

# Dispersants in Oil Spill Response

When prevention efforts fail and oil spills on the water, spill responders face a difficult battle against a dynamic and ever-changing opponent. Dispersant use is one of several tools that may be employed, individually or in combination, to minimize consequences of the spill. Only the Federal On-Scene Coordinator may approve dispersant use. Unauthorized use of dispersants or detergents on navigable waters is illegal.



A Coast Guard C-130 fitted with a modular dispersant system sprays water in a May 1997 exercise in Oregon

## What Are Dispersants?

Dispersants are specially designed oil spill products that are composed of detergent-like surfactants in low toxicity solvents. Dispersants do not remove oil from the water, but instead break the oil slick into small droplets. These droplets disperse into the water and are further broken down by natural processes. Dispersion of oil into the water column occurs naturally in untreated spills; dispersants speed up this process. Dispersants also prevent the oil droplets from coming back together as another surface slick. Dispersed oil is less likely to stick to birds and other animals, shoreline rocks, and vegetation. The effects of the rapidly diluted dispersed oil must be weighted against the effects of that oil if it were allowed to impact the shoreline and wildlife.

Dispersants may be applied to oil from airplanes, helicopters, or vessels. Spray systems are designed to provide the correct droplet size and dosage, as both are important factors in effective oil dispersal. The volume of dispersant applied is a fraction of the volume of oil treated, with a typical dispersant to oil ratio of 1:20.

## Where the Oil Goes

When the oil is treated with dispersants, it initially disperses within approximately the upper 30 feet of the water column. The dispersed oil will be spread horizontally by tides and currents, rapidly decreasing the concentration of the oil. Many impacted water column populations will rapidly recover from the dispersed oil exposure because of their mobility. If these

impacts are expected to be short term, these organisms are given a lower priority than bird and mammal populations and sensitive shoreline habitats, which when oiled recover quite slowly. Typically, dispersant use is reserved for deeper waters to ensure sufficient dilution of the oil and to prevent impacts on bottom-dwelling organisms. There may be cases where use in shallower environments can be justified to minimize impact to highly sensitive areas that are difficult to otherwise protect. Like other spill response techniques, dispersants are not likely to be 100% effective, leaving a portion of the oil on the surface. Effectiveness will depend on the type of oil and environmental conditions.

## Approval of Dispersant Use

Because of the tradeoffs involved (i.e., relative benefits and potential negative effects), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) restricts dispersant use. Dispersants must be on a national list maintained by the Environmental Protection Agency. Federal and state agency agreements establish areas where rapid decisions on dispersants may be made by the Federal On-Scene Coordinator. Use outside these areas requires the approval of additional agencies identified in the NCP.

## Studies of Dispersants

Evidence from spills treated with dispersants show that dispersion of oil can reduce overall environmental impacts by reducing damage at the sea surface and shore. The limited damage from the 1993 *Braer* spill in Scotland was due to near total natural dispersion, and dispersant use on the 1996 *Sea Empress* spill in Wales reduced impacts and the intrusiveness, duration, and cost of the cleanup.

## What Are the Potential Benefits?

- Reduces impact of oil on shorelines, sensitive habitats, birds, mammals, and other wildlife.
- Rapid treatment of large areas.
- Reduces oil storage and disposal problems.
- Accelerates natural degradation processes.
- Use in high seas and currents is feasible.

## What Are the Potential Tradeoffs?

- Increased impacts in upper 30 feet of water column.
- Time frame for effective use may be short
- Application may be restricted by equipment availability and time window for effective use.