

## Development of Remedial Objectives for the former Cape Breton Development Corporation Mine Closure Program

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**Abstract** The former Cape Breton Development Corporation (CBDC) was a federal crown corporation formed in 1967 to consolidate existing coal mines and subsequently operate new coal mines until 2001. CBDC engaged Public Works and Government Services Canada (PWGSC) to aid in the planning and implementation of the CBDC Mine Closure Program consisting of over 700 properties. The development of this program prompted the requirement for a clear and consistent framework by which decisions were based and stakeholders were engaged. CBDC and PWGSC engaged others to form a Remedial Objectives Advisory Committee (ROAC) to oversee the development of remedial objectives in the area of: decision-making; wetlands; ecological and human health; mine workings; long term monitoring, care and maintenance; environmental management; fish habitat; groundwater and surface water, regulator engagement.

**Key Words** remedial objectives, mine workings, regulator engagement

### Introduction

The former Cape Breton Development Corporation (CBDC) was a Canadian (federal) crown corporation formed under an Act of Parliament in 1967. The primary objective of the Government of Canada at the time was to expropriate the assets of the Dominion Steel and Coal Company (DOSCO) during a period of industry downturn (late 1950's to early 1960's) in hopes of developing alternative economic opportunity in the area over a 20-year period, which would hopefully result in alternative industries for the area. The Oil Embargo of the mid 1970's prompted further exploration of the coal resources in the Sydney Coal Field by CBDC and resulted in continued activity until 2001 when the last mine closed operation. At the time of CBDC inception and through much of its operation, environmental sensitivities were low compounded by the unique status of CBDC as a federally owned coal mining 'company', in a regulatory structure enforced through provincial laws. This unique scenario left a void in guidance for closure framework.

The long history of coal mining in Cape Breton resulted in a large number of closed mines requiring rehabilitation. In 2001, CBDC engaged the Canadian government common service provider, Public Works and Government Services Canada (PWGSC) to aid in the planning and implementation of the CBDC Mine Closure Program, which involves over 700 properties and multiple project managers and consultants.

PWGSC provides expertise in environmental, engineering, IT, project management, communications, GIS, and real property and facility management working within a federal government framework of contracting where fairness and transparency are paramount. Standing Offer Agreements (SOAs) are commonly used by PWGSC. These SOAs establish agreements between consultants and PWGSC for specific services including rates for personnel. Based on the SOA specific work scopes are approved on an as needed basis. PWGSC established a Mine Reclamation SOA with three consultants in 2007. These consultants were tasked with conducting studies (i.e. environmental assessment, hydrogeological, geotechnical) providing remedial approach options, providing remedial designs based on option analysis and construction inspection.

### Method

With such a large amount of properties to be prioritized, assessed, and potentially remediated, PWGSC devised an approach to perform high level health and safety (H&S) and environmental evaluations based on classes – Class 1 is high potential for H&S or environmental impact to Class 4 low potential for H&S or environmental impact. High priority health and safety issues were addressed under initiatives by CBDC. Consistent with the Canadian Federal Contaminated Sites (FCS)

programs, approximately 45 properties with environmental issues moved into further assessment following the Canadian Council on Minister of the Environment (CCME) and Canadian Standards Association (CSA) Phased Approaches. This risk-based methodology provides guidance on approaches for human and environment (ecological) risk assessment and the development of site-specific target levels. PWGSC initiated a report to further develop human health and environmental target levels specific to the CBDC program and identified the need for more developed and consistent policy in several areas including:

- Wetlands: Many sites brought forward in the program have geographical proximity to wetlands. Wetlands are a provincially regulated domain with limited federal guidance.
- Long-term care and maintenance: With the future and divestiture of the properties unclear, consideration needed to be given to the effort that would be required to maintain the sites over their remedial design duration.
- Human Health and Ecological Risk Assessment: The risk-based approach prescribed under the FCS guidance defines various land-use scenarios on which to model exposure such as vacant, commercial, parkland, etc.
- Regulatory framework: Consistent application of regulations, guidelines and regulatory engagement. As indicated CBDC were a federal crown corporation and pursuant to the Canadian Environmental Assessment Act, however decision making on remedial approaches involved consultation with several federal and provincial departments including Health Canada, Department of Fisheries and Oceans, Environment Canada, Nova Scotia Environment and Nova Scotia Department of Natural Resources.
- Mine Workings Hazards: Many former mine properties in the CBDC inventory had concerns related to shallow workings and mine openings. This presented a challenge with regards to ground stability and associated health and safety concerns.

In order to deal with these areas, CBDC and PWGSC agreed that there was a requirement to develop a consistent framework by which decisions were based and stakeholders were engaged. CBDC and PWGSC with its environmental and engineering consultants (AMEC, EarthTech now AECOM, SENES) formed a Remedial Objectives Advisory Committee (ROAC) to oversee the development of remedial objectives in the areas of: decision-making; wetlands; ecological and human health; mine workings; long-term monitoring, care and maintenance; environmental management; fish habitat; groundwater and regulator engagement. The outcome was the development of a Remedial Objectives guidance document.

In developing the Remedial Objectives Guidance documents, PWGSC aimed to establish a consensus on remediation objectives and closure standards (between CBDC, PWGSC, Regulators, Consultants, etc), streamline the consulting process and promote a consistent approach. The first step was to systematically identify issues/challenges/obstacles. Broad themes were identified by PWGSC and then refined by a facilitator conducting interviews with CBDC/PWGSC project managers; consultants; organizing meetings and a workshop.

As a result of the recommendations by the facilitator, a number of committees and sub-committees were formed to lead the work on specific themes. The committees along with key responsibilities are outlined as follows:

#### ***Remedial Objectives Advisory Committee (ROAC)***

- Made-up of senior representatives from SOA consultants, PWGSC, CBDC
- Provide overall advice to CBDC and PWGSC i.e. Remedial Objectives
- Provide guidance/advice to sub-committee
- Assumes the lead in areas not covered by sub-committees i.e. Communications

#### ***Risk Assessment / Regulatory Framework sub Committee (RARFC)***

- HHRA and ERA Assessment framework and standard terms of reference (TOR)
- Screening criteria for water, sediment, soil
- Class Risk Assessment for sites with common impacts and exposure scenarios

- Fish habitat and wetland assessment methodology
- Consensus on compliance point, toxicity testing
- Regulator interaction/engagement flow chart

#### *Health & Safety / Mine Workings sub-Committee (HSMWC)*

- Mine Workings Protocol to establish a systematic approach to identifying and assessing the potential for unstable ground, unsecured mine openings, mine water discharge and release of hazardous gas
- Comprehensive Step-wise approach to defining, investigating, securing and monitoring mine workings features

#### *Land Use / Encroachment sub-Committee (LUEC)*

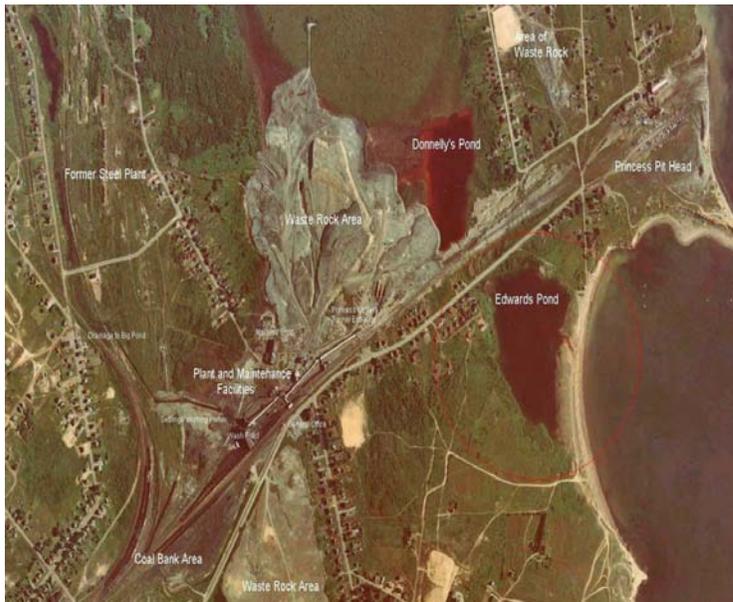
- Probable land-use plan
- Legacy optimization approach
- Encroachment policy

#### *Long-Term Maintenance, Monitoring / Design Criteria sub-Committee (LTMMC)*

- General Principles: estimate the Net Present Value (NPV), reduce the level of activity, design for facilitated maintenance, abnormal events contingency, performance monitoring

The Remedial Objectives document is considered to be a fluid document used by anyone involved with the site closure to ensure a consistent approach to all aspects of the program. The document will be reviewed on a regular basis to ensure that it is up to date reflecting program requirements and regulatory updates. Several areas that are being further developed in the ROAC document include Environmental Effects Monitoring (EEM), Environmental Protection Plan Auditing Protocol and Closure and Record of Site Conditions Reporting.

The way the document is applied and how the Remedial Objectives become incorporated in each remediation project is multi-fold process that involves the consideration of several areas



*Figure 1 Princess (1969)*



*Figures 2 and 3 Photo to left represents waste rock pile prior to remediation (2007). Photo to right represents waste rock pile post remediation (2010)*

such as wetlands, mine workings and the use of appropriate primary and secondary screening criteria for the determination of chemicals of concern to evaluate further in a human health and/or ecological risk assessment.

The former Princess Mine Site remediation project is located in a residential area of Sydney Mines, Cape Breton, Nova Scotia. Figure 1 shows an aerial view of the site in 1969. The photo shows several features including the plant site area, waste rock pile, wetlands to the north, several ponds and Sydney Harbour shown to the east. The ROAC guidance document supported the remediation program as follows:

- Wetland and ponds were evaluated during the assessment and planning stages to identify issues;
- Mine workings protocols were incorporated very early in the study of the property to identify any subsurface features such as mine workings and/or shafts that would require further closure;
- Primary and secondary risk based criteria were used to screen soil, surface water and groundwater chemistry data in order to determine chemicals of concern for further human health and ecological risk assessment activities consistently determine and minimize the delineation lines of remediation; and
- The outcomes from these and other support studies have resulted in the development of remedial designs for the plant site area, waste rock pile and Edwards Pond (currently in development stage).