



## **Best Practices for Locating Underground Utilities**

### **Importance of locating buried utilities:**

It is critical for all pipeline and other contractors to accurately locate and identify pipelines/utilities before any excavation begins.

The 811 call (nationwide one-call) should be made.

The owners of known utilities that are not identified, or did not respond, following the one call notification must be notified prior to excavation.

Sources for locating utilities are construction maps, utility markers, drawings and alignment sheets.

### **Types of equipment:**

**The two main types of equipment used to locate underground utilities are:**

#### **Probe rod:**

- Probe rods should have a blunt tip and care must be taken using probe rods because of the potential damage to the utilities and/or coatings.
- Probe rods should be made of non-conductive materials because there is a risk of hitting electric lines.

- Some Pipeline Operators do not allow the use of probe rods. Check with your Operator before using one.

### **Electromagnetic Line Locator:**

- These locators detect the alternating magnetic fields that surround a metallic line. They cannot locate **non-metallic** lines, such as plastic pipe, unless it is installed with tracer wires.
- There are numerous makes and models of Electromagnetic Line Locators. Users must be trained in the proper operating procedures of the device they are utilizing.

### **Active Line Locating Method:**

There are two methods of placing active signals on a utility:

**Direct Connection** – The most accurate method for locating a utility is by connecting directly to the line. The signal is then isolated to a single utility.

- Use the lowest frequency that will work.
- Proper grounding is critical. If the conductor is not well grounded, or if the transmitter connection to the ground rod is poor, the signal will also be poor and not detectable.
- Connect the **red lead** to the pipe and the **black lead** to the ground rod.
- Follow your specific models manufacturer's guidelines when operating but generally, using low frequency, hold the receiver vertical and parallel to the pipe location.
- Make short, sweeping motions across the path of the pipe.
- The strongest signal (peak) will be over the pipe and fade on either side.
- In the null mode, the signal will be weakest directly over the pipe and will be at strongest on either side of the pipe.

**\*CAUTION\***: Electric shock or equipment damage can result if transmitter is connected to live cable. Follow all manufacturer guidelines and safety precautions when connecting to the pipeline. ☒

## **Induction Method:**

**The induction** method induces a frequency into the ground which will radiate back from the pipe to the receiver.

- Induction works well especially when you don't have a place to make a connection.
- Multi-frequency systems allow you to tune the frequency you are putting into the ground to the type of line or pipe you are trying to locate.
- Follow your specific model's manufacturer's guidelines but generally, you should test the signal level by placing the receiver 50 feet away from the transmitter on the ground near the pipe.
- The transmitter and receiver should be in a vertical position and parallel to the supposed location of the pipe. Begin walking toward the location of the pipe.
- The signal will be strongest when directly above the pipe and be weakest as you move away from the pipe.
- Pipelines with impressed current cathodic protection systems can be located using the induction method also.

**\*CAUTION\***: Depth of pipeline must be verified by other means. The use of a line locator should never be used as a method relied upon when verifying the depth of a pipeline.

## **Temporary markings:**

- Temporary markings must be installed where activities may endanger pipelines.
- Temporary markers must be durable and visible during the entire activity requiring marking.
- Common types of temporary markings:

Stakes

Flags

Paint

Buoys

Signs

Marker post

- The American Public Works Association (APWA) color codes include:

**Red – Electric**

**Yellow – Gas/Oil**

**Orange – Communications/CATV**

**Blue – Potable Water**

**Purple – Reclaimed Water**

**Green – Sewer**

**Pink – Temporary Survey Markings**

**White – Proposed Excavation**

Through the OSHA and American Pipeline Contractors Association (APCA) Alliance, APCA developed this Best Practices for informational purposes only. It does not necessarily reflect the official views of OSHA or the U.S. Department of Labor. 11/2012

