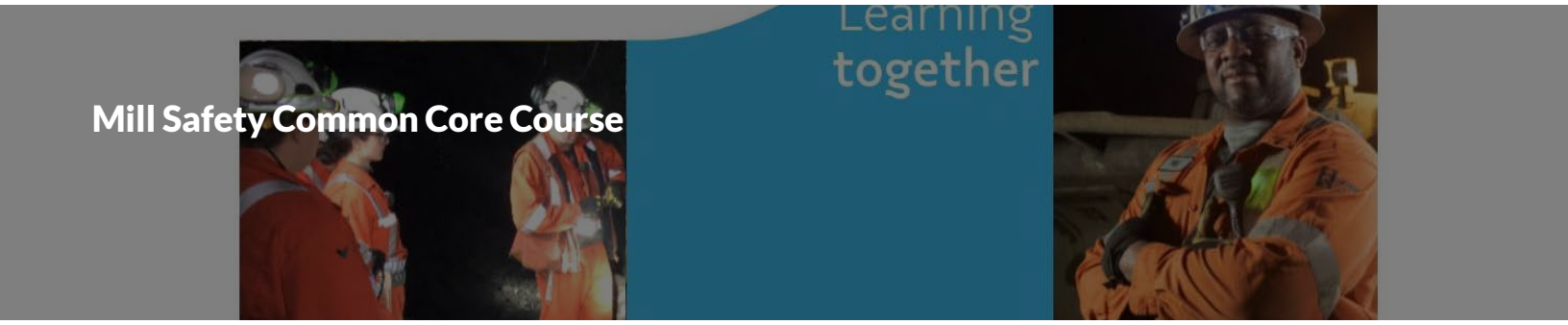
Mill Safety Common Core Course



Hello, welcome to the Voisey's Bay Mill Safety training course for VNL Concentrator employees, visitors, and contractors.

There are 3 parts to this course. You will need to complete all 3 parts and obtain a minimum score of 70% on the quizzes to obtain your certification for this course.

Ves ID: VB0854
Module Duration: About 2 hrs.
Revised: 06/07/2023

- Welcome
- Course Objectives

GENERAL SAFETY FOR CONCENTRATORS

- General Safety Objectives
- Safety Policies and Procedures
- Emergency Response Procedures
- Potential Hazards
- Personal Protective Equipment (PPE) Requirements
- High Hazard Areas & Barricading Procedures
- General Safety Quiz
- General Safety Summary

HAZARDOUS MATERIAL HANDLING & AWARENESS

- Hazardous Material Objectives
- Waste Management Segregation, Labeling, and Packaging

- Hydrogen Peroxide Awareness
- Hydrogen Sulfide Awareness
- Radiation Awareness
- Hazardous Material Quiz
- Hazardous Material Summary

ELECTRICAL AWARENESS FOR THE NON-ELECTRICAL PERSON

- Electrical Awareness Objectives
- About Electrical Awareness
- Spotting Hazards
- Arc Flash
- Equipment Trips and Resets
- Disconnect Switches and Isolation
- Controlling Hazards
- Responding to Electrical Incidents
- Electrical Awareness Knowledge Check
- Electrical Awareness Summary

COURSE COMPLETE!

- Conclusion

Lesson 1 of 28

Welcome

If you require a refresher on how to navigate online learning courses, please click to play the video below. Otherwise, you may continue with the course.

Upon completion of each section of this module, you will be given an opportunity to submit questions to obtain clarification of any content you are not sure of.

You will also be required to complete a brief survey designed to support continual improvement to your Vale learning experience.

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

CONTINUE

Course Objectives

00:12

Click play to begin the audio.

After completing this course, you will be able to:

- **Describe general safety procedures at the concentrator complex**
- **Explain how to handle hazardous materials**
- **Describe electrical precautions and procedures**

Complete the content above before moving on.

01:10

Click play to begin the audio.

Course Outline

This course is designed for all VNL Concentrator employees, visitors, and contractors. The purpose of this course is to provide information regarding safe working practices and procedures, potential hazards, and normal operating conditions in a milling environment.

Short-term visitors usually work independently with freedom of movement throughout the Voisey's Bay Mine site facility. They do not have a company escort during their stay, although they will have a company representative who acts as their supervisor and contact person. This training is required when an individual first arrives at the site and then again after an absence of 1 year or longer.

The instructions and guidance contained within this course are comprehensive and follow safety standards which you will be required to observe on an ongoing basis.

It is recognized, however, that this course does not cover every circumstance that could arise, and for that reason, it is intended as a training aid only.

This course is to be used as training material and best practice reference. It does not replace detailed technical (equipment manufacturer's documentation) or legal documentation (Mines Acts). You should also be familiar with the information contained in these documents.

Complete the content above before moving on.

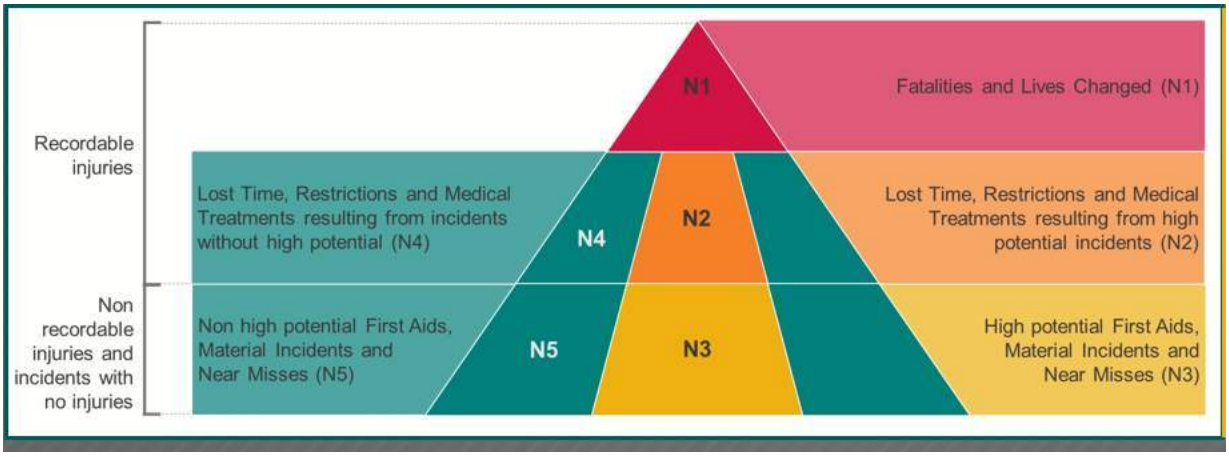
00:18

Click play to begin the audio.

Incident/Accident History

While the overall objective is to reduce or eliminate workplace hazards, it should be recognized that not all workplaces within Vale operations can be made free of all hazards.

Critical to safe operation is the ability to recognize and control hazards that may cause injuries, equipment damage, or even worse, fatalities.



Our injury and fatality index is updated monthly. It shows the numbers for Fatalities and Live Changed (N1), Recordable High-Potential Injuries (N2), Other High-Potential events (N3), Recordable Non-High Potential Injuries (N4), and Other Non-High Potential events (N5)

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

General Safety Objectives

00:33

Click play to begin the audio.

After completing the General Safety section, you will be able to:

- Identify the layout of the concentrator complex
- Describe safety policies and procedures
- Describe emergency response and evacuation procedures
- Describe potential hazards and their controls in the concentrator complex
- Describe basic PPE requirements in the concentrator complex
- Identify the areas where respirators are mandatory
- Describe task-specific PPE requirements
- Identify the areas where a high hazard is present
- Describe barricading procedures

Complete the content above before moving on.

Safety Policies and Procedures

00:08

Click play to begin the audio.

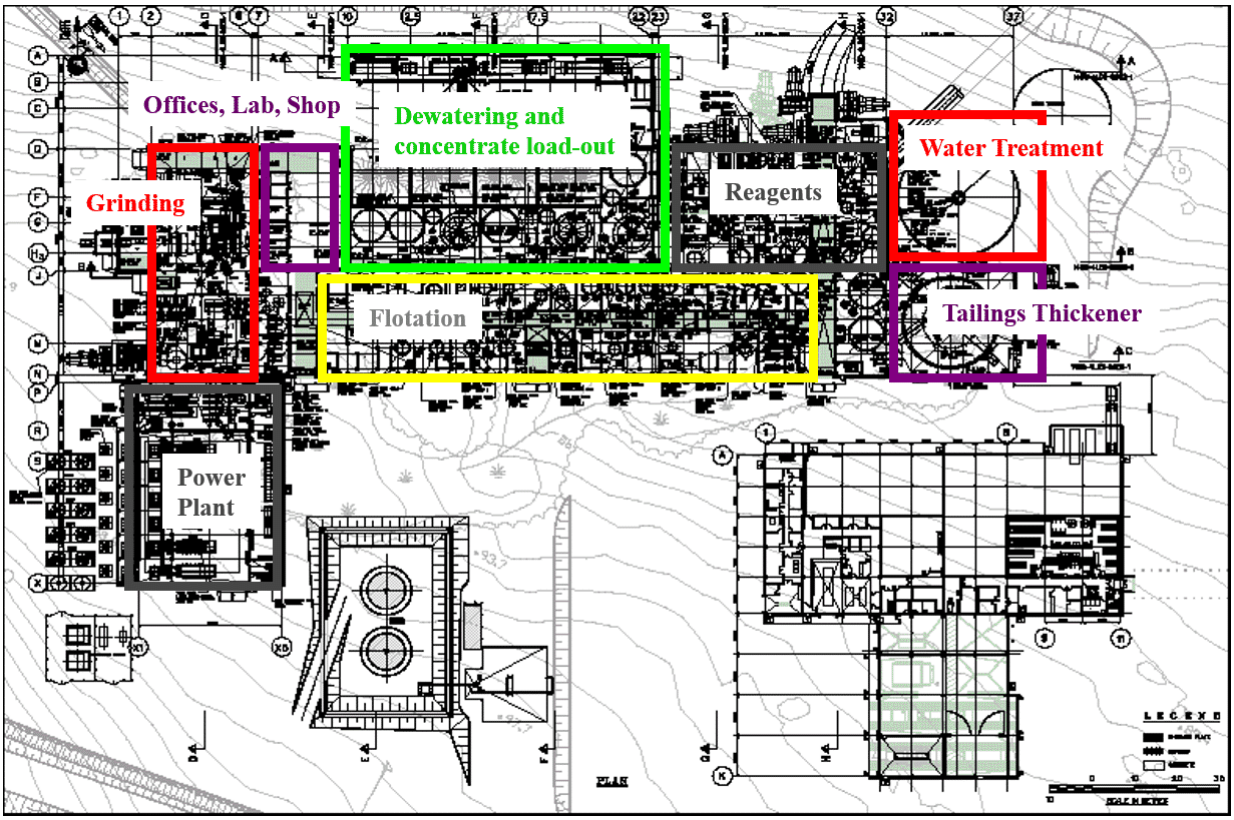
Objectives

- Identify the layout of the concentrator complex
- Describe safety policies and procedures

Complete the content above before moving on.

Concentrator Layout

This schematic depicts the specific areas of the concentrator.



Complete the content above before moving on.

00:55

Click play to begin the audio.

General Safety Policies & Procedures

- All concentrator personnel will actively support Vale Newfoundland and Labrador's Safety, Health, and Environmental policies and procedures directives
- All personnel will actively support the HomeSafe program
- All personnel will wear required PPE as well as long-sleeves and long-legged work attire in the concentrator complex
- Where required, employees will wear and use additional safety equipment necessary to complete their work assignments safely
- Lockout isolation procedure will be used where identified to ensure that concentrator personnel can safely work at their assigned jobs
- All employees will receive training. Failure to follow policies and/or procedures may result in dismissal

- All non-concentrator personnel must login/logout when visiting the concentrator complex. The book is located in the hallway upon entering the mill complex.

Complete the content above before moving on.

00:18

Click play to begin the audio.

At **Vale**, we believe that **ALL injuries can be prevented**.

All injuries, incidents, and 'near misses' must be reported immediately.

At Vale, we have a commitment to:

- Continuous improvement
- Hazard/risk management
- Pollution prevention
- Compliance with legislation and other requirements

Complete the content above before moving on.

00:36

Click play to begin the audio.

Potential Job Hazards & Controls

White-out conditions

During white-out conditions, employees are required to travel inside closed-in walkways to access areas of the concentrator complex and accommodations buildings.

Wildlife

- Employees must not provide any source of food that would tempt wildlife to enter the concentrator complex
- Report all sightings to security
- Employees are encouraged to keep all concentrator doors closed when not in use

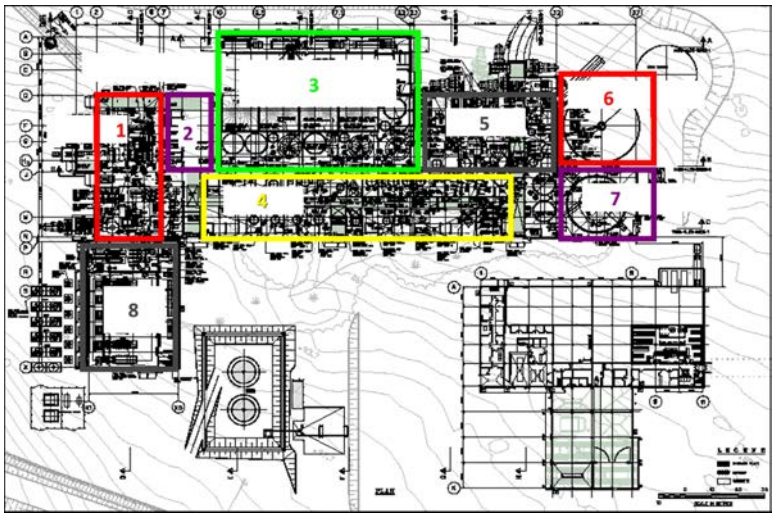
Environmental Protection

Any visible escapes of contaminants must be reported to the concentrator control room for assessment and appropriate response.

Complete the content above before moving on.

Activity

Match the label to its numbered location on the schematic.



SUBMIT

Got a Question?

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CLICK HERE!

Complete the content above before moving on.

Emergency Response Procedures

00:06

Click play to begin the audio.

Objective

- Describe emergency response and evacuation procedures

Complete the content above before moving on.

00:08

Click play to begin the audio.

Emergency Numbers

The following emergency response numbers can be found in various locations around the site. Stickers on telephones also display these numbers.

- **Radio:** Channel 1 - Say "Code 1, Code 1, Code 1"
- **Emergency from a telephone:** dial 4911
- **Health centre:** 922-4444
- **Security (Mine mill site):** 922-4437
- **SH&E Department:** 922-4246

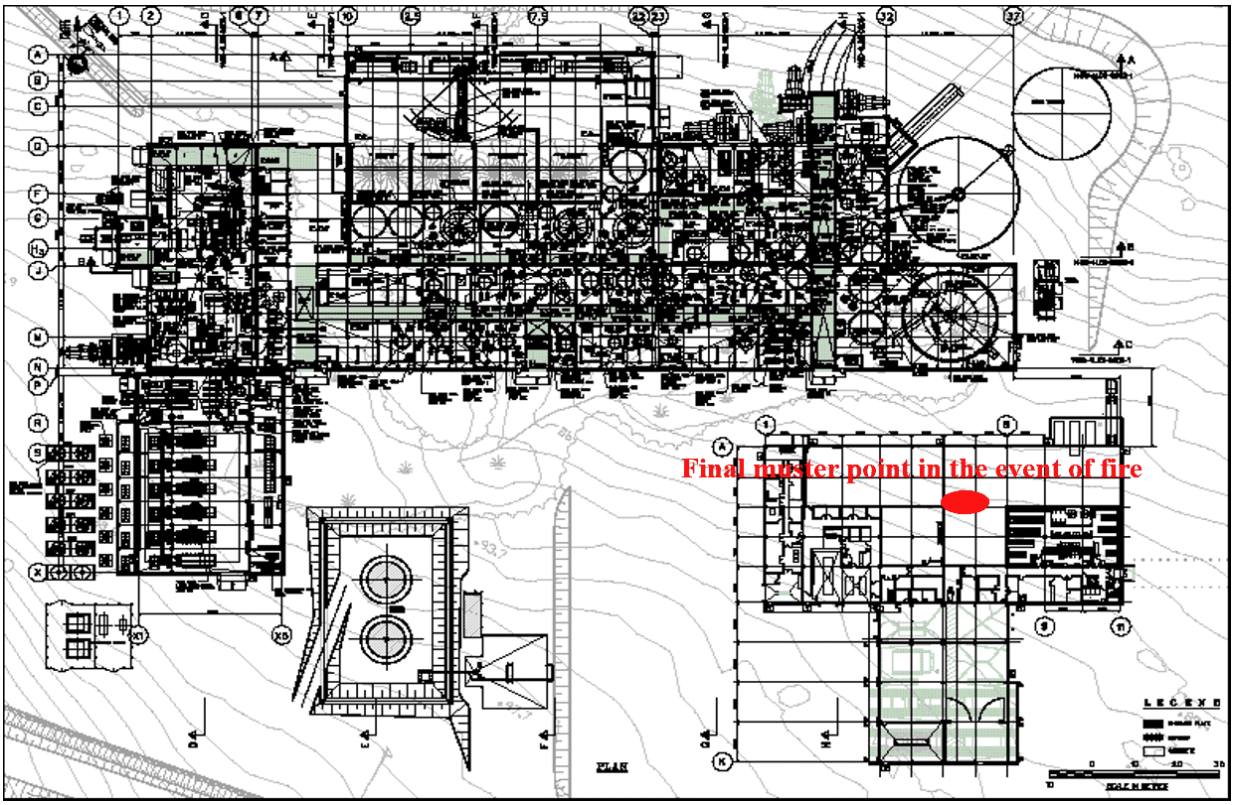
Complete the content above before moving on.

00:27

Click play to begin the audio.

Fire Emergency Response

- Extinguishers are located throughout the plant and are fully charged at all times
- Emergency pull stations are located throughout the plant
- Fire hoses are not to be used for operational or other purposes
- Call for help if needed. In the concentrator, radios and phones are available. Pull stations are a quick method of sounding an alarm
- Report all incidents
- Know the evacuation routes to the muster stations



Complete the content above before moving on.

00:40

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Evacuation Procedure

All non-concentrator personnel must login/logout on the log book in the hallway of the mill complex entry. This allows us to quickly see if everyone is accounted for.

If a "code 1" is called, all employees must evacuate to the warehouse where each supervisor will take roll call and report to the muster captain. Exceptions to this are:

- Control room operator remains in the control room during the emergency, unless the control room is compromised
- Crusher operator does not evacuate unless fire alarm is in crusher area (control room operator to notify)
- Dewatering operator to walk through concentrate load-out and ensure ALL personnel proceed to pre-muster point

Complete the content above before moving on.

All employees must evacuate when a "Code 1" is called except: *Select all that apply.*

- [ ] Crush operator
- [ ] Non-concentrator personnel
- [ ] Control room operator
- [ ] Dewatering operator

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Potential Hazards

00:06

Click play to begin the audio.

Objective

- Describe potential hazards and their controls in the concentrator complex

Complete the content above before moving on.

00:08

Click play to begin the audio.

Potential Hazards

The following are some potential hazards you may encounter in the concentrator complex.

Click each problem to learn more about controls in these areas.

Walkways

Watch out for moving equipment commonly found in the concentrator, such as forklifts, skid steer loaders, aerial lifts, overhead and carry deck cranes

Barricades

Do not enter an area that is barricaded

Crane hoisting

Areas to be aware of crane hoisting activities include:

- Reagent mix area has several crane hoisting locations for lifting tote bags
- Maintenance repair shops
- Mill charging areas
- Maintenance areas with barricade tape

Fixed equipment

There is automated equipment in the concentrator complex that will start or stop at any given time. Some are equipped with start-up alarms, but many do not have these alarms.

Conveyor galleries

Personnel must cross conveyor systems at designated areas only:

- If conveyor has a catwalk over the unit, it is safe to cross at catwalk only
- If conveyor has an area guarding the underside of return belt, it is safe to pass under the belt at that location only
- Employees must locate emergency stop cords; this will provide individuals the tool to stop the conveyor if they see something amiss with the potential to injure or cause damage
- Employees walking near conveyors must be alert to a grab and pull condition by the conveyor if wearing loose clothing

Conveyor belts

- Never try to turn an idler that has stopped or appears seized
- Never try to remove any object from or between a conveyor belt decking
- When shoveling onto a belt conveyor, always shovel in direction of conveyor travel

Dust

- Certain areas or conditions may result in the need to wear an approved respirator
- Personnel must be fit-tested to ensure a proper seal for the respirator
- Masks are to be kept clean by the owner
- Appropriate cartridge/filter to be used

Contained energy sources

The following are contained energy sources found at the concentrator complex:

- Electrical lines and motors
- High-pressure water lines (fire lines > 150psi)
- High-pressure air lines:
    - Plant > 100psi
    - Instrument
- High-pressure hydraulic lines
- High-pressure slurry lines

Radioactive sources

- Found throughout the mill on slurry lines
- Only qualified and trained personnel can energize or de-energize radioactive probes
- Sources are tested regularly
- Report damaged probes immediately to the concentrator supervisor

Reagent mixing and storage

- Both full and diluted strength chemicals are used in the concentrator
- The chemicals used can be either liquid or dry
- Chemicals can also be found in high-pressure pipelines

Complete the content above before moving on.

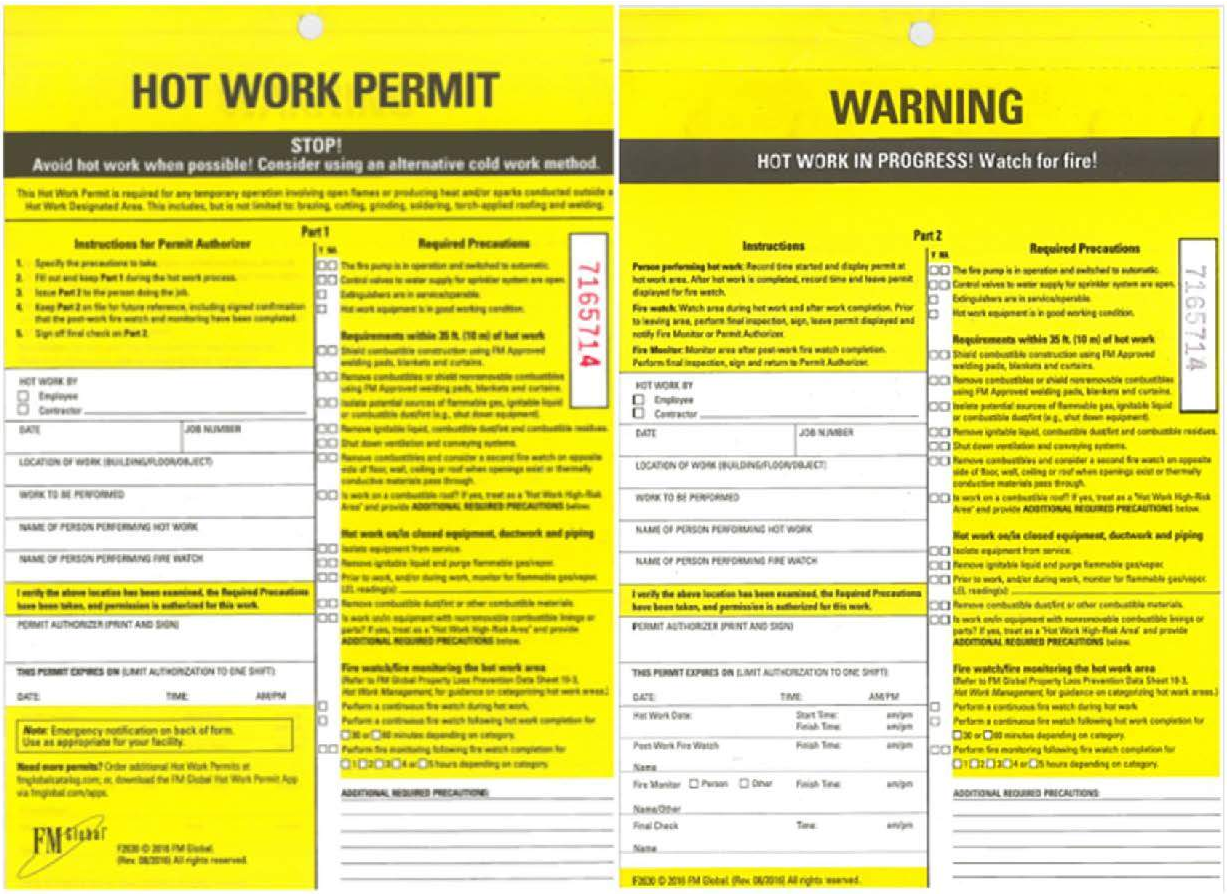
00:23

Click play to begin the audio.

Hot Work

A Hot Work Permit is required for any temporary operation involving open flames or producing heat and/or sparks conducted outside a Hot Work Designated Area.

This includes, but is not limited to:



HOT WORK PERMIT

STOP!
Avoid hot work when possible! Consider using an alternative cold work method.

This Hot Work Permit is required for any temporary operation involving open flames or producing heat and/or sparks conducted outside a Hot Work Designated Area. This includes, but is not limited to: brazing, cutting, grinding, soldering, torch-applied roofing and welding.

Instructions for Permit Authorizer

1. Specify the precautions to take.
2. Fill out and keep Part 1 during the hot work process.
3. Issue Part 2 to the person doing the job.
4. Keep Part 2 on file for future reference, including signed confirmation that the post-work fire watch and monitoring have been completed.
5. Sign off final check on Part 2.

Part 1

Required Precautions

7165714

HOT WORK BY
Employee
Contractor

DATE | JOB NUMBER

LOCATION OF WORK (BUILDING/FLOOR/OBJECT)

WORK TO BE PERFORMED

NAME OF PERSON PERFORMING HOT WORK

NAME OF PERSON PERFORMING FIRE WATCH

I verify the above location has been examined, the Required Precautions have been taken, and permission is authorized for this work.

PERMIT AUTHORIZER (PRINT AND SIGN)

THIS PERMIT EXPIRES ON (LIMIT AUTHORIZATION TO ONE SHIFT)

DATE: TIME: AM/PM

Note: Emergency notification on back of form. Use as appropriate for your facility.

Need more permits? Order additional Hot Work Permits at fmglobalcatalog.com; or, download the FM Global Hot Work Permit App via fmglobal.com/apps.

FM Global

Requirements within 35 ft. (10 m) of hot work

Hot work on/in closed equipment, ductwork and piping

Fire watch/fire monitoring the hot work area

ADDITIONAL REQUIRED PRECAUTIONS:

WARNING

HOT WORK IN PROGRESS! Watch for fire!

Instructions

Person performing hot work: Record time started and display permit at hot work area. After hot work is completed, record time and leave permit displayed for fire watch.

Fire watch: Watch area during hot work and after work completion. Prior to leaving area, perform final inspection, sign, leave permit displayed and notify Fire Monitor or Permit Authorizer.

Fire Monitor: Monitor area after post-work fire watch completion. Perform final inspection, sign and return to Permit Authorizer.

Part 2

Required Precautions

7165714

HOT WORK BY
Employee
Contractor

DATE | JOB NUMBER

LOCATION OF WORK (BUILDING/FLOOR/OBJECT)

WORK TO BE PERFORMED

NAME OF PERSON PERFORMING HOT WORK

NAME OF PERSON PERFORMING FIRE WATCH

I verify the above location has been examined, the Required Precautions have been taken, and permission is authorized for this work.

PERMIT AUTHORIZER (PRINT AND SIGN)

THIS PERMIT EXPIRES ON (LIMIT AUTHORIZATION TO ONE SHIFT)

DATE: TIME: AM/PM

Hot Work Done: Start Time: am/pm Finish Time: am/pm

Post Work Fire Watch: Finish Time: am/pm

Name

Fire Monitor ☐ Person ☐ Other: Finish Time: am/pm

Name/Other

Final Check: Time: am/pm

Name

Requirements within 35 ft. (10 m) of hot work

Hot work on/in closed equipment, ductwork and piping

Fire watch/fire monitoring the hot work area

ADDITIONAL REQUIRED PRECAUTIONS

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- brazing
- cutting
- grinding
- soldering
- torch-applied roofing
- welding

Avoid hot work when possible!
Consider using an alternative cold work method instead.

Complete the content above before moving on.

00:38

Click play to begin the audio.

Reagents

All reagents must be treated with respect!

Before working on a reagent system you must contact the metallurgist at 4436 to ensure proper procedures and precautions are used (some are hazardous and/or flammable.)

Reagents used include:

- Lime
- Xanthate (Flex 31)
- Frother (Dowfroth 250C or Unifroth 250C)
- Flocculant
- Ferric Sulphate
- Hydrogen Peroxide (H_2O_2)
- Carboxymethyl cellulose (CMC)

Warnings:

- Always use proper PPE when working with reagents

- Reagents can cause serious injury
- Ask if you are not certain
- Do not work on reagent systems without a job hazard analysis (JHA) being completed with a metallurgist

Complete the content above before moving on.

00:20

Click play to begin the audio.

Confined Spaces

There are many confined spaces in the concentrator (examples include mills, tanks, chutes, etc.) Confined spaces in the concentrator are identified by signage. A confined space entry permit must be obtained before entering a confined space. Only personnel who are trained in confined space entry are able to work in a confined space.

Complete the content above before moving on.

00:26

Click play to begin the audio.

Fall Protection and Prevention

- Vale Newfoundland and Labrador's fall protection policy applies to working in an unprotected area 10 feet or more off the ground
- Vale's Standard Operating procedure states that ALL employees MUST be 100% tied off at 6 feet or more
- Fall protection or restraint equipment is required at 6 feet or more

- Only personnel who are trained in fall protection are able to work at heights greater than 6 feet that require the use of restraint equipment

Complete the content above before moving on.

00:22

Click play to begin the audio.

Concentrator Warning Devices

Alarms found in the concentrator complex include:

- Fire and evacuation alarms. These are tested regularly. During testing, listen for the test and report any areas that are not audible
- All operating cranes
- Eye wash stations and emergency showers
- Backup alarms and flashing lights on mobile equipment
- Fixed equipment startup alarms

Complete the content above before moving on.

00:09

Click play to begin the audio.

Machine Guards

Report missing, damaged, or inadequate guards.

Keep body parts on the safe side of the guard. Do not reach over, under, or through a machine guard

Complete the content above before moving on.

00:32

Click play to begin the audio.

Housekeeping

Good housekeeping and safety go hand-in-hand. Keep these points in mind:

- Keep work areas and respective access routes clear of debris and unnecessary materials
- Keep stairways, passageways, and emergency exits free of materials and obstructions at all times
- Do not throw rubbish and debris from elevated areas
- Remove or bend nails or similar protruding items from lumber prior to handling
- Secure loose materials prior to moving
- Trash and scrap should be stored in approved containers with lids to reduce the potential of fire

Complete the content above before moving on.

Match the control to its hazard.

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Personal Protective Equipment (PPE) Requirements

00:15

Click play to begin the audio.

Objectives

- Describe basic personal protective equipment (PPE) requirements in the concentrator complex
- Identify the areas where respirators are mandatory
- Describe task-specific PPE requirements

Complete the content above before moving on.

00:18

Click play to begin the audio.

Responsibilities, Training, & Qualifications

All responsibilities specified in NL OSHA must be complied with including:

- Canadian standards association (CSA)
- Workplace Hazardous Materials Information System (WHMIS)
- Concentrator orientation
- Respirator fit tested
- Sulfur dioxide (SO_2) awareness training

- Hygiene awareness training

Complete the content above before moving on.

00:41

Click play to begin the audio.

Minimum PPE Requirements

- **Hard hat** with reflective stripes
- CSA-approved **steel-toed safety boots** - minimum height of 6” and boots must be laced up to the top
- **Safety glasses with side shields** - shaded safety glasses not permitted inside the mill
- **Coveralls with reflective stripes** (to be worn when a worker’s clothes may become contaminated with ore, oil, grease, etc.). Disposable Tyvek coveralls are permitted under a reflective safety vest. Loose-fitting clothing, scarves, etc. are not allowed
- **Reflective safety vest** (long sleeves must cover the arms and legs)
- Single **hearing protection** (i.e. approved ear muffs or ear plugs)

Complete the content above before moving on.

00:35

Click play to begin the audio.

Exceptions to PPE Requirements

PPE is **not** required in the following areas:

- Mill office area (including lunchroom and washrooms)
- Enclosed stairwell between shop floor, met lab, office floor, and upper floor
- Washrooms on second floor next to met lab
- Concentrator control room

- Crusher control room

Partial PPE Requirement Areas

Only **safety glasses and steel-toed safety boots** are required in the following areas:

- Metallurgical lab
- Electrical, instrumentation, and mechanical shops

All general concentrator PPE is required for the general shop floor

Complete the content above before moving on.

00:14

Click play to begin the audio.

Mandatory Respirator Areas

A half-mask respirator with an olive multi-cartridge and HEPA filter (75SCP100 cartridge) is the minimum requirement for a respirator. Mandatory respirator areas are:

- Crusher building
- Coarse ore storage building
- Concentrate load-out area

Complete the content above before moving on.

00:43

Click play to begin the audio.

Hand Protection

Gloves are **mandatory** for all work involving contact with ore or concentrate. Particular gloves are required depending on the nature of the work as follows:

- **Fine work requiring a sensitive touch:** disposable nitrile gloves
- **Dry, relatively clean work:** Leather gloves or Hyflex gloves (coated cloth gloves). The use of disposable nitrile gloves beneath leather gloves and pulled up over sleeves to keep wrists clean is recommended, especially if necessary to take off leather gloves periodically
- **Wet or very dirty work:** Long-sleeved rubber gloves are strongly recommended (nitrile gloves underneath and pulled up over sleeves is also recommended.) Sleeve covers can also be used to keep the arms clean and dry.

Complete the content above before moving on.

00:24

Click play to begin the audio.

Reagent Handling

Refer to the MSDS and SOP for the reagent you are handling to get necessary information for specific handling requirements, first aid response, PPE, storage, and other additional information. For other reagents brought into the mill not listed below, you must consult with your supervisor before handling.

Click each (+) to learn about the required PPE for that reagent.

Ferric sulfate

Task	Mandatory PPE
• Performing maintenance on the storage and delivery systems • Responding to small spills • Isolating and cleaning ferric sulfate strainers • Performing flow measurement checks	• PVC jacket and pants • PVC gloves (green or yellow)(nitrile gloves can also be used for ferric sulfate) • Full face respirator (or half mask with safety goggles) with olive multi-cartridge and HEPA filter (75SCP100 cartridge) • CSA-approved rubber safety boots

Collector (Xanthate, Flex 31)

Task	Mandatory PPE
• Emptying bulk bags into mix system • Handling and rinsing empty bulk bags • Changing tote tanks (Cytec) • Isolating and cleaning strainers • Performing flow measurement checks • Performing maintenance on storage and delivery systems (including valves/flowmeters) • Responding to small spills*	• Half-mask respirator with olive multi-cartridge and HEPA filter (75SCP100 cartridge) and faceshield or mono-goggles OR Full-face respirator with olive multi-cartridge and HEPA filter (75SCP100 cartridge) • PVC gloves (green or yellow) or nitrile gloves • *CSA-approved rubber safety boots (only required for spill response)

Quicklime (dry lime)

Task	Mandatory PPE
• Hoisting and emptying quicklime bulk bags into hopper* • Unplugging the quicklime feed system into the lime slaking mill • Emptying the quicklime dust collector hopper • Working on quicklime equipment • Responding to a quicklime spill	• Half-mask respirator with olive multi-cartridge and HEPA filter (75SCP100 cartridge) and mono-goggles OR Full-face respirator with olive multi-cartridge and HEPA filter (75SCP100 cartridge) • PVC gloves (green or yellow) • *Tyvek disposable coveralls • *CSA-approved rubber safety boots *not mandatory for hoisting and emptying bulk lime bags. Tyvek sleeves are mandatory for hoisting bulk bags. See"Emptying Bulk Bags of Quicklime Into Hopper" SOP for details.

Slaked lime, Frother, & Flocculant

Reagent	Task	Mandatory PPE
• **Slaked lime (lime slurry)** • **Frother (Dowfroth 250C, Unifroth 250C)** • **Flocculant (Magnafloc 338)**	• Emptying tote tanks or bulk bags • Isolating and cleaning strainers • Performing maintenance on storage and delivery systems involving contact with chemicals • Responding to spills*	• Mono-goggles or face shield • PVC gloves (green or yellow) or nitrile gloves • *CSA-approved rubber safety boots (for spill cleanup only)

Reagent	Task	Mandatory PPE

Hydrogen peroxide _

Task	Mandatory PPE
• Offloading ISOtainers • Performing maintenance on storage tanks and all piping & delivery systems involving potential contact with chemicals	• Rain jacket and pants made of vinyl, neoprene, or polyethylene • Vinyl, rubber, or neoprene boots • Rubber gloves • Chemical goggles • Hard hat with a face shield
Routine inspections while operating dosing system (if no leaks are observed)	• Mandatory mill PPE • Face shield
Routine inspections while operating dosing system and repairs or adjustments (if leaks are observed or potential leaks created)	• Rain jacket and pants made of vinyl, neoprene, or polyethylene • Vinyl, rubber, or neoprene boots • Rubber gloves • Chemical goggles • Hard hat with face shield

Complete the content above before moving on.

00:37

Click play to begin the audio.

Incident at Vale!

So you have work to do around the lime slaker? You want it done fast so you're thinking about shortcuts, like not wearing the proper PPE. Think again!

August 27, 2011

These four employees were working on unplugging the lime slaker screw conveyor. As the lime screw was cleared, lime was discharged from the screw into the white plastic bucket. The lime came in contact with moisture (either from the bucket or in the mixing bowl) and began generating heat. Enough heat to melt the plastic bucket. It's summer. It's hot. The moisture needed to generate heat could be your own sweat. Protect yourself by wearing full PPE!

Complete the content above before moving on.

Question

What is the required PPE when emptying the quicklime dust collector hopper? *Select all that apply.*

- [ ] Half-mask respirator with olive multi-cartridge and HEPA filter (75SCP100 cartridge) and mono-goggles OR Full-face respirator with olive multi-cartridge and HEPA filter (75SCP100 cartridge)
- [ ] Tyvek disposable coveralls
- [ ] PVC gloves (green or yellow)
- [ ] CSA-approved rubber safety boots

SUBMIT

Got a Question?

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CLICK HERE!

Complete the content above before moving on.

High Hazard Areas & Barricading Procedures

00:08

Click play to begin the audio.

Objectives

- Identify the areas where a high hazard is present
- Describe barricading procedures

Complete the content above before moving on.

00:22

Click play to begin the audio.

High Hazard Area: Coarse Ore Storage

Permission from Mill Operations Supervisor is required to enter this area. Identified due to the following uncontrolled hazards:

- Struck by falling rock from overhead conveyor – Possible/Severe = Extreme (E15)
- Falls into underneath conveyor (live stockpile) – Possible/Severe = Extreme (E15)

Ensure lockout procedure is applied before entry.

Complete the content above before moving on.

00:16

Click play to begin the audio.

High Hazard Area: Crusher Dump Pocket

Permission from Mill Operations Supervisor is required to enter this area. Identified due to the following uncontrolled hazard:

- Fall into opening of operating equipment – Possible/Severe = Extreme (E15)

Ensure lockout procedure is applied before entry.

Complete the content above before moving on.

00:16

Click play to begin the audio.

High Hazard Area: Crusher Dump Pocket

Permission from Mill Operations Supervisor is required to enter this area. Identified due to the following uncontrolled hazard:

- Fall into opening of operating equipment – Possible/Severe = Extreme (E15)

Ensure lockout procedure is applied before entry.

Complete the content above before moving on.

Barricading Definitions

Click each (+) to read the barricade definitions.

Danger – Do Not Enter barricades

"Danger – Do Not Enter" barricades are used when conditions or work being performed pose an immediate danger to workers moving through an area. The intent of the barricade is to prevent access to an area by unauthorized personnel while the unsafe condition exists.

Caution barricades

"Caution" barricades are used to alert workers entering an area to potentially unsafe conditions, and to indicate that caution should be used when moving through the area to avoid the stated hazard. As a rule, "Caution" barricades denote hazards posing a lower level of risk to workers.

Hard barricades

Hard barricades are a temporary physical barrier to prevent unwarranted or unintentional access to an area. Hard barricades can take many forms, such as scaffold tubes, jersey barriers, fencing, or prefabricated guarding.

Complete the content above before moving on.

00:31

Click play to begin the audio.

Safe Operating Procedure Responsibilities

- **All:** No person shall proceed through a Danger barricade without authorization from the person who installed the barricade and tag
- **Employees:** Responsible for installing the appropriate barricade type required by task and for obeying all barricading rules
- **Supervisor:** Responsible for making available the necessary tape, tags, and other supplies, ensuring workers follow the procedure, and approving the removal of barricades upon confirmation of area being made safe

Complete the content above before moving on.

00:49

Click play to begin the audio.

Barricading Requirements

- Barricade only the area where the hazard exists to prevent interference with other work activities
- Barricading is only a temporary measure. All efforts shall be made to eliminate the hazardous condition as soon as possible
- Barricading must be installed at a suitable height that makes it difficult to inadvertently bypass
- Where airborne contaminants are generated, such as the disturbance of dust, careful attention must be given to the dimensions of the zone and tags must clearly indicate the contaminant. At a minimum, respiratory protection is required anywhere dust is being generated

- Barricade tape must not be anchored to a readily movable object that may be inadvertently moved
- Barricade tape must not be anchored to objects where it creates additional hazard, e.g., compressed gas cylinders or sources of heat

Complete the content above before moving on.

02:46

Click play to begin the audio.

Danger - Do Not Enter Barricades

Danger - Do Not Enter barricades must be used when:

- Personnel are working above
- Unsafe, deteriorating, or slippery walkways are found
- Unsecured structures exist
- Danger of falling process material or other items from overhead exists
- Temporary removal of existing protection such as guardrails is taking place
- Opening in a floor, vessel, bin, sump, etc. exists
- Securing the scene of a critical injury

Procedures

- Only authorized personnel are permitted in these areas.
- The affected area shall be sealed at all access points by red “Danger – Do Not Enter” tape, red chain, temporary guard rails, or fencing by the person identifying the hazard or the person performing work that requires installation of barricades.
- An approved identification tag or sign shall be placed on each barricade at all access points. Information on the tag or sign shall include the date the barricade was installed, the name and department of the person installing the barricade, and information clearly describing the nature of the hazard that requires the protection of a barricade. When possible, an alternate contact name is to be listed on the identification tag / sign if the barrier is to be in place longer than one shift.

- The worker installing the barricade shall notify the supervisor responsible for the area of the barricade's installation.
- Under no circumstances shall a person enter the barricaded area unless permission is obtained from the person who barricaded the area.
- The danger zone of live energy sources such as unguarded equipment must be barricaded until the equipment is returned to a safe state with guarding installed. Zero energy isolation is required before entering these zones. The tagging of these danger zones must indicate the requirement for lockout.
- Permanent safety chains with appropriate warning signs shall be used where barricading is regularly required (i.e. hoist wells in mill), or where local conditions would affect durability of danger tape or other temporary guards.
- The delineated zone for a crane lift should incorporate a safety margin to ensure that no personnel will be harmed in the event of a dropped load. The safety margin must take into account the potential for a load to swing, slide out of rigging, eject material on contact with the ground, or strike other objects that will change the path of the fall.
- Depending on the nature of the hazard, additional precautions such as warning lights, signs, personnel acting as guards, or permanent barricades may also be required.
- The person who installed the barricade is responsible for the removal of the barricade when work is completed and the area is made safe to enter. In situations where a barricade is to remain in place beyond the end of shift, responsibility for removal is transferred to the area supervisor if the person who installed the barricade is no longer on duty.

Complete the content above before moving on.

01:05

Click play to begin the audio.

Caution Barricades

Caution barricades are used most commonly to indicate that caution should be used when a person must pass through an area where a known hazard exists. As a general rule, caution barricades are used to block off areas containing hazards posing a lower level of risk to workers.

Procedures

- The affected area shall be sealed at all access points by yellow caution tape or yellow chain by the person identifying the hazard or person performing work that requires installation of barricades.
- An approved identification tag or sign shall be placed on each barricade at all access points. Info includes the date the barricade was installed, the name and department of the person installing the barricade, and information clearly describing the nature of the hazard that requires the protection of a barricade.

- The worker installing the barricade shall notify the area supervisor of barricade's installation.
- Workers wishing to cross a "Caution" barricade must first take note of the hazard indicated on the identification tag, and then proceed with appropriate caution.
- After the hazardous condition has been eliminated, barricade may be removed by an employee other than the person who installed it.

Complete the content above before moving on.

00:47

Click play to begin the audio.

Hard Barricades

- Where there is a risk of falling to another level as a result of missing or defective flooring, it is mandatory to install hard barricades around all access points, as well as signage indicating the hazard.
- An open hole is any opening in flooring that exposes personnel to falling from height. Rigid barricades shall be installed for all open holes and placed a minimum of 2 meters back from the edge. Any work within 2 meters of an open hole will be considered work at height and fall protection is required.
- Where an area is barricaded to restrict traffic entry, the use of barricade tape is not permitted due to its lack of durability; hard barricades and signage are required.
- Report missing, damaged, or inadequate guards. Remember to keep body parts on the safe side of a machine guard: Do not reach over, under, or through.

Complete the content above before moving on.

Drag and drop the situation card into the correct pile for the barricade that should be used.

Danger-Do Not Enter

unsafe walkway

unsecured structure

falling process material overhead

Caution

potential unsafe condition

Hard

open hole

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

General Safety Quiz

You will now take an evaluative test regarding the content of this training.

In order to receive credit for this training, you need to pass the following quiz with a score of 70% or better.

Good luck.

Question

01/08

What must you do if "Code 1" is called on the radio?

- Wait until further procedure is given
- Shutdown your station/area and wait for further notice to resume
- Evacuate to the warehouse for roll call

Question

02/08

Where might you find barricades for a crane hoisting areas? *Select all that apply.*

- [ ] Mill charging
- [ ] Maintenance area with barricade tape
- [ ] Reagent mix area
- [ ] Maintenance repair shop

Question

03/08

Which of the following activities require a hot work permit? *Select all that apply.*

- [ ] Welding
- [ ] Squeezing
- [ ] Grinding
- [ ] Soldering
- [ ] Bending
- [ ] Cutting

Question

04/08

Fall protection or restraint equipment is required at 10 feet or more.

- ◯ True
- ◯ False

Question

05/08

Which of the following are the minimum-required PPE for **all** areas of the concentrator complex (not including the office, lunchroom, washrooms, stairwells, and control rooms)? *Select all that apply.*

- [ ] Reflective safety vest
- [ ] Coveralls with reflective stripes
- [ ] Hearing protection
- [ ] Half-mask respirator
- [ ] Steel-toed boots
- [ ] Hard hat with reflective stripes
- [ ] Safety glasses with side shields

Question

06/08

Match the job to the correct glove type.

Fine, sensitive work	Disposable nitrile gloves
Wet or dirty work	Leather or hyflex gloves
Dry, relatively clean work	Long-sleeved rubber gloves

Question

07/08

Match the description to the correct barricade type.

Temporary physical barrier to prevent unwarranted or unintentional access to an area	Danger - Do not enter
Potentially unsafe conditions; Be careful when moving through area	Caution
Conditions or work being performed poses immediate danger to workers moving through area	Hard

Question

08/08

Permission from the Mill Operations Supervisor is required to enter which of the following high hazard areas? *Select all that apply.*

- [ ] Concentrator complex
- [ ] Mill charging
- [ ] Coarse ore storage
- [ ] Crusher dump pocket
- [ ] Maintenance repair shop

General Safety Summary

00:38

Click play to begin the audio.

You should now be able to:

- Identify the layout of the concentrator complex
- Describe safety policies and procedures
- Describe emergency response and evacuation procedures
- Describe potential hazards and their controls in the concentrator complex
- Describe basic PPE requirements in the concentrator complex
- Identify the areas where respirators are mandatory
- Describe task-specific PPE requirements
- Identify the areas where a high hazard is present
- Describe barricading procedures

Congratulations

You have completed the General Safety section of this course. You will now continue on to the Hazardous Material Handling & Awareness section.

Complete the content above before moving on.

Hazardous Material Objectives

00:37

Click play to begin the audio.

After completing the Hazardous Materials section, you will be able to:

- Identify regulatory requirements for waste management
- Describe waste bin sorting procedures
- Identify hazardous material labeling requirements
- Describe requirements for storage of hazardous materials
- Identify locations for hydrogen peroxide storage onsite
- Describe safe operating procedures for hydrogen peroxide
- Identify exposure symptoms of hydrogen sulfide and how to respond
- Describe how to protect yourself from H_2S
- Describe safe operating procedures concerning radiation
- Identify location of radiation gauges

Complete the content above before moving on.

Waste Management Segregation, Labeling, and Packaging

00:13

Click play to begin the audio.

Objectives

- Identify regulatory requirements
- Describe waste bin sorting procedures
- Identify hazardous material labeling requirements
- Describe requirements for storage of hazardous materials

Complete the content above before moving on.

00:30

Click play to begin the audio.

Why Do We Need Proper Waste Management?

Requirements are governed by both regulatory and site-specific procedures. These are based on:

- **Federal Regulatory:** Transportation of Dangerous Goods
- **Provincial Regulatory:** Certificate of Approval - Operational Waste Management System
- **Site Regulatory Policy:** Waste Management Plan
- **Site Procedure:** SOP - Storage and Tracking of Hazardous Waste Materials

Let's examine each of these in more detail.

Complete the content above before moving on.

00:22

Click play to begin the audio.

Transportation of Dangerous Goods (TDG)

Federal Regulatory Requirements

- Ensure the safe transport of hazardous materials from one location to another (road, marine, air)
- Depending on the mode of travel, hazardous materials must conform to specific packaging requirements (UN specified packaging)
- TDG-regulated products have a unique:
  - UN number (UN 1203 – gasoline)
  - Shipping name (fuel, aviation, turbine engine)
- There are nine classes of TDG-regulated products

Complete the content above before moving on.

00:29

Click play to begin the audio.

Certificate of Approval - Operational Waste Management System

Provincial Regulatory Requirements

- Permit obtained from Government Services Centre which outlines our requirements for waste management
- Contains requirements for:
  - Hazardous Materials Storage Areas (Mill Site, PortSite)

- Operation of the C & D Landfill (Dump 4)
- Incinerator (KM 2.2)
- Scrap Metal Stockpile (KM 2.2)
- Bioremediation Pad

- All of these permit requirements are based on the approval of waste management plan

Complete the content above before moving on.

00:29

Click play to begin the audio.

Waste Management System

Site Specific Regulatory Policy & Procedure

The safe operating procedures document for storage and tracking of hazardous waste materials can be found in document central (site-wide procedures.) It includes procedures for correct labeling, storage, and pickup requirements for hazardous wastes generated at the site. Appendix A provides a listing of the common waste types and packaging requirements. You should familiarize yourself with this procedure. The following sections represent some of the responsibilities, policies, and procedures in the document.

Complete the content above before moving on.

01:51

Click play to begin the audio.

Responsibilities Under the Waste Management System

Site Services Department

For Hazardous Waste:

- Ensure that all hazardous waste materials are collected and transported to the permanent waste storage facilities
- Ensure that the type and quantity of hazardous materials are tracked using the waste hazmat tracking form
- Offer transport for all hazardous waste materials offsite to a registered waste handling facility

For Site Waste:

- Empty the skip boxes and return empty skip boxes between Doors #9 and 10 in a timely fashion
- Deliver non-hazardous waste to the appropriate locations (i.e., landfill, burn pit, incinerator, etc.)

Operating Department

- Every employee is responsible for ensuring proper segregation of waste in accordance with Voisey's Bay Waste Management procedures
- Each department is responsible for ensuring that hazardous waste materials generated in their locations are labeled and placed in acceptable containers and stored in the appropriate location. Note that drums must be placed on pallets and strapped for pickup
- Each department is responsible for contacting site services for pickup of waste hazmat to the permanent waste storage facility (satellite hazmat storage area)

Think of it this way: Site Services is responsible for pickup and transfer, much like municipal garbage collectors. Everyone else is responsible to have their waste properly sorted, stored, and ready for pickup – just like in a municipality when you place your garbage on the curb on your designated pickup day.

Site services reserves the right to refuse transportation of waste materials if it is found that the waste has not been stored, segregated, or labeled in accordance with site procedures. If waste is not segregated properly, operating departments will be asked to properly sort waste bins.

Complete the content above before moving on.

00:16

Click play to begin the audio.

Six Main Categories of Waste Streams Onsite

Waste Type	Final Disposal Location
Domestic waste	Incinerator
Wood & cardboard waste	Burn pit (KM 2.2)

Waste Type	Final Disposal Location
Landfill waste	C&D Landfill (Dump 4)
Sulphide-contaminated waste	Offsite disposal
Clean scrap metal waste	Offsite recycling
Hazardous waste	Offsite disposal

Let's look at each of these in more detail. *Click each category to learn more.*

Domestic Waste

Domestic waste is mainly comprised of food and office waste. All waste from offices, the kitchen, accommodations rooms, and lunch rooms is considered domestic waste. Domestic waste is incinerated at the incinerator located at KM 2.2.

All food waste MUST be incinerated at the site. Regulatory approvals have no allowance for food waste at the landfill. Food waste must be segregated from all other waste streams. If generated in areas outside of designated lunchrooms, such as in shops area, it must be separated and disposed of in a lunch room or accommodations. Improperly segregated food waste causes major problems with black bears. When black bears find a source of food they don't go away. This usually results in the required euthanization of the bear.

Examples of Domestic Waste:

- Food
- Food wrappers/containers
- Food tins (i.e., sausage, beans)
- Ziploc bags
- Paper Towels
- Lunch bags
- Tissues
- Paper

Incinerator Building at KM 2.2

Waste Bins for Domestic Waste

Wood & Cardboard Waste

Wood and Cardboard waste is burned at the burn pit located at KM 2.2.
Examples of Wood and Cardboard waste:

- Clean paper air filters
- Wooden pallets
- Wooden cable spools
- Wooden crates
- Cribbing
- Lumber
- Plywood
- Cardboard

Note: any packing material (foam, plastic, etc.) inside cardboard boxes must be removed prior to disposal. Packing material is Landfill Waste.

Burn Pit at KM 2.2

Landfill Waste

Clean, inert waste is disposed of at the C&D Landfill located at Dump 4.
Examples of Landfill Waste:

- Damaged/used PPE & gloves
- Plastic hose from lime chute
- Plastics, tarps
- Styrofoam, insulation
- Old furniture, mattresses
- Flooring
- Rope
- Caution/Barricade Tape

C & D Landfill

Sulphide Waste

Sulphide Contaminated waste is shipped off-site for disposal.
Sulphide Waste is:

- Items that have a thick coating of concentrate or ore dust that cannot be removed.
- Concentrate should not be easily cleaned off.
- Remember: No other hazardous waste (solvents, oils, greases, etc.) go in the sulphide

Sulphide Contaminated Waste Bin

Clean Scrap Metal

Clean Scrap Metal is sent off-site for Recycling.

Clean Scrap Metal is:

- Scrap metal that is not contaminated with concentrate or ore dust.
- Mostly generated by Maintenance Shops.
- Parts and equipment that are no longer usable must be drained of all fluids prior to disposal.
- Some examples are: floor grating, unused guarding, cables, angle iron, crushed drums (not sulphide-contaminated), sheet metal, etc.

Scrap Metal Stockpile at KM 2.2

Hazardous Material

Hazardous materials are sent off-site for disposal. ALL hazardous waste must be stored indoors until a pickup time has been scheduled with Site Services.

Each container must contain a waste label with:

- Proper shipping name
- UN number (as applicable)

*Appendix A - SOP Storage & Tracking of Waste Hazmat provides additional information on labeling and container requirements

TDG Regulated Waste	Non-Regulated Waste
• Waste oily rags • Waste solvent/paints • Waste aerosols (not crushed containing flammable mixture) • Xanthate bags • Aero promoter totes • Ferric sulfate bags	• Waste oil • Waste oil filters • Waste grease • Waste alkaline batteries • Waste lime bags • Waste flocculant bags • Sulphide contaminated material*

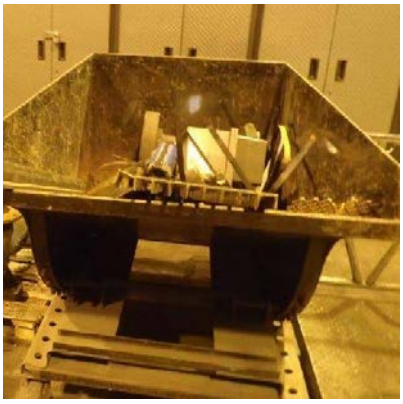
Complete the content above before moving on.

Waste Disposal Areas

Reagents

Inside door #9

Fixed maintenance shop

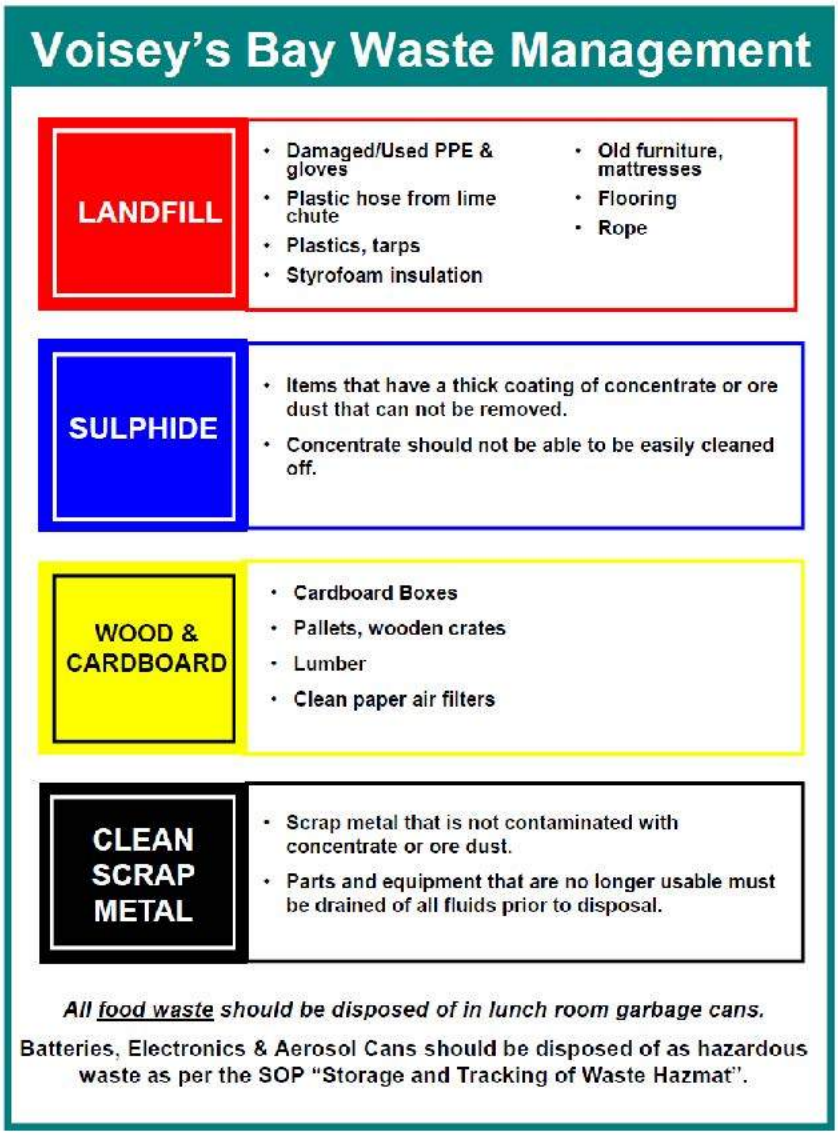


Clean scrap metal

Waste disposal area - Door #9

Still not sure where it goes?

- Consult the Waste Management legend mounted in strategic locations throughout site
- Ask your co-workers
- Ask your supervisor
- Ask the Environmental Coordinators (Channel 4 or x4432)



Complete the content above before moving on.

Activity

Drag the waste item to the correctly sorted waste bin.

Domestic Waste

Food tins

Paper

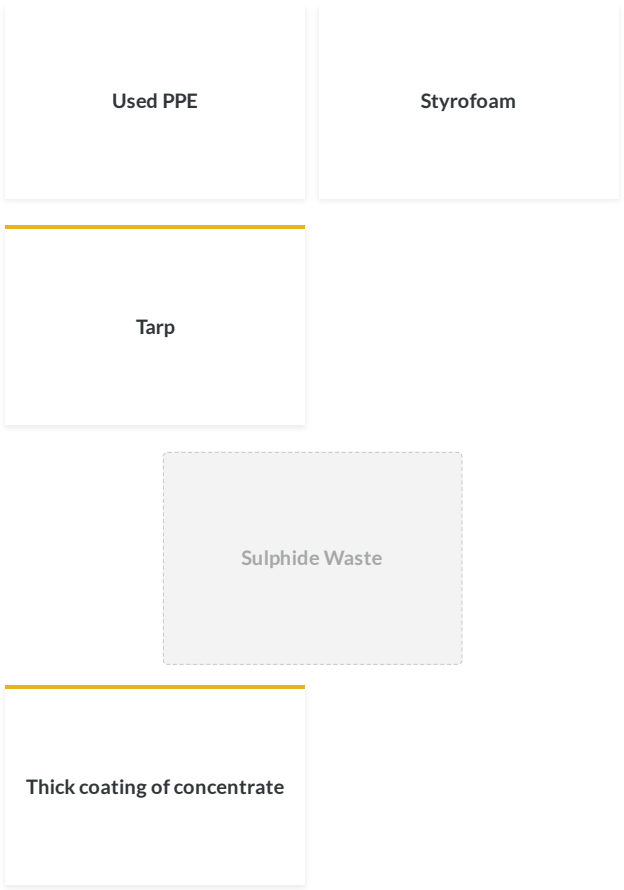
Ziploc bag

Wood & Cardboard Waste

Wooden pallet

Clean paper air filters

Landfill Waste



Complete the content above before moving on.

00:35

Click play to begin the audio.

Hazardous Waste Containment

Container	Hazardous Waste
1000L totes	**Liquid waste** such as waste oil and waste glycol
Bung-type steel and plastic drums	**Liquid waste** such as diesel, gasoline, and Jet-A1

Container	Hazardous Waste
Open-head steel and plastic drums	**Solid waste** such as aerosol cans, oily rags, filters, and hydraulic hoses

- DO NOT MIX WASTES
- Do not store liquid waste in open-head drums
- Fill drum or tote to maximum of 80%
- If a drum/tote is damaged, use overpack (retain information)
- Refer to Appendix A (SOP) for questions about the types of container for other waste types

Complete the content above before moving on.

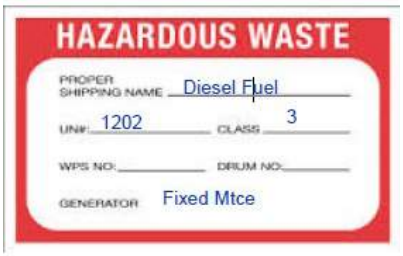
01:13

Click play to begin the audio.

Labeling of Hazardous Waste

To ensure waste hazmat is identified correctly and meets regulatory requirements, hazmat storage containers must be labeled with the right information. As soon as you begin storing waste in a container, label the container with:

1. A waste label. Use a weather-resistant marker to write:
   - Department or contractor who generated the waste container
   - Product: type of waste contained such as waste fuel, waste oil, waste batteries, chemical waste, cylinder type (refer to Appendix A of procedure for the appropriate name)
   - Date started: print the day, month, and year the container was first used for this waste. When the drum is full, indicate the date that it was sealed
2. Two orientation (arrow) labels, on opposite sides of the container
3. A TDG hazard label (if product is regulated, refer to Appendix A for procedure)
4. Identify the contents on the lid using a grease or paint marker



Ensure waste label is affixed to container using spray adhesive; this will ensure that the label is not easily removed from the container and helps to ensure the markings do not fade.

Each department/contractor must correctly label their hazmat storage containers with the appropriate information or it may be refused for pick up.

Complete the content above before moving on.

00:39

Click play to begin the audio.

Storage of Waste Containers

- Place the container in the appropriate storage area on pallets
- Up to four drums may be placed on a pallet
- Pallets must be in good condition
- When the pallet is full, ensure drums are strapped to pallets
- Totes or crates do not have to be placed on pallets. Waste totes or crates may be stacked two high, provided it is safe to do so and waste labels are visible for inspection.

- ALL hazardous waste must be stored inside the building until a pickup time is scheduled with Site Services
- Do not place drums of incompatible hazmat on the same pallet. See the information below for waste that can be stored together on the same pallet. *Click each plus sign to learn more.*

Non-regulated waste

The following items can be stored together on the same pallet:

- Waste oil
- Waste grease (including kitchen grease)
- Waste glycol
- Crushed oil filters
- Waste carbon
- Empty oil, grease, and glycol drums
- Empty plastic oil bottles/tubs (in an open-top drum)
- Alkaline batteries (in an open-top plastic drum)

Waste Oil			
Bung-Type Steel or Plastic Drum			
UN NUMBER and Proper Shipping Name	**Waste Label Information**	**TDG Label**	**Handling Label**
Waste Oil	HAZARDOUS WASTE PROPER SHIPPING NAME Waste Oil UN#: CLASS WPS NO: DRUM NO: GENERATOR Mill Mtce		

Regulated waste

The following items can be stored together on a pallet:

- Waste diesel fuel
- Waste gasoline
- Waste aviation gas
- Waste methanol
- Waste solvent
- Crushed fuel filters
- Fuel-soaked rags and/or fuel soaked spill pads
- Empty fuel, gasoline, solvent, aviation gas, and methanol drums

Waste Diesel Fuel			
Steel Bung Type Drum			
UN NUMBER and Proper Shipping Name	**Waste Label Information**	**TDG Label**	**Handling Label**
UN 1202 **Diesel Fuel** **f.p. 40°C**	HAZARDOUS WASTE PROPER SHIPPING NAME: Diesel Fuel f.p. 40C UN#: 1202 CLASS: 3 WPS NO: DRUM NO: GENERATOR: Mill Mtce		

Regulated: Oily rags & spill pads

Oily rags and oily spill pads must be stored on a pallet by themselves because they are spontaneously combustible

Waste Rags, Oily			
Open Head Steel or Plastic Drum			
UN NUMBER and Proper Shipping Name	**Waste Label Information**	**TDG Label**	**Handling Label**
UN 1856 **Rags, Oily**	HAZARDOUS WASTE PROPER SHIPPING NAME: Oily Rags UN#: 1856 CLASS: 4 WPS NO: DRUM NO: GENERATOR: Mill Mtce		

Regulated: Aerosol cans

Aerosol cans must be stored on a pallet by themselves in an open-top drum

Crushed Aerosols			
Open Head Steel or Plastic Drum			
UN NUMBER and Proper Shipping Name	**Waste Label Information**	**TDG Label**	**Handling Label**
Crushed Aerosols	HAZARDOUS WASTE PROPER SHIPPING NAME: Crushed Aerosols UN#: _____ CLASS: _____ WPS NO: _____ DRUM NO: _____ GENERATOR: Mill Mtce		

Complete the content above before moving on.

Pickup of Hazmat

When hazmat pickup is required from your area, the following form is required to be completed and forwarded to site services.

HAZMAT PICKUP						
PICK UP POINT	**CONTACT PERSON**	**PHONE NUMBER**	**TYPE OF MATERIAL**	**UN Number**	**CONTAINER TYPE**	**NUMBER OF CONTAINERS**
Mill Mtce - Door 4	Ed Power	4361	Diesel Fuel	UN1202	45 Gallon Drum	1
Mill Mtce - Door 4	Ed Power	4361	Oily Rags	UN1856	45 Gallon Drum	6
Mill Mtce - Door 4	Ed Power	4361	Crushed oil filters	N/A	45 Gallon Drum	2
Mill Mtce - Door 4	Ed Power	4361	Waste grease	N/A	45 Gallon Drum	3
Mill Mtce - Door 4	Ed Power	4361	Waste oil	N/A	1000L Cube	4
SAMPLE ONLY						
IT IS THE RESPONSIBILITY OF THE PERSON REQUESTING HAZARDOUS MATERIAL PICKUP TO ENSURE THAT CONTAINERS ARE CORRECTLY LABELED. SITE SERVICES HAVE THE RIGHT TO REFUSE PICKUP OF ANY MATERIAL THAT IS NOT LABELED CORRECTLY. THE CORRECT LABELING IS LISTED IN THE SOP IN DOCUMENT CENTRAL.						

Complete the content above before moving on.

Drag the card to the correct pallet.

Pallet 1 - Non-Regulated

waste oil

alkaline batteries

crushed oil filters

Pallet 2 - Regulated

fuel soaked rags

waste solvent

crushed fuel filters

Pallet 3 - Oily Rags/Spill Pads

oily rags

oily spill pads

Pallet 4 - Aerosol

aerosol cans

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Hydrogen Peroxide Awareness

00:09

Click play to begin the audio.

Objectives

- Identify locations for hydrogen peroxide storage onsite
- Describe safe operating procedures

Complete the content above before moving on.

00:05

Click play to begin the audio.

H_2O_2 Storage Tanks

The bulk storage tanks are located beside the reactor clarifier.

Complete the content above before moving on.

00:05

Click play to begin the audio.

H_2O_2 Storage for Transport

Bulk transportation tanks are stored at the port during offloading and loading.

Complete the content above before moving on.

Complete the content above before moving on.

01:00

Click play to begin the audio.

H_2O_2 Safe Operating Procedures

- Special PPE is available for off-loading activities
- Report all leaks, even small ones, immediately
- Always use care and caution
- Don't let H_2O_2 come in contact with anything organic or combustible
- Don't leave organic materials around the worksite
- Don't delay diluting H_2O_2 spills with water
- Never smoke around H_2O_2
- If you accidentally get H_2O_2 on your skin or clothes, immediately go to the nearest shower. Remove and throw away contaminated clothing
- If you accidentally get H_2O_2 in your eyes, immediately go to the nearest eye wash station and flush your eyes for at least 15 minutes. Hold your eyes open, but do not rub them. After flushing, immediately go to an eye doctor
- Always wear required PPE. Use a SCBA when necessary
- See MSDS sheets for details and safety instructions

Complete the content above before moving on.

Question

How long should you flush your eyes with water if you get H_2O_2 in your eyes?

- ◯ 5 minutes
- ◯ 10 minutes
- ◯ 15 minutes
- ◯ 30 minutes

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Hydrogen Sulfide Awareness

00:09

Click play to begin the audio.

Objectives

- Identify exposure symptoms and how to respond
- Describe how to protect yourself from H_2S

Complete the content above before moving on.

01:48

Click play to begin the audio.

What is Hydrogen Sulfide (H_2S)?

Hydrogen Sulfide is a colourless, poisonous gas formed in the natural decomposition process of organic matter.

It is also a byproduct during a reaction between any acid and any sulfur compound. This occurs only during abnormal plant operations when the treated effluent/reclaim water system shuts down for an extended period of time and is left stagnant (in pipelines/tanks). Observation has shown this to occur after approximately >1 week.

Some additional properties of H_2S include:

- Odour of rotten eggs at very low concentrations (0.00047ppm is the recognition threshold)
- Sickening sweet odour at 30-100 ppm
- The ability to smell H_2S can begin to dull at 50 ppm and can be completely lost

- Highly flammable, explosive gas; flammability range 4 – 46% with an ignition temperature of 260°C. By comparison, the temperature of the tip of a lit cigarette is over 370°C
- It is heavier than air (20%), so tends to concentrate at the bottom of poorly ventilated spaces
- H_2S may be dissolved in liquids and then released if agitated, depressurized, or heated. This means that gas in liquids is released when they are circulated, pumped, flowed, or swabbed into tanks

It is found in nature in these settings:

- In natural gas, volcanic gases, some water courses (hot springs), well water (often as a result of the action of sulfate-reducing bacteria)
- Part of many unrefined carbonaceous fuels, such as natural gas, crude oil, and coal. It is obtained as a byproduct of refining such fuels
- Often formed during the decay of animal and organic matter, such as marshes, sand flats/estuaries, etc.
- Exists in the human digestive system

Complete the content above before moving on.

00:26

Click play to begin the audio.

Exposure

You can be exposed to Hydrogen Sulfide through:

- **Inhalation:** Breathing air that contains H_2S may paralyze the olfactory nerve (sense of smell), making it impossible to smell the gas after an initial strong exposure. You may not smell the gas, thinking the danger is gone.
- **Absorption:** H_2S gas has only limited potential to be absorbed through the skin and skin absorption does not contribute significantly to exposure

Complete the content above before moving on.

00:21

Click play to begin the audio.

Exposure Symptoms

Exposure to lower concentrations of H_2S can cause:

- Eye irritation
- Sore throat
- Cough
- Shortness of breath
- Fluid in the lungs

Long-term low-level exposure can cause:

- Fatigue
- Loss of appetite
- Headaches
- Irritability
- Poor memory
- Dizziness

If you think you have been exposed to hydrogen sulfide, seek medical attention IMMEDIATELY!

Complete the content above before moving on.

00:30

Click play to begin the audio.

Exposure Guidelines

Threshold Limit Values (TLV)

Threshold limit values are the time-weighted average concentration for a normal 8-hour workday and 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effects.

- **8 hr work shift:** 1ppm
- **Short-term exposure limit (STEL):** 5ppm
- **Immediately dangerous to life and health limit (IDLH):** 100ppm

Concentration Levels & Health Effects

Concentration Levels in parts per million (ppm)	Health Effects
Less than 1	• Smell of rotten eggs (most people)
1 to 20	• Moderately offensive odour • Possibly with nausea, tearing of the eyes, or headaches with prolonged exposure
20 to 50	• Nose, throat, and lung irritation • Digestive upset and loss of appetite • Sense of smell starts to become “fatigued” • Odour cannot be relied upon as a warning of exposure
100 to 200 (IDLH 100)	• Severe nose, throat, and lung irritation • Ability to smell odour completely disappears • Prolonged exposure can cause a runny nose, cough, hoarseness, and shortness of breath
250 to 500	• Headache, nausea, vomiting, and dizziness • Potentially fatal build-up of fluid in the lungs (pulmonary edema), especially if exposure is prolonged • Important to note symptoms such as chest pain and shortness of breath can be delayed for up to 72 hours after exposure
500	• Severe lung irritation

Concentration Levels in parts per million (ppm)	Health Effects
	• Sudden collapse (“knockdown”) • Unconsciousness and death within 4-8 hours • Loss of memory for period of exposure
500 to 1000	• Respiratory paralysis • Irregular heartbeat • Collapse • Death

Complete the content above before moving on.

01:02

Click play to begin the audio.

How Can I Protect Myself and Others?

- If you smell H_2S, or *even think* you may smell H_2S, leave the area immediately and contact your supervisor
- Assess the need for standby personnel to initiate emergency procedure
- Ensure good ventilation of the area. Use portable monitoring equipment if required. If the monitor goes into alarm, **leave the area immediately**!
- Warning signs are posted in all areas where H_2S is a potential hazard
- Eliminate all ignition sources
- Never enter an area with high concentrations of H_2S to attempt a rescue without using appropriate respiratory protection and without being properly trained. Rescuers who enter the area without proper PPE can be overcome and potentially be the next victim

Respiratory Protection

You cannot rely on your sense of smell as a detection device!

Half-mask or full-face respirators with approved olive cartridges are to be used for escape. The only type of respiratory protection allowed in an H_2S environment (≥1 ppm) is SCBA

Complete the content above before moving on.

Question

You can always rely on your sense of smell in a potential hydrogen sulfide exposure scenario.

- True
- False

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Radiation Awareness

00:09

Click play to begin the audio.

Objectives

- Describe safe operating procedures concerning radiation
- Identify the location of radiation gauges

Complete the content above before moving on.

00:45

Click play to begin the audio.

Using Radiation Safely

Many industries use equipment such as nuclear measuring gauges that incorporate a radioactive source. There are two types of nuclear gauges:

- Fixed
- Portable

Fixed gauges are widely used in factories and processing environments to ensure quality control. These are the types of gauges used in Voisey's Bay.

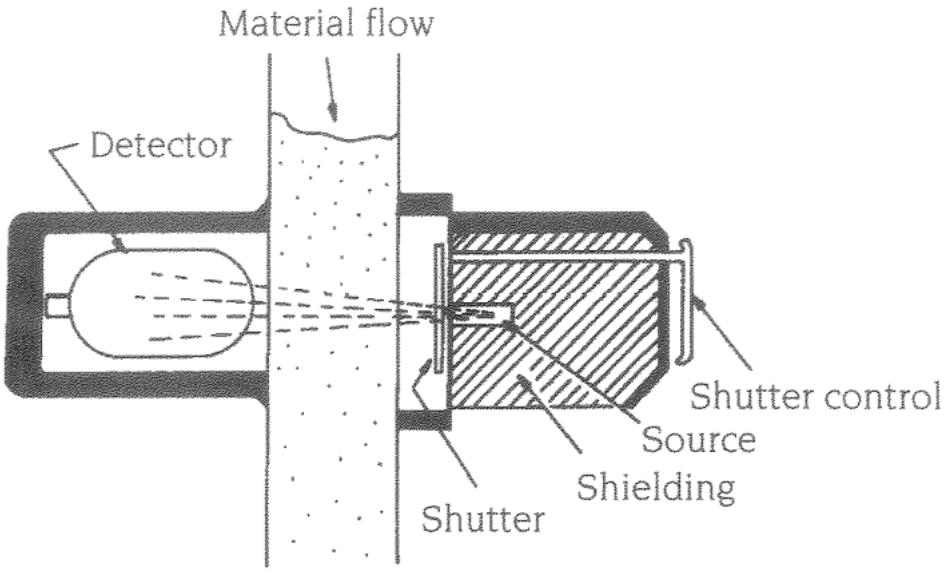
Fixed Gauges

Radiation released by opening a shutter passes through the material and is measured by a detector mounted opposite the source. The amount of radiation detected indicates the thickness or density of the material.

The passage of radiation through the material does not cause any detectable change, and the material itself in no way becomes radioactive.

The main components include:

- Source
- Detector
- Shutter
- Shielding



Complete the content above before moving on.

00:17

Click play to begin the audio.

Strength of the Source

- Each nuclear gauge uses one or two small radioactive sources
- Our source on site is cesium 137
- The source's energy is measured in terms of how much radioactive energy it gives off
- Although the sources are quite small, they are extremely powerful and highly radioactive

Complete the content above before moving on.

00:50

Click play to begin the audio.

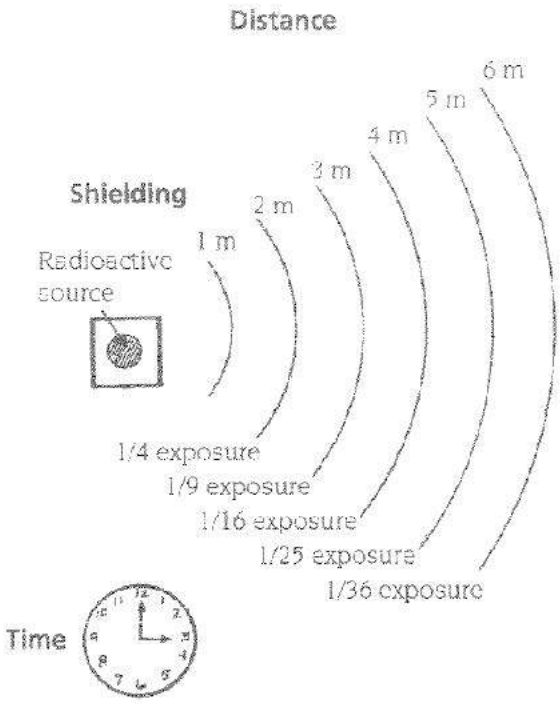
Are Nuclear Gauges Safe?

Nuclear gauges are as safe as a power saw or a welding torch. As with these two tools, safety precautions must be taken. As the potential harm from radiation is not as obvious as the dangers from a sharp blade or flame, the safety precautions are not as obvious either.

Radiation Protection

The 3 elements of radiation protection are:

- **Time:** The less time a person remains in the area of radiation, the less of a radiation dose that person will receive
- **Distance:** The intensity of radiation and its effects fall off sharply as you move further away from the source. By moving twice as far away from a radioactive source, you are exposed to 1/4 the amount of radiation. By moving 3 times as far away means 1/9 the exposure, and so on.
- **Shielding:** Barriers of lead, concrete, or water provide protection from penetrating radiation.



Complete the content above before moving on.

00:22

Click play to begin the audio.

Inspection and Testing

Once a gauge is in place and being used, regular tests must be performed to ensure that the radioactive source is secure within its capsule and is not leaking out. A small amount of radiation always penetrates the gauge housing and can be detected in a radiation survey even if the source capsule is intact. This low-level radiation poses no measurable health risk.

Radiation survey meter onsite: Surveyor 50 Portable GM

Complete the content above before moving on.

01:16

Click play to begin the audio.

Safe Operating Procedures With Nuclear Gauges

Working with or around nuclear gauges is no different than working with any other type of industrial equipment. In order to ensure complete safety with nuclear gauges, you must, as with any type of equipment, follow the operating rules, instructions, and procedures provided by the manufacturer. In the event of a discrepancy, the Canadian Nuclear Safety Commission regulations supersede the manufacturer's instructions.

- Never use or manipulate a gauge without proper training, knowledge of the instruction manual, and authorization

- Read the conditions of the license
- Post a copy of the license in a common area where all workers can see it
- Ensure radiation warning signs are prominently posted in any area where nuclear gauges are being used
- Only the supplier of the gauge or an authorized person should attempt to repair the source holder or shutter
- Always secure the shutter in the “off” position until maintenance is completed
- Avoid physical contact with or direct exposure to the source when performing any maintenance
- Clean the gauge once or twice a week to prevent dirt from getting near the shutter
- Make sure the gauge is leak-tested annually
- Make sure that the gauge is clearly and durably labeled with the radiation warning symbol and with the name and telephone number of the person to contact in case of problems

Complete the content above before moving on.

00:24

Click play to begin the audio.

Emergency Procedures

- Cease work immediately

- If the gauge has been partially damaged or destroyed keep people at least 5 metres away until the source is replaced or shielded or until radiation levels are known to be safe
- Have a leak test performed after any incident that may result in source damage
- In case of an incident or fire, do not use the gauge until any danger from or damage to the source is addressed

Complete the content above before moving on.

00:03

Click play to begin the audio.

Gauge Locations

Onsite gauges are located:

- Cu cleaner conc. pump discharge
- Hg Ni thickener u/f pump discharge (2 units)
- Middlings conc. thickener u/f discharge (2 units)
- Cu regrind cyclone pump discharge
- Scav. regrind cyclone feed pump discharge
- Grind primary cyclone
- Tails thickener u/f pump discharge
- Cu. concentrate thickener u/f pump discharge
- Scavenger tailings to tailings primary sampler
- Scavenger cleaner tailings to tailings primary sampler
- Copper concentrate thickener u/f pump discharge (2 units)
- Tailings to tailings pipeline


DANGER


DANGER
CAPACITY 2 TONNES


DANGE
RADIATION - RAYONNEMENT
0.37
CONTROL ROOM
4451 OR CH. 2


DANGER
RADIATION - RAYONNEMENT

Complete the content above before moving on.

Question

What are the elements of radiation protection? *Select all that apply.*

- [ ] Shielding
- [ ] Gauges
- [ ] Time

- [ ] Distance

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Hazardous Material Quiz

You will now take an evaluative test regarding the content of this training.

In order to receive credit for this training, you need to pass the following quiz with a score of 70% or better.

Good luck.

Question

01/08

What of the following are properties of hydrogen sulfide? *Select all that apply.*

- [ ] Highly flammable
- [ ] Always has an odour of rotten eggs or sickeningly sweet
- [ ] Colourless
- [ ] Heavier than air
- [ ] Poisonous

Question

02/08

The only approved respiratory protection against hydrogen sulfide is a self-contained breathing apparatus (SCBA).

- ◯ True
- ◯ False

Question

03/08

Match the waste item to its correctly sorted location.

Food and food wrappers	Domestic waste
Items with a thick coating of concentrate	Wood & cardboard waste
Pallets	Landfill waste
Used PPE & gloves	Sulphide waste
Non-contaminated metal parts	Clean scrap metal
Aerosol cans	Hazardous material

Question

04/08

Which of the following are required labels for a Regulated Hazardous Waste material? *Select all that apply.*

- [ ] 2 orientation labels
- [ ] Waste label with department, product, and date
- [ ] TDG hazard label
- [ ] Waste type written on top of drum

Question

05/08

What is shown in this picture?

- ◯ H_2O_2 bulk storage tanks
- ◯ Storage tanks for hazardous waste
- ◯ Radiation storage tanks

Question

06/08

How does distance help protect you from a radiation source?

- The intensity is increased as you move further away from the radiation source
- As you move further away from the source, radiation exposure is increased
- The intensity of radiation and its effects decrease as you move further away from the source

Question

07/08

A small amount of radiation always penetrates gauge housing and can be detected in a radiation survey even if the source capsule is intact. This low-level radiation poses no measurable health risk.

- ◯ True
- ◯ False

Question

08/08

The amount of radiation detected when using a fixed gauge indicates the thickness or density of the material.

- ◯ True
- ◯ False

Hazardous Material Summary

00:45

Click play to begin the audio.

You should now be able to:

- Identify regulatory requirements for waste management
- Describe waste bin sorting procedures
- Identify hazardous material labeling requirements
- Describe requirements for storage of hazardous materials
- Identify locations for hydrogen peroxide storage onsite
- Describe safe operating procedures for hydrogen peroxide
- Identify exposure symptoms of hydrogen sulfide and how to respond
- Describe how to protect yourself from H_2S
- Describe safe operating procedures concerning radiation
- Identify location of radiation gauges

Congratulations

You have completed the Hazardous Material Handling & Awareness section of this course. You will now continue on to the electrical awareness for the non-electrical person section.

Complete the content above before moving on.

Electrical Awareness Objectives

00:28

Click play to begin the audio.

After completing the Electrical Awareness section, you will be able to:

- **Recognize electrical hazards and understand how to eliminate, remove, and prevent electrical hazards in the workplace**
- **Discern the extreme importance of observing all electrical safety requirements and practices related to Arc Flash**
- **Understand electrical safety while performing equipment trips and resets**
- **Identify electrical hazards for opening and closing disconnect switches**
- **Know how to respond to electrical incidents**

Complete the content above before moving on.

About Electrical Awareness

00:07

Click play to begin the audio.

Objectives

- Understand the need for electrical awareness
- Define key terms

Complete the content above before moving on.

00:38

Click play to begin the audio.

Why do we need electrical awareness?

Did you know?
In the USA, there are approximately 350 electrical-related fatalities each year.
- OSHA

Coming into contact with an energized (live) wire, or (neutral) any conductor will result in current flowing through your body causing an electrical SHOCK.

The safest approach to electrical systems is to gain a basic knowledge of electricity, be aware of possible electrical hazards, and apply precautions and safeguards. Failing to take the necessary precautions can result in:

- Death
- Personal injury
- Internal or External Burns
- Secondary effects (falls)
- Property damage
- Fire

Complete the content above before moving on.

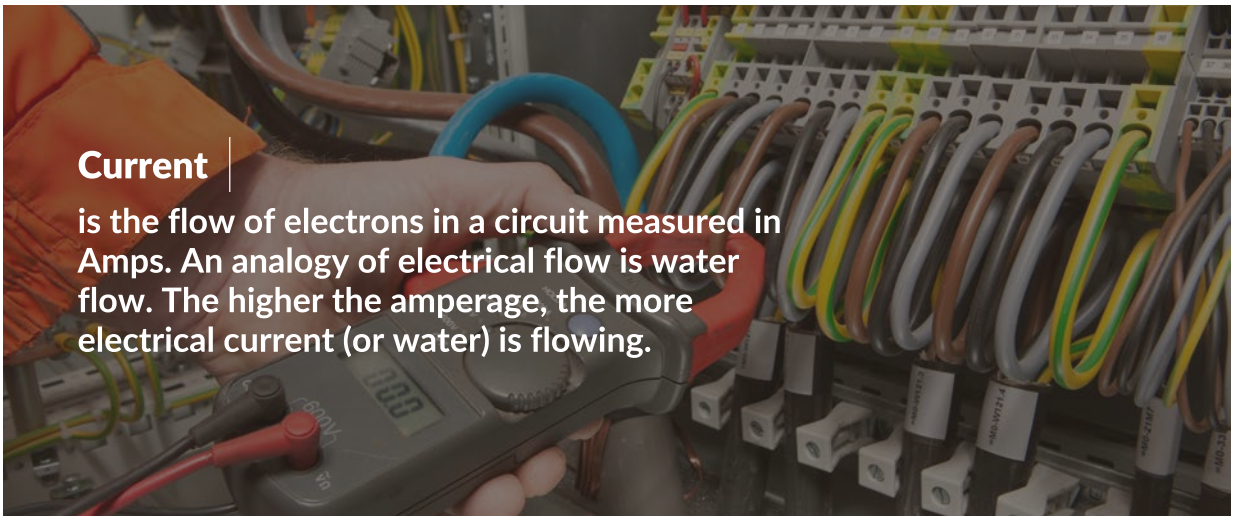
Click on the video below to watch Donnie's story. Warning: some images are graphic.

Complete the content above before moving on.

Terminology

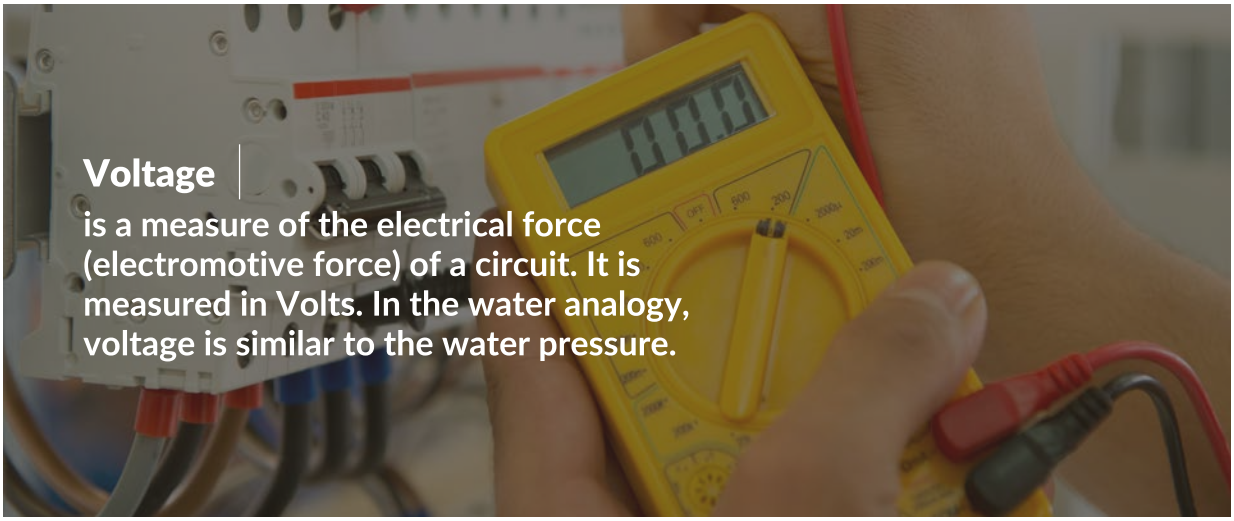
Before we get started, let's look at some of the key electrical terminology we need to understand.

Click through the images below to review some key terms.



Current

is the flow of electrons in a circuit measured in Amps. An analogy of electrical flow is water flow. The higher the amperage, the more electrical current (or water) is flowing.

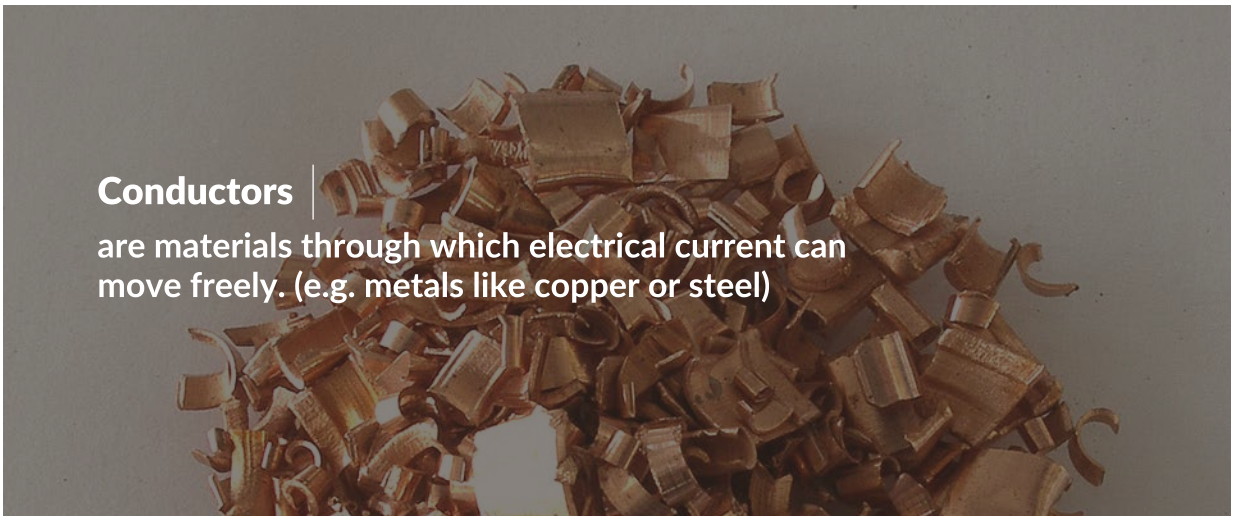


Voltage

is a measure of the electrical force (electromotive force) of a circuit. It is measured in Volts. In the water analogy, voltage is similar to the water pressure.

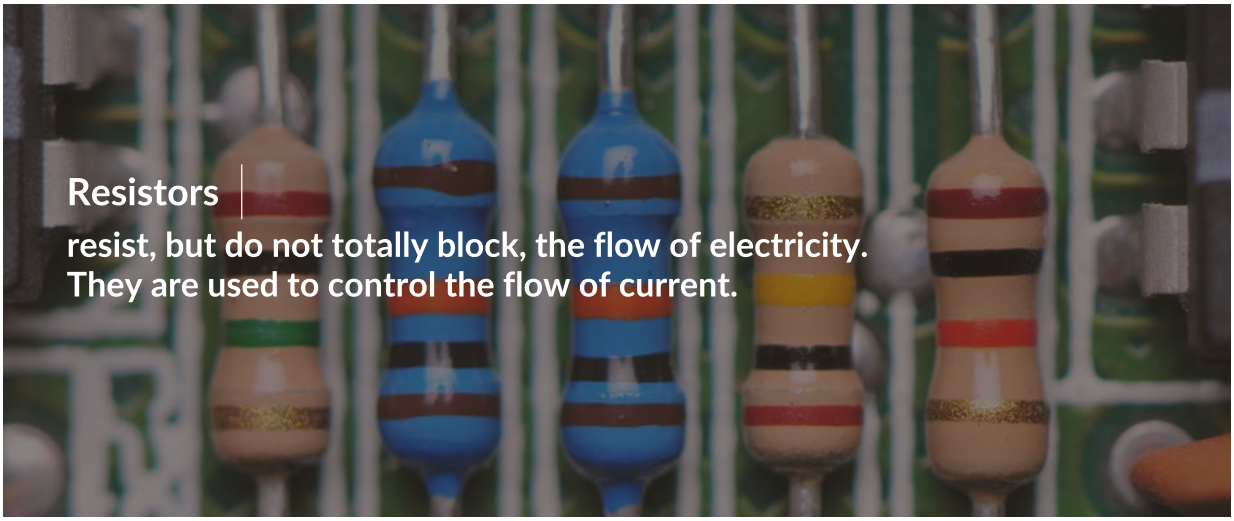
Resistance

is the ability of a material to oppose the flow of electricity. It is measured in Ohms.



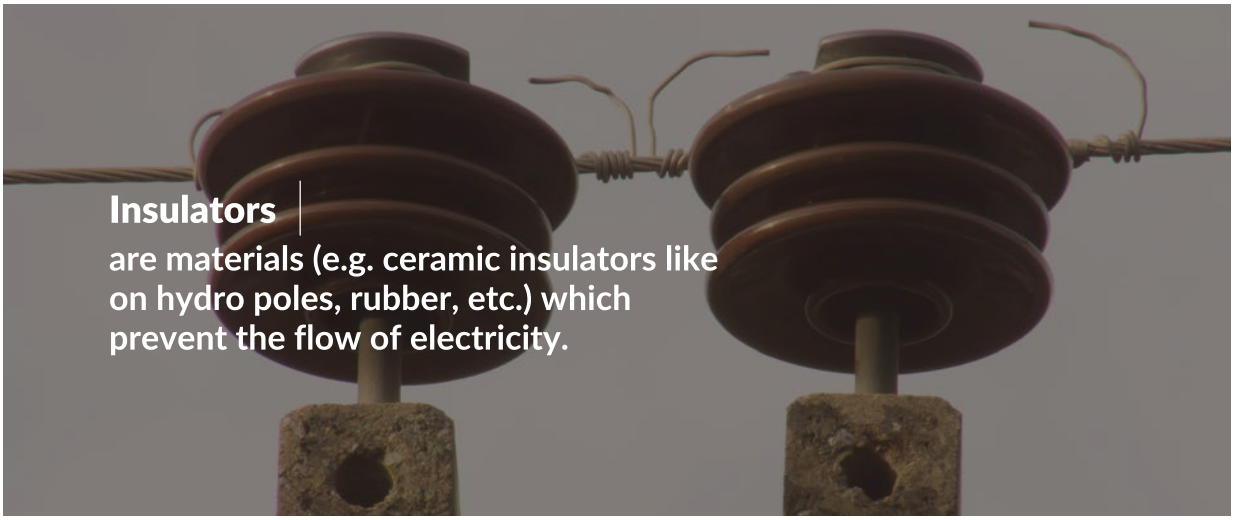
Conductors

are materials through which electrical current can move freely. (e.g. metals like copper or steel)



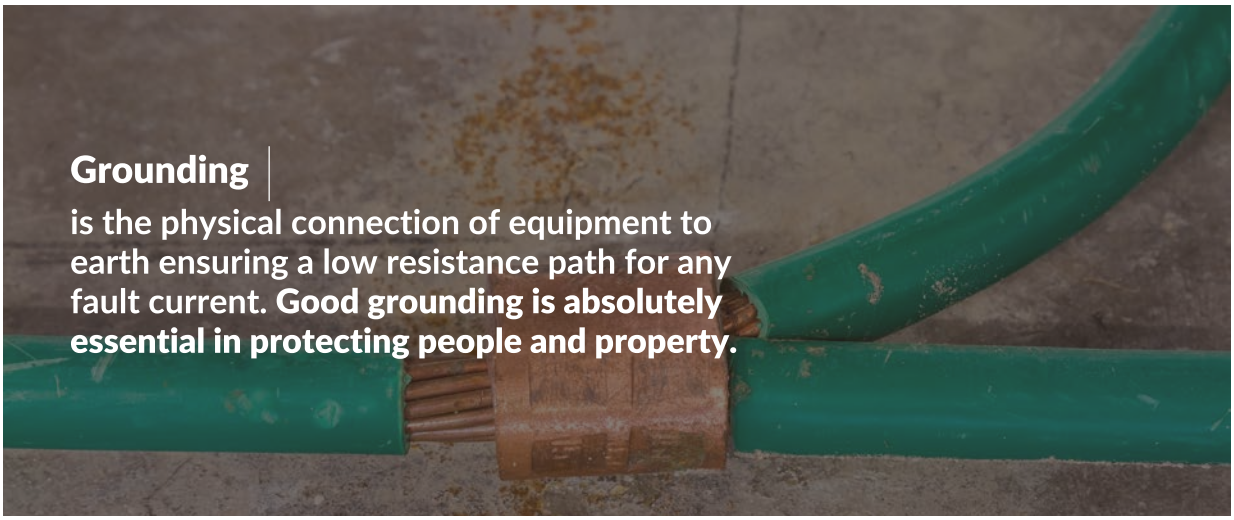
Resistors

resist, but do not totally block, the flow of electricity. They are used to control the flow of current.



Insulators

are materials (e.g. ceramic insulators like on hydro poles, rubber, etc.) which prevent the flow of electricity.



Complete the content above before moving on.

Question

Match the term with its description.

Current	Flow of electrons in a circuit measured in amps.
Voltage	A measure of the electrical force of a circuit measured in volts.
Resistors	Used to control the flow of current.
Conductors	Material through which electrical current can move freely
Grounding	Physical connection of equipment to earth.
Resistance	The ability of a material to oppose the flow of electricity.

Insulators	Materials which prevent the flow electricity.

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Spotting Hazards

00:05

Click play to begin the audio.

Objective

- Identify common electrical hazards and how to address them

Complete the content above before moving on.

Common Device Hazards

Let's look at some common device hazards, signs to pay attention to, and actions to take.

Click on each phrase below to learn more.

Damaged equipment

Visually inspect electrical equipment before each use for damage and / or external defects such as loose, missing or deformed parts, pinched or crushed outer jackets or insulation.

Damaged Power Cords

The path to ground from circuits, equipment and enclosures must be permanent and continuous.
Do not make alterations to polarized blades or ground pin to make plugs fit into non-polarized or non-grounded outlet. A polarized plug ensures that the "hot" wire is connected to the "hot" side of the electrical system and the neutral is connected to the neutral and not vice versa

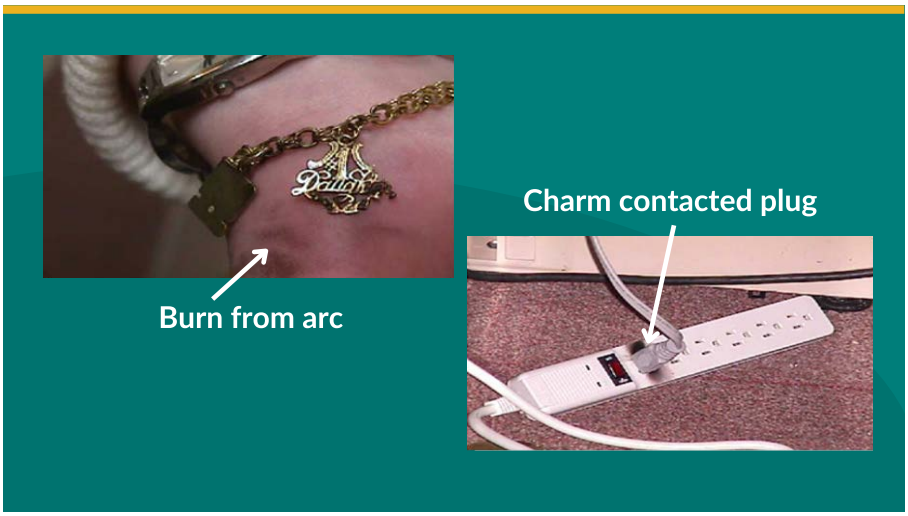
Other indicators of potential issues

- Tripped circuit breakers or blown fuses. This usually indicates that there is a problem
- Hot to the touch on tools, wires, cords, connections, or junction boxes
- Dim and flickering lights
- Sizzles and buzzes - unusual sounds from electrical system
- Odor of hot insulation and / or smoke
- Mild tingle from contact with case or equipment
- GFCI trips a circuit
- Worn or frayed insulation around wire or connection

- Burn marks or discoloration on receptacle plates or plug prongs

Conductive Apparel

Don't wear loose conductive apparel like rings, watches, bracelets, necklaces, etc.
…. OR hold keys in your hand when plugging in electrical cords. The picture shows the result of a bracelet shorting out a power bar connection.



Junction Boxes

Junction boxes, pull boxes and fittings must have approved covers in place.
Unused openings in cabinets, boxes and fittings must be closed (no missing knockouts).

MCC Starter

Avoid if....

- Door is open or damaged
- Handle is broken
- Handle does not feel it is engaging breaker
- Water present in area

Disconnects

Avoid if……..

- Not physically attached to metal support
- Damaged
- Cover not present or does not completely close
- Disconnect handle broken or missing

Disconnects

Cable Trays and Receptacles

Avoid if.....

- The tray is falling
- There is no contact with metal structures (i.e. ground cable missing and no support bracket)

Welding Receptacle

Cable Trays

If in doubt, STOP!
Contact an electrician or your supervisor/coach immediately.

Complete the content above before moving on.

00:44

Click play to begin the audio.

Welding Electrical Incidents

A high proportion of electrical incidents relate to welding. It is a common belief that an electric shock from a welder will not harm you – this is NOT true. Welding uses low voltage (20-50 volts) but high current (50-300 amps).

Some common methods to reduce the exposure to receiving an electric shock from a welder are:

Check the boxes below to demonstrate your understanding.

- [ ] Wear all required PPE
- [ ] Wear appropriate and undamaged gloves, clothing, and footwear
- [ ] Avoid contact between electrode and any exposed part of the body
- [ ] Inspect for faulty insulation on welding cables
- [ ] Ensure that the mechanical interlock at the feeder breaker is functioning properly
- [ ] Ensure that the work piece is securely grounded; poor or ineffective grounding could result in a serious fire

Complete the content above before moving on.

Battery Safety

Click through the images below to learn about battery safety.

Batteries may contain an acid or an alkaline substance in the electrolyte. If you get electrolyte on you, rinse with water for 15 minutes and then get medical help. Failure to do this may lead to severe burns or blindness.

Batteries can store significant amounts of electrical energy. Do not use conductive equipment / tools around batteries. If you cause an ARC, you can be severely injured. Remember, there is no ‘off’ switch on a battery!

Most batteries give off explosive gasses when charged. Ensure adequate ventilation is available. Don’t cause sparks or flames in the vicinity of batteries. This could lead to an explosion.

Complete the content above before moving on.

00:30

Click play to begin the audio.

How Electricity Causes Fires

There are 3 ways electricity can cause a fire:

1. **Arc Flash or Arc Blast:** We will look at Arc Flash and Arc Blasts in the next section
2. **Overheating equipment (Overload):** This may happen because a machine is running too slowly for long periods due to insufficient power, machines being used beyond their intended capacity, and material being allowed to accumulate on motors, etc.
3. **Overheating of circuits (Overload):** This can happen due to too much equipment on the same circuit, or too large a fuse or circuit breaker being used in a circuit

Complete the content above before moving on.

Question

What is the hazard relating to this junction box?

- ◯ Conductors are exposed
- ◯ Handle is broken
- ◯ Cover missing from panel
- ◯ Nothing

SUBMIT

Due to the fact that welding uses low voltage (20-50 volts), an electric shock from a welder will not harm you.

- ◯ True
- ◯ False

SUBMIT

Overheating of a circuit can cause an electrical fire. How does the circuit become overheated? *Select all that apply.*

- ☐ Too much equipment on the same circuit
- ☐ Equipment running too fast during a short period of time
- ☐ Too large a fuse or circuit breaker being used in a circuit

- [ ] Too much equipment on different circuits

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Arc Flash

00:06

Click play to begin the audio.

Objective

- **Describe arc flash and how to protect yourself from injury**

Complete the content above before moving on.

In the last section, we looked at the causes of electrical fire. Arc flash can be a cause of electrical fire and injury. Let's look at Arc Flash in more depth.

Click on the video below to learn more.

Complete the content above before moving on.

Question

Arc Flashes are usually very short in duration.

- True
- False

SUBMIT

Arc Flash can only occur with devices over 600v.

- ◯ True
- ◯ False

SUBMIT

Which of these can trigger an arc flash? *Select all that apply.*

- ☐ Dirt or debris contaminating a device
- ☐ A dropped tool creating a short circuit
- ☐ Careless cover or device removal
- ☐ Insulating materials being worn

SUBMIT

Complete the content above before moving on.

00:47

Click play to begin the audio.

What damage can an arc flash cause?

Exposure energy is expressed in calories/cm^2. 1 calorie/cm^2 equals the exposure on the tip of a finger by a cigarette lighter in one second.

An exposure energy of only one or two calories/cm2 will cause a 2nd degree burn on human skin.

As much as 80% of all electrical injuries are burns resulting from an arc flash and ignition of flammable clothing. Arc temperature can reach 19,500°C (~35,000°F). This is four times hotter than the surface of the sun. Fatal burns can occur at distances over 3 meters (10 ft).

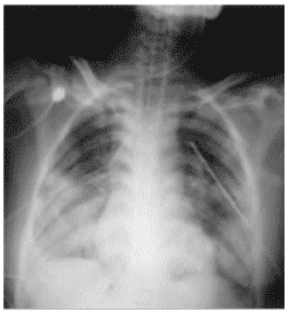
Click through the information below to learn more about the different types of injuries that can be caused by arc flash.

Electric shock, severe burns, shrapnel wounds, ruptured eardrums, pressure wave injuries and blindness can all be caused by arc flash.

In an arc flash event, molten metal and shrapnel are propelled away from the arc location, and can attain speeds of over 700 miles per hour.

An individual struck by any of this material can receive serious or fatal injuries.

The natural reaction of an individual to an event such as an arc flash / arc blast is to gasp. Inhalation injuries can be the result of this sudden gasp for air. There are more than 100 toxic substances in the fume produced by an arc flash event. A combination of blast lung injury and severe burns will greatly increase the likelihood that the victim will succumb to their injuries.



The sound generated by an arcing fault can cause ruptured eardrums and permanent hearing loss.

The concussion produced by the arc blast can knock a worker off of a ladder or propel the worker into nearby walls or equipment.

2000 lb/ft. sq. pressures can collapse lungs, cause concussions, and result in other types of internal injuries.

Complete the content above before moving on.

00:22

Click play to begin the audio.

Protection Against Arc Flash Hazards

The following are ways you can limit your exposure to arc flash:

Check each box to demonstrate your understanding:

- [ ] Using distance as a protective measure
- [ ] DO NOT enter barricaded areas in the MCC
- [ ] DO NOT stand behind an electrician troubleshooting an open and exposed panel; you are NOT protected from a potential flash
- [ ] DO NOT store material in electrical panels; you may come into contact with a voltage source resulting in an arc flash

Complete the content above before moving on.

00:08

Click play to begin the audio.

Limits of Approach

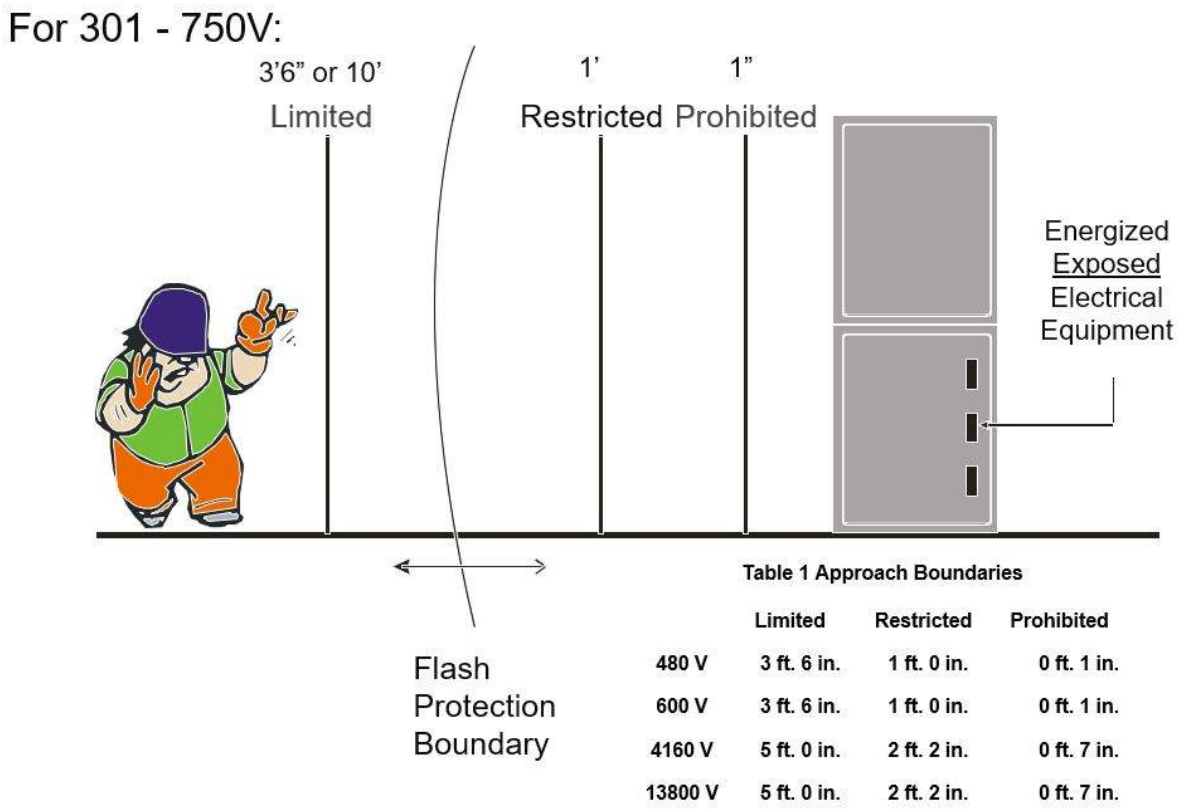


Table 1 Approach Boundaries

	Limited	Restricted	Prohibited
480 V	3 ft. 6 in.	1 ft. 0 in.	0 ft. 1 in.
600 V	3 ft. 6 in.	1 ft. 0 in.	0 ft. 1 in.
4160 V	5 ft. 0 in.	2 ft. 2 in.	0 ft. 7 in.
13800 V	5 ft. 0 in.	2 ft. 2 in.	0 ft. 7 in.

To provide protection against arc flash, there are defined limits of approach - who is allowed inside of those zones.

Click on the cards below to learn more.

Limited boundary - is an approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists. This is as close as an unqualified person may approach an exposed live part.

Restricted boundary is an approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part.
This boundary is intended to restrict the approach of **qualified personnel.**

Prohibited boundary is an approach limit at a distance from an exposed energized electrical conductor or circuit part within which work is considered the same as making contact with the energized electrical conductor or circuit parts.

Complete the content above before moving on.

00:20

Click play to begin the audio.

Limited Approach Arc Flash Boundary

The details on the Arc Flash Label will provide you with information so you can determine the PPE requirements and the Limited Approach Arc Flash Boundary (the boundary that you can safely be without arc-flash gear and not be injured).

If an electrical switch/gear is closed you can stand/work within the boundary and do not need arc flash PPE.

Complete the content above before moving on.

00:23

Click play to begin the audio.

Protecting Against Arc Flash - Recommended PPE

Hazard / Risk Category	Energy Level
0	N/A
1	4 cal/cm^2
2	8 cal/cm^2
3	25 cal/cm^2
4	40 cal/cm^2

Different levels of risk require different protections in place and types of PPE. Review the table below to understand the different PPE worn at different Hazard/Risk Categories.

Any work on equipment with greater than 40 cal/cm^2 must be performed de-energized.

HRC 1 CLOTHING AND PPE | HRC 2 CLOTHING AND PPE | HRC 3 CLOTHING AND PPE | HRC 4 CLOTHING AND PPE

Arc-rated clothing with minimum arc rating of 4 cal/cm2 (16.75 J/cm2) :

- Arc rated long sleeve shirt and pants or arc rated coverall
- Arc-rated face shield or arc flash suit hood
- Arc rated jacket, parka, rainwear or hard hat liner (as needed)

Protective equipment:

- Hard hat
- Safety glasses or safety goggles (required)
- Hearing protection (ear canal inserts)·
- Leather gloves
- Leather work shoes (as needed)

HRC 1 CLOTHING AND PPE | HRC 2 CLOTHING AND PPE | HRC 3 CLOTHING AND PPE | HRC 4 CLOTHING AND PPE

Arc-rated clothing with minimum arc rating of 8 cal/cm2 (33. 5 J/cm2):

- Arc-rated long sleeve shirt and pants or arc-rated coverall
- Arc-rated arc flash suit hood or arc-rated face shield and arc-rated balaclava
- Arc rated jacket, parka, rainwear or hard hat liner (as needed)

Protective equipment:

- Hard hat
- Safety glasses or safety goggles (required)
- Hearing protection (ear canal inserts)
- Leather gloves
- Leather work shoes

HRC 1 CLOTHING AND PPE | HRC 2 CLOTHING AND PPE | HRC 3 CLOTHING AND PPE | HRC 4 CLOTHING AND PPE

Arc-rated clothing selected so that the system arc rating meets the required minimum arc rating of 25 cal/cm2 (104.7 J/cm2):

- Arc-rated long sleeve shirt (as required)
- Arc rated pants (as required)
- Arc rated coverall (as required)
- Arc rated arc flash suit jacket (as required)
- Arc rated arc flash suit pants (as required)
- Arc rated arc flash suit hood·
- Arc rated gloves
- Arc rated jacket, parka, rainwear or hard hat liner (as needed)

Protective equipment:

- Hard hat
- Safety glasses or safety goggles (required)
- Hearing protection (ear canal inserts)
- Leather work shoes

HRC 1 CLOTHING AND PPE	HRC 2 CLOTHING AND PPE	HRC 3 CLOTHING AND PPE	HRC 4 CLOTHING AND PPE

Arc-rated clothing selected so that the system arc rating meets the required minimum arc rating of 40 cal/cm2 (167.S J/cm2):

- Arc-rated long sleeve shirt (as required)
- Arc rated pants (as required)
- Arc rated coverall (as required)
- Arc rated arc flash suit jacket (as required)
- Arc rated arc flash suit pants (as required)
- Arc rated arc flash suit hood
- Arc rated gloves
- Arc rated jacket, parka, rainwear or hard hat liner (as needed)

Protective equipment:

- Hard hat
- Safety glasses or safety goggles (required)
- Hearing protection (ear canal inserts)
- Leather work shoes

If in doubt, STOP!
Contact an electrician or your supervisor/coach immediately.

Complete the content above before moving on.

Activity

Sort these cards into the correct pile.

True

Distance is a means to protect yourself from arc flash hazard

Arc Flashes create shrapnel and flying debris

The sound of an arc flash can rupture ear drums and cause hearing loss

Arc flash can happen on any device regardless of voltage

False

Technicians and other staff can enter restricted boundaries

Arc flash injuries are predominantly shrapnel wounds

You should stand behind an electrician working on an open panel

Lung damage or collapse is not a potential arc hazard injury

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Equipment Trips and Resets

00:05

Click play to begin the audio.

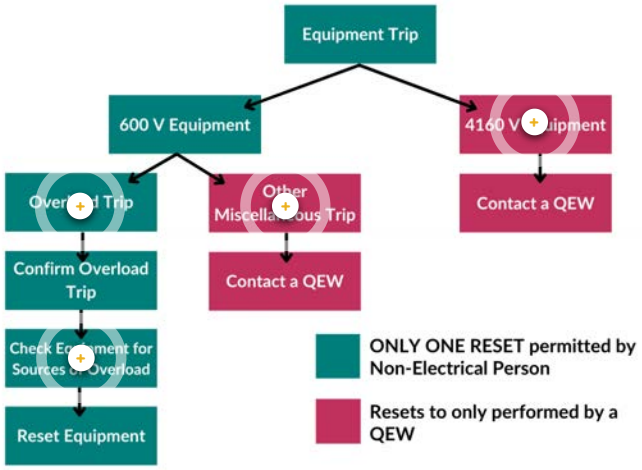
Objective

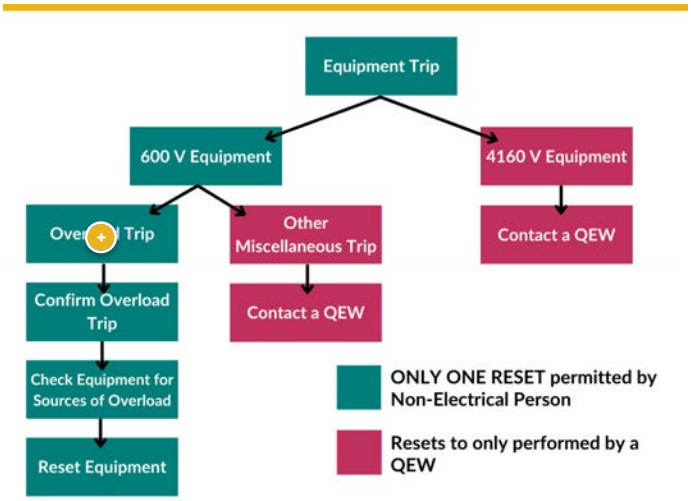
- Describe safe operating procedures for trips and overloads

Complete the content above before moving on.

Handling Trips and Resets

As non-electrical personnel, you cannot reset all electrical equipment on site. Some equipment can only be reset by an electrician. Click on the markers below to learn more:





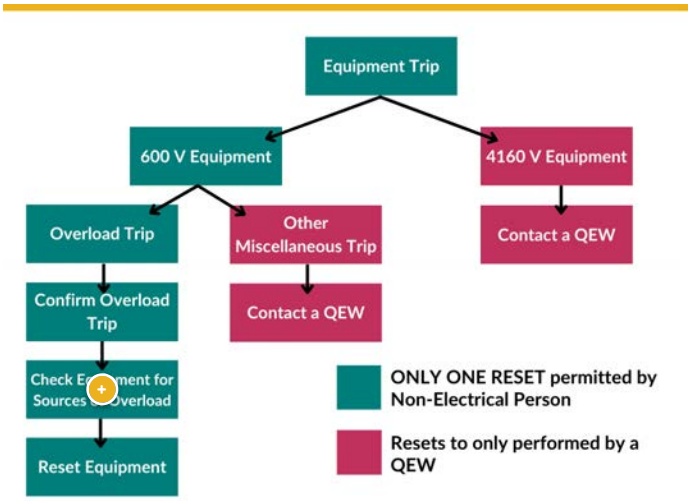
Overload Trip

00:20

The equipment itself is overloaded, caused by jams in equipment or pushing equipment past the design limits. For example, overloading a conveyer belt with too much material.

You will find overloads on devices such as starters and VFDs.

In these situations, a technician can troubleshoot. We will look at this in more detail in the rest of this section.

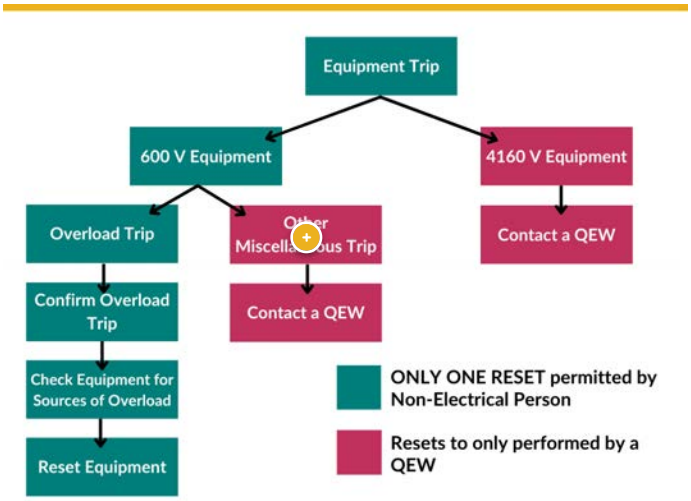


Equipment Overload

00:23

If the equipment itself is overloaded, then technicians can troubleshoot the issue. Follow the steps below.

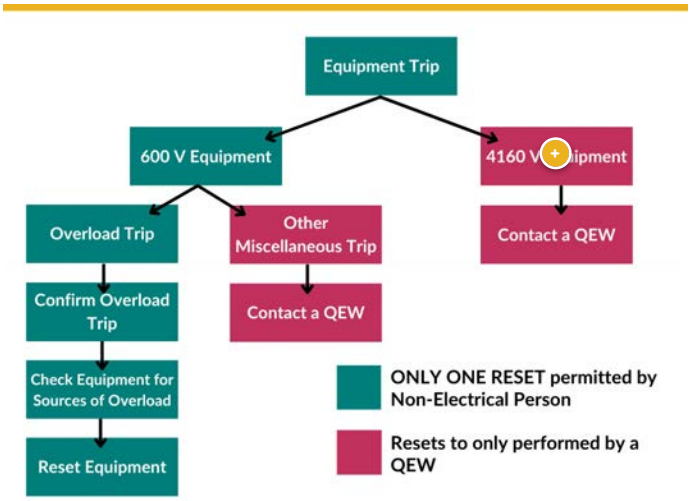
1. Confirm that the equipment tripped due to overload
2. Inspect field equipment to potentially identify cause of overload such as jamming or clearing issues
3. If possible, decrease the load on the equipment
4. Technicians can perform a single reset at the Motor Control Centre (MCC)



Other Miscellaneous Trips

00:15

Other miscellaneous trips are caused by spikes in current supplied to equipment or other electrical issues, for example a grounded cable may trip due to a short circuit. Troubleshooting of these types of trips is only to be completed by Qualified Electrical Workers (QEW).



4160V Equipment Trips

00:11

Due to safety concerns, non-QEW technicians shall not reset 4160V equipment, not even once.
The equipment can only be reset by Qualified Electrical Workers (QEWs).

Complete the content above before moving on.

Question

Which of the following trips can be investigated by a technician or operator?

- [ ] A trip due to an overload device

- [ ] A trip in a 4160V piece of equipment
- [ ] Grounded cable trip due to a short circuit
- [ ] Equipment Overload

SUBMIT

Complete the content above before moving on.

What is an overload?

As we saw from the flow chart above, some equipment may trip due to an overload device. Click on the numbered elements below to learn more about an Overload.

What is an overload?

What is an overload?

What is an overload?

00:12

A device used to protect equipment from damage due to overheating by opening the circuit. Sometimes referred to as thermal overload, overload relay, overload protection, or simply, overload.

What is an overload?

1

2

3

4

Why do we need overloads?

00:28

Overloads protect the integrity of the equipment. Higher equipment temperatures correspond to higher probability for mechanical failure.

When equipment is overloaded there is a strain on the equipment. While temporarily acceptable, it is not desirable for continuous operation.
Lock out time is crucial to allow equipment to cool to an appropriate temperature

Continually resetting pushes equipment past design limits and can end in damage and ultimately complete equipment failure.

What is an overload?

1

2

3

4

When is a reset required?

00:13

A reset is required to restore power to equipment after an overload condition occurs.

Overload protection is set at the Human Machine Interface (HMI) on VFDs, or at the E3 Plus on starters.

What is an overload?

1

2

3

4

What are the challenges with resets?

00:07

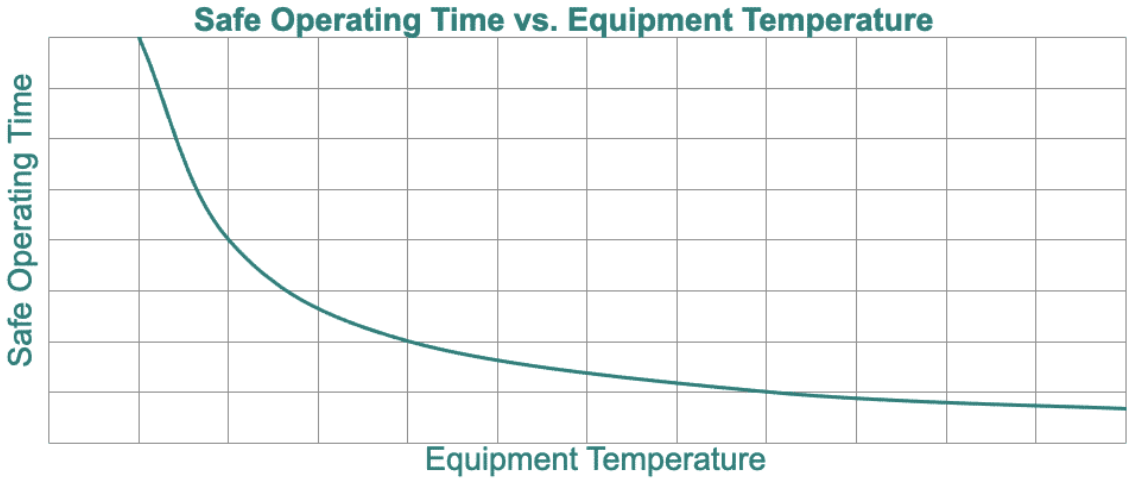
Multiple consecutive resets can lead to equipment damage. Each reset results in longer lock out duration to allow equipment to cool

Complete the content above before moving on.

00:17

Click play to begin the audio.

Overload Reset Time



As we saw from the information on overloads above, equipment can only operate at higher temperatures safely for a short amount of time. Higher machine temperatures correspond to longer lock out times to allow the equipment to cool. Equipment temperature is directly proportional to equipment current.

Complete the content above before moving on.

00:31

Click play to begin the audio.

Troubleshooting a Trip From an Overload Device

The majority of overload modules are located in their respective electrical rooms. Only operators who have completed Electrical Hazard Awareness Training (EHAT) are permissible to enter electrical rooms.

When entering the electrical room assess the room for hazards (such as the ones you have learned about in this course). Hazardous electrical room equipment can lead to both electrical shock or arc flash, which can be fatal.

Complete the content above before moving on.

00:11

Click play to begin the audio.

VFD Faults Due to Overload

The following fault codes displayed on the HMI are due to overload, and are the only faults on 600V VFDs acceptable to be reset by operators.

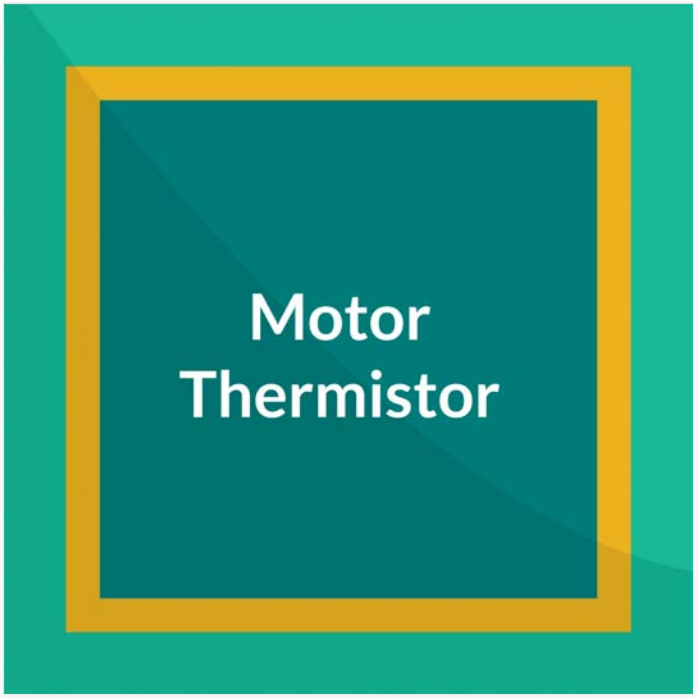
Click each card to learn more.

The motor is operating at high current and low frequency and not accelerating

Internal electronic overload

The heatsink has exceeded the maximum allowable value

The output transistors have exceeded their maximum operating temperature due to an excessive load



The option board thermistor input is greater than the limit

Complete the content above before moving on.

Resetting 600v Equipment

Let's look at the reset process for a 600v starter. Starters are generally integral to an MCC.

Click the arrows to learn more.

Step 1

Fault Light

00:03

A fault light will illuminate to indicate an equipment trip has occurred.

Step 2

Confirm the trip

00:06

When resetting a 600V starter, first confirm with the control room operator that the trip was due to an overload.

Step 3

Check the equipment

00:02

Check the equipment for sources of overload.

Step 4

Starter Door

00:02

Ensure the starter door is closed and latched.

Step 5

Trip Reset Button

00:12

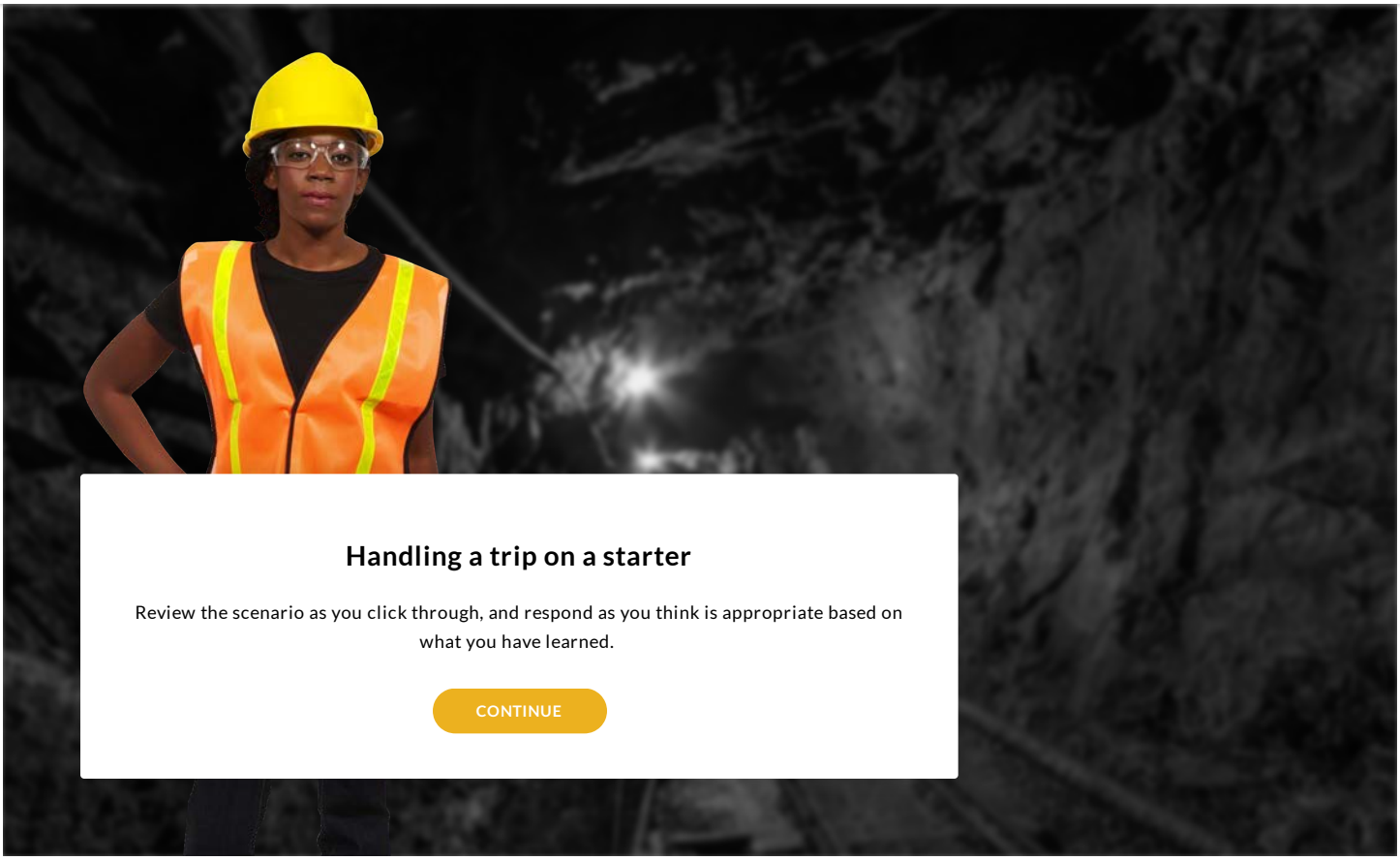
Press the TEST TRIP/RESET button in order to reset. This button will press a plastic TEST/RESET button on the E3 Plus Overload Module.

DO NOT reset 600V starters by pulling the operating handle.

Complete the content above before moving on.

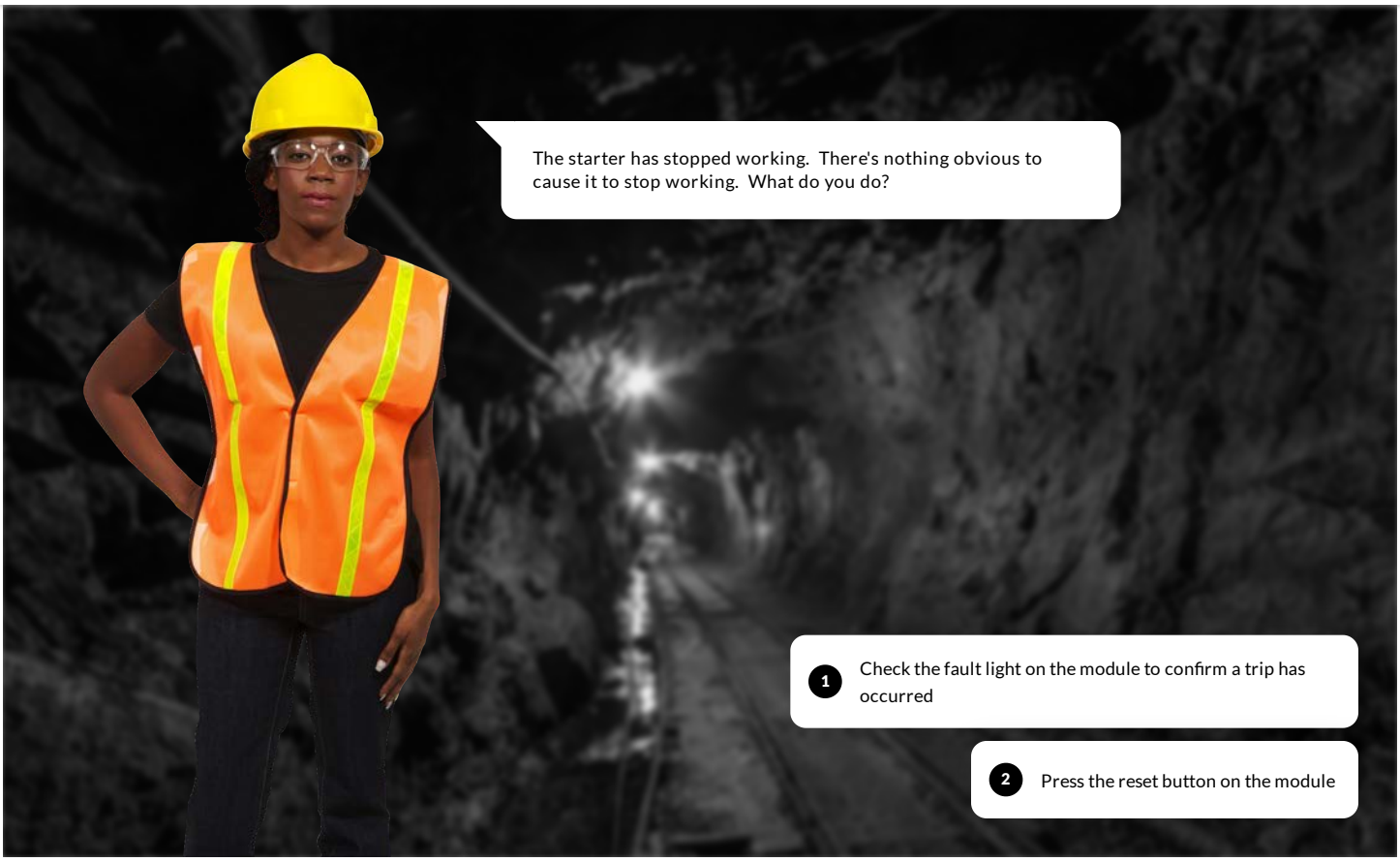
Activity

Now, let's test your knowledge! *Click through the scenario below to handle each situation correctly.*



Scene 1 Slide 1

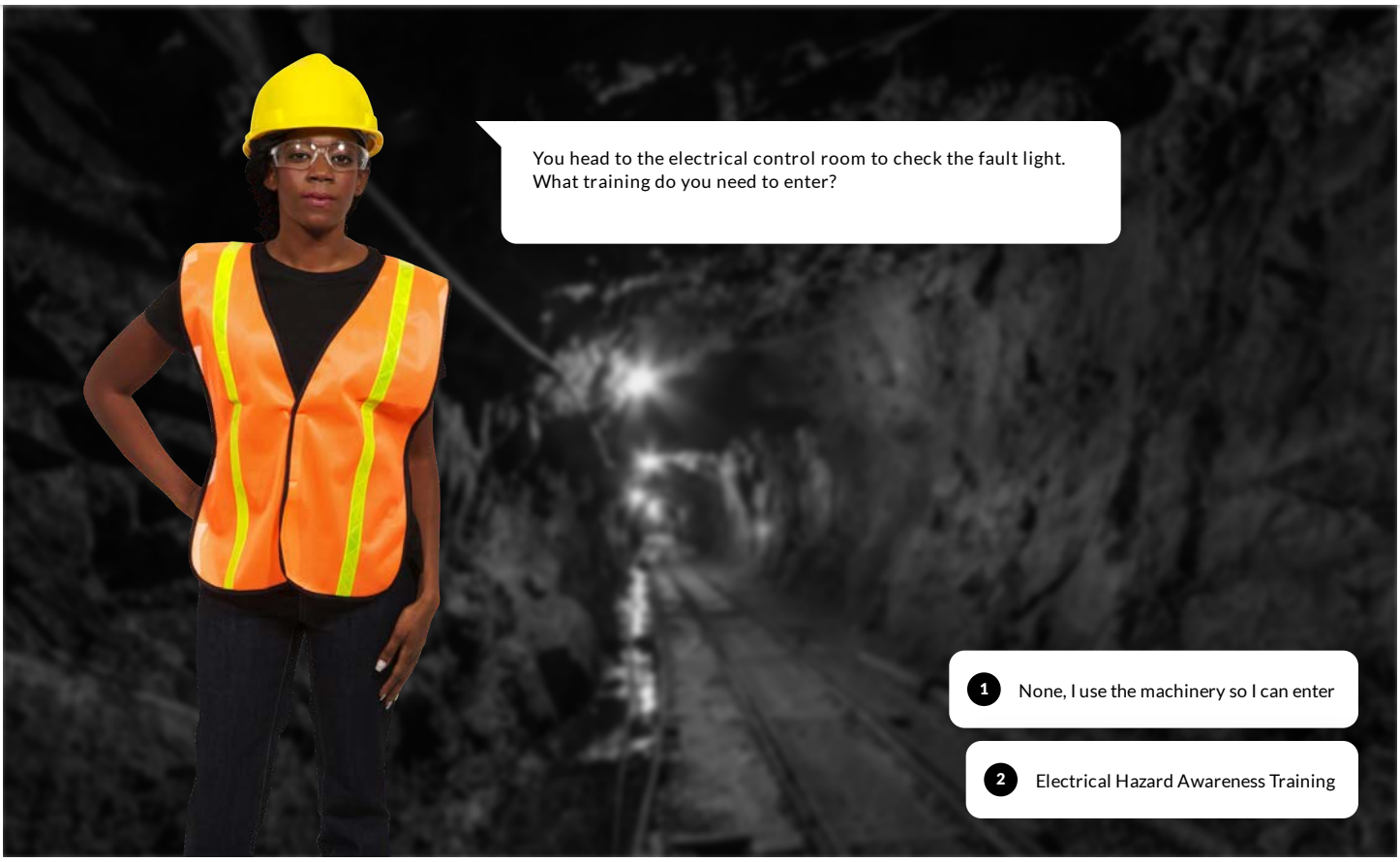
Continue → Next Slide



Scene 1 Slide 2

0 → Next Slide

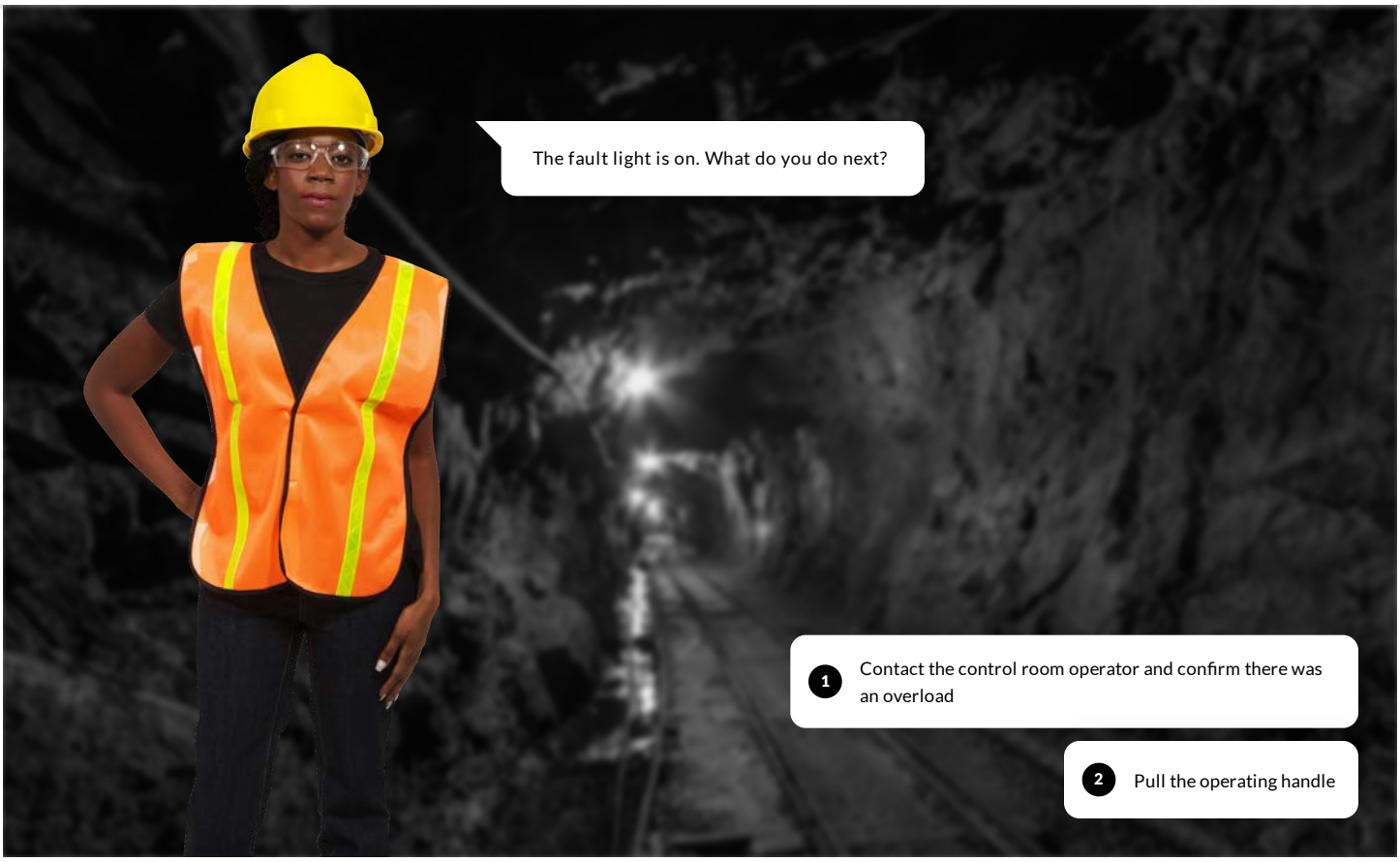
1 → Next Slide



Scene 1 Slide 3

0 → Next Slide

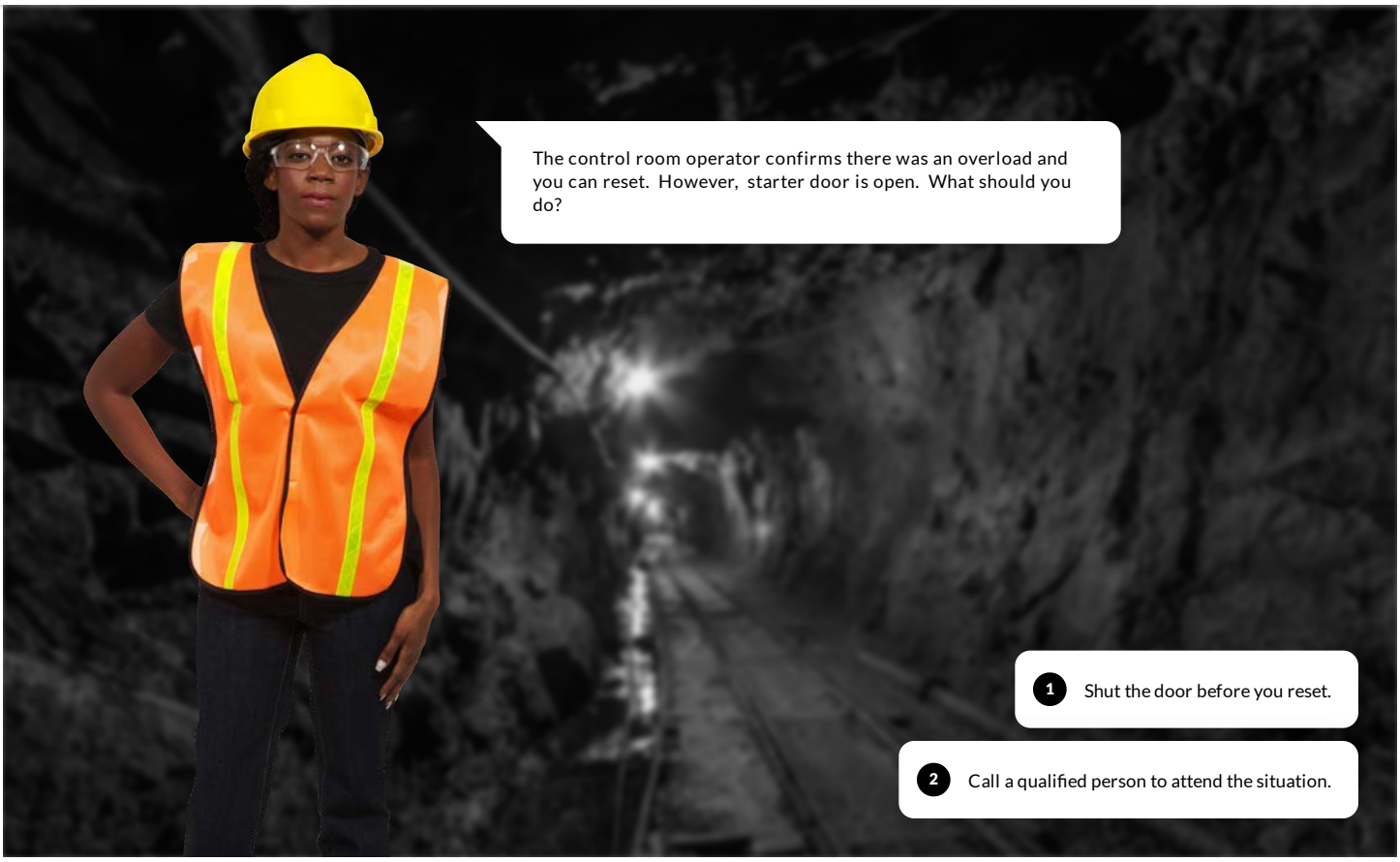
1 → Next Slide



Scene 1 Slide 4

0 → Next Slide

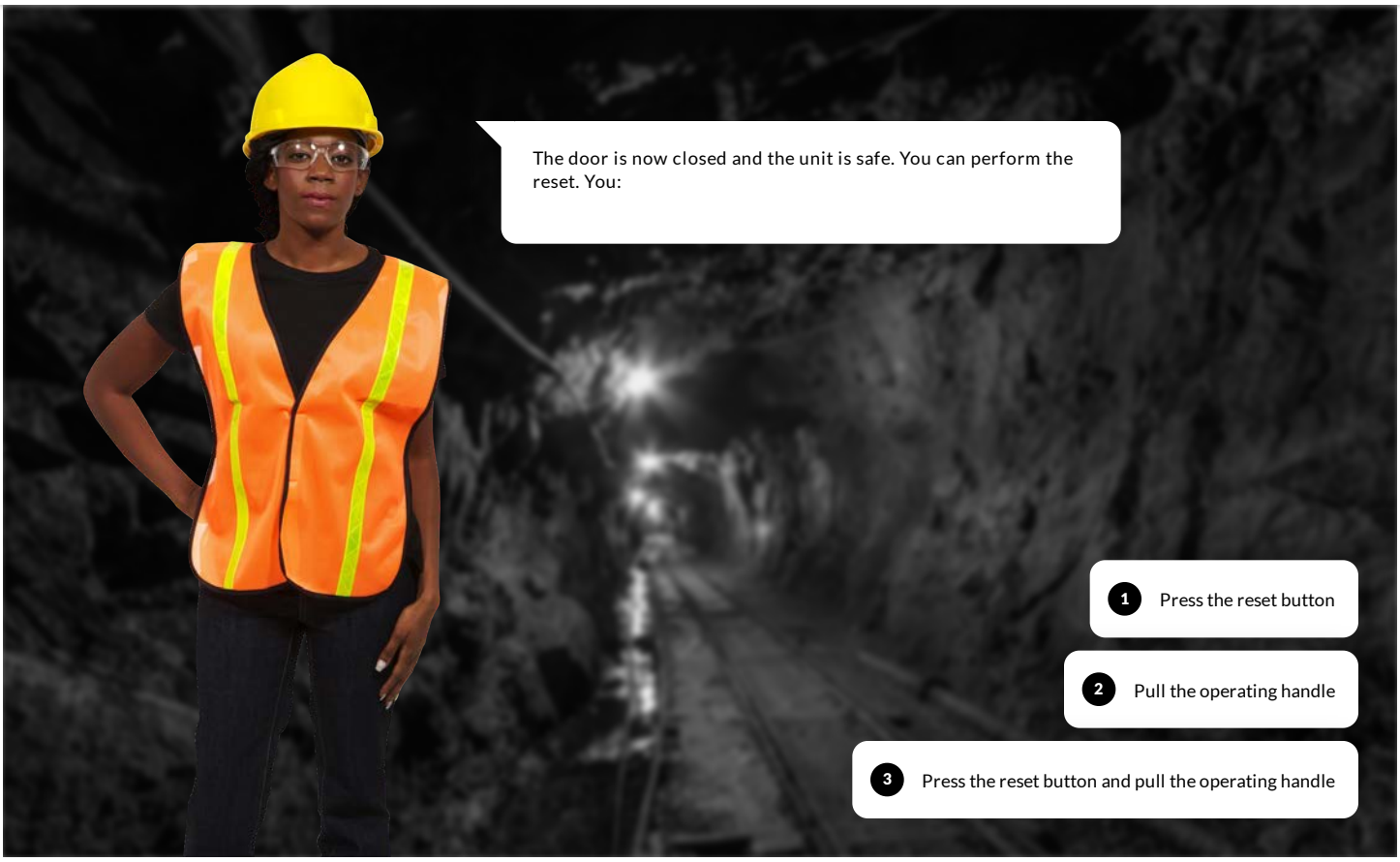
1 → Next Slide



Scene 1 Slide 5

0 → Next Slide

1 → Next Slide

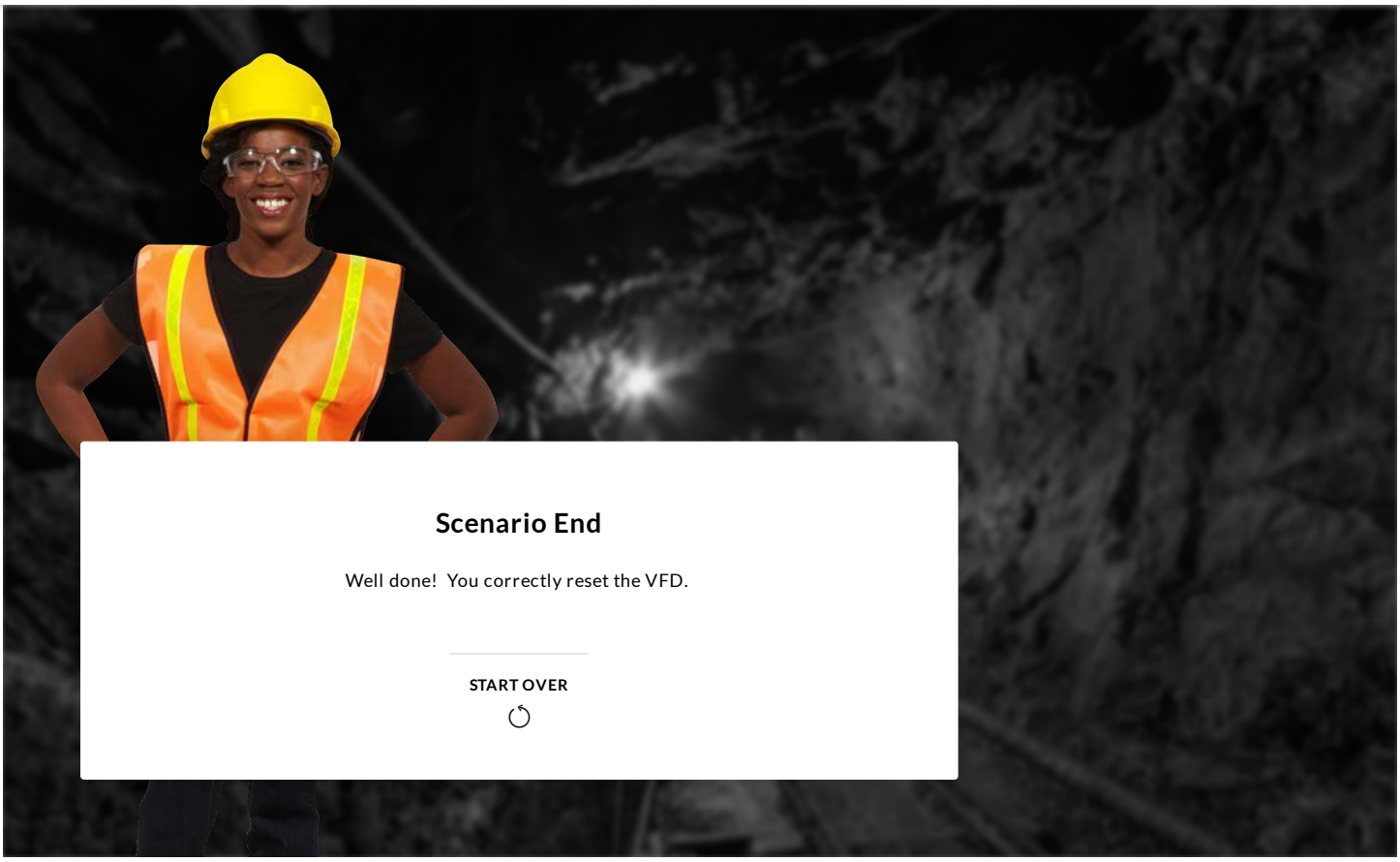


Scene 1 Slide 6

0 → Next Slide

1 → Next Slide

2 → Next Slide



Scene 1 Slide 7

Continue → End of Scenario

Complete the content above before moving on.

600v Variable Frequency Devices

Let's look at the reset process for a 600v VFD. VFDs are usually integral to a MC but can be externally mounted. *Click the arrows to learn more.*

Step 1

The Fault Light

00:03

The Fault Light will illuminate to indicate an equipment trip has occurred.

Step 2

The HMI check

00:06

When resetting a 600V VFD first check the HMI (Human Machine Interface) to ensure the fault was due to an overload.

Step 3

Check the equipment

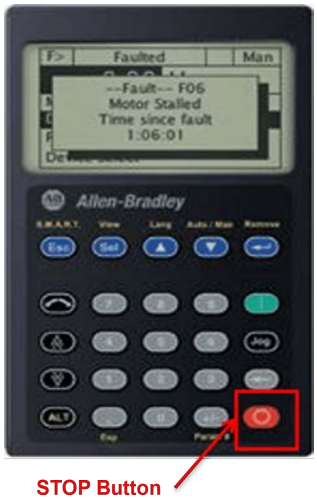
00:03

Check the equipment in field for sources of overload.

Step 4

Press the STOP button

00:13



Press the red STOP button in the bottom right of the HMI to reset the overload.

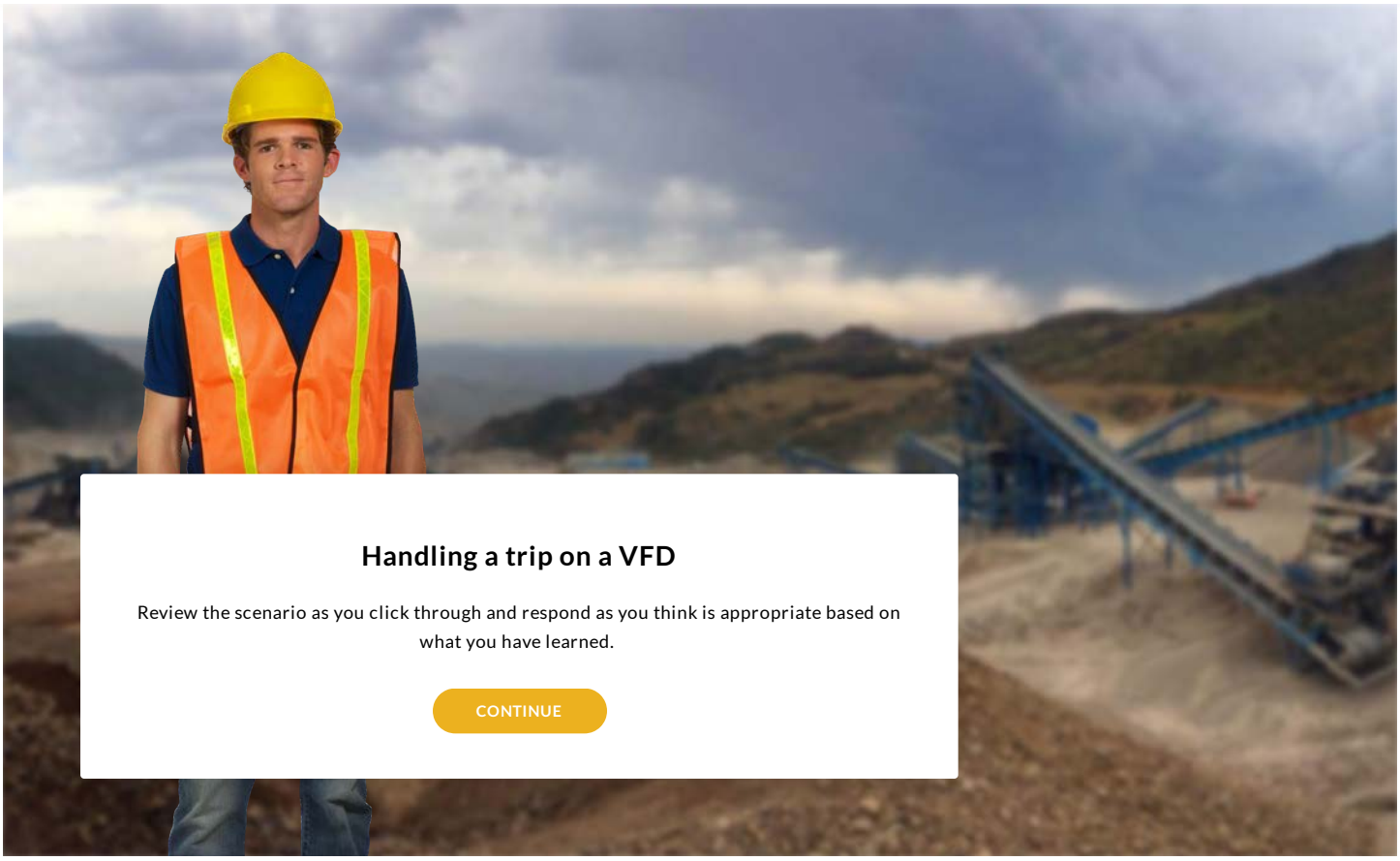
DO NOT press any other buttons as it could result in changes to the VFD parameters.

DO NOT reset 600V VFDs by pulling the operating handle.

Complete the content above before moving on.

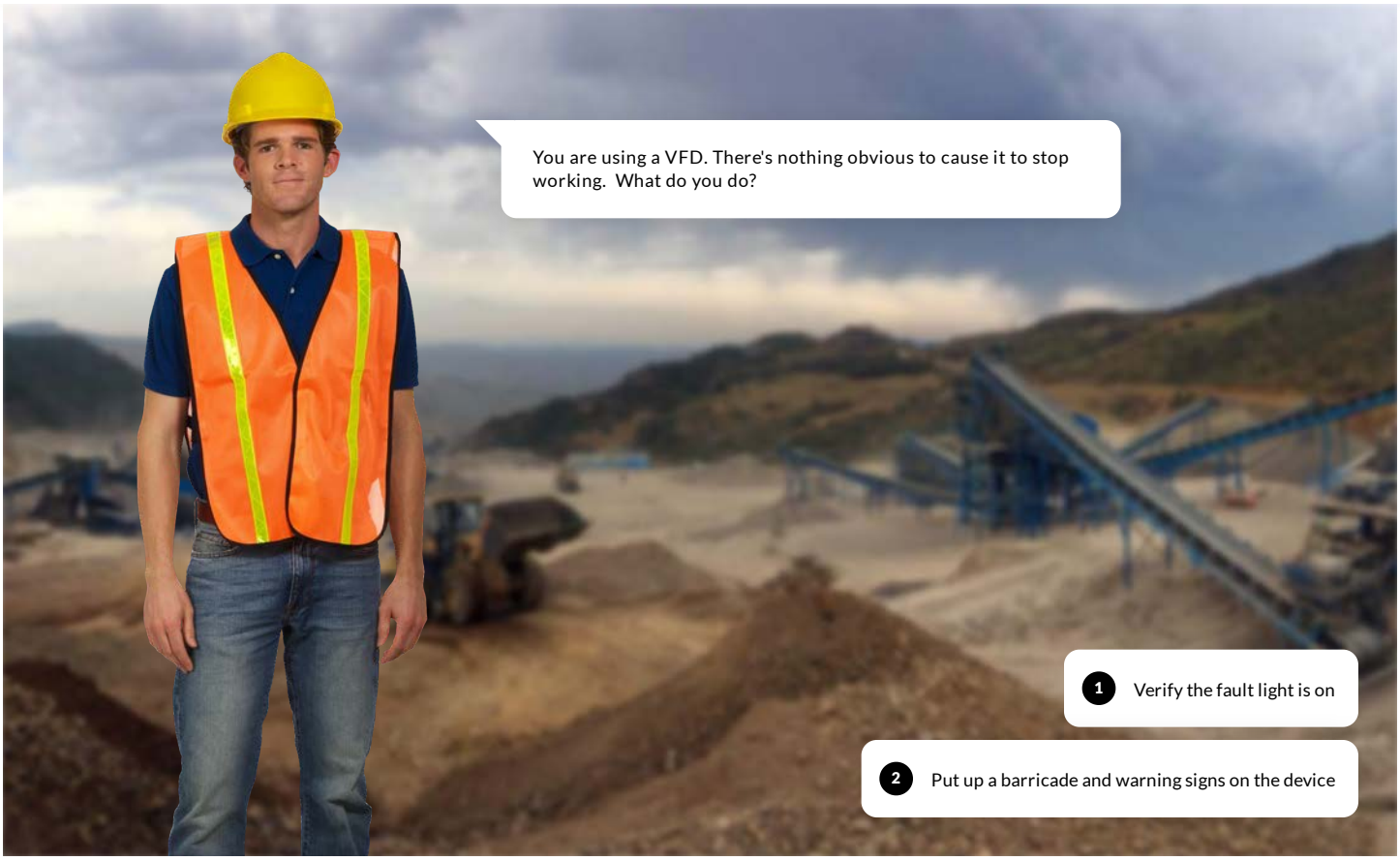
Activity

Now, let's test your knowledge! *Click through the scenario below to handle each situation correctly.*



Scene 1 Slide 1

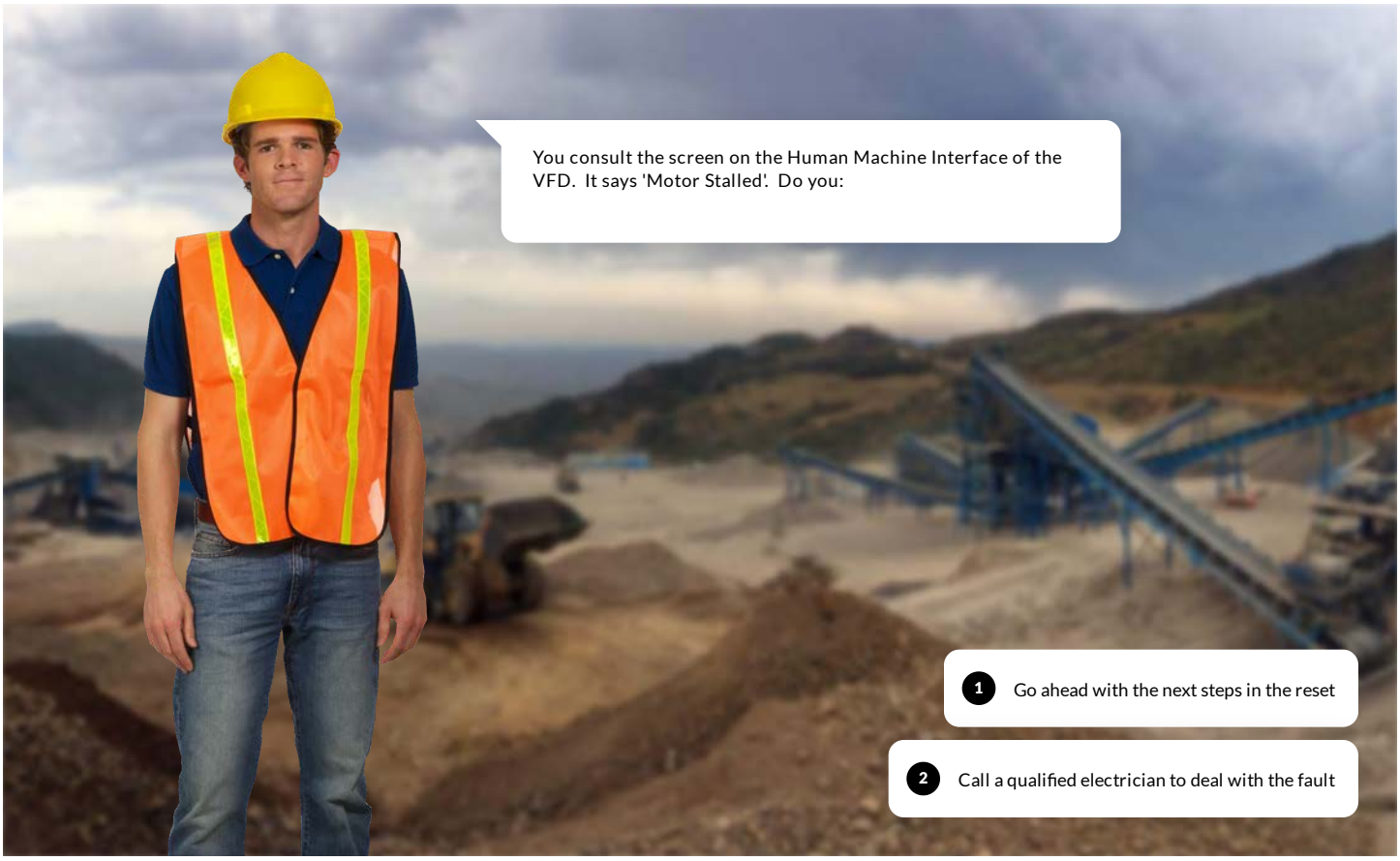
Continue → Next Slide



Scene 1 Slide 2

0 → Next Slide

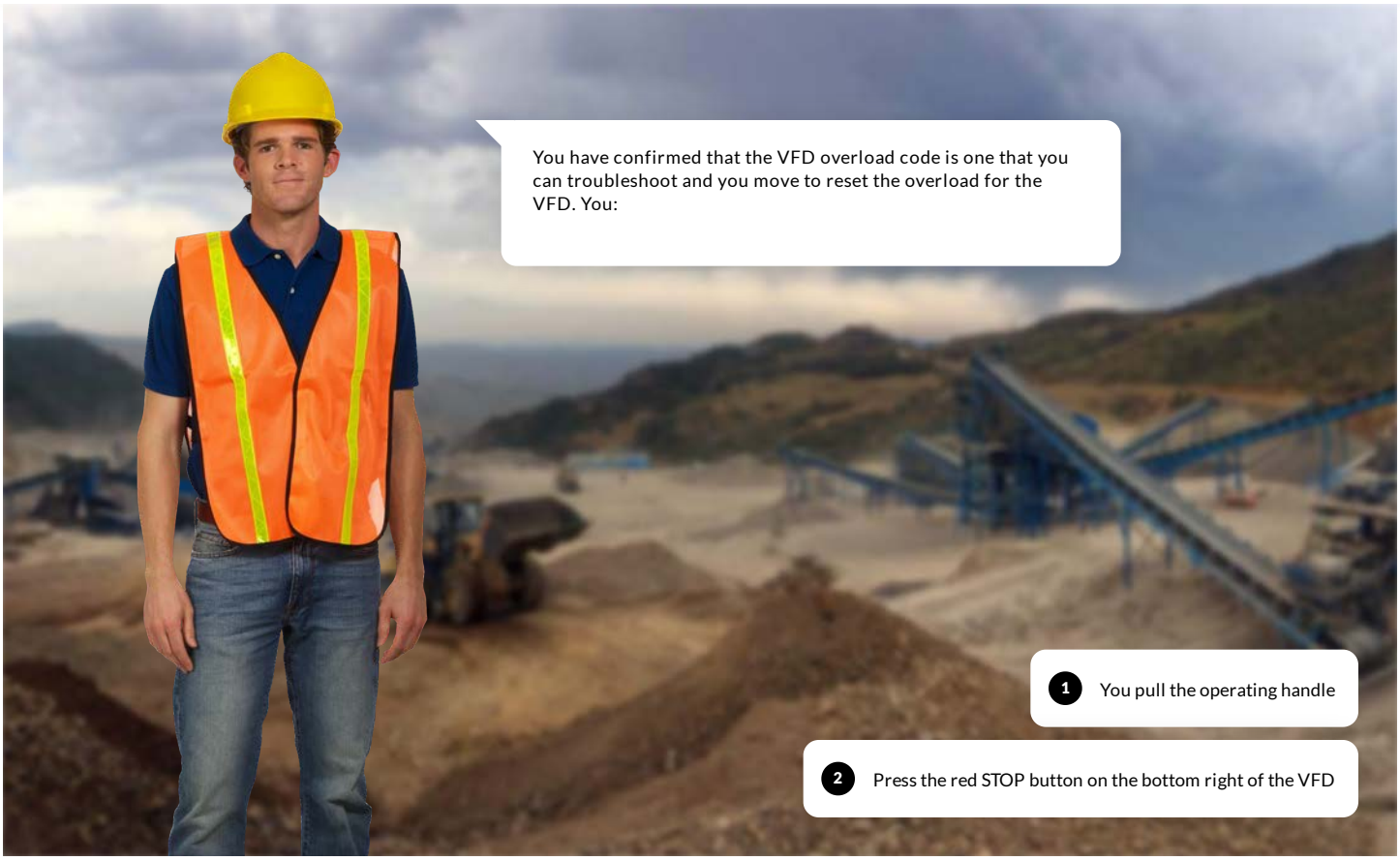
1 → Next Slide



Scene 1 Slide 3

0 → Next Slide

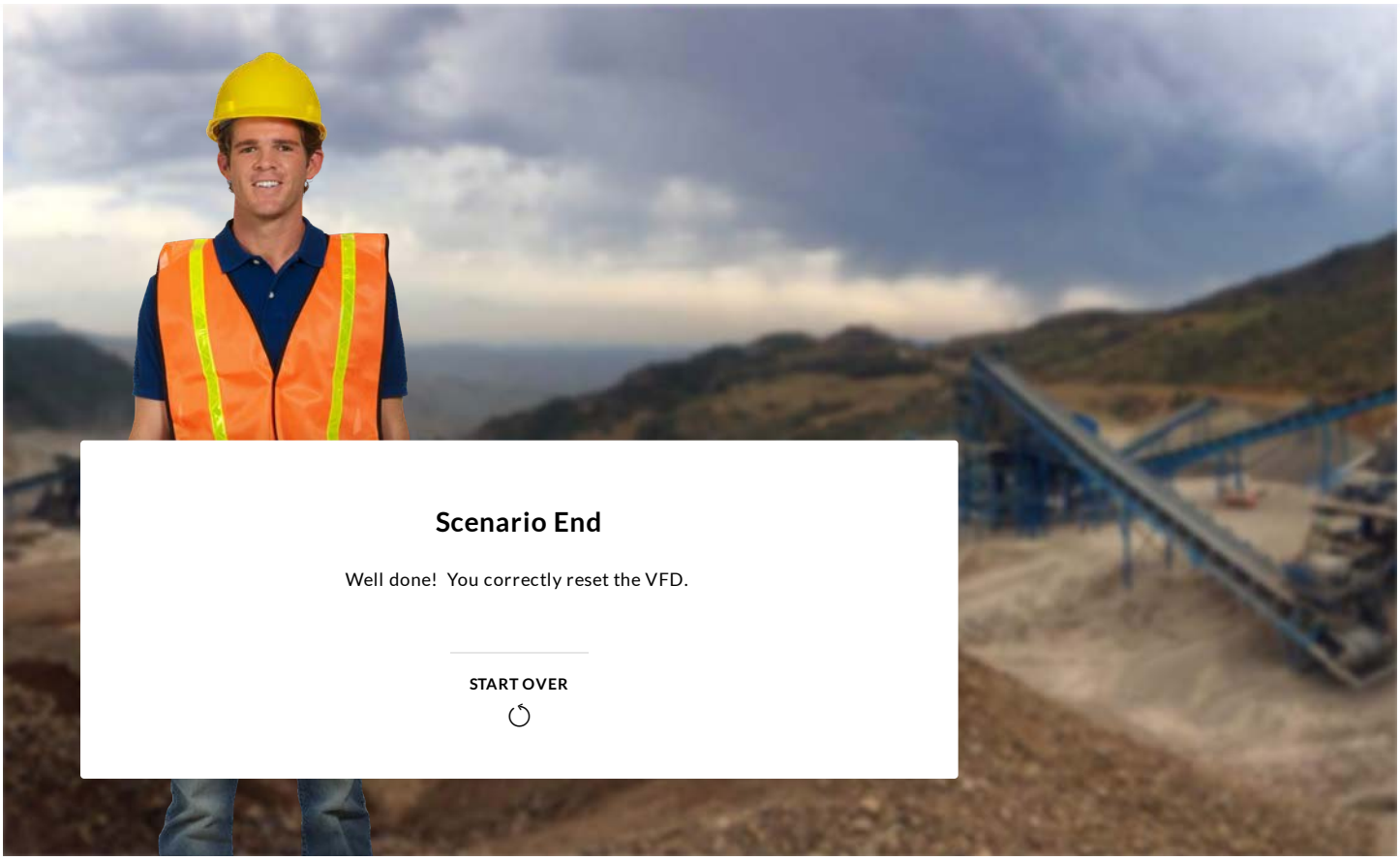
1 → Next Slide



Scene 1 Slide 4

0 → Next Slide

1 → Next Slide



Scene 1 Slide 5

Continue → End of Scenario

Remember: non-electrical personnel can only troubleshoot certain types of trips. If in doubt, contact your supervisor/coach or an electrician.

Complete the content above before moving on.

Question

What does it mean when 'Motor Stalled' is displayed on the HMI?

- ◯ Internal electronic overload
- ◯ The motor is operating at high current and low frequency and not accelerating
- ◯ The heatsink has exceeded the maximum allowable value
- ◯ The motor is accelerating and operating at a high frequency

SUBMIT

All operators, even those without Electrical Hazard Awareness Training are allowed to enter electrical rooms.

- ◯ True
- ◯ False

SUBMIT

An overload can be referred to as which of the following? *Select all that apply.*

- ☐ Overload delay
- ☐ Thermal overload

- [ ] Overload protection
- [ ] Hot equipment

SUBMIT

In order to reset 600V starters you start by pulling the operating handle.

- ○ True
- ○ False

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Disconnect Switches and Isolation

00:09

Click play to begin the audio.

Objectives

- Identify disconnect switches and isolation procedures
- Describe requirements for working on energized equipment

Complete the content above before moving on.

00:34

Click play to begin the audio.

Disconnect Switches

A disconnect switch is an electrical device used to isolate equipment. A disconnect switch is NOT designed to break load. Personnel may be required to safely operate disconnect switches for various reasons.

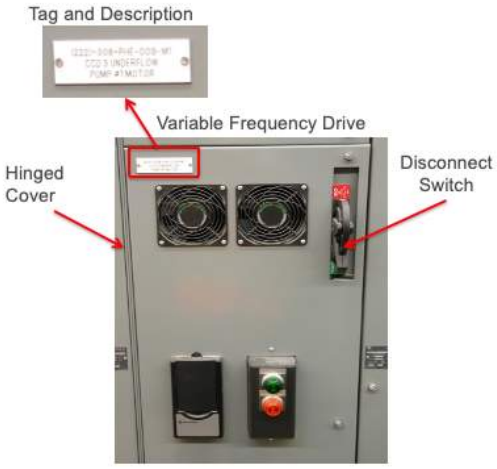
Disconnect switches can be found:

1. In the field: All motors 50hp and below can be isolated with a field disconnect switch
2. As part of a Variable Frequency Drive (VFD) in an Electrical House (E-House)
3. As part of a Motor Starter in an E-House

Let's look at the safe operation of disconnect switches. *Click on the tabs below to learn more.*

BEFORE OPERATION | VISUAL INSPECTION | SAFE SWITCH OPERATION

1. Check tag and description to verify correct equipment before operating disconnect switch.
2. Verify that equipment is not running. Either in field or with control room operator. Opening switches while equipment is running, and especially when equipment is starting, will cause unnecessary wear to the switch. Given unusual circumstances the switch may even fail catastrophically, creating the potential for injury to anyone near the switch. Always turn off the equipment before opening the switch.
3. Visually inspect disconnect switch and any associated equipment (VFD or Starter).



BEFORE OPERATION | VISUAL INSPECTION | SAFE SWITCH OPERATION

1. If not secure, DO NOT proceed. Secure area and contact appropriate personnel.
2. Visually inspect VFD or Starter for wear, broken or damaged parts.
3. If VFD or Starter is unsafe DO NOT operate, contact a Qualified Electrical Worker (QEW).

BEFORE OPERATION | VISUAL INSPECTION | SAFE SWITCH OPERATION

Use the left hand rule:

1. Stand to the RIGHT SIDE of the switch, DO NOT stand in front of the equipment.
2. Grab the disconnect with your LEFT hand.
3. Turn your body and face away from the switch.
4. Close eyes.
5. Take a deep breathe and hold it.
6. "Throw" the disconnect lever.
7. If switch fails to operate properly DO NOT reattempt to operate. Secure area and contact appropriate personnel.
8. DO NOT operate disconnect switches on any other type of electrical equipment (i.e. switchgear, power breakers, etc.).

Complete the content above before moving on.

Click on the video below for a demonstration of the Safe Switch Operation (left hand rule).


Allen-Bradley
CENTERLINE

Complete the content above before moving on.

Working on Energized Equipment

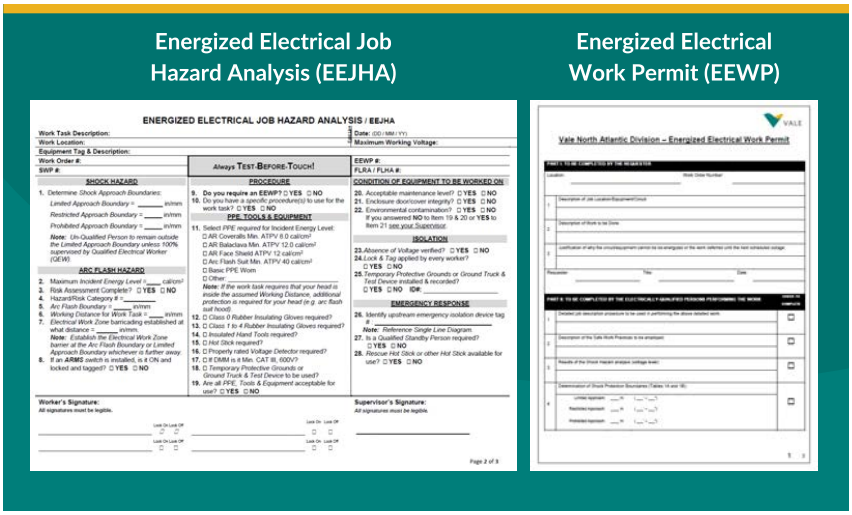
00:34

The priority is to avoid performing energized electrical work to prevent exposure to the worker from electrical shock and arc flash hazards. We must always reduce the risk related to the energized electrical work task to as low as reasonably achievable (ALARA), unless de-energizing introduces additional hazards or increased risk, or is infeasible to be completed in a de-energized state.

When it is not possible to work in a de-energized state, the potential exposure must be mitigated or limited through the use of effective preventive and protective control measures. *Click the arrows to learn more.*

Step 1

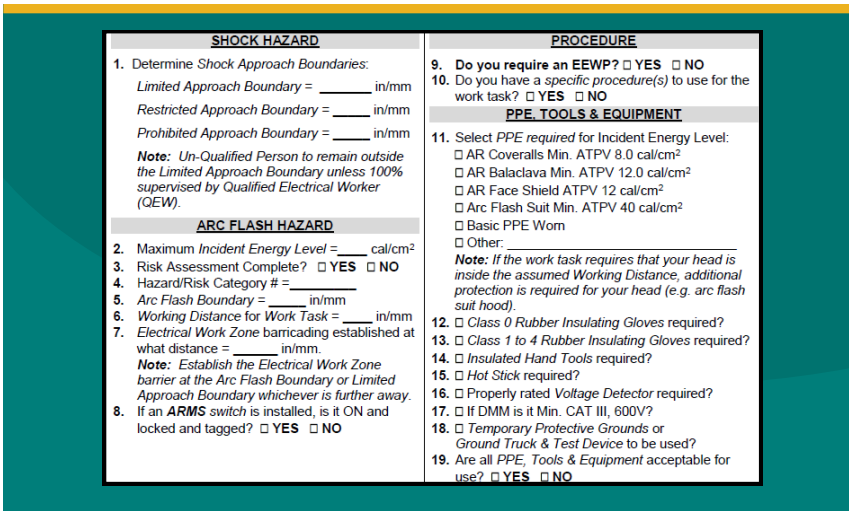
00:18



An Energized Electrical Work Permit (EEWP) and an Energized Electrical Job Hazard Assessment (EEJHA) must be completed when energized electrical conductors, or circuit parts are placed in an abnormal condition where personnel may be exposed to electrical hazards (i.e. electrical shock, arc flash, and associated arc blast).

Step 2

▶ 00:11



SHOCK HAZARD

1. Determine *Shock Approach Boundaries*:
   Limited Approach Boundary = _____ in/mm
   Restricted Approach Boundary = _____ in/mm
   Prohibited Approach Boundary = _____ in/mm
   Note: *Un-Qualified Person to remain outside the Limited Approach Boundary unless 100% supervised by Qualified Electrical Worker (QEW).*

ARC FLASH HAZARD

2. Maximum *Incident Energy Level* =____ cal/cm²
3. Risk Assessment Complete? ☐ **YES** ☐ **NO**
4. Hazard/Risk Category # =_____
5. *Arc Flash Boundary* = _____ in/mm
6. *Working Distance* for *Work Task* = ____ in/mm
7. *Electrical Work Zone* barricading established at what distance = _____ in/mm.
   Note: *Establish the Electrical Work Zone barrier at the Arc Flash Boundary or Limited Approach Boundary whichever is further away.*
8. If an ***ARMS*** *switch* is installed, is it ON and locked and tagged? ☐ **YES** ☐ **NO**

PROCEDURE

9. **Do you require an EEWP?** ☐ **YES** ☐ **NO**
10. Do you have a *specific procedure(s)* to use for the work task? ☐ **YES** ☐ **NO**

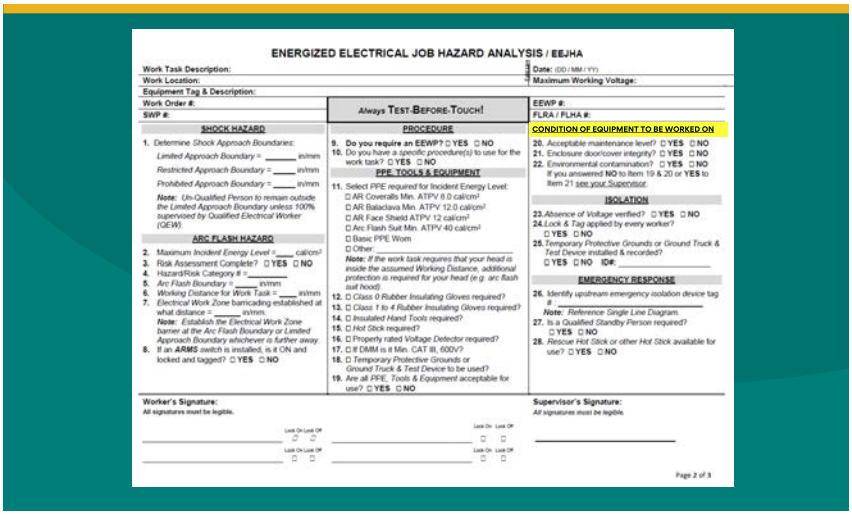
PPE, TOOLS & EQUIPMENT

11. Select *PPE required* for Incident Energy Level:
    ☐ AR Coveralls Min. ATPV 8.0 cal/cm²
    ☐ AR Balaclava Min. ATPV 12.0 cal/cm²
    ☐ AR Face Shield ATPV 12 cal/cm²
    ☐ Arc Flash Suit Min. ATPV 40 cal/cm²
    ☐ Basic PPE Worn
    ☐ Other: _____
    Note: *If the work task requires that your head is inside the assumed Working Distance, additional protection is required for your head (e.g. arc flash suit hood).*
12. ☐ *Class 0 Rubber Insulating Gloves* required?
13. ☐ *Class 1 to 4 Rubber Insulating Gloves* required?
14. ☐ *Insulated Hand Tools* required?
15. ☐ *Hot Stick* required?
16. ☐ Properly rated *Voltage Detector* required?
17. ☐ If DMM is it Min. CAT III, 600V?
18. ☐ *Temporary Protective Grounds* or *Ground Truck & Test Device* to be used?
19. Are all *PPE, Tools & Equipment* acceptable for use? ☐ **YES** ☐ **NO**

The Electrical Hazard Assessment comprises both a shock and arc flash hazard analysis. It is required in order to establish Boundaries of Approach and for the selection of appropriate PPE.

Step 3

00:34



ENERGIZED ELECTRICAL JOB HAZARD ANALYSIS / EEJHA

Work Task Description:
Work Location:
Equipment Tag & Description:
Work Order #:
SWP #:
Date: (DD / MM / YY)
Maximum Working Voltage:

Always TEST-BEFORE-TOUCH!

SHOCK HAZARD

1. Determine Shock Approach Boundaries:
Limited Approach Boundary = _____ in/mm
Restricted Approach Boundary = _____ in/mm
Prohibited Approach Boundary = _____ in/mm
Note: Un-Qualified Person to remain outside the Limited Approach Boundary unless 100% supervised by Qualified Electrical Worker (QEW).

ARC FLASH HAZARD

2. Maximum Incident Energy Level = _____ cal/cm²
3. Risk Assessment Complete? ☐ YES ☐ NO
4. Hazard/Risk Category # = _____
5. Arc Flash Boundary = _____ in/mm
6. Working Distance for Work Task = _____ in/mm
7. Electrical Work Zone barricading established at what distance = _____ in/mm.
Note: Establish the Electrical Work Zone barrier at the Arc Flash Boundary or Limited Approach Boundary whichever is further away.
8. If an ARMS switch is installed, is it ON and locked and tagged? ☐ YES ☐ NO

PROCEDURE

9. Do you require an EEWP? ☐ YES ☐ NO
10. Do you have a specific procedure(s) to use for the work task? ☐ YES ☐ NO

PPE, TOOLS & EQUIPMENT

11. Select PPE required for Incident Energy Level:
☐ AR Coveralls Min. ATPV 8.0 cal/cm²
☐ AR Balaclava Min. ATPV 12.0 cal/cm²
☐ AR Face Shield ATPV 12 cal/cm²
☐ Arc Flash Suit Min. ATPV 40 cal/cm²
☐ Basic PPE Worn
☐ Other: _____
Note: If the work task requires that your head is inside the assumed Working Distance, additional protection is required for your head (e.g. arc flash suit hood).
12. ☐ Class 0 Rubber Insulating Gloves required?
13. ☐ Class 1 to 4 Rubber Insulating Gloves required?
14. ☐ Insulated Hand Tools required?
15. ☐ Hot Stick required?
16. ☐ Properly rated Voltage Detector required?
17. ☐ If DMM is it Min. CAT III, 600V?
18. ☐ Temporary Protective Grounds or Ground Truck & Test Device to be used?
19. Are all PPE, Tools & Equipment acceptable for use? ☐ YES ☐ NO

EEWP #:
FLRA / FLHA #:
CONDITION OF EQUIPMENT TO BE WORKED ON

20. Acceptable maintenance level? ☐ YES ☐ NO
21. Enclosure door/cover integrity? ☐ YES ☐ NO
22. Environmental contamination? ☐ YES ☐ NO
If you answered NO to Item 19 & 20 or YES to Item 21 see your Supervisor.

ISOLATION

23. Absence of Voltage verified? ☐ YES ☐ NO
24. Lock & Tag applied by every worker? ☐ YES ☐ NO
25. Temporary Protective Grounds or Ground Truck & Test Device installed & recorded? ☐ YES ☐ NO ID#: _____

EMERGENCY RESPONSE

26. Identify upstream emergency isolation device tag # : _____
Note: Reference Single Line Diagram.
27. Is a Qualified Standby Person required? ☐ YES ☐ NO
28. Rescue Hot Stick or other Hot Stick available for use? ☐ YES ☐ NO

Worker's Signature:
All signatures must be legible.
Lock On Lock Off

Supervisor's Signature:
All signatures must be legible.

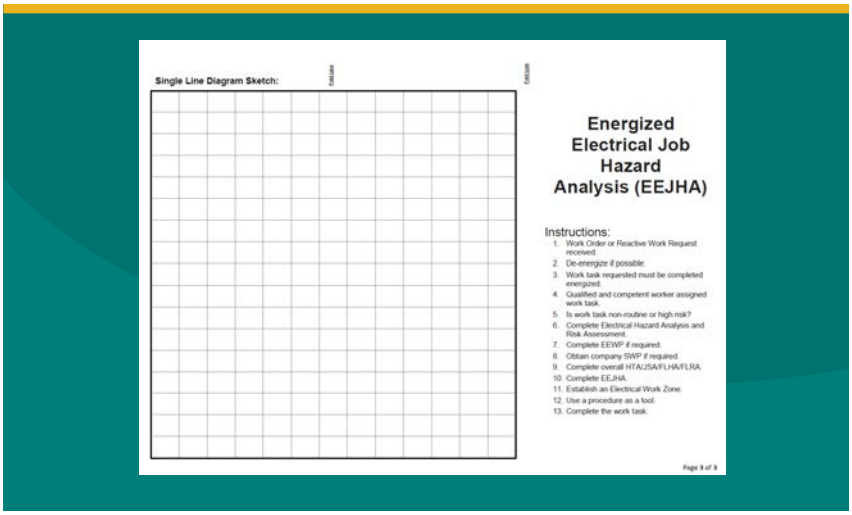
Page 2 of 3

All work tasks that expose a worker to energized electrical parts must have an Energized Electrical Job Hazard Analysis (EEJHA) form completed and retained with Work Permit related paperwork, regardless if the task is viewed as a low or high risk.

The EEJHA must be filled out just before executing the work task. Parts of this form could be filled out (e.g. electrical hazard information and PPE selection) in the Pre-Job Briefing & Planning phase of work task execution, but an equipment Condition Based Assessment must be completed when in front of the electrical equipment to be worked on.

Step 4

00:16



The EEJHA also includes a grid that can be used to sketch a Single Line Diagram related to the work task or add any notes related to executing the work task. Completed EEJHA's are to be returned to the contractor's Supervisor for review and retention.

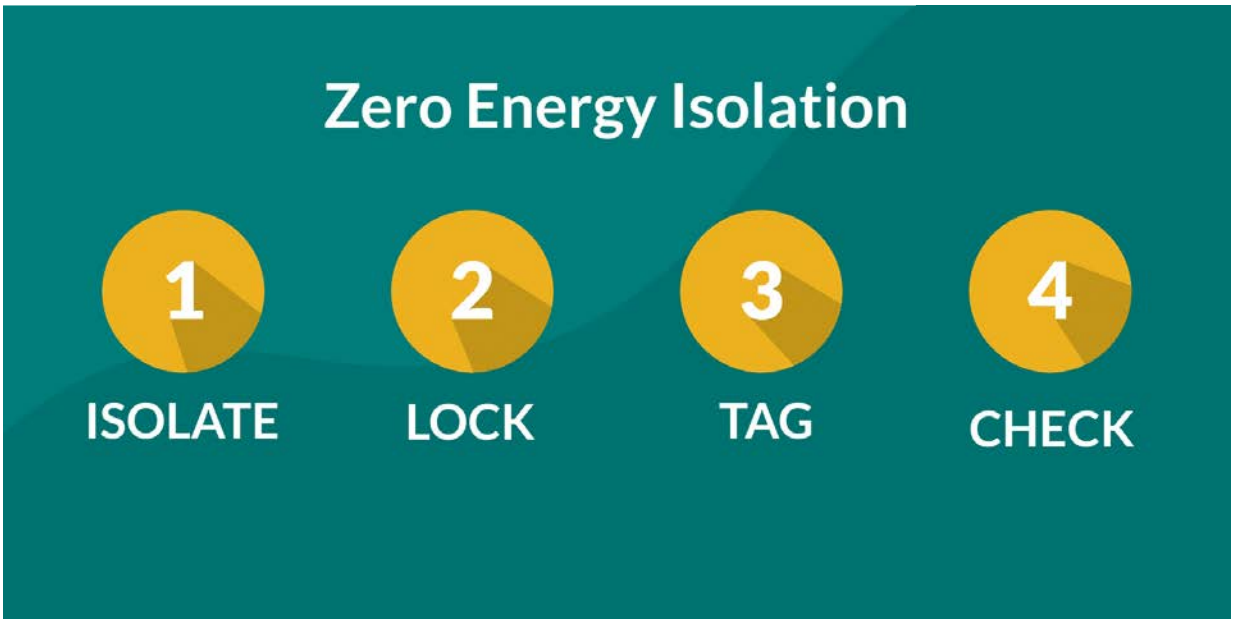
Complete the content above before moving on.

00:24

Click play to begin the audio.

Isolations

Isolations are a way of preventing people from re-energizing equipment while it's being worked on. Zero Energy Isolation is the process we follow to make the equipment safe to work on and involves locking and tagging of all energy sources. The process for completing an isolation is **Isolate**, **Lock**, **Tag**, and **Check** to ensure the isolation is working. Lock-out, tag-out is referred to as Zero Energy Isolation.



Complete the content above before moving on.

00:22

Click play to begin the audio.

The Isolation Process

Check the boxes below to demonstrate your understanding:

- [ ] Complete the isolation following the Zero Energy Isolation process
- [ ] Have the isolation verified by a qualified isolator
- [ ] Complete the Zero Energy Isolation permit
- [ ] Lock the keys in the lockbox
- [ ] Verifier also ensures the keys are in the box

Examples of Isolations

Below are some examples of isolations. *Click through the pictures to review.*

100 AMP Disconnect

600V MCC Bucket

MCC Bucket

4160V Bucket Disconnect

Wire Termination Lockout

Breaker Panel

Breaker Panel
Square D

Power Cable
Junction Box

Wire Termination Lockout

Lockout Marshalling Cabinets

Complete the content above before moving on.

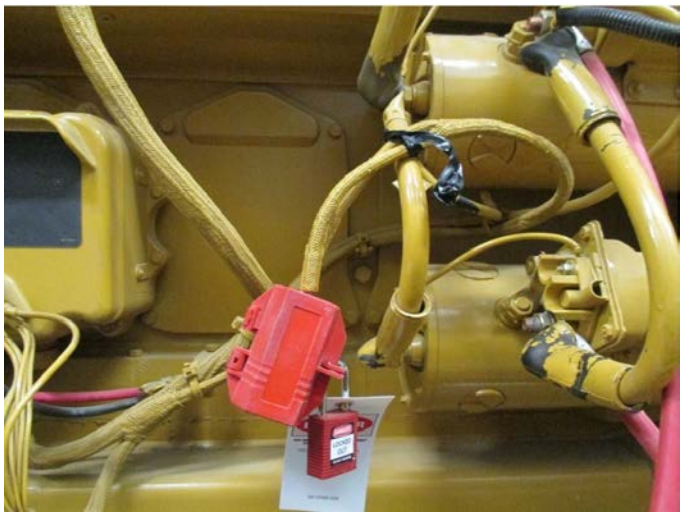
How to Isolate

Click though the steps to understand how to isolate an Emergency Generator Starter Motor and a JBE box with Blade Fuses.

Step 1

Emergency Generator Starter Motor Disable

00:31



This isolation prevents a generator from being started-up.

Ensure the starter motor(s) control cables are disconnected by the generator vendor/mechanic prior to Zero Energy Isolation install. Fold cables and tie-wrap together if necessary to ensure cables do not pull out of cap.

Follow the Zero Energy Isolation process.

Have isolation verified and complete Zero Energy Isolation permit. Lock key(s) in lockbox; verifier also ensures that keys are in the box.

Step 2

JBE Boxes with Blade Fuses

00:32

This isolation protects employees working on equipment downstream.

Isolation is provided by opening the knife switch. Tags are placed on the field wires identified with the instrument numbers at the terminal block.

Because the blade fuses are non-lockable, the door of the JBE box acts as the lockable point.

JBE boxes are typically located in the field, outside of restricted area E-houses. Therefore, it is necessary to lock the door of the JBE box to prevent unauthorized access and activation of the blade fuses.

Step 3

JBE Box continued

00:32

A copy of the Zero Energy Isolation permit will be attached to the door lock to indicate which circuits are locked out.

The permit is attached due to the door prohibiting visual inspection of which blades are closed or locked out.

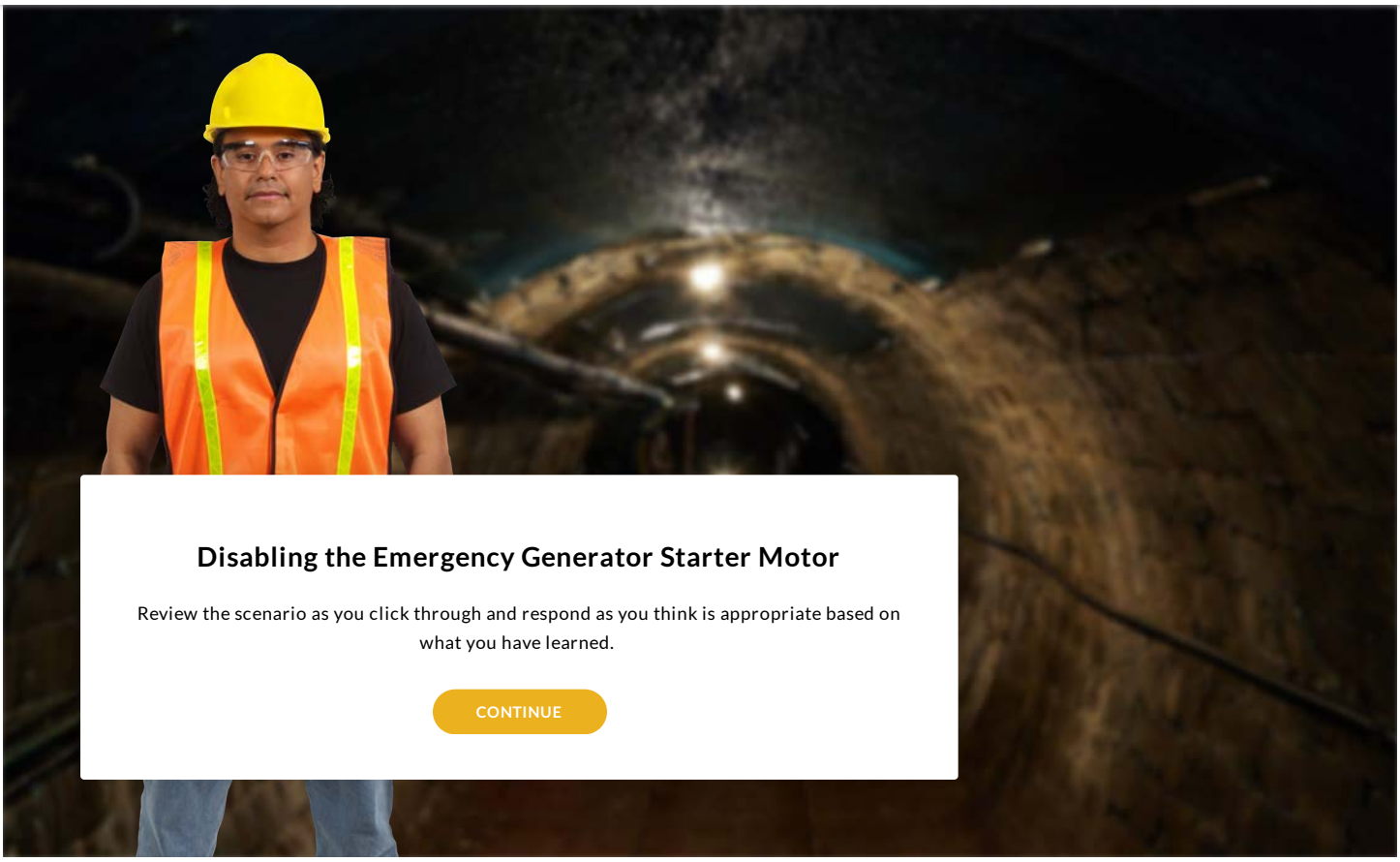
IMPORTANT! When permanent lifts or other alterations are made to the Zero Energy Isolation, the verifier must open the JBE box to check the tags and position of the blade fuses.

The verifier must also ensure a new updated copy of the permit is attached to the JBE box with each permanent lift or alteration.

Complete the content above before moving on.

Activity

Now, let's test your knowledge! *Click through the scenario below to handle each situation correctly.*



Scene 1 Slide 1

Continue → Next Slide

Scene 1 Slide 2

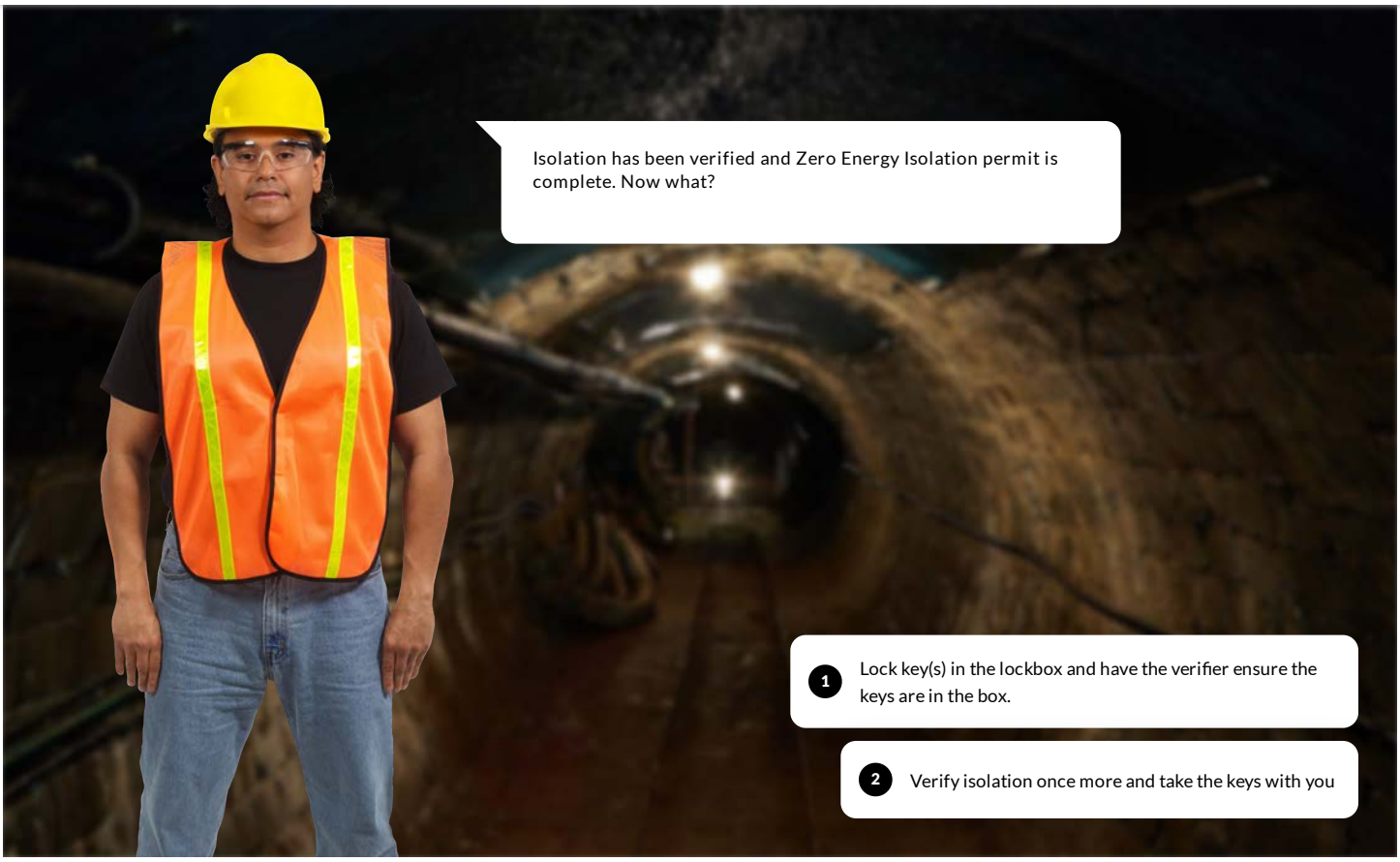
0 → Next Slide

1 → Next Slide

Scene 1 Slide 3

0 → Next Slide

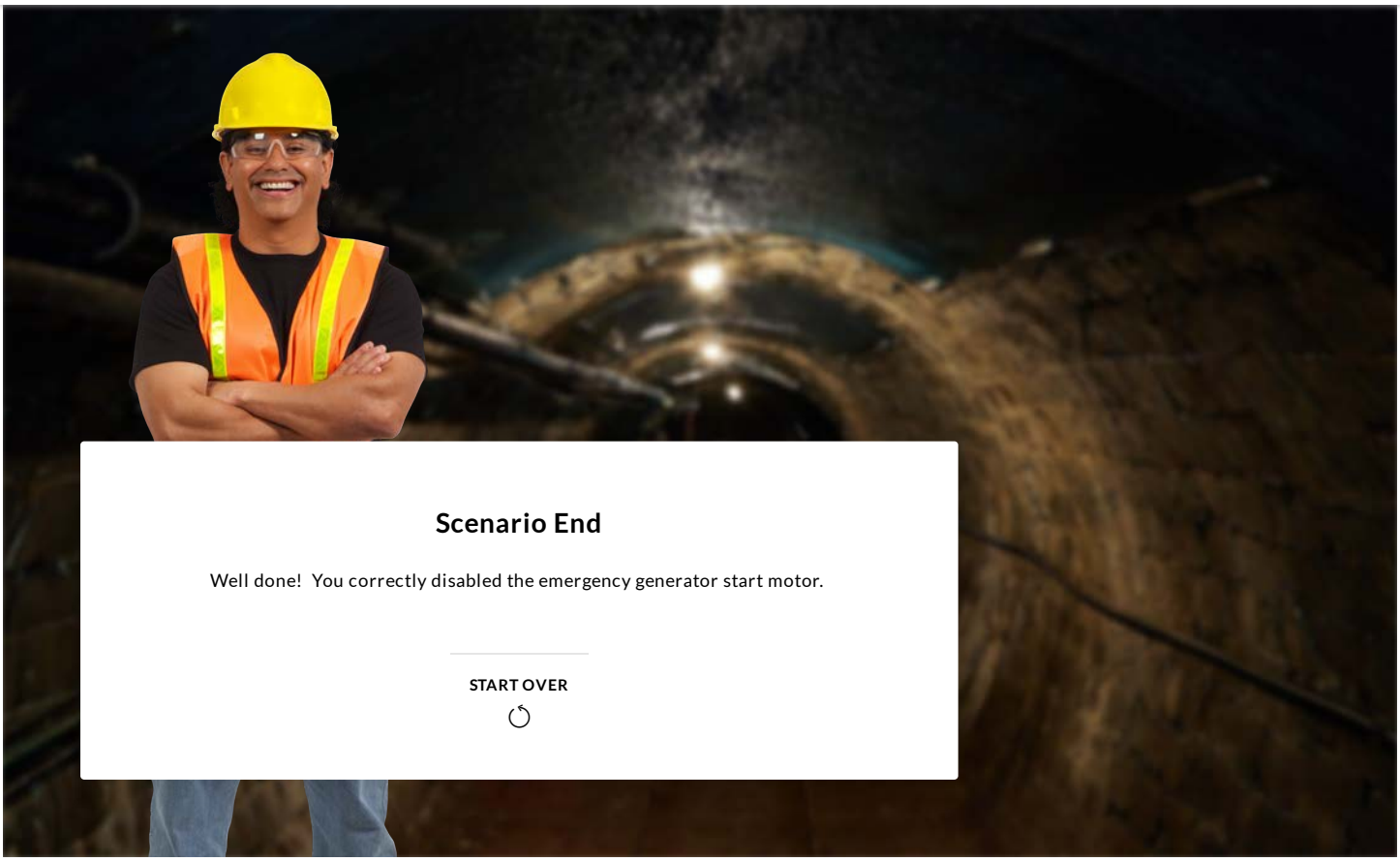
1 → Next Slide



Scene 1 Slide 4

0 → Next Slide

1 → Next Slide



Scene 1 Slide 5

Continue → End of Scenario

Complete the content above before moving on.

Question

Disconnect Switches isolate equipment but they do not break the load.

- ○ True

- ◯ False

SUBMIT

When energized electrical conductors, or circuit parts are placed in an abnormal condition where personnel may be exposed to electrical hazards, what needs to e completed? *Select all that apply.*

- ☐ Zero Energy Isolation Permit
- ☐ Energized Electrical Work Permit
- ☐ Electrical Circuit Analysis
- ☐ Energized Electrical Job Hazard Assessment

SUBMIT

If you throw the disconnect switch and it doesn't work, you should try again.

- ◯ True
- ◯ False

SUBMIT

It is not necessary to lock the door of the JBE box to prevent unauthorized access because they are always located in a restricted area.

- ◯ True
- ◯ False

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Controlling Hazards

00:05

Click play to begin the audio.

Objective

- Describe how to control electrical hazards

Complete the content above before moving on.

Risk Management

Click through the images below to learn more.

Use a Ground Fault Circuit Interrupter (GFCI) in industrial locations; this device protects you from electrocution

Unplug equipment correctly;
don't pull cord

Report any deficiencies
immediately

If a 'Do Not Operate' tag
is on a equipment,

DO NOT ATTEMPT A
START-UP. CONTACT AN
ELECTRICIAN!

Adhere to lockout requirements and work procedures

Complete the content above before moving on.

00:52

Click play to begin the audio.

Incident:

A worker received a fatal shock when he was cutting drywall with a metal casing router. The router's 3-wire power cord was spliced to a 2-wire cord and plug set which was not rated for hard service. A fault occurred, and with no grounding and no GFCI protection, the worker was electrocuted.

Source: OHSA

What do I do if I identify a hazardous condition?

When encountering a hazardous condition, take the following steps to contain the situation.

Check each box to demonstrate your understanding:

- [ ] Warn other employees if you find any unsafe electrical conditions
- [ ] Report unsafe electrical conditions immediately to your supervisor or an electrician so corrective actions can be taken
- [ ] Barricade the area with danger tape

- [ ] Do not attempt to repair the unsafe electrical condition yourself; only trained and qualified personnel are permitted to conduct electrical repairs

Complete the content above before moving on.

00:33

Click play to begin the audio.

Reduce Your Personal Risk of Shock

Check each box to demonstrate your understanding:

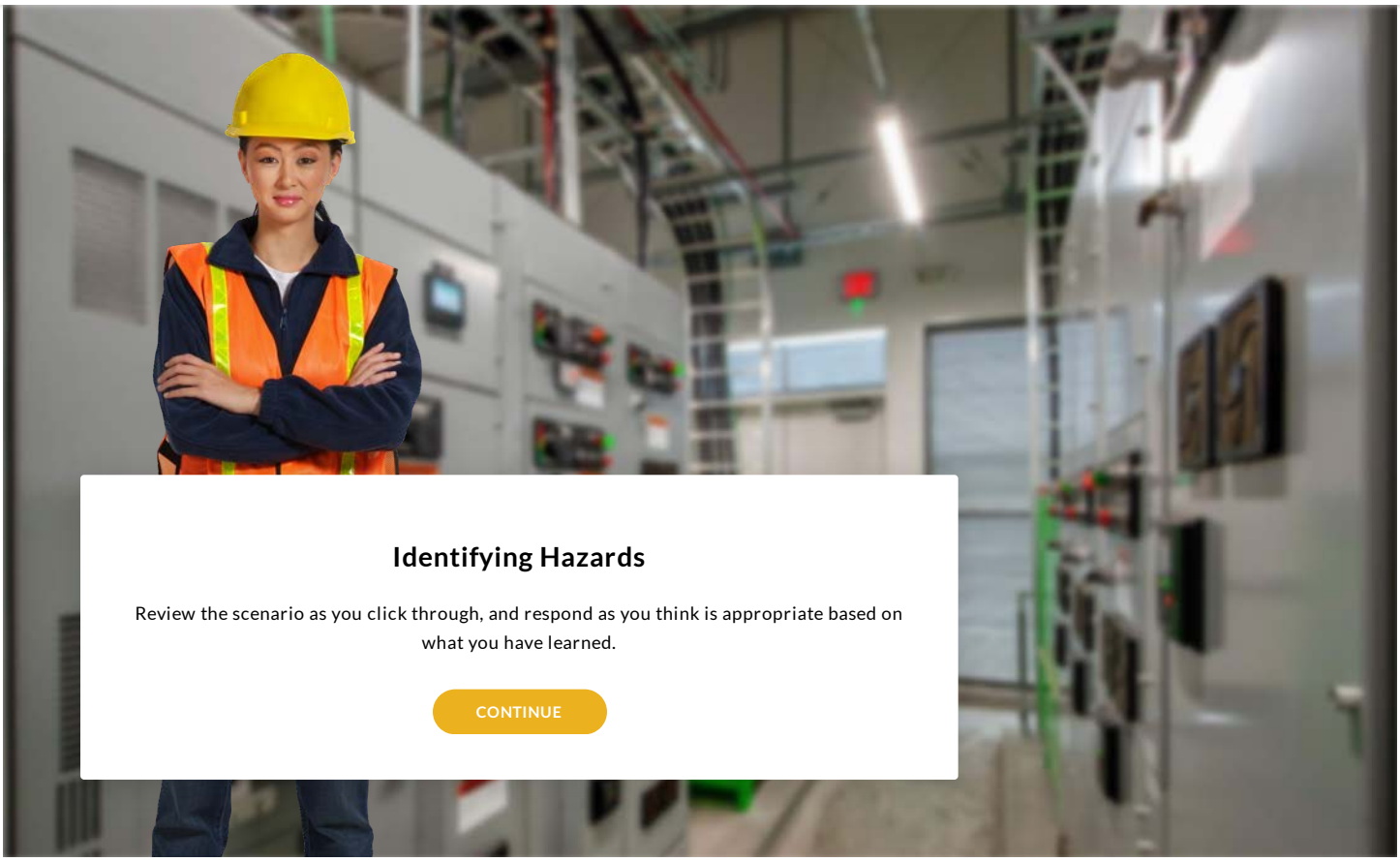
- [ ] Read and heed all warnings
- [ ] Do not enter a barricaded zone
- [ ] Report all incidents, no matter how minor they might seem
- [ ] Check that all extension cords, portable power tools, and task-specific lighting are in good condition and fit for use
- [ ] If unsure, consult with your supervisor
- [ ] Participate in post-job reviews to help us keep improving our procedures and assigned tasks

If in doubt, STOP!
Contact an electrician or your supervisor/coach immediately!

Complete the content above before moving on.

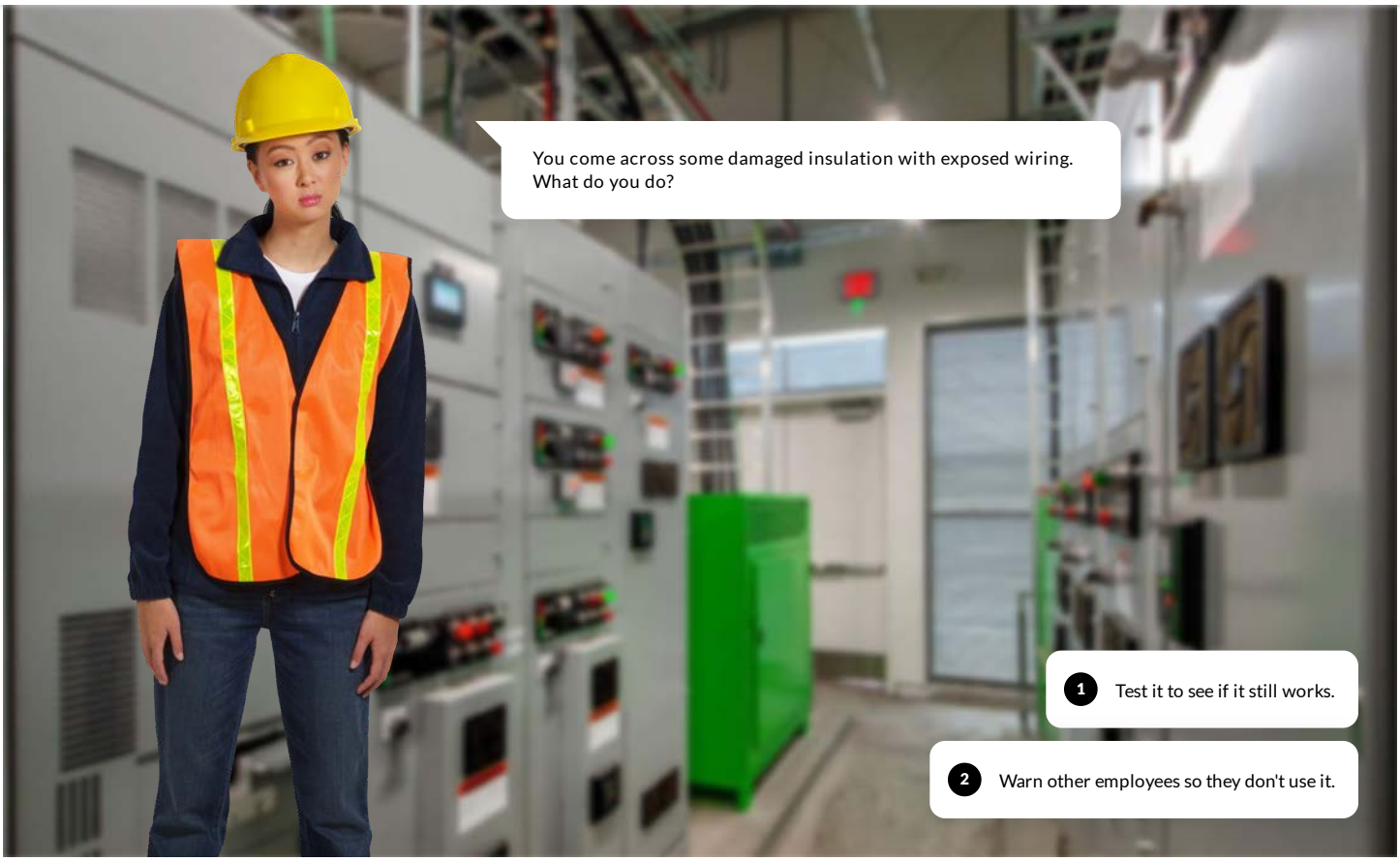
Activity

Now, let's test your knowledge! *Click through the scenario below to handle each situation correctly.*



Scene 1 Slide 1

Continue → Next Slide



Scene 1 Slide 2

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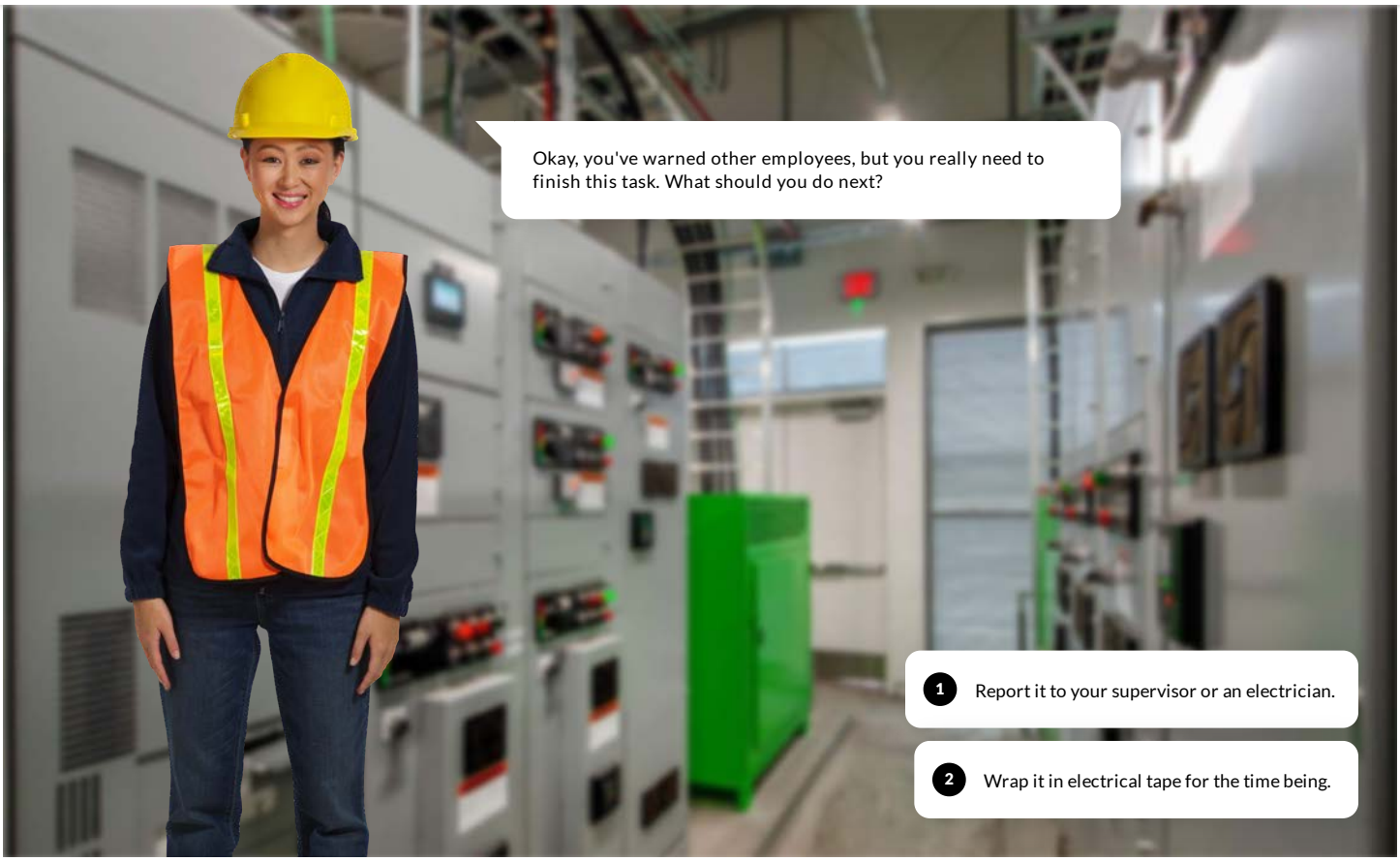
1 → Next Slide



Scene 1 Slide 3

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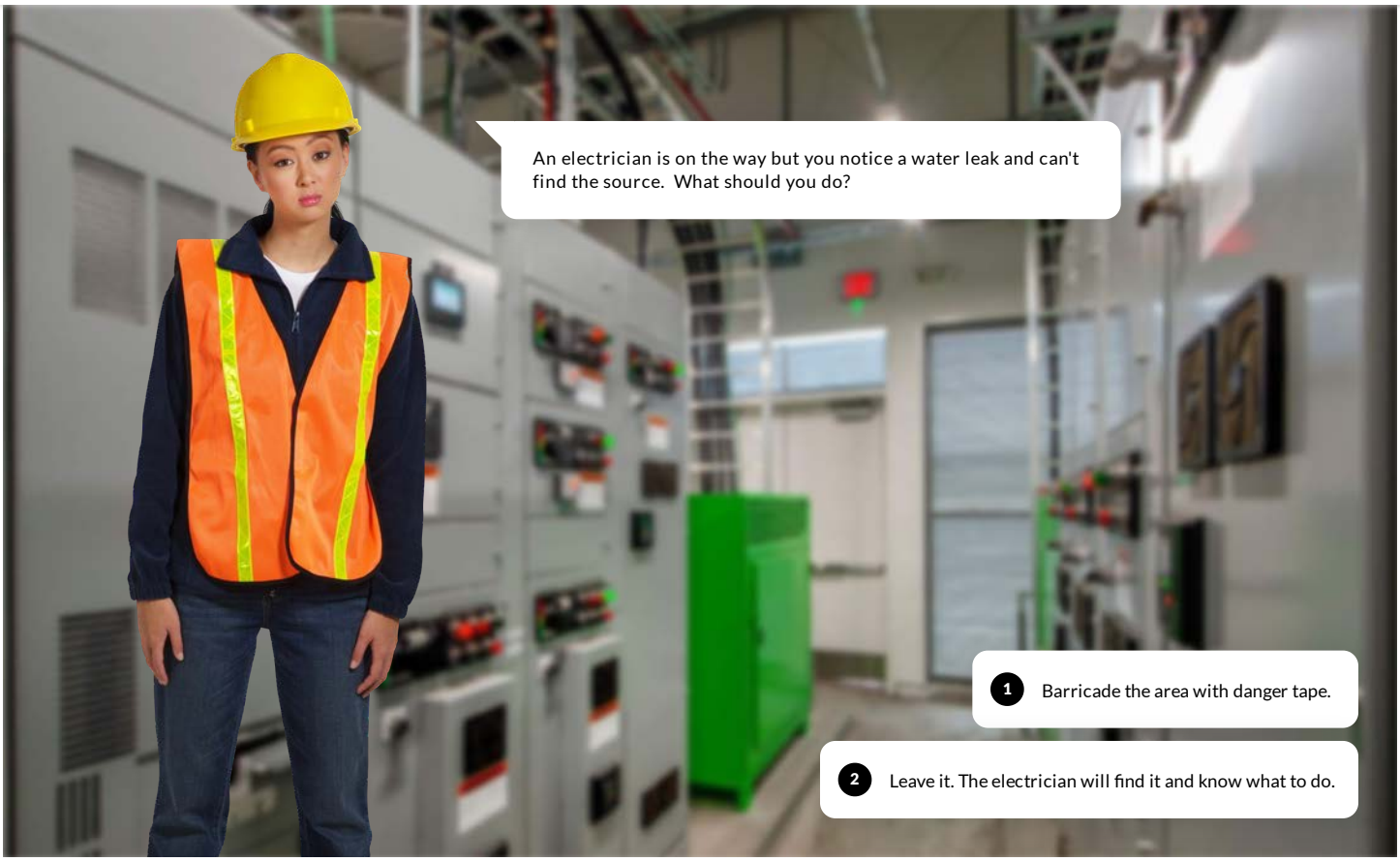
1 → Next Slide



Scene 1 Slide 4

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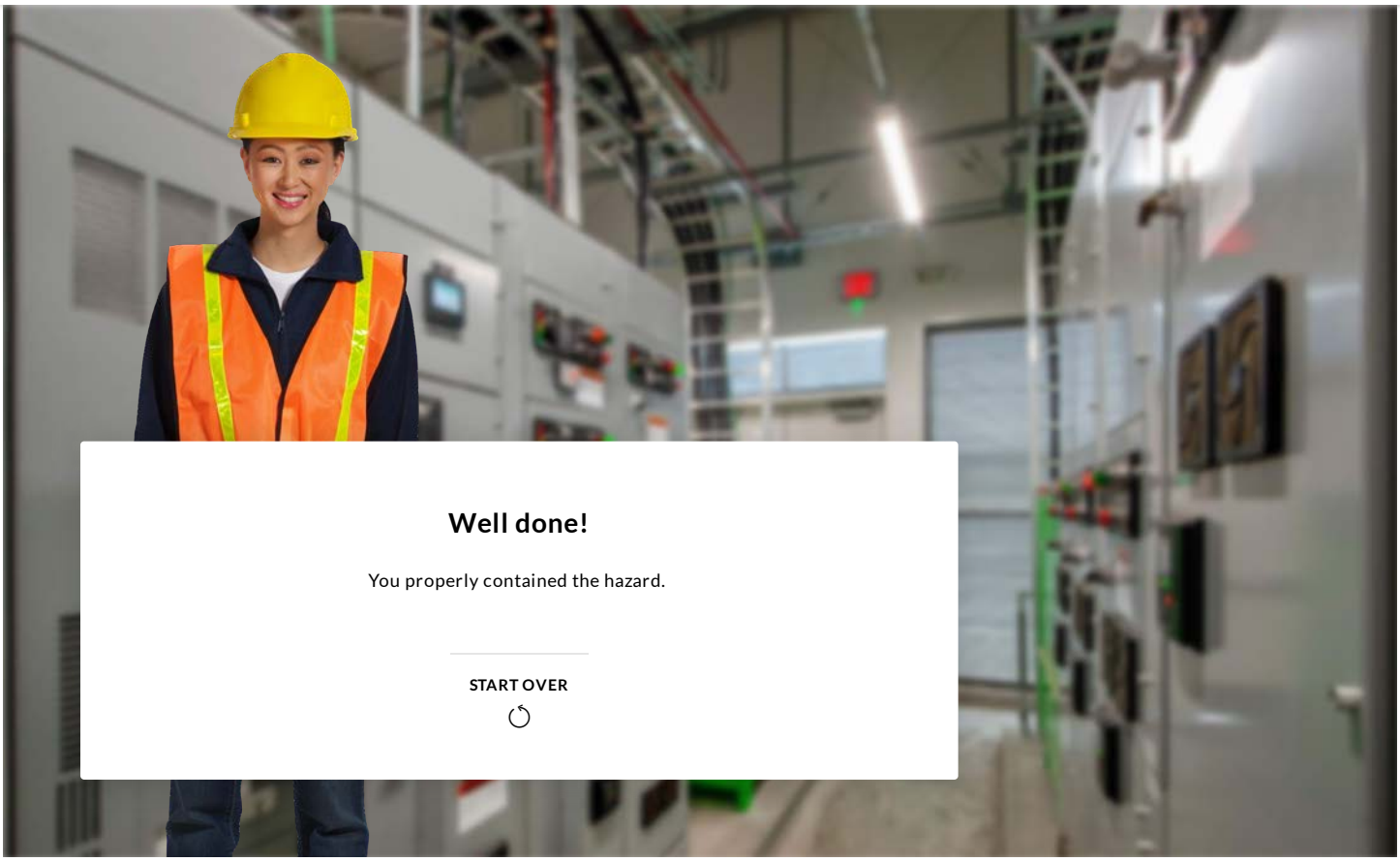
1 → Next Slide



Scene 1 Slide 5

Continue → End of Scenario

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Responding to Electrical Incidents

00:05

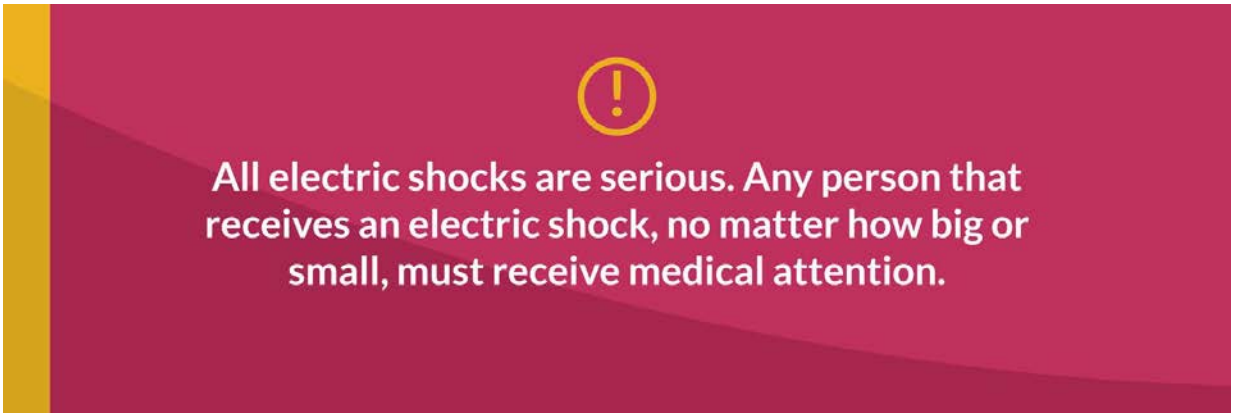
Click play to begin the audio.

Objective

- Describe how to respond to an electrical incident

Complete the content above before moving on.

Responding to an Electrical Incident



Response of Body to Electrical Incidents

Click on the markers below to learn more:

BODILY EFFECT	DIRECT CURRENT (DC)	60 Hz AC	10 kHz AC
Slight sensation felt at hand(s)	Men = 1.0 mA Women = 0.6 mA	0.4 mA 0.3 mA	7 mA 5 mA
Threshold of perception	Men = 5.2 mA Women = 3.5 mA	1.1 mA 0.7 mA	12 mA 8 mA
Painful, but voluntary muscle control maintained	Men = 62 mA Women = 41 mA	9 mA 6 mA	55 mA 37 mA
Painful, unable to let go of wires	Men = 76 mA Women = 51 mA	16 mA 10.5 mA	75 mA 50 mA
Severe pain, difficulty breathing	Men = 90 mA Women = 60 mA	23 mA 15 mA	94 mA 63 mA
Possible heart fibrillation after 3 seconds	Men = 500 mA Women = 500 mA	100 mA 100 mA	

BODILY EFFECT	DIRECT CURRENT (DC)	60 Hz AC	10 kHz AC
Slight sensation felt at hand(s)	Men = 1.0 mA Women = 0.6 mA	0.4 mA 0.3 mA	7 mA 5 mA
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Painful, unable to let go of wires	Men = 76 mA Women = 51 mA	16 mA 10.5 mA	75 mA 50 mA
Severe pain, difficulty breathing	Men = 90 mA Women = 60 mA	23 mA 15 mA	94 mA 63 mA
Possible heart fibrillation after 3 seconds	Men = 500 mA Women = 500 mA	100 mA 100 mA	

The bodily effect or imapct

00:05

The person that has received the shock MUST be accompanied to First Aid for immediate assessment.

BODILY EFFECT	DIRECT CURRENT (DC)	60 Hz AC	10 kHz AC
Slight sensation felt at hand(s)	Men = 1.0 mA Women = 0.6 mA	0.4 mA 0.3 mA	7 mA 5 mA
Threshold of perception	Men = 5.2 mA Women = 3.5 mA	1.1 mA 0.7 mA	12 mA 8 mA
Painful, but voluntary muscle control maintained	Men = 62 mA Women = 41 mA	9 mA 6 mA	55 mA 37 mA
Painful, unable to let go of wires	Men = 76 mA Women = 51 mA	16 mA 10.5 mA	75 mA 50 mA
Severe pain, difficulty breathing	Men = 90 mA Women = 60 mA	23 mA 15 mA	94 mA 63 mA
Possible heart fibrillation after 3 seconds	Men = 500 mA Women = 500 mA	100 mA 100 mA	

The Direct Current measured in milliamps

00:06

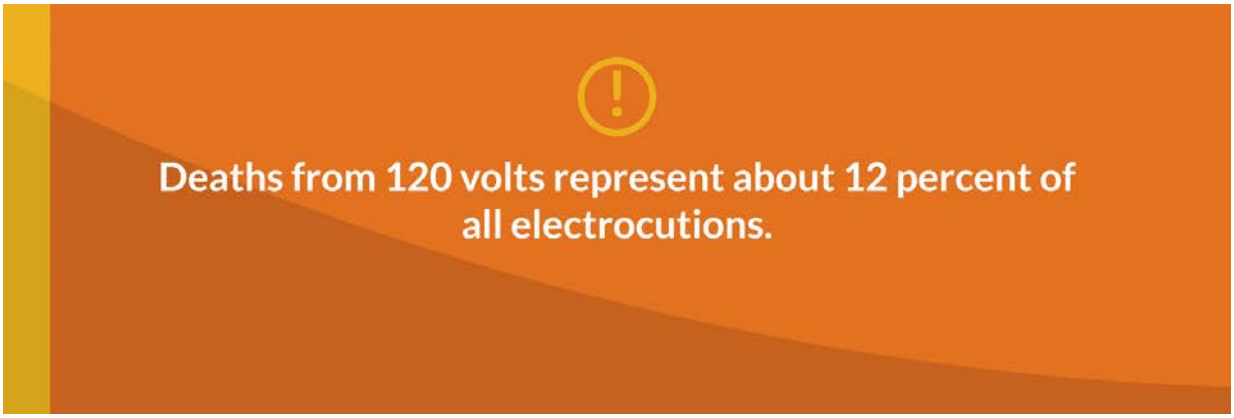
Currents greater than 75 mA can cause ventricular fibrillation (rapid, ineffective heartbeat).

BODILY EFFECT	DIRECT CURRENT (DC)	60 Hz AC	10 kHz AC
Slight sensation felt at hand(s)	Men = 1.0 mA Women = 0.6 mA	0.4 mA 0.3 mA	7 mA 5 mA
Threshold of perception	Men = 5.2 mA Women = 3.5 mA	1.1 mA 0.7 mA	12 mA 8 mA
Painful, but voluntary muscle control maintained	Men = 62 mA Women = 41 mA	9 mA 6 mA	55 mA 37 mA
Painful, unable to let go of wires	Men = 76 mA Women = 51 mA	16 mA 10.5 mA	75 mA 50 mA
Severe pain, difficulty breathing	Men = 90 mA Women = 60 mA	23 mA 15 mA	94 mA 63 mA
Possible heart fibrillation after 3 seconds	Men = 500 mA Women = 500 mA	100 mA 100 mA	

Standard Alternating Current

00:07

The current from a 7.5-watt, 120-volt lamp, passing across the chest, is enough to cause fatal electrocution.



Complete the content above before moving on.

00:48

Click play to begin the audio.

Electrical Burns

The most common burns are shock related, non fatal injuries. They occur when you touch electrical wiring or equipment that is improperly used or maintained. Typically, they occur on the hands and are very serious injuries that require medical attention.

If you come across a person who has received an electric shock:

- [ ] Assess the situation. Never put yourself at risk.
- [ ] Ensure that an electrician has disconnected the power supply before trying to help a victim of electric shock
- [ ] Assess the injuries and move the casualty to a safe area
- [ ] Seek urgent medical attention using the appropriate local emergency response communication methods
- [ ] Administer First Aid and CPR if trained and as required

All electric shocks are serious! Any person who receives an electric shock, no matter how big or small, must receive medical attention.

Complete the content above before moving on.

Question

Not all injuries from electrical shock require medical treatment, some you can treat yourself.

- ◯ True

- ◯ False

SUBMIT

When you encounter an individual that has received a shock, your first step should be to move them out of the area.

- ◯ True
- ◯ False

SUBMIT

Got a Question?

Submit your question here using Valeforms. Be sure to include your first name, last name, & contact information.

CLICK HERE!

Complete the content above before moving on.

Electrical Awareness Knowledge Check

You will now take an evaluative test regarding the content of this training.

In order to receive credit for this training, you need to pass the following quiz with a score of 70% or better.

Good luck.

Question

01/12

How can electricity cause a fire?

- [ ] Overheating of equipment
- [ ] Regular maintenance and operational practices
- [ ] Overheating of circuits
- [ ] An arc blast

Question

02/12

It is fine to use conductive equipment or tools around batteries.

- ◯ True
- ◯ False

Question

03/12

Avoid using an MCC Starter when:

- [ ] Water is present in the area
- [ ] Door is closed
- [ ] Handle is broken
- [ ] All of the above

Question

04/12

Up to what temperature can be attained in an arc flash?

- 3,500°F
- 35,000°F
- 2,500°F
- 25,000°F

Question

05/12

Sound waves levels from an arc blast can reach what decibel?

- 100 - 110 dB
- 260 dB
- 140 - 160 dB
- 130 dB

Question

06/12

Arc flash injuries include which of the following?

- [ ] Electric shock
- [ ] Blindness
- [ ] Shrapnel wounds
- [ ] Organ failure
- [ ] Severe burns

Question

07/12

A **prohibited boundary** is as close as an unqualified person may approach an exposed live part.

- ◯ True
- ◯ False

Question

08/12

When performing an Energized Electrical task, an EEJHA must be filled out after executing the work task.

- ◯ True
- ◯ False

Question

09/12

The Electrical Hazard Assessment comprised of both a shock and arc flash hazard analysis is required in order to establish what?

- [ ] How to operate a Disconnect Switch
- [ ] Boundaries of Approach
- [ ] Selection of appropriate PPE
- [ ] Zero Energy Isolation

Question

10/12

What is an overload?

- An electrical device used to isolate equipment.
- A device used to protect equipment from damage due to overheating by opening the circuit.
- Materials through which electrical current can move freely.
- An injury that occurs when you touch electrical wiring or equipment that is improperly used or maintained.

Question

11/12

If you come across a person that has received an electric shock you should:

- [ ] Assess the injuries and move the casualty to a safe area
- [ ] Ensure the power supply is disconnected
- [ ] Seek urgent medical attention
- [ ] Administer First Aid and CPR if trained and as required

Question

12/12

Any person that receives an electric shock, no matter how big or small, must receive medical attention.

- ◯ True
- ◯ False

Electrical Awareness Summary

00:31

Click play to begin the audio.

You should now be able to:

- Recognize electrical hazards and understand how to eliminate, remove, and prevent electrical hazards in the workplace
- Discern the extreme importance of observing all electrical safety requirements and practices related to Arc Flash
- Understand electrical safety while performing equipment trips and resets
- Identify electrical hazards for opening and closing disconnect switches
- Know how to respond to electrical incidents

Congratulations

You have completed the electrical awareness for the non-electrical person section of this course.

Complete the content above before moving on.

Conclusion

00:19

Click play to begin the audio.

Congratulations! You have completed this course.
You should now be able to:

- **Describe general safety procedures at the concentrator complex**
- **Explain how to handle hazardous materials**
- **Describe electrical precautions and procedures**

If needed, you can review any part of this course again to gain a better understanding of these tasks.

Online Training Survey
Submit your evaluation here using Valeforms.
All submissions are anonymous. Thank you.

CLICK HERE!

Thank you for completing the Vale Online Module Training.

Complete Your Module Validation

PLEASE CLICK HERE