



Federal Contaminated Sites Action Plan (FCSAP)

Brevoort Island Remedial Options Analysis

An accidental fuel leak in harsh arctic conditions leads to an innovative approach to selecting the best remedial solution—while building “green” elements into the plan.

Background

A pipe failure at a Department of National Defence (DND) Long Range Radar Facility on Brevoort Island, located just off the coast of Baffin Island, Nunavut, led to the accidental release of about 150 000 litres of Jet A-1 aviation turbine fuel. After the release was discovered in 2007, DND carried out an environmental site assessment to determine the extent of the contamination.

Normally, the next step would be to carry out a standard remedial options analysis—essentially, looking at the engineering feasibility and financial considerations of the available ways to contain the release or decontaminate the site. Such an analysis was required by regulation, and to meet the requirements of stakeholders and an insurance claim associated with the assessment and remediation.

The Challenge

Several factors at Brevoort Island made conventional approaches impractical. The remoteness of the location would drive up the costs of transporting remediation equipment to the site and the removal of contaminated soil. Also, harsh arctic weather conditions, coupled with continuous permafrost, ruled out some remediation activities that could have had



Collecting contaminated water

a negative effect on the delicate ecosystem. These factors limited the time available to carry out remediation activities.

The Solution

Stantec Consulting, Ltd. was engaged to carry out a remedial options analysis that incorporated sustainability elements, including “green” remediation and reuse of waste materials. This analysis would then be used to evaluate and select the best possible solution to address the contamination at Brevoort Island.

The first step was to assess each contaminated medium, looking at:

- hydrocarbon-contaminated soil (both accessible and inaccessible to remediation efforts),
- groundwater contaminated by petroleum hydrocarbons (PHCs),
- booms and pads that had been used to adsorb PHCs, and
- aviation fuel recovered from the release.

This project was made possible with support from the Federal Contaminated Sites Action Plan (FCSAP), a program aimed at reducing the environmental and human health risk, and associated federal financial liabilities, from known federal contaminated sites. More information about FCSAP is available at www.federalcontaminatedsites.gc.ca.

Stantec then evaluated a range of remedial options, using a weighted scoring system. This system was based on the principles of multi-criteria decision analysis, which allowed for weighting of sustainability indicators, such as social and economic impacts, as part of an overall life cycle approach.

Stantec's analysis took into account the factors considered in a conventional remedial options analysis—essentially, the scheduling, cost and feasibility of several engineering solutions. In the case of Brevoort Island, the following factors were also used to assess the available technologies:



Excavator removing contaminated snow

- operations (regulatory approvals and degree of site disruption),
- reliability (maintenance requirements, vulnerability to downtime, and availability of parts),
- performance (monitoring requirements, option effectiveness, hydraulic control, infrastructure),
- logistical limitations (securing equipment and supplies for remedial operations), and
- track record.

The analysis also involved local stakeholder consultations and took into consideration a variety of environmental considerations:

- the human environment, including social factors (air quality, noise and vibration), health and safety,
- the natural environment, including soil and water quality, and
- sustainability indicators, such as reuse and recycling, and minimizing long-term disruption.

Outcomes and Benefits

Once the remedial options analysis was complete, Stantec was able to provide DND with an option that had scored highest—and became part of an overall remedial action plan. The resulting treatment combined active remediation techniques with risk-assessment elements and a plan for the managed natural decreasing of the contaminants.

The chosen approach required minimal specialized expertise, which allowed for local employees to be included in the project team; it also made possible the collection of nearly 30 000 litres of fuel, which were then treated, filtered and reused in the site generators. Normally, collected fuel cannot be reused.

Perhaps just as important as the “green” aspects of this plan was the multi-criteria decision analysis. The analysis demonstrated to DND, stakeholders and affected communities that the chosen approach was the best possible solution overall—once human and environmental considerations were taken into account—and one that could be applied to similar situations in the future.



Treatment and filtration of fuel

Public Works and Government Services Canada is mandated by FCSAP to promote the use of innovative technologies, approaches and best practices in the remediation of federal contaminated sites. This is one of a series of profiles featuring innovative, sustainable and green remediation technologies, approaches, and best practices in Canada.



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