About dispersants: Persistent myths & hard facts

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About Dispersants[1]

Dispersants are mixtures of solvents, surfactants, and additives that are designed to break apart slicks of floating oil and facilitate formation of small droplets of oil in the water column to enhance dispersion and microbial degradation.

The U.S. National Contingency Plan (NCP or Plan) governs our nation's oil and chemical pollution emergency responses. The first NCP, in 1970, advocated mechanical methods to remove and dispose of spilled oil, but it allowed for use of chemical dispersants if they were listed on the NCP Product Schedule. For over a decade, dispersant use was restricted; it wasn't until the mid-1980s that the Plan began to shift to include more chemical treatment measures and requirements. 1994 updates to the Plan included provisions for expedited and preauthorized use of dispersants, as government and industry acted to anticipate and avoid public opposition to dispersant use during future spills—a public relations 'lesson learned' from the 1989 *Exxon Valdez* oil disaster.

During the 2010 BP Deepwater Horizon oil disaster response, unprecedented amounts of dispersants were used at the surface and subsurface wellhead, over an unprecedented duration of nearly three months, leading to unprecedented amounts of oil deposition on the ocean floor. The 1994 National Contingency Plan still remains in effect, despite public outcry over dispersant use.

Persistent Myths & Hard Facts

MYTH 1: A listing on the NCP Product Schedule means that dispersants are "safe" for use during oil spill response.

FACT: "The listing of a product on the NCP Product Schedule does not constitute approval of the product" [§300.920(e)] and products are required be labeled with a disclaimer to that effect. Rather, the listing means only that data have been submitted to EPA as required by Subpart J of the NCP. The EPA authorizes, it does NOT *approve*, use of dispersants listed on the Product Schedule.

The data include a screening test for toxicity, based on short-term, 96-hour lab tests on lab-tolerant species, and meeting an efficacy test threshold, based on the average of results from two test oils. The data are used to indicate relative toxicity and efficacy of products in laboratory conditions. These laboratory tests bear little resemblance to, and are not indicative of toxicity or performance in, natural environments where products may be used.

[1] EPA, 2015, Rulemaking on Subpart J, NCP, Supplemental Information, Background and Definitions www.epa.gov/emergency-response/national-contingency-plan-subpart-j

MYTH 2: Dispersants do more good than harm; they mitigate environmental damage from oil spills.

FACT: Dispersants are proprietary mixtures of oil-based solvents, surfactants, and additives that are—by nature—toxic to wildlife and people. According to a July 2010 scientific consensus statement: "The properties that facilitate the movement of dispersants through oil also make it easier for them to move through cell walls, skin barriers, and membranes that protect vital organs, underlying layers of skin, the surfaces of eyes, mouths, and other structures."[2]

The two Corexit dispersants used during the BP DWH disaster—over scientists' objections—were Corexit EC9500A and Corexit EC9527A. According to Safety Data Sheets, these products should not be allowed contact with surface water—the water on the surface of a river, lake, wetland, or ocean. Any accidental leaks should be stopped and contained "to ensure runoff does not reach a waterway."[3] Further, Corexit EC9500A and Corexit EC9527A are listed as "harmful" or "toxic" to aquatic life, respectively.[4]

Studies following the BP DWH disaster have confirmed that while oil and dispersants are each independently toxic to sea life, the combined (synergistic) toxicity of chemical-enhanced oil is more deadly to marine wildlife from the seafloor to the upper ocean, from bacteria and plankton to coral, and from fish to dolphins.[5]

MYTH 3: Dispersants don't sink oil.

FACT: In standardized lab conditions where dispersants are developed and tested, dispersants may not cause oil to sink. According to the EPA, dispersants "submerge" oil below the water surface "but generally not to the bottom of the water body . . . "[6] The EPA acknowledges, however, that oil droplets readily form oil-mineral aggregates with naturally occurring marine

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[2] Consensus Statement: Scientists oppose the use of dispersant chemicals in the Gulf of Mexico, July 16, 2010, pp. 1–2. Statement drafted by Dr. Susan D. Shaw, Marine Environmental Research Institute. https://www.peer.org/assets/docs/fda/8_4_10_CONSENSUS_STATEMENT_ON_DISPERSANTS.pdf

[3] Nalco Safety Data Sheet, Corexit EC9500A, revision date 9/26/16: www.nalcoenvironmentalsolutionsllc.com/wp-content/uploads/COREXIT-EC9500A-GHS-SDS-USA.pdf
Nalco Safety Data Sheet, Corexit EC9527A, revision date 12/17/14: www.nalcoenvironmentalsolutionsllc.com/wp-content/uploads/COREXIT%E2%84%A2-EC9527A-GHS-SDS-USA.pdf

[4] Ibid., Nalco 2014 and 2016, (FN 3).

[5] Samantha Joye et al., 2016. The Gulf of Mexico ecosystem, six years after the Macondo oil well blowout, 129 *Deep Sea Research Part II: Topical Studies in Oceanography* 4:13–16.
Suzanne M. Lane et al., 2015. Reproductive outcome and survival of common bottlenose dolphins sampled in Barataria Bay, Louisiana, USA, following the Deepwater Horizon oil spill, 282 *Proc. Biol. Sci 1*.
Lori H. Schwacke et al., 2017. Quantifying injury to common bottlenose dolphins from the Deepwater Horizon oil spill using an age-, sex-, and class-structured population model, 33 *Endangered Species Research* 265.

[6] EPA 2015, p. 3385 (FN 1).

detritus, sediment particles, and bacteria.[7] During the BP disaster, this "marine snow" was found to coalesce into underwater oily plumes and sink, as the plumes accumulated more mass over time. Dispersants facilitate the transport of large quantities of oil to the ocean bottom.[8]

In the 2015 rulemaking on dispersant use, EPA maintained the prohibition on use of sinking agents in the National Contingency Plan but revised the definition of "sinking agents" to become, "those substances deliberately introduced into an oil discharge to submerge the oil to the bottom of a water body."[9]

Since dispersants arguably don't fit this description, EPA's loophole and entrenched 'look-the-other-way' approach to regulating dispersants undermine the Clean Water Act's mandate to "prevent, minimize, or mitigate damage to public health and welfare" from the oil spill and spill mitigating products [311 (a)(1)(8)].[10]

MYTH 4: Dispersants work in all waters of the U.S.

FACT: Dispersants were designed for use on conventional (floating) oil in saltwater environments and their effectiveness decreases as the salinity of the water decreases. Effectiveness is minimal in freshwater environments. EPA proposed a conditional listing for dispersant use only in saltwater environments in its 2015 rulemaking, but that rulemaking was never concluded. Current rules in effect allow dispersant use in all waters of the U.S.[11]

MYTH 5: Use of subsea dispersant injections disperses oil released from deep sea wellheads and minimizes the amount of harmful volatile hydrocarbons upwelling from depth.

FACT: Independent studies conducted on BP's Gulf Science Dataset indicate that oil distribution at depth and throughout the water column was controlled by temperature- and pressure-dependent processes, not subsea dispersant injections.[12] The pressurized jet of oil that blew out of the wellhead led to rapid expansion of the dissolved gases, which atomized the gas-saturated oil into micro-droplets. This shifted the droplet size distribution to smaller droplets that remained suspended in a deep oily plume thousands of meters below the

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7 Ibid., EPA 2015, p. 3385 (FN 1).

8 Passow U, Sweet J, Quigg A. How the dispersant Corexit impacts the formation of sinking marine oil snow. *Mar Pollut Bull.* **2017** Dec 15, 125(1–2):139–145. doi: 10.1016/j.marpolbul.2017.08.015. Epub 12 Aug 2017.

Suja LD, Summers S, Gutierrez T. Role of EPS, dispersant and nutrients on the microbial response and MOS formation in the subarctic northeast Atlantic. *Front Microbiol.* **2017**, 8:676. Epub 21 Apr 2017. doi:10.3389/fmicb.2017.00676

Doyle SM, Whitaker EA, De Pascuale V, et al. Rapid formation of microbe-oil aggregates and changes in community composition in coastal surface water following exposure to oil and the dispersant Corexit. *Front Microbiol.* **2018** Apr 11, 9:689. doi: 10.3389/fmicb.2018.00689.

9 EPA 2015, p. 3422 (FN 1).

10 EPA 2015, p. 3393 (FN 1).

11 EPA 2015, p. 3406 (FN 1).

12 Paris CB, Berenshtein I, Trillo ML, et al., 2018**.** BP Gulf Science Data reveals ineffectual subsea dispersant injection for the Macondo blowout. *Front. Mar. Sci.* doi.org/10.3389/fmars.2018.00389

surface—until it started to break down after the discharge stopped. Efforts to control the Macondo blowout and repair the riser increased the turbulent energy and increased the flow rate, which, data show, also mechanically dispersed the oil into micro-droplets that remained suspended at depth. The timing of these operations coincided with increased subsea dispersant injection and oil collection at the wellhead. Disaster responders at the surface erroneously attributed the decrease in benzene and other light hydrocarbons upwelling from depth to successful use of dispersants, rather than—as the data show— to mechanical dispersion.

MYTH 6: Use of dispersants during oil spill response is safe; it does not have unintended consequences for workers or the general public.

FACT: Dispersants are sprayed from planes and on the water from boats during oil spill response, as recommended by the manufacturer.[13] The resulting chemical-enhanced oil droplets are more harmful to humans and wildlife than oil alone.[14] For example, an ongoing assessment of the health impacts on Coast Guard responders after the BP Deepwater Horizon disaster showed a strong correlation between these workers' dispersant-oil exposure and higher rates of coughing, pulmonary issues, and gastrointestinal issues, compared to those exposed to oil alone.[15]

Aerial spraying of dispersants contributed to widespread dispersion of oil-chemical pollutants that likewise adversely affected coastal communities. Studies of Louisiana residents in areas most likely impacted by chemical-enhanced oil[16] reported residents had high incidence of respiratory illness and other exposure-related health complaints compared to communities further inland.[17]

MYTH 7: Dispersant manufacturers can be held liable for harm caused by their product from use during oil spill response.

FACT: In November 2012, a U.S. District Court in Louisiana ruled that under federal law, the government's authority during an emergency overrides any state product liability laws.

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[13] EPA NCP Subpart J Technical Notebook: A Compendium to the NCP Product Schedule, March 2019, pp. 104–106 (Corexit EC9527A) and pp. 114–117 (Corexit EC9500A). www.epa.gov/emergency-response/ncp-product-schedule-products-available-use-oil-spills

[14] Sindhu Ramesh et al., 2018. Evaluation of behavioral parameters, hematological markers, liver and kidney functions in rodents exposed to Deepwater Horizon crude oil and Corexit, 199 *Life Sciences* 34:37–38.

[15] Melannie Alexander et al., 2018. The Deepwater Horizon oil spill Coast Guard cohort study: A cross-sectional study of acute respiratory health symptoms, 162 *Environmental Research* 196, 200–201.

[16] Earthea Nance et al., 2016. Ambient air concentrations exceeded health-based standards for fine particulate matter and benzene during the BP DHOS. *J. Air Waste Manag. Assoc.* 66(2):224-36. doi: 10.1080/10962247.2015.1114044.

[17] Lauren Peres et al., *The Deepwater Horizon oil spill and physical health among adult women in southern Louisiana: The women and their children's health (WaTCH) study*, 124 Environmental Health Perspectives 1208, 1211–1212 (2016).

Under this ruling, dispersant manufacturers such as Nalco are not liability for any harmful side effects from use of its product as long as the federal government has listed them on the NCP Product Schedule.[18]

MYTH 8: Dispersants must be pre-authorized for use during oil spills.

FACT: Dispersant pre-authorization is NOT mandatory, although most coastal states have pre-authorized dispersant use. Dispersants that are not pre-authorized may also be used in oil spill response. In pre-disaster oil spill prevention and response planning, the task of determining which products, if any, should be pre-authorized falls to Area Committees—local officials and citizens. The NCP requires Area Committees to work with "federal, state and local officials to expedite decisions for the use of dispersants and other mitigating substances and devices" during oil spills [40 CFR §300.205 (c)(3)].

Area Committees are required to develop a detailed annex that provides for pre-authorization of application of specific countermeasures or removal actions that, if expeditiously applied, will minimize adverse spill-induced impacts to fish and wildlife resources, their habitat, and other sensitive environments [40 CFR §300.210 (c)(4)(ii)(D)] *emphasis added.*

The explicit assumption in the pre-authorization process is that products listed on the NCP Product Schedule mitigate oil spill impacts. Since Corexit dispersants are known to exacerbate rather than mitigate environmental harm, these products should not be pre-authorized—or used at all—for oil spill response. Instead, these Corexit dispersants should be removed from the NCP Product Schedule.

Pre-authorization of Corexit dispersants is a big disincentive to developing—and using—less toxic alternatives.

[18] Nalco skirts lawsuits over Corexit use after BP oil spill, Law306, 2012, www.law360.com/articles/397322/nalco-skirts-lawsuits-over-corexit-use-after-bp-oil-spill.
Emily Pickrell, Dispersant maker to be dismissed in spill case. *Houston Chronicle*, Dec. 1, 2012. www.chron.com/business/energy/article/Dispersant-maker-to-be-dismissed-in-spill-case-4082622.php.