

FATE, EFFECT, BEHAVIOUR AND ENVIRONMENTAL IMPACTS AS THE PRODUCTS WEATHER

Hydrocarbons

Marine Diesel:

Diesel fuel is considered a non-persistent oil (as compared to a heavier Bunker or crude oil product) in even the most calm sea conditions, as it will lose 40% of its volume due to evaporation within 48 hours in cold weather. Diverse weather will disperse the sheen into smaller slicks creating a greater surface area for evaporation. In open rough seas most of the volume released will be dispersed and evaporated within 5 days.

Nevertheless, it still poses a threat to marine organisms and particularly birds if they happen to come into contact with the slick.

Marine diesel in sediments: In general, diesel fuel can penetrate sediment since its viscosity is so low. The extent of penetration depends on the sediment type. In porous like sand it can penetrate quickly and to depth. If clay-like, penetration is slow. Diesel also evaporates even when stranded on sediment. In fact, it would prefer to evaporate then sink into the sediment.

Summary properties: Relative rapid evaporation and dissolution rates in water column (surface winds expedite these qualities), not prone to form stable emulsions, has relatively high aquatic toxicity, rapid natural degradation or remediation in water and surface sediments on the order of days to months.

Lube/Hydraulic Oils:

Lubricating oils, for all their differences in formulation, have many similarities. When spilled into a lake, river, or ocean they will spread rapidly to a thin slick. They will not evaporate, and they will disperse fairly readily in high energy conditions without the addition of chemical dispersants. In general, lubricating oils will be of low to moderate aquatic toxicity. While the base oils used in the production of lubricating oils are generally of extremely low toxicity to aquatic organisms, the large number of different additives, in varying amounts, make it impossible to issue more specific statements, unless details of the composition (usually proprietary) are known.

For comparison purposes: Bunker C is quite heavy, will sink and involves significant manual/cleanup recovery techniques. The latest and most recent large spill in Canada was at Wabamun Lake, Alberta on August 6, 2005 of approximately 750,000 litres of Bunker C.

For Reference

Appendixes:

A: (Marine Diesel)

With comparison data for heavy fuel oil blend and Bunker C. In recent years the International Standards Organization (ISO) and the American Society for Testing and Materials (ASTM) have published standard specifications for marine fuels. In summary, these documents set out specifications for 19 grades of marine fuels: four distillate fuels and 15 residual fuels. Despite the existence of such specifications, marine fuels continue to be referred to using broad categories such as Marine Diesel Oil (MDO), Intermediate Fuel Oil (IFO), and Bunker C.

MDOs are generally formulated from middle distillates, typically containing less than 10% residuum.

IFOs are blends of heavy residual fuels with enough distillate to lower the viscosity to that required.

Natural dispersion and evaporation behaviours of MDO, IFO 180 and Bunker C and a effectiveness of chemical dispersants: MDO will disperse readily in high sea states and will also evaporate up to 50% in two days, and completely in approximately 5 days. Chemical dispersants, although effective on MDO spills are not recommended as natural dispersion is likely. The distillate component of IFO behaves independently of the residual component, dispersing and evaporating in the same manner as MDO. Bunker C will remain essentially unchanged even after long periods of time. Chemical dispersants are not effective with either IFO 180 or Bunker C.

Aquatic toxicity and effect on the environment of MDO, IFO 180, and Bunker C:

MDO, and refined fuels in general, such as diesel and gasoline, have high aquatic toxicity values due to their relatively high content of naphthalenes. The aquatic toxicity of Bunker C is relatively low because it contains only small quantities of compounds that are soluble in water. The distillate component of IFO behaves independently of the residual component, with aquatic toxicity similar to that of MDO. Bunker C, on the water or along the shoreline, will remain essentially unchanged even after long periods of time.

B: Lubricating oils

Lubricating oils are ubiquitous. They are used in all types of engines operating on land, at sea, or in the air. Compound classes that would impart undesirable qualities to a lubricant (waxes, polar compounds, and others) are removed in the refining processes.

INFORMATION PROVIDED BY:

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