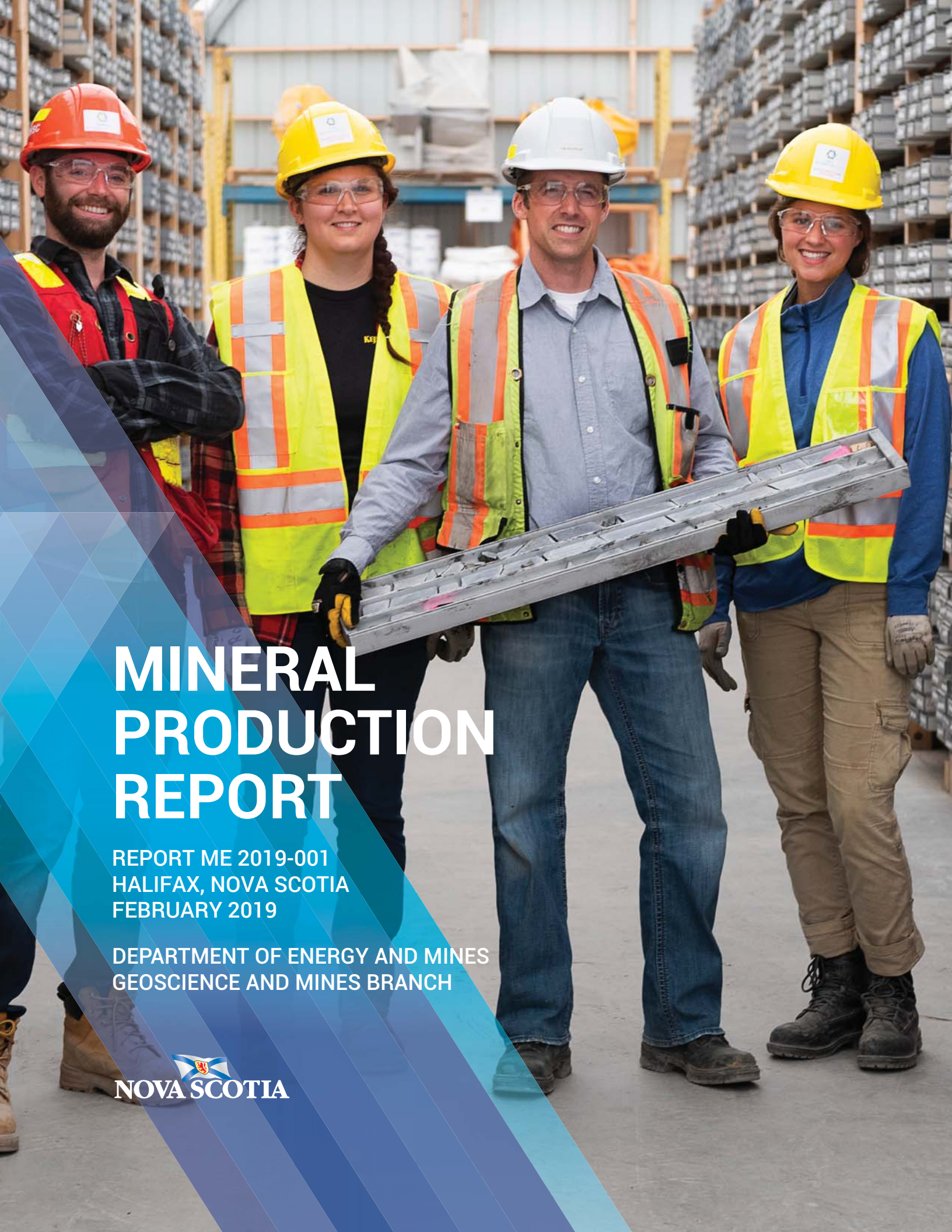


# MINERAL PRODUCTION REPORT

REPORT ME 2019-001
HALIFAX, NOVA SCOTIA
FEBRUARY 2019

DEPARTMENT OF ENERGY AND MINES
GEOSCIENCE AND MINES BRANCH

NOVA SCOTIA

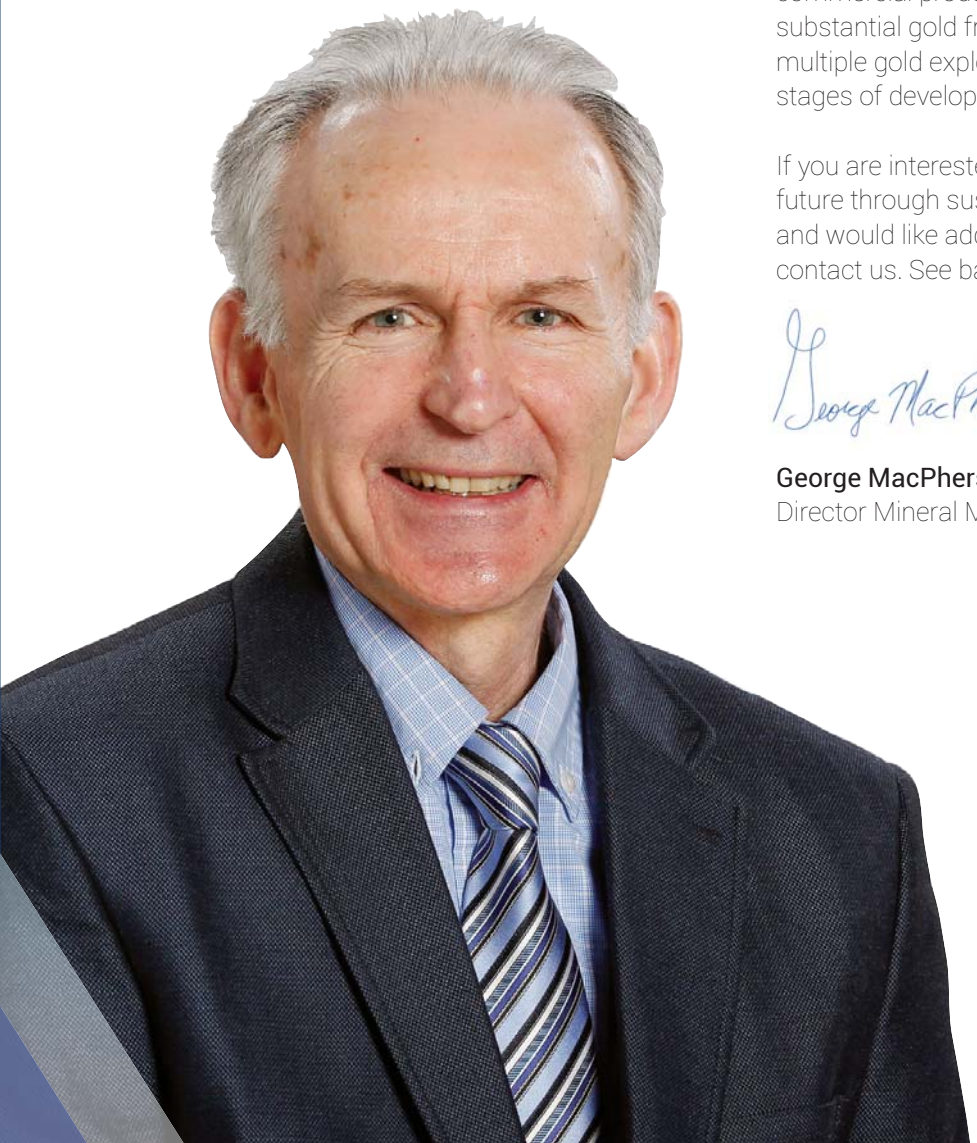
*Cover photo courtesy of Atlantic Gold*

# Message from the Director of Mineral Management

The Mineral Production Report for 2017 highlights activities of the exploration and mining industry in Nova Scotia. This report includes exploration highlights and production information for various minerals. The information was developed in cooperation with industry, and the data was provided by each of the companies surveyed. I'd like to thank Nova Scotia's expoloration and mining industry for its cooperation.

As a part of the highly competitive, global environment for mineral investment dollars, Nova Scotia is attuned to the challenges faced by the mining industry. The Nova Scotia Department of Energy and Mines is positioning the province to compete successfully for investment dollars within this global context by providing clear and effective laws and policies that support sustainable geological resource development.

The mineral industry in Nova Scotia experienced an increase in activity in 2018 that included progress in grassroots exploration, advanced exploration projects, and mine development work. Exploration activity in the province increased by 113 per cent in terms of claims under license, and exploration expenditures totalled $17.3 million.



The gold sector led the trend. A new gold mine declared commercial production in 2018, a second produced substantial gold from its underground bulk sample, and multiple gold exploration projects are now at various stages of development.

If you are interested in working with us to build a better future through sustainable mineral resource development and would like additional information, I invite you to contact us. See back page for contact information.



**George MacPherson**
Director Mineral Management

# 2018 Exploration Highlights

Mineral claim-staking activity in Nova Scotia picked up in 2018 relative to 2017, with the total number of claims under licence increasing to 33,655—more than double the 15,808 in 2017.

Field expenditures by the mineral exploration industry in 2018 are estimated to have been about $17.3 million, compared with an estimated $19.4 million in 2017, and $5.3 million in 2016.

Under the new Mineral Resources Act, which was brought into force in December 2018, exploration licences are now issued for two-year terms. This may help the industry to increase exploration activity into 2021.

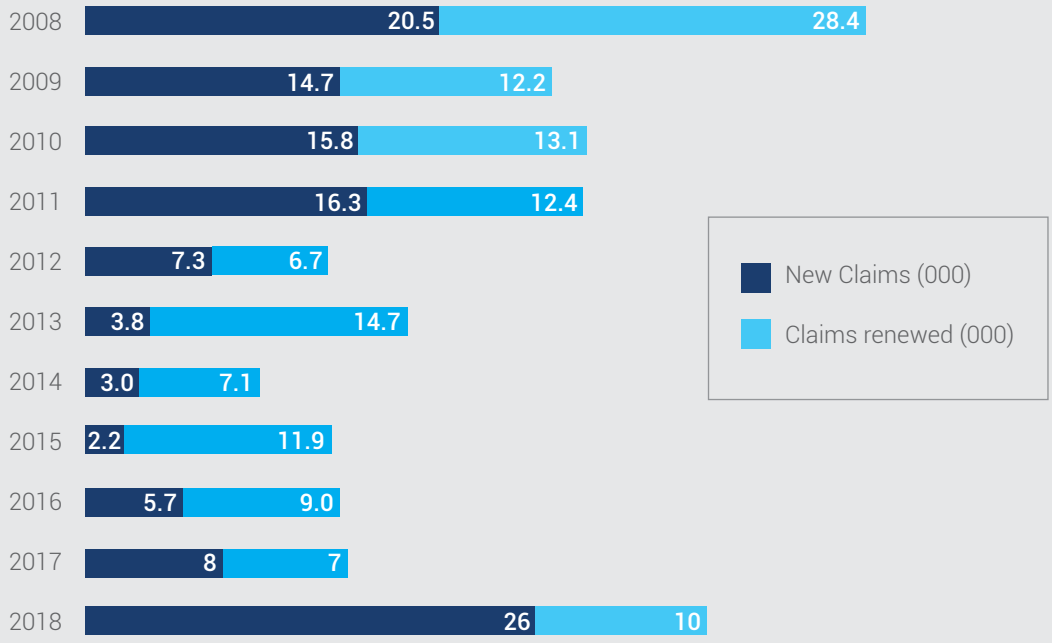
About 228 companies and individuals held exploration interests (licences or options) in the province in 2017, including 3 major, 11 junior, and 66 private companies, as well as 148 individuals. In addition, several mineral-lease holders carried out exploration and development work on leases or open ground where selected commodities did not require licences (e.g., limestone and gypsum). Entities actively engaged in exploration during 2017 included 1 major, 4 junior, and 17 private companies, as well as 17 individuals.

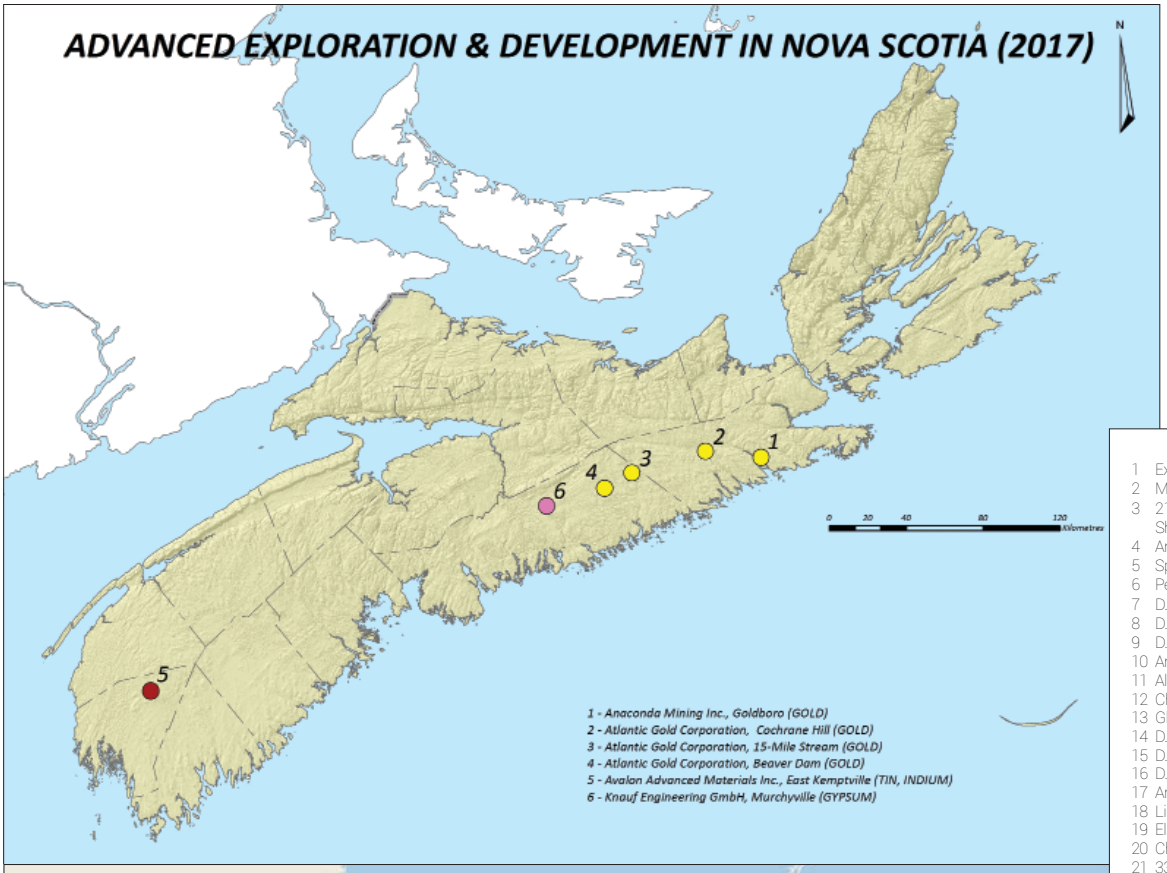
The amount of exploration drilling surged in 2017 with preliminary estimates for combined diamond and reverse-circulation drilling totalling over 200,000 m, compared with an estimated 7,295 m in 2016. Approximately 96 per cent of diamond drilling in Nova Scotia was done by Atlantic Mining NS Corp, a wholly-owned subsidiary of Atlantic Gold, for a resource definition program at Fifteen Mile Stream, Halifax County.

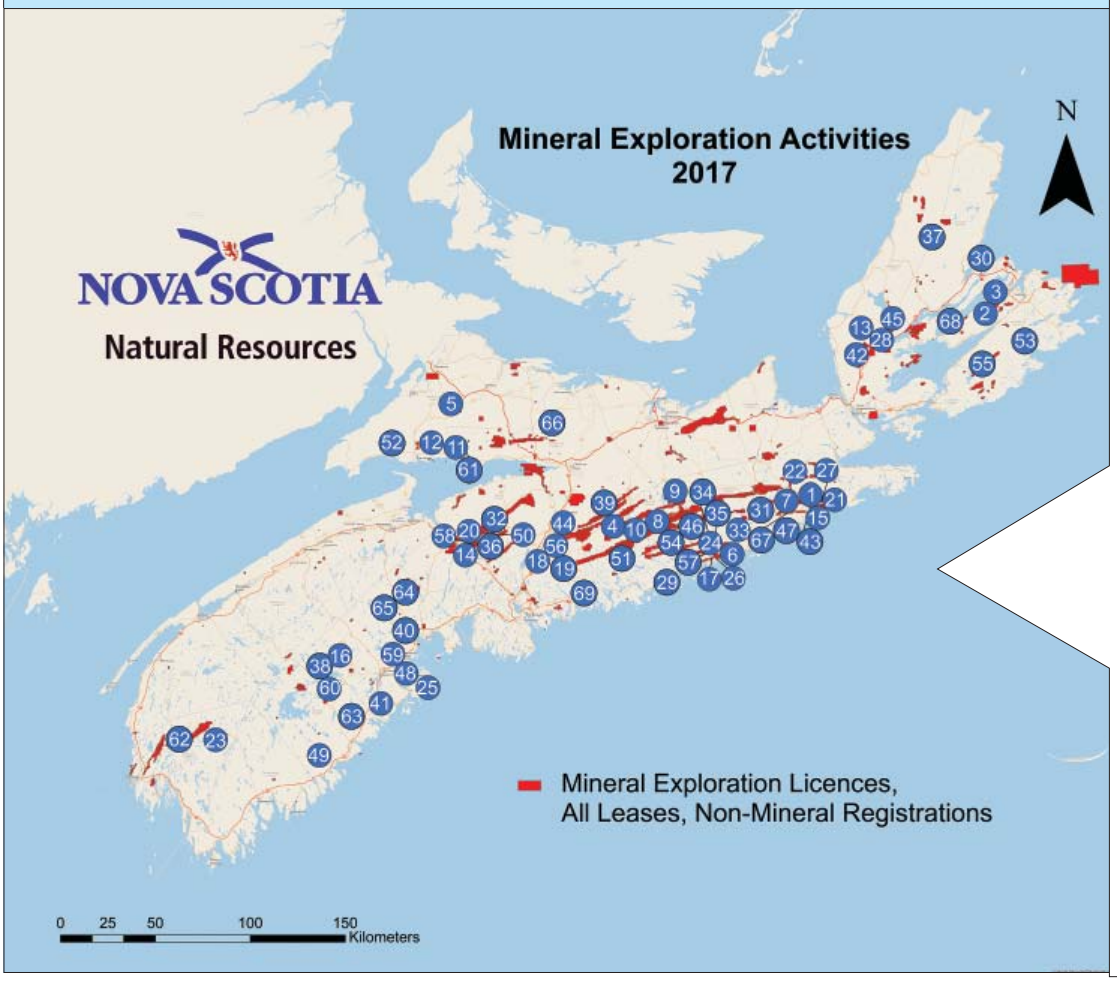
The map shows the locations of advanced mineral exploration and development sites where preliminary economic assessments have been completed and efforts are being made to advance projects into production.

For an up-to-the minute view of the number and distribution of mineral exploration licenses in the province, the reader is referred to https://novaroc.novascotia.ca.

## Exploration Claims by Year






1 Exploration Orex Inc.
2 Mt. Cameron Minerals Inc.
3 21Alpha Resources Inc., John Shurko
4 Annapolis Properties Corp.
5 Springhill Coal Mines Ltd.
6 Perry T. Bezanson
7 D.D.V. Gold Ltd.
8 D.D.V. Gold Ltd.
9 D.D.V. Gold Ltd., Annapolis Properties
10 Annapolis Properties Corp.
11 Alex MacKay
12 Chilean Metals Inc.
13 Glencoe Resources Inc.
14 D.D.V. Gold Ltd.
15 D.D.V. Gold Ltd., Annapolis Properties
16 D.D.V. Gold Ltd.
17 Annapolis Properties Corp.
18 Lindsay John Allen
19 Elk Exploration Ltd.
20 Christopher Stephen Findley
21 3302051 Nova Scotia Ltd.
22 Flex Mining & Exploration Ltd.
23 Perry R. MacKinnon
24 Flex Mining & Exploration Ltd.
25 Art Crowell
26 Rainbow Resources Ltd.
27 Alex C. Thomson
28 John Shurko
29 Flex Mining & Exploration Ltd.
30 21Alpha Resources Inc., John Shurko
31 Kevin Hatton
32 Perry R. MacKinnon
33 Perry R. MacKinnon
34 Marilyn MacDonald
35 Genius Properties Ltd.
36 Art Crowell
37 Perry R. MacKinnon
38 Sharon Allan
39 Perry R. MacKinnon
40 Elk Exploration Ltd.
41 Ken R. Hiltz
42 W & S Shaw Enterprises Inc.
43 Entreprises Minieres Globex Inc.
44 Christopher Stephen Findley
45 James Milton
46 Perry R. MacKinnon
47 Art Crowell
48 Genius Properties Ltd.
49 Wayne Carlon
50 Perry R. MacKinnon
51 3302051 Nova Scotia Ltd.
52 Chilean Metals Inc.
53 Perry R. MacKinnon
54 Rick Horne
55 ScoZinc Ltd.
56 ScoZinc Ltd.
57 Anita Robinson
58 Art Crowell
59 Genius Properties Ltd.
60 Ken R. Hiltz
61 Rod Tyson
62 Ayarco Gold Corp.
63 Magnum Resources Inc.
64 Finders Keepers USA
65 John F. Wighman
66 Magnum Resources Inc.
67 Henry F. Schenkels
68 S. Farrell & Associates Ltd.
69 Annapolis Properties Corp.

## 2017 Mineral Production

tonnes shipped (tonnes)

| | |
|---|---|
| Gypsum | 2,083,791 |
| Salt | 939,912 |
| Limestone | 521,956 |
| Coal | 367,000 |
| Silica Sand | 12,380 |
| Gold (ounces) | 15,577 |

Market Value ($CDN)

| | |
|---|---|
| Gypsum | 22,979,288 |
| Salt | 42,455,656 |
| Limestone | 15,648,241 |
| Coal | 19,302,489 |
| Silica Sand | 530,442 |
| Gold (ounces) | 24,923,200 |

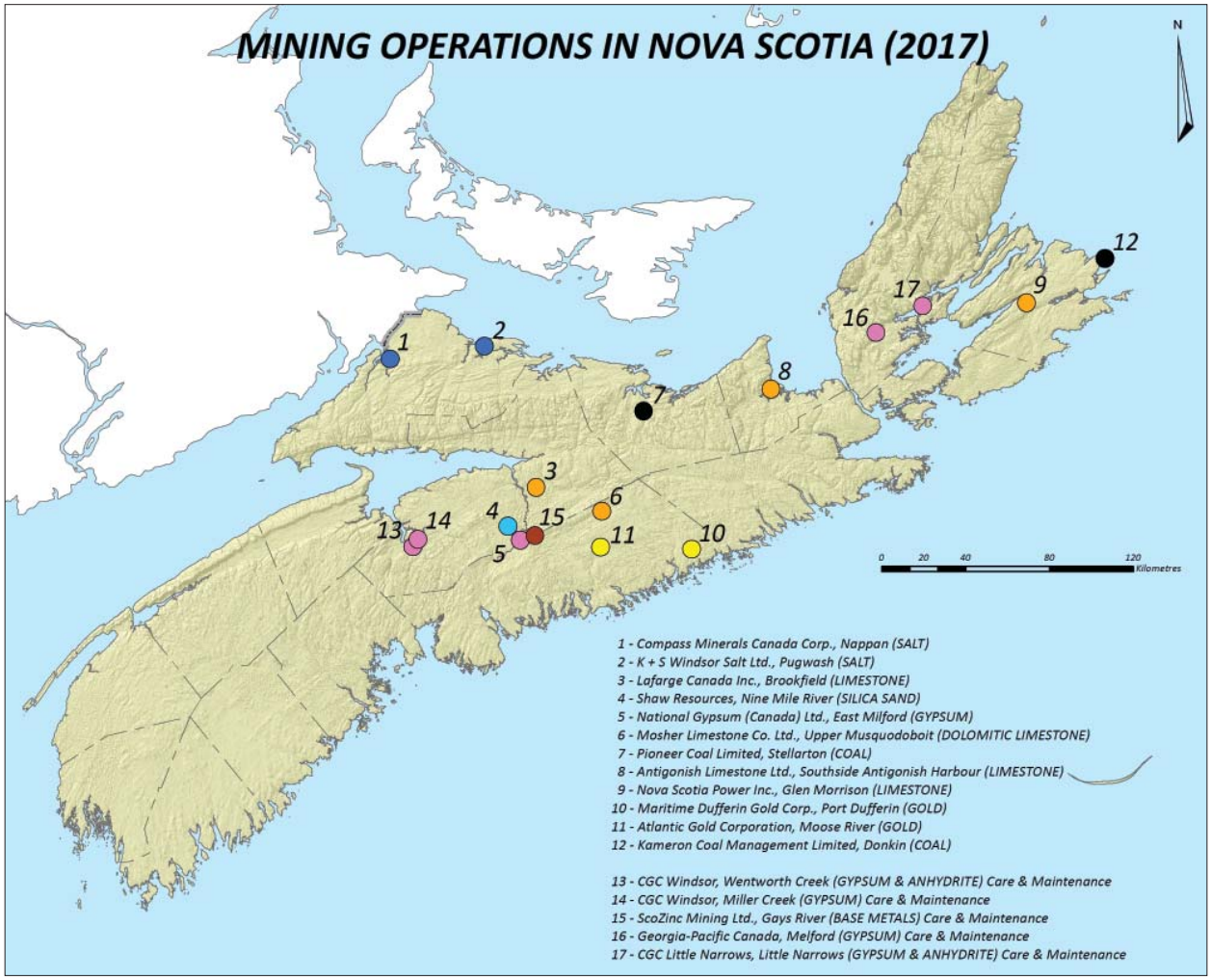
*Photo courtesy of Atlantic Gold*

# 2017 Production Highlights

There were twelve actively producing mines in Nova Scotia during 2017, all of which operated under the authority of the Mineral Resources Act.

In addition, five operations were under care-and-maintenance, awaiting favourable market conditions to restart production.

In 2017, mineral production in the province (excluding construction aggregates) resulted in $125.8 million in market value. The market value increased significantly from $92.4 million in 2016 but remains significantly lower than the high of about $190 million established in 2008. The 2017 market value increase was largely the result of production from the Touquoy and Dufferin gold mines, and increaed production of salt at Pugwash.



# Salt

## Salt Production (market value of shipped products)

Two operating salt mines in Nova Scotia produced 939,912 tonnes of salt during the 2017 calendar year. There were 202,729 tonnes (27.5 per cent) more salt produced compared to 2016. Salt accounted for 33.7 per cent ($42.5 million) of the total value and 23.9 per cent of the total mineral tonnage produced in Nova Scotia in 2017.

Since about 1980, production has averaged about one million tonnes per year. Annual fluctuations are directly related to the severity of winter weather in the region and therefore to fluctuating demands for the de-icing of roads.

### Pugwash, Cumberland County

The Pugwash underground salt mine has been in continuous production since 1959. It is operated by K+S Windsor Salt Ltd. Salt is extracted by room-and-pillar mining. It is drilled and blasted, then transported by trucks to the production shaft where it is hoisted to the surface.

K+S Windsor Salt produced 828,701 tonnes of finished product in the form of bulk and packaged salt during 2017. Finished rock salt was distributed throughout eastern Canada via ships and trucks. Most of the finished product was sold in Nova Scotia for de-icing roads and other surfaces.

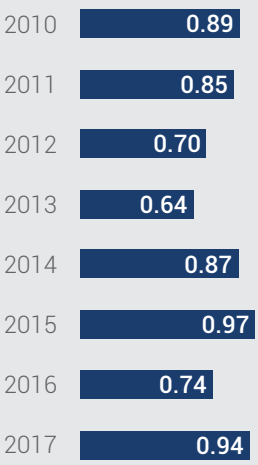
### Nappan, Cumberland County

A solution salt mine in Nappan has been in operation since 1947. It is operated by Compass Minerals. Wells are drilled into the salt formations, and heated water is used to dissolve the salt, creating a brine solution. The brine is brought to the surface and sent through a processing plant, which evaporates the water and produces high-purity salt.

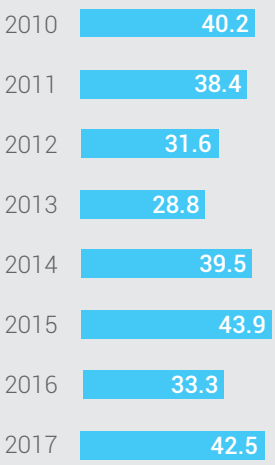
In 2017, the plant shipped 111,211 tonnes of salt. About half of the salt produced is for use in the food-processing industry and for domestic consumption as table salt. The plant also produces and packages salt for other purposes, such as water conditioning, agriculture, de-icing, and more. Salt is shipped in bulk and packaged form to locations in eastern Canada, northeastern United States, and the Caribbean.

**Salt Production**

(million tonnes)




**(million dollars)**




windsor

# Gold

## Gold Production (market value of shipped products)

Two gold-mine projects advanced to production in 2017, both located along the Eastern Shore in Halifax County. The Touquoy project began open pit mining near Moose River Gold Mines, and the Dufferin project restarted underground production near Port Dufferin. These projects mark the first gold production in Nova Scotia since 2014.

A total of 15,577 ounces of gold was produced in 2017, representing a market value of $24.9 million or 19.8 per cent of the value of all minerals produced.

### Touquoy, Halifax County

In 2017, the Touquoy gold-mining project, operated by Atlantic Gold, began operations near Moose River Gold Mines. The company is mining a relatively low-grade disseminated gold deposit by open-pit methods, as opposed to a high-grade, narrow-vein deposit via underground mining, which was the historic method for mining narrow-vein gold deposits in Nova Scotia.

From August to December 2017, 735,798 tonnes of ore were mined from the Touquoy open pit, using a bench mining method of drilling and blasting and loading broken ore with hydraulic excavators into haulage trucks for transport to the mill. That year, 374,322 tonnes of ore were processed, producing 11,667 ounces of gold.

The company plans to commence mining at Fifteen Mile Stream in 2021, and Beaver Dam and Cochrane Hill in 2022.

### Dufferin, Halifax County

The Dufferin Gold Mine is an underground operation located on the Eastern Shore of Nova Scotia in Halifax County. It is operated by Maritime Dufferin Gold Corp, a subsidiary of Resource Capital Gold Corp. A total of 26,212 tonnes of ore were mined on four saddle reefs, and 3,910 oz of gold was produced and shipped in 2017. All gold bars were shipped to Ontario for further refinement.

The method for mine development is called "drifting," which employs an electric hydraulic single boom drill jumbo. Ramp and haulage drifts are 4.0 m wide by 4.0 m high, increasing to 5.0 m high for truck loading zones and truck dumps. The mining method for ore development is jackleg development of overcut and undercut, and long-hole stoping. An additional mining method known as resue drifting was tested in 2017. Ore was processed in the mill between April and December 2017.

Major upgrades to the mill facilities in 2017 included work on the cone crusher, the Falcon concentrator, and the induction furnace power supply.

**Gold Production**

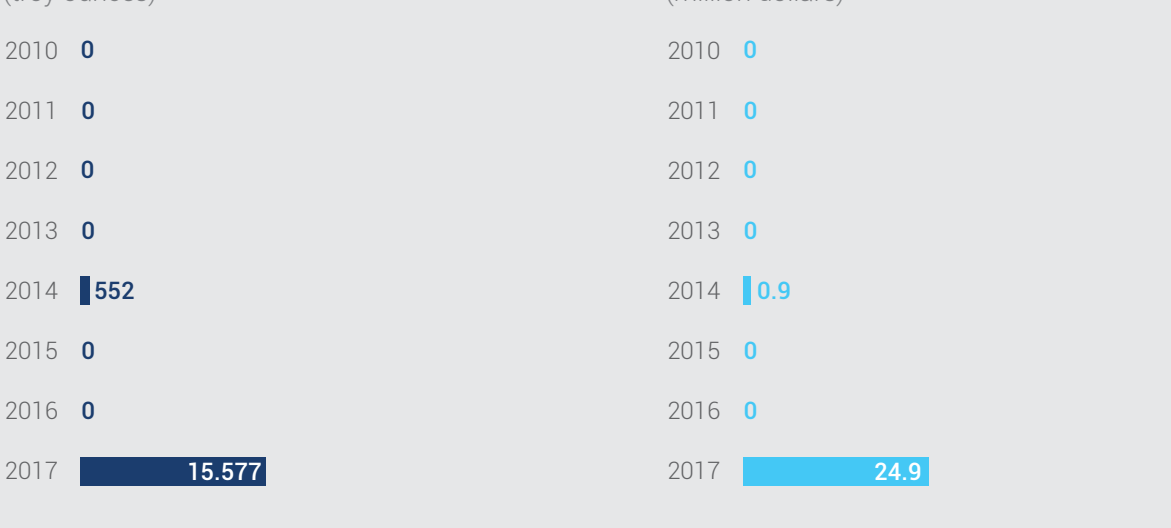


*Photo courtesy of Atlantic Gold*

# Gypsum

## 2010–2017, Gypsum Production (market value of shipped products)

During 2017, gypsum production accounted for 15.6 per cent ($22.9 million) of the total value and 53.1 per cent (2,083,791 t) of the total tonnage mined in Nova Scotia. This represented a decrease in gypsum production tonnage of 104,088 tonnes, compared with 2016. One large-scale gypsum mine at East Milford and one small-scale mine at Dean Settlement, both in Halifax County, were in production. The Dean Settlement gypsum was processed into an agricultural product and marketed locally, whereas the bulk of the East Milford production was shipped as raw gypsum for manufacturing wallboard. No anhydrite was produced in the province in 2017.

Several gypsum and anhydrite mine sites remained in care-and-maintenance status, waiting for improved market conditions to restart. Production has been relatively steady at around 2 million tonnes since 2013; however, volumes remain significantly lower than the peak production of 8.6 million tonnes in 2005. The financial crisis of 2007–08 resulted in a reduced demand for new house construction in the United States, from 1.5 million to less than 0.5 million units per year. This significant decline in demand, plus competition from synthetic gypsum (derived from pollution-control equipment at coal-fired electric generating plants), resulted in the unprecedented decline in demand for natural gypsum for building construction materials. In 2017, housing starts in the US were back up to about 1.28 million; however, natural gypsum demand has not followed this upward trend, as the high substitution rate of natural gypsum by synthetic gypsum continued.

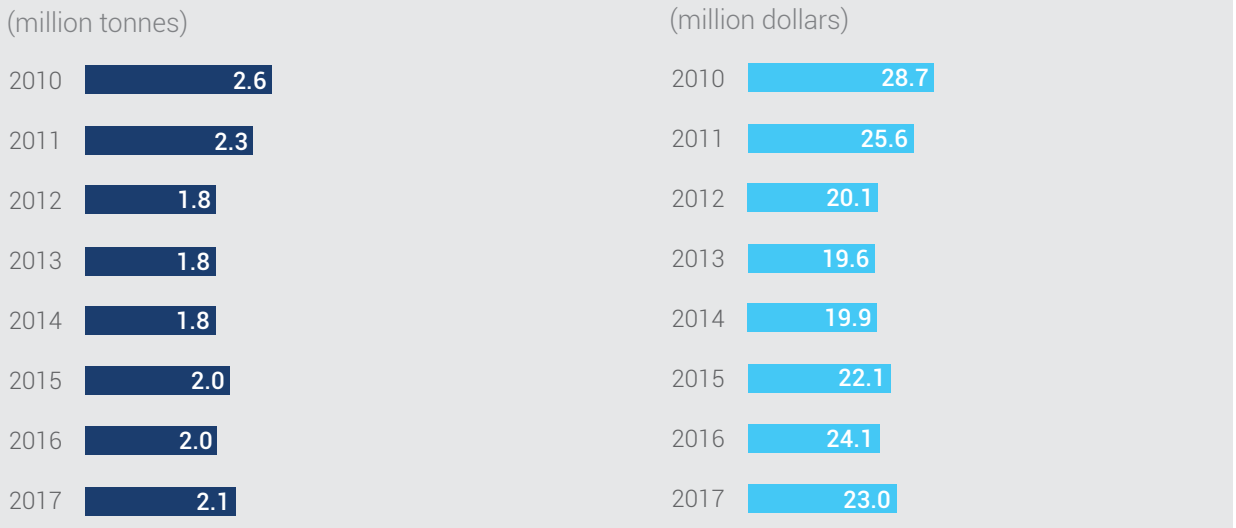
The prospect of increased demand for natural gypsum is positive, as the gradual phasing out of coal-fired power plants will result in a reduction in the availability of synthetic gypsum in the marketplace. This trend has already begun to occur, with some gypsum wallboard plants having switched to natural gypsum due to a lack of locally-available synthetic gypsum.

### East Milford, Halifax County

National Gypsum (Canada) operates a gypsum mine in East Milford, Halifax County. The mine has produced more than 134 million tonnes since it began continuous operation in 1954.

Mining involves drilling, blasting, and loading the gypsum onto trucks. It is then crushed and screened to remove impurities, and transported by train from East Milford to Wrights Cove, Dartmouth. Crushed rock is loaded onto ships for customers in Canada and the United States. The quarry also sells products within Nova Scotia for use in the manufacture of cement and wallboard, and for agricultural use.

**Gypsum Production**



# Coal

## 2010–2017, Coal Production (market value of shipped products)

During 2017, coal accounted for 15.3 per cent ($19.3 million) of the total value and 9.4 per cent (367,000 t) of the total tonnage mined in Nova Scotia. Production was from the surface mine in Stellarton, Pictou County, and from the Donkin undergound coal mine in Cape Breton County. The Donkin mine could eventually produce over 3 million tonnes per year. Coal is used as a fuel in the province for electrical power generation and is shipped to export markets through the Port of Sydney.

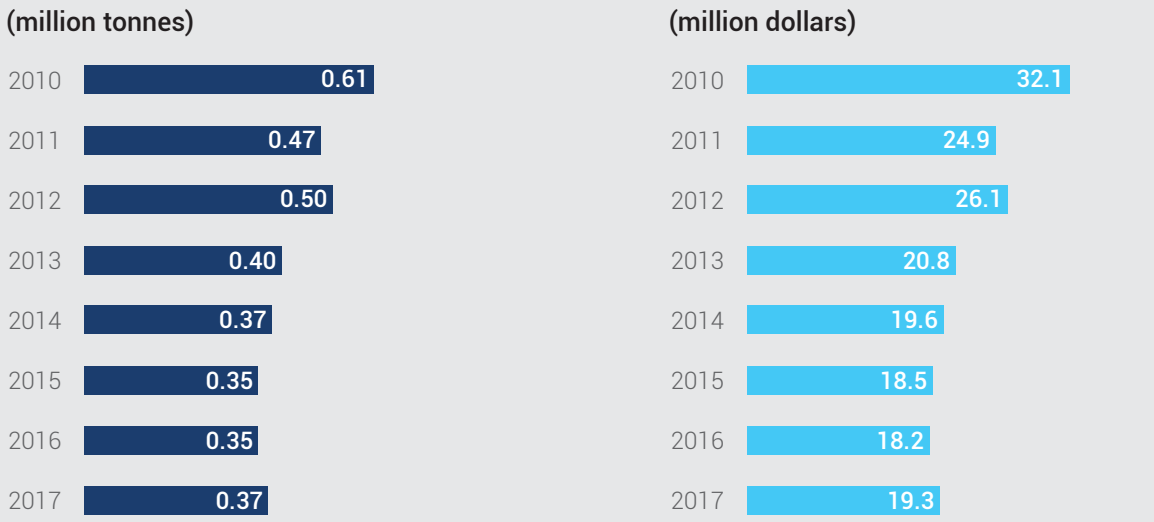
### Stellarton, Pictou County

Pioneer Coal Ltd has operated the Stellarton surface coal mine since 1996. In 2017 the operation produced 273,475 tonnes of coal from the Foord Seam, Cage Seam, Third Seam, and the Flemming/ MacGregor Seams. The coal seams in Stellarton are relatively thick, with the Foord Seam averaging over 40 feet. However, most of the coal seams were previously mined from underground, and therefore coal recovery is about 50 per cent of the original *in situ* reserves. Neither drilling nor blasting is conducted at this mine.

After overburden removal, excavators mine the coal and load it onto trucks for haulage to the crushing and sizing plant. Within the crushing/trans-shipment facility various coal-seam qualities are blended and shipped by truck to Nova Scotia Power's  generating station in Trenton.

All mining activity occurs east of MacGregor Avenue. Mining at Stellarton involves a series of open-cuts, with overburden materials being placed into adjacent cuts as backfill or temporary stockpiles to allow for progressive reclamation. Once an area is backfilled and contoured, it is covered with a suitable growing material, limed, fertilized, seeded, and mulched.

**Coal Production**



## Donkin, Cape Breton County

The focus in 2017 at the Donkin underground mine, operated by Kameron Coal Ltd, was to commission a coal processing plant, to construct and activate a refuse area and water treatment system, and to continue test mining to develop underground infrastructure and productive capacity.

Remaining rehabilitation work underground was completed early in 2017, and the mine transitioned into production, with the first coal extracted on February 27 that year. Development of underground work is confined to the Harbour seam, which intersects the main tunnels at the 3,500-metre mark.

A room-and-pillar mining method is employed to extract coal, which is conveyed by belt to a surface raw-coal stockpile. Coal extraction was performed with continuous mining machines paired with battery haulers to transport coal from the active face to the feeder-breaker and conveyor belt. Changes to the mine plan in November replaced the battery haulers with shuttle cars. Surface construction projects primarily focused on commissioning a 500 tph coal processing plant, a refuse storage facility, and a winter storage warehouse. Water collection infrastructure and treatment facilities were also installed. The processing plant required the extension of high-voltage power lines from the existing network.

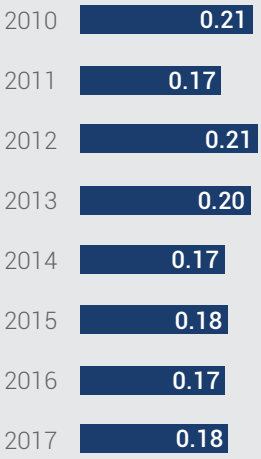
# Limestone

## 2010–2017, Limestone Production (market value of shipped products)

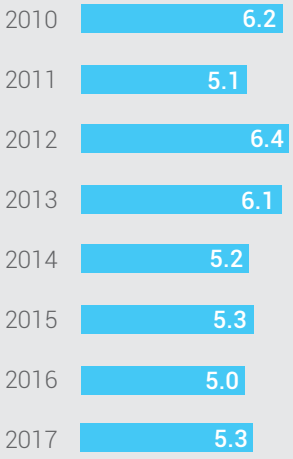
In 2017, limestone production from four mines in Nova Scotia accounted for 12.4 per cent ($15.6 million) of total value and 13.3 per cent (521,956 tonnes) of the total tonnage mined in the province. The majority of the limestone produced (343,701 tonnes) was used as a feed-stock or raw-material for Portland cement production. The next largest use of limestone(137,650 tonnes) was for the management of combustion gas emissions at a coal-fired power station The remainder was used for agricultural soil amendment (37,409 tonnes) and in the manufacture of pulp and paper products (3,196 tonnes).

### Crown Limestone Production

(million tonnes)

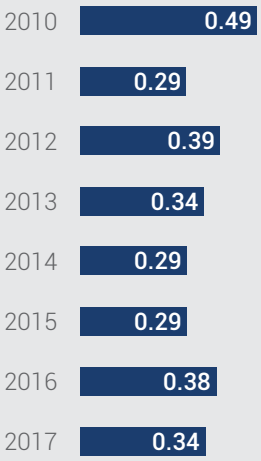



(million dollars)

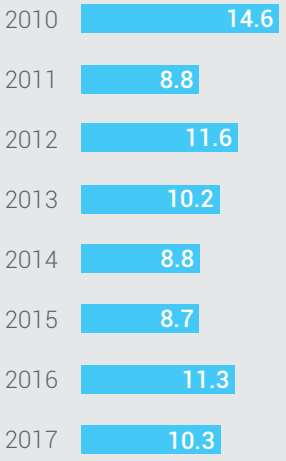



### Non-Crown Limestone Production

(million tonnes)




(million dollars)




## All Limestone Production

(million dollars)

| | |
|---|---|
| 2010 | 20.8 |
| 2011 | 13.8 |
| 2012 | 18.0 |
| 2013 | 16.3 |
| 2014 | 14.0 |
| 2015 | 14.0 |
| 2016 | 16.4 |
| 2017 | 15.6 |

## Brookfield, Colchester County

Lafarge Canada Inc has operated a limestone mine and a cement manufacturing plant in Pleasant Valley, 5 km west of Brookfield, Colchester County, since 1965.

In 2017, the Brookfield Quarry produced 343,701 tonnes of crushed limestone. Mining limestone involves removing the overburden (till and cap rock), followed by drilling, blasting, and loading the rock onto trucks for haulage to a crushing plant. All of the limestone from Brookfield is used to manufacture Portland cement products.

## Glen Morrison, Cape Breton County

Production from the limestone quarry at Glen Morrison, Cape Breton County, began in 1993. The quarry is owned by Nova Scotia Power Inc, and contractor Kelly Rock Ltd operates the quarry. Limestone is mined by first removing the overburden, followed by drilling and blasting the limestone and hauling it by front-end loader to the primary crusher. The limestone is further crushed and processed into several products at an on-site milling facility.

Most of the 137,650 tonnes of limestone produced in 2017 was shipped to Nova Scotia Power's fluidized-bed, coal-and-pet-coke-fired power station in Point Aconi, where it is used to reduce stack emissions. A small volume of fine limestone was sold to other local customers.

## Upper Musquodoboit, Halifax County

Mosher Limestone operates several quarries near Upper Musquodoboit. The company drilled and blasted 37,337 tonnes of limestone from its northeast Archibald and Mosher #1 mines in 2017. The company sold 26,074 tonnes of limestone in 2017.

Agricultural grade dolomite and limestone is produced at the company's grinding plant in Upper Musquodoboit. The product is sold throughout the Atlantic provinces in bagged or bulk form. The company produces both pulverized and pelletized limestone.

## South Side Antigonish Harbour, Antigonish County

Antigonish Limestone Ltd operates a small quarry at Southside Antigonish Harbour. However, the company did not carry out mining operations in 2017. Rather, limestone stockpiles on the site provided source material that was processed in a cage mill. Limestone is crushed and sorted into three different sizes, each having its own application and markets. In 2017, 14,531 tonnes of product were sold.

# Silica Sand

## 2010–2017, Silica Sand Production (market value of shipped products)

All silica sand produced in Nova Scotia comes from the Nine Mile River deposit. During 2017, silica sand production accounted for 0.4 per cent ($530,442) of the total value and 0.3 per cent (12,380 tonnes) of the total tonnage mined in the province.

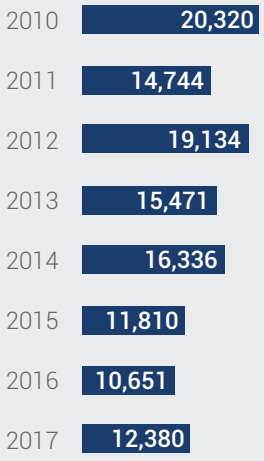
## Nine Mile River, Hants County

Shaw Resources, a member of the Shaw Group Ltd., produces silica sand from a deposit located on the West Indian Road in Nine Mile River. Sand is excavated from the pit and trucked to a wash plant. It is washed and screened into several products.

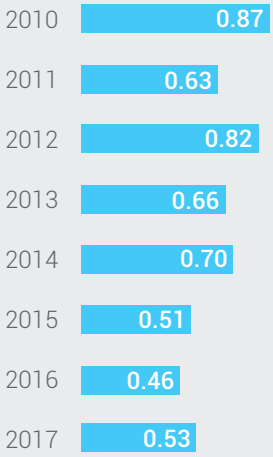
In 2017, there was no extraction from the pit. Source material processed in 2017 was taken from a stockpile originally created in 2012. There were 12,380 tonnes of product sold and shipped, mostly throughout the Atlantic provinces and Quebec.

### Silica Sand Production

(tonnes)




(million dollars)



# Contact Us

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