STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

DOCKET NO. DG 17-198

IN THE MATTER OF:

LIBERTY UTILITIES (ENERGYNORTH NATURAL GAS) CORP. d/b/a LIBERTY UTILITIES

PETITION TO APPROVE FIRM SUPPLY, TRANSPORTATION AGREEMENTS, AND THE GRANITE BRIDGE PROJECT

DIRECT TESTIMONY OF

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SEPTEMBER 13, 2019

Introduction

Q. Please state your name, occupation, and business address.

A. My name is Randall Knepper and I am employed by the New Hampshire Public Utilities Commission (Commission) as the Director of Safety & Security. My business address is 21 S. Fruit Street, Suite 10, Concord, New Hampshire 03301.

Q. Please summarize your educational and professional experience.

A. In December 2004, I became Director of the Commission's Safety Division and in 2010, the Director of Safety & Security. I have testified in numerous dockets at the Commission that have addressed rate case reviews, cast-iron/bare-steel replacement and expenditures, rule changes, and technical investigations. A list of those dockets are located in Attachment RSK-1.

In addition, I have participated in several gas-related rulemakings and have been the principal investigator in a number of after-action reviews and investigations. Those proceedings are also included in Attachment RSK-1. Finally, I have written dozens of recommendations for Commission consideration in a number of dockets and can provide those cases upon request.

Prior to joining the Commission, I worked as an environmental engineer, as staff engineer for a gas utility, and as project engineer for an electrical (high voltage transmission) equipment provider. My professional work experience spans more than 30 years. I have a Bachelor of Science in Mechanical Engineering from the University of Rochester and a Master's in Civil Engineering from the University of Massachusetts.

I am a registered professional engineer in New Hampshire and a member of the Association of Energy Engineers (AEE). In addition, I am a member of the Governor's Advisory Council on Emergency Preparedness, and I serve on multiple committees of the National Association of Pipeline Safety Representatives (NAPSR), including prior positions of Chair and Past Chair. I served as editor and principal author of both biennial editions of NAPSR's *Compendium of State Pipeline Safely Requirements & Initiatives Providing Increased Public Safety Levels Compared to Code of Federal Regulations*. I currently chair the Staff Pipeline Safety Subcommittee of the National Association of Regulatory Utility Commissioners (NARUC). I also serve on the Common Ground Alliance Technology Committee, am appointed as a member of the Gas Technology Institute's Public Interest Advisory Committee, and am a board member of the New Hampshire Public Works Standards and Training Council. Finally, I have testified before the United States Congress on pipeline safety issues.

Q. Given the use within the gas industry of a variety of unit descriptions applicable to energy, can you provide a reference point for readers to understand the various references to quantities and descriptions used in Staff testimony to discuss the Granite Bridge Project?

A. Yes. Discussions of energy concepts within the gas industry typically describe energy in terms of therms, which is derived from the British measurement of thermal units. Natural gas is transported and stored in both gaseous states and liquid states and volume measurements for each are dependent upon pressure, temperature and density. To assist the reader, I have attached in RSK-2 a summary of the descriptive terms used, with the

equivalent conversion units. Many of these terms were used throughout Staff's testimony in this proceeding. In addition, Attachment RSK-3 is a drawing produced by the Safety Division of the proposed transmission pipeline route along New Hampshire Route 101, with identified exit numbering, LNG storage tank and facility location, and an inset of Attachment RSK-2 that includes a summary of key quantities referenced within the Liberty petition.

Q. Please compare the characteristics of the proposed Granite Bridge Project in terms of scope and project size in relation to your knowledge of other gas pipelines operated by Liberty Utilities (EnergyNorth Natural Gas) Corp. (EnergyNorth).

A. EnergyNorth has stated that its preferred option for the proposed Granite Bridge Project is to install a 16-inch nominal diameter coated steel gas pipeline, approximately 27 miles in length, that will traverse through 7 towns and will be classified as an intrastate gas transmission line. It is expected to be operated at 750 psig with a maximum allowable operating pressure (MAOP) of 950 psig.

The overall scope of the Granite Bridge Project will be the largest single project ever undertaken by EnergyNorth in New Hampshire in terms of diameter, pressure, and length. The proposed 27-mile transmission line will be approximately 10 times longer than EnergyNorth's only other intrastate pipeline, a 2.7 mile transmission line located in Londonderry. The existing Londonderry transmission line is only 12 inches in diameter and operates at 21% lower pressure (based on MAOPs) than the proposed Granite Bridge transmission pipeline. To my knowledge, Liberty has never installed 16-inch diameter pipelines before and will need to purchase the equipment and stock items necessary for this size line. Historically, the proposed pipeline for the Granite Bridge Project dwarfs in scope

any other project ever undertaken by EnergyNorth. The next largest projects that I am familiar with include the 12-inch diameter 7.5-mile Highline (300 psig MAOP) replacement project installed from Concord to Laconia in 2015, and the original 22-mile 6-inch diameter Highline (200 psig MAOP) installed in 1963 from Concord to Tilton.

Q. Please compare the Granite Bridge LNG Storage/Vaporization/Liquefaction Project characteristics in terms of scope and project size in relation to your knowledge of other gas storage or LNG production facilities operated by EnergyNorth.

A. The Company has stated that a 2.0 billion cubic feet (bcf) storage tank will be necessary and the preferred size. A 2.0 bcf storage tank has approximately 30,000,000 gallons of liquid storage capacity. For comparison, Liberty's existing storage capacity are three small single LNG storage containers each having 60,000 gallons storage capacity. These are located in Manchester, Concord, and Tilton. Thus, the proposed storage capacity of the Granite Bridge Project would be 500 times larger in scope than any production facility that EnergyNorth has owned or operated in the past. A production facility of this size is orders of magnitude larger than the existing plants and becomes a much more complex operation to operate and maintain.

Q. Do EnergyNorth's existing facilities have liquefaction capabilities now?

A. No, the existing plants have no liquefaction capability and are used only to offload standard trucked deliveries that have much smaller amounts, such as 9,500 gallons per load, with off-loading capabilities. Thus, existing personnel that operate the plants have no experience with liquefaction in their normal daily duties. The proposed LNG storage tank facility in Epping

will need to be staffed 24 hours a day, 7 days a week. In addition, I would assume that its operations would be isolated from the existing 3 liquefaction plants due to the operational complexity, strategic value, and level of security with plant control rooms involved.

Q. Do you envision that Liberty will have difficulty in attracting experienced plant operators to operate and maintain the plant?

A. Yes. Currently there are few LNG plant operators that have the experience required to operate and maintain a facility as large as the one proposed by EnergyNorth. Such a large investment requires constant monitoring and oversight to ensure safe and reliable operations and service. I would highly recommend that they have operating personnel that function separately from maintenance personnel, and that the Company not try to combine those tasks. Many production facilities try to combine those duties, but while that can be done with Liberty's smaller plants, these are functions that need to be separated so as to achieve optimal operations that are continuous, with minimal disruptions.

Since few experienced LNG plant operators exist, Liberty is going to have to pay an amount higher than the prevailing wage for gas plant operators to attract appropriate, qualified personnel that will in all likelihood require relocation. The proposed storage facility in Epping should be staffed by personnel whose primary duty and function is to keep the Epping facility operating continuously, efficiently, and in good repair. The pool of specialized operators that have the required experience is much smaller than the available pool for traditional distribution pipeline installation crews that the Company typically uses.

Q. What Commission oversight do you envision if the proposed projects are approved?

A. As a preliminary estimate, I would envision at least one additional full time inspector for the pipeline project alone, supplemented with a part-time inspector for the pipeline project, as well, depending upon Liberty's construction schedule. Before, being placed into service, Liberty anticipates that the pipeline project would take at least 24 months to complete and test prior to operation. That will also be dependent upon any conditions required by NH DOT, the availability of materials and contractors, and cooperative weather conditions. The Commission may also require the assistance of a consulting team over a multiyear term that could supply personnel and expertise, with both office and field construction oversight capabilities, to assist with the oversight of the multiyear buildout of the LNG storage facility. I would anticipate such a contract to require Governor and Executive Council approval, and given the size and scope of the Project, could easily total in excess of $1 million by the time the Project is completed. The Commission's Safety Division does not have the staffing resources to oversee a project of this size, and Liberty has not provided enough details at this time to permit the preliminary development of a request for proposal for the anticipated contractor services.

Q. Has the Commission used similar assistance for projects of this scope in the past?

A. Yes, during the construction of the scrubber and environmental equipment required for the approximately $400 million dollar upgrade of Merrimack Station, the Commission retained the use of a consultant to assist in overseeing the installation and keeping the Commission informed on progress. I would expect daily attendance at Company meetings, weekly and monthly summaries be submitted to the Commission with appropriate detail by both the

Company and Commission consultant team, as well as frequent public updates on the projects provided by the Company through Liberty's website.

Q. What kind of oversight would be needed by Liberty for such a large project?

A. I would envision Liberty having dedicated teams with responsibility for this project, with a project manager that has appropriate authority to purchase equipment, oversee documented procedures and processes, schedule and oversee meetings, and make daily project decisions. The team leader would need to be given authority and responsibility to deliver project milestones on time and within budget, and to communicate and resolve the numerous issues that are likely to arise. This all would have to be accomplished while Liberty continues to conduct the traditional operation and maintenance functions that will continue the growth goals that are the premise for the need of this large investment.

Q. Liberty has referenced the Granite Bridge pipeline will provide additional reliability. What has the reliability been with the existing Kinder Morgan transmission pipeline that primarily feeds EnergyNorth's existing gate stations where supply transfers occur?

A. Kinder Morgan's Tennessee Gas Pipeline, (TGP), which comprises the Concord Lateral, has had an excellent record of providing uninterrupted gas supplies to EnergyNorth. To my knowledge, natural gas supply has never been interrupted on that pipeline in more than 65 years of existence. In addition, there is no record of ever having an "incident" on the TGP transmission pipelines within New Hampshire. This includes continuity of supply during periods during period requiring repairs and maintenance activities such as valve maintenance,

leak repair, installation of new gate stations, installation and operation of integrity management equipment and compressor station installations. The Safety Division's underground damage prevention records show no excavation damages have occurred on the TGP transmission pipeline in the past 20 years.

Q. What aspects of the proposed transmission pipeline make the Granite Bridge Project more complicated than other transmission pipelines in EnergyNorth's system?

A. EnergyNorth has only a single transmission pipeline to compare, but the Granite Bridge pipeline will be more be complicated in a number of ways. First, regulator stations will need to be designed at higher pressures than EnergyNorth has traditionally used. Secondly, the two interstate pipeline connections with Maritimes and TGP will have to be designed for bilateral flow situations, which is not what is usually encountered on EnergyNorth's interconnection locations.

The interstate transmission pipelines of Maritimes and TGP also operate at different pressures, 1440 psig and 750 psig respectively, and Liberty has stated they will be using a 950 psig MAOP on the Granite Bridge pipeline. This influences the directions of flow and system design. In addition, Liberty does not have traditional compressor stations in their systems so compressing gas anywhere within the project design adds complexity to Liberty's proposed undertaking.

Another complicating factor is a pipeline inspection tool used only on transmission lines involving a launcher and receiver that is required by regulation for integrity management reasons. The launcher and receiver will need to be installed as has been done on Liberty's Londonderry pipeline but this proposed configuration for Granite Bridge requires a facility

bypass which is something EnergyNorth does not have. Future integrity management on the proposed transmission line would need to be coordinated at intervals and cycles that coincide with those required with the Londonderry transmission line so that scheduling of specialized inspection tools used by specialized crews (typically originating from out of state) can be synchronized at compatible times. While the Granite Ridge electric generation plant is involved for ultimate delivery needs, it will need to be factored into the operations of the Epping LNG facility as well.

Additionally, automatic and remote control valves will need to be installed on the new pipeline as they are now a requirement for gas transmission pipelines under federal regulations. Furthermore, during pipeline construction numerous directional drilling operations would be anticipated, some very deep and lengthy, at locations along the pipeline route. That drilling technique often involves a risk of frack outs and project delays resulting from ledge. Finally, Liberty construction procedures will need to be amended to include techniques used for larger diameter pipelines such as the 16-inch nominal diameter proposed for the Granite Bridge transmission line.

Q. What aspects of the proposed LNG facility will the Safety Division be focusing if the project is approved?

A. A partial list of items we will be reviewing includes the following:

- Siting requirements including general layout, thermal radiation protection, flammable vapor gas dispersion models:
- Design and fabrication specifications including material selections, design of process components and buildings, impoundment capacities, liner selection and insulating materials;
- Construction techniques including corrosion control, welding and non-destructive testing;

- Equipment selection associated with power, control systems, vaporization equipment, liquefaction equipment, odorization injection and removal equipment;
- Operational procedures including methods of cool-down, monitoring, emergency procedures, personnel safety, product transfer, purging methods, communication systems used and operational records;
- Maintenance procedures including support systems, fire protection, power sources, isolating and purging, repair methods, control systems, testing of transfer hoses, inspection of storage tanks, and maintenance of corrosion protection systems used;
- Personnel qualifications and training including those of plant operators and maintenance staff, construction personnel, installation personnel, inspection personnel, testing personnel, security personnel, and engineering personnel;
- Fire protection systems;
- Security systems, security procedures, alarms, lighting, auxiliary power systems, warning systems; and
- Cyber protection plans including the isolation of Londonderry Control Room for system and those of the LNG Plant operations.

Q. Do you have concern's regarding the operating and maintenance cost estimates used by Liberty in its financial analysis?

A. Yes, it would not be surprising if the actual operating and maintenance cost exceed those used in Liberty's financial analysis. As explained earlier in my testimony, the Granite Bridge Project is a major undertaking and Liberty does not currently have the resources necessary to operate and maintain the proposed facilities, may have a difficult time acquiring those resources and acquisition of those resources could cost much more than expected.

Q. What kind of safety record has the industry overall experienced with LNG in terms of accidents, spills, and reportable safety conditions?

A. The U.S. gas industry, including New Hampshire, has a very good safety record with LNG. The primary reason for this is the level of redundant systems, controls, security and design requirements that are involved. If requested by the Commission I could provide a summary of the above conditions encountered nationally over the last five years.

Q. **Does this conclude your testimony?**

A. Yes, it does.