

# Technical Data Bulletin

## OH&ESD

### #195 — Personal Protective Equipment For Oil Spill Response

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Published: May, 2010

#### Background

The oil released from the Deepwater Horizon disaster in the Gulf of Mexico has the potential to contaminant the coast line and ecological environment of many of the States that are on the Gulf coast of the United States.

Individuals participating in oil spill related activities could face a range of work related hazards, such as carcinogens and other hazardous materials, eye/head/face hazards, heat stress and safety hazards associated with working around heavy equipment. From the start of the containment period through the clean-up and remediation activities, the need for personal protective equipment (PPE) is essential.

The requirement for PPE applies not only to the professional worker, but may be a consideration for volunteers who may be included in helping with clean-up activities. As these individuals represent such a diverse group, their knowledge and experience in the use of PPE may vary significantly. At a minimum, a basic understanding of the use and limitations of each type of PPE is necessary. For professional workers falling under the scope of the Occupational Safety and

Health Administration (OSHA), specific regulatory requirements apply when using PPE. In addition, activities related to stopping or containing the spilled oil and post-emergency clean-up operations are regulated by OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, 29 CFR 1910.120 and 1926.65. All aspects of the HAZWOPER and other applicable OSHA standards must be followed during oil spill related activities.

If questions arise concerning the proper use of PPE, refer to the product user instructions or contact the manufacturer directly.

#### Crude Oil

According to the National Institute of Environmental Health Sciences (NIEHS) crude oil is a mixture of hydrocarbons and consists of light, medium and heavy chemicals. The hydrocarbons in crude oil are mostly alkanes, cycloalkanes and various aromatic hydrocarbons while the other organic compounds contain nitrogen, oxygen and sulfur, and trace amounts of metals such as iron, nickel, copper and vanadium. The exact molecular composition

varies widely. The light parts, such as benzene, xylene, toluene and ethyl benzene generally evaporate into the air in the first 24 hours of a spill (usually before reaching the shore). The medium and heavy parts (consistency much like motor oil) is what cleanup operations on the land and near shore areas focus on.

Weathered crude or "mousse" is crude petroleum that has lost an appreciable quantity of its more volatile components and has mixed with sea water and organic matter. This is caused by evaporation and other natural causes during the spill landing on the shore and during oily waste handling, storage and treatment or disposal.

Weathering is a series of chemical and physical changes that cause spilled oil to break down and become heavier than water. Winds, waves, and currents may result in natural dispersion, breaking a slick into droplets which are then distributed throughout the water. These droplets may also result in the creation of a secondary slick or thin film on the surface of the water.

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Evaporation occurs when the lighter substances within the oil mixture become vapors and leave the surface of the water. This process leaves behind the heavier components of the oil, which may undergo further weathering or may sink to the ocean floor.

Oxidation occurs when oil contacts the water and oxygen combines with the oil to produce water-soluble compounds. This process affects oil slicks mostly around their edges.

### Worker Exposure to Weathered Crude

Workers participating in containment or clean-up activities may be exposed to crude oil through dermal, or inhalation exposure. Potential dermatitis hazard from skin contact may occur. If the oil or oil absorbed material becomes aerosolized during clean-up operations it may irritate to eyes, nose, throat and lungs. It may also be inhaled into the workers respiratory system.

### Personal Protective Equipment (PPE)

The type of PPE needed will depend on the amount and type of contamination as well as the clean-up activity being performed. They may include any of the following types of PPE:

1. Hard hats
2. Permeable or impermeable protective full body clothing or suit
3. Full face or eye protection (e.g. face shields, safety glasses or goggles)
4. Safety footwear
5. Respiratory protection
6. Personal flotation device (PFD) if working near water
7. Hearing protection if working near noisy equipment

The National Institute for Occupational Safety and Health (NIOSH) conducted a health hazard evaluation (HHE) during the cleanup of more than 10 million gallons of oil spilled in Prince William Sound, Alaska on March 24, 1989. Based on this, HHE NIOSH recommends the following PPE be provided for personnel directly involved in work tasks associated with oil spill cleanup activities:

1. Hard hats equipped with hearing protection should be provided to all workers. These hard hats should be decontaminated and properly stored daily.
2. Full face and eye protection, e.g., face shields, should be provided for all workers, and should be attached to the hard hats noted above. Additionally, workers using high pressure spray nozzles should wear full cover eye

- goggles to prevent injury or irritation from splash back.
3. Full body personal protective equipment should be utilized which will provide protection from both steam/hot water and oil contamination. This PPE should be properly decontaminated and stored daily.
4. Footwear should have steel toes and shanks and slip and oil resistant soles. Footwear should be cleaned daily.
5. Workers should be provided high efficiency dust/mist respirators<sup>1</sup> during high-pressure spraying operations to prevent ingestion of oil mists present due to splash back. Where vapors are present and airborne concentrations have not been quantified, workers should use organic vapor-rated respirators<sup>2</sup>. Replacement filters and/or cartridges should be available at every work site.

<sup>1</sup>Since the publication of these recommendations, respirator certification regulations have changed and the "high efficiency dust / mist" terminology is no longer utilized. A NIOSH-approved particulate respirator, for use against oil mist should be selected per OSHA regulation 29 CFR 1910.134.

<sup>2</sup>NIOSH-approved respirator equipped with organic vapor cartridges. A particulate filter may be used in conjunction with cartridges as well.

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### References and Additional Resources

For additional assistance concerning the selection and use of PPE for oil spill recovery and clean-up, contact 3M at 1-800-243-4630. For more information on oil spills and the hazards associated with them contact your local emergency management office or one of the following agencies:

#### Occupational Safety and Health Administration (OSHA)

<http://www.osha.gov/>  
<http://www.osha.gov/oilspills/index.html>  
<http://www.osha.gov/Publications/3172/3172.html>

#### National Institute for Occupational Safety and Health (NIOSH)

<http://www.cdc.gov/niosh/>  
<http://www.cdc.gov/niosh/topics/oilspillresponse/>  
<http://www.cdc.gov/niosh/hhe/reports/pdfs/1989-0200-2111.pdf>

#### National Institute of Environmental Health Sciences (NIEHS)

<http://www.niehs.nih.gov/>  
<http://tools.niehs.nih.gov/wetp/index.cfm?id=2495>

For more information, please contact:

#### **3M Occupational Health and Environmental Safety Division (OH&ESD)**

##### **In the U.S., contact:**

###### **Customer Service**

1-800-328-1667

###### **Technical Assistance**

1-800-243-4630

###### **Internet**

[www.3M.com/occSafety](http://www.3M.com/occSafety)

###### **For other 3M products**

1-800-3M HELPS

##### **In Canada, contact:**

3M Canada Company, OH&ESD

P.O. Box 5757

London, Ontario N6A 4T1

###### **Customer Service**

1-800-265-1840

###### **Technical Assistance (Canada only)**

1-800-267-4414

###### **Fax On Demand**

1-800-646-1655

###### **Internet**

[www.3M.com/CA/occSafety](http://www.3M.com/CA/occSafety)

##### **Technical Assistance In Mexico**

01-800-712-0646

5270-2255, 5270-2119 (Mexico City only)

##### **Technical Assistance In Brazil**

0800-132333



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