

**NATIONAL TRANSPORTATION SAFETY BOARD**  
**Public Meeting of April 23, 2019**  
**(Information subject to editing)**

**Building Explosion and Fire**  
**Silver Spring, Maryland**  
**August 10, 2016**  
**NTSB/PAR-19/01**

This is a synopsis from the NTSB's report and does not include the Board's rationale for the conclusions, probable cause, and safety recommendations. NTSB staff is currently making final revisions to the report from which the attached conclusions and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing to reflect changes adopted during the Board meeting.

## **Executive Summary**

On August 10, 2016, at 11:51 p.m., eastern daylight time, a 14-unit apartment building, located at 8701 Arliss Street, in the unincorporated community of Silver Spring, in Montgomery County, Maryland, partially collapsed due to a natural gas-fueled explosion and fire. The explosion and fire also heavily damaged an adjacent apartment building, 8703 Arliss Street, which shared a common wall with building 8701. As a result of this accident, 7 residents died, 65 residents were transported to the hospital, and 3 firefighters were treated and released from the hospital. The damage from the accident exceeded \$1 million.

The following are safety issues in this accident:

- the location and inspection of service regulators within a structure
- the inspection of the gas meter assembly
- the notification of the natural gas odor to Washington Gas
- the detection of natural gas through odorants and methane

## **Findings**

1. The postexplosion responses by both Montgomery County Fire and Rescue Service and Washington Gas were prompt and adequate.
2. Based on the pattern of debris and the location of the victims, the explosion radiated from the meter room, where the gas meter assembly was located.
3. The upper mercury service regulator was most likely connected to the vent line through the threaded nipple and union assembly prior to the explosion in building 8701 and the regulator

likely became separated from the vent line due to forces of the explosion or from the building collapse.

4. The external threaded socket of the lower mercury service regulator union most likely was not threaded to the nut and therefore the lower mercury service regulator was not connected to the vent line prior to the explosion.
5. Without a requirement that technicians verify the connection of vent lines for indoor service regulators, such vent lines could inadvertently be left open following service work.
6. The gas piping to the water heater was most likely separated at the control valve due to overstress forces resulting from the explosion.
7. The water heater did not fail prior to the explosion and was not the source of the natural gas release in the meter room.
8. The audible hissing noises heard by a resident, the evidence of past mercury service regulator failures, the pre-existing unconnected vent line union, and the lack of evidence of any pre-existing anomalies in the gas piping or gas appliances, indicate that a failed mercury service regulator was the most likely source of the natural gas release in the meter room of building 8701.
9. A low leakage rate of venting natural gas from a mercury service regulator with an obstructed orifice, and other regulator failure scenarios with higher leakage rates, could have allowed the gas concentration to build up to an explosive atmosphere in the meter room between 8:42 p.m. and the time of the explosion at 11:51 p.m.
10. Washington Gas relied on unvalidated information to determine the location and condition of mercury service regulators.
11. The failure of a service regulator, combined with an unconnected vent line, poses a significant threat to people and property with little warning.
12. Had service regulators been located outside building 8701, the explosion would not have occurred because gas would have vented to the atmosphere and dissipated.
13. Had Washington Gas been notified of the gas odor call on July 25, a service technician may have had the opportunity to enter the meter room of building 8701, identify the unconnected vent line, and remedy the situation, potentially preventing the gas release and explosion that occurred on August 10.
14. The use of gas odorants alone does not effectively mitigate the risk of death and injuries caused by gas system leaks, such as the undetected leak that occurred at the Flower Branch apartment complex.
15. Had methane detectors been installed at the Flower Branch apartment complex, an alarm would have alerted residents to a gas release on either July 25, 2016, or August 10, 2016, reducing the potential and consequences of a natural gas explosion.

16. The development of a national code that establishes methane-detection performance criteria and requires the technology to be installed in residential and commercial buildings with natural gas service would provide a redundant means of leak detection to supplement the use of odorants.
17. The scope of *National Fire Protection Association 54, International Fuel Gas Code*, and their widespread adoption by local authorities appear to be the most appropriate standards for requiring methane detector alarms with local jurisdictions enforcing the requirements and making them feasible.

## **Probable Cause**

The National Transportation Safety Board determines that the probable cause of the explosion in building 8701 of the Flower Branch apartment complex was the failure of an indoor mercury service regulator with an unconnected vent line that allowed natural gas into the meter room where it accumulated and ignited from an unknown ignition source. Contributing to the accident was the location of the mercury service regulators where leak detection by odor was not readily available.

## **Recommendations**

### **New Recommendations**

As a result of this investigation, the National Transportation Safety Board makes the following new safety recommendations:

#### **To the Pipeline and Hazardous Materials Safety Administration:**

1. Require that all new service regulators be installed outside occupied structures.
2. Require existing interior service regulators be relocated outside occupied structures whenever the gas service line, meter, or regulator is replaced. In addition, multifamily structures should be prioritized over single-family dwellings.

#### **To the Public Service Commission of Maryland, the Commonwealth of Virginia State Corporation Commission Division of Public Utility Regulation, and the Public Service Commission of the District of Columbia:**

3. Following Washington Gas's successful completion of Safety Recommendation P-19-XX, audit and verify the performance of Washington Gas's mercury service regulator replacement program, including its recordkeeping.
4. Oversee the replacement process for the mercury service regulators that Washington Gas has in service.

**To the International Academies of Emergency Dispatch:**

5. Revise *Protocol-60 Gas Leak/Gas Odor (Natural and Liquefied Petroleum Gases)* to direct dispatchers to notify the gas company when any odor call is received.

**To the International Code Council:**

6. In coordination with the Gas Technology Institute and the National Fire Protection Association, incorporate provisions in the *International Fuel Gas Code* that requires methane detection systems for all types of residential occupancies with gas service. At a minimum, the provisions should cover the installation, maintenance, placement of the detectors, and testing requirements.

**To the National Fire Protection Association:**

7. In coordination with the Gas Technology Institute and the International Code Council, revise the *National Fuel Gas Code, National Fire Protection Association 54* to require methane detection systems for all types of residential occupancies with gas service. At a minimum, the provisions should cover the installation, maintenance, placement of the detectors, and testing requirements.

**To the Gas Technology Institute:**

8. In coordination with the National Fire Protection Association and the International Code Council, work to develop standards for methane detection systems for all types of residential occupancies in both the *International Fuel Gas Code and the National Fuel Gas Code, National Fire Protection Association 54*. At a minimum, the provisions should cover the installation, maintenance, placement of the detectors, and testing requirements.

**To Washington Gas:**

9. Throughout the Washington Gas network, implement an audit program to verify the data on the service forms used to determine the location and condition of mercury service regulators to ensure the accuracy of this safety-critical data.
10. Revise your procedures and field forms to require technicians to verify the integrity of vent lines following the testing of indoor service regulators throughout the Washington Gas network.
11. Establish a time frame with specific dates and milestones for the replacement of mercury service regulators throughout the Washington Gas network that recognizes the need to expedite this program and that prioritizes multifamily dwellings where mercury service regulators are located inside the property.
12. Install all new service regulators outside occupied structures.

13. Relocate existing interior service regulators outside occupied structures whenever the gas service line, meter, or regulator is replaced. In addition, multifamily structures should be prioritized over single-family dwellings.