Heavy Metals

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 heavy metals including nickel and vanadium, using standard operating and quality assurance procedures. Refer to the regulatory requirement in the Code of Federal Regulations (CFR): **40 CFR 300.913(b)**.

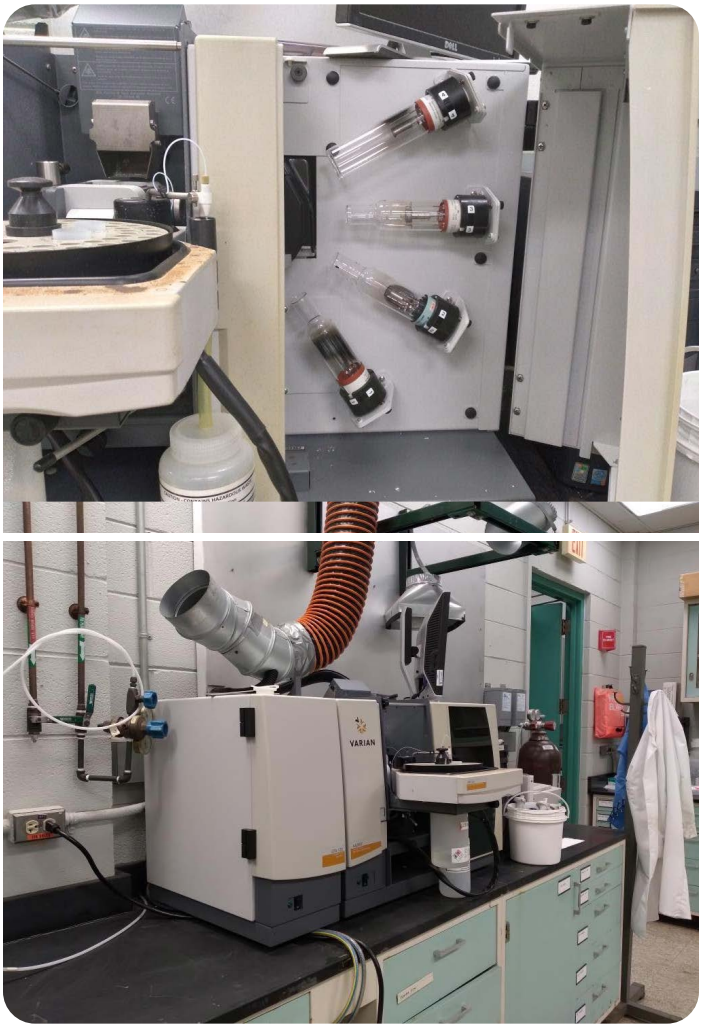
Heavy Metals

Metallic chemical elements with relatively high densities are referred to as heavy metals. Heavy metals such as nickel and vanadium are impurities sometimes present in crude oil and can be toxic at low concentrations.

Measuring and Reporting Heavy Metals

- Atomic absorption spectrophotometry is a technique for measuring the concentrations of heavy metals (Figure 1).
- Distinct elements absorb electromagnetic wavelengths coming from a measurement device's light source differently; results identify specific heavy metals and their concentrations in the water column.
- Heavy metals concentrations are reported in micrograms per liter (µg/l) or milligrams per liter (mg/l).

Figure 1: A flame atomic absorption spectrophotometer.



Credit: EPA

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. Observed increases in heavy metals are an important factor for the On-Scene Coordinator to consider and can inform whether dispersant use should begin, continue, continue with modifications, or cease.

Using Heavy Metals Measurements

Measurements indicate the presence and concentration of specific heavy metals in the water column. When compared to expected levels from the source oil, these measurements can help identify whether there may be other sources of heavy metals contributing to their water column concentrations. Heavy metals measurements also serve to contrast the levels present against applicable water quality standards.

Dispersants can increase the bioavailability of oil constituents, including heavy metals, to some aquatic organisms (e.g., phytoplankton, zooplankton, fish). Potential exposures to increased concentrations of heavy metals could result in varying effects:

- Accumulation in organs causing failure and mortality.
- Alteration of blood components, making organisms weak, anemic, and vulnerable to diseases.
- Developmental inhibition, including hatching delays and deformities.
- Disruption of oxygen levels adversely impacting reproductive processes.

Data Collection and Reporting Frequencies

Collection

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

Reporting

- **Immediate:** Important ecological receptors' exposure to heavy metals.
- **Daily:** Most current available heavy metals data and analyses – not to exceed a five-day window between collection and reporting.

Additional Resources

NCP Product Schedule

Lists dispersant products and data submitted to EPA as required by Subpart J of the NCP.

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 products including the presence of any heavy metals.

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

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