Tennessee Valley, 1936

[Music playing with introduction]

Scrolling script: "The continued idleness of a great national investment in the Tennessee Valley leads me to ask the 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 fields of flood control, soil erosion, afforestation, 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 D. Roosevelt

[More music playing with introduction]

Narrator: Two rivers join to form the Tennessee: the Holston and the French Broad. Here's where they meet, just above Knoxville, Tennessee. From this point it is 652 miles to Paducah, Kentucky, where the Tennessee flows into the Ohio.

A number of major tributaries help to drain the 40,600 square miles of the Tennessee Watershed, a basin which includes parts of seven states. There's a rainfall here, ranging from fifty to eighty inches a year. These rivers and the myriad of smaller streams tap a richly diversified area. The Tennessee Valley is a fair cross section of our country. Some problems of other regions are absent here. Others are more acute than elsewhere. But in the main, the problems of the Valley are the problems of America.

And here comes the outline of the Tennessee Valley, the area in which President Roosevelt asked Congress to establish a demonstration of national planning. Let us examine some of the conditions the President is determined to correct. Of course, such poverty as this is not universal in the Valley, but it exists, and all too frequently, not only in the Tennessee Valley, but throughout the length and breadth of our land. Here is regimentation with a vengeance, the regimentation of poverty. Sometimes the outlook becomes so hopeless that men actually abandon their farms. Here is where one did. The principle reason for abandoning farms is soil erosion. Torrential rains cut deep gullies, washing away the soil and destroying the growing power of the land. And floods have taken their toll in human misery, besides destroying millions of dollars in property every year.

These are some of the reasons why President Roosevelt asked Congress to create the Tennessee Valley Authority. He had in mind the tremendous national investment lying idle at Muscle Shoals: two huge nitrate plants, built as wartime emergency measures, and Wilson Dam and powerhouse, begun during the World War but left virtually idle until the coming of the TVA. He believes that these objectives, when realized, will not only bring about the economic and social well-being of the people living in the Valley, but also point the way to similar advances throughout the rest of the country.

[Map of major TVA objectives: diversification of industry; new and better fertilizers; afforestation; prevention of soil erosion; navigation; a yardstick for power; flood control; elimination of agricultural use of marginal lands]

Scrolling script: The first major construction project of the authority was Norris Dam. Located in the hills of East Tennessee, 25 miles northwest of Knoxville, it will dam the Clinch River, creating a reservoir 83 square miles in area. It will store a year's rainfall, thus preventing floods.

Released during the dry season, the water will aid navigation along the Tennessee River and substantially increase the dependable power generated at Wilson Dam and other run-of-river-plants. Storage dams are essential in any plan for the integrated control of an entire watershed. Norris Dam will cost $34,000,000 and will be completed in 1936.

Narrator: Actual construction operations start with the building of a cofferdam. These watertight compartments enclose a portion of the river. When they are pumped dry, the workers begin excavating for bedrock. In this cofferdam at Norris, excavation is complete, and the placing of concrete has begun. A wall is rising here 265 feet high, 210 feet thick at the base. The Authority was fortunate in finding a quarry, which you see on the left, of hard dolomite limestone, admirably suited for making concrete. Now let's get up closer to the quarry, and show you from start to finish the straight line operation which converts this hillside into high grade concrete.

First, the soil is sluiced off, much as in placer mining. There's a pressure there of 175 pounds per square inch. Then the drillers move in and prepare the exposed rock for blasting. When everything is ready, the signal is given, the workers leave the quarry, and there she goes! If that big one goes over the edge… no not quite. And here comes another!

Electric shovels move in as soon as the smoke is cleared, and start the rock on its way to the crusher. There! That did it! Ahh, it's a relief to ease that one down! Heavily-laden with this all-important dolomite rock, these trucks leave the scene of the blast and wind their way through the quarry to the primary crusher, where the truck tilts and dumps its load into the waiting maw below. Shape and size of rock mean nothing to this crusher; its job is to reduce everything to stones not over six inches through, and it does this with a slight gyratory motion of that spindle in the center there. This crusher is embedded in the hillside, and it drops the crushed stone onto an endless conveyor belt, which crosses the gully on a rise, to deliver its load to the secondary crusher standing just between those two conveyor belts. The conveyor in the background comes from the primary crusher on the far hillside.

Here the stone is reduced to various sizes, three inches and under, and poured onto the lower belt which takes it to the screening plant. It is sorted into four sizes by passing it over these screens. The screens deposit the aggregate in four piles under the screening trestle. Underneath these storage piles is a concrete tunnel, with electrically operated gates in the roof, and a belt conveyor to carry any desired size forward. Stone too fine for the stockpiles is taken over this belt to be cracked into sand in the hammer mill. Then it is screened into two sizes, and washed free of all impurities. Finally, the sand is carried out on that belt at the left, and dumped into storage piles over the recovery tunnel.

Meanwhile, cement in bulk is taken from this 6,000 barrel storage tank at the railroad five miles away, and carried to a similar bin at the dam. The way leads over a heavy duty concrete highway built by the

TVA to transport materials and equipment to the site. The road winds through beautiful wooded hills with a silhouette of the distant Cumberland Mountains beyond. When the dam is complete, the road will cross the crest to form a permanent part of Tennessee's highway system.

All these operations come together at the batcher, beneath which stand three concrete mixers, where stone, sand, and cement are turned into concrete. Scales with dials register the weights, and an operator proportions the ingredients. No, not quite enough that time. Better give it a little more! There, that's right! The batch shoots down through this funnel to charge one of the three mixers. This plant is electrically timed to deliver three cubic yards of fresh concrete every minute.

When the mixture is ready, it is poured into gasoline driven transfer cars, which carry the concrete over the shoulder of the hill to the waiting bucket. These buckets hold six cubic yards, and there are two of them in operation. One of them receives a load every minute and a half, day and night. It will take a million cubic yards to complete Norris Dam. That means a 166,000-odd buckets-full must be swung out into space and deposited. This bucket now swinging through the air has historic significance, for it contains the first concrete to be deposited at Norris Dam in July of 1934.

The two cableways used at Norris Dam are suspended between the head towers, high on the west abutment and the tail towers 1,925 feet away across the site. A carriage runs on each cable, from which hangs a block and tackle, with a massive hook to lift the concrete buckets or any other heavy object the engineers wish to have moved. An operator in each head tower controls the full operation of his cableway. It is a simple matter for him to raise and lower the hook, to run the carriage out and back, or to move his head and tail tower up or downstream at will. The main cable is anchored securely at each end. Here's a cross section showing the 175 separate strands of steel wire, which give the cable a breaking strength of 1,100,000 pounds.

When Mrs. Franklin D. Roosevelt visited Norris Dam, she was keenly interested in the operation of the cableway. After inspecting the controls inside the head tower, she went into detail with Chairman Arthur E. Morgan of the Tennessee Valley Authority, who with his fellow directors, Dr. Harcourt A. Morgan and David E. Lilienthal, guides the activities of the authority. Mrs. Roosevelt counted herself fortunate in being given a ride out over the site in the man cage, hooked onto the cableway in place of a concrete bucket.

A delicate operation in the construction of Norris Dam was the placing of twenty-foot steel tubes, known as penstocks, to pass the water through the dam into the turbines. Here they are attaching both cables to the first section of penstock to be placed. The signal man in the left foreground tells the two cableway operators to "take it away." The cables pull taut – those sections weigh forty tons a piece, and keeping the two cables exactly in step called for perfect coordination. It's clear of the ground now. It's on its way! And here it is settling into its cradle in the base of the dam. When all sections of both penstocks have been completely laid, concrete will rise around them.

And now this shift, which has worked five and a half hours, is through for the day and is waiting while a new shift piles out of buses. Soon the men you see on the ground will be rolling toward the town of Norris, which serves them as a construction camp.

Scrolling script: Instead of erecting an ordinary construction camp to be destroyed when the dam is finished, the Authority laid out the permanent town of Norris, five miles from the site.

Narrator: Recreation plays an important part in the lives of Norris Dam workers. The community house contains a reading room and a lending library, as well as facilities for dancing, motion pictures, basketball, and a variety of indoor games. And there's a post office, a chapel where ministers of various denominations hold services, and the community bank.

These dormitories, now housing single workers, are also a permanent part of the town. And here's where the girls who run the cafeteria live. This cafeteria serves 3300 well-balanced meals a day. Let's go inside! Outdoor work brings these chaps in here feeling good and hungry. There are no frills, but the helpings are generous. And look at the milk bottles! Visitors often comment on the high type of worker employed there.

Three hundred and fifty individual houses have been built at Norris, some of brick, some of wood, one of steel, several of stone, and a large number of cinder blocks. While providing necessary houses for married workers, the Authority is endeavoring to make a real contribution to the housing problems of America. The use of cinder blocks in home construction has opened new vistas in up-to-date low-cost housing. Ordinary cinders are mixed with cement, and cast into large blocks, easily laid, and absolutely termite proof. Due to the low building costs, it is possible for a man to rent a modern, well-insulated home for from $14.50 to $20.50 a month. Imagine you had only this amount to spend on rent – would you get a house in your town like this?

The Authority maintains trade shops at Norris for maintenance and repair work. The shops are also trade schools, where vocational training is offered to workers in their spare time. The trade unions, through the Worker's Council which any worker is free to join, are backing the training and collaborating in the preparation of courses, and in some cases even initiating new ones. About two-thirds of the force has signed up for one or more courses. The men are acquiring new skills, which will give them an added source of income when they return to their homes. Besides these, there are courses offered in ceramics, natural science, mathematics, poultry raising, dairy, and other subjects.

And here are the citizens of Norris in another mood. Ranged on a shady hillside, they watch some of their fellows competing in an impromptu holiday sports meet. Norris knows what all work and no play does to Jack – to Jill too, for that matter!

Scrolling script: In November, 1933, President Roosevelt asked the TVA to begin construction of Wheeler Dam, 15 ½ miles above Muscle Shoals on the Tennessee. This barrier, over 6,000 feet long, will aid navigation, help to prevent floods, and form a link in the Authority's hydro-electric chain.

Narrator: At a plant such as Wheeler, power is generated in proportion to the amount of water flowing. When the river is high, much power can be developed; when it is low, little is available. It is during the dry periods that the water stored in Norris Reservoir, several hundred miles away, will be released, generating power up there, again and again, as it passes each run-of-river plant, such as Wheeler. Now let's get down into that cofferdam.

Watch the drillers pave the way for a blast which will loosen tons and tons of rocks from the riverbed. For this particular blast, one hundred holes were drilled. Seldom does anyone, except a construction engineer, have an opportunity to witness operations of this kind so close at hand. Compressed air blows the drill holes clean.

Then comes the dynamite. This man is known as a powder monkey. His job is to insert the electric fuses into sticks of dynamite. It's ticklish work – calls for a steady hand and plenty of nerves. Then the stick, with the fuse in it, is lowered into the hole, and rammed home. Go easy there, son, that's dynamite! Sand is poured in and tamped down, and a hundred wires led into the central switch. Electric shovels begin clearing up immediately after the blast. The rock is loaded into trucks, and rolled away.

Meanwhile, the U.S. Army engineers have built a navigation lock on the opposite bank of the river. The lock will have a lift of fifty-three feet. Sand and gravel for Wheeler Dam is obtained from the riverbed. These buckets bring up aggregate and drop it into a screening plant aboard the dredger, where it is sifted into assorted sizes and poured into separate barges, which are then towed upstream to the Wheeler site and moored alongside the floating cranes and concrete mixers employed on this job. In the absence of rail connections, all material and equipment comes to Wheeler by water from Wilson Dam.

A crane lifts great buckets full of gravel and drops the aggregate into a batcher, such as the one at Norris, except that the batcher and the mixer are mounted on a steel barge. When mixed, the concrete is poured into drop bottom buckets. Another crane swings this bucket out over the cofferdam to the point where the concrete is to be deposited. Forms have been prepared; steel reinforcing rods are waiting to be embedded in the concrete. Over 600,000 cubic yards will be required to complete Wheeler Dam early in 1936. The bucket deposits its load, and the crane goes back for more.

Scrolling script: President Roosevelt visited the Tennessee Valley in November, 1934. He inspected the major projects and spoke briefly to some of the 12,000 TVA employees.

Narrator: The Authority's latest project is Pickwick Dam, near Shiloh battlefield in southwestern Tennessee. Before construction could begin, however, exhaustive study of the foundation had to be made, just as at Wheeler and at Norris. This part of the process is known as core drilling. A steel cylinder with a diamond studded ring attached to the end bores its way one hundred feet or more into the bedrock. The cylinder encloses a rock core as it descends; the process is just like coring an apple. Good engineering requires many such … [tests. The ring]… is disconnected. They cost $2500 each and wear out after a few months use. The core is carefully removed and placed in trays, and a notation is made of the depth from which the specimen came. Samples are then shipped to the laboratory for tests and analysis. The core is one of many checks on the stability of foundations.

Scrolling script: Reservoir areas must be cleared of timber to prevent possible clogging of penstocks, remove hidden dangers to navigation, and safeguard public health. Lumber is saved and brush is burned. Nearly 5,000 men are engaged in this work.

Malaria control along the reservoir shores is an important public health problem.

Narrator: Marsh grass and driftwood make ideal breeding grounds for malaria carrying mosquitoes. Here on Wilson Lake, TVA patrols cruise along the shoreline spraying a film of oil upon the water. When the water is too shallow, a hand pump is resorted to. Where growth is too thick, Paris Green combined with an inactive dust is used. This mixture, entirely harmless to man and beast and fish, is deadly to the mosquito. This is one of many ways in which TVA is cooperating with local authorities.

Scrolling script: The preservation of the soil.

Narrator: One of the major objectives of the Tennessee Valley Authority Act is the readjustment and use of Nitrate Plant #2 at Muscle Shoals to promote the more economical production of plant food or fertilizer. The Act calls for active research in quest of new processes, concentrations, and combinations, which will reduce the cost of the essential elements. The most challenging problem today is that of securing sufficient phosphorous. Most soils throughout the world are woefully deficient in this vital plant food element.

As a nation, we don't yet realize the tremendous tax on phosphorous which civilization has imposed upon the land. The chief source is the vast accumulated remains of prehistoric animals, whose bones have long since gone back into the earth, but whose burden of phosphorous has been processed by nature into phosphate beds such as these in central Tennessee. When no thought is given to the future welfare of the land, phosphate strip mining produces desolation, such as this. Under the old system, the topsoil was scraped off, the raw phosphate rock extracted, and the scene abandoned. A proper regard for the land might have caused men to replace the topsoil before moving on.

Such badlands will no longer mar the landscape, for the TVA is thinking of the future. Its mining methods will make it impossible for the traveler to tell whether or not the phosphate has been extracted. Phosphate is in such demand throughout this country and the whole world, and the supply is so restricted, that it has been deemed advisable to begin reclaiming the phosphorous contained in the secondary beds – more difficult to mine, but often very rich. Phosphorous is the limiting factor in plant food all over the world, and the most important element in soil preservation and rehabilitation. As crops are grown, grains are marketed or fed to animals which in turn are shipped to market, the natural heritage of phosphorous leaves the land forever.

Here's an untouched phosphate bed. If the TVA mines here, you will never be able to tell that the phosphate rock has been extracted. The method is to remove the topsoil and take out the raw phosphate rock, sand, and muck. Later the topsoil is replaced, and the land returned to agriculture. The farmers themselves are mining the rock for the TVA. They will not destroy the land, for to them, phosphate is just another cash crop. But if phosphorous is not made more readily available to American farmers, the growing power of our land will continue to decline.

Visualize for a moment the millions and millions of tons of grain and meats which are consumed in the course of a year. Every kernel of grain and every speck of bone, which goes to market along with the meat, contains phosphorous. Only a pitifully small percentage is ever returned to the soil as fertilizer. The heavy draft upon our natural supply must be restored if our plant and animal life is to be maintained. When the phosphate rock is mined, it's taken by truck to the river's edge and poured down chutes into barges. Here's a good close view of this all-important element. When the barge is full, it is towed to the fertilizer plant, where the rock is transferred to hopper cars, and taken to the storage piles. Some phosphate, not readily transported by water, makes the whole journey by rail.

Now let's inspect briefly the pilot demonstration plant the TVA has installed at Nitrate Plant #2. First the rock is dried in this kiln dryer. Then it is weighed and mixed in this scale house, and placed in storage bins above the electric furnaces. High temperatures convert the phosphorous into a gas. Then it is passed through a scrubber, and placed in acid tanks. The pilot manufacturing plant will be adequate for any demonstration in fertilizer production desired.