Dispersants, why or why not.

While the questions continue as to why certain steps to address the Deep Horizon spill weren't taken earlier, the issue of dispersant use to many is of equal concern.

While I am adamantly against the use of dispersants for this catastrophe, I'll try to present the pros and cons of use and disuse objectively, difficult though it may be.

I see two major issues regarding their use. The first is their toxicity and the second their purpose.

The toxicity issue seems to raise the most rancor among opponents. And this is also the issue about which very little is known. The recent reports regarding toxicity (e.g. June 30: "EPA releases first round of toxicity testing data for eight oil dispersants") stress **relative** toxicity. These reports compare different dispersants, including Corexit 9500 (the one in use) with various other dispersants. Findings are that some are more toxic to finfishes, others to invertebrates such as mysid shrimp. Other findings are that acting alone they may or may not be more toxic than when in conjunction with oil. And they seem to be less toxic than oil.

This appears to me to be a red herring. They are toxic! Relative toxicity is irrelevant. But what is totally unknown but of grave concern is the toxicity toward fragile life stages of marine organisms. Most of these have especially delicate respiratory apparatuses, and the toxic nature of dispersants is probably most lethal to these. Testing done on hearty adult minnows, and on their endocrine system, tells us absolutely nothing about impact on the fragile gills of larval fishes or invertebrates.

So that brings us to the question of purpose. Why use dispersants? The two principal reasons are: 1) they break down fresh oil to smaller particles to speed up bacterial degradation into less toxic components, and 2) by suspending oil in the water column, the amount of oil reaching critical estuarine and surface habitats is reduced.

Let's address each. The breakdown into smaller particles is true, and these are likely to be degraded more rapidly. That is all we know. What we don't know is how rapidly this occurs, what role temperature plays, and what the final end product will be. We do know that the degradation requires oxygen, and this results in creation of potentially hypoxic areas. These are most likely in shallow areas where the temperatures are higher. At depths, where much of the dispersants are applied, the process will be much slower and will require less oxygen in the short term. And since the oil is comprised of a complex cocktail of different components, ultimate breakdown products are unknown.

But it's the suspension of the oil in the water column that is of greatest concern. The argument that suspension reduces the likelihood of the oil reaching fragile coastal ecosystems would be valid were this a limited spill. But this is of such massive proportions that those benefits are trumped, and the coastal habitats are already overwhelmed, as are the offshore floating habitats like Sargassum communities. In addition, to a limited degree, booms can protect coastal habitats from floating oil. Oil in the water column passes beneath booms, moving directly toward shorelines.

In the water column, when marine organisms encounter the oil droplets, the effects can be devastating. For example, many marine organisms are filter feeders. They strain water as it passes through their filtering organs, such as gills. But rather than food items, they collect oil particles, which if in high enough concentrations, is fatal.

As an example, anchovies swim through the water with their mouths agape, collecting food on the fine filaments of their gills. Recently at Ft. Morgan, where oil in the water column was evident, the beach was littered with dead anchovies. While we don't know the direct cause, this doesn't occur during normal ecological cycles.

Vast clouds of organisms in the oceans make nocturnal migrations to the surface, then descend to the depths with daylight. These are comprised of myriads of species, including larval forms, barely visible crustaceans, and a plethora of other species. Wherever there are plumes of oil, regardless of the concentration, these organisms will pass through. What the impact is, one can only surmise, but it isn't likely beneficial to the ecosystem.

Eventually, oil in the water column will settle on substrate, regardless of the degree of degradation. This, along with dispersant remnants, will enter the food web. The ultimate fate in the higher trophic levels is unknown.

Oil on the surface can be skimmed or burned, and the volatile components dissipate naturally. Reason suggests that it should remain on the surface. Oil in the water column has the potential for massive negative impacts on marine organisms, the extent and duration of which are unknown, but which we will have to experience and measure in the years to come.

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