BARC’s 19th Annual Community Workshop

Randle Reef Panel Discussion

Originally Presented Sept 27, 2011
Updated January 2013
Sponsored by:

- Environment Canada
- Ontario Ministry of the Environment

Protecting our environment.
Featuring:

• Roger Santiago, Environment Canada
• Brian McCarry, McMaster University
• John Shaw, Environment Canada, retired
• John Hall, Hamilton Harbour RAP
An overview of the Randle Reef Project with Roger Santiago
Where is Randle Reef?
Spill in Slow Motion
Randle Reef Statistics (1)

- 675,000 m³ of PAH-contaminated sediment.
- Equivalent to filling Copps Coliseum to the rafters 3 times!
- Largest known PAH contaminated site in Canada.
Randle Reef Statistics (2)

- Impacted by historic operation of coal gasification plant and current steel operations;

- Average total PAH concentration near 5,000 ppm with peaks over 73,000 ppm.
Summary of Project Plan

- Construct a 7.5 hectare (18.5 acres) Engineered Containment Facility (ECF) over the most highly contaminated sediment (130,000 m³ \textit{in-situ});
- Using a combination of hydraulic and mechanical dredging, remove 500,000 m³ and place within ECF;
- Thin Layer Capping of 40,000 m³ of marginally contaminated sediment;
- Cap U.S. Steel Intake/Outfall Channel sediments 5,000 m³;
- Cap ECF and construct a port facility and light industrial space.
- 675,000 m³ of contaminated sediment requiring management.
Reliable Technology Used With Great Success on Similar International Clean-up Projects

Thunder Bay, Ontario
Seattle, Washington
Installation of Double Steel Sheetpile Walls
Mechanical Dredging Between Walls

- Dredge ~21,300 m³ of contaminated sediment from between ECF walls
- Dredge ~41,600 m³ of clay from between ECF walls
Cutter Suction Hydraulic Dredge

Hydraulic Environmental Dredging of ~500,000m³
What happens to dredged material after it is placed in the ECF? Sediment management and effluent treatment flow diagram
Capping the ECF

- Initial cap placement gradually displaces pond water;
- Wick drains are installed to speed up de-watering;
- Dredged material gains strength.
Randle Reef; ECF Cap – Multiple Layers, Each with a Purpose:

Hydraulic barrier seals contaminated sediment within the ECF
U.S. Steel Channel Capping
U.S. Steel Channel Capping

• The sediment cap in the U.S. Steel Channel will consist of a 60 cm-thick layer of sand with silt and enriched total organic carbon (TOC); and

• The cap may be placed using a tremie pipe system.
Draft Construction and Cost Schedule

$138.9M

ECF Construction

Dredging/Management

ECF Capping + Long Term Monitoring

Year


Within the chart, the costs are represented by vertical green bars, illustrating the budget allocation over the years for each project category.
Where Are We?

• Engineering Design: Completed
• Environmental Assessment: Report completed. Public comment period Jan 4th to Feb 3rd 2013
• Project Funding Partnerships: To be completed by early 2013
• Construction: To start in 2014 and be completed by 2022
Thank you!

Roger Santiago
Head, Sediment Remediation Unit
Environment Canada

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E-mail: roger.santiago@ec.gc.ca
A Plan for Remediation with Brian McCarry
Previous Remediation Plans

• 1996
  – Various remediation options were reviewed and ranked.
  – Selected option involved dredging and removal of the most contaminated sediments (~20,000 m³).
  – Dredged sediments to be trucked away for off-site disposal.
  – Off-site disposal option was later rejected and it was decided that re-use of the sediments was preferred.

• 1999
  – An option to put the most contaminated sediments (~20,000 m³) through Stelco sinter plant was explored.
  – Contaminated sediments would be added as 1-3% of material used as sinter plant feedstock.
  – Due to concerns raised at a public meeting, this option was abandoned (primarily due to air quality concerns and lack of public consultation).
Project Advisory Group (PAG) Formed

- Bay Area Restoration Council (BARC)
- Central North End West Neighbourhood Association
- City of Burlington
- City of Hamilton
- Clean Air Hamilton
- Department of Fisheries and Oceans
- Environment Canada
- Great Lakes United
- Hamilton Beach Preservation Committee
- Hamilton Conservation Authority
- Hamilton Harbour RAP
- Hamilton Industrial Environmental Association Citizen Liaison Committee
- Hamilton Port Authority
- Ontario Ministry of Environment
- Ontario Ministry of Labour
- Stelco (now U.S. Steel)
- United Steel Workers of America, Local 1005
Timeline of Major Randle Reef Activities

• **2001-03:**
  – Public Advisory Group (PAG) formed - composed of 17 interest groups.
  – Thorough review of all known sediment removal/remediation/treatment options and technologies – major education effort.
  – Sediment removal option ruled out due to strong public concerns about contaminant exposures, number of trucks and public safety.
  – Containment and chemical/biological treatment alternatives explored.
  – No viable cost-effective chemical or biological treatment options found.
  – Containment option explored in detail by PAG.
  – Some interest groups balked at idea of containment option.
  – PAG voted for containment option in mid-2003 (except for one group).
Initial Screening – Identification of Remedial Options

1. Dredge, dewater and dispose of waste in a hazardous waste landfill;
2. Dredge, dewater, treat sediments and dispose of in a non-hazardous waste landfill;
3. Dredge, dewater, treat and reuse as industrial fill;
4. a) In-situ containment; and
   b) In-situ containment with construction of an ECF (Environmental Containment Facility).
Initial Screening - Assess Options

• Maximize containment/removal of acutely toxic sediments in the Harbour;

• Ensure that the health and safety of workers and citizens are protected during all stages of the project;

• Minimize local and downwind airborne emissions during remediation process;

• Ensure safe transportation of hazardous materials through residential areas, if disposal to be located in an out of area site;
Initial Screening - Assess Options

• Avoid high risk alternatives that could result in technology failures, cost overruns and protracted implementation schedules;
• No net loss of fish habitat productive capacity;
• No loss of navigation routes;
• Prevent uptake of contaminants by waterfowl;
• Partnership opportunities; and
• Permanent solution/long-term sustainability.
Initial Screening Results

The PAG recommended in-situ containment using an isolation structure:

• Cost-effective solution
• Offers the potential to address other acutely toxic sediments in the harbour (i.e., achieve a larger-scale cleanup) – total sediment volume ~200,000 m³.
• Low technological risk
• Provides greater opportunity for partnership resources
Timeline of Major Randle Reef Activities

- **2001/02** – Sediment removal & containment alternatives evaluated (e.g. removal & disposal, removal & re-use, and in-situ containment)

- **2006** – Basis of Design report completed (30% engineering design)

- **2008** – Basis of Design Addendum completed (95% engineering design)

- **2012** – Final specifications and drawings
Conceptual Design Option 1

Figure 3.1
Hamilton Port Authority, Environment Canada & Ministry of the Environment
Randle Reef Sediment Remediation "Containment" Project
Natural/Commercial Concept
Conceptual Design Option 2

Figure 3.2
Hamilton Port Authority, Environment Canada & Ministry of the Environment
Randle Reef Sediment Remediation "Containment" Project
All Natural Concept

Headwater
Conceptual Design Evaluation

- **PAG endorsed** the natural-commercial concept and agreed it should be carried forward to the necessary environmental assessment process & further public consultation.

- **3 Critical Objectives:**
  - ‘Whole harbour’ approach
  - **Containment** without need for extensive dredging
  - **Ownership** of project
Economic Benefits of a remediated Hamilton Harbour with John Shaw
Benefits – a preview
City of Tacoma

ISSUES:
• Industrialized waterfront
• depressed downtown core
• polluted image
• contaminated sediments & soils (PAHs)
Results

• Property values went from $6.50 - $30 per sq. ft.

• Value of investments by developers now $40M - $60M/site. Total to date: $254M

• Cultural aspects of Tacoma – art museum, glass museum, theatre (restored opera house)

• Properties back on tax roles

• Industry legacy – mixed uses (residential, retail, commercial)

• $100M in-water cleanup cost pay-back in 5 years

• “Hurry up” process = 20 years - ongoing
Types Of Ships, Types Of Cargoes

Each year, over 1,500 ship come into Commencement Bay, bringing in and taking out millions of tons of cargo. There are many types of ships, each designed to handle specific types of cargoes. Here are some of the types of ships you will often see on Commencement Bay:

**Containerships**

- **Vessels:** Up to 300,000 TEU (twenty-foot equivalent units)
- **Cargo:** Containerized goods
- **Use:** International trade

**Auto Carriers**

- **Vessels:** 2,000 to 4,000 cars
- **Cargo:** New cars and trucks
- **Use:** Import and export of vehicles

**Bulker Carriers**

- **Vessels:** Up to 200,000 dwt (deadweight ton)
- **Cargo:** Dry bulk commodities
- **Use:** Transportation of coal, grain, and other bulk goods

**Ro-Ro Carriers**

- **Vessels:** 3,000 to 5,000 passengers
- **Cargo:** Passenger vehicles and cargo
- **Use:** Transportation of passengers and vehicles between Europe and North America

**LNG Carriers**

- **Vessels:** 175,000 m³
- **Cargo:** Liquefied natural gas
- **Use:** Transportation of natural gas for power generation and heating

**Icebreakers**

- **Vessels:** Up to 10,000 dwt
- **Cargo:** Icebreakers
- **Use:** Breaking ice in harbors and rivers

**Other Types**

- **Tugboats:** Assist in port operations
- **Tugboats:** Assist in port operations
- **Tugboats:** Assist in port operations
- **Tugboats:** Assist in port operations

Thea Foss Waterway Cleanup

**What’s going on here?**

- **Objectives:** Removing sediment, restoring habitat, and improving water quality
- **Who’s paying for it?**
  - City of Tacoma
  - Washington Department of Ecology
  - Washington State Department of Natural Resources

**Questions?**

- Contact: [Cleanup Coordinator]
- Phone: [Contact Phone]
- Email: [Contact Email]
Other Great Lakes research examples:

- Economic studies (U.S.) show 5-28% decrease in home values in AOC proximity

- $26 Billion investment to complete GL restoration will yield conservative estimate of $80-$100 Billion return in the long and short term (U.S.)

- Freshwater technology is a $400 Billion a year business

Source: “Healthy Waters, Strong Economy: The Benefits of Restoring GL Ecosystem”
John Austin, Soren Anderson, Paul Courant
Benefits of a Randle Reef Cleanup

- An environmental imperative - Removes 1500 tonnes of PAHs and associated environmental and health risks
- Removes major environmental constraint to full recovery of harbour ecosystem
- Increases capacity for international trade (deep draft vessels)
- Increases property values
- Increases growth and redevelopment – attract commercial businesses, encourages new residents to move into the area
- Helps to change negative image to positive one
- Improves recreational opportunities
- Direct economic benefits to community during implementation
BENSIM - Study Objectives

- Cultivate stakeholder dialogue
- Identify benefits and beneficiaries
- Develop a dynamic benefits assessment framework
- Encourage participation of funding partners
- Develop an approach with wider application
• BENSIM includes four basic remediation scenarios:
  • Randle Reef
  • Clean-up of other contaminated sediment (Dofasco)
  • Wastewater treatment projects
  • Fish and wildlife habitat restoration

• Estimates of accumulated benefits from 2007 – 2032 for two scenarios: Randle Reef and full implementation of all projects.
Assessment Approach

Identify benefits and beneficiaries

- Interviews with individual stakeholders
- Interviews with other interested parties
- Research other benefits assessments
- Stakeholder charrettes
- Peer-reviewed

Categorize benefits and beneficiaries

<table>
<thead>
<tr>
<th>Benefits</th>
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<tbody>
<tr>
<td>monetary, environmental, social</td>
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</table>

<table>
<thead>
<tr>
<th>Beneficiaries:</th>
</tr>
</thead>
<tbody>
<tr>
<td>public</td>
</tr>
<tr>
<td>industry</td>
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<tr>
<td>government</td>
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## BENSIM: Aggregate Benefits

<table>
<thead>
<tr>
<th>Beneficiary</th>
<th>Randle Reef Project</th>
<th>All Projects</th>
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</thead>
<tbody>
<tr>
<td>Federal Government</td>
<td>21.4</td>
<td>337.6</td>
</tr>
<tr>
<td>Provincial Government</td>
<td>18.8</td>
<td>296.7</td>
</tr>
<tr>
<td>Municipal Governments</td>
<td>28.8</td>
<td>60.2</td>
</tr>
<tr>
<td>Hamilton Port Authority</td>
<td>11.2</td>
<td>11.2</td>
</tr>
<tr>
<td>Stelco</td>
<td>14.5</td>
<td>14.6</td>
</tr>
<tr>
<td>Dofasco</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Local Businesses</td>
<td>37.5</td>
<td>591.8</td>
</tr>
<tr>
<td>Un(der)mployed People</td>
<td>13.2</td>
<td>206.3</td>
</tr>
<tr>
<td>Recreational Users</td>
<td>3.3</td>
<td>496.0</td>
</tr>
<tr>
<td>Local Property Owners</td>
<td>96.1</td>
<td>124.0</td>
</tr>
</tbody>
</table>

All units are $2005 million.
Benefits Study Assessment

- $126M economic benefits to the local economy from the cleanup of Randle Reef sediments

- $914M economic benefits from implementation of all remediation projects from:
  - job creation
  - business development
  - enhanced recreational opportunities (beaches, boating, fishing)
  - enhanced shipping and port facilities
  - improved image of the harbour, and
  - community as a place to live and work
Environmental Assessment of the Randle Reef Project with Roger Santiago
Environmental Assessment

• Environmental assessment (EA) of the project began on March 7, 2003

• The project is being assessed in accordance with Canadian Environmental Assessment Act (Bill C-13)
EA Overview

- Environment Canada, Department of Fisheries and Oceans, Transport Canada & the Hamilton Port Authority are preparing a comprehensive study report (CSR).

Randle Reef Sediment Remediation Project
Factors to be Considered in Comprehensive Study Report

- Purpose of the project
- Alternative means of carrying out the project
- Environmental effects of the project and mitigation measures
- Effects of the environment on the project and significance
- Comments received from the public
- The need for and the requirements of any follow-up program
What is a Valued Environmental Component?

• Focus of the assessment
• Issues or features of concern (e.g. ecological, socio-economic or cultural)
• The issue or feature that is potentially affected by the Project (directly or indirectly)
Valued Ecological Components

- Air Quality
- Ambient Noise
- Soil Quality
- **Surface Water Quality, Currents and Circulation**
- Aquatic Biota
- Species at Risk
Surface Water Quality

- Silt curtain
- Storm water management system
- Manage re-suspension during in-water work
- Implement effluent monitoring program
Re-suspension Controls

Sheetpile wall

Air (bubble) curtain
Valued Socio-Economic and Cultural Components

- Public Health and Safety
- Residential Areas
- **Recreational Use of the Harbour**
- Shipping and Navigation
- Industrial, Commercial and Municipal Use and Infrastructure
- Sherman Inlet
Recreational Uses of the Harbour

• **Potential Adverse Effects**
  - Temporary closure of recreational boating areas and increased marine construction traffic
  - Navigational hazards

• **Potential Mitigation**
  - Advanced notice to mariners, recreational facilities and user groups
  - Mark/cordon off work areas with buoys
  - Dredging and ECF operation will displace less than 3% of total harbour area available for recreation
  - ECF naturalization area will enhance recreational use
Ecosystem Approach and Delisting Hamilton Harbour with John Hall
Ecosystem Approach

• Everything is connected to everything else
• Integrate social, economic and environmental matters
• 14 Beneficial Use Impairments
Hamilton Harbour Remedial Action Plan

Stakeholder approach:
- citizens
- civil servants
- scientists
Progress to date on RAP goals:
What are the AOC’s priority actions?

- Randle Reef Remediation
- Skyway WWTP upgrade
- Woodward WWTP upgrade
- Cootes Paradise restoration and watershed stewardship programs
Thank you!

For updates, please visit
www.hamiltonharbour.ca