

2346

PRIVATE ACTS.

[Chap. 2451.]

CHAPTER 2450.

AN ACT to amend an act approved June 27, 1857, and entitled "An act to incorporate the Langdon Manufacturing Company."

Be it enacted by the Senate and House of Representatives, in General Court convened:

SECTION 1. That the capital stock of said corporation may consist of any sum not exceeding five hundred thousand dollars, and that the limitation in the charter of said corporation of the power to purchase and hold personal and real estate not exceeding in value the sum of two hundred thousand dollars, be, and the same is hereby repealed.

SEC. 2. This act shall take effect from and after its passage.

SEC. 3. The Legislature may at any time alter, amend or repeal this act, whenever, in their opinion, the public good shall require it.

Approved June 27, 1860.

CHAPTER 2451.

AN ACT to incorporate the Keene Gas Light Company.

Be it enacted by the Senate and House of Representatives, in General Court convened:

SECTION 1. That Thomas H. Leverett, Josiah H. Carter, Levi Chamberlain, Samuel Dinsmoor, Edward Gustine, William P. Wheeler, Henry Pond, John H. Elliot, Robert Wilson, Caleb T. Buffum and William P. Abbott, their associates and successors, are hereby constituted a body politic and corporate, by the name of the Keene Gas Light Company, and vested with all the powers and privileges, and subject to all the restrictions and liabilities by law incident to corporations of a similar nature.

SEC. 2. The said corporation is authorized to purchase and hold all such real and personal property as may be necessary and proper to enable them to carry on the manufacture, distribution and sale of gas, for the purpose of lighting the streets, manufactories, machine shops, and all other buildings in the town of Keene, and to construct or purchase such buildings,

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PRIVATE ACTS.

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works, furnaces, reservoirs, gas holders, gas pipes, and other things as may be requisite and proper for such purpose.

SEC. 3. Said corporation shall have the right to lay and maintain gas pipes in any of the public highways in said town of Keene—the consent of the selectmen of said town having first been obtained therefor—and to re-lay and repair the same, subject to such regulations regarding the health and safety of the citizens and the security of the public travel as may be prescribed by said selectmen.

SEC. 4. The whole amount of the capital stock of said corporation shall not exceed the sum of sixty thousand dollars, and said stock shall be divided into shares of not more than one hundred dollars each.

SEC. 5. The manufacture of gas shall not be carried on by said corporation in the compact part of said town, unless the selectmen of said town shall first approve of the place selected by said corporation for such manufacture.

SEC. 6. Any three of the persons named in this act may call the first meeting of said corporation, by notice in any newspaper published in said Keene, not less than ten days before the day of such meeting, at which meeting, or at any subsequent meeting, duly called, by-laws may be adopted, and all necessary officers chosen for managing the affairs of said corporation.

SEC. 7. The Legislature may at any time alter, amend or repeal this act, whenever, in their opinion, the public good shall require the same; and this act shall take effect from its passage.

Approved June 27, 1860.

CHAPTER 2452.

AN ACT in amendment of an act entitled "An act to incorporate the Ashuelot Manufacturing Company."

Be it enacted by the Senate and House of Representatives, in General Court convened:

SECTION 1. The said corporation is hereby authorized to commence, carry on and continue any or all of the various branches of business contemplated in their original act of incorporation in the town of Gilsum, as well as in the town of Winchester, in said county of Cheshire; and, for that purpose, and the purposes specified in said act of incorporation, may erect all necessary build-

OLD YANKEE WAYS

Enduring Use of "City Gas" Keeps N.H. Utility Reminiscent of a Simpler Age

With roots going back more than a century, Keene Gas Corp. still produces and pipes a special propane/air mix through 34 miles of municipal lines. Customer storage tanks are not needed.

At a time when environmental regulators and LP-gas industry spokesmen are emphasizing the importance of alternative fuels now and into the 21st century, the irony of piping an old-fashioned "manufactured" gas into 60-year-old cast iron city mains is creating a striking anachronism in a picturesque New England town. The place is Keene, N.H., a well-developed Yankee "settlement" of approximately 22,000 people nestled in the southwest corner of the state. The fuel supplier is Keene Gas Corp., an unusual hybrid operation that serves both as an unregulated (straight) LP-gas marketer (Retail Division) and a state-regulated utility (City Division) that produces a 740-Btu, 29% propane/71% air mix called "city gas."

In much the same way that the city of Keene preserves examples of Early American tradition and lifestyles, a study of the gas company reveals an intriguing history of fuel technology over the years. What is especially noteworthy is the fact that the bulk of the utility's early 20th century distribution lines are still being used today.

Keene Gas' origins go back to the Keene Gas Light Co., which was incorporated on June 27, 1860 for "the manufacture, distribution, and sale of gas for the purpose of lighting the streets, manufactories, machine shops, and all other buildings in the town of Keene." In 1901, the company became known as Keene Gas and Electric Co., and was purchased in 1929 by Public Service Co. of New Hampshire, an electric utility. In 1946, the Gas Division was sold to Gas Service, Inc. of Nashua, N.H. The current owner, Harry B. Sheldon of Concord, Mass., acquired the firm in 1979.

The company produced gas from coal until 1954, when a change to reformed butane using the Koppers-Hasche Process took place. The reformed butane was replaced around 1957 by a butane/air mixture. Keene Gas entered the propane market in 1958, when it began deliveries of 100-lb cylinders. Ten

years later, a 300,000-cu ft water-seal holder was removed and a quadruple jet system featuring Eclipse Fuel Engineering injectors was installed. Still in use, the system provides the city with a low pressure, 740-Btu propane/air mixture through 34 miles of municipal mains. All lines are situated within city limits. State utility franchise law dictates that the gas company maintain an average of 740-Btu output around the clock.

It's difficult to say how many, or if any other LP-gas suppliers or utilities still produce the propane/air mix today, but the principals at Keene Gas believe that their firm may be among the last. "The only thing I know for certain is that Claremont, N.H. (a town of about 15,000 people a few miles north) uses it, but there it's rated to about 900 Btu," said John DiBernardo, Keene Gas' assistant general manager and plant operations manager. "There were a number of [city gas suppliers] in Vermont at one time. I think I heard something about it still being used in Ocean City, Md. but we're not sure."

Comparing Notes

General manager Robert Egan added, "We're always looking for people out there who have the same setup we have, so we can 'compare notes.' If anybody knows of anyone who still uses city gas, we'd sure like to know. The parts we use at 'the point of mixture'—including the jets, venturis, and automatic switching system to turn on the jets—are about 22 years old." Egan and DiBernardo believe that Keene Gas could conceivably run into difficulties if any of these parts needed replacement.

The concept of producing a manufactured propane/air mix has been around since the late 1920s. According to H. Emerson Thomas, a veteran industry consultant who worked directly with the fuel, Phillips Petroleum installed the first systems in the East in 1928. Propane/air reached the height of popularity in the 30s, yet most plants were converted over to natural gas after World War II. In the case of Keene Gas, the

fuel is mixed and produced according to demand at the plant on Emerald Street—the site of the original gas plant 130 years ago.

Propane is brought in via transport and stored on the premises. The tank farm here consists of one 30,000-gal. and one 61,400-gal. aboveground tank plus two 30,000-gal. mounded tanks, which were built and installed by Gas Service, Inc. (Covered with earth and stone, mounded tanks offer a superior degree of flame resistance. For additional details on this unusual method of storage, see "Worldwide Development of Mounded LP-Gas Storage: Alternative Storage System Gains Favor," BPN, April 1989, p. 28.)

The way DiBernardo described the gas production process, propane is fed as a vapor through a regulator and venturi-type injectors where the air is entrained. "We don't use compressors," he said. "We depend on the energy that is 'stored' in the liquid propane. It enters the venturi at a pressure of 30 psi; the mixed gas leaves the plant at a low pressure of 1 psi. Additional jets come on automatically to meet the demand. During cold months, we have to use steam-fired vaporizers, but in summer we can take the vapor directly from the tank."

Propane/air gas offers at least two notable advantages over pure propane. First, there is less likelihood of reliquefaction in cold temperatures. Second, appliances that operate on propane/air or other manufactured gas such as coal, coke, or carburetted water gas can be easily converted over to natural gas if it should become available. By far the most practical advantage of Keene Gas' system is that users do not require storage tanks on their property. "We have many customers—concentrated mostly in the downtown district—who would have difficulty siting a fuel oil tank or LPG tank," Egan pointed out. "We can offer an energy source that eliminates the consideration of having to install a tank on-site."

The only drawback posed by the pro-

OLD YANKEE WAYS

pane/air mixture is that conventional LP-gas appliances must be adjusted or modified accordingly. The orifice in every unit must be sized for the different Btu output, and generally the air shutter must be sized for the different Btu output, and generally the air shutter must be adjusted for primary air. No appliance is believed to be manufactured at this time to run on the propane/air mixture when it leaves the factory.

For a good idea of what city gas distribution systems looked like decades ago, one need look no further than Keene Gas' pipeline network almost anywhere within the town. According to DiBernardo, the original mains were laid in the 1860s but most of the system was replaced with cast iron piping in the late 1920s and 30s. It is still in use today. Thirty miles of iron pipe are fed at a pressure of 11 in. WC. The only portion of the infrastructure that consists of modern material is a four-mile segment of welded coated steel that was laid in 1968 to service a growing area of the city.

It is important to note that, because a specially-produced fuel is being utilized, modifications must be made in pipe sizing over the normal requirements for straight propane. According to DiBernardo, "The pipeline has to be calculated based on our own 'peculiar' amount of heat output. We wouldn't get as much Btu output if we used conventional size pipe. We have to use piping that is approximately 30% larger in order to make up for the lower Btu. We use computer-generated tables to determine the proper pipe and orifice sizes."

Keene Gas Corp. performs virtually all new pipe installations and maintenance. (The work is seldom contracted out.) When a replacement segment is needed, plastic is usually selected; the favored type is Phillips' "Driscopipe," a polyethylene product that is installed with heat fusion equipment.

In Good Shape

For the last decade or so, considerable media attention has been focused on the nation's deteriorating urban bridges, roads, and pipelines. In the city of Keene, however, the old gas piping is apparently not in any danger of giving way. DiBernardo reports that Keene Gas maintains a continuous program of inspection, replacement, and

upgrading, with specific areas targeted because of age and ambient soil conditions. He stated that there is no known problem with acidic soil; however, low resistivity exists in certain areas. That condition is best handled with cathodic protection.

Keene Gas' propane/air pipeline system falls under CFR 49 Part 192, which



Robert Egan

is part of the Natural Gas Pipeline Safety Act of 1968. The pertinent rules apply to LP-gas suppliers who serve 10 or more customers from a single source.

While examining the involvement of



John DiBernardo

the federal government in regulating Keene Gas' operations, it becomes clear that a convenient arrangement exists in which the gas company can earn its necessary state approvals at the same time. As DiBernardo explained it, "The state of New Hampshire has an agreement with the federal government, in that there is a state inspector (Richard Marini, gas safety engineer) who works for the New Hampshire Public Utility

Commission (PUC) and who is also granted powers under the Federal granted powers under the federal government's Office of Pipeline Safety makes sure all natural gas or propane utilities that fall under the state PUC also follow regulations under the Natural Gas Pipeline Safety Act."

This "two-hatted" individual is responsible for overseeing all operations, including physical inspections, and for making sure that the gas company follows appropriate plans. "The inspector must ensure that we're adhering to the letter of the law," DiBernardo said, citing, for example, leak surveys and the need to keep meticulous records of them.

As a hybrid company that markets two types of fuel, Keene Gas enjoys a somewhat complex relationship with state regulators. The City Division, which handles the manufacture and distribution of city gas (propane/air), is listed as a state public utility. In a typical exchange for having been granted exclusive franchise rights, the division has agreed to operate under jurisdiction of the PUC for the setting of customer rates. Egan estimates that the City Division's customer base of 1100 comprises 80% residential, 15% commercial (mostly restaurants), and 5% industrial accounts. The Retail Division markets only straight propane to approximately 3600 customers.

Although the establishment of natural gas in the area would not hurt Keene Gas (since the company would hold the franchise), it is interesting to note that a changeover to natural gas appeared to be a fair possibility until recently. As Egan explained, the proposed Champlain Pipeline Project would have brought a natural gas main within three miles of Keene's plant, and the firm would have laid its own pipeline to connect with it. According to the principals, there was definite talk about changing the entire system over to natural gas. However, the Champlain Project is reportedly stalled as a result of environmental considerations, and no changeover is contemplated at this time.

Nevertheless, Keene Gas Corp. stands apart as a supplier of a fuel that was once quite popular. The way Egan and DiBernardo perceive it, manufactured gas systems serve as a "bridge" between the old gas hookups of yesterday and the natural gas systems of today and tomorrow.

UTILITY FOCUS:

KEENE GAS COMPANY



With a franchise to provide gas service to Keene, Keene Gas Corporation may very well be the only remaining utility in the country producing and supplying manufactured propane/air mixture gas to its utility customers. Certainly the pending abandonment of the Claremont Gas franchise leaves Keene Gas as the sole remaining utility of its kind in New Hampshire. An unusual hybrid operation serving both as an unregulated, straight propane gas marketer through its retail division and as a state regulated utility that produces a 740 Btu, 29% propane/71% air mix called "city gas" through its city division, Keene Gas is nothing if not unique.

Keene Gas' origins go back to Keene Gas Light Co., which was incorporated on June 27, 1860 for the manufacture, distribution, and sale of gas for the purpose of lighting the streets and the factories, machine shops, and all other buildings in the town of Keene. In 1901, the company became known as Keene Gas and Electric Co. and was purchased by Public Service Co. of New Hampshire in 1929. In 1946, the Gas Division was sold to Gas Service Inc. of Nashua, a forerunner of EnergyNorth Natural Gas. The current owner, Harry B. Sheldon, acquired the company in 1979.

A study of Keene Gas Company's past reveals an intriguing history of fuel technology over the years. Like many other gas utilities in the first part of this century, Keene Gas manufactured gas from coal. In 1954, Keene Gas changed to reformed butane using the Koppers-Hasche Process. However in 1968, the reformed butane was replaced by a butane/air mixture.

Keene Gas entered the propane market in 1958, when it began deliveries of 100 pound cylinders. Ten years later, a 300,000 cubic foot water seal holder was removed and a quadruple jet system featuring Eclipse Fuel Engineering injectors was installed. Still in use now, the system provides the city with a low pressure, 740 Btu propane/air mixture through 29 miles of municipal mains. All lines are situated within the city limits of Keene.

The concept of producing a manufactured propane/air mixture has been around since the late 1920s. Phillips Petroleum installed the first systems in the East in 1928. Propane/air mixtures reached the height of their popularity in the 1930s; however, most plants were converted over to natural gas after World War II. In the case of Keene Gas, the fuel is mixed and produced according to demand at its plant on Emerald Street, the site of the original gas plant 130 years ago. Propane is brought in via transport and stored on the premises. The tank farm here consists of two above ground tanks, one 30,000 gallon and one 61,400 gallon, plus two 30,000 gallon mounded tanks which were built and installed by Gas Service, Inc. Mounded tanks, which are covered with earth and stone, offer a superior degree of flame resistance.

Propane-air mixtures offer at least two notable advantages over pure propane. First, there is less likelihood of reliquefaction in cold temperatures. Second, appliances that operate on propane/air or other carburetted water gas can be easily converted to natural gas should it become available. By far the most practical advantage of the

Keene Gas system is that users do not require storage tanks on their property. Many of the company's customers are concentrated in the downtown area and would have difficulty siting an oil tank or a propane tank on their property. Keene Gas can offer an energy source that eliminates the consideration of having to install a tank on-site. The only drawback posed by the propane/air mixture is that conventional propane gas appliances must be adjusted or modified accordingly. No appliance is believed to be manufactured at this time to run on the propane/air mixture when it leaves the factory. The orifice in every unit must be sized for the different Btu output, and, generally, the air shutter must be sized for primary air.

While the original mains were laid in the 1860s, most of the system was replaced with cast iron piping in the late 1920s and early 1930s. It is still in use today and consists of twenty one miles of cast iron pipe fed at a pressure of 11 inches of water column. The only portions of the infrastructure that consist of modern material are a four mile segment of welded coated steel that was laid in 1968 to service a growing area of the city and an approximately two mile segment of polyethylene main installed in recent years. Despite its age, Keene Gas' old gas piping is not in any danger of giving way. Keene Gas maintains a continuous program of inspection, replacement and upgrading targeting specific areas because of age and ambient soil conditions.

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GAS SERVICE, INC.

July 25, 1974

TO: F. Derrickson C.R. Prichard
F. Hokenstrom R. Robichaud
M. Mancini L. Stagney
R. Nichols

FROM: C.A. Drexel

SUBJECT: SWITCH FROM BUTANE TO PROPANE
KEENE PLANT OPERATIONS

This is to notify you that on August 1, 1974, it is planned to change from Butane to Propane for the Keene Plant operation.

If you are involved in the changing of any records, etc., in regards to this switch, would you please make the necessary arrangements to take care of this change as the BTU value will go from 760 to 740.


C.A. Drexel

CAD/me

GAS SERVICE, INC.

DATE Aug. 12, 1974

TO Ray Robichaud

FROM Ron Nichols

SUBJECT Correction Factors for Propane and Butane Air

ASSUME:

Therm = 100,000 BTU ✓

Propane = 91,300 BTU = .913 therms ✓ sp. gr. 1.522

Butane = 103,000 BTU = 1.03 therms ✓ sp. gr. 2.006

760 BTU Butane Air Specific gravity 1.22

$$\frac{1000 \text{ cf} \times 760 \text{ BTU}}{103000 \text{ BTU}} = 7.378 \text{ gallons per mcf}$$

$$\text{MCF} = \frac{\text{gallons}}{7.378} \checkmark$$

$$\text{THERM} = \text{MCF} \times .76 \checkmark$$

740 BTU Propane Air Specific gravity 1.15

$$\frac{1000 \text{ cf} \times 740 \text{ BTU}}{91300 \text{ BTU}} = 8.105 \text{ gallons per mcf}$$

$$\text{MCF} = \frac{\text{gallons}}{8.105} \checkmark$$

$$\text{THERM} = \text{MCF} \times .74 \checkmark$$

RAN/eg

C/c CAD
LTS ✓

Ron
This looks
OK to me
Larry
8/27/74