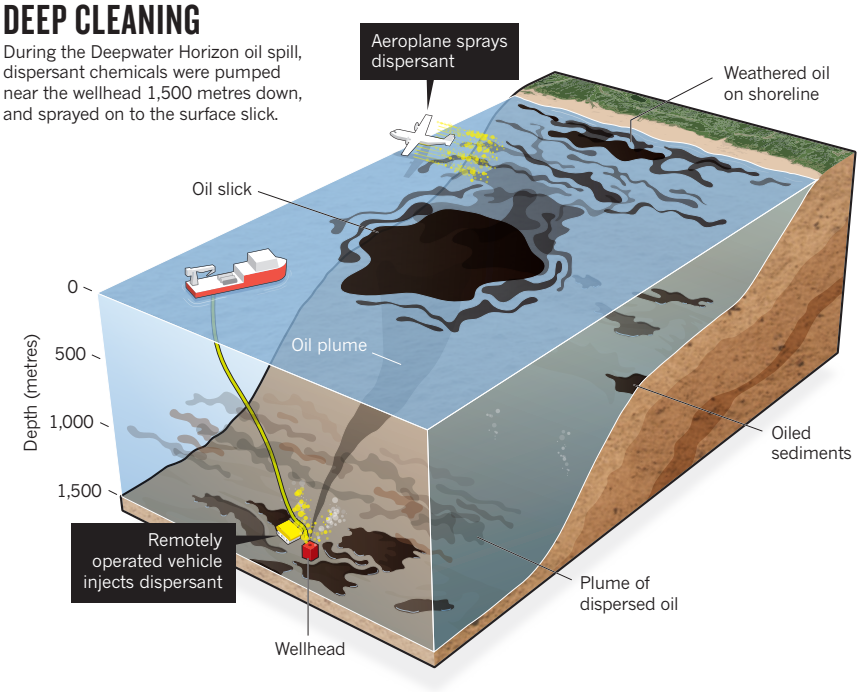
JASIEK KRZYSZTOFIAK/NATURE

DEEP CLEANING

During the Deepwater Horizon oil spill, dispersant chemicals were pumped near the wellhead 1,500 metres down, and sprayed on to the surface slick.



ENVIRONMENT

Researchers debate oil-spill remedy

Oil industry maintains that dispersants should be part of routine response to deep-water blowouts.

BY MARK SCHROPE

No aspect of the 2010 Deepwater Horizon oil spill in the Gulf of Mexico was more controversial than the decision to pump massive doses of chemical dispersant into the oil gushing from 1,500 metres down (see 'Deep cleaning'). Advocates said that the mixture of solvents and detergent would separate the deep oil plume into finer droplets, speeding its breakdown. Critics feared damage to deep-water ecosystems.

This week, researchers at the Gulf of Mexico Oil Spill and Ecosystem Science Conference in New Orleans, Louisiana, are assessing the outcome — and sometimes drawing markedly different conclusions from the scant data. Industry scientists argue that the nearly three million litres of subsea dispersant worked as expected and caused minimal ecological damage. Dispersant, they say, should be a standard option for fighting future sea-floor blowouts. But other researchers say that applying dispersants at depth has not yet been proved to be effective, let alone safe.

Both the US National Oceanographic and Atmospheric Administration and industry representatives have touted aerial photos showing that the surface oil plume in the Gulf of Mexico diminished after dispersant was applied. And oil company BP, which owns the well, reported improvements in the air quality measured from work ships, suggesting that less oil was floating to the surface.

Seawater samples collected at depth during the spill for monitoring by the US Environmental Protection Agency also suggest that the dispersants worked, according to data presented by Kenneth Lee, a marine biologist at Fisheries and Oceans Canada in Dartmouth. He and his team documented droplet sizes that are consistent with lab experiments in which dispersant and oil are mixed in a wave tank.

Some post-spill results described at the conference this week offer support. Eric Adams, an engineer at the Massachusetts Institute of Technology in Cambridge, and his colleagues used glass beads as a proxy for oil in tank experiments simulating the spill. Based on their results, he says, "If your goal is to spread the oil out, then dispersant appears to help."

With an eye to the future, the American Petroleum Institute, an industry group in Washington DC, is studying the most efficient means of injecting dispersant into a deep oil plume, as well as considering designs for dispersant applicators that could be installed at the wellhead in case of a spill. Study-group members are presenting their early findings at the conference. "We think subsurface dispersant played a critical role and that that response effort had a positive outcome," says Emily Kennedy, a policy analyst at the institute.

The oil industry's confidence leaves some researchers wary. "I think it's incredibly premature," says Sean Anderson, an ecologist at California State University Channel Islands in Camarillo, who is part of a group studying the spill[1]. "We're in no way saying dispersants should never be used or didn't work at all; it's a question of, 'Show us the data to show it was actually effective'," he says.

He and others cite hints that turbulence at the wellhead could have caused substantial dispersal on its own. And Claire Paris-Limouzy, an oceanographer at the University of Miami in Florida, questions some of the positive conclusions. Using a computer model, she and her colleagues concluded that dispersants may have had little effect on the amount of oil that ultimately surfaced[2].

The data are even thinner when it comes to the ecosystem effects of the chemicals, or of the oil they might have helped to disperse through the depths. Biologists conducting the government assessment of effects on deep-sea fish, for instance, concluded that they couldn't quantify any impacts because of a lack of baseline data on these populations.

In 2010, however, researchers found soft corals that had apparently been killed by dispersed oil from the spill[3]. At the conference, Charles Fisher, a deep-sea biologist at Pennsylvania State University in University Park, reported that the spill damaged at least one deep coral stand and possibly two more. His collaborators are also reporting substantial losses of sea-floor animals, such as worms, downstream of the spill. And in shipboard tests, Erik Cordes of Temple University in Philadelphia, Pennsylvania, who collaborates with Fisher, showed that an oil–dispersant mixture is highly toxic to deep-sea soft corals, which can take hundreds of years to grow.

Cordes admits that dispersant use presents a difficult choice: the possibility of faster breakdown of spilled oil against what could be a greater environmental impact from the finely dispersed oil. "I don't know where the trade-off lies," he says. "But my gut and what I've seen in these experiments tells me I would rather the oil just go a little further and last a little longer than have the oil and dispersant causing that kind of damage." ■

1. Peterson, C. H. *et al. BioScience* **62,** 461–469 (2012).
2. Paris, C. B. *et al. Environ. Sci. Technol.* **46,** 13293–13302 (2012).
3. White, H. K. *et al. Proc. Natl Acad. Sci. USA* **109,** 20303–20308 (2012).