OCEANA Protecting the World's Oceans
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Options for Dealing with a Spill

Once oil is in the water there are really no good options for dealing with a spill. None of the options currently available are fully effective and each has negative impacts. Once a spill occurs, we are left with no choice but to find the lesser of evils. The bottom line is that with continued oil production, spills are inevitable and we simply do not have effective and safe methods for cleaning them up.

Burning of Slick

Controlled burns were used by BP as a method to control the oil spill. Here, surface oil is corralled in a u-shaped fireproof boom and the oil is burned off in a monitored fire. Unfortunately, burning off of the oil is a no-win situation. Burning of the oil can result in large, toxic plumes of smoke that can result in respiratory problems and eye, nose, throat and skin irritations in both wildlife and humans. Birds may become disoriented in the smoke, and if proper searches are not conducted prior to burns, sea turtles could become trapped in the burn zones and killed as they surface for air.

Although there are many negative impacts associated with the burning of the oil, compared to leaving the oil in place, burning seems to be the lesser of two evils as it will remove large amounts of oil that could otherwise result in immediate and long-term impacts to wildlife in the area. Impacts on wildlife can include skin irritations, organ damage, reproductive failures, developmental abnormalities and death. Even after the burn, there will still be oil remaining in the marine environment as there is no truly effective way of cleaning up a spill.

Dispersants

Dispersant Overview:

Dispersants are chemicals that work with the energy of the waves allow oil to be mixed into the water column instead of sitting on the surface. Corexit 9500 and Corexit 9527 are two formulations that were used in the Gulf spill. The EPA and the U.S. Coast Guard authorized BP to use these dispersants underwater, at the source of the Deepwater Horizon leak, and it is the first time dispersants have been used underwater in a spill response. Subsea dispersant application has been in use since May 15, 2010. In total, about 1.8 million gallons of dispersants were applied.

Dispersants are usually comprised of a surfactant, a solvent and stabilizing compound. The level of toxicity depends on the specific surfactant and solvent contained in the dispersant as well as the environmental conditions under which it is applied. The toxicity of dispersants has been reduced considerably over the years, and the toxicity of dispersed oil is primarily due to the toxic components of the oil itself. The main ecological concern associated with dispersants is their ability to enhance the effective toxicity of oil through the dispersion process.

Dispersants do not actually reduce the total amount of oil entering the environment; rather they change the properties of the oil so that it is transported differently. Dispersant actually increases the amount of oil that mixes into the water column, which reduces the amount on the surface and decreases the chances of shoreline contamination. While transferring oil from the water surface into the water column can decrease the exposure for surface dwelling organisms, such as seabirds, marine mammals and sea turtles, it increases the possibility of exposure for species within the water column and bottom-dwellers like fish, their eggs and larvae, and shrimp, oysters and corals.

Dispersed oil particles tend to remain in the upper layers of the ocean and as they approach inshore areas, increasingly impact benthic (bottom) habitats and benthic animals. Dispersed oil particles tend to assume a less visible, more persistent (i.e. not easily cleaned-up) and pervasive presence in the environment, with increased opportunities for long-term ecological impacts, particularly in coastal areas.

Natural "weathering" makes the oil more difficult to disperse; consequently, the window of opportunity for effective dispersant application is early, usually within hours to 1–2 days after a release. Loss of volatile compounds also leads to an increase in viscosity after spill occurs which reduces the effectiveness of dispersants. Wave energy is required for successful application of dispersant, however too much wave energy can prevent contact between dispersant and oil. Dispersant effectiveness generally decreases as oil viscosity increases. Fresh light to medium crude oils (group 2 or 3 oils) can typically be dispersed. Oils that cool and become highly viscous after the spill are difficult to disperse.

The choice to use dispersants is a choice to increase the amount of oil in one part of the ecosystem (water column and seafloor) while decreasing the amount from another (surface water and coasts). The decision to use dispersants is therefore a trade-off between decreasing the risk to water surface and shoreline habitats while increasing the potential risk to animals and plants in the water column and on the seafloor.

Dispersant effects:

Sensitivity to dispersants and dispersed oil can vary significantly by species and life stage. Embryonic and larval stages appear to be more sensitive than adults to both dispersants and oil. Dispersants are not generally used when corals, sea grass, and fish spawning areas can be affected by dispersed oil and the dispersants. However, the Deepwater Drilling Disaster occurred in a recognized fish spawning area.

Oil droplets that form after dispersants break up the oil can physically affect exposed organisms, for example by smothering through the physical coating of gills and other body surfaces. Oil droplets may also be ingested by many suspension-feeders. The general size of the oil droplets is similar to the preferred food size of many of these organisms, including oysters, amphipods, polychaetes, and common zooplankton, such as copepods.

These microdroplets are then efficiently accumulated by the suspension feeders such as clams, barnacles, some kinds of zooplankton, and deepwater corals. Zooplankton may ingest oil droplets which become mixed with inorganic material from other prey and ejected as oily fecal pellets that sink to the seafloor, where they may be scavenged by deepwater corals. These corals are abundant in the vicinity of the Deepwater Horizon, and the effects of oil microdroplets or of oily fecal pellets derived from them on these corals is not well known. This is probably the most serious threat associated with wellhead application of dispersants. Accumulation of oil microdroplets by suspension feeders is especially worrisome when dispersants are applied to oil near the coast. Biological productivity in general increases dramatically as the coast is approached, and many suspension feeders such as oysters are commercially important.

All of these risks must be weighed against impacts that arise from no response, and are especially acute when sensitive and vulnerable habitats such as coastal marshes and coral reefs are threatened. Oil cannot be removed from these habitats without serious collateral damage, and if left in place may continue to destroy the habitats themselves, along with fish and wildlife for years and possibly decades. From this perspective, another distinct advantage of dispersants is the option to choose, to some extent, where toxicity occurs.