**Instructor Guide**

Locating Gas Structures

Table of Contents

[Overview and Goals 3](#_Toc359657100)

[Preparation – Facilitation Guidelines 3](#_Toc359657101)

[Materials 4](#_Toc359657102)

[Schedule 5](#_Toc359657103)

[Boot Camp Activities 7](#_Toc359657104)

[Activity Worksheet #1-Locate Methods 7](#_Toc359657105)

[Activity Worksheet #2-Excavation Requirements 8](#_Toc359657106)

[Appendix 1 – Locate Methods-Performance Checklists 9](#_Toc359657107)

Overview and Goals

It is extremely important to know the following about the excavation site.

* The location of buried facilities before any excavation activities to prevent damage to the underground utilities, which in turn, could threaten personnel, as well as the property and people in the area.
* Information on location, placement, and maintenance of permanent pipeline markers, including how to recognize abnormal operating conditions associated with line markers.

In this unit of work the instructor will:

* Highlight the concepts introduced in the online course.
* Demonstrate how to use the relevant tools and reference guides, applicable to the content and activities.
* Guide the participants through hands-on activities to work safely with natural gas, as a qualified operator would on the job.

Upon completion of this unit of work, participants will be able to:

* Conduct locating procedures through multiple methods.
* Identify appropriate line markers and the characteristics which must comply with federal safety guidelines.
* Interpret map and survey data, alignment drawings, and locating equipment to locate and then mark a pipeline.
* Explain the safety procedures and PPE requirements that must be followed when handling buried facilities.

Preparation – Facilitation Guidelines

Ensure the participants have completed:

* ASME-1291 Locate Underground Pipelines, including the pre-test and 25 question course assessment.
* ASME-1301 Install and Maintain Pipeline Markers, including the pre-test and 15 question course assessment.

Conduct this training in a classroom setting, with a simulated lab and/or field site allowing the participants to work independently or in groups (dependent on number of participants) and then present findings to the workshop for further discussion.

Use a flipchart to capture key lessons learned from the group discussions, or to identify questions that will be answered in upcoming units of work or that require further research and discussion.

Reinforce the importance of damage prevention programs and the best practices and guidelines of the Compressed Gas Association (CGA), the Occupational Safety and Health Administration (OSHA), and the Federal Government.

Ensure the participants have a copy of the Common Ground Alliances (CGA) Best Practices guide: <http://www.commongroundalliance.com>

Review the following regulations as tasks are introduced, demonstrated, and practiced.

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| §192.321 Installation of plastic pipe. | 195.442 Damage prevention program. |
| §192.614 Damage prevention program | §198.37 State one-call damage prevention program |
| §192.615 Emergency plans. | §198.39 Qualifications for operation of one-call notification systems. |
| §192.707 Line markers for mains and transmission lines. | §1926.652 Requirements for protective systems |
| §195.410 Line markers. |  |

Materials

Provide the following to each participant:

* A copy of the Activity Worksheets and Appendix 1 Performance Checklists.
* Access to the Internet, as needed, for OSHA, federal, and industry resources/references supporting course related discussions, demonstrations, and hands-on activities.
* Access to manufacturers’ instructions as needed.

Provide the following materials and tools used locally for the lab demonstrations and hands-on practice:

* Materials and tools to white line an area.
* Personal Protective Equipment (See materials section: Hand and Power Tool Safety).
* Materials and tools, for example: maps and markers for Activities 1 and 2, with appropriate company guidelines and the manufacturers’ instructions to locate underground pipe and to install and maintain pipeline markers.

***Note****:*

*These items, and any other materials used for demonstrations and participant activities, will be determined by the materials and tools used at the training facility.*

Schedule

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| **Time** | **Topics for Discussion, Demonstrations, and Activities** |
| **60 minutes** | **Introduction**   * Explain that locating pipes and installing and maintaining line markers are all jobs that need to be successfully completed before a site can be excavated. * Point out how installers use drawings and maps and other information sources, to: * Determine the general location of underground utilities. * Insert a corridor mark based on the facilities within the trench. * Use the state code for marking a buried facility (refer to appropriate industry guidelines). * Identify on the map, permanent pipeline markers. * Document the location of plastic pipe. * Reinforce that all excavation requirements must be adhered to in order to ensure the safety of the personnel and property (See Excavation Activities). |
| **60 minutes** | **Locating Gas Structures**  **Discussion**  The excavator’s responsibilities are to:   * Visually inspect and locate interference. * Locate non-metallic facilities. * Locate metallic facilities. * Use the triangulation method to determine facility depth. * Identify and mark a tolerance zone. * Secure signals, through the direct connect method.   Present real-world, on-the-job experiences to highlight safety measures taken and encourage “what if” discussions if installers do not abide by the guidelines. |
| **120 minutes** | **Locating**  **Demonstration**   * Demonstrate locating procedures, using the materials and tools available in the lab and the following methods: * Electronic markers locating * Measurement locating   + Point out that the excavation company must be informed if this is the only method of location because it is not the most reliable. * Acoustic locating * Ground-Penetrating Radar (GPR) locating * Inductive locating   + Walk a grid pattern to sweep during induction locating * Conductive locating * Instruct participants to complete **Activity Worksheet #1.** |

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| **Time** | **Topics for Discussion, Demonstrations, and Activities** | |
| **60 minutes** | | **Line Marker Requirements**  **Discussion**   * Show examples of line marker signs. * Point out the purpose, identifying features and usage of the following: * Above ground markers * Aerial markers * Vent markers * Transmission pipeline markers * Reinforce and discuss how line markers must: * Comply with federal regulations. * Comply with International color codes. * Contain highly visible letters of contrasting colors. * Name the gas or liquid being transported by the pipeline. * Indicate a 24/7 contact telephone number. |
| **180 minutes** | | **Line Marker Installation and Maintenance**  **Demonstration**   * Demonstrate how to: * Identify a right-of-way and an easement on the land survey to allow access on property that is not company-owned. * Use the maps, survey, alignment drawings, and locating equipment to locate and then mark a pipeline.   + Indicate on the maps where a line marker will be set.   + Identify approximately how many markers will be installed.   + Create a location for the markers for correct information, visibility, orientation, and easy maintenance*.* * Reinforce that installers must be trained to: * Interpret map and survey data * Operate a line locator * Use appropriate safety procedures * Understand PPE requirements * Instruct participants to complete **Activity Worksheet #2**. |

Boot Camp Activities

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| Activity Worksheet #1 - Locate Methods | |
| Task  \*Indicate tools and steps on the Performance Checklist | Using the available materials and tools, select three of the following locating methods and then, enter your findings on the chart (see Appendix 1).   * Electronic markers locating * Measurement locating * Acoustic locating * Ground-Penetrating Radar (GPR) locating * Inductive locating   + Walk a grid pattern to sweep during induction locating * Conductive locating * Compare actions taken and results/outcomes during the Workshop Discussion. |
| References/Guidelines including:   * Industry sources * Online course materials * CFR   Indicate, if applicable, measures that appear to be a potential problem and or an abnormal operating condition (AOC). |  |
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| Lessons learned |  |
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| General discussion questions or notes |  |
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Working with a partner or partners, complete the following tasks, using the materials and equipment in your lab. Be sure to follow the industry guidelines and manufacturers’ instructions as needed.

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| |  |  | | --- | --- | | Activity Worksheet #2 - Excavation Requirements | | | Task  ***Note****: The tools, PPE and materials for this activity will be determined by the materials and tools used at the training facility.* | Use the site location maps, drawings and the information sources to complete the following tasks.   * Determine the general location of underground utilities by using existing maps, documents and/or existing records. * Insert a corridor mark based on the facilities within the trench. * Use the state code for marking a buried facility (refer to appropriate industry guidelines). * Identify on the map, permanent pipeline markers. * Document the location of plastic pipe. | | Tools used |  | |  | |  | |  | | Steps -actions |  | |  | |  | |  | | References/Guidelines including:   * Industry sources * Online course materials * CFR   Indicate, if applicable, measures that appear to be a potential problem and or an abnormal operating condition (AOC). |  | |  | |  | |  | |  | |  | |  | |  | |  | | Lessons learned |  | |  | |  | |  | | General discussion questions or notes |  | |  | |  | |  | |  |

Appendix 1 – Locate Methods-Performance Checklists

Using the tools and information in the lab and/or field, choose three different methods of locating procedures.

Carefully work through the process and record the results. Note similarities and differences which will be further discussed in the workshop.

**METHOD\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-**

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| **Item** | **Results** | **Identify Problems (e.g.; locating, bleed over, air coupling )** | **Identify Frequency Issues** |
| Requirements |  |  |  |
| Tools used |  |  |  |
| Equipment tested |  |  |  |
| Equipment location |  |  |  |
| Frequency used |  |  |  |
| Antenna selected |  |  |  |
| Perform locate |  |  |  |
| Modes if a split box is used:   * Null * Peak |  |  |  |
| Depth measurement |  |  |  |
| Verify locate to map location |  |  |  |

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| **Additional notes** |
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| --- | --- | --- | --- |
| **Item** | **Results** | **Identify Problems (e.g.; locating, bleed over, air coupling)** | **Identify Frequency Issues** |
| Requirements |  |  |  |
| Tools used |  |  |  |
| Equipment tested |  |  |  |
| Equipment location |  |  |  |
| Frequency used |  |  |  |
| Antenna selected |  |  |  |
| Perform locate |  |  |  |
| Modes if a split box is used:   * Null * Peak |  |  |  |
| Depth measurement |  |  |  |
| Verify locate to map location |  |  |  |

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| **Additional notes** |
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**METHOD\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| --- | --- | --- | --- |
| **Item** | **Results** | **Identify Problems (e.g.; locating, bleed over, air coupling)** | **Identify Frequency Issues** |
| Requirements |  |  |  |
| Tools used |  |  |  |
| Equipment tested |  |  |  |
| Equipment location |  |  |  |
| Frequency used |  |  |  |
| Antenna selected |  |  |  |
| Perform locate |  |  |  |
| Modes if a split box is used:   * Null * Peak |  |  |  |
| Depth measurement |  |  |  |
| Verify locate to map location |  |  |  |

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| **Additional notes** |
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