**Instructor Guide**

**Safety**

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Overview and Goals

Working with natural gas, safety is of the utmost importance. Operators should wear and carry appropriate personal protective equipment (PPE) required by their company rules and guidelines for each type of job. They must know how to protect motorists, pedestrians, and themselves by managing a safe flow of traffic by defining the appropriate measures to follow based on the type of traffic hazards.

In this unit of work the instructor will:

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

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

* Explain the importance of correct usage of personal protective equipment for operators.
* Identify the fall protection equipment as required by OSHA for gas workers.
* Identify typical insulating safety tools and equipment, as required by OSHA.
* Explain the safety guidelines using protection systems and live line tools.
* Discuss how to manage traffic flow with temporary traffic control (TTC) devices to avoid risks and harm to pedestrians, motorists, and workers in defined high-traffic areas

**Note:** *Specific step-by-step details and the outcomes of the demonstrations and participant activities will be determined by the materials and tools used at the training facility.*

Preparation – Facilitation Guidelines

All utility workers, gas, electric, or water must follow the strictest safety guidelines.

Ensure the participants have completed the following online courses which focus on electrical workers, who like gas operators and installers are responsible for the safety of themselves, other personnel, as well as the public and the property.

* ELEC-11100 Personal Protection Equipment, including the pre-test and the 20 question course assessment.
* ELEC-11108 Worksite Protection-Traffic Control, including the pre-test and the 20 question course assessment.

Conduct this training in a classroom setting, with a simulated lab environment using the local materials and tools for illustration, demonstration, and the hands-on workshop activities.

During the class introduction:

* Encourage discussion through demonstrations and activities.
* Discuss the importance of participation.
* Explain that participants may work with a partner or in small groups to complete the activities. After each activity, the participants will be encouraged to present their findings for further discussion to the workshop.

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

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

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

* CFR 29 § 1910.132 Personal Protective Equipment-General requirements.
* CFR 29 § 1926.200 Accident prevention signs and tags.
* CFR 29 § 1926.201 Signaling.
* CFR 29 § 1926.202 Barricades.
* CFR 29 § 1926.203 Definitions applicable to this subpart.
* CFR 23 § 634.1 Purpose.
* CFR 23 § 634.2 Definitions.
* CFR 23 § 634.3 Rule.

Materials

Provide the following to each participant:

* A copy of the Activity Worksheets and Appendix 2-Performance Checklists.
* Access to the Internet, as needed, for OSHA, federal, and industry resources/references supporting course related discussions, demonstrations, and hands-on activities.
* Access to manufacturer’s instructions as needed.

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

* Personal Protective Equipment (See materials section: Hand and Power Tool Safety)
* Rubber gloves
* Hard hats
* Safety goggles
* Examples of site
* Site map
* Engineering drawings
* Materials list
* Example of a traffic control plan
* Traffic control devices

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

Schedule

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| **Time**  | **Topics for Discussion, Demonstrations, and Activities**  |
| **15 minutes**  | **Introduction** * Review the importance of:
* Following company guidelines for PPE.
* Mapping the hazard assessment to the work required.
	+ See 29 CFR 1910.132, Personal Protective Equipment-General requirements.
	+ Provide additional on-the-job examples.
 |
| **45 minutes** | **Topic: Electric PPE** * Explain, with examples, why it is not always possible to de-energize, isolate, test, and ground facilities before beginning the work.
* Address the PPE safe practices standard operators must follow if working on de-energized equipment.
	+ Conduct a hazard assessment.
	+ Determine appropriate PPE for the work assignment.
* Instruct participants to complete **Activity Worksheet #1**.
 |
| **45 minutes** | **Topic: Live Line Work** * Review why company guidelines and job planning are essential to protect linemen and ensure their safety while they are working on live lines.
* Discuss the importance of:
* Wearing the correct PPE and using the right tools.
* Correctly covering work areas.
* Emphasize that these guidelines are required by OSHA.
* Instruct participants to complete **Activity Worksheet #2**.
 |
| **45 minutes** | **Rubber Gloves** **Discussion*** Explain when rubber gloves and sleeves are required.
* Review the following topics:
* Dielectric strength ratings
* Classes of rubber gloves
* Rubber glove usage rules
* Types of gloves matched to type of test
* How to store rubber gloves
* Care and maintenance of rubber gloves

**Demonstration*** Demonstrate how to test rubber gloves and sleeves using the materials and tools available locally.
* Instruct participants to complete **Activity Worksheet #3**.

***Note:*** *Refer to Appendix 1 and provide examples for the participants to inspect bases on the equipment and tools available at the training location.*  |
| **Time**  | **Topics for Discussion, Demonstrations, and Activities**  |
| **30 minutes** | **Face Protection****Discussion*** Explain when face protection/safety goggles are used.
* Show examples (and use the examples for the workshop activity) and explain when the types of goggles, face shields, and eye shields are used. Refer to ANSI Standard Z87.2.

**Demonstration*** Demonstrate how to clean, inspect, and store eye and face protection and hard hat equipment using the materials and tools available locally.

 |
| **45 minutes** | **Hard Hats****Discussion*** Explain when hard hats are used.
* Explain ANSI A 89.1 standards for hard hat rating A (G), B (E), and C.

**Demonstration*** Demonstrate, using the materials and tools available locally, how to:
* Inspect a hard hat to ensure it is still in good condition to be used.
* Clean hard hats.
* Instruct the participants to complete **Activity Worksheet #4**.

***Note:*** *Refer to Appendix 1 and provide examples for the participants to inspect bases on the equipment and tools available at the training location* |
| **30 minutes** | **Insulating Covers and Other Hazards-Protection Systems** * Review OSHA 29 CFR 1910.269 and 29 CFR 1910.269 (g) (2) (v).
* Provide examples of the following about secondary protection covers:
* Types of safety tools and equipment
* Characteristics
* Uses of the safety tools
* Review the conditions and correct use of the following OSHA-approved fall protection systems:
* Personal fall arrest system
* Work positioning systems
* Show the types of PPE used by operators and point out the characteristics and features of safety equipment, clothing, and footwear, used for:
* Traffic protection
* Work around helicopters
* Hazardous flames
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| **Time**  | **Topics for Discussion, Demonstrations, and Activities**  |
| **60 minutes** | **Topic: Worksite Protection** * Review common traffic/traffic control measures acronyms and terms.
* Review Part 6 of the Federal Manual on Uniform Traffic Control Devices (MUTCD)-standards and guidelines related to work zones.
* Explain the standards applied by the U.S. Department of Transportation:
* When traffic control measures are implemented
* Devices used for traffic control
* Provisions made for disabled pedestrians
* Review the influencing factors that impact traffic protection is implemented:
* Job duration types
* Traffic speed and volume
* Location and size of the work area
* Duration
* Worksite area/boundaries of the worksite
* Discuss how to plan a worksite and assign safety responsibilities.
* Review the [U.S. Department of Transportation Federal highway Administration](https://www.fhwa.dot.gov/) (FHWA) website for work zone traffic control and safety standards.
* Instruct participants to complete **Activity Worksheet #5**.
 |
| **60 minutes** | **Topic: Public Traffic Control** * Review
* The standards for temporary traffic control (TTC).
* The importance of early and clear warning for drivers.
* Define the types of driver processing zones and how to advise drivers about each of the types of zones.
* Discuss
* Types of sign and sign placement used for warning.
* Guidelines for Traffic Control Devices.
* The use of channelizers.
* How to select speeds and calculate taper length.
* Review the guidelines about controlling traffic.
* When flaggers are used; flagger certification.
* Rules that flaggers must follow.
* Actions flaggers use at intersections.
* When Automated Flagging Assistance Devices (AFADs) are used.
* The factors that cause crash risks at or near a worksite.
* Instruct participants to complete **Activity Worksheet #6.**
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| **Time**  | **Topics for Discussion, Demonstrations, and Activities**  |
| **60 minutes** | **Topic: Protecting Workers from Traffic** * Review
* A Temporary Traffic Control Plan (TTCP)
* An Internal Traffic Control Plan (ITCP)
* Point out the importance of warning alarms:
* Reverse motion warning alarms
* Rear obstacle detection systems
	+ Discuss how alarms and detection systems are not enough to manage blind spots, and the due diligence one should take to ensure full visibility
* Illustrate how an Internal Traffic Control Plan (ITCP) plots pedestrian worker and vehicle paths.
* Discuss a spotter‘s responsibilities, and his or her work clothing, to ensure the safe operation of an equipment vehicle.
* Instruct participants to complete **Activity Worksheet #7**.
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Boot Camp Activities

Working with a partner or partners, answer the following questions and complete the tasks, according to the materials, equipment, and manufacturers’ instructions used.

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| Activity Worksheet #1 - Electrical Personal Protective Equipment (PPE) - On the Job Scenario  |
| Scenario | It is raining and the installer needs to check a gas pipe that is located near an electric pole.* Determine if hazards are present which necessitate the use of personal protective equipment (PPE).
	+ If so, what PPE should be considered?
* Explain your findings.
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| Notes on how the evaluation was made |  |
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| References/Guidelines including:* Industry sources
* Online course materials
* CFR

Indicate, if applicable, measures that appear to be a potential problem and or an abnormal operating condition (AOC). | Access 29 CFR 1910.132, Personal Protective Equipment-General requirements  |
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| Lessons learned |  |
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| General discussion questions or notes |  |
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| Activity Worksheet #2 - Live Line Work - On the Job Scenario  |
| Scenario | Working with project requirements, maps, engineering drawings, and a materials list, a crew will be excavating an old pipe line to create a branch and run new service.* Identify hazards which might be associated with this task.
* What points would you bring up at the job briefing?
* What type of protective clothing is appropriate for this job task?
* Discuss, as a group, why a job plan and job briefing are important?
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| Answers/Evaluations/Notes  |  |
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| References/Guidelines including:* Industry sources
* Online course materials
* CFR

Indicate, if applicable, measures that appear to be a potential problem and or an abnormal operating condition (AOC). |   |
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| Activity Worksheet #3 - Rubber Gloves  |
| Task | Refer to Appendix 2–Performance Checklist–Rubber Gloves and inspect the rubber gloves. Results will be discussed. |
| Answers/Evaluations/Notes  |  |
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| References-guidelines-tools used, including CFR (If applicable)Indicate if applicable, measures to respond report and document potential problems and AOCs. |  |
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| Activity Worksheet #4 - Protective Devices: Eye and Face Protection and Hard Hats |
| Task | Using the available materials and tools, examine the eyewear and hardhats and then, enter your findings on the chart (See Appendix 2-Performance Checklist–Protective Eye Wear and Hard Hats).Results will be discussed. |
| Answers/Evaluations/Notes  |  |
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| References/Guidelines including:* Industry sources
* Online course materials
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Indicate, if applicable, measures that appear to be a potential problem and or an abnormal operating condition (AOC). |   |
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| Activity Worksheet #5 - Worksite Protection - On the Job Scenario |
| ScenarioWorking with a partner or partners, determine what you must do to ensure the safety on the job. | A lift station is being installed in a residential area, near a hospital zone. The work area is on a corner, and the east-west street has a traffic light 100 yards away. Heavy duty equipment is being used daily. The south side sidewalk is ripped up. The north side sidewalk is passable.Based on the online course materials, industry guidelines, and classroom demonstration, indicate:* What traffic control measures should be implemented?
* The devices to use for traffic control.
* How to provide for disabled pedestrians.

Determine the:* Job duration types.
* Traffic speed and volume.
* Location and size of the work area.
* Duration.
* Worksite area/boundaries of the worksite.

Discuss how to plan for the worksite and how safety responsibilities are assigned. |
| Answers/Evaluations/Notes   |  |
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| References/Guidelines including:* Industry sources
* Online course materials
* CFR

Indicate, if applicable, measures that appear to be a potential problem and or an abnormal operating condition (AOC). |   |
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| Activity Worksheet #6 - Public Traffic Control - On the Job Scenario |
| ScenarioWorking with a partner or partners, determine what you must do to ensure the safety on the job. | An old building is being renovated in the downtown area of a small city. Part of the road must be closed while cement is being poured.It is important to determine the taper length for this area (speed is 35 mph or less).Based on the online course materials, industry guidelines, and classroom demonstration, indicate:* Types of driver processing zones
* How to advise drivers about each type of zone.
	+ Types of sign and sign placement used for warning.
	+ Guidelines for Traffic Control Devices.
	+ If channelizers will be used, why or why not.
	+ Select speeds and calculate taper length.
* How traffic will be controlled, for example:
	+ Will flaggers be used; why or why not. If used, what rules/guidelines will be followed and why.
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| Answers/Evaluations/Notes   |  |
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| References/Guidelines including:* Industry sources
* Online course materials
* CFR

Indicate, if applicable, measures that appear to be a potential problem and or an abnormal operating condition (AOC). |   |
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| General discussion questions or notes |  |
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| Activity Worksheet #7 - Protecting Workers from Traffic - On the Job Scenario |
| ScenarioWorking with a partner or partners, determine what you must do to ensure the safety on the job. | An elementary school is being torn down.Trenches are being excavated to move gas lines. Electrical workers, gas workers, and water utility workers are all on the scene with the construction crew. Each utility worker must be able to access the equipment he or she needs to do the job and to move through the worksite.How will you ensure the safety of the personnel in the work zone as well as the safe operation of the vehicles and equipment required to do the job? * Draft a Temporary Traffic Control Plan (TTCP) that identifies the conditions/compliance factors which comply with the standards outlined in the Manual on Uniform Traffic Control Devices (MUTCD) to ensure worker safety.
* An Internal Traffic Control Plan (ITCP) to ensure worker safety on a worksite.
	+ Illustrate how an Internal Traffic Control Plan (ITCP) plots pedestrian workers and vehicle paths.
	+ Indicate the spotter‘s responsibilities, and his or her work clothing, to ensure the safe operation of an equipment vehicle.
 |
| Answers/Evaluations/Notes   |  |
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| References/Guidelines including:* Industry sources
* Online course materials
* CFR

Indicate, if applicable, measures that appear to be a potential problem and or an abnormal operating condition (AOC).Lessons learned |   |
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# Appendix 1

Appendix 1–Performance Checklist–Rubber Gloves (Instructor)

Complete the task(s) and answer the question(s). The instructor will provide appropriate feedback.

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|  | **Tasks** | **Actions and Questions** | **Answers** |
| 1 | Care and maintenance of rubber gloves.  | How do you check rubber gloves for air leaks?  | *Answer: Inflate the gloves to check for air leaks and inspect for holes.* |
| 2 | Identifying problems  | Look at the following examples. Identify any problems.

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| Glove | Glove Colors  | Identify any problems |
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| *Glove*  | *Problems*  |
| *The answers will depend on the inspection results of the gloves used to complete this exercise.* |
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*Inflate the gloves to check for air leaks and inspect for holes. In addition, any cuts, blisters, scratches or embedded foreign materials should be noted.* |

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|  | **Tasks** | **Actions and Questions** | **Answers** |
| 1 | Eye wear  | * What situation requires that you wear the following types of eye wear?
* There may be types of eye wear that are not safe to use on the job. If so, indicate why.

|  |  |
| --- | --- |
| Eye Wear  | Reason  |
| Safety Goggles |  |
| Contact Lenses |  |
| Metal Frames |  |
| Side Shields |  |
| Flexible Cover Goggles |  |
| Plastic Face Shield  |  |

 | *Answers will vary but include:** *During switching, installing, and removing protective grounds*
* *When working on a live circuit such as a live secondary*
* *When there is a risk of flying particles*
* *When there is a possibility of exposure to strong alkalis or acids during battery boosting*
* *When firing on wedge connectors*
* *When working with high-pressure hydraulic tools*
* *When working with power tools*
* *Potential exposure to medium or high pressure gas (where respiratory protection not required).*

*Not to wear:** *Contacts*
* *Metal frames*
 |
| 2 | ??? | * Inspect the hard hats labeled A-D and then indicate which hat is still in good condition and can be worn on the job. Explain why.

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| Hard Hat  | Condition  | Reason  |
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* Indicate why the other hard hats do not meet industry standards.
 | *The answers will depend on the inspection results of the hard hats used to complete this exercise.*

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| Hard Hat  | Condition  | Reason  |
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Appendix 1 – Performance Checklist – Protective Eye Wear and Hard Hats (Instructor)

# Appendix 2

Appendix 2 – Performance Checklist – Rubber Gloves

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| . | **Tasks** | **Actions and Questions** | **Answers** |
| 1 | Care and maintenance of rubber gloves.  | How do you check rubber gloves for air leaks?  |  |
| 2 | Identifying problems.  | Look at the following examples. Identify any problems.

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| --- | --- | --- |
| Glove | Glove Colors  | Identify any Problems |
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Complete the task(s) and answer the question(s). The instructor will provide appropriate feedback.

Appendix 2 – Performance Checklist – Protective Eye Wear and Hard Hats

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|  | **Tasks** | **Actions and Questions** | **Answers** |
| 1 | Eye wear  | * What situation requires that you wear the following types of eye wear?
* There may be types of eye wear that are not safe to use on the job. If so, indicate why.

|  |  |
| --- | --- |
| Eye Wear  | Reason  |
| Safety Goggles |  |
| Contact Lenses |  |
| Metal Frames |  |
| Side Shields |  |
| Flexible Cover Goggles |  |
| Plastic Face Shield  |  |

 |  |
| 2 | ??? | * Inspect the hard hats labeled A-D and then indicate which hat is still in good condition and can be worn on the job. Explain why.

|  |  |  |
| --- | --- | --- |
| Hard Hat  | Condition  | Reason  |
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* Indicate why the other hard hats do not meet industry standards.
 |  |