New Herding Agents for Thickening Oil Slicks in Drift Ice for In situ Burning

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Abstract
Buist et al. (2007) found that herding agents will allow thickening of oil slicks and in situ burning in drift ice and close a gap for this response option in ice. The herding agents studied were developed in the 1970’s and used hydrocarbon-based surfactants as the active ingredient. The best herding agent found was a formula developed by the US Navy (USN). There have been significant advances in surfactant technology since the 1970’s with the development of two classes of “superwetter” surfactants – fluorosurfactants and silicone-based surfactants. This paper describes research that evaluated the use of these next-generation surfactants as the active ingredient in herding agents.

In 2007 and 2008, tests were carried out comparing the efficacy of herding agents formulated with silicone-based surfactants, formulated with fluorosurfactants, and the USN herder. The fluorosurfactant-based herders did not perform significantly better than the USN herder. In static tests, a silicone-surfactant based herder initially produced significantly higher herded slick thicknesses but declined back to the thickness of the USN herder over the one-hour test period.

In 2009, experiments were conducted with three new silicone-based surfactant herder formulations: first, in the SL Ross lab at small-scale (1-m² pans); and second, at much larger scale using the US Army Corp of Engineers Cold Regions Research and Engineering Laboratory (CRREL). These tests and comparisons with prior work found that one of the new silicone surfactant formulations significantly outperformed the USN herder.