Innovation and Remediation

in the

Federal Contaminated Sites Action Plan

PWGSC Expert Support

May 2012

Overview

- Objective and activities in FCSAP Phase 1 – innovative remedial technologies and approaches

- Revised objective and activities in FCSAP Phase 2 – addition of sustainable and green aspects

Innovative Technologies and Approaches

- Use of Innovative Remedial Technologies and Approaches is recognized as a secondary benefit under FCSAP
- PWGSC given the mandate to promote use of innovative technologies and approaches at federal contaminated sites
- PWGSC initiated a number of activities to deliver on this mandate

FCSAP : PHASE 1 (2006-2011)

Focus on Innovation

- Defining INNOVATION
- Facilitating INNOVATION
- Showcasing INNOVATION

PHASE 1

Defining INNOVATION

Early definition of Innovative Technologies …

- *anything, but conventional dig and dump or pump and treat*

Expanded definition…

- *process or approach with **limited full-scale application***
- *a **new application** to the site remediation sector*
- *'innovation' in **how the technology is applied**,*
- approach should be ***environmentally preferable**,*

PHASE 1
Facilitating INNOVATION

- **Innovative Solution Workshops**
- **Decision Making Tools**
- **Delivery Mechanisms**

Innovative Solution Workshops

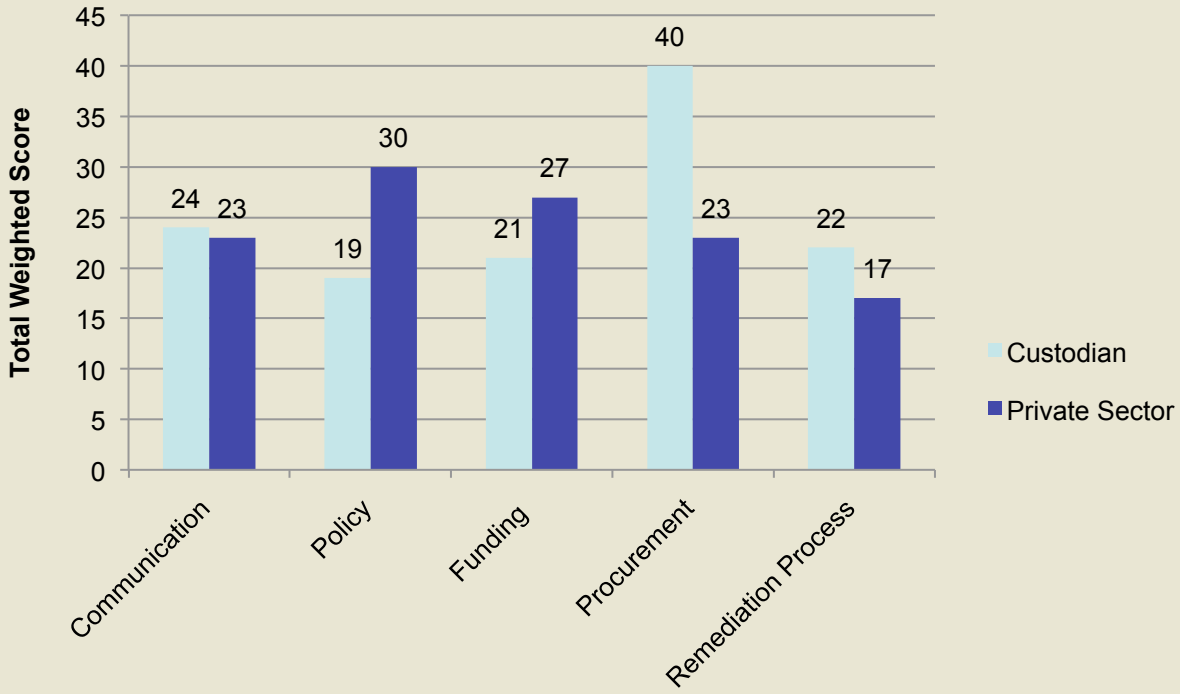
Innovative Solution Workshops (5)

- created awareness among ~1000 federal custodians, technology vendors/consultants and academia of remedial issues and potential technology solutions, and
- explored challenges to advancing innovation.

Vendor Workshops

- explored innovative technology remediation options

Workshop Findings: Innovation Issues/Challenges



Decision Making Tools

- **GOST** (Guidance and Orientation for Selecting Technologies)

  provides considerations in deciding among remediation technology options.

- **SDT** (Sustainable Development Tool)

  integrates SD principles into remedial technologies evaluation process;

- **Guidance Standards** provide direction **:**

  e.g. Guidance on Human Health Risk Assessment, Standardization of Wildlife Receptor Characteristics…

Delivery Mechanisms

- Review delivery tools and mechanisms;
- Adopt regional best practices;
- Enhance consistency in regional call-ups;
- Combine to create fewer mechanisms and more regional consistency;
- Investigate optional delivery approaches

PHASE 1
Showcasing INNOVATION

- **Innovative Technology Profiles**
- **Editorials**
- **POS Materials**

Technology Profiles

INNOVATIVE REMEDIATION
Saviktok Point
Tuktoyaktuk, NWT

This profile portrays one of several Case Studies featuring innovative technologies and approaches being used to remediate federal contaminated sites by way of the $3.5 billion Federal Contaminated Sites Action Plan (FCSAP).

The Challenge

Canada's North has some of the toughest geology and climate conditions in the world. When a former Department of National Defence (DND) tank farm site near Tuktoyaktuk, Northwest Territories, needed remediation, Defence Construction Canada (DCC) issued a public tender hoping to find a technology innovative enough to tackle these difficult conditions.

The soil in this former industrial land was contaminated with hydrocarbons that had migrated down to the permafrost. Levels of contaminants in the soil were well above the Government of NWT's industrial limits. With funding support by way of the Federal Contaminated Sites Action Plan (FCSAP) initiative, DCC was able to remediate the site.

Biogénie was chosen for its biostimulation technology—one that could be used on site and would work in difficult geographical conditions, while still remaining cost effective.

"Wind-powered turbines allowed us to work without the diesel-powered generators that would typically be used on this type of site."

Eric Lacroix, Biogénie

Biogénie's approach led to:

- **The innovative use of a renewable energy source, significantly reducing fuel use and minimizing potential fuel spillage in transportation to the site.**
- **The remediation of contaminated**
- **Optimal use of local resources (bo wind velocities and soil microbes, local Inuit subcontractors and wor**

The Difference: Innovation

The site was removed from the Tuktoyaktuk community and out off from any potential power sources by a large body of water. Diesel generators are typically used to power such soil aeration systems on remote sites. But this particular site, while challenging, also provided an opportunity for a unique environmental approach. The high wind velocities of the Tuktoyaktuk area allowed Biogénie to use a wind-powered venting system to enhance the biostimulation process.

In biostimulation, oxygen and aut contaminated soil to stimulate the soil microbes. Using an innovative appro total of 17,000 cubic metres of soil w Following treatment, a human healt that metal concentrations levels in d to below the calculated Site Specific was deemed safe for both present an

Biogénie Canada

More details about I federalcontaminated

FEDERAL REMEDIATION
Vessel Disposal
Bay Roberts Harbour, NL

This profile portrays one of several case studies featuring unique, significant, and innovative projects being undertaken to remediate federal contaminated properties throughout Canada.

The Challenge

In 2006, the Department of Fisheries and Oceans Canada (DFO) obtained ownership of two abandoned vessels in Bay Roberts Harbour, Newfoundland and Labrador.

DFO contracted with Public Works and Government Services Canada (PWGSC) to manage the safe disposal of the vessels. By the time DFO acquired the vessels, both were in a state of serious disrepair. Increasing the complexity were hazards posed by the ships' leaking refrigeration systems, damaged asbestos, and water ingress due to deteriorated valves and pipes raising concern for potential sinking at the wharf.

Given limited capability for salvage in the area, various options for disposal were explored. Ocean disposal (safely sinking the ship) was one clear option proven successful in the past, but how would the public feel about that method for these ships? Was there a viable alternative? Salvage was the other potential solution, but it had its own set of varied and complex challenges. Could the vessels be safely towed a long distance? Was it feasible? Could it be done at the DFO wharf or alongside at another facility?

The Difference: Unique and Significant

PWGSC put out a request for proposals for both the ocean disposal and salvage options, incorporating evaluation for sustainable development. The proposals included a preliminary work plan, schedule, and a list of recyclable/salvageable items. The contract was awarded to the Marine Recycling Corporation (MRC), which proposed to take the ships to its facilities in Port Colborne, Ontario. MRC obtained a certificate of Seaworthiness for both vessels; however, both vessels had a considerable list, one to port and the other to starboard. To get both trawlers upright, onboard materials were rearranged on deck and within the ships. The ships were secured towed by the tug boat Commodore Straits, and arrived in Port Colbourne in September 2008. Recycling of both ships began at the MRC docks shortly after.

Benefits and Outcome

In total, MRC managed to recovered approximately 1,000 tonnes of iron, 40 tonnes of aluminum, and 120 tonnes of non-iron metal from both trawlers. These materials were sent to audited and approved facilities for recycling. The salvage process generated approximately 175 tonnes of garbage and waste, including 2,300 litres of liquid Ammonia, 65000 kg kg of Asbestos Containing Material (ACM), and 30,000 litres of polluted liquids. The project was a complete success without environmental or safety incident, accident or spill.


These vessels sat abandoned in Bay Roberts Harbour for this years.


Both vessels were eventually dismantled piece by piece.


The vessels were tied togother and towed from Newfoundland's Bay Roberts to Port Colbourne, Ontario.

Canada

Public Works and Government Services Canada (PWGSC) is a federal department that delivers contracting and project management services to custodian departments in the remediation of federal contaminated sites.

FEDERAL SITE REMEDIATION
Port Hope Area Initiative
Port Hope, Ontario

This profile portrays one of several case studies featuring unique, significant, and innovative projects being undertaken to remediate federal contaminated sites throughout Canada.

The Challenge

Port Hope had an active uranium refinery that operated from the 1930s to 1970s. Due to these activities, 90 per cent—or 1.7 million cubic metres (m^3)—of Canada's historic low-level radioactive waste can be found in the Port Hope area. This waste had been managed through containment in various licensed and unlicensed facilities within the community of Port Hope and the nearby rural hamlet of Port Granby. The goal of both the government and local municipalities was to develop a plan for the long-term management of the historic low-level radioactive waste (LLRW) in these Ontario municipalities.

The Difference: Unique and Significant

In 2001, the Port Hope Area Initiative (PHAI) was created. Essentially, the PHAI is the product of a legal agreement between the Government of Canada, the Town of Port Hope, the former Township of Hope (now amalgamated with the Town of Port Hope to form the Municipality of Port Hope) unicipality of Clarington to cleanup and remediate rt Hope and Port Granby that are contaminated te low-level radioactive waste. The Initiative was after several years of environmental and technical well as extensive public consultation.

Recently, under a tripartite Memorandum of Understanding, Natural Resources Canada (NRCan), Atomic Energy Canada Limited (AECL) and Public Works and Government Services Canada (PWGSC), formed the Port Hope Area Initiative Management Office to develop the final design and construction plans for the safe long-term management of facilities in the Port Hope area at both Port Hope and Port Granby. Under the MOU, NRCan is identified as sponsor, AECL as proponent, and PWGSC as major contracts manager.

The PHAI calls for two engineered aboveground mounds, one constructed at each site. The mounds will isolate waste within multiple thick layers of a double-base liner and cover system.

The facilities will be able to isolate and provide secure management of approximately 2.3 million m^3 of waste. A long-term monitoring program will ensure the safety of the surrounding environment and community.

The presenc a unique re were condu health and fi and ongoing

A detailed d construction remediation through Pub joint ventur and Associa and constru Canada, Ltd begin in 201

The Fut

Once projec Port Granby begin. It will new facilitie monitoring respective m been activel for the mou

part of the Municipality of Port Hope (in the foreground) and the f Clarington are areas of interest in the Port Hope Area Initiative.

Port Hope Area Initiative Canada

Public Works a department th custodian depa

INNOVATIVE REMEDIATION
Swallowtail Lightstation
Grand Manan Island, New Brunswick

This profile portrays one of several Case Studies featuring innovative technologies and approaches being used to remediate federal contaminated sites by way of the $3.5 billion Federal Contaminated Sites Action Plan (FCSAP).

The Challenge

Built in 1859 on a rocky outcrop of remote Grand Manan Island, the Swallowtail Lightstation is one of the oldest surviving lighthouses in Southern New Brunswick.

The remoteness of the location posed a challenge when Fisheries and Oceans Canada (DFO) decided to capitalize on the opportunity provided by the Federal Contaminated Sites Action Plan (FCSAP) to clean up the site. The soil was contaminated with lead from previous land-use and structural painting. A phased environmental site assessment showed the soil surrounding the lightstation to be leachate toxic, with lead concentrations exceeding the CCME Soil Quality Guidelines.

Halifax-based CleanEarth Technologies Inc. (CleanEarth) was brought in to develop a solution.

CleanEarth's patented soil washing process, proven to be particularly effective for soil contaminated with metals, worked particularly well in this scenario, as the mobile soil washing unit brought to site limited the removal of contaminated soil from the island. After treatment, only a small volume of residuals required further treatment or disposal. This innovative technology uses physical separation modules to concentrate and remove particulate metals from the bulk soil matrix, followed by leaching/extraction to remove any remaining fine particulate metals or molecular/ionic species that may remain bound to the soil following physical processing.

"This is genuine innovation. The process was developed specifically for Grand Manan as a pilot, because of the site's remoteness. We can build on the lessons learned and apply this knowledge to future projects."

Colin Morrell, CleanEarth Technologies

The Difference: Innovation

There is currently no other process to treat lead-based paint in soil—CleanEarth's soil washing technology, developed at the company's Nova Scotia facility, is unique in North America.

Rather than just disposing of or containing contaminated soil, this method actually removes contaminants from the soil on-site.

It concentrates the contaminants, leaving behind a significantly smaller volume of material to be disposed of or recycled.

Other technologies require the removal of contaminated soil from the island, transporting it long distances for disposal. CleanEarth developed a scaled-down version of its patented technology, lowering the cost and environmental footprint of the project.

When the process was complete, metal concentrations were well below the calculated SSTL identified in the human health risk assessment, making it safe for both its present use and any future land-uses.

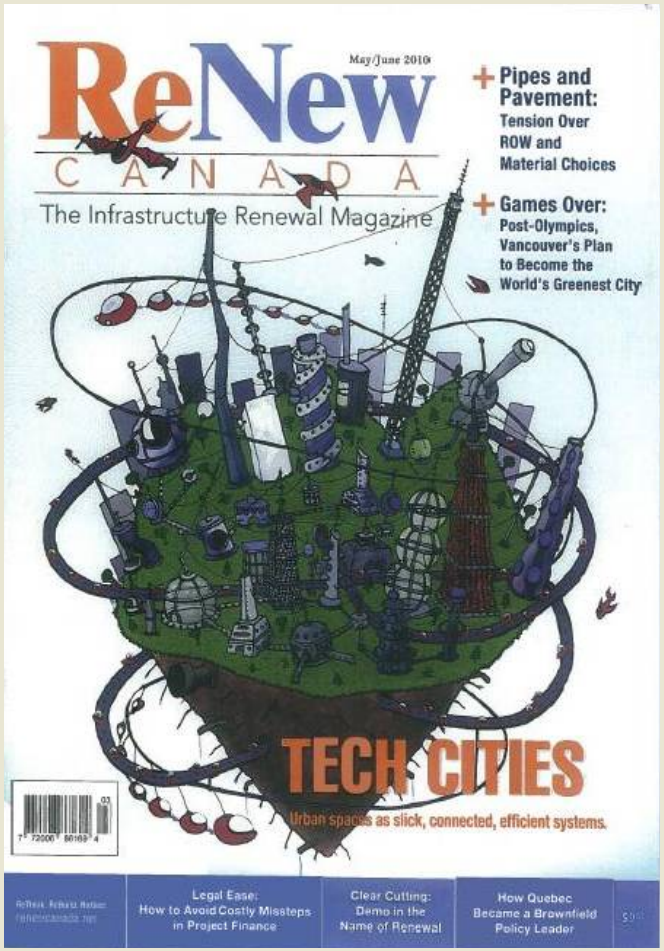

All equipment, materials, and personnel had to be transported to and from Grand Manan Island by Helicopter.

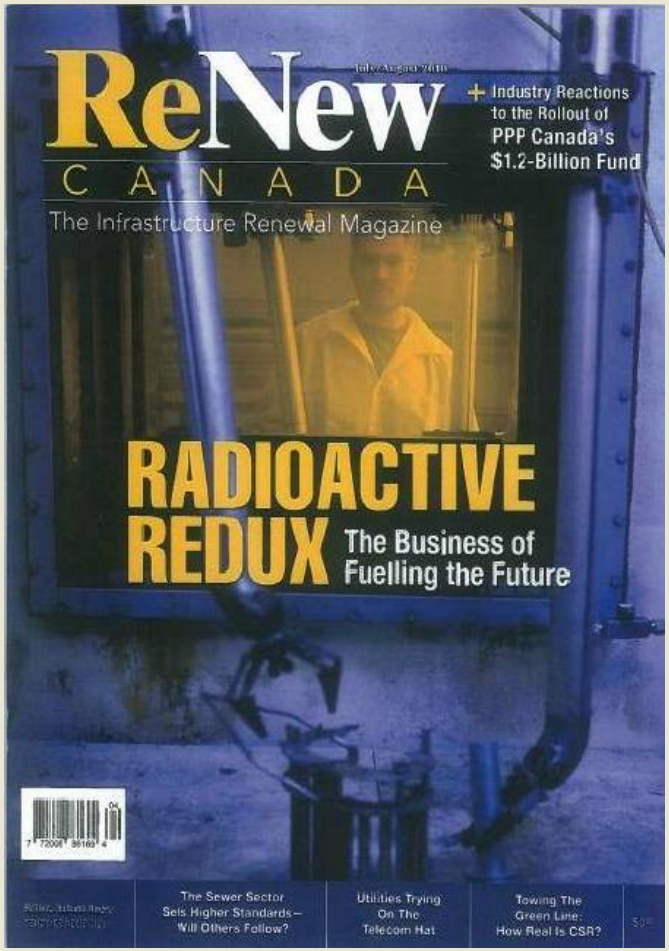

Thirty-five kilometres off the New Brunswick coast, Grand Manan Island is one of the more isolated brownfields in Canada.

CleanEarth Technologies Canada

More details about FCSAP at federalcontaminatedsites.gc.ca

Editorials


ReNew
CANADA
The Infrastructure Renewal Magazine
May/June 2010
+ Pipes and Pavement: Tension Over ROW and Material Choices
+ Games Over: Post-Olympics, Vancouver's Plan to Become the World's Greenest City
TECH CITIES
Urban spaces as slick, connected, efficient systems.
Legal Ease: How to Avoid Costly Missteps in Project Finance
Clear Cutting: Demo in the Name of Renewal
How Quebec Became a Brownfield Policy Leader


ReNew
CANADA
The Infrastructure Renewal Magazine
+ Industry Reactions to the Rollout of PPP Canada's $1.2-Billion Fund
RADIOACTIVE REDUX
The Business of Fuelling the Future
The Sewer Sector Sets Higher Standards—Will Others Follow?
Utilities Trying On The Telecom Hat
Towing The Green Line: How Real Is CSR?

FCSAP : PHASE 2 (2011-2015)

Focusing on INNOVATION

through

sustainable principles and practices

"innovative, sustainable and green remediation technologies, approaches and best practices"

PHASE 2
Redefining INNOVATION

So as to:

- **Minimize environmental footprint,**
  by reducing/minimizing resource utilization and maximizing social and economic benefits;
- **Minimize incremental human and ecological risks;**
- **Enhance skills, existing and local businesses and jobs, and create new.**

PHASE 2:
Facilitating INNOVATION

- **Skills Enhancement**
- **Decision Making Tools**
- **Delivery Mechanisms**

Skills

Resources

- Skill/Training resources/needs being identified,
- Expertise sharing across Regions

Training Courses/Webinars on:

- Remediation Technologies,
- CCME Environmental Quality Guidelines,
- Environmental Site Investigations,
- Erosion and Sediment Control,
- Sustainable, green approaches and best practices
- Objective (Performance) Based Contracting

Decision Making /Project Management Tools

GOST available on-line.

SDT available on-line (Fall 2012),

Guidance Standards

- Site closure Tool (PWGSC)/Tool for Risk Assessment Validation (EC)
- Performance Specifications for Solidification /Stabilization Webinar (ITRC)
- Sustainable Remediation Specifications

Annual Demand Forecasts

Delivery Mechanisms

Investigate innovative, sustainable and green (ISGR) remedial delivery approaches through:

- **Policy…** promote use/evaluate use of ISGR;
- **Contracting…** perform specific activities/attain specific outcomes using ISGR;
- **Proposal Evaluations…** identify ISGR approaches, expertise/experience and environmental benefits; and ISGR results/benefits reporting methods.

Phase 2:
Showcasing INNOVATION

Case Studies and Profiles
of unique, significant and innovative, sustainable and green technologies and approaches being profiled, showcased and posted.

Project Brochures/Posters
showcased and distributed at local, regional and national remediation venues, e.g. FCSAP booth.

FCSAP Summary

Phase I :

- Focus on Innovative Technologies
- Development of GOST and SD Tools
- Innovative Remedial Solution Workshops
- Showcasing of Innovative Technologies/Approaches

Phase 2 :

- Enhance focus to sustainable and green remedial approaches
- Finalize Sustainability Tool, add to GOST
- Develop Green Procurement Tools
- Showcase Innovative, Sustainable and Green Remedial Approaches