Northeast Gas Association

2020 Virtual Gas Operations School

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Incident Investigation for the First Responder

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PUBLIC SERVICE COMMISSION OF THE STATE OF MISSOURI
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Incident #1

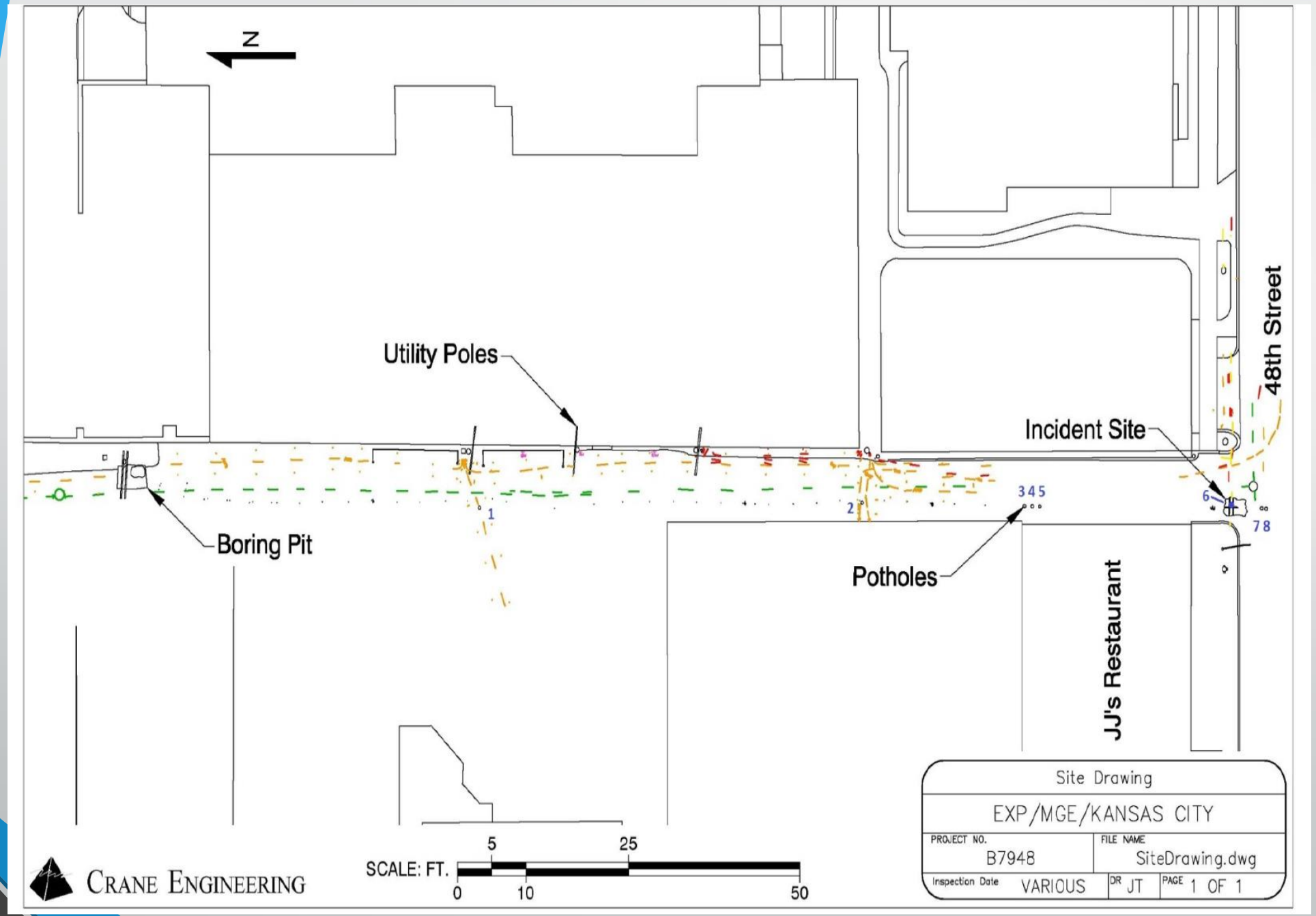
- 6:02 PM

Executive Summary

- At approximately 6:02 PM CST on February 19, 2013, a natural gas explosion and fire occurred at 910 West 48th Street in Kansas City, MO
- The restaurant and its contents were destroyed as a result of the explosion and subsequent fire.
- Several adjacent buildings sustained extensive damage.
- Several Restaurant employees were inside the restaurant at the time of the explosion. One employee was fatally injured and several other employees were severely injured. The fatality was a worker that went back inside to see if the cash registers were locked. (No coordination)

Executive Summary

- Gas company personnel and workers from two contractors were at the location of the damaged natural gas main at the time of the explosion.
- Several of these individuals received injuries as a result of the explosion and subsequent fire.
- The source of the gas that caused the explosion and fire was from a damaged 2” PE main operating at 25 psig.
- The cause of the damage was a horizontal drill being operated by a contractor installing a fibre optic line for the local phone company.


N
Utility Poles
Incident Site
48th Street
Boring Pit
Potholes
JJ's Restaurant
1
2
345
6
78
SCALE: FT.
0
10
5
25
50
CRANE ENGINEERING
Site Drawing
EXP/MGE/KANSAS CITY
PROJECT NO.
B7948
FILE NAME
SiteDrawing.dwg
Inspection Date
VARIOUS
DR JT
PAGE 1 OF 1


Drill Bit
Drilling Rod
Transmitter
Housing


W
E

Time Line of Events

- 4:55 PM Dispatch receives notification of hit main.
- 4:56 PM First Responder receives notice of the hit.
- 4:58 PM Duty Supervisor receives notice of the hit.
- 5:04 PM Fire Company arrives at the scene.
- 5:16 PM First Responder arrives at the scene.

Time Line of Events

- 5:16 PM Service Tech #1 proceeds to scene from another location.
- 5:17 PM Fire Company leaves the scene. (Question regarding communication with KCFD).
- 5:19 PM First Responder calls dispatch requesting additional personnel. First Responder evaluates situation and confirms natural gas is blowing based on hissing noise and bubbling of back fill.
- 5:25 PM First Responder calls dispatch a second time to request additional personnel.

Time Line of Events

- 5:31 PM Service Tech #1 arrives at the scene.
- 5:37 PM Service Tech #1 assists C&M foreman and his crew gain access to the location of the damage.
- 5:37 PM Service Tech #1 responds to an odor complaint at 4746 Belleview Ave.
- 5:32 to 5:40 PM C&M foreman is briefed by First Responder regarding the damage
- 5:40 to 5:57 PM C&M foreman and locate contractor photograph the scene and marked the location for excavation of pavement at the damage.

Time Line of Events

- 5:48 to 5:51 PM Service Tech #1 returns to the scene, meets with First Responder and enters the nearby restaurant to check for natural gas. The Combustible Gas Indicator registers a reading of 2-3%gas in air and a low battery fault.
- 5:51 PM Service Tech #1 tells the manager of the restaurant to evacuate and leaves to replace the batteries in his CGI.
- 5:52 PM Service Tech #2 arrives and enters the restaurant while Service Tech #1 is changing the batteries in his CGI. Service Tech #2 obtains a reading of 3.5-4% Gas in air and tells the manager of the restaurant to evacuate.

Time Line of Events

- 5:51-5:52 PM Both Service Tech #1 and Service Tech #2 reported to Dispatch that they told the manager of the restaurant to evacuate.
- 6:02 PM The restaurant explodes with one fatality and multiple persons injured both inside and outside of the restaurant. There was significant residual fire which consumed the entire restaurant and damaged adjacent buildings.

Initial Make Safe Activities

- Based on conditions at the scene, was response time adequate?
- 32 minutes elapsed between the time of arrival of gas company personnel at the scene and when they entered the restaurant for the first time. What could they have done better?
- Was communication at the scene adequate based on conditions?
- What should the message have been to the manager of the restaurant?

Initial Make Safe Activities

- Multiple people were severely injured both inside and outside of the restaurant. Many of the injured were gas company and contractor personnel. What could have been done to minimize the number of injured in the incident?
- Was any one person responsible to monitor and coordinate make safe activities?

The Find and Fix Syndrome

- The Cure for this is to ask yourself a question, “Where is the Gas”?
- If you can answer the question and it is not affecting property, you are cured.
- You must continually ask yourself this question on every leak before you get into the “repair” mode and during the repair mode as well.

Facility Damages (Dig-ins)

- The First Responder should monitor the area for changing conditions while the crew works to control the gas.
- In all incidents involving damage to gas company facilities, you must assume conditions are “dynamic” until you can prove otherwise.

Utility Company and Fire Department Interaction

- The main focus of the fire department should be securing the area.
- The gas company's main focus should be securing the gas.
- The common focus of both parties' actions should be:

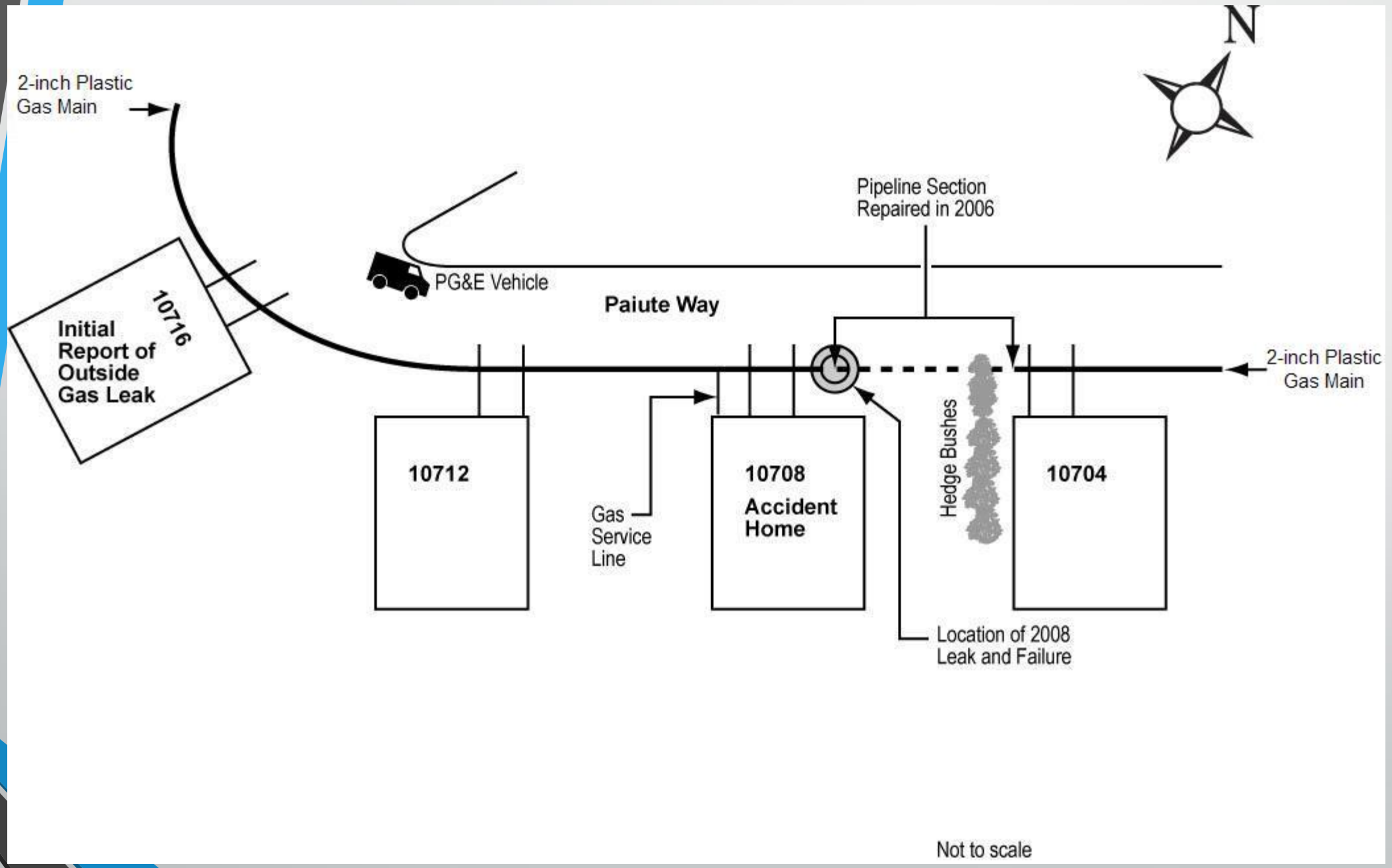
Public Safety!

Incident #2

- 1:35 PM

The Accident

- About 1:35 PM on December 24, 2008, an explosion and fire caused by a natural gas leak destroyed a house at 10708 Paiute Way in Rancho Cordova, CA. One person suffered fatal injuries, and five other people, including one utility employee and one firefighter, were hospitalized as a result of the explosion.
- Two adjacent homes, one on either side, had sever damage, and several homes suffered minor damage.


N
2-inch Plastic
Gas Main
Pipeline Section
Repaired in 2006
PG&E Vehicle
Paiute Way
10716
Initial
Report of
Outside
Gas Leak
2-inch Plastic
Gas Main
10712
Gas
Service
Line
10708
Accident
Home
Hedge Bushes
10704
Location of 2008
Leak and Failure
Not to scale

Time Line of Events

- 9:16 AM Call Center received a call from 10716 Paiute Way regarding a gas odor outside the house.
- 9:21 AM Technician dispatched to location to investigate.
- 9:30 AM Technician acknowledged receipt of field order.
- 9:55 AM Technician en route to location.
- 10:15 AM Technician arrived at 10716 Paiute Way. Technician talked with resident who said they no longer smelled the gas. Indicated that she now smelled gas near her neighbors house.
- 10:24 AM Technician spoke to the neighbor at 10712 Paiute Way.

Time Line of Events

- 10:24 AM Resident of 10712 Paiute Way told the Technician that she had smelled a gas odor outside of her house. Technician asked her to call the gas company Call Center and report a gas odor.
- 10:25 AM The Technician called the Call Center on a dedicated phone line requesting that the leak call ticket be forwarded to the Maintenance and Construction Department for follow up with a Flame Ionization Leak Detector.
- 10:29 AM The Call Center received the odor complaint call from the resident at 10712 Paiute Way.

Time Line of Events

- 10:35 AM Technician called the Call Center and made a second request for a maintenance crew to be dispatched to the location.
- 10:38 AM The Technician completed the Leak Ticket for 10716 Paiute Way and proceeded to follow up on the Leak Ticket created for 10712 Paiute Way.
- 10:42 AM Call Center issues a ticket requesting a maintenance crew.
- 10:42 AM The Technician checks inside 10712 Paiute Way for the presence of gas and found none. The occupant told the Technician that she thought the odor of gas was coming from in front of 10708 Paiute Way.

Time Line of Events

- 10:42 – 11:11 AM The Technician determines there is a leak in front of 10708 Paiute Way approximately 5 feet west of the drive way and 45 feet in front of the house. The Technician knocks on the door in an attempt to gain access but there is no answer.
- 11:11 AM The Technician again contacts the call center to request assistance.
- 11:26 AM The Maintenance Department acknowledges the request for assistance at 10708 Paiute Way.
- 11:30 AM A Maintenance Department Leak Investigator arrives at the service center to pick up a Flame Ionization Leak Detector.

Time Line of Events

- 12:42 PM Due to an issue with his company vehicle, the Leak Investigator doesn't leave the service center until 12:42 PM.
- 1:14 PM Foreman arrives at the scene.
- 1:19 PM Leak Investigator with a Flame Ionization Detector arrives at the scene, 2 hours and 47 minutes after the initial request from the Technician for additional assistance.
- 1:27 PM The Leak Investigator is attempting to locate the leak on the main.
- 1:34 PM The Leak Investigator locates a leak on the main in front of 10708 Paiute Way.

Time Line of Events

- 1:35 PM The Leak Investigator knocks on the door of 10708 Paiute Way and talks with the resident. As the Leak Investigator turned to walk away from the house the building exploded.

Initial Response Activities

- The first responder, Technician, was not equipped with state of the art leak detection equipment for an expanded leak investigation.
- The first responder, Technician, had not been trained in proper leak investigation procedures.
- The first responder had not been trained in leak classification and hazard recognition.
- Contributing to the accident was the 2 hour and 47 minute delay in the arrival at the job site by a crew that was properly trained and equipped to identify and classify outdoor leaks and to begin response activities to ensure the safety of the residents and public.

Incident #3

- On July 2, 2017, at 12:32 p.m. eastern daylight time, a natural gas fueled explosion occurred at a single-family residence at 206 Springdale Lane, Millersville, PA.
- The explosion killed one person and injures three others.
- 206 Springdale Lane was destroyed, six neighboring homes were also damaged, one was condemned and had to be torn down.

Timeline of Events

- 10:26 a.m., neighborhood resident calls in gas odor.
- 11:00 a.m., technician arrives to investigate and confirm gas leak.
- 11:18 a.m., technician calls supervision for crew.
- 11:20 a.m., supervisor tells dispatch to call PA OneCall for emergency markout.
- 11:27 a.m., emergency one call ticket issued.
- 11:25 a.m. to 11:44 a.m., supervisor calling in crew. First on call out list does not respond.

11:50 a.m., three person C&M crew assembles at site.

Timeline of Events

- 12:00 p.m., Senior supervisor arrives at site. Enroute, discussed with engineering most effective way to control gas. Discussed options with workers at the site, two options:
  - Close the mainline valve at the nearest intersection.
  - Squeeze off main closer to leak.
  - They chose to squeeze off the main.

Timeline of Events

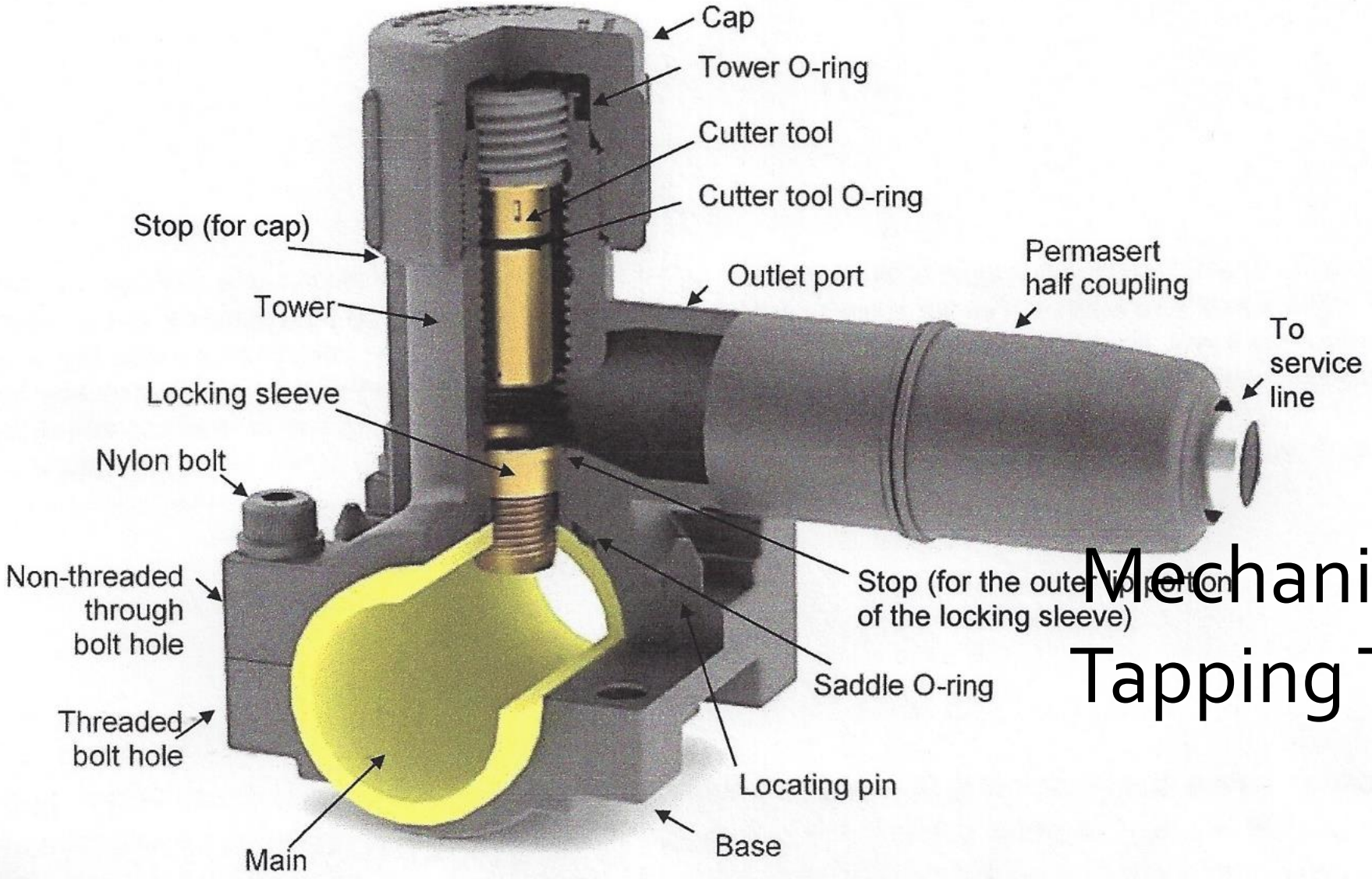
- 12:14 p.m., Dispatch calls 911 to have fire department respond to the scene. First responder continues to monitor conditions at 202 and 206 Springdale Lane. Occupant at 206 Springdale Lane not responding to attempts by first responder to have her come to the door. Supervisor adivses first responder to break the door if necessary.
- 12:19 p.m., Fire Department arrives.

Time Line of Events

- 12:19 p.m. to 12:32 p.m., technician finally makes contact with occupant of 206 Springdale Lane and advises her to evacuate. She askes if she can take her car, technician assists her in removing car from garage without using automatic door opener. Technician reports gas readings in 202 Springdale Lane at less than 20% LEL, (no evacuation) and readings of 20% LEL inside 206 Springdale Lane.
- 12:32 p.m., 206 Springdale Lane explodes killing technician who was near the gas meter and injuring the two gas company workers performing the squeeze off as well as a worker from the sewer company.

Probable Cause

- The National Transportation Safety Board determines that the probable cause of the natural gas explosion at 206 Springdale Lane was in improperly installed mechanical tapping tee that leaked and allowed gas to migrate into the house where it ignited.



Mechanical Tapping Tee

Figure. Cross-section diagram of an exemplar PermaLock mechanical tapping tee assembly, provided by Honeywell

Postaccident Actions

- The operator took a number pf postaccident actions to insure the continued safety of their customer base and improve their ability to respond to future incidents of this nature.
  - System Improvement Initiatives
    - Began daily leak surveys of the neighborhood where the incident occurred
    - Repaired or replaced all known mechanical tees
    - Replaced the entire gas main
    - Expanded the inspection and remediation program to include a greater portion of the area where the incident occurred

Postaccident Actions

- Pipeline and Public Safety Improvements
  - Training initiatives to emphasize the incident command system
  - Increased outreach efforts with external emergency response departments to strengthen the awareness of natural gas pipeline safety
- Training and Field Compliance
  - Updated training to improve skill sets of employees when responding to an emergency

Postaccident Actions

- Pipeline Facility Improvements
  - Ongoing project to identify and repair or replace mechanical tees through the distribution system
  - As of October 2018, 2,577 mechanical tees have been remediated or replaced
- Dispatch Improvements
  - The operator modified their dispatch process or proactively identify the need for electrical shutdown and additional help

Postaccident Actions

- Standard and Procedure Improvements
  - Created separate Emergency Plan from the general operating manual
- Emergency Response Related Initiatives
  - Developeda first-hour check list for first responders that provides guidance on when to:
    - Contact the local emergency agencies; 911 and Emergency Medical Services
    - Shut off electrical power in the area
    - Conduct an evacuation

Postaccident Actions

- Updated its response procedures to include “safety perimeter” criteria
- Reinforced the discretion of a first responder to shut down a pipeline
- Created checklists for leak investigations
- Identified specific emergency situations where immediate 9-1-1 notification is required
- Reviewed and updated dispatch procedures to include a decision matrix
- Identified Situations and keywords where immediate 9-1-1 notification is required

Postaccident Actions

- Hired a third party contractor to access the efficacy of the gas company safety-related initiatives and incident investigation process to create a unified safety brand.

Incident Control (command and control)

- In all incidents, from a third party damage with significant migration to a single structure house fire, someone needs to be in charge!
- Initially it is the First Responder until relieved by supervision or a designated incident coordinator.
- Follow company emergency response procedures.
- Does your company have a "Go Team" for dealing with post incident investigations?

The following list of response activities is not intended as step-by-step procedure, but a listing of response activities that may be necessary to secure the hazard zone and protect life and property.

Emergency Response

- Immediately check all buildings in the area of the damage or suspected leak for the presence of gas.
- Establish an exclusion zone (safety zone) which would include:
  - Mandatory evacuation of all buildings adjacent to the damaged gas line.
  - Limit work activity in the exclusion zone to that which is only necessary to regain control of the gas.
  - If shutting the gas off in the hazard zone is not feasible, consider alternative means.

Emergency Response

- Stop the flow of traffic in and around the exclusion zone.
- Once gas is detected inside adjacent buildings, do not re-enter until the release of gas is under control and readings have started to come down.
- Prevent residents and by-standers from entering affected buildings and other structures.

Emergency Response

- If an incident has taken place, attempt to reduce the potential for another incident.
- Call for additional assistance.
- Coordinate response effort with civil authorities. (Exclusion or Safety Zone)
- Eliminate ignition sources where feasible; telephone, electric, cable for example.
- Vent the area, manholes, valve boxes, and where possible, buildings.
- Monitor for changing conditions in the hazard zone; MONITOR, MONITOR, MONITOR.
- Focus on the hazard, not the leak repair.

Communication

- Communicate with gas company personnel as to the magnitude of gas migration and any buildings where gas has been detected.
- Communicate with first responders, police and fire, as to the magnitude of the hazard.
- Communicate any changes in the extent of gas migration.
- Communicate the degree of hazard to any occupants of buildings in the hazard zone. If they fail to evacuate, solicit help from police and fire personnel as need.

After an Incident

- Other actions to consider after the area is secured:
  - Have a skilled photographer on the scene ASAP, photographic documentation.
  - Perform sniff tests, odor tests, witness and document.
  - Preserve and document evidentiary materials and equipment.
  - Record names and addresses of witnesses.

After an Incident

- Pressure test affected portions of the mains and services using qualified personnel and the proper equipment to record and document the tests. Always pressure test at operating pressure (integrity test) , not at 100 p.s.i.g. (strength test).
- Develop an event time line.
- Debrief and record statements of operating personnel involved in the response effort.
- Calibrate any instruments used in the response, document calibration.

Post Incident Documentation

- In the event of a reportable incident:
  - All documents will usually be created, collected and maintained by corporate legal staff.
  - Any documentation of the incident, including customer call logs/tickets, markout requests, leak reports, etc. should be completed at the time of the incident or shortly there after.
  - Any documentation related to the incident should be completed accurately and legibly.
  - Remember: any documents created as part of an incident, will be discoverable by the courts.

Final Thoughts/Lessons Learned

- Could we have done anything differently?
- Initial response and call out activity?
- Dispatch?
- Job site safety?

Final Thoughts/Lessons Learned

- Remember: Avoid the “find and fix syndrome”.
- If we do not have control of the gas or know the extent of migration, we do not have a “made safe condition”.

References

- Missouri Public Service Commission
  - Staff's Gas Incident Report, 910 W. 48th Street, Kansas City, MO.02/19/2013
- National Transportation Safety Board
  - Accident Identification Number: DCA17FP006
- American Gas Association, Gas Piping Technology Committee
  - GPTC GUIDE FOR GAS TRANSMISSION, DISTRIBUTION, AND GATHERING PIPING SYSTEMS (www.aga.org)
- National Fire Protection Association, NFPA (www.nfpa.org)
  - NFPA 921, Investigation of Fires and Explosions

Questions?