

Remediation of Abandoned Mine Openings, April 2020 to March 2021

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Introduction

There are more than 8,400 abandoned mine openings in Nova Scotia, many of which are located on Crown land. An inventory of these openings was started in 1993, and in 2001 the Abandoned Mine Openings (AMO) Remediation Program was initiated. The program is managed jointly by the Geoscience and Mines Branch and the Regional Services Branch of the Department of Natural Resources and Renewables (NRR). Over the last 20 years the program has invested about \$930,000 to remediate the most hazardous openings on Crown land. In the 2020-21 fiscal year, about \$55,000 was spent on five former mine sites.

Background

The AMO Remediation Program is overseen by a steering committee consisting of the Executive Directors of the Geoscience and Mines Branch and the Regional Services and Land Services branches of NRR. Working from a priority list, each year an AMO Work Plan is prepared, approved and funded from a Special Purpose Fund. Implementation of the program is coordinated by a working group consisting of one of the three NRR Regional Resource Managers and two Geoscience and Mines staff. The work is managed by Regional Services staff throughout the province, with support from Geoscience and Mines staff.

The Department of Transportation and Infrastructure Renewal (TIR) and the Department of Service Nova Scotia and Internal Services have major roles in the AMO Remediation Program, both in carrying out work with their own crews (specifically TIR), and in tendering and managing contracted work.

The Geoscience and Mines Branch conducts field programs to inspect the AMOs on Crown land on a regular basis. Operating on a three-year cycle,

almost every AMO on Crown land in the province is inspected, and the degree of hazard re-assessed. Mine openings located in well-travelled areas are assessed on an annual basis. Warning signs and flagging are upgraded as needed.

The Geoscience and Mines Branch maintains a database of the known abandoned mine openings in the province (on both private and Crown lands). This database is available online at <http://novascotia.ca/natr/meb/geoscience-online/about-database-amo.asp>. In April 2020, Version 8 of the Nova Scotia Abandoned Mine Openings Database was released. It is an update to the 2017 release, and provides updated information (e.g. hazard rating, coordinates) on more than 1,200 mine openings, including approximately 850 newly identified mine openings. With the utilization of GPS and GIS technology over the past number of years, and the annual release of new lidar imagery of various areas of the province, updates to the AMO database are a continuing effort.

AMO Remediation Program

Most of the abandoned mine openings found on Crown lands are shafts, but there are also slopes, adits, pits, trenches, and raises. In a few cases, the openings are collapsed mine workings, which can be extremely hazardous.

The methods used to remediate AMOs include excavating, backfilling, fencing, and placement of concrete caps and steel grates over the openings. In the past 20 years the program has backfilled about 700 AMOs, fenced 50, capped 7, and installed 4 grates to protect bat habitat. In addition, about 160 AMOs on Crown lands have been addressed through partnerships with private operators. Work has been carried out at 45 different sites throughout the province.

The recognition of potential issues related to biodiversity is part of the review of all sites proposed for mine opening remediation work. This

collaborative effort, involving wildlife specialists, biologists, foresters, and engineering staff ensures that all relevant branches of government are in agreement on proper mine opening remediation work, while minimizing the disturbance to surrounding habitats.

In 2020 thirty-eight (38) abandoned mine openings and eighty (80) prospect pits were remediated at four locations. Locations of 2020 remediation work are shown in Figure 1, and the work performed is summarized in Table 1.

Crown Lands Mine Remediation Initiative

In the spring of 2016, NRR (then Department of Natural Resources) staff compiled a listing of historic abandoned mine sites on Crown land that

had indications of potential contamination. Based on existing documentation, staff experience and site knowledge, as well as databases of both abandoned mine sites and abandoned mine openings, the Mineral Management Division of the Geoscience and Mines Branch identified 69 former Crown land mine sites that had potential for contamination.

The former Department of Lands and Forestry (now part of NRR) manages provincial Crown land, including these potentially contaminated sites. That department engaged Nova Scotia Lands to assess, prioritize, and remediate the sites. The majority of the sites are former gold or coal producers, with a few iron, base metal, and industrial mineral sites included on the list. Most of the sites are former underground mines, but there are a few former quarry operations listed.

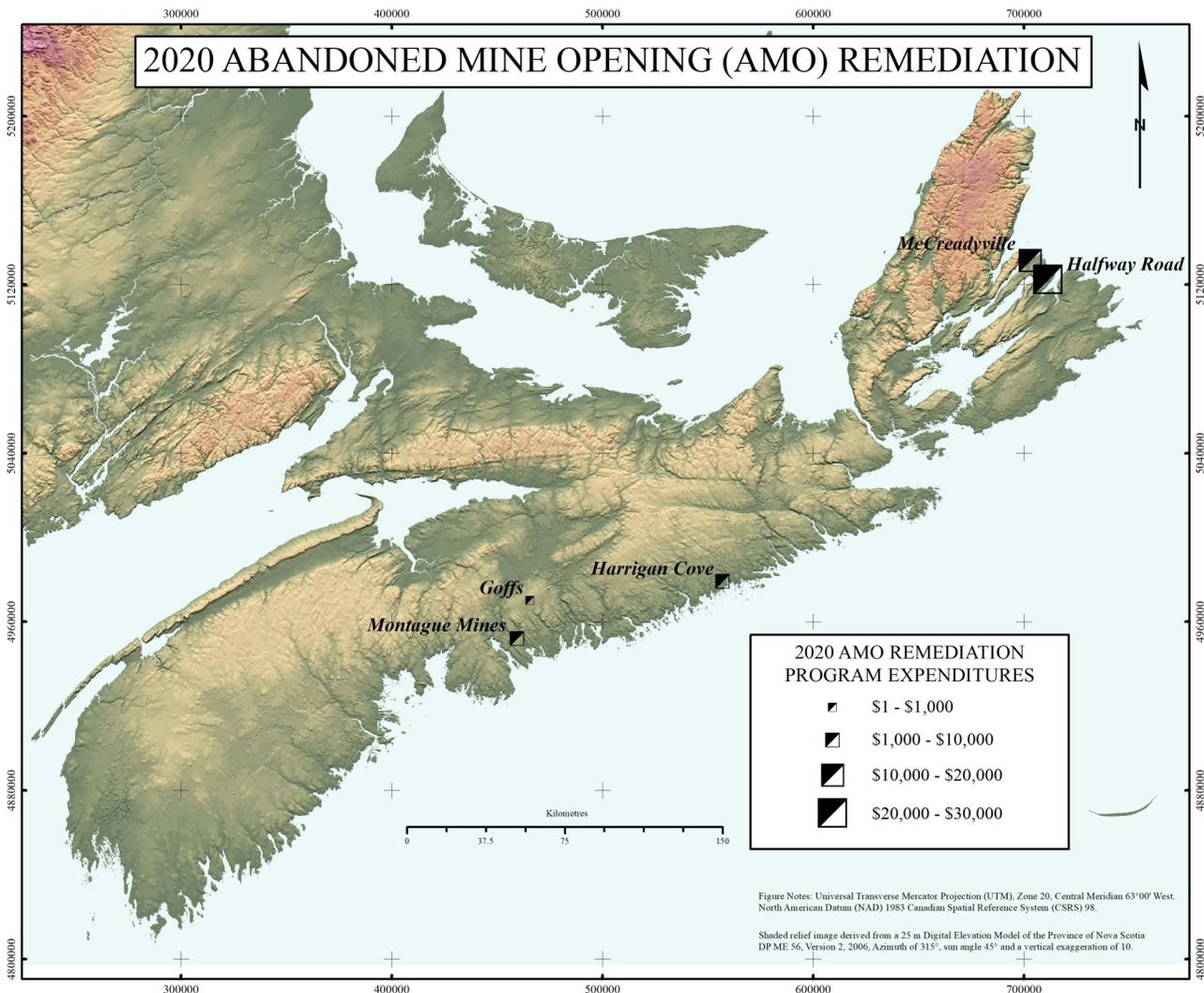


Figure 1. Locations of abandoned mine openings on Crown land that were part of the 2020-2021 remediation program.

Table 1. Location of sites, and remediation work performed in 2020.

Central Region	Work performed in 2020
Montague Mines	Two extremely hazardous mine openings were backfilled by TIR. One opening had been backfilled in the early 1960s, and the other was fenced in 2003. Active caving in and around the openings and their proximity to well-travelled trails necessitated remediation on a priority basis. Two adjacent mine shafts were excavated and re-filled to ensure the stability of the backfill.
Harrigan Cove	Twenty-five mine openings and twenty prospect pits were backfilled by TIR.
Goffs	After a review by Lands and Forestry staff, the location was deemed too remote to allow access for the heavy equipment required to backfill the two mine shafts and adjacent trenching. Snow fencing and new warning signs were erected. The site will be checked on a regular basis to ensure that the temporary safeguards remain in place.
Eastern Region	
Halfway Road (Sydney Mines)	Utilizing approximately 500 cubic yards of carbonate material, a mine slope, air shaft, ten prospecting pits and a 30-metre long trench were backfilled by a contractor. The mine openings had been discharging acidic mine water into an adjoining wetland. Nova Scotia Environment staff contributed to the project, as did Cape Breton Regional Municipality staff who facilitated construction of a temporary access road.
McCreadyville (Point Aconi)	Six extremely hazardous mine openings and approximately fifty prospect pits were excavated and backfilled on contract. Approximately 2.2 hectares of woodland was harvested to allow heavy equipment access. The work also required removal and disposal of approximately 10 tonnes of old car bodies.

Some of the past-producing sites are located in urban areas (e.g., the Jacob and Caledonia mine sites in Sydney Mines and Glace Bay), while others, including 19th century gypsum and limestone quarries, are overgrown with little remaining indication of the historical operations. At a couple of sites, old quarries are now part of a Provincial Park (e.g., Lennox Passage and Cheverie). Notably, one of the sites, the Irish Cove Quarry, has already undergone reclamation work, including recontouring of the stockpiles and highwalls, revegetation, and stream restoration. It is anticipated that several of the sites on the list, once assessed during an initial investigation, will require little, if any, remediation work.

Recently closed mine sites (e.g., East Kemptville, Toronto Road, and Little Pond), as well as current mining operations in Stellarton and Moose River, were included on the list in order to present a complete package of historical mining operations on Crown lands. On these properties, many of the sources of historical contamination would likely be, or have been, addressed as part of mining and reclamation activities. Further, these sites are not abandoned mine sites. Listing these sites, however, recognizes and documents that there may be potential offsite impacts from historical operations that may not have been addressed by the current mine operators.

Many of the listed sites remain attractive targets for mineral exploration. Staff members are working to accommodate the interests of the mineral rights holders on those identified sites.

Nova Scotia Lands is currently managing remediation of two of the highest priority sites at Montague Mines (Halifax Regional Municipality) and Goldenville (Guysborough County). The work is being done on behalf of NRR and initial conceptual closure plans have been prepared.

During the past year Geoscience and Mines staff worked with both Nova Scotia Lands and former Lands and Forestry staff to provide personal background knowledge and documentation related to the sites. Both groups have also been briefed on the newly released Version 8 of the Abandoned Mine Openings Database, and on a newly released database of existing mine tailings: <https://novascotia.ca/natr/meb/download/dp533.asp>. The collaborative effort will support the development of a comprehensive package of information, to be used in setting priorities for future study and remediation.

Conclusions and Recommendations

All forty Type I (inescapable) AMOs and about 45% of the Type II (escapable, but very hazardous) AMOs known to exist on Crown land in Nova

Scotia have been remediated. About 650 potentially hazardous mine openings on Crown land remain to be remediated, but more than half of those are located in very remote areas or are in such a condition that they pose little risk to public safety.

Although Nova Scotia Lands has taken on the tasks of assessing and reclaiming potentially contaminated abandoned mine sites, the AMO Remediation Program will continue to manage the remediation, monitoring, and documentation of abandoned mine openings on Crown land throughout the province.

The public is advised to avoid areas with known AMOs, as their condition, even of those that have been safeguarded, can change over time. Under no circumstances should anyone enter an AMO, due to the numerous hazards that may be present. Information on the location of AMO's is publicly available on the Department of Natural Resources and Renewables interactive map website.