

## Common Covered Task 607

### Damage Prevention: Observation of Excavating and Backfilling

#### Directions

This training guide is to be used by a Veriforce Authorized Evaluator/Trainer and Trainee during on-the-job training (OJT) or prior to an evaluation as a resource. (S) Indicates a demonstration or skill task; (K) indicates a knowledge task.

#### OJT Reminder

OJT is an active hands-on process. Practice should be as similar to the actual job task as possible. However, if the training is being provided on an actual job site while a covered task is actually being performed, the Evaluator either needs to be qualified on that covered task or be assisted by someone who is qualified on the covered task. The Evaluator should closely monitor the Trainee's practices to ensure safe and correct task performance. At no time should a non-qualified individual perform, or train for, a covered task unless directed and observed by a qualified individual. However, if the *"span of control"* for that particular covered task is "1:0" (requiring only qualified individuals to perform the covered task), the training must be simulated. Training is simulated by "walking through" the task and simulating all actual manipulations (valves, switches, tools, etc.) an individual would use during the performance of a covered task. Simulating includes the use of safety and administrative requirements as if the task were being performed live. Refer to the Veriforce Evaluator Training Program for more on how to conduct formal OJT.

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### Damage Prevention: Observation of Excavating and Backfilling

#### Recommended Student Training or Resources:

- DOT 49 CFR 192.319(b)
- DOT 49 CFR 192.328(a)(1)
- DOT 49 CFR 192.614(c)(6)
- DOT 49 CFR 195.252
- DOT 49 CFR 195.442(c)(6)

#### Introduction

Excavating is the process of digging into the earth. Two of the most common reasons for excavation in the pipeline industry are to place new pipe in the ground and to access existing pipes that need repair or replacement. Once the excavation work is finished, the pipe will then need to be reburied. This process is called backfilling. While these are two common activities in the pipeline industry, they carry with them a high risk for damage to the pipe and associated pipeline facilities. If the pipe or facility is damaged during excavation or backfilling, it would have to be repaired or replaced, which could be costly. This course will help you understand what to look for during excavation and backfilling activities in order to prevent damage to the pipe or facility.

**Knowledge:** Explain what is required prior to performing this task.

#### Operator-Approved Procedures

Before starting any excavating or backfilling tasks, you will need to refer to the pipeline operator-approved procedures on how to perform this task. Example procedures may include, but are not limited to, guidelines for construction near pipelines, potholing guidelines, and location or elevation measurements.

#### Appropriate Equipment/Material

Before performing any excavation or backfilling tasks, you will need to gather all appropriate equipment and material needed to safely complete the task. Examples of appropriate equipment and materials could include personal protective equipment (PPE) and specific tools or machines needed to complete the task, such as digging equipment.

**Knowledge:** Describe the steps that must take place prior to excavation (including trenchless activities such as boring and directional drilling) activities.

#### Verification of One-Call

One-Call must be called prior to starting any excavation activities. 811 is the national One-Call number, and the One-Call service will connect you with the appropriate state One-Call center. One-Call requires the excavator or anyone working for the excavator to give notice before beginning the excavation job. One-Call should be notified at least 48 hours but no more than 10-14 days before the excavation is set to begin. Be mindful of the days prior to the start date of the excavation job. Some states do not include weekends or holidays in the time requirements for One-Call notification.

It is recommended that any sub-contractors make their own One-Call notification calls. Sometimes the general contractor's notification does not cover sub-contractor activities. Some states require the company doing the actual excavating to notify One-Call. One-Call will transmit the information to the affected utility companies or other service members. The utility owners will either mark their facilities or inform the excavator that the

facilities are not in the proposed area of excavation. Make certain that you receive and retain the One-Call request ticket number.

### **Identification of Pipeline Markers, Foreign Structures, and Utilities**

At the jobsite, mark or indicate the approximate area to be excavated. This will give facility locators an estimate of the proposed excavation. Utility locators often use temporary markers to locate underground utilities in the vicinity of planned work. They can be flags, paint, stakes, whiskers, etc., providing they are durable and visible during the entire activity requiring marking. They should be placed along the pipeline or utility in accordance with state and local laws and with the pipeline operator's operating procedures.

Some states use the American Public Works Association, or APWA, for color codes on markings. If there is any question about the type and/or location of a facility marker, contact the appropriate utility company.

There are also permanent markers. These markers are signs with large lettering that identifies the utility, company, and emergency phone number. They do not, however, indicate the pipeline depth.

Typical permanent markers include:

- Markers near roads, railroads, and along pipeline rights-of-way.
- Markers for pipeline patrol planes. These face skyward.
- Markers for pipeline casing vents.

Now that we know what to look for at the excavation site, be sure to examine the surroundings carefully to make sure you have identified any other signs, markers, or foreign utilities. Look for any markers that may indicate underground facilities, such as valves, valve boxes, pedestals, junction boxes, manhole covers, cables running from poles to the underground, warning signs, etc.

It is important to note that not all utilities participate in One-Call programs. For instance, traffic signal wires and illumination for intersections ARE NOT covered by locate services. It is your responsibility to contact the proper authority to locate the traffic signal wires. Notify all utilities if you are suspicious of traffic signal wires prior to commencement of excavation.

### **Provide excavator with guidelines for construction near pipelines.**

It is important to provide the excavator with guidelines for construction near a pipeline or facility. A general guideline is the required clearance away from the pipeline where the use of heavy excavation is allowed. This clearance takes into consideration the tolerance zone and the width of the pipe.

The utility location markings represent the approximate location of the pipeline or facility; however, a tolerance zone should be added. The tolerance zone is defined as a horizontal space from the outside edge of the underground facility on either side.

This tolerance zone will be set by state law and/or the pipeline operator. To get the total clearance required for the excavation, you would add half of the pipe's width to the tolerance zone; for example, on a 12" pipeline with a tolerance zone of 18", the total required clearance would be 24". There should be no excavating by machine within this required clearance.

6" which represents half of pipe width  
+ 18" tolerance zone  
24" on each side of the marking

### **Potholing**

For new construction in a highly congested area, some pipeline operators may pothole to verify foreign line locations. After the temporary markings have identified the line location, potholing may be used next. Potholing is the practice of digging a test hole to expose underground facilities to determine the horizontal and vertical location and travel path. Potholing can physically confirm the exact location of existing pipelines as well as other utilities buried in the right-of-way.

A pothole can be dug either by hand or machine. Hand digging a pothole is the method of digging a pothole by manual means with handheld equipment, such as a shovel. This method is labor-intensive and time-

consuming. The advantage to hand digging is that it does not require expensive equipment and is relatively safe for locating most facilities. However, mechanical excavation equipment, such as a backhoe, can be used for potholing as well. When using mechanical excavation equipment, take necessary precautions to make sure the pipeline or utility is not accidentally struck.

Vacuum excavation is another method used to dig a pothole. This method is generally faster and less destructive than traditional excavations. Vacuum excavation is the nondestructive exposure of buried utilities. It utilizes either air or water pressure to break up the soil and a vacuum device to collect the spoil.

While mechanical excavation may be limited in close proximity of the pipeline, nondestructive vacuum excavation generally isn't because it doesn't pose the same risk of damage as mechanical equipment. Pothole excavation may be observed by an inspector or pipeline operator representative who will take measurements and record the exact pipe or facility locations as well as place a marker to indicate the exact location.

### **Standby Personnel**

Standby personnel may be needed to hand excavate when inside of the tolerance zone of the pipeline or facility. Spotters are examples of standby personnel that are often used to help the excavator operator watch for foreign objects and unmarked lines while digging.

**Knowledge:** Identify considerations during excavation of pipelines.

### **Excavation Equipment**

When using mechanical excavation equipment, it is important to make sure that the equipment will not cause any accidental damage to the pipeline. For example, if you are using an excavator or backhoe that has a bucket with teeth or side cutters to dig, a pipeline operator may require the bucket teeth to be barred and side cutters removed so no accidental damage occurs to the pipeline. Be sure to check any applicable operator guidelines for specific requirements concerning mechanical excavation. Also, maintain the required clearance between the bucket and pipeline or facility, as outlined in the operator guidelines. As the excavation process moves closer to the pipeline or facility, hand excavation may be required. Check with the operator's procedures or guidelines if you are unsure when you should excavate by hand.

### **Unidentified Foreign Structures**

While excavating, you may encounter unidentified foreign structures or pipeline appurtenances, such as taps or valves. It is important to anticipate encountering unidentified foreign structures or pipeline appurtenances and take the proper precautions. For example, hand excavating or potholing may be required to prevent accidental damage to an appurtenance of a pipeline or facility.

### **Adequate Pipeline Support**

It is important to provide adequate support when excavating around a pipeline or facility. It is possible that the pipeline or facility could shift, sag, or otherwise move when the soil that was supporting and protecting it is removed. Pipelines or facilities that are rendered unsupported due to excavating should be supported by appropriate support methods.

Examples of adequate pipeline supports can be fill dirt, sandbags, or cribbing. Spaces should be dug under the pipe to add support as needed. Follow the operator's procedures regarding the spacing of supports.

**Skill:** Verify location and elevation of affected belowground structures.

It is important to verify the location and elevation (or depth) of belowground structures that could be affected by the excavation. You can verify the location and elevation by using maps, markings, probing, and/or

potholing. If necessary, contact the utility companies in question if you are unable to confirm the location or elevation of their facilities.

If belowground utilities present a hazard, discuss the work with the designated utility representative. It is very important to know the elevation or depth of the foreign lines. Use your knowledge of the depth of foreign lines to help you determine how and where to do the excavation.

**Knowledge:** Describe how to establish effective communication prior to performing this task.

While performing excavation and backfilling work, it is important to establish effective communication between the equipment operator and spotter, especially when using mechanical excavation equipment. As mentioned earlier in the course, spotters are often used to assist mechanical excavation equipment operators. Before beginning, the spotter and mechanical excavation equipment operator should coordinate communication requirements and discuss how the job will be performed. If you cannot use verbal communication due to noise, distance, or any other reason, then non-verbal communication will need to be used. An example of non-verbal communication that could be used is hand signals. It is important to review any hand signals that will be used during the job. As a rule of thumb, any directions given should be from the mechanical excavation equipment operator's point of view.

**Knowledge:** Describe how to prevent damage during backfill operations.

### **Rock Shield**

Rock shield is a lightweight covering that is easy to apply and helps protect the pipe from impacts and penetrations, including moderately abrasive rocks. Operator procedures or guidelines may require the use of a rock shield.

### **Pad Dirt**

Now that the rock shield is in place, you can start backfilling with pad dirt. Pad dirt is the dirt that directly surrounds the pipeline and provides the next level of protection and support. It is important that pad dirt not contain any rocks or foreign material and that it be compacted around the pipe. Examples of foreign material include, but are not limited to, scrap metal, skids, tree limbs, large clumps of dirt, or any other material that could damage the pipe coating or pipe itself.

Check your operator-approved procedures and guidelines for the amount of pad dirt required to surround the pipe. Many excavations are much deeper than the bottom of the pipe. Regular backfill material can be used to bring that level closer to the pipe before the pad dirt is used, as long as it is free of any large rocks or foreign material. The same applies to the sides of the pipe. The pad dirt backfill should be brought up evenly on both sides of the pipe to avoid unequal side loads that could fall on or move the pipe. Never backfill any dirt directly on the pipe.

### **Other Backfill Material**

Now that the pipe is buried in pad dirt, you should backfill the remaining ditch with sound earthen material, free from broken concrete, broken pavement, wood, or other harmful material. Remove any harmful materials before backfilling the remaining material.

## Abnormal Operating Conditions (AOCs)

Candidates are required to possess the ability to **RECOGNIZE** and **REACT** to the listed AOCs for each task. Be prepared to answer questions concerning additional AOCs that may be relevant. Evaluators may ask questions about AOCs throughout the evaluation.

An AOC is defined in **49 CFR §§ 192.803** and **195.503** as:

A condition identified by the pipeline operator that may indicate a malfunction of a component or deviation from normal operations that may:

- Indicate a condition exceeding design limits; or
- Result in a hazard(s) to persons, property, or the environment.

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**Recognize:** Improperly marked and/or unmarked foreign structures and utilities are abnormal operating conditions.

**React/Respond:** Proper reactions/responses to take in the event of improperly marked and/or unmarked foreign structures and utilities include the following:

- Stop the activity.
- Mark the location so it may be easily located.
- Notify the designated pipeline operator representative.

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**Recognize:** Unintentional releases, vapors, or hazardous atmosphere could be signs that an abnormal operating condition has occurred. Examples could include, but are not limited to:

- Blowing gas
- Puddles
- Dead vegetation

**React/Respond:** Proper reactions/responses to take in the event of an unintentional release, vapors, or hazardous atmosphere include the following:

- Eliminate potential ignition sources.
- Move to a safe location.
- Notify emergency response personnel, as appropriate.
- Notify the designated pipeline operator representative.

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**Recognize:** Damage to pipe, coating or a component that has impaired or is likely to impair the serviceability of the pipeline is an abnormal operating condition. Examples could include, but are not limited to:

- Damaged risers
- Dents
- Gouges

**React/Respond:** Proper reactions/responses to take in the event of damage to pipe, coating or a component that has impaired or is likely to impair the serviceability of the pipeline include the following:

- Stop the activity and notify the designated pipeline operator representative.
- Mark the location so it may be easily located.

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**Recognize:** Failure or malfunction of pipeline component(s) is an abnormal operating condition. Examples could include, but are not limited to:

- Valve leaking
- Pipe support failure

**React/Respond:** Proper reactions/responses to take in the event of a failure or malfunction of pipeline component(s) include the following:

- Stop the activity.
- Notify the designated pipeline operator representative.

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**Recognize:** Unintended movement or unusual loading of a pipeline and/or pipeline support that has impaired or is likely to impair the serviceability of the pipeline is an abnormal operating condition. Examples could include, but are not limited to:

- Earthquake
- Washout/erosion
- Soil subsidence
- Improper pipe placement
- Pockets of air/no soil support under pipeline

**React/Respond:** Proper reactions/responses to take in the event of an unintended movement or unusual loading of a pipeline and/or pipeline support that has impaired or is likely to impair the serviceability of the pipeline include the following:

- Stop the activity.
- Notify the designated pipeline operator representative.

## Glossary

**AOC**

abnormal operating condition

**CCT**

common covered task

**CFR**

Code of Federal Regulations