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?
  - A Leak is defined as an unintentional escape of gas
- What is a Class ?
  - A Class is defined as the severity of the leak
  - 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
  - Everyone has their own form and format
  - Fill out on **EVERY** leak
- Classifying leaks should consider the following:
  - Leak Location
  - Amount of gas read (LEL or % Gas)
  - Pipeline pressure (8 oz or 80 psi)
  - Type of surfacing (soil, concrete)
  - Soil conditions (sandy, clay, compacted, freshly excavated)
  - Potential spread or migration of gas
  - Proximity to other underground facilities
- Migration Patterns
  - **Measured** and drawn on the back of leak investigation report or equivalent
  - Zeroed out in the four cardinal directions
  - Distance from structures

Leak Classification

- Class 1 Defined
  - Represents an existing or probable hazard to persons or property
  - Requires immediate repair or continuous action until the conditions are no longer hazardous
  - Any leak which in your judgment is regarded as an immediate hazard
  - Any leak where escaping gas has ignited
  - Any indication that gas has migrated into or under a building or into a tunnel
  - Any reading of gas at the outside wall of a building or where gas would likely migrate to an outside wall of a building
  - Any reading of 4% gas in air or greater in a confined space
  - Any reading of 4% or greater in a small substructure which gas would likely migrate to the outside wall of a building
  - Any leak that can be seen, heard, or felt and in a location that may endanger the general public or property
- What to do
  - Protect life and property
  - Continuous action until the conditions are not longer hazardous
- Other
  - Gain access into buildings in the area of the leak to perform entry checks
  - Use police and fire departments to access homes/buildings where owners/tenants are not home

Classification – What help do I need?

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

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

Leak Classification

- Class 2 Defined
  - Any leak that is nonhazardous at the time of detection
  - Justifies scheduled repair based on probable future hazard
  - Any reading of 2% gas in air or greater under wall-to-wall pavement
  - Any reading of 5% or greater under wall-to-wall pavement that has significant gas migration
  - Any reading less than 4% in a small substructure from which gas would likely migrate creating a probable future hazard
  - Any reading between 1% and 4% gas in air in a confined space
  - Any reading on a pipeline operating at 30% SMYS or greater in a class 3 or 4 location
  - Any reading of 4% or greater in a gas associated substructure
  - Any leak which in the judgment of the employee is of significant magnitude to justify scheduled repair
- What to do
  - Protect life and property
  - Repair within six months after detection
  - Ask yourself...Can I leave it for six months?
  - Monitor weekly under adverse soil conditions
    - Flooding, Drought, Settlement, Frozen Ground

Classification – What help do I need?

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

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

Leak Classification

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

- What to do
  - Repair within thirty months after detection
  - Must be rechecked and documented every 6 months
  - 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
  - Shut off and lock gas meter
  - Perform outside leak investigation and try to get readings from open windows or crawl spaces
  - If gas is detected inside or against foundation (Class 1)
    - get police or fire dept to help you gain access to the structure
  - If no gas is detected
    - Secure door tag for customer and conduct inside investigation when customer is available

Outside Leak Investigation

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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

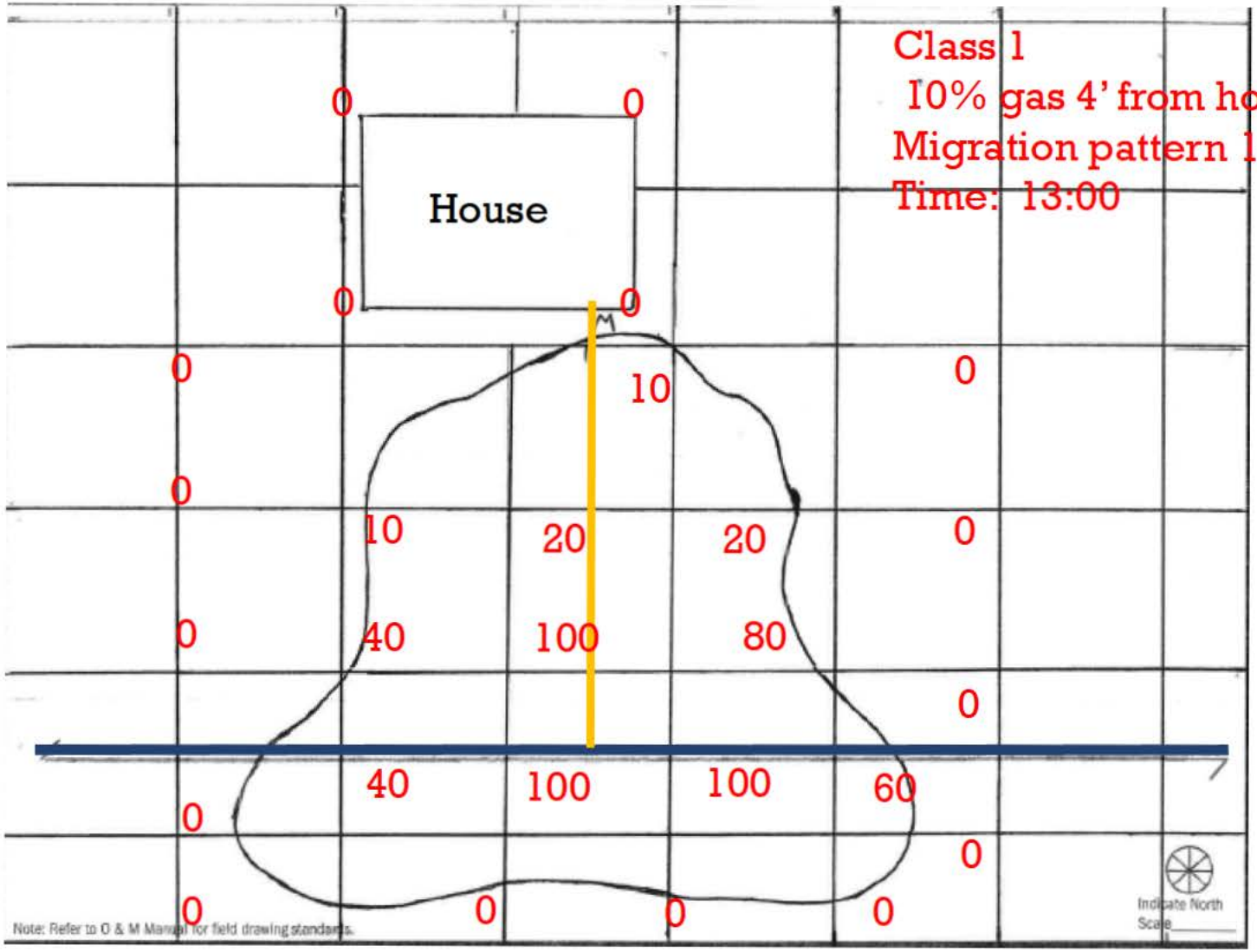
Pinpointing Underground Leaks

- 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
  - Use soap
  - Look for dust particles blowing from test hole
  - Sound or sight
  - Sunlight diffraction can sometimes be observed
- Watch out for multiple leaks...do not get tunnel vison
- Consider the leak to be natural gas until proven otherwise
  - Landfill, sewer gas, gasoline

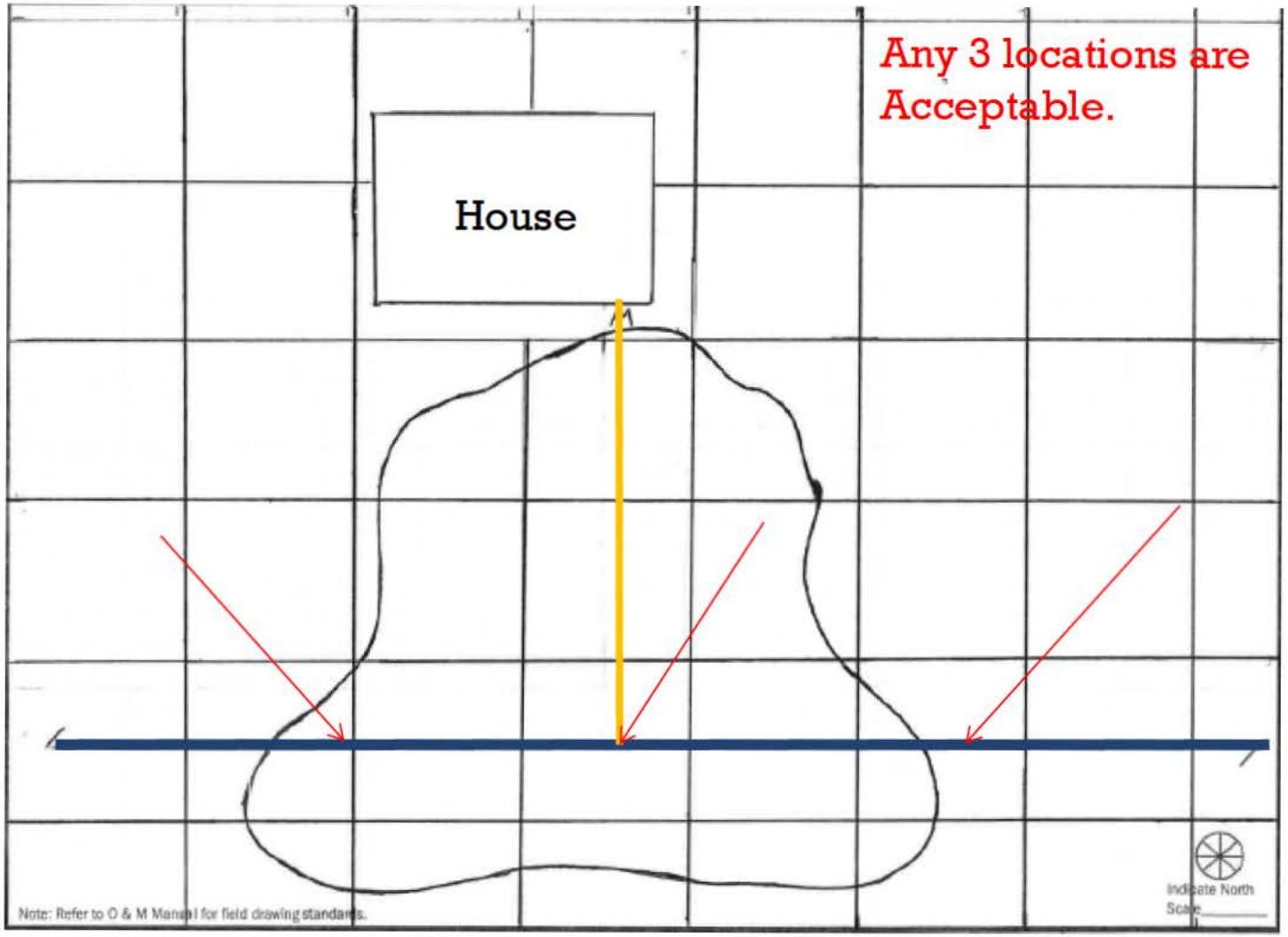
Example: Service Tee Leak



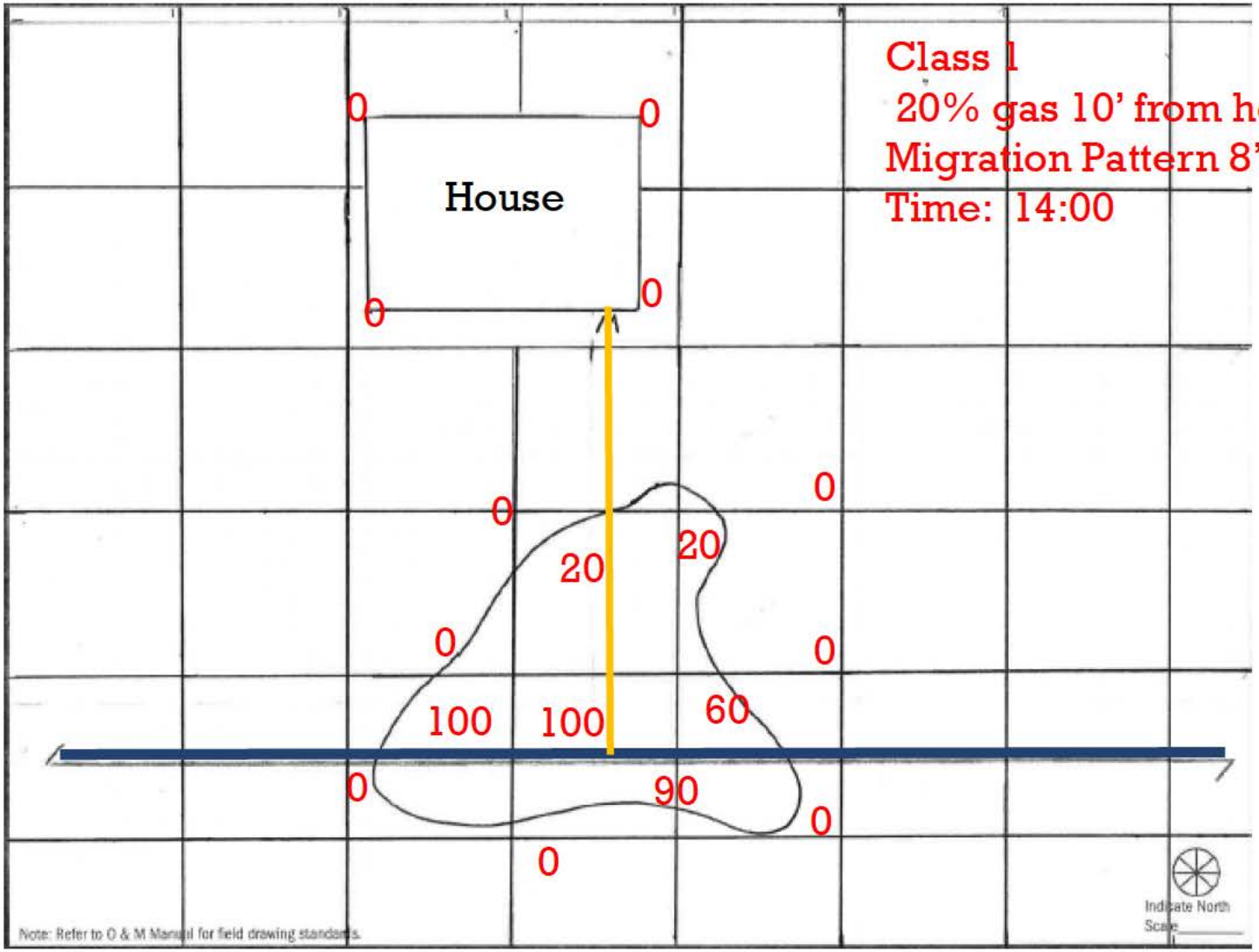
Evacuator

- 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

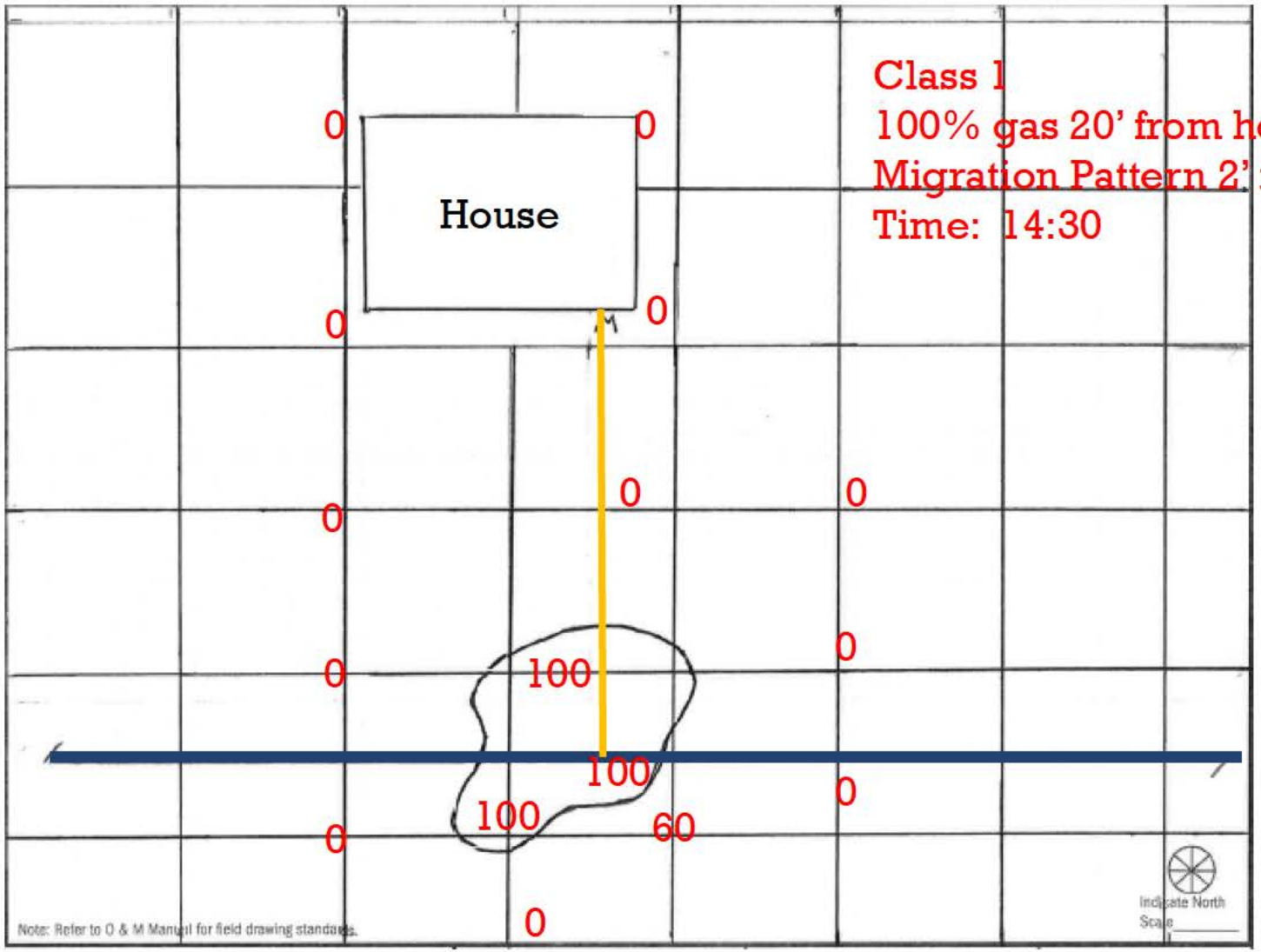
Evacuator Placement



Reduced Reads



Leak has been pinpointed



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