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# Contaminant mobilization in a warming Arctic; melting permafrost, erosion and characterization studies in Barrow, Alaska.

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## Abstract

Barrow, Alaska is home to the former Naval Arctic Research Laboratory (NARL) which was operational from 1947 until 1980, occupying a 350 acre site north of the city. At a latitude of 71 degrees north Barrow is the most northerly city in North America and is located at the strategic junction of the Chukchi and Beaufort Seas. Most of the original structures at NARL are still intact and have been re-purposed. However, complete utilization of the facility is limited by soil and groundwater contamination dating back to the Navy's tenure. Most of the sub-surface contamination relates to fuel spills but metals, PCBs and chlorinated solvents are also present at some locations above action levels. Characterization and remediation efforts have been ongoing since the Navy left NARL and are expected to continue for another decade or more.

Sub-surface movement of contaminants is complicated by the presence of permafrost which limits vertical migration of contaminants and restricts lateral migration to the active layer during the summer months. As extreme low temperatures in Barrow during the Arctic winter greatly reduce the effectiveness of natural degradation, contaminant concentrations can remain elevated for an extended period. Other remediation options are limited by the high cost of transporting contaminated soil by barge during the short window when ocean transportation is possible; there are no road connections to Barrow.

Climate change has impacted Arctic communities through loss of sea ice, increased erosion and melting permafrost which has affected sub-surface hydrology and created pathways for contaminants to migrate through the active zone towards fresh water resources. This presentation provides an overview of on-going studies to determine the factors which control migration.

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