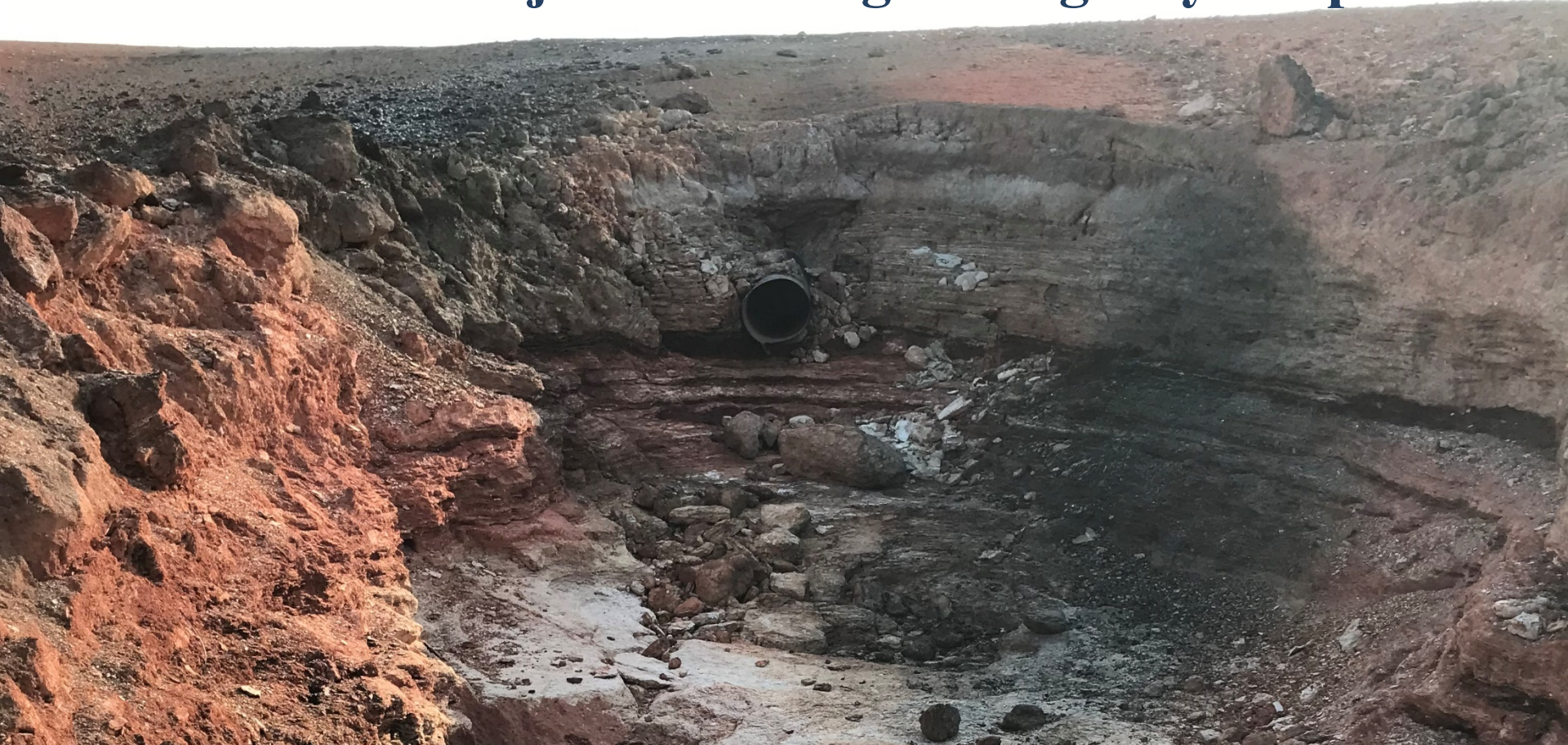


Kansas Pipeline Safety Seminar

Fatalities and Injuries During Emergency Response



Pipeline and Hazardous Materials Safety Administration (PHMSA)
Office of Pipeline Safety (OPS) - Accident Investigation Division (AID)

Curtis Huff - October 27, 2021



U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

Investigate – Analyze – Prevent

PHMSA: Your Safety is Our Mission



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Fatalities and Injuries During Emergency Response Outline



- Background
- Case Study Examples
- AID Recommendations
- Additional Resources



Background



- AID SAFE Bulletin
 - Situational Awareness For Employees
- Capture and share lessons learned
- Data analysis identified trend of fatalities and injuries during the emergency response phase of an event



Emergency Response



- The collection of activities that take place during an emergency
- For this study, the initiation of Emergency Response is the time operator personnel arrive onsite
 - Current 30-Day Reports do not capture the time when fire, police or EMS arrive onsite



Emergency Response



- Operators activate their emergency response plans and their responders
 - Take action to save lives
 - Stabilize the incident
 - Mitigate further consequences
- Evaluate the hazards
 - LEL, VOC, H₂S, O₂ & etc.
 - Physical hazards
- Control or stop the release
- Assume worst case scenario



Event Escalation Factors



- Timing – Can occur at anytime
 - Immediately upon arrival
 - After several hours
- Evacuation of buildings or areas
 - Delays in implementation of evacuation
 - Refusal of evacuation requests/orders
 - Migration of natural gas, especially distribution
- Operator personnel not following established procedures



Case Studies



- Events where the consequences escalated
 - Fatalities or injuries occurred
- Pipeline types include
 - Natural gas distribution
 - Natural gas transmission
- Incidents investigated by PHMSA AID, State Programs and the National Transportation Safety Board (NTSB)
 - The NTSB monitors all pipeline related incidents and deploys to investigate at their discretion



Case History #1 – Injury Incident



- Excavation damage – 1st party – Auburn Hill, MI
 - Crew was working to lower a 2” PE main
 - Operator struck a shallow tee causing a release of gas
- Escalation of the consequences
 - Procedures called for excavation to cease and for the emergency response plan to be implemented
 - Crew continued to excavate in order to isolate the release
 - The excavator hit an electric line that was parallel to the main
 - The electrical line arced and ignited the natural gas



Case History #1 – Injury Incident



- Operator personnel not following established procedures
 - Immediate ceasing of excavation once a release occurs
- Consequences
 - Employee hospitalized with burns
 - Complete loss of excavation equipment



Case History #2 – Fatality & Injury Incident



- Outside Force Damage – Midland, TX
 - A non-regulated 6” natural gas gathering pipeline (Operator #1) ruptured and the releasing natural gas ignited
 - The 6” pipeline was immediately below a PHMSA regulated 12” natural gas transmission pipeline (Operator #2)
 - The rupture and blowing gas uncovered the 12” transmission pipeline
 - The resulting fire was impinging on the 12” pipeline
 - The natural gas fire also started a grass fire in the area
 - Operator #1, Operator #2 and firefighters were at the site



Case History #2 – Fatality & Injury Incident



- Continuation of events
 - The 6” pipeline was isolated, and the fire was significantly reduced
 - The 12” pipeline was isolated and holding 765-psig
 - Operator #2 field personnel submitted a request to blow down the isolated section of the 12” pipeline at 12:29 p.m.
 - Firefighters and operator personnel were gathered around the crater within 30 to 80-feet to discuss what had occurred



Case History #2 – Fatality & Injury Incident



- Escalation of the consequences
 - At 12:33 p.m. the 12” pipeline, impinged by the fire, ruptured



Case History #2 – Fatality & Injury Incident



■ Consequences

- Personnel were too close to a fire compromised pipeline
- Five operator employees were injured
- Two firefighters were injured
- One operator employee later died from their injuries



Case History #3 – Fatality & Injury Incident



- Excavation damage – 3rd party – Murrieta, CA
 - At a house, a solar panel installation crew drove a ground rod into a ½” PE service line
 - No One-Call was made
 - The house was evacuated but a secured perimeter was not setup
 - An occupant of the house was allowed to return
 - Gas company employee removed the grounding rod prior to shutting off the gas



Case History #3 – Fatality & Injury Incident



- Escalation of the consequences
 - Emergency response procedures were not followed
 - Crew did not evacuate or mark off the area
 - Area was not made safe
 - Flow of gas was not stopped
 - No check for gas migration



Case History #3 – Fatality & Injury Incident



■ Consequences

- One fatality – gas company employee

- Eight injuries

- One resident
- Three firefighters
- Two gas company employees
- Two solar panel contractors



- Four homes red tagged, no re-entry

- Thirteen homes yellow tagged, limited access



Case History #4 – Fatality & Injury Incident



- Excavation damage – 3rd party – Durham, NC
 - HDD crew installing a fiber optic cable hit a ¾” PE service line
 - A One-Call was made, and marks were visible
 - No pot-holing was performed to verify line location
 - Timeline of the event
 - 9:11 a.m. - A call reporting a strong smell of gas had been placed to 911
 - 9:13 a.m. - Local responders investigated, but detected no odor of gas
 - 9:28 a.m. – HDD operator called 811 to report damage
 - 9:37 a.m. – HDD operator called 911, reporting a gas line had been hit, resulting in the same fire department unit being dispatched to the scene
 - 10:07 a.m. – Explosion occurs at business address. Evacuations and isolation of the escaping gas were in process at the time of the explosion



Case History #4 – Fatality & Injury Incident



- Escalation of the consequences
 - Initial response to 911 call did not detect gas odor
 - Gas line strike was not immediately reported to 911
 - Operating personnel and public not evacuated far enough away
 - Business owner refused operator's and firefighter's evacuation orders



Case History #4 – Fatality & Injury Incident



■ Consequences

- Two fatalities – 1 gas company employee and 1 business owner
- 25 injuries
 - 5 requiring overnight hospitalization
 - 20 transported to hospitals
- Two buildings condemned and subsequently demolished
- 21 total buildings damaged by the explosion
- Costs exceeded \$35 million



Case History #5 – Fatality & Injury Incident



- Excavation damage – 3rd party – Aurora, CO
 - HDD crew was working to install fiber optic cables
 - 1.25” PE main was hit causing a release of natural gas
 - No One-Call was made
 - Media reports this was the 5th gas line hit within a month by cable company crews and the 2nd within 72 hours at the site
- Escalation of the consequences
 - Gas migrated to a residence which subsequently exploded
 - Residence exploded over one hour after the first notice
 - Evacuation area was insufficient



Case History #5 – Fatality & Injury Incident



- Consequences
 - One fatality – 80-year-old resident
 - Two injuries – First responder and member of the public
 - Three duplex residences damaged, six units
 - Thirty elderly residents were evacuated to a Red Cross center



Picardi: The charred remnants of a home in East Lincoln Place in Aurora Nov. 10, 2015. An explosion caused a large fire at the Heather Gardens senior community at about 5:30 p.m. Friday, Nov. 16. One person was killed in the fire. Credit: Philip B. Heister / The Sentinel.



Credit: SKY 9



Case History #6 – Fatality & Injury Incident



- Excavation damage – 3rd party – Canton, IL
 - HDD crew was working to install fiber optic cables
 - 1” PE main was hit causing a release of natural gas
 - A One-Call was made, and marks were visible
 - No pot-holing was performed to verify line location
 - Timeline of the event
 - 3:58 p.m. – HDD contractor called 811 to report a damaged pipeline
 - 4:06 p.m. – HDD contractor called the gas operator, who dispatched techs
 - 4:13 p.m. – Operator tech arrived, shortly thereafter confirmed the release
 - 4:48 p.m. – Nearby customers reported gas odor inside & outside building
 - 5:37 p.m. – Pipeline isolated and release secured
 - 5:43 p.m. – The nearby building exploded



Case History #6 – Fatality & Injury Incident



- Escalation of the consequences
 - HDD contractor called 811 but did not call 911
 - Gas migrated to a nearby building which later exploded
 - No gas reading were taken inside the building after gas odors were reported inside
 - Evacuation area was insufficient



Case History #6 – Fatality & Injury Incident



- Consequences
 - One fatality – gas company employee
 - Eleven injuries – First responder and member of the public
 - Commercial building destroyed



Case History #7 – Fatality & Injury Incident



- Excavation damage – 3rd party – Kansas City, MO
 - HDD crew was working to install fiber optic cable
 - 2” PE main was hit causing a release of natural gas
 - Locates were made and marks were visible
 - Pot-holing was performed to verify line locations
 - An unmarked electrical conduit was exposed
 - A 2” gas main, 1’ foot below the electric line, was not exposed
 - Timeline of the event
 - 4:54 p.m. – 911 was called to report a gas release
 - 4:55 p.m. – Operator notified
 - ? :?? p.m. – Evacuation orders reportedly provide for two of the buildings prior to the explosion
 - 6:02 p.m. – The explosion occurred



Case History #7 – Fatality & Injury Incident



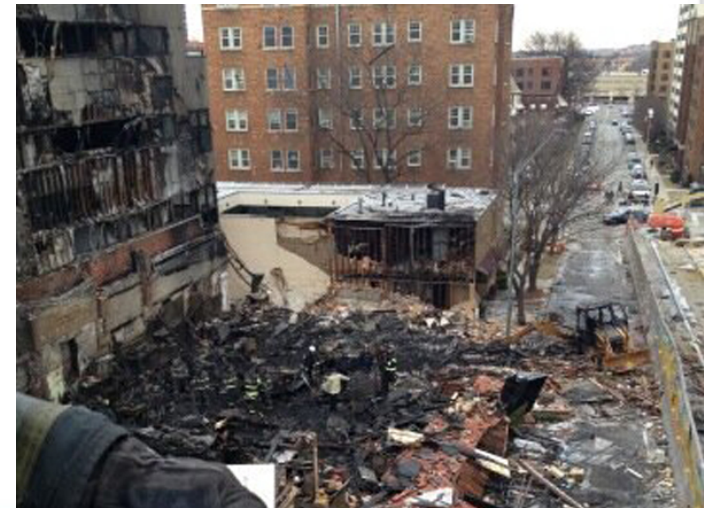
- Escalation of the consequences
 - Operator failed to take “prompt and adequate” steps to ensure safety
 - Gas migrated to a nearby building which later exploded
 - Utility workers waited too long before checking gas levels
 - Evacuation area was insufficient



Case History #7 – Fatality & Injury Incident



- Consequences
 - One fatality – restaurant employee
 - Fifteen injuries
 - One operator employee, two other workers and one citizen hospitalized
 - Eleven other treated for injuries without hospital stay
 - Restaurant building destroyed
 - Total damages exceeded \$19.7 million



Regulatory Requirements



- Emergency Response Preparedness for Operators
 - Procedural manual for emergencies - Part 192.605 and 195.402
 - Written Emergency Plan - Part 192.615 and 195.402(e)
 - Written Public Awareness Program - Part 192.616 and 195.440



Code of Federal Regulations

A point in time eCFR system



■ Title 49 ■



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AID Recommendations



- Inspection Considerations
- Incident Command Considerations
- Emergency Response and Public Awareness Programs





- During inspections, consider the following
 - Perform a detailed review of written procedures for emergency response operations
 - Review training records for emergency responders
 - Have candid discussions about making a site safe when
 - Responding to a gas release call
 - Responding to odor call
 - Responding to other potentially hazardous calls

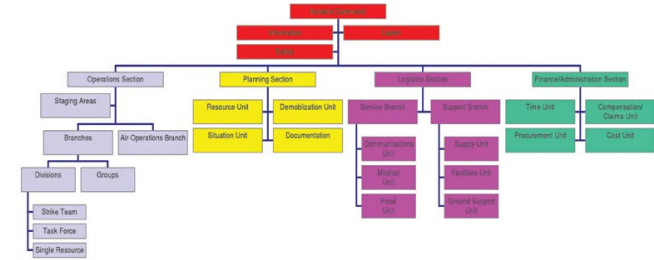




- Structured, standardized and consistent ER operations
- Incident Command System (ICS)

- ICS organization
- ICS roles and responsibilities
- ICS procedures

INCIDENT COMMAND ORGANIZATION CHART



- Emergency scenarios should be explored, discussed, and trained on
- Timely evacuation and have an adequate perimeter





- Do the operator's procedures cover multiple scenarios?
 - Scenarios provide a framework for discussion of safety issues
 - Discussion of tactical options for handling various emergencies
 - Operators should set objectives for discussing each scenario type
 - Follow training with discussion of leak and fire control methods
 - Timely evacuation and have an adequate perimeter





- Special considerations for HDD
 - Location of damage may be unknown
 - Have an adequate perimeter
 - Potential for multiple migration paths
 - Provide information to excavators on the importance of evacuating buildings promptly if they hit a natural gas pipeline
 - Increased onsite observations of HDD operations
 - Preplan for isolation when monitoring excavations





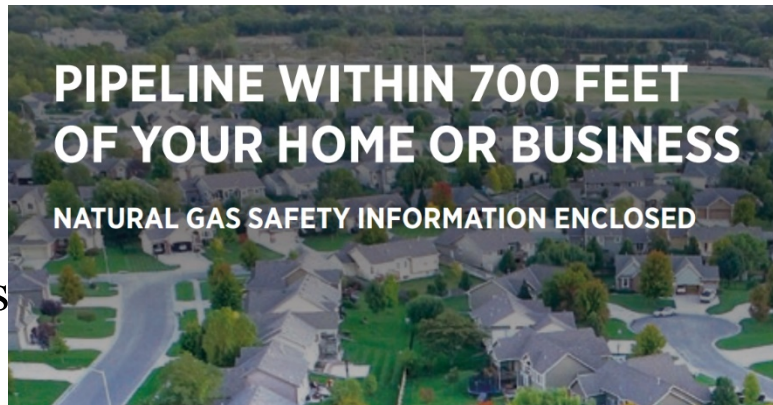
- Do the operator's procedures cover potential gas migration?
 - Gas migration paths
 - Procedures on gas inside of buildings
 - Evacuation area
 - Timing of evacuation
 - Size
 - Timing of evacuees returning





- Does the operator's program include education concerning?
 - Chemical and physical properties of the product in the pipeline
 - Physical properties – natural gas is lighter than air
 - Steps to take in the event of a pipeline release
 - Physical indications that such a release may have occurred

- Odor
- Noise
- Bubbles



Leak recognition

The following symptoms are representative of a leak, but this shouldn't be considered a complete list.



What you may see:

- Unexplained areas of dead vegetation where the surrounding area is green
- A meter dial that continues to move after all natural gas appliances and equipment have been shut off.
- Blowing dirt, bubbling or standing water near a pipeline.



What you may smell:

- In all urban and most rural settings, natural gas utilities add an odorant to the gas. Most people compare the odor to the smell of rotten eggs or another peculiar odor. Regardless, most people agree that it's not a pleasant smell. Some may not be able to smell the odor, or in certain rare circumstances, odor fade can occur.



What you may hear:

- Listen for a hissing, roaring, whistling or bubbling sound from the ground.



Additional Resources



- National Incident Management System (NIMS)

- No cost online training on ICS



- <https://www.fema.gov/nims-training>

- National Association of State Fire Marshals

- No cost online training on Pipeline Emergencies

- <https://nasfm-training.org>



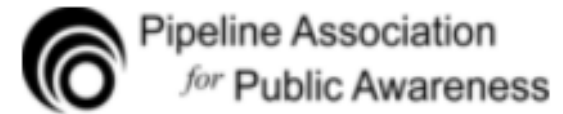
Additional Resources



- Pipeline Emergency Response Guidelines

- Pipeline Association for Public Awareness

- <https://pipelineawareness.org>



- Federal Emergency Management Agency (FEMA)

- September is National Preparedness Month each year

- <https://www.ready.gov/september>



- PHMSA AID SAFE Bulletin, Vol. 1 No. 6, Nov. 2019

- Potential for Fatalities and Injuries During Emergency Response Operations



Additional Resources



- National Pipeline Incident Coordinator (NPIC)
 - NPIC is an AID rotational duty
 - Monitors/Evaluates/Coordinates all ongoing incidents
 - 24/7/365
- NPIC Hotline: (888) 719-9033
 - Single Point for Operators, State Partners and Agencies
- PHMSAAccidentInvestigationDivision@dot.gov



Fatalities and Injuries During Emergency Response



- Any Questions On?

- Background

- Case Study Examples

- AID Recommendations

- Additional Resources



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