Sharing Our Harbour

The Construction and Vision of Randle Reef

Roger Santiago
Head, Sediment Remediation Unit
Environment and Climate Change Canada

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Randle Reef Sediment Remediation Project
Hamilton Harbour, Lake Ontario

Randle Reef Project Site
Randle Reef Site Specifics

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

- Approximately 695,000 m³ of contaminated sediment (PAHs & metals); and

- Average total PAH concentration near 5,000 ppm with peaks over 73,000 ppm.

- **Site Area:** ~60 ha (148 acres)

- **Depth of Water:** Ranges from ~4 m to 12 m

- **Sediment Depth:** Ranges from ~0.1 m to >3 m
Remedial Approach

8 years to complete: 2015-2022

Dredging (hydraulic & mechanical)

Containment

Capping
Project Funding

Environment and Climate Change Canada
$46.3M

Ontario Ministry of the Environment and Climate Change
$46.3M

Local Funding Partners
$46.3M

$138.9M

Local Funding Partners:
1. U.S. Steel Canada
2. City of Hamilton
3. Hamilton Port Authority
4. City of Burlington
5. Region of Halton
Project Components

- Construct a 6.2 hectare Engineered Containment Facility (ECF) over the most highly contaminated sediment (140,000 m$^3$ *in-situ*);
- Using a combination of hydraulic and mechanical dredging, remove 445,000 m$^3$ and place within ECF;
- Thin Layer Capping of 105,000 m$^3$ of marginally contaminated sediment
- Cap U.S. Steel Intake/Outfall Channel sediments 5,000 m$^3$
- Cap ECF and construct a port facility.
- Total sediment management of 695,000 m$^3$
Construction Components

1. **S-1** Pier 15 Re Construction **2015**;

2. **S-1** Installation of double steel sheetpile walls (ECF structure) **2016 & 2017**;

3. **S-1** Mechanical dredging between ECF walls **2016 & 2017**;

4. **S-2** Production dredging and thin layer backfill **2018 & 2019**;

5. **S-2** Capping in U.S. Steel Channel **2019**; and

6. **S-3** Installation of ECF cap **2020-2022**.
Raw steel for the project was produced at U.S. Steel Canada’s Lake Erie Works in Nanticoke.

The length of the ECF face wall sheet pile required fabrication at a roll forming mill in Iuka, Mississippi.

ECF anchor wall sheet pile was fabricated at a roll forming mill in Cambridge, Ontario.
Stage 1: Pier 15 Reconstruction

Wall Reconstruction

Photo Courtesy of Riggs Engineering

Photo Courtesy of Riggs Engineering
Complete Pier 15 Rehabilitation
Stage 1 ECF Construction

2016 Work Season

2017 Work Season

Photo Courtesy of Hamilton Port Authority
Start of Sheet Pile Wall Installation
Threading Sheet Pile
Installing Sheet Pile
Installing Sheet Pile

Vibrohammer

Impact Hammer

Photo Courtesy of Riggs Engineering
Dredging Between the Walls
(Began August 25, 2016)

- 6,000 m³ contaminated sediment
- 4,500 m³ clay (structural)
Installation of Monitoring Well Casings

Before installation

After installation
Granular A Placement

- 3,000 tonnes
- 1st layer of backfill
- 25cm thick

Photo courtesy of Riggs Engineering
Quarry Rock Fill

- 70,000 tonnes placed in 2016

Photo courtesy of McNally Construction
Dredging & Backfill Between the Walls
(Oct 6, 2016)

Photo courtesy of McNally Construction
Stage 2: Dredging/Capping Sequence

Thin-layer cap on undredged sediment with tPAH >100 ppm
• Dredging for the Randle Reef Project will be completed on a sub area by sub area basis.

• Additional rounds of dredging MAY need to be completed in some areas.

• Placement of post dredge backfill (sand) MAY be required in some areas.
Hydraulic Dredge Equipment

- Floating Pipeline
- Spuds
- Dredge Head
- Anchor lines swinging from dredge head
Backfill Equipment

A scow used to shuttle backfill material to the placement barge

Placement by barge mounted crane or equivalent

Silt curtains
Stage 1 Year 3 (2017)

ACCESS ROUTE

50m Offset

Boat Launch/ Haul Out Area
Stage 2 Year 1 (2018)
Spring

Boat Launch/Haul Out Area
Stage 2 Year 1 (2018)
Summer/Fall

Boat Launch/ Haul Out Area
Stage 2 Year 2 (2019)
Spring

Boat Launch/
Haul Out Area
Stage 2 Year 2 (2019)
Summer Fall

Boat Launch/ Haul Out Area
Water Quality Monitoring - Turbidity

- Turbidity is required to be no more than 12 NTUs above background levels, 100 m from in-water work.

- Turbidity readings are taken at 500m, 100, or less than 100m from the in-water operation.
Randle Reef Air Monitoring Programs

- **Background Air Monitoring:** This has been conducted in 2014 and 2015 by Environment Canada to establish an accurate account of current air quality conditions around the Randle Reef site. Background air monitoring will continue on thorough implementation of the project.

- **Project Air Monitoring:** This will take place during project activities and will be conducted by the project air specialist. Both constant real-time monitoring and periodic grab samples are included.

- **Contractor Health and Safety Monitoring:** The construction contractor will monitor air quality within the confines of the work area to ensure the safety of workers on the site.

- **Odour Monitoring:** This will be conducted by the project air specialist. Baseline odours will be established. Complaints will trigger odour and air quality sampling.
Background Air Monitoring

Additional ECCC background air monitoring locations where selected to augment the existing HAMN stations and provide more project related coverage in specific areas.

Grab samples for VOC collected every 12 calendar days.
Air Monitoring Program

5 real time air monitoring (PiD) locations will be set up along the project boundary.

The fifth location P5, will shift based on wind direction.
Air Monitoring Program
Environmental Monitoring - Air

PID monitoring station

Tedlar bag sample being taken

Photo courtesy of Riggs Engineering

Photo courtesy of Riggs Engineering
Construction Schedule

Stage 1
- ECF Construction
- 2015 to 2017

Stage 2
- Dredging
- 2018 to 2019

Stage 3
- Capping & Consolidation
- 2020 to 2022
General Inquiries

• If you have questions or concerns regarding this project, please contact Environment and Climate Change Canada’s Public Inquiries Centre toll-free at 1-800-668-6767.

• You can also obtain further information about the project by visiting www.randlereef.ca.

• In the event of an environmental emergency, please call the Ontario Ministry of the Environment and Climate Change’s Spills Action Centre 24-hour toll-free number at 1-800-268-6060.

• Randle Reef Animation: https://www.youtube.com/watch?v=Tng5wCHDVjs
Acknowledgements
The End

Roger Santiago,
Head Sediment Remediation Unit
Environment and Climate Change Canada
416 739-5876

Roger.Santiago@canada.ca