



The Origins of a Corporate Giant: Tennessee Gas and Transmission's Wartime Pipeline

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By late 1943, demand for natural gas in the heavily industrialized northern Appalachian region of the United States was outstripping supply. With local gas fields in deep decline, industries, entrepreneurs, and the federal government looked outside the region for new supplies to keep the defense plants in operation. Formed to meet these demands for gas, Tennessee Gas and Transmission (later Tenneco) rushed to build its 1,265-mile pipeline to connect Texas gas fields with the factories, plants, and homes of Appalachia. Facing labor shortages, unusually severe weather, lack of equipment, and regulatory hurdles, Tennessee struggled to finish the pipeline by the winter of 1944. The completion of the pipeline on schedule and within budget marks a noteworthy beginning for a company that would pioneer the conglomeration movement following World War II.

From inauspicious beginnings in the 1930s, the Tennessee Gas & Transmission Company was incorporated on April 1, 1940, to bring natural gas from Louisiana to the Tennessee market by pipeline.¹ Tennessee Gas encountered numerous setbacks in obtaining both reliable gas supplies and financing for its proposed pipeline. Investors were reluctant to write big checks to a new company with no experience in the gas pipeline business. Bad luck also plagued Tennessee Gas; two prominent financial backers died during the company's formative years, damaging efforts to obtain financing. In addition to these issues, Tennessee Gas faced high regulatory hurdles in obtaining the certificate of public convenience and necessity from the Federal Power Commission (FPC) required to build its pipeline. Despite years of earnest effort, from 1940 to 1943 Tennessee Gas was unable to arrange either the necessary gas supplies or the financing for its pipeline.²

¹ The company name changed to "Tennessee Gas Transmission Company" in 1947 and to "Tenneco" in 1966.

² Douglas Hicks, "Early History, Tennessee Gas Transmission Company," Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-2, Predecessor Co. (4), 27 Aug. 1952, p.

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Following the entry of the United States into World War II in late 1941, the original Tennessee Gas promoters, Wade Thompson, Curtis Dall, and Victor Johnson, sought to reclassify the proposed Tennessee Gas pipeline as a national defense project, which would qualify it for partial financing through the Reconstruction Finance Corporation (RFC). They redrew the proposed pipeline to extend from the gas fields of northern Louisiana to the rich Appalachian industrial region of western Pennsylvania, West Virginia, and Ohio. Home to hundreds of defense plants, the Appalachian region was facing critical shortages of natural gas, as the local Appalachian fields were in advanced states of decline. Tennessee Gas's pipeline would provide the gas the defense industries badly needed. By the summer of 1943, the Federal Power Commission had designated the pipeline project vital to the war effort and indicated that it would issue the necessary certificates if Tennessee Gas could come up with gas supplies and its share of the financing. Failing that, the FPC would give the project to one of Tennessee Gas's competitors, Standard Oil (New Jersey) subsidiary Hope Natural Gas, which had already begun preparations for the pipeline, including gas supplies and right-of-way.³

In August 1943, Tennessee Gas signed a long-term gas purchase contract with the Chicago Corporation, an investment trust with extensive natural gas holdings in south Texas, agreeing to extend its pipeline to the Corpus Christi area. With this agreement in hand, Tennessee Gas lacked only financing to make the pipeline a reality. The task of obtaining Tennessee Gas's share of the financing fell to Victor Johnson, the wealthy founder of Mantle Lamp Company and a major shareholder in Tennessee Gas. To the misfortune of the original Tennessee Gas group, Johnson died suddenly of a heart attack, just nine days before the FPC was to begin hearings on Tennessee Gas's proposed pipeline.⁴ Without enough money of their own to invest, the original Tennessee Gas operators faced the prospect of losing the pipeline certificate to Hope.⁵

Out of time and options, Tennessee Gas's directors agreed to a buyout proposal from the Chicago Corporation. In return for the assumption of Tennessee Gas's debts, Chicago agreed to arrange the financing and the construction of the pipeline in return for 90 percent ownership of Tennessee Gas. The original backers of the pipeline reluctantly agreed, and on September 20, 1943, Chicago assumed control of Tennessee Gas, installed a new board of directors and president, and quickly began work on the 1,265-mile pipeline.⁶ With war industries facing critical shortages of natural gas,

1. A note attached to this document indicates it is from minutes of the stockholder and directors' meetings.

³ Christopher Castaneda, *Regulated Enterprise: Natural Gas Pipelines and North-eastern Markets, 1938-1954* (Columbus, Ohio 1993), 52.

⁴ Hicks, "Early History, Tennessee Gas Transmission Company," 22.

⁵ Ray Fish, interview by Alan Dabney, 30 April 1962, Tenneco Archives, El Paso Corporation, box 42D, 3-1-0-1, Oral History Transcripts, 13.

⁶ Hicks, "Early History, Tennessee Gas Transmission Company," 28.

Tennessee Gas had just over a year to build the pipeline, with the stipulation that gas had to be flowing to customers by the winter of 1944-1945.⁷ Such a timetable was ambitious at best, and Tennessee Gas faced the further problems of securing adequate supplies of steel pipe and labor—both commodities in short supply as a result of wartime demand.

Gardiner Symonds

Following the Chicago Corporation's takeover of Tennessee Gas in September 1943, the original organizers resigned and a new board, nominated by the Chicago Corporation, took the reins. The new board consisted of Clyde H. Alexander, Arthur D. Chilgren, Ray C. Fish, Charles F. Glore (chair of the Chicago Corporation), Paul Kayser (president of El Paso Natural Gas and Gulf States Petroleum), Richard Wagner (president of the Chicago Corporation), and Gardiner Symonds. The board members were all experienced in the natural gas industry, and several of them played active roles in building Tennessee Gas's pipeline.

The new president of Tennessee Gas was 40-year-old Henry Gardiner Symonds, a vice-president and director of Chicago Corporation who had managed that company's oil and gas interests in Corpus Christi, Texas, since 1938.⁸ Symonds was born in Pittsburgh in 1903 to Amy Irene (Millberry) and Nathaniel G. Symonds, a Westinghouse vice president and a member of the city's business elite.⁹ Symonds, raised in Chicago, proved to be a gifted leader and organizer from a young age. He served as high school class president and graduated as valedictorian at 16.¹⁰

After high school, Symonds earned a war memorial scholarship to Stanford University, but he was uncertain about what he wanted to study.¹¹ He selected geology and received his undergraduate degree in 1924. The following year, he entered Harvard Business School. According to Symonds, "I had nothing more specific in mind than to try to get a broad business education. The business world and I were barely nodding acquaintances, if that."¹² Symonds excelled at Harvard, earning an MBA (Master of Business Administration) with distinction in 1927.¹³

⁷ U.S. Federal Power Commission, Opinion No. 93-A, Docket No. G-230, Tenneco Archives, El Paso Corporation, box 8D, 2-2-0-2, FPC Hearings.

⁸ "Gardiner Symonds Biographical Data," Tenneco Archives, El Paso Corporation, box 75, Press Kits, Tennessee Gas 20 Years Old, Hist. Res. File.

⁹ *Handbook of Texas Online*, s.v. "Symonds, Gardiner"; viewed 5 Jan. 2008. URL: <http://www.tsha.utexas.edu/handbook/online/articles/SS/fsy3.html>. See also "Tennessee Gas Transmission," *Forbes* (15 Feb. 1966), 4.

¹⁰ "The Best of Friends," *The Line* (Tenneco pub.) (1983), 26.

¹¹ "Presenting Gardiner Symonds, President," *The Line* 1, no. 9 (Oct. 1946).

¹² Gardiner Symonds, "Mr. Symonds' talk to Harvard Business School Club of New York, 8 p. m., Nov. 18, 1959." Tenneco Archives, El Paso Corporation, box 8C, 2-1-0-2, Executive Papers, Gardiner Symonds, 53-68. 1.

¹³ "Gardiner Symonds Biographical Data."

Aside from his leadership and organizational abilities, Symonds had a strong work ethic. He enjoyed hard work and did not consider manual labor beneath him. After completing his MBA, Symonds took a job with the Continental Illinois Bank and Trust Company of Chicago, serving as a statistician, prospectus writer, and clerk. His duties included running errands and moving furniture. Symonds excelled at the job, considering it valuable experience. He later counseled young business people not to think they were too good to do such work and advised them to be humble and to do anything moral and legal that was asked of them.¹⁴ This work ethic was part of Symonds' successful personal philosophy, and it became a part of the corporate culture of Tennessee Gas.

In 1930, Symonds joined the Chicago Corporation as assistant treasurer. The Chicago Corporation, an investment trust, was organized in 1929 and capitalized at \$60 million; its directors included executives from Swift & Co., Marshall Fields, Pullman, International Harvester, and other large corporations.¹⁵ Symonds gained the notice of his superiors, who promoted him to vice-president after two years, at the age of 29. By 1940, Symonds was a director of the Chicago Corporation.¹⁶

Symonds was also a devoted husband and father. He married his childhood sweetheart, Margaret Clover, in 1928, and they had five children.¹⁷ Symonds worked long hours, sometimes 16-hour days, but always took time to spend with his children. Symonds was an affable man who learned about the people he worked with. He had an excellent memory, often recalling names and faces perfectly for years.¹⁸

In 1938, Symonds and his family moved to Corpus Christi, Texas, where he managed Chicago Corporation's oil and gas interests in south Texas. Chicago had acquired extensive holdings in the area, including large natural gas reserves in the Stratton-Agua Dulce Field near Corpus Christi. Chicago Corporation also owned three gas-recycling plants in the area: Wardner, Coastal, and Gulf Plains. After purchasing these plants in the mid-1930s, Chicago Corporation put Symonds in "complete charge" of its oil and gas operation in south Texas.¹⁹ One problem Symonds and the Chicago Corporation faced was the lack of a market for natural gas in Texas. With little industry to speak of, Texas had only a few outlets for its gas, primarily power generation. After taking the helm of Chicago's Oil and Gas Division, Symonds found that the natural gas in south Texas was practically worthless; in many cases, flaring (burning) or venting natural gas made more sense

¹⁴ Symonds, "Mr. Symonds' talk to Harvard Business School Club of New York," 53-68. 6.

¹⁵ "Chicago Corp.," *Time* (25 Feb, 1929).

¹⁶ "Gardiner Symonds Biographical Data."

¹⁷ The Philosophical Society of Texas, "Margaret Clover Symonds, 1905-1995"; viewed 8 July 2008. URL: <http://www.pstx.org/2001/memorials.html>.

¹⁸ "The Best of Friends," 26.

¹⁹ Ray Fish, interview by Alan Dabney, 22-23.

economically than selling it or re-injecting the gas into the ground. A few offers to purchase gas came in at \$.01 to \$.015 cents per thousand cubic feet (mcf), prices so low that Symonds was not interested.²⁰ It would fall to Symonds to create a market for the trillions of cubic feet of gas owned by the Chicago Corporation.

Symonds and the Chicago Corporation looked to the expanding cities and factories of the Northeast, where demand for gas was growing. The Chicago Corporation seriously investigated the construction of a pipeline to the Northeast several years prior to the Tennessee Gas effort. In 1938, Chicago Corporation became interested in Reserve Natural Gas, a group headed by a local Corpus Christi gas promoter, Clyde Alexander. Alexander had the idea to build a pipeline to carry south Texas gas to the New York area. Alexander hired Ray C. Fish, an engineer with Stearns-Roger Manufacturing, to design the pipeline. Alexander also hired a geologist to conduct feasibility studies. Chicago invested more than \$100,000 in the project, but it failed to get off the ground when Reserve could not market the gas in the Northeast. Northern utilities would not pay the prices Reserve wanted, offering only \$.16 to \$.18 per mcf; Reserve wanted a few cents more. At the outset of World War II, the company shelved the project as a result of steel and labor shortages. Alexander later shared his ideas about a south Texas to the Northeast pipeline with the original Tennessee Gas promoters, Curtis Dall and Wade Thompson. Both Fish and Alexander would serve on the Tennessee Gas board of directors.²¹

Establishing Tennessee Gas

After Chicago Corporation's buyout of Tennessee Gas, the FPC issued a certificate of public convenience and necessity authorizing the construction of the Tennessee Gas pipeline on September 24, 1943. The FPC instructed Tennessee Gas to commence construction on the pipeline no later than February 1, 1944, and specified that the pipeline was to be in service for the winter of 1944-1945.²² The Chicago Corporation and its new subsidiary were now faced with the extremely difficult challenge of establishing an organization for Tennessee Gas, hiring competent personnel, securing materials for the pipeline, planning and engineering the pipeline, as well as mapping, surveying, and obtaining rights-of-way over the length of the 1,265-mile pipeline route. Doing this during peacetime would have been daunting; doing it amid the shortages and uncertainties of World War II seemed impossible.

Impossible or not, Gardiner Symonds immediately began organizing the new company and hiring competent people to run it. Tennessee Gas's second

²⁰ Gardiner Symonds to Governor Coke Stevenson, 4 Nov. 1943, Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-2 (cont.), Predecessor Co. (1), Hist. Res. File, 3.

²¹ Ray Fish, interview by Alan Dabney, 4-6.

²² U.S. Federal Power Commission, Opinion No. 93-A, Docket No. G-230, 24. Sept. 1943.

employee (after Gardiner Symonds) was Ray Fish, then an engineer with Stearns-Roger Manufacturing. Fish and Symonds were already acquainted; Fish had done engineering work on the proposed Reserve gas pipeline a few years earlier and had worked on the designs for Chicago's south Texas recycling plants. Fish reprised his role, overseeing engineering work on the Tennessee Gas pipeline.²³ He was vice-president in charge of engineering and construction with Tennessee Gas, as well as serving on the Tennessee Gas board.²⁴

Symonds carefully selected top personnel with well-established expertise. W. E. Mueller from Chicago's Oil and Gas Division became vice-president and treasurer. Harold Burrow was hired from Chicago Corporation as purchasing agent; W. C. Norman became assistant secretary and assistant treasurer. Charles S. Coates became district and, later, division superintendent. In addition to these early employees, Binford Arney and C. C. Small headed up the legal, land, and right-of-way department. With the initial management in place, Tennessee Gas began operations by late September 1943, only a few days after the FPC had issued its ruling.²⁵

Obtaining skilled and experienced labor was a serious problem for Tennessee Gas. Because of wartime employment restrictions, Tennessee Gas could not hire workers away from other jobs, but had to hire people who had already quit; experienced workers of all types were in short supply. According to Ray Fish in an interview from the early 1960s, "[we] were prohibited from hiring anybody good . . . all of the good people, bear in mind, were on jobs and . . . [we] were very lucky to get anybody. And we needed people." Tennessee Gas relied on word-of-mouth and informal contacts to recruit workers, and let it be known they were paying higher-than-average salaries, which helped to fill the ranks.²⁶

Symonds and Tennessee Gas's managers moved with impressive speed in getting organized, placing orders for major equipment with manufacturers by October 1, 1943.²⁷ A. O. Smith Corporation and National Tube Company supplied most of the steel pipe.²⁸ Merco-Nordstrom supplied the main line

²³ "Memorandum: Synopsis of Discussion with Rufus Jarman concerning proposed article. . . ." Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-2 (cont.), Predecessor Co. (4), Wade Thompson Hist. Res. File, 2.

²⁴ "Factual Information Relating to the Tennessee Gas and Transmission Company Large Diameter Gas Pipeline, No. 29, Issued to G. Symonds," 4. Courtesy of Jonathan Taft Symonds.

²⁵ *Ibid.*

²⁶ Ray Fish, interview by Alan Dabney, 33.

²⁷ "Factual Information Relating to the Tennessee Gas and Transmission Company Large Diameter Gas Pipeline, No. 29," 5.

²⁸ A. O. Smith provided 878.56 miles of pipe, National Tube supplied 392.01 miles, and Youngstown Sheet and Tube Company provided 3.81 miles of pipe. The War Production Board supplied the necessary steel certificates for this tubing; see "Tennessee Gas and Transmission Company Fact Sheet," Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-2 (cont.), Predecessor Co. (1), Hist. Res. File, Exhibit A.

valves; Worthington Pump & Machinery and Cooper-Bessemer Company provided the fifty-eight massive compressors (1,000 horsepower each) required to push gas through the pipeline.²⁹ Stearns-Roger Manufacturing Company built the original seven compressor stations, three types of gas metering stations, as well as a dehydration plant near Corpus Christi that removed water and other impurities from the gas.³⁰ Dozens of smaller contractors supplied myriad other needs. Tennessee Gas placed these orders even before it had established its offices in Houston in early October, 1943.³¹

By November 5, 1943, Tennessee Gas had signed contracts for the river crossings and main line construction areas. Nine construction companies received contracts to build the pipeline, with more than half the mileage going to two major groups: Williams Brothers and Bechtel-Dempsey-Price.³² Construction was divided into fourteen sections in order to maximize speed and efficiency; work on all sections was to begin simultaneously and to "proceed with utmost speed" in order to meet the stringent deadlines imposed by the FPC. As a result of heavy rain and equipment shortages during the initial phases of the project, more contractors were hired and the work force was expanded in 1944.³³

After letting contracts for material and construction, Tennessee Gas faced further challenges. One of the most pressing was the necessity of obtaining right-of-way from more than 12,000 individual landowners. Tennessee Gas's pipeline would cross more than seventy counties in seven states, making land titles a potential source of delay. However, Tennessee Gas was fortunate because part of the right-of-way had been acquired and surveyed. An appropriate right-of-way from the Monroe, Louisiana area to the pipeline terminus at Cornwell Station, West Virginia, was available. Hope Natural Gas, Tennessee Gas's one-time rival in obtaining the FPC certificate for the

²⁹ C. Elbert Jackson, "The Spotlight of Southwest Texas, An Authentic Oil Report," 12 Nov. 1943. Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-2 (cont.), Predecessor Co. (1), Hist. Res. File, 1-2.

³⁰ Browning-Ferris Machinery Company, *Tennessee Gas and Transmission Co. Pipe Line: The Pictured Story of Its Construction*, from "The Oil Weekly: Engineering, News, Statistics," Gulf Publishing Company, 6 Nov. 1944, pp. 50-51. Courtesy, Gary Cheatham. Stearns-Roger's contracts totaled more than \$8.4 million.

³¹ "Factual Information Relating to the Tennessee Gas and Transmission Company Large Diameter Gas Pipeline, No. 29," 4.

³² "Tennessee Gas and Transmission Company Fact Sheet," Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-2 (cont.), Predecessor Co. (1), Hist. Res. File, Exhibit B. Williams Brothers and Bechtel-Dempsey-Price built 728.8 of the 1,255.4 dry miles of the pipeline. The other contractors were N. A. Saigh (131. 2 miles), Brown and Root/O. C. Whitaker Co. (110. 9 miles), J. R. Horrigan Construction Co. (92.4 miles), Midwestern Engineers (63.7 miles), Ray L. Smith Construction Co. (60.9 miles), Pipe Line Construction Corporation (37.7 miles), and Swinerton and Walberg (29.8 miles).

³³ "Factual Information Relating to the Tennessee Gas and Transmission Company Large Diameter Gas Pipeline, No. 29," 3-4.

pipeline, had surveyed and purchased right-of-way for their proposed pipeline in the early 1940s and was eager to sell it to Tennessee Gas. With more than half the right-of-way secured, Tennessee Gas's contractors were able to begin construction immediately on the eastern portions of the pipeline. Surveyors and agents were working on obtaining the remaining rights-of-way in western Louisiana and Texas by mid-October 1943.³⁴

Pipeline Overview

Tennessee Gas's wartime pipeline was a remarkable feat of logistics, engineering, financing, and construction. Some of the basic engineering for the pipeline was completed prior to the issuance of the certificate of public convenience and necessity, and Tennessee Gas engineers, led by Ray Fish, finalized the design as the pipeline construction began.

Tennessee Gas's pipeline was among the first all-welded long-distance pipelines, using no Dresser couplings or flanges. While innovative at the time, the all-welded design was selected by Tennessee Gas primarily to save time. Dresser couplings were the industry standard, but their use would have seriously delayed the project. In consultation with Symonds, Fish and his engineers designed the line around continuous welds. Although the competition criticized Tennessee Gas for this decision, the all-welded design proved durable and cost-effective, becoming standard in the postwar era.³⁵

The original design capacity of the pipeline was 207,000 mcf per day.³⁶ Designed to operate at 72 percent of yield point of the steel pipe, the pipeline in emergencies could carry more gas than the rating indicated. The majority of the pipe used was either 9/32- or 1/4-inch walled pipe, which was rather thin for the time.³⁷ When finished, the pipeline spanned 1,265 miles; 1,180 miles were 24-inch diameter pipe, and the final 85 miles were of 20-inch diameter pipe.³⁸

The pipeline began near Driscoll, Texas, at Tennessee Gas's massive dehydration plant and proceeded northeasterly, skirting the Houston area, and passing south of Shreveport and to the north of Monroe, Louisiana (see Figure 1). The line crossed the Mississippi River at Greenville, Mississippi,

³⁴ Jackson, "The Spotlight of Southwest Texas, an Authentic Oil Report," 1; see also Ray Fish, interview by Alan Dabney, 35.

³⁵ Ray Fish, interview by Alan Dabney, 38-39. A number of shorter, all-welded pipelines preceded the Tennessee Gas pipeline.

³⁶ "Factual Information Relating to the Tennessee Gas and Transmission Company Large Diameter Gas Pipeline, No. 29," 6-7. Note that 207,000 mcf equals 207 million cubic feet per day.

³⁷ *Ibid.*, 9. Ultimately, the original pipeline safely carried 262,000 mcf after the installation of additional compressors.

³⁸ *Ibid.*, 6. The final 85 miles required 20-inch pipe because of the mountainous terrain. Smaller and thicker pipe was easier to field-bend; the 20-inch section had the same carrying capacity as the 24-inch section because it operated at a higher pressure (912 psi vs. 750 psi).

and thence northeast across Mississippi into Tennessee, where it passed north of Nashville and into Kentucky. Near Danville, Kentucky, the pipeline took an easterly course into West Virginia. The pipeline terminated at Cornwell Station, West Virginia, where the bulk of the gas would be metered and delivered to Hope Natural Gas for final distribution.³⁹

The pipeline drew its gas supplies primarily from the Stratton-Agua Dulce field near Corpus Christi, but also drew gas from Chicago Corporation's Wardner, Coastal, and Gulf Plains Recycling Plants via a feeder system of small-diameter pipelines.⁴⁰ Ten percent of its supplies came from reserves owned by Paul Kayser, who was president of El Paso Natural Gas and Gulf States Petroleum; Kayser also served on the Tennessee Gas board. Estimates of the total reserves available to the pipeline in the Stratton-Agua Dulce field were approximately 3 trillion cubic feet. A pipeline extension later constructed to the San Salvador field (owned by Kayser) in south Texas added an additional trillion cubic feet of reserves.⁴¹ After piping raw gas from the ground and the recycling plants to the dehydration plant near Driscoll, Texas, the gas was processed, dehydrated, and stripped of impurities before it entered the 1,265-mile pipeline. Gas took approximately twenty-eight hours to pass through the pipeline.⁴²

The initial design of the pipeline provided for seven compressor stations positioned at approximately 170-mile intervals along the line. Fifty-eight compressors, generating 1,000 horsepower (hp) each, consumed about 17,000 cubic feet of gas per day. The compressor stations were self-contained, with on-site Westinghouse electrical power generators driven by large Ingersoll-Rand 370-hp gas engines. Massive oiling and water-cooling systems served the main compressors, and on-site crews living in company housing maintained and operated the 300-foot-long stations.⁴³

In addition to the compressor stations, the company constructed three types of gas-meter stations: purchase gas, sales, and check meter stations. The purchase gas stations measured gas taken into the line from outside suppliers; all were initially located in Nueces County, Texas, where most of the gas supplies originated. The three sales stations operated at points where Tennessee Gas's pipeline intersected the pipeline systems of other companies; two sold gas to United Fuel Gas Company and the other served Hope Natural Gas at the pipeline terminus, all in West Virginia. Located at

³⁹ Ibid., 6. Cornwell Station was northeast of Charleston, West Virginia.

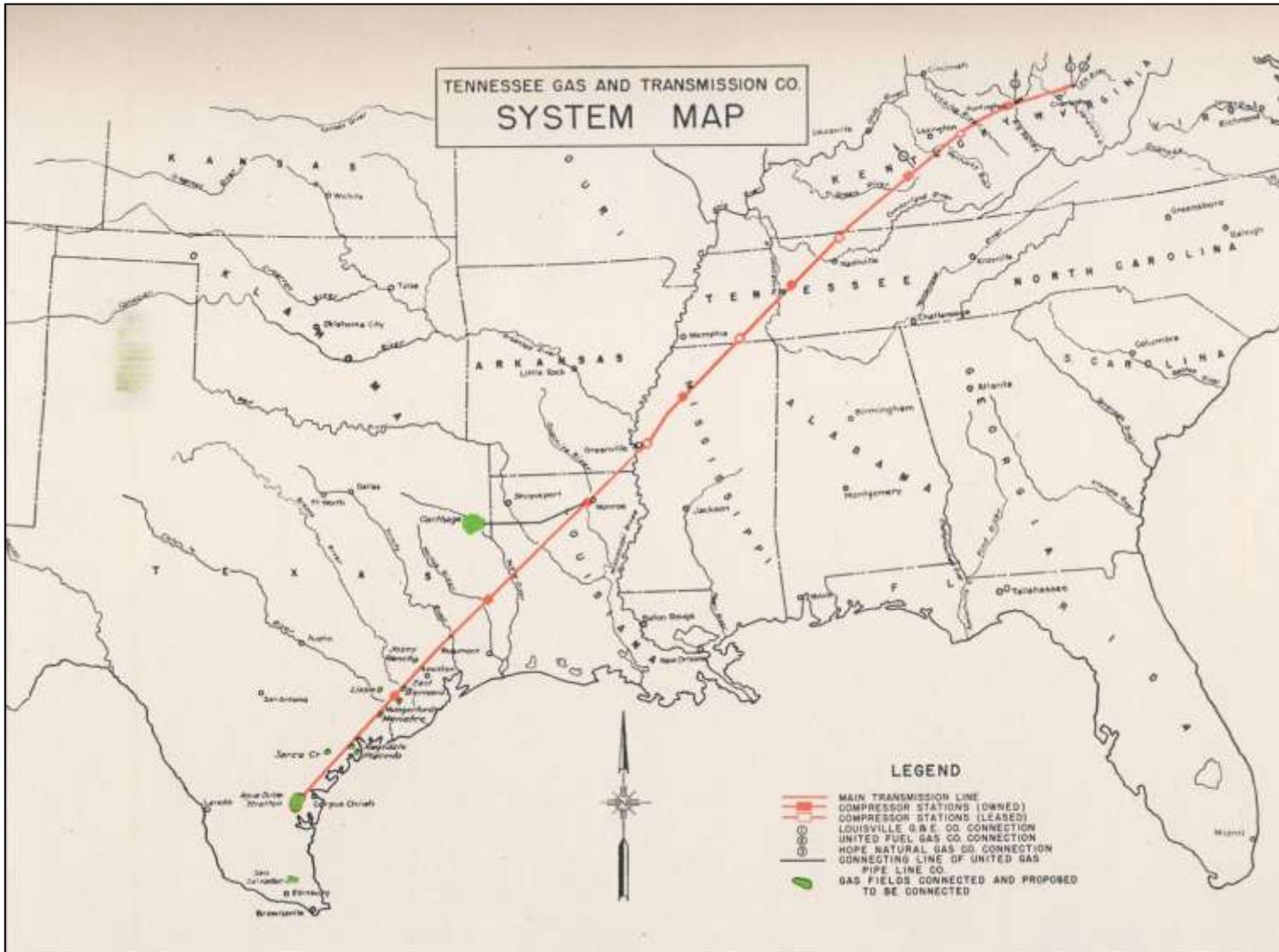
⁴⁰ Ibid., 6, 8. The diameters ranged from 10.75 to 18.75 inches. The recycling plants provided up to 350,000 cubic feet of gas daily to the pipeline.

⁴¹ Jackson, "The Spotlight of Southwest Texas, An Authentic Oil Report," 2.

⁴² Browning-Ferris Machinery Company, *Tennessee Gas and Transmission Co. Pipe Line: The Pictured Story of Its Construction*, 106.

⁴³ Ibid., 120-60.

FIGURE 1
Tennessee Gas and Transmission Company System Map



various points along the pipeline, the check meter stations measured the gas passing through the system in order to isolate leaks. Stearns-Roger designed and built all the metering and compressor stations for Tennessee Gas.⁴⁴

Tennessee Gas specified main-line block valves at approximately 10-mile intervals along the pipeline. Designed and manufactured by Merco-Nordstrom Corporation, these valves could quickly isolate compromised sections of the pipeline, and allowed for easy repair and maintenance.⁴⁵ Among the innovations on the Tennessee Gas pipeline was the use of welds to install the block valves; prior pipelines had used gaskets and bolts. Tennessee Gas welded in the valves to reduce cost and time, both crucial issues during construction; repair crews could cut out defective valves with blowtorches to replace them.⁴⁶

The pipeline terminated at Cornwell Station (near Kenova), West Virginia, where up to 165,000 mcf of gas was delivered to Hope Natural Gas. A smaller tie-in with United Fuel Gas at Clendenin, West Virginia, provided that company with up to 45,000 mcf.⁴⁷ The ultimate destination of the South Texas gas was the factories, homes, and power stations of the northern Appalachian region.⁴⁸

Opposition to the Pipeline

Despite the support of the Federal Power Commission, the War Industries Board, the War Department, and many large corporations, Tennessee Gas faced considerable opposition to its pipeline plans. Generally, Tennessee Gas's opposition fell into two camps: industries that would suffer from increased energy competition, and those who feared that the pipeline was unfairly stripping Texas of its natural resources. The campaign to stop or delay the pipeline was ineffectual, but proved a troubling element in Tennessee Gas's efforts to finish the pipeline on time.

During Tennessee Gas's hearings before the FPC, several coal companies, unions, and railroads expressed their opposition to the pipeline, fearing increased competition.⁴⁹ The declining coal industry was eager to keep Tennessee Gas out of the Appalachian region,

⁴⁴ "Factual Information Relating to the Tennessee Gas and Transmission Company Large Diameter Gas Pipeline, No. 29," 8-9.

⁴⁵ *Ibid.*, 8.

⁴⁶ Ray Fish, interview by Alan Dabney, 39.

⁴⁷ Browning-Ferris Machinery Company, *Tennessee Gas and Transmission Co. Pipe Line: The Pictured Story of Its Construction*, 120.

⁴⁸ Only a small quantity of gas went to other customers.

⁴⁹ "Employees of the Tennessee Gas and Transmission Company," 21 Jan. 1944. Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-2 (cont.), Predecessor Co. (1), Hist. Res. File, 3. Tennessee Gas's opponents included the National Coal Association, United Mine Workers, Railway Labor Executives Association, Southern Appalachian Coal Operators Association, Brotherhood of Railroad Trainmen, Anthracite Institute, Ohio Coal Association, and the Baltimore & Ohio Railroad.

having continually lost market share in terms of energy consumption to oil and natural gas throughout the country. In 1920, coal had accounted for more than 78 percent of the total energy used in the United States; the infant natural gas industry accounted for less than 5 percent of the energy used that year, with oil at just over 13 percent of the total. However, by 1940, coal's dominance had eroded to a slim majority of energy consumed—52.4 percent—while the market share of natural gas had jumped to more than 12 percent and of oil to 31.4 percent.⁵⁰

Facing huge losses, the coal industry petitioned the FPC to keep Tennessee Gas out of the Appalachian region, traditionally a strong market for coal. The railroads, which profited from hauling bulky coal to end-users, seconded the coal industry in this approach, as did the unions, whose members labored in the mines, on the railroads, and in the factories powered by labor-intensive coal. In addition, the unions feared that the rise of the natural gas industry in the Northeast would lessen their influence, because natural gas needed far fewer workers to extract, transport, and market than did coal. The unions were also aware that the headquarters of Tennessee Gas and many of its competitors were in the South and Southwest, areas traditionally hostile to labor unions and unionization.

The FPC rejected the arguments of the coal industry and its allies, despite investigating several alternatives to the use of natural gas in the Northeast. In its decision, the FPC quoted the Solid Fuels Administrator for War, who had stated on September 18, 1943, that “. . . coal production has been unable to keep pace with the expansion of war requirements. . . . [t]here is a far better chance that the situation will grow worse before it grows better, because the coal industry faces strict limitations despite any efforts which can be made to raise production levels.”⁵¹

Undeterred, the coal industry and its allies approached the seven states crossed by the proposed pipeline, attempting to halt Tennessee Gas at the state level. Here the potential for success was greater, because seven different utility commissions regulated gas across the pipeline route. Success in any of the seven could seriously delay Tennessee Gas. However, the state commissions concurred with the decisions of the FPC, ruling that the Tennessee Gas pipeline was vital to the war effort and that construction should proceed. By early 1944 the coal industry and its allies had given up their efforts to halt the pipeline.⁵²

Another threat to the pipeline came from organizations and individuals who feared that Tennessee Gas was stripping Texas of its natural resources. These included several chambers of commerce and manufacturing associations who played on Texans' fears and prejudices, as well as politicians such as Texas Senator W. Lee “Pappy” O’Daniel, Railroad Commission member Beauford Jester, Olin Culberson, head of the Texas Railroad

⁵⁰ Library of Congress, Congressional Research Service, *The Energy Factbook* (Washington, D. C., 1980), 13.

⁵¹ U.S. Federal Power Commission, Opinion No. 93-A, 11.

⁵² “Employees of the Tennessee Gas and Transmission Company,” 3.

Commission, and governor Coke Stevenson, who tapped into popular apprehension over the export of natural gas.⁵³ Several Texas newspapers, notably the *Dallas Morning News*, also opposed the pipeline. In general, opponents argued that industry would have no incentive to relocate to Texas if cheap natural gas was available in the Northeast, thus “robbing” Texas of its industrial future for temporary gains. Even worse, argued the opposition, the industrial lifeblood of Texas would aid the economic development of other states. Opponents played on regional tensions, pointing out that the Chicago Corporation owned Tennessee Gas, a “Yankee” corporation from the North, not owned or controlled by Texans. Opponents also insinuated that out-of-state business people might not have the best interests of the state at heart, and that Texas’s interests would best be served by keeping the gas at home.⁵⁴

Refuting such arguments fell upon the shoulders of Gardiner Symonds, and to a lesser extent on Brown Booth, whom Symonds hired to head a public relations effort to convince Texans that the Tennessee Gas pipeline was good for the nation, good for the war effort, and good for Texas.⁵⁵ Symonds was a tireless advocate for Tennessee Gas and the pipeline, confronting reporters and politicians alike about their attempts to keep the gas in Texas. He noted that the Chicago Corporation was a good corporate citizen, having invested millions in Texas, creating hundreds (later thousands) of jobs in the state, and paying substantial taxes. In a letter to Coke Stevenson, Symonds pointed out that natural gas was a practically worthless commodity in Texas prior to Tennessee Gas’s efforts to build its pipeline; Texas producers could get no more than \$.015 per mcf for their gas before 1943, and there were few markets for the gas in Texas. Tennessee Gas wanted to pay Texans five times more than the going rate for their gas (\$.05 per mcf), giving landowners substantial royalties, employing thousands of people, and paying nearly \$2 million a year in taxes to the state.⁵⁶ Aside from the direct benefits to Texas, the pipeline would also aid the war effort in providing defense plants with a continuous and reliable source of fuel.

Symonds argued that higher prices meant less waste of gas through flaring or venting, as producers and landowners had a real incentive to conserve and market their gas to Tennessee Gas. Increased prices would have the further effect of stimulating exploration

⁵³ Ray Fish, interview by Alan Dabney, 20. The Texas Railroad Commission had received regulatory authority over natural gas in Texas in the early 1930s.

⁵⁴ “More New Pipelines Applied for to Carry Texas Industrial Lifeblood to Texas’ Competitors,” San Antonio Manufacturers Association, *Bulletin* no. 1585, 25 Nov. 1944. Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-2 (cont.), Predecessor Co. (1), Hist. Res. File. Other groups opposed to Tennessee Gas’s pipeline were the Corpus Christi Chamber of Commerce; see Brown Booth interview by Alan Dabney, 16 Nov. 1961, Tenneco Archives, El Paso Corporation, box 42A, 3-1-0-1, Oral History Transcripts, 1; the Houston Chamber of Commerce, the South Texas Chamber of Commerce, Railroad Commissioner Olin Culberson, Mayor Otis Massey of Houston, and several reporters for prominent Texas newspapers.

⁵⁵ Brown Booth, interview by Alan Dabney, 1.

⁵⁶ Gardiner Symonds to Coke Stevenson, 4 Nov. 1943, p. 4.

and extraction, theoretically increasing Texas's gas reserves through new discoveries. Furthermore, argued Symonds, Tennessee Gas's pipeline would increase exports by 10 percent, which would in no way endanger the state's huge proven reserves of natural gas.⁵⁷ Gas already left Texas for Arizona, Colorado, Minnesota, Ohio, Iowa, Illinois, Michigan, and Mexico. Symonds and Tennessee Gas thus pointed out the obvious: the pipeline would be a boon to the Texas economy in terms of royalties, taxes, jobs, and economic growth. Noting that gas delivered to end users in the Northeast was priced at between \$.30 and \$.40 per mcf, Symonds argued that business would still come to Texas, given that gas in Texas could be had for as little as \$.05 per mcf in practically unlimited quantities.⁵⁸

Symonds skillfully rebutted Tennessee Gas's critics in the media, writing not only to Coke Stevenson, but also replying to editorials calling for a halt to pipeline construction. In a letter to the *Dallas Morning News*, Symonds responded to an editorial calling for the curtailment of gas deliveries to out-of-state customers. The article, "Fuel will be Required for Industrial Future," also insinuated that there had been no consideration of public input on the pipeline and that Tennessee Gas would collect excess profits at the expense of Texas's future. Symonds wrote that "the text of the article is so full of inaccuracies and misleading information as to make me wonder whether the *Dallas Morning News* is departing from its acknowledged high standard of journalistic reporting." His letter carefully refuted every contested point, noting that open hearings on the pipeline were conducted in Washington over a period of several years and that profits were strictly limited by the FPC to 6.5 percent of capital investment. He reiterated his stance that Tennessee Gas was effectively quintupling the price of natural gas paid to producers and landowners in Texas.⁵⁹ In light of staunch support for the pipeline at the federal level, as well as from Gardiner Symonds and many others, the opposition to the line failed to make any headway.

Building the Pipeline

Despite some opposition, Tennessee Gas and its contractors proceeded with construction as quickly as possible. With contractors signed up, materials ordered, and financing in place, Tennessee Gas held a brief groundbreaking ceremony at a site on the Cumberland

⁵⁷ Estimates at the time ranged from 45 to 75 trillion cubic feet.

⁵⁸ Gardiner Symonds to Coke Stevenson, 4 Nov. 1943, p. 5.

⁵⁹ Gardiner Symonds to J. A. Morrow, 1943. Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-2 (cont.), Predecessor Co. (1), Hist. Res. File. A note on the letter states "copied from an original letter in Mr. Symond's [sic] handwriting."

River in Tennessee on December 4, 1943.⁶⁰ Gardiner Symonds officially inaugurated the pipeline, and the first pipe was welded on January 10, 1944.⁶¹

Tennessee Gas and its contractors operated on a “stop-loss” basis, compensating the contractors for equipment rental and paying a set fee per foot of pipeline completed; this arrangement was similar to that used in building the Big Inch and Little Big Inch Pipelines. Several of the contractors also agreed to return a share of cost savings to Tennessee Gas.⁶² However, the contractors had to overcome a number of problems to get the line built in time, including right-of-way issues, lack of equipment, labor problems, and, especially, bad weather.

An early problem was the lack of heavy equipment, which, with the construction demands of World War II, was exceedingly scarce. Contractors such as Bechtel-Dempsey-Price had priority for heavy equipment, but this did not guarantee that necessary equipment could be located or purchased. In the words of the late Oscar Dempsey of Bechtel-Dempsey-Price, equipment priorities were merely “a hunting license.” With most equipment devoted to the war effort, Tennessee Gas’s contractors scoured the country for equipment to lease, borrow, or buy. In some cases, the scarcity forced contractors to improvise or to rely on animal power to complete their spreads.⁶³

Another problem the contractors faced was the width of the right-of-way on the eastern portions of the line. When Hope Natural Gas purchased the original right-of-way during the 1930s, they counted on building the pipeline partly with animal power and purchased a relatively narrow 30-foot easement along most of the route. Hope apparently intended to use horse teams to pull the welding equipment and wrapping machines and to rely on trucks or tractors only to move the heavier sections of pipe. Tennessee Gas’s contractors found it difficult not to stray off the narrow right-of-way.⁶⁴ Tennessee Gas had to pay damages when its contractors deviated from the right-of-way, as well as to restore farmland to good condition.⁶⁵

Labor issues also plagued the contractors. With many able-bodied men away in the military, Tennessee Gas’s contractors hired practically anyone who applied. Finding and hiring experienced pipeline workers was a serious problem. Skilled welders were in

⁶⁰ Browning-Ferris Machinery Company, *Tennessee Gas and Transmission Co. Pipe Line: The Pictured Story of Its Construction*, 48.

⁶¹ Oscar E. Dempsey, interview by Alan Dabney, 14 Jan. 1963, Tenneco Archives, El Paso Corporation, box 42A, 3-1-0-2, Oral History Transcripts, 5.

⁶² *Ibid.*, 3-4.

⁶³ *Ibid.*

⁶⁴ Ellis and Ernest Dunn, interview by Alan Dabney, 5 July 1963, Tenneco Archives, El Paso Corporation, box 42A, 3-1-0-2, Oral History Transcripts, 10. See also E. S. Murray, interview by Alan Dabney, 15 June 1961, Tenneco Archives, El Paso Corporation, box 42B, 3-1-0-3, Oral History Transcripts, 16, and Oscar E. Dempsey, interview by Alan Dabney, 17.

⁶⁵ B. J. Whitley, interview by Alan Dabney, 6 June 1961, Tenneco Archives, El Paso Corporation, box 42C, 3-1-0-4, Oral History Transcripts, 11.

particularly short supply, and the company had to turn away most of the poorly trained liberty-ship welders who applied.⁶⁶ Even so, problems with welds were common; during the testing phase after construction, one Tennessee Gas employee remarked that welds routinely broke when put under load. Workers had to repair damaged welds or cut out and replace them with a new piece of pipe, causing delays and further expense. Leaks also plagued the Tennessee Gas pipeline. One crew working 20-hour days found seventy-one leaks in one section of the pipeline. The crews found the leaks by listening for escaping gas as well as by the use of fire baskets—pieces of charcoal wrapped in wire mesh tied to the end of a long cane fishing pole. The leaking gas caught fire, making the leak visible so workers could mark and repair the spot.⁶⁷

Contractors also faced hostile unions, violence, and sabotage. Although some areas of the pipeline proceeded with relatively few labor problems, the contractors building the line through Kentucky and Mississippi dealt with labor unrest. Union members in Kentucky picketed Bechtel-Dempsey-Price's employees, and the situation escalated when the company refused to allow access to organizers. There were accusations of American Federation of Labor (AFL) agents harassing Bechtel-Dempsey-Price's employees; at one point, seventeen AFL members were in jail for damaging equipment, harassing workers, and even for assaulting a construction superintendent. Faced with sabotage of its equipment, Bechtel-Dempsey-Price hired armed guards and appealed for assistance to the state of Kentucky, which agreed to supply state police to protect the workers. Even so, tension between the contractor and the unions continued. On several occasions, Bechtel-Dempsey-Price equipment was targeted at night; vandals poured sand or sugar into gas tanks, ruining hard-to-replace machinery and further delaying construction.⁶⁸

Problems with landowners were common along the line. Eminent domain had to be used to claim right-of-way from recalcitrant landowners who wanted nothing to do with the pipeline. In some cases, landowners threatened violence to keep contractors off their land, though no major bloodshed erupted. Inexperienced contract workers contributed to the problems with landowners. According to pipeline tester B. J. Whitley, the contractors "used anybody that could operate a piece of equipment, drive a truck, or what-not, and they didn't care, they'd tear down gates and tear down private phone lines . . . so the landowners [got] quite riled up." Often landowners denied access to their land by locking gates or blocking the right-of-way with timber or gates, bringing work to a halt.⁶⁹ In Kentucky, Bechtel-Dempsey-Price faced hostility from wealthy horse-breeders and tobacco farmers resentful of losing portions of their valuable land to the pipeline.⁷⁰

⁶⁶ Oscar E. Dempsey, interview by Alan Dabney, 6.

⁶⁷ B. J. Whitley, interview by Alan Dabney, 5. Tennessee Gas did not add odorants to the gas in the pipeline at this time. Without odorants such as mercaptans, natural gas has no discernible odor.

⁶⁸ Oscar E. Dempsey, interview by Alan Dabney, 12-13, 45.

⁶⁹ B. J. Whitley, interview by Alan Dabney, 2.

⁷⁰ Oscar E. Dempsey, interview by Alan Dabney, 5.

The biggest challenge the contractors faced was the weather. In 1944, an unusually wet year, the rain began in January and continued along portions of the pipeline well into April. Heavy rains churned the soil into mud, entrapping equipment and workers alike (see Figures 2 and 3). Trenches filled with water and collapsed, delaying construction. The weather was so poor that by the end of April 1944, only 76 miles of pipeline had been finished—just 6 percent of the total. Desperate to finish the line before the end of the year, Tennessee Gas increased the number of construction areas to twenty-three, bringing in smaller contractors to make up for lost time. The work force increased to between 9,000 and 11,000 workers, and work picked up in the spring as the weather improved.⁷¹

FIGURE 2



To get loads of pipe up steep hills and through mud, tractors were used, as here in east Texas. *The Oil Weekly* (6 Nov. 1944), 64 (Courtesy Gary Cheatham).

After the rains stopped, the pipeline began to take shape. Contractors surveyed the pipeline route and then moved in workers and equipment to clear the construction areas. They cut down trees several feet above the ground and removed stumps with tractors or by blasting. Once workers cleared the right-of-way, heavy trenching equipment dug the 3-foot wide and 6-foot deep trench that would hold the pipeline. In some places, they shored

⁷¹“Factual Information Relating to the Tennessee Gas and Transmission Company Large Diameter Gas Pipeline, No. 29,” 4.

up the trenches with timbers to prevent collapse. Using soil from the trench for grading allowed easements on either side to serve as roads for the equipment and workers.⁷²

After the trenches and easements were prepared, subcontractors (stringers) brought in the pipe on heavy trucks. Stringing the pipe could be an ordeal; trucks stuck in soft soil, and stringers often had to rely on tractors to drag the heavy pipe sections into position along the trench. In flat areas in good weather, workers could string several miles of pipeline in a day. After the trench was prepared and the pipe strung, positioning and welding could begin.⁷³

FIGURE 3



Mud a foot or more deep hampered construction; trucks were sometimes anchored to trees to provide maximum power without shifting position. *The Oil Weekly* (6 Nov. 1944), 64 (Courtesy Gary Cheatham).

⁷² Browning-Ferris Machinery Company, *Tennessee Gas and Transmission Co. Pipe Line: The Pictured Story of Its Construction*, 56-60.

⁷³ *Ibid.*, 64-66.

Workers using heavy equipment put the pipe sections into position atop wooden cribbing alongside the trench. If bending was required, they attached clamps and applied pressure until the desired bend was achieved. Bending was used where slight changes of direction were required, such as to bypass obstacles or to traverse slopes. After positioning and bending, contractors used a variety of methods to weld the pipeline: from arc welding along the eastern sections, to pressure-welding in Texas (clamping together two sections of pipe and heating using a large oxyacetylene torch that encircled the weld area, fusing all around the pipe ends at the same time, which was quicker than other methods). At least a quarter of the pipeline was pressure-welded. After the welding was completed, inspectors checked the pipeline for leaks, making repairs if necessary.⁷⁴

Workers then wrapped and treated some sections of the nearly finished pipeline to inhibit corrosion. The wrapping consisted of a primer covered with a layer of coal tar enamel, with an asbestos felt covering on the surface. Two to four layers of asbestos wrapped the entire pipe used in the river crossings. From the Corpus Christi area to Memphis, Tennessee, Tennessee Gas used cathodic protection to inhibit further corrosion on the pipeline. Contractors laid the pipeline bare where they considered corrosion unlikely.⁷⁵

Once coated, the pipeline was ready for the trench. After draining and cleaning the trench (if necessary), workers spread a layer of mulch or soft soil along the bottom of the trench to cushion the pipe. Several side-boom tractors working in tandem lifted the pipe clear of the wooden supports and gently lowered it to the bottom of the trench. Once in place, backhoes buried the pipeline with “backfill” and workers tamped it down.⁷⁶

The pipeline intersected sixty-seven major streams and rivers, which the contractors had to traverse with special crossings. In most instances, Tennessee Gas blasted trenches out of the streambeds, and then the carefully wrapped pipeline was weighted, sunk, and buried. In one or two cases barge-mounted dredges had to clear the river bottom before work could proceed. The pipe used in the submerged crossings was generally thicker than the main line pipe, and a number of crossings used two or even three smaller pipelines. Where river traffic or swift currents made submerged pipeline inappropriate, aerial crossings were constructed. The contractors for the aerial crossings—Austin Bridge Company and Pittsburgh-Des Moines Steel Company—pre-fabricated the bridging sections and suspended them over the rivers by cables.⁷⁷ The Mississippi River crossing at

⁷⁴ Browning-Ferris Machinery Company, *Tennessee Gas and Transmission Co. Pipe Line: The Pictured Story of Its Construction*, 68-80. See also B. J. Whitley, interview with Alan Dabney, 5.

⁷⁵ “Factual Information Relating to the Tennessee Gas and Transmission Company Large Diameter Gas Pipeline, No. 29,” 8. Cathodic protection involved slightly electrically charging the pipeline to change its polarity, reducing the tendency of the metal to corrode.

⁷⁶ Browning-Ferris Machinery Company, *Tennessee Gas and Transmission Co. Pipe Line: The Pictured Story of Its Construction*, 92.

⁷⁷ *Ibid.*, 54-55.

Greenville, Mississippi, used the highway bridge—two 18-inch pipeline sections carried the gas on either side of the highway. In addition to river crossings, the pipeline traversed 274 roads and 62 railroads and crossed numerous easements, electrical rights-of-way, and other obstacles. To cross roads and railroads, Tennessee Gas's contractors tunneled underneath and then forced a capped section of pipe through the tunnel. This accomplished, the pipe would be uncapped, cleaned, welded, and tested, all without disturbing the road or railroad above.⁷⁸

Construction continued throughout the summer and fall of 1944. With improving weather and a looming deadline, the contractors made excellent time, eventually reaching a pace of more than seven miles a day. After delays caused by bad weather, extremely rough terrain, and labor problems, Bechtel-Dempsey-Price laid the final sections of the pipeline in late October.⁷⁹ The final tie-in occurred on October 31, 1944, with gas reaching Tennessee Gas's customers less than 24 hours later. Completing the Tennessee Gas pipeline had taken fewer than eleven months after the groundbreaking, with 94 percent of the pipeline built between May 1 and October 31, 1944. The total cost of the line was approximately \$54 million, with more than \$44 million provided by an RFC loan. The new pipeline would prove to be of immense value to the war effort, and it played a crucial role in keeping Appalachian defense plants in operation.⁸⁰

Conclusion

The completion of the Tennessee Gas pipeline on schedule during World War II was a remarkable achievement. Led by Gardiner Symonds, the new Tennessee Gas had hired managers, engineers, and contractors, contended with landowners and suppliers, answered critics, and overcome major challenges to finish the pipeline on schedule. With gas flowing to defense plants and other customers, a resource that would have been useless or wasted in Texas proved vital to the U.S. victory in World War II.

Demand for natural gas in the Appalachian region had spiked during the early 1940s. From a low demand of 246 bcf in 1933, gas usage had increased to more than 450 bcf during the war years. Defense plants burned much of this gas to churn out war materiel, and the gas kept homes warm and cities illuminated throughout the thickly populated industrial region. Until 1943, most of the gas burned in Appalachia was produced locally; however, shortfalls increasingly threatened defense plants with closure as the winter of 1944 approached. Tennessee Gas's contribution was more than 10 billion cubic feet (bcf)

⁷⁸ "Factual Information Relating to the Tennessee Gas and Transmission Company Large Diameter Gas Pipeline, No. 29," 14. See also Browning-Ferris Machinery Company, *Tennessee Gas and Transmission Co. Pipe Line: The Pictured Story of Its Construction*, 94, 104.

⁷⁹ Oscar Dempsey reported having to contend with swamps, quicksand, and slopes as steep as 70° in Mississippi and Kentucky. See Oscar E. Dempsey, interview by Alan Dabney, 31-32.

⁸⁰ "Tenneco's First 35 Years, 1943-1978," Tenneco Archives, El Paso Corporation, box 8B, 1-6-0-4, History Mss, 3.

in 1944, and by 1945, Tennessee Gas was supplying 73 bcf annually, or approximately 16 percent of the total gas consumed in the Appalachian region. Without the contribution of Tennessee Gas, defense plants such as the steel foundries of Pittsburgh and Youngstown would have halted, slowing the war effort.⁸¹

Tennessee Gas's main customers, Hope Natural Gas and United Fuel Gas, in turn distributed the gas to a variety of end users in the Appalachian region. Interconnected with numerous local distribution companies (LDCs), Hope and United provided gas to Consolidated Natural Gas Company and Columbia Gas & Electric, who supplied the factories, plants, generating stations, and homes with fuel. The gas served customers in West Virginia, Kentucky, Ohio, and Pennsylvania.⁸²

Following the completion of the original pipeline, Tennessee Gas began making plans for expanding it. By adding new compressor stations and loop lines, Tennessee Gas planned to increase its delivery capacity into the Northeast in the postwar years. In 1946, four additional compressor stations came online, adding 60 million mcf to the system capacity.⁸³ Tennessee Gas petitioned the FPC to build additional gathering lines and to sell gas to more customers. Gardiner Symonds also laid the groundwork for future growth, planning yearly pipeline expansions and setting Tennessee Gas's sights on acquiring the Big Inch and the Little Big Inch pipelines.

In December 1944, the FPC began investigating the Chicago Corporation. The purpose of the investigation was to determine if the Natural Gas Act of 1938 should apply to Chicago, because it was the majority owner of a natural gas pipeline. Rather than fall under the regulatory jurisdiction of the FPC, the Chicago Corporation began divesting its holdings in Tennessee Gas, and by September 1945, Tennessee Gas was an independent corporation. Gardiner Symonds severed his ties with the Chicago Corporation and remained president of Tennessee Gas, while the remainder of the original board of directors resigned.⁸⁴ With a steady stream of income derived from the pipeline and a visionary leader, Tennessee Gas would begin to diversify its operations that same year, eventually leading to the creation of one of the largest conglomerates in the world.

⁸¹ Prospectus, Tennessee Gas and Transmission Company, 15 Jan. 1946. 13.

⁸² *Ibid.*, 14.

⁸³ *Ibid.*, 11.

⁸⁴ Tennessee Gas and Transmission Company *Annual Report*, 31 Dec. 1945; *The Line* 1 (1946): 13.