About Dispersants

Persistent Myths and 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, according to the oil industry and the EPA. Dispersants are used in oil spill response to make the oil disappear from the water surface—but the oil and the dispersants don't magically go "away" after use.

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—and now hard science showing that dispersants do more harm than good to people and wildlife. Use continues because of persistent myths that dispersants are safe and do more good than harm.

Persistent Myths and 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 reality is that the laboratory tests EPA uses to "list" (not approve)

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

dispersants for use bear little resemblance to, and are not indicative of toxicity or performance in, natural environments where products may be used. The "listing" (not approval) process includes a screening test for toxicity—based on short-term 96-hour lab tests on lab-tolerant species—and on 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 and are absolutely not predictive of harm to wildlife or people.

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]

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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.

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 detritus, sediment particles, and bacteria.[7] During the BP disaster, this "marine oil snow" was found to accelerate sinking of oil. [8] The MOS also coalesced into underwater oily plumes and sank, as the plumes accumulated more mass over time. Dispersants facilitate the transport of large quantities of oil to the ocean bottom—in a process now well understood and diagrammed in reports co-sponsored by the EPA.[9]

In its 2015 rulemaking on dispersant use, the 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" (emphasis added).[10]

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)].[11]

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

FACT: Dispersants were designed for use on conventional (floating) oil in saltwater environments. Their effectiveness is dependent upon water temperature and salinity. Dispersants are considerably less effective when salinity falls below 20 ppt and temperatures below 10° C.[12]

Regarding salinity, effectiveness is minimal in freshwater and brackish environments, including Arctic surface waters diluted by ice melt. EPA proposed a conditional listing for dispersant use only in saltwater environments in its 2015 rulemaking, but it did not specify a lower (or higher) salinity threshold for use, despite consistent findings that dispersant efficacy

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

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.
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 National Academies of Sciences, Engineering, and Medicine, 2019, *The Use of Dispersants in Marine Oil Spill Response,* Washington, DC: The National Academies Press, p. 48 (diagram). https://doi.org/10.17226/25161

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

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

12 SL Ross Environmental Research, 2010, for U.S. Dept. of Interior MMS, 2005, Literature Review of Chemical Oil Dispersants and Herders in Fresh and Brackish Waters.

peaks in waters with a salinity ranging between 20 to 40 ppt, depending on the type of dispersant.[13] Further, the 2015 rulemaking was never concluded. *Current rules in effect allow dispersant use in all waters of the U.S.*[14]

Regarding temperature, in its 2015 rulemaking the EPA proposed setting minimum dispersant effectiveness goals at two temperatures, 5 and 25 ºC, to accommodate industry's interest in drilling in the Arctic and in deep water offshore in the continental U.S. While Arctic surface waters *may* reach 5º C during summer months, most of the year temperatures are lower,[15] while most of the deep ocean water is between 0–3 degrees.[16] Regardless, the effectiveness goals are not achieved *at either temperature* with less than 20 percent salinity.[17]

MYTH 5: Use of subsurface dispersant injections disperses oil released from deepsea 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.[18] 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 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.

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13 Fingas, M. and L Ka'aihue, 2005. A literature Review of the Variation of Dispersant Effectiveness with Salinity," Proceedings of the 28th Arctic Marine Oil Spill Program Technical Seminar, Environment Canada, Ottawa, ON, pp. 377-389, 2005 *in* SL Ross Environmental Research, 2010, p. 54.

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

15 Sea temperature info in the Arctic: https://seatemperature.info/arctic-ocean-water-temperature.html

16 Deep ocean water temperature: https://www.windows2universe.org/earth/Water/temp.html%26edu=elem

17 Fingas, M., B. Fieldhouse, Z. Wang. 2005, The Effectiveness of Dispersants under Various Temperature and Salinity Regimes, Proceedings of the 28th Arctic Marine Oil Spill Program Technical Seminar, Environment Canada, Ottawa, ON, pp. 1043-1083, Table 2.

18 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

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.[19] The resulting chemical-enhanced oil droplets are more harmful to humans and wildlife than oil alone.[20] 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.[21]

Aerial spraying of dispersants contributed to widespread dispersion of oil-chemical pollutants that likewise adversely affected coastal communities. For example, airborne levels of benzene and fine particulate matter (PAHs), the two contaminants of primary concern during the BP Deepwater Horizon disaster, were measured over a five-month period from May through September of 2010 across southeastern Louisiana. A study that analyzed these available data found levels of benzene that consistently exceeded the Unacceptable Cancer Risk level used by the EPA to enforce the Clean Air Act.[22] Likewise, airborne levels of PAHs across the study region also exceeded the $PM_{2.5}$ standard used to enforce the Clean Air Act.

An ongoing health assessment of Louisiana women and their children in this region reported these residents had high incidence of respiratory illness and other exposure-related health complaints compared to communities further inland.[23] Early studies predicted a higher risk of leukemia and liver cancers among workers, due to key alterations in blood profiles.[24] These cancers and other rare and unusual cancers are showing up in former BP oil spill responders—and in coastal residents and their children.[25] Studies also report long-term and

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[19] 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

[20] 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.

[21] 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.

[22] 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.

[23] 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).

[24] D'Andrea MA, Reddy GK. Health consequences among subjects involved in Gulf oil spill cleanup activities, *The American Journal of Medicine*, **2013**, 126(11):966–974. www.ncbi.nlm.nih.gov/pubmed/24050487

[25] D'Andrea MA, Reddy GK, 2018. The development of long-term adverse health effects in oil spill cleanup workers of the [BP] Deepwater Horizon offshore drilling rig, Frontiers in Public Health, 26 April 2018. https://doi.org/10.3389/fpubh.2018.00117

Government Accountability Project, 2020, Ten years after [BP] Deepwater Horizon: Whistleblowers continue to suffer an unending medical nightmare triggered by Corexit. https://whistleblower.org/wp-content/uploads/2020/04/Ten-Years-After-Deepwater-Horizon.pdf multi-generation harm occurring in another mammal—dolphins—and other wildlife in the oil spill-impacted zone.[26]

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. Under this ruling, dispersant manufacturers such as Nalco are not liable for any harmful side effects from use of its product as long as the federal government has listed them on the NCP Product Schedule.[27]

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)].

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

ALERT Project, Surviving the BP oil disaster, Episodes 1–3, recorded in March and April 2020. https://www.youtube.com/channel/UCljGU7enuaFOXaX_Dte1GsQ

26 Meiners, J., 2020. Ten years later, BP oil spill continues to harm wildlife, especially dolphins, *National Geographic.* https://www.nationalgeographic.com/animals/article/how-is-wildlife-doing-now--ten-years-after-the-deepwater-horizon

De Guise, S., et al., 2021**,** Long-term immunological alterations in bottlenose dolphin a decade after the [BP] *Deepwater Horizon* oil spill in the Northern Gulf of Mexico: Potential for multigenerational effects, ***Environmental Toxicology & Chemistry,* online Feb. 17, 2021. https://doi.org/10.1002/etc.4980**

27 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.

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.

MYTH 9: The 2019 National Academy of Sciences report "proves" that dispersants work as intended and that more is better.

FACT: The American Petroleum Institute and at least one major oil spill response contractor supported this piece of work.[28] NAS boasts a membership of over 600 oil corporations and industry service providers including response contractors. The NAS report is based mostly on industry-funded lab studies, while it downplays or ignores the growing evidence-based data and studies that show causal links between these deadly dispersants, dangerous levels of dispersants and oil in the air and water, human and wildlife exposures to these dangerous levels, and resulting short- and long-term harm in the world outside the lab.

The lab tests that the NAS cites throughout its report conclude that the most optimal concentration for dispersant use *is several times the concentration used during the BP Deepwater Horizon oil spill response.* The trouble is, some of the lab models also found no difference in lessening airborne levels of hydrocarbons when *no* dispersants were used versus the supposed optimal concentration.[29] Models and statistics are only as honest as the people who use them. Former BP oil spill responders and Gulf coast residents and their children speak a different truth. Maybe it's time to listen to them.

[28] NASEM 2019, p. ii (sponsors).

[29] Committee on the Evaluation of the Use of Chemical Dispersants in Oil Spill Response, National Research Council, The Use of Dispersants in Marine Oil Spill Response 58, in NASEM 2019, p. 358.