



Environment  
Canada

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Canada

Canada

# TOUR DE TABLE – CANADA

## NATO/CCMS Pilot Study Prevention and Remediation In Selected Industrial Sectors: SEDIMENTS

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June 20, 2007



# Outline

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- Contaminated Sites Remediation in Canada
  - Legislation and principles
  - Approach taken by provinces and territories
  - Federal Contaminated Sites
- Sediment Management in Canada
  - General overview
  - Federal programs and initiatives
  - Contaminated sediment remedial measures
  - Key regions of sediment management



★ National capital  
⊙ Province capital  
—+— Railroad  
— Road

0 200 400 Kilometers  
0 200 400 Miles

Lambert Conformal Conic Projection, SP 52N/74N

# Contaminated Sites Remediation in Canada

- Tens of thousands of contaminated sites across a country of 9,970,610 km<sup>2</sup>
- Most sites fall under the responsibility of provinces and territories and are the result of industrial/agricultural activity, fuel spills, military operations, airports, harbours, landfilling, and mining
- Main contaminants are petroleum products, heavy metals, chemicals, acids.
- The following Federal acts impact how Canadians protect the Environment including controlling contamination on land and water:
  - Canadian Environmental Protection Act
  - Fisheries Act
  - Canadian Environmental Assessment Act
  - Migratory Birds Convention Act
  - Species At Risk Act
- Canadian provinces and territories have broad authorities to regulate contaminated sites under their responsibility and most have their own specific legislation
- Polluter-pays principle is applied across the country

# Contaminated Sites Remediation in Canada - Initiatives

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- National Orphaned/Abandoned Mines Initiative (NOAMI)  
[http://www.abandoned-mines.org/tc\\_e.htm](http://www.abandoned-mines.org/tc_e.htm)
- Canadian Council of Ministers of Environment (CCME)  
<http://www.ccme.ca>
- Sustainable Development Technology Canada (SDTC)  
<http://www.sdtc.ca/en/about/index.htm>
- Brownfields
  - National Round Table on the Environment and the Economy (NRTEE)
  - Canadian Brownfield Network (CBN)
  - Green Municipal Funds

# Federal Contaminated Sites

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- Policy on management of federal real property (revised November 2006)
- The Federal Contaminated Sites Inventory currently contains over 11,000 federal contaminated sites

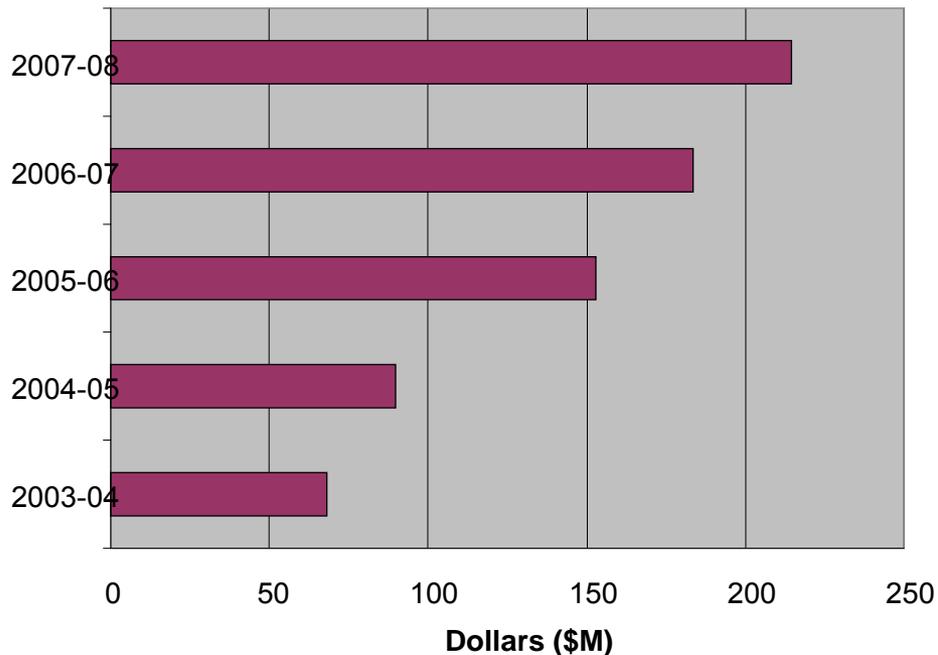
<http://www.tbs-sct.gc.ca/fcsi-rscf/default.aspx>

## FCSAP - Federal Contaminated Sites Action Plan

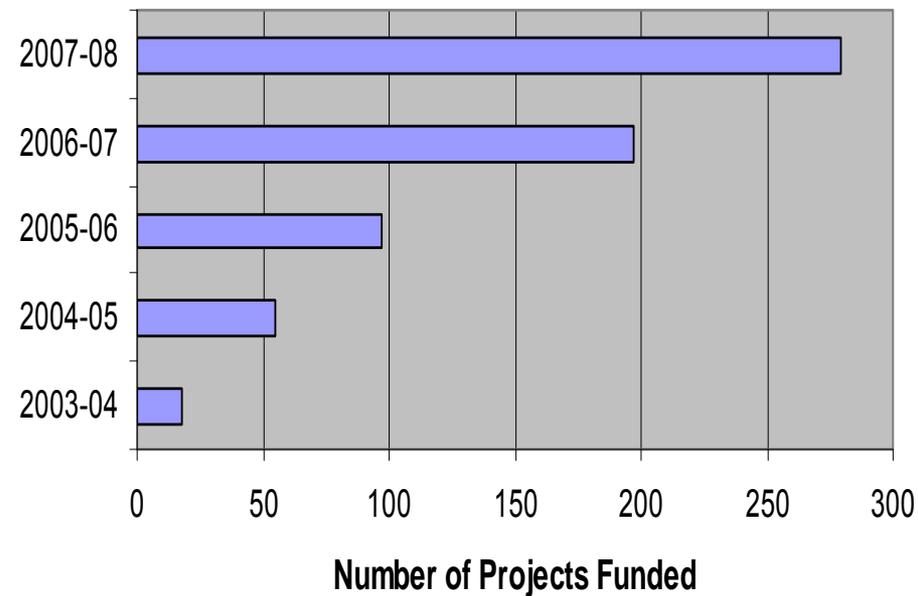
- currently the largest contaminated site management program in Canada
- \$3.5 billion over 15 years on the assessment/ risk management and remediation of federal contaminated sites
- 2007-2008 represents Year 3 of 15
- Key Program objectives:
  - Reduce ecological and human health risks, reduce federal financial liabilities (national debt) associated with cleaning up federal sites
- A public web portal of the FCSAP program available shortly

# Federal Contaminated Sites Action Plan (Progress to date)

FCSAP Funding Approved to Date



Number of Remediation/Risk Management Projects



# Management of Sediments in Canada

- Sediments play a major role in the transport and fate of pollutants.
  - Concern in water quality management
- Sediment-related problems associated with agriculture and past industrial activities occur across the country
  - Main contaminants
    - Polychlorinated biphenyls (PCBs),
    - Heavy metals such as Cu, Pb, As, Hg, Zn
    - Persistent organic pollutants (POPs) etc.
- Focus on reducing contaminant sources and containing or mitigating contaminated sediments
- Canadian Sediment Quality Guidelines (SQGs) for the protection of aquatic life
  - Developed for individual chemicals for both freshwater and marine sediments (including estuarine sediments)

<http://www.ec.gc.ca/CEQG-RCQE/English/Ceqg/Sediment>

# Contaminated Sediment Remedial Measures in Canada

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- Four remediation approaches are typically applied to clean up contaminated sediments:
  - **Natural Remediation (*No Action*)** – natural river processes resulting in decay, biological decomposition, coverage by clean sediments, and downstream transport
  - **Contain Sediment In Place (*Capping*)** – Use cleaner sediments or a synthetic cap to cover moderately contaminated sediments
  - **In-Situ Treatment** – Inject chemicals into contaminated sediments to stimulate biodegradation of contaminants
  - **Removal (*Dredging*)** – Physically remove the contaminated sediment. Dredged contaminated sediments then disposed in Confined Disposal Facility (CDF) or other suitable treatment facility

# Federal Programs and Initiatives

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- Canada's National Program of Action for the Protection of the Marine Environment from Land-Based Activities (NPA)
  - The NPA is a collective federal, provincial and territorial effort addressing issues on both regional and national levels (Atlantic, Pacific, Arctic, Quebec)
  - General management objective for most contaminants:
    - Reduce presence in marine environment, primarily through pollution prevention.
    - Apply life-cycle management or remediation to address the problems.
  - Specific management objective for contaminated sediments is to reduce the sources of sediment contamination.  
<http://www.npa-pan.ca/en/index.cfm>

# Key Regions of Sediment Management in Canada



# Great Lakes

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- A unique natural resource containing 20 percent of the world's fresh surface water.
- Part of the international boundary between Canada and USA
- International Joint Commission (IJC) established to *Boundary Waters Treaty of 1909* - To protect water resources, address problems along their common border, and “enhance Great Lakes water quality,”
- IJC identified locations throughout the Great Lakes where action was needed
- These locations (43) are known as Areas of Concern (AOCs)

# Sediment Management Initiatives in the Great Lakes

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- **Federal Great Lakes Program**

- Provides the framework for working towards a "healthy, prosperous, and sustainable Great Lakes Basin ecosystem".

<http://www.on.ec.gc.ca/greatlakes/default.asp?lang=En&n=A4F36C99-1>

- **Great Lakes Water Quality Agreement**

- Commits Canada and United States to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem
- A successful model of Canada-United States partnership.

<http://www.on.ec.gc.ca/greatlakes/default.asp?lang=En&n=FD65DFE5-1>

- **Great Lakes Sustainability Fund**

- Provides technical and financial support to remediation action projects

[http://sustainabilityfund.gc.ca/Introduction-WS8EF2CCF9-1\\_En.htm](http://sustainabilityfund.gc.ca/Introduction-WS8EF2CCF9-1_En.htm)

# Sediment Management Initiatives in the Great Lakes

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- **Great Lakes Binational Toxics Strategy**
  - Purpose is to set a collaborative process by which Environment Canada (EC) and the United States Environmental Protection Agency (USEPA), in consultation with stakeholders
  - Works in cooperation with their public and private partners towards the goal of virtual elimination of persistent toxic substances
- **Bi-National Public Advisory Council (BPAC)**
  - Advises the Remedial Action Plan (RAP) Team on key aspects of the RAP preparation and adoption.

# Great Lakes Sediment Contamination



Note: Quality criteria for freshwater sediment of the Canadian Council of Ministers of the Environment (CCME)  
 0.5  $\mu\text{g/g}$ : Probable Effect Level (PEL)  
 0.2  $\mu\text{g/g}$ : Threshold Effect Level (TEL)

# Progress on Sediment Management in Great Lakes

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- Mercury concentrations in the Great Lakes–St. Lawrence system have declined by ~ 50% compared to 20 to 30 years ago.
- This reduction is the result of :
  - Particularly binational initiatives
  - Closure of industrial facilities,
  - Improvements in industrial processes and water cleanup operations.
  - Great Lakes Water Quality Agreement and the Great Lakes Binational Toxics Strategy.

[http://www.qc.ec.gc.ca/csl/fich/fich002\\_003\\_e.html](http://www.qc.ec.gc.ca/csl/fich/fich002_003_e.html)



# Sediment Management in St-Lawrence River - Quebec Region

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- **St. Lawrence Plan for a Sustainable Development 2005-2010**
  - Contribute to a sustainable development that promotes ecological integrity, environmentally responsible economic activities, community commitment and informed, concerted and integrated governance of the St. Lawrence.  
[http://www.planstlaurent.qc.ca/plan/accueil\\_e.htm](http://www.planstlaurent.qc.ca/plan/accueil_e.htm)
- Three major projects currently underway:
  - Riviere St Louis: 16,000 m<sup>3</sup> removed and secured, freshwater tributary (\$8 million)
  - Montreal Harbour area: 40,000 m<sup>3</sup> treated or disposed of freshwater portion of river (\$9.7 million)
  - Gaspé Harbour (Sandy Beach): 40,000 m<sup>3</sup> saltwater sediments removed (\$15 to \$20 million)
- Main contaminants: Metals, PCBs, PAHs, oil, grease
- Activities linked to the St. Lawrence Plan for a Sustainable Development 2005-2010

# Sydney Tar Ponds Remediation Project

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- One of Canada's largest and most contaminated sites
  - Cleanup is complicated as it is located on a tidal estuary in the midst of an urban community.
  - Contamination caused by 100 years of steel and coke production
  - 34-ha Tar Ponds contain 745,000 tonnes of contaminated sediments.
  - Main contaminants are heavy metals (e.g. Pb, As, Cu, Zn), PAHs, PCBs etc.
  - Plan for sediment remediation 2007-2013 - \$256M:
    - Tar Ponds sediments to be treated in place before containing them within an engineered containment system.
    - Stabilization/ Solidification (S/S) and containment of sediments.
    - Long term monitoring and maintenance

<http://tarpondscleanup.ca/default.asp?T=7&M=53>