EPA United States Environmental Protection Agency

EPA Response to BP Spill in the Gulf of Mexico

Dispersants

View EPA and Coast Guard's directive to BP to reduce the use of dispersants (PDF) (1pp., 58 KB, About PDF)

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- May 24: **Statement by EPA Administrator Lisa P. Jackson from Press Conference on Dispersant Use in the Gulf of Mexico with U.S. Coast Guard Rear Admiral Landry (PDF)** (10 pp., 84 KB, About PDF)
  - Audio of May 24 press conference call with EPA Administrator Lisa P. Jackson and USCG Rear Admiral Mary Landry to discuss dispersant use.

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- May 22: **EPA Releases BP's Response to Directive on Dispersants**
- May 20: **EPA: BP Must Use Less Toxic Dispersant**
- May 20: **EPA Posts Underwater Dispersant Monitoring Data**
- May 17: **Statement from NOAA Administrator Jane Lubchenco on Ongoing Efforts to Monitor Subsea Impacts of the BP Oil Spill**
- May 15: **Coast Guard and EPA approve use of dispersant subsea in further effort to prevent oil from reaching U.S. shoreline.**
- May 12: **EPA and NOAA Press Conference Call on Dispersant Use and Approval**

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- May 22: **BP's response to EPA's dispersant directive (PDF)** (13 pp., 3 MB, About PDF)
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Directives and Addenda

- **EPA's Dispersant Monitoring and Assessment Directive for Subsurface Dispersant Application**

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EPA's Dispersant Monitoring and Assessment Directive for Subsurface Dispersant Application

Government Response

For questions about the response, call the Joint Information Center: 985-902-5231 or 985-902-5240

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Following the BP Oil Spill in the Gulf of Mexico on April 22, 2010, EPA has provided full support to the U.S. Coast Guard and is monitoring and responding to potential public health and environmental concerns. EPA continues to closely coordinate with other federal, state and local agencies as well.

Environmental data, including air quality and water samples, will be posted and frequently updated on this site as it is collected and validated by EPA's response teams along the impacted coastlines. This data is meant to determine potential risks to public health and the environment.

This directive requires BP to implement a monitoring and assessment plan for subsurface and surface applications of dispersants as part of the BP oil spill response. Addendum 1 also requires BP to include a more thorough oil analysis which will allow EPA to determine whether the plume is toxic to aquatic life. Addendum 2 requires BP to identify and use a less toxic and more effective dispersant from the list of EPA authorized dispersants.

- **Summary (May 10, 2010) (PDF)** (1 pp., 62 KB, About PDF)
- **Directive (May 10, 2010) (PDF)** (5 pp., 107 KB, About PDF)
- **Addendum 1 (May 14, 2010) (PDF)** (17 pp., 64 KB, About PDF)
- **Addendum 2 (May 20, 2010): Directive from EPA to BP on using less toxic and more effective dispersants (PDF)** (1 pp., 63 KB, About PDF)
- **Addendum 3 (May 26, 2010): Directive from EPA and Coast Guard on reducing the use of dispersants (PDF)** (1 pp., 58 KB, About PDF)

Analysis of Sub-surface Dispersant Use

Here are the BP sampling results (in various formats) from 5/15 to 5/23 (Posted 5/25):

- Results in Microsoft Excel format (54 KB)
- Results in comma delimited (csv) format (8 KB)
- Results in Adobe PDF format (10 pp., 21 KB)

EPA is working closely with its federal partners, including the U.S. Coast Guard and NOAA, to ensure an aggressive dispersant monitoring plan is implemented by BP and that data are regularly and rigorously reviewed.

To-date, the toxicity data does not indicate any significant affects on aquatic life. Moreover, decreased size of the oil droplets is a good indication that, so far, the dispersant is effective.

We are closely watching the dissolved oxygen levels, which so far remain in the normal range. Dissolved oxygen levels initially appeared low when measured with a device called a LaMotte tool. In order to conduct a more thorough analysis, more sensitive equipment was then employed, called an Extech Probe. The subsequent dissolved oxygen readings from the Extech Probe indicate that dissolved oxygen levels are within the normal range.

Statement on Dispersant Use in BP Oil Spill

When this crisis occurred, Coast Guard and EPA granted BP authorization to use an approved dispersant on oil present on the surface of the water in an effort mitigate the impact of the spill. This authorization included specific conditions to ensure the protection of the environment and the health of residents in affected areas. At this time, BP is authorized to continue use of this dispersant on the surface of the water. To ensure nearby residents are informed and protected, the EPA is constantly monitoring air quality in the Gulf area through air monitoring air craft, and fixed and mobile air stations. The air monitoring data is posted as it becomes available.

The EPA and the U.S. Coast Guard have authorized BP to use dispersants underwater, at the source of the Deepwater Horizon leak. Preliminary testing results indicate that subsurface use of the dispersant is effective at reducing the amount of oil from reaching the surface – and can do so with the use of less dispersant than is needed when the oil does reach the surface. While BP pursues the use of subsurface dispersants, the federal government will require regular analysis of its effectiveness and impact on the environment, water and air quality, and human health through a rigorous monitoring program. Below is EPA's directive to BP, including the monitoring plan the company must adhere to in order to ensure the protection of the environment and public health. We reserve the right to discontinue the use of this dispersant method if any negative impacts on the environment outweigh the benefits.

EPA and NOAA Press Conference Call on Dispersant Use and Approval

The Environmental Protection Agency and the National Oceanic and Atmospheric Administration (NOAA), hosted a press conference call on May 12 at 4 p.m. ET to answer questions related to the use, approval and science of dispersants being used on the BP oil spill in the Gulf of Mexico.

Download the full transcript of the conference call (PDF) (32 pp, 60K, About PDF)

Questions and Answers on Dispersants

Monitoring and Assessment of Dispersants Used in the BP Spill Response

What monitoring is BP required to perform regarding the subsea application of dispersants?

Subsurface water monitoring will be performed following dispersant application in order to provide the best scientific information possible. Some of the monitoring parameters include: 1) identification of dispersed oil, 2) oil droplet size, 3) dissolved oxygen (DO) and other physical characteristics such as conductivity, temperature and depth (CTD) and, 4) toxicity information. The Directive which requires BP to perform this sampling is available on this page.

What is dissolved oxygen (DO) and why would dispersant application monitoring be stopped if DO levels dropped?

Dissolved oxygen (DO) analysis measures the amount of gaseous oxygen (O2) dissolved in the water. Adequate dissolved oxygen is necessary for good water quality. Normal ranges for DO in the Gulf area are 4 mg/l. The lower the concentration of dissolved oxygen, the greater the stress is on aquatic life. The evaluation criteria to determine further use of subsea dispersant include DO levels that are < 2mg/l and the results of toxicity

tests.

The monitoring and assessment directive calls for the use of a "CTD rosette." What is a CTD rosette?
The "rosette" is a cylindrical piece of equipment that holds multiple specialized water bottles that can take separate water samples at different depths every time it goes in the water. The rosette is deployed and lowered a specific depth and then brought back to the surface. On its way to the surface, the water bottles will be "fired" at certain depths, thus trapping water from that depth inside the bottle ready to be sampled on deck.

The CTD is a set of small high-tech probes attached to the rosette and is the primary tool for understanding the physical properties of sea water that are essential for supporting marine life. C stands for "Conductivity," T stands for "Temperature," and D stands for "Depth". A CTD gives scientists an accurate and comprehensive charting of the distribution and change in water temperature, salinity, and density for the water column they are studying. While the CTD is still underwater it reports electronic messages through a cable back to the onboard computer lab. While the CTD is gathering data underwater, computers on the ship are constantly receiving and analyzing the data.

What is a toxicity test?
Toxicity tests are methods for determining the impact of a chemical or an effluent on living organisms and measure the degree of response using commonly tested species. Many different kinds of tests can be used to identify potential toxic effects but since toxic effects differ, comparing the toxicity of one to another may not be appropriate.

What types of toxicity tests are required to monitor the biological impacts of subsurface dispersant application?
The biological impacts of dispersants applied under water will be monitored using a standardized rotifer test that evaluates the potential toxicity of the water. Rotifers are sensitive small invertebrates that occur in the Gulf of Mexico and are important to the food chain. They feed on bacteria and other small pieces of organic matter and, in turn, are fed upon by crustaceans and other organisms. A commercially-available procedure using rotifers (called Rototox®) is used and is specified for the BP dispersant monitoring directive because it is a rapid test that can be performed remotely on a ship. The test exposes rotifers to water collected at different distances from the oil release location. Toxicity is determined by comparing the survival of the rotifers exposed to the deep water samples to survival in clean water.

There is toxicity test data available for the dispersants on the NCP Product Schedule (http://www.epa.gov/emergencies/content/ncp/index.htm) and it talks about LC50s. What is an LC50?
In environmental studies, LC stands for "Lethal Concentration" and is the concentration of the chemical, given all at once, in the water that causes the death of 50% of a group of test animals in a given time (for example, during a 96-hour period). In general, the smaller the LC50 value, the more toxic the chemical. The opposite is also true: the larger the LC50 value, the lower the toxicity. For example, a chemical with an LC50 of 2 parts per million (ppm) would be more toxic than a chemical with an LC50 of 20 ppm. The LC50 is the measure of the immediate (or acute) toxicity of a chemical for the particular animal species being tested. The LC50 was not designed nor intended to give information on the long-term exposure effects of a chemical.

It is also important to note that the LC50 value may be different for a given chemical depending on the route of exposure (e.g., skin contact, ingestion, inhalation) and can be different for different animal species, ages and sexes. The LC50 is only one source of toxicity information and only provides information for the species and concentrations of chemical being tested under laboratory conditions. Toxicity tests resulting from controlled laboratory experiments may not accurately represent the degree of toxicity seen in the environment because of factors such as breakdown of the chemical, different species, different routes of exposure, age, sex, stage of development (e.g., adult versus larval).

To date, how much dispersant has been used in the BP Oil Spill response? Is BP is running out of dispersants?
For the latest information on the use and amount of dispersants used, go to the Deepwater Horizon Response Current Operations on the Official Site of the Deepwater Horizon Unified Command

How do scientists identify if the oil is dispersed?
Monitoring of oil will be performed using a number of different fluorometers that enable us to determine where the oil plume is located (or the chemical "signature" of the oil) and whether the oil is being broken down chemically (from the use of dispersants) or physically by natural means such as wave action or underwater mixing.

Fluorometers measure fluorescence which helps scientists locate dispersed oil plumes in the water column. Fluorescence is technically defined as the absorption of light of a certain wavelength (typically ultraviolet) that induces the emission of light with a longer wavelength (and lower energy). To measure fluorescence, fluorometers expose a chemical or compound to a specific wavelength in UV light range (similar to a black light). When the compound is exposed to the UV light, one of the chemical's electrons is "excited" by the light and jumps up to a higher wavelength and then back down to its normal state. When the electron drops down to its normal state it emits a "glow" or "fluorescence." The fluorometer measures the emitted light or "fluorescence," which allows scientists to identify certain compounds in the oil and, under certain circumstances, even the effectiveness of the dispersant application.

Why do scientists measure oil droplet size?
By determining the size of the oil droplets, scientists can potentially distinguish between dispersed and non-dispersed oil. Droplet size can also help scientists determine if the oil is being broken up chemically via the dispersants or if its physically being broken up by wave action or wind. Droplet size also helps scientists evaluate how quickly the oil droplet rise through the water column.

How do scientists measure oil droplet size?
Oil droplet size is determined by means of a laser-induced particle size analyzer. This instrument uses a laser which hits the particles, or droplets, in the water column and scatters the light. The scattered light information is collected on a detector which provides real-time instant results to scientists.

EPA's List of Authorized Dispersants (NCP Product Schedule)

BP is using two different types of Corexit dispersants. What's the difference? What can you tell us about about the ingredients or chemical composition of these products?
BP is using Corexit 9500A and 9527A. These dispersants perform the same function, but have different formulations. EPA posts information about all authorized dispersants on our National Contingency Plan (NCP) Product Schedule website.

All the information EPA can make public about these dispersants can be found on the Product Schedule. You may notice that some of the ingredients are confidential. This is because the manufacturer has chosen to keep this information proprietary, and as a result EPA is obligated by law to protect this information. However, NALCO, the manufacturer of Corexit products can choose to make this information available.

Does EPA make a determination on the toxicity of dispersants before they are approved?
EPA requires toxicology tests and reports for all dispersants that are approved on the National Contingency Plan (NCP) Product Schedule, the authorized list of dispersants. All determinations regarding the specific application or use of a dispersant are made by the Federal On-Scene Coordinator in charge of the response.

EPA lists all dispersants that have been authorized for use on National Contingency Plan (NCP) Product Schedule

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Dispersant Effects

What are the tradeoff considerations being weighed regarding the impact of fish and wildlife when making decisions about the subsea use of dispersants?
Dispersants are generally less toxic than oil. When considering the use of a dispersant in the deep ocean, the federal government weighs the effectiveness of the dispersant in breaking down the oil at such depths, the benefits of preventing the oil from rising to the surface and eventually hitting the shore where it is likely to do significant damage to birds, wetlands and aquatic life, and the long term impacts of the dispersant mixed with oil in deeper waters. We have a monitoring and sampling plan in place to track the movement of the oil and we reserve the right to stop the use of these dispersants at any time based on the results.

Are any human health effects expected as a result of using the dispersants?
People working with dispersants are strongly advised to use a half face filter mask or an air-supplied breathing apparatus to protect their noses, throats, and lungs, and they should wear nitrile or PVC gloves, coveralls, boots, and chemical splash goggles to keep dispersants off skin and out of their eyes. CDC provides more information on reducing

occupational exposures while working with dispersants during the Gulf Oil Spill Response.

Material Data Safety Sheet for Corexit 9500A (PDF)
Material Data Safety Sheet for Corexit 9527A (PDF)

What effects, if any, does the use of dispersants have on marine life?
It's important to understand that the use of dispersants is an environmental trade-off. We know dispersants are generally less toxic than the oils they breakdown. We know that surface use of dispersants decreases the environmental risks to shorelines and organisms at the surface and when used this way, dispersants breakdown over several days. However the long term effects on aquatic life are unknown, which is why EPA and the Coast Guard are requiring BP to implement a robust sampling and monitoring plan.

The federal response is intended to ensure that these operations are constantly monitored for any short or long term adverse effects that may outweigh the benefit of using dispersants.

How will we know the future and total effects on marine life of dispersant use?
It is too early in the process to know what the scope of the natural resource damage will be. Look to federal partners such as NOAA and DOI for information on impacts to fish, shellfish, marine mammals, turtles, birds and other sensitive resources as well as their habitats, including wetlands, beaches, mudflats, bottom sediments, corals and the water column.

Apart from marine life, has the Unified Command been able to make an assessment on the effects of the dispersant on the environment?
The harm or toxicity of dispersed oil in the environment is generally associated with the oil rather than with the dispersant alone. However, use of dispersants breaks up a slick of oil on the surface into smaller droplets that can go beneath the surface. When applied on the surface before spills reach the coastline, dispersants will potentially decrease exposure for surface-dwelling organisms (such as sea birds) and intertidal species (such as mangroves and salt marshes), while increasing exposure to a smaller population of aquatic life found deeper in the water. It is unknown if dispersed oil has toxic implications to the human population because bioaccumulation through the food chain has not been evaluated.

To ensure nearby residents are informed and protected, the EPA is constantly monitoring air quality in the Gulf area through air monitoring air craft, and fixed and mobile air stations. EPA is also monitoring the water along the coast for indicators of water quality and toxicity to aquatic life. Following major oil spills, NOAA conducts annual damage assessments to determine and monitor long term effects on shoreline wildlife and spawning habitats.

How will the government ensure the protection of the environment when dispersants are used?
The authorization given to BP to use dispersants on oil stemming from the BP Oil Spill included specific conditions to ensure the protection of the environment and the health of residents in the affected areas. BP, through the Unified Command, continues to monitor the environment for effects of dispersant use. In addition, EPA is collecting air and water quality data daily.

Under the Oil Pollution Act, state, Tribal and federal Natural Resource Trustee agencies are responsible for assessing the injury, loss or destruction of natural resources due to spills. The trustees will also assess any lost human uses of these resources, for example, fishing, hunting, and beach recreational closures. The trustees are also assessing the efficacy of evaluating impacts from the response, including burning, and surface and sub surface dispersant use.

Surface Use of Dispersants

How do dispersants work on the water's surface?
Oil spill dispersants are chemicals applied directly to the spilled oil in order to break it into small droplets that fall below the surface. Dispersants are usually applied to the oil slick with specialized equipment mounted on an airplane, helicopter or ship. Once applied, dispersants help break up oil into tiny micron-sized droplets which mix into the upper layer of the ocean. Dispersed oil forms a "plume" or "cloud" of oil droplets just below the water surface. The dispersed oil mixes vertically and horizontally into the water column and is rapidly diluted. Bacteria and other microscopic organisms are then able to act more quickly than they otherwise would to degrade the oil within the droplets.

Oil on calm water surfaces is often cohesive and natural degradation processes are slow. In heavy seas, however, the oil gets naturally dispersed into the surface waters. It should

be noted that oil released from the BP Oil Spill is also naturally dispersing into the water column due to the physical agitation of the wind, waves, and vessel operations.

Surface Use of Dispersants in the Response to the BP Spill:
The authorization given to BP to use the dispersant on oil present on the surface of the water included specific conditions to ensure the protection of the environment and the health of residents in affected areas. At this time, BP is authorized to continue use of this dispersant on the surface of the water. The Unified Command will continue to monitor for the effects of this dispersant on the environment and we reserve the right to discontinue its use.

Underwater Use of Dispersants

How do dispersants work under the water?
The use of the dispersant at the source of the leak represents a novel approach to addressing the significant environmental threat posed by the spill. Preliminary testing results indicate that subsea use of the dispersant is effective at reducing the amount of oil reaching the surface – and can do so with the use of less dispersant than is needed when the oil does reach the surface. This is an important step to reduce the potential for damage from oil reaching fragile wetlands and coastal areas. While BP pursues the use of subsea dispersants, the federal government will require regular analysis of its effectiveness and impact on the environment, water and air quality, and human health through a rigorous monitoring program. EPA's directive to BP, including the monitoring plan the company must adhere to in order to ensure the protection of the environment and public health, is available on this page. We reserve the right to discontinue the use of this dispersant method if any negative impacts on the environment outweigh the benefits.

Underwater Use of Dispersants in the Response to the BP Spill:
The Coast Guard and EPA have authorized BP to use dispersants underwater at the source of the Deepwater Horizon leak. Preliminary testing results indicate that subsurface use of the dispersant is effective at reducing the amount of oil from reaching the surface – and can do so with the use of less dispersant than is needed when the oil does reach the surface. While BP pursues the use of subsurface dispersants, the federal government will require regular analysis of its effectiveness and impact on the environment, water and air quality, and human health through a rigorous monitoring program. EPA has issued a directive to BP, which includes a monitoring plan the company must adhere to in order to ensure the protection of the environment and public health. This directive can be found on this page. We reserve the right to discontinue the use of this dispersant method if any negative impacts on the environment outweigh the benefits.

Is the underwater chemical dispersant that EPA approved contributing to underwater oil plumes?
There is no information currently available to connect use of dispersants to the subsurface layers discovered. NOAA continues to work closely with EPA and the federal response team to monitor for the presence of oil and the use of surface and sub-surface dispersants. As we have emphasized, dispersants are not a silver bullet. They are used to move us towards the lesser of two environmental outcomes. Until the flow of oil is stemmed, we must take every responsible action to reduce the impact of the oil. EPA reserves the right to stop the application of dispersant at any time. We reserve the right to discontinue the use of this dispersant method if any negative impacts on the environment outweigh the benefits.

General Information about Dispersants

Have dispersants ever been used this much before?
While dispersants have been used in previous oil spills, this is the largest application of dispersants at an oil spill response in the United States. Since the spill occurred, EPA and its federal partners have closely monitored any potential impacts of the dispersant including air quality monitoring by both planes and through mobile and fixed locations. Air sampling is geared toward looking for significant increases in airborne (volatile) chemicals.

Thus far, preliminary results of EPA's initial air monitoring efforts have not shown risks to human health from dispersants. We have also developed a plan to monitor the surface and subsea use of dispersants. That plan is evolving and we will continue to update the website. The plan is posted on this page.

What are the future plans for use of dispersants for oil spills? Will the industry and federal government look to continue their use?

Generally, the use of dispersants is restricted under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Dispersants must be on the US EPA Product List, and federal and state agencies have agreements establishing areas where rapid decisions on dispersants may be made by the Federal On–Scene Coordinators. Areas outside those with designated agreements are required to get additional approval from agencies identified in the NCP.

Some History of Dispersant Use:

- *In the US, dispersants have been applied to much smaller spills off the coast of Louisiana and Texas over the last 15 years.*
- *At the IXTOC-I Well Blowout near Vera Cruz, Mexico in 1979, between 1 million and 2.5 million gallons of mostly Corexit dispersant products were applied over a five-month period on the oil discharge.*
- *In Australia last year, 50,000 gallons of dispersants were used on the 9 million gallon West Atlas oil platform spill in the northern Timor Sea.*
- *In the United Kingdom, dispersants are considered the first line of defense because of high seas and rugged coastlines. In 1996, 118,000 gallons of dispersants were used on the 20 million gallon Sea Empress oil spill in Wales.*