

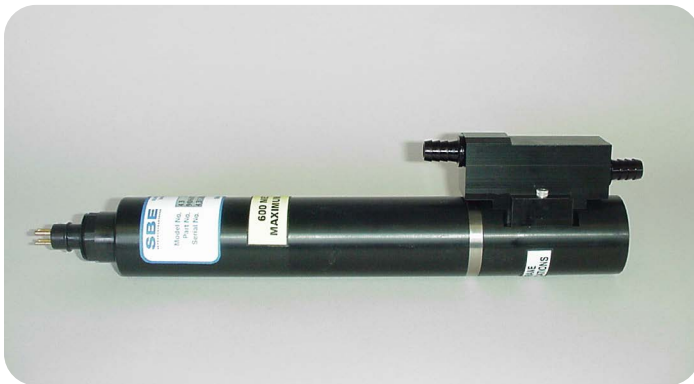
## About

Dispersants are chemical agents used to break up oil into smaller droplets throughout the water column. Dispersants are applied to surface oil floating on water, or below the surface closer to an uncontrolled release of crude oil from a well blowout source. This series of fact sheets details monitoring requirements and how to apply the collected data to inform the use of dispersants under **Subpart J of the National Contingency Plan (NCP)**.

## Description of the Requirement

The responsible party must collect and analyze water column samples from the ambient background, baseline oil plume, and dispersed oil plume for dissolved oxygen (subsurface only), using standard operating and quality assurance procedures. Refer to the regulatory requirement in the Code of Federal Regulations (CFR): **40 CFR 300.913(b)**.

**Figure 1:** Dissolved oxygen measurement device.



Credit: Sea-Bird Scientific

## Subsurface Dissolved Oxygen

Dissolved oxygen is the amount of gaseous oxygen that is in the water column and available for aquatic organisms.

## Measuring and Reporting Dissolved Oxygen

Dissolved oxygen measurements from water column sampling are collected directly at the site (*in situ*) (Figure 1), through laboratory analysis (*ex situ*), or both. While there is an advantage of quick turnaround times for *in situ* dissolved oxygen measurements, responders must protect the instrument from becoming fouled with oil to avoid erroneous measurements. *Ex situ* dissolved oxygen measurements using laboratory titrations (such as Winkler) can verify *in situ* measurements. Dissolved oxygen units are reported as milligrams per liter (mg/L) (Figure 2).

## Using Dissolved Oxygen Measurements

Dispersants promote the formation of small oil droplets in the water column that are then subject to transport by subsurface currents and other natural processes. For example, petroleum oil hydrocarbons are an attractive carbon and energy source for microbial degradation or biodegradation by naturally occurring microbes in the water column. While naturally occurring processes may be an advantage for mitigating an oil spill, biodegradation rates must be carefully monitored. Changes in the biodegradation rates of hydrocarbons in the natural environment can reduce the dissolved oxygen concentration in the water column, causing hypoxic (low oxygen) conditions and negatively affecting marine organisms. Dissolved oxygen levels are an important variable to monitor for changes that can impact biodegradation rates and can inform the response.

### ► Decision Points for Responders

The On-Scene Coordinator should consider all available data and information relevant to the response and consult with subject matter experts. With the dissolved oxygen data, the On-Scene Coordinator can reevaluate if dispersant use should begin, continue, continue with modifications, or cease.

- If responders observe a decrease in the dissolved oxygen concentration compared to baseline data, this may indicate lower quality or hypoxic conditions for water column organisms.
- In many regions, dissolved oxygen levels less than or equal to 2 mg/L indicate the onset of hypoxic conditions. Note that some regions have different thresholds for hypoxia.
- Hypoxic conditions may slow the biodegradation of oil.

### Data Collection and Reporting Frequencies

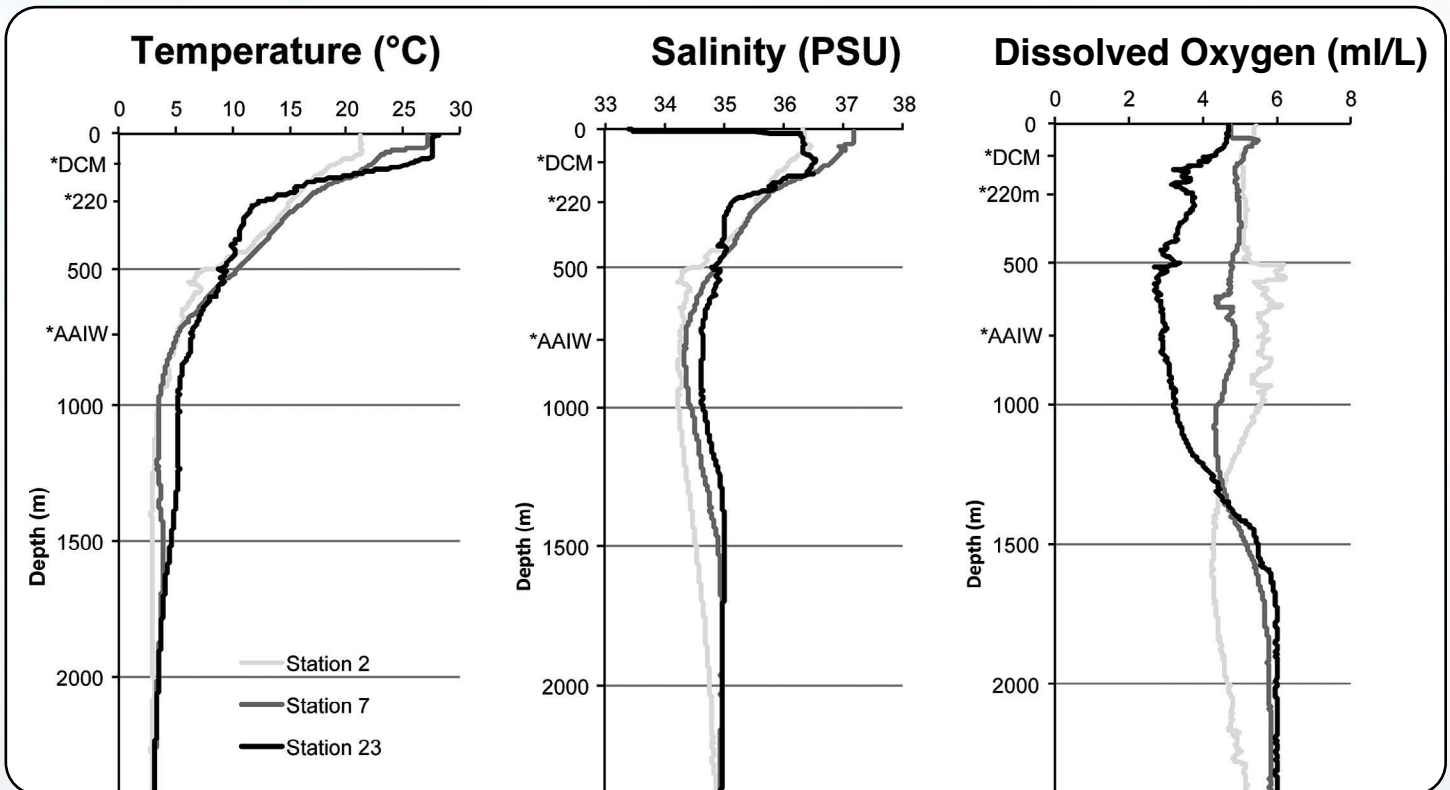
#### Collection

- Dissolved oxygen data from the ambient background water column and baseline oil plume.
- **Daily:** Dissolved oxygen data from the dispersed oil plume.

#### Reporting

- **Immediate:** Important ecological receptors' exposure to decreased dissolved oxygen concentrations.
- **Daily:** Dissolved oxygen data and analyses.

**Figure 2:** Sample dissolved oxygen profile alongside temperature and salinity.



Credit: Adapted from Rocke et al. (2015)

## Additional Resources

### **NCP Product Schedule Technical Notebook**

A compilation of product bulletins summarizing data requirements and test results for dispersant products listed in EPA's NCP Product Schedule. The Technical Notebook includes information on dispersant application methods, toxicity and effectiveness, and physical properties.

### **Oil Spill Emergency Response – Monitoring the Use of Dispersants Fact Sheets**

- Water Column Sampling
- Reporting of Dispersant Use
- Characterization of Ecological Receptors – Habitats
- Characterization of Ecological Receptors – Toxicity

## Legal Disclaimer

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