Lesson Plans for Module AOCFG-17

Abnormal Operating Conditions – Field and Gas

Module AOCFG-17 describes how field personnel recognize and properly react to abnormal operating conditions (AOCs) that may occur during pipeline operations. Trainees will learn about the federal regulations and agencies governing the operation of gas and liquid pipelines.

Objectives

Learning Objective 1

- Explain how to recognize abnormal operating conditions for both gas and liquid pipelines.
  - a. Explain how to recognize abnormal pipeline facility conditions.
  - b. Explain how to recognize the activation of a safety device.
  - c. Explain how to recognize a communications failure and a control system failure.
  - d. Explain how to recognize power interruptions.
  - e. Explain how to recognize a fire, explosion, and natural disaster occurring in the vicinity of the pipeline.
  - f. Explain how to recognize the unexpected release of hazardous liquid or gas.
  - g. Explain how to recognize unexplained pressure/flow rate changes.

Learning Objective 2

- Describe the proper reaction to abnormal operating conditions for both gas and liquid pipelines.
  - a. Describe the proper reaction to abnormal pipeline facility conditions.
  - b. Describe the proper reaction to the activation of a safety device.
  - c. Describe the proper reaction to a communications failure and a control system failure.
  - d. Describe the proper reaction to power interruptions.
  - e. Describe the proper reaction to a fire, explosion, and natural disaster occurring in the vicinity of the pipeline.
  - f. Describe the proper reaction to the unexpected release of hazardous liquid or gas.
  - g. Describe the proper reaction to unexplained pressure/flow rate changes.

Performance Tasks

- This is a knowledge-based module; there are no performance tasks.

Teaching Time: 5 hours

(Two 2.5-Hour Classroom Sessions)

Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the PowerPoint presentations from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70 percent or above for the Module Examination.

Safety Considerations

This module does not include Performance Tasks, and as such, no PPE is required for completion of this module. However, trainees should consistently be reminded of all dangers presented by abnormal operating conditions in pipeline work. It should also be stressed that personnel safety is a priority.

Classroom Equipment and Materials

Whiteboard/chalkboard
Markers/chalk
Pencils and paper
PowerPoint® Presentation Slides
Computer
Copies of the Module Examination
Vendor-supplied videos/DVDs showing abnormal operating conditions (*optional*)
TV/DVD player

Additional Resources

The following recommended resources can provide additional helpful information related to the requirements for this covered task:

Code of Federal Regulations 49, Parts 192 and 195

OSHA *Occupational Safety and Health Standards* 1910, Subpart L, Standard 1910.157.

There are a number of online resources available for trainees who would like more information on abnormal operating conditions. A search for additional information may be assigned as homework to interested trainees.

Lesson Plans for Module CT14_1-17
Locate Line

Module CT14_1-17 describes line locating methods and equipment, and abnormal operating conditions that may be encountered. It also presents the general procedures for locating a line.

Objectives

Learning Objective 1

1. Identify and describe the methods used to locate a pipeline.
   a. Describe the purpose and procedure for the One-Call System.
   b. Explain the use of alignment sheets, maps, drawings, and GPS to locate pipelines.
   c. Explain mechanical line-locating equipment.
   d. Explain electronic line-locating equipment.

Learning Objective 2

2. Describe the procedure for locating a line (CT14_1-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with locating a line.
   b. Describe the general procedure used to locate a line.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Locate a line per company procedure (CT14_1-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Identify section to be located using the most recent versions of the maps and alignment drawings, and interpret survey as-built information.
   - Determine access requirements.
   - Check locating equipment operation.
   - Determine the line location and depth.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT14_1-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (optional)
Module Review answer key
Module Examinations
Specific PPE required by the site
Alignment sheet/strip maps
Electromagnetic locators
Electronic pipe-locating equipment
Ground clamp and rod
Induction set
Probe rods
Samples of One-Call tickets
Shovels
Test leads
Vacuum-powered tools
Copies of the Performance Profile sheets

Lesson Plans for Module CT14_2-17
Install, Inspect, and Maintain Permanent Marker

Module CT14_2-17 describes the general procedures for installing, inspecting, and maintaining permanent pipeline markers. It also explains the abnormal operating conditions that may be encountered during the performance of this task.

Objectives

Learning Objective 1

1. Explain the process for marking pipelines with permanent line markers.
   a. Explain the purpose and procedure for permanent line markers.

Learning Objective 2

2. Describe how to install, inspect, and maintain permanent markers (CT14_2-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with installing, inspecting, and maintaining permanent line markers.
   b. Describe the general procedure used to install, inspect, and maintain permanent line markers.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Install, inspect, and maintain permanent line marker (CT14_2-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Determine proper marker location and orientation of signs.
   - Install a sufficient number of markers so that location of the pipeline is accurately known (within line of sight).
   - Safely and securely install each marker (with support for each sign).
   - Properly attach correct signs for the locations as necessary.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT14_2-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (optional)
Module Review answer key
Module Examinations
Specific PPE required by the site
Alignment sheet/strip maps
Permanent line markers
Photographs of signs designating underground pipelines
Probe rods
Shovels
Copies of the Performance Profile sheets

Lesson Plans for Module CT14_5-17
Install, Inspect, and Maintain Temporary Marker

Module CT14_5-17 describes the general procedures for installing, inspecting, and maintaining temporary pipeline markers. It also explains the abnormal operating conditions that may be encountered during the performance of this task.

Objectives

Learning Objective 1

1. Explain the process for marking pipelines with temporary line markers.
   a. Explain the purpose and procedure for temporary line markers.

Learning Objective 2

2. Describe the procedure used to install, inspect, and maintain temporary markers (CT14_5-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with installing, inspecting, and maintaining temporary line markers.
   b. Describe the general procedure used to install, inspect, and maintain temporary line markers.

Performance Tasks

Performance Task 1 (Learning Objective 2)

1. Install, inspect, and maintain temporary line marker (CT14_5-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Determine proper marker location and orientation of signs.
   - Identify the section of the pipeline to be inspected.
   - Determine the access requirements for the section to be inspected or maintained.
   - Once on the ROW, inspect the markers for visibility and orientation.
   - Install or replace temporary markers as needed.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT14_5-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (optional)
Module Review answer key
Module Examinations
Specific PPE required by the site
Alignment sheet/strip maps
Photographs of signs designating underground pipelines
Photographs of temporary markers in place
Samples of One-Call tickets
Temporary line markers
Access to pipeline
Copies of the Performance Profile sheets

Lesson Plans for Module CT29_1-17
Launching In-Line Inspection Devices

Module CT29_1-17 describes the various types of in-line inspection and maintenance devices (pigs); the procedures for launching, monitoring, and receiving them; and the process for following up on inspection results.

Objectives

Learning Objective 1

1. Identify and describe the types of pigs.
a. Identify and explain the purpose of cleaning pigs.
b. Identify and explain the purpose of sizing pigs.
c. Identify and explain the purpose of metal-loss pigs.
d. Identify and explain the purpose of crack detection pigs.
e. Identify and explain the purpose of mapping pigs.

Learning Objective 2

2. Describe the requirements and procedures for working with pigs (CT29_1-17).
a. Identify the prerequisites, competencies, and abnormal operating conditions (AOCs) associated with launching a pig.
b. Explain the guidelines used to select the appropriate pig.
c. Explain the procedure to prepare for launching a pig.
d. Explain the procedures for launching a pig.
e. Explain the procedures for monitoring a pig.
f. Summarize the procedures for receiving and unloading a pig.

Learning Objective 3

3. Describe the activities performed to follow up on in-line inspection results.
a. Explain the process for interpreting results collected from in-line inspections.
b. Explain the procedure for performing verification digs.
c. Explain the process for planning repairs to correct conditions discovered during in-line inspections.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Launch an inspection and/or maintenance device (CT29_1-17).
   - Identify potential abnormal operating conditions (AOCs) that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Confirm that there is adequate product available to launch the pig.
   - Review job responsibilities and communication guidelines with personnel involved with the operation.
   - Notify operations control center before beginning to load or unload inspection devices from barrels.
   - Identify and understand the function of key components of the device.
   - Properly identify the barrel of system to be inspected and ensure that the proper size inspection tool is loaded.
   - Ensure that the launcher barrel valves have been properly closed.
   - Demonstrate the proper use of a combustible gas indicator to detect the presence of hazardous vapors.
   - Follow the company lockout/tagout procedures.
   - Demonstrate the proper sequence to follow to verify that pressure has been relieved before opening the device access door.
   - Mechanically bond the inspection device and barrel prior to insertion.
   - Insert the inspection device into the barrel and into the neck of the launcher. Close the barrel access door and pressurize the barrel.
   - Contact proper operations personnel immediately before launching the device.
   - Sequentially open valves to properly pressurize the barrel; then introduce the device into the system.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 15 hours

(Six 2.5-hour sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module requires that trainees launch and receive in-line inspection and maintenance devices in a pipeline. Safety is paramount in the pipeline maintenance trade, and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required personal protective equipment and follow safe tool practices and procedures.

Equipment, Materials, and Resources

Computer
Performance Profile Sheets
LCD projector and screen
Markers/chalk
Module CT29_1-17 PowerPoint® presentation slides
Pencils and paper
TV/DVD player
Vendor-supplied videos/DVDs showing how to launch and receive in-line inspection and maintenance devices *(optional)*
Whiteboard/chalkboard
Copies of manufacturers' documentation for in-line inspection tools
Copies of the Pipeline and Hazardous Materials Safety Administration (PHMSA) website page "Pipeline Safety Inspections" (available at http://primis.phmsa.dot.gov/comm/Inspection.htm)
Copies of a report produced by an in-line inspection tool
Copies of your company's policies and procedures for launching and receiving in-line maintenance and inspection devices
Copies of your company's policies and procedures for reading and interpreting data gathered from smart-pig runs
Copies of your company's written and approved procedures for planning and scheduling work orders related to pipeline repairs
Model pigs provided by manufacturers
Section of clear pipe filled with water

Additional Resources and References

The following recommended resources can provide additional helpful information related to the requirements for this covered task:

API Recommended Practice 1161, Third Edition, © 2014 American Petroleum Institute. API Publishing Services, 1220 L Street, NW, Washington, DC 20005. Distributed by Thompson Reuters (Scientific) LLC, *www.techstreet.com*.
49 *CFR* 192, *www.ecfr.gov*.
49 *CFR* 195, *www.ecfr.gov*.
NCCER Module AOCCC-17, *Abnormal Operating Conditions Control Center*
NCCER Module AOCFG-17, *Abnormal Operating Conditions Field and Gas*
NCCER Module CT29_2-17, *Receiving In-Line Inspection Devices*
The following websites provide resources for products and training:
Pipeline and Hazardous Materials Safety Administration (PHMSA). *www.phmsa.dot.gov*

There are a number of online resources available for trainees who would like more information on launching and receiving in-line inspection and maintenance devices. A search for additional information may be assigned as homework to interested trainees.

Lesson Plans for Module CT29_2-17
Receiving In-Line Inspection Devices

Module CT29_2-17 describes the various types of in-line inspection and maintenance devices (pigs); the procedures for launching, monitoring, and receiving them; and the process for following up on inspection results.

Objectives

Learning Objective 1

1. Identify and describe the types of pigs.
a. Identify and explain the purpose of cleaning pigs.
b. Identify and explain the purpose of sizing pigs.
c. Identify and explain the purpose of metal-loss pigs.
d. Identify and explain the purpose of crack detection pigs.
e. Identify and explain the purpose of mapping pigs.

Learning Objective 2

2. Describe the requirements and procedures for working with pigs (CT29_2-17).
a. Identify the prerequisites, competencies, and abnormal operating conditions (AOCs) associated with receiving a pig.
b. Explain the guidelines used to select the appropriate pig.
c. Summarize the procedure to prepare for launching a pig.
d. Summarize the procedures for launching a pig.
e. Explain the procedures for monitoring a pig.
f. Explain the procedures for receiving and unloading a pig.

Learning Objective 3

3. Describe the activities performed to follow up on in-line inspection results.
a. Explain the process for interpreting results collected from in-line inspections.
b. Explain the procedure for performing verification digs.
c. Explain the process for planning repairs to correct conditions discovered during in-line inspections.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Receive an inspection and/or maintenance device (CT29_2-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Set up the receiver valve alignment as soon as possible by opening the inlet receiver valve and closing the pipeline flow valve.
   - Monitor the product upstream and prepared the receiving unit.
   - Notify operations control center before beginning to unload inspection devices from barrels.
   - Identify and understand the function of key components of the device.
   - Before opening the access door, demonstrate the proper sequence to follow to verify that pressure has been relieved.
   - Follow the company lockout/tagout procedures.
   - Demonstrate the proper use of a combustible gas indicator to detect the presence of hazardous vapors.
   - Mechanically bond the inspection device and barrel prior to retraction.
   - Remove the inspection tool from the barrel.
   - Close the barrel access door and pressurize the barrel.
   - Realign the pipeline system by opening or closing necessary valves.
   - Confirm product flow when the system is started.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 15 hours

(Six 2.5-hour sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module requires that trainees launch and receive in-line inspection and maintenance devices in a pipeline. Safety is paramount in the pipeline maintenance trade, and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required personal protective equipment and follow safe tool practices and procedures.

Equipment, Materials, and Resources

Computer
Performance Profile Sheets
LCD projector and screen
Markers/chalk
Module CT29_2-17 PowerPoint® presentation slides
Pencils and paper
TV/DVD player
Vendor-supplied videos/DVDs showing how to launch and receive in-line inspection and maintenance devices *(optional)*
Whiteboard/chalkboard
Copies of manufacturers' documentation for in-line inspection tools
Copies of the Pipeline and Hazardous Materials Safety Administration (PHMSA) website page "Pipeline Safety Inspections" (available at http://primis.phmsa.dot.gov/comm/Inspection.htm)
Copies of a report produced by an in-line inspection tool
Copies of your company's policies and procedures for launching and receiving in-line maintenance and inspection devices
Copies of your company's policies and procedures for reading and interpreting data gathered from smart-pig runs
Copies of your company's written and approved procedures for planning and scheduling work orders related to pipeline repairs
Model pigs provided by manufacturers
Section of clear pipe filled with water

Additional Resources and References

The following recommended resources can provide additional helpful information related to the requirements for this covered task:

API Recommended Practice 1161, Third Edition, © 2014 American Petroleum Institute. API Publishing Services, 1220 L Street, NW, Washington, DC 20005. Distributed by Thompson Reuters (Scientific) LLC, *www.techstreet.com*.
49 *CFR* 192, *www.ecfr.gov*.
49 *CFR* 195, *www.ecfr.gov*.
NCCER Module AOCCC-17, *Abnormal Operating Conditions Control Center*
NCCER Module AOCFG-17, *Abnormal Operating Conditions Field and Gas*
NCCER Module CT29_1-17, *Launching In-Line Inspection Devices*
The following websites provide resources for products and training:
Pipeline and Hazardous Materials Safety Administration (PHMSA). www.phmsa.dot.gov

There are a number of online resources available for trainees who would like more information on receiving in-line inspection devices. A search for additional information may be assigned as homework to interested trainees.

Lesson Plans for Module CT33_1-17
Determine Allowable Line Pressure in Section of Pipe to be Moved

Module CT33_1-17 describes the process and general procedures used to determine the allowable line pressure in a section of pipe to be moved.

Objectives

Learning Objective 1

1. Explain the process for determining the allowable line pressure in a section of pipe to be moved.
   a. Explain the purpose and procedure for determining the allowable line pressure.
   b. Identify the required activities to determine allowable line pressure.

Learning Objective 2

2. Describe the procedure used to determine the allowable line pressure in a section of pipe to be moved (CT33_1-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with determining the allowable line pressure.
   b. Describe the general procedure used to determine the allowable line pressure.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Determine the allowable line pressure in a section of pipe to be moved (CT33_1-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Confirm with project leader section of pipeline system to be lowered.
   - Confirm type of product currently flowing through section to be lowered.
   - Determine location of valves immediately upstream and downstream from lowering location.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT33_1-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Copies of your company's inspection documentation
Copies of a typical move plan and related documentation
Alignment sheet/strip maps
Electronic pipe locating equipment
Copies of your company's procedures for determining the actual pressure of the pipeline section being moved, raised, lowered, or moved laterally
Examples of typical data used to calculate the allowable line pressure for an in-service line move (*optional*)
Copies of the Performance Profile sheets

Lesson Plans for Module CT33_2-17
Preparation for Movement Activities

Module CT33_2-17 describes the process and general procedures for preparing to move an in-service pipeline.

Objectives

Learning Objective 1

1. Explain the process for preparing to move an in-service pipeline.
   a. Identify the required activities for pipeline move preparation.

Learning Objective 2

2. Describe the preparation procedures for a pipeline move (CT33_2-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with move preparation.
   b. Describe the general procedures used to prepare for pipeline movement activities.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Preparation for movement activities (CT33_2-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Check with operations personnel to confirm status of pipeline.
   - Identify location and depth of cover for the pipeline.
   - Trench along the pipeline to desired depth.
   - Remove cover directly over the pipeline to a prescribed depth by mechanical means; then expose the pipeline by hand.
   - Dig windows out from under the pipeline at predetermined points to support and stabilize the pipeline.
   - Dig out remainder of the soil between mechanical supports below the pipeline.
   - Inspect the external coating of the exposed pipeline.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

- Whiteboard and markers
- Pencils and paper
- *CT33_2-17* PowerPoint® Presentation
- DVD player
- LCD projector and screen
- Computer
- Internet access during class (*optional*)
- Module Review answer key
- Module Examinations
- Specific PPE required by the site
- Copies of your company's inspection report
- Copies of a move plan
- Samples of One-Call tickets
- Photographs of excavation sites in different types of soil conditions
- Alignment sheet/strip maps
- Electronic line locating equipment
- Probe rods
- Excavators
- Hand excavation tools
- Lifting devices and slings
- Padding
- Pipe supports
- Stations with buried or submerged sections of coated pipe
- Tamping tools, such as backhoes
- The following items may also be required:
    - Excavator-mounted rock hammers
    - Jackhammers
    - Ladders
    - Protective shielding, such as blasting mats, oversized pipe, or pipe sleeves
    - Trench boxes
- Copies of the Performance Profile sheets

Lesson Plan for Module CT33_3-17
Moving In-Service Pipeline

Module CT33_3-17 describes the process and general procedures for moving an in-service pipeline.

Objectives

Learning Objective 1

1. Explain the considerations involved in moving in-service pipeline.
   a. Identify safety measures, move considerations, and techniques used to move in-service pipeline.

Learning Objective 2

2. Describe the requirements and procedures for moving in-service pipeline (CT33_3-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with moving in-service pipeline.
   b. Describe the general procedure used to move in-service pipeline.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Moving in-service pipeline (CT33_3-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Ensure means of closing block valves immediately upstream and downstream of the section to be lowered.
   - Ensure the trench into which the line is being moved conforms to the lowering profile established and that it is padded. If the line is being lifted to reposition, locate lifting devices at predetermined locations to reduce possibility of overstressing line while being moved. If the line is being moved laterally into a new profile, position slings at predetermined locations and establish a clear and unencumbered path for the movement.
   - Move the pipeline in small increments to obtain the new and desired position. If the pipeline has been lowered or moved laterally, check the bottom of the pipe to determine if sufficient support exists. If the pipeline has been raised, check the permanent support structures, distance between each structure, and final resting elevation to ensure the pipeline has not been subjected to any additional stress not accounted for during pre-movement calculations.
   - Inspect the external coating of the exposed pipeline.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

- Whiteboard and markers
- Pencils and paper
- *CT33_3-17* PowerPoint® Presentation
- DVD player
- LCD projector and screen
- Computer
- Internet access during class (*optional*)
- Module Review answer key
- Module Examinations
- Specific PPE required by the site
- Copies of your company's inspection documentation
- Copies of a typical move plan and related documentation
- Alignment sheet/strip maps
- Hand excavation tools
- Lifting devices and slings
- Mechanical excavators
- One-Call ticket
- Padding
- Pipe supports
- Probe rods
- Stations with buried or submerged sections of coated pipe
- Tamping tools, such as backhoes
- The following items may also be required:
    - Ladders
    - Protective shielding, such as blasting mats, oversized pipe, or pipe sleeves
    - Trench boxes
- Copies of the Performance Profile sheets

Lesson Plans for Module CT36_1-17
Safe Disconnect of Pipeline Facilities

Module CT36_1-17 describes the preparation activities and general procedures required to safely disconnect pipeline facilities.

Objectives

Learning Objective 1

1. Explain the process for disconnecting pipeline facilities.
   a. Identify potential hazards and safety precautions.
   b. Identify the required preparation activities to safely disconnect pipeline facilities.

Learning Objective 2

2. Describe the procedure used for safe disconnection of pipeline facilities (CT36_1-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with safe disconnection of pipeline facilities.
   b. Describe the general procedure used to safely disconnect pipeline facilities.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Safely disconnect pipeline facilities (CT36_1-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Determine method to be used to disconnect segment of pipeline.
   - Complete lockout/tagout procedure.
   - Isolate the pipeline in which the segment to be disconnected is located. If the segment to be disconnected can be isolated by use of valves, isolate the segment of pipe to be disconnected by using existing valves. If the segment to be disconnected must be isolated by hot tapping and plugging the line, isolate the segment of pipe to be disconnected by hot tapping and inserting a shut-off plug. Note: Welding on the pipeline to perform a hot tap will require a person qualified under this OQ program for welding.
   - Shut down cathodic protection rectifier, if applicable.
   - Bond the segment to be disconnected.
   - Separate the pipe to be disconnected from the existing pipeline.
   - Select method to disconnect. If the segment to be disconnected contains a flange at each end, unbolt the flange and drain-down the liquid from the line. If the segment to be disconnected has to be hot tapped and cut, drain-down the liquid from the line and then cut the pipe to disconnect.
   - Dispose of evacuated liquid.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT36_1-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Access to an exposed pipeline for disconnecting
Assortment of monitors, including atmospheric monitors, personal hydrogen sulfide monitors, and personal monitors
Copies of required documentation for a pipeline disconnection procedure
Copies of the section of 49 *CFR* 195 that addresses abandonment or deactivation of facilities
Copies of your company's procedures for safely disconnecting pipeline from service
Copies of your company's safety policies and procedures for disconnecting a pipeline segment
Grounding clamps
Lengths of pipe
Prefabricated bonding cables
Tools for disconnecting flanged pipeline
Cold-cutting tools
Copies of the Performance Profile sheets

Lesson Plans for Module CT36_2-17
Purging of Pipeline Facilities

Module CT36_2-17 describes the preparation activities and general procedures required to safely purge pipeline facilities.

Objectives

Learning Objective 1

1. Explain the process for purging pipeline facilities.
   a. Identify potential hazards and safety precautions.
   b. Identify the required preparation activities for purging of pipeline facilities.

Learning Objective 2

2. Describe the procedure used for purging pipeline facilities (CT36_2-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with purging pipeline facilities.
   b. Describe the general procedure used to purge pipeline facilities.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Purge pipeline facilities (CT36_2-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Complete lockout/tagout procedures in accordance with company policy.
   - Determine the method to be used for purging (using a pig, or by injecting an inert gas).
   - Purge the line using the desired method, following company O&M procedures.
   - Use a proper instrument to sample the atmosphere inside the disconnected segment of pipe.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT36_2-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Access to an exposed pipeline for purging
Assortment of monitors, including atmospheric monitors, personal hydrogen sulfide monitors, and personal monitors
Container filled with paraffin
Copies of written procedures for a pipeline purge
Copies of your company's policies and procedures for draining product from pipelines
Copies of your company's policies and procedures for launching and receiving pigs for pipeline purging
Copies of your company's procedures for purging of petroleum or hazardous vapors from an idling pipeline
Copies of your company's safety policies and procedures for purging a pipeline segment
Paraffin-cutting chemical
Copies of the Performance Profile sheets

Lesson Plans for Module CT36_3-17
Sealing a Disconnected Portion of Pipeline

Module CT36_3-17 describes the preparation activities and general procedures required to safely seal a disconnected portion of pipeline.

Objectives

Learning Objective 1

1. Explain the process for sealing a disconnected portion of pipeline.
   a. Identify potential hazards and safety precautions.
   b. Identify the required preparation activities for sealing a pipeline.

Learning Objective 2

2. Describe the procedure used for sealing a disconnected portion of pipeline (CT36_3-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with sealing a disconnected pipeline.
   b. Describe the general procedure used to seal disconnected portion of pipeline.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Seal a disconnected portion of a pipeline (CT36_3-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Perform atmospheric testing within the pipe for explosive vapors.
   - Install a blind flange on each end of the pipe if there are flanges on the ends.
   - Weld a cap or plate on the ends of the pipe if there is no flange.
   - If nitrogen remains in the line being disconnected and sealed, leave a small amount of pressure on the nitrogen to help preserve the interior surface of the pipe and to remove any residual vapors.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT36_3-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Assortment of monitors, including atmospheric monitors, personal hydrogen sulfide monitors, and personal monitors
Copies of your company's procedures for sealing the end(s) of a disconnected portion of pipeline from the environment or an active pipeline
Copies of your company's safety policies and procedures for sealing a pipeline segment and hot work permit
Weld plates and caps and welding equipment
Blind flanges, gaskets, bolts, and appropriate tools
Copies of the Performance Profile sheets

Lesson Plans for Module CT38_3-17
Visually Inspect that Welds Meet DOT Requirements

Module CT38_3-17 describes different types of weld discontinuities and explains how welds are inspected, examined, and evaluated. The general procedure for visually inspecting that welds meet DOT requirements is presented.

Objectives

Learning Objective 1

1. Explain the process for visually inspecting that welds meet DOT requirements.
   a. Recognize different types of weld discontinuities.
   b. Describe how to visually inspect welds.
   c. Describe the types of nondestructive examinations and evaluations.

Learning Objective 2

2. Describe the procedure used to visually inspect that welds meet DOT requirements (CT38_3-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with visually inspecting that welds meet DOT requirements.
   b. Describe the general procedure used for visually inspecting that welds meet DOT requirements.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Visually inspect that welds meet DOT requirements (CT38_3-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Decide which weld inspection process is appropriate per weld.
   - Ensure that NDT technicians are certified for inspection process on the component/type of weld.
   - Witness the technician conducting the appropriate test per component/weld (mag particle, dye penetrate, ultrasonic, or gamma ray) and examine the results for abnormal conditions or defects.
   - If weld defects are found, repair or cut out the defect and retest for weld integrity.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT38_3-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Example of a qualified welding procedure
Pipe segments that exhibit weld discontinuities such as arc burn, external undercut, porosity, slag, cap, and inclusions
Welds with undercuts of various degrees of severity
Borescopes, including flexible fiberscopes with the operator's manuals and interchangeable viewing heads
Copies of the operator's manual for a borescope
Copies of your company's inspection documentation
Copies of your company's policies for performing nondestructive testing (NDT)
Liquid penetrant dye, cleaner, and developer
Magnetic-particle testing equipment
Magnets of various strengths
Metal particles used in the magnetic-particle testing process
Photographs of screen displays from an ultrasonic testing (UT) device
Ultrasonic testing (UT) device
Holiday detector
Photographs of screen displays from a radiographic testing (RT) device that uses gamma rays
Photographs of screen displays from a radiographic testing (RT) device that uses X-rays
Copies of the Performance Profile sheets

Lesson Plans for Module CT40_1-17
Fit Full Encirclement Welded Split Sleeve

Module CT40_1-17 describes sleeve types used for pipeline repair, and presents the techniques and general procedures for fitting a full encirclement welded split sleeve onto a pipe.

Objectives

Learning Objective 1

1. Describe pipeline repair criteria.
   a. Identify pipeline repair standards.
   b. Describe how pipe sleeves are used for repair.

Learning Objective 2

2. Describe how to fit a full encirclement welded split sleeve (CT40_1-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with fitting a full encirclement welded split sleeve.
   b. Describe the procedure for fitting an oversleeve.
   c. Describe the procedure for fitting a tight-fitting sleeve.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Fit a full encirclement welded split sleeve (CT40_1-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Confirm that the surface has been properly prepared, including the removal of coating, if applicable.
   - Confirm that the pipe surface has been inspected for dents, gouges, or other irregularities.
   - Fill any defects with operator-approved material according to manufacturer's recommendations.
   - Confirm the proper type of sleeve to be installed.
   - If installing a Type A sleeve, authorize the proper line welding procedure to ensure a proper fit.
   - If installing a Type B sleeve, confirm acceptable wall thickness has been measured in the seal welding zones.
   - Verify proper sleeve length and material grade per operator's procedures.
   - Prepare and fit the sleeve to the pipeline.
   - Use a lifting device and chains or clamps to achieve a proper fit and an equal welding gap for the longitudinal seam, as necessary.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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Safety Considerations

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Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT40_1-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Vendor-supplied videos/DVDs showing pipeline valves and valve maintenance procedures (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Backup straps
Chains
Clamps or lifting devices
Copies of your company's policy for installation of pipe sleeves
Sections of pipe
Split sleeves
Welding equipment
Copies of a permanent repair report
Copies of company's policies and procedure for responding to gas and liquid leaks
Copies of Performance Profile Sheets

Lesson Plans for Module CT40_3-17
Apply Composite Sleeve

Module CT40_3-17 describes sleeve types used for pipeline repair, and presents the techniques and general procedures for installing composite sleeves.

Objectives

Learning Objective 1

1. Describe pipeline repair criteria.
   a. Identify pipeline repair standards.
   b. Describe how pipe sleeves are used for repair.

Learning Objective 2

2. Describe how to apply a composite sleeve (CT40_3-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with applying a composite sleeve.
   b. Describe the procedure for applying a composite sleeve.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Apply a composite sleeve (CT40_3-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Assess defect.
   - Prepare pipe surface.
   - Install composite sleeve.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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Safety Considerations

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Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT40_3-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Vendor-supplied videos/DVDs showing pipeline valves and valve maintenance procedures *(optional)*
Module Review answer key
Module Examinations
Specific PPE required by the site
Acetone *(optional)*
Adhesive
Applicators
Blue and pink activator
Composite sleeves
Coating
Copies of the manufacturer's instructions for installing composite sleeves
Copies of the manufacturer's safety data sheet (SDS) for acetone
Filament tape
Filler
Hammers
Pipe markers
Scraper
Sections of pipe
Wire brush
Wooden blocks
Copies of Performance Profile Sheets

Lesson Plans for Module CT40_4-17
Install Mechanical Bolt-On Split Repair Sleeve

Module CT40_4-17 describes sleeve types used for pipeline repair, and presents the techniques and general procedures for installing mechanical bolt-on split repair sleeves.

Objectives

Learning Objective 1

1. Describe pipeline repair criteria.
   a. Identify pipeline repair standards.
   b. Describe how pipe sleeves are used for repair.

Learning Objective 2

2. Describe how to install a mechanical bolt-on split repair sleeve (CT40_4-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with installing a mechanical bolt-on split repair sleeve.
   b. Describe the procedure for installing a mechanical bolt-on split repair sleeve.

Performance Tasks

Performance Task 1 (Learning Objective 2)

1. Install a mechanical bolt-on split repair sleeve (CT40_4-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Buff ends and side seams. File off seam and clean pipe where sealing elements fit.
   - Perform or request ultrasound.
   - Inform pipeline control center of planned activity.
   - Center and install bottom and top of mechanical bolt-on split repair sleeve on pipe. Tighten stud bolts on both sides of mechanical bolt-on split repair sleeve using proper sequence.
   - Request line startup at 50 percent of maximum operating pressure prior to welding.
   - Weld side seams, ends, and studs, if applicable.
   - Inform pipeline control center that planned activity is completed or that further maintenance is required.
   - Request return to normal operating pressure.
   - Request magnetic particle test to be conducted as per company policy after the line has been restored to normal operations.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT40_4-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Active leaking pipeline
Leak defect system (LDS) sleeves
PLIDCO® Split+Sleeves™
Pressure-containment sleeves
Wrench for tightening studs on PLIDCO® Split+Sleeves™
Copies of Performance Profile sheets

The following items are optional:

Clamps
Files or grinders
Petroleum-, silicone-, or glycerin-based lubricant
Pipe markers
Welding equipment
Wire brushes
Wrenches

Lesson Plans for Module CT40_5-17
Install Weldable Compression Coupling

Module CT40_5-17 describes sleeve types used for pipeline repair, and presents the techniques and general procedures for installing weldable compression couplings.

Objectives

Learning Objective 1

1. Describe pipeline repair standards and explain how pipe sleeves are used for repair.
   a. Identify pipeline repair standards.
   b. Describe how pipe sleeves are used for repair.

Learning Objective 2

2. Describe how to install a weldable compression coupling (CT40_5-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with installing a weldable compression coupling.
   b. Describe the procedure for installing a weldable compression coupling.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Install a weldable compression coupling (CT40_5-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Prepare the carrier pipe for proper fit of the sealing elements according to the manufacturer's instructions.
   - Before installing the coupling, confirm that the acceptable wall thickness has been measured in the seal welding zones if the installation will be permanent.
   - Confirm that the coupling is compatible with the existing pipeline (pressure rating, material grade).
   - Perform ultrasound test for welds.
   - Grind or file welded side seam and slide coupling completely onto new pipe or onto clean existing pipeline.
   - Install coupling and support the new pipe section with jacks.
   - Snug all centering bolts evenly, maintaining space between pipeline and coupling. Tighten sealant bolts using the proper sequence and torque according to the manufacturer's specifications.
   - Fill pipeline slowly to manufacturer-recommended working pressure for the coupling.
   - Post fire watch.
   - Cut off excess sealant element bolt and centering bolt ends. Weld coupling ends, sealant element bolts, and centering bolts.
   - Request return to operating pressure.
   - Request magnetic particle test to be conducted after the line has been restored to normal operations in accordance with company procedures.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT40_5-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Vendor-supplied videos/DVDs showing pipeline valves and valve maintenance procedures (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Copies of your company's policies for preparing and installing weld end couplings
Cutting equipment
PLIDCO® Weld+Ends couplings
Pipe jacks
Welding equipment
Wrenches
Copies of Performance Profile Sheets

Lesson Plans for Module CT40_6-17
Install and Remove Plugging Machine

Module CT40_6-17 describes the general procedure for installing and removing a plugging machine. Other line plugging methods are also discussed.

Objectives

Learning Objective 1

1. Describe plugging machine requirements and identify other methods used for line plugging.
   a. Describe the requirements for plugging machine installation and removal.
   b. Identify other line plugging methods.

Learning Objective 2

2. Describe the procedures used to install and remove a plugging machine (CT40_6-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with the installation and removal of a plugging machine.
   b. Describe the general procedure used to install and remove a plugging machine.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Install and remove a plugging machine (CT40_6-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Install the plugging machine and other fittings and appurtenances as required by manufacturer's specifications
   - Install the appropriate support for the plugging machine, as necessary.
   - Equalize the pressure on either side of the valve.
   - Open the valve.
   - Operate the plugging machine to lower the plug into place.
   - Monitor the pipeline pressure upstream and downstream of the plug.
   - Confirm maintenance repairs are complete.
   - Equalize the pressure on either side off the plug.
   - Retrieve the plug from the pipe.
   - Close the valve and relieve the pressure from the plugging machine.
   - Drain the plugging machine before removal.
   - Remove the plugging machine from the valve.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

- Whiteboard and markers
- Pencils and paper
- *CT40_6-17* PowerPoint® Presentation
- DVD player
- LCD projector and screen
- Computer
- Internet access during class (*optional*)
- Module Review answer key
- Module Examinations
- Specific PPE required by the site
- Allen wrenches
- Bleeder valves
- Blind flanges
- Bolt-weld fittings
- Box-end wrenches
- Completion (Lock-O-Ring®) plugs
- Concrete pads or adjustable supports
- Copies of installation manual for Stopple® fittings
- Copies of operator's manual for a hot-tap machine
- Copies of installation manuals for line-plugging devices
- Cross-line stops
- Drift pins
- Equalization valves
- Grease
- HiStops®
- Hot-tap machines
- Line-stop plugs
- Low-pressure or vacuum stops
- Manufacturer's specifications for removal of a completion plug
- Measuring rods
- Measuring tape
- Mechanical-joint fittings
- Pipe cutters
- Pressure gauges
- Purge-and-equalization fittings
- Sandwich valves
- Sections of pipe
- Stopple® fittings
- Split-tee fittings
- Tapping valves
- Torque wrenches
- Welding equipment
- Copies of the Performance Profile sheets

Lesson Plans for Module CT40_7-17
Installing a Tap 2-Inches and Under on a Pipeline System

Module CT40_7-17 describes pipeline repair criteria, and presents the general procedures for installing a tap 2-inches or under on a pipeline system.

Objectives

Learning Objective 1

1. Describe pipeline repair criteria.
   a. Identify pipeline repair standards.
   b. Describe pipe cutting and replacement operations.

Learning Objective 2

2. Describe how to install a tap 2-inches and under on a pipeline system (CT40_7-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with installing a tap 2-inches and under.
   b. Describe the procedure for installing a tap 2-inches and under.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Install a tap 2-inches and under on a pipeline system (CT40_7-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Prepare tapping machine and check the valve.
   - Check the hot tap machine manufacturer's chart.
   - Attach the appropriate tool to the boring bar, then connect the hot tap machine and the valve.
   - Make sure accurate measurements have been made for the depth of cut.
   - Turn the ratchet clockwise to lower the boring bar and make the hot tap, then turn the ratchet counterclockwise to raise the boring bar. Close the valve.
   - Release pressure from the fluid trapped between the valve and the hot tap machine.
   - Remove the bolts from the hot tap machine and valve flanges to disconnect the hot tap machine from the valve.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT40_7-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Vendor-supplied videos/DVDs showing pipeline valves and valve maintenance procedures (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Hand-operated hot-tap machines
Manufacturer's charts for determining proper machine travel
Measuring rods for hand-operated hot-tap machines
Sections of pipe with attached valves
Copies of Performance Profile sheets

Lesson Plans for Module CT40_8-17
Installing a Tap Larger than 2 Inches on a Pipeline System

Module CT40_8-17 describes the general procedures for installing a tap larger than 2 inches on a pipeline.

Objectives

Learning Objective 1

1. Explain the process for installing a tap larger than 2 inches on a pipeline system.
   a. Identify and describe line tapping equipment, safety considerations, and process preparation requirements.
   b. Describe the installation of various fitting types and valves used in the tapping process.

Learning Objective 2

2. Describe the procedures used to install a tap larger than 2 inches on a pipeline system (CT40_8-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with installing a tap.
   b. Describe the general procedures used to install a tap larger than 2 inches.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Install a tap larger than 2 inches on a pipeline system (CT40_8-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Properly install the valve on the fitting according to manufacturer's specifications.
   - Confirm proper operation of the valve and that it is in the open position.
   - Prepare the tapping machine according to the manufacturer's procedures.
   - Confirm the tapping machine manufacturer's specifications.
   - Attach the appropriate cutter and pilot bit to the boring bar.
   - Prior to connecting the tapping machine to the valve, confirm that accurate measurements have been made for the depth of cut.
   - Install the tapping machine on the valve with the valve in the open position.
   - Ensure that the cutter or drill bit can pass through the open valve and that, with the cutter and drill bit in the retracted position, the valve can be fully closed.
   - Verify that the operating conditions meet company procedures and requirements.
   - Lower the boring bar, cutter, and pilot bit to verify proper alignment and initial depth measurements.
   - Operate the tapping machine to complete the hot tap and verify the depth measurement of the cutter assembly.
   - Raise the boring bar, cutter, and pilot bit and verify depth measurements to ensure valve clearance and allow closure.
   - Close the valve.
   - Release pressure from the product trapped between the valve and the tapping machine.
   - Remove the tapping machine.
   - Confirm retrieval of the coupon and verify integrity.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT40_8-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Allen wrenches
Bolt-weld fittings
Box-end wrenches
Copies of operator's manual for a hot-tap machine
Drift pins
Hot-tap machines
Measuring tape
Mechanical-joint fittings
Sections of pipe
Split-tee fittings
Tapping valves
Torque wrenches
Welding equipment
Copies of the Performance Profile sheets

Lesson Plans for Module CT40_9-17
Install and Remove Completion Plug on Pipelines Larger than 2 Inches

Module CT40_9-17 describes the general procedures for installing and removing a completion plug on pipelines larger than 2 inches.

Objectives

Learning Objective 1

1. Explain the process for installing and removing a completion plug on pipelines larger than 2 inches.
   a. Identify the required activities for installing and removing completion plugs.

Learning Objective 2

2. Describe the procedures used to install and remove a completion plug (CT40_9-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with installing and removing completion plugs.
   b. Describe the general procedure used to install and remove a completion plug.

Performance Tasks

Performance Task 1 (Learning Objective 2)

1. Install completion plugs on pipelines larger than 2 inches (CT40_9-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Install the plug holder onto boring bar, confirming the arrows are aligned. Attach the completed plug to the plug holder.
   - Inspect and assemble tapping machine and plug holder components.
   - Take necessary measurements prior to installing the tapping machine on the valve.
   - Install tapping machine onto the valve with the plug holder fully retracted.
   - Prior to opening the valve, equalize the pressure on each side of the valve, if possible.
   - Slowly open the valve fully on the fitting.
   - Lower the completion plug into the fitting with the boring bar. Verify proper alignment and initial depth measurements. Set holding segments according to manufacturer's specifications.
   - Relieve pressure above plug and verify proper sealing of plug.
   - Retract the boring bar and plug holder from the fitting and valve. After retracting, close the valve and relieve pressure above the valve.
   - Remove the tapping machine from the valve.
   - Remove the valve, if required.
   - Install the cap blind flange, piping, instrumentation, or other component onto the fitting or valve.
   - Complete appropriate documentation as required by operator's procedures.

(*continued*)

Performance Task 1 *(continued)*

2. Remove completion plugs on pipelines larger than 2 inches (CT40_9-17).
   - Identify potential abnormal operating conditions (AOCs) that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Slowly open the valve fully on the fitting.
   - Visually inspect that the completion plug is seated in the fitting and verify access for connecting the plug holder.
   - Inspect and assemble tapping machine and plug holder components.
   - Take necessary measurements prior to installing the tapping machine on the valve.
   - Install tapping machine onto the valve with the plug holder fully retracted.
   - Prior to removing the plug, equalize the pressure on each side of the plug, if possible.
   - To remove the completion plug: 1) Lower the plug holder into the fitting with the boring bar; 2) Verify proper alignment and initial depth measurements; 3) Connect the plug holder to the completion plug; 4) Set holding segments according to manufacturer's specifications.
   - Retract the boring bar and plug holder from the fitting and valve. After retracting, close the valve and relieve pressure above the valve.
   - Remove the tapping machine from the valve.
   - Install the cap, blind flange, piping, instrumentation, or other component onto the valve.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT40_9-17 PowerPoint® Presentation
DVD player
LCD projector and screen
Computer
Internet access during class (*optiona*l)
Module Review answer key
Module Examinations
Specific PPE required by the site
Allen wrenches
Box-end wrenches
Completion (Lock-O-Ring®) plugs
Concrete pads or adjustable supports
Copies of operator's manual for a hot-tap machine
Hot-tap machine
Manufacturer's specifications for removal of a completion plug
Sandwich valves
Sections of pipe
Torque wrenches
Copies of the Performance Profile sheets

Additional Resources and References

The following recommended resources can provide additional helpful information related to the requirements for this covered task:

API Recommended Practice 1161, Third Edition, © 2014 American Petroleum Institute. API Publishing Services, 1220 L Street NW, Washington, DC 20005. Distributed by Thompson Reuters (Scientific) LLC, **www.techstreet.com**.

NCCER Module AOCCC-17, *Abnormal Operating Conditions Control Center*
NCCER Module AOCFG-17, *Abnormal Operating Conditions Field and Gas*
NCCER Module 63104-02, *Piping and Mechanical Blueprint Reading*
NCCER Module 67102-02, *Basic Pipeline Pneumatics and Equipment*
NCCER Module CT40_6-17, *Install and Remove Plugging Machine*
NCCER Module CT40_8-17, *Installing a Tap Larger than 2 Inches on a Pipeline System*

49 *CFR,* Section 192, *Transportation of Natural and Other Gas by Pipeline,* Subpart I, *Requirements for Corrosion Control*. Available from the US Government Printing Office at **www.ecfr.gov.**

49 *CFR*, Section 195, *Transportation of Hazardous Liquids by Pipeline,* Subpart H, *Corrosion Control*. Available from the US Government Printing Office at **www.ecfr.gov.**

The following websites provide resources for products and training:

Occupational Safety and Health Administration (OSHA), 200 Constitution Avenue, NW, Washington, DC 20210, **www.osha.gov**.
Pipeline and Hazardous Materials Safety Administration (PHMSA), **www.phmsa.dot.gov.**

There are a number of online resources available for trainees who would like more information on completion plugs. A search for additional information may be assigned as homework to interested trainees.

Instructors should view any videos that may be identified in the lesson plan before using them to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the Internet, make personal videos, and take still pictures related to the subject matter and add them to the PowerPoint® presentations throughout the program.

Lesson Plans for Module CT41_0-17
Conduct Pressure Test

Module CT41_0-17 describes how to prepare for, perform, and document pressure testing on a pipeline.

Objectives

Learning Objective 1

1. Describe the primary considerations for pressure testing.
   a. Describe safety requirements.
   b. Describe planning procedures.
   c. Identify the required tools and equipment.
   d. Describe how a test medium is selected.
   e. Explain the process of preparing pumps for pressure testing.
   f. Describe the procedures for sealing the system before testing begins.

Learning Objective 2

2. Describe the procedure used to conduct a pressure test (CT41_0-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with conducting a pressure test.
   b. Describe the key elements of a hydrostatic pressure test.
   c. Explain the procedure for conducting a pressure test.
   d. Describe the requirements for documenting a pressure test.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Conduct a pressure test (CT41_0-17).
   - Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   - Utilize the appropriate personal protective equipment according to relevant company procedures.
   - Confirm the pipeline segment has been isolated for the test according to the specified procedures.
   - Confirm that the calibration and certification of the testing instrumentation is current.
   - Connect a pump or compressor to the pipeline segment.
   - Install temperature probes and connect the temperature and pressure recording devices.
   - Fill and vent the pipeline segment with the test medium, and allow the temperature to stabilize.
   - Increase pipeline pressure according to specified procedures.
   - Observe and record the pressure and temperature according to specified procedures.
   - Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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Safety Considerations

This module may require trainees to work in the vicinity of functioning equipment. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

- Whiteboard and markers
- Pencils and paper
- *CT41_0-17* PowerPoint® Presentation
- DVD player
- Vendor-supplied videos/DVDs showing how to prepare for and perform hydrostatic testing on a pipeline *(optional)*
- LCD projector and screen
- Computer
- Internet access during class (*optiona*l)
- Module Review answer key
- Module Examinations
- Specific PPE required by the site
- Containers of test medium
- Copies of a test procedure
- Copies of your company's safety procedures for hydrostatic tests
- Devices to seal a piping system
    - Mechanical test plugs
    - Welded caps
    - Blind flanges
    - Slip blinds
- Lengths of test hose
- Sections of pipe
- Tools and equipment required to prepare for a hydrostatic test
    - Pumps
    - Manifolds
    - Valves
    - Tanks
    - Measuring instruments
- Whip checks
- Copies of your company's policies and procedures for launching and receiving pigs
- Copies of your company's test record forms
- Pigs
- Copies of Performance Profile sheets

Lesson Plans for Module CT42_7-17
Welding

Module CT42_7-17 describes the general procedures and safety guidelines that must be followed when performing welding operations for pipeline repair and maintenance. It also describes the repair processes for common weld defects.

Objectives

Learning Objective 1

1. Describe general considerations for welding.
   a. Explain welding safety guidelines.
   b. Explain the safety precautions and procedures for proper grinding.
   c. Identify types of equipment that are used to move, lift, and position pipe in order to perform welding procedures.
   d. Describe a welding procedure specification.
   e. Describe welding inspection, testing, and documentation criteria.

Learning Objective 2

2. Describe the procedures used for welding (CT42_7-17).
   a. Identify the prerequisites, competencies, and abnormal operating conditions associated with welding.
   b. Describe the general procedures used to repair a weld containing defects other than cracks.
   c. Describe the general procedures used to repair a direct pass on a weld containing defects other than cracks.
   d. Describe the general procedures used to repair a butt weld containing cracks.
   e. Describe the general procedures used to repair a previously repaired weld.
   f. Describe the general procedures used to replace a weld or cylinder of pipe.

Performance Task

Performance Task 1 (Learning Objective 2)

1. Perform welding according to the operator's qualified welding procedures (CT42_7-17).
   – Identify potential abnormal operating conditions that may occur during performance of this CT, and know the appropriate actions to take in response to them.
   – Utilize the appropriate personal protective equipment according to relevant company procedures.
   – Successfully complete the qualifying weld(s) according to the operator's qualified welding procedures.
   – Complete appropriate documentation as required by operator's procedures.

Teaching Time: 5 hours

(Two 2.5-Hour Sessions)

Session time and quantity may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Performance Profile Sheets from **www.nccerirc.com**. For information and updates about accessing the Module Examinations, visit **www.nccer.org/testing**. The passing score for submission into NCCER's Registry is 70% or above for the Module Examination; performance testing is graded pass or fail.

Safety Considerations

This module requires that trainees weld pipe or remove cylinders or pipe. Electrical and mechanical safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and remain aware of any potential abnormal operating conditions. Any deficiencies must be corrected to ensure trainee safety in the future. Work performed on or in the vicinity of functioning equipment must be completed under the direct supervision of the instructor.

Equipment, Materials, and Resources

Whiteboard and markers
Pencils and paper
CT42_7-17 PowerPoint® Presentation
DVD player
Vendor-supplied videos/DVDs showing maintenance welding on pipelines *(optional)*
LCD projector and screen
Computer
Internet access during class (*optional*)
Module Review answer key
Module Examinations
Specific PPE required by the site
Completed welding procedure specification
Copies of API Standard 1104
Copies of 49 *CFR* 192 Subpart E
Copies of 49 *CFR* 195 Subpart D
Angle grinder
Pencil grinder
Line-up clamps
Pipe samples with cracks and gouges
Powered extraction system
Sections of pipe
Shielded-metal arc welding, gas-metal arc welding, or gas-tungsten arc welding equipment
Photographs of weld defects on pipe
Pipe sections with weld defects
Pipe sections with weld defects other than cracks
Powered extraction system
Pipe sections with butt welds containing cracks
Pipe sections with previously repaired welds
Liquid penetrant examination equipment *(optional)*
Magnetic-particle examination equipment *(optional)*
Radiographic testing equipment *(optional)*
Ultrasonic examination equipment *(optional)*
Copies of Performance Profile sheets