**Instructor Guide**

**Hand and Power Tools**

Table of Contents

[Overview and Goals 3](#_Toc359584870)

[Preparation – Facilitation Guidelines 3](#_Toc359584871)

[Materials 4](#_Toc359584872)

[Schedule 5](#_Toc359584873)

[Boot Camp Activities 7](#_Toc359584874)

[Activity Worksheet #1-General Tool Safety (Work Area) 7](#_Toc359584875)

[Activity Worksheet #2-General Tool Safety (PPE) 8](#_Toc359584876)

[Activity Worksheet #3-General Tool Safety (PPE) 9](#_Toc359584877)

[Activity Worksheet #4-Hand Tool Safety 10](#_Toc359584878)

[Activity Worksheet #5-General Power Tool Safety-Best Practices 11](#_Toc359584879)

[Activity Worksheet #6-General Power Tool Safety-Inspection and Maintenance 12](#_Toc359584880)

[Activity Worksheet #7-Liquid Fuel Power Tools 12](#_Toc359584881)

[Activity Worksheet #8-Power Tool Safety: Portable circular saws, belt sanding equipment, and abrasive wheels 14](#_Toc359584882)

Overview and Goals

Natural gas is a safe and efficient energy source when handled correctly, and that means qualified operators must know how to use hand and power tools safely to ensure the operator’s well-being as well as the safety of the other personnel and the people and property being serviced.

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, participants will be able to:

* Identify which tools are required for the tasks at hand.
* Use hand tools safely and efficiently (following manufacturer’s instructions as needed).
* Use power tools safely and efficiently (following manufacturer’s instructions as needed).

***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

Ensure the participants have completed:

* OS-0202 e-TNG Hand and Power Tool Safety, including the pre-test and 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.

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| **Main Standards*** [1910 Subpart P](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910&p_text_version=FALSE#1910_Subpart_P), Hand and portable powered tools and other hand-held equipment
* [1926 Subpart I](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1926#1926_Subpart_I), Tools - hand and power

**Related Standards*** [1910 Subpart O](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910&p_text_version=FALSE#1910_Subpart_O), Machinery and Machine Guarding
* [1910 Subpart Q](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910#1910_Subpart_Q), Welding, Cutting, and Brazing
* [1910 Subpart S](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910#1910_Subpart_S), Electrical
* [1926 Subpart F](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1926#1926_Subpart_F), Fire Protection and Prevention
* [1926 Subpart K](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1926#1926_Subpart_K), Electrical
* [1926 Subpart V](http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1926#1926_Subpart_V), Power Transmission and Distribution

American National Standards Institute (ANSI) <http://www.ansi.org/> MaterialsProvide the following to each participant:* A copy of the Activity Worksheets.
* 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 materials and tools for the lab demonstrations and hands-on practice. The following chart lists examples that can be used in the lab set up for demonstration, practice, and for the participants to use while completing the Activity Worksheets. (This is a limited list of examples. The materials and tools used locally should be used.)

|  |  |  |
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| **Hand Tools** | **Power Tools** | **Personal Protective Equipment (PPE)** |
| Screwdriver | Electric drills | Hats | Gloves |
| Hammer | Hydraulic hammers | Boots | Shin guards |
| Hand saw | Saw | Protective vests | Safety shoes  |
| Wrench | Power nail guns |  |  |
| Chisels | Pneumatic grinders |  |  |

Working with the materials and tools in the training facility and the number of participants, assign tools to individuals or teams, based on each of the Activity Worksheets. Be sure to provide copies of the manufacturer’s instructions for reference. |
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Schedule

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| **Time**  | **Topics for Discussion, Demonstrations, and Activities** |
| **15 minutes**  | **Introduction** * Explain that each year there are a great number of injuries that could be prevented through hazard awareness, proper tool use, and training.
* Emphasize that this unit of work will address general safety practices and proper tool usage.
* Point out that the demonstrations and activities will adhere to state and federal safety regulations and the manufacturer’s instructions for proper use of local materials and tools.
 |
| **120 minutes** | **Topic: General Tool Safety*** Discuss:
* How operators/installers know what tools to use. Reinforce the tool selection process outlined in Module 1: General Tool Safety.
* The difference between working at a residential site versus a commercial site.
* The importance of safe work areas.
* How to correctly use personal protective equipment.
	+ Discuss what happens if PPE is not used. Solicit “real-world” examples.
* Instruct participants to complete **Activity** **Worksheets #1, #2, and #3**.

***Note:******Activity Worksheet #3*** *could be run as a competition if there are a number of participants.* |
| **90 minutes** | **Demonstration: Hand Tool Safety** * Demonstrate how to properly handle several commonly used tools on the job, for example:
* Screwdrivers
* Hammers
* Pliers, wrenches
* Hand Saws
* Emphasize safety measures and the importance of preventive maintenance. Provide real-world examples to illustrate these points.
* Instruct participants to complete **Activity Worksheet #4**.

***Note:*** *Assign each participant a repair.*  |
| **90 minutes** | **Demonstration: Power Tool Safety Best Practices*** Demonstrate how to handle several commonly used tools on the job.
* Emphasize safety measures.
* Review [OSHA Hand and Power Tools](http://www.osha.gov/doc/outreachtraining/htmlfiles/tools.html) safety guidelines.
* Instruct participants to complete **Activity Worksheet #5**.

***Note:*** *Assign each participant a repair using power tools.* * + *Ensure some of the tools he or she can choose from have items that require maintenance before using.*
	+ *Provide tags to label the tools****.***
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| **Time**  | **Topics for Discussion, Demonstrations, and Activities** |
| **90 minutes** | **Demonstration: General Power Tool Safety-Inspection and Maintenance*** Demonstrate how to oil, tighten, and replace worn tool components.
* Emphasize the importance that:
* Power tools with exposed moving parts must have guards.
* Power tools with blades have safety switches (on/off, constant pressure) and demonstrate how to position these controls.
* Instruct participants to complete **Activity Worksheet #6.**

***Note:*** *Assign each participant a power tool to repair.* |
| **120 minutes** | **Topic: Liquid Fuel Power Tools** * Review safety guidelines handling liquid fuels.

*Be sure to allow each participant to see your actions and ask questions as demonstrations are taking place. Encourage questions.* |
|  | **Demonstration: Liquid Fuel Power Tools** * Show participants where to check for leaks on hydraulic tools, hoses, and couplings.
* Demonstrate how to:
	+ Connect hoses securely.
* Use a pneumatic fastener.
* Connect and disconnect a pneumatic tool and/or hose.
* Clean with compressed air.
* Use a powder actuated tool.
	+ Emphasize:
	+ User must be licensed to use a powder actuated tool.
	+ The safety guidelines covered in the online course.
* Discuss the PPE used when using liquid fuel power and powder actuated tools.
* Instruct participants to complete **Activity Worksheet #7.**

***Note:**** *Ensure participants are paired up as mini-teams as they learn how to fire a fastener.*
* *Reinforce that each participant review the manufacturer’s instructions as the other prepares to use the tool and ensures that all safety measures are being addressed****.***
 |
| **180 minutes**  | **Demonstration: Power Tool Safety: Portable circular saws, belt sanding equipment, and abrasive wheels.** * Show participants how to follow safety guidelines/requirements while handling:
	+ Portable circular saws
	+ Portable belt sanding machines
	+ Portable abrasive wheels
	+ Hydraulic jacks
* Ensure that each participant sees your actions and ask questions as demonstrations are taking place. Encourage questions.
* Discuss when these tools are used and why.
* Instruct participants to complete **Activity Worksheet #8**.

***Note:**** *This activity can be further developed based on the materials, tools, and training facility and the expertise of the participants.*
* *The objective is to ensure the participants will know:*
	+ *Which tool or tools to use to handle a task*
	+ *How to inspect the tools for safety, i.e.: switches, blades, cords*
	+ *Guards are in place.*
 |

Boot Camp Activities

Working with a partner or partners, answer the following questions and complete the tasks, according to:

* The available tools, materials, and manufacturers’ instructions used locally.
* The tools/equipment/repair you are assigned.

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| Activity Worksheet #1 - General Tool Safety (Work Area)  |
| **Task**Work station set-up | **Scenario:** The work station in the lab is not set-up properly Task: Inspect and correctly stage the work area.* Identify what is out of place/not correctly set up
* Explain what should be done and why
* Fix the work area setup.
 |
| Identify problems  |  |
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| Steps-actions to correct |  |
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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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| Lessons learned |  |
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| General discussion questions or notes |  |
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| Activity Worksheet #2 - General Tool Safety (PPE) |
| **Task** Use PPE correctly.  | **Scenario: ???****Part 1**Identify on this chart, from the personal protective equipment (PPE) displayed at the training site what you would use to work with metal pipes on the job site.**Part 2*** Complete this worksheet.
* Be prepared to discuss the choices you made, including how the task influenced your choice and what you did to ensure you were making the best choices for the job assignment.
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| Equipment selected  |  |
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| Identify any problems you encountered Identify ways to overcome problem(s)you encountered |  |
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| Lessons learned  |  |
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| General discussion questions or notes |  |
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| Activity Worksheet #3 - General Tool Safety (PPE) |
| **Task** Use PPE correctly.  | **Scenario:** Emergency call received reporting a natural gas fire.**Part 1**Task: Put on the equipment, in the proper order, while being timed.**Part 2*** Complete this worksheet.
* Be prepared to discuss the choices you made, for example, why did you choose a safety shoe or shin guards, including how the task influenced your choice and what you did to ensure you were making the best choices for the job assignment.
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| Identify any problems you encountered  |  |
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| Identify ways to overcome any problem(s)you encountered |  |
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| General discussion questions or notes |  |
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| Activity Worksheet #4 - Hand Tool Safety |
| **Task** Use the correct hand tools. | **Scenario:** The instructor will assign you a repair.**Part 1*** Identify what hand tool should be used for the repair, for the task(s) you are given.

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| **Task** | **Tool (s)**  |
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* Indicate the condition of the tool. Is it considered usable? If not, why.

**Part 2*** Complete this worksheet.
* Be prepared to discuss your answers.

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| Tools used  | Why was the tool used? |
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| Notes about working with this particular tool, e.g.: sharpness of blade.  |  |
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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 #5 - General Power Tool Safety-Best Practices  |
| **Task**Make the repair. | **Scenario:** The instructor will assign you a repair.**Part 1*** Select the correct tool(s).
* Tag any tools that are not safe to use (Use the tags provided to mark and indicate problems).
* Wear the correct PPE.

**Part 2*** Complete this worksheet.
* Be prepared to discuss your answers.
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| Tools used |  |
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| Personal Protective Equipment (PPE) worn |  |
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| Tool condition  | Indicate how you determined if the tool(s) used was acceptable.Indicate any unsafe tools that you tagged and explain why you considered them unsafe.  |
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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 #6 - General Power Tool Safety-Inspection and Maintenance  |
| **Task** | **Scenario:** The instructor will assign you a tool that requires repair.**Part 1**Task: Oil, tighten, and replace worn tool components on the tool you are assigned.**Part 2*** Complete this worksheet.
* Be prepared to discuss your answers.
 |
| Tool to inspect and maintain | Indicate how you handled the guards and safety switches, if applicable. |
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| Inspection  | What do you see after a visual inspection? |
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| What do you see after trying to use the tool (if applicable)? |
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| Maintenance  | What did you do? How, Why?  |
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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 - Liquid Fuel Power Tools**  |
| **Task** | **Part 1**The instructor will assign a team to use the tools and materials available to fire a fastener in a contained area.**Part 2*** Complete this worksheet.
* Be prepared to discuss your answers.
 |
| Specific information on task | What are the details about where you had to fire a fastener, for example: location, problems you could see, size? |
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| Tools used  |  |
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| Steps-actions  |  |
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| References-Guidelines followed including OSHA Standard 1910 Subpart S (If applicable)  |  |
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| Lessons learned |  |
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| General discussion questions or notes |  |
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| Activity Worksheet #8 - Power Tool Safety: Portable circular saws, belt sanding equipment, and abrasive wheels |
| **Task** | **Part 1*** Match the tools to the tasks and then identify the safety guidelines operators must review for proper usage.

**Part 2*** Be prepared to discuss your answers.

  |
| Choose the tool (A-H) and indicate appropriate safety measures for the task listed.

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| **Task** | **Tool** | **Safety Guidelines/Requirements**  |
| 1. To cut metal
 |  |  |
| 1. Lift heavy objects
 |  |  |
| 1. Sharpening blades
 |  |  |
| 1. Drill through hard formations
 |  |  |
| 1. Removing a stump
 |  |  |
| 1. Connect a metal guard to a concrete wall
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| **Tools** |
| 1. Portable belt sanding machine
 | E. Air Hammers |
| 1. Portable abrasive wheels
 | F. Drills |
| 1. Hydraulic jack
 | G. Fastener |
| 1. Portable circular saws
 | H. Portable abrasive wheels |

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| Additional Notes, References-Guidelines followed  |   |
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| Lessons learned |  |
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| General discussion questions or notes |  |
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