



Vulnerability of Selected Beaches to Petroleum Contamination, Placentia Bay, NL, Canada

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Placentia Bay currently hosts the highest volume of ship traffic in along the Atlantic Canadian coastline, and is additionally exposed to accidental and deliberate discharges of petroleum products by Trans-Atlantic ship traffic. Placentia Bay has been identified as the region in Canada that is most likely to suffer a petroleum contamination event within the next 10 years. The morphological, sedimentological, energy regime, and marine debris characteristics of 4 beaches at the head of Placentia Bay were investigated in detail. Differing morphological, sedimentological and energy regime conditions alter the sensitivity of each system to oil spill contamination. Differences in the type and amount of marine debris between each system alter the potential risk of exposure to oil spill contamination. Based on differences in sensitivity and exposure, a vulnerability assessment was created for each system. This system was applied to additional beaches and rocky coastlines to demonstrate the applicability of the method and to highlight the actual vulnerability of each study beach relative to the spectrum of beaches actually present throughout eastern Newfoundland.

Typical of the majority of beaches throughout Placentia Bay, the 4 study beaches are characterized by gravel dominated, reflective, moderate to high energy systems. Observations of sediment re-working and accretionary features along the beaches of Arnold's Cove and Come by Chance indicate that self-cleaning would not be an effective agent of oil removal in the case of a spill. The absence of sediment re-working and protected nature of Goose Cove beach suggest that oil would persist in this environment for an extended period of time. Evidence of high wave energies at Hollett's Cove indicates that this beach would self-clean effectively.

Differing types and quantities of marine debris indicate that each beach, with the exception of Goose Cove, would likely be exposed to oil originating from a Placentia Bay spill. The heaviest quantities would be expected at Hollett's Cove and Arnold's Cove. Based on these factors, Arnold's Cove and Come by Chance are considered the most vulnerable beaches to oil contamination. Hollett's Cove and Goose Cove are considered the least vulnerable respectively. Applying the vulnerability assessment to the additional coastlines revealed that the 4 study beaches rank as moderately to highly vulnerable to oil spill contamination. This ranking, combined with the frequency of vessel traffic, indicates that a significant risk exists.