



National Transportation Safety Board

Building Explosion and Fire
Silver Spring, Maryland
August 10, 2016

Rachael Gunaratnam
Investigator-in-Charge

Flower Branch Apartment Complex in November 2015



Flower Branch Apartment Complex on August 11, 2016



Buildings 8701 and 8703 Arliss Street





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Gas Odor on August 10, 2016

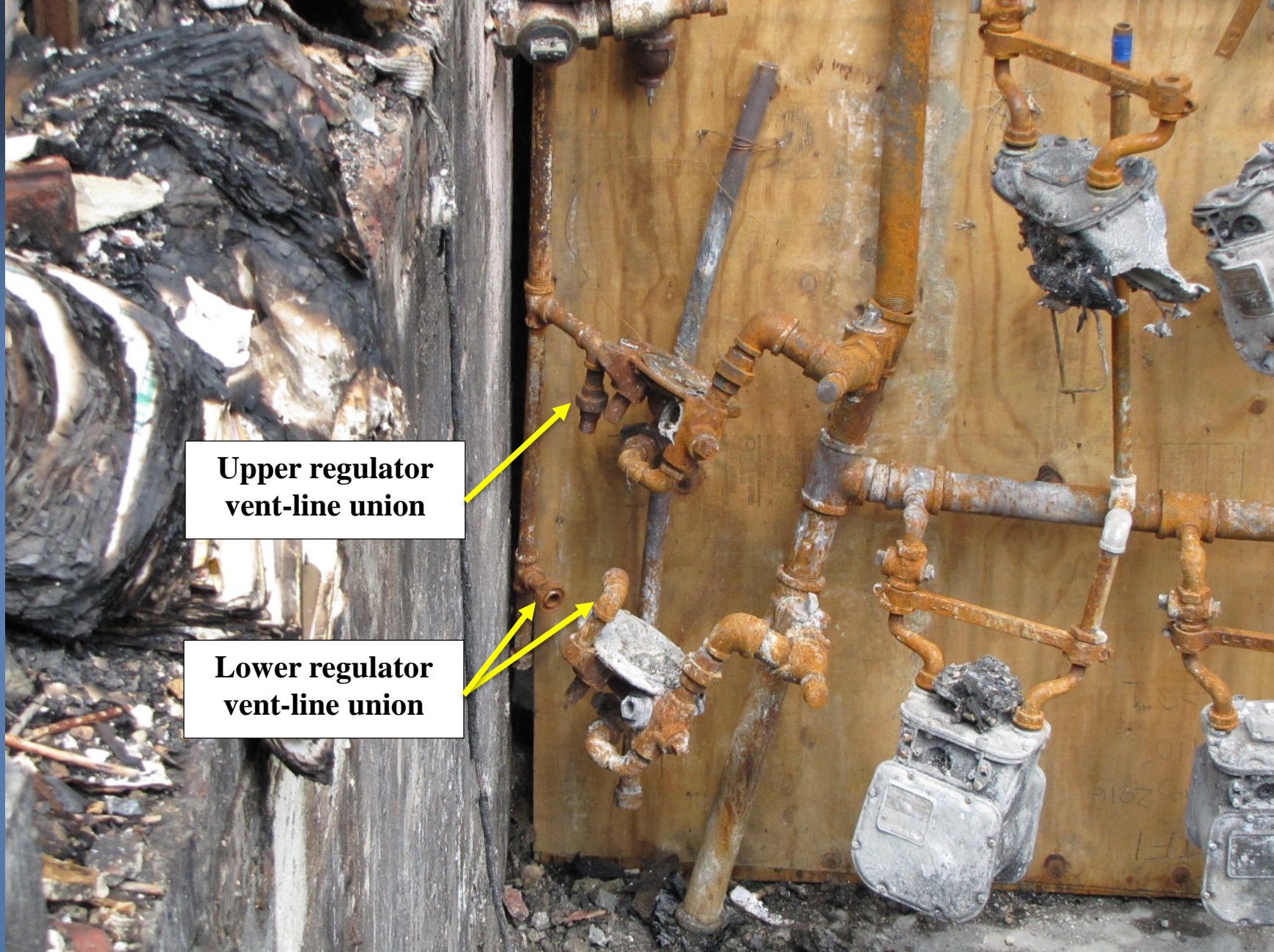
- 11:00 p.m. - 11:30 p.m.: Resident smelled gas after returning from work
- 11:30 p.m. - 11:50 p.m.: Resident left the building to take the trash out and smelled gas odor while walking down the stairwell. Went to investigate in the basement
- 11:51 p.m.: Building exploded

Field Investigation

- Pressure tests conducted on gas main and two service lines to buildings 8701 and 8703
- Soil bar hole tests conducted around buildings 8701 and 8703; no gas readings or leaks detected
- Postaccident odorant testing found compliant

Field Investigation



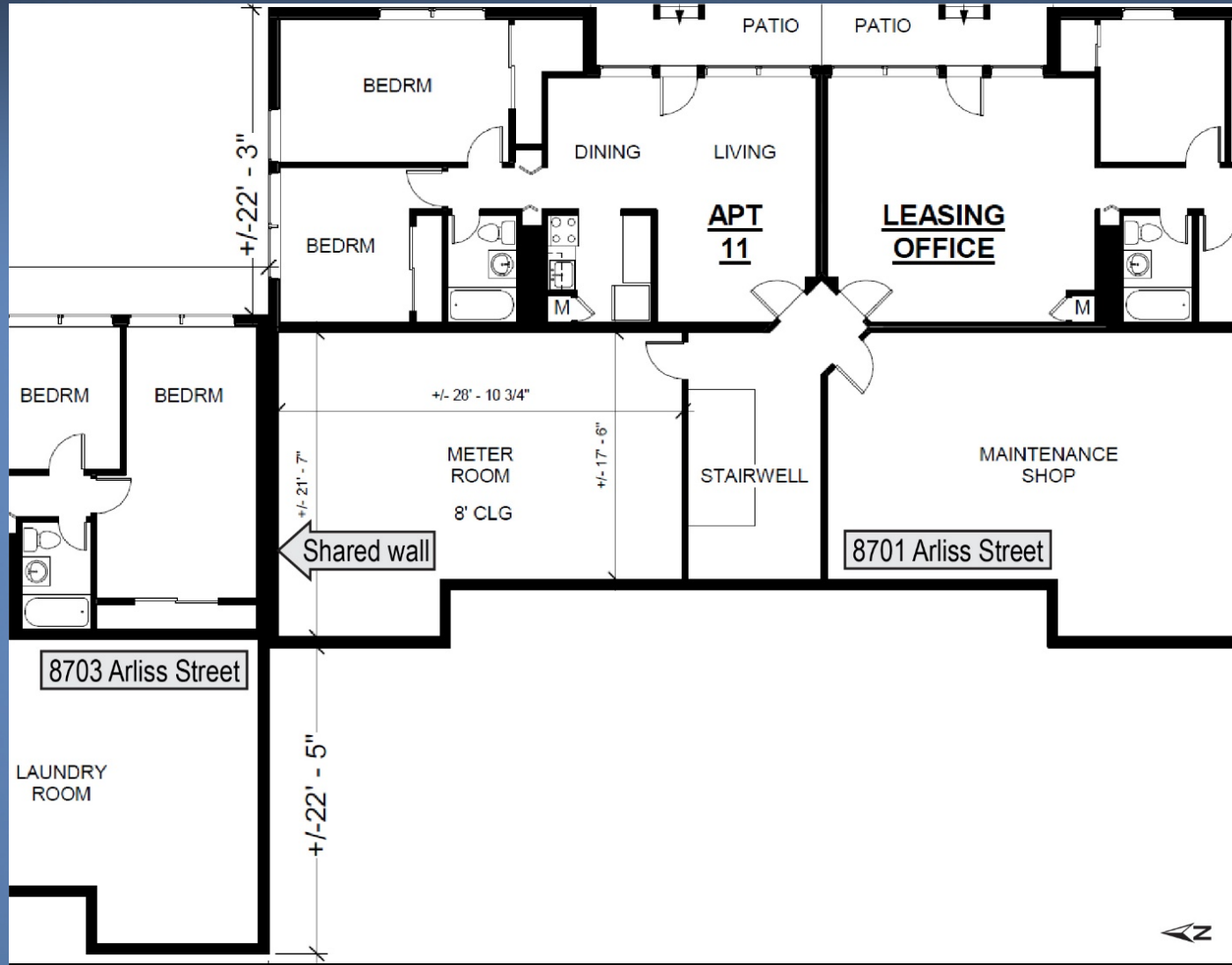


**Upper regulator
vent-line union**

**Lower regulator
vent-line union**



Building 8701 Basement Floor Plan





Safety Issues

- Location of service regulators within a structure
- Inspection of the gas meter assembly
- Notification of natural gas odor to the gas company
- Detection of natural gas

Parties to the Investigation

- Pipeline and Hazardous Materials Safety Administration (PHMSA)
- Maryland Public Service Commission
- Montgomery County Fire and Rescue Service
- Montgomery County Police Department
- Washington Gas Light Company (Washington Gas)



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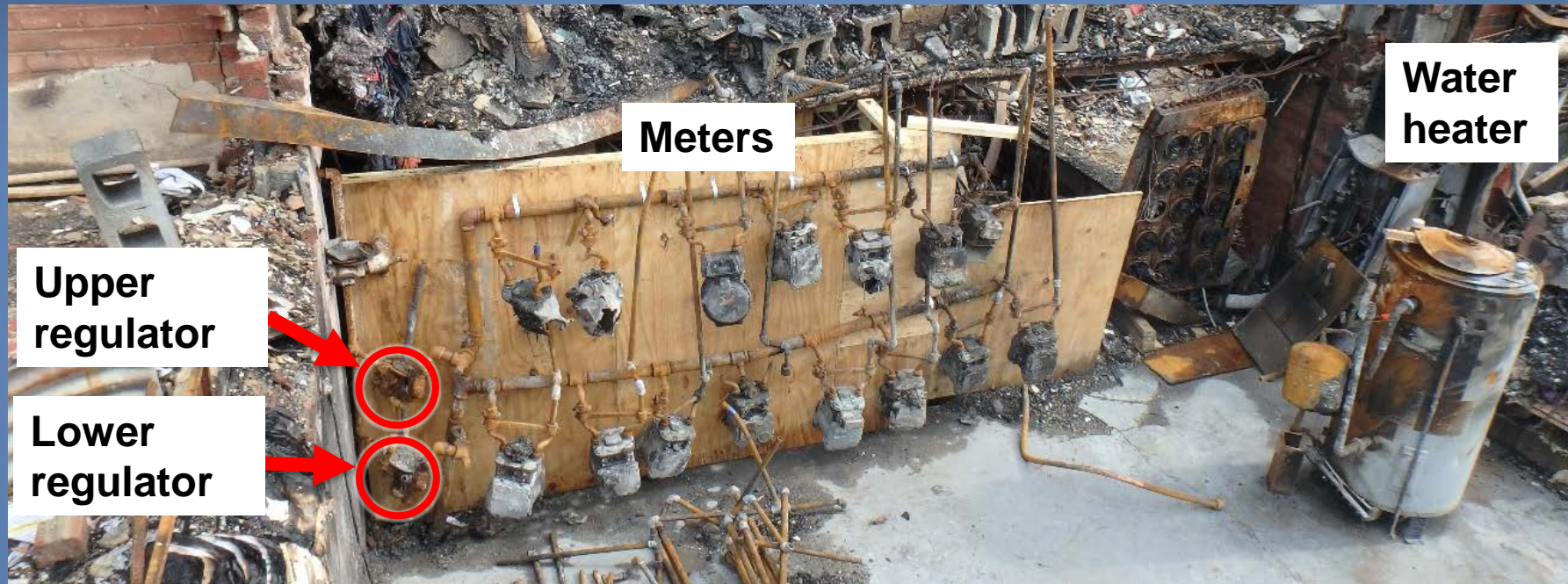
Service Regulators Examination

Frank Zakar

Senior Metallurgist

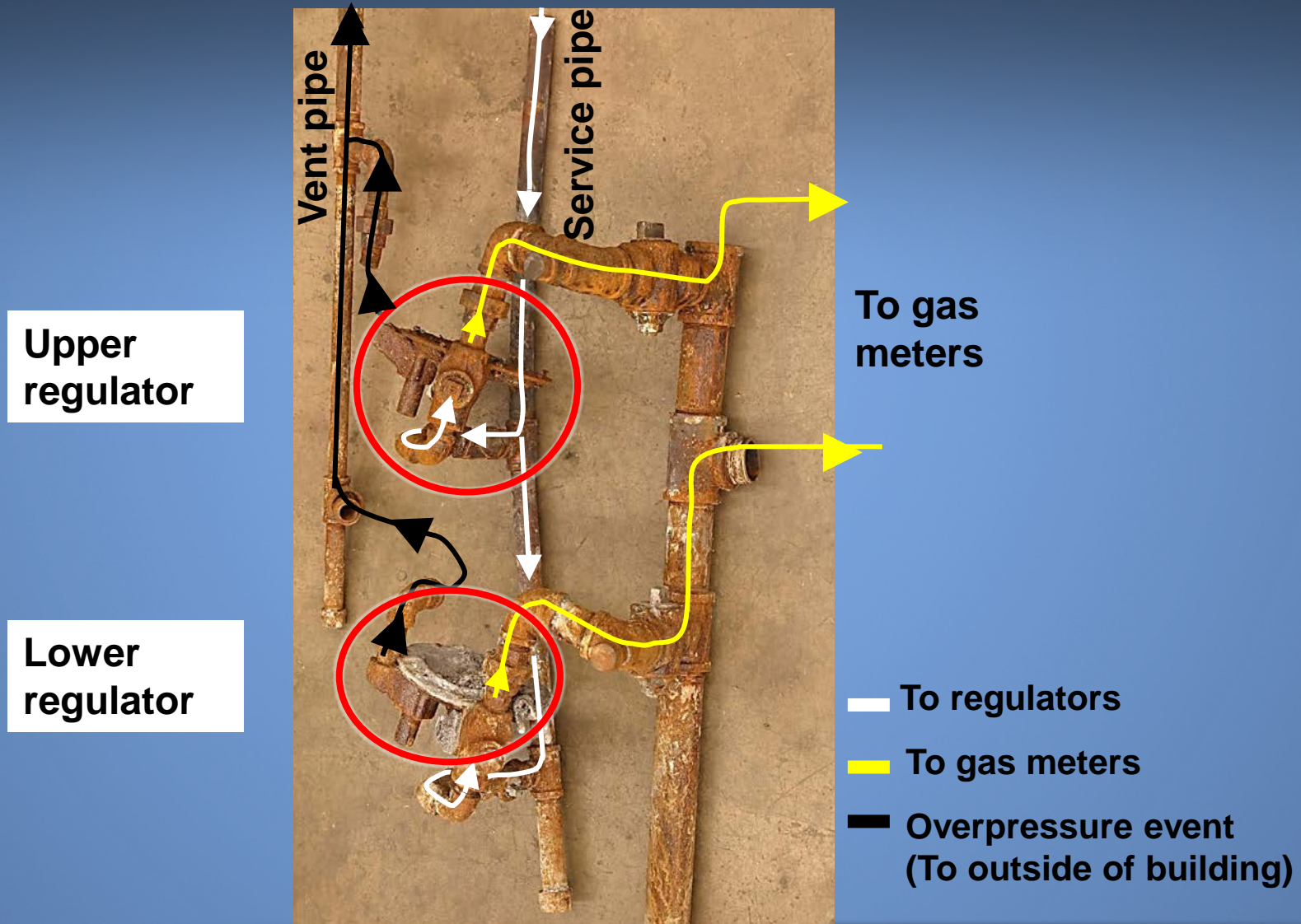
Materials Laboratory

Service Regulators - Reconstruction

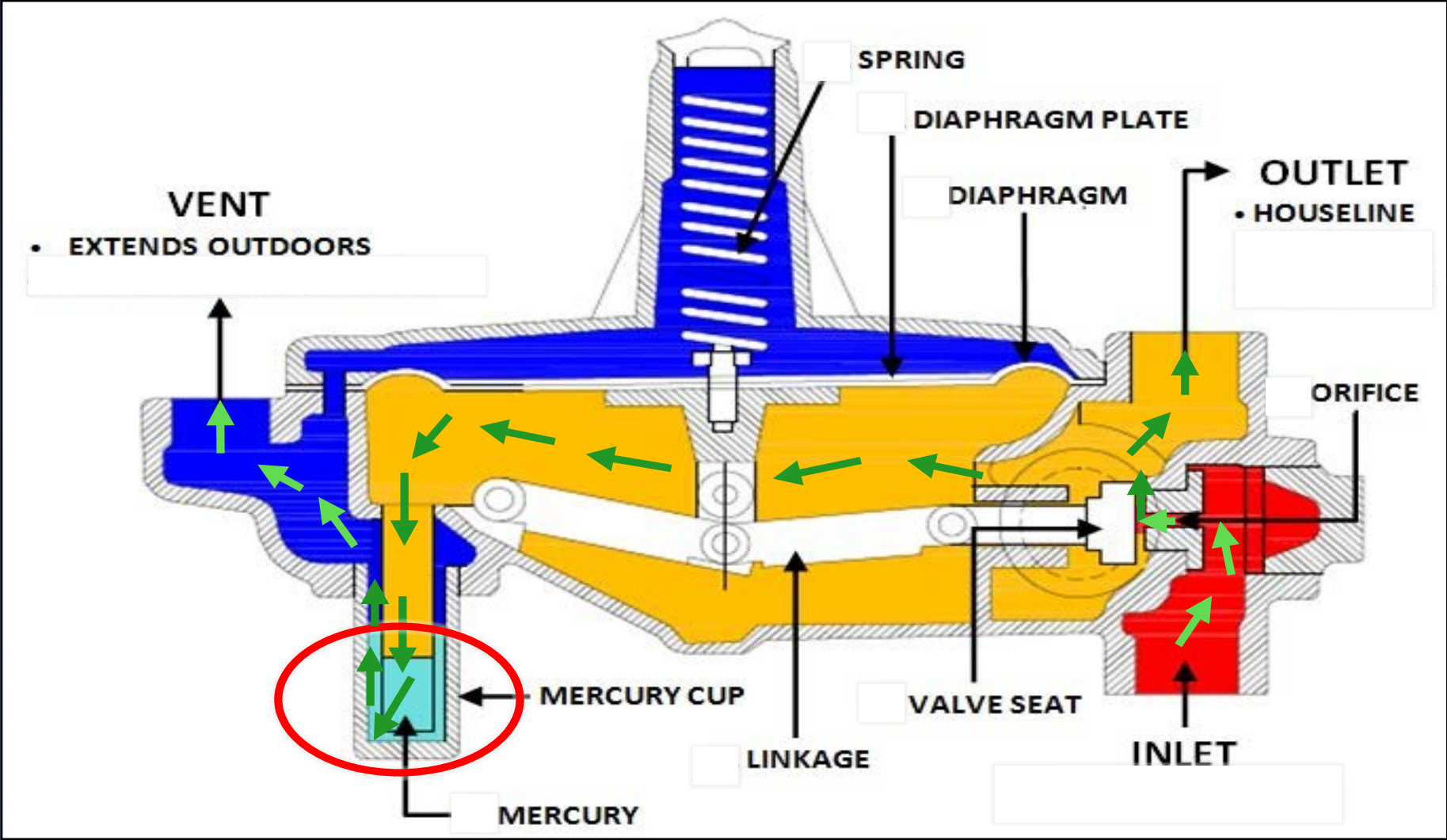


Basement at 8701 Arliss Street

As-received Service Regulators – Gas Flow

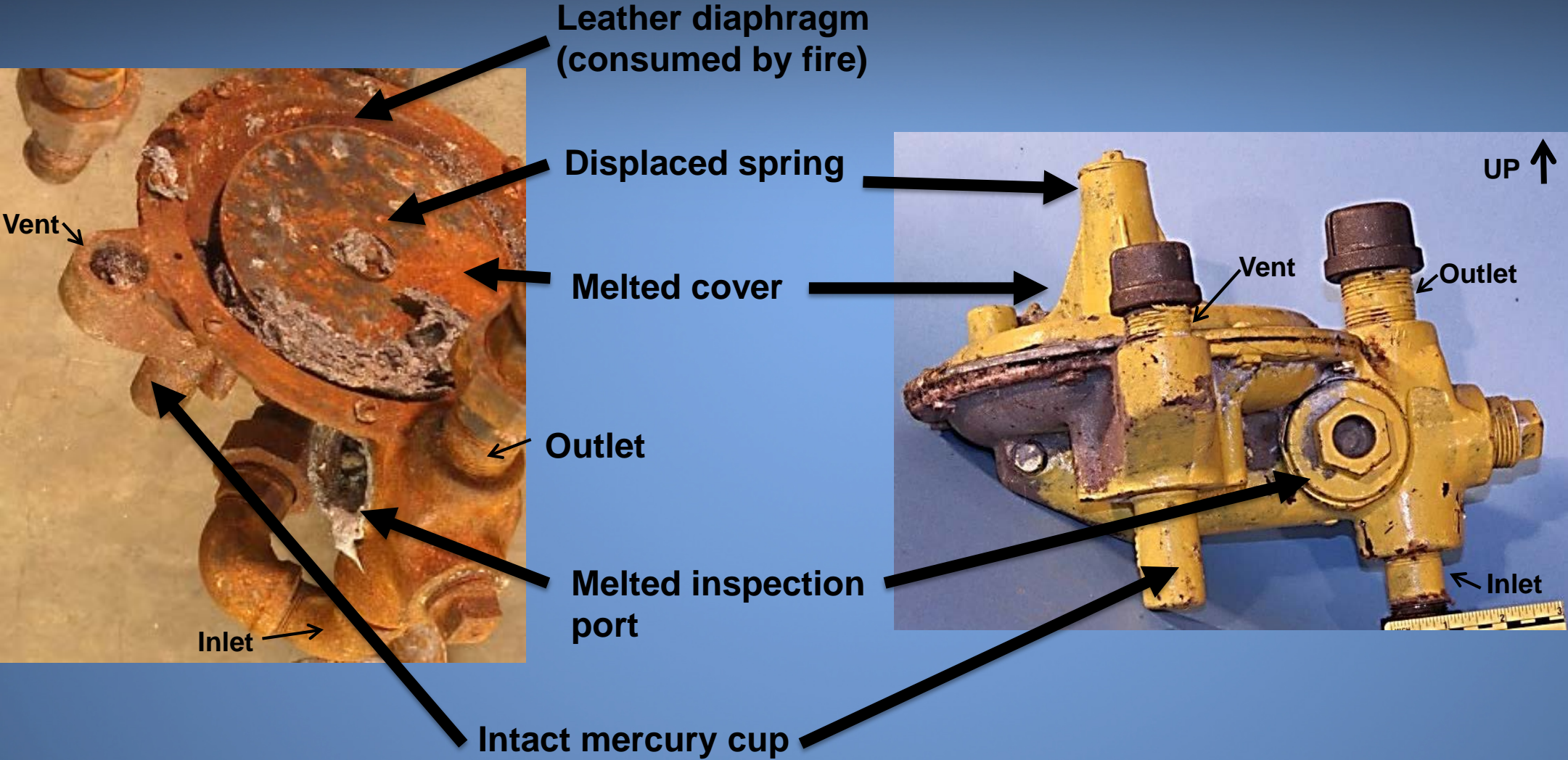


Mercury Service Regulator – Overpressure (Venting)

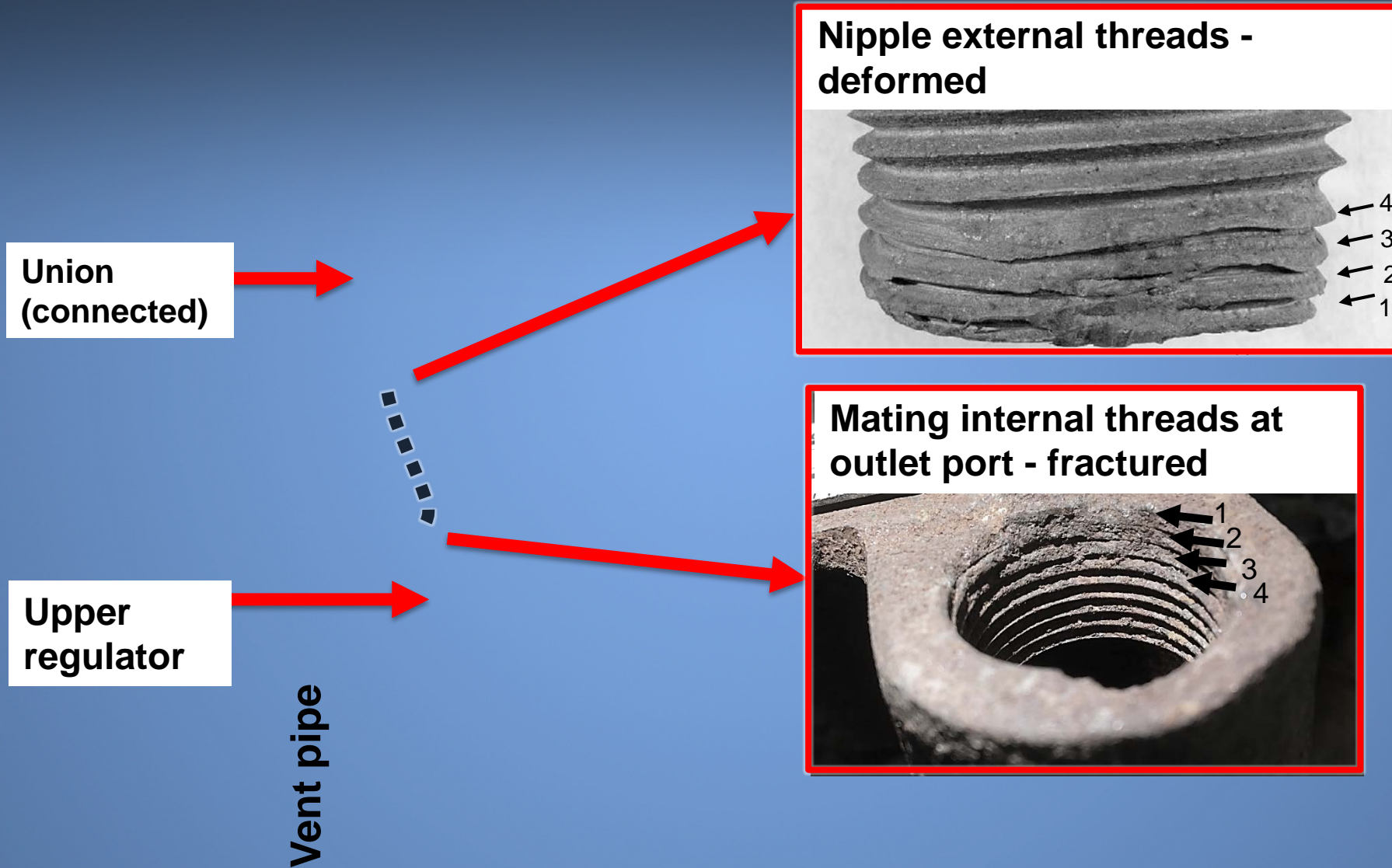


Fire Damaged Upper Regulator

Undamaged Regulator From Other Building



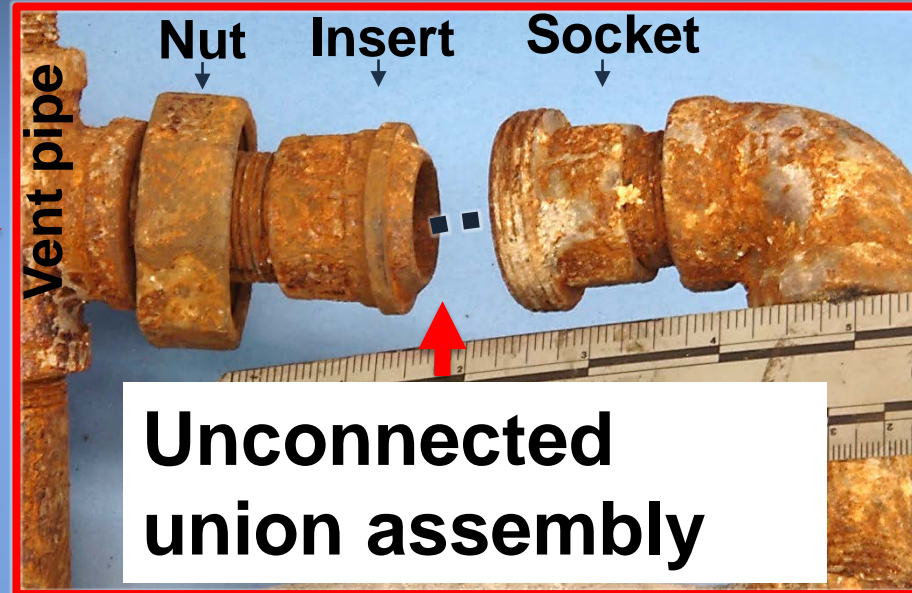
Upper Service Regulator



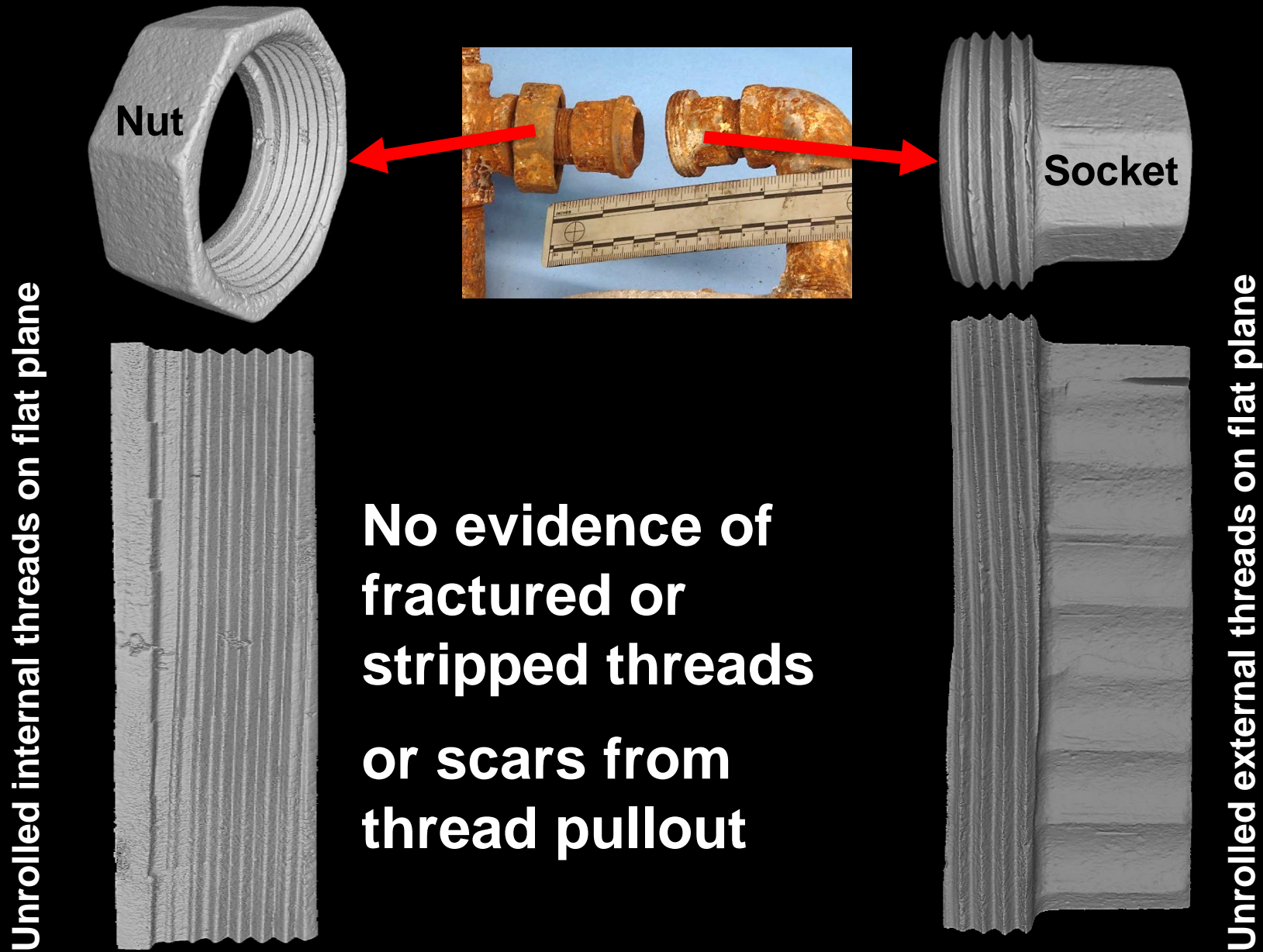
Lower Service Regulator



Lower regulator



Lower Regulator – Union Assembly X-ray CT Scan



NTSB – Finding

Gas venting from the lower mercury service regulator through the unconnected union assembly allowed gas to accumulate in the meter room to an explosive level, and found an ignition source.



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Operations:
Mercury Service Regulators

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Mercury Service Regulators

- Manufactured and installed in 1940-1970
- EPA recommended in 2011 to remove mercury service regulators
- WG removal of mercury service regulators

Replacement of Mercury Service Regulators

- Conditions for replacement:
 - “Blown” or weeping gas through vent
 - Tested and malfunctions
 - Gas system uprated to a higher MAOP of 25 psig
 - Gas service is being replaced
 - Connected piping is altered or replaced
 - Regulator is scheduled for removal

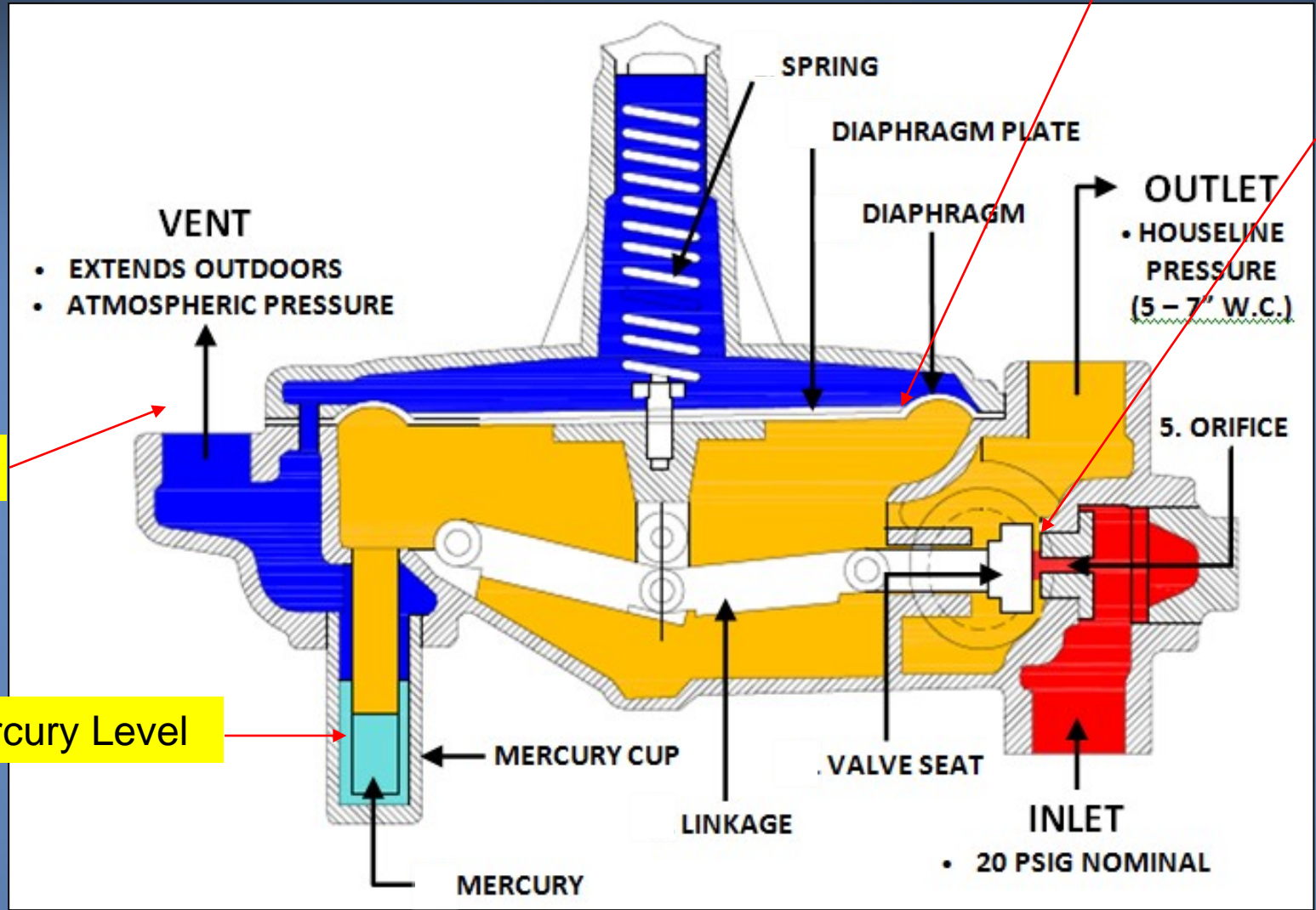
Venting

Low Mercury Level

Diaphragm Tear

Debris/Blockage

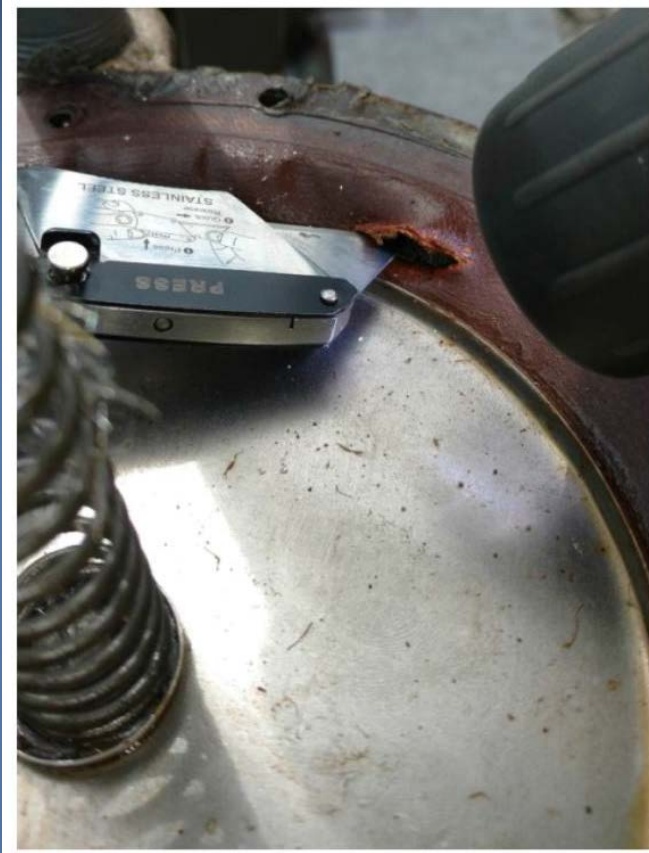
Leaking Body Connection



Service Visits to Building 8701

- Visiting building 8701 six different times; turned on gas meter service twice
- Vent line inspection practices
 - Did not verify connection to the vent line for multifamily dwellings

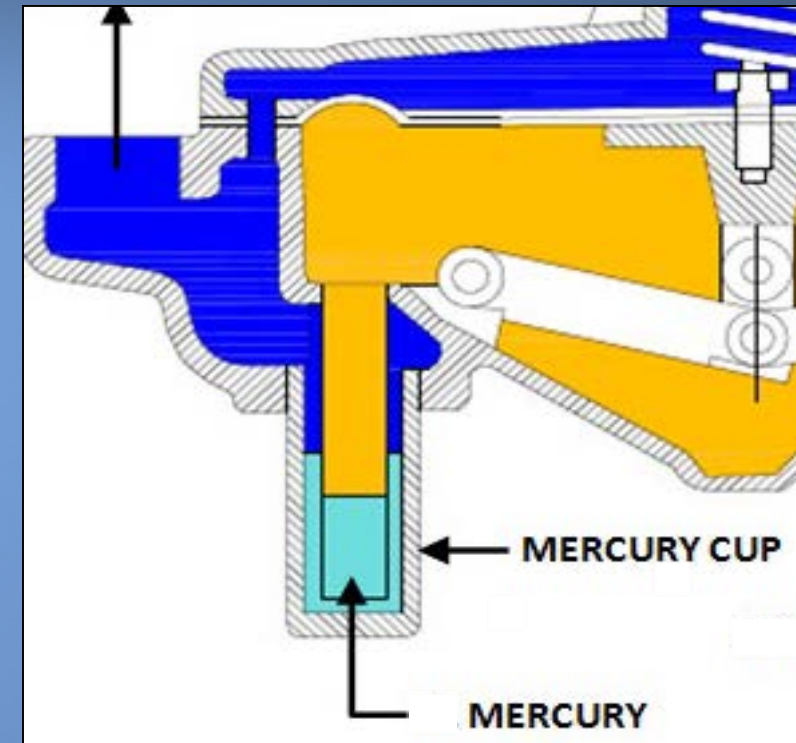
Mercury Service Regulator Testing



Diaphragm Tear

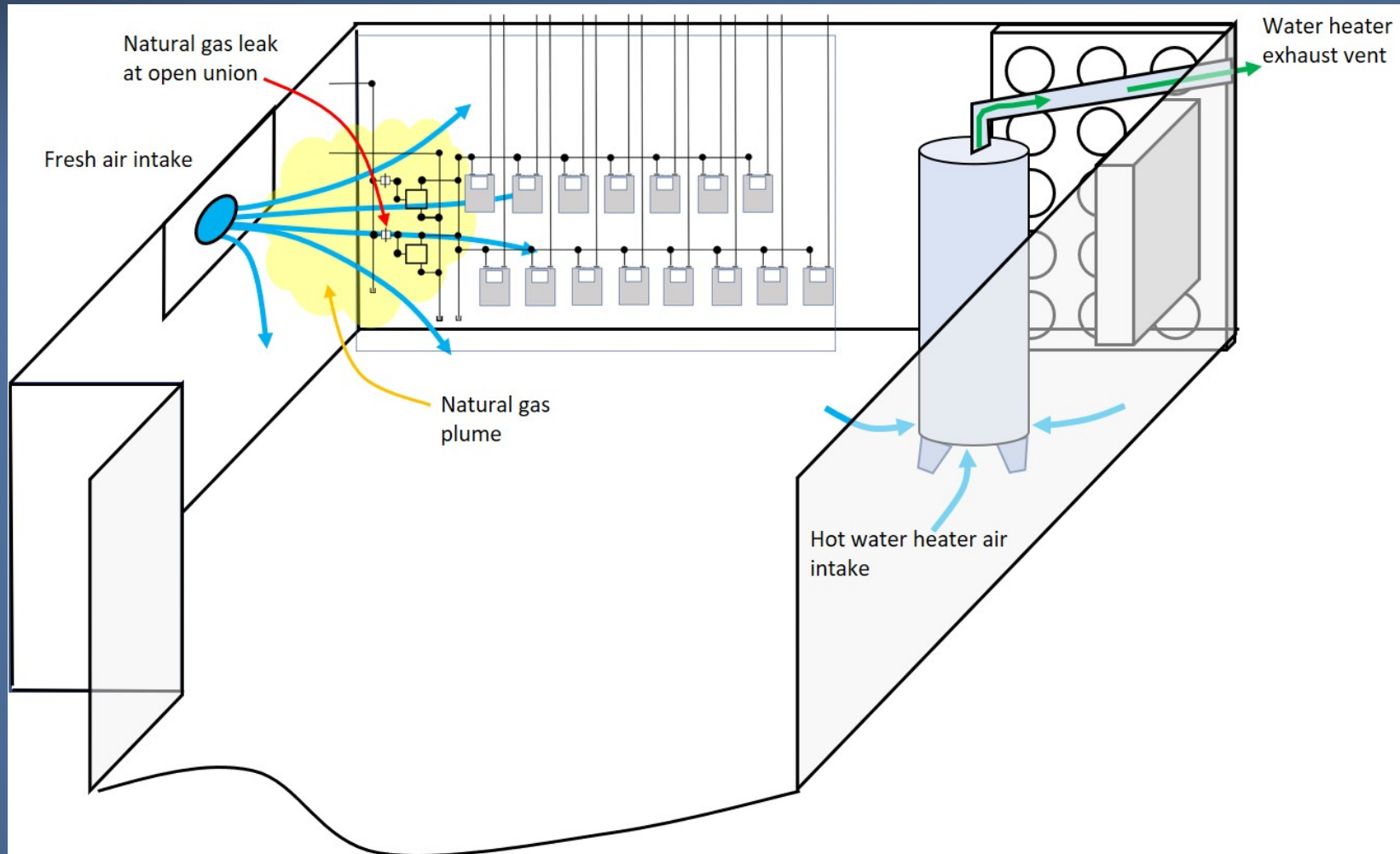


Obstruction to the Valve Seat



Low Mercury Levels

Natural Gas Accumulation



- 8:42 p.m.: Meter room alarm armed
- 11:51 p.m.: Explosion occurred
- Lowest flow rate could create an explosive atmosphere

PHMSA Regulations

- Title 49 CFR Part 192
 - Ventilated area and at least 3 feet from an ignition source
 - Each service regulator must be installed in a readily accessible location and near the service line entrance
 - Service regulator vents and relief vents must terminate outdoors
- Service regulators installed outdoors are safer



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Natural Gas Odor Detection and Notification

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Odor Call on July 25, 2016

- Same resident who smelled the gas on August 10, 2016
- Firefighters did not detect gas in building 8701
- No call to Washington Gas

Odor Call on July 25, 2010

- 9-1-1 call
 - Instructed resident to evacuate
 - Did not notify the gas company
- 9-1-1 protocols do not require gas company notification
- Gas company expertise to detect and remedy gas leaks

Previous Odor Calls

- Calls to property management company
 - Six odor calls from 2015-2016
- Washington Gas not notified of gas odors
- PHMSA requirement, Public Awareness Plan
 - Washington Gas had a Public Awareness Plan

Odorants

- Odorization requirements, Title 49 CFR 192.625 and COMAR Chapter 20
- Purpose is to warn of a natural gas leak
- Previous NTSB pipeline investigations found odorant has not sufficiently warned of gas leaks before fires or explosions

Methane Detection

- Natural gas alarms are not required in residential buildings
- OTD, “Residential Methane Detection Program”
 - currently testing commercially available methane detectors
 - advocate for lower detection limit of 10 percent LEL

Industry Standards

- UL1484, “Residential Gas Detectors”
- National gas codes, NFPA and ICC
- National safety standard needed for methane gas detectors



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