Basic Leak Investigation

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Agenda

• Leakage 101
• Leak Classifications
• Outside Leak Investigations
• Bar Holing & Pinpointing
• Examples
• Evacuator
• Sample Taking
• Questions
Disclaimer

• KCC Pipeline Safety Regulations are Referenced

• Some BHE References and Best Practices

• Be Familiar with YOUR Specific O&M Policies and Procedures
Leakage 101

• What is a leak?
  o A Leak is defined as an unintentional escape of gas

• What is a Class?
  o A Class is defined as the severity of the leak
  o How bad is it?

• All leaks must be classified within two hours of notification
Probably a Leak
Leakage 101

• All leaks must be documented on leak investigation report
  o Everyone has their own form and format
  o Fill out on EVERY leak

• Classifying leaks should consider the following:
  o Leak Location
  o Amount of gas read (LEL or % Gas)
  o Pipeline pressure (8 oz or 80 psi)
  o Type of surfacing (soil, concrete)
  o Soil conditions (sandy, clay, compacted, freshly excavated)
  o Potential spread or migration of gas
  o Proximity to other underground facilities

• Migration Patterns
  o Measured and drawn on the back of leak investigation report or equivalent
  o Zeroed out in the four cardinal directions
  o Distance from structures
Leak Classification

• Class 1 Defined
  o Represents an existing or probable hazard to persons or property
  o Requires immediate repair or continuous action until the conditions are no longer hazardous
  o Any leak which in your judgment is regarded as an immediate hazard
  o Any leak where escaping gas has ignited
  o Any indication that gas has migrated into or under a building or into a tunnel
  o Any reading of gas at the outside wall of a building or where gas would likely migrate to an outside wall of a building
  o Any reading of 4% gas in air or greater in a confined space
  o Any reading of 4% or greater in a small substructure which gas would likely migrate to the outside wall of a building
  o Any leak that can be seen, heard, or felt and in a location that may endanger the general public or property

• What to do
  o Protect life and property
  o Continuous action until the conditions are not longer hazardous

• Other
  o Gain access into buildings in the area of the leak to perform entry checks
  o Use police and fire departments to access homes/buildings where owners/tenants are not home
Classification – What help do I need?

• Class 1
  o Danger to Life and Property
  o Beyond your capability to control without help
  o In your judgment a hazardous condition exists
  o Fire or Explosion

• What to do
  o Check compliant house
  o Evacuate, do no reenter
  o Call supervisor and/or 911
  o Advise of situation (get help coming)
  o Shut off gas if possible
  o Check and evacuate surrounding buildings and area
  o Secure area
  o Eliminate ignition sources
  o Bar hole test
  o Do not get tunnel vision
  o Follow Emergency Plan
Leak Classification

• Class 2 Defined
  o Any leak that is nonhazardous at the time of detection
  o Justifies scheduled repair based on probable future hazard
  o Any reading of 2% gas in air or greater under wall-to-wall pavement
  o Any reading of 5% or greater under wall-to-wall pavement that has significant gas migration
  o Any reading less than 4% in a small substructure from which gas would likely migrate creating a probable future hazard
  o Any reading between 1% and 4% gas in air in a confined space
  o Any reading on a pipeline operating at 30% SMYS or greater in a class 3 or 4 location
  o Any reading of 4% or greater in a gas associated substructure
  o Any leak which in the judgment of the employee is of significant magnitude to justify scheduled repair

• What to do
  o Protect life and property
  o Repair within six months after detection
  o Ask yourself...Can I leave it for six months?
  o Monitor weekly under adverse soil conditions
    • Flooding, Drought, Settlement, Frozen Ground
Classification – What help do I need?

• Class 2
  o Less severe than Class 1
  o Potential danger to life and property
  o Beyond your capability to repair or control without help
  o Only requires assistance from company personnel
  o In your judgment a hazardous condition does not exist

• What to do
  o Check compliant house
  o Evacuate if any doubt
  o Call Supervisor, advise of situation
  o Check surrounding buildings and if gas detected upgrade to a Class 1
  o Check how widespread leak area is
  o If widespread treat as Class 1
  o Shut off gas if possible
  o Conduct shut-in test
  o Bar hole test
  o Document migration pattern with measurements
Leak Classification

• Class 3 Defined
  o Any leak that is nonhazardous at the time of detection and can be reasonably expected to remain non-hazardous
  o Any reading of less than 4% gas in air in a small gas associated substructure
  o Any reading under wall-to-wall pavement where it is unlikely the gas could migrate to the outside wall of a building
  o Any reading of less than 1% in a confined space

• What to do
  o Repair within thirty months after detection
  o Must be rechecked and documented every 6 months
  o Ask yourself...Can I leave it for 30 months?
Classification – What help do I need?

• Class 3
  - No danger to life and property
  - You can handle
  - Leak can easily be repaired without danger

• What to do
  - Check compliant house
  - Conduct shut-in test
  - Bar hole test at service line entrance/meter set, riser, side of complaint building
  - Bar hole test at adjacent buildings and service tees from complaint building
  - Document migration pattern with measurements
Other Considerations

• **BHE requires a shut in test on ALL leak calls originating from a customer report**

• If the customer leaves the premise before you get there
  
  o Shut off and lock gas meter
  
  o Perform outside leak investigation and try to get readings from open windows or crawl spaces
  
  o If gas is detected inside or against foundation (Class 1)
    
    • get police or fire dept to help you gain access to the structure
  
  o If no gas is detected
    
    • Secure door tag for customer and conduct inside investigation when customer is available
Outside Leak Investigation
Bar Holing

- All bar holes should be of equal depth, evenly spaced, and down to the pipe depth (extra long plunger bars may be needed)
- Use 6’ – 10’ spacing to establish migration pattern
- Additional test holes can be placed with spacing as close as 12” to help pinpoint the leak
- All CGI readings should be taken at an equal depth in order to obtain consistent and worthwhile readings
- Use the highest sustained reading for documentation
- The leak can be traced to its source by identifying the test holes with the highest readings
- Plunger Bar and Concrete Drill are a necessity
Pinpointing Underground Leaks

• Pinpointing is the process of tracing a gas leak to its source

• The migration of gas should be determined by establishing the outer boundaries of the indications (zero out in the four cardinal directions)

• This will define the area in which the leak will normally be located

• Watch for recent trenches or other utility lines in the area

• Measure and record migration pattern and times in a bracket or grid type pattern on leak investigation sheet

• Pinpointing leaks can be frustrating...do not get tunnel vision...look at the big picture and document your findings

• Locate flags can be numbered and used to identify test holes
Combustible Gas Indicator Readings

• Use highest sustained reading to determine leak location

• High or equal readings are sometimes found in multiple test holes, especially if the leak has been there any length of time

• Venting or purging may be necessary to accurately pinpoint the leak

• Other Ways to Determine Leak Location
  o Use soap
  o Look for dust particles blowing from test hole
  o Sound or sight
  o Sunlight diffraction can sometimes be observed

• Watch out for multiple leaks...do not get tunnel vision

• Consider the leak to be natural gas until proven otherwise
  o Landfill, sewer gas, gasoline
Example: Service Tee Leak

- Class 1
  - 10% gas 4’ from house
  - Migration pattern 15’ x 10’
  - Time: 13:00
Evacuator

- Used to pull underground gas away from a structure or purge the soil
- Connects to air compressor and creates a vacuum that allows you to purge gas out of the soil without excavating
- Typically placed in the area of the highest reading (away from structure)
- Be mindful of where the exhaust of the evacuator is going (away from buildings/traffic, etc)
- Once the evacuator is running, recheck bar holes every 15 minutes and document your readings
- When readings have dissipated shut off the evacuator and monitor readings
- Readings could go back up once the evacuator has been shut off
Evacuator Placement

Any 3 locations are Acceptable.
Reduced Reads

Class 1
20% gas 10’ from house
Migration Pattern 8’ x 8’
Time: 14:00
Leak has been pinpointed

Class 1
100% gas 20’ from house
Migration Pattern 2’ x 2’
Time: 14:30
Sample Taking

• Samples are sometimes necessary when you suspect sewer gas or other contaminant problem

• Could be important if you have an incident

• BHE uses a Model 60 CGI

• Have sample bags available

• Get system gas sample for comparison

• Use the highest reading for your sample

• Put date, time, and % of gas on bag

• Demo
Questions