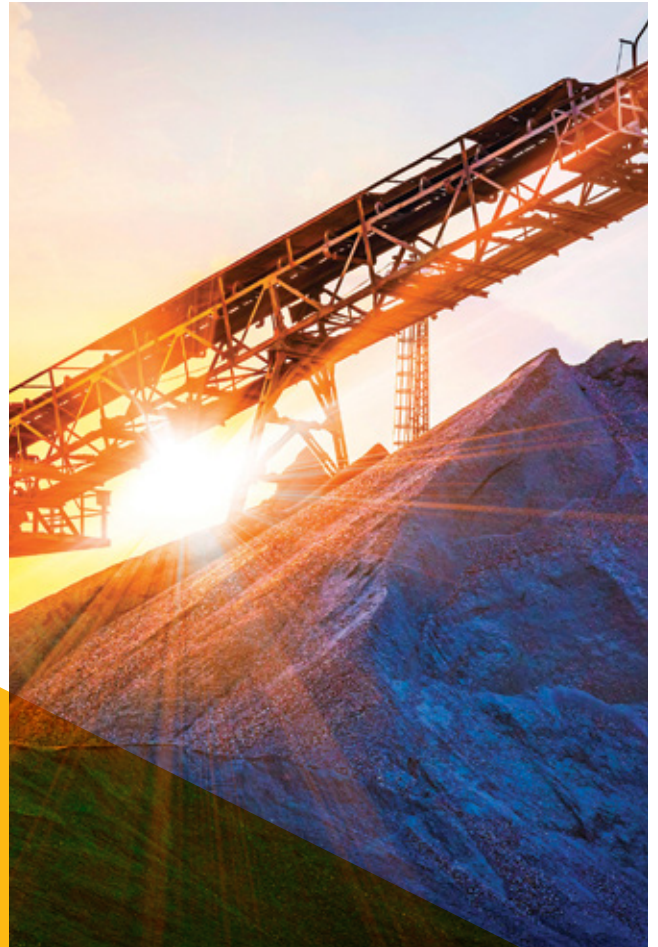


Chief Inspector  
of Mines

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# 2017 ANNUAL REPORT



# Executive Summary

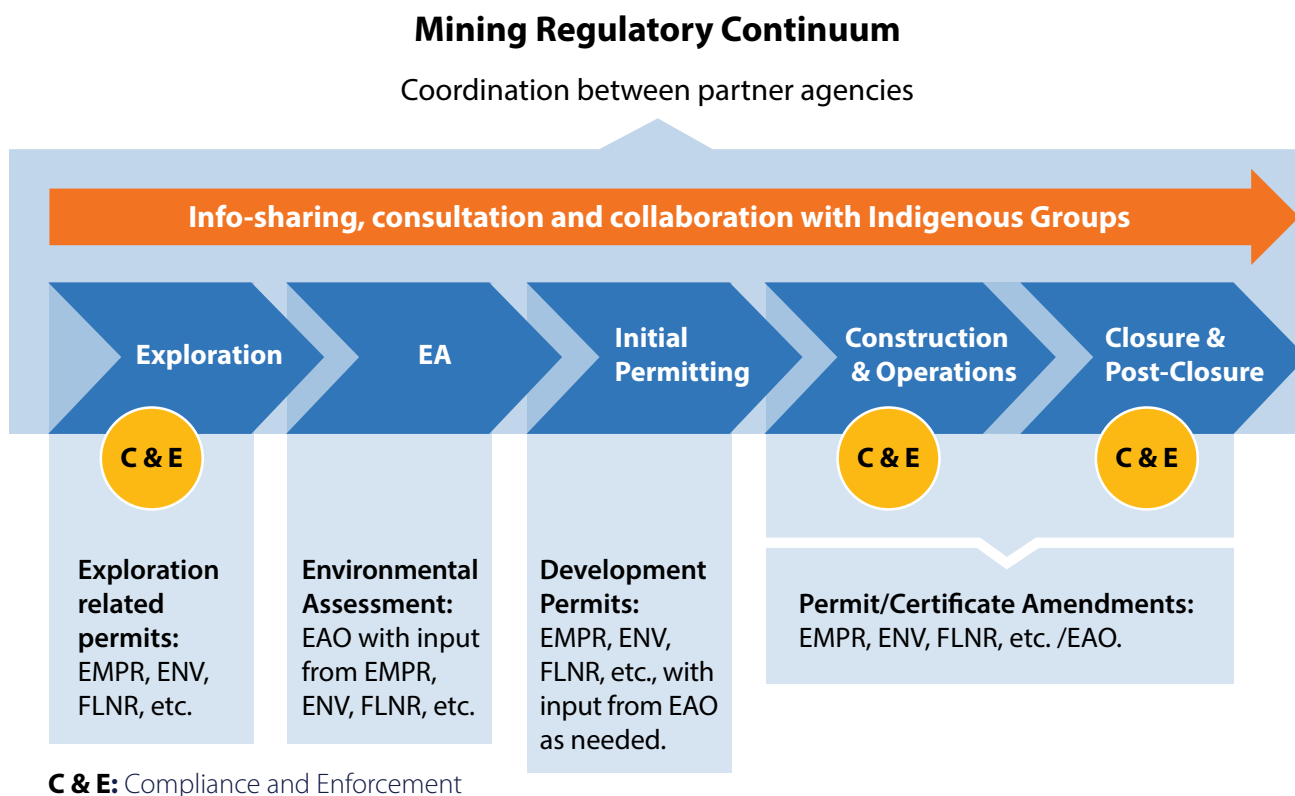
Mining has been a mainstay of the British Columbia economy for many years and it is one of the province's most dynamic industries. Direct employment in B.C.'s mineral sector accounted for 38,440 jobs in 2017<sup>1</sup>, while production estimates for major commodities mined in the province was \$8.8 billion<sup>2</sup>. Industry mineral exploration spending in 2017 totaled \$246 million<sup>3</sup>.

The provincial government is committed to maintaining a globally competitive mining sector that creates jobs and grows the economy. It is also steadfast in its commitment to provide effective oversight.

Mining is one of B.C.'s safest heavy industries and the province is a world leader in mine health and safety practices. The *Mines Act* and the *Health, Safety and Reclamation Code for Mines in British Columbia* (the Code) protect workers and the public through provisions for minimizing the health, safety and environmental risk related to mining activities.

The Office of the Chief Inspector of Mines and staff with the Ministry of Energy, Mines and Petroleum Resources work with industry, workers and communities to ensure that mineral exploration and mining activities are conducted safely and responsibly. The Office of the Chief Inspector of Mines is involved at every stage of a mine's life.

## The Lifecycle of a Mine



1. <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/further-information/statistics/employment>

2. <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/further-information/statistics/production>

3. <https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/further-information/statistics/exploration-spending>

# Mandate

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To ensure worker health and safety, public safety, and reclamation and protection of the land and watercourses affected by mining and exploration in B.C.

To administer and regulate the full mining cycle, including exploration, development, production, reclamation and closure for metal, placer, industrial mineral and coal mines, and gravel pits and quarries.

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# A Message from the Chief Inspector of Mines

December, 2018

The work of the Office of the Chief Inspector of Mines is to administrate and regulate the mining industry in British Columbia. It has been my privilege to lead a team of dedicated staff in this work for over 10 years. Through their efforts, and those of the sector, mining is one of our province's safest heavy industries. Everyone associated with the mining sector was proud that 2017 was the second consecutive year with no work-related fatalities.

Mining remains an important contributor to British Columbia's economy. The monetary benefits from the 16 metal and coal mines in production across the province in 2017 was enormous. It translated into thousands of family-supporting jobs in resource-based communities. Through Economic and Community Development Agreements, the provincial government also shares mineral tax revenue with First Nations. The total amount in 2017 was more than any previous year.

We take our responsibilities for worker health and safety, public safety, and reclamation seriously. In June 2017, the government published the revised Health, Safety and Reclamation Code for Mines in British Columbia. It represents the culmination of two years of hard work undertaken by the Code Review Committee and two technical sub-committees on tailings storage facilities and health and safety. Its impact will be to strengthen protection of workers, the public and the environment.

Sincerely,  
Al Hoffman, P.Eng.  
Chief Inspector of Mines

**"Mining provides thousands of family-supporting jobs in resource-based communities"**

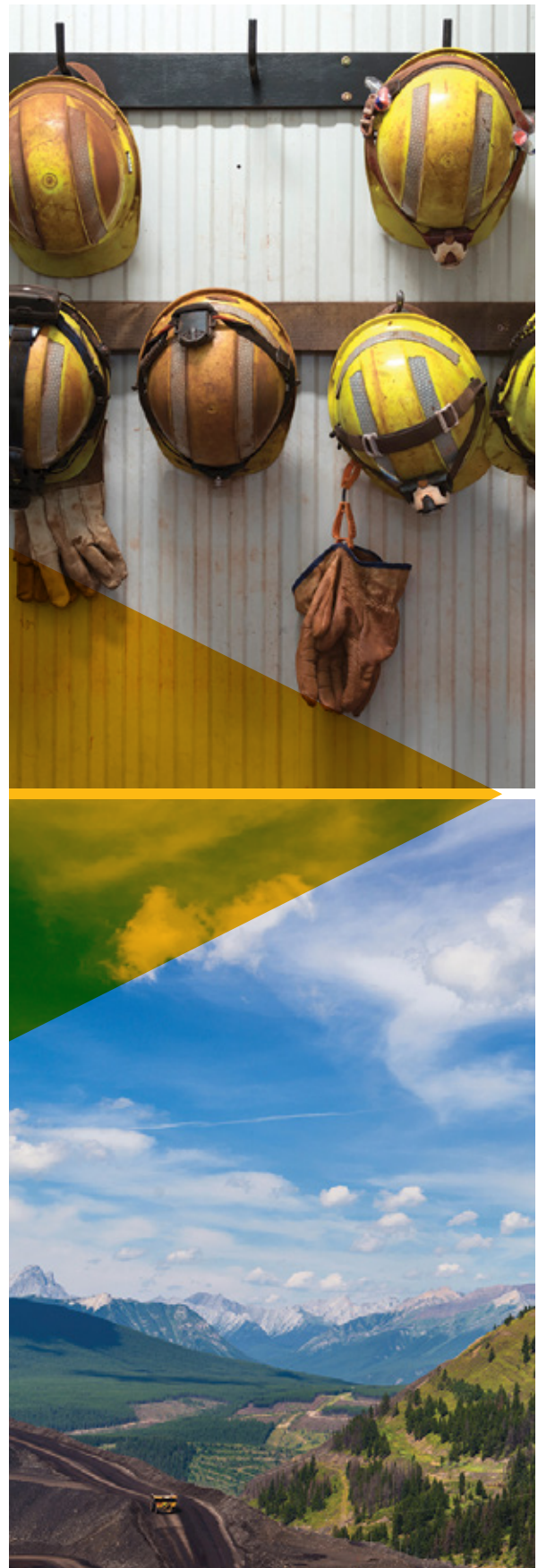


Photo: Fording River Operations – Teck Resources Limited

# About the Office of the Chief Inspector of Mines

The chief inspector of mines is also the executive director of the Health, Safety and Permitting Branch of the Mines and Mineral Resources Division of the *Ministry of Energy Mines and Petroleum Resources* (EMPR).

The Office of the Chief Inspectors of Mines is located in Victoria, with five regional offices throughout the province: Cranbrook; Kamloops; Prince George; and Smithers; as well as Victoria. The executive director of operations oversees regional operations, with directors in each region responsible for their area.

## AT A GLANCE: KEY FUNCTIONS

- » Regulates all mines in B.C.
- » Reviews applications and issues permits
- » Conducts regular mine inspections, compliance reviews and enforcement activities
- » Reviews mine emergency preparedness plans
- » Establishes geotechnical and reclamation standards
- » Ensures financial securities adequately mitigate risks and reflect mine site reclamation liabilities
- » Collaborate with First Nations on full life-cycle of mining
- » Liaises with mine management, unions and workers, occupational health and safety committees, communities, and other technical organizations, committees, and government agencies
- » Supports research, development and ongoing training to enhance best practices and promote new knowledge



Photo: Fording River Operations – Teck Resources Limited

- » Administers certifications and examinations
- » Collects data and maintain records with respect to accidents, dangerous occurrences and inspections.

# Sector Overview and Administration

Natural Resources Canada data indicates the production value of B.C. mines increased in 2017. While final production figures have yet to be released, preliminary estimates are currently \$8.8 billion, which indicates a significant increase from the \$6.7 billion generated in 2016. Estimates generated by the *British Columbia Mineral and Coal Exploration Survey* show that exploration expenditures in B.C. were \$246 million in 2017, up from \$205 million for 2016. Over 38,000 people in British Columbia were employed in mineral exploration, mining and related sectors in 2017.

## Spotlight on ECDA Revenue Sharing

In 2008, B.C. became the first province in Canada to introduce a policy to share with First Nations

direct provincial mineral tax revenue from new and expanded mines. Economic and Community Development Agreements (ECDAs) secure support for mining projects, increase process certainty for the Province, First Nations and industry, and reduce litigation risks for the life of the agreement. In 2017, the provincial government shared the most revenue through ECDAs (\$22 million) than in any other year. The Government of B.C. currently has 32 signed revenue sharing agreements with 44 Indigenous groups.

## METAL AND COAL MINE ACTIVITIES

Eight metal mines and eight coal mines were in production across B.C. in 2017. The following tables provide information on the estimated production of these mines based on company reports.

“Eight metal mines and eight coal mines were in production across B.C. in 2017.”

### Metal Mines

Mine Name	Company	Nearby Community	Production	
Brucejack <sup>4</sup>	Pretium	Iskut	Gold	152,484 oz
			Silver	179,237 oz
Copper Mountain	Copper Mountain Mining	Princeton	Copper	75.8 million lbs
			Gold	23,600 oz
			Silver	277,000 oz
Gibraltar	Taseko	Williams Lake	Copper	141.2 million lbs
			Molybdenum	2.64 million lbs
Highland Valley Copper	Teck	Logan Lake	Copper	205 million lbs
			Molybdenum	9.3 million lbs
Mount Milligan	Thompson Creek Metals	Fort St. James	Copper	53.6 million lbs
			Gold	222,567 oz
Mount Polley	Imperial Metals	Likely	Copper	19.1 million lbs
			Gold	48,009 oz
			Silver	36,626 oz
New Afton	New Gold	Kamloops	Copper	90.6 million lbs
			Gold	86,163 oz
			Silver	300,000 oz
Red Chris	Imperial Metals	Iskut	Copper	74.6 million lbs
			Gold	33,416 oz
			Silver	133,157 oz

4. Commenced operations in July 2017

## Coal Mines

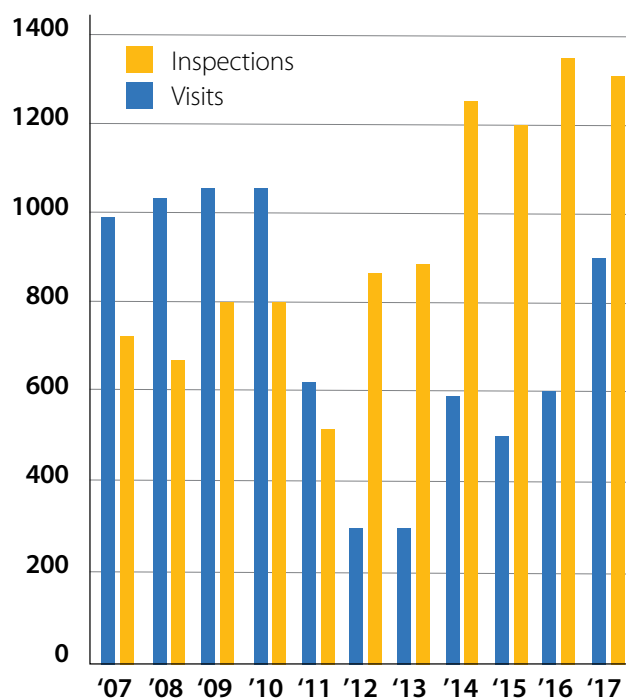
Mine Name	Company	Nearby Community	Production (tonnes)
Brule	Conuma Coal	Chetwynd	2.4 million
Coal Mountain	Teck	Sparwood	2.7 million
Elkview	Teck	Sparwood	6.2 million
Fording River	Teck	Elkford	8.3 million
Greenhills	Teck	Elkford	6.2 million
Line Creek	Teck	Sparwood	3.6 million
Quinsam <sup>5</sup>	Quinsam Coal Corp.	Campbell River	Less than 50,000
Wolverine <sup>6</sup>	Conuma Coal	Chetwynd	855,000

5. Restarted operations in November 2017

6. Restarted operations in January 2017

## MINE VISITS AND INSPECTIONS

EMPR staff and contractors visit mines to conduct inspections as well as audits, meetings, investigations or training. In 2017, inspectors of mines made 2,198 visits to mine sites across B.C. and conducted 1,308 inspections.



“In 2017, inspectors visited mines a total of 2198 times, of which 1308 were inspections.”

## ORDERS

During their reviews, inspectors of mines may decide to issue orders for contraventions of the *Mines Act*, the Code, other applicable codes and statutes (e.g., the Canadian Electrical Code) or permit conditions. Orders can generally be grouped into the categories of health and safety, environmental, and shutdown (orders to shut down all or part of a mine site).

The table below summarizes orders issued in 2017.

Type of Order	2017
Health and Safety	3,631
Environmental	275
Shutdown	46
<b>Total orders issued</b>	<b>3,952</b>

# Code Review

In July 2015, a committee was appointed to review the *Health, Safety and Reclamation Code for Mines in British Columbia*. The Code Review Committee, chaired by the chief inspector of mines and consisting of an equal number of representatives from First Nations, mine labour unions and industry, was given two separate tasks:

- » Provide a review of the tailings storage facility (TSF) section of the Code and determine how best to implement the independent expert panel's seven recommendations. This was completed in 2016
- » Provide a focused review of the health and safety section of the Code.

The committee's review of the health and safety portion of the Code was completed in early 2017 and a *new Code book* was released in June 2017.

## AT A GLANCE: CODE REVISIONS

Revisions to the Code include:

- » A requirement that all personnel in a supervisory role of workers at a mine or mine exploration site, other than office employees, must hold a mine supervisor or open pit shiftboss certificate
- » Updated threshold limit values set for carbon disulfide, lead, nitrogen dioxide, silica and welding fumes
- » A mine's TSF emergency preparedness and response plan must now be integrated with its Mine Emergency Response Plan (MERP). First Nations and communities must also be included in the planning and annual testing of a mine's MERP and a record of the annual MERP testing must be included in the mine's annual report to the chief inspector of mines
- » A requirement for all work under section 5.1.1 (electrical) of the Code and mechanical work

on braking and steering systems of tracked and rubber-tired mobile equipment must be performed by, or under the supervision of, a certified person

- » Operators of mobile cranes, boom trucks, folding boom and tower cranes performing critical lifts are required to have valid certification
- » All underground electrical equipment must be certified as suitable for use in an underground coal mine by an accredited laboratory
- » Companies are now required to have a minimum of two first aid certified personnel on all exploration sites and first aid attendants on site can now obtain their certification with any provider as long as they meet the requirements set out by the chief inspector of mines
- » A requirement that all side-by-side ATVs and UTVs operating on a mine site must have rollover protection that meets the appropriate standards.

With these updates to the health and safety section of the Code, along with the July 2016 updates government made to the TSF section, British Columbians can have confidence that B.C.'s standards for tailings facilities are as good or better than those that exist anywhere in the world.

*"British Columbians can have confidence that B.C.'s tailing standards are as good as or better than those that exist anywhere in the world."*

# Permitting

Before mining activity can begin, a *Mines Act* permit is required. The requirements depend on the mine type as well as the scope of proposed activities.

EMPR's regional offices are responsible for processing applications under section 10.1.1 of the Code for all exploration, placer, quarry and sand and gravel mining activities. Applications are submitted through a Notice of Work and are reviewed by EMPR regional staff, Indigenous Nations, other agencies and specialist technical staff as required.

For larger metal and coal mines that fall under section 10.1.2 or 10.1.18 of the Code, applications are submitted to the Office of the Chief Inspector of Mines. This includes applications for new mines, for expansions or upgrades to existing mines, amendments for changes to existing mines, and some large-scale exploration and development projects.

The review of major mine projects is supported by an interagency review that is coordinated through a Mine Review Committee (MRC) that is led by the Major Mines Permitting Office (MMPO) within EMPR. Where multiple authorizations are required, the MMPO coordinates the review of all applications, providing a one-window approach for proponents. The MMPO-led process supports a thorough, timely and integrated assessment of a project and provides meaningful opportunities for participation by Indigenous Nations, proponents, local governments, and federal and provincial agencies.

New major mines and expansions may also be subject to the [Environmental Assessment Act](#) and require an Environmental Assessment Certificate. The environmental assessment (EA) process is managed by the [Environmental Assessment Office](#) (EAO). For larger projects and major expansions, the EA process typically precedes the Mine Act permit application review, with an EA certificate required prior to the issuance of any other permits or authorizations.

MMPO works with the EAO and relevant permitting agencies including the Ministry of Environment and Climate Change Strategy and the Ministry of Forest, Lands, Natural Resource Operations and Rural Development as mining projects transition from exploration, through EA, to permitting and closure. This "Team BC" coordination along the regulatory continuum ensures that pertinent issues are tracked and addressed at the most appropriate and effective stage of project development.

*"The process supports a thorough, timely and integrated assessment of a project and provides meaningful opportunities for participation."*

## COLLABORATION WITH INDIGENOUS NATIONS

The provincial government has committed to transform its relationship with Indigenous peoples, including adopting and implementing the United Nations Declaration on the Rights of Indigenous Peoples. As part of an evolving reconciliation policy framework, the Government of B.C. has released 10 draft principles to guide its relationships with Indigenous peoples. In accordance with the 10 principles, the Province continues to conduct responsive and respectful consultation with Indigenous Nations, to meet its constitutional obligation to consult and, where appropriate, accommodate Indigenous Nations on land and resource decisions that could potentially impact their Indigenous rights, title, and interests. The 10 principles also support more collaborative engagement with Indigenous peoples, and a renewed fiscal relationship that promotes a mutually supportive climate for economic partnership and resource development.

EMPR works collaboratively with Indigenous Nations throughout the full lifecycle of a mine to ensure their interests are considered in the Province's decision-making processes. Through the Economic and Community Development Agreement program, the provincial government

also shares mineral tax revenues with impacted Indigenous Nations on new major mines to support their socio-economic priorities.

The Province encourages mining proponents to engage early in the project planning stages with Indigenous peoples and to build ongoing, strong relationships throughout the life of mining projects.

**“The provincial government shares mineral tax revenues with impacted Indigenous Nations on new major mines to support their socio-economic priorities.”**

## 2017 HIGHLIGHTS

- » Issued 44 *Mines Act* permit amendments for major mines across B.C.
- » Completed seven restart permits and an expansion permit
- » Issued 17 permit amendments for various projects and plans
- » Participated in EA reviews of seven projects in 2017
- » Participated in four technical working group meetings
- » Coordinated MRCs for 17 projects
- » Provided support and expertise for eight projects in EA.



## PROJECT MANAGEMENT CENTRE

The MMPO's Project Management Centre (PMC) analyzes and tracks data and creates new tools to help improve workflow and project management processes. In 2017, the PMC achieved the following key milestones:

- » Worked with the BC Public Service's Innovation Hub to develop a cost-effective and secure online eGuide for distributing project management tools, templates and best practices to MMPO project teams and permitting agency partners
- » Piloted a workload forecasting tool which allows EMPR to better understand the workload availability and constraints of EMPR technical specialists to inform the development of achievable permit review schedules and avoid resource-driven delays
- » Tracked and provided quarterly reports on key performance indicators designed to inform strategies to address delays in the review process, understand resourcing pinch points and pressures, and monitor the success of engagement and agreement implementation with First Nations on mine permitting processes.

## Spotlight on Permitting Activities

### Myra Falls

The Myra Falls underground zinc, copper and lead mine started operations in central Vancouver Island in 1966 and was put into care and maintenance in 2014. MMPO coordinated the government and Indigenous Nations review of Nyrstar Myra Falls Inc.'s permit applications to restart operations in 2017. Key challenges that were overcome included building a lengthy ore chute in order to avoid the loss of old growth trees in the surrounding Strathcona Provincial Park, and strengthening relations between the mining company and Indigenous Nations. Myra Falls is expected to restart operations by early 2019, and employ approximately 375 people over 10 years.

## Murray River

If it proceeds, a proposed Murray River underground coal mine near Tumbler Ridge will be the largest underground coal mine in Canada, producing six million tonnes of metallurgical coal per year over 25 years. MMPO coordinated the government and Indigenous Nations review of the permit applications to develop the mine. A robust strategy for managing the potential effects of ground subsidence as underground mining panels are exhausted was established, as was a strategy to manage the cumulative effects of mine development on water quality in the Murray River watershed. HD Mining Inc. is now considering whether to proceed with the \$7.6 billion investment to build the project, which would provide 1,354 person-years of employment during construction and 16,910 person-years of employment during operations.

## Kemess Underground

In 2017 MMPO and EMPR staff participated in the EA review and led the permitting process for the Kemess Underground Mine (KUG). An innovative and highly collaborative approach with Indigenous Nations was undertaken that resulted in the issuance of an EA and the start of the *Mines Act* permit application process.

The Tse Keh Nay (TKN) is an alliance of three First Nations: Tsay Keh Dene; Takla Lake; and Kwadacha. TKN asserts Aboriginal rights and title in and to the area affected by the Kemess project. The provincial government and TKN worked under collaboration plans that sought consensus on conditions and recommendations to decision makers and established a link between issues brought forward by TKN during the EA and permitting. The project is located at the same site as the proposed Kemess North Project, which was previously not supported by TKN and which was rejected by a provincial-federal review panel in 2008 due to impacts to Amazay Lake, which is regarded as sacred by TKN.

AuRico Metals Inc. worked collaboratively with TKN in designing the project to avoid impacts to Amazay Lake and other TKN interests. The Province, AuRico and TKN worked together to draft conditions for monitoring and mitigation

measures that will be applied through the life of the mine. This collaborative approach ultimately resulted in timely and durable regulatory decisions, built confidence for investors and industry, advanced the credibility of the regulatory regime, fostered an efficient permitting process and added to the foundation for reconciliation with Indigenous Nations.



Photo: Mainland Construction Materials ULC



# Health and Safety

## Occupational Health Department

### AT A GLANCE: DEPARTMENT RESPONSIBILITIES

- » Assists in the anticipation, recognition, evaluation and control of health hazards for mines
- » Provides materials for health and safety education and training
- » Sets standards for the inspection and enforcement of occupational health issues
- » Makes comparative measurements to ensure companies follow proper procedures and obtain accurate results
- » Provides mining companies with assistance in medical surveillance and Workplace Hazardous Materials Information System (WHMIS) program development.

### 2017 HIGHLIGHTS

- » Conducted onsite inspections to ensure OH programs are being effectively implemented
- » Monitored and evaluated health hazards at underground, surface coal, surface metal, and sand and gravel mines. Whole-body vibration levels experienced by workers operating mine vehicles were also assessed
- » Conducted four musculoskeletal disorder prevention workshops with a total of 54 participants
- » Participated in mine development review committees to address and encourage anticipation, elimination and control of occupational health concerns in the early phases of project development and design.

### Spotlight on Greater Protection for Worker Health

The OH Department focused its 2017 monitoring activities on diesel particulate matter (DPM). DPM is a component of diesel exhaust emitted from diesel powered engines. Workers exposed to DPM over several years without proper protection may be at greater risk of experiencing adverse health effects such as lung cancer. The OH Department evaluated DPM levels at various mine types across the province, including both surface and underground operations. The results were used to provide a recommendation to industry for a new time-weighted-average exposure level that is protective of workers' health. The recommendation also includes an updated monitoring procedure that is more specific to DPM and is less susceptible to interferences than the previous method used.



Photo: New Gold Inc. - New Afton Mine

## COMPETITIONS AND AWARDS

### Provincial Mine Rescue & First Aid Competition

The Provincial Mine Rescue & First Aid Competition has been held annually since the 1950s. It brings together mine rescue teams from across British Columbia to test their emergency response and rescue abilities in either surface or underground competitions in a one-day event open to the public.

Kimberley hosted the 62nd annual competition in June 2017. EMPR staff and industry personnel judged the competitions. Congratulations to all the winners.

*"The Provincial Mine Rescue & First Aid Competition has been held annually since the 1950s."*

#### Three-Person First Aid Competition:

- Three-Person First Aid Trophy (Best Three-Person Team): Coal Mountain
- Kathy Lofstrom Memorial Trophy (Best Coach for Three-Person First Aid): Josh Gallinger - Coal Mountain

#### Surface Mine Rescue:

- Ron Brow Memorial Trophy (Best Extrication for Surface Team): Red Chris Mine
- Maurice Boisse Memorial Trophy (Best Bench for Surface Team): Highland Valley Copper
- East Kootenay Mines Industrial Safety Association Trophy (Best Written for Surface Team): Highland Valley Copper
- East Kootenay Mines Industrial Safety Association Mine Rescue Memorial Trophy (Best Team Rope Task): Greenhills Mine
- Levitt-Safety Fire Trophy (Surface): Highland Valley Copper
- HVC Highest Non-Aggregate Points Trophy: Greenhills Mine
- Overall Surface Mine Rescue Winner: Greenhills Mine

#### Underground Mine Rescue:

- Best Bench Technician Trophy: David Heathfield - Sullivan Mine

- USWA Mine Mill Trophy (Best Underground Coordinator): Jared Moe - New Afton Mine
- Richard Booth Award (Best Written for Underground Team): New Afton Mine
- Sullivan Cup (Best First Aid by Underground Team): New Afton Mine
- Barry Abbott Memorial Trophy (Best Underground Practical Skills): Sullivan Mine
- Best Performance in Underground Smoke: Tie - Sullivan Mine and New Afton Mine
- Keith Bracewell Memorial Award (Best Obstacle and Recovery): Sullivan Mine
- Levitt-Safety Fire Trophy (Underground): New Afton Mine
- Overall Underground Mine Rescue Winner: New Afton Mine

### Mine Safety Awards

The Province established the Mine Safety Awards in 1961 to recognize the safety record of mines in B.C. The 56th annual awards ceremony took place in Victoria and recognized mines and quarries that accumulated 15,000+ worker or contractor hours with no fatalities in 2017. Congratulations to the winners.

- Large Underground Mine Safety Award: New Afton Mine
- John Ash Award – Open-Pit Mines and Quarries: Greenhills Mine
- Edward Prior Award – Open-Pit Mines and Quarries: Brule
- Stewart/O'Brian Safety Award – Open-Pit Mines and Quarries: Central Aggregates; Pitt River Quarries; Earle Creek; and Orca Sand and Gravel



Photo: Mainland Construction Materials ULC

## Spotlight on the Chief Inspector of Mines Awards

The chief inspector of mines acknowledges courageous acts and individuals who make extraordinary contributions to mine safety. Two such awards were presented for 2017. Tyson Mackay, Mike McDonald, Mike Bremner and Rick Dobson received the Chief Inspector of Mines Award for Excellence in Mine Rescue for their heroic response on April 20, 2017 during a train derailment in Woss. Their expertise in rescue was integral in extricating a trapped worker. The work of all the team members exemplifies the importance of mine rescue.

Kelly Miller's contribution and dedication to mine rescue for over 20 years earned him a Chief Inspector of Mines Award. Mr. Miller has been an instrumental part of the fire task exercises at both the Provincial and the National Western Regional Competitions since the early 1990s. His skill at designing complex fire tasks and coaching mine rescue personnel in both fire extinguisher and fire hose use has contributed to the improvement of firefighting skills at all British Columbia mines.

**"The work of all the team members exemplifies the importance of mine rescue."**

## Certificates of Achievement and Special Commendations and Awards

Certificates of achievement are presented to mines with a minimum of 15,000 worker hours and an injury frequency ratio of zero. Five awards were presented in 2017: Windermere; Butler Brothers Supplies Ltd.; Imperial Limestone Co. Ltd.; West Ridge Quarries (Otter Lake, Larkin, Oyama); and Abbotsford Gravel.

## National Safety Awards – John T. Ryan Trophies

John T. Ryan trophies are provided by Mine Safety Appliances Canada Limited as a memorial to its founder. The Canadian Institute of Mining, Metallurgy and Petroleum presents the awards to

the metal mine, coal mine and select mine that, in the previous year, experienced the lowest reportable injury frequency per 200,000 employee hours in all of Canada. There are two trophy categories: Canada and Regional. New Gold Inc.'s New Afton Mine was awarded the BC/Yukon regional award for the lowest reportable injury frequency in the metal mine category during the 2017 calendar year.

## CERTIFICATIONS

The *Mines Act* requires that everyone employed at a mine must, if required by the regulations of the Code, be under the daily supervision of a person who holds a valid and appropriate certificate. Valid permanent certificate holders must complete re-examination every five years to ensure their knowledge of the Code remains current.

### Shiftboss Certificates

When six or more people are working in an open-pit or underground mine, they must be under the supervision of a person holding a shiftboss certification. The following table summarizes shiftboss certification activity in 2017:

Shiftboss Certificate Type	New Certificates
Surface (includes sand and gravel)	76
Underground	37
<b>Total Permanent Certificates Issued</b>	<b>113</b>

### Underground Coal Fireboss Certifications

Fireboss certification is required to supervise people in underground coal mines. No underground coal fireboss certificates were issued in 2017, and none were suspended.

### Blasting Certificates

Blasting certification is required to perform blasting on a mine site in B.C. Types of blasting certificates include basic, exploration, surface,

underground, underground coal (shotfirer), electrical blasting, and general, which includes all categories except underground coal.

In 2017, 192 new blasting certificates were issued, 96 certificates were recertified, and five blasting certificates were suspended.

Mine Rescue Certifications

To qualify for mine rescue certification, mine employees must complete approved training and demonstrate their knowledge in rescue techniques by passing an exam that consists of both a written and practical skills component.

The provincial government is responsible for certifying miners in several categories of mine rescue. The following mine rescue certificates were issued in 2017, there were two suspensions issued due to inactivity:

Type	Number Issued
Underground mine rescue	104
Surface (open-pit) mine rescue	311
Total certificates issued	415

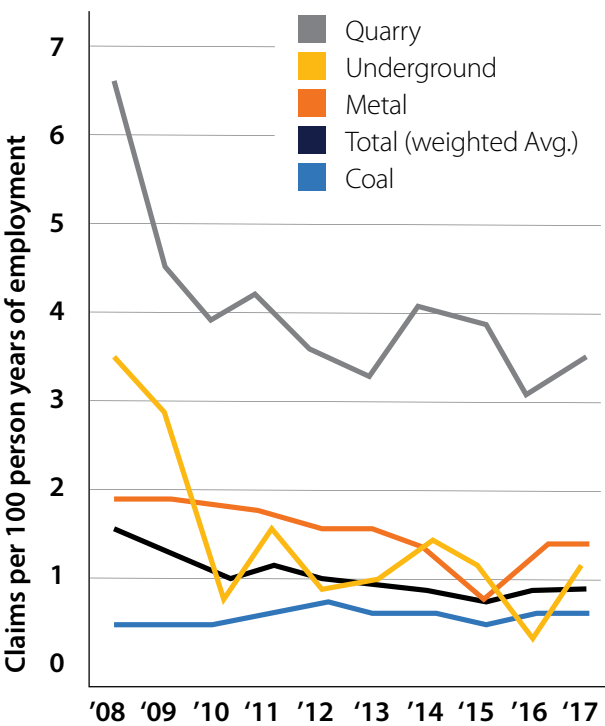
ACCIDENTS AND INCIDENTS

Injury Rates

Safety is a top priority for B.C.'s mining companies as well as the provincial government. The sector is one of the safest heavy industries in the province, with B.C. a world leader in mine health and safety practices. WorkSafeBC data indicates the 2017 total estimated injury rate at mines in British Columbia was 0.9. This is the same as the rate recorded in 2016.

The following table outlines the injury rates for the mining industry over the past 10 years; the unit for injury rates is the number of claims per 100 person-years of employment. Rates may be adjusted on an ongoing basis to match claims data.

Injury Rates for Quarries, Open-Pit Coal, Open-Pit Metal, and Underground Mines in British Columbia, 2008–2017



Fatalities

There were no mining-related fatalities in 2017. This was the second year in a row with no fatalities.



Photo: New Gold Inc. - New Afton Mine

## Mechanical and Electrical Engineering

Health, Safety and Permitting Branch mechanical and electrical inspectors are located throughout the province. They ensure that all mechanical and electrical equipment installed and used at mines in B.C. complies with the code and all applicable standards, and that this equipment is maintained and operated appropriately to reduce risks to people and property.

### AT A GLANCE: DEPARTMENT RESPONSIBILITIES

- » Ensures all mechanical and electrical equipment installed and used at mines in B.C. complies with the *Mines Act* as well as applicable codes and standards
- » Ensures equipment is maintained and operated appropriately to reduce risks to people and property
- » Participates, as appropriate, on Mine Development Review Committees and investigations.

### 2017 HIGHLIGHTS: MECHANICAL ENGINEERING

2017 saw the addition of a new mechanical inspector, which brings the department up to three.

- » The mechanical inspectorate participated and provided advice and resources for over 82 mine development review committee meetings
- » The mechanical inspectors conducted inspections at 16 major mines throughout the province on a regular basis throughout the year
- » Provided feedback and expertise for mechanical issues at over 169 meetings for inspectorate training purposes, general equipment discussions, and other related topics

- » Contributed to eight CSA and ISO Standards committees
- » Provided expertise and oversight for the development and the implementation of requirements for autonomous mining equipment
- » The department was also consulted and provided advice on over 22 variance requests relating to mechanical issues at mines
- » Participated in discussions regarding alternative fuels for underground mines as well as reviewed submissions of data for new machines for use in mining in B.C.

### 2017 HIGHLIGHTS: ELECTRICAL ENGINEERING

- » Conducted 148 inspections across the province, which is an increase of 30 per cent when compared with the average of the past three years
- » Generated a quarterly list of the most common type of orders issued by electrical inspectors to be analyzed and used for prevention strategies
- » Noted significant improvements on the electrical installation of some mines, including cases related to upgrades in electrical rooms, proper installation and handling of portable power cables and adequate maintenance of electrical substation compounds
- » Provided input and participation on the 2017 provincial mine rescue competition, mine development review committees, certification for underground coal mine managers, analysis of dangerous occurrences involving the electrical system in mines, and analysis of applications for variances of the Code.

# Compliance and Enforcement

## Spotlight

In January 2017, the Province and the Tahltan Central Government signed the Red Chris Mine Management Agreement. During the first year of the agreement, the implementation team met regularly and developed in-depth guidance materials that outlined processes for Tahltan participation in Provincial inspections of the mine as well as the development and delivery of training to support ongoing engagement. This is the first agreement of its kind.

The Compliance and Enforcement Branch was established in 2016 in response to both the Chief Inspector's Mount Polley Investigation recommendations and the Auditor General's recommendations on Mining C&E. The purpose of the branch is to provide support to the Mines Inspectorate to ensure coordinated, consistent and risk-based compliance and enforcement activities for mining activities across the province.

The branch has a number of roles to support enforcement and compliance activities for the division:

- » Develop and deliver a robust training program for the Mines Inspectorate
- » Provide support and assistance to resolve complex compliance issues brought to the branch by mines inspectors, titles inspectors, MMPO, partner agencies or First Nations
- » Undertake or support Chief Inspector of Mines' investigations to establish what, how and why an incident happened and make recommendations for prevention.

## Investigations

In 2017, EMPR created a dedicated investigation team comprised of investigative professionals and mines inspectors. The Mines Investigations

Unit (MIU) reports through the Director of Investigations to the Deputy Chief Inspector of Mines, Compliance and Enforcement.

## 2017 HIGHLIGHTS

- » Referred two cases to the Crown in 2017; both met the standard for charge approval and resulted in charges being laid against various parties. These cases are currently before the courts
- » Worked with the mines inspectorate to develop cases recommending escalated enforcement action by way of administrative monetary penalties. Three cases were referred to the statutory decision maker for adjudication
- » Visited four regional offices to deliver compliance and enforcement training to help staff better perform the compliance activities associated with their positions.



Photo: New Gold Inc. - New Afton Mine

# Geotechnical

## AT A GLANCE: DEPARTMENT RESPONSIBILITIES

- » Ensures compliance with provisions of the *Mines Act* and the Code
- » Performs compliance reviews and completes inspections at operating and closed mines with a focus on performance of tailings dams, waste rock dumps, open-pit slopes and underground openings
- » Provides technical reviews of proposed mining projects
- » Reviews geotechnical incidents and responds to mine inquiries
- » Provides geotechnical advice and leads or assists policy development for:
  - tailings impoundments and dams
  - waste rock and overburden dumps
  - open pits and underground developments
  - mine roads
  - risk evaluation for worker protection and public health and safety
  - assessing the environmental impact of geotechnical projects
- » Conducted dam safety inspections (DSIs) at four abandoned tailings storage facilities (TSFs) that are under government purview, and developed a work plan for addressing recommendations made through those DSIs
- » Implemented a Manager, TSF position to provide documentation compliance oversight
- » Worked towards improvement in the quality of DSI submissions
- » Increased the number of TSFs with an identified engineer of record
- » Implemented improved tracking system for annual geotechnical reporting
- » Improved TSF compliance for closed/non-operational sites.

## 2017 HIGHLIGHTS

- » Conducted 56 geotechnical inspections at metal and coal mines as well as at several placer operations and select sand and gravel quarries
- » Developed geotechnical permit conditions for the construction and operation of major mine structures, including tailings impoundments, pit walls, and waste rock dumps
- » Undertook environmental assessment reviews for new mine projects
- » Reviewed annual reports for tailings storage facilities, waste rock dumps and pit walls

## Spotlight on Tailings Storage Facilities

The design, construction and operation of tailings facilities and dams on mine sites in British Columbia are regulated by the *Mines Act* and the Code. New compliance requirements for TSFs as set out in the revised Code came into effect in 2016 and progress towards compliance for the new requirements was a key focus in 2017. The updated requirements set a new standard for regulation of tailings storage facilities, and other jurisdictions are considering incorporation of some of these changes into their own regulations.

The major new requirements include:

- Retention of an engineer of record
- Appointment of an independent tailings review board
- Establishment of quantifiable performance objectives
- Assessment of best available technology for new TSFs
- Minimum design criteria
- Increased frequency of third-party dam safety reviews

Mines must submit reports outlining the results of their annual requirements to the chief inspector of mines by March 31 following the compliance year.

“The updated requirements set a new standard for regulation of tailings storage facilities, and other jurisdictions are considering incorporation of some of these changes into their own regulations.”

### DAM SAFETY INSPECTIONS

The Code requires DSIs to be carried out annually for all dams on a mine site in accordance with [EMPR guidelines](#). DSI reports must be prepared by the engineer of record, a qualified professional engineer registered with the [Association of Professional Engineers and Geoscientists of British Columbia](#), and submitted to EMPR by March 31 of the year following the inspection.

DSI reports for mines in British Columbia are available [online](#).



Photo: New Gold Inc. - New Afton Mine

# Reclamation

## AT A GLANCE: DEPARTMENT RESPONSIBILITIES

- » Enforces provisions of the *Mines Act* and the Code through permit conditions, inspections and detailed technical reviews
- » Finds environmentally sound, economically viable solutions to enable B.C.'s mining industry to remain internationally competitive without compromising rigorous environmental standards
- » Provides technical expertise in the areas of soil restoration, re-vegetation, land capability, erosion control, geology, geochemistry, and metal leaching and acid rock drainage (ML/ARD)
- » Conducts regular mine inspections
- » Administers reclamation security deposits on behalf of the provincial government
- » Participates in national and international committees conducting research and technology transfer
- » Organizes and participates in various provincial committees and activities that review and highlight best practices and facilitates government co-operation with industrial, public and academic institutions.

## 2017 HIGHLIGHTS

- » Commissioned an in-depth examination of reclamation securities practice
- » Developed an application guidelines document in consultation with Ministry of Environment to provide detailed information requirements to mine proponents
- » Represented the provincial government at the Canadian Dam Association (CDA) annual meeting and served on a number of CDA sub-committees

- » Represented the provincial government on the National Orphaned/Abandoned Mines Advisory Committee
- » Contributed to the organization of the annual ML/ARD workshop attended by over 125 participants. The theme in 2017 was "Challenges and Best Practices in Metal Leaching and Acid Rock Drainage."
- » The 2017 British Columbia Mines Reclamation Awards conference was cancelled due to forest fires. The conference was to be held in Williams Lake with a site visit to Mount Polley.

## ENVIRONMENTAL STEWARDSHIP

The *Mines Act* and the Code ensure:

- » Land and watercourses on mine sites in B.C. are reclaimed to a level equal to that which existed prior to mining
- » Disturbed lands and watercourses are re-integrated into the surrounding landscape
- » Long-term stability of structures (e.g., tailings storage facilities).
- » Mining and mitigation requirements associated with ML/ARD are conducted in a manner that prevents significant impacts to downstream or onsite biota to minimize reduction in post-mining productive capacity of the site.



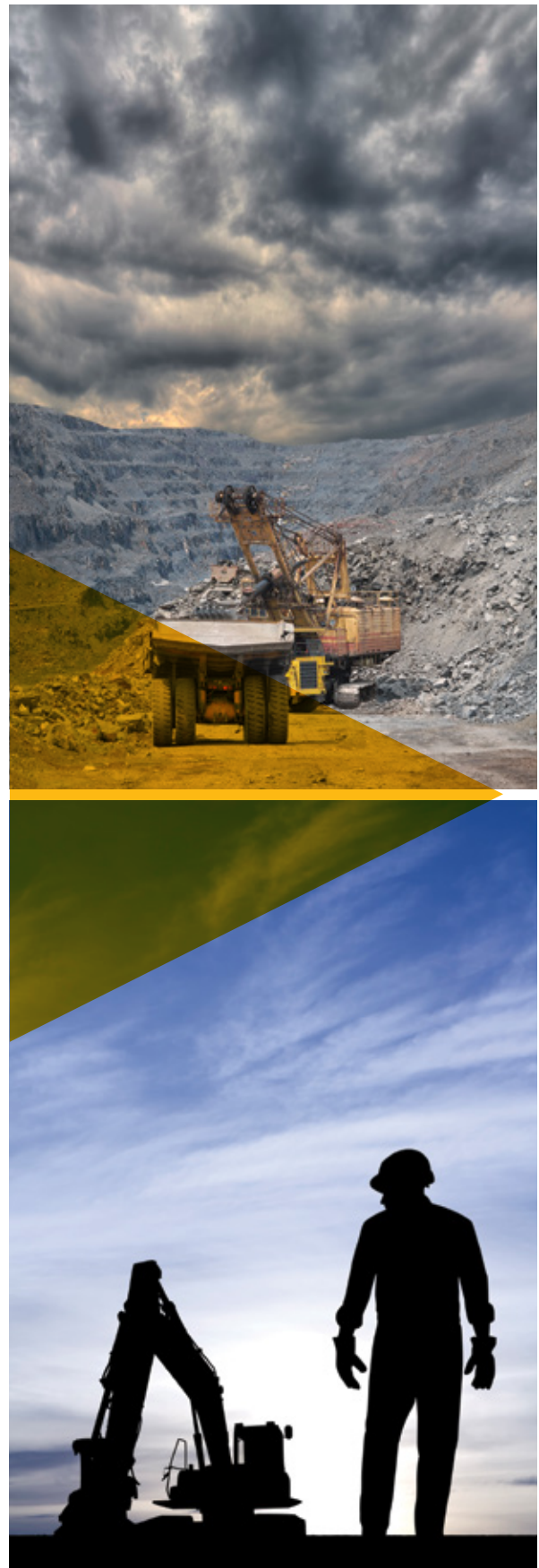
## INDUSTRY RECLAMATION RECORD

British Columbia's land base is roughly 95 million hectares, with mining touching less than one per cent of the province. The province's mining industry has grown steadily since the late 1960s. Major coal and metal mines, which occupied less than 1,000 hectares in 1969, had, by the end of 2017, expanded to cover 51,175 hectares. Close to one-third of this disturbed land (14,696.7 hectares) has been reclaimed (i.e., re-vegetation has been successfully established for one year or more).

Metal mines have disturbed 26,716 hectares, with 7,966 hectares of this land reclaimed (29 per cent; up two per cent from 2016). Coal mines have disturbed 24,459.3 hectares; 6,730.7 hectares have been reclaimed (27 per cent, down three per cent from 2016).

The increase in disturbance and decrease in reclamation at mine sites in the last few years is the result of the current pace of construction and development of new mines and expansion and redevelopment at older mines.

**"Mining touches less than one per cent of the province."**



# Reclamation

## Security Table

A summary of the reclamation liability for major mines and current reclamation security held by EMPR is presented in the following table, which includes information up to December 31, 2017. Additionally, mine permits may contain schedules for placing additional security that are not reflected in this table.

Mine	Owner (2016)	Total Bond Amounts	Liability Estimate	Differentials
COAL MINES				
Elk Valley (Elkview, Fording River, Line Creek, Coal Mountain, Greenhills)	Teck Coal Limited	724,619,000.00	1,404,810,000.00	680,191,000
Sage Creek	Sage Creek Coal Ltd.	1,000.00	1,000.00	0.00
Tent Mountain	Luscar	58,500.00	58,500.00	0.00
Sukunka	Tailsman Energy Inc.	50,000.00	67,500.00	17,500.00
Mt Speiker	Canadian Natural Resources Ltd.	10,000.00	10,000.00	0.00
Benson Mt.	Netherlands Pacific Mining Co. Ltd.	5,000.00	5,000.00	0.00
Willow Creek	Conuma/Willow Creek Coal partnership	6,000,000.00	11,987,574.00	5,987,574.00
Quintette	Teck Coal Limited	20,083,200.00	27,020,000.00	6,936,800.00
Bullmoose	Teck Coal Limited	1,000,000.00	1,000,000.00	0.00
Benson Mt.	Wolf Mountain Coal Ltd.	20,000.00	20,000.00	0.00
Arctos Anthracite	Fortune Coal Ltd.	25,000.00	0	-25,000.00
Quinsam	Quinsam Coal Corp.	7,281,000.00	7,281,000.00	0.00
Basin Coal	Basin Mine Ltd. Partnership	276,547.00	316,500.00	39,953.00
Brule	Conuma /Brule Coal Partnership	3,350,000.00	23,833,875.00	20,483,875.00
Wolverine	Conuma /Wolverine Coal partnership	11,500,000.00	47,194,812.00	35,694,812.00
Trend-Roman	Peace River Coal Ltd.	73,900,000.00	93,330,564.00	19,430,564.00

Mine	Owner (2016)	Total Bond Amounts	Liability Estimate	Differentials
METAL MINES				
Endako	Thompson Creek Mining Co.	15,345,700.00	46,372,654.00	31,026,954.00
Pinchi	Teck Resources Ltd.	2,000,000.00	2,000,000.00	0.00
Granisle	Glencore Canada Corp.	161,522.00	678,935.00	517,413.00
Island Copper	BHPBilliton Base Metals.	4,216,492.00	4,637,000.00	420,508.00
Kitsault	Avanti Kitsault Mine Ltd.	1,770,000.00	1,770,000.00	0.00
Highland Valley Copper	Teck Highland Valley Copper Ltd.	18,250,000.00	276,994,000.00	258,744,000.00
Brenda	Glencore Canada Corp.	5,000,000.00	31,833,333.00	26,833,333.00
Cassiar	Cassiar-Jade Contracting Inc.	600,000.00	530,000.00	-70,000
Myra Falls	NVI Mining Ltd.	71,170,987.00	131,308,787.00	60,137,800.00
Copper Mountain	Copper Mountain Mining Corp.	8,000,500.00	7,010,000.00	-990,500
Bull River	Bull River Minerals Corp.	491,511.19	470,747.00	-20,764.19
Bell	Glencore Canada Corp.	25,100,000.00	13,879,331.00	-11,220,669
Taseko Mines Ltd.	Gibraltar Mines Ltd.	47,289,432.00	41,300,000.00	-5,989,432
Alwin	Dekalb	6,000.00	8,063.00	2,063.00
Giant Nickel	Barrick Gold Inc.	27,000.00	12,524,463.00	12,497,463.00
Silvana/Hinkely	Klondike Silver Corp.	75,000.00	120,500.00	45,500.00
Craigmont	Huldra Properties Inc.	700,000.00	1,447,005.00	747,005.00
Dolly Varden	Dolly Varden Mines Ltd.	6,000.00	6,000.00	0.00
Beaverdell	Teck Resources Ltd.	5,000.00	10,000.00	5,000.00
Mt. Copeland	KRC Operators	3,484.10	3,484.10	0.00
Sullivan	Teck Resources Ltd.	22,500,000.00	22,500,000.00	0.00
HB Mine	Teck Resources Ltd.	10,000.00	10,000.00	0.00
Dankoe	439813 BC Ltd.	10,000.00	10,000.00	0.00
Boss Mountain	Glencore Canada Corp.	30,000.00	833,333.00	803,333.00
Afton	KGHM Ajax Mining Inc.	350,000.00	350,000.00	0.00
Equity	GoldCorp	87,722,000.00	87,722,000.00	0.00
Cusac	Cassiar Gold Corp.	264,444.00	1,510,586.00	1,246,142.00

Mine	Owner (2016)	Total Bond Amounts	Liability Estimate	Differentials
Mosquito Creek	Mosquito Consolidated Gold Mines Ltd.	5,000.00	437,119.00	432,119.00
Carolin	New Carolin Gold Corp.	225,000.00	660,000.00	435,000.00
Scottie Gold	Red Eye Resources Ltd.	15,000.00	15,000.00	0.00
Baker	Dupont Canada Ltd.	15,606.00	165,681.00	150,075.00
Goldstream	Bethlehem Resources (1996) Corp.	200,000.00	1,074,418.00	874,418.00
Venus	United Keno Hills Mines Ltd.	7,000.00	7,000.00	0.00
Taurus	Cassiar Gold Corp.	10,000.00	577,305.00	567,305.00
Dimac	Dimac Resources Corp.	10,000.00	10,000.00	0.00
Baymag	Baymag Mines Co. Ltd.	15,101.71	815,724.00	800,622.29
Ashlu Gold	Osprey Mining and Exploration Ltd.	10,000.00	160,000.00	150,000.00
Four-J/Lussier	Georgia Pacific Canada Ltd.	20,000.00	45,930.00	25,930.00
Perlite	Aurum Mines Ltd.	0	0	0.00
Union	Sumac Resources Ltd.	5,000.00	1,100.00	-3900
Blackdome	J- Pacific Gold Inc	100,000.00	130,000.00	30,000.00
Nickel Plate	Barrick Gold Inc.	1,671,754.00	159,912,573.00	158,240,819.00
Cheni/ Lawyers	Cheni Gold Mines Ltd	1,766.00	14,400.00	12,634.00
Johnny Mountain	Skyline Gold Corp.	562,310.33	8,911,500.00	8,349,189.67
Premier	Boliden Canada Ltd.	3,000,000.00	3,000,000.00	0.00
Parson Barite	Sheritt International Corp.	10,000.00	83,680.00	73,680.00
Candorado	Sunrise Resources Ltd	0	3,000,000.00	3,000,000.00
Samatosum	First Quantum Minerals Ltd.	7,800,000.00	7,266,667.00	533,333
Barrier Feldspar	Kanspar Industries Inc.	20,000.00	0	-20,000
Golden Bear	Goldcorp Canada Ltd. - Equity Division	210,000.00	73,200.00	136,800
Horse Creek Silica	HiTest Sand Inc.	125,000.00	94,873.00	30,127
Sable/ Shasta	Sable Resources Ltd.	54,146.00	1,110,000.00	1,055,854.00
Snip	Barrick Gold Inc.	1,500,000.00	1,813,201.00	313,201.00
CIL	Clayburn Industries	1,000.00	5,000.00	4,000.00
Cirque	Cirque Operating Corp.	220,000.00	220,000.00	0.00
Eskay Creek	Barrick Gold Inc.	3,774,000.00	12,519,722.00	8,745,722.00
QR	Barkerville Gold Mines Ltd.	8,750,000.00	10,250,000.00	1,500,000.00

Mine	Owner (2016)	Total Bond Amounts	Liability Estimate	Differentials
Elk/Siwash	Gold Mountain Mining Corp.	150,000.00	60,672.00	-89,328.00
Mount Polley	Mount Polley Mining Corp.	31,350,611.00	37,666,196.00	6,315,585.00
Huckleberry	Huckleberry Mines Ltd.	32,000,000.00	66,600,000.00	34,600,000.00
Kemess South	AuRico Gold Inc.	18,520,000.00	17,144,663.00	-1,375,337
Bralorne	Bralorne Gold Mines Ltd.	865,000.00	12,300,000.00	11,435,000.00
Bow Mines (Tailings)	Golden Dawn Minerals Inc.	50,000.00	94,999.00	44,999.00
Ainsworth Mill	Bluebird Mining Ltd.	5,000.00	250,000.00	245,000.00
Quinto Mine	Saddle Mountain Minerals Ltd.	5,000.00	5,000.00	0.00
Blue Bell	Teck Resources Ltd.	0	0	0.00
HB Tailings	Regional Distirct East Kootenay	0	0	0.00
Churchill Copper	Teck Resources Ltd.	0	0	0.00
Max Molybdenum	Discovery Ventures Inc.	730,000.00	1,313,403.00	583,403.00
New Afton	New Gold Inc.	9,500,000.00	14,361,702.00	4,861,702.00
Galore Creek	Galore Creek Mining Corporation	1,167,000.00	1,167,000.00	0.00
Ruby Creek	Global Drilling Solutions Inc.	100,000.00	50,000.00	-50,000
Tulsequah	Chieftain Metals Inc.	1,075,015.00	1,200,000.00	124,985.00
Zip Mill	Huakan International Mining Inc.	235,000.00	202,225.00	-32,775
Lexington-Grenoble	Huakan International Mining Inc.	215,000.00	324,558.00	109,558.00
Yellowjacket	African Queen Mines Ltd.	150,000.00	248,732.00	98,732.00
Mount Milligan	Terrane Metals Corp.	30,000,000.00	38,926,996.00	8,926,996.00
Dome Mountain	Gavin Minerals Ltd.	579,000.00	13,312,503.00	12,733,503.00
Bonanza Ledge	Barkerville Gold Mines Ltd.	7,400,000.00	6,356,780.00	-1,043,220
Treasure Mountain	Huldra Silver Inc.	505,100.00	505,100.00	0.00
Red Chris	Red Chris Operating Corp.	12,000,000.00	17,055,921.00	5,055,921.00
Yellow Giant (Tel)	Banks Island Gold Ltd.	214,315.00	2,273,123.00	2,058,808.00
Silvertip	JDS Silver Inc.	10,493,000.00	12,096,385.00	1,603,385.00
Brucejack	Pretium Resources inc.	14,200,000.00	32,637,821.00	18,437,821.00
<b>Total</b>		<b>1,359,131,044.33</b>	<b>2,791,304,418.10</b>	

# Office of the Chief Inspector of Mines

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