

Project Title: Small arms range risk assessment at Resolute Bay

Lead Researcher's Name and Affiliation;

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Project Proposal

Current understanding of small-caliber ammunition transport processes in permafrost-affected soil and the ability to quantify them is inadequate. An improved understanding of the influence of Arctic conditions such as soil characteristics and especially temperature and light, on the transformation and fate of munition constituents (MC), the long-term trends in levels of MC in different ecological compartments and a better understanding of the effects of contaminants on Arctic ecosystems to aid in the design and implementation of monitoring and potential management, if required, is needed.

The scope of the project is to perform field work to aid in the assessment of the environmental fate and ecological impact of munitions constituents under the environmental conditions specific to Northern Canada. The five main objectives are: 1) to survey evidence of MC usage and measure their concentrations in soil and surface water using new sampling devices to promote efficiency; 2) to test new field sampling methods to enhance MC recovery; 3) to assess transport parameters from observed quaternary deposits and vegetation cover; 4) conduct targeted manual drilling to collect soil and potentially permafrost cores for analysis related to permafrost structure; 5) to determine the biotransformation potential of MC by local Arctic soil microbial communities and assess respective biotic transformation rates as a function of temperature; and 6) to perform aquatic and terrestrial toxicity tests of MC on ecological receptors representative of the Canadian Arctic macro- and micro-flora.

From September 16th to September 25th 2026, DRDC personnel will be deployed to characterize the firing range located 3 km east of Resolute Bay, as well as other sites within Resolute Bay.

Indications of the presence of MC and transformation products in surface water will be assessed using a multiparameter digital water quality meter. Surface water samples will be collected directly from the site and its surroundings for energetic material, metals, ammoniacal nitrogen (N-NH₄⁺), anions and perchlorate analysis. The presence of MC will also be assessed in the soil based on the multi-increment sampling approach. DRDC personnel will collect three 45-gallon soil barrels using manual tools. The soil will be transported to the DRDC laboratory in Quebec for subsequent analysis. In subsequent years, if feasible, soil characterization for permafrost investigations is planned to be conducted using a manual drilling rig with a diameter of 2 to 4 inches.

Also, a monitoring station will be installed to help with the modeling of potential contaminant transport.

A survey of the site flora will be made to better assess biotransformation potential and enhance relevancy on present laboratory ecotoxicological investigations. A strict assurance/quality control (QA/QC) program will be put in place.

VRC is analyzing soil properties as part of a partner agreement study with the National Research Council Canada to make recommendations related to Canadian Armed Forces readiness and sustainable training practices in the unique ecological environment of the Arctic.

All acquired data will be stored in DRDC's computers and managed only by the technical Lead/authority of this research. The management plan will reflect DNDs' directives captured from the Defense Administrative Orders and Directives, DAOD-6000-0.

DRDC-VRC requested the support from a member of CRPG to JTF(N) for wildlife protection.

Upon request, results will be shared to Nunavut governmental authority.