The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC UTILITIES

PIPELINE SAFETY DIVISION

INCIDENT REPORT

Merrimack Valley, Massachusetts

Incident date: September 13, 2018

Final Report date: August 31, 2022

PIPELINE SAFETY DIVISION

Location:
Merrimack Valley (Lawrence, Andover, North Andover) Massachusetts

Date:
September 13, 2018

Company:
Bay State Gas Company d/b/a Columbia Gas of Massachusetts

Estimated Property Damage:
131 Structures

Injuries:
One civilian fatality, 22 civilian individuals hospitalized for injuries, and an additional seven firefighters incurred minor injuries.

Report Issued: August 31, 2022

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I. INTRODUCTION

A. Scope of the Investigation

The Massachusetts Department of Public Utilities ("Department"), Pipeline Safety Division ("Division"), pursuant to G.L. c. 164, § 105A and a Federal Certification Agreement as provided for in 49 U.S.C. § 60105, has investigated an over-pressurization of distribution piping and components that occurred on September 13, 2018 ("Incident").

Pursuant to 49 U.S.C. § 60105(c), and as part of the Department's annual certification process by the United States Department of Transportation ("U.S. DOT"), the Department must report to the U.S. DOT:

> each accident or incident . . . involving a fatality, personal injury requiring hospitalization, or property damage or loss of more than an amount the [U.S. DOT] Secretary establishes, any other accident the [Department] considers significant, and a summary of the investigation by the [Department] of the cause and circumstances surrounding the accident or incident.

The Department has established procedures for determining the nature and extent of violations of codes and regulations pertaining to the safety of pipeline facilities and the transportation of gas including, but not limited to, G.L. c. 164, §§ 76, 76C, and 105A and 220 CMR §§ 69.00 and 101.00 through 115.00. The Division, on behalf of the Department, also enforces the U.S. DOT safety standards for gas pipeline systems as set forth in 49 CFR Parts 40, 192, 193, and 199.

B. Exhibit List

Exhibit 1: NTSB Accident Report (NTSB/PAR-19/02)

Exhibit 2: Merrimack Valley Natural Gas Explosions After Action Report

Exhibit 3: CMA Response Attachment IR-PL-1-20(a) (Event Timeline)

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C. Definitions

Abandoned Pipeline - An abandoned pipeline is one that is no longer being used by any pipeline operating company to transport natural gas or oil. Abandoned pipelines are usually left in the ground but are no longer used or maintained in a usable condition. An abandoned pipeline is a pipeline that has been physically separated from its source of gas or hazardous liquid and is no longer maintained under federal regulations. Abandoned pipelines are usually purged of the gas or liquid they transported and refilled with nitrogen, water, or a non-flammable slurry mixture.

Covered Task – As defined in 49 CFR 192.801.

Exit Letters – Pursuant to 49 USC § 60108(e)(2), within 90 days, to the extent practicable, after the completion of a PHMSA pipeline safety inspection, the certified State authority must provide the owner or operator of gas or hazardous liquid pipeline facility with written preliminary findings of the inspection.

Incident - As used in pipeline safety regulations, an incident is an event occurring on a natural gas pipeline for which the operator must make a report to the Office of Pipeline Safety. Events of similar magnitude affecting hazardous liquid pipelines are considered accidents. (Reference 49 CFR 191.3, 49 CFR 195.50).

Incident Command System "ICS" - In widespread or major emergencies that could affect large populations or have significant environmental impacts an ICS is usually established to coordinate the combined actions of various emergency response personnel. Such emergencies could include natural disasters, such as tornados, train wrecks involving hazardous materials or major oil or natural gas pipeline releases. An ICS is an emergency management system that allows coordination and key decisions to be made by a unified command group consisting of representatives of involved government (Federal, state, and local), emergency response organizations (fire, police, medical, hazardous materials) and other responsible organizations such as, in pipeline related events, the pipeline operator.

Leak Survey - A leak survey is a systematic inspection for the purpose of finding leaks on a pipeline. The frequency and methods of performing leak surveys are regulated and may vary depending on several factors.

Low-Pressure Distribution System - A low-pressure distribution system is a pipeline system designed and used for distributing natural gas, and is characterized by the gas pressure in the main being substantially the same as the pressure provided to the consumer.

Main - A main is a natural gas distribution line that serves as a common source of supply for more than one service line.

Maximum Allowable Operating Pressure "MAOP" - Maximum allowable operating pressure is the maximum internal pressure at which a natural gas pipeline or pipeline segment may be operated.

Meters and Regulating Stations - Metering and regulating stations are installations containing equipment to measure the amount of gas entering or leaving a pipeline system and, sometimes, to regulate gas pressure.

New Construction - New construction is the act of building a pipeline facility or expanding an existing pipeline facility (as in looping a pipeline segment, which may also be done to meet increased load requirements or to enhance reliability of the system) in order to provide new service to a customer(s) or in order to meet increased demand.

Pressure Relief Valve - A pressure relief valve is a mechanical safety device that provides protection to a pressurized container, such as a pipeline, by reducing the internal pressure by releasing it outside the container.

Purge - The act of freeing a gas conduit of air or a mixture of gas and air.

Regulator - A device used to control the pressure of the pipeline system to which it is connected.

Regulator Station - Equipment installed for the purpose of automatically reducing and regulating the gas pressure in the downstream pipeline, main, holder, pressure vessel or compressor station piping to which it is connected. Included are piping and auxiliary devices such as valves, control instruments, control lines, the enclosure, and ventilation equipment. (see pressure regulating station).

Remote Control Valve – A remote control valve is a type of valve that can be operated from a location other than at the valve site.

Root Cause – Root cause is the basic, underlying causal factor in an incident, accident or other event scenario which if removed would have prevented the incident, accident or event from occurring.

Operator Qualification "OQ" Rule – Minimum requirements for operator qualification of individuals performing covered tasks on a pipeline facility as defined in 49 CFR 192 subpart N.

Qualified Individual – A person who has been evaluated and deemed able to; (1) perform assigned covered tasks; and (2) recognize and react to abnormal operating conditions, and (3) maintains current qualification.

Over-pressurization – Whenever pressure in a section of pipeline exceeds MAOP.

Tie-in – The connection of one section of pipeline to another. Tie-ins typically occur when one or both sections are gassed.

D. Key Acronyms

AOC – Abnormal Operating Conditions

API – American Petroleum Institute

CFR - Code of Federal Regulations

CMA - Columbia Gas of Massachusetts

DPU - Massachusetts Department of Public Utilities

EOC - Emergency Operations Center

ERP - Emergency Response Plans

EST – Eastern Standard Time

FMEA - Failure Modes and Effects Analysis

FOL - Field Operations Leader

GIS - Geographic Information System

IC - Incident Commander

ICC – Incident Command Center

ICS – Incident Command System

LFE - Leader of Field Engineering

M&R - Measurement and Regulation

MAOP - Maximum Allowable Operating Pressure

MEMA - Massachusetts Emergency Management Agency

MOC - Management of Change

NTSB - National Transportation Safety Board

OQ - Operator Qualification

P.E. - Professional Engineer

PHMSA - Pipeline and Hazardous Materials Safety Administration

psi - Pounds Per Square Inch

psig - Pounds Per Square Inch, Gauge

PSMS - Pipeline Safety Management Systems

RP - Recommended Practice

SCADA - Supervisory Control and Data Acquisition system

SMS – Safety Management systems

w.c. - Water Column

WMS - Work Management System

CRO – Chief Recovery Officer

II. EXECUTIVE SUMMARY

Around 4:00 p.m. EST on September 13, 2018, the low-pressure natural gas distribution system servicing the Merrimack Valley of Massachusetts was over-pressurized, resulting in multiple structural fires, explosions, one fatality, and 22 hospitalizations for injuries, including emergency response personnel. A total of 131 residential and commercial structures were destroyed across Andover, North Andover, and Lawrence due to the natural gas induced fires and explosions (Exh. 1, Abstract; Exh. 18, at 1). Columbia Gas of Massachusetts ("CMA") owned and operated the distribution system involved in this Incident.

The Department was notified at 4:50 p.m. via the Division's Telephonic Incident Notification system ("TIN") (Exh. 4). Emergency response was conducted by CMA, police, and fire departments from Andover, North Andover, and Lawrence. Additional support was provided by the State Fire Marshall's Office, the Massachusetts Emergency Management Agency ("MEMA"), Massachusetts State Police, National Grid Electric, and mutual aid from neighboring cities, as well as New Hampshire and Maine.

During the three-month restoration period, individuals were without heat, hot water, and other amenities fueled by natural gas. As a result, MEMA, the American Red Cross, state and local officials provided alternative housing and other resources to those in need. Approximately 2,300 families were relocated to alternative housing (Exh. 1, at 13).

The National Transportation Safety Board ("NTSB") led an investigation into the root cause of the Incident. The Department supported the investigation and adopted the findings of NTSB. During the subsequent restoration period, the Department, with mutual aid from New Hampshire, Maine, and federal authorities, oversaw CMA's purging and construction

efforts. The Division issued several Exit Letters to address regulatory compliance with regulator stations, overpressure protection, and service line abandonment projects.

During its initial investigation and prior to restoration efforts, NTSB determined that the over-pressurization occurred during the tie-in of a low pressure main (Exh 18, at 1). CMA failed to account for and relocate the sensing lines from the pipeline to be abandoned to the pipeline being placed into service. As a result, high-pressure was introduced into the low-pressure distribution system downstream of the South Union St. at Winthrop Ave. Regulator Station. In addition, CMA personnel monitoring the distribution system pressure, failed to have adequate qualifications to identify an AOC for the start-up of the new pipeline in violation (Exh. 18, at 2).

After NTSB released the final report, the Department opened two proceedings related the Incident. As part of these proceedings, the Department approved the sale of CMA to NSTAR Gas Company d/b/a Eversource Energy ("Eversource"). Eversource is a natural gas distribution company with about 204,947 services operating in Massachusetts. The Department also approved a settlement agreement where, in addition to selling its assets to Eversource, CMA was ordered to pay a $56 million payment in lieu of penalties. Part of the payment funded the establishment of an "Energy Relief Fund" to directly benefit residents of the Merrimack Valley who were affected by the Incident.

As a result of the Incident, the Department made several internal changes to ensure increased regulatory and safety oversight of natural gas operators. In addition to hiring a new Director, the Division hired fifteen new Public Utility Engineers ("PUEs") to expand the volume and scope of its inspections of natural gas operators. Through increased inspections, the Department is able to correct and enforce any observed areas of noncompliance with state

and federal pipeline safety laws. Additionally, the Department enacted new regulations requiring a Professional Engineer ("PE") stamp on all complex projects undertaken by natural gas operators.

III. BACKGROUND

A. Columbia Gas of Massachusetts and NiSource

NiSource is an Indiana based energy company with six subsidiary companies across six different states. CMA is one of NiSource's subsidiary distribution companies. At the time of the incident, CMA delivered natural gas to approximately 325,000 customers including those affected by the events of September 13, 2018 (Exh. 1, at 3-4).

B. Feeney Brothers

Feeney Brothers Utility Services ("Feeney Brothers") is a utility services company contracted by CMA for its natural gas distribution system construction needs. Feeney Brothers was founded in 1988 and operates throughout Massachusetts, Connecticut, and New York. On September 13, 2018, Feeney Brothers was performing work for CMA on the cast iron main replacement project in Lawrence. Four Feeney Brothers employees performed the tie-in at Salem St. and South Union St. in Lawrence the day of the Incident (Exh. 1, at 4).

C. Regulator Station Construction

Both low-pressure and high-pressure natural gas distribution systems are used to supply natural gas to customers. In a low-pressure natural gas distribution system, the natural gas in the distribution piping is approximately the same pressure as the pressure provided to the customer's piping and used by appliances. Natural gas is typically supplied to the distribution system from a high-pressure source through a regulator station that reduces the pressure (Exh. 1 at 4).

Merrimack Valley had a low-pressure distribution system that was fed from 14 regulator stations across Lawrence, Andover, and North Andover. Each of these stations converts an inlet pressure of approximately 90 psig down to approximately 0.5 psig (12" w.c.) outlet pressure. These stations were the primary means of pressure reduction on the date of the Incident. The regulator station at Winthrop Ave. and South Union St. in Lawrence was the location directly affected from the tie-in on September 13, 2018. The station was equipped with two 3" Grove 900 TE regulators. The monitor regulator was set to 14" w.c. and the control regulator was set to 11" w.c. The station is equipped with a critical valve that stops high pressure flow to the station in the case of emergency. This valve was activated as part of the emergency response (Exh. 1, at 4).

IV. INVESTIGATION

A. Department's Initial Response

The Division was notified by Columbia Gas of Massachusetts at 4:50 p.m. via the Division's TIN system (Exh. 4). The Division Director and three PUEs arrived at CMA's Incident Command Center at 55 Marston St. in Lawrence at 9:15 p.m. on September 13, 2018 to assist in emergency response and conduct an initial investigation.

Upon their arrival, Division staff met with members of CMA's engineering and compliance departments along with the incident commander to identify the root cause of the Incident and to confirm shut down of the impacted system. The South Lawrence low pressure distribution system was affected by the over pressurization event, which included the city of Lawrence and towns of Andover and North Andover. As part of its emergency response efforts, at 7:24 p.m., CMA had reported closure of critical valves to regulator stations supplying the impacted system. After closing the critical valves, CMA believed that

the impacted portion of the South Lawrence distribution system had been completely isolated (Exh. 3, Att. IR-PL-1-20 (a) at 7). However, according to a CMA event timeline, at 10:18 p.m, a ½" w.c. was read at 234 Mount Vernon St. in Lawrence, indicating that gas was present, and that the system had not been isolated (Exh. 3, Att. IR-PL-1-20 (a) at 8). CMA then conducted additional readings to determine if gas was present at other locations within the isolated system. At 2:56 a.m. on September 14, 2018, CMA conducted a purge of the system (Exh. 3, Att. IR-PL-1-20 (a) at 9). At 4:21 a.m., after completing a purge, CMA determined that gas was still present and additional actions were required to ensure that it had achieved positive shutdown and that the system had been completely isolated. CMA attempted to perform a lock in on 14 regulator stations on the South Lawrence distribution system. The purpose of the lock in was to isolate the system from any supply of gas by ensuring that the inlet and outlet valves were completely closed (Exh. 1, at 12). Ten of the regulator stations were successfully isolated. CMA was unable to confirm that the remaining four regulator stations were completely isolated. CMA discovered that a critical valve at the Massachusetts Ave. regulator station was partially open which was the main cause of the remaining gas in the system. CMA closed the critical valve at this location at 6:26 a.m. on September 14, 2018. At 6:27 a.m., CMA confirmed positive system shutoff, indicating the system had been isolated and no gas remained in the system (Exh. 3, Att. IR-PL-1-20 (a) at 9; Exh. 5; Exh. 6).

At 7:00 a.m. on September 14, 2018, a fourth PUE arrived at the Operations Command Center to relieve one PUE and establish an around the clock rotation. The Incident Command Center had been moved to a remote location at Winthrop Ave., Lawrence during the night. The Division Director was stationed at the Incident Command Center.

One PUE went to all 14 district regulator stations including the regulator station at Winthrop Ave. at South Union St, Lawrence. The remaining two PUEs oversaw the leak survey efforts that were being conducted on the affected system throughout the initial investigation.

On a number of occasions during the initial response, there was miscommunication, difficulty in obtaining information, and slow response due to lack of follow-up between the Department and CMA. These issues occurred, at least in part, because the Department had to communicate with several individuals from CMA to obtain accurate information. Once CMA assigned a dedicated liaison to the Department, the above-mentioned issues were resolved to ensure the Department could properly oversee the investigation and subsequent restoration (Exh. 18, at 1).

When CMA was unable to produce an effective action plan for short-term remediation to the Department, Governor Baker issued a Declaration of Emergency authorizing the Chairman of the Department to take action under G.L. c. 25 § 4B. This statute allows the Chairman to take action "necessary to assure public safety and welfare through the priority restoration or continuing availability of gas, electric, and water utility services." Under this authorization, and in response to the lack of resource coordination and effective communication, the Department directed Eversource[1] to take management control over the effort to safely restore utility services in the impacted area (Exh. 2, at 45).

[1] At the time of the incident, National Grid, the largest operator of gas mains and services in the Commonwealth, and their union labor force were engaged in a labor dispute, which limited National Grid's resources.

B. National Transportation Safety Board Investigation

On September 14, 2018, NTSB arrived and assumed the lead role in the investigation of the Incident. The Department supported NTSB's investigation through interviews, inspections, and data gathering. NTSB departed the Merrimack Valley after its investigation had been conducted and prior to restoration preparations being made. Through its investigation, NTSB concluded that the root cause of the over-pressurization of the low-pressure natural gas system was CMA's failure to adequately plan, design, review, and manage a construction project that resulted in the existing regulator station sensing lines being left connected to newly abandoned cast iron main (Exh. 1, at vii). Without relocating the sensing lines to the newly installed main, the regulator station at Winthrop Ave. and South Union St. in Lawrence received readings from the abandoned cast iron main and functioned, as designed, by introducing additional pressure into the low-pressure distribution system (Exh. 1, at 48; Exh. 7). A "false" reading of no pressure resulted in the regulators at this station over-pressurizing the downstream low-pressure distribution system. NTSB found that low-pressure natural gas distribution systems that use only sensing lines and regulators as the means to detect and prevent over-pressurization are not sufficient to prevent over-pressurization (Exh. 1, at 48). A comprehensive and formal risk assessment, such as a failure modes and effects analysis, would have identified the human error that caused the redundant regulators to open and overpressurize the system. (Exh. 1, at 48).

NTSB noted that at the time of the incident, two PE-licensed CMA employees were involved with the South Union St. project (Exh. 1, at 29). While they were required to review the projects, there was no requirement that employees review and sign off on projects and none of the projects had PE stamps (Exh. 1, at 29). NTSB determined that CMA did

not have a sufficient constructability review process that would have detected the work order to relocate the sensing lines (Exh. 1, at 48). NTSB concluded that requiring a PE stamp "would illustrate that the plans had been approved by an accredited professional with the requisite skills, knowledge, and experience to provide a comprehensive review" (Exh. 1, at 48).

The complete investigation and findings of the NTSB report were published on October 24, 2019. While NTSB conducted its investigation into the root cause of the incident, the Department focused its oversight on restoration efforts on the impacted system in Merrimack Valley.

V. RESTORATION

A. Mutual Aid

At 2:52 a.m. on September 14, 2018, CMA requested mutual assistance from Northeast Gas Association ("NGA") to assist in the restoration efforts. NGA is a representative body for natural gas operators across nine states. A total of 27 companies responded with approximately 650 individuals arriving on site (Exh. 1, at 12). At the direction of the Department's Chairman, Eversource took the lead in the restoration process for the affected towns of the Merrimack Valley. On September 21, 2018, Governor Baker appointed Joe Albanese, a retired Navy captain, as Chief Recovery Officer ("CRO") to oversee additional construction efforts (Exh. 10).

The Department filed an Emergency Management Assistance Compact ("EMAC") resource request for mutual aid during the restoration phase. The request was for eight out-of-state gas pipeline inspectors per week starting October 7, 2018 and ending on November 24, 2018 (Exh. 11, at 1). Prior to this request, inspectors from New Hampshire,

Connecticut, Pennsylvania, New York, and PHMSA assisted Division inspectors with overseeing restoration operations. Throughout the course of the restoration, MEMA coordinated mutual aid from a total of 38 state pipeline inspectors across ten different states. PHMSA also provided seven inspectors who contributed to the regulatory oversight during restoration operations (Exh. 2, at 10). Upon arrival, each out-of-state inspector was given a copy of CMA's procedures, a copy of state regulations, and an inspection form to adequately document findings and provide reporting consistency across all inspections.

B. Purging Operations

Due to the over-pressurization, the integrity of the affected system was compromised. As a result, new pipe was installed and the affected system was abandoned. To ensure the affected distribution system was clear of gas, purging operations were conducted prior to the pipeline's abandonment. With oversight from the Division, CMA established a purging plan breaking the affected system into eight zones and furthermore into subsections for a more efficient purge (Exh. 12). To do so, the main was cut and capped in calculated locations to separate subsystems. CMA introduced compressed air from venturi air movers at specific locations to purge gas out of the pipeline at grounded vent stack locations. Calibrated combustible gas indicator ("CGI") machines were used at the vent stack locations to ensure a 0% gas reading. Purging operations began on September 21, 2018 and the last zone was completed on October 3, 2018.

C. Construction

Construction crews throughout the country assisted in the restoration efforts in the Merrimack Valley. They were trained on CMA procedures and had verified operator qualifications. Following the purge of each zone, the Division oversaw the abandonment of

the affected distribution system and installation of the new main and services. The existing low-pressure system was upgraded to a high-pressure system. Since much of the old system was cast iron pipe, it was updated to High Density Poly Ethelene ("HDPE") plastic. Tie-in operations were conducted following the construction requirements of each subsection. This process helped in getting customer's gas restored as quickly as possible. Construction efforts were finished on December 16, 2018 (Exh. 2, at 64-67). Meters that were located inside buildings were moved outside and were equipped with service regulators and excess flow valves ("EFV") to support the newly installed high pressure system. Relocating the meters outside makes shut off valves more accessible to technicians during emergencies, prevents customer tampering, and provides easier access for safety inspections.

The Division continued its oversight of CMA to ensure compliance with state and federal regulations after the restoration was complete. Throughout the restoration process both state and federal regulators and CMA Quality Assurance/Quality Control ("QA/QC") personnel identified and documented any non-compliance items and Abnormal Operating Conditions ("AOCs"). These items consisted primarily of meter/regulator locations, bollard protection, and EFV identification, and did not warrant immediate remediation.

As of November 12, 2018, the Division identified 1,127 non-compliant items (Exh. 19). The restoration efforts were nearly complete on December 26, 2018 when 7,083 out of 7,113 affected services had been relit (Exh. 19). Following the completion of restoration efforts, CMA continued to address the outstanding compliance items and monitored the newly installed high pressure system for leaks. On December 21, 2018, the Department received the first leak report from CMA where they identified 45 leaks on the newly installed piping (Exh. 20). In July 2019, CMA had a total of 22 items remaining on

the non-compliance list and 42 of the 45 identified leaks had been remediated (Exh. 20). Under Division supervision, all AOCs, leaks, and non-compliant items for the restoration process were resolved by December 19, 2019.

VI. PIPELINE SAFETY DIVISION'S INVESTIGATIONS

A. Sensing Line Investigation and Mapping Project

Following the events on September 13, 2018, the regulator stations of the South Lawrence distribution system were taken out of service as the system was upgraded to high-pressure piping during the restoration phase. From February 19, 2019 through April 17, 2019, the Division inspected of CMA's Regulator Station Control Line Mapping and Investigation Project for the North Lawrence distribution system ("North Lawrence Project"). This system was not affected by the events of September 13, 2018, however, the regulator stations for this system were similar to those found on the affected system. The North Lawrence Project included the following: validation of station drawings and confirmation of all components; point-to-point verification of all sensing lines; and verification that installation conforms with current design practices and addition of control lines for future use.

On August 15, 2019, the Division issued an Exit Letter with its findings from the North Lawrence Project (Exh. 13). The inspections included the review of the standard operating procedures ("SOP"), existing maps and records, operator qualification records, welding activity, control lines and associated piping, and backfilling operations (Exh. 13, at 1). The Division found several violations of federal and state regulations, including CMA's failure to follow its own procedures, failure to follow proper corrosion inspections, and failure to comply with damage prevention laws (Exh. 13, at 8). The Department found

CMA's actions were in violation of 49 C.F.R. Part 192, ("Part 192") §§ 192.13(c); 192.457(b); 192.459; 192.605(a); 192.605(b)(3); 192.614(c)(5); and 220 CMR 99.06(3).

B. OPP Installation Project

Following the Project, CMA began an Over-pressure Protection Project for all low-pressure distribution system regulators. As part of this project, over-pressure protection devices or "slam shuts" were incorporated in all regulator stations as an additional layer of over-pressure protection. The Division conducted inspections at the North Lawrence distribution system regulator stations from May 10, 2019 through July 24, 2019. The over-pressure protection devices that were installed at these locations were the Pietro-Fiorentini PF FE 25 regulators with slam-shuts incorporated.

On August 7, 2019, the Division issued an Exit Letter with its findings from this inspection (Exh. 14). The inspection included the review of the SOPs, existing maps and records, operator qualification records, welding activity, and regulators and associated piping. The Division found that CMA had failed to update and follow its own procedures in violation of Part 192, §§ 192.605(a); 192.727(a)(b) and (d); and 220 C.M.R. § 107.04 (Exh. 14, at 2).

C. MV SLA Project/ South Broadway Incident

On September 11, 2019, CMA met with the Department to disclose issues pertaining to two abandoned service lines, one of which occurred during the restoration phase of the Merrimack Valley incident. CMA did not abandon these service lines in the manner required by federal regulations, state regulations, and CMA's procedures. As a result, CMA launched a service line abandonment project ("MV SLA") to verify service lines abandoned during the restoration phase of the Merrimack Valley incident were in compliance with federal

regulations, state regulations, and CMA procedures. The MV SLA project commenced on September 19, 2019 and on-site project overview briefings were conducted with PUEs and the Division Director.

On September 27, 2019, the Division received a TIN from CMA alerting the Division to a Grade 1 gas leak on a plastic main that CMA installed during the restoration efforts after the Incident (Exh. 15, at 1). The Division reported to the scene of the incident on South Broadway in Lawrence with several PUEs on September 27th, 28th, and 29th. The Division provided oversite while CMA performed emergency response and restoration tasks. A 2" high pressure plastic main was inserted through an abandoned 6" low pressure main after the September 13, 2018 incident. On September 27, 2019, a contractor for the municipal water department exercised, or manipulated, a valve on the abandoned main, causing a Grade 1 gas leak. The valve was able to be exercised because CMA did not abandon the main as required by company procedures.

On October 1, 2019, the Division issued a separate Exit Letter documenting its findings (Exh.15, at 2). The Division found CMA failed to follow procedures abandoning the valve box in violation of Part 192, § 192.605. The Division continued to oversee CMA's MV SLA project.

CMA completed the MV SLA project on November 25, 2019. In total 4,892 services were verified for abandonment compliance across Andover, North Andover, and Lawrence. Of these services, CMA disclosed that approximately 921 services needed mitigation. The Division conducted a sampling of inspections throughout the entire project verifying that procedures were followed during the verification and mitigation work (Exh. 16, at 1-2).

D. Dynamic Risk Assessment

In November 2018, the Department contracted with Dynamic Risk Assessment Systems, Inc. ("Dynamic Risk") to conduct an assessment of the Commonwealth's natural gas distribution system. The purpose was to evaluate the safety of the system across all Massachusetts operators, governing bodies, and other stakeholders. Dynamic Risk's evaluation was broken down into two Phases. The Phase 1 report, "Massachusetts Gas Pipeline Safety Assessment" was issued on May 13, 2019. The Phase 2 report, "CMA MV Restoration Program Assessment" was issued June 22, 2020. Final recommendations were given for CMA, successor of interest, and the Pipeline Safety Division (Exh. 17a, at 53).

As a result of the Dynamic Risk report, and through legislative funding, the Department was able to increase its Division staffing, including additional inspectors to provide essential regulatory oversight (Exh. 17a, at 54). The Department also appointed a new Division Director. The new leadership and staff were able to implement immediate action and set clear expectations with CMA going forward (Exh. 17a, at 54). Since the Dynamic Risk report, the Division has continued to retain fully qualified inspectors and hire additional staff. Through increased staffing, the Division has been able to provide stronger regulatory oversight.

Additionally, the Dynamic Risk report made assessments of the current safety of pipeline infrastructure throughout the Commonwealth. As a result of these assessments, the Department issued a letter on January 31, 2020, requesting action plans from each natural gas operator as to how the Dynamic Risk recommendations would be implemented in their distributions systems (Exh. 8). On February 28, 2020, each natural gas operator submitted their plans, which were reviewed by the Department. On July 7, 2021, the Department

issued a second letter requesting updates on the status of each Dynamic Risk recommendation. On July 21, 2021, each natural gas operator submitted their status updates, which were again reviewed by the Department (Exh. 9).

E. API-1173 and Professional Engineer Regulations

Following the Incident in Merrimack Valley, the Department ordered CMA to adopt the American Petroleum Institute's ("API") Recommended Practice 1173, a safety management system (Exh. 1, at 29). On November 21, 2018, the Baker-Polito Administration announced that NGA had adopted API-1173 to help pipeline operators create a framework for developing a comprehensive, process-oriented approach to safety, emphasizing continual assessment and improvement (Exh. 2, at 118). When applied, API-1173 helps to reveal threats to distribution systems, manage risk, and promote a learning environment that drives continuous improvement and safety. On April 24th, 2019, The Blacksmith Group, an NGA selected company, began implementing API-1173 across all participating members. Since then, consistent with the recommendations of NGA, all of the natural gas operators in Massachusetts, including CMA, have adopted API-1173 and are in the final stages of implementation.

Following its investigation, NTSB issued P-18-5, a Safety Recommendation to the Commonwealth of Massachusetts to remove the PE licensure exemption for public utility work (Exh. 1 at 48). An additional recommendation, P-18-6, was issued to the parent company of CMA, NiSource, recommending PE approval of all natural gas projects moving forward (Exh. 1 at 48).

On December 31, 2018, Governor Baker signed into law An Act Further Providing for the Safety of the Commonwealth's Natural Gas Infrastructure, Chapter 339 of the Acts of

2018, , Section 2 of the act requires the stamp of a PE stamp on "any engineering plans or specifications for engineering work or services that could pose a material risk to public safety."

On February 18, 2021, the Department opened a rulemaking, docket 21-04-A, for the purpose of adopting uniform requirements regarding the use of PEs by local gas distribution companies, pursuant to G.L. c. 164, § 148. After receiving comment from interested stakeholders, on September 21, 2021, the Department issued an Order adopting final regulations requiring a PE stamp. See Investigation of the Department of Public Utilities Instituting a Rulemaking to Establish Requirements for Use of Processional Engineers for Gas Utility Work, D.P.U. 21-04, Order Adopting Final Regulations (2021).

VII. DEPARTMENT PROCEEDINGS

A. D.P.U. 19-140 and D.P.U. 19-141

On October 25, 2019, following the release of the NTSB final report, the Department opened an investigation into CMA's responsibility for and response Incident as well as CMA's subsequent restoration efforts. This docket encompassed the findings of the Division's prior investigations and inspections conducted during and post restoration, including those where Exit Letters had previously issued. See Investigation by the Department of Public Utilities on its own Motion into Bay State Gas Company d/b/a Columbia Gas of Massachusetts' responsibility for and response to the September 13, 2018 Merrimack Valley Incident, D.P.U. 19-140, (2020).

That same day, the Department also opened an investigation into CMA's efforts to prepare for and restore service following the September 13, 2018 incident. See Investigation by the Department of Public Utilities on its own Motion into the Preparation and Response of

Bay State Gas Company d/b/a Columbia Gas of Massachusetts with respect to the September 13, 2018 Merrimack Valley Gas Event, D.P.U. 19-141, (2020). As part of each investigation, the Department solicited comments from interested stakeholders. During its investigation, the Department held public hearings on January 29, 2020, in Lawrence, Massachusetts; and February 10, 2020, in Andover, Massachusetts. The Department received numerous written and oral comments for each docket regarding the community impact the events of September 13, 2018 had on the Merrimack Valley.

Through its investigation on D.P.U. 19-140, the Department determined CMA had violated several additional state and federal regulations. The Department determined that the over-pressurization occurred during the tie-in of two low pressure mains (Exh 18, at 1). CMA failed to account for and relocate the sensing lines from the pipeline to be abandoned to the pipeline being placed into service. As a result, high-pressure was introduced into the low-pressure distribution system downstream of the South Union St. at Winthrop St. Regulator Station. In addition, CMA personnel monitoring the distribution system pressure, failed to have adequate qualifications to identify an AOC for the start-up of the new pipeline in violation (Exh. 18, at 2). This was in violation of Part 192 § 192.805(h), which requires after December 16, 2004, gas operators shall provide training, as appropriate, to ensure that individuals performing covered tasks have the necessary knowledge and skills to perform the tasks in a manner that ensures the safe operation of pipeline facilities.

The Department also found that CMA failed to deploy measures either through physical or procedural actions to mitigate the control of any AOCs either at the site where the tie-in occurred or at the South Lawrence district regulator station at South Union St. and Winthrop St. During the tie-in process, Construction and Maintenance ("C&M") crews

should have measures in place to identify possible AOCs that may occur during the construction of new pipelines. During the over-pressurization, CMA was unaware that high pressure had entered the low-pressure distribution system. The use of gauges on the main being placed in service would have shown an over-pressurization of the low-pressure distribution system (Exh. 18, at 2). CMA failed to have adequate procedures or did not follow its procedures for the startup of the newly installed plastic pipeline, in violation of Part 192, § 192.605(b)(5), which requires gas operators to have a manual that includes procedures for starting up and shutting down any part of the pipeline in a manner designed to assure operation within the MAOP limits, plus the build-up allowed for operation of pressure-limiting and control devices.

At the time CMA reported the Incident to the Department, the Department inquired as to the status of the distribution system and was told that CMA was having difficulty with one or more of its critical valves necessary to obtain a complete shutdown of the system. This was reiterated over the course of several hours through the night. Complete shutdown was not obtained until early the next morning (Exh. 18 at 3). This was in violation of Part 192, § 192.747(a), (b), which outlines servicing requirements for valve maintenance on distribution systems.

Since CMA failed to maintain its critical valves, it could not ensure complete shutdown of the distribution system when necessary. Had all critical valves been monitored and maintained, the complete isolation of the low-pressure distribution system may have been achieved sooner.

Each operator of a distribution system must protect its distribution system from over-pressurization. This can be accomplished by providing over-pressure protection devices

that stop the flow of gas or allow the gas to vent. In the low-pressure distribution system in the Merrimack Valley incident area, CMA elected to use "retention type over-pressure protection devices" to prevent over-pressurization of the low-pressure distribution system. This was a violation of Part 192, § 192.195(b)(1), (2), which requires each distribution system supplied from a source of gas that is at a higher pressure than the MAOP for the system must have pressure regulation devices capable of meeting the pressure, load, and other service conditions that will be experienced in normal operation of the system, and that could be activated in the event of failure of some portion of the system. The pressure regulation devices must also be designed so as to prevent accidental over-pressuring. The devices used by CMA did not meet these criteria.

CMA's design of its district regulator stations failed to prevent the over-pressurization of the low-pressure distribution system in the Merrimack Valley incident area (Exh. 18, at 3-4). The Department also found CMA did not have a knowledge base of its district regulation stations in violation of Part 192, § 192.1007(a)(3).

The Department also found that CMA failed to comply with the federal code in developing and implementing a plan to obtain knowledge of its district regulator stations by August 2011 in violation of Part 192, § 192.1005. This requirement was not met until after the over-pressurization on September 13, 2018 (Exh. 18, at 4-5).

B. Acquisition of CMA Assets

On July 2, 2020, Eversource, Eversource Gas Company of Massachusetts ("EGMA"), NiSource, and CMA filed a petition jointly with the Department for approval of the sale of substantially all of CMA's assets to Eversource pursuant to G.L. c. 164, § 96. See Joint Petition of Eversource Energy, NiSource Inc., Eversource Gas Company of

Massachusetts, and Bay State Gas Company d/b/a Columbia Gas of Massachusetts for approval by the Department of Public Utilities of Purchase and Sale of Assets, D.P.U 20-59, (2020). As part of the Department's Final Order, CMA was ordered to pay $56 million in lieu of penalty to fund the establishment of an "Energy Relief Fund" comprising two components: the "Merrimack Valley Renewal Fund" and the "Arrearage Forgiveness Fund" The Merrimack Valley Renewal Fund would be directed toward energy efficiency and clean energy measures for the benefit of residents, businesses, and municipal governments within the City of Lawrence, the Town of Andover, and the Town of North Andover. The Arrearage Forgiveness Fund would benefit certain low-income customers in Merrimack Valley. D.P.U. 20-59, at 35.

In addition, the Department accepted a Consent Order executed between CMA and the Division resolving all enforcement actions associated with Merrimack Valley in D.P.U. 19-140 and D.P.U. 19-141, as well as all other pending CMA enforcement matters before the Division. D.P.U. 20-59 at 63. To resolve the outstanding enforcement actions, CMA agreed to a $12 million payment in lieu of penalty. CMA further agreed to certain compliance actions, and any outstanding compliance action after the closing of the sale became the responsibility of Eversource and EGMA. D.P.U. 20-59, at 63. The Final Order authorizing the sale was executed on October 7,2020, concluding the Department's investigation into the Merrimack Valley incidents.

VIII. CONCLUSION

The events of September 13, 2018 severely impacted businesses and disrupted the lives of residents of North Andover, Andover, and Lawrence. Approximately 11,000 people were evacuated from their homes on September 13, 2018 and were not allowed to begin to

return home until 7:00 a.m. on September 16, 2018. National Grid, who is the electrical utility provider for the Merrimack Valley, restored power to the affected area between September 14th and September 16th. As reflected in the public comments submitted during the Department's investigations, the impact of this incident caused lasting physical and emotional trauma to the impacted residents and business owners in Merrimack Valley.

Since the Incident, the Department has overseen extensive restoration efforts in Merrimack Valley. The Department ordered CMA to provide $56 million in funds to help support further recovery efforts of those impacted. Specifically, $12 million dollars went to resolving violations of state and federal pipeline safety laws. Additionally, the Department adopted regulations requiring a PE stamp on all complex projects to enhance public safety. The actions of the Legislature and Governor have devoted more resources to the Department to ensure that the Division continues regulatory oversight of all gas operators in the Commonwealth. With the additional resources, the Department continues its work to change pipeline safety culture and prioritize public safety.