Review of Orimulsion and Freshwater

Abstract

Orimulsion is a heating fuel derived from bitumen in Venezuela. It is processed to form a water-in-oil that is stabilized with a surfactant at a concentration of about 0.5%. Orimulsion is shipped on demand to about 20 power plants around the world, but not in the United States. Most power plants are located on salt-water and only the Canadian buyer at Dalhousie, New Brunswick, is located where the salinity varies from fresh to saline, depending on season. A review of the current commercial situation will be presented.

Orimulsion has been a matter of concern because of its unique spill behaviour. Upon entry into the water column, the material disperses. In salt water, the surfactant rapidly destabilizes and a slick begins to form within minutes of the water entry. Depending on turbulent energy, the product will largely form surface slicks within 48 hours. In freshwater, however, the product is more stable. The bitumen in the Orimulsion has a density of about 1.2 g/mL, which means that it will sink in water densities less than that. In freshwater, the product slowly destabilized and bitumen is precipitated to the bottom. Dynamic studies of this behaviour will be reviewed and summarized.

Studies of the toxicity of Orimulsion, show that the bulk of toxicity resides in the surfactant. A newer formulation has a less-toxic surfactant and thus an overall lower toxicity. The bitumen itself has a very low aquatic toxicity.

Several countermeasures have been optimized for the recovery of Orimulsion from sea water. These studies will be summarized and applicability to freshwater will be appraised.

Other studies related to Orimulsion will be summarized. Some studies on analysis, remote sensing and detection in water have been conducted.