STATE OF NEW HAMPSHIRE

Inter-Department Communication

DATE: December 22, 2016
AT (OFFICE): NHPUC

FROM: Stephen Frink SPF
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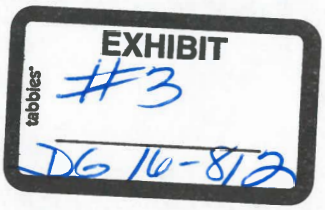

SUBJECT: DG 16-812
Liberty Utilities - Keene Division Cost of Gas
Keene Production Facility Costs

TO: Commissioners
Docket File
Service List

SUMMARY OF STAFF RECOMMENDATION

Keene facility production costs should not be recovered through cost of gas (COG) rates. Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities – Keene Division (Liberty or Company) should remove $124,190 of production costs when calculating its monthly projected over- or under-collection and adjust the Keene COG rate effective January 1, 2017 and a hearing should be scheduled in January to address what, if any, production costs should be allowed for recovery through the COG.

BACKGROUND

On October 28, 2016, the Commission issued Order 25,960 approving the Keene 2016-2017 Winter COG rate and directed Staff to more fully review productions costs with the Company. Commission Analysis (p. 5):

> 'The Commission notes that the primary driver of the COG increase is the asserted need to continually staff the Keene production facility. We direct Staff to more fully explore this need with the Company with an eye towards reducing costs as well as ensuring reliable service."

In the 2016-2017 Liberty - Keene COG filing the Company included production costs, which had not been the practice under the predecessor utility, New Hampshire Gas Company, or the prior COG seasons since Liberty acquired the Keene operations on January 2, 2015. The 2016-2017 COG rate calculation includes 2015-2016 winter

production costs of $124,189 (Audit Report, Audit Issue #1) and 2016-2017 winter production costs (projected) of $124,190 (filing Bates p. 21), for a total of $248,379.

Continual staffing of the production plant commenced in December 2015, a policy change implemented in response to a December 19, 2015 incident which was the subject of Commission Docket IR 15-517. The change in the staffing policy accounts for $78,027 of the 2015-2016 winter production costs (Staff DR 3-5) and $108,600 of the 2016-2017 winter production costs (Staff DR 2-1), for a total of $186,627.

INVESTIGATION

Staff issued data requests regarding the Keene operations on November 15, 2016 and November 30, 2016, and met with Liberty personnel for informal work sessions on November 18, 2016 and December 5, 2016.

At the November 18, 2016 meeting, Staff put Liberty personnel on notice that Staff would be filing a report with the Commission recommending that production costs should not be recovered through the Keene COG, and that the cost of continually manning the Keene production plant is not prudent and should not be recovered from ratepayers.

Staff also reviewed the Commission Safety Division Report on the IR 15-517 Investigation into the Keene incident that led to the staffing policy change, Commission orders establishing the Keene COG mechanism, the Gas Restructuring and EnergyNorth revenue neutral rate redesign dockets (DE 98-124 and DG 00-063, respectively), the New Hampshire Gas Company rate filing in which the current delivery rates were approved by the Commission (DG 09-038), and the docket in which the Liberty acquisition of the Keene facility was approved (DG 14-155).

FINDINGS

Change in Keene Production Facility Staffing Policy

The change in Keene production facility staffing was made unilaterally by the Company in response to an operational incident at the Keene facility that occurred on December 19, 2015. The Commission opened an investigation into the incident, Docket IR 15-517. The Commission Safety Division filed an Investigative Report on April 1, 2016. The Safety Report (pages 15-16) includes the Safety Division's comments on each action and enhancement considered in Liberty's internal report of actions and enhancements to increase the reliability of the Keene plant. Regarding Liberty's decision to staff the facility around the clock, the Safety Division questioned the long term viability of such an approach due to the cost (p. 15, item ii) and commented that the need for such staffing would be diminished if the system can reliably switch to automatic mode and if the restart required for the blowers can be done remotely (p. 16). The plant enhancements

necessary to switch to automatic mode operation and remote-restart capability were completed by the Company by July 2016.

On February 21, 2016 another malfunction occurred with the blowers requiring manual resetting at the Keene facility the system automatically went into Atmospheric Safe Mode without operator intervention, as designed. The malfunction was corrected in less than 10 minutes.

Since the December 19, 2015, incident Liberty has implemented 12 Keene production plant enhancements (DR 2-7).

In weighing the operational risk to the reliable and safe operation of the Keene plant, the Company found the risk of a similar incident to be very small (Company response to DR 2-8): 'While the Company has implemented a broad range of safety and operational enhancements to the system, there remains a residual risk of another incident similar to the incident that occurred on December 19, 2015. We believe this risk to be very small; nonetheless, the Company also believes that it must take whatever steps are reasonably justified to ensure the safety of our customers, employees, and the Keene community.'

Cost of Gas Mechanism and Production Expenses

On November 13, 1974, Gas Service, Inc., Keene Division, filed for a gas price adjustment effective December 1974 through April 1975 to coincide with the commencement of a permanent gas price adjustment clause the Company intended to file to become effective May 1, 1975. The Company explained that the gas supply situation dictated the need for the purchase of propane at substantially higher prices than those used to determine basic rates and that the proposed gas price adjustment provided for the collection of that increased cost. Order 11,659 (issued November 29, 1974) approved the revised price adjustment clause to provide for the fluctuating supply costs.

Order 11,976 (issued August 26, 1975) approved a cost adjustment mechanism for Gas Service, Inc. for seasonal adjustments to provide for the direct credit or charge for decreases or increases in purchase or supplemental gas costs.

Order 20,950 (issued September 7, 1993) approved competition in the New Hampshire natural gas industry, and required the natural gas utilities to file both firm and transportation tariffs. At the time delivery rates included certain costs more appropriately attributable to the gas supply function (i.e., bad debts attributable to gas billed to customers, local production and storage capacity costs and miscellaneous administrative and general costs). Customers were not being given appropriate price signals regarding comparative savings available through the competitive market and delivery rates subsidized the COG rates. Rate redesign was undertaken to ensure that the natural gas utilities would be compensated for delivery service through delivery rates only, rather than being dependent on the sale of gas to recover delivery-related costs.

Order 23,675 (issued April 5, 2001) approved EnergyNorth Natural Gas, Inc.'s revenue neutral rate redesign, which moved indirect gas costs from delivery service rates to the COG mechanism. Indirect gas costs previously included in base rates were also moved to the COG. These indirect gas costs related to the portion of the revenue requirement associated with liquid propane and liquefied natural gas peaking facilities, gas dispatching and acquisition costs, administrative and general/miscellaneous expenses, as well as working capital allowance and bad debt expenses related to purchased gas costs. The approved indirect gas supply service revenue requirement could only change pursuant to a Commission rate order in a general rate case.

Production costs to be recovered through the COG must be determined through a general rate case pursuant to Liberty Tariff Page 19, 16(E)(8): 'Local Production and Storage Capacity Costs: The cost of providing storage service from the Company's storage facilities (i.e., LNG and LPG) as determined in the Company's most recent rate proceeding.' Local production and storage capacity costs required for distribution pressure maintenance purposes are recovered through delivery rates determined through a cost of service study filed in a general rate proceeding.

The Keene Division does not provide natural gas or offer transportation service and production costs are recovered through delivery rates. The delivery rates for Keene are based on NHGC's last general rate case. Order 25,039 (issued October 30, 2009) approved the Settlement Agreement on delivery rates entered into by the Staff, Office of the Consumer Advocate and the NHGC. Attachment A of the Settlement Agreement is the revenue requirement used to set the delivery rates and includes COG revenue of $2,329,996 and purchase gas costs of $2,324,216. The revenue requirement also includes a gas production expense of $110,521. While there is a slight discrepancy of $5,780 between the COG revenue and purchased gas costs, the gas production costs are far in excess of that and are therefore reflected in the approved delivery rates. NHGC did not included production costs in any of its COG filings.

Order 25,736 (issued November 21, 2014) approved Liberty's purchase of NHGC under the terms of a Settlement Agreement entered into by the Staff, Office of the Consumer Advocate, HotZero, LLC and the Company. The Commission analysis states (p. 6):

> "We first find that the petitioners have met the no net harm standard of RSA 369:8. The Settlement Agreement requires EnergyNorth to manage and operate what will become the Keene Division separately, without a change in distribution rates, and without substantial changes in the Keene Division's operation. Thus, the financial concerns raised in Mr. Frink's and Mr. Rubin's pre-filed testimony are premature. They will be addressed, if necessary, in a future rate case as Mr. Rubin recommended in his pre-filed testimony and as Mr. Frink suggested at the hearing. Ex. 3 at 18; Tr. at 16-17. The Settlement Agreement also requires EnergyNorth to maintain the current operations of the Keene Division, satisfying Staff's concerns in the areas of safety highlighted in Mr. Knepper's testimony."

Following the acquisition, Liberty continued to charge Keene Division customers the delivery rates approved for NHGC and COG rates that provided for recovery of the same gas cost components that NHGC included in its COG filings, until Liberty added production costs in its 2016-2017 winter COG filing.

On June 28, 2016, Liberty filed its 2015-2016 winter COG reconciliation (Reconciliation) for the Keene Division. The Commission Audit Staff conducted an audit of the revenues and expenses and on September 8, 2016 issued a **Final Audit Report (Attachment 1)**. The Audit Report (p. 5) noted that the Reconciliation includes a "Produced Gas Cost" of $162,308, which included customer installation labor, gas mixing labor, contracted work, misc. production expenses, insurance, property taxes and interest. Audit Report, Audit Issue #1 (p. 6) states that Audit Staff understands that some of these costs can be included according to Keene's tariff, but that costs that are already included in the Company's base rates may not be recovered again by another mechanism. The Audit Report recommended that Liberty remove $38,119 of the produced gas costs and associated interest as those costs are being recovered through the delivery rate. The Company's response to the Audit Staff recommendation (Audit Report p. 6) was that it did not agree but would make the adjustment for the following reason: "The Company understands that the best time to get a full separation of "Produced Gas Costs" from distribution costs is in a distribution rate proceeding and, therefore, will adjust the COG reconciliation accordingly until such time as the Company's next distribution rate case."

Liberty filed its 2016-2017 Keene Division winter COG, which included a new line item for 'Direct Propane Produced Costs' and a reported prior period under-collection of $394,761 which included production costs of $124,190 that had not been forecast in Liberty's 2015-2016 COG filing. The added production costs account for $0.2449 of the approved Keene winter COG rate of $1.5152 per therm.

At the October 13, 2016 Keene COG hearing, Commissioner Scott questioned Liberty about the production costs (Hearing Transcript pages 20-22):

Q. I'd like to talk a little bit more about the production costs. So, it's -- you said that portion of the increase is related to staffing the facility 24/7, correct?
A. (Simek) Mostly, yes.
Q. So, help me out here. So, that's a fixed cost, isn't it? That that doesn't vary, that staffing cost doesn't vary with the amount of propane that your customers use, does it?
A. (Simek) No.
Q. Okay.
A. (Simek) What happened was, previously, the production costs were not included in the cost of gas. And we went through the tariff and were researching different ways of how we could work with our cost of gas and what should be included and what shouldn't be included. And we found that production costs should be included. So, we went ahead and reached out to the PUC Audit Staff, and pointed out our findings and asked them if they agreed, and they did. So, they approved that we include these costs, it did go through audit. And these are the costs that we are now including. But they weren't added until

after the winter period was already over. So, that's going to be an undercollection for those costs.
Q. So, help me out. Generally speaking, aren't those type of fixed costs more like a distribution charge than a cost of gas variable cost?
A. (DaFonte) Well, typically, there are what we call "indirect costs", and those are includable in the cost of gas. So, the same occurs with EnergyNorth. For example, they have LNG and propane facilities, but there are indirect costs related to those facilities that are collected through the cost of gas. And I think that's how we see these production costs the same way.

STAFF POSITION

Keene Production Costs Should Not Be Recovered Through COG Rates

As correctly pointed out by Commissioner Scott when questioning the Company regarding Keene production costs, those costs are more like a distribution charge than a gas variable cost.

Liberty witness, Mr. Simek, made a statement that previously, production costs were not included but the Company went through the tariff and researched different ways of how it could work with the COG and what should be included, determined that the COG Tariff provided for the recovery of production costs, and reached out to the PUC Audit Staff and the Audit Staff agreed.

Several points raised by Mr. Simek need clarification. First, the Keene COG Tariff does not specify that production costs should be included. The Tariff term being referenced by the Company regards the purpose of the COG and states (Tariff Page 11, 17(a), 'To permit the company to charge its customers with the cost of gas purchased or produced.' All of Keene's gas (propane) is purchased and to the extent the purchased propane is vaporized and mixed with air at the Keene gas plant before being injected into the distribution system, produced. The fixed costs associated with the Keene gas plant, including gas production (labor) costs, have always been included in delivery (base) rates. Second, the Audit Report, Audit Issue #1 (p. 6), regarding the cost of gas produced in the COG reconciliation, "While Audit understands some of these costs can be included according to Keene's current Tariff, page 11, section 17(a)-Cost of Gas, costs that are already included in the company's base rates may not be recovered again by another mechanism." The Audit Report identified four categories of expense that were being recovered through the COG and recommended that Liberty remove the associated costs from the COG reconciliation. Although the Audit Staff did not realize it at the time it issued its Audit Report, the other production cost categories that the Company included in 2015-2016 COG reconciliation are also in base rates. Third, the Company Comments on the Audit Issue #1, state that while certain categories of cost may have been included in distribution rates it is difficult to state the costs are being recovered when Company is operating at a loss, but concludes with, "The Company understands that the best time to get a full separation of "Produced Gas Costs" from distribution costs is in a distribution

rate proceeding and, therefore, will adjust the COG reconciliation accordingly until such time as the Company's next distribution rate case." As the other production cost categories included in the reconciliation are also in delivery rates, those costs should also have been removed from the 2015-2016 winter COG reconciliation and addressed in the Company's next delivery rate case, as should the production costs included in the COG for the 2016-2017 winter period.

Liberty witness, Mr. DaFonte, explained that the Company sees the Keene production costs as similar to the costs of the LNG and propane facilities on its natural gas system that are allowed for recovery through the COG.

Staff disagrees with Mr. DaFonte's characterization of those costs. The LNG and propane facility costs allowed for recovery in the Liberty COG are for a very different reason, directly tied to EnergyNorth's and Northern Utilities's final unbundling of all gas related costs, including supplemental LNG and LPG production and supply related costs from delivery related costs. Not all of the LNG and propane facilities costs for Liberty's natural gas operations are recovered through the COG, costs associated with those facilities are identified and allocated between supply and distribution functions as part of general rates, and the amounts to be recovered through the COG and delivery rates remain fixed until the next general rate case. With the exception of the Laconia region, all of the Liberty LNG and propane plants on the natural gas system are used for supplemental peak-shaving supply, which allows the Company to meet its supply requirements at least cost and the costs associated with those facilities are recovered through the COG. As referenced earlier, in the Laconia region the plants not only operate as a supplemental peak-shaving supply resource in the Company's supply portfolio, the facilities are also available as needed for pressure support of its distribution system during cold, higher demand periods. The allocated portion of those plant costs for pressure support is determined in a general base rate proceeding and recovered through delivery rates. The Keene propane plant is not a peak-shaving facility that supplements pipeline supplies. The Keene plant must be operated to deliver gas to its customers, the plant is an integral component of the Keene Division distribution system and recovered in delivery rates. If Liberty believes it is under earning the Company should file for an increase in delivery rates rather than attempt to recover a perceived shortfall through the COG.

Keene Production Plant Round the Clock Staffing is Unnecessary

Around the clock staffing of the Keene production was initiated by the Company following the December 19, 2015 incident in which the plant blowers that inject air into the system to achieve the required propane-air mix failed. The Company undertook an internal investigation into the event and participated with Staff in a Commission ordered investigation to determine the cause of the failure and evaluate and implement system enhancements to reduce the risk of another failure and limit the damage if a similar event were to occur.

The Company response to **Staff DR 2-8 (Attachment 2)** states: 'We believe this risk to be very small; nonetheless, the Company also believes that it must take whatever steps are reasonably justified to ensure the safety of our customers, employees, and the Keene community. Therefore, the incremental cost to continue 24/7 staffing for the next two to three months is considered to be necessary and justified in order to mitigate the residual safety risks.'

The Company response to **Staff DR 3-2 (Attachment 3)** states: 'The enhancements enacted by the Company since the December 19, 2015, incident have had a significant impact on the safe and reliable operation of the plant, addressing most of the contingency risks associated with supplying a fuel/air mixture to the high pressure (3.5 psi) system. However, levels of residual risk remain associated with continued plant operation. Examples of residual risks include a failure of the backup generator to start following loss of utility power to the plant and a lock-up or a failure of the fuel stepping system to properly respond to propane/air fuel demand. Further, the plant has a unique mix of vintage fuel delivery and control equipment. Despite a very broad and deep research effort, including vendor involvement, the Company cannot be 100 percent certain that all possible failure modes have been identified and fully mitigated.'

Staff does not know the cost of the enhancements the Company has made to address the risk, or when and if the Company will be seeking recovery of the costs of those enhancements. Liberty has estimated the incremental cost of the round the clock staffing for the 2015-2016 and 2016-2107 winter months to be $186,627 and is currently recovering those costs through its 2016-2017 COG rates. There are approximately 1,300 customers on the Keene system, the incremental cost of the round the clock staffing adds $144 in winter costs on a per customer basis. Liberty's Keene customers already pay very high delivery and supply costs compared what the other regulated NH gas utility customers must pay. The added production costs to the COG rate represent a very significant expense to address what the Company has identified as a very small risk. And as Company notes in its response regarding possible failure modes, there is never 100% certainty regarding system operations.

In light of the many and significant enhancements Liberty has made to address the risk of similar event, the incremental cost of manning the plant are not reasonable or justified. Furthermore, personnel costs should not be allowed for recovery through COG rates and the matter should be addressed in a general rate case if Liberty wishes to seek recovery.

STAFF RECOMMENDATIONS

Liberty should remove $124,190 of production cost expense from its December Projected Over- and Under-collection Report and adjust the Keene COG rates effective January 1, 2017 accordingly. A hearing to determine what amount, if any, of Keene production costs should be allowed for recovery through the COG should be conducted in January 2017. The procedural schedule should provide for Liberty discovery on Staff's recommendation and subsequent Staff responses, followed by Liberty rebuttal testimony

or brief and a hearing on the merits, with a goal of issuing an order that will allow for Liberty to adjust the Keene COG rates accordingly, effective February 1, 2017.

Removing $124,190 of production expenses from the over- and under-collection report (one half of the production expenses included in Liberty's 2016-2017 Keene winter COG filing) will limit the rate impact for January rates and the rate impact once a final decision is rendered.

IR 15-517 NHPUC SAFETY DIVISION
INVESTIGATION REPORT
March 31, 2016
Of
DECEMBER 19, 2015 OPERATIONAL EVENT
LIBERTY UTILITIES - KEENE, NH DIVISION

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Cover photos from Keene Sentinel and Union Leader News Articles Dec 19 -21, 2015 and PUC photo

IR 15-517 NHPUC SAFETY DIVISION INVESTIGATION REPORT DECEMBER 19, 2015 OPERATIONAL INCIDENT LIBERTY UTILITIES KEENE DIVISION

Purpose

On December 21, 2015 Governor Hassan requested the New Hampshire Public Utilities Commission undertake a comprehensive investigation of an operational incident that occurred on December 19, 2015 involving the EnergyNorth Natural Gas Corp. d/b/a Liberty Utilities ("Liberty") gas distribution systems in Keene. That same day the New Hampshire Public Utilities Commission (NHPUC) issued an Order of Notice opening docket IR 15-517 for an investigation regarding the equipment failure at Liberty's supply plant for the Keene underground gas pipeline distribution systems. As required by the Order of Notice the NHPUC Safety Division conducted an investigation into the December 19, 2015 operational incident.[1] The Commission required the Safety Division to file a report with three objectives:

- to examine this operational event carefully,
- to review compliance with applicable state and federal regulations, and
- to recommend steps to prevent such incidents in the future

In addition to the requirements of the Commission, this report will also serve as an incident report fulfilling requirements regarding failure investigations contained within the certification granted to the NHPUC by the federal agency charged with pipeline safety oversight, the Pipeline and Hazardous Material Safety Administration.[2]

The Safety Division's investigation consisted of physically responding to the emergency response field location and providing support staffing at the State Emergency Operations Center on the date of the incident, conducting a subsequent meeting at the Keene plant to review systems, initiating discovery questions and review of Liberty responses, completing a failure investigation inspection report and researching applicable tariffs, safety regulations of hazardous material classifications and providing a preliminary assessment to the Commission at a public hearing on January 19, 2016.

Lastly, during the course of this investigation a separate event occurred on February 21, 2016, regarding abnormal levels of propane/air mixture entering the Keene system. While not explicitly required by the Commission and not considered an "incident" under state rules or federal regulations, the Safety Division also included an addendum that describes the events of that day.

System Background Description

Liberty has two gas distribution systems in the inner city of Keene. The first system is comprised of 26.8 miles of main with 818 services that operates at 13.5 inches water column (w.c.)[3] and supplies approximately 1,122 customers. The system has a maximum operating pressure (MAOP) of 13.8 in. w.c. The second system is comprised of 3.3 miles of main with 56 services that operates at approximately 3.5 psig (5 psig MAOP) and mainly feeds the Monadnock Shopping Plaza area and 85 commercial and 25 residential customers. The propane/air mixture is supplied for both systems from the Propane/Air Plant located at 207 Emerald St, Keene

[1] The term incident here is consistent with the definition of 49 CFR Part 191.3 subsection 3 of definition of "incident" as *"An event that is significant in the judgment of the operator, even though no release of gas occurred and this was not an LNG facility."*
[2] PHMSA is one of ten agencies organized under the US Department of Transportation. PHMSA consists of two separate offices: the Office of Pipeline Safety and the Office of Hazardous Materials. The NHPUC has an annual certification on file with PHMSA's Office of Pipeline Safety.
[3] 13.5 inches w.c. is approximately equivalent to 0.5 pounds per square inch gauge (psig).

which is comprised of a 60,000 gallon and a 30,000 gallon propane storage container, vaporizers, blowers, and mixing equipment. Appendix 1-A shows an overview of Liberty's Keene distribution systems.

Incident Overview

Liberty supplies gas service to the City of Keene through distribution systems using a propane/air mixture. Liberty indicated that on Saturday, December 19, 2015, the compressed air supply[4] to the system was electrically interrupted by three brief momentary (less than a second) voltage fluctuations. The voltage fluctuations caused the blower equipment to shut down which significantly and adversely affected the normal propane/ air mixing process used for systems supplies. This resulted in higher British thermal unit (Btu) gas mixture being directed into the distribution systems and significantly contributed to incomplete fuel combustion at some customer appliances. In Keene, customer appliances and other gas burning equipment are tuned to operate using a specific level of Btu supplied gas. The incomplete fuel combustion resulted in the generation of carbon monoxide gas (CO) at some customer locations. CO can form at appliances located in residences and businesses downstream of the utility owned distribution systems, after customer metering, if incomplete combustion of the propane/air mixture occurs. As part of the emergency response to the situation, Liberty and local emergency responders shut off 137 customers. Throughout the day and evening Liberty systematically purged the distribution systems to remove the higher than normal Btu gas mixture and restore the systems to normal operations. Liberty indicated one customer required medical attention suffering from symptoms of CO exposure; the customer was sent to Cheshire Medical Center but did not require overnight hospitalization.

Emergency Response by local first responders was substantial and swift. Reports indicated that 64 fire departments from three states responded to Keene's call for mutual assistance for fire and EMS equipment with another dozen agencies between local, regional, state and private companies being involved. More than 100 fire and police calls were made to the City. The City of Keene opened a local emergency shelter although it went unused. The fire chief notified the State Emergency Operation Center in case more support was needed. The fire chief classified the action as a Level 2 mass casualty event. Liberty relied on its own resources[5] to respond to the emergency and did not require mutual aid assistance of other gas providers.

Review of Emergency Plan

To assess Liberty's response to the event Staff reviewed the facility Emergency Plan which was last updated (Version 11) on December 30, 2013. The Liberty Keene System Settlement Agreement approved in Order 25,736[6] on November 21, 2014, referenced the same version of the Emergency Plan.

Liberty's Emergency Plan has specific provisions for responding to malfunctions of the Propane/Air Plant as the proper gas/air mixture is critical to maintaining gas quality consistent with the character of service and standard heat content value (740 Btus) applicable for the Keene customer base. Liberty's Emergency Plan classifies emergencies into three main categories:

Class A Emergency – Least Severe:

- Outages involving less than 25 customers (civil, municipal, or news media not involved).
- Significant unintentional escape of gas with no report of ignition, explosion, evacuation, or serious damage.
- Abnormal Btu mixtures due to Plant Facility Equipment failure (such as Blowers).

[4] Compressed air supply and blower equipment are terms used interchangeably throughout this report. The compressed air supply for the gas mixture is located at Liberty's operations plant on 207 Emerald St, Keene.
[5] Three local heating contractors provided and supplemented relight assistance to Liberty during the customer restoration process.
[6] See NHPUC Docket DG 14-155. The transfer of the Keene propane/air systems from Iberdrola USA to Liberty was completed in January 2015

Class B Emergency – Moderate:

- Interruptions of gas supply affecting service to 25 to 100 customers, requires notification of "Stand-by" status for Incident Command System (**Appendix VI**) or other assistance.
- Explosions or fires where gas may be involved.
- Situations which require taking a main supply line out of service.
- An unintentional escape of gas, which due to existing conditions, would require a more extensive plan other than that designed to deal with a Class A emergency.
- Situations where damage to Company or private property is anticipated to exceed $5,000.

Class C Emergency – Most Severe

- Interruptions of gas supply affecting service to over 100 customers, requires notification of "Mobilization" status for Incident Command System (**Appendix VI**) or other assistance.
- Situations resulting in the need to conserve gas in the system in order to prevent or delay a major interruption. Such situations could result in the implementation of the Company Load Curtailment Plan or the shutting off of an isolation area.
- Civil disorders which could cause damage to company facilities or result in a situation involving gas which would be hazardous to the public.
- Natural disasters such as floods, hurricanes, earthquakes, which could result in damages to facilities or create an unsafe situation necessitating an emergency appraisal.

Evaluation of Emergency Response in Accordance with Liberty's Emergency Plan

A. The Safety Division reviewed the actions of Liberty to see if they were consistent with the Emergency Plan and if they were effective. The Safety Division conducted a review of whether Puc and Federal notification and reporting requirements were met.

Appendix 1-D of this report captures many of the key milestones and details of the emergency response actions taken and provides a timeline of events that occurred on December 19, 2015. A brief description of the event response actions taken in regard to the Liberty Emergency Plan requirements is listed below:

- The December 19, 2015 event met the definition of an "emergency" defined in Section 2.0 (1)(d) of Liberty's Emergency Plan because abnormal propane/air mixtures entered the distribution systems.
- Although systems pressures went from typical of 3.5 psig (100 in w.c.) to as low as 1.7 psig (47 in w.c.) during the event, this was not the reason to trigger the threshold of being an "emergency" as defined in Section 2.0 (1)(a) of Liberty's Emergency Plan.
- An "emergency" was declared by the designated company official – [R MacDonald] consistent with Section 2.1 requirements. Section 2.1 only allows authorized representatives to declare an emergency
- The event was eventually classified as a "Class C" emergency by Liberty because the aggregated interruptions of gas supply affected service to over 100 customers throughout the City and resulted in notification of "Mobilization" status for the Incident Command System (Appendix VI) and other assistance. This is in accordance with Section 2.2 of Liberty's Emergency Plan.
- Section 6.3 of Liberty's Emergency Plan outlines Abnormal Btu mixtures as below 650 or above 850. This event exceeded 2,000 Btus for more than 40 minutes and thus triggered the "Bad Gas" Level 3 Protocol contained in Appendix VII of Liberty's Emergency Plan.
- This event was not an "uncontrolled release" as defined in Liberty's Emergency Plan Appendix VII.
- Although Section 6.3 is the qualifying categorization of the Dec 19, 2015 operation event, a review of Section 6.4 subsection 7 as well as Appendix VI incorrectly required calls to NYSEG which now should be the Liberty Londonderry Dispatch or Control Center.
- Liberty reported the incident to the PUC Safety Division consistent with Section 7 requirements. This notification was by telephone to PUC Inspector D Burnell at 10:32 am. Because Liberty made this past one hour from the time of discovery, the notification was not in accordance with PUC requirements of Puc 504.05(c).

- Liberty subsequently notified the USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA). Although this event did not involve the 'release' of gas in the sense that the federal rules are often interpreted, the rules require a PHMSA report when the event "is significant in the judgment of the operator", even though it might not meet the criteria of 49 CFR §191.3(3). Liberty considered the event "significant" which is a determining factor of whether the event is an "incident" as defined by Puc 502.07 and PHMSA per 49 CFR §191.3

The Safety Division's review of the actions taken by Liberty as outlined in the Emergency Plan revealed that they were for the most part completed effectively. An "effective" and "prompt" response is critical component to reacting to notifications that are considered emergencies. A more detailed review of the plan is provided Appendix 3 of this report.

B. Emergency Response timeline from initial alarm to final demobilization and return to normal status.

The Emergency response timeline was divided into three activity groupings:

1. Initial malfunction and restoration of plant systems to normal operation.
2. Purging of high Btu gas from the delivery system, and
3. Restoration of gas service to impacted customers following precautionary shut-offs by company and emergency response personnel.

B1. Plant Restoration Response:

The outside temperature of Keene on the morning of Saturday December 19 was approximately 30 degrees Fahrenheit with a light wind of 10 mph. High temperatures for the day reached 36 degrees Fahrenheit. Liberty received the initial indication at 8:51 am on Saturday Dec 19, 2015, that there were 2 alarms that were activated at the Plant. Typically for most hours on Saturdays the Plant is unattended but on December 19, an on-call Meter Service Technician was performing standard maintenance activities earlier that morning. He completed his routine work activities and left the Plant to return to his residence. En route to his home, the Meter Technician received a call from Liberty's Londonderry Control Center that 2 alarms had been activated. Alarm 1 was an indication of distribution system low pressure (propane/air mixture) and Alarm 2 was an indication of inadequate process air being supplied when low pressure from the blowers was sensed.

Appendix 1-B provides a full detail of the 68 minute time line of actions taken at the Plant for correcting the supply of high Btu propane/air gas mixture and provides a more detailed time line of the emergency response actions of personnel at the Plant.

A Safety Division review revealed the following:

- The plant was unmanned at the time the first of 2 alarms were simultaneously activated.
- The Londonderry Control Center monitors 8 status points of the Propane Air Plant: 1) fire alarm activation, 2) gas detection activation, 3) generator fault, 4) vapor pressure, 5) steam pressure at the boilers, 6) gas pressure, 7) propane/air Btus and 8) blower system fault. These do not have alarms associated with them just status points for the controller to see.
- There are 4 alarms that are remotely monitored at the Londonderry Control Center:
  High Pressure Propane/Air System,
  Low Pressure Propane/Air System,
  Process Air,
  Btu levels of Propane/Air.

- Each of the 4 alarms have High High, High, Low, and Low Low Alarm levels that are monitored at the Londonderry Control Center.

- Alarm #1 was for Low Pressure of the Distribution system and Alarm #2 was for low processed air volumes which are sensed by low air pressure recordings.
- Alarms #1 and #2 were triggered at approximately 8:51 am.
- The Alarm measuring high or low Btus of the propane/air mixture did not activate until 39 minutes after Alarm#1 and Alarm #2 were activated. This is a function of the location of the collection point and the distance to the calorimeter as well as customer demands upon the system.
- Liberty's Internal Report of the Keene Incident adequately describes the atmospheric mode and blower modes operation and response within Section 3 KEENE GAS DELIVERY SYSTEM AND GAS PRODUCTION PLANT and Section 4 CHRONOLOGY of their report. Liberty's full report is attached in Appendix 2.
- Liberty's report indicated the plant was restored to normal operations within a 68 minute period and the report describes in detail the actions taken.

Staff considered Liberty's response including time frames and actions taken to be adequate in regards to plant restoration. Staff noted that the emergency response to change the plant from an unmanned operation to a manned operation was 12 minutes. This was a result of the on call meter technician being in the area after performing some routine maintenance at the plant. This could have been longer if the technician had been closer to home at the time of notification from the Londonderry Control/Dispatch Center. 100 percent propane was injected into the system for approximately 28 minutes. This included16 minutes that elapsed during the changing of the system into "atmospheric mode." "Atmospheric mode" is the condition where limited amounts of air are able to be mixed with propane and can supply the system for large portions of the year. While "atmospheric mode" could not have been sustained throughout the winter months, it can keep the system stabilized until full "blower mode" is reached. On December 19, it took an additional 29 minutes to reach "blower mode" where the air compressors were restored. During these 29 minutes the plant was in "atmospheric mode." After the blowers were started, the system Plant output was deemed to be back to normal Btu levels approximately 11 minutes later. A key factor in plant restoration is the blowers require a manual (on site) restart as presently configured. Staff also noted that the Btu alarm level at the mixing plant was not one of the initial alarms to get triggered – it took approximately 40 minutes for the Btu alarm level to become activated.

High High alarms were set at 755 Btus,
High alarms were set at 750 Btus
Low alarms were set at 730 Btus and
Low Low alarms were set at 725 Btus.

These translate into +/- 10 Btus and +/- 15 Btus which is appropriately below the "Bad Gas" thresholds listed in Liberty's Emergency Plan.

B2. Purging of high Btu gas from the distribution system

Following the restoration of plant output to normal Btu levels, Liberty accompanied by fire department personnel purged the rich fuel mixture from the system from 10 system locations. The gas was purged from the distribution system at strategic locations until the monitored percent gas levels were generally less than 50% gas in air. Liberty indicated the purging of approximately 6,090 cubic feet of propane air was completed in approximately 10 hours[7]. The system purge locations are shown in Appendix 1-C of this report. The Safety Division noted that 90% Gas in Air recordings were initially found which equates to approximately a 2,070 Btu level. The purging was ceased on the 2.5 psig system after levels

[7] In aggregate the total hours of purging amounted to 14.5 hours but multiple locations and overlap are reasons for the discrepancy.

reached 45% to 50% Gas in Air at the purge points after approximately 1.5 hrs. After purging for approximately three hours Gas in Air recordings at other locations indicated approximately 70%. This translates to approximately 1,600 Btus. This was an indicator that the "Bad Gas" was still in the system but was in the process of becoming less bad. At 40% Gas in Air recordings the Btus are lowered to approximately 920 Btus which is nearing the normal range of 740 Btus. Staff notes "Bad Gas" per Liberty's Emergency Manual is above 850 Btus and below 700 Btus.

Liberty's purging operation is something that has been done previously and works well to go to known locations that have the largest demand and purge high Btu gas mixtures at those locations using a hose and purging at the riser but allowing the gas to exit away from buildings. This controlled purge allows for the quickest way to get the system back to normal. The optimum response to this situation is the opposite of controlling leaking gas. Corralling and channeling the abnormal Btu gas mixture has the best probability of lessening the impacts over the whole system. This process became more complicated when the distribution system flows were altered from typical patterns by shutting off gas services at locations where the highest flow was occurring. This causes the duration of the purging actions to be longer and less efficient, actually hampering the emergency response. High levels of situational awareness necessary to accomplish lowering the Btus in the shortest time frame requires continuous feedback of CO readings, Gas in Air Readings, and visually monitoring appliance burning characteristics. The Safety Division noted that Liberty ensured all high levels of Btu gas were purged by going to the endpoint locations of the distribution systems and in effect circled the outer perimeter of the distribution piping with the gas plant being at the epicenter. System pressures were recorded as follows:

Church St – LP System – dropped from 8.9 in w.c. to 6 in w.c.
Monadnock- HP System – dropped from 3.3 psig to 1.5 psig.

These levels confirm that the purging operation was performed in a manner that did not jeopardize the loss of the system.

B3. Customer turn-ons following precautionary shut-offs by company and emergency response personnel

The fire departments and the Company visited each customer to check building CO levels and to assess customer safety. Following the system purge Liberty and the fire department personnel returned to the customer locations that had been disconnected and restored gas service. Liberty indicated that by about 1:00 a.m. on Sunday, December 20, 2015, all services had been restored and all 1250 customers had been checked for CO levels. At 1:00 am not all meters had been turned-back on. That operation continued for another 12 hours and required coordination with customers to relight appliances while meters were being returned to the on position.

C. Emergency Personnel Used:

Liberty's response included about 80 employees, including the following personnel. Roughly 35 Liberty employees worked in Keene, including the Keene-based employees described above, service crews from throughout the Company assisted the fire departments with the purging and restoration of service, provided assistance to emergency personnel, staffed the phones in Keene and provided other logistical support. An additional 30 customer service representatives were in the Londonderry office receiving inbound calls that were transferred from Keene, and making outbound calls to all Keene customers. Liberty called every customer in Keene on December 19. Liberty management and engineering employees in Londonderry and at Liberty's corporate headquarters assisted to coordinate and supervise the response. The initial emergency response was completed by 1:00 a.m. on Sunday, December 20. Meter turn-ons for customers continued until 1:00 p.m. on Sunday, December 20, at which time Liberty Utilities' Keene Division returned to normal operations mode.

The overall response timeline is illustrated in Appendix 1-D and displays times when employees arrived in phases.

The Safety Division's field observations from the onsite local emergency location used by Liberty was that there was complimentary and beneficial coordination and exchange occurring between the local Keene office field personnel most familiar with the distribution system and Liberty support provided from outside the Keene division to coordinate an integrated emergency response. The response would have been much different if the former New Hampshire Gas field personnel were on their own (prior to the acquisition). Liberty was able to bring ample resources and previous emergency response experience that only a larger utility operation could accomplish. This included providing extra service crews, incident command, familiarity with company procedures and resources available, call center operations, responding to media inquiries, external communications, regulatory requirements and creating an investigation after action plan.

Compliance with Existing State and Federal Regulations

Staff reviewed Keene system operations and the incident response in regard to compliance with NH Puc 500 rules, 49 CFR Part 191 and Part 192 code requirements. A summary of applicable rules and code sections follows.

NH Puc 500 Rule Requirements:

The Puc has several rules regarding the Quality of Service, Equipment and Facilities, Safety Accident and Leakage Requirements as well as Enforcement Procedures for Gas Pipeline Utilities that are applicable to emergencies and interruptions of gas service.

1. Puc 504.01 Heating Value Requirements (a) – (h) are applicable. This includes normal Btu fluctuations as well as abnormal fluctuations.
2. Puc 504.04 Interruptions of Service (a) – (h) are applicable. This includes planned interruptions as well as those that are unexpected. Puc 504.4 (i) is not applicable.
3. Puc 504.05 Emergency Notification (a) – (d) are applicable.
4. Puc 504.06 Incident Reporting (a) – (c) are applicable.
5. Puc 504.07 Emergency Response (a) and (b) are applicable
6. Puc 506.02 Construction, Operations and Maintenance (u) is applicable.
7. Puc 508.03 Accident (a) and ((d) are applicable. Puc 508.03 (b) and (c) are not applicable.
8. Puc 511.01 Jurisdiction Scope and Application of Authority (b) is applicable.
9. Puc 511.02 Intervals of Inspection (b) and (c) are applicable.
10. Puc 511.03 Inspection of Utilities (a) and (b) (10) are applicable.

Federal Regulations:

The federal government has several regulations revolving around notification and reporting, operations manual, emergency plans, failure investigations, purging of pipelines, qualification of personnel and control rooms involved in emergencies.

1. 49 CFR Part §191.3 Definition of "Incident".
2. 49 CFR Part §191.5 Immediate notice of certain incidents. (a) and (b) are applicable.
3. 49 CFR Part §191.9 Distribution system: Incident report. (a) and (b) are applicable.
4. 49 CFR Part §192.605 Procedural manual for operations, maintenance, and emergencies. (a) and (e) are applicable.
5. 49 CFR Part §192.615 Emergency plans. (a) – (c) are applicable.
6. 49 CFR Part §192.617 Investigation of failures.
7. 49 CFR Part §192.629 Purging of pipelines (a) is applicable.
8. 49 CFR Part §192.631 Control room management. (a) (2) is applicable.
9. 49 CFR Part §192.805 Qualification program. (d) is applicable.

An assessment of the system and incident response compliance with applicable Puc 500 rules, 49 CFR Part 191 and Part 192 code sections are summarized in the tables attached in Appendix 3. Overall this represents 31 applicable state rules and 14 applicable federal regulations. Liberty met or exceeded 27 of 31 associated state rules. Based on Staff review of the information presented by Liberty it appears that the following Puc 500 rule requirements did not appear to be fully met by Liberty at the time of the incident:

- Puc 504.01 (a) Heating Value Requirements
- Puc 504.01 (d) Heating Value Requirements
- Puc 504.05 (c) Emergency Notification
- Puc 504.07 (b) Emergency Response Reporting

Liberty met or exceeded 10 of the 14 federal regulations regarding emergency response, emergency planning, notification, and written reporting. Those that were not met include:

- Federal regulations 49 CFR Part §192.605 (a) requires each operator of a gas pipeline to review their Emergency Plan at least once each calendar year at intervals not exceeding 15 months. Liberty either did not review the Emergency Plan at least once each calendar year or if a review was done did not document such a review. The Emergency Plan needs to be updated to reflect current system ownership and emergency contact information. Appendices II, III, V, VI, VIII of the Emergency Plan all contain out of date references.

- Federal regulations 49 CFR Part §192.615 (a) (11) requires actions required to be taken during an emergency by a controller in a control room in accordance with 49 CFR Part §192.631 (a) (2) be listed as part of the plan. Because the gas controller located in the Liberty control room in Londonderry was incorporated as part of the emergency response function once Liberty completed the acquisition in January 2015, and because the method in which plant alarm levels were being exceeded was incorporated into the internal notification process, Liberty should update the Emergency Plan to reflect this change. This would fulfill both regulations.

- Not associated with Emergency functions – Staff noted the Surveillance methods for Operations and Maintenance appears to be hardly mentioned within the Operations and Maintenance Plan. Incident investigations for plant malfunctions need to be expanded upon. 49 CFR Part §192.605 (e).

Previous Accidents or Emergencies

Liberty indicated the blower system went into fault mode three times (March 22, 2015, July 2, 2014, and March 29, 2014) in the twenty four months prior to December 19, 2015. On two occasions, March 2015 and March 2014, the causes of the blower outages were related to other process problems with the plant. These included initial alarms for low output pressures in which the blower controller, the Programmable Logic Controller, realized there was too large of a variance in its parameters, therefore causing a programmed system shutdown.

The July 2014 occasion was caused by a severe lightning storm. While there was no recorded power failure, the Adjustable Speed Drives of the blowers went into lockout most likely due to a voltage spike or drop in the power supply. All three events resulted in an improper mix of the propane vapor and air due to the loss of the forced air supply. On all three occasions, the system successfully transitioned to atmospheric safe mode which provided time for personnel to restore the systems to normal operations with a relatively small amount of the rich mixture entering the system. Staff also noted those events occurred during lower flow conditions and less system demand than what was experienced by the December 19, 2015 event.

February 21, 2016 Similar Abnormal Btu Event

An additional operational event occurred on February 21, 2016 that involved the gas plant malfunctioning. The February 21, 2016 operational event is summarized in the Addendum to this report.

Contributing Factors and Root Cause

Liberty identified and the Safety Division agrees the following factors contributed to the event:

- Dependence on the physical response of personnel to the plant to initiate diagnosis and action;
- Dependence on a limited number of individuals with sufficient knowledge to diagnose system conditions and to safely operate the plant;
- A complex interface of vintage control and alarm systems; and
- A manual series of control system interface steps, in different plant locations, to restore the system to normal operation.

The Safety also identified the following contributing factors:

- The Eversource substation proximity to the Keene plant provides a direct path for momentary fluctuations (less than a second) to have a direct impact on Keene operations. The substation served through a common bus bar as a direct path of voltage disturbances occurring on a separate circuit affecting electrical users of a second circuit. In this case it was the 12.5 kv W1 circuit and 12.5 kv W185 circuits of Eversource.
- There was no written inspection procedure in place of inspecting the panel fuses to discover if a component was inoperable and affect plant gas air mixtures.
- As currently configured, the blower reset requires a manual intervention yet the plant is typically unmanned during non-business hours (nights, holidays and weekends).
- The equipment uses simplistic logic to determine the resulting condition that allows for unique conditions to be only uniquely resolved. Its lack of sophistication could not differentiate signals to the degree required to correctly apply the appropriate resultant actions.
- The Programmable Logic Controller did not have a battery interface the allowed for continuous power to the PLC.

The Safety Division agrees with Liberty there were two root causes of the December 19th event. The first cause was the series of voltage drops on the Eversource supply circuit outside the Keene facility, which caused the blowers to shut down. The second root cause was the failure of an open fuse in the alarm board circuitry, which prevented the appropriate signal from reaching the RTU based control system, resulting in the system RTU control remaining in blower mode instead of switching to atmospheric mode. This subsequently led to the applied preprogrammed logic not temporarily switching to atmospheric air supply mode which would have lessened the amount of Btus entering the system. This cascaded into the inability of distribution system sensors to recognize that the blowers had shut down, and wrongly interpreting the lower distribution systems pressures as an indicator of system demand.

Discussion of Classification of Propane in Hazardous Material Regulatory Framework

This section of the report discusses Keene Propane/Air Mixture and how it fits into Federal and State Classifications, and regulatory treatment.

RSA 154:8-a section II-a allows for the reimbursement of certain expenses for responses related to hazardous material incidents. Hazardous materials within RSA 154:8-a are further defined as in RSA 147-B:2, VIII.

RSA 147-B:2, VIII states "Hazardous materials" means those substances or materials in such quantity and form which may pose an unreasonable risk to health and safety or property *when transported in commerce, by all modes which may include,* but are not limited to, explosives, radioactive materials, etiologic agents, *flammable liquids or solids,* combustible liquids or solids, poisons, oxidizing or corrosive materials, and *compressed gases which are listed by the Materials Transportation Bureau* of the United States Department of Transportation in Title 49 of the Code of Federal Regulations, as amended. Emphasis added.

The Materials Transportation Bureau within the US Department of Transportation was formerly a subdivision of the Research and Special Programs Administration. The US DOT reorganized its divisional organizational structure under the Norman Y. Mineta Research and Special Programs Improvement Act of 2004 into the current Pipeline and Hazardous Materials Safety Administration. The former Materials Transportation Bureau was absorbed into PHMSA and PHMSA is now organized into two separate offices:

- The Office of Pipeline Safety and
- The Office of Hazardous Materials Safety.

Hazardous Materials are regulated under Code of Federal Regulations Part 172 through the Office of Hazardous Materials Safety while Pipeline Safety is regulated under Code of Federal Regulations Parts 190, 191, 192, 193, 194, 195, 196, 198 and 199 through the Office of Pipeline Safety.

The propane air mixture for Keene is regulated under CFR Part 192 as it is a gaseous vapor contained in a pipeline. The function and mode of transportation is significant in how it is treated within regulatory framework. Gaseous vapor within a pipeline is not regulated by CFR Part 172.

The United States Department of Transportation (DOT) through PHMSA regulates hazmat transportation within the territory of the US. It lists nine classes of hazardous materials that it regulates.

Explosives	Class 1
Gases	Class 2
Flammable Liquids	Class 3
Flammable Solids	Class 4
Toxic and Infectious Substances	Class 5
Oxidizing Agents and Peroxides	Class 6
Radioactive Substances	Class 7
Corrosive Substances	Class 8
Miscellaneous	Class 9

These correspond well with RSA 147-B:2, VIII definition:

"Hazardous materials" means those substances or materials in such quantity and form which may pose an unreasonable risk to health and safety or property *when transported in commerce, by all modes which may include*, but are not limited to, explosives **(Class 1)**, radioactive materials **(Class 7)** , etiologic agents **(Class 2 and Class 6)**, *flammable liquids **(Class 3)** or solids **(Class 4)*** combustible liquids **(Class 4)** or solids **(Class 4)**, poisons **(Class 6)** , oxidizing **(Class 6)** or corrosive materials **(Class 8)** , and *compressed gases **(Class 2)** which are listed by the Materials Transportation Bureau* of the United States Department of Transportation in Title 49 of the Code of Federal Regulations, as amended. Emphasis added.

The Safety Division concludes that RSA 147-B:2 VIII definition of hazardous material does not include the vaporized propane contained within the gas distribution pipeline systems of Keene. This is further supported by RSA 21-P:12 which excludes propane gas lines regulated by the Public Utilities Commission from the State Fire Marshal's office duties of assisting local incident commanders with command, logistics, and resources, coordinating the training and procedures of the state's regional hazardous materials response teams, overseeing the preparedness of the hazardous materials response teams and assisting local communities in their efforts to obtain reimbursement for emergency responses pursuant to RSA 154:8-a, II-a.

Appendix 1-G provides a further explanation on how hazardous materials are classified and the applicable RSAs of New Hampshire.

In Liberty's report Section 4 Chronology Incident Costs (as of March 25, 2016) are listed as:
Internal Costs – Liberty and Keene Personnel $ 77,762
External Costs – City of Keene $ 47,096
External Costs – Surrounding cities and towns $ 103,861

Thus total costs expended are $228,719 as of March 25, 2016 for this high Btu "incident." The Safety Division has no knowledge if Liberty expects to recover costs from the Keene customers for such an extraordinary response and if it does what methods are proposed. These response expenditures would raise customer bills an average of $183 per customer meter not inclusive of any carrying charges. This will be left for the Gas Division and Audit Divisions of the PUC to examine. The basis of Keene's and other surrounding cities and towns for invoicing Liberty for personnel costs and other expenditures rests with the ability to invoke RSA 154:8-a section II and classifying the abnormal Btu event a hazardous material incident.

Staff Recommendations and Review of Liberty Post Incident Actions

The Commission requested The Safety Division recommend steps to prevent such incidents in the future. While the Safety Division cannot make recommendations that guarantee abnormal Btu gas never is injected into the Keene system, the Safety Division can recommend actions that will minimize the likelihood of that occurrence.

The Safety Division studied Liberty's internal report found in Appendix 2 of actions and enhancements that will increase the reliability of the Keene propane-air plant. Liberty provided a list of eight actions implemented immediately post incident. They are:

Liberty Identification in Liberty Report	Liberty Actions Implemented	Safety Division Comments
i	Place the Keene Production Plant under the direction of the Director of Production, Dispatch, and Control	Agree this will help as this could enhance the coordination of technical support and emergency response personnel from corporate offices in Londonderry and extend/broaden knowledge of plant operations. It is uncertain how additional resources from Londonderry will result in additional expenses applied for the Keene system as this may impact Settlement Agreement restrictions.
ii	Staff the Keene Production Plant 24/7, with experienced Keene-based personnel available for supplemental response	Safety Div has been informed that the system is being staffed 24/7 and two 12 hour day shifts are currently being covered each week by non-Keene based personnel. Additional information would be required from Liberty to assess the training and experience of the additional personnel required. It is questionable this action being a long term viable solution in terms of cost.
iii	Provide additional training to those staffing the plant on plant operations and contingency response.	Agree this makes sense moving forward. Safety Div has not received documentation in regard to this additional training which is a necessary OQ requirement for implementing action ii above.
iv	Re-wire the signal circuits to alarm the condition for an open fuse element, program a spare RTU and install a new server and a back-up server. Power the PLC from the 24VDC battery panel allowing for continuous power to the PLC in the event of a supply outage or disturbance.	Agree this should enhance the recognition of system alarms and provide system server reliability and redundancy.
v	Replace one of the output plug valves with a full port valve, allowing for all of the air/gas mixture to pass through the surge tank first before injection into the delivery system.	This should provide more consistent control of the output Btu mixture.
vi	Update the Keene Emergency Response Plan and issue to stakeholders.	Staff agrees with this action as it is a code requirement to keep this up to date but Safety has not received a copy of the updated Keene Emergency Plan.
vii	Transition the Keene system mapping from a paper based system to Energy North's GIS ArcFM system including scanned records (underway, landbase and records scanning completed, conversion to ArcFM by 3rd quarter 2016.	While this effort is required, this really affects all operations and engineering of the Keene system and not plant operations. This can aid in emergency response if electronic systems are available to response personnel. It is uncertain how additional resources from Londonderry will result in additional expenses applied for the Keene system as this may impact Settlement Agreement restrictions.
viii	Extend control wiring from the plant control room to the blower room, allowing for control of the stepping of gas jets from the same location as control of the blower system.	Safety Division agrees it is an inefficient use of time to run back and forth between the two locations information from both systems is necessary for proper control of system.

Of those listed above the Safety Division believes items iv and vii will have the most immediate impact as the staffing option (ii) can be diminished if system can reliably switch to automatic mode reliably and if the manual restart required for the blowers can be done remotely.

Liberty considered and discarded the following options as possible enhancements as either being too costly or too complex to implement. It is important to understand all options that were considered to understand better that longer term options that Liberty is pursuing. The following options were considered but are not being pursued:

1. Transfer to generator supply upon detection of sag in supply voltage by switching over to generators for voltage sags. This was discarded because of simpler fix was suggested and is costly.
2. Transfer to generator supply upon detection of sag in supply voltage by switching over to generators for voltage sags and include the smaller back up blowers rather than main blowers. This is similar to 1 above but includes utilizing back up blowers.
3. Install an air compressor and surge tank to aid system when blower shuts down. This will be costly and includes high cost for construction that may not ultimately be kept.
4. Install Uninterruptible Power Supply (UPS) on Adjustable Speed Drive (ASD) controls to eliminate impacts of incoming voltage sags on controls for the ASD. This is seen as too costly between $50K and $500K and can be accomplished with having a delay for the controls at a fraction of the cost.
5. Install UPS on Adjustable Speed Drive (ASD) controls to eliminate impacts of incoming voltage sags on the blower themselves for the ASD. This was estimated to be greater than $500K and discarded.
6. Install a Propane/Air Mix Holder to feed the 3.5 psig system if blowers shutdown. This was too costly and discarded and would use CNG system as an alternative.
7. Install a small modular LNG system to feed the 3.5 psig and allow for the remainder of the system to operate in “atmospheric mode” and eliminate blowers. This was estimated to be greater than $500K and discarded.

Liberty identified six other actions that they plan are considering going forward with. They are

Liberty Identification in Liberty Report	Liberty Actions Evaluated To Be Implemented	Safety Division Comments
1	Set a Time Delay on ASD Trip, Reset the ASD voltage pickup setting, or modify the control sequence of ASD auto restart. Initiate auto restart of Blowers following certain fault conditions.	The Safety Division agrees. There is a time delay set in the system for a 100% power loss event and it makes sense that there should be modifications considered to maintain system continuity during voltage fluctuation events. These adjustments should be evaluated along with an assessment of the installation of additional power stability control equipment. Testing will likely be completed in May with the installation of a proxy fault.
2	Enhance Remote Control capability through Gas Control in Londonderry.	Remote control capability would require additional training for controllers and plant controls would require modernization through capital improvements. Operator qualifications would need to be updated as well as Control Room Plans and OQ Plans.
3 and (11)	Model the Keene system and determine the feasibility of supplying the high pressure system via atmospheric air only during periods of light demand (April through October).	The Safety Division agrees an assessment of this option and an estimation of the operational savings make sense. It is surprised this has not already occurred. System response testing would be required. This should be completed and submitted to the commission within 30 days.
5	Increase the size of the pressure relief valve downstream of the regulators feeding the low pressure system.	Safety Division doesn't feel this is an issue for the plant. It may not need to be done since overpressure protection is provided by the Norican board as it cuts out when pressures go above the MAOP.
6	Install a CNG feed for all or a portion of the High Pressure system (including Monadnock Market Place) allowing for de-activation of the blower system; the low pressure system fuel mixture can be adequately supplied via atmospherically supplied air	There are tariff implications of this option including gas quality and providing two different levels of service to customers. This may allow consistent operation of the low pressure system in atmospheric mode. Liberty would need to model this prior to the conversion of the high pressure system. Liberty expects to file a petition on this in 2nd quarter.
7	Install an LNG Plant - Fully Sized for Permitting, Construction to be modular.	The Safety Division believes Liberty needs to provide a comprehensive business plan as this has large rate implications, equipment warranties and cost implications. It would need community support and commitments of largest customers of Keene.

The Safety Division believes option 1 should be implemented as soon as practical.

In addition to those listed in Liberty's internal report the Safety Division adds the following:

- The Safety Division recommends that Liberty have a specific pre-established public announcement in Appendix III of the Liberty Emergency Plan to discuss Abnormal Propane Air Mixtures and levels of CO.

- The Safety Division recommends that Liberty create or update electronic drawings of the Keene plant and operations center identifying all key components and critical systems documenting manufacturers equipment, hyperlinking maintenance schedules and technical instructions.

- The Safety Division recommends continued and increased training with Keene Fire Department that includes improvements made and those that may be made in the future be incorporated into drills uniquely developed for Keene including specific abnormal Btu scenarios and actions to respond to CO readings.

- The Safety Division should be invited to attend to review conducting of drills. The Safety Division recommends that Liberty keep track of the expenditure of each implemented item besides the initial segmenting into costs that are less than $50K, between $50K and $500K and $ above $500K. and provide updates to the Commission on a periodic basis but at minimum annually. At this point in time costs can be identified more precisely.

Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities

DG 17-048
Distribution Service Rate Case

Staff Data Requests – Set 8

Date Request Received: 10/4/17
Request No. Staff 8-44

Date of Response: 10/18/17
Respondent: Richard MacDonald
Steve Rokes

REQUEST:

On May 2, 2017 Liberty notified the Commission Safety Division of a 'Level 3 – Serious Impact Event' at the intersection of West St and Central Square, Keene NH. Please provide a detailed description of the event, including who was noticed, when notices and updates were sent, city and company response and work performed. Describe all costs incurred related to the emergency response and leak repair and where those costs were booked. Provide supporting documentation, including copies of notices, work orders and invoices.

RESPONSE:

At 2.45 p.m., on May 2, 2017, a gas odor in a manhole was reported by Eversource to a Liberty Employee in the area of 33 West Street. At 2:47 p.m. a crew was dispatched to investigate. Upon initial investigation, no gas readings were detected. The crew headed east checking other below-grade structures and the edges of the street. At an Eversource manhole cover at the corner of West Street and Central Square a gas reading of 15% LEL was detected. The Keene Fire Department requested notification for any reading in a non-gas associated sub-structure of over 10% LEL. The Fire Department was notified at 2:56 p.m. Liberty Dispatch was notified at 3:45 p.m., followed by notification to the PUC at 4:06 p.m. due to the presence of Fire Department personnel and media on the scene. There were no evacuations. Readings in the manhole fluctuated from 15% to 70% LEL levels.

Further investigation and excavation discovered a 2" wrought iron service line that ran beneath an Eversource duct bank to a building at 19 – 25 West Street. The line appeared to have concrete from the duct bank poured over it and was leaking in this area. The service had previously been inserted and rebuilt from the curb line into the building. The remainder of the service back to the main was retired and rebuilt by insertion up to the curb line and including a new curb valve. The entire service was pressure tested and service to the building restored.

See the table below for costs associated with the leak repair. See Attachment Staff 8-44 for other supporting documentation.

Docket No. DG 17-048 Request No. Staff 8-44

Expense Type		Invoice Number	Cost
Keene Fire Department	Hazardous Material Response	FIR1000091	$ 10,803.71
Cold River Materials	Sand & Gravel	1790220	$ 880.90
MME Construction, LLC	Excavation and Backfill	1272	$ 3,850.00
MME Construction, LLC	Concrete Restoration	1278	$ 780.00
BDM Sweeper Service	Paving Restoration	21576	$ 280.00
Keene Police Department	Traffic Control	DETL002561	$ 741.00
Internal Direct Labor Costs	Labor to repair	N/A	$ 1,778.51
		Total Repair Cost	$ 19,114.12

http://www.sentinelsource.com/news/local/officials-investigate-gas-smell-part-of-west-st-closed-in/article_55c60091-0781-5fa2-8a78-7759160af3ca.html

FEATURED | TOP STORY

Officials investigate gas smell; part of West St. closed in Keene

By Sentinel Staff May 2, 2017 Updated 12 hrs ago

Michael Moore / Sentinel Staff

Keene firefighters head up West Street with their gas detection meters on Tuesday afternoon.

Update, 9:35 p.m.: Although firefighters have cleared the area and the line has stopped leaking gas, it has not been completely repaired, according to Deputy Fire Chief Jeff Chickering. Officials from Liberty Utilities will remain on-site to continue repairs, which will likely continue through the night, Chickering said.

The stretch of road between St. James Episcopal Church and Central Square will remain shut and

Keene police will assist in diverting traffic, according to Chickering.

Contrary to what was previously thought, the gas leak was caused by a rupture of a feeder line, not a main line, Chickering said. That feeder line serves the building at 19-25 West Street, which houses Eagle Books and New England Studio, according to Chickering.

No gas readings have been detected in the building itself, Chickering reiterated.

Update, 8:49 p.m.: The rupture has been plugged and units are beginning to clear the area, according to an 8:49 p.m. radio dispatch to Southwestern N.H. Fire Mutual Aid. Firefighters were seen rolling up hoses and packing away equipment.

Keene Fire Chief Mark F. Howard was not immediately available to confirm the development. A spokesperson for Liberty Utilities said a full report by the company would likely be available later tonight.

Update, 7:10 p.m.: Both Keene Fire Chief Mark F. Howard and Liberty Utilities spokesman John Shore say the gas leak on West Street isn't a danger to the public. The low-level gas readings are isolated to the utility structures under West Street, Howard said, and aren't in any buildings. The leak is coming from an 8-inch main that serves the city's propane-air distribution system, he said. The system is owned and operated by Liberty Utilities. West Street from School Street to Central Square remains closed while crews dig up the street to find and stop the leak.

Update, 6 p.m.: A gas leak has been confirmed under West Street, according to Keene Fire Chief Mark F. Howard in a dispatch to Southwestern N.H. District Fire Mutual Aid Tuesday evening. Liberty Utilities' crews are on scene, and it will be a few hours before they excavate the area and stop the leak, he said.

Liberty Utilities owns and operates the city's propane-air distribution system, which is over 100 years old.

The company has been looking to replace the system with a natural gas operation.

The current system has malfunctioned twice in recent years, most notably in December 2015 when it caused a large, city-wide emergency that brought in crews from dozens of other towns.

Original report, 3:30 p.m.: Fire officials have closed West Street from School Street to Central Square in Keene to both cars and pedestrians as crews investigate an odor of gas in the area.

Officials have confirmed some type of gas leak exists, but are looking for its source.

Fire officials are detecting gas levels in an approximately 100-foot section of West Street, Chief Mark F. Howard said in an interview. They have not detected gas in any buildings and there are no forced evacuations, Howard said. Firefighters are monitoring to check how far the gas readings extend, he said.

Several utility crews are on the scene.

Brattleboro, Spofford and Swanzey fire departments have been called to assist.

No further information was yet available.

Meghan Foley can be reached at 352-1234, extension 1436, or mfoley@keenesentinel.com. Follow her on Twitter @MFoleyKS.

THE STATE OF NEW HAMPSHIRE

PUBLIC UTILITIES COMMISSION
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June 4, 2014

HAND DELIVERED
Ms. Debra Howland
Executive Director
New Hampshire Public Utilities Commission

Re: DG 14-091, Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities (Liberty)
Special Contract and Lease Agreement with Innovative Natural Gas, LLC d/b/a iNATGAS
Staff Report

Dear Ms. Howland:

Please find attached Staff's Report, prepared by Stephen P. Frink, Assistant Director, Gas & Water Division, regarding the above-captioned matter. This Report includes three Attachments.

Sincerely,

Alexander F. Speidel
Staff Attorney

Cc: Service List
Attachments

STATE OF NEW HAMPSHIRE

Inter-Department Communication

DATE: June 4, 2014
AT (OFFICE): NHPUC

FROM: Stephen P. Frink SPF
Assistant Director, Gas & Water Division

SUBJECT: DG 14-091
Liberty Utilities/iNATGAS Special Contract and Lease Agreement
Staff Report

TO: Commissioners
Executive Director
Docket File
Service List

Summary of Staff's Position

Staff analyzed the special contract and lease agreement (the Agreements) proposed by Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities (Liberty) and its counterparty, Innovative Natural Gas, LLC d/b/a iNATGAS (iNATGAS), for a compressed natural gas (CNG) venture. In its analysis of the Agreements, Staff applied the statutory standards of RSA 378:18, requiring that special contracts be just and consistent with the public interest, and of RSA 374:30, requiring that leases of public utilities be for the public good. Staff concludes that the Agreements, as connected components of a business proposal by Liberty and iNATGAS, do not meet these standards of approval as currently structured, and require modification. Staff proposes two major modifications. (1) iNATGAS or its guarantors must provide an additional financial security payable to Liberty in the event of a default by iNATGAS under the terms of the Agreements, in the form of either a security bond or a lien on real property as collateral. (2) Liberty and iNATGAS must establish under the Agreements that Liberty will have the final say on CNG compressor operations and maintenance; must enter into a signed maintenance agreement that comports with the recommendations of Liberty's engineering consultant; and must file the maintenance agreement with the Commission within 10 days of execution as a condition precedent for Commission approval. If these modifications are made by Liberty and iNATGAS, Staff would support Commission approval of these parties' business proposal under the governing standards of review.

Liberty's financial analysis comparing the revenue and cost streams using the discounted cash flow methodology indicates Liberty ratepayers may realize a substantial benefit under the terms of the Agreements, but the financial analysis does not reflect the risks associated with the projected revenue. While the upfront capital costs have a great deal of certainty, the revenue streams are much less certain given the nascent and speculative CNG market and iNATGAS's recent entry into the market. These risks to Liberty, and by extension, its ratepayers, must be ameliorated with additional financial security to enable the Agreements to meet the public

interest-public good standards of review. There is also a concern regarding the operation and maintenance of the compressors which will be owned by Liberty but operated and maintained by iNATGAS. The lease agreement is unclear as to which entity has final say on operations and maintenance and compressor service life is dependent on the level of maintenance. Staff views these operational matters to be an inherent component of the public interest-public good standards of review.

General Background

On April 4, 2014, Liberty filed with the Commission a petition for approval of its Agreements with iNATGAS, related to the proposed construction of a CNG filling and fueling station in Concord. The proposed CNG station is designed to primarily serve large commercial and industrial customers' on-site energy requirements, referred to as bulk or thermal CNG, but it will also serve CNG vehicles.

On April 14, 2014, the Commission issued an Order of Notice that identified the following issues: whether Liberty's investigation and analysis of the risks and benefits of constructing, owning and operating a CNG station are reasonable; whether entry into the long term special contract to provide CNG to iNATGAS is prudent and in the public interest; whether the proposed lease agreement is for the public good; whether Liberty's investment in the CNG facility is prudent; and whether Liberty's plans and specifications to build and operate the proposed CNG station meet the appropriate construction and operating safety standards.

Staff and the OCA issued rolling data requests and participated in two technical sessions. The technical sessions included CNG providers, station owners, operators and transporters, which received the status of limited intervenors under Commission Order 25,666 (May 14, 2014). Staff independently contacted two New Hampshire CNG end users for additional technical and business background.

Liberty Analysis of the Risks and Benefits

Liberty used the discounted cash flow (DCF) methodology to determine the Net Present Value (NPV) of the project. DCF compares the present value of money today to the present value of money in the future by comparing revenue and cost steams and accounting for inflation. Typically, the cost stream is quite certain, with the capital costs being incurred very early in the time horizon, whereas the timing and magnitude of the revenues associated with the investment are much less certain. Staff supports the use of the DCF methodology in determining the prudency of the project but a clear understanding of the assumptions underlying the revenue stream is vital in the evaluation.

Capital Costs: Liberty is obligated to construct a compressor station, conduct all site survey work and site preparation, extend a distribution grade natural gas service line[1] to the compressor station from its take station on Broken Bridge Road, provide an electric transformer and related electrical connections, and install gas conditioner equipment and up to six electric compressors.

[1] Assumes the gas service line will be less than 20% SMYS using an appropriate steel grade material and heavy wall thickness.

Liberty's capital investment is expected to be $2.2 million. These costs will all be incurred prior to the commencement of CNG service. These costs are included in Liberty's analysis as a component of the annual revenue requirement calculation.

Annual Operating Costs: iNATGAS will be responsible for operating and maintaining the electric compressors, including the cost of electricity. Liberty will be responsible for site up-keep such as grass trimming and snow removal, as well as monitoring the site. Liberty's annual estimated operating costs total $11,500. These costs were not included in Liberty's analysis.

Cost Stream – Annual Revenue Requirement: Liberty intends to seek recovery of these costs in a future rate case and therefore used the annual revenue requirement associated with the project as the annual cost. The methodology Liberty used in calculating the annual revenue requirement is consistent with the approved methodology used in determining the revenue requirement for Liberty's annual Cast Iron Bare Steel adjustment. Liberty did not request approval of the proposed ratemaking treatment in this proceeding but, if approved, the annual revenue requirement related to this project is the appropriate cost stream to use in the DCF analysis.

Revenue Stream – Delivery Revenues: iNATGAS will pay a fixed per therm charge for the 15 year term of the contract and is also subject to a 'must take' provision whereby iNATGAS must pay for annual volumes whether or not those volumes are actually taken. The annual 'must take' volumes are 300,000 Dth[2] in Years 1 and 2,500,000 Dth in Years 3 and 4, and 1,300,000 Dth in Year 5. Liberty's analysis calculates annual revenues based on three sales scenarios: (1) Minimum Take-or-Pay Assumption Level, using the 'must take' requirement for Years 1-5 and the Year 5 requirement for the remainder of the 15 year contract; (2) Base Assumption Level, representing expected sales; and (3) Accelerated Sales Assumption Level, representing potential sales.

Revenue Stream – Cost of Gas Revenues: Cost of Gas (COG) rates reflect both variable and fixed costs. Demand charges for pipeline capacity are a significant fixed cost included in the COG and borne by firm sales customers and non-grandfathered (capacity assigned) transportation customers. iNATGAS will be a firm sales customer in Year 1 and subject to the COG rate on metered sales. COG revenues related to fixed costs paid by iNATGAS represent an avoided cost for existing ratepayer subject to those charges. iNATGAS may elect to switch to transportation service after the first year but would be subject to capacity assignment and continue to pay capacity costs. These revenues were not included in Liberty's analysis.

Along with failing to quantify and include a significant revenue stream, Liberty's analysis does not reflect the risks associated with the revenue streams and assumes 'Take or Pay' sales at the Year 5 level throughout the remainder of the contract term, in spite of the fact that the 'must take' provision is only in effect for the first five years. If the projected sales do not materialize and the only revenues realized through the Agreements are those required under the 'must take' provision, the NPV of the annual revenues would be $1,223,640, considerably less than Liberty's upfront cost of $2.2 million.

[2] Dth, or dekatherm, equals 10 therms.

Another issue not addressed in Liberty's analysis is the possibility that future revenues under the special contract may not exceed Liberty's marginal cost to serve iNATGAS over the life of the contract. The delivery rate provided for in the special contract is higher than the tariff delivery rate, so it can be assumed the revenue under the special contract exceeds the marginal cost at this time. However, the long 15-year term of the contract, with no provision for rate adjustments tied to inflation, means that the special contract revenues could fall short of the marginal cost of serving iNATGAS in the future.

Financial Prudency of Entering into a Long Term Special Contract with iNATGAS

The results of Liberty's DCF analysis indicate the project provides a substantial benefit to ratepayers under all three scenarios:

Liberty Sale Scenario Results	
Sales Level	Net Present Value
Minimum Take-or-Pay	$1,767,310
Baseline	$4,732,416
Accelerated	$5,541,275

As previously stated, Liberty's analysis does not address the risk that marginal costs could exceed revenues, does not include annual operating costs, and fails to include potential COG revenues related to fixed gas costs. Because the special contract delivery rate is significantly higher than the tariff delivery rate and, with only minor exceptions, the operating and maintenance costs are iNATGAS' responsibility, the possibility that the special contract revenues would fall below the marginal cost to serve are remote. Also, as Liberty's annual operating costs under the provisions of the Agreements are relatively minor, including those costs in the analysis would not have a material impact on the results of the analysis. Although Liberty failed to include the avoided gas costs as a revenue stream in its analysis, the results show that exclusion of this revenue stream is not fatal to the analysis.

Where the analysis fails is in not weighing the risk associated with the future revenue streams, which is substantial. Liberty will be serving one customer, iNATGAS, which is new to the thermal CNG market, has no captive customers at present, has limited resources, and faces competition in close proximity (*i.e.*, the Clean Energy facility in Pembroke). Another concern is that the CNG market, which is just starting to develop using novel technology, is a competitive and limited market generally. These concerns and how, if at all, these concerns are addressed through the terms of the Agreements are explored below.

New England CNG Market:

Natural gas is currently significantly cheaper than alternative energy supplies and has spurred development of CNG and liquefied natural gas (LNG) infrastructure to serve large energy users located beyond the natural gas pipelines. Businesses such as paper mills, asphalt plants, manufacturers, commercial laundry plants, hospitals, and colleges can see a significant return on investment when converting to CNG, as compared with #2 or #6 oil. The CNG supply train

consists of producers, pipelines, compressor stations, on-road transportation and decompression stations. End users must also purchase new systems or convert existing systems to be able to use CNG.

See Attachment Staff-1 for a general description of the supply train and costs, and related article and presentation.

See Attachment Staff-2, White paper prepared by Concentric Consulting on behalf of OSCOMP on the comparative benefits of converting to CNG or LNG, http://www.oscomp.com/wp-content/uploads/2013/09/Concentric-White-Paper-1.pdf.

To be competitive, a CNG station needs to be located on a natural gas pipeline with sufficient pressure to operate, have sufficient pipeline capacity that is competitively priced, be located close to end users, and have sufficient refill capability to minimize transporter refill and wait times.

The proposed iNATGAS compressor station proposal is based on a business plan that is very different from that of its competitors. Under the terms of the lease agreement with Liberty, iNATGAS has avoided the costs of building a take station off the interstate pipeline and of purchasing compressors, but will be required to pay a utility delivery charge and capacity costs. With the current pipeline constraints in New England, it may be that the Liberty capacity costs are competitive with that of third party suppliers and that potential customers may be willing to pay a premium for greater reliability. Whether that is actually the case, and for how long and to what extent the pipeline constraints will continue, is unknown. What is known is that, to date, competing CNG stations avoid using utility service. Since CNG end users have dual fuel capability, primary delivery is not critical, and end users are likely receiving a discounted price in exchange for interruptible service.

The iNATGAS business plan also differs from its peer competitors' in that it intends to offer service to all CNG transporters rather than signing an exclusive contract with one, as other CNG stations do. Exclusive agreements allow a transporter to cost effectively schedule tanker refills, minimizing tanker wait and refill times. How transporters will respond to the level of risk inherent in a public CNG station is unknown. The iNATGAS business plan will afford end users the opportunity to own and operate CNG trailers, as they will access a CNG refill station.

Another unknown is the growth potential of the CNG market. There are a finite number of potential customers and there is competition for those customers, both from other CNG providers and alternative fuel providers, notably, LNG. Current economics are such that new businesses with substantial energy loads only locate where natural gas is available. Consequently, the potential CNG market is limited to existing customers with substantial energy requirements that are located within 200 miles of a CNG station. Furthermore, there are a number of CNG providers competing for those customers and the largest potential customers may be better served by converting to LNG, a more costly conversion, but with the potential for greater savings. There is the possibility that CNG customers could increase production following conversion, as the energy savings could improve the businesses' competitive positioning and

profitability, although the risk of a customer decreasing sales or going out of business for unrelated reasons also exists.

The proposed iNATGAS CNG station appears to be ideally located for service to potential customers in Northern New England but it is entering a competitive and limited market and the iNATGAS business plan is untested. The market risk is substantial, and there are no guarantees that the proposed station will be able to capture and hold a significant share of the limited CNG market.

The 'must take' provision of the special contract offers limited protection to Liberty in the event that iNATGAS does not achieve the necessary growth to cover Liberty's investment. Under the terms of that provision, iNATGAS or its guarantors (including iNATGAS' principal, Mr. Babak Alizadeh) are to make set annual payments that total $1,817,000, compared to Liberty's projected capital costs of $2,245,000. If the only payments under the contract were those required under the 'must take' provision, the NPV of the project is a negative $1,146,286, as 45% of the required annual payments occur in Year 5.

The lease agreement also contains a provision that allows Liberty to acquire the CNG station at net book value in the event of default. If the default occurs because iNATGAS is unable to provide competitive CNG service, there is a strong possibility that the station would have limited value and that the guarantors would be experiencing economic distress. If that were the case, the 'must take' provision may prove worthless and purchasing the station at market value could produce further losses for Liberty and its ratepayers.

iNATGAS and Affiliated Companies:

iNATGAS is a Massachusetts LLC formed in 2013, has three employees, and is 100% owned by the Alizadeh family, with Mr. Alizadeh as principal. Affiliated companies include Alternative Vehicle Service Group, LP (AVSG) and Consolidated Utilities Corp (CUC). AVSG is a Massachusetts LP formed in 1994, has four employees and is 77% owned by the Alizadeh family. AVSG has been in the business of owning and operating public access CNG vehicle refueling stations for approximately 20 years. CUC is a Massachusetts "S" Corporation with 9 employees and 100% owned by the Alizadeh family. CUC is a design, construction and maintenance company of private access vehicle refueling stations.

iNATGAS is a new entity with no customers, three employees, very limited assets, and will be competing with the Clean Energy CNG station located within a mile of the Concord facility, along with other stations located in Vermont and Maine. If the iNATGAS business plan is not successful, the lease agreement provides for Mr. Alizadeh and the affiliate company AVSG to satisfy the requirements of the 'must take' provision. Liberty reviewed the balance sheets of the two guarantors and is confident that they will be able to fulfill their obligations in the event of a default.

Staff reviewed the guarantors' balance sheets, and while current assets appear sufficient to fulfill their obligations, there is no guarantee that those assets will be available if iNATGAS defaults during the five years the performance guarantee is in effect. An iNATGAS bankruptcy would

also be expected to have a negative impact on Mr. Alizadeh's balance sheet. The guarantors' current balance sheets do not ensure they will be able meet their obligations throughout the term of the guarantee, particularly in Year 5 when 45 percent of the 'must take' charges are due.

Financial Prudency of Entering into a Lease Agreement with iNATGAS

The land to be leased by iNATGAS and used as a buffer zone was purchased by Liberty in December of 2013, and the iNATGAS rent payments are based on the purchase price, including the acreage for the buffer zone, Liberty's weighted average cost of capital, and the length of the lease. Staff views these measures for rent payments to be prudent and appropriate.

Staff Recommendation on Entering the Special Contract and Lease Agreement

As currently structured, Staff does not believe approval of the proposed Agreements is in the public interest or public good as required by RSA 374:32 and RSA 378:18. The proposed project is a high risk, high reward proposition, largely dependent on how the CNG market develops and on the success of iNATGAS' business plan. Under the terms of the Agreements, the Liberty ratepayers bear a disproportionate share of the risk relative to that of iNATGAS. Liberty's upfront costs are approximately double those of iNATGAS, and the financial obligations under the 'must take' provision only offer limited protection.

The provisions in the Agreements designed to mitigate the risk, namely, the 'must take' requirement, the guarantees by AVSG and Mr. Alizadeh, and the option for Liberty to acquire the CNG station in case of default, do not offer sufficient ratepayer protection. An iNATGAS default could well mean the market value of the station is less than its net value and that the guarantor assets could be insufficient to satisfy their obligations at the time of default.

Because the iNATGAS business plan is untested and uses utility funding for major capital components, iNATGAS should assume a larger share of the risk. If the market rejects the iNATGAS business plan and the only revenues realized are those recovered through the 'must take' provisions, the cost to ratepayers would be over $1 million when factoring in time value of money. If no revenues are realized through the special contract, ratepayers may absorb the entire cost of the project.

Using Liberty's DCF analysis, adjusted to include iNATGAS' COG capacity payments, Staff considers three scenarios. Scenario I assumes no sales and no revenues, which would occur if iNATGAS and the guarantors defaulted on the contract. Scenario II assumes no sales but iNATGAS or the guarantors pay for the 'must take' volumes without using any gas. The NPV for Scenarios I and II uses a 31-year discounted cash flow to reflect full rate recovery. Scenario III assumes actual sales equal the 'must take' volumes for Years 1 through 5 and Year 5 sales for Years 6 through 15. The NPV for Scenario III uses a 15 year discounted cash flow. The three scenarios produce the following NPVs *(See Attachment Staff-3)*:

Staff Sale Scenario Results	
Sales Level	Net Present Value
Scenario I	($2,370,157)
Scenario II	($1,146,286)
Scenario III	$6,439,606

As the results indicate, there is substantial risk but if iNATGAS is able to achieve the sales that iNATGAS and its guarantors have committed to, ratepayers will see a very positive return. Sales above those levels would further enhance ratepayer benefits.

To balance the risk, Staff recommends that iNATGAS or the guarantors provide additional security, such as a security bond or a lien on real property as collateral. If this modification is made, the special contract would meet the approval standard of RSA 378:18. The security requirement would be adjusted at the end of each year based on the NPV of the actual and assured revenues over the balance of first five years of the contract.

Staff recommends the following calculation mechanism and sunset provision for this requirement. Actual Revenue would be the delivery charges and rent payments made to date by iNATGAS. Assured Revenues would be the annual rent payments and the actual and assured delivery revenues guaranteed by the terms of the Agreements. The Assured Revenues are to be calculated by multiplying the actual sales from the most recent 12 months by the delivery rate by the number of remaining years. Staff has determined that it is reasonable to assume that future sales will equal or exceed achieved sales in developing this mechanism. Below are two examples of how the additional security would be calculated at the end of Year 1.

Example 1 - Sales equal 'must take' volumes:

Required Security – Year 1	$1,223,640
Less: NPV of Actual and Assured Revenue (Actual and Assured Revenue $192,600 per year)	($702,737)
Required Security – Year 2	$520,903

Example 2 - Sales equal baseline assumption:

Required Security – Year 1	$1,223,640
Less: NPV of Actual and Assured Revenue (Actual and Assured Revenue $314,600 per year)	($1,148,252)
Required Security – Year 2	$75,388

Regarding the specific terms of the proposed lease agreement, Staff views these terms to be reasonable. However, the lease agreement, as a component of the Agreements between iNATGAS and Liberty, must be viewed in concert with the special contract. If the special contract is modified appropriately, as discussed above, that would be the first step towards making approval of the lease agreement in the public good, as required by RSA 374:30. The next step required for approval of the lease agreement would be certain engineering-related modifications to the Liberty-iNATGAS proposal, as outlined below.

Liberty Construction, Operation and Maintenance of Compressor Station (Engineering/Safety Aspects)

Liberty is constructing the compressor station, will be purchasing the compressors and associated equipment, and is financially responsible for replacement of failed compressors. iNATGAS is responsible for the operation and maintenance of the compressor station.

CUC, an iNATGAS affiliate, is the authorized warranty provider for the compressors and associated equipment and will be performing the maintenance. CUC has many years of experience in the compressed gas industry, servicing compressors as well as all other CNG equipment such as dryers, filters, dispensers, hoses and piping. CUC has a large number of factory trained technicians, and an extensive inventory of spare parts in stock. The compressor station will be remotely monitored around the clock and will be checked, in person, on either a daily or every other day basis by iNATGAS personnel. There will not be a person on site and the travel time and distance from the nearest CUC location are unknown if a problem were to occur.

The service life of a compressor is largely dependent on proper operation and maintenance. iNATGAS is operating and maintaining the compressors at its expense but Liberty is financially responsible for the replacement of compressors. This arrangement creates a conflict of interest, whereby Liberty may desire strict operating standards and a very high level of maintenance and iNATGAS may wish to operate under more exacting conditions and perform the lowest level of maintenance.

Liberty has retained an engineering consultant to review both the design and maintenance schedule of the compressor and filling stations and will have final determination of the maintenance schedule. A maintenance agreement will be developed upon the completion of the consultant's review.

The overall CNG station safety regulation is the National Fire Protection (NFPA) standard number 52-2013. This standard is used as a primary guide across the United States for the safe design, construction, and operation of CNG stations including the compressors. At the New Hampshire state level, the Office of the State Fire Marshal, in conjunction with the City of Concord Fire Department, will have local inspection/enforcement authority of the project's design and operations. The enforcement authority is unlike the PUC Safety Division as most ongoing maintenance and operations will not be inspected. The Fire Department typically puts its focus on upfront reviews of the station.

The proposed facilities will have to meet those safety requirements, as well as those required by the Concord Building, Electrical and Plumbing Departments. The Commission Safety Division is available to assist the State Fire Marshal and City of Concord with their review of the prosed project and has historically advised the State Fire Marshal on technical gas matters.

Staff Recommendation Regarding CNG Operations, Maintenance and Safety:

Liberty and iNATGAS must establish under the Agreements that Liberty will have the final say on CNG compressor operations and maintenance; must enter into a signed maintenance agreement that comports with the recommendations of Liberty's engineering consultant; and must file the maintenance agreement with the Commission within 10 days of execution as a condition precedent for Commission approval.

The initial site and planning designs filed with the State Fire Marshal and City of Concord should also be provided to the Commission's Safety Division, as should any substantive changes during the planning and construction phases and the final design. If changes in the design materially impact design and construction costs, the additional costs would be subject to a prudency review if Liberty seeks recovery of those incremental costs.

Whether Liberty's Investment in the CNG Facility is Prudent

Liberty will be purchasing equipment and facilities not used in the direct provision of utility service to its customers. While not a common practice, there are instances where New Hampshire's natural gas utilities have done so. One of Liberty's predecessor companies, EnergyNorth Natural Gas, Inc., offered a free gas water heater to potential customers along new or replacement mains, as it was cost effective to install a service at that time under the assumption that increased sales would occur when those customers eventually converted to heating service. Northern Utilities, Inc. made a $495,000 capital contribution to convert the University of New Hampshire's (UNH) boiler plant and to rehabilitate its propane system when extending service under the terms of the 10 year special contract with a 'must take' provision. The Commission approved the Northern/UNH special contract and the amortization expense of the capital contribution in future rates. *Northern Utilities, Inc.*, 81 NH PUC 662, Order No. 22,297 (Aug. 28, 1996).

Staff Recommendation Regarding Prudency of Investing in the CNG Facility:

Based on a very narrow focus, that being the risk and benefit to ratepayers, investing in the CNG facility is prudent if the modifications recommended by Staff to the Agreements are made. The additional delivery revenues, rent payments, and gas revenues from the projected increase in sales justify the investment by Liberty.

Rate Treatment

In a future rate case, Liberty intends to include the capital cost of the project in rate base, and associated revenues and expenses when calculating the revenue requirement. While a Commission decision is not required on the intended rate treatment at this time, if the Commission rules that the investment is prudent as part of this proceeding Staff would not seek to disallow the costs if the project ultimately proved unprofitable. Therefore Staff's recommendation regarding prudency is very narrowly focused on the customer rate impact.

Staff
Revenue Requirement for iNATGAS Investment
Computation of Revenue Requirement Using Projected & Actual Capital Investment

			Projected	Actual
Capital Investment				
Year of Operation			1	1
Calendar Year			2017	2017
Investment				
Compressors			1,000,000	1,100,000
Piping, meter set, survey, etc			865,000	3,080,084
Land (pro-rated)			200,000	200,000
Contingency (Projected)/AFUDC (Actual)			180,000	435,510
Estimated annual operating costs	see real estate taxes below		-	-
Total Amount			2,245,000	4,815,594
Deferred Tax Calculation				
Annual Tax Depreciation (no bonus in 2014)	MACRS 15 year		102,250	230,780
Annual Book Depreciation (30-yr prop)	3.33%		68,833	146,003
Annual Book/Tax Timer			33,417	84,777
Book/Tax Timer			33,417	84,777
Effective Tax Rate			39.41%	39.41%
Deferred Tax Reserve			13,121	33,362
Rate Base Calculation				
Plant In Service			2,245,000	4,815,594
Accumulated Depreciation			(68,833)	(146,003)
Net Plant in Service			2,176,167	4,669,591
Deferred Tax Reserve			(13,121)	(33,362)
Year End Rate Base			2,163,046	4,636,230
Revenue Requirement Calculation				
Year End Rate Base			2,163,046	4,636,230
Pre-Tax ROR			9.16%	9.16%
Return and Income Taxes			198,135	424,679
Book Depreciation - annual			68,833	146,003
Property Taxes *	3.03%		65,938	141,489
Annual Revenue Requirement			332,906	712,170
Revenue at Minimum Take-or-Pay			192,600	192,600
Revenue Deficiency			140,306	519,570
Staff Proforma Adjustment for iNATGAS Revenue Requirement (Projected minus Actual)				**(379,264)**

Staff Proposed Capital Structure/ROR

	Ratio	Rate	Weighted Rate	Tax Rate	Pre Tax
Long Term Debt	49.85%	4.39%	2.19%		2.19%
Short Term Debt	0.95%	2.49%	0.02%		0.02%
Common Equity	49.21%	8.55%	4.21%	39.41%	6.94%
	100.01%		6.42%		9.16%

* Property tax rate reflects actual calendar year 2016 ratio of municipal tax expense to average net plant in service

Liberty Utilities (EnergyNorth Natural Gas) Corp d/b/a Liberty Utilities
Quarterly Report
Residential Low Income Assistance Program (RLIAP)
2016-17 Discounted 60%

2333

		Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Summary: Actual/ Projected Total To Date (2)	Summary: Original Projection (3)	Summary: Variance
Customer Count		(1)														
		Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Projection			
Actual / Projected No. of Customers														Average		
LIHEAP		4,046	4,252	4,402	4,499	4,568	4,593	4,590	4,487	3,834	3,741	3,680	4,245	4,245	4,468	223
Non-LIHEAP		664	626	599	595	616	603	610	603	629	656	724	630	630	535	-95
Total	(a)	4,710	4,878	5,001	5,094	5,184	5,196	5,200	5,090	4,463	4,397	4,404	4,874	4,874	5,003	129
RLIAP Recoveries																
Actual / Projected																
Therm Sales		10,853,467	18,253,381	24,184,090	23,291,389	22,231,603	20,848,167	10,907,162	8,400,536	5,477,505	5,417,274	5,774,030	6,681,398	162,320,002	166,523,068	4,203,066
RLIAP Rate Per Therm		$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	$ 0.0067	
Total		$ 72,718	$ 122,298	$ 162,033	$ 156,052	$ 148,952	$ 139,683	$ 73,078	$ 56,284	$ 36,699	$ 36,296	$ 38,686	$ 44,765	$ 1,087,544	$ 1,115,705	$ 28,161
Adjustment		64,667	2,027	(1,756)	1,522	99	37	168	(35)	(144)	(159)	(43)	0	66,383	0	
Total Adjusted Recoveries (4)		$ 137,385	$ 124,324	$ 160,277	$ 157,575	$ 149,051	$ 139,720	$ 73,246	$ 56,249	$ 36,555	$ 36,137	$ 38,643	$ 44,765	$ 1,153,927	$ 1,115,705	$ (38,222)
Program Costs																
Actual & Projected Costs																
IT		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Admin.	(b)	0												0	0	0
Education		0												0	0	0
Prior Period Ending Balance	(c)	(333,808)												(333,808)	(290,305)	43,503
Other (incl. Reporting Costs)		(1,041)	(1,040)	(1,504)	(3,203)	1,858	(1,256)	1,104	156	368	558	558	0	(3,441)	0	3,441
Discounts LIHEAP		87,825	142,084	187,506	188,567	191,094	196,706	148,416	99,688	76,960	74,222	71,479	76,267	1,540,813	1,330,140	(210,673)
Discounts Non-LIHEAP		14,413	20,918	25,515	24,938	25,769	25,825	19,724	13,397	12,626	13,015	14,063	11,311	221,515	159,271	(62,243)
Total Costs (4)	(d)	$ (232,611)	$ 161,963	$ 211,517	$ 210,302	$ 218,721	$ 221,274	$ 169,244	$ 113,240	$ 89,955	$ 87,796	$ 86,100	$ 87,578	$ 1,425,079	$ 1,199,107	$ (225,973)
Avg Monthly Residential Customer Bill		$ 70.62	$ 115.90	$ 173.41	$ 154.61	$ 135.89	$ 125.51	$ 51.26	$ 35.33	$ 33.25	$ 31.71	$ 31.66	$ 59.05	$ 1,018.20	$ 1,064.78	$ 46.58
Avg Monthly Residential Low Income Customer Bill		$ 48.74	$ 84.23	$ 133.31	$ 114.85	$ 96.77	$ 86.25	$ 23.29	$ 15.44	$ 14.07	$ 13.32	$ 13.29	$ 41.78	$ 685.34	$ 790.74	$ 105.39
Avg Monthly RLIAP Customer Discount		$ 21.88	$ 31.67	$ 40.10	$ 39.76	$ 39.12	$ 39.26	$ 27.97	$ 19.89	$ 19.18	$ 18.39	$ 18.37	$ 17.27	$ 332.86	$ 274.04	$ (58.82)
Avg Monthly RLIAP Customer Discount as a % to Avg Monthly Residential Customer Bill		31%	27%	23%	26%	29%	31%	55%	56%	58%	58%	58%	29%	33%	26%	
Gross Monthly Revenues		$ 13,430,327	$ 20,538,401	$ 19,214,725	$ 16,269,492	$ 19,949,229	$ 7,113,141	$ 7,644,841	$ 4,937,095	$ 4,621,084	$ 5,195,854	$ 5,154,107	$ 7,333,058	$ 131,401,354	$ 117,415,931	$ (13,985,424)
Total Costs as a percent of Gross Monthly Revenues		-1.73%	0.79%	1.10%	1.29%	1.10%	3.11%	2.21%	2.29%	1.95%	1.69%	1.67%	1.19%	1.08%	1.02%	

(1) Please specify deferred costs incurred prior to November by cost component. Note: the effective date for RLIAP discounts is November 1, 2005: hence, there should no RLIAP discounts prior to November 1, 2005.
(2) This column represents actual data for the months in which such data is available plus projected data for the remaining months in the 12-month program year.
(3) See RLIAP Projection on Bates Page 119 of the 2016-17 Cost of Gas Filing, DG 16-814 and Third Revised Page 82 in the Company's tariff
(4) Ties to the Company's RLIAP deferral account 8840-2-0000-10-1169-1756

(a) The actual number of customers provided for this report are the number of registered customers that were billed during the month.
(b) Actual administrative costs consists of bill inserts and advertising.
(c) The Prior Year 2015-16 under/(over) ending balance.
(d) The total discount is calculated from the actual Residential Low Income R-4 bills for the month. The discount by LIHEAP and Non-LIHEAP are prorated by the number of customers listed above.