

Dielectric Fluids Spills (non-PCB fluids)

Definition

The primary component in dielectric fluids are mineral oils, light petroleum distillates, silicone fluids, and synthetic and natural esters. Multiple products can be used in cables and other equipment.

Properties

- Dielectric fluids are complex chemical mixtures containing hundreds of primarily semi-volatile, organic compounds. They are designed to be stable, chemically inert, and have good thermal and dielectric properties. Because the diversity of dielectric fluids products currently available, it is important to review the Safety Data Sheet for the specific product spilled so that the physical properties and environmental fate and effects of the chemical constituents can be determined.
- They generally have low to moderate viscosity (<100 cSt) improving flow and flushing; however, some products have higher viscosity at low temperatures.

Environmental Behavior

- All of these products are expected to float when released to water and spread quickly into a thin sheen that is easily dispersed into the water column.
- Tests in large tanks showed that they can be effectively removed from the water surface using drum and disk skimmers, at rates about 5 times higher than diesel.
- They vary widely in degradation rates (based on laboratory studies over 10 days): 0% for silicone fluids; 25% for mineral oils; 60% for fluids based on synthetic esters; and 89-99% for fluids based on natural esters.
- Dielectric fluids are generally colorless and have a weak odor, making them unavoidable by wildlife. For similar reasons, these oils may be difficult to detect when spilled on the water surface or when stranded on shorelines.

Environmental Effects

- The greatest hazard of dielectric fluid spills to biological resources is smothering.
- Dielectric fluids may cause bird mortality by hypothermia from matted feathers. Greater risks to birds may result from large aggregations in the proximity of the spill.
- Mineral oils, silicone fluids, and ester-based fluids have low to very low water solubility (<1 ppm), aquatic toxicity, and bioaccumulation potential; therefore, mortality of aquatic resources (fish, invertebrates and seaweed) is unlikely. Products based on light petroleum distillates will have physical and fate properties based on their chemical composition. Environmental hazard may be attributed primarily to the additives used in these products.
- The effects of low dissolved oxygen concentration may be a concern for highly biodegradable dielectric fluids, particularly for releases to shallow or isolated water bodies. There is little fate, environmental and toxicological information regarding spills of these fluids in freshwater and marine environments.

