The aftermath of the *Arrow* oil spill

BY **JEFF BARTON**

Disaster struck Chedabucto Bay — the body of water between the Strait of Canso and the Atlantic Ocean — on February 4, 1970 when the oil tanker *Arrow* ran aground. It broke up and sank over the next two days, and in doing so, spilled over 11.4 million litres of Bunker C Oil (making it approximately one third the size of the *Exxon Valdez* spill).

Most of the thick oil washed ashore within the first 24 hours, but leakage persisted from the twisted hull until cargo salvage was completed in March. Oil from this spill was seen as far away as Sable Island. In total, 305 kilometres of Chedabucto Bay shoreline were soiled to various degrees. Of this, approximately 50 kilometres were cleaned by the Department of Public Works during Operation Oil (May-August, 1970), the Canadian Armed Forces, and researchers. Reconnaissance surveys in 1982 by Petro Canada/ Woodward-Clyde found "with a few exceptions, the coastline is free of oil."

To further check the progress of the natural cleansing of Chedabucto Bay's shoreline, Environment Canada launched a field survey. Its results have been published as *Chedabucto Bay 1992 Shoreline Oil Conditions Survey: Long-term Fate of Bunker C Oil from the Arrow Spill in Chedabucto Bay, Nova Scotia*. The researchers investigated 249 of the 305 kilometres that were previously oiled and they uncovered some interesting results.

The spill may have happened 25 years ago, but the damage is still becoming apparent.

Although scattered in its distribution, oil remained on 13.3 kilometres, or 5.37 per cent, of the study area. The amount of this that was classified in the "heavy" oil category and "light" or "very light" categories based on width, distribution, and thickness were 10 per cent (1336.5 m) and 83 per cent, respectively. The majority of heavily oiled segments were found in the upper intertidal and supratidal zones of Black Duck Cove and Lennox Passage. Since the accident, these areas have consistently been found to be more soiled.

It was felt that most of the oil has been eroded by physical means, i.e. wave action and ice scouring. Another process, which was first described after the *Exxon Valdez* spill, involves the mixing of fine suspended sediments with the oil. The clay-oil flocculation prevents the formation of a hard weathered surface and permits biodegradation to proceed.

Where no fine sediments were present, an asphalt pavement-like surface layer formed. Oil beneath this is safe from physical erosion and biodegradation. On the other hand, an abundance of fine sediments helped to clean once heavily soiled shoreline in low wave-energy environments.

Of most interest is what was found at Black Duck Spit. Looking over the cobble beach, very little oil could be seen (10 to 20 per cent). Upon closer inspection, "shiny black to dark brown, mobile oil" was found between the cobbles. The depth of this oil was felt to be greater than 20 centimetres. Chemical analysis revealed that oil samples from Black Duck Spit were very similar to those taken from the *Arrow*, implying that they have weathered very little.

This survey "did not address the ecological implications of the presence of residual oil" but they were felt to be "very limited in scale."