

# Waterway Debris Remediation General Safety Awareness



Developed by **HMTRI** through cooperative agreement  
# 2 U45 ES006177-14 with NIEHS under the Worker Safety and Health Training  
Support Annex



## Overview

- Introduction
- Ship breaking Hazards
- PPE
- Materials Handling
- Hot Work
- Hazardous Materials
- Additional Safety Precautions
- Summary





## Objectives of this training - At the end of this short session, you should be able to:

1. Identify the hazards in the field
2. Explain how to protect yourself from these hazards
3. Increase safety and health awareness





## Hazards may include:

- Impact (falling objects, struck-by hazards, impact tools)
- Puncture and cuts (tools, knives, slag, nails, wire rope, sheet metal)
- Compression/Crushing (gears, struck-by hazards, shifting loads)
- Chemical (solvents, corrosives, paints, fumes)
- Heat/Cold (welding, burning, environmental temperatures)
- Burns (thermal, chemical)
- Vibration (pneumatic tools)
- Dust (heavy metals, silica)
- Light (optical) radiation (arc welding, lasers)
- Excessive noise (abrasive blasting, needle gunning, scaling, grinding, metal straightening)
- Falling (from elevations, into water)
- Drowning





## PPE Selection

- Identifying the potential hazards
- Determining the types of protective equipment available for the present hazards
- Evaluating the effectiveness of the PPE
- Selecting appropriate protective equipment
- Providing a variety of sizes to properly fit all users
- Selecting equipment that is compatible with other PPE





## Types of general work personal protective equipment include:

- Head Protection
- Eye and Face Protection
- Foot Protection
- Hearing Protection
- Respiratory Protection
- Hand and Body Protection
- Lifesaving Equipment and Personal Flotation Devices (PFDs)
- Personal Fall Protection Equipment





## Head Protection

Head injuries may be caused by falling or flying objects, or by bumping the head against a fixed object.

Protective helmets must do three things:

- Resist penetration
- Absorb the shock of a blow
- Protect against electrical shock
- Head injuries may be prevented by the selection and use of appropriate head protection.





## Use of Head Protection

### Potential Hazards:

- Head trauma due to contact with falling objects
- Electrical shock or burns due to contact with exposed electrical conductors
- Various head and neck injuries due to the striking low overhead objects (for example piping, I-beams)







## Eye and Face Protection

- **Safety glasses with side shields**
- **Wrap-around safety glasses.**
- **Safety goggles.**
- **Welding hood.**





## Eye and Face Protection

**Potential Hazards:** Eye and face injuries may result from:

- Contact with flying particles, molten metal, chemicals, welding arc, lasers or radiant energy (such as bright light, UV, infrared)
- Not wearing safety glasses when welding shields are raised to inspect welds or use chipping hammer
- Equipment failures due to not meeting nationally recognized standards
- Additionally, obscured vision due to dirty or scratched lenses may cause workers injuries (such as trips, falls, struck-by, collisions).





## Foot Protection

Workers may be at risk of crushing injuries due to contact with falling or rolling objects; as well as punctures from sharp objects.

Additional hazards include contact with:

- Electrical or electricity
- Molten metals
- Hot surfaces
- Chemicals
- Wet or slippery surfaces
- Injuries may be prevented by the use of appropriate footwear.





## Use and Selection of Foot Protection

**Potential Hazards:** Workers may be exposed to injuries including:

- Crushing from falling objects,
- Crushing from rolling cylinders,
- Punctures from sharp objects,
- Burns or shocks from electrical hazards,
- Burns from molten metal or hot surfaces,
- Skin contact or burns from chemicals, or
- Slips and falls from wet or slippery surfaces.



## Hearing Protection



Workers exposed to excessive noise must use appropriate PPE including ear plugs, muffs, or both when engineering or administrative controls are not feasible to reduce exposure.

Hearing protection is part of a hearing conservation program, which is required when noise exposure exceed the action level [85 decibels on the A scale (dBA)].





## Selection and Use of Hearing Protection

### Potential Hazards:

Some operations in the shipyard produce excessive noise, which may lead to hearing loss. Some of the loudest ship repair operations include:

- Abrasive blasting
- Needle gunning
- Scaling
- Grinding
- Metal straightening
- Carbon Arcing/Arc gouging
- Pneumatic pumps
- High-pressure steam or water cleaning
- Ventilation equipment





## Respiratory Protection

Respiratory protection is used to protect workers from the effects of toxic, corrosive, or irritant vapors; and gases, dusts, mists, fumes, and fibers when engineering controls are not adequate or feasible.

Respirators used can range from simple disposable dust masks to more complex supplied air respirators.



**Clean respirator**



**Improper practice:  
Dirty respirator.**



## Requirements for Respirators

**Potential Hazards:** Workers may be exposed to hazardous atmospheres that result in:

- Being overcome by lack of oxygen
- Occupational illness due to long-term low-level exposures (for example asbestos, silica, lead)
- Acute or systemic illness from exposure to solvents paints and cleaners
- Acute respiratory damage due to exposure to corrosives (such as acids, gases, mists)
- Severe illness or even death from inhaling toxic materials (such as hydrogen sulfide, carbon monoxide).





## Hand and Body Protection

- Proper selection and use of appropriate hand and body PPE will prevent or minimize the potential for worker injuries due to chemical or physical hazards. For example:
- When using solvents, improper glove selection may allow the solvent to leak through the gloves, leading to skin contact.





## Selection of Hand and Body Protection

Injuries and illnesses such as:

- Skin absorption of harmful substances
- Cuts or lacerations
- Abrasions
- Punctures
- Nerve or tendon damage caused by exposure to vibration
- Chemical burns
- Thermal burns
- Heat stress, frostbite, and hypothermia due to harmful temperature extremes
- Shocks and burns from electricity







## Lifesaving Equipment

- Personal flotation devices (PFDs) are required when there is a chance of falling into water such as working near unguarded edges, boarding or leaving small boats, or working on floats. Lifesaving equipment such as life ring buoys with ropes and ladders must be provided when working from floats, barges, or vessels.
- Personal Flotation Devices (PFDs) Specifications
- Swimming Harness
- Life Ring Buoys and Ladders Specifications
- Life Saving Equipment for Shipbreaking





## Personal Floatation Devices (PFD) Specifications

### Potential Hazard:

- Unable to self rescue or be rescued from ladder
- Drowning





## Life Ring Buoys and Ladders Specifications

### Potential Hazard:

- Drowning
- Hypothermia (due to delayed rescue)



**Improper practice:  
Workers on small float must wear PFD.**



## Personal Fall Protection Equipment

Personal fall protection systems must:

- Prevent a worker from falling (positioning device systems), or
- Arrest the fall of workers without causing injuries.
- Prevent workers from striking or falling to a lower level (PFAS).





## Use of Personal Fall Protection Systems

### Potential Hazards:

- Falls caused by failure to use fall protection
- Injuries due to improper use of fall protection equipment







## Some of the hazards associated with improperly cleaned or maintained personal protective equipment include:

- Severe burns due to employees performing hot work while wearing greasy or oily clothing
- Impaired vision due to using eye and face protection with dirty, scratched, or fogged lenses or shields
- Skin irritation or chemical absorption due to contaminated PPE such as clothing, gloves, face pieces, gloves, and boots
- Inhalation of toxic chemicals due to damaged respiratory valves or face pieces, or saturated cartridges
- Inter-changing parts that may void the manufactures approval and cause equipment failure
- Exposure of hazardous materials such as lead, arsenic, and asbestos due to improper cleaning of respirators
- Spread of infectious diseases due to shared equipment



## Gear and Equipment for Rigging and Materials Handling

Serious injuries may result from:

- Equipment failure
- Improper use of equipment
- Getting caught between or struck by loads or rigging gear
- Getting struck by loads or rigging gear





## Material Handling » Inspection

There are specific inspection requirements for the following:

- Ropes, Chains, and Slings
- Shackles and Hooks
- Chain Falls and Pull-Lifts
- Hoisting and Hauling Equipment
- Use of Gear



**Improper practice:  
Worker riding crane  
hook exposed to fall  
and entanglement  
hazards.**



## Inspection

### Potential Hazards:

Failure to adequately inspect material-handling devices and rigging gear may allow unsafe equipment to be used, and may result in serious accidents.



**Safe load of chain fall illegibly marked.**



## Natural (Manila) and Synthetic Rope and Slings

### Potential Hazards:

Failure of slings due to abrasion, cuts, overloading, improper storage and use, environmental conditions and chemical deterioration may result in serious accidents.







## Synthetic Web Slings

### Potential Hazards:

Failure of slings due to broken stitching, perforations, burns, abrasion, cuts, overloading, improper storage and use, environmental conditions and chemical deterioration may result in serious accidents.



Capacity marking tag (white) on reinforced synthetic web sling.



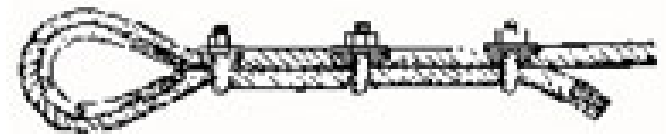
## Wire Rope and Wire-Rope Slings

### Potential Hazards:

Failure of slings due to broken wires, kinking, crushing, bird caging, overloading, improper storage and use and environmental conditions may result in serious accidents.

#### INSTALL CLIPS CORRECTLY

RIGHT

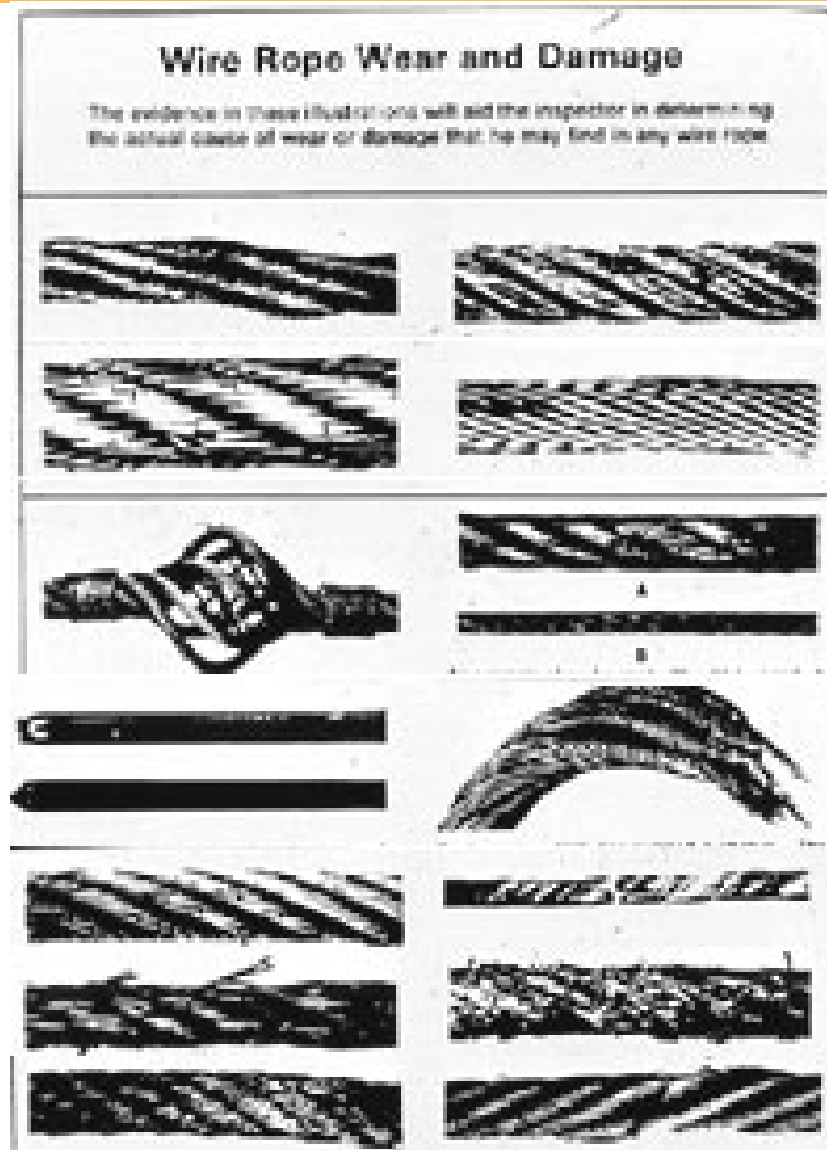


WRONG



WRONG







## Chains and Chain Slings

### Potential Hazards:

Failure of chains and chain slings are typically due to overloading, sharp edges, environmental deterioration, and exposure to heat (for example, from electrical arc, welding, and cutting torches). Use of damaged chains and chain slings may result in serious accidents.



Worker inspecting wire rope slings.



## Shackles and Hooks

### Potential Hazards:

Failure of shackles or hooks while loads are being lifted or moved, may cause serious injuries.





## Chain Falls and Pull-lifts

Chain falls and pull-lifts such as come-alongs are frequently used to move or lift heavy items. Anchor points must be strong enough to carry the load and the attachment device must be secured

### Potential Hazard:

Failure of equipment, anchor points, or supporting structures due to overloading, distortion, or misuse may cause serious injuries.

**Improper practice:**  
Load applied to the throat of the hook, safety latch defective.







## Hoisting and Hauling Equipment

Hoisting and hauling equipment is used to move heavy loads. Hoisting and hauling equipment may consist of mobile or stationary cranes and derricks and marine railway installations.

- Cranes and Derricks
- Marine Railways
- Powered Industrial Trucks





## Cranes and Derricks

### Potential Hazard:

Workers can be injured by falling loads, falling booms overturning equipment being caught in moving machinery parts, and being struck by moving machinery or loads.



**Improper practice:  
Worker exposed to overhead load.**



**Crane swing radius guarded with barriers.**



## Pulling and Dragging

- Inspect Chains and straps used for pulling or dragging materials for signs of wear.
- Ensure the load rating and proper rigging of pulling devices





## Use of Gear

Material-handling equipment (such as cranes and derricks) and rigging gear (slings, shackles, and hooks) must be used correctly and safely to prevent accidents and serious injuries.



### Potential Hazard:

Worker injuries can be caused by falling loads due to rope, chain, or sling failure during the lifting of items due to overloading, worn or defective equipment or improper use of connection of the lifting components.







## Deck Machinery



### Potential Hazards:

Workers may be injured by being struck by, caught in, or caught between by the sudden movement of anchor chains or windlass.



## Welding and Cutting

- Hot work operations include job set-up and placement, inspecting and testing equipment, and performing the hot work.
- Identify and eliminate potential fire and explosion hazards prior to hot work
- Use a fire watch with an accessible fire extinguisher







## Hazardous Materials

- Hazardous Materials May include:
  - Variety of hazardous material containers
  - Submerged barrels





## Hazardous Materials

- Hazardous Materials May include:
  - Diesel and other fuels in vehicles and vessels





## Removing Hazardous Material

- Includes removing items included in the [inventory of hazardous materials](#) (such as fuel and cargo residues, insulating materials, preservatives, and paints):
- [Confined Space Entry](#)
- Specific Requirements for Removal of Hazardous Materials
- [Personal Protective Equipment \(PPE\)](#)
- [Access](#)
- [Scaffolds](#)
- [Ladders](#)
- [Cleaning](#)
- [Surface Prep](#)
- [Tools](#)
- [General Working Conditions](#)







## Additional Safety Precautions

- Working Surfaces
- First Aid
- Illumination
- Biological Hazards
- Health and Sanitation
- Utilities
- Electrical
- Housekeeping





## Working Surfaces

Working surfaces such as decks, and gangways include locations such as boilers and firebox floors, aloft, restricted quarters, and small boats.

### Potential Hazards:

Primary hazards are:

- Slip-Trip Hazards
- Falls to solid surfaces
- Falls into water
- Falls due to limited visibility



**Improper practice:**  
**Workers exposed to tripping hazards**  
**due to poor housekeeping.**



## First Aid

### Potential Hazards:

Injuries to workers may worsen due to inadequate or delayed access to medical treatment.







## Illumination

### Potential Hazards:

Inadequate or poor-quality lighting systems can lead to:

- Slips, trips, and falls.
- Electric shocks and burns.
- The inability to exit the space.





## Health and Sanitation

### Potential Hazards:

Worker illness and injury can be caused by exposure to hazardous materials such as garbage, sewage, and toxic chemicals.





## Biological Hazards

- Potential Hazards:** Some operations expose employees to biological hazards from sewage and human waste, fungi and molds, and decomposing organic products.
- Collection, holding, and transfer (CHT) tanks, which workers are often required to enter, may contain dangerous, even fatal, levels of hydrogen sulfide or other toxic gases, which are products of decomposing human waste.
  - Toxic spores inhaled from fungi and molds growing on grain and lumber may pose an inhalation hazard.





## Utilities

- Power lines
  - Have the local Power company De-energize the lines
  - Maintain a minimum 10' approach distance
- Have Underground gas and utilities marked





## Electric Power

- **Potential Hazards:**

Worker injuries may include electrical shock and burns from electric power supplied to the vessel.



**Circuit breakers used with temporary electrical power supplied to ship.**



## Housekeeping

Good housekeeping is important in preventing injuries caused by slips, trips and falls on slippery decks or cluttered walking or working surfaces. Poor housekeeping can block employee access to emergency equipment as well as exits. Failure to remove trash and other debris increases the risk of a fire and injury.



**Fuel gas cylinders  
neatly organized.**





## Good Housekeeping

### Potential Hazards:

Cluttered work areas can lead to accidents and cause worker injuries, due to slips, trips, and falls, being struck by falling objects, impeded access to exit routes and firefighting equipment, and fires because of improper disposal of flammable or combustible materials such as rags, paper and cardboard).



**Improper practice:  
Poor housekeeping.**



## Summary

- The hazards and issues are dynamic and require vigilance and flexibility.
- The key to a safe operation is attention to the safety issues of your work environment.
  - The physical and Health hazards are unique due to the scope of the Katrina disaster and the debris present in the waterways.
    - Check the rigging of equipment
    - Wear appropriate PPE
    - Use of Engineering Controls and Administrative Controls