

Submarine Outboard Equipment Grease and External Hydraulics Discharge Summary

Description of Discharge

How is this discharge generated? This discharge occurs when grease applied to a submarine's outboard equipment is released to the environment through the mechanical action of seawater eroding the grease layer while the submarine is underway, and by the slow dissolution of the grease into the seawater. This discharge also includes any hydraulic oil that may leak past the seals of hydraulically-operated external components of a submarine (e.g., bow planes).

Which vessels generate this discharge? Outboard equipment grease is discharged by all submarines, but the discharge of oil from external hydraulic equipment is limited to 22 submarines.

How often and where is this discharge generated? This discharge occurs continuously both within and beyond 12 n.m. from shore, although the rate of discharge depends upon the degree of contact between seawater and the greased outboard components, and how fast the submarine is traveling. Most hydraulically-operated outboard equipment, for example, does not contact seawater within 12 n.m. from shore because submarines generally operate on the surface in this region, and the hydraulically-operated equipment producing this discharge is located mostly above the waterline.

Analysis

Nature of Discharge: This discharge consists of grease (Termalene #2) and hydraulic oil. Termalene #2 consists of mineral oil, a calcium-based rust inhibitor, thickening agents, an antioxidant, and dye. Using an assumption that 100 percent of all grease applied to outboard equipment is washed away at a constant rate during submarine operations, the amount of grease released fleetwide within 12 n.m. is approximately 520 lbs/year. This value is believed to overstate the actual mass of grease discharged within 12 n.m. because submarines operate at lower rates of speed in coastal waters (thus leading to less erosion of the grease) and a surfaced submarine exposes a lesser amount of grease to the water than is exposed by a submerged submarine.

Hydraulic oil consists of paraffinic distillates and additives. Using a calculation that assumes all hydraulic system seals leak oil at the maximum allowable leak rate, approximately 0.4 lbs/year of hydraulic oil is released fleetwide within 12 n.m. from shore. (Based on discussions with Navy hydraulic system experts, such oil leakage rates are not common and thus this calculation overestimates the amount of oil actually leaked.) The submarine will displace approximately 120 million cubic feet of water as it travels within 12 n.m. from shore. Assuming that hydraulic oil and outboard grease are leaked at a constant rate, this will result in concentrations below the levels established in acute Federal criteria and State acute water quality criteria. In addition, the turbulence created by the vessel wake is expected to result in rapid dispersion of the constituents released.

Discussion and Discharge Determination

Discussion: Submarine outboard equipment grease and external hydraulics discharge has low potential for causing adverse environmental effects. EPA and DOD determined it is not reasonable and practicable to require a MPCD to mitigate adverse impacts on the marine environment for this discharge.

Determination: A marine pollution control device is not required.