



Reducing Occupational Exposures while Working with Dispersants During the Deepwater Horizon Response

Dispersants are being used in the Deepwater Horizon (Gulf of Mexico) response to remove oil from the surface of water where it can be especially harmful to the environment. The National Institute for Occupational Safety and Health (NIOSH) has prepared this document to guide workers involved in these efforts on ways to protect themselves from potential exposures. This fact sheet will be updated as new information on the types of dispersants being used in the response is received.

Dispersants are usually applied directly to the spilled oil by spraying from an airplane, helicopter, or vessel. Although dispersants are manufactured by many companies and their ingredients may differ, most contain a detergent and a solvent. The solvent allows the detergent to be applied. The detergent helps to break up the oil on the water surface into very small drops. These tiny oil drops are then able to easily mix with the water and be diluted.

Based on the information provided to NIOSH, two dispersants have been used for the Deepwater Horizon response. Both COREXIT® EC9527A and COREXIT 9500 were utilized early in the response, but only the latter product is currently in use. Both products are made by the Nalco Company in Naperville, Illinois. Both products contain 10-30% sulfonic acid salt (detergent) and 1-5% propylene glycol, which are regarded as non-hazardous substances. In addition, COREXIT 9500 contains between 10-30% of petroleum distillates (solvent) and COREXIT EC9527A contains between 30-60% of 2-butoxyethanol (solvent).

Petroleum distillates are a colorless liquid with a gasoline- or kerosene-like odor. They are composed of a mixture of paraffins (C₅ to C₁₃) that may contain a small amount of aromatic hydrocarbons. Because dispersants containing petroleum distillates are sprayed and generate mists, OELs for mineral oil mist are applicable. Exposure to oil mist can cause irritation to the eyes, skin, or respiratory tract. The OSHA PEL and NIOSH REL for mineral oil mist are 5 mg/m³ up to a full workshift. NIOSH also specifies a short-term exposure limit for oil mist of 10 mg/m³, which is the average amount of oil mist a worker may be exposed to over 15 minutes without experiencing health effects. NIOSH also recommends preventing skin contact with oil mist.

2-butoxyethanol, also called butyl cellosolve, is a widely used cleaning agent. The potential human health effects of 2-butoxyethanol have been studied. Dispersants containing 2-butoxyethanol may irritate the skin. 2-butoxyethanol vapors or mists can cause respiratory irritation such as coughing. Several occupational exposure limits (OELs) have been established for 2-butoxyethanol. The legally enforceable OEL in the United States is the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL). For airborne 2-

butoxyethanol the OSHA PEL is 50 parts per million (ppm) for up to a full work shift. The NIOSH Recommended Exposure Limit (REL) for 2-butoxyethanol is 5 ppm, also for up to a full work shift. The NIOSH REL is intended to minimize potential long-term health effects to workers, primarily hemolysis of red blood cells (RBCs). Hemolysis of RBCs has been found in animals exposed to 2-butoxyethanol, but recent data suggests that human RBCs are less susceptible to these effects. Both the OSHA PEL and NIOSH REL contain guidance to minimize skin contact with 2-butoxyethanol.

NIOSH recommends that worker exposures to petroleum distillates, 2-butoxyethanol and similar cleaning agents in dispersants be reduced to prevent harmful respiratory and dermal health effects. Workers can be protected by taking the following steps:

- Mix and load dispersants in well ventilated areas.
- Use automated spraying systems to apply dispersants when available.
- Remain upwind of the mists that are generated if spray systems are manned.
- Wear nitrile gloves during mixing, loading, or spraying of dispersants to prevent skin irritation.
- Wear protective eyewear when mixing, loading, or spraying dispersants.
- Wash hands and any other body parts exposed to dispersants thoroughly with soap and water.
- If personal air monitoring indicates the above steps are not effective at reducing exposures below applicable OELs, then respiratory protection would be needed. Respirators should be used as part of a comprehensive respiratory protection program that includes proper selection, training, and maintenance. The NIOSH respirator topic page at <http://www.cdc.gov/niosh/topics/respirators/> provides information for safety and health officers who are designated to establish and conduct such programs.

For more information on oil dispersants:

NOAA Dispersants: A Guided Tour

[http://response.restoration.noaa.gov/topic_subtopic_entry.php?RECORD_KEY%28entry_subtopic_topic%29=entry_id,subtopic_id,topic_id&entry_id\(entry_subtopic_topic\)=155&subtopic_id\(entry_subtopic_topic\)=8&topic_id\(entry_subtopic_topic\)=1](http://response.restoration.noaa.gov/topic_subtopic_entry.php?RECORD_KEY%28entry_subtopic_topic%29=entry_id,subtopic_id,topic_id&entry_id(entry_subtopic_topic)=155&subtopic_id(entry_subtopic_topic)=8&topic_id(entry_subtopic_topic)=1)

For more information on 2-butoxyethanol:

NIOSH Pocket Guide to Chemical Hazards

<http://www.cdc.gov/niosh/npg/>

NIOSH Topic Page on 2-butoxyethanol

<http://www.cdc.gov/niosh/topics/butoxyethanol/>

New Jersey Hazardous Substance Fact Sheet on 2-butoxyethanol

<http://nj.gov/health/eoh/rtkweb/documents/fs/0275.pdf>