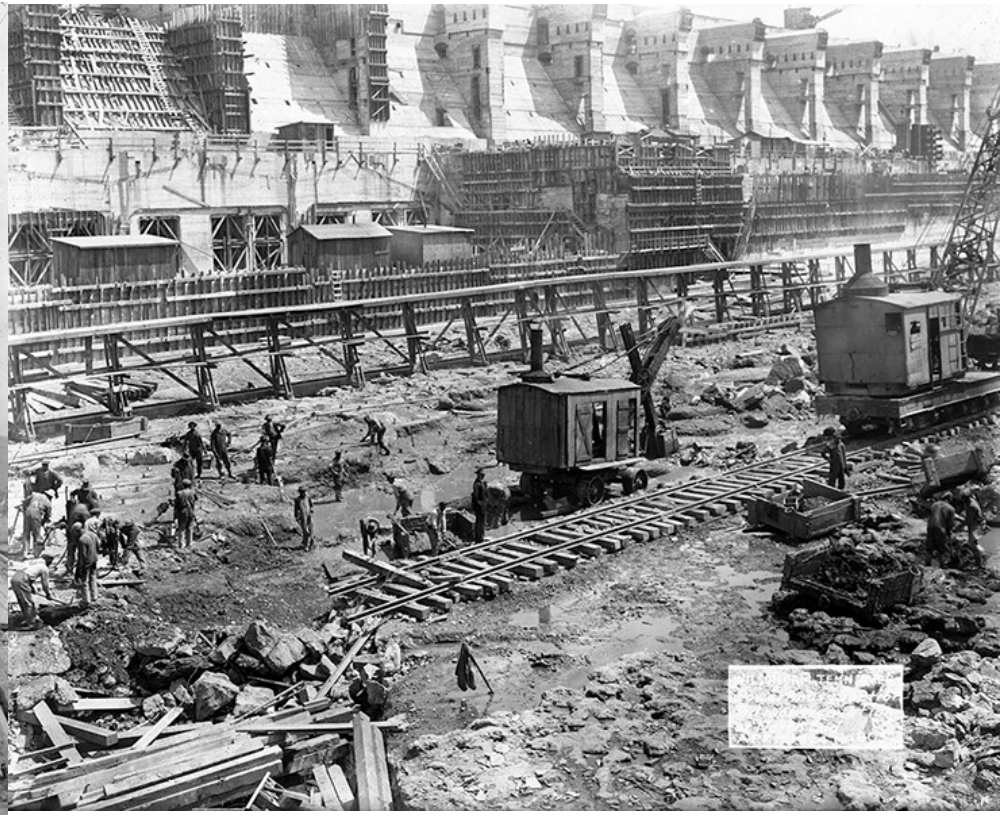

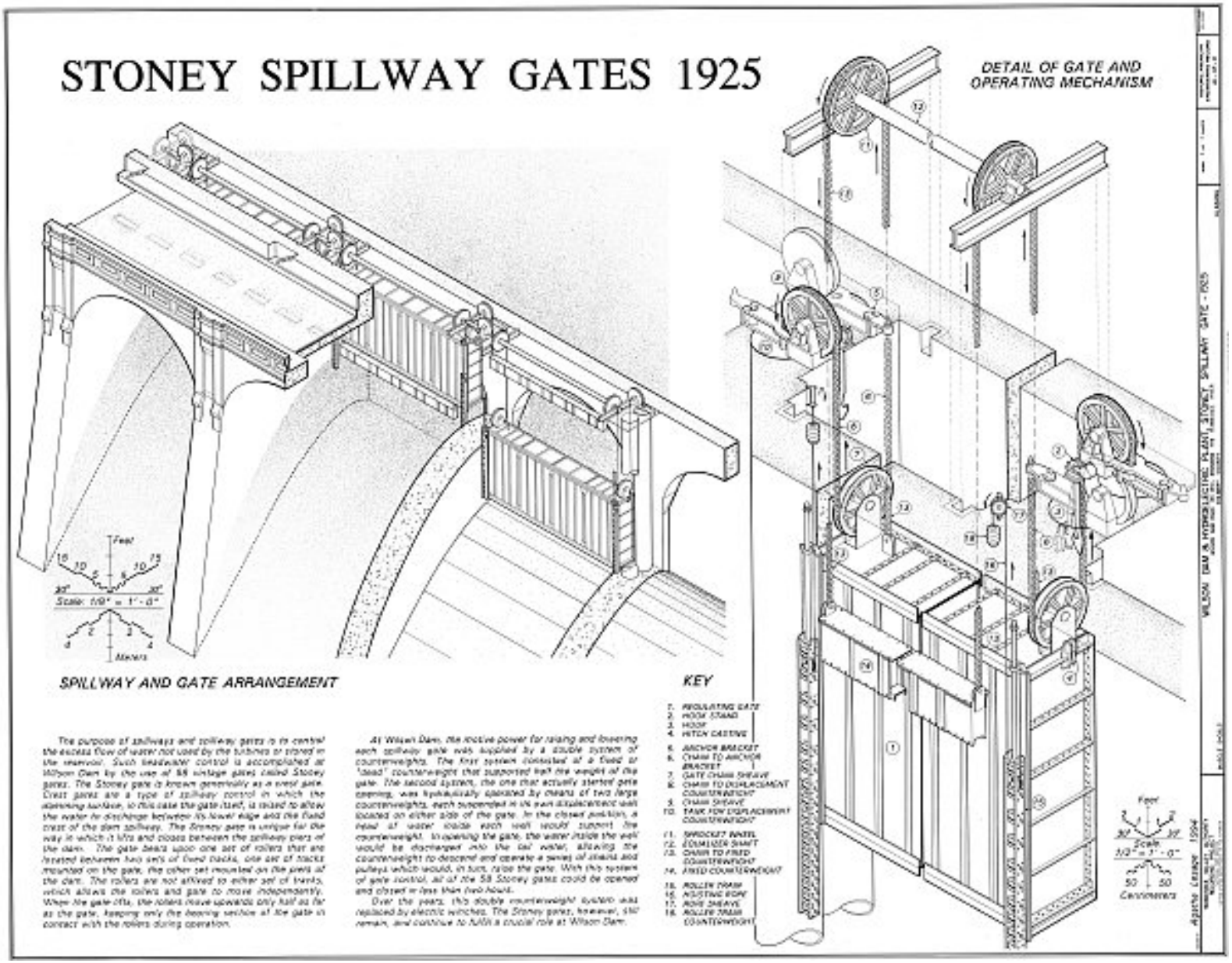

The purpose of spillways and spillway gates is to control the excess flow of water not used by the turbines or stored in the reservoir. Such headwater control is accomplished at Wilson Dam by the use of 58 vintage gates called Stoney gates. The Stoney gate is known generically as a crest gate. Crest gates are a type of spillway control in which the skimming surface, in this case the gate itself, is raised to allow the water to discharge between its lower edge and the fixed crest of the dam spillway. The Stoney gate is unique for the way in which it lifts and closes between the spillway piers of the dam. The gate bears upon one set of rollers that are located between two sets of fixed tracks, one set of tracks mounted on the gate, the other set mounted on the piers of the dam. The rollers are not affixed to either set of tracks, which allows the rollers and gate to move independently. When the gate lifts, the rollers move upwards only half as far as the gate, keeping only the bearing section of the gate in contact with the rollers during operation.

At Wilson Dam, the motive power for raising and lowering each spillway gate was supplied by a double system of counterweights. The first system consisted of a fixed or "dead" counterweight that supported half the weight of the gate. The second system, the one that actually started gate opening, was hydraulically operated by means of two large counterweights, each suspended in its own displacement well located on either side of the gate. In the closed position, a head of water inside each well would support the counterweight. In opening the gate, the water inside the well would be discharged into the tail water, allowing the counterweight to descend and operate a series of sheaves and pulleys which would, in turn, raise the gate. With this system of gate control, all of the 58 Stoney gates could be opened and closed in less than two hours.

Over the years, this double counterweight system was replaced by electric winches. The Stoney gates, however, still remain, and continue to fulfill a crucial role at Wilson Dam.

<u>Above</u>: caption: "Stoney Spillway Gates 1925 - Wilson Dam & Hydroelectric Plant, Stoney Spillway Gate, Spanning Tennessee River at Wilson Dam Road (Route 133), Muscle Shoals, Colbert County, AL"

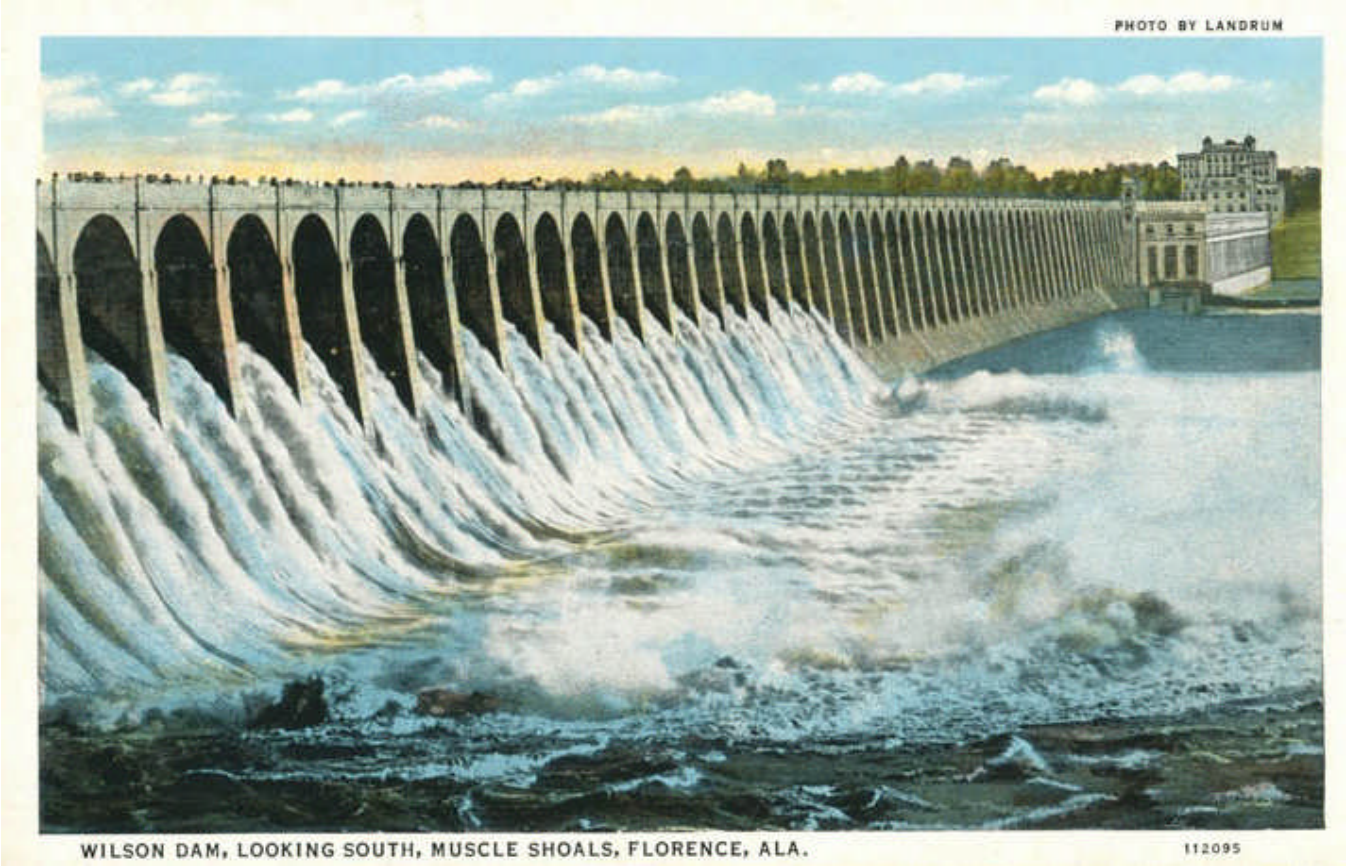
PHOTO BY LANDRUM
WILSON DAM, LOOKING SOUTH, MUSCLE SHOALS, FLORENCE, ALA.
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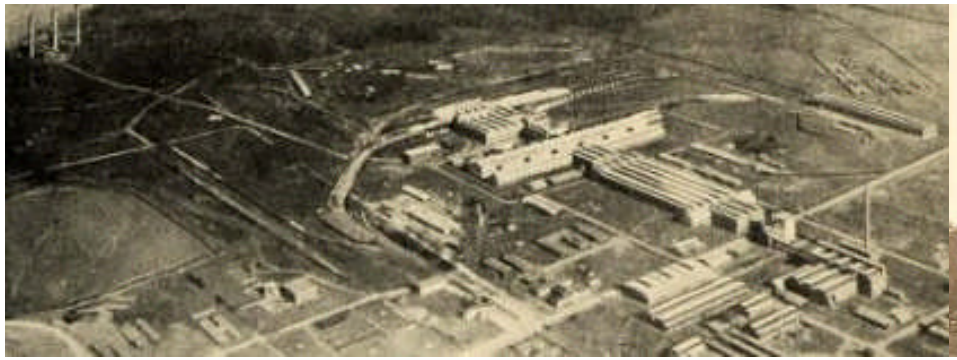
Part 4

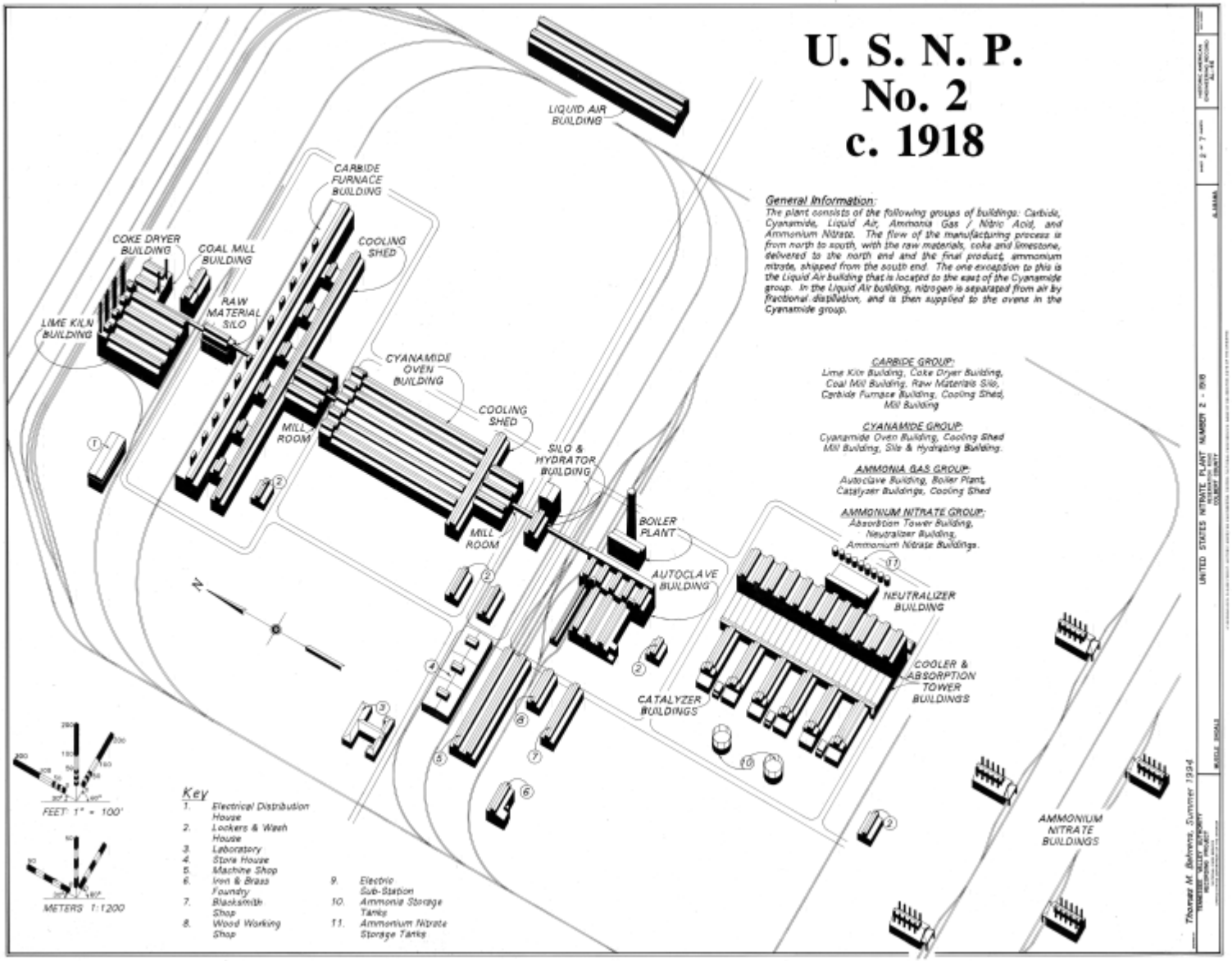
Swords and Plowshares

The Four County Plan



"…You can argue, of course, that without the World War there would have been no Tennessee Valley Authority. It does seem unlikely that Congress, back in 1917, would have authorized the spending of $150,000,000 at Muscle Shoals just to make nitrate fertilizers. It was because they wanted the nitrates for the war that Uncle Sam didn't count the cost of Wilson dam and the two factories. Of course, no nitrate fertilizers or nitrates for war use ever were produced at Muscle Shoals. Two plants, numbered One and Two, were built there for $68,000,000. But before anything could be done with Plant Number One, the process it was built to follow became obsolete. This is one story; another is that the German patent never fully revealed the process and so failed in performance just as other properties seized during the war were found to fail. At any rate, Plant Number One proved even less useful than the good ship Vaterland, and couldn't even be sold for scrap…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)
<u>Left</u>: caption: "Airplane view of the Muscle Shoals District.
<u>Right</u>: caption: "U.S. Nitrate Plant No.2 – Muscle Shoals, Ala."


U. S. N. P.
No. 2
c. 1918
General Information:
The plant consists of the following groups of buildings: Carbide, Cyanamide, Liquid Air, Ammonia Gas / Nitric Acid, and Ammonium Nitrate. The flow of the manufacturing process is from north to south, with the raw materials, coke and limestone, delivered to the north end and the final product, ammonium nitrate, shipped from the south end. The one exception to this is the Liquid Air building that is located to the east of the Cyanamide group. In the Liquid Air building, nitrogen is separated from air by fractional distillation, and is then supplied to the ovens in the Cyanamide group.
CARBIDE GROUP:
Lime Kiln Building, Coke Dryer Building, Coal Mill Building, Raw Materials Silo, Carbide Furnace Building, Cooling Shed, Mill Building
CYANAMIDE GROUP:
Cyanamide Oven Building, Cooling Shed Mill Building, Silo & Hydrating Building.
AMMONIA GAS GROUP:
Autoclave Building, Boiler Plant, Catalyzer Buildings, Cooling Shed
AMMONIUM NITRATE GROUP:
Absorption Tower Building, Neutralizer Building, Ammonium Nitrate Buildings.
LIQUID AIR BUILDING
CARBIDE FURNACE BUILDING
COKE DRYER BUILDING
COAL MILL BUILDING
COOLING SHED
RAW MATERIAL SILO
LIME KILN BUILDING
CYANAMIDE OVEN BUILDING
COOLING SHED
MILL ROOM
SILO & HYDRATOR BUILDING
MILL ROOM
BOILER PLANT
AUTOCLAVE BUILDING
NEUTRALIZER BUILDING
COOLER & ABSORPTION TOWER BUILDINGS
CATALYZER BUILDINGS
AMMONIUM NITRATE BUILDINGS
N
FEET: 1" = 100'
METERS 1:1200
Key
1. Electrical Distribution House
2. Lockers & Wash House
3. Laboratory
4. Store House
5. Machine Shop
6. Iron & Brass Foundry
7. Blacksmith Shop
8. Wood Working Shop
9. Electric Sub-Station
10. Ammonia Storage Tanks
11. Ammonium Nitrate Storage Tanks
UNITED STATES NITRATE PLANT NUMBER 2 - 1918
Thomas M. Behrens, Summer 1994

"…What will be done with the Shoals nitrate plants is yet to be decided. As they stand, they're pretty useless and out-dated. But TVA, experimenting in cooperation with agri-cultural colleges and farmers' organizations, hopes in time to learn how to make fertilizers which will sell at about a third their present cost. Perhaps on the 'four-county' plan - a central plant to each four counties, each to serve the needs of its limited territory. TVA doesn't know yet…"

***Fortune* magazine, October 1933**

Top Left: caption: "Perspective View Looking Southeast at the Cyanamide (Lime-Nitrogen) Oven Building – U.S. Nitrate Plant No. 2, Reservation Road, Muscle Shoals, Colbert County, AL"

Top Right: caption: "Perspective View Looking Northeast at One of the Ammonium Nitrate Buildings – U.S. Nitrate Plant No. 2, Reservation Road, Muscle Shoals, Colbert County, AL"

Left: caption: "General View Looking Northeast at the Catalyzer Buildings – U.S. Nitrate Plant No. 2, Reservation Road, Muscle Shoals, Colbert County, AL"

"…Plant Number Two, the largest Cyanamide factory in the world, tested and found fully capable of producing nitrates, was left in idleness until it was taken over by TVA. It is now making phosphate fertilizer, but it must be ready for wartime use as a nitrate plant if required. It is said that the plant could, with a few weeks' warning, provide enough nitrates to meet the requirements of an army of a million and a half men…"

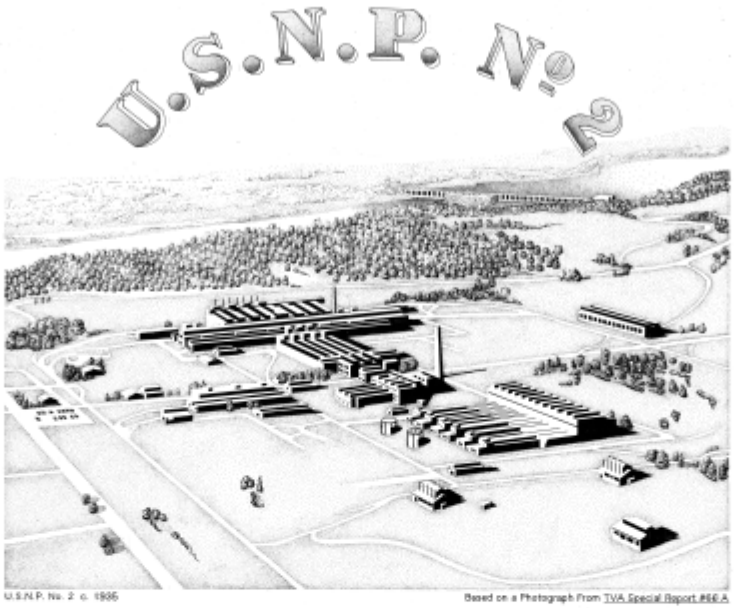
RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Built as a war measure for the production of ammonium nitrate, a key component in high explosives, United States Nitrate Plant Number 2 was among the largest synthetic nitrogen works in the world, with a capacity of 110,000 tons of ammonium nitrate per year. The plant and its adjoining industrial town were erected with little regard to cost between February and November of 1918. After two brief periods of operation, one at the end of November 1918 and the other in February of 1919, the 2,306 acre site lay idle for the next fourteen years while Congress and private industry debated its disposition, a problem that had less to do with the plant itself than it did with the hydro-power of the nearby Wilson Dam.

Using the commercially successful "cyanamide process" for the fixation of atmospheric nitrogen, U.S.N.P. No. 2 superseded U.S. Nitrate Plant Number 1, which had been constructed in the adjacent town of Sheffield, Alabama. Plant Number 1 used the then innovative Haber process, a synthetic method of producing ammonia. Difficulties in operating Plant Number 1 and an urgent, unexpected demand for ammonium nitrate led the Ordnance Department to contract the American Cyanamid Company, the only manufacturer on the continent with proven experience in nitrogen fixation, to build U.S.N.P. No. 2. A subsidiary company was formed, the Air Nitrates Corporation, and construction commenced February 16, 1918.

Incorporated as a producer of cyanamide fertilizer American Cyanamid had only recently begun to experiment on the production and oxidation of ammonia, key steps in the manufacture of ammonium nitrate. These new processes involved steam-heating cyanamide in large pressure vessels, known as autoclaves, to produce ammonia and converting ammonia into nitric oxide by means of a special catalyzer. Just prior to the American entry into the war, American Cyanamid secured these special autoclaves from Germany and had set up experimental plants in Canada and in this country to produce ammonia and nitric oxide using the new equipment. U.S.N.P. No. 2 utilized this new technology in the largest installation of its kind with 56 autoclaves and 696 catalyzers capable of producing 50,000 tons of fixed nitrogen annually.

As a chemical plant for the production of ammonium nitrate, U.S.N.P. No. 2 was actually a series of discreet plants, each producing an intermediate product in a lengthy and mechanically complex industrial process. On an unprecedented scale, U.S.N.P. No. 2 assembled state of the art technologies for the production of calcium carbide, liquid air, cyanamide, ammonia gas, nitric acid, and ammonium nitrate.



U.S.N.P. No. 2 c. 1936

Based on a Photograph From TVA Special Report #66 A

U. S. NITRATE PLANT No. 2
MUSCLE SHOALS, ALABAMA

With the signing of the armistice, the wartime demand for ammonium nitrate ceased and the Ordnance Department was directed to keep the plant in standby condition. U.S.N.P. No. 2 stood idle until taken over by the Tennessee Valley Authority in 1933. Over the course of the next few decades, many of the plant's buildings and equipment were used in TVA experimental work in fertilizer development. In addition, during World War Two, the plant was an important supplier of calcium carbide and ammonium nitrate, using rehabilitated portions of its original furnace department and ammonium nitrate departments.

As a supplier of ammonium nitrate for World War One, United States Nitrate Plant Number 2 was in the right place at the wrong time. Built to fulfill dual defense and domestic peacetime goals, the immense size of the plant was an obvious handicap to economic operation in saturated fertilizer markets. The plant and adjoining Wilson Dam became the birthplace of the Tennessee Valley Authority, and the promise of hydroelectric power and fertilizer development did indeed come to fruition, albeit many years later than expected.

U.S.N.P. No. 2 stands today only as a shell of its original industrial grandeur. One of the largest collections of equipment ever assembled for the fixation of atmospheric nitrogen has since been removed, scrapped, or buried.

This recording project is part of the Historic American Engineering Record (HAER), a long range program to document the engineering, industrial, and transportation heritage of the United States. The HAER program is administered by the Historic American Buildings Survey/Historic American Engineering Record Division (HABS/HAER) of the National Park Service, U.S. Department of the Interior. The Tennessee Valley Authority-Muscle Shoals Recording Project was cosponsored during the summer of 1994 by HAER under the general direction of Robert J. Kapsch, Chief of HABS/HAER and by the Tennessee Valley Authority with the assistance of Charles Tichy, Historic Architect and the staff of the Tennessee Valley Authority's Environmental Research Center, Muscle Shoals, Alabama.

The field work, measured drawings, historical report and photographs were prepared under the direction of Eric N. DeLony, Chief of HAER and Project Leader; Richard O'Connor, Project Historian; Jet Lowe, HAER Photographer; and Craig N. Strong, Project Architect. The recording team consisted of Tom Behrens, Field Supervisor; Balázs Kinkovszky (COMOS) and Sergio Sanchez, Architects; Brian F. Coffey, Historian; and Susie B. Leong, Illustrator.

REGIONAL MAP

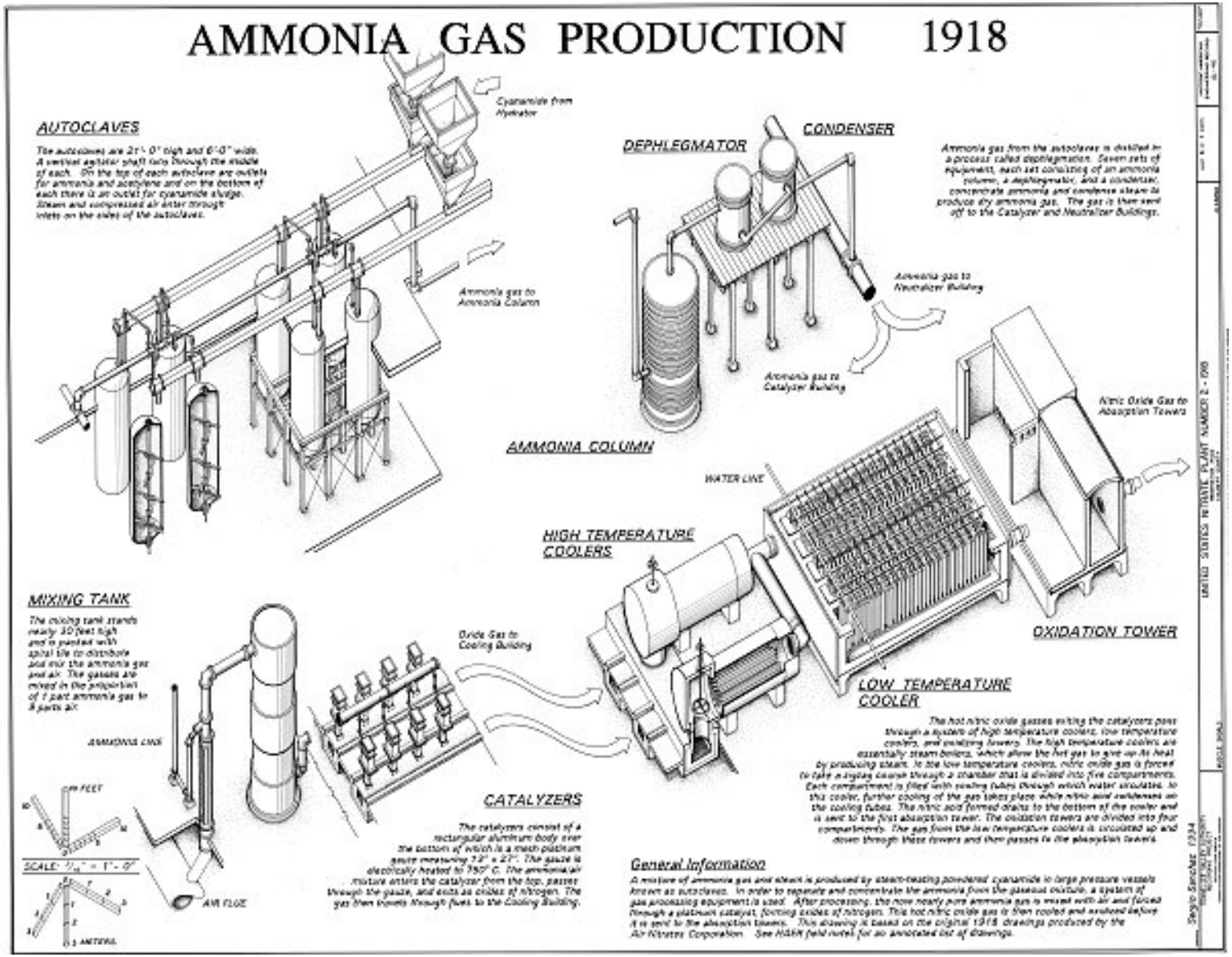
VICINITY MAP

SITE MAP
ENLARGED FROM USGS MAP
UTM COORDINATES: 16.440820.3967880

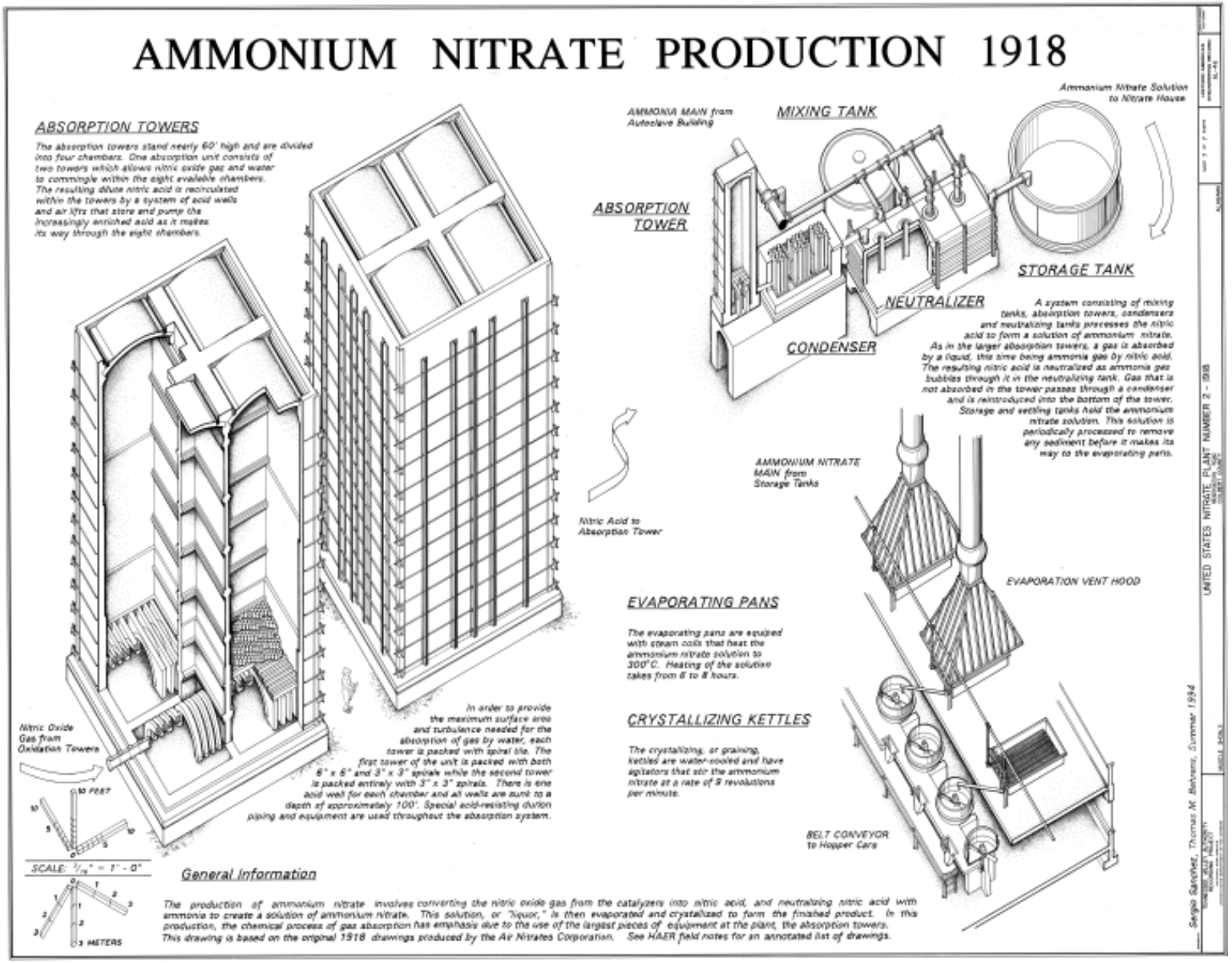
SCALE 1:24000 .5 MI 1 KM

UNITED STATES NITRATE PLANT NUMBER 2 - HAER
MUSCLE SHOALS
ALABAMA

Susie B. Leong, Thomas M. Behrens, Summer 1994


AMMONIA GAS PRODUCTION 1918
AUTOCLAVES
The autoclaves are 21'-0" high and 6'-0" wide. A vertical agitator shaft runs through the middle of each. On the top of each autoclave are outlets for ammonia and acetylene and on the bottom of each there is an outlet for cyanamide sludge. Steam and compressed air enter through inlets on the sides of the autoclaves.
Cyanamide from Hydrator
Ammonia gas to Ammonia Column
DEPHLEGMATOR
CONDENSER
Ammonia gas from the autoclaves is distilled in a process called dephlegmation. Seven sets of equipment, each set consisting of an ammonia column, a dephlegmator, and a condenser, concentrate ammonia and condense steam to produce dry ammonia gas. The gas is then sent off to the Catalyzer and Neutralizer Buildings.
Ammonia gas to Neutralizer Building
Ammonia gas to Catalyzer Building
AMMONIA COLUMN
Nitric Oxide Gas to Absorption Towers
WATER LINE
HIGH TEMPERATURE COOLERS
OXIDATION TOWER
LOW TEMPERATURE COOLER
The hot nitric oxide gasses exiting the catalyzers pass through a system of high temperature coolers, low temperature coolers, and oxidizing towers. The high temperature coolers are essentially steam boilers, which allow the hot gas to give up its heat by producing steam. In the low temperature coolers, nitric oxide gas is forced to take a zigzag course through a chamber that is divided into five compartments. Each compartment is filled with cooling tubes through which water circulates. In this cooler, further cooling of the gas takes place while nitric acid condenses on the cooling tubes. The nitric acid formed drains to the bottom of the cooler and is sent to the first absorption tower. The oxidation towers are divided into four compartments. The gas from the low temperature coolers is circulated up and down through these towers and then passes to the absorption towers.
MIXING TANK
The mixing tank stands nearly 30 feet high and is provided with spiral fins to distribute and mix the ammonia gas and air. The gasses are mixed in the proportion of 1 part ammonia gas to 8 parts air.
AMMONIA LINE
Oxide Gas to Cooling Building
AIR FLUE
CATALYZERS
The catalyzers consist of a rectangular aluminum body over the bottom of which is a mesh platinum gauze measuring 12" x 21". The gauze is electrically heated to 750° C. The ammonia-air mixture enters the catalyzer from the top, passes through the gauze, and exits as oxides of nitrogen. The gas then travels through flues to the Cooling Building.
SCALE: 1/4" = 1'-0"
IN FEET
ARTIFICIAL
General Information
A mixture of ammonia gas and steam is produced by steam-heating powdered cyanamide in large pressure vessels known as autoclaves. In order to separate and concentrate the ammonia from the gaseous mixture, a system of gas processing equipment is used. After processing, the now nearly pure ammonia gas is mixed with air and forced through a platinum catalyst, forming oxides of nitrogen. This hot nitric oxide gas is then cooled and oxidized before it is sent to the absorption towers. This drawing is based on the original 1918 drawings produced by the Air Nitrates Corporation. See HAER field notes for an annotated list of drawings.
Sergio Sanchez 1994
UNITED STATES NITRATE PLANT NUMBER 2 - 1918
HAER NO. ALA-

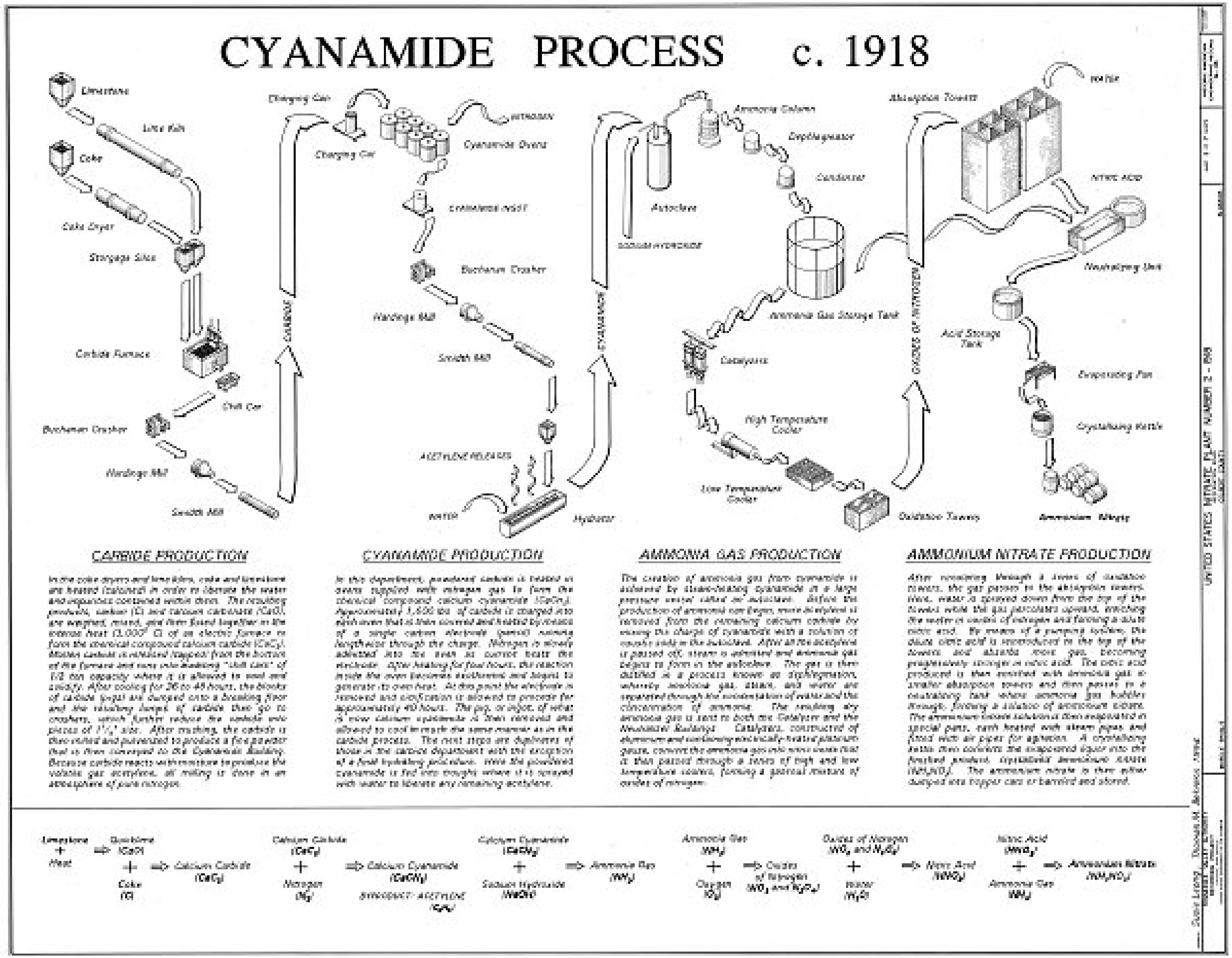
AMMONIUM NITRATE PRODUCTION 1918



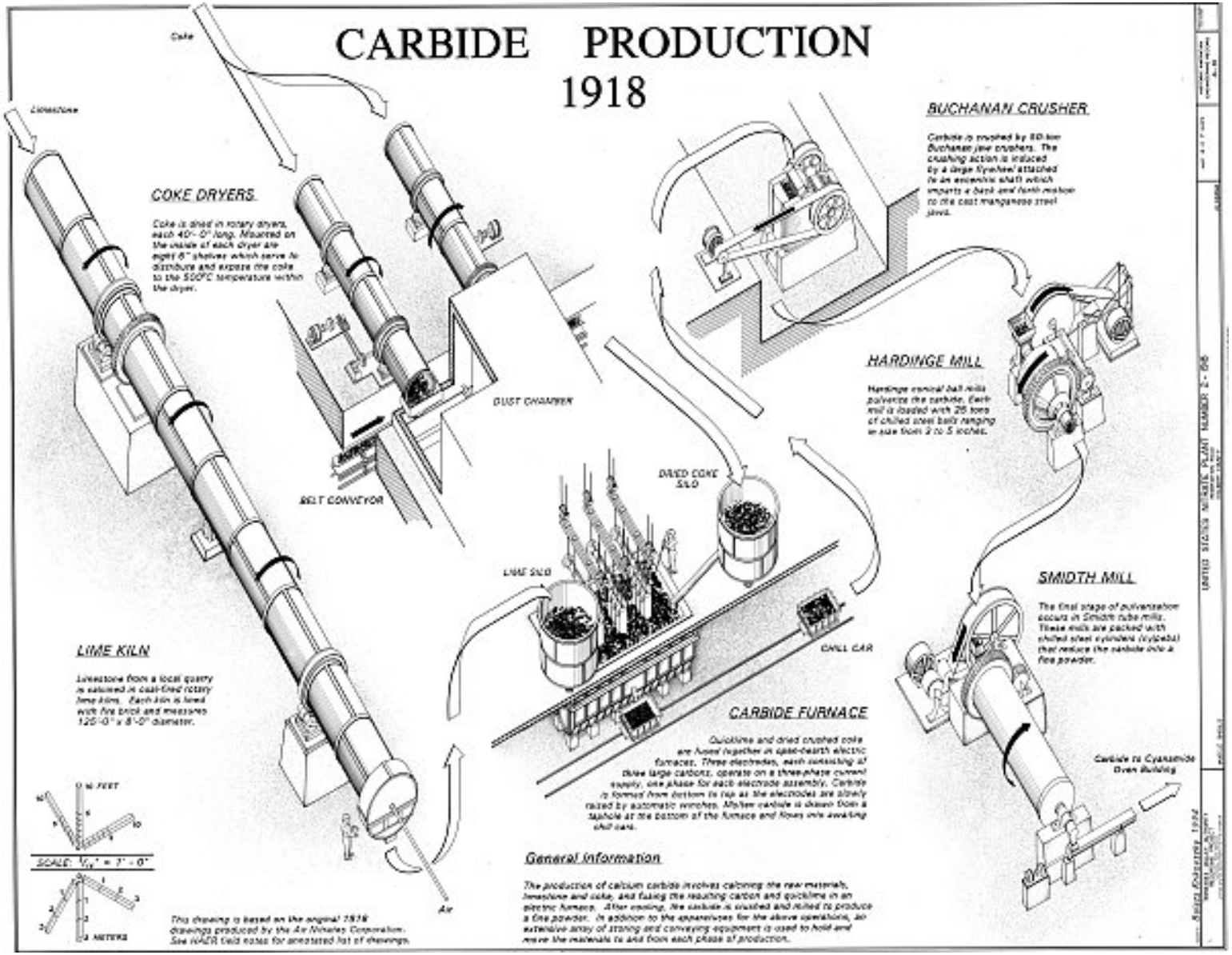
<u>Top Left</u>: caption: "Perspective View Looking Southeast at the Caustic Soda Filter Building and the Autoclave Building – U.S. Nitrate Plant No. 2, Reservation Road, Muscle Shoals, Colbert County, AL"

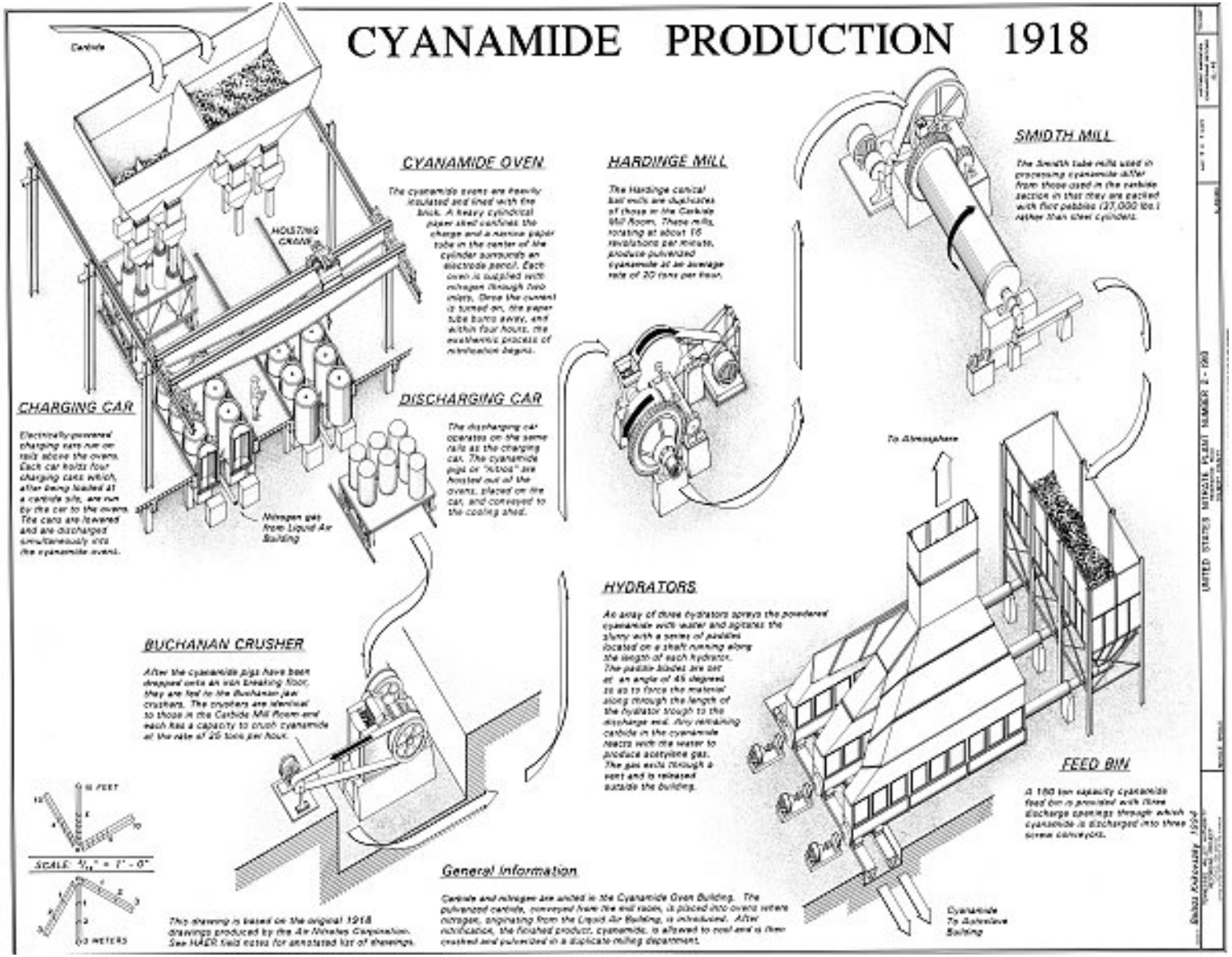
<u>Top Right</u>: caption: "View Looking Southwest at the Engine House and Machine Shop. June 6, 1919. U.S. Nitrate Plant No. 2, Reservation Road, Muscle Shoals, Colbert County, AL."

<u>Left</u> caption: "View Looking South at the Chemical Lab. July 7, 1919. U.S. Nitrate Plant No. 2, Reservation Road, Muscle Shoals, Colbert County, AL."



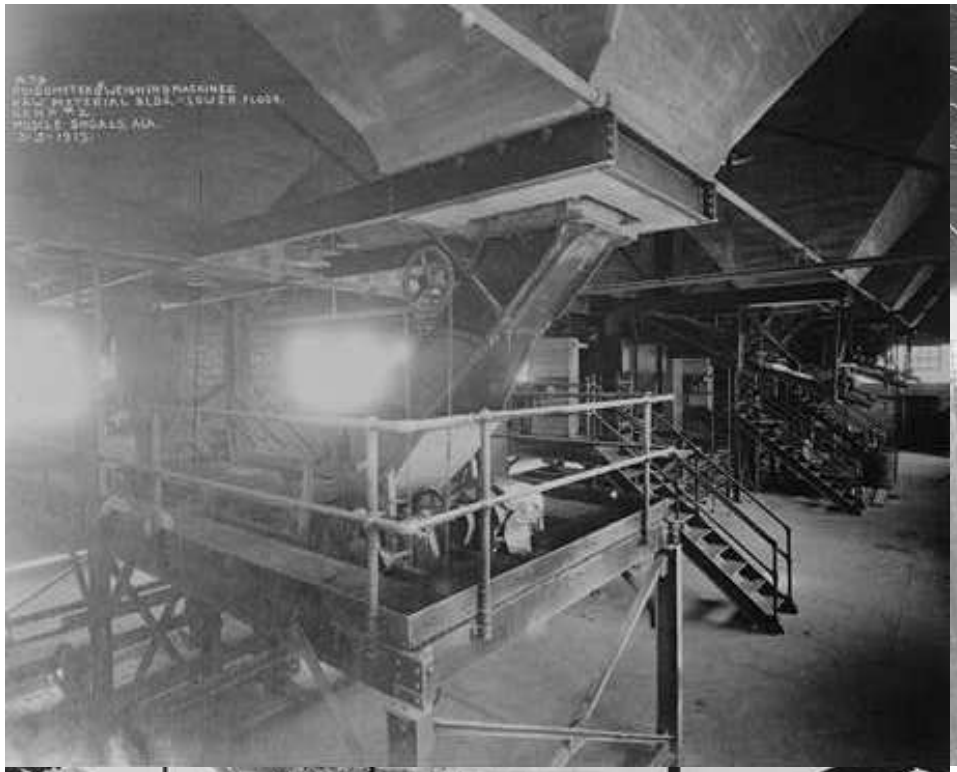
CYANAMIDE PROCESS c. 1918
Limestone
Lime Kiln
Coke
Coke Dryer
Storage Silos
Carbide Furnace
Chill Car
Buchanan Crusher
Hardinge Mill
Smidth Mill
CARBIDE
Charging Car
Cyanamide Ovens
NITROGEN
Buchanan Crusher
Hardinge Mill
Smidth Mill
ACETYLENE RELEASED
WATER
Hydrator
CYANAMIDE
SODIUM HYDROXIDE
Autoclave
Ammonia Column
Dephlegmator
Condenser
Ammonia Gas Storage Tank
Catalyzers
High Temperature Cooler
Low Temperature Cooler
Oxidation Towers
OXIDES OF NITROGEN
Absorption Towers
WATER
NITRIC ACID
Neutralizing Unit
Acid Storage Tank
Evaporating Pan
Crystallizing Kettle
Ammonium Nitrate
CARBIDE PRODUCTION
CYANAMIDE PRODUCTION
AMMONIA GAS PRODUCTION
AMMONIUM NITRATE PRODUCTION
Limestone + Heat
Quicklime (CaO)
Coke (C)
Calcium Carbide (CaC2)
Nitrogen (N2)
Calcium Cyanamide (CaCN2)
BYPRODUCT: ACETYLENE
Sodium Hydroxide (NaOH)
Ammonia Gas (NH3)
Oxygen (O2)
Oxides of Nitrogen (NO2 and N2O4)
Water (H2O)
Nitric Acid (HNO3)
Ammonia Gas (NH3)
Ammonium Nitrate (NH4NO3)
UNITED STATES NITRATE PLANT NUMBER 2 - 1918

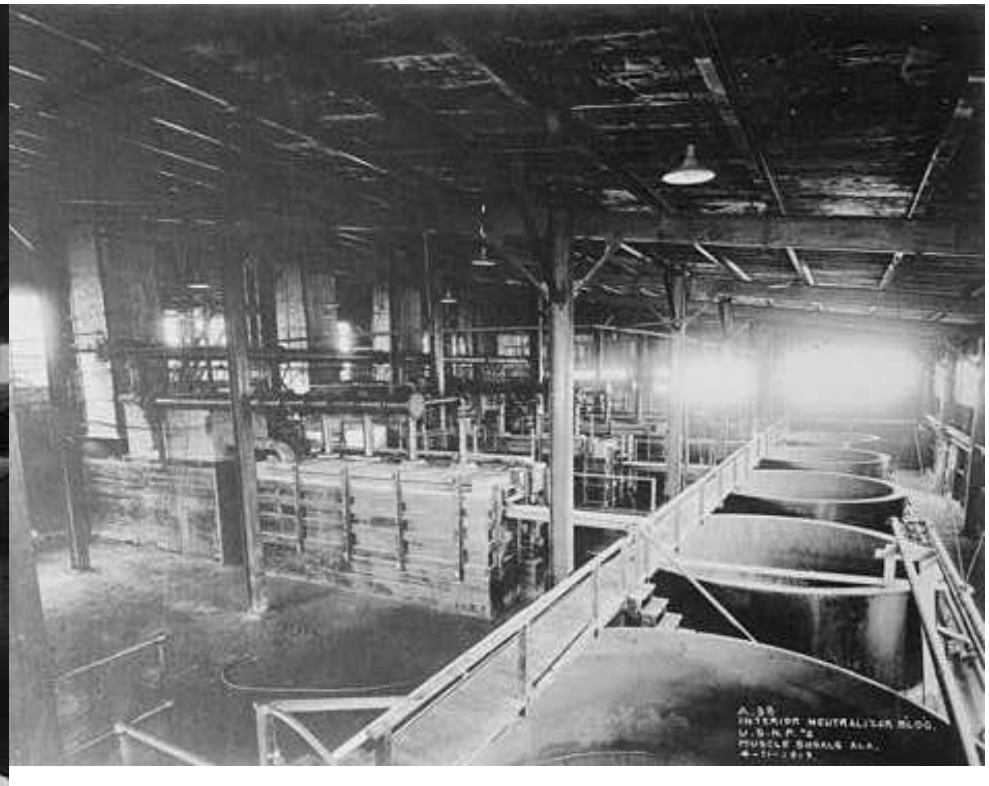

CARBIDE PRODUCTION
1918
Coke
Limestone
COKE DRYERS.
Coke is dried in rotary dryers, each 40'- 0" long. Mounted on the inside of each dryer are eight 6" shelves which serve to distribute and expose the coke to the 500°C temperature within the dryer.
DUST CHAMBER
BELT CONVEYOR
BUCHANAN CRUSHER
Carbide is crushed by 60-ton Buchanan jaw crushers. The crushing action is induced by a large flywheel attached to an eccentric shaft which imparts a back and forth motion to the cast manganese steel plate.
HARDINGE MILL
Hardinge conical ball mills pulverize the carbide. Each mill is loaded with 25 tons of chilled steel balls ranging in size from 2 to 5 inches.
DRIED COKE SILO
LIME SILO
CARBIDE FURNACE
Quicklime and dried crushed coke are fused together in open-hearth electric furnaces. Three electrodes, each consisting of three large carbons, operate on a three-phase current supply, one phase for each electrode assembly. Carbide is formed from bottom to top as the electrodes are slowly raised by automatic winches. Molten carbide is drawn from a taphole at the bottom of the furnace and flows into awaiting skull cars.
SKULL CAR
SMIDTH MILL
The final stage of pulverization occurs in Smidth tube mills. These mills are packed with chilled steel cylinders (cylpebs) that reduce the carbide into a fine powder.
Carbide to Cyanamide Oven Building
LIME KILN
Limestone from a local quarry is calcined in coal-fired rotary lime kilns. Each kiln is lined with fire brick and measures 125'-0" x 8'-0" diameter.
Air
SCALE: 1/16" = 1'-0"
0 10 FEET
3 METERS
This drawing is based on the original 1918 drawings produced by the Air Nitrates Corporation. See HAER field notes for annotated list of drawings.
General Information
The production of calcium carbide involves calcining the raw materials, limestone and coke, and fusing the resulting carbon and quicklime in an electric furnace. After cooling, the carbide is crushed and milled to produce a fine powder. In addition to the apparatuses for the above operations, an extensive array of storing and conveying equipment is used to hold and move the materials to and from each phase of production.
UNITED STATES NITROGEN PLANT NUMBER 2 - 1918
Alvin Palmerlee, 1994


CYANAMIDE PRODUCTION 1918
Carbide
HOISTING CRANE
CHARGING CAR
Electrically-powered charging cars run on rails above the ovens. Each car holds four charging cans which, after being loaded at a carbide silo, are run by the car to the ovens. The cans are lowered and are discharged simultaneously into the cyanamide ovens.
CYANAMIDE OVEN
The cyanamide ovens are heavily insulated and lined with fire brick. A heavy cylindrical paper shell confines the charge and a narrow paper tube in the center of the cylinder surrounds an electrode pencil. Each oven is supplied with nitrogen through two inlets. Once the current is turned on, the paper tube burns away, and within four hours, the exothermic process of nitrification begins.
DISCHARGING CAR
The discharging car operates on the same rails as the charging car. The cyanamide pigs or "slabs" are hoisted out of the ovens, placed on the car, and conveyed to the cooling shed.
Nitrogen gas from Liquid Air Building
HARDINGE MILL
The Hardinge conical ball mills are duplicates of those in the Carbide Mill Room. These mills, rotating at about 16 revolutions per minute, produce pulverized cyanamide at an average rate of 20 tons per hour.
SMIDTH MILL
The Smidth tube mills used in processing cyanamide differ from those used in the carbide section in that they are packed with flint pebbles (27,000 lbs.) rather than steel cylinders.
To Atmosphere
HYDRATORS
An array of three hydrators sprays the powdered cyanamide with water and agitates the slurry with a series of paddles located on a shaft running along the length of each hydrator. The paddle blades are set at an angle of 45 degrees so as to force the material along through the length of the hydrator trough to the discharge end. Any remaining carbide in the cyanamide reacts with the water to produce acetylene gas. The gas exits through a vent and is released outside the building.
BUCHANAN CRUSHER
After the cyanamide pigs have been dropped onto an ash breaking floor, they are fed to the Buchanan jaw crushers. The crushers are identical to those in the Carbide Mill Room and each has a capacity to crush cyanamide at the rate of 20 tons per hour.
FEED BIN
A 150 ton capacity cyanamide feed bin is provided with three discharge openings through which cyanamide is discharged into three screw conveyors.
SCALE: 3/16" = 1'-0"
10 FEET
3 METERS
This drawing is based on the original 1918 drawings produced by the Air Nitrates Corporation. See HAER field notes for annotated list of drawings.
General Information
Carbide and nitrogen are united in the Cyanamide Oven Building. The pulverized carbide, conveyed from the mill room, is placed into ovens where nitrogen, originating from the Liquid Air Building, is introduced. After nitrification, the finished product, cyanamide, is allowed to cool and is then crushed and pulverized in a duplicate milling department.
Cyanamide To Ammonia Building
UNITED STATES NITRATE PLANT NUMBER 2 - 1918
Bruce Kennedy 1994

"…The Shoals seem peaceful now; the buildings that were army clubs house the TVA offices and the school. But in the former nitrate plant, where the furnaces cook phosphate ore at a temperature of 2,750 degrees Fahrenheit, it is easy to feel the lethal possibilities. Phosphates have their own war uses in the making of poison gas and smoke screens. The acid that runs in little rivers into a big tank gives off unpleasant fumes, and visitors are warned not to step where it's wet. Phosphates can be used to make the clover grow, but they can also be used to kill men…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)





<u>Top Left</u>: caption: "Interior View of the Raw Materials Building, Looking at the Poidometer and Weighing Machine. May 5, 1919. U.S. Nitrate Plant No. 2, Reservation Road, Muscle Shoals, Colbert County, AL."

<u>Top Right</u>: caption: "Interior View of the Neutralizer Building, Looking at Condensers, Neutralizers and Storage tanks. April 11, 1919. U.S. Nitrate Plant No. 2, Reservation Road, Muscle Shoals, Colbert County, AL."

<u>Left</u>: caption: "Interior View of Ammonium Nitrate House, Looking at Ammonium Nitrate in Storage. April 18, 1919. U.S. Nitrate Plant No. 2, Reservation Road, Muscle Shoals, AL."

The Gathering Clouds

"…the Tennessee Valley Authority has taken this country's first step towards government manufacture of munitions. Shortly after the Muscle Shoals chemists announced the new metaphosphate, it was said that the army planned to make the Valley the fortified center of armament-making for the country. Already, few and scattered as industries are in the South, a surprising number of those essential to modern warfare are in or near the Valley and the army likes to play its war games there. And there are people, firmly opposed to the government planning that involves tree-planting and strawberry barges, who would welcome as proper preparedness the military administration of the Tennessee river system. Farmers might miss the fertilizer, but war would send the price of lowland cotton kiting, and give an occupation to the tall tow-headed boys in the hills. In another way, you can say that a war is just a matter of fertilizer, for export…"

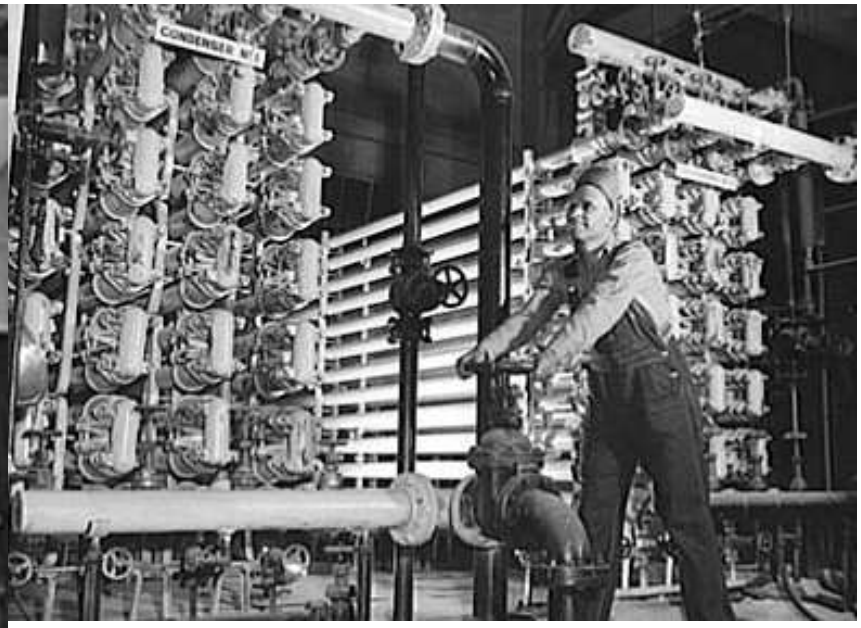
RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

"The world's important deposits of phosphates are owned by four countries. They are exported, of course, because the countries without them must import them, either for war or for peace. We export ourselves mostly to Italy, Germany, and Japan, the countries without a natural supply. The natural deposits are in this country, in the British and French possessions, and in Russia. We have the most; Russia has the largest single field, near Archangel. So these four countries the United States, Great Britain, France, and Russia could by acting together virtually control the world supply. These four countries could declare peace."

***Dr. H.A. Morgan,* TVA Director (ca. 1939)**

"…the determination of the quantity and destination of phosphate exports should therefore be a function of the Federal Government as a matter of foreign policy."

RE: excerpt from *The 1937 Annual Report of the Tennessee Valley Authority*



<u>Above</u>: caption: "An operator adjusts a gate valve in the ammonia condenser section of the TVA's synthetic ammonia plant in Muscle Shoals, Alabama. The TVA was one of the government's main research facilities for nitrogen production. During the war, the nitrogen was used for bombs. After the war, it was used for fertilizer."

<u>Left</u>: caption: "Nitrogen determination apparatus in TVA research at University of Tennessee. June 1942."

<u>Above L&R</u>: caption: "Studies in the high-pressure synthesis of gases are being made continuously in the TVA laboratories in the Muscle Shoals area. The plants served by these laboratories make ammonia for conversion into ammonium nitrate for use in the manufacture of high explosive shells, elemental phosphorus for incendiary bombs and shells, phosphoric acid and highly concentrated phosphatic fertilizer. June 1942."

<u>Left</u>: caption: "Section of the TVA's phosphoric acid plant operated in conjunction with the making of elemental phosphorus in the Muscle Shoals area. The phosphorus, used in the manufacture of incendiary bombs and shells and of material for 'smoke,' is produced by smelting phosphate rock, coke and silica together in electric furnaces and condensing the resulting phosphorus gases. When surplus phosphorus is available it is converted into highly concentrated phosphatic fertilizer, much of which is shipped abroad under provisions of the Lend-Lease Bill. June 1942."

<u>Right</u>: caption: "Part of the gas purification section of the TVA's new synthetic ammonia plant in the Muscle Shoals area. Ammonia is made here by the high-pressure synthesis of nitrogen and hydrogen. The ammonia thus secured is converted at Muscle Shoals to ammonium nitrate for use in the making of high explosive shells. In addition to the production of munitions, the TVA is engaged in research in many fields, seeking new sources of strategic materials and better ways to utilize them in the war effort. June 1942"

Nitrogen production got its biggest boost from WWII exigencies. Nitrogen is one of the prime ingredients in explosives. During the 1930s, the U.S. government spent millions of dollars researching how to produce nitrogen from air. The resulting process requires tremendous amounts of electricity thus, some of the first plants were built near hydroelectric dams of the TVA. The nitrogen produced took the chemical form of ammonia. When WWII began, the federal government constructed ten new plants to produce ammonia for munitions (all were located in the interior of the country). Several of the plants were built alongside natural gas pipelines so they could use the gas as raw material for their production. By the end of the war, these new plants and the old ones were producing 730K-tons of ammonia each year and had the capacity of producing 1.6 million tons. When the nitrogen was no longer needed for explosives, the nitrogen-rich ammonia was used for making fertilizer.

Left: caption: "Negro farmer hauling bags of dry fertilizer onto his truck, San Augustine, Texas, 1939"

Counterfeiting Thirst

"…On Dr. H.A. Morgan's desk in Knoxville, between his pipe and one of those birds the woodcarvers whittle up in the mountains, is a chunk of something that looks like hoarhound candy. Actually it is TVA's proud achievement called 'metaphosphate.' From the standpoint of distribution, what is important is that this product, which is nearly two-thirds plant food, is less bulky to ship than ordinary fertilizers. It is not affected by a little weather, so it can be moved like coal, in flat cars or barges. And from the standpoint of manufacture, it is important that this concentrated fertilizer can be made from low-grade phosphate rock, not hitherto considered to be of great value. Dr. H.A. Morgan feels that the TVA process, which made available for use large deposits of this low-grade ore, has contributed immeasurably to our natural resources. If you must measure, maybe it's worth more than the whole cost of the project…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

"…phosphates are no patent medicine, but something necessary to a fertile soil. In parts of Tennessee the crops and gardens languish, and the land looks exactly as if it needed water, but the rainfall is abundant and the fact is that hunger is counterfeiting thirst. Land needs water, but it also needs nitrogen and phosphorus, as part of its regular diet; dirt farmers can say they never heard of such a thing, but the land nowadays seems to know about it, the way a modern child will ail if it doesn't get enough vitamins. It may take the diagnosis of a soil specialist to show what element is lacking, and the proportion in which it should be supplied. But you have to accept the idea that the basic soil elements are as essential as water and air and more essential than dirt as such; the new-fangled dirtless farm puts these elements into the water…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

"…That TVA has undertaken to supply phosphates instead of nitrates, as provided in the original plan for Muscle Shoals, is explainable on several counts. By growing the right cover crop you get five pounds of nitrate for every pound of phosphate you add to the soil. So every phosphate-demonstration farm in the Valley becomes the nitrate factory Uncle Sam had intended to run at Muscle Shoals, with clover or lespedeza to do what the German manufacturing process was supposed to do - pull the nitrates right out of the air…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Above</u>: caption: "TVA Fertilizer at Muscle Shoals Storage Facility"

Where Was that Clover?

"…the clover or the lespedeza or whatever cover crop you plant solves another problem, that of hitching the fertilizer to the ground…But anchor the fertilizer with a cover crop, and maybe you've got it; at any rate you've helped TVA stop erosion, which is the part that fertilizer is supposed to play in the reclamation cycle…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Above</u>: caption: "Harvesting a wheat crop on the banks of the Tennessee River, in the Muscle Shoals district"

"…As for what the phosphates will do on the ground, all you have to do is look at a field in any one of the demonstration farms. There are over twenty-three thousand of these farms in the Valley and in states over the country farms where TVA phosphates are being used in accordance with conditions laid down by the Authority and agreed to by the farmer. On these farms, crop yields increase, weeds give up, and farmers note the miraculous appearance of dormant legumes. One said: 'I didn't sow nothin'. Tell me, where was that clover?' In one of the mountain counties where they have copperheads, a woman farmer said that when she crossed the pasture she always walked on the part where no phosphate had been applied, because the grass was so thin there she could see the snakes. And of course the smart farm animals prefer a phosphate-flavored pasture…"

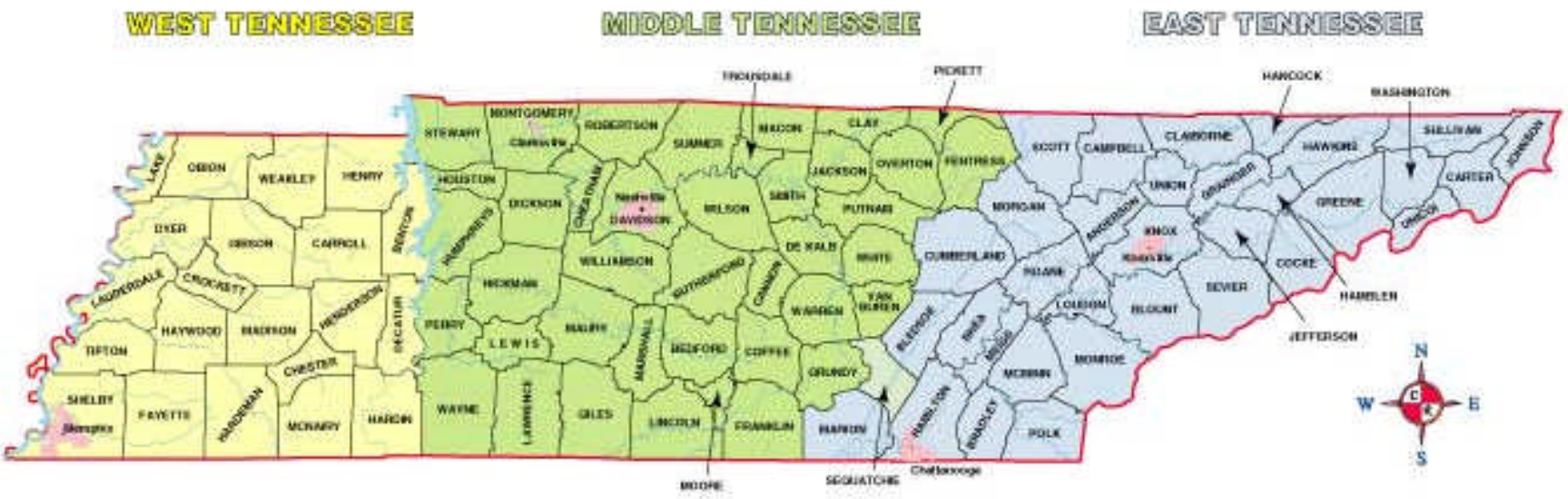
RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Top Left</u>: caption: "View of more farm land purchased by the TVA. This land will be used as a poultry and gardening demonstration center. Note the rockiness of the soil. In the background are the dormitories for un-married workmen on Norris Dam. November 1933."

<u>Top Right</u>: caption: "Flock of bronze turkeys on farmland purchased by the TVA for use as demonstration farms. November 1933."

<u>Left</u>: caption: "Teams plowing in one of the fields on the TVA demonstration farm near Norris townsite. November 1933."

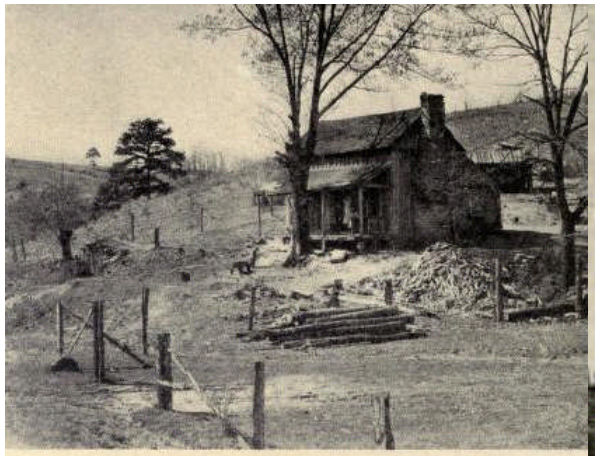
The Dimple of the Universe



"…But nobody claims that phosphates are a panacea. The TVA men are fond of making an example of Middle Tennessee, the part of the state known locally as the 'dimple of the universe.' (It was the whole state that Governor Fiddlin' Bob Taylor called the diamond breastpin on the shirtfront of the world.) Even a non-agrarian from the outside can see the difference, going over the rim of the Cumberlands and down into this section where they have fat barns, like Pennsylvania, and bluegrass, like Kentucky. Almost anything will flourish in Middle Tennessee, although there's no telling what will happen if they keep on growing corn on the slopes and hay in the bottoms…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Above</u>: caption: "The Counties and three 'Great Divisions' of Tennessee"



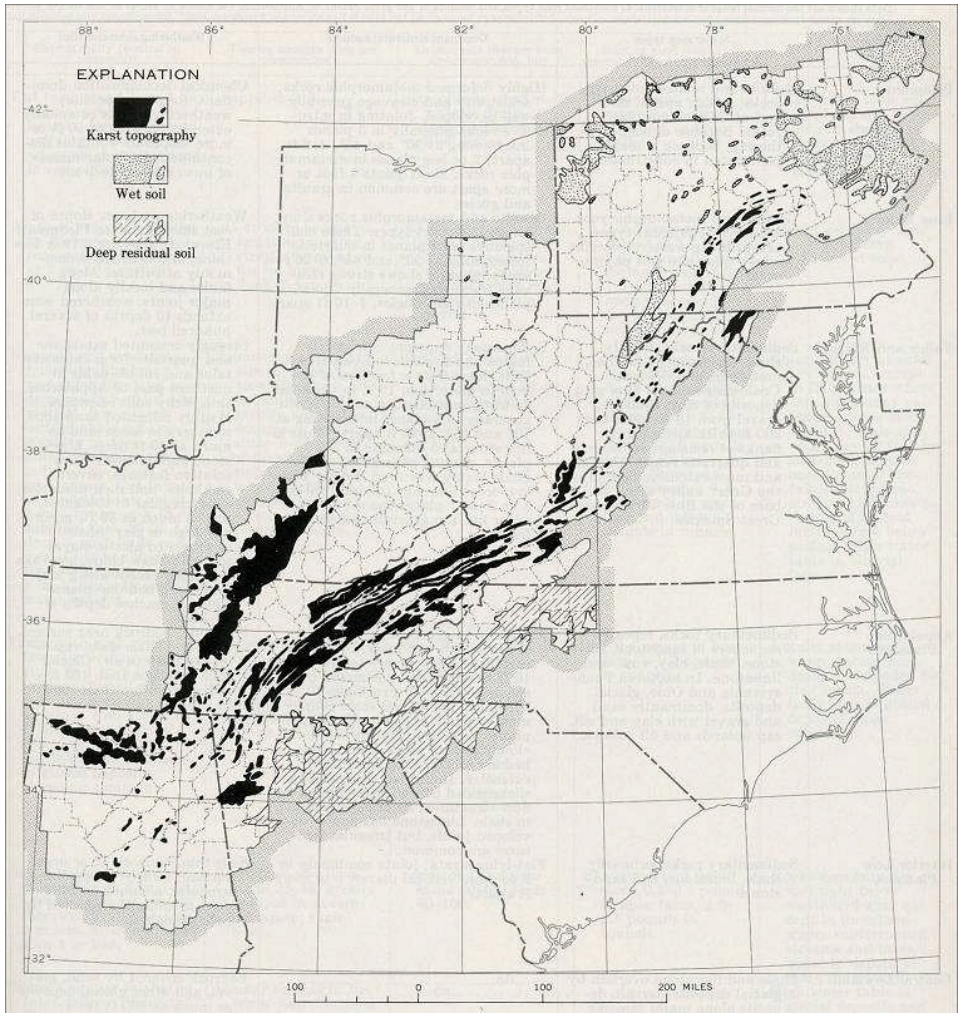
<u>Above</u>: caption: "But some folks have good farms in Tennessee. Where water runs off a hill farm, the soil goes, too, until there is no living for man or beast. In contrast, see the contented cows in fat, flat, and flourishing Middle Tennessee, where God put plenty of phosphates and they weren't washed away."

<u>Left</u> (top-to-bottom): caption: "Going…Going…Gone"

"…Any Valley farmer knows that the dimple of the universe was favored by Providence with good soil, but the TVA men reveal that the secret of this soil is phosphates, put there like a present from Providence. Middle Tennessee is where TVA gets its phosphate ore. Dig out that Middle Tennessee mud, refine it at Muscle Shoals, and you can make another dimple anywhere anyhow, you can grow blue-grass. If, that is, phosphate is the missing element. Of course it does no good to put phosphates on a farm in Middle Tennessee, where they are already…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939). By 1940, phosphorus was being produced by chemical processes and by mining phosphate rock. In the 1940s, the use of "normal superphosphate" fertilizers peaked. In later decades, it was replaced by "triple superphosphate" and ammonium phosphates.

<u>Left</u>: caption: "Tennessee Valley Authority employees mining phosphate for use in fertilizer"



"…Also the dose for soils needing phosphate will vary, and tests are required to determine the right formula. That is why the TVA makes soil maps and is co-operating with the Department of Agriculture and the land-grant colleges in a soil survey of the Valley. It is one reason why the phosphate program is not being rushed through, but the chief reason for that is that you can't get anywhere if you try to rush farmers. Especially Southern farmers…"

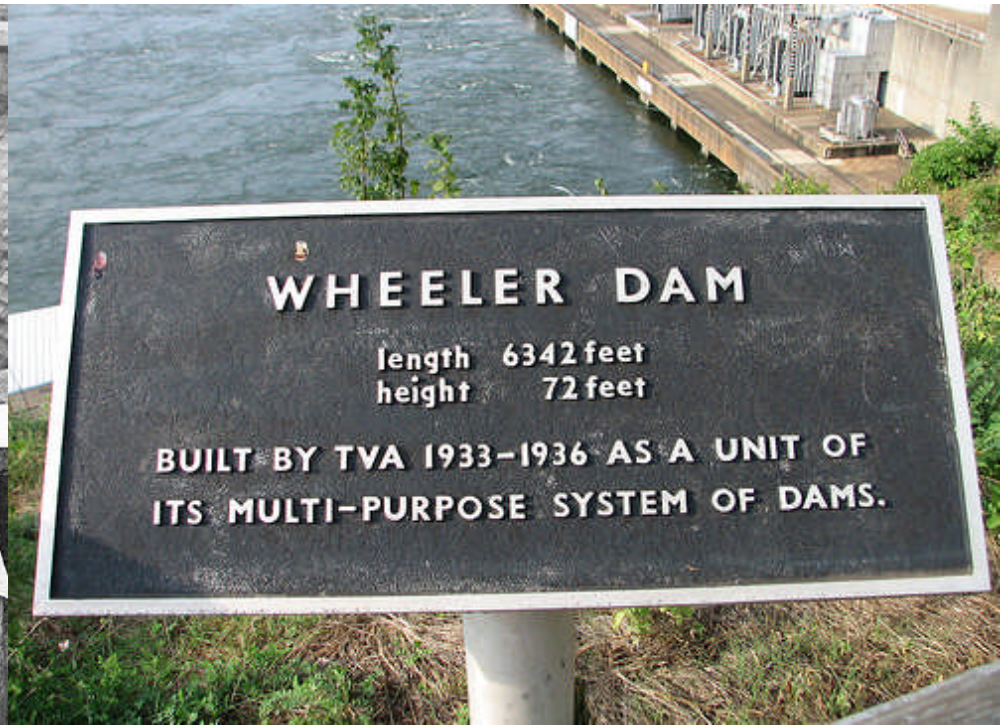
RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u>: caption: "Areas of Karst Topography, wet soils, and cover by deep soil in the Appalachian Region"

Part 5

Electricity for All

Built for the People



"…Two major construction projects have been launched under the supervision of the Tennessee Valley Authority – the building of Norris Dam and Wheeler Dam. Wheeler Dam, like Wilson Dam, is to be a run-of-the-river dam with a dual purpose of improving navigation and providing power development. Norris Dam, on the Clinch River is to be a storage dam, and although some power will be generated there, it will function as a control of the flow of water entering the Tennessee River from the Clinch River. The possibilities for construction of other dams on the Tennessee River and its tributaries are being studied, and plans are being proposed for the initiating of some of these projects…"

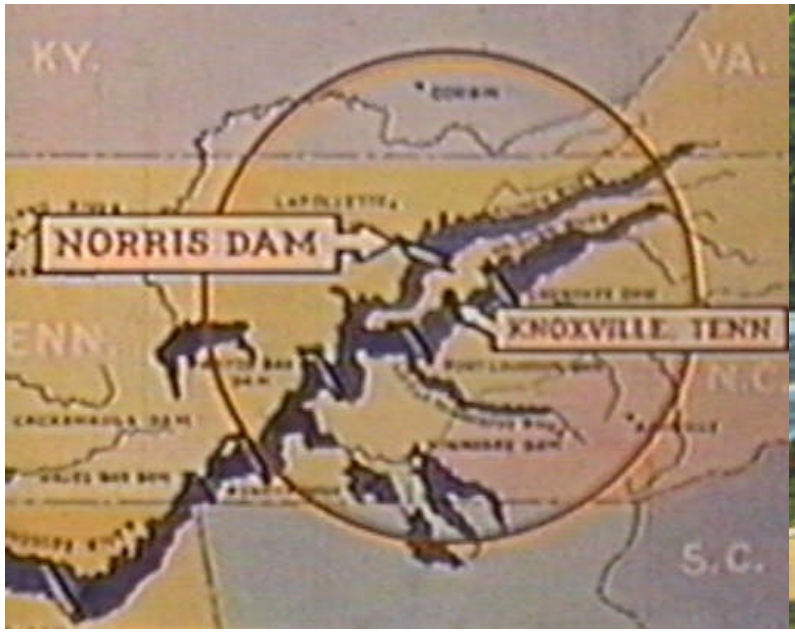
RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1933)

"…In the mountains northwest and southeast of Knoxville, two CCC (Civilian Conservation Corps) camps and 400 men are beginning the great task of reforestation and erosion control which in time, Dr. Morgan estimates, will absorb 5,000 workers at the very least. In a secluded laboratory a onetime Alabama Rhodes Scholar is developing a new method of transmitting power over long distances - a method which may make today's transmission as obsolete as a wooden plow. What the method and who the man are TVA's secrets. In Knoxville's Sprankle Building, in 106 offices, TVA draftsmen are busied over plans; in the wild country twenty miles above Knoxville, where Cove Creek steps into the Clinch River, more men on the TVA payroll explore the countryside. In these last two activities center TVA's most immediate, most important present undertaking: the Norris Dam…"

***Fortune* magazine, October 1933**

"…The wild honeycomb of caves upstream has been found safe against reservoir leakage, and now TVA's men are laying out highway and railway connections, clearing the three miles of land where a model and permanent town will rise to house the workers. An able body of able-minded men is going over the plans for Norris Dam, among them Colonel George R. Spalding (St. Louis office of the War Department), Mr. S.M. Woodward of the University of Iowa (whom Chairman Morgan describes as 'one of the ablest men the United States ever produced in hydraulics'), Mr. J.L. Savage (designer of the Boulder and Madden dams), and Mr. Savage's colleagues in the Denver office of the Reclamation Bureau. Who will boss the job of building, TVA can't tell. Some other government agency snitched from under the TVA's nose the able gentleman chosen (his name is withheld), and all the Authority can say is that Norris Dam will not be built by public contract…"

***Fortune* magazine, October 1933**



"…However that may be, construction will start early in 1934. The 250-foot Norris Dam and the powerhouse will take four years to build and, together with the transmission line that will link the development with Muscle Shoals, will cost nearly $45,000,000. The deep tangle of valleys above the dam will brim with a ragged lake of some eighty-three square miles, impounding 140,000,000,000 cubic feet of water. From ninety-two cemeteries to drier territory, tactful TVA will transfer the occupants of 4,260 historic graves, 'with signal honor to the dead and with due deference to the living.'…"

***Fortune* magazine, October 1933**

Left: caption: "Norris Dam Location Map"

Right: caption: "T.V.A. Norris Dam and lake on Clinch River, Tennessee. Located about twenty miles from Knoxville, Tenn."

"…The average March-October flowage ratio of the Tennessee River at Muscle Shoals has been estimated at ten to one (peak divergence was fifty-three to one). The Norris Dam, with its immense storage, will go far toward bringing this flow into balance. Which will mean:…"

***Fortune* magazine, October 1933**

<u>Above</u>: caption: "Boating – Norris Lake"

"…For navigation: At present, navigation is governed by the seasons, and the channels are poor. Every year 2,000,000 tons of cargo ply the river below and the river above Muscle Shoals, but only 12,000 tons use its locks. Water storage and the clearing of a nine-foot, 650-mile channel will give this tonnage free passage from Knoxville to Paducah. In time to come, the valley's raw materials will have cheap passage by water, and cheaply by water valley products may reach any port on earth. Flood: Norris Dam will greatly reduce; subsequent dams will eliminate…"

***Fortune* magazine, October 1933**

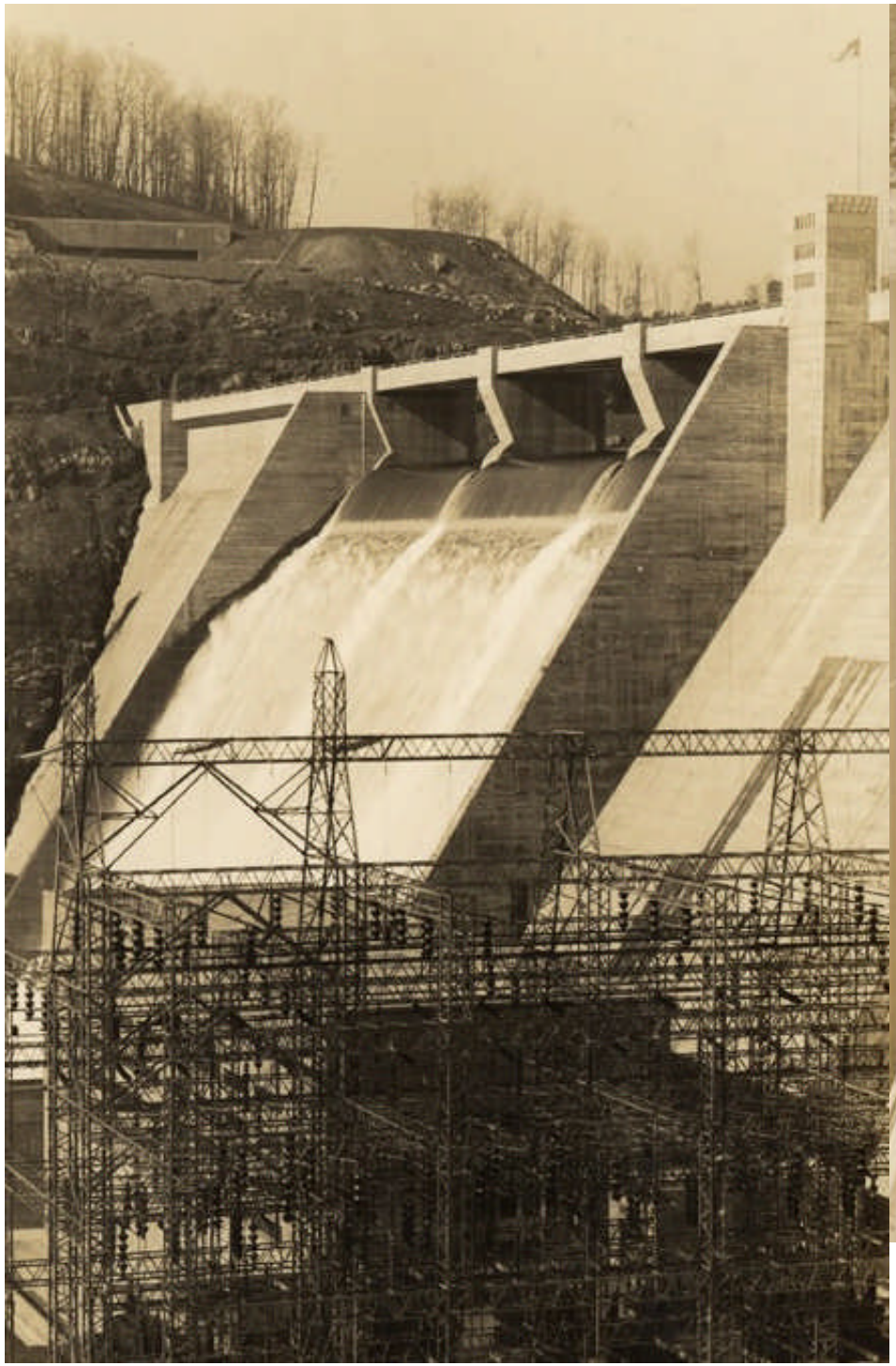
<u>Above L&R</u>: *Norris Dam* under construction

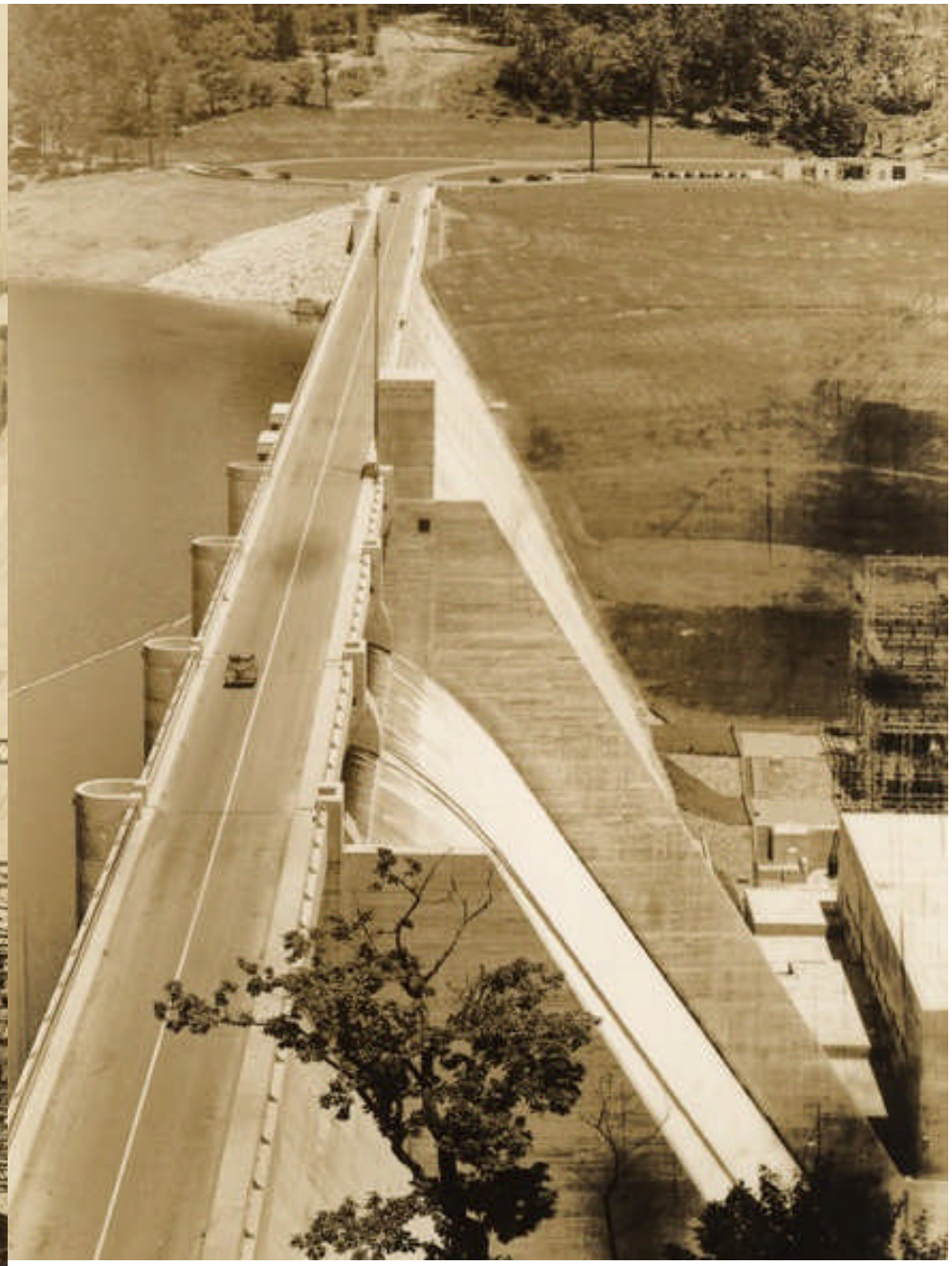
"…Power: At present, Muscle Shoals can count on only about 120,000 horsepower of 'firm' (constant, year-round) waterpower - and only firm power is worth talking about. The powerhouse at Norris Dam will generate 220,000; balancing the flow of the Tennessee is sure to raise Muscle Shoals well toward its ultimate capacity of 610,000 horsepower. Subsequent dams not yet scheduled will do still more. The ultimate horsepower possible to wrench out of the river is estimated at 3,000,000…"

***Fortune* magazine, October 1933**

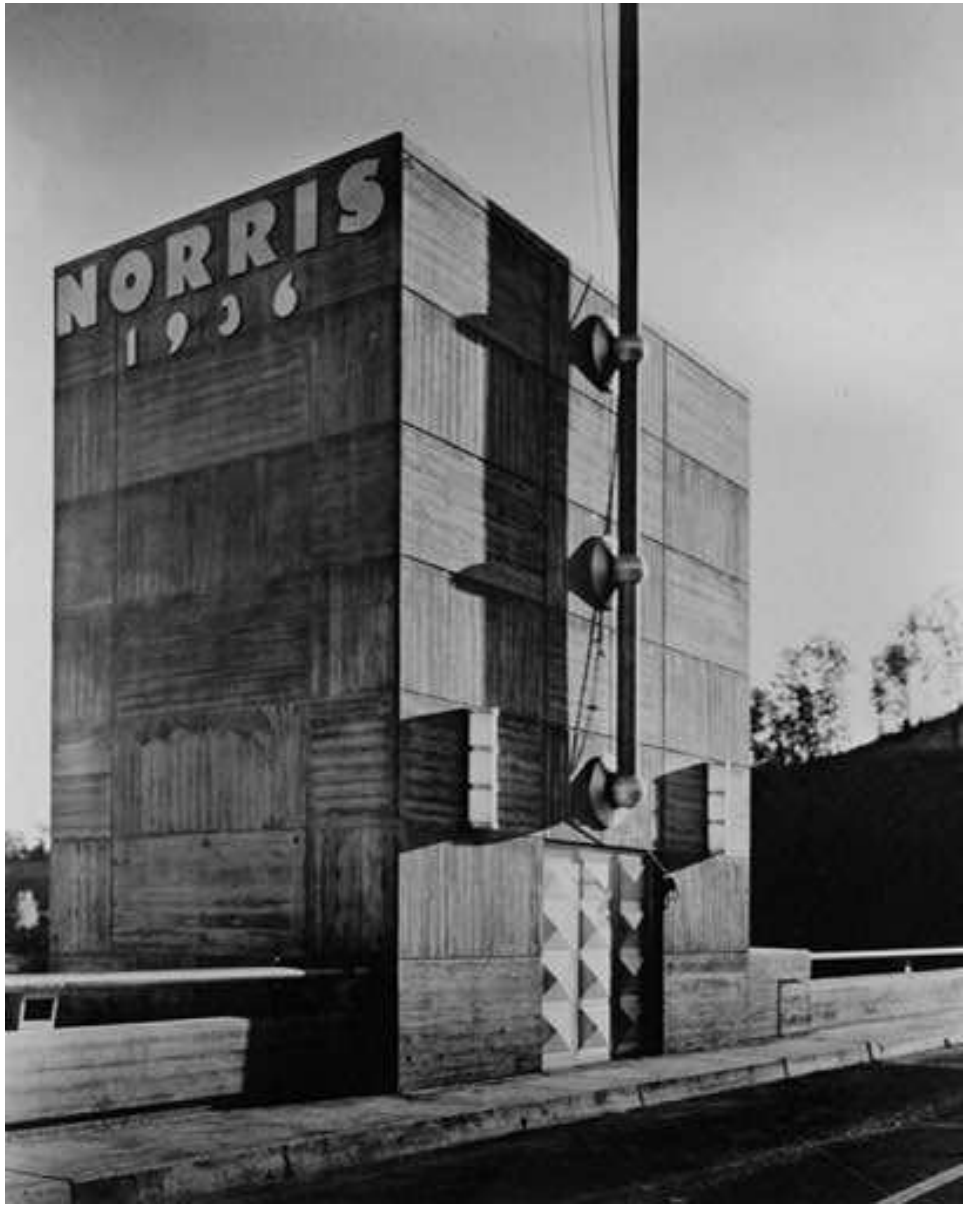
<u>Top</u>: caption: "Norris Dam Powerhouse Construction (1936)"

<u>Bottom</u>: caption: A portion of the switchyard and powerhouse at the TVA's Norris Dam in foreground. Beyond, the waters of the Clinch River cascade 207-feet down the face of the spillway."

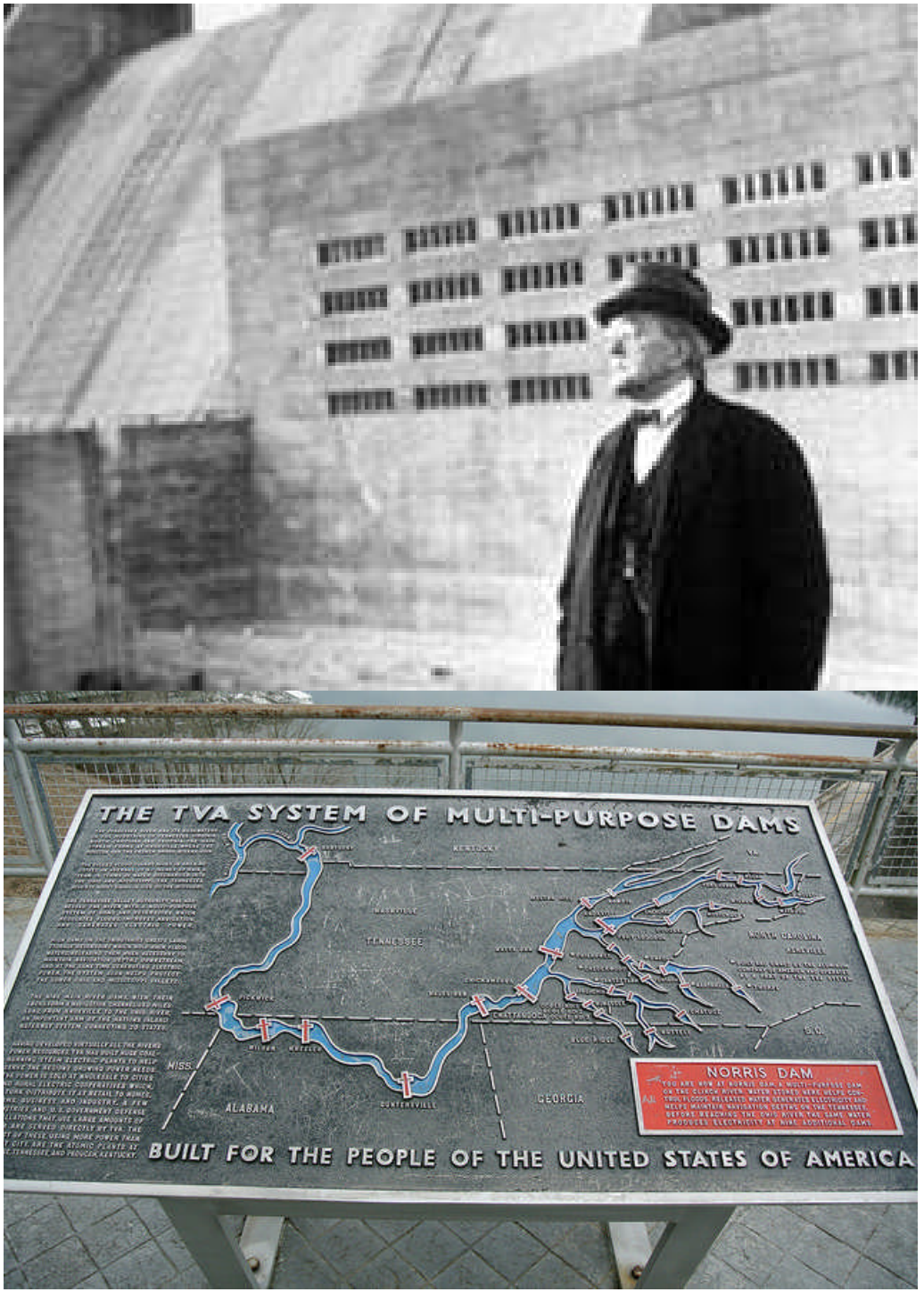




<u>Above & Left</u>: the TVA's *Norris Dam*



<u>Left</u>: caption: "Elevator penthouse atop dam which also serves as flagpole base. Elevator serves various levels of operating machinery inside dam. Top of dam is developed as roadway with sidewalks. Note handrail projecting toward sidewalk and toe space in parapet to make enjoyment of view more comfortable. Handrail brackets are hollow and contain lights which illuminate the roadway but avoid glare by the use of reflectors and directional lenses."


THE TVA SYSTEM OF MULTI-PURPOSE DAMS
KENTUCKY
TENNESSEE
MISS.
ALABAMA
GEORGIA
NORRIS DAM
BUILT FOR THE PEOPLE OF THE UNITED STATES OF AMERICA

The Power Trust

"…What TVA could do with this power is what scared Presidents Coolidge and Hoover into vetitive spasms. Nine power companies under two great holding corporations, Commonwealth & Southern and Electric Bond & Share, now serve 550,000-odd valley customers with power at an average production and transmission cost estimated at nine mills per kilowatt hour. This, as applied to all nine companies, is the merest estimate-derived-from-an-estimate. Carl D. Thompson's 'Confessions of the Power Trust' contains, among much else, a study of Alabama Power Co. (subsidiary of Commonwealth & Southern) as a representative company, and Alabama Power's average production cost is therein estimated at 0.882 cents a kilowatt hour…"

Fortune **magazine, October 1933**

"…Wholesale power to other utilities and to manufacturers is generally cheap, but it is alleged that domestic users and small municipalities have been known to pay six to eighteen times the average production cost. These private companies, combined, are equipped to supply 33 per cent more power than the valley is using…"

***Fortune* magazine, October 1933**

Powermen Would Like to Know

"…Within a very few years, thanks to TVA, excess production will jump to 66 per cent. And TVA hopes to sell its power at a uniform switch-board rate considerably lower (how much, nobody can be sure) than rates have a habit of being. How on earth the valley is to absorb all this excess power and what on earth it will mean to the power companies and a $400,000,000 investment in private power (the figure is Wendell L. Willkie's, President of Common-wealth & Southern), powermen would like very much to know…"

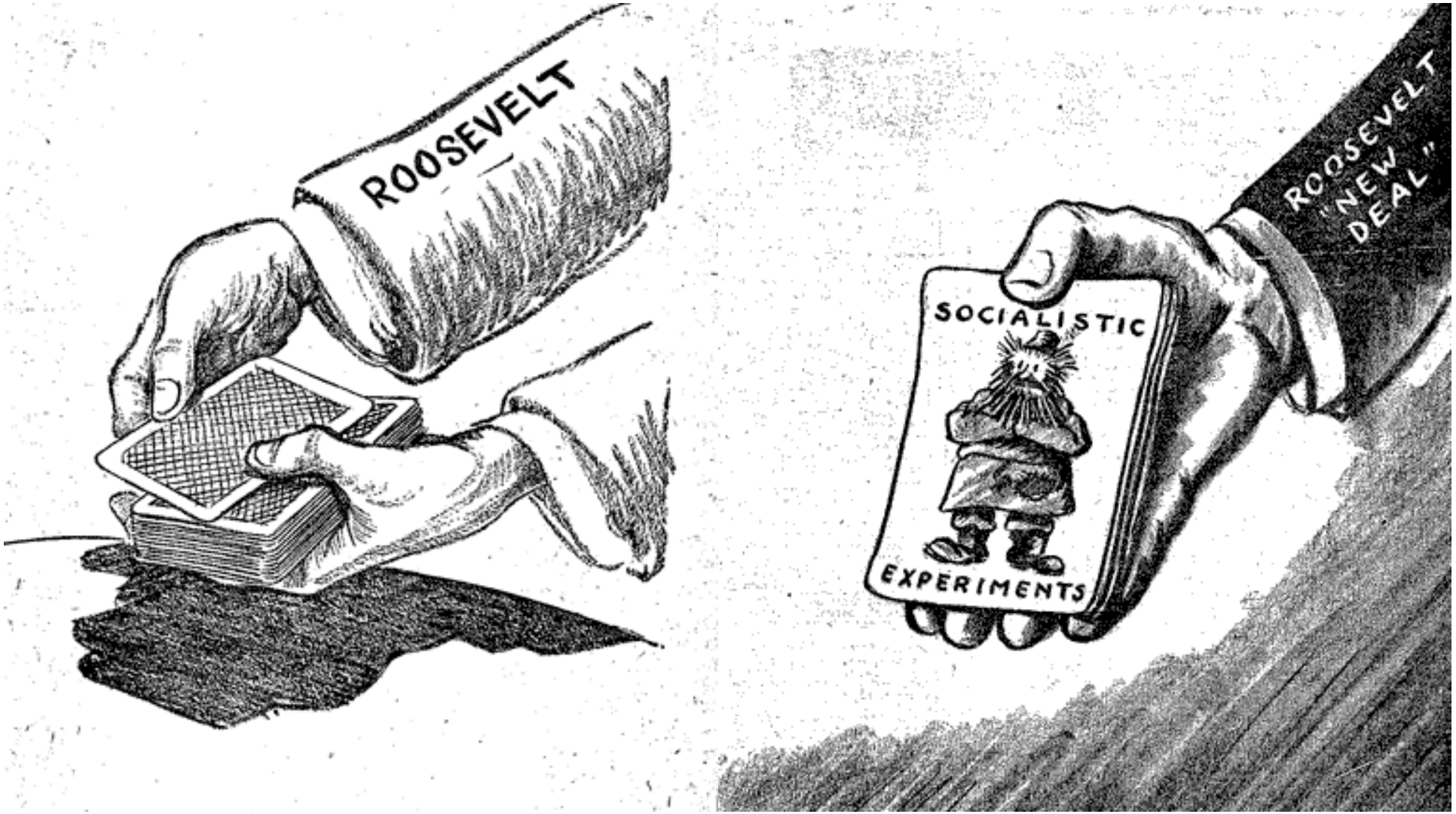
***Fortune* magazine, October 1933**

<u>Left</u>: caption: "Wendell Wilkie stops during his off-the-record talk before the National Press Club to answer questions from club members.
June 12, 1940."

Keep Dumb, Look Wise

"…Many an interested party was trying to find out during the summer months, while TVA issued broad missionary statements and while TVA's Mr. Llewellyn Evans investigated power rates in the valley and while, on every issue significant to powermen, TVA's Directors kept dumb and looked wise. Not even yet, not for years to come, may powermen or TVA or any human agency know all it wants to know about TVA's power problems, yet when, on August 25, the Authority put its cards on the table, powermen recognized a New Deal and a strong hand indeed…"

***Fortune* magazine, October 1933**


ROOSEVELT
ROOSEVELT "NEW DEAL"
SOCIALISTIC
EXPERIMENTS

Furthering the Public Interest

"Private and public interests in the business of power are of a different kind and quality and should not be confused. The right of a community to own and operate its own electric plant is undeniable…one of the measures which the people may properly take to protect themselves against unreasonable rates. Such a course of action may take the form of acquiring the existing plant, or setting up a competing plant, as circumstances may dictate. The fact that TVA action…may have an adverse economic effect upon a privately owned utility…a matter for the serious consideration of the Board in framing and executing its power program…is not the determining factor. The most important considerations are the furthering of the public interest in making power available at the lowest rate consistent with sound financial policy, and the accomplishment of the social objectives which low cost power makes possible."

***David E. Lilienthal,* TVA Director (1933)**

RE: Lilienthal was the Director-in-Charge of setting TVA's electric power policies. Power was the lifeblood of the TVA's social-industrial-agrarian scheme for creating successful farms and industry in the valley of the *Tennessee River*. By the fall of 1933, over fifty towns had applied for power to be generated by TVA dams.

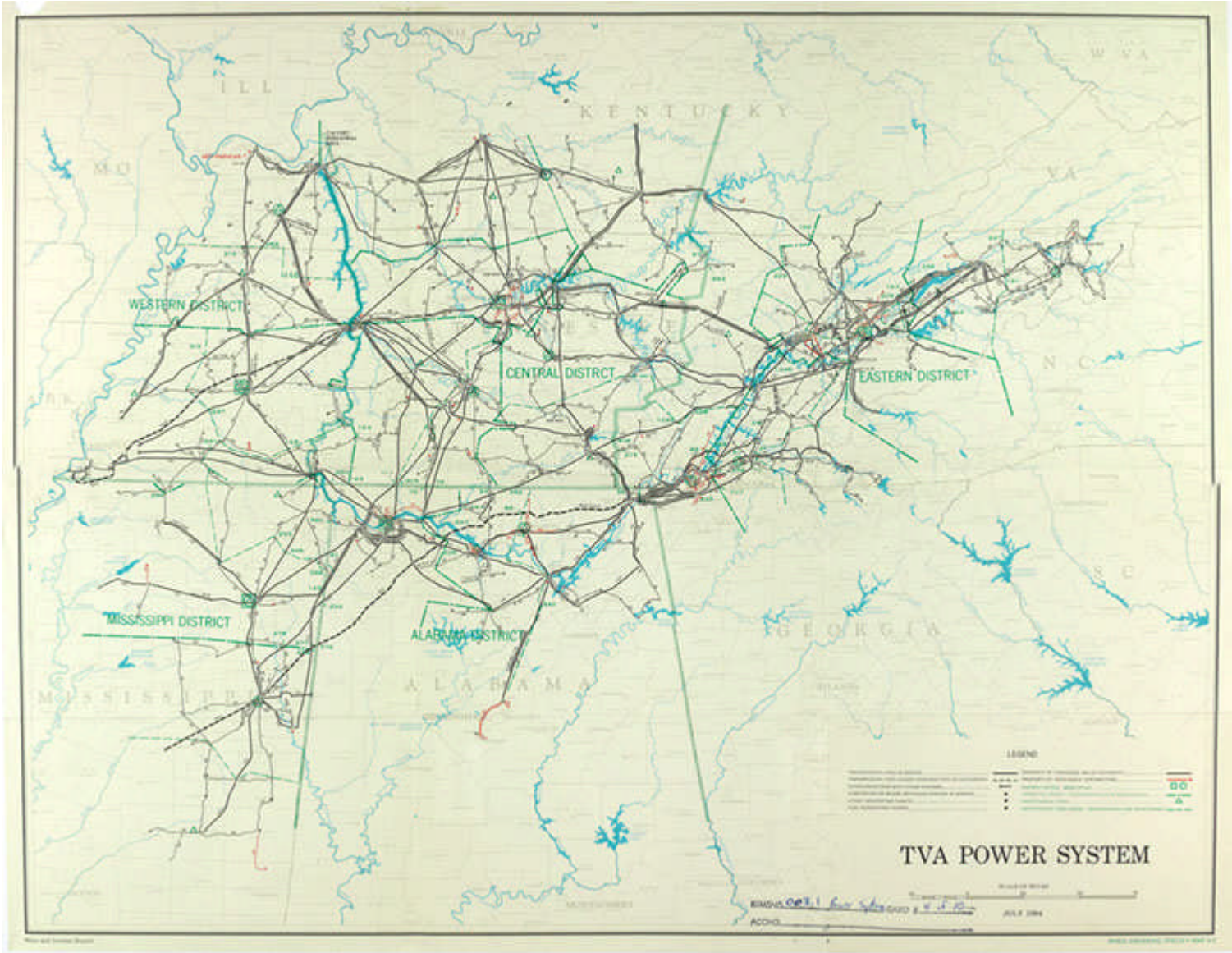
"…The public character of electric service is dictated by the very nature and function of electricity. Electric power is not just another commercial product to be placed on the commodity market at the highest price it will bring. Electricity is energy and in this modern age it is a basic necessity of life. It provides many of the comforts of modern living. Full development of a community's commercial and industrial economy would be impossible without a plentiful supply. Every community is entitled to an adequate supply at reasonable rates. It is an absolute requirement for minimum national strength and security. It is for these reasons, then, that the electric business is a public business. Where the public interest and the private interest conflict, as they sometimes do, the public interest must prevail. In the TVA Act, Congress recognized the public character of power supply and took steps to ensure that in the Tennessee Valley the public interest would be served…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Left</u>: caption: "Transmission Towers from TVA's Chickamauga Dam, TN. June 1942."

…"'To provide a workable and economic basis for operations,' TVA plans first 'to serve certain definite regions' (those in the vicinity of Muscle Shoals and Norris Dam, and the belt of land that will lie near the transmission line connecting these dams) 'and to develop its program in those areas before going outside.' Later, the development will include the whole Tennessee Valley and 'to make the area a workable one and a fair measure of public ownership…several cities of substantial size (such as Chattanooga and Knoxville) and ultimately, at least one city of more than a quarter million…such as Birmingham, Memphis, Atlanta, or Louisville.'…"

***Fortune* magazine, October 1933**


WESTERN DISTRICT
CENTRAL DISTRCT
EASTERN DISTRICT
MISSISSIPPI DISTRICT
ALABAMA DISTRICT
KENTUCKY
GEORGIA
LEGEND
TVA POWER SYSTEM

On an Equitable Basis

"…Although TVA's present intention is to develop its power program in the valley before thinking of going outside, it may go outside 'if there are substantial changes in general conditions…governmental policy…' or if the private companies 'do not cooperate in the working out of the program.' And, possibly more sinister still to powermen, since conceivably it foreshadows a great buying-over campaign: 'Every effort will be made…to avoid the construction of duplicate physical facilities, or wasteful competitive practices. Accordingly, where existing transmission lines of privately owned utilities are required to accomplish the Authority's objectives…a genuine effort will be made to purchase such facilities…on an equitable basis.' Accounting will show 'detail of costs, and will permit of comparison of operations with privately owned plants, to supply a 'yardstick' and an incentive to both private and public managers.' TVA's power accounts and power records 'will always be open to inspection by the public.'…"

***Fortune* magazine, October 1933**

War and Remembrance

"…Powermen bitterly recall that day in War-time when Alabama Power forked over the site of Muscle Shoals - on which it had already spent some $500,000 - to its government. All that for $1. They remember, too, what happened later when, for publicity purposes, Alabama Power reproduced that $1 check: Alabama Power was fined $500 for re-producing a government document…"

***Fortune* magazine, October 1933**

<u>Above</u>: caption: "Panoramic view of Wilson Dam and Powerhouse, Muscle Shoals, Alabama. April 1926."

The Path to Wisdom

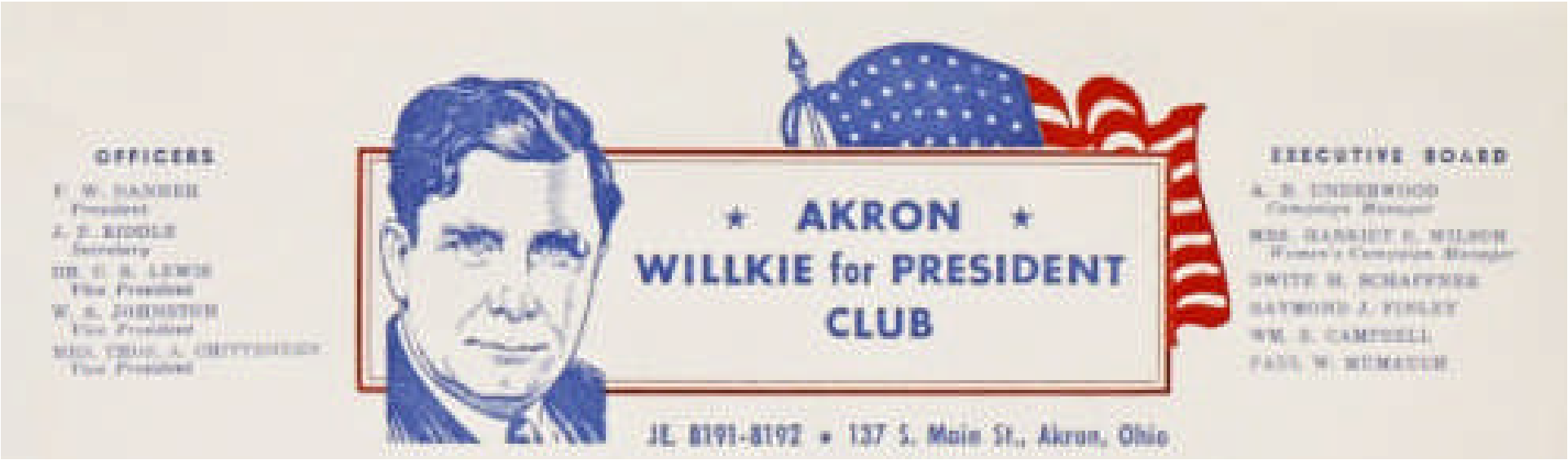
"…Nowadays even louder and funnier things are afoot. Tossing reminiscence aside, the same gentlemen bitterly observe that (through a 3 per cent tax on the gross revenue from sales of energy both commercial and domestic, through the $1 tax on every $1,000 in capital stock which, as NRA boys, they must hand over) they, along with thousands of investors in private power and along with U.S. citizens by the million the country over, are forced to pay for TVA's program. Bitterly, they agree with Professor Richard J. Smith, legal authority on utilities (who, in the Yale Law Journal, June, 1933, points out that municipal control and state regulation of private power have often as not been merely negative in properly directing the expansion of the industry), and again bitterly they expand upon his observations, cry that if the government must take the utilities in hand, there's a sounder, wiser way of doing it than by TVA's proposed policy of serving isolated municipalities, or breaking down the great transmission systems whereby the load may be balanced and the rates may be kept down…"

***Fortune* magazine, October 1933**

"…That wiser way, say the powermen, is by out-and-out, comprehensive acquisition of such systems. And as for that, Wendell L. Willkie recalls the offer he made before a House Committee last April when TVA was imminent: to absorb all power TVA might generate and to sell it over his own lines at rates congruent with such savings as TVA might effect. Not a move was made about that, but Mr. Willkie's offer still stands…"

***Fortune* magazine, October 1933**

<u>Left</u>: caption: "In 1940, Willkie became the Republican Party's nominee for president. A member of the liberal wing of the party, he crusaded against those domestic policies of the New Deal that he thought were inefficient and anti-business."



In 1929, *Wendell L. Willkie* (1892-1944) became a lawyer for the *Commonwealth & Southern Corporation* which provided electrical power to consumers in eleven states. Four years later, he became the holding company's president. As early as April 1933, Willkie was testifying against the TVA before a committee in the House of Representatives, convincing that legislative body to limit the TVA's ability to build transmission lines that might compete with those of existing private companies. Undeterred, FDR persuaded the Senate to remove all such restrictions and grant the TVA broad powers which Willkie's Commonwealth & Southern proved could not compete. In 1939, the company sold its properties in the *Tennessee Valley* to the TVA. The following year, Willkie switched his political affiliation from Democrat to Republican and became that party's nominee in the presidential election campaign of 1940.


OUR NEXT PRESIDENT
WENDELL LEWIS WILLKIE

In the Business

"…As for what can be done about it, powermen will remind you of certain rights which are theirs according to the Fourteenth Amendment. And will observe that TVA cannot enter into direct competition without nullifying the franchise which grants a utility exclusive right to operate within its given territory. And will remark that even in these dizzy times there are courts where, perhaps, such matters will be granted a fair hearing. In fact, TVA has swung a bold foot through a beehive of problems both practical and ethical, of significance not merely in themselves but as they apply to the whole theory of relationships between private and public interests. These are problems and this is a theory which have yet to be solved and defined. Meanwhile, one corner is quite clear of doubt: the U.S. government is 'in the power business.'…"

***Fortune* magazine, October 1933**

The Feasibility and the Wisdom

"…Such is the program of the Tennessee Valley Authority (and be it observed that power, important though it is, is to be the mere spine of the whole living animal). Such are the mere first inklings of the action which must, through years to come, carry it out. And such are a few of the problems yet to be solved by the men who have committed themselves by oath to a belief in 'the feasibility and wisdom' of TVA's program. Meanwhile, nothing is built and all is planning and a ruffling of blueprints. Not until 1938, when Norris Dam stands tall and solid to the memory of the men who fought for it, when the great hive-shaped dynamos down the river begin to whine their hearts out, will TVA begin to realize returns. Not until then will the world be qualified to begin to judge the men now busy with beginnings."

***Fortune* magazine, October 1933**

The *Tennessee Valley Authority* was created by the *Tennessee Valley Authority Act* of the 73rd Congress, in May 1933: *"…for the purpose of maintaining and operating the properties now owned by the United States in the vicinity of Muscle Shoals, Alabama, in the interest of the national defense and for agricultural and industrial development, and to improve navigation in the Tennessee River and to control the destructive flood waters in the Tennessee River and Mississippi River Basins…"* Furthermore, the TVA was directed to:

- **Construct dams and reservoirs on the *Tennessee River* and its tributaries to provide a nine-foot channel from Knoxville to the river mouth;**
- **Advise and cooperate in the readjustment of the population displaced by the construction of dams;**
- **Manufacture and sell fertilizer at Muscle Shoals, and to contract with commercial producers for such fertilizers as may be needed in excess of that produced by government plants;**
- **Manufacture explosives for the United States government, upon requisition of the Secretary of War, and;**
- **Produce, distribute and sell electric power.**

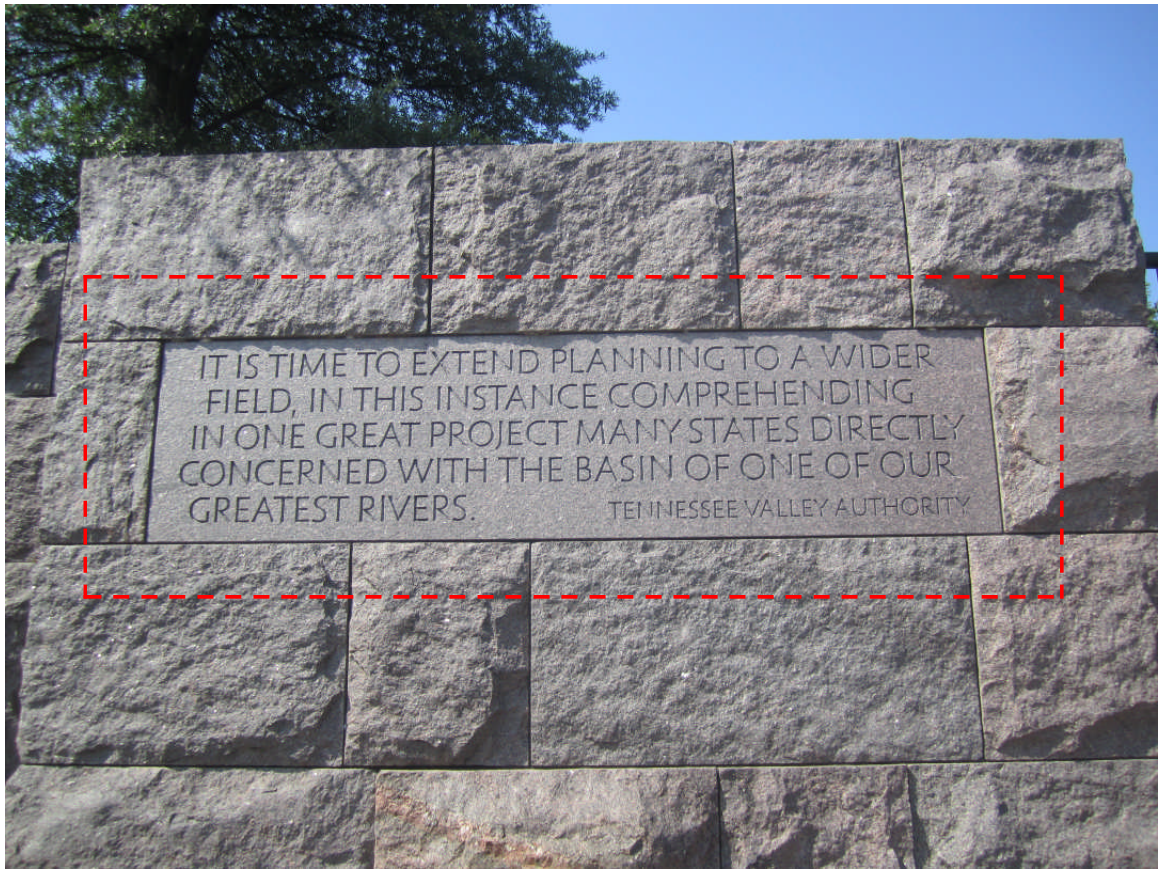
TENNESSEE VALLEY AUTHORITY ACT

AN ACT

To improve the navigability and to provide for the flood control of the Tennessee River; to provide for reforestation and the proper use of marginal lands in the Tennessee Valley; to provide for the agricultural and industrial development of said valley; to provide for the national defense by the creation of a corporation for the operation of Government properties at and near Muscle Shoals in the State of Alabama, and for other purposes.

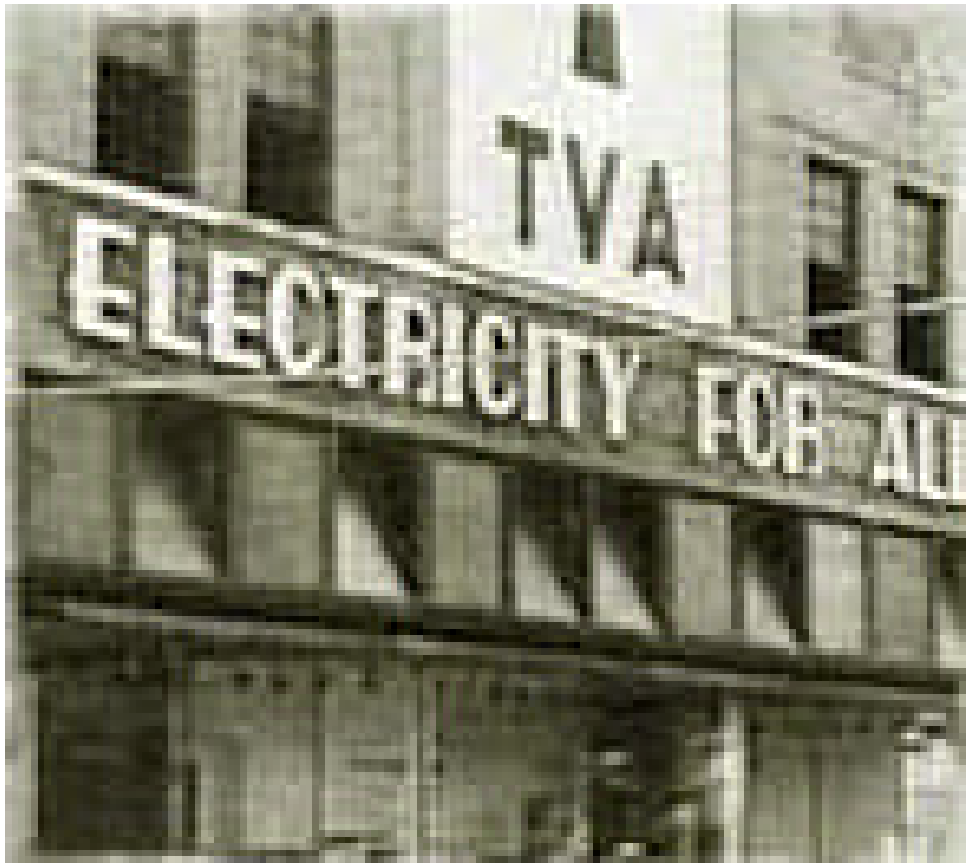
Be it enacted by the Senate and House of Representatives of the United States of Americain Congress assembled, That for the purpose of maintaining and operating the properties now owned by the United States in the vicinity of Muscle Shoals, Alabama, in the interest of the national defense and for agricultural and industrial development, and to improve navigation in the Tennessee River and to control the destructive flood water in the Tennessee River and Mississippi River Basins, there is hereby created a body corporate by the name of the ”Tennessee Valley Authority” (hereinafter referred to as the “Corporation”). The Board of Directors first appointed shall be deemed the incorporator, and the incorporation shall be held to have been effected from the date of the first meeting of the Board. This Act may be cited as the ”Tennessee Valley Authority Act of 1933…”

A Wider Field



IT IS TIME TO EXTEND PLANNING TO A WIDER FIELD, IN THIS INSTANCE COMPREHENDING IN ONE GREAT PROJECT MANY STATES DIRECTLY CONCERNED WITH THE BASIN OF ONE OF OUR GREATEST RIVERS **TENNESSEE VALLEY AUTHORITY**

RE: TVA inscription at the *Franklin D. Roosevelt Memorial* in Washington D.C. (above)


TVA
ELECTRICITY FOR

Part 6

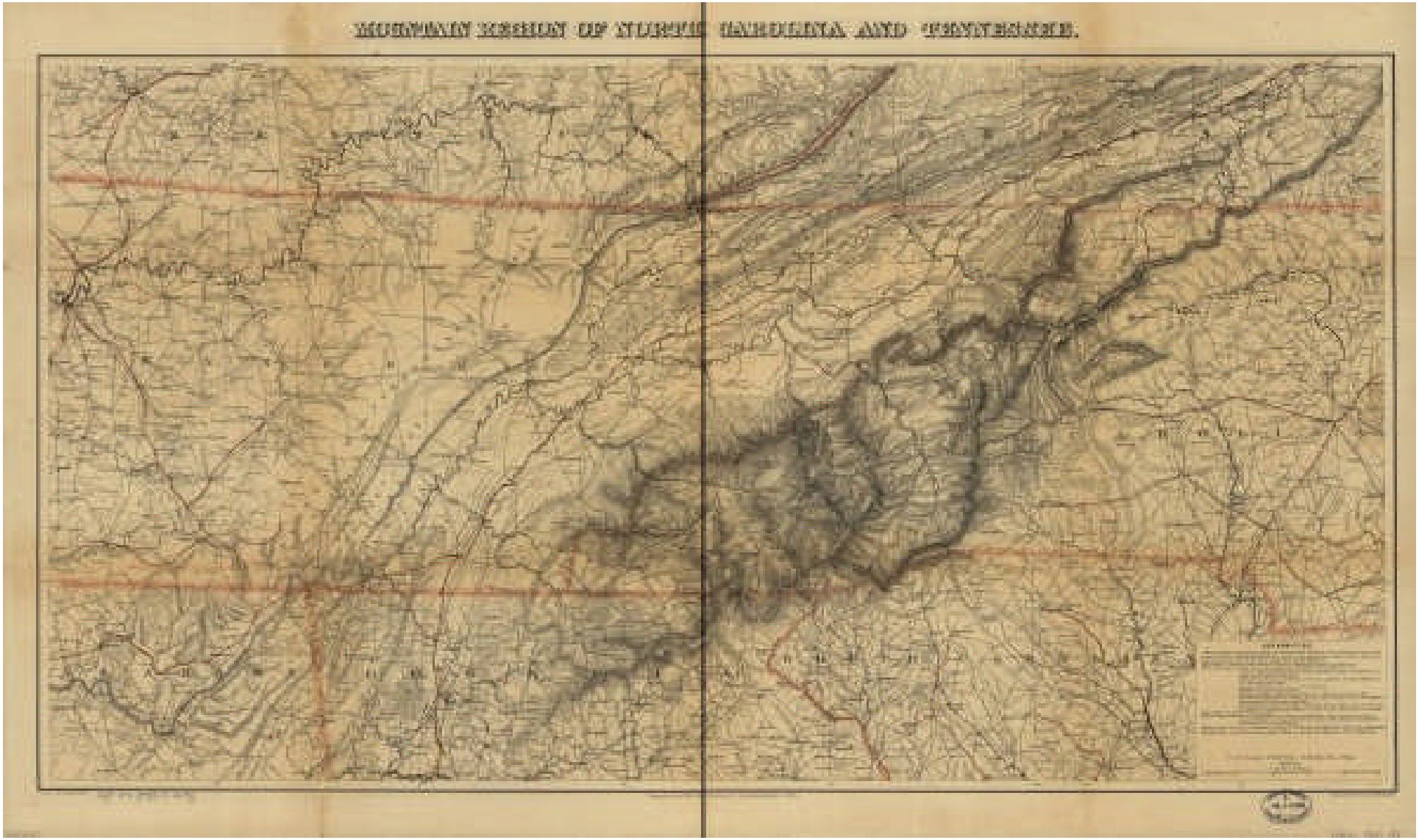
God’s Valley

A Defiled Heritage

"And I brought you into a plentiful country, to eat the fruit thereof and the goodness thereof; but when ye entered, ye defiled my land, and made mine heritage an abomination…"
Jeremiah 2:7

"…The valley of the Tennessee river extends, east to west, over a hundred counties in seven states lying below Mason and Dixon's line. It is not a political division but a natural one, a region marked by a water level an intaglio island with the river's watershed for its coast. It is almost as large as England. The course of the river, generally westward, curves down into Alabama before it flows north to join the Ohio in Kentucky; and you cross it twice as you cross the state of Tennessee. The Valley watershed is best described as shaped like a butterfly with its waist at Chattanooga. The wings of this creature, veined with big and little rivers and stretching from Virginia to Kentucky, are curiously marked and variegated. The hill folks of the eastern wing tip, who haven't changed their manner of speaking since they left England three hundred years ago, would call them pied…The east wing of the butterfly tilts up sixty-six hundred feet to the highest peak east of the Rocky mountains. The west wing is lower, but not flat, and Lookout Mountain at Chattanooga will give you a view of seven states. Substitute Mississippi for South Carolina and they are the states of the Valley - North Carolina, Tennessee, Georgia, Alabama, Kentucky, and Virginia…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)



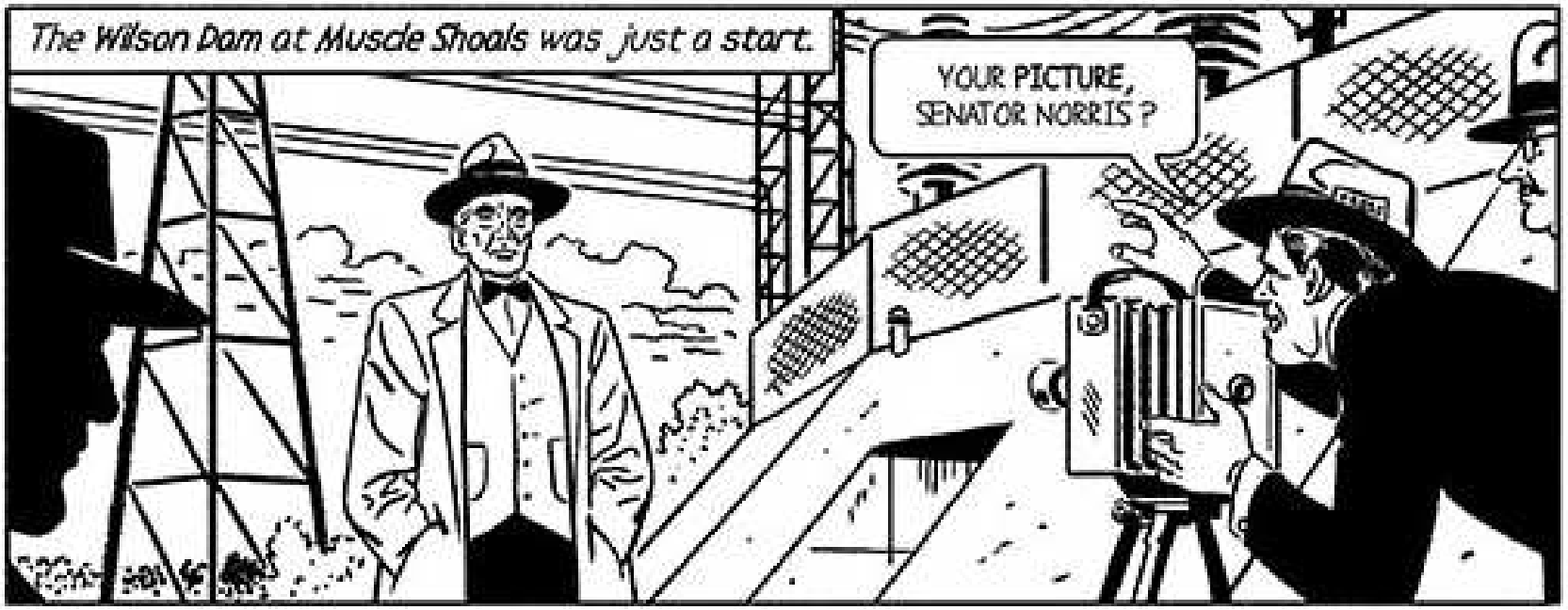
<u>Above</u>: caption: “Mountain Region of North Carolina and Tennessee” (1863). This mountain region was unique insofar as it contained a ‘negative axis’ - a valley east of the *Cumberland Mountains* and west of the *Appalachian Mountains*. Situated in the heart of the South, because of its hostile terrain it had been left fairly isolated from regions all around it.

"…Some might say you needn't try to reconstruct the Tennessee Valley as a belated gesture of reparation, because of the very spottedness of the butterfly wings. Western North Carolina and Eastern Tennessee fought for the Union, and the hills were full of horse thieves who stole impartially from both sides. This part of the watershed is still riddled with Republicans who resent the whole program of the Authority. As rugged individualists they resent any authority, and as royalists from away back they resent the Democrats…Farther south there are no Republicans, but a slew of Southerners living within shooting distance of Shiloh battleground know that no good ever came of Yankee invasion. Some old-timers in the Muscle Shoals district, which has opened up and spread itself hopefully for one boom after another these hundred years, feel that Uncle Sam is no more to be trusted than Henry Ford…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939). Henry Ford's post-WWI plans for an industrial empire in the *Tennessee River Valley* was, ultimately, never realized (for a variety of reasons)

"…There are all sorts of people in the Valley and a big lot of them, for one reason or another, don't give a hang for New Deal improvements. But now, for the first time in seven decades, there are a lot of folks up North who are turning their eyes south to see what's happening there, and maybe to meddle in Southern affairs under that curious Yankee delusion that this is a country one and indivisible…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)



"…Without knowing it, Wilson's administration had already made the first move that was to bring Yankee money and Yankees themselves down into this country, and tie into one region the land from the hills to Alabama. It was in Wilson's administration that the government took over Muscle Shoals. It was too bad that the South, especially the Valley, had already had an unfortunate experience with the government of the United States…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

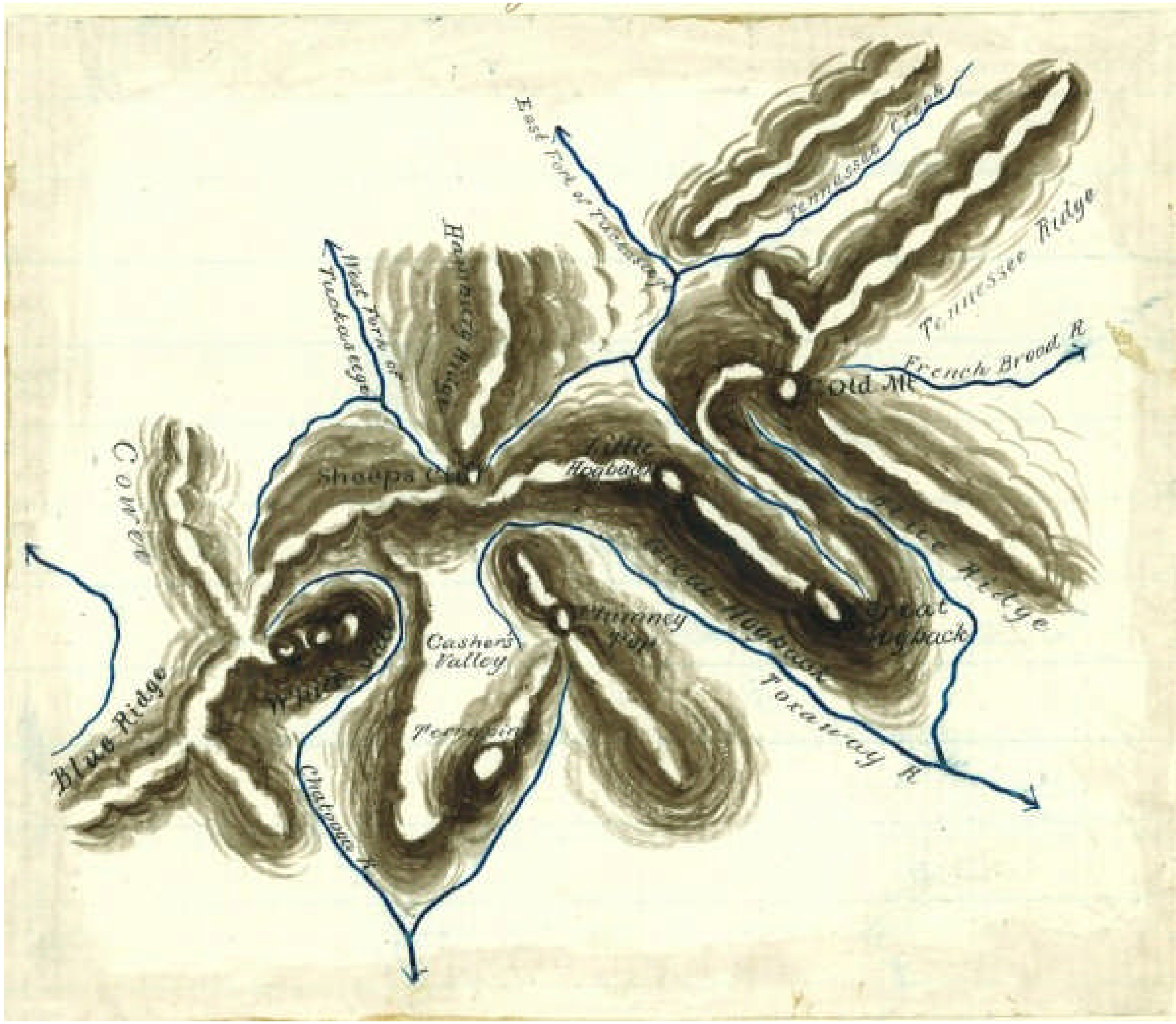
Damyankees

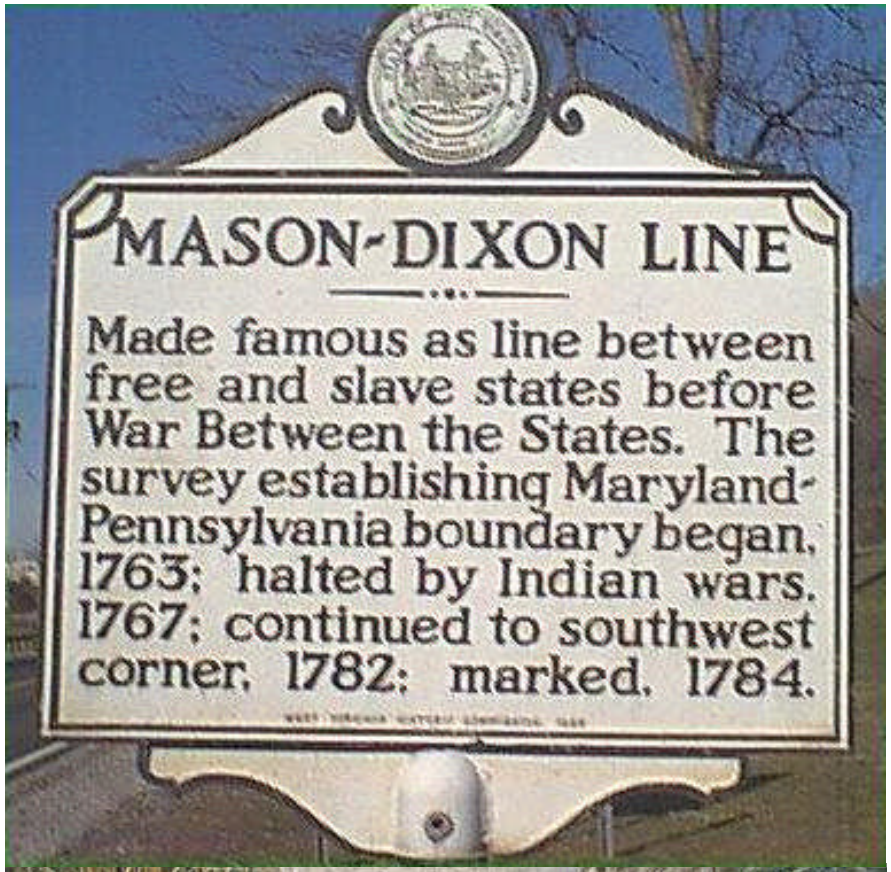
"…In 1863 an army of damyankees had invaded Southern soil and was fighting along the Tennessee river from Chickamauga to Missionary Ridge and Lookout Mountain at Chattanooga. When they won, defeat hammered a loose-jointed confederation of sovereign states into the Solid South…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

RE: the mountain region of Western North Carolina and East Tennessee held tremendous military value to an invading army. By occupying the region, the Union could control the passes over the mountains to the east, which were connected to several major southern cities. As well, the valley offered a direct path to the south with no physical obstacles. Confederate General *Braxton Bragg* would resist, but there would be no mountain ranges blocking Union General William Rosecran's Army as it advanced south towards the *Gulf of Mexico*.

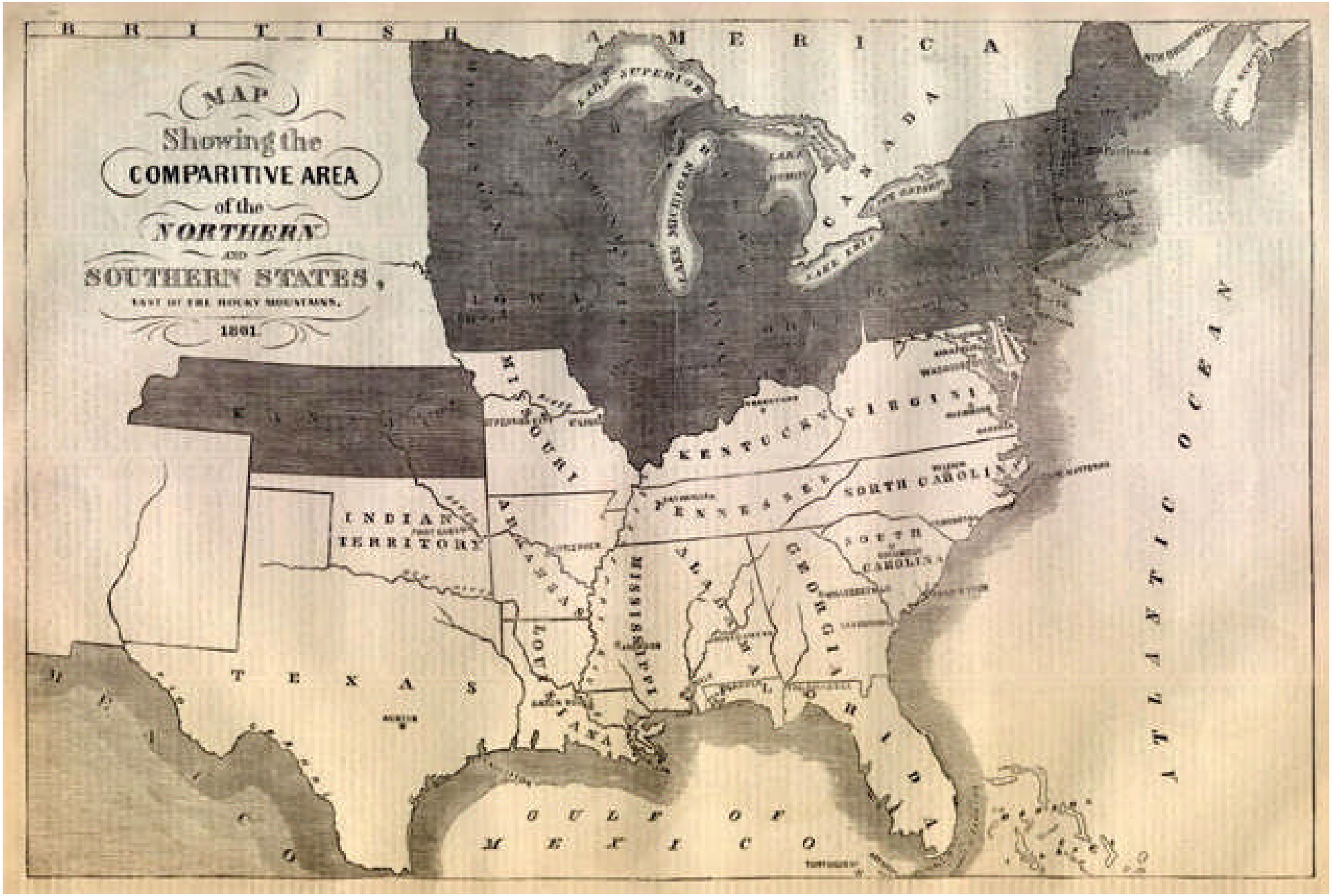
In the spring of 1863, the *Coast Survey* was in the midst of an effort to comprehensively map the rebellion on a series of regional maps at a scale of ten miles to the inch for use by commanders in the field (the fact that the Coast Survey had been assigned the task indicates how much it had expanded its original responsibility: charting the coastlines and inland waterways). This region posed the particular challenge of making sense of the complex mountain system of the southern Appalachians. To do this in the midst of a *Civil War*, without access to the terrain itself, the Superintendent of the Coast Survey called upon *Arnold Guyot* - the nation's leading expert on the *Appalachian Mountains*. Guyot had spent several summers in the late 1850s exploring the region, compiling detailed records about the geography of the system. He responded with a lengthy report on the region. Among his more interesting insights was that the southernmost reaches of the mountains were unique in the system: while the mountains lie in parallel ridges to the north, in Tennessee and North Carolina they twist and turn into interlocking ridges. He took great pains to draw the relationship between a few of these ridges in the southwestern corner of Tennessee for the Superintendent. Guyot was the first to properly separate the interlocking watercourses into the watersheds of the *Mississippi River* and the *Atlantic Ocean*.


West Fork of
Tuckaseege
Tennessee Creek
Tennessee Ridge
French Broad R
Cold Mt
Little
Hogback
Cowee
Cashers
Valley
Great
Hogback
Blue Ridge
Toxaway R



"…A part of the Valley split off from the rest of the South at the time of the Civil War, when North Carolina and Tennessee were full of union sympathizers whose loyalty to established government was temperamental, as well as economically sound. The mountain people had no slaves; Negroes are scarce in the hills today, and with Union sympathizers as far south as Northern Alabama, the Tennessee river was a better boundary for slavery sentiment than Mason and Dixon's line…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)



Above: caption: "1861 map showing the Mason-Dixon Line. Northern (free) states are shaded dark and Southern (slave) states are light"

"…Besides having no Negroes, the mountain people generally were without excitement over the other economic quarrel, the protective tariff. Free trade wasn't important to folks who made their own furniture and pottery and dressed in homespun. Since what trading they did was back and forth over the state lines, what they did object to was a frontier dividing the states…This border division meant that the Valley was fought over even more than other parts of the South…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

To the Victor Go the Spoils

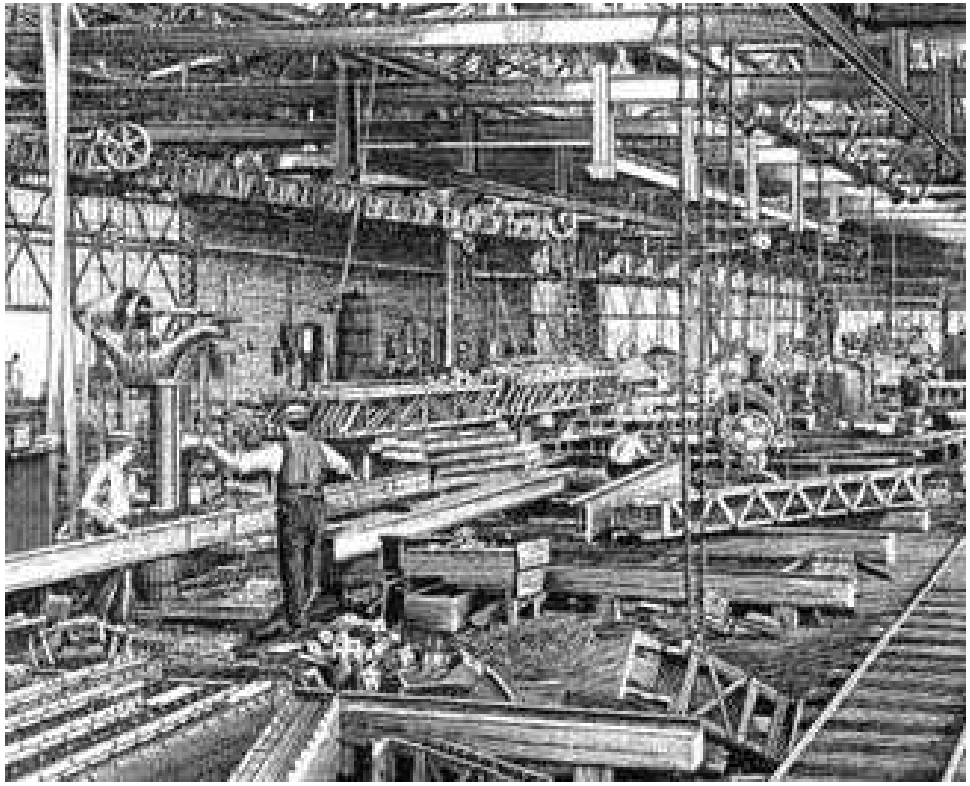
"…The South was the battleground and the South was the loser. More, the South was subject to reprisals which have never ended. To this day it is experiencing the economic penalties of defeat, paying for a poverty that goes back to the sixties. Southerners see it as a result of the war that Yankees own most of the railroads and the industries of the country, that the financial center is in the Northeast, and that Northern capital continues to punish the South by tariffs and freight differentials. Of the two hundred great corporations that own a quarter of the country's wealth and tend to control all the country's business, all but twenty are owned in the Northeast. Ninety-five percent of the life insurance of the whole country is in the hands of Northern companies, and around eighty percent of the nation's bank deposits are in the North. Observers say that from eighty to ninety percent of the nation's wealth is owned in the North, and that this disparity between the North and the South is increasing. The tariff to protect American industry actually protects Yankee industry. It has been calculated that, in the seven fat years before the depression, the tariff took fourteen billion dollars of purchasing power into the Northeastern states…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

"…Southern people pay more for shoes and clothes and manufactured goods, not only because of the tariff, but because to the cost of manufacture must be added the cost of shipment South. Reverse that shipment, send Southern goods North, and the shipper meets an ingenious interstate tariff known as the freight differential. To ship a hundred pounds of freight, first class, the 645 miles from Birmingham, Alabama, to Chicago, Illinois, costs $1.78. To ship the same weight one mile more the 646 miles from Elmira, New York, to Chicago will cost you only $1.25. The 53 cents' difference is the freight differential, the premium awarded to the Northern shipper for being a Northern shipper…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Pittsburgh Plus



"…Further to discourage Southern manufacture there was until lately the 'Pittsburgh plus' price on steel. Steel is made in the South, but the steel companies are owned in the North, and the price of steel for the whole country was, until recently, figured as if it all came from Pittsburgh. A Southern firm could get its materials from Birmingham, but it paid the Pittsburgh price plus the cost of shipment from Pittsburgh…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Ever Since Appomattox

"…Nor is it mere inertia that keeps the South from having more industries of its own. Destruction of capital, that horrid fear of propertied people today, occurred in this country on a tremendous scale by the passage of the thirteenth amendment. The defeated Southerner returned home to find his salable property gone; he must, from now on, pay for labor, and he had no money for payment. How could he build mills when he couldn't even afford to farm?..."

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

"…So came the credit system, clamping down on Southern agriculture. Crop liens and chattel mortgages are part of the farmer's experience today because they have been ever since Appomattox, when an ex-Confederate able to work could maybe get credit for his good intentions, and sign a note for the family spoons if the family was lucky enough to have any left. The printing of lien and mortgage forms makes work for every small Southern print shop, and their signing keeps notaries busy, and the resulting litigation helps the small-town lawyer and makes eventual gain for the small town storekeeper or banker. It also keeps the farmer growing corn or cotton, because these are the cash crops. Everybody knows what happened to Confederate bonds and currency. But farm products were down, too, with nobody to make the crops; and the Confederate officer who paid sixty percent on the money he borrowed to start farming again was charged high interest even for a cropper…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

"…Before the war the South had more railroad mileage than the North, and it is said that the Southern roads were more solidly financed. After the war they were streaks of rust, the rolling stock gone, bridges wrecked, workshops burned even the ties had been rooted up and piled for bonfires, and the rails twisted so they couldn't be used again. Both sides did it, but both sides did it in the South. In the ten years from 1860 to 1870, the assessed property of the Southern states decreased in value more than two billions, or a third of the whole. Property losses by states were estimated at over $450,000,000 for Virginia; over $150,000,000 for North Carolina, where there wasn't much fighting; over $600,000,000 for Alabama; and over $320,000,000 for Mississippi. General Sherman accounted for $100,000,000 of the loss in Georgia; he said that $20,-000,000 worth of property could be used by the Yankees but $80,000,000 was 'simply waste and destruction.' And meanwhile the wealth of the Northern states had doubled…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

The Heart of Dixie

"…From this a Yankee might think that the Valley, which was disputed territory at the start of the war, would have cast in its lot with the North. But you're forgetting the prejudices on both sides. When they had done the bitterest fighting of the war along the Tennessee river, and when they had tried re-constructing the Valley states, there was no longer any question; the Valley was part of the South. Today even Kentucky and Tennessee, for the most part, claim to be Southern states…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Bled White

"…Down South you naturally assume that everybody's grandfather was in the war. Up North they made it a class war by letting the well-to-do hire substitutes, so it's not so hard to find Yankees whose people went on buying and selling and sailing ships and publishing papers while the fighting was hottest. Like all the other costs, the human cost of the war was greater in the South, which was 'bled white,' as England was in the World War, while the North was suffering, in comparison, no more than the United States in 1917-18. And now we know what that means politically. Wipe out a generation and you scare a country into going backwards; you can see the same thing in Europe today. So, in the South, there was the mental backsliding that always comes when there is no money for books, and all the young folks are dead…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

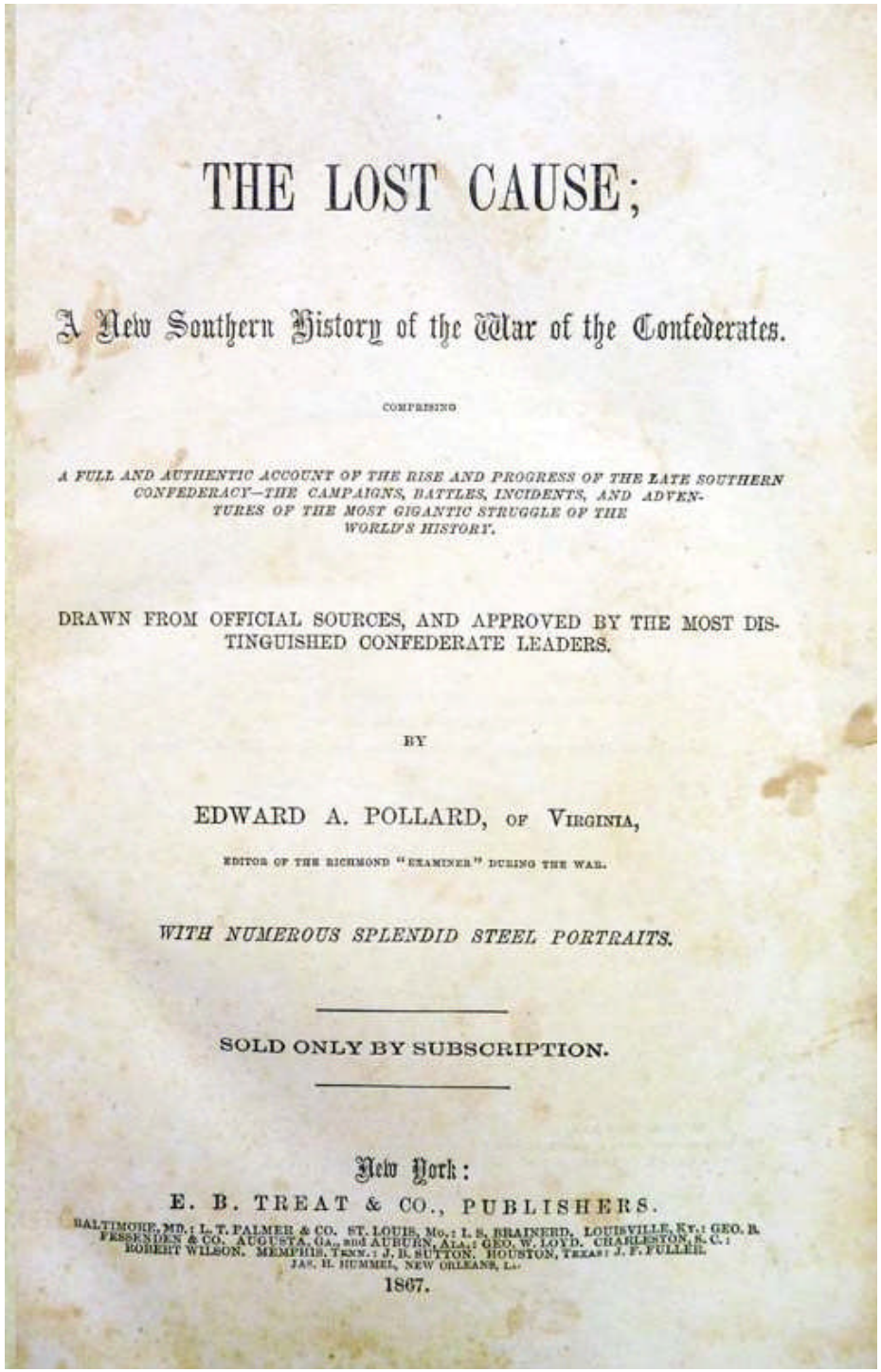
"…Energetic Southerners could and did call for a rebuilding in spite of handicaps. But usually the best that could be imagined by the vanquished was successful competition with the victor in his own field, that is, industrialization. Let the South show what could be done with iron and steel, with textile mills, with railroads. Perhaps Yankee money could be coaxed to come down, perhaps the national pork barrel would yield something for river navigation or a new post office thus Southern dreams around the turn of the century…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

"…That the South should accept second place with a humble conviction of war guilt was too much to expect of human nature…For the country as a whole, it was and is unfortunate that the standard of values in the new South was taken from the conquerors. While it was evident to surviving Southerners that their personal salvation depended on proving themselves better industrial hustlers than the Yankees, a nationwide competition in industrial hustling was no help to civilization in the United States…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Born Knowing



THE LOST CAUSE;

A New Southern History of the War of the Confederates.

COMPRISING

A FULL AND AUTHENTIC ACCOUNT OF THE RISE AND PROGRESS OF THE LATE SOUTHERN CONFEDERACY—THE CAMPAIGNS, BATTLES, INCIDENTS, AND ADVENTURES OF THE MOST GIGANTIC STRUGGLE OF THE WORLD'S HISTORY.

DRAWN FROM OFFICIAL SOURCES, AND APPROVED BY THE MOST DISTINGUISHED CONFEDERATE LEADERS.

BY

EDWARD A. POLLARD, OF VIRGINIA,

EDITOR OF THE RICHMOND "EXAMINER" DURING THE WAR.

WITH NUMEROUS SPLENDID STEEL PORTRAITS.

SOLD ONLY BY SUBSCRIPTION.

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BALTIMORE, MD.: L. T. PALMER & CO. ST. LOUIS, MO.: I. S. BRAINERD. LOUISVILLE, KY.: GEO. B. FESSENDEN & CO. AUGUSTA, GA., and AUBURN, ALA.: GEO. W. LOYD. CHARLESTON, S. C.: ROBERT WILSON. MEMPHIS, TENN.: J. B. SUTTON. HOUSTON, TEXAS: J. F. FULLER. JAS. H. HUMMEL, NEW ORLEANS, LA.

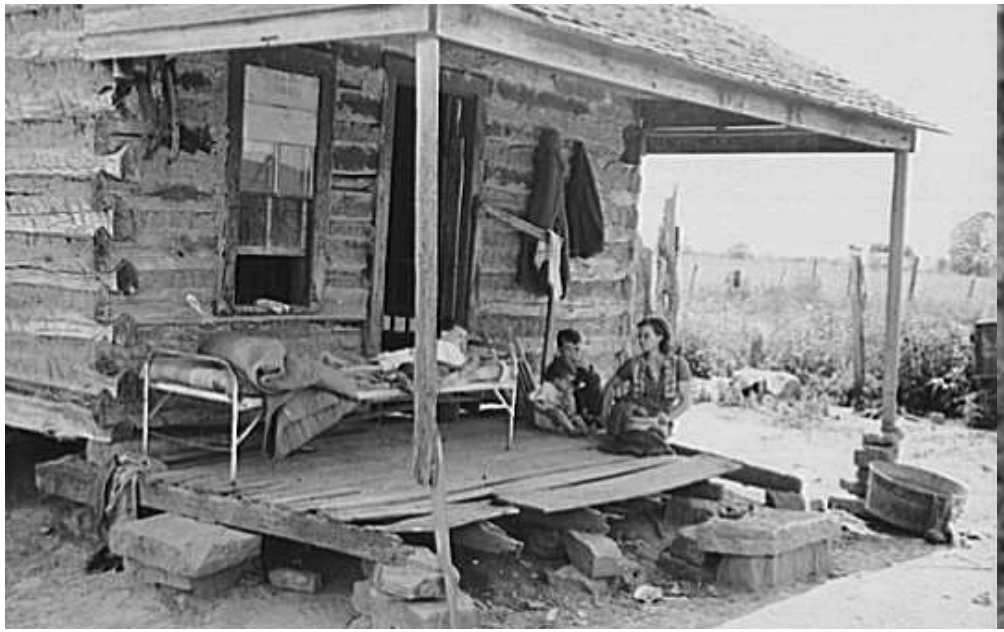
1867.

"…It is only when Northerners learn what every Southerner is born knowing, that the South never recovered from its blow, that they can understand this delay. The 'Lost Cause' was well named by Southern sentimentalists, for the conditions caused by loss persist. And though the South may pay the freight, the whole country pays for the time lag in the Southern mind…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u>: title page of a book entitled "The Lost Cause" (1867)

Lower than a Fishworm



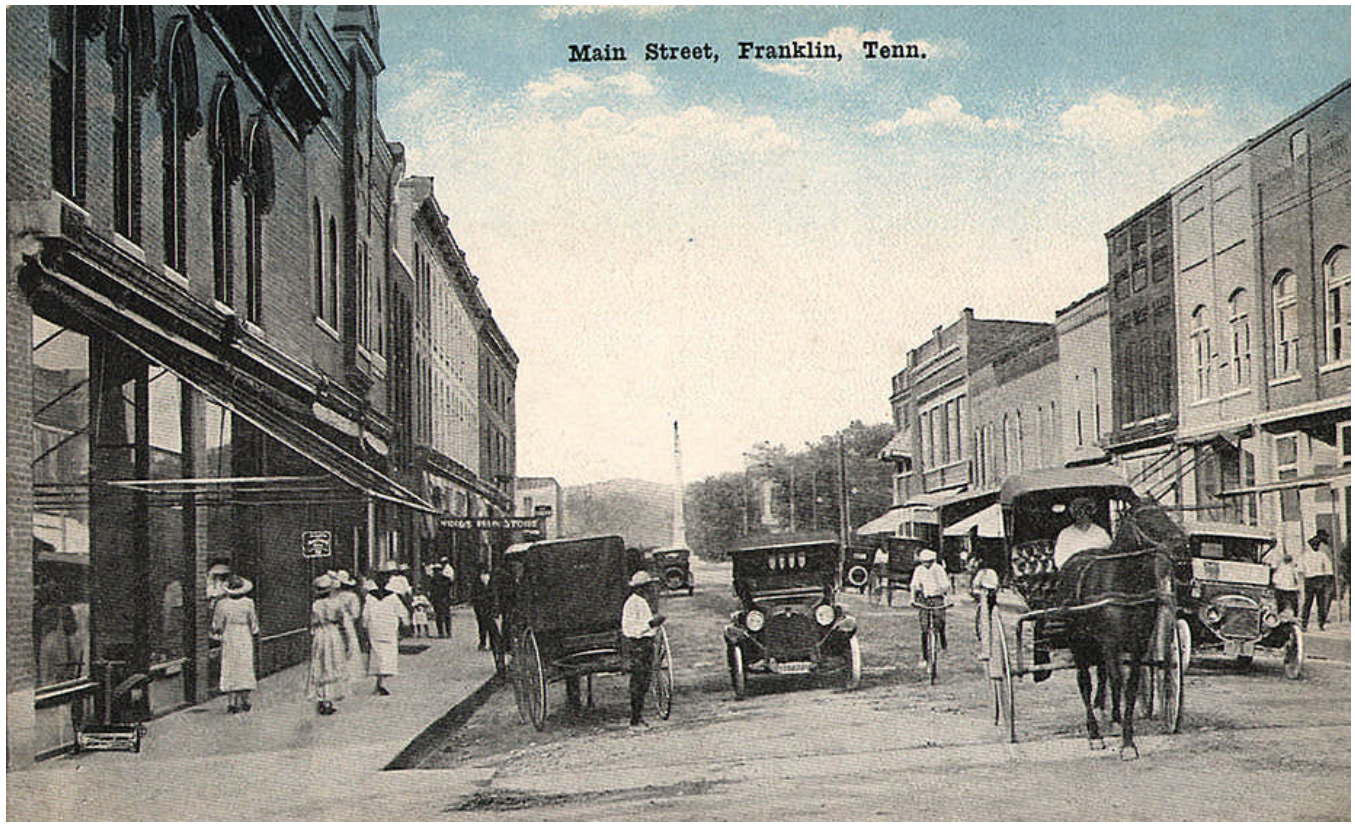
"…The main point to keep in mind is that the South, and even one section of it, the Tennessee Valley, is too big for generalizations. But it is safe to say that the South as a whole is poor…The South does not measure its hard times by a seven-year boom-panic cycle; all its years are lean and you can't, Southerners say, feel a depression much if your natural state is lower than a fishworm's…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Above L&R</u>: caption: "Many of Mississippi's small white landowning farmers, also known as yeoman farmers, had not been heavily involved in the cotton economy before the Civil War; however, after the war, a number of factors led the white yeoman farmers to turn increasingly to cotton cultivation. They needed cash to pay off debts acquired during four years of war and the increased taxes levied during Reconstruction and beyond. Many of these white yeomen who had staked their future on cotton production lost their farms. When they did, they frequently became tenant farmers or sharecroppers."

"…As you go down the map, shake roofs, shaky bridges, and snake fences are the visible signs of poverty. There may be brand-new highways stretching white across the hills, and marked, as in the North, by neon lights, gasoline pumps, and hot-dog stands. There is sure to be a motion-picture theater in every town, and competing beauty shoppes get the girls ready for Hollywood. There is a 'Times Square Grill' four thousand feet up and forty miles from a railroad in the Blue Ridge…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)


Main Street, Franklin, Tenn.

Change Costs Money

"…But in spite of these evidences of enterprise, the old landmarks remain: the weathered Negro cabins under the chinaberry trees, with the crazy clay chimneys, the unglazed windows, and the white folks' washing on the fence; the boxlike shacks of the po' white trash, built hopefully facing the railroad tracks, with children and zinnias and primitive sanitary arrangements in the yards; the occasional big house that always needs a coat of paint. These things are unchanged from year to year because it costs money to change them…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u>: caption: "With no electric pump, you draw water this way"

"…Nationwide efforts to get over a depression have actually improved the ordinary standard of living in some sections of the South. Thus, in some of the mountain counties in the Tennessee Valley, three-quarters of the people were eligible for relief always had been and those who got it were better off than they had been before. For half the population to be on relief is common, and to the civilized eye necessary; in one mountain county the average cash income of a farm family was $45, not per month but for the year 1933; and of this amount $10 came from relief…"

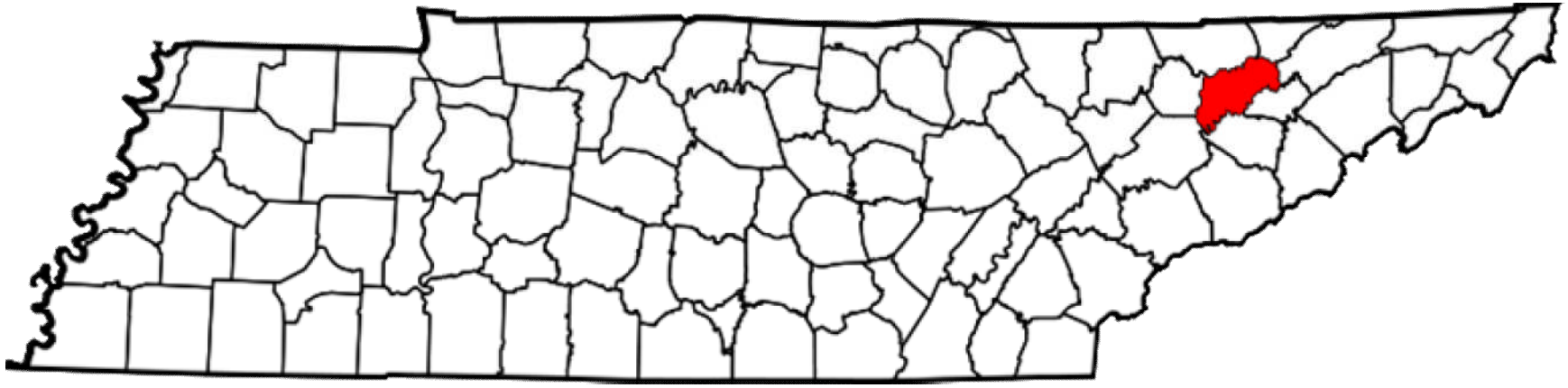
RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

"…When you say that farm families in the Valley commonly have cash incomes of $100 a year or less it means that in one mountain county half the farm people didn't have a work animal no mule, no ox and that two out of five families had no cow or pig. Such people are called shiftless, but you must consider what they have to do with. A man looks easy-going if he keeps all his money in a tobacco sack, but maybe that's good enough for what money he's got…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u>: caption: "When corn is scarce, you have to muzzle the mule"

Profit and Loss



"…the National Industrial Conference Board worked it out that the per capita wealth of the Valley is only half that of the country as a whole. Farming counties in the South can go deeper and deeper into debt every year just by getting less for what they grow than they must pay for what they use. The classic example is Grainger county, Tennessee, where somebody took the trouble to add up the profit and loss just as if the county were a private business. In 1932, before the era of 'wild spending,' state and federal agencies spent on Grainger county $91,000 in excess of revenues collected there. In the same year buildings in the county were considered to depreciate by $60,000, and soil and forests by $55,000, which made the total loss for the year $206,000…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Doin’ Nothin’

"…When he vetoed the Norris bill of 1931, President Hoover felt sure that 'the real development of the resources and the industries of the Tennessee Valley can only be accomplished by the people of the Valley themselves.' This was flattering to Southern pride, but there is a Southern saying that you can't do nothin' when you ain't got nothin' to do nothin' with…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u>: caption: "Herbert Hoover"

A National Shame

"…Southern poverty would be less shameful if it were unavoidable, but it is among the more ridiculous examples of mismanagement to be found in a world of bad housekeeping. In everything but money the South is big-rich. It is bad enough for a third of the nation to be ill-clothed, ill-housed, ill-fed, on a continent that is oversupplied with materials for meeting these needs and with the skill and labor for using them, even when the essentials and the needy may be long distances apart. But the bare and starving South is both the storeroom and the servants' quarters of this national crazy house…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)


WORLD'S HIGHEST STANDARD OF LIVING
There's no way
like the
American Way

The Fairest Flower in God’s Garden

"…forty essential minerals are found in the Southern mountains; that coal and iron for making steel are side by side; that ores of modern importance zinc, chromium, nickel, and bauxite are plentiful. Georgia marbles, to say nothing of those on the bottom of Norris lake in Tennessee, are famous and so accessible that two small towns have marble sidewalks and curbs, and one has a marble jail. Sandstones, limestones, and other building materials, brick and terra cotta clays, and clay deposits suitable for porcelain are all available in the Valley states. Southern streams, including the tributaries of the Tennessee, contain chemicals of value in the manufacture of rayon. Southern forests were among the most valuable in America, and the uncut timber still includes oak, maple, poplar, hemlock, and balsam. Climate and rainfall are favorable to all forms of temperate-zone and even to some tropical vegetation and animal life. And so on and so on, for endless rolling periods, to prove that the Southland is the fairest flower in God's garden spot, a flashing pearl in the diadem of a peerless continent, and the only logical place for next year's convention or a runaway knitting mill…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

"…Unfortunately Southerners do not eat flowers or pearls or iron ore, although some of the Alabama Negroes are said to be reduced to eating clay. And along with the best climate, soils, forests, minerals, rivers and harbors, and water power, the most abundant wild life and the most willing workers on the continent, the South also has the lowest per capita income, fewest mechanical farm aids, lowest production of dairy products, lowest ratio of pure-bred livestock, and lowest records for education and health…"

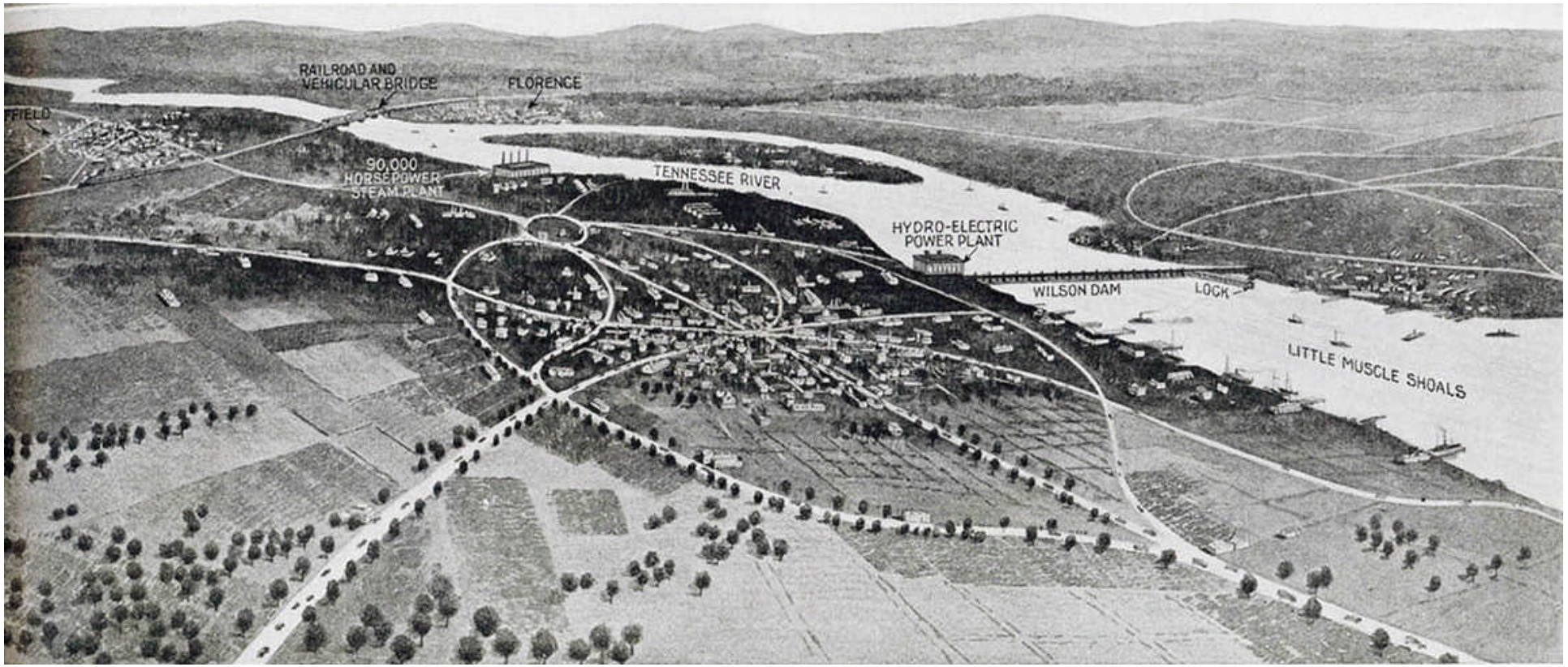
RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Right Out of the Ground

"…In short the South has had to do without money, and in the effort has wrecked itself and held back the progress of the whole country. The really profitable industries motor vehicles, meat packing, oil refining, printing and publishing, steel works, foundry and machine shops, electrical machinery, women's clothing carry on outside the South. The South makes no radios, refrigerators, fountain pens, typewriters, roller skates, sewing machines, shoes, or linoleum. Instead, in little towns of the Southern frontier, you can still find the signs of those who deal in raw hides, furs, roots and herbs, as they dealt a hundred years ago. In the South most people still try to make some sort of living right out of the earth, by scratching the soil with hoes, bending their backs over it, and grubbing on their knees. Only a quarter of the people in the South live in cities, and they aren't big cities. In the Tennessee Valley there are only two, Knoxville and Chattanooga, with more than 100,000 people…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

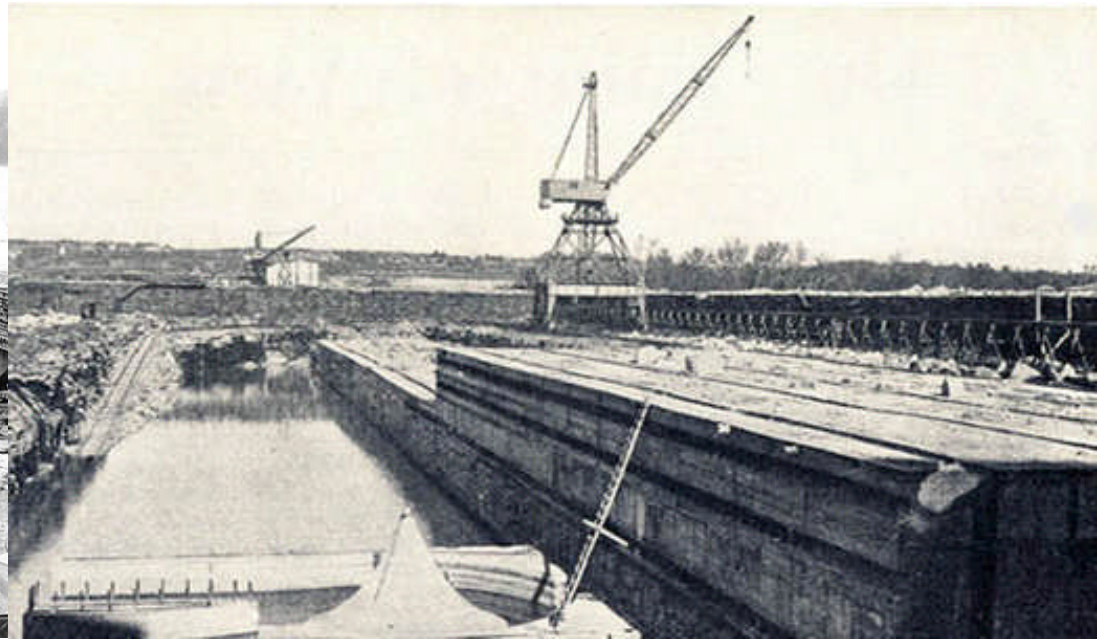
The Destiny of America



"…Then, of course, there was the World War boom, when they built Wilson dam and planned to take nitrates right out of the air. Later still there was the Ford boom at Florence, which everybody remembers that's when they built all the city curbs you'll find out there in the bushes, making it hard to plow. Henry Ford said: 'The destiny of the American people, industrially, for centuries to come, lies there on the Tennessee river at Muscle Shoals.'…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

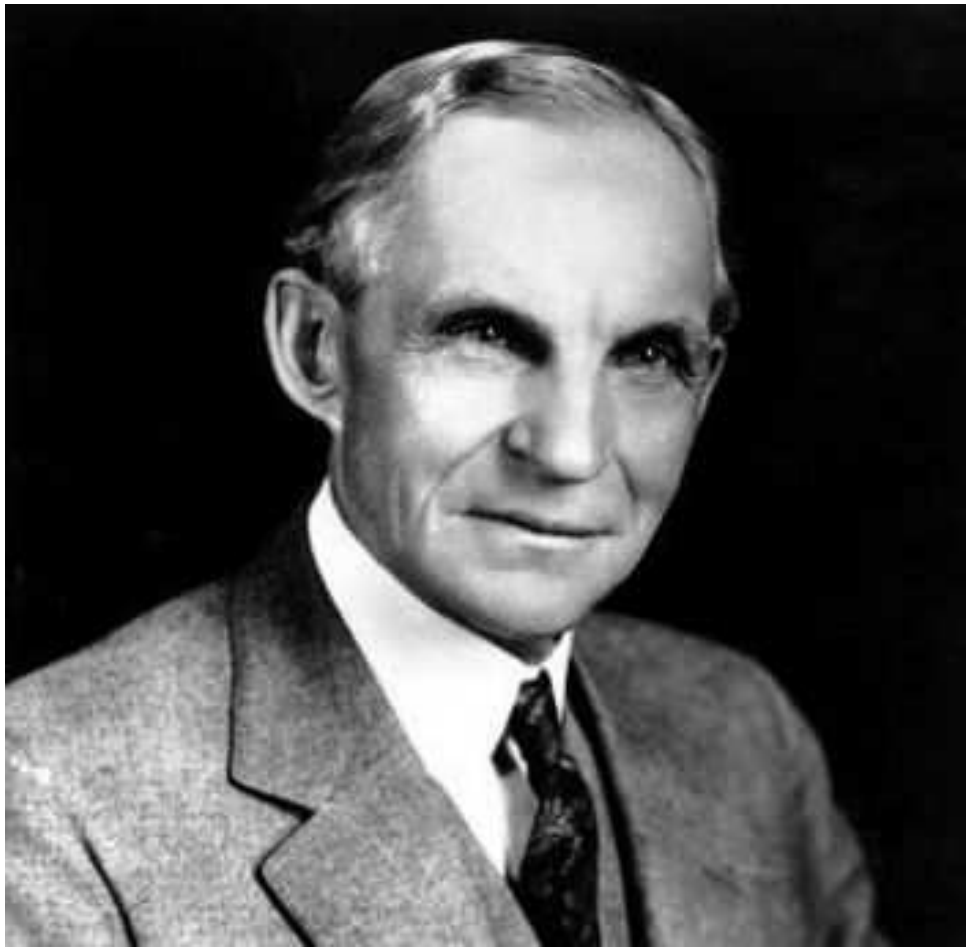
<u>Above</u>: caption: "A birdseye view of the Tennessee Valley in the Muscle Shoals neighborhood, showing the Wilson Dam, the existing cities of Florence and Sheffield, etc.; and suggesting how these features would become part of the general scheme involving the whole valley"



During WWI, POTUS *Woodrow Wilson* authorized a dam just downstream of *Muscle Shoals* to help power nitrate plants for munitions manufacture. Eighteen thousand workers streamed in to the area to build the factories and dam. However, the first nitrates were not produced until two weeks *after* the armistice was signed. Named in honor of President *Woodrow Wilson*, *Wilson Dam* was not completed until 1924.

<u>Left</u>: construction on Wilson Dam was begun in 1918 (along with work on two nitrate facilities for munitions manufacture). When WWI ended, construction halted and *Henry Ford* offered to lease the dam and privatize it in 1921, with a plan to create a manufacturing hub for nitrate fertilizer.

<u>Right</u>: caption: "A portion of the Wilson Dam as it stands today, needing 18 months' work to complete it"



In 1921, automobile pioneer *Henry Ford* (left) had a vision. Ford would do for northern Alabama what he had done for Detroit, turning a sleepy Alabama town into a center of industrial activity. He announced a plan to build a city that would encompass seventy-five miles of Northern Alabama. His plan included buying the unfinished *Wilson Dam* and two nitrate plants which, at the time, the U.S. government was willing to sell to a private company to produce nitrate fertilizer.

RUSH FOR MUSCLE SHOALS

Ford's Proposed Seventy-five-Mile City Already Attracting Thousands

"The dream city reared suddenly at Muscle Shoals by Henry Ford somewhat after the fashion of Aladdin with his wonderful lamp is already being peopled. The countryside around the great power project undertaken by the government as a war emergency is now the scene of a rush somewhat like those to California and the Klondike following the discovery of gold...The belief is that industries developed by the genius of Ford in Northern Alabama will furnish a cure for the unemployment and other ills of Central Alabama…"

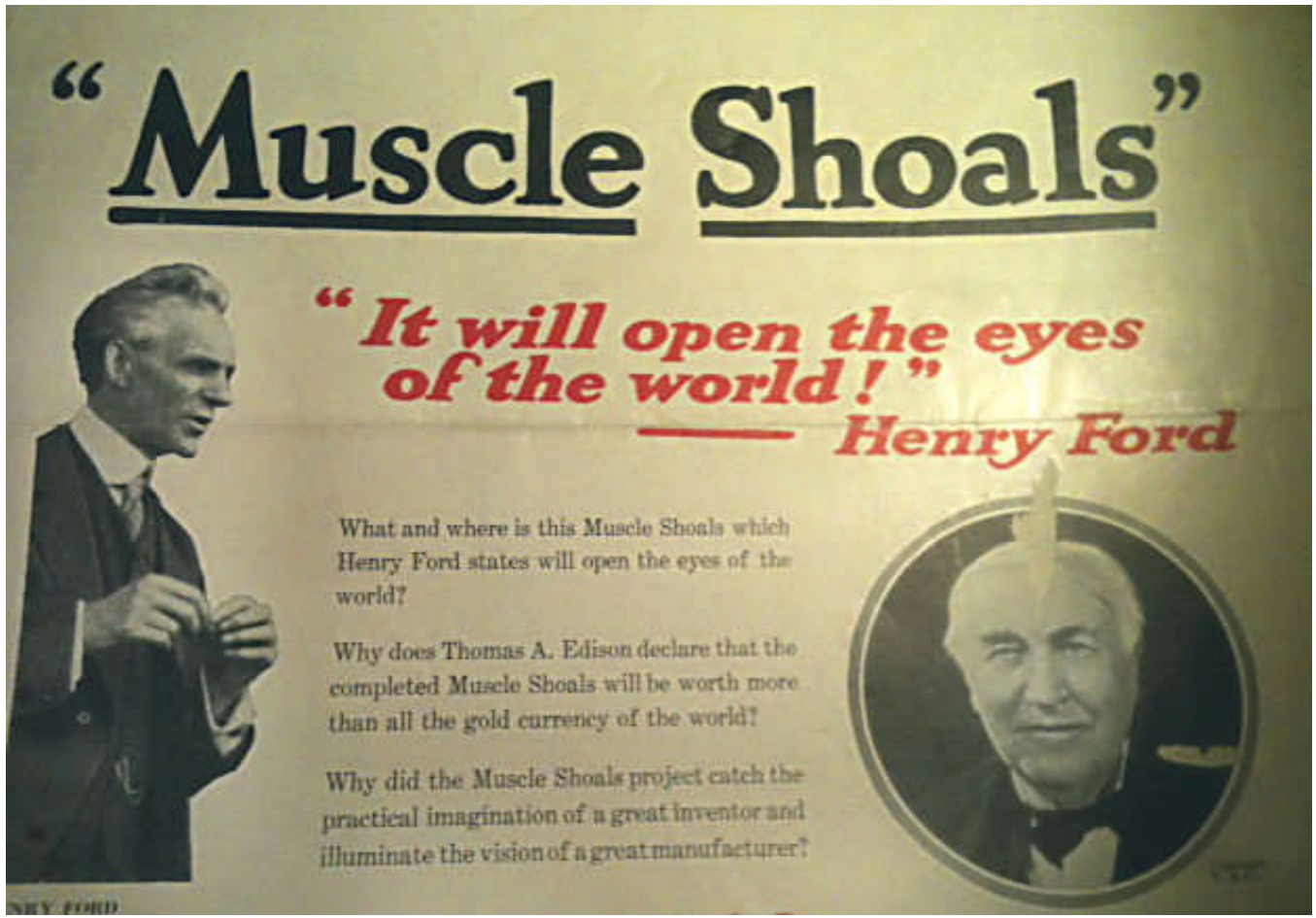
***The New York Times*, February 12th 1922**

<u>Above</u>: *New York Times* headline

"I will employ one million workers at Muscle Shoals and I will build a city 75 miles long at Muscle Shoals"

Henry Ford

RE: so great was the anticipation of Ford's vision, speculators began buying land to create subdivisions complete with streets, sidewalks, fireplugs and street lights. Speculative land developers closed in on Muscle Shoals, buying up land and cutting it up into 25-foot lots. In Southern Alabama, orchards and farmland were being planted to feed the teeming populace expected to arrive in Northern Alabama as part of the boom. In 1922, Ford unfurled a master plan for *Muscle Shoals*. He would build a 75-mile city along the reservoir. Having shaped the way the American industrial worker worked, he would now shape the way the American industrial worker lived. Muscle Shoals would become a thin thread of city, in close touch with the countryside along its entire length. He would finish *Wilson Dam* and build more dams upstream. Ford believed that factories and farms should be integrated and that cities were a mistake needing correction. A *Scientific American* article detailed Ford's grand plan, but the editor added that though he liked Ford's ideas, he was concerned about the automotive tycoon's unrealistic notion of how the government should fund it. Even Ford's good friend *Thomas Edison* got in on the act.


"Muscle Shoals"
"It will open the eyes of the world!"
— Henry Ford
What and where is this Muscle Shoals which Henry Ford states will open the eyes of the world?
Why does Thomas A. Edison declare that the completed Muscle Shoals will be worth more than all the gold currency of the world?
Why did the Muscle Shoals project catch the practical imagination of a great inventor and illuminate the vision of a great manufacturer?

"…They hoped most of all from Mr. Ford, down in Alabama, and they say he might have got the Shoals if only he hadn't talked too much. He said he was going to sell cheap aluminum, and that stepped on Andy Mellon's toes. Mr. Ford was going to build a railroad right down from Detroit, and to hell with the freight differential; and the railroad people naturally didn't care for that. In Alabama they don't think you have much chance of succeeding at anything if you talk against all the big moneyed people that run the country. So they weren't any too eager for the government to step in, down at the Shoals, and the city of Florence wasn't in any great hurry to take TVA power. They signed up finally, but they held out for a special rate; they hadn't forgotten that Thomas Edison had said: 'The completed Muscle Shoals will be worth more than all the gold and currency in the world. Its possibilities are so great I cannot tell them.'…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

FOURTH OFFER MADE FOR MUSCLE SHOALS

Alabama Power Company Asks Fifty Years' Lease of Dam, Agreeing to Complete It.

WOULD PAY $5,000,000 CASH

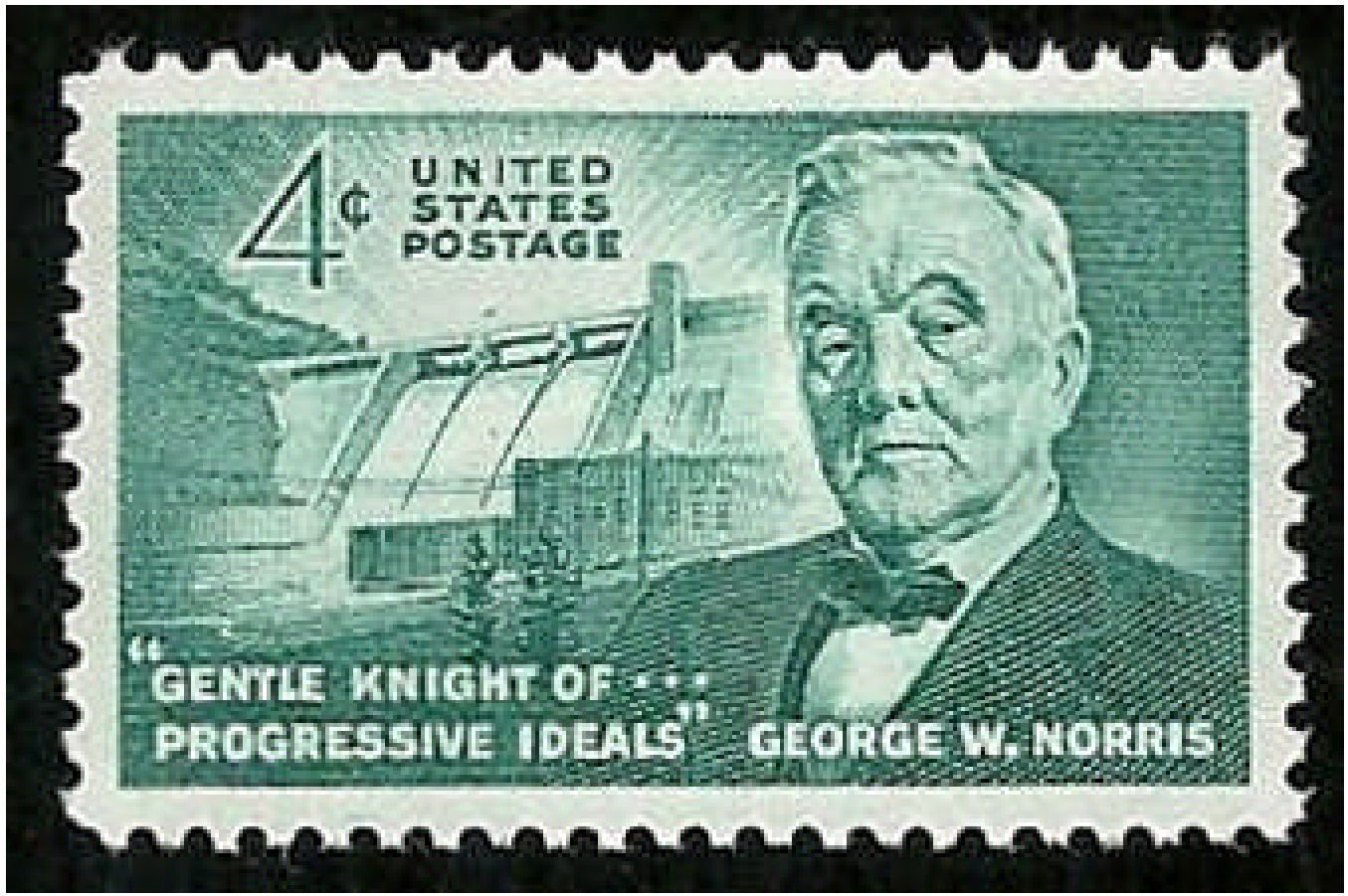
Weeks Is Said to Favor Proposal as Being Better Than That of Ford.

GOVERNOR IS AGAINST IT

Tennessee Executive Comes Out Strongly for Plan of Detroit Manufacturer.

Henry Ford **placed his offer to the government: $5 million to lease *Wilson Dam*, a project in which the federal government had already invested more than $46 million. Some members of Congress got wind of the offer, in particular Senator *George Norris* of Nebraska, and began a fight to keep the dam as a federal property. In the meantime, other entities, including the *Alabama Power Company*, placed bids on the dam. In 1924, Ford tired of the fight and withdrew his offer, causing an outcry by locals who felt the federal government had ruined their futures. Norris received death threats from angry residents of the valley who believed Ford would have made them rich. In fact, on his first trip to *Muscle Shoals*, he was accompanied by an armed bodyguard. In 1926, Norris introduced a bill that not only outlined a plan for the federal government to complete and operate Wilson Dam, but to build more dams along the *Tennessee River*. The bill stalled under two administrations but the seeds of his idea would eventually grow to become what is now the *Tennessee Valley Authority* - a federally owned non-profit corporation that is the nation's largest public power provider.**

Left: ca. 1922 *New York Times* article


4¢
UNITED
STATES
POSTAGE
"GENTLE KNIGHT OF
PROGRESSIVE IDEALS"
GEORGE W. NORRIS

"…The industrial history of Muscle Shoals summarizes that of the South. You could say it was extra unlucky…The country was good fat farm land, settled like any other and sold over and over during the booms..."

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Part 7

When the Rains Came

Thou Hast Set a Bound

"…The waters stood above the mountains.
At thy rebuke they fled; at the voice of thy thunder they hasted away.
They go up by the mountains; they go down by the valleys unto the place which thou hast founded for them.
Thou hast set a bound that they may not pass over; that they turn not again to cover the earth…"
Psalms 93:3

A Yankee River

"…Down South some think the trouble with the Tennessee is that it's a Yankee river. That seems a mean thing to say, but there are arguments that go to prove it. Just look at the way the river comes along and takes the good rich topsoil off the land. Isn't that exactly like a big company from up North coming in, to cut the trees and mine the coal out, and leave nothing but stumps and holes in the ground? Then look at the way the floods are always bringing down the tall trees and the good soil from up on the hills, and putting everything on the bottom turning things upside down, like the Yankee with his ideas of social equality. The river hasn't got any respect for people's ways of living either. It just makes a big bend towards the South to fool you, but in the end it flows North…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Blessing or Curse?

"…Dr. Harcourt Morgan, chairman of the Tennessee Valley Authority, came down from Canada half a century ago and picked Tennessee as a good place to live because he liked the big rainfall. But he says that big rainfall is either the Valley's biggest blessing or its biggest curse, according to how you manage it…"

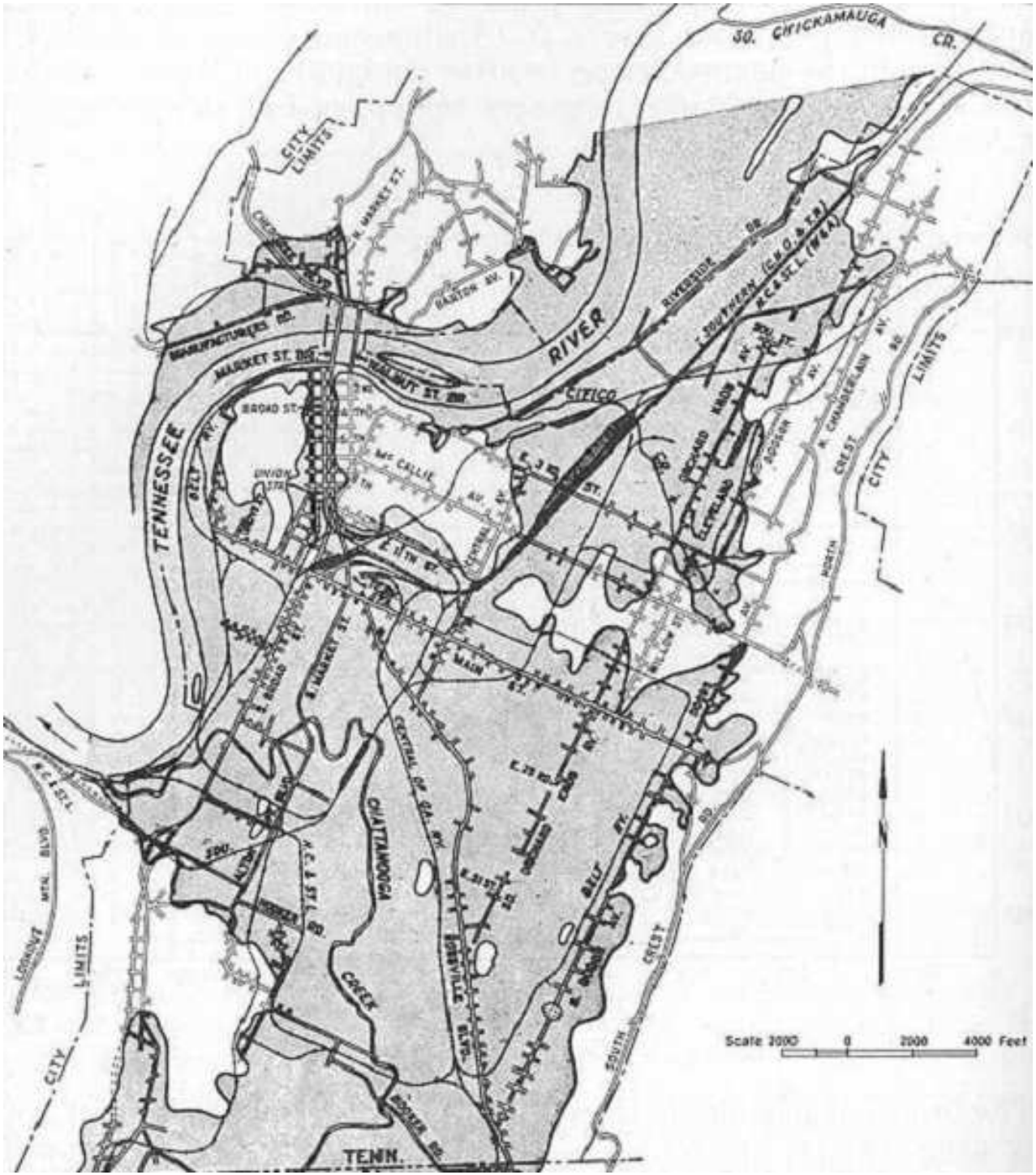
RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u>: caption: "Flooding in the Tennessee River Valley"

<u>Right</u>: caption: "Heavy rainfall passes through Pickwick Dam"

"…Members of Congress have been known to doubt the wisdom of interference with nature, and one Ohio town subject to floods just gave up and moved. But the act creating the Tennessee Valley Authority says it is 'to control the destruction of flood waters in the Tennessee river and Mississippi river basins.' A Yankee wondered in print why such an enterprise should have been undertaken in a region relatively free from floods. Tell that in Chattanooga, where they've seen steamboats in the streets and where TVA men, charting the course of the flood of '67, planted their tripods in front of the Hotel Patten in the heart of town…"

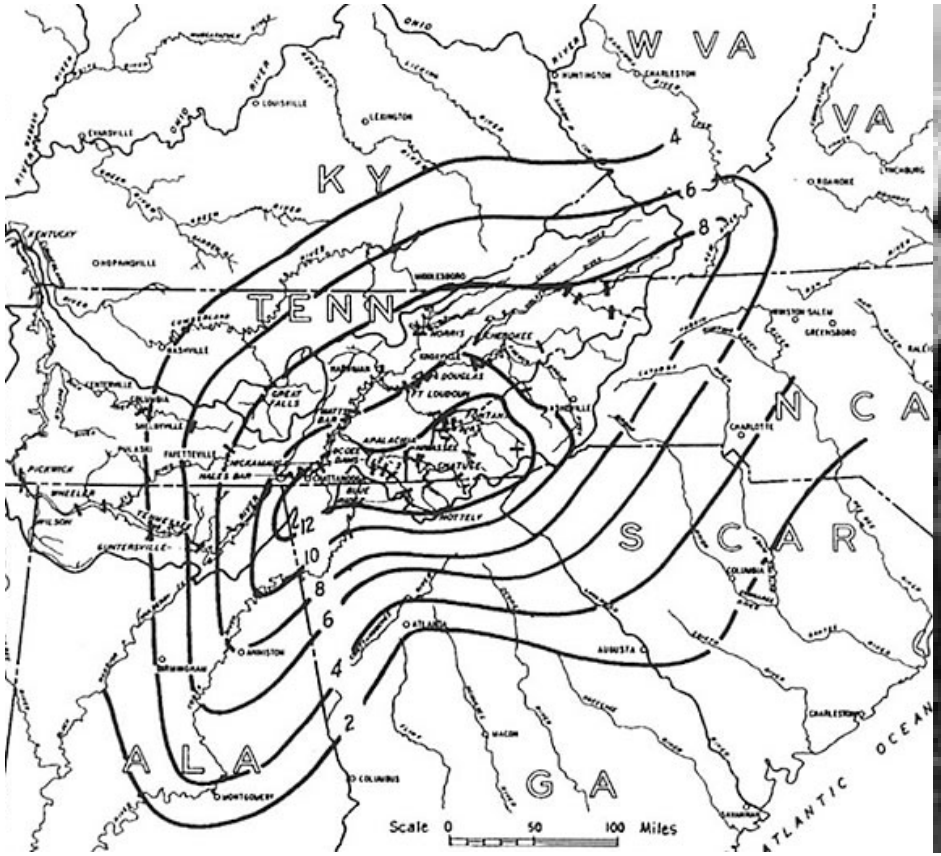
RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)



<u>Left</u>: caption: "Shaded map showing the extent of the March 1867 flood in downtown Chattanooga, Tennessee. Dam construction by the Tennessee Valley Authority in the upper Tennessee Valley in the 1930s and '40s largely ended Chattanooga's persistent flood problems."

"The flood of 1867 far exceeded all precedents for the past 90 years. It consisted of one great rise due to furious rain storms which covered its entire valley, particularly the mountain region. At Kingsport, on the Holston, rain fell nearly continuously from February 28 to March 7. At noon on March 7 the river attained its highest point, being 30-feet above low water and 4-feet above any other flood. In 20 hours it fell 10-feet. At Strawberry Plains (northeast of Knoxville) the freshet (flood waters) rose 52-feet above low water and 11-feet above any other flood. At Knoxville the river rose 12-feet above the high-water mark of 1847 and was over 50-feet deep. Near Harrison the Tennessee rose 15-feet above any known water mark. At Chattanooga the rise began on March 4, overflowed the banks on March 8, and attained height on March 11, being 53-feet above low water and 15.5-feet above the high water of 1847, the highest on record. The river fell with equal rapidity to the usual level. Rains were incessant for four days before the highest water. The destruction of property and life occasioned by this flood was beyond parallel in the history of the Tennessee Valley."

RE: excerpt from *The Chattanooga Flood Control Problem, 76th Congress, 1st Session, House Document No. 91, 1939*



The map (left) shows that during the first seven days of March 1867, upwards of 12-inches of rain fell across an area extending from *Lookout Mountain* (view of the flood from Lookout Mountain at right) in northwest Georgia, to *Maggie Valley*, North Carolina. Rainfall is estimated to have easily exceeded 6-inches across the remainder of the *Upper Tennessee Valley* and its drainages. But the heavy rainfall was not the entire story. The rain produced rapid snowmelt across the higher elevations, which contributed to the total storm runoff. The flood of 1867 is the most significant flood ever recorded in East Tennessee. The Upper Tennessee Valley is especially susceptible to flooding due to its location between the *Smoky Mountains* (to the east) and the *Cumberland Plateau* (to the west). The valley gradually slopes from southwest Virginia to Chattanooga, TN, with nearly all precipitation runoff from across the region flowing through Chattanooga.

Warfare of the Worst Kind

"…Opinions differ about the best means of flood control; people have suggested digging holes through to China to drain off the water. Some engineers are faithful to the levee idea even after what they saw along the Mississippi. But the army engineers officially abandoned the levee plan in 1927, and Dr. Arthur Morgan had made up his mind when he worked out the Miami river project in Ohio. Building dirt walls and messing with sandbags is clumsy and primitive, like trench warfare. In fact it was warfare of the worst kind when Mississippi valley farmers crossed the river to cut the levees so other folks' fields instead of theirs would be flooded…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u>: caption: "Business section of Paducah, Kentucky, February 2, 1937" 289

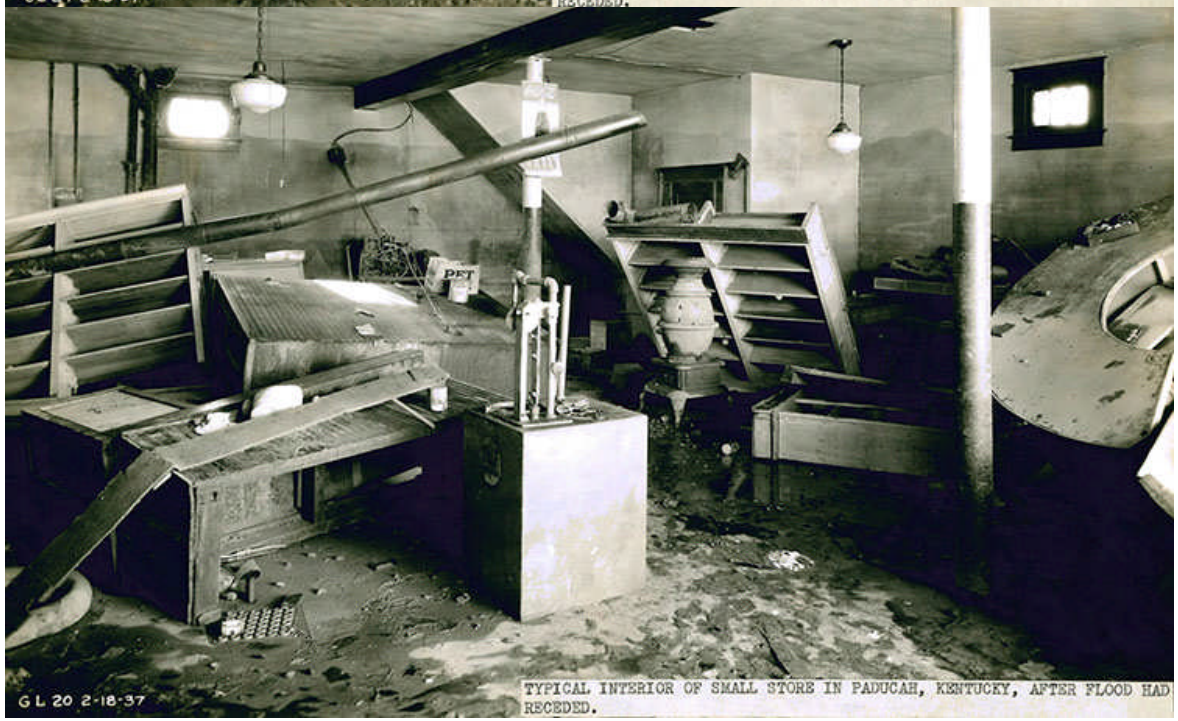
<u>Right</u>: caption: "Water Damage: When the Floods Came to Paducah"

AIR VIEW OF PADUCAH KENTUCKY. DURING FLOOD.

AIRVIEW OF PADUCAH, KENTUCKY, HOMES DURING CREST OF FLOOD.

GL 24 2-18-37

MURRELL BOULEVARD IN PADUCAH, KENTUCKY, AFTER THE FLOOD WATERS HAD RECEDED.



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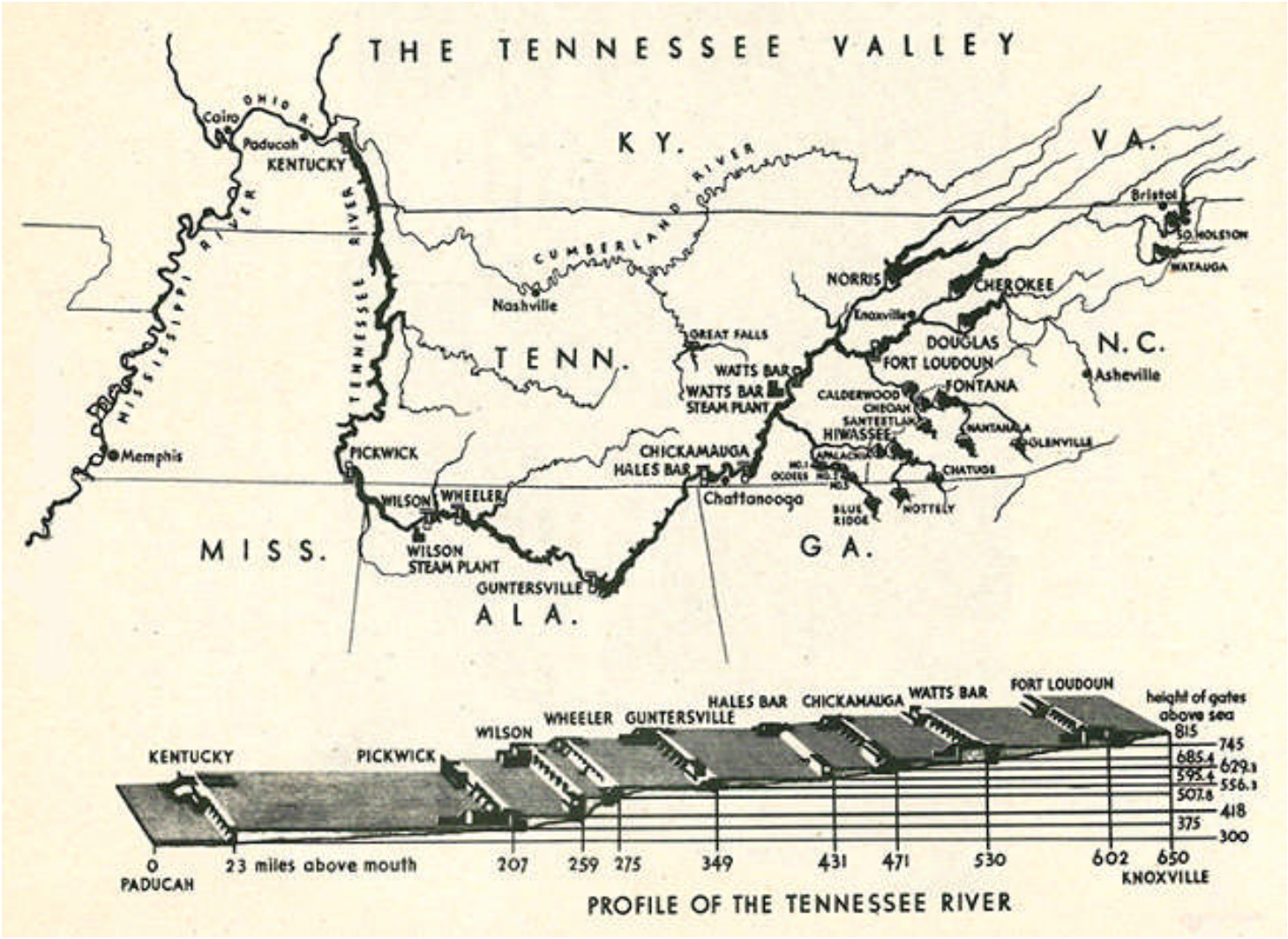
TYPICAL INTERIOR OF SMALL STORE IN PADUCAH, KENTUCKY, AFTER FLOOD HAD RECEDED.

"…But if you want flood control by dams you must build them in the upper reaches of the river; this means that dams on the Tennessee will help in Ohio and Mississippi floods just as a dam on the Hiwassee affects the Tennessee. One engineer, not working for TVA, considered that the effect of the whole TVA system on the lower Mississippi should be comparable to that of the Bonnet Carre spillway at New Orleans. Engineers for the Authority say it should take two feet, at least, off the big river below Cairo…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u>: caption: "Bonnet Carre Spillway"

<u>Right</u>: caption: "Emergency Mississippi flood outlets: Bonnet Carre Spillway and Morganza Spillway. These openings in the levee provide an 'escape valve' for high water on the River, protecting against flooding in cities downstream, particularly New Orleans."



"…By its dams the Tennessee will, in the words of one of the TVA engineers, 'flow down a giant stairway from one end of the Valley to the other.'…"

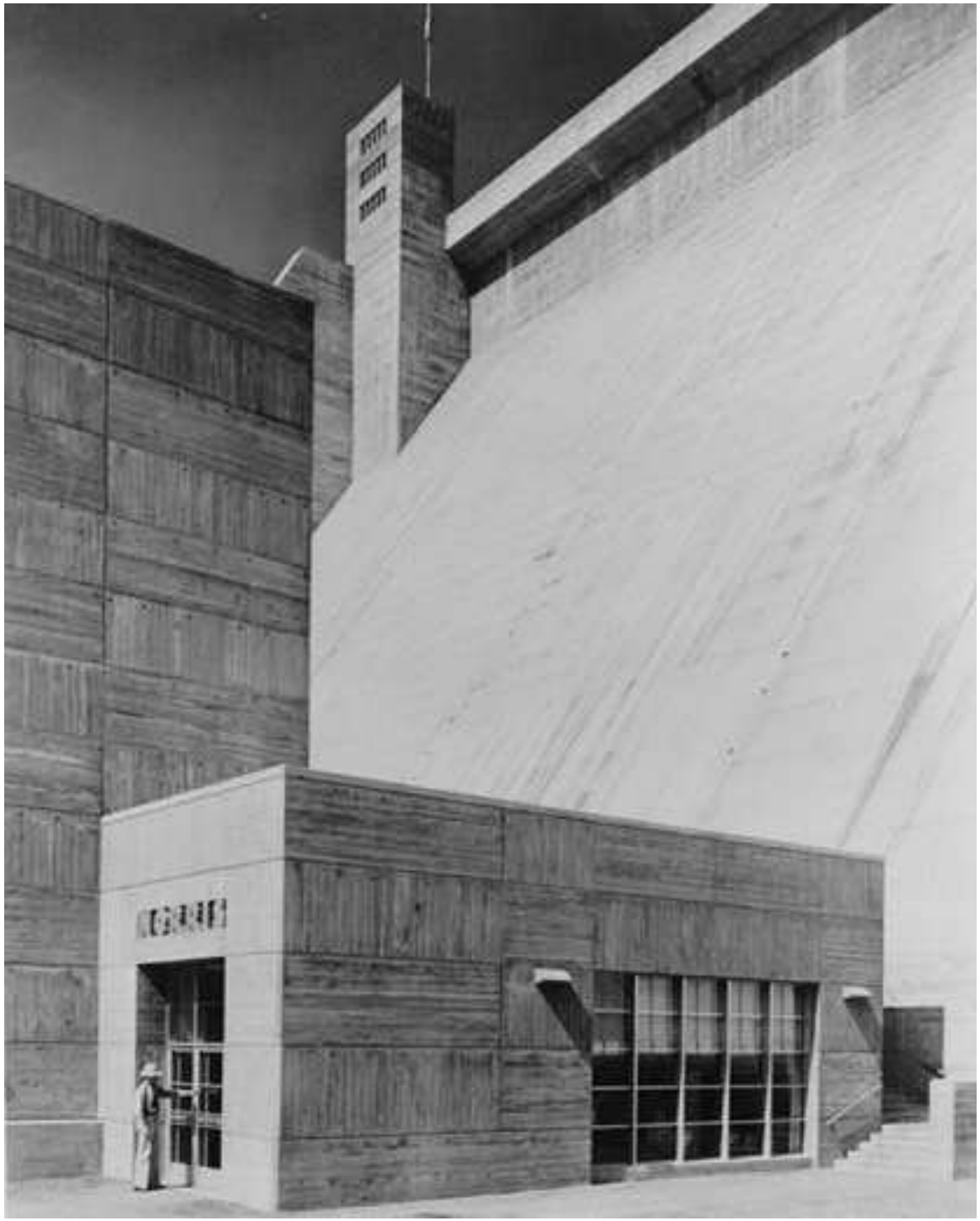
RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Above</u>: caption: "The Tennessee Valley - sketch map, 1942"

"…It will be gauged and guided; even with work in progress in 1936, they managed the floodgates at Norris and Wheeler to prevent flooding the coffer dams at Pickwick Landing. They don't depend on finding catfish up the branches or seeing boll weevils dig in; they post daily schedules in the TVA offices, and even the schoolchildren at Norris study river-gauging. Considering all this, it is surprising that TVA is inclined to discount the importance of dams in its water-control program. The dams are necessary, they say. But to do the thing right you must catch the water where it falls…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

Omnipresent



"…Sightseers at the dams, going as close as they are allowed to the big steel shafts and feeling the pulse of the power, think that the power starts with this machinery. Actually the machinery just harnesses the power of water so it can be used to drive more machinery, or wash the clothes, or cook the waffles. The power was there all the time, and for years it's been pushing down on the topsoil of the Valley a light soil, tilted every which way so that the water can carry it right off…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u>: caption: "Corner view of Norris powerhouse showing pedestrian entrance. Behind large window is visitors' reception room. Dam in background."

"…Stories of the North Carolina farmer who fell out of a field and broke his neck, and of his cousin in Tennessee who always tied his mule to a tree before he began to plow, don't seem far-fetched when you look at the country. If you insist on farming those hills you have to plow slopes that look dangerous to man and beast, and are dangerous to the land. Over in North Carolina they tell how it took generations to teach corn to climb the mountains, and that should have taught them corn was never meant to grow up there. Water runs off corn land several times as fast as it runs off grass or woodland, and instead of traveling alone it elopes with the topsoil…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

In the Old Days

"…In the old days they knew so little about erosion that they plowed straight up the hill and let the water race down in ditches between the rows. After a while it seeped into their minds that it would be better to plow round and round the hill. But a lot of Southern farmers got to where they couldn't grow enough corncobs to stopper the jugs before they decided it would be better not to plow at all. Bottom lands, of course, grew fatter as the topsoil from above came down. But on the rich bottom farms the corn is drowned when the water runs wild, and the floods these days are fiercer and more frequent…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)


ABERNATHY
FURNITURE CO.
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"…Now, why is that? The average rainfall is just what it was, and they say 50 inches is just about ideal for vegetation. It's what they have at the source of the Blue Nile in the mountains of Africa. But the Tennessee Valley's maximum variation, 40 to 80 inches, isn't enough to account for the extra damage done when the creeks and rivers start cutting new ways through bare land. Old folks in the Valley all know the land washes worse than it used to, and the floods are worse, too. Most of the creeks and branches are so muddy, even in ordinary weather, that you can't see anything of a swimming turtle except his head. In flood times, you expect them to run like mean-dispositioned claybank horses, with sticks and cornstalks and even tree trunks tangled in their manes…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

<u>Left</u> (top-to-bottom): caption: "Abused Lands…Hold No Water. Quick Run-Off Streams…Swell Rivers into Flood Tide."

"…To find clear water and the sandy bottoms they used to have in Dixie, you've got to go way up in the hills and woods, where leaves and moss and roots still act as a filter. Any railroad cut or roadside shows you what happens when they go; you'll see roots holding the soil at the top, and hanging in the air where it has washed below. But if there are no roots to take hold, the ground washes into gullies, and that shows you how it is that the plowed land bleeds to death. There are places now where you can hardly tell what color the top-soil was; what you see is the red clay underneath, the color of raw beefsteak, with shattered bones of limestone sticking through…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee River* (1939)

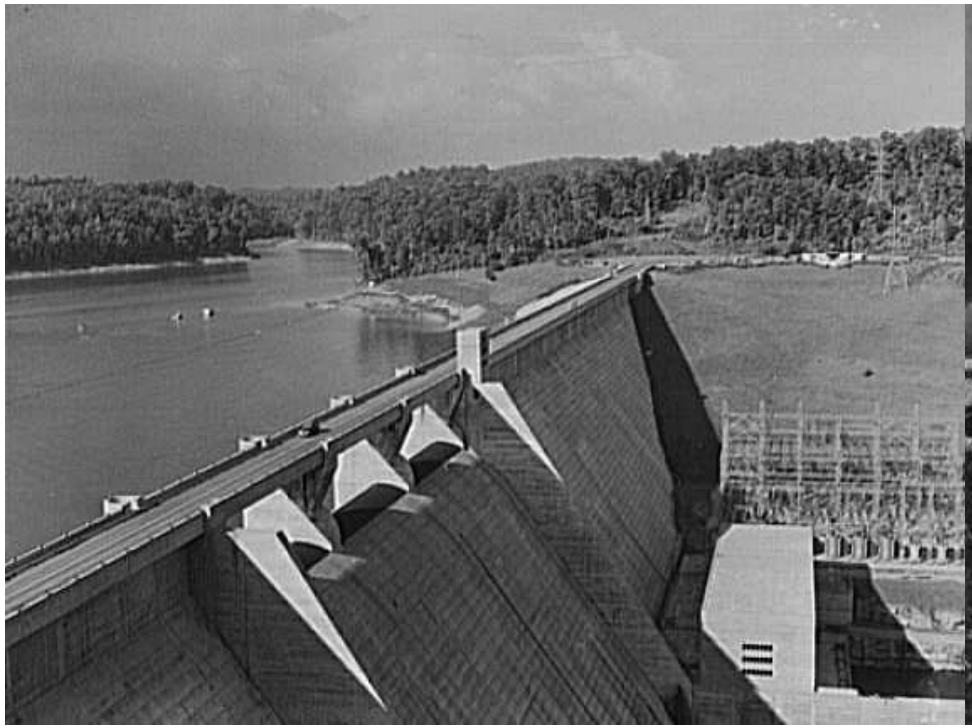
The United States in Solution

"…People notice erosion more than they used to, and it's got around that the Mississippi takes an acre a minute into the Gulf, so that travelers who exclaim over the changing color of the water at New Orleans are seeing the United States in solution. Milk bottles in TVA's hydraulics laboratory show what the various branches of the Tennessee contribute to this burden, and all the people who believe in fighting to defend American soil should look hard at those bottles of silt…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Top</u>: caption: "Lower Mississippi River near the city of New Orleans"

<u>Bottom</u>: caption: "Fire Damage: sometimes they burn off the trees"



"…The Tennessee Valley Authority is interested in erosion because it silts up reservoirs and buries dams. They say Deep river, in North Carolina, silted up eleven out of fifteen private power reservoirs built there in less than fifty years, and a private power dam on the Ocoee is filling up now. Dr. Arthur Morgan feels that the danger has been exaggerated in the case of the TVA dams, and they say that Norris lake is good for at least seven hundred years. Nevertheless, they aren't taking any chances…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Norris Dam pushes back the Tennessee River seventy-two miles to form Norris Lake"

<u>Right</u>: caption: "General view of Norris Dam. Spillway in foreground."

Into the Breach

"…Leaping into the breach, in its first year the Authority put CCC boys to work building 59,000 little 'gully dams' on dry land. In bad cases the boys put down wired mats of brush to hold the ground, and some farmers ready to move off decided to stay awhile, in case the scheme should work. Tractor-drawn terracing machines were brought in, too, and they got the cost of terracing down as low as $1.75 an acre…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Left: caption: "Erosion Control Project"

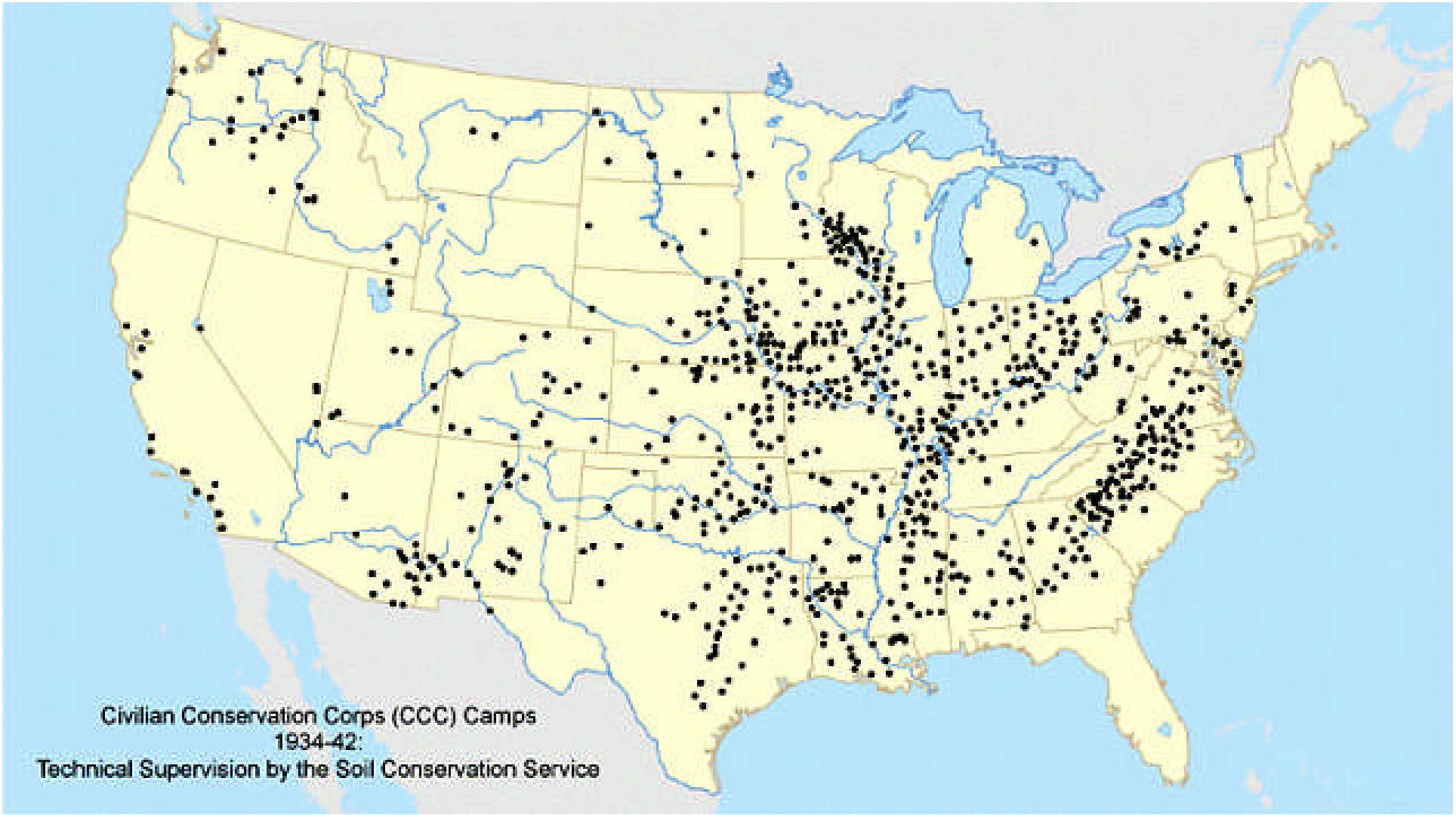
<u>Above</u>: caption: "This cotton field, located on the Athens-Huntsville Road, was terraced under the direction of the County Terracing Engineers. The stone terrace outlet was built during the summer of 1934 by the boys from CCC Camp No. 6, Athens, Alabama."

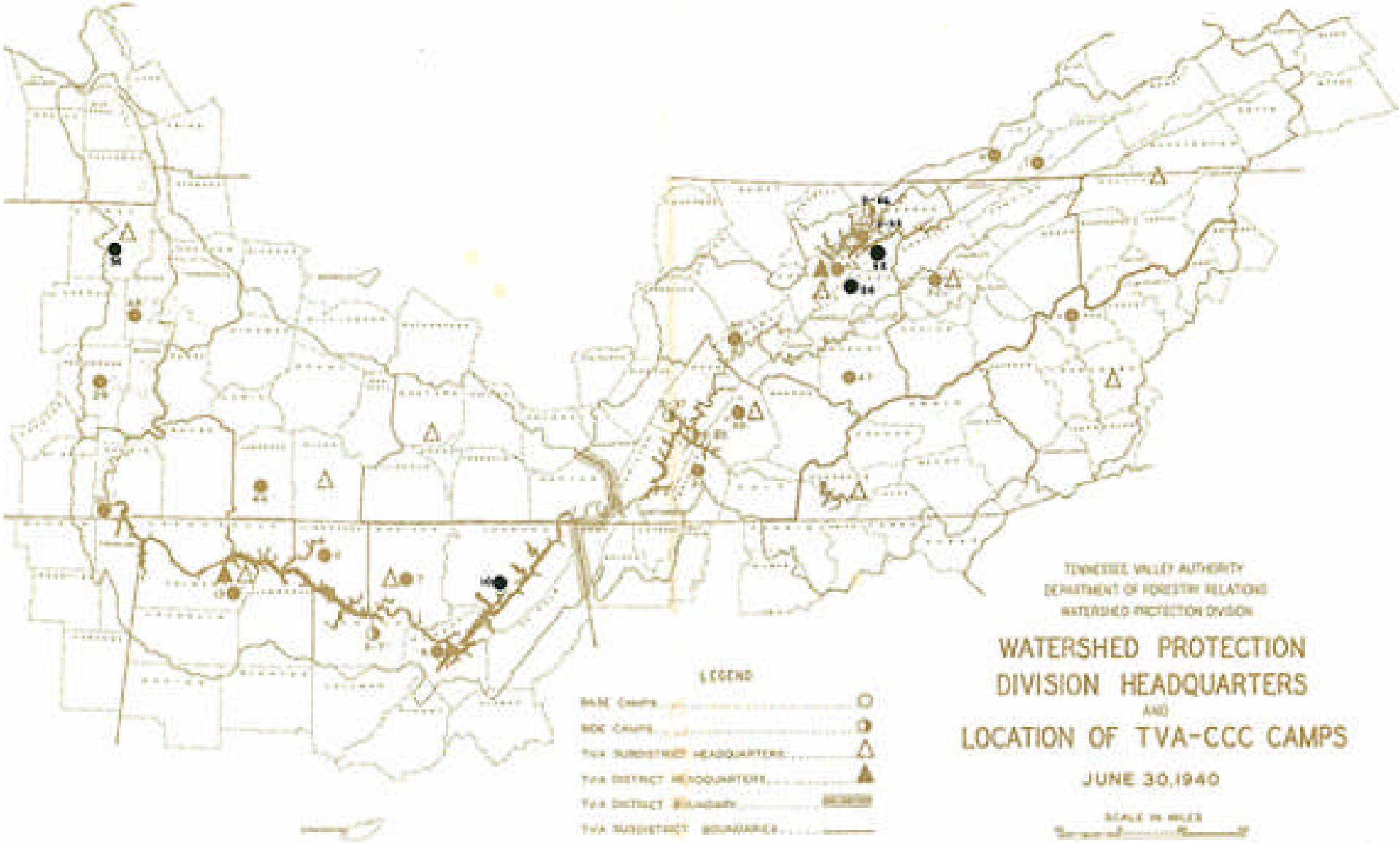
<u>Left</u>: caption: "A series of masonry check dams built at the end of terraces on the Lindsay farm in Limestone County, Alabama. In order to take care of the run-off from the terraces and to protect the narrow county road, it was deemed advisable to build a separate ditch within the limits of the field and to control the run-off water in this ditch by means of rock check dams."

"…Some of the steeper slopes can't be helped that way, but it works down in the rolling cotton country where they have sheet erosion…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

The *Civilian Conservation Corps* (CCC) was established in the early days of FDR's administration and ultimately employed over three million young men during the Depression. The TVA utilized CCC workers to accomplish many tasks, including suppressing forest fires and building recreation facilities. They were charged primarily with solving soil erosion and public drainage problems on TVA and/or privately owned land. Reforestation was a common technique used against soil erosion and the CCC planted millions of trees while working under TVA's direction. The TVA's *Department of Forestry Relations, Watershed Protection Division*, selected the location of the CCC camps based on the priority of the work needed. The CCC provided the labor and certain materials required.


Civilian Conservation Corps (CCC) Camps
1934-42:
Technical Supervision by the Soil Conservation Service


LEGEND
TVA SUBDISTRICT HEADQUARTERS
TVA DISTRICT HEADQUARTERS
TVA SUBDISTRICT BOUNDARIES
TENNESSEE VALLEY AUTHORITY
DEPARTMENT OF FORESTRY RELATIONS
WATERSHED PROTECTION DIVISION
WATERSHED PROTECTION
DIVISION HEADQUARTERS
AND
LOCATION OF TVA-CCC CAMPS
JUNE 30,1940

During fiscal year 1940, twenty-one Forestry CCC camps were assigned to the Tennessee Valley Authority to assist in the conservation program of the Authority. These camps were located as follows:

Camp No.	Side Camps	Location
Alabama 6		Athens, Alabama
Alabama 7	Somerville, Ala.	Huntsville, Alabama
Alabama 8		Guntersville, Alabama
*Alabama 10	Guntersville, Ala.	Scottsboro, Alabama
Alabama 13		Wilson Dam, Alabama
North Carolina 2		Mars Hill, N. C.
Tennessee 22	Mossy Springs, Tenn.	Maynardville, Tennessee
Tennessee 28		Powells Station, Tenn.
Tennessee 29		Lexington, Tennessee
Tennessee 31		Adamsville, Tennessee
Tennessee 32		Jefferson City, Tenn.
Tennessee 35	Big Springs, Tenn.	Cleveland, Tennessee
Tennessee 36		Paris, Tennessee
Tennessee 37	Dayton, Tennessee	Kingston, Tennessee
Tennessee 39		Athens, Tennessee
Tennessee 44		Lawrenceburg, Tennessee
Tennessee 45		Norris, Tennessee
Tennessee 46	Speedwell, Tenn.	Mossy Springs, Tenn. (Sharp's Chapel, Tenn.)
Tennessee 47		Almvick, Tennessee
Tennessee 48		Camden, Tennessee
Virginia 1		Clinchport, Virginia
Virginia 4		Jonesville, Virginia

*Camp Alabama 10 was re-established as Camp Alabama 8 at Guntersville, Alabama, on September 30, 1939.

ANNUAL REPORT OF

WORK ACCOMPLISHED

~ BY THE ~

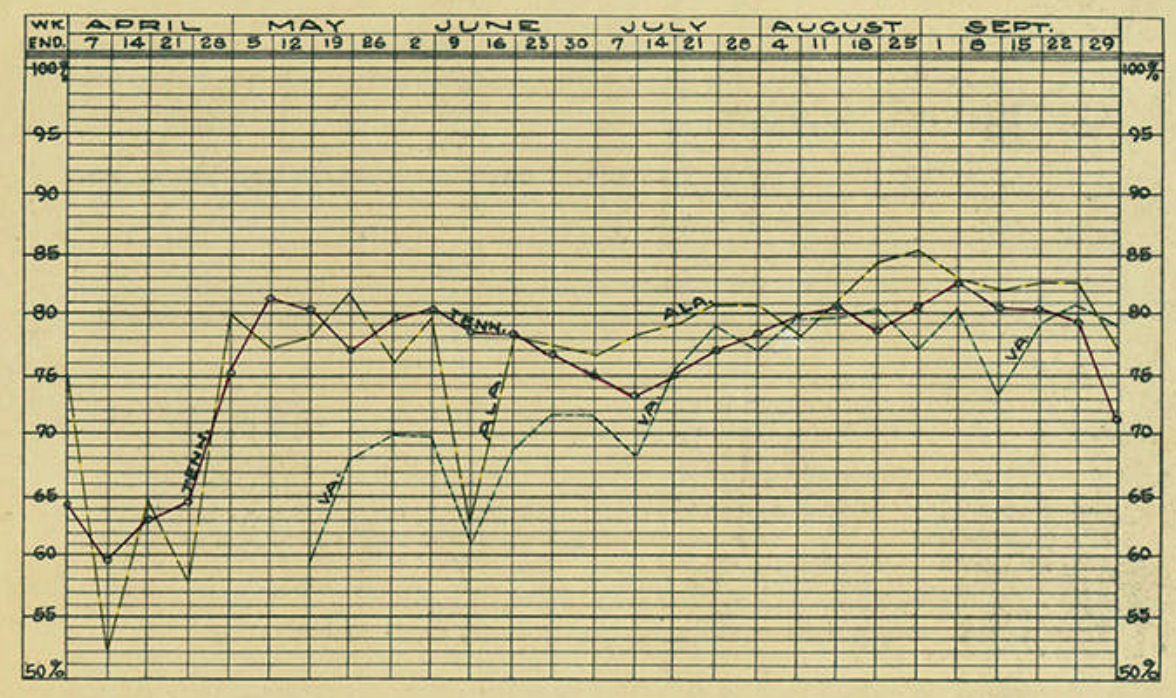
T.V.A.-C.C.C. CAMPS

ADMINISTERED BY

~ THE ~

U. S. FOREST SERVICE

OCT. 1934



LEGEND

ALA. CAMPS-8-

VA. CAMPS-3-

TENN CAMPS-18

MAN-DAY ANALYSIS SHOWING PERCENTAGE OF TOTAL ENROLLED STRENGTH THAT WAS AVAILABLE FOR FIELD DUTY DURING THE THIRD PERIOD IN THE TVA-CCC CAMPS.

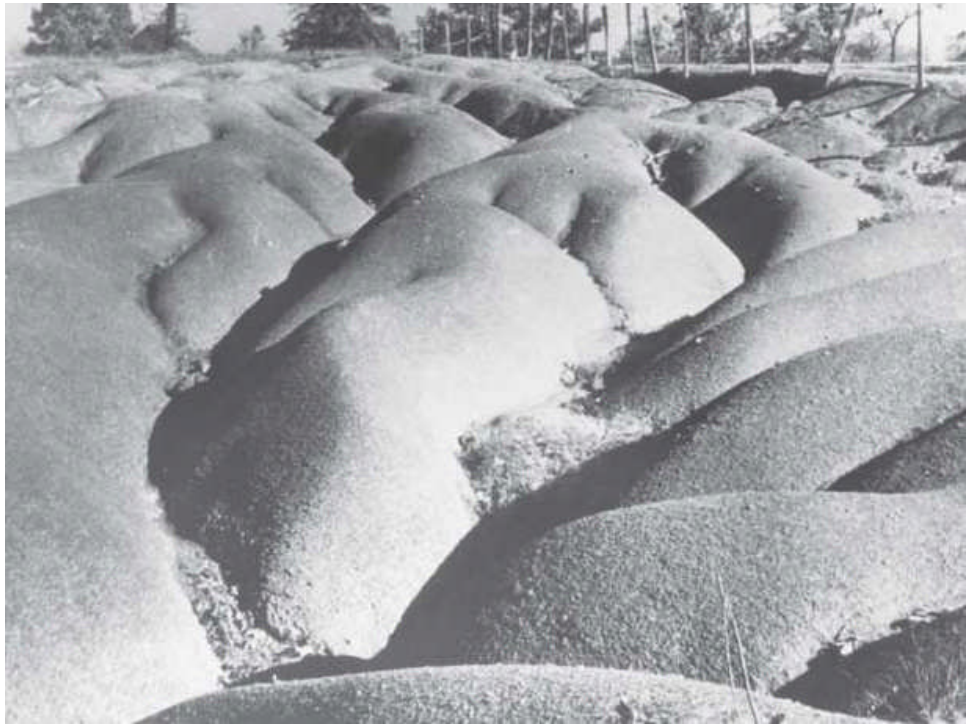
<u>Above L&R & Left</u>: sociologist and photographer *Lewis Hine* accepted an assignment to document the TVA construction of *Norris Dam* in 1933. These November 17th 1933 images show CCC workers at camps designated TVA No. 22 and No. 23 along the *Clinch River* in Tennessee. Routine CCC activities captured in these photographs include receiving instructions, obtaining supplies, eating lunch, and erecting tents for living quarters.

<u>Above</u>: caption: "CCC Tennessee Soil Erosion Project. "Improper disposal of the drainage from the highway caused the erosion in the head of a farm near Demoray. Plank check dams were built in the main gully, with a masonry soil-saving dam constructed at a point where it would catch a considerable amount of silt. The further treatment of this area will be to plant locust and pine."

<u>Above</u>: caption: "CCC Tennessee Soil Erosion Project. "The sheet and gully erosion taking place on the Ford farm near Alder Springs Exchange was checked by means of diverting the water into one channel into which plank and masonry check dams were built. The other gullies were plowed in, seeded to grass and small bag dams placed crosswise the gully to prevent any wash taking place prior to the grass becoming established. This area is to be planted to trees as a further means of control."


UNITED STATES
CCC
CIVILIAN CONSERVATION CORPS

Feet of Clay



"…Of course you've still got people who can't be worried about it or who consider the land will last their time. But even the bottom lands suffer in time, as the washing goes on in the hills. Under the top-soil lies clay, and it washes too. Some of this clay can be used for making fine porcelain, but none of it is suitable for agriculture; and when the kaolin coats the bottoms they will have to mine for good soil down there…"

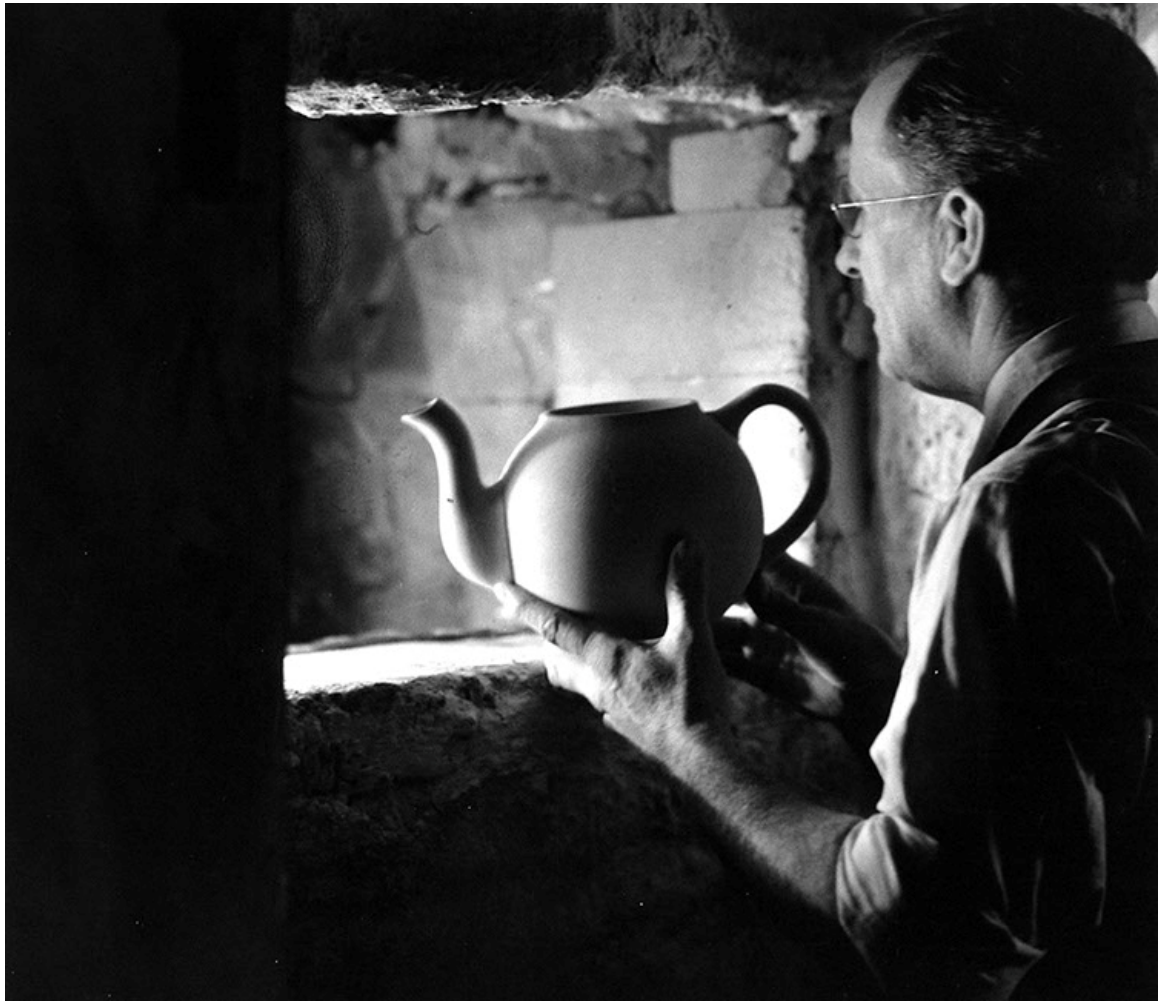
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

In 1935, there was a lot the *Tennessee Valley* region lacked. However, one thing it did have in abundance was clay. FDR's charge to the TVA was to help the people of the TVA region make the most of their own natural resources. TVA Chairman *Arthur E. Morgan* (left, ca. 1921) figured if he could find a marketable use for all that clay, the people of the *Tennessee Valley* would be off to a good start. The scarcity of a type of white clay known as *kaolin* (formed from decomposed feldspar) accounted for the development of fine porcelain in Europe and Asia. When a resident of Spruce Pine, NC mentioned to Morgan that kaolin existed in his part of the TVA region, Morgan had some of his engineers look into it. The early reports were so promising that Morgan asked *Robert Gould*, a porcelain expert who'd been working in the Polish ceramics industry, to come to Norris to open up an experimental laboratory.

Gould accepted the post as TVA's Chief Ceramics Engineer and was impressed with what he found. The North Carolina kaolin was strong and malleable and had an excellent color when fired. Cheap electricity, Gould believed, might be the catalyst that could make high-quality porcelain a reality in the *Tennessee Valley* region. In cooperation with the *Harris Clay Company*, Gould began developing new ways to refine the kaolin at the Norris lab. Everything seemed to work. According to TVA documents, the product: *"combined the thinness, translucency, and beauty of fine china with the durability and strength of hotel ware."* French author *Odette Keun* toured the lab in 1936 and found it "delightful." She left convinced that TVA's experiments would lead to the opening of *"an entirely untouched field of manufacture"* in the region.

Top: caption: "Ceramics Lab mold for a porcelain pot"

Bottom: caption: "Fine porcelain made at Norris is part of the TVA Historic Collection"



"…the primary objectives were approaching completion, and further operation of the lab was unwarranted"

Tennessee Valley Authority

RE: having demonstrated that porcelain could be made from American kaolin fired in electrically heated kilns, TVA announced in 1938 that it was suspending the lab's operations. That this decision closely followed the dismissal of TVA Chairman *Arthur Morgan* - the lab's chief proponent - may have been a contributing factor. Several pieces of Norris porcelain are in the TVA Historic Collection at TVA's corporate headquarters in Knoxville, TN. They attest to the fine quality of the lab's small output. One is a pair of shiny white bookends, each decorated with a muscular Atlas-like figure holding aloft a glowing light and a generator. The design was proposed but rejected as an adornment for TVA dams.

The Grip of a Giant

"…People who think that the job of the Tennessee Valley Authority is building dams and nothing else are inclined to minimize the importance of the fight against erosion, but the TVA staff, from the chairman down, emphasizes that part of the job. They are struggling to pry loose the grip of a giant whose gnarled red hands, gouging deeper, are tearing the Southern hills apart and crumbling them into the river. You can figure it out in acre-feet or tons of pressure and find they're right when they say that the underground reservoir, meaning the ground drainage, is the biggest one in the Valley bigger even than Norris lake, which could cover the state of Pennsylvania with a foot of water…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Engineering on a Grand Scale

"…flood control of the Tennessee river system is, in the words of a TVA engineer, 'engineering on a scale hitherto unattempted in America.' The nearest thing was the Panama Canal, but except for the malaria problem the jobs are very unlike. In the Canal Zone lines can be drawn firmly and Uncle Sam has the say-so, beyond question, on his side of the line. In the Valley the state and city and county authorities are there to have their say, in the American or anyhow the Southern language, and no dividing line keeps the rest of the country out…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…Dr. Arthur Morgan told about a dam on the French Broad river authorized by the government in 1929. A year or two later other federal officials, at the request of local and state officials, approved a million-dollar bridge just above the dam site. The bridge and three million dollars' worth of highway would be drowned out by the dam. This is the sort of thing that planning on the TVA scale is meant to avoid. So far, going slowly and studying the records of previous floods not only in the streets of Chattanooga, but on the Danube and in the Nile valley, the Authority has managed to hold to a general program; and it has yet to make an error as costly as that of the private company which found a better site for a dam after it had spent six millions in one false start…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)


PRIVATE PROPERTY
TVA KEEP OFF
ALL SURVIVORS
WILL BE PROSECUTED

Part 8

Abomination of Desolation

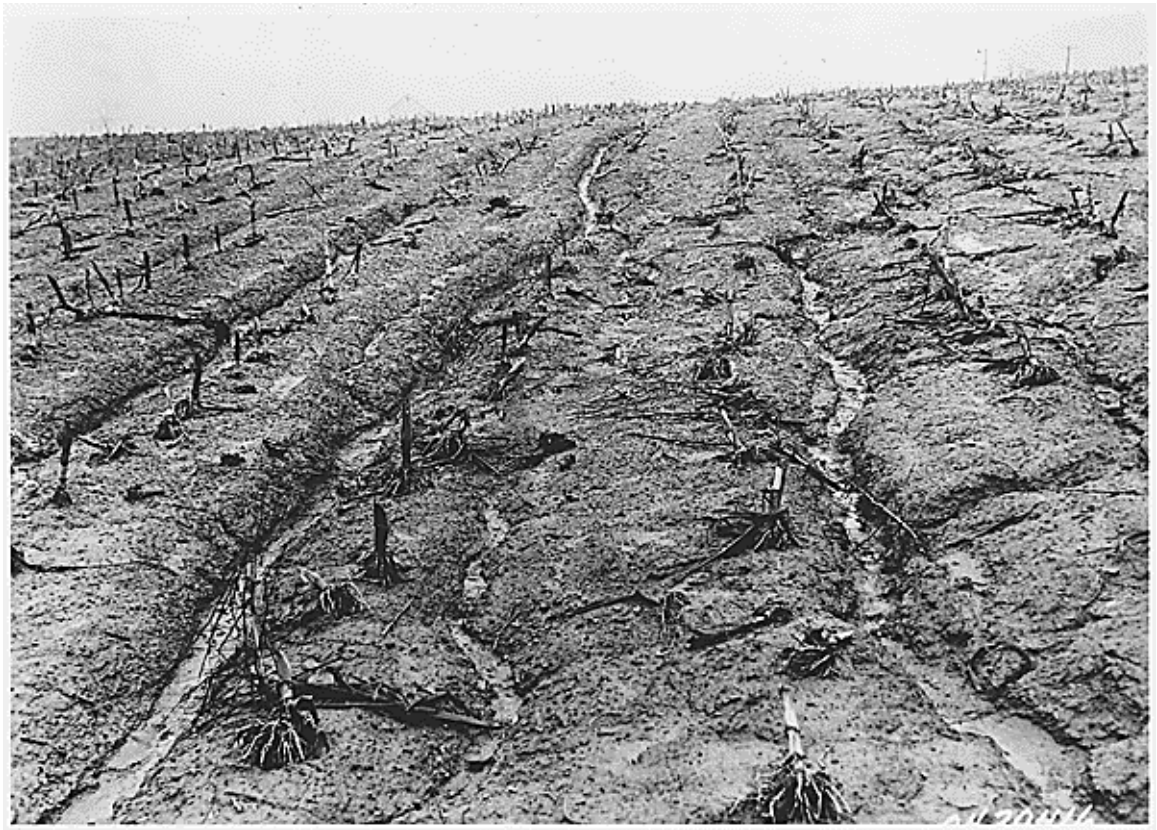
The Prophecy

"…Nature's cycle by which rain makes the plants grow, the plants feed the animals, the animals fertilize the soil and in turn feed the plants, seemed bound to last. It was broken by the animal that learned to use other animals and plants and minerals in excess of his own needs. Sometimes the break is temporary, but sometimes the land itself is washed out, worked out, gone. The abomination of desolation mentioned by the prophet is in Eastern Tennessee. They say it might have been in North Carolina, but when they were marking the boundary they ran out of whisky and had to make a trip down into Georgia after it. This accounts for the jagged corner where the three states meet, and where the copper mines are…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Erosions in Copper Basin, Ducktown, Tenn"

<u>Right</u>: caption: "Erosion near Ducktown, Tenn"



"…this imitation of a Western waste wasn't made by centuries of erosion, as the natural deserts were. This desert was man-made, of recent memory. They stopped the sort of mining that made it when a power company sued because its reservoirs were being filled up, and now the fumes that killed the trees are turned into acid that sells for more than the copper ore. But the desolation is left, mile after mile of it, raw red gullies as far as the eye can see. The earth still washes, exposing roots to show there once were trees, and the creeks cut deeper into canyons to be bridged by the WPA…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left T&B</u>: caption: "Farmland in Jefferson County, Tenn."

No Natural Right

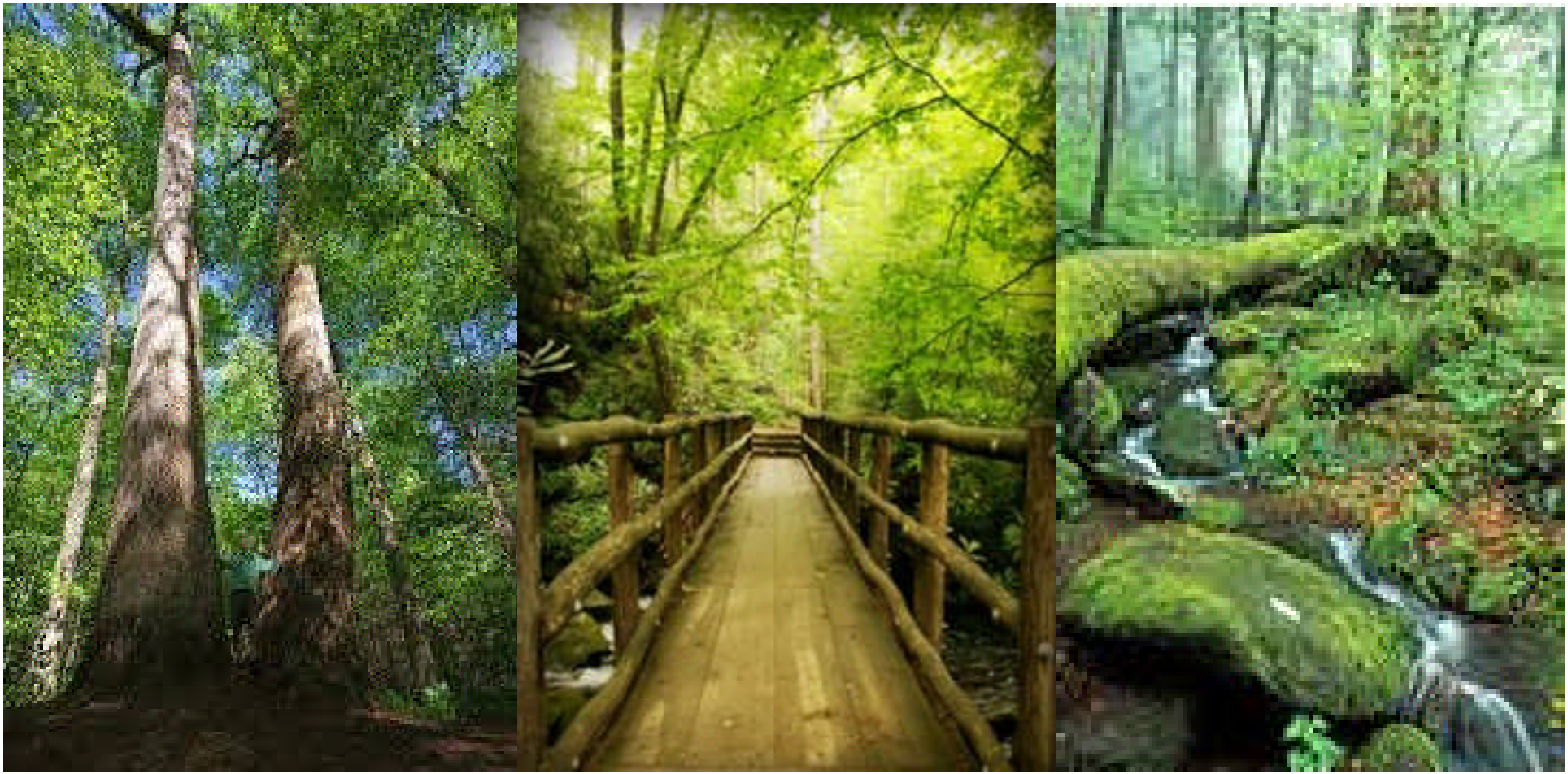
"A man has no natural right to inherit good land and pass on a waste of gullied hillsides to those who come after him…laws of land ownership should be changed so that men shall not be allowed to own and occupy land unless they will manage it in the interest of a permanent agriculture…while the government is spending millions of dollars to prevent soil erosion, the small-scale mountain farmers of this region, hard-pressed for sources of livelihood, are clearing steep mountainsides for three or four corn crops before the soil is washed and the land destroyed. It is therefore a question as to whether the expensive repair work of the government is keeping pace with this destruction going on in the same region at the same time. At present the TVA law does not provide a legislative basis for meeting this problem."

***Dr. Arthur E. Morgan,* TVA Chairman**

Only God Can Make a Tree

"…And within an afternoon's drive is the other extreme, the land as God made it. Climb up into the Joyce Kilmer Memorial Forest, in North Carolina, and you can see nearly 3,500 acres of virgin hardwood poplars and hemlocks six or seven feet through. Nobody can slash them with a saw or poison the air they breathe; they are safe on their reservation, forever…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



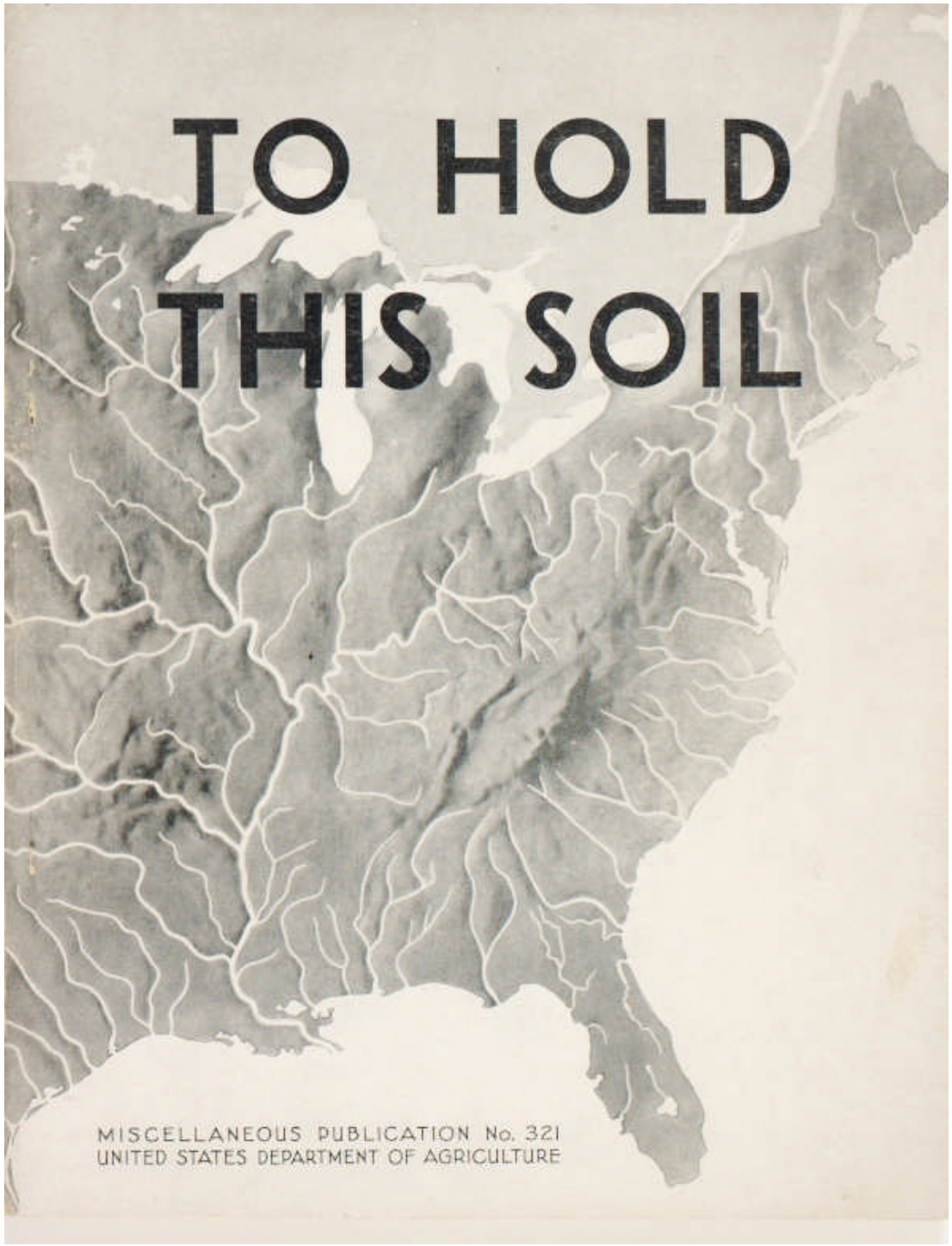
I think I shall never see a poem lovely as a tree.
A tree whose hungry mouth is prest against the earth's sweet flowing breast.
A tree that looks at god all day and lifts her leafy arms to pray.
A tree that may in summer wear a nest of Robbins in her hair.
Upon whose bosom snow has lain; who intimately lives with rain.
Poems are made by fools like me.
But only God can make a tree.

RE: poem entitled: "Trees" (by *Joyce Kilmer*)
<u>Above</u>: *Joyce Kilmer National Forest*

<u>Above</u>: caption: "Four-cent USPS Soil Conservation commemorative stamp, ca. 1959"

<u>Left T&B</u>: caption: "These photographs show Mr. and Mrs. Sollie Wiseman from Benton County, Tennessee whose land was reforested by family and friends in 1949. The second photograph from 1956 shows the growth of the trees in the background."

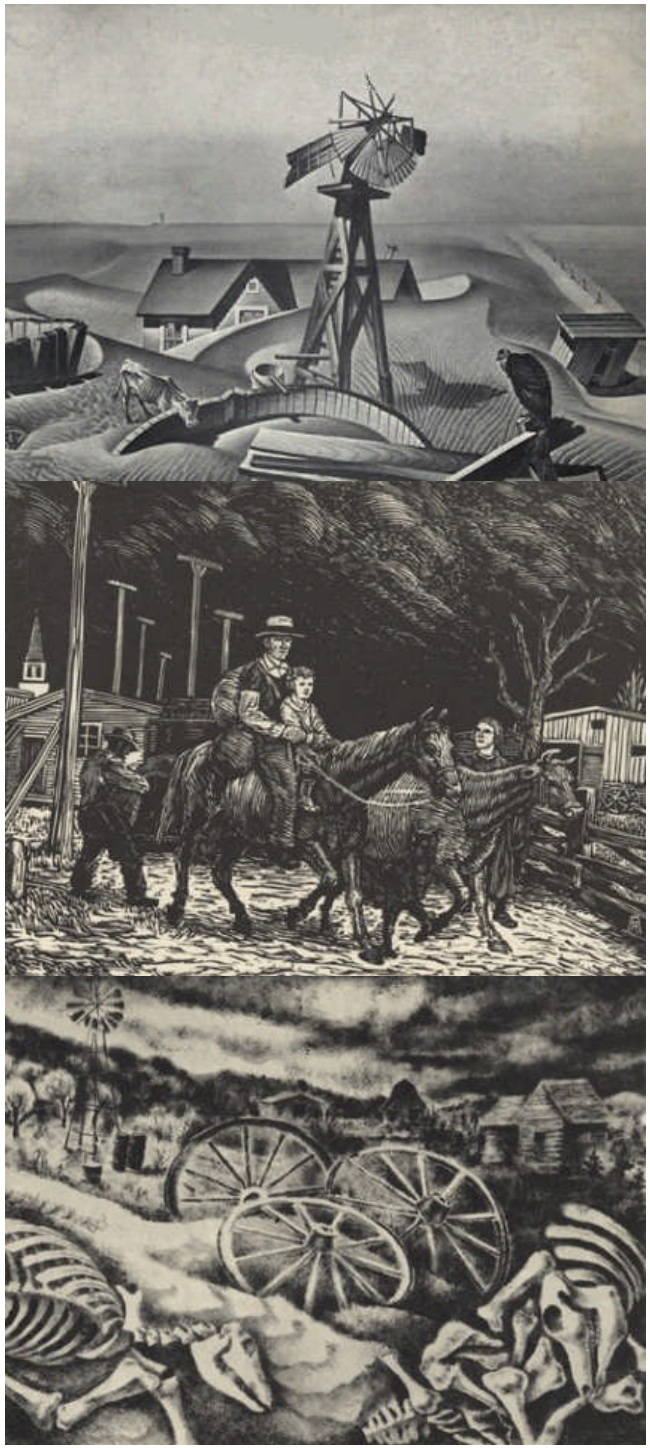
The Dirty Thirties



"…The odd thing is that the natural state of the Kilmer trees is due to planning, while the desolation around Ducktown is due to letting nature, human nature, take its course. Thanks to human nature the destruction throughout the Valley, as throughout the country, differs from that of Copper Hill only in degree. In time, lumbering and farming can do what mining did…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: cover of a Dept. of Agriculture publication (ca. 1935). In 1933, FDR began rolling out an alphabet soup of New Deal programs: the *Civilian Conservation Corps* (CCC), *Soil Conservation Service* (SCS), *Resettlement Administration* (RA), *Tennessee Valley Authority* (TVA) and others aimed at addressing the nation's environmental problems.



One of the worst ecological catastrophes of the 20th Century was the "Dust Bowl" (period artwork, at left) effecting approximately 100 million acres of land in the *Southern Plains States*. Having plowed under and converted the arid *Great Plains* grasslands to mono-crop cultivation (to cash in on the wheat boom of WWI), farmer-speculators abandoned the land when prices plummeted after the war and natural drought cycles began to transform the land into desert. By the early 1930s, wind storms began scooping the barren top-soil into the air and creating "black blizzards" or "dusters" - a phenomenon that gave rise to the char-acterization of the depression years as the "dirty thirties." On April 14th 1935, (a/k/a "Black Sunday"), a single dust storm swept across the plains carrying twice as much dirt as was dug out of the earth to build the *Panama Canal*. That same month, *Hugh Hammond Bennett* was in Washington D.C. to testify before Congress on the pressing need for soil conservation legislation when the skies prematurely darkened as a dust storm passed over and blotted out the sun like an eclipse. Faced with such incontrovertible evidence, Congress passed the *Soil Conservation Act* that same year.

A Grudge Against Trees

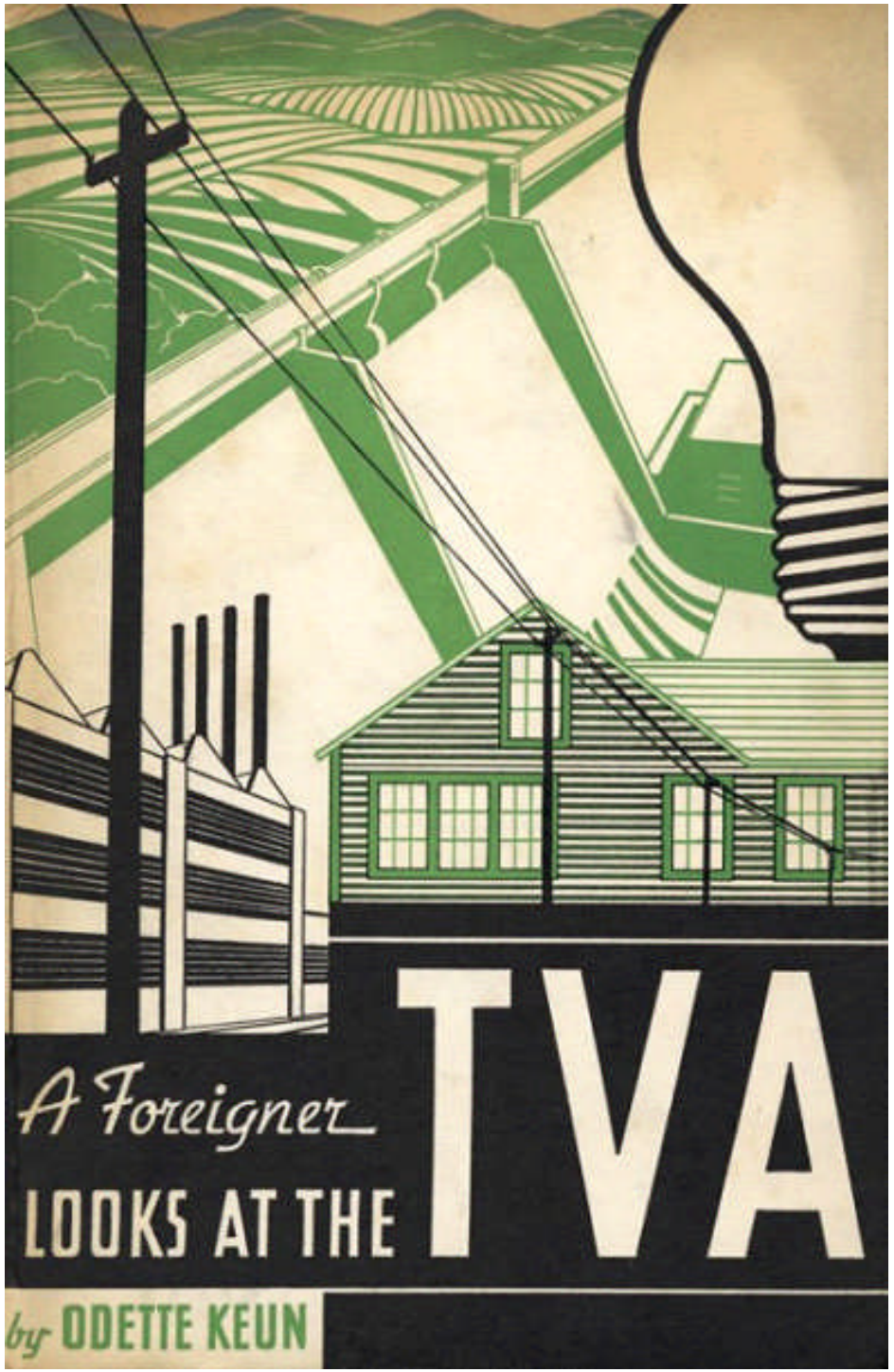
"…While the pioneers were eager to kill off the birds, buffaloes, and Indians, they had a lasting grudge against trees. The pioneer cabin stood in a 'clearing,' and indeed it was necessary to clear a cover under which wild animals or Indians might lurk, as it was to clear the fields before they could be plowed…This determination to get out of the woods was not peculiar to the South. In the far West, men cut down the biggest sequoia the oldest living thing on earth just for the fun of it; and in New England, not so long ago, mischief-makers hacked the heart out of a historic elm. A Frenchman traveling in New York in 1831 noticed 'a general feeling of hatred against trees…They believe that the absence of woods is the sign of civilization.'…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…On the other hand, it was a good old custom to leave or even to plant an avenue of trees leading up to the big house, and in some parts of the South where the Yankees burned the houses you can still see those double rows of oaks or cedars or magnolias, leading nowhere…"

RE: excerpt from *God's Valley – People and Power Along the Tennssee* (1939)

<u>Above</u>: caption: "Oak Alley Plantation, tree-lined entrance"



"All the international wars waged in Europe since the fall of the Roman Empire did not do as much damage to the European soil as the Americans managed to inflict in three centuries on their own earth."

RE: excerpt from *A Foreigner Looks at the TVA* by *Odette Keun*


NO-MANS LAND
ONCE A FOREST "IN FLANDERS FIELDS" X217

Cut and Get Out

"…It is now recognized by the utilitarians that large-scale destruction of the trees was bad business. It seems the trees served a purpose in catching clouds, breaking winds, and holding down a fugitive soil. So they had been a help to the farmers who were so glad to see them go, and the soil was poorer and the floods worse after the lumber companies cashed in on the slow growth of centuries under their policy of 'cut and get out.' Since this expert opinion is not generally held, there are parts of the South and of the Valley where you have to persuade them to let the little trees grow. In Western North Carolina, only last year, it was reported that half the forest fires were deliberately set. They have a mistaken idea that burning off the trees helps the land; or sometimes hunters do it to scare out game. Anyhow, on one tract that they fired, over ten thousand acres burned…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Back to a State of Nature

"…Of course the game never had a chance. Back in the days when Andy Jackson was a young man, Reelfoot lake in Tennessee just over the edge of the Valley was made by an earthquake. That lake and the cypress swamps around it attracted all sorts of birds and for a while there weren't enough settlers to kill them off. They made up for it later, though. They killed the swans and shipped them in box-car loads to Nashville and Memphis, where they sold for two bits apiece. They killed the egrets. Now just to mention Reelfoot to some people is enough to make them cry. But over the eastern rim of the Valley they are bringing wild life back to the national parks; they have deer and wild turkeys and ravens and eagles in the Smokies now. As with the trees, it appears to take some sort of planning to get back to a state of nature…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…Even partial restoration is a job to keep several government agencies busy. The Tennessee Valley Authority is welcomed in reforestation circles; it grows 18,000,000 seedlings a year in its nurseries and oversees their planting by the CCC boys. Fish hatcheries established by the Authority supply the river and the reservoirs; bird sanctuaries and game reserves have been marked out along the new shorelines or on the islands. The Forest Service is doing the same thing, but it can use reinforcements…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

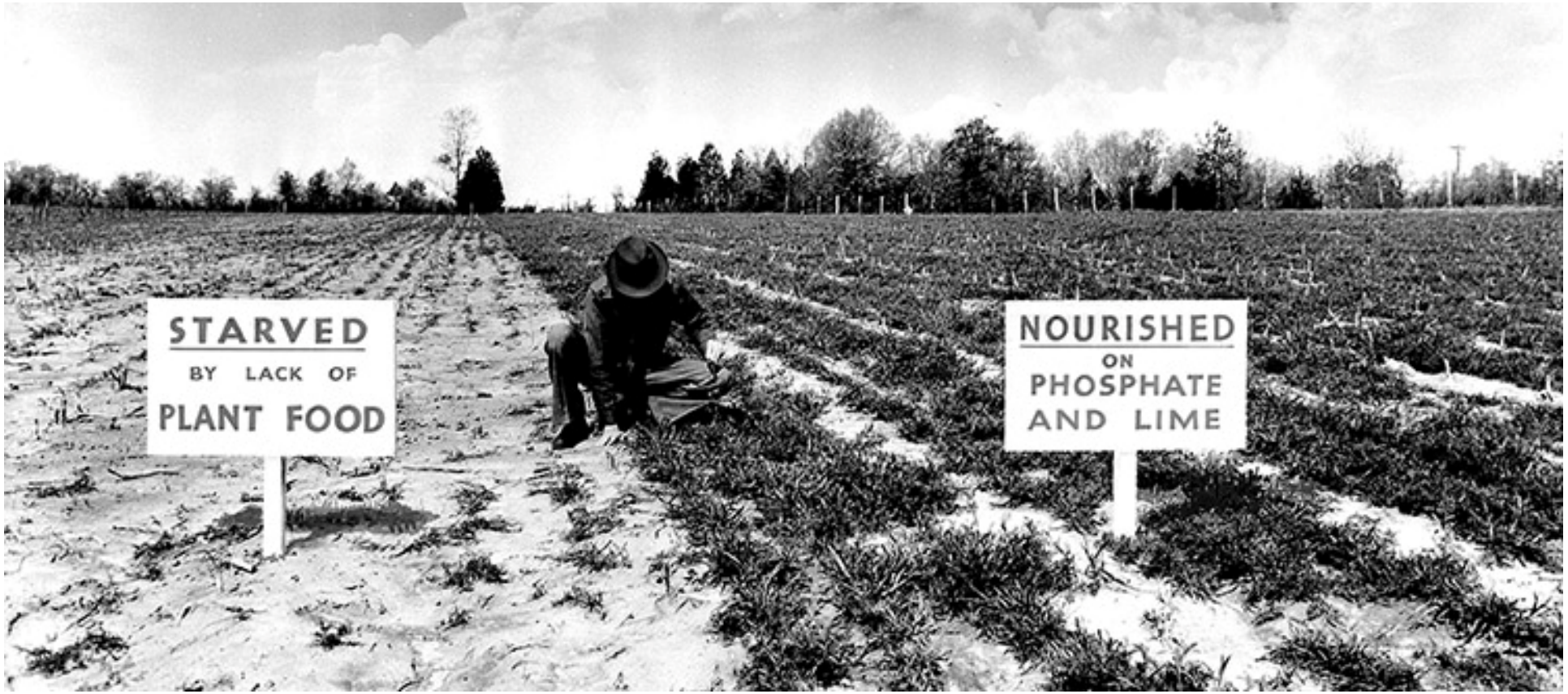
"…These little trimmings just touch the real trouble, which is that of the wasted soil. You can grow trees, not a primeval forest but ordinary hardwood for commercial cutting, in two or three generations; it takes centuries to restore lost land. Up to a point you can turn wornout lands to pasture, so eventually restoring their fertility, but there comes a time when even grass refuses to grow. There are places in the Valley where no cover crop will grow without fertilizer; and so, in the new cycle being set up to take the place of a natural cycle that has been destroyed, the making of fertilizer by water power at Muscle Shoals is one stage…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Julien H. Case's farmhands load TVA superphosphate fertilizer. Case uses it to improve the soil on his 500 acre farm"

<u>Right</u>: caption: "The difference between corn grown without TVA fertilizer (left) and corn grown with it (right) was phenomenal"

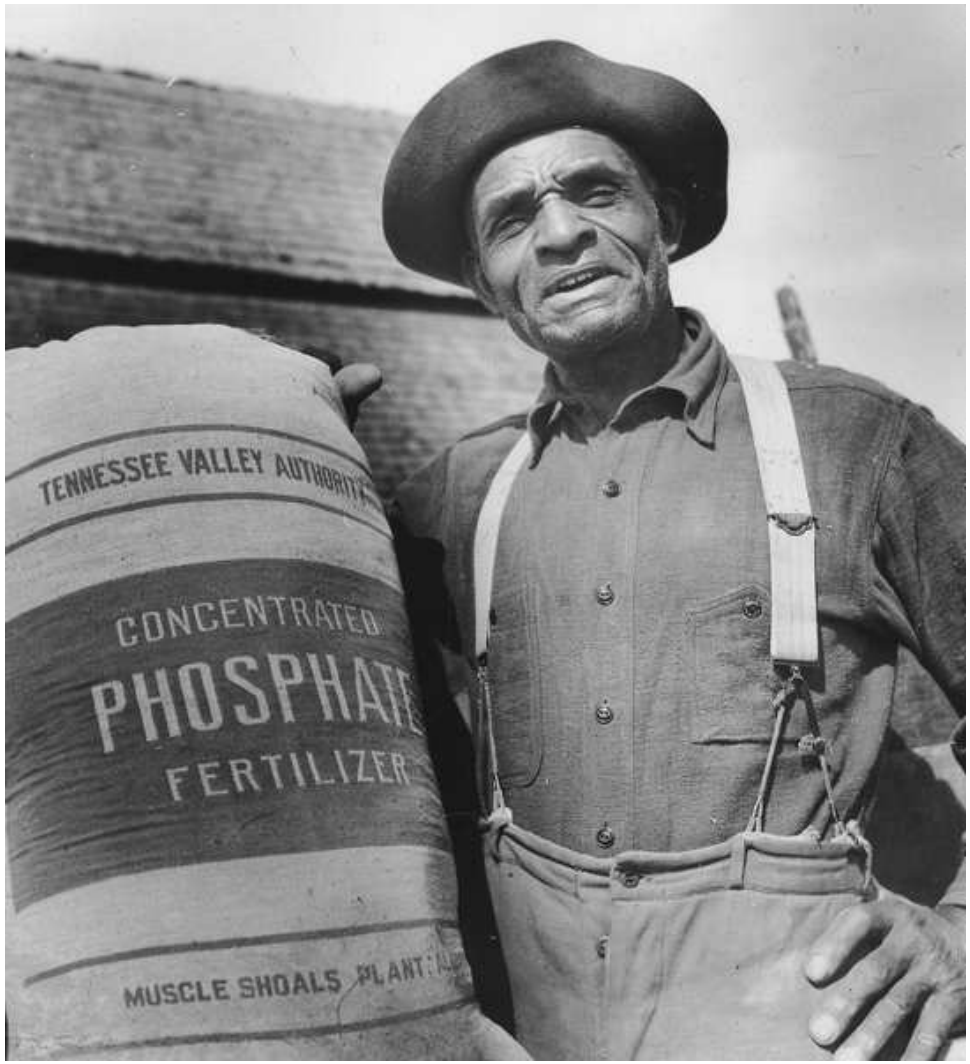
Beginning at the End



"…You can start following a cycle anywhere and come out the same place, but there is something reassuring about beginning on the ground. TVA may be able to replace the broken natural cycle the old simple rhythm of rain to plants, plants to animals, animals to soil with its own new rhythm of rain to river, river to power, power to fertilizer, and fertilizer to crops. But in this new pattern you can see that the dams and the fertilizer factory together do only what a good soil would do: they hold the water, and combine it with crushed rock to make plant food…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Hard Up



"…The only trouble about buying fertilizer is that it takes money. At that, hard-up Southern farmers buy more than twice as much fertilizer as do farmers in all the rest of the country; and they pay two to three dollars an acre for it, as against an average cost of 30 cents an acre in Yankee states like Iowa, Wisconsin, Illinois. They have to use more and more of it, too commercial fertilizer sales reached a new high only last year. It's one of the things that keeps the Southern farmer hard up…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…It's erosion that made fertilizer necessary in most cases, but the damage has been done, now, until on those little farms, mostly under a hundred acres and the average around seventy, less than thirty acres ought to be cultivated. They could use more cover crops, which are feed crops; more than eight million dollars' worth of hay is brought into the Valley every year. But a feed crop isn't a cash crop and the farmer has to eat too…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"Over in Grainger county, we've got a farmer who is anxious to save his land. The trouble is it's not very good land you know Grainger county and by rights he ought to put nearly all of it into cover crops. That will increase the value of the land eventually, but what will the family live on meanwhile? There are eleven young children, and while you save the soil you're starving them."

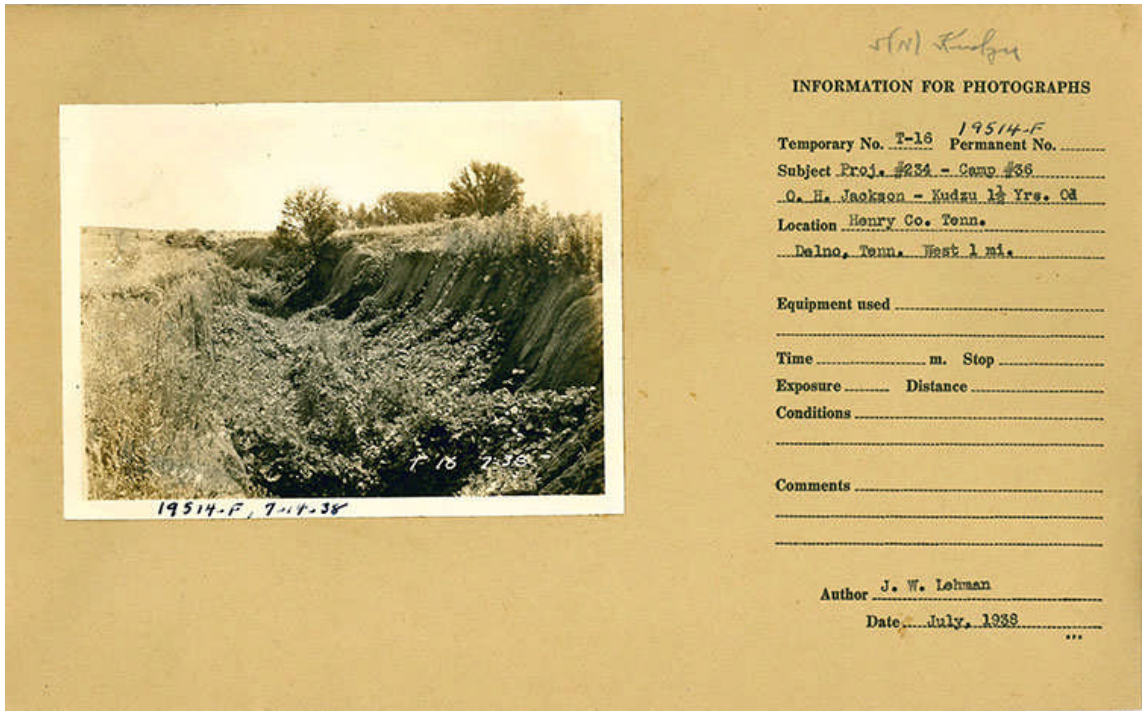
***TVA Agricultural Division*, Knoxville, TN**

Left: caption: "Farm of A.L. Wales showing winter cover crops, near Athens. Part of field fertilized and part unfertilized as experiment.

The Vine That Ate the South

"…Kudzu is a perennial leguminous vine native to Japan…In the North the stems are killed by cold; and new growth comes from the root each year. In parts of the South, such as southern Georgia, only the leaves and young shoots are killed, and consequently the main stem may attain considerable size. Kudzu is valuable as a forage crop. It may be grazed or cut for hay…Since Kudzu is a hot-weather plant, its growth is delayed until the ground warms up, and it stops with the first frost…When the plants are cut new shoots are put out. Kudzu will grow on many soil types and can thrive on soils too acid for alfalfa or clover. This is one of its great advantages…Kudzu makes good grazing, but it must be handled with care…There is no danger that Kudzu will become a pest…In gullies and on steep slopes a heavy growth go Kudzu gives substantial protection against soil erosion…"

RE: excerpt from a U.S. Dept. of Agriculture publication (dated March 24th 1937) entitled "Technical Instruction No. 133 – General Information on Kudzu"



INFORMATION FOR PHOTOGRAPHS

Temporary No. T-16 Permanent No. 19514-F

Subject Proj. #234 - Camp #36
O. H. Jackson - Kudzu 1½ Yrs. Old

Location Henry Co. Tenn.
Dalno, Tenn. West 1 mi.

Equipment used

Time m. Stop

Exposure Distance

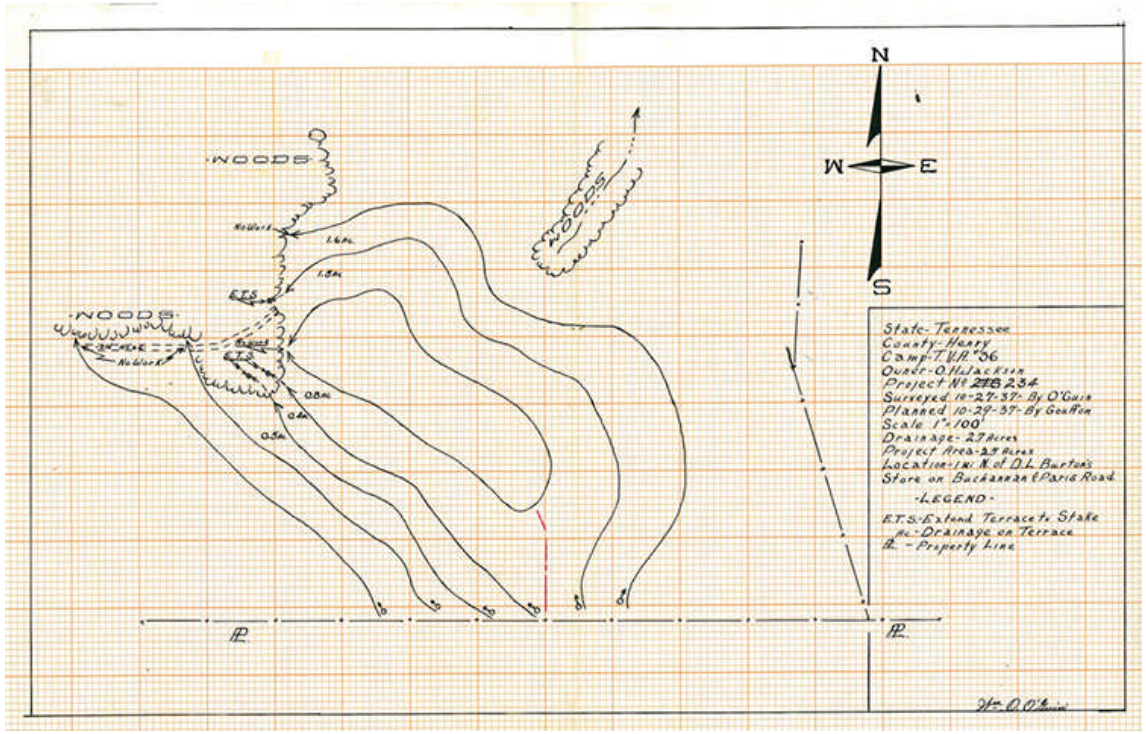
Conditions

Comments

Author J. W. Lehman

Date July, 1938

19514-F, T-16-38



<u>Left T&B</u>: caption: "Using Kudzu To Combat Soil Erosion. These records show that Kudzu was one of the plants introduced during the 1930's by CCC workers in their efforts to combat soil erosion. The aggressive nature of this plant was not understood until millions of seedlings had been planted. In 1953 the USDA categorized it as a weed and restricted its use."

<u>Above</u>: caption: “Two year old Kudzu on the Jowers project, 7½ miles northeast of Lexington, Tennessee. Project worked by Camp Tenn, TVA-29.” Kudzu is a vine native to Southeast Asia that was introduced to the Southeast as a cover plant to prevent soil erosion. Due to the climate and environment of the region, kudzu has spread at a rapid pace and is often referred to as “The vine that ate the South.”

Gentle Persuasion

"…At present the TVA approach is most tactfully made through fertilizer, which the farmer wants and which the Authority is willing to give him on conditions. The free distribution is necessary because the farmers can't afford to pay and also because Uncle Sam isn't going into the fertilizer business, at present. He is having enough trouble with power companies without getting the hundreds of manufacturers of commercial fertilizers on his neck. The TVA fertilizers are no longer in the experimental stage as regards manufacture, but they are, the agricultural division will tell you, still experimental as regards use by the farmer on the land. The farmer gets the TVA phosphates free (except for carrying charges) but he must promise to use them only on cover crops; and he must make his farm a demonstration farm for the benefit of his community. Land use must be in accordance with drainage and soil surveys; this may well mean turning everything around, putting clover where the corn was or turning a cottonfield into pasture. Records must be kept this is the hardest part for many of the farmers, and TVA has learned to call on the wives for clerical help, or maybe the children in school. And the farm is open for inspection…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…So they earn their phosphates, and it is testimony to the value of the fertilizer that they are meeting the conditions. The farmer doesn't himself apply for the honor; the system is to call a community meeting at which the Authority's ideas for better land use are explained, and farmers attending select their own representatives for the demonstration. Then the candidates make plans with the help of the county agent, who must approve the application for phosphate and see that the plans are carried out. There is nothing compulsory about the program, but when the farmer stops, the phosphates stop. In other words the phosphate is a persuader, or you might call it a downright bribe, except that it's to everybody's interest to save the land…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…The point that proper land use is the main thing is stressed by the Authority, and no effort is made to keep from the farmers the fact that they will have to work, and wrassle with figures, and maybe even make less if they meet the conditions. Anybody who undertakes to change the minds of farmers knows that, just as you have to contend with what they call acidity in the soil, you need an antidote for an acid condition of mind among men who have worked hard and got nothing to show for it. With the possible exception of Vermont, the Tennessee Valley leads the country in the conviction that things are terrible and nothing can be done, especially by outsiders. Having continued on his way unimpressed by county, state, and other federal educators, the Valley farmer saw the TVA, at first, merely as a new target for cackling rural wit…But some of the TVA college boys had studied psychology, and they had a patient man at the head of the Authority's agricultural activities. Dr. Harcourt Morgan had nothing to learn about Valley farmers; he had been dealing with them for nearly fifty years…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above</u>: caption: "This series of photographs depicts the transformation of James C. Ray's property in Buncombe County, North Carolina during a soil erosion project from 1938 to 1950"

Preference Provisions

"…Section 10 empowered the Board to sell any surplus power developed by TVA and to give preference in the sale to states, counties, and municipalities, and to co-operative organizations not organized or doing business for profit but primarily for the purpose of supplying electricity to their own members. To make sure that the benefits of this power were actually realized by the people, the act also authorized the Board to include in the contracts for sale of power such terms and conditions, including resale rate schedules, as were in its judgment necessary to carry out the purposes of the act. Section 11 reaffirmed the distribution policy set out in section 10, providing also that the power projects were to be considered primarily as for the benefit of the people of the region as a whole and particularly the domestic and rural consumers to whom the power could economically be made available. Sale of power to industry was to be a secondary purpose, to be utilized principally to secure revenue returns which would permit domestic and rural use at the lowest possible rates. In sections 10 and 11 of the act, therefore, Congress made clear its intention to preserve for the people the benefits which would result from the development of the Tennessee River. This was a re- affirmation of a general policy first laid down by Congress in the Reclamation Act of 1906. These are the so-called preference provisions of the act and they are generally similar to the preference clauses contained in other laws relating to the sale of power generated at government-owned dams…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…Two categories of preference are set out: first, municipalities, co-operatives, and other public agencies not distributing electricity for profit were to have first call on the power TVA produced; and second, the power was to be considered primarily for the benefit of the domestic and rural consumer…Section 10 contains another important provision which authorizes the TVA Board of Directors to make studies and experiments to promote the wider and better utilization of electric power for agricultural and domestic use and for small industries. This section also directed TVA to cooperate with state governments and their subdivisions, with educational and research institutions, and with cooperatives or other organizations, in the application of electric power to the fuller and better balanced development of the resources of the region…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Evidence of Success

"…As evidence of success, the Authority now points with pride to a community on Poplar creek where 132 farmers of Roane and Anderson counties, Tennessee, have organized themselves into a board of trustees responsible for the land. The community called Wheat has become, you might say, one big demonstration farm. Surveys and soil analyses to determine land use have here been made by TVA on a community scale: first an air-mapping to show the woods, then a land-ownership map, then a cover survey for the study of erosion in the watershed, and finally a soil survey. The farmers added the usual case histories required on the demonstration farms, and went into further details about the community life. Wheat community knows, now, what its soil will do, how many trees it has, how much livestock, how much relief is paid, how much mortgage money owed, what crop-control benefits are to be had, what goes to pay the salaries of teachers and preachers, and even how many people aren't getting enough to eat. This exposure may be regarded by some folks as indecent, but the attitude of TVA and of the 132 farmers who decided to co-operate is that such a stock-taking is the first step in managing the business of living along Poplar creek…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)


KENTUCKY
VIRGINIA
NORTH CAROLINA
GEORGIA
HANCOCK
WASHINGTON
SCOTT
CAMPBELL
CLAIBORNE
SULLIVAN
HAWKINS
JOHNSON
CARTER
UNION
GRAINGER
GREENE
UNICOI
MORGAN
ANDERSON
KNOX
Knoxville
CUMBERLAND
ROANE
SEVER Co.
1794
COCKE
HAMBLEN
LOUDON
BLOUNT
JEFFERSON
SEQUATCHIE
BLEDSOE
RHEA
MEIGS
MCMINN
MONROE
MARION
HAMILTON
BRADLEY
POLK
Chattanooga
N
W
E
S
THE COUNTIES
OF
EAST TENNESSEE

"…So far, TVA has taken the obvious course of stressing fruit- and vegetable-growing for local use. Cooperative canneries and community refrigerators are a big help with the county food supply, if you can just get people to try them…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above</u>: caption: "This photo depicts the benefits of commercial refrigeration for the local inhabitants of Clarksville, Tennessee, as well as potential electricity customers in the region. January 16, 1947"

<u>Left</u>: caption: "Freezer locker plants and cooperatively owned cold storage rooms are important in the agricultural improvement program of the Authority. Photograph shows a view of one at White Pine, North Carolina. Such structures are designed for local materials and the simplest possible workmanship because the purpose is to encourage rural residents to plan and erect them on their own initiative."

<u>Left</u>: caption: "Refrigerated barge designed and built by the TVA in collaboration with the University of Tennessee to encourage the fruit and vegetable freezing industry in the Valley and the marketing of its products over the inland waterways system. The architects of the Authority cooperated in the design of the superstructure which was erected on a standard steel barge. Sheathing is of T and G boards, roof of galvanized sheet metal. Glass-enclosed cabin at one end houses refrigerating machinery, at other end crew's quarters."

"…These new possibilities come with the electricity, and so do other farm improvements that the farmer is quicker to see for himself. They are finding out that you can warm seed beds, hatch baby chicks, cure tobacco, dry hay, and grind corn with electricity, and some like to put a jolt in the fence wires or rig up insect traps…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Not only did TVA succeed in power generation itself, it also excelled at promoting the benefits of the electric power it generated. Shelah Tubb of McMinnville, TN is using a portable electric motor to grind feed more efficiently (ca. 1945)."

Eyes Wide Open

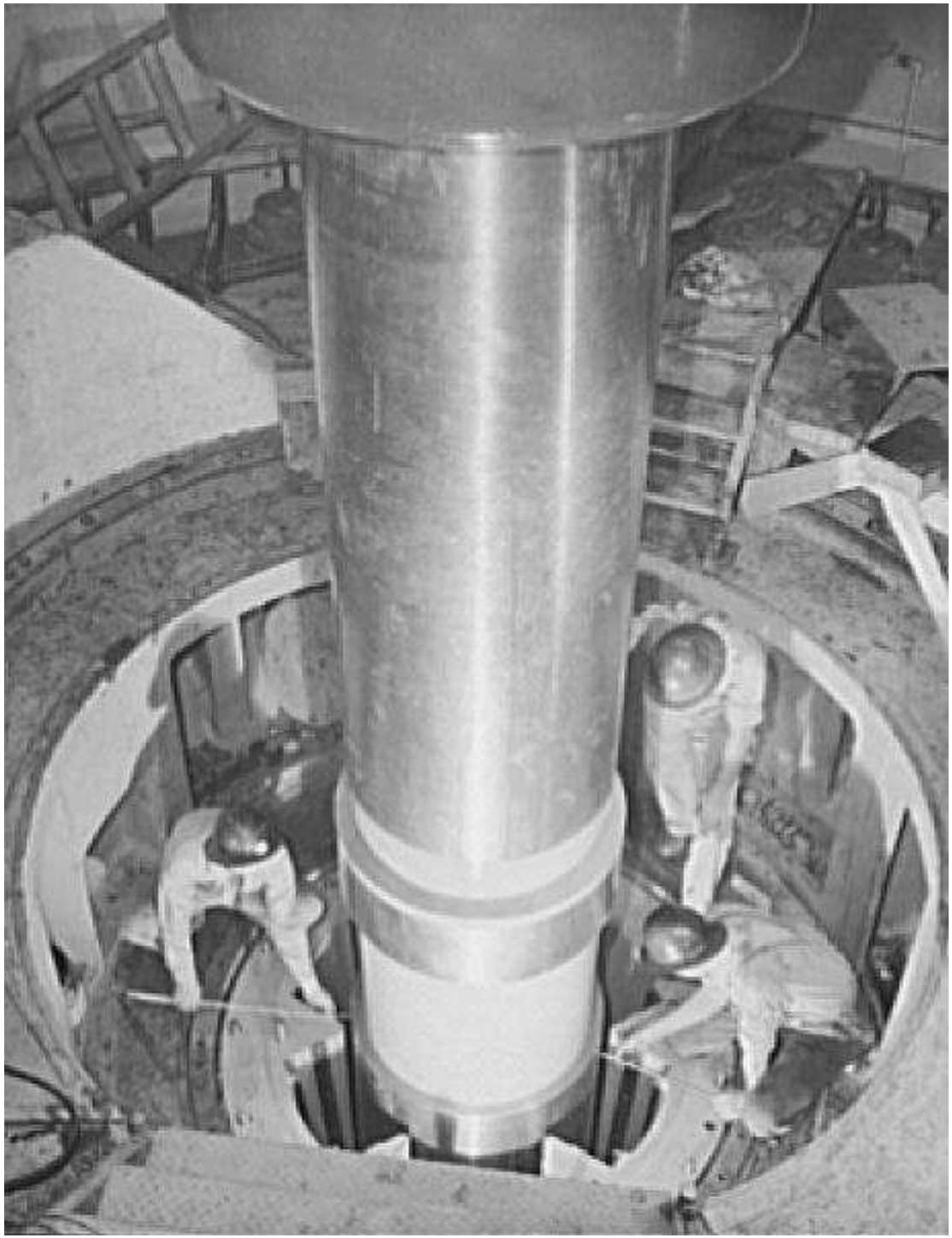
"…TVA came to the conclusion that farmers were like flies, to be caught with molasses instead of vinegar; for molasses, read metaphosphate. But if you can get them to talk in the agriculture division at Knoxville, they may confide to you that one thing they are trying to do is to find out if the ordinary farmer can afford to farm at all; or must farming be subsidized, like the merchant marine? If the government is to stop gambling on each crop and hire the farmers regularly to do their jobs in the best way, what should be the details of such an arrangement? The Authority, in time, may be able to persuade the nation to the same sort of stock-taking they now have on Poplar creek, and for the first time in its history the country will be farming with its eyes open…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Part 9

Multi-Purpose

Just Plain Foolish



"…dams are expensive, and Yankee taxpayers, who are putting up most of the money for TVA, stand their only chance to get their money back through the sale of power. But some people, seeing that the allocation figures finally charged a little over half the costs to power development, wonder if it wouldn't have been cheaper to leave the power out. The answer is that to build dams for flood control alone may be reasonable, but once you include navigation, it would be plain foolish not to include power…"

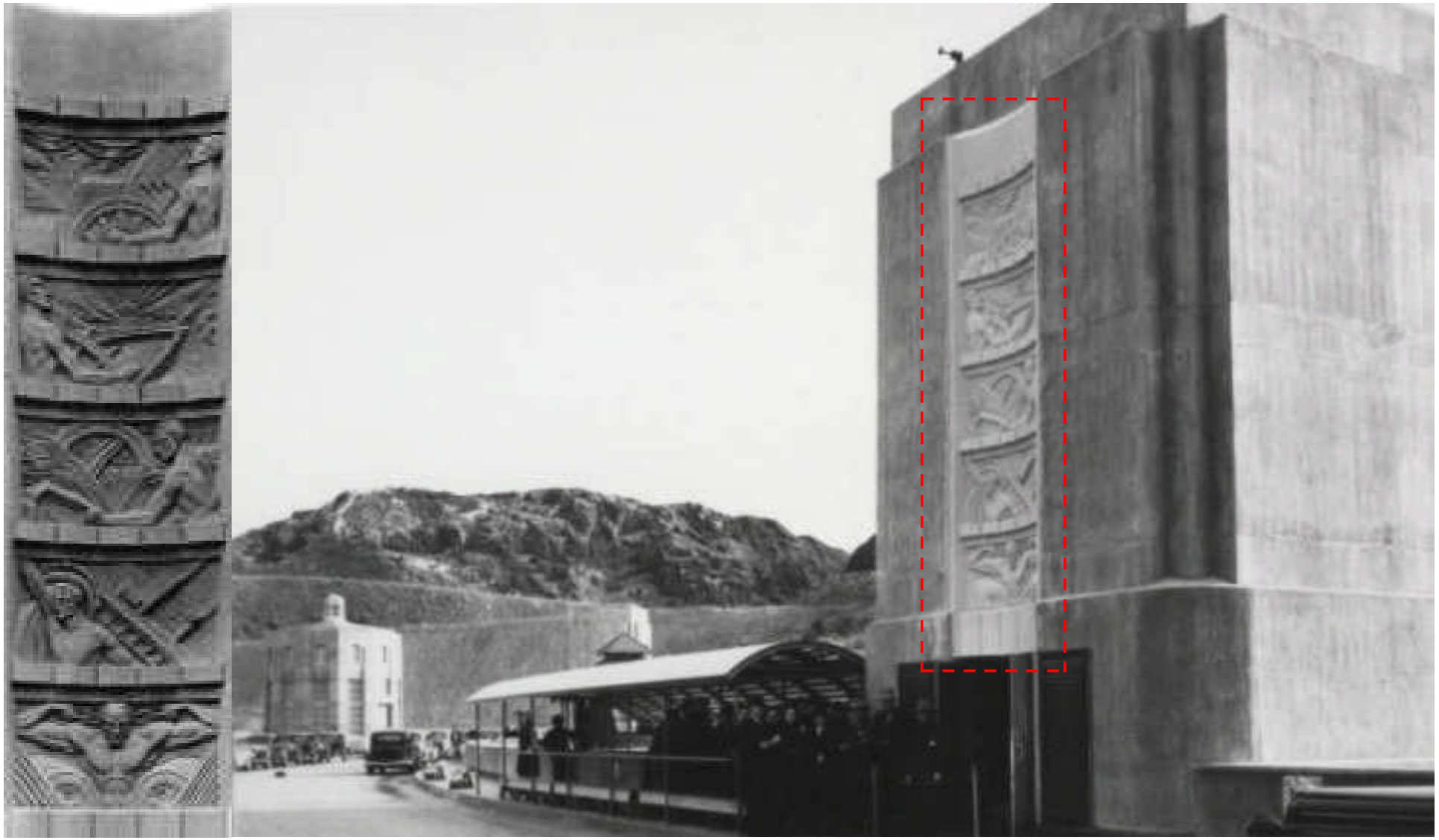
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Checking the alignment of a turbine shaft at the top of the guide bearing in TVA's hydroelectric plant at Watts Bar Dam. The dam has an authorized power installation of 90,000 KW."

"…Anybody can see the sense in planning for water control over a wide area; you don't stop a flood at the river mouth or erosion in the bottom lands. But another kind of breadth to the TVA program is harder for folks to understand. That is the spr-ead into the economic field that takes in power production along with flood control and navig-ation; they call them 'multi-pur-pose' dams…"

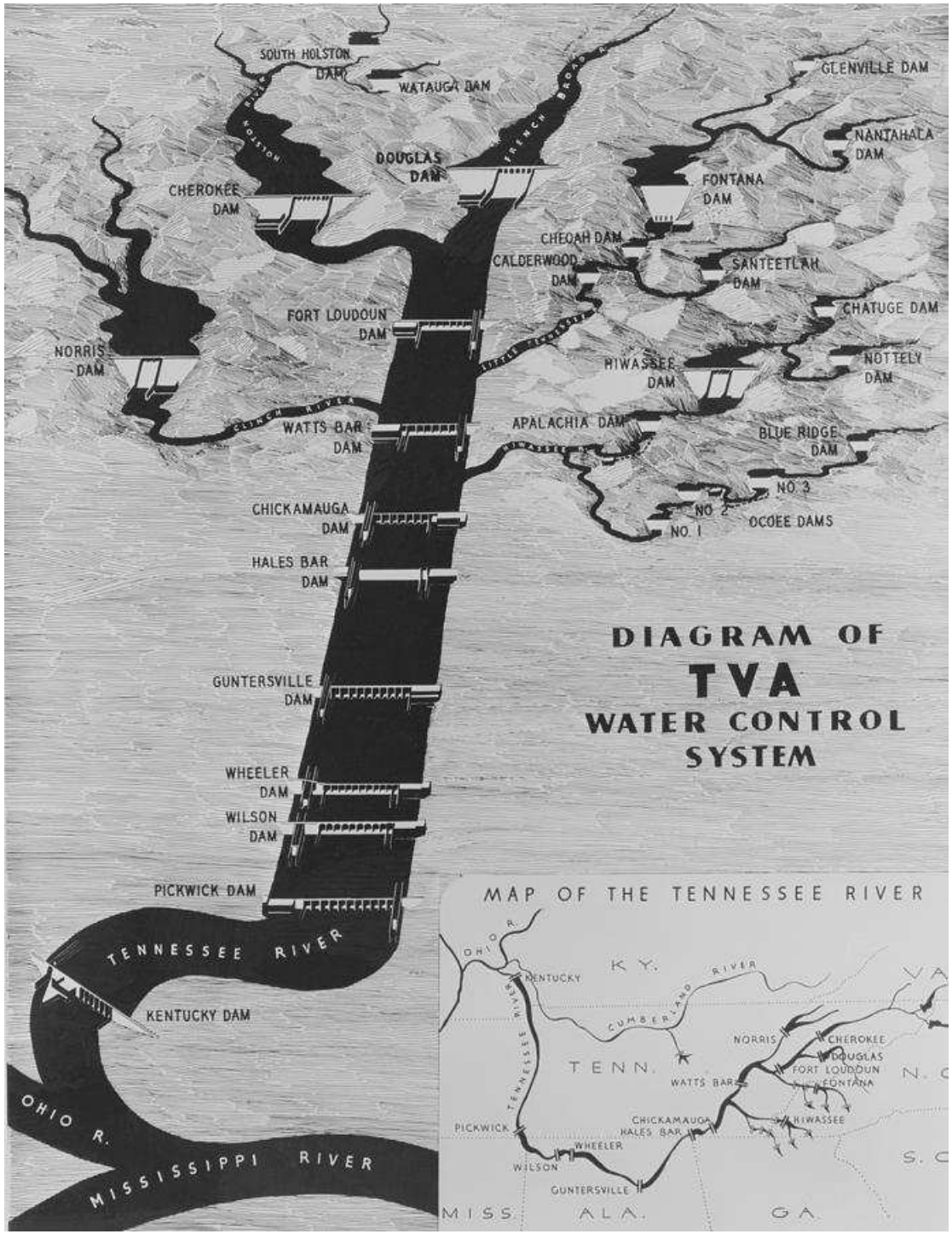
RE: excerpt from *God's Valley – People and Power Along the Tenne-ssee* (1939)

<u>Left</u>: caption: "Detail of bas-relief cele-brating the multiple benefits of Hoover Dam"



<u>Above L&R</u>: caption: “The five bas-reliefs on the Nevada elevator tower show the benefits of Hoover Dam (top-to-bottom): flood control, navigation, irrigation, water storage and power”

The Lion’s Share



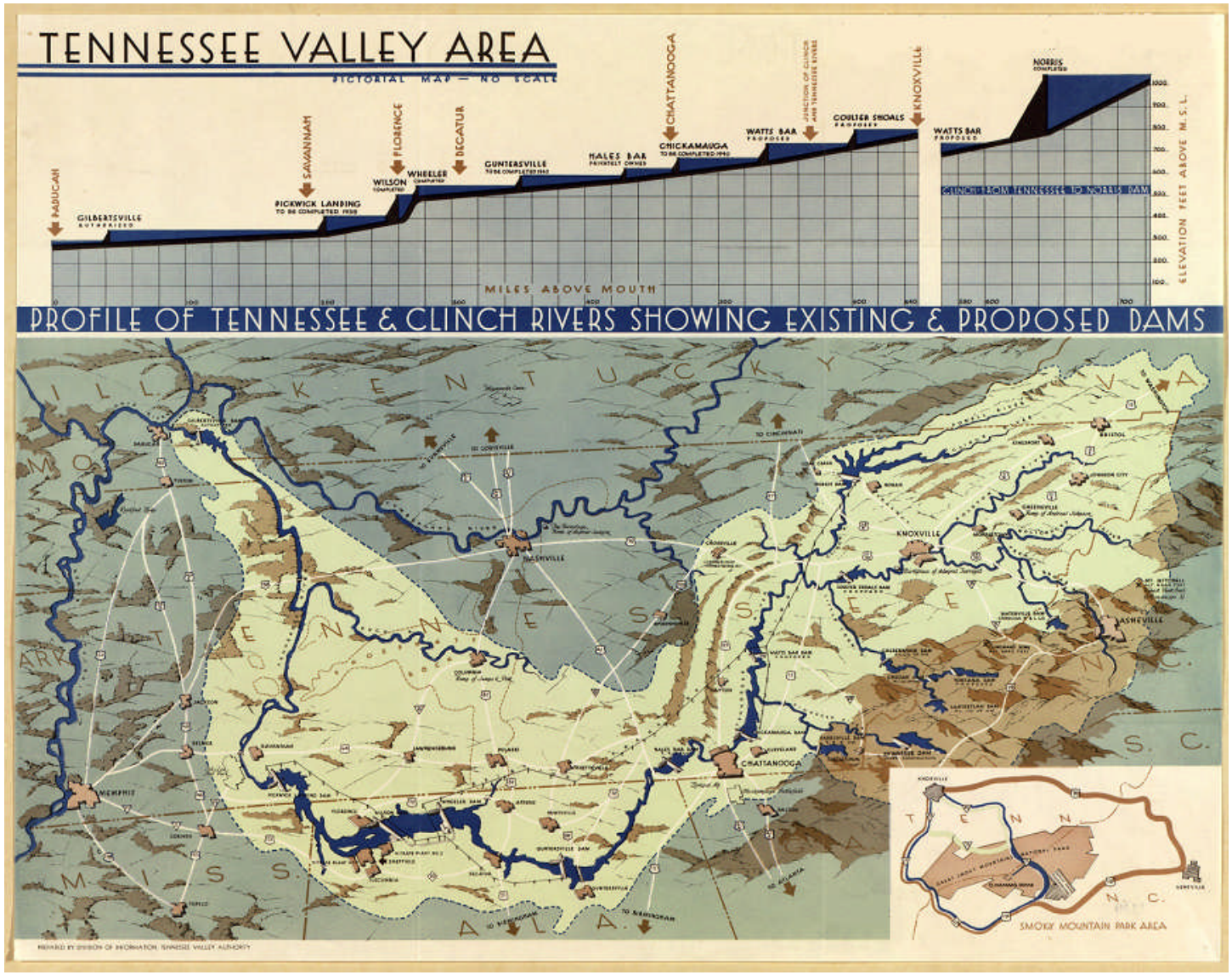
"…The system of control of the Tennessee River and its tributaries lies at the very heart of the TVA development program. The planning, design, construction, and operation of this system are essentially engineering problems, which require technical engineering skills in their solution. The importance of the river control program in TVA is shown by the very size of the program. Of the more than $1,000,000,000 which the TVA had invested in assets by 1952, nearly three-quarters was in the river control system…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

East vs. West

"…The eastern half of the Tennessee Valley, where rivers flow in a general southwesterly direction, is mountainous and rugged, with elevations varying from as low as 600 to as high as 6,500-feet. The rainfall in some places in the mountains has reached as much as 100-inches a year, but in general it averages about 50-inches. In contrast, the western half of the Valley is rather rolling and low country with few high elevations and no mountains. The river through this western half is relatively slow-moving with a fall of about one foot to the mile, in contrast to the rivers in the eastern half which have a very rapid fall and runoff…"

RE: excerpt from *TVA: The First Twenty Years* (1956)


TENNESSEE VALLEY AREA
PICTORIAL MAP — NO SCALE
PADUCAH
GILBERTSVILLE
AUTHORIZED
PICKWICK LANDING
TO BE COMPLETED 1938
SAVANNAH
WILSON
COMPLETED
FLORENCE
WHEELER
COMPLETED
DECATUR
GUNTERSVILLE
TO BE COMPLETED 1942
HALES BAR
PRIVATELY OWNED
CHICKAMAUGA
TO BE COMPLETED 1940
CHATTANOOGA
WATTS BAR
PROPOSED
JUNCTION OF CLINCH AND TENNESSEE RIVERS
COULTER SHOALS
PROPOSED
KNOXVILLE
NORRIS
COMPLETED
WATTS BAR
PROPOSED
CLINCH FROM TENNESSEE TO NORRIS DAM
MILES ABOVE MOUTH
ELEVATION FEET ABOVE M. S. L.
PROFILE OF TENNESSEE & CLINCH RIVERS SHOWING EXISTING & PROPOSED DAMS
KENTUCKY
VIRGINIA
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
N. C.
S. C.
KNOXVILLE
NASHVILLE
CHATTANOOGA
MEMPHIS
ASHEVILLE
SMOKY MOUNTAIN PARK AREA

Extremely Varied

"…This variation in physical characteristics had an important bearing on the planning of the entire TVA project. Rainfall in the Tennessee Valley does not vary greatly during the year. It is somewhat less in the fall months than in the winter, but over a period of a great many years it is fairly evenly distributed, so that there is little need for irrigation in the Valley. But the runoff from this rainfall is extremely varied. Rain that falls in the winter strikes ground that is sometimes frozen and always partially denuded, the leaves being off the deciduous trees and much of the vegetation dead. Consequently, the water runs off very rapidly and helps to swell the streams, thus producing floods…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…Much of the rain that falls in the summer months, by contrast, is absorbed by vegetation or is evaporated, and consequently the runoff in the summer months is generally low. This produces wide variations in the stream flow. Before TVA the lowest flows on the Tennessee went below 5,000 second-feet, whereas the high flows during the greatest flood approached 500,000 second-feet. Thus, the flow of the river during high floods was as much as 100 times that of the lowest season…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Not Enough

"…Although the Tennessee River (as distinguished from its upper tributaries) has a gradual drop for the most part, there is one point, at Muscle Shoals, Alabama, where in a distance of only 16 miles the river falls about a hundred feet. The Shoals had always been a barrier to navigation on the Tennessee, as had the extremes in the flow of the river. In addition, the higher flows created a flood hazard, and the cities along the river were subject to frequent and severe floods. For instance, in 1867 the city of Chattanooga was nearly completely inundated to depths up to 15 or 20-feet. That flood, had it occurred in the 1940's, would have caused damages of over $100,000,000. The city of Chattanooga had employed engineers to devise a plan to protect Chattanooga from such floods, but it was impossible to achieve this end by local protection alone. What was needed was supplementary holding back of the water by means of upstream reservoirs…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

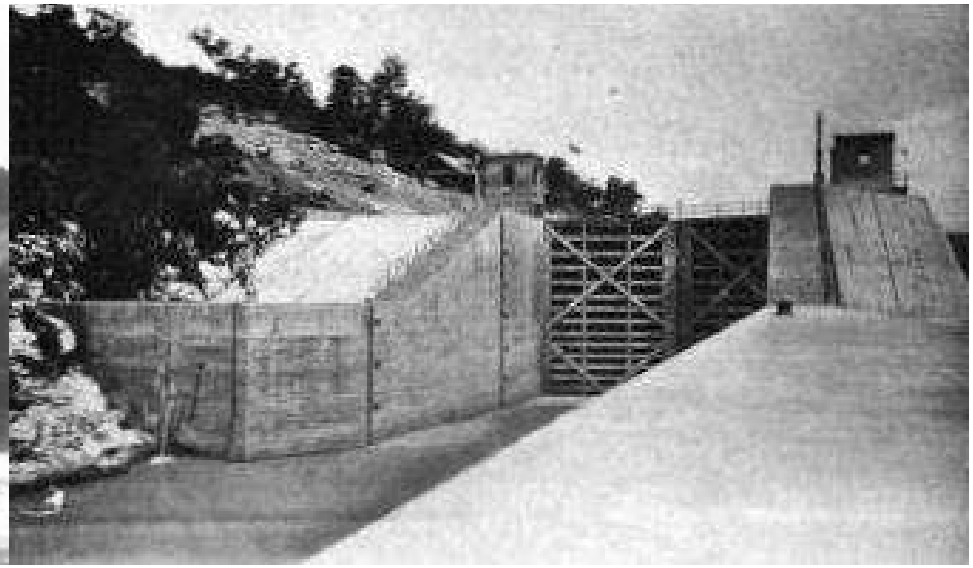
Economies of Scale

"…Another major problem in the development of the river lay in the fact that, again because of the extreme variation of flow, the production of hydroelectric power at single plants was not economical. Some hydroelectric development had been made by private interests. The Aluminum Company of America had built three dams, Calderwood, Cheoah, and Santeetlah Dams on the Little Tennessee River, to produce power for the refining of aluminum at their plants in Alcoa. The Carolina Power and Light Company had built a hydro-electric plant at Waterville, North Carolina, and the Tennessee Electric Power Company had constructed a dam at Hales Bar below Chattanooga, mainly to furnish power for the city of Chattanooga…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Above</u>: caption: "Calderwood Dam in 1939." ALCOA began developing the *Little Tennessee Valley* in 1909 to provide the enormous amounts of electricity needed to power to its aluminum smelting operations in Blount County. The first of ALCOA's Little Tennessee Valley dams; *Cheoah Dam*, was completed in 1919 and the second; *Santeetlah Dam*, was completed in 1928. Preliminary work on *Calderwood Dam* began in 1918, but test drilling suggested the site might not be satisfactory. However, subsequent tests confirmed the site's stability and construction began in 1927. The first two generating units went into operation on June 22nd 1930 and a third unit was added in 1938.


271 Cheoah Dam, Tapoco, North Carolina, near Great Smoky Mountains National Park



"…All these developments were for power only, except that at Hales Bar a lock had been installed; it is now the smallest lock in the TVA system. The total power produced from these installations was very small in amount, and it was almost impossible for private interests to do more because of the extreme variation of flow and because of the magnitude of the task of equalizing the flow…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Left</u>: caption: "Hales Bar Dam – Tennessee River"

<u>Right</u>: caption: "The lock of Hales Bar Dam near Chattanooga, Tennessee"

Trifecta

"…Thus when TVA engineers arrived on the job in 1933, they were confronted with three major objectives. First, they had to regulate the river so as to eliminate the low flows of the autumn as well as the high flows of the winter. They set as a goal a flow of about 30,000 second-feet for a minimum, and a reduction in flood flows to perhaps half of what they were before. A second objective was to create a navigation channel on the river from its mouth at Paducah to Knoxville. The third was to devise a plan to utilize the vast potential energy in the river for the generation of power…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Left</u>: caption: "One of the largest navigation locks in the world under construction at Pickwick Landing Dam, TN"

For All the People

"…Here then, an opportunity was presented for the engineer to develop a river for all the purposes for which it was capable of being developed. Three fundamental ideas underlay this multiple-purpose development. The first and most important was that the resources of the river were to be developed for the benefit of all the people of the region - not for any one group, industry, or agency, but for all the people. The second basic concept was that flood control and navigation should be put first in importance, hydroelectric power second. This policy was stipulated in the TVA Act…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Twin Foundations

"…Since a hydroelectric plant yields a monetary income from the sale of the power it produces, there is always a temptation to give priority to power; but in the TVA system, it was made mandatory that navigation and flood control be given prior consideration. The third fundamental idea was that the TVA was to develop all the resources of the river system, all its potentialities, not just for navigation, not just for flood control, not just for power, but for all possible purposes, remembering always that in the total developmental program navigation and flood control must provide the twin foundations…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

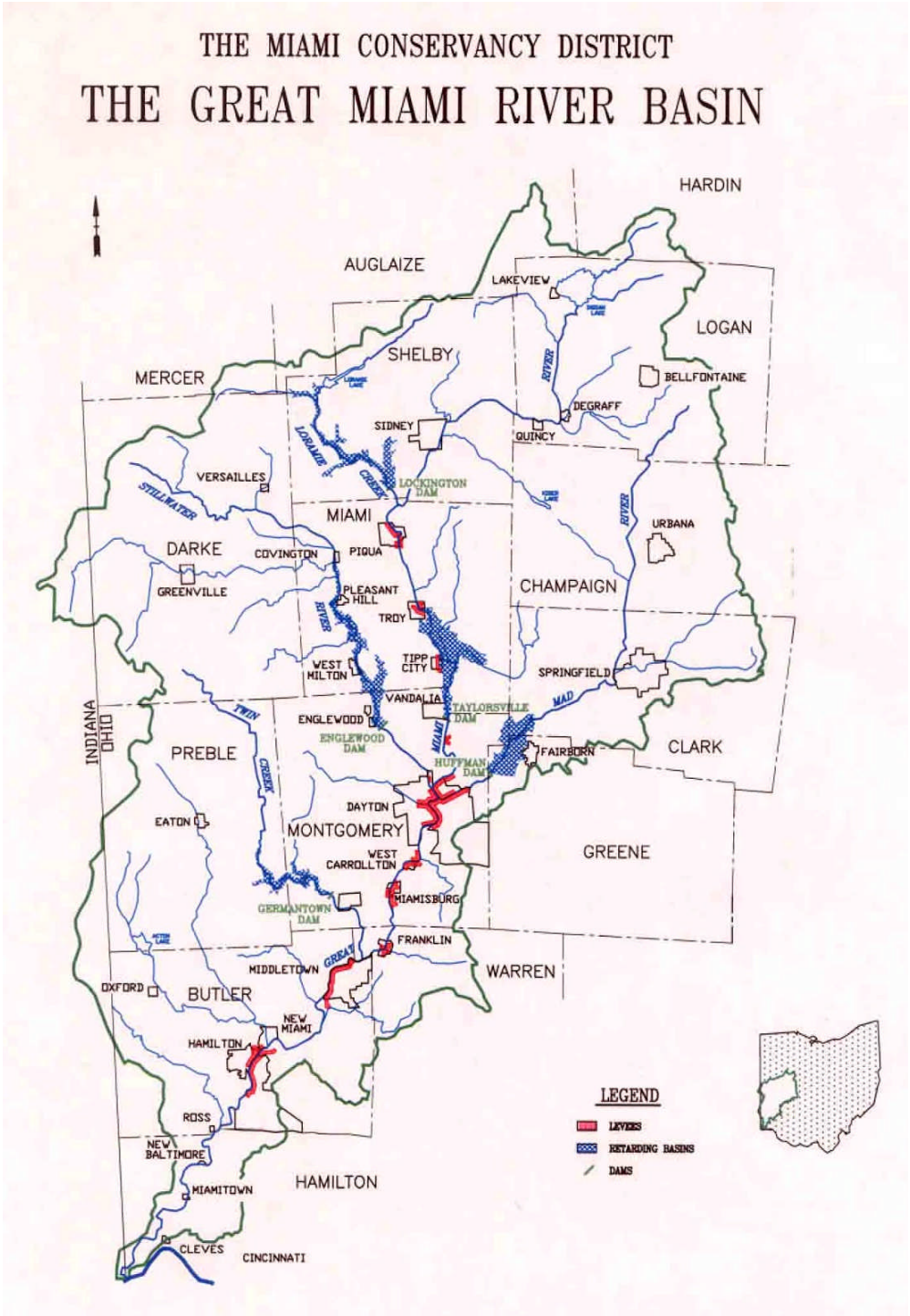
By Comparison

"…The significance of the multiple-purpose concept becomes clear when the development of the Tennessee is contrasted with that of certain rivers improved to serve single purposes. Consider first the Miami River in Ohio. This river in 1913 caused untold damage to the cities of Dayton and Hamilton. Afterward the people of that area organized a flood control district and employed a consulting engineer, Dr. Arthur E. Morgan, to solve their flood problems. He planned a system of flood control for the Miami River which forever obviates the possibility of a severely damaging flood on the river, but in doing so he also precluded the possibility of the five dams in the system ever being used for any other purpose but flood control. A plaque has been placed on each of the five dams which reads, 'The dams of the Miami Conservancy District are for flood protection purposes. Their use for power development or for storage would be a menace to the cities below.' Critics of TVA have cited this in arguing that the TVA dams cannot be used for flood control and other purposes simultaneously. The truth is, of course, that Dr. Morgan himself, who engineered the Miami Valley project, as the first Board Chairman of TVA was responsible for much of the engineering which resulted in TVA's multiple-purpose system…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Although most rivers tend to flood every spring, the flooding of March 1913 was unprecedented across much of the *Ohio Valley*. The amount of runoff from the late March rains resulted in as much runoff as is normal for a six-month period. The impact from this runoff was rivers rising several feet above previous high water marks. Heavy rain fell over all watersheds in Indiana, Ohio and parts of Kentucky, Pennsylvania and New York from this event, but the damage was most significant along the *Great Miami River* (left). In downtown Dayton, OH, flood levees broke leading to water rising up to 20-feet (right). The 1913 flood along the Great Miami and its tributaries exceeded any known flood by +10-feet in many locations. The *Great Miami Basin* suffered more fatalities than that of any river basin affected by the 1913 storm system. At least 260 of the estimated 467 deaths from these floods occurred there.

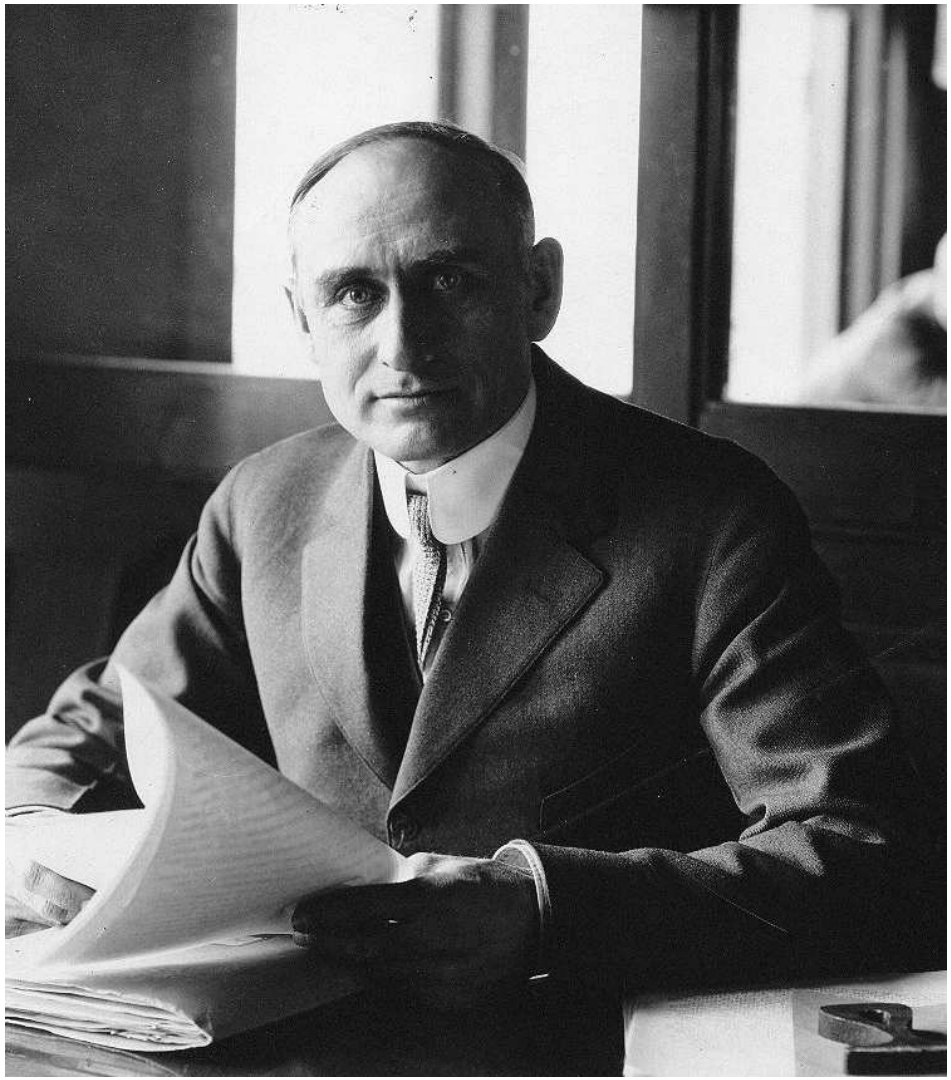
Morgan’s Pyramids



"What can last not just fifty or a hundred years, but will endure for all time...?"

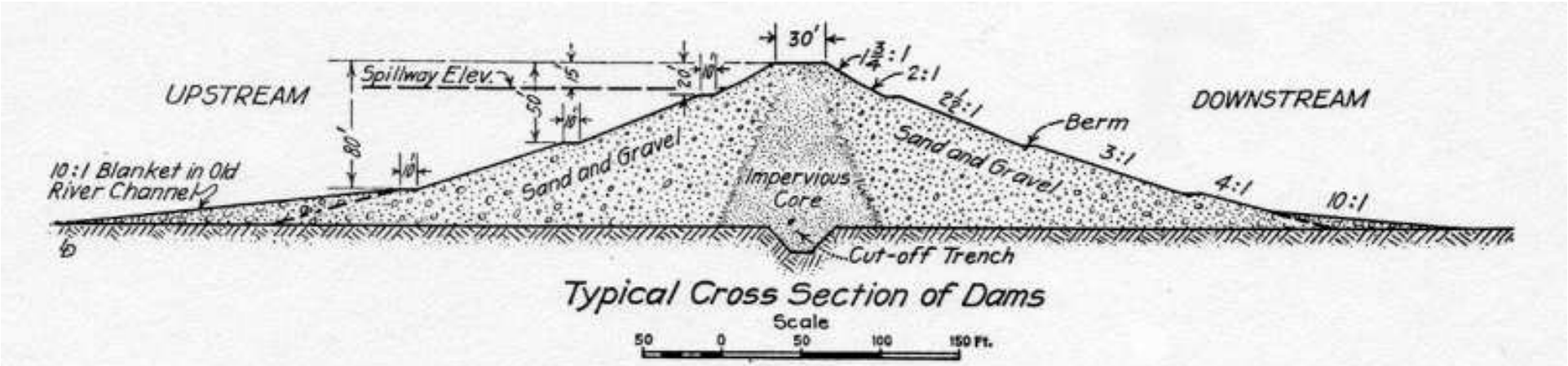
***Arthur E. Morgan*, September 1913**

RE: Morgan prepared engineering sketches for eight possible flood-protection projects. They ranged from massive local levees through Dayton, to diverting whole rivers around the city, to enlarging and straightening river channels, to several reservoir systems of differing designs. All were large, expensive projects, but none met Morgan's stringent goal of enduring for "all time." Scrutinizing a topographical map of the rolling *Miami River Watershed* (making up 10% of the state of Ohio), in his mind's eye, he clearly saw how the *Miami River Valley* acted as a mammoth funnel, directing the phenomenal volume of water from unprecedented rainfall over the entire valley straight into downtown Dayton and other valley cities. Morgan focused on how the individual valleys of the Miami River and its four principal tributaries: the *Mad River*, *Stillwater River*, *Twin Creek* and *Loramie Creek*, alternately widened and narrowed.



"What if big earthen dams were strategically placed at the lowest narrow neck of each of five valleys? But instead of creating reservoirs filled with water for drinking, irrigation, or recreation, what if at the base of each earthen dam permanently open outlets or conduits let each river flow through the dam unimpeded? If the rivers swell with a major flood, the hulking dams would hold back the excess floodwaters, their open conduits letting through only a flow that could be safely handled by the river channels below. Never again would Dayton and the other cities be assaulted by flood - and all with absolute reliability: there would be no gates to open or close - no moving parts to fail!"

Arthur E. Morgan **(left)**



Typical cross section of Conservancy dam. Explanation: In actual construction the slopes near the top were made 1¾ to 1, so that the roadway could be made 30 feet wide. Where there was not at least 4 feet of impervious material above the dam, a clay blanket 4 feet thick was placed over the ground.

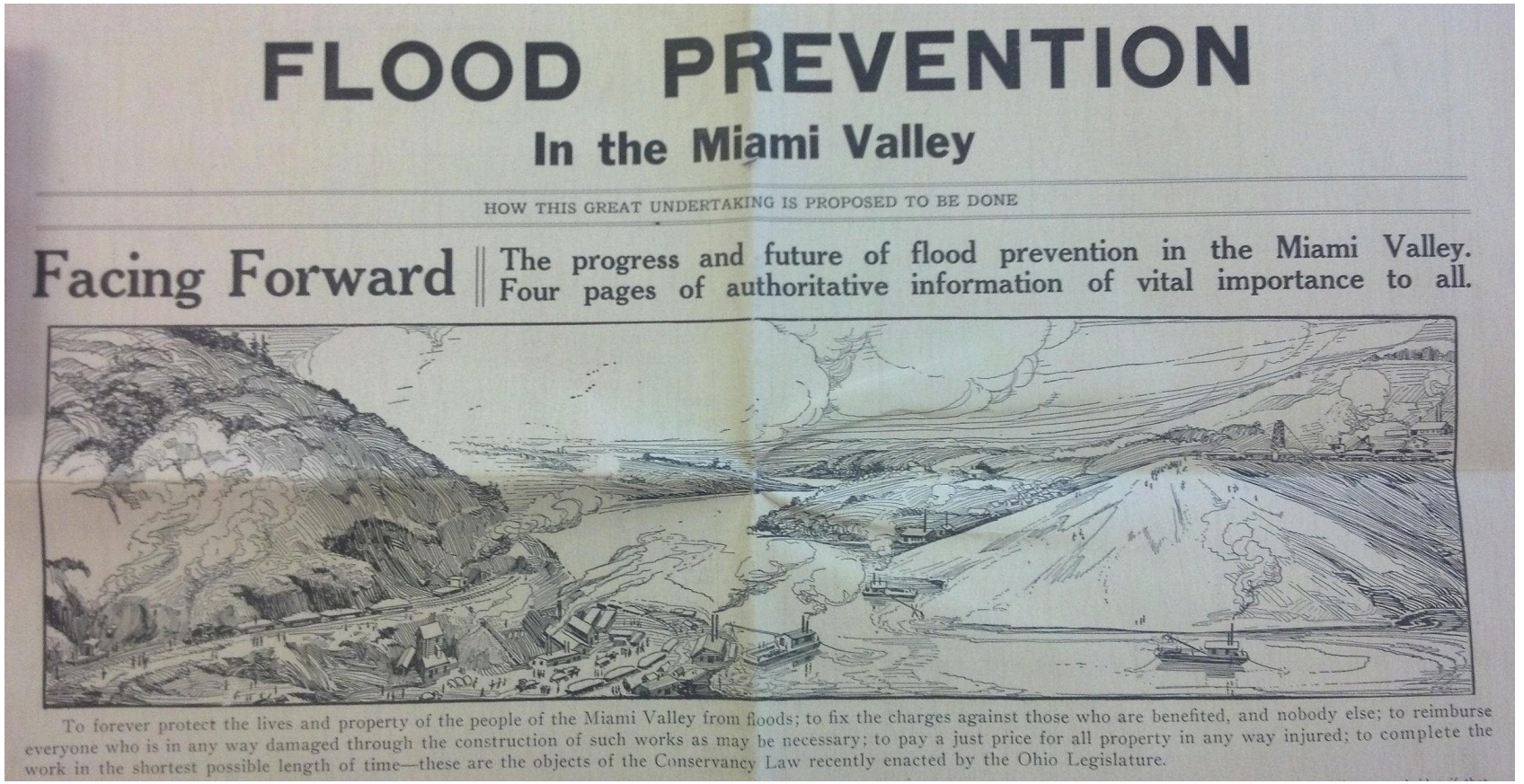
"Forget reservoirs, how can they work if already filled with water..."
***Arthur E. Morgan*, September 1913**

RE: the 1913 flood brought about the *Miami Conservancy District* (MCD) in which lead design engineer *Arthur E. Morgan* developed one of the most comprehensive and far reaching flood control plans of the era, still considered visionary and still protecting the major population centers of the *Great Miami Valley* to the present day. Morgan Engineering Company's diagram of the flood control dams of the MCD (above) shows their squat, triangular cross section which was massive enough to hold back a volume of floodwaters 40% greater than that of March 1913. At the base of each dam would be conduits or culverts forming a principal spillway left permanently open; big enough to allow each river to flow through unimpeded, even during normal spring freshets. But the conduits/spillway would be proportioned to hold back or retard any flow greater than what the riverbeds below could safely handle.

"All our studies of centuries-long flood records in Europe show that the maximum flood in 1,000 or 2,000 years is likely to be not much more than 20 or 25 percent greater than the maximum flood of a century or two, and a flood of 40 percent greater appears beyond all possibility. Thus, I recommend that we build the flood control works large enough to control runoff 40 percent greater than that of March 1913. Had this system of earthen dams and dry detention basins been in place before March, the excess runoff would have been distributed over more than two weeks rather than all descending on Dayton in four days!"

Arthur E. Morgan

RE: on October 3rd 1913, Morgan stood before the *Dayton Citizens' Relief Commission*, presenting his eight flood control ideas (complete with estimates of reliability, cost and construction time for each option)



FLOOD PREVENTION

In the Miami Valley

HOW THIS GREAT UNDERTAKING IS PROPOSED TO BE DONE

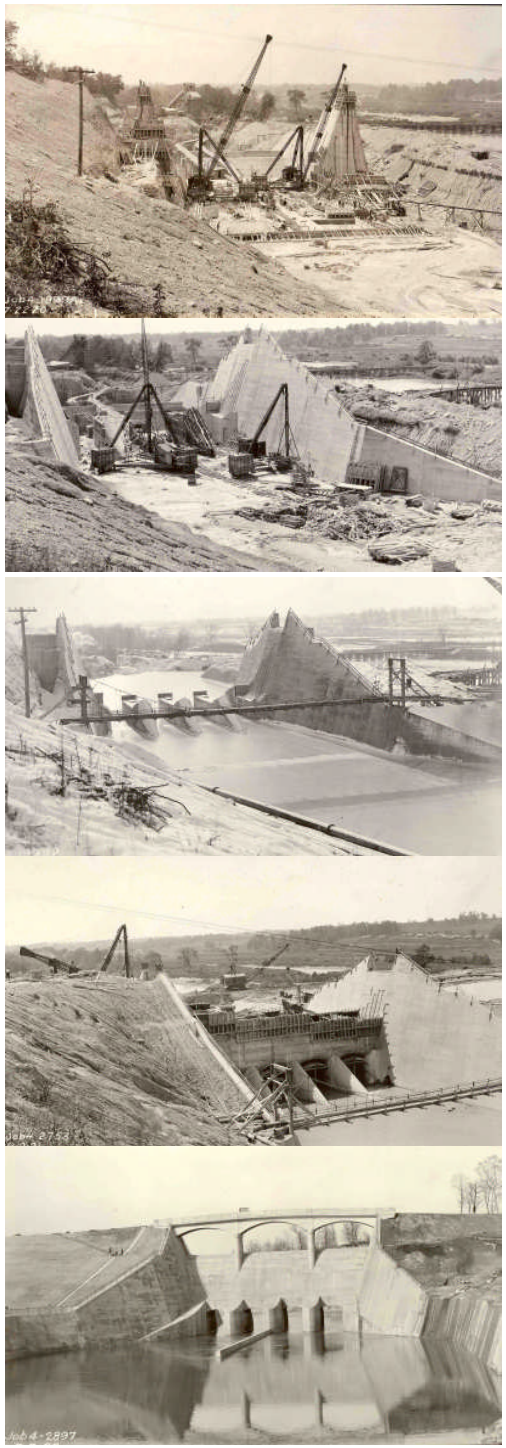
Facing Forward | The progress and future of flood prevention in the Miami Valley. Four pages of authoritative information of vital importance to all.

To forever protect the lives and property of the people of the Miami Valley from floods; to fix the charges against those who are benefited, and nobody else; to reimburse everyone who is in any way damaged through the construction of such works as may be necessary; to pay a just price for all property in any way injured; to complete the work in the shortest possible length of time—these are the objects of the Conservancy Law recently enacted by the Ohio Legislature.

"To protect the entire Miami Valley with dry detention basins would take only half the construction time and less money than to protect Dayton alone by local works! Of course, it will take some time for the legal proceedings to obtain the lands needed. But once legal matters are settled, I have no doubt we can build all five earthen dams in just two or three years!"

Arthur E. Morgan

RE: response to a skeptical commission member's inquiry as to how long Morgan's ambitious plan would take to build (it was to be the single largest-scale engineering project yet undertaken in the U.S.). The *Dayton Citizens' Relief Commission* approved Morgan's final plan in February 1914.



"…relieve the public mind of any apprehension as to their possible failure…who built his pyramids on so broad a base that no matter what mistakes of judgment might be made, or how faulty the work might be done in the building, they would yet stand through the thousands of years."

Arthur E. Morgan

RE: Morgan comparing the architecture of his *Miami River* dams to that of the pyramids. In 1918 (after delays in part due to WWI), the MCD sold two issues of 30-year bonds totaling $34 million. One of the MCD's first acts was to hire *Morgan Engineering Company* to turn its engineering plans into reality (Morgan served as Chief Engineer). The five earthen dams ranged from 65 to 110-feet high; their crests ranged from 1,200 to 6,400-feet long; their bases were all hundreds of feet thick. Construction lasted five years and was completed without fanfare in 1923 (conduit construction sequence, left, top-to-bottom). Morgan's comparison of the project to the great pyramids was appropriate. The *Great Pyramid of Cheops* stands 40 stories tall and has a volume of 3.5 million cubic yards. MCD's dams rearranged a volume of earth equal to nearly five Cheops pyramids.

In 1922, *Engineering News Record* (ENR) awarded the MCD's flood protection system its distinguished "Project of the Year" award, placing it in distinguished company (i.e. *Brooklyn Bridge*, *Eiffel Tower*). In 1972, all five earthen dams were designated a "National Historic Civil Engineering Landmark." Most importantly, since their completion, the five dams have held back floodwaters more than 1,500 times. Even in 1937 and 1982 (when rainfall and flood stages over the Midwest approached the magnitude of 1913 and inundated surrounding communities) and in 1959 (year of the highest watershed runoff in the *Miami Valley* since 1913), the areas protected by the MCD's dams (a/k/a "Morgan's Pyramids") - including downtown Dayton – have never flooded.


TAYLORSVILLE
ONE OF FIVE DAMS
BUILT BY THE MIAMI
CONSERVANCY DISTRICT
FOR FLOOD CONTROL
IN THE MIAMI VALLEY
COMPLETED 1922
HEIGHT 78 FT. LENGTH 3000 FT.
WIDTH AT BASE 415 FT.
TAYLORSVILLE
ONE OF FIVE DAMS
BUILT BY THE MIAMI
CONSERVANCY DISTRICT
FOR FLOOD CONTROL
IN THE MIAMI VALLEY
COMPLETED 1922
HEIGHT 78 FT. LENGTH 3000 FT.
WIDTH AT BASE 415 FT.

Power Only

"…Consider next a river which has been developed for power only, the Coosa River in Alabama. This is a very efficient development, but since the dams were built for power alone, the Coosa River cannot economically be developed for either navigation or flood control, or for any other purpose…"

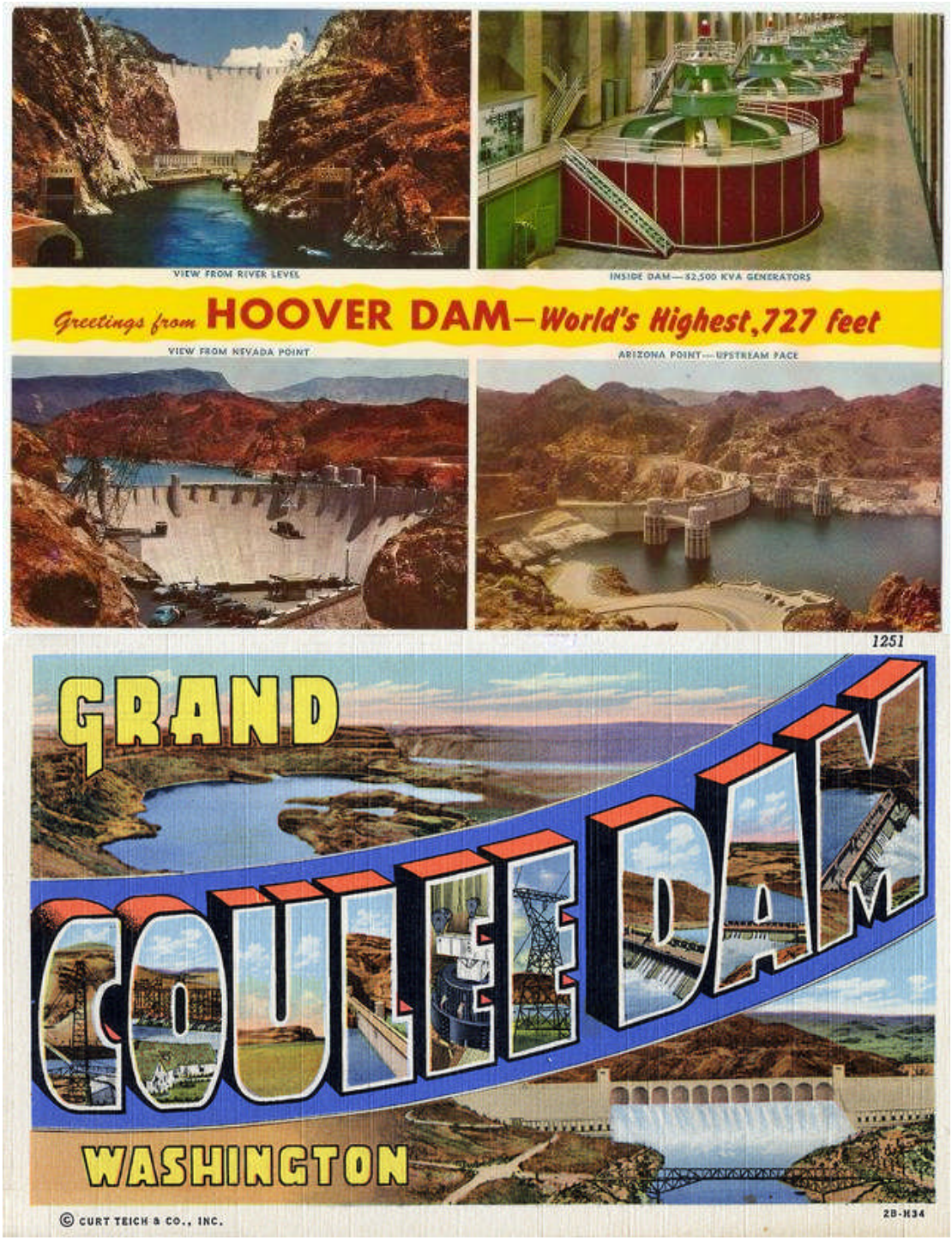
RE: excerpt from *TVA: The First Twenty Years* (1956)

RE: the *Coosa River* was an important transportation route into the early 20th Century as a commercial waterway for riverboats along the upper section of the river for two-hundred miles south of Rome. However, shoals and waterfalls such as the "Devil's Staircase" (along the river's lowest sixty-five miles) blocked the upper Coosa's riverboats from access to the *Alabama River* and the *Gulf of Mexico*. Prior to 1912, only seventy-two Alabama communities had electricity, but by 1928 (when *Jordan Dam* went into operation) the *Alabama Power Company* served four hundred twenty-one communities in sixty-one of Alabama's sixty-seven counties. The company also provided power for coal and iron mines, cotton mills, cement plants, quarries, steel plants and rolling mills, foundries, pipe plants and machine shops, ice plants, public utilities and electric furnace installations, employing thousands of Alabama's citizens. The Coosa is one of Alabama's most developed rivers. Most of the river has been impounded, with Alabama Power Co. (a unit of the *Southern Company*), maintaining seven dams on the river. The dams all produce hydroelectric power.

<u>Left (top-to-bottom):</u> Lay-Martin-Neely Henry-Weiss Dam/s


ALABAMA
POWER CO.

Never Before



"…While there was no multiple-purpose development of an entire river system before TVA, there are instances of single dams which are multiple-purpose in character. For instance, Hoover Dam on the Colorado River was built not only for irrigation, power, and flood control, but also to regulate the flow of water below the dam. This stands as an instance of an isolated multiple-purpose structure. The Grand Coulee Dam, the largest in the world, is also a multiple-purpose dam built for irrigation, flood control, and power, but it too was conceived as a single project, rather than as one in a system of dams…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Incompatible(?)

"…It is easy enough, on the basis of successful experience covering a period of twenty years, to grasp the implications of the decision to build multiple-purpose dams; it was quite a different matter to comprehend the problems involved in 1933. Some prominent engineers went so far as to characterize the scheme as visionary. Clearly, they maintained, it is not practicable to keep a reservoir full, which is desirable for power production, and at the same time empty so as to provide the maximum in flood protection. Power production and flood control are incompatible, they argued, since they require directly opposite management practices for the reservoir behind the dam…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…TVA insisted from the beginning that the same space could be used for both purposes. The reasoning of the TVA engineers rested basically on the Valley's rainfall and water runoff characteristics. The seasonal variation, the engineers reasoned, could be utilized to equalize stream flow, with water being stored in the early months of the year and released to augment the low flows in the later months…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Double Duty

"…To test this reasoning, records of floods over many years were analyzed. It was found that the big floods always came in the period between January and April. The record showed that there had never been a major flood after April 15. This suggested that if the space in the reservoirs could be used to catch the large floods before the fifteenth of April, after that date the water in the reservoirs could be utilized for power production for the rest of the year without reference to further need for flood control. Thus the same space could be used for both flood control and power production…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

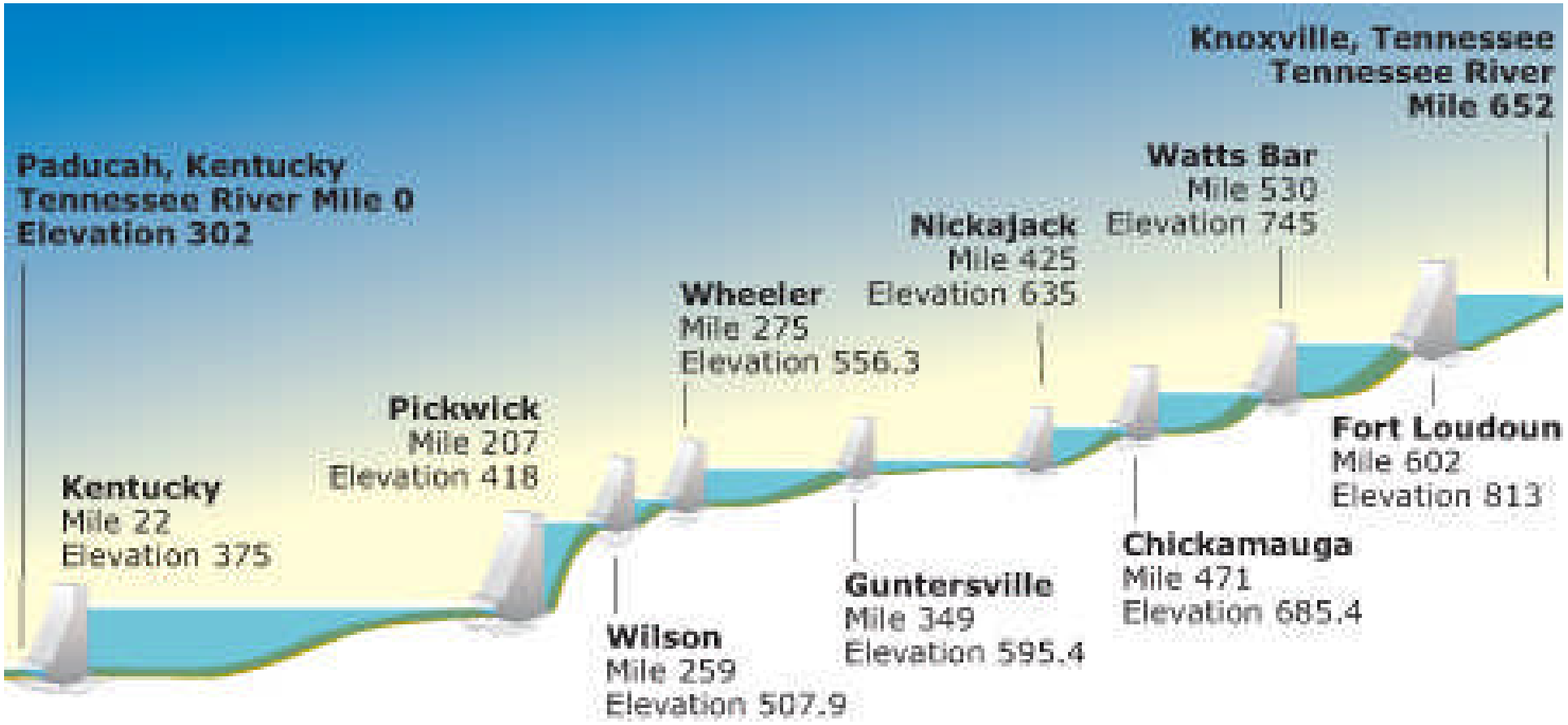
A Balanced Approach

"…In order for the multiple-purpose theory to work in practice, however, there had to be very careful coordination of all dams, both in structure and in operation, throughout the Tennessee River system. In the eastern half of the Valley high dams were required to store as much water as possible. On the lower river, an option was available: there the dams might have been either high or low. The United States Corps of Engineers had devised a plan for building 32 low dams from the mouth of the river to Knoxville. All these would have been navigation dams, which with adequate locks would have created a navigable channel, but they would have had no value for flood control or power…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…TVA decided, instead, to build high multi-purpose dams on the main river. Already there were two high dams, the Wilson Dam and the Hales Bar Dam, and it was decided to complete the system by building additional high dams, each of which would back up the water to the next higher dam upstream. Kentucky Dam backs the water up to Pickwick and Pickwick to Wilson and Wilson to Wheeler and so on, each dam creating a slack-water pool, while navigation between pools is provided by a large lock in each dam…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



<u>Above</u>: caption: "Nine main-river dams form a 'staircase' of quiet, pooled water and controlled current - a continuous series of reservoirs that stretches along the entire length of the Tennessee River. From its beginning just above Knoxville, the Tennessee drops a total of 513-feet in elevation before it joins the Ohio River."

"…The main advantage of a balanced system is obvious from a study of TVA's method of operation. During the winter, rains are sufficient to permit concurrent storage of water in the tributary dams and maximum generation of power at the high dams downstream. On the other hand, in late summer when rainfall and runoff are low, releases from the storage reservoirs are used to generate power at these dams and provide a flow of water for power generation at the down-stream dams…"

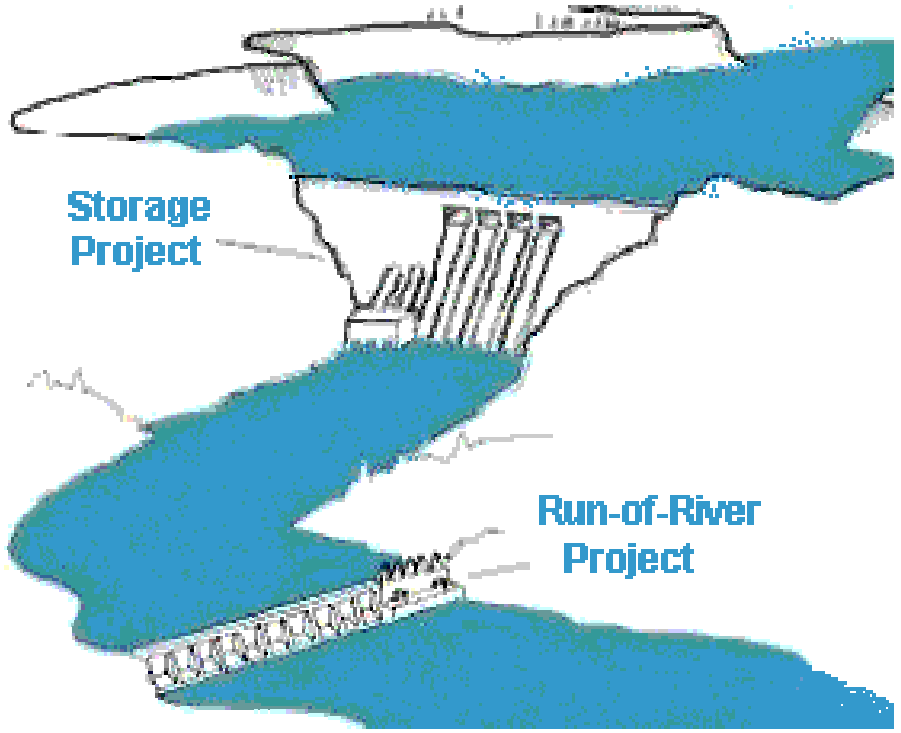
RE: excerpt from *TVA: The First Twenty Years* (1956)

Control Structures

"…Two main types of dams have been constructed in the TVA system: one the storage type on tributary streams in the eastern half of the Valley, the second the run-of-river type on the main river. All the storage dams are similar, being high structures placed as a rule in narrow channels with high abutments on each side. They require gates to control the flow of water over the dam and adequate spillway capacity to pass excess flood water. In addition, they require sluiceways through the dam to discharge water, so as to provide storage for a flood which may occur later. And they require a power plant to convert the energy of the falling water into electric power. Since there is no navigation except near the mouth on the tributary streams, the storage dams have no locks. The run-of-river dams on the main river are lower and larger, and are built with large gates so as to pass a great deal of water during flood flows. Practically the entire width of the river at these dams is occupied by the spillway. The power-house is located at one end of the dam, the lock usually at the opposite end…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

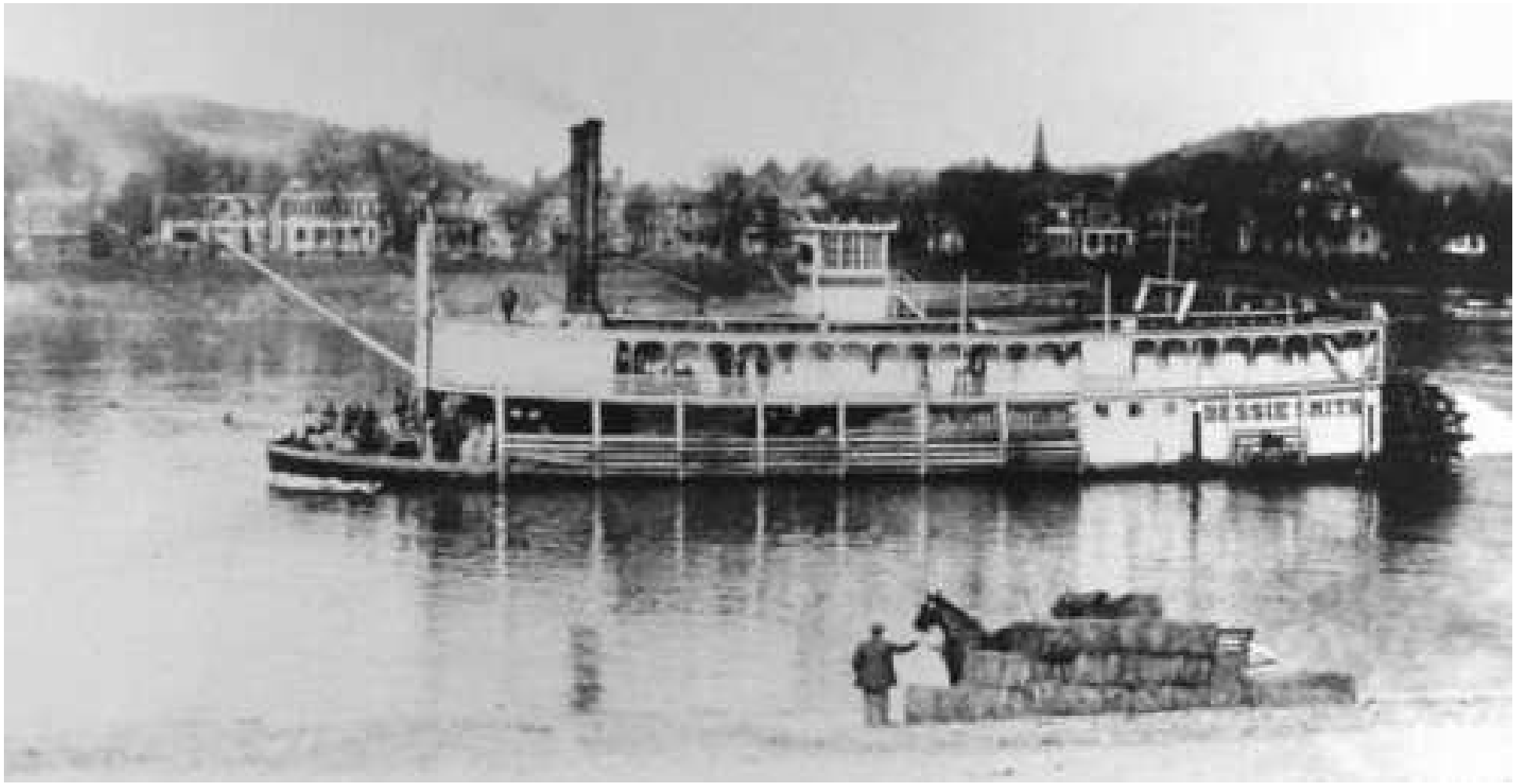
Storage and Run-of-River Projects



Part 10

To Improve the Navigation

Auslander Raus!



"…An orator at Knoxville objected to the arrival of the steamboat Atlas, on March 3, 1828, because it would bring outsiders into Tennessee. He wasn't alone in his hostility; the state had to have a law against throwing rocks at steamboats…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above</u>: caption: "Tennessee River Steamboat 'Bessie Smith'"

Fourth Navigable River

"…But most Southern politicians like the idea of river navigation, and steamboats in the golden era on the Mississippi were the forerunners of dream boats on every creek and branch and bayou from Florida to Texas. The Tennessee, coming after the Mississippi, the Ohio, and the Missouri as the country's fourth navigable river, was an obvious subject for hope…"

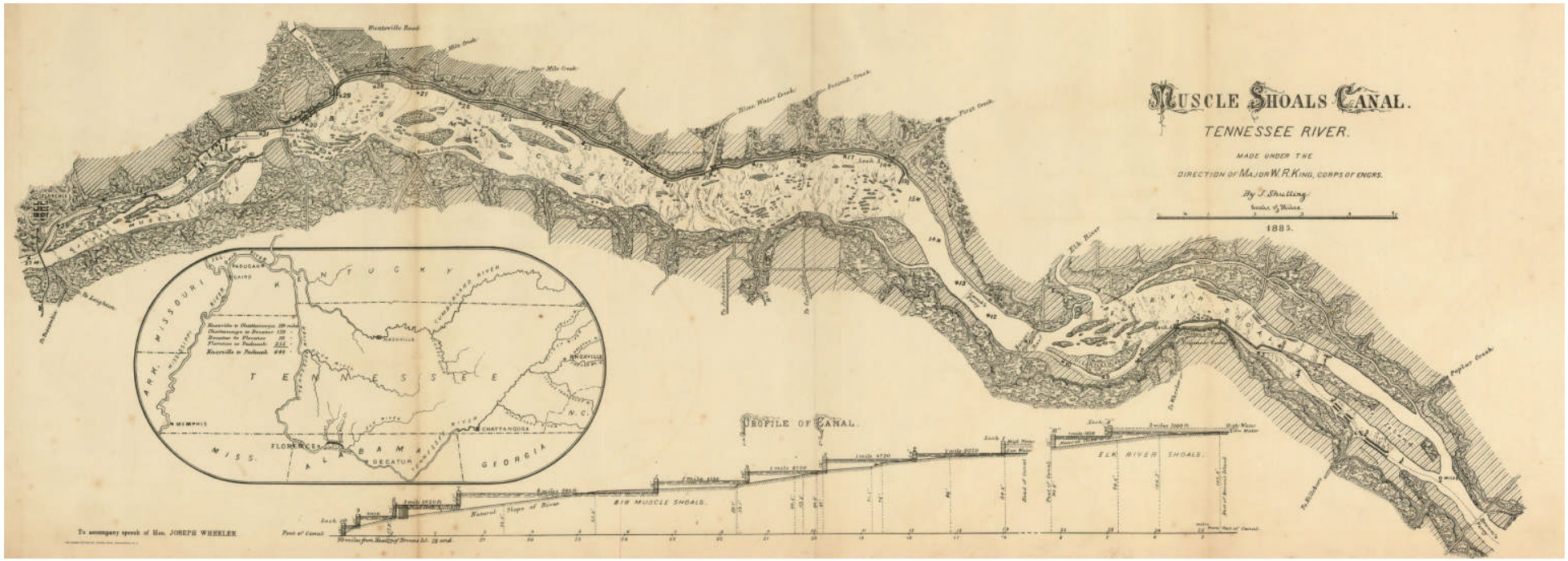
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above</u>: caption: "During the early days of commercial navigation, steamboats on the Tennessee River had to contend with low water, swift currents, and rocky shoals"

"…The Tennessee River is the fourth largest in the United States in point of flow. It is exceeded by only three other rivers, the Mississippi, the Columbia, and the Ohio. The problem of controlling this river, because of its very size and complexity, was too great for any private or local agency to undertake. There was apparently only one way in which this Valley could be completely developed and that was by a branch of the federal government having the resources to develop the entire Valley as a single planned development. Happily before TVA was organized, private exploitation of the river had not reached the point where it would have been impossible to proceed with an integrated program, as has happened on many rivers. The Ohio River, for instance, has been developed by the use of low navigation dams to the extent that it would be very expensive now to develop that river for other purposes…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Being the largest tributary to the *Ohio River*, the *Tennessee River* (in red and highlighted, at left) is 652 miles long reaching from Knoxville, TN, to Paducah, KY. The river was explored as early as 1540 by *Hernando DeSoto*, traveling the river from present-day Chattanooga to Guntersville. The first steamboat seen on the Tennessee most likely was in 1821. In February 1822, the *Rocket* arrived at Florence. In 1828 the *Atlas* made it, eventually, up to Knoxville. Regular traffic between Knoxville and Decatur, Ala., was in place by about 1835.



"…So it was seven years after the first steamboat got to Florence, in 1821, before one got up as far as Knoxville. They made all sorts of plans for getting over or around the Shoals; one man took out a patent for putting steamboats on rollers, and they dug or started more than one canal; the last one was begun by a young engineer named Goethals, who afterwards did a good big job of canal-digging. But the Shoals jinx defeated him, and they ran out of funds, as usual…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above</u>: caption: "Muscle Shoals Canal. Tennessee River. made under the direction of Major W.R. King, Corps of Engrs. 1885." Before the completion of the *Wilson Dam* (in 1924), the *Tennessee River* was divided by a series of shoals near the *Muscle Shoals* area where the Tennessee fell over 100-feet in approximately thirty miles. Between 1830 and 1890, adjacent to the river and around the Shoals, a series of canals and locks were built and improved upon to provide for commercial navigation.

"…Their best plan was to run one boat line up to the Shoals and another above, and that was the way they managed around the time of the Civil War. They had enough boats then to make what they could call an armada for General Grant, when he managed to get the river on his side. After the war, in the eighties, they never did much with passenger boats, but the freight traffic was considerable, and some people think it might have kept up if the railroads hadn't got control of the boat lines…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Man standing in the middle of the Tennessee River at Muscle Shoals before Wilson Dam was built"

An Inherited Objective

"….the army engineers who studied navigation on the Tennessee before the days of TVA estimated that, with proper development of the channel, the river traffic in 1950 could amount to 17,800,000 tons, with an annual saving of $22,800,000 in transportation costs. Everybody now agrees that this was too optimistic, but it sounded well to Southern congressmen. So 'to improve navigation in the Tennessee river' is one of the legally constituted objectives of TVA, although it was cannily observed by the first chairman of the Authority that 'TVA did not originate the policy of making the Tennessee river navigable. That policy was established by the national government through congressional action under a Republican administration before the TVA was born.'…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

RE: the *TVA Act of 1933* was explicit in the matter of navigation on the main river: TVA was directed to provide a nine-foot channel from the mouth of the *Tennessee River* (at Paducah, KY) to Knoxville, TN. But the Act left some discretion to TVA in its reference to navigation on the river and its tributaries. It became clear early in the development of the main plan that it would not be practicable to develop extensive navigable channels on any of the tributary streams. Thus, the decision was made to construct locks only on the main stream.

"…Dutifully carrying out its mandate to do what Congress authorized in 1930, the Authority is making a nine-foot channel from Paducah to Knoxville; and now the little river excursion steamer, the 'Golden Eagle,' can get past the Shoals…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Tourist steamer Golden Eagle on Tennessee River"

Republicans & Sinners

"…Republicans and sinners who like to talk about the un-navigable Tennessee can take even less comfort from the freight traffic, which passed the 2,000,000-ton mark in 1936 and is rising right along. Last April the Gulf Refining Company started sending tow-loads of gasoline and oil from St. Louis down the river to Perryville, Sheffield, Decatur, and Guntersville, because they found they could do it for about half the railroad rate; there were rumors that the Standard Oil people were planning to send barges up from Baton Rouge. So when the Southern railroads petitioned the Interstate Commerce Commission to abolish the freight differential, they cited the Gulf Refining Company's shipments as competition to be met, although Perryville, Tennessee, isn't even on a railroad…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

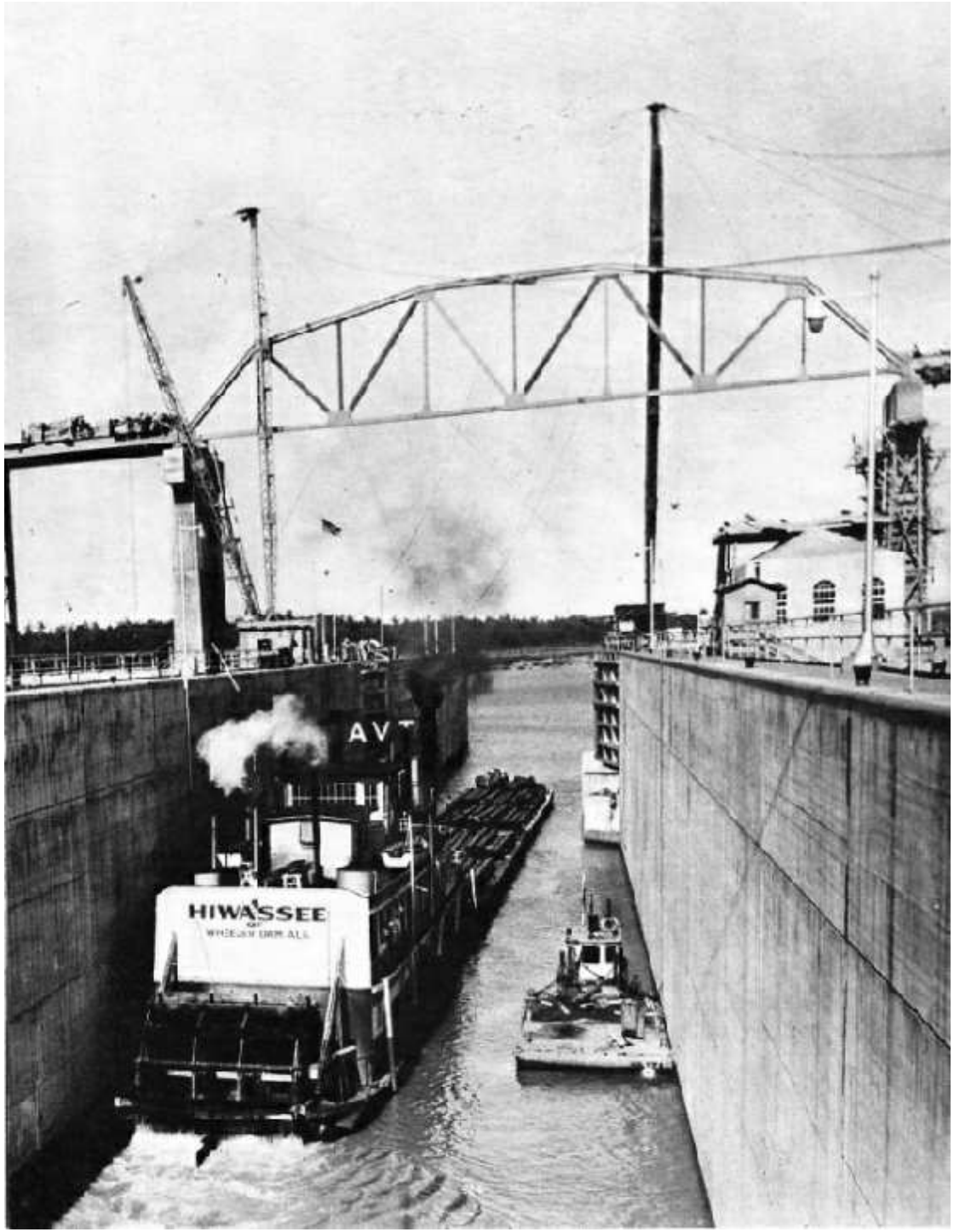
To Turn the Trick

"…Conservative Southerners who don't think so much of government interference admit that if TVA gets rid of the freight differential, it will be paying its way. And while Southern politicians will vie with each other to claim credit for that achievement, it seems clear that the Authority has done more than any other agency to bring it about. Southerners had been working on the problem a long time, but TVA built the dams that provided the competition to turn the trick…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…Besides that, the Authority has been a convincing witness in the controversy. In a survey issued in 1937, it pointed out that it costs 39 cents more to ship a hundred pounds of freight from Atlanta to Chicago, 731 miles, than it does to ship the same amount 890 miles to Chicago from New York; that you must pay 41 cents more to send the same package from Atlanta to New York than to ship it the greater distance from Chicago to New York; and that it costs two cents more to send it from Atlanta to Louisville, than it does to send it 403 miles farther, from New York to Louisville. These things are no news to you if you grew up in the South, but it seems you have to put them down in black and white before the Yankees will believe it…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



"…Of course the South moves less freight, but if they want to charge more because they ship less, they also ship less because they charge more. Moans and groans never did any good, but now big corporations have started buying river terminals, and they say that Atlanta, built on its railroad traffic, got excited enough to ask about waterfront connections at Chattanooga…"

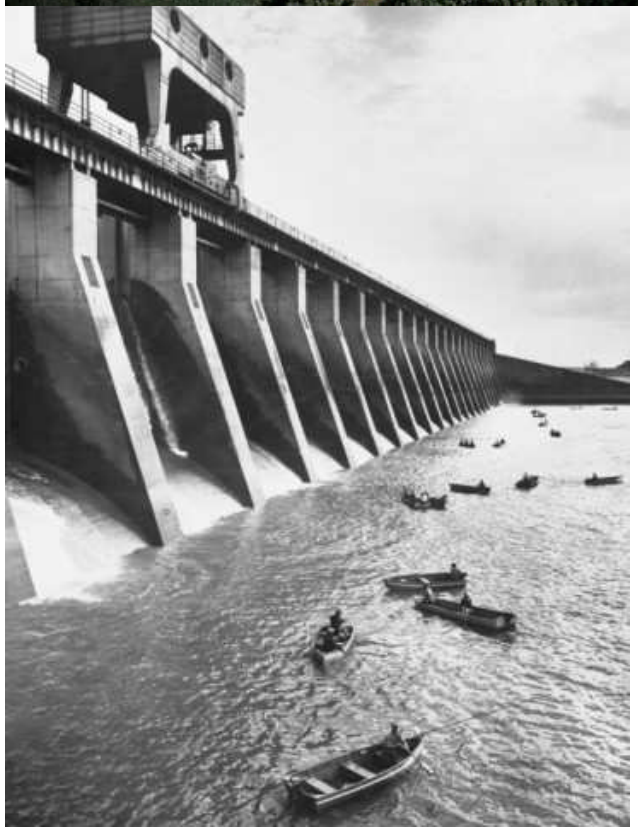
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Navigation Lock at Wheeler Dam, Alabama. This lock, which is 60-feet wide and 350-feet long, has a lift of 50-feet. At the north end of Wheeler Dam is a cut-off wall, 220-feet long, which is built across the possible location of a future lock. Should it be found necessary, this second lock will be 110-feet wide and 600-feet long."

"…Consider Kentucky Dam itself. This dam will hold back four million acre-feet of flood water from the lower Ohio and Mississippi Rivers. The people behind the levees on those rivers know how much that will mean to them in protection from disaster. When the danger of flood is past, those flood waters are not to be wasted. They will be put through the water wheels here at the dam to produce great quantities of electricity. That electricity will rush to serve the people of the Valley, their homes and farms and industries. Kentucky Dam also provides a deep-water, navigable channel one hundred eighty-three miles long. The other TVA dams carry that reliable deep water channel all the way to Knoxville in east Tennessee, six hundred fifty miles away. As a result, the South and the Middle West of this nation are now connected by water transportation. The benefits of this dam go not only to the Tennessee Valley; they go to Saint Paul and Minneapolis, to New Orleans and Memphis, to Saint Louis and Kansas City, to Omaha and Sioux City - to all the communities in the great Mississippi Valley that are served by our inland waterways…"

***Harry S. Truman*, POTUS**

RE: excerpt from his October 10th 1945 *Kentucky Dam* dedication speech



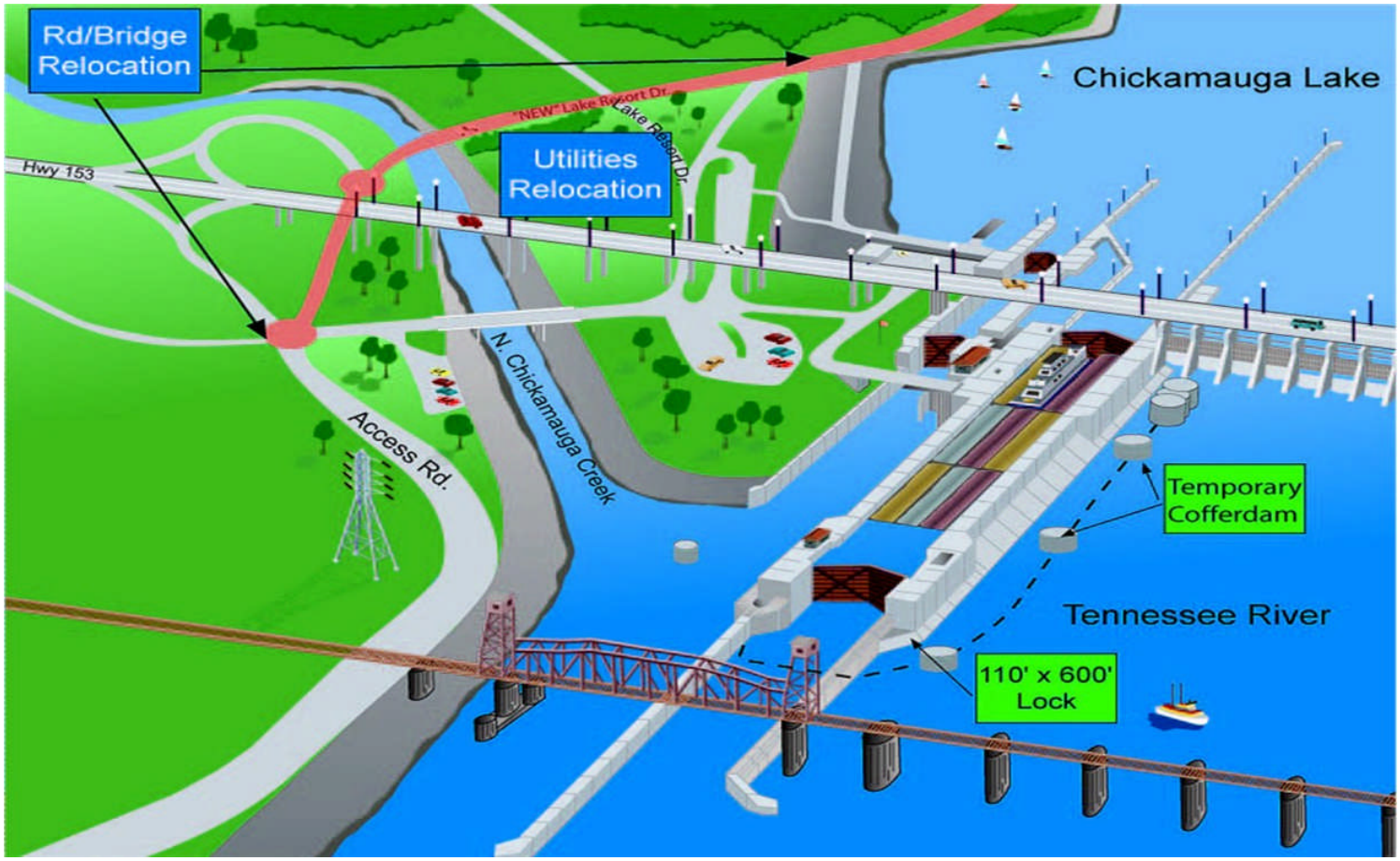
Nine main and four auxiliary locks on the *Tennessee River* make it possible for both commercial and recreational vessels to pass easily from one reservoir to another. The largest lock, at *Pickwick Dam*, is 110-feet wide and 1,000-feet long. The lock at *Kentucky Dam* is the busiest on the entire system. Including Kentucky, the locks at *Nickajack, Guntersville, Wheeler*, *Wilson and Pickwick Dam/s* operate 24/7/365.

<u>Top Left</u>: caption: "Kentucky Dam, Lock and Lake"

<u>Top Right</u>: caption: "Barge on the Kentucky Dam Canal Lock on the Tennessee River"

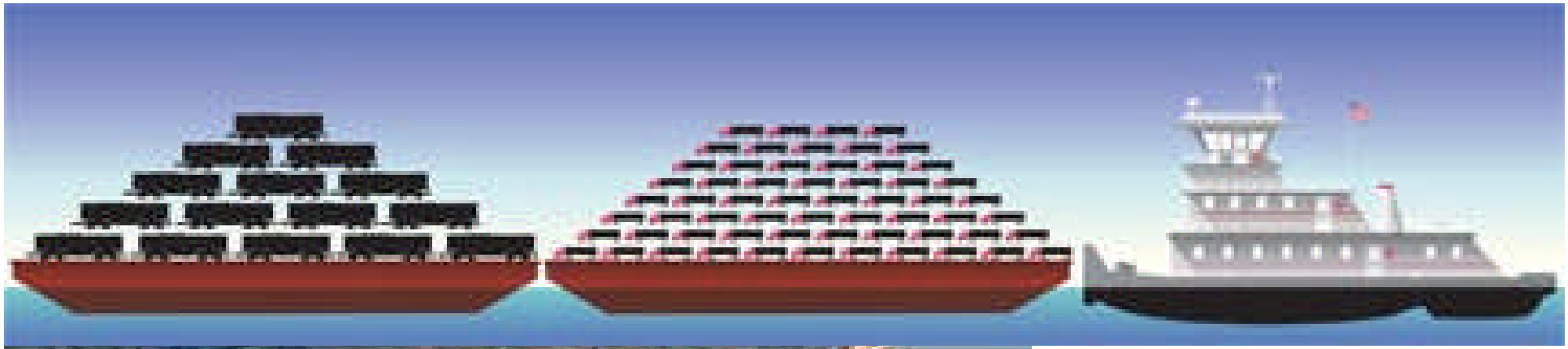
<u>Left</u>: caption: "Fishermen at Kentucky Dam's base"

<u>Above</u>: the *Kentucky Lock Addition Project* is located at mile 22.4 of the *Tennessee River* in western Kentucky. The project includes design and construction of a new 110' x 1200' lock to be located landward of the existing 110'x 600' lock. Products originating from or designated to twenty states pass through the system of Kentucky and Barkley Locks, the lowermost locks on the Tennessee and *Cumberland River/s*, respectively. Over 80% of the commercial tows hauling these products pass through *Kentucky Lock* instead of *Barkley Lock* because of difficult and costly navigation on the Cumberland River below Barkley. Since most of the tows are greater than 600' in length, they must perform a time-consuming double lockage to transit through the existing 600' long Kentucky Lock. As a result, Kentucky Lock has some of the longest average delay times of any lock in the inland waterway system - delays that range from four to seven hours. Construction of a new 1200' lock would eliminate the delay time in the near term and drastically shorten it for forecasted traffic levels past the year 2020.



Above: concrete aggregate problems caused structural concerns at the existing *Chickamauga Dam Lock*, resulting in the closure of the lock. As well, the existing 60-foot by 360-foot lock was a non-standard size that's not suited for the barges used by the modern transportation industry. The new 110-foot by 600-foot *Chickamauga Lock*, designed and constructed by the *U.S. Army Corps of Engineers* (Nashville District) will replace the existing lock, improve locking efficiency, and solve the structural issues caused by the deficient concrete.

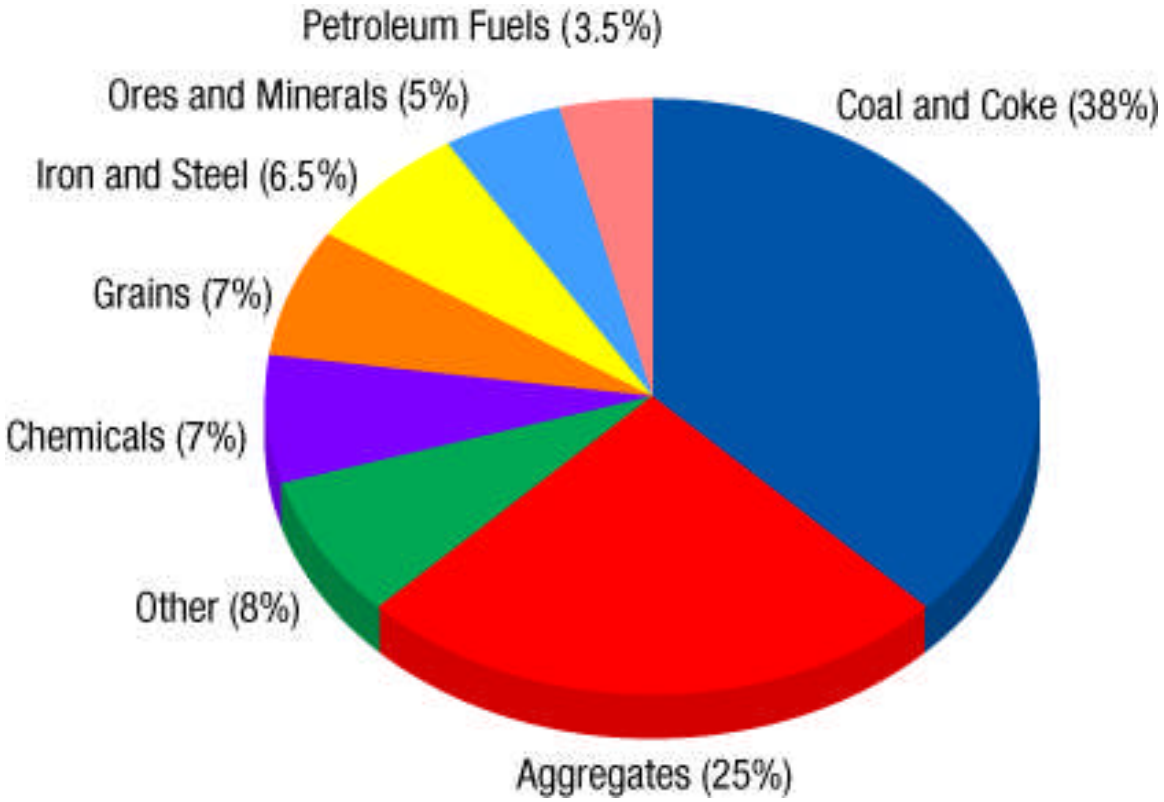
<u>Left T&B</u>: in the middle of the photograph/s is the cofferdam that was used to dewater the construction area for the new lock at Pickwick. The cofferdam encloses the work area so that water can be removed and work can be accomplished under "in the dry". On the rear side of the cofferdam is a portion of the new lock wall that was incorporated into the enclosure so that the existing lock could remain open to navigation (a traditional cofferdam would have blocked access to the downstream end of the existing lock, effectively closing the lock to navigation). A traffic circle and small bridge (part of the roadway relocation project) were completed to allow for the construction of the new lock.



Navigation has contributed greatly to the economic and industrial development of the *Tennessee Valley.* Substantial investments have been made in waterfront plants, terminals and distribution facilities all along the river, providing employment for thousands of residents of the TVA region.

<u>Above</u>: caption: "Because one barge can transport as much cargo as 15 rail cars or 60 tractor-trailers, waterway transportation benefits the environment. It reduces fuel consumption and emissions, and makes the roads safer by keeping more trucks off of the highways."

<u>Left</u>: caption: "Chickamauga Lock, Chattanooga, TN"



Commodities Shipped on the Tennessee River

"…During the early days of TVA, navigation was referred to by some as one of the two constitutional pegs on which the whole TVA program was hung. The implication frequently was that navigation did not amount to very much and probably would never be more than a mere peg. When Pickwick Dam was under construction someone observed that it would be cheaper for TVA, instead of building a navigation lock in the dam, just to buy every boat that came up the river and wanted to get through. It is fortunate that the lock was built, for today about 1,500 bargeloads of commodities come up the Tennessee and pass through Pickwick lock each year…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Above</u>: caption: "Pickwick Lock from Pickwick Lake." The dam, lock and lake took their names from the nearby community which, in the late 1880s, was named after Charles Dickens' classic novel *The Pickwick Papers*.


US Army Corps
of Engineers
Pickwick
Locks

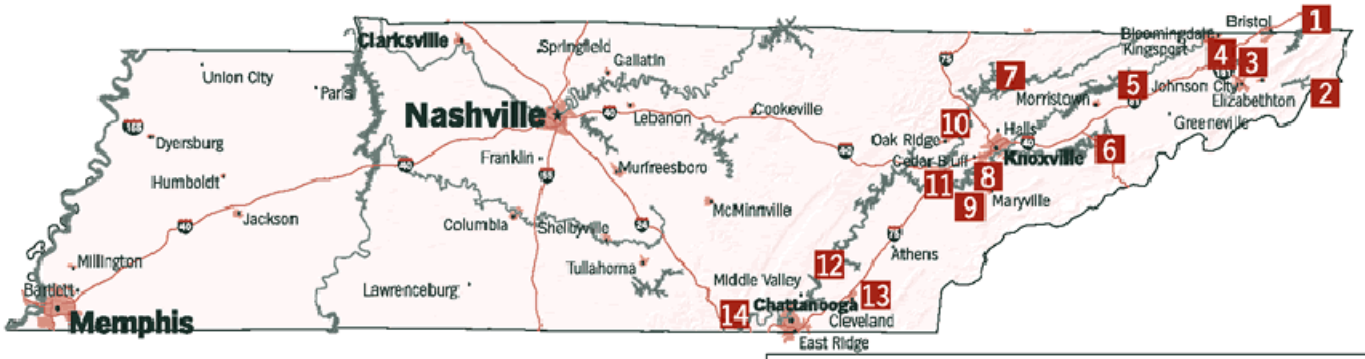
Great Lakes of the South

"…TVA's statutory obligation to provide river transportation led to the construction of seven high dams on the main stem of the Tennessee which, together with the two already there, converted the river into nine slack-water reservoirs. These reservoirs, sometimes called 'the Great Lakes of the South,' are connected by locks which permit through navigation over the 630 miles of the river up to Knoxville. The dams have created navigable channels for varying distances and depths in several of the tributary streams and in many embayments. A network of subsidiary waterways of almost 300 miles has been thus added, 110 miles of it with a depth of nine feet or more…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Tennessee Valley Authority Lakes

There are 14 Tennessee Valley Authority lakes.



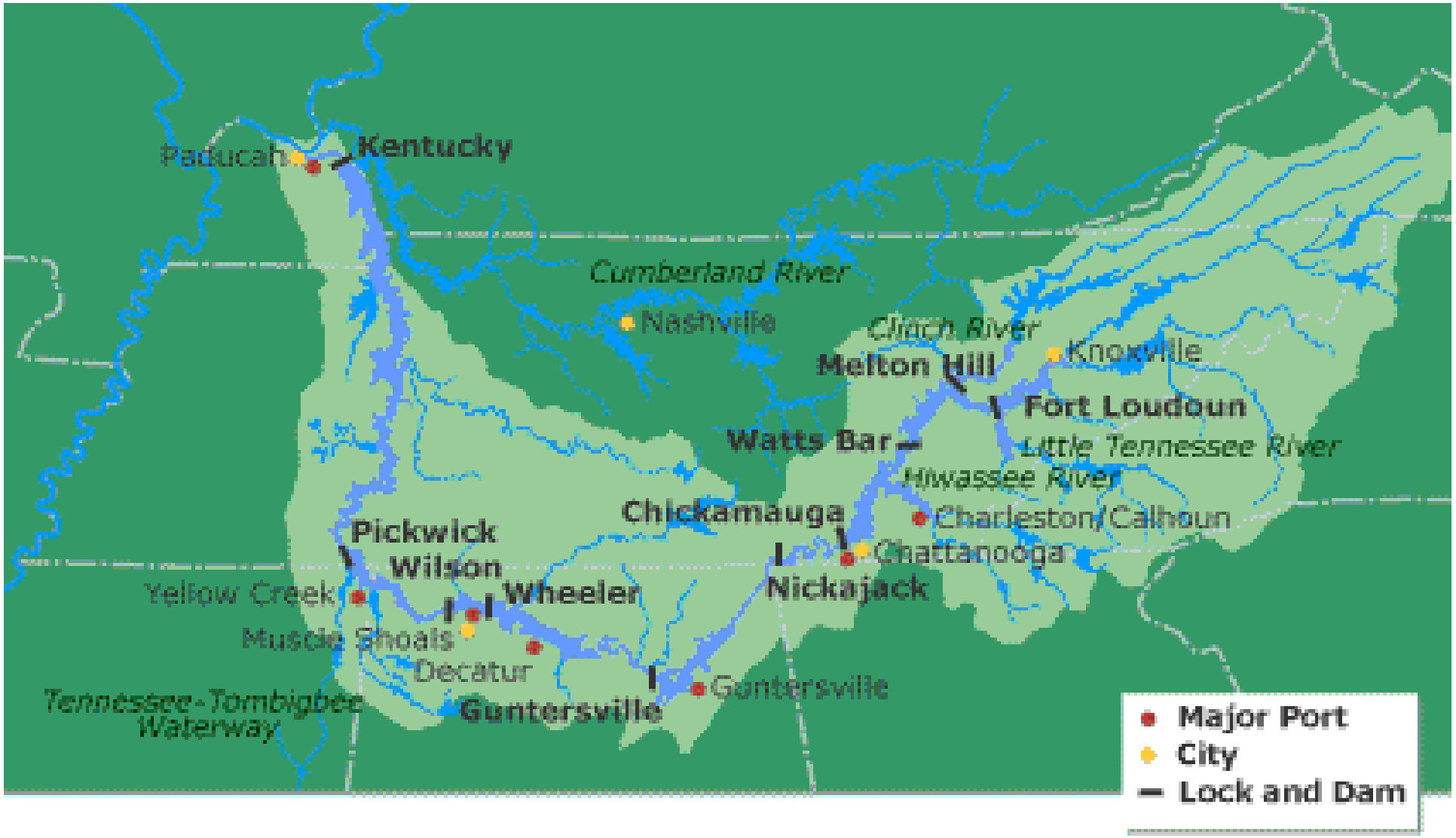
"…TVA's nine-foot main-stem channel is somewhat less than ten per cent of the nation's nine-foot inland waterway system in length (630 miles as against 6,970), but its total main-stream and tributary channel of more than 900 miles constitutes an extremely important link in the transportation network of the Tennessee Valley…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Ports & Terminals

"…The terminals on the Tennessee in active use in 1933 were mostly sand and gravel docks and unimproved landings for loading of forest products. Early in TVA's history, it was recognized that the waterway could not be fully used and that the small shipper who could not afford a private terminal would be left without access to the waterway unless public-use general commodity terminals were built. A sustained program of encouragement of local agencies and institutions was carried on from about 1939 to 1942 in an effort to obtain some type of non-federal sponsorship for public-use terminals. This effort probably would have been successful but for the Second World War. In order to provide promptly for the transportation needs of the region and the nation during that emergency, TVA, with Congressional approval, constructed public-use terminals at Knoxville and Chattanooga, Tennessee, and Guntersville and Decatur, Alabama…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



<u>Above</u>: caption: "The Tennessee River's main navigable channel is 652 miles long. It begins a mile above Knoxville, Tennessee, and eventually joins the Ohio River at Paducah, Kentucky. Commercial navigation also extends into three major tributaries: 61 miles up the Clinch River, 29 miles up the Little Tennessee River and 22 miles up the Hiwassee River. Another 374 miles of channel that is too shallow for commercial traffic is marked by TVA for recreational boaters."

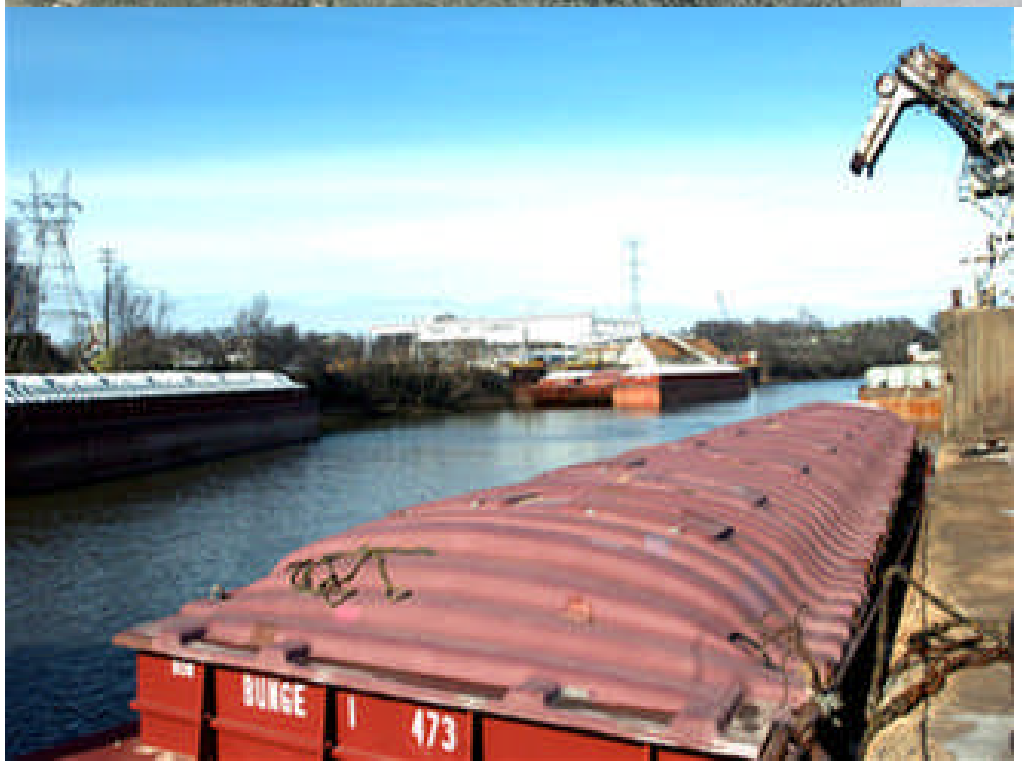
"…TVA operated these terminals during the war emergency and through 1951. During this period it was demonstrated that sufficient traffic could be obtained to make the terminals attractive to private operators. Also, it was obvious that private operators could actively solicit river traffic, whereas TVA as a government agency could not. For the same reason it was not felt that either the state or local governments should be encouraged to operate the terminals. At the beginning of 1952, therefore, TVA leased the terminals, with an option to purchase, to private operators. During the first year under private operation, the terminals handled more traffic than during any prior year, and the prospects for substantial future traffic growth are bright…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…In the twenty years since 1933, a total of about 45 terminals have been built along the Tennessee River. All except the public-use terminals have been constructed and operated by private enterprise. The development of private terminals has been facilitated by TVA's assistance to ind-ustries and others in locating sites where channel access could be obtained at minimum cost, and in providing data on reservoir pool levels and operating conditions and advice on special freight-handling problems…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

RE: river freight is presently handled at approximately 185 public and/or private-use terminals at locations all across the Valley. The public-use terminals are equipped to handle a broad range of commodities and actively solicit business from a variety of shippers. Private-use terminals are designed for the specific needs of their owners and are usually equipped to handle only one kind of commodity (i.e. coal, grain, liquid chemicals etc.).



<u>Above L&R & Left</u>: the *Port of Florence* (AL) is owned and operated by the *Florence-Lauderdale County Port Authority*. Located at mile 256.6 on the *Tennessee River*, the port serves regional business and industry through links with transportation systems including highways (with connections to major interstates) and the *Tennessee Southern Railroad Co.* (with connections to *CSX Railways*). TSRR also provides port services. Fleeting in the port area is provided by the *Muscle Shoals Marine Service*.

The location of ports is determined mainly by centers of industrial activity. The busiest of these urban ports is Decatur, AL. Decatur handles over five million tons of river freight annually, almost half of which consists of grains moving inbound to be processed into food products and animal feed. Other major port areas in the Valley include Paducah and Calvert City, KY; Florence, Muscle Shoals, and Guntersville, AL and Chattanooga and Lenoir City, TN. Commercial navigation connects these areas in ways that are critically important to the region's economy, allowing industrial customers direct access to inexpensive shipping.

Left: caption: "The Yellow Creek Port in Luka, Mississippi, handles a wide variety of commodities"

Part 11

First Among Equals

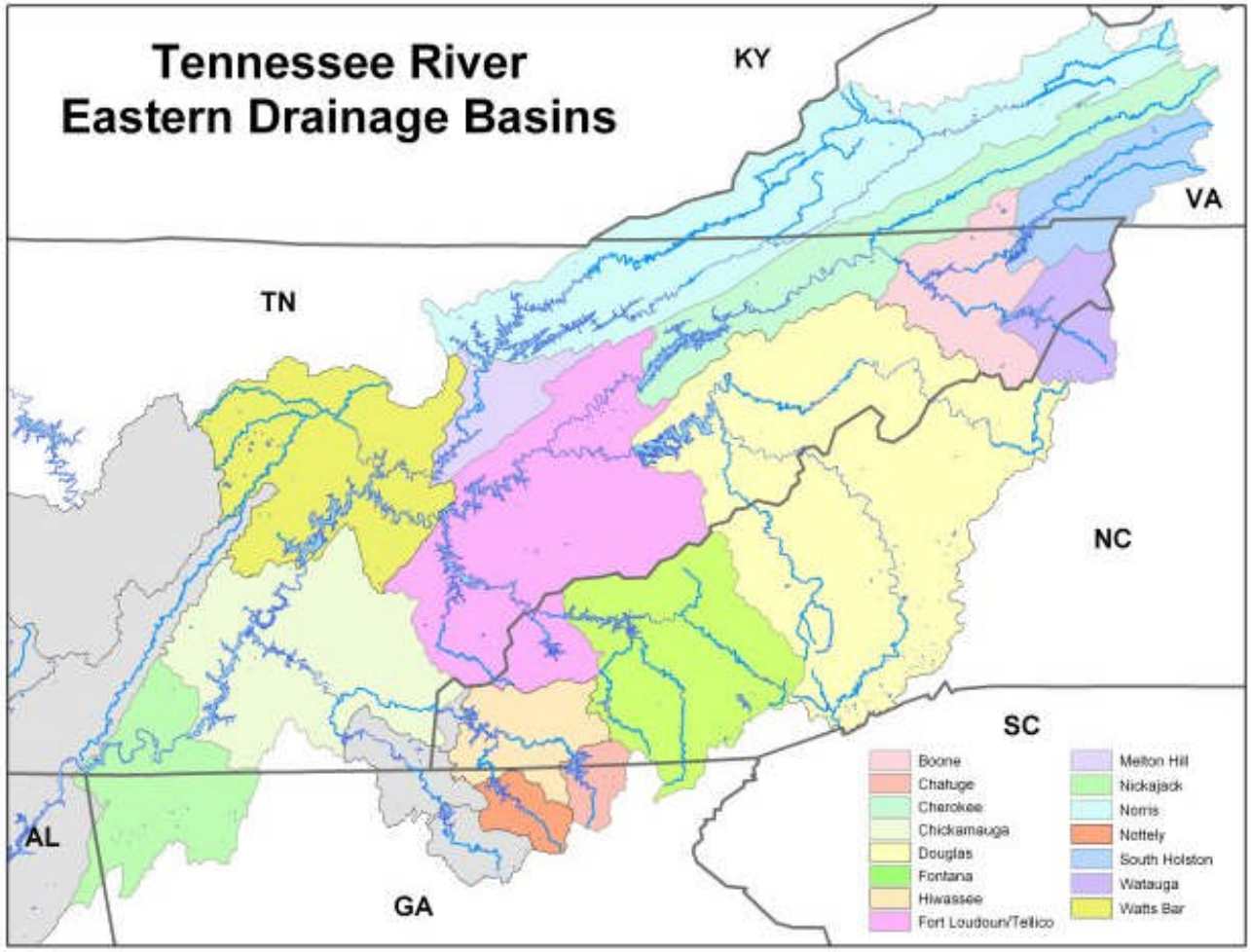
The Prime Objective

"…The principal water control responsibilities assigned to the TVA by the Act of 1933 were (a) to provide nine-foot navigation on the Tennessee River from its mouth to Knoxville; (b) to control destructive flood waters in the Tennessee and Mississippi River basins; and (c) to generate the maximum amount of electric power consistent with the first two objectives. Because of the temperamental character, and the sometimes catastrophic consequences of rainfall, the prevention of floods has been given primary attention in TVA's system of river control…the water held back from destructive flooding can be used for both navigation and power production, but the first and basic consideration is protection from floods…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…Flood control was of course a different matter, for every dam could contribute directly to that goal. The amount of storage to be incorporated for flood waters presented a complicated problem. The conclusion was reached that about 12,000,000 acre-feet should be available for storing floods on the first of January, that this could be reduced by March 15 to about 10,500,000 acre-feet, and that it could be further reduced by July 15 to 2,500,000 acre-feet. By that time each year the danger of any devastating flood was entirely over. These figures were used in the integrated plan…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

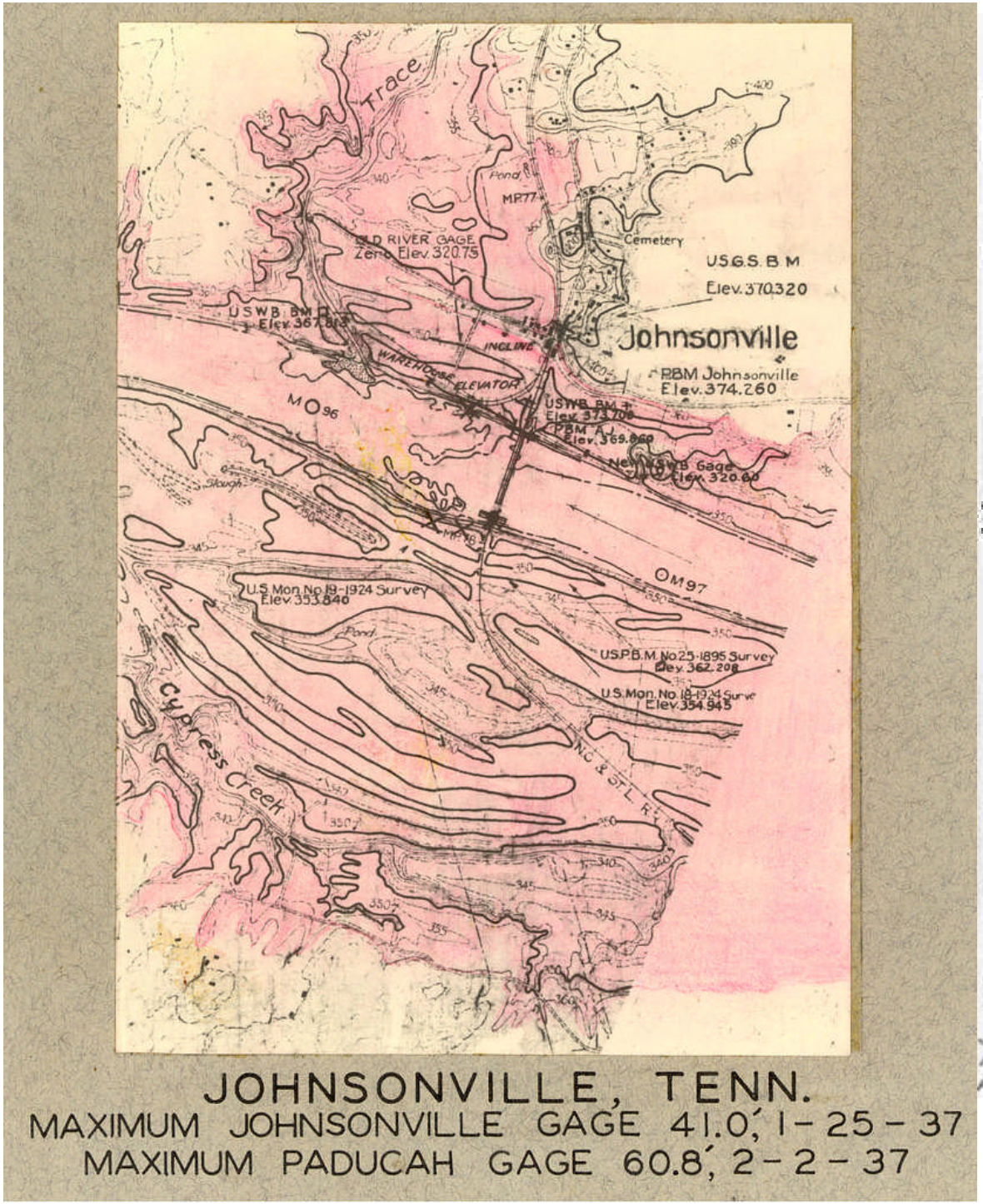

Tennessee River
Eastern Drainage Basins
KY
VA
TN
NC
SC
AL
GA
Boone
Chatuge
Cherokee
Chickamauga
Douglas
Fontana
Hiwassee
Fort Loudoun/Tellico
Melton Hill
Nickajack
Norris
Nottely
South Holston
Watauga
Watts Bar

An Ever-Present Danger

"…Floods and scenes of devastation have been frequent along the Tennessee River and its tributaries. Often the Valley-wide floods have had a destructive effect on the lower Ohio River and the lower Mississippi. Adding their waters to an already overburdened Mississippi, the peak of one flood was piled on top of another…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Left</u>: caption: "Sulphur Dell Baseball Field during flood, Nashville, Tenn., 1937"



JOHNSONVILLE, TENN.

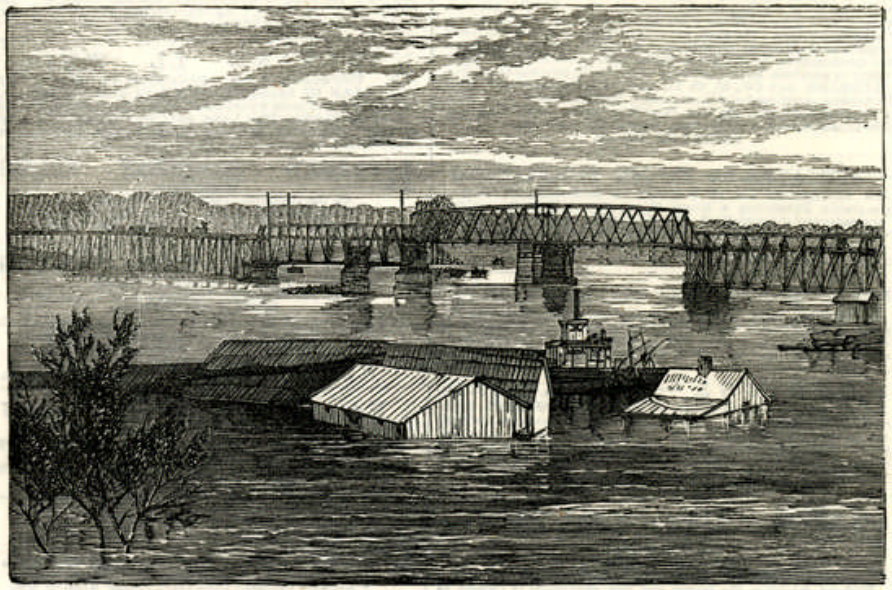
MAXIMUM JOHNSONVILLE GAGE 41.0', 1-25-37

MAXIMUM PADUCAH GAGE 60.8', 2-2-37

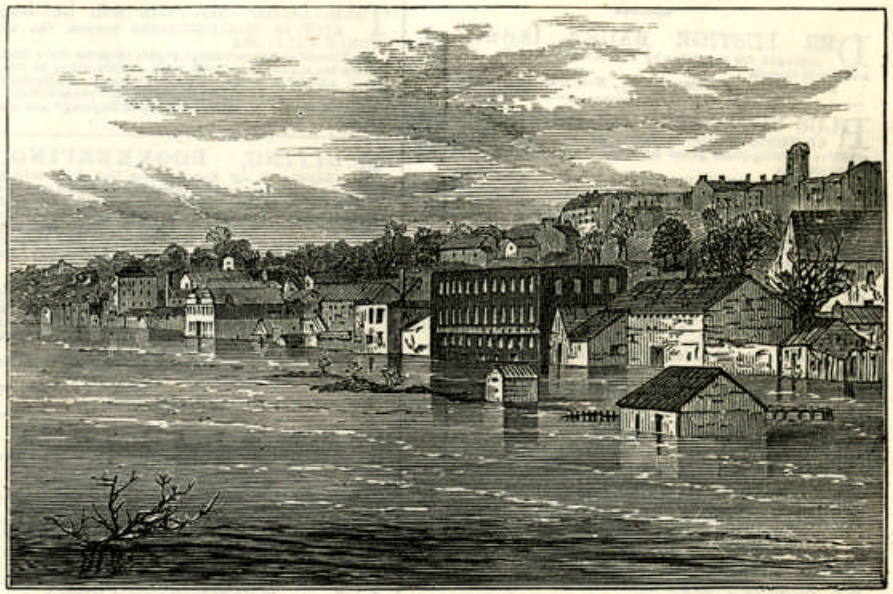
Johnsonville, Tenn, Tennessee River, Gage 33.5', 2-5-37
The workshop of T.L. Herbert and Sons was flooded.
13343

Johnsonville, Tenn, Tennessee River, Gage 33.5', 2-5-37
Portion of railroad track in T.L. Herbert and Sons
loading yard was flooded.
13349

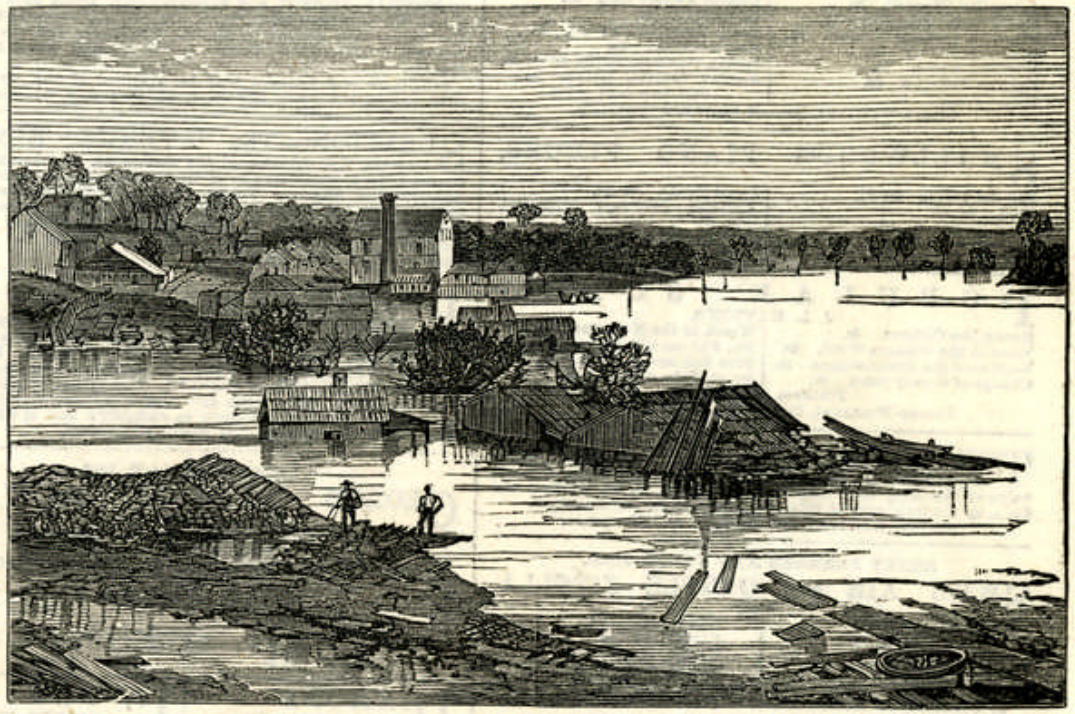
Crisscrossed by several major rivers and home to numerous lakes and streams, Tennessee is one of the most water-rich states in the U.S. Heavy rains and/or ice run-off can cause many bodies of water to swell and encroach upon towns and cities. Major floods in 1847, 1902, 1927, 1937, 1948 and 1951 (among other years) have caused severe damage to property and loss-of-life. Even small floods can destroy entire towns, produce thousands or tens of thousands of refugees, spread disease and take lives. Dam and reservoir breaks add to these troubles, for many of Tennessee's rivers have been dammed and much of the state lies in the flood plains of dammed rivers and/or lakes. Unlike the slow-rising floods caused by swollen natural rivers, streams and lakes, dam or reservoir ruptures are sudden and difficult to predict or contain. With so many cities situated near or around Tennessee's numerous rivers, lakes and streams, the threat of flooding is an ever-present danger.



RAILROAD BRIDGE, CLARKSVILLE, TENNESSEE.

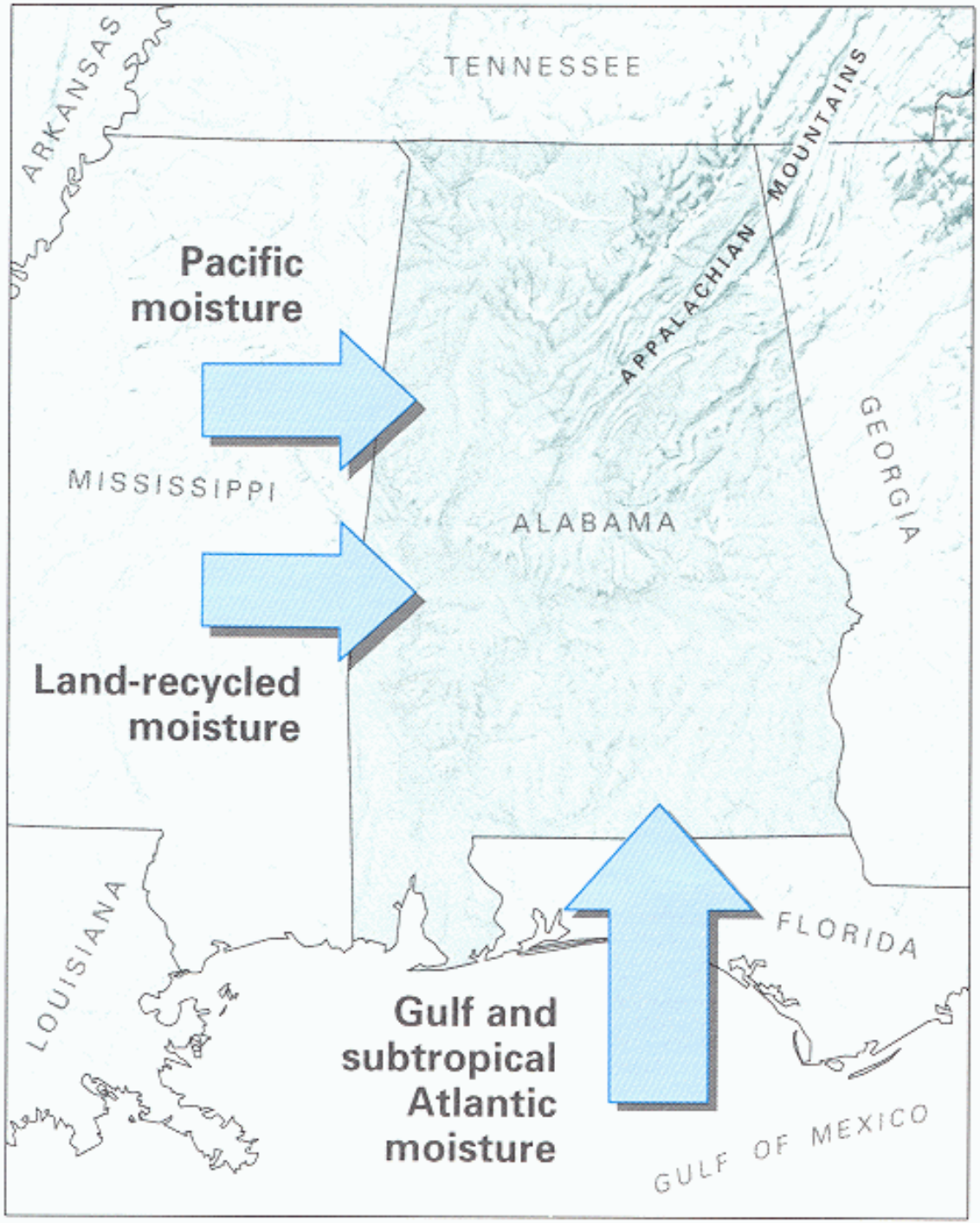


FRONT-STREET, CLARKSVILLE.



CUMBERLAND RIVER, LOOKING UP STREAM, AT CLARKSVILLE.

<u>Above & Left</u>: caption: "Cumberland River Flood, Clarksville, Tenn., 1874 - *Illustrated London News*"



Left: caption: "Principal sources and patterns of delivery of moisture into Alabama. Size of arrow implies relative contribution of moisture from source shown." Annual precipitation ranges from about 50-inches in the *Tennessee River Valley* area to about 65-inches in the Gulf region. Precipitation distribution varies seasonally, annually and geographically. The *Gulf of Mexico* and the subtropical *Atlantic Ocean* are the principal sources of moisture with the *Pacific Ocean* a lesser source. Most winter precipitation results from frontal systems and cyclone development in the Gulf. Summer precipitation results mainly from thunderstorms and occasional tropical cyclones, including tropical storms and hurricanes. In addition to the oceans, moisture sources include land surfaces as well as lakes and reservoirs from which moisture evaporates into the atmosphere.

"…While floods long have ravaged the whole Tennessee Basin, Chattanooga has suffered most. It is said that a steamboat pushed down the main business street of the city during the crest of the 1867 flood. Other great floods, though not quite so high, occurred in March, 1875, April, 1886, and March, 1917. Several scores of small floods, averaging about one a year, equaling or exceeding a flood stage of thirty feet and causing varying amounts of damage, have plagued the city…"

RE: excerpt from *TVA: The First Twenty Years* (1956). The largest flood in Chattanooga's history occurred in March 1867, the flood waters cresting at 58-feet and completely inundating the city. Since the completion of the TVA reservoir system, the highest Chattanooga flood stage was nearly 37-feet, which occurred in 1973. Without regulation, the flood would have crested at 52.4-feet. The original flood protection plan for Chattanooga called for the construction of levees to supplement the protection provided by upstream reservoirs. However, since the city did not meet the requirements of the *Flood Control Act of 1936*, the levee system was never constructed.

Left: caption: "Chattanooga during the 1867 flood - view from Point Lookout, Lookout Mountain"

Right: caption: "Chattanooga flood of 1896"

<u>Top Left</u>: caption: "Tennessee River Flood, Chattanooga, Tenn., 1917"

<u>Top Right</u>: caption: "Emory River Flood, Harriman, Roane County, Tenn., ca. 1920s"

<u>Left</u>: caption: "Duck River Flood, Shelbyville, Bedford County, Tenn., 1948"

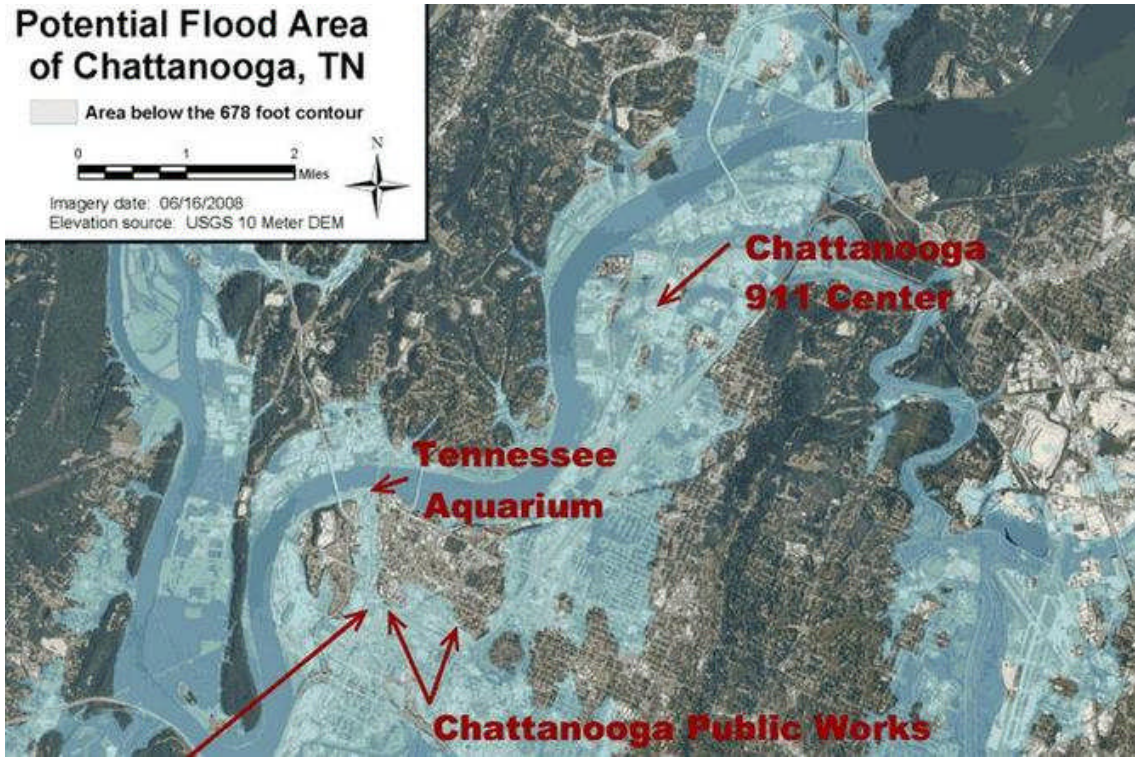
On May 1-2, 2010, the combined effects of a stalled frontal boundary and warm, moist air rising from the *Gulf of Mexico* caused West and Middle Tennessee to be inundated with record-breaking amounts of rainfall. In Nashville, a new two-day rainfall record was established when 13.57 inches fell, shattering the previous record of 6.68 inches set on September 13-14, 1979. The entire region experienced "1,000-year floods," caused by the fact that many locations received 10-20 inches of rain over a 48-hour period.

<u>Above</u>: caption: "Grand Ole Opry, Nashville, Tenn., May 3, 2010"

<u>Left</u>: caption: "Davidson County, Tenn., May 3, 2010"

Dams and reservoirs in the eastern portion of the TVA region were planned primarily to reduce flood damage in Chattanooga, but other areas benefit as well. TVA's reservoir system was designed to protect fifteen damage centers (locations that were statistically likely to suffer flood damage):

- **Kingsport, TN**
- **Elizabethton, TN**
- **Clinton, TN**
- **Knoxville, TN**
- **Lenoir City, TN**
- **Copperhill, TN / McCaysville, GA**
- **Chattanooga, TN**
- **South Pittsburg, TN**
- **Shelbyville, TN**
- **Fayetteville, TN**
- **Huntsville, AL**
- **Decatur, AL**
- **Florence, AL**
- **Savannah, TN**
- **Paducah, KY / Cairo, IL**



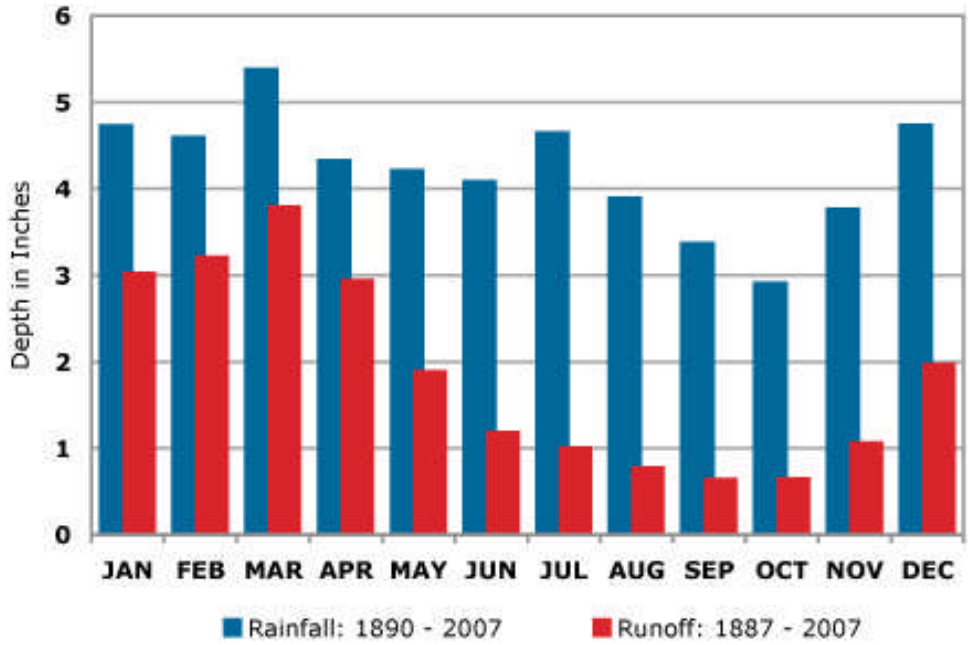
Of these fifteen, Chattanooga was/is at greatest risk. The city sits in a low plain between the eastern and western parts of the TVA region just above the point where the *Tennessee River* passes through the *Cumberland Mountains*. Before TVA started flood control operations, major storms occurring in the 21,400 square-mile drainage area above Chattanooga would cause the Tennessee River to rise rapidly. When it reached Chattanooga, the swollen river would attempt to carry more water through the narrow mountain gorge below the city than the river channel would allow. The excess water that could not flow immediately through the mountains would naturally back up to the city, flooding it an average of once a year. Reducing the flood risk at Chattanooga was a major priority in the design of the TVA reservoir system and remains a major operating priority to the present day. Flood storage below Chattanooga is used to regulate floods below the dams on the Tennessee River and on the lower *Ohio* and *Mississippi River/s*.

<u>Above</u>: caption: "Map projecting the possibility of a major flooding event in Chattanooga"

"…The average rainfall in the Tennessee River Basin in a year is about 51 inches. Some 20 inches, or approximately 40 per cent, usually falls during the flood season in the winter and early spring. Of this 20 inches, something like ten inches run off. During a whole year the total runoff is only 22 or 23 inches, so that nearly half the yearly total occurs in the January-to-April flood period. Wet ground and other conditions in the winter may cause runoff during a heavy storm to be 75 per cent or more of the rainfall. It is under such circumstances that floods occur…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

RE: the *Tennessee River Watershed* is one of the wettest in the U.S., with an average of 51-inches of rain per year (the *Gulf of Mexico* is a major source of moisture). The *Tennessee Valley* region also is subject to heavy rainfall resulting from dissipating hurricanes moving across the Southeast. December through early May is the major flood season in the Valley. Winter storms provide the most rainfall since they are, generally; more numerous, last longer and cover larger areas.



<u>Above</u>: caption: "Average monthly rainfall/runoff comparison." In over one-hundred years of record-keeping, annual rainfall has ranged from 30.65-inches (in 2007) to 65-inches (in 1973). The greatest extremes occur in the eastern half of the Valley. Average annual precipitation at several places in the mountains of the *French Broad, Hiwassee* and *Little Tennessee River* watershed/s exceeds 80-inches. In contrast, other locations in the French Broad and *Holston River* watershed/s average less than 40-inches per year. The monthly average rainfall in the *Tennessee Valley* region ranges from 3.0 to 5.5 inches. March, July and December are typically the wettest months and September through November are usually the driest (in any given year, the wettest and driest months may, of course, vary). The average annual runoff in the region (the amount of water that ends up in the river system after it rains) is about 23-inches, or 44% of the average rainfall. The monthly average runoff varies from almost 4-inches in March to less than 1-inch in August, September and October. Generally, runoff is heaviest in winter and early spring when vegetation is dormant and the ground is saturated. As a result, heavy storms moving across the Tennessee Valley region between December and early May become potential causes of major floods.

Dam and Control

"…The plan which was finally adopted included the control of all the major tributaries of the Tennessee River. The first of these are the Clinch and Powell rivers, which were controlled by the construction of Norris Dam; the second is the Holston River, which was controlled by the construction of Cherokee Dam; the third is the French Broad River, which was controlled by Douglas Dam; the fourth, the Little Tennessee River, was controlled by Fontana Dam; and the fifth, the Hiwassee River, was controlled by Hiwassee Dam. By construction of these five main storage dams all of the main tributaries were brought under control and much of the 12,000,000 acre-feet of flood storage considered necessary was provided. In addition to these main tributary dams, dams were later built on some of the minor tributaries, including the South Fork Holston River, the Ocoee, the Nottely, and the Watauga. On the Little Tennessee River, the Aluminum Company of America had built three power dams, none of which was useful for flood control…"

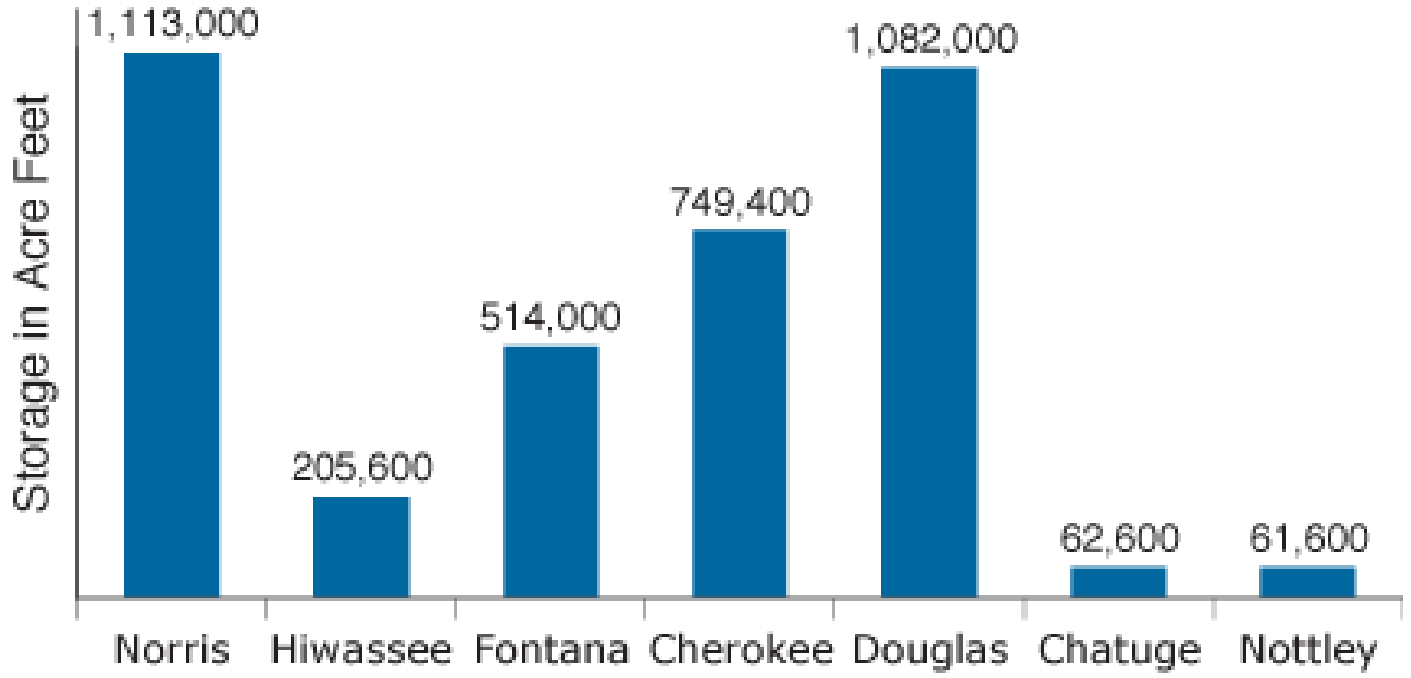
RE: excerpt from *TVA: The First Twenty Years* (1956)

"…In discharging its water control responsibilities, the TVA brings into play as an integrated system the thirty major dams on the Tennessee River and its tributaries. The annual cyclical pattern of rainfall and runoff, established by exhaustive analysis over the history of a century, governs the operation of the system. Operating guides called 'rule curves,' one for each storage reservoir in the system, show in graphic form the limits of fill and drawdown which can be allowed for a particular reservoir throughout the year. These guides and their use in the whole system of multiple-purpose reservoirs is probably the most distinctive characteristic of TVA water control operations…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…The guides for the tributary reservoirs provide for the water to be at its lowest level on January 1, when the flood season is just beginning and when the greatest amount of flood storage space is needed. The level rises gradually during the flood seasons, until the end of March; thereafter it rises steeply so that the reservoirs may reach their highest level not later than June 1. When heavy flood runoff occurs, the reservoirs are temporarily filled above the guide curve until the flood crest has passed downstream. They are then drawn down again to the required seasonal level as the flood recedes. During the summer, when runoff is moderate or low, they are filled as nearly as possible to top level. Then starting in late summer or early fall, the water is drawn out gradually so as to return again to the flood control level by January 1 to be ready for the next flood season, thus completing the annual cycle. The tributary reservoirs may be substantially below top levels during periods of drought and may not be completely refilled…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



<u>Above</u>: caption: "Targeted Flood Storage above Chattanooga, January 1." The reservoir system in the eastern *Tennessee Valley* was primarily planned to protect Chattanooga from flooding. At least one reservoir was built on each of the five major tributary rivers above Chattanooga with enough space to store floodwaters from large storms in the drainage areas above them. These seven reservoirs do the main work in controlling floods:

- **Norris Reservoir on the Clinch River**
- **Fontana Reservoir on the Little Tennessee River**
- **Douglas Reservoir on the French Broad River**
- **Cherokee Reservoir on the Holston River**
- **Chatuge, Nottely and Hiwassee reservoirs in the Hiwassee River basin**

Three main-river reservoirs above Chattanooga: *Fort Loudoun/Tellico*, *Watts Bar* and *Chickamauga* provide additional, limited storage capacity. Combined, all TVA reservoirs above Chattanooga can store about five million acre-feet of water during the winter flood season.

"…The mainstream reservoirs are also at their lowest level on January 1, but unlike the tributary reservoirs they remain at that level until the end of the flood season (about April 1) before filling to top summer level. Like the tributary res-ervoirs, those on the main stream may be filled temp-orarily to the top of the gates, the highest operating level, one or more times in the flood season in storing water to reduce the flood crest downstream. After the flood season the water is at its highest normal level until late summer or early fall. Then it is gradually drawn down during the fall dry season to return by January 1 to its minimum flood control level and thus complete the cycle. In the summer and early fall operation the water level is fluctuated about one foot weekly which, together with a gradually receding water level, strands and destroys mosquito larvae and effectively aids in malaria control…"

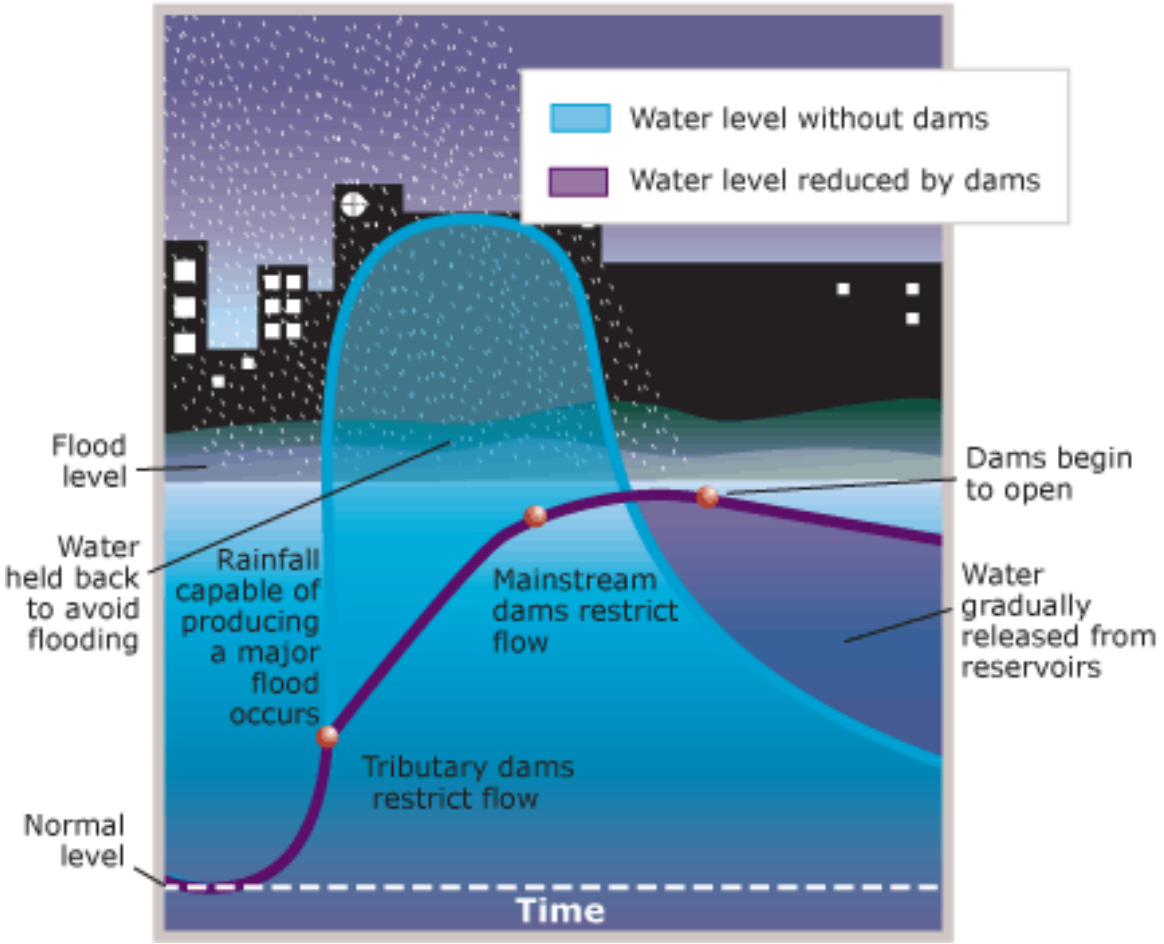
RE: excerpt from *TVA: The First Twenty Years* (1956)

Below Chattanooga, the *Kentucky Reservoir* (near the mouth of the *Tennessee River*) has four-million acre-feet of flood storage space during the winter and early spring, representing more than 40% of the flood storage in the entire TVA reservoir system. This capacity can be used to reduce flood crests on the *Mississippi River* at Cairo, Illinois by as much as two to three feet. Three other main-river reservoirs upstream from Kentucky but below Chattanooga: *Pickwick, Wheeler* and *Guntersville,* provide about one-million acre-feet of storage space. This is used to supplement storage in the Kentucky Reservoir and to reduce flooding immediately below these dams. Storage space in main-river reservoirs is limited by topography and the requirement in the *TVA Act of 1933* for a nine-foot waterway for commercial navigation from the beginning of the *Tennessee River* at Knoxville, TN, to its mouth at Paducah, KY.

<u>Above</u>: caption: “The Kentucky Lake is a reservoir of the Tennessee River located in Kentucky and Tennessee. It was created in 1944 by the Tennessee Valley Authority.”

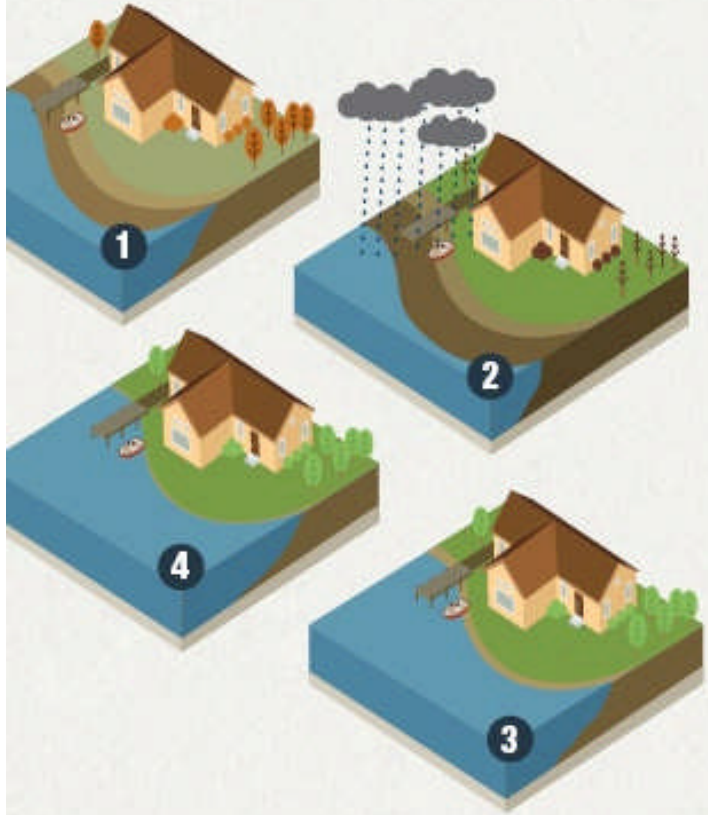
Many Ounces of Prevention

The TVA prepares for the winter flood season by lowering the level of flood-storage reservoirs to make room to hold the run-off produced by winter storms. When a storm hits, TVA holds the water back by reducing releases from the dams in areas where it is raining. When the rain stops and the danger of flooding is over, TVA gradually lets the water out to get ready for the next storm. In the summer, when flood risk is lower, TVA keeps lake levels higher to support recreation. To get ready for winter, TVA begins releasing water from tributary storage reservoirs at a faster rate following *Labor Day* weekend. This allows TVA to put the stored water to good use during September and October (which are typically hot, dry months) by generating electricity to power air conditioners and supplementing flows for water quality and navigation. Main-river reservoirs don't fluctuate nearly as much as the tributaries because of their original design and navigation requirements. Their drawdowns are staggered from July through the end of the year to ensure the released water can be used efficiently, generating electricity as it runs through the turbines at as many as nine dams downstream. The seasonal drawdown begins after the July 4th weekend on *Kentucky Reservoir*. Following the Labor Day weekend, on: *Chickamauga, Guntersville, Wheeler*, and *Pickwick Reservoir/s,* and on November 1st: *Fort Loudoun* and *Watts Bar Reservoir/s.*


Water level without dams
Water level reduced by dams
Flood level
Water held back to avoid flooding
Rainfall capable of producing a major flood occurs
Tributary dams restrict flow
Mainstream dams restrict flow
Dams begin to open
Water gradually released from reservoirs
Normal level
Time

Reservoirs are typically lowered at least to winter flood-guide levels by January 1st each year. During the flood season, these levels may fall below flood guide levels by several feet to satisfy other operating objectives, but flood guide levels will only be exceeded during flood control operations. As soon as the downstream floodwaters begin to recede, the reservoirs are lowered at a controlled rate to recover flood storage space for future storms. If enough water can't be released through the turbines, it is sometimes necessary to let additional water flow through sluiceways or over spillways to speed-up the drawdown and regain the storage space needed for future rains. Aggressive filling of tributary reservoirs to summer levels begins in mid-March, when the chance of flood-producing storms, prolonged wet periods, and multi-storm sequences begins to decline. Main-river reservoirs are kept at lower levels until near the end of the flood season (late April or early May) because flood storage space in these reservoirs is limited (for this same reason). However, main-river reservoirs fill more quickly than tributary reservoirs. A small amount of flood storage capacity is reserved in all reservoirs through the summer months as a protection against flood-producing storms over limited areas.

Understanding the annual drawdown is easy. TVA reservoirs are operated on an annual cycle that includes four key transitions.



1 FALL
CONTROLLED DRAWDOWNS

Reservoir levels are lowered to create enough room to store floodwater.

2 WINTER
PREPARING FOR RAIN EVENT

Reservoir levels are held low during the winter months when there is a higher risk of flooding. When heavy rain hits the Valley, all that water can be stored and then released so levels can be drawn down and ready for the next flood.

3 SPRING
CONTROLLED FILL

Reservoir levels are filled during the spring.

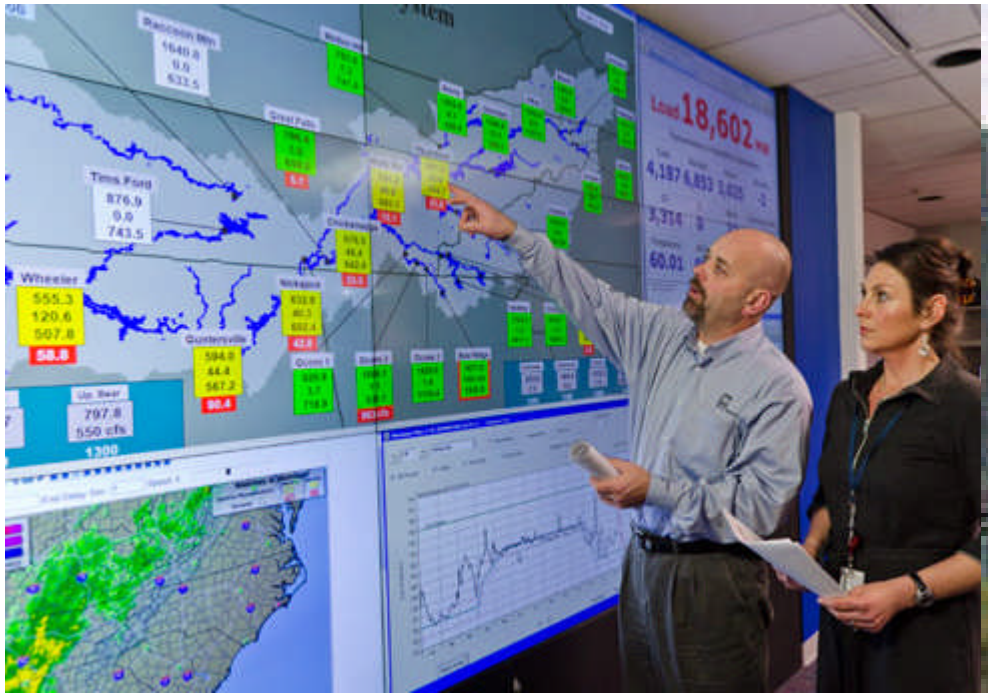
4 SUMMER
STEADY WATER LEVELS

Levels remain high during summer for recreation.

Predicting the Future

"…Dependable and frequent predictions of the amount of rain expected and adequate reports of rainfall and stream stages are essential to successful water control. To meet the first of these needs, the U.S. Weather Bureau, through a cooperative agreement, furnishes TVA at least two forecasts daily of precipitation to be expected. During floods three daily forecasts are furnished. The staff of TVA engaged in water control operations includes personnel who (1) collect and transmit rainfall and stream flow data; (2) receive, assemble, and analyze these data; and (3) apply the data to the current conditions to determine where it is necessary to impound or release water to maintain desired river levels and flows…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



Left: caption: "TVA's River Forecast Center, located in Knoxville, Tenn., is staffed around the clock, 365 days a year. River schedulers continually monitor weather conditions and water quality data, as well as water availability and demand - all with the goal of routing water through the river system to provide the most public value given changing weather conditions and water needs. Their duties include:

• Issuing forecasts of reservoir levels and water releases at TVA dams;

• Providing hourly generation schedules for TVA hydroelectric projects, eight projects operated by the U.S. Army Corps of Engineers on the Cumberland River system, and four reservoirs that make up Alcoa Power's Tapoco project;

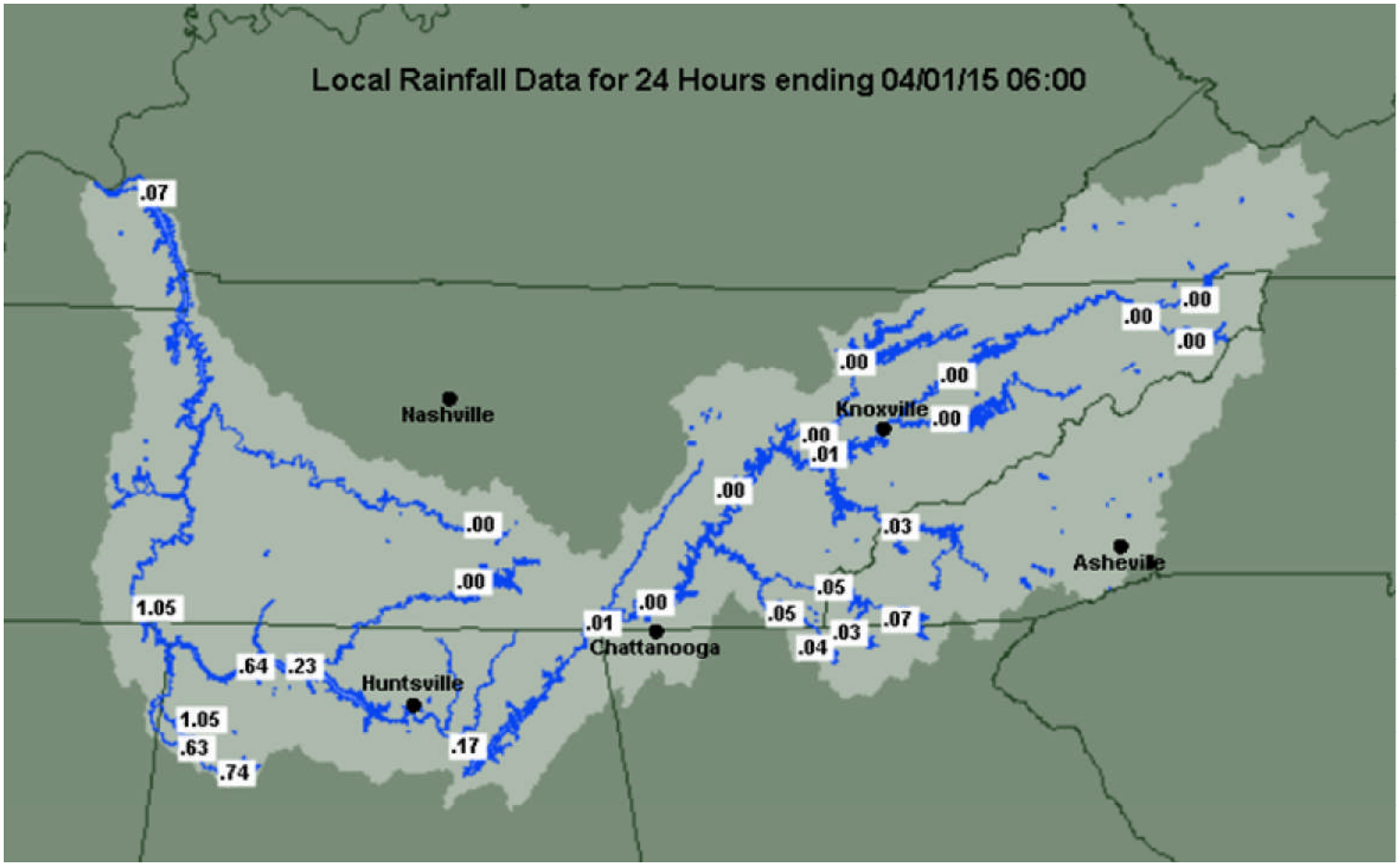
• Providing special notifications to the public during flood events;

• Evaluating cooling water needs for TVA coal-fired and nuclear plants;

• Monitoring water quality conditions below TVA dams so that aeration equipment can be turned on when needed to maintain adequate dissolved-oxygen concentrations, and;

• Serving as the main point of contact in the event of a river system emergency."

Right: caption: "TVA uses self-emptying rain gauges that funnel precipitation into a bucket that tips when a certain amount of rainfall is collected. The gauge records the number of tips and transmits information to TVA by satellite hourly or every three hours, depending on the gauge."


Local Rainfall Data for 24 Hours ending 04/01/15 06:00
.07
Nashville
.00
.00
1.05
.64
.23
Huntsville
1.05
.63
.74
.17
.01
.00
Chattanooga
.00
.00
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Knoxville
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Asheville
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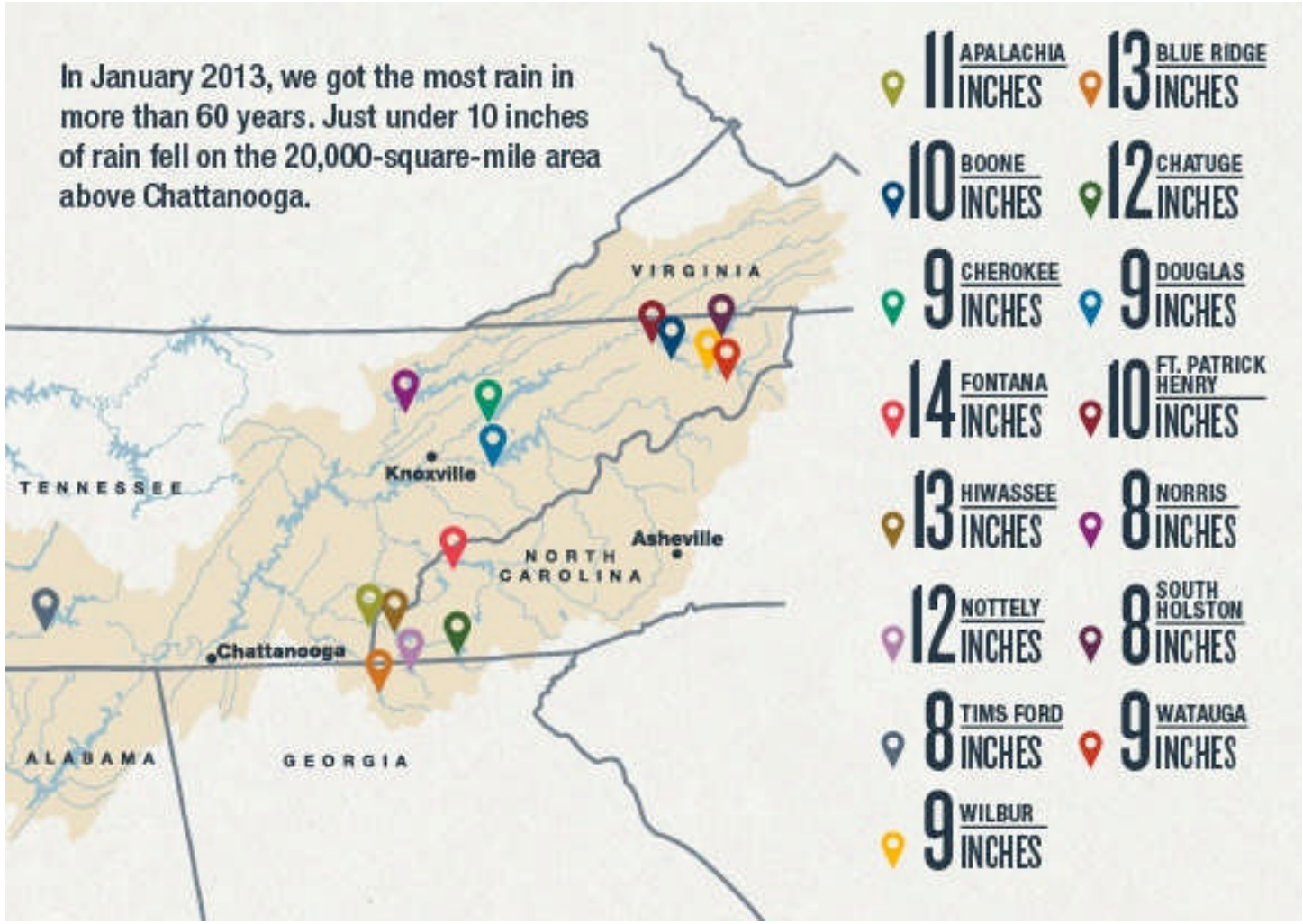
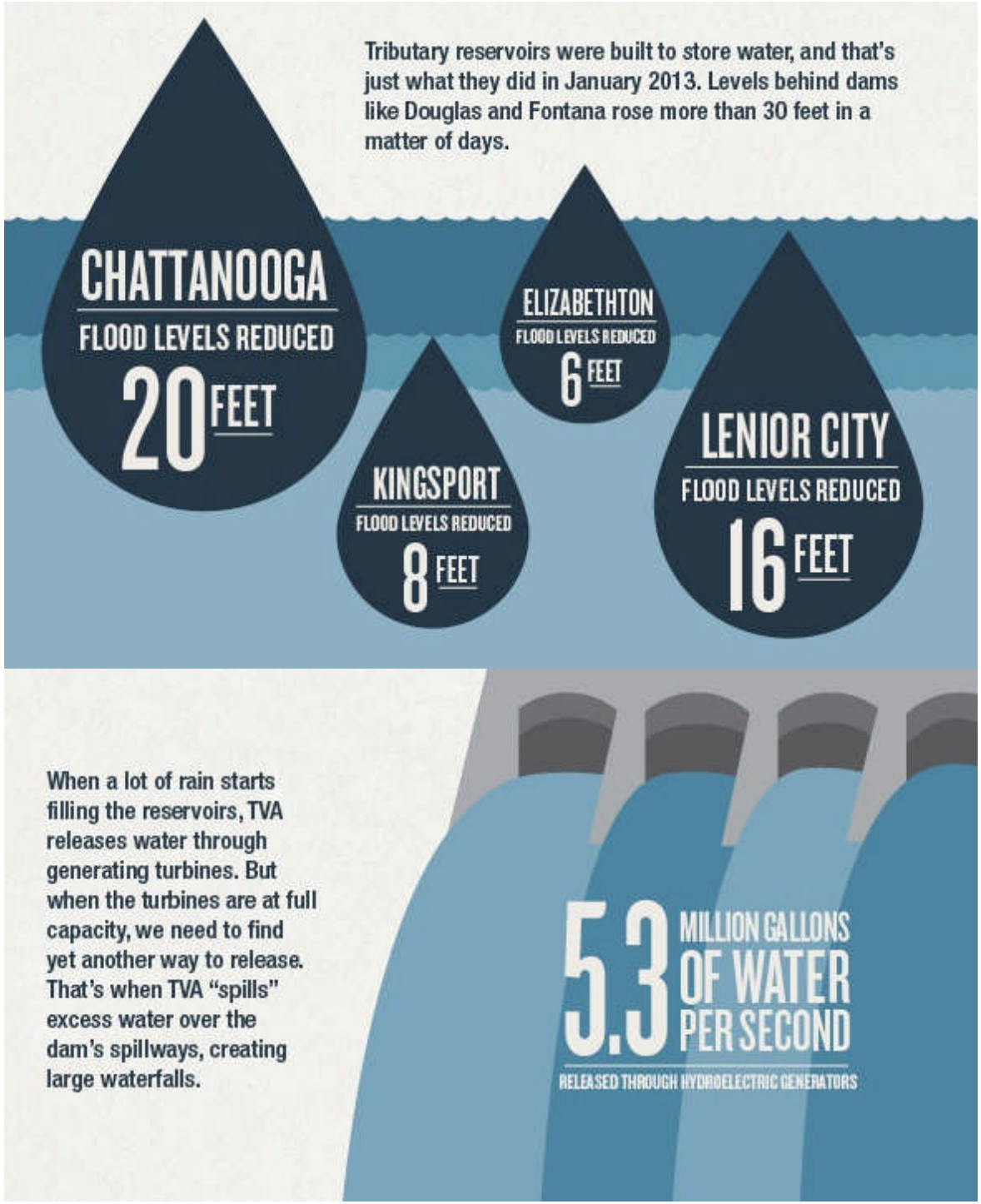
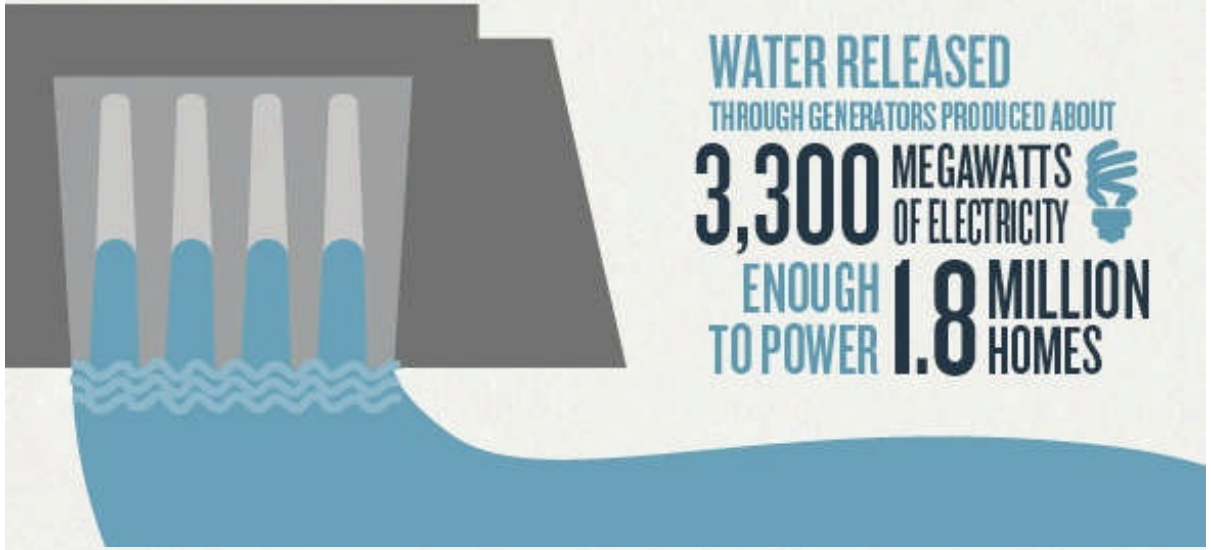
The Flood That Never Was



<u>Above</u>: in January 2013, a forecast for two-inches of rain in the upper *Tennessee Valley* turned into a major rain event of nearly 10-inches. TVA's *River Forecast Center* ran continuous forecast models and sent instructions to open and/or close dam spillways with the goal of keeping the excess water from causing a flood. This time, however, the rain kept coming – the most in more than sixty years. The TVA brought in reinforcements to help deal with the challenge of rapidly filling reservoirs.


Tributary reservoirs were built to store water, and that's just what they did in January 2013. Levels behind dams like Douglas and Fontana rose more than 30 feet in a matter of days.
CHATTANOOGA
FLOOD LEVELS REDUCED
20 FEET
KINGSPORT
FLOOD LEVELS REDUCED
8 FEET
ELIZABETHTON
FLOOD LEVELS REDUCED
6 FEET
LENIOR CITY
FLOOD LEVELS REDUCED
16 FEET
When a lot of rain starts filling the reservoirs, TVA releases water through generating turbines. But when the turbines are at full capacity, we need to find yet another way to release. That's when TVA "spills" excess water over the dam's spillways, creating large waterfalls.
5.3 MILLION GALLONS OF WATER PER SECOND
RELEASED THROUGH HYDROELECTRIC GENERATORS

Once flood storage recovery efforts were in full swing, TVA was able to return reservoir levels to normal operating guides through a combination of spilling water through gates and generating electricity through turbine releases.



WATER RELEASED
THROUGH GENERATORS PRODUCED ABOUT
3,300 MEGAWATTS OF ELECTRICITY
ENOUGH TO POWER 1.8 MILLION HOMES

In January 2013 alone, averted flood damages totaled an estimated $800 million because of the way reservoir levels were managed (remember the cycle!). TVA stored floodwaters and released them at a slower rate so that communities like Elizabethton, Knoxville and Chattanooga were spared the major structural damages that can be caused by high water.

WHAT COULD HAVE HAPPENED

$800 MILLION IN DAMAGES AVERTED

WHAT DID HAPPEN

Very Great

"…In the years since March, 1936, when TVA began reservoir operations with the closure of Norris Dam, the benefits of flood regulation in the Tennessee Valley have been very great. These benefits have been felt on the five principal tributary streams below the multiple-purpose reservoirs and all down the main Tennessee Valley through the reduction of flood crest heights. From 1936 to 1951, fifteen floods occurred at Chattanooga which in their natural state would have equaled or exceeded a flood stage of 30-feet, at which damage begins. All of these floods were lowered by amounts varying up to as much as 12.5-feet, the greater reductions being mostly from the higher flood crests. The total estimated savings in flood damages averted at that city alone exceed $45,000,000, more than one-fourth of the flood control investment in the entire river system. The real effectiveness of the TVA system was shown in three successive years, 1946, 1947, and 1948, when without regulation the fifth, sixth, and seventh highest floods of record would have occurred. All three would have been very close in height to the fourth highest of record in 1917. These three flood crests were lowered by from ten to 12.5-feet with estimated savings aggregating some $36,000,000…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…In the same fifteen-year period some 24 floods on the Mississippi River which would have equaled or exceeded a flood stage of forty feet at Cairo, Illinois, were lowered by amounts varying up to two feet, the larger reductions again being usually from the highest flood crests. Some of the smaller reductions were before the big Kentucky reservoir came into use in 1944. It has been estimated that the TVA water control system can reduce dangerous floods on the lower Ohio and Mississippi rivers by as much as two to four feet, depending on the type and size of flood in the Tennessee River Basin…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Hell & High Water

TVA dams and reservoirs help: “keep floods away from the people,” but they cannot prevent all flooding. For this reason, the TVA also tries to: “keep the people away from floods,” by promoting the enlightened use of floodplains and preventing development that can adversely impact operation of the reservoir system for flood damage reduction (floodplains are lands bordering rivers and streams that are normally dry but are covered with water during floods.) The focus is on the lands and projects the TVA holds in stewardship and on the floodplains along the rivers and streams regulated by TVA dams. A key component of the TVA’s floodplain management effort is promoting awareness of flood risks. The TVA uses historic data to determine which areas fall within the 100-year floodplain. People living in these areas have a 1-in-100 chance of being flooded in any given year (which is different from being flooded once every 100 years). Essentially, this means that if they choose to build there, they do so at their own risk.


WOR HINGTON & CO.
Coca-Cola
Coca-Cola

Part 12

An Unavoidable Consequence

"…Either high dams or low dams will keep back floods, but to make a deep channel for navigation high dams are better, because you don't need so many. The army engineers made two plans for the Valley, one for thirty-two low dams, the other for seven or more high dams. The low dams would have lengthened the navigation time from the river mouth to Knoxville by eleven and a half hours. Deciding to build high dams, TVA provided for flood control, shortened navigation time, and got power as a by-product or anyhow as an unavoidable consequence…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Of Secondary Importance

"…The prime purpose of the new agency, as denned by the Act of 1933, was to bring the Tennessee River under control and to put it to work. Flood control and navigation were listed in the Act as primary activities, power production as secondary. Notwithstanding the prominent billing given to electric power in the years since 1933, it is important to remember that it is subservient to the primary purposes of flood control and navigation…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

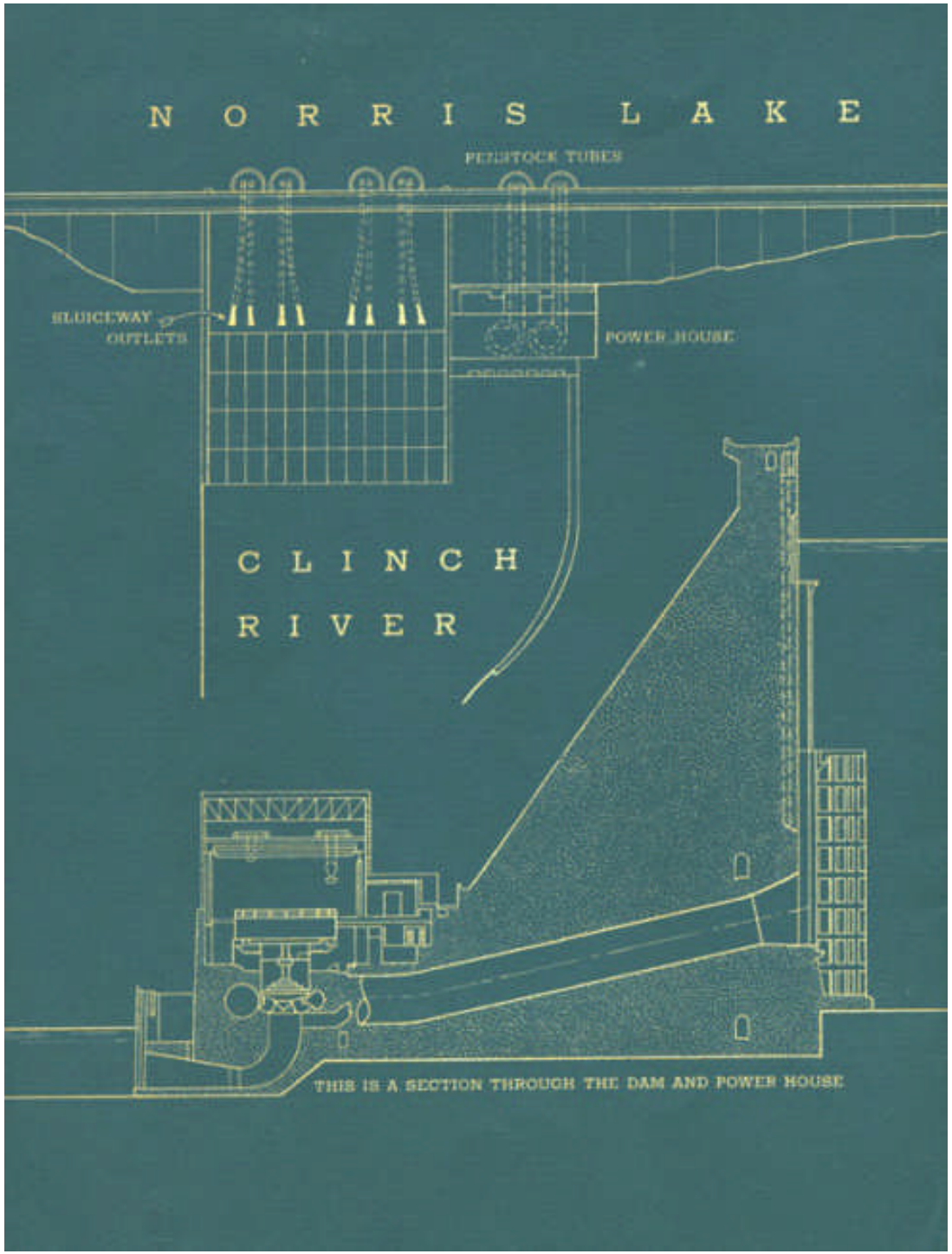
"…Proof of power's secondary position is found in the method of operation of the river control system. Though the Office of Power is responsible for the physical operation of the system, the power people operate according to instructions from the Division of Water Control Planning in the Office of Engineering. The latter organization determines the amount of storage space which must be provided at any given time in each reservoir in order to provide needed flood protection. It also determines the water requirements needed to provide the minimum required depth in the navigation channel. If the power managers can operate the system in such a way as to meet the navigation and flood protection requirements set up by the Chief Engineer and utilize the water to generate power at the same time, well and good; but if a conflict of interests develops, as it often does, navigation and flood control come first…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

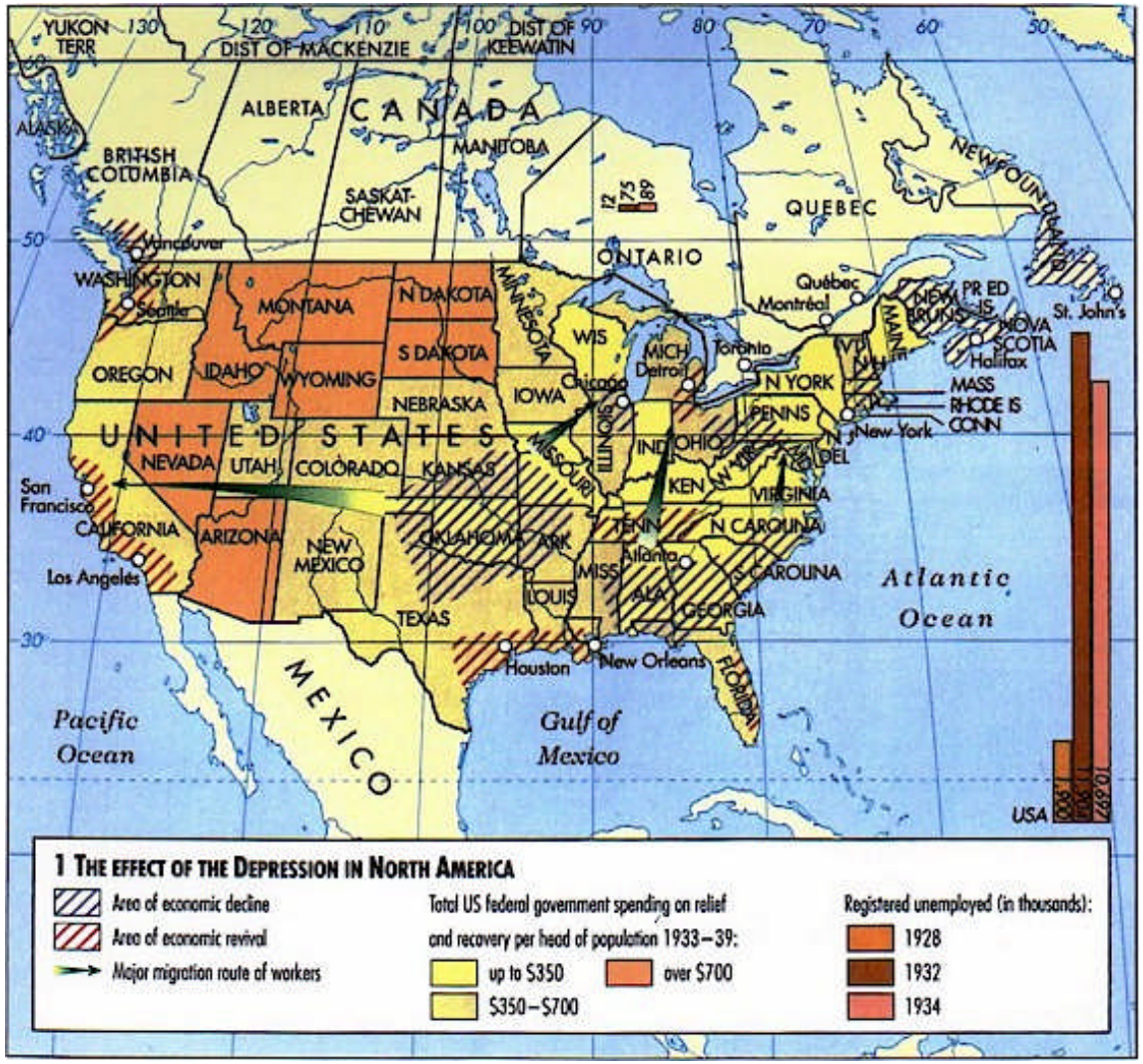
"…It is frequently necessary during the winter months to spill water in order to maintain storage space in the reservoirs against the possibility of future floods. Spilled water is wasted water as far as power production is concerned, and a good deal of potential hydroelectric production is lost in this fashion nearly every year. This is the only way the system can operate if it is to provide flood protection and navigation, however, and this is the way it does operate…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

First of Many

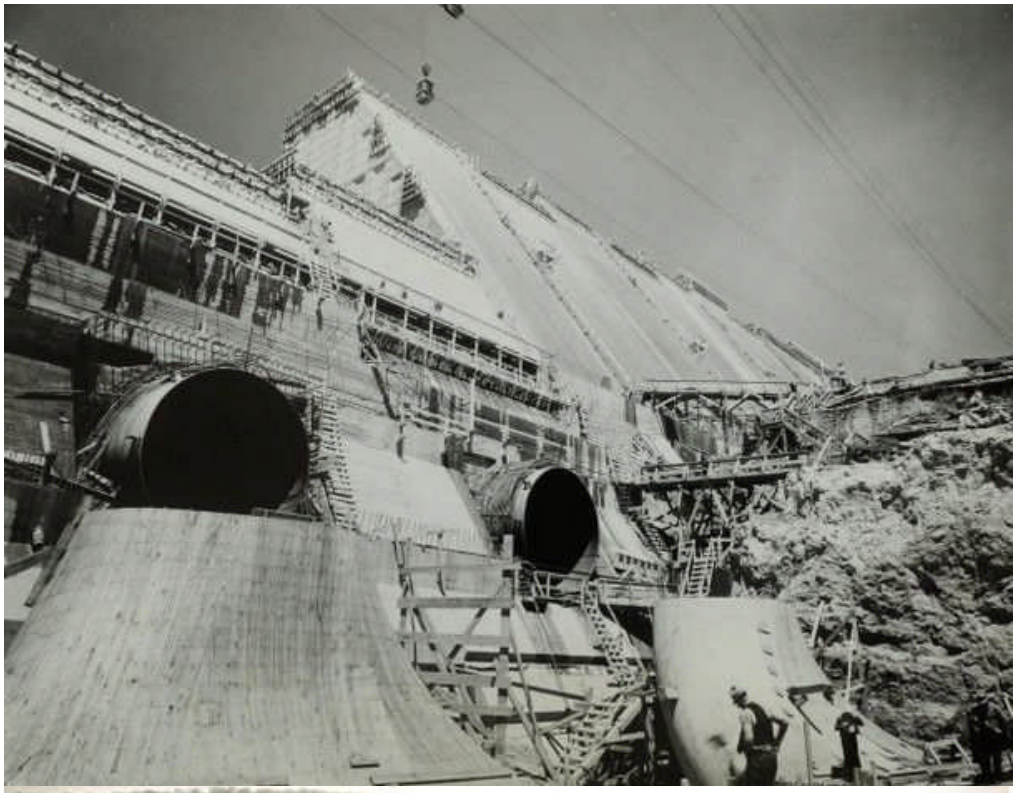


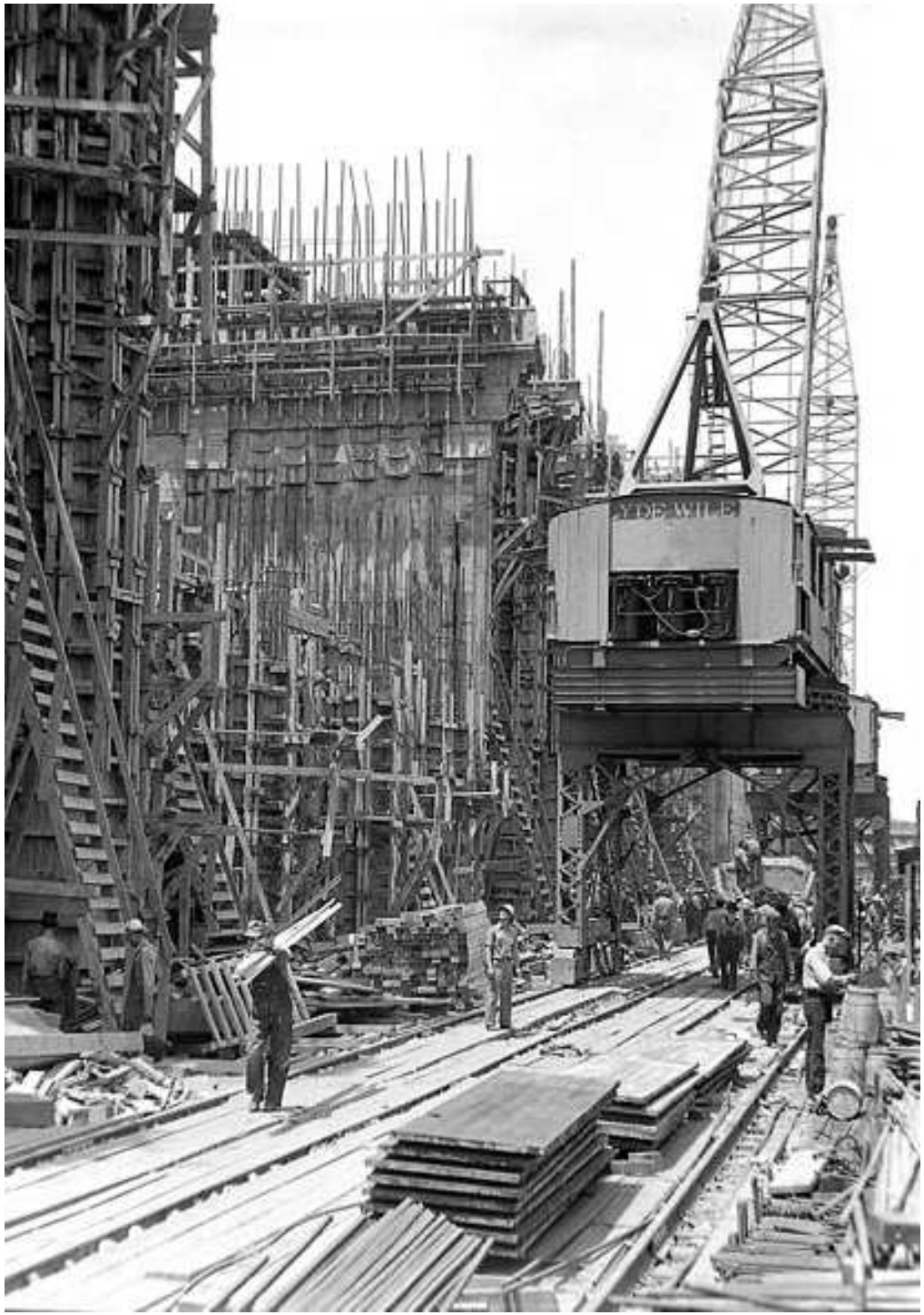
The TVA started with only one dam; *Wilson*, at *Muscle Shoals*. The first dam the TVA was authorized to construct was *Norris Dam*, on the *Clinch River*. The *TVA Act of 1933* specified that that dam should be begun at once. At the time, the nation was in the depths of the Depression and, to relieve chronic unemployment, it became imperative that construction commence forthwith. However, there were no designs or plans available. The *U.S. Army Corps of Engineers* had selected a location which the TVA found satisfactory, but not even the height of the dam had been determined when the TVA took over.


YUKON TERR
DIST OF MACKENZIE
DIST OF KEEWATIN
ALBERTA
CANADA
ALASKA
BRITISH COLUMBIA
MANITOBA
SASKAT-CHEWAN
ONTARIO
QUEBEC
NEWFOUNDLAND
Vancouver
WASHINGTON
Seattle
MONTANA
N DAKOTA
S DAKOTA
MINNESOTA
WIS
MICH
Toronto
Québec
Montréal
St. John's
NEW BRUNS
PR ED IS
NOVA SCOTIA
Halifax
MAINE
VT
N H
MASS
RHODE IS
CONN
OREGON
IDAHO
WYOMING
NEBRASKA
IOWA
Chicago
Detroit
N YORK
PENNS
New York
N J
DEL
UNITED STATES
NEVADA
UTAH
COLORADO
KANSAS
ILLINOIS
MISSOURI
IND
OHIO
W VIRG
KEN
VIRGINIA
San Francisco
CALIFORNIA
ARIZONA
NEW MEXICO
OKLAHOMA
ARK
TENN
N CAROLINA
Atlanta
Los Angeles
MISS
ALA
S CAROLINA
GEORGIA
LOUIS
TEXAS
Houston
New Orleans
FLORIDA
Atlantic Ocean
Pacific Ocean
MEXICO
Gulf of Mexico
USA
10,637
1 THE EFFECT OF THE DEPRESSION IN NORTH AMERICA
Area of economic decline
Area of economic revival
Major migration route of workers
Total US federal government spending on relief and recovery per head of population 1933–39:
up to $350
over $700
$350–$700
Registered unemployed (in thousands):
1928
1932
1934

Under normal circumstances, for a project the size of *Norris Dam*, complete plans and specifications would be drawn up, bids solicited from contractors, and contracts let before construction began. That process would have taken at least a year. It became evident that the only way to get men to work quickly was for TVA to hire its own construction forces and start building while plans were still in preparation (*a/k/a* "Fast Tracking").

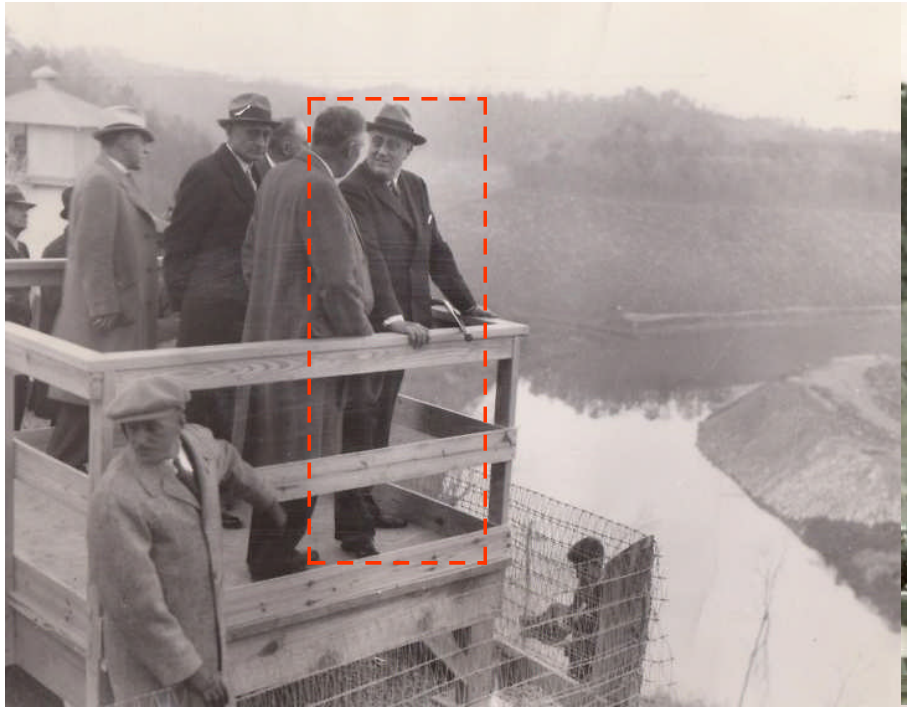
<u>Left</u>: caption: "The upstream face of Norris Dam, seen from the top of the mixing plant on the west abutment during the building of the dam. The semicircular structures at the base are 'trash-racks' or filters covering the openings through the dam. The masonry section of Norris Dam is 1,570-feet long; the dam is situated on the Clinch River, an important tributary of the Tennessee River."





The TVA hired superintendents, foremen, laborers, mechanics, and all the other personnel necessary to build a dam; the men were out on the job working before there were any completed plans. The *U.S. Bureau of Reclamation* (USBR), called on to design the dam, began to turn out plans in their Denver office for work already underway at Norris. The fast-track system whereby the design stayed one or two steps ahead of actual construction worked, but there were many close calls. Work had been going only about three months at *Norris Dam* when FDR ordered a start on *Wheeler Dam*. Once again, the USBR was called upon for design assistance and, as at Norris, construction began with the TVA's own forces. Inside of two months, nearly five-thousand men were at work at Wheeler.

<u>Left</u>: caption: "Wheeler Dam – Cofferdam Construction (1935)

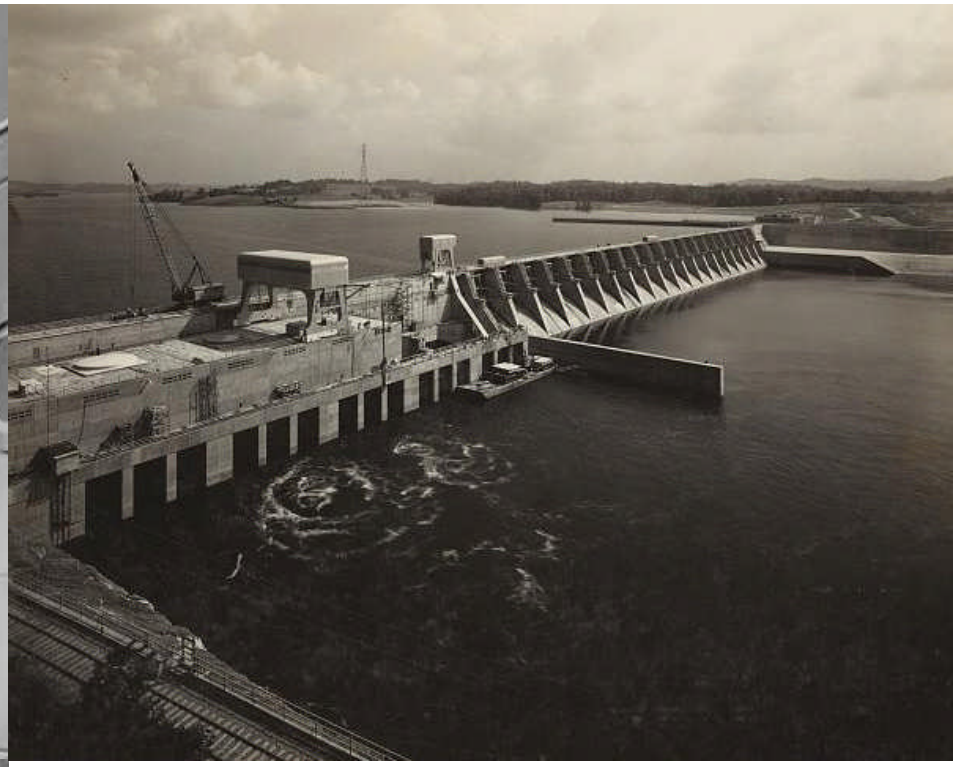


As work on *Norris* and *Wheeler Dam/s* approached completion, construction began on *Pickwick* and *Hiwassee*, two additional dams called for by the TVA's "Integrated Plan of 1936." These dams (and all subsequent dams) were designed by TVA's own in-house design organization. To keep the system in balance, it was planned to build alternately a storage dam and a run-of-river dam (Norris was a storage dam, Wheeler a run-of-river dam; Hiwassee a storage dam, Pickwick a run-of-river dam, etc.). This scheme would result in securing maximum benefits at the earliest possible date/s. The first phase of the construction program included these four dams, along with *Guntersville* and *Chickamauga* Dam/s.

<u>Left</u>: caption: "President Roosevelt at Norris Dam"

<u>Right</u>: caption: "Opening day - Norris Dam"

In 1939, the TVA completed negotiations with the *Tennessee Electric Power Company* for the purchase of its system, which included *Hales Bar Dam, Great Falls Dam*, *Ocoee Dam/s* (Nos. 1 and 2), *Blue Ridge Dam* and several steam plants. With the international situation deteriorating, the federal government foresaw a need for new power for national defense. Thus, the TVA was asked to proceed more rapidly with construction to expedite power production. The agency was requested to devise an emergency program which would produce additional power in the shortest time. It responded by speeding up the schedule on some of the dams then under construction: *Kentucky Dam, Watts Bar Dam* and *Fort Loudoun Dam*, and by beginning another dam already planned; *Cherokee Dam*. The power the TVA was asked to furnish was not only to supply ALCOA's big plant near Knoxville, but also for many other war industries in the area.

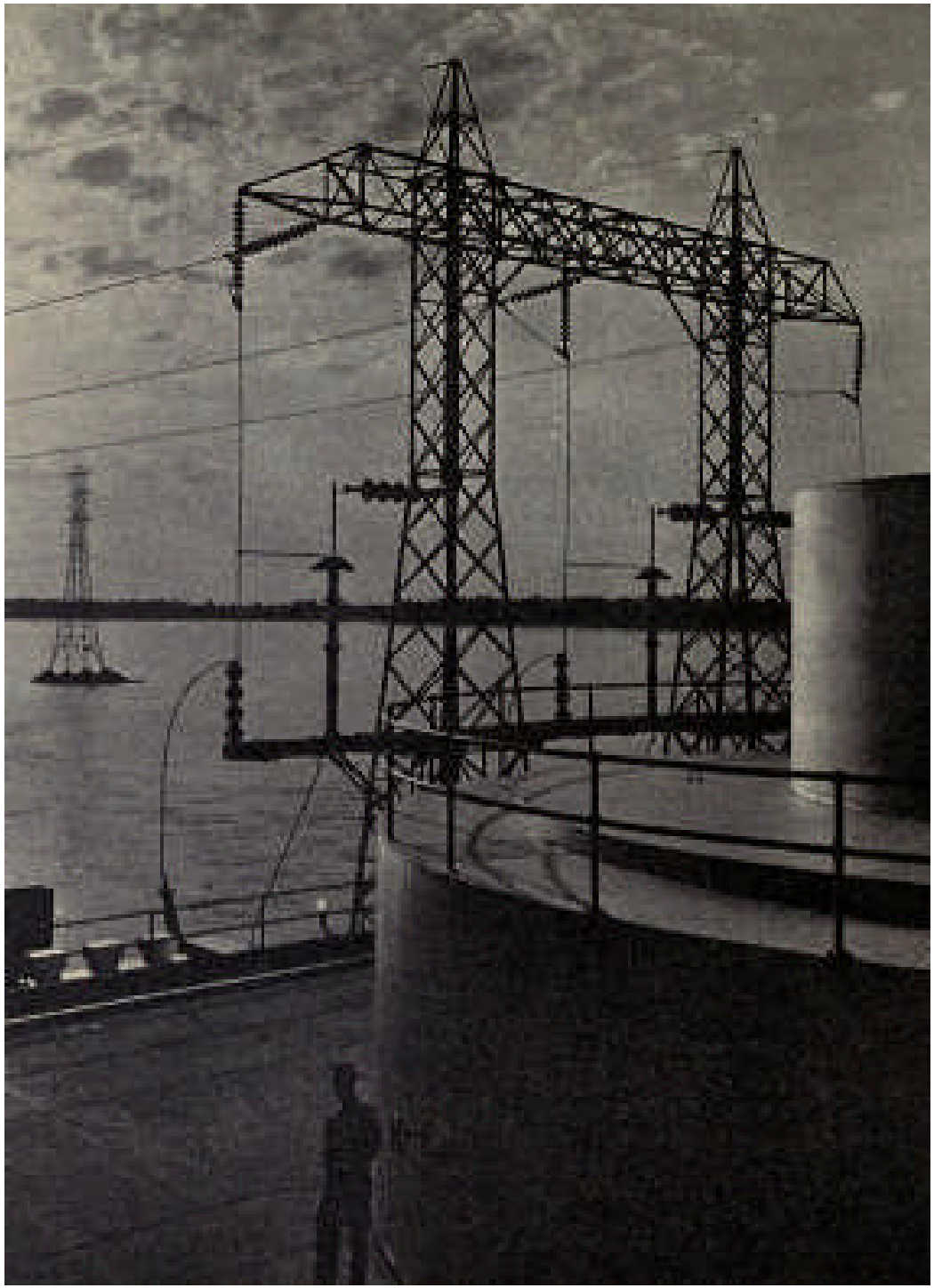


<u>Top Left</u>: caption: "Kentucky Dam, close to the mouth of the Tennessee River, will be one of the biggest projects of the Authority and will back the water up for a distance of 185 miles. It will be completed in 1944. This photograph shows a partial view of the lock operation building, with the commanding officer's work space, shaped somewhat like a control cabin in the foreground on the second floor."

<u>Top Right</u>: caption: "Watts Bar Dam"

<u>Left</u>: caption: Drillers at work, TVA's Fort Loudoun Dam"

A Steamship in Reverse



"…Another study made by TVA shows that the prosperous parts of the country are those with access to deep water, along the coasts or the Great Lakes and the Mississippi. So far there's nothing nautical about Tennessee, but the dams do remind you of big ships in port. Maybe it's the cleanness, and the paint, and the railings with life preservers. And of course the working of a power dam is easier to understand if you see it as a steamship in reverse. A ship's engines work to turn the screw, which turns the propeller, which moves the ship through the water. A dam stands still and lets the water run through it. But the rush of the water moves the turbines, and the power goes out to work engines on the land…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Everything is Shipshape Down at Wheeler Dam"

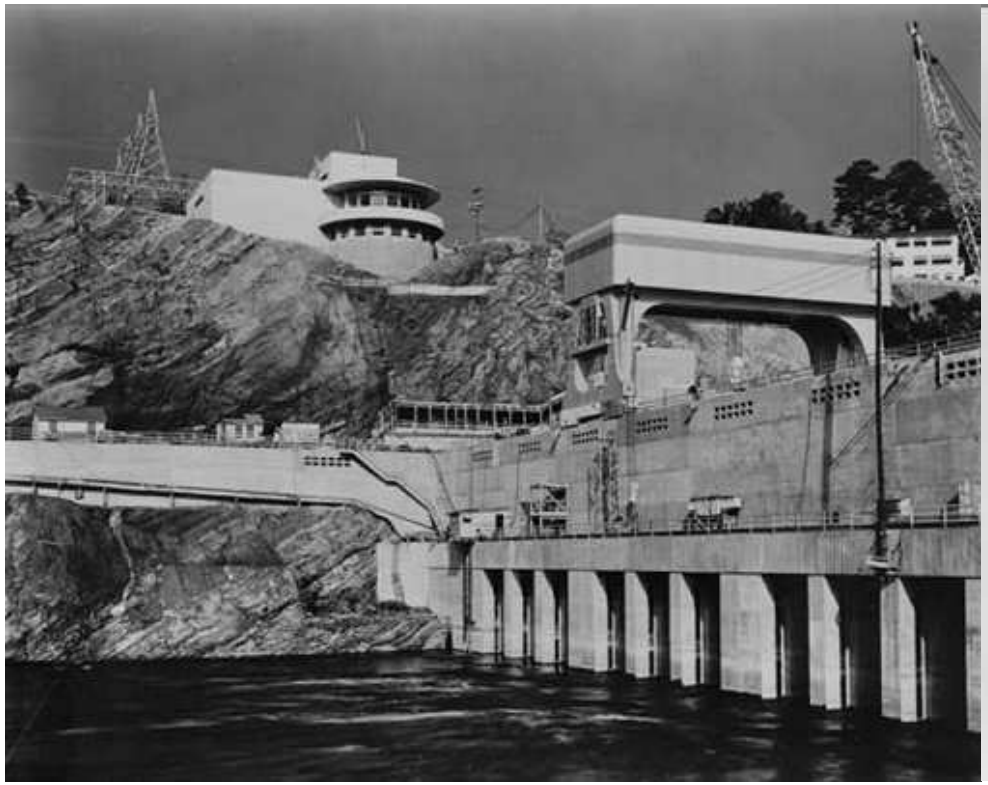
War Work

"…It was evident that to guarantee firm power for such important projects it was necessary to add some steam standby to the system. Accordingly a steam plant was proposed for Watts Bar, where TVA was then building a dam and had the construction forces, an access road, and a construction camp already available. Congress authorized first a 60,000-kilowatt unit, then another 60,000, and finally two more, or a total of 240,000 kilowatts of electric steam power, all installed in Watts Bar Steam Plant…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

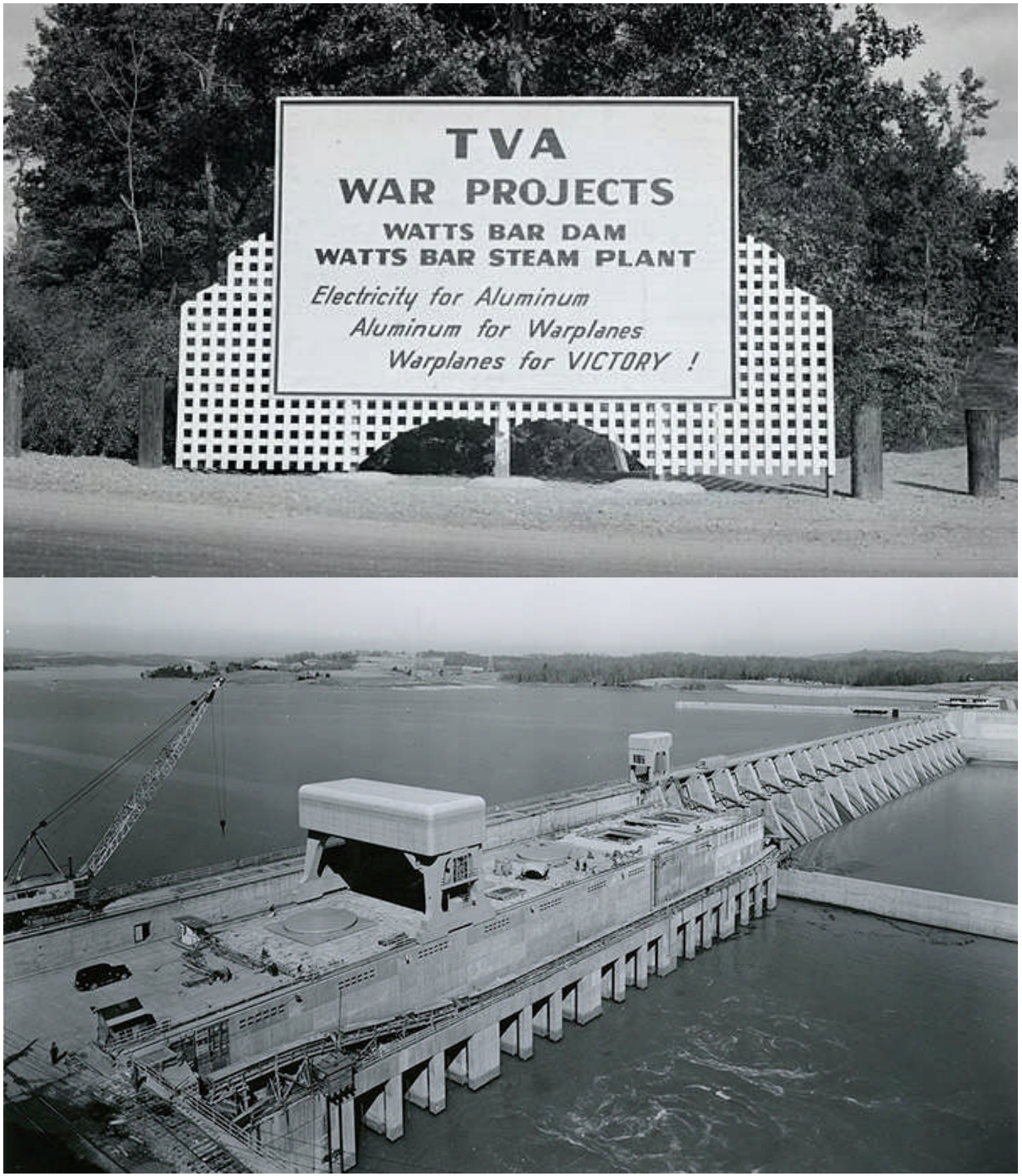
<u>Left</u>: caption: "Watts Bar steam plant. General view of the plant still under construction."

<u>Right</u>: caption: "One of four turbo-generating units produce electric power at TVA's Watts Bar steam plant. This plant will supplement the big hydroelectric installations at Watts Bar Dam, which has an authorized output of 90,000 kilowatts, and a possible ultimate of 150,000 kilowatts. Each of the four big turbo-generators in the steam plant is rated at 60,000 kilowatts."

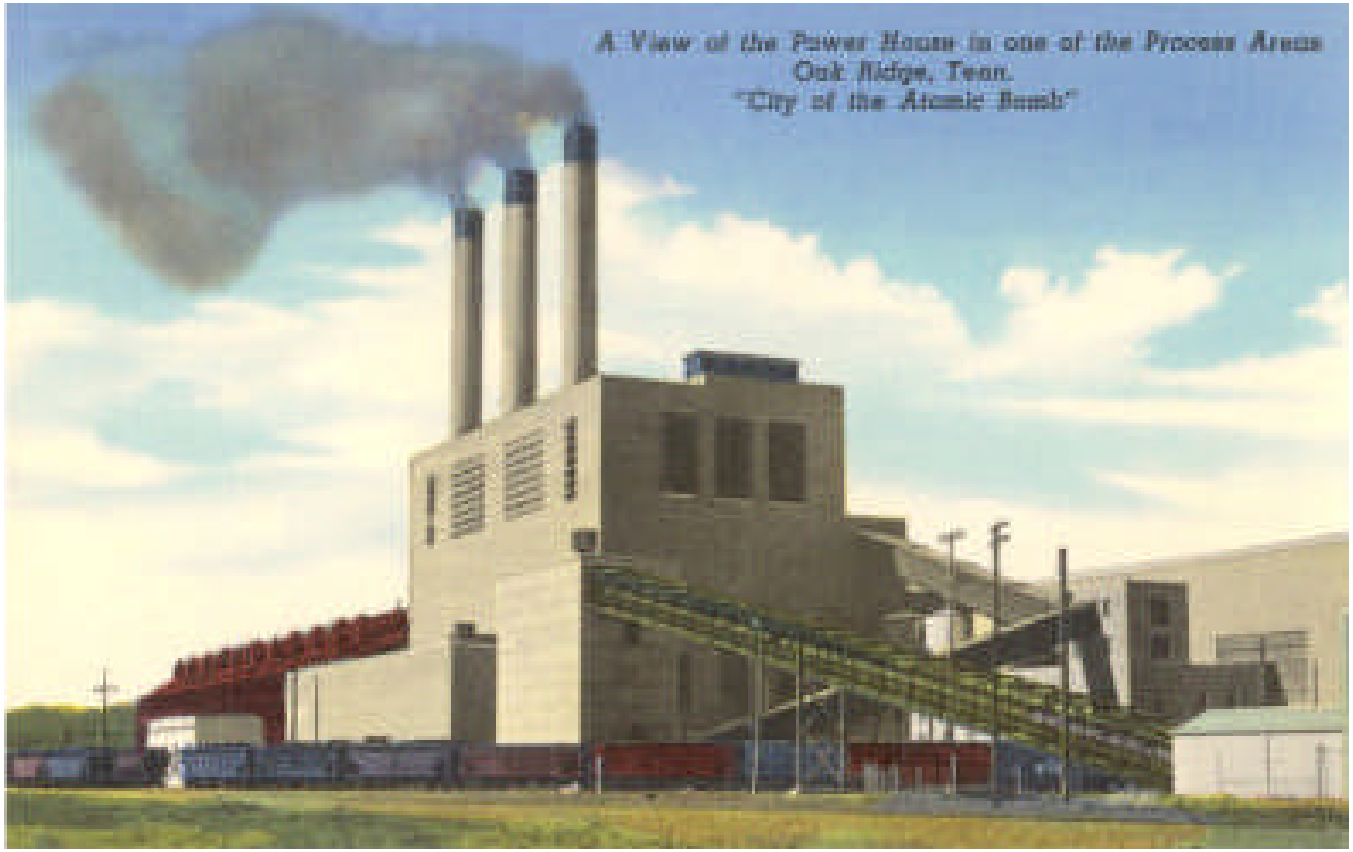


Left: caption: "Watts Bar Dam, shown here under construction, has a semi-outdoors type powerhouse with an enormous gantry crane (to the right of the picture) for installation and removal of units. The project is further distinguished by a control building which is entirely removed from the hydro plant, being located some 120-feet higher on top of a steep cliff and with direct connection to the switchyard behind. The windowless left wing of the control building houses the control room; the tower-like structure in the back accommodates air conditioning, restrooms, etc. The glass wall, upper level, contains the reception room with a broad semi-circular overlook terrace, the story below the terrace devoted to offices."

Right: caption: "Perspective rendering of the Watts Bar control building"


TVA
WAR PROJECTS
WATTS BAR DAM
WATTS BAR STEAM PLANT
Electricity for Aluminum
Aluminum for Warplanes
Warplanes for VICTORY !

As the international situation worsened, the federal government requested that the TVA expedite its dam-building program still further and build additional dams, primarily for power. This second emergency program resulted in construction of four dams which were not in the *Integrated Plan of 1936*. These were the *Chatuge, Nottely, Ocoee* (No. 3) and *Appalachia Dam/s*. They were completed in record time and furnished significant amounts of electrical power for the war effort. Although TVA was building dams at a rapid rate, Congress authorized still more power, not only for the production of aluminum but also for the new federal project at Oak Ridge, TN. The purpose of this project was still secret, but it demanded a large amount of power, necessitating a third emergency program. This included *Fontana Dam* (on the *Little Tennessee River*) and *Douglas Dam* (on the *French Broad River*).

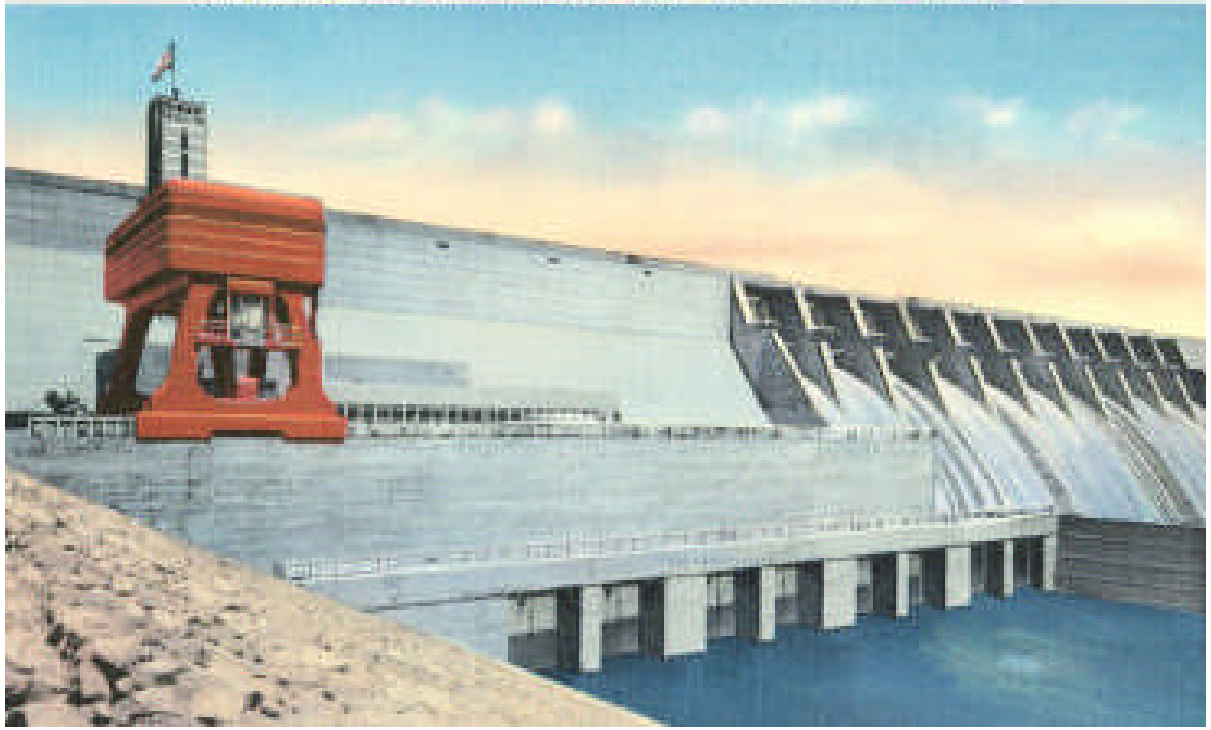

A View of the Power House is one of the Process Areas
Oak Ridge, Tenn.
"City of the Atomic Bomb"

In order to start *Fontana Dam*, a contract was executed with the *Aluminum Company of America* (ALCOA) which called for the company to furnish the site for the dam and for the TVA to build a dam on the site and to furnish the company a certain amount of power at its plant at agreed-to prices. Under this contract, the TVA started to build Fontana Dam, but *Douglas Dam* was held up because Congress was placed under pressure to deny funds for Douglas in favor of two dams on the *Holston River*. Douglas was needed for several reasons, most importantly was the fact that its power potential was much greater than could be found elsewhere. Additionally, it was an essential link in the integrated system in that it controlled one of the largest tributaries; the *French Broad River*. Congress postponed action for about thirty days and, in the meantime, authorized two other dams: *South Holston* and *Watauga*, as a substitute. These two dams were in no way a substitute for Douglas Dam and, in the end, Congress recognized the value of Douglas for power and authorized its construction. It was completed within thirteen months, making for a world-record in construction time for a project of its size.

Left: caption: "Floodgate Construction at Douglas Dam"

Right: caption: "Floodgates Open at Douglas Dam"

TVA DOUGLAS DAM ON THE FRENCH BROAD RIVER IN EAST TENNESSEE



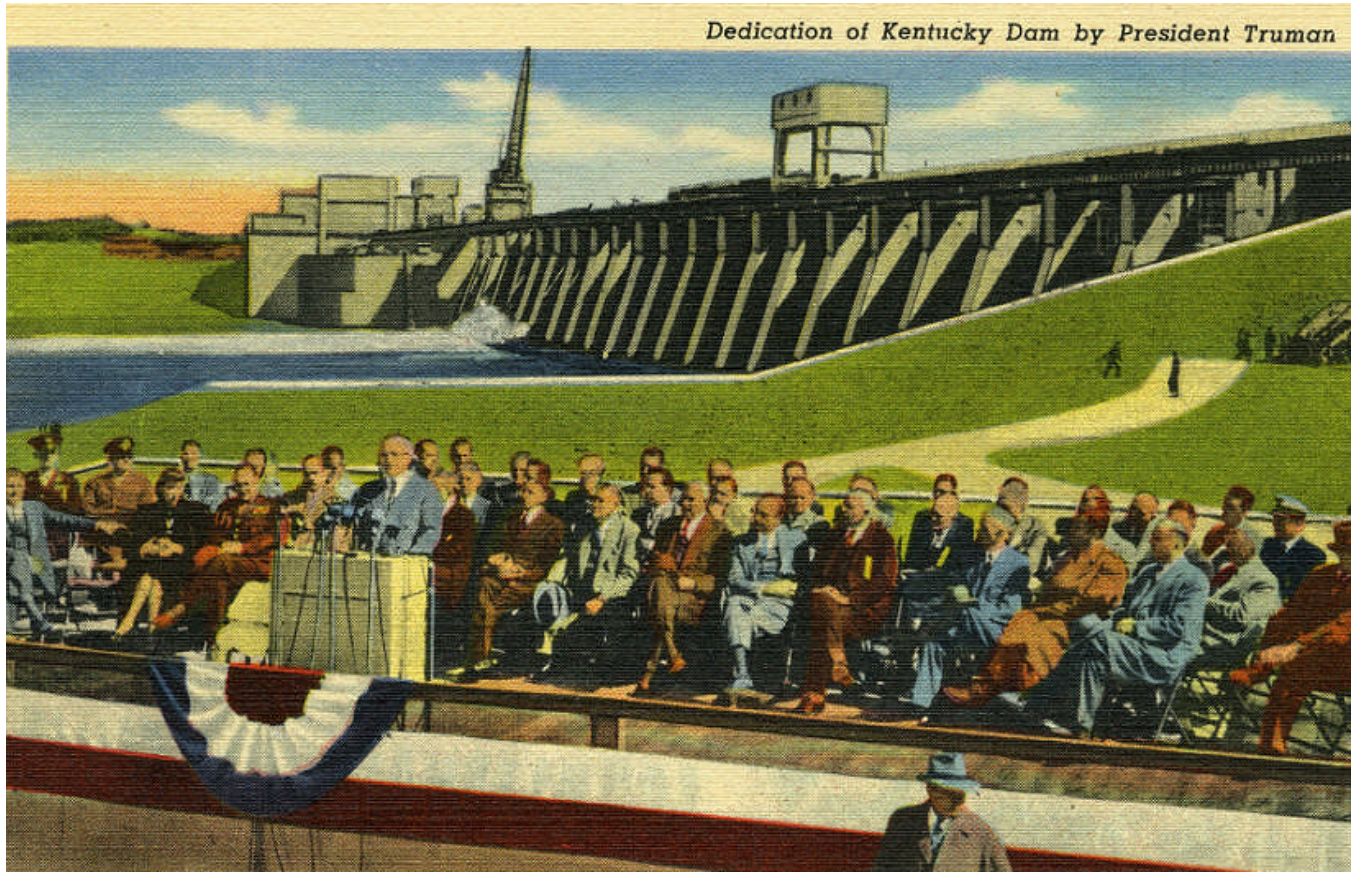
The Great Vision

"Nine years ago the first dam of the Tennessee Valley Authority – the Norris Dam on the Clinch River – was dedicated by my illustrious predecessor – Franklin D. Roosevelt. At the very start of his Presidency, he had the great vision and foresight to recommend and encourage the comprehensive development of this entire great Valley. It is now a matter of great pride to me to dedicate the sixteenth great structure built by the TVA – the Kentucky Dam. The system of dams across the Tennessee now puts under the control of man a whole vast river – and harnesses it to do his work, This has not happened on any other river. The completion of this dam marks a new high point in modern pioneering in America…"

***Harry S. Truman,* POTUS (October 10th 1945)**

<u>Left</u>: caption: "President Harry S. Truman Riding through the streets of Paducah, KY enroute to the Kentucky Dam dedication"

<u>Right</u>: caption: "October 10, 1945 - President Truman officially dedicates Kentucky Dam"


Dedication of Kentucky Dam by President Truman

Traveling Far

"…The Tennessee Valley Authority has traveled far since the early, urgent days of hasty construction by relief workers. Its construction program in the years since 1933 is summarized in the accompanying table, which lists twenty dams and eight steam plants as having been built or as under construction by the agency. The river control system includes not only these twenty dams, but fourteen others as well, of which one (Wilson) was built by the United States government in pre-TVA days, three were constructed by the Corps of Engineers, and ten either were acquired from or are operated under contract with private business. Of the total of 34 major dams, nine are on the main stem of the Tennessee, 21 are on tributary streams, and four are in the Cumberland Basin. All are integrated into the TVA's river control system…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

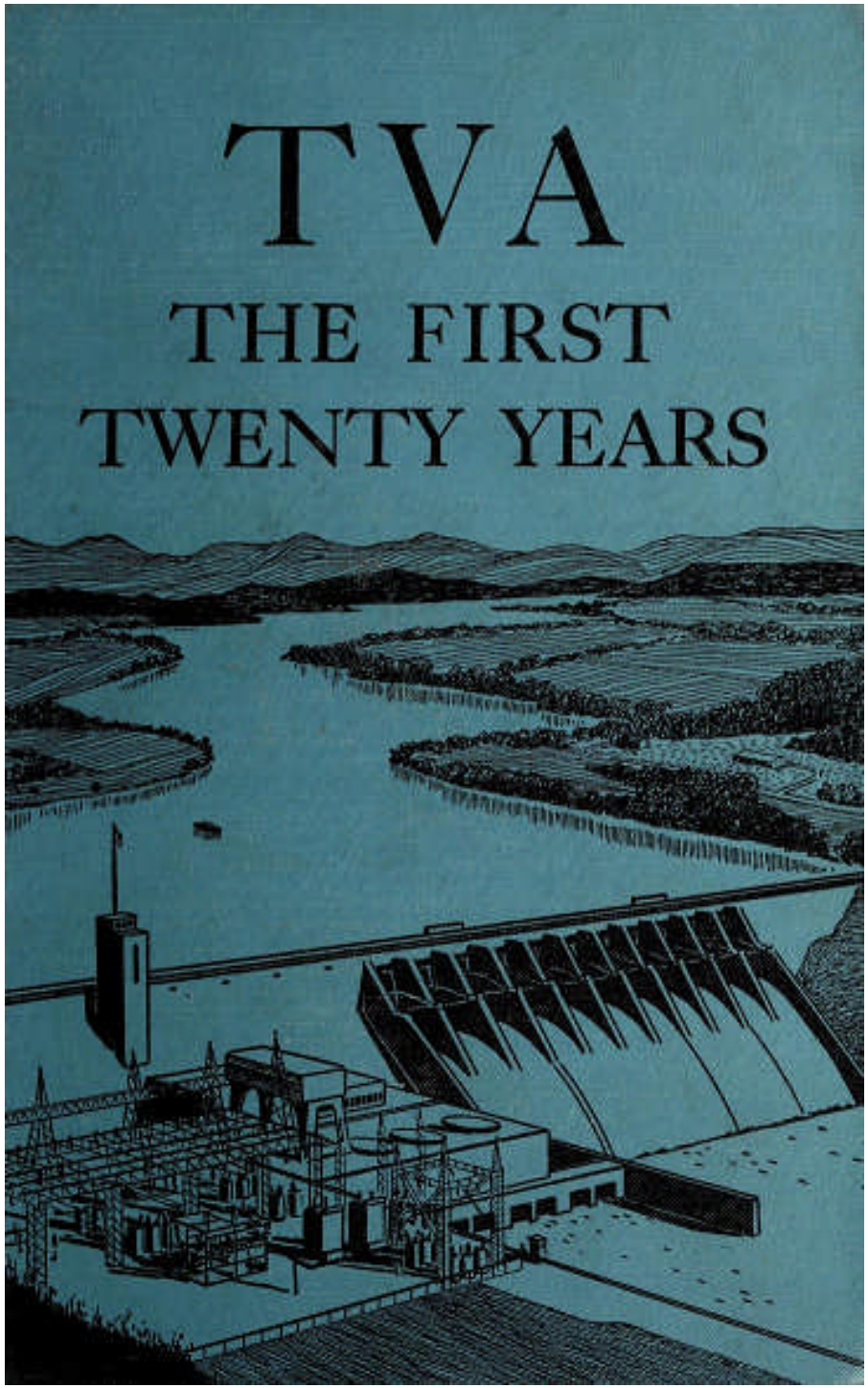
TABLE I

MAJOR PROJECTS CONSTRUCTED BY THE TENNESSEE VALLEY AUTHORITY
1933–1953

Projects	Construction Started	Initial Power Delivered	Estimated Cost Amount	Estimated Cost Number of Units	Actual Final Cost Amount	Actual Final Cost Number of Units
DAMS						
Norris	10– 1–33	7–28–36	$ 36,025,230	2	$ 30,508,004	2
Wheeler	11–21–33	11– 9–36	52,116,537	2	29,994,700	2
Pickwick	5– 8–35	6–29–38	52,529,685	2	29,700,287	2
Hiwassee	7–25–36	5–21–40	15,250,000		15,922,637	1
Guntersville	12– 4–35	8– 1–39	29,500,000		31,098,780	3
Chickamauga	1–25–36	3– 4–40	31,630,000		33,730,996	3
Kentucky	7– 1–38	8–14–44	112,000,000	8	116,302,296	8
Watts Bar	7– 1–39	2–11–42	35,000,000	3	32,976,647	3
Fort Loudoun	7– 8–40	11– 9–43	28,500,000	2	34,930,339	2
Cherokee	8– 1–40	4–16–42	34,000,000	3	29,763,267	2
Douglas	6– 8–42	3–21–45	50,000,000	3	39,496,385	2
Fontana	1– 1–42	1–29–45	48,000,000	3	69,033,688	2
Chatuge	7–13–42	8–12–42	10,000,000		5,076,589	
Nottely	7–17–42	1–24–43			5,873,709	
Ocoee No. 3	7–17–42	4–30–43	6,600,000	1	5,988,050	1
Appalachia	7–17–42	5–28–43	20,000,000	2	22,558,532	2
Watauga	7–22–46	8–30–49	28,000,000	2	31,561,053	2
South Holston	6– 4–47	2–13–51	30,650,000	1	30,502,504	1
Boone	7– 1–50	8–16–53	27,500,000	3	27,468,000	3
Ft. Patrick Henry	5– 1–52	12– 5–53	14,500,000	2	———*	2
Additional Units			18,000,000	6		
Subtotal			$621,321,452	42		42
STEAM PLANTS						
Watts Bar	8– 8–40	2–15–42	$ 18,000,000	4	$ 18,866,856	4
Johnsonville	5–12–49	10–27–51	98,000,000	6	93,342,000	6
Widows Creek	5–19–50	7– 1–52	108,000,000	6	———*	6
Kingston	1–11–51	———*	118,000,000	9	———*	9
Colbert	5–18–51	———*	110,500,000	4	———*	4
Shawnee	1– 6–52	4– 9–53	216,500,000	10	———*	10
Gallatin	8– 7–52	———*	85,000,000	2	———*	2
John Sevier	7–28–52	———*	96,000,000	3	———*	3
Subtotal			$940,000,000	44	———	44
Grand Total			$1,561,321,452	86		86

* Not completed at the time of writing.

Concept Proven



"…The success of TVA's system of water control is of course to be measured in terms of results obtained. As to the primary objective, the control of excess runoff, it may be noted simply that there has been no serious general flood since the system went into operation…Navigation is a story to be separately told, but it may be noted here nevertheless that the nine-foot channel stipulated in the Act of 1933 has been established, with lakes and locks throughout the 630 miles from Knoxville to the Ohio River. The power story likewise requires separate treatment, though again it is worthy of brief note that the TVA power system was not found wanting in the emergencies of the war and the immediate postwar years. Over all, the concept of the multiple-purpose development of the river has been vindicated by a successful operating experience of over twenty years…"

RE: excerpt from *TVA: The First Twenty Years* (1956)


KENTUCKY
Ohio river
Tenessee river
Mississippi river
Fontana Dam
VIRGINIA
Hiwassee Dam
Cherokee Dam
NORTH CAROLINA
TENNESSEE
Chickamauga Dam
Memphis
Chattanooga
SOUTH CAROLINA
Wilson Dam
MISSISSIPPI
GEORGIA
ALABAMA
N
Dams
Area served by TVA power
0 miles 75

Part 13

The Chosen Man

"…And who is a chosen man, that I may appoint?
Jeremiah 49:19

How Stupid it Would Be

"…Back in 1903, when he vetoed a bill for a private power franchise at the Shoals, President Theodore Roosevelt said: 'Justice to the taxpayers of the country demands that when the government is or may be called upon to improve the stream, the improvement should be made to pay for itself, so far as practicable.' Thirty years later Dr. Arthur Morgan observed that, if dams to make a navigable channel could also develop two or three million kilowatts of energy, 'how stupid it would be to throw it away.'…Even Dr. Arthur Morgan, so confident of possibilities that he wanted TVA to find a way to save the power companies from loss, began to be nervous about using dams for both flood control and power as soon as he had to turn the management over to other people. But he thought they were all right as long as he had control…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…While you use the same dam for holding back flood waters, and for storing water for navigation and power production, of course you can't use the same reservoir space. So you must provide extra storage capacity for your multi-purpose dams. This has been done by TVA; it was not done in the Ohio district where Dr. Arthur Morgan built a dam marked with a much-quoted warning:

THE DAMS
OF THE MIAMI CONSERVANCY DISTRICT ARE FOR
FLOOD PREVENTION PURPOSES.
THEIR USE FOR POWER DEVELOPMENT OR FOR STORAGE
WOULD BE A MENACE TO THE CITIES BELOW.

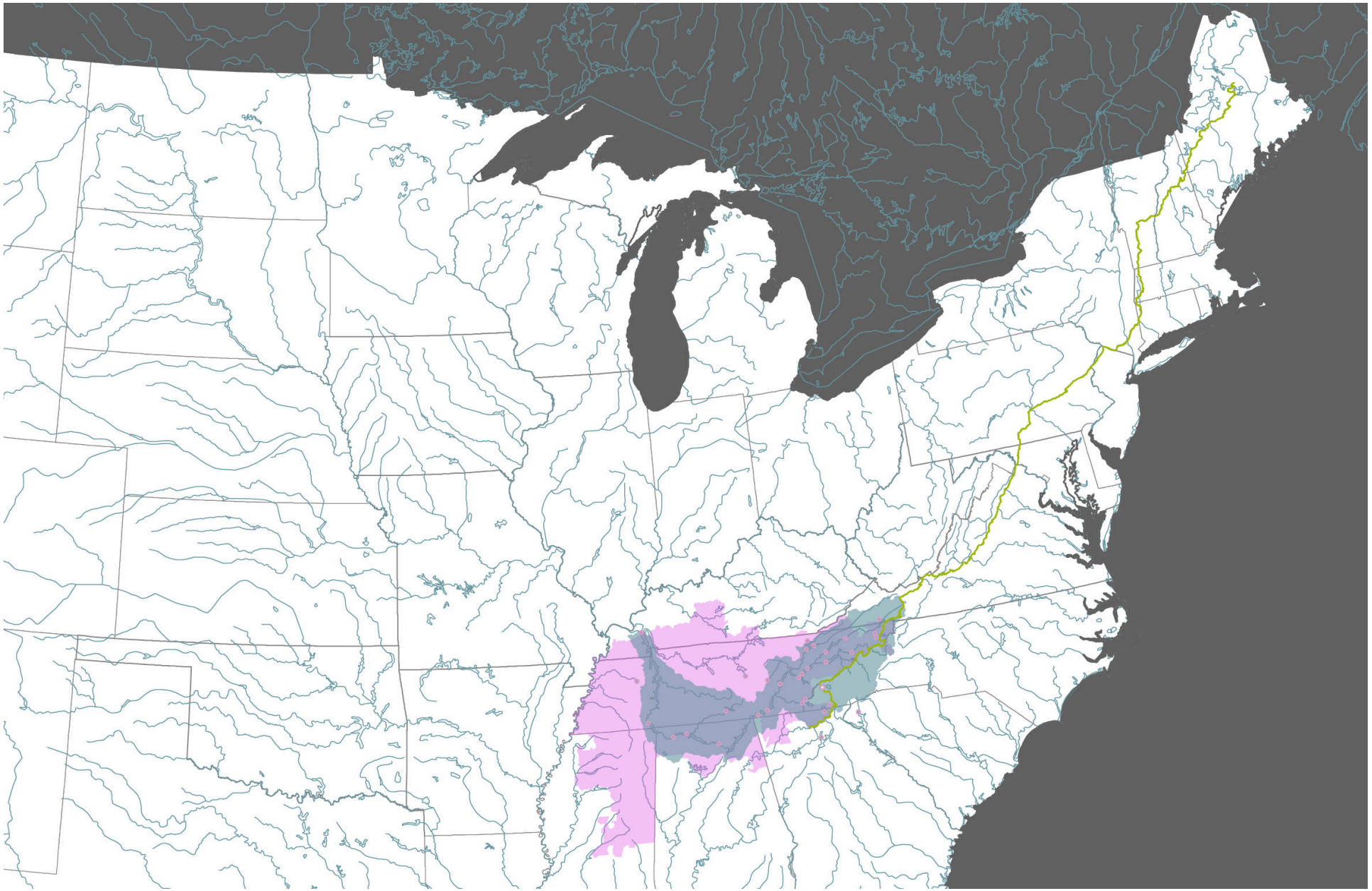
To insure complete flood protection under the TVA system, you need only make sure that the dams are not worked too hard; that is, that the reservoirs are not kept too full. This works out automatically if the installed generating capacity of the dam is in the right proportion to the size of the reservoir, considered from the standpoint of flood expectancy. Dr. Arthur Morgan has expressed his confidence in the safety of the dams as built…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…I have come to believe that the attitude of a ruthless fight to the finish and without quarter against public ownership of power has been a characteristic position of the public utilities…In their fight private utilities have bribed legislation…controlled newspapers…sought to cripple or destroy educational institutions which dared to be independent. I believe, too, that the long fight to limit utility abuses is part of a slow-moving revolution which is striving to free the mass of the people from exploitation. Yet, notwithstanding my own experience and what I have learned of utility abuses…I believe that the proper attitude…is to strive to find a basis of agreement between the Tennessee Valley Authority and private utilities which will protect both private and public investment…"

***Dr. Arthur E. Morgan,* TVA Chairman (January 1937)**

Begun during WWI to produce munitions for the war effort, *Muscle Shoals* (a*l*k*l*a *Wilson*) *Dam* had lost its main purpose with the signing of the Armistice and, in turn, financing for its completion. Between 1921 and 1933, one-hundred and thirty-eight separate bills were introduced in Congress, never resolving the question of government versus private operation of the dam. Meanwhile, the *Tennessee Valley Basin* was largely without power. The "Electric Age" - a generation old in urban America by then, had not yet dawned in the back hills and dusty lanes of Tennessee and Alabama, where only one farmhouse in twenty-five had electricity. Public power advocates hoped FDR would back completion of Muscle Shoals. When *Dr. Arthur E. Morgan* first met with FDR, the president spoke little of Muscle Shoals or of electricity but, rather, of the *Tennessee River* – potentially the region's greatest asset, which each spring pulled more topsoil from the denuded hillsides; rutting the fields, turning creeks into gullies and forcing the farmers higher up the less fertile slopes. FDR spoke of the need to recreate the life of the region through flood control, reforestation, new agricultural practices and diversified small industry. FDR assigned this task to the newly-created *Tennessee Valley Authority*, with broad responsibilities throughout the 40K-square-mile water-shed.



<u>Above</u>: caption: “Regional Map of the TVA Watershed”

A Flashy River

"…Anybody just looking at the river, particularly around the Shoals, would say it was naturally intended to provide power but not very promising for boats. The little grist mills all over the Valley one near Norris dam is over a hundred years old show that early settlers with common sense saw what to do with a river that drops a foot a mile from the mountains to its mouth. Water boiling over the rocks at the Shoals was working hard, only it wasn't earning much. But of course the river had to be trained to work regularly, day in and day out, the whole year long. Sometimes, left to itself, it would get down to a trickle; then in a few weeks it might be a flood half a mile wide. At Florence they measured and found the big flow over a hundred times the lowest flow. Engineers called it a 'flashy' river…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Troika

The *Great Depression* had thrown vast numbers of skilled technicians out of work and TVA Chairman *Arthur E. Morgan* wanted them. In just five weeks, he traveled ten-thousand miles to find and recruit the very best talent in the nation. He also recruited the two other directors who would constitute the TVA board. Establishing offices in Knoxville, Morgan rapidly initiated engineering studies, assembled construction staffs for the great dams that would follow, outlined an extensive forestry program, made plans for a cement works, dry ice factory, sweeping socio-economic reforms and more. At the board's first formal meeting, the other directors were surprised that Morgan had progressed so far, so soon and, more to the point, with so little consultation of them. *David Lilienthal* and *Harcourt Morgan* did not share Arthur Morgan's enthusiasm for the broader purposes of the TVA. They worried over his chaotic administrative style and were somewhat appalled when Morgan presented an eight-page "Code of Ethics" for TVA employees, which proposed to ban everything from "lax sex morality" to "greed." Barely three months into the agency's existence, they rebelled.

"…When Dr. Arthur Morgan stood out against the President and got his wish for a congressional investigation, news-paper readers who didn't know much about TVA found the reports of the hearings that began in Washington and lasted through the hot weather in the Valley almost as complicated as the trials they have in Russia. There were all sorts of charges and counter-charges and accusations of 'sabotage.' There was even mention in the Northern papers of 'another Teapot Dome'…"

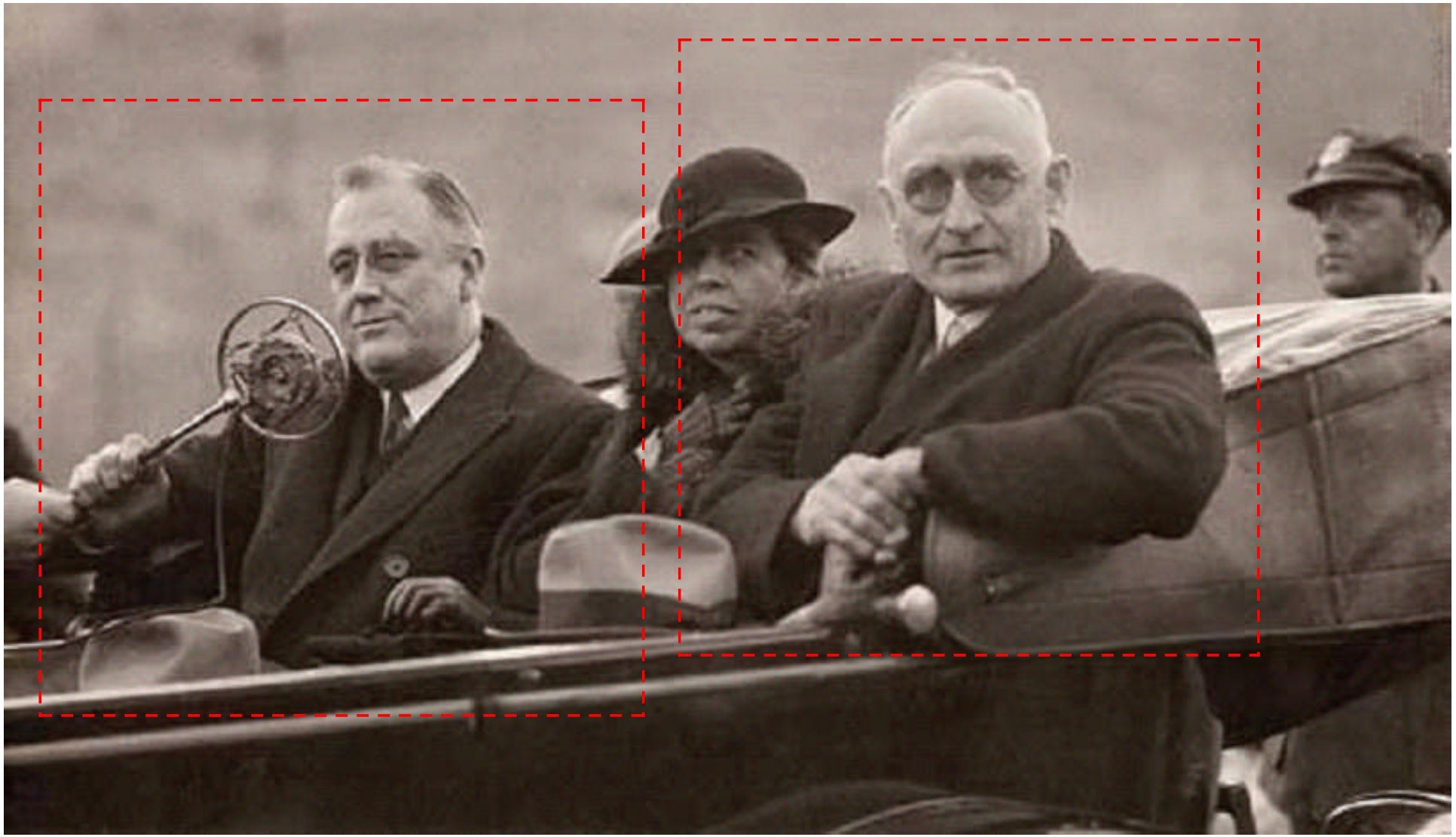
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

RE: on July 31st 1933, *David Lilienthal* and *Harcourt Morgan* (representing a majority of the TVA board) presented an ultimatum to *Arthur Morgan*. Lilienthal would handle legal matters and electric power policy; Harcourt Morgan would direct agricultural programs and Arthur Morgan could build his dams, direct the forestry program and leave the others alone. It appeared Morgan's "hundred days" had ended in a palace coup.

David Lilienthal **viewed Arthur Morgan's high-mindedness as hopelessly naive. By the mid-1930s, conservative opponents had secured nearly one-thousand injunctions against New Deal measures, often on the flimsiest of grounds, and several against the TVA specifically. Allied with *Harcourt Morgan*, Lilienthal controlled the TVA board; they approved each other's proposals and voted Arthur Morgan's down. Lilienthal maneuvered shrewdly; by phone, letter, leaks to the press etc. to gain influence with those who had influence.**

Despite the internal revolt, Chairman Morgan won important concessions from his two peers. He pointed out that if the TVA dams were built by contractors, months would be lost drawing up specifications for bids. However, if the TVA used its own labor force, preliminary work could begin immediately and make a dent in the nation's chronic unemployment problem. *Harcourt Morgan* and *David Lilienthal* agreed. That work force would need housing. Construction camps were typically shantytowns, housing a drifting population of work-ers. If the TVA board would authorize an extra $1 million, *Arthur Morgan* would create something better. Reluctantly, the expenditure was authorized. Morgan took the money and built the town of Norris, TN.

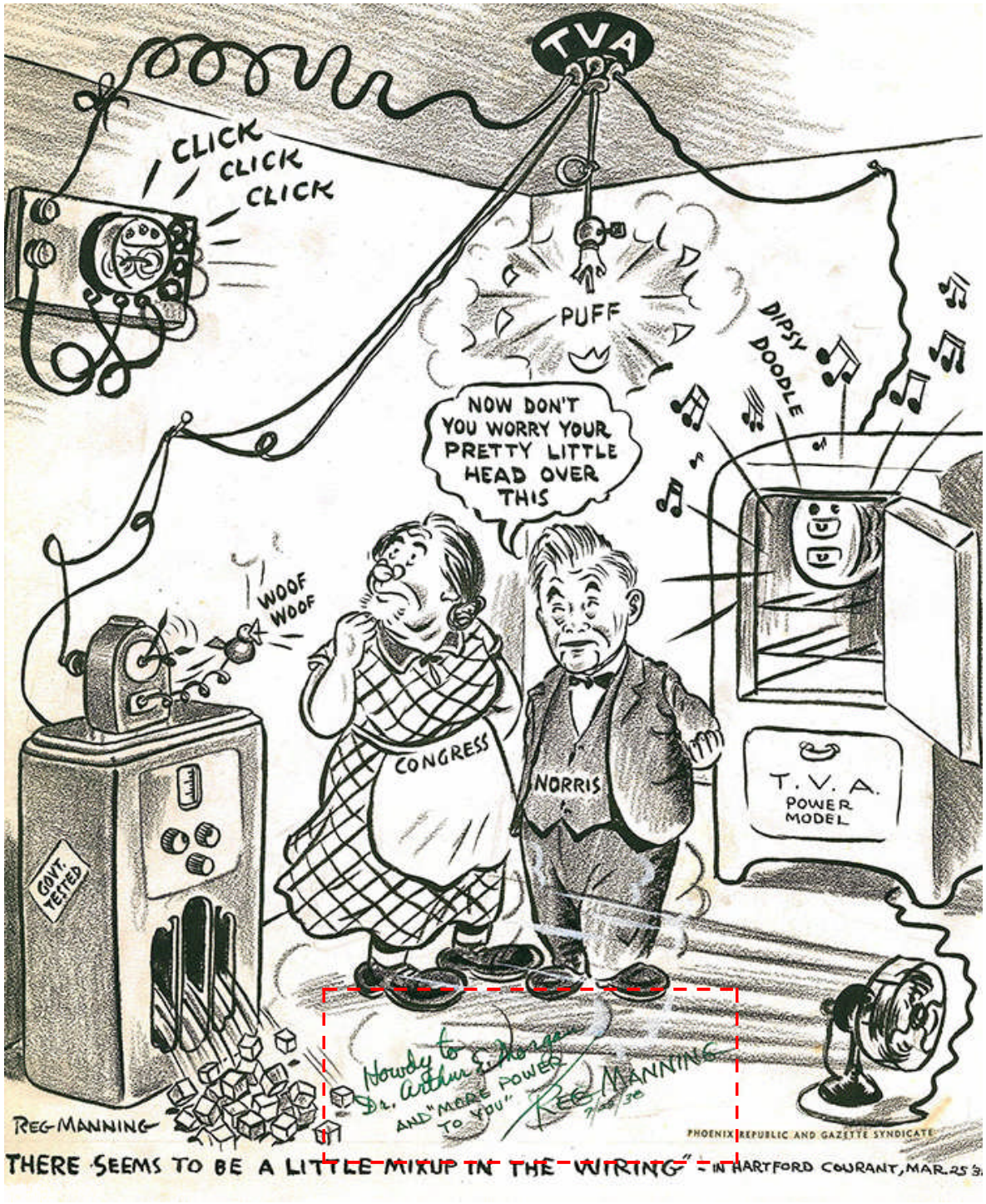
<u>Left</u>: caption: "To accommodate construction personnel at projects, most of which are at some distance from population centers, the TVA built permanent housing where there were reasons to expect such communities to be permanent. Being the single owner of land and of structures, the Authority used such housing projects to demonstrate modern principles of town planning of which other federal housing programs and private enterprise made use subsequently. The photograph shows a scene in the town of Norris, Tennessee, adjacent to Norris Dam."



<u>Above</u>: FDR (left) tried to reconcile his squabbling subordinates at TVA. At one point, he wrote A.E. Morgan (right) to suggest that everyone get together for a chat (FDR believed there was no problem gentlemen could not solve if they sat down with a snifter of brandy and a good cigar). Somewhat awkwardly, the president added that he knew Morgan neither drank nor smoked.

Arthur Ernest Morgan **wasn't simply non-political, he was anti-political; both outside of and opposed to the entire world in which gentlemen and brandy rubbed elbows and made decisions behind closed doors. For example, he believed that patronage appointments were the bane of government. At TVA, he insisted all positions - from ditch digger to supervising engineer, be filled by competitive examination exclusively. Morgan held to that position despite the cries of foul from congressmen in five states.**

<u>Above</u>: caption: "Arthur and Lucy Morgan in their home on Limestone Street in Yellow Springs, ca. 1921"



Disputes and allegations between TVA Director/s *Dr. Arthur E. Morgan* and *David Lilienthal* prompted a Congressional investigation of the TVA. The result of the investigation was Morgan's ouster, the politics of which played out in political cartoons across the country in 1938. In sympathy, some of the cartoonists sent copies of their handiwork to Dr. Morgan.

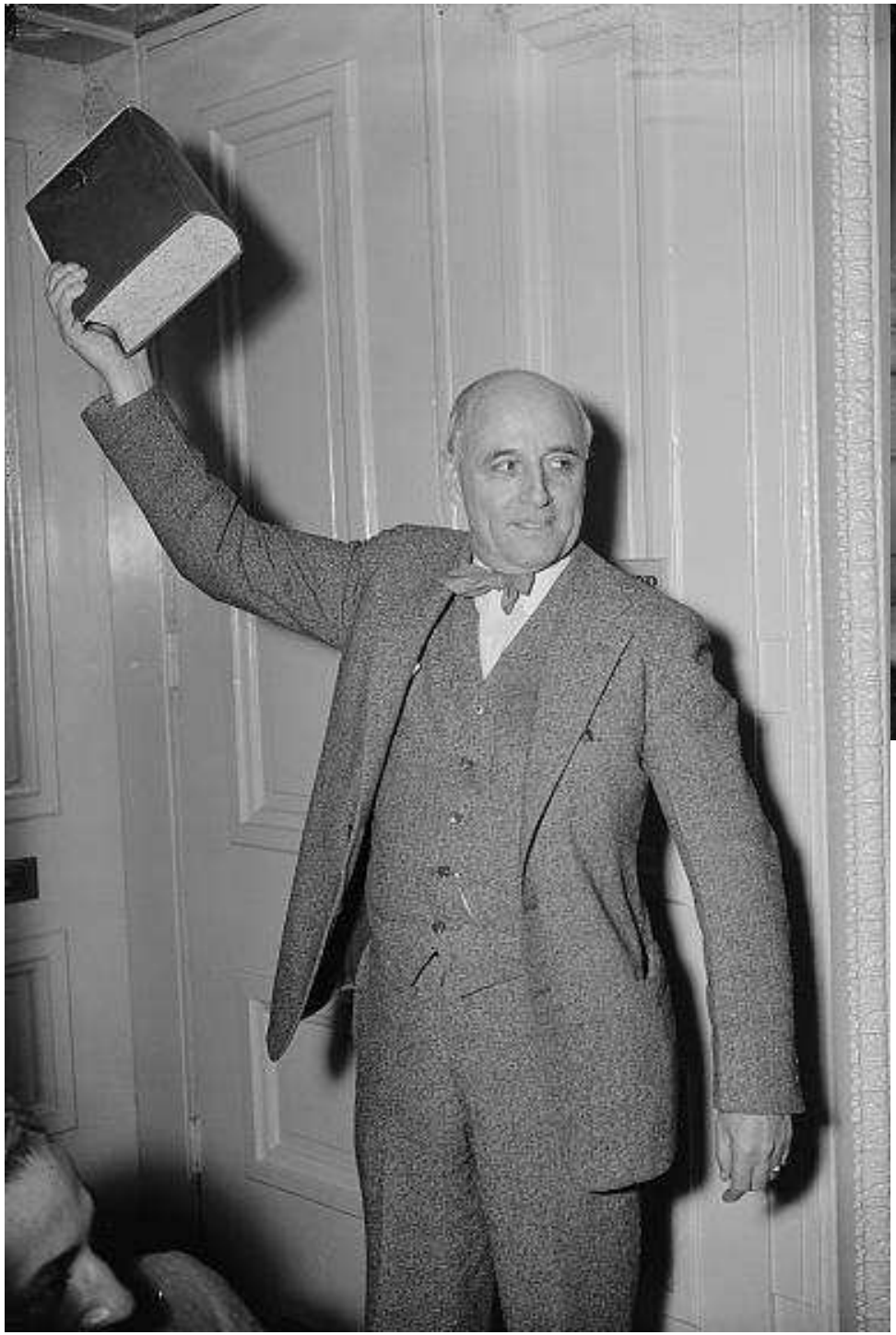
<u>Left</u>: inscription (highlighted) at the bottom of the cartoon (in green ink) from Cartoonist *Reg Manning* reads: *"Howdy to Dr. Arthur E. Morgan and 'More Power To You'"*

To *Arthur Morgan*, the issue was the sacrifice of the TVA ideal to Lilienthal's power policy, both electric and personal. Morgan felt Lilienthal had crossed his ethical red line, charging that Lilienthal was party to a deal by a prominent local Democrat to sell to the TVA at top prices a worthless marble quarry. In crying scandal, Morgan cost himself the support of the one man who mattered - the POTUS. FDR was serene with squabbling, but sensitive to the scent of scandal. He resolved to invite the three directors to the Oval Office and, in closed session, demand that Morgan detail or withdraw his various charges.

<u>Above</u>: caption: "Among the first for the Tennessee Valley Authority Conference with President Roosevelt today were members Harcourt A. Morgan (left) and David E. Lillienthal, 3/11/38"

<u>Left</u>: caption: "Arthur E. Morgan, Chairman of the TVA, arriving at the White House today to join other members of the authority at a special conference called by President Roosevelt, 3/11/38"

Summoned peremptorily to the *White House* on March 11th 1938, *Arthur Morgan* noted that his co-directors had stacks of prepared statements, even though they supposedly had no more notice of the meeting than he had. Feeling as though he'd been invited to his own hanging, Morgan refused to cooperate. In what the *New York Times* called: "the most unusual meeting of its kind ever held in Washington," for six hours FDR demanded that Morgan present his evidence. For six hours, Morgan declined to respond. Morgan maintained his silence through two additional meetings, at which point FDR dismissed the TVA's first Chairman; for "contumacy," and the temperamental inability to exercise shared authority.



<u>Above</u>: caption: "Foes of the TVA pooled forces today in an attempt to override administration opposition and obtain a Congressional investigation of the power agency, 3/14/38"

<u>Left</u>: caption: "Rep. Andrew J. May, Democrat of Kentucky, who today appeared before the Senate Rules Committee to urge the investigation of the TVA as proposed by Senate Majority Leader Barkley in a resolution just introduced, 3/28/38"

<u>Left</u>: caption: "TVA Director David E. Lillienthal, (left) and Wendell L. Wilkie, President of the Commonwealth and Southern Corporation, met today in the first of series of conferences to discuss the sale of private utilities to communities in the TVA area. At the Conclusion of the morning session, no definite decision had been reached in the negotiations, 3/16/38."

<u>Right</u>: caption: "Fiery Rep. Maury Maverick (right) of Texas, today started a House revolt against Senate Majority Leader Barkley's resolution for an investigation of the TVA. He declared the Senate resolution is the foundation for a 'purge trial' to get rid of Dr. Arthur E. Morgan, deposed Chairman of the T.V.A. Rep. Andrew J. May, (left) Democrat of Kentucky, is warmly supporting the resolution for an investigation, 3/28/38."

Left: caption: "With their membership now complete, The Joint Congressional Committee to investigate the Tennessee Valley Authority met today for the first time. They laid plans to round up their staff of lawyers, investigators, and clerks, some of whom will probably go south to do preliminary work, 4/27/38."

Right: caption: "Seats were at a premium today as the Joint Congressional Committee opened hearings on the Tennessee Valley Authority investigation at the Capitol. This picture, taken from back of the committee room with Dr. Arthur E. Morgan, (center) deposed TVA Chairman, at the witness table, 5/25/38."

"…when Dr. Arthur Morgan tried to explain to the congressional committee that his biggest evidence of dishonesty on the part of the board was willingness to have a senator's claims appraised by an expert from Washington, he gave himself a hard job. When he tried to show why he felt impelled to interfere in the utilities suit at Chattanooga, they brought in a Republican candidate for the Senate to testify that at Chattanooga Dr. Morgan had worried the lawyers to death. When he tried to explain what he meant by honest administration, they asked him if he meant that the Authority had paid too much for its land; and they hardly knew what to make of it when he said: 'In some cases, they paid too little.'…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Appearing as the first witness before the Joint Congressional TVA Investigating Committee today, Dr. Arthur E. Morgan deposed Chairman of the TVA, declared that his two co-directors had engaged in 'misrepresentations and hypocrisy,' but made no effort to show they had been guilty of corrupt practices. he is pictured with Senator Vic Donahey, (left) Chairman, and Rep. James M. Mead, co-chairman of the committee, 5/25/38."

<u>Right</u>: caption: "Listeners may hear no good of themselves, but, David E. Lillienthal, co-director of the TVA, certainly cupped his ear today to catch every word of Dr. Arthur E. Morgan, deposed TVA Chairman, as he hurled charges at his foes before the Congressional TVA Investigating Committee. Morgan accused his co-directors of misrepresentations and hypocrisy, 5/25/38."

"…When Dr. Arthur Morgan talked of 'intellectual dishonesty,' all it came to was that he and Mr. Lilienthal didn't see eye to eye. An intellectually dishonest person is a person with no convictions that he will fight for, and Mr. Lilienthal is not that way. His convictions about power are stronger than Dr. Arthur Morgan's, although he talks less about public power and more about cheap power. Also his convictions about labor are stronger than Dr. Arthur Morgan's, and clearer. When you talk to him, Mr. Lilienthal is pretty definite on both these subjects, and he says himself that if you know where a man stands on power and labor, these days, you ought to be able to judge his other ideas from that…"

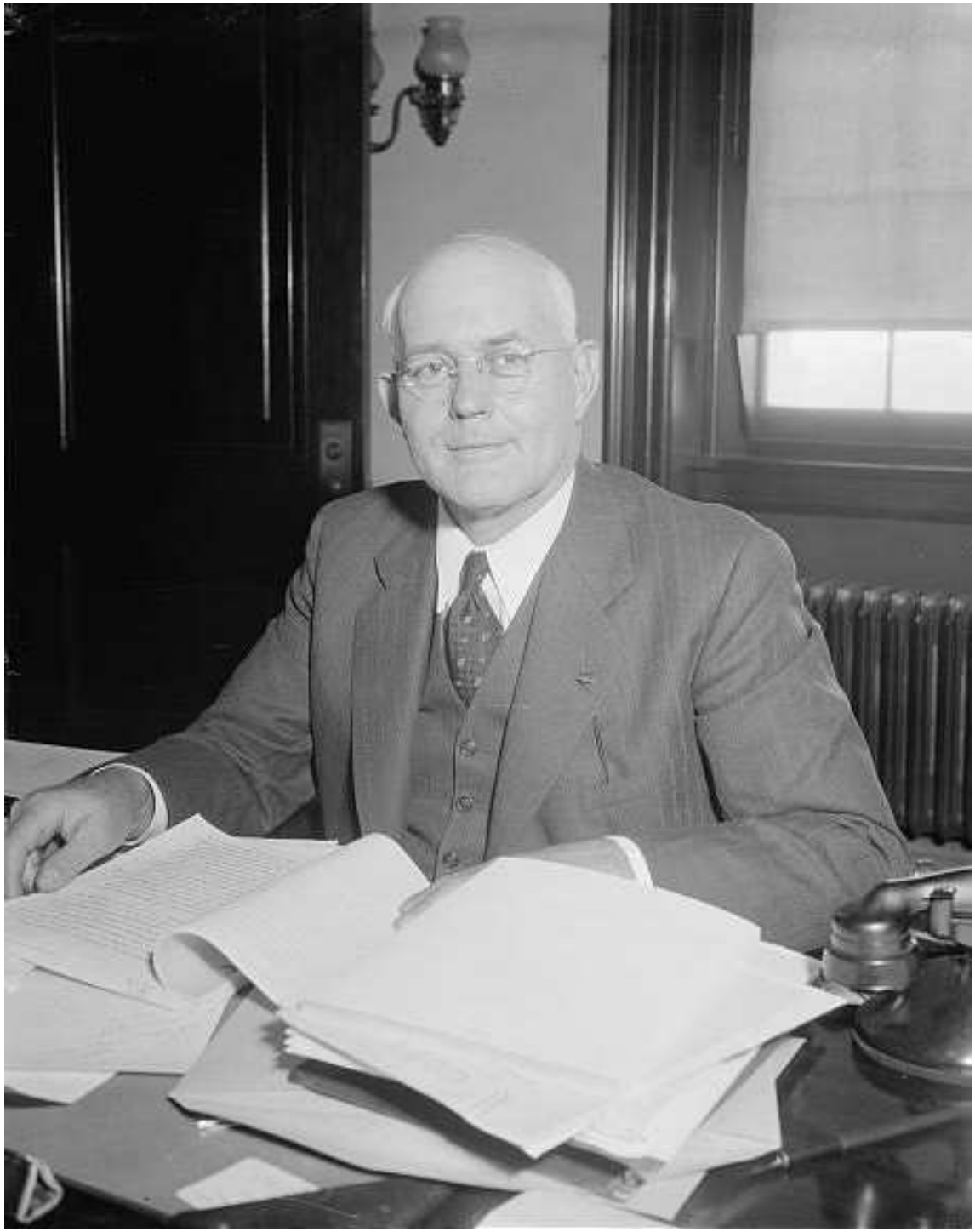
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above</u>: caption: "President Roosevelt discussed the question of pooling private and public electric power with private and government power experts at the White House today. After a conference that lasted most of the afternoon Frank R. McNinch, Chairman, Federal Power Commission, and Wendell L. Wilkie, President of Commonwealth and Southern Corporation, emerged from the President's office to state that President Roosevelt had agreed to consider pooling Government hydroelectric projects and private power facilities in the TVA area. The president's decision will not only mean an exchange between the Tennessee Valley Authority and private utilities of the Southeast but touch possibilities for Bonneville Dam on the Columbia River and other public works projects, 9/30/38"

"…Mr. Wendell Willkie, always persuasive, found TVA publicity a 'cruel deception' and mourned publicly over the plight of a utility system 'broken up' and 'dismembered, piece by piece.'…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Appearing before the Congressional TVA Committee today, President Wilkie of Commonwealth and Southern Corp., proposed that the S.E.C. determine a fair price for the utility holdings which the TVA seeks to purchase. He said if the TVA would agree to this, his company would abide by the valuation which the S.E.C. may finally set upon their properties, 11/23/38"



"…Now that Senator Pope of Idaho has been appointed to the board, people are talking of more politics, but you don't have to wait for Senator Pope's work with TVA to see why he was appointed. In the Senate, his pet project had been manufacture of phosphate fertilizer, using the TVA process, on the government lands in Idaho. As a director of TVA, Senator Pope will have a chance to do for the whole country what he hoped to start in his home state…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "President Roosevelt has indicated he will nominate Senator James P. Pope of Idaho, as a Director of the Tennessee Valley Authority, 12/28/38"

"…Dr. Arthur Morgan was the only one of the three TVA directors who appeared cut out for personal leadership, and if you wanted a leader he was considerably above the average of leaders…As Dr. Morgan said, it was an engineering project and he was the only engineer on the board…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Irreconcilable Differences

"…Dr. Arthur Morgan seemed determined to bend backwards to be fair to the power companies, but he was pretty hard on other people. The other two directors worried less about the widows and orphans who might own utilities stocks, but were more gentle in their handling of small farmers and even politicians with senate appointments. People who followed the hearings soon discovered, of course, that there was no ground for scandal, no 'conspiracy' for anti-New Dealers to lick their chops over. There was a plain case of incompatibility of temperament, which finally required a divorce. As usual in such cases, nobody was wholly blameless, and nobody was wholly to blame, and the gossip was exaggerated…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)


TVA
HARCOURT MORGAN
CHAIRMAN MORGAN
LILIENTHAL
C.K. Berryman
EVENING STAR WASH. D.C.
1938
OH, BOY, WHEN ONE OF THESE GETS OUT OF THE WAY, LOOK FOR A FLOOD OF MUDDY WATER!

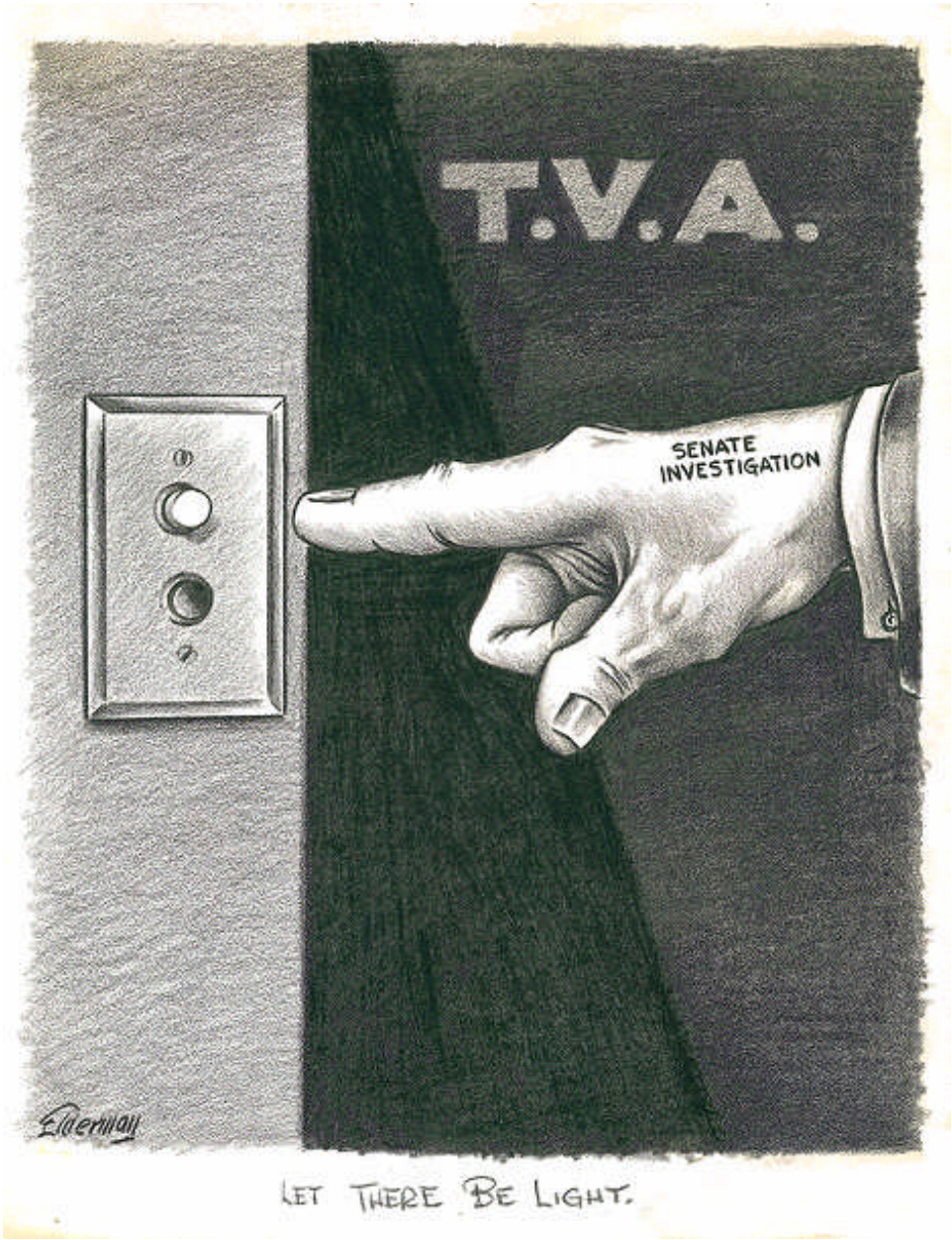
"…As the complainant, Dr. Arthur Morgan had to prove the charges he made, and he couldn't prove them; some fell to pieces and some he withdrew. But he was sincere in making the charges. Dr. Morgan is a remarkable man with a keen and original mind, although it is not a mind adapted to effective dealing with people of the present era. Dr. Morgan was so devoted to the Tennessee Valley Authority that he actually paid out some of his own money, at the start, to foot the project's first little bills. But the other side to that is that he could feel too strong a sense of personal responsibility. Like Moses, he was a good head man until he got mad…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…As an engineer Dr. Morgan would presumably go around an obstacle when necessary, but as an administrator he was always for going right ahead in a straight line. This brought him into conflict with other people, and he seemed to have some trouble understanding ordinary folks. He himself could always see what should be done, and in theory at least he was always right, so it was odd that people should oppose him. As one young man who had worked for him put it: 'It isn't that he wants yes-men around him. It's only that he can't stand fools.' When you know you are right, and the people who don't agree with you are not fools, you wonder if they could be knaves…Dr. Arthur Morgan was not one to harbor fear or suspicion in silence…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)


NTERNATIONAL
DICTATORS'
CLUB.
CASTOR OIL IS THE ONLY THING!
I WOULD HAVE LIQUIDATED HIM.
GIVE HIM A PUBLIC TRIAL!
CHAIRMAN MORGAN AGAIN DECLINES TO RUN AWAY
CHAIRMAN MORGAN REFUSES TO RESIGN!
T.V.A. CHAIRMAN DEFIES THE PRES!!
NO RESIGNATION REPLIES CHAIRMAN MOR
PRESIDENT GIVES MORGAN TWENTY-FOUR HOURS TO GET OUT!
MORGAN REITERATES HIS REFUSAL TO QUIT
C.K. Berryman
WASHINGTON EVENING STAR
1938



"…When the chairman was moved to call his fellow-directors hard names, of course it was pie for all the people fighting TVA. They leaped to make Dr. Arthur Morgan a hero. They took his picture for the newsreels and talked about him on the radio and wrote columns about him. He was a great engineer and some said he was a Quaker, and the New York Herald Tribune and the Saturday Evening Post were in favor of that combination…Then the boom-boom stopped suddenly, and somebody must have read some of the things Dr. Arthur Morgan had said and written…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…He wanted to make the Valley over brand-new and right; some said he even suggested that it might have its own money system. You can see how he thought of that because, with electric power, the Valley could feed and clothe and house itself as well or better than any other part of the country. It's paying out for what they buy from up North, and getting so little for what they raise, that keeps Valley folks poor. And you have to consider that the South has a separate money system now. What else would you call the wage and freight differentials and the higher interest rate?..."

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…So, while the people who worry about TVA license plates on TVA cars would have had apoplexy, you couldn't say that the idea of making the Valley a totalitarian state was visionary. Maybe it wasn't visionary enough. The idea is to take the South back into the Union, not keep it out; but you have to look way ahead to hope that some day, if you keep on acting as if the United States were just one country, it will be that way…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Impractical and Idealistic

"…But there were ways in which Dr. Arthur Morgan was impractical and idealistic. He seemed to be that way about the power business. Generally speaking, he favored public ownership, but he was careful to say that we have in this country 'a mixture of despotism, aristocracy, communism, socialism, and democracy.' The average American, he pointed out, approved 'the economic despotism of Henry Ford,' accepted 'the oligarchic and aristocratic management of Harvard,' heartily believed in American public schools, 'a thoroughly communistic institution,' and was 'loyal to the post office, which is socialistic.' The democratic balance, Dr. Morgan felt, should be none of the 'isms that have become little more than labels or battle slogans,' and among the isms he included capitalism…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"I have been asking people to give me money made by one economic order in order to build another order. Most people are conservative enough not to be persuaded in that way, and so I have not gotten much money. For the past few years I have been living partly on incomes from foundations. But each of these foundations has accumulated its resources by a social and economic order that will, I hope, pass away."

***Dr. Arthur E. Morgan,* TVA Director (July 1934)**

"…In some ways, although he came from up North, Dr. Arthur Morgan was more like a conscientious, religious-minded Southerner of the mountain breed than like a Yankee. When he got mad at the other directors, he acted like a Southerner, seceding from the board decisions and opening fire, regardless of consequences. He was like a Southerner, too, for splitting hairs on points of doctrine…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…Now that Dr. Morgan is no longer chairman of TVA, it might not be important to consider his views except that they are the views of a good many other high-minded people…Dr. Morgan believed, apparently, that TVA could reform the corporations by argument and example, somewhat as Woodrow Wilson hoped to reform the European nations…"

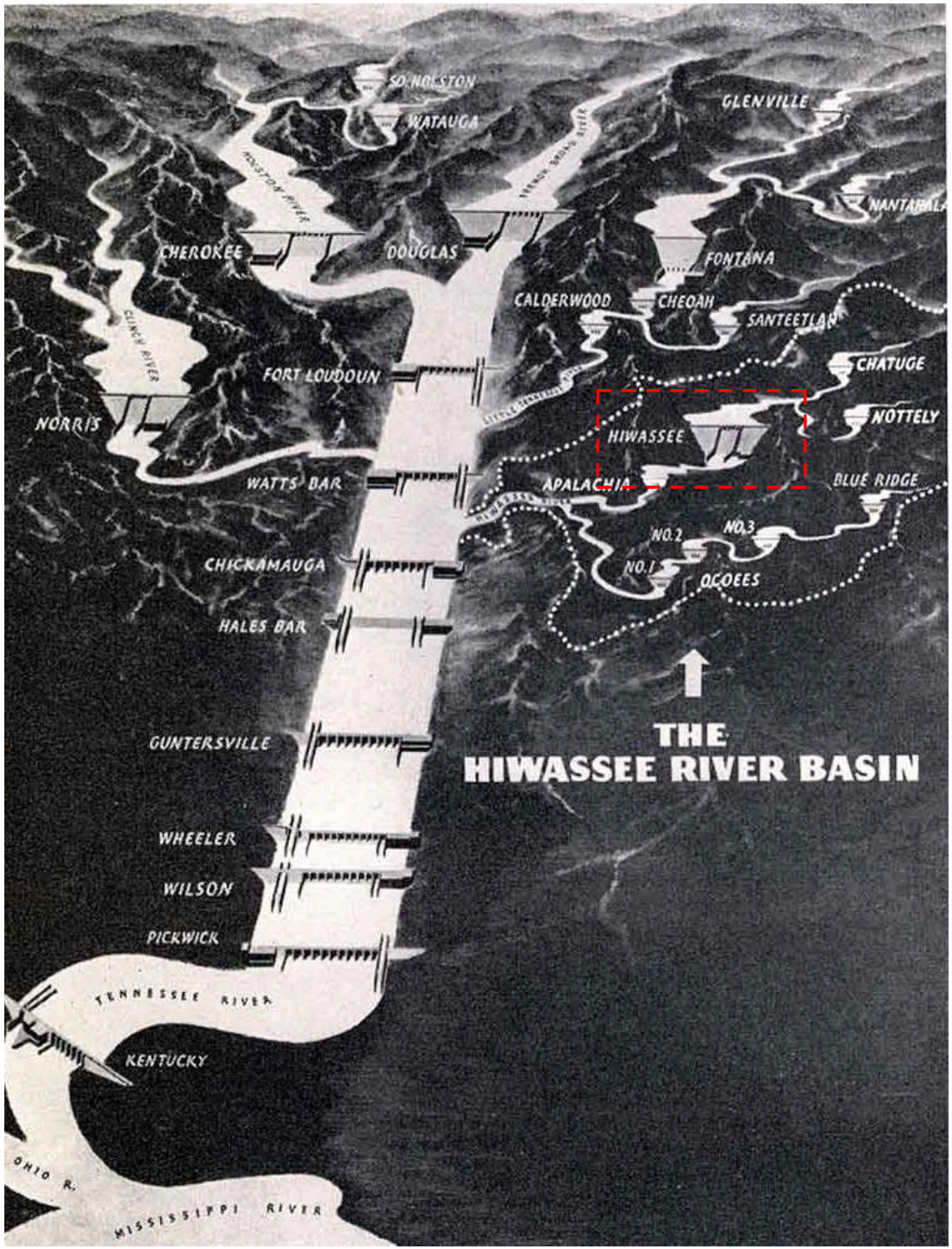
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

RE: increasingly, *Dr. Arthur E. Morgan* was a creature out of time; part sage, part relic of the past. After his ouster in 1938, the former TVA chairman returned to Yellow Springs; to brood, rest and recover. In 1939, he consulted on an effort to resettle European Jews in Mexico. In 1940, he founded an organization to promote his ideas about the small community. He wrote a biography of writer *Edward Bellamy* - a book attempting to prove that Thomas More's *Utopia* was based on actual reports of the *Inca Empire.* He also wrote a practical guide to entrepreneurship entitled: *A Business of My Own*. He consulted in Finland on postwar reconstruction and served in India as a member of a commission. On the *Upper Volta River*, he consulted on a major hydroelectric plan. He died in 1975, at the age of ninety-seven.

Part 14

New Rock

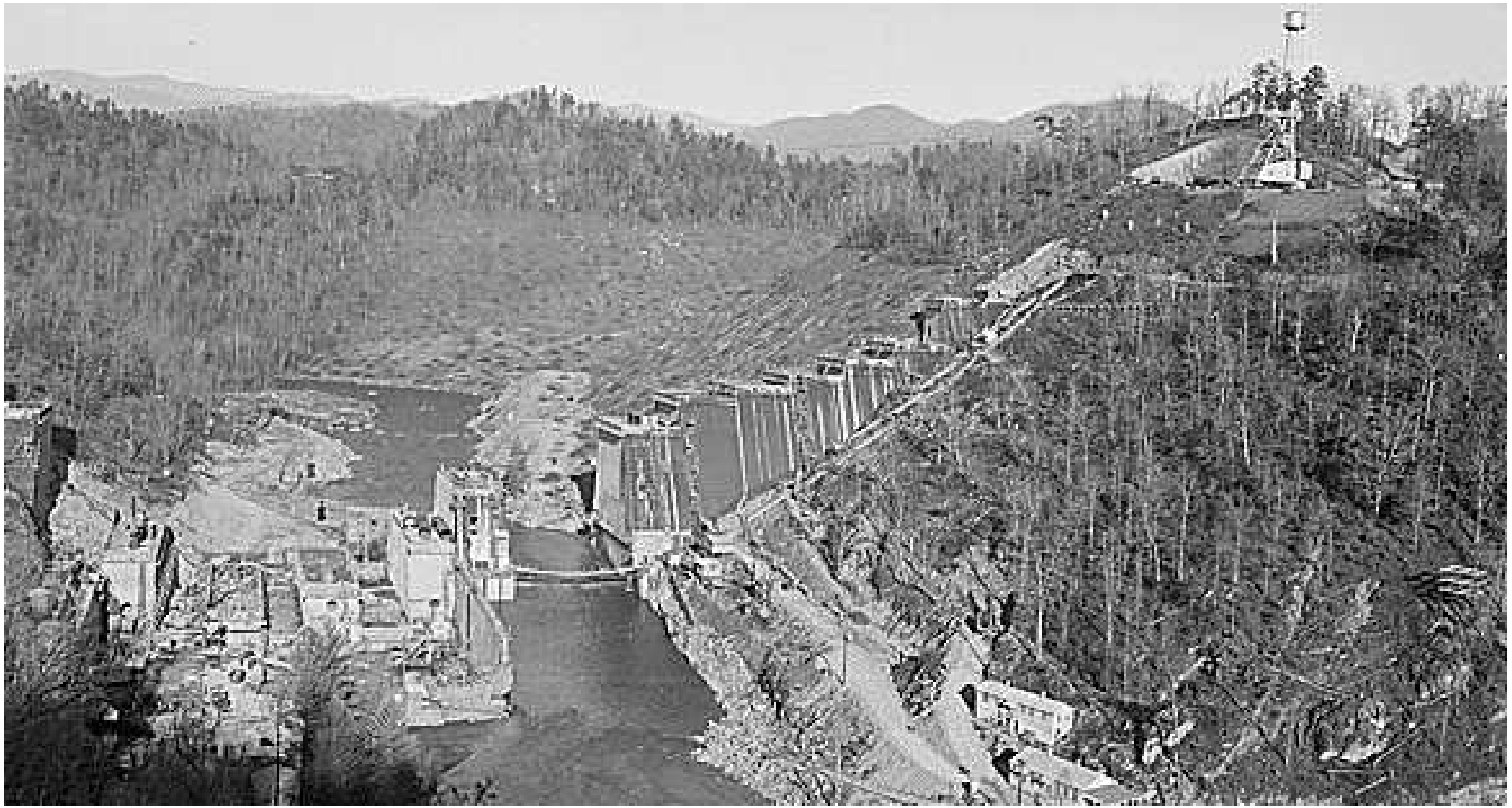
Moving Mountains



"…To understand a dam you want to catch it young, when the steam shovels are taking bites out of the mountainside above the river, and making funny faces as they spit out mouthfuls of rock into the trucks that take it to be crushed. Most of the tourists go to Norris, but that dam is finished now, and quiet, while last summer you could see one being built by going up into the hills to Hiwassee…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Map is from the book *The Hiwassee Valley Projects*, Government Printing Office, 1948"



"…The job is just what one of the TVA engineers called it, moving a mountain half a mile or so from a place where it serves no useful purpose to a place where it can do some good. These hills have been here so long it may seem a hard thing to move them; but after all they are dead rock now. The dams are new rock, growing right under your eyes…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above</u>: caption: "Early stage of Hiwassee Dam"

"…There is a big raw gash in the side of one hill, where the dam is to sit; and along the river a piece there is another gouged-out cliff where they are quarrying the rock, with the help of a steam shovel named Bucy-rus. Another kind of shovel that can work in the water is browsing on the river bottom; this semi-aquatic mon-ster ought to be a brontosaurus. The rock is being dug out of hills and rivers by machines that remind you of the animals that were here when the rocks were laid down…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Top</u>: caption: "Norris Dam construction progress"

<u>Bottom</u>: caption: "Power shovel on roadway on hillside at Norris Dam site"

Right Handy

"…For both the high dams, Norris and Hiwassee, the rock was right handy; it looked as if Providence, knowing there would be no navigation up there, had kindly planted a mountain of dolomite to do the job at Norris, and there was a similarly useful cliff at Hiwassee. Down the river where there are no mountains you can send the rock in barges, and use floating mixers, right on the water, to make the concrete…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Top</u>: caption: "Drilling for a shot in boulder in roadway at Norris Dam"

<u>Bottom</u>: caption: "Drilling in lateral test shaft for examination of substrata at base of Norris Dam"

Home Grown

"…For the high dams they strung cables across and rigged up a new kind of concrete-carrier that holds seven cubic yards…TVA had a little cement war when it built Norris, which it won by threatening to make its own cement down the river at Sheffield. They did get the lumber for the forms right out of the reservoir area, where it had to be cut anyhow, and they kept that up at the other dams, building out of what the land-clearance people chopped up. At Wheeler they filled the coffer dam with rock and clay from an excavation for the power house, and for a highway cut. So it got to be mainly a case of rearranging the country, just using what they had and putting it somewhere else…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Top Left</u>: caption: "Logs for the construction of a cofferdam at TVA's new Douglas Dam on the French Broad River"

<u>Top Right</u>: caption: "A log cofferdam at TVA's new Douglas Dam on the French Broad River"

<u>Left</u>: caption: "Workman operating circular saw at the Norris Dam site"

<u>Top Left</u>: caption: "Inside the log cofferdam of TVA's new Douglas Dam on the French Broad River"

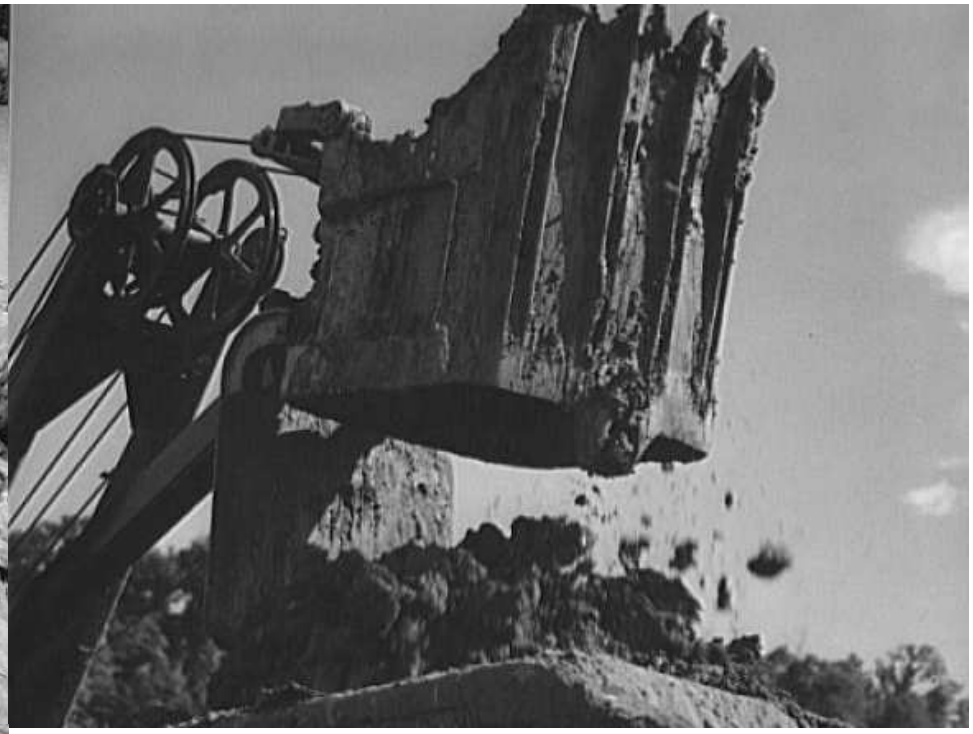
<u>Top Right</u>: caption: "Rocky going for a bulldozer at TVA's new Douglas Dam on the French Broad River"

<u>Left</u>: caption: "Hauling dirt and rock to an earth fill at the site of TVA's new Douglas Dam on the French Broad River"

"…After the steam shovels the thing to watch is the rock-crusher, an especially soothing sight if you are mad at anybody. At Hiwassee they spray water on the rock to keep down silica dust; then the crushed rock travels on conveyors to be graded and crushed finer, till some of it gets to be sand, and it all goes to the cement-mixer…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Drilling a blast hole with a jackhammer at the rock quarry at the TVA's new Douglas Dam on the French Broad River"



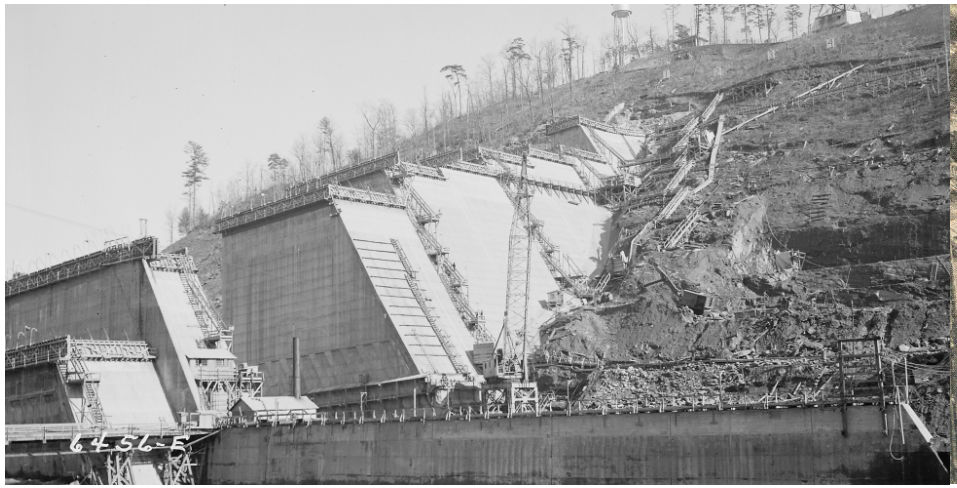
<u>Top Left</u>: caption: "Loading out rock for crushing into aggregate for concrete work at TVA's new Douglas Dam on the French Broad River"

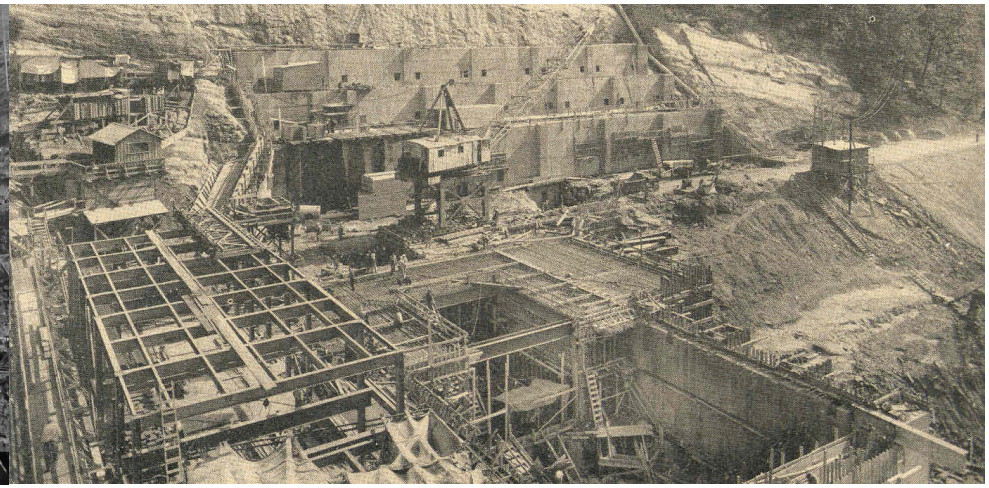
<u>Top Right</u>: caption: "Dumping another dipper load of dirt and rock into a truck at the TVA's new Douglas Dam on the French Broad River"

<u>Left</u>: caption: "Loading out rock for crushing into aggregate for concrete work at the TVA's new Douglas Dam on the French Broad River"

<u>Top L&R</u>: caption: "Aggregate storage pile which provides crushed stone and sand for the building of the new Fort Loudoun Dam, furthest upstream of the TVA's main Tennessee River projects"

<u>Left</u>: caption: "Concrete mixer at TVA's new Douglas Dam on the French Broad River"





"…A little toy train takes it from the cement-mixer to the cableway, and then they do their tight-rope stunt high in the air, with one cable tower moving and a man on the ground telephoning across to tell them where to land. From the height of the cables the load of wet rock looks too small to count, and you start doing arithmetic to see how many trips the carrier will have to make. But remember they dammed the Nile when a man could not carry in a day half of what the bucket carries in one trip…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Hiwassee Dam, progress in construction"

<u>Right</u>: caption: "Construction of Hiwassee Dam's powerhouse"

Safety Pays

"…After they dump the cement, it's like setting a sidewalk, just one of those jobs that attracts rubbernecks fond of watching other folks work. But the dam-builders themselves, in safety helmets and sometimes goggles, are something to see. They say it took persuasion, at Norris, to get the men to use all the safety inventions that TVA provided, but now they are easier to convince because the safety records are good…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Welder"

"…It takes some sort of skill for even the simplest jobs because the working equipment is complicated, and there are all kinds of special skills necessary. So, besides the people from the neighborhood and the engineers, they have men from all over to make a dam construction camp a little world in itself. Perhaps their last job was in Seattle and their next will be in China, or Hawaii, or Canada…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

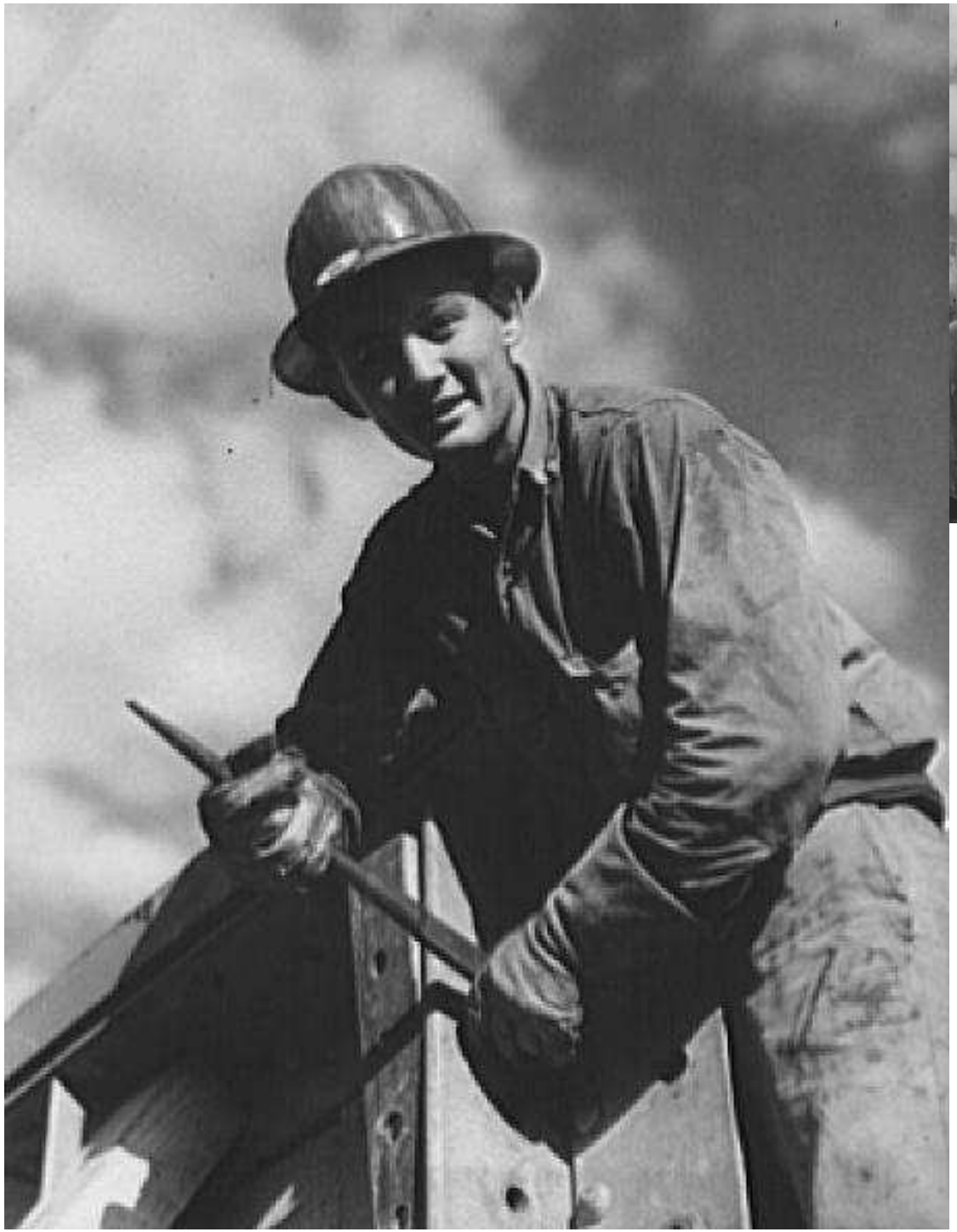
<u>Left</u>: caption: "The dangerous work of the diver is important for TVA dam construction operations"

<u>Above</u>: caption: "A carpenter at the TVA's new Douglas Dam on the French Broad River"

<u>Left</u>: caption: "Hot tar tank tender. His job is to furnish plenty of hot tar at the site of TVA's new Douglas Dam on the French Broad River." [636]

<u>Above</u>: caption: "Gas welding a joint in a line of spiral pipe at the TVA's new Douglas Dam on the French Broad River"

<u>Left</u>: caption: "A welder at the TVA's new Douglas Dam on the French Broad River"

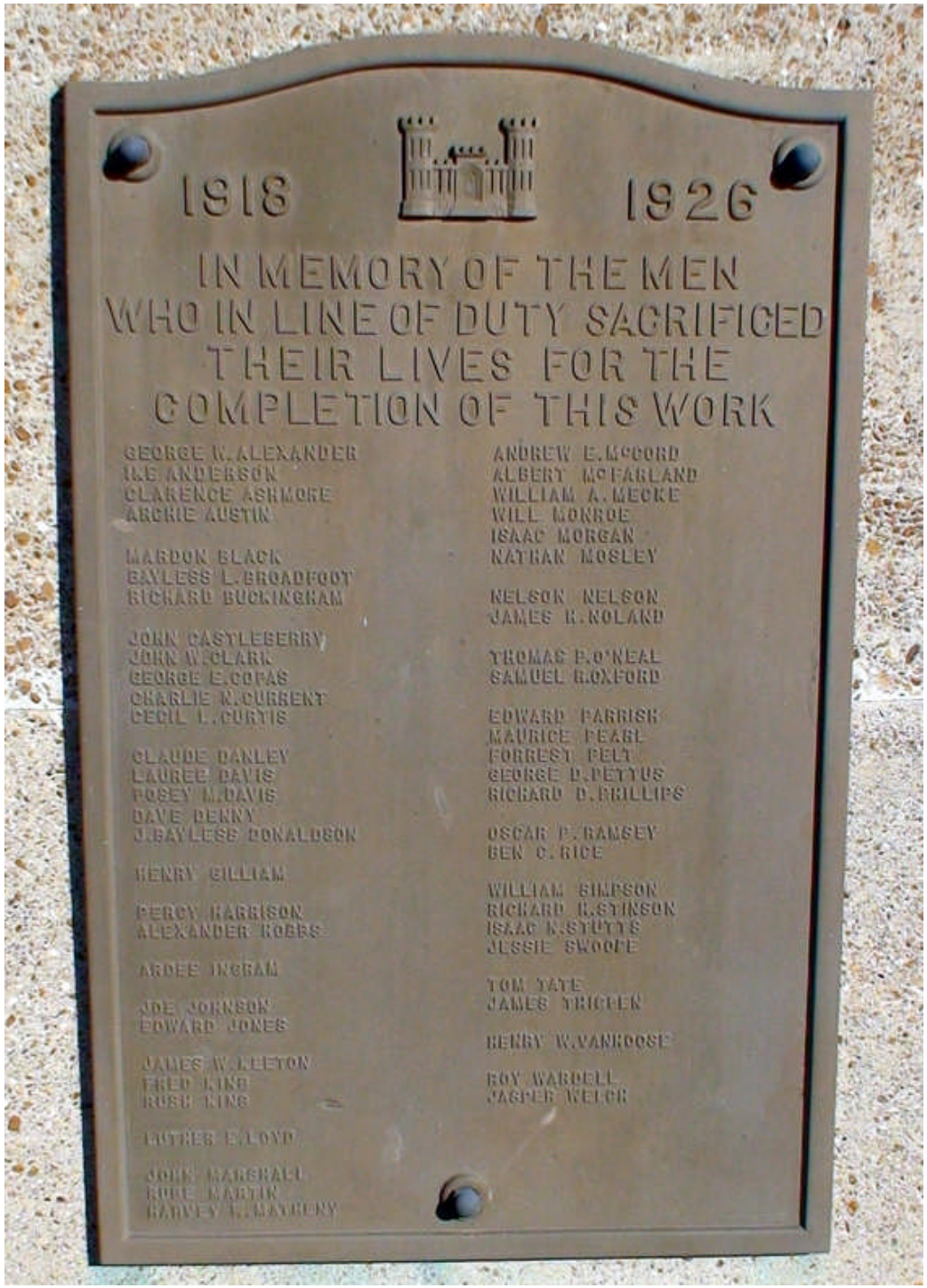


<u>Above</u>: caption: "Construction of Douglas Dam. Pneumatic winch operator at TVA's new Douglas Dam on the French Broad River"

<u>Left</u>: caption: "Rigger at the TVA's new Douglas Dam on the French Broad River"

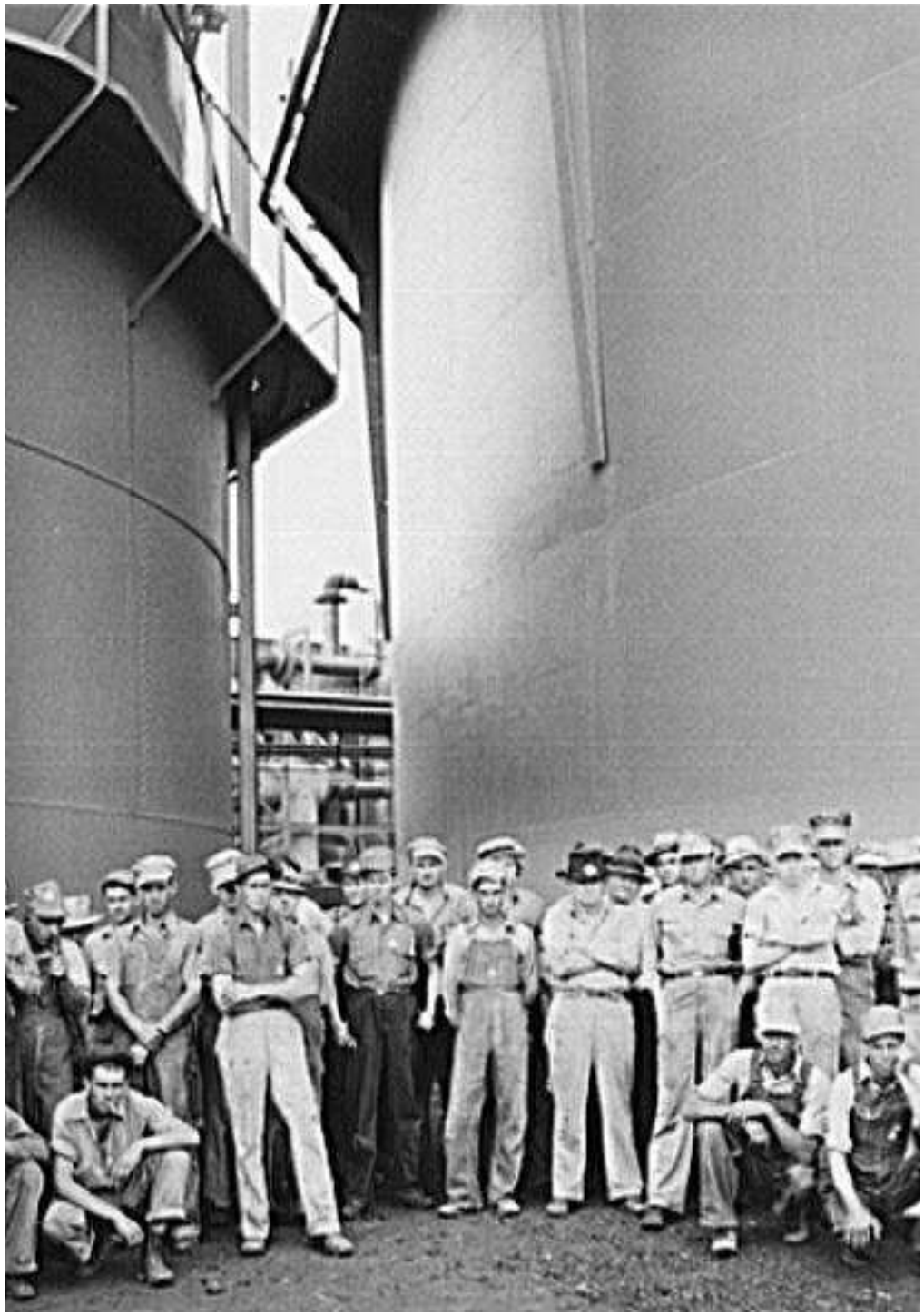
<u>Above</u>: caption: "'Big Pete' Ramagos, rigger at the TVA's new Douglas Dam on the French Broad River, served overseas in the last war, with the 90th Division, 345th machine gun company. He is a Greek who speaks with a Southern drawl."

<u>Left</u>: caption: "A good type of workman is building the new Fort Loudoun Dam, furthest upstream of the TVA's main Tennessee River projects"



"…A big blackboard down by the drinking fountain lists accidents, but the totals are so much lower than usual on such jobs that they are something for ordinary builders to think about. At Hiwassee, in the summer of 1938, two men had been killed; at Chickamauga, the year before, the record was higher they had lost six but the dam was nearer done, and the engineer in charge was rightly proud of his safety record. The same was true of Pickwick and Wheeler and Guntersville. When Wilson dam was built in the old careless wartime days they killed 57 men there, as a memorial tablet will tell you…"

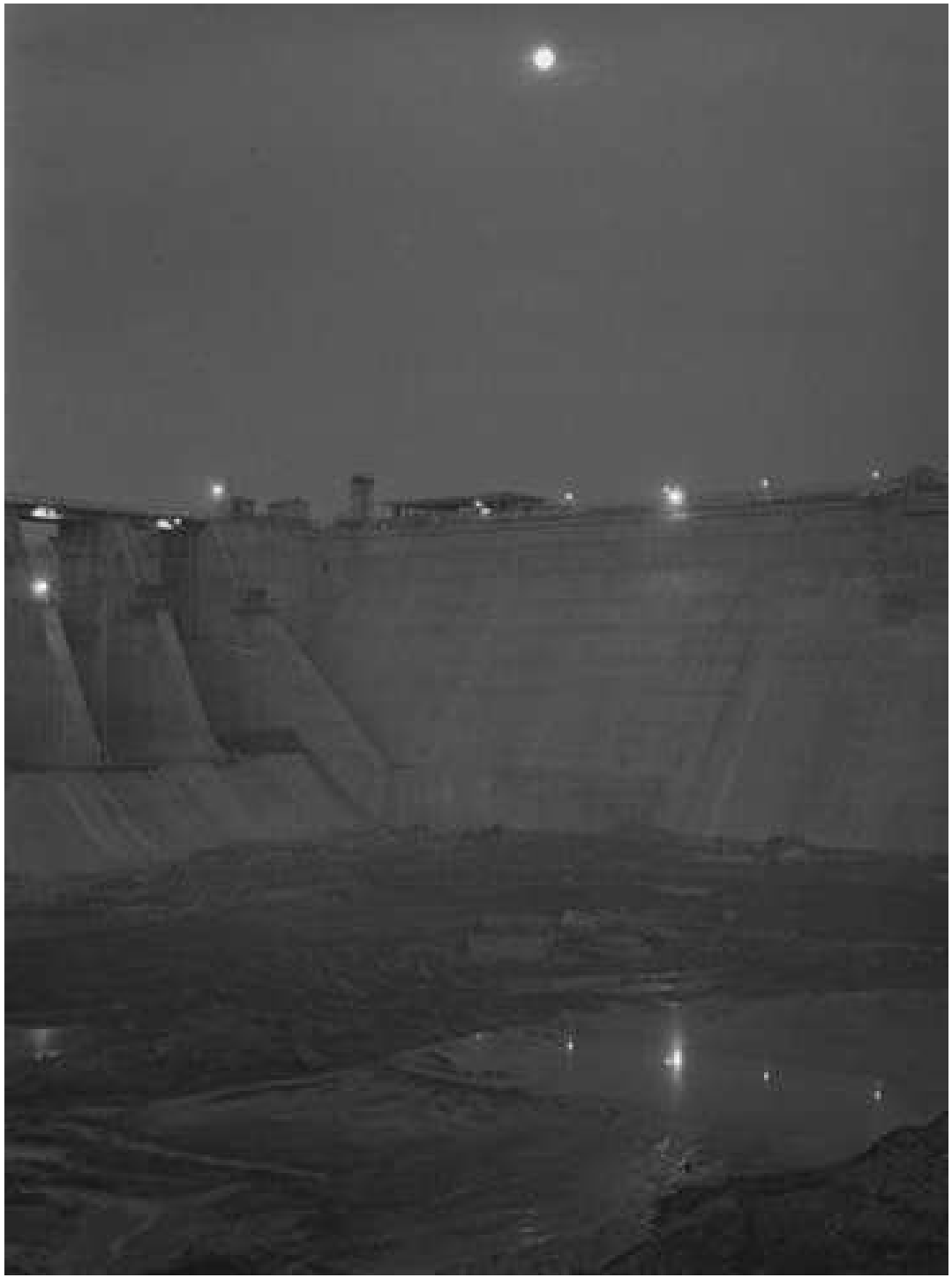
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



"…Besides having all sorts of training in safety, with men rotating on safety committees so that everybody gets the idea, they take the trouble to put railings on all the steps and on the concrete forms. Also there are posters, here at the dam and in the community house and the cafeteria, telling the men not to hurry. The Southerners know about that, and the Yankees learn…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Safety meeting"



"…They work here at night, with lights on the towers of the cableway and up the side of the mountain. And every so often, mostly at night, you will hear the boom of the dynamite blasts. After you've stayed at the construction camp for a while, you realize that the biggest difference between it and any city you have seen, these times, is that everybody is working…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Fort Loudon (i.e., Loudoun) Dam, Tennessee. Tennessee Valley Authority. Construction at night. June 1942."


SAFETY PAYS
BIG DIVIDENDS
TO YOU
DRIVE CAREFULLY
PLAY SAFELY
WORK SAFELY
AND
LIVE HAPPILY
MIXING
ALCOHOL WITH GASOLINE
AND
PLAY WITH WORK
CAUSES
ACCIDENTS

Getting Uppity

"…Appointing the Negro foreman at Pickwick wouldn't mean anything to people who have lived North all their lives, but any Southerner knows you have to get past a lot of prejudice to make a Negro a boss. There is the feeling of the low-grade white people who can't stand to see a 'nigger' getting uppity. And there is the conviction of the upper-class white folks that Negroes won't work for Negroes, and anyhow you can't give a Negro authority because he's sure to abuse it, and be harder on the men under him than a white man would be…"

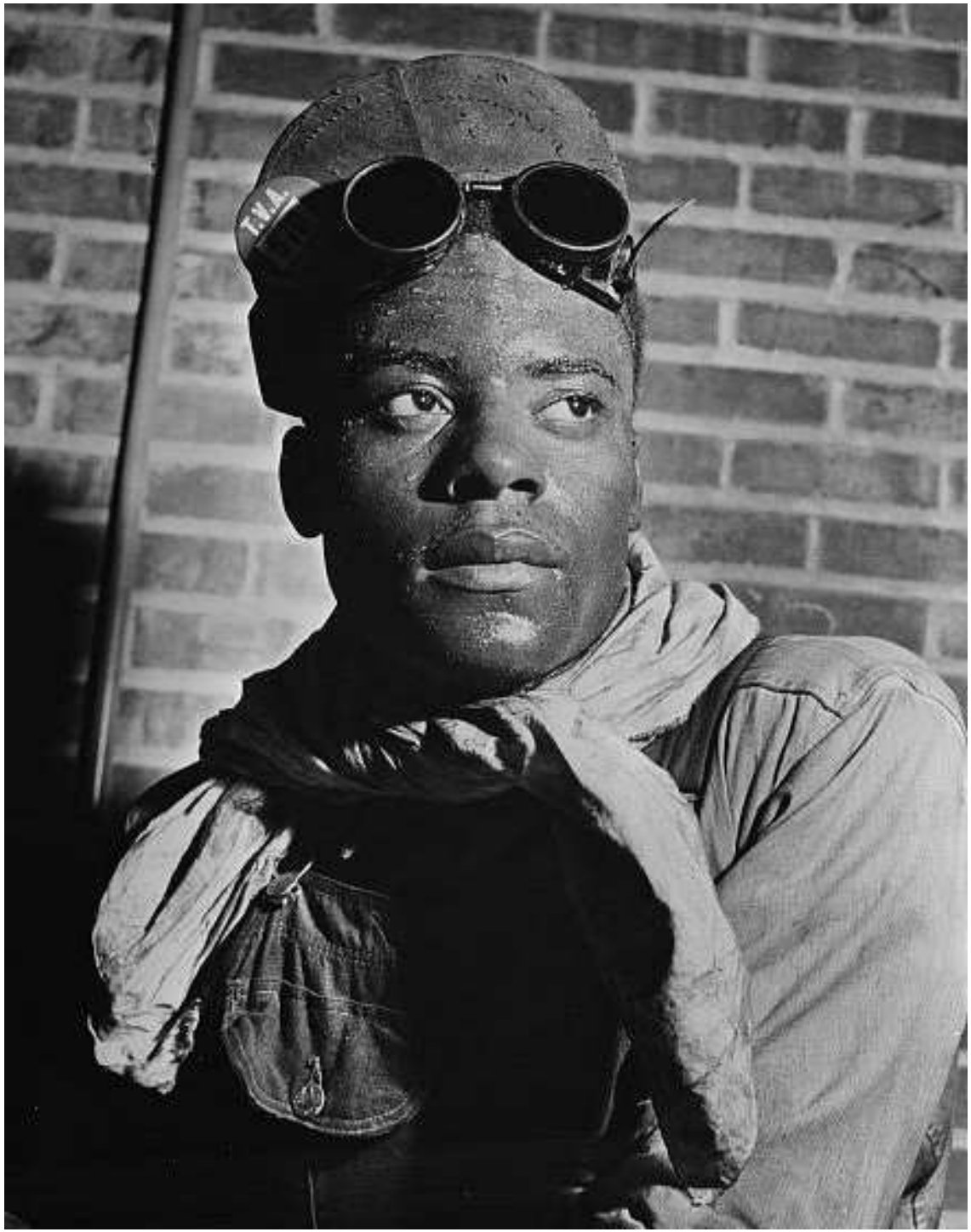
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…But the Authority tried it, more than a year ago, and the man is still foreman with eight or ten workmen under him. They've lately got another colored man as sub-foreman on construction. Of course they started right out paying the same wages for the same work, without distinction of color. Because TVA wages were higher than most local wages, it meant that some of the colored workers on the dams were making more than white men working for private industries in the same places. That was astounding…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Lincoln C. Johnson, sub-labor foreman at Wilson Dam"

<u>Above & Left</u>: caption: "Negro worker at the TVA's new Douglas Dam on the French Broad River"

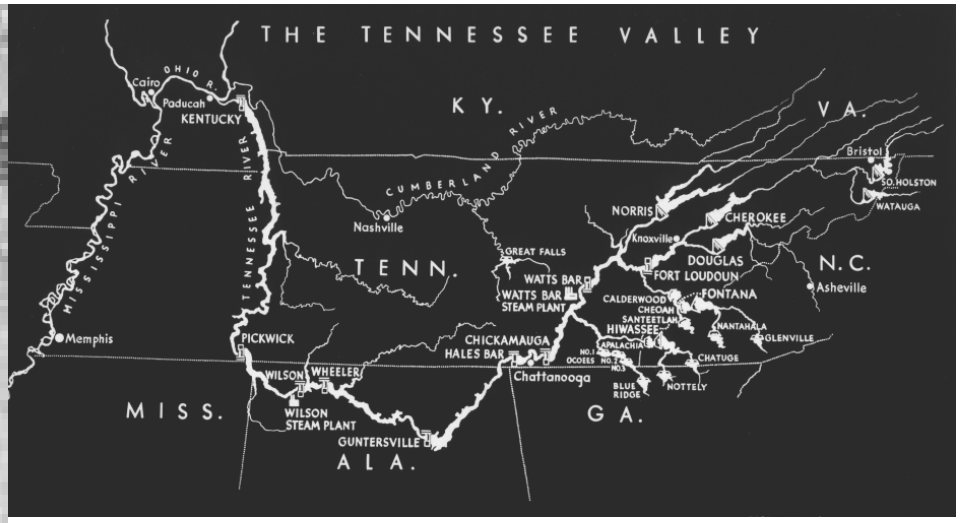


"…Most of the colored workers are in Alabama because TVA made a rule that they would employ Negroes in proportion to their part in the population. This saved argument and meant that they could use a good many colored men down at Pickwick and in the Shoals phosphate plants, while keeping them out of the hill country, where they are not known and not welcome…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Alonzo Bankston is a furnace operator in the TVA plant producing carbide for use of plants manufacturing synthetic rubber"

Men of Genius



"…They say that TVA employs some thirty different kinds of engineers, some of them of course being concerned with the land-reclamation program, and some with power, but you can see how a lot of them are needed just for one dam. They begin with mapping, up in the air; the army engineers did a lot of that and TVA carried on to make the Valley one of the most-mapped regions of the world. Then the geologists have to dig down under the earth…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above</u>: caption: "TVA map showing dam locations in theTennessee River Valley"

<u>Bottom</u>: caption: "Drilling in lateral test shaft for examination of sub-strata at base of Norris Dam"

<u>Top Left</u>: caption: "Wilson Dam, Alabama. Tennessee Valley Authority Engineers discuss blueprints. June 1942."

<u>Top Right</u>: caption: "Field engineers at TVA's Watts Bar steam plant. June 1942."

<u>Left</u>: caption: "A TVA engineer establishes a line during the construction of the Watts Bar steam plant. June 1942."

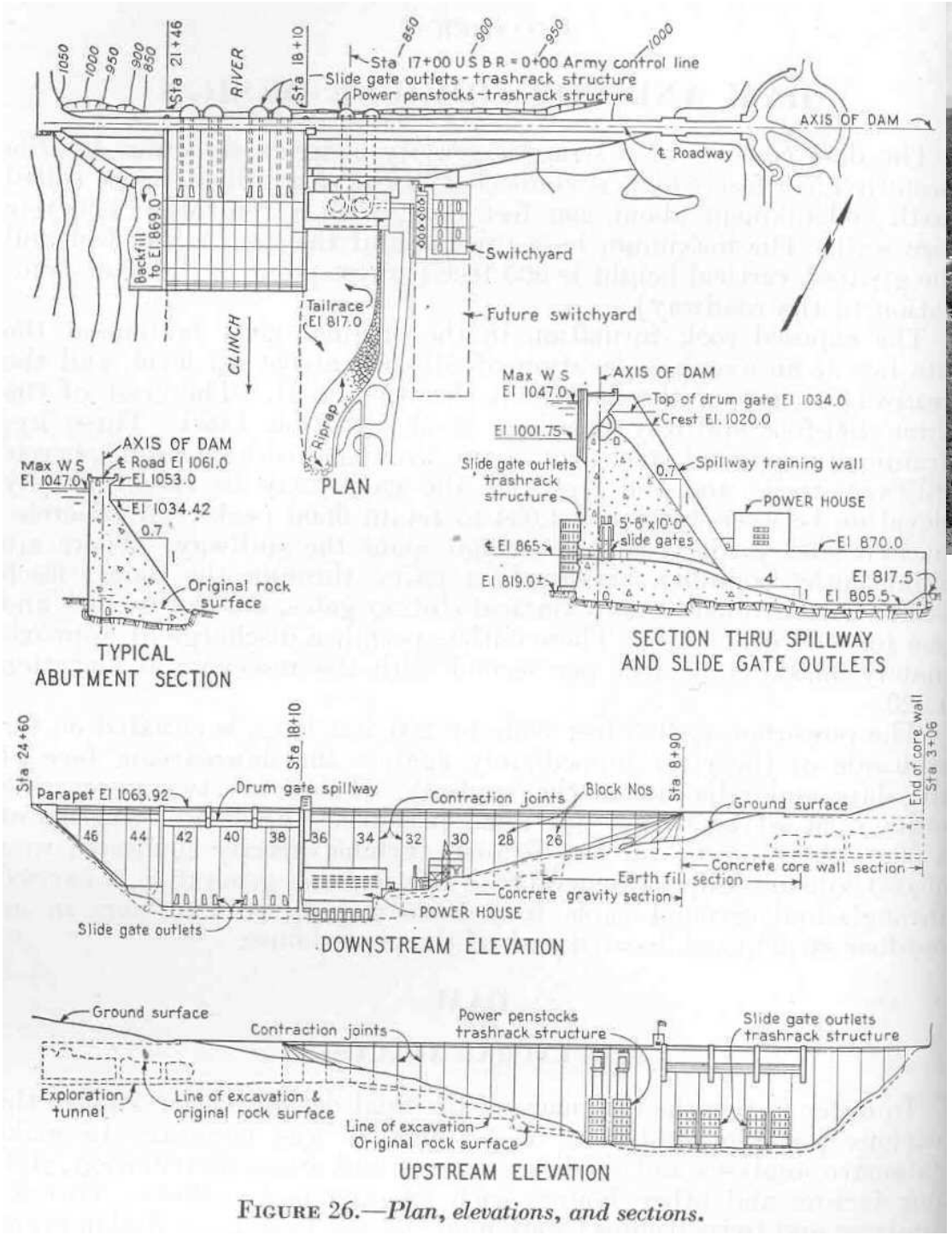
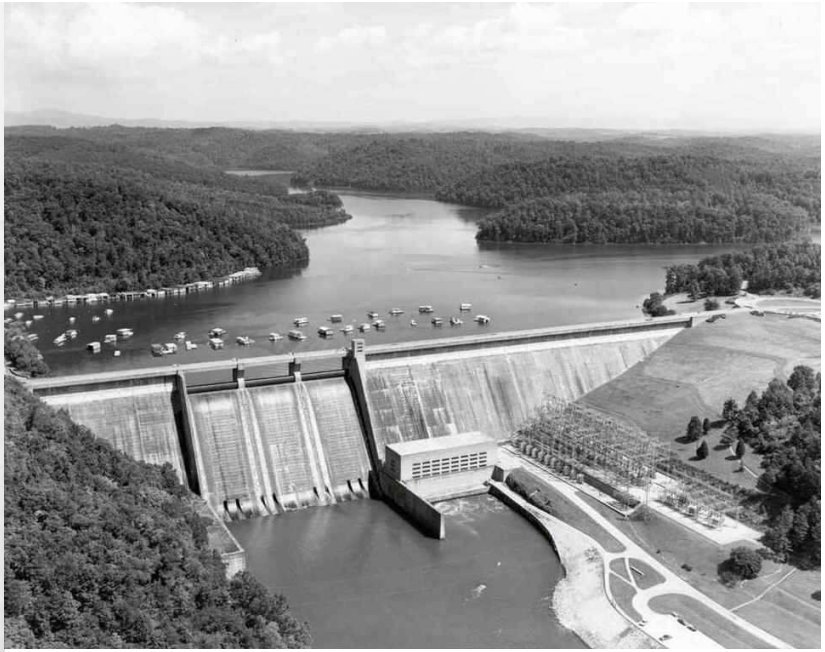
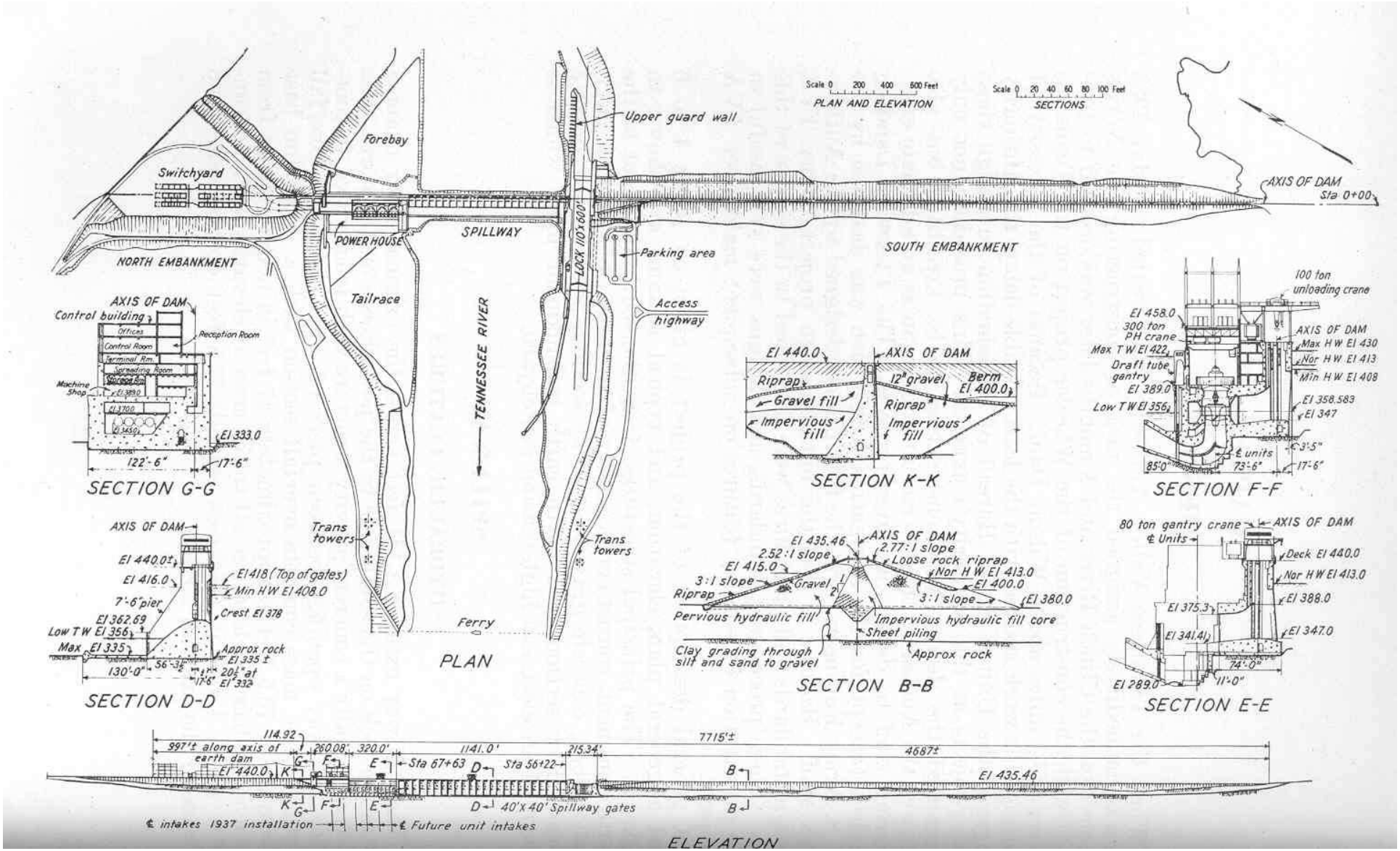


FIGURE 26.—*Plan, elevations, and sections.*



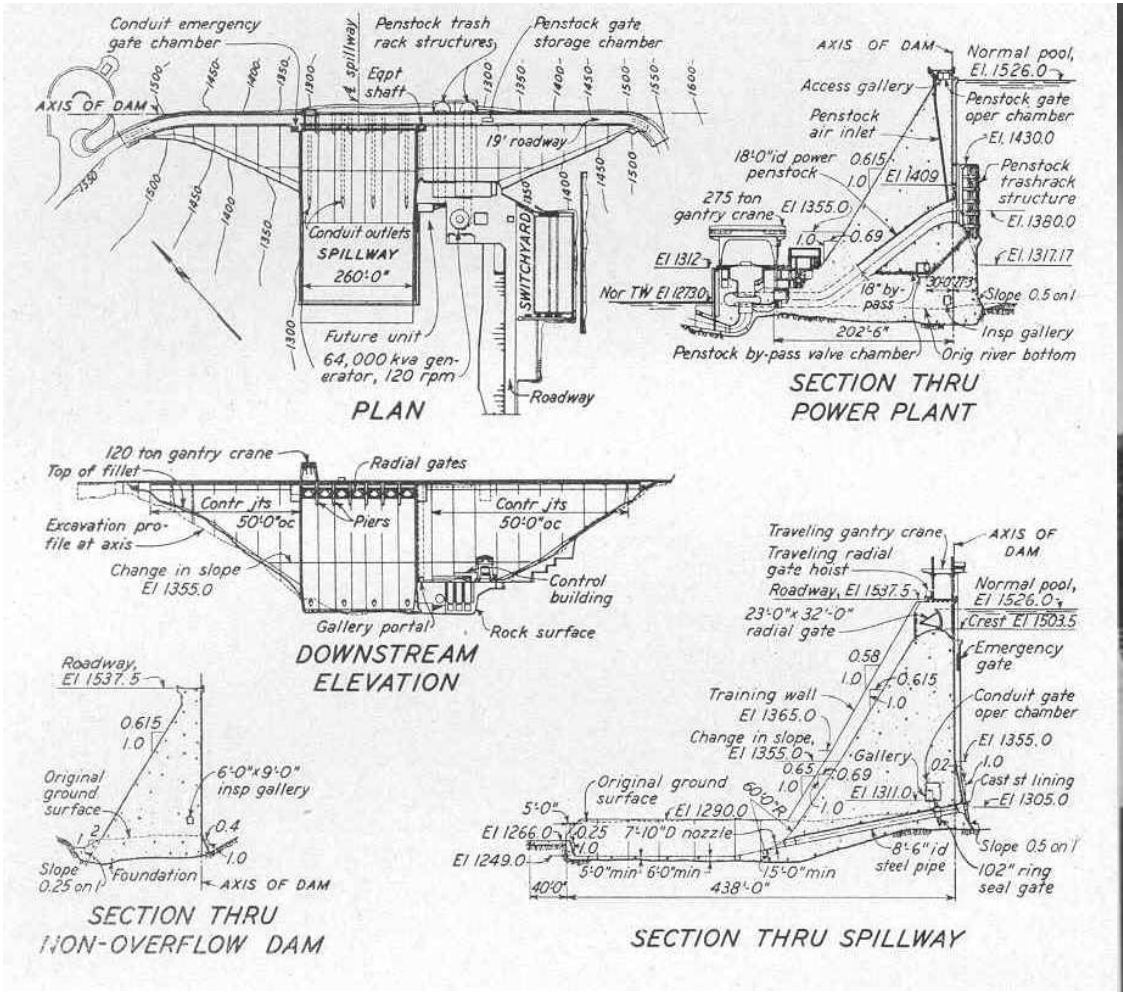
<u>Above</u>: caption: "Norris Dam was the pilot project of the TVA. The construction and administration of the dam and reservoir would serve as a model for over two dozen other TVA dams built throughout the Tennessee Valley in subsequent decades."

<u>Left</u>: caption: "Norris Dam Design"



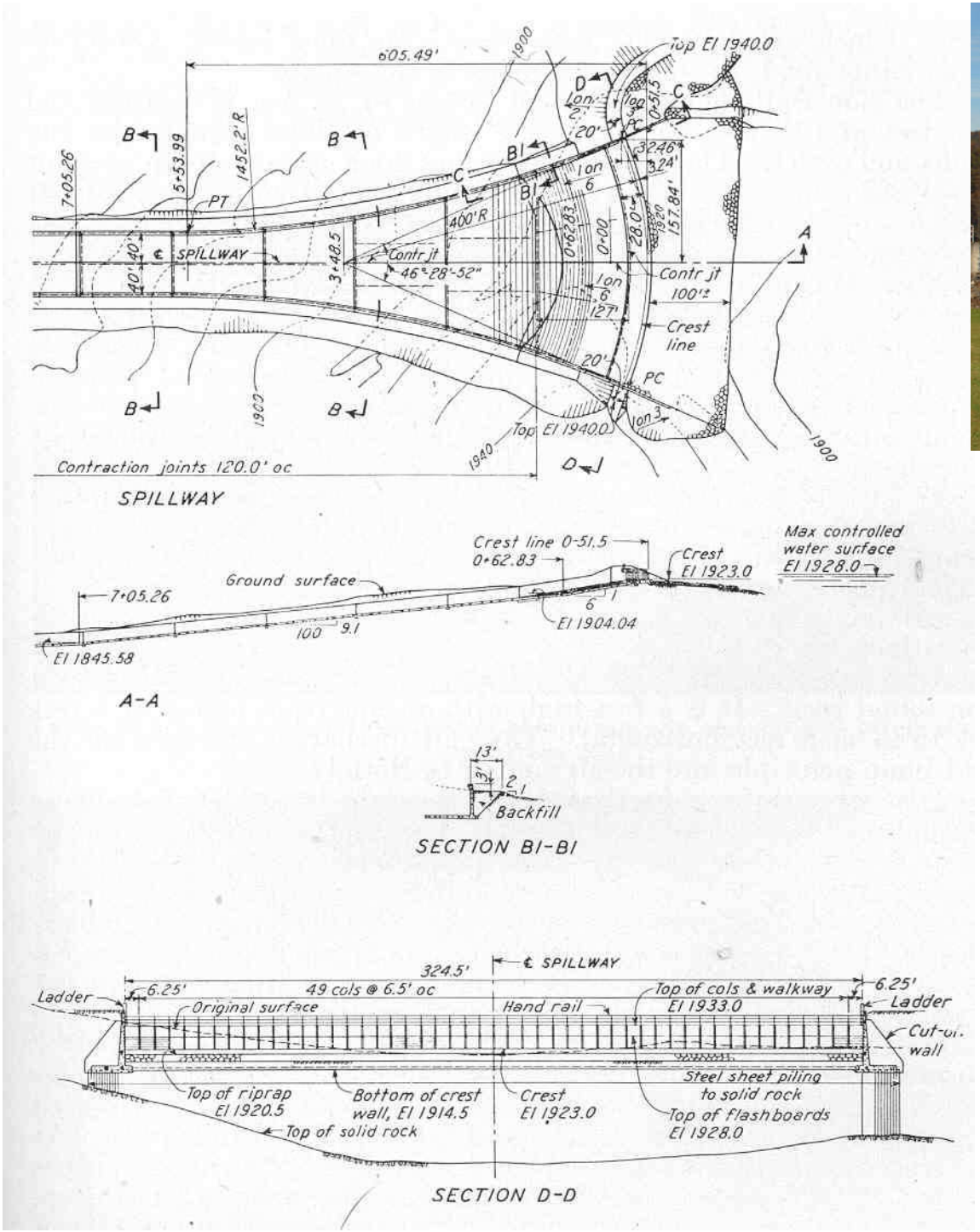
<u>Above</u>: caption: “Pickwick Landing Dam Design”

<u>Above</u>: caption: "Pickwick Dam was constructed between 1935 and 1938 and was named for the nearby community at the time. Along with Wilson and Wheeler Dams, Pickwick flooded the Muscle Shoals area which significantly impeded Tennessee River traffic prior to the 1930s (March 1938)."



Left: caption: "Hiwassee Dam Design"

Right: caption: "Hiwassee Dam and powerhouse. View of control building. This dam, about 307-feet high, closes a deep canyon in a scenically outstanding section of the North Carolina Mountains. Keynote of design is extreme simplicity. Highway is carried across top of dam."



<u>Above</u>: caption: "TVA built the Chatuge Dam on the Hiwassee river in the early 1940s for flood storage and to provide flow regulation at Hiwassee Dam further downstream"

<u>Left</u>: caption: "Chatuge Dam Design"

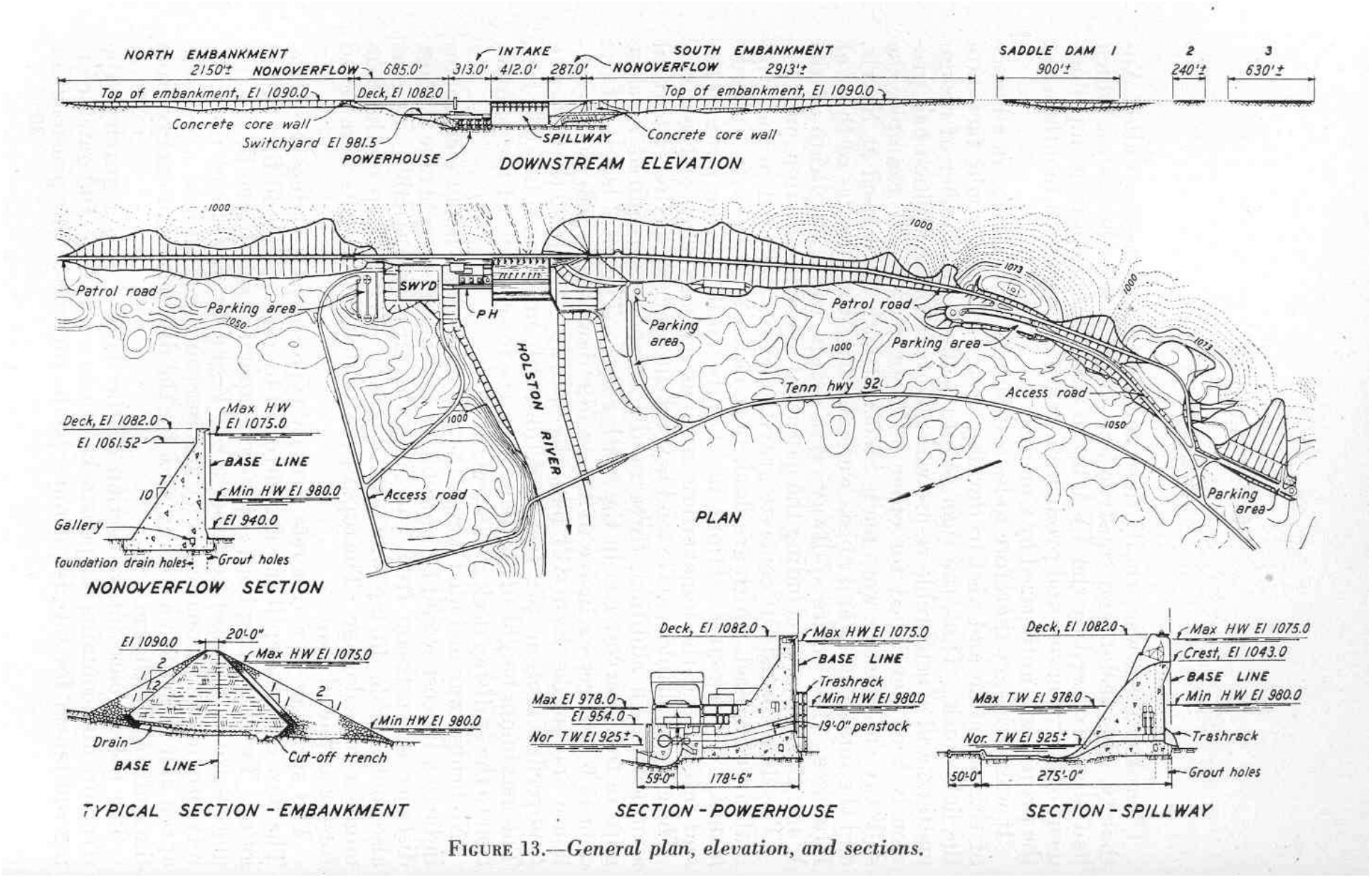


FIGURE 13.—*General plan, elevation, and sections.*

Above: caption: "Cherokee Dam Design"

<u>Above</u>: caption: “The TVA built Cherokee Dam on the Holston River in the early 1940s to help meet urgent demands for energy at the outbreak of WWII”

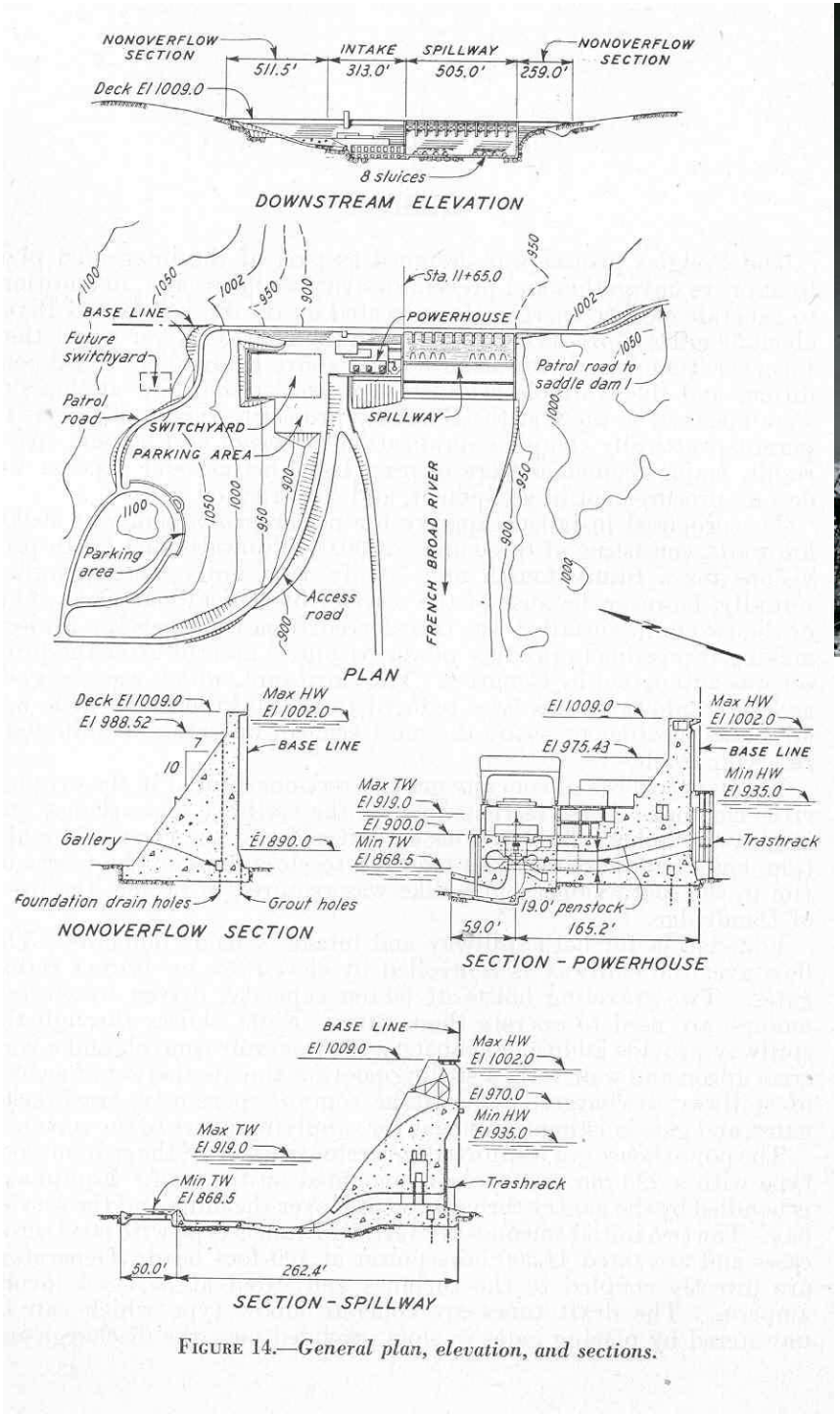
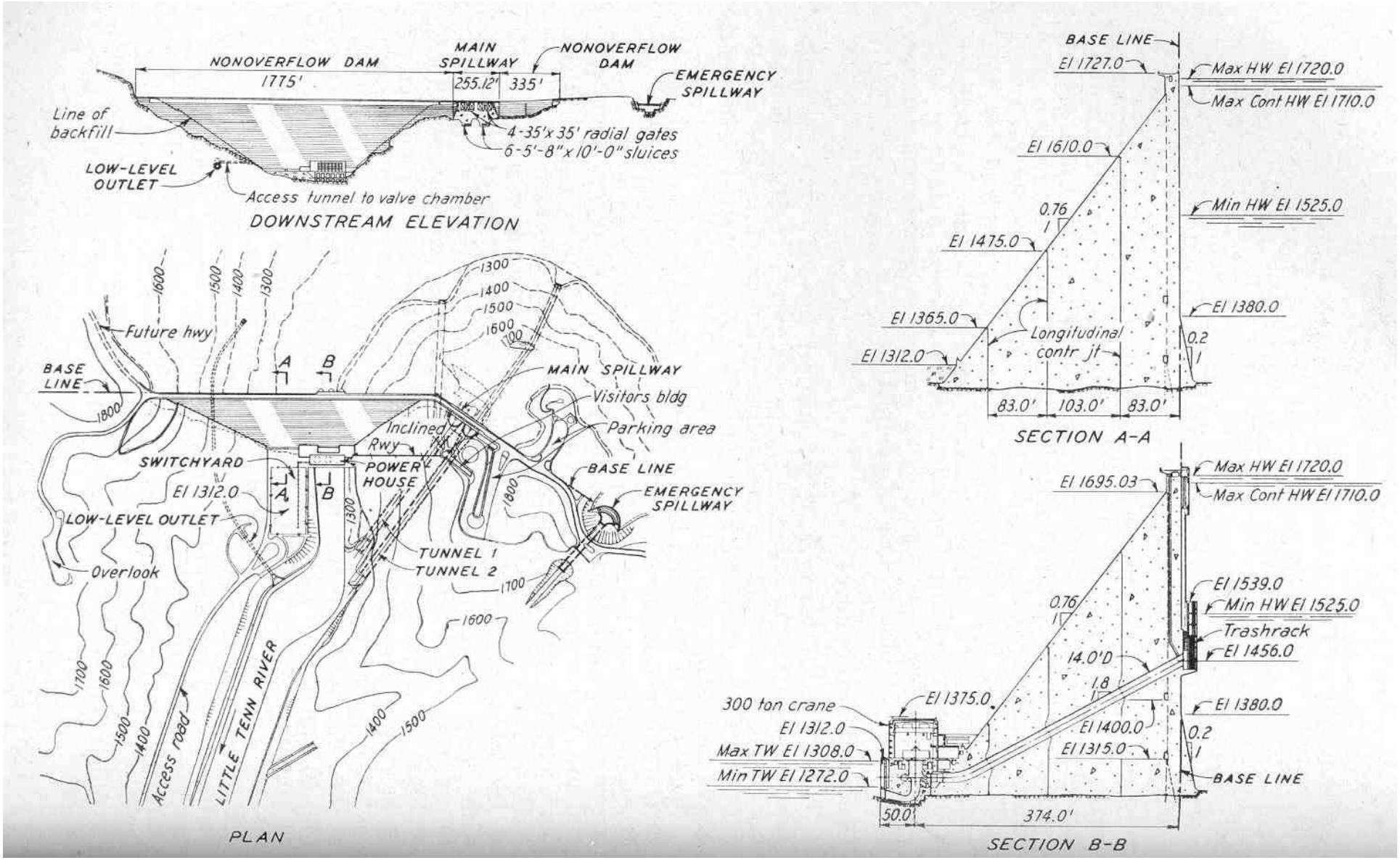
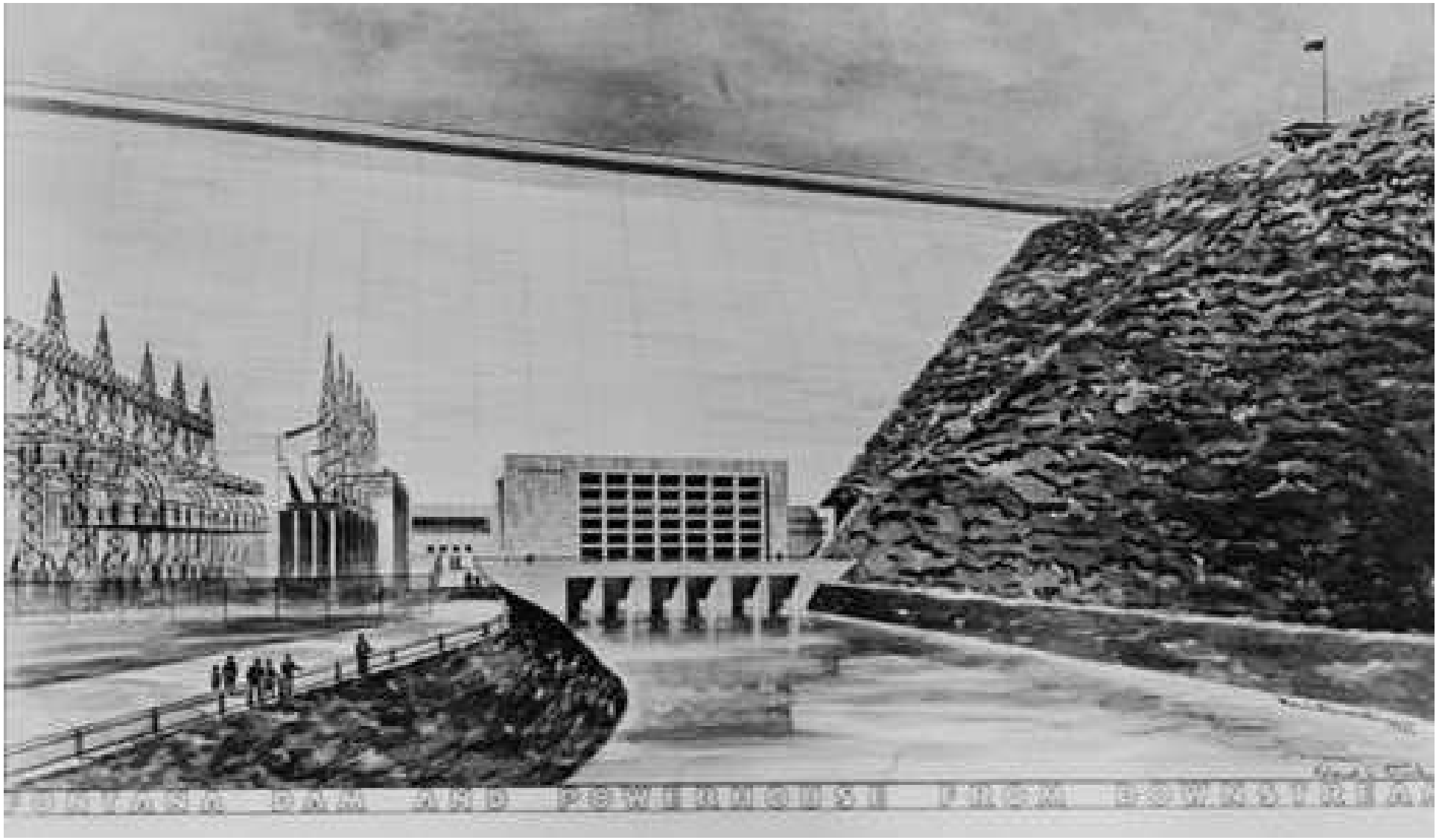


FIGURE 14.—*General plan, elevation, and sections.*

<u>Above</u>: caption: "Douglas Dam was built during World War II to provide power for critical war functions: aluminum and magnesium production and uranium enrichment. The struggling Smoky Mountain Railroad averted bankruptcy by supplying its construction (ca. 1943)."
<u>Left</u>: caption: "Douglas Dam Design"



<u>Above</u>: caption: “Fontana Dam Design”



<u>Above</u>: caption: "Fontana Dam in the mountains of North Carolina, famous for their scenery, will be one of the biggest of the Authority's projects, being over 500-feet tall. As it is under construction, no photographs are available but a general perspective view is shown above. The downstream face of the powerhouse is developed in part as a gigantic show window.

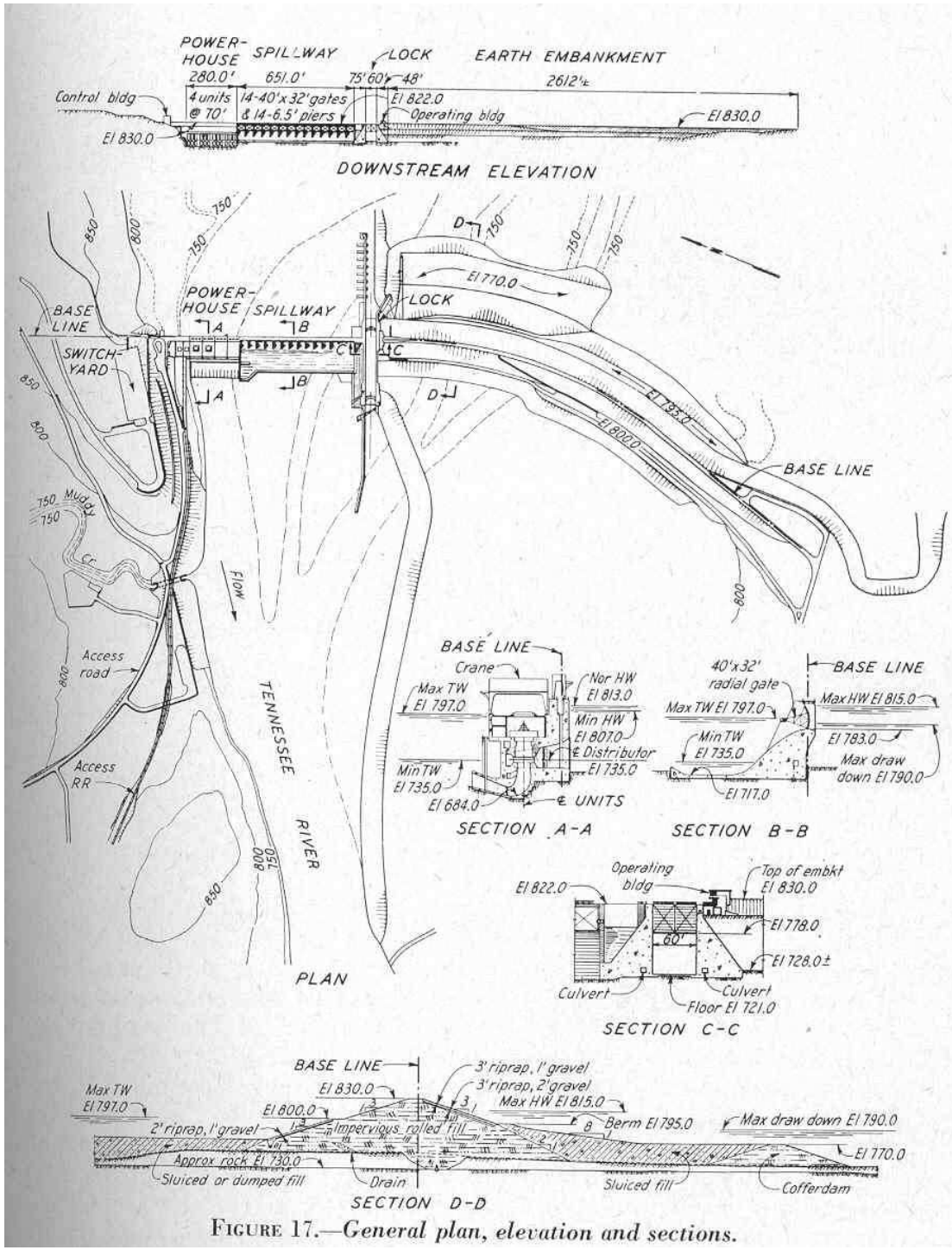
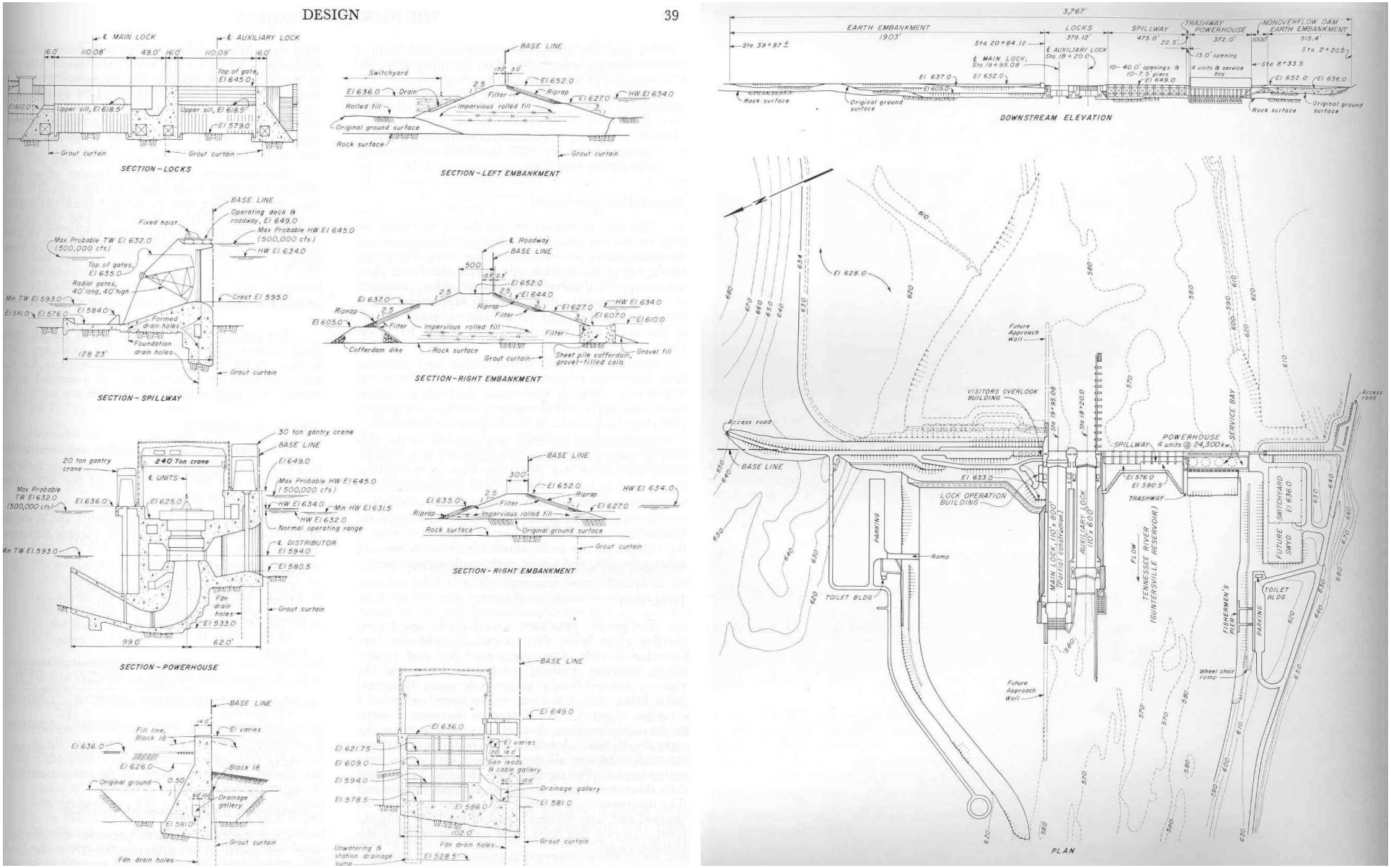


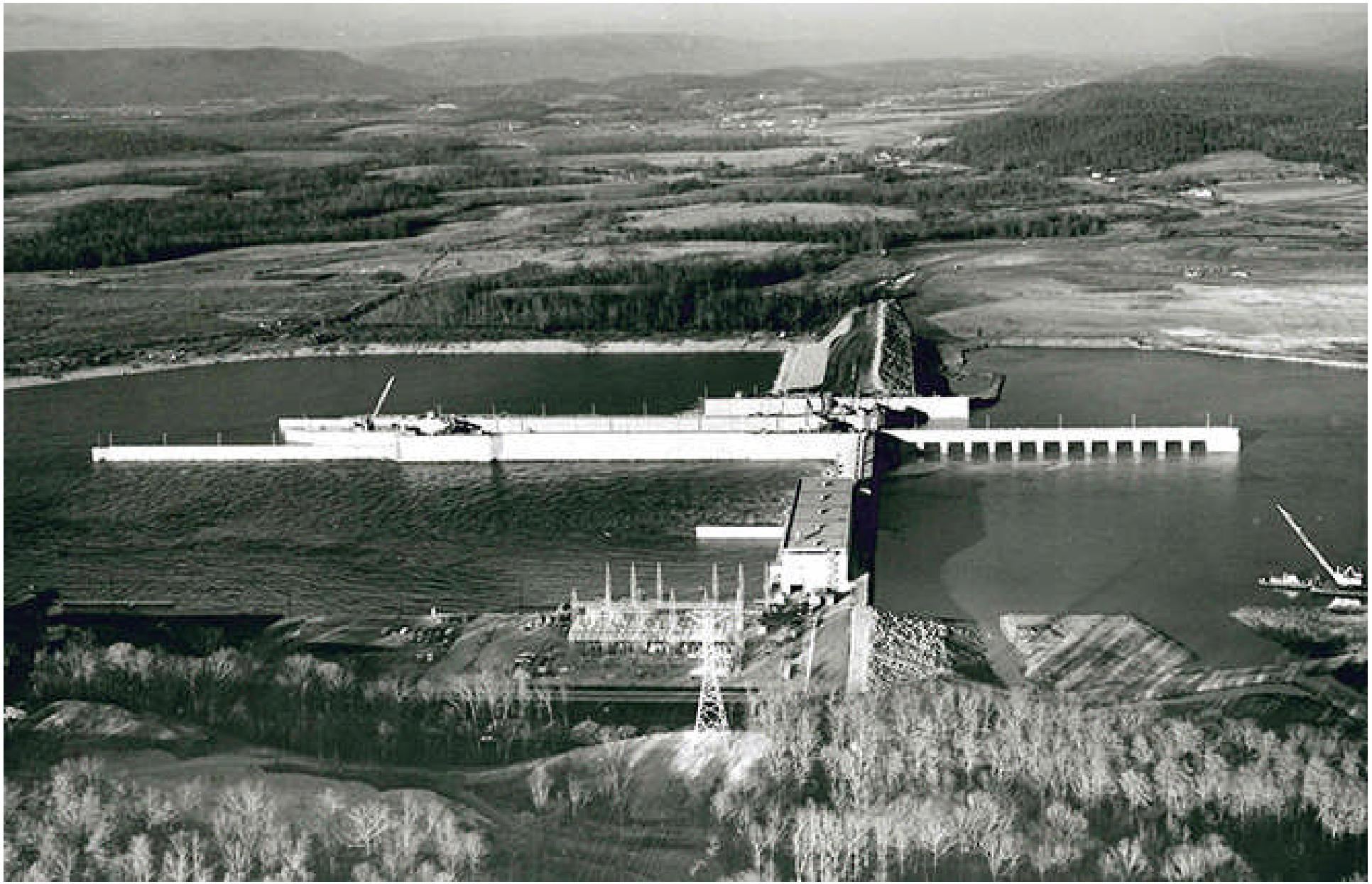
FIGURE 17.—*General plan, elevation and sections.*

<u>Above</u>: caption: "The TVA built the Fort Loudoun Dam in the early 1940s as part of a unified plan to provide electricity and flood control in the Tennessee Valley and to create a continuous (652-mile) navigable river channel from Knoxville, TN to Paducah, KY"

<u>Left</u>: caption: "Fort Loudoun Dam Design"



<u>Above</u>: caption: “Nickajack Dam Design”



<u>Above</u>: caption: “Nickajack Dam, which was constructed between 1964 and 1967, replaced the old Hales Bar Plant (December 1967)”

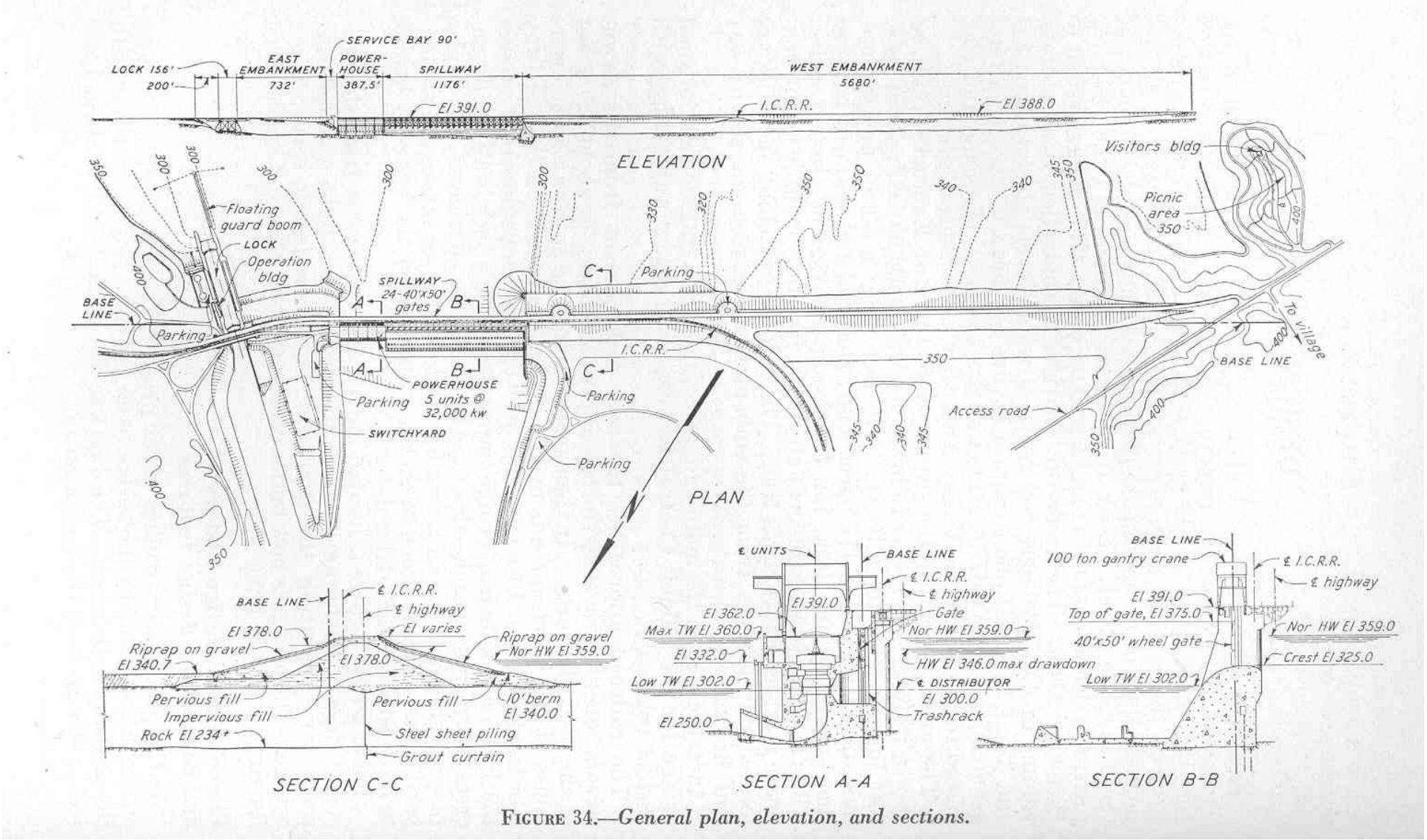


FIGURE 34.—*General plan, elevation, and sections.*

<u>Above</u>: caption: “Kentucky Dam Design”

<u>Above</u>: caption: "TVA built the Kentucky Dam in the late 1930s and early 1940s to improve navigation on the lower part of the Tennessee river and reduce flooding on the lower Ohio and Mississippi rivers"

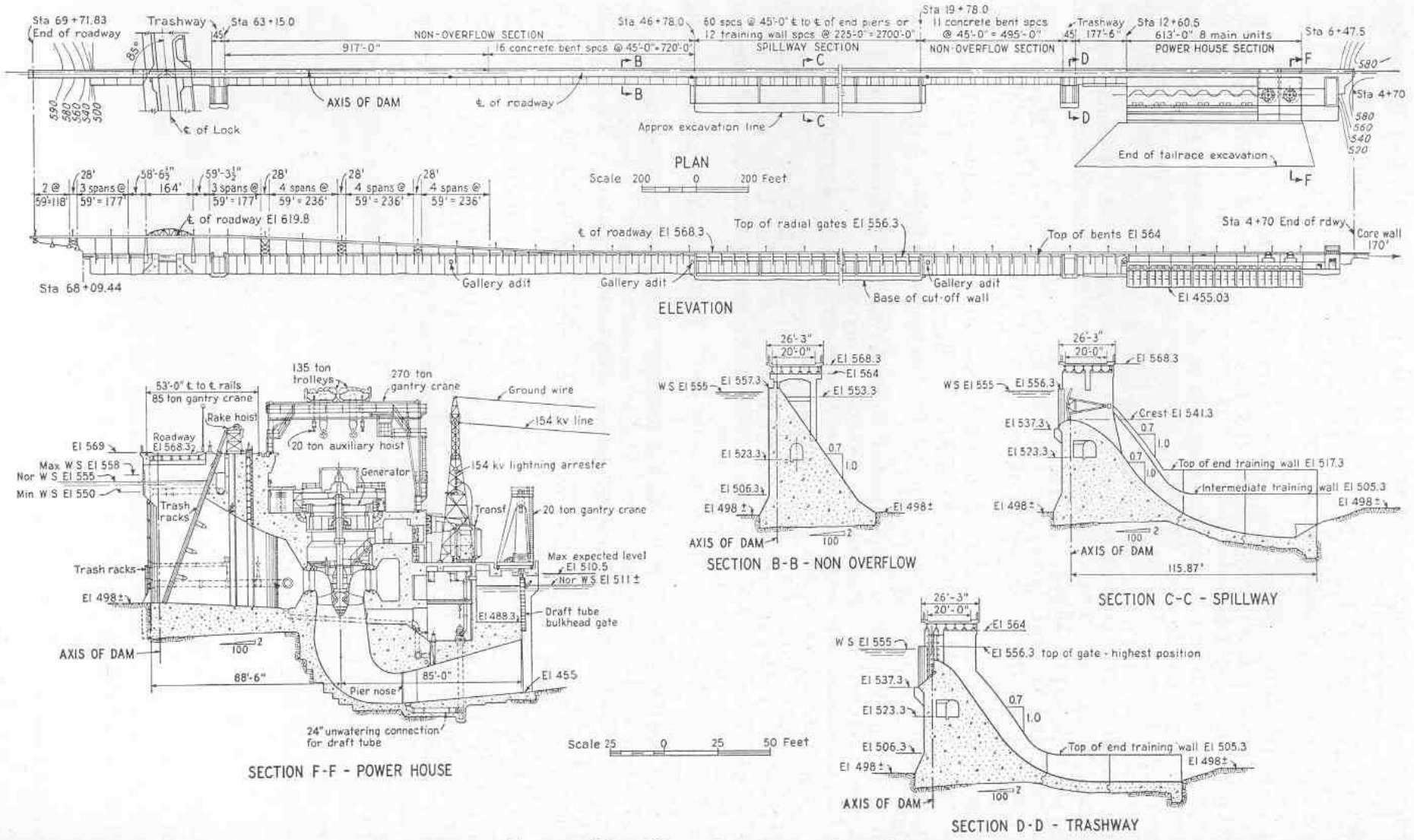


FIGURE 15.—*Plan, elevation, and sections.*

<u>Above</u>: caption: “Wheeler Dam Design”

<u>Above</u>: caption: "The Wheeler Dam project was the first main-river dam built by the Tennessee Valley Authority, and one of the few visited by President Roosevelt (February 1934)"

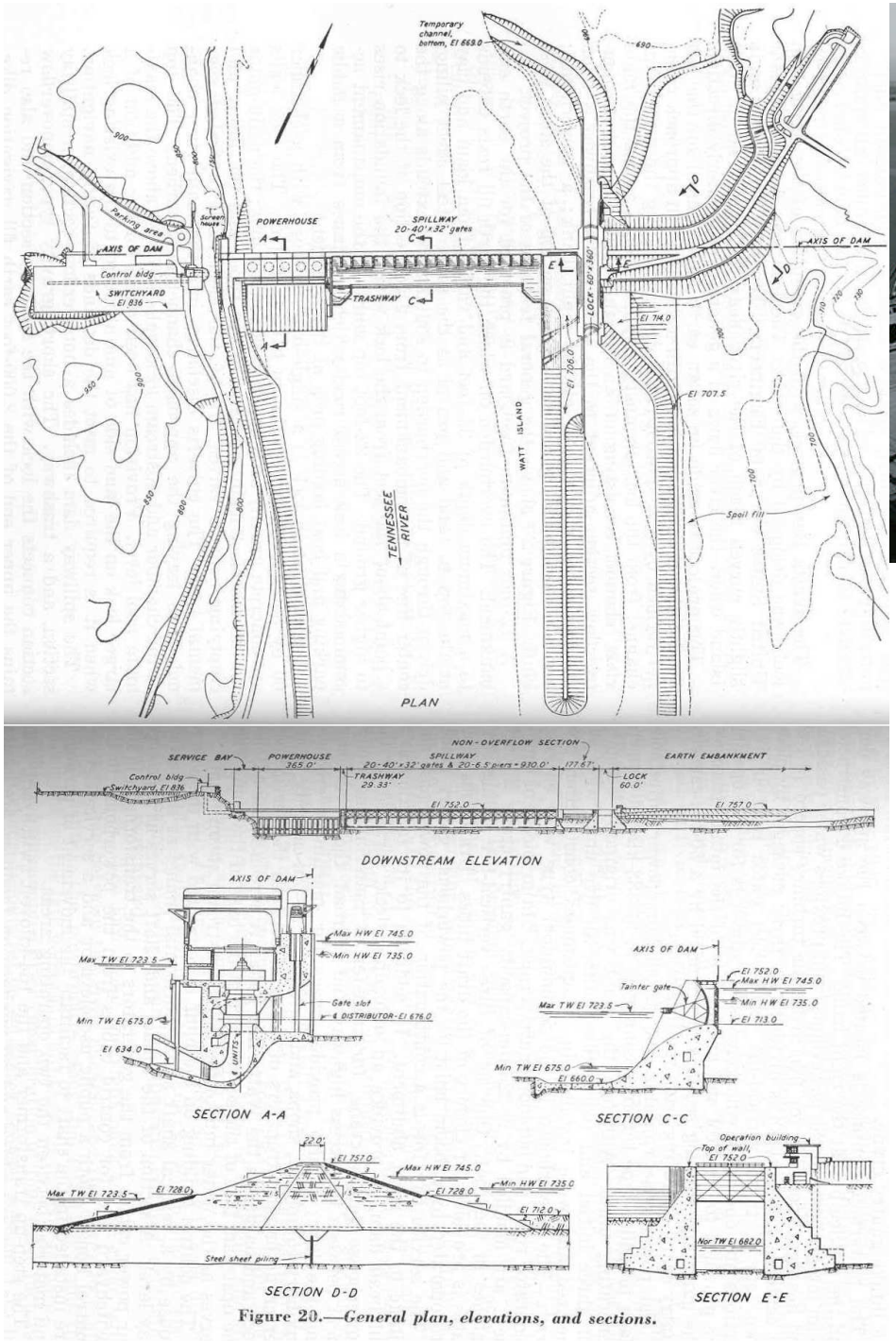
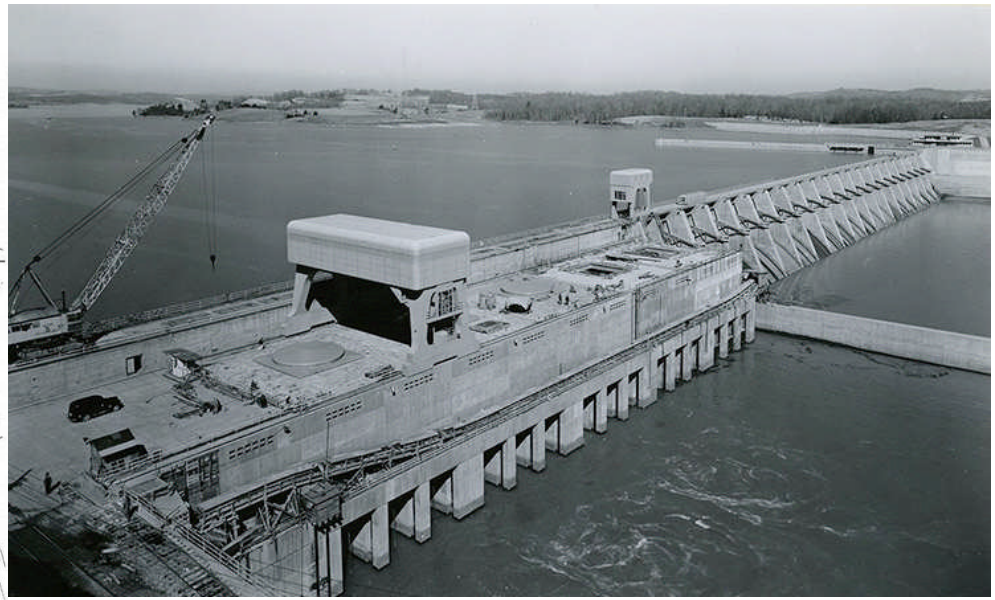


Figure 20.—*General plan, elevations, and sections.*



<u>Above</u>: caption: "At the cost of displacing 832 families and 17 cemeteries when construction began in 1939, Watts Bar provided flood control, electricity, and a continuous navigable channel along the Tennessee River between Chattanooga and Knoxville (February 1943)"

<u>Left</u>: caption: "Watts Bar Dam Design"

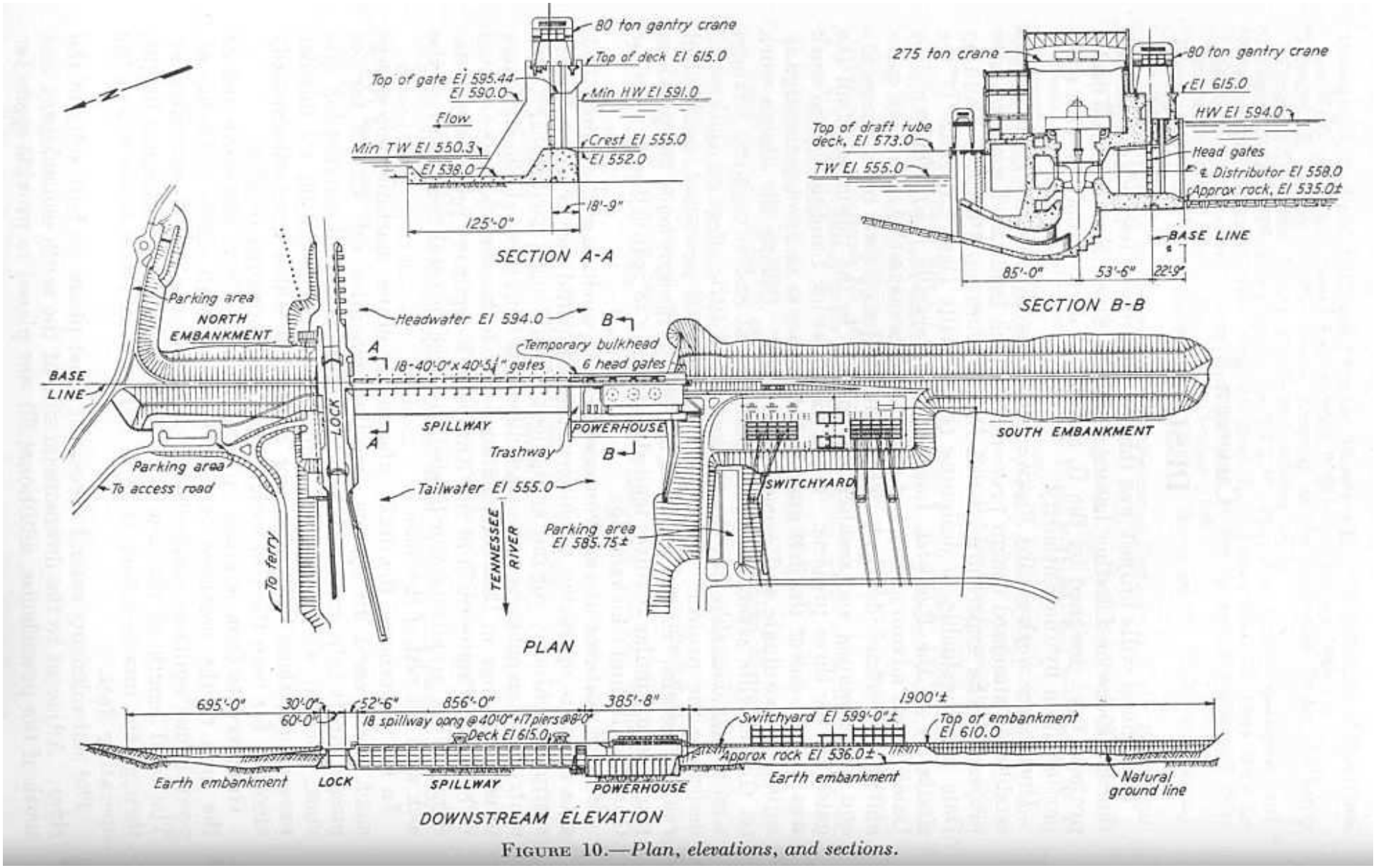
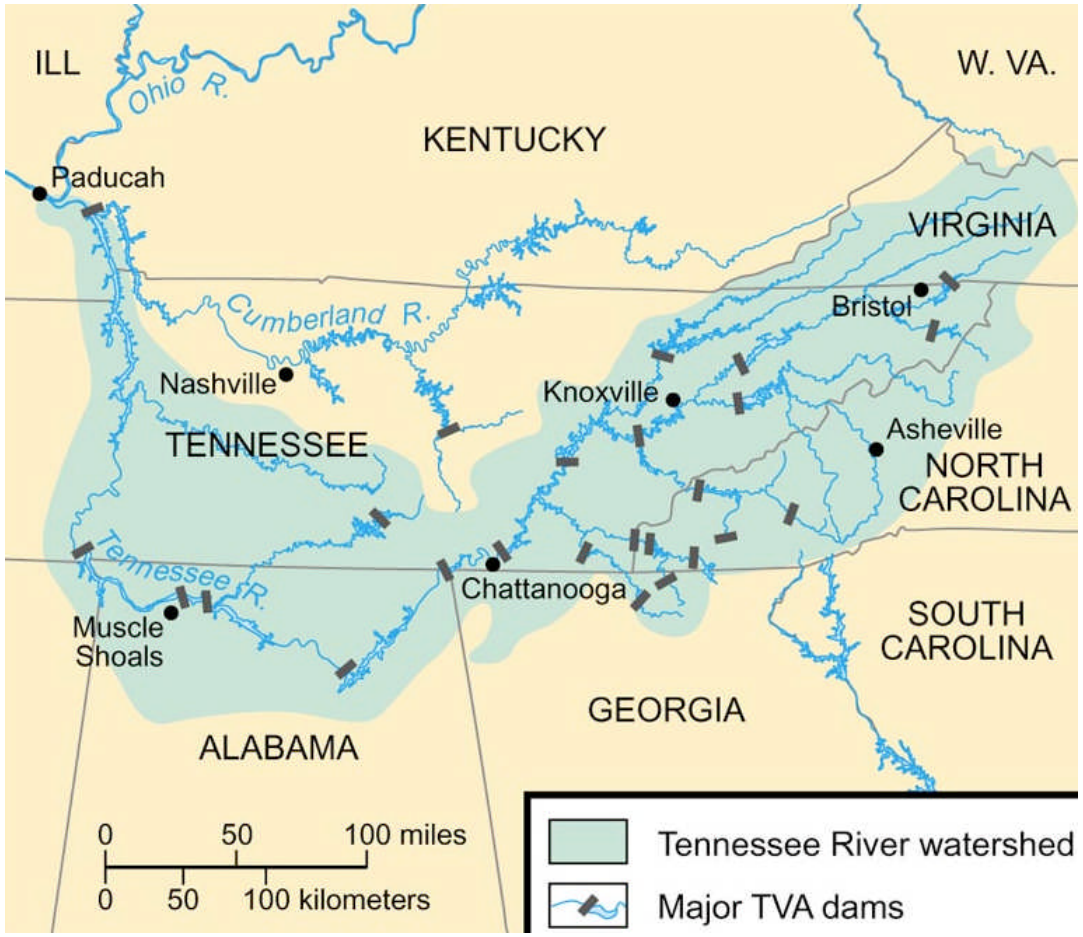


FIGURE 10.—*Plan, elevations, and sections.*

<u>Above</u>: caption: “Guntersville Dam Design”

<u>Above</u>: caption: The TVA built the Guntersville Dam in the late 1930s as part of a New Deal-era initiative to create a continuous navigation channel on the entire length of the Tennessee river and bring flood control and economic development to the region. The dam impounds the Guntersville Lake of 67,900 acres and its tailwaters feed into Wheeler Lake."



"…whenever anybody quotes $1,400,000,000 as the final cost of all the dam-building in the Valley, you have to re-member that is what the army engineers guessed it might cost and not what TVA is spending. So far, TVA has spent only a little over $200,000,000 and the estimate is something like $500,000,000 for the whole job…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Major TVA Dams"

"…After they pick a location and design a dam to fit it, the planners make scale models and the hydraulic engineers run water through to see what it will do. They float confetti to show the course of the currents, and move carefully calculated amounts of silt; and in one case they saved themselves the trouble of dredging out an obstruction because they found that the water, in its new channel, would do the job for them…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…The geologists go to work again on the river-bed, when piles driven in have changed its course so they can work on the bottom where the dam will be. They drill to test the rock and fill in flaws as you'd fill a tooth 'grouting,' they call it; one of the things invented on the job at Norris was a special tool, a sort of feeler, for this purpose. They're so sure of what is under the dams that they draw pictures of it…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Excavating within the cofferdam of TVA's new Douglas Dam on the French Broad River. June 1942."

<u>Right</u>: caption: "Cleaning up bed rock at the site of TVA's new Douglas Dam on the French Broad River. June 1942."

"…The new rock they are making must be tested, too; every batch of concrete they mix has to be sampled before it is poured. These dams are meant to last. And still, when you watch them, you can't believe they can do it at all. If it's a high dam, it looks as if they never could bridge the hills with their little cables and buckets. If it's a low dam, with the big river that got there first flowing right where this construction aims to be, it seems just as unlikely. In either case, as you stand on the bank and watch the machinery slowly but surely having its way, tended only by ant-sized men, you may feel that the machinery is pretty wonderful and the men are pretty small…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Part 15

Let There Be Power

"…The lightnings lightened the world.
How hast thou helped him that is without power?..."

Psalm 77: 16-20

<u>Left</u>: on the fifth floor galleries of the *Wolfsonian Museum*, a bas-relief entitled "Electricity" depicts a male nude - his hair pulled up by a static charge - surrounded by elements such as fire and water, industrial smoke stacks, glass insulators and light bulbs. Carved out of alabaster and backlit to make it glow, the piece was exhibited at the *Century of Progress Exhibition* in Chicago (1933-34) and appears to have been an artistic promotion of public power at the very time that Congress was voting to authorize the TVA.

By 1935, five dams were under construction and Arthur Morgan's construction program was widely hailed as a model of efficiency. The dams were massive structures. When completed, *Kentucky Dam* (206-feet high, 1,810-feet long and 140-feet wide) would back up the *Tennessee River* for 184 miles. As the great dams neared completion, the question of how the electricity they generated would be sold gained prominence. To progressives, the private utilities were the scourge of the l920s, a decade in which they had been conglomerated by self-interested holding companies. Thirteen such holding companies controlled three-quarters of the private electricity in the nation, which they offered at high rates and low volume.

"…Dr. A.E. Morgan, head of the Tennessee Valley Authority organization, has summed up the power development policies and objectives of the Tennessee Valley Authority as follows:

1. It hopes to unify the development of water power for the entire Tennessee River System and thus to avoid the enormous waste of various independent installments.

2. It intends to support vigorously the position that the generation and sale of power is properly a public function, in which it is proper for the public to engage.

3. It hopes to establish a 'yardstick' for power, to discover what electric power ought to cost the people, and to provide a comparison between public and private ownership.

4. It hopes to encourage the wider and freer use of electricity in American homes.

5. There are dangers and disadvantages in public ownership. To evade or deny this fact can only lead to trouble. The Tennessee Valley Authority hopes to face honestly these disadvantages and if possible to remove or master them…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

Wheels Within Wheels

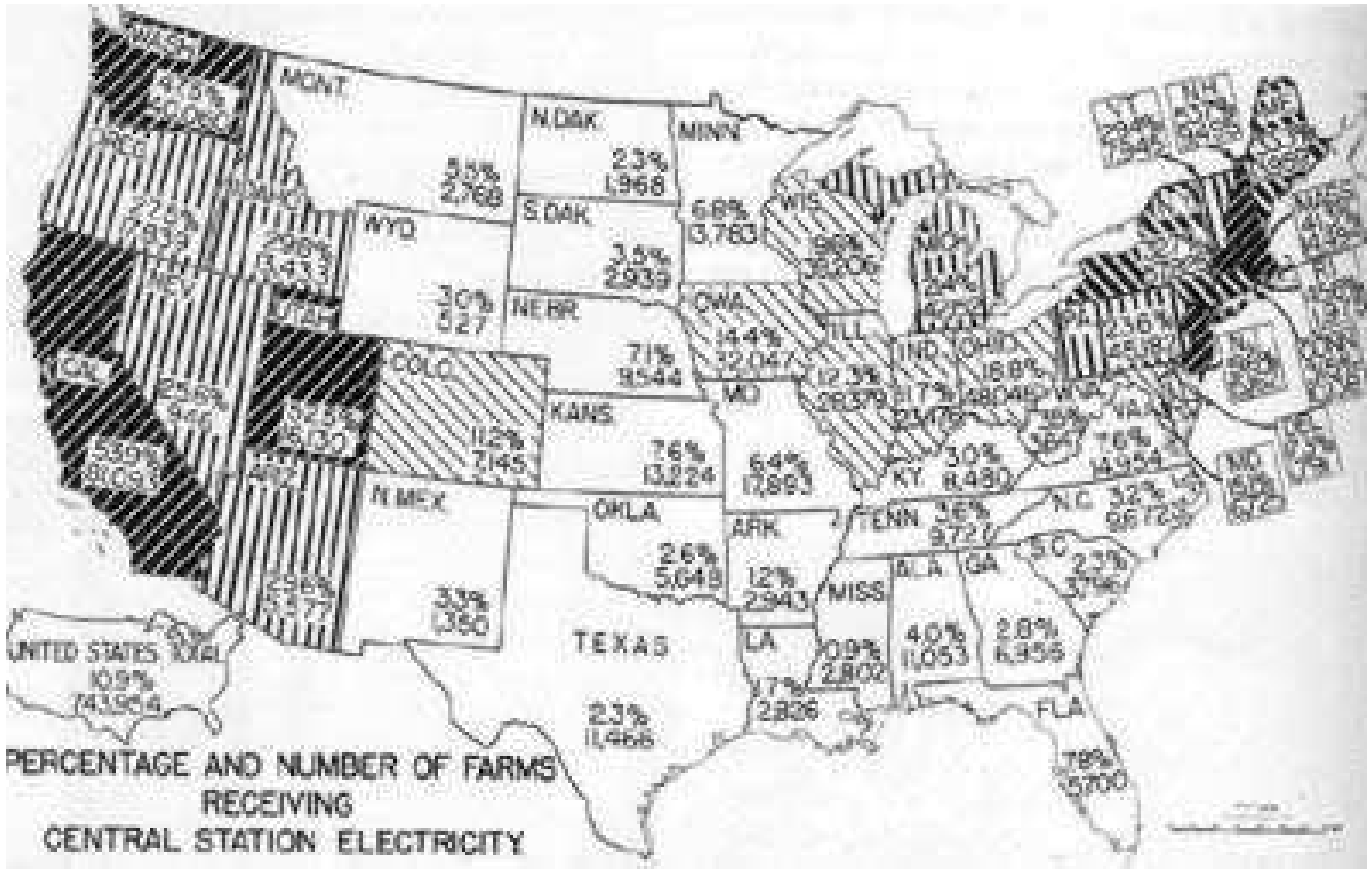
"…nobody thought much of the fact that when the Tennessee Valley Authority was established in 1933, there were four big electric power companies in the Valley. They were the Alabama Power Company, the Tennessee Electric Power Company, the Georgia Power Company, and the Mississippi Power Company. Leaving out the wheels within wheels, these four companies were subsidiaries of a holding company, Commonwealth and Southern, with headquarters up North…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Best Index

"…Dutch farms are said to be a hundred percent electrified; German farms ninety percent; Swedish farms fifty percent; farms in the United States, only ten percent. When they say that electric horse-power is the best index of wealth, and that this country leads in it, they are talking of other industries than farming…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

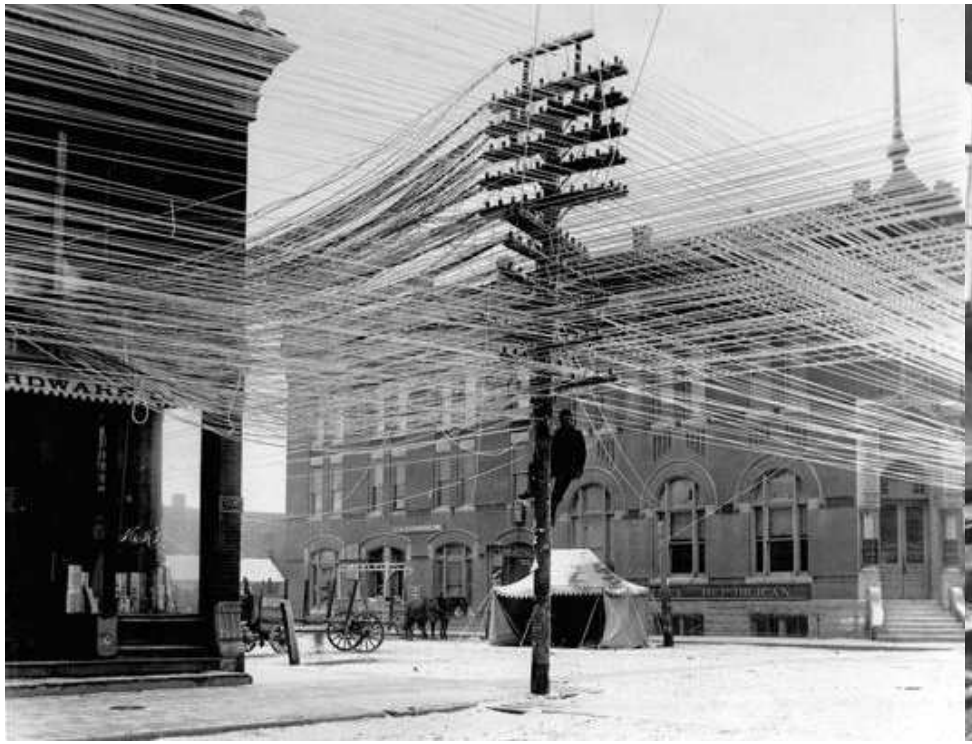


"…But his position in farm power does help explain the troubles of the Southern farmer. Before TVA went to work in the Valley, in a list of states ranked according to the number of farms having electric light, Tennessee was number forty-one, Georgia forty-four, Alabama forty-six, and Mississippi forty-eight. Fewer than three out of a hundred farms in Georgia, Alabama, and Mississippi had lights, and fewer than five had them in Tennessee. In none of the four states did one farm out of a hundred have any other electrical equipment…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above</u>: caption: "Percentage and Number of Farms Receiving Central Station Electricity" (ca. 1935)

Saturation Point



"…The big companies weren't doing anything about it. They said that the use of electricity in the Valley had reached the saturation point. By this they meant that it wouldn't pay to furnish any more; nobody but Uncle Sam would run a mile of wire so a farmer could screw in a twenty-five watt bulb. Mr. Wendell Willkie, president of Commonwealth and Southern, said that the four cities of Knoxville, Chatta-nooga, Memphis, and Nashville took sixty percent of the power sold by his Tennessee company…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Even small towns like Pratt, Kansas ended up with a huge mishmash of wires clogging the streets as early electric companies competed to supply power to businesses (ca. 1911)"

<u>Right</u>: caption: "A teacher instructing pupils in a 1930s rural area schoolhouse"

The Rate-Determines-Cost Theory

"…It's true that taking power to farms is like delivering mail, it just wouldn't pay cash dividends right away. Farmers wanting lights were told they would have to pay the cost of line construction, usually five hundred to a thousand dollars. At best they got an extra 'line charge' of two or three dollars a month added to the bill. So when the Tennessee Valley Authority proposed to sell power to farmers, it was easy to ask if it expected to be paid by tenants and croppers who didn't know where the next meal would come from, or to 'become a permanent social missionary by supplying mountain cabins with electric lights, even before they have moved up from the pine knot and tallow dip stage to that of the kerosene lantern.' TVA had an answer for that one, and if they can make it stick, it may turn out to be pretty important. Director David Lilienthal said: 'The rate charged for electricity, within wide limits, determines its cost.'…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

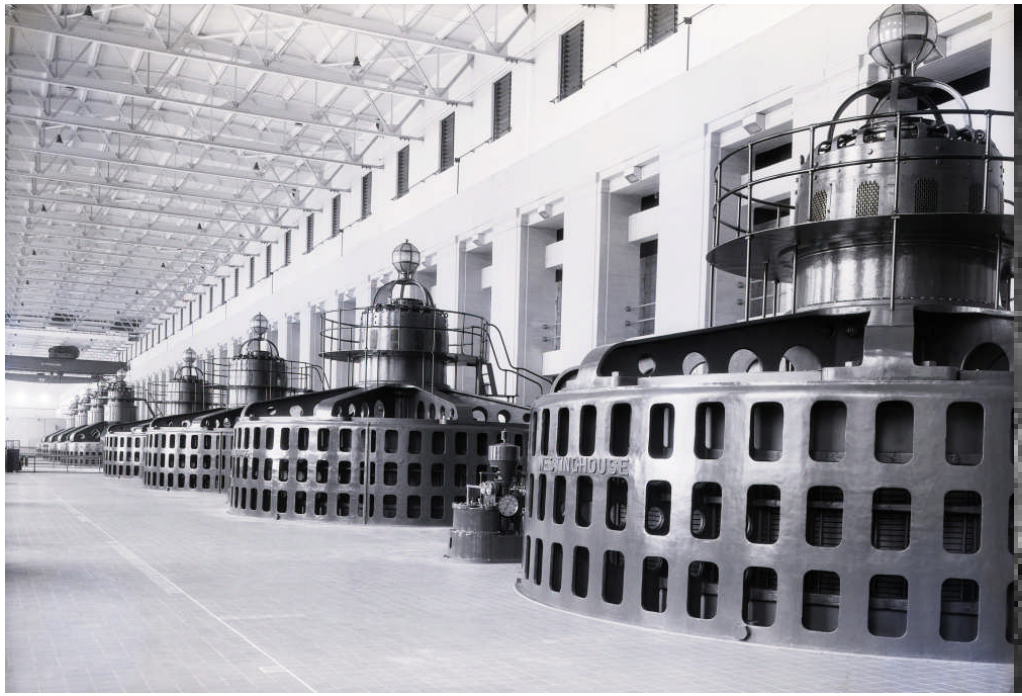
<u>Above</u>: caption: “Life in a rural household lit by kerosene lantern.” In 1935, about one in every ten homes in the rural areas of the U.S. had central station electric service. Across the nation, rural citizens could not get electric service (at least at a price they could afford). Investor-owned electric utilities would not extend their electric lines into rural areas, their reason: it would require too much investment for too little return (they believed farmers would only use a few kilowatts per month, mainly for lighting). Farmers knew if there was an adequate supply of low cost power their farms would be more productive.

Greater production would lower costs thus benefiting everyone in the long run.

"…if you took a dozen American cities and put them in order according to the home use of electricity in 1933, with Tacoma and Seattle, Washington, which used the most, at the top, and Boston and New York and Toledo, Ohio, down near the bottom, you couldn't help noticing that the use went down as the price went up, or vice versa. The Western cities, where power was cheap, used the most and spent the least. You could argue all day about which came first, the rate or the sale; the power companies would always say it had to be the sale, and ordinary people would always say it had to be the rate. But the power companies weren't really arguing. They just weren't taking any risks with their stockholders' money…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Supply & Demand




"…if the local rate is ten cents a kilowatt-hour, that is too high for a lot of people, presumably all the people that aren't taking the power. So you have to choose between making a drastic reduction that will increase sales a whole lot, and a little reduction that will increase them a little. You have nothing to guide you except what people can afford to pay, and what your lowest cost of production will be; and that will vary with how much you sell. When TVA made its minimum rate to farmers seventy-five cents a month, it was observed that the average farmer paid just about that much for coal oil to put in lamps, so they could have got the figure that way. But as a matter of fact TVA had cost figures of its own to go on because Uncle Sam had been in the power business for over ten years…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Turbine Room of Wilson Dam Power Plant, Florence, Alabama"

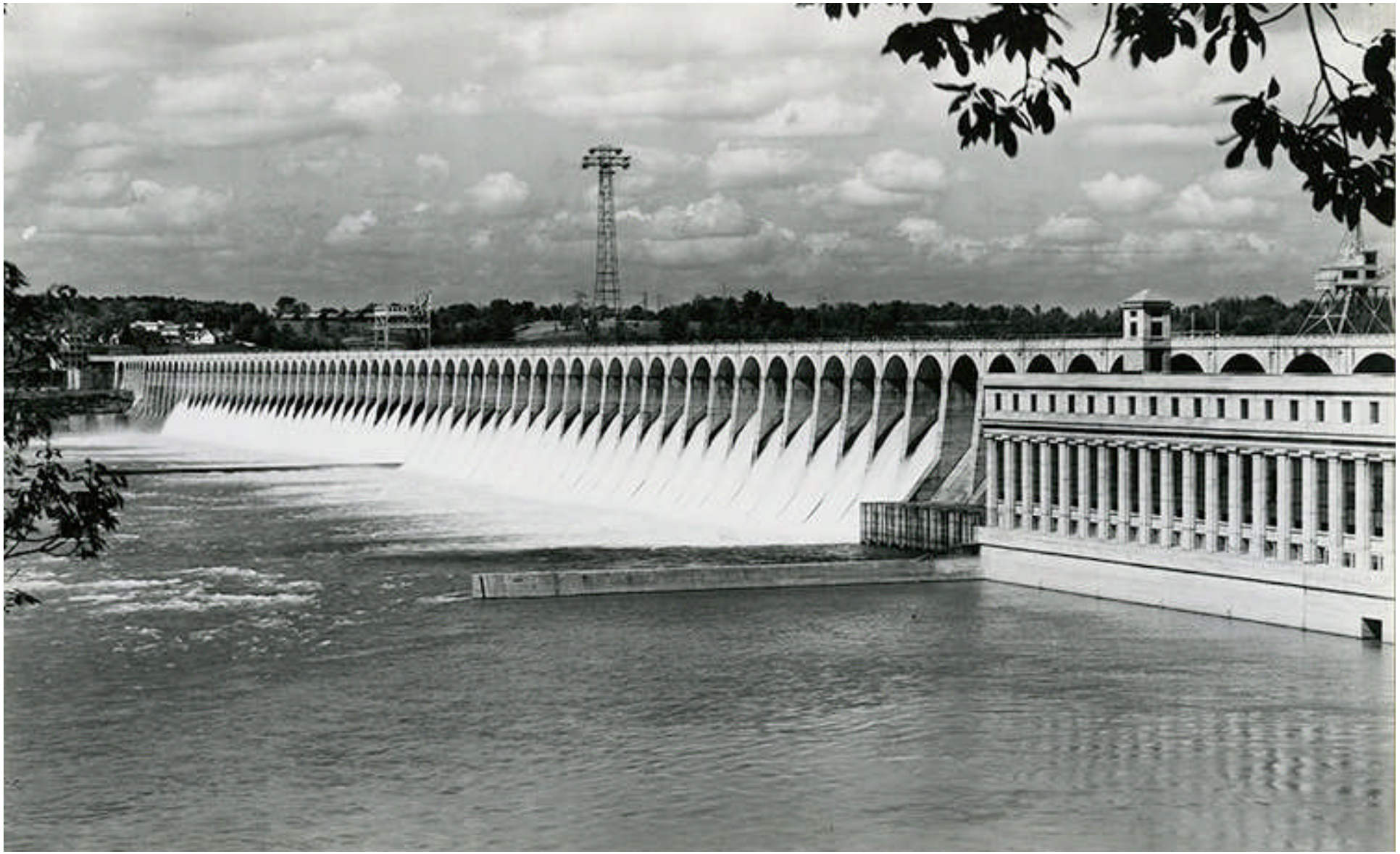
<u>Right</u>: caption: "The electrical switchyard at the TVA's Wilson Dam"

Buy Low, Sell High

"…Since the papers were full of discussion and doubt as to whether the government had any right to sell electricity at all, most people didn't realize that the government had been selling power from Wilson dam ever since the dam was finished. There was a provision in the Muscle Shoals Act that would seem to an ordinary person to be against it, but they were selling it just the same, beginning in the Harding administration. The usual customer was the Alabama Power company, and maybe they felt some obligation because the company had sold the government the dam site for a dollar, back during the war. But in 1921 they relayed power all the way from Muscle Shoals to North Carolina, to make up a shortage that resulted from a drought in the Duke power preserve. And what was the regular price to the Alabama Power company? Two mills, a fifth of a cent, a kilowatt-hour, wholesale; then the company resold the same power right across the river, to its retail customers, at ten cents…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

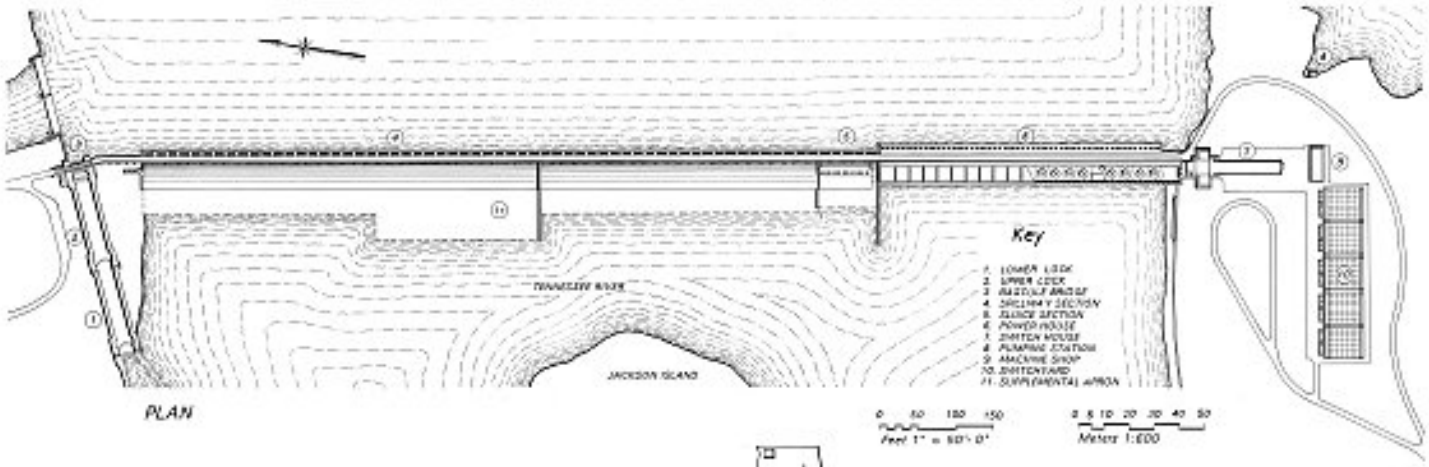
<u>Above</u>: caption: "Wilson Dam generators"



<u>Above</u>: caption: "Originally constructed to power two nitrate plants that manufactured explosives, Wilson dam was completed in 1924. TVA acquired the dam from the Army Corps of Engineers in 1933" (ca. 1943).

WILSON DAM & HYDROELECTRIC PLANT
1918-1925

DOWNSTREAM ELEVATION

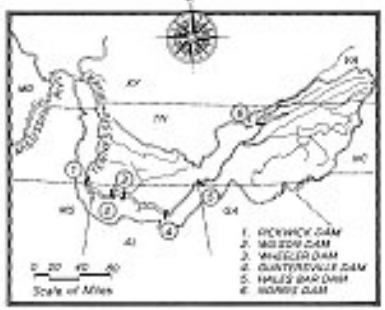


PLAN

In 1918, by the directive of the U.S. War Department, the Army Corps of Engineers began construction on Wilson Dam, a large hydroelectric project that was to supply power to U.S. Nitrate Plant No. 2 in Muscle Shoals, Alabama. With the ending of the war in the same year, Wilson Dam lingered in an uncompleted state until government appropriations saw it through to its completion in 1925.

Begun at the end of a period of intense innovation and later standardization in hydroelectric technology, Wilson Dam incorporated state-of-the-art equipment for the generation and transmission of electrical power. When taken over by the newly formed Tennessee Valley Authority (TVA) in 1933, Wilson Dam became the first hydroelectric facility in that agency's power system, and as a result, it is now also the oldest.

Reflecting the high level of operating efficiency reached during the formative period of hydroelectric dam-building, Wilson has retained much of its original equipment, including vintage generators, turbines and various electrical components, despite ensuing construction of more modern facilities that now comprise the extensive TVA system.



TENNESSEE RIVER BASIN

WILSON DAM & VICINITY

This recording project is part of the Historic American Engineering Record (HAER), a long range program to document the engineering, industrial, and transportation heritage of the United States. The HAER program is administered by the Historic American Buildings Survey/Historic American Engineering Record Division (HABS/HAER) of the National Park Service, U.S. Department of the Interior. The Tennessee Valley Authority-Muscle Shoals Recording Project was implemented during the summer of 1994 by HAER under the general direction of Robert J. Kapsch, Chief of HABS/HAER and by the Tennessee Valley Authority with the assistance of Charles Tichy, Historic Architect and the staff and operators of the Tennessee Valley Authority's Wilson Dam, Muscle Shoals, Alabama.

The field work, measured drawings and photographs were prepared under the direction of Eric N. DeLony, Chief of HAER and Project Leader; Richard O'Connor, Project Historian; Jet Lowe, HAER Photographer; and Craig N. Strang, Project Architect. The recording team consisted of Tom Behrens, Field Supervisor; Christopher J. Payne, Architect Foreman; Kathryn M. Kasparek and Agatha Lesage (ICOMOS), Architects; and Sharon F. Coffey, Historian.

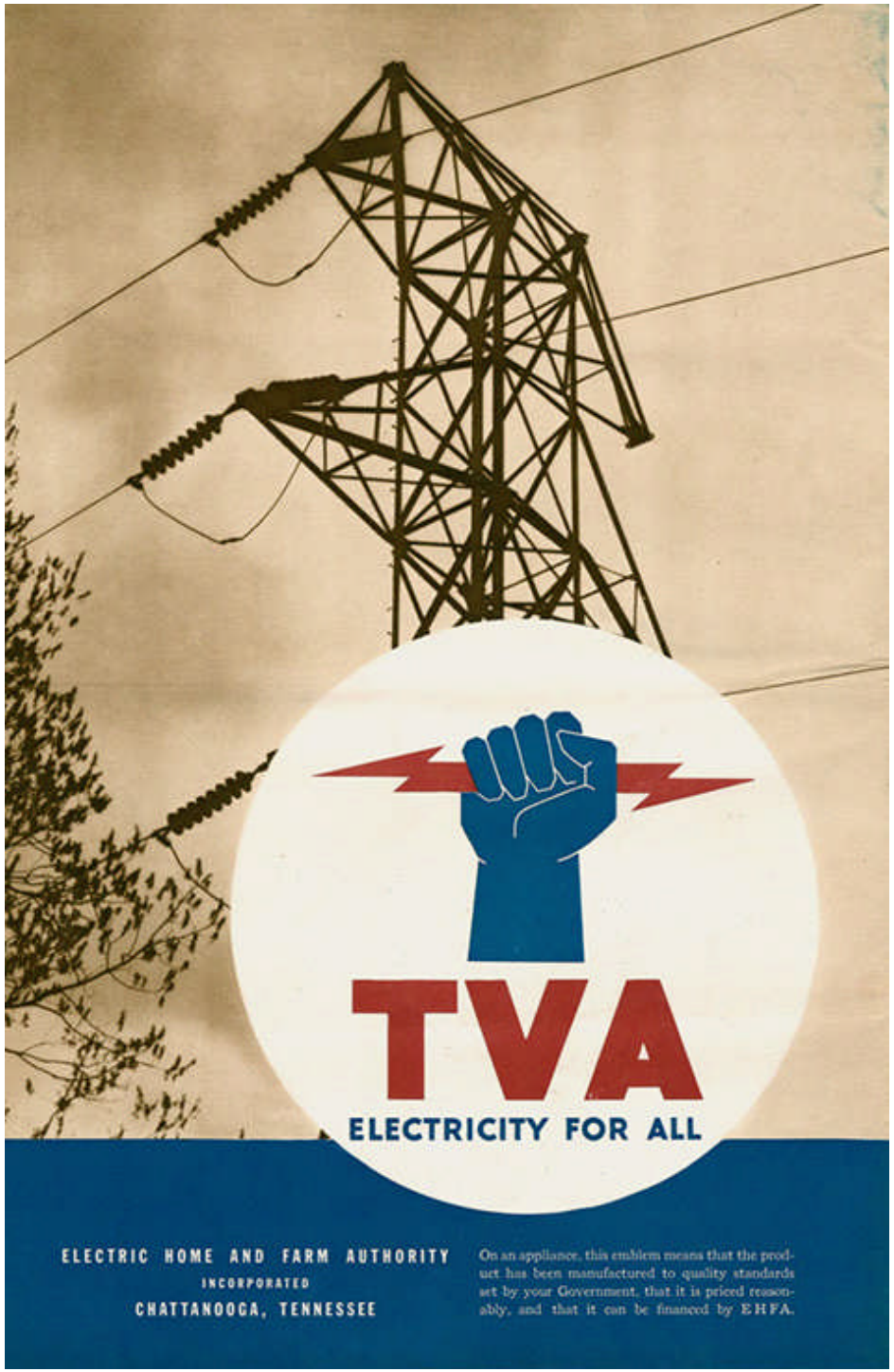
Kathryn Kasparek, Agatha Lesage, 1994

WILSON DAM & HYDROELECTRIC PLANT


Aerial View, Wilson Dam, near Florence, Ala.

"…So the quarrel was not over whether the government could sell the electricity generated at the dam, but whether it should sell to a private company or to the public, and thereby set retail prices. As long as it did only the first, nobody started any lawsuits. There was that rate precedent to go on, then, when TVA made its rate base. The rates they announced were higher than the rate they charged the power company, because it is easier to sell electricity right at the dam than to take it to a city, just as it is easier to take it to the city than to sell it out among retail customers. So, announcing a rate schedule for cities and rural co-operatives, TVA raised the Muscle Shoals scale to seven mills a kilowatt-hour on the average load…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



"…Then, not selling retail at all, TVA went on to say what retail prices should be charged by the cities and co-operatives reselling its power. They said the customer should have it at three cents a kilowatt-hour, minimum use, going on down to four mills a kilowatt-hour for maximum use. Just as its own price to cities was three and a half times the previously established price to the power company, this retail rate began at a little more than four times the average wholesale rate the cities were to pay. The mark-up didn't represent any profit, but the cost of distributing the current. The rates were similar to those of Ontario Hydro, and to those of the exceptional city plant at Tacoma…"

RE: excerpt from *God's Valley* – *People and Power Along the Tennessee* (1939)

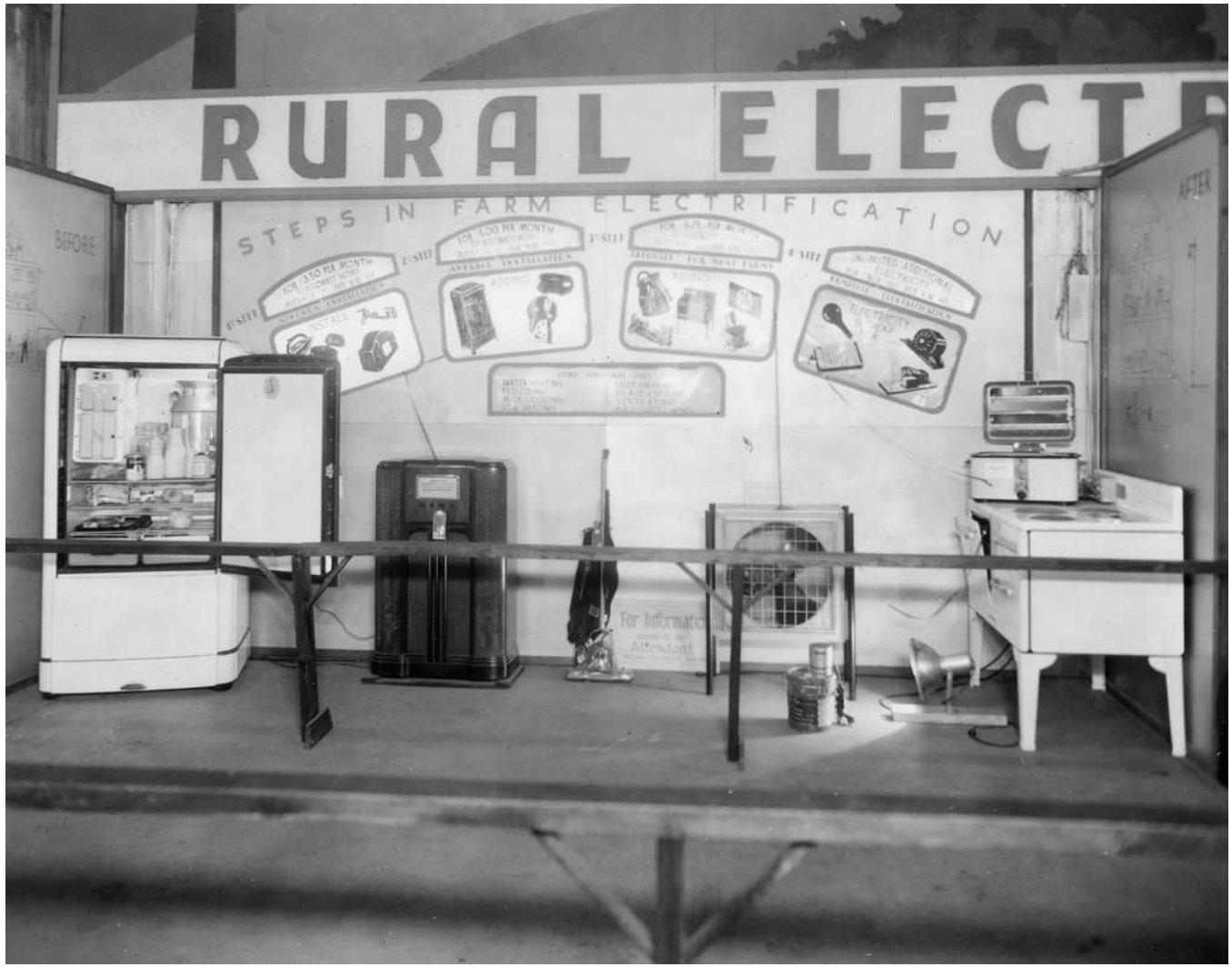
"…It is hereby declared to be the policy of this Act that, in order, as soon as practicable, to make the power projects self-supporting and self-liquidating, the surplus power shall be sold at rates which, in the opinion of the board, when applied to the normal capacity of the Authority's power facilities, will produce gross revenues in excess of the cost of production of said power…"

RE: excerpt from Section 14 of the *TVA Act of 1933.* Electricity was to be one of the tools used to help the region improve its economic status. This was to be accomplished by the application of low rates, the benefits of which were to be spread as widely as possible. The TVA Act further provided that the proceeds from the sale of power were to be used to assist in liquidating the cost of the projects. The *Appropriation Act of 1948* included a requirement that the TVA pay into the federal treasury (from net power revenue) amounts which would equal all appropriations made for power purposes.

"…But when they got the news in New York, utilities stocks took a drop in the market, and all the utilities experts started explaining how the rates were ridiculous. Why, one expert said, the companies were paying two cents a kilowatt-hour now just in taxes. Of course that was a little exaggerated, in the first place; and in the second place the taxes were proportioned to sales. But experts often speak impulsively that way. On the other hand Mr. Samuel Ferguson, president of the Hartford Electric Light Company, said that a completely electrified house should be able to buy current at two cents or less, for light, refrigeration, water-heating, and cooking. He added that there was much more profit in the all-electric house, even at a rate as low as 1.7 cents a kilowatt-hour, than in the average house using less electricity and paying 4.5 cents, or the minimum user paying eight cents…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "This familiar power line design was new in the 1930s and made rural electrification more efficient"

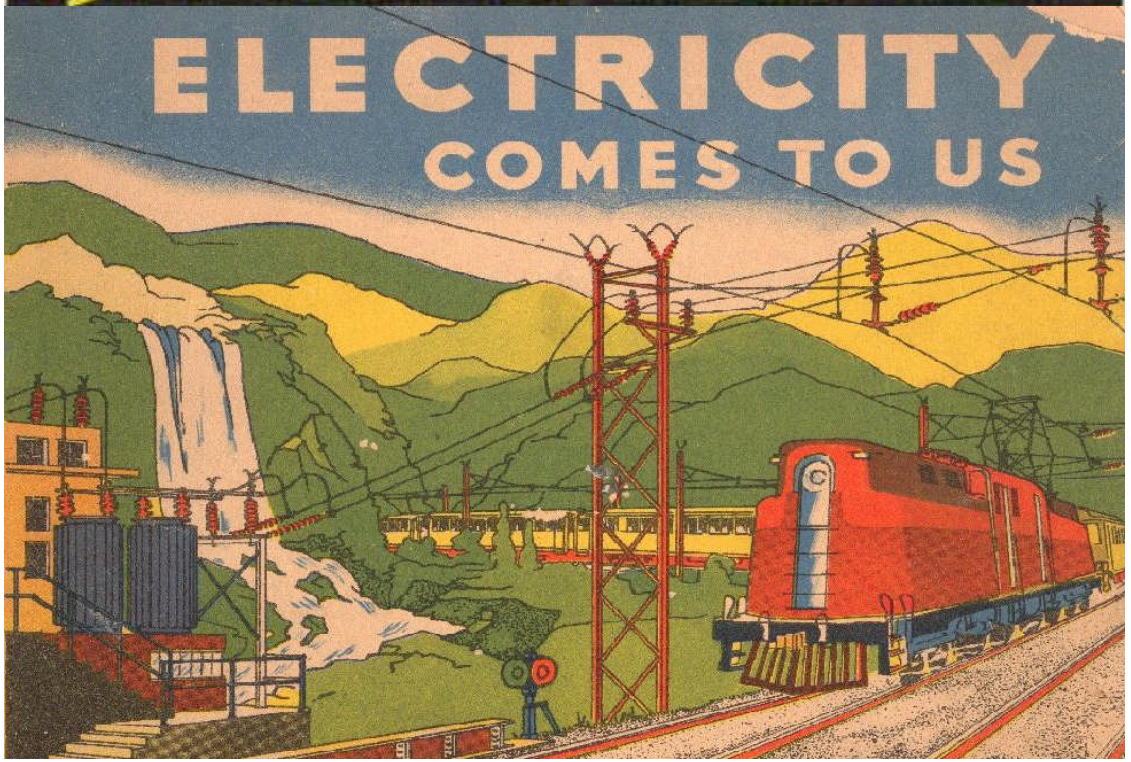

RURAL ELECT
STEPS IN FARM ELECTRIFICATION
BEFORE
AFTER

Dream Rates

"…Still, the papers and magazines went on talking about TVA's 'dream rates,' and down in the Valley they had their own troubles understanding how it worked. Maybe the Authority was a little tactless in establishing an average rate for its sale to cities, and then setting retail rates for quantity use that could go below that. It's all right when you study it out, but at first glance it did look funny. But anybody could understand that the highest retail rate, for minimum use, was less than a third of what people had been paying. That was news. Of course the only towns that could do anything about it right away were the ones that had their own distributing systems. After Tupelo, Mississippi, Athens, Alabama, and Pulaski, Tennessee, came along as soon as they could. Then TVA began selling to rural co-operatives, which was the only way they could reach the farmer…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

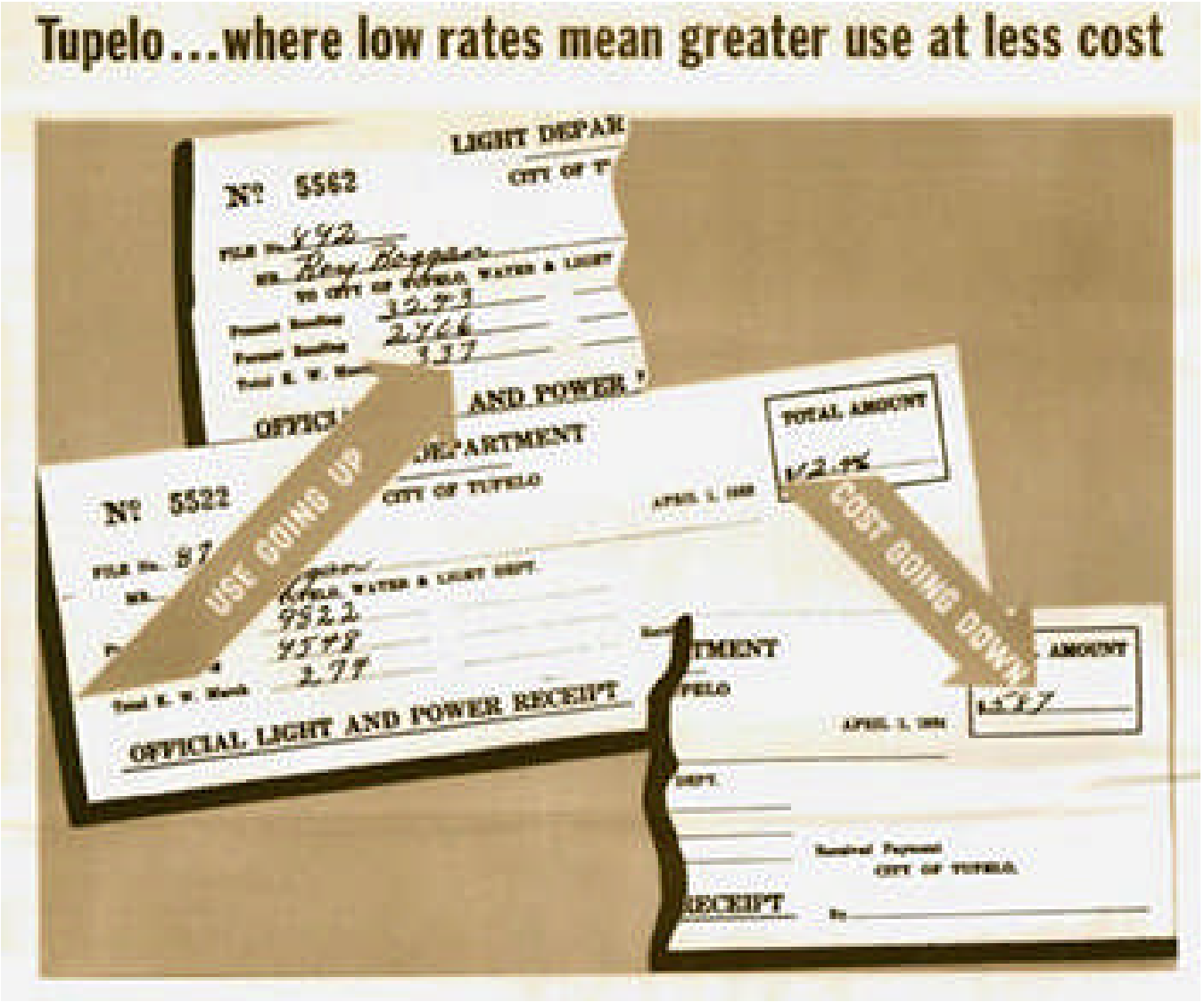

RURAL ELECTRIFICATION ADMINISTRATION
NEW MEMBER - NEW OWNER
REA CO-OPS ARE MEMBER-OWNED AND CONTROLLED


ELECTRICITY
COMES TO US

"…In Tupelo they got the final bills at the old rate in March, and with so much talk of the whole thing being a mistake, everybody watched for the new bills to see if there was some April Fool trick being played. But the bills were what they said they'd be and after they came in there were a lot of new customers. One man who had been paying $2.30 for his home lights found he came under the TVA minimum charge of seventy-five cents. A department store had its bill cut from $65.14 for 966 kilowatt-hours to $23.69 for 952 kilowatt-hours. The Tupelo Journal paid $18.94 instead of $41.38. The Lyric theater paid $29 instead of $94. So even the old customers began using more electricity, just as TVA had figured they would. Woolworth's store had paid $65.22 for 968 kilowatt-hours, on its last bill under the old rates. Its first month at the new rate it used only 746 kilowatt-hours but it paid only $19.16. So the store turned on more light. In January 1934 they had used 876 kilowatt-hours, at $61.54. In January 1935 they had increased the use to 2054, for which they had to pay only $36.22…"

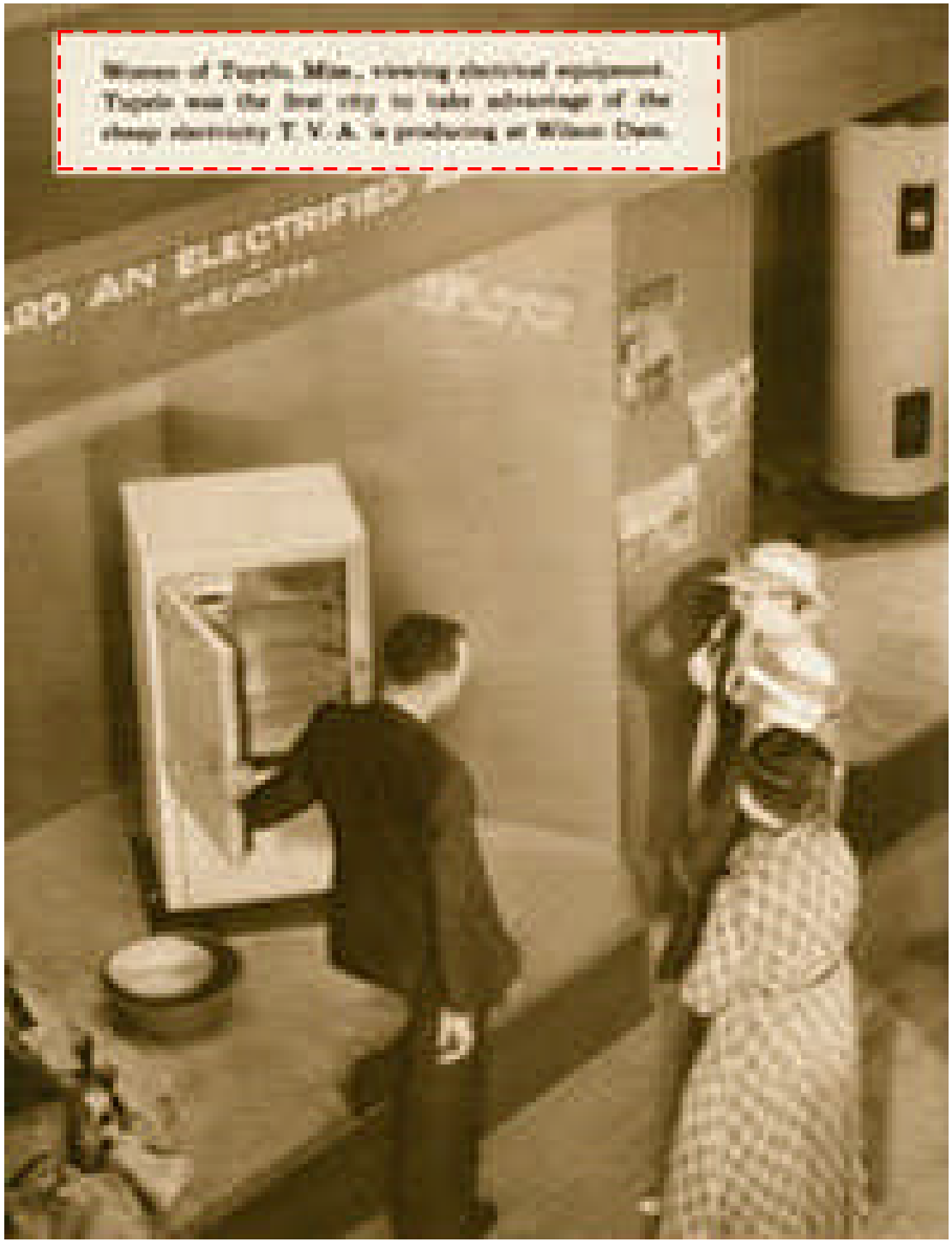
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Tupelo...where low rates mean greater use at less cost



"…In four months the home use of electricity in Tupelo increased seventy-five percent, and in twenty-two months it had gone up 267 per-cent. Right away the objectors began to discover that Tupelo was an exception to the general rule; they said Tupelo's municipal system had been badly managed and they had an extra high rate there. In fact Mr. Wendell Willkie, in a speech to the American Statisticians' Association in New York, said that the Tupelo rate had been 'one and a half times to twice as high as the rates charged by privately operated public utility companies in the same area.' That sounded fine until you discovered that they had paid ten cents a kilowatt-hour in Tupelo just as they paid the private companies in nearby Mississippi and Alabama towns. They're still paying a dime in a lot of places over the country, including the North Carolina mountains where TVA is building a dam but hasn't yet sold current. Athens, Alabama, went to work and used more current than Tupelo, and Alcorn and Pontotoc counties in Mississippi started to run up records…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



"…Next thing, you heard that towns using TVA power would go broke because they were losing tax revenue. They said that about Tupelo and about Athens, and somebody paid good money to have printed and circulated in the Valley an anonymous circular that said dire things about public power in Pulaski. Eventually, the Federal Power Commission made a special study to show that tax receipts in TVA territory were all right, but the town officials had already said so at the time…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Women of Tupelo, Miss., viewing electrical equipment. Tupelo was the first city to take advantage of the cheap electricity T.V.A. is providing at Wilson Dam."

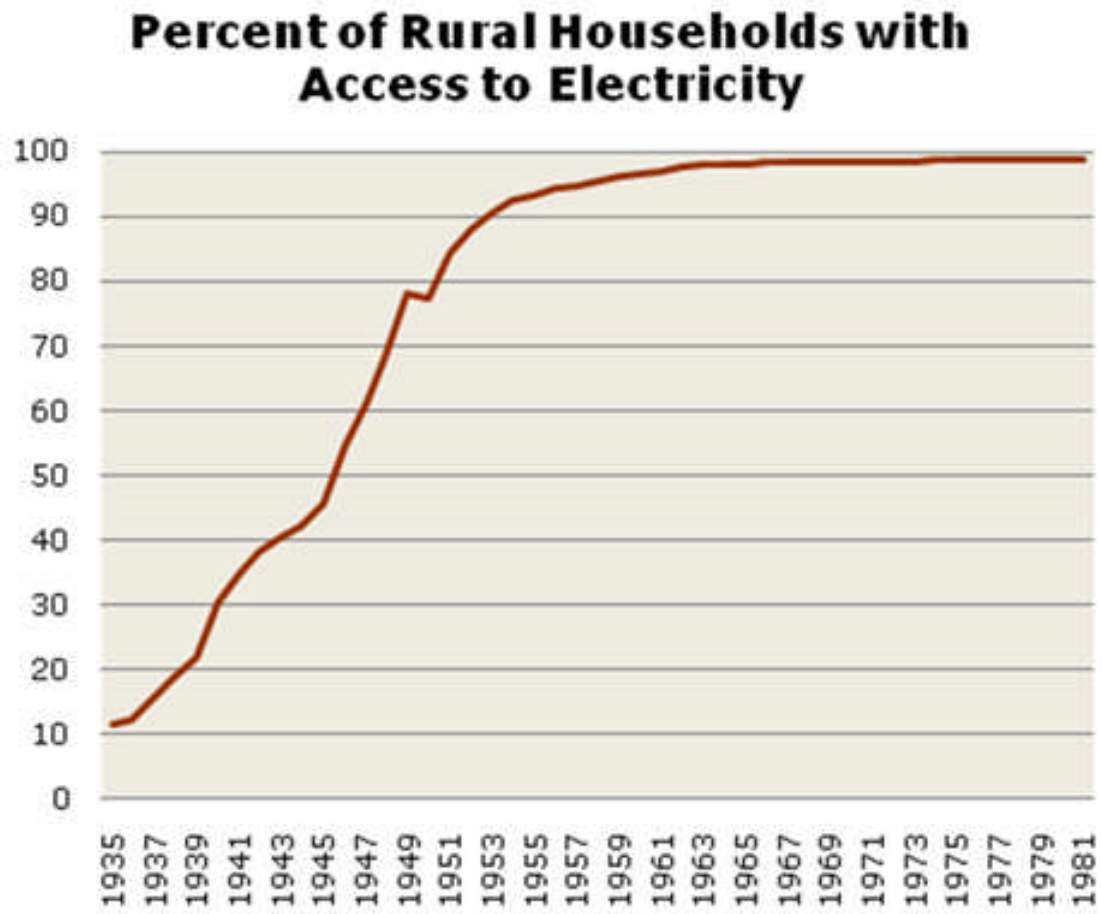
"One year ago we were buying power from the Mississippi Power Company at 17 mills per kilowatt hour. It is now costing us about 5 mills per kilowatt hour. We own our distribution system and re-sell it under TVA rates. Before we contracted with the Tennessee Valley Authority for electricity our rates were lower than the average in Mississippi and lower than the Mississippi Power Company retail rates. Our residential consumption has more than doubled since we contracted with the TVA. The community consumption has almost doubled, and we have had a large increase in industrial consumption, due, however, to some extent, to our taking over some industrial customers who were formerly served by the Mississippi Power Company. We are delighted with our TVA contract."

J.P. Nanney, Mayor – Tupelo, Mississippi (January 1935)

<u>Left T&B</u>: electric creamer (top) and electric washer (bottom)

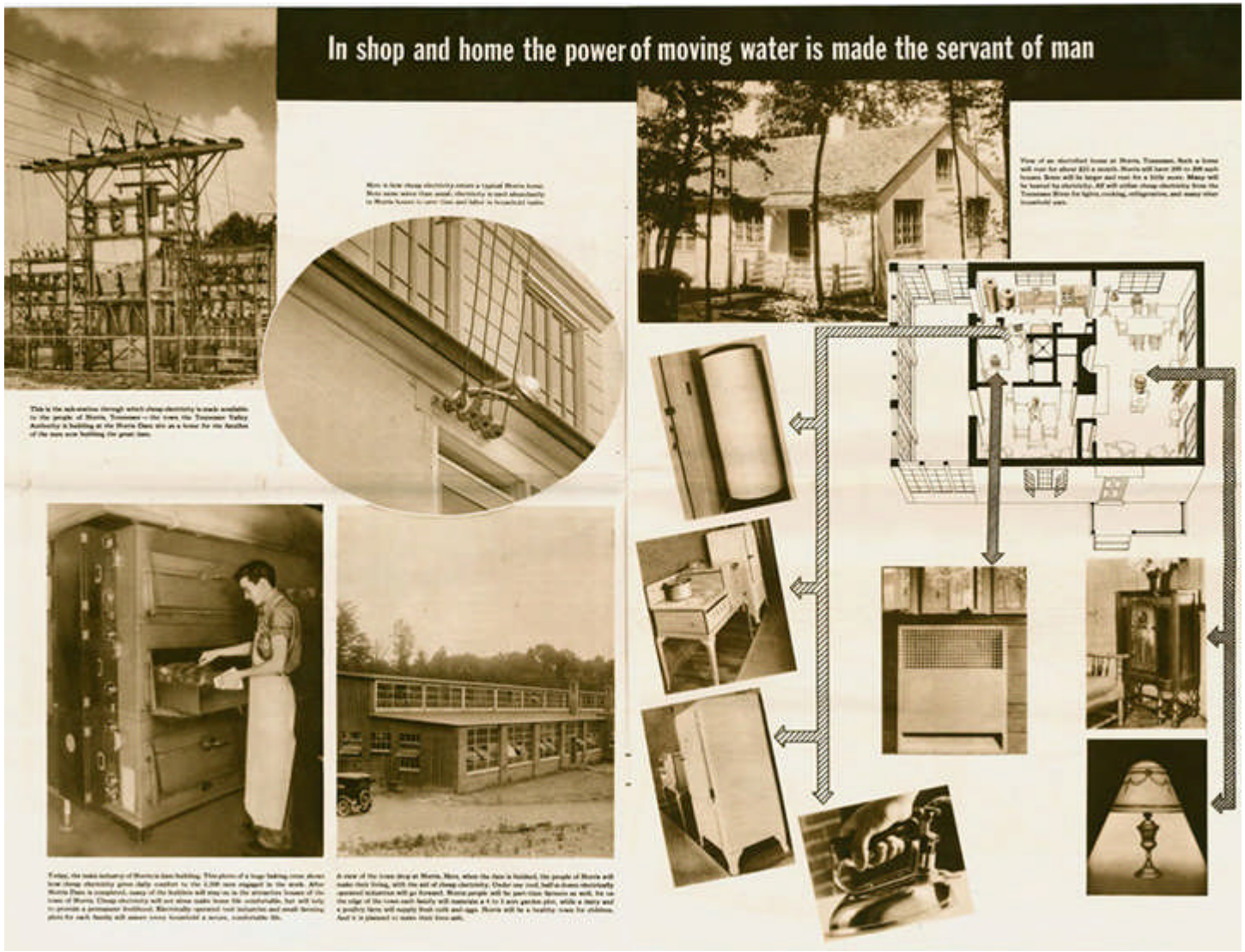
"…At Pulaski, they replied to the circular by reporting that the use of power per residential customer had doubled, and the average saving per customer was $18.50…when a town first starts taking TVA power and cutting rates, its revenues slump, and TVA has to hold its hand and explain the rate-determines-use idea. As the use increases the revenues rise again, and at the end of a year they are back to covering the costs. After that there may be a surplus. As polite as the post office, TVA makes no differences, or practically none, between rural and city rates. The average minimum rate was set at seventy-five cents, assuming there were five to ten users a mile. For two to five users it went up to $1.20, for over ten it dropped to sixty cents…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)


Percent of Rural Households with Access to Electricity
100
90
80
70
60
50
40
30
20
10
0
1935
1937
1939
1941
1943
1945
1947
1949
1951
1953
1955
1957
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981

"…Farm users found they could have an electric water pump for $1.50 a month, and like the town folks they could have a refrigerator and cook with electricity for around five dollars. They could run a little motor by paying as much as eight dollars, and for ten dollars a month they could supply the light and power for a thirty-cow dairy. The rural co-operatives had the same arrangement for lowering rates as use increased, and in Alcorn county, Mississippi, where they started paying 5.37 cents a kilowatt-hour for 49.4 kilowatts a month in 1934, they worked up to 138.7 kilowatts and a rate of only 1.82 cents an hour. That is more than twice the electricity and less than half the rate given for the average residential consumer in the United States…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)


In shop and home the power of moving water is made the servant of man

"…Corinth, Mississippi, took the unusual step of helping finance the county co-operative because the increased use decreased the town rate. But the usual procedure was to sell rural co-op memberships at a hundred dollars apiece, and TVA didn't expect to collect all that at once. A man could pay ten dollars down and as little as twenty-five cents a month, the same quarter he saved on a minimum bill…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)
Left: *Rural Electrification Administration* (REA) brochure (ca. 1936)


WORKING TOGETHER DID IT
ALL THE POWER YOU WANT
AT LAST AT LOWEST COST/
A DREAM COME TRUE
AT LAST
AT LAST

Part 16

Competition is a Sin

Spite Lines

"…It's odd how much more important the country market became after TVA entered the field. Take the case of Rhea county, Tennessee. Up there a man who owned a poultry farm had tried to get lights, and he remembered that the company had wanted five hundred dollars to build a line. They also wanted him to buy a refrigerator. Naturally he didn't do anything about it. But after TVA came in, blessed if the company didn't offer to build at its own expense. The government men, they explained, were just a bunch of Yankees who would talk a lot but not do anything. The company men rushed all around, making hook-ups with Delco lights and working their installation people overtime, though they didn't pay them any union wages…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Work crew and truck in rural location"

"…Over in Coffee county a little town called Beech Grove had wanted power for a long time; three years before, according to a Beech Grove preacher, they had gone so far as to offer to pay the company $1,500 to come in. Nothing came of it; but when they planned to start a co-operative with Bedford county, to buy TVA power, the workmen came in a big hurry. The very day before the meeting they put up poles, and strung wire from a farmer's 32-volt plant in his hogpen, and hung up a street light…"

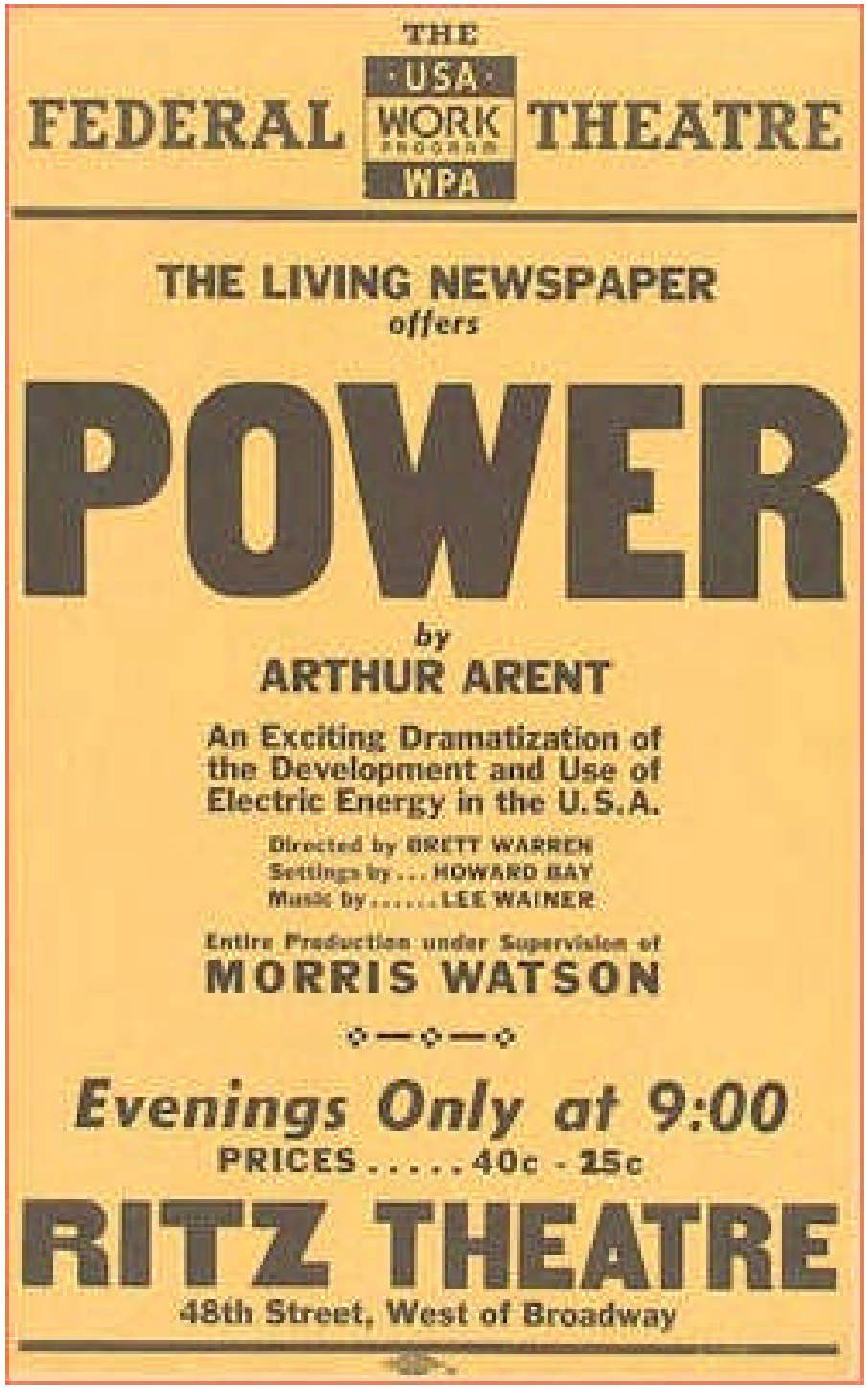
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "As the REA reached further into rural America, power lines criss-crossed the landscape and meters appeared on farmstead walls"


D-X
PHO.

Left: caption: "The wholesale power of the Authority is distributed among rural consumers by cooperatives formed and managed by the farmers. The head-quarters buildings of the co-operatives, usually located in small towns or in open country, are for many of the local residents the first contact with modern construction, architecture and interior appointments, as well as with electrical power and modern business methods. The buildings contain reception rooms, which also accommodate the display of appliances; offices; garages; ware-houses; and meeting rooms, usually in the second story. They are built within strict cost limitations and perform a much needed service as clubs or minor cultural centers for the rural population. This one is located at Murfreesburo, Tennessee."

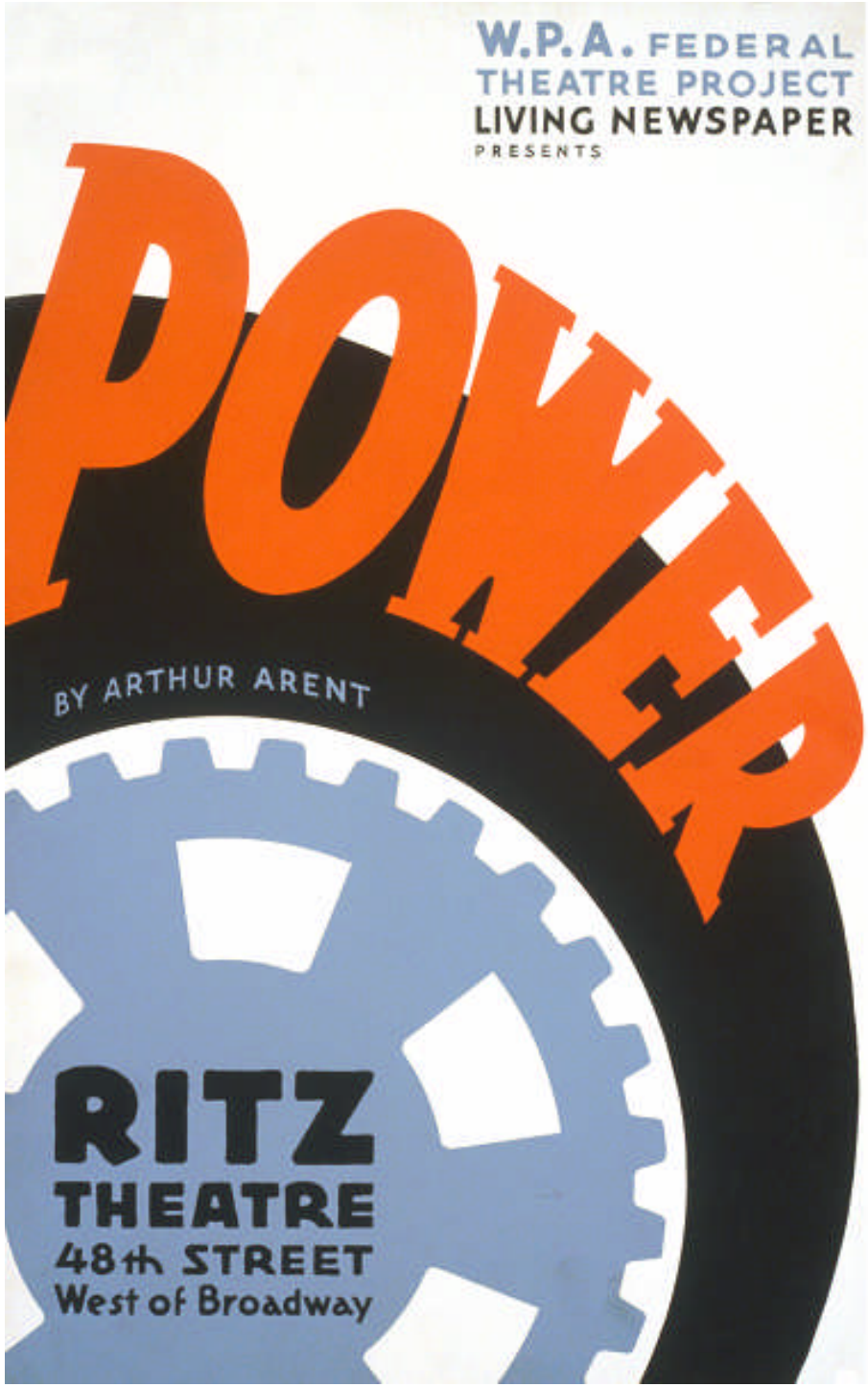
Right: caption: "This group of men paused from their daily work routine to pose for this image for the Cherokee Electric Co-op, located in Centre, Alabama (ca. 1945)"



"…It was the same way over in Catoosa county, Georgia, where they started building what the people called 'spite lines,' hurried-up construction to get ahead of TVA, and some didn't take it any too kindly. You might say there was a little trouble in Catoosa, because one woman got so mad she stood off the company pole-setters with a shotgun. Mr. Preston Arkwright, president of the Georgia Power company, said he found it 'particularly gratifying…that the agitation in Northwest Georgia attracted little or no attention outside of the comparatively small area,' but he spoke too soon; the Federal Theatre play 'Power' put it on the New York stage…"

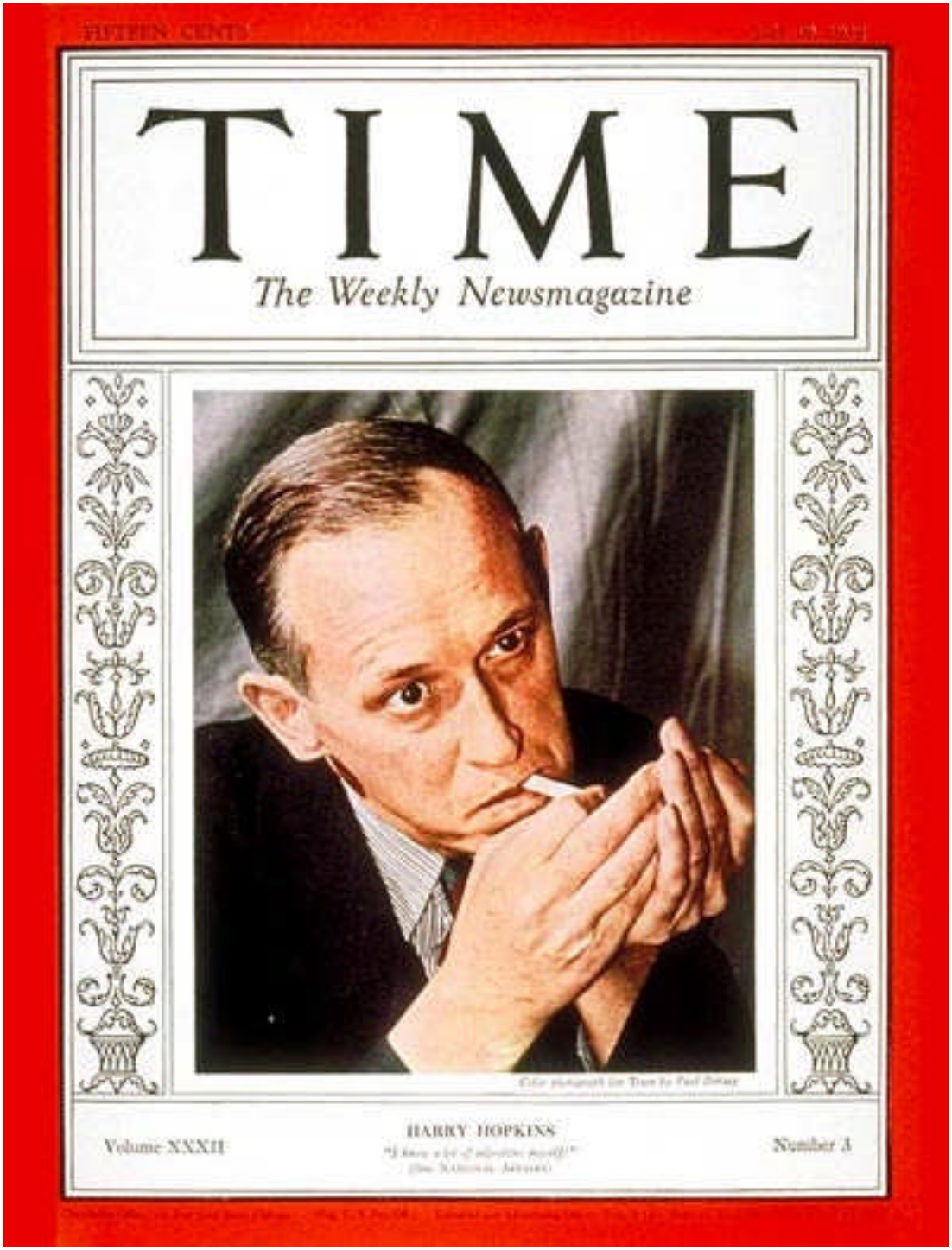
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: flyer for the NYC production of *Power*



Left: another of FDR's New Deal programs, the *Federal Theatre Project* (FTP), attempted to generate public enthusiasm for the TVA in an Off-Broadway play. In February 1937, as the U.S. Supreme Court made ready to rule on the controversies surrounding the TVA, the NYC "Living Newspaper" unit of the FTP opened its production of *Power* (left). After dramatizing the creation of the TVA by the end of the first act, the second act opened with farmers and workers standing in front of a projection of waterfalls and hydro-electric dams, singing:

All up and down the valley
They heard the glad alarm
The Government means business -
It's working like a charm
Oh, see them boys a-comin'
Their Government they trust.



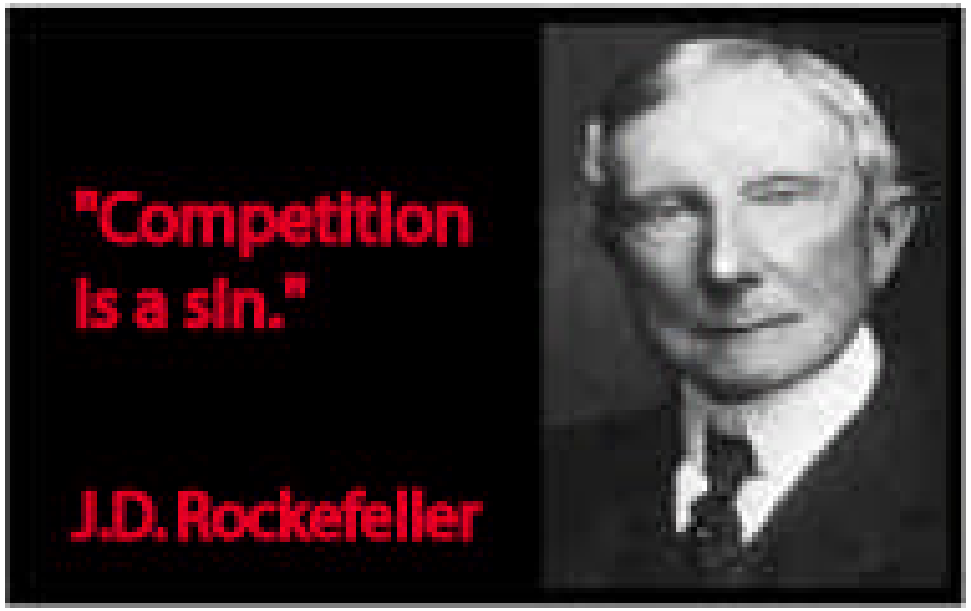
"I want this play and plays like it done from one end of the country to the other…you'll take a lot of criticism on this play. People will say it's propaganda. Well, I say what of it? It's propaganda to educate the consumer who's paying for power. It's about time someone had some propaganda for him. The big power companies have spent millions on propaganda for the utilities. It's about time that the consumer had a mouthpiece. I say more plays like 'Power' and more power to you."

RE: *Works Progress Administration* (WPA) Administrator *Harry Hopkins* (1890-1946) went backstage to congratulate and gave advice to the cast of *Power* after attending a NYC performance. He appeared on the cover of *TIME* magazine on July 18th 1938 (left).

Taken for Granted

"…All this rural-line controversy was trifling except to the people who lived in the country and wanted lights. But the lawyers in a suit brought by the Alabama Power Company against the co-operative in Cullman county, Alabama, wrote a brief that said one funny thing. After charging that TVA had actually gone into areas which the company served or intended to serve, and complaining of the 'ruthless competition' of a 'powerful adversary,' the brief said the company was 'forced to appeal to the courts for the protection of the property of the company and its markets.' You see they just took it for granted that the company owned the county as a market…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)


"Competition
is a sin."
J.D. Rockefeller

Domino Effect

"…While it was outside TVA territory, some people using electricity up in Toecane, North Carolina, undertook to prove they wouldn't stand for that sort of market division. They were customers of a company that charged $1.50 for seventeen kilowatt-hours, while over in the next company territory the rate was twenty kilowatt hours for a dollar. The companies weren't fighting each other because they understood that they each owned their markets. But the Toecane people got up their own petition; it read:

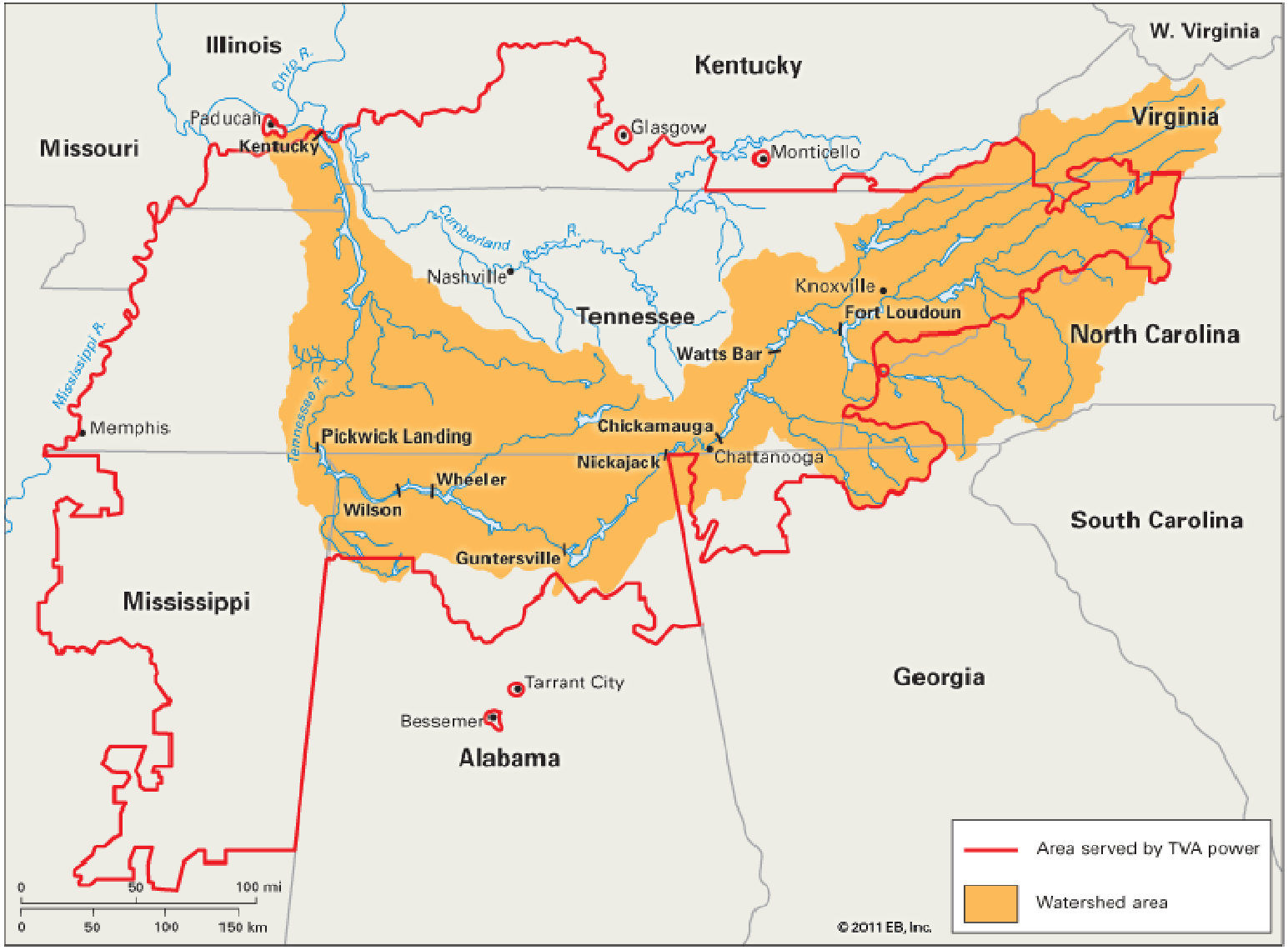
We, the undersigned, agree to have our lights cut off until the Northwest Carolina Utilities Company meets the price rate of the Carolina Power and Light Company.

The Baptist church signed first, agreeing to stop its night services, and everybody else in Toecane went back to kerosene except one family that was paying for an electric icebox and another that had a baby. You notice the rate they asked for was still considerably higher than the TVA rate…"
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

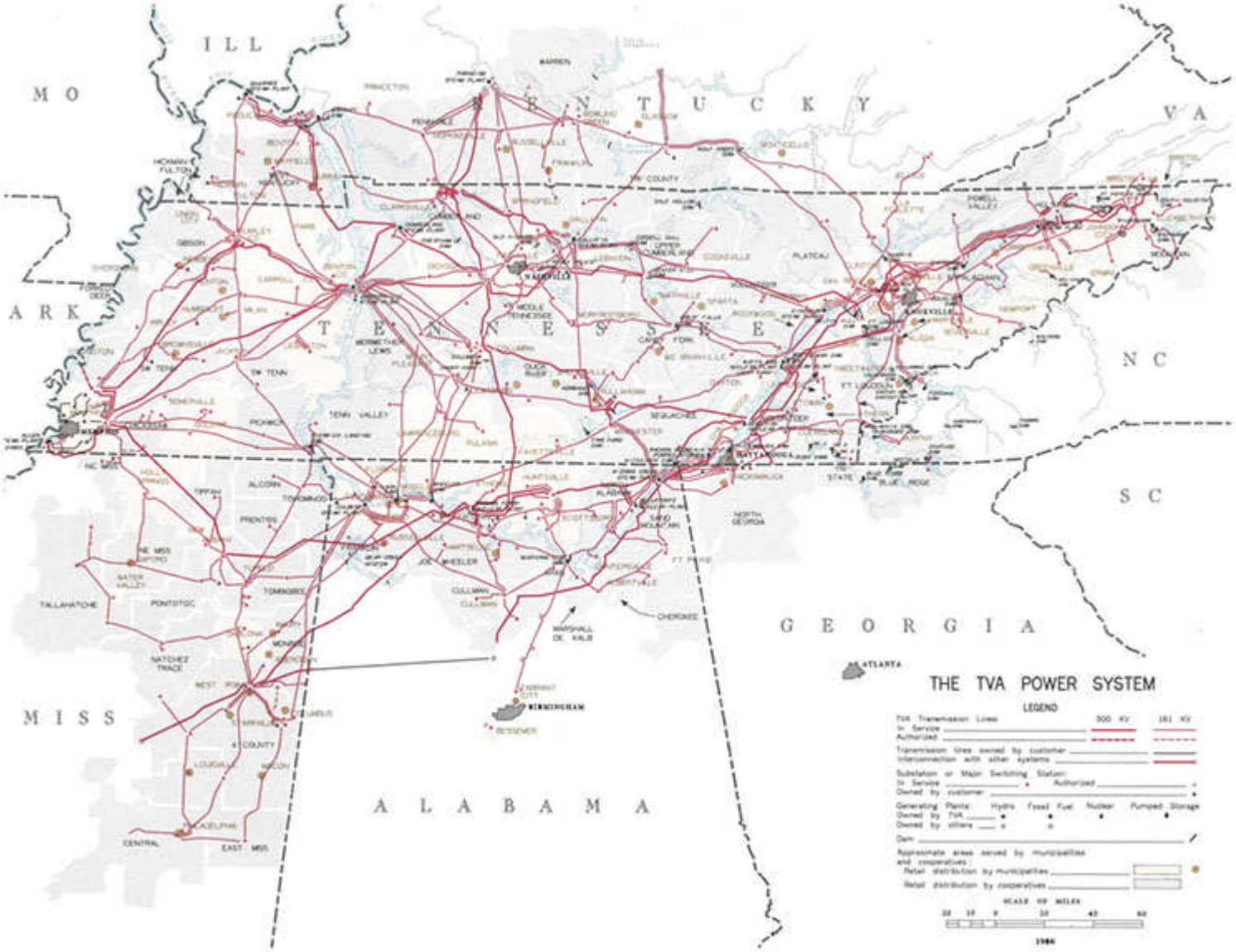
TVA Territory

"…In TVA territory the companies have had to come way down on their rates but they are still building rural lines. In its annual report for 1936-37, the Authority noted as an 'encouraging sign of progress' that the Alabama Power Company, which built only 55 miles of rural lines in 1934, built 285 miles in 1935 and 1300 in 1936. The Georgia Power Company was credited with a similar expansion; after it had built three million dollars' worth of rural lines the president of the company said: 'I won't be so foolish as to say our action was not influenced by the TVA lines, because it was.'…"

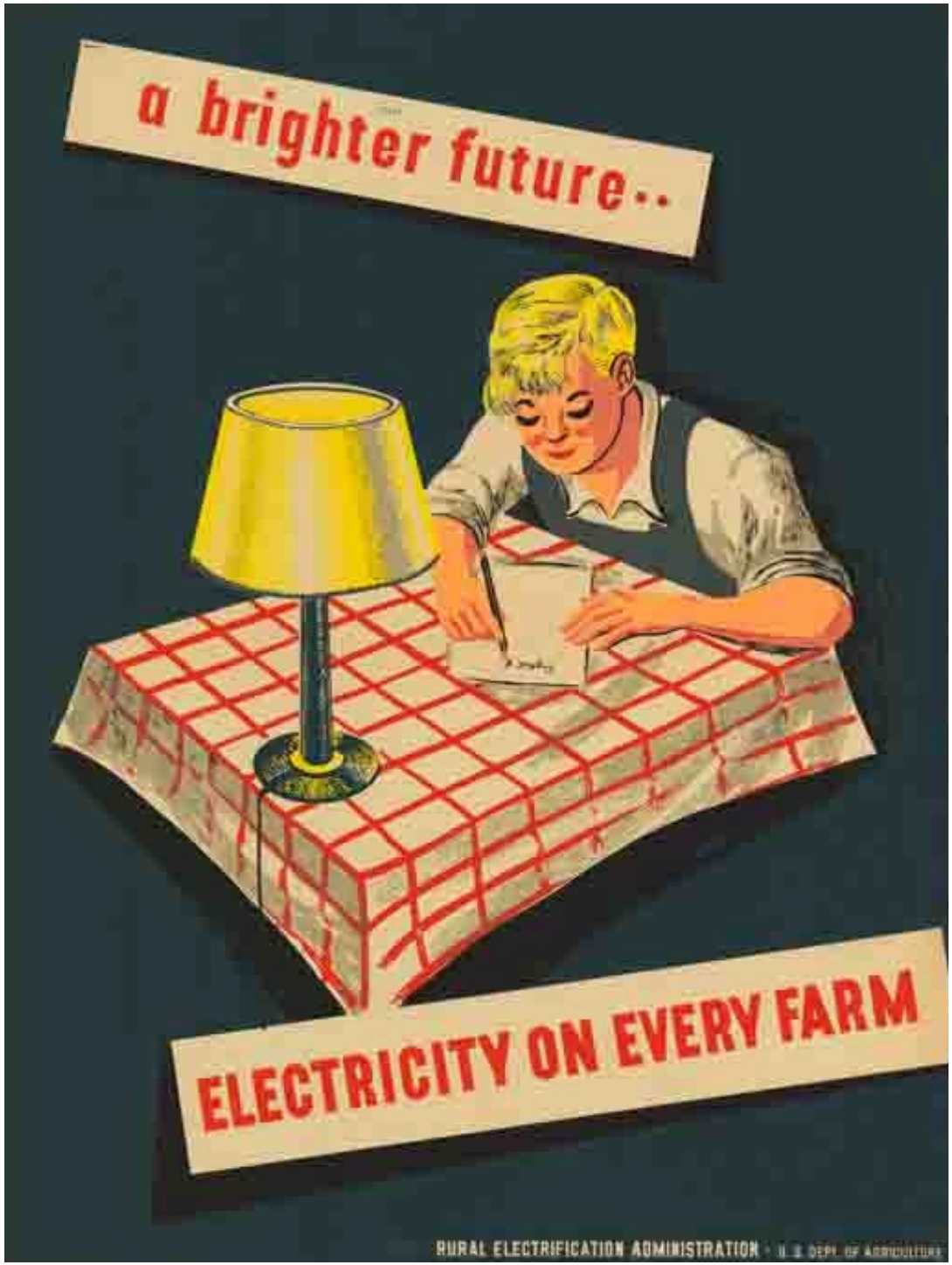
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



<u>Above</u>: caption: "The seven-state region that receives electric power service from the Tennessee Valley Authority's many power-generating stations is much larger than the watershed area drained by the Tennessee River"


ILL
MO
KENTUCKY
VA
ARK
TENNESSEE
NC
SC
GEORGIA
MISS
ALABAMA
ATLANTA
BIRMINGHAM
THE TVA POWER SYSTEM
LEGEND

Meeting the Challenge



"…Actual rate reductions in the Valley to meet the TVA challenge have amounted to thirty-one percent for the Alabama Power Company, thirty-five percent for the Georgia Power Company, and forty-six percent for the Tennessee Electric Power Company. Increased residential use corresponds to these reductions: the Alabama Power Company had an increase of forty-four percent, the Georgia Power Company forty-seven percent, and the Tennessee Electric Power Company ninety-two percent. Notice that the order is the same, but the increased use keeps a little ahead of the decreased price; also, when you lower the price more, you get a much bigger jump in use…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…Since the Tennessee company made the biggest cut and had the biggest increase, it is interesting to note that back in 1933 the company told the legislature that a cut of twenty percent in rates would mean blue ruin. Nobody denies that the companies reduced their rates because the Authority forced them to do it. Besides competing, TVA sold power to the companies, and the act of Congress which governs the Authority provides that requirements as to the rate of resale be made. It was under contract provisions that the Tennessee Electric Power Company made its first reductions in 1934 and the Alabama and Mississippi companies came down, while the Georgia public service commission ordered the Georgia Power Company to make reductions, and Kentucky joined the procession. There were also voluntary offers of reductions in certain areas where communities were voting on whether or not to acquire their own distributing systems and plug in TVA power. Most spectacularly, the Memphis Power and Light Company cut rates to the TVA level in December 1938, with negotiations for sale of its property to the city under way…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"The demand by the public for electric service through the fourth year of a severe economic depression is, in my opinion, an outstanding feature of the electric light and power industry at the present time. That the public highly esteems the use of electricity is very apparent, for in spite of greatly reduced family incomes and the necessity for curtailing expenditures wherever possible, customers generally have continued the use of electricity. This is striking proof that the electric service is rated by the consumer to be worth considerably more than he is paying for it."

***George B. Cortelyou,* February 1934**

RE: decisions to reduce rates significantly were hard for utility companies to make since it went against their ingrained principles (they especially did not believe in reducing rates). In fact, during the height of the Depression, they had not reduced their rates. Mr. Cortelyou's statement reveals the fact that while rate undoubtedly determined use in the case of new customers (and the amount used by old customers), the family that has gotten used to electric light considered it a necessity rather than a luxury and typically did not go back to using candles or kerosene lanterns.

For the Sake of the Stockholders

"…Then there was another reason for not lowering rates, discovered by another writer who put it this way: 'If we acknowledge the secondary interest of vicarious investors, such as policy holders and savings depositors whose funds have been invested in part in the securities of their companies, it is safe to say that those with a proprietary stake in the utilities exceed those who consume the services of the utilities.' This is pretty complicated but if you work it out you will discover that he means to say the utilities have more stockholders than customers. In that case, and if the Yankees are right in saying the preponderance of officers over privates in the Confederate army helped lose the Civil War, the utilities industry is in worse shape than anybody thought…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…TVA forced a reduction in rates in the Valley, and something perhaps all the talk of government competition in the air brought rates down all over the country…Down in the Valley a maximum rate of three cents instead of ten cents a kilowatt-hour for the light in the kitchen was what everybody noticed, and over the country the minimum charge was seldom under $1.50; twice the TVA minimum…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Left: the REA brought electric power to rural areas and farmlands across the country for the first time, opening up an entirely new market for manufacturers of electric appliances. *International Harvester* (well known for their tractors and farm equipment) also made industrial refrigeration units for dairy farms long before rural electrification. After WWII, IH developed a campaign to sell refrigerators and freezers to newly electrified rural areas.

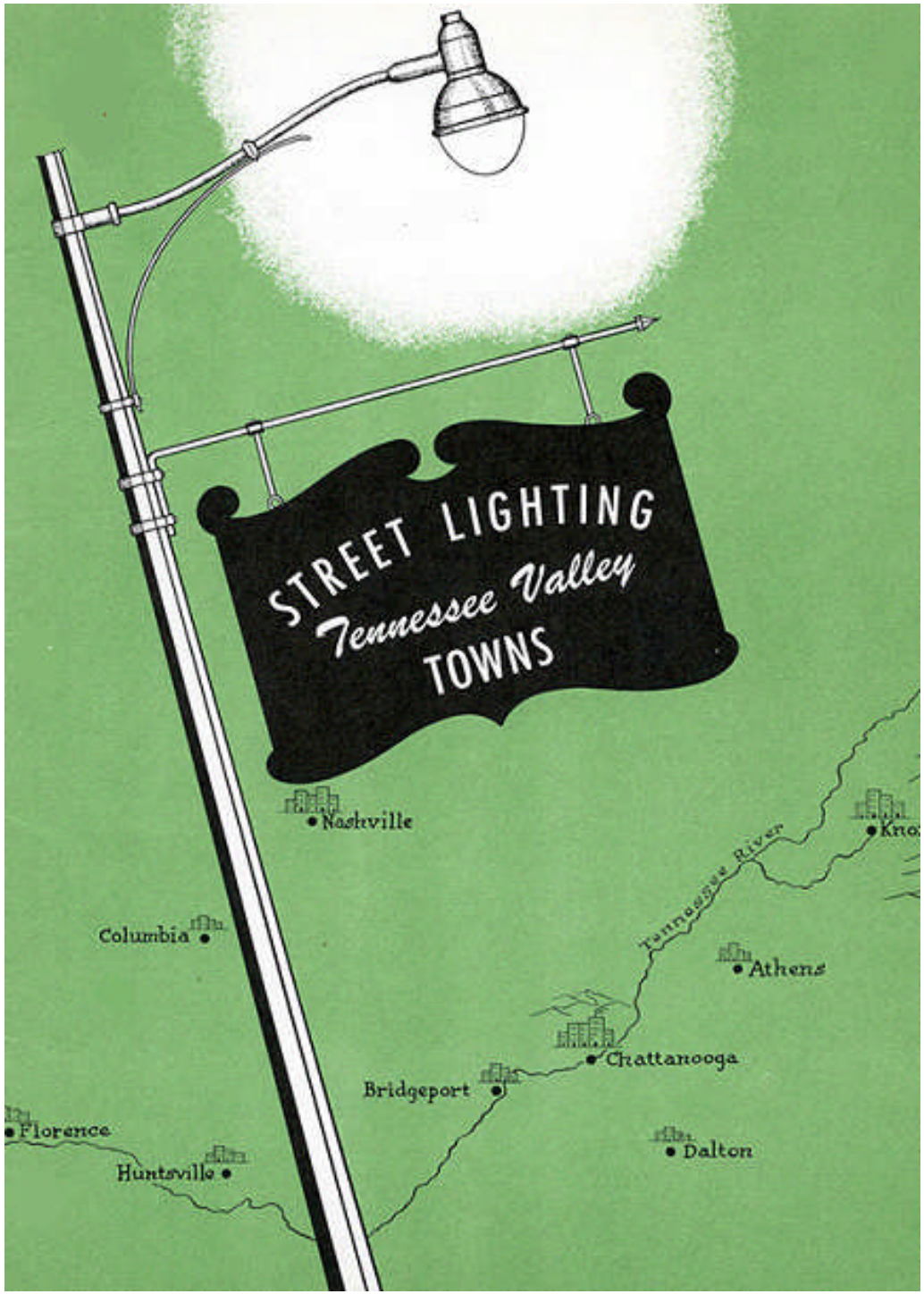
"…With rates gone down a quarter to a third since TVA started, towns taking TVA power don't get the big reductions they used to, but it can still be estimated that the average citizen in Tupelo pays less than half the national average..."

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

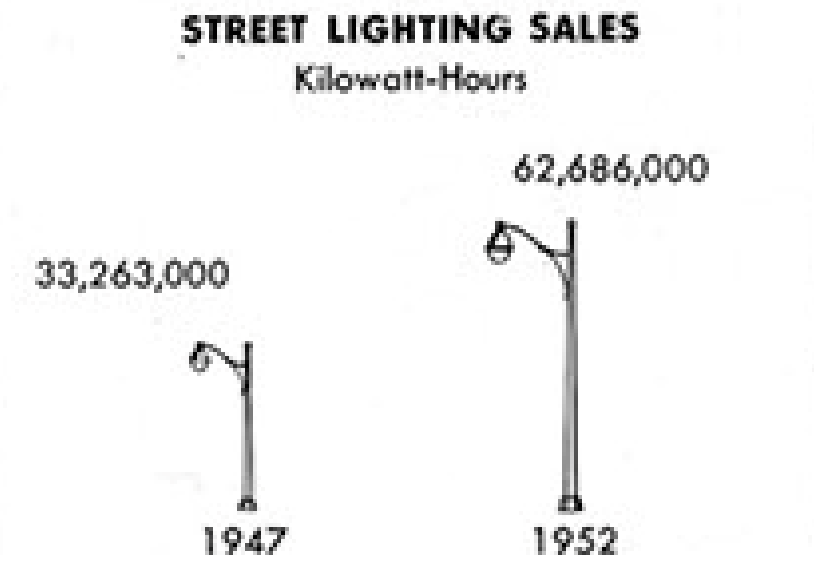
Left: this 1934 photo indicates that Tupelo, Mississippi was the first municipality to purchase TVA power

<u>Left</u>: caption: "Tupelo householders, for as little as $6.98 a month, can buy electricity enough for a generous use of electric range, refrigerator and water heater. This would allow the consumption of 70 kilowatt hours by the refrigerator, 150 kilowatt hours by the range, and 300 kilowatt hours by the water heater. A total of 520 kilowatt hours of comfort and convenience . . . all for $6.98."

Light Up the Night



"Up and down the Tennessee Valley, the people are lighting the streets of their towns and cities at a remarkable rate. City officials, distributors of TVA power, and citizens have teamed up to lift their towns out of darkness at night. Much of the progress has come in the past five years. And perhaps the key factor in this street lighting improvement was a 1949 change in street lighting rates. In that year, new rates were made available to the power distributors which were designed to reflect each distributor's actual cost of street lighting service. A specific aim of the rate was the encouragement of better street lighting throughout the Valley. These lower rates, plus an increasing awareness of the values of modern street lighting, have brought striking advances in the quality of street lighting in the past five years…"



"…A recent survey, covering street lighting growth in the period from July 1, 1947 to June 30, 1952, showed that the 148 municipal and cooperative distributors of TVA power have made this impressive record:

• Improved street lighting has been installed in 275 cities and towns within the service areas of more than 100 power distributors.

• Investment in street lighting facilities in the Valley has more than doubled – from less than $3 million in 1947 to well over $6 million in 1952.

• The amount of electricity used for street lighting has virtually doubled, from about 33 million kilowatt-hours to nearly 63 million kilowatt-hours a year.

• The number of street lighting units has increased by some 22,000. Of these new units, 2,300 are modern mercury vapor lamps rated from 15,0000 to 21,000 lumens. More than 1,400 are 10,000 lumen incandescent fixtures. Some 6,000 are in the 4,000 to 6,000 lumen class. The others are units of 2,500 lumens or less…"

RE: excerpt from *Street Lighting Tennessee Valley Towns* (1952)

The EHFA

"…Appliance prices were still high, so for a while the Authority undertook to arrange for cheaper stoves and refrigerators, to be sold on time. This job was done through the Electric Home and Farm Authority, now a Washington agency, which started in the Valley in 1934. While the manufacturers had to be cajoled into making the low-priced models, half the established price was plenty for most Valley folks to pay. But given a chance, they set themselves up in gadgets at a great rate. In 1934, thanks to EHFA, Tennessee and Georgia were first and second among the states in sales of electric ranges and refrigerators. In 1935 the town of Tupelo established a national record…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Left: *Tennessee Electric Power Co.* advertisement

"Large use of electric service is more definitely planted in the minds of our customers than ever before in the history of our country"

G.C. Estell*, President and General Manager of the *Florida Power and Light Co.

RE: in 1934 the *Tennessee Electric Power Company* reported the greatest percentage of increase in use of residential power of any company in the country, with a volume of appliance sales three times that of 1933, and won a prize at the utilities convention in Atlantic City for outstanding business growth and record appliance sales. The *Alabama Power Company* reported a consumption increase of 19.5 percent, with appliance sales doubled. The EHFA assisted farmers in purchasing major appliances like electric ranges, refrigerators and water heaters. Affordable electricity greatly improved the quality of life for rural farm families.

"The TVA is the grandest piece of promotion that has ever broken for the electrical industry. Imagine the President of the United States standing up and saying that every house in America ought to be completely electrified!"

RE: comment of an appliance manufacturer to the editor of a woman's magazine (ca. 1934)

"…Some sales efforts in the lower brackets had been successful before; up in Hartford they rented electric ranges at thirty cents a week, and out on the Coast the Pacific Gas and Electric company offered unlimited electricity for two months at the cost of last month's bill, to get people used to using more. Up in Canada the public-power people installed both ranges and heaters rent-free, regarding them as outlets, at a time when the Alabama Power Company was charging extra for an ordinary outlet in the wall…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "An abundance of electrically heated water – all the time – a happier household – a healthier family"

"…They couldn't very well overlook what happened in the Valley, so the Northern companies of Commonwealth and Southern got busy with a campaign of their own, and in 1937 Mr. Wendell Willkie was able to report the happy results of 'an aggressive, uniform merchandising policy' in the North. But Mr. Willkie did not give any credit to TVA. He complained, instead, that in 1936 more gadgets were sold by his Northern companies than by his Southern companies, and he said: 'The difference reflects in part the retarding effect which the Tennessee Valley Authority has had on the development of private enterprise in the South.' You see, Mr. Willkie just had a short memory. He had forgotten in 1937 that the sales of appliances in the South had done their doubling and tripling between 1933 and 1936, and that you can't sell people new refrigerators every year. It was one of those times when the South got ahead of the North but didn't get any credit..."

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…An even stranger reaction to the EHFA campaign in the Valley was that of Dr. Arthur Morgan, who made it the basis for his widely headlined charge of a 'hidden subsidy' in the TVA yardstick. He thought too much had been spent for publicity, which should have been charged to the city plants instead of to the Authority…Dr. Morgan then went on to mention, as another 'hidden asset,' the low wages paid employees of municipal distributing systems in the South…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Part 17

War & Peace

Truce in the Valley

"In its manner of selling power to private utilities…an administration inclined to do so might almost contribute to the exploitation of the region by utility companies at public expense"

***Dr. Arthur E. Morgan*, TVA Chairman (ca. 1933)**

RE: when the TVA began to function in the spring of 1933, there was no more opposition than there was at that time to other energetic recovery measures. The utilities did not fight the power provisions of the TVA because it was assumed that the power produced would be sold to them without any strings attached to the resale. Even after the federal government had gone into the public-power business (in what *Public Utilities Fortnightly* called the "Truce in the Tennessee Valley"), the *Commonwealth and Southern Corporation* signed over to TVA some $2.9 million worth of transmission and distribution facilities in Mississippi, Alabama, and Tennessee. The districts included Knoxville and Pulaski, TN and the "Tri-Cities" at *Muscle Shoals*: Florence, Sheffield and Tuscumbia (as well as Decatur, AL). Commonwealth & Southern was praised by the *Washington Post* for its: "fine spirit of cooperation." *Barren's* said: "It could be worse." Knoxville also arranged to buy its city plant from the *Tennessee Public Service Company* through *National Power & Light.* Indeed, it appeared as if the Southern power companies were akin to the farmers in the reservoir area; glad to sell out given a fair price.

"…In November 1934 thirteen coal- and ice-dealers, non-residents of Knoxville, won a court ruling in Tennessee which killed the city's agreement with the Tennessee Public Service Corporation. This ruling was annoying in several ways. Ninety percent of the company stock-holders, it was generally admitted, were satisfied with the sale. Knoxville was satisfied with the plan to buy. But the court ruling gave the plaintiffs ninety days to prepare evidence, which was just long enough for the agreement to expire. Over in Alabama, thirteen minority stockholders of the Alabama Power Company prevented the sale of TVA power to fourteen towns. Among these towns were the 'Tri-Cities,' where Shoals power is generated, and where retail customers were charged thirty to forty times its cost. More suits then tied up the PWA funds that had been allocated for purchase of company plants. Legal measures against a law are an old Alabama custom; the state undertook to test the thirteenth amendment that way…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…The suits were to go on and on, but what was clear from the start was that the utilities industry, in the headlines of its own organs, had declared war on TVA. What was the cause of this breaking of the 'truce'? Maybe a smarter question would be: 'Why did the power companies ever agree to sell anything?' They had good lawyers. They could have fought right from the start, tooth and nail. What actually happened nobody will ever know…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Divide & Delay

"…it is plain to see that the regional planning of the power companies could, from the first, be summed up in two words: divide and delay. City against city, county against county, one group of politicians against another, one state against another, one region against the rest of the country, and idealists against realists even among the government planners these made the divisions. Court injunctions and long-drawn-out trials made the delay…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

The Hindenburg Line

"…The delays worked so well, indeed, that after 1934 it was unnecessary to cede any more territory, and the companies sat tight on what came to be called their 'Hindenburg line.' Their lawyers did the work. Suits by minority stockholders to break contracts, suits to enjoin the use of PWA funds to build municipal plants in sixty-one towns, suits challenging the legality of farmers' co-operatives, suits charging conspiracy by the government of the United States they have all been tried, and they have all been successful in causing delays. The two suits that got as far as the Supreme Court, so causing the most satisfactory delay, questioned the right of the government, through the Tennessee Valley Authority, to sell power a right which the government first assumed at Muscle Shoals in 1921…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…While the courts granted injunctions, TVA went ahead building dams. There is a certain amount of persuasion about a big, expensive structure that just sits and says: 'Well, here I am; what are you going to do about me?' It's possible that there never would have been a Tennessee Valley Authority if it hadn't been for Wilson dam, sitting there and saying that at the Shoals…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Still Legitimate

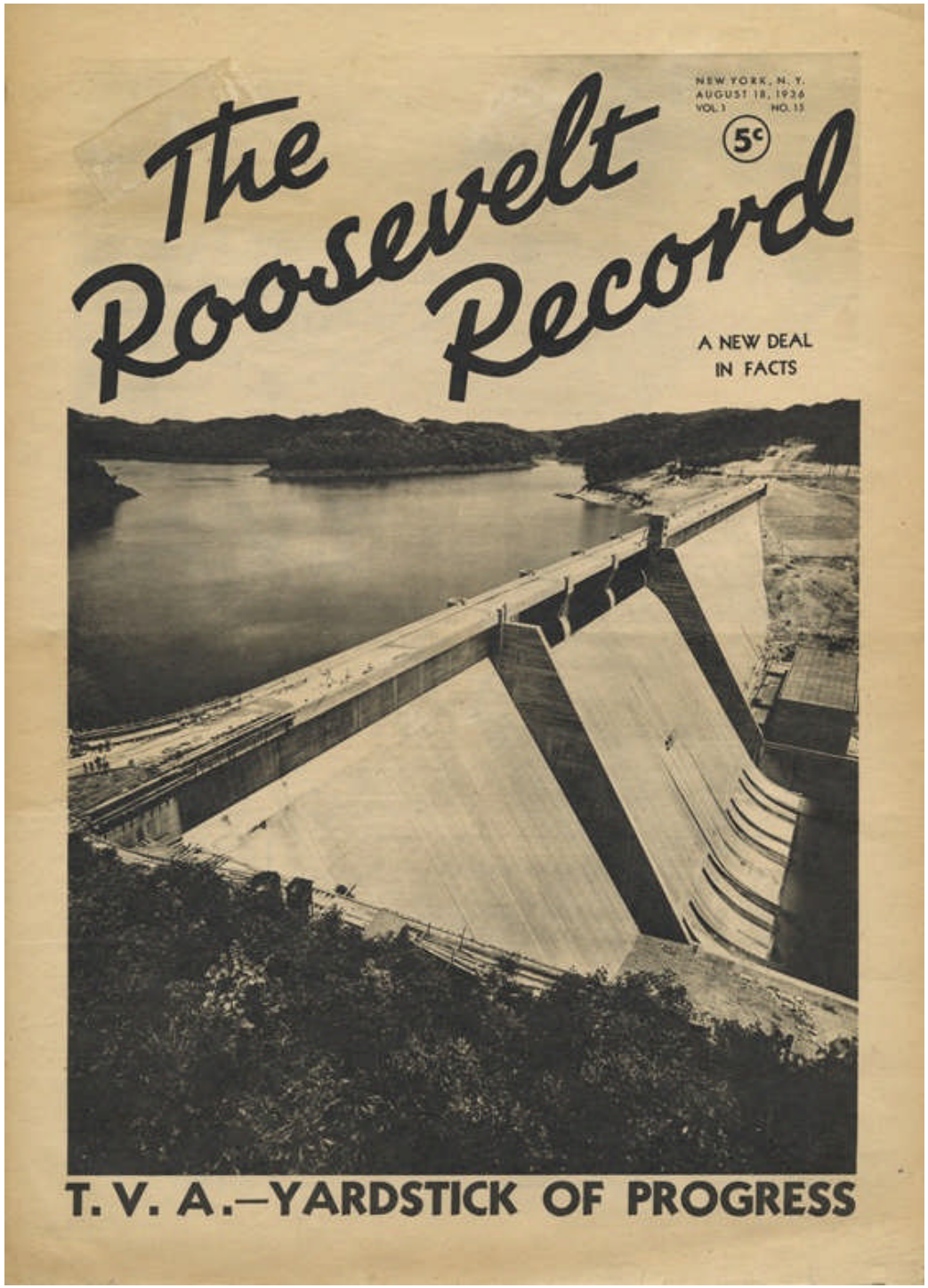
"…The Supreme Court decision of January 30, 1939, was no surprise even to the stock market; if the court of 1936 could decide that Wilson dam was legal, it seemed safe to suppose that the court as now constituted would say the same thing of all the dams…the three dams at work in the Valley, and the others being built, are still legitimate…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"Since 1939 our relations with TVA have been satisfactory; power has been sold or exchanged between TVA and The Southern Company group, of which Alabama Power Company is a member, and each has helped the other in emergencies that inevitably arise in large system operation. The relationship has now for more than a decade been a pleasant one, and illustrates that government and industry can sometimes work in harmony for the public benefit and to the mutual benefit of each."

Chairman of the Board, *Alabama Power Company* (1952)

Yardstick of Progress



"…A yardstick is not a commodity, not even a price, but a unit of measure. There is no need to confuse the TVA yardstick with the rate at which TVA sells electricity to the consumer. There is no indication that there was such confusion in the mind of the government, but there is plenty of it outside. As far as sales go, the government, not being in business to make a profit, can and should sell electricity for as little as possible. Its rates belong right on the ground level, as long as they will eventually, over a long period, pay for the dams. A yardstick, on the other hand, should show what it costs to produce and sell electricity. On the rate-determines-cost theory, the rate is part of the yardstick, rather than the yardstick part of the rate…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…And all the arguments have served a purpose; as time passed, the public was bound to get better informed about TVA and the whole power question. At the start people might have believed such a primitive economic fallacy as, choosing at random from the wealth of such material published by the Saturday Evening Post: 'Every time someone in Athens, Alabama, or in Dayton, Tennessee, or in Tupelo, Mississippi, switches on his lights or tunes in his radio, each one of us, in Boston and Peoria and Spokane, has a little more added to his taxes.' The objections now have to be as close to the truth as the comment of the New York Times on the publication of cost allocations and of the declaration that TVA should be able to pay out the investment for flood control and navigation in thirty years: 'In order to accomplish such results, utility circles believe, the TVA will have to enlarge the scope of its operations in the Tennessee Valley through further competition with private companies, unless it buys them.' In other words, it is admitted that the use determines the cost…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

A Third Possibility

"…What the arguments come to is that some people want public power and some want private power, and you can figure on either side. There is a third possibility, cheap power, without regard to how you get it, and TVA was willing to proceed on the simple theory that it wouldn't matter who provided the power if it was cheap enough. As long as the price was kept low, some people would prefer to buy from private companies; and maybe some would even be willing to pay three or four or six percent extra to retain the privilege of trading with a ruggedly individualistic corporation…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

DIY Power

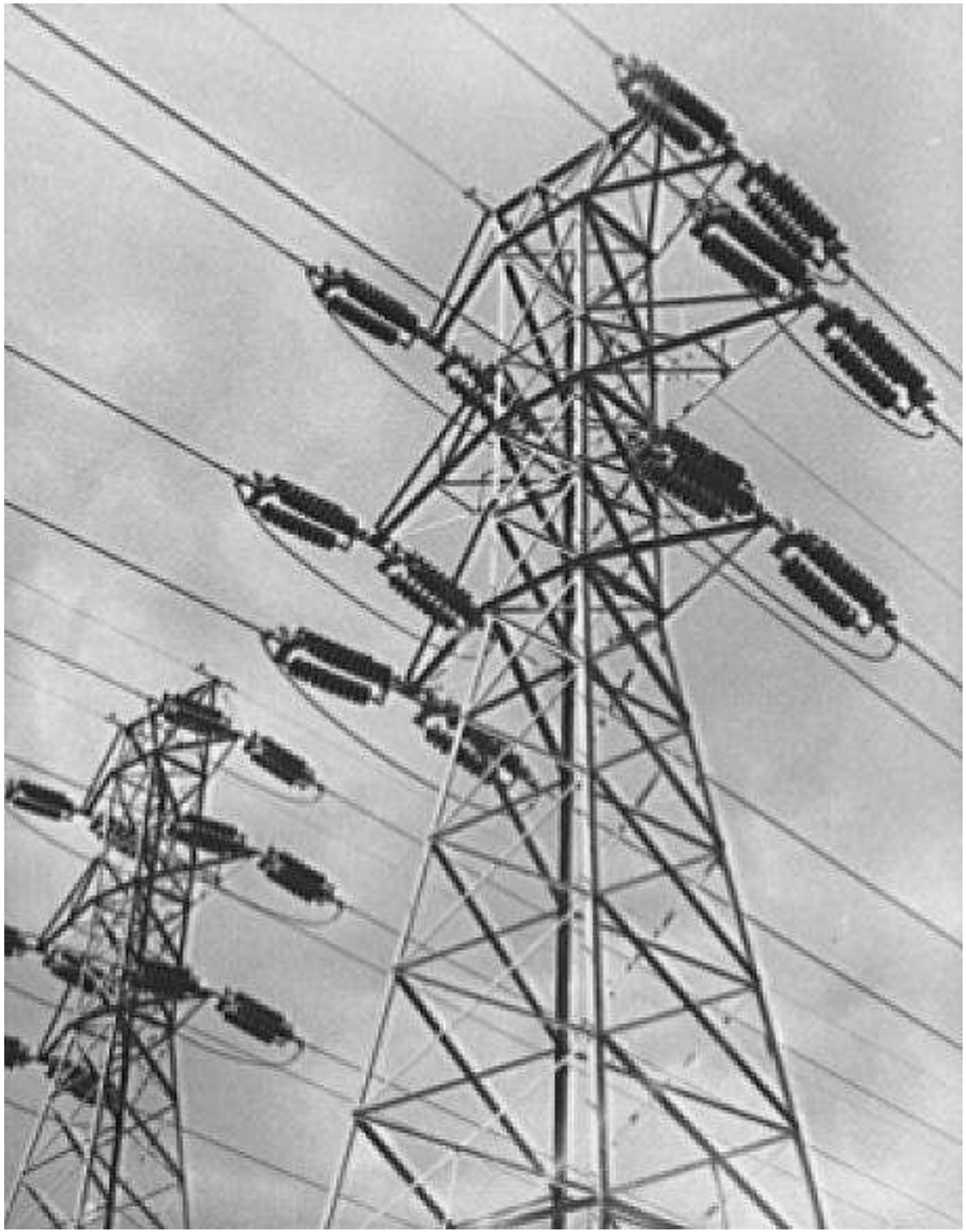
"…Right in the middle of the power controversy came a little private invention that might make as much difference in the long run as the Rust cotton-picker. Columbia University and several business buildings in greater New York put in power plants using Diesel engines. When a Brooklyn department store started up its plant in 1936, Mayor La Guardia said that New York now had its own 'footstick' for power costs. After two years the store estimated costs to be half the utility rate. Diesels are no answer to the problem of individual house-holders, but they are something for hospitals and theaters and such to consider…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Hydra vs. Hydro

"…the job of buying out the private companies will take a lot longer and be more trouble than building dams, but they are making some progress in the Valley. When they started the suit decided by the Supreme Court in 1939, it was eighteen power companies against TVA, or hydra against hydro. It ended with only fourteen suing; the others had sold out…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



"…At the time the TVA Act was passed there were two dams on the Tennessee River, one built by the United States government, the other by a power company. By the terms of the act, the government-owned Wilson Dam was to be transferred from the War Department to TVA. The act also authorized TVA to proceed with the construction of several new dams, including Norris and Wheeler, and to connect these generating plants one with another by the construction of transmission lines. TVA could also build transmission lines to carry the power to market…"

RE: excerpt from TVA: *The First Twenty Years* (1956)

<u>Left</u>: caption: "Insulators and transmission wires in the switchyard of the TVA's Chickamauga Dam"

"…One of the first big tasks confronting TVA was the development of a suitable market wherein its power could be sold. A few scattered municipal electric systems were operating in the region in 1933, and these were among the first to enter into power contracts with TVA. There were of course no electric co-operatives at that time. Most of the area was served by a few rather large privately owned power companies, which were controlled by big holding companies. Over the years, and particularly in the period immediately preceding the war, TVA and the municipal and co-operative distributors of TVA power purchased practically all of the privately owned utility company properties in the Valley power service area. Only two small private companies remain, and they distribute TVA power under contracts which are practically identical to the Authority's standard municipal power contract…"

RE: excerpt from TVA: *The First Twenty Years* (1956)

"…Altogether, TVA and the distributors paid $125,000,000 for the acquisition of utility company properties. The usual pattern has been for TVA to buy the generation and transmission facilities and the local agencies - municipalities and cooperatives - to buy the distribution properties. The last major acquisition was in 1945, when properties of the East Tennessee Light and Power Company were acquired. The boundaries of the service area have not changed materially since that time, notwithstanding a number of requests, principally from municipalities and cooperatives, that the area be extended…"

RE: excerpt from TVA: *The First Twenty Years* (1956)

AN ANNOUNCEMENT WE ARE PROUD TO MAKE

OFFICERS

Sitting, left to right: Grady Nanney, Cashier, Baldwyn; Roy Bonds, Secretary; Mrs. Josephine Holliday, Cashier; H. G. Gangwer, Superintendent; Standing: B. B. White, lineman, Percy White, lineman; R. C. Barnett, lineman; A. W. Pugitt, lineman.

DIRECTORS

Sitting, left to right: Sidney Finch, Attorney; Joe Young, Treasurer; Seth Pounds, President; R. W. Caldwell, Vice-Pres.; Roy Bonds, Secretary; H. G. Gangwer, Superintendent.

Standing, left to right: George Oakley, Charles Murray Gordon, Will Carver, E. L. Moore, C. A. Oakley, Wheeler Holley, J. W.Wust, C. R. Walden, Guy Garner, directors.

The last of its long-term debt has been paid by the Prentiss County (Mississippi) Electric Power Association, one of the nonprofit cooperatives distributing TVA power. The announcement was made today by Seth Pounds, President of the Association, at Booneville, Mississippi.

With the payment of $5900.00 to the Tennessee Valley Authority the Association's entire indebtedness of over $110,000.00 is now paid off and the system is debt free. The Association's indebtedness was incurred for the purpose of acquiring the original system from TVA and to reimburse the Authority for rural lines which TVA constructed. This is the second of the power distributing cooperatives that has thus completely retired its debt. The other is the Alcorn County Electric Power Association, Corinth, Mississippi.

When the Prentiss County cooperative was formed in June, 1935, the Association operated less than 40 miles of rural distribution lines. This number has now been more than trebled. Before TVA power came to Prentiss County, citizens here paid an average rate of 5.73 cents a kilowatt-hour for residential service; the rate now is 1.88 cents per kilowatt-hour. Before TVA, the average residential customer used 550 kilowatt-hours a year; now he uses 1500. The average rate paid by commercial customers before TVA rates were introduced by the Association was 7.22 cents per kilowatt-hour, or nearly 3½ times the present average of 2.11 cents. Commercial customers have increased their average annual use from 830 kilowatt-hours to more than 2800 kilowatt-hours annually.

Net income of the Association has increased from $4,050, in the fiscal year 1936, the first year of operation under TVA power contract, to $18-400.00 for the year ending June 30, 1942.

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Prentiss County Electric Power Association

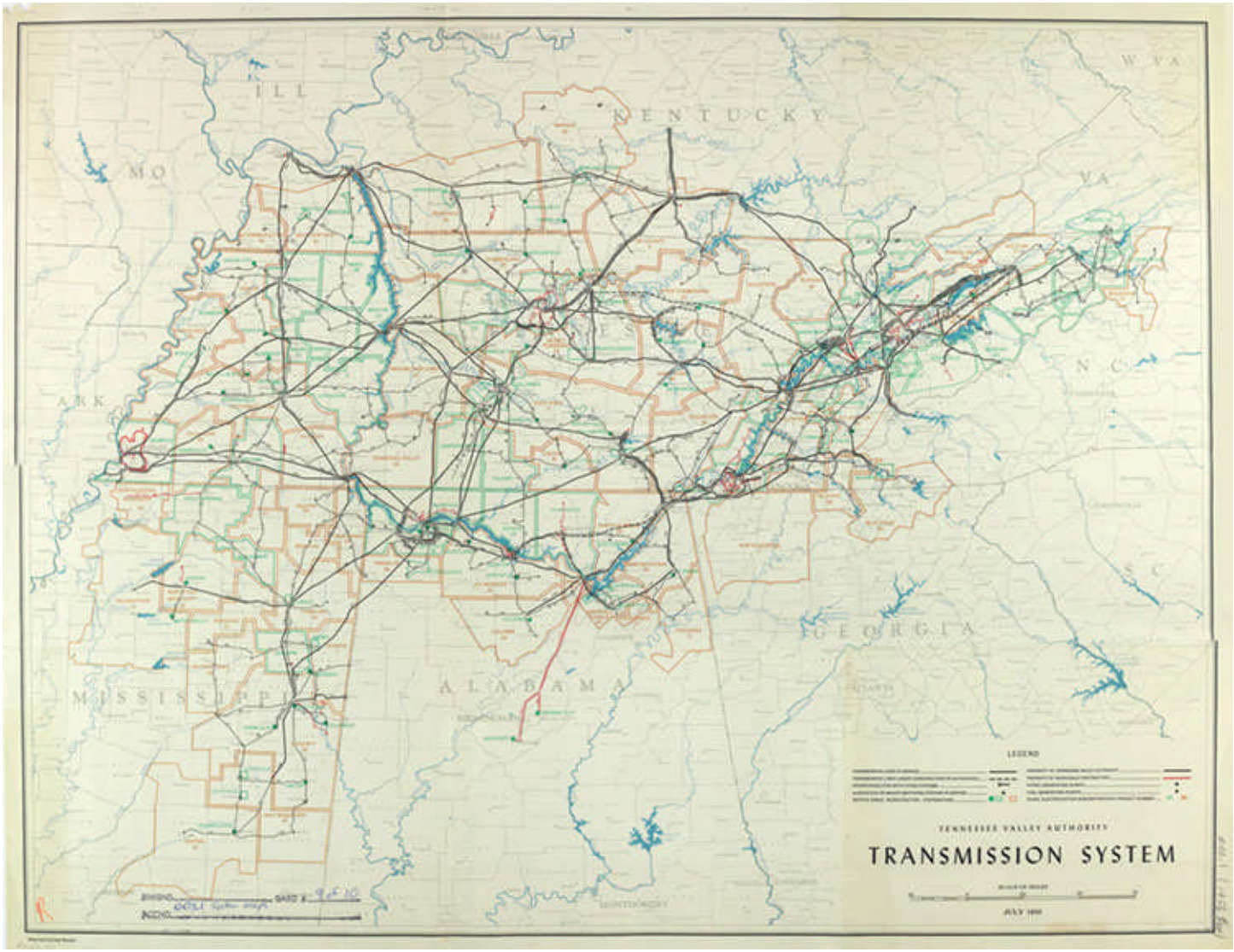
Left: caption: "The last of its long-term debt has been paid by the Prentiss County (Mississippi) Electric Power Association, one of the nonprofit cooperatives distributing TVA power…With the payment of $5,900.00 to the Tennessee Valley Authority the Association's entire indebtedness of over $110,000.00 is now paid off and the system is debt free. The Association's indebtedness was incurred for the purpose of acquiring the original system from TVA and to reimburse the Authority for rural lines which TVA constructed. This is the second of the power distributing cooperatives that has thus completely retired its debt…When the Prentiss County cooperative was formed in June, 1935, the Association operated less than 40 miles of rural distribution lines. This number has now been more than…Net income of the Association has increased from $4,050, in the fiscal year 1936, the first year of operation under TVA power contract, to $18,400.00 for the year ending June 30, 1942."

"…As a result of the transfers of utility properties to public ownership, TVA, with Congressional approval, has assumed a responsibility to supply the power requirements of the region. The utility properties in question were purchased outright: TVA bought the generating plants and transmission lines and integrated them into its system; and at the same time the municipalities and cooperatives - the preferred customers under the act - acquired the distribution systems…"

RE: excerpt from TVA: *The First Twenty Years* (1956)

"…At present, there are 150 electric systems distributing TVA power - 97 municipals, 51 cooperatives, and two small privately owned utilities. Their investment in distribution facilities totals almost $400,000,000. The area they serve covers practically the entire State of Tennessee, the north-eastern quarter of Mississippi, the northern part of Alabama (roughly one-fourth of the whole state), the northwestern corner of Georgia, very limited areas in western North Carolina and Virginia, and the southwestern part of Kentucky. Altogether, the distribution area for TVA power covers about 80,000 square miles. It is therefore about double the drainage area of the Tennessee River watershed. Within this area live some five million people and there are more than one-and-a-quarter million electric consumers in the area…"

RE: excerpt from TVA: *The First Twenty Years* (1956)


ILL
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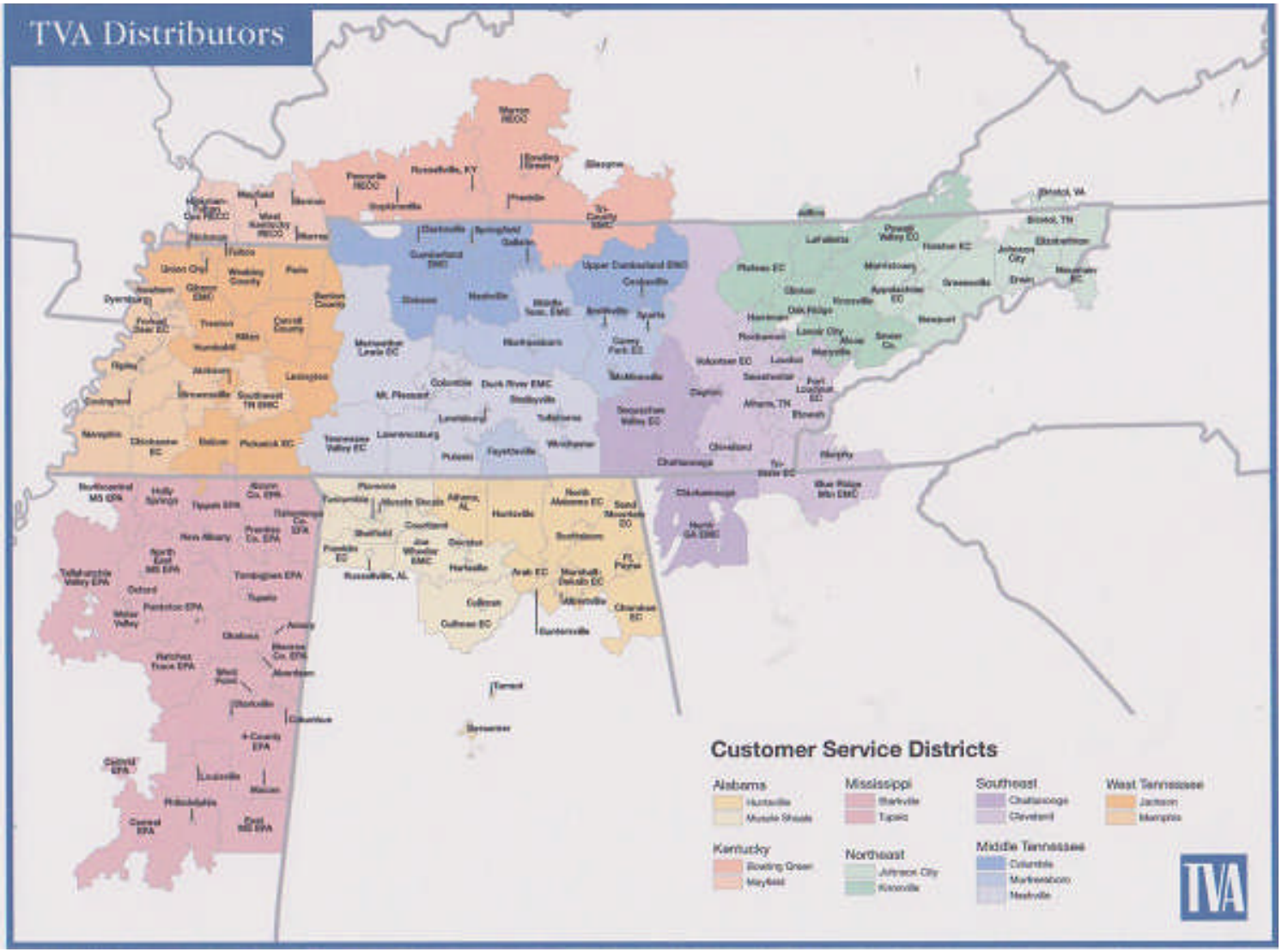
GEORGIA
MISSISSIPPI
ALABAMA
LEGEND
TENNESSEE VALLEY AUTHORITY
TRANSMISSION SYSTEM
JULY 1950

"…The Tennessee Valley Authority and its distributors combine to form the largest power system in the country. In 1952 the TVA system produced 21,000,000,000 kilowatt-hours, or roughly fourteen times as much energy as the same area produced in 1933. When TVA was started, this area had a generating capacity of about 800,000 kilowatts and there were many who thought that was enough…"

RE: excerpt from TVA: *The First Twenty Years* (1956). Today, the TVA owns and operates one of the largest and most reliable transmission systems in North America, serving some nine million residents in an 80K square-mile area spanning portions of seven states. TVA's transmission system moves electric power from their generating plants to distributors of TVA power then to customers throughout the region. The TVA was the first utility to build 500K-volt transmission lines and operates/maintains one of the largest single-owner transmission systems in the U.S. Its 16K miles of transmission lines are enough to span the nation more than six times.



<u>Above</u>: caption: "TVA Distributor Map." There are 155 distributors (municipal utility companies and cooperatives) that resell TVA power to consumers. The municipal utilities make up the largest of block of TVA customers. Cooperatives are customer-owned companies, many of which were originally formed to bring electricity to the farthest reaches of the TVA region. The two groups represent the wholesale base of TVA's business, accounting for 85% of total revenue."

Power to the People

"Humboldt, Tenn., July 28 – Chester Williams, 50-year-old farmer living near here, today was designated as the one-millionth consumer of TVA power. And Chester and his rosy-faced wife, now a family 'with the power' after 26 years without electricity in their modest farm homestead in this gently-rolling Western Tennessee country, had rubbed Aladdin's lamp to perform a modern miracle to transform their home…"

RE: excerpt from a TVA press release dated July 28th 1949

Farm Family To Become Millionth TVA Consumer

BELLS, Tenn. — Mr. and Mrs. Chester Williams of Fruitvale will flip on their electric lights tomorrow morning—the 1,000,000th consumer of TVA power.

A rickety oil stove will be dragged off to the smokehouse, and the junkyard will resound to the arrival of assorted pieces of metal, including a flame-blackened coffee pot with a handle that always burned the hands of its user.

There'll Be Some Changes Made!

BELLS, Tenn.—Mrs. Chester Williams lights her ancient oil stove for what she hopes will soon be the last time. The Williams family, whose farm is near here, will become the millionth customer of TVA power tomorrow.

Will Carry in New Equipment

Then the menfolks around the 100-acre Williams farm, far from the main highway, will cart in the shiny new porcelain electric range, refrigerator, deep freeze unit and other handy equipment which will gladden the heart of any housewife —$2,000 worth in all.

Watching this transformation from the old to the new will be a group of public power officials, including representatives of the 144 municipal and rural co-operative distributors of TVA power, REA and TVA officials, and James P. Pope, TVA director, who will be principal speaker at a ceremony celebrating the Williamses' good fortune.

Switch To Be Thrown

At 10:30 a.m. a switch will be thrown, and the current's steady energy will hum through the house like an invisible giant.

Mrs. Williams will take a young fryer from the block and begin her first "electric" meal.

"It's just like Christmas," Mrs. Williams said in an interview this week. "I'm just a farm wife, and all this has me excited."

She was referring to the excite-

(Continued on Page 2, Column 3)

Today's Tennessean

"…A large group of public power officials was present including representatives of the 144 municipal and rural cooperative distributors of TVA power, REA and TVA men. The crowd was augmented by county agents, neighbors of the Williams couple and officials of the Gibson County Electric Membership Corporation of which Mr. Williams is now a member…"

RE: excerpt from a TVA press release dated July 28th 1949

Left: picture caption: "Bells, Tenn. – Mrs. Chester Williams lights her ancient oil stove for what she hopes will soon be the last time. The Williams family, whose farm is near here, will become the millionth customer of TVA power tomorrow."

"…They watched as workers wheeled in new appliances to signalize that the little Crockett County farm - miles from the main highway, on a narrow gravel road - was no longer to be without the essentials of modern living. The appliances included a new electric range; new refrigerator and deep freeze unit; new hot water heater; and last but not least, a new electric pump to make obsolete the old windlass, and permit Mrs. Williams, with a flick of her wrist, to obtain water from the faucets of her new sink…"

RE: excerpt from a TVA press release dated July 28th 1949

<u>Left</u>: caption: "Old & new on the Williams' farm"

"…A row of discarded kerosene lanterns and lamps on the back porch gave eloquent testimony that the 'old order changeth, giving place to new,' and that the Williamses would henceforth have abundant electric light in home and barn. Mrs. Williams was already planning to work in her garden after nightfall, using a special outdoor light installed by her husband…"

RE: excerpt from a TVA press release dated July 28th 1949

<u>Above</u>: caption: "As these women can attest, electricity powers all the wonderful appliances for the home, even a dishwasher in 1949"

Yesterday & Today

"This occasion gives us an opportunity to appraise the work of those responsible for extending electric service to the million customers. A great job of rural electrification has been done in the last 15 years. In 1933 there were only 15,000 electrified farms in the Valley and these were located very near the cities and towns. Today there are almost 300,000. The 144 distributors operate 66,000 miles of rural lines, enough to span the American continent 20 times. When TVA began only a little more than 3 percent of the region's farms had electric service; now two-thirds of the farms in the Valley have electricity. More than 20 times as many farms are now electrified as in 1933. And each customer is, on the average, using about three times as much electricity as was used 15 years ago and the total amount used on farms today is 50 times what it was in 1933. The remaining Valley farms are being electrified at the rate of six to seven thousand each month. Every sixty days the distributors are extending service to as many farms in the Valley as were served in all the years before TVA…"

***James P. Pope*, TVA Director**

RE: Pope was the principal speaker at the "Millionth TVA Customer" celebration held on the Williams farm on July 28th 1949. Pope also pointed out that the increased use of electricity was not confined to rural areas.

"…The distributors have within the last four years invested $125,000,000 in new distribution facilities and TVA has expended about the same amount for generating and transmission facilities. The distributors contemplate making service available to all farms within feasible distance of central station service. It is estimated that about 9,000 miles of rural line were under construction on July 1 of this year. At least 15,000 miles are to be placed in service during calendar year 1949. Over the next several years the distributors have planned to build about 30,000 miles of new line, in addition to the 66,000 now in use, to serve more than 145,00 additional customers."

***James P. Pope*, TVA Director**

RE: Pope was the principal speaker at the "Millionth TVA Customer" celebration held on the Williams farm on July 28th 1949. Pope also cited the high earnings of the distributors and the benefits to other areas of the nation, stating that in 1949 alone, $100 million worth of electric appliances were purchased (mainly from manufacturers in the North).


22 USA
Rural
Electrification
Administration
1935 1985

Part 18

On the Periphery

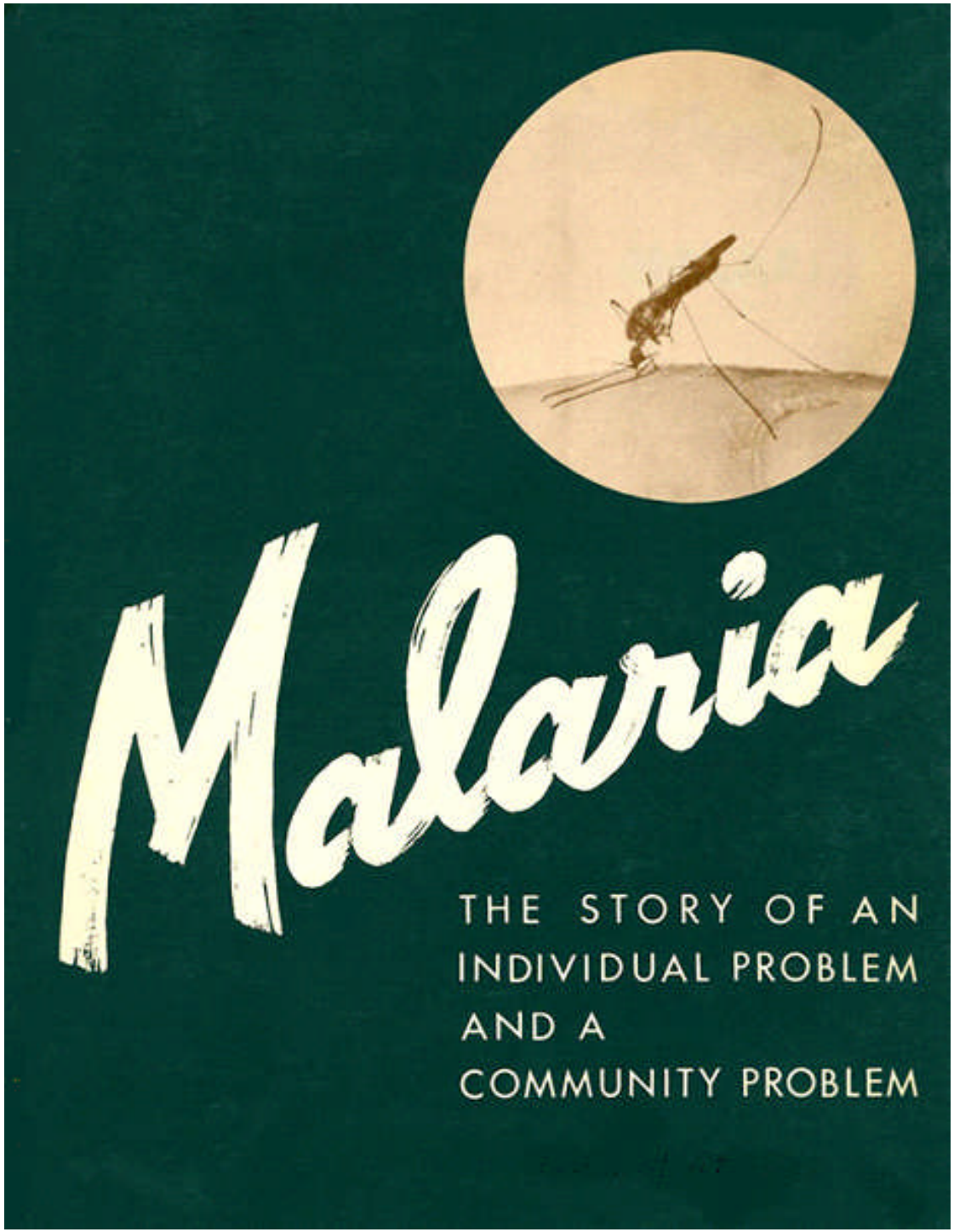
Multi-Faceted

"…In addition to the two major construction activities there have been many other engineering projects instituted. These include flood control, navigation, silt study, general and aerial surveys, land planning and housing, chemical engineering and fertilizer manufacture, industrial engineering, training programs, dendrochronology, and similar activities…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

The TVA is well known for building dams and supplying power to rural areas, employing thousands of people and for bringing prosperity to previously blighted areas of the remote *Tennessee Valley*. However, not so well known were the numerous activities and technological advancements made on the periphery of the three prime objectives. In order to bring power to underdeveloped regions, TVA had to contend with the natural world. Their employees battled malaria and helped educate citizens about the disease as well. They surveyed and mapped hundreds of square miles of the Southeastern United States, developed alternative means of fuel production and helped with town planning and community design. They hired and trained young engineers in-house, creating their own home grown knowledge base and cultivated future leaders of the power industry. As part of the Lend-Lease program during WWII, TVA shared technology, equipment and know-how with their wartime ally; the Soviet Union (to help meet their power production needs during the war). Since its inception during the depths of the *Great Depression*, TVA was much more than just a regional power company. Its peripheral activities and technological development affected nearly every aspect of people's lives with whom TVA came in contact.

<u>Above</u>: caption: "This map shows the results of the Malaria Control Program's 1941 survey for malaria in the Guntersville Reservoir region"



CONTENTS

WHAT DO WE FIND IN PLACES WHERE MANY PEOPLE HAVE MALARIA?

NOT THIS

BUT THIS

WE CAN KEEP MALARIA MOSQUITOES AND MALARIA OR WE CAN CONTROL THEM.

On the following pages you will find suggestions for controlling them. Some of these suggestions are things which we can do for ourselves.

Some of the things can be done if everyone in the community helps.

This means that all of the

doctors,

engineers,

nurses,

teachers, and

EVERYBODY must help —

including YOU and YOU and YOU!

WHAT CAN BE DONE TO CONTROL MALARIA?

THESE ARE THE THINGS WHICH WE CAN DO FOR OURSELVES.

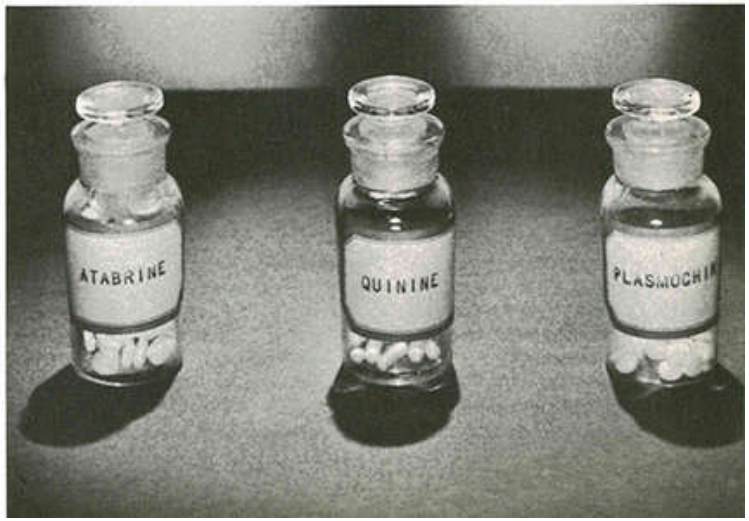
FIRST:

If we think that we have malaria, we can go to a doctor.

If the doctor finds that we have malaria, he gives us medicine. The medicine helps to make us well. We are less likely to have parasites which malaria mosquitoes can get and pass on to other persons.

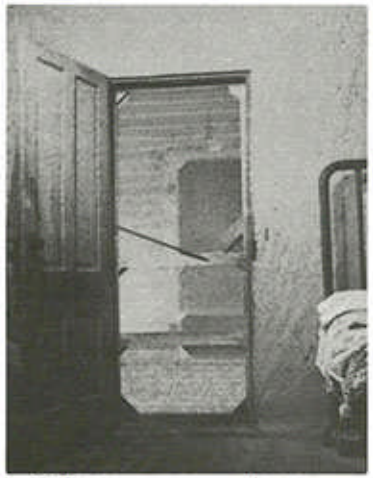
We go to the doctor.

The doctor uses these.



When we mosquito - proof, we . . . .

screen houses,



build strong screen doors,

seal fireplaces so mosquitoes that fly down chimney cannot get in,

cover wall cracks with heavy paper,

and cover floor cracks with roofing paper.

THIRD:

We find and kill mosquitoes which get into our houses.

"Quad" mosquitoes which are in houses are the ones that most often have malaria parasites in their bodies.

We should not let these mosquitoes live to bite us in our own homes.

We should not let these mosquitoes live to fly away and bite other people.

We find.

We kill.

<u>Above</u>: caption: "Spraying insecticide along banks of Tennessee River for malaria control. June 1942."

Comrades

A G R E E M E N T

Witness this agreement entered into this day of 1943, by the Procurement Division of the Treasury Department of the United States of America and the Tennessee Valley Authority, a corporation organized and existing under the laws of the United States of America.

The Tennessee Valley Authority, as promptly as practicable, shall perform all architectural and engineering services requested by the officer signing this agreement on behalf of the Procurement Division necessary to complete the construction of two certain hydro-electric plants described in U.S.S.R. Requisition For Defense Articles No. R-5350, dated January 21, 1943, a copy of which requisition is hereto attached. Further, the Tennessee Valley Authority shall designate a qualified engineer to be stationed in Washington, D. C. to consult with the Procurement Division, the War Production Board, and representatives of the U.S.S.R. for the purpose of facilitating the performance of the services to be performed by the Tennessee Valley Authority under this agreement.

As complete compensation for its undertakings under this agreement, the Tennessee Valley Authority shall be reimbursed (a) for salaries and wages actually paid by it to all personnel for time spent in the services to be performed under this agreement; (b) a sum equal to 19.7 percent of said salaries and wages to cover charges and contingent charges for statutory leave privileges and retirement system expense; (c) all expenses, including all per diem in lieu of subsistence, incurred by the Authority for travel performed in connection with such services; and (d) all direct expenses incurred by the Authority in connection with the performance of such services, including, without limitation, the cost of special materials, supplies, and equipment required for such services, and drawing reproduction costs.

In witness whereof, the parties have executed this agreement as of the day and year first above written.

UNITED STATES TREASURY PROCUREMENT DIVISION

By _____

_____
(Official Title)

TENNESSEE VALLEY AUTHORITY

By _____

_____
(Official Title)

<u>Above & Left</u>: under this February 1943 agreement, the TVA committed to provide architectural and engineering services related to the construction of two hydroelectric plants in the Soviet Union

OFFICE OF THE DIRECTOR

TREASURY DEPARTMENT

PROCUREMENT DIVISION

WASHINGTON

July 13, 1943

Mr. M. V. Malyshev
Chief Engineer, Hydroelectrical Division
Soviet Government Purchasing Commission
300 Union Building, Room 401
Knoxville, Tennessee

Dear Sir:

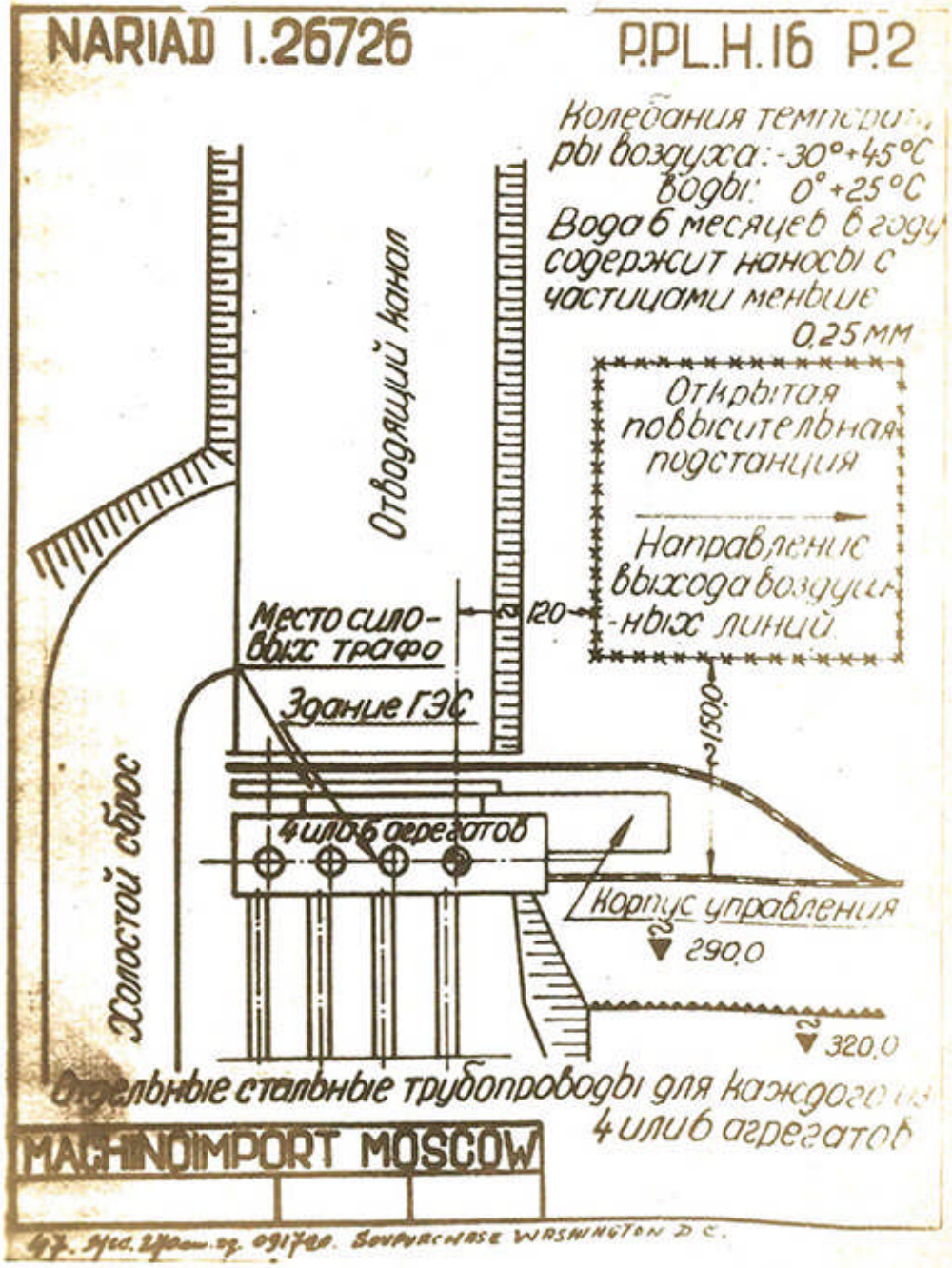
Reference is made to letter dated July 5, 1943 addressed to Mr. K. I. Lukashev of the Soviet Government Purchasing Commission by Mr. John L. Loeb, Assistant to the Director of Procurement, with respect to the inspection of lend-lease material.

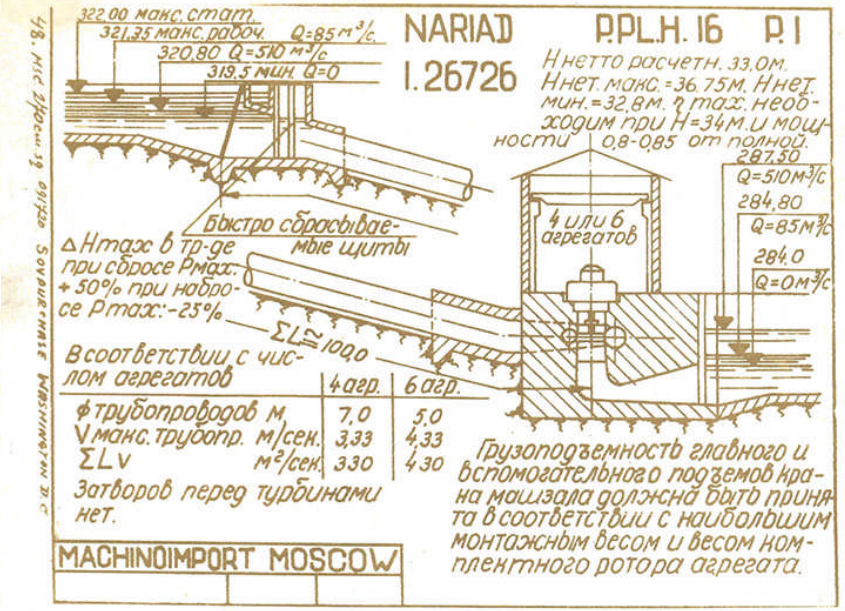
When it is desired that visits be made to the plants of the various contractors by yourself or members of your staff to inspect materials, equipment or plant facilities in connection with the hydro-electric program, it will be appreciated if you will so advise the writer, giving approximate dates and locations of such visits, in order that appropriate arrangements may be made to have a representative of the Procurement Division present.

Very truly yours,

H. L. Brite,
Special Assistant

<u>Left</u>: in this July 1943 letter, Special Assistant *H.L. Brite* of the U.S. Treasury Dept. is inquiring when Soviet officials plan to visit the U.S. facilities which were contracted to provide equipment for the Soviet plants





<u>Above & Left</u>: these Russian language documents pertain to "Plant 13" in the Soviet Union. They are engineering drawings related to turbines used in the powerhouse.

Engineering Activities

"…Brief descriptions of various engineering activities that are being carried out under the supervision of the Tennessee Valley Authority follow. The purpose of these short descriptions is to familiarize the reader to some extent with the scope and variety of engineering activities in the Tennessee Valley…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

Office of Engineering

"…The planning, design, and construction of TVA's multiple-purpose system is carried out by the Office of Engineering, headed by the Chief Engineer. This office is organized into three major divisions, the Division of Water Control Planning, the Division of Design, and the Division of Construction, which are headed by a Chief Planning Engineer, Chief Design Engineer, and Chief Construction Engineer, respectively…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…The Division of Water Control Planning in turn is divided into seven branches, as follows: the Maps and Surveys Branch, which has the responsibility for making all maps and surveys; the Hydraulic Data Branch, which has the responsibility for obtaining all rainfall, runoff, and other hydraulic data necessary in planning; the Geologic Branch, consisting of a few geologists who have the responsibility for determining geologic conditions influencing design and construction; the Power Studies Branch, which studies the power potentialities of the river; the Flood Control Branch, which studies past floods and potential floods and plans for the regulation of these floods; the Project Planning Branch, which, using data provided by the other branches, develops plans for project construction; and the River Control Branch, which has the responsibility for the operation of the system after the dams are constructed. There are about 600 employees in this division…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…After a plan for a particular project has been completed by the Project Planning Branch, it is incorporated in a planning report which, after approval by the Chief Engineer, is transmitted to the Division of Design for execution of designs and specifications. This division comprises five design branches, dealing respectively with Civil Design, Electrical Design, Structural and Heavy Equipment Design, Mechanical Design, and Architectural Design. In addition, there is an Inspection and Testing Branch to inspect the equipment purchased from manufacturers, a Drafting Service Branch for the actual drafting of drawings as distinguished from the design, and a small technical staff of specialists in various lines for advice on special problems. This division has over 600 engineers, although the number varies as the nature of the work changes…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…The Division of Construction is organized in a number of branches, including a branch for each project under construction. At present there are eight such branches. In addition, there are two service branches, the Construction Plant Branch, which designs the construction plants for all the different projects; and the Construction and Maintenance Branch, which does the lighter construction work. The number of personnel in this division varies with the amount of work under way, and at present totals somewhat less than 10,000. The majority of these are skilled craftsmen and laborers…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…A small staff is responsible for the administrative work of the Office of Engineering; and a Board of Consultants, consisting of a group of eminent engineers from all over the United States, meets from time to time to advise on special problems…"

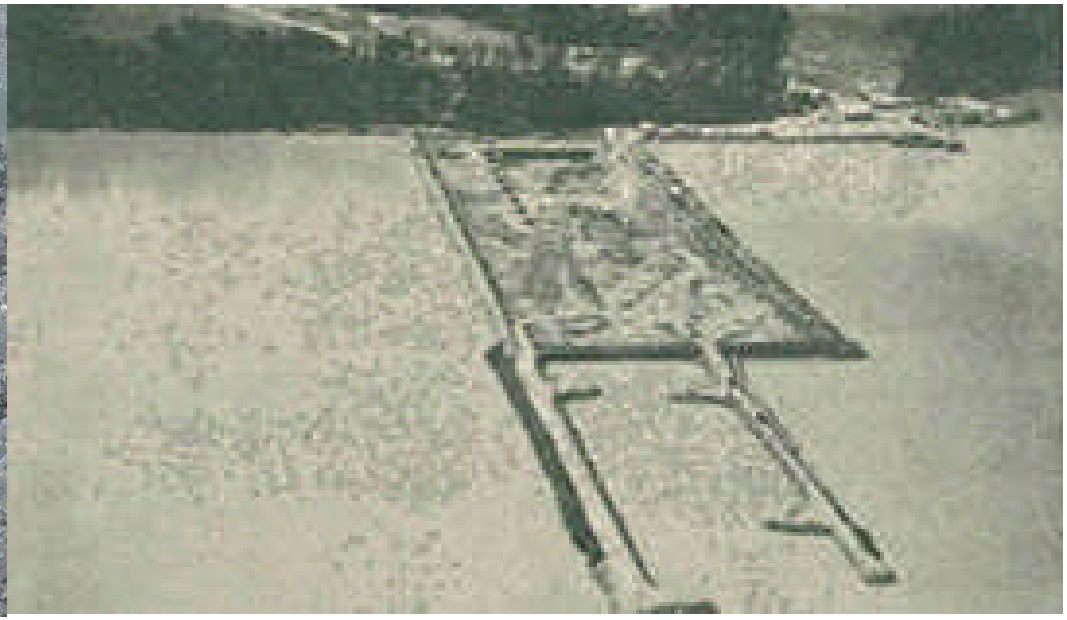
RE: excerpt from *TVA: The First Twenty Years* (1956)

Aerial Photography, Mapping & Surveys

"….the President is hereby authorized…to make such surveys of and general plans for said Tennessee basin and adjoining territory as may be useful to the Congress and to the several States in guiding and controlling the extent, sequence, and nature of development that may be equitably and economically advanced through the expenditure of public funds, or through the guidance or control of public authority, all for the general purpose of fostering an orderly and proper physical, economic, and social development of said areas…"

RE: excerpt from Section 22 of the *TVA Act of 1933*

The *TVA Act of 1933* required a report to Congress by March 1936, setting out an *Integrated Plan of Development* for the river. Before this plan could be made, several tools of analysis and planning had to be refined. One of these was maps. The *U.S. Army Corps of Engineers* had made some maps of the main river area, but there were few maps in existence of the large areas that contributed to the runoff into the river. The federal agency for such mapping is the *United States Geological Survey* (USGS), whose policy was to match the sums that a state puts up for mapping in that state. Typically, the southern states were not able to put up enough money to provide for any mapping of consequence. The problem then was to find some means of mapping the Valley rapidly. A contract was made with the USGS whereby in return for an annual payment, the TVA was able to utilize the USGS's men, machines and mapping experience.



"…A program of mapping that will eventually cover the entire Tennessee River watershed was started in December, 1933, and is rapidly supplying the maps and pictures necessary for planning. Most of this work is being done by the United States Geological Survey under an agreement with the Tennessee Valley Authority. Aerial pictures, mosaics, and planimetric maps of the entire basin are being furnished, and topographic maps are being made where needed. The scale of all maps and pictures is 1:24000…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "Early Tennessee Valley Authority archeological survey of Chickamauga Lake with modern aerial photography"

<u>Right</u>: caption: "An aerial photograph showing cofferdams at Wheeler Dam"

Mapping work began with flights over the area to take airplane photographs, from which were made planimetric maps. Such maps show the forests, streams, railroads, highways, and all other physical features except elevations. While elevations would have been useful, it would have been impossible to obtain them in time. The planimetric maps, which were completed in a matter of months, were then used in planning the integrated system outlined in the TVA's 1936 report on the "Unified Development of the Tennessee River System."

Evolution of the Map

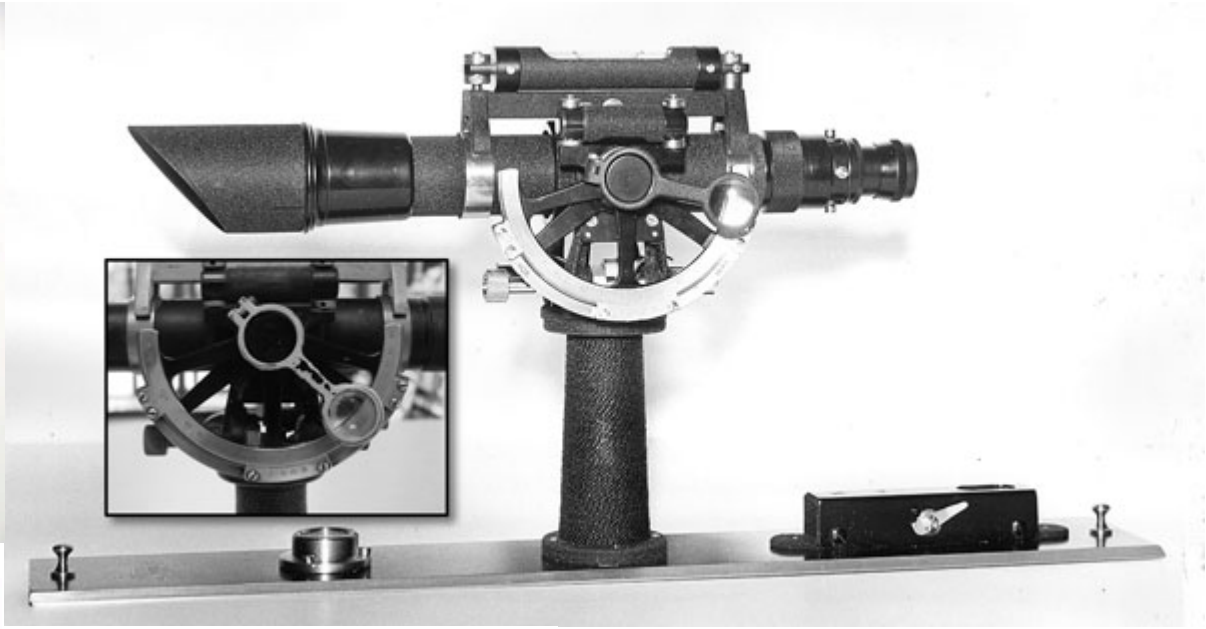
On December 4-5, 1884, *John Wesley Powell* addressed the U.S. Congress seeking authorization for the *United States Geological Survey* to begin systematic topographic mapping of the United States. During the next 125 years, mapping techniques evolved from field surveys through *photogrammetry* to the computer-based methods currently used and the scales and content of the topographic maps changed. In the late 19th Century, surveyors created topographic maps in the field. A series of points were measured in the field using tape and compass traverses with elevations determined with an aneroid barometer and used in a process known as "field sketching" to draw a terrain representation using contours. The introduction of the plane-table and alidade, which could measure vertical angles, point positions and elevations much more rapidly, greatly increased the accuracy of data shown on topographic maps, but still required the surveyor to field sketch the contours after control points had been identified. The aid of a visual three-dimensional model in the office to construct the surface representation awaited the development of *photogrammetry*.

"…All topographic and other informational surveys are executed by the plane table method, using aerial photographs as the map base whenever possible. The plane table has proved to be a most efficient and economical mapping instrument…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

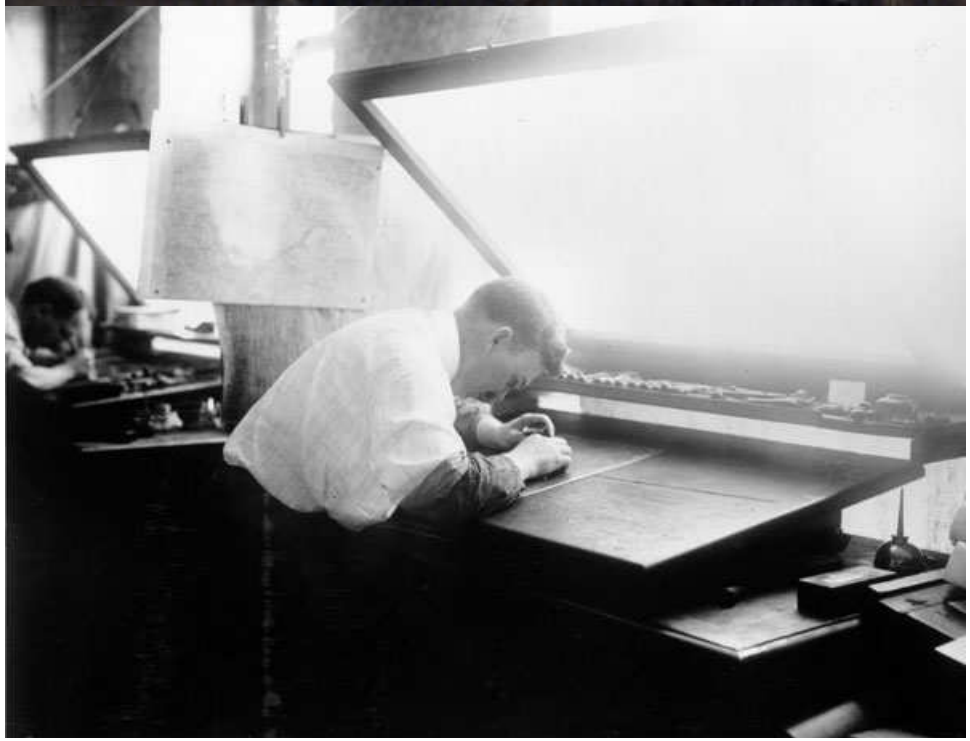
<u>Above</u>: caption: "Field Sketching"

<u>Left</u>: caption: "After orienting the plane-table and leveling the alidade, an early USGS topographer takes measurements while his assistant records the information on a field sketch"



<u>Top Left</u>: Tape
<u>Top Right</u>: Alidade
<u>Bottom Left</u>: Aneroid Barometer
<u>Bottom Right</u>: Plane-table

Early USGS maps were created at scales of 1:250000 (for 1-degree areas) and 1:125000 (for 30-minute areas). The scales were increased with time and by 1894, most of the maps were 15-minute areas and produced at a scale of 1:62500. Features shown on the maps included civil divisions of state, county, township, and cities or villages; public works including rail-roads, tunnels, wagon roads, trails, bridges, ferries, fords, dams, canals and acequia; hypsography with contours and floodplain representations; and miscellaneous features of forest, sand and sand dunes. The reproduction of maps from the original field sketches used a three-color lithographic printing process based on copper plates. The image of the topographic features was engraved on the copper plates. A three-color process was used with civil divisions and public works in black, hydrography in blue and hypsography and miscellaneous features in brown.



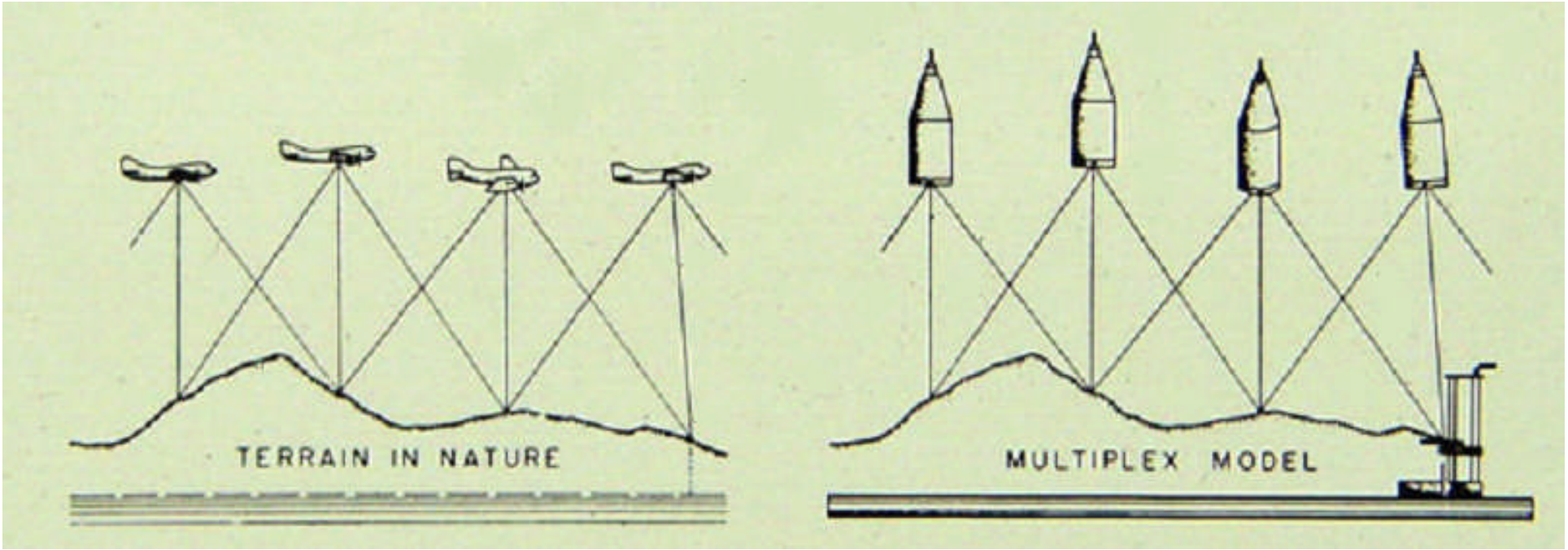
"…The Aero Service Corporation of Philadelphia, PA, has contracted to furnish five-lens aerial pictures and mosaics to be compiled from these pictures. The flying and photography have been completed. Photographs of one-third of the area and mosaics of a small portion of this area have been delivered. Photographs for the remaining area will be delivered by December 31, 1934, and the mosaics by February 1, 1935…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

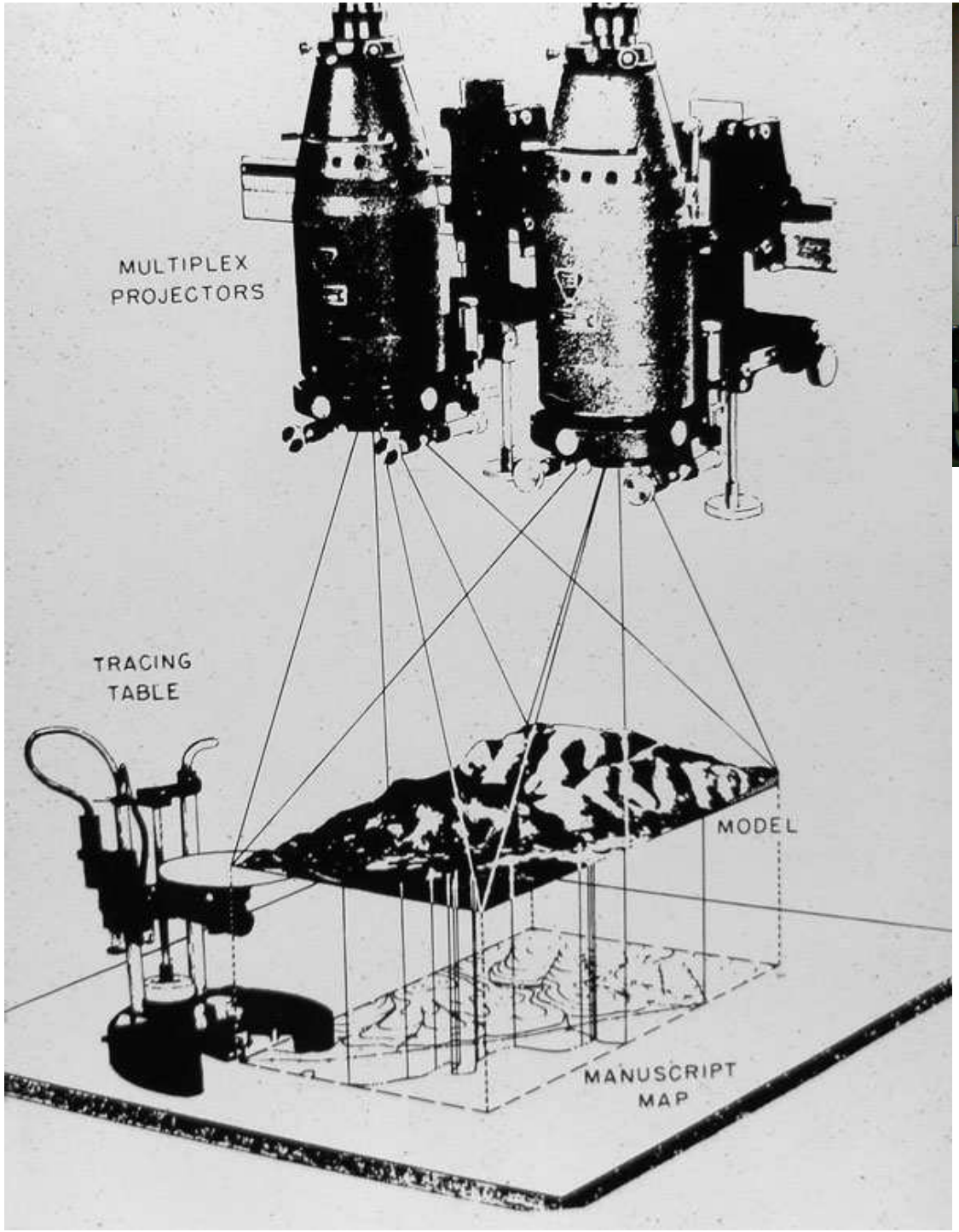
<u>Top</u>: caption: "A map engraver carefully prepares one of the three lithographic stones required for the 1915 reprint of the Donaldsonville, Louisiana, topographic map.

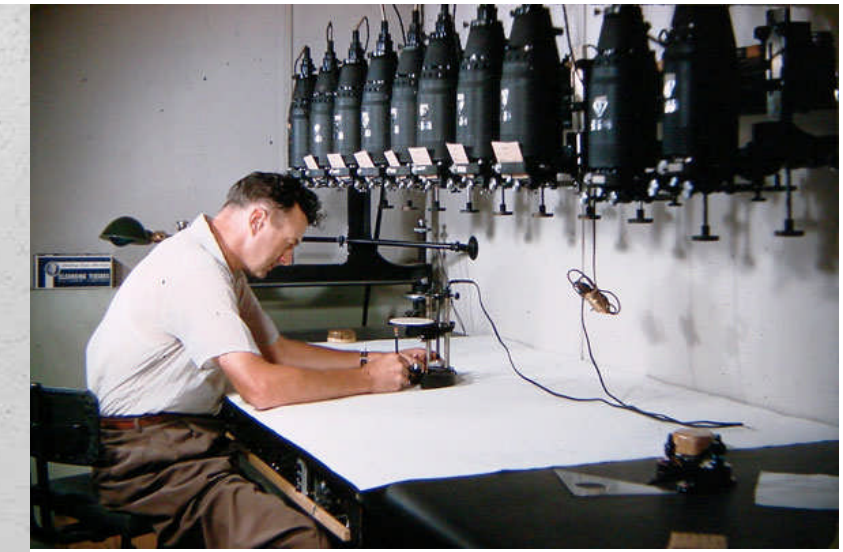
<u>Bottom</u>: caption: "Engraving copper plate"

In addition to planimetric maps, topographic maps were needed in connection with more detailed planning. For that purpose the engineers chose the German multiplex machine, which used the stereoscopic principle based on the different wave length of red and green light, to portray elevations from small photographs. This topographic program was instituted immediately after the planimetric maps were finished. TVA refined its topographic mapping to the point that the *Army Map Service* used TVA machines and methods for producing many of the maps used in Europe and the Pacific Islands during WWII.



USGS cartographers commissioned for military service during WWI brought back with them knowledge of aerial photography. Throughout the 1920s, the USGS experimented with *photogrammetry*, but it was not until the 1930s when the TVA's need for complete topographic maps of the entire *Tennessee Valley* and time constraints of the mapping led the USGS to establish a "Multiplex" mapping office in Chattanooga, TN. The ability to view a three-dimensional terrain surface by doubly reflecting the overlap area (a/k/a "stereomodel") of a pair of stereo-photos in a Multiplex stereoplotter effectively replaced the requirements of field sketching. An operator could fix a vertical floating mark at a preset elevation in the stereomodel and trace contours to represent the terrain. Similarly, tracing a road or other planimetric feature in the stereomodel but allowing the mark to change elevation along the feature provided recording of all required planimetric features for the topographic map.



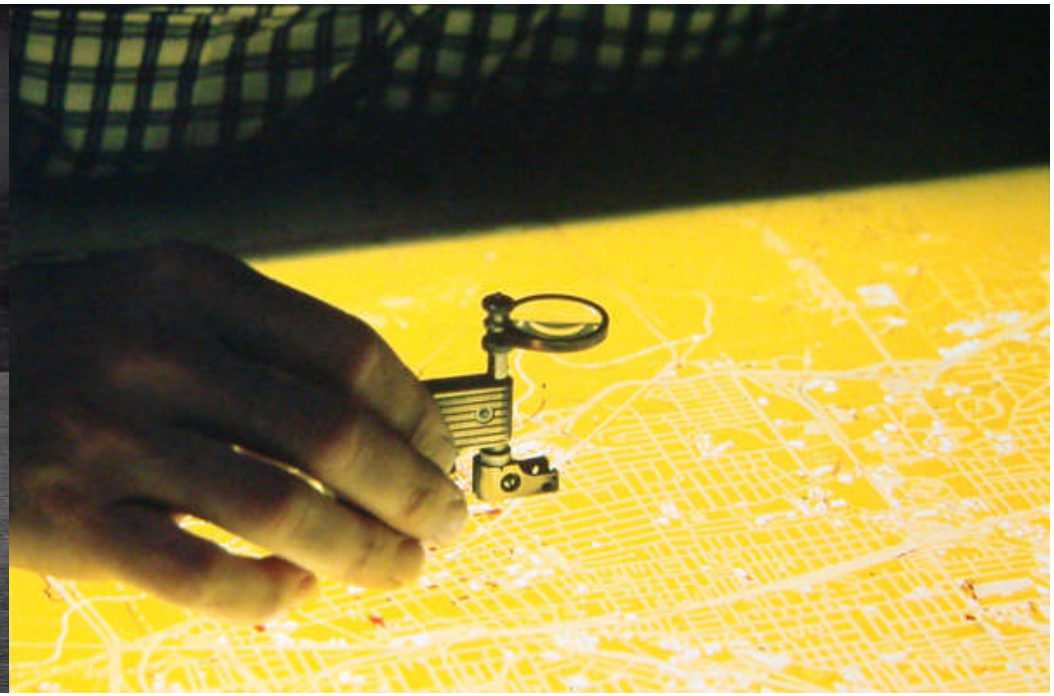


"…The Aero Service Corporation has installed a branch office at Chattanooga, Tennessee. Here a large force of employees are developing the films and making the necessary prints of the aerial pictures. Mosaics are being fashioned to the uniform scale and can be enlarged or reduced as desired…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Above</u>: caption: "Multiplex Stereoplotter"

<u>Left</u>: caption: "Stereo-model"

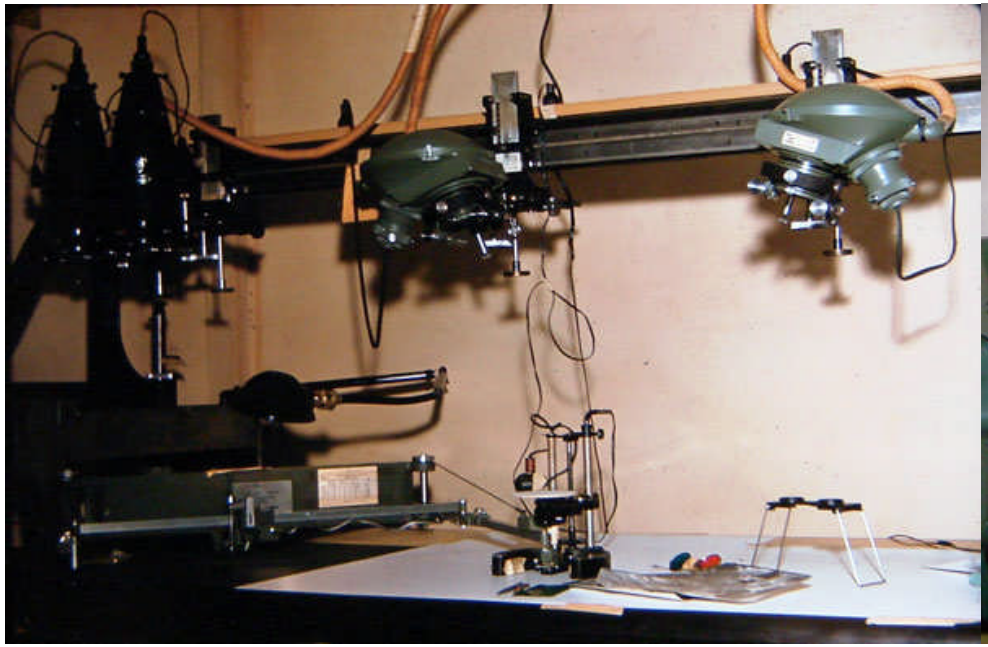


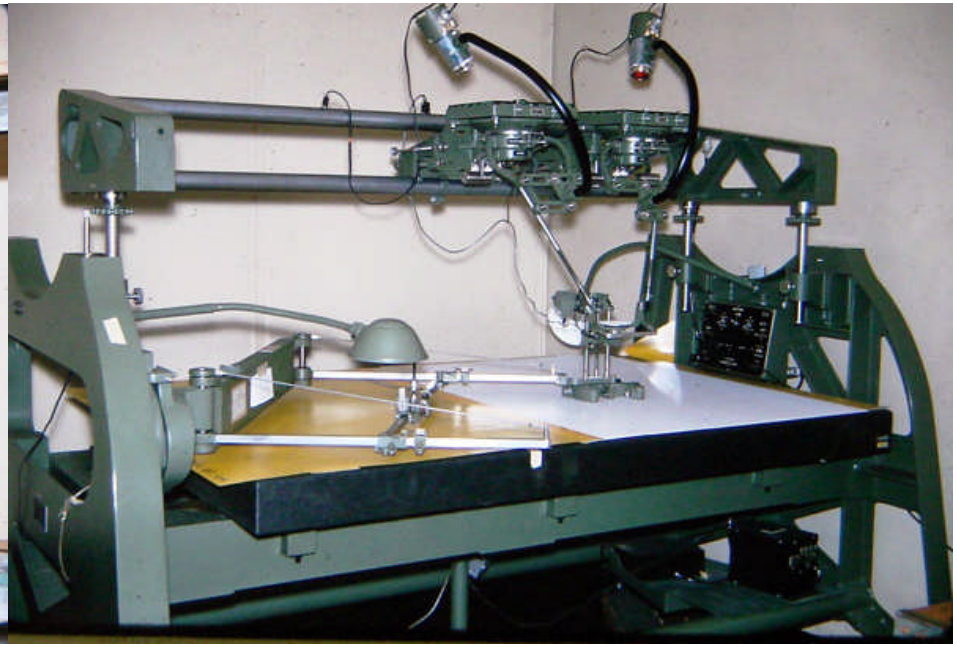
"…Topographic maps of approximately 600 square miles in the eastern potion of the basin have been completed. This is the only topographic work that is included in the program for the fiscal years of 1934 and 1935…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934). After 1942, the USGS used pen and ink drawings (left) that were photographed to film separations, eliminating the need for copper plates. After a few years the pen and ink process was replaced by the use of engravers and scribecoat (right). The scribecoat replaced the film in the pen and ink process and could be used directly for photographic reproduction.

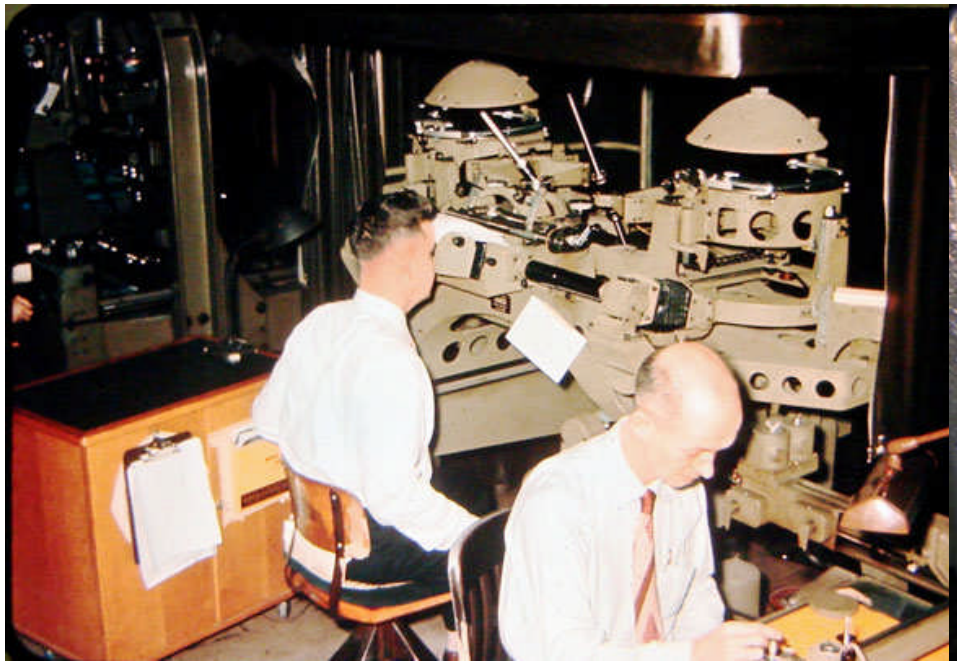
"…The horizontal control for the eastern third of the basin has been completed. The greater part of this area is controlled by triangulation. The remaining two-thirds of the basins will be controlled by traverse which is now being supplied by approximately twenty field parties. The field office is stationed at Chattanooga where all field notes are computed and compiled as they are turned in. Planimetric maps are being rapidly compiled from the aerial photographs by an office force of approximately seventy men at Chattanooga. Maps of a part of the eastern portion of the basins have been completed to date…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934). The 1:24000-scale 7.5-minute mapping program resulted from demand for more detail on the topographic maps. With the larger scale, the USGS included almost two-hundred features separated into color groups for the five color plates to be used in the film-based reproduction process. The five plates included cultural features, such as roads shown with casings, buildings and much of the type used on the map on a black plate; road fills, urban tints, Public land survey lines and other features on a red plate; woodland tint and other vegetation on a green plate; hydrographic features on a blue plate; and contours, depressions and other hypso-graphic features on a brown plate. The color separations were composited on a five-color lithographic press.





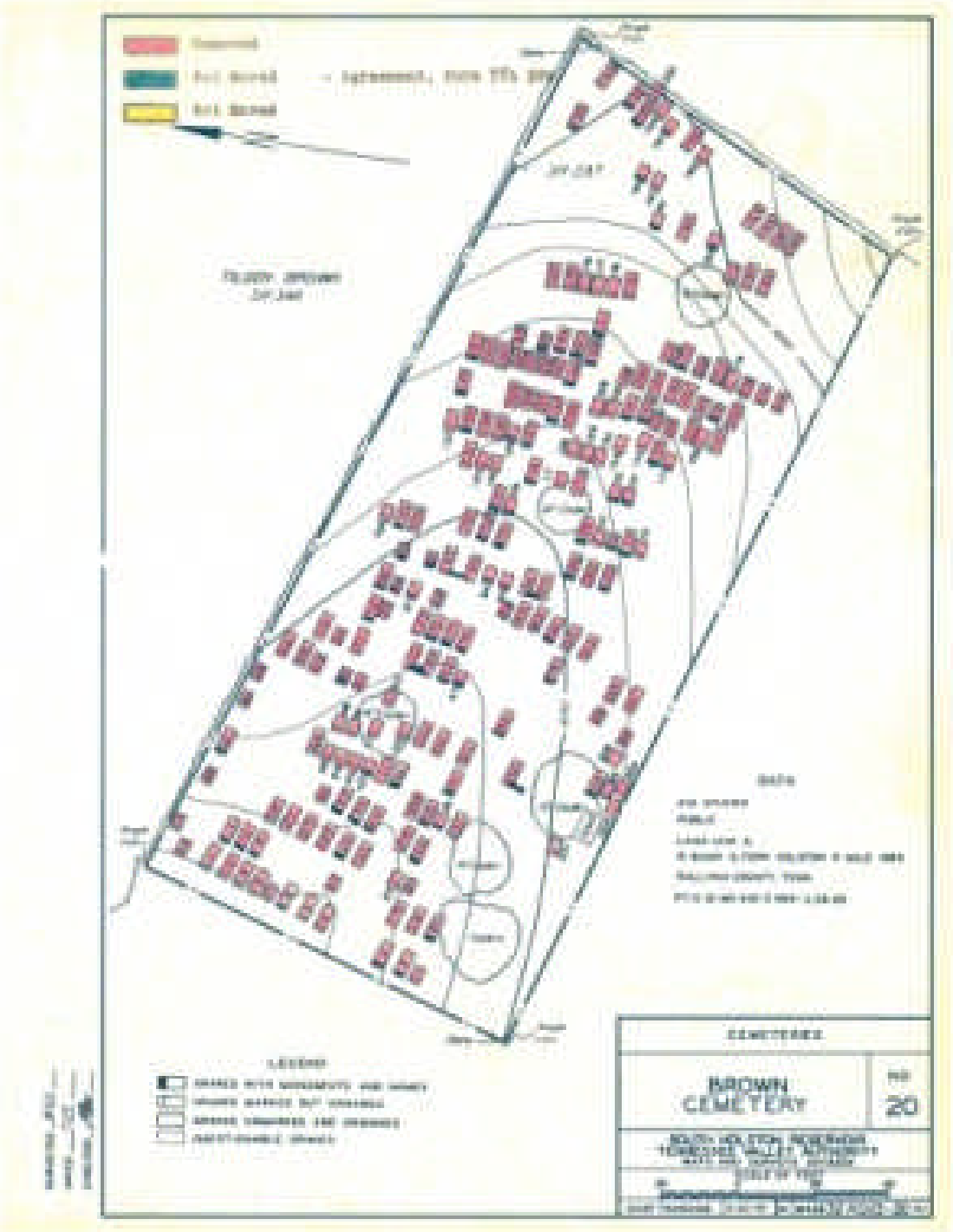
The USGS widely adopted *photogrammetry* as a part of the mapping process after WWII and USGS employees developed innovations in the production workflow and in the instrumentation. *Russell K. Bean* of the USGS invented the "Ellipsoidal Reflector Projector" (ER-55, left) for which he was awarded a patent in 1956. The ER-55 became a replacement for the *Multiplex stereoplotter* for the USGS and was later manufactured and marketed by *Baush and Lomb* as the *Balplex stereoplotter*. Also, during this period, the *Kelsh stereoplotter* (right), invented by *Harry T. Kelsh* of the USGS, was widely adopted. A USGS innovation for the Kelsh and other optical projection stereoplotters was "StereoImage Alternation" (SIA), which operators often called the "squirrel-cage" (because of the rotating shutters inside a short metal tube). When viewed with the naked eye, the SIA sequentially presented the left photo to the left eye and the right photo to the right eye to form the stereomodel.



Additional innovation and developments provided the USGS with solutions for *stereoplotting*, *aerotriangulation*, point measurement and other *photogrammetric* operations. The Kelsh stereoplotters were used in areas of moderate to high relief, but low relief areas, such as along the coasts and large parts of the *Great Plains*, required the capabilities of the "heavy" stereoplotters that used projection by mechanical rods. These stereoplotters included the *Wild A8* (left), *B8*, the *Kern PG-2* (right) and others of German, Swiss and Italian manufacture. The Kelsh and the heavy plotters were used until completion of the 7.5-minute topographic map series in 1991; however, additional innovations led to the concept and technology for producing *orthophotos* in the 1960s.

The development by the USGS of the *orthophoto* concept and building of a practical *orthophotoscope* (by *Russell K. Bean*, with a patent in 1959) led to the production of *orthophotoquads* – rectified aerial photos. Orthophotos became a standard product of the USGS and later served as a base for the 7.5-minute topographic maps. Many other innovations affected the mapping process such as the measurement of angles in the field with instruments including transits and theodolites. Distances were measured with electronic distance measuring (EDM) units using microwave technology and, later, lasers. In the 1960s, the USGS developed the "AutoPlot" - a device that used stepping motors to move scribing engravers to create a scribecoat negative of the topographic map neat line (latitude and longitude lines that bound the quadrangles) and horizontal pass points. After 1970, the USGS embarked on three different tracks using digital technology. First, a massive program to manually digitize existing maps to create a product with an arc/node data model, known as a "Digital Line Graph" (DLG), was initiated. During the same time, the advances in *photogrammetric* technology that generated an orthophotograph were used to simultaneously produce a "Digital Elevation Model" (DEM). Both DLGs and DEMs were placed in the public domain.

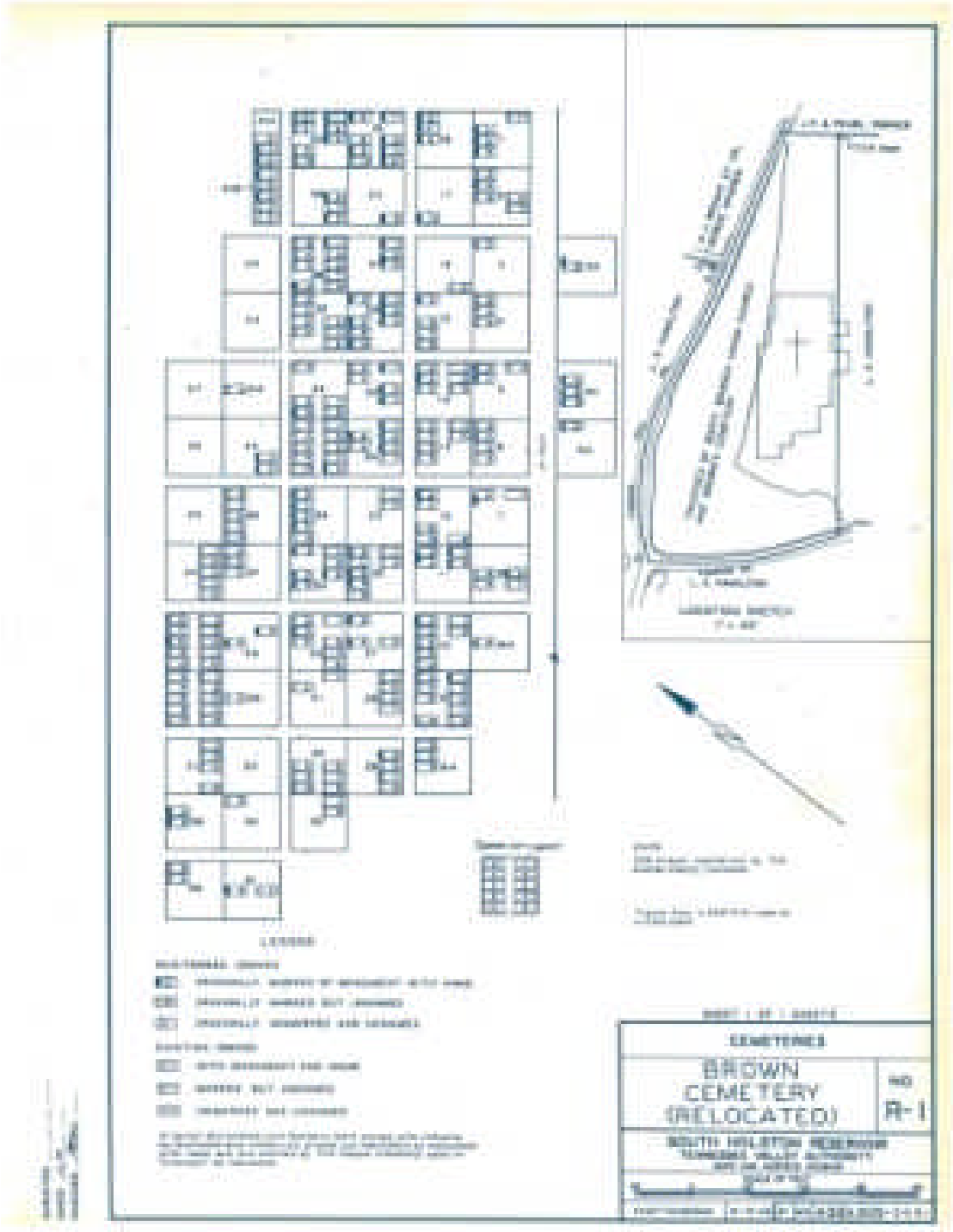
Of an Informational Character



"…Surveys, other than those directly chargeable to Land Acquisition, include traverse control of 1:5000 accuracy; third-order leveling; topographic surveys of dam sites, construction camps, recreational areas; flowage damage surveys; marking clearing contours; preliminary surveys for transmission lines; railroad and highway relocations, cemetery relocations; silt range profiles; monumenting reservoir boundary; and numerous other surveys of informational character…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "Brown Cemetery"



"…Reservoir traverse control surveys are in every case based upon and coordinated with the basic triangulation of the U.S. Coast & Geodetic Survey. This local rectangular coordinates may be immediately transformed to geodetic positions, or vice versa. Similarly all bench mark elevations of the vertical control are mean sea level, as determined by the first or second-order levels of the U.S. Coast & Geodetic Survey…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "Brown Cemetery (Relocated)"

"…The clearing contours are established by a level party, the actual contour being marked by paint on trees or by staking, such marks averaging 50-feet apart in wooded areas. The clear-contour in Norris Reservoir is at elevation 1020, and 775 miles in length. At Wheeler Reservoir the contour is at elevation 556 and 1,200 miles in length…"

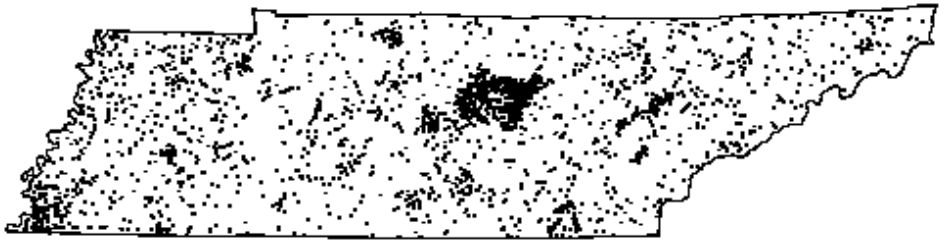
RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)


Norris Lake
TN
Construction Started October 1, 1933
Gates Closed March 4, 1936
Completed Filling January 22,1937
750 Miles Of Shoreline
50 Miles Of Island Shoreline
34,200 Surface Acres
Lake Named For George W. Norris
BOAT DOCK—NORRIS LAKE, TENN.

Silt & Hydrographic Studies

"…An intensive silt determination study of the various streams in the basin was started in January 1934. Previous studies had been made but only for preliminary information. These investigations are being made to determine the suspended silt load and rates and methods of sedimentation in reservoirs under present conditions. The effects of several programs recently initiated in the basin, such as soil erosion prevention, removal of marginal lands from cultivation, reforestation, educational work among the farmers, and scientific land planning will be studied…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934). Another piece of the puzzle that was lacking was hydrographic data. The *U.S. Army Corps of Engineers* had records sufficient to determine the flow of the main river, but to determine flows in the tributaries it was necessary to establish many new rainfall and runoff stations. USGS and later the state geological surveys (especially those of Tennessee and North Carolina) cooperated in setting up the necessary stations.

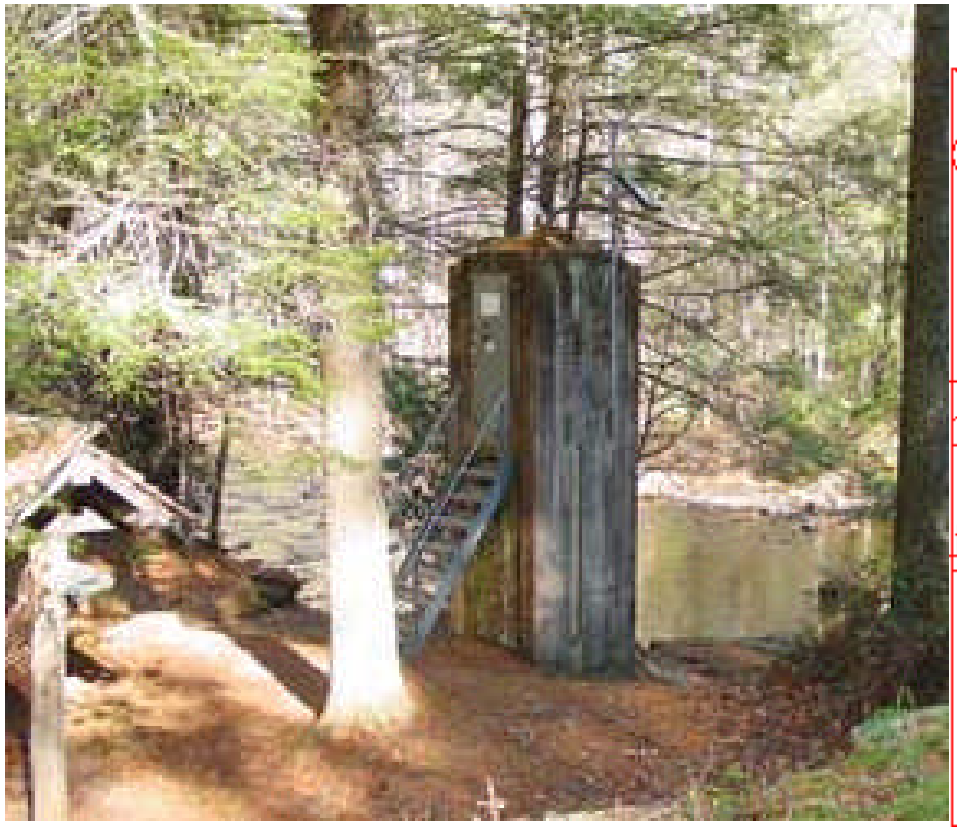


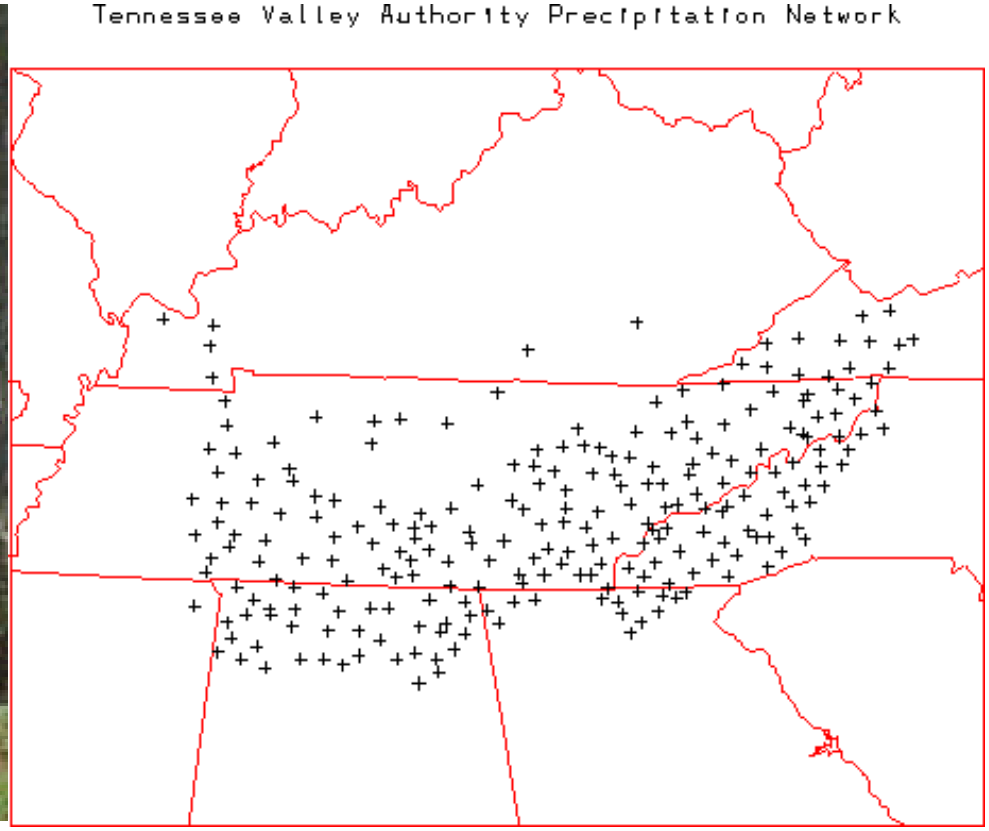
"…Several Tennessee Valley Authority area offices have been established at convenient points throughout the basin for the purpose of obtaining more complete data regarding rainfall and its intensity, floods and their causes, and the amount of silt carried by the streams at various times and stages. Fifty-one new reinforced concrete recorder houses have been constructed on different streams and an improved type of stage recorder installed in each of them. This new stage recorder was developed by engineers of the Tennessee Valley Authority and has many improvements over the types of recorders which were used in the past…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934). An extensive system of rainfall gaging stations was established by the TVA. As a rule, the gages were read by residents in the area who sent in reports either by mail or, during times of flood, by telephone or telegraph. Many stations were needed where there were no residents to read the gages. At these remote locations, automatic radio gages were established, measuring the rainfall automatically and transmitting radio messages to Knoxville periodically (usually twice a day).

Left: caption: "Stations where streamflow data have been or are being collected"

Right: caption: "Stations where water-quality data have been or are being collected"



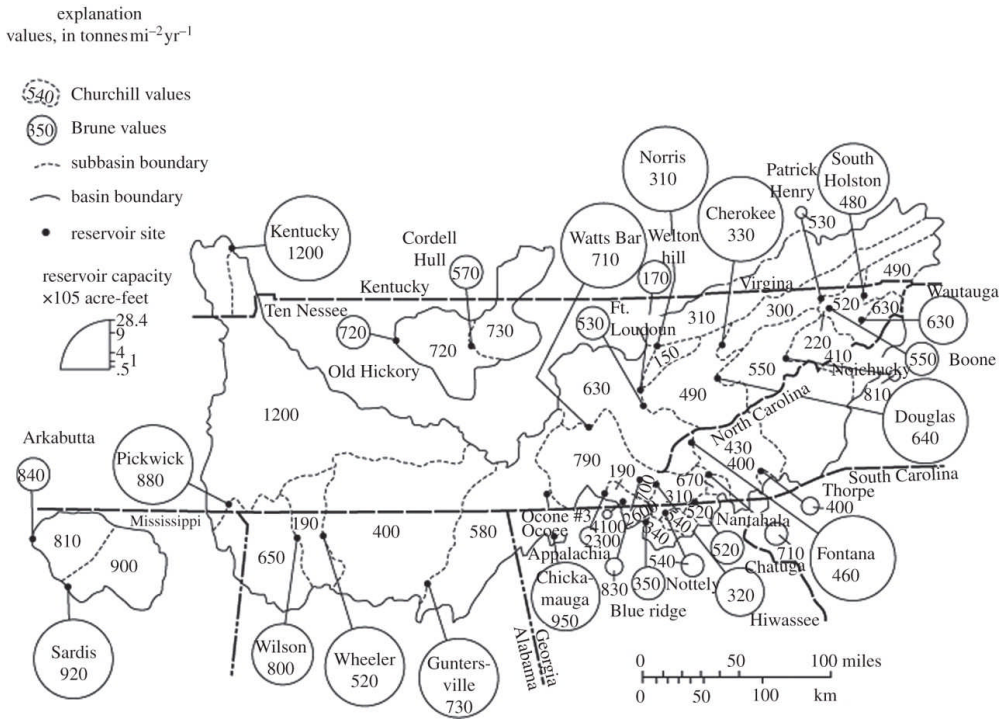


"…The U.S. Geological Survey is cooperating in maintaining approximately 125 active stations in the basin. All records are compiled and are accessible to all concerned…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

Left: caption: "USGS streamgaging station in a forested area"

Right: caption: "TVA Precipitation Network. TVA operates this network of 243 precipitation gages throughout its service area in the southeastern U.S. (131 in Tennessee). The network provides 6-hourly observations of precipitation (ca. 2015)"

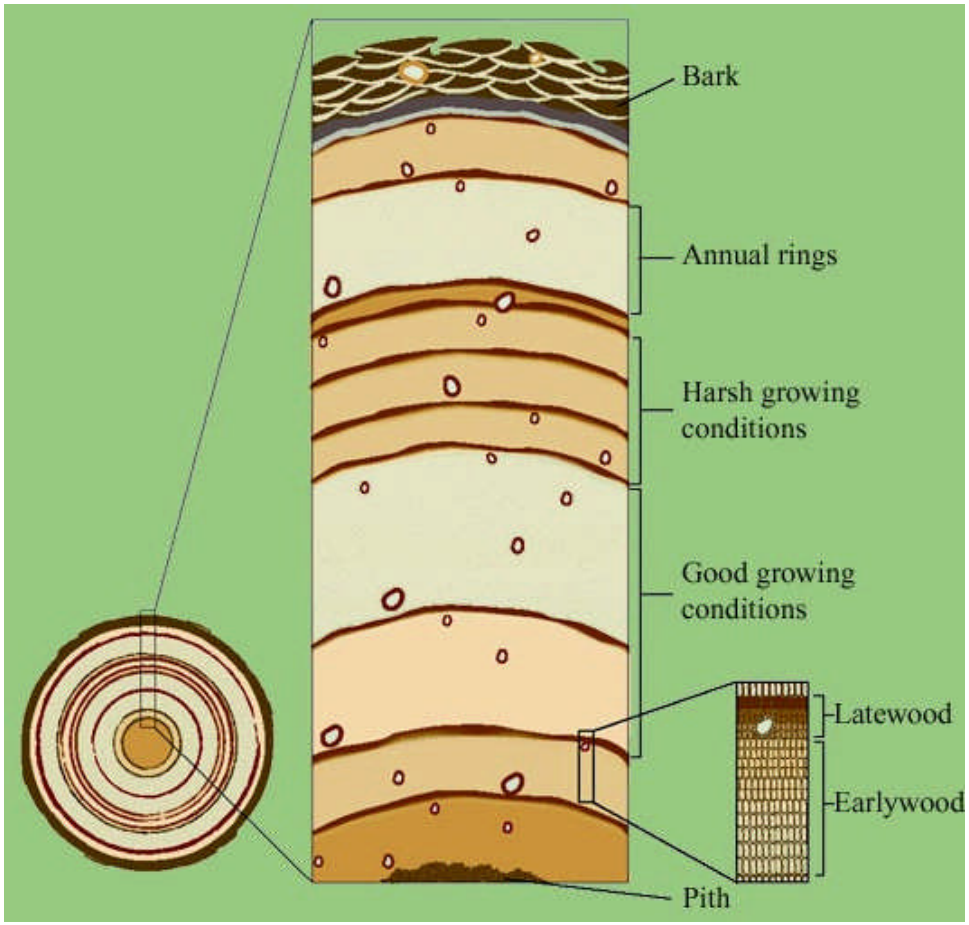


"…As storms in this mountainous area are so often local and differ very much from those in flatter country, it is necessary to have numerous rainfall stations established. Also, the steep slopes of the drainage area lead to greater soil erosion. These elements make it necessary to have complete data on all sections of the area for the most economical planning…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "TVA photographer Pare Lorenz working in the Great Smoky Mountains as a storm is approaching. November 3, 1936."

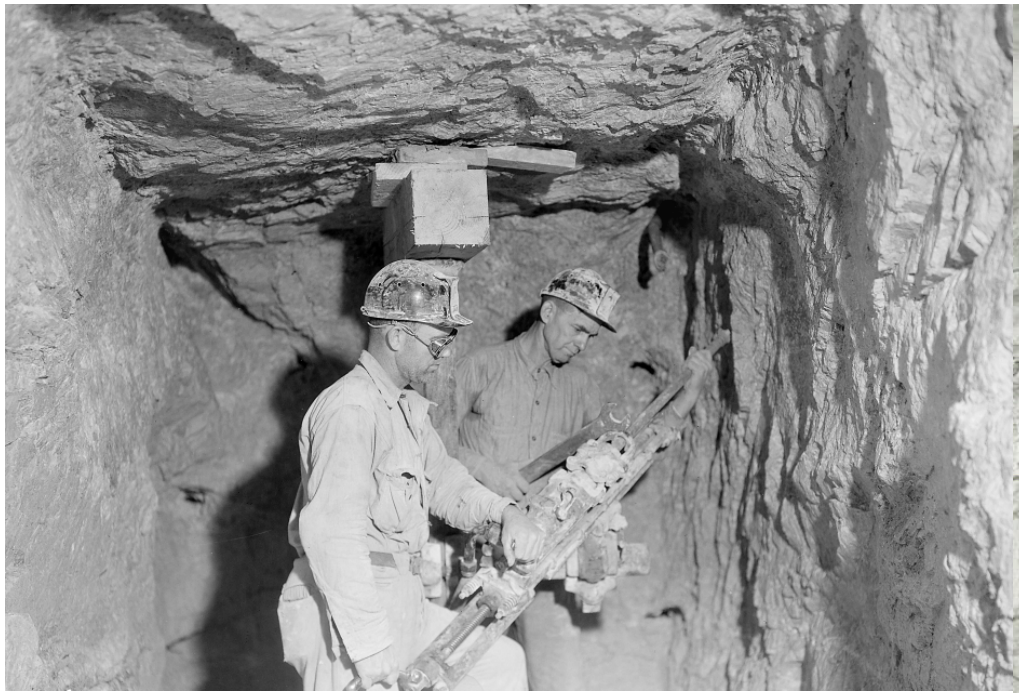
<u>Right</u>: caption: "Sediment yields for the Tennessee River Basin ca. 1940-1975, based on Tennessee Valley Authority reservoir surveys"



To supplement the long-term records of run-off and rainfall, TVA engineers used an unusual tool: "Dendrochronology" (the study of tree rings). Some trees in the *Tennessee Valley* over 300 years old were found and, by cutting them down and studying the width of the annular rings, it was possible to develop cycles of rainfall and to predict (based on a 300-year record) future rainfall patterns.

Left: caption: "The rings have both earlywood and latewood parts to each annual ring, with the center core or pith"

Geological Conditions



Geological conditions in the *Tennessee Valley* were/are generally unfavorable for the construction of dams. Much of the region is underlain by limestone rock which erodes easily and produces "solution channels" in many of the places otherwise suitable for dams. This has been a on-going problem in connection with the location of dams and has necessitated filling and grouting of many channels in the foundation rock at selected sites.

<u>Above L&R</u>: caption: "Lateral test shaft for examination of substrata at base of Norris Dam"

Chemical Engineering & Agriculture

"…A Chemical Engineering Division and Fertilizer Plant Division have been set up under the direction of Dr. Harry Curtis with functions to improve and cheapen the production of fertilizer, utilizing the Muscle Shoals properties where possible and desirable. Initial activity has been directed toward the development and demonstration of processes for the production of concentrated phosphate fertilizers, especially needed in the proper agricultural development of this region…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

"…Electric furnace units from Nitrate Plant No. 2 have been re-designed for the manufacture of phosphoric acid from phosphate rock. These units are part of a complete demonstration Fertilizer Works, constructed at Muscle Shoals, and recently put into operation…

RE: excerpt from *The Tennessee Valley Authority Program is Launched*
(ca. 1934)

<u>Above</u>: caption: "TVA's facility at Muscle Shoals"

"…Research on fertilizer is under way at chemical engineering laboratories at Muscle Shoals. Research on coal will be conducted in Knoxville. This latter project was started originally to study coking of coal in connection with blast furnace production of phosphoric acid, but has been expanded to cover the development of new uses for this major natural resource of the Tennessee Valley…"

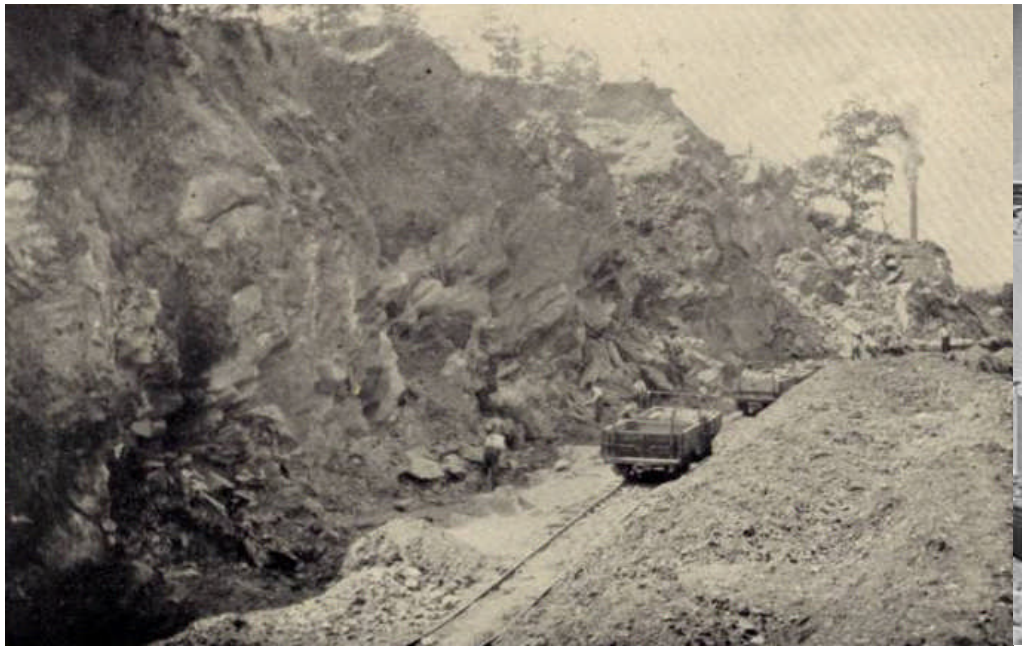
RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "Laboratory technicians at the TVA plant at Muscle Shoals"

Materials Inspection & Testing

"…The Authority has secured personnel and equipped chemical and physical laboratories for the standard inspection and testing of all material and machinery to be incorporated in the work. The chemical laboratory is equipped to analyze portland cement, bituminous materials, paints, metals, and other construction materials. The physical laboratory is equipped with a constant temperature and humidity control room for the storage of cement samples, and approximately 15,000 barrels of cement are placed under test daily…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)



"…The specifications of the Authority provide for a modified portland cement in which tricalcium silicate is restricted to from 35 to 55 percent, and tricalcium aluminate shall not exceed 8 percent. Fineness is restricted to limits between 1,600 and 2,200 square centimeters surface area per gram, and it is determined by a Wagner turbidimeter. These specifications provide a cement with high resistance to the reaction of sulphate waters, and the concrete possesses a very high degree of durability against corrosion. The fineness produces additional workability without the use of excess water. The heat of hydration is lower than average portland cement, but not as low as that used in Boulder Dam with its corresponding slowness in time of setting…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "Chickamauga Limestone, Quarry No. 3, Southern States Portland Cement Company"

<u>Right</u>: caption: "Douglas Dam, TN. TVA cement mixing tower and electric cranes"

Industry Division

"…Activities of this division have concerned the development of industries, except those of fertilizer manufacture and power generation. Its program has included research in the design and development of new products and equipment; investigation of promising industrial enterprises and preparation of surveys to determine the relative needs of various areas for them; and the working out of methods of encouraging, organizing and financing such developments…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "Knoxville Tourist Bureau on Tennessee Highway 71, 1938"

"…Steps have been taken to stimulate industrial research in Valley educational institutions and other laboratories and to coordinate this program with research directly by the Tennessee Valley Authority. Using the results of all such investigations and acting in cooperation with other divisions of the Authority, the formulation of an industry development program for specific demonstration areas has been started. In this program emphasis has been placed on the development of new, non-competitive products, and on industrial enterprises which can supplement agriculture in developing the resources of the region for the benefit of its inhabitants…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

The TVAC

"…The Tennessee Valley Associated Co-operatives, Incorporated, is a Tennessee Corporation controlled by the same directors as the Tennessee Valley Authority. The purpose of this organization is to promote, organize, establish, manage, finance, assist and aid in every possible way the development of co-operatives in the Tennessee Valley and its contiguous areas. Funds amounting to $300,000 have been allocated to the TVAC by the Federal Relief Administration, and this money is in use as a revolving fund for the establishment of co-operatives…"

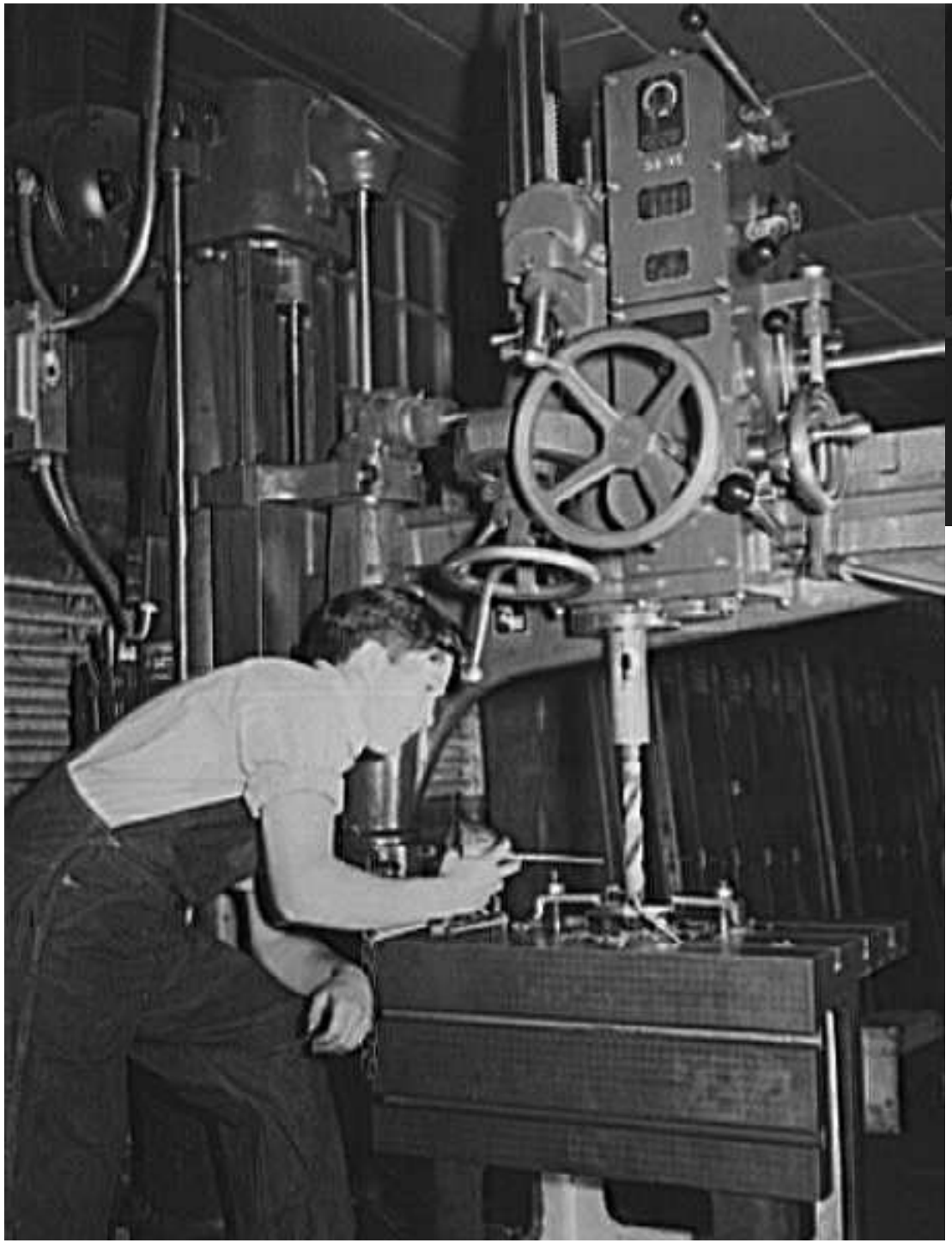
RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

"…During the past year the TVAC has established five cooperative canning plants, mostly in western North Carolina, and has given assistance to one which had been established. These plants have been set up with the belief that by improving the winter diet of a large number of people the prevalence of pellagra and tuberculosis would be diminished. The farmers of Cooke County, Tennessee, and those of the surrounding counties, have been organized as a co-operative and have secured a 250 barrel flour mill, 500 bushel feed mill and considerable storage space for their grains. This co-operative expects to be of great assistance in securing fertilizer and seeds and also obtaining cold storage facilities…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "A community refrigerator means better eating"

The Training Program



"…Here, too, model cities are being built where the TVA will instruct inhabitants in the arts of weaving, furniture making, china firing and other industries. Men will be put to work on government projects, working only five and a half hours a day, their leisure time being used to learn these industries…"

***Modern Mechanix,* November 1934**

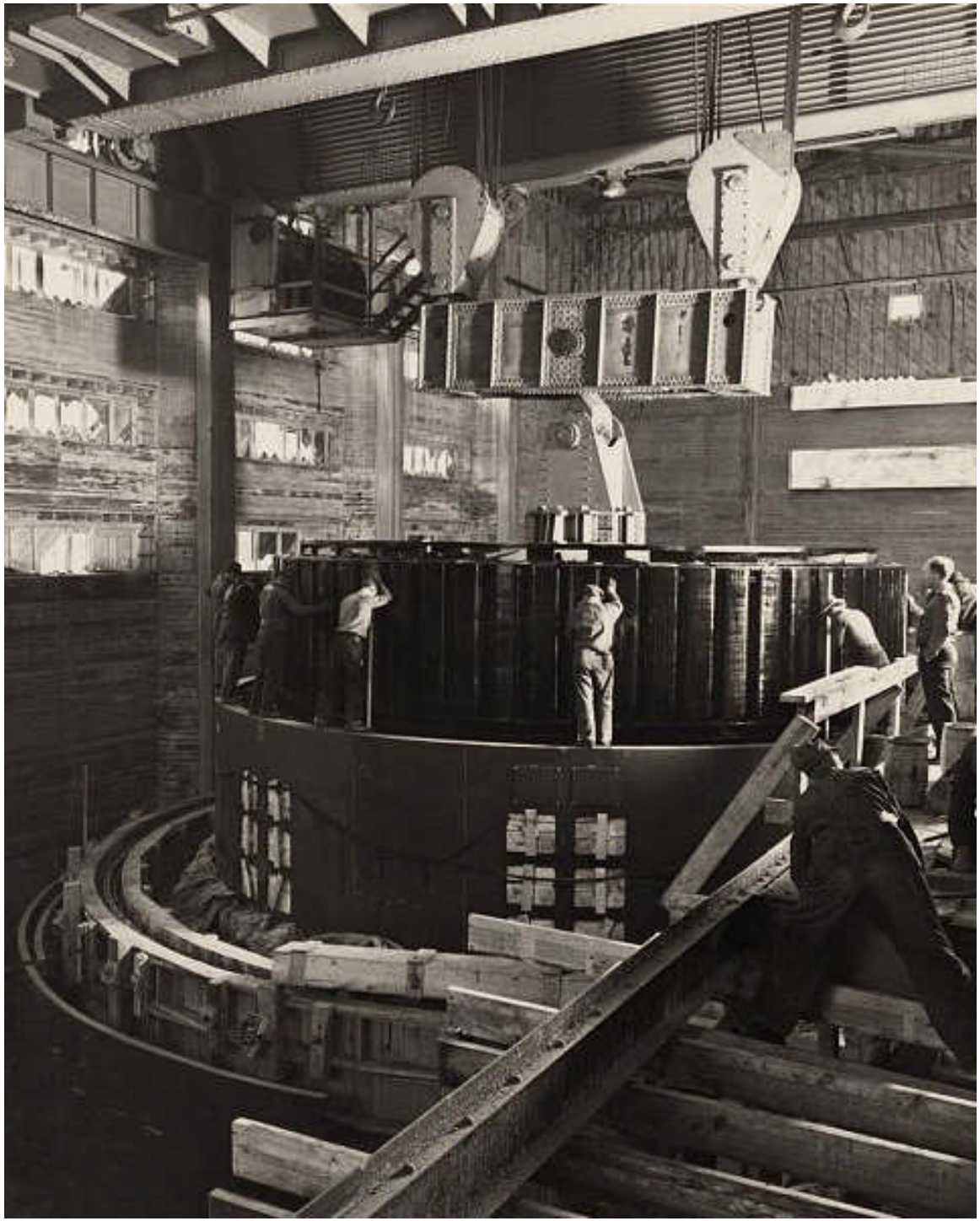
<u>Above & Left</u>: caption: "Training at Stair Vocational High School"

"…The training program furnishes opportunities for employees during their leisure time off the job; to secure further training in the occupations in which they are already employed and to improve their effectiveness on their present jobs, to study and explore vocational possibilities and to utilize training facilities on the various TVA operating projects in preparing for chosen lines of work, and to participate in recreational activities and in general education classes and discussion groups dealing with present-day topics. The training work is, wherever feasible, associated with operations of the Authority which are part of or which serve the construction projects in the Norris Dam and Muscle Shoals areas. Participation in training is voluntary. The arrangement of training groups is such as to accommodate men on all of the various work shifts…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

"…Around the following functional units the training program is being developed: agriculture, training for construction work, trades, engineering, general education, recreation, home planning and management (for the women). Many phases of the training work are organized and conducted by individuals and by groups as contributory services. Approximately 600 individuals were participating in the training program at Norris Dam on June 30. The training work at Muscle Shoals was just being started…

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)



At Norris, *Arthur Morgan* brought in *J.D. Dawson* from Antioch to direct a social and educational program. Workers on each shift were offered four-hour courses in farming, dairy-ing, stock breeding and chicken raising at the demonstration farm and classes in iron working, fur-niture making and draftsman-ship in the village. *David Lilienthal* was later to dismiss all this as "basket-weaving" and argued that rural self-sufficiency was no more likely than "The Second Coming of Daniel Boone." But Morgan believed the programs went beyond "uplift." They more than paid for them-selves, he claimed. Absenteeism was low, morale was high and eff-iciency was such that the *Norris Dam* (which army engineers had estimated would take four years to build) was completed in less than two and a half.

<u>Left</u>: caption: "Workmen in the Norris Dam powerhouse installing a generator, ca. 1935"

<u>Left</u>: caption: “Norris Dam and powerhouse. Tower at training wall is elevator penthouse.”

<u>Right</u>: caption: “Door to generator hall, Norris Dam Powerhouse. Constructed entirely of aluminum for ease of operation. Transom section removable when required. Function of door is to permit passage of large machine parts and complete transformers. Division into horizontal bands continues scale and appearance of windows on other walls.”

Part 19

Gimme Shelter

Before the War

"…Before the war, the Civil War, they built good private houses, but the South never studied civic planning. There were few garden cities or even good suburban developments before 1933. Instead, the average Southern town boasted one or two good houses left over from the good old days, respected by the women's club for historic reasons, but usually in a state of disrepair. There would be crazy shacks, built anyhow, occupied by the Negroes and the poor whites. And if the blessings of industry were enjoyed, there were rows of identical company houses, with a modern brick house for the boss and some bungalows for the white-collar workers. A Southern town counts itself a real city when it gets one or two duplex houses and apartments; as for architecture, people who get their ideas from the movies see nothing much wrong with filling stations…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Top</u>: caption: "House in the lower Clinch River valley in East Tennessee, ca. 1930s"

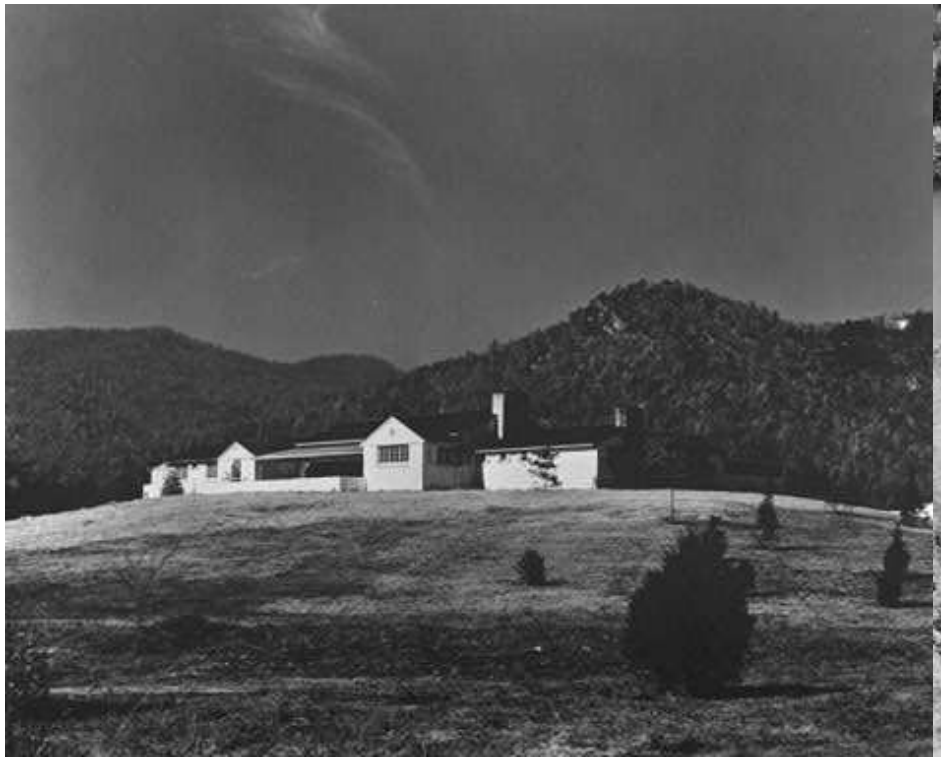
<u>Bottom</u>: caption: "One of several low-rent house types developed unskilled labor employed on TVA dam construction."

Both Present and Future

"Prominent among other provisions of the Act of the 73rd Congress defining the scope of the Tennessee Valley Authority's work in the Tennessee Valley is this clause: '…to provide for the agricultural and industrial development of said valley,' and this: '…fostering an orderly and proper physical, economic and social development of such areas'…"

RE: excerpt from a TVA press release dated November 24th 1933

RE: in order to support the successful completion of a large-scale dam project in the middle of the East Tennessee wilderness, TVA needed a functioning community that housed and provided for the workers and their families. While this was the primary reason to create the town of Norris, TVA Chairman *Arthur Morgan* also wanted to design and build an ideal co-operative community. Thus, the TVA planned Norris to achieve both goals. Houses were simple yet comfortable, with porches and modern electric conveniences. Also included in the town's plans were shopping areas, health facilities, and other recreational sites which promoted a sense of community, as well as a pedestrian-focused layout, limiting the use of automobiles. TVA adopted this model of town planning in other remote locations such as Fontana Village, but none were as complete and deliberate as Norris.

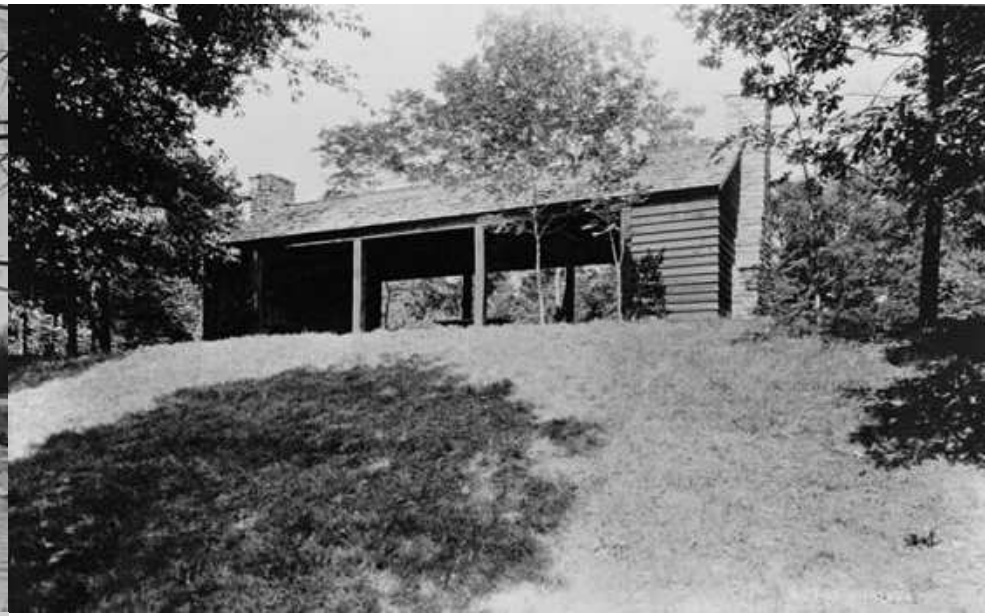


Left: caption: "Cove Lake Park was built under TVA direction by the Tennessee State Department of Conservation with the assistance of the CCC on an arm of Norris Lake. It was initiated as a demonstration of standards appropriate to valley conditions."

Right: caption: "Boat harbor at Norris, with parking spaces in foreground. Harbor was obtained practically without added expense by application of design to the quarrying operations which furnished the concrete aggregate for the dam. This view, which shows only a portion of the parking space, indicates the tremendous popularity enjoyed by TVA resorts, all the parking spaces being full on summer holidays."

"…The Division of Land Planning and Housing is one of the planning services of the Tennessee Valley Authority, its field being primarily that of physical land planning. It is composed of three Planning Sections dealing respectively with Regional Planning, Town Planning, and Architecture. An Engineering Section, in charge of the detailed design and supervision of roads, utilities and other engineering aspects of the town and regional plans, has since been retained in the planning Sections…"

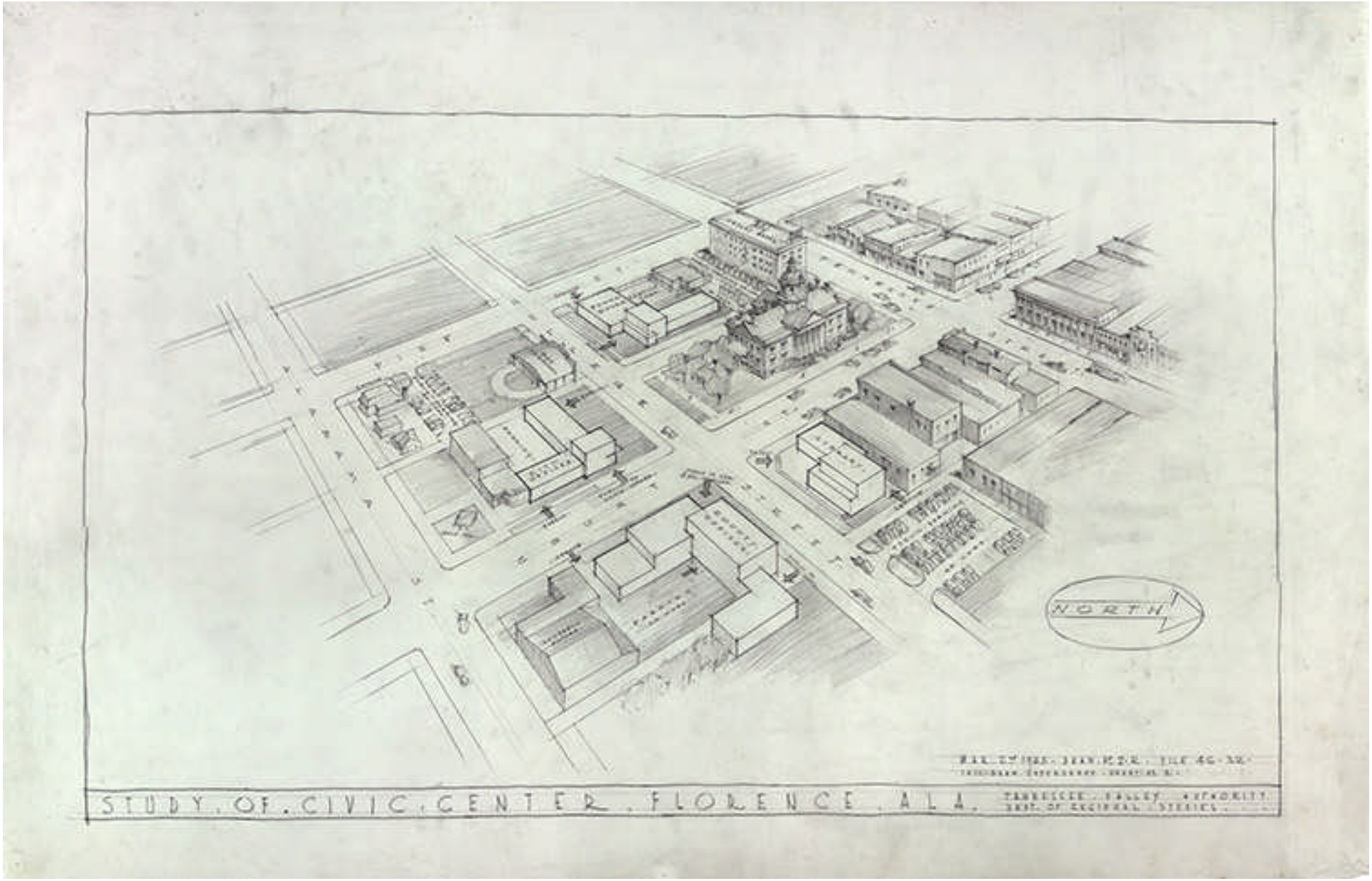
RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)



Top Left: caption: "Bridge on Norris freeway which was built by TVA as construction road, and later turned over to the state as part of the highway system. The bridge is of reinforced concrete and is cantilevered on the land side of the foundations to meet the highway fill."

Top Right: caption: "Picnic shelter, more or less typical of many such structures on TVA recreational properties. All were built with CCC or similar work relief assistance with local materials to minimize cash expense."

Left: caption: "This grocery store was likewise designed as an offset to the usual dark and messy crossroads establishment typical of rural areas. While originally established to serve TVA employees, it is now used by residents of the vicinity in general."

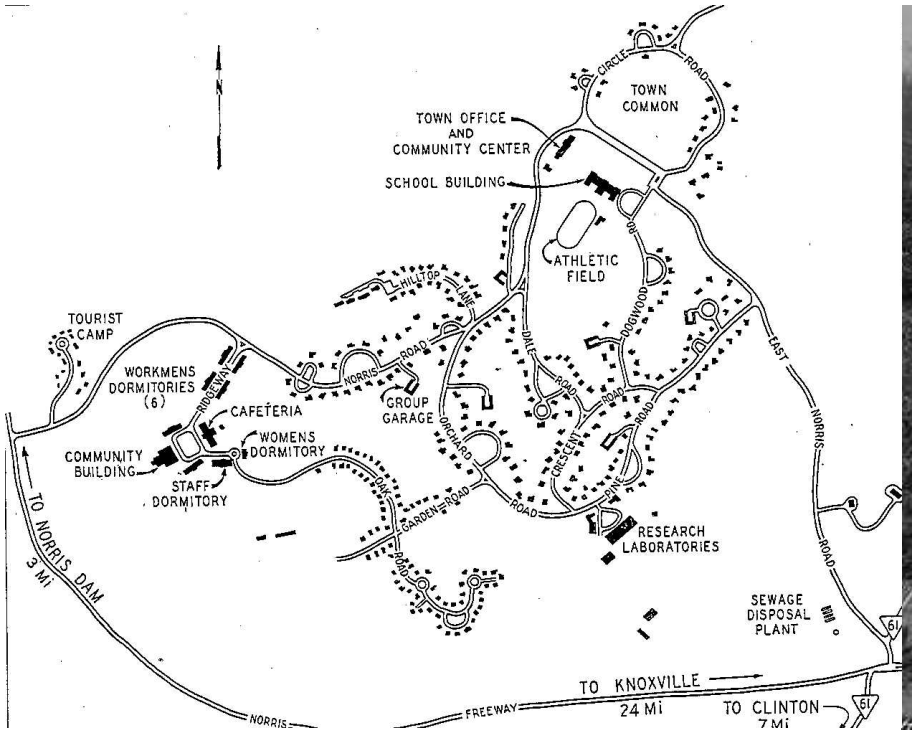


<u>Above</u>: caption: "This sketch was drawn as part of a visual aid during a study of the town of Florence, Alabama. March 2, 1945"

Variation of Orientation

"…The Town of Norris, after serving its primary purpose of housing the workers on the dam during its construction period, is to become a permanent community. Accordingly, it differs from the ordinary construction camp in being more carefully planned and more permanently constructed. There are already occupied or under construction 280 single-family houses, 10 duplex houses and 4 small apartment buildings. A comparatively small number of standard house plans have been used, but by variation of orientation and minor modifications in details, the appearance of machine-like uniformity has been avoided. Each house is provided with water, sewer and electrical services. The majority of the houses have electric kitchen ranges and water heaters, and are heated entirely by electricity…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)



"…At the edge of the town nearest the dam, is located the construction camp which includes seven bunk houses with accommodations for 1,200 men. In this group are also a cafeteria building, women's dormitory, and a community building which is the recreational center. At the town center, an agricultural building is now in use, and the school building is under construction. The dairy group includes a model pasteurizing plant…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1934)

<u>Left</u>: caption: "Norris, TN – site layout"

<u>Right</u>: caption: "View of the engineers' building and women's dormitory under construction at Norris town site"

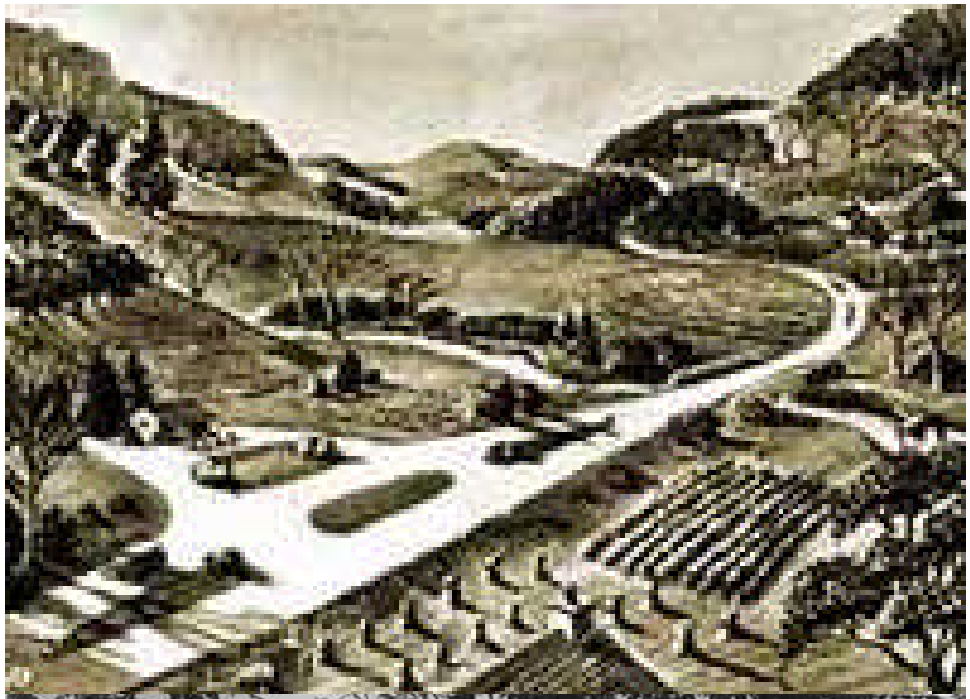
"…In the development of plans for housing the workers at Norris Dam…it was recognized that merely to provide for temporary housing of 2,000 or more workers during the construction period of the dam would involve the large-scale erection of reasonably durable and habitable buildings, the installation of extensive water supply and sanitary systems, road building, lighting and other expensive works, most of which would largely be abandoned upon completion of the dam. To avoid this waste and at the same time to provide for future contemplated developments in the region, the housing program now adopted provides for the building of a permanent town. Further, for the establishment of a community based upon the orderly combination of industrial work and subsistence farming. In this the TVA is following the growing sentiment which favors the coordination of farm and factory in the productive lives of workers throughout the Nation. The Authority also recognizes that this combination of work fits not only the present tendencies of the local people, but also looks forward to the full expansion of the resources and opportunities to be developed in the Valley…"

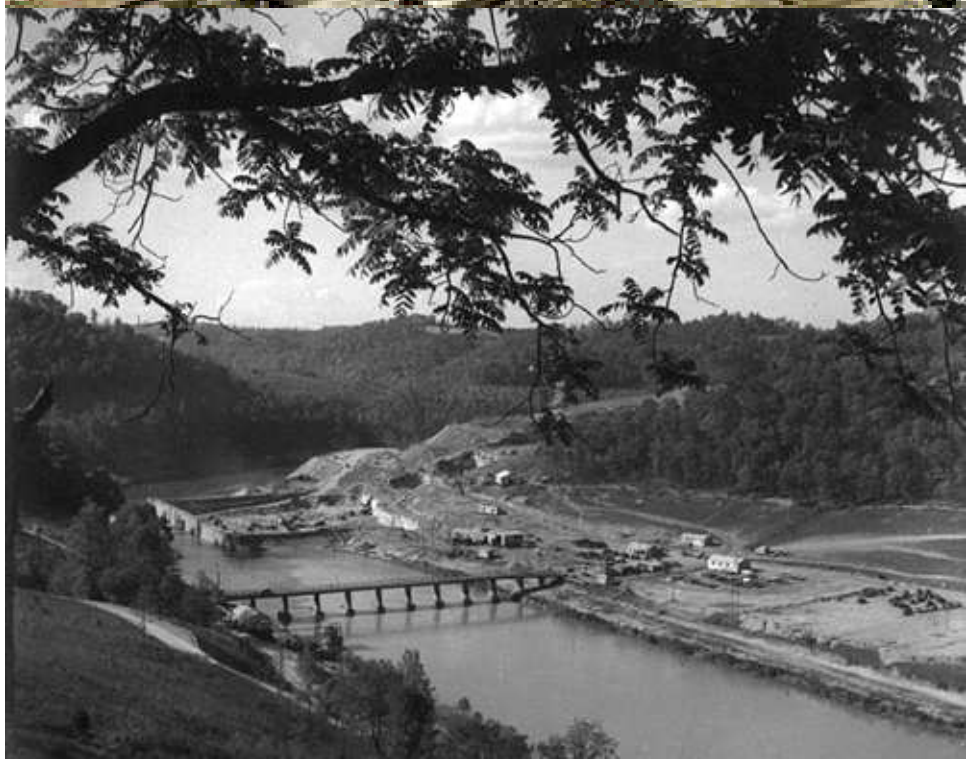
RE: excerpt from a TVA press release dated November 24th 1933

"…A number of factors entered into the selection of the site for the new town of Norris: its accessibility to the dam; the avoidance of ground too rugged or rocky for economical development; the inclusion of sufficient land suitable for small-scale agricultural use, and, looking forward, its general suitability for development as a permanent community serving the probable social and industrial development of the locality. After a great deal of exploration and consideration, the present site was chosen as fulfilling all of theses conditions to a greater extent than does any other feasible area of ground nearby…"

RE: excerpt from a TVA press release dated November 24th 1933

Left: caption: "Plan of Development – Town of Norris, Tennessee"

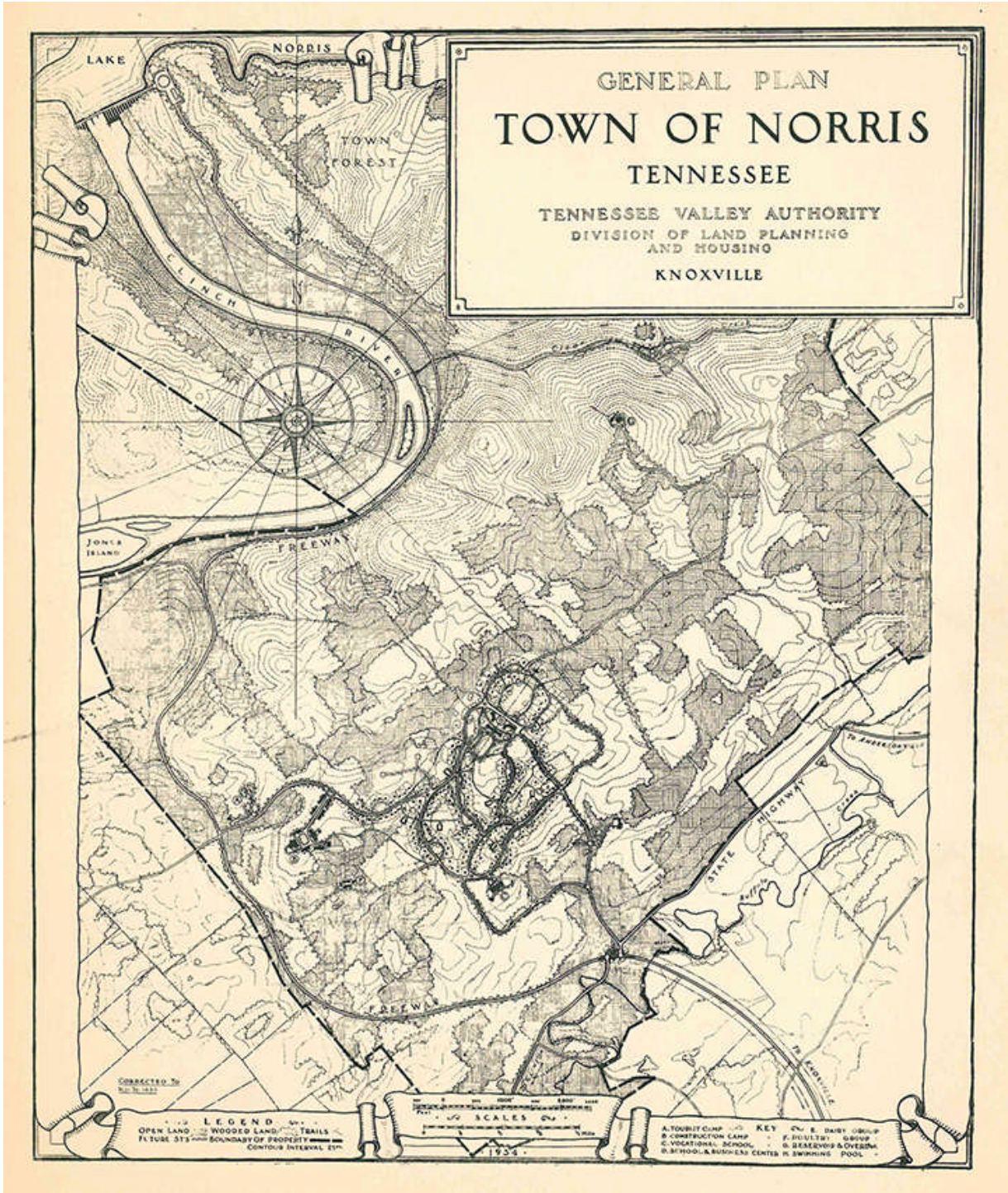




"…The streets have been laid-out on easy curves to fit the rolling topography. The surfacing is macadam with bituminous topping. The water supply is taken from a spring in the Clear Creek Valley about three miles away. The water is chlorinated and pumped into a 250,000-gallon concrete reservoir underground from which it flows to the town by gravity. Fire hydrants, as well as domestic service, are provided. Sewerage and storm drainage systems are separate. Sewage is treated by sedimentations and aeration before being discharged into Buffalo Creek…"

RE: excerpt from *The Tennessee Valley Authority Program is Launched* (ca. 1933)

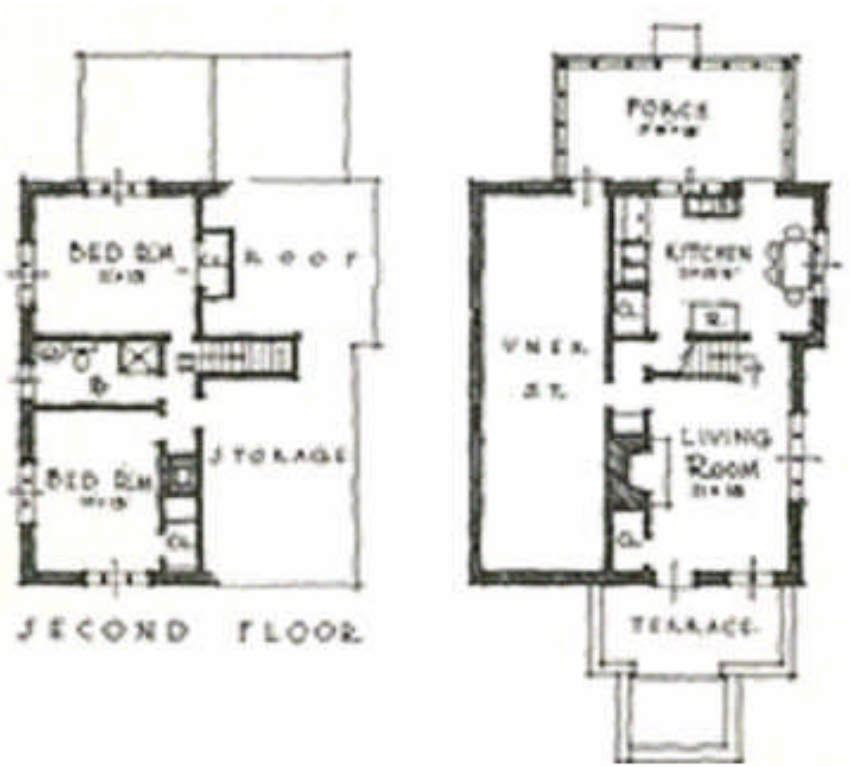
<u>Left T&B</u>: caption: "Norris, TN"



"…The site chosen for the permanent housing community covers an approximate area of 2,500 acres; the center lying four mile, by way of road, from Norris Dam. It occupies a high, rugged plateau stretching between the Clinch River and Buffalo Creek Valleys. Deep wooded areas are abundant, and vistas and panoramas far across Buffalo Creek Valley on the east and toward the Cumberland Mountains on the west, add constant, ever-changing variety and scenic interest to the view…"

RE: excerpt from a TVA press release dated November 24th 1933

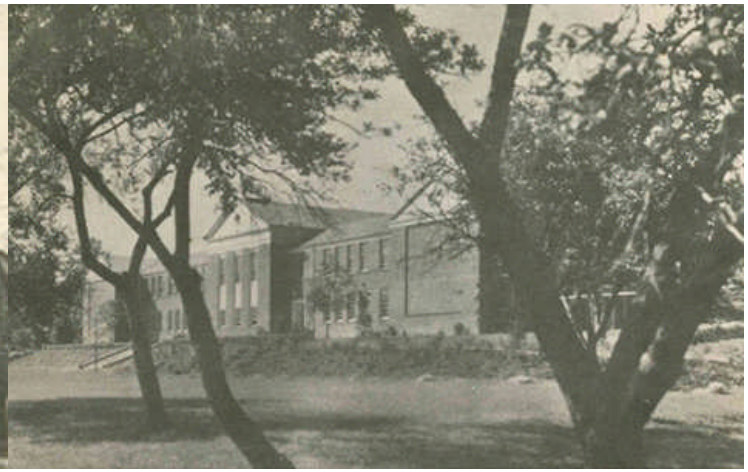
<u>Left</u>: caption: "Map of Norris, TN, showing its proximity to the Norris Dam site"



"…Due to conditions at the site, both natural and imposed, the size of the town of Norris will be deliberately limited, and the great majority of the houses will be individual or single-family homes. These will be supplemented by several apartment houses of moderate size, and a boarding house for single workers.

RE: excerpt from a TVA press release dated November 24th 1933

<u>Above L&R</u>: caption: "Four-room hillside houses (Type 42) are electrically equipped and heated"



"…The housing site under development not only recognizes that the community's initial and primary reason for being is to provide housing facilities for the force of workers during the Norris Dam construction period; but in addition, it will provide for a permanent community fitting into the social, economic and traditional life of the region, both present and future…"

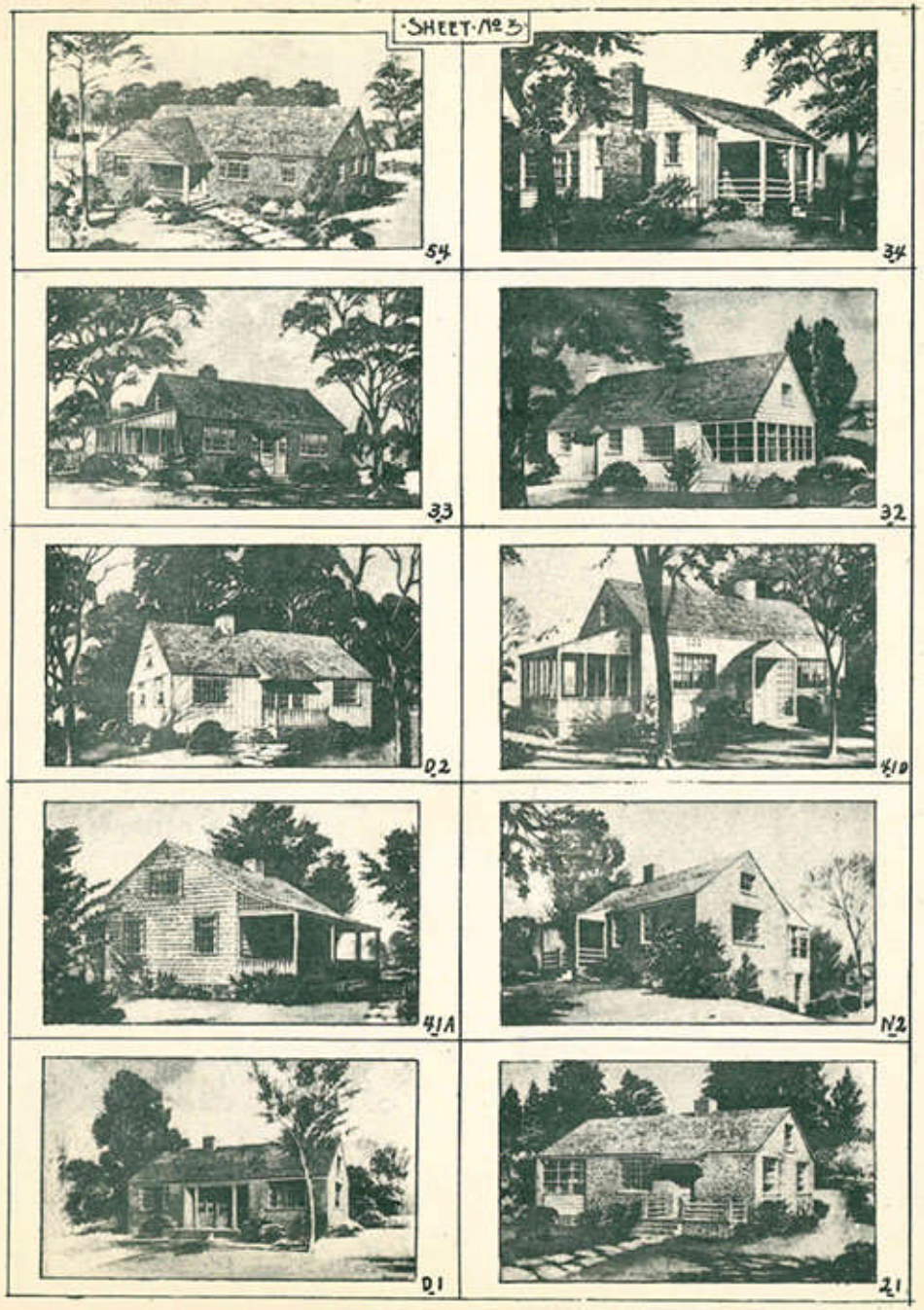
RE: excerpt from a TVA press release dated November 24th 1933

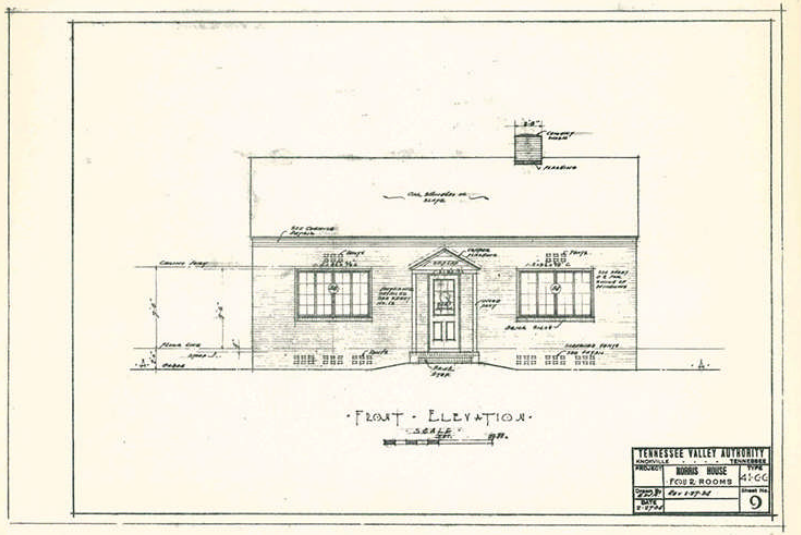
Left: caption: "Recreation building at the Construction Camp includes library, commissary and gymnasium-auditorium"

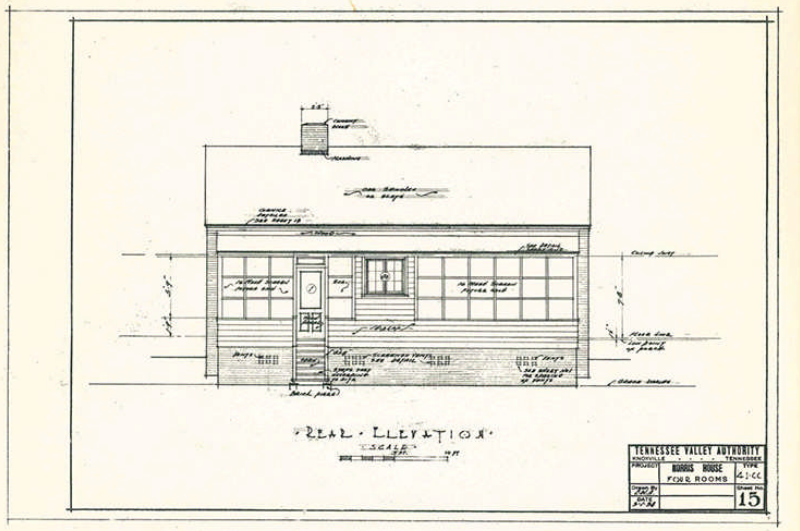
Right: caption: "The school serves all grades, 400 pupils; is electrically heated, has photo-electric cell lighting control"

"…the Authority tried brick, and stone, and a newfangled cinder-block construction, and even their plainest wooden houses had improvements that ran up the cost. They talked to women, who spoke for screened porches to work and eat on, and plenty of shelves. They talked to health authorities, who suggested cross-ventilation. And they even talked to mountain people, who said of course you ought to have a fireplace; you could set up a stove just to warm by, but you'd have no place to look, and no place to sit, and no place to spit. They didn't listen to people who might have fancied Swiss chalets or Spanish bungalows; there isn't one in the town. Mostly they took their designs from the oldest hill cabins, and built what folks call 'dog-trot' or 'shotgun' houses, with a hall or 'breezeway' right through and rooms on each side. They don't look like the Northern houses that people try to copy, but they are comfortable to live in…"

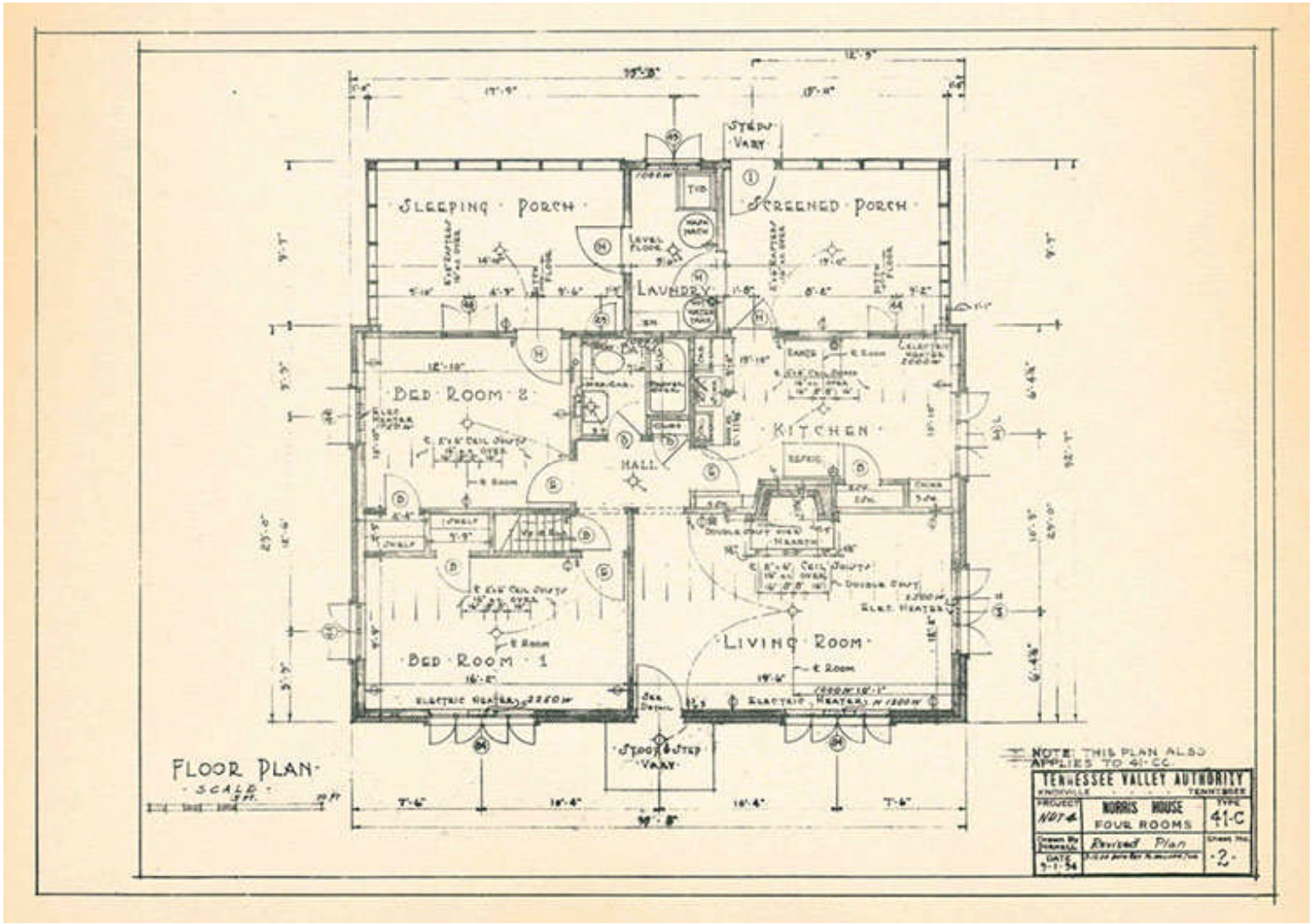
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

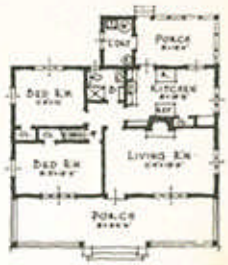


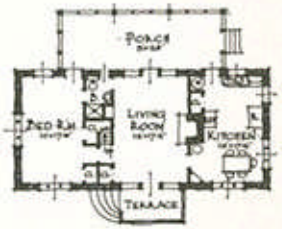




<u>Above T&B:</u> caption: "Norris House – Four Rooms – Type 41-CC – Front/Rear Elevations"
<u>Left</u>: caption: "Norris House Types"


SLEEPING PORCH
SCREENED PORCH
LAUNDRY
BED ROOM 2
KITCHEN
HALL
BED ROOM 1
LIVING ROOM
STEPS VARY
STOOL & STEP VARY
FLOOR PLAN
SCALE
NOTE: THIS PLAN ALSO APPLIES TO 41-CC
TENNESSEE VALLEY AUTHORITY
KNOXVILLE TENNESSEE
PROJECT NO. 4
NORRIS HOUSE
FOUR ROOMS
TYPE 41-C
Revised Plan
DATE 5-1-34
-2-





(Above) Four-room house with a large attic. Electrically equipped and heated. (Center and left) Two variations of the "Dog-trot" type (D-2) have screened porches across the rear. They are electrically equipped, including heating. (Opposite page) Recreation building at Construction Camp includes library, commissary and gymnasium-auditorium

"…In Norris, home-building lots will average about 75 by 200 feet in size, giving an area of about one-third acre in each case…In addition, subsistence farm plots, averaging about four acres each, will be located within easy access of all dwellers in the town who desire to carry on small-scale farming in connection with their own work…"

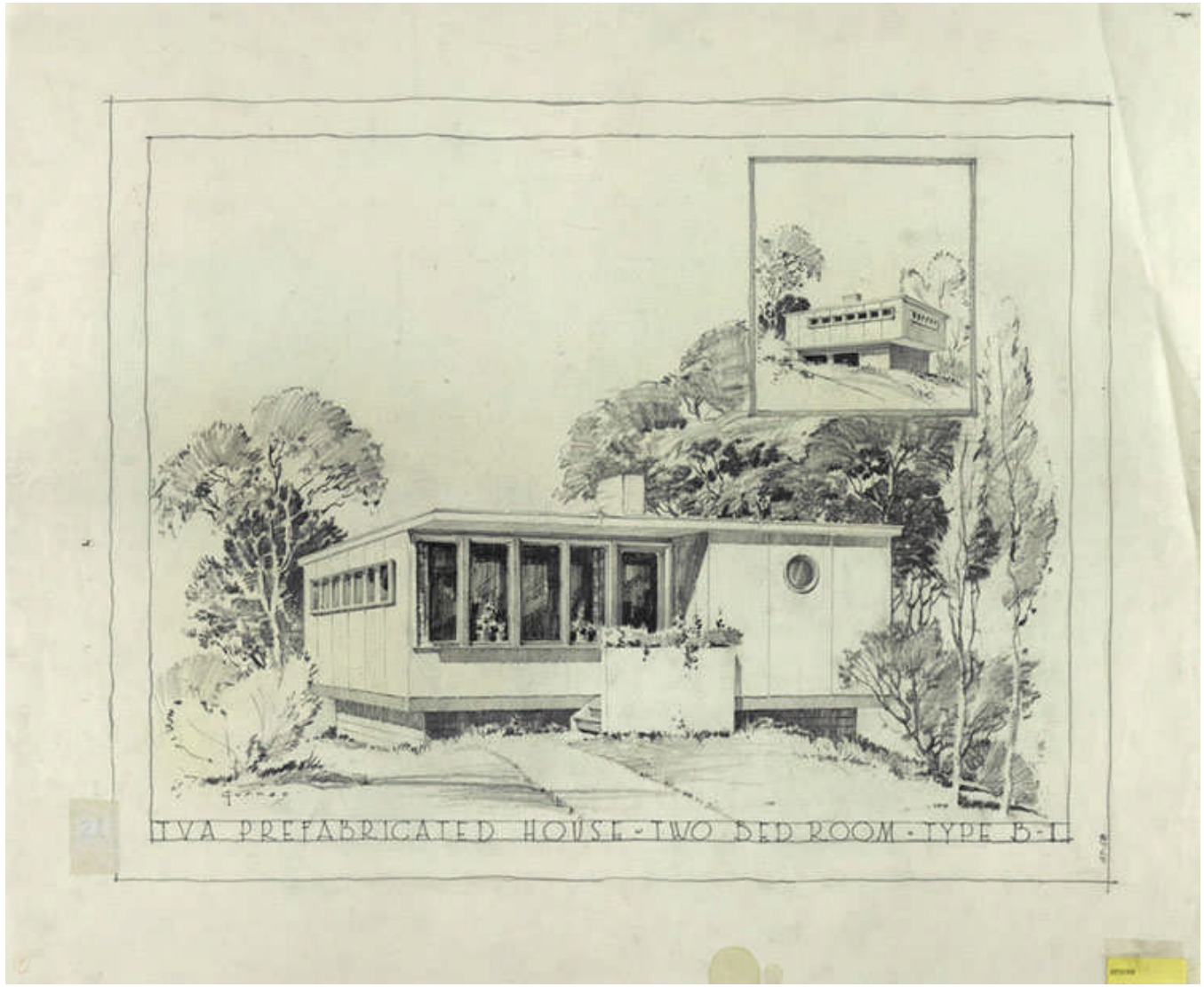
RE: excerpt from a TVA press release dated November 24th 1933

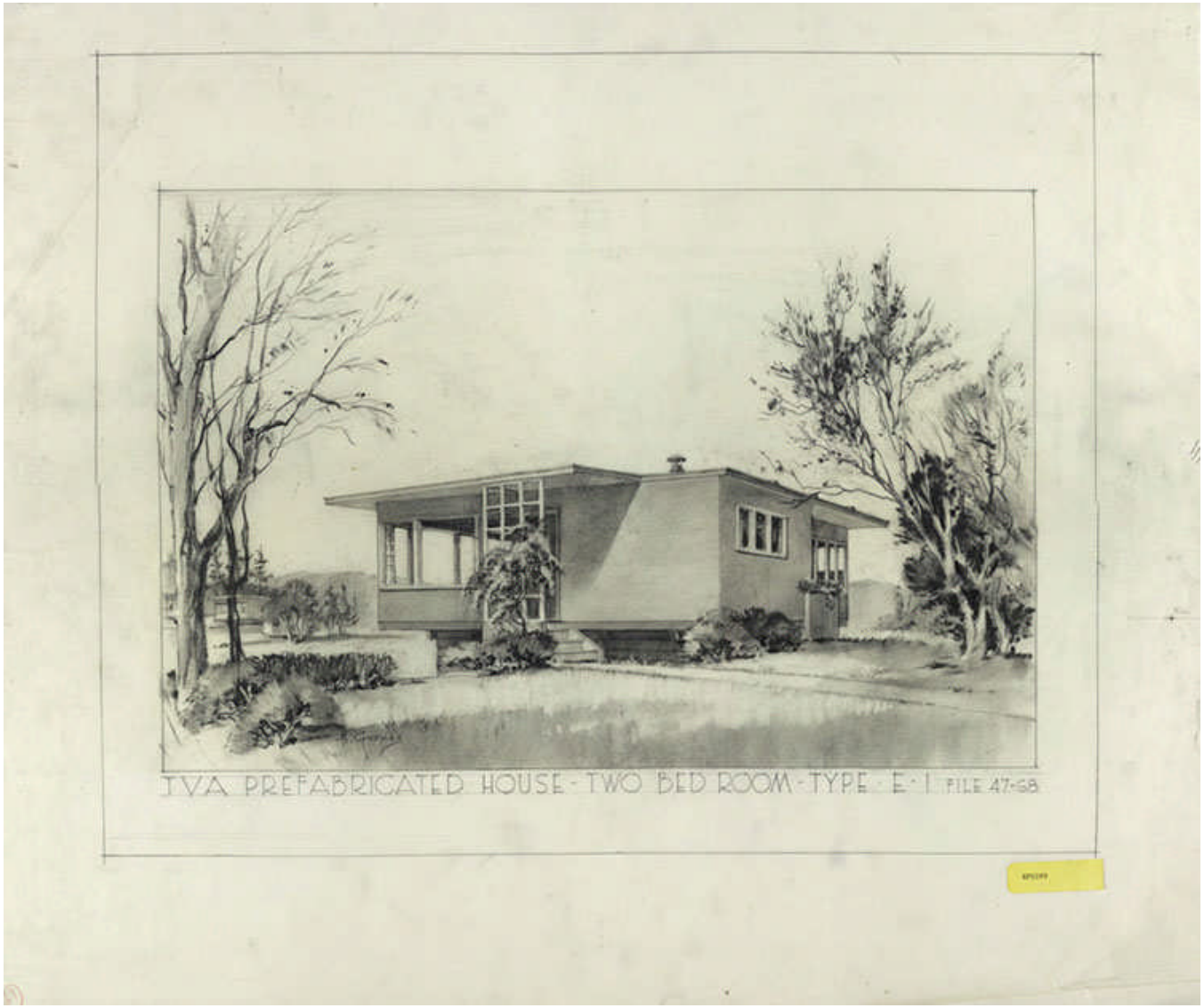
<u>Left</u>: caption: "(Top) Four-room house with a large attic. Electrically equipped and heated. (Center and Bottom) Two variations of the 'Dog-trot' type (D-2) have screened porches across the rear. They are electrically equipped, including heating."

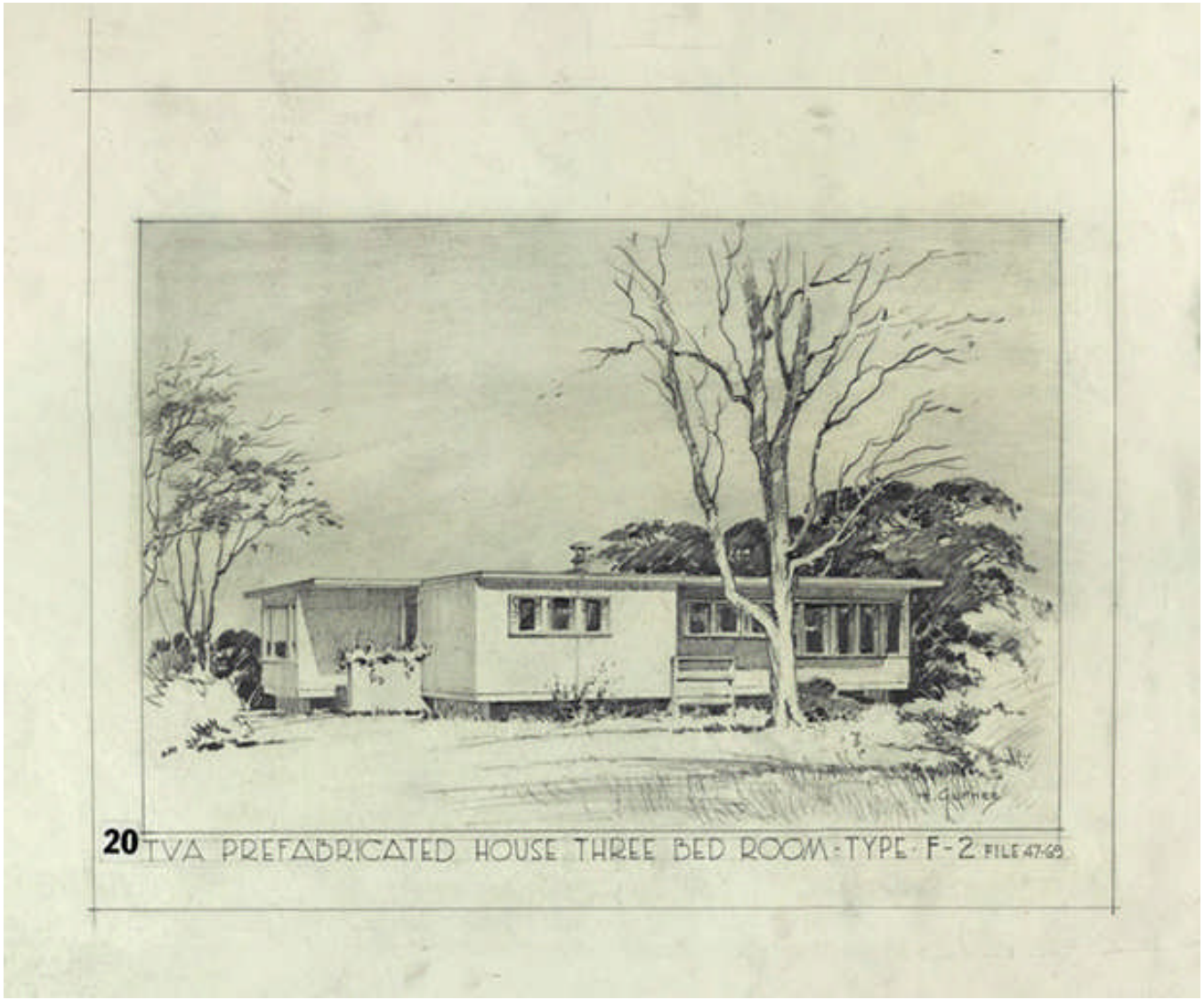
There’s No Place Like Home

In answer to the TVA's need for housing for temporary use on construction projects in remote locations, "demountable" (a/k/a "pre-fabricated" and or "trailer") housing was developed through several intermediate steps and experiments in prefabrication. Remote fabrication off-site reduced considerably dependence on overburdened accommodations at the construction site/s. After completion of the project, demountable housing could be quickly removed and used elsewhere. In fact, some of the earlier TVA demountables were moved several times from project to project. The designs were particularly lightweight due to full use of the (then) recently developed "stressed-skin" system of plywood construction (they were typically built using exterior-grade plywood). These "trailer houses" were cost competitive with traditionally constructed housing of the similar floor area. Constructed in a controlled environment rather than in the field, they were produced with much closer tolerances, considerably better finish and with equipment designed and constructed with greater detail and superior utilization of space.

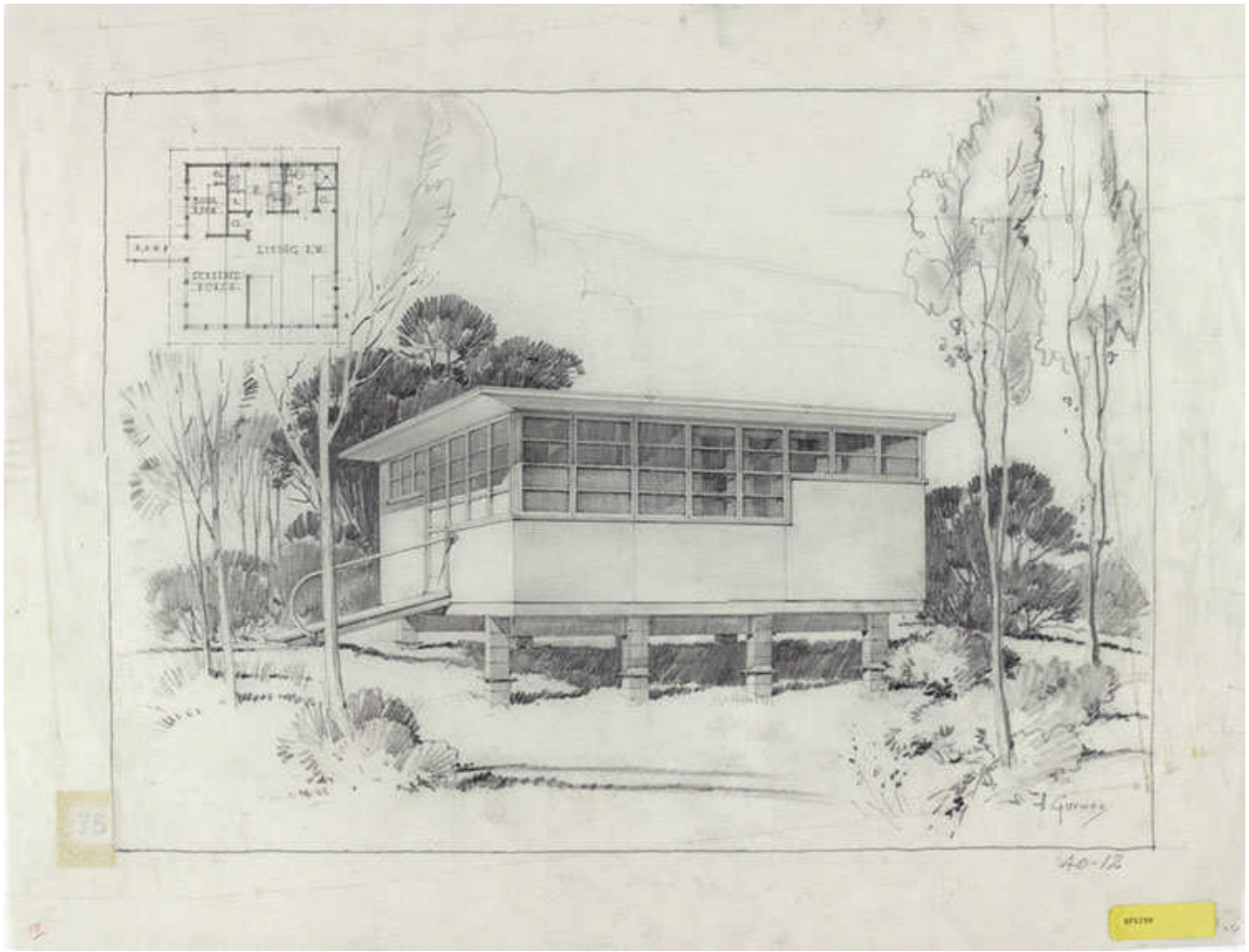
<u>Left</u>: caption: "Demountable employee housing. Because many construction projects are in remote localities where the need for housing exists only during the construction period, the TVA developed over a period of years its own method of prefabrication. Houses, recreation buildings, dormitories, washhouses, etc. have been constructed in three dimensional slices which are transported individually, fully equipped, and are coupled up on the site much like cars of a railroad train. Photograph shows one slice of a cabin, 7½' x 22', in transit." 902

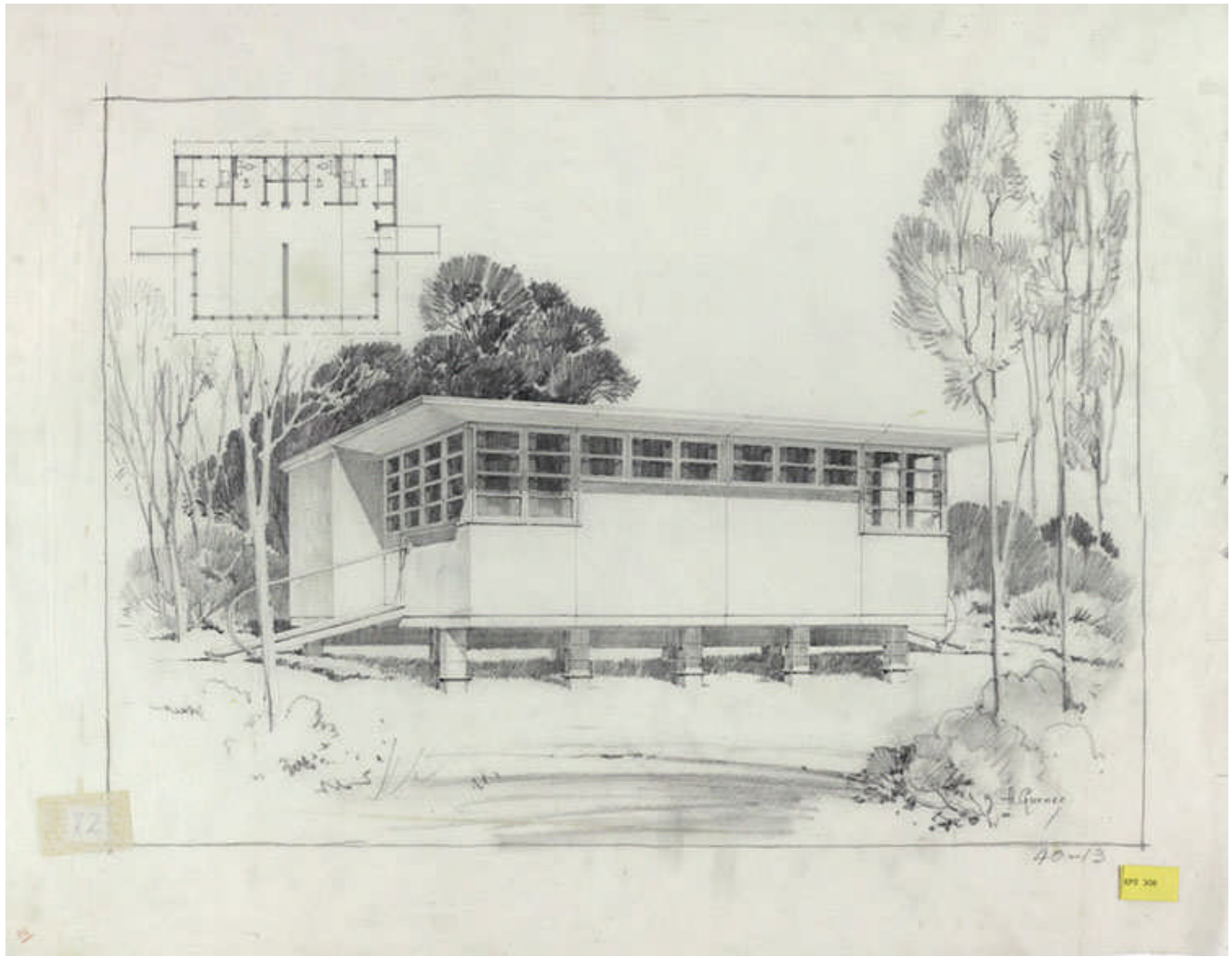

TVA PREFABRICATED HOUSE - TWO BED ROOM - TYPE B-1

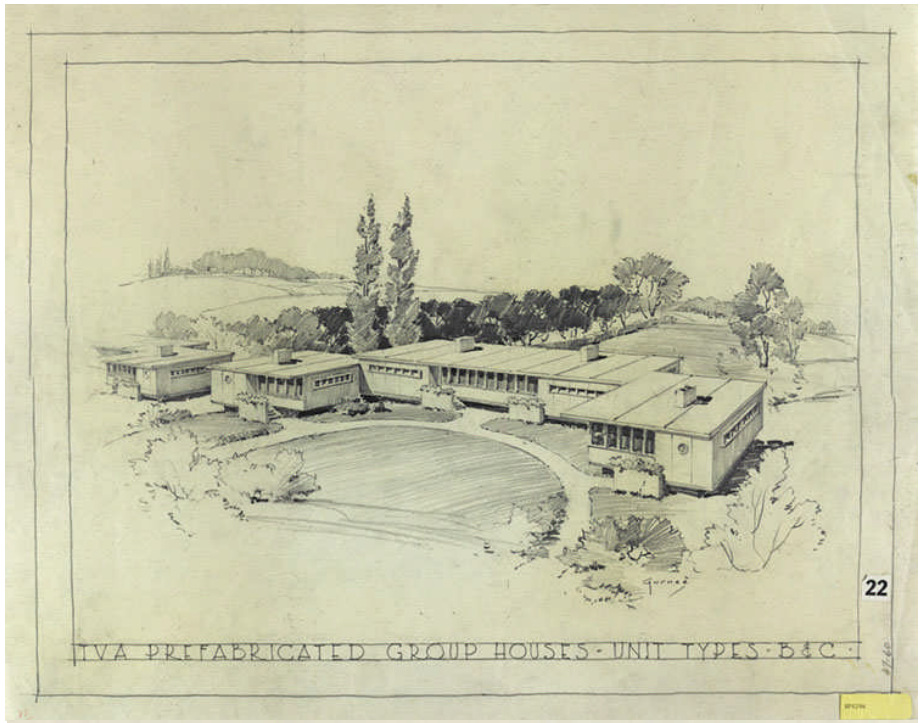

TVA PREFABRICATED HOUSE - TWO BED ROOM - TYPE - E - 1 FILE 47-68

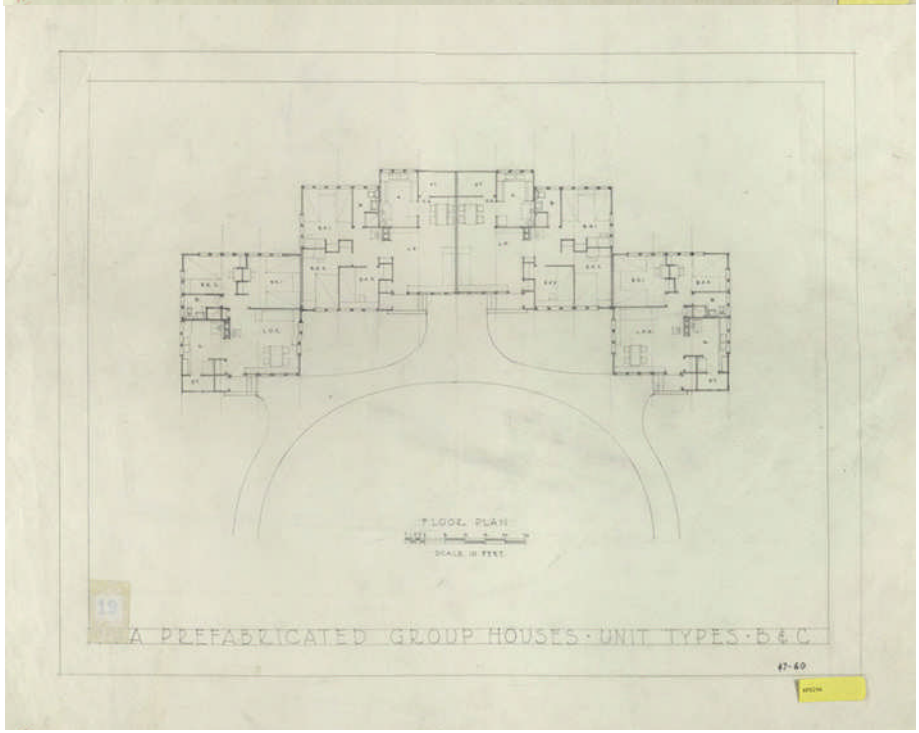


20 TVA PREFABRICATED HOUSE THREE BED ROOM - TYPE F-2 FILE 47-69






22
IVA PREFABRICATED GROUP HOUSES · UNIT TYPES · B & C ·


FLOOR PLAN
19
A PREFABRICATED GROUP HOUSES · UNIT TYPES · B & C
47-40



TVA houses were designed to be functional, affordable, and with simple lines so their silhouettes would not detract from the natural beauty of the land. While these minimalist designs facilitated rapid construction, they also allowed for mobile homes; an essential requirement for such a dispersed work-force. Even with their limiting design criteria, all the houses included the amenities of electric appliances and heating, conveniently supplied by TVA power.

No Model Town

"…In none of its aspects is this to be considered a 'model' town development. A thoughtful and conscientious effort has been made here to smooth out and eliminate where practicable, and without wasting money on frills, some of the crudeness and haphazard developments of the typical small town…In its broadest sense, this is an attempt to make rural conditions more livable for its inhabitants, that is all. True, it has its own distinct values that may be drawn upon and put to use elsewhere – but it isn't a model…"

RE: excerpt from a TVA press release dated November 24th 1933

"…Following the completion of Norris Dam, the community will serve adequately to house the permanent force employed in the operation of the dam and its adjuncts, in reforestation and erosion control, and those in charge of the management of the adjacent TVA properties…To serve the entire community, a complete town center has been laid out adjacent to a 14 acre public recreation ground or park. Here will be grouped the public hall and administration building, a small hotel, stores, public market, bus station and service garage and other community features as the need arises…"

RE: excerpt from a TVA press release dated November 24th 1933

<u>Above</u>: caption: "The Administration Building and Shopping Center in Norris contains a modern drug store, food shop and automatic telephone exchange. Off-street parking, a typical convenience, is provided in the front and rear of both buildings."

"…The offices for the town management, and the school, were put right in the middle of the town. Any town could be proud of that school. The building is two stories high, but they backed it up against a hill so the children on the second floor can walk out without having to use stairs. Inside they left the plain brick walls but painted them cream-color. They put in an electric heating plant, with humidifiers for the air, so even the janitor could have a college degree and a white-collar job; and they trained a trick 'electric eye' to turn on the lights in cloudy weather…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

A Modern Utopia (?)

C O P Y

Wm. Thornwall Davis, M. D.
Ernest Sheppard, M. D.

927 Seventeenth Street N. W.
(Farragut Square)

Washington, D. C.
June 29th, 1935

Dr. Arthur Morgan
Chairman of the Board
TVA Norris, Tenn.

My dear Dr. Morgan:

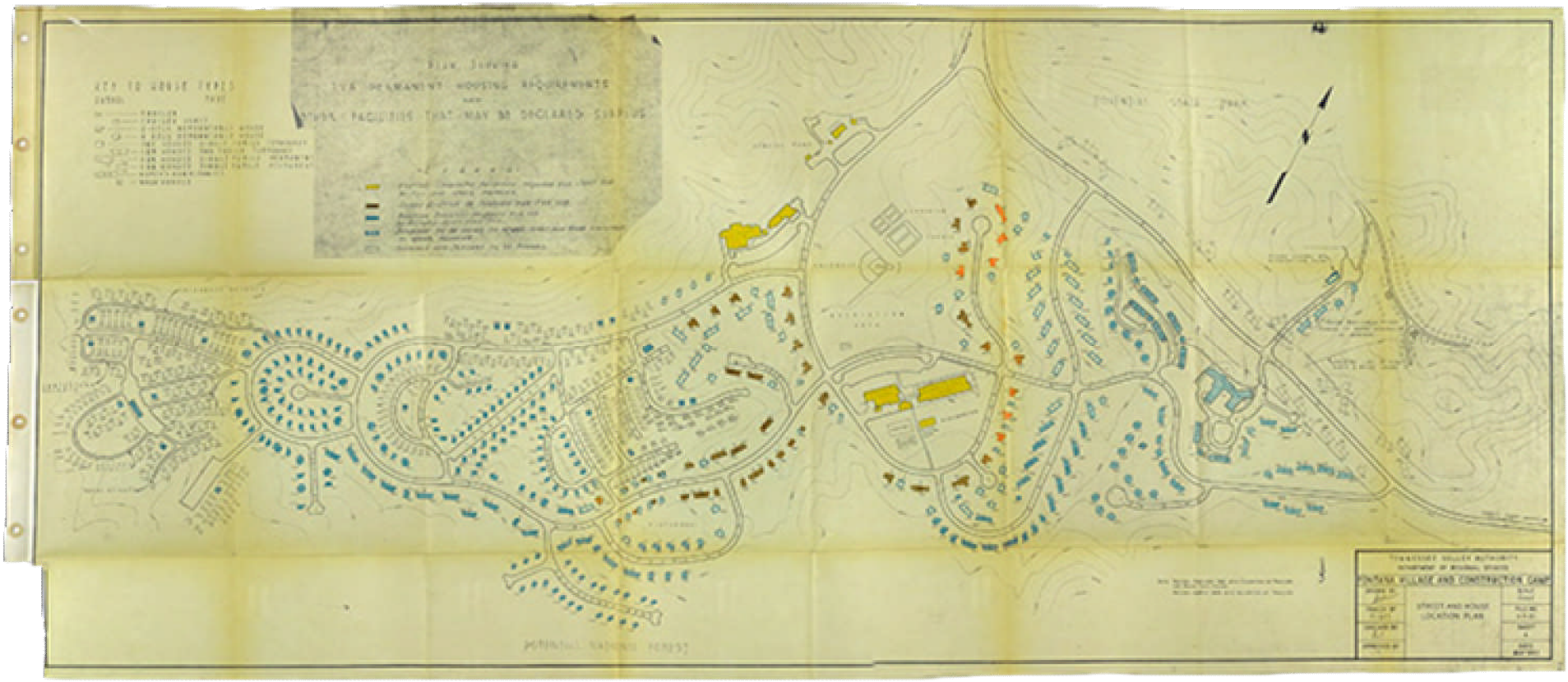
For thirteen years I was a surgeon in the United States Army. I have inspected many camps, barracks, mess-halls and the like from the Arctic to the Equator and I have never before seen anything so perfect as your community at Norris Dam.

I spent the whole afternoon wandering over the place and inspected it thoroughly merely for my own pleasure and satisfaction. Such an inspection of course brings out the real truth because nobody knew me and I really saw the plant as it is everyday. Having had so many years training in inspections, I feel that I am competent to judge and if I were asked to give an official report I would say I could find no fault of any kind.

Will you accept my congratulations upon your modern Utopia?

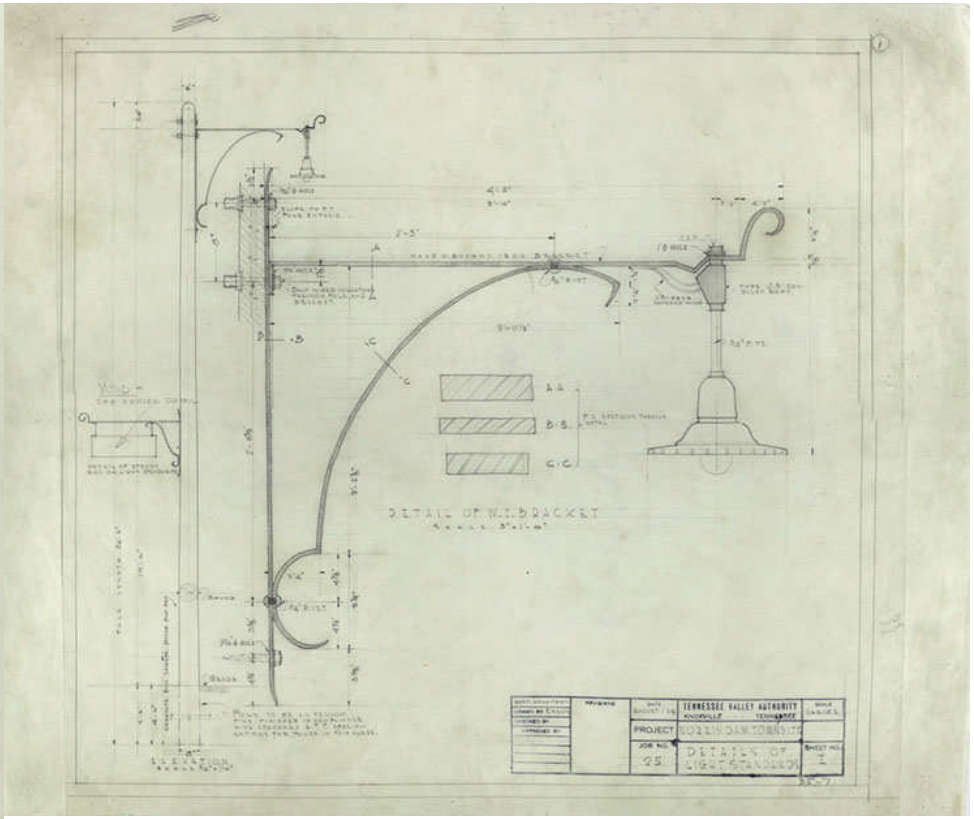
Very sincerely,

(signed) Wm. T. Davis

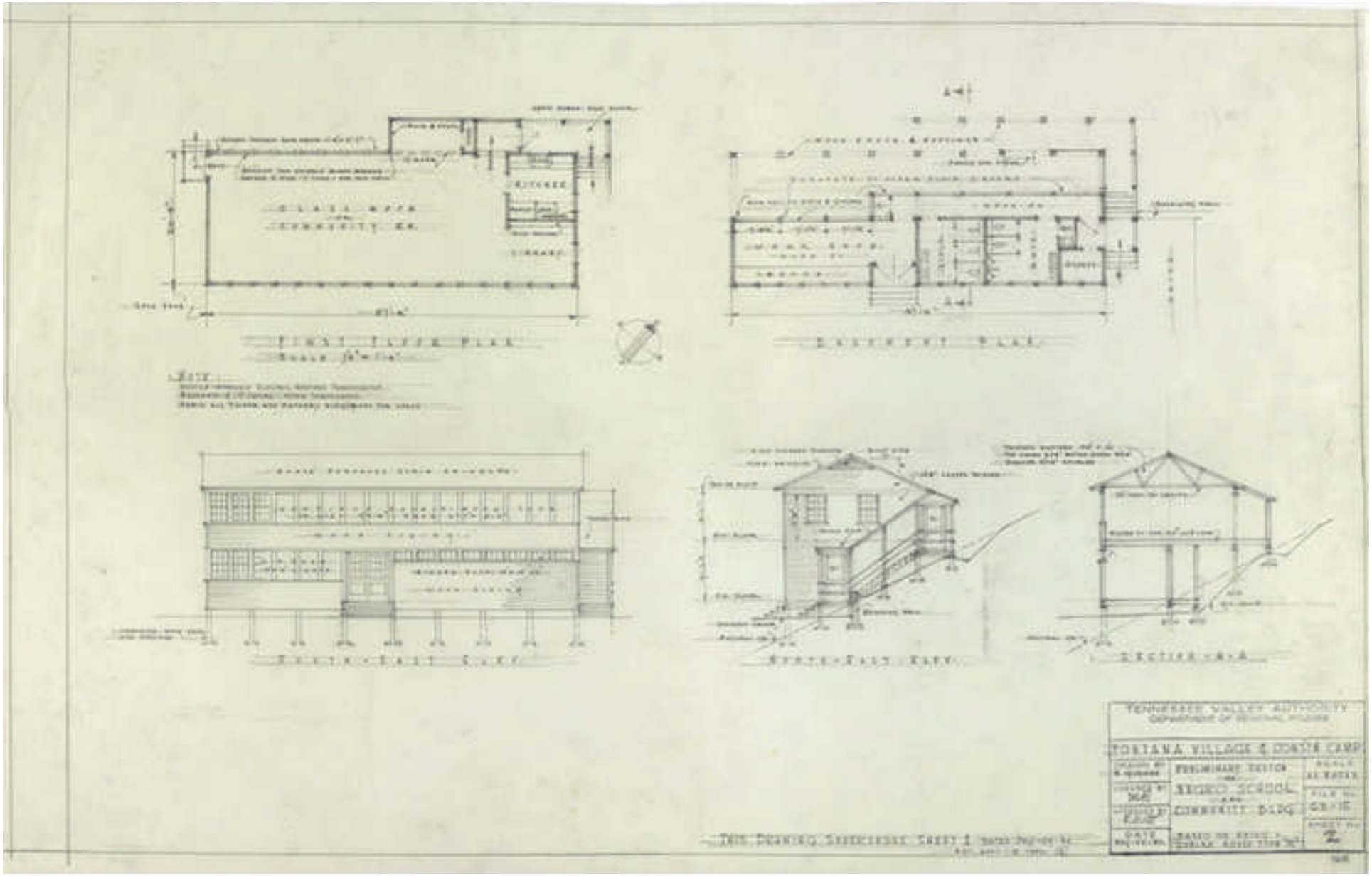


Aside from housing, the TVA towns that developed from the "ground-up" had to provide their residents with a variety of goods and services: medical care, education, shopping, mail, recreation, laundry, etc. Nothing was overlooked (even the garbage receptacles and light posts were designed to create aesthetic cohesion). Despite the TVA's desire for utopian communities, these towns could not transcend the culture of a deeply segregated South.

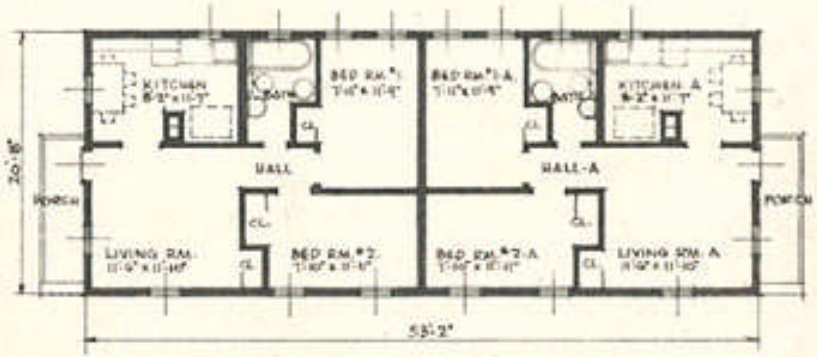
<u>Above</u>: caption: "Full map of Fontana Village showing housing, shopping, facilities, recreational areas, and evidence of segregation"



<u>Above & Left</u>: caption: "TVA architects designed the minute details of the town of Norris, including street lights, lamp posts, and garbage receptacles"



<u>Above</u>: caption: "Construction plans depict designs for segregated cafeterias and schools at Pickwick and Fontana Dams (Jan. 1935)"

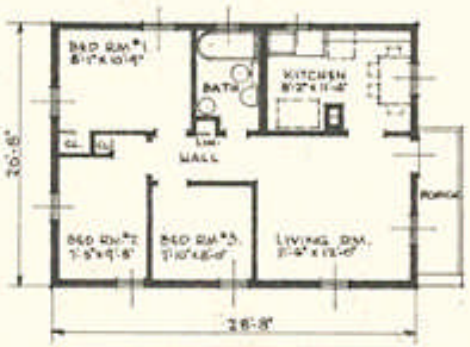


TYPE L

FLOOR PLAN

SCALE IN FEET 0 10 20

TVA TEMPORARY HOUSES-FONTANA PROJECT

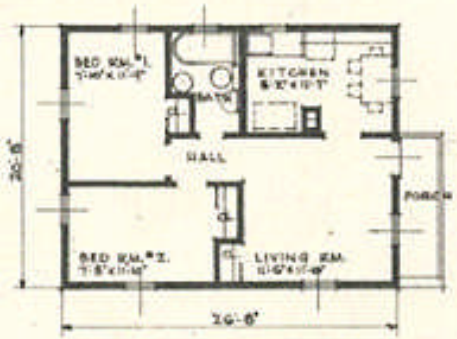


TYPE K

FLOOR PLAN

SCALE IN FEET

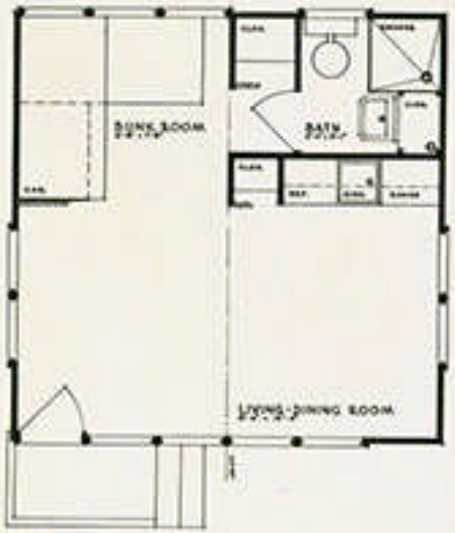
TVA TEMPORARY HOUSES–FONTANA PROJECT



TYPE J

FLOOR PLAN
SCALE IN FEET

TVA TEMPORARY HOUSES-FONTANA PROJECT



FLOOR PLAN
SCALE IN FEET

TVA

PREFABRICATED VACATION COTTAGE
TWO SECTION TYPE R-1

TENNESSEE VALLEY AUTHORITY
DEPARTMENT OF REGIONAL STUDIES

<u>Above</u>: caption: "The TVA used recreational opportunities as a way to promote life near the new lakes of the Tennessee River and built several cottages and cabins to house visitors (ca. 1934)"

<u>Left</u>: caption: "Demountable employee housing. Completed demountable vacation cottage consisting of four slices such as shown on K-2361. Construction method was developed and proved on a series of such cabins, and later put to use for employee housing."

<u>Left</u>: caption: “Miscellaneous design. In the course of reservoir construction the Authority occasionally floods out existing railroad lines which it replaces, together with their bridges and stations. This small station at Concord, Tennessee, is notable principally for its total deviation from usual practice for such structures in the Valley, chiefly in its clear cut plan, open shelter, light brick masonry, and the use of bright colors.”

Part 20

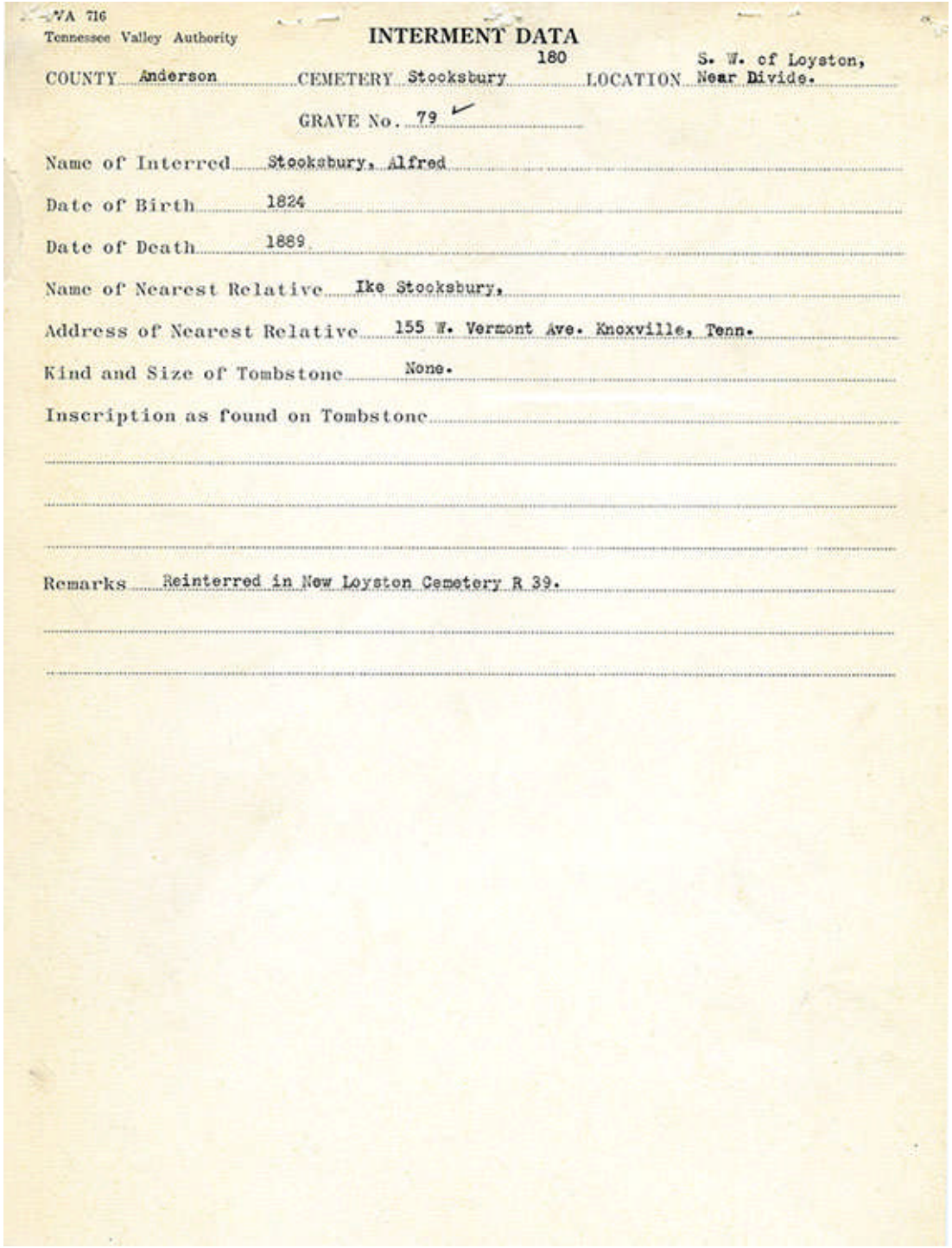
No Pain No Gain

The TVA's efforts to bring electrification to the rural *Tennessee Valley* region resulted in the displacement of many people; both living and dead. As dam construction flooded inhabited areas, burial plots had to be exhumed and relocated to new cemeteries. Through proceedings in U.S. District Courts, TVA declared eminent domain and condemned populated land, forcing families to move from their homes (in very many cases the only home they and the generations before them had ever known). This resulted in a range of emotions from the land owners; from happiness to anger and/or confusion. In cold, hard numbers, the impact of the displacement/s is evident; over 69K individual burial plots were either removed or left in place and approximately 20K families relocated to new homes.

Moving the Dead

"…Most folks don't think of building a dam in terms of moving graveyards. But before they could swing into place the million cubic yards of concrete they put in Norris dam, they had to move the gravestones and the bones from Bull Run Creek and Hogskin Creek and Caney Creek, from Sinking Springs and Dripping Springs, and from Black Fox Ford and Dead Mine Bend. Norris lake has fingers that go far up into the hills, and little coves and inlets show where there were hollows and valleys before the water came. In those places were little cemeteries that would be covered with water, or would be where nobody could get to them except in a boat…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



VA 716
Tennessee Valley Authority

INTERMENT DATA

180

COUNTY Anderson CEMETERY Stocksbury LOCATION S. W. of Loyston, Near Divide.

GRAVE No. 79 ✓

Name of Interred Stocksbury, Alfred

Date of Birth 1824

Date of Death 1889

Name of Nearest Relative Ike Stocksbury,

Address of Nearest Relative 155 W. Vermont Ave. Knoxville, Tenn.

Kind and Size of Tombstone None.

Inscription as found on Tombstone

Remarks Reinterred in New Loyston Cemetery R 39.

"…So in Raccoon Valley and Hickory Valley and Poorland Valley, in Elbow Hollow and Kettle Hollow and Powder Mill Hollow, the TVA men surveyed and mapped, and where there were burying grounds or just family plots with two or three graves, they made notes and took pictures of the grave-stones. Then they talked to the relatives to decide what was to be done. They moved more than a hundred Stooksburys and Snodderlys and around fifty Hatmakers out of the Norris churchyards without getting them mixed…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: Internment Data for *Alfred Stooksbury*

X

TVA 298

TENNESSEE VALLEY AUTHORITY

TVA GRAVE REMOVAL PERMIT

156 W Vermont Ave

Residence Lonsdale

State of Tenn

Date Oct 16 1935

I hereby represent to the Tennessee Valley Authority that I Ike Stooksbury the surviving ______ RELATION Son of Alfred Stooksbury Age 65 Years who died of T. B. in or about the year of 1889 and was buried in a Wood container, GRAVE No. 79 CEMETERY No. 180 known as Stooksbury CEMETERY, and within the area which will be flooded by the building of the Norris Dam, and as such nearest kin or relative have the right to authorize the disinterment and removal of the remains of the said deceased from the said area.

And I hereby authorize the Tennessee Valley Authority to go ahead at its own expense and disinter and remove the remains of the said deceased person and all the markers of the grave from the said area, and reinter the said remains and properly replace the said markers in some other suitable cemetery, preferably New Houston R. 39

WITNESS:

Claude F. Guyton

B L Johnson

Name Ike Stooksbury

Residence ______

Name ______

Residence ______

GRAVE IDENTIFIED BY:

______

______

______

Name ______

Residence ______

Name ______

Residence ______

Name ______

Residence ______

Do not Notify

TVA 709

TENNESSEE VALLEY AUTHORITY

GRAVE REMOVAL RECORD

Engineering Service Division

Norris Reservoir

REMOVAL ORDER

To: Jake M. Guyton Date Oct. 17, 1935.

You are hereby directed to proceed with disinterment of the body buried in grave # 79
Cemetery # 180 on the property of Sam Fox (Stocksbury)
Body is to be transported to and reburied in the New Loyston Cemetery # R 39

Name of nearest relative Ike Stocksbury, Son Address 155 W. Vermont Ave. Knoxville, Tenn.

Name of deceased Alfred Stocksbury, Age 65 Cause of death T. B.

Date of death 1889 Type of container Wood

Contract by CFG SIGNED Fred Wallace
Supervisor

DISINTERMENT REPORT

On Oct 23 1935 10.10 am. disinterred the body buried in grave # 79. as indicated
(Date & hour of disinterment)
on Cemetery Map # 180 and marked by monument bearing the following inscription:
None -

Condition of container Decayed Condition of body Bulk of Bones.
Black dirt.

Inventory and disposition of articles in grave None

Preparation for reburial Placed Remains in 3' box
Address placed on new container (including number of new grave)
Alfred Stocksbury #79 Head New Loyston R 39.

Remarks

WITNESSED AS ABOVE:
Jerome K. Lively
Moon Love

SIGNED Jake M. Guyton
Foreman

TRANSPORTATION RECORD

Received Oct 23 1935 12.08 pm. the remains from grave # 79. in Cemetery # 180
(Date & hour of receipt)
which were transported a distance of 8 miles and delivered in good order at 12.45 AM/PM
on the same day to Roy W. Davis at New Loyston R 39.
Transporter

CERTIFICATE OF REBURIAL

On Oct. 23 1935 the body and all identification records from Grave # 79.
(Date, giving hour of reburial)
in Cemetery # 180 were found according to disinterment report of Jake M. Guyton
and have this date been reburied in Grave # 79. in the New Loyston R 39.
Cemetery.

SIGNED
Foreman of Reinterment

WITNESSED AS ABOVE:

Examined and approved for file on Oct. 24 1935.
Date

Robert L. Wallace
Clerk.

GRAVE REMOVAL OPERATIONS

The Tennessee Valley Authority, if requested to do so, sends a car to bring relatives to witness the removal operations if they live within a reasonable distance of the cemetery. Upon completion of these operations, such persons are taken back to the point from which they were brought. It is seldom that some relatives or local citizens are not present to view the removals.

As to how we disinter and reinter the remains, laborers remove the earth down to the casket or box. At this point a licensed undertaker, employed by the Tennessee Valley Authority, takes over the operation and removes the remains which are placed in a new, sturdily built, wooden box. This box has a large sheet of undertaker's white wrapping (a kind of paper) within it upon which the remains are deposited, and the wrapping is folded over the remains after which the top is nailed on the box. The box is placed on a truck and a clean tarpaulin placed over it, and then transported to the place of reinterment. Lowering straps are placed underneath the box and it is carried to the new opening and lowered into its new resting place. If there are any markers or monuments on the grave, they are moved and reset at the new grave. If the grave has none, the Tennessee Valley Authority furnishes a small metal marker and places it on the grave.

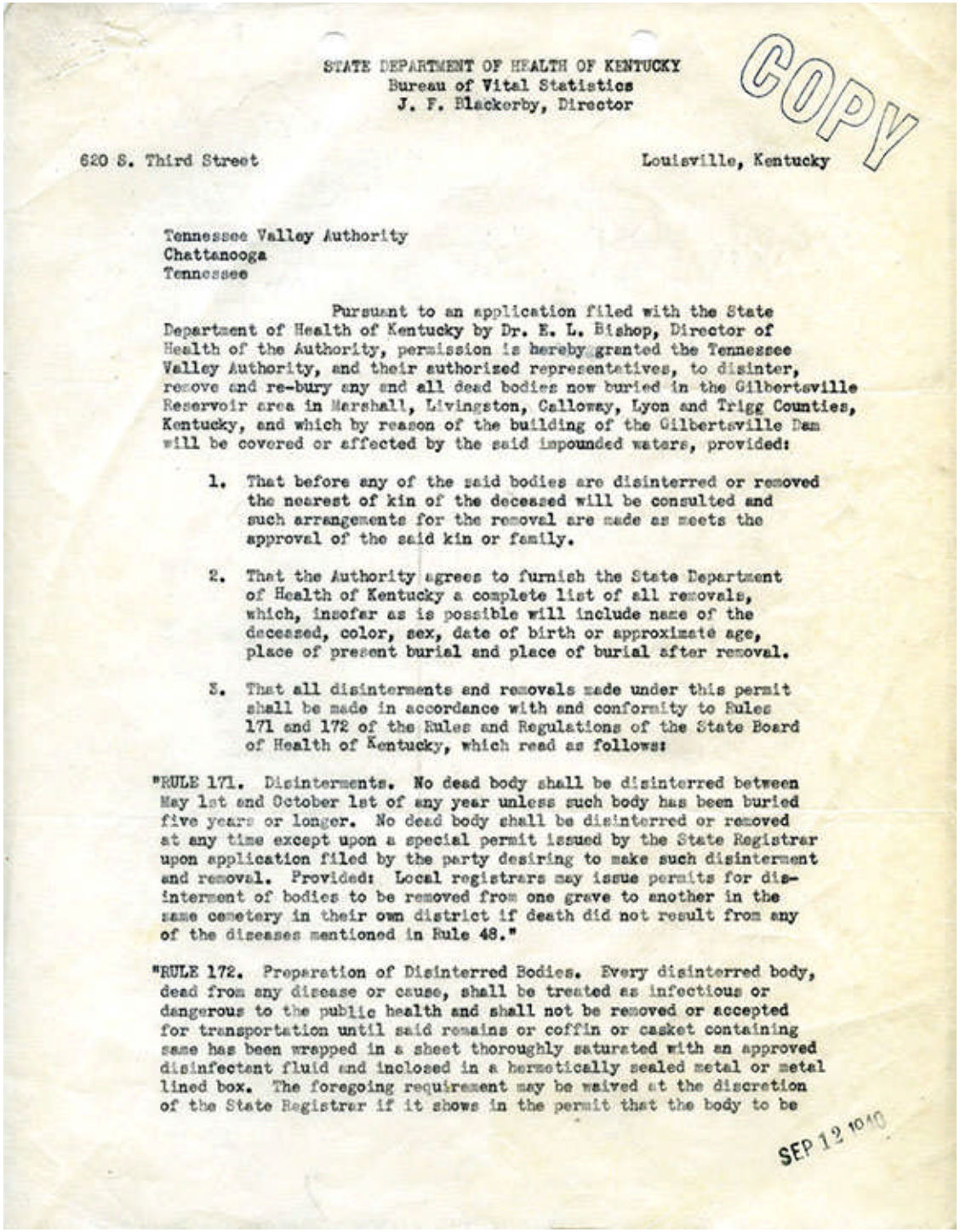
The Tennessee Valley Authority realizes the delicacy of this type of work, and is especially alert to see that it is performed in a most respectful manner.

Should it be decided to have the graves of relatives removed, it will be necessary to choose the cemetery in which it is desired to have the graves reintered. In most cases it is not necessary to pay out any money for a lot, if the lot chosen is in some local cemetery that is out of the inundated or isolated area. Permission is generally obtained from the trustees of the new cemetery to make these reinterments without cost. The Tennessee Valley Authority will not take the initiative in such a service but would render advice and aid to anyone contacting us about this matter.

The TVA recognized that the removal and re-internment of burial plots was a delicate matter, compounded by the fact that many residents were already angered by TVA's taking of their lands for their many dam/reservoir projects.

<u>Above</u>: caption: "Hickory Grove Cemetery in Eddyville, Kentucky. August 1939."

<u>Left</u>: TVA "Grave Removal Operation" (explanatory letter)



STATE DEPARTMENT OF HEALTH OF KENTUCKY
Bureau of Vital Statistics
J. F. Blackerby, Director

COPY

620 S. Third Street — Louisville, Kentucky

Tennessee Valley Authority
Chattanooga
Tennessee

Pursuant to an application filed with the State Department of Health of Kentucky by Dr. E. L. Bishop, Director of Health of the Authority, permission is hereby granted the Tennessee Valley Authority, and their authorized representatives, to disinter, remove and re-bury any and all dead bodies now buried in the Gilbertsville Reservoir area in Marshall, Livingston, Calloway, Lyon and Trigg Counties, Kentucky, and which by reason of the building of the Gilbertsville Dam will be covered or affected by the said impounded waters, provided:

1. That before any of the said bodies are disinterred or removed the nearest of kin of the deceased will be consulted and such arrangements for the removal are made as meets the approval of the said kin or family.

2. That the Authority agrees to furnish the State Department of Health of Kentucky a complete list of all removals, which, insofar as is possible will include name of the deceased, color, sex, date of birth or approximate age, place of present burial and place of burial after removal.

3. That all disinterments and removals made under this permit shall be made in accordance with and conformity to Rules 171 and 172 of the Rules and Regulations of the State Board of Health of Kentucky, which read as follows:

"RULE 171. Disinterments. No dead body shall be disinterred between May 1st and October 1st of any year unless such body has been buried five years or longer. No dead body shall be disinterred or removed at any time except upon a special permit issued by the State Registrar upon application filed by the party desiring to make such disinterment and removal. Provided: Local registrars may issue permits for disinterment of bodies to be removed from one grave to another in the same cemetery in their own district if death did not result from any of the diseases mentioned in Rule 48."

"RULE 172. Preparation of Disinterred Bodies. Every disinterred body, dead from any disease or cause, shall be treated as infectious or dangerous to the public health and shall not be removed or accepted for transportation until said remains or coffin or casket containing same has been wrapped in a sheet thoroughly saturated with an approved disinfectant fluid and inclosed in a hermetically sealed metal or metal lined box. The foregoing requirement may be waived at the discretion of the State Registrar if it shows in the permit that the body to be

SEP 12 1940

"…The Authority offered to move the graves to any place within twenty miles, or to allow money for the families to do it. In most cases they just left it to the Authority, and TVA built up new cemeteries at New Loyston, New Baker's Forge, New Indian Creek, and Big Barren Memorial. They had all local men to do the work, and in all they moved more than five thousand graves out of the Norris area…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: March 1939 letter outlining the approval procedure for TVA grave removal, as well as the many rules (172) that accompanied the process.

"….So they got archaeologists from the universities, and WPA workers to do the digging, and they went to work. In the Norris area, at Caryville, they found the first temple site to be discovered east of the Mississippi. They found relics too, cooking pots and counters used to play a game like checkers, and of course they found lots of skeletons. The men that built the temple, and lived in caves along the Powell river, where more bones were found, weren't Cherokee Indians; they went a lot farther back than that. So they said three civilizations would be flooded by Norris lake…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

IN THE UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF TENNESSEE, NORTHERN DIVISION

CIVIL NUMBER 3-79418

AMMONETA SEQUOYAH, RICHARD CROWE, GILLIAM JACKSON, Individually, and representing other Cherokee Indians similarly situated; the EASTERN BAND OF CHEROKEE INDIANS; and the UNITED KETOOAH BAND OF CHEROKEE INDIANS,

PLAINTIFFS,

vs.

TENNESSEE VALLEY AUTHORITY,

DEFENDANT,

3-79418

COMPLAINT FOR DECLARATORY AND INJUNCTIVE RELIEF

INTRODUCTION

1] This is an action for injunctive and declaratory relief brought by numerous individual Cherokee Indians and through their tribal governments against the Tennessee Valley Authority to save their sacred Little Tennessee River Valley from destruction by the TVA. The Plaintiffs consist of a number of individually named Cherokee Indians and the Indian tribes known as the Eastern Band of Cherokee Indians, presently located in Cherokee, North Carolina, and the United Ketooah Band of Cherokee Indians, presently located in Tahlequah, Oklahoma. The individual Plaintiffs sue on behalf of themselves individually and on behalf of other Cherokee Indians who are similarly situated, with the class of persons defined as all those present or future Cherokee Indians who practice the traditional Cherokee religion and adhere to Cherokee Indian tradition and culture.

2] The Defendant, Tennessee Valley Authority, is presently undertaking action which will cause permanent and irreparable injury to these Indian Plaintiffs and the class they represent.

HOLT, HAIRE & BRIDGERS, P.A.
ATTORNEYS AT LAW
50 WEST MAIN STREET
SYLVA, NORTH CAROLINA 28779

<u>Left</u>: caption: "Sequoyah v. Tennessee Valley Authority." The plaintiffs in this lawsuit were two bands of the *Cherokee Indian Nation* and three individual Cherokee Indians. The plaintiffs claimed that the land along the *Little Tennessee River* (which would be flooded by the *Tellico Reservoir*) was sacred to the Cherokee religion and a vital part of Cherokee religious practices. The land included several old Cherokee settlements and burial grounds with religious significance to the Cherokee people. The federal judge ruled in favor of TVA and the case was appealed to the *6th District Court of Appeals*. The Court of Appeals upheld the lower court's decision.

"…All this attention to dry bones took some time and trouble, but if the tactful TVA men were to tell the truth, they'd say that moving the dead is a whole lot easier than moving the living. Engineers know how to handle clay and dust and lime rock; it's living creatures that worry them…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Moving the Living

"First come the engineers to survey they go right across and pay no attention to anybody. Then the men come to value, and nobody's satisfied, because if a TVA man walks across a field, of course it doubles in price. Then come the people cutting wood. And then the relocation people have to smooth it all out."

Alabama farmer (ca. 1933)

"…Because it is careful, the Tennessee Valley Authority does its most varied and diplomatic work in what is called re-location, meaning the removal and resettlement of people from the reservoir areas. Uncle Sam is doing a good deal of this sort of work right now, but in the Valley there are special conditions. In the first place, the Authority has a right to condemn land, and rising water completes the argument. On the other hand, the land required for the reservoirs is not always waste land unsuited to any other use in fact it's only too often the other way round. If it were possible, certainly it would be better to take a wornout mountain farm than to flood the bottom lands, which are the best farm lands, and all the men on relocation work wish that water would run up-hill…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"Nowhere did the Authority's program have more direct and disturbing effects than upon the hundreds of families who had to abandon their homes and farms to the waters of a TVA reservoir"

***C. Herman Pritchett*, Author (1943)**

RE: for some people, relocation brought joy while to many others it brought anger and resentment. For example, *Oma Boren* was overjoyed that she no longer had to carry water from the spring because her new home came with running water. Conversely, *Mrs. Fannie Cotham* was incredibly upset with TVA when they put her out of her home. Thousands of land condemnation proceedings removed people from the only homes they had ever known. Relocating people in the *Tennessee Valley* region was a very personal experience which impacted each affected family differently.

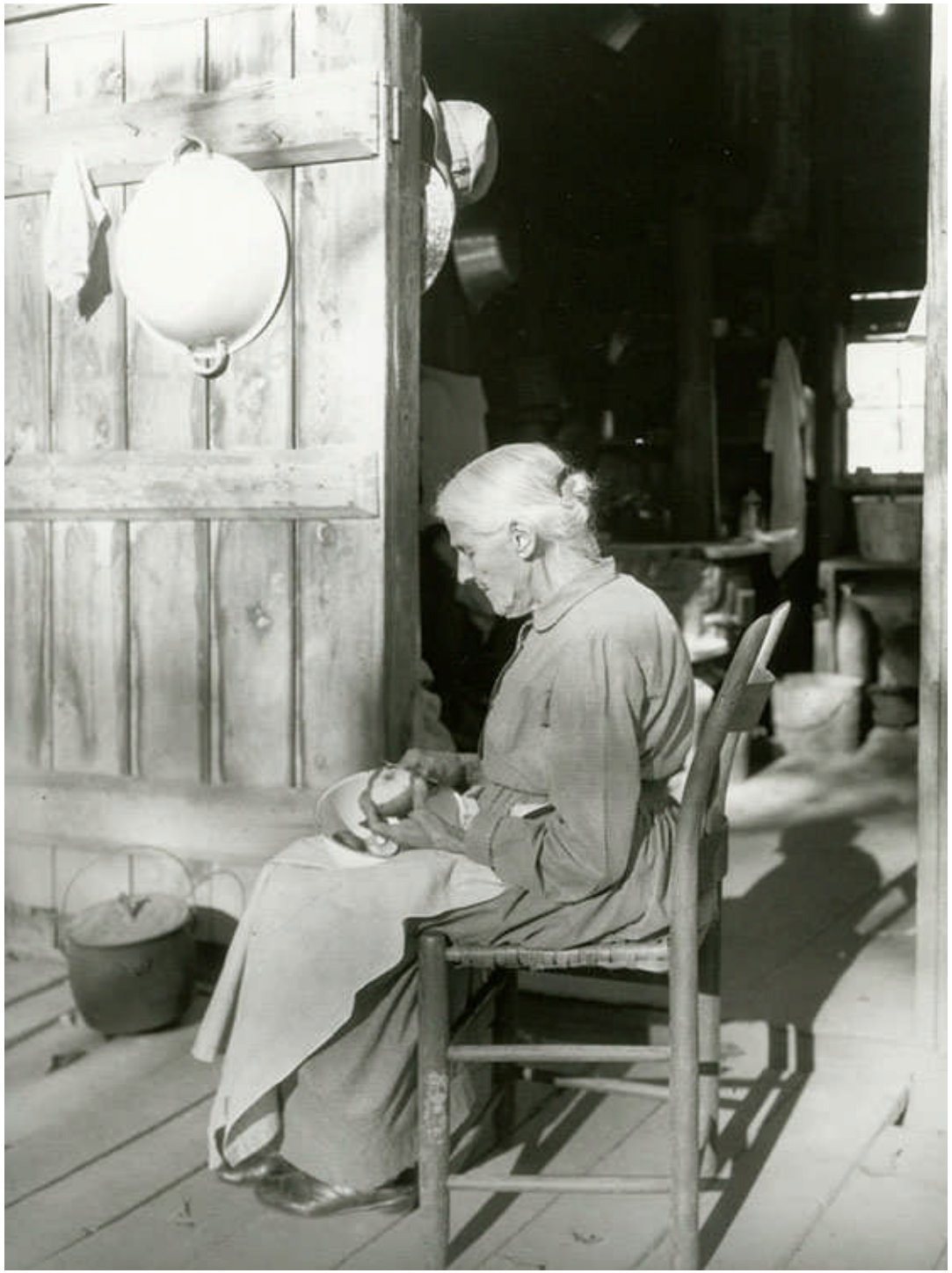
<u>Above</u>: caption: "Hugh Smith on the day that his family moved from Hoitt Avenue in Knoxville, Tennessee. February 4, 1939."

From this Valley we soon will be leaving;
How we will miss our old friends and our homes.
For they say that the waters will cover
The place where we all love to roam.
There's the aged old father and mother
Who have spent many years here in toil;
They have reared up the little children
On the products of old Clinch river soil.

RE: lyrics to a popular song of lament sung by those residents of the *Tennessee Valley* forced to relocate. The story of an old lady who said she'd just sit right there in her rocking chair until the water came up to drown her circulated far and wide. In other sections of the country, locals had been dislocated by water supply projects. For example, some Catskill mountain villages (for NYC's water supply) and some in the *Swift River Valley* of Massachusetts (to supply water to Boston) were similarly affected.

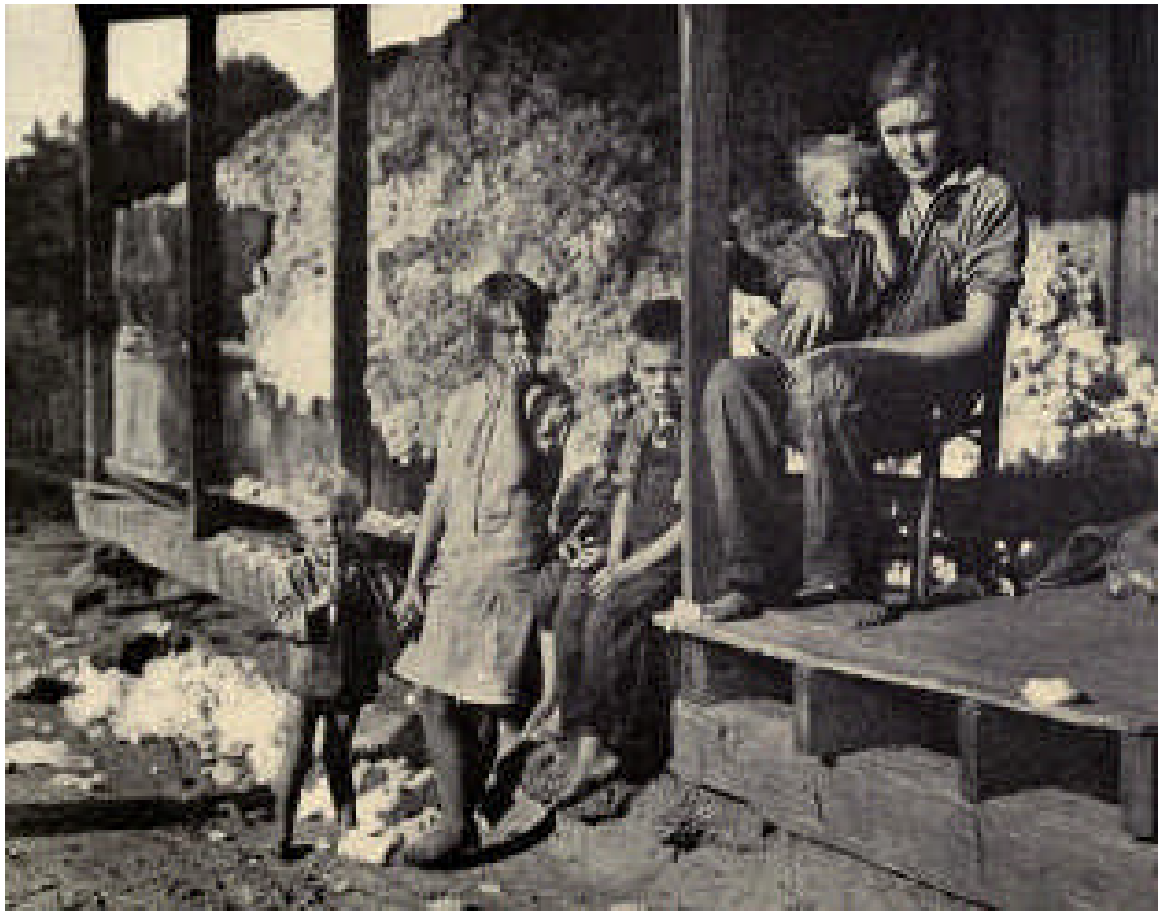

DRINK
Coca-Cola


CAMCO



"…Most of the work of the Authority is specialized, but a relocation man has to know a little of every-thing. He meets the most objections and makes the most friends…"

RE: excerpt from *God's Valley – People and Power Along the Ten-nessee* (1939)



"…First of all, the relocation man has to remember what TVA plans to do how the lake will run and when the reservoir clearance will begin. Relocation men get contour lines so well fixed in their minds that they can look at wooded hills and corn-fields and talk of islands and penin-sulas. Then it is necessary to know enough about farming to judge the value of land. Land acquisition is a separate department of TVA, but in dealing with the people it is im-portant to understand whether a man is moving from a good farm to a bad one, or vice versa. It also helps if you know enough about the man to know when he is lying and when he is telling the truth…"

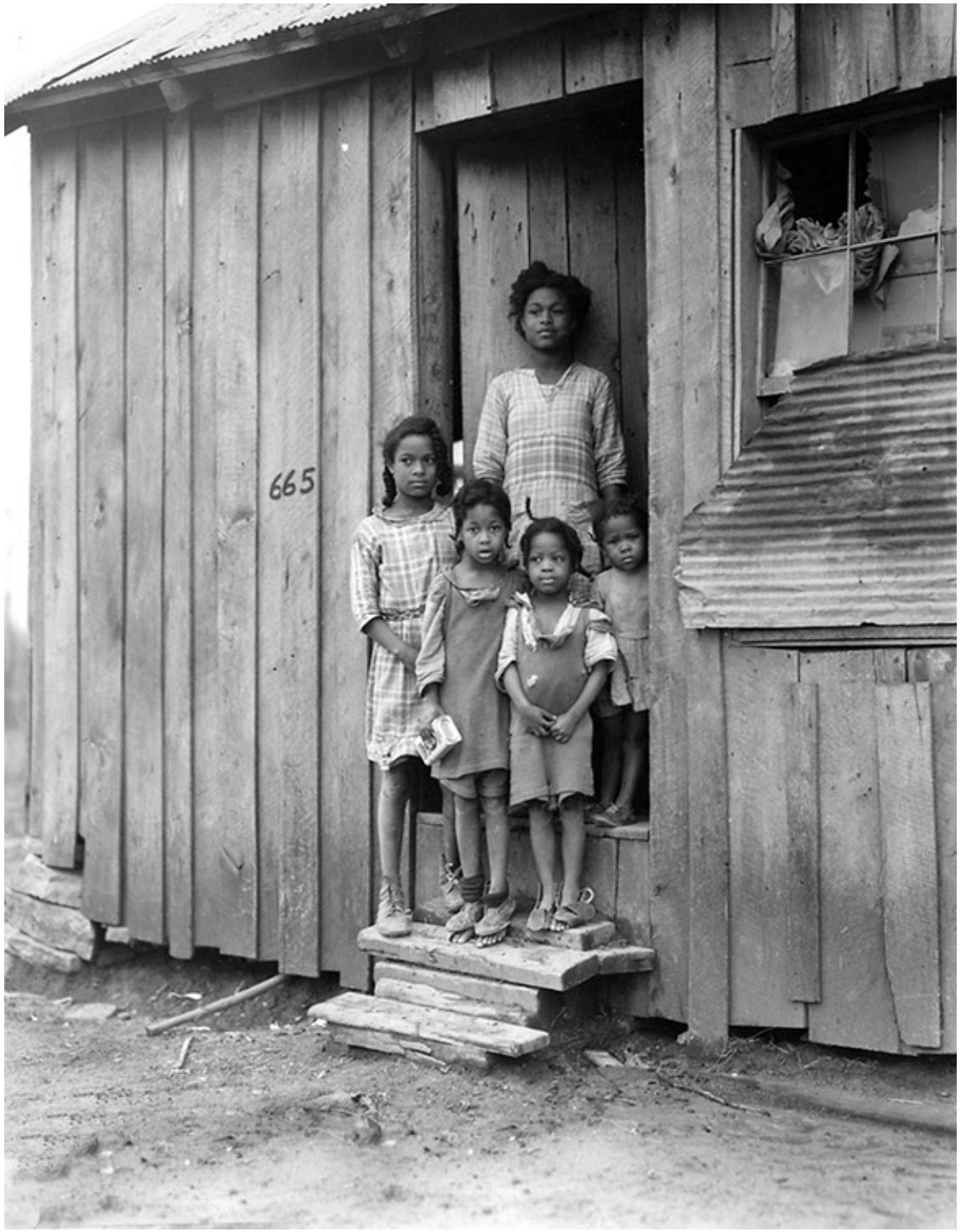
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

On the other hand, it was also true that many of the younger generation, in particular, were thankful for the coming changes (many were asking for jobs at the dams). In fact, they had their own ballad:

My name is William Edwards, I live down Cove Creek way.
I'm workin' on the project they call the TVA.
The government begun it when I was but a child,
But now they are in earnest and Tennessee's gone wild.
All up and down the Valley they heard the glad alarm;
The government means business it's workin' like a charm.
Oh, see the boys a-comin' their government they trust.
Just hear their hammers singin' they'll build that dam or bust.

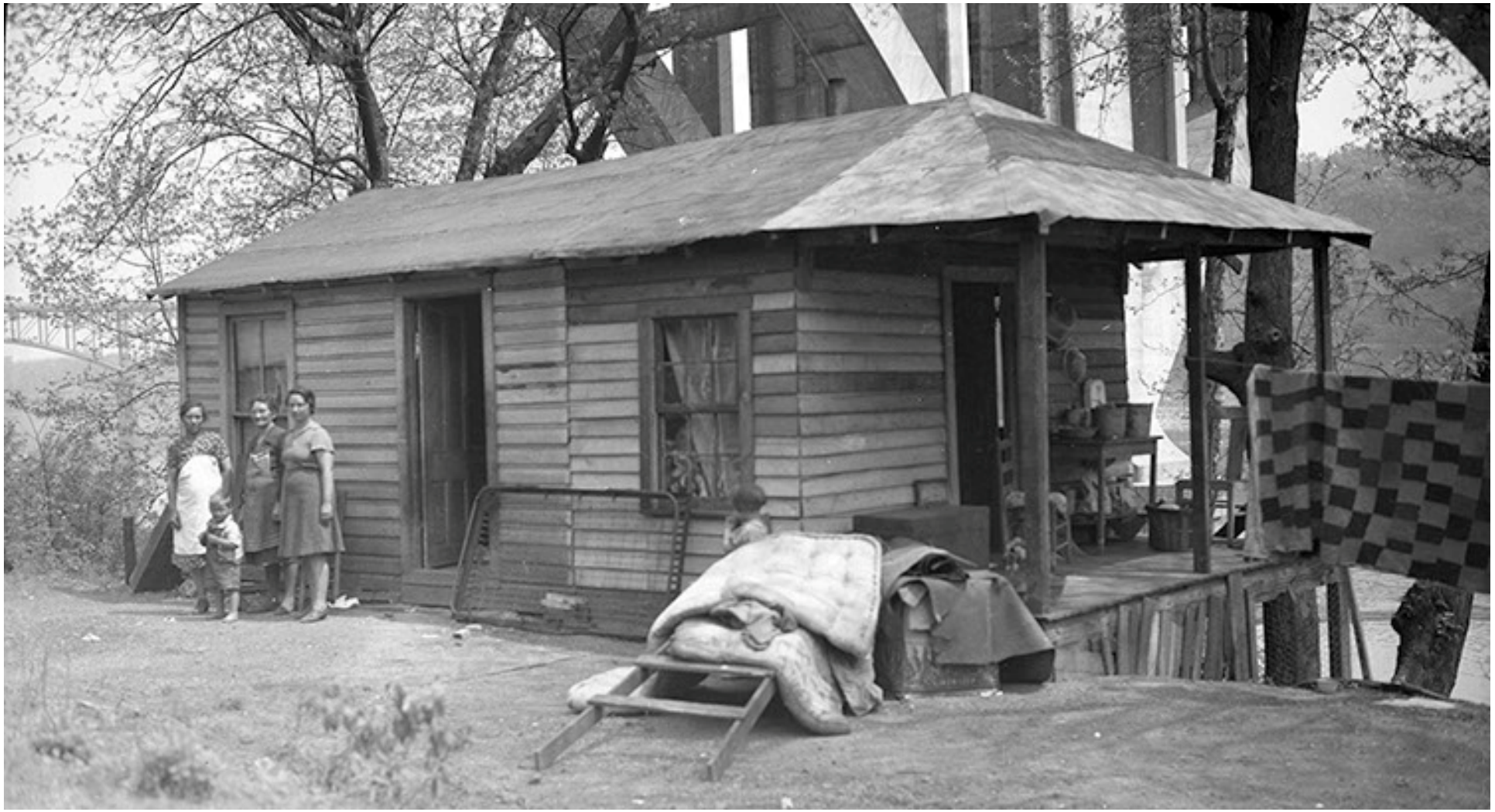
"…Then you must understand the customs of the people. It does no good to leave a man on a farm if you drown out the road that gives him access to markets, so local trade routes must be studied, not on maps but on the ground. The maps may show as a road a trail that you couldn't get a sledge down; the way to find out is to drive your own Ford over. And remember that the farmer may not have a Ford - he may have to walk…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



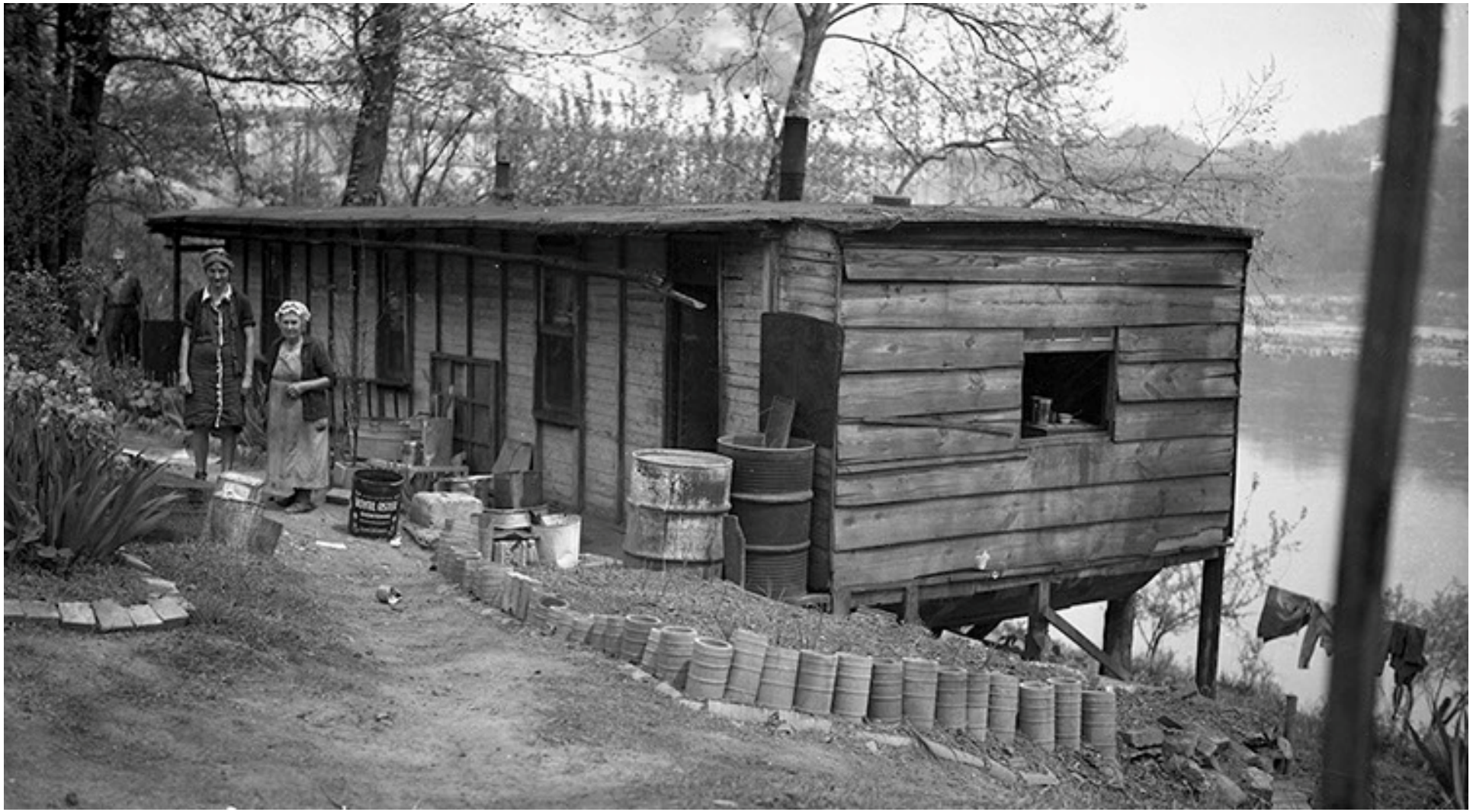
"…When it comes to deciding removal dates, you must try to adjust to the crop year and the length of leases. In some cases, after buying the land, TVA leases it back for one last crop before the water comes. But will it be safe from flood damage while the dam is being built? You must talk to the engineer about flood stages. With such details given attention, there always remains a general problem about transplanting farmers. They are broke already; how can they sell a mortgaged farm for enough to finance a new place?..."

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



"…Under the present procedure, not only the county agent and the university-extension man, but a representative of the Farm Security Administration is also likely to be called in. And will the farmers flourish under transplanting? There may be a resettlement project elsewhere in the state with plenty of room for them, but will they like it there? Will their wives like it?..."

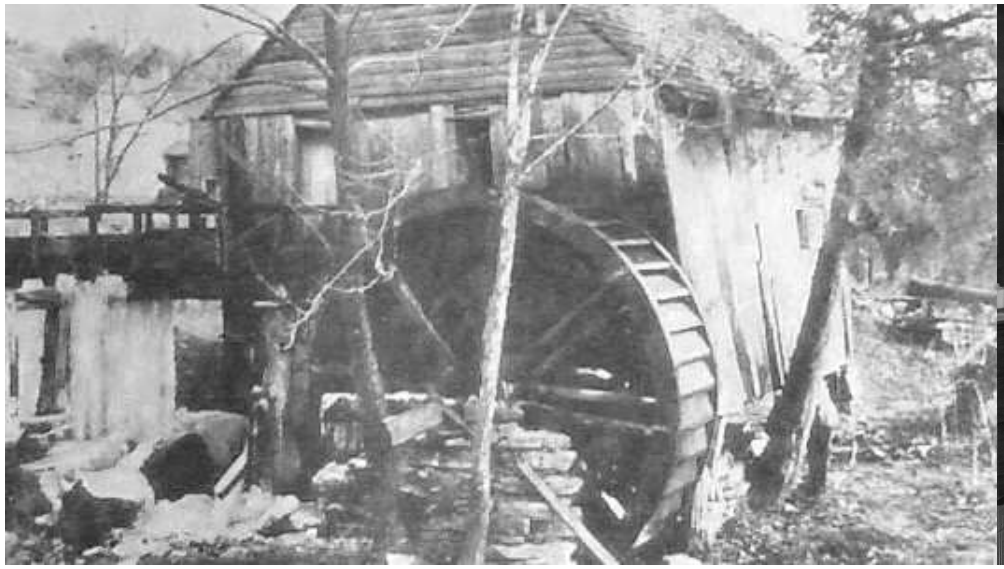
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



"…Most of them want to stay in or near the same county; it is the exceptional mover who thinks he'd like to seize this opportunity to take a look at Venezuela or Brazil. Yet the nearby farms may be scarce, and undesirable from the expert's point of view…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Since the Days of Daniel Boone



"…Few who came to look at Norris in the early days failed to mention the Stooksburys, who became the standard example of a sturdy mountain family uprooted from its native soil. There were pictures of one of the Stooksbury houses, and of Mrs. Jacob Stooksbury at her spinning wheel, and of other Stooksburys doing the washing in a three-legged iron pot. The Stooksburys, said the stories, had lived apart from the world since the days of Daniel Boone…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Francis Stooksbury's mill in Loyston, Tennessee. Photographed before Loyston was inundated by Norris Lake in the mid-1930s"

<u>Right</u>: caption: "Another view of the interior of the home of Mrs. Jacob Stooksbury, Loyston, Tennessee. Many of the furnishings are characteristic of the homes in the region - the oil lamps, the spinning wheel, the wickerwork chairs, the embroidery on the fireplace mantel (November 1933)"

"…Nobody took the trouble to go a few steps off the market square in Knoxville, where two Stooksbury brothers were keeping a store. They are still there, as they were before TVA came to town, and this year, while he gave a good measure of peaches, Mr. Stooksbury said that as far as he knew most of the Stooksburys who had moved out for the lake were doing as well as or better than they had before. Most of them hadn't gone far, just into the next county. Of course he'd got out earlier himself, so it wasn't exactly true that the Stooksburys had never heard of the world outside until the dam was built. For that matter there's a Judge Stooksbury in Knoxville, too…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left T&B</u>: "Mrs. Jacob Stooksbury, at her spinning wheel"

"…Considerable effort was made to keep those who had to move from being cheated while they had in their hands the cash that Uncle Sam had paid for their farms. County agents, knowing the people, were a big help here; their advice was offered and in some cases accepted. Working with the Authority, they listed available farms in the nearby counties, and made their own appraisal figures. Farmers who had to move were driven around to look at the possibilities, and some of them were suspected of being extra hard to please just to get free rides…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

II a l

RELOCATION OF FAMILY (FAMILY) I 2

Fieldman Ruby Cox
Date 9-12-34
Co. Anderson Dist. 7 2446
Map
Tract
Schedule 35

Name Wagner Stooksbury P. O. Address Andersonville

Marital Status: M ✓ S D Sep. W Birthplace: Father Anderson Co. Date 1891

Mother: Campbell Co. Date 1893 No. of Births: Boys 3 Girls

Now living: Boys 2 Girls Living at Home: Boys 2 Girls Living away:

Boys Girls. Others in Household: 5

Name	Age	What Relation	Dependent
Sarah Ford	65	mother-in-law	yes

Distance of home from: School - Elem 3 High 4 Church 2 Store 3 Doctor 7 Dentist 15

Hospital 35 Names of Schools: Elem Belmont

High Andersonville Church Mt Moriah Methodist

No. of rooms in home 4 Wired for electricity no List Electric Equipment now used —

Telephone: no Toilet-Inside Outside: ✓

None Provision for Bath tub Source of Water Supply: Well Cistern Tin Hose

Spring ✓ Distance of water supply from house (Yds) 50 How is house heated

Church Preference Methodist Membership in Fraternal Organization Am Legion

— Cooperative Association: — Others — Years lived

in this Community 12 On this farm 7 Does any member of the family have part

time employment which takes him away from home for weeks or months: Kind no

— Where — Has any member of family previously gone to

city to work and returned home — City: — Type of Work —

How long away Returned when Would he or she return to the city

if his old or similar job were offered? Did he or she marry while away —

Where is home of (wife or husband)

Ages of Children at home: Boys 3, 7 month Girls

Grades in School of " "

Grade reached in school by Father 4 Mother 8 Newspapers read by family: None

Magazines Am Legion Books None Insurance carried: No. of

Policies-Life no Accident — Total amount of Life — Accident

Does family have articles such as books, papers, heirlooms, etc., which require special attention: If so list:

Are there any physical defects in any member of the family: Describe None

Have there been any deaths in family

while living in this community 1 Boy Cause infection

Where buried Mt Moriah

II.

RELOCATION OF FAMILY

FARM DATA

Fieldman Ruby Cox
Date 9-12-34
County Anderson Dist 7
Map
Tract
Schedule 35

Land Owned: Woodland 10 Pasture 15 Crops 6 Other land 18 Total Acres 49 ✓

Type of soil: Limestone Red Dolomite Cherty Dolomite ✓ Black Shale

Yellow Shale Acres Bottom Lands: River no Creek

Lay of soil: Acres level Gently rolling 20 Steeply rolling 29 Location of land

1 mile East Clinch River 2½ miles S. Andersonville

Land Rented: Woodland Pasture Crops Other land Total Acres

Type of soil: Limestone Red Dolomite Cherty Dolomite Black Shale

Yellow Shale Acres Bottom Lands: River Creek

Lay of soil: Acres level Gently rolling Steeply Rolling Location of land

Acres Rented out: Woodland Pasture Crops Other Land Total Acres

Type of soil: Limestone Red Dolomite Cherty Dolomite Black Shale

Yellow Shale Acres Bottom Lands: River Creek

Lay of soil: Acres level Gently Rolling Steeply Rolling Location of land

Type of Farming: General ✓ Live Stock Trucking Dairying Poultry

not given Orcharding Acres in crops last year: Corn Hay Small grains

Tobacco Other cash crops Normal yield per acre:

Corn 25 Hay 1½ Tobacco

Final Appraisal Value: Total $1465.50 Land Improvements

Liabilities: Mortgages None Other Debts None For what

Number of Tenants: Do you plan to take care of your tenants

Do you recommend tenant?

If you are a tenant, give name and address of last three landlords:

Does Tenant want to pay cash rental or farm on shares? Furnish Stock

Tools

What is your chief trade center: Clinton How often do you go there?

Once Month Miles from your home 10

How heavy loads do you take? light Number of trips annually to

Knoxville? 2 Do you own a truck no Capacity —

Fieldman [illegible]	RELOCATION OF FAMILY	Map
Date 9-11-34		Tract
Co. Anderson Dist 2	PROPERTY	Schedule 35

Live Stock:	Number	Value	:		Number	Value
Horses	1	$100.00	:	Sheep		
Mules	2	$200.00	:	Chickens	10 hens 25 fry	$16.25
Cattle	1 Cow	$50.00	:	Turkeys		
Hogs	4	$30.00	:	Other Poultry		
Other			:	Bee Stands		

total $396.25

Machinery:

Article	Age	Value	: Article	Age	Value	: Article	Age	Value
Turning P.H.		$15.00	:			:		
Small plow	old	$10.00	:			:		
Harness	old	$20.00	:			:		
Small tools		$5.00	:			:		
			:			:		

total $50.00

List trucks, wagons, tractors, mowers, hayrakes, binders, hay balers, disc harrows, turning plows, gang plows, corn planters, grain drills, corn harvesters, threshers, lime spreaders, manure spreaders, section harrows, small tools, harness.

Personal Possessions:

Article	Make	Age	Value	:	Article	Make	Age	Value
Car	none			:	Sewing Machine	Davis	35	$25.00
Radio	—			:	Floor Coverings	—	—	
Piano	—			:	List Other Articles			
Stove	—			:				
Phonograph	—			:				

What is the approximate value of furniture in Kitchen: $150.00 Bed Rooms: $100.00

1 - 2 - 3 - 4 - 5 -: Dining Room $75.00 Living Room $125.00

Comments: Very well arranged small home TVA Employee

total $450.00

896

Fieldman [illegible]	RELOCATION OF FAMILY	Map
Date 9-19-34		Tract
Co. Anderson Dist. 2	INCOME	Schedule 35

FARM EXPENDITURES AND RECEIPTS FOR 1933

Expenditures - 1933	Amount	:	Receipts - 1933	Amount
Livestock and Poultry	none	:	Crops, hay, vegetables, fruits	$25.00
Foods	none	:		
Farm Implements and Machinery	—	:	Livestock and livestock prods.	$30.00
Machinery Repairs and Replacements	—	:	Poultry and poultry prods.	$20.00
Farm Labor	$15.00	:	Milk and milk products	none
Commercial fertilizers, manures lime	$45.00	:	Forest products	—
Seeds, plants, trees, etc.	$2.00	:	Other products	—
Taxes	$8.00	:	Home occupation, such as handcrafts	—
Insurance of buildings, crops equipment	none	:		
Other expenses		:		
Total Expenditures for 1933	$70.00 ✓	:	Total Receipts for 1933	$75.00 ✓

FAMILY LIVING

Products Furnished By the Farm and Used by the Family 1933

Kind of Product	Amount	Estimated value	:	Kind of Product	Amount	Estimated value
Butter, lbs.	160	$32.00	:	Sweet Potatoes other than in garden, bushels	15	$11.25
Milk, gallons	250	$37.50	:	Apples, Bushels	12	$6.00
Eggs, Dozen	200	$30.00	:	Peaches, Bushels	—	—
Poultry, number	40	$20.00	:	Garden, acres	1/4	$25.00
Pork, lbs. dressed	500	$40.00	:	Honey, pounds		
Corn, Bushels	14	$18.00	:			
Wheat, Bushels	—	—	:			
Irish Potatoes (other than in garden) Bushels	6	$6.00	:	Wood, cords	25	$25.00

Total $250.75 ✓

Per Capita 50.15 ✓

V.

RELOCATION OF FAMILY
OUTSIDE INCOME

Fieldman [illegible]
Date 9-19-34
Co. [illegible] Dist. 2

Map
Tract
Schedule 35

Give the approximate income from sources other than home farm (1933) :

From Pensions $72.00 From Life Insurance no From Health and Accident —

From Savings Deposits None From Rents no

From Other Investments no From Labor off the farm of family at home: Days ____ Amount ____

From Cash now on hand none Assistance from children away from home no

From Industrial Compensation no From State or Federal Relief None

tot. $72.00

Data on children and other members of household now living at home who have employment away from the farm:

Name	Age	Type of Work	Where	Annual Income	Steady or Part time
Wager Stocksbury	24	TVA Clearing	Dan[illegible]	$780	Steady

Data on children not living at home who now have employment:

Name	Age	Type of Work	Where	Annual Income	Steady or Part time

VI.

RELOCATION OF FAMILY
(Location Desired)

Fieldman [illegible]
Date 9-19-34
Co. [illegible] Dist. 2

Map
Tract
Schedule 35

What new location have you selected: County None Community ____

P.O. Address ____ Reasons for selection ____

____ Were you assisted by a real estate agency ____

____ By some other organization ____

If no location has been selected, what sections are you considering ____

Do you wish to own or rent in the new location buy Approximate amount you will invest 2,000 Size of house desired ____

Barns for storage and stock needed good size barn

Acres wanted: Crop land 20 Pasture 30 Woodland 15

Do you want electricity for general purposes Care nothing about it

If you do not wish to relocate on farm where are you going ____

What are your reasons for this choice ____

What type of employment do you wish: Farm ____ Industry ____ Part time Farm and Industry ✓ Garage ____ Stores ____ Teaching ____ List any other mercantile or professional employment desired ____ Has employment been secured yes List knowledge of special trades such as, auto mechanic, carpenter, brick mason, etc: ____

Do you expect to sell or move your: Household goods move

Farm equipment move Livestock move

Are you interested in the relocation service of the Extension Division of the University of Tennessee yes.

VII.

Fieldman Rudy Cox RELOCATION OF FAMILY Map
Date 9-12-34 Tract
Co. Dist. Schedule

REPORT OF INVESTIGATOR ON RELOCATION OF FAMILIES

This blank should be filled in completely as soon as possible after the interview is over. The following questions ask for your judgment of the applicant on a number of different points. Before recording your opinion on any item, read and consider carefully all the descriptive statements under the line. Indicate your opinion by making a check (✓).

1. How did the individual respond to the interview? (Check ✓ along this line at some point).

Antagonistic Suspicious Indifferent Interested ✓ Gladly Cooperated

Comments: Cooperative Very nice
(Continue on back of sheet if needed).

2. What is his attitude towards the TVA? (Check ✓ on line).

Antagonistic Critical Neutral ✓ Interested Active Booster

Comments supporting your judgement Ready Cooperation
(Continue on back of sheet if needed).

3. Do you feel there are any special problems in the moving of this family that need further study? If so, describe:

4. Give gist of conversation with family:
not much to say not satisfied
With price TVA have offered for land
Would like to locate in Anderson co
If Possible
Now Employed by TVA
Has very well kept small farm
a little above the average in his
Community has good stock and fair
Tools

9/6/34

TENNESSEE VALLEY AUTHORITY
OFFICE MEMORANDUM

To: Mr. J. C. McAmis, Industrial-Agricultural Division.
From: E. W. Cowling, Jr., Land Acquisition Division.
Date: September 6, 1934.

Subject: NR-568 - Wager Stooksbury et ux - Anderson County - 49.5 acres - - $1,462.50 -

The above property owner advises us that he is very dissatisfied with the price we are offering him, and that he will not execute contract for the sale of his land until he is able to find another place upon which to relocate. He works for the T. V. A. Clearance Unit, and I do not believe he has had much opportunity to make an effort to find a place to purchase.

Your assistance in this matter will be appreciated.

E. W. Cowling, Jr.

Copy to:

Mr. Pat W. Kerr.

EWC:CBC

One in Five

"…The removal men did what they could to help families living below what they considered a normal subsistence standard; one reason people were on the whole so willing to move was that so many of them thought things couldn't be worse. In the more desperate cases the Authority looked around and sometimes found long-lost relatives who agreed to help, or furnished a link with the outside world. Three years after the removal a charity worker in the area, in no way connected with TVA, gave it as his opinion that the families moved out were on the whole slightly better off than they had been before, and certainly in no worse condition. A survey showed one out of five to be dissatisfied, which is a low percentage of dissatisfaction anywhere…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above L&R</u>: caption: "This couple lived in the two-room tar paper shack with no conveniences. They had little income and no rel-atives to assist them in relocating. An early purchase was made in order to give plenty of time to search for replacement property. Transportation was furnished and replacement property was found one block from U.S. highway. Whereas the couple had been six miles from the nearest store, they are now one block from bus service, surrounded by neighbors, and near a brother-in-law who can help them when the need arises."

Lessons Learned

"…A lot of the lessons they learned at Norris could be put into practice down the river, when they moved people out of the other areas. But the down-river country was different. They were lucky, in the first place, in not having so many people to move less than a thousand families at Wheeler, around a thousand at Guntersville, eight hundred at Chickamauga, and less than five hundred at Pickwick. The trouble was that down there they had to flood more good rich bottom land. However, down in the cotton country most of the farmers were either tenants or croppers, in no position to argue about what was done. And in dealing with the owners it could be argued truthfully that, while this was pretty good land, it was also the area of flood damage. Relocation was assigned to see that the tenants got, if possible, a fair chance elsewhere. And they did what they could to adjust removals to crop seasons…"

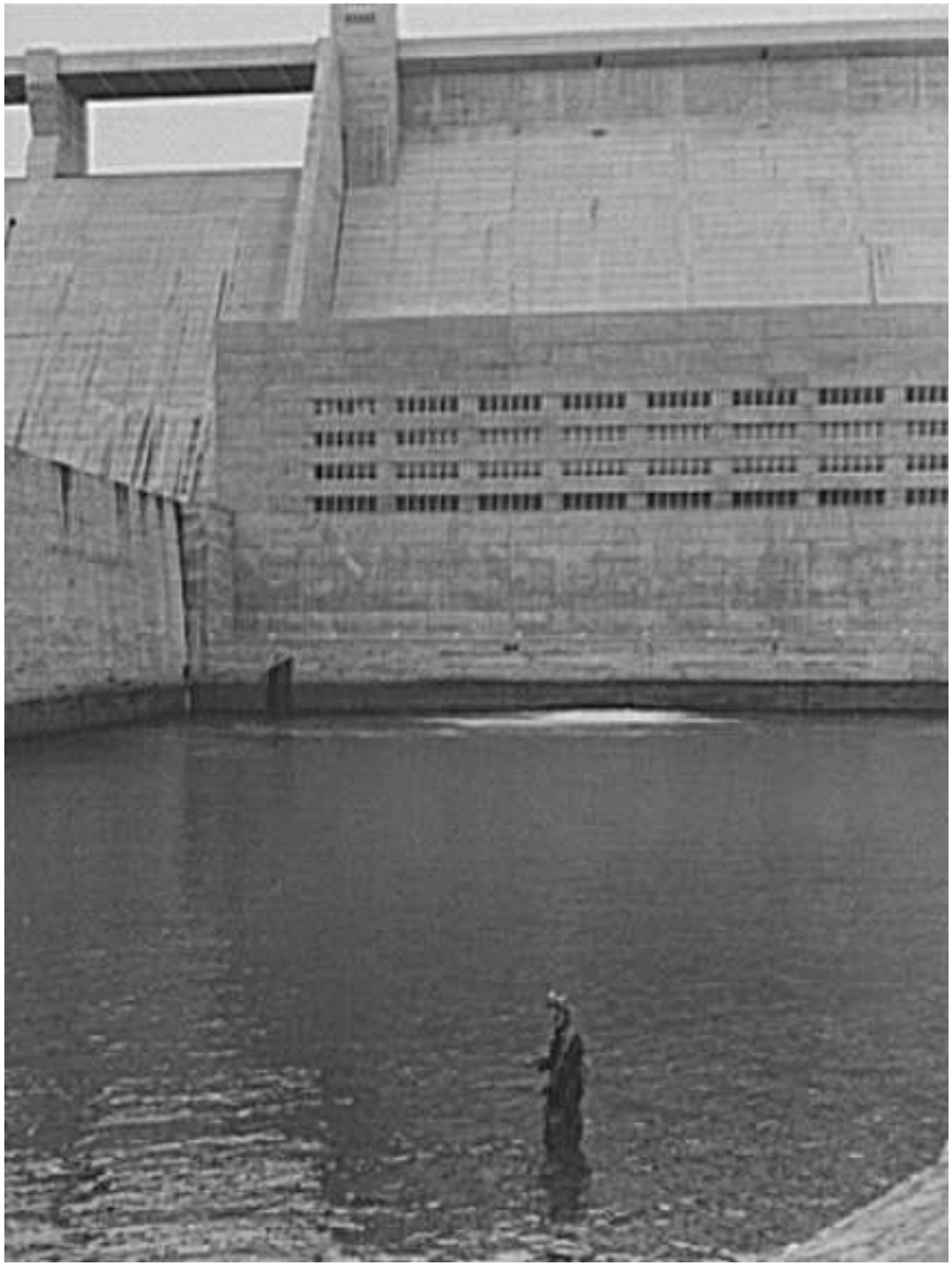
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Above L&R</u>: caption: "Countryside near TVA's new Douglas Dam on the French Broad River. June 1942."
<u>Left</u>: caption: "Looking upstream from TVA's new Douglas Dam on the French Broad River. June 1942."

A Fisherman’s Best Friend

"…Down where the river is really a river, a certain amount of river industry had to be considered. One fisherman at Pickwick fixed things for himself; he had lived some distance from the water because you could never tell where it would rise to, but now, with the river under control, the TVA engineers could tell him where it would come. So he moved right by the water line, where setting his trot lines across the river for cat, up-river for buffalo would be less trouble than it had been before…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



"…Objectors to the big Western dams made a lot of fuss over what would happen to the fish; but TVA had no romantic salmon to deal with, and the catfish of the Tennessee, slipping over the spillway at Wheeler dam, soon recover from their surprise. The reservoir lakes are being stocked with real fish, bass and bream and trout, so that on the whole it is understood throughout the Valley that TVA is the fisherman's best friend…"

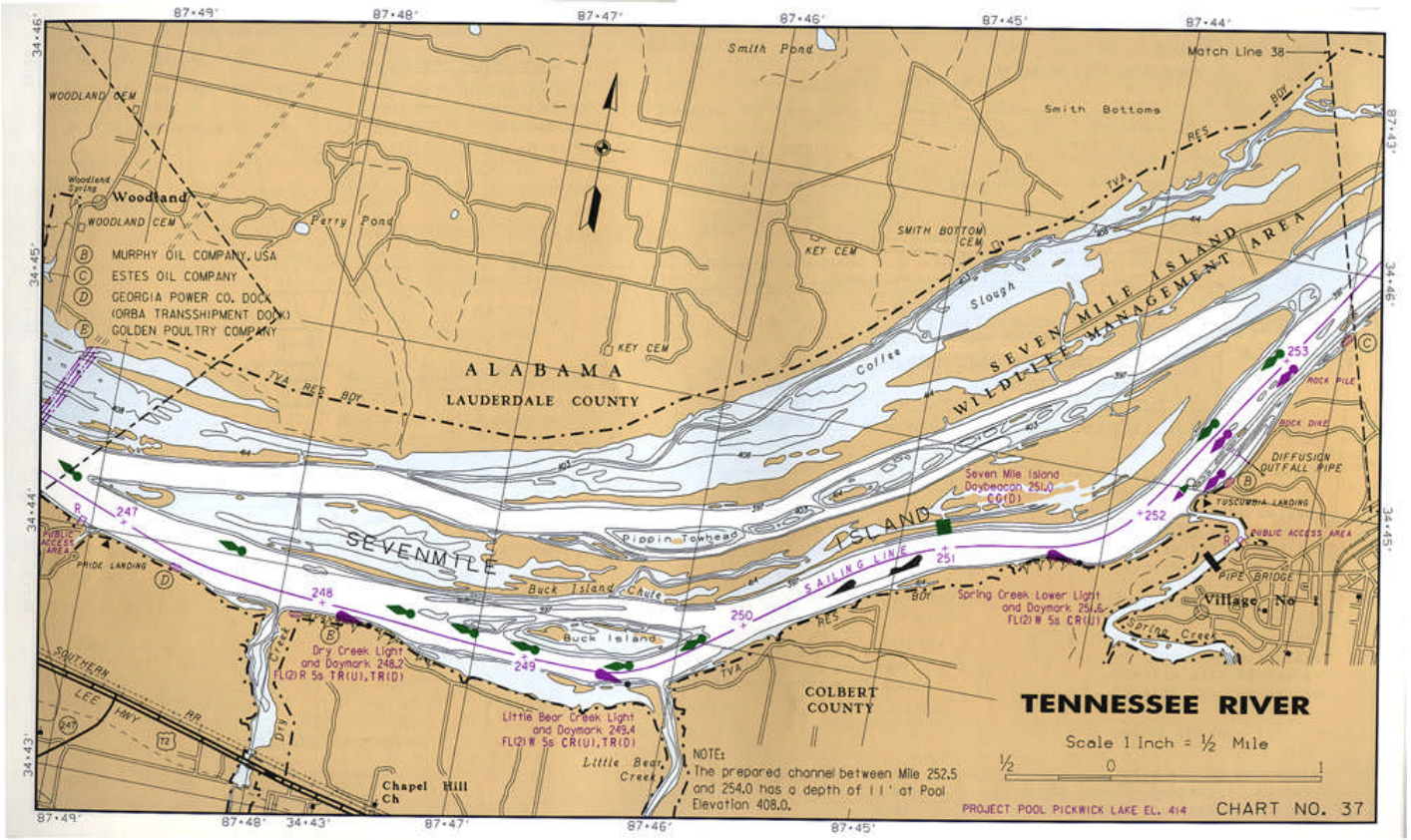
RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Fishing at the base of Norris Dam. June 1942."

Seven Mile Island

"…Northern papers did mention sadly that the mussel industry was being ruined, but you wouldn't worry much over that if you were on the ground. Nobody eats mussels; the Indians did, but that was before the white man turned the river into a sewer. At the Shoals, mussels could be gathered by lowering an iron bar with short lines and hooks attached. The mussel grabs and holds until he is hauled up; he is thrown away to rot while his shell is sold to make pearl buttons. A ton of shells sells for $20 to $50 when the shell boat makes its rounds, and some farmers added to their income that way, as did some of the fishermen on the river and the people living on Seven Mile island. Deep water will mean no more mussels, but on the whole the industry was not as important as some of the papers made it sound. Most of the river people wouldn't even take the trouble to grade the shells; they left that to be done on the boat, though they might have made extra money by sorting them…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)



"…Seven Mile island is, or was, a strip of jungle in the river near Pride's Landing, accessible only after various works of man had begun to conquer the Shoals. Before the TVA men came, part of it was farmed, but tall cypress and tupelo gum trees were left standing along the shoreline, with wild grapevines looping to the tops to tie together water, earth, and sky. In the old days, with the matted grass and creepers for a screen, eyes peered suspiciously at all strangers who landed, because the real industry of Seven Mile island was bootlegging…"

990

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

Do No Harm

"…In the Hiwassee area of North Carolina the relocation men found another set of problems. This country is more like the Norris country, although there is no city as near as Knoxville is to Norris. In the hills around Persimmon Creek, Hanging Dog Creek, and Bear Paw Church, you will find sledges used for transportation and see oxen plowing the fields…Then, too, this area is one where national parks and forests have already accustomed people to dealing with Uncle Sam. Over the line in Georgia some of them moved once for a park, and now they're moving again for the reservoir. But of course the state of Georgia started as a resettlement project. On the Carolina side many of the people are of Cherokee descent, and the land titles of the Dockerys and the Stileses and other families of the area go back to Indian grants. One Indian treaty was signed at Tellico Plains between Knoxville and Hiwassee, and while it's a little late, it's interesting to know that Uncle Sam is at last paying fair prices for Cherokee lands…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

"…Besides raising a lot of individual problems, large-scale planning has to consider whole communities…To be fair, to do as little damage as possible, and to do a little improving wherever possible, these are the gentle purposes of the relocation staff. To achieve these ends you must have more than good intentions; you must have knowledge and firmness and tact, and a sense of proportion. You must also have luck, either direct from Providence or through some other agency, because big as TVA is, there are limits to what it can do…"

RE: excerpt from *God's Valley – People and Power Along the Tennessee* (1939)

<u>Left</u>: caption: "Air-cooled in summer time: what about the winter?

<u>Right</u>: caption: "Norris houses follow old styles, but in a new way"

Part 21

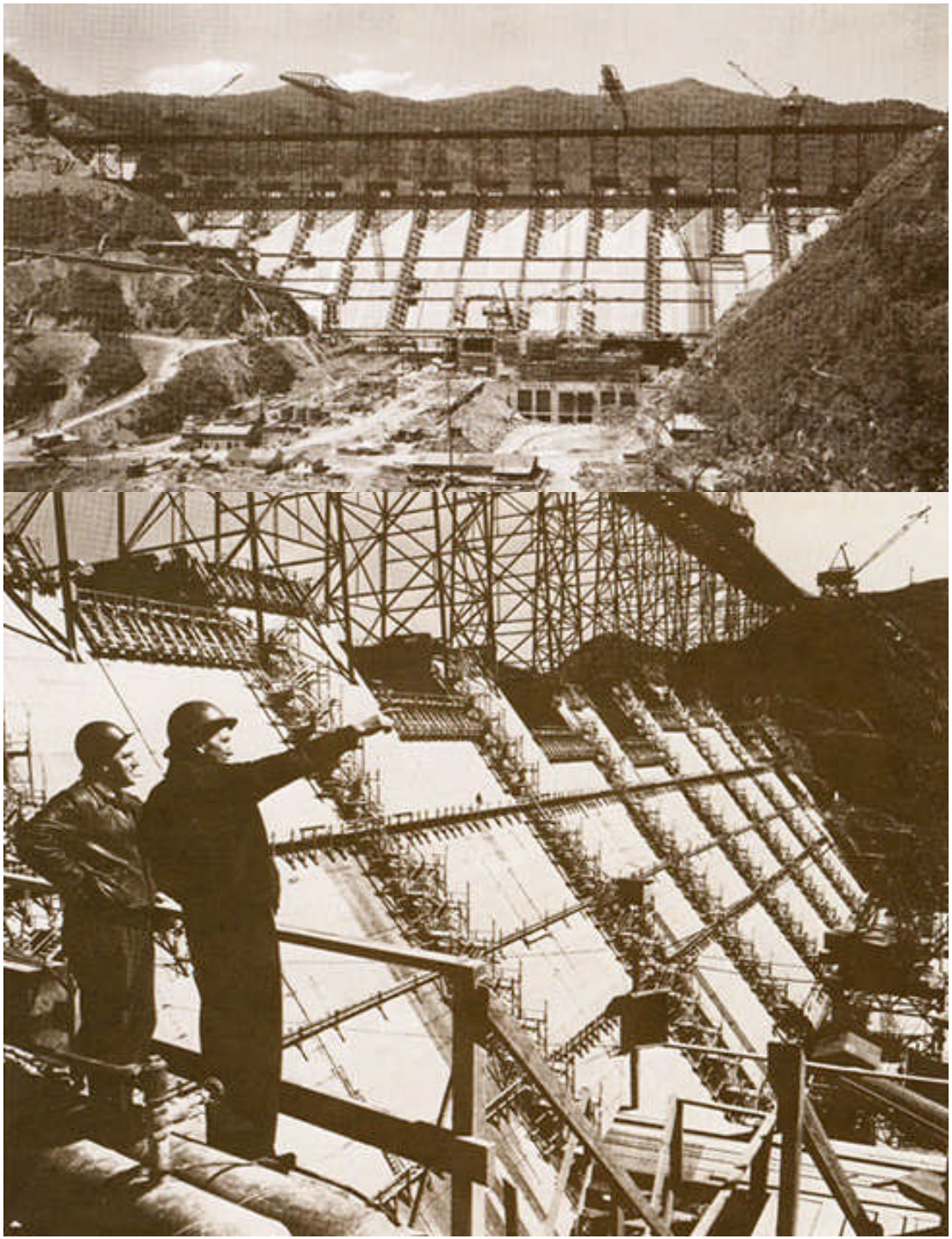
To Beat the Bastards

By the Dozen

"They're burning the midnight oil in the Tennessee Valley, Glaring 3,000-watt lamps illuminate the muck of river beds. Behind cofferdams thousands of men are working overtime to finish a dozen dams to provide more power for war industries in 1943…"

***Popular Mechanics*, January 1943**

<u>Above</u>: caption: "Fontana Dam nighttime construction"

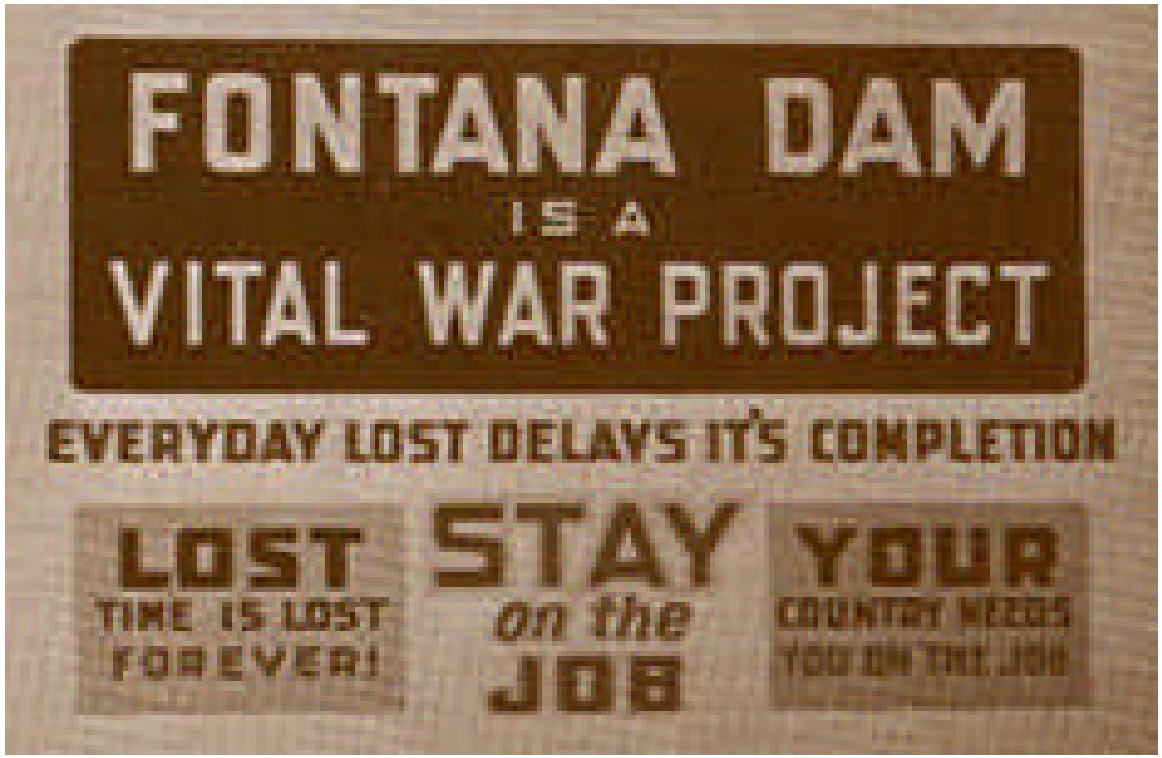


"…The Tennessee Valley Authority is making history by building concrete monoliths by the dozen. Mountains of earth and shale are moved; countless tons of gravel and sand churned into concrete; thousands of pounds of steel parts fitted into vital sections of the great dams, and millions of man hours are being poured into this TV (for Victory) A project…"

***Popular Mechanics*, Jan. 1943**

Left: TVA WWII-era poster

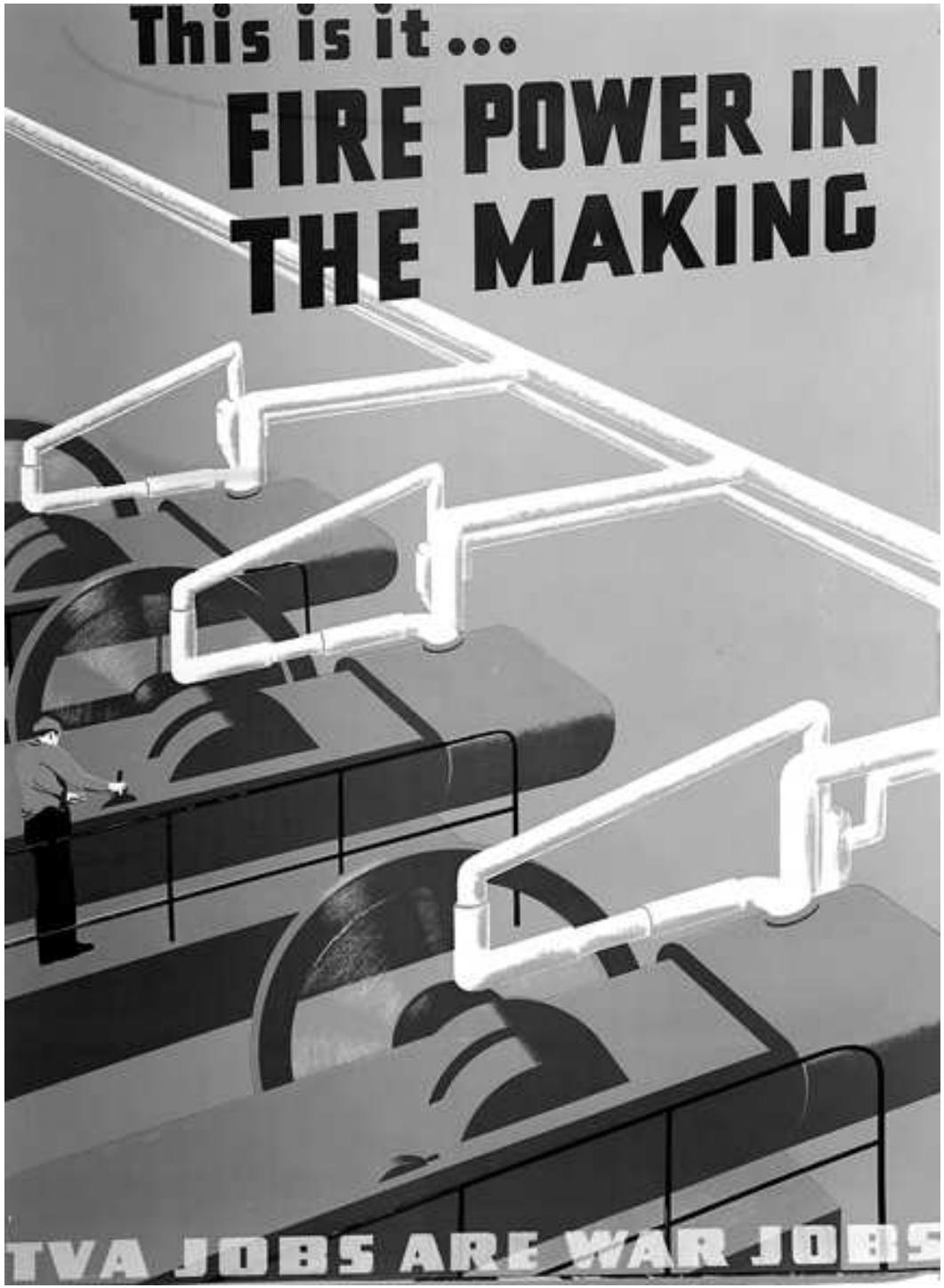

WORK SAFELY


FONTANA DAM
IS A
VITAL WAR PROJECT
EVERYDAY LOST DELAYS IT'S COMPLETION
LOST
TIME IS LOST FOREVER!
STAY
on the
JOB
YOUR
COUNTRY NEEDS YOU ON THE JOB

Kilowatts to Kill the Rats!

"…Extra generating units installed in the dozen dams now in operation await the increased water flow to spin the hungry blades of their turbines. Power from the system flows directly into the South's big aluminum, chemical and electrometallurgical plants. These industries are straining to produce the materials for bombers, explosives and other critical war products in unheard of quantities…"

***Popular Mechanics*, Jan. 1943**



"…The TVA already supplies a large amount of power for the aluminum industry which must produce enough silvery sheets of the lightweight metal to build 125,000 warplanes in 1943. Experts say the completion of the new dams – especially Douglas – will assure the goal set by the aluminum companies…"

***Popular Mechanics,* January 1943**

RE: the threat of war called TVA to action as it sought to assist with national defense by increasing its scope of activities. Already a major contributor to electric power in the *Tennessee Valley* region, TVA expanded these capabilities with the construction of three dams: *Cherokee*, *Douglas* and *Fontana* (specifically for the increased production requirements of war industries in the region).

"Tonight a single subject hold's America's attention. One concern is shared by every citizen: that this nation must be made safe against the threat of military aggression. Everywhere through the length and breadth of the country Americans in all walks of life are measuring our resources for defense. We are now in the midst of a great effort to transform our peacetime economic institutions so that the needs of defense shall be met quickly and effectively. America viewed as one great production plant is being geared to that task…Remember that this southeastern region has been named by military authorities as one of the most desirable situations in the United States for the location of national defense production units…"

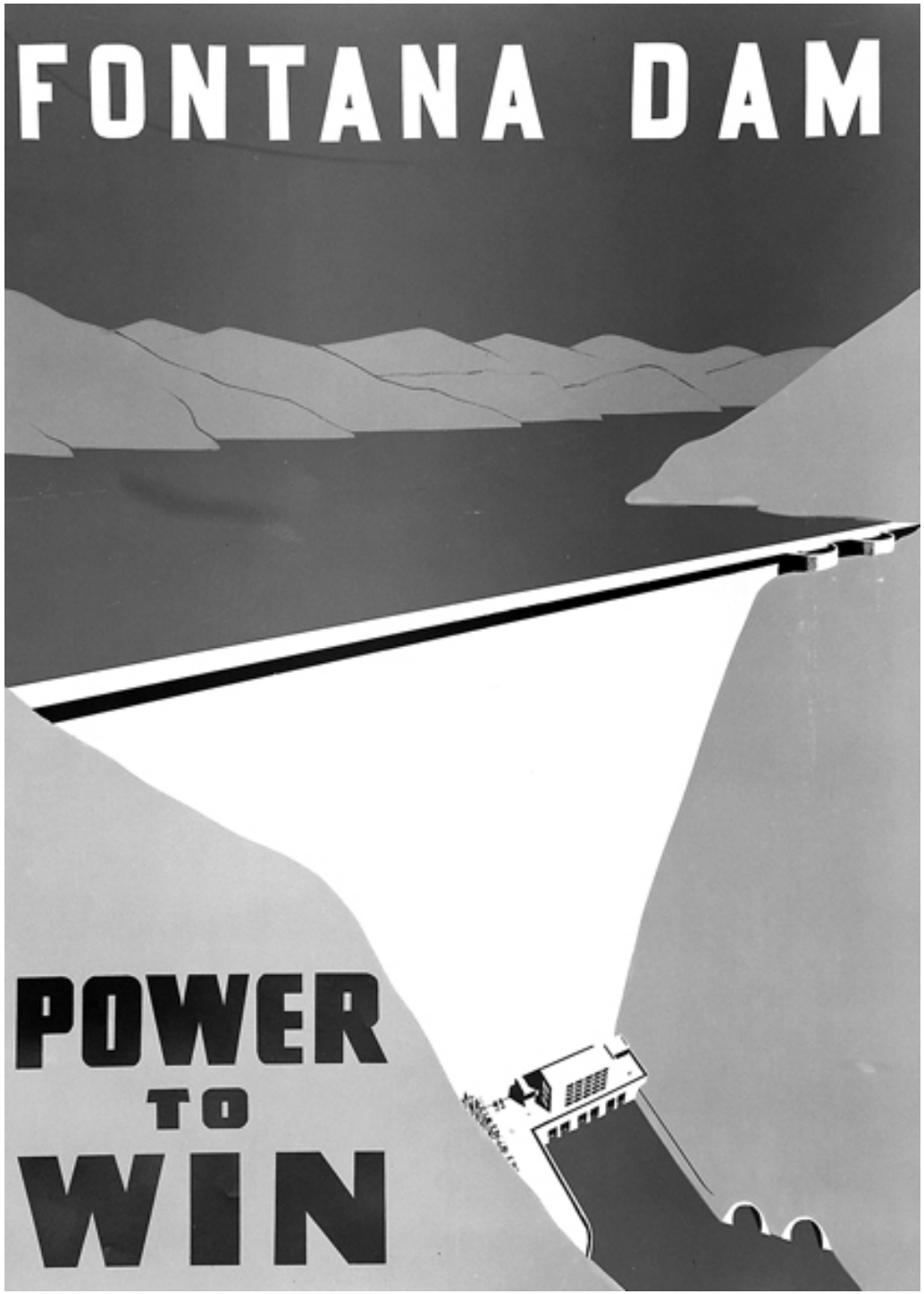
RE: excerpt from a June 21st 1940 speech given by TVA Director *David Lilienthal* (left, ca. 1938) at a public dinner (it was broadcast nationally)

How Soon and How Much?

"…Ever since the TVA was created as a federal agency nearly nine years ago, somebody has been saying its job either couldn't or shouldn't be done. These controversies are now forgotten and the only question is: How soon and how much?..."

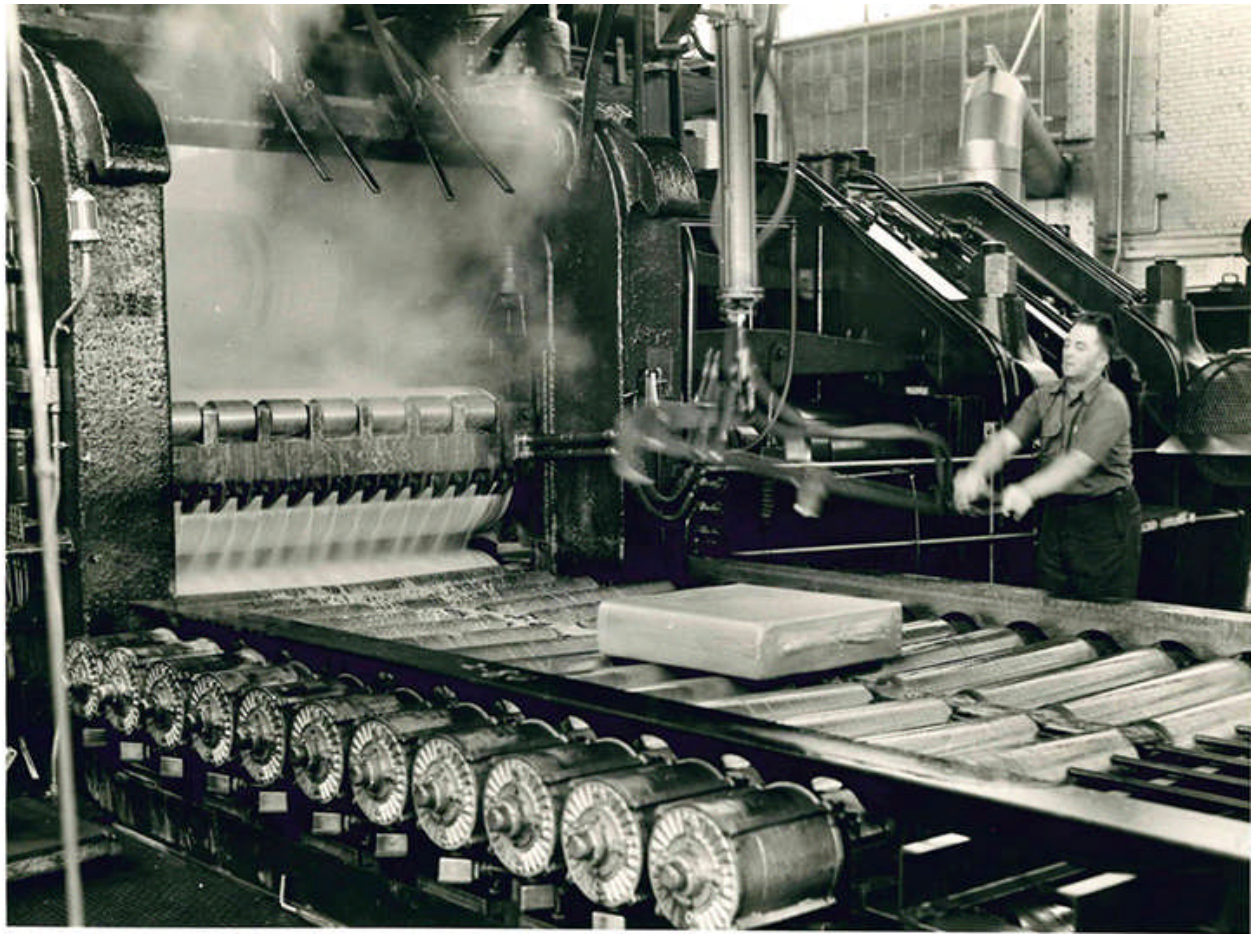
***Popular Mechanics,* January 1943**

RE: the TVA's main contribution to the war effort lay in producing enormous amounts of electric power. To that end, it had many power customers that were vital to the war effort, including an A-31 bomber factory in Nashville TN. However, two customers loomed larger than all the others combined. One had been in the region long before TVA while the other came to the region, in large part, because TVA was already there.



The *Aluminum Company of America* (ALCOA) factory (south of Knoxville) was the largest aluminum plant in the world. As war loomed, defense experts realized how important aluminum would be when war came. In its early days, ALCOA had produced its own energy, in part from hydroelectric plants of its own. In 1935, ALCOA began buying power from TVA, forming an unusually close public-private relationship with its energy supplier. In 1941, ALCOA made the government a gift of its Fontana property (a prime site for a TVA dam) in return for various considerations from TVA. A bill authorizing the construction of *Fontana Dam* was signed just ten days before the attack on Pearl Harbor.


FONTANA DAM
ESSENTIAL
WAR PROJECT
Power for Aluminum
Aluminum for Warplanes
Warplanes for VICTORY!
TENNESSEE VALLEY AUTHORITY



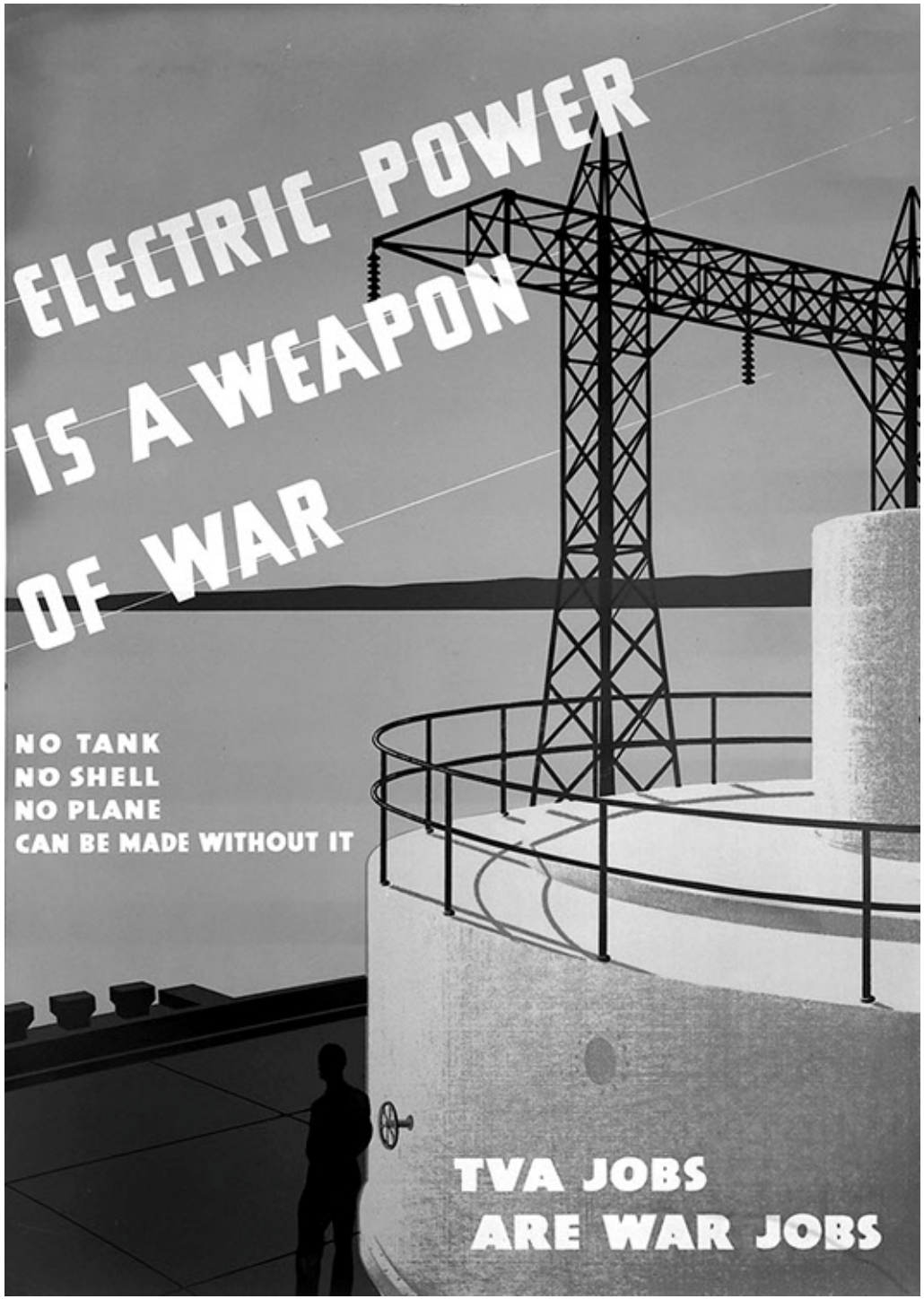
A Temporary Thing

"…the striking thing is the lightness, the fragility of these buildings. The village has no weight, it seems barely to rest upon the soil; it has not managed to leave a human imprint on the reddish earth and the dark forest; it is a temporary thing. In America, just as any citizen can theoretically become President, so each Fontana can become Detroit or Minneapolis; all that is needed is a bit of luck…Detroit and Minneapolis, Knoxville and Memphis, were born temporary and have stayed that way…"

Jean-Paul Sartre

RE: in 1945, Satre wrote an essay entitled "American Cities," in which he described the transitory, distinctly un-European quality of the prefabricated village TVA had built to house the workers at *Fontana Dam* (left)


FONTANA DAM
length 2365 feet
height 480 feet
BUILT BY TVA 1942-1945 AS A UNIT OF
ITS MULTI-PURPOSE SYSTEM OF DAMS.

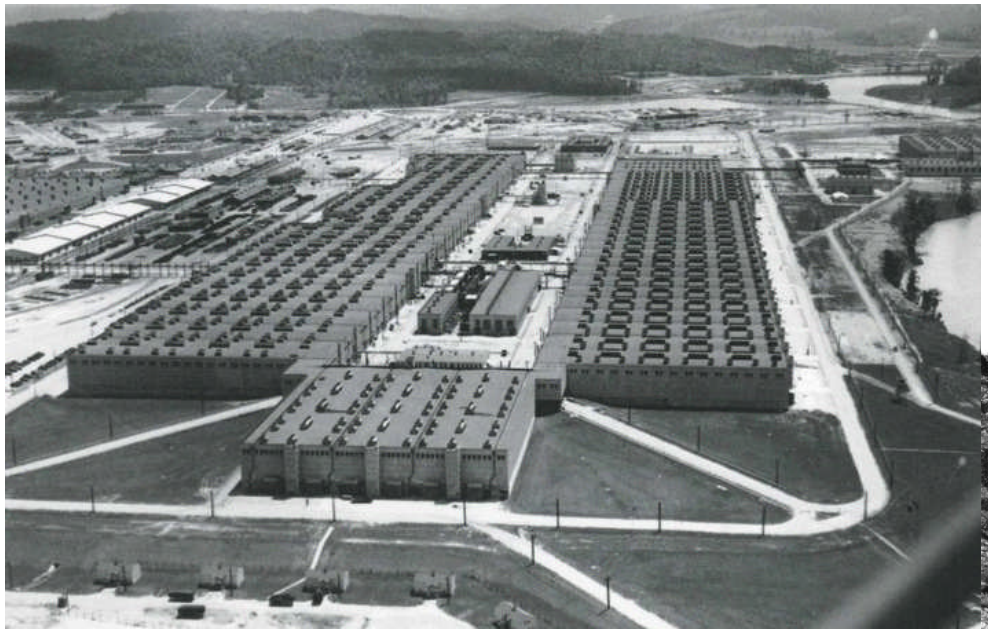


"…When the vast project is completed – the largest single construction program ever undertaken in the U.S. – its present capacity of slightly more than 1,000,000 kilowatts will be tripled and the yellow waters of the Tennessee river and its tributaries will supply one-half as much electricity as the entire nation produced during World War I…"

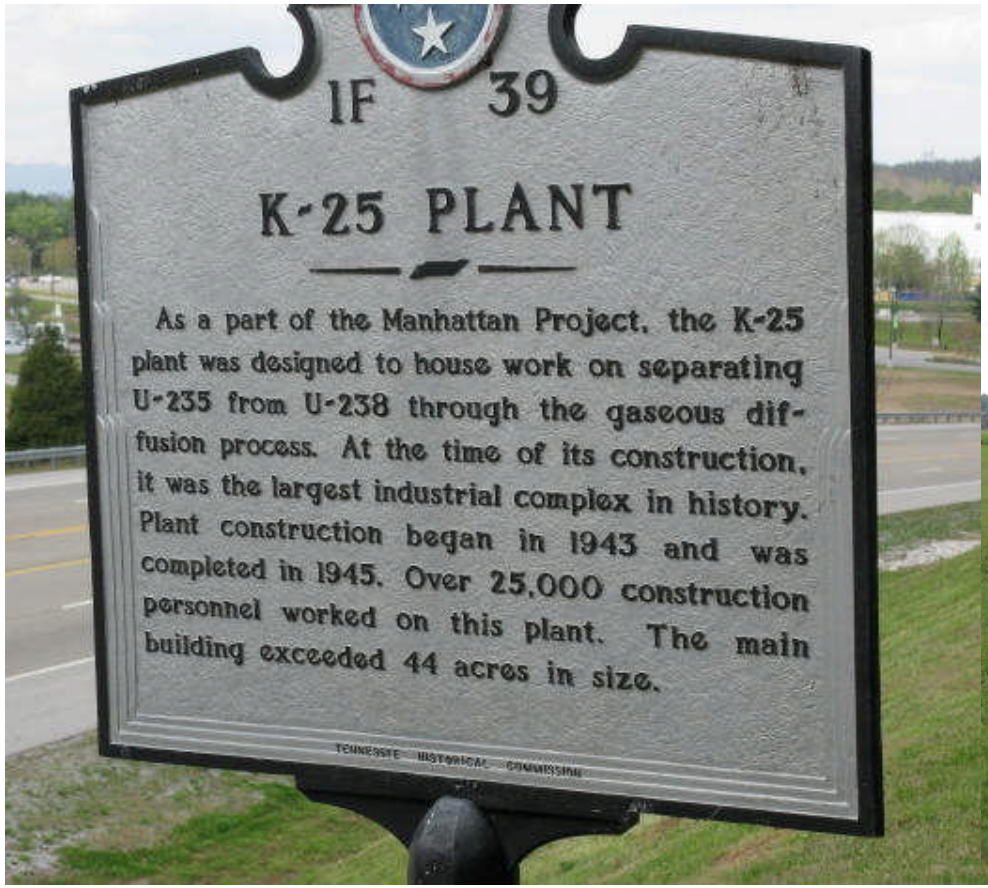
***Popular Mechanics,* January 1943**

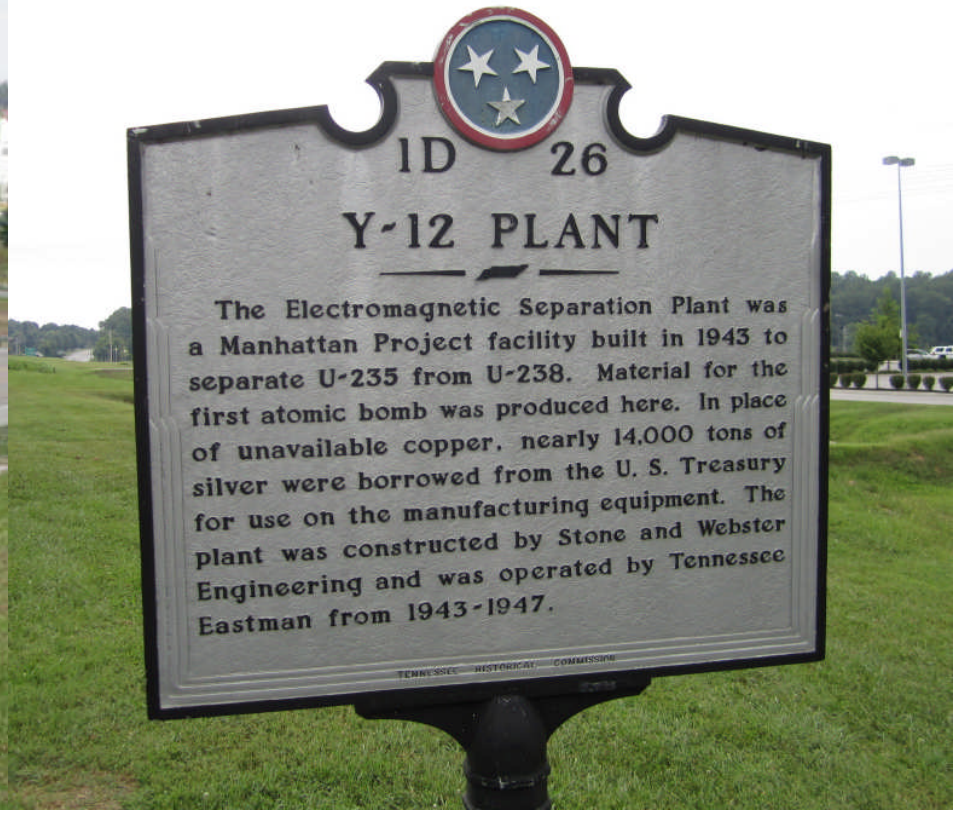
RE: according to a 1946 article in *Fortune* magazine, what won the war was air power, based on "Aluminum and Alcoa"

A National Asset



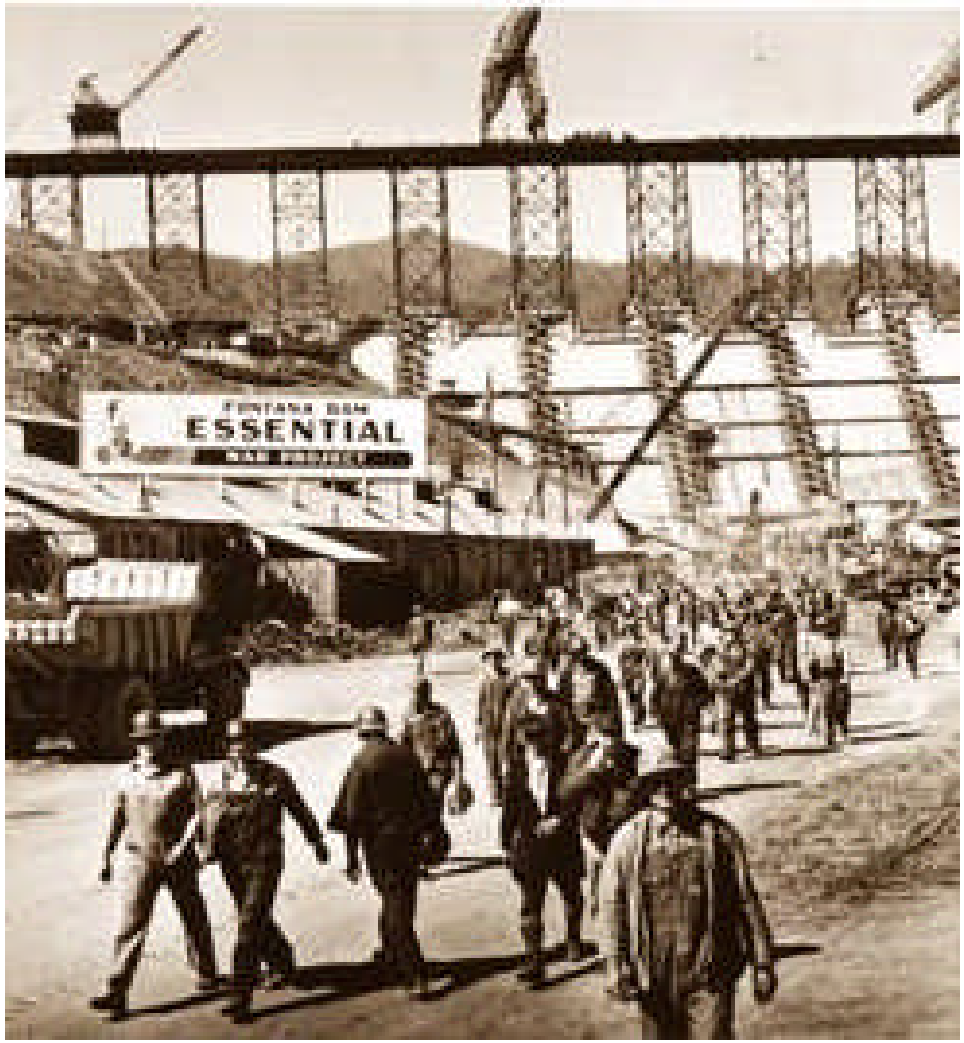
The second of TVA's critically important wartime power customers was a secret project set up in an isolated area along the *Clinch River* in 1942. At first it was known simply as the "Clinton Engineer Works" (after the nearest town of any size, Clinton, TN). It was part of a larger effort that produced the first atomic bomb - the *Manhattan Project*. To manufacture the nuclear materials needed for the bomb, the government secretly built an entire city called *Oak Ridge* in the Tennessee hills. The location was chosen for a number of reasons, but two of them were directly related to TVA's presence. One reason was the massive amount of power needed to fuel the elements of nuclear-materials production (K25 Gaseous Diffusion Plant, at left). The second arose from the fact that nuclear-materials production; delicate and potentially dangerous, required large amounts of fresh water for cooling - and fresh water in a place planners were confident would never flood. Oak Ridge, sixteen miles downstream on the Clinch River from the TVA's *Norris Dam*, fit the bill.





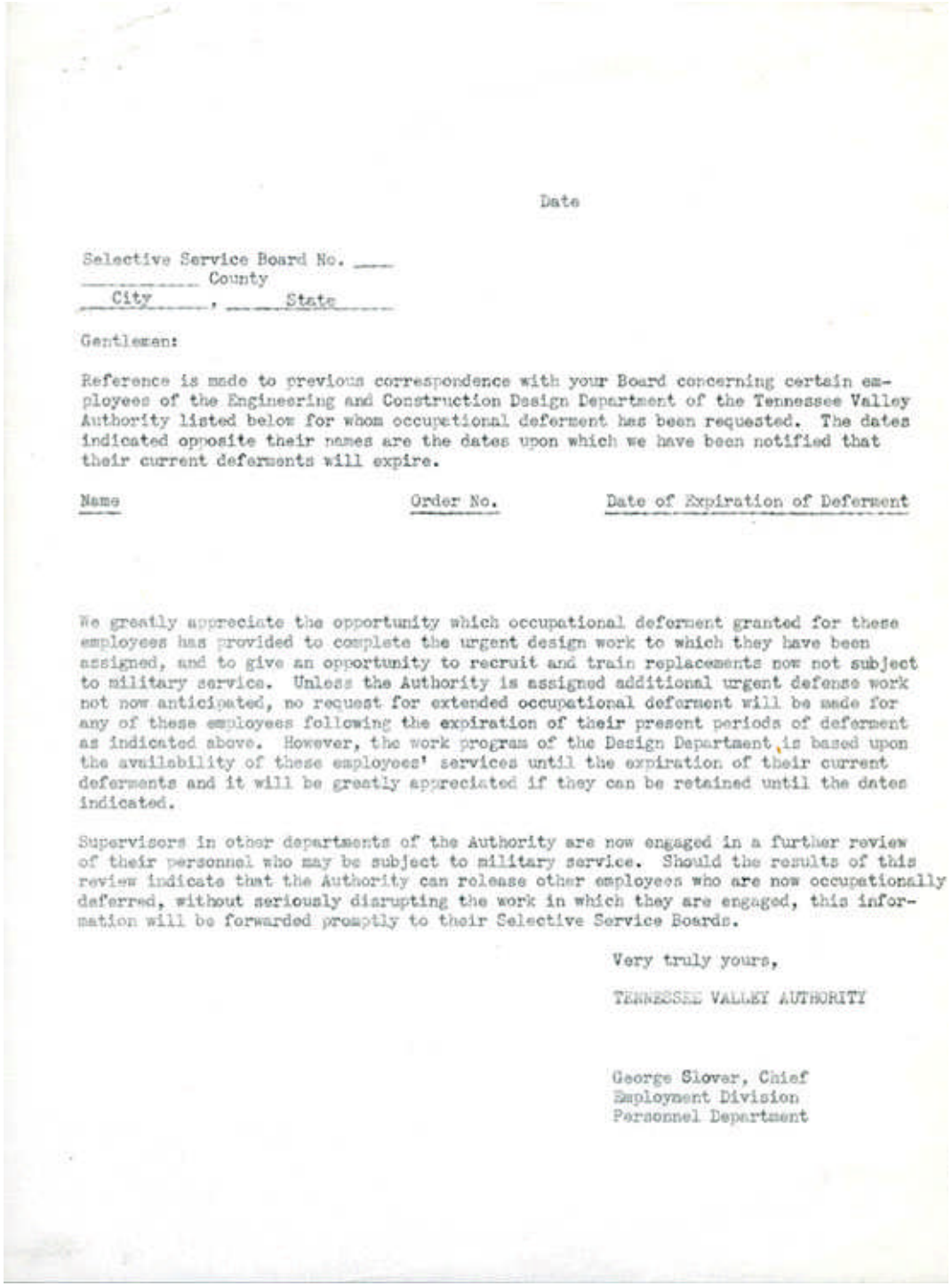
For three years, the *Clinton Engineer Works* churned away, using millions of kilowatts of TVA energy for something not even the Chairman of the TVA was aware of. According to many historians, it was WWII - more than anything else - that focused TVA's efforts on energy production. The contributions TVA made to the war effort cemented its reputation as a national asset.

Always on the Job



"…The question of time is being met every hour by the mud-streaked workers manning cat-wagons loaded with dripping clay or operating giant power shovels cutting their way to bedrock for the laying of concrete, by others at gantry cranes, by the army of skilled and unskilled workers, and the huge staff of design engineers always on the job…"

***Popular Mechanics,* January 1943**



Date

Selective Service Board No. ____
_____ County
City _____, ____ State _____

Gentlemen:

Reference is made to previous correspondence with your Board concerning certain employees of the Engineering and Construction Design Department of the Tennessee Valley Authority listed below for whom occupational deferment has been requested. The dates indicated opposite their names are the dates upon which we have been notified that their current deferments will expire.

Name	Order No.	Date of Expiration of Deferment

We greatly appreciate the opportunity which occupational deferment granted for these employees has provided to complete the urgent design work to which they have been assigned, and to give an opportunity to recruit and train replacements now not subject to military service. Unless the Authority is assigned additional urgent defense work not now anticipated, no request for extended occupational deferment will be made for any of these employees following the expiration of their present periods of deferment as indicated above. However, the work program of the Design Department is based upon the availability of these employees' services until the expiration of their current deferments and it will be greatly appreciated if they can be retained until the dates indicated.

Supervisors in other departments of the Authority are now engaged in a further review of their personnel who may be subject to military service. Should the results of this review indicate that the Authority can release other employees who are now occupationally deferred, without seriously disrupting the work in which they are engaged, this information will be forwarded promptly to their Selective Service Boards.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

George Slover, Chief
Employment Division
Personnel Department

<u>Left</u>: although there were many TVA employees who enlisted and/or were drafted for military service during WWII, TVA identified 882 positions (out of an estimated 42K), that it requested be occupationally deferred under Selective Service regulations.

TENNESSEE VALLEY AUTHORITY EMPLOYEES OCCUPATIONALLY DEFERRED

UNDER SELECTIVE SERVICE REGULATIONS OCTOBER 1942

BY DEPARTMENTS AND POSITION TITLES

CHEMICAL ENGINEERING DEPARTMENT

TITLE	NUMBER
Chemists (All Grades)	49
Chemical Aides (All Grades)	44
Engineers (All Grades)	
Chemical	68
Civil	1
Electrical	4
Mechanical	3
Structural	2
Engineering Draftsmen (All Grades)	2
Acid Operator	1
Ammonium Nitrate Operator	2
Assistant Furnace Head Tapper	2
Assistant Process Steam Plant Operator	1
Metaphosphate Furnace Operator	1
Mine Shift Supervisor	1
Neutralizer Operator	2
Nitrate Shift Supervisor	1
Pilot Plant Operator	1
Processing and Manufacturing Shift Foreman	1
Bricklayer	1
Electricians (Including Foremen and Apprentices)	3
Machinists	2
Steamfitter	1

ENGINEERING AND CONSTRUCTION DEPARTMENTS

TITLE	NUMBER
Construction Superintendents	4
Engineers (All Grades)	
Architectural	1
Cartographic	1
Civil	141
Cost	3
Design	2
Electrical	65
Highway	14
Hydraulic	30
Materials	5
Mechanical	29
Structural	51
Engineering Aides (All Grades)	48
Engineering Draftsmen (All Grades)	22
Accountant	1
Architects (All Grades)	11
Chemists (All Grades)	1
Geologists (All Grades)	6
Geologic Aides (All Grades)	4
Construction Aides (All Grades)	2
Inspectors of Construction (All Grades)	36
Labor and General Foremen (All Grades)	9
Carpenter Foremen (All Grades)	3
Equipment Foreman	1
Grade Foreman	1

ENGINEERING AND CONSTRUCTION DEPARTMENTS (CON'T)

TITLE	NUMBER
Core Drill Operators (Including Foremen)	7
Electricians (Including Foremen and Apprentices)	29
Gas and Diesel Mechanic	3
Hydro Operator	1
Machinists (Including Foremen and Apprentices)	3
Mixing Plant Operator	1
Pile Driving Carpenters	2
Powderman	1
Reinforcing Steel Workers (Including Foremen)	4
Sheetmetal Worker	1
Shovel and Crane Operator	4
Steamfitters (Including Foremen and Apprentices)	7
Structural Steel Workers (Including Foremen and Apprentices)	11
Welders (All Grades and Including Foremen)	8

POWER DEPARTMENTS

TITLE	NUMBER
Division Engineer	1
District Operating Superintendent	1
System Load Dispatcher	1
Shift Engineer	2
Engineers (All Grades)	
Electrical	14
Mechanical	1
Power Supply	2
Engineering Aides (All Grades)	1

POWER DEPARTMENTS (CON'T)

TITLE	NUMBER
Engineering Draftsmen (All Grades)	1
Substation Superintendent	1
Substation Operators (All Grades)	7
Switchboard Operators (All Grades)	13
Turbine Operators--Hydro and Steam (All Grades)	6
Student Generating Plant Operators	3
Assistant Coal and Ash Foreman	1
Junior Stoker Boiler Operator	1
Pulverizer Fuel Boiler Operators (All Grades)	2
Boilermaker Welder	1
Electricians (Including Foremen and Apprentices)	12
Machinist	3
Steamfitter	1

COMMERCE DEPARTMENT

TITLE	NUMBER
Geologists (All Grades)	3
Navigation Engineers (All Grades)	2

HEALTH AND SAFETY DEPARTMENT

TITLE	NUMBER
Health and Medical Officers (All Grades)	25
Safety Officers (All Grades)	4
Medical Aides (All Grades)	3
Assistant Sanitary Engineer	1
Associate Industrial Hygienist	1

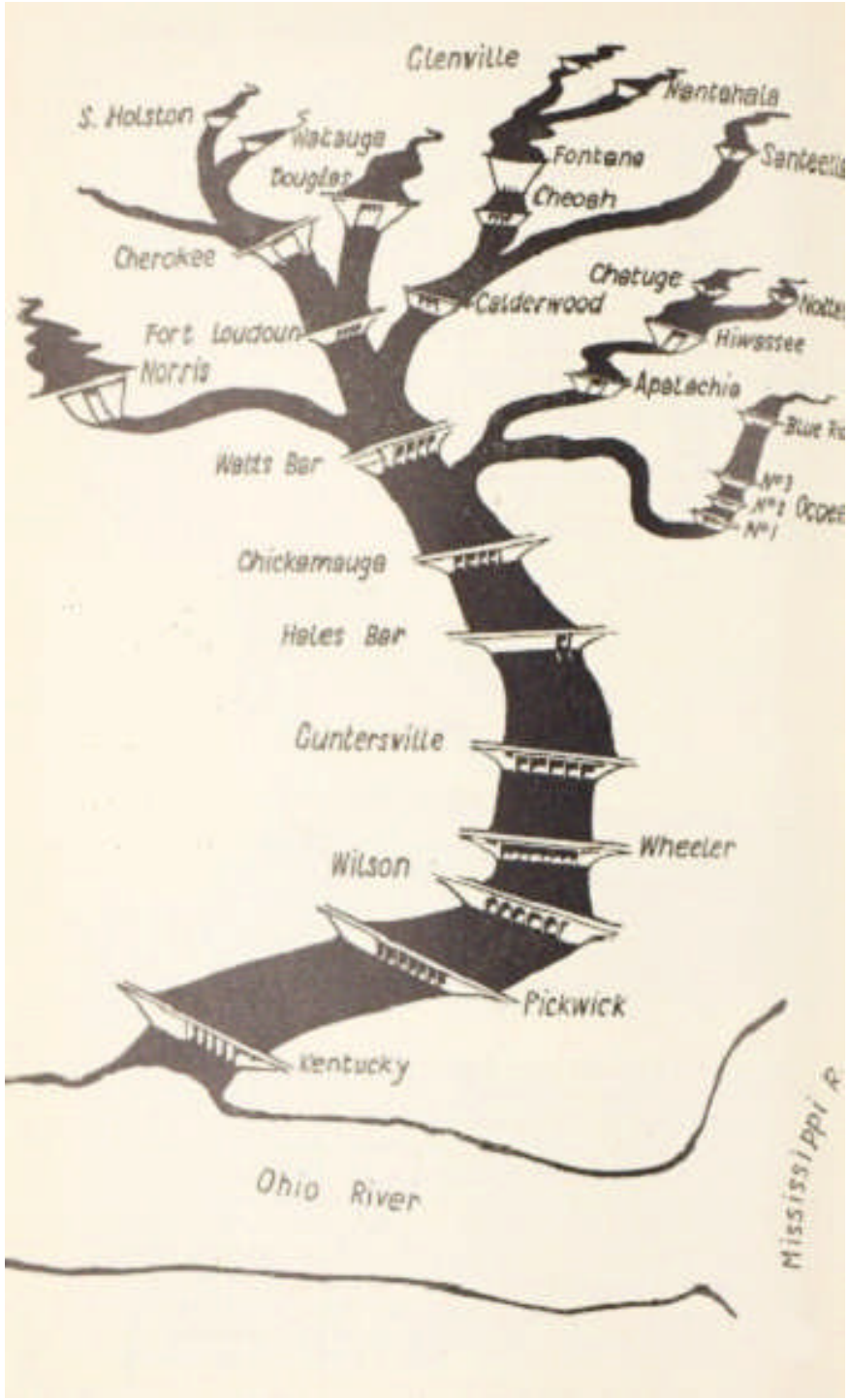
LAND ACQUISITION DEPARTMENT

TITLE	NUMBER
Assistant Director	1

PERSONNEL DEPARTMENT

TITLE	NUMBER
Personnel Officer	1
T O T A L	882
Total TVA Employees as of October 1942	42000

First Time



"…When the last bucket of concrete is hardened and the final turbine in place, an entire rivershed will be harnessed for the first time in history. The system cuts across three states and part of a fourth. It starts from the finger-like tributaries of the Tennessee river on the slopes of the Great Smokies in western North Carolina and eastern Tennessee, follows the great bend of the river that dips into Alabama, sweeps north across Tennessee and Kentucky to Paducah where the stream joins the Ohio River…"

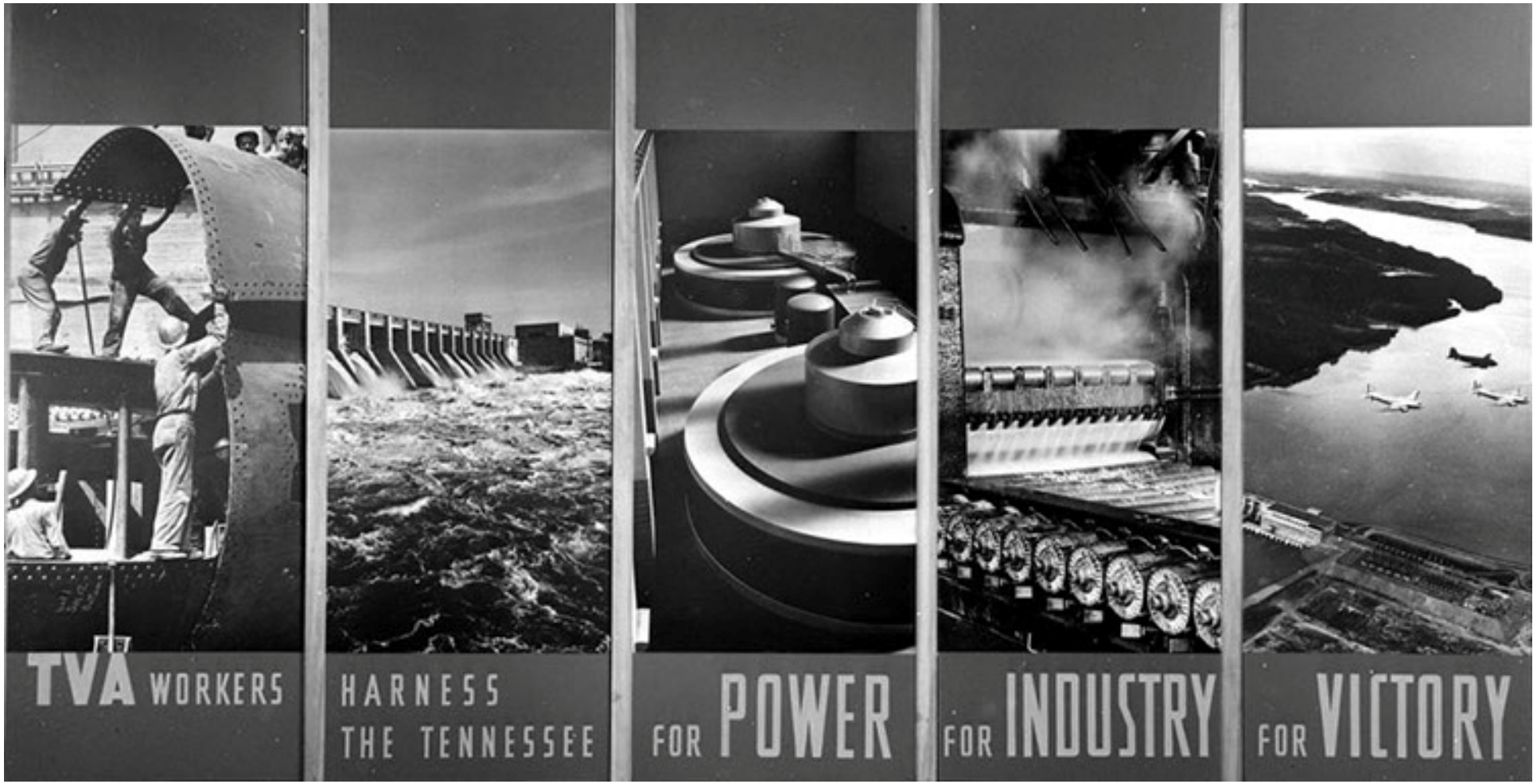
***Popular Mechanics,* January 1943**

<u>Left</u>: caption: "An exaggerated bird's-eye view of the controlled Tennessee River System. The main river becomes a series of huge lakes separated by seven new, and two old, dams. In the upper reaches, the tributaries in the narrow valleys are formed into a series of reservoirs by high dams."


Norris Lake
Cherokee Lake
Melton Hill Lake
Douglas Lake
Fort Loudon Lake
Watts Bar Lake
Tellico Lake
Knox
Jefferson
Sevier
Blount
Monroe


LAND BETWEEN THE LAKES
TVA

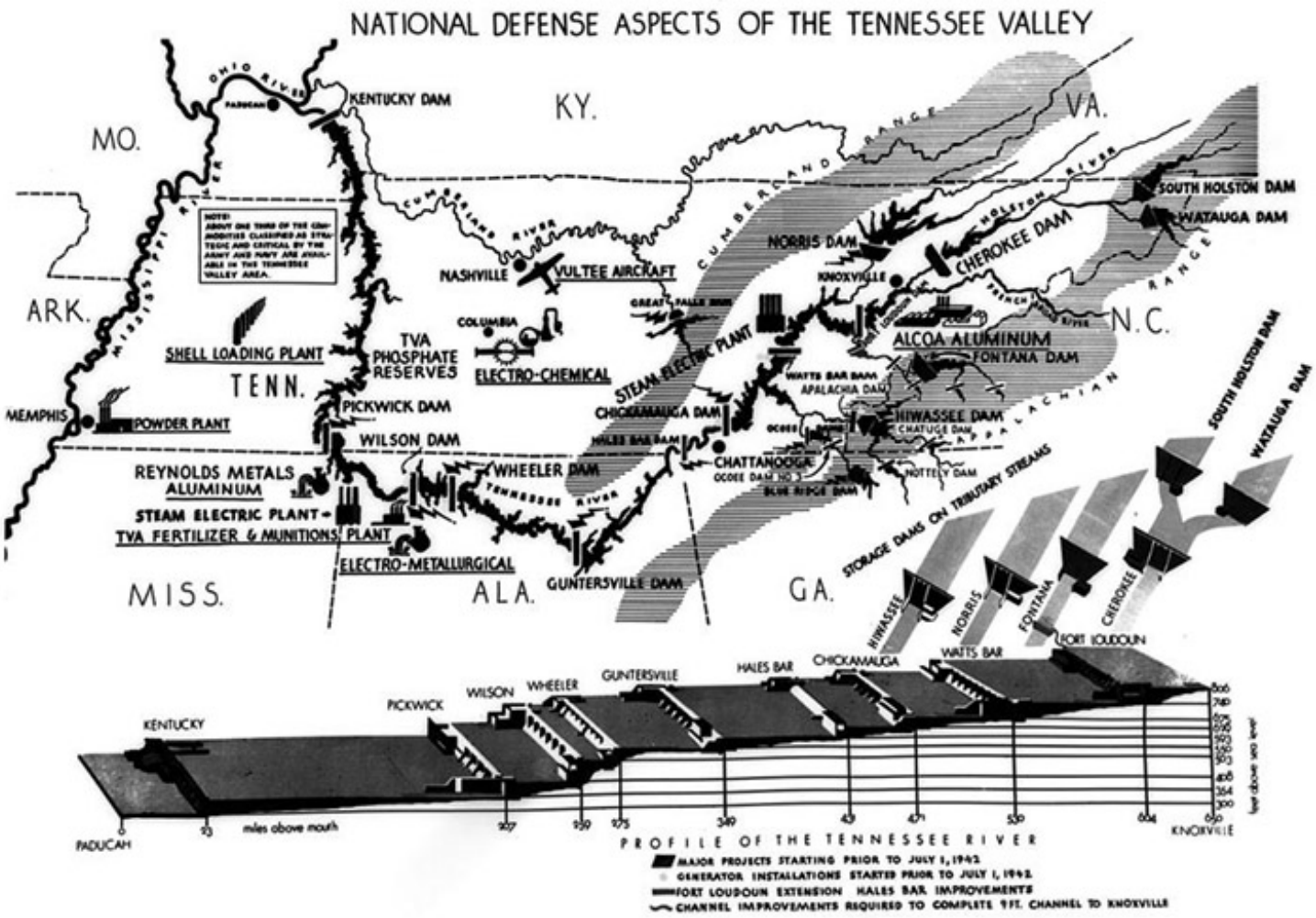
Two Types

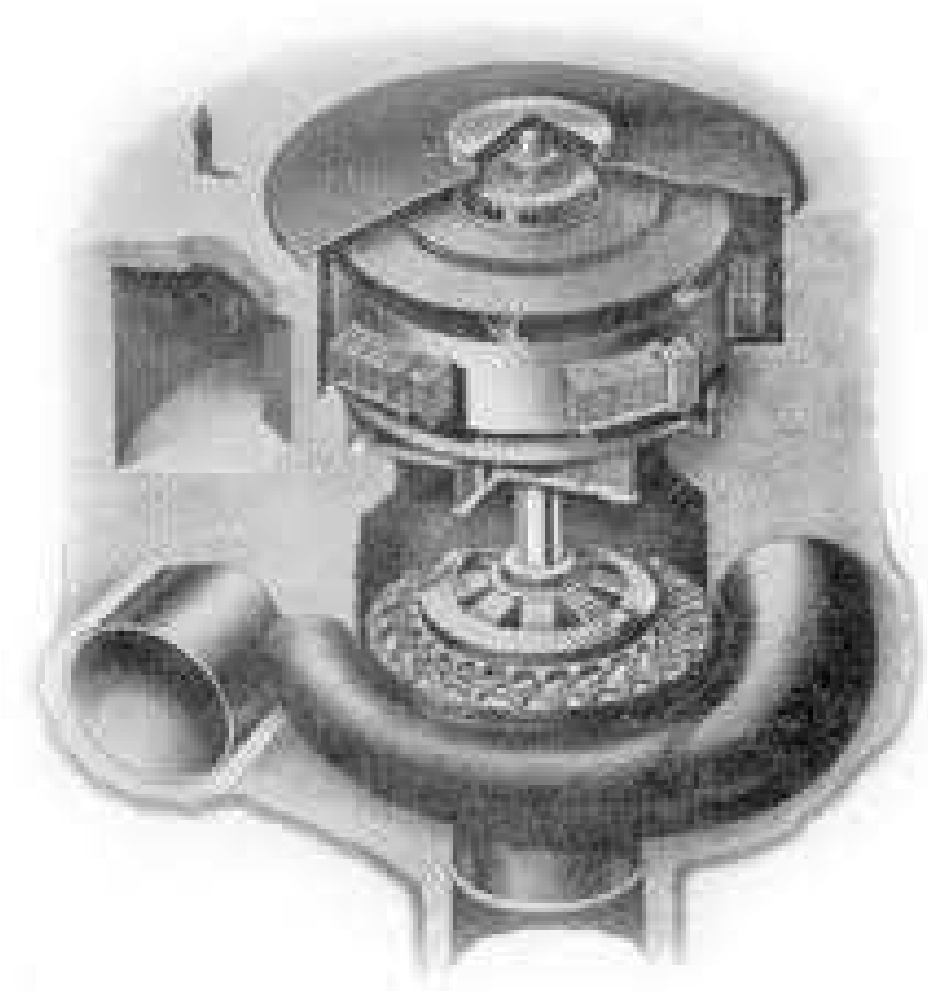


"…There are two types of dams in the system; those built primarily to store up flood waters and others to produce power. The storage dams are built across the mountain tributaries, creating reservoirs holding millions of gallons of water that are released to meet the power needs of the power dams in the main stream…"

***Popular Mechanics*, January 1943**

<u>Above</u>: the TVA used print media to promote its participation in the war effort

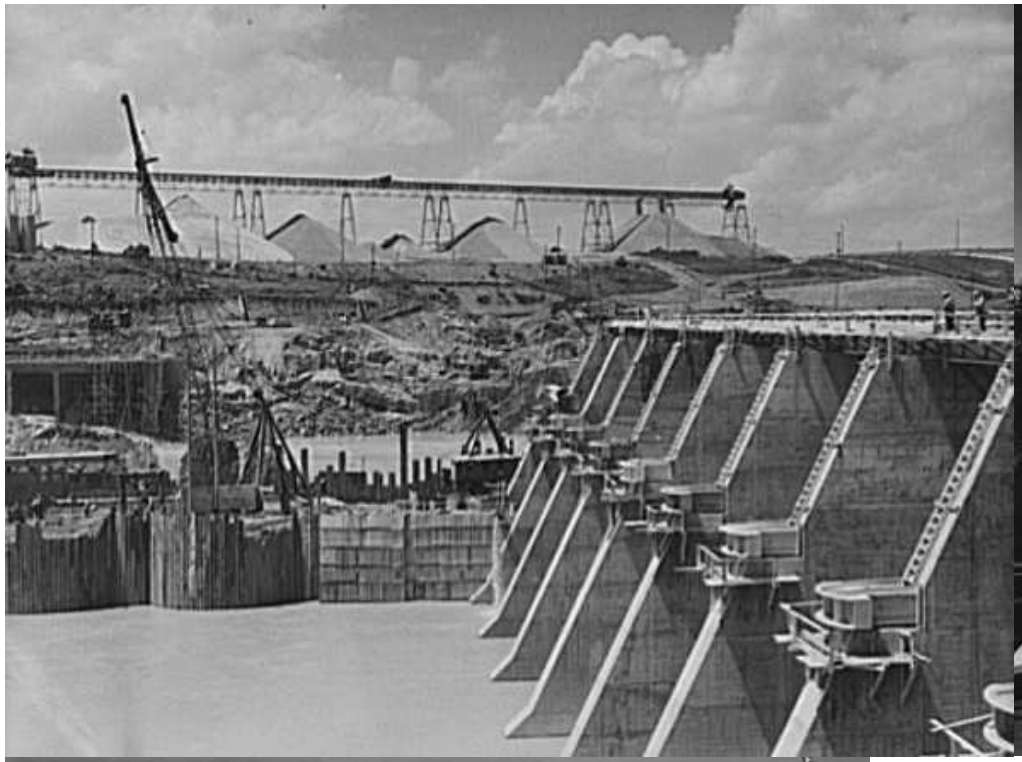

NATIONAL DEFENSE ASPECTS OF THE TENNESSEE VALLEY
MO.
KY.
VA.
ARK.
TENN.
N.C.
MISS.
ALA.
GA.
OHIO RIVER
MISSISSIPPI RIVER
CUMBERLAND RIVER
TENNESSEE RIVER
HOLSTON RIVER
FRENCH BROAD RIVER
CUMBERLAND RANGE
APPALACHIAN RANGE
PADUCAH
KENTUCKY DAM
NASHVILLE
VULTEE AIRCRAFT
NORRIS DAM
KNOXVILLE
CHEROKEE DAM
SOUTH HOLSTON DAM
WATAUGA DAM
GREAT FALLS DAM
COLUMBIA
SHELL LOADING PLANT
TVA PHOSPHATE RESERVES
ELECTRO-CHEMICAL
STEAM ELECTRIC PLANT
ALCOA ALUMINUM
FONTANA DAM
WATTS BAR DAM
APALACHIA DAM
MEMPHIS
POWDER PLANT
PICKWICK DAM
CHICKAMAUGA DAM
HIWASSEE DAM
CHATUGE DAM
WILSON DAM
HALES BAR DAM
CHATTANOOGA
OCOEE DAM NO 3
NOTTELY DAM
BLUE RIDGE DAM
REYNOLDS METALS ALUMINUM
WHEELER DAM
STEAM ELECTRIC PLANT
TVA FERTILIZER & MUNITIONS PLANT
ELECTRO-METALLURGICAL
GUNTERSVILLE DAM
STORAGE DAMS ON TRIBUTARY STREAMS
HIWASSEE
NORRIS
FONTANA
CHEROKEE
FORT LOUDOUN
WATTS BAR
CHICKAMAUGA
HALES BAR
GUNTERSVILLE
WHEELER
WILSON
PICKWICK
KENTUCKY
KNOXVILLE
miles above mouth
PROFILE OF THE TENNESSEE RIVER
MAJOR PROJECTS STARTING PRIOR TO JULY 1, 1942
GENERATOR INSTALLATIONS STARTED PRIOR TO JULY 1, 1942
FORT LOUDOUN EXTENSION HALES BAR IMPROVEMENTS
CHANNEL IMPROVEMENTS REQUIRED TO COMPLETE 9 FT. CHANNEL TO KNOXVILLE

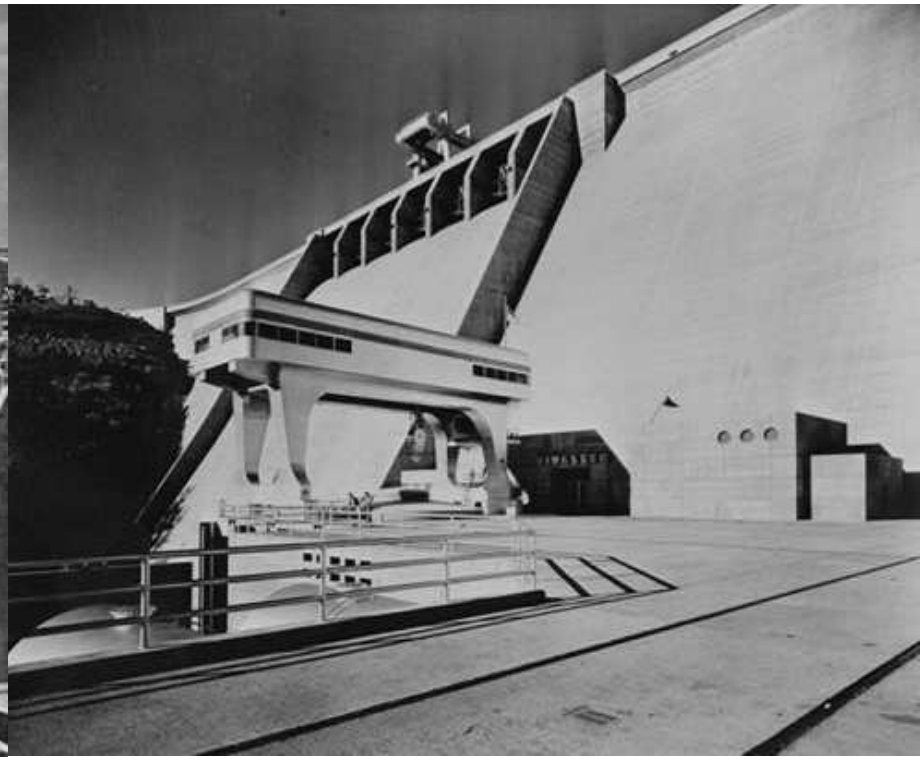


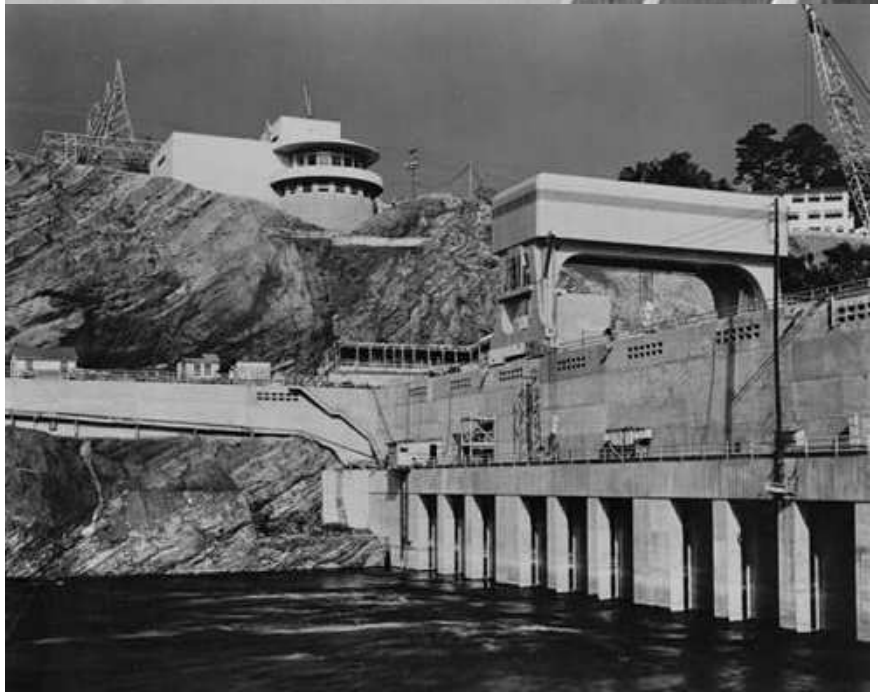
"…Six of the power dams – Pickwick Landing, Wilson, Wheeler, Guntersville, Hales Bar and Chickamauga – are now in operation. Three more – Kentucky, Watts Bar and Fort Loudoun – are well under way. Eventually, as the water drops down the valley it will be used nine times over to produce electricity. The storage dams are also equipped with generating units so that no fraction of water power is wasted…"

***Popular Mechanics,* January 1943**

<u>Left</u>: caption: "Hiwassee Dam Unit 2 Reversible Pump-Turbine"





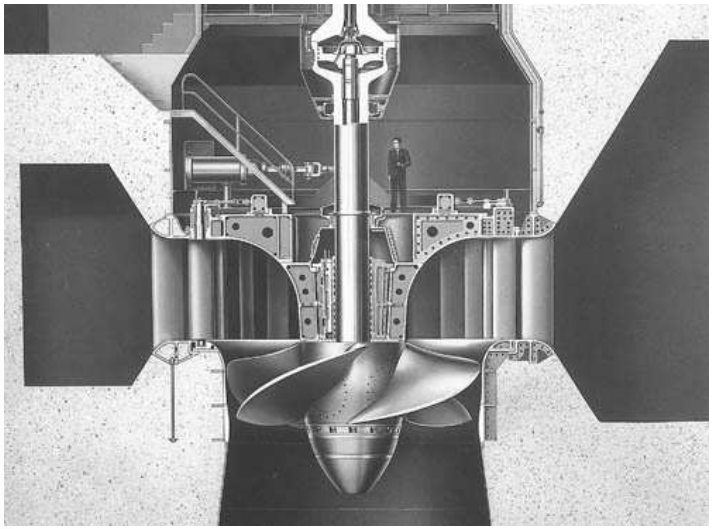


<u>Top Left</u>: caption: "Fort Loudoun dam, one of TVA chain on the Tennessee river, being built on a 24-hour wartime schedule to produce needed electric power for plants turning out aluminum for thousands of planes"

<u>Top Right</u>: caption: "Tallest of the dams is Hiwassee backing up a lake 22 miles long. Like other storage dams, it releases water to main power dams."

<u>Left</u>: caption: "Watts Bar, second downstream dam in the system"

1030



<u>Above</u>: caption: "Kaplan turbine (a propeller turbine with pitch-adjustable blades) at Watts Bar Dam on the Tennessee R, TN. It develops 42,000 hp (31.3 MW) at 94.7 rpm under a head of 52-feet. Flow is downward."

<u>Left</u>: caption: "Named for its Austrian inventor, Viktor Kaplan (1876-1934), the Kaplan-type hydraulic turbine was an outstanding innovation, operating with a high, nearly constant efficiency over a wide load range."

The Race is On

"…At present TVA engineers are speeding the construction of Douglas dam in a race to beat the deadline set by the spring rains that will flood the French Broad river. A delay of two or three months will mean the loss of a full year's production of electric power…"

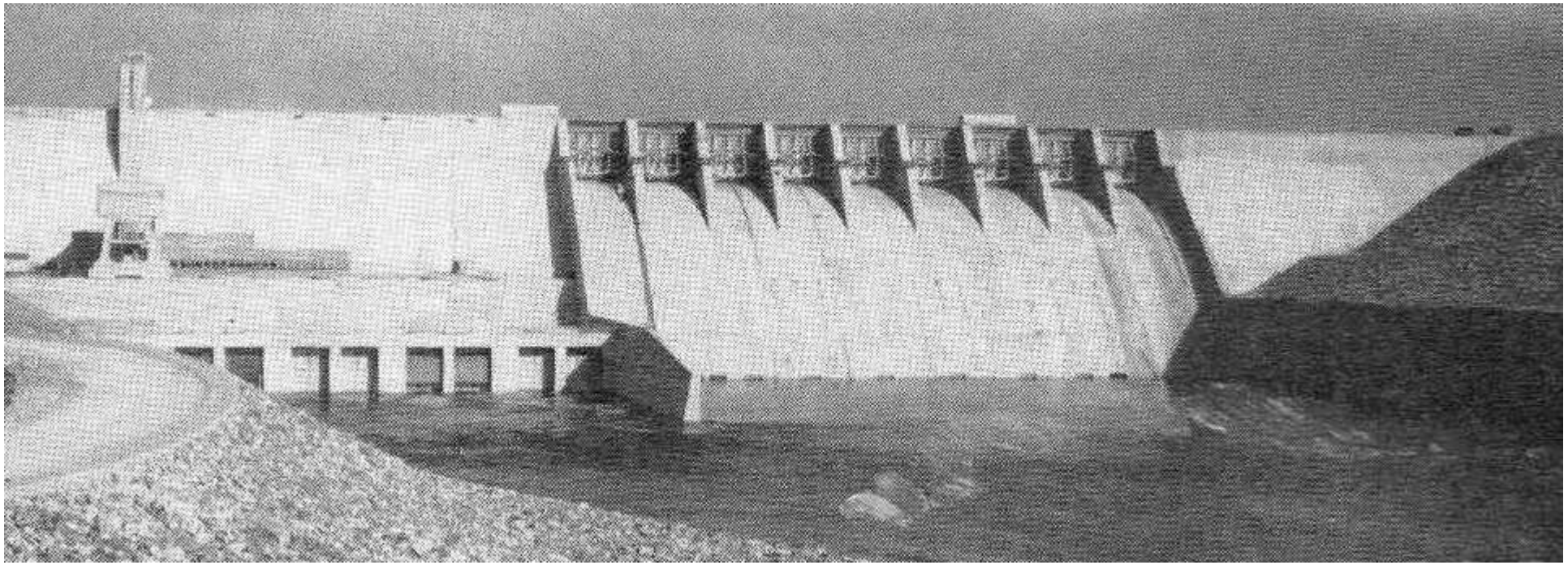
***Popular Mechanics,* Jan. 1943**

RE: the TVA launched the crash construction of two more dams, *Cherokee* and *Douglas*, mainly to support the wartime production of aluminum. Cherokee was completed in just 16 months - a full year ahead of schedule. Douglas went up in 12 months, 17 days.

"…Normally, it would take a couple of years to build a structure like the Douglas dam. To produce current in 1943 it would have to be built in 13 months. It was pointed out that custom-built equipment for a dam requires two to four months to design, often another 12 months to manufacture – a time bottleneck that cannot be avoided. Complicating the problem of obtaining tailor-made steel castings, turbines, generators, spillway gates and cranes were the increased war demands on industrial plants…"

***Popular Mechanics*, January 1943**

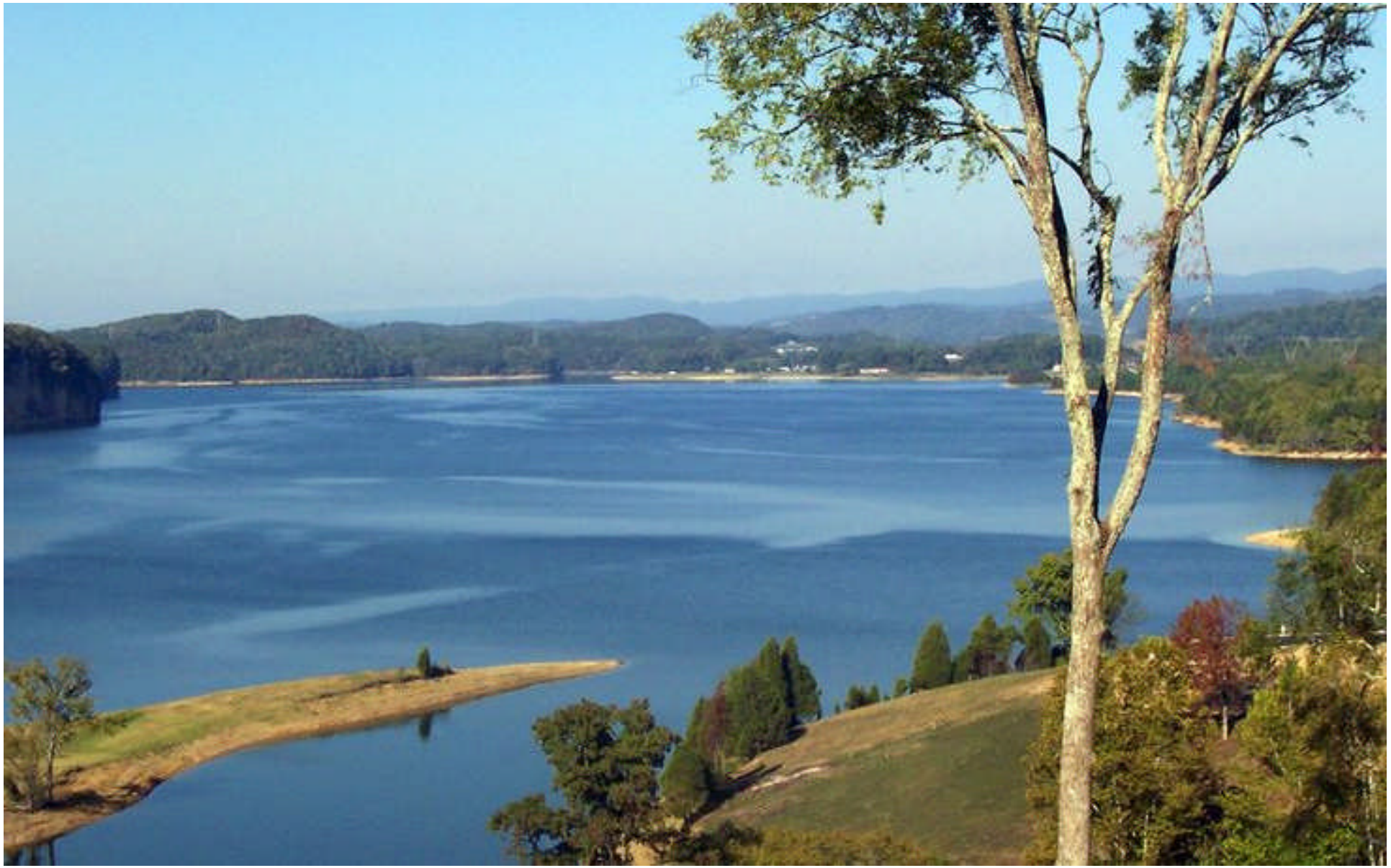
Doppelganger Dams



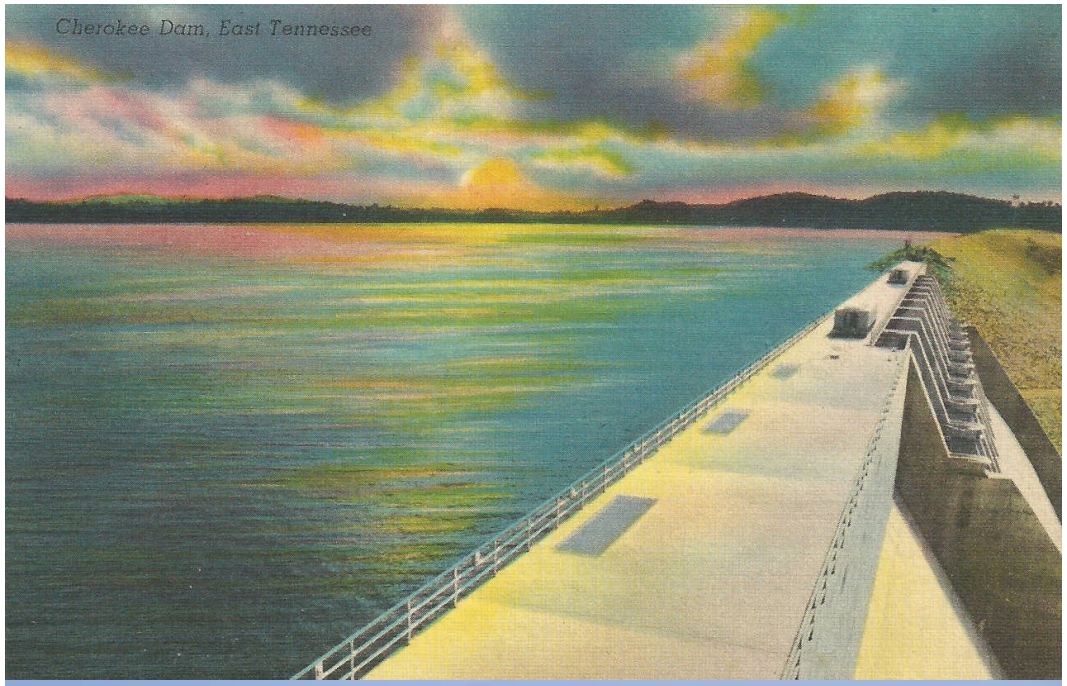
"…When the situation looked blackest, Col. T.B. Parker, chief engineer of the TVA, and his staff of topnotch design engineers pulled a trick that will go down in the history of dam building. First, they announced the dam could be built in 13 months. They explained that requirements for the Douglas dam were so similar to the recently completed Cherokee that whole portions of the latter's design, beginning with the massive concrete section of the dam itself, could be used…"

***Popular Mechanics*, January 1943**

<u>Above</u>: caption: "Cherokee Dam"



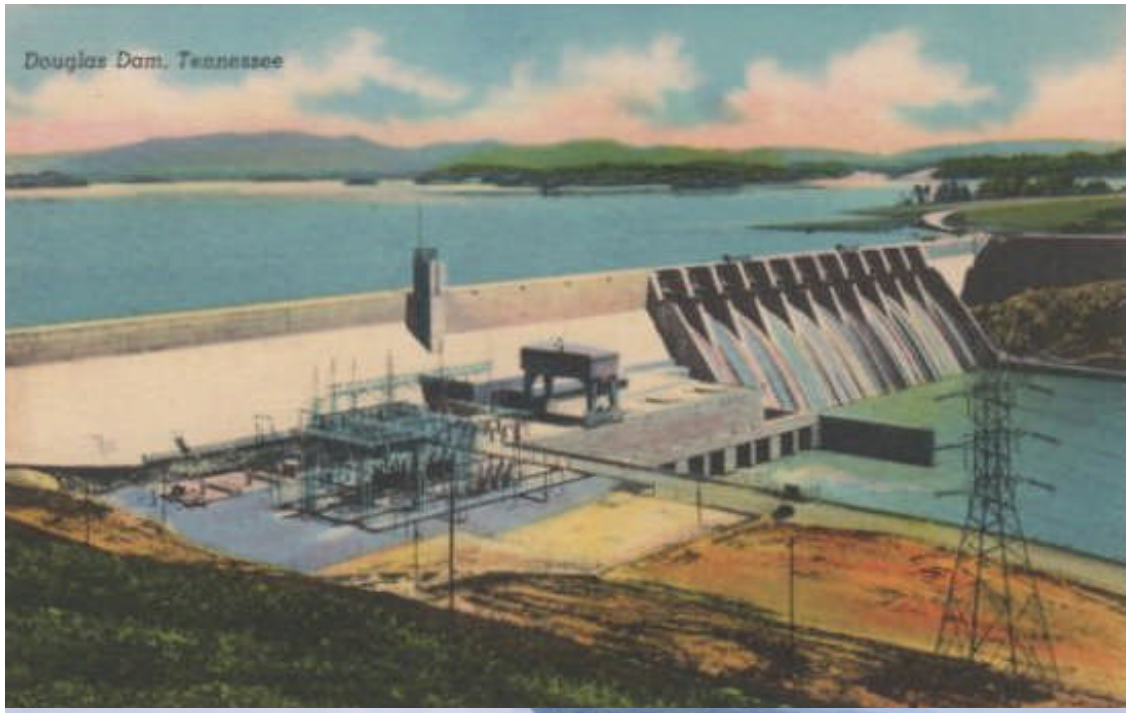
<u>Above</u>: *Cherokee Lake* is one of the oldest of the TVA reservoirs. Construction on *Cherokee Reservoir Dam* was completed December 5th 1941. The dam is 175-feet high with a length totaling 6,760-feet. Cherokee Lake covers 30,300 acres (at full pool), is 59 miles long and has 463 miles of shoreline.



"…A week after the Douglas was authorized the plate steel penstock liners were placed on order. Two days later the gate hoists were ordered. On the 20th day the turbines and governors. On the 31st day the structural steel for the powerhouse. Orders for sluice gates, trash racks, head gates, generators, transformers, switchyard equipment and other vital items were rushed to the factories. By the end of the fifth week after the authorization of the project, all the critical equipment was on order!..."

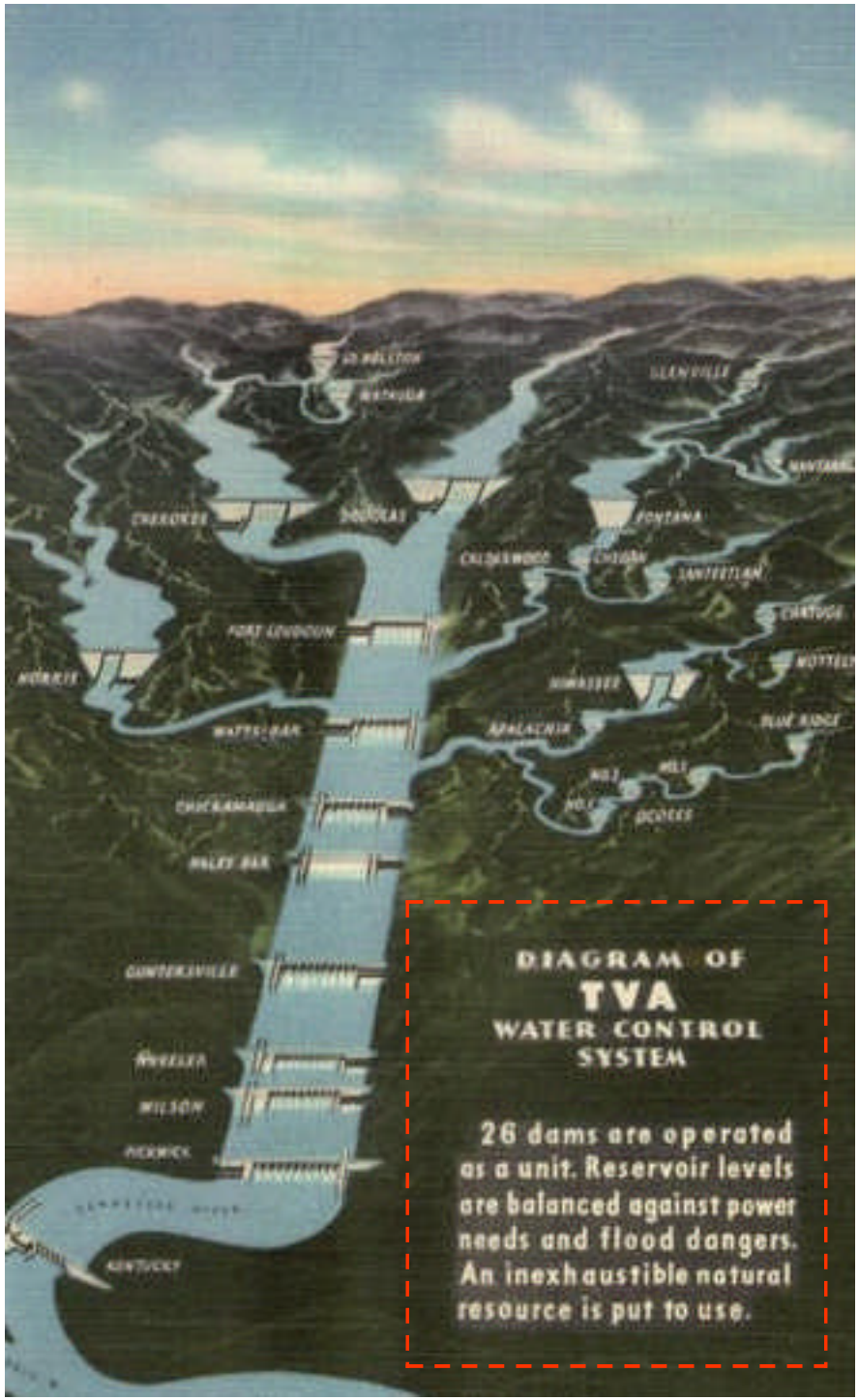
***Popular Mechanics,* January 1943**

<u>Left T&B</u>: *Cherokee Dam*



"…A few days after the authorization, men were moved overland by truck from the Cherokee dam along with construction gantry cranes, concrete mixer plant, machine shop, water system, warehouses and dormitories. Even the construction trestle at Cherokee was moved to Douglas. Looking forward to the completion of Douglas, four extra 24,000-kilowatt generators are being installed at Wilson dam, 400 miles down the Tennessee river…"
***Popular Mechanics*, Jan. 1943**
<u>Left T&B</u>: *Douglas Dam*

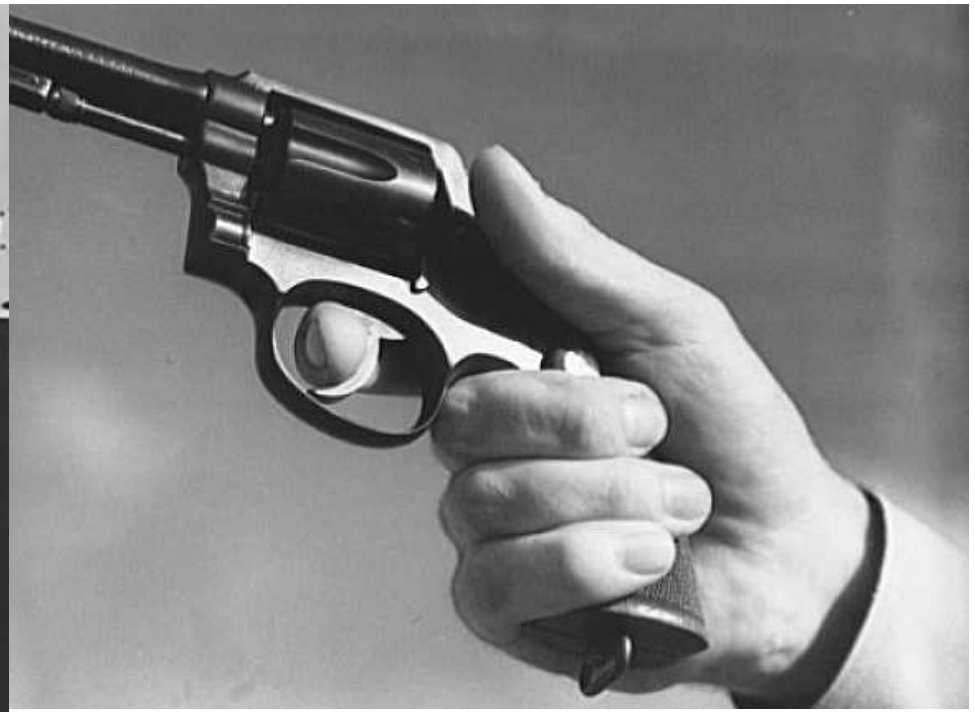
Friendly Competition



"…While Boulder dam, as well as Grand Coulee in Washington and Shasta in California, lay claim to various distinctions in size, the dams of the Tennessee Valley vie with each other for superlatives. There's Douglas with a construction time record that beats them all; Kentucky, near the mouth of the river, longest when completed (8,650-feet) and most costly ($107,500,000) in the system; Hiwassee, tallest (307.5-feet) of the present dams which will be topped by Watauga (318-feet) and Fontana (460-feet) when they are finished; Wheeler in Alabama, longest all-concrete main-stream dam; Fort Loudoun, farthest upstream, and Norris with the greatest storage capacity at present…"

***Popular Mechanics*, January 1943**

Left: caption: "Diagram of TVA Water Control System. Twenty-six dams are operated as a unit. Reservoir levels are balanced against power needs and flood dangers. An inexhaustible natural resource is put to use."



<u>Left</u>: caption: "No absenteeism here. Knoxville, TN. As he threw the switch that started the first generators of TVA's Douglas Dam, a vital war power-production unit, Patrick P. Marshall, steam-fitter, said: 'I realized that any day I was absent was a day given to the enemy.' Marshall had been on the job for 374 consecutive workdays. He was chosen among eighteen workers, all of whom never missed a day of work on Douglas, to speak for the employees. He is shown here being congratulated by W.L. Batt, War Production Board (WPB) vice-chairman, on the completion of a job that is making aluminum for bombers ahead of schedule."

<u>Right</u>: caption: "Ready for action against saboteurs is the hand and weapon of a public safety service officer at the new Fort Loudoun Dam, furthest upstream of the TVA's main Tennessee River projects. Scheduled for closure and first storage of water early in 1943, this dam will create a 15,000-acre lake reaching fifty-five miles upstream to the city of Knoxville. The reservoir will have a useful storage capacity of 126,000 acre-feet. Power installation of 64,000 kilowatts is authorized, with a possible ultimate of 96,000 kilowatts."

Inland Waterway

"…The reservoirs of the main river projects are designed to provide a channel for boats of nine-foot draft from the mouth of the river to Knoxville, a distance of 650 miles. The inland waterway is already completed to Chattanooga and goods now being transported include wheat, petroleum products and pig iron…"

***Popular Mechanics*, January 1943**

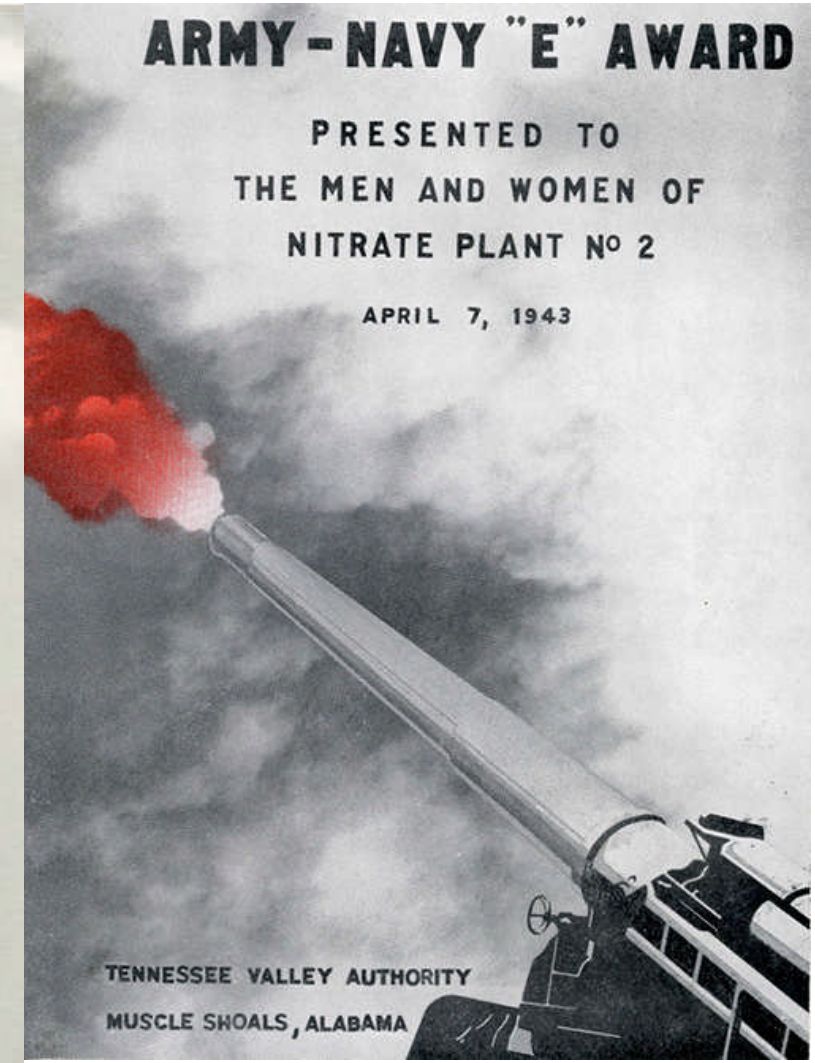
<u>Left</u>: caption: "Lock and barge"

Tangential Benefits

"…Aside from building dams to provide electric power to keep war plants humming, the TVA has made contributions to the nation's welfare from its research laboratories and in cooperation with state engineering and agricultural experimental stations. One of the outstanding results is the development of a process for the extraction of alumina, the raw material for aluminum, from clays found plentiful in this country…"

***Popular Mechanics,* January 1943**

RE: not satisfied with limiting its role to electric power, the TVA offered its services to other agencies in agriculture, manpower and munitions manufacture. However, often times this eagerness to insert itself into various war-related activities sparked controversy with private industry. The agency's hiring practices were also called into question (like those of many employers during the war years). In spite of this, TVA's contributions to the war effort played a decisive role in the allied victory.



In a ceremony held on April 7th 1943, Nitrate Plant No. 2 was presented the "Army–Navy 'E' Award" from Under Secretary of War *Robert Patterson*: The award was presented to war industries for excellence in manufacturing.

WAR DEPARTMENT

Office of the Under Secretary

Washington, D. C.

March 13, 1943

To the Men and Women
of Nitrate Plant No. 2
Tennessee Valley Authority
Wilson Dam, Alabama

This is to inform you that the Army and Navy are conferring upon you the Army-Navy Production Award for high achievement in the production of war material.

Your patriotism, as shown by your remarkable production record, is helping our country along the road to victory. May I extend to you men and women of Nitrate Plant No. 2 my congratulations for accomplishing more than seemed reasonable or possible a year ago.

In conferring this award, the Army and Navy will give you a flag to fly above your plant and will present to every individual within it a lapel pin symbolic of leadership on the production front.

Sincerely yours,

(s) Robert P. Patterson

Robert P. Patterson
Under Secretary of War

Note: No newspaper publicity allowable until the day before the ceremony, April 7.

A.M.W.

"…In the field of housing, the TVA offered the war program the results of eight full years of experiment in providing homes for workers. The authority's demountable house, complete with electric, water, sanitary and other installations, is designed for trailer transportation and can be erected in four to six hours…"

***Popular Mechanics,* January 1943**

<u>Top</u>: caption: "Sheffield, Alabama. Homes built by the TVA for war workers. These houses are prefabricated and demountable."

<u>Bottom</u>: caption: "To help alleviate a serious housing shortage arising from increased employment in national defense industries, the TVA is building 100 conventionally built homes and 150 demountable homes for defense workers in the Muscle Shoals area."

<u>Left</u>: caption: "Demountable employee housing. Three-bedroom war workers' house constructed in five slices. On this project, where the houses went into an existing community in Alabama to provide housing for employees of chemical and metallurgical industries of the TVA, the local desire for traditional appearance was accommodated by the use of a pitched roof. Each side of the roof is hinged at the eaves and is laid down, during transport, over the ceiling to bring overall height within normal highway clearances."

<u>Right</u>: caption: "These wheels help make the demountable house 'demountable.' Frame for a section of one of the 150 demountable houses which the TVA is building at Muscle Shoals, Alabama, for defense workers. A set of four wheels is mounted in the base of the floor frame of each section, one wheel near each corner. The wheels enable the house to be rolled along the assembly line, onto the trailers which transport them, and into the proper place on the permanent foundation."

For the National Offense

"…an adequate supply of electric energy comes pretty close to being a matter of national defense."

***Dr. Arthur E. Morgan*, TVA Chairman**

RE: excerpt from testimony to Congress in 1935. Over the next six years, TVA took the initiative and geared up its energy capacity to be ready in the event of war. The *Federal Power Commission* declared later that without the TVA, the United States wouldn't have been prepared to enter the fight in 1941. The TVA made a number of key contributions to the war effort. Its mapping department (based in Chattanooga, TN) used aerial reconnaissance and techniques perfected in the course of mapping the TVA region to make crucial maps of Europe for Allied aviators. Its nitrate plants in *Muscle Shoals* supplied the raw material for thousands of tons of munitions, as well as fertilizer to help grow food in beleaguered Allied countries.

"…The TVA, established by Congress 'to provide for national defense,' in the words of the TVA act, has created a hydroelectric powerhouse for national offense. When its system of 24 dams – all built by the authority except five small ones - is finished, it will have cost the nation more than a half billion dollars."

***Popular Mechanics,* January 1943**

<u>Above</u>: caption: "Dedication of Douglas Dam, 1943"

"…Before the end of the war the three emergency programs were largely completed and the plants were supplying power for the war effort. TVA's electricity load had grown from nothing in 1933, very gradually for the first few years and then at an increasing rate, until in 1945 it had reached a peak of about 2,000,000 kilowatts. Everybody expected that at the close of the war it would immediately drop, and so it did. But, inside of one year it had climbed back to where it was at the peak of the war, and it continued to go up at an accelerated rate…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

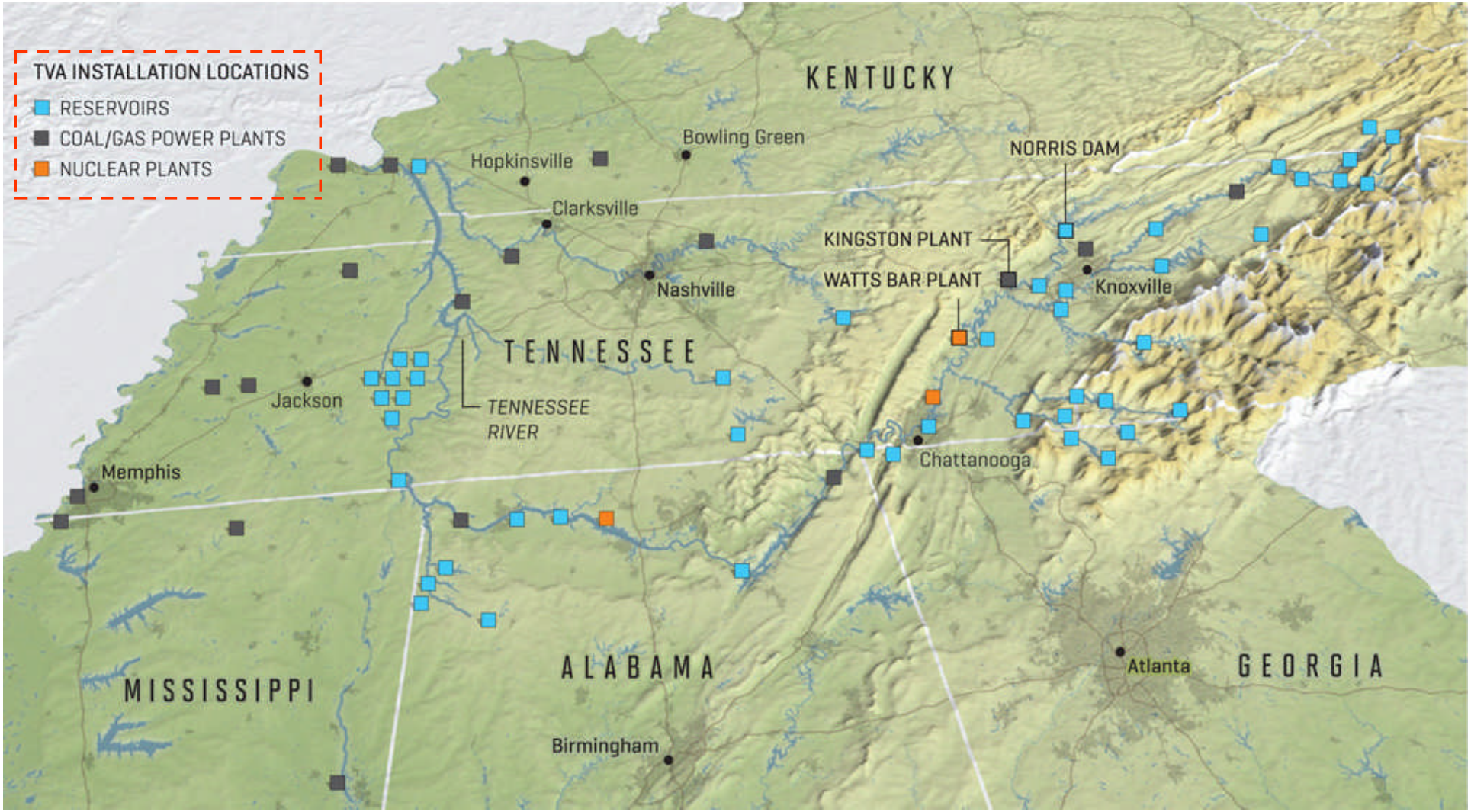
Part 22

The Power to Serve

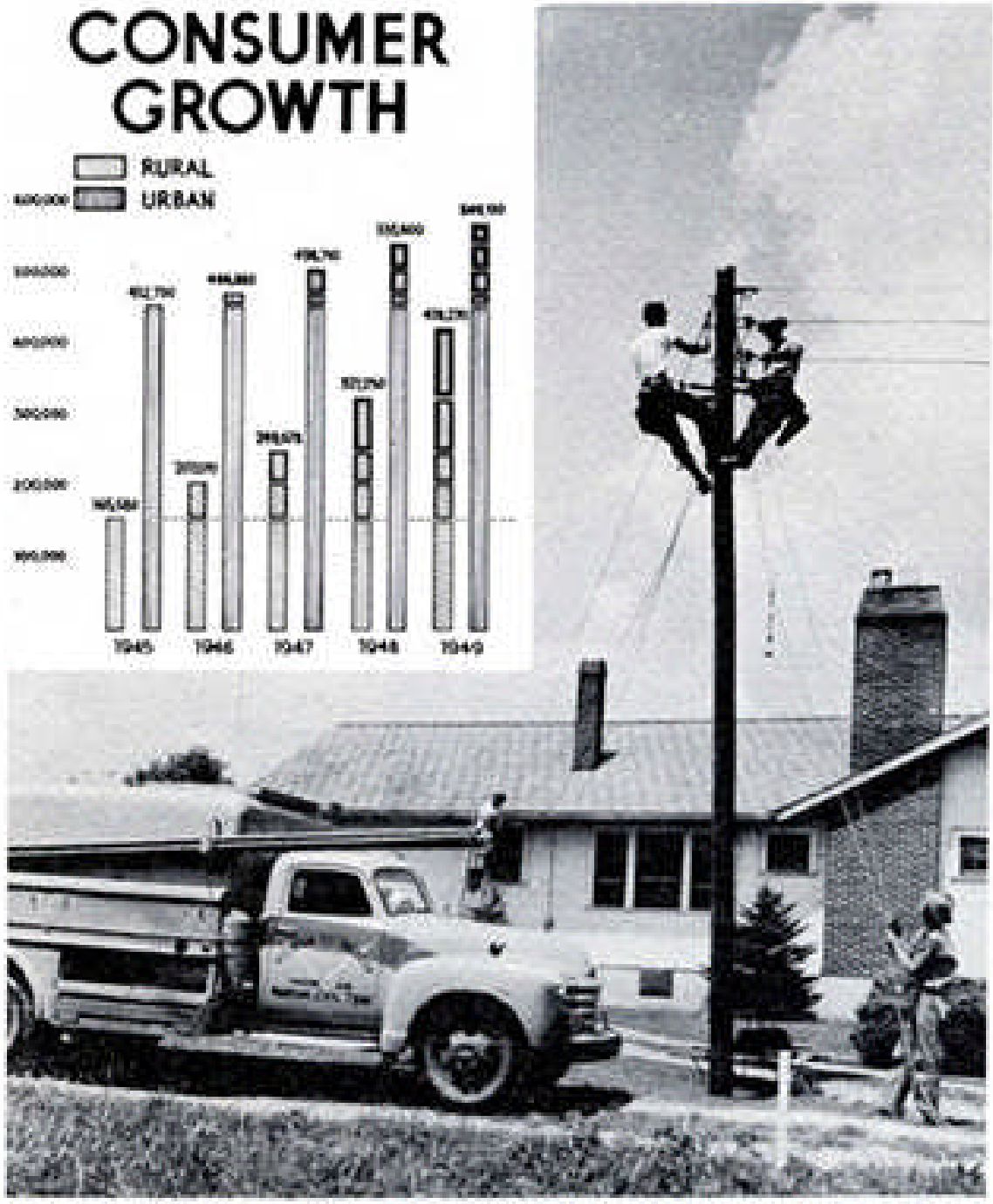
Post-War

"…In 1933 the region now supplied with TVA power consumed 1,500,000,000 kilowatt-hours of electricity; in 1945, the peak year of World War II, the area's requirements totaled 11,500,000,000 kilowatt-hours; in 1952 requirements reached 23,000,000,000 kilowatt-hours; and by 1956 it is estimated the region will need 58,000,000,000 kilowatt-hours…"

RE: excerpt from *TVA: The First Twenty Years* (1956). In 1933, the TVA was charged with the ambitious task of making electricity widely available to support commercial and residential interests in the struggling *Tennessee Valley*. It was a modest start when TVA acquired *Wilson Dam* near Muscle Shoals, AL. Soon, construction began on hydroelectric facilities along the *Tennessee River* at sites like *Norris, Wheeler* and *Pickwick Landing*. During WWII, the TVA built more facilities to provide power for war industries while continuing to meet the needs of the region.



<u>Above</u>: caption: "TVA Installation Locations." During and after WWII, the TVA built fossil fuel plants which harnessed steam power. By the 1960s, the increasing demand for electricity led TVA to begin constructing nuclear facilities. By 1977, *Browns Ferry Nuclear Plant* had become the largest in the world, capable of providing enough electricity to meet the needs of about 1.3 million homes. Today, the TVA uses a complex and diverse network of fossil fuel, nuclear, hydroelectric and other renewable energy sources to generate power to its many customers.



"The remarkable postwar growth of rural electrification affects all the people of the Tennessee Valley. From July 1945 to July 1949, the number of rural consumers increased by 150%, from 165,000 to well over 400,000. In the Tennessee Valley as many new farms are being served in two months as the total number reached with electricity in all the years before TVA was created…"

RE: excerpt from *On the Farm* (ca. 1949)

<u>Left</u>: caption: "More rural homes are being hooked up every day, as typified by this scene in Mountain Electric Co-operative's territory. Chart shows amazing growth of rural electrification in TVA area since end of war."

"…The trend may be seen in the accompanying tabulation of the region's power requirements, which will repay careful examination. There it can be observed that the local distributors, the primary category of preferred customers, almost trebled their requirements from 1945 to 1952, and that they are expected to experience an increase of approximately sixty per cent from 1952 to 1956. The federal agencies, the second preferred category, more than doubled their consumption from 1945 to 1952, and will multiply their requirements by more than five between 1952 and 1956. Industries directly served are increasing steadily, but at a much less rapid rate than the preferred customers. The total effect is one of an extremely rapid growth in regional electric power requirements, particularly from 1952 to 1956, when the full impact of the national defense effort will be felt by the TVA power system…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

TABLE 2

TVA SYSTEM POWER REQUIREMENTS, 1945–1956

(Millions of Kilowatt-Hours)

	Final Year		Estimated
	1945	1952	1956
Municipalities and Cooperatives	3,320	9,800	15,500
Federal Agencies	2,550	5,550	31,200
Directly Served Industries	4,960	6,460	9,100
Total	10,830	21,810	55,800
Transmission Losses	700	1,070	2,200
Total TVA Area	11,530	22,880	58,000
Delivered to Utilities	1,020	100	—
Total System Requirements	12,550	22,980	58,000

"…The figures of the table acquire added meaning when cast in more familiar terms. In 1933 the homes and farms in what is now the TVA service area used about 150,000,000 kilowatt-hours of electricity, and commerce and industry (excluding Aluminum Company of America) used about 750,000,000 kilowatt-hours. None of this was TVA power…"

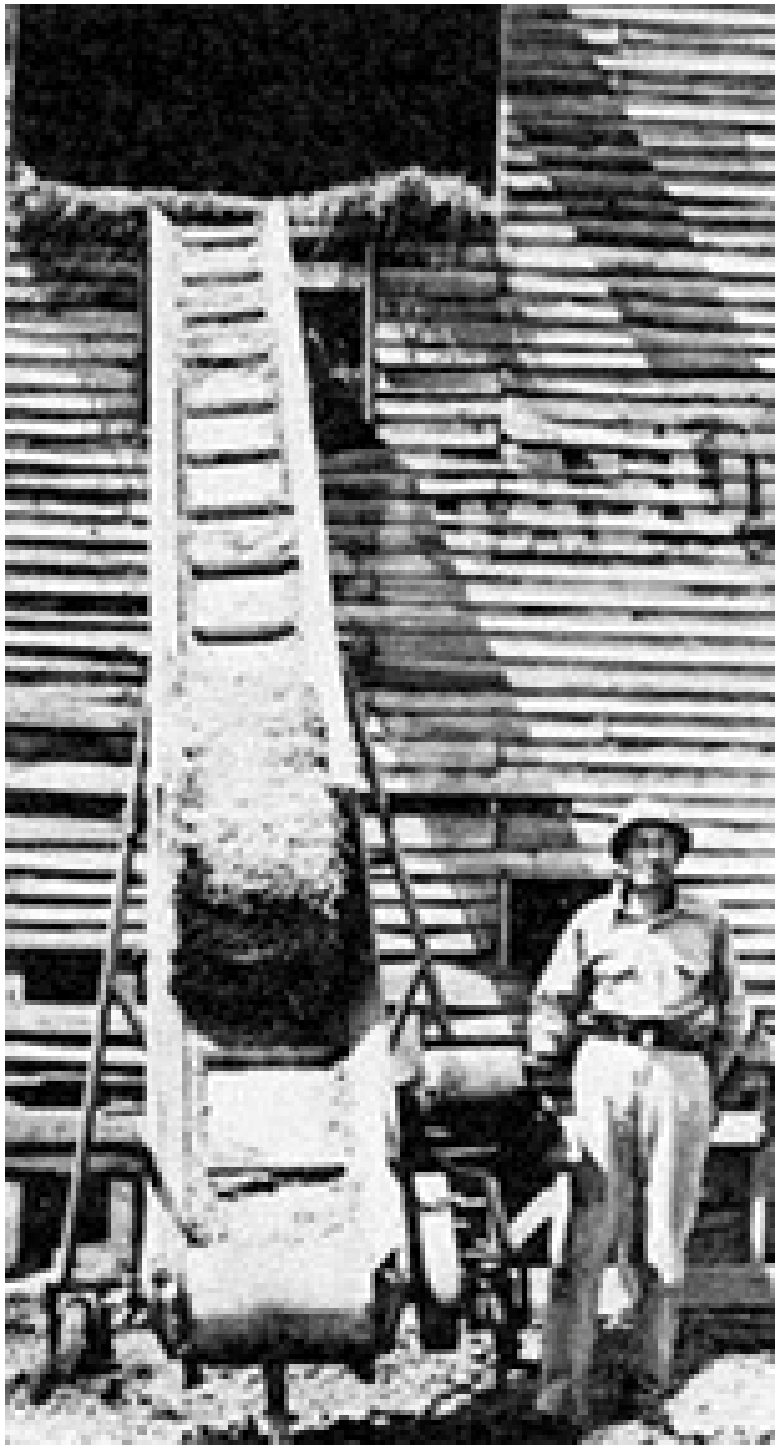
RE: excerpt from *TVA: The First Twenty Years* (1956)

"…We have meetings with rural groups, especially with homemakers. Hundreds of home equipment schools have been held to demonstrate modern kitchen equipment. These meetings stress electric cookery, but are not cooking schools in the usual sense of that term. They show the homemaker how to use her electric kitchen equipment to save time, and to help her plan and prepare better balanced meals…"

RE: excerpt from *On the Farm* (ca. 1949)

<u>Left</u>: caption: "Talking directly to valley homemakers is a TVA home economist"

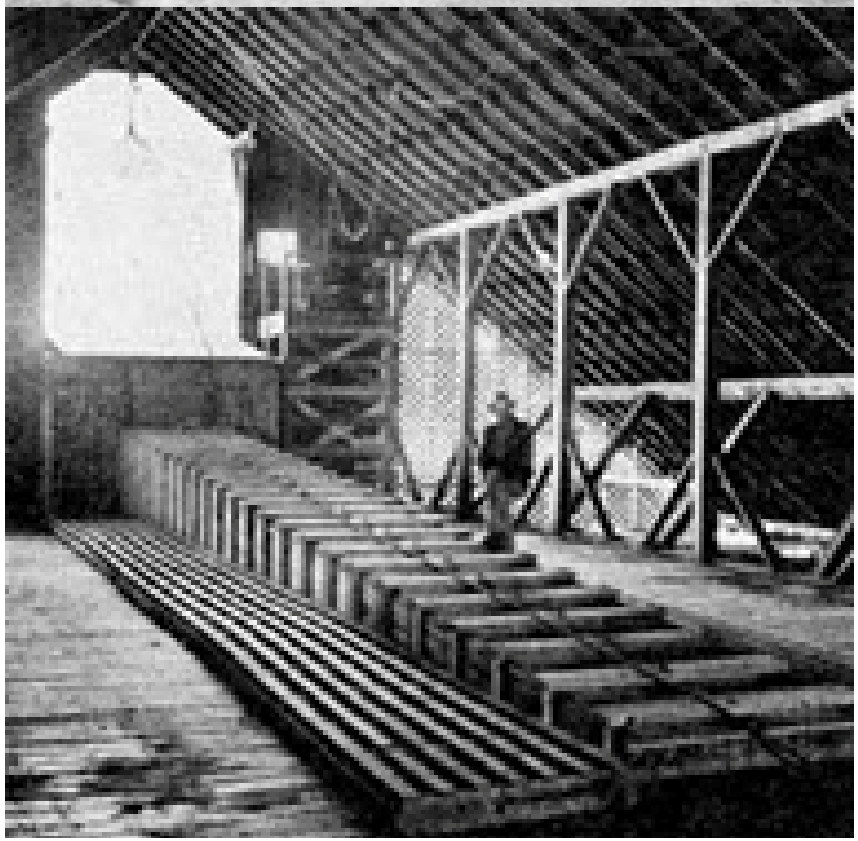
Down on the Farm



"…By 1941 home and farm use had increased to about 550,000,000 kilowatt-hours, all but a little of it served by TVA distributors; and commerce and industry used about 1,700,000,000 kilowatt-hours. By 1946 home and farm use totaled 1,000,-000,000 kilowatt-hours, while commercial and industrial use totaled 2,300,000,000 kilowatt-hours. In 1952 homes and farms used 4,200,000,000 kilowatt-hours, commerce and industry 4,800,000,000 kilowatt-hours. The 1956 forecasts anticipate home and farm use of 7,200,000,000 kilowatt-hours, and commercial and industrial use of 7,300,000,000 kilowatt-hours…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Left</u>: caption: "An electric motor powers this elevator to take hay to the hay loft, saving many hours of back-breaking labor. This same motor, on a Middle Tennessee farm, is used for elevating corn."



<u>Top</u>: caption: "Grade A Dairies have sprung up all over the TVA area in recent years. Dairy farming is one way the farmer can increase profits and build up land. But he could not market Grade A milk without the refrigeration which electricity can give him, Besides refrigeration, electricity helps in dairying by supplying water under pressure, heating that water, running milking machines, ventilating the dairy barn, and in other ways."

<u>Bottom</u>: caption: "Hay improves the farmer's soil and, fed to livestock, is converted into meat and dairy products. The Valley's heavy rainfall is excellent for growing this crop, but a serious handicap in harvesting it. Electric hay driers, as shown here, are overcoming this difficulty."

Five-by-Seven Fold

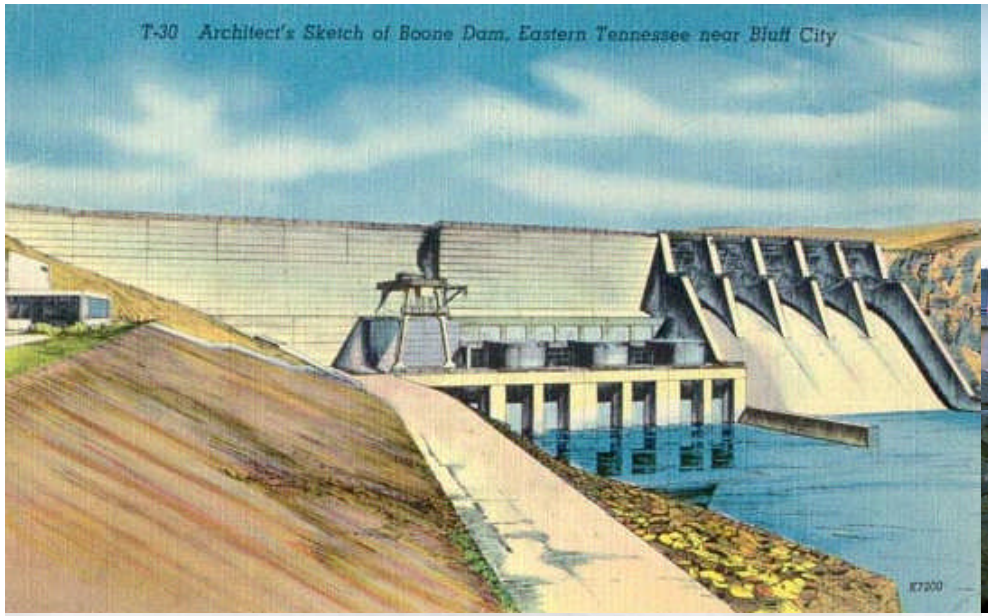
"…In 1933 the utility companies were serving 225,000 homes and farms in the Valley; by 1946 the distributors of TVA power were serving 570,000, and by 1952 more than 1,-100,000. Many of these additional customers represent new homes, but the majority are homes that did not have electricity in 1933. Since 1946, nearly 300,000 farms have been electrified. About 90 per cent of the farms now have electricity as compared with 3 per cent in 1933. In 1933 average annual use among homes in the region was 600 kilowatt-hours; twenty years later it averaged about 4,200 kilowatt-hours per year. Thus five times as many homes are electrified, and each uses on the average about seven times as much electricity…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Of No Great Consequence

"…The agency ended World War II with about 2,500,000 kilowatts of generating capacity. Contrary to expectation and forecast, the postwar slump in the demand for power which occurred in 1945 was of no great consequence: industrial production continued to increase, new homes continued to be built, and the market for electrical appliances boomed. Present capacity is about 5,000,000 kilowatts; construction under way or authorized by Congress will increase generating capacity to nearly 10,000,000 kilowatts by 1956…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



"…TVA had to resume work on two dams on which construction had been postponed during the war, the South Holston and Watauga Dams. Still more power was needed; so two additional dams, Boone and Fort Patrick Henry Dams, were started…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Top Left</u>: caption: "Architect's Sketch of Boone Dam, Eastern Tennessee near Bluff City"

<u>Top Right</u>: caption: "Fort Patrick Henry Dam, Kingsport, Tennessee"

<u>Left</u>: caption: "The site for the TVA's Watauga Dam, located near Elizabeth-ton, Tenn. (April 1946)"

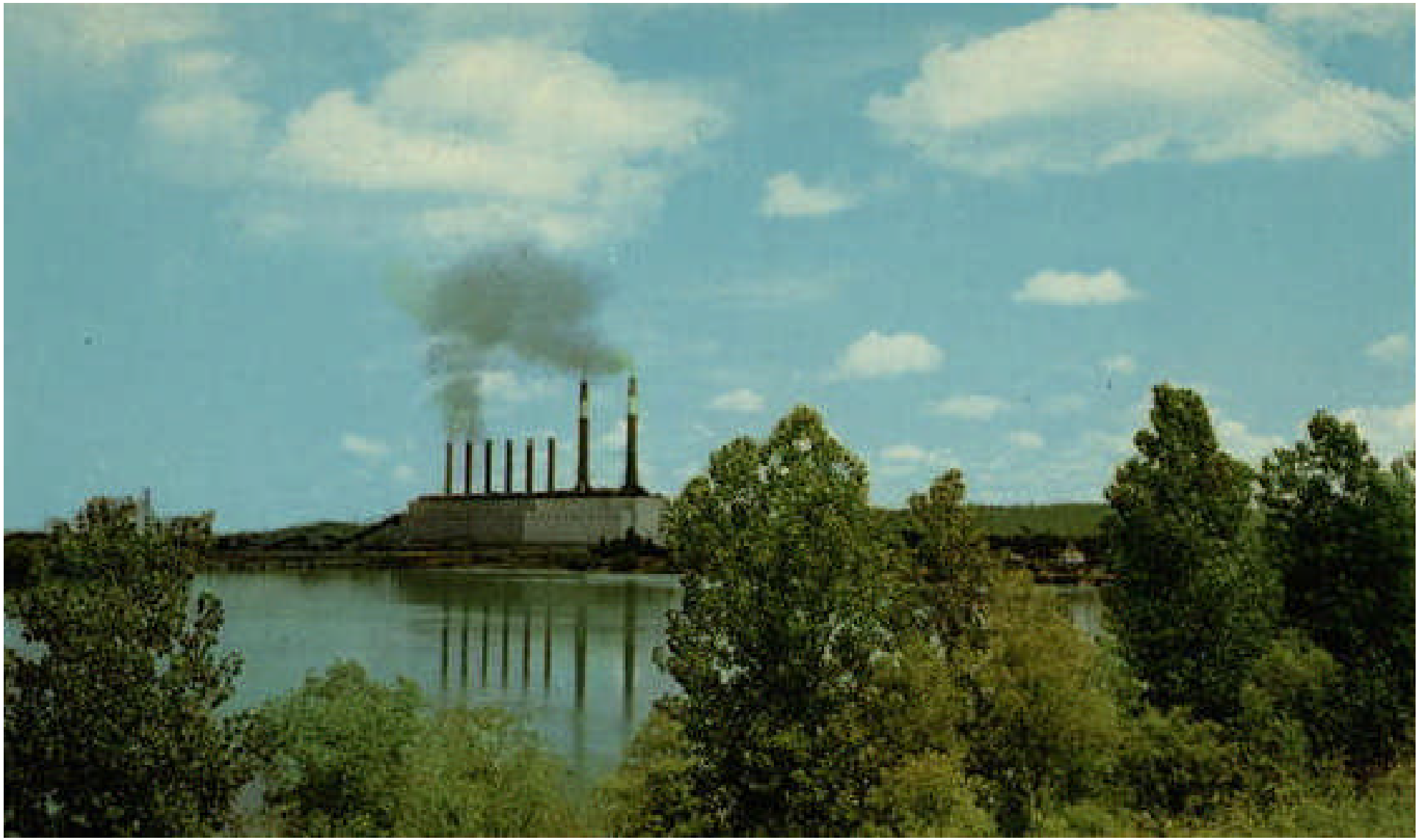
"…In addition, it became essential to have more steam power in the system. The Watts Bar Steam Plant of 240,000 kilowatts provided a very small percentage of the total 3,000,000-kilowatt capacity, which was not sufficient steam standby power to carry through a dry period. TVA asked Congress to authorize construction of another steam plant, and since the Watts Bar Steam Plant was on the east end of the Valley, it was logical to have the other steam plant at the west end. This project, though not approved by Congress on its first submission, was approved in 1949, and became the John-sonville Steam Plant…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Above</u>: caption: "Workmen Building Coal-Fueled Generating Plant, under Construction by the TVA"
<u>Left</u>: caption: "Workmen High Atop Girders While Building Coal Fueled Generating Plant, under Construction by the TVA"

<u>Above</u>: caption: "Aerial View of World's Biggest Coal-Fueled Generating Plant, under Construction by the TVA"

<u>Left</u>: caption: "Railroad Tracks Leading to World's Biggest Coal-Fueled Generating Plant, under Construction by the TVA"



"…The Johnsonville steam plant, though nearly three times as large in generating capacity as the Watts Bar plant (the first steam plant built by TVA), will employ less than one and a half times as many men…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Above</u>: caption: "New Johnsonville Steam Plant"

Hydro vs. Steam

"There is one school of thought who apparently look upon water power, publicly developed, as the leading factor in the solution of our economic problems. There is another school who argue that steam generated energy has been so greatly reduced in cost that water power is obsolete and its further development should be completely abandoned. As in the case of most controversial questions the facts lie somewhere between these two extremes. Some fifty years ago it required about fifteen pounds of coal to produce a kilowatt hour in the then inefficient steam plants. Today it requires about one pound. Recognition of this phenomenal advance cannot be overlooked in its relation to hydroelectric development when considered from a strictly cold blooded economic viewpoint, which is my viewpoint. At one time water power was synonymous with cheap power and factories gathered about water power centers, such as in the mill districts of New England. Now, it is recognized, in fully informed circles, that hydro has lost much of its former prestige as an independent producer of cheap electrical energy, on a run-of-river basis, where it must bear the entire cost of development."

L.F. Harza

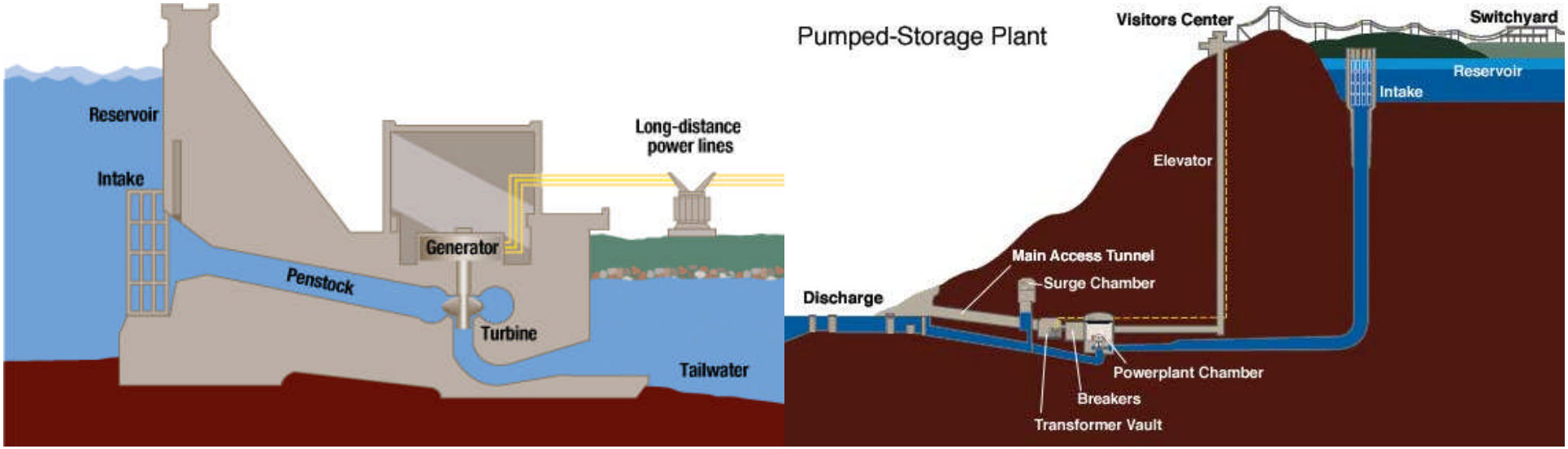
RE: speech he made at the *Midwest Power Conference* - held in Chicago on April 22nd 1936

"…The importance of steam plants in a hydro system of this character is not always understood. A hydroelectric system, of course, is dependent upon rainfall, which is erratic. Power from the dams must be sold to consumers who naturally insist on getting electricity when needed. No manufacturer could afford to build a plant and then have power cut off for certain months of the year when he might need it most; so the only kind of power having a high market value is power which is available all the time. This is called firm or continuous power. It is impossible for a hydroelectric system to guarantee a maximum output of power for every year or even for any part of the year, because there will always be years of low flow in any ten- or twenty-year period. Moreover, in some years a very dry month will occur, usually in the fall, when there will be a deficiency of water to carry the system loads. The storage dams, of course, help minimize that difficulty, but by themselves they are not sufficient. This makes it necessary to have some auxiliary standby, which in the TVA system is provided by steam plants using coal…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

RE: the *Tennessee Valley* region offers unique and abundant natural resources that were ripe for harvesting. Two of these resources, found in the region's abundant river systems and fossil fuel deposits, yielded hydroelectric and steam energy. Harnessing this energy for electricity throughout the region presented both challenges and benefits.

Hydropower



The TVA maintains twenty-nine conventional hydroelectric dams throughout the *Tennessee River* system In addition, four ALCOA dams on the *Little Tennessee River* and eight *U.S. Army Corps of Engineers* dams on the *Cumberland River* contribute to the TVA power system. Hydropower is America's leading renewable energy resource. Of all the renewable power sources, it's the most reliable, efficient and economical. Water is needed to run a hydroelectric generating unit (left). It's held in a lake behind the dam and the force of the water being released from the lake through the dam spins the blades of a turbine. The turbine is connected to the generator that produces electricity. After passing through the turbine, the water reenters the river on the downstream side of the dam. A pumped-storage plant (right) uses two reservoirs, one located at a much higher elevation than the other. During periods of low demand for electricity, such as nights and weekends, energy is stored by reversing the turbines and pumping water from the lower to the upper reservoir. The stored water can later be released to turn the turbines and generate electricity as it flows back into the lower reservoir. The TVA currently operates one pumped-storage facility for the production of electricity at *Raccoon Mountain*, which is the TVA's largest hydroelectric facility. *Raccoon Mountain Pumped-Storage Plant* is located in southeast Tennessee on a site that overlooks the Tennessee River near Chattanooga.

Construction at *Raccoon Mountain Pumped Storage Station* began in 1970 and was completed in 1978. The reservoir constructed at the top of the mountain has 528 acres of water surface. The dam at Raccoon Mountain's upper reservoir (above) is 230-feet high and 8,500-feet long and is the largest rockfill dam ever built by the TVA. Raccoon Mountain is a hydroelectric facility consisting of four generating units with a net (dependable) capacity of 1,652 megawatts. The plant works like a large storage battery. During periods of low demand, water is pumped from *Nickajack Reservoir* (at the base of the mountain) to the reservoir built at the top (it takes twenty-eight hours to fill the upper reservoir). When demand is high, water is released via a tunnel drilled through the center of the mountain to drive generators in the mountain's underground power plant.

Coal-Fired

"…However the TVA power demand has now far exceeded the hydroelectric capacity of the Tennessee River system. One of the greatest factors in that growth is the demand of the Atomic Energy Commission's plants at Paducah and at Oak Ridge. To meet these heavy loads, TVA was forced to build more steam plants. At the present time TVA is building seven steam plants, the total capacity of which is in the neighborhood of 5,000,000 kilowatts…TVA's construction and operation of steam plants does not, of course, reduce in any way its responsibility for flood control and navigation or for its other regional development activities…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

WIDOWS CREEK STEAM PLANT

First unit goes to work

TENNESSEE VALLEY AUTHORITY

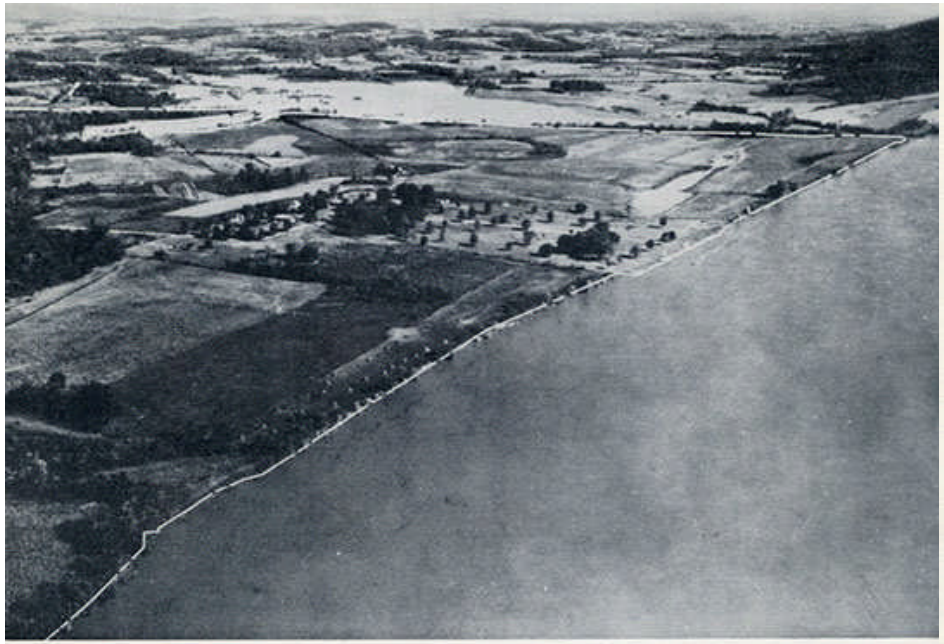
FOREWORD

This is the story of a farmland site on Guntersville Lake in northeastern Alabama and its transformation into one of the Nation's largest and most modern steam electric generating plants. It is the story of the Widows Creek Plant – an important unit of the TVA system producing electric energy to serve the people of the Tennessee Valley region and the Nation.

The Congress on March 28, 1950, appropriated funds for this plant; construction started the same day. There was no time to spare, additional power requirements of the Atomic Energy Commission were urgent. The first unit was scheduled to go "on the line" in June 1952, only 26 months away. This unit 1, with its full capability of 125,000 kilowatts, joined the TVA system on schedule.

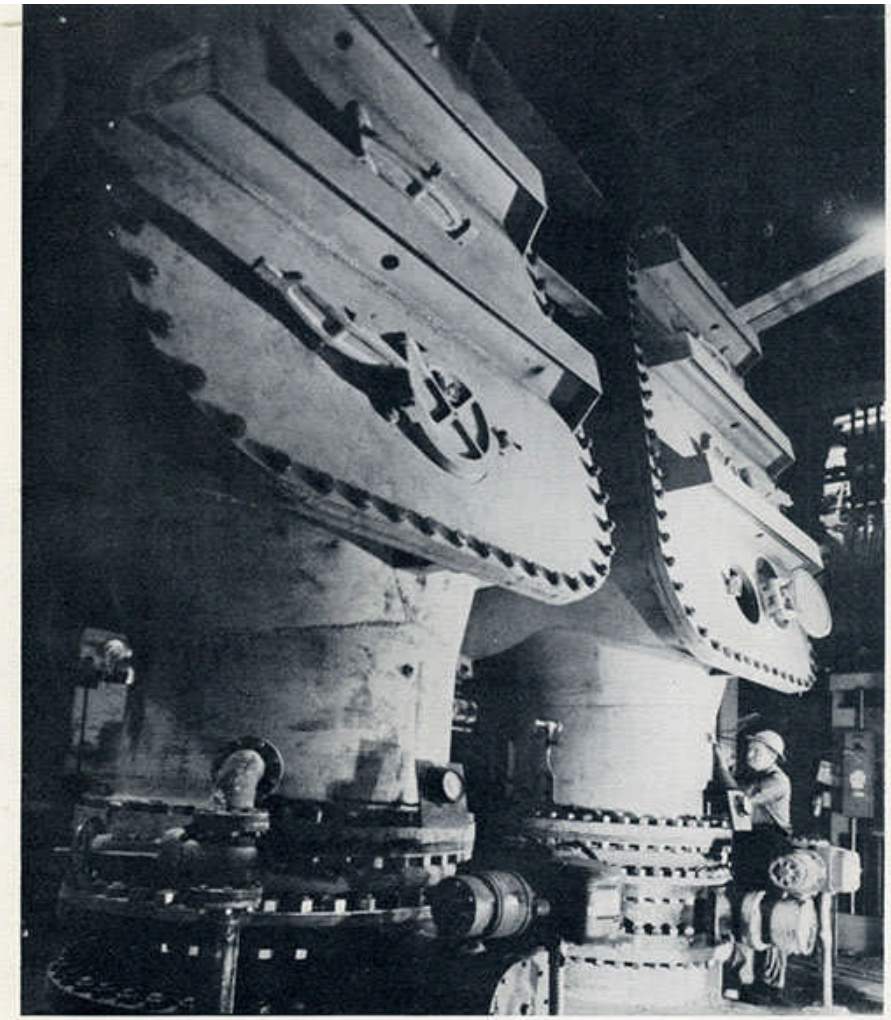
Successive appropriations by Congress provide for an installation of 6 units. Each has the same capability as the first–125,000 kilowatts–so that the total capability of the plant will be ¾ million kilowatts. Units 2, 3, and 4 will follow unit 1 on the line at about 2-month intervals. Units 5 and 6 will start operating in March and May of 1954.

Again TVA's engineers, construction men, those in procurement and other service units have accepted a challenge and made good. The ideas, skills, and efforts of many individuals combined to make this achievement possible–to them this booklet is dedicated.

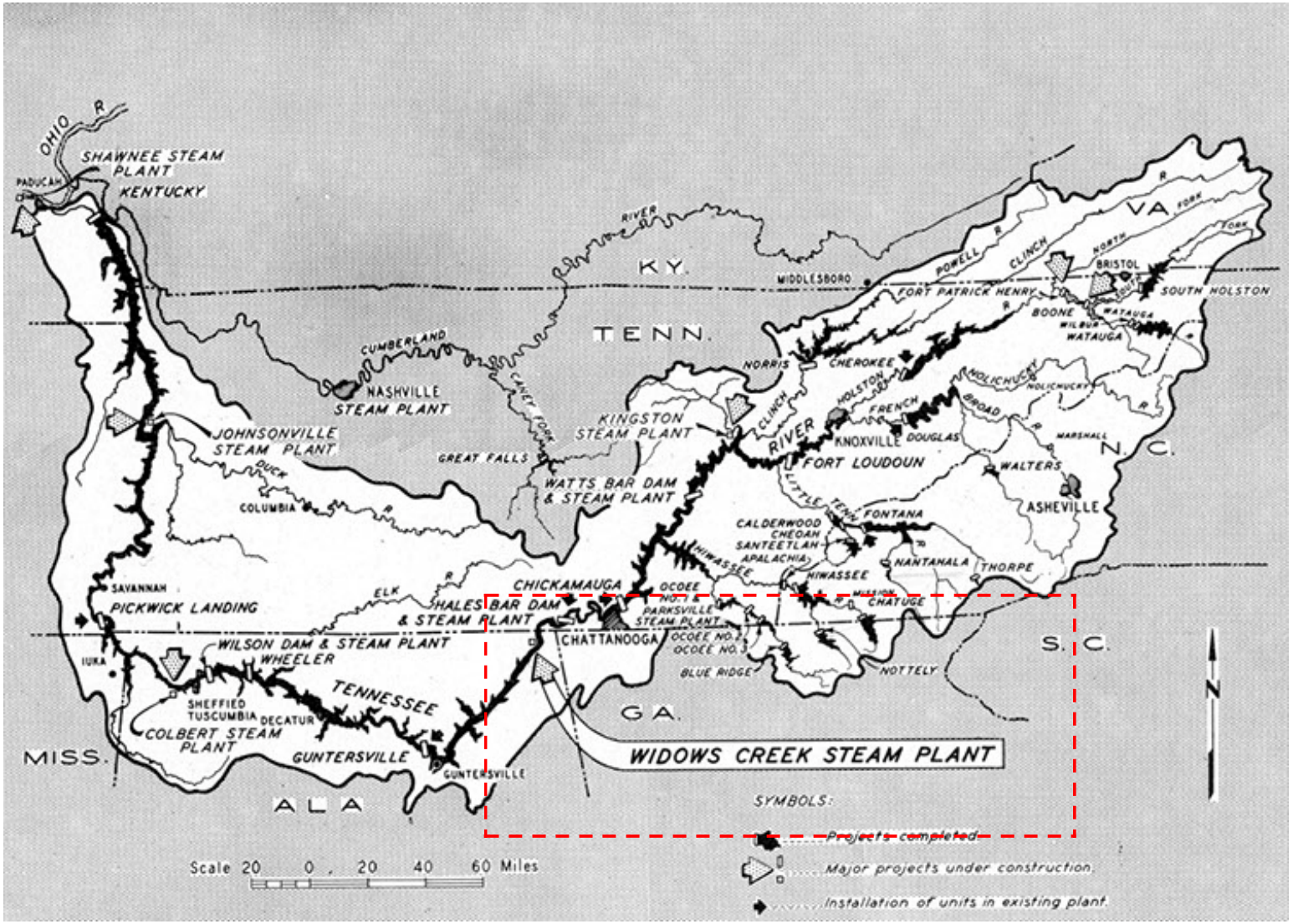


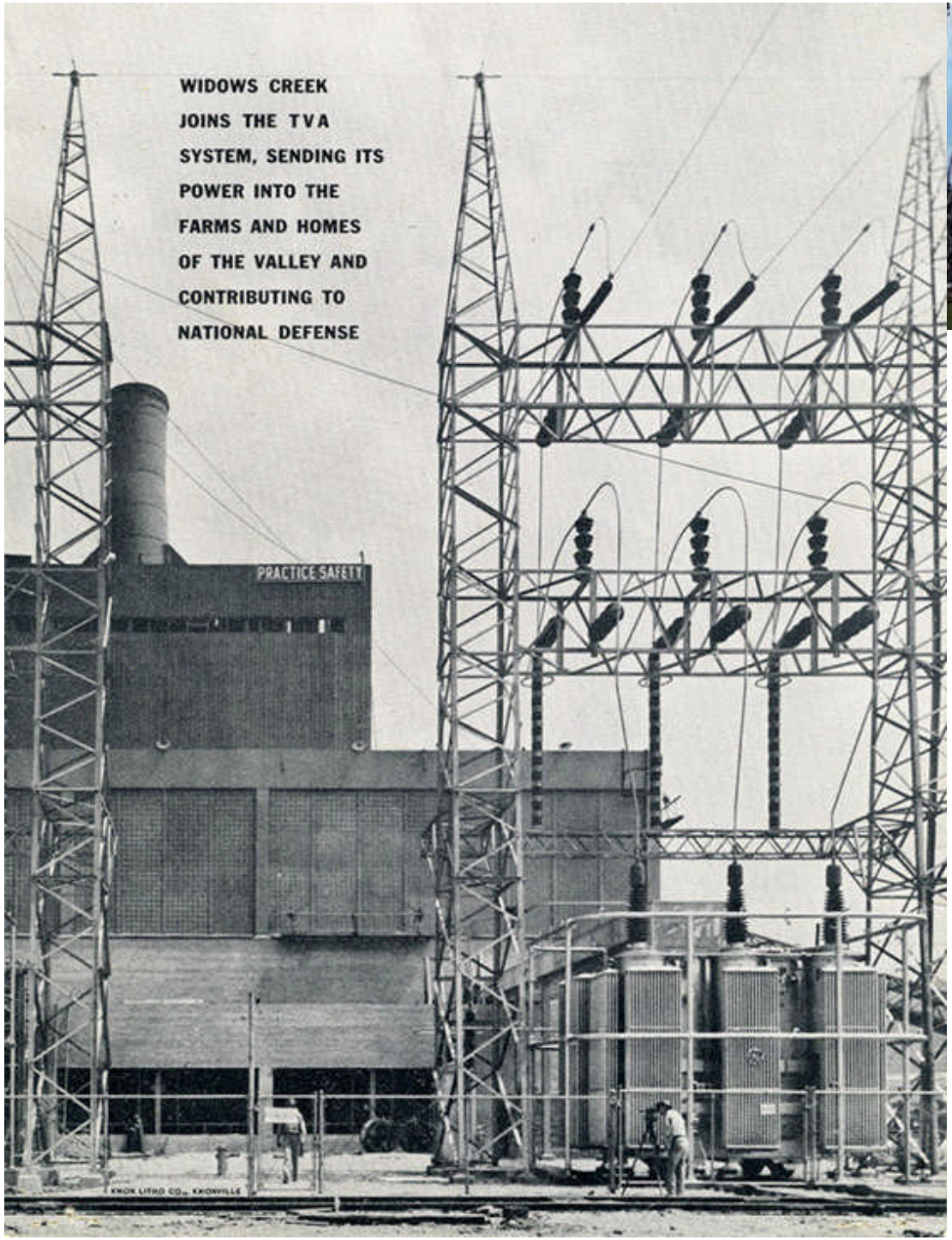
The site selected—outlined area above—lies on the right bank of Guntersville Lake about halfway between Bridgeport and Stevenson in northeastern Alabama. Work started March 28, 1950, the same day Congress appropriated funds for construction of the project.

Less than two months later the overburden had been removed from the original powerhouse area and rock drilling operations had started.



Steam, its work spinning the turbine finished, exhausts into enormous condensers where it again becomes water ready for recirculation to the boilers. Cooling water at the rate of 107,600 gallons per minute is pumped through the over 58 miles of tubing in the condenser. Two 56,000-gallon-per-minute pumps on the intake structure supply each condenser.


OHIO R
SHAWNEE STEAM PLANT
KENTUCKY
PADUCAH
KY.
TENN.
MIDDLESBORO
CUMBERLAND RIVER
NASHVILLE STEAM PLANT
CANEY FORK
GREAT FALLS
JOHNSONVILLE STEAM PLANT
DUCK
COLUMBIA
KINGSTON STEAM PLANT
WATTS BAR DAM & STEAM PLANT
NORRIS
CHEROKEE
HOLSTON
CLINCH
POWELL R
CLINCH
VA
NORTH FORK
BRISTOL
SOUTH HOLSTON
FORT PATRICK HENRY
BOONE
WILSON
WATAUGA
HOLICHUCKY
BROAD
FRENCH
KNOXVILLE
DOUGLAS
FORT LOUDOUN
MARSHALL
N. C.
WALTERS
ASHEVILLE
LITTLE TENN.
FONTANA
CALDERWOOD
CHEOAH
SANTEETLAH
APALACHIA
NANTAHALA
THORPE
HIWASSEE
CHATUGE
SAVANNAH
PICKWICK LANDING
ELK R
CHICKAMAUGA
WHALES BAR DAM & STEAM PLANT
OCOEE NO. 1 & PARKSVILLE STEAM PLANT
OCOEE NO. 2
OCOEE NO. 3
CHATTANOOGA
WILSON DAM & STEAM PLANT
WHEELER
IUKA
TENNESSEE
SHEFFIELD
TUSCUMBIA
DECATUR
COLBERT STEAM PLANT
GUNTERSVILLE
BLUE RIDGE
NOTTELY
S. C.
GA.
MISS.
ALA
WIDOWS CREEK STEAM PLANT
N
SYMBOLS:
Projects completed.
Major projects under construction.
Installation of units in existing plant.
Scale 20 0 20 40 60 Miles



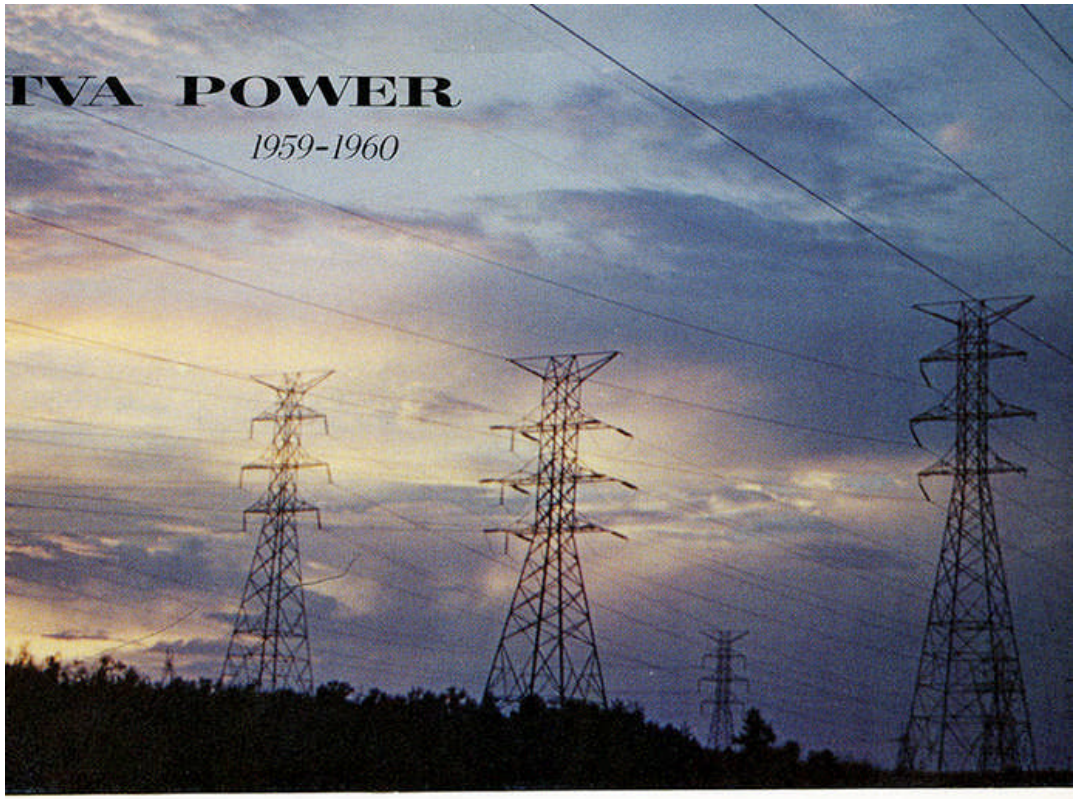
Widows Creek Fossil Plant **(above) was named for a creek that flows through the plant site. It's located on *Guntersville Reservoir* on the *Tennessee River* in northeast Alabama. In April 2005 Widows Creek Unit No. 3 set a national record for a continuous run by a coal-fired unit, operating for 819 days before it was shut down for scheduled maintenance (a new record was set when TVA's *Shawnee Fossil Plant* Unit No. 6 achieved 820 days of nonstop operation in May 2006). Widows Creek has two active coal-fired generating units with a summer net capability of 974 megawatts (units Nos. 1 thru 6 are idle and will be retired by July 31st 2015). Construction began in 1950 and was completed in 1965.**

"…It is essential for continued economic growth of the region that power costs be kept as low as possible. Since steam plants are necessary to supply the region's power requirements, it is important that all the advances in steam plant engineering be reflected in their design, construction, and operation. Large plants make possible capital savings and operating economies which cannot be obtained in smaller plants…Furthermore, in the construction of large plants with large units it is economically feasible to use higher steam pressures and temperatures with more efficient use of the heat in the fuel burned. At the Watts Bar plant about 0.92 pound of coal is required to produce a kilowatt-hour of electricity; at Johnsonville this figure is 0.84 pound, or about 10 per cent less…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…By 1956 TVA's large steam plants will require 18,000,000 to 20,000,000 tons of coal a year. By the use of a few very large steam plants, huge bulk purchases of coal are possible for each plant. This will permit steadier mine operation and will justify mechanized operating methods and reduce transportation rates, thereby lowering the cost of coal. The construction of a small number of large plants also makes it possible to concentrate the capacity at the very best locations, where the plants may be built and operated most economically…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



THE POWER SYSTEM

48 Hydro Plants

15 Steam Plants

61 Billion kwh Generation

12,000 Miles of Transmission Line

The power plants in operation include 48 hydro projects, 8 large modern steam plants, and 7 older steam plants of moderate or small size. The total generating capacity is nearly 11½ million kilowatts (January 1960). Operated as part of the power system are 15 hydro projects of the Aluminum Company of America on tributaries of the Tennessee River. By operating Alcoa's projects as part of an integrated system, both TVA and Alcoa get more power. All of the power produced at 4 hydro projects of the U. S. Army Engineers in the Cumberland River basin is purchased by TVA. The map on the opposite page shows the location of the major dams and steam plants.

Generation during fiscal year 1959 totaled 61 billion kilowatt-hours. This is more than was produced by any other power system in the United States. The chart on page 4 shows the source and the disposition of energy during the year.

The generating plants are connected with one another, and with the loads they serve, by 12,000 miles of high-voltage transmission lines. This system is connected at a number of points with neighboring systems.

Left: caption: "The power plants in operation include 48 hydro projects, 8 large modern steam plants, and 7 older steam plants of moderate or small size. The total generating capacity is nearly 11.5 million kilowatts (January 1960). Operated as part of the power system ar 15 hydro projects of the Aluminum Company of America on tributaries of the Tennessee River. By operating ALCOA's projects as part of an integrated system, both TVA and ALCOA get more power. All of the power produced at 4 hydro projects of the U.S. Army Engineers in the Cumberland River basin is purchased by TVA…Generation during fiscal year 1959 totaled 61 billion kilowatt-hours. This is more than was produced by any other power system in the United States…The generating plants are connected with one another, and with the loads they serve, by 12,000miles of high-voltage transmission lines. This system is connected at a number of points with neighboring systems."

"…It is clear then, that TVA's combination of hydro and steam plants, with increasing emphasis on the latter, rests upon economic considerations. Further, it is clear that the policy of expansion of generating facilities stems directly from the Act of 1933, particularly from those provisions which charge TVA with responsibility for supplying the power needs of the region, and for selling electricity to the greatest possible number of preferred consumers at the lowest practicable cost…"

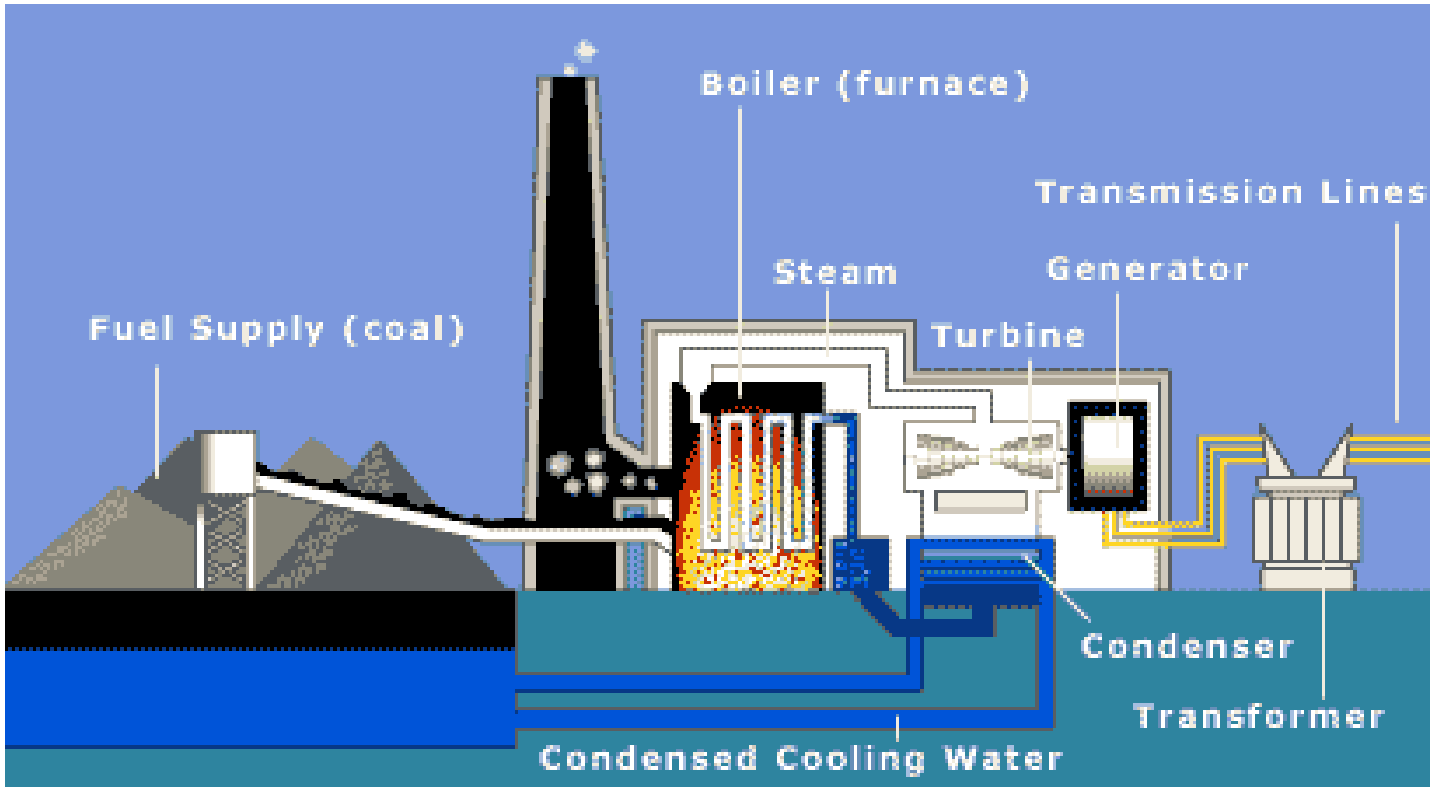
RE: excerpt from *TVA: The First Twenty Years* (1956)

RE: the TVA's eleven coal-fired generating facilities became the backbone of the power system in the 1950s, when TVA first began building coal plants to make electricity for the *Tennessee Valley* region. The TVA's fossil system also includes 106 natural gas-fired generators powered by combustion turbines. These generators can be quickly started and are vital for meeting peak electricity demands.

TVA's eleven coal-fired fossil plants have a total of fifty-nine generating units, of which forty-six are active. Each unit produces electricity by burning coal in a boiler to heat water to produce steam. The steam, at tremendous pressure, flows into a turbine, which spins a generator to produce electricity. The steam is cooled, condensed back into water, and returned to the boiler to start the process over.

Left: caption: "John Sevier Steam Plant. General yard view north from the Administration building." Constructed between 1952 and 1957, the *John Sevier Steam Plant* uses fossil fuels from the region to produce steam for the generation of electrical energy."

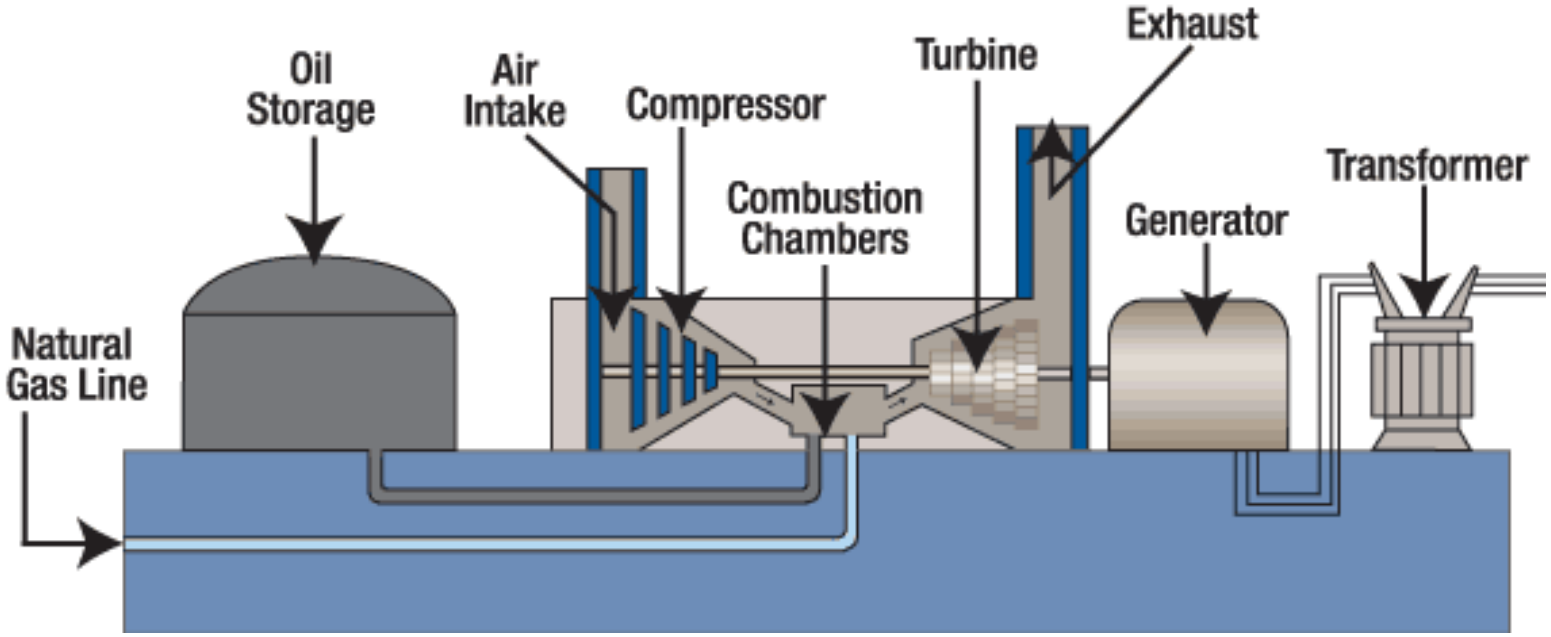
Right: caption: "John Sevier Fossil Plant is on the Holston River near Rogersville, TN. It's named for John Sevier, the state's first governor. John Sevier Fossil Plant has four coal-fired generating units with a summer net capability of 704 mega-watts. The plant consumes about 5,700-tons of coal a day. The John Sevier site also has three combined cycle combustion turbines with 880 mega-watts of combined capacity. These units began operation in April 2012."



<u>Above</u>: caption: "Coal-fired units produce electricity by burning coal in a boiler to heat water to produce steam. The steam, at tremendous pressure, flows into a turbine, which spins a generator to produce electricity. The steam is cooled, condensed back into water, and returned to the boiler to start the process over." For example, the coal-fired boilers at TVA's Kingston Fossil Plant near Knoxville, Tennessee, heat water to about 1K-degrees Fahrenheit (540-degrees Celsius) to create steam. The steam is piped to the turbines at pressures of more than 1,800psi. The turbines are connected to the generators and spin them at 3,600rpm to make alternating current electricity at 20K-volts. River water is pumped through tubes in a condenser to cool and condense the steam coming out of the turbines.

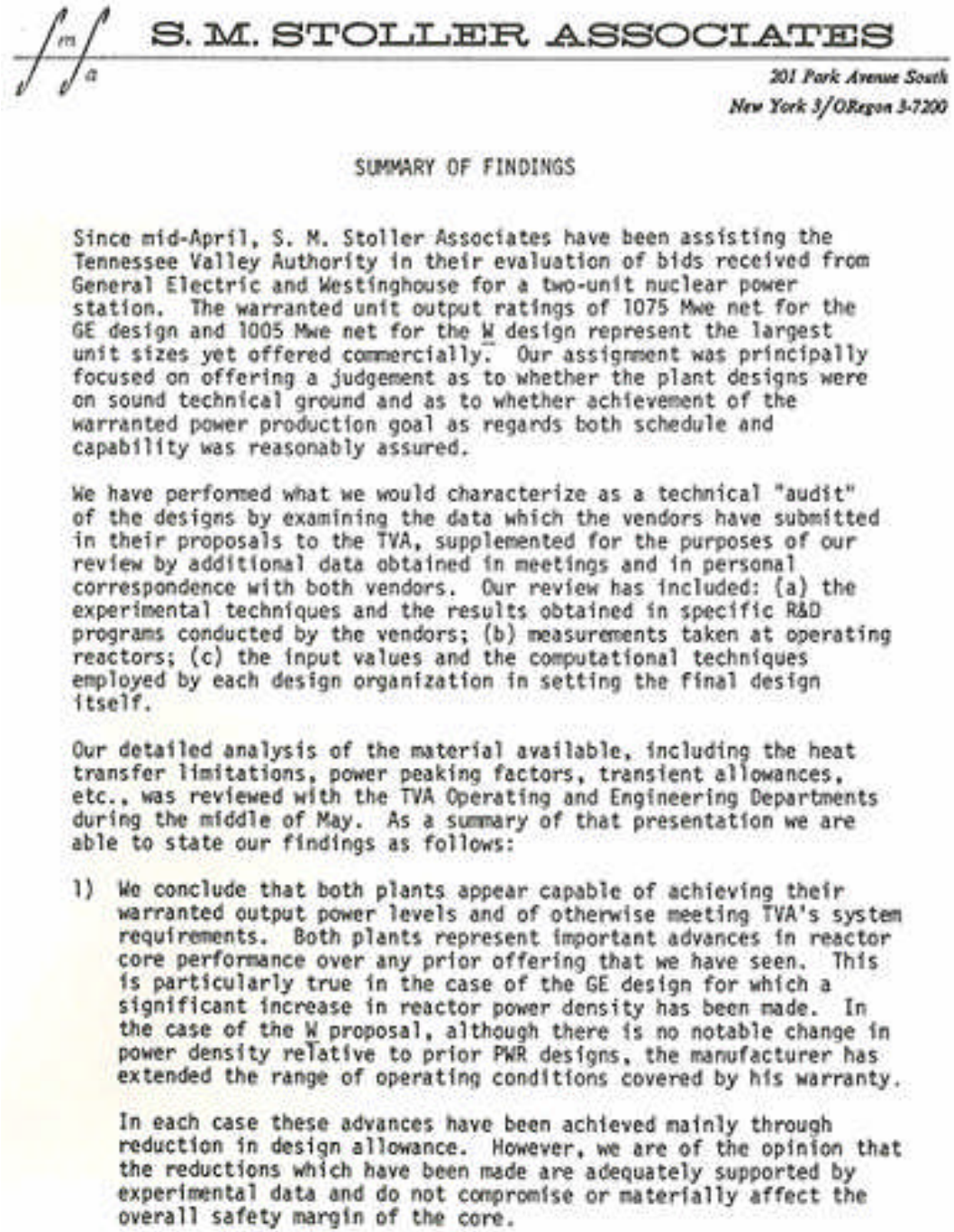
<u>Above</u>: Kingston Fossil Plant is located on Watts Bar Reservoir on the Tennessee River near Kingston, TN. At the time of its completion (1955), Kingston was the largest coal-burning power plant in the world (a distinction it held for more than a decade). Kingston Fossil Plant has nine generating units with a summer net capability of 1,398 megawatts (net capability is a measure of how much power a plant can generate for a specified time period, minus the power used by the plant itself). Construction began in 1951 and was completed in 1955. The Kingston plant generates about 10 billion kilowatt-hours a year, or enough electricity to supply 700K homes. To meet this demand, Kingston burns about 14K-tons of coal each day; an amount that would fill 140 railroad cars.

Combustion Turbines



The TVA's combustion turbine generators (diagram above) are located at thirteen sites across the TVA service area. They run on natural gas or fuel oil (low-sulfur fuel oil can also be used as needed) and are designed to start quickly during peak demand periods. The turbines operate like a jet engine, drawing in air, compressing it, mixing it with fuel and igniting it. The hot combustion gases then expand through turbine blades connected to a generator to produce electricity. Combined cycle units initially operate like combustion turbines, the difference occurs when the hot combusting gases used to turn the turbine are captured to produce steam. This steam is then used to drive a steam turbine to produce an additional 50% output. The TVA has combined cycle units at five locations.

Nuclear vs. Coal



S. M. STOLLER ASSOCIATES

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New York 3/ORegon 3-7200

SUMMARY OF FINDINGS

Since mid-April, S. M. Stoller Associates have been assisting the Tennessee Valley Authority in their evaluation of bids received from General Electric and Westinghouse for a two-unit nuclear power station. The warranted unit output ratings of 1075 Mwe net for the GE design and 1005 Mwe net for the W design represent the largest unit sizes yet offered commercially. Our assignment was principally focused on offering a judgement as to whether the plant designs were on sound technical ground and as to whether achievement of the warranted power production goal as regards both schedule and capability was reasonably assured.

We have performed what we would characterize as a technical "audit" of the designs by examining the data which the vendors have submitted in their proposals to the TVA, supplemented for the purposes of our review by additional data obtained in meetings and in personal correspondence with both vendors. Our review has included: (a) the experimental techniques and the results obtained in specific R&D programs conducted by the vendors; (b) measurements taken at operating reactors; (c) the input values and the computational techniques employed by each design organization in setting the final design itself.

Our detailed analysis of the material available, including the heat transfer limitations, power peaking factors, transient allowances, etc., was reviewed with the TVA Operating and Engineering Departments during the middle of May. As a summary of that presentation we are able to state our findings as follows:

1) We conclude that both plants appear capable of achieving their warranted output power levels and of otherwise meeting TVA's system requirements. Both plants represent important advances in reactor core performance over any prior offering that we have seen. This is particularly true in the case of the GE design for which a significant increase in reactor power density has been made. In the case of the W proposal, although there is no notable change in power density relative to prior PWR designs, the manufacturer has extended the range of operating conditions covered by his warranty.

   In each case these advances have been achieved mainly through reduction in design allowance. However, we are of the opinion that the reductions which have been made are adequately supported by experimental data and do not compromise or materially affect the overall safety margin of the core.

Left: caption: "Summary of Findings." An independent study entitled: "Comparison of Coal-Fired and Nuclear Power Plants for the TVA System" (conducted by *S.M. Stoller Associates)* concluded that both coal-fired and nuclear power plants were capable of meeting TVAs system requirements.

We should note that on the particular basis now offered neither design appears to have much room left for further increase of power output capability. Further core design changes would have to be made in the replacement fuel loads and/or in the design correlations and allowances if it is found in service that the balance of the plant could accommodate even further extensions of output capability than is now contemplated. The procedure for making such future changes appears straightforward. This represents a considerable inherent protection of nuclear plants against technical obsolescence, namely: the core in which these improvements would originate (and also which sustains the most rigorous conditions in the plant) is periodically replaced and hence advanced versions would be routinely installed.

2) Our studies indicate that either plant will maintain low fuel costs over their nominal 30 year lifetime. Based on a series of fuel cycle cost studies conducted by SMSA for utilities over the past several years, we are confident that when all fuel cycle factors are taken into account, the average fuel cost over the lifetime of the units contemplated herein would not exceed the average fuel cost warranted by the vendors for the first 12 years.

3) Our analysis seems to us to permit the choice between these offers to be made by the TVA on traditional economic grounds. Although these designs cannot be compared directly inasmuch as they represent different reactor types, they each are judged to be capable of meeting the TVA performance requirements and we see no need for special weighting or debiting of either offer as a result of technical limitations.

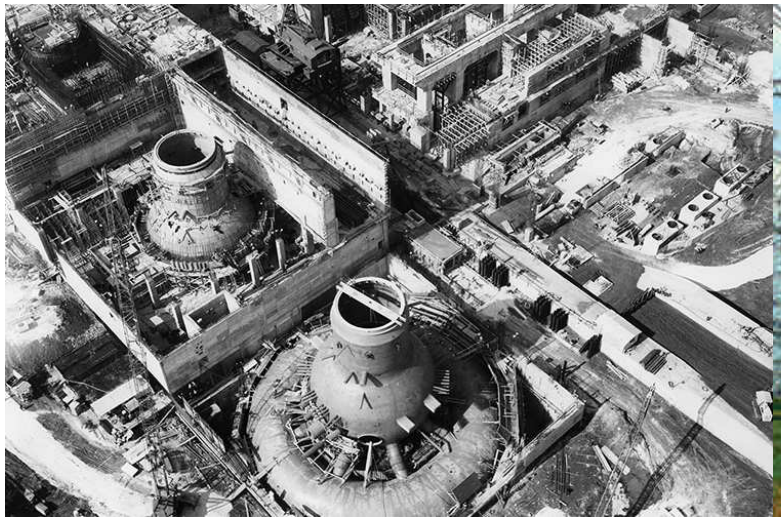
June 6, 1966

Nuclear

"*Nuclear power is one hell of a way to boil water!*"

Albert Einstein

RE: unlike the hydroelectric and steam plants that had been generating power for years, the age of nuclear power was a journey into the relative unknown for the TVA. Based on a thermal power station and nuclear reactor, the TVA began construction on its first nuclear power plant in 1966. As it mastered this new technology, the TVA was confronted with new challenges. Despite setbacks, environmental concerns and budget issues, today the TVA maintains three operating nuclear facilities: *Browns Ferry* (near Athens, AL); *Sequoyah* (in Soddy-Daisy, TN) and *Watts Bar* (near Spring City, TN). About 30% of TVA's power supply comes from its three nuclear plants, producing enough electricity to power more than three million homes in the *Tennessee Valley*. TVA's nuclear plants contribute about 6,600 megawatts of electricity to the power grid, making the *Nuclear Power Group* an integral part of the seven-state power system.



Construction (left) began on *Browns Ferry Nuclear Plant* in 1966 and when completed in 1974, it was the largest nuclear plant in the world. The TVA's first nuclear plant is located on 840 acres beside *Wheeler Reservoir* on the *Tennessee River* (the plant is named after a ferry that operated at the site until the middle of the 20th Century). Browns Ferry's three boiling water reactors were the first in the world capable of powering generators that could produce more than 1K megawatts 1 billion watts) of electricity each, making it the largest nuclear power plant in the world at that time. The plant's maximum summer capacity of some 3,300 megawatts is about 10% of TVA's total generating capacity and enough electricity to meet the needs of about two million homes. To improve generating capabilities in hot weather, in 2012 TVA put in service a new state-of-the-art cooling tower at Browns Ferry. About 1,400 people operate and maintain the Brown's Ferry plant.

"…A nuclear reactor is simply an apparatus in which a chain reaction, the splitting of atoms to produce heat, can take place with precision and safety. The heat can be controlled by regulating the nuclear reaction. The reactors for the brown's Ferry plant use water as a means to absorb heat from the nuclear reaction to produce steam. The steam turns the turbine-generators that generate electricity…"

RE: excerpt from an article published in 1971 in *The Timken Company* magazine highlighting the company's contributions to the construction of *Browns Ferry Nuclear Power Plant*

<u>Left</u>: caption: "Up, up goes the 620-ton unit one reactor pressure vessel at the Browns Ferry nuclear power plant. Timken steel components in the generating units and Timken bearings in the hoisting barge make the Timken Company an important supplier for the project."

TVA NEWS

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TENNESSEE VALLEY AUTHORITY

For Immediate Release

The Tennessee Valley Authority has announced that work will begin next year on its second nuclear power plant at a site on Chickamauga Lake 18 miles northeast of Chattanooga, Tennessee. It will be known as Sequoyah Nuclear Power Plant.

This will be the first commercial nuclear power plant in Tennessee, and one of the largest such plants anywhere, with two record-size 1,220,000-kilowatt generating units. The preliminary cost estimate exceeds $300 million, and the project will take about five years to complete. Like all TVA power projects of recent years it will be financed from power system revenues and borrowings.

The Sequoyah project will be a major power source for the Chattanooga area and is one of a series of new installations TVA is building to help supply the Tennessee Valley region's increasing use of electricity in coming years. Its 2,440,000-kilowatt capacity will exceed that of the eight-unit Widows Creek Steam Plant in northeast Alabama, the largest TVA generating plant now in operation.

Two other large plants are under construction on the TVA system, the 3,456,000-kw Browns Ferry Nuclear Power Plant in northern Alabama and the 2,600,000-kw coal-fired Cumberland Steam Plant northwest of Nashville. The new Sequoyah plant's units are scheduled for operation in 1973 and 1974, next in line after those two plants.

Contracts for nuclear reactors, turbogenerators and initial fuel supply for the new nuclear power plant were awarded earlier this year to Westinghouse Electric Corporation, before the plant site was selected.

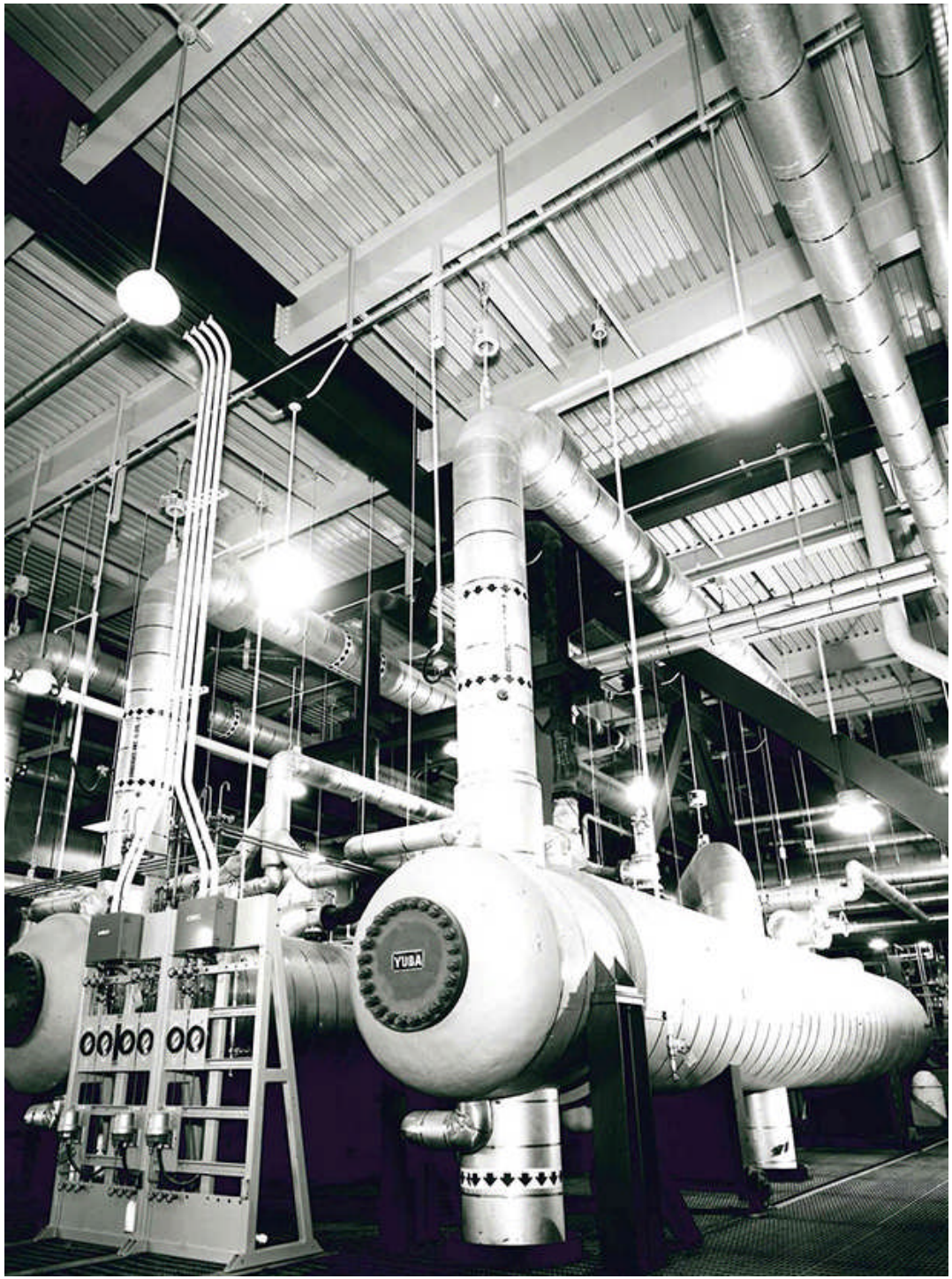
-ooo-

(Mailed August 12, 1968)

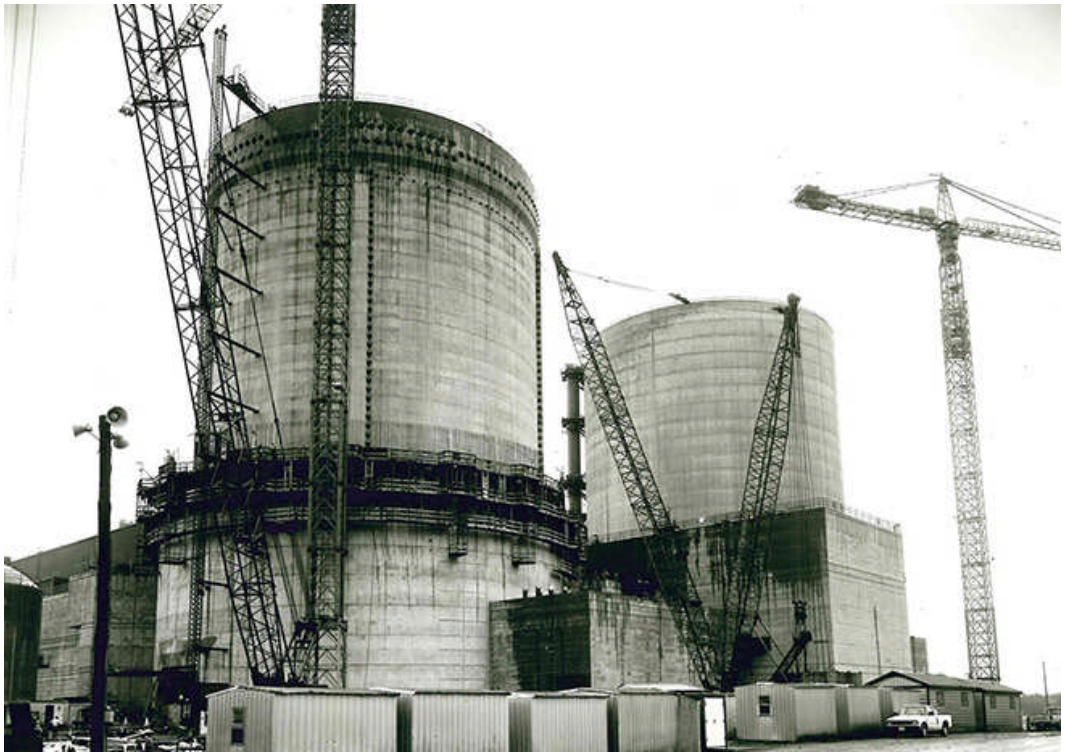
TVA 4516 (8-68)

The TVA's second nuclear power plant; *Sequoyah Nuclear Plant* (above), is located on 525 acres beside *Chickamauga Reservoir.* The plant was named in honor of a Cherokee Indian who lived in the area and invented an alphabet that was the tribe's first written form of communication. Groundbreaking occurred in 1969, with major construction beginning a year later. Unit 1 began commercial operation July 1st 1981, and Unit 2 began commercial operation June 1st 1982. Each unit can produce more than 1,160 megawatts of electricity. Together they can supply the needs of about 1.3 million homes per day. At left, the original TVA press release (dated August 12th 1968).

The TVA's third nuclear power plant; *Watts Bar Nuclear Plant*, is located on 1,700 acres on the northern end of *Chickamauga Reservoir*, in east Tennessee. The plant was named for a sandbar at *Watts Island* that hampered navigation on the *Tennessee River* until it was flooded by *Watts Bar Reservoir*. Groundbreaking occurred in 1972, with major construction beginning a year later. Unit 1 (the last commercial nuclear unit in the U.S. to come online in the 20th Century) began commercial operation in May 1996. It can produce about 1,100 megawatts of electricity, enough to serve 650K homes. In August 2007, following detailed studies of energy needs, schedule, costs, environmental impacts and financial risks, the TVA decided to complete construction of Unit 2 to help meet the Tennessee Valley's growing demand for power. Completing Unit 2 will add more than 1,100 mega-watts of generating capacity to the TVA power system.



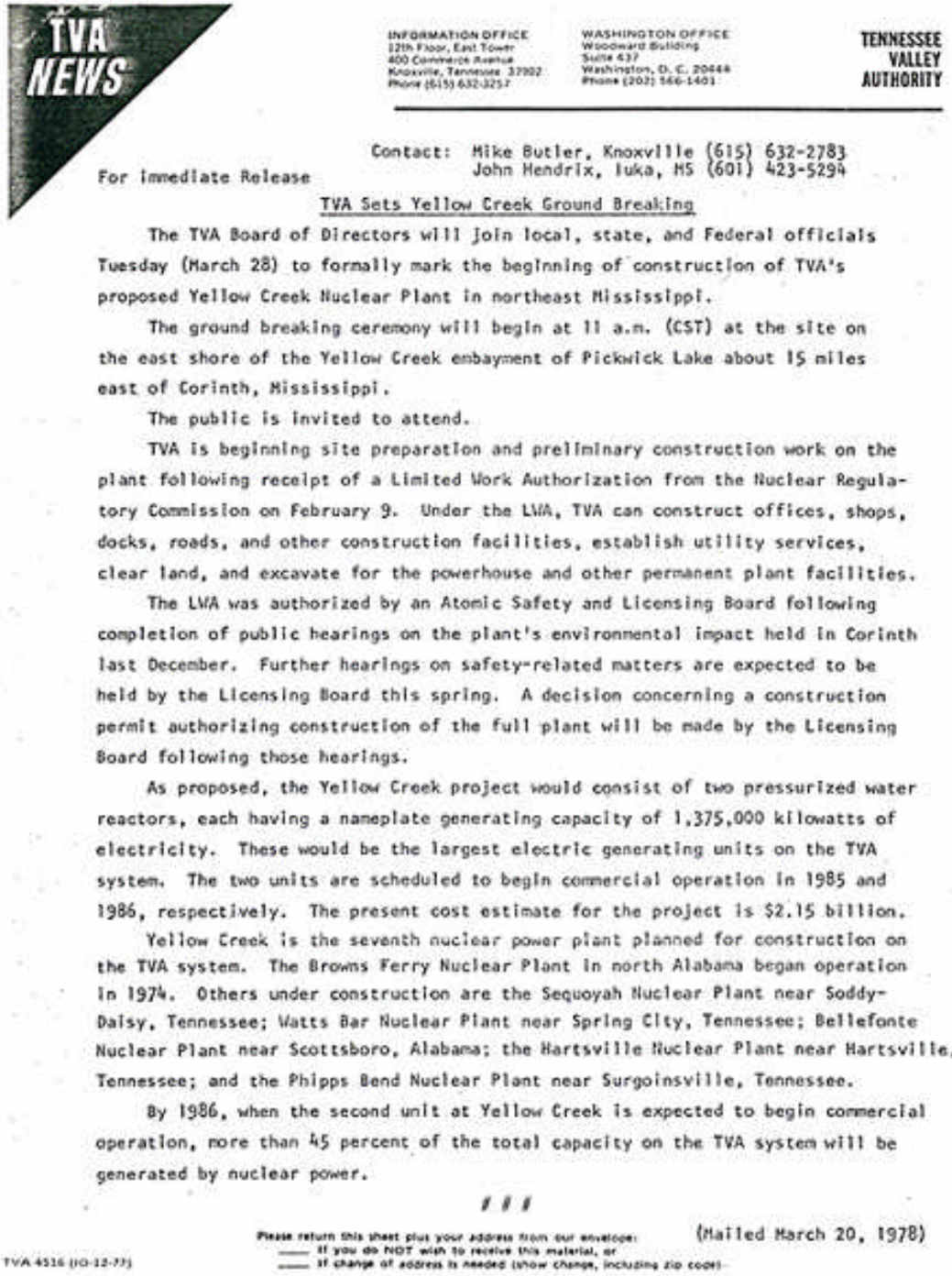
Left: caption: "This photo depicts feedwater heaters, which are components used to pre-heat water delivered to a steam-generating boiler. While not actually splitting an atom, it's an important process in a nuclear plant nonetheless." In a pressurized water reactor, water is pumped through the reactor core and heated by the fission process (the water is kept under high pressure inside the reactor so it doesn't boil). The heated water from the reactor passes through tubes inside four steam generators, where the heat is transferred to water flowing around the tubes. The water boils and turns to steam. The steam is piped to the turbines. The force of the expanding steam drives the turbines, which spin a magnet in coil of wire (the generator) to produce electricity. After passing through the turbines, the steam is converted back to water by circulating it around tubes carrying cooling water in the condenser. The condensed steam (now water) is returned to the steam generators to repeat the cycle.



"Changes in economic conditions, power demand and other external factors have caused TVA to reexamine the scheduled construction of the Bellefonte Nuclear Plant. In 2013, TVA developed a plan to reduce spending and staff at Bellefonte while continuing to protect the facility for future potential development. Based on work that has been accomplished to protect the Bellefonte asset and to develop an estimate to complete, TVA is focusing its resources on nearer term priorities."

TVA (2015)

<u>Above</u>: caption: "While this photo was taken over thirty years ago, construction on Bellefonte Nuclear Plant still has never been completed due to several suspensions and setbacks"



TVA NEWS

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For immediate Release

TVA Sets Yellow Creek Ground Breaking

The TVA Board of Directors will join local, state, and Federal officials Tuesday (March 28) to formally mark the beginning of construction of TVA's proposed Yellow Creek Nuclear Plant in northeast Mississippi.

The ground breaking ceremony will begin at 11 a.m. (CST) at the site on the east shore of the Yellow Creek embayment of Pickwick Lake about 15 miles east of Corinth, Mississippi.

The public is invited to attend.

TVA is beginning site preparation and preliminary construction work on the plant following receipt of a Limited Work Authorization from the Nuclear Regulatory Commission on February 9. Under the LWA, TVA can construct offices, shops, docks, roads, and other construction facilities, establish utility services, clear land, and excavate for the powerhouse and other permanent plant facilities.

The LWA was authorized by an Atomic Safety and Licensing Board following completion of public hearings on the plant's environmental impact held in Corinth last December. Further hearings on safety-related matters are expected to be held by the Licensing Board this spring. A decision concerning a construction permit authorizing construction of the full plant will be made by the Licensing Board following those hearings.

As proposed, the Yellow Creek project would consist of two pressurized water reactors, each having a nameplate generating capacity of 1,375,000 kilowatts of electricity. These would be the largest electric generating units on the TVA system. The two units are scheduled to begin commercial operation in 1985 and 1986, respectively. The present cost estimate for the project is $2.15 billion.

Yellow Creek is the seventh nuclear power plant planned for construction on the TVA system. The Browns Ferry Nuclear Plant in north Alabama began operation in 1974. Others under construction are the Sequoyah Nuclear Plant near Soddy-Daisy, Tennessee; Watts Bar Nuclear Plant near Spring City, Tennessee; Bellefonte Nuclear Plant near Scottsboro, Alabama; the Hartsville Nuclear Plant near Hartsville, Tennessee; and the Phipps Bend Nuclear Plant near Surgoinsville, Tennessee.

By 1986, when the second unit at Yellow Creek is expected to begin commercial operation, more than 45 percent of the total capacity on the TVA system will be generated by nuclear power.

###

(Mailed March 20, 1978)

Please return this sheet plus your address from our envelope:
____ if you do NOT wish to receive this material, or
____ if change of address is needed (show change, including zip code)

TVA 4516 (10-12-77)

<u>Left</u>: this TVA press release (dated March 20th 1978) announced the groundbreaking ceremony at *Yellow Creek Nuclear Plant*. By 1984 (before construction was completed) the Yellow Creek project was cancelled.

The *TVA Nuclear* (TVAN) corporate organization operates out of the TVA offices in Chattanooga, TN. The organization's primary role is to provide governance, oversight and support to TVA's nuclear plants. Governance involves setting policies, principles and rules that establish expectations for high standards of performance. Oversight means critically monitoring production work and performance results to assure functional outcomes are met. Support involves providing additional resources to the sites as well as unique technical expertise. The groups that operate under TVAN-Corporate are Engineering, Nuclear Assurance and Licensing, Plant Operational Reliability, Technical Programs Reliability, Business and Project Services, Nuclear Asset Recovery, Nuclear Fuel, Inspection Services, Nuclear Procurement, Computer Engineering, Process Methods and Emergency Services.

Electricity for Everyone

An Overview of TVA Today

TVA is one of the largest producers of electricity in the United States, generating 4 to 5 percent of all the electricity in the nation. Some 7.7 million people in a 7-state region depend on the power provided by TVA.

TVA's power system includes 5 nuclear generating units, 11 coal-fired plants, 29 hydroelectric dams, 48 combustion turbine units, and 1 pumped-storage facility. The system is linked by approximately 16,000 miles of transmission lines throughout the 7-state region. TVA's electric system is self-financed, as are other electric utilities, and receives no subsidies from the federal government.

With its low average utility rates, TVA ranks 30th in a comparison of 130 utilities in the nation. TVA's rates have remained constant since 1987 because of improved productivity and efficiency.

Operating revenues were $5.4 billion for fiscal year 1994, with net income for 1994 of $151 million. Total energy generated was 134 billion kilowatt-hours for 1994, an increase of 3.4 percent over 1993.

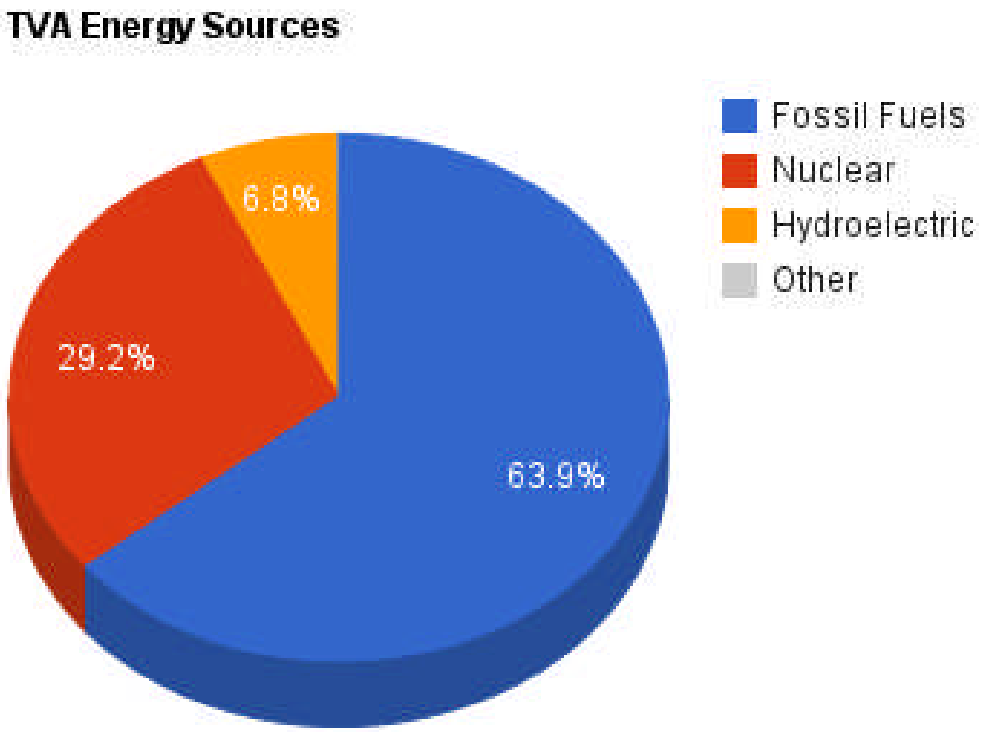
The size of TVA's power system and its influence on the Tennessee Valley's economy make integrated resource planning especially important. The decisions TVA makes today will have a significant impact on tomorrow's quality of life for millions of residents of the Valley, as well as on the competitive success of area business and industry.

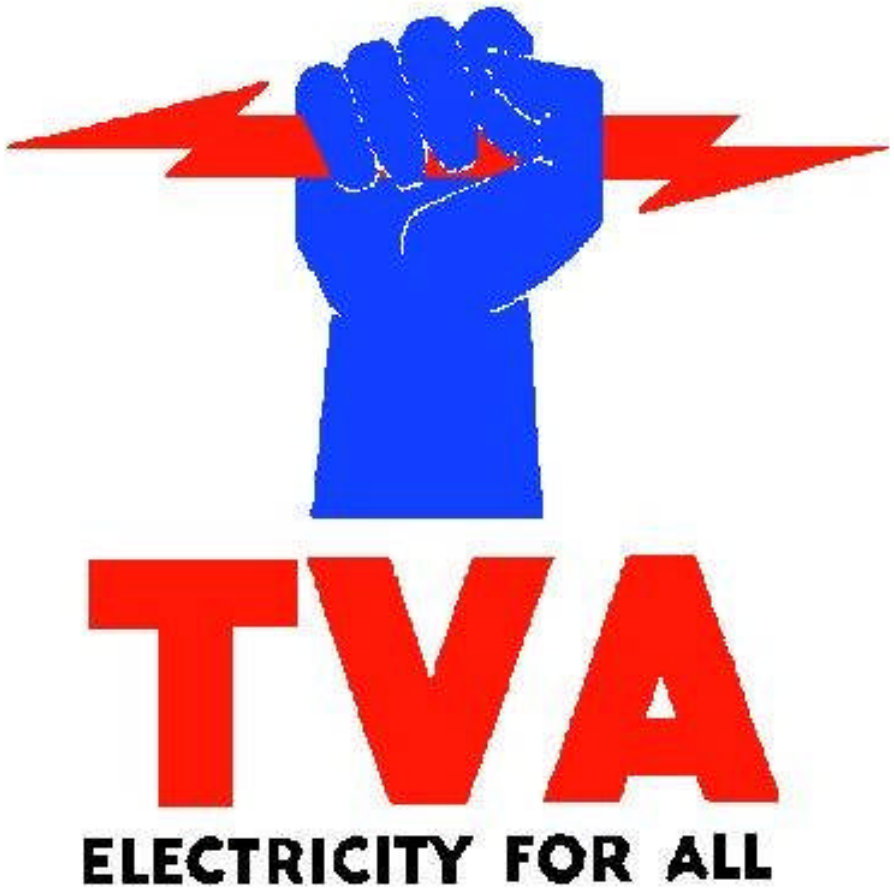
TVA's power system serves about 8 million people in a 7-state region encompassing some 80,000 square miles.

FIGURE 1. **TVA's Power System**

In the years following WWII, the number of rural electricity consumers increased by 150%, and the TVA played a significant role in this expansion. After serving its one-millionth customer in 1949, the TVA sought to expand the reach of electricity to more people. With a public engagement campaign that included photographs and comic books, TVA was not shy about publicizing the benefits of electricity to various consumers like children, farmers and homemakers. Thus, by the 1990s, it had taken power to 7.7 million people in seven states.

Left: excerpt from a 1994 TVA publication (Executive Summary) entitled: "Energy Vision 2020"


TVA Energy Sources
Fossil Fuels
Nuclear
Hydroelectric
Other
6.8%
29.2%
63.9%


TVA
ELECTRICITY FOR ALL

Part 23

The Test of Progress

Stand Alone

"…The Tennessee Valley Authority stands alone as a regional resource organization in the United States. Repeated efforts have been made to establish similar organizations elsewhere in the country, but TVA today remains the only integrated regional resource development agency. However, while TVA may be isolated as an organization its influence has been widespread. Many United States resource development operations have profited from TVA experience, and the pattern of such activities bears the unmistakable imprint of TVA innovations…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

Principles & Practices

"…The principles and practices of two decades which have been found useful elsewhere may be classified into two primary groups. First, there are those technical innovations, mostly of a scientific or engineering character, which have found wide acceptance; second, there are the contributions which TVA has made to the art of governance as an agency of regional administration…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

For the Good of Man

"…TVA has made a number of contributions to the technical and scientific life of the country. They range from improved engineering procedures to new scientific formulae, from high dams to patented machines and equipment, and from new uses for forest products to new community library services. Essentially, all deal directly or indirectly with the development and improved utilization of natural resources for the good of man…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

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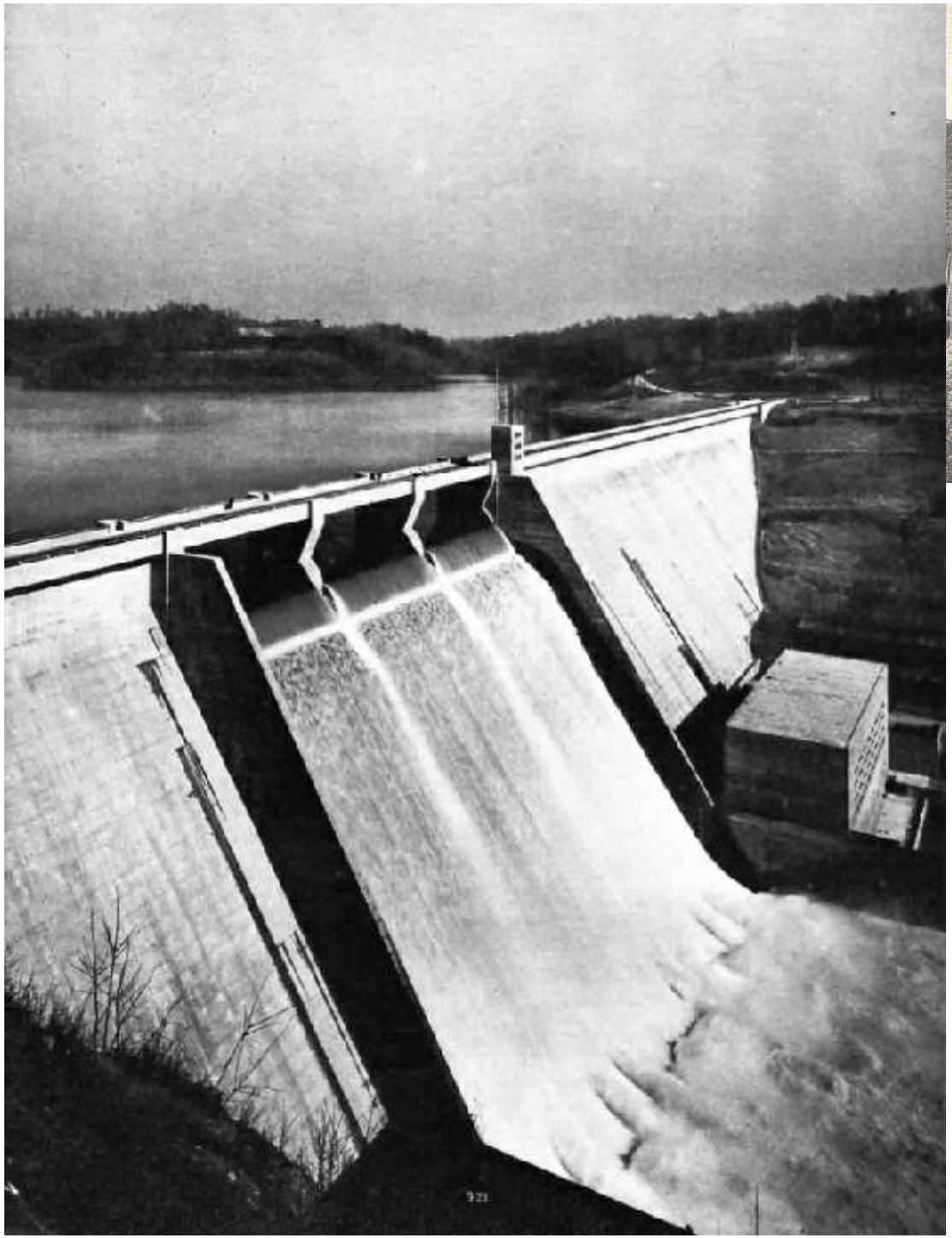
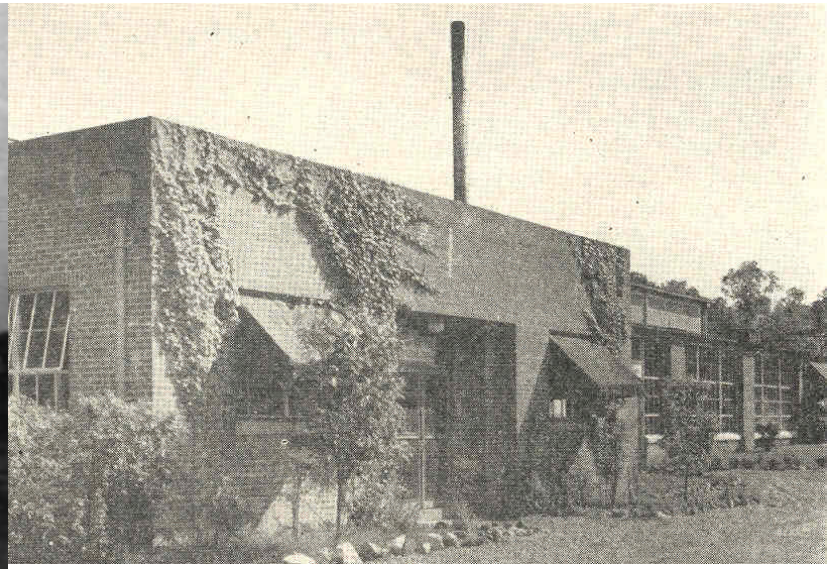




<u>Above</u>: caption: "TVA Hydraulics Laboratory"
<u>Left</u>: caption: "Norris Dam is 265-feet high and 204-feet thick at the base of the spillway section. At the crest of the spillway are three hydraulically-operated gates, each 100-feet long."

"…Among all of TVA's activities, the techniques of multiple-purpose river development and integrated water control management on a regional basis have had the most widespread recognition outside the Valley. After twenty years few engineers of note and no recognized specialist on river basin planning would think of approaching the development of a river valley on any other than an integrated multiple-purpose basis. The principle is now firmly established in the operating techniques of the other two important development agencies in the federal government, the Department of the Interior and the Corps of Engineers…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Left</u>: caption: "Norris power 1123
and light add to the stature of man"

<u>Left</u>: caption: “In bringing down its overall planning program to actual cases, the Authority works in intimate contact with local political institutions, and county, city, and state planning agencies, most of which owe their existence to TVA instigation. Models, designs, surveys, drafts of ordinances and legislation are developed by TVA technicians to assist in the physical re-planning of the valley.”

<u>Right</u>: caption: “In the reception room of Norris powerhouse the guide explains to a group of visitors the functioning of the project and will follow up by an explanation of the relation of the particular dam to the integrated system and to the general program of the TVA”

Water Master

"…Of notable importance has been TVA's experience as a single water master on the Tennessee River. From the beginning TVA has followed the policy of looking upon all waters in the basin as a single problem, wherever they may happen to fall, and has brought the principal surface waters in the basin under a single, integrated control. The value of this feature of TVA operations has not been so widely realized as the integrated planning and development of the river…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

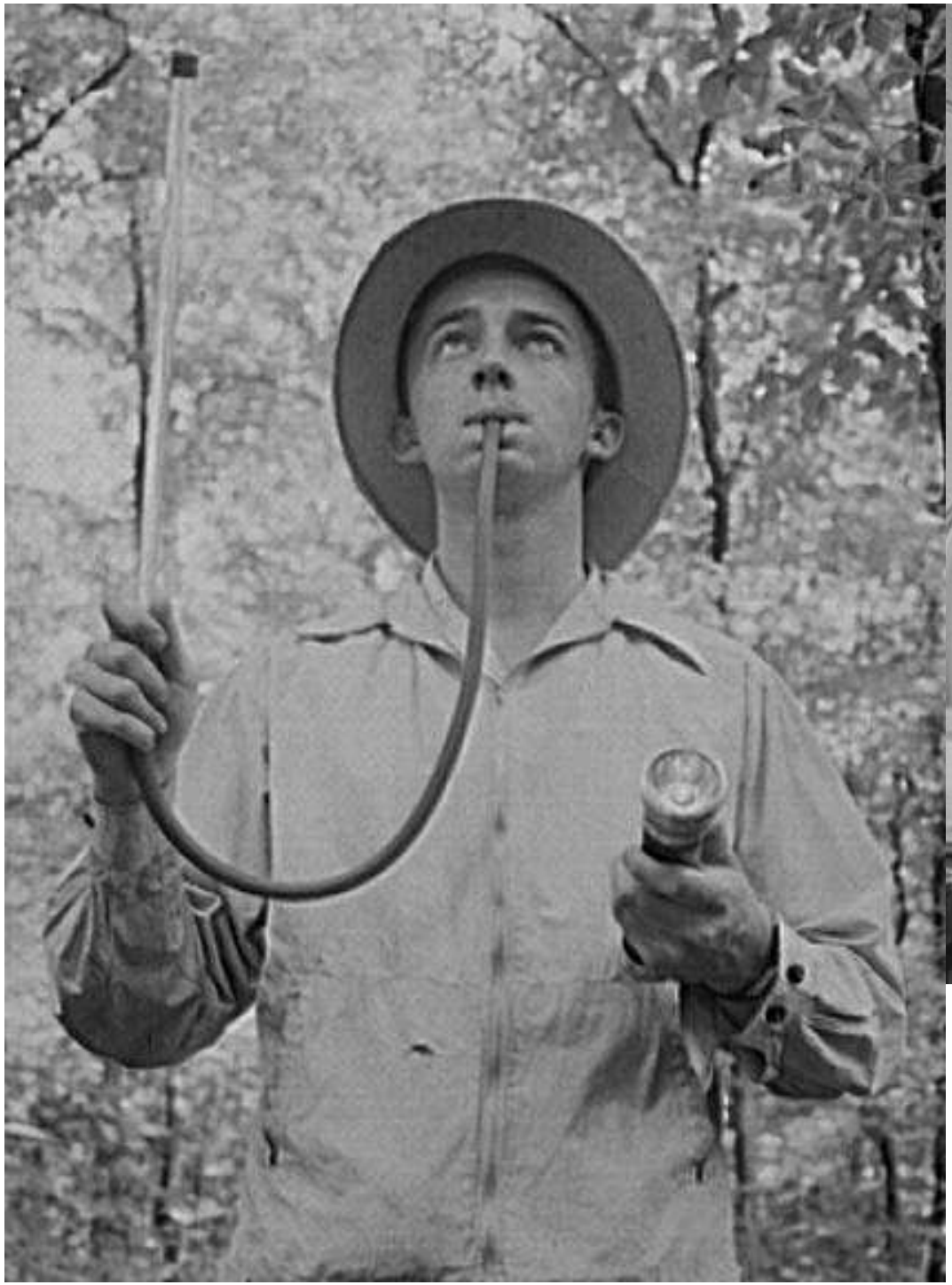
Secondary Lessons

"…The secondary lessons to be learned from TVA's experience in multiple-purpose river development are many. For illustration, three will suffice for mention here…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…The first relates to public health, and the subject of principal concern is malaria. Before the TVA system was commenced, the Southeast had had some unpleasant experiences with increases in malaria resulting from the creation of reservoirs. The Santee-Cooper Reservoir in South Carolina was a notable case. It is not too much to say that if TVA had not solved the malaria problem, its coming might have marked the end rather than the beginning of extensive reservoir development in the Southeast. As it is, TVA has developed a malaria control system which does not add unduly to the costs of reservoir operation, and which is compatible with the major purposes of reservoir construction and with the propagation of fish and wildlife as well. This is a professional achievement which since the late thirties has been noted wherever reservoirs have been constructed in regions where the Anopheles mosquito threatens…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



<u>Above</u>: caption: "Testing insecticide for malaria-carrying mosquito at malaria control laboratory"
<u>Left</u>: caption: "Collecting anopheles mosquitoes in malaria control area"

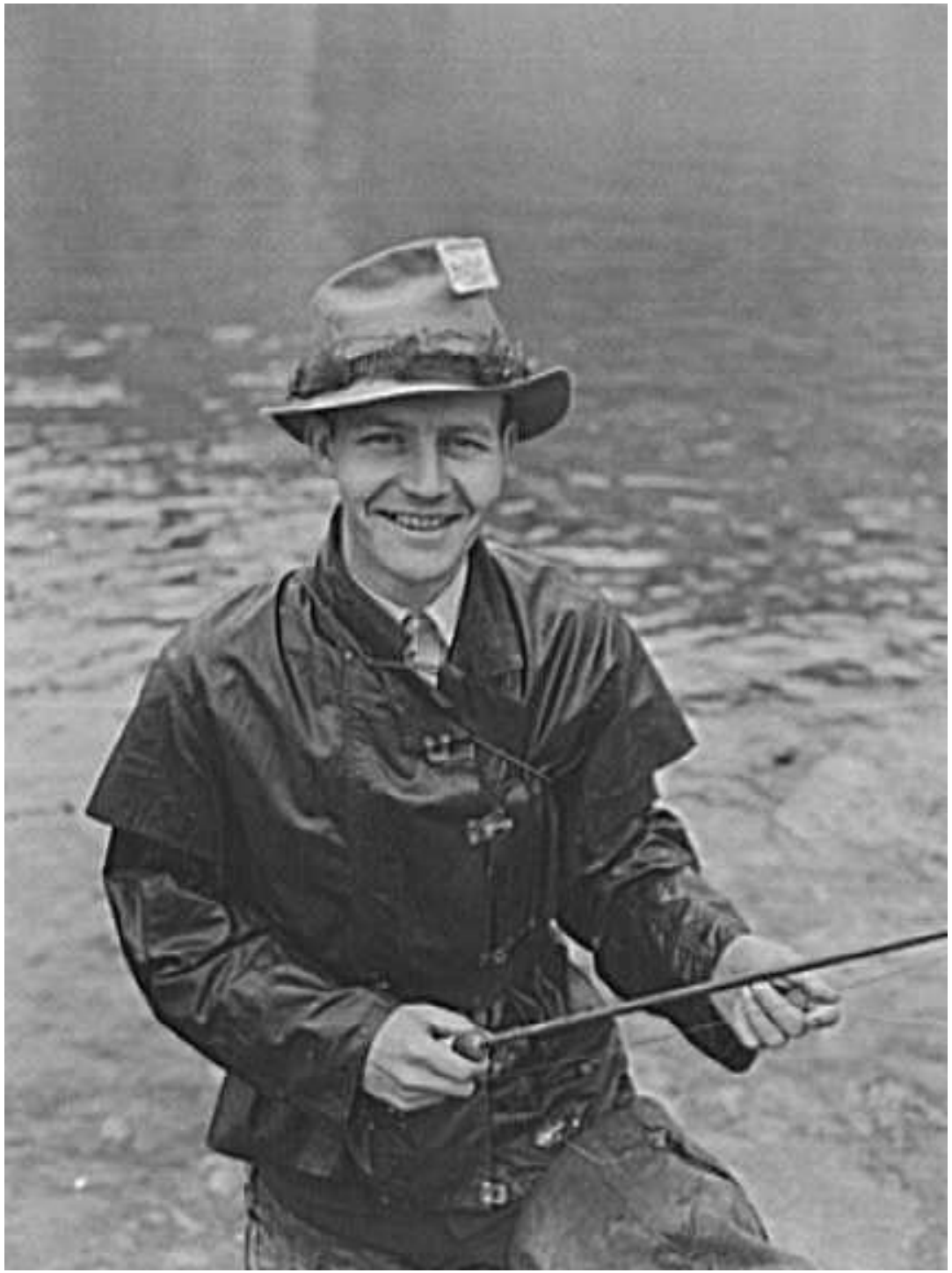
<u>Above Top</u>: caption: "Loading insecticide into plane used in malaria control work"

<u>Above Bottom</u>: caption: "Spreading insecticide for malaria control"

<u>Left</u>: caption: "Spraying insecticide along the banks of the Tennessee River for malaria control"

"…Fish and wildlife is another subsidiary area in which TVA experience has been of national use. Before experience with the extensive system established on the Tennessee, many conservation interests had maintained that large reservoirs on flowing streams meant the end of effective fish re-production. The fate of fish and wildlife was anticipated as a real problem when the TVA reservoirs came into existence, and extensive preparations were made through provision for restocking to see that fish did not disappear from the river…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



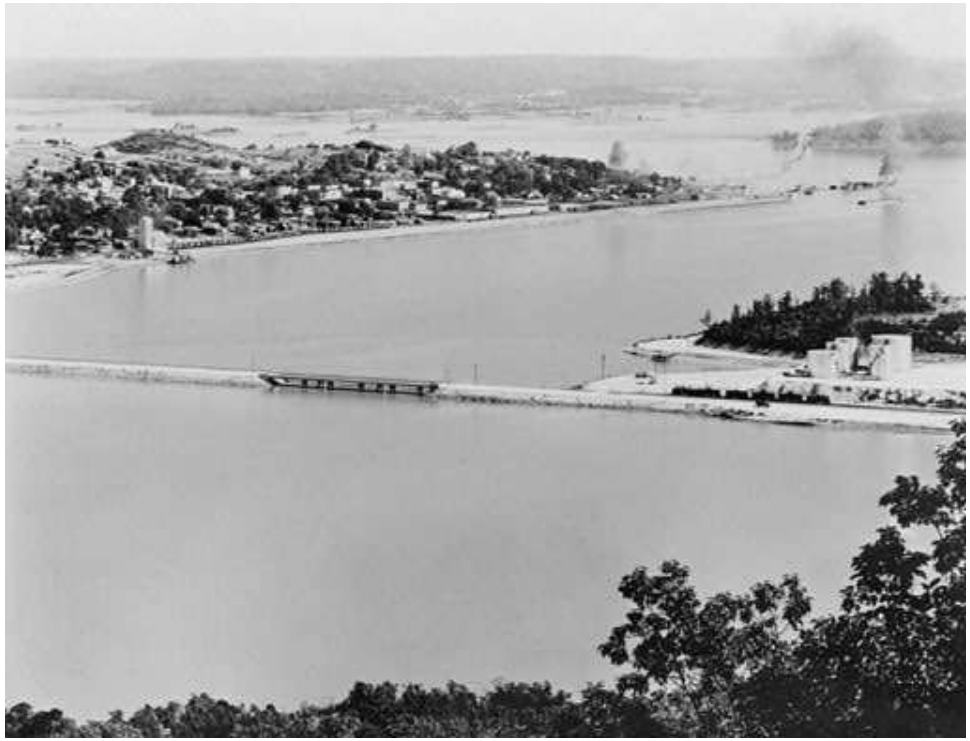
"…As it turned out, these precautions proved unnecessary. The hatcheries long since have closed operation for the Tennessee, and natural reproduction supports both commercial fishing and a high level of game fishing. While this experience does not have universal application, it has effectively put to rest many of the old arguments about 'cross purpose' reservoirs. It has been taken as applicable throughout much of the eastern United States…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

<u>Left</u>: caption: "Fishing at the base of Norris Dam"

"…A final example relates to the problem encountered in developing reservoirs in densely settled country. Another of the objections to multiple-purpose reservoir creation has always lain in the hardship caused by the dislocations resulting from water storage in a valley where communities and farms may have been located for generations. Because of the fragmentary planning which generally had been devoted to the solution of this social problem, it had often been regarded as a major obstacle to the creation of large reservoirs in densely settled country. Through careful planning and analysis, TVA has demonstrated that this problem can be handled economically and equitably even under adverse conditions. Other agencies faced with similar problems have made careful studies of what TVA has done. The most recent study of TVA methods was undertaken for the Missouri Basin…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

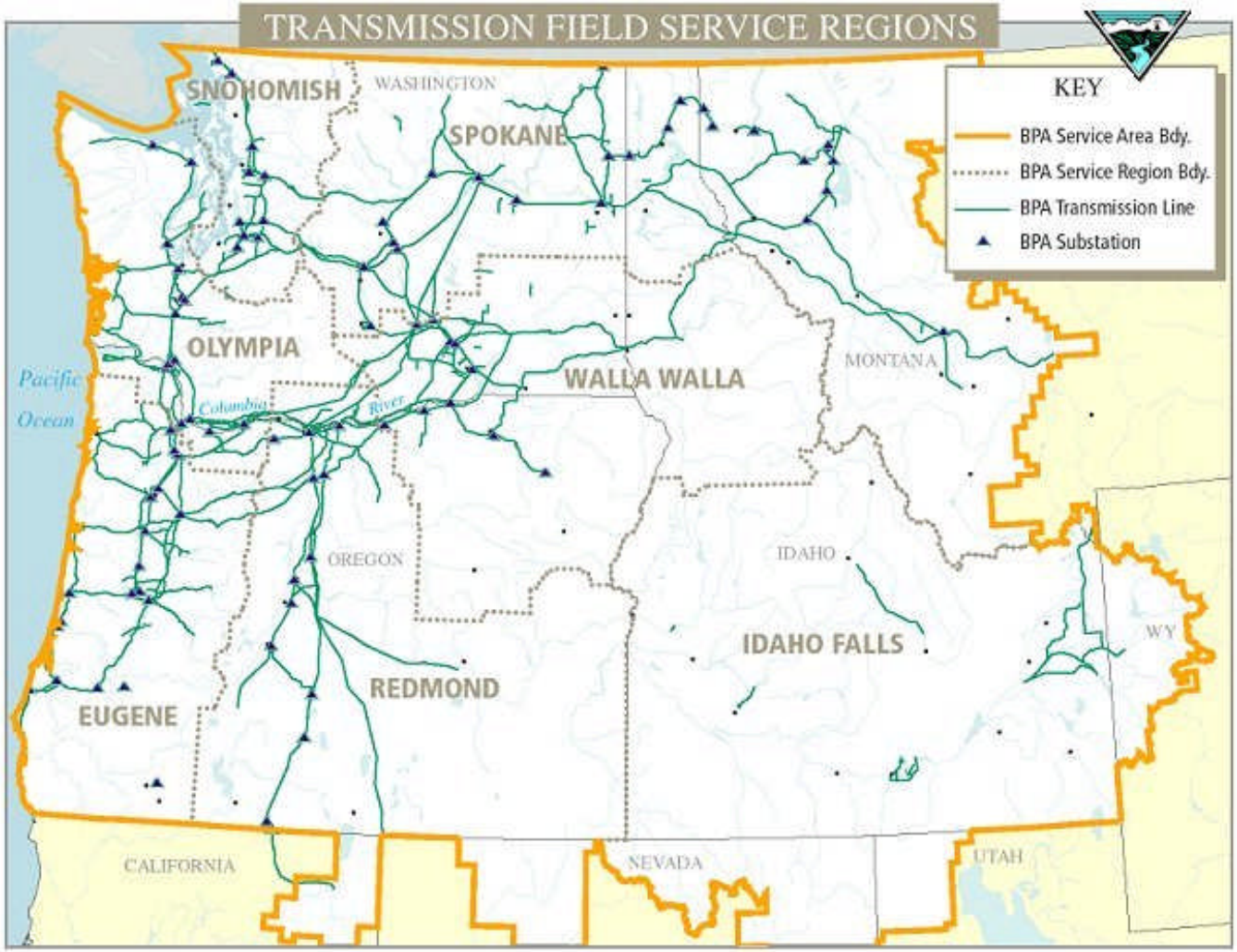


<u>Left</u>: caption: "The town of Guntersville, Alabama, one of many whose entire future has been reoriented due to the program of the Authority. Formerly a sleepy crossroads in a depressed cotton raising area, it became a center of navigation and commerce due to the construction of the reservoir. It's current and anticipated rapid development will be guided by newly established planning and zoning commissions, city plans and ordinances, with the assistance of the Authority's technicians."

Made Manifest

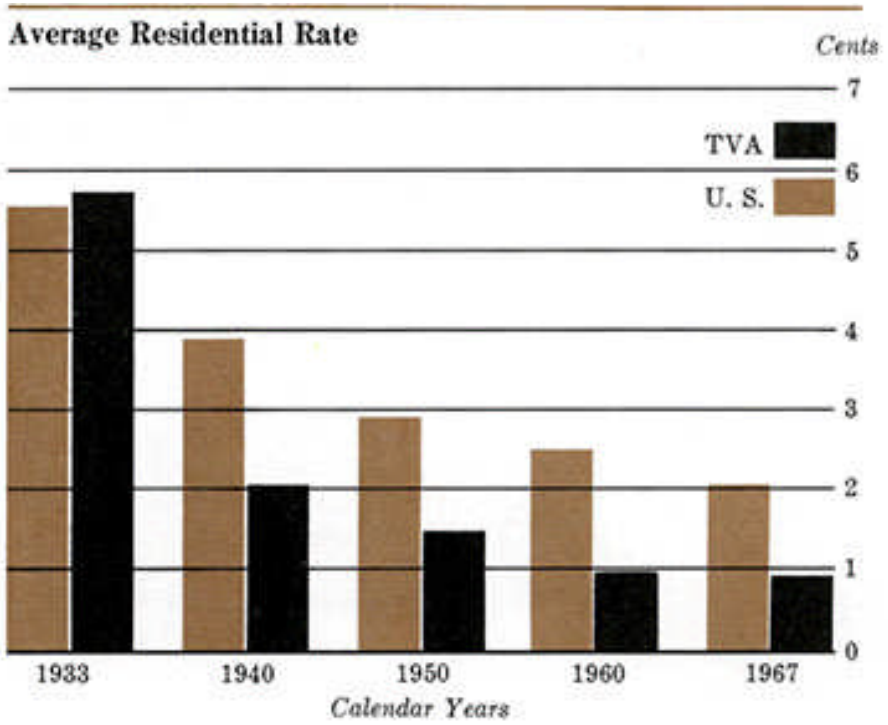
"…In the domain of public power TVA experience offers a number of lessons for wider consumption. Among the most significant of these is its demonstration of the value of a single, closely integrated electric power system distributing the energy from a number of hydroelectric and steam plants over an entire region. The stability and the cost advantages of a single large distribution network were first made manifest in TVA's experience. The same principle was later illustrated by the Bonneville Power Administration's distribution network in the Northwest…"

RE: excerpt from *TVA: The First Twenty Years* (1956)


TRANSMISSION FIELD SERVICE REGIONS
KEY
BPA Service Area Bdy.
BPA Service Region Bdy.
BPA Transmission Line
BPA Substation
SNOHOMISH
WASHINGTON
SPOKANE
OLYMPIA
WALLA WALLA
MONTANA
Pacific
Ocean
Columbia
River
OREGON
IDAHO
IDAHO FALLS
WY
REDMOND
EUGENE
CALIFORNIA
NEVADA
UTAH

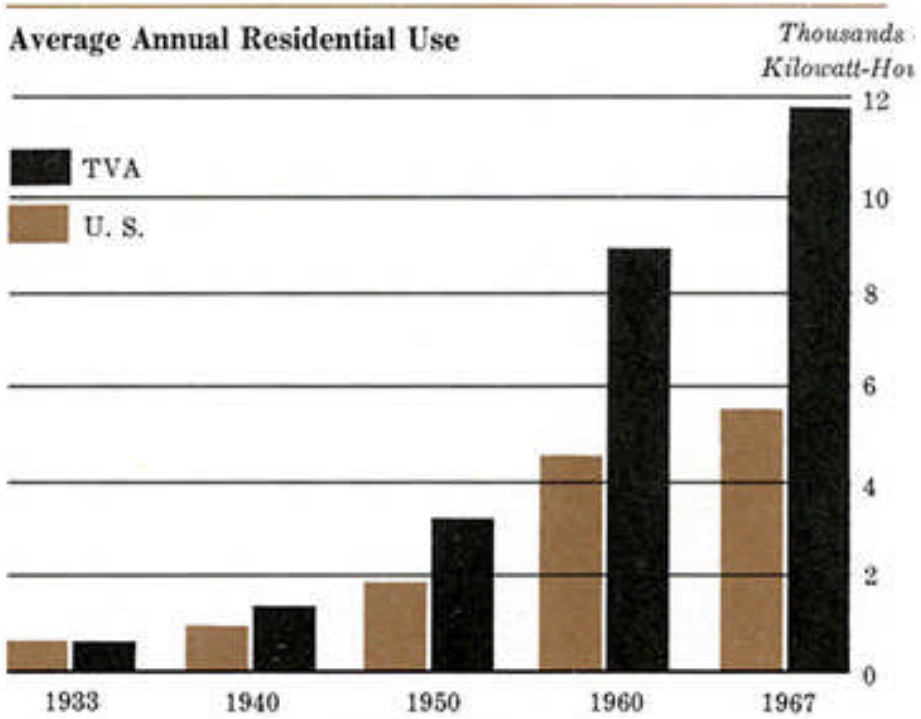
"…Another major area in which TVA's experience in public power has yielded dividends for the whole country concerns the cost and use of electricity, upon which TVA's influence is observable in at least three important particulars…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



"…First, the experience of the Tennessee Valley has had significant effects on the nation's electricity rate structure. To comprehend these effects one need only examine the range of electricity rates from 1935 to 1952. There has been a marked reduction in rates both throughout the country and, more especially, in the Southeast. Several factors combined to effect this reduction, but one of the most significant unquestionably was the experience of the Tennessee Valley Authority…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

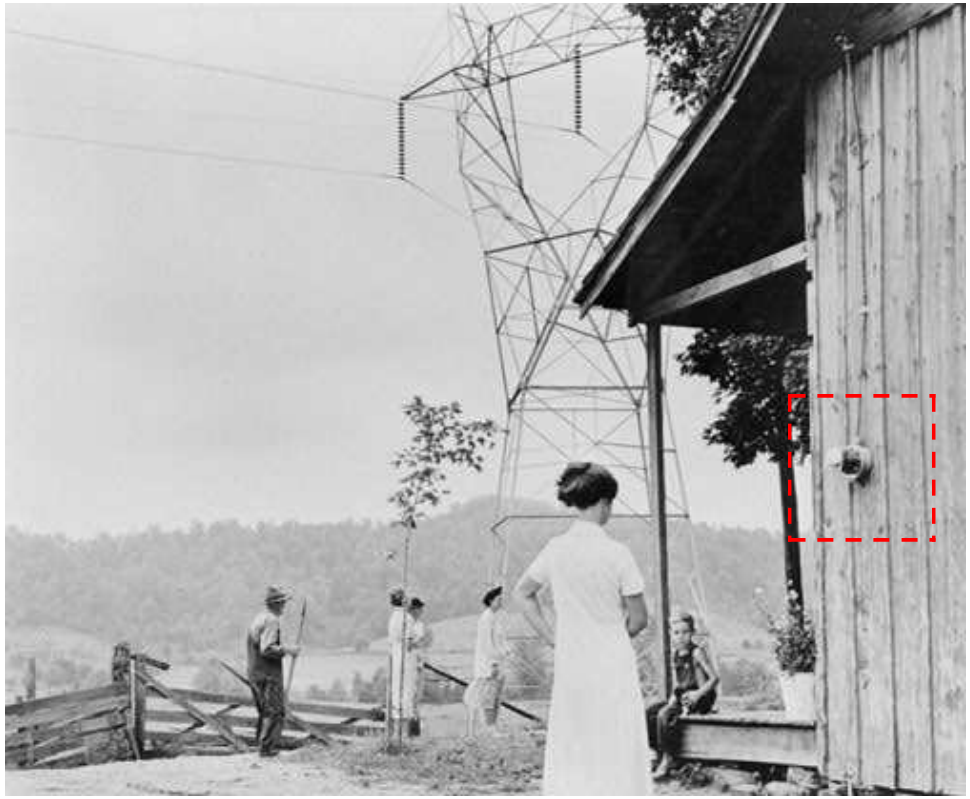


"…Second, TVA from its beginning has made optimistic forecasts of the potential electricity market. For at least the first ten years of its life, the TVA was criticized continually by private utility spokesmen for constructing capacity for which, to quote an oft-repeated charge, 'there could be no possible use within this generation.' Lately, thinking on this subject has undergone a marked change; the President's Materials Policy Commission, to illustrate, reported estimated needs for electric energy for the country which are notably at variance with the traditionally cautious estimates of the utility industry. The forecasts made by the TVA almost twenty years ago appear in retrospect to have been imaginative but wholly realistic. They have come to provide the background for national thinking about the potential need for electricity…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"…Third, there has been a remarkable increase in the use of electricity by individual consumers throughout the country as a whole but more especially in the Tennessee Valley. This increase has been notable on the farms, few of which had electricity twenty years ago but most of which are now electrified. Credit for this trend can go to the Rural Electrification Administration, which provided the financial means for bringing electricity to the farms; to the local electricity distribution co-operatives for their initiative, interest, and good management; and to the TVA, which lowered the cost of electricity to the point where the farmers could afford it…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

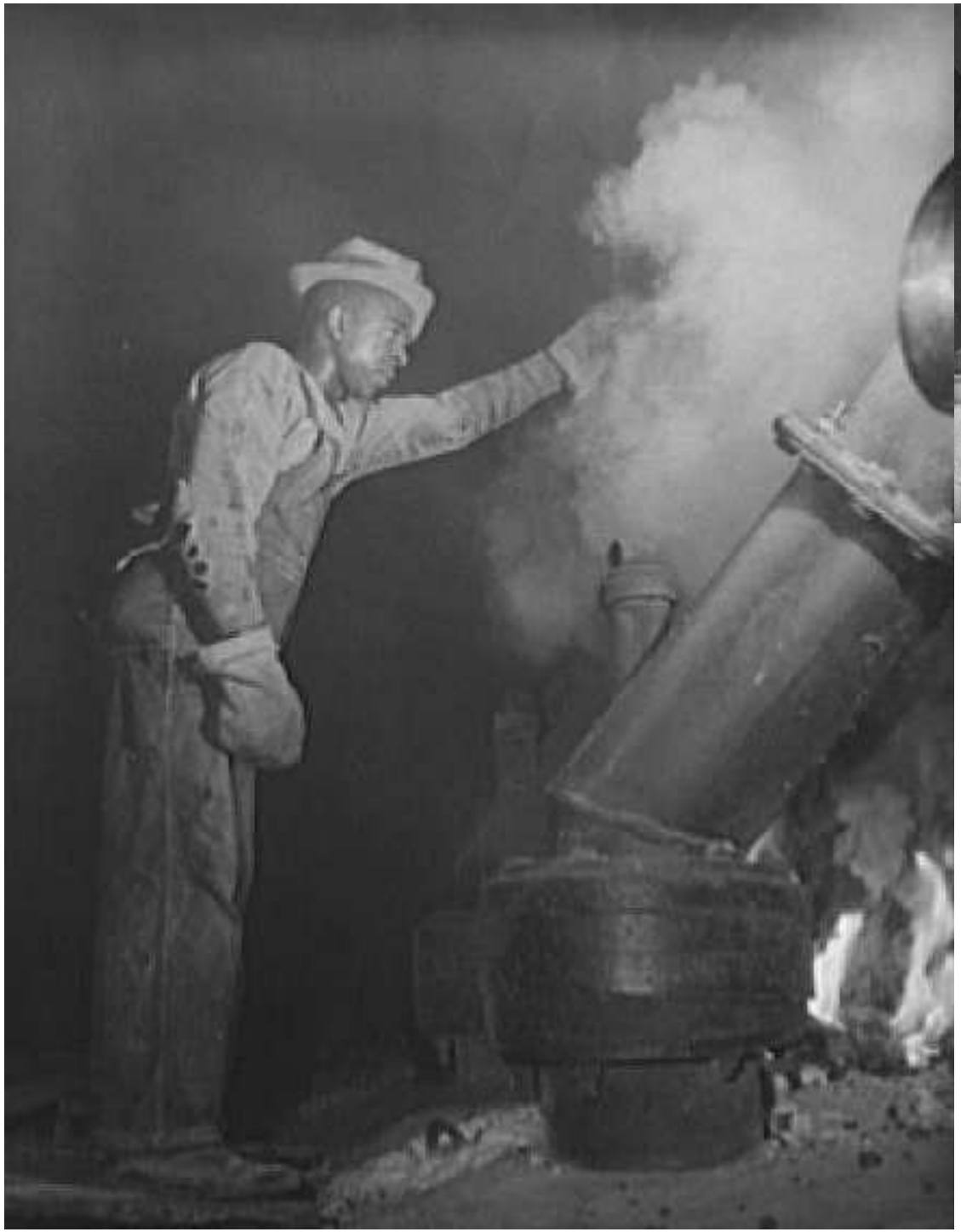


<u>Left</u>: caption: "This photograph is included in the series as a vivid document on the impingement of Twentieth Century technology upon the neglected and backward rural scene. The meter on the wall of the rural shack indicates that it now receives its share of electricity from the power carried overland by the huge TVA transmission line. TVA programs must resolve the conflict between modern and ancient ways of life so that individuals, similar to those which are shown in the picture, will be benefited."

A Nationwide Responsibility

"…It is fitting that this summary of technical and scientific contributions conclude with reference to the only major activity for which TVA was given true nationwide responsibility. Since 1933 the agency has been the only important publicly maintained organization for experimenting with fertilizers; it has had the only extensive laboratories and pilot plant in the industry, and it has had statutory authorization for a countrywide fertilizer program…"

RE: excerpt from *TVA: The First Twenty Years* (1956)



<u>Above & Left</u>: caption: "A Negro worker tending an electric phosphate smelting furnace which is producing elemental phosphorus at a TVA chemical plant in the Muscle Shoals area. The phosphorus is produced by smelting phosphate rock, coke and silica together in the electric furnaces and condensing the resulting phosphorus gases. It is then con-verted into highly concentrated phosphate fertilizer.

"….Given the mission of lowering fertilizer costs to farmers, TVA has developed concentrated commercial fertilizers which demand fewer and lower grade raw materials and which can be transported at lower cost than previous low-analysis fertilizer. Currently there are trends in the industry toward higher grade and lower cost fertilizers, and toward the introduction of new and experimental fertilizer materials. On the consumer side, there are trends toward much wider use of established products and toward adoption of experimental materials as well. For these developments, which are national as well as regional in scope, TVA neither deserves nor claims full credit. At the same time, it is not to be doubted that TVA's fertilizer program has made its imprint on both production and consumption patterns, and so has had an accelerating influence on current trends…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

"The long-range benefits of the TVA fertilizer program are not confined to any single group or area. Rather they accrue to producers, distributors, and users of fertilizer, regardless of whether or not they handle a single sack of TVA fertilizer. By strengthening the productive enterprise of farming and those who serve it, the TVA program serves the entire nation."

***Gordon Clapp*, TVA Chairman**

RE: as the U.S. entered the postwar era, TVA fertilizer was being tested across a large part of the country (eventually, in thirty-five states). By the 1970s, the TVA was finding innovative ways to make the production of nitrogen fertilizer less polluting.

The Art of Administration

"…The lessons of TVA experience for public administration are likely to be obscured, and on occasion even to be lost altogether, in the public debate of the various issues of high policy in which the agency is involved. Public power, alleged regional favoritism, alleged sectional competition - the controversy surrounding these and like issues provides the environment in which the Tennessee Valley Authority too frequently is judged. Above and beyond this controversy, the TVA for twenty years has conducted its affairs in a manner which skilled observers repeatedly have reported to be both highly moral and highly effective…"

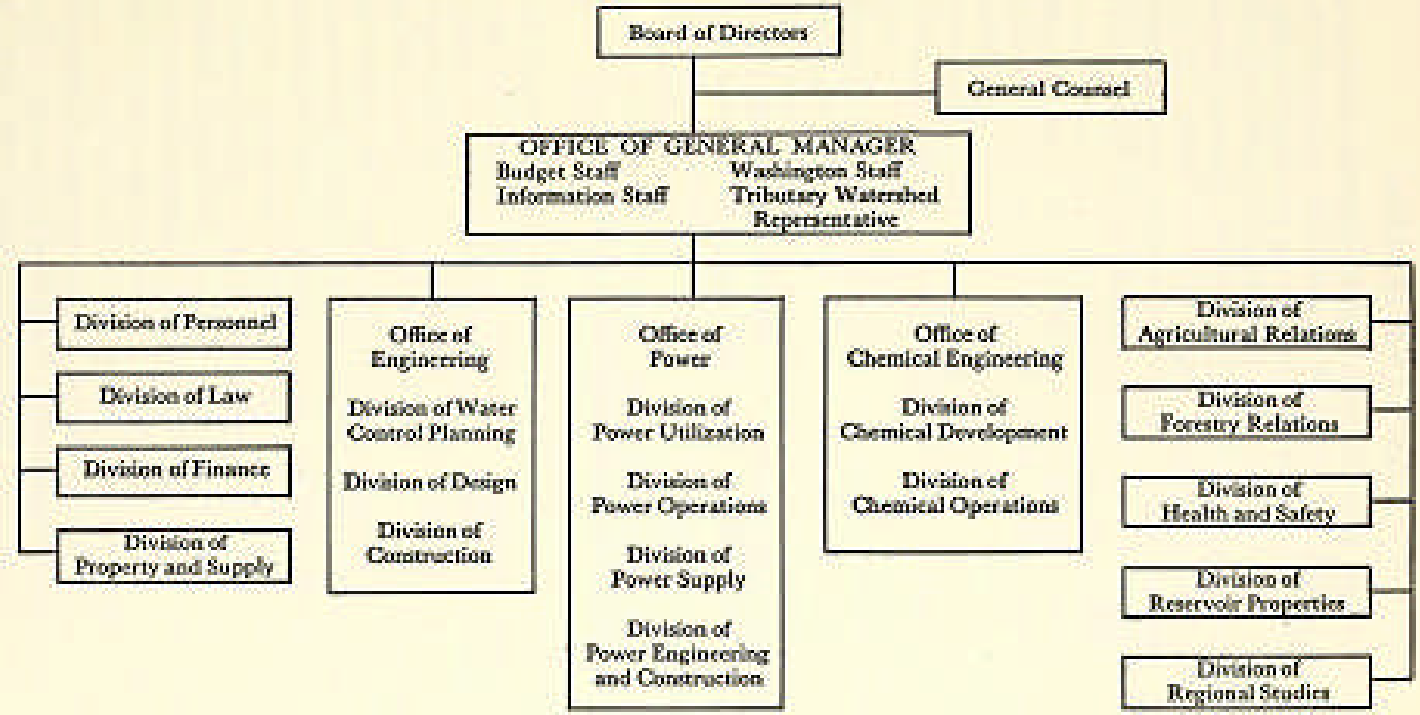
RE: excerpt from *TVA: The First Twenty Years* (1956)

"…TVA's organizational forms have provided several significant innovations for a public agency. Among them may be cited: (1) policy formation by a small (three-man) but very active Board of Directors, examining the problems of the organization on a day-to-day basis; (2) decentralization of routine administration in divisions and offices, but centralization of policy implementation in a general manager with full authority for coordination; (3) an imaginative personnel system, recognizing the value of experiment and incentive, avoiding the freezing of incompetence; (4) a rigorous but simplified accounting and records system. Other agencies in the federal government have examined all of these features and others, making use of applicable TVA experience…"

RE: excerpt from *TVA: The First Twenty Years* (1956)

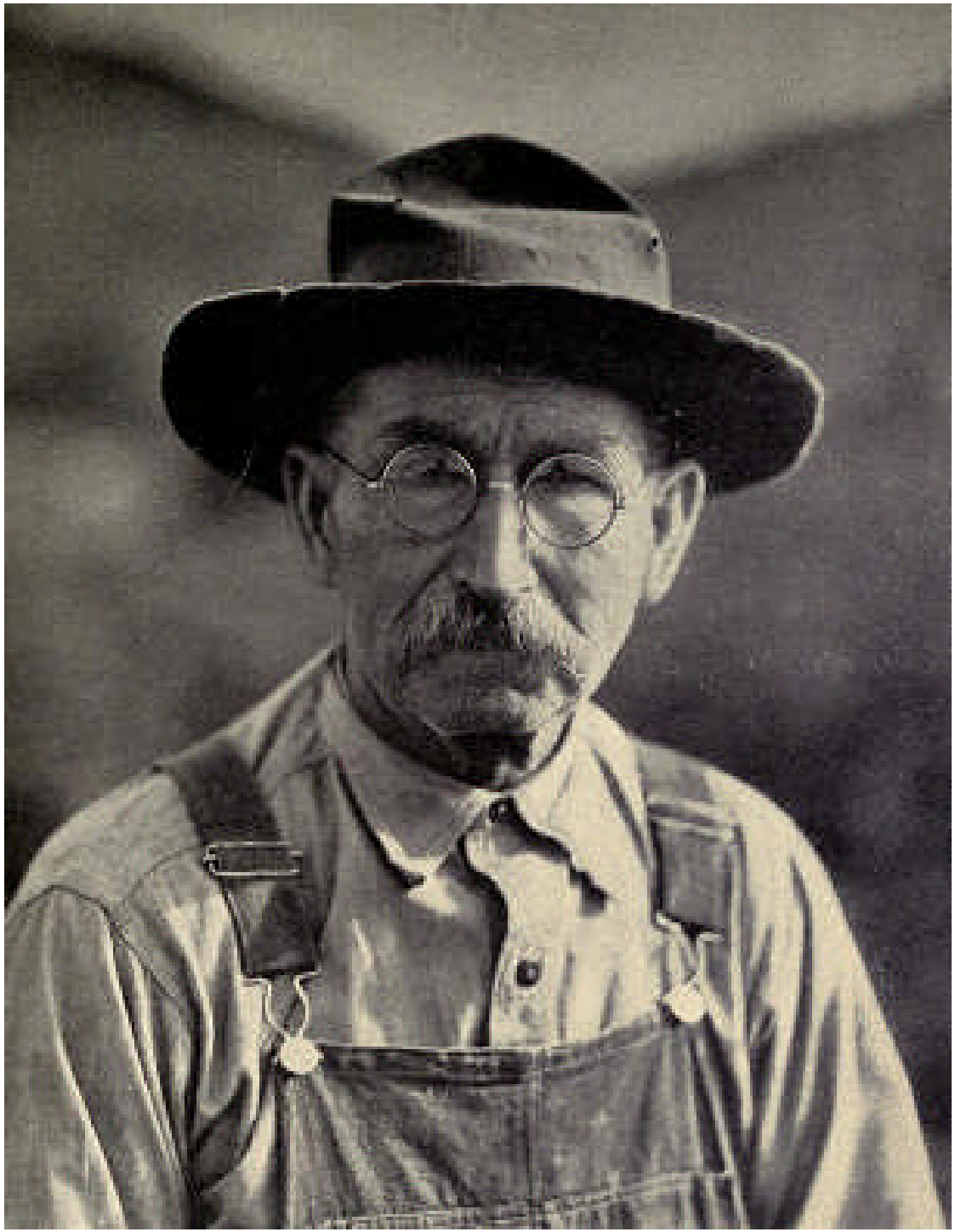
CHART I

ORGANIZATION OF TENNESSEE VALLEY AUTHORITY



February 1953

Ends & Means



"…The spirit in which TVA has undertaken the responsibilities imposed upon it is just as important as its new forms. The TVA was charged by the Act of 1933 with responsibility for the development of the Tennessee Valley. It might have proceeded at once with a program limited to physical construction and it would have made a more imposing record had it done so. It chose instead to begin with the people of the Valley. What was their stake in the development which the Congress had ordered? What immediate steps could be taken to meet their needs? How could their energies be enlisted and utilized day by day in the whole Valley enterprise? How could the end sought be made to serve them all along the way? This conviction lay behind all subsequent policy decisions: that means were equally as important as ends in TVA's affairs…"

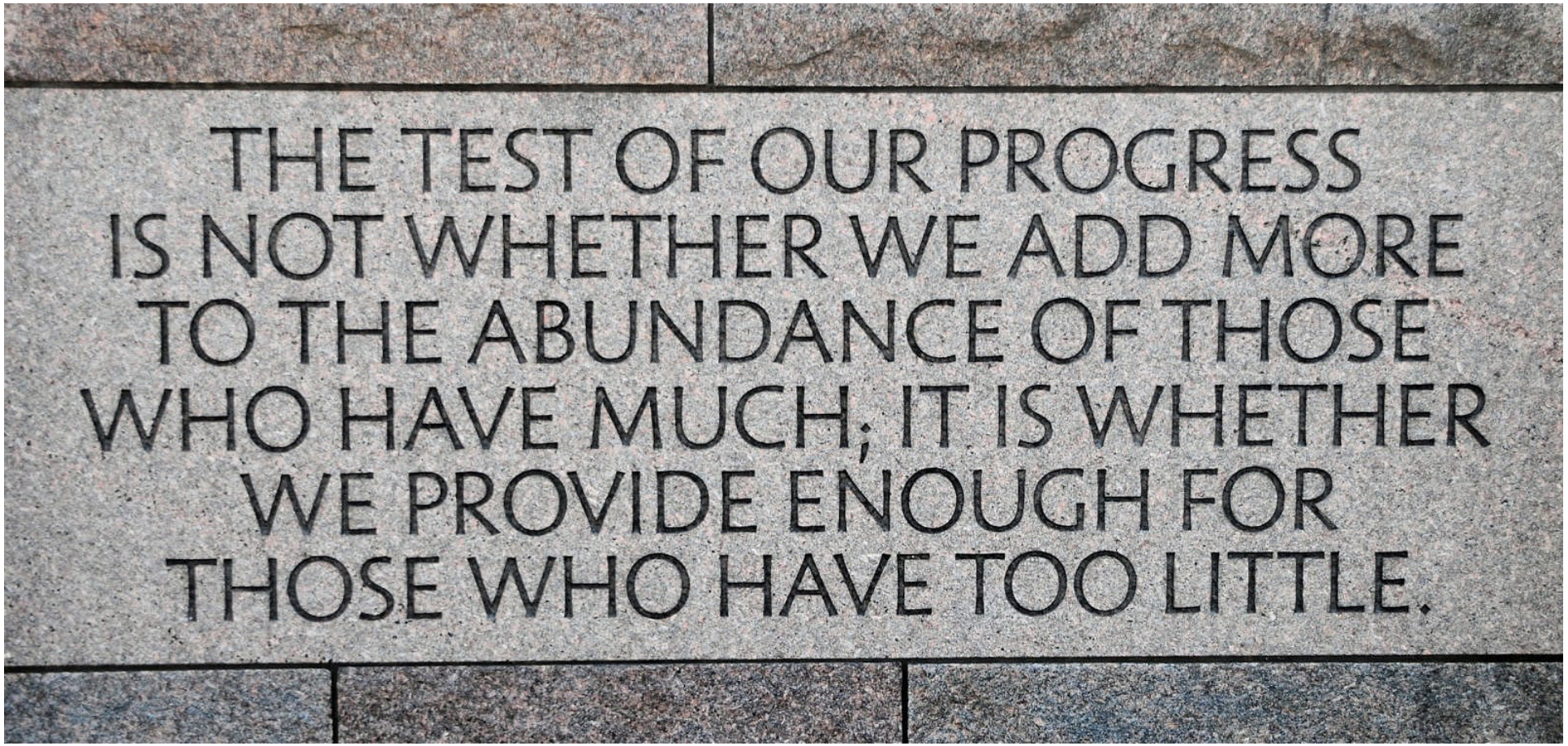
RE: excerpt from *TVA: The First Twenty Years* (1956)

We Now Know

"…during those twenty years, we have changed greatly our attitudes toward using our lands and waters. We have learned that the mark of a well-managed land lies in the care a Nation gives to its rivers…we have demonstrated for all time the efficiency and the humanity of comprehensively planned multipurpose river-basin development…we have learned the true place of electric power-generating facilities in our national life…they are so vital that never again can we trust to haphazard planning for their construction. We know that electricity can be produced and sold cheaply…We know that large reserves of generating capacity are vital to economic health and to national security…TVA proved a lot of these things to us, and our works in other parts of the country have confirmed and extended that proof…We now know that fertilizer can be produced and sold more cheaply than it was in the past…We have learned that the advantages of flood control can be extended on a large scale through multiple-purpose reservoirs and watershed improvements, aiding town and farm alike…we now have well charted the obstructions to efficient national water resource development of widespread benefit…I believe that a more certain route to these benefits can be planned. When that is done, the Nation can build even more surely and more rapidly than before."

***Harry S. Truman*, POTUS (January 1953)**

To Serve Others


THE TEST OF OUR PROGRESS
IS NOT WHETHER WE ADD MORE
TO THE ABUNDANCE OF THOSE
WHO HAVE MUCH; IT IS WHETHER
WE PROVIDE ENOUGH FOR
THOSE WHO HAVE TOO LITTLE.


Tennessee
Valley
Authority
USA 20c