24-hour Hazardous Waste Site Worker Review Guide

Copyright © 2023

Midwest Consortium for Hazardous Waste Worker Training

Acknowledgments

The Midwest Consortium developed this guide for participants in the 24-hour site worker program for Hazardous Waste Workers under cooperative agreement number U45 ES 06184 from the National Institute of Environmental Health Sciences.

We encourage you to comment on these materials. Please give your suggestions to those leading the program in which you are now enrolled, or click on 'contact us' at https://mwc.umn.edu.

Warning

The Midwest Consortium has copyrighted this material. A recipient of the material, other than the Federal Government, may not reproduce it without permission of the copyright owner. The material was prepared for use during off-site training of site workers, as required in 29 CFR 1910.120. Authors of this material have prepared it for the training of this category of workers as of the date specified on the title page. Users are cautioned that the subject is constantly evolving. Therefore, the material may require additions, deletions, or modifications to incorporate the effects of that evolution occurring after the date of this material preparation.

For each major topic in the program, key terms are provided for you to define and describe why the idea is important to safe site work; these are followed by review questions. The topics follow, taken from titles of sessions on the program agenda:

Table of Contents

Rights and Responsibilities

Key Terms

Define each of these terms and THEN

Describe why the agency/idea may be important on a hazardous waste site:

- SARA
- OSHA
- HAZWOPER
- OSHAct
- Worker rights
- Filing a complaint
- Worker responsibilities
- Employer responsibilities
- OSHA form 300A
- EPA
- DOT

- USCG
- NRC
- National Oil and Hazardous Substances Pollution Contingency Plan (NCP)
- Hazardous Materials Transportation Uniform Safety Act (HMTUSA)
- TSCA
- RCRA
- CERCLA

Review Questions

1. How is HAZWOPER related to SARA?

2. List thirteen employee rights under the OSHAct.

3. List five worker responsibilities under the OSHAct.

4. List four employer responsibilities under the OSHAct.

5. Where can you find more information about rights and responsibilities?

6. For each of the following questions, answer true (T) or false (F).

T or F The EPA studies and regulates environmental quality including air, water, and land resources of the U.S.

T or F The DOT regulations and guidance cover interstate transport of hazardous materials.

T or F State-run OSHA programs are not monitored by federal OSHA.

T or F RCRA does not apply to underground storage tank (UST) installation, operation, or removal.

T or F HMTUSA regulates cleanup of hazardous material spills on waterways

T or F The requirement to establish worker safety and health standards for hazardous waste operations and emergency response is mandated in SARA.

Toxicology and Health Effects

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Exposure
- Response
- Acute
- Chronic
- Routes of entry
    - Inhalation
    - Skin absorption
    - Ingestion
    - Injection
- Dose

- Exposure-response
- Dose-response
- Local effect
- Systemic effect
- Target Organ
- Carcinogen
- Mutagen
- Reproductive toxicity
- Teratogen
- Sensitizer
- Aspiration
- Concentration
    - ppm
    - mg/m3
    - f/cc
- IDLH
- PEL
- TLV
- REL
- C
- STEL
- TWA

- Biological Exposure Standards
- BEI
- Exposure record
- Medical Surveillance

Review Questions

1. Describe the effect on the eyes of an acute exposure to corrosives.

2. Name four target organs and a chemical exposure that might affect each target organ.

3. Name the four routes of entry of chemicals into the body.

4. Name the two areas of the body that absorb the most chemicals through the skin.

5. Describe the difference between an acute and a chronic exposure to carbon monoxide.

Give an example of a situation that is a chronic exposure to carbon monoxide.

Give an example of a situation that is an acute exposure to carbon monoxide.

6. Show a local effect and a systemic effect of exposure to a solvent.

7. You have been cutting structural steel painted with lead-based paint so that the pieces can be recycled. You are late for the lunch break. Time is short, so you go get your lunch box and join coworkers.

What route(s) of entry may put you at risk of exposure to a hazard?

What route(s) of entry may put co-workers at risk of exposure?

What route(s) of entry may put your family at risk of exposure?

What actions could you have taken to reduce exposure?

8. Exposure monitoring has been conducted in your work area. List two actions you should take.

You learn that exposure is 1 ppm. What resource can you use to help understand this measure of concentration and any possible effect that might be related to a 1 ppm exposure?

9. Five drums of asbestos were breached during excavation and your employer wants you to have a medical exam of your chest.

   Is this exam required by HAZWOPER?

   During the exam, shrapnel from an injury during service in Iraq is found in your upper arm.

   Can the information be provided by the physician to your employer?

   Why?

10. List four reasons that medical surveillance is important

PPE – Introduction and RPE

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Personal protective equipment
- Hierarchy of controls
- PPE program
- Don and doff
- APR
- ASR
- Full facepiece

- Half facepiece
- Particulate filters
- N, R, P filters
- Chemical cartridges
- End-of-service-life
- PAPR
- Single-use respirator
- SAR
- SCBA
- Positive pressure SAR
- Escape bottle
- Qualitative fit testing
- Quantitative fit testing
- Positive-pressure user check
- Negative-pressure user check
- Assigned Protection factor
- Fit Factor
- Maximum Use Concentration
- Respiratory Protection Program
- Medical fitness to wear a respirator
- Respirator training

Review Questions

1. Describe the hierarchy of controls.

   Where is PPE on the hierarchy of controls?

2. List 10 elements of a PPE program. Why is each important?

3. What are the two most important factors in assuring that respirators or clothing provide PROTECTION?

4. List five situations where respiratory protection would be required.

5. For each situation above in 4, specify if a single use, APR with half-face, APR with full-face or SAR is appropriate.

6. List two advantages of qualitative fit testing.

   List two advantages of quantitative fit testing.

7. What is 'NIOSH approval' for respirators?

   How can you determine if a respirator is NIOSH approved?

8. If APRs are used, what must be known about the work or area?

9. How often are each of the following done:

   medical exam for respirator use?

   fit testing?

   user fit checks?

10. What is a safe O_2 range to use a PAPR?

11. Mark the important parts of the unit shown above.

12. Explain the importance of respirator

    Cleaning

    Storage

    Inspection

    Maintenance

13. List eight topics that must be included in a written respiratory protection program.

14. Why are medical exams required to use a respirator?

15. List three reasons that site-specific respiratory protection training required?

PPE – CPC and Other Protective Gear

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Totally encapsulating chemical-protective suit (TCEP)
- Partially encapsulated chemical-protective suit (PECP)
- Disposable suits
- Hazard assessment
- Chemical resistance
- Physical integrity
- Resistance to temperature extremes

- Ability to be cleaned
- Cost
- Flexibility
- Size
- Design
- Level A protection
- Level B protection
- Level C protection
- Level D protection
- Penetration
- Permeation
- Degradation
- High-Temperature Clothing
- Arc Flash Protection

Review Questions

1. What is the main purpose of CPC?

2. When would PECP be chosen over TECP?

3. List eight considerations in a hazard assessment to select CPC. Show why each is important.

4. Describe a worksite activity requiring each of the following:

   Level A

   Level B

   Level C

   Level D

5. List three areas on a CPC ensemble of full-body suit and gloves where penetration can occur.

6. Can you determine degradation of CPC visually? Why?

7. List 5 factors that affect permeation.

8. List 6 reasons to inspect CPC or RPE.

9. Why is it essential to know the chemicals used to select an appropriate chemical-resistant gloves?

10. Describe 6 precautions when wearing PPE.

11. CPC test for gas leakage showed 0.75%, did it pass?

12. List three types of PPE aside from RPE and CPC that may be required.

Chemical Properties

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Boiling point (BP)
- Vapor pressure (VP)
- Specific Gravity (Sp.Gr)
- Flash point (Fl.P.)
- Relative gas density (RGasD)
- Acid
- Base
- pH
- Organic chemical

- Inorganic chemical
- Solvent
- Incompatible chemicals
- Reactive materials
- Flammable
- Combustible
- Ignitable
- Explosive Limits
- Lower Explosive Limit (LEL)
- Upper Explosive Limit (UEL)
- Fire tetrahedron
- Chemical chain reaction
- Oxidizer
- Reducing agent
- Spontaneous combustion
- Explosion
- Combustible dust explosion
- Radioactive material
    - Alpha

  - Beta
  - Gamma
  - Neutron
- Biological hazards
- CAS number

Review Questions

1. What is the range of the pH scale?

2. List three compounds with low pH.

   What word characterizes compounds with low pH?

3. List three compounds with high pH.

   What word characterizes compounds with high pH?

4. Give two examples of the result of a chemical reaction.

5. What four elements are necessary for a fire to burn?

6. Describe the three potential results of improper storage of chemicals.

7. Describe an important resource for finding properties of a chemical.

8. List three uses of chemical property information to evaluate risks from exposure/use.

9. List two reasons that ionizing radiation is a concern.

10. List two concerns in each of these categories of biological hazards

    Plants

    Insects

    Animals

Material Identification, Physical and Safety Hazards

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Hazard Communication, 29 CFR 1910.1200
- HCS2012
- Safety Data Sheet (SDS)
- Pictograms
- Hazard class
- Signal word
- Precautionary statement
- NFPA-704 system
- HMIS system

- Emergency Response Guidebook
- DOT Placard and Label system
- Pesticide label
- Infectious waste label
- Radioactive source label
- Shipping Papers
- Bill of Lading
- Manifest form
- Waste Profile Sheet
- Physical and Safety Hazards at/on
    - ponds and lagoons
    - confined spaces
    - level surfaces
    - heights
    - energized equipment
    - moving machinery/vehicles
    - buildings
    - maintenance
- Ergonomics
- dB
- Heat exposure
- Cold exposure

Review Questions

1. Name one feature unique to

   HCS2012 label

   HMIS label

   NFPA label

   DOT placard

   Infectious waste label

   Radiation source label

2. List the sixteen parts of an SDS.

3. In 2, above,

   Underline the part(s) of the SDS that help you find health hazards.

   Circle the part(s) of the SDS that help you find safety hazards.

   Put a * beside part(s) of the SDS that help you find controls for hazards.

4. What is the source of information regarding the contents of hazardous waste being transported by air, rail, sea or road?

5. Confined spaces can be particularly hazardous. Identify four hazards that could occur in confined space work.

6. The most frequent workplace fatalities occur during driving. What are four activities during hazardous waste site work that pose a risk of injury during operation of a vehicle?

7. Describe the loudest noise you have heard.

   Was this at work, or away from work?

8. Think about safety hazards at prior jobs. List four safety hazards you have observed that might also be present at a hazardous waste site.

9. List the four types of heat-related illness. Which is the most serious?

10. List three work situations where cold exposure might put a worker at risk of injury on a hazardous waste site.

Monitoring

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Detect
- Measure
- Concentrations
- Units of concentration
- Oxygen-deficient atmosphere
- Oxygen-enriched atmosphere
- Lower Explosive Limit
- Upper Explosive Limit

- Explosive Range
- Corrosivity
- Compatibility testing
- Air sampling
- Soil sampling
- Water sampling
- Surface sampling
- Sampling plan or protocol
- Direct-reading instruments
- Personal monitoring
- Calibration
- Chain of custody
- pH paper
- Compatibility testing
- Oxygen/Combustible Gas/Combination Instruments
- Colorimetric tubes
- Personal Alarms
- Hydrocarbon Detectors
- Flame Ionization Detectors
- Radiation Exposure Monitoring
- Noise Monitoring
- Personal Monitoring for Organic Vapors

- Personal monitoring for particles, fibers
- Area air monitoring
- Water Sampling
- Soil Sampling
- Surface Contamination Sampling
- Monitoring at an emergency

Review Questions

1. Show five activities that trigger OSHA-required air monitoring at a hazardous waste site.

2. During site preparation, a pool of liquid has been found in an existing trench. There is an odor according to two of the four-person team that discovered it; the other team members reported no odor. One worker who smelled it, is now vomiting.

   Would you use device(s) to detect a substance? Why?

   Would you take device(s) to measure the concentration? Why?

3. List 4 media in/on which toxic chemicals might be detected or measured.

4. Provide at least five reasons to have a sampling plan.

5. Give an example of

   oxygen-deficient atmosphere.

   oxygen-enriched atmosphere.

   potentially explosive atmosphere.

6. List four reasons that for training prior to using monitoring equipment.

7. The combustible-gas indicator gives a reading of 0%. What are the possible reasons for this reading?

8. When would you choose to use an FID vs PID instrument?

9. Show the device/method you would use to measure/collect each of the following:

- LEL
- IDLH
- TWA
- acidity
- alpha radiation
- dBA
- organic vapor at an unintended release
- dusts during a work shift
- water in a surface pond
- water in a sampling well
- below surface soil sample
- tool contamination

10. List three advantages of real time (direct reading) monitoring.

11. List three advantages of sampling requiring laboratory analysis.

Decontamination

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Site-specific Health and Safety Plan (HASP)
- Decontamination
- Work zones
- Hot Zone/Exclusion Zone/Danger Zone
- Warm Zone/Contamination Reduction Zone/Decontamination Zone
- Cold Zone /Support Zone/Clean Zone
- Contamination Reduction Corridor
- Decon Line
- Physical removal

- Chemical removal
- Rinsing off
- Disinfecting/sterilizing
- Effectiveness of decon
- Emergency decon line

Review Questions

1. List four justifications to plan for decon.

2. List six ways you can help prevent contamination.

3. What is the overall goal of decontaminating the following:

   - PPE

   - personnel

   - equipment/supplies

4. List the three work zones, and for each show

   - at least two activities that would be conducted there, and
   - at least one consideration as to where to place the zone at the site.

   - a.

   - b.

   - c.

5. Where do you find the layout of the decon line and the procedures to be used at your site?

6. List four decon methods and show why/when each might be used.

7. List four methods to evaluate the effectiveness of decontamination without destroying the PPE.

8. Describe two problems that might occur when decontaminating tools with wooden handles.

9. What level of protection is worn by the workers performing decontamination of those who have been working in the hot zone?

10. List six safety considerations during decon.

11. List four considerations when a worker in the hot zone goes down due to heat illness, and must be brought for emergency medical treatment.

Work Practices

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Safety and Health Plan
- Standard Operating Procedure (SOP)
- Standard Operating Guide (SOG)
- Buddy system
- Permit-required confined space
- Lock-out/tag-out
- Explosive or shock sensitive wastes
- Lab pack
- Drum staging

- Spill containment program
- Confinement
    - Diking
    - Blocking
    - Absorption
    - Collecting
- Confinement
    - Plugging
    - Patching
    - Overpacking
- Illumination
- Sanitation at temporary workplaces

Review Questions

1. List five reasons why SOPs are required as part of the Safety and Health Plan.

2. List seven essential elements included in a work practice SOG.

3. Why is site-specific training needed to conduct work safely?

4. What are the criteria for a Permit-required confined space?

   Is every confined space a permit-required confined space?

   Give an example for each of the following:

   A confined space becomes a permit-required confined space;

   A permit required confined space no longer requires a permit.:

5. List three reasons why post-entry permit-required confined space entry procedures are important.

6. List three injuries that will be prevented by adherence to lock-out/tag-out.

7. Name two types of drums and the expected contents (based on shape/material of construction).

8. What are six types of information collected during drum inspection?

9. You are assigned to a team to move drums from an abandoned storage building to pallets for transport. What are six practices that will help assure this is done safely and with minimal risk of exposure to the contents of the drums?

10. You've found an unmarked drum at the far end of the perimeter of the site. What is the first action you take?

11. Describe two scenarios where working with a drum might result in contaminated PPE. For each, what do you do?

12. You discover a spill from a drum that is fed at a slow rate. How would you proceed as a Hazwoper-trained employee?

13. You are going to plug a leak in a drum that appears to have good structural integrity. List five considerations before you do this work.

14. List four hazards of inadequate illumination.

15. Why is sanitation important at a hazardous waste site?

Hazard Control

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Hierarchy of controls
- Elimination
- Substitution
- Modify the process
- Contain the contaminant
- Ventilation
- Engineering controls
- Administrative controls
- Safety and Health Program

- Comprehensive work plan
- HASP
- Site Characterization
- Site Control Program
- Spill containment program
- New technologies

Review Questions

1. In the hierarchy of controls, why is elimination preferred and PPE the last resort?

2. What are three examples of Administrative controls?

3. List four examples of engineering controls?

4. List the seven parts that must be included in the safety and health program and describe at least two items included in each part.

5. Site characterization provides information for decision making. Give an example of how site characterization could be used to determine PPE for workers setting the perimeter fence.

6. When is site characterization complete?

7. Identify a hazard that could be controlled by elimination?

8. Identify a hazard that can only be controlled by use of PPE?

9. Why is site control important?

   List elements of a site control plan.

10. What additional training and experience is required following this 40 hour course?

    Why is this important?

11. Draw stick figures for hand signals for the three situations below:

In trouble cannot finish out of air

12. Is it possible to eliminate all the hazards on a worksite?

13. Is it possible to control identified hazards on a worksite?

14. What are the four parts of a spill containment plan?

15. A new technology for treatment of sludge has been developed at a local engineering firm, and they would like to test it at the site. What is needed?

Emergency Response

Key Terms

Define each of these terms and THEN

Describe why the property/idea may be important on a hazardous waste site:

- Emergency
- Emergency Response Plan (ERP)
- Emergency Action Plan (EAP)
- Emergency Alerting Systems
- Incident Command System (ICS)

- Incident Commander
- Safety Officer
- Liaison Officer
- Public Information Officer
- Operations Officer
- Planning Officer
- Logistics Officer
- Finance Officer
- Unified Command
- Local Emergency Planning Committee
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- State Emergency Response Commission

Review Questions

1. What is the difference between how a worksite is organized if there is an ERP compared with an EAP?

2. List the 11 elements of an ERP.

3. List the 6 elements of an EAP.

4. List three procedures that assure operation or recognition of the alarm in the alerting system.

5. What is the first, second and third priority in any emergency?

6. For each of the eight personnel roles in the ICS shown in Key Terms, provide at least one duty.

7. Where do you find information on training required for members of the Emergency Response Team?