

**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.<sup>1</sup> 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.<sup>2</sup>

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.)<sup>3</sup> 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

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<sup>1</sup> 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.*”

<sup>2</sup> 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.

<sup>3</sup> 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<sup>4</sup> 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<sup>5</sup> 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<sup>6</sup> 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).

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<sup>4</sup> 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.

<sup>5</sup> Three local heating contractors provided and supplemented relight assistance to Liberty during the customer restoration process.

<sup>6</sup> 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 included 16 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<sup>7</sup>. 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

<sup>7</sup> 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 19<sup>th</sup> 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 2 <sup>nd</sup> 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.

Appendices

Appendix 1

1-A System Map of Liberty's Keene Distribution Systems



## 1-B 68 Minute Timeline of Plant Related Activities

Source: *Discovery Attachment 1-12.xlsx (Tab 1)*

<b>Keene Incident - December 19 - Plant Timeline of Key Activities - Timeline limited to Plant Related Activities</b>		
<b>Time (AM)</b>	<b>Activity</b>	<b>Action Taken</b>
7:45	On-Call Meter Service Technician, Ryan LaBelle, conducts Daily Plant Walk-Through	Changed Pressure and Temperature Charts, Took Storage Tank Readings and associated record keeping, took Alcohol and Water tank reads, and Conducted Plant Walk-through including monitoring and adjustments to Btu output.
8:30	Ryan left the Plant	
8:51	Ryan received a call from Gas Control regarding two Alarms at Plant (Processed air and Low Pressure)	Ryan turned around @ Irving Gas Station on West St. and returned to the plant
9:03	Ryan arrived back at the Plant	Ryan noted two alarms - processed air and low pressure
9:04	Ryan called Steve Rokes, Manager of the Keene Division	Ryan informed Steve Rokes that he was at the plant and that it was very quiet at the plant and that the Blowers were off line.
9:07	Ryan called Steve Swain, Distribution Technician.	Ryan informed Steve Swain that the Blowers were off-line. Ryan noted a Power Fault message on Blower control boards.
After 9:04	The answering service, Advance Answering Service of Rutland, VT, called and stated that the Elm City Brewery was experiencing high flames.	Note: The alarm company (PPM, Property Protection Management) never called due to an open fuse in the alarm circuit, unknown at the time of the incident
	Steve Rokes asked Ryan if the generator was running	Ryan replied that the generators were not running
	Steve had Ryan to open the secondary valve on the 8 inch line by turning the valve approximately 2 cranks.	
	Ryan communicates with Gas Control for 2nd time	
9:12	The Answering service called again and relayed another customer call.	
9:15	Steve Rokes called Ryan	

## Keene Incident - December 19 - Plant Timeline of Key Activities - Timeline limited to Plant Related Activities

Time (AM)	Activity	Action Taken
9:19	Ryan Called Steve Rokes	<p>Ryan informed Steve Rokes that the Plant was on Step 15 indicating that all gas jets were open.</p> <p>Steve asked whether computer panel Make Mode annunciated "Blower" or "Atmospheric". Ryan stated that the Make Mode was in "Blower" mode. Steve then instructed Ryan on how to change to "Atmospheric" mode and Ryan did so, putting the system in atmospheric mode. Within several seconds of changing to atmospheric mode, the jets began stepping down from step 15 to step 0. This took approximately 2 minutes. The stepping system continued to cycle up and down until it reached an equilibrium point. Refer to Steps tab, this file.</p>
9:24	Mutual Aid (Keene Fire Dept.) contacted Ryan	The Fire Department was receiving numerous carbon monoxide calls
9:27 - 9:35	Steve and Ryan continued to communicate over the phone as Steve Rokes travelled to the Plant	
9:35	Ryan communicated with Gas Control	
9:38	Steve Rokes arrived at the Plant	Steve Rokes proceeded to the Plant control room to check the status of the system.
9:44	Steve Rokes began shuttling between the control room and blower rooms	Steve Rokes initiating steps to bring the blowers back on line and matching blower pressure to outlet operating pressure and Btu levels. Over the next 15 minutes Steve made approximately 8 trips between the control room and blower room in order to gradually ramp up and synchronize blower pressures, outlet pressures, and Btu levels.
9:59	The system reached a stable level.	The system was stabilized at 9:59 between steps 2 and 3. The system was restored to Auto, Blower Make Mode; the auxiliary atmospheric valve closed during the restoration.
9:17 - 9:58	Call Outs by Ryan	<p>9:17 - Bob Pierce - Gas Service Technician</p> <p>9:33 - Terry Peets - Gas Service/Distribution Technician</p> <p>9:40 - Steve Swain - Distribution Technician</p> <p>9:58 - Ron Bausum - Lead Distribution Technician</p>
10:10	Gas Control Call to Rich MacDonald, Director of Gas Operations	Incident Response initiated by Rich.





**Appendix 1-E, New Hampshire Public Utilities Commission  
Gas Safety Division Investigation Report  
Liberty Utilities December 19, 2015 Operational Event  
Emerald St. Propane/Air Plant Component Photo Documentation**



Liberty Keene – The plant mixes propane with air supplied by the blowers shown above.



Liberty Keene - The blowers are equipped with variable speed drive controls that are sensitive to incoming 3-phase power fluctuations.

**Appendix 1-E, New Hampshire Public Utilities Commission  
Gas Safety Division Investigation Report  
Liberty Utilities December 19, 2015 Operational Event  
Emerald St. Propane/Air Plant Component Photo Documentation**

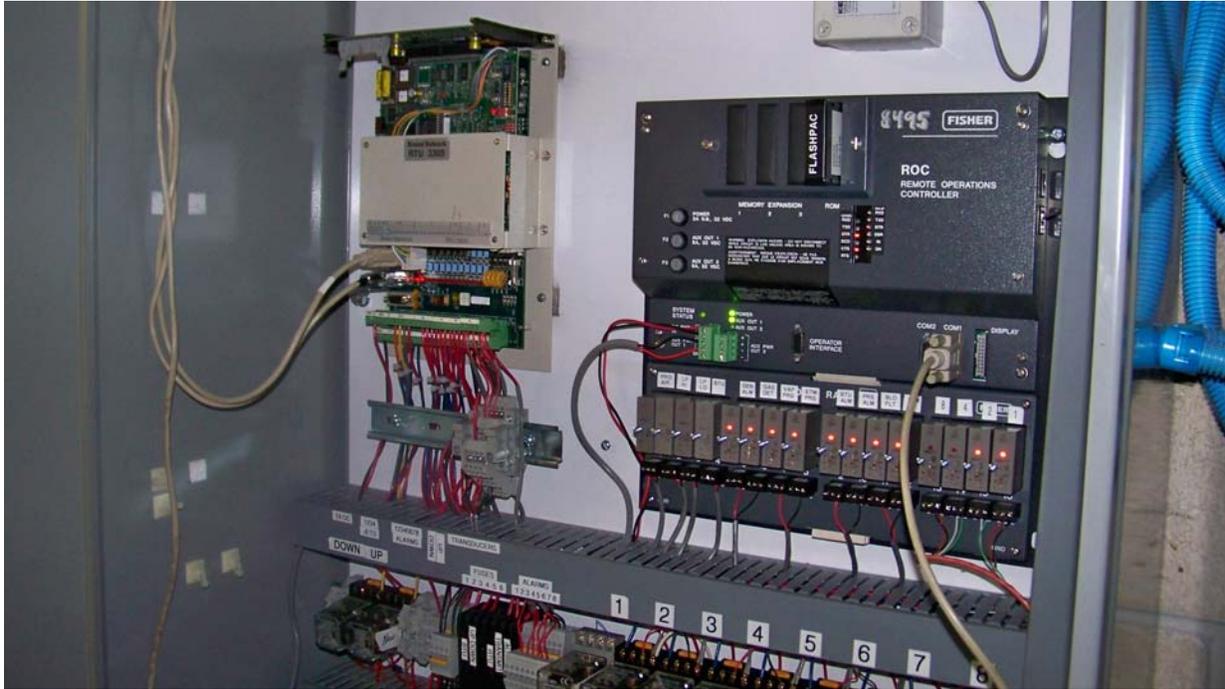


Liberty Keene – The air blowers are equipped with a 125 KW emergency generator.

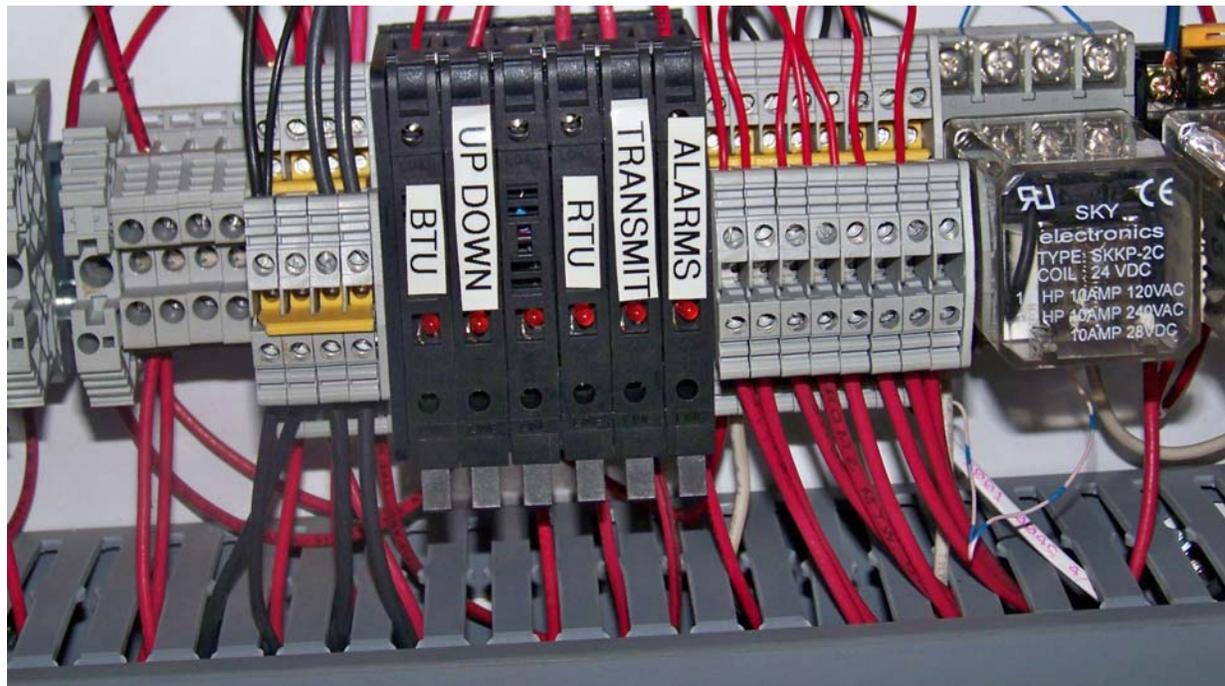


Liberty Keene – The system was not configured to transition to emergency backup power without experiencing a brief power interruption to the variable speed drives which requires manual restart of the blowers.

**Appendix 1-E, New Hampshire Public Utilities Commission  
Gas Safety Division Investigation Report  
Liberty Utilities December 19, 2015 Operational Event  
Emerald St. Propane/Air Plant Component Photo Documentation**



Liberty Keene – The plant is equipped with a remote terminal unit (RTU) that is a microprocessor-controlled device which interfaces analog data from system pressure sensors to the remote operations controller (ROC) which in turn regulates propane and air mixing rates. As the mixture leaves the Keene facility to enter the distribution system, sensors that monitor two constants – pressure and BTU content [a pressure of 3.5 psi in the winter with a BTU content of about 740]. These sensors regulate the fuel and blower systems to automatically respond to greater or lesser customer demand for gas in order to maintain proper pressure and BTU levels.

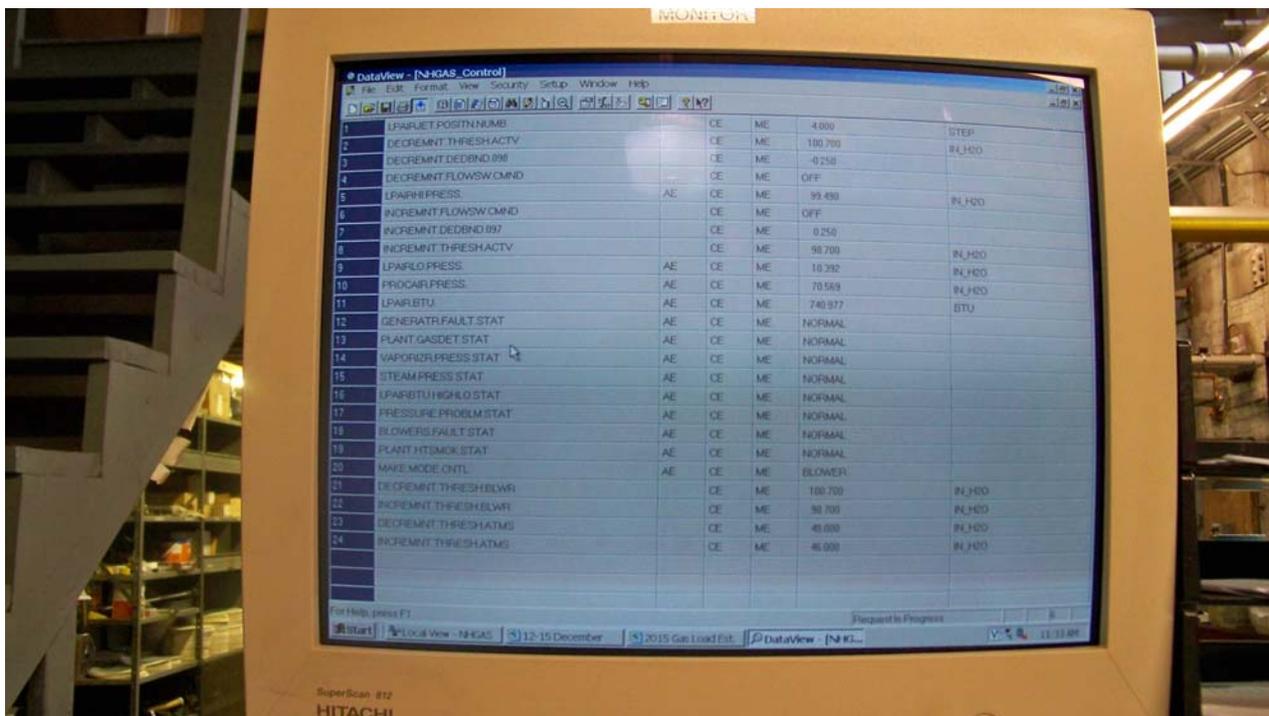


Liberty Keene - Liberty indicated an open fuse in the alarm board circuitry (#6 from left) prevented the appropriate signal from reaching the RTU based control system, resulting in the system RTU control remaining in blower mode instead of switching to atmospheric mode.

**Appendix 1-E, New Hampshire Public Utilities Commission  
Gas Safety Division Investigation Report  
Liberty Utilities December 19, 2015 Operational Event  
Emerald St. Propane/Air Plant Component Photo Documentation**



Liberty Keene – The plant propane/air output Btu heating value is monitored and recorded using a Cutler-Hammer calorimeter.



Liberty Keene – System alarms are monitored remotely by Liberty Gas Control as well as Plant Operations personnel.

## Appendix 1-E, New Hampshire Public Utilities Commission Gas Safety Division Investigation Report Liberty Utilities December 19, 2015 Operational Event Emerald St. Propane/Air Plant Component Photo Documentation

Two jet rooms house the venturiers or “Jets” to blend the propane vapor with supplied air in a 30% Propane and 70% Air ratio to produce the 740 BTU Propane/Air Gas used in the distribution system. The Jets vary in size from one and one half inch (1 ½”) up to six inch (6”). There are three (3) modes of operation: Summer, Spring and Fall and Winter. Each of these modes use a different combination of jets to produce the desired amount of gas based on demand. The NORICAN system operates based on the three settings or modes of the Jets, “Summer”, “Spring & Fall” and “Winter”. Each mode uses a different combination of Jets to produce a desired amount of gas. Each mode has sixteen possible Steps (0-15). The various jet combinations and output capacities are summarized below.

MODE CAPACITY MCF				WHICH JET					
STEP	SUMMER	SPRING FALL	WINTER	STEP	1	2	4	8	STEP
1	4	8	12	1	X				1
2	8	15	23	2		X			2
3	12	23	35	3	X	X			3
4	15	31	46	4			X		4
5	19	39	58	5	X		X		5
6	23	46	69	6		X	X		6
7	27	54	81	7	X	X	X		7
8	31	61	92	8				X	8
9	35	69	104	9	X			X	9
10	39	76	115	10		X		X	10
11	43	84	127	11	X	X		X	11
12	46	92	138	12			X	X	12
13	50	100	150	13	X		X	X	13
14	54	107	161	14		X	X	X	14
15	58	115	173	15	X	X	X	X	15

### JETS USED BY MODE

<i>Summer</i>	1	2	4	6
<i>Spring / Fall</i>	3	5	7	8
<i>Winter</i>	1 + 3	2 + 5	4 + 7	6 + 8

### Jets Size

JET #	1	2	3	4	5	6	7	8	Standbys
SIZE	1 1/2 "	2 "	2 "	3 "	3 "	4 "	4 "	6 "	1 1/2 "

**Appendix 1-F**

**Various Media Reports Describing the Event**

1-F Various Media Reports describing the Event

# This weekend's city-wide gas problem to be investigated

By Meghan Foley Sentinel Staff | Posted: Monday, December 21, 2015 12:00 pm

The N.H. Public Utilities Commission will open an investigation into the city-wide gas problem that struck Keene Saturday, including what happened to a failed backup power source at the gas distribution facility that would likely have prevented it.

Emergency responders began getting calls shortly after power went out at Liberty Utilities' distribution center on Emerald Street, which mixes air and propane, at about 8:50 a.m. Four people were taken to the hospital and more than 1,000 homes and businesses were checked for carbon monoxide exposure.

Debra A. Howland, executive director of the Public Utilities Commission, said this morning that officials planned to issue a notice later today announcing the start of the investigation.

She said for further details about what the investigation will involve and its timeline, she'd have to consult with the commission's safety director, who was in Keene Saturday to respond to the incident.

She said she expects to have those answers later today, as well as what natural gas distribution facilities in the state are required to have for backup power supplies.

Liberty Utilities officials are conducting a thorough investigation into what happened at the Keene distribution facility, said company spokesman John Shore.

The facility has a backup power source, which didn't work, he said.

"We're not sure exactly what occurred with the system," he said.

The emergency response Saturday into early Sunday drew more than 75 fire departments from across New Hampshire, Vermont and Massachusetts, incurring significant costs.

Shore said he wasn't sure how paying for the emergency response would be handled, and if Liberty Utilities would be contributing money toward the expenses now faced by Keene and the other communities that responded.



## Strong effort

Firefighters work to shut off a gas valve at Monadnock Food Co-op during a city-wide gas problem Saturday.

### 1-F Various Media Reports describing the Event

“We’ll be in discussions with the parties involved. We’ll work something out, but I’m not exactly sure how that will work out,” he said.

Phone messages for Keene Fire Chief Mark F. Howard and Kurt D. Blomquist, emergency management and public works director, weren’t returned by press time this morning.

The problem started after the power outage led to an imbalance in the mixture of air and propane sent to homes and businesses on the system. The lack of air in the mixture caused pure propane to be sent to customers, and the potential for carbon monoxide to be released when burned.

The toxic chemical is odorless, colorless and tasteless, and can be deadly if people experiencing symptoms of carbon monoxide poisoning aren’t treated right away.

Fire and police crews responded to more than 100 calls connected to the incident; buildings and homes were evacuated; and — according to first responders — four people were taken to Cheshire Medical Center/Dartmouth-Hitchcock Keene to be treated for carbon monoxide poisoning.

The situation lasted for more than 15 hours.

Liberty Utilities has 1,250 customers in Keene. The distribution system is about 100 years old and was previously owned by N.H. Gas Corp.

Liberty Utilities officials are planning to expand the system into Swanzey, and eventually connect it to the proposed Northeast Energy Direct pipeline as it comes through Winchester.

Tennessee Gas Pipeline Co. LLC, a subsidiary of Kinder Morgan, has proposed building the high-pressure transmission pipeline to carry fracked natural gas from shale gas fields in Pennsylvania through upstate New York, parts of northern Massachusetts and into southern New Hampshire before going to a distribution hub in eastern Massachusetts. The route would cross the Cheshire County towns of Fitzwilliam, Richmond, Rindge, Troy and Winchester.

Tennessee Gas Pipeline officials filed the project’s application with the Federal Energy Regulatory Commission, which has the power to approve or reject the pipeline, last month. Company officials have asked the commission to approve the project by the fourth quarter of 2016.

Shore said this morning he didn’t believe the incident Saturday would have any effect on the company’s expansion plans into Swanzey.

Liberty officials have said those plans aren’t dependent on the construction of the pipeline.

As to whether it will affect the Northeast Energy Direct project, Shore referred the question to Tennessee Gas Pipeline Co.

**1-F Various Media Reports describing the Event**

Tennessee Gas Pipeline officials were working to answer that question this morning, but their response was unavailable by press time.

Eversource spokesman Martin Murray said this morning that the power outage in Keene Saturday affected about 1,072 customers.

“The outage was related to a failed piece of electronic equipment on the system, a ‘recloser’ that acts as a type of circuit breaker,” he said.

Crews made repairs and power was restored at 9:27 a.m., he said.

1-F Various Media Reports describing the Event

## Company to be billed for Saturday's gas emergency in Keene, official says

By Meghan Foley Sentinel Staff | Posted: Tuesday, December 22, 2015 12:00 pm

Liberty Utilities is on the hook to pay for the massive emergency response to a city-wide gas problem in Keene Saturday, according to the city's emergency management director.

Meanwhile, some opponents of a proposed natural gas pipeline through the area said this weekend's incident reinforces their concerns about that project's safety.

After power went out at the company's Keene distribution center, equipment that mixes propane with air failed, sending pure propane to customers in the city and the potential for carbon monoxide to be released when burned. A backup system at the Emerald Street center also failed.

City officials have determined the situation, which brought brought fire departments from across New Hampshire, Massachusetts and Vermont to the city, was a hazardous-materials incident, said Kurt D. Blomquist, Keene's emergency management director and public works director.

According to state statute, the business at fault for such an incident pays for it, he said.

Keene officials will spend the next week gathering costs associated with the emergency response, including any overtime incurred by firefighters, emergency medical services personnel and city staff, he said.

He declined to venture an estimate yet of what that cost might be.

Agencies from other communities that responded to the city for the incident are also eligible for reimbursement, he said.

That included 64 fire and emergency medical services departments and 12 local, regional, state and private agencies, according to a news release Monday from Keene Fire Chief Mark F. Howard.

Liberty Utilities also brought in 81 employees, Howard wrote.

The situation lasted for about 15 hours.

Both Liberty Utilities and the N.H. Public Utilities Commission are conducting separate investigations into what happened Saturday to cause the imbalance between air and propane mixture pumped through Liberty Utilities' distribution system.

Four people were taken to Cheshire Medical Center/Dartmouth-Hitchcock Keene, and more than 1,000 homes and businesses were checked for carbon monoxide exposure throughout the day Saturday and into early Sunday morning. The toxic chemical is odorless, colorless and tasteless,

**1-F Various Media Reports describing the Event**

and can be deadly if people experiencing symptoms of carbon monoxide poisoning aren't treated right away.

Liberty Utilities has 1,220 customers in Keene, according to a notice from the N.H. Public Utilities Commission Monday, which announced the agency's investigation into the incident.

The company's distribution system's facility lost power at 8:50 a.m., but its backup power source didn't come online, Liberty Utilities and city officials have said.

Eversource spokesman Martin Murray said Monday that the power outage affected about 1,072 customers in Keene, and power was restored by about 9:30 a.m.

In response to questions about why the backup power system failed, how it was supposed to work, if Saturday's incident exposed any vulnerabilities in the system, and, if so, how those would be addressed, Liberty Utilities spokesman John Shore said they will be examined during the company's investigation.

The investigation will be "very thorough," and include members of the company's engineering and operations departments, and its equipment vendors, he said.

"We will work closely with the PUC throughout the process," he said.

While Saturday's incident was centered in Keene, it's made some residents living in towns south of the Elm City uneasy about a natural gas pipeline proposed by the Kinder Morgan company that would go through the area.

Liberty Utilities is set to benefit from the pipeline should it be built, and has filed a petition with the N.H. Public Utilities Commission seeking approval to own and operate gas franchises in Jaffrey, Rindge, Swanzey and Winchester.

Liberty Utilities is a subsidiary of Algonquin Power and Utilities Corp., which has its headquarters in Ontario, Canada. Algonquin partnered with Kinder Morgan to form Northeast Expansion LLC to build and own the Northeast Energy Direct pipeline, with Tennessee Gas Pipeline Co. being brought in as Kinder Morgan's subsidiary to operate it.

Kinder Morgan spokeswoman Tiffany Eddy referred a question about any effects Saturday's incident could have on the pipeline project to Liberty Utilities.

"This is a Liberty Utilities operation issue and did not involve Kinder Morgan or natural gas," she said.

Communities in the path of the proposed pipeline — Fitzwilliam, Richmond, Rindge, Troy and Winchester — have been fighting the project for about a year, and among their concerns are the safety of the interstate transmission line and the emergency response in the event the line leaked or exploded.

1-F Various Media Reports describing the Event

Area fire chiefs have said they're worried about whether they'd have the manpower and expertise to respond to a potential pipeline-related emergency.

Richmond Fire Chief Ed Atkins said Monday it was reassuring to see the large number of agencies respond to the Keene incident. "It's comforting to know other towns have our back" if an emergency hit the natural gas pipeline.

But, he questioned whether that response would be enough.

Fitzwilliam Selectman Susan S. Silverman said in her town and others along the proposed pipeline route, there aren't as many people as in Keene to notice problems until they've become extreme, and that worries her. Even though the system in Keene isn't natural gas, she said the incident Saturday reinforced her safety concerns about the proposed pipeline.

Tennessee Gas Pipeline officials have proposed building the high-pressure transmission pipeline to carry fracked natural gas from shale gas fields in Pennsylvania through upstate New York, parts of northern Massachusetts and into southern New Hampshire before going to a distribution hub in eastern Massachusetts.

Officials filed the project's application with the Federal Energy Regulatory Commission, which has the power to approve or reject the pipeline, last month. Company officials have asked the commission to approve the project by the fourth quarter of 2016.

Rindge resident Maryann Harper, vice chairwoman of New Hampshire Pipeline Awareness, an anti-pipeline group, said her safety concerns about the pipeline became "extremely heightened" by the incident in Keene.

"I think people experiencing something like this close by within our state or general region, you can see this is an unnecessary risk for us to take," she said.

Richmond resident Seth Reece, another pipeline opponent, said he worries Kinder Morgan and Liberty Utilities will use Saturday's incident to make a case that the pipeline is needed now more than ever to supply energy because the propane-air system in Keene is aging and out-of-date.

"Who's to say Kinder Morgan does not just jump on the bandwagon of this emergency saying their pipeline is safer, or Liberty says its equipment is outdated and needs to be upgraded," he said.

The N.H. Public Utilities Commission will hold a status conference in January to accept a preliminary assessment and factual information from Liberty Utilities' investigation and its own probe into Saturday's incident in Keene.

## 1-F Various Media Reports describing the Event



## Some report symptoms of carbon monoxide exposure; Keene residents warned

*Residents asked to call 911 if they experience CO exposure symptoms*

UPDATED 11:48 PM EST Dec 19, 2015

### KEENE, N.H. -

Liberty Utilities customers in Keene are being warned about the possibility of elevated carbon monoxide levels in their homes after an issue at a plant in the city.

[Watch News 9's coverage.](#)

The State Emergency Operations Center was activated due to the situation in Keene.

[Watch as officials update the situation in Keene.](#)

Residents and visitors of Keene are encouraged to call 911 if they smell gas or experience weakness, headache and/or dizziness, which could be related to carbon monoxide exposure. If their carbon monoxide detector goes off, residents are encouraged to leave their home and call 911.

"If they can smell gas in their buildings or in their homes they should be calling 911, they should be opening their windows, and they should be vacating the house. If they are having any symptoms potentially of, related to light-headedness or being dizzy or confused. And if you are home alone, that's going to be hard to determine that," said Chief Mark Howard of the Keene Fire Department.

Three people were taken to local hospitals with symptoms of carbon monoxide exposure. At least two other people also checked themselves into the hospital with similar symptoms.

Residents who are serviced by Liberty Utilities and are within a two-mile radius of Main Street are urged to open their windows and check on their neighbors.

Officials said no leak occurred, but a mixture of gases distributed by the utility company led to increased levels of carbon monoxide in some cases.

Liberty Utilities officials said that the issue arose around 9 a.m. after the company's propane production plant experienced an issue that affected the propane/air mixture flowing into the distribution system. Officials said the change in gas mixture may have resulted in the production of carbon monoxide at the gas appliance or burner tip in a home or business.

"At some point, the blower that puts that air into that mixture tripped and was no longer putting air into the mixture, so we were just having propane into the mixture," said Michael Lacotta of Liberty Utilities.

#### 1-F Various Media Reports describing the Event

The plant's safety system detected the change in the mixture, which led to the notifications of company officials and emergency workers.

As of 5 p.m., Keene fire officials were continuing to go door to door to check on Liberty Utilities customers in the city. No issues have been discovered as of yet.

Keene officials are also in the process of determining customer locations where the gas supply had been turned off because of high carbon monoxide readings. Crews will eventually return to those areas to reactivate the gas supply.

Customers are encouraged to call Liberty Utilities at 603-352-1230 if they experience any problems with their service.

The Red Cross is opening a shelter for residents displaced in Keene. The shelter is located at 312 Washington Street.

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December 21, 2015 8:11PM

# Keene officials respond to more than 100 calls after plant problem

KEENE — The official post-mortem is out from Keene Fire Chief Mark Howard on his department's response to a gas mixing problem at a Liberty Utilities plant in Keene that had firefighters responding to more than 100 calls reporting

propane and carbon monoxide emergencies over a 17-hour time period during the weekend.

According to Liberty Utilities spokesman John Shore, the gas emergency started around 9 a.m. Saturday, when a brief power outage caused a blower that blends air into the propane gas mixture that is fed into the homes and businesses of 1,200 customers in Keene to stop working.

The improperly blended propane gas caused high CO levels in some gas company customers' homes and businesses.

According to Chief Howard, Keene fire and EMS personnel rescued one adult female found unconscious in the Tilden's Hallmark store on Main Street.

Fire crews had been sent there to investigate an odor of gas and upon entering and checking the store, detected high levels of carbon monoxide and propane gas levels. Crews checked to make sure the store had been fully evacuated when they found the woman, whose name was not released, unconscious and down in the rear of the store. Firefighters removed her from the building and provided emergency medical care and transported her to Cheshire Hospital.

Three other patients were transported by EMS crews for possible exposure to carbon monoxide at other locations. All patients were later released from the Cheshire Hospital. There were no injuries reported by Fire/EMS personnel.

According to Howard, a total of 64 departments responded with fire and EMS apparatus, personnel and equipment, coming from across New Hampshire and communities in Vermont and Massachusetts. A total of 12 local, regional, state and

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1-F Various Media Reports describing the Event

private agencies provided support to the fire and EMS response, while Liberty Utilities deployed 81 people to help with the response.

December 20, 2015 8:45PM

# Keene carbon monoxide scare probed

KEENE — Gov. Maggie Hassan has called for a full investigation by state officials into the cause of a gas-mixing problem at a utility plant that had firefighters responding to more than 100 calls reporting gas odors.

According to Liberty Utilities spokesman John Shore, the gas emergency started around 9 a.m. Saturday when a brief power outage shut down a blower that blends air into the propane gas mixture fed into the homes and businesses of 1,200 customers in Keene.

The improperly blended propane gas caused high CO levels in some gas company customers' homes and businesses.

Five Keene residents were hospitalized for symptoms of exposure to carbon monoxide on Saturday, city officials said. The Keene Fire Department received a total of 104 calls for service related to the gas emergency. City and mutual aid fire crews working with Liberty Utilities personnel were busy Saturday night conducting door-to-door evaluations of all gas customer buildings and infrastructures, both commercial and non-commercial, in the city.

According to Shore, those inspections were completed around 1:15 a.m. Sunday.

"The system is back to normal and conditions are safe," said Shore. "Our focus now has turned to investigating the root cause of the issue."

On Sunday, Hassan issued a statement calling for an investigation into the gas-mixing



[\(/storyimage/UL/20151220/NEWS07/151229898/AR/0/AR-151229898.jpg?q=100\)](#)

Liberty Utilities and firefighters begin going door-to-door during a gas emergency in the city Saturday. (Meghan Pierce/Union Leader Correspondent)



## Related Stories

[Six-alarm emergency in Keene due to gas leak from Liberty Utilities plant \(/article/20151220/NEWS07/151218996\)](#)

problem.

"We have been closely monitoring the situation since reports of problems with the gas mixture in Liberty Utilities' Keene gas distribution system began to come in yesterday, and we activated the State Emergency Operations Center," Hassan said in a statement, "State and local emergency management and public safety officials will continue to work closely with the Keene Emergency Operations Center to ensure that the situation has been resolved. Gas leaks can be a serious threat to public safety and public health, and I will ask the Public Utilities Commission (PUC) to open a full investigation of this event."

Shore said Liberty Utilities would cooperate with state officials.

"We were expecting a full investigation by the PUC," Shore said. "We informed them of the incident shortly after it occurred yesterday morning. We kept them apprised of the situation throughout the day. We will fully comply with their investigation and we'd like to echo the governor's recommendation for all residents to purchase CO detectors."

December 19, 2015 10:16PM

# Keene gas emergency coming to an end

KEENE -- The count of those hospitalized for symptoms of exposure to carbon monoxide has risen to four, city officials said Saturday night.

The number of calls for service to the fire department related to the gas emergency incident has risen to a total of 104 calls for service related to today's incident.

Keene officials said as of 9 p.m. city and mutual aid fire crews working with Liberty Utilities personnel were more than halfway through their door-to-door evaluations of all gas customer buildings and infrastructures -- commercial and non-commercial -- in the city.

As of 9 p.m. crews were about 60 percent through their target of the city's 1,250 gas customers. The crews plan to continue to conduct the door-to-door through the night till all Liberty Utilities gas customer locations have been contacted and evaluated, city officials said Saturday night.

No issues have been discovered so far, city officials said. "We are in the process of determining the customer locations where the gas supply had been turned off because of high CO readings, and crews continue returning to those locations to reactivate."



(/storyimage/UL/20151220/NEWS07/151218979/AR/0/AR-151218979.jpg?q=100)

Liberty Utilities and firefighters begin going door-to-door during a gas emergency in the city Saturday. (Meghan Pierce/Union Leader Correspondent)



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3 people hospitalized as of Saturday evening due to carbon monoxide poisoning in Keene (/3-people-hospitalized-as-of-Saturday-evening-due-to-carbon-monoxide-poisoning-in-Keene)

1-F Various Media Reports describing the Event

Liberty Utility customers are encouraged to contact the company's service line at (603) 352-1230 if they experience any problems with their service.

Since no further issues have arisen, a warming shelter at 312 Washington Street, the Keene Recreation Center, will be close at 11 p.m.

And Keene's Emergency Operation Center will close at 11 p.m. as well.

The gas emergency started around 9 a.m. Saturday. A Liberty Utility spokesman said it is believed a brief power outage Saturday morning caused a blower -- that blends air into the propane gas mixture that is fed into the homes and businesses of 1,200 city customers -- to stop working. The improperly blended propane gas caused high CO levels in some gas company customers' homes and businesses.

December 19, 2015 3:46PM

# Six-alarm emergency in Keene due to gas leak from Liberty Utilities plant

KEENE – A 6-alarm emergency has been struck in Keene to respond to a gas emergency, Keene Fire Chief Mark Howard said at a press briefing Saturday afternoon.

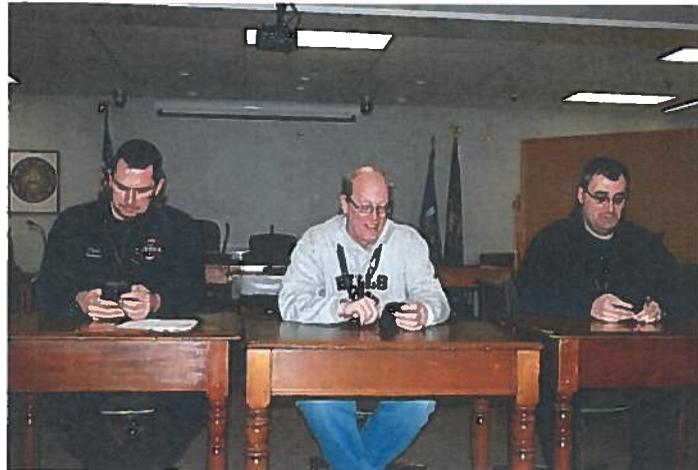
"This is not a gas leak that is occurring within the city. The gas company Liberty Utilities had a power issue at their plant and we refer to it as they were making bad gas or a high BTU gas."

Howard said at least one person has been hospitalized because of the emergency.

The danger is of suffocation because of the high levels of BYUs in the gas, Howard said.

The emergency is taking place within a two-square mile radius of Main Street downtown, he said.

"Anybody that smells gas and is a customer of Liberty Utilities or the city



(/storyimage/UL/20151220/NEWS07/151218996/AR/0/AR-151218996.jpg?q=100)

Keene officials keep an eye on the rapidly unfolding emergency in the city stemming from a Liberty Utilities plant in the city. (MEGHAN PIERCE/UNION LEADER CORRESPONDENT)



(/storyimage/UL/20151220/NEWS07/151218996/EP/1/1/EP-151218996.jpg?q=100)

Swansey firefighters Tyke Frasier, Brendan West and Rob Herrick in-between door-to-door stops on Roxbury Street in Keene Saturday evening as Keene and mutual aid fire crews along with Liberty Gas Company check each of the city's 1,200 gas company customers. (MEGHAN PIERCE/UNION LEADER CORRESPONDENT)



Related Stories

gas system should call 911 if they haven't already.

Anybody who is a customer of Liberty Utilities, again the city underground system, should be opening windows in their homes and ventilating their homes," Howard said.

"Unless you have CO monitors within your home you could have CO readings within your business or with your home."

Keene carbon monoxide scare probed (/Keene-carbon-monoxide-scare-probed)

3 people hospitalized as of Saturday evening due to carbon monoxide poisoning in Keene (/3-people-hospitalized-as-of-Saturday-evening-due-to-carbon-monoxide-poisoning-in-Keene)

Keene gas emergency coming to an end (/article/20151220/NEWS07/151218979)

The state's emergency staff are on standby and a Public Utilities Commission representative is on their way to the city.

Fire crews will soon be going home to home and business to business to check on each gas customer, Howard said.

"Currently we are working with Liberty Utilities and the fire department staff. We're still actively responding to 911 calls and we're still taking calls for odors of gas in buildings. Along with CO emergencies," Howard said. "We've put the hospital on stand by for level two for CO emergencies."

More information will be made available at 3 p.m., he said.

Howard said at least one person has been hospitalized because of the emergency.

The danger is of suffocation because of the high levels of BTUs in the gas, Howard said.

"We are asking neighbors to check on neighbors," said Kurt Blomquist, Keene Public Work Director/ Emergency Management Director. "If you know you have an elderly neighbor you haven't seen in a while, knock on their door and make sure they are alright."

The six-alarm has brought in 33 engine companies, 3 ladder companies, and 11 ambulances into the city, Howard said.

December 19. 2015 6:52PM

## 3 people hospitalized as of Saturday evening due to carbon monoxide poisoning in Keene

KEENE — As the sun set in Keene on Saturday, firefighters were going door to door to every Liberty Utilities customer to check for carbon monoxide poisoning.

The city has 1,200 Liberty Utilities customers, Keene Fire Chief Mark Howard said.

As of Saturday night, the fire department had received more than 80 calls for the smell of gas. It is not, however, a gas leak, Howard said, but high amounts of carbon monoxide in the city's gas.

Three people experiencing carbon monoxide poisoning had been hospitalized as of Saturday, Howard said. "It's an odorless, colorless gas, carbon monoxide, referred to as a silent killer. It can be lethal if exposed to over time."

Symptoms of carbon monoxide poisoning are, lightheadedness, dizziness



(/storyimage/UL/20151220/NEWS07/151218985/AR/0/AR-151218985.jpg?q=100)

Keene Fire Chief Mark Howard and Kurt Blomquist, Keene Public Work Director/ Emergency Management Director, give an update on a gas emergency in Keene Saturday. (Meghan Pierce)



(/storyimage/UL/20151220/NEWS07/151218985/EP/1/1/EP-151218985.jpg?q=100)

Liberty Utilities spokesman Michael Licata gives an update on a gas emergency in Keene Saturday with Keene emergency management director Kurt Blomquist and district chief of NH state fire marshal's office Tom Riley. (Meghan Pierce)

or confusion, Howard said.

The gas emergency started with a power outage around 9 a.m., said Michael Licata, Liberty Utilities director of government and community relations. "We're not positive the outage caused the issue. We're still investigating," he said Saturday afternoon, "What we are sure of is at some point, the blower that mixed air into the propane tripped and was no longer blending air with the mixture."

That caused ineffective combustion, he said.

Later Saturday, Liberty Utilities spokesman John Shore said "the issue that caused the problem at the plant has been resolved."

The alteration in the mixture of propane and air meant the fuel carried more energy, he said. Because a furnace or appliance may not completely burn the fuel with the different propane-air ratio, that appliance or furnace may release carbon monoxide into a building, Shore said.

Shore didn't know how many downtown businesses were affected or how much money merchants might have lost in Christmas shopping sales.



[\(/storyimage/UL/20151220/NEWS07/151218985/EP/1/2/EP-151218985.jpg?q=100\)](#)

Liberty Utilities and firefighters begin going door-to-door during a gas emergency in the city Saturday. (Meghan Pierce)



[\(/storyimage/UL/20151220/NEWS07/151218985/EP/1/3/EP-151218985.jpg?q=100\)](#)

Saturday firefighters responded to 80 calls for service related to the gas emergency and at least three people were taken the emergency room for symptoms of exposure to carbon monoxide. (Meghan Pierce)

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[Six-alarm emergency in Keene due to gas leak from Liberty Utilities plant \(/article/20151220/NEWS07/151218996\)](#)

[Keene gas emergency coming to an end \(/article/20151220/NEWS07/151218979\)](#)

Asked about assisting customers who lost sales, Shore said: "I know we'll do right by the customers. That's something that will have to be examined."

As of 5 p.m. Saturday, fire crews from Keene and the area, in conjunction with Liberty Utilities personnel, were 15 percent through their inspection of 1,250 gas company customers, Howard said.

A group of Swanzey firefighters said they had already interrupted several Christmas parties and had just checked on a home where the family had been cooking a roast in their gas oven all day with no issues.

The gas emergency encompassed a 2-square-mile area out from Main Street, causing several downtown business to close, including restaurants.

Many people who had come downtown to enjoy lunch and then go Christmas shopping wandered downtown confused by the closures.

One shopper said every time she left a downtown store it had to be evacuated. Businesses that were open couldn't use their gas, including stoves and heat.

Howard said an emergency shelter was opened at the city recreation center on Washington Street for Liberty Utilities customers without heat.

1-F Various Media Reports describing the Event

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# UPDATE: Liberty Utilities: no gas leak in Keene, but elevated risk of carbon monoxide symptoms

**NH1.com**

KEENE - A spokesman for Liberty Utilities says the citywide gas emergency on Saturday is not due to a leak, but to a problem with the mixture of gas created at the Keene production facility.

"The mixture created gas that has elevated levels of carbon monoxide," said John Shore, a spokesman for Liberty Utilities.

The mixture also has a stronger odor than the gas that's normally produced, leading to multiple calls from residents who smelled gas, he said. The problem is restricted to Keene customers.

"If you do smell gas, or if you experience symptoms of high levels of carbon monoxide, open your windows and move to fresh air," Shore said.

Symptoms include headaches, dizziness, weakness, nausea and visual problems like seeing spots.



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### 1-F Various Media Reports describing the Event

Shore said the problem is being addressed, and crews continued to work in Keene late morning and early afternoon. Anyone Keene customers experiencing problems with their natural gas can call 603-352-1230.

"The Keene Fire Department urges anyone that smells natural gas to call the Fire Department. If you have a problem with a natural gas appliance, shut off the gas, evacuate the building and call the Fire Department. We are currently working with several agencies and are identifying and correcting the problem," the fire department said in a statement.

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## Some report symptoms of carbon monoxide exposure; Keene residents warned

*Residents asked to call 911 if they experience CO exposure symptoms*

UPDATED 11:48 PM EST Dec 19, 2015

### KEENE, N.H. -

Liberty Utilities customers in Keene are being warned about the possibility of elevated carbon monoxide levels in their homes after an issue at a plant in the city.

[Watch News 9's coverage.](#)

The State Emergency Operations Center was activated due to the situation in Keene.

[Watch as officials update the situation in Keene.](#)

Residents and visitors of Keene are encouraged to call 911 if they smell gas or experience weakness, headache and/or dizziness, which could be related to carbon monoxide exposure. If their carbon monoxide detector goes off, residents are encouraged to leave their home and call 911.

"If they can smell gas in their buildings or in their homes they should be calling 911, they should be opening their windows, and they should be vacating the house. If they are having any symptoms potentially of, related to light-headedness or being dizzy or confused. And if you are home alone, that's going to be hard to determine that," said Chief Mark Howard of the Keene Fire Department.

Three people were taken to local hospitals with symptoms of carbon monoxide exposure. At least two other people also checked themselves into the hospital with similar symptoms.

Residents who are serviced by Liberty Utilities and are within a two-mile radius of Main Street are urged to open their windows and check on their neighbors.

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"At some point, the blower that puts that air into that mixture tripped and was no longer putting air into the mixture, so we were just having propane into the mixture," said Michael Lacotta of Liberty Utilities.

#### 1-F Various Media Reports describing the Event

The plant's safety system detected the change in the mixture, which led to the notifications of company officials and emergency workers.

As of 5 p.m., Keene fire officials were continuing to go door to door to check on Liberty Utilities customers in the city. No issues have been discovered as of yet.

Keene officials are also in the process of determining customer locations where the gas supply had been turned off because of high carbon monoxide readings. Crews will eventually return to those areas to reactivate the gas supply.

Customers are encouraged to call Liberty Utilities at 603-352-1230 if they experience any problems with their service.

The Red Cross is opening a shelter for residents displaced in Keene. The shelter is located at 312 Washington Street.

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## CHAPTER 21-P DEPARTMENT OF SAFETY

### Section 21-P:12

**21-P:12 Division of Fire Safety.** – There is established within the department a division of fire safety. Such division shall be under the supervision of an unclassified director who shall be known as the state fire marshal. The state fire marshal shall be nominated by the commissioner of safety, after consultation with the state advisory board of fire control, for appointment by the governor, with the consent of the council, and shall serve a term of 4 years until a successor is appointed. If no successor has been appointed with the consent of the council within 6 months of the expiration of the term, the governor shall appoint a successor with the consent of the council. The state fire marshal shall be academically and technically qualified to hold the position. The state fire marshal shall be a citizen of this state or become a citizen of this state within one year of his or her appointment. He or she shall devote his or her entire time to the duties of the division of fire safety and shall receive the salary specified in RSA 94:1-a for the state fire marshal. The state fire marshal shall be responsible for the following functions, in accordance with applicable law:

I. Investigation of the causes and circumstances of fires.

II. Fire safety regulations and education.

III. Coordination of state agency response to accidents involving hazardous materials, and regulation of liquid propane gas pipelines safety, except propane gas pipelines regulated by the public utilities commission pursuant to RSA 362. The director, with the approval of the commissioner, shall appoint a hazardous materials incident response coordinator who shall assist local incident commanders with command, logistics, and resources, coordinate the training and procedures of the state's regional hazardous materials response teams in all areas of the state, oversee the preparedness of the hazardous materials response teams and assist local communities in their efforts to obtain reimbursement for emergency responses pursuant to RSA 154:8-a, II-a.

III-a. Administration of the modular building standards program under RSA 205-C.

IV. Carrying out all other functions assigned to him in RSA 153 or any other provision of law.

V. [Repealed.]

VI. [Repealed.]

VII. Administration, supervision, and enforcement of RSA 153:27-38. There is hereby established within the department of safety a bureau of building safety and construction under the supervision of the state fire marshal, which shall include the mechanical safety staff.

VIII. Provision of clerical support for the state advisory board of fire control.

**Source.** 1987, 124:1. 1989, 388:1, 11. 1994, 389:8. 2002, 220:1; 257:1, 5. 2003, 319:102, 131, III. 2004, 171:24. 2005, 122:1; 177:104, 105. 2006, 206:1. 2011, 11:5, eff. April 25, 2011. 2012, 237:7, II, eff. June 4, 2013. 2013, 275:1, eff. July 1, 2013.

## CHAPTER 154 FIREWARDS, FIREFIGHTERS, AND FIRE HAZARDS

### Firewards, Fire Chiefs and Fire Departments; Organization, Powers and Duties

#### Section 154:8-a

**154:8-a Liability Concerning Hazardous Materials Accidents.** – Notwithstanding any other provision of law, no person who provides assistance or advice in mitigating or attempting to mitigate the effects of an actual or threatened discharge of hazardous materials or wastes or in preventing, cleaning up, or disposing of or in attempting to prevent, clean up or dispose of any such discharge shall be subject to civil liabilities or penalties of any kind, providing that such assistance or advice is rendered at the request of state, county or local officials in charge at the emergency scene.

I. The immunities provided in this section shall not apply to any person:

(a) Whose act or omission caused in whole or in part such actual or threatened discharge and who would otherwise be liable therefor; or

(b) Who receives compensation other than reimbursement for out-of-pocket expenses for services in rendering such assistance or advice.

II. Definitions. As used in this section:

(a) "Discharge" shall include leakage, seepage, or other release of hazardous materials or wastes.

(b) "Hazardous materials" means hazardous materials as defined in RSA 147-B:2, VIII.

(c) "Wastes" means wastes as defined in RSA 147-B:2, VII.

II-a. (a) Any person whose act or omission caused the actual or threatened discharge of hazardous materials or toxic wastes which resulted in the reasonable and proportionate response of police, fire, emergency preparedness, or emergency response equipment shall be responsible for payment of the cost of the equipment use or replacement of the equipment used, if damaged or expended, in containing the hazardous materials or toxic wastes.

(b) Any person whose act or omission caused the actual or threatened discharge of hazardous materials or toxic wastes which resulted in the reasonable and proportionate response of police, fire, emergency preparedness, or emergency response equipment shall be responsible for payment of the personnel costs of police, fire, public safety, and municipal personnel, including mutual aid standby personnel, directly involved in the emergency response and any reasonable court costs and legal fees incurred by the municipality, organization, or mutual aid district in collecting costs or defending an unsuccessful appeal of such costs.

(c) The response to fires or other emergencies where the discharge of hazardous materials is incidental to the fire or other emergency and does not require the use of specialized hazardous materials response equipment or personnel specially trained pursuant to 40 C.F.R. section 311 shall not be costs eligible for reimbursement.

(d) Within 30 days after the equipment leaves the site of the incident, the municipality, organization, or mutual aid district which seeks payment shall submit a bill for cost of equipment use, equipment cleanup, or equipment replacement and the costs of personnel, if applicable, to the person responsible for the equipment contamination under subparagraph (a) and the costs of personnel under

**1-G Haz Material Federal Classifications and applicable New Hampshire Hazardous Material Incident RSAs**

subparagraph (b). At the time of billing, the municipality, organization, or mutual aid district which seeks payment shall notify the billed party that an appeal may be filed with the commissioner of safety within 30 days of the receipt of the bill. Payment shall be made directly to the municipality, to the organization, or to the mutual aid district. A municipality, organization, or mutual aid district within whose jurisdiction the incident occurs is authorized to collect payment on behalf of the municipalities, organizations, or mutual aid districts that participated in the response and to disburse payment accordingly.

(e) The person responsible for the equipment contamination may appeal payment for such costs within 30 days of receipt of the bill for the costs to the commissioner of safety. The commissioner shall hold an administrative hearing within 30 days after receiving the appeal, at which time the extent of liability for costs shall be determined. The commissioner shall issue a decision within 30 days after holding the hearing. Any person aggrieved by a decision of the commissioner under this section may appeal the decision to the superior court in the same manner as that prescribed in RSA 263:75, II and III.

(f) If no appeal is filed within 30 days after receipt of the bill, the person responsible for the hazardous materials response shall be deemed to have waived all rights to appeal and shall be liable to the municipality, organization, or mutual aid district for the total amount billed, subject to the additional penalty and interest set forth under subparagraph (h) in the case of nonpayment.

(g) The commissioner of safety shall establish rates for equipment use, supplies, and costs of personnel that shall be the maximum amount that may be charged by any municipality, organization, or mutual aid district in accordance with this section. The rates and costs, and guidelines for establishing them, shall be adopted pursuant to RSA 541-A. To the extent possible, the rates and costs shall reflect the actual expenses, including overhead costs, for emergency response to hazardous materials incidents for municipalities throughout the state.

(h) A one-time penalty of \$1,000 plus interest assessed at the rate of interest established in RSA 336:1, may be assessed for nonpayment.

III. Nothing in this section shall be construed to limit or otherwise affect the liability of any person for damages resulting from such person's gross negligence or from such person's willful, reckless or wanton misconduct.

**Source.** 1981, 413:4. 1983, 393:9. 1989, 91:1. 1992, 154:10. 1993, 28:10. 1998, 318:20; 367:1. 2003, 209:1. 2006, 102:1. 2010, 256:1-3, eff. Sept. 4, 2010.

# TITLE X

## PUBLIC HEALTH

### CHAPTER 147-B

### HAZARDOUS WASTE CLEANUP FUND

#### Section 147-B:2

**147-B:2 Definitions.** – In this chapter, the following words shall have the following meanings, unless the context otherwise requires:

I. [Repealed.]

I-a. "Borrower" means the obligor of an obligation secured by a mortgage interest, mortgage lien, or security interest in a facility.

I-b. "Automotive oil" means any lubricating oil, which is reclaimable, classified for use in an internal combustion engine, transmission, gear box or differential for a motor vehicle, boat, off highway recreational vehicle, or commercial or household power equipment.

I-c. "Commissioner" means the commissioner of the department of environmental services.

I-d. "Department" means the department of environmental services.

II. "Disposal" means the discharge, deposit, incineration, injection, dumping, spilling, leaking or placing of any waste into or onto any land or water so that the waste or any constituent of the waste may enter the environment, be emitted into the air, or be discharged into any waters, including groundwaters.

III. "Facility" means any site, area or location where hazardous waste or hazardous materials are or have been treated, stored, generated, disposed of, or otherwise come to be located.

III-a. (a) "Fiduciary" means a person:

(1) Who is acting in any of the following representative capacities, but only to the extent such person is acting in such representative capacity: an executor or administrator of an estate, including a voluntary executor or a voluntary administrator; a guardian; a conservator; a trustee under a will under which the trustee takes title to, or otherwise controls or manages, property for the purpose of protecting or conserving such property under the ordinary rules applied in the courts of the state of New Hampshire; a court-appointed receiver; a trustee appointed in proceedings under federal bankruptcy laws; an assignee or a trustee acting under an assignment made for the benefit of creditors; a trustee under a revocable or irrevocable donative or estate-planning inter vivos trust; or a trustee, pursuant to an indenture agreement or similar financing agreement, for debt securities, certificates of interest of participation in any such debt securities, or any successor thereto; and

(2) Who holds legal title to, controls, or manages, directly or indirectly, any facility as a fiduciary for purposes of administering an estate or trust of which such facility is a part.

(b) Any person or entity acting as trustee of a business trust, a realty trust, a real estate trust, a nominee trust, or any similar trust shall not be considered a "fiduciary" under this chapter.

III-b. "Foreclosure" means any foreclosure by a holder of a mortgage lien, or, in the case of a tax lien, the conveyance of property by tax deed by a municipality, county or state pursuant to the procedures of RSA 80:20-RSA 80:42-a or of RSA 80:58-RSA 80:86.

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IV. "Fund" means the New Hampshire hazardous waste cleanup fund.

V. "Generation" means the act of producing hazardous waste.

VI. "Generator" means any person who owns or operates a facility where hazardous waste is generated.

VII. "Hazardous waste" means a solid, semi-solid, liquid or contained gaseous waste, or any combination of these wastes:

(a) Which, because of either quantity, concentration, or physical, chemical, or infectious characteristics may:

(1) Cause or contribute to an increase in mortality or an increase in irreversible or incapacitating reversible illness; or

(2) Pose a present or potential threat to human health or the environment when improperly treated, stored, transported, disposed of or otherwise mismanaged.

(b) Or which has been identified as a hazardous waste by the department using the criteria established under RSA 147-A:3, I or as listed under RSA 147-A:3, II. Such wastes include, but are not limited to, those which are reactive, toxic, corrosive, ignitable, irritants, strong sensitizers or which generate pressure through decomposition, heat or other means. Such wastes do not include radioactive substances that are regulated by the Atomic Energy Act of 1954, as amended.

VIII. "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.

VIII-a. [Repealed.]

VIII-b. "Notice of lien" means an instrument signed on behalf of the commissioner, designating a particular facility or facilities and identifying the persons then deemed by the commissioner to be liable under this chapter with respect to each such facility and their mailing addresses, to the extent known to the commissioner, and declaring a lien upon the real and personal property of such persons for the payment of the amounts due or to become due from such persons to the state under this chapter; provided, however, that neither the failure to state any address nor the designation of an incorrect address shall invalidate such notice of lien; and provided further that successive notices of lien, naming the persons so deemed liable, may be issued. The notice of lien shall be in the following form:

**NOTICE OF LIEN**

NOTICE is hereby given that the Department of Environmental Services claims a lien against the persons identified below pursuant to RSA 147-B:10-b in the amount claimed:

Name/Address Location of Facility Amount

In accordance with RSA 147-B:10-b, this notice shall be recorded with \_\_\_\_\_ and shall constitute a lien against property of the person(s) identified above and shall have effect and priority in accordance with RSA 147-B:10-b upon recording of this notice of lien with the above

referenced department.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

DEPARTMENT OF ENVIRONMENTAL SERVICES

By: \_\_\_\_\_

VIII-c, VIII-d. [Repealed.]

VIII-e. "Holder" means a person who holds indicia of ownership primarily to protect a mortgage interest or security interest in real or personal property on or at the facility.

VIII-f. "Indicia of ownership" means evidence of a mortgage lien, a security interest, or other interests in real or personal property securing payment or performance of a loan or other obligation.

VIII-ff. "Mortgage interest" and "mortgage lien" mean a mortgage lien, tax lien, or other lien or encumbrance securing the payment of money or performance of an obligation.

VIII-g. "Participation in the management of a facility" means the actual participation by a holder in the management or operational affairs of the facility, including without limitation where a holder (i) exercises decision-making control over environmental compliance or (ii) exercises control at a level comparable to that of a manager of the enterprise with responsibility for day-to-day decision-making either with respect to environmental compliance or all or substantially all of the operational (as opposed to financial or administrative) aspects of the facility. The following types of activities, among others, shall not constitute participation in the management of a facility:

(a) Taking title to a facility by foreclosure, by accepting a deed to such facility in lieu of foreclosure or by other similar means, or the transfer or sale of such facility;

(b) Conducting, or requiring the borrower to conduct, an environmental assessment or audit of the facility;

(c) Withholding funds under an existing obligation or restructuring or renegotiating the terms of a borrower's obligations, including but not limited to, requiring the payment of interest, the extension of payment periods or the issuance of additional funds;

(d) Providing to the borrower financial advice;

(e) Requiring or advising the borrower to comply with federal, state or local laws, rules, regulations, orders or permits;

(f) Collecting rents, maintaining utility services and securing the facility from unauthorized entry; and

(g) Undertaking any cleanup action approved by the department.

VIII-h. "Primarily to protect a mortgage interest or security interest" means that the holder's indicia of ownership are held primarily for the purpose of securing the payment or performance of the loan or other obligation. The indicia of ownership held after foreclosure continues to be maintained primarily as protection for a security interest provided that the holder undertakes to sell, re-lease property held pursuant to a lease financing transaction (whether by a new lease financing transaction or substitution of the lessee), or otherwise divest itself of the property in a reasonably expeditious manner, using whatever commercially reasonable means are relevant or appropriate with respect to the facility, taking all facts and circumstances into consideration, and provided that the holder does not participate in management. A holder establishes that it is seeking to sell, re-lease or otherwise divest itself of the property following foreclosure and its equivalents by, within 5 months following foreclosure, listing the facility with a broker, dealer, or agent who deals with the type of property in question, or by advertising the facility as being for sale or disposition on at least a monthly basis in either a real estate publication or a trade or

**1-G Haz Material Federal Classifications and applicable New Hampshire Hazardous Material Incident RSAs**

other publication suitable for the facility in question, or a newspaper of general circulation covering the area where the property is located. The holder is entitled to a presumption that it is holding indicia of ownership primarily to protect a mortgage interest or security interest but if the holder does not divest itself of the property within 3 years, the holder bears the burden of showing compliance with this paragraph.

VIII-i. "Qualifying holder" means a holder who does not participate in the management of the facility.

IX. "Person" means any individual, trust, firm, joint stock company, corporation (including a government corporation), partnership, association, state, municipality, commission, United States government or any agency thereof, political subdivision of the state, or any interstate body.

IX-a. "Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment.

X. "Storage" means the containment of hazardous wastes, either on a permanent basis or on a temporary basis or for a period of years, in such a manner as not to constitute disposal of the hazardous wastes.

X-a. "Tax lien" means a tax lien arising under RSA 80:19, the rights acquired by the grantee in a tax sale pursuant to RSA 80:20-RSA 80:42-a, and a tax lien acquired or transferred pursuant to RSA 80:58-RSA 80:86.

XI. "Transportation" means the movement of hazardous wastes from the point of generation to any intermediate points and, finally, to the point of ultimate storage or disposal.

XI-a. "Transporter" means any person who transports hazardous waste.

XI-b. [Repealed.]

XII. "Treatment" means any process, including neutralization, designed to change the physical, chemical or biological character or composition of any hazardous waste so as to neutralize the waste or to render the waste not hazardous, safer for transport, amenable to recovery, amenable to storage or reduced in volume.

XIII. "Used oil" means any oil that has been refined from crude oil, or synthetic oil, which, through use or handling, has become unsuitable for its original purpose due to the presence of physical or chemical impurities or loss of original properties.

**Source.** 1981, 413:3. 1983, 227:4, 6, 20, I; 291:1, I. 1986, 119:2-5; 202:6, I(e), 29, VI. 1992, 178:1, 2; 263:1. 1993, 323:11-13. 1994, 199:16-19; 364:2, 3, 14, I, II. 1995, 216:3. 1996, 228:34, 35, 106, 107. 1999, 52:7, eff. July 20, 1999.



U.S. Department of Transportation  
Pipeline and Hazardous Materials Safety Administration

# DOT CHART 15

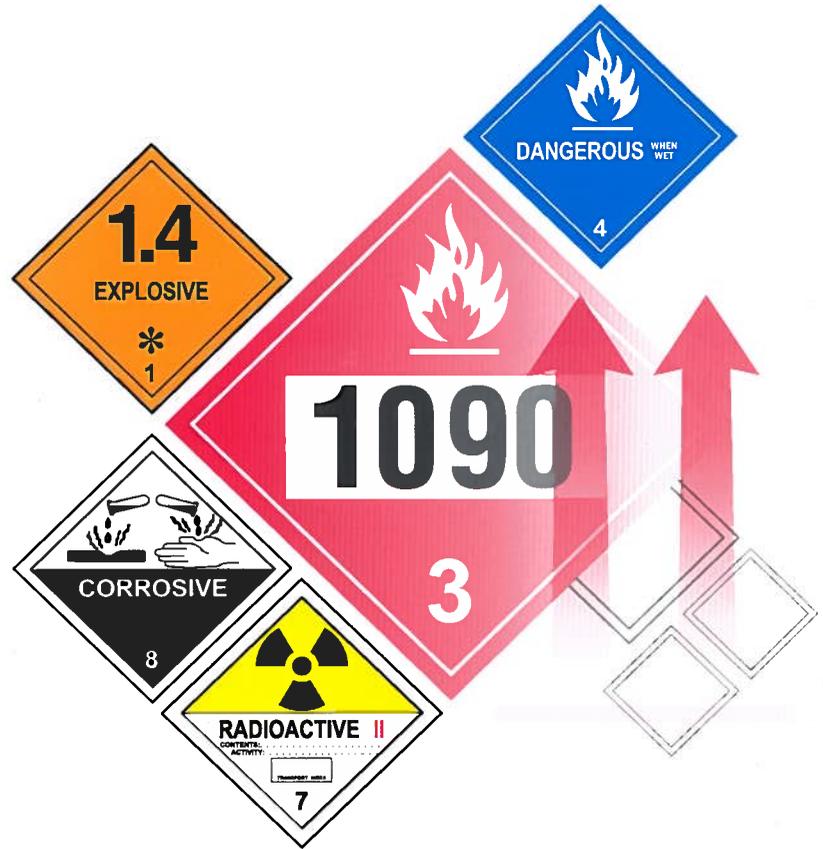
## Hazardous Materials Markings, Labeling and Placarding Guide

Refer to 49 CFR, Part 172:

Marking - Subpart D

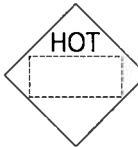
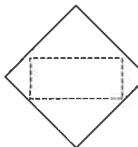
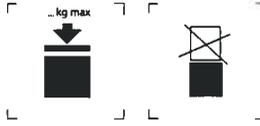
Labeling - Subpart E

Placarding - Subpart F



**NOTE:** This document is for general guidance only and should not be used to determine compliance with 49 CFR, Parts 100-185.

### HAZARDOUS MATERIALS MARKINGS

<p>Package Orientation (Red or Black)</p>  <p>or</p>  <p>§172.312(a)</p>	<p>Keep Away from Heat</p>  <p>§172.317</p>	<p>OVERPACK</p>  <p>§173.25(a)(4)</p>	<p>Fumigant Marking (Red or Black)</p>  <p>§172.302(g) and §173.9</p>	<p>INHALATION HAZARD</p>  <p>§172.313(a)</p>	<p>HOT</p>  <p>§172.325</p>	<p>Biological Substances, Category B</p>  <p>§172.332(a)</p>	<p>UN3373</p>  <p>§173.199 (a)(5)</p>
<p>Limited Quantity*</p> <p>All other Modes</p>  <p>NEW</p> <p>Air Only</p>  <p>§172.315</p>	<p>ORM-D, Transition December 31, 2020</p> <p>CONSUMER COMMODITY</p>  <p>§172.316</p>	 <p>§172.316</p>	<p>Excepted Quantity</p>  <p>§173.4a(g)</p>	<p>Marking of IBCs</p>  <p>§178.703(b)(7)(i)</p>	<p>Marine Pollutant</p>  <p>§172.322</p>		

\* The limited quantity marking designates hazardous materials packages meeting the requirements for transportation as a limited quantity by air (Y mark) and packages meeting the requirements for transport as a limited quantity by surface modes (no Y). A Y-marked package meeting the requirements for transport by air may be transported by all modes. In some instances, packages bearing the surface mark (no Y) may also be acceptable for transport by air provided the packages meet all relevant requirements for air transport. For example, ammunition of UN0012, UN0014, or UN0055.

# Hazardous Materials Warning Labels

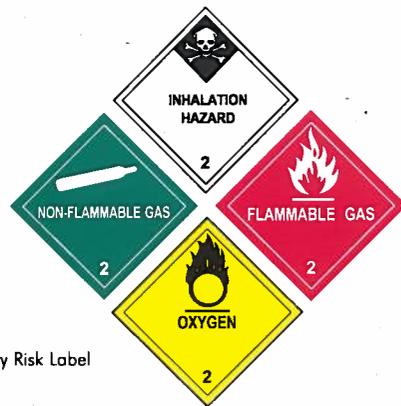
Actual label size: at least 100 mm (3.9 inches) on all sides

## CLASS 1 Explosives: Divisions 1.1, 1.2, 1.3, 1.4, 1.5, 1.6



§172.411

## CLASS 2 Gases: Divisions 2.1, 2.2, 2.3



§172.405(b), §172.415, §172.416, §172.417

## CLASS 3 Flammable Liquid



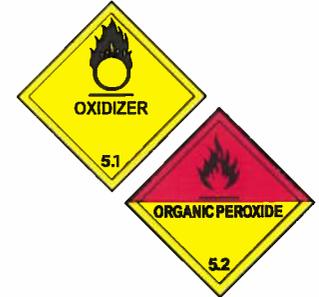
§172.419

## CLASS 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet: Divisions 4.1, 4.2, 4.3



§172.420, §172.422, §172.423

## CLASS 5 Oxidizer, Organic Peroxide: Divisions 5.1 and 5.2

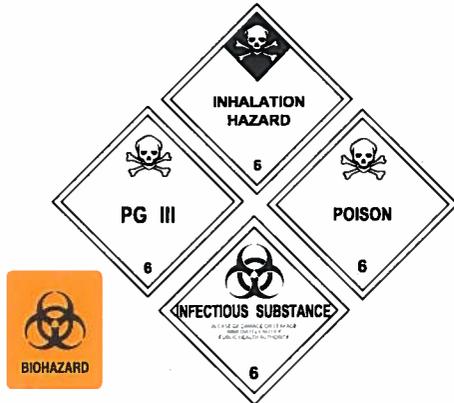


§172.426, §172.427

\* Include compatibility group letter.

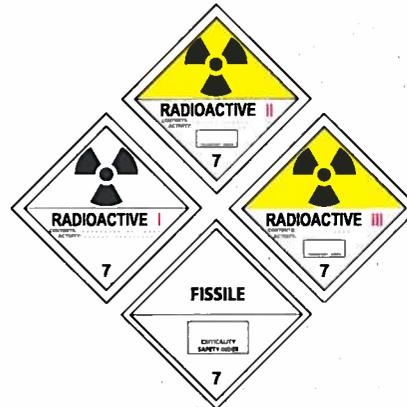
\*\* Include division number and compatibility group letter.

## CLASS 6 Poison (Toxic), Poison Inhalation Hazard, Infectious Substance: Divisions 6.1 and 6.2



§172.323, §172.405(c), §172.429, §172.430, §172.432

## CLASS 7 Radioactive



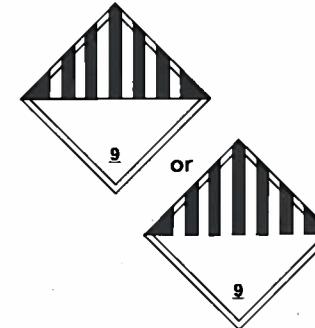
§172.436, §172.438, §172.440, §172.441

## CLASS 8 Corrosive



§172.442

## CLASS 9 Miscellaneous Hazardous Material



§172.446

## Cargo Aircraft Only



§172.448

## Empty Label



§172.450

For Regulated Medical Waste (RMW), an Infectious Substance label is not required on an outer packaging if the OSHA Biohazard marking is used as prescribed in 29 CFR 1910.1030(g). A bulk package of RMW must display a BIOHAZARD marking.

# Hazardous Materials Warning Placards

Actual placard size: at least 250 mm (9.84 inches) on all sides

## CLASS 1 Explosives



§172.522  
§172.523  
§172.524  
§172.525

\* For Divisions 1.1, 1.2, or 1.3, enter division number and compatibility group letter, when required; placard any quantity. For Divisions 1.4, 1.5, and 1.6, enter compatibility group letter, when required; placard 454 kg (1,001 lbs) or more.

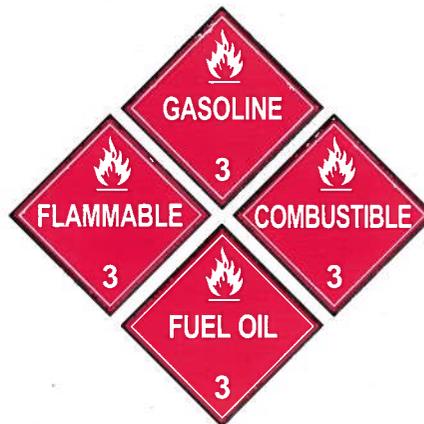
## CLASS 2 Gases



§172.528  
§172.530  
§172.532  
§172.540

For NON-FLAMMABLE GAS, OXYGEN (compressed gas or refrigerated liquid), and FLAMMABLE GAS, placard 454 kg (1,001 lbs) or more gross weight. For POISON GAS (Division 2.3), placard any quantity.

## CLASS 3 Flammable Liquid and Combustible Liquid



§172.542  
§172.544

For FLAMMABLE, placard 454 kg (1,001 lbs) or more. GASOLINE may be used in place of FLAMMABLE placard displayed on a cargo tank or portable tank transporting gasoline by highway. Placard combustible liquid transported in bulk. See §172.504(f)(2) for use of FLAMMABLE placard in place of COMBUSTIBLE. FUEL OIL may be used in place of COMBUSTIBLE on a cargo or portable tank transporting fuel oil not classed as a flammable liquid by highway.

## CLASS 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet



§172.546, §172.547, §172.548

For FLAMMABLE SOLID and SPONTANEOUSLY COMBUSTIBLE, placard 454 kg (1,001 lbs) or more. For DANGEROUS WHEN WET (Division 4.3), placard any quantity.

## CLASS 5 Oxidizer & Organic Peroxide



Organic Peroxide, Transition-2011 (rail, vessel, and aircraft) 2014 (highway)

§172.550, §172.552

For OXIDIZER and ORGANIC PEROXIDE (other than TYPE B, temperature controlled), placard 454 kg (1,001 lbs) or more. For ORGANIC PEROXIDE (Division 5.2), Type B, temperature controlled, placard any quantity.

## CLASS 6 Poison (Toxic) and Poison Inhalation Hazard



§172.504(f)(10), §172.554, §172.555

For POISON (PGI or PGII, other than inhalation hazard) and POISON (PGIII), placard 454 kg (1,001 lbs) or more. For POISON-INHALATION HAZARD (Division 6.1), inhalation hazard only, placard any quantity.

## CLASS 7 Radioactive



§172.556

Placard any quantity - packages bearing RADIOACTIVE YELLOW-III labels only. Certain low specific activity radioactive materials in "exclusive use" will not bear the label, but the radioactive placard is required for exclusive use shipments of low specific activity material and surface contaminated objects transported in accordance with §172.504(e) Table 1 and §173.427(a)(6).

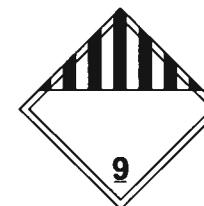
## CLASS 8 Corrosive



§172.558

For CORROSIVE, placard 454 kg (1,001 lbs) or more.

## CLASS 9 Miscellaneous



§172.560

Not required for domestic transportation. A bulk packaging containing a Class 9 material must be marked with the appropriate ID number displayed on a Class 9 placard, an orange panel, or a white square-on-point display.

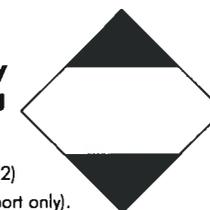
## Dangerous



§172.521

A freight container, unit load device, transport vehicle, or rail car which contains non-bulk packages with two or more categories of hazardous materials that require different placards specified in Table 2 §172.504(e) may be placarded with DANGEROUS placards instead of the specific placards required for each of the materials in Table 2. However, when 1,000 kg (2,205 lbs) or more of one category of material is loaded at one loading facility, the placard specified in Table 2 must be applied.

## Limited Quantity Marking



§172.315(a)(2)  
(Vessel transport only).

**LABELS**

See 49 CFR, Part 172, Subpart E, for complete labeling regulations.

- The Hazardous Materials Table [§172.101, Col. 6] identifies the proper label(s) for the hazardous material listed.
- Any person who offers a hazardous material for transportation **MUST** label the package, if required [§172.400(a)].
- Labels may be affixed to packages when not required by regulations, provided each label represents a hazard of the material contained in the package [§172.401].
- For labeling mixed or consolidated packages, see §172.404.
- The appropriate hazard class or division number must be displayed in the lower corner of a primary and subsidiary hazard label [§172.402(b)].
- For classes 1,2,3,4,5,6, and 8, text indicating a hazard (e.g., "CORROSIVE") is **NOT** required on a primary or subsidiary label. The label must otherwise conform to Subpart E of Part 172 [§172.405].
- Labels must be printed on or affixed to the surface of the package near the proper shipping name marking [§172.406(a)].
- When primary and subsidiary labels are required, they must be displayed next to each other [§172.406(c)].
- For a package containing a Division 6.1, PG III material, the POISON label specified in §172.430 may be modified to display the text PG III instead of POISON or TOXIC. Also see §172.405(c).
- The ORGANIC PEROXIDE label [§172.427] indicates that organic peroxides are highly flammable. Use of the ORGANIC PEROXIDE label eliminates the need for a flammable liquid subsidiary label. The color of the border must be black and the color of the flame may be black or white.

**PLACARDS**

See 49 CFR, Part 172, Subpart F, for complete placarding regulations.

- Each person who offers for transportation or transports any hazardous material subject to the Hazardous Materials Regulations must comply with all applicable requirements of Subpart F [§172.500].
- Placards may be displayed for a hazardous material, even when not required, if the placarding otherwise conforms to the requirements of Subpart F of Part 172 [§172.502(c)].
- For other than Class 7 or the DANGEROUS placard, text indicating a hazard (e.g., "FLAMMABLE") is not required. Text may be omitted from the OXYGEN placard only if the specific ID number is displayed on the placard [§172.519(b)(3)].
- For a placard corresponding to the primary or subsidiary hazard class of a material, the hazard class or division number must be displayed in the lower corner of the placard [§172.519(b)(4)].
- Except as otherwise provided, any bulk packaging, freight container, unit load device, transport vehicle or rail car containing any quantity of material listed in Table 1 must be placarded [§172.504].
- When the aggregate gross weight of all hazardous materials in non-bulk packages covered in Table 2 is less than 454 kg (1,001 lbs), no placard is required on a transport vehicle or freight container when transported by highway or rail [§172.504(c)].
- Notes: See §172.504(f)(10) for placarding Division 6.1, PG III materials.
- Placarded loads require registration with USDOT. See §107.601 for registration regulations.
- The new ORGANIC PEROXIDE placard became mandatory 1 January 2011 for transportation by rail, vessel, or aircraft and becomes mandatory 1 January 2014 for transportation by highway. The placard will enable transport workers to readily distinguish peroxides from oxidizers [§172.552].

**PLACARDING TABLES**

[§172.504(e)]

TABLE 1

Category of material (Hazard Class or division number and additional description, as appropriate)	Placard name
1.1.....	EXPLOSIVES 1.1.....
1.2.....	EXPLOSIVES 1.2.....
1.3.....	EXPLOSIVES 1.3.....
2.3.....	POISON GAS.....
4.3.....	DANGEROUS WHEN WET.....
5.2 (Organic peroxide, Type B, liquid or solid, temperature controlled).....	ORGANIC PEROXIDE.....
6.1 (Materials poisonous by inhalation (see §171.8)).....	POISON INHALATION HAZARD.....
7 (Radioactive Yellow III label only).....	RADIOACTIVE <sup>1</sup> .....

<sup>1</sup>RADIOACTIVE placard also required for exclusive use shipments of low specific activity material and surface contaminated objects transported in accordance with §173.427(b)(4) and (5) or (c) of the subchapter.

TABLE 2

Category of material (Hazard Class or division number and additional description, as appropriate)	Placard name
1.4.....	EXPLOSIVES 1.4.....
1.5.....	EXPLOSIVES 1.5.....
1.6.....	EXPLOSIVES 1.6.....
2.1.....	FLAMMABLE GAS.....
2.2.....	NON-FLAMMABLE GAS.....
3.....	FLAMMABLE.....
Combustible Liquid.....	COMBUSTIBLE.....
4.1.....	FLAMMABLE SOLID.....
4.2.....	SPONTANEOUSLY COMBUSTIBLE.....
5.1.....	OXIDIZER.....
5.2 (Other than organic peroxide, Type B, liquid or solid, temperature controlled).....	ORGANIC PEROXIDE.....
6.1 (Other than materials poisonous by inhalation).....	POISON.....
6.2.....	(None).....
8.....	CORROSIVE.....
9.....	Class 9 (See §172.504(f)(9)).....
ORM-D.....	(None).....

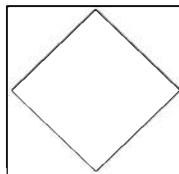
**IDENTIFICATION NUMBER DISPLAYS**



§172.332

Appropriate placard must be used with orange panel.

IDENTIFICATION NUMBER MARKINGS ON ORANGE PANELS OR APPROPRIATE PLACARDS MUST BE DISPLAYED ON: (1) Tank Cars, Cargo Tanks, Portable Tanks, and other Bulk Packagings; (2) Transport vehicles or freight containers containing 4,000 kg (8,820 lbs) in non-bulk packages of only a single hazardous material having the same proper shipping name and identification number loaded at one facility and transport vehicle contains no other material, hazardous or otherwise; and (3) transport vehicles or freight containers containing 1,000 kg (2,205 lbs) of non-bulk packages of materials poisonous by inhalation in Hazard Zone A or B. See §§172.301(a)(3), 172.313(c), 172.326, 172.328, 172.330, and 172.331.



§172.527

Square white background required for placard for highway route controlled quantity radioactive material and for rail shipment of certain explosives and poisons, and for flammable gas in a DOT 113 tank car [§172.507 and §172.510].

This Chart is available online at the following link:  
<http://phmsa.dot.gov/hazmat>



**U.S. Department of Transportation**  
**Pipeline and Hazardous Materials Safety Administration**

USDOT/PHMSA/OHMIT/PHH-50  
 1200 New Jersey Avenue, SE  
 Washington, D.C. 20590  
 Phone: (202) 366-4900  
 Email: training@dot.gov

PHH50-0143-0214

## Pipeline Failure Investigation Report

**Pipeline System:** Keene Distribution System      **Operator:** Liberty Keene Division  
**Operator ID:** 31265      **Unit Number:** \_\_\_\_\_      **Activity Number:** \_\_\_\_\_  
**Location:** 80 Pearl St Keene NH 03431      **Date of Occurrence:** December 19, 2015  
**Material Released:** None      **Quantity:** NA  
**PHMSA Arrival Time & Date:** 12/19/15 3:30 pm      **Total Damages \$:** \_\_\_\_\_  
**Investigation Responsibility:**     State     PHMSA     NTSB     Other \_\_\_\_\_

<i>Company Reported Apparent Cause:</i>	<i>Company Reported Sub-Cause (from PHMSA Form 7000-1/7100.2):</i>
<input type="checkbox"/> Corrosion	
<input type="checkbox"/> Natural Force Damage	
<input type="checkbox"/> Excavation Damage	
<input type="checkbox"/> Other Outside Force Damage	
<input type="checkbox"/> Material Failure (Pipe, Joint, Weld)	
<input checked="" type="checkbox"/> Equipment Failure	Propane/Air plant malfunction injected high BTU mixture
<input type="checkbox"/> Incorrect Operation	
<input type="checkbox"/> Other	

<i>Accident/Incident Resulted in (check all that apply):</i>	<i>Comments:</i>
<input type="checkbox"/> Rupture	
<input type="checkbox"/> Leak	
<input type="checkbox"/> Fire	
<input type="checkbox"/> Explosion	
<input checked="" type="checkbox"/> Evacuation	Number of Persons: <u>0</u> Area: _____

<i>Narrative Summary</i>
<p>Short summary of the Incident/Accident scenario</p> <p>At approximately 8:50 am the Propane/Air plant went into alarm it was injecting a high BTU mix (exact BTU unknown but estimated to be greater than 2,000BTUs) into the system. The system consists of 30.06 miles of main &amp; 876 services with operating pressures of 3.5psi and 13.5 inches of water column. The plant produces the propane/air mix with a forced air system using blowers to induce air into the mixing jets. The standard mix produces an approximate 740 btu output. According to Liberty, on 12/19/2015 the system blowers had reacted to voltage fluctuations and shutdown and the system did not react as designed which resulted in a high propane/air btu mixture in the distribution system. Typically when the blowers go off line the system is designed to revert back to an atmospheric air injection by lowering the pressures in the system and changing the jet on off sequence (“stepping”) to maintain an acceptable btu level until the blowers can be brought back on line. The system apparently did not recognize the blowers had stopped working and the jets were compensating for the lower pressure within the system with additional propane and resulted in a very high btu gas mixture. This mixture was injected for about 28 minutes of pure propane and 29 minutes of propane with limited air volumes before it was corrected this resulted in incomplete combustion and high CO levels at some customer locations. The fire department responded and shut more than 100 customers off. The situation was corrected by purging several of the mains back into service, turning on meters for certain amount of customers, checking CO levels at each customer and relighting customer appliance.</p>

**Region/State:** Eastern Region/ New Hampshire      **Reviewed by:** R Knepper  
**Principal Investigator:** D Burnell and J Vercellotti      **Title:** Director of Safety  
**Date:** Dec 22, 2015      **Date:** March 28, 2016

**Pipeline Failure Investigation Report**

<b>Failure Location &amp; Response</b>																																			
Location (City, Township, Range, County/Parish): Keene, NH			(Acquire Map)																																
Address or M.P. on Pipeline: Liberty Utilities 207 Emerald St Keene, NH 03431		(1)	Type of Area (Rural, City): City is the Type of Area																																
Coordinates of failure location (Latitude): 42.930812		(Longitude): -72.285980																																	
Date: 12.19.15		Time of Failure: 8:50 am																																	
Time Detected: 8:51 am		Time Located: 9:03 am																																	
How Located:	System has SCADA monitoring point alarm levels on the unattended plant which notified the Control Room who relayed information to field technician																																		
NRC Report #: 1136250	(Attach Report)	Time Reported to NRC: 12/19/2015 20:39	Reported by: Liberty Utilities																																
<b>Type of Pipeline:</b>																																			
<table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: left;">Gas Distribution</th> <th style="text-align: left;">Gas Transmission</th> <th style="text-align: left;">Hazardous Liquid</th> <th style="text-align: left;">___ LNG</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> LP</td> <td><input type="checkbox"/> Interstate Gas</td> <td><input type="checkbox"/> Interstate Liquid</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Municipal</td> <td><input type="checkbox"/> Intrastate Gas</td> <td><input type="checkbox"/> Intrastate Liquid</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/> Public Utility</td> <td><input type="checkbox"/> Gas Gathering</td> <td><input type="checkbox"/> Offshore Liquid</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Master Meter</td> <td><input type="checkbox"/> Offshore Gas</td> <td><input type="checkbox"/> Liquid Gathering</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> Offshore Gas - High H<sub>2</sub>S</td> <td><input type="checkbox"/> CO<sub>2</sub></td> <td></td> </tr> <tr> <td></td> <td></td> <td><input type="checkbox"/> Low Stress Liquid</td> <td></td> </tr> <tr> <td></td> <td></td> <td><input type="checkbox"/> HVL</td> <td></td> </tr> </tbody> </table>				Gas Distribution	Gas Transmission	Hazardous Liquid	___ LNG	<input type="checkbox"/> LP	<input type="checkbox"/> Interstate Gas	<input type="checkbox"/> Interstate Liquid		<input type="checkbox"/> Municipal	<input type="checkbox"/> Intrastate Gas	<input type="checkbox"/> Intrastate Liquid		<input checked="" type="checkbox"/> Public Utility	<input type="checkbox"/> Gas Gathering	<input type="checkbox"/> Offshore Liquid		<input type="checkbox"/> Master Meter	<input type="checkbox"/> Offshore Gas	<input type="checkbox"/> Liquid Gathering			<input type="checkbox"/> Offshore Gas - High H <sub>2</sub> S	<input type="checkbox"/> CO <sub>2</sub>				<input type="checkbox"/> Low Stress Liquid				<input type="checkbox"/> HVL	
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		<input type="checkbox"/> Low Stress Liquid																																	
		<input type="checkbox"/> HVL																																	
Pipeline Configuration (Regulator Station, Pump Station, Pipeline, etc.): The propane/air distribution system operates at two pressures 3.5psi and 13.5 inches of water column. The system consists of one propane/air mixing plant and one regulator station																																			

<b>Operator/Owner Information</b>			
Owner: Liberty Utilities Address: 28 Buttrick Rd Londonderry NH		Operator: Liberty Utilities Keene Div. Address: 9 Pearl St Keene, NH	
Company Official: Rich MacDonald Phone No.: 603 782 2344 Fax No.:		Company Official: Steve Rokes Phone No. 603 352 1230 Fax No.	
<u>Drug and Alcohol Testing Program Contacts</u>			_X_ N/A
Drug Program Contact & Phone:			
Alcohol Program Contact & Phone:			

1 Photo documentation

## Pipeline Failure Investigation Report

<i>Damages</i>			
Product/Gas Loss or Spill <sup>(2)</sup> N/A		Estimated Property Damage \$	None
Amount Recovered		N/A	
Estimated Amount \$		Associated Damages <sup>(3)</sup> \$	None
Description of Property Damage: None Purged approximately 3.6 MCF of gas throughout the day (gas loss estimated at \$76)			
Customers out of Service:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Number:	137
Suppliers out of Service:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Number:	

<i>Fatalities and Injuries</i>						<input type="checkbox"/> N/A
Fatalities:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Company:	Contractor:	Public:		
Injuries - Hospitalization:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Company:	Contractor:	Public: 4		
Injuries - Non-Hospitalization:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Company:	Contractor:	Public:		
Total Injuries (including Non-Hospitalization): 1		Company:	Contractor:	Public:		
Name	Job Function	Yrs. w/ Comp.	Yrs. Exp.	Type of Injury		
Unknown Female (Hipaa)	Shopping Downtown			Possible CO- symptoms		

<i>Drug/Alcohol Testing</i>					<input checked="" type="checkbox"/> N/A
Were all employees that could have contributed to the incident, post-accident tested within the 2 hour time frame for alcohol or the 32 hour time frame for all other drugs?					
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Job Function	Test Date & Time	Location	Results		Type of Drug
			Pos	Neg	

<i>System Description</i>
---------------------------

2 Initial volume lost or spilled  
3 Including cleanup cost

## Pipeline Failure Investigation Report

<i>System Description</i>
Describe the Operator's System: 30.06 miles of main with 876 services with most of the system operating at inches of water column. There is a 2.5 psi main that runs to a shopping plaza known as Monadnock Shopping Plaza. The propane/air plant is on Emerald St and consists of a 60,000 & 30,000 gallon propane containers and the vaporizer, blowers and mixing facility.

<i>Pipe Failure Description</i>		__X__ N/A
Length of Failure (inches, feet, miles):   None		(1)
Position (Top, Bottom, include position on pipe, 6 O'clock):   (1)	Description of Failure (Corrosion Gouge, Seam Split):   (1)	
Laboratory Analysis:                    ___ Yes    ___ No		
Performed by:		
Preservation of Failed Section or Component:   ___ Yes    ___ No		
If Yes - Method:		
In Custody of:		
Develop a sketch of the area including distances from roads, houses, stress inducing factors, pipe configurations, direction of flow, etc. Bar Hole Test Survey Plot, if included, should be outlined with concentrations at test points.		

<i>Component Failure Description</i>		__X__ N/A
Component Failed:		(1)
Manufacturer:	Model:	
Pressure Rating:	Size:	
Other (Breakout Tank, Underground Storage):		

<i>Pipe Data</i>		__X__ N/A
Material:	Wall Thickness/SDR:	
Diameter (O.D.):	Installation Date:	
SMYS:	Manufacturer:	
Longitudinal Seam:	Type of Coating:	
Pipe Specifications (API 5L, ASTM A53, etc.):		

<i>Joining</i>		__X__ N/A
Type:	Procedure:	
NDT Method:	Inspected:   ___ Yes    ___ No	

<i>Pressure @ Time of Failure @ Failure Site</i>		__X__ N/A
Pressure @ Failure Site:	Elevation @ Failure Site:	





## Pipeline Failure Investigation Report

<i>Internal Pipe or Component Examination</i>		<u>  X  </u> N/A
Results of Gas and/or Liquid Analysis <sup>(6)</sup>		
Internal Inspection Survey: <input type="checkbox"/> Yes <input type="checkbox"/> No	Results <sup>(7)</sup>	
Did the Operator have knowledge of Corrosion before the Incident? <input type="checkbox"/> Yes <input type="checkbox"/> No		
How Discovered? (Instrumented Pig, Coupon Testing, ICDA, etc.):		

<i>Outside Force Damage</i>		<u>  X  </u> N/A
Responsible Party:	Telephone No.:	
Address:		
Work Being Performed:		
Equipment Involved: <sup>(1)</sup>	Called One Call System? <input type="checkbox"/> Yes <input type="checkbox"/> No	
One Call Name:	One Call Report # <sup>(8)</sup>	
Notice Date:	Time:	
Response Date:	Time:	
Details of Response:		
Was Location Marked According to Procedures? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Pipeline Marking Type: <sup>(1)</sup>	Location: <sup>(1)</sup>	
State Law Damage Prevention Program Followed? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No State Law		
Notice Required: <input type="checkbox"/> Yes <input type="checkbox"/> No	Response Required: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Was Operator Member of State One Call? <input type="checkbox"/> Yes <input type="checkbox"/> No	Was Operator on Site? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Did a deficiency in the Public Awareness Program contribute to the accident? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Is OSHA Notification Required? <input type="checkbox"/> Yes <input type="checkbox"/> No		

<i>Natural Forces</i>	<u>  X  </u> N/A
Description (Earthquake, Tornado, Flooding, Erosion):	

6 Attach copy of gas and/or liquid analysis report  
 7 Attach copy of internal inspection survey report  
 8 Attach copy of one-call report

## Pipeline Failure Investigation Report

<b>Natural Forces</b>	<b><u>  X  </u> N/A</b>

<b>Failure Isolation</b>	<b><u>  X  </u> N/A</b>
Squeeze Off/Stopple Location and Method: <span style="float: right;">(1)</span>	
Valve Closed - Upstream: Time:	I.D.: M.P.:
Valve Closed - Downstream: Time:	I.D.: M.P.:
Pipeline Shutdown Method:    ___ Manual    ___ Automatic    ___ SCADA    ___ Controller    ___ ESD	
Failed Section Bypassed or Isolated:	
Performed By:	Valve Spacing:

<b>Odorization</b>	<b><u>  ___  </u> N/A</b>
Gas Odorized: <u>  X  </u> Yes    ___ No	Concentration of Odorant (Post Incident at Failure Site):
Method of Determination: ___ Yes    ___ No	% LEL: ___ Yes    ___ No         % Gas In Air: ___ Yes    ___ No
	Time Taken: ___ Yes    ___ No
Was Odorizer Working Prior to the Incident? ___ Yes    ___ No	Type of Odorizer (Wick, By-Pass):
Odorant Manufacturer: Model:	Type of Odorant:
Amount Injected:	Monitoring Interval (Weekly):
Odorization History (Leaks Complaints, Low Odorant Levels, Monitoring Locations, Distances from Failure Site): Low levels or High Levels of Odorization was not a factor. Monthly Odorization Reports are submitted to PUC.	

<b>Weather Conditions</b>	<b><u>  ___  </u> N/A</b>
Temperature: 30 Deg F	Wind (Direction & Speed): 10 mph
Climate (Snow, Rain): Clear	Humidity: N/A
Was Incident preceded by a rapid weather change?    ___ Yes <u>  X  </u> No	
Weather Conditions Prior to Incident (Cloud Cover, Ceiling Heights, Snow, Rain, Fog): Cloud Cover	

## Pipeline Failure Investigation Report

<i>Gas Migration Survey</i>		_X_ N/A
Bar Hole Test of Area: <input type="checkbox"/> Yes <input type="checkbox"/> No	Equipment Used:	
Method of Survey (Foundations, Curbs, Manholes, Driveways, Mains, Services) <sup>(9)</sup> <span style="float: right;">(1)</span>		

<i>Environment Sensitivity Impact</i>		_X_ N/A
Location (Nearest Rivers, Body of Water, Marshlands, Wildlife Refuge, City Water Supplies that could be or were affected by the medium loss): <span style="float: right;">(1)</span>		
OPA Contingency Plan Available? <input type="checkbox"/> Yes <input type="checkbox"/> No	Followed? <input type="checkbox"/> Yes <input type="checkbox"/> No	

<i>Class Location/High Consequence Area</i>		_X_ N/A
Class Location: 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>	HCA Area? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Determination:	Determination:	
Odorization Required? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		

<i>Pressure Test History</i>							_X_ N/A
<i>(Expand List as Necessary)</i>							
	Req'd <sup>(10)</sup> Assessment Deadline Date	Test Date	Test Medium	Pressure (psig)	Duration (hrs)	% SMYS	
Installation	N/A						
Next							
Next							
Most Recent							
Describe any problems experienced during the pressure tests.							

<i>Internal Line Inspection/Other Assessment History</i>						_X_ N/A
<i>(Expand List as Necessary)</i>						
	Req'd <sup>(10)</sup> Assessment Deadline Date	Assessment Date	Type of ILI Tool <sup>(11)</sup>	Other Assessment Method <sup>(12)</sup>	Indicated Anomaly If yes, describe below	
Initial					<input type="checkbox"/> Yes <input type="checkbox"/> No	
Next					<input type="checkbox"/> Yes <input type="checkbox"/> No	
Next					<input type="checkbox"/> Yes <input type="checkbox"/> No	
Most Recent					<input type="checkbox"/> Yes <input type="checkbox"/> No	

9 Plot on site description page

10 As required of Pipeline Integrity Management regulations in 49CFR Parts 192 and 195

11 MFL, TFI, UT, Combination, Geometry, etc.

12 ECDA, ICDA, SCCDA, "other technology," etc.

## Pipeline Failure Investigation Report

<b>Internal Line Inspection/Other Assessment History</b> <span style="float: right;">_X_ N/A</span>
<i>(Expand List as Necessary)</i>
Describe any previously indicated anomalies at the failed pipe, and any subsequent pipe inspections (anomaly digs) and remedial actions.

<b>Pre-Failure Conditions and Actions</b> <span style="float: right;">X__ N/A</span>
Was there a known pre-failure condition requiring <sup>(10)</sup> the operator to schedule evaluation and remediation? __ Yes (describe below or on attachment)    __ No
If there was such a known pre-failure condition, had the operator established and adhered to a required <sup>(10)</sup> evaluation and remediation schedule? Describe below or on attachment.    __ Yes    __ No    __ N/A
Prior to the failure, had the operator performed the required <sup>(10)</sup> actions to address the threats that are now known to be related to the cause of this failure?    __ Yes    __ No    __ N/A
List below or on an attachment such operator-identified threats, and operator actions taken prior to the accident.
Describe any previously indicated anomalies at the failed pipe, and any subsequent pipe inspections (anomaly digs) and remedial actions.

<b>Maps &amp; Records</b> <span style="float: right;">___ N/A</span>
Are Maps and Records Current? <sup>(13)</sup> __X Yes    __ No
Comments: Used during Emergency Response at the Local EOC and used for Purging information. Finally Liberty submitted maps to PUC as part of investigation.

<b>Leak Survey History</b> <span style="float: right;">__X_ N/A</span>
Leak Survey History (Trend Analysis, Leak Plots):

<b>Pipeline Operation History</b> <span style="float: right;">___ N/A</span>
Description (Repair or Leak Reports, Exposed Pipe Reports):
Approximately 3 Leaks per year on System
Did a Safety Related Condition Exist Prior to Failure?    ___ Yes    __X__ No    Reported?    ___ Yes    ___ No
Unaccounted For Gas: All Gas was accounted for by estimating the amount purged
Over & Short/Line Balance (24 hr., Weekly, Monthly/Trend): Unaccounted For Gas is reviewed 2 x per year by PUC during docketed Cost of Gas hearings.

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13 Obtain copies of maps and records

## Pipeline Failure Investigation Report

<i>Operator/Contractor Error</i>				<u> X </u> N/A
Name:		Job Function:		
Title:		Years of Experience:		
Training (Type of Training, Background):				
Was the person "Operator Qualified" as applicable to a precursor abnormal operating condition? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A				
Was qualified individual suspended from performing covered task <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A				
Type of Error (Inadvertent Operation of a Valve):				
Procedures that are required:				
Actions that were taken:				
Pre-Job Meeting (Construction, Maintenance, Blow Down, Purging, Isolation):				
Prevention of Accidental Ignition (Tag & Lock Out, Hot Weld Permit):				
Procedures conducted for Accidental Ignition:				
Was a Company Inspector on the Job? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Was an Inspection conducted on this portion of the job? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Additional Actions (Contributing factors may include number of hours at work prior to failure or time of day work being conducted):				
Training Procedures:				
Operation Procedures:				
Controller Activities:				
Name	Title	Years Experience	Hours on Duty Prior to Failure	Shift
Alarm Parameters:				
High/Low Pressure Shutdown:				
Flow Rate:				
Procedures for Clearing Alarms:				
Type of Alarm:				
Company Response Procedures for Abnormal Operations:				

## ***Pipeline Failure Investigation Report***

<b><i>Operator/Contractor Error</i></b>		<u>  X  </u> N/A
Over/Short Line Balance Procedures:		
Frequency of Over/Short Line Balance:		
Additional Actions:		

## **Pipeline Failure Investigation Report**

<i>Additional Actions Taken by the Operator</i>	<u>    </u> N/A
<p>Make notes regarding the emergency and Failure Investigation Procedures (Pressure reduction, Reinforced Squeeze Off, Clean Up, Use of Evacuators, Line Purging, closing Additional Valves, Double Block and Bleed, Continue Operating downstream Pumps):</p> <p>Company completed after action review on Monday Dec 21 and shared findings with PUC inspectors on Dec 22. Investigation Report Drafted in January for a preliminary hearing before the PUC. Multiple interim actions taken by Operator regarding operations of the Plant were implemented immediately or within the first week.</p>	

<i>Photo Documentation <sup>(1)</sup></i>			
<p>Overall Area from best possible view. Pictures from the four points of the compass. Failed Component, Operator Action, Damages in Area, Address Markings, etc.</p>			
Photo No.	Description	Photo No.	Description
1		16	
2		17	
3		18	
4		19	
5		20	
6		21	
7		22	
8		23	
9		24	
10		25	
11		26	
12		27	
13		28	
14		29	
15		30	
<p>Camera Type: Digital Camera Photos of Plant Piping Taken</p>			







## ***Pipeline Failure Investigation Report***

### ***Site Description***

Provide a sketch of the area including distances from roads, houses, stress inducing factors, pipe configurations, etc. Bar Hole Test Survey Plot should be outlined with concentrations at test points. Photos should be taken from all angles with each photo documented. Additional areas may be needed in any area of this guideline.

Affected the entire downtown area of Keene approximately a 2mile x 2 mile area. See PUC Investigation Report for area map with Scales.

NOTICE: This report is required by 49 CFR Part 191. Failure to report can result in a civil penalty not to exceed 100,000 for each violation for each day that such violation persists except that the maximum civil penalty shall not exceed \$1,000,000 as provided in 49 USC 60122.		OMB NO: 2137-0522 EXPIRATION DATE: 10/31/2017	
 U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration	<b>Original Report Date:</b>		01/15/2016
	<b>No.</b>		20160004- 16223
			----- (DOT Use Only)
<b>INCIDENT REPORT - GAS DISTRIBUTION SYSTEM</b>			
A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a current valid OMB Control Number. The OMB Control Number for this information collection is 2137-0522. All responses to this collection of information are mandatory. Send comments regarding the burden or any other aspect of this collection of information, including suggestions for reducing the burden to: Information Collection Clearance Officer, PHMSA, Office of Pipeline Safety (PHP-30) 1200 New Jersey Avenue, SE, Washington, D.C. 20590.			
<b>INSTRUCTIONS</b>			
<b>Important:</b> Please read the separate instructions for completing this form before you begin. They clarify the information requested and provide specific examples. If you do not have a copy of the instructions, you can obtain one from the PHMSA Pipeline Safety Community Web Page at <a href="http://www.phmsa.dot.gov/pipeline/library/forms">http://www.phmsa.dot.gov/pipeline/library/forms</a> .			
<b>PART A - KEY REPORT INFORMATION</b>			
Report Type: <i>(select all that apply)</i>	<b>Original:</b>	<b>Supplemental:</b>	<b>Final:</b>
Last Revision Date	<b>Yes</b>		<b>Yes</b>
1. Operator's OPS-issued Operator Identification Number (OPID):	31265		
2. Name of Operator	NEW HAMPSHIRE GAS CORP		
3. Address of Operator:			
3a. Street Address	80 PEARL ST., PO BOX 438 PO BOX 438		
3b. City	KEENE		
3c. State	New Hampshire		
3d. Zip Code	03431		
4. Local time (24-hr clock) and date of the Incident:	12/19/2015 08:51		
5. Location of Incident:			
5a. Street Address or location description	207 Emerald St. 03431		
5b. City	Keene		
5c. County or Parish	Cheshire		
5d. State:	New Hampshire		
5e. Zip Code:	03431		
5f. Latitude:	42.9336		
Longitude:	-72.2781		
6. National Response Center Report Number:	1136250		
7. Local time (24-hr clock) and date of initial telephonic report to the National Response Center:	12/19/2015 19:54		
8. Incident resulted from:	Reasons other than release of gas		
9. Gas released:			
- Other Gas Released Name:			
10. Estimated volume of gas released - Thousand Cubic Feet (MCF):	3.600		
11. Were there fatalities?	No		
- If Yes, specify the number in each category:			
11a. Operator employees			
11b. Contractor employees working for the Operator			
11c. Non-Operator emergency responders			
11d. Workers working on the right-of-way, but NOT associated with this Operator			
11e. General public			
11f. Total fatalities (sum of above)			
12. Were there injuries requiring inpatient hospitalization?	No		
- If Yes, specify the number in each category:			
12a. Operator employees			
12b. Contractor employees working for the Operator			
12c. Non-Operator emergency responders			
12d. Workers working on the right-of-way, but NOT associated with this Operator			
12e. General public			
12f. Total injuries (sum of above)			
13. Was the pipeline/facility shut down due to the incident?	No		
- If No, Explain:	Incorrect Propane/Air mixture		
- If Yes, complete Questions 13a and 13b: <i>(use local time, 24-hr clock)</i>			

13a. Local time and date of shutdown:	
13b. Local time pipeline/facility restarted:	
- Still shut down? (* Supplemental Report Required)	
14. Did the gas ignite?	No
15. Did the gas explode?	No
16. Number of general public evacuated:	0
17. Time sequence (use local time, 24-hour clock):	
17a. Local time operator identified Incident - effective 10-2014, "Incident" changed to "failure"	12/19/2015 08:51
17b. Local time operator resources arrived on site:	12/19/2015 09:03
<b>PART B - ADDITIONAL LOCATION INFORMATION</b>	
1. Was the Incident on Federal land?	No
2. Location of Incident	Operator-controlled property
3. Area of Incident:	Aboveground
Specify:	Inside a building
If Other, Describe:	
Depth of Cover:	
4. Did Incident occur in a crossing?	No
- If Yes, specify type below:	
- If Bridge crossing –	
Cased/ Uncased:	
- If Railroad crossing –	
Cased/ Uncased/ Bored/drilled	
- If Road crossing –	
Cased/ Uncased/ Bored/drilled	
- If Water crossing –	
Cased/ Uncased	
Name of body of water (If commonly known):	
Approx. water depth (ft):	
<b>PART C - ADDITIONAL FACILITY INFORMATION</b>	
1. Indicate the type of pipeline system:	Privately Owned
- If Other, specify:	
2. Part of system involved in Incident:	Other
- If Other, specify:	Blowers
2a. Year "Part of system involved in Incident" was installed:	2003
3. When "Main" or "Service" is selected as the "Part of system involved in Incident" (from PART C, Question 2), provide the following:	
3a. Nominal diameter of pipe (in):	
3b. Pipe specification (e.g., API 5L, ASTM D2513):	
3c. Pipe manufacturer:	
3d. Year of manufacture:	
4. Material involved in Incident:	Other
- If Other, specify:	Mechanical Air Supply Blower
4a. If Steel, Specify seam type:	
None/Unknown?	
4b. If Steel, Specify wall thickness (inches):	
4c. If Plastic, Specify type:	
- If Other, describe:	
4d. If Plastic, Specify Standard Dimension Ratio (SDR):	
Or wall thickness:	
4e. If Polyethylene (PE) is selected as the type of plastic in Part C, Question 4.c:	
- Specify PE Pipe Material Designation Code (i.e. 2406, 3408, etc.)	
Unknown?	
5. Type of release involved :	Other
- If Mechanical Puncture - Specify Approx size:	
Approx. size: in. (axial):	
in. (circumferential):	
- If Leak - Select Type:	
- If Other, Describe:	
- If Rupture - Select Orientation:	
- If Other, Describe:	
Approx. size: (widest opening):	
(length circumferentially or axially):	
- If Other - Describe:	Liberty Utilities Technicians purged high concentration BTU propane from system at 10 designated locations.

<b>PART D - ADDITIONAL CONSEQUENCE INFORMATION</b>	
1. Class Location of Incident :	Class 4 Location
2. Estimated Property Damage :	
2a. Estimated cost of public and non-Operator private property damage paid/reimbursed by the Operator – effective 6-2011, "paid/reimbursed by the Operator" removed	\$ 0
Estimated cost of gas released – effective 6-2011, moved to item 2f	
2b. Estimated cost of Operator's property damage & repairs	\$ 0
2c. Estimated cost of Operator's emergency response	\$ 41,986
2d. Estimated other costs	\$ 50,000
- Describe:	Local city and towns emergency responses reimbursement is yet to be determined.
2e. Property damage subtotal (sum of above)	\$ 91,986
<b>Cost of Gas Released</b>	
2f. Estimated cost of gas released	\$ 76
Total of all costs	\$ 92,062
3. Estimated number of customers out of service:	
3a. Commercial entities	35
3b. Industrial entities	0
3c. Residences	54
<b>PART E - ADDITIONAL OPERATING INFORMATION</b>	
1. Estimated pressure at the point and time of the Incident (psig):	3.50
2. Normal operating pressure at the point and time of the Incident (psig):	3.50
3. Maximum Allowable Operating Pressure (MAOP) at the point and time of the Incident (psig):	5.00
4. Describe the pressure on the system relating to the Incident:	Pressure did not exceed MAOP
5. Was a Supervisory Control and Data Acquisition (SCADA) based system in place on the pipeline or facility involved in the Incident?	Yes
- If Yes:	
5a. Was it operating at the time of the Incident?	Yes
5b. Was it fully functional at the time of the Incident?	Yes
5c. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume or pack calculations) assist with the detection of the Incident?	Yes
5d. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Incident?	Yes
6. How was the Incident initially identified for the Operator?	SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume or pack calculations)
- If Other, Specify:	
6a. If "Controller", "Local Operating Personnel, including contractors", "Air Patrol", or "Ground Patrol by Operator or its contractor" is selected in Question 6, specify.	
7. Was an investigation initiated into whether or not the controller(s) or control room issues were the cause of or a contributing factor to the Incident?	No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: (provide an explanation for why the Operator did not investigate)
- If "No, the operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to:" (provide an explanation for why the operator did not investigate)	Propane SCADA only monitors system alarms, there are no other Controller adjustments or activities.
- If Yes, Specify investigation result(s) (select all that apply):	
- Investigation reviewed work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue	
- Investigation did NOT review work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue	
- Provide an explanation for why not:	
- Investigation identified no control room issues	
- Investigation identified no controller issues	
- Investigation identified incorrect controller action or controller error	
- Investigation identified that fatigue may have affected the controller(s) involved or impacted the involved controller(s) response	
- Investigation identified incorrect procedures	
- Investigation identified incorrect control room equipment operation	

- Investigation identified maintenance activities that affected control room operations, procedures, and/or controller response	
- Investigation identified areas other than those above	
Describe:	
<b>PART F - DRUG &amp; ALCOHOL TESTING INFORMATION</b>	
1. As a result of this Incident, were any Operator employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations?	No
- If Yes:	
1a. How many were tested:	
1b. How many failed:	
2. As a result of this Incident, were any Operator contractor employees tested under the post-accident drug and alcohol testing requirements of DOT's Drug & Alcohol Testing regulations?	No
- If Yes:	
2a. How many were tested:	
2b. How many failed:	
<b>PART G - CAUSE INFORMATION</b>	
<i>Select only one box from PART G in shaded column on left representing the Apparent Cause of the Incident, and answer the questions on the right. Describe secondary, contributing, or root causes of the Incident in the narrative (PART H).</i>	
<b>Apparent Cause:</b>	G6 - Equipment Failure
<b>G1 - Corrosion Failure</b> – only one <b>sub-cause</b> can be picked from shaded left-hand column	
<b>Corrosion Failure Sub-Cause:</b>	
<b>- If External Corrosion:</b>	
1. Results of visual examination:	
- If Other, Specify:	
2. Type of corrosion:	
- Galvanic	
- Atmospheric	
- Stray Current	
- Microbiological	
- Selective Seam	
- Other	
- If Other, Describe:	
3. The type(s) of corrosion selected in Question 2 is based on the following:	
- Field examination	
- Determined by metallurgical analysis	
- Other	
- If Other, Describe:	
4. Was the failed item buried under the ground?	
- If Yes:	
4a. Was failed item considered to be under cathodic protection at the time of the incident?	
- If Yes, Year protection started:	
4b. Was shielding, tenting, or disbonding of coating evident at the point of the incident?	
4c. Has one or more Cathodic Protection Survey been conducted at the point of the incident?	
If "Yes, CP Annual Survey" – Most recent year conducted:	
If "Yes, Close Interval Survey" – Most recent year conducted:	
If "Yes, Other CP Survey" – Most recent year conducted:	
- If No:	
4d. Was the failed item externally coated or painted?	
5. Was there observable damage to the coating or paint in the vicinity of the corrosion?	
6. Pipeline coating type, if steel pipe is involved:	
- If Other, Describe:	
<b>- If Internal Corrosion:</b>	
7. Results of visual examination:	
- If Other, Describe:	
8. Cause of corrosion <i>(select all that apply)</i> :	
- Corrosive Commodity	

- Water drop-out/Acid	
- Microbiological	
- Erosion	
- Other	
- If Other, Specify:	
9. The cause(s) of corrosion selected in Question 8 is based on the following: <i>(select all that apply)</i> :	
- Field examination	
- Determined by metallurgical analysis	
- Other	
- If Other, Describe:	
10. Location of corrosion <i>(select all that apply)</i> :	
- Low point in pipe	
- Elbow	
- Drop-out	
- Other	
- If Other, Describe:	
11. Was the gas/fluid treated with corrosion inhibitor or biocides?	
12. Were any liquids found in the distribution system where the Incident occurred?	
<b>Complete the following if any Corrosion Failure sub-cause is selected AND the "Part of system involved in incident" (from PART C, Question 2) is Main, Service, or Service Riser.</b>	
13. Date of the most recent Leak Survey conducted	
14. Has one or more pressure test been conducted since original construction at the point of the Incident?	
- If Yes:	
Most recent year tested:	
Test pressure:	
<b>G2 – Natural Force Damage – only one sub-cause can be picked from shaded left-handed column</b>	
<b>Natural Force Damage – Sub-Cause:</b>	
<b>- If Earth Movement, NOT due to Heavy Rains/Floods:</b>	
1. Specify:	
- If Other, Specify:	
<b>- If Heavy Rains/Floods:</b>	
2. Specify:	
- If Other, Specify:	
<b>- If Lightning:</b>	
3. Specify:	
<b>- If Temperature:</b>	
4. Specify:	
- If Other, Specify:	
<b>- If Other Natural Force Damage:</b>	
5. Describe:	
<b>Complete the following if any Natural Force Damage sub-cause is selected.</b>	
6. Were the natural forces causing the Incident generated in conjunction with an extreme weather event?	
6.a If Yes, specify <i>(select all that apply)</i> :	
- Hurricane	
- Tropical Storm	
- Tornado	
- Other	
- If Other, Specify:	
<b>G3 – Excavation Damage – only one sub-cause can be picked from shaded left-hand column</b>	
<b>Excavation Damage – Sub-Cause:</b>	
<b>- If Previous Damage due to Excavation Activity: Complete the following ONLY IF the "Part of system involved in Incident" (from Part C, Question 2) is Main, Service, or Service Riser.</b>	
1. Date of the most recent Leak Survey conducted	
2. Has one or more pressure test been conducted since original construction at the point of the Incident?	
- If Yes:	
Most recent year tested:	
Test pressure:	

<b>Complete the following if Excavation Damage by Third Party is selected.</b>	
3. Did the operator get prior notification of the excavation activity?	
3a. If Yes, Notification received from: <i>(select all that apply)</i> :	
- One-Call System	
- Excavator	
- Contractor	
- Landowner	
<b>Complete the following mandatory CGA-DIRT Program questions if any Excavation Damage sub-cause is selected.</b>	
4. Do you want PHMSA to upload the following information to CGA-DIRT ( <a href="http://www.cga-dirt.com">www.cga-dirt.com</a> )?	
5. Right-of-Way where event occurred <i>(select all that apply)</i> :	
- Public	
- If Public, Specify:	
- Private	
- If Private, Specify:	
- Pipeline Property/Easement	
- Power/Transmission Line	
- Railroad	
- Dedicated Public Utility Easement	
- Federal Land	
- Data not collected	
- Unknown/Other	
6. Type of excavator :	
7. Type of excavation equipment :	
8. Type of work performed :	
9. Was the One-Call Center notified?	
9a. If Yes, specify ticket number:	
9b. If this is a State where more than a single One-Call Center exists, list the name of the One-Call Center notified:	
10. Type of Locator:	
11. Were facility locate marks visible in the area of excavation?	
12. Were facilities marked correctly?	
13. Did the damage cause an interruption in service?	
13a. If Yes, specify duration of the interruption:	
14. Description of the CGA-DIRT Root Cause <i>(select only the one predominant first level CGA-DIRT Root Cause and then, where available as a choice, the one predominant second level CGA-DIRT Root Cause as well)</i> :	
- Root Cause Description:	
- If One-Call Notification Practices Not Sufficient, specify:	
- If Locating Practices Not Sufficient, specify:	
- If Excavation Practices Not Sufficient, specify:	
- If Other/None of the Above, explain:	
<b>G4 - Other Outside Force Damage</b> - only one <b>sub-cause</b> can be selected from the shaded left-hand column	
<b>Other Outside Force Damage – Sub-Cause:</b>	
<b>- If Damage by Car, Truck, or Other Motorized Vehicle/Equipment NOT Engaged in Excavation:</b>	
1. Vehicle/Equipment operated by:	
<b>- If Damage by Boats, Barges, Drilling Rigs, or Other Maritime Equipment or Vessels Set Adrift or Which Have Otherwise Lost Their Mooring:</b>	
2. Select one or more of the following IF an extreme weather event was a factor:	
- Hurricane	
- Tropical Storm	
- Tornado	
- Heavy Rains/Flood	
- Other	
- If Other, Specify:	
<b>- If Previous Mechanical Damage NOT Related to Excavation: Complete the following ONLY IF the "Part of system involved in Incident" (from Part C, Question 2) is Main, Service, or Service Riser.</b>	
3. Date of the most recent Leak Survey conducted:	
4. Has one or more pressure test been conducted since original construction at the point of the Incident?	
- If Yes:	
Most recent year tested:	
Test pressure (psig):	
<b>- If Intentional Damage:</b>	

5. Specify:	
	- If Other, Specify:
<b>- If Other Outside Force Damage:</b>	
6. Describe:	
<b>G5 - Pipe, Weld, or Joint Failure</b> - only one <b>sub-cause</b> can be selected from the shaded left-hand column	
<b>Pipe, Weld or Joint Failure – Sub-Cause:</b>	
<b>- If Body of Pipe:</b>	
1. Specify:	
	- If Other, Describe:
<b>- If Butt Weld:</b>	
2. Specify:	
	- If Other, Describe:
<b>- If Fillet Weld:</b>	
3. Specify:	
	- If Other, Describe:
<b>- If Pipe Seam:</b>	
4. Specify:	
	- If Other, Describe:
<b>- If Mechanical Fitting:</b>	
5. Specify the mechanical fitting involved:	
	- If Other, Describe:
6. Specify the type of mechanical fitting:	
	- If Other, Describe:
7. Manufacturer:	
8. Year manufactured:	
9. Year Installed:	
10. Other attributes:	
11. Specify the two materials being joined:	
11a. First material being joined:	
	- If Other, Specify:
11b. If Plastic, specify:	
	- If Other Plastic, specify:
11c. Second material being joined:	
	- If Other, Specify:
11d. If Plastic, specify:	
	- If Other Plastic, Specify:
12. If used on plastic pipe, did the fitting – as designed by the manufacturer – include restraint?	
12a. If Yes, specify:	
<b>- If Compression Fitting:</b>	
13. Fitting type:	
14. Manufacturer:	
15. Year manufactured:	
16. Year installed:	
17. Other attributes:	
18. Specify the two materials being joined:	
18a. First material being joined:	
	- If Other, specify:
18b. If Plastic, specify:	
	- If Other Plastic, specify:
18c. Second material being joined:	
	If Other, specify:
18d. If Plastic, specify:	
	- Other Plastic, specify:
<b>- If Fusion Joint:</b>	
19. Specify:	
	- If Other, Specify:
20. Year installed:	
21. Other attributes:	
22. Specify the two materials being joined:	
22a. First material being joined:	
	- If Other, Specify:
22b. Second material being joined:	

- If Other, Specify:	
<b>- If Other Pipe, Weld, or Joint Failure:</b>	
23. Describe:	
<b>Complete the following if any Pipe, Weld, or Joint Failure sub-cause is selected.</b>	
24. Additional Factors ( <i>select all that apply</i> ):	
- Dent	
- Gouge	
- Pipe Bend	
- Arc Burn	
- Crack	
- Lack of Fusion	
- Lamination	
- Buckle	
- Wrinkle	
- Misalignment	
- Burnt Steel	
- Other	
- If Other, Specify:	
25. Was the Incident a result of:	
- Construction defect	
	Specify:
- Material defect	
	Specify:
	- If Other, Specify:
- Design defect	
- Previous damage	
26. Has one or more pressure test been conducted since original construction at the point of the Incident?	
- If Yes:	
	Most recent year tested:
	Test pressure:
<b>G6 - Equipment Failure</b> - only one <b>sub-cause</b> can be selected from the shaded left-hand column	
<b>Equipment Failure – Sub-Cause:</b>	Malfunction of Control/Relief Equipment
<b>- If Malfunction of Control/Relief Equipment:</b>	
1. Specify:	
- Control Valve	
- Instrumentation	
- SCADA	
- Communications	
- Block Valve	
- Check Valve	
- Relief Valve	
- Power Failure	
- Stopple/Control Fitting	
- Pressure Regulator	
- Other	Yes
	- If Other, Specify: Electrical power fluctuations caused the adjustable speed drives to trip, shutting down control supply air blowers to system.
<b>- If Threaded Connection Failure:</b>	
2. Specify:	
	- If Other, Specify:
<b>- If Non-threaded Connection Failure:</b>	
3. Specify:	
	- If Other, Specify:
<b>- If Valve:</b>	
4. Specify:	
	- If Other, Specify:
4a. Valve type:	
4b. Manufactured by:	
4c. Year manufactured:	
<b>- If Other Equipment Failure:</b>	
5. Describe:	

<b>G7 - Incorrect Operation</b> - only one <b>sub-cause</b> can be selected from the shaded left-hand column	
<b>Incorrect Operation Sub-Cause:</b>	
<b>- If Other Incorrect Operation:</b>	
1. Describe:	
<b>Complete the following if any Incorrect Operation sub-cause is selected.</b>	
2. Was this Incident related to: (select all that apply)	
- Inadequate procedure	
- No procedure established	
- Failure to follow procedure	
- Other	
- If Other, Describe:	
3. What category type was the activity that caused the Incident:	
4. Was the task(s) that led to the Incident identified as a covered task in your Operator Qualification Program?	
4a. If Yes, were the individuals performing the task(s) qualified for the task(s)?	
<b>G8 - Other Incident Cause</b> - only one <b>sub-cause</b> can be selected from the shaded left-hand column	
<b>Other Incident Cause – Sub-Cause:</b>	
<b>- If Miscellaneous:</b>	
1. Describe:	
<b>- If Unknown:</b>	
2. Specify:	
<b>PART H - NARRATIVE DESCRIPTION OF THE INCIDENT</b>	
Liberty Utilities and a third party monitoring company reported that their monitoring had detected a problem with the blowers that provide air to the propane/air mixing system at the plant. This mechanical failure resulted in incorrect air to propane mixture volumes being sent into the distribution system. Liberty Utilities resources responded and corrected the malfunction, mitigated additional hazards and commenced Customer awareness and notifications.	
<b>PART I - PREPARER AND AUTHORIZED SIGNATURE</b>	
Preparer's Name	Russell McIntyre
Preparer's Title	Program Manager- Compliance
Preparer's Telephone Number	603-216-3664
Preparer's E-mail Address	Russell.McIntyre@Libertyutilities.com
Preparer's Facsimile Number	603-421-1768
Authorize Signature's Name	Leo Cody
Authorized Signature's Title	Manager-Compliance
Authorized Signature's Email Address	Leo.Cody@Libertyutilities.com

**LIBERTY UTILITIES NEW HAMPSHIRE  
KEENE DIVISION**

**KEENE, NH INCIDENT  
DECEMBER 19, 2015**

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2. Incident Summary
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**INCIDENT REPORT**  
**KEENE, NH INCIDENT**  
**DECEMBER 19, 2015**

## 1. INTRODUCTION

Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities (“Liberty”) supplies gas service to the City of Keene through a stand-alone distribution system using a propane-air fuel mixture. On Saturday, December 19, 2015, the compressed air supply to the system was lost for a short time, resulting in higher BTU gas being sent into the system. As a result, a significant number of Liberty Utilities customers experienced incomplete fuel combustion and generation of carbon monoxide gas (CO). Company personnel responded with local emergency responders to contain the incident and restore the system to normal operation.

## 2. INCIDENT SUMMARY

**Date of Incident:** Saturday, December 19, 2015

**Location of the Incident:** 207 Emerald St., Keene, NH

**Time of Incident:** Approximately 8:50 a.m.

**Date of Investigation:** December 21, 2015, to January 22, 2016

**Gas System Anomaly:** The air compressors (blowers) supplying air to the fuel mixture shut down. We believe that the shut-down was caused by a dip in voltage resulting from the loss of power on a nearby Eversource circuit. As the Eversource system responded to the failed circuit, the adjacent circuit serving the Keene plant experienced a momentary drop in voltage causing the blowers to trip off line. This resulted in an abnormally high BTU (propane) level in the propane/air fuel mixture.

**Customers Affected:** The entire Keene customer base of approximately 1,250 customers was impacted to a greater or lesser degree depending upon the BTU value of the gas that migrated through the delivery system to individual customers. In response to the potential for incomplete combustion, which may generate CO and/or propane superfluity, 137 customers were either shut off by the company, by emergency response personnel, or by the auto-shut downs on their equipment.

**Causes of the Incident:** The root cause of the incident was an open fuse in the alarm circuit, resulting in an incomplete transfer of the control system to an atmospheric air fed system.

**Fatalities and/or Injuries:** One member of the public was transported to the hospital by emergency response personnel, treated, and released. Three other individuals may have transported themselves to the hospital for examination during the general timeframe of the incident, based on the limited information, due to confidentiality, that is available to us.

**Liberty Crews Responding to the Incident:** 35 Liberty employees responded and were assigned directly to on-site support activities. An additional 45 individuals provided off-site call center, engineering, and corporate support.

**Emergency Response to Incident:** The Emergency Response Timeline is 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. Customer turn-ons following precautionary shut-offs by company and emergency response personnel.

The activities are detailed in Attachments 1-12, 1-16, and 1-17.

**Close of Incident:** The initial emergency response was completed by 1:00 a.m. on Sunday, December 20. Customer turn-ons continued until 1:00 p.m. on Sunday, December 20, at which time Liberty Utilities' Keene Division returned to normal operations mode.

**Reporting:** Liberty immediately reported the incident to Safety Division Staff of the New Hampshire Public Utilities Commission (NH PUC), and later on December 19 to US Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA). Although this event arguably 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 did not meet the criteria of paragraphs (1) or (2) of this definition." 49 CFR 191.3(3). Liberty considered the event "significant." Liberty subsequently filed the appropriate reports with the NH PUC and PHMSA.

**Follow-Up Actions:** The Company has implemented six immediate actions to ensure the safe and reliable operation of the plant. (See Section 6 of this Report.) We plan to implement additional actions going forward to increase the automation and redundancy of the plant to further enhance its safe and reliable operation. The Company's findings, including this report, will be made available to the NH PUC Staff.

### **3. KEENE GAS DELIVERY SYSTEM AND GAS PRODUCTION PLANT**

#### **Description of Keene System**

Liberty Utilities purchased the Keene Gas Corporation from Iberdrola USA in January 2015. Liberty owns and operates the distribution system as a stand-alone "propane-air" system which serves about 1,250 customers in Keene. Portions of The City of Keene are provided with gas service through a delivery system, consisting of gas mains ranging in size from 2-inch to 12-inch. There is a low pressure (13" Water Column) system, serving approximately 1100 mostly residential customers, and a "high" pressure system (3.5 lbs. per square inch gauge [psig]), serving approximately 150 mostly commercial customers. The delivered gas commodity is a propane-air mixture consisting of approximately 30% propane vapor and 70% air. Propane storage and mixing with air occurs at a mixing plant located at 207 Emerald St. The plant is owned by Keene Propane Corporation, leased to Liberty Utilities ("Liberty") under a 10-year lease agreement, and is operated and maintained by Liberty.

#### **Overview of Plant Operation:**

The Keene facility mixes propane with air to reduce the propane's BTU content to a level that is appropriate for customer appliances. The facility uses either atmospheric pressure, during contingency operation, or fans/blowers to mix the air with fuel. As the mixture leaves the Keene facility to enter the pipeline system, there are sensors that monitor two constants – pressure and BTU content [a pressure of 3.5 psi in the winter and a BTU content of about 740]. These sensors regulate the fuel and blower systems to automatically respond to greater or lesser customer demand for gas in order to maintain proper pressure and BTU levels. As demand increases the system recognizes lower pressure. The lower pressure causes the blowers to increase output to supply additional air in order to match the output of and the fuel system. In the blower room, the blowers are constantly changing speeds in order to respond to changes in demand.

The system also works without the blowers in an “atmospheric” air supply mode. While in atmospheric mode, there are two pipes, a primary and a secondary, that allow air to be drawn into the system. As demand increases, more air is drawn into the system through these pipes. The fuel system works in a similar fashion as the blowers, monitoring the pressure and regulating the BTU content by injecting the right amount of fuel to maintain the proper mix. The atmospherically fed arrangement has very limited capacity and can supply the system for only a limited period of time.

Both systems are designed to operate without manual input through a combination of control points fed into a Programmable Logic Controller (PLC) and Remote Terminal Unit (RTU). Because of this design, the Keene facility is typically unstaffed at night and over weekends, as has been the case for many years, including prior to Liberty’s purchase of the system in 2015. Although unstaffed, the sensors that measure pressure and BTU content are connected to alarms. When the system pressure falls below what is called for by the control settings, an alarm sounds at Liberty’s main Control Room, located in Londonderry NH, and at a third party alarm service. The Control Room is staffed 24 hours a day and seven days a week. Gas Control immediately contacts the on-call employee in Keene to respond to the plant.

### **Normal Operation:**

Air is supplied to the propane-air mixture via a blower (compressor) system driven by two Adjustable Speed Drives (ASDs) controlled by a PLC. Two other ASDs are installed, but are not in service due to their small size and difficulty interfacing with the output of the larger blowers.

Fuel is supplied to the mixture via eight gas jets. The jets are brought on line in a stepping sequence, Steps 1-15, depending on the customer demand. Differential pressure between the blower output and system demand is monitored and acts as an input to adjust blower output. Based upon system demand, the system automatically adjusts the gas jets and blower system to supply the proper level of fuel to achieve a 30% fuel/70% air mixture or an approximate 740 BTU/cubic ft. caloric measure.

### **Contingency Operation (loss of blower air):**

There are two modes of contingency operation: operation after a complete loss of power to the facility and operation after a momentary loss of power to the facility.

### **Complete Loss of Power:**

For a more than momentary power outage, sensed when power to the ASD drops to 0 volts, the ASD control does not lock out, but remains in the same state as it was prior to the outage. The blower pressure drops to zero and, via the PLC, triggers the pickup of the SV-1 contact that causes the atmospheric air supply valve in the blower room to open. Meanwhile, the backup 125kW generator switches on line, the blowers restart, and then the atmospheric valve closes. This restart and transfer occurs in less than 5 seconds. If the PLC senses a pressure differential outside of a range of 1 psig for longer than 25 seconds, the PLC senses a "System Shutdown" and sends a fault signal to the RTU, which puts the control system back into atmospheric mode control and opens the atmospheric air supply valve. For prolonged power outages, a second 5kW backup generator that powers the control room also switches on-line. Please refer to the company’s response to Staff DR 1-4.

### **Momentary Loss of Power**

For a momentary power outage, such as a voltage dip that results in a supply voltage outside of the normal band, the ASD control for each blower locks out. This is to protect the drive from potential damage during a

high current condition. In turn, the PLC will process the blower lock out condition and pick up an Emergency Contact Switch (EC-1 contact).

The PLC also monitors the differential pressure between system send-out and blower pressures. If the differential pressure is outside of the setting range (1 psig) for longer than 25 seconds, a signal is sent to open the atmospheric air valve (SV-1 contact), which allows for uptake of atmospheric air into the system. Taken together, these two contacts (EC-1 and SV-1) drive logic in the RTU to place the system in atmospheric air supply mode and to limit send out control pressures to a maximum level of approximately 48 inches water column (1.5 psig) vs. the normal pressure of 3.5 psig.

The “Atmospheric Mode” operating pressure of 1.5 psig is designed to help limit, to a degree, the amount of increased BTU content entering the distribution system. The operation of the system at this decreased pressure during a loss of supplied air from the blower system is the minimum operating pressure required to maintain a safe operating pressure to the customers while minimizing the effects of the increased BTU levels in the system. Once the decreased operating pressure of 1.5 psig has been reached, the automatic jet sequencing will maintain this pressure to meet the current customer demand until the Plant personnel respond to the emergency and restore the system to normal operating pressures and BTU levels.

Please refer to the company’s response to Staff DR 1-4.

#### **4. CHRONOLOGY**

##### **December 19, 2015**

At about 8:51 a.m. on December 19, 2015, the air blowers shut down. The shutdown was caused by a dip in supply voltage resulting from the loss of power on a nearby Eversource circuit. As the Eversource system responded to the failed circuit, the adjacent circuit serving the Keene plant experienced momentary drops in voltage. There were 3 voltage drops in total, all lasting less than a second, with voltages dropping to less than two-thirds of the nominal supply voltage in each instance. (Refer to the company’s response to Staff data request DR 1-5).

The blowers in the Keene facility are run by sophisticated adjustable speed motors. As described above, these drives constantly change speed, and consequently blower output, to respond to changes in demand. The drives are very sensitive to changes in voltage. For their own protection, they are programmed to shut down when there is a sufficient drop/increase in voltage. That is what happened on the morning of December 19.

As described above, the Keene facility has back-up power systems for both loss of blower power and loss of control room power. However, these generators were not called on because there was only a momentary drop in voltage, not a power failure. The generators are programmed to start only after power is out for approximately 5 seconds. Here, there was no loss of power. The generators and transfer system were tested as part of the investigation and were both found to be in good working order.

Normally, the voltage issue on Eversource’s system and resulting blower shutdown would not cause the events which occurred on December 19. As described above, the system is designed to recognize that the blowers shut down and transition to ‘atmospheric mode.’ At the same time, a ‘low pressure’ alarm would annunciate at the Londonderry Control Room, and at the third party alarm service, and a technician would be immediately called to respond to the facility. The low pressure atmospheric mode is sufficient to keep the system running until a technician can respond, restart the blowers, and restore the higher pressure. The system is designed such that when there is a failure of the primary blower system, the atmospheric system can safely run, although at reduced capacity, until the blower system is re-activated.

The problem that occurred on December 19 was that the RTU controlling the fuel system did not receive the signal (via the EC-1 contact) indicating that the blowers had shut down, so the system did not recognize that it was time to switch and begin servicing the lower pressure of atmospheric mode (1.5 psig). Only the PLC recognized the blower shutdown and activated contact SV-1 and opened the atmospheric air supply valve. Absent receiving a signal of the blower shutdown, the RTU, controlling the fuel system, recognized the lower system output pressure, as caused by loss of blower output pressure, as an increase in demand. This false signal increase in demand caused the RTU to increase production of the propane fuel system. In an attempt to maintain the normal operating pressure of 3.5 psig in the system without the aid of the pressure from the blower system, the jet sequence stepping increased to its' maximum potential of Step 15, all jets open, and remained at this level of production as it was still insufficient to maintain the 3.5 psig. As the system tried to maintain the normal operating pressure through the additional supply of propane fuel with only the minimal supply of "atmospheric air", the BTU content rose substantially. Instead of maintaining a 30% propane/70% air mixture, the system was actually delivering a much higher propane mixture at its maximum point. We believe that the BTU level of the gas leaving the plant was well beyond the maximum reading of 900 BTU/cubic ft. that was available from plant recording charts following the initial event and in some instances was above 2000 BTU per cubic foot based on gas detector reading taken in the field.

This high-BTU gas caused two related problems. First, customer appliances are not designed to burn such rich gas, so some of the gas remained un-combusted. Customers smelled gas and contacted the Company or 911, reporting gas odor. Also, the combustion that did occur was incomplete and resulted in a release of CO (normal complete combustion releases harmless carbon dioxide (CO<sub>2</sub>)). The gas odors and CO issues resulted in 911 calls and the resulting emergency response. It is worth noting that there were no leaks from the Company's system.

### **The Response**

The Company responded to the facility's low pressure alarm. The Control Room in Londonderry contacted the on-call technician who arrived at the facility at 9:03, 12 minutes after the 8:51 alarm. The technician had just left the plant, having performed a routine inspection. The technician called the Keene Division Manager, Steve Rokes, at 9:04, the two continued to speak while Steve Rokes drove to the facility, arriving at 9:38. They diagnosed the problem, manually placed the system in atmospheric mode at 9:19, brought the blowers on-line by 9:48, and restored normal operation by 9:59 a.m. The technician communicated with local fire personnel and Mr. Rokes several times during the half hour between his arrival and Mr. Rokes' arrival. Please refer to the Company's response to Staff DR 1-12.

The Keene Fire Department (KFD) and other fire departments responded to about 90 customer calls where, for the most part, they turned off the propane service, at the meter riser, and attended to the customers, often advising the customers to leave the buildings. The KFD Chief was in charge of the situation, as was appropriate, and Liberty's Director of Gas Operations Rich MacDonald was by his side in the Emergency Operations Center (EOC) throughout the day. Over the course of the day, Liberty and fire department personnel went to about 10 locations on the system where they purged the rich fuel mixture from the system by venting the larger distribution pipes at safe locations, until the percent gas levels were appropriate. Please refer to the Company's response to Staff DR 1-16. The Company and the fire departments returned to the customers that had been disconnected and restored their service. The fire departments and the Company visited every customer to check CO levels and customer safety. By about 1:15 a.m. on Sunday, December 20, 2015, all services had been restored and all 1250 customers had been checked for CO levels.

Liberty's response included about 80 employees, included 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. Every customer in Keene was called on December 19. Finally, a group of Liberty management and engineering employees in Londonderry and at Liberty's corporate headquarters in Oakville, Canada helped coordinate and supervise the response.

### **The Follow-Up**

Liberty immediately reported the incident on December 19 to NH PUC Safety Division staff and, later that same day, to PHMSA. Although this event arguably did not involve the 'release' of gas in the way 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 did not meet the criteria of paragraphs (1) or (2) of this definition." 49 CFR 191.3(3). Liberty considered the December 19 event to be significant. Liberty subsequently made the required 10 and 20 day reports to the NH PUC Safety Division and, on Friday January 15, the 30 day written report to PHMSA and PUC Staff. Liberty provided detailed answers to Staff's data requests and appeared before the Commission on January 11 to provide an update of the incident response, causes, and findings to date.

### **Incident Costs:**

The cost of the incident to date is as follows:

Internal Costs – Liberty and Keene Personnel	\$ 77,762
External Costs – City of Keene	\$ 47,096
Surrounding cities and towns	\$ 103,861

## **5. FINDINGS**

### **Investigation and Recommendations**

#### **The Investigation**

On Saturday and Sunday, December 19 and 20, Liberty contacted the vendors of all the equipment at the Keene facility and asked that they travel to Keene on Monday December 21 to begin the investigation. Every vendor was present and, led by the Director of Engineering, Chris Brouillard, and the Director of Gas Operations, Rich MacDonald, the investigation began. They spent the day walking through all the mechanical, electrical, and computer systems and arrived at a working theory for the causes of the incident.

On Tuesday December 22, NH PUC Safety Division Staff travelled to Keene and conducted their own review with Liberty personnel, who shared all that had happened the day before, including Liberty's tentative conclusions.

#### **Findings**

As described above, Liberty has determined that there were two causes of the incident. The first cause was the voltage drop on the Eversource supply circuit outside the Keene facility, which caused the blowers to shut down. The second cause was the failure of the fuel system to recognize that the blowers had shut down, and that it was time to switch to atmospheric air supply mode. This failure was caused by 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.

## Contributing Factors

The response time of Keene personnel was noteworthy. In less than 15 minutes the plant was placed in atmospheric (safe) mode, and within 40 minutes the blowers were brought back on-line and the system was stabilized. However, there were several factors that contributed to the high BTU gas entering the delivery system and making its way to customer appliances during the overall response period. The contributing factors center around the time that it took to respond to the plant, diagnose the status of the system, place the system into atmospheric air (safe) mode, and restore the fuel mixing system to normal operation and control. These factors include:

- 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.

## Prior History

The plant has experienced similar events in the recent past, but not to the degree experienced on December 19, 2015. The blower system went into fault mode three times in the past twenty-four months, on March 22, 2015, July 2, 2014, and March 29, 2014.

On two occasions, March 2015 and March 2014, the causes were other process issues with the plant. These were initial alarms for low output pressures, in which the blower controller, the PLC, realized there was too large of a variance between system pressure and blower output pressure parameters, therefore causing a programmed shutdown of the system.

The third occasion in July 2014 was caused by a severe lightning storm. While there was no recorded power failure, the ASD's went into lockout most likely due to a voltage spike or drop in the power supply.

All three incidents 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. Other than a few calls attributable to higher than normal flame height. These three events did not result in customer reports of gas odors, CO issues, or other complaints attributable to higher BTU content.

## **6. FOLLOW UP ACTIONS AND ENHANCEMENTS**

As a result of the Company's investigation into the incident, we have identified a portfolio of immediate, short term, mid-term and long term actions that will enhance the safe and reliable operation of the Keene propane-air plant. Please refer to the attached file, "Keene Plant Operational Alternatives" for further details.

In the immediate / short term, the Company has introduced, and continues to evaluate, redundancies in the control system so that one or two failures do not cause a broader problem. These include computer/hardware changes, wiring changes, new alarm circuits, and different ways of having the system respond to voltage dips and power outages. Over the medium term, we are evaluating whether we can make more substantive equipment or system changes to the existing Keene facility to avoid a repeat of this problem. Over the longer term, we are evaluating the replacement of the propane-air system with a compressed natural gas (CNG) or

liquefied natural gas (LNG) facility. That has been the Company's long-term plan for Keene, and we are looking to see how we can accelerate that plan, in light of the December 19 incident.

The eight actions below were implemented following the incident, with the exception of the mapping initiative which was begun earlier in 2015. The remaining eight items are under evaluation. The Company expects to have a decision on the short-term and mid-term initiatives by the end of March, 2016. The long-term initiatives will require further analysis and discussion with NH PUC Staff. Please refer to "Keene Plant Operational Alternatives" for further details on Follow Up Actions and Enhancements.

#### Implemented:

1. Place the Keene Production Plant under the direction of the Director of Production, Dispatch, and Control.
2. Staff the Keene Production Plant 24/7, with experienced Keene-based personnel available for supplemental response.
3. Provide additional training to those staffing the plant on plant operations and contingency response.
4. 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.
5. 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.
6. 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.
7. Update the Keene Emergency Response Plan and issue to stakeholders.
8. 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 3<sup>rd</sup> quarter 2016).

#### Under Evaluation and Probable Implementation:

1. Reprogram the ASD control to provide for ASD auto restart following detection of an interruption of power supply.
2. Enhance the monitoring capability of Gas Control in Londonderry by providing real time high pressure system end point readings.
3. Model the Keene system and determine the feasibility of supplying the high pressure system via atmospheric air only during periods of light demand (May through September).
5. Increase the size of the pressure relief valve downstream of the regulators feeding the low pressure system
6. Install a CNG supply to feed 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..
7. Install an LNG Plant - Fully Sized for Permitting, Construction to be modular – contingent on outcome of permitting for the proposed NED gas transmission line. A favorable outcome to the NED permitting application would likely provide support for the construction of a lateral to the Keene franchise area.

## **7. CONCLUSIONS**

The gas delivery system incident that occurred in Keene on December 19, 2015, was caused by two factors:

1. An electrical fault outside of the Keene plant on the utility supply system, and
2. The failure of a component (fuse) within the Plant's control and alarm system circuitry.

The Company responded to the incident appropriately, with local personnel and a significant resource complement from the other Liberty locations and its headquarters. Liberty worked with area emergency response personnel to ensure the safety of residential dwellings and commercial establishments before proceeding to purge the system of high BTU gas. Following a return to normal operations, the Company opened an investigation into the incident in collaboration with NH PUC staff. The investigation findings, action recommendations, and this report will be provided to NH PUC Staff.

## **LIST OF ATTACHMENTS/APPENDIX**

1. NH PUC Staff Data Requests, Sets 1 and 2.
2. PHMSA Report
3. PUC 10, 20, and 30 day Reports
4. Keene Plant Operational Alternatives

Alternative	Description	Notes	Details	Scope/Resources	Risk	Cost (Low=<\$50k, Med=\$50k-\$500k, High=>\$500k)	Schedule (ST=< 3 mos., MT=3-6 mos., LT= >6 mos.)	Complexity	Recommendation	Implementation Probability	Update 3/22/16
i	Place the Keene Production Plant under the direction of the Director of Production, Dispatch, and Control.	The Keene Plant, although a different design, is conceptually the same as other operating plants within Energy North	Utilize the expertise within gas production to enhance the staffing, operation, and response activities at the plant	Utilize existing expertise within the Production group.	None	Low	Immediate	Low	Implemented	Done	Verified Done
ii	Staff the Keene Production Plant 24/7, with experienced personnel available for secondary response	Utilize personnel at Manchester, Keene, and Tilton to augment existing Keene based staffing.	Ensure the safe and reliable operation of the plant until such time that equipment, systems, and process enhancements can be fully implemented.	Utilize personnel at Manchester, Keene, and Tilton to augment existing Keene based staffing.	None	Medium	Immediate	Low	Implemented	Done	Verified Done
iii	Training	Training of Keene and Liberty NH personnel staffing the plant	Provide training to those staffing the plant on plant operations and contingency response		None	Low	Immediate	Low	Implemented	Done	Verified Done
iv	Re-wire signal circuits, program spare RTU and install a new server and a back up server.	Re-wire signal circuits to eliminate the lack of alarms when the protective fuse in the circuit operates. also have spare RTU, back up server, and spare PLC which will be pre-programmed. Provide ride-through to the PLC.	Currently the signal circuits are fused in an undesirable manner and don't send an alarm signal upon failure. Supply the PLC with 24VDC battery supply to allow for continuous power to the PLC during a power supply interruption.	This can be completed in house with Scada SME and electrician	Potential re-occurrence of Dec event.	Low	Immediate	Low	Implemented	Done	Complete
v	Replace one of the Plug valves with full port valve, sending all gas through surge tank	Buy time vs. supplying gas directly via jets., surge tank allows for mixing of higher BTU gas with air/gas mixture in surge tank.	Could do almost anytime.	Minimal	Low if any.	Low	ST	Low	Implemented	Done	Complete
vi	Update Keene Emergency Plan	Update is required to reflect change of ownership, organization structure, and responsible parties	Update, review, and issue to file save locations and key stakeholders	Minimal	None	Low	Immediate	Low	Implemented	Done	Complete

Alternative	Description	Notes	Details	Scope/Resources	Risk	Cost (Low=<\$50k, Med=\$50k-\$500k, High=>\$500k)	Schedule (ST=< 3 mos., MT=3-6 mos., LT= >6 mos.)	Complexity	Recommendation	Implementation Probability	Update 3/22/16
vii	Keene System Mapping Enhancements	Transition Keene system mapping from a paper based system to Energy North's GIS ArcFM system including scanned records	Obtain Landbase, scan records, obtain and convert main/service data, and convert data to the GIS ArcFM system used by Energy North	Liberty Mapping with Outside Vendor	None	Low	MT	Low	Continue Implementation	High	Landbase, scanning are complete. Vendor engaged to digitize and enter into GIS ArcFM.
viii	Keene System Mapping Enhancements	Extend control wiring from the plant control room to the blower room.	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.	Internal Liberty Production Staff	None	Low	ST	Low	Implemented	High	Complete
1	Set Time Delay on ASD Trip, Reset ASD voltage pickup setting, modify control sequence of auto restart. Also include powering the PLC directly from 24V DC plant system.	include modifying the pick up setting of ASD voltage level, time delay, and the control sequence. Alternatives 1 -3 are all related.	Reprogram the ASD control to provide for ASD auto restart following detection of an interruption of power supply.	Engage Baldor and Hope Air to determine what is possible for time delay settings and protection trade offs	Potential damage to equipment	Low	ST	Low	Allow Greg Clement to finish his review. Contact Baldor representative if necessary. Likely to implement after discussions with the vendors.	High	Working to optimize the best combination of setting and control system modifications. Targeting mid-May to implement.
2	Cutover to generators for voltage sags	include modifying the pick up setting of ASD voltage level, time delay, and the control sequence. Alternatives 1 -3 are all related.	Transfer to generator supply upon detection of sag in supply voltage	Engage Baldor to determine what is possible for transfer settings and protection trade offs	Potential damage to equipment	Low	ST	Medium	Probably not as it introduces a number of complexities and response actions relatively little benefit as compared to other control system and setting changes (Alternative No.1)	Low	Shelve this alternative for now.
3	Cutover to generators for voltage sags; utilize back up blower	include modifying the pick up setting of ASD voltage level, time delay, and the control sequence. Alternatives 1 -3 are all related.	Same as #2, but utilize back up blower instead of main blower	Engage Baldor to determine what is possible for transfer settings and protection trade offs	Potential damage to equipment	Low	MT	Medium	Probably not as it introduces a number of complexities and response actions relatively little benefit as compared to other control system and setting changes (Alternative No.1)	Low	Shelve this alternative for now.
4	Air compressor/air surge tank	Volume of air needed for 1 hour?	Install air compressor and air surge tank to ride through blower shutdown	Adequate storage to ride through blower shutdown until blowers are brought back on line.	Additional construction and equipment at the plant and plant site which will ultimately be abandoned.	High	LT	High	Discard	Low	Discard this option due to cost, complexity, and need for further site development and investment.

Alternative	Description	Notes	Details	Scope/Resources	Risk	Cost (Low=<\$50k, Med=\$50k-\$500k, High=>\$500k)	Schedule (ST=< 3 mos., MT=3-6 mos., LT= >6 mos.)	Complexity	Recommendation	Implementation Probability	Update 3/22/16
5	Enhance Remote Control capability - Gas Control	Steve and the on-call individual can do this now via laptop from home.	Provide Gas Control with ability to restart blowers remotely and possibly control stepping. Provide training to gas controllers in Londonderry of Keene system operation		Operators would need to get OQ for the plant; risk of some other mis-operation	Low	MT	Medium	Final decision of whether to allow the system to be placed in atmospheric (safe) mode from gas control in Londonderry. Positive determination is likely.	High	Probably will not extend remote capability to stepping due to vintage equipment, complexity, and training.
6	Auto Restart of Blowers following certain fault conditions	See No. 1 above.	Provide auto restart or one try for certain types of faults/voltage sags	Engage Baldor to determine what is possible for transfer settings and protection trade offs	Increased potential for damage to equipment	low	MT	low	Will incorporate into control setting changes in Alternative No. 1.	High	Will implement as control system and settings allow.
7	Control Fuel system stepping and Blowers from one location	Norm to Discuss with Greg; is there a way to simplify the steps	Eliminate the need to run from blower room to control room to set and adjust blower and jet settings	In-house		Low	ST	Low	Install laptop into blower room to provide visibility into RTU. Also provide stepping control capability from blower room.	High	Will implement.
8	UPS - VFD Controls	Mask the condition that the blowers are seeing. Can accomplish via changes to pick up and time delay setting.	Install UPS on VFD controls to ride through voltage sag		Potential damage to equipment	Low	MT	Medium	Do not proceed, potential damage to VSD's.	Discard	Discard.
9	UPS - Full Blowers	Very high cost, space required.	Install UPS on blowers to provide conditioned voltage to the blowers during a voltage sag			High	LT	Medium	Shelve this one for now due to very high cost.	Discard	Discard.
10		Provide for real time pressure readings on the high pressure system.	Enhance the monitoring capability of Gas Control in Londonderry by providing real time high pressure system end point readings.	Internal Liberty	Low if any.	Low	MT	Low	Will implement	High	In progress. Customer identified (Price Chopper) at sensitive end-point.
11	Take Blowers off line on a seasonal basis.	Determine what months blowers can be taken off line based on historical demand and anticipated minimum low temperatures.	This would take the blower completely off of the scheme during a significant portion of the year. Potentially take blowers off line April 1 through October 31. This also include development of Keen pressure model.	None	Very small risk to low pressures on end of HP system	Low	ST	Low	Evaluate capacity of atmospheric based air supply during May to September time frame. - Done by Ryan Burns. Looks feasible. Will test atmospheric pressure capability using the blower system operated at atmospheric output.	High	Evaluate capacity of atmospheric based air supply during May to September time frame. This option also buys us time to continue testing and implementation of further enhancements to the Keene Plant operating system.

Alternative	Description	Notes	Details	Scope/Resources	Risk	Cost (Low=<\$50k, Med=\$50k-\$500k, High=>\$500k)	Schedule (ST=< 3 mos., MT=3-6 mos., LT= >6 mos.)	Complexity	Recommendation	Implementation Probability	Update 3/22/16
12	Propane Tank Farm	Worth looking into, 10-15 customers in Manadnock Market Place to convert to Propane	Temporarily serve the HP system via propane tank farm. Allows for move to atmospheric based system until LNG is brought to Keene, put at remote location at Marketplace.		Would some customers leave for their own propane bottle supply. What about rate to charge.	High	LT	High	Less desirable option to CNG, put aside for now.	Discard	CNG is preferred option to alternative to Propane/Air
13	Increase Pressure Relief Valve size - LP Regulator	Pressure relief valve to the LP (13 inches WC) system is undersized	Increase valve size to match regulator output and hold pressures to within design limits of the HP system during a pressure regulator fail open contingency	Size and replace the regulator	Overpressurization of the LP system during regulator contingency	Low	ST	Low	Implement	High	Will implement. Anticipated cost is around \$30k.
14	CNG feed to HP system; all or portion (Manadnock Market Place)	End of production avenue about 2500 ft. of pipe to the Marketplace.	Feed the HP system with CNG, allows for complete de-activation of the blower system throughout the year until an LNG plant comes on line.	Significant. May also be able to lease the CNG station.	File as temporary solution; how much space would it take up on Production Ave.	Medium	LT	Medium	Pursue as option. Bill Clarke to pursue economics.	Medium-High	Proceed with this interim option.
15	Air/Propane Holder		Install an air/propane mix holder to feed the HP system during a blower shutdown			High	LT	High	Leave aside for now.	Discard	
16	LNG Plant - Small	Pipeline related as far as size goes. Discard in favor of Alt. 13.	Modularize (size) the LNG plant to initially serve the HP system only - allows for atmospheric mode to LP system and elimination of blower system	May allow for faster permitting and construction		High	LT	High	LT Option	Discard	
17	LNG Plant - Fully Sized Permitting, Construction Modular	Probably will permit for full, until NED status is known, and buy for small size, modular first.	Sized for growth customers, Swanzey, and new Keene customers including those now on bottled propane			High	LT	High	LT Option	High	Will be pursued in conjunction with anticipated filing. Fully Sized for Permitting, Construction to be modular – contingent on outcome of permitting for the proposed NED gas transmission line. A favorable outcome to the NED permitting application would likely provide support for the construction of a lateral to the Keene franchise area.

**Appendix 3-A NH Puc 500 Rules Compliance Summary**

<b>PUC SAFETY REQUIREMENTS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT</b>				
<b>Rule</b>	<b>Section</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIV COMMENTS</b>
Puc 504.01 (a)	Heating Value Requirements	Each utility shall establish its own standard heating value for the gas it furnishes the public. At no time shall the daily average heating value be less than the established standard. The standard adopted by the utility shall be stated in its tariff.	○ UNMET	Liberty filed E-6 report Jan 14 2016 that shows all days ranged from 737.5 to 743 Btus for month. 14 days below 740 threshold Dec 19 2015 daily recording of 740 Btus 740 therms/cf is listed in Co Tariff Original Page 17 STANDARD HEAT CONTENT VALUE
Puc 504.01 (b)	Heating Value Requirements	Each utility shall, unless it only takes gas from interstate pipelines or obtains a waiver pursuant to Puc 201.05, maintain equipment for measuring thermal content as follows: (1) Each utility shall maintain a standard calorimeter outfit or gas chromatograph for the regular determination of the heating value of gas sold; and (2) Each utility shall use the manufacturer's recommended procedures as a basis for: a. Maintaining the accuracy of all calorimeters and gas chromatographs; and b. The method of measuring heating value tests.	✓ MET	Keene has a Cutler Hammer calorimeter at the plant that water reserve is replenished 2x week Sample points come from the Reg Station cutting to low pressure, at each of the jets and at stand-by jets
Puc 504.01 (c)	Heating Value Requirements	The total heating value of the gas shall be determined at least once daily and more often as is necessary to obtain an accurate record of the average heating value and of the fluctuation in heating value.	✓ MET	Graphs indicate Btu levels are continuously recorded. See Discovery Attachment 1-12 Btus Recorded Tab
Puc 504.01 (d)	Heating Value Requirements	Each utility shall provide a definition in its tariff of the methodology used to determine the thermal heating value.	○ UNMET	Could not find within tariff
Puc 504.01 (e)	Heating Value Requirements	To obtain the monthly average heating value the results of all tests of heating value made on any day during the calendar month shall be averaged, and the average of all daily averages shall be taken as a monthly average.	✓ MET	Sample points come from the Reg Station cutting to low pressure, at each of the jets and at stand-by jets per Plant Operatons Manual Section 11.3

## PUC SAFETY REQUIREMENTS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT

Rule	Section	DESCRIPTION	STATUS	SAFETY DIV COMMENTS
Puc 504.01 (f)	Heating Value Requirements	If a utility's calorimeter or gas chromatograph is of the recording type, its record shall be used in determining the average heating value provided that the recording calorimeter or gas chromatograph is checked at least annually.	✓ MET	2x per year internal check and once per year independent verification by outside company as outlined in Gas Plant Operations Manual Section 11.3
Puc 504.01 (g)	Heating Value Requirements	Heating value reports shall be made to the commission on Form E-6 once a month pursuant to Puc 509.08.	✓ MET	Filed E-6 Report Jan 14 2016 for December 2015 data
Puc 504.04 (a)	Interruptions of Service	Each utility shall use all practicable means to avoid interruptions to service, including maintaining appropriate levels of maintenance and planning for unexpected events.	✓ MET	O&M Manual, Plant Maintenance Manual and Emergency Response Manual meet these requirements
Puc 504.04 (b)	Interruptions of Service	Should interruptions occur, a utility shall reestablish service within the shortest time practicable consistent with safety.	✓ MET	Plant Restored in 69 minutes on Dec 19 2015 12 minute arrival, additional 16 minutes to atmospheric mode [28] additional 29 minutes to restore air compressors [57], additional 11 minutes to restore to normal [68]
Puc 504.04 (c)	Interruptions of Service	Each utility shall keep a record of all interruptions to service.	✓ MET	file E-23 report filed Jan14 2016 referred to Discovery 1-17 attachment
Puc 504.04 (d)	Interruptions of Service	Each utility shall include in its record of service interruptions the following:(1) The date and time of interruption;(2) The approximate number of customers affected;(3) The date and time of service restoration;(4) The cause of such interruption when known; and(5) A description of steps taken to prevent its recurrence.	✓ MET	E-23 Report contains 1-4 and does not have any description of steps to prevent recurrence Most Months report none. A suggested improvement is to update form. Dec 2015 referenced Special Report
Puc 504.04 (e)	Interruptions of Service	Each utility shall provide emergency notification to the commission of service interruptions as provided in Puc 504.05(a).	✓ MET	Puc Safety Division routinely receives emails and phone messages from Dispatch
Puc 504.04 (f)	Interruptions of Service	Each utility shall report to the commission all service interruptions on Form E-23, pursuant to Puc 509.12, once a month, if any interruption occurs.	✓ MET	E-23 Report is reported monthly Most Months report none.
Puc 504.04 (g)	Interruptions of Service	When service is interrupted to perform work on lines or equipment, such work shall be done at a time causing minimum inconvenience to customers consistent with the circumstances.	✓ MET	Applies to scheduled maintenance not emergencies

**PUC SAFETY REQUIREMENTS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT**

<b>Rule</b>	<b>Section</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIV COMMENTS</b>
Puc 504.04 (h)	Interruptions of Service	Customers seriously affected by interruption to service to perform work on lines or equipment shall be notified in advance, if practicable.	✓ MET	Applies to scheduled maintenance not emergencies
Puc 504.05 (a)	Emergency Notification	<p>The utility shall notify the safety division of the commission by telephone when any of the following events occur:</p> <p>(1) A release of gas from a pipeline, release of LNG or LPG, or release of gas from a LNG or LPG facility that results in: a. A death;b. Personal injury necessitating same day professional medical treatment; or c. Estimated property damage of \$5,000 or more;</p> <p>(2) A fire or an explosion at, or emergency shutdown of, a liquefied natural gas facility, or propane-air facility;</p> <p>(3) An evacuation of a building conducted by a fire department, utility or other emergency personnel because of the presence of gas in the atmosphere or in, or in the immediate vicinity of, the building;</p> <p>(4) An unplanned service interruption or gas outage that is expected to result in 50 or more customer outage hours;</p> <p>(5) A single outage occurring at a state, federal, or municipal facility, hospital, school or other facility in which the public could be affected;</p> <p>(6) A breach of security or other threat that jeopardizes the operation of a utility’s major facilities;</p> <p>(7) Any exceedance of maximum allowable operating pressure of any duration, including accidental overpressurizations, consistent with Puc 506.01(a);</p> <p>(8) A gas facility-related event, that the utility is aware of or has reason to believe has been or will be reported in the news media, including, but not limited to, a shutdown of a major highway, arterial roadway or rail system, or where a person identified as a news reporter was present;</p> <p>(9) When the utility confirms that levels of odorant do not meet the requirements of Puc 506.02(m); or</p> <p>(10) An event which is significant in the judgment of the utility, even though it is not described above.</p>	✓ MET	Element (2), (3), (4), (5) and (8) of event notification were triggered Element 10 was deemed later in the evening (8:39 pm) of Dec 19, 2015

**PUC SAFETY REQUIREMENTS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT**

<b>Rule</b>	<b>Section</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIV COMMENTS</b>
Puc 504.05 (b)	Emergency Notification	A utility shall file any report required pursuant to (a)(1) above in addition to any report required pursuant to (a)(2).	✓ MET	(a) (1) is not applicable but (a) (2) is applicable. Reports filed were 10 day, 20 day and 30 day reports
Puc 504.05 (c)	Emergency Notification	The telephone notification shall be made promptly, but no more than one hour following confirmed discovery by the utility of the event or any incident defined in Puc 504.06.	○ UNMET	D Burnell of PUC was notified by Liberty Dispatch K Kelly from Londonderry at 10:32 am Confirmed Discovery was 9:03 am when R Labelle arrived at plant after alarms went off {29 minutes after rule requirement}
Puc 504.05 (d)	Emergency Notification	The utility shall provide to the commission representative who responds to the call the following information: (1) Identity of reporting utility; (2) Name, title, and location of the person reporting the incident and contact information; (3) Location of the incident including street address and city or town; (4) Number of known or estimated fatalities and personal injuries, if any; (5) Type and extent of known or estimated property damage; (6) Description of the incident or event including any significant facts known by the utility that relate to the cause and resolution of the problem; (7) Date and hour the incident occurred and was discovered by the utility and, to the extent known, by any other party; (8) For a service interruption, gas outage, or evacuation of a building, the estimated or known number of people and/or customers affected and the estimated or actual duration of the outage; and (9) When the Office of Pipeline Safety of the United States Department of Transportation was, or will be, notified of the incident, if applicable.	✓ MET	See completed PUC Accident Report PUC Form 4.1 (revised 4/8/2009) for Dec 19 2015 by D Burnell of PUC

**PUC SAFETY REQUIREMENTS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT**

<b>Rule</b>	<b>Section</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIV COMMENTS</b>
Puc 504.06 (a)	Incident Reporting	In addition to the emergency notification required in Puc 504.05, a utility shall also report in writing to the commission any incident occurring in connection with its facilities and services, as follows: (1) In accordance with 49 C.F.R. §191.9 and §191.15, a utility shall report to the commission, within 20 days following discovery, any incident which the utility shall be required to report to the federal Office of Pipeline Safety pursuant to 49 C.F.R. 191.9, which report shall be made on federal Department of Transportation form PHMSA F 7100.1, which is entitled, "Incident Report - Gas Distribution Systems" and a copy thereof shall be submitted to the commission; and (2) A utility shall report each month, pursuant to Puc 509.15, the status of any leaks occurring in its gas distribution system.	✓ MET	in compliance with 191.9 reported on January 15, 2016 within 30 days and January 8, 2016 within 20 days and used for PHMSA F 7100.1 Puc 504.06 (a) (2) is not applicable;
Puc 504.06 (c)	Incident Reporting	When additional relevant information is obtained after a report under this section is submitted, the utility shall make a supplementary report to the commission conveying this information.	✓ MET	Liberty filed a Final 7100.1 Report to PHMSA on January 15, 2016. There were no supplementary reports needed.
Puc 504.07 (a)	Emergency Response	For any utility that serves a single municipality or serves fewer than 2,500 customers, emergency response times shall be limited to within 30 minutes.	✓ MET	8:51 am to 9:03 response rate (12 minutes) for R Labelle of Liberty. 34 minutes later S Rokes arrived
Puc 504.07 (b)	Emergency Response	Reports on emergency response times shall be submitted as follows: (1) For any response time in excess of 30 minutes, the utility shall report the amount of time it took to arrive at the location of the report of gas odor, the location of the report of gas odor, and a detailed explanation for its failure to respond to the location within 30 minutes and preventive measures taken to limit potential future (2) On a monthly basis the utility shall report the number of gas odors responded to, leaks and other unplanned releases of gas responded to, and any other emergency responses. The report should include the date, time and location of emergency response and reason for emergency response.	○ UNMET	(b) (1) not applicable since response time was less than 30 minutes [12 min] Liberty filed monthly reports however the Dec 19 2015 event is not listed on the January 15, 2016 report filing.

**PUC SAFETY REQUIREMENTS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT**

<b>Rule</b>	<b>Section</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIV COMMENTS</b>
Puc 506.02 (u)	Construction, Operations and Maintenance	By July 1, 2015, all operator qualification plans shall list all covered tasks and include specific abnormal operating conditions for each task. All operator qualifications covered tasks shall be cross referenced with applicable construction standards or specifications or applicable operation and maintenance activities including emergency response.	○ UNMET	Possible OQ Covered Task 35, 38, 75. also note Section 3.1 of Appendix E
Puc 508.03 (a)	Accident	Each utility shall notify the commission of any accident, as described in Puc 504.05(a), pursuant to Puc 504.05.	✓ MET	Dec 19, 2015 incident does not meet the requirements of 504.05 (a) since no release of gas and significant in eyes of utility is not a selection available
Puc 508.03 (d)	Accident	A utility shall submit concurrently to the commission a copy of any written accident or incident report submitted to the federal government.	✓ MET	Liberty filed all reports concurrently with Safety Division that also went to Fed Government
Puc 511.01 (b)	Jurisdiction Scope and Application of Authority	In enforcing safety standards and practices the commission shall consider: (1) Pipeline safety data; (2) The appropriateness and reasonableness of a safety standard applied to a particular incident or circumstances; and (3) Other relevant information regarding the particular circumstances of an incident.	Pending	Puc Safety Division must consider the circumstances of the particular incident when reviewing listed unmet items and determining if any possible violations exist or processes need updating.
Puc 511.02 (b)	Intervals of Inspection	Each utility shall permit the commission to conduct inspections in response to or related to any of the following: (1) Routine scheduling; (2) A complaint received from a member of the public or any party; (3) Information obtained from a previous inspection; (4) Pipeline accident or incident; and; (5) Compliance with Puc 500.	✓ MET	Liberty has been cooperative with replying to all discovery requests and sharing all findings
Puc 511.02 (c)	Intervals of Inspection	The commission shall schedule and conduct inspections if: (1) Results obtained in an initial inspection show a defect, irregularity or non-compliance which establishes the need for a subsequent or follow-up inspection; or (2) The commission determines that additional inspections are required to provide sufficient information to allow it to determine utility compliance with commission rules and orders.	✓ MET	Puc 511.02 (c ) (2) applicable and Commission ordered an investigation that specifically called out compliance

**PUC SAFETY REQUIREMENTS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT**

<b>Rule</b>	<b>Section</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIV COMMENTS</b>
Puc 511.03 (a)	Inspection of Utilities	Inspections conducted pursuant to Puc 511.02 shall include a thorough review of the utility's records concerning inspection, operation, maintenance, and emergency procedures.	✓ MET	Emergency Procedures are being reviewed by the Safety Division within the investigation
Puc 511.03 (b) (10)	Inspection of Utilities	Field inspections combined with office inspections shall cover: (10) Public awareness programs, emergency response programs, quality assurance programs, underground damage prevention programs, and integrity management programs for transmission and distribution pipeline facilities;	✓ MET	Staff went to site on Dec 19 2015 as part of field inspection (J V and RSK) Follow up plant inspection conducted Dec 22 2015

Appendix 3-B 49 CFR Part 191 and Part 192 Code Compliance Summary

<b>FEDERAL SAFETY REGULATIONS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT</b>				
<b>Regulation</b>	<b>RULE NAME</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIVISION COMMENTS</b>
49 CFR Part §191.3 " Definitions"	Definition of "Incident"	<i>Incident means any of the following events:</i> (1) An event that involves a release of gas from a pipeline, or of liquefied natural gas, liquefied petroleum gas, refrigerant gas, or gas from an LNG facility, and that results in one or more of the following consequences: (i) A death, or personal injury necessitating in-patient hospitalization; (ii) Estimated property damage of \$50,000 or more, including loss to the operator and others, or both, but excluding cost of gas lost; (iii) Unintentional estimated gas loss of three million cubic feet or more; (2) An event that results in an emergency shutdown of an LNG facility. Activation of an emergency shutdown system for reasons other than an actual emergency does not constitute an incident. (3) An event that is significant in the judgment of the operator, even though it did not meet the criteria of paragraphs (1) or (2) of this definition.	✓ MET	Liberty deemed the event "significant" so that made it an "incident" although criteria from (1) and (2) were not met
49 CFR Part §191.5 (a)	Immediate notice of certain incidents.	At the earliest practicable moment following discovery, each operator shall give notice in accordance with paragraph (b) of this section of each incident as defined in §191.3.	✓ MET	NRC was notified via electronic email on 12/19/2015 at 8:39 pm from M Sheehan of Liberty after Liberty decided it was significant. Note: In future federal requirement to change to notifications within one hour currently NPRM on this issue. PHMSA Advisory Bulletin issued January 30, 2013 stated one hour

## FEDERAL SAFETY REGULATIONS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT

Regulation	RULE NAME	DESCRIPTION	STATUS	SAFETY DIVISION COMMENTS
49 CFR Part §191.5 (b)	Immediate notice of certain incidents.	Each notice required by paragraph (a) of this section must be made to the National Response Center either by telephone to 800-424- 8802 (in Washington, DC, 202 267-2675) or electronically at <a href="http://www.nrc.uscg.mil">http://www.nrc.uscg.mil</a> and must include the following information: (1) Names of operator and person making report and their telephone numbers. (2) The location of the incident. (3) The time of the incident. (4) The number of fatalities and personal injuries, if any. (5) All other significant facts that are known by the operator that are relevant to the cause of the incident or extent of the damages.	✓ MET	NRC was notified via electronic email on 12/19/2015 at 8:39 pm from M Sheehan of Liberty after Liberty decided it was significant. All 5 elements were included in report to NRC
49 CFR Part §191.9 (a)	Distribution system: Incident report	Except as provided in paragraph (c) of this section, each operator of a distribution pipeline system shall submit Department of Transportation Form RSPA F 7100.1 as soon as practicable but not more than 30 days after detection of an incident required to be reported under § 191.5.	✓ MET	Liberty filed a Final 7100.1 Report to PHMSA on January 15, 2016 within 30 day requirement. There were no supplementary reports needed.
49 CFR Part §191.9 (b)	Distribution system: Incident report	When additional relevant information is obtained after the report is submitted under paragraph (a) of this section, the operator shall make supplementary reports as deemed necessary with a clear reference by date and subject to the original report.	✓ MET	Liberty filed a Final 7100.1 Report to PHMSA on January 15, 2016 within 30 day requirement. There were no supplementary reports needed.
49 CFR Part §192.605 (a) General	Procedural manual for operations, maintenance, and emergencies	Each operator shall prepare and follow for each pipeline, a manual of written procedures for conducting operations and maintenance activities and for emergency response. For transmission lines, the manual must also include procedures for handling abnormal operations. This manual must be reviewed and updated by the operator at intervals not exceeding 15 months, but at least once each calendar year. This manual must be prepared before operations of a pipeline system commence. Appropriate parts of the manual must be kept at locations where operations and maintenance activities are conducted.	○ UNMET	Liberty either did not review the Emergency Plan 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 all contain out of date references.

**FEDERAL SAFETY REGULATIONS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT**

<b>Regulation</b>	<b>RULE NAME</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIVISION COMMENTS</b>
49 CFR Part §192.605 (e) Surveillance, emergency response, and accident investigation.	Procedural manual for operations, maintenance, and emergencies	Surveillance, emergency response, and accident investigation. The procedures required by §§192.613(a), 192.615, and 192.617 must be included in the manual required by paragraph (a) of this section	○ UNMET	Liberty has separate Emergency Plan (so this meets the 192.615 portion) Incident Investigations is mentioned in the Operations & Maintenance Manual 1.17 LEAK REPAIR UNDERGROUND FACILITIES INSTRUCTIONS TO EMPLOYEES Section G although this section does not correlate well with Dec 19 2015 incident. Surveillance 192.613 methods is not mentioned in the O&M other than leak surveying

**FEDERAL SAFETY REGULATIONS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT**

<b>Regulation</b>	<b>RULE NAME</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIVISION COMMENTS</b>
49 CFR Part §192.615 (a)	Emergency plans	<p>Each operator shall establish written procedures to minimize the hazard resulting from a gas pipeline emergency. At a minimum, the procedures must provide for the following:</p> <p>(1) Receiving, identifying, and classifying notices of events which require immediate response by the operator.</p> <p>(2) Establishing and maintaining adequate means of communication with appropriate fire, police, and other public officials.</p> <p>(3) Prompt and effective response to a notice of each type of emergency, including the following:</p> <p>(i) Gas detected inside or near a building.</p> <p>(ii) Fire located near or directly involving a pipeline facility.</p> <p>(iii) Explosion occurring near or directly involving a pipeline facility.</p> <p>(iv) Natural disaster.</p> <p>(4) The availability of personnel, equipment, tools, and materials, as needed at the scene of an emergency.</p> <p>(5) Actions directed toward protecting people first and then property.</p> <p>(6) Emergency shutdown and pressure reduction in any section of the operator's pipeline system necessary to minimize hazards to life or property.</p> <p>(7) Making safe any actual or potential hazard to life or property.</p> <p>(8) Notifying appropriate fire, police, and other public officials of gas pipeline emergencies and coordinating with them both planned responses and actual responses during an emergency.</p> <p>(9) Safely restoring any service outage.</p> <p>(10) Beginning action under § 192.617, if applicable, as soon after the end of the emergency as possible.</p> <p>(11) Actions required to be taken by a controller during an emergency in accordance with § 192.631.</p>	○ UNMET	<p>10 of 11 items are included in the 2013 Emergency Plan</p> <p>Item 1 is in Section 2.2,</p> <p>Item 2 is in Section 4.2,</p> <p>Item 3 is in Section 6.0,</p> <p>Item 4 is in Section 6.0,</p> <p>Item 5 is in Sections 1.0, 2.0, 4.0, 4.4, 6.1, 6.2, 6.3, 6.4, 6.5</p> <p>Item 6 is in Sections 6.5 A2 and C1; Section 6.2</p> <p>Item 7 is in Section 6.0,</p> <p>Item 8 is in Section 7.0,</p> <p>Item 9 is in Section 4.0,</p> <p>Item 10 is in Section 6.4.</p> <p>Item 11 is missing. The plan should be amended to include actions to be taken by a controller during an emergency.</p>

**FEDERAL SAFETY REGULATIONS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT**

<b>Regulation</b>	<b>RULE NAME</b>	<b>DESCRIPTION</b>	<b>STATUS</b>	<b>SAFETY DIVISION COMMENTS</b>
49 CFR Part §192.615 (b)	Emergency plans	Each operator shall: (1) Furnish its supervisors who are responsible for emergency action a copy of that portion of the latest edition of the emergency procedures established under paragraph (a) of this section as necessary for compliance with those procedures. (2) Train the appropriate operating personnel to assure that they are knowledgeable of the emergency procedures and verify that the training is effective. (3) Review employee activities to determine whether the procedures were effectively followed in each emergency.	✓ MET	Item 1 is in Section
49 CFR Part §192.615 (c)	Emergency plans	Each operator shall establish and maintain liaison with appropriate fire, police, and other public officials to: (1) Learn the responsibility and resources of each government organization that may respond to a gas pipeline emergency; (2) Acquaint the officials with the operator's ability in responding to a gas pipeline emergency; (3) Identify the types of gas pipeline emergencies of which the operator notifies the officials; and (4) Plan how the operator and officials can engage in mutual assistance to minimize hazards to life or property.	✓ MET	Item 1 is in Section 4.1 Item 2 is performed in annual training Item 3 is listed in Liberty's EP Section 6.2, 6.3, 6.4 Appendices III, VII Item 4 is in Section 2
49 CFR Part §192.617	Investigation of failures	Each operator shall establish procedures for analyzing accidents and failures, including the selection of samples of the failed facility or equipment for laboratory examination, where appropriate, for the purpose of determining the causes of the failure and minimizing the possibility of a recurrence.	✓ MET	Item 1 is in Section 4.1
49 CFR Part §192.629 (a)	Purging of pipelines	When a pipeline is being purged of air by use of gas, the gas must be released into one end of the line in a moderately rapid and continuous flow. If gas cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the gas.	✓ MET	Safety Division did not identify any issues with purging locations or methods used. Emergency Plans could be improved by including a paragraph that describes the locations and gas mixtures necessary for achieving goals and instrumentation to record the

**FEDERAL SAFETY REGULATIONS FOR DEC 19, 2015 KEENE OPERATIONAL EVENT**

Regulation	RULE NAME	DESCRIPTION	STATUS	SAFETY DIVISION COMMENTS measurements.
49 CFR Part §192.631 (a) (2) General	Control Room management	(a) General. (2) The procedures required by this section must be integrated, as appropriate, with operating and emergency procedures required by §§ 192.605 and 192.615. An operator must develop the procedures no later than August 1, 2011, and must implement the procedures according to the following schedule. The procedures required by paragraphs (b), (c)(5), (d)(2) and (d)(3), (f) and (g) of this section must be implemented no later than October 1, 2011. The procedures required by paragraphs (c)(1) through (4), (d)(1), (d)(4), and (e) must be implemented no later than August 1, 2012. The training procedures required by paragraph (h) must be implemented no later than August 1, 2012, except that any training required by another paragraph of this section must be implemented no later than the deadline for that paragraph.	○ UNMET	Liberty should not be using the Control Room in Londonderry without integrating it into the operating and emergency procedures of 192.615. Between Jan 2015 when the official acquisition was completed and December 2015 no updates were made. Settlement Agreement Conditions II Item 16 of Settlement Agreement filed Oct 17 2014 and approved in Order 25,736 on November 21, 2014 do not anticipate nor limit or prohibit this from occurring.
49 CFR Part §192.805 (d)	Qualification program	Each operator shall have and follow a written qualification program. The program shall include provisions to:(d) Evaluate an individual if the operator has reason to believe that the individual's performance of a covered task contributed to an incident as defined in Part 191;	✓ MET	Safety Division has no reason to believe that an individual's performance of a covered task contributed to the incident as it was mechanical and electrical failure of Gas Plant components that contributed to the "incident"

## **Addendum Discussion of February 21, 2016 Event**

On February 21, 2016 at 10:50 am Liberty notified the Safety Division that at 7:47am Liberty's Gas Control Center in Londonderry received the following Keene propane air plant operational status alarms: 1) Blower System Fault, 2) System Pressure Problem, 3) System Outlet Pressure Low Low State and 4) Process Air Pressure Low Low State. Liberty indicated that the plant operator was immediately notified and was on site and the system went into Atmospheric Safe Mode without intervention as designed. During this 10 minute event the plant output went into High Btu alarm (750 Btu) but did not go into High-High Btu alarm (755 Btu). Liberty indicated the Marriot Courtyard kitchen notified the fire department of a high burner flame but no evacuation was required. Liberty further indicated that the plant returned to normal operation in under 10 minutes and that no services were interrupted during this event.

Staff requested additional information from Liberty in regard to the root cause of this brief plant malfunction. Liberty indicated the blower stoppage may have been triggered by a voltage dip similar to that experienced in December 2015.

Eversource confirmed that at 07:48am an event which was similar to the December 19th event occurred on the Eversource electrical distribution system. The W185 circuit breaker (12 kV) operated to lockout at Keene S/S. (The gas plant is served from circuit W1.) The outage on the W185 circuit lasted 35 minutes, with all customers restored at about 08:23am. Eversource indicated the likely cause of the outage was a squirrel contact on Foundry St which was the same site of the recloser failure in December. Like December, the Eversource recloser was bypassed on 2/21 and a temporary replacement was installed. Eversource confirmed that there was four brief voltage dips that lasted less than a second each at the Keene substation (S/S) associated with the outage. Voltage records extracted from the numerical relays at the Keene S/S indicated the nominal voltage to the relay is 480 volts. The voltage dipped at the Keene S/S four times during this event. There was an initial trip and reclose of the W185 at 07:45. Two minutes passed which allowed the reclosing on W185 to fully reset. Then, a Trip/Reclose/Trip/Reclose/Trip sequence occurred. The dips lasted approximately 0.737, 0.891, 0.641 and 0.545 seconds respectively. The fault involved all 3 phases for all except the second trip event. The voltage at Keene S/S dipped to about 300 volts (62.5% of nominal) for the 3-phase events. Eversource indicated additional steps have been taken to reduce the probability of a second animal contact at this specific recloser. A replacement recloser was installed by Eversource that has a different style animal guard.

Liberty indicated that the plant has been reconfigured for all of the plant gas (mixed) to be directed through the surge tank which will help stabilize the propane/air mixture to remain nearer the desired 740 Btus. Previously the jet output went directly into the high pressure system. During this event and similar to the Dec 19<sup>th</sup> event the plant operator manually switched the setting of the blowers after it went to "atmospheric mode". Atmospheric Mode has two potential supplies:

- a 6 inch diameter pipe triggered by a PLC when control valve opens and
- a separate 8 inch diameter pipe that must be manually operated.

Liberty indicated during this event both the 6 inch and 8 inch diameter piping systems were engaged which limited the duration of the abnormal Btu propane/air gas mixture.