

Common Covered Task 040 Isolation of Pipe with Mud Plug

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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Recommended Student Training or Resources:

- DOT 49 CFR 192.751
- DOT 49 CFR 195.402 (c)(11)
- DOT 49 CFR 195.402 (c)(14)

Knowledge: Explain what is required before performing the task.

Operator-approved procedures

Each pipeline operator will provide you with approved procedures for how to isolate a pipe with a mud plug. Appropriate procedures may include a work permit as installing a mud plug may be one of the last tasks prior to welding.

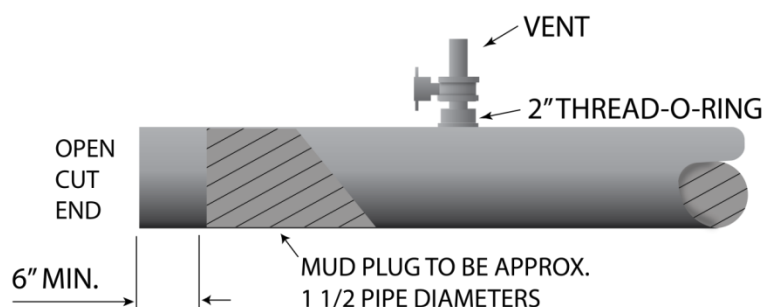
Appropriate equipment/materials

The necessary equipment/material to perform this task will vary based on the pipeline operator and the pipe specifications. The appropriate equipment/material may include water, a mixing stick and container (such as a 5 gallon bucket), and commercial-grade bentonite powder. Some areas may also need antifreeze to prevent the water from icing over.

Knowledge: Identify and describe the steps to make adequate mud balls.

Determine volume required to provide thorough isolation.

To produce adequate mud balls to make the needed mud plug, you'll first need to determine the volume required to provide thorough isolation. For pipes of appropriate diameter, use the pipeline operator's procedure to determine the length and size of the needed mud plug. The industry rule of thumb for length of a completed mud plug is 1 ½ times the pipe diameter.



Calculate the necessary amount of water and bentonite to make mud balls.

Next, you'll need to refer to the operator's procedure for the necessary amount of water and bentonite to make mud balls. For example, a typical mixture is 1 gallon of water to 10 pounds of bentonite.

Thoroughly mix water and bentonite.

Before you mix the water and bentonite together, first make sure the mixing container is clean and free of any debris, such as rocks, sticks, grass/weeds, trash, dust, and/or any solids. Next, thoroughly mix the water and bentonite. Start by mixing a small amount of water into the bentonite until the mixture is cohesive, but still moldable. The mixture should be free of all dry and powdery areas. **CAUTION:** If mud plugs are used in freezing weather, an antifreeze and water mixture or a non-freezing medium should be substituted for water. If the plug freezes, there is a possibility that the sealing mechanism could be impacted, which could cause problems when the system is returned to service.

Properly shape and size mud balls.

Once you have a moldable mix, use your hands to properly shape and size the mud balls into spheres. They should be approximately the size of softballs, although the size may vary with smaller diameter pipe.

Properly store mud balls.

Mud balls that will not be used immediately should be kept properly cooled and hydrated by storing them in shaded or covered areas so they don't dry out. If you notice that your mud ball is becoming hard, use a little water to moisten it.

Knowledge/Skill: Describe the process to prepare and place mud plugs into the pipe for the isolation of hazardous vapors.

Ensure that air monitoring is performed prior to mud packing.

The first step in preparing to place the mud balls into the pipe is to secure the area and monitor for hazardous vapors. This is done by first ensuring a vent is installed on the upstream side of a mud plug to relieve vapor pressure.

Clean the inside of the pipe where the mud plug will be located.

Next, use any remaining water or water/antifreeze mixture to clean the inside of the pipe where the mud plug will be located. Allow any remaining moisture to evaporate or use a handful of dry powder to soak up any moisture left behind in the pipe. The inner diameter of the pipe needs to be clean and relatively smooth to ensure a successful mud plug isolation.

Determine the length of the plug and mark the inside of the pipe to assure adequate coverage.

Use your pipeline operator's procedure to determine the length of the plug and then mark the inside of the pipe to ensure adequate coverage. For example, the pipeline operator may want the completed mud plug to be 1.5 times the pipe diameter, then for an 8" pipe you'll need a 12" plug.

Make the mud balls.

After the pipe is clean, begin making the mud balls. Grab a small handful of mud from the mixing container. You should grab enough mud to work with, but not so much that you cannot hold it in one hand. Next, use both hands to form a ball by squeezing the mud into a sphere shape. Your mud ball should become firmer and more solid and as round as possible. Continue to add mud until your mud ball reaches the desired size, most notably that of a softball.

Place mud balls in the pipe.

The mud ball should be placed as far away from the open end of the pipe as possible without physically entering the pipe. Since the plug itself will be 1.5 times the diameter, you'll want to start at least 2 pipe diameters back from the opening. Continue to install mud balls in a pyramid fashion.

Compact and spread mud balls to eliminate gaps.

Using your hands, continue to compact and spread the mud balls. Repeat this process until the inner diameter of the pipe is completely sealed at least 6" from the end of the pipe or until an acceptable plug length is reached, per your pipeline operator's procedure.

Ensure that air monitoring is performed after completion.

After packing is complete, perform all air monitoring per your pipeline operator's procedure to verify that the mud plug is sealing the pipe and no vapors are leaking past the plug. You may also want to check any upstream vents to ensure they are open and free of product. If vapors are detected, stop all work activity and visually inspect the mud plug. If problems are found, rework the mud plug and recheck for vapors until no vapors are detected.

Caution! Mud plugs are only used for sealing open pipelines. They are intended to act as a vapor barrier to reduce the lower explosive limit (LEL). These plugs must not be relied on to retain pressure or free liquid.

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.

While performing breakout tank inspections on a pipeline facility, at a minimum you will be required to recognize and react to the following AOCs.

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:

- Puddles
- Dead vegetation
- Blowing gas

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

- Move to a safe location.
- Notify emergency response personnel, as appropriate.
- Notify designated pipeline operator representative.

Recognize: Material defects, anomalies, or physical damage of a pipe or component that has impaired or is likely to impair the serviceability of the pipeline are abnormal operating conditions. Examples could include, but are not limited to:

- Corrosion
- Dents

- Gouges

React/Respond: Proper reactions/responses to take in the event of material defects, anomalies, or physical damage of a pipe or component include the following:

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

Glossary

AOC

abnormal operating condition

bentonite

a colloidal clay that expands and thickens to several times its dry mass in water.

CCT

common covered task

CFR

Code of Federal Regulations

lower explosive limit (LEL)

the minimum concentration of that gas, at normal ambient conditions, necessary to cause a flash or combustion when exposed to an ignition source (e.g. arc, flame).