

Annual Report of the **Chief Inspector of Mines**

2015



Ministry of
Energy and Mines

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A Message from the Chief Inspector of Mines

December 21, 2016

I am pleased to present the Annual Report of the Chief Inspector of Mines for the 2015 calendar year.

The year 2015 was another challenging one for MEM and the BC mining industry as a whole in the face of continuing low commodity prices and mine closures. A large portion of my time was focused on continued response and investigation into the Mount Polley mine tailings storage facility (TSF) breach. However, regional operations continued to meet their permitting timelines, and two new major mines were also permitted in 2015 and are now under construction.

Following on work initiated in 2014, during 2015, two investigations into the Mount Polley mine TSF breach were completed. The report of the independent expert engineering panel was released at the end of January 2015. This report established the root cause of the breach and made seven recommendations aimed at preventing a similar event in the future. In December 2015, I completed and released my investigation, making 19 recommendations in seven categories directed toward the mining operator, mining industry, professional organizations and the government regulator. The Province accepted all 26 recommendations and commenced action to address them. This included initiation of a review of the Health, Safety and Reclamation Code for Mines in British Columbia (the Code). This review is completed by a committee appointed by the Minister of Energy and Mines, and for the first time included First Nations representatives. The review started with a focus on tailings facilities and continued into 2016.

The Chief Inspector of Mines is appointed by the Minister of Energy and Mines to administer and enforce the Mines Act and the Code. The Chief Inspector is also the Executive Director of the Health, Safety and Permitting Branch, which operates through a central office in Victoria (which includes the Southwest regional office) and four regional offices in Cranbrook, Kamloops, Prince George and Smithers.

The Office of the Chief Inspector and MEM as a whole works with industry, workers and communities to ensure that mineral exploration and mining activities are conducted responsibly. Protection of workers, the public and the environment is always at the top of our minds, and our collective efforts continue to ensure that mining remains one of the safest heavy industries in British Columbia. Injuries at B.C. mines remained low in 2015, a testament to industry and government's continued commitment to health and safety in the mining sector.

Sincerely,

A handwritten signature in black ink, appearing to read "Al Hoffman", written over a horizontal line.

Al Hoffman
Chief Inspector of Mines



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1 Principal Functions of the Office of the Chief Inspector and the Health, Safety and Permitting Branch

1.1 Structure and Organization

The Chief Inspector of Mines is the Executive Director of the Health, Safety and Permitting branch of the Mines and Mineral Resources Division (MMRD) of the Ministry of Energy and Mines (MEM). In 2015, there were two Deputy Chief Inspectors of Mines—one oversaw health and safety activities, and the other oversaw permitting, reclamation and geotechnical activities. In addition, Regional Directors who reported to the Chief Inspector were responsible for overseeing operations in their respective regions.

Health, Safety and Permitting Branch staff are located in Victoria and in regional offices in Cranbrook, Kamloops, Prince George and Smithers.

1.1.1 MINE RESCUE STATIONS

All government-owned mine rescue equipment is stored at a centrally located station in Kamloops. This station is supervised by the Inspector of Mines, Health and Safety based in Kamloops, and the Deputy Chief Inspector of Mines, Health and Safety based in Victoria.

1.2 Mandate & Activities

The primary mandate of MEM's Health, Safety and Permitting Branch is 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. The Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia (the Code) specify the legal responsibilities mining companies operating in this province have regarding meeting this mandate, and also protect workers and the public through provisions for minimizing health, safety and environmental risks related to mining activities.

MMRD's Health, Safety and Permitting Branch reviews technical applications, issues permits and performs inspections and audits to ensure compliance with the Mines Act, Code and permit conditions. Branch staff conduct timely and efficient technical reviews and provide expert guidance to industry on the development and operation of mines. The Branch also works closely and collaboratively with other provincial and federal agencies and local governments to issue approvals.

Key functions of the Health, Safety and Permitting Branch include:

- Regulating all mines in B.C. (including metal and coal mines, sand and gravel operations, exploration projects, placer and quarry operations and historical mines), which comprises:
 - reviewing applications and issuing permits under section 10 of the Mines Act for all exploration mining activities taking place in B.C.;
 - conducting regular mine inspections and audits; and
 - compliance and enforcement activities in relation to requirements under the Mines Act, the Code, orders and permit conditions.
- Reviewing mine emergency preparedness plans, emergency response plans, and other plans/policies developed by mine operations related to health and safety.
- Establishing geotechnical and reclamation standards.
- Ensuring financial securities adequately mitigate risks and reflect mine site reclamation liabilities.
- Liaising with mine management, unions and workers, occupational health and safety committees, communities, First Nations and other technical organizations, committees and government agencies.
- Supporting research, development and ongoing training to enhance best practices and promote new knowledge.
- Administering certifications and examinations (e.g., shiftboss, fireboss, mine rescue, blasting, and underground coal mine manager).
- Data collection and maintenance of records with respect to accidents, dangerous occurrences and inspections.

2 Sector Overview & Administration

2.1 2015 Sector Highlights

According to estimates from Natural Resources Canada, the production value of B.C. mines fell to \$5.9 billion in 2015 from \$7 billion in 2014. Estimates generated by the Province's regional geologists indicated that exploration expenditures in British Columbia were \$272 million for 2015, down from \$338 million for 2014. Despite the industry downturn, over 30,000 people were employed in mineral exploration, mining and related sectors in 2015.

2.2 Metal and Coal Mine Activities

In 2015, 12 metal mines and 6 coal mines (including Bonanza Ledge, Myra Falls and Yellow Giant, which went into care and maintenance at various times throughout the year) were in production across B.C. The following tables provide information on all of these mines, including estimated production and the number of inspections conducted by MEM staff and contractors at each site in 2015. Inspection figures are generated from MEM's Mine Management System (MMS) and are current at the time of drafting this report (December 2016). Production figures are based on company reports and/or MEM estimates.

2.2.1 METAL MINES

Mine Name	Company	Nearby Community	Production		# of Inspections
Bonanza Ledge ¹	Barkerville Gold Mines Ltd.	Quesnel	Gold	11,162 oz	2
Bralorne ²	Bralorne Gold Mines	Lillooet	Gold	N/A	6
Copper Mountain	Copper Mountain Mining	Princeton	Copper	77.6 million lbs	9
			Gold	29,200 oz	
			Silver	276,300 oz	
Gibraltar	Taseko	Williams Lake	Copper	141.2 million lbs	14
			Molybdenum	963,000 lbs	
Highland Valley Copper	Teck	Logan Lake	Copper	333.8 million lbs	8
			Molybdenum	3.4 million lbs	
Huckleberry	Imperial Metals	Houston	Copper	43.3 million lbs	8
			Gold	3,576 oz	
			Silver	206,781 oz	
Mount Milligan	Thompson Creek Metals	Fort St. James	Copper	71.4 million lbs	9
			Gold	218,081 oz	
Mount Polley ³	Imperial Metals	Likely	Copper	8 million lbs	24
			Gold	15,190 oz	
			Silver	25,911 oz	
Myra Falls ⁴	Nyrstar	Campbell River	Zinc	19.8 million lbs	18
			Copper	1.3 million lbs	
			Lead	440,925 lbs	
			Gold	4,000 oz	
			Silver	209,000 oz	
New Afton	New Gold	Kamloops	Copper	86 million lbs	6
			Gold	105,487 oz	
			Silver	300,000 oz	
Red Chris ⁵	Imperial Metals	Iskut	Copper	20.4 million lbs	12
			Gold	10,025 oz	
Yellow Giant ⁶	Banks Island Gold Ltd.	N/A	Gold	9,250 oz	13

¹ Went into care and maintenance in April 2015

² Underground mining operations limited to one shift January–April 2015; went into care and maintenance in April 2015

³ Re-opened June 2015

⁴ Went into care and maintenance in April 2015

⁵ Opened in July 2015

⁶ Shutdown in July 2015

2.2.2 COAL MINES

Mine Name	Company	Nearby Community	Production (tonnes)	# of Inspections
Coal Mountain	Teck	Sparwood	2.5 million	4
Elkview	Teck	Sparwood	6.3 million	4
Fording River	Teck	Elkford	7.4 million	6
Greenhills	Teck	Elkford	5 million	5
Line Creek	Teck	Sparwood	3.4 million	2
Quinsam	Quinsam Coal Corp.	Campbell River	198,880	16

2.3 Mine Visits & Inspections

Mine visits include site visits done by MEM staff and contractors for the purpose of conducting inspections as well as audits, meetings, investigations or training. In 2015, Inspectors of Mines made 1,700 visits to mine sites across B.C. and conducted 1,203 inspections. The information below is current as of December 21, 2016, reflecting 2015 numbers.

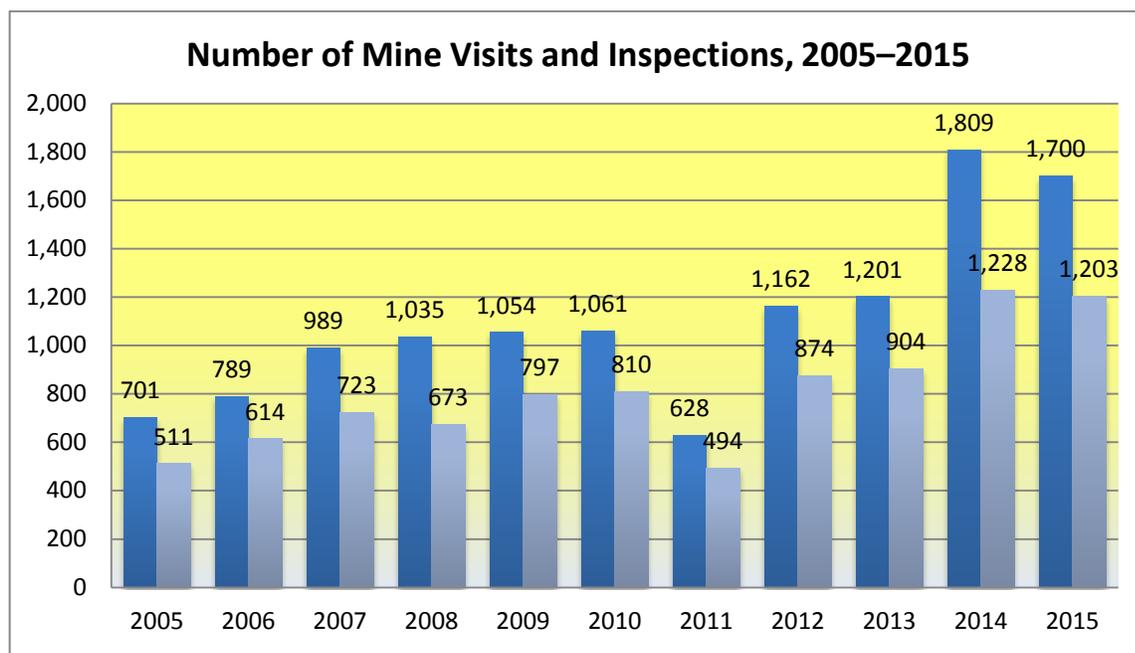


Figure 1: Number of Mine Visits and Inspections, 2005–2015

2.3.1 ORDERS

During inspections, Inspectors of Mines may decide to issue orders for contraventions of the Mines Act, the Health, Safety and Reclamation Code for Mines in British Columbia, other applicable codes and statutes (e.g., the Canadian Electrical Code) or permit conditions. Orders can generally be grouped into the categories of “Health & Safety”, “Environmental” and “Shutdown” (which includes orders to shutdown all or part of a mine site). The table below summarizes orders issued in 2014 and 2015.

Type of Order	2014	2015
Health & Safety	3,160	2,798
Environmental	198	256
Shutdown	37	32
Total Orders Issued	3,395	3,086



3 Health & Safety

3.1 Occupational Health Section

3.1.1 ROLES AND RESPONSIBILITIES

The Occupational Health (OH) Section of MEM assists in the anticipation, recognition, evaluation and control of health hazards. The section provides materials for health and safety education and training, and sets standards for the inspection and enforcement of occupational health issues for mines in British Columbia.

The Health, Safety and Reclamation Code for Mines in British Columbia (the Code) requires Mine Managers to develop and implement a written occupational hygiene-monitoring program to establish procedures and measure chemical and physical hazards to which their workers are exposed in the workplace. These hazards can include dusts, silica, respirable combustible dust, noise, gases and fumes, radiation (ionizing and non-ionizing) and heat/cold stress. The OH Section makes comparative measurements to ensure companies follow proper procedures and obtain accurate results.

A written preventative training program that educates the mine site's workforce and Occupational Health and Safety Committee members on the recognition, evaluation and prevention of adverse health effects resulting in musculoskeletal disorders is also a requirement of the Code. Such musculoskeletal disorders may consist of lower back injury, repetitive strain, overexertion or vibration-induced injuries. Training must include a practical component that involves identifying and evaluating risks to develop practical solutions. The OH Section assists mines in this training area by providing information and assistance as needed.

Medical Surveillance and Workplace Hazardous Materials Information System (WHMIS) programs are included in the OH Section's responsibilities. OH staff also provide assistance in program development.

3.1.2 STRUCTURE AND ORGANIZATION

During 2015, there were six full-time staff in the Occupational Health (OH) Section:

- Manager, Occupational Health
 - 2 Inspectors of Mines, Occupational Health
 - Occupational Health and Safety Advisor
- Senior Inspector of Mines, Ergonomics
 - Inspector of Mines, Ergonomics

3.1.3 SUMMARY OF ACTIVITIES

In 2015, the OH group:

- conducted onsite inspections of mines to fulfill its mandate to monitor workplace conditions;
- participated in health and safety audits at mines;
- conducted research toward guidelines on reducing lead exposure in fire assay labs, use of perchloric acids, and storage of flammable and combustible materials;
- conducted research into the Globally Harmonized System (GHS) of Classification and Labelling of Chemicals and its application to the B.C. mining industry with plans to adopt GHS in the future; and
- organized the Mine Safety Awards and Provincial Mine Rescue Competition.

3.2 Mine Health and Safety Auditing Program

The Mine Health and Safety Auditing Program is designed to evaluate mines on their implementation of Health and Safety Management Systems for compliance with key parts of the Code. The audit program reflects the 2008 version of the Code and emphasizes the findings of auditing inspectors. Audit reports summarize the findings of the auditors, who base their conclusions on field observations, interviews with mine management and staff, and research of mine records. Audit reports help mine management and workers improve their health and safety practices and compliance with the Code.

In 2015, audits were conducted at Copper Mountain (March 2015), Mount Polley (August 2015) and Gibraltar (November 2015).

3.3 Competitions and Awards

3.3.1 ROLES AND RESPONSIBILITIES

The primary mandate of MEM's Health, Safety and Permitting Branch is 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. The Mines Act and the Code specify the legal requirements of provincial mining companies in meeting this mandate. However, many B.C. mining companies and their individual workers not only meet the applicable requirements but also voluntarily and consistently exceed them. Through the efforts of these individuals, companies and staff of the Province of British Columbia, mining is one of B.C.'s safest heavy industries.

Mine rescue competitions, first aid competitions and safety awards all promote and encourage safety at B.C. mines. Reclamation awards (see section 4.2.8) acknowledge those companies that go beyond their mine plans by conducting superior research and introducing innovative techniques to restore the land.

3.3.2 MINE RESCUE COMPETITIONS

The 60th annual Provincial Mine Rescue and First Aid Competition was held in Smithers on June 6, 2015. The various components of this yearly event are judged by MEM staff and industry personnel who are responsible for all aspects of worker and public safety in B.C.'s mining sector.

In 2015, Highland Valley Copper won the Levitt Safety Fire Trophy (Surface) and the Highest Non-Aggregate Points Trophy. The EKMISA Trophy (Best Written for Surface Team) went to Elkview Operations. Other 2015 competition winners are listed below. Note that there was no underground competition in 2015.

Surface Mine Rescue – Overall Winner

Highland Valley Copper won the overall Surface Mine Rescue trophy in 2015.

Surface Bench Competition

The surface bench competition originated in 1995. The Maurice Boisse Memorial Trophy is awarded to the surface mine rescue team that excels at the practical bench competition. The practical bench task is designed to test individual team members on their knowledge and practical skills in mine rescue equipment and techniques. This competition is held in memory of Maurice Boisse, Mine Rescue Team Coach, Island Copper Mine.

In 2015, the mine rescue team from Huckleberry Mine won the award for best bench for a surface team.

Obstacle and Recovery

Quinsam Coal mine provides this award in recognition of the contributions made by Keith Bracewell to the underground mine rescue competition. This award recognizes the winning team in obstacle and recovery, the largest task in the underground competition, an area that Keith worked hard to develop and improve upon. As there was no underground mine rescue competition in 2015, there was no winner in this category.

3.3.3 FIRST AID COMPETITIONS

There are usually two separate competitions in the first aid category: the three-person miners' first aid competition and the first aid component of the underground mine rescue competition; however, there was no underground competition in 2015.

Three-Person Miners' First Aid

The first provincial miners' three-person first aid competition was held in 1978. Following the completion of a short written exam, the three team members perform first aid tasks. The St. John Ambulance standard-level first aid course is the training standard, and only those who work at a mine are permitted to enter this competition. The three-person first aid competition is designed to be an extension of training in basic first aid skills and is a unique way for teams to prepare to assist their fellow workers in the event of an injury or medical emergency.

The 2015 three-person first aid winning team was from the Huckleberry mine, which also won the 2014 Kathy Lofstrom Memorial Trophy for best coach of a first aid team (Dwayne Allen). Huckleberry has won these two trophies four years in a row.

3.3.4 54TH ANNUAL MINE SAFETY AWARDS

The 54th Annual Mine Safety Awards were handed out in Victoria on March 7, 2016, to B.C. mines and quarries that accumulated 15,000 or more worker or contractor hours and had no fatalities between the period of January 1 and December 31, 2015.

Small Underground Mine Safety Award

This award was donated by the West Kootenay Mine and Industrial Safety Association in 1951 to encourage and promote safety in small underground mines. Since 1956, the competition has been open to qualifying mines throughout B.C. The award is given to the mine having the lowest compensable injury-frequency rate after working between 20,000 and 240,000 hours, one-third of which were underground. The mine must have operated for at least nine months during the calendar year. No mines qualified for this award in 2015, as most underground mines in the province compete in the "large" mines category.

Large Underground Mine Safety Award

This award was created in 2010 to recognize safety excellence in B.C.'s large mines with underground workings. The award is given to the mine with the lowest compensable injury-frequency rate with more than 240,000 worker hours, one-third of which were

underground. The mine must have operated for at least nine months during the calendar year. The 2015 recipient was New Gold Inc.'s New Afton mine.

John Ash Award (Open-Pit Mines and Quarries)

This award is presented to the mine that has worked a minimum of 1,000,000 hours in a year and attained the lowest compensable injury-frequency rate. Taseko Mines Ltd.'s Gibraltar mine received the 2015 John Ash Award.

Edward Prior Award (Open-Pit Mines and Quarries)

This award is presented to operations that logged between 200,000 and 1,000,000 worker hours and had the lowest compensable injury-frequency rate. The 2015 recipients were the Copper Mountain and Huckleberry mines.

Stewart/O'Brian Safety Award (Open-Pit Mines and Quarries)

This award is presented to operations that logged between 35,000 and 200,000 worker hours and had the lowest compensable injury-frequency rate. The 2015 award was shared by eight mines:

- Pit D (Allard Contractors Ltd.)
- Cox Station (Mainland Sand and Gravel ULC)
- Wolverine Mine (Walter Energy)
- Willow Creek (Walter Energy)
- Brule Mine (Walter Energy)
- Central Aggregates (LafargeHolcim)
- Earle Creek (LafargeHolcim)
- Ward Road (Summit Crushing)

3.3.5 CERTIFICATES OF ACHIEVEMENT & SPECIAL COMMENDATIONS AND AWARDS

Certificates of Achievement

Certificates of Achievement are presented to mines with a minimum of 15,000 worker hours and an injury-frequency ratio of zero. There were a total of six operations that qualified for certificates for work conducted in 2015:

- Harper Ranch Quarry (Plateau Construction Ltd.)
- Windermere Mining Operation (CertainTeed Gypsum Canada Inc.)
- Treat Creek (Jack Cewe Ltd.)
- Jamieson Quarry and Maple Ridge Quarry (Mainland Sand and Gravel ULC)
- Quintette (Teck)
- Moberly Silica (HCA Mountain Minerals Ltd.)

Chief Inspector of Mines' Recognition Award

The Chief Inspector of Mines' Recognition Award is a merit-based award intended to recognize mine sites and/or individuals that have accomplished outstanding achievements in or greatly advanced health and safety at B.C. mines. The 2015 recipient was Gerry Wong for his contribution to mine rescue at Teck's Highland Valley Copper Operations and across the province.

3.3.6 NATIONAL SAFETY AWARDS – JOHN T. RYAN TROPHIES

John T. Ryan trophies are provided by Mine Safety Appliances Canada Limited as a memorial to the founder of the company. The trophies are awarded by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) to the metal mine, the coal mine and the select mine which, 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. Teck's Greenhills Operations was awarded the Canadian national award for the lowest reportable injury frequency in the coal mine category during the 2015 calendar year—the third year in a row that Greenhills received this award.

3.4 Examinations and Certifications

Section 26 of the Mines Act states that every person employed at a mine must, if required by the regulations or the Code, be under the daily supervision of a person who holds a valid and appropriate certificate as required by the regulations or the Code. The required certification is specified in Part 1.12 of the Code. Recipients of a valid permanent certificate must complete re-examination every five years to ensure that their knowledge of the Code remains current.

3.4.1 BOARD OF EXAMINERS

The Chief Inspector of Mines chairs the Board of Examiners and appoints other inspectors as members. In 2015, the board was chaired by A. Hoffman, and E. Taje, R. Thorpe, R. Booth and D. Howe sat as members. The board is responsible for:

- examining applicants for First and Second Class Underground Coal Mine Manager, fireboss and shiftboss certificates and certificates of competency;
- issuing certificates;
- conducting reviews of suspended certificates;
- administering blasting certificates; and

- reviewing qualifications and ensuring certification validity among other provinces.

3.4.2 SHIFTBOSS CERTIFICATES

The following table summarizes shiftboss certification activity in 2015:

Number Passed	New Certificates
Surface (includes sand and gravel)	62
Underground	16
Total Permanent Certificates Issued	78

One shiftboss certificate was suspended in 2015.

3.4.3 TOTAL UNDERGROUND COAL FIREBOSS CERTIFICATIONS

Three underground coal fireboss certificates were issued in 2015, and none were suspended.

3.4.4 BLASTING CERTIFICATES

Blasting certification is required under Part 8.2.1 of the Code. Types of blasting certificates include:

- Basic
- Exploration
- Surface
- Underground
- Underground Coal (Shotfirer)
- Electrical
- General (which includes all categories except for Underground Coal)

A total of 90 blasting certificates were issued in 2015, and 3 blasting certificates were suspended.

3.4.5 MINE RESCUE CERTIFICATIONS

To qualify for mine rescue certification, mine employees must complete approved training and must pass written exams developed for various types of mining, as per Part 3 of the Code.

The Province is responsible for certifying miners in several categories of mine rescue, as listed below. The following mine rescue certificates were issued in 2015:

Type	Number Issued
Underground mine rescue	97
Surface (open-pit) mine rescue	153
Total certificates issued	250

One First Class Certificate of Competency for coal was issued in 2015.

3.5 Accidents and Incidents

3.5.1 DANGEROUS OR UNUSUAL OCCURRENCES

Inspectors of Mines are responsible for determining which incidents should be included in the Mine Management System (MMS). There were 114 dangerous occurrences recorded in MMS for 2015, compared to 191 dangerous occurrences entered for 2014.

Location of Incident	Number of Incidents Reported	% of Total Incidents Reported
Pit	34	29.8
Plant/Mill	14	12.3
Maintenance (Shop)	5	4.4
Maintenance (Field)	1	0.9
Highwall	0	0
Dump	7	6.1
Tailings Pond	3	2.6
Office	0	0
Dry	2	1.8
Underground General	2	1.8
Underground Face	0	0
Underground Outbye/Haulage Drift	1	0.9

Work Practice Contributing to Incident	Number of Incidents Reported	% of Total Incidents Reported
Equipment Failure	12	11
Inadequate Planning	38	33
Inadequate Management	21	18
Inadequate Equipment	9	8
Poor Work Standards	13	11
Abuse or Misuse	9	8
Training	19	17
Not Following Work Procedures	30	26
Operator Error	34	30

Equipment Involved	Number of Incidents Reported	% of Total Incidents Reported
Haul Truck	13	11.4
Grader	3	2.6
Loader	4	3.5
Shovel	4	3.5
Dozer	10	8.8
Drill, Surface	7	6.1
Drill, Underground	0	0
Pickup	7	6.1
LHD	1	0.9
Conveyer	8	7
Electrical	6	5.3
Explosives	6	5.3
Excavator/Backhoe	2	1.8
Crane	1	0.9
Forklift	0	0
Water Truck	0	0
Scraper	0	0
Service Truck	7	6.1

Note: The numbers in the tables shown above are not intended to add up to 100% as there may be several preventative actions, locations, work practices or equipment involved for a single incident.

General Incident Information	Number of Incidents Reported	% of Total Incidents Reported
Number of Persons Involved	99	-
Number of Persons Injured	14	-
Near Miss	29	25
Fire	6	5
Geotechnical	3	3

3.5.2 INJURY RATES FOR QUARRIES AND OPEN PIT COAL, OPEN PIT METAL AND UNDERGROUND MINES

According to WorkSafeBC data, as of November 1, 2016, the 2015 total estimated injury rate (weighted average) at mines in British Columbia was 0.7. The rate has decreased from 2014's estimated injury rate of 0.9. The unit for the injury rate statistic is the "number of claims per 100 estimated person-years of employment", where "number of claims" refers to those that received standard, limited or survivor benefits in the year of injury or in the first quarter of the year following the year of injury. The estimated injury rates are adjusted on an ongoing basis to match claims data.

In 2015, the estimated injury rates for open pit metal mines and open pit coal mines decreased, from 1 and 0.6 in 2014 to 0.7 and 0.5, respectively. The estimated injury rate for underground mines has also decreased dramatically in recent years, from 2.9 in 2011 to 1.6 in 2014 to 1.2 in 2015. The estimated injury rate at quarries in 2015 decreased to 3.9 since reaching 4.2 in 2014.

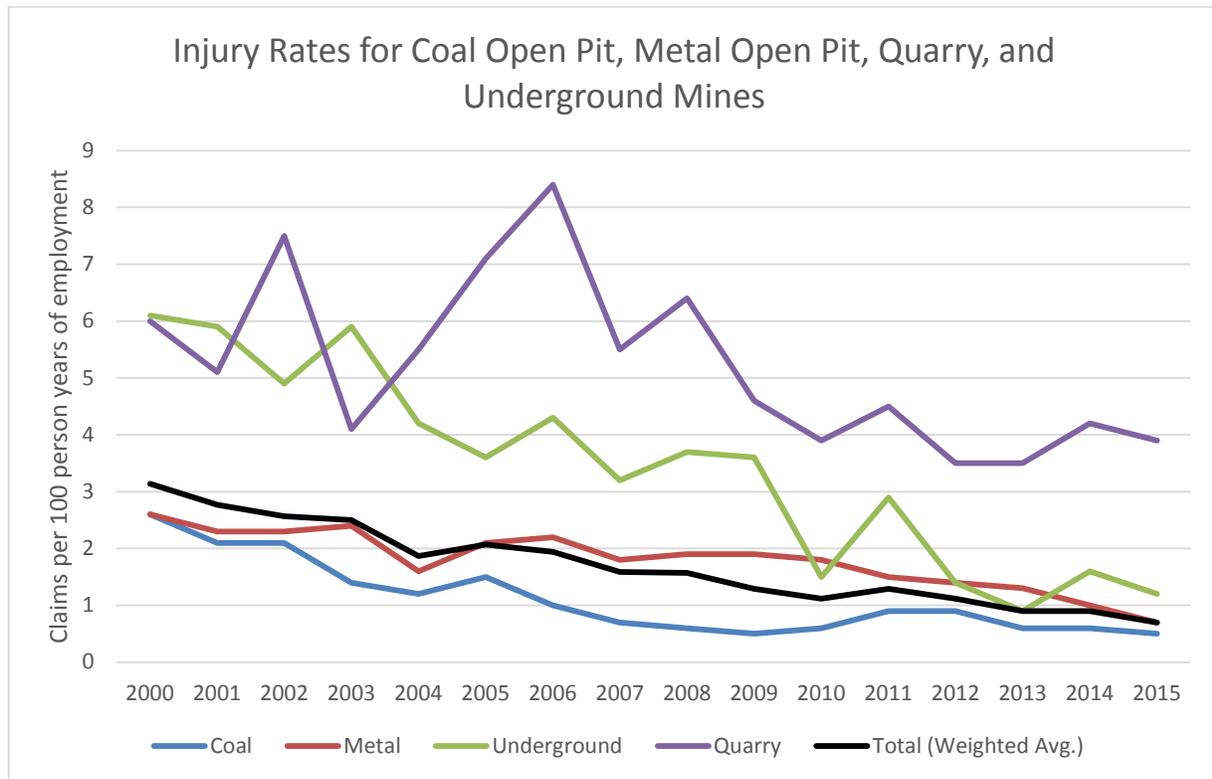


Figure 3: Injury Rates for Quarries, Open Pit Coal, Open Pit Metal, and Underground Mines in British Columbia, 2000–2015

As of September 2016, WorkSafeBC has accepted a total of 100 short-term disability, long-term disability and fatal claims for 2015, down from 139 in 2014. The number of days lost to injury also decreased considerably, down to 6,170 in 2015 from 7,933 in 2014.

3.5.3 FATALITIES

There was one mining-related fatality in 2015:

- On July 21, 2015, an equipment operator was fatally injured at Green Mountain Gemstones Polar Jade operation, located in northwest B.C. At the time of writing, the Chief Inspector of Mines investigation of this incident is ongoing.

3.5.4 INVESTIGATIONS

In 2015, the Chief Inspector of Mines had a total of four investigations that were either initiated or ongoing:

- Mount Polley mine tailings dam failure investigation initiated in 2014 was concluded in December 2015;
- Swansea quarry fatality investigation initiated in 2014 continued through 2015;

- Polar Jade operation fatality investigation was initiated in July of 2015;and
- Banks Island Gold mine permit non-compliance investigation was initiated in July of 2015.

Mount Polley Tailings Dam Failure

The Chief Inspector of Mines concluded his investigation into the cause of the Mount Polley tailings dam failure on November 20, 2015. The investigation report was released publicly on December 17, 2015. The report included 19 recommendations in seven categories directed toward the mining operator, the mining industry, professional organizations and the government regulator.

The Chief Inspector found that the Mount Polley mine and its engineers employed weak practices on the mine site, and many recommendations involve developing new standards and guidelines to improve these practices.

The Chief Inspector, with advice from the Ministry of Justice, did not find sufficient evidence that Mount Polley Mining Corporation contravened existing regulatory requirements. Based on these findings, the Chief Inspector determined there were no actions that would warrant a report to Crown Counsel pursuant to the Mines Act.

Further information and the investigation report is available online:

www.gov.bc.ca/mountpolley



4 Permitting

4.1 Overview

In general, MEM's Regional Offices handle applications under the Mines Act for exploration and small-scale mining activities. These kinds of permit applications are called "Notices of Work" and are reviewed by MEM regional staff and/or regional Mine Development Review Committees.

Proposed major mines, major expansions/upgrades to existing mines, and some large-scale exploration/development projects require approval under the Mines Act as per part 10.1.2 of the Health, Safety and Reclamation Code for Mines in British Columbia (the Code). Large-scale mining applications, including major expansions/upgrades to existing major mines, are reviewed by a wide array of staff from the Health, Safety and Permitting Branch and other agencies. MEM's Major Mines Permitting team consists of specialized technical staff from across the province who review applications with regards to health and safety, environmental, electrical, mechanical, geotechnical, and reclamation considerations, among others. In addition to Mines Act permits or permit amendments, various other authorizations are required for major mining projects, and applications are generally reviewed by project-specific Mine Review Committees.

Major mines and expansions also typically require environmental assessment (EA) certificates. The Environmental Assessment Office (EAO) manages the review of proposed major projects in British Columbia, as required by the Environmental Assessment Act. The EA process provides for the thorough, timely and integrated assessment of the potential environmental, economic, social, heritage and health effects that may occur during the lifecycle of these projects, and provides for meaningful participation by First Nations, proponents, the public, local governments, and federal and provincial agencies. Health, Safety and Permitting Branch staff participate in the EA process as working group members and/or technical experts.

4.2 Co-operation and Consultation with First Nations

The Province is legally obligated to consult and, where appropriate, accommodate First Nations on land and resource decisions that could impact Aboriginal interests. The Health, Safety and Permitting Branch works closely with First Nations to inform them of proposed exploration and mining activities and ensure that all concerns are considered. Applications involving mechanical disturbance of the land surface and/or watercourses are referred to First Nations so their interests can be considered.

4.3 Major Mines Permitting

During 2015, a total of 49 Mines Act permits were issued for major mines. This included two new mines, Silvertip and Brucejack, and a major expansion at Fording River Operations (Swift Project). The Ministry also approved the TSF Buttress and restricted mine restart at the Mount Polley mine. Other permits amendments were issued for Huckleberry, Red Chris, Myra Falls, Copper Mountain, Greenhills, Line Creek, Endako, Elkview, Fording River, and Brucejack mines, among other operations, for various projects and plans.

Staff from MEM were involved in the EA reviews of several mine projects in 2015, including the Ajax, Elkview Baldy Ridge Extension, Blackwater, Brucejack, Fording River Swift, Giscome, Harper Creek, Murray River and Sukunka projects. MEM staff also participated in technical working groups for the Burnco, Crown Mountain, Kemess Underground, Kootenay West, Michel Creek, and Red Mountain projects.

4.3.1 MAJOR MINE PERMITTING OFFICE (MMPO)

The Ministry of Energy and Mines' Major Mine Permitting Office (MMPO) improves the co-ordination of major mine permitting across the province. The MMPO team works directly with proponents, First Nations and government technical advisors to co-ordinate multi-agency regulatory permits and implement the efficient and timely review of high-quality and complete applications for new major mines and major expansion projects.

MMPO works closely with Health, Safety and Permitting Branch staff and applies project management skills to enhance communication, ensure issues identification and resolution, and efficiently conduct project reviews. In 2015, MMPO staff worked on 13 different major mine projects:

Project	Region
Ajax (new mine)	South Central
Blackwater (new mine)	Central/Northeast
Brucejack (new mine)	Northwest
Burnco Aggregate (new mine)	Southwest
Dome Mountain	Northwest
Giscome Quarry and Lime (new mine)	Central/Northeast
Kemess Underground (new mine)	Central/Northeast
Kootenay West Gypsum (new mine)	Southeast
Murray River (new mine)	Northeast
Red Chris	Northwest
Red Mountain (new mine)	Northwest

Silvertip (new mine)	Northwest
Sukunka (new mine)	Northeast

4.4 Notices of Work (NoWs)

The following data on Notice of Work (NoW) permit applications was entered into MMS for 2015:

Type	Notice of Work Applications Received	Notice of Work Applications Processed*	Average # of Days To Process
Mineral/Coal (Exploration)	216	203	31
Mineral/Coal (other)	28	30	57
Placer	292	267	68
Sand & Gravel/Quarry	225	177	64
Total	761	677	49

*Applications that were approved or rejected.

The table below presents a regional breakdown of the 2015 NoW data:

Region	Placer	Sand & Gravel/Quarry	Mineral & Coal	Total
Central/Northeast	55	98	62	215
Northwest	74	38	63	175
South Central	128	39	46	213
Southeast	31	24	64	119
Southwest	4	26	9	39
Total	292	225	244	761

The chart below presents a monthly breakdown of the 2015 NoW data:

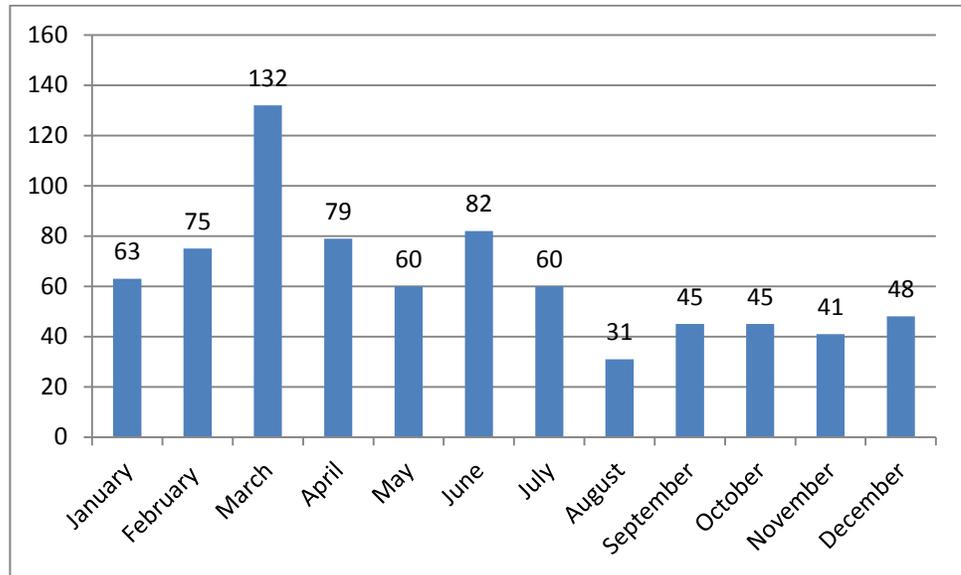


Figure 4: 2015 Notices of Work by Month

The areas covered by the regions are:

- Central/Northeast = Prince George, Omineca, Horsefly and Valemont
- Northwest = Smithers and Skeena
- South Central = Kamloops, Okanagan and Thompson
- Southeast = Cranbrook, Fernie and Elk Valley (Kootenay)
- Southwest = Lower Mainland, Vancouver Island, South Coast and Haida Gwaii



5 Mechanical and Electrical

5.1 Mechanical and Electrical Engineering

5.1.1 ROLES AND RESPONSIBILITIES

Mechanical and electrical inspectors ensure that all mechanical and electrical equipment installed and used at mines in B.C. complies with the Mines Act and applicable codes and standards, and that this equipment is maintained and operated appropriately to reduce the risk of causing hazard to people or property.

5.1.2 STRUCTURE AND ORGANIZATION

There is a Senior Inspector of Mines, Mechanical, based in Prince George, an Inspector of Mines, Mechanical, based in Smithers, and a Senior Inspector of Mines, Mechanical (auxiliary) based in Kamloops. There is also a Senior Inspector of Mines, Electrical (auxiliary) and an Inspector of Mines, Electrical, based in Kamloops, and a Senior Inspector of Mines, Electrical based in Victoria.

5.1.3 SUMMARY OF ACTIVITIES

In 2015, there was a significant demand on the Mechanical and Electrical Engineering Section to keep up with the design, approval and construction plans of new mines. The section was also part of the ongoing provincial site presence at the Mount Polley mine in 2015 and assisted with the Provincial Mine Rescue and First Aid Competition. In addition, Mechanical and Electrical Engineering Section staff conducted numerous mine site inspections and attended meetings around the province.

During the 2015 calendar year, mechanical and electrical inspections were conducted at major mines and large sand and gravel operations across the province, as well as at some smaller sand and gravel/quarry operations. The electrical inspector from Kamloops was involved in a process of identifying and regulating common deficiencies found in aggregate operations throughout B.C. with a goal of improving the overall compliance of these operations. Several new operations required extra inspections and reviews of engineering specifications and drawings, and a number of new projects were reviewed for compliance; the Mechanical and Electrical Engineering Section devoted considerable time to the review of new equipment and installations for these operations to ensure compliance with the necessary B.C. and Canadian code requirements.

In 2015, MEM's mechanical inspectors reviewed submissions of data to ensure compliance with code requirements for several new models of mobile equipment proposed to enter service in British Columbia, and reviewed submissions for mining

infrastructure for new and existing mines. In 2015, the Senior Inspector of Mines, Mechanical, remained a member of the review committees for CSA Standard G-4 (Wire Ropes), CSA Standard CSA M-422 (Fire Performance and Antistatic Requirements for Conveyor Belting), CSA Standard Z-150 (Safety Code on Mobile Cranes) and CSA Standard Z-150.3 (Safety Code on Articulated Cranes), and continued to participate in the CSA Mine Advisory Panel (steering group for mining standards development).

In 2015, the Senior Inspector of Mines, Electrical remained a member of the review committee for CSA Standard M421-11 (Use of Electricity in Mines). Membership for this committee is in transition as of 2016 as the previous Senior Inspector of Mines, Electrical, has retired and a new Senior Inspector of Mines, Electrical, has joined Ministry of Energy and Mines.

6 Geotechnical

6.1 Roles and Responsibilities

The Geotechnical Section is responsible for completing inspections at operating and closed mines with a focus on performance of tailings dams, waste rock dumps, open pit slopes and underground openings. Mining projects are reviewed for the health and safety of the public and mine workers, as well as protection of the environment.

The Geotechnical Section provides technical review of proposed mining projects seeking approval under the Mines Act and the B.C. Environmental Assessment Act. The section also reviews geotechnical incidents and responds to mine enquiries.

The Geotechnical Section provides geotechnical advice and leads/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; and
- assessing the environmental impact of geotechnical projects.

6.2 Summary of Activities

In 2015, the Geotechnical Section (four MEM staff, four contractors and a consulting firm):

- conducted 41 geotechnical inspections (compared to 38 in 2014);
- 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; and
- reviewed annual reports for tailings storage facilities, waste rock dumps and pit walls.

In 2015, a total of 41 geotechnical inspections were conducted by MEM staff and contractors. These inspections (surface, underground or combined) took place at metal and coal mines as well as several placer operations and select sand and gravel quarries.

6.3 Dam Safety Inspections

The design, construction and operation of dams on mine sites in British Columbia is covered by regulations and requirements under the Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia (the Code). The Code requires dam safety inspections (DSIs) to be carried out annually for all dams on a mine site in accordance with MEM guidelines⁷ (in accordance with Part 10.5.3 of the Code). Reports must be prepared by a qualified professional engineer registered with the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) and submitted to MEM by March 31 of the year following the inspection.

The objective of annual DSIs is to review the operation, maintenance and surveillance of tailings storage facilities (TSFs). A DSI typically involves review of existing documents, a site visit by a qualified professional engineer, interviews with the TSF inspector and operators, a visual inspection of the TSF, and a review of available instrumentation and monitoring data. The DSI report provides recommendations ranging from items impacting the safety of the dam to best management practices. DSI reports also provide schedules and priority levels for executing the listed recommendations to ensure dams are operated or maintained in safe and stable conditions. Typical recommendations include adjusting the current operations (e.g., beach width, pond level), updating operation manual and emergency plan documents, provision of additional inspection and instrumentation, carrying out repair and maintenance activities, or conducting new analyses.

Dam Safety Inspection reports for mines in British Columbia are available online at: <https://mines.empr.gov.bc.ca/>

7 Reclamation

7.1 Roles and Responsibilities

Reclamation and environmental protection are major components of all mineral exploration and mine development activities in British Columbia. Since 1969, companies have been required by law to reclaim all lands disturbed by mining and related activities. B.C. was one of the first provinces in Canada to enact mine reclamation legislation, and the first to extend this policy to exploration sites.

⁷<http://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/permitting/geotechnical-information>

MEM's Reclamation Section enforces the reclamation provisions of the Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia (the Code) through permit conditions and detailed technical reviews aimed at finding environmentally sound, economically viable solutions that enable British Columbia's mining industry to remain internationally competitive without compromising this province's rigorous environmental standards.

Prior to starting work, mining companies are required to obtain a permit approving the mine plan, a program for protection of the land and watercourses, and a reclamation program. Mining companies must also place a security deposit with the Province to ensure reclamation obligations are kept.

The environmental protection and reclamation objectives of 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 (i.e., tailings storage facilities); and
- mining and mitigation requirements associated with metal leaching and acid rock drainage (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.

To achieve these objectives, the Reclamation Section:

- conducts detailed technical reviews of new projects and proposed project revisions under the Environmental Assessment Act;
- conducts detailed technical reviews and issues permits for operating and closed mines with outstanding reclamation responsibilities under Section 10 of the Mines Act;
- inspects mine reclamation activity;
- administers reclamation security deposits on behalf of the Province of British Columbia;
- participates in national and international committees conducting research and technology transfer, including the national Mine Environment Neutral Drainage (MEND) Committee and the National Orphaned and Abandoned Mines Initiative (NOAMI) committee; and
- organizes and participates in various provincial committees and activities that review and highlight best practices and facilitate government co-operation with industrial, public and academic institutions (examples include the Technical and Research Committee on

Reclamation, the Annual Mine Reclamation Symposium, and the Annual ML/ARD Workshop).

Additionally, Reclamation Section staff provide information and assistance on a regular basis to the Ministry of Environment, Ministry of Transportation and Infrastructure, Ministry of Forests, Lands and Natural Resources, Environment Canada, First Nations and the public on technical issues involving mine reclamation. Collaboration facilitated by MEM staff between industry, the public, government and the academic community continues to result in a constructive climate for exchanging and disseminating new ideas and technologies.

7.2 Structure and Organization

The Reclamation Section has expertise in the technical areas of soil restoration, re-vegetation, land capability, erosion control, geology, geochemistry and ML/ARD. Technical assistance for biological and effluent discharge and offsite requirements is provided by other areas of government (e.g., the Ministry of Environment).

7.3 Summary of Activities

7.3.1 METAL LEACHING AND ACID ROCK DRAINAGE (ML/ARD)

A provincial ML/ARD policy, a more detailed set of ML/ARD guidelines, and a manual of recommended methods for the prediction of ML/ARD indicate what constitutes acceptable mine design and adequate technical evidence. These documents provide a checklist for industry and inform the public of regulatory conditions and environmental-protection requirements.

7.3.2 RECLAMATION SECURITIES AND FUNDS

All mines operating in B.C. must deposit securities with the government to ensure that reclamation costs do not fall on provincial taxpayers (e.g., if a mining company goes bankrupt). In the past few years, the value of security deposits has increased to reflect more closely the full costs of reclamation.

The total value of securities held by the Province has risen from \$10 million in 1984 to more than \$1 billion by the end of 2015. In addition to this, mine permits contain schedules for further reclamation bond payments to be made to the Province. An additional \$846 million is scheduled to be deposited with MEM for major mines within the next eight years.

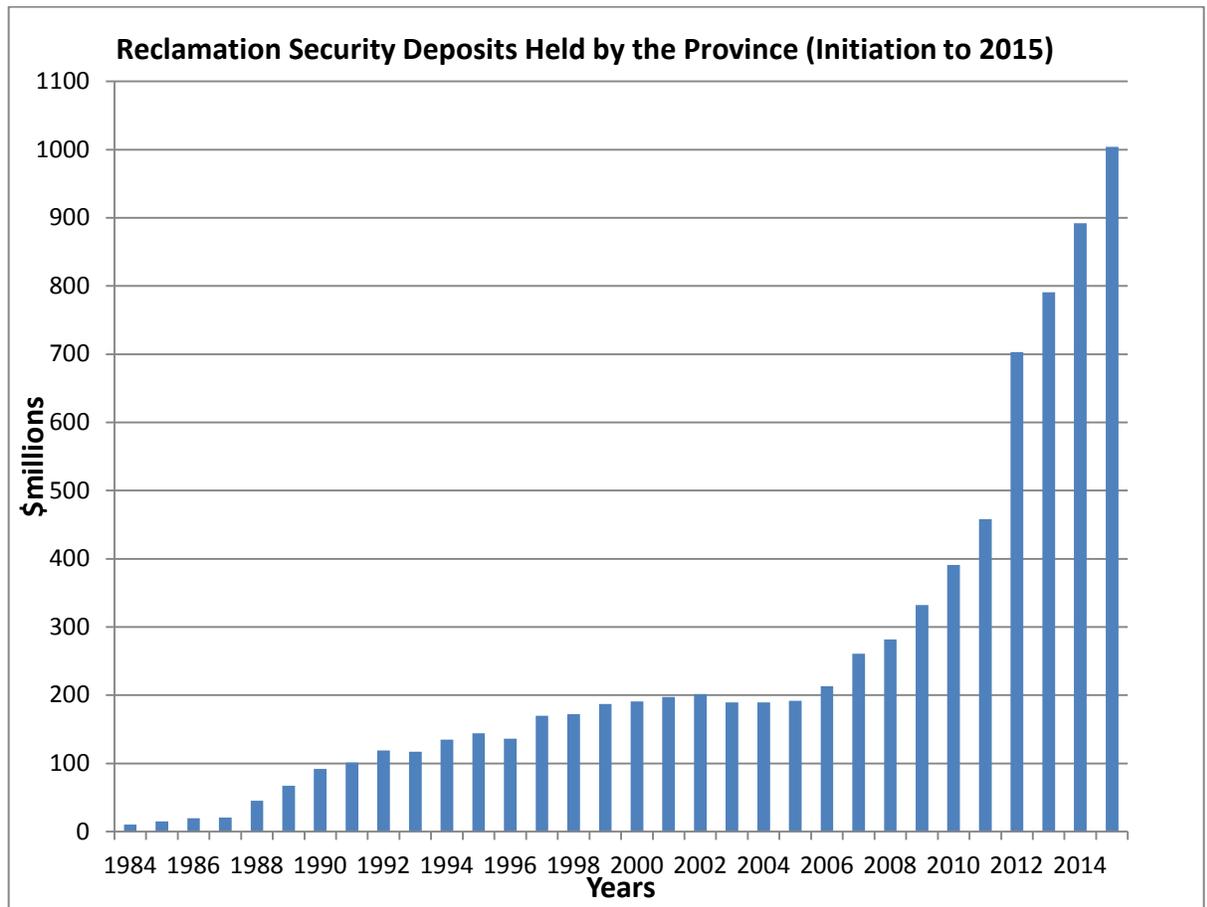


Figure 5: Reclamation Security Deposits Held by the Province (Initiation to 2015)

Following release of the Auditor General’s report on compliance and enforcement of the mining sector in May 2016, the Province committed to reviewing its reclamation security policy, and that work is underway as of December 2016. MEM has commissioned Ernst and Young, a leading auditing firm with experience and knowledge of the mining industry worldwide, to undertake an in-depth examination of reclamation securities practice. This will include a comprehensive examination of MEM’s current approach and analysis on how reclamation securities are administered in other jurisdictions.

A summary of the reclamation liability estimated by major mines in their 2015 Annual Reclamation Reports, current reclamation security held by MEM and the calculated differential is presented in the table below.

Mine	Owner (2015)	Total Bond Amount (\$)	Liability Estimate (\$)	Differential (\$)
COAL MINE PERMITS				
Elk Valley (Elkview, Fording River, Line Creek, Coal Mountain, Greenhills)	Teck Coal Limited	446,620,000.00	1,075,578,393.00	628,958,393.00
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 Spieker	Canadian Natural Resources Ltd.	10,000.00	10,000.00	0.00
Benson Mountain.	Netherlands Pacific Mining Co. Ltd.	5,000.00	5,000.00	0.00
Willow Creek	Walter Energy/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	0.00	0.00
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	Walter Energy /Brule Coal Partnership	3,350,000.00	23,833,875.00	20,483,875.00
Wolverine	Walter Energy /Wolverine Coal partnership	11,500,000.00	47,194,812.00	35,694,812.00
Trend-Roman	Peace River Coal Ltd.	53,900,000.00	93,330,564.00	39,430,564.00
METAL MINE PERMITS				
Endako	Thompson Creek Mining Co.	15,345,700.00	47,730,000.00	32,384,300.00
Pinchi	Teck Resources Ltd.	2,000,000.00	2,000,000.00	0.00
Granisle	Glencore Canada Corp.	161,522.00	677,269.00	515,747.00
Island Copper	BHP Billiton Base Metals.	4,209,737.00	4,637,000.00	427,263.00
Kitsault	Avanti Kitsault Mine Ltd.	1,770,000.00	1,400,000.00	0.00
Highland Valley Copper	Teck Highland Valley Copper Partnership Ltd.	18,250,000.00	251,575,881.00	233,325,881.00

Mine	Owner (2015)	Total Bond Amount (\$)	Liability Estimate (\$)	Differential (\$)
Brenda	Glencore Canada Corp.	5,000,000.00	28,033,333.00	23,033,333.00
Cassiar	Cassiar-Jade Contracting Inc.	600,000.00	1,530,000.00	930,000.00
Myra Falls Operations	NVI Mining Ltd.	70,936,288.00	60,829,268.00	0.00
Copper Mountain	Copper Mountain Mine Ltd..	11,500,500.00	20,300,000.00	8,799,500.00
Gallowai Bul River	Bul River Mineral Corporation	491,511.19	468,023.00	0.00
Bell	Glencore Canada Corp.	5,000,000.00	16,529,331.00	11,529,331.00
Gibraltar	Gibraltar Mines Ltd.	46,873,620.00	30,000,000.00	0.00
Alwin	D.K. Mining Inc.	6,000.00	6,000.00	0.00
Giant Nickel	Barrick Gold Inc.	27,000.00	4,351,610.00	4,324,610.00
Silvana/Hinckley	Klondike Silver Corp.	75,000.00	185,333.00	110,333.00
Craigmont	Huldra Properties Inc.	700,000.00	700,000.00	0.00
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	3,000.00	0.00
Boss Mountain	Glencore Canada Corp.	30,000.00	1,266,667.00	1,236,667.00
Afton	KGHM Ajax Mining Inc.	350,000.00	2,000,000.00	1,650,000.00
Equity	GoldCorp	82,467,000.00	82,467,000.00	0.00
Cusac	Cassiar Gold Corp.	264,444.00	627,762.00	363,318.00
Mosquito Creek	Mosquito Consolidated Gold Mines Ltd.	5,000.00	437,119.00	432,119.00
Carolin	New Carolin Gold Corp.	256,250.00	199,564.00	0.00
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	1,059,585.00	859,585.00
Venus Mill	United Keno Hills Mines Ltd.	7,000.00	7,000.00	0.00

Mine	Owner (2015)	Total Bond Amount (\$)	Liability Estimate (\$)	Differential (\$)
Taurus	Cassiar Gold Corp.	10,000.00	10,000.00	0.00
Dimac (Silence Lake)	Dimac Resources Corp.	10,000.00	10,000.00	0.00
Mt. Brussilof Baymag	Baymag Mines Co. Ltd.	15,101.71	792,453.00	777,351.29
Ashlu Gold	Osprey Mining and Exploration Ltd.	10,000.00	10,000.00	0.00
Four-J /Lussier	Georgia Pacific Canada Ltd.	20,000.00	20,000.00	0.00
Perlite	Aurum Mines Ltd.	0.00	0.00	0.00
Union	Sumac Resources Ltd.	5,000.00	5,000.00	0.00
Blackdome	Sona Resources Corp.	100,000.00	100,000.00	0.00
Nickel Plate	Barrick Gold Inc.	1,671,754.00	96,500,000.00	94,828,246.00
Cheni/Lawyers	Cheni Gold Mines Ltd	15,000.00	15,000.00	0.00
Johnny Mountain	Skyline Gold Corp.	562,310.33	336,000.00	0.00
Premier	Boliden Westmin Canada Ltd.	3,000,000.00	15,909,000.00	12,909,000.00
Parson Barite	Sherritt International Corp.	10,000.00	83,680.00	73,680.00
Candorado	Candorado Operating Company	0.00	3,000,000.00	3,000,000.00
Samatosum	First Quantum Minerals Ltd.	7,800,000.00	7,266,667.00	0.00
Barrier Feldspar	Kanspar Industries Inc.	20,000.00	20,000.00	0.00
Golden Bear	Goldcorp Canada Ltd. - Equity Division	210,000.00	73,200.00	0.00
Horse Creek Silica	HiTest Sand Inc.	125,000.00	125,000.00	0.00
Sable/Shasta	Sable Resources Ltd.	164,000.00	1,110,000.00	946,000.00
Snip	Barrick Gold Inc.	1,000,000.00	2,968,943.00	1,968,943.00
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	9,348,950.00	5,574,950.00
QR	Barkerville Gold Mines Ltd.	2,860,000.00	677,002.00	0.00
Elk/Siwash	Gold Mountain Mining Corp.	150,000.00	60,672.00	0.00
Mount Polley	Mount Polley Mining Corp.	23,647,211.00	35,350,620.00	11,703,409.00

Mine	Owner (2015)	Total Bond Amount (\$)	Liability Estimate (\$)	Differential (\$)
Huckleberry	Huckleberry Mines Ltd.	37,000,000.00	59,000,000.00	22,000,000.00
Kemess South	AuRico Gold Inc.	18,520,000.00	17,144,663.00	0.00
Bralorne	Avino Silver and Gold Mines Ltd.	115,000.00	1,521,300.00	1,406,300.00
May Mac (formerly Bow Mine)	Golden Dawn Minerals Inc.	50,000.00	49,710.00	0.00
Ainsworth Mill	Bluebird Mining Ltd.	5,000.00	250,000.00	245,000.00
Lumby Mine	Saddle Mountain Minerals Ltd.	5,000.00	5,000.00	0.00
Bluebell	Teck Resources Ltd.	0.00	0.00	0.00
HB Tailings	Regional Distirct East Kootenay	0.00	0.00	0.00
Churchill Copper	Teck Resources Ltd.	0.00	0.00	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	9,902,174.00	402,174.00
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	100,000.00	0.00
Tulsequah	Chieftain Metals Inc.	1,200,000.00	1,200,000.00	0.00
Zip Mill	Huakan International Mining Inc.	235,000.00	202,225.00	0.00
Lexington-Grenoble	Huakan International Mining Inc.	215,000.00	168,232.00	0.00
Yellowjacket	African Queen Mines Ltd.	150,000.00	105,300.00	0.00
Mount Milligan	Terrane Metals Corp.	30,000,000.00	36,152,707.00	6,152,707.00
Dome Mountain	Gavin Minerals Ltd.	579,000.00	11,225,503.00	10,646,503.00
Bonanza Ledge	Barkerville Gold Mines Ltd.	960,000.00	4,450,891.00	3,490,891.00
Treasure Mountain	Huldra Silver Inc.	505,100.00	505,100.00	0.00
Red Chris	Red Chris Operating Corp.	12,000,000.00	18,210,985.00	0.00
Yellow Giant (Tel)	Banks Island Gold Ltd.	355,000.00	355,000.00	0.00
Silvertip	JDS Silver Inc.	2,500,000.00	13,347,994.00	10,847,994.00
Brucejack	Pretium Resources inc.	3,500,000.00	31,156,195.00	27,656,195.00
Total		1,004,063,386.33	2,250,986,197.10	1,272,843,279.29

Please Note: Bonds greater than liability have a differential of zero (not minus)

7.3.3 TECHNICAL AND RESEARCH COMMITTEE ON RECLAMATION

The Technical and Research Committee on Reclamation has been actively promoting and fostering reclamation research and information exchange for more than three decades. Members come from the Ministry of Energy and Mines, the Ministry of Environment, mining companies, the Mining Association of British Columbia, Association for Mineral Exploration in BC, Natural Resources Canada, the University of British Columbia and Thompson Rivers University. This committee has been responsible for the organization of the annual B.C. Mine Reclamation Symposium since 1977.

7.3.4 NATIONAL ORPHANED/ABANDONED MINE INITIATIVE (NOAMI)

The National Orphaned/Abandoned Mines Advisory Committee was formed in March 2002 at the request of Canadian Mines Ministers. The Advisory Committee was asked to study the issue of orphaned/abandoned mines and to develop initiatives and partnerships to implement remediation programs across Canada.

The Advisory Committee takes direction from Mines Ministers and reports back to them through the Intergovernmental Working Group on the Mineral Industry. The Advisory Committee is made up of representatives of federal/provincial/territorial governments, the Canadian mining industry, environmental non-governmental organizations and Aboriginal peoples and their communities. Committee members are responsible for communication with their constituencies. The Ministry represents the Province of British Columbia on this Advisory Committee.

7.3.5 MINE RECLAMATION SYMPOSIUM

The 39th Annual Mine Reclamation Symposium was held as a joint event with 10th International Conference on Mine Closure at the Hyatt Hotel in Vancouver from June 1–3, 2015. The combined conference featured presentations from keynote speakers on mine reclamation and closure; a panel discussion on “Success and Challenges in Closure – Optimal Outcome for Communities”; and a field trip to the Britannia Mine Museum and EPCOR Water Treatment Plant. Over 450 delegates from 23 countries attended the joint conference.

7.3.6 THE ANNUAL BRITISH COLUMBIA MINE RECLAMATION AWARDS

The purpose of the Jake McDonald Annual Reclamation Award and category reclamation awards is to highlight excellence in mine reclamation practice and environmental stewardship. The winners are chosen by a sub-committee comprising B.C. Technical and Research Committee on Reclamation members, staff from the

Ministry of Energy and Mines and Ministry of Environment, and representatives from the Mining Association of British Columbia and academia.

The 2015 Jake McDonald Award was the only mine reclamation award presented for that year at the 40th Annual Mine Reclamation Symposium in Penticton, B.C., in September 2016. Thompson Creek Metals Company Inc. received the 2015 Jake McDonald Award for its innovative reclamation techniques at the Mount Milligan mine, which is located in central British Columbia, approximately 150 kilometres from Prince George.

The 2014 Annual Report of the Chief Inspector of Mines reported that the Annual British Columbia Mines Reclamation Awards were not presented for 2014 due to a lack of nominations; usually the awards are presented during the following year's Annual Mine Reclamation Symposium, but because this was a joint event in 2015, the Annual Mine Reclamation Awards for 2014 were presented at a much later date than usual, in December 2015. The 2014 Jake McDonald Annual Reclamation Award was presented to Valley Gravel Sales Ltd for Valley Gravel Mine, where the quarry site been restored to equal or superior agricultural capability prior to mining activities. The Valley Gravel mine operation is located in Abbotsford, B.C., within the Agricultural Land Reserve.

The TRCR presented the 2014 Metal Mine Reclamation Category Award to Huckleberry Mines Ltd. for Huckleberry Copper Mine, located near Houston, B.C. The award was a result of habitat rehabilitation for fish in local creeks and pro-active First Nation consultation regarding mine site reclamation.

7.3.7 METAL LEACHING AND ACID ROCK DRAINAGE WORKSHOP

The 22nd annual Metal Leaching and Acid Rock Drainage Workshop was held in Vancouver December 2–3, 2015. The theme of the workshop was “Challenges and Best Practices in Metal Leaching and Acid Rock Drainage”. The workshop was organized by the Ministry of Energy and Mines, Natural Resources Canada and the Mine Environment Neutral Drainage (MEND) program in association with the B.C. Technical and Research Committee on Reclamation.

7.4 Industry Reclamation Record

British Columbia's land base is roughly 95 million hectares, and while land occupied by the mining industry has steadily grown since the late 1960s, mining has touched less than one per cent of the province. Major coal and metal mines, which occupied less than 1,000 hectares in 1969, had, by the end of 2015, expanded to cover 50,823.364 hectares. Close to one-third of this disturbed land, or 16,043.43 hectares, has been reclaimed (i.e., revegetation has been successfully established for one year or more).

Metal mines have disturbed 24,078.3 hectares, and 7,481.5 hectares (or 31 per cent) of this land has been reclaimed. Coal mines have disturbed 26,745.064 hectares, and 8,561.93 hectares (or 32 per cent) have been reclaimed. 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 the expansion and redevelopment at older mines.