Merrimack Valley Natural Gas Explosions After Action Report

September 13 - December 16, 2018

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1.0 Executive Summary

In the fall of 2018, a series of gas fires and explosions, as a result of a gas line over-pressurization in the Merrimack Valley, forced responders from across the Commonwealth to convene on three communities that were experiencing a no notice disaster. The Governor and local leaders provided leadership and demonstrated a resourceful use of existing authorities to achieve unity of effort across public and private agencies in the management of this incident. This was essential for an effective response and recovery from this disaster.

The coming days required an unprecedented response effort that tested and exceeded the capacities of public safety agencies and required the development of entirely new capabilities. Approximately 15,000 residents were evacuated from their homes for days, and thousands of homes needed to be entered, rendered safe, and secured to ensure that dangerous gas levels no longer existed. As the emergency response concluded, it was clear that the recovery effort would span months. Again, public safety agencies, government, business, and community organizations, as well as private sector partners under the leadership of local and state elected officials, came together with the responsible utility and solved unique problems that included repairing infrastructure damage, providing shelter, and finding longer-term housing solutions as recovery efforts extended into the fall and winter months.

This After Action Report (hereafter, AAR), which was jointly written by the Massachusetts Emergency Management Agency (MEMA) and the Massachusetts National Guard (MANG), aims to capture both the successes of and the opportunities posed by a response and recovery effort of this size, complexity, and duration. The research and interviews conducted for this report revealed the overarching themes that guide the recommended actions listed in the Improvement Plan (IP). They further revealed best practices that help to sustain the strengths identified throughout the process.

1.1 Overarching Themes

After review and consolidation of the information collected in the after action process, four overarching themes were identified. These themes highlight strategic considerations to support enhanced preparedness for, response to, and recovery from future events, regardless of the cause. Additionally, these themes further supported the development of an Improvement Plan, which is included as Appendix B of this document.

1. A Unified Command[1]/Coordination Structure is needed for complex regional disasters.
    - While the Governor and municipal leaders actively collaborated throughout this incident, establishing a formal Unified Command Post with requisite staff would have helped to mitigate a number of operational shortfalls identified in the after action process.

[1] A Unified Command is an authority structure in which the role of incident commander is shared by two or more individuals, each already having authority in a different responding agency. Unified Command is coordinated out of a physical setting, known as a Unified Command Post.

- Locally led incident command structures and processes worked well during the initial response to this incident. As operations expanded in scope and scale, information sharing, coordinated situational awareness, and enhanced planning may have been better supported through a deliberate implementation of a Unified Command/Coordination Structure.
- During a complex regional incident, the experience of state agency partners in assisting in the establishment of a Unified Command/Coordination structure and process should be considered. State resources and structures can be mobilized to support local incident commanders and leaders.

2. Gas Utilities' implementation of their emergency operations plans must be capable of addressing significant infrastructure failures, include processes to quickly identify impacted infrastructure and customers, and be socialized with public safety partners.
   - Columbia Gas of Massachusetts developed and filed emergency operations plans as required by The Commonwealth of Massachusetts Regulation 220 CMR 19[2] and Massachusetts General Law (MGL) 164, Section 1J.[3] However, Columbia Gas did not implement its plans in a manner that would effectively respond to such a large incident.
     - The statute requires investor-owned gas utilities annually to provide emergency operations plans to the Massachusetts Department of Public Utilities (DPU) and the municipalities they serve. These plans require gas companies to respond to *any* system outage and restore service in a prompt manner.
     - The DPU may consider requiring all gas companies to provide additional information related to the scope of future damage and customer impacts to public safety partners in a reasonable timeframe to support life safety response, enhanced employee training for those assigned key positions in the plan, and focused exercises with partner public safety agencies to ensure plans account for key considerations.
3. A Commonwealth Disaster Recovery Framework is needed to organize and guide recovery efforts.
   - Integrating the key lessons learned from this incident and the resulting complex recovery considerations that were required will enhance overall disaster recovery planning for the Commonwealth.
   - The Framework will require participation from key public and private sector partners in order to develop a realistic posture to recovery in the Commonwealth.
   - Training and exercise programs should accompany this Framework in order to ensure that partners clearly understand the structure, responsibilities, and roles that support recovery.

[2] https://www.mass.gov/regulations/220-CMR-1900-standards-of-performance-for-emergency-preparation-and-restoration-of

[3] https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXXII/Chapter164/Section1J

4. The Commonwealth's Disaster Housing Plan and Executive Playbook need to be updated to incorporate the lessons learned from this incident.
    - While the Commonwealth does have a Disaster Housing Plan, Executive Playbook, and Massachusetts Disaster Housing Task Force (MADHTF) in place, lessons learned from this incident can help to strengthen their implementation.
    - Additional considerations for the plan include revised decision points, which ensure that considerations for individuals with Access and Functional Needs (AFN) are implemented, and incorporate additional creative options for temporary housing regardless of disaster cause.

2.0 Introduction

On September 13th, 2018, the Merrimack Valley experienced the worst natural gas disaster in the history of the Commonwealth. At approximately 4:00 PM, a gas contractor, following a plan developed by Columbia Gas, was performing routine maintenance work on a low-pressure gas line in Lawrence. During the work, the line became over-pressurized, resulting in at least three explosions, 60-80 structure fires, and over 120 calls for emergency fire and EMS crews in Lawrence, Andover, and North Andover. These events destroyed approximately 15 homes, and rendered many more uninhabitable in the three communities. One person was killed and 25 injured as a result of the explosions. The ensuing response and recovery efforts to support nearly 8,600 families and over 600 businesses lasted for three months. Public and private sector partners worked with the responsible utility to address cascading impacts and unanticipated needs. With cold weather on the horizon, efforts focused on returning residents to their homes - with natural gas service - before winter's arrival.

2.1 Report Scope and Structure

This AAR reviews the response and recovery efforts of public safety and government partners from local, state, private, and nonprofit organizations in relation to the September 2018 Natural Gas Explosions in the Merrimack Valley. The purpose of this report is to highlight best practices, identify areas of improvement, and capitalize on key recommendations to improve future response efforts. A comprehensive list of all findings can be found in Appendix A. For purposes of this report, the following layout captures these themes:

Finding S-XX: Strength

Strengths, showcasing successful details of the event, are noted in blue-bordered boxes throughout this report. Strengths, as implied, are best practices, and their implementation should be continued for future events.

Finding I-XX: Area for Improvement

Areas for Improvement, detailing components of the response and recovery effort which can be enhanced in future events, are noted in gray-bordered boxes throughout this report.

Key Finding R-XX: Recommendation

Recommendations are developed to suggest improvements in programs or initiatives, to either continue and/or improve upon actions documented in this report. Recommendations influence the Improvement Plan and are noted in black-bordered boxes throughout this report.

An Improvement Plan (IP) accompanies this document and identifies specific areas for improvement, and assign responsibility for implementation, where appropriate. The IP can be found in Appendix B.

Information contributing to this report was compiled from a variety of sources. Dispatch logs, daily reports, public information broadcasts, Columbia Gas daily briefings, individual interviews, and other materials were all analyzed to ensure a comprehensive review. Additionally, four detailed After Action Workshops were conducted in July 2019. Participants from over 50 organizations attended these workshops to provide feedback and recollections of best practices and areas for improvement. All references influencing the development of this AAR can be found in Appendix D.

This report has been compiled with a focus on four areas, which span the entirety of the response and recovery effort:

1. Initial Response (first 24 hours)
2. Ongoing Response (until lifting of the evacuation order)
3. Recovery Efforts (gas restoration and replacement)
4. Recovery Efforts (human services)

A detailed incident timeline, organized according to these focus areas, has also been created to help understand various decision points and timestamps, relative to this disaster.

This AAR will not investigate or determine the cause of the natural gas explosions. That effort is being conducted by the National Transportation Safety Board (NTSB), the lead federal agency for the ongoing investigation. An investigatory report has been published by the NTSB and can be found here: https://www.ntsb.gov/investigations/AccidentReports/Pages/PAR1902.aspx.

The AAR describes the utility's interactions with public safety partners during the ongoing response and recovery efforts. The conclusions detailed in this AAR are subject to revision as additional information becomes available.

2.2 Incident Overview

Columbia Gas of Massachusetts, a subsidiary of NiSource, is a natural gas provider to over 320,000 customers in the Commonwealth, including residents in communities within the Merrimack Valley. On September 13th, 2018, a gas contractor was conducting routine maintenance work in Lawrence following a work plan developed by Columbia Gas. At approximately 4:00 PM, a low-pressure gas line was over-pressurized with gas, resulting in a response and recovery effort across three communities that lasted several months.[4] The over-pressurization resulted in many fires, explosions, and damage to thousands of appliances, gas meters, and roughly 50 miles of underground service lines and pipeline mains. One person was killed, and several were injured. This gas line served approximately 6,100 gas meters and was

[4] The affected natural gas distribution system ran on low pressures of natural gas, near ½ pounds per square inch (PSI). High pressure was introduced into this system, stressing it beyond its design limits to the point of failure.

linked to approximately 7,300 residential units and 685 commercial units in Lawrence, Andover, and North Andover.[5]

In the immediate aftermath of the event, 911 calls reporting gas odors, building fires, and explosions began flooding Public Safety Answering Points (PSAPs) in the three communities. Local resources were fully engaged in firefighting activities, and local law enforcement was supporting emergency response efforts. During the height of the response, calls for service outnumbered assets available to respond.

Figure 1: Structures Burn or Explode As a Result of the Natural Gas Over-pressurization.

Andover activated their Emergency Operations Center (EOC) and recalled all necessary personnel. In a similar fashion, North Andover activated a Command Center in the parking lot of St. Michael's School to coordinate response in their town. Not knowing the breadth of the event, a Unified Command Post was established at the Showcase Cinemas parking lot on Route 114 in Lawrence. An evacuation order was given to residents in Lawrence, Andover, and North Andover, advising them to leave the area and that shelters were being opened. North Andover and Andover utilized existing, locally owned emergency notification systems to notify their residents of the need to evacuate. In Lawrence, Wireless Emergency Alerts (WEA) were broadcast by the Massachusetts Emergency Management Agency (MEMA) to South Lawrence residents in both English and Spanish. Community websites and social media were also extensively used as notification tools. Pick-up points were established in the south end of Lawrence for evacuees. Busses were then dispatched to these locations in Lawrence to retrieve evacuees and provide transportation to local emergency shelters. Additionally, evacuees in the towns of Andover and North Andover were prompted to evacuate to the emergency shelters in their respective communities.

Due to the threat of additional fires and explosions, a decision was made to de-energize the electric grid in the area while the impacted gas line was being shut down and de-pressurized. This would remove a major source of possible electrical discharges that could create additional

[5] In some instances, gas meters may have been associated with more than one family or business unit. Similarly, family and business units may have housed more than one family or business within the unit.

hazards when mixed with gas vapors. However, de-energizing the electrical grid in the impacted area also created security concerns after dark. Local law enforcement, seeing the extent of the impact and the increasing need for security due to the thousands of vacant homes left after the evacuation, executed their regional mutual aid plans. This resulted in 660 additional law enforcement officers from 140 different law enforcement agencies descending on the area. Traffic Control Points, increased patrols, and an enhanced law enforcement presence were apparent in all communities until electricity was restored.

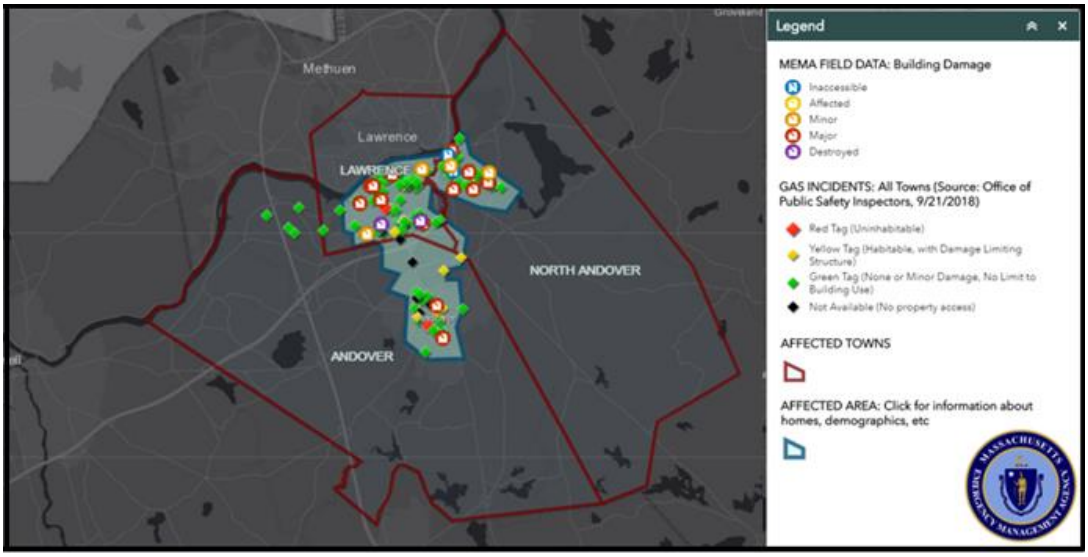


Figure 2: Map Showing Merrimack Valley Damage.

Firefighting resources were also spread thin, and Fire Chiefs in each town recognized the need for mutual aid outside of their normal 10-alarm run cards.[6] In response, the Commonwealth's Fire Mobilization Plan was activated, bringing in firefighting task forces from outside the area. Staging Areas were established in Lawrence and in North Andover, and fire apparatus were sent to calls as they arrived. Over the coming days, 15 Regional Task Forces consisting of 180 fire departments from three states supported the communities. Resources from Massachusetts, New Hampshire, and Maine supported the ongoing response efforts, ensuring that all fires were extinguished in the three towns. An EMS mobilization also brought 54 ambulances into the Staging Area to support response.

On September 14th, Governor Baker declared a State of Emergency for the three communities. Through the authority of an emergency declaration, the Chairman of the Department of Public Utilities (DPU) appointed Eversource[7] as the lead utility for recovery, directing them to oversee

[6] In order to streamline mutual aid, fire departments across the country develop run cards, which prescript, based on the size of the event, the specific resources which will be requested to respond to assist the affected fire department.

[7] Eversource Gas provides gas service to Connecticut and much of Eastern Massachusetts, and is one of the main gas utilities in New England.

the Columbia Gas restoration effort. The process of conducting damage assessments also began at this point in the response, with multiple departments and agencies involved.

Figure 3: Governor Baker Provides an Update to the Media at the Unified Command

Once fires were extinguished, firefighting task forces conducted house-to-house safety checks with Columbia Gas employees, local law enforcement, and locksmiths to ensure that gas service was shut off and there were no dangerous gas levels in the homes. This effort took several days, and on Sunday, September 16th, the electrical grid was re-energized in the impacted area. This resulted in the evacuation order being lifted, allowing residents to return home, albeit without heat or hot water.

With residents back in their homes but still without gas service, a Chief Recovery Officer (CRO) was appointed by the Chairman of the DPU through its authority during Governor Baker's emergency declaration. A recovery team of local and state officials coordinated with Columbia Gas and other private sector companies to support restoration, reconstruction, and recovery efforts. During the onset of the overall recovery effort, two programs were developed to support residents: Operation Hot Plate and Operation Temporary (Temp) Heat. These programs were a means to provide electric cooktops and space heaters to impacted residents. From September 22nd to September 25th, nearly 7,000 hotplates were distributed to residents. After this was completed, impacted homes were assessed to determine whether a space heater could safely be used in the homes. While these operations were planned with good intentions, there were several obstacles that limited their success. Most critically, many electrical systems in the older housing stock prevalent in the area were deemed inadequate for the safe use of the appliances provided. Operation Temp Heat was ultimately deemed ineffective and was discontinued.

Several recovery efforts were initiated in the days after the disaster. A Recovery Resource Center (RRC) was opened in Lawrence on September 16th to provide impacted residents from all three impacted communities access to various programs and resources. Over 3,000 residents received support at the RRC from a multitude of service providers. In order to attend to the needs of impacted residents in each community, local recovery centers and Columbia Gas

Claims Centers also opened around this time. Emergency loan funds were established to assist impacted businesses and help them get back on track, and a Small Business Administration (SBA) Economic Injury Disaster Loan (EIDL) Program was authorized to provide support to small businesses. Additionally, the Greater Lawrence Disaster Relief Fund (GLDRF) was established to serve the short- and medium-term shelter and sustenance concerns of affected residents and businesses in Andover, Lawrence, and North Andover. Columbia Gas contributed $10 million to the GLDRF. These funds were distributed to impacted residents in a timely and efficient manner. A request was made through the Federal Emergency Management Agency (FEMA) to the President of the United States for a Presidential Disaster Declaration.[8] Based on the information present at the time, FEMA determined that the disaster did not exceed the capabilities of state and local government, and this request was denied on December 10, 2018. Columbia Gas was financially responsible for all costs related to the incident.

The initial estimate for gas restoration was set for November 19th, with expectations of restoring gas service prior to the Thanksgiving Holiday. As the scope of the necessary repair work grew and the slower-than-expected pace of work completion was realized, this timeline had to be adjusted to December 16th. Understanding that the new December restoration timeframe could impact the health and safety of residents residing in homes with no heat or hot water during winter, local and state officials quickly determined a temporary housing solution was needed. Columbia Gas Claims Centers became the gateway for affected residents to seek temporary alternative housing. In addition to the Claims Centers, a dedicated Call Center was set up and staffed with contractors who specialized in crisis management to manage the overwhelming mission of finding temporary housing for residents as winter arrived. Over the months of the recovery, the following temporary housing solutions were put into place:

- 5,100 hotel rooms within 30 miles of the impacted area
- 210 apartments in the impacted area
- 514 travel trailers, leased and placed in 5 sites in the three communities
- 1,000 bed congregate shelter in North Lawrence

These solutions supported 2,107 families comprising 7,548 people (1,648 families in hotels, 69 families in apartments, and 390 families in travel trailers) until gas service was restored in mid-December. These numbers do not account for the hundreds of utility workers who came into the three communities to support gas restoration. These workers were housed on a cruise ship in Boston Harbor, and commuted to and from the incident zone.

[8] States can request a Presidential Disaster Declaration through FEMA when they determine that the state and local capability to effectively respond to an incident is overwhelmed. This request, if approved, can result in the activation of support under the Stafford Act, which could provide federal assistance and reimbursement for 75% of eligible costs related to the event.

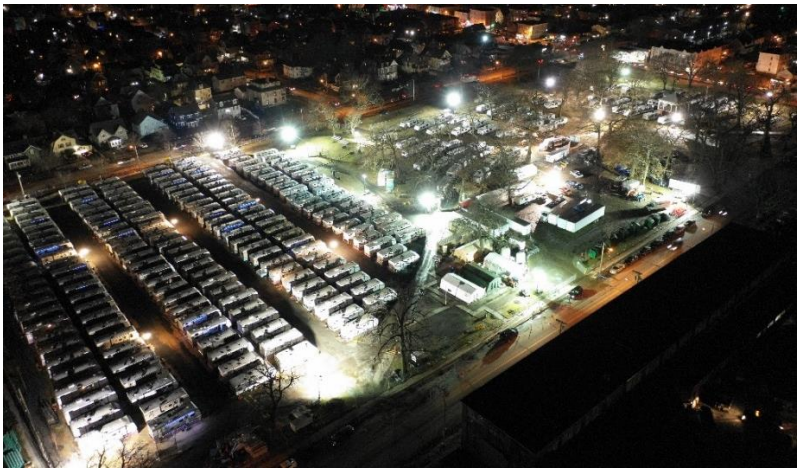


Figure 4: Night Descends Upon the Lawrence South Common Trailer Site.

The recovery effort was hampered by complications and delays in repairing and reactivating the impacted natural gas infrastructure. The Chief Recovery Officer managed an operation involving hundreds of gas company personnel out of the Columbia Gas Offices in Lawrence. The impacted area was broken into eight zones both to allow for a focused effort in each zone and to manage span of control. Together, these utility crews replaced 43.5 miles of the underground cast iron and bare steel distribution system and 5,086 service lines; they also recertified 12.3 miles of polyethylene main pipe via a successful pressure test. The crews ultimately installed a state-of-the-art system, complete with auto-close valves to prevent similar incidents from occurring in the future.

While the pipeline infrastructure was being replaced, thousands of appliances - including water heaters, furnaces, dryers, and stoves - were replaced and installed in impacted homes. Energy efficient solutions were used where possible in an effort to ensure that appliance standards and efficiencies were better than they were before the disaster. With appliance replacement ongoing, the gas infrastructure was re-pressurized to normal operating pressures. The successful re-pressurization allowed gas service to be restored to the area, and residents could again use the utilities in their homes. Impacted businesses were also able to reopen once necessary inspections were completed. Health inspectors from surrounding towns supported this effort through the Statewide Public Safety Mutual Aid Law.

Inspections were also critical to ensure all work was done safely and met state building codes and regulations. Pipeline inspectors were brought into the area from surrounding states through existing mutual aid agreements and through the Emergency Management Assistance Compact (EMAC).[9]

While gas service has been restored, the recovery and full restoration is still ongoing. As of the date of this report, abandoned gas line removal and capping, street repaving projects, field renovations as a result of travel trailer site use, and other recovery efforts continue. The

[9] EMAC is the United States' interstate mutual aid system (www.emacweb.org).

response and recovery efforts have taken a multi-disciplinary approach to ensure that the impacts realized from the September 13th, 2018, natural gas explosions in the Merrimack Valley are not repeated in the future and that existing response capabilities are ready should they be needed for a similar disaster.

2.3 Community Geography and Demographics

The City of Lawrence and the Towns of Andover and North Andover are located in Essex County in Northeastern Massachusetts. They are located in a portion of Essex County known as the Merrimack Valley, an area in Massachusetts surrounding the Merrimack River along the New Hampshire Border. These communities are located within five to ten miles of the New Hampshire border and are approximately 25 miles north of Boston.

The Merrimack River flows through Lawrence, dividing it into a Northern Section and a Southern Section. South Lawrence was the only part of Lawrence impacted during this disaster. Portions of northeastern Andover and northwestern North Andover were also impacted. The most heavily damaged parts of these communities were in a fairly concentrated area. While some reports were received outside of this zone, impacts were relatively minor.

Though these three communities are geographically near one another, they are different demographically. Lawrence is a densely populated urban city with twice the population, a higher percentage of Spanish-speaking residents, and a higher poverty rate when compared to Andover and North Andover. Andover and North Andover are middle-class suburban communities, and although each has half the population size of Lawrence, their geographic size is four to five times that of Lawrence.

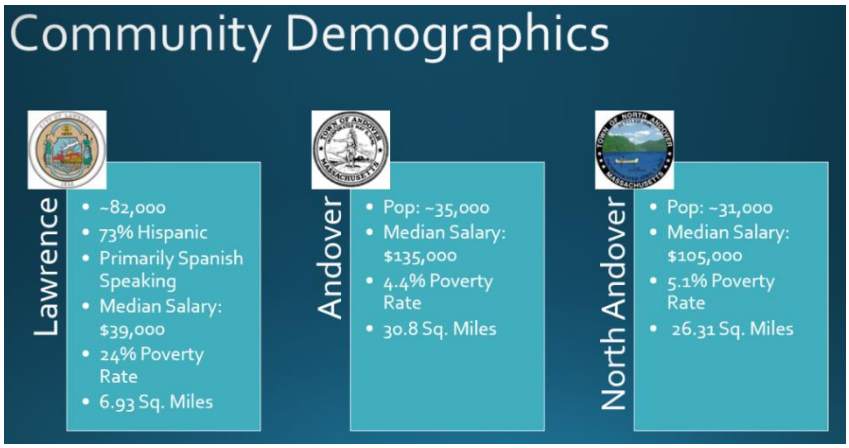


Figure 5: Community Demographics by the Numbers.

The majority of the housing stock in Lawrence is much older than that of its surrounding communities, as well. Older multi-family homes, many with balloon-frame construction[10] and/or knob-and-tube wiring[11], were prevalent in Lawrence, which hampered some of the recovery efforts.

[10] Balloon-frame construction is a style of wood-framed housing that uses long, vertical wood beams for exterior walls. The resulting voids extend, uninterrupted, from basement to attic, allowing for rapid fire spread.
[11] Knob-and tube-wiring is an early standardized method of electrical wiring in buildings, common in North America from about 1880 to the early 1940s.

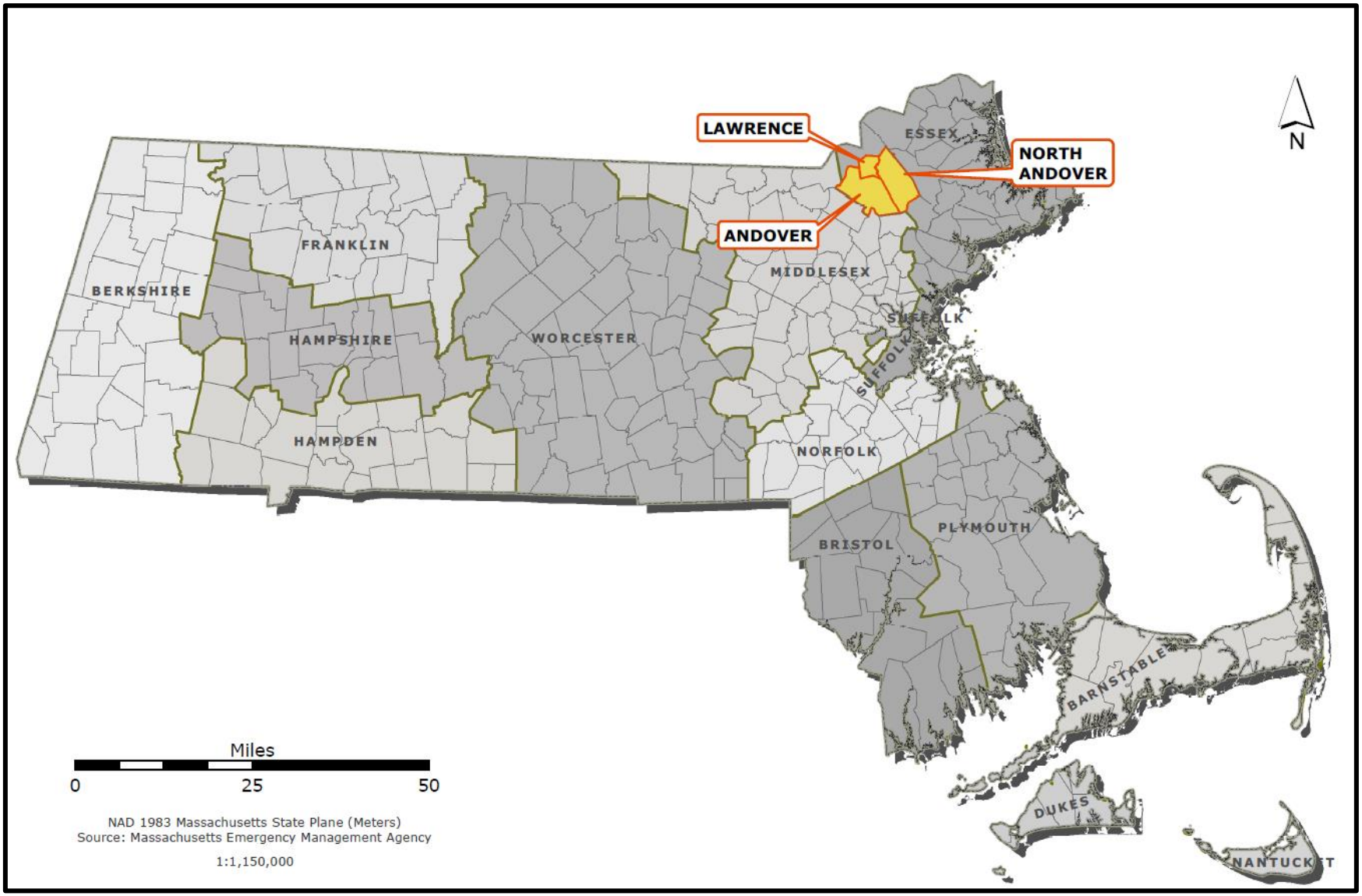


Figure 6: Commonwealth of Massachusetts, with Impacted Communities Highlighted.

3.0 Acknowledgments

3.1 Steering Committee

To ensure the AAR would be thorough and would achieve the required objectives, a Steering Committee was assembled to provide guidance and direction to the development of this report. The Steering Committee is comprised of the following agencies and representatives:

- **City of Lawrence**
  - Dan Rivera, Mayor
- **Town of Andover**
  - Andrew Flanagan, Town Manager
- **Town of North Andover**
  - Andrew Maylor, Former Town Manager
- **Office of the Governor**
  - Kristen Lepore, Chief of Staff, Governor Baker
  - Elizabeth Guyton, Director of Communications
- **Executive Office of Energy and Environmental Affairs**
  - Matthew Beaton, Former Secretary
  - Patrick Woodcock, Undersecretary
- **Executive Office of Public Safety and Security**
  - Thomas Turco, Secretary
  - Jeanne Benincasa-Thorpe, Undersecretary
- **Massachusetts Department of Fire Services**
  - Peter Ostroskey, State Fire Marshal
  - David Clemons, Operations Section Chief
- **Massachusetts Division of Professional Licensure**
  - Charles Borstel, Commissioner
- **Massachusetts Department of Public Utilities**
  - Matthew Nelson, Chairman
- **Massachusetts Emergency Management Agency**
  - Samantha Phillips, Director
  - Christine Packard, Former Deputy Director
- **Massachusetts National Guard**
  - Colonel Margaret White
  - Lieutenant Colonel Donald Hamilton
- **Massachusetts State Police**
  - Major Pasquale Russolillo
  - Major Scott Range
  - Major Jack Lannon
- **American Red Cross**
  - Holly Grant, Chief Executive Officer

3.2 Participating Agencies and Representatives

The Steering Committee would like to acknowledge and thank the many members of the following agencies for the invaluable contributions and time commitment to this project:

- City of Lawrence:
  - Lawrence Mayor's Office
  - Lawrence Fire Department/Emergency Management
  - Lawrence Police Department
  - Lawrence Senior Center
- Town of Andover:
  - Andover Town Manager
  - Andover Fire Department
  - Andover Police Department/Emergency Management
  - Andover Public Health
- Town of North Andover:
  - North Andover Town Manager
  - North Andover Fire Department
  - North Andover Police Department
  - North Andover Emergency Management Agency
- Commonwealth of Massachusetts:
  - Office of the Governor
  - Executive Office of Public Safety and Security
  - Executive Office of Energy and Environmental Affairs
  - Executive Office of Health and Human Services
  - Massachusetts Department of Fire Services
  - Massachusetts Department of Mental Health
  - Massachusetts Department of Public Health
  - Massachusetts Department of Public Utilities
  - Massachusetts Department of Transportation
  - Massachusetts Division of Professional Licensure
  - Massachusetts Emergency Management Agency
  - Massachusetts National Guard
  - Massachusetts Office of Public Safety Inspections
  - Massachusetts State Police
  - Massachusetts Statewide Interoperability Coordinator
- Additional Public and Private Sector Partners and Representatives
  - American Red Cross
  - Essex County Community Foundation
  - Eversource
  - Fire Mobilization Committee
  - Joe Albanese, Commodore Builders

- Kurt Schwartz, former MEMA Director
- Lawrence Partnership
- Mass Housing
- McKinsey and Company
- Andover Medical Reserve Corps
- National Grid
- NiSource/Columbia Gas
- Northeast Massachusetts Law Enforcement Council (NEMLEC)
- Salvation Army

4.0 Incident Timeline

The following chronology represents key events, actions, and decision points during the immediate and ongoing response, and the short- and long-term recovery operations surrounding this event. Higher-level strategic decisions or key program implementations are depicted in the graphics, while a more detailed list of events by date and time follows. Note: Every effort was made to be as accurate as possible with timestamps; however, many timestamps are approximate, having been gathered from various sources.

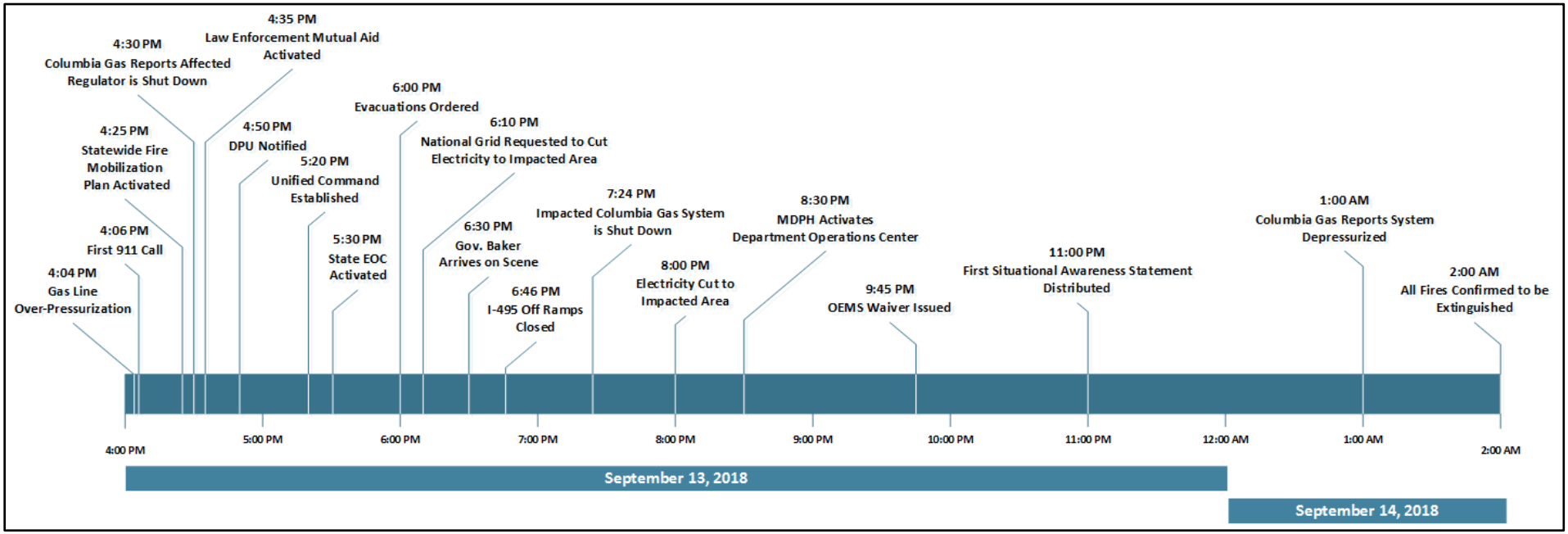


Figure 7: Timeline Depiction of First Operational Period, September 13-14, 2018.

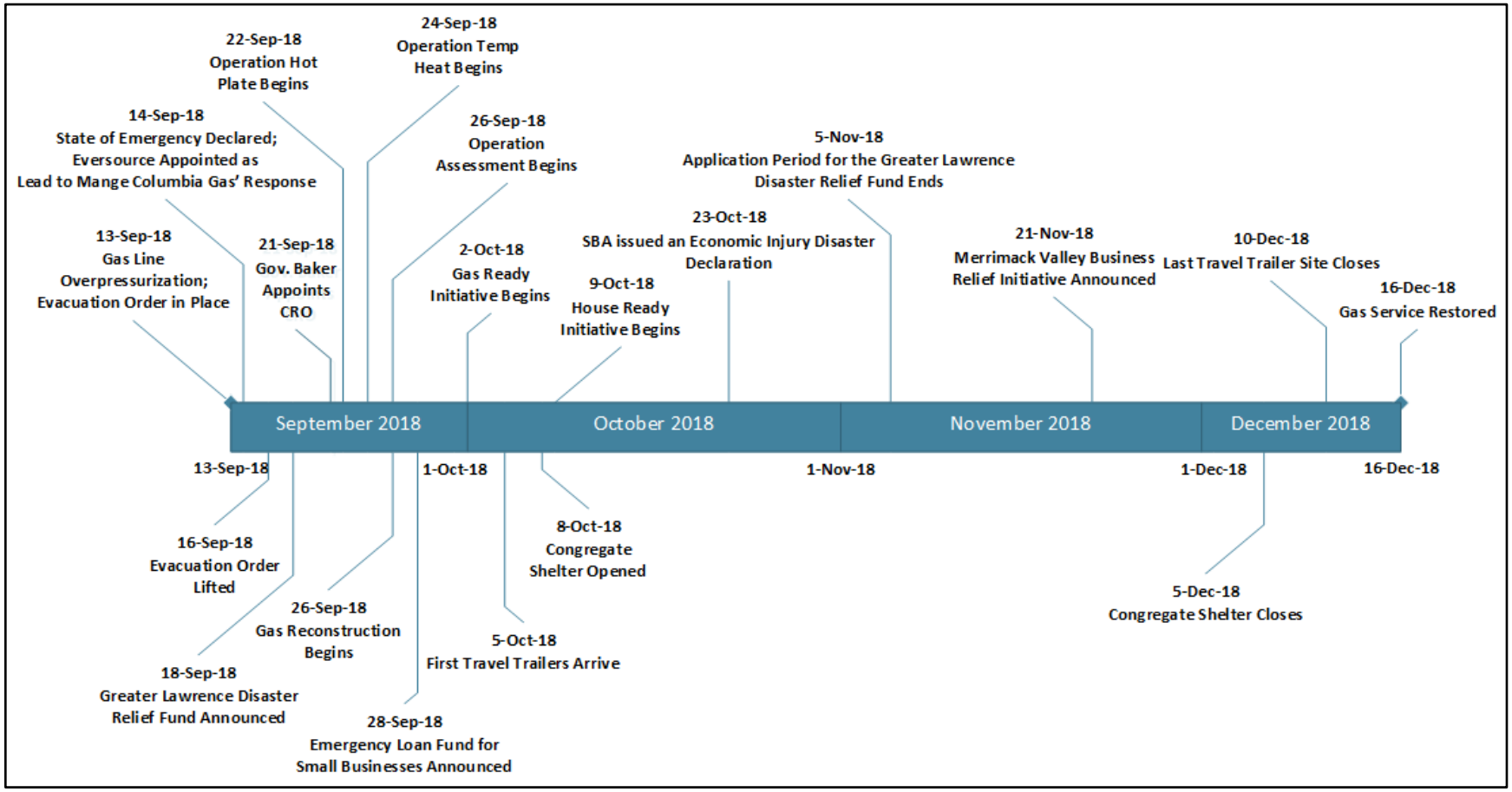


Figure 8: Overall Event Timeline, September 13-December 16, 2018.

Thursday, September 13, 2018

- 4:04PM: First high pressure alarm sounded in Columbia Gas Control Room
- 4:05PM: Second high pressure alarm sounded
- 4:06PM: First Lawrence 911 call, for an incident on Osgood Street
- 4:13PM: First North Andover 911 call, for smoke in basement
- 4:13PM: First Andover Fire 911 call
- 4:15PM: Massachusetts Emergency Management Agency (MEMA) notified
- 4:25PM: Lawrence fire chief activated the Fire Mobilization Plan, and requested two Fire Mobilization Task Forces
- 4:30PM: Lawrence Mayor Rivera directed Lawrence Health and Human Services to open a shelter at the Partham School
- 4:30PM: Columbia Gas reported the natural gas regulator involved was closed
- 4:30PM: American Red Cross on scene in Lawrence and North Andover
- 4:40PM: Andover opened its Emergency Operations Center (EOC)
- 4:42PM: Andover activated the Fire Mobilization Plan for their town
- 4:44PM: Massachusetts State Police (MSP) A-Troop notified all MSP personnel, including the Commonwealth Fusion Center (CFC)
- 4:45PM: The CFC notified MSP Command Staff, who notified the Executive Office of Public Safety and Security (EOPSS)
- 4:45PM: The CFC notified federal partners and deployed MSP Anti-Terrorism Unit and Joint Terrorism Task Force (JTTF) Investigators to the scene
- 4:45PM: North Andover activated a Command Center in the Parking Lot of St. Michael's School, and declared a Local State of Emergency
- 4:50PM: Department of Public Utilities (DPU) notified by Columbia Gas of a gas issue with unknown cause
- 4:52PM: MSP notified the public via social media of multiple gas explosions and structure fires in Andover, Lawrence, and North Andover
- 5:00PM: Andover Police Department activated Northeast Massachusetts Law Enforcement Council (NEMLEC) support, which included an Incident Management Assistance Team (IMAT). The requested assets supported Andover
- 5:00PM: North Andover established a Staging Area of North Andover Middle School to receive incoming mutual aid
- 5:00PM: MSP Incident Management Assistance Team (IMAT) arrived at Lawrence Police Department Command Post, contacted local public safety officials, and requested their presence in Lawrence in order to establish Unified Command
- 5:05PM: MEMA arrived on scene at Lawrence Staging Area
- 5:20PM: Unified Command established at the Showcase Cinemas Parking Lot in Lawrence
- 5:25PM: North Andover began evacuating residents to North Andover High School
- 5:30PM: State Emergency Operations Center (SEOC) activated to Level II (Partial Activation)

- 5:33PM: Andover began evacuating residents to Senior Center, 30 Whittier Court.
- 6:00PM: Initial Wireless Emergency Alerts (WEA) to evacuate South Lawrence issued in both English and Spanish
- 6:10PM: National Grid received request from North Andover to de-energize electrical grid
- 6:10PM: Request received to de-energize everything in Lawrence south of Merrimack St.
- 6:28PM: MSP CFC sent situational awareness message to stakeholders and indicated that initial reports were pointing to a possible over-pressurization of natural gas lines in that area
- 6:30PM: Governor Baker arrived at the Unified Command Post in Lawrence
- 6:30PM: MSP CFC provided MSP Command Staff and EOPSS a map, by town, of the Columbia Gas service area within Massachusetts
- 6:36PM: National Grid de-energized South Lawrence
- 6:46PM: All off-ramps on I-495 from Exits 42 through 45 were closed; on-ramps remained open to allow evacuation
- 7:00PM: Andover opened shelters at Senior Center, which remained open through Sunday evening
- 7:24PM: Columbia Gas' natural gas distribution system was closed
- 7:26PM: National Grid de-energized North Andover and Downtown Andover
- 8:00PM: All affected areas were taken off the electrical grid
- 8:00PM: Department of Public Safety gathered inspectors to triage damage and began vetting licenses from 26 states participating in the inspection efforts
- 8:00PM: Columbia Gas established a hotline for claims
- 8:04PM: Red Cross began setting up an emergency shelter at North Andover High School and brought a shelter trailer for 100 people to this location. Animal Control Officer was prepared to receive residents with pets
- 8:30PM: The Massachusetts Department of Public Health (MDPH) activated its Department Operations Center (DOC)
- 9:00PM: The initial press conference with the media, including Governor Baker with state and local officials, was conducted
- 9:30PM: MSP CFC continues situational awareness message distribution to stakeholders
- 9:45PM: MDPH Office of Emergency Medical Services (OEMS) issued a waiver allowing ambulances in EMS Region 3 (Northeastern MA) to transport individuals to alternate destinations, such as shelters
- 11:00PM: MEMA distributed first comprehensive Situational Awareness Statement (SAS)
- 11:44PM: The Massachusetts Society for the Prevention of Cruelty to Animals (MSPCA) made their Nevins Farm facility in Methuen available as a pet shelter

Friday, September 14, 2018

- 1:00AM: Columbia Gas Reports affected system is depressurized
- 2:00AM: Any remaining fires triggered during the incident extinguished

- 6:07AM: MSP CFC continues situational awareness message distribution to stakeholders
- 2:00PM: Columbia Gas opened first Claims Center at Lawrence Public Library
- 3:00PM: Governor Baker declared a State of Emergency for all affected communities.
- 3:00PM: The Chairman of the Department of Public Utilities (DPU) directed Eversource to take management control over Columbia Gas' response to the incident

Sunday, September 16, 2018

- 7:00AM: It was determined that the depressurizing of the gas line was complete, all meters were shut off, and all structures were free of residual gas. The electrical grid was re-energized, and Unified Command lifted the Evacuation Order
- 8:53AM: All ramps and road closures associated with the gas explosions affecting Lawrence, Andover, North Andover, and Methuen were reopened
- 9:00AM: Columbia Gas Claims Center opened at Lawrence High School
- 9:46AM: WEA Messages sent to South Lawrence area to return to their homes in both English and Spanish
- 1:00PM: Recovery Resource Center (RRC) opened at Arlington Middle School in Lawrence
- 1:00PM: North Andover High School Shelter was closed

Tuesday, September 18, 2018

- Governor Baker activated the Massachusetts National Guard (MANG) to support Operation Hotplate and Operation Temporary Heat
- Governor Baker announced the Greater Lawrence Disaster Relief Fund (GLDRF)
- Columbia Gas opened Claims Center in Andover at 10 Main Street (later moved to 45 Main Street), operating from 12:00PM-8:00PM
- The RRC was relocated to the Lawrence Elks Lodge at 652 Andover Street

Wednesday, September 19, 2018

- Columbia Gas opened Claims Center in North Andover at 115 Main Street
- The SEOC returned to Level I: Steady State/Monitoring

Friday, September 21, 2018

- Governor Baker directed the Chairman of the DPU to request that Columbia Gas hire an outside contractor. A Chief Recovery Officer (CRO) was appointed as a result to oversee the recovery efforts
- The RRC closed

Saturday, September 22, 2018

- Operation Hot Plate began

Monday, September 24, 2018

- Operation Temporary Heat began, with door to door space heater assessments conducted

- EMAC utilized with New Hampshire, Pennsylvania, and New York to deploy state pipeline inspectors to Massachusetts to support the Department of Public Utilities in its work inspecting the pipeline construction

Wednesday, September 26, 2018

- Gas system reconstruction began in Andover
- Operation Assessment began

Thursday, September 27, 2018

- Gas system reconstruction began in Lawrence
- Operation Hot Plate ended

Friday, September 28, 2018

- Governor Baker announced the creation of the Emergency Loan Fund for small businesses
- Operation Temporary Heat ended

Monday, October 1, 2018

- Gas system reconstruction began in North Andover

Tuesday, October 2, 2018

- Gas Ready Plan was publicly announced

Wednesday, October 3, 2018

- Applications for funding from the GLDRF opened

Friday, October 5, 2018

- First travel trailers on site, Lawrence South Common
- Governor Baker publically announced the Alternative Housing Options Program
- Columbia Gas began to move utility workers from local area hotels to the MS Grand Celebration cruise ship docked in Boston Harbor

Sunday, October 7, 2018

- First travel trailers on site, Andover Recreation Park Road

Monday, October 8, 2018

- Congregate shelter in Lawrence opened with 250 beds

Tuesday, October 9, 2018

- House Ready Plan publicly announced

Wednesday, October 10, 2018

- First residents on travel trailer site, Andover Recreation Park Road

- First residents on travel trailer site, Lawrence South Common
- First travel trailers on site, North Andover Grogan Field
- First travel trailers on site, Lawrence Pemberton Park
- Operation Assessment ended

Saturday, October 13, 2018

- Congregate shelter surged from 250 to 1,000 beds

Tuesday, October 16, 2018

- First resident on travel trailer site, North Andover Grogan Field

Wednesday, October 17, 2018

- First resident on travel trailer site; Lawrence Pemberton Park

Tuesday, October 23, 2018

- The Small Business Administration (SBA) issued an Economic Injury Disaster Declaration

Thursday, November 1, 2018

- First travel trailer on site, Lawrence Sullivan Park

Monday, November 5, 2018

- The application period for the GLDRF ended
- First residents on travel trailer site, Lawrence Sullivan Park

Friday, November 9, 2018

- MEMA submitted a request from the Governor to the President of the United States for an Emergency Declaration under the Stafford Act

Thursday, November 15, 2018

- Congregate shelter capacity was reduced from 1,000 to 500 beds

Monday, November 19, 2018

- Original date for gas service restoration, which was later pushed back to mid-December

Thursday, November 22, 2018

- Third (and final) round of GLDRF distributed to households

Wednesday, December 5, 2018

- Last travel trailer removed, North Andover Grogan Field

Thursday, December 6, 2018

- Congregate shelter in Lawrence closed

Saturday, December 8, 2018

- Last travel trailer removed, Lawrence Sullivan Park

Sunday, December 9, 2018

- Last travel trailer removed; Andover Recreation Park Road
- Last travel trailer removed; Lawrence Pemberton Park

Monday, December 10, 2018

- MEMA received notification that FEMA denied the Commonwealth's Emergency Declaration request
- The last travel trailer occupant checked out, all trailer sites were closed and in the process of being demobilized

Thursday, December 13, 2018

- All travel trailers removed from Sullivan Field. Remaining infrastructure would be removed within days

Friday, December 14, 2018

- Last travel trailer removed, Lawrence South Common

Sunday, December 16, 2018

- All gas system repairs completed, gas service restored to the incident area

5.0 Focused Review Areas

Throughout the after action review process, a series of stakeholder workshops and interviews were conducted to ensure a collective and cohesive process existed for the creation of this report. The Focused Review Areas below follow the general layout of the stakeholder workshops and were approved by the Steering Committee, who oversaw this process.

This report has been compiled with a focus on four areas, which span the entirety of the response and recovery effort:

1. Initial Response (first 24 hours)
2. Ongoing Response (until evacuation order lifted)
3. Recovery Efforts (gas restoration and replacement)
4. Recovery Efforts (human services)

5.1 Initial Response

This section of the report focuses on the first 24 hours, from September 13th to September 14th, 2018. From the volume and nature of the 911 calls, two things were quickly apparent to all three communities: 1) this was a wide-scale event, with a then-unknown origin, and 2) additional resources would be required to mitigate the impacts and protect public safety. Immediate objectives for this operational period included:

- Life safety
- Incident stabilization
- Notification and warning
- Evacuation coordination
- Command and control
- Effective mutual aid coordination
- Staging Areas
- Emergency shelter operations

Immediately after the over-pressurization and resulting explosions and fires, calls began flooding the 911 Public Safety Answering Points (PSAPs) in all three communities. Lacking the personnel and technical capacity to service the high volume of calls, departments quickly implemented procedures to triage calls based on the severity of the reported threat. This triaging effort allowed limited available emergency resources to be quickly dispatched to areas reporting the greatest immediate risk to human life and property. The most serious emergencies included explosion and active fires, while calls reporting an odor of gas or other non-emergency were held for a later response as resources became available. The information gleaned from the triage effort also helped to later gauge the size of the impacted area.

5.1.1 First Responder Activities

The first calls were received by the City of Lawrence's Public Safety Dispatchers shortly after 4:00PM. Similar emergency calls in rapid succession flooded the Andover and North Andover

911 dispatch centers, as well as wireless PSAPs in the Commonwealth. The large volume of calls to all three communities quickly exceeded their personnel and dispatch capacity. Available resources were dispatched as calls were received, but soon the number of requests for service outnumbered the available resources in the three communities. Dispatchers followed procedures and notified key decision-makers in each town to ensure they were aware of the scope and magnitude of the incident. Additionally, dispatchers ensured that mutual aid was activated when requested by incident commanders,[12] being cognizant to avoid requesting the same assets already in use by other towns. As the scale of the incident grew, it became clear that this incident was not a routine series of fire calls. Rather, a complex response metric had to be put in place, with an eventual need for extensive mutual aid. While this was heavily a fire response at the onset, law enforcement soon followed, along with other agencies, to support the long-term response.

Local Firefighting and EMS Response

Numerous emergency calls to report residential and commercial buildings fires and explosions, as well as odor of gas calls, flooded local PSAPs. As the number of emergency calls grew, firefighting assets were quickly spread thin. All calls for services followed a similar trend; within minutes, local incident commanders and shift commanders became suspicious that this was a natural gas-related event. There were so many emergencies at the onset that fire departments began to send single-engine company assignments to building fires to attempt to control fires until more help could respond from out of town. After a short time, available resources were no longer able to respond to calls, and mutual aid requests began to fill the region.

Mutual aid was requested from surrounding communities, utilizing existing 10-alarm run cards and mutual aid agreements. As each town began to approach their 10th alarm mutual aid complement for their respective community, incident commanders realized the need for additional mutual aid from outside of the region. Approximately 30 minutes into the event, the Massachusetts Statewide Fire and EMS Mobilization Plan was activated by the three communities. This plan, which had been used extensively in the past, prescripts mutual aid from out of the requesting fire district, to augment local fire response. A key benefit of this plan is that it prevents depleting firefighting resources in any one geographic area while supporting

Figure 9: Fire Mobilization Resources in the Staging Area.

[12] Local public safety response was overseen by an incident commander in each community, who retained control and authority for the incident within their jurisdiction.

needs in another area of the Commonwealth. Numerous structural task forces[13] would be requested over the coming days to support fire suppression, local department augmentation, and Render-Safe activities (see Section 5.2.2 for more detail on Render-Safe activities). Ultimately, over 330 pieces of fire apparatus (167 engines, 65 ladders, and a plethora of command, communications, canteen, and other support vehicles) from over 180 fire departments (133 from Massachusetts, 50 from New Hampshire, and 1 from Maine) responded into the region. As the first Fire Mobilization resources came into the impact area, they were sent to calls for service still in the queue. Once additional mutual aid augmented the response, and later as fires were extinguished and the Render-Safe process began, Staging Areas were established to support the staging and deployment of these resources.

Finding S-1: Strength

The Statewide Fire and EMS Mobilization Plan effectively provided firefighting mutual aid resources to the Merrimack Valley Region for four days.

Until the number of casualties and fatalities was known, Lawrence General Hospital EMS activated their crisis plans to ensure that sufficient Emergency Medical Services (EMS) resources were available in the communities. This ensured that multiple ambulances were available if needed. Twenty-four people were injured during the first hours of the incident and were transported to local hospitals. In anticipation of additional injuries, a total of 54 ambulances were staged in Lawrence, available for use should the need arise. Fortunately, additional injuries were not reported, and ambulances remained in the Staging Area.

Local Law Enforcement Response

The Lawrence Police Department began receiving the first reports of fires and explosions throughout South Lawrence shortly after 4:00PM. They were quickly overwhelmed with hundreds of calls for service. All officers, including those who were off duty, were ordered to report to work to support the response. The Towns of Andover and North Andover also found themselves responding to a multitude of emergency calls and were quickly overwhelmed. As the magnitude and scope of the incident became clear, mutual aid was requested and a comprehensive law enforcement plan for the impacted area was developed.

The first law enforcement agency to respond to the request for mutual aid in the City of Lawrence was Massachusetts State Police (MSP) Troop A, which was already stationed in the area. Within the first few hours of the response, additional local, regional, and state law enforcement mutual aid was provided to all three communities by the Lawrence Auxiliary Police, the Methuen Police Department, the Northeastern Massachusetts Law Enforcement Council (NEMLEC), as well as additional officers and assets from MSP. The Lawrence Auxiliary Police, Methuen Police, and MSP were primarily assigned to South Lawrence. NEMLEC

[13] As scripted in the Statewide Fire Mobilization Plan, a Structural Task force is comprised of six engine companies, two ladder companies, and a commanding officer.

coordinated the law enforcement response activities in the towns of Andover and North Andover. These resources were deployed and managed by the NEMLEC Incident Management Assistance Team (IMAT).[14] Once established, NEMLEC requested additional support from the Central Law Enforcement Council (CEMLEC) and Southeastern Law Enforcement Council (SEMLEC).

As police officers reported to the impacted areas in each community, they were provided with assignments to ensure the continued safety and security of the region. This was particularly necessary when the electrical grid was de-energized the first evening and the impacted area was evacuated, as described in Section 5.1.4. Law and order was maintained throughout this process, and continued to be maintained over the following days while the area was made safe and residents permitted back home. Throughout the event, hundreds of officers from numerous law enforcement agencies around the Commonwealth assisted in the effort.

Finding S-2: Strength

Existing Law Enforcement mutual aid plans deployed and managed law enforcement assets from across the region. Assets were managed effectively by the three communities and the NEMLEC IMAT.

Key Finding R-1: Recommendation

Law Enforcement and Fire Mobilization mutual aid plans should continue to be utilized to their fullest to allow for the effective requesting, deploying, integration, and tasking of regional resources.

State and Regional Response

The response quickly grew from local fire, police, and emergency medical services to include a robust contingent of state and regional assistance, reflecting real-time monitoring of the situation and evolving needs. Within 30 minutes of the start of the incident, several state agencies had been notified and were deploying to the area. Several disaster relief agencies, including the American Red Cross (ARC) and Salvation Army, were also notified and responded. Within an hour, many of these agencies were on the ground and assisting with the response.

Public Safety Communications

As with any no-notice event of this scale, radio communications and interoperability solutions were critically important to the continued safety of responding agencies. With the hundreds of responders mobilizing into the three communities, there was no feasible way to ensure that they all had local police and fire radio frequencies programmed into portable and mobile

[14] The NEMLEC Incident Management Assistance Team (IMAT) is a team of law enforcement professionals, which provide overhead coordination and logistics capabilities to regional law enforcement assets during significant events involving NEMLEC.

radios. As mutual aid task forces were augmenting the response, Communications Unit Leaders (COML)[15] embedded within some of the task forces supported them to ensure that incoming assets could talk as a group and then later be incorporated within the larger interoperability picture. COMLs deployed as secondary assets to the mutual aid response, and were not written into the larger mutual aid plans as an assigned resource. The Statewide Interoperability Coordinator (SWIC) maintains and organizes a list of Massachusetts COMLs, once they meet all requirements as set forth by the Office of Emergency Communications (OEC). These credentialed liaisons have the knowledge needed to assign and manage interoperability channels throughout a response to an incident.

The Commonwealth has a range of non-federal national and statewide interoperable radio channels and frequencies, designed for large scale response with numerous partners. These available channels were able to be rapidly assigned by function into a Communications Plan and given to incoming responders to ensure they could communicate with each other and incident commanders. However, having this suite of radio platforms available is not useful if communications experts knowledgeable in their equipment's assignment and use are not part of the strategic conversation. While Communications Unit Leaders were on site at the command post, and were able to answer inquiries and make tactical channel assignments to ensure available channels were used effectively and appropriately, their deployment was tied to certain mutual aid task forces and agencies, and not part of a formal program. Formalizing a Communications Program, under the SWIC, to ensure communications experts are tied to regional events from the onset, is key to a coordinated response. Further, having experts on-scene will allow for a more rapidly executable Communications Plan that can be used by responders when they are not in their normal geographic operating location.

INCIDENT RADIO COMMUNICATIONS PLAN			Incident Name: Lawrence / Andover / N. Andover GAS EMERGENCY			Date/Time Prepared: Sept. 16 2018 1600			Operational Period Date/Time: Sept 16 2018 1030-1900
Net #	Function	Channel Name/Trunked Radio System Talkgroup	Assignment	RX Freq N or W	RX Tone/NAC	TX Freq N or W	Tx Tone/NAC	Mode A, D or M	Remarks
1	STATE LE OPS	SOPS 7	MASS SP	MASS STATE TRUNKING SYSTEM					
2	LE OPS	Area Wide 4	LOCAL Towns	470.5625N	131.8				PATCHED
2	LE OPS	SOPS 5	LOCAL Towns	MASS STATE TRUNKING SYSTEM					PATCHED
2	LE OPS	EVENT 3	LOCAL Towns	MASS STATE TRUNKING SYSTEM					PATCHED
5	LE TRAVEL	Area Wide 3	LE Travel	470.7875N	131.8				
6									
7	Coordination	EVENT 4	Staging / Command	MASS STATE TRUNKING SYSTEM					Fire Mob Task Forces
8	M/A Fire OPS	EVENT 1	Task Forces	MASS STATE TRUNKING SYSTEM					Northeast only
8	M/A Fire OPS	VTAC13	Task Forces	158.7375N	156.7	158.7375N	156.7	A	
8	M/A Fire OPS	UTAC43	Task Forces	453.8625N	156.7	458.8625N	156.7	A	
8	M/A Fire OPS	8TAC93	Task Forces	853.0125W	156.7	808.0125N	156.7	A	
12	FD Dispatch	Lawrence FD	Lawrence Fire	154.4450N	100.0			A	
13									
14	Coordination	MEMA East	ALL	MASS STATE TRUNKING SYSTEM					
15	TECH	TECH WIDE	TECH	MASS STATE TRUNKING SYSTEM					
16	Coordination	EVENT 2	CP Net	MASS STATE TRUNKING SYSTEM					
17	Coordination	8TAC92D	Damage Assessment	852.0125W	156.7	852.0125W	156.7	A	
18									
19									
20									
Prepared By (Communications Unit)				Incident Location: County State Latitude N Longitude W					

Figure 10: Gas Explosions Interoperable Radio Communications Plan (Transmit Frequencies Removed).

[15] Communications Unit Leaders (COML) are federally credentialed through the Office of Emergency Communications (OEC), and are tasked with coordinating public safety communications during disasters. In Massachusetts, these trained personnel are coordinated by the Statewide Interoperability Coordinator (SWIC).

Finding S-3: Strength

Communications Unit Leaders (COMLs) were embedded with some public safety assets and mutual aid task forces to ensure that available interoperability channels were made available, by function, to support emergency response.

Key Finding R-2: Recommendation

A formal Communications Program, coordinated through the Statewide Interoperability Coordinator (SWIC), could ensure Communications Unit Leaders (COMLs) are built into existing mutual aid plans, to deploy to the scene during any regional or significant mutual aid operation, to allow for assignment and utilization of interoperable radio channels.

Despite these assets being on scene, there were still numerous reports of incoming mutual aid having portable or mobile radios that did not have the appropriate interoperability channels, or having misnamed channels that were not used appropriately. These radios needed to be either reprogrammed on the fly or replaced by available cache radios supplied by communications technicians on scene. The Massachusetts Tactical Channel Plan (MA-TCP) outlines consistent naming and programming guidance, along with common regional interoperability channels that are now considered a Commonwealth standard when developing communications capabilities. COMLs, through the SWIC, are knowledgeable of the MA-TCP and can support subject matter expertise for those who need to implement it. Further training with local public safety radio system users will support the implementation and awareness of the MA-TCP throughout the Commonwealth.

Finding I-1: Area for Improvement

In some cases, incoming mutual aid did not have portable or mobile radios programmed with appropriate interoperability channels, or had misnamed channels which were not used appropriately.

Key Finding R-3: Recommendation

Public safety agencies must ensure that interoperability channels are properly programmed and named in their radios, using guidance in the Massachusetts Tactical Channel Plan, for use when assigned at complex or out of district events.

5.1.2 Scene Organization

As resources continued to augment the local response in Lawrence, Andover, and North Andover, the need to organize the multitude of mutual aid was quickly realized. To accomplish this, the Lawrence Fire Chief determined that the vacant parking lot at the Route 114 Showcase Cinema (6 Chickering Road, Lawrence) would be an effective location to stage incoming mutual aid. Similarly, Lawrence Police decided to utilize this parking lot, as did incoming state officials. Out of this parking lot, the initial Staging Area for the response was created. While this lot was not formally written into any staging plan, it was known to be vacant and of sufficient size to accommodate significant amounts of mutual aid resources. Throughout the evening, arriving fire, police, and emergency medical service task forces built an impressive Staging Area. This Staging Area also incorporated feeding, respite, and several tactical command posts, each with its own function to support the overall operation.

Figure 11: Civil Air Patrol (CAP) Photo of Unified Command Post and Staging Area.

In addition to serving as a Staging Area, this same parking lot, due to its size and concentration of responders, also began to grow as a Unified Command Post. The Massachusetts State Police (MSP) deployed a mobile command post to the lot, where local and state decision makers convened to establish priorities and objectives for that first operational period.

As the operation continued to mature, and additional resources continued to augment response over the coming days, the decision was made to separate staging from command. Therefore, Unified Command remained at the Route 114 Showcase Cinema lot. Staging moved up the road to the Market Basket Plaza on Route 114 in North Andover. This allowed public safety agencies to stage in parallel with utility workers and locksmiths, to support the Render-Safe Operations, as discussed in Section 5.2.2.

NEMLEC operated a separate Staging Area, located on York Street in Andover, that was specific to law enforcement response supporting Andover and North Andover. Any incoming law enforcement mutual aid for the two communities would report to the NEMLEC Mobile Command Post for the assignment and would deploy from there into the field.

5.1.3 Initial Decision Making

The cause of the over-pressurization was not immediately known. While this could have been an event caused by human error, deliberate causes were unable to be immediately ruled out. The Massachusetts State Police (MSP) worked with the Commonwealth Fusion Center (CFC)[16] to compile and analyze details regarding the event. This information was shared with federal investigatory agencies, including the Federal Bureau of Investigation (FBI) and Joint Terrorism Task Force (JTTF). By following this process, the CFC looked to identify any potential trends from across the country (ultimately none were found), while helping to provide as much awareness as possible to the scope of the incident. While this was occurring, local and state officials were continuing to determine immediate priorities and objectives to respond to the cascading impacts of this event.

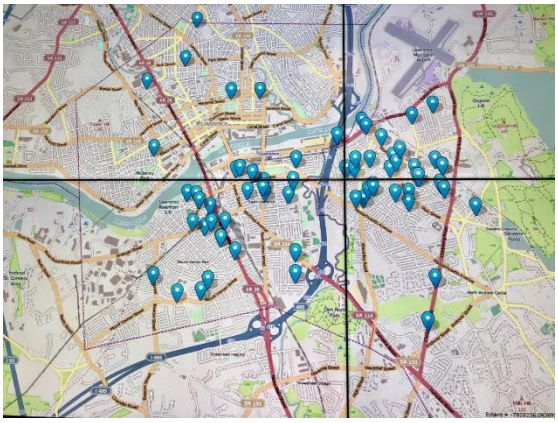


Figure 12: Initial Situational Awareness Map Developed by the CFC.

Once a Staging Area was established, and the Unified Command Post began to inherently grow out of the same area, MEMA's Director, the State Fire Marshal, and the Major of the MSP A-Troop convened on this area and began to develop broad goals and objectives with local leaders. Incident command was retained at the local levels in all three communities, as their leaders attempted to gain control of the situation that was unfolding. As the response matured and began to stabilize, and as the Staging Area began to grow, these incident commanders began to fold their operations into a Unified Command structure to ensure that strategic level discussions were occurring.

While Unified Command was established, a Leadership Group, comprising key elected officials, convened in the same location to provide guidance on the response. In many disasters, the establishment of Unified Command alone is sufficient for response. When incidents grow in scope or scale, as was seen in this incident, a Leadership Group can be an efficient force multiplier to provide strategic direction to Unified Commanders. This allowed both elected officials and their department heads to be co-located. The Leadership Group is designed to provide strategic direction and decision-making authority to those tasked with implementing objectives. This Group could also prepare for future operational periods and ensure that gaps are addressed before they become a reality. Unified Command jointly implements these, to ensure tactics remain effective. Within a Unified Command Structure, the Leadership Group should work in parallel with but function separately from Unified Command at future incidents,

[16] The Commonwealth Fusion Center, under the Massachusetts State Police, is the principal state repository for threat-related information, including criminal activity, threats to public safety, and terrorist activity.

to ensure that missions are not blended. This structure grew and matured as the event grew. Additional command and control considerations that occurred in future days are captured in Section 5.2.1.

Key Finding R-4: Recommendation

Unified Command and a Leadership Group should be established during large, regional disasters. A Leadership Group can serve to establish policy and provide strategic direction and decision making to Unified Command in the management of a crisis, issue, or incident. Unified Command takes this direction to implement strategic objectives. MEMA will support the development and management of these structures and provide recommendations on implementation.

As the response matured, the Leadership Group, including elected officials, continued to press Columbia Gas for detailed information on the locations of the over-pressurized gas lines in their communities to aid in assessing the scope and scale of the incident. Maps, along with lists of impacted customers and impacted streets were requested but were not provided in a timely manner. This significantly hampered public safety response to the event and caused potential unnecessary actions to be taken during the immediate response efforts. Instead of targeting specific residents, for example, first responders needed to go door to door to evaluate impacts and determine where the gas lines were over-pressurized.

Finding I-2: Area for Improvement

During emergencies, public safety agencies require sufficient information to inform their response. The lack of this information from Columbia Gas delayed public safety response efforts.

Key Finding R-5: Recommendation

In times of emergency, gas utilities must be able to provide timely and accurate information to public safety partners to allow them to respond effectively. The Department of Public Utilities (DPU) and the Executive Office of Energy and Environmental Affairs (EOEEA) will work with gas utilities to determine the information types that are reasonable to provide.

5.1.4 Immediate Actions to Protect the Public

As the event continued to unfold, and potentially dangerous levels of natural gas were present in three communities, decisions were made to ensure the safety of citizens in the impacted area. The priority focused on getting residents out of harm's way before the area could be rendered safe. The evacuation process was a collaborative effort between local and state organizations and non-governmental organizations (NGOs).

Evacuation

Leaders from the three impacted communities were all present at the Unified Command Post, and were making critical decisions impacting life safety. With an uncontrolled release of natural gas occurring, and without more detailed knowledge of where all impacted areas were located, leaders agreed that removing residents from the impacted areas was critical to their continued safety. Leaders of the three communities agreed that evacuation orders were needed. Each community sent their own evacuation notifications targeting their individual constituents because they had an idea of where the impacts were due to 911 calls for service. They used this data to come to a consensus about which areas to evacuate, since they were unable to utilize impacted customer data from Columbia Gas. At approximately 5:33PM, Andover and North Andover began using their existing emergency notification systems to notify residents to evacuate. Messaging included guidance to leave the area if their homes had natural gas service or if they smelled natural gas in their homes. Residents in these towns were directed to evacuate to opened local emergency shelters if needed. At approximately 6:00PM, evacuation orders in South Lawrence were coordinated between MEMA and the Mayor's office. Lawrence did not have a locally owned emergency notification system, and opted to use Wireless Emergency Alerts (WEA), a component of the Integrated Public Alert and Warning System (IPAWS), a federally owned mass notification system for which MEMA is an authorized user in the Commonwealth. WEA were sent specifically to residents in South Lawrence. The WEA message, along with media posts, directed residents in South Lawrence to evacuate their homes and head north. This action was designed to move residents out of the danger area, but created unintended consequences that caused the evacuation of residents from Lawrence, Andover, and North Andover to converge on many of the same roads, and created delays due to congestion and traffic bottlenecks. The MSP helicopter responded to help identify bottlenecks throughout the city during the evacuation. With this asset monitoring the evacuation, suggestions for traffic re-routing were shared with Lawrence police officials on the ground. Additionally, MSP recommended closing the southbound lane of Route 93 in order to free up three additional lanes for evacuees heading north.

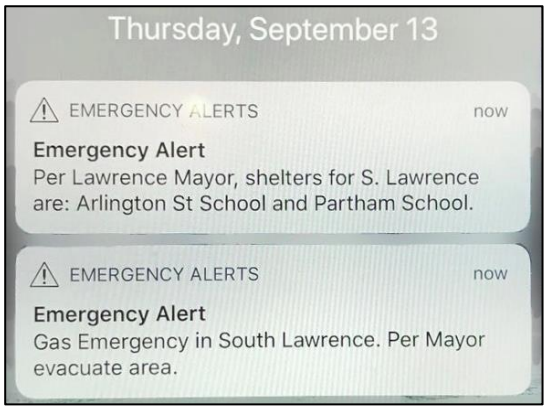


Figure 13: Wireless Emergency Alert (WEA) Sent to Lawrence Residents.

At the time of the incident, the WEA system allowed text messages that were limited to only 90 characters.[17] These messages were intended to be a way to get critical, short messages to residents. As a result, it did not allow for fully detailed messages to be delivered. Due to this

[17] Upcoming revisions to the federal WEA system will allow for expansion of character limits from 90 to 360 characters, for links to be embedded, for images to accompany the message, and include native Spanish language support. This enhancement will allow for WEA to provide additional time sensitive details.

message size restriction, Lawrence's webpage complemented the emergency alerts with more detail regarding the evacuation and proactive actions residents should take.

Finding S-4: Strength

Wireless Emergency Alerts (WEA) were effectively used to notify a large population in the affected area of the need to evacuate.

Key Finding R-6: Recommendation

Wireless Emergency Alerts (WEA) are a useful tool for rapid notification to all people in an impacted area. Continued use and education on the WEA tool should be considered in local and state government. Given the limitations on the number of characters, other notification systems should supplement the WEA to provide additional details on the situation.

Once the decision was made to evacuate South Lawrence, MEMA coordinated with the Mayor of Lawrence to determine the most effective support mechanisms to implement the evacuation. Since Lawrence had a higher concentration of residents in the impacted area with Critical Transportation Needs (CTN),[18] components of the Commonwealth's Evacuation Coordination Plan were implemented. The City of Lawrence worked with MEMA to identify three Evacuation Assembly Points (EAPs)[19] and subsequent evacuation routes within South Lawrence:

1. Mount Vernon Ballpark, on Mt. Vernon Street
2. South Common, at the corner of Osgood Street and Salem Street
3. The Everett Street Boat Ramp, on Everett Street.

From these points, residents could be picked up and taken to a local emergency shelter by a bus. To ensure the public could access this information via multiple sources, residents in Lawrence were advised to call Mass 211[20] for information regarding the evacuation, EAPs, transportation to shelters, shelter locations, and other support during the incident.

The Merrimack Valley Regional Transit Authority (MVRTA) was a key player in the success of the evacuation. MVRTA deployed buses and an Operations Manager, to the Lawrence Staging Area. The Operations Manager worked with the Mayor's office and MEMA to deploy buses in a continuous loop between each EAP and emergency shelters. The Operations Manager had radio

[18] Residents with Critical Transportation Needs refers to the segment of the population that either lacks access to personal transportation or is unable to operate a personal vehicle.
[19] An EAP is a temporary location within an evacuating community used exclusively for evacuee embarkation.
[20] Mass 211 connects callers to information about critical health and human services available in their community. It serves as a resource for finding government benefits and services, nonprofit organizations, support groups, volunteer opportunities, donation programs, and other local resources. Mass 211 is available 24/7.

communications with buses making the rounds at each EAP and was able to maintain the status of each bus, including the number of residents brought to the shelter. This operation was effectively managed and allowed for the evacuation process to be conducted very efficiently.

Finding S-5: Strength

There was strong coordination and communication throughout the evacuation process between local and state government agencies and the transportation provider.

Key Finding R-7: Recommendation

Local evacuation plans should be developed in coordination with state partners to support evacuations during both notice and no-notice events.

The evacuation order was in effect until Sunday, September 16th, when the impacted area was deemed safe and the public could return home. More information on lifting the evacuation order can be found in Section 5.2.2.

De-Energizing the Electrical Grid

National Grid had an early presence at the Unified Command Post. National Grid provides electricity service to the three communities, as well as the rest of the region. The utility recognized the potential hazards associated with natural gas leaks and the potential ignition sources posed by electricity. They recommended to Unified Command that power be shut off to the affected areas of Lawrence, Andover, and North Andover to remove this threat during the emergency response. Starting shortly after 6:00PM, Unified Command authorized National Grid to begin shutting down the power grid in the affected areas. The service grids for various providers do not neatly overlap one another, so the process to shut electricity service down to the affected area required cross coordination with all three municipalities and with UCC Officials. Despite this challenge, electricity was off in each of the impacted areas by 8:00PM. Removing power mitigated an immediate public safety threat, but it also came with cascading consequences. Terminating electrical service also meant that several key pieces of critical infrastructure no longer had power. Cell towers, public safety radio sites, fire stations, streetlights, traffic signals, and other key locations also had their electrical service disrupted, and without natural gas to power emergency generators, these sites had no power supply. Battery backups at key communication nodes, such as radio and cell phone towers, began to degrade and approach failure. Over the next several hours, temporary generators had to be

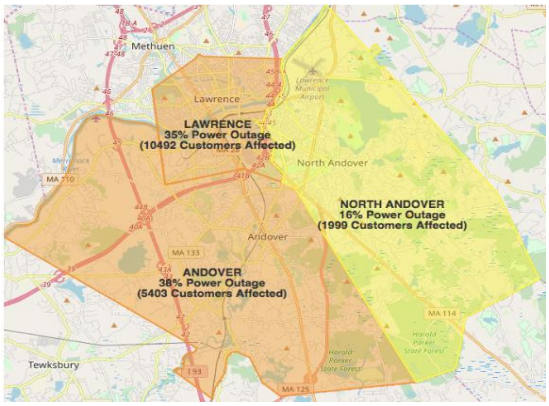


Figure 14: Map of Electrical Outages on September 13th, 2018.

deployed to these areas to provide backup power. Significant service degradations were prevented due to the rapid deployment of alternate power sources, but the logistical requirements of deploying additional generators added to the complexity of the response.

While each town's elected and public safety officials were represented during the decision-making process at Unified Command, their arrival was staggered. Therefore, the decision to cut electricity was first made for Lawrence and was then followed by Andover and North Andover upon the arrival of those towns' officials at the Unified Command Post. This decision, once made, was not communicated as well from Unified Command back to town officials and staff members remaining at local command posts and EOCs in a timely manner. Andover and North Andover officials at these locations were initially unaware that the power would be cut to their towns. At 7:26PM, electricity was shut off in Andover, and it was shut off shortly thereafter in North Andover. In total, 18,634 households in the three towns were without power (10,492 in Lawrence, 5,403 in Andover, and 1,999 in North Andover).

Finding I-3: Area for Improvement

Critical policy-level decisions made by senior officials about the incident were not always shared with local incident commanders and EOCs. Having a fully staffed Unified Command structure complemented by a Leadership Group would help to mitigate the information sharing gap.

Emergency Shelter Activation

Once evacuation orders were issued, emergency shelters were established in each community. As the severity of the incident became clear, and with electricity being shut down in the area, the communities recognized an even greater need for sheltering services. Each community already had a plan in place and emergency shelter locations designated, allowing for easier implementation of shelter operations. Regional shelters were not considered due to the fact that local plans were already in place, and anticipated demand was not expected to exceed local capacity. In total, five shelters were opened in the immediate aftermath of the explosions.

Finding S-6: Strength

Locally developed comprehensive Mass Care and Shelter Plans, with pre-identified shelter locations, initially allowed for a rapid shelter activation in each town.

Community	Shelter Location	Capacity	Occupancy on 9/13	Occupancy on 9/14
Andover	Cormier Youth Center	50	30	10
	Andover Senior Center	100	30	49
Lawrence	Partham Middle School	150	180	126
	Arlington Middle School	150	150	180
North Andover	North Andover High School	500	80	25

Figure 15: Locally Operated Emergency Shelter Statistics.

The American Red Cross deployed staff/volunteers to the local emergency shelters within the three communities to support operations. Management responsibilities within emergency shelters in the City of Lawrence were not clearly defined or well understood by those supporting the operation. This issue initially caused confusion between supporting agencies.

While thousands of people were directed to evacuate, many either went to the homes of friends and family outside of the area, or to hotels. The affected population did not overwhelm the shelters; however, many residents used the shelters as Personal Care Sites to charge electrical devices and collect information on the incident. Actual numbers of overnight residents did not match the shelter assumptions that were used to open the shelters.

Food services were made available at each of the five shelters. Thursday evening, the Salvation Army and American Red Cross were both operating at the shelters with a joint feeding service. While the American Red Cross and Salvation Army were coordinating feeding at shelters, local shelter workers were simultaneously creating a second request for feeding for the same shelter. As a result, two meals were being prepared. A streamlined approach to feeding operations, using consistent methods, may have helped to reduce this duplication and to maximize efforts by responding agencies. Unsolicited food donations were also being received at shelters, creating an overabundance of food availability.

Finding S-7: Strength

The American Red Cross (ARC) and Salvation Army effectively synchronize feeding and shelter activities and have efficient feeding capabilities to provide mass feeding services during emergency shelter operations.

Key Finding R-8: Recommendation

Mass Feeding operations can be better coordinated by the Local Emergency Management Director in an Emergency Operations Center. Coordination through an EOC will ensure both that there is a centralized Point of Contact (POC) and that competing requests do not

5.1.5 Information Sharing

As emergency personnel were fully engaged in the immediate response, leaders from Lawrence, Andover, and North Andover worked to manage and share critical information with their residents, first responders, and incoming support agencies. Resources were stretched thin, and a coordinated message was difficult to establish. As additional resources arrived on scene, this posture improved, and unified messages were created and shared.

Common Operating Picture

In any incident, maintaining a Common Operating Picture (COP) allows all responders at multiple levels of government to understand the impacts, priorities, and ongoing situation. Due to the fact that the three communities were overwhelmed in the initial response, information was not effectively collected and shared in the field. Similarly, this information was not being passed from the field to the command- and policy-level decision-makers and then on to the State EOC. For this reason, painting a picture of the entire incident was difficult to accomplish. Achieving a common operating picture would have allowed improved decision-making and information sharing to all levels of the response.

Key Finding R-9: Recommendation

An information liaison should be designated by the Unified Command Post to support the collection, analysis, and dissemination of information between agencies, which will aid in the development of a Common Operating Picture. One tool the liaison can utilize is WebEOC, the Commonwealth's primary information sharing platform, to ensure that key stakeholders are up to date on the details of the response.

Coordination of Information

As with most larger-scale and multi-jurisdictional responses, information sharing and coordinating with media partners is a challenge. Communities were drafting situational awareness messages separate from state agencies, and information was being posted to websites and social media with varying details. While information was available, it was not being shared in a consistent and coordinated manner. This led to discrepancies and confusion concerning the message. Establishing a Joint Information Center (JIC) with representation from all involved parties would have aided the creation of unified messages that could have been shared with the public through multiple media.

Finding I-4: Area for Improvement

A Joint Information Center (JIC), which is a physical location where officials can collaborate on public messaging, was not established during this event. While Unified Command worked together to coordinate messages and host press conferences, a JIC would have better supported the management of media messages and requests for information.

Key Finding R-10: Recommendation

The Commonwealth should develop a Joint Information Center Coordination Plan, to ensure unity of message from multiple stakeholders during a significant event.

Communication with the Media

Due to the scale of this event, there was a significant media presence at the Unified Command Post in Lawrence. A Media Staging Area was established, and the first press conference occurred at approximately 9:00PM on Thursday, September 13th. Governor Baker, along with town and city leaders, provided the first unified message to the public. This message provided basic public safety information and shelter guidance. There were three additional press conferences held in the first 24 hours of this event. Press conferences became less frequent after that, and there was no set rhythm established for press conference coordination.

Figure 16: Governor Baker Addressed the Public at a Press Conference.

Finding S-8: Strength

A clearly defined Media Staging Area was established at the Unified Command Post in Lawrence, which allowed for efficient and effective access to the media, and also kept the media in a controlled location.

Finding I-5: Area for Improvement

There was no established schedule for press conferences during the initial days of this event. Having a set schedule and rhythm, coordinated by a JIC, would have allowed media to manage expectations in a more efficient manner, and would have provided a more consistent process for updated information.

American Sign Language (ASL) interpreters were present during each of these press conferences to ensure that deaf and hard-of-hearing residents received the message. While communications accommodations were made for the deaf and hard-of-hearing community,

providing language translation services to accommodate Spanish-speaking residents was not initially considered. Understanding that residents in Lawrence are primarily Spanish speaking, Mayor Rivera translated each press conference in both English and Spanish to ensure residents understood the message.

Finding I-6: Area for Improvement

Having plans and agreements in place to provide language translation services that match the demographics of the impacted community is essential when providing public safety information to the general public.

Key Finding R-11: Recommendation

To ensure residents of an impacted community can receive time sensitive messages, the Commonwealth should have an agreement in place to provide appropriate language translation services during press conferences.

Social Media Coordination

As public messages were being developed and shared, communities and state agencies recognized the importance of utilizing and monitoring social media platforms. Utilization of these tools allowed for enhanced monitoring of the situation while also empowering the leaders of the impacted communities to communicate with residents in real time as the event was unfolding. All three towns dedicated staff to monitoring social media platforms, which was critical to effective public information coordination considering the role these platforms played as a source of news and information.

Finding S-9: Strength

Andover, Lawrence, and North Andover all assigned representatives to monitor their social media platforms, which allowed for enhanced monitoring and information sharing with their residents.

Key Finding R-12: Recommendation

To support the Public Information Officer (PIO), a liaison should be dedicated in all agencies for social media monitoring in order to assist in developing an understanding of the operating environment and providing analysis of local needs and impacted areas.

5.2 Ongoing Response

Once the initial situation in Merrimack Valley was stabilized—gas and electricity turned off within the impacted area, most of the fires extinguished, evacuations completed, and injured residents successfully transported to hospitals for treatment—the response transitioned from emergency stabilization to what this report will term the "Ongoing Response" phase. This phase began the afternoon of Friday, September 14th, and concluded the morning of Monday, September 17th. At the conclusion of this time period, power was restored to the impacted area, evacuated residents were allowed to return to their homes, and mutual aid assets began to demobilize from the Staging Area.

Objectives during the Ongoing Response phase included:

- Maintaining coordination and information sharing among local and state officials to maximize efficient usage of limited public safety, housing, and mutual aid resources.
- Maintaining overall public safety within the evacuated area.
- Ensuring that individual homes and businesses were safe by shutting off individual meters and confirming that no residual gas remained within the home or business.
- Developing a plan to restore power to the impacted area in a safe and coordinated manner.
- Providing shelter and human services to temporarily displaced residents.
- Conducting more detailed assessments of the impacts.
- Developing a long-term plan to return gas service to impacted homes and businesses.
- Providing timely updates to residents and businesses on the status of the recovery.

Accomplishing these objectives in an effective and efficient manner required local, state, and utility officials to collaborate in developing and employing innovative (and in at least one case, unprecedented) solutions.

5.2.1 Command and Coordination

Local Command and Coordination

The Town of Andover activated a local Emergency Operations Center (EOC) during the initial response to this incident. An EOC is a central coordination point for resource support, information gathering and dissemination, and coordination with local government agencies, outside contractors, and mutual aid. The activation of this EOC allowed Andover to manage the operation within their town from a centralized location. This also helped the town to make coordinated decisions.

North Andover activated a Command Center in the parking lot of the St. Michael's School shortly after the incident began. This center became North Andover's central coordination point for the initial response to the emergency in their town. It allowed key local decision-makers to come together in one location, manage resources, and make critical decisions to keep their residents safe.

While Andover and North Andover activated their local coordination points, Lawrence officials began to arrive at the Unified Command Post at the Showcase Cinemas parking lot. From here, local leaders ensured that the response in Lawrence was occurring in a coordinated manner, and that needed resources were being requested and deployed to incidents. As the response grew in scale and scope, all three communities eventually merged their leadership and decision-making at this site, and a Unified Command Post was maintained during the remainder of the initial response. This decision allowed for local and state leaders and elected officials to convene in one location, establish critical decisions, and ensure that they were effectively carried out.

Unified Command

At this point in the response, a Leadership Group made of key officials existed alongside an effective Unified Command structure. The Leadership Group helped to develop senior-level strategic guidance for Unified Command to implement. This effort was still being coordinated from the Showcase Cinemas Command Post in Lawrence, where command elements from utilities and numerous state and local agencies, including the Governor's Office, the Secretary and staff from the Executive Office of Energy and Environmental Affairs (EOEEA), Columbia Gas, National Grid, MEMA, MSP, DFS, Massachusetts Department of Transportation (DOT), and key officials from the impacted communities assembled. Governor Baker and his staff met with key decision-makers and local leaders several times a day in the MSP command vehicle, to share information, develop response priorities, and prioritize resource allocation.

Figure 17: MSP Incident Command Vehicle.

Key decisions made by Governor Baker, key leaders, and local officials were then passed to the Unified Command structure to ensure implementation. This structure managed resource requests from three municipalities and ensured that capabilities supported local operations. Resources were dispatched to the highest priority areas. As needs evolved, this remained a critical aspect of the Unified Command Post and ensured that resources were properly allocated.

Finding S-10: Strength

Physically co-locating representatives from the Governor's Office, local and state agencies, and electric and gas utilities was essential for timely and collaborative policy-level decision making.

A critical component that was never implemented was the utilization of a Safety Officer. The Safety Officer is responsible for the overall safety of the incident and its responders. This position could have helped craft responder safety messaging and guidance to ensure they remained safe during a response.

Finding I-7: Area for Improvement

There was no designated Safety Officer for this incident to ensure the continued safety of responders.

Key Finding R-13: Recommendation

A Safety Officer should be designated as part of the Incident Command Structure during a response, to assess safety hazards and ensure personnel safety during operations.

State Emergency Operations Center

The State Emergency Operations Center (SEOC), located at MEMA Headquarters in Framingham, MA, is the central coordination point for state agencies to support local communities in response to an emergency or disaster. It can be activated, when needed, to ensure sufficient support is available, based on the priorities of the incident and the needs of local government partners. MEMA staff were monitoring the event under Level 1 (Steady State/Monitoring)[21] from its onset Thursday evening, to ensure that situational awareness was maintained. As the event grew in scale, the SEOC increased its activation posture to Level 2 (Partial Activation) at 7:00AM Friday with liaisons from the following agencies and Emergency Support Functions (ESFs):

- MEMA
- ESF-2 (Communications)
- ESF-6 (Mass Care, Emergency Housing & Human Services)
- ESF-12 (Energy)

The SEOC staffing plan did not reflect the situation in the field. For instance, MEMA did not activate the following:

- ESF-1 (Transportation), despite road closures along major routes in the impacted area;
- ESF-4 (Firefighting), despite significant firefighter operations and Statewide Fire Mobilization Plan activation;

[21] The State EOC has three levels of activation: Level 1(Steady State/Monitoring), Level 2 (Partial), and Level 3 (Full). A Partial Activation only requires limited ESFs to be activated by MEMA, under Executive Order 144, to support state response. The ESFs are activated based on conditions, impacts, and anticipated needs at the time of the activation.

- ESF-13 (Public Safety and Security), despite ongoing significant police mutual-aid response and roadway impacts;
- ESF-8 (Public Health and Medical Services), even though a major hospital and other medical facilities were in the impacted area and an ambulance strike team had been deployed.

If these ESF liaisons had been present in the SEOC, their presence may have facilitated closer coordination and information sharing with response assets in the field. Additionally, MEMA did not forward deploy an information liaison to serve as an established point of contact between the SEOC and the command post. This led to difficulties in gathering information from the field in a timely and accurate manner, negatively impacting situational awareness products being developed in the SEOC.

The SEOC remained activated until 5:00PM on Monday, when it returned to Level 1 (Steady State/Monitoring).

Finding I-8: Area for Improvement

Additional Emergency Support Functions (ESF) should have been activated by MEMA in the State Emergency Operations Center (SEOC), and a MEMA liaison should forward deploy to the command post, to better coordinate and support the operational activities in the field.

Utility Command and Control

With the incident taking place in its service territory, Columbia Gas was initially in charge of the gas utility response, including marshaling its own resources, bringing in mutual aid resources from outside the service area, coordinating operations and sharing information with local first responders, and developing a short-term plan to ensure homes and businesses in the impacted area were free of gas and residents could safely return. By Friday morning, it became clear that Columbia Gas and its emergency response plan were overwhelmed by the incident's magnitude. Columbia Gas was unable to produce a comprehensive list of affected customers in the impacted area, could not provide local public safety officials with a map showing affected gas lines or impacted areas of their communities, and was slow to request mutual aid from outside the service area.

Finding I-9: Area for Improvement

Columbia Gas did not have a flexible and scalable emergency response plan, to address a catastrophic incident within their service area. The lack of a comprehensive plan hampered their ability to effectively support the public safety response.

Key Finding R-14: Recommendation

Minimum standards for gas utilities should be expanded to require the development of flexible, scalable, and actionable response plans, with associated training and exercise programs, which can address catastrophic incidents within their service area. This will better prepare gas utilities to provide the information and expertise needed for a rapid response with public safety agencies during an emergency.

When Columbia Gas was unable to produce an effective action plan for short-term remediation by noon that Friday, Governor Baker issued a Declaration of Emergency authorizing the Chairman of the Department of Public Utilities (DPU) to take any action "necessary to assure public safety and welfare through the priority restoration or continuing availability of gas, electric, and water utility services."[22] Under this authorization, and in response to the need for experienced management capable of advanced resource coordination and effective communication, the DPU Chairman promptly directed another gas utility, Eversource, to take management control over the effort to safely restore utility services in the impacted area. This marked the first time in the nation's history that a gas utility had been put in charge of response to a disaster occurring within another gas utility's service area. Once placed in control of the response, Eversource swiftly mobilized an incident management team, began deploying its own technicians to the impacted area, reached out for mutual aid through Northeast Gas Association (NGA), and began developing a four-phase plan for the restoration of gas service within the impacted area.

Finding S-11: Strength

Governor Baker and the DPU Chairman promptly used the emergency powers available to them to empower utility leadership—which had the requisite capability and experience—to facilitate advanced resource coordination and effective communication in the face of a disaster of unprecedented magnitude.

[22] Quotation, from "Testimony before the Senate Committee on Commerce, Science and Transportation" *Matthew A. Beaton, Secretary of Energy and Environment*, November 26, 2018.

5.2.2 Continued Operations

Render-Safe Operations

Figure 18: Render-Safe Teams Access the Interior of a Structure to Inspect the Gas Meter.

Beginning around midnight on Friday September 14th, Render-Safe teams consisting of gas technicians, locksmiths, local firefighters, and law enforcement began shutting off and depressurizing gas meters at individual homes and businesses within the impacted area. This served to isolate the homes from the natural gas distribution system. Teams gained entry to shut off the meter and/or confirm no residual natural gas was trapped inside the structure. The process was complicated by the fact that Columbia Gas could not provide a list of affected homes for the Render-Safe teams to check. As a result, all homes in the impacted areas needed to be checked, significantly increasing the scope of the Render-Safe process.

Early in the Render-Safe process, it was discovered that many evacuees had secured their homes/businesses before leaving and could not be contacted; in order to facilitate entry to locked buildings, locksmiths had to be retained on short notice through several avenues, including the Department of Corrections (DOC), outreach via professional associations, and even web-based searches. In all, more than 30 locksmiths were retained to accompany Render-Safe teams. This process continued until the evening of Sunday, September 16th, when it was confirmed that gas service had been shut off to all homes, that dangerous gas levels in homes was not present, and that the evacuation order could be rescinded.

Finding S-12: Strength

Obtaining locksmiths at short notice made entering the houses easier and in turn expedited the process of turning off the 8,000 meters in the impacted area.

Re-Energizing the Electrical Grid

Once Render-Safe teams had visited all homes and businesses in the impacted area, the decision was made by local officials, in conjunction with National Grid, to begin re-energizing the impacted area starting Saturday night. Render-Safe teams, in the process of making entry to homes to check for residual gas, had noticed evidence of appliance damage caused by the gas over-pressurization. Such damage could potentially result in electrical fires once power was restored. Therefore, local fire officials developed a plan to restore power on a street-by-street basis with close coordination between safety and fire officials (including pre-positioning fire department resources). This plan included assessments of which appliances were potentially damaged and ensured there was ongoing communication between local public safety and utilities throughout the process.

Finding S-13: Strength

The power restoration process was methodical and coordinated, with an emphasis on public safety.

Damage Assessments

Initial lack of a coordinated plan with a clearly identified data collection requirement and a centralized reporting mechanism led to an incoherent picture of the overall damage assessment process. Starting on the day of the explosions, and continuing into the following week, approximately six different agencies began conducting damage assessments in the impacted area based on their organizations' information needs. These assessments initially took place in an uncoordinated fashion, with little attempt to work collaboratively or share information until after the assessments had been completed. There was no process for tracking data and reporting it to a central source. This led to occasional duplication of effort and also affected future planning factors. Additionally, residents and business owners had to deal with multiple assessors showing up at different times to inspect and photograph damage to meet agency-specific inspection requirements. This resulted in a lack of public confidence about the effectiveness of the response, inconsistent data quality, and an overall lack of shared situational awareness.

Finding I-10: Area for Improvement

The damage assessment process was not coordinated amongst the various partners needing damage assessment data. This resulted in duplicate assessments, delays in sharing information, and reduced efficiency.

Key Finding R-15: Recommendation

Agencies should utilize the Commonwealth's Rapid Damage Assessment Coordination Plan in future events to maximize effort, enable effective information sharing, and reduce duplication of effort during the damage assessment process.

Figure 19: Examples of the ATC-45 Standard Inspection Cards.

One of the agencies conducting these damage assessments, the Office of Public Safety Inspections (OPSI), used a national standard known as ATC-45 (see Figure 19: Examples of the ATC-45 Standard Inspection Cards.

), which provided a consistent method to evaluate both damage and the ability for residents to return to their homes in the impacted communities. This standard has been widely adopted by building officials, building inspectors, engineers, and others involved in post-disaster safety evaluations of building types commonly found in the United States. Based on the result of the assessment, inspectors affixed a color-coded card signifying the assessed condition of the building to the front door. This allowed residents, owners, and local officials to determine the condition of a given building at a glance.

Re-Entry of Evacuated Residents

Safety was the key factor determining whether residents could return to their homes. Specifically, confirmation was needed that all gas lines were depressurized, all meters were shut off, and all structures were free of residual gas. This was complete as of Saturday night, September 15th. Re-energization of the impacted area began that night with National Grid restoring power on a street-by-street basis in coordination with local public safety officials. Power was restored to nearly all customers in the impacted area by Sunday morning. For safety reasons, local officials did not want residents attempting to return home in the dark, even though some residences had power returned Saturday night.

The evacuation order for all three communities was not lifted until 7:00AM on Sunday, September 16th. Local officials in Andover and North Andover communicated the lifting of the evacuation order to their residents using their existing emergency notification systems; the City of Lawrence coordinated with MEMA to issue WEA messages in both English and Spanish to Lawrence residents.

Figure 20: WEA Sent to Lawrence Residents on September 16.

Finding S-14: Strength

When making the decision to rescind the evacuation order, and to minimize the risk to residents, officials timed re-entry to coincide with daylight hours.

5.2.3 Immediate Human Services

The immediate human service needs (health/safety post fire and explosion, evacuation, and sheltering during power outage) quickly transitioned to more long-term needs, such as:

- Temporary housing for individuals who could not return to a home with no heat or hot water
- Support for interrupted business

- Support for individuals who returned home without heat/hot water
- Financial assistance

Columbia Gas financially supported these needs, which allowed for enhanced service provisions to those who needed them.

Columbia Gas Claims Centers

On Friday September 14th, Columbia Gas opened the first Claims Center in Lawrence at the Lawrence Public Library (from 2PM- 5PM) for affected customers to establish an initial claim and a monetary advance payment toward loss to meet immediate needs for evacuation costs, food spoilage, child care costs, and other expenses. Due to the demand and capacity issues at the library, this location was changed to the Lawrence High School on Sunday, September 16th, and operated from 9AM- 5PM. Over 4,000 affected residents came to the Claims Center that day looking for assistance, completely overwhelming Columbia Gas officials. Many residents could not be helped the first day, and had to come back to a Claims Center on a following day. Since they could not keep up with the daily demand, Columbia Gas and Lawrence city officials devised a color/number ticketing system to maintain order, address the growing crowd, and ensure clients could keep their spot in the queue if they could not be helped that day and had to return.

Figure 21: Lines at the Columbia Gas Claims Center on Sunday.

Within a few days, subsequent Claims Centers opened in Andover and North Andover. The Claims Center in Andover was located in a vacant commercial space at 10 Main Street and operated from 12PM- 8PM (the center was later moved to a larger space at 45 Main Street). In North Andover, the Claims Center was located at 115 Main Street and operated from 12PM- 8PM. Logistics and operations for each Claims Center (e.g., security personnel, equipment, and supplies) were coordinated and supported by local government partners. Columbia Gas also offered claims through an established Columbia Gas Claims Center phone line as well as online via their website. These Claims tools remained available to impacted residents throughout the recovery process.

To support the Claims Center, it may have been helpful for Columbia Gas to coordinate with local leaders, to understand the demographics of the impacted communities, which would have better guided decision-making and tailored service delivery—for instance, there was a significant language barrier initially between Lawrence residents (many of whom are Spanish speaking) and Columbia Gas representatives. Data available from the American Community Survey and census tracts—including summarized information on disability, transportation, age, poverty, and limited English proficiency along with mapping of critical infrastructure and

locations of hospitals, long-term care facilities, police, and fire stations—can help provide more targeted and community-specific services.

Finding I-11: Area for Improvement

The gas utility did not fully account for the demographics of the impacted communities, which in some cases delayed delivery of appropriate services to impacted customers.

Key Finding R-16: Recommendation

Local governments should ensure that their community's demographics are included in all-hazards planning so that the needs of their residents are considered during a disaster.

On Tuesday, September 18th, the Columbia Gas Claims Center moved to the Lawrence Firefighters Association on Market Street. Changes to streamline the intake process as well as a surge of 50 additional claims adjusters allowed this Claim Center to process between 1,200 to 1,800 claims per day for the fourteen days that it operated at this location. As the volume of claims decreased, the Claims Center was scaled down and transferred to a new location at 430 South Union Street.

Additional Claims Centers opened in Andover on September 18th and in North Andover on September 19th.

Support for Returning Residents

While residents were able to return to their homes before gas service was restored, local officials recognized that these individuals would need additional services due to the lack of natural gas, and therefore heat and hot water. Additionally, the extended period without natural gas posed unique issues for vulnerable residents, such as elders and Supplemental Nutrition Assistance Program (SNAP) recipients, as well as businesses in the impacted area.

Local officials in Andover began working on Sunday to set up shower trailers at Pomps Pond (147 Abbott Street) using town staff and Medical Reserve Corps (MRC) volunteers. An accessible shower located at the Senior Center (30 Whittier Street) was made available. The City of Lawrence made the showers at Lawrence High School available to city residents. Lawrence General Hospital donated linens, towels, and laundry service for the showers. North Andover coordinated with the local YMCAs to allow impacted residents who were non-members to use their shower facilities.

Figure 22: Signage Directing Andover Residents to Pomps Pond Showers.

Andover accessed town census data to locate residents over the age of 70 and conducted door-to-door wellness checks. Local

officials also visited elderly housing complexes to assist residents with disposal and replacement of spoiled food.

North Andover went door-to-door to check on vulnerable elderly residents, such as those who receive Meals on Wheels deliveries, and developed food-related public service announcements for residents and businesses.

The Department of Transitional Assistance supported the Recovery Resource Center (RRC) on its second day of operations to replace food lost by SNAP recipients[23] as a result of the power cut following the gas explosions. Other charitable organizations supported the RRC by providing gift cards to impacted residents to replace spoiled food if needed. More information on RRC operations can be found in Section 5.4.2.

Behavioral Health and Emotional/Spiritual Care

The Salvation Army embedded Disaster Chaplains in their mobile teams to support affected residents by providing emotional/spiritual care and psychological first aid as needed. Columbia Gas/Eversource posted gas technicians on street corners throughout the impacted area to answer questions from returning residents in an effort to alleviate concerns.

However, responder behavioral health[24] was not fully addressed. In North Andover, officials recognized that the length of the employee workday while living in the impacted areas was challenging for first responders. In response to this, the town offered more information on the employee assistance program and brought in other resources. The Lawrence Fire Chief reported similar concerns.

Finding I-12: Area for Improvement

There was a lack of consideration for the behavioral health needs of public health and public safety personnel. Because first responders are faced with a myriad of stressors that go beyond what the general population may experience, it is imperative they have immediate and ongoing access to behavioral health services.

Key Finding R-17: Recommendation

Disaster behavioral health plans should be developed by appropriate state and local agencies to include provision of services to first responders.

[23] SNAP recipients may be entitled to receive up to one month's worth of replacement SNAP benefits through DTA in the event of food loss due to flooding or lack of electricity.

[24] Behavioral Health is the scientific study of the emotions, behaviors, and biology relating to a person's mental well-being, their ability to function in an everyday life, and their concept of self.

5.2.4 Resource Demobilization and Logistics

The initial response to the disaster required the activation of the State's Fire Mobilization Plan and mutual aid resources from throughout the region. The massive response was initially needed to stabilize the incident and ensure the life safety of the impacted residents.

As the incident stabilized and the need for mutual aid decreased, the Unified Command Post began to scale back the operation. Two smaller command units demobilized, allowing the response team to transition to a smaller space. This freed up critical open space, which the utilities could use to stage resources.

When it was determined that there was no longer an immediate security threat from the direct impact of the gas system and the security of the area was stabilized, responders demobilized under the direction of the incident commanders. By Sunday afternoon the Northeastern Massachusetts Law Enforcement Council (NEMLEC) had demobilized their resources, and by Monday morning all the mutual aid fire apparatus had departed. Command trailers remained on site for a few more days.

As the emergency operation led by Eversource wound down, it became even clearer that there would be a long-term recovery and reconstruction effort in order to return the impacted area to its pre-existing condition. Once all gas service was safely turned off, control over the gas system was returned to Columbia Gas. Eversource began to demobilize their command and control assets, and released many of their emergency response crews. Columbia Gas became the lead on the restoration project and set out on a long-term process to support their impacted customers.

In general, demobilization was driven by two factors: space considerations at the Staging Area and a decreased level of need for staged assets. While decisions to demobilize were made by the individual agencies, they sought out the concurrence of the command group before demobilizing.

Figure 23: Entrance of MEMA's Recovery Office on Merrimack Street in Lawrence.

MEMA anticipated the need to maintain a longer-term presence in the area for recovery efforts and began looking for a more permanent base location, eventually securing office space at 55 Merrimack Street in Lawrence.

Donations Management

The disaster triggered an overwhelming charitable response from the public and private sectors, including a steady flow of donations into the affected communities. The three impacted communities ultimately decided to establish their own donations management site.

Figure 24: Volunteers Distributing Donated Food and Goods at the Lawrence Senior Center.

Unfortunately, there was no centralized plan to receive, store, and distribute donations. Public safety personnel did not know where to tell the public to bring donations, and guidance was not released about the kind of donations that would most help communities. This led to donations management challenges. For example, communities received warm weather clothing instead of cold weather clothing. With no demand for these items and no capacity to store them, communities had to manage donations they had no immediate use for. In Lawrence, a committee was developed to manage the disbursement of donated funds. The establishment of an "unmet needs committee" of local agencies such as the Greater Lawrence Community Action Council (GLCAC) and Salvation Army may have helped in addressing the unique specific needs of individuals whose needs were not covered by existing support mechanisms.

There was also an interest in volunteerism from the general public (spontaneous volunteers), but there was no process for or capacity to conduct just-in-time training to maximize this potential resource.

Finding I-13: Area for Improvement

Better coordination needs to exist for donations and volunteer management. Without guidance to the general public, donations were not always appropriate, and were often not being dropped off in appropriate locations.

Key Finding R-18: Recommendation

Statewide donations management guidance should be developed to ensure effective operation, management, and coordination of donations following a regional disaster.

Key Finding R-19: Recommendation

A statewide volunteer management plan should be developed to ensure a process exists to coordinate spontaneous volunteers.

5.3 Recovery Efforts: Restoration and Reconstruction

As the response phase began to wind down on Sunday, September 16th, and with the residents returning to their homes, the emphasis shifted to the restoration and reconstruction of the natural gas infrastructure. Resource management was required, comprising pipeline construction equipment, replacement of white goods (appliances), hiring and managing of skilled labor, and mutual aid. Information sharing and situational awareness between responding partners was vital to the success of the restoration of gas services to these communities. The restoration and reconstruction process would span many months which required ongoing information sharing and transparency with the public and public safety officials.

Some of the major recovery objectives related to restoration and reconstruction included, but were not limited to:

- Assignment and development of a Chief Recovery Officer and Recovery organizational structure
- Development of a long-term recovery plan for the restoration and reconstruction of gas services
- Management of resources such as gas piping equipment, appliances, and labor
- Sharing of information among the multitude of recovery partners as well as with the public throughout the months of the restoration and reconstruction process.

5.3.1 Appointment of a Chief Recovery Officer

Shortly after the issuance of the Declaration of Emergency by Governor Baker on September 14th, leaders started to consider the need for a Chief Recovery Officer (CRO) to manage the extensive recovery efforts. An individual was considered for this position as early as September 17th, and the process began to bring him in to lead the recovery effort. The Governor's emergency declaration authorized the Department of Public Utilities Chairman to direct Columbia Gas to hire an outside contractor to manage the effort to safely restore utility services. On September 21st, the DPU Chairman officially appointed Joe Albanese as the CRO, to manage and coordinate the restoration efforts. This creative decision was made in order to bring in a leader with experience in complex construction projects who could act effectively as an intermediary to control recovery operations.

Finding S-15: Strength

The hiring of a Chief Recovery Officer (CRO) to manage and coordinate the restoration efforts, who was familiar with both construction trades and the geographic area, allowed for a rapid and effective recovery structure to be quickly implemented.

Roles and Responsibilities of the CRO

The CRO was appointed to oversee the repairs and reconstruction to homes, businesses, and natural gas pipelines in the impacted area of the Merrimack Valley. He was responsible for

coordinating with government officials and managing thousands of people from disparate groups—local gas and electric employees, contractors, tradespeople from all over the country, and public relations specialists—many of whom had never worked together before and had never seen or trained for such a complex event. Once appointed, the CRO also became responsible for the full suite of recovery services, in addition to the repair and reconstruction. Realizing the enormous scope of the recovery, the CRO proactively established an organizational structure and support mechanisms to manage each of these unique needs.

Organizational Structure

Prior to this incident, the Commonwealth had yet to experience a disaster that called on such extensive infrastructure recovery operations. Once the life safety threat of the incident subsided, the response structure needed to shift to a recovery structure.

Finding I-14: Area for Improvement

With the State's lack of recent experience in major recovery operations, an organizational structure focused on recovery efforts did not exist and needed to be developed quickly.

Key Finding R-20: Recommendation

The Commonwealth needs to invest in an all-hazards Recovery Framework, and ensure buy-in and agreement from cross sector partners, to include elected officials.

An organizational structure was drafted to depict each aspect of the recovery. This organizational structure included groups overseeing each of the following areas: construction, social services, mitigation, customer support/relations, communications, and support services.

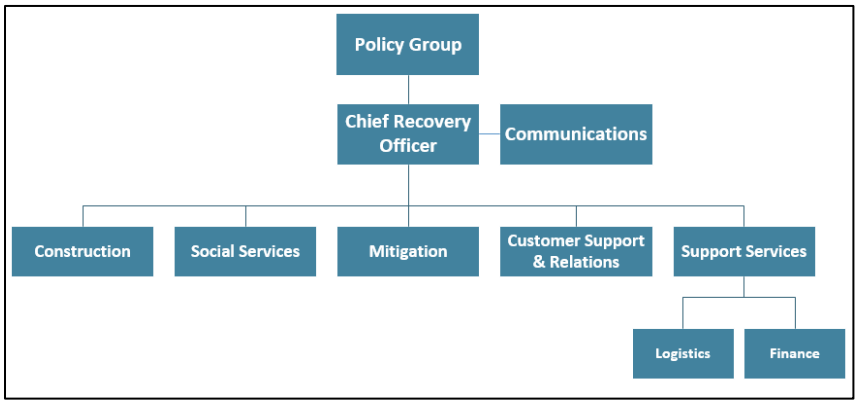


Figure 25: Initial Proposed Recovery Organizational Chart.

When the CRO was appointed, the recovery mission was heavily focused on reconstruction and restoration. With the winter approaching and many families still without heat and hot water, human services needs started to play a much larger role in the overall recovery picture. The CRO proactively reached out to partner agencies to determine how best to address human services needs throughout the restoration process. Additional information on human services considerations are addressed in Section 5.4. The organizational structure under the CRO was

highly fluid throughout the early stages of recovery and improved over time. As this structure grew, sharing of improvements and updated information with partners would have augmented understanding of the structure and how it adapted over time.

Finding I-15: Area for Improvement

Enhanced information sharing amongst all partners, while the organizational structure expands, can allow for improved clarity of reporting structures, and synchronization within the existing structure.

Key Finding R-21: Recommendation

There are established processes and national best practices to ensure a streamlined recovery structure and planning process. Partnering emergency management subject matter experts with the Chief Recovery Officer can help to streamline this process and associated programs.

Creation of Fire Safety Working Group

During the decision process for designating a CRO, the Division of Fire Safety, under the Department of Fire Services, recommended the creation of a Fire Safety Working Group to work in parallel with the Chief Recovery Officer. The Fire Safety Working Group was established to ensure fire safety considerations were addressed by every component of the reconstruction, and to provide decision support and messaging for local fire departments (e.g., evaluate temporary appliance specifications, fire safety devices including smoke and carbon monoxide detectors).

Finding S-16: Strength

The Fire Safety Working Group (established to ensure fire safety considerations were part of every component of the reconstruction, and to provide decision support and messaging for local fire departments) was a key advisor to the CRO in decision-making regarding fire safety, and ensured local input from fire chiefs in the impacted communities.

5.3.2 Development of Restoration/Reconstruction Plan

Recovery efforts for the restoration and reconstruction process would entail three phases: (1) assess and repair damage to the gas lines that fed the 8,570 meters and replace all 8,570 meters, (2) assess and repair damage to gas lines within the structures and replace gas appliances as necessary, and (3) restore gas service to each of the 8,570 meters. Later in the process these phases became known as “Gas Ready,” “House Ready,” and “Relight.”

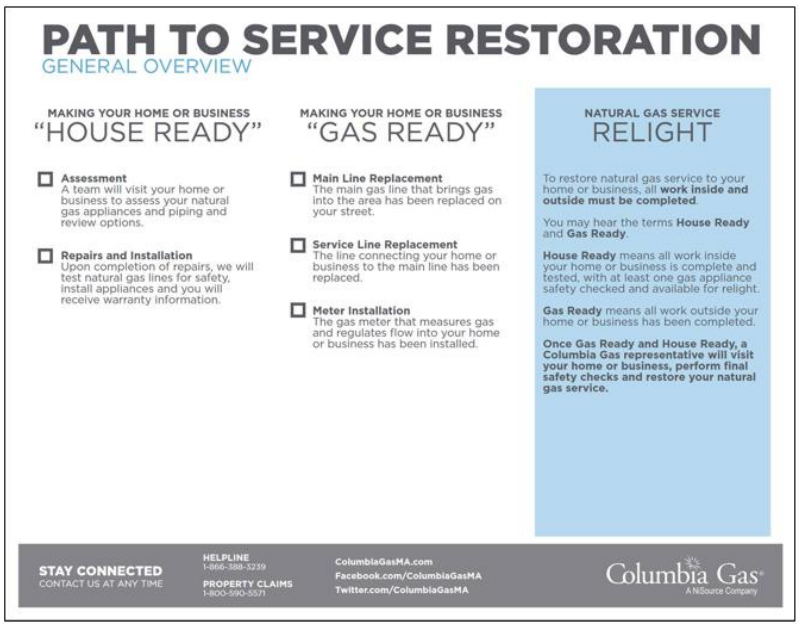


Figure 26: Snapshot of Columbia Gas' Initial "Path to Service Restoration" Plan.

During the first week after the incident, it became evident that customers who wished to stay in their homes needed alternate means to cook and stay warm. To address these needs, Columbia Gas developed plans, initially with limited external partner input, to procure and distribute temporary cooktops and space heaters. These plans became Operation Hot Plate and Operation Temporary Heat.

On September 18th, Governor Baker activated the Massachusetts National Guard (MANG) to support these missions. On September 19th, MANG provided the Columbia Gas Planning Group an experienced logistics planner and operations officer to assist in the development of a plan for disseminating the electric hot plates and space heaters. MEMA worked with MANG to develop these plans, using zones determined by Columbia Gas, and created a mechanism and process for distributing hot plates and then space heaters to the public in all three communities. Over 200 MA National Guard personnel were activated to support Operations Hot Plate and Temp Heat.

Figure 27: The Massachusetts National Guard Staging for Missions.

Operation Hot Plate

Operation Hot Plate began on September 22nd. The purpose of this mission was to provide impacted customers a temporary cooking source to support their ability to stay in their homes during the restoration project. Columbia Gas took the lead on ordering hot plates and establishing a central receiving facility. From there, MANG picked up the hot plates and delivered them to the Staging Area established at the South Lawrence East Middle School. The Lawrence Police Department supported site security operations at this Staging Area. MANG was tasked with coordinating with each impacted community to implement hot plates distribution. The distribution method differed slightly in each community, and the plans were adjusted accordingly. In Lawrence, MANG accompanied Columbia Gas by going door to door in each impacted neighborhood to hand deliver hot plates. This method of delivery was positively received by the majority of residents. Andover and North Andover established central locations to distribute hot plates to residents who needed a cooking source. This decision was made because the towns did not anticipate as high a demand for temporary cooktops as was being projected in Lawrence. In Andover, 350 hot plates were initially delivered to a distribution site at 36 Bartlett Street. In North Andover, 350 hot plates were delivered to the Columbia Gas Claims Center. MANG delivered the hot plates to the locations, and soldiers stood by to hand them out to citizens.

Figure 28: The Massachusetts National Guard Distributing Electric Hot Plates.

In Andover and North Andover, the unexpected demand exceeded the initial supply, and an additional 1,000 hot plates were sent to both towns from the Lawrence supply to make up the gap. The operation continued until September 27th. In total, 7,439 (5,500 in Lawrence, 1,017 in Andover, and 922 in North Andover) self-contained hot plate units were distributed to customers who needed them for cooking while their natural gas service was being restored. Once this program ended, remaining hot plates were retained by the three municipalities to address additional support requests as needed.

Operation Temporary Heat

As Operation Hot Plate was ongoing, the Chief Recovery Officer and Columbia Gas officials began to investigate ways to provide temporary heating solutions to their customers. A decision was made to provide impacted customers with a space heater to support their ability to stay in their homes during the cold months of the restoration project. However, Columbia Gas did not solicit input from local and state partners and regulatory agencies. Critical safety concerns were not identified prior to the initial selection and procurement of space heaters. Eventually, local fire chiefs, the Massachusetts Department of Fire Services (DFS), and the Massachusetts Division of Professional Licensure (DPL) were made aware of the initial plan and expressed concerns regarding fire safety and code compliance. It was quickly realized that many of the older homes in the area did not have the electrical service needed to safely operate space heaters. This changed the path of the temporary heat mission. In order to begin implementation, the Fire Safety Working Group provided recommendations of approved indoor space heaters that met all safety codes. Additionally, due to the increased fire hazard of having these in homes, the committee required that fire and carbon monoxide detectors be installed in any home that was visited during this program. Finally, prior to any space heater being installed, a certified electrician would evaluate the electrical service in the home to ensure that a correctly installed and dedicated 20-amp circuit existed to operate the space heater safely.

Figure 29: Two Types of Space Heaters Distributed.

Operation Temporary Heat was launched on September 24th. MANG assisted Columbia Gas in distributing space heaters and smoke and carbon monoxide detectors to impacted residential customers.

As in Operation Hot Plate, distribution of space heaters was conducted differently for each community. Andover and North Andover customers wanting space heaters were required to call Columbia Gas to schedule an assessment and delivery. In Lawrence, space heaters were delivered door to door once an assessment revealed the home could support the heater. Of all homes evaluated for this program, only 192 space heaters were ultimately installed. Due to the lack of sufficient electrical circuitry in many of the older homes, Operation Temp Heat ceased on September 28th and was merged with Operation Assessment.

Finding I-16: Area for Improvement

There was a lack of comprehensive input from all partners regarding Operation Temp Heat, which caused this plan to become impractical. There was a need for more robust and inclusive planning surrounding this operation.

Key Finding R-22: Recommendation

Recovery efforts must include input from all key stakeholders to account for potential cascading impacts and consequences.

Operation Assessment

Operation Assessment was launched on September 26th and continued through October 10th. Assessment teams of licensed plumbers, electricians, Columbia Gas technicians, and translators began doing home assessments of appliances, boilers, and furnaces to determine what, if any, appliances needed to be replaced. Starting on September 28th, the assessment teams began doing full electrical and plumbing assessments to determine appliance needs and whether space heaters could be safely installed, conducting repairs and installing space heaters and smoke and carbon monoxide detectors when applicable.

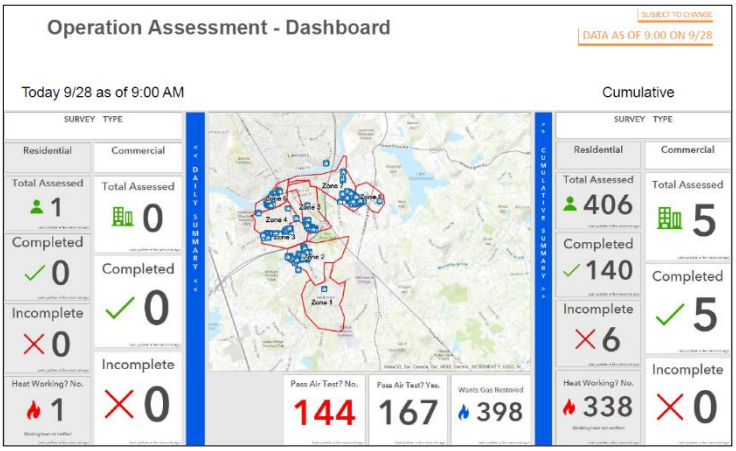


Figure 30: Columbia Gas Daily Briefing Slide: Operation Assessment Dashboard.

Gas Ready and House Ready

As the restoration continued, *Gas Ready* and *House Ready* initiatives began in parallel. The *Gas Ready* Initiative included all exterior replacement work, while *House Ready* included all interior modification and replacement work.

Although the gas pipeline reconstruction began on September 26th, Columbia Gas unveiled their planned path to restoring service on October 2nd, starting with the *Gas Ready* initiative. The *Gas Ready* initiative entailed all of the outside (of the house) construction, including fixing the main lines on the street, the service lines from the street to house, and the meters.

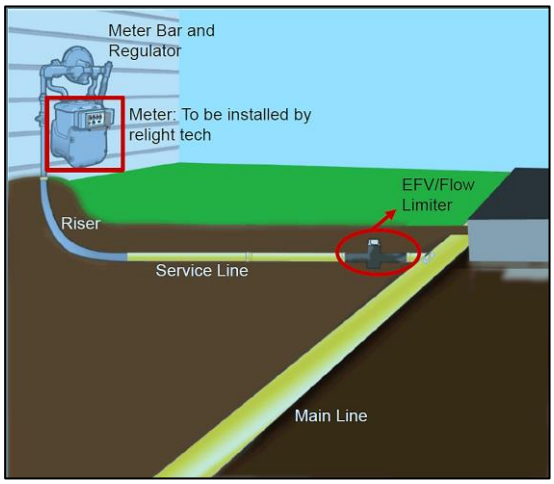


Figure 31: Graphic of "Gas Ready" phase.

This effort ultimately replaced the 43.5-mile underground cast iron and bare steel distribution system with state-of-the-art infrastructure and safety features such as excess flow valves that automatically shut off gas flow if a service line is damaged or broken.

Columbia Gas identified eight work zones, further defined into 63 projects, running in parallel across the three communities. Zone commanders were assigned to manage the daily operations in each zone.

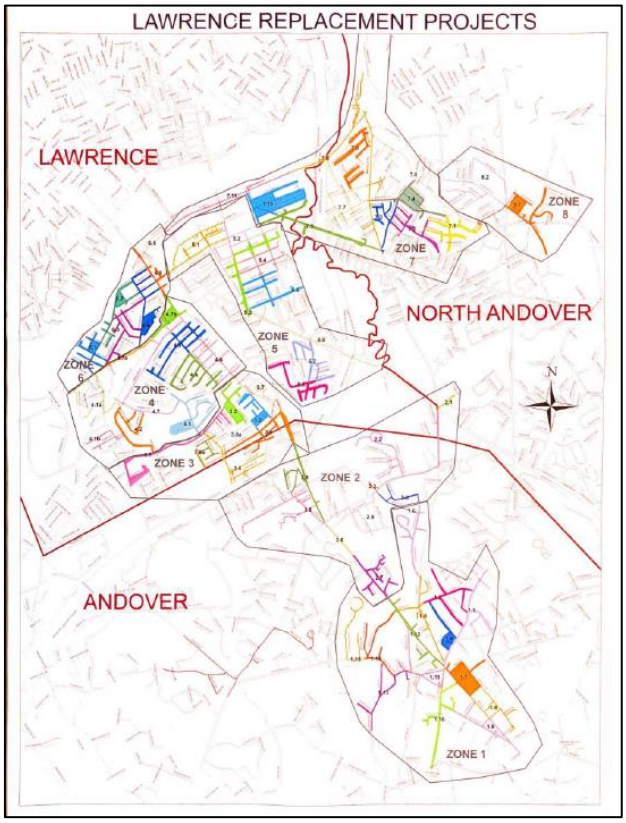


Figure 32: Map of Eight Work Zones.

Finding S-17: Strength

Columbia Gas established eight Restoration Zones, and each zone had an assigned zone commander to manage daily operations.

On October 9th, Columbia Gas unveiled their plan for the *House Ready* initiative. The *House Ready* initiative entailed all of the inside (of the house) construction, including assessing and repairing the damage to gas lines within the structures, and replacing gas appliances as necessary. This initiative also included ensuring that necessary electrical upgrades were completed and other enhancements were made to the home to ensure compliance was maintained with various safety codes.

Figure 33: Snapshot of "House Ready" Work.

White Goods (Appliances for Homes)

The gas over-pressurization that occurred on Thursday, September 13th, not only impacted the gas lines; it also impacted customers' gas appliances. A decision needed to be made whether to repair or replace customers' appliances in the homes. The decision was made, out of an abundance of caution, to replace the devices in whole due to the magnitude of the pressure that went through the system. It was also initially decided only to replace four primary (gas) appliances: dryer, stove, water heater, and furnace. Additional appliances not on this list were addressed at later dates on a case-by-case basis.

Once the decision was made to replace these items, there was a race to order equipment. Impacted customers were given the options of accepting the provided appliances offered by Columbia Gas or working with Columbia Gas Claims Centers to receive a reimbursement for self-purchased appliances.

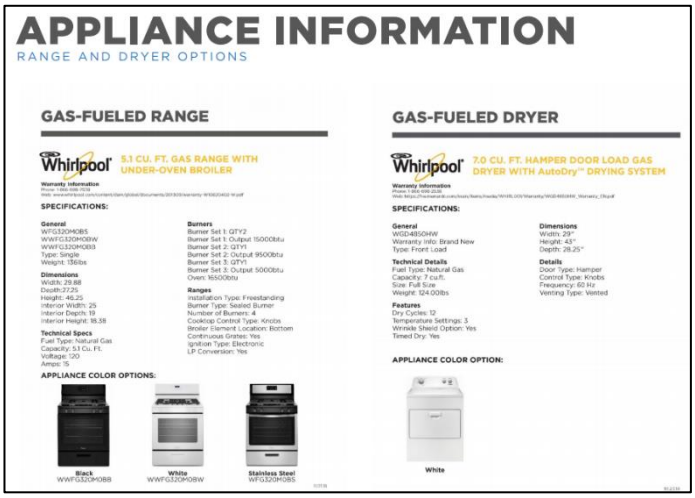


Figure 34: Example Columbia Gas Flyer with Appliance Options.

There was also a desire to install energy-efficient appliances that could meet criteria set forth by the Mass Save program.[25] The process for installing efficient systems - although an overall strength – also introduced challenges. This initiative created a greater need for electricians to install the efficient appliances in older homes that did not meet code. Along with the need for more

[25] Mass Save (https://www.masssave.com/) is a program conducted in Massachusetts that provides rebates in return for the installation of energy efficient appliances.

electricians, particularly in Lawrence, the older home stock caused a large need to retrofit other equipment in the homes to enable accommodation of the new systems.

Finding S-18: Strength

The Commonwealth's Executive Office of Energy and Environmental Affairs (EOEEA) proactively looked at ways to increase energy efficiency as appliances were replaced, utilizing Mass Save programs.

With all of the retrofits occurring during repair and replacement, there were multiple cascading impacts including the following: chimney repair, additional fireproofing, orifice changes for various gas supplies, and kitchen cabinetry adjustments. Ultimately, the large number of home retrofits was a major cause for the delay in the project.

On October 26th, the CRO announced an updated timeline for restoration. In order to expedite the process of safely restoring heat and hot water to customers, the original plan to immediately replace all appliances was shifted to a new plan of repair, if able, then replace. This process change was put in place as a temporary measure to provide residents with heat and hot water quickly before the winter. Licensed contractors and inspectors began inspecting heating equipment (boiler and/or furnace) to determine whether the heating equipment could safely operate with repairs. If the heating equipment could be repaired, then those repairs were made, with the plan for Columbia Gas to return at a later date to replace this equipment.

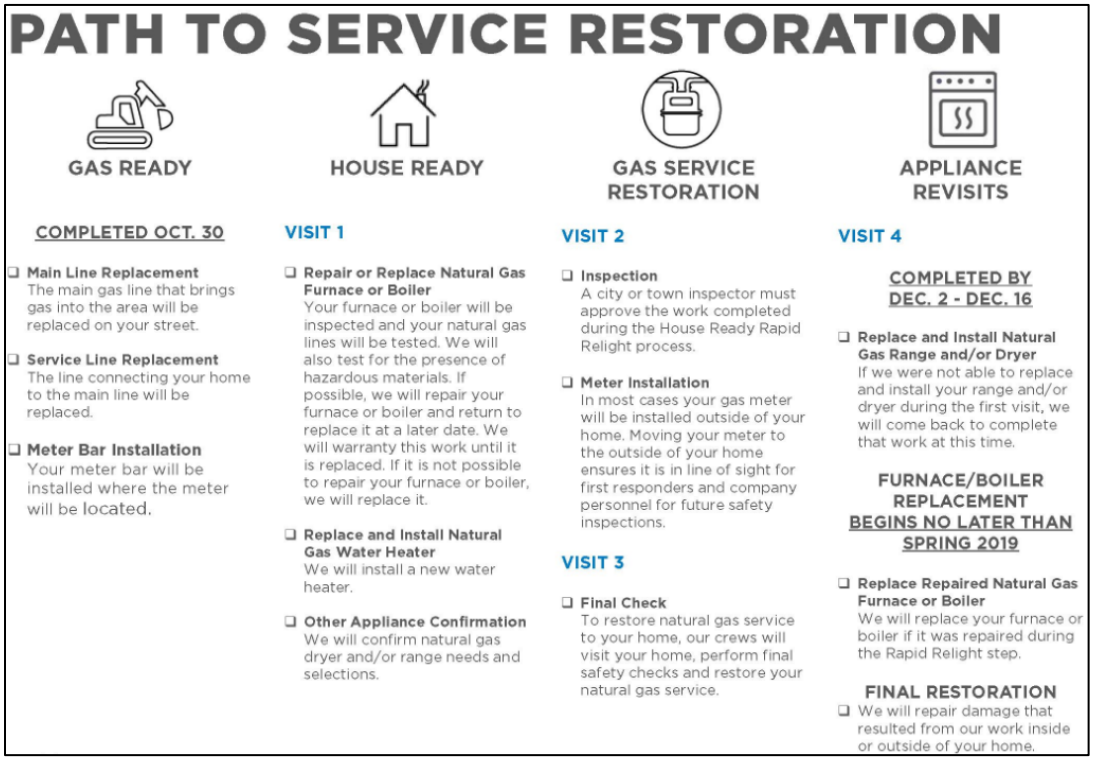


Figure 35: Snapshot of Updated "Path to Service Restoration" plan.

Back to Business Campaign

While the restoration was ongoing to the thousands of residential customers, the CRO recognized the needs of the business community in the impacted area. Columbia Gas was working a separate track to see that businesses had their gas service restored as well. On October 10th, with concerns about the progress made to date, the CRO met with Columbia Gas and devised an updated strategy to ensure that impacted business properties were on track for restoration. The CRO proactively brought a separate construction company with nearly 50 project managers on site to oversee tens of millions of dollars' worth of commercial gas restoration work. This renewed priority became the "Back to Business Campaign," and was accompanied by financial support as described in Section 5.4.5. Due to the renewed focus, nearly all of the 685 impacted businesses had their gas service restored by Thanksgiving 2018.

Services/Skilled Labor (Including Mutual Aid and Licensing)

A wide range of skilled laborers and mutual aid was needed during the restoration/ reconstruction process. The *Gas Ready* phase required construction crews including contractors, subcontractors, pipe-fitters, and pipeline inspectors. The *House Ready* phase required a number of tradesmen, including licensed plumbers, electricians, inspectors (building, house, electrical, gas, plumbing, and food), and translators.

- More than 5,000 workers worked on the restoration project. This included an average of 3,000 contractors per day. This also included an average of 1,000 Columbia Gas and NiSource employees per day.

To fulfill the need for construction crews, Columbia Gas utilized the International Union Network to acquire additional pipeline workers for the *Gas Ready* phase. Columbia Gas was able to acquire the labor needs for the outside construction work quite readily due to the CRO's partnerships with the trades and unions. With the length of underground piping that needed to be replaced, repaired, or bypassed, there was a large need for pipeline safety inspectors.

The Department of Public Utilities (DPU) coordinated with the Massachusetts Emergency Management Agency (MEMA) to bring in additional natural gas pipeline inspectors from out of state through the Emergency Management Assistance Compact (EMAC) process. EMAC, in addition to being an effective state-to-state mutual aid mechanism, also ensures that reimbursement, liability, and legal concerns are considered. Mutual aid through EMAC was brought in from Connecticut, New Hampshire, New York, Pennsylvania, Ohio, Oregon, Virginia, Minnesota, and Arizona. Each state deployed state pipeline inspectors to Massachusetts to support the DPU in its work inspecting the pipeline construction in Lawrence, Andover, and North Andover. Separate from the EMAC process, the DPU also coordinated with the Pipeline and Hazardous Materials Safety Administration (PHMSA), who deployed inspectors into the area.

Licensed plumbers were brought in through Columbia Gas partnerships as well as through the EMAC process. However, because some out of state licenses were not transferrable, an Executive Order (approved on October 3rd by the State Plumbing Board) was issued that

outlined a process to issue temporary Massachusetts journeyman licenses for out-of-state plumbers to work in Massachusetts.

Finding S-19: Strength

Leveraging the Emergency Management Assistance Compact (EMAC) was the most effective tool to source additional inspectors with appropriate licensure and experience.

Finding S-20: Strength

Plumbers were vetted based on their education and time in the field; this expedited the process and allowed for 750 plumbers to be vetted. To further ensure all work was done in accordance with state plumbing code, temporarily licensed, out-of-state plumbers worked under the supervision of Massachusetts licensed master plumbers.

The extent of *House Ready* work that needed to be completed created permitting challenges. Each contractor needed a permit for each job, causing multiple permits to be written for each project. Due to the number of outside contractors and the number of permits for each project, tracking became a challenge. Each community and contractor utilized a different method for data management (e.g., systems used to track inspectors), and these were not always compatible.

Finding S-21: Strength

The Division of Professional Licensure (DPL) coordinated the inspectional services for all plumbing and electrical work associated with this event for all three communities, which helped to expedite the process.

The Division of Professional Licensure (DPL):

- Issued 25,138 permits
- Coordinated 12,006 inspections
- 504 failed inspections

Disposal and Pick-up of Old/Used Goods

The pickup/removal of white goods was conducted by Columbia Gas, with the support of several vendors. Impacted customers who chose to accept the Columbia Gas-provided appliances worked with Columbia Gas through the entire process of replacing and removing damaged or destroyed appliances. This process allowed for Columbia Gas to coordinate with the vendors to remove the appliances from the house, in some instances in multiple steps (one team for removal from home, the second team to pick up removed appliances from the street). Columbia Gas leased many warehouses in the area to store both new and old appliances.

Customers who chose to self-mitigate were told to work through the Columbia Gas Claim Centers for reimbursement. Columbia Gas, in these cases, worked with customers as they came to Claim Centers to arrange for removal of replaced appliances.

Relight

Natural gas service *Relight* occurred once a structure was *Gas Ready* and *House Ready*. A Columbia Gas representative would perform a final safety check and restore natural gas service.

The process of *Relight* involved many home visits from different contractors, plumbers, electricians, inspectors, Columbia Gas representatives, and other authorized individuals, each utilizing a different data management method and system. Documentation and tracking of resources and tasks were not consistent, creating duplicate visits to homes and redundant work done. This caused frustration and lack of confidence within the communities.

Finding I-17: Area for Improvement

No common data management system was utilized to track inspections and numerous visits to impacted homes. This duplicated efforts and delayed the process.

Key Finding R-23: Recommendation

The process of relighting each home with natural gas service involved many home visits from different contractors. A consistent data management system is needed to allow for reconstruction efforts to be coordinated, and reduce duplicate visits at homes during recovery assessments, repairs, and inspections.

5.3.3 Information Sharing

As seen in the following sections, there were many successes and challenges regarding information sharing among recovery partners as well as the public. Overall, information sharing processes started out slow and conservative but began to ramp up, becoming more coordinated throughout the recovery.

Partners

The term *partners* refers to everyone involved in recovery actions throughout the incident and includes the Governor's office, the Chief Recovery Officer, local and state officials, local fire, local police, and the 5,000 workers brought in for the restoration project.

While there was an incredible amount of work being done, coordination and information sharing among partners did not occur in a smooth fashion initially, mostly due to the large number of players that needed to be included and involved in decision-making. A major trend from the stakeholder meetings involved the need to ensure the appropriate people were in the room.

On September 23rd, the CRO began conducting daily briefing calls with local and state officials, utility partners, and NiSource/Columbia Gas. These calls provided updates on the ongoing operations and mission areas as well was an open forum for discussion, questions, and feedback. One portion of these briefings included a Daily Briefing Packet, which was shared with all partners. This briefing gave visuals and context to partners participating in the calls.

Finding S-22: Strength

The Chief Recovery Officer (CRO) held regular briefings which were helpful to involved responders. The daily briefing calls were constructive, provided updates on the restoration process, and provided a platform for idea-sharing.

Although these daily briefings played a major role in the success of the restoration process, the plan was not always shared as widely as needed. For example, during the extensive *Gas Ready* phase, a large number of construction crews and areas under construction were active throughout the three communities. Under normal circumstances, construction projects are vetted by the local police to ensure roads were clear enough for emergency vehicles to pass while work was being done on the roads. With the need for speedy reconstruction of the pipelines, the normal vetting process with the local police departments and this important consideration for fire safety were overlooked. Multiple construction crews were discovered to be working in the same area, thereby blocking fire apparatus access. This issue was quickly remediated by including fire personnel in the daily project planning. The evolving process proved to be effective, and information sharing greatly improved as the process matured.

Finding S-23: Strength

While initially identified as a gap, a lack of coordination amongst public safety officials was quickly remediated. These officials were integrated into daily utility project planning meetings to ensure that future unanticipated consequences were avoided.

Public Outreach

The desire to provide information to the public in a timely manner competed with the ability to provide consistent, accurate information. Each community used a different method for sharing information with the public. The City of Lawrence and the Towns of Andover and North Andover provided daily updates on their respective websites, including a link to the Columbia Gas Daily Briefings. The three communities developed robust and ongoing public information strategies, which included social media, face-to-face information sharing, and other options to ensure residents were receiving updated information. This was regularly revised to ensure the needs of residents were continually being met. As with the experiences referenced in Section 5.1, a Joint Information Center may have helped to relay a more uniformed message to the public in a consistent manner.

Finding I-18: Area for Improvement

While regular briefings were held with key officials in the Recovery Organizational Structure, regular construction updates, including daily Columbia Gas briefings, were not consistently being shared with the public, which delayed transparency.

Columbia Gas provided flyers to residents describing each of the recovery phases. A weekly newsletter was mailed to affected residents with updates on construction and available resources, from claims to housing. Although Columbia Gas provided the public with information on their options, there was still confusion around the energy efficiency appliance replacement plan. Customers were unsure of their financial responsibilities if they chose to participate in the energy efficiency program.

Starting the week of October 9th, Columbia Gas launched an interactive map for customers to track restoration projects in their neighborhoods. Columbia Gas also published a 72-hour work schedule forecast indicating which streets would have work teams performing assessments and installations. As the efficiency of the repair process moved forward and improved, so did the communications with the public. New tools were developed, and clearer, timelier communications prevailed, allowing customers to see where they were in relation to the work being done. In addition to the weekly newsletter, customers were encouraged to call the Affected Customer Helpline for schedule updates. Regardless of the improvement, better usage of data management tools and more comprehensive and inclusive initial planning will help to remove some of these challenges in future disasters.

5.4 Recovery Efforts: Human Services

In the aftermath of the incident, a whole community approach was used to provide disaster relief assistance to the affected population. Collaborative efforts ranged from providing interim housing to philanthropic financial contributions and applying innovative private industry solutions to solve critical issues. Many of these recovery efforts started just days after the incident and lasted well into 2019.

Some of the major recovery efforts related to human services included but were not limited to:

- Coordination and activation of a state managed Recovery Resource Center
- Development and implementation of an Alternative Housing Options Plan
- Creation and distribution of the Greater Lawrence Disaster Relief Fund (GLDRF)
- Establishment and implementation of the Merrimack Valley Business Relief Initiative

5.4.1 Recovery Resource Center

As emergency shelters in the three impacted communities demobilized and residents began to return home, local and state partners and NGOs quickly recognized the need for a mechanism to meet the ongoing needs of the affected population. To elucidate and gain understanding of the best way to meet the affected population's needs, MEMA facilitated a human services meeting with key local and state partners and NGOs. During this meeting, the concept of a Recovery Resource Center (RRC) was discussed. An RRC is an efficient way to deliver services to individuals and families affected by a disaster by bringing together multiple service providers in a single location and providing on-site assistance. This discussion included determining a location and overall planning and management of the operation.

The decision was made to open a state-managed RRC in Lawrence. While this facility would service all three impacted communities, the decision to locate it in Lawrence was based on the fact that Lawrence was the most heavily impacted of the three communities.

MEMA was charged as the lead state agency responsible for convening the RRC, identifying partner agencies, coordinating overall planning and operations, and ensuring necessary RRC functions and tasks were fulfilled.

RRC Planning

At MEMA's Headquarters in Framingham, the MEMA Recovery Unit staff had anticipated that a state-managed RRC would be requested and had begun the initial planning work. In their initial efforts to develop an RRC plan, they experienced difficulty identifying a Point of Contact (POC) at the field level of the operation that could adequately gauge the affected population's ongoing needs.

During the planning phase, MEMA Recovery staff mobilized to the City of Lawrence to gauge the aftermath of the incident, meet with local officials and community liaisons to gain a better sense of the affected population's needs, and physically assess the identified RRC facility. While the timeframe to plan for the RRC was brief, initial planning involved:

- Logistical and operational considerations
- Client-centered considerations (e.g., an awareness of the demographics in the City of Lawrence)
- Making initial outreach to partner agencies (governmental, non-governmental, and corporate) that had resources or services available to those affected by the incident.

The specific types of resources and services that would be provided at the RRC were determined by MEMA in coordination with local officials and were based on community needs and available resources. Resources and services included, but were not limited to:

- Case management services (working with individuals/families to obtain assistance, and referrals to offsite services)
- Housing assistance services
- Fuel assistance
- Disability services
- Financial/transitional assistance services
- Food assistance
- Health and welfare services (to include crisis counseling services and emotional and spiritual care)
- Distribution of bulk supplies
- Spanish translation services
- American Sign Language (ASL) interpreter services

RRC Operations

The RRC was operational from Sunday, September 16th, to Friday, September 21st. During this time, over 3,000 individuals/families registered at the Center. The objective of the RRC was to address client needs in one visit by providing effective information and assistance. In order to meet this objective, MEMA established an organizational structure (modified ICS) to manage the operation. In addition, MEMA developed an RRC staff POC list and an RRC schedule for all participating agencies and organizations.

The RRC opened on Sunday, September 16th, at the Arlington Middle School in Lawrence. The RRC was co-located with an American Red Cross (ARC) emergency shelter and an ad hoc donated goods center. The Salvation Army provided Disaster Chaplains at the RRC, to ensure that the immediate mental health needs of survivors were being met. These trained disaster chaplains embedded in the intake teams at the RRC to provide Emotional and Spiritual Care to those seeking help. In addition, the Department of Mental Health (DMH) staffed the RRC with trained crisis counselors. These individuals provided Psychological First Aid and other support services in both Spanish and English. The combined services of the Salvation Army and DMH helped individuals and families begin to process the emotional impact of the disaster. With no physical barriers between the RRC, the emergency shelter, and the donated goods center, security and crowd control became major concerns. It also became quickly apparent to the staff

and volunteers working in the facility that clients were confused about the various resources and services being offered.

Due to overcrowding and a desire to re-open the school for their student population, the RRC was relocated to the Lawrence Elks Lodge at 652 Andover Street on Tuesday, September 18th.

The Lawrence Elks Lodge proved to be a more conducive environment for RRC operations, and made it clear that, when possible, an RRC should be physically separate from an emergency shelter.

By the time of the move, RRC staff had developed a streamlined client triage and intake process, enabling them to register clients quickly. Only clients with a higher level of need, such as those whose homes were damaged or destroyed, went through the full ARC registration process. The resources and services made available to clients increased as client needs were better identified, and more local and state agencies/organizations and charities stepped in to assist. While the process and system became streamlined as the RRC operation matured, it was noted that there were datasets in development that could have greatly enhanced the efficiency of disaster services delivery.

Figure 36: RRC Operation at Lawrence Elks Lodge.

Several departments were collecting damage assessment data, as referenced in Section 5.2.2, but this data was not being shared with agencies working in the RRC. If support agencies and organizations serving the RRC (e.g., ARC and Salvation Army) had these damage assessments earlier on they would have had better awareness of the level and type of assistance individuals and families needed. The amount of damage a person has to their property following a disaster determines the amount of financial and resource support they may be eligible for through NGOs. Failure to share this information created a missed opportunity to provide the best possible support to affected residents.

Finding I-19: Area for Improvement

There was no state RRC Plan in place to guide the RRC operation in Lawrence. Additionally, the American Red Cross (ARC) was not consulted, and their Multi-Agency Resource Center Planning Guide was not considered for help managing the RRC.

Key Finding R-24: Recommendation

A state-led Recovery Resource Center (RRC) Plan and accompanying local guidance should be developed to ensure there is a consistent and efficient mechanism to deliver a full spectrum of services in times of disaster.

RRC Demobilization and Ongoing Services

The RRC in Lawrence closed on Friday, September 21st, based on RRC staff's observation of dwindling client numbers seeking resources and services at the facility. To ensure ongoing services would be made available to affected residents following closure of the facility, MEMA coordinated with the Executive Office of Health and Human Services (EOHHS), local and state stakeholders, and NGOs to develop a "Resource Guide" comprising an extensive contact list of municipal and state resource and service providers. The Resource Guide included, but was not limited to, state and municipal level contacts for the following types of services:

- Transitional assistance
- Housing assistance
- Fuel assistance
- Child/family services
- Education/career services
- Food assistance
- Elder services
- Disability services
- Public health services

Once the Resource Guide was completed, an electronic version of the Guide was shared with stakeholders supporting this effort, including Mass 211 to ensure the information was accessible 24/7 by phone.

Following the closure of the RRC in Lawrence, MEMA also coordinated a conference call with NiSource/Columbia Gas and the Department of Mental Health to coordinate efforts to provide ongoing behavioral health and crisis counseling services to the affected population. NiSource/Columbia Gas reacted to this discussion by planning a workshop in each impacted community to teach ways to identify stress in individuals and strategies for coping with stress.

Finally, in the weeks and months following the incident, client case management continued to be made available to the affected individuals/families through NGOs such as ARC and the Salvation Army. They continued to provide goods and services such as gift cards and store vouchers for essential needs (allowing the individual or family to determine what essential items they may need), food boxes, and furniture. For any goods and services NGOs may not

have been able to provide, individuals and families were provided with referrals to other agencies that could assist.

Finding S-24: Strength

Following the closure of the RRC, many local organizations and non-governmental organizations (NGOs) remained in the affected community to provide continued support

5.4.2 Interim Housing

The long-term extensive impact of the incident led to an unprecedented demand on local and state government to support interim housing operations across the communities of Lawrence, Andover, and North Andover. The Alternative Housing Options Program quickly became one of the top recovery missions, given the number of homes without heat or hot water, the timeframe for restoration, the diverse socioeconomic composition of the communities, and the forecast of cold weather approaching the area.

During operations of the RRC in Lawrence, ARC reported that many affected residents were seeking temporary housing. At the time, ARC case management staff started to coordinate with the most heavily impacted individuals/families to provide short-term stay in hotel rooms. However, they quickly realized they were not able to keep up with demand. Within that same time period, Columbia Gas was conducting a parallel form of assistance: offering their most vulnerable and heavily impacted customers hotel rooms for short durations. However, they had no formal plan in place to manage this process and did not initially communicate this activity with recovery partners.

Early in the recovery phase, this issue rose to the attention of state and local officials. The first step in addressing this issue was to gain a better understanding of the number of customers and their families who had been placed in hotels. MEMA encouraged Columbia Gas and ARC to share each other's hotel placement data and to begin tracking this information.

As recovery activities continued, the recovery leadership team recognized the restoration process was not going to take days or weeks, but likely months, to complete. With this in mind, Columbia Gas needed to organize and augment their ability to provide hotel rooms to their affected customers and find longer-term temporary housing options. To that end, the Governor's Office created a Housing Task Force within the recovery organizational structure. This task force comprised leadership staff from MEMA and Columbia Gas, with linkages to the work being spearheaded by the Chief Recovery Officer.

The Housing Task Force worked to bring on vendors to assist Columbia Gas with the process of booking and reserving hotel rooms; through collaborative discussion, this task force decided to establish a state-managed Alternative Housing Options Program to assist Columbia Gas with a longer-term interim housing solution. MEMA was tasked by the Governor's Office to coordinate with Columbia Gas, and take the lead on identifying, planning for, and executing an Alternative

Housing Options Program to provide temporary housing to approximately 15,000 affected individuals in the three communities.

Human Services Recovery Office

A temporary State Recovery Office was established in Lawrence to maintain consolidated human services recovery activities in the impacted area. The State Recovery Office became the centralized location for MEMA, vendors, and other local and state partners to coordinate, manage, and support recovery activities related to human services. Personnel from MEMA's Headquarters and Region 1 Office managed and supported recovery activities from this location 7 days a week throughout the restoration effort.

Finding S-25: Strength

A temporary State Recovery Office was established in the impacted area to allow staff to be visible in the community and engaged in continued human services recovery service delivery.

Alternative Housing Options Program Overview

On October 5th, the Governor's Office, MEMA, the Mayor of Lawrence, the Town Managers of Andover and North Andover, and Columbia Gas announced that alternative housing options would be made available to Columbia Gas customers who did not want to stay in their homes due to having no heat or hot water. Hotel rooms and apartments were made available on the date of this announcement. Travel trailers and the congregate shelter became available three days later on October 8th.

The goal of the Alternative Housing Options Program was to provide impacted residents temporary housing options until gas service to their homes was restored. The key objectives of the program were to:

- Expand on the offering of hotel rooms by identifying additional alternative housing solutions
- Have alternative housing options made available quickly to those seeking temporary housing
- Provide alternative housing options that were in close proximity to or within the three impacted communities

State and local officials, in coordination with Columbia Gas, determined the following alternative housing options:

1. Hotel rooms (to expand on the current number of hotel rooms offered within a 30-mile radius of the impacted region)
2. Apartments
3. Travel trailers

In addition to these alternative housing options, a congregate shelter[26] was to be established and made available to Columbia Gas customers as a shelter of last resort. The congregate shelter would also include co-located accommodations for household pets.

Any affected residents whose gas service was not fully restored by the original forecasted November 19th restoration date received a phone call from Columbia Gas to identify customer needs and provide resources including temporary housing, temporary heating, or assistance with claims.

While the Alternative Housing Options Program appeared to be an appropriate solution for the interim housing needs of Columbia Gas customers, it did not initially take into consideration the need to shelter household pets. A concern was raised that residents with household pets may avoid seeking temporary housing if their pets were not welcome. While household pets were permitted in some of the alternative housing options (e.g., pet friendly hotel rooms) availability to accommodate pets was limited. Understanding that this situation could present as public safety/health issue, MEMA coordinated with local emergency managers and animal control officers in each community, Massachusetts Society for the Prevention of Cruelty to Animals (MSPCA), and Nevins Farm in Methuen to develop a household pet emergency shelter plan. This planning effort resulted in a Memorandum of Understanding (MOU) between Columbia Gas and Nevins Farm, whereby Nevins Farm would manage the overall shelter and care of household pets as needed at no cost to Columbia Gas customers.

The Governor's Office, state and local officials, and Columbia Gas were deeply committed to the Alternative Housing Options Program. Their collective goal was to get as many people as possible out of the cold and into a warm place, focusing on the most vulnerable, as the hard work of the "Gas Ready/House Ready" project pressed on. To ensure that coordination remained intact, housing coordination calls were conducted twice a day. Call participants included members of the NiSource/Columbia Gas Housing Team, the Governor's team, and MEMA and EOHHS staff.

Alternative Housing Reservations

In the initial days of recovery, Columbia Gas Claims Centers struggled to manage the booking and reservation process for hotel rooms. This resulted in significant customer service issues to include delays reserving temporary housing. For example, customers were being told they would be helped and then never received a call back from the Claims Center representative to finalize the reservation process. This issue resulted in many customers having to reach out to their local officials to seek assistance in finding temporary housing.

To attempt to remedy this, Columbia Gas hired a vendor to support the process. The initial vendor worked to identify and hold hotel rooms within a specific radius, but they were understaffed and quickly overwhelmed. Initially, they were working remotely in another state,

[26] Congregate shelters are facilities that provide safe, sanitary, and secure places to temporarily shelter groups of people.

and no comprehensive database existed to track room availability. This led to inaccuracies of information, which resulted in some customers arriving at a hotel with a reservation when in fact there were no rooms available. The Governor's Office intervened and requested this vendor relocate to Lawrence to remove some of the complexity. Eventually, this vendor was replaced with two other vendors. One vendor ensured that accurate hotel availability was determined based on need, and shared this information via a comprehensive database. The second vendor physically worked out of Claims Centers, taking calls, conducting targeted outreach, and ensuring that the customers' alternative housing needs were being effectively matched with available temporary housing solutions. A third vendor later came on board to help develop software solutions to streamline this process and ensure that success was maximized.

Another issue that presented during this timeframe was that Columbia Gas Claims Center Housing Assistance Teams did not have customer intake guidance in place to ask customers seeking alternate housing what specific needs they or their family members may have (e.g., medical needs, mobility and accessibility challenges, family pets, young children in the family). To resolve this issue, MEMA coordinated with key state organizations and NGOs to develop a telephonic intake questionnaire (including questions about access and functional needs), a housing assignment process, and a Code of Conduct for customers assigned to hotel rooms/apartments. MEMA provided this information to Columbia Gas for their Housing Assistance Team representatives to use when responding to customers seeking alternative housing.

Key Finding R-25: Recommendation

State and local recovery plans should include considerations for individuals with disabilities and others with access and functional needs (AFN). This will ensure effective and appropriate supports and services are provided to the affected population.

As these issues were addressed, the process continually improved. Columbia Gas, with assistance from the Governor's Office and MEMA, continued to work with the hired vendors to facilitate and manage the booking and reservation process through their Claims Centers. Columbia Gas customers seeking temporary housing were prompted to call the Columbia Gas Claims Line. Once the call was made, the customer was directed to a member of the Housing Assistance Claims Team at the newly constructed Call Center. The staff were equipped with a telephonic intake questionnaire to gather information from the customer, including information about access and functional needs, size and family makeup, and individual and family needs. This information was used to identify the most appropriate housing option for the customer and their family.

One of the more significant issues with the hotel reservation process was the location of many of the available hotel rooms. Initially, a 30-mile radius was established as a search criterion for

available hotel rooms. Options were offered as far away as New Hampshire and Boston. This proved to be unrealistic, as children still needed to go to school, adults needed to work, and families needed access to their communities. The intake process was restructured to account for these needs.

For those Columbia Gas customers staying in hotels and apartments with no means of personal transportation, the company provided transportation through Uber and Lyft rideshare services at no cost. This information was provided to customers during the placement process. School bus companies were also consulted to create new pick up plans for affected students.

The reservation process was slow to improve, primarily due to the communication issues with hundreds of different housing options. The Governor's Office, in partnership with NiSource and a supporting vendor, worked to develop an App to make it easier for the Columbia Gas Call Center to access hotel rooms and for the hotels immediately to communicate room status with the Call Center. Available room status inventory was clearly displayed on this App, which was used by all Call Center members. This App not only included available hotel rooms; it was later adjusted to accommodate available apartments and travel trailers.

Columbia Gas made a concerted effort to enhance communication with their affected customers. They developed Customer Newsletters (posted on the company's website in both English and Spanish) and physically sent company representatives into the impacted communities to distribute informational flyers to impacted homes.

Finding I-20: Area for Improvement

Columbia Gas' emergency plan did not account for scalable temporary housing solutions to support customer's needs on a mass scale.

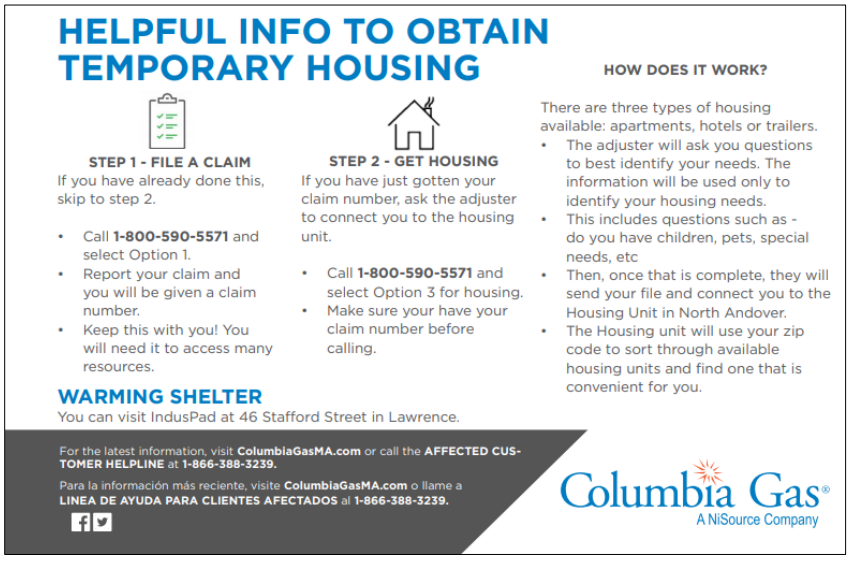


Figure 37: Columbia Gas Webpage, Showing Information on Obtaining Temporary Housing.

Finding S-26: Strength

While any resident in the impacted area was eligible for housing, local officials, in coordination with Columbia Gas, proactively reached out to the most vulnerable residents and to residents whose homes would not have their gas service restored until after November 1st to assess their needs and offer to facilitate alternative housing assignments.

Hotels

Relocating Utility Crews

During the onset of restoration and recovery efforts, Columbia Gas housed thousands of utility crew workers in hotel rooms in the Merrimack Valley Region. Understanding there was a deeper need to have impacted customers in temporary housing within or closer to their community, local and state officials coordinated with Columbia Gas to identify alternative housing solutions. Columbia Gas addressed this issue by implementing an innovative solution to free up hotel rooms in the Merrimack Valley Region. On October 5th, Columbia Gas began to move utility workers from local area hotels to a 733-foot-long cruise ship they leased and docked in Boston Harbor. This vessel, the MS Grand Celebration, was owned by Bahamas Paradise Cruise Line and had the capacity to house over 1,400 passengers and 670 crew members.

Figure 38: MS Grand Celebration Docked in Boston Harbor.

Hotel Rooms Offered to Columbia Gas Customers

On October 5th, hotel rooms were made available to Columbia Gas customers seeking temporary housing. By mid-November over 4,000 hotel rooms, of a target goal of 5,000, had been reserved. Participating hotels were all within approximately 30 miles of the three impacted communities.

In addition, Columbia Gas provided a per diem to their customers living in hotels to help offset the cost of food and gas. For customers with CTN, Columbia Gas offered Uber and Lyft ride share services free of cost.

Once the outside vendors gained consistent control over the available inventory, a new challenge emerged. Hotel rooms could not be booked for long-term stay due to unrelated

existing reservations. As Thanksgiving approached, this issue became augmented as non-impacted families had already reserved rooms for holiday travel, thus reducing the available hotel room inventory. Because hotel rooms could only initially be booked for short durations, customers had to move from one hotel room to another after only a few nights' stay. As time went on, it became easier for the outside vendors hired by Columbia Gas to reserve hotel rooms for longer durations.

Hotel Summary	
Total Number of Hotel Rooms Booked	6,300
Peak Occupancy	1,862 Families (6,236 Individuals)
Grand Total for Hotel Operations	$65 Million

Figure 39: Hotel Summary Statistics.

Apartments

On October 5th, apartments became available to those Columbia Gas customers who sustained extensive home damage (requiring longer-term housing) and/or required alternative arrangements. However, offering apartments to customers came with its own set of challenges. The major challenges faced by Columbia Gas included, but were not limited to, a lack of housing stock and a lack of understanding of Massachusetts tenant and landlord rights. Customers who sub-leased an apartment but did not have their own means of transportation were provided Uber and Lyft rideshare services at no cost.

Columbia Gas hired a vendor to manage the process of identifying and leasing apartments in the Merrimack Valley Region. Over 160 apartments were leased by Columbia Gas within a 15-mile radius of the Region. These apartments were then, when able, sub-leased to impacted customers who needed temporary housing. Apartments included one-, two-, and three-bedroom units. Although Columbia Gas was able to acquire a small number of apartments within a narrow timeframe, finding available apartments in general presented a challenge, owing to low availability among area housing stock. During peak occupancy, 92 apartments were occupied.

The other major issue experienced by Columbia Gas, as it related to leasing/sub-leasing apartments, was understanding tenant/landlord rights in Massachusetts. According to Columbia Gas, there were reports of tenants who did not want to leave their temporary apartment and return to their original rented apartment, and reports of landlords refusing to take back their tenants upon their return from temporary housing.

Finding I-21: Area for Improvement

Leasing and sub-leasing apartments as a form of temporary housing was challenging and resource intensive, due to multiple issues, including the background check process, low housing stock, and navigating complex tenant/landlord laws.

Key Finding R-26: Recommendation

Tenant/landlord laws should be evaluated and considered by the Leadership Group at the onset of the disaster housing mission, to determine if leasing/subleasing apartments as a form of interim housing is a viable option.

Travel Trailers

MEMA was charged by the Governor's Office with planning for and managing the travel trailer operation, which included identifying and securing vendors to support the operation. The travel trailer operation proved to be the largest and most complex interim housing mission; a mission of this type and scale had never been conducted in the state's history. Key planning objectives included:

- Acquiring travel trailers units,
- Identifying and securing a Staging Area (or Staging Areas),
- Identifying and securing trailer sites,
- Managing trailer site operations.

MEMA identified two Recreational Vehicle (RV) suppliers with large stocks of units across the country: Camper's World and Camper's Inn. Once Columbia Gas secured a contract with these suppliers, MEMA was able to coordinate with the suppliers - who used independent transport companies - to mobilize their inventories of travel trailer units from across the country into Massachusetts. The initial trailers were sent to Lawrence from the Midwest, and required extensive communication with MEMA to ensure they were transported to the correct location to be used.

In the early stages of the operation, travel trailer units were directly deployed to established travel trailer sites. As additional travel trailers descended on the area, and while new sites were being prepared, they were briefly staged at Lawrence Airport before moving to their final destinations. This ensured the influx of travel trailers was maintained, and delays in their implementation were reduced.

MEMA coordinated with Columbia Gas, local officials, and Deployed Resources (the vendor activated for the operation with an existing contract with the state) to discuss potential travel trailer site locations within the impacted communities. These site options included community parks, streets, and residential driveways. The coordinated site selection process ensured the needs of affected residents were covered. Ultimately, the following sites were chosen (these sites were either grass fields or paved sites):

- South Common Park, Lawrence (250 trailers on-site)
- Pemberton Park, Lawrence (99 trailers on-site)
- Sullivan Park, Lawrence (75 trailers on-site)
- Grogan Field, North Andover (60 trailers on-site)

- Recreation Park Road, Andover (32 trailers on-site)

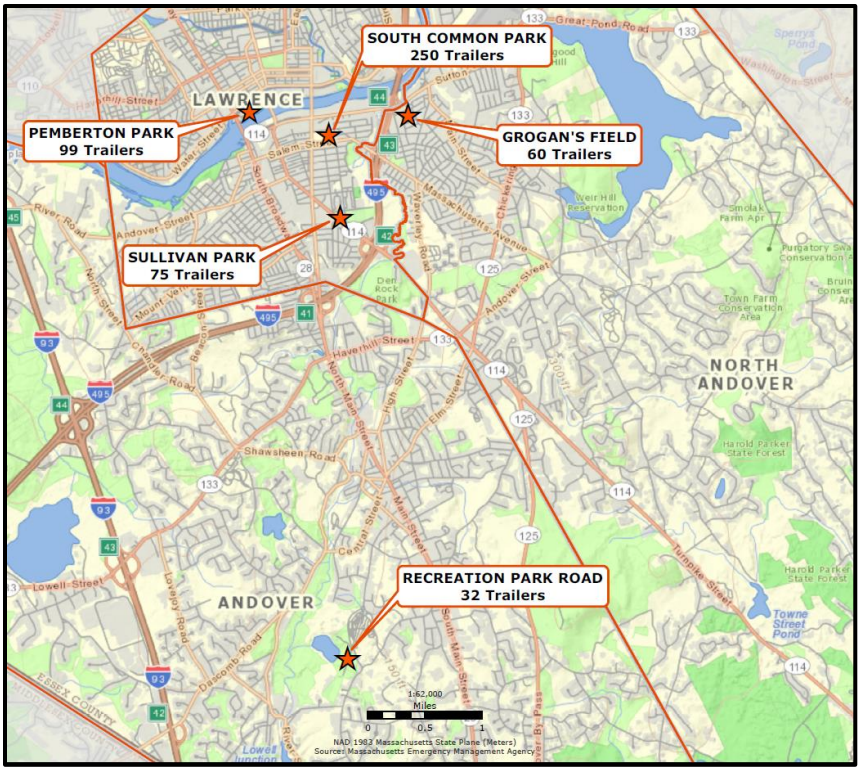


Figure 40: Map of the Five Travel Trailer Sites.

Finding S-27: Strength

Travel trailer sites were established in close proximity to the most impacted areas of each community, allowing individuals and families to be near their home, place of work, school, and community services.

Through contracts secured by Columbia Gas, MEMA brought on additional vendors to support operations. Travel trailer site operations were managed by MEMA in coordination with the following vendors:

1. Deployed Resources: Responsible for specific site maintenance support services (e.g., fencing and laundry), housing structures, and contracted services (e.g., wastewater removal, fresh water and trash disposal).
2. Hagerty Consulting: Responsible for the "human services" side of the operation, including 24/7 on-site customer service, trailer assignment and orientation, restocking trailer supplies (basic amenities), and tracking occupancy.
3. Strategos International: Provided unarmed site security, attended to guest safety and security concerns, performed site identification checks, and controlled access.

Once a travel trailer site was approved by the local community, a plan and site map was developed for each location. Plans were developed by MEMA in coordination with local government partners, contracted vendors, and Columbia Gas. Site planning considerations included, but were not limited to, site set-up (e.g., how much space was needed between each trailer), fire safety (e.g., ensuring emergency vehicle access and numbering of trailer units), and security (e.g., provisions made for fencing around site perimeters and on-site security via local law enforcement and Strategos International). In addition, considerations for the needs of guests such as on-site basic amenities, proximity of the site to essential community services, and providing personal comforts were woven in to the plan. For example, guests were provided with portable laundry facilities and a sheltered/heated common area with access to television and Wi-Fi at the South Common Park site in Lawrence. In addition, there was coordination with public schools in the area to re-route student busing services to the site.

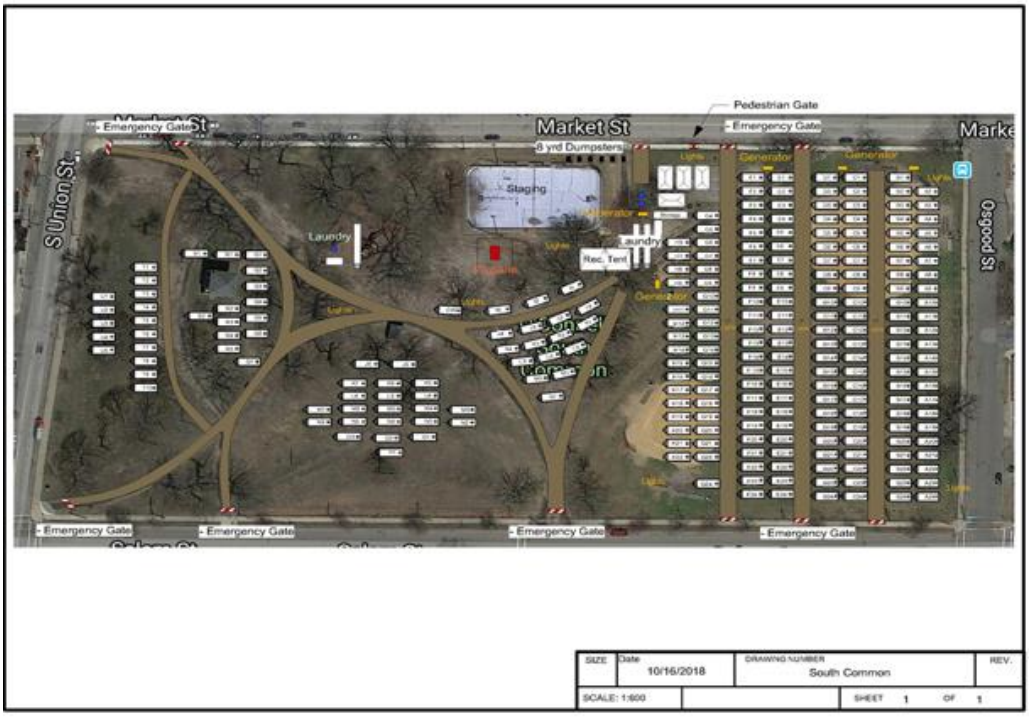


Figure 41: Map of Travel Trailer Site at South Common Park, Lawrence, MA.

Finding S-28: Strength

A comprehensive plan and site map were developed for each travel trailer site, to ensure that all logistical and operational considerations were captured.

The travel trailers on each site were brand new units. Each trailer included a kitchen, bathroom with a shower, and sleeping accommodations (generally accommodating up to 5 occupants). In addition, each trailer was supplied with basic household items (eating utensils, pots, linens, etc.).

Trailer units were not ADA compliant or conducive for children. Individuals with physical disabilities and/or families with very young children were provided with alternative housing options such as hotel rooms or apartments that may or may not have been located in their community.

Figure 42: Example of Travel Trailer Dimensions.

South Common Park in Lawrence was operational on October 5th. The last site to be operational was at Lawrence's Sullivan Park on November 1st. As at other alternative housing options, reservations were made through the Columbia Gas Claims line. An Incident Command System (ICS) structure was implemented to manage operations at each trailer site and across the larger housing mission. Central command for the overall operation was headed out of the State Recovery Office in Lawrence. Additionally, a situation report was generated daily for each travel trailer site, which was shared through the chain of command.

Finding S-29: Strength

Each of the travel trailer sites utilized an Incident Command Structure (ICS) to effectively manage, organize, and coordinate the activities of multiple agencies serving and supporting the operation, which complemented the overall housing mission ICS Structure.

Figure 43: Travel Trailer Sites: Pemberton Park, Lawrence (L); Recreation Road, Andover (R).

While the travel trailers proved to be a good overall alternative housing solution, a mass housing operation of this type and scale had never been conducted in the state's history. The lack of experience in mass disaster housing operations, combined with a setback in the timeframe for the restoration of affected homes, resulted in local and state officials being faced with numerous operational and logistical challenges. To augment these challenges, travel trailers are not built to withstand New England winter conditions, and creative solutions needed to be developed to ensure their continued operation during cold temperatures. Each trailer had to be wrapped in thick insulating foam and heated lines were run under every trailer to ensure that both the underside of the trailers did not freeze and maintenance valves could be accessed and operated. Some of the main challenges faced included, but were not limited to:

- A full understanding of the logistical requirements
- Site/trailer maintenance and scheduling of services
- Determining the roles and responsibilities of hired contractors
- Contracted services and terms of agreement
- Site inspections
- Maintaining unoccupied trailers
- Turnover of trailers to new occupants (cleanup and preparation of trailers for new guests)
- Trailer unit security (e.g., controlling the distribution of and return of unit keys)
- Ensuring twice-daily visits to every trailer to replace an empty propane tank and ensure the second propane tank was utilized for continued heating
- Refilling fresh water tanks and emptying graywater and blackwater tanks
- Adequately preparing trailer sites and trailer units for inclement weather (e.g., removing snow, managing mud and pooling water, insulating units from the cold, servicing frozen unit valves)

Figure 44: North Andover Site (L) and Lawrence South Common Site (R), After First Major Snowfall.

Figure 45: Mud and Cold Temperatures Require Innovative Trailer Solutions in North Andover (R) and South Common Park, Lawrence (L).

Finding S-30: Strength

Local and state partners and contracted vendors coordinated to identify creative, ad hoc solutions to logistical and operational challenges that enabled them to maintain travel trailer units/sites and keep guests comfortable.

Key Finding R-27: Recommendation

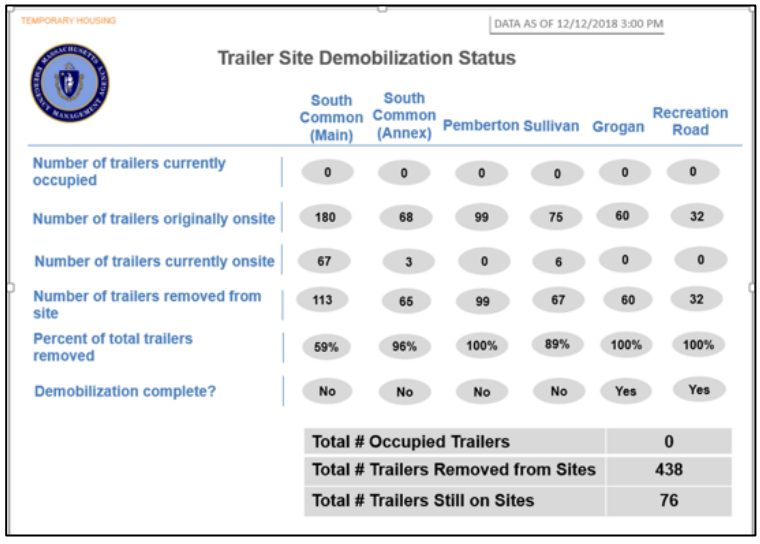
The Commonwealth's Disaster Housing Plan should be revised to include considerations for creative alternative housing solutions on a mass scale, with many options, to allow for survivors to remain close to home and engaged in their normal community activities, while having a safe place to stay.

Travel Trailer Summary	
Total Number of Sites	5 Across 3 Communities
Total Number of Trailers Across Sites	515
Max. Population Supported	1,752 individuals
Highest One Day Peak Occupancy	376 Trailers Occupied
Grand Total for Trailer Operations	$50.15 Million

Figure 46: Travel Trailer Summary Statistics.

Demobilization

A travel trailer demobilization plan was developed by MEMA in coordination with local government partners, contracted vendors, and Columbia Gas. The demobilization plan consisted of two main phases: demobilization of travel trailer units and site demobilization. The demobilization operation was briefed up through the chain of command on a daily basis until the mission was completed on December 14th.


TEMPORARY HOUSING

DATA AS OF 12/12/2018 3:00 PM

Trailer Site Demobilization Status

	South Common (Main)	South Common (Annex)	Pemberton	Sullivan	Grogan	Recreation Road
Number of trailers currently occupied	0	0	0	0	0	0
Number of trailers originally onsite	180	68	99	75	60	32
Number of trailers currently onsite	67	3	0	6	0	0
Number of trailers removed from site	113	65	99	67	60	32
Percent of total trailers removed	59%	96%	100%	89%	100%	100%
Demobilization complete?	No	No	No	No	Yes	Yes

Total # Occupied Trailers	0
Total # Trailers Removed from Sites	438
Total # Trailers Still on Sites	76

Figure 47: Daily Briefing Report: Trailer Site Demobilization Status.

From the Alternative Housing Option Program's conception on Oct 5th through completion of the "Gas Ready/House Ready" mission on December 16th, more than 2,000 families, comprising approximately

8,000 individuals, utilized temporary housing solutions offered through Columbia Gas and managed by MEMA.

Figure 48: Press Conference Announcing Demobilization of Last Travel Trailer Site.

Congregate Shelter

As in the travel trailer operation, MEMA was charged by the Governor's Office with planning for and overseeing a congregate shelter operation. The concept behind providing a congregate shelter was to ensure:

- The gap between available alternative housing options and the number of impacted families/individuals was closed
- Columbia Gas customers who chose to stay in their homes had an immediate safe and warm place to go that included amenities such as overnight dormitory accommodations, hot showers, heated corridors, hot meals, and other necessary wrap-around services.

Because this incident had an identified responsible party, ARC—after consulting with their National Headquarters—elected not to manage or support the congregate shelter operation. Therefore, MEMA was tasked with identifying a vendor(s) who could manage the operation.

MEMA coordinated with Columbia Gas to secure contracts with three vendors to manage and support the congregate shelter operation. The three vendors were given specific operational assignments:

1. Deployed Resources: Coordinate with MEMA to identify a site/facility.
2. SLS: Responsible for site identification, logistics and planning, shelter management, shelter status reporting, and offering a shelter "turn-key" solutions.
3. BCFS Health and Human Services: Responsible for the "people side" of the operation which included, but was not limited to, providing shelter staffing support (including medical staff), food services, and janitorial services.

Finding S-31: Strength

The contracted vendors from SLS and BCFS had a vast amount of experience in providing "turn-key" emergency shelter services, which were accompanied by a complete management, operations, and logistics team that was highly adept at working with governments and agencies at all levels.

The plan was to identify a facility in the area that could support upwards of 1,000 clients and meet the various needs of the population (e.g., providing access and functional needs, and accommodating household pets). MEMA coordinated with Deployed Resources to identify and physically inspect a number of potential facilities in the area. A large and spacious facility, IndusPAD Mill (formerly Malden Mills) at 46 Stafford St. in Lawrence was determined to be the best location. This facility was privately owned, which required Columbia Gas to enter into a lease agreement with the property owner. Once the facility was secured, MEMA and the vendors were faced with the logistical challenge of making a large empty mill facility conducive to a mass care and shelter operation. Before the vendors could bring in the equipment and supplies needed to operate the facility (e.g., mobile bathroom and shower units, cots, etc.), the facility had to first be cleared out, cleaned, and provided with a source of heat. Local contractors were brought on to assist with this mission.

Finding S-32: Strength

The congregate shelter plan was both flexible and scalable allowing the shelter to accommodate up to 1,000 shelter clients if needed.

MEMA coordinated a meeting at the State Recovery Office with key agency partners, including the MA Office on Disability, the Department of Public Health, and NGOs, to discuss additional resources required and resource gaps that needed to be addressed. The feedback and recommendations generated from this meeting were shared with SLS and BCFS to ensure the congregate shelter could meet the needs of all clients.

Finding S-33: Strength

MEMA, American Red Cross (ARC), and Salvation Army provided recommendations from state agency partners and NGOs as well as referenced the Commonwealth's State Initiated Regional Shelter (SIRS) Plan when coordinating with SLS and BCFS to ensure the needs of all shelter clients would be met.

The congregate shelter officially opened on October 8th. The shelter was open to Columbia Gas customers and their families from Lawrence, Andover, and North Andover. The announcement of the shelter opening was broadcast through various types of media tools and outlets: social media, the Columbia Gas webpage (dedicated to the incident recovery/ restoration), Columbia Gas newsletters and flyers (delivered to impacted residents), the Columbia Gas Claims Center line, and Mass 211.

Figure 49: Congregate Shelter Command Center.

SLS utilized an ICS structure to operate and manage the shelter. A command center was embedded within the facility and operated 24/7. SLS also provided both a detailed Situation Report (SITREP) on the shelter status every 12 hours and a daily "Services Rendered" report to MEMA. These reports were shared through the chain of command to the Governor's Office, and the information from these reports was shared in Columbia Gas' daily briefings.

Finding S-34: Strength

SLS leveraged the Incident Command System, including operating a Command Center with a strong organizational structure, to efficiently manage and operate the shelter.

Finding S-35: Strength

To better identify, process, and comprehend the status of the congregate shelter, a detailed Situation Report (SITREP) was provided every 12 hours, and a daily "Services Rendered" report was provided daily, to key stakeholders.

Figure 50: Interior View of the Congregate Shelter.

Shelter safety and security were jointly supported by local law enforcement from the Cities of Lawrence and Methuen, as the shelter site was on the border of both communities. Lawrence Fire Department had a presence at the shelter to conduct daily fire watch. Additionally, representatives from the City of Lawrence's Health and Human Services Department had a presence at the shelter, to offer client support and conduct client case management as needed.

Finding S-36: Strength

The presence of local public safety and health/human services staff was well received by shelter clients. In addition, being present in the shelter provided health and human services staff an opportunity to interface with shelter clients to gauge and address any unmet needs.

The shelter officially closed on the morning of December 5th. Later that day, SLS and BCFS began the process of decommissioning the equipment and trailers on-site.

Congregate Shelter Summary	
Shelter Capacity	Up to 1,000
Total Meals Served to Guest	2,704
Total Meals Served to Community	162,008
Total Client Count	242
Peak Overnight Occupancy	12
Peak Registered Clients	187
Total Cost for Sheltering	$30 Million

Figure 51: Congregate Shelter Summary Statistics.

Tracking Interim Housing

The Housing Task Force and Columbia Gas compiled daily status reports produced for each alternative housing option operation. This information was shared with local and state stakeholders via the Columbia Gas Daily Briefing to gain a better understanding of how many individuals/families remained in temporary housing, and to gauge if Columbia Gas was meeting their goal of getting customers in temporary housing back in their homes by the revised restoration completion target date of December 16th.

As gas restoration teams were working to make homes ready to be reoccupied, Call Centers had a responsibility to ensure that the affected resident was notified and kept up to date on the process. Initially, the communication between these two components was not sufficient, and residents were not being contacted in a timely or efficient manner to notify them that their homes were nearly at "move-in ready" condition. A meeting was convened between leadership of the restoration teams and the Call Centers, and a new operational plan was developed. This change ensured that cross communication and process were optimized, and that residents were better informed on the status of their residence and its related work.

Finding I-22: Area for Improvement

Communication between Columbia Gas Restoration Teams and Call Centers was not initially sufficient to keep residents informed of the status of their residences, and as they neared "move-in ready" status.

An additional component to tracking interim housing solutions and processes, was to ensure that, as housing needs began to subside, temporary occupants were returning back to their homes. There were some cases where occupants were delaying their departure from interim housing solutions. The demobilization plan should account for a process to ensure that all interim housing solutions can be effectively demobilized as the need diminishes.

Finding I-23: Area for Improvement

There was a lack of a comprehensive transition plan in place, as interim housing needs began to subside, to assist individuals and families move from their interim housing placement back to their home or to more permanent housing.

Key Finding R-28: Recommendation

State and local disaster housing plans should include strategies and considerations to transition individuals and families residing in an emergency shelter or interim housing, and who require additional support, back to their home or to more permanent housing.

5.4.3 Rent Recoupment

Massachusetts State Sanitary Code requires landlords to provide a heating system in good working condition and hot water for residents. The heating system must be able to heat homes to at least 68º F during the day and 64º F at night. Hot water in homes must be between 110º F and 130º F.

In the aftermath of the incident, the state Attorney General's Office had issued guidance stating that landlords could not collect rent for the time period that affected units lacked heat or hot water. Instead, Columbia Gas would pay rent to landlords for affected units that have been without heat or hot water since September 13th. As part of the claims process, landlords who had collected rent since September 13th were required to return those payments to their tenants.

Those tenants with no heat or hot water were asked to contact their landlord to file a lost rent claim with Columbia Gas. If the tenant paid rent to their landlord while their unit was without heat or hot water and did not receive a refund from their landlord, they were asked to call the Attorney General's Merrimack Valley Hotline and advise their Columbia Gas adjuster.

5.4.4 Greater Lawrence Disaster Relief Fund

In response to a local disaster in 2009, the City of Lawrence established the Lawrence Emergency Fund (LEF) through the Essex County Community Foundation (ECCF). LEF remained viable over the years and was reserved for use during an emergency in which residents needed financial support. Within five hours of the gas explosions, ECCF staff activated this fund to begin raising charitable support for those impacted. This effort was immediate and transparent, giving donors from across the nation an effective platform to support survivors.

Finding S-37: Strength

Having the Lawrence Emergency Fund in place prior to the incident allowed the Essex County Community Foundation (ECCF) to quickly respond to the immediate financial needs of residents.

Key Finding R-29: Recommendation

Communities should identify a mechanism or partner with a nonprofit organization to create an emergency fund in advance of a disaster in order to allow for financial support that is rapid and accountable to survivors' needs.

On Sunday, September 15th, ECCF staff met with Governor Baker, Lawrence Mayor Rivera, and Lawrence Emergency Fund advisor Benny Espaillat. During this meeting at the Command Post in Lawrence, ECCF learned of a forthcoming $10 million donation from Columbia Gas, secured by Governor Baker and the three municipal leaders, to financially support the survivors of the crisis.

On Monday, September 16th, Governor Baker convened a meeting of representatives from all organizations working on the relief effort: the Governor's Office, municipal leaders and department heads, MEMA, the American Red Cross, Lawrence Emergency Fund advisors, and ECCF staff leadership. The $10 million donation was discussed, and a framework for deploying these and other financial resources was finalized.

The concept of a new fund was presented - the *Greater Lawrence Disaster Relief Fund* (GLDRF) – which would allow all three communities to play a leadership role in responding to the needs of the residents. Seven fund advisors were named to oversee this fund and its operation.

Initial GLDRF meetings included all key players from all parts of the system. Where relationships did not exist, they were forged quickly by open and honest support. Where relationships existed, speedy response occurred.

By September 17th, it was understood that over 65 residential/business units were deemed destroyed or structurally unsafe, causing 65+ families to be "permanently displaced." In addition, an estimated 15,000 household/business units could not return home for the foreseeable future. It became evident that months would pass before gas could be restored, and with cold weather settling in, a massive effort to financially support people and businesses in need was necessary. It became the mission of the GLDRF to serve the short- and medium-term shelter and sustenance concerns of these impacted residents and businesses in Andover, Lawrence, and North Andover.

ECCF staff convened nonprofit and municipal leaders to develop a system to disperse GLDRF Funds and wrap-around services to the thousands impacted. ECCF defined roles for each nonprofit and helped to ensure they were staffed accordingly. Daily meetings for nonprofit representatives were led by ECCF beginning on September 19th for 10 consecutive days. This included fund guidelines, the center system, securing computers, designing signage, addressing translation needs, and also the incredible number of other logistical details that had to be confirmed.

The application process and fund distribution formula (one per household unit) were developed by a team of ECCF and lead nonprofits, all of which had previous experience working together. An online application website page and the Customer Relationship Management (CRM) system[27] were developed to capture all applicants and disburse stipend checks.

[27] The Customer Relationship Management (CRM) System is a platform that connects different departments, from marketing to sales to customer service, and organizes their notes, activities, and metrics into one cohesive system. A similar system is used by some human services agencies, such as the Department of Children and Families (DCF).

Finding S-38: Strength

A small number of lead nonprofits had the ability to handle a large amount of money and had the infrastructure to deliver resources. Selecting the right organizations allowed the response to be efficient.

Finding I-24: Area for Improvement

The swift setup and infrastructure of the Customer Relationship Management (CRM) system caused issues throughout the efforts. Although the site was designed within 10 days, it needed constant improvement and upgrades for efficiency and reporting needs. It required updates to address cultural and language sensitivities.

The final implementation plan was confirmed on October 1st, and outreach to the impacted households and businesses began. ECCF, nonprofit organizations, and volunteers used a variety of communication methods to connect with as many survivors as possible. Efforts were made in both English and Spanish across press, radio, print, websites, and social media channels. Municipalities, faith-based organizations, and housing authorities were all critical to spreading the word to their residents and communities.

On Wednesday, October 3rd, the application process to receive support from the GLDRF opened. To support the impacted residents' different needs, applications were made available in three ways: online at www.GLDRF.org, by phone by dialing Mass 211, and in person at three community drop-in application centers.

Additional efforts were made to reach marginalized populations by going door to door at the temporary/emergency housing option sites for impacted residents (trailer sites, hotels/motels, local emergency shelters), and to neighborhoods where it was known impacted residents were living temporarily.

The GLDRF Funds were provided in two main forms:

- Stipend - In an effort to ensure anyone impacted by the 8,570 gas meters received financial resources, anyone applying - regardless of socioeconomic background - could ask for direct funding based on the phases outlined in the process. These stipends were checks that were either mailed or picked up as part of the application system that provided funding in support of those who qualified.
- Gift cards – Understanding that stipends would not meet all needs, additional resources were provided for those with greater needs. As an additional complication, the GLDRF nonprofits discussed how to support "undocumented citizens." There was a concern that these families would not apply in writing for financial support because of serious immigration concerns. It was determined that gift cards were a useful tool in addressing their needs. Those who needed additional support beyond gift cards were provided with

connections to state and local resources. The distribution of gift cards and connections to greater service needs was accomplished through a case management system by which nonprofit case managers worked individually with each identified applicant.

Initially, there was no plan for multiple phases of funding, as it was unclear how many eligible household units would apply and how much money would be raised to support them. As the weeks went on, funds continued to be raised and the aftereffects of the disaster continued to evolve. On Tuesday, December 4th, the WCVB Local Channel 5 News "Relief Fund 5: Explosion Recovery" telethon raised more than $350,000 for the Greater Lawrence Disaster Relief Fund. The charitable gifts made by more than 3,500 viewers provided critical funds for those still struggling in the aftermath of the disaster.

The GLDRF advisors decided additional phases of fund disbursements were necessary and met to determine a new distribution strategy. Funding was distributed during the following phases:

- Phase 1: October 3, 2018 – November 5, 2018
- Phase 2: November 5, 2018 – November 21, 2018
- Phase 3: December 4 – December 31, 2018
- Phase 4: January – September 2019

By December 31st, this complex delivery system provided over $12 million of financial support to more than 10,000 households and businesses and brought case management support to more than 1,500 families. During this period and in the months that followed, ECCF continued to accept and process more than 7,000 donations to the GLDRF.

GLDRF advisors continued to review the Fund balance in order to strategize a final disbursement of funds. After much dialogue on outcomes and use of the remaining $800,000, the advisors agreed to the following plan that would continue the work through September 2019:

- Case management and gift card support would continue to those in greatest financial need at the Lawrence Senior Center and GLCAC (for Andover/North Andover) through March 31st, 2019.
- The Lawrence Senior Center would continue as the central point for remaining gift card distribution after March 31st, 2019.
- $370,000 would be reserved to support the 65 families permanently displaced from their homes based on need through GLCAC.

- $350,000+ would be reserved for ECCF to grant to Greater Lawrence nonprofits providing programs to support continued needs in the region (the Request for Proposals [RFP] process was designed in collaboration with nonprofits and municipalities).

Figure 52: Governor Baker Facilitates a Meeting of the Greater Lawrence Disaster Relief Fund.

Funds Raised/Awarded

Funds Raised:

- $12.6 million was raised by 6,887 donors for direct support to those in need.
- An additional $700,000 was raised by ECCF staff from private foundations for infrastructure and administration to deliver the relief efforts.
- Nonprofits and administrative expenses were paid from the "admin fund" ensuring that every dollar donated to help those in need was used as intended. This included items such as signage, radio advertising, donor receipts, and credit card fees.

Funds Awarded:

- $11 million was awarded to approximately 9,250 households and businesses.
- $1.1 million in gift cards for those in greatest need have or will be awarded by September 2019 to an estimated 2,500 households through case management support.
- $370,000 was awarded by June 2019 to the 65 families permanently displaced by the crisis.
- $423,000 was awarded by March 31st, 2019, to 17 nonprofits supporting the continued needs of gas crisis survivors with vital programming.

Finding I-25: Area for Improvement

While there was a committee developed for the access and distribution of the major donated funds for those impacted by the disaster, there lacked a committee to address how to meet the unmet, unique, and complex needs of impacted residents.

5.4.5 Financial Support to the Business Community

Merrimack Valley Business Relief

More than 800 businesses were impacted as a result of the incident and subsequent service disruptions. Markets and restaurants lost their inventories, closed businesses, and lost their employees and key staff. Impacted customers, who were relocated or forced to change their spending habits, were no longer frequenting their favorite businesses. Even businesses which were not directly impacted by the gas explosions and related service interruptions were economically impacted. Owners struggled to pay their bills, feed their families, and afford housing.

The Merrimack Valley Business Relief initiative was established as an offshoot mission of the GLDRF to support the acute needs of impacted businesses in Andover, North Andover, and Lawrence, and invest long term in the regional business ecosystem. The formation of this business effort, however, took longer to form than the GLDRF did.

In late September, Governor Baker publicly announced the establishment of a $1 million Emergency Loan Fund for businesses directly impacted by the incident. The Fund, which officially opened on October 1st, 2018, was a result of the collective effort of Mass Growth Capital Corporation, Lawrence Partnership, the ten lenders involved with Lawrence Venture Loan Fund, and Mill Cities Community Investments. In addition, a $250,000 loan loss reserve for this fund was contributed by Columbia Gas.

The program offered emergency loans to eligible businesses with no payments and no interest for the first six months. The application process was expedited with the goal of processing applications within 24 to 48 hours.

A local coalition was formed in October to coordinate the loan fund. Business leaders; town employees from Lawrence, Andover, and North Andover; state officials; and community advocates comprised the heart of the coalition, which met on an almost weekly basis to respond to the initial crisis and develop and implement integrated programming to support impacted businesses. In addition, the coalition aligned resources, developed strategies, and implemented a variety of critical services to help these businesses get back up and running.

On October 24th, the Emergency Loan Fund grew to $3 million due to recapitalization with the support of numerous financial institutions and a $750,000 contribution from Columbia Gas.

With the large influx of funds being raised for the business community, Columbia Gas established support systems to ensure that business owners had the tools they needed to ensure financial recovery. First, Columbia Gas established a claims line “Back-to-Business” center for impacted businesses to file claims and for other business recovery resources and information.

Additionally, impacted business owners; NiSource/Columbia Gas; the city of Lawrence and the towns of Andover and North Andover; the Commonwealth of Massachusetts; and local non-

profit providers assembled a coalition of local stakeholders to develop, implement, and coordinate a customized business support services plan. This helped businesses get their doors open again and ensure that they had access to the resources to get their customers back. Since the incident, the coalition has conducted outreach to impacted businesses through nearly 4,000 site visits, phone calls, and other efforts; helped small businesses secure $500,000 in loans; provided technical assistance in hiring, accounting, and marketing; and assisted with claims filings. Additionally, more than 200 businesses received resiliency training and specialized support.

In mid-November, the Emergency Loan Fund was re-negotiated by Governor Baker, local town officials, and Columbia Gas. The re-negotiation resulted in a plan to leverage $10 million in additional funding from Columbia Gas to continue to support business recovery efforts in Merrimack Valley. On November 21st, the Merrimack Valley Business Relief Fund (MVBRF) was publically announced, replacing the Emergency Loan Fund. It was decided that MVBRF funding would be spread across three major areas, with clear goals and objectives:

- $2 million – Acute Fund: December 2018 – July 2019
- $6 million – Municipal Fund: December 2018 – until expended
- $2 million – Long-Term Innovation Fund: September 2019 – 2022

Finding I-26: Area for Improvement

While business relief efforts were developed through a coalition effort, it took time to formulate a plan to negotiate an additional $10 million contribution from Columbia Gas and ramp up lead partners to deliver the work of the relief effort. Therefore, the business relief efforts didn't officially launch until late November/early December.

SBA Economic Injury Disaster Loans

In response to this disaster, the Small Business Administration (SBA) issued an Economic Injury Disaster Loan for impacted businesses in the region. Under this declaration, SBA made available working capital loans to help small businesses, small agricultural cooperatives, small businesses engaged in aquaculture, and most private, non-profit organizations of all sizes to meet their ordinary and necessary financial obligations that could not be met as a direct result of the disaster. These loans were intended to assist through the disaster recovery period.

The SBA established a SBA Disaster Loan Outreach Center in Lawrence to answer questions about the loan program, explain the application process, and help individuals complete their application. In addition, the SBA created:

- A website for businesses to apply online: https://disasterloan.sba.gov/ela.
- A 1-800 Customer Service Center number, to include an additional phone number for the deaf and hard of hearing.
- An email address to request more information on SBA disaster assistance.

5.4.6 Support to Local Restaurants

In the aftermath of the incident, many restaurants/food services businesses in the three communities were temporarily closed due to no source of heat and hot water. As the effects on the restaurant community were realized, the communities developed guidance and support mechanisms to assist food establishments with reopening. The Town of Andover's Public Health Department reached out to businesses in the town to assess any public health issues, and to work with these businesses on various options for safely re-opening. On September 25th, the Town's Public Health Department announced/released guidance on "Possible Temporary Food Service Options." This guidance outlined a number of options local establishments could use to become operational, as well as provided a list of local contacts that could offer support, including such contacts as the local Fire Chief and food service equipment suppliers.

The City of Lawrence proactively reached out to the Massachusetts Department of Public Health (MDPH) to request assistance with food inspection services as they planned to bring food establishments back online. The Bureau of Environmental Health (BEH) provided inspectors to assist in this process. Additionally, the Statewide Public Safety Mutual Aid Law was utilized to bring other local public health inspectors into the City to assist with the need before capacity was exceeded.

6.0 Conclusion

The methodical process undertaken by the Steering Committee and participating agencies to discuss, report, and capture critical details from the response and recovery efforts to the Merrimack Valley natural gas explosions has yielded an after action report that is useful to guide the planning and preparedness for future disasters. Best practices were identified that emphasize the extensive work undertaken by local, state, private, non-profit, and federal agencies to prepare for, respond to, and recover from disasters in the Commonwealth. Areas for improvement were captured in an unbiased fashion, because any response and recovery effort can reveal deficiencies in process or performance. Based on the points addressed throughout this document, an Improvement Plan (IP) was developed to highlight attainable improvement areas, assign responsibility to various agencies to take lead roles in completing the actions, and associate timelines based on the priority of the recommended actions.

The September 2018 Natural Gas Explosions in the Merrimack Valley constituted one of the more unique disasters in the history of the Commonwealth. Out-of-the-box thinking was required to ensure that the needs of the citizens in these communities were addressed, and to limit additional disruption to their daily routines. Communities developed creative solutions for their citizens, attended to their individual needs, and ensured their constituents had what they needed to recover. State agencies responded to the disaster, ready to support the local communities in any way possible. Existing plans were executed to ensure local response was supported where needed, and agencies worked side by side to ensure the continued safety of responders and the public. The impacted utility, being recognized as a responsible party, came to the table to ensure their customers' needs were eventually met and the impacted gas infrastructure was completely rebuilt—an effort that completed ten years' worth of work in about three months. Mutual aid from across the United States supported the recovery effort, utilizing existing systems which, up until September 2018, had largely been used to support response to a natural disaster. New and innovative temporary housing solutions were met the unique needs of three demographically different communities.

As a result of the methodical and unbiased process used to create this report, it is the hope of the authors that the identified best practices and the IP may be used to enhance planning and preparedness for any incident and in any state. The uniqueness of the event and the creativity used to solve problems can serve as discussion and learning points for responders and agencies across the country, and certainly in the Commonwealth of Massachusetts.

Appendix A: Findings Matrix

This Appendix consolidates all findings located throughout the document into an easy-to-follow table. For greater context, the section in which they are located is also listed, so they can be referenced in Section 5 of the AAR.

Reference #	Finding	Section
S-1	The Statewide Fire and EMS Mobilization Plan effectively provided firefighting mutual aid resources to the Merrimack Valley Region for four days.	5.1.1
S-2	Existing Law Enforcement mutual aid plans deployed and managed law enforcement assets from across the region. Assets were managed effectively by the three communities and the NEMLEC IMAT.	5.1.1
R-1	Law Enforcement and Fire Mobilization mutual aid plans should continue to be utilized to their fullest to allow for the effective requesting, deploying, integration, and tasking of regional resources.	5.1.1
S-3	Communications Unit Leaders (COMLs) were embedded with some public safety assets and mutual aid task forces to ensure that available interoperability channels were made available, by function, to support emergency response.	5.1.1
R-2	A formal Communications Program, coordinated through the Statewide Interoperability Coordinator (SWIC), could ensure Communications Unit Leaders (COMLs) are built into existing mutual aid plans, to deploy to the scene during any regional or significant mutual aid operation, to allow for assignment and utilization of interoperable radio channels	5.1.1
I-1	In some cases, incoming mutual aid did not have portable or mobile radios programmed with appropriate interoperability channels, or had misnamed channels which were not used appropriately.	5.1.1
R-3	Public Safety agencies must ensure that interoperability channels are properly programmed and named in their radios, using guidance in the Massachusetts Tactical Channel Plan, for use when assigned at complex or out of district events.	5.1.1
R-4	Unified Command and a Leadership Group should be established during large, regional disasters. A Leadership Group can serve to establish policy and provide strategic direction and decision making to Unified Command in the management of a crisis, issue, or incident. Unified Command takes this direction to implement strategic objectives. MEMA will support the development and management of these structures, and provide recommendations on implementation.	5.1.3
I-2	During emergencies, public safety agencies require sufficient information to inform their response. The lack of this information from Columbia Gas delayed public safety response efforts.	5.1.3
R-5	In times of emergency, gas utilities must be able to provide timely and accurate information to public safety partners to allow them to respond effectively. The Department of Public Utilities (DPU) and the Executive Office of Energy and Environmental Affairs (EOEEA) will work with gas utilities to determine the information types that are reasonable to provide.	5.1.3

Reference #	Finding	Section
S-4	Wireless Emergency Alerts (WEA) were effectively used to notify a large population in the affected area of the need to evacuate.	5.1.4
R-6	Wireless Emergency Alerts (WEA) are a useful tool for rapid notification to all people in an impacted area. Continued use and education on the WEA tool should be continued in local and state government. Given the limitations on the number of characters, other notification systems should supplement the WEA to provide additional details on the situation.	5.1.4
S-5	There was strong coordination and communication throughout the evacuation process between local and state government agencies and the transportation provider.	5.1.4
R-7	Local evacuation plans should be developed in coordination with state partners to support evacuations during both notice and no-notice events.	5.1.4
I-3	Critical policy-level decisions made by senior officials about the incident were not always shared with local incident commanders and EOCs. Having a fully staffed Unified Command structure complemented by a Leadership Group would help to mitigate the information sharing gap.	5.1.4
S-6	Locally developed comprehensive Mass Care and Shelter Plans, with pre-identified shelter locations, initially allowed for a rapid shelter activation in each town.	5.1.4
S-7	The American Red Cross (ARC) and Salvation Army effectively synchronize feeding and shelter activities and have efficient feeding capabilities to provide mass feeding services during emergency shelter operations.	5.1.4
R-8	Mass Feeding operations can be better coordinated by the Local Emergency Management Director in an Emergency Operations Center. Coordination through an EOC will ensure there is a centralized Point of Contact (POC) and that competing requests do not conflict.	5.1.4
R-9	An information liaison should be designated by the Unified Command Post to support the collection, analysis, and dissemination of information between agencies, which will aid in the development of a Common Operating Picture. One tool the liaison can utilize is WebEOC, the Commonwealth's primary information sharing platform, to ensure that key stakeholders are up to date on the details of the response.	5.1.5
I-4	A Joint Information Center (JIC), which is a physical location where officials can collaborate on public messaging, was not established during this event. While Unified Command worked together to coordinate messages and host press conferences, a JIC would have better supported the management of media messages and requests for information.	5.1.5
R-10	The Commonwealth should develop a Joint Information Center Coordination Plan, to ensure unity of message from multiple stakeholders during a significant event.	5.1.5
S-8	A clearly defined Media Staging Area was established at the Unified Command Post in Lawrence, which allowed for efficient and effective access to the media, and also kept the media in a controlled location.	5.1.5
I-5	There was no established schedule for press conferences during the initial days of this event. Having a set schedule and rhythm, coordinated by a JIC, would have allowed media to manage expectations in a more efficient manner, and would have provided a more consistent process for updates information.	5.1.5

Reference #	Finding	Section
I-6	Having plans and agreements in place to provide language translation services that match the demographics of the impacted community is essential when providing public safety information to the general public.	5.1.5
R-11	To ensure residents of an impacted community can receive time sensitive messages, the Commonwealth should have an agreement in place to provide appropriate language translation services during press conferences.	5.1.5
S-9	Andover, Lawrence, and North Andover all assigned representatives to monitor their social media platforms, which allowed for enhanced monitoring and information sharing with their residents.	5.1.5
R-12	To support the Public Information Officer (PIO), a liaison should be dedicated in all agencies to social media monitoring which will assist in developing an understanding of the operating environment and providing analysis of local needs and impacted areas.	5.1.5
S-10	Physically co-locating representatives from the Governor's Office, local and state agencies, and electric and gas utilities was essential for timely and collaborative policy-level decision making.	5.2.1
I-7	There was no designated Safety Officer for this incident to ensure the continued safety of responders.	5.2.1
R-13	A Safety Officer should be designated as part of the Incident Command Structure during a response, to assess safety hazards and ensure personnel safety during operations.	5.2.1
I-8	Additional Emergency Support Functions (ESF) should have been activated by MEMA in the State Emergency Operations Center (SEOC), and a MEMA liaison should forward deploy to the command post, to better coordinate and support the operational activities in the field.	5.2.1
I-9	Columbia Gas did not have a flexible and scalable emergency response plan, to address a catastrophic incident within their service area. The lack of a comprehensive plan hampered their ability to effectively support the public safety response.	5.2.1
R-14	Minimum standards for gas utilities should be expanded to require the development of flexible, scalable, and actionable response plans, with associated training and exercise programs, which can address catastrophic incidents within their service area. This will better prepare gas utilities to provide the information and expertise needed for a rapid response with public safety agencies during an emergency.	5.2.1
S-11	Governor Baker and the DPU Chairman promptly used the emergency powers available to them to empower utility leadership—which had the requisite capability and experience—to facilitate advanced resource coordination and effective communication in the face of a disaster of unprecedented magnitude.	5.2.1
S-12	Obtaining locksmiths at short notice made entering the houses easier and in turn sped up the process of turning off the 8,000 meters in the impacted area.	5.2.2
S-13	The power restoration process was methodical and coordinated, with an emphasis on public safety.	5.2.2
I-10	The damage assessment process was not coordinated amongst the various partners needing damage assessment data. This resulted in duplicate assessments, delays in sharing information, and reduced efficiency.	5.2.2

Reference #	Finding	Section
R-15	Agencies should utilize the Commonwealth's Rapid Damage Assessment Coordination Plan in future events to maximize effort, enable effective information sharing, and reduce duplication of effort during the damage assessment process.	5.2.2
S-14	When making the decision to rescind the evacuation order, and to minimize the risk to residents, officials timed re-entry to coincide with daylight hours.	5.2.2
I-11	The gas utility did not fully account for the demographics of the impacted communities, which in some cases delayed delivery of appropriate services to impacted customers.	5.2.3
R-16	Local governments should ensure that their community's demographics are included in all-hazards planning so that the needs of their residents are considered during a disaster.	5.2.3
I-12	There was a lack of consideration for the behavioral health needs of public health and public safety personnel. Because first responders are faced with a myriad of stressors that go beyond what the general population may experience, it is imperative they have immediate and ongoing access to behavioral health services.	5.2.3
R-17	Disaster behavioral health plans should be developed by appropriate state and local agencies to include provision of services to first responders.	5.2.3
I-13	Better coordination needs to exist for donations and volunteer management. Without guidance to the general public, donations were not always appropriate, and were often not being dropped off in appropriate locations.	5.2.4
R-18	Statewide donations management guidance should be developed to ensure effective operation, management, and coordination of donations following a regional disaster.	5.2.4
R-19	A statewide volunteer management plan should be developed to ensure a process exists to coordinate spontaneous volunteers.	5.2.4
S-15	The hiring of a Chief Recovery Officer (CRO) to manage and coordinate the restoration efforts, who was familiar with both construction trades and the geographic area, allowed for a rapid and effective recovery structure to be quickly implemented.	5.3.1
I-14	With the State's lack of recent experience in major recovery operations, an organizational structure focused on recovery efforts did not previously exist and needed to be developed quickly.	5.3.1
R-20	The Commonwealth needs to invest in an all-hazards Recovery Framework, and ensure buy-in and agreement from cross sector partners, to include elected officials.	5.3.1
I-15	Enhanced information sharing amongst all partners, while the organizational structure expands, can allow for improved clarity of reporting structures, and synchronization within the existing structure.	5.3.1
R-21	There are established processes and national best practices to ensure a streamlined recovery structure and planning process. Partnering emergency management subject matter experts with the Chief Recovery Officer can help to streamline this process and associated programs.	5.3.1
S-16	The Fire Safety Working Group (established to ensure fire safety considerations were part of every component of the reconstruction, and to provide decision support and messaging for local fire departments) was a key advisor to the CRO in decision-making regarding fire safety, and ensured local input from fire chiefs in the impacted communities.	5.3.1

Reference #	Finding	Section
I-16	There was a lack of comprehensive input from all partners regarding Operation Temp Heat, which caused this plan to become impractical. There was a need for more robust and inclusive planning surrounding this operation.	5.3.2
R-22	Recovery efforts must include input from all key stakeholders to account for potential cascading impacts and consequences.	5.3.2
S-17	Columbia Gas established eight Restoration Zones, and each zone having an assigned zone commander to manage daily operations.	5.3.2
S-18	The Commonwealth's Executive Office of Energy and Environmental Affairs (EOEEA) proactively looked at ways to increase energy efficiency as appliances were replaced, utilizing Mass Save programs.	5.3.2
S-19	Leveraging the Emergency Management Assistance Compact (EMAC) was the most effective tool to source additional inspectors with appropriate licensure and experience.	5.3.2
S-20	Plumbers were vetted based on their education and time in the field; this expedited the process and allowed for 750 plumbers to be vetted. To further ensure all work was done in accordance with state plumbing code, temporarily licensed, out-of-state plumbers worked under the supervision of Massachusetts licensed master plumbers.	5.3.2
S-21	The Division of Professional Licensure (DPL) coordinated the inspectional services for all plumbing and electrical work associated with this event for all three communities, which helped to expedite the process.	5.3.2
I-17	No common data management system was utilized to track inspections and numerous visits to impacted homes. This duplicated efforts and delayed the process.	5.3.2
R-23	The process of relighting each home with natural gas service involved many home visits from different contractors. A consistent data management system is needed to allow for reconstruction efforts to be coordinated, and reduce duplicate visits at homes during recovery assessments, repairs, and inspections.	5.3.2
S-22	The Chief Recovery Officer (CRO) held regular briefings that were helpful to involved responders. The daily briefing calls were constructive, provided updates on the restoration process, and provided a platform for idea-sharing.	5.3.3
S-23	While initially identified as a gap, a lack of coordination amongst public safety officials was quickly remediated. These officials were integrated into daily utility project planning meetings to ensure that future unanticipated consequences were avoided.	5.3.3
I-18	While regular briefings were held with key officials in the Recovery Organizational Structure, regular construction updates, including daily Columbia Gas briefings, were not consistently being shared with the public, which delayed transparency.	5.3.3
I-19	There was no state RRC Plan in place to guide the RRC operation in Lawrence. Additionally, the American Red Cross (ARC) was not consulted, and their Multi-Agency Resource Center Planning Guide was not considered for help managing the RRC.	5.4.1
R-24	A state-led Recovery Resource Center (RRC) Plan and accompanying local guidance should be developed to ensure there is a consistent and efficient mechanism to deliver a full spectrum of services in times of disaster.	5.4.1

Reference #	Finding	Section
S-24	Following the closure of the RRC, many local organizations and non-governmental organizations (NGOs) remained in the affected community to provide continued support and services.	5.4.1
S-25	A temporary State Recovery Office was established in the impacted area, to allow staff to be visible in the community and engaged in continued human services recovery service delivery.	5.4.2
R-25	State and local recovery plans should include considerations for individuals with disabilities and others with access and functional needs (AFN). This will ensure effective and appropriate supports and services are provided to the affected population.	5.4.2
I-20	Columbia Gas' emergency plan did not account for scalable temporary housing solutions to support customer's needs on a mass scale.	5.4.2
S-26	While any resident in the impacted area was eligible for housing, local officials, in coordination with Columbia Gas proactively reached out to the most vulnerable residents, and to residents whose homes would not have their gas service restored until after November 1st to assess their needs and offer to facilitate alternative housing assignments.	5.4.2
I-21	Leasing and sub-leasing apartments as a form of temporary housing was challenging and resource intensive, due to multiple issues, including the background check process, low housing stock, and navigating complex tenant/landlord laws.	5.4.2
R-26	Tenant/landlord laws should be evaluated and considered by the Leadership Group at the onset of the disaster housing mission, to determine if leasing/subleasing apartments as a form of interim housing is a viable option.	5.4.2
S-27	Travel trailer sites were established in close proximity to the most impacted areas of each community allowing individuals and families to be near their home, place of work, school, and community services.	5.4.2
S-28	A comprehensive plan and site map were developed for each travel trailer site, to ensure that all logistical and operational considerations were captured.	5.4.2
S-29	Each of the travel trailer sites utilized an Incident Command Structure (ICS) to effectively manage, organize, and coordinate the activities of multiple agencies serving and supporting the operation, which complemented the overall housing mission ICS Structure.	5.4.2
S-30	Local and state partners and contracted vendors coordinated to identify creative, ad hoc solutions to logistical and operational challenges that enabled them to maintain travel trailer units/sites and keep guests comfortable.	5.4.2
R-27	The Commonwealth's Disaster Housing Plan should be revised to include considerations for creative alternative housing solutions on a mass scale, with many options, to allow for survivors to remain close to home and engaged in their normal community activities, while having a safe place to stay.	5.4.2
S-31	The contracted vendors from SLS and BCFS had a vast amount of experience in providing "turn-key" emergency shelter services, which were accompanied by a complete management, operations, and logistics team that was highly adept at working with governments and agencies at all levels.	5.4.2
S-32	The congregate shelter plan was both flexible and scalable allowing the shelter to accommodate up to 1,000 shelter clients if needed.	5.4.2

Reference #	Finding	Section
S-33	MEMA, American Red Cross (ARC), and Salvation Army provided recommendations from state agency partners and NGOs as well as referenced the Commonwealth's State Initiated Regional Shelter (SIRS) Plan when coordinating with SLS and BCFS to ensure the needs of all shelter clients would be met.	5.4.2
S-34	SLS leveraged the Incident Command System, including operating a Command Center with a strong organizational structure, to efficiently manage and operate the shelter.	5.4.2
S-35	To better identify, process, and comprehend the status of the congregate shelter, a detailed Situation Report (SITREP) was provided every 12 hours, and a daily "Services Rendered" report was provided daily, to key stakeholders.	5.4.2
S-36	The presence of local public safety and health/human services staff was well received by shelter clients. In addition, being present in the shelter provided health and human services staff an opportunity to interface with shelter clients to gauge and address any unmet needs.	5.4.2
I-22	Communication between Columbia Gas Restoration Teams and Call Centers was not initially sufficient to keep residents informed of the status of their residences, and as they neared "move-in ready" status.	5.4.2
I-23	There was a lack of a comprehensive transition plan in place as interim housing needs began to subside, to assist individuals and families move from their interim housing placement back to their home or to more permanent housing.	5.4.2
R-28	State and local disaster housing plans should include strategies and considerations to transition individuals and families residing in an emergency shelter or interim housing, and who require additional support, back to their home or to more permanent housing.	5.4.2
S-37	Having the Lawrence Emergency Fund in place prior to the incident allowed the Essex County Community Foundation (ECCF) to quickly respond to the immediate financial needs of residents.	5.4.4
R-29	Communities should identify a mechanism or partner with a nonprofit organization to create an emergency fund in advance of a disaster in order to allow for financial support that is rapid and accountable to survivors' needs.	5.4.4
S-38	A small number of lead nonprofits had the ability to handle a large amount of money and had the infrastructure to deliver resources. Selecting the right organizations allowed the response to be efficient.	5.4.4
I-24	The swift setup and infrastructure of the Customer Relationship Management (CRM) system caused issues throughout the efforts. Although the site was designed within 10 days, it needed constant improvement and upgrades for efficiency and reporting needs. It required updates to address cultural and language sensitivities.	5.4.4
I-25	While there was a committee developed for the access and distribution of the major donated funds for those impacted by the disaster, there lacked a committee to address how to meet the unmet, unique, and complex needs of impacted residents.	5.4.4
I-26	While business relief efforts were developed through a coalition effort, it took time to formulate a plan to negotiate an additional $10 million contribution from Columbia Gas and ramp up lead partners to deliver the work of the relief effort. Therefore, the business relief efforts didn't officially launch until late November/early December.	5.4.5

Appendix B: Improvement Plan

This Improvement Plan has been developed to guide and facilitate enhancements to local and state government public safety agencies, and can be used to augment response and recovery efforts during future disasters. Recommended priorities are incorporated in an effort to assigned timelines for action completion. Priority timelines include:

- High: Substantial effort initiated within 12 months
- Moderate: Effort initiated within 12-24 months
- Low: Effort initiated in more than 24 months
- Ongoing: Action Item is already in development or in place; continued practice is recommended.

Recommendation #	Action Item	Reference #	Primary Responsibility	Supported By	Priority
1. Initial Response					
R-1	Law Enforcement and Fire Mobilization mutual aid plans should continue to be utilized to their fullest to allow for the effective requesting, deploying, integration, and tasking of regional resources.	S-1 & S-2	Local Fire Local Police	MEMA DFS, MSP, Fire Mobilization	Ongoing
R-2	A formal Communications Program, coordinated through the Statewide Interoperability Coordinator (SWIC), could ensure Communications Unit Leaders (COMLs) are built into existing mutual aid plans, to deploy to the scene during any regional or significant mutual aid operation, to allow for assignment and utilization of interoperable radio channels.	I-1 & S-3	SWIC	Statewide COML's	High
R-3	Public Safety agencies must ensure that interoperability channels are properly programmed and named in their radios, using guidance in the Massachusetts Tactical Channel Plan, for use when assigned at complex or out of district events.	I-1	SWIC	Individual Radio Owners	High
R-4	Unified Command and a Leadership Group should be established during large, regional disasters. A	I-3 & S-10	MEMA		High

Recommendation #	Action Item	Reference #	Primary Responsibility	Supported By	Priority
	Leadership Group can serve to establish policy and provide strategic direction and decision making to Unified Command in the management of a crisis, issue, or incident. Unified Command takes this direction to implement strategic objectives. MEMA will support the development and management of these structures and provide recommendations on implementation.				
R-5	In times of emergency, gas utilities must be able to provide timely and accurate information to public safety partners to allow them to respond effectively. The Department of Public Utilities (DPU) and the Executive Office of Energy and Environmental Affairs (EOEEA) will work with gas utilities to determine the information types that are reasonable to provide.	I-2	Gas Utilities	EOEEA DPU	High
R-6	Wireless Emergency Alerts (WEA) are a useful tool for rapid notification to all people in an impacted area. Continued use and education on the WEA tool should be considered in local and state government. Given the limitations on the number of characters, other notification systems should supplement the WEA to provide additional details on the situation.	S-4	MEMA	Local EMD	Moderate
R-7	Local evacuation plans should be developed in coordination with state partners to support evacuations during both notice and no-notice events.	S-5	Local EMD	MEMA	Moderate
R-8	Mass Feeding operations can be better coordinated by the Local Emergency Management Director in an Emergency Operations Center. Coordination through an EOC will ensure both that there is a centralized	S-7	Local EMD MEMA	ARC Salvation Army	High

Recommendation #	Action Item	Reference #	Primary Responsibility	Supported By	Priority
	Point of Contact (POC) and that competing requests do not conflict.				
R-9	An information liaison should be designated by the Unified Command Post to support the collection, analysis, and dissemination of information between agencies, which will aid in the development of a Common Operating Picture. One tool the liaison can utilize is WebEOC, the Commonwealth's primary information sharing platform, to ensure that key stakeholders are up to date on the details of the response.	I-3 & I-8	MEMA	Local EMD	High
R-10	The Commonwealth should develop a Joint Information Center Coordination Plan, to ensure unity of message from multiple stakeholders during a significant event.	I-4 & I-5	MEMA		Moderate
R-11	To ensure residents of an impacted community can receive time sensitive messages, the Commonwealth should have an agreement in place to provide appropriate language translation services during press conferences.	I-6	MEMA		High
R-12	To support the Public Information Officer (PIO), a liaison should be dedicated in all agencies for social media monitoring in order to assist in developing an understanding of the operating environment and providing analysis of local needs and impacted areas.	I-4 & S-9	Local EMD	MEMA	Moderate
2. Ongoing Response					
R-13	A Safety Officer should be designated as part of the Incident Command Structure during a response, to	I-7	Local EMD	MEMA	High

Recommendation #	Action Item	Reference #	Primary Responsibility	Supported By	Priority
	assess safety hazards and ensure personnel safety during operations.				
R-14	Minimum standards for gas utilities should be expanded to require the development of flexible, scalable, and actionable response plans, with associated training and exercise programs, that can address catastrophic incidents within their service area. This will better prepare gas utilities to provide the information and expertise needed for a rapid response with public safety agencies during an emergency.	I-9, I-11, I-17, & I-20	EOEEA DPU	Gas Utilities	Low
R-15	Agencies should utilize the Commonwealth's Rapid Damage Assessment Coordination Plan in future events to maximize effort, enable effective information sharing, and reduce duplication of effort during the damage assessment process.	I-10	MEMA	OPSI, DFS, MSP, ARC, CAP	High
R-16	Local governments should ensure that their community's demographics are included in all-hazards planning so that the needs of their residents are considered during a disaster.	I-11	Local EMD	MEMA	Moderate
R-17	Disaster behavioral health plans should be developed by appropriate state and local agencies to include provision of services to first responders.	I-12	DMH Local EMD	MEMA	Moderate
R-18	Statewide donations management guidance should be developed to ensure effective operation, management, and coordination of donations following a regional disaster.	I-13	MEMA		Ongoing

Recommendation #	Action Item	Reference #	Primary Responsibility	Supported By	Priority
R-19	A statewide volunteer management plan should be developed to ensure a process exists to coordinate spontaneous volunteers.	I-13	MEMA	ARC Salvation Army	Ongoing
3. Recovery Efforts: Restoration and Replacement					
R-20	The Commonwealth needs to invest in an all-hazards Recovery Framework, and ensure buy-in and agreement from cross sector partners, to include elected officials.	I-14 & I-15	MEMA	Recovery Partners	Ongoing
R-21	There are established processes and national best practices to ensure a streamlined recovery structure and planning process. Partnering emergency management subject matter experts with the Chief Recovery Officer can help to streamline this process and associated programs.	I-15	MEMA	Recovery Partners	Ongoing
R-22	Recovery efforts must include input from all key stakeholders to account for potential cascading impacts and consequences.	I-16	All		High
R-23	The process of relighting each home with natural gas service involved many home visits from different contractors. A consistent data management system is needed to allow for reconstruction efforts to be coordinated, and reduce duplicate visits at homes during recovery assessments, repairs, and inspections.	I-17	Gas Utility	EOEEA DPU	Moderate
4. Recovery Efforts: Human Services					
R-24	A state-led Recovery Resource Center (RRC) Plan and accompanying local guidance should be developed to ensure there is a consistent and efficient mechanism to deliver a full spectrum of services in times of disaster.	I-19	MEMA	RRC Partner Agencies	Ongoing

Recommendation #	Action Item	Reference #	Primary Responsibility	Supported By	Priority
R-25	State and local recovery plans should include considerations for individuals with disabilities and others with access and functional needs (AFN). This will ensure effective and appropriate supports and services are provided to the affected population.	I-20 & S-25	MEMA Local EMD	ARC	High
R-26	Tenant/landlord laws should be evaluated and considered by the Leadership Group at the onset of the disaster housing mission, to determine if leasing/subleasing apartments as a form of interim housing is a viable option.	I-21	EOHHS	MEMA	Moderate
R-27	The Commonwealth's Disaster Housing Plan should be revised to include considerations for creative alternative housing solutions on a mass scale, with many options, to allow for survivors to remain close to home and engaged in their normal community activities, while having a safe place to stay.	S-26 & S-30	MEMA	EOHHS	Ongoing
R-28	State and local disaster housing plans should include strategies and considerations to transition individuals and families residing in an emergency shelter or interim housing, and who require additional support, back to their home or to more permanent housing.	I-22 & I-23	Recovery Manager MEMA Local EMD	EOHHS	Moderate
R-29	Communities should identify a mechanism or partner with a nonprofit organization to create an emergency fund in advance of a disaster in order to allow for financial support that is rapid and accountable to survivors' needs.	S-37, S-38, & I-24	Local EMD	EOHHS	Low

Appendix C: Acronyms and Abbreviations

AAR	After Action Report
ADA	Americans with Disabilities Act
AFN	Access and Functional Needs
Amp	Ampere
ARC	American Red Cross
ASL	American Sign Language
BEH	Bureau of Environmental Health
CAP	Civil Air Patrol
CEMLEC	Central Massachusetts Law Enforcement Council
CFC	Commonwealth Fusion Center
CMR	Commonwealth of Massachusetts Regulation
COML	Communications Unit Leader
COP	Common Operating Picture
CRM	Customer Relationship Management
CRO	Chief Recovery Officer
CTN	Critical Transportation Needs
DCF	Department of Children and Families
DFS	Department of Fire Services
DMH	Department of Mental Health
DOC	Department Operations Center; or Department of Corrections
DPL	Division of Professional Licensure
DPU	Department of Public Utilities
EAP	Evacuation Assembly Points
ECCF	Essex County Community Foundation
EEA/EOEEA	Executive Office of Energy and Environmental Affairs
EIDL	Economic Injury Disaster Loan
EMAC	Emergency Management Assistance Compact
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOHHS	Executive Office of Health and Human Services
EOPSS	Executive Office of Public Safety and Security
FBI	Federal Bureau of Investigations
FEMA	Federal Emergency Management Agency
GLCAC	Greater Lawrence Community Action Council
GLDRF	Greater Lawrence Disaster Relief Fund
ICS	Incident Command System
IMAT	Incident Management Assistance Team
IP	Improvement Plan
IPAWS	Integrated Public Alert and Warning System
JIC	Joint Information Center
JTTF	Joint Terrorism Task Force
LEF	Lawrence Emergency Fund

MADHTF	Massachusetts Disaster Housing Task Force
MANG	Massachusetts National Guard
MA-TCP	Massachusetts Tactical Channel Plan
MDPH	Massachusetts Department of Public Health
MEMA	Massachusetts Emergency Management Agency
MGL	Massachusetts General Law
MOU	Memorandum of Understanding
MRC	Medical Reserve Corps
MSP	Massachusetts State Police
MSPCA	Massachusetts Society for the Prevention of Cruelty to Animals
MVRTA	Merrimack Valley Regional Transit Authority
NEMLEC	Northeast Massachusetts Law Enforcement Council
NGA	Northeast Gas Association
NGO	Non-Governmental Organizations
NTSB	National Transportation Safety Board
OEC	Office of Emergency Communications
OEMS	Office of Emergency Medical Services
OPSI	Office of Public Safety Inspections
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIO	Public Information Officer
POC	Point of Contact
PSAP	Public Safety Answering Point
RFP	Request for Proposals
RRC	Recovery Resource Center
RV	Recreational Vehicle
SAS	Situational Awareness Statement
SBA	Small Business Administration
SEMLEC	Southeastern Massachusetts Law Enforcement Council
SEOC	State Emergency Operations Center
SIRS	State Initiated Regional Shelter
SITREP	Situation Report
SME	Subject Matter Expert
SNAP	Supplemental Nutrition Assistance Program
SWIC	Statewide Interoperability Coordinator
Temp	Temporary
UCC	Unified Coordination Center
UMR	Urgent Matter Report
WEA	Wireless Emergency Alerts
YMCA	Young Men’s Christian Association

Appendix D: References

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