



# Annual Report of the Chief Inspector of Mines 2010



Ministry of  
Energy and Mines





# Table of Contents

<b>1</b>	<b>Principal Mining Functions</b>	<b>1</b>
1.1	Mining Health and Safety Function	1
1.1.1	Mandate/Activities	1
1.1.2	Mine Rescue Stations	2
1.2	Mining Administration Function	2
1.2.1	Mandate/Activities	2
<b>2</b>	<b>Health &amp; Safety</b>	<b>3</b>
2.1	Occupational Health Section	3
2.1.1	Roles and Responsibilities	3
2.1.2	Structure and Organization	3
2.1.3	Summary of Activities	4
2.2	Mechanical and Electrical Engineering	4
2.2.1	Roles and Responsibilities	4
2.2.2	Structure and Organization	4
2.2.3	Summary of Activities	4
2.3	Competitions and Awards	5
2.3.1	Roles and Responsibilities	5
2.3.2	Mine Rescue Competitions	6
2.3.3	First Aid Competitions	7
2.3.4	49th Annual Mine Safety Awards	7
2.3.5	Certificates of Achievement	9
2.3.6	National Safety Awards – John T. Ryan Trophies	9
2.4	Examinations and Certifications	10
2.4.1	Board of Examiners	10
2.4.2	Shiftboss Certificates	10
2.4.3	Total Underground Coal Fireboss Certifications	11
2.4.4	Blasting Certificates	11
2.4.5	Mine Rescue Certifications	11
2.5	Accidents and Incidents	12
2.5.1	Dangerous or Unusual Occurrences	12
2.5.2	Injury Rates	14
2.5.3	Fatalities	14

<b>3</b>	<b>Administration</b>	<b>15</b>
3.1	Summary of Mine Production	15
3.2	Mine Visits	16
3.3	Mine Health and Safety Auditing Program	18
3.4	Notices of Work	18
<b>4</b>	<b>Reclamation</b>	<b>20</b>
4.1	Roles and Responsibilities	20
4.1.1	Structure and Organization	21
4.2	Summary of Activities	21
4.2.1	Permitting	21
4.2.2	Co-operation and Consultation with Stakeholders	22
4.2.3	Metal Leaching and Acid Rock Drainage (ML/ARD)	22
4.2.4	Reclamation Securities and Funds	22
4.2.5	Technical and Research Committee on Reclamation	23
4.2.6	National Orphaned/Abandoned Mine Initiative (NOAMI)	23
4.2.7	Mine Reclamation Symposium	24
4.2.8	The Annual British Columbia Mine Reclamation Awards	24
4.2.9	Metal Leaching and Acid Rock Drainage Workshop	24
4.3	Industry Reclamation Record	25
4.4	Geotechnical	27
4.4.1	Roles and Responsibilities	27
4.4.2	Summary of Activities	27
<b>5</b>	<b>For More Information</b>	<b>28</b>



# 1 Principal Mining Functions

---

## 1.1 Mining Health and Safety Function

### 1.1.1 MANDATE/ACTIVITIES

The Mining Health and Safety Function derives its mandate from the Mines Act and its accompanying Health, Safety and Reclamation Code for Mines in British Columbia (the Code).

The Code is reviewed on an ongoing basis by the Code Review Committee, comprised of representatives from labour, industry and government. The Chief Inspector of Mines chairs this committee, which ensures that the Code remains current as new technology, mining practices and health and safety concerns emerge. The latest version of the Code was released in December 2008.

With respect to mine health and safety, the key mandate of the Government of British Columbia is to ensure the health and safety of workers and the public. In keeping with this mandate, the Mine Health and Safety Function's responsibilities include the following:

- review of aspects of mining and exploration proposals related to health and safety;
- mine inspections and the monitoring of mining activity for compliance with the Mines Act and the Code;
- approval of mine plans with regard to health and safety concerns;
- completion of audits to evaluate how well a health and safety program has been implemented at a mine;
- collection of data and maintenance of records with respect to accidents, dangerous occurrences, inspection frequencies and audiometric (hearing test) data; and
- participation in relevant research and development projects to enhance procedures, technology and practices in mine health and safety.

Additional guidance for government activities is derived from the British Columbia Mining Plan, which is based on four Cornerstones:

- Focus on Communities and First Nations;
- Protecting Workers, Protecting the Environment;
- Global Competitiveness; and
- Access to Land.

### 1.1.2 MINE RESCUE STATIONS

Regional mine rescue stations were consolidated in 1999. All mine rescue equipment is now located in a single centrally located station in Kamloops. This station is under the supervision of the Inspector of Mines, Health and Safety based in Kamloops, and the Deputy Chief Inspector of Health and Safety in Victoria.

## 1.2 Mining Administration Function

### 1.2.1 MANDATE/ACTIVITIES

The Province administers and regulates the full mining cycle, including exploration, development, production, reclamation and closure for metal, placer, industrial mineral and coal mines, and gravel pits and quarries located in British Columbia. This mandate includes the following:

- review of applications and issuance of permits under Section 10 of the Mines Act for all mining activities taking place in B.C., including major mining projects subject to the Environmental Assessment Act;
- establishment of geotechnical and reclamation standards and security levels;
- participation in regional and sub-regional planning; and
- reviews of draft legislation and policies being developed by other agencies.

Provincial staff also provide guidance and assistance to companies and individuals exploring for minerals, and monitor exploration and mining activities in order to provide policy advice to government.

Mineral exploration expenditures in British Columbia were over \$370 million in 2010 (according to Natural Resources Canada)—more than double the previous year's expenditures. 2010 was also a busy year for mine development, with approximately 20 large projects moving through the permitting process at any given time.

In addition to health and safety functions, Inspectors of Mines address the environmental and social sensitivities of proposed and permitted mines. The process for reviewing Mines Act permit applications includes consultation with other government agencies and affected stakeholders, including First Nations, to identify concerns to be addressed through site-specific permit conditions. Inspectors monitor mining activities to ensure compliance with these permit conditions and take enforcement actions if necessary.



## 2 Health & Safety

---

### 2.1 Occupational Health Section

#### 2.1.1 ROLES AND RESPONSIBILITIES

The Occupational Health Section assists 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 at mines in British Columbia.

The Health, Safety and Reclamation Code for Mines in British Columbia requires that mine managers develop and implement a written occupational hygiene-monitoring program. Larger operations in particular are required to establish procedures and to perform their own measurements of chemical and physical hazards to which workers are exposed in the workplace. These hazard could include, among others, dusts, silica, respirable combustible dust, noise, gases and fumes, radiation (ionizing and non-ionizing) and heat/cold stress. The Occupational Health (OH) section also makes comparative measurements to ensure companies follow proper methodology and obtain accurate results.

Medical Surveillance and Workplace Hazardous Materials Information System (WHMIS) programs are also included in the OH section's responsibilities. OH staff provide assistance in program development and also periodically schedule audiometric technician training as needed.

A written, preventative training program to educate mines' Occupational Health and Safety Committee members in 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 using tools to identify and objectively evaluate risks and develop practical solutions. The OH group assists mines in supplying this training by providing information and assistance as needed.

#### 2.1.2 STRUCTURE AND ORGANIZATION

During 2010, there were two people in the OH group with specialties in industrial hygiene and human factors/ergonomics.

### 2.1.3 SUMMARY OF ACTIVITIES

In 2010, the OH group

- conducted on-site inspections of mines to fulfill their mandate to monitor workplace conditions;
- led and organized health and safety audits at mines;
- responded to worker concerns regarding exposures to gases and respirable silica;
- delivered MSD Prevention training to safety representatives from B.C. mines; and
- organized the Mine Safety Awards Competition and Awards Dinner.

## 2.2 Mechanical and Electrical Engineering

### 2.2.1 ROLES AND RESPONSIBILITIES

Mechanical and electrical inspectors ensure that all mechanical and electrical equipment installed and used at mines complies with the Mines Act and applicable codes and standards, and that this equipment is maintained and operated in acceptable condition such that its operation causes no hazard to people or property.

### 2.2.2 STRUCTURE AND ORGANIZATION

There is a Senior Inspector of Mines, Mechanical, based in Fernie and a second Inspector of Mines, Mechanical, based in Prince George. There is also a Senior Inspector of Mines, Electrical, based in Cranbrook and a second Inspector of Mines, Electrical, based in Kamloops.

Once again in 2010, there was a great deal of activity with new and re-opened mines, and there was a significant demand on the mechanical and electrical engineering section to keep up with the design, approval and construction plans of the new mines, as well as rehabilitation and improvement plans of existing operations. The section also worked with the provincial audit group and participated in or provided input for six new mine audits in 2010.

### 2.2.3 SUMMARY OF ACTIVITIES

#### **Mechanical Engineering**

Delivery of new machinery and equipment to mines, together with the steady upgrading of existing items, enables mines in British Columbia to maintain their competitive capabilities. At the same time, safety systems of new and upgraded

equipment are usually enhanced, often as a result of new technology employed in such systems. The highly automated and complex control systems found in new equipment demand a high level of skill from those who operate and maintain the equipment. Provincial staff are involved in reviewing engineering drawings associated with the safety systems on such equipment, as a precursor to installation and field inspections on the items. Staff endeavour to keep abreast of the many changes and innovations. Mine managers, in collaboration with inspectors, have to ensure that equipment operators are aware of how equipment modifications may affect operating functions, and ensure that operators, maintenance personnel and supervisors understand the consequences should failures occur in installed control or sensing systems.

In 2010, section inspectors also participated in review committees for CSA Standard Z150-11 (Safety Code on Mobile Cranes), CSA Standard Z150.3-11 (Safety Code on Articulating Boom Cranes) and CAN/CSA Standard M422-M87 (Fire-Performance and Antistatic Requirements for Conveyor Belting).

## **Electrical Engineering**

The inspectors performed electrical inspections at major mines, including the larger sand and gravel operations as well as some of the smaller sand and gravel/quarry operations. Several new operations required extra inspections and review of engineering specifications and drawings, and a number of new projects were reviewed initially for compliance. All of these operations also required considerable time in the review of their new equipment and installations to ensure compliance with the necessary B.C. and Canadian code requirements.

Section inspectors were also on the 2010 review committee for CSA Standard M421-11 (Use of Electricity in Mines).

## **2.3 Competitions and Awards**

### **2.3.1 ROLES AND RESPONSIBILITIES**

The primary mandate of the Mining Health and Safety Function is to ensure worker health and safety, public safety and suitable 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 stipulate the legal responsibility of provincial mining companies in meeting this mandate; however, many B.C. mining companies and their individual workers voluntarily and consistently exceed these legal requirements. 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 serve as a means to promote safety at B.C. mines. Reclamation awards acknowledge those companies that go beyond what is called for in their mining plans by conducting superior research and introducing innovative techniques to restore the land.

### **2.3.2 MINE RESCUE COMPETITIONS**

The 55th annual Provincial Mine Rescue and First Aid Competition was held at the Max Turyk Elementary School in Fernie on June 5, 2010. The various components of this yearly event are judged by mines inspectors and industry personnel who are responsible for all aspects of worker and public safety in B.C.'s mining industry.

#### **Underground Mine Rescue – Overall Winner**

The overall winner of the Underground Mine Rescue trophy in 2010 was NVI Mining Ltd. Myra Falls Operation's mine rescue team.

#### **Surface Mine Rescue – Overall Winner**

The team from Teck Coal's Greenhills Operations won the overall Surface Mine Rescue trophy in 2010.

#### **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 2010, the mine rescue team from Teck Coal's Highland Valley Copper won the award for best bench for a surface team.

#### **Underground Bench Competition**

The underground bench competition originated in 1978. The competition is held in memory of the late Barry Abbott, Captain of the Cominco HB mine rescue team, who won the Canadian Championship in 1976. In 2010, the Barry Abbot Memorial Trophy was won by Quinsam Coal Corporation's mine rescue team.

## **Obstacle and Recovery**

Quinsam Coal Mine provides this award in recognition of the contribution 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. In 2010, NVI Mining Ltd. Myra Falls Operation's mine rescue team won the Keith Bracewell Memorial Award.

### **2.3.3 FIRST AID COMPETITIONS**

There are two separate competitions in the first aid category: the three-person miners' first aid competition, and the first aid components of the underground and surface mine rescue competitions.

#### **Underground First Aid**

This award was originally introduced by Cominco Ltd. to recognize the best first aid by an underground mine rescue team. The award, known as the "Sullivan Cup", was presented to NVI Mining Ltd. Myra Falls Operation's mine rescue team at the 2010 competition.

#### **Three-Person Miners' First Aid**

The first provincial miners' three-person first aid competition was held in 1978. After doing a short written exam, the three team members render first aid. 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 2010 Three-Person First Aid winning team was from Greenhills Operations, Teck Coal. Greenhills Operations also won the 2010 Kathy Lofstrom Memorial Trophy for Best Coach of a First Aid Team.

### **2.3.4 49TH ANNUAL MINE SAFETY AWARDS**

The 49th Annual Mine Safety Awards were handed out to 18 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, 2010. Recipients were celebrated at a banquet in Revelstoke, B.C. on June 11, 2011. Awards were presented in the following five categories:

### **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, and a fatality automatically disqualifies a mine for that year. There was no recipient of this award in 2010.

### **Large Underground Mine Safety Award**

This award was created in 2010 to recognize safety excellence in underground mine with more than 240,000 hours. The award is given to the mine with the lowest compensable injury-frequency rate with more than 240,000 workers hours, one-third of which were underground. The mine must have operated for at least nine months during the calendar year, and a fatality automatically disqualifies a mine for that year. The first ever recipient of this award was New Gold's New Afton Mine, for their achievements in 2010.

### **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. The 2010 recipient was Teck Coal's Elkview Operations.

### **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. In 2010 there was a tie between two operations, both with an injury-frequency rate of zero. The two recipients for 2010 were Teck Coal's Line Creek Operations and Thompson Creek Mining's Endako Mine.

### **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 2010 award was shared by five mines:

- Coquitlam Sand and Gravel (Lafarge Canada Inc.)
- Cox Station Quarry (Mainland Sand and Gravel Ltd.)
- Pit D (Allard Contractors Ltd.)
- Pitt River Quarries (Division of Lafarge Canada Inc.)

- Texada Quarry (Lafarge Canada Inc.)

### 2.3.5 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 a compensable injury-frequency rate of zero. There were a total of seven mines that qualified for certificates for work conducted in 2010:

- Duncan Aggregate (Butler Brothers Supplies Ltd.)
- Harper Ranch Quarry (Plateau Construction Ltd.)
- Keating Pit (Butler Brothers Supplies Ltd.)
- Steelhead Skway (Lehigh Materials)
- Sumas Shale Quarry (Fraser Pacific Enterprises)
- Treat Creek, Jervis Inlet Mine (Jack Cewe Ltd.)
- Windermere Mining Operation (CertainTeed Gypsum Canada Inc.)

#### Special Commendations

Special Commendations were presented to mines for a significant reduction in their compensable injury-frequency rate. There were a total of two mines that qualified for special commendations for work conducted in 2010:

- Cox Stations Quarry (Mainland Sand and Gravel)
- Myra Falls Operations (NVI Mining)

#### 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 have greatly advanced health and safety at mines.

Teck Highland Valley Copper Partnership's Mine Rescue Team received the 2010 award for their heroic efforts on September 18, 2007. The team came to the aid of another mine to rescue an excavator operator who had been working a highwall when 17,000 – 35,000 tonnes of material sloughed off the wall and completely buried the excavator. The operator was trapped in the cab for approximately 13 hours before being rescued by the Highland Valley Copper mine rescue team. Their mine rescue knowledge, skills, experience and leadership at the mine saved the operator's life.

### 2.3.6 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. No trophies were awarded in the regional category for British Columbia and Yukon in 2011 (for 2010 performance). In the National Coal Mine Category, the 2010 recipient was a British Columbia mine, Teck Coal's Coal Mountain Operation.

## 2.4 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 appropriate certification is specified in Part 1.12 of the Code. Recipients of a valid permanent certificate require re-examination every five years to ensure that their knowledge of the Code remains current.

### 2.4.1 BOARD OF EXAMINERS

The Board of Examiners comprises the Chief Inspector of Mines as chair and other inspectors appointed by the Chief Inspector. Board members were A. Hoffman, E. Taje, R. Thorpe, R. Booth and D. Howe in 2010. The Board is responsible for the following:

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

### 2.4.2 SHIFTBOSS CERTIFICATES

The following table summarizes shiftboss certification activity in 2010:

Activity	New Certificates
Examinations written (surface)	77
Examinations written (underground)	27
Number passed (surface)	77
Number passed (underground)	17
<b>Total permanent certificates issued</b>	<b>104</b>

One shiftboss certificate was suspended in 2010.

### 2.4.3 TOTAL UNDERGROUND COAL FIREBOSS CERTIFICATIONS

Six underground coal fireboss certificates were issued in 2010.

### 2.4.4 BLASTING CERTIFICATES

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

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

A total of 111 blasting certificates were issued in 2010. A total of seven blasting certificates were suspended in 2010.

### 2.4.5 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 Health, Safety and Reclamation Code for Mines in British Columbia.

The Province is responsible for certifying miners in several categories of mine rescue, as listed below. The following mine rescue certificates were issued in 2010:

Type	Number Issued
Underground mine rescue	23
Surface (open-pit) mine rescue	249
Gravel pit mine rescue	13
<b>Total certificates issued</b>	<b>285</b>

## 2.5 Accidents and Incidents

### 2.5.1 DANGEROUS OR UNUSUAL OCCURRENCES

Inspectors of Mines are responsible for determining which incidents should be included in the Mines Management System (MMS). These decisions are influenced by workload and staffing levels. In the past few years, Occupational Health and Safety Committees at the mines have been the primary incident investigators, requiring less involvement from inspectors. There were 184 dangerous occurrences entered into MMS in 2010, compared to 157 dangerous occurrences entered in 2009.

Location of Incident	Number of Incidents Reported	% of Total Incidents Reported
Pit	96	52.2
Plant/Mill	32	17.4
Maintenance (Shop)	14	7.6
Maintenance (Field)	8	4.3
Highwall	3	1.6
Dump	7	3.8
Tailings Pond	2	1.1
Office	3	1.6
Dry	0	-
Underground General	2	1.1
Underground Face	0	-
Underground Outbye/Haulage Drift	2	1.1

Work Practice Contributing to Incident	Number of Incidents Reported	% of Total Incidents Reported
Equipment Failure	42	23.0
Inadequate Planning	44	24.0
Inadequate Management	42	23.0
Inadequate Equipment	25	14.0
Poor Work Standards	79	43.0
Abuse or Misuse	6	3.0
Training	68	37.0
Not Following Work Procedures	52	28.0
Operator Error	63	34.0

Equipment Involved	Number of Incidents Reported	% of Total Incidents Reported
Haul Truck	31	16.8
Grader	2	1.1
Loader	4	2.2
Shovel	21	11.4
Dozer	16	8.7
Drill, Surface	11	6.0
Drill, Underground	2	1.1
Pickup	12	6.5
LHD	0	-
Conveyer	5	2.7
Electrical	17	9.2
Explosives	15	8.2
Excavator/Backhoe	10	5.4
Crane	5	2.7
Forklift	1	0.5
Water Truck	0	-
Scraper	0	-
Service Truck	10	5.4

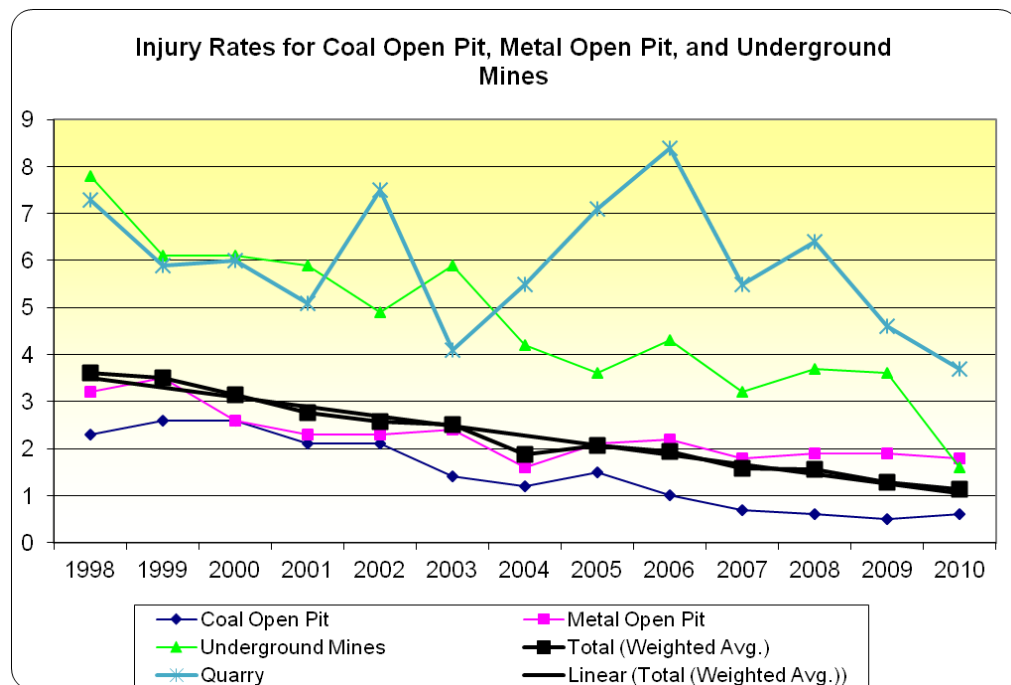
Note: The numbers in the tables shown above are not intended to add up to 100% as there may be several preventative actions, locations, work practices or equipment involved for a single incident.

General Incident Information	Number of Incidents Reported	% of Total Incidents Reported
Number of Persons Involved	231	n/a
Number of Persons Injured	36	n/a
Average Time Into Shift (minutes)	129	n/a
Near Miss	30	16.0
Fire	8	4.0
Geotechnical	3	2.0
Fatality (Mining Related)	0	-
Fatality (Non-mining)	2	1.0

## 2.5.2 INJURY RATES FOR OPEN PIT COAL, OPEN PIT METAL AND UNDERGROUND MINES

According to WorkSafeBC data, the 2010 total estimated injury rate (weighted average) at open pit coal, open pit metal and underground mines in British Columbia was 1.14. This is a decrease from 2009's estimated injury rate of 1.28. 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 2010, the estimated injury rate for open pit metal mines decreased to 1.8 from 1.9 in 2009, and the underground mines rate also decreased to 1.6 from 3.6 in 2009. The estimated injury rates for open pit coal mines increased to 1.6 in 2010 from 1.5 in 2009.



**Figure 1: Injury Rates for Open Pit Coal, Open Pit Metal and Underground Mines in British Columbia, 1998–2010**

To date, WorkSafeBC has accepted a total of 128 short-term disability, long-term disability and fatal claims for 2010, up from 116 in 2009. However, there was a decrease in worker days lost from 10,311 in 2009 to 8,108 in 2010.

## 2.5.3 FATALITIES

There were no mine operating fatalities in B.C. in 2010.



## 3 Administration

### 3.1 Summary of Mine Production

The tables below summarize production and average employment at major British Columbia mine sites in 2010.

#### 2010 Production: Coal Mines

	Annual Rated Plant Capacity (Tonnes)	Actual Tonnes Produced	% of Capacity	Days Mill Operated	Average Employment <sup>1</sup>	Contract Employment
Coal Mountain	3,840,000	2,189,000	57%	208	226	-
Elkview	6,570,000	5,460,000	83%	302	841	-
Fording River	8,395,000	7,535,000	90%	328	1,071	-
Greenhills	4,964,000	4,653,000	94%	341	521	-
Line Creek	3,117,000	2,564,000	82%	300	407	-
Quinsam Coal	1,500,000	700,000	47%	350	122	11

#### 2010 Production: Metal & Precious Metal Mines

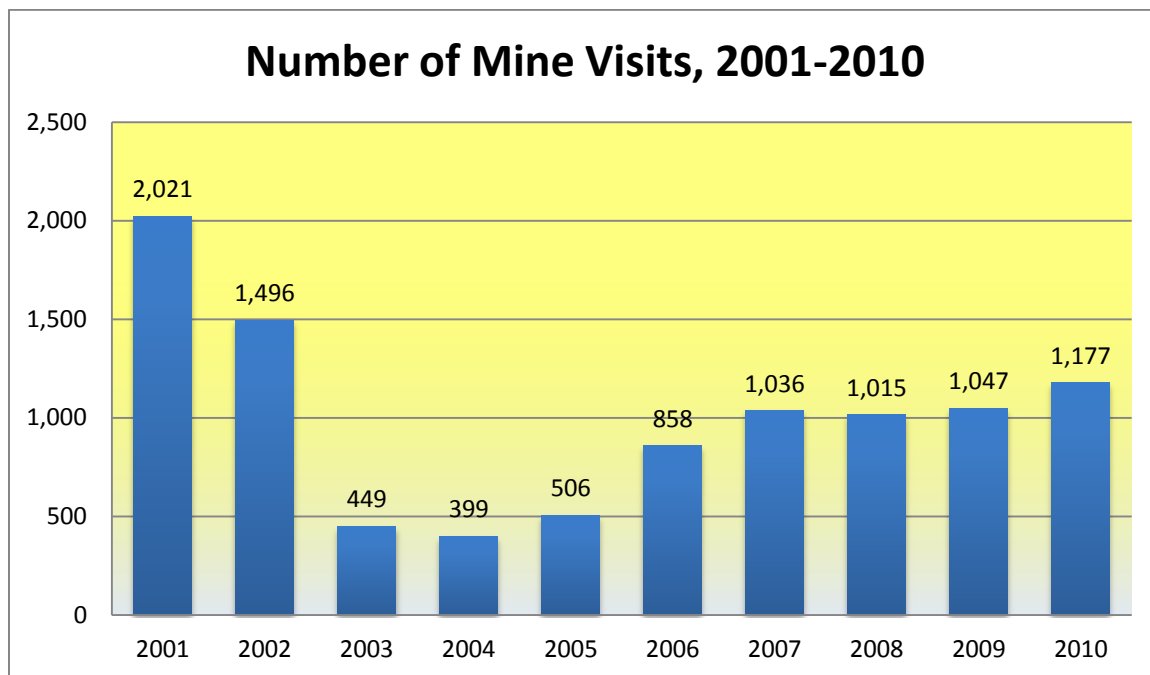
	Annual Rated Mill Capacity (Tonnes)	Actual Tonnes Milled	% of Capacity	Days Mill Operated	Average Employment <sup>1</sup>	Contract Employment
Endako	10,980,000	10,176,000	93%	365	328	14
Gibraltar	16,790,000	13,604,000	81%	358	463	10
Highland Valley Copper	49,640,000	42,488,000	86%	365	1,190	153
Huckleberry	7,000,000	5,684,600	81%	365	233	-
Kemess South	18,800,000	18,748,000	100%	365	291	-
Mount Polley	7,300,000	7,244,000	99%	365	385	-
Myra Falls	1,460,000	502,000	34%	305	284	-

Source: PricewaterhouseCoopers, The Mining Industry in British Columbia 2010 (Mining Industry Survey)

1. Average number of employees actually working during fiscal year.

## 3.2 Mine Visits

The Mines Management System (MMS) allows for the tracking of mine visits and issuances of orders at mines. When an inspector visits a mine, he or she passes on information on issues to which staff from other areas of government may need to attend.



**Figure 2: Number of Mine Visits, 2001–2010**

In 2010, Inspectors of Mines made 1,177 visits to mines, conducted 1,062 inspections, issued 2,802 health and safety orders, and shut down 107 pieces of equipment. Inspectors also issued 95 environmental orders during the year. The following table provides a summary of MMS data on visits to mines made in 2010 by mine type.

Mine Type	Inspections	H&S Orders	Equipment Shutdowns	Environmental Orders	Dangerous Occurrence	Investigations	Training	Other
Abandoned	0	0	0	0	0	0	0	0
Custom Mill	9	14	0	0	2	0	0	1
Coal - Surface	93	326	8	0	122	2	9	5
Coal - Underground	22	28	0	18	0	0	0	0
Coal - Exploration	11	30	2	0	1	0	0	0
Exploration - Surface	94	240	18	16	4	3	1	9
Exploration - Underground	37	93	0	0	1	0	0	2
Industrial Minerals - Surface	47	169	8	3	0	1	0	3
Industrial Minerals - Underground	0	0	0	0	0	0	0	0
Metal Leach - Surface	0	0	0	0	0	0	0	0
Metal Mine - Surface	76	190	8	4	37	3	2	10
Metal Mine - Underground	34	110	2	0	4	0	0	7
Non-Assignable/Unidentified	2	6	0	0	0	1	0	0
Placer - Surface	96	156	9	23	0	0	0	1
Placer - Underground	0	0	0	0	0	0	0	0
Rock Quarry	122	352	12	8	4	2	1	9
Sand/Gravel Pit	419	1,088	40	23	3	1	1	16
TOTALS	1,062	2,802	107	95	178	13	14	63

### 3.3 Mine Health and Safety Auditing Program

The Mine Health and Safety Auditing program is designed to evaluate mines on implementation of their Health and Safety Management Systems for compliance with key sections of the Health, Safety and Reclamation Code for Mines in British Columbia. The audit program has been revised to reflect the 2008 version of the Code, with an emphasis on the findings of Auditing Inspectors. The resulting audit reports reflect 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 increase compliance with the Health, Safety and Reclamation Code for Mines in British Columbia and continue to improve their Health and Safety practices.

In 2010, four initial and two follow-up audits were conducted at the following mines: Baymag Mine, Shasta, Quinsam Coal, Orca Sand and Gravel, Highland Valley Copper and Imasco Minerals Inc.'s Crawford Bay quarry/Sirdar plant.

### 3.4 Notices of Work

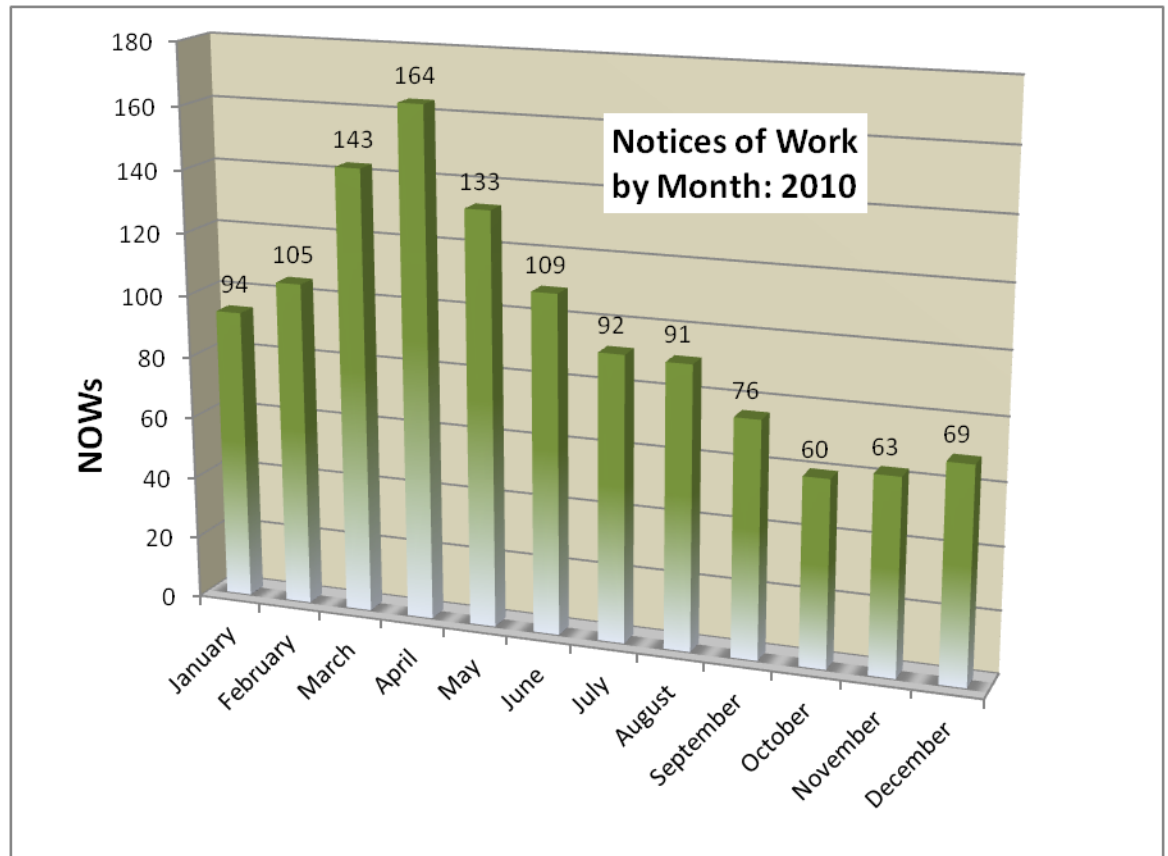
The following Notices of Work and permit information were entered into MMS in 2010.

Type	Notice of Work Applications	Permits Issued	Average # of Days To Issue
Mineral/Coal (Exploration)	509	296	70
Mineral/Coal (other)	78	47	58
Placer	326	190	83
Sand & Gravel	286	159	130
<b>Total</b>	<b>1,199</b>	<b>692</b>	<b>86</b>

The breakdown of the 2010 Notices of Work by area is as follows:

Region	Placer	Sand & Gravel	Mineral & Coal	Total
Central/Northeast	43	67	122	232
Northwest	88	28	141	257
South Central	161	102	152	415
Southeast	29	40	132	201
Southwest	5	49	40	94
<b>Total</b>	<b>326</b>	<b>286</b>	<b>587</b>	<b>1,199</b>

The breakdown of the 2010 Notices of Work by month is as follows:



**Figure 3: 2010 Notices of Work by Month**

The areas covered by the regions are as follows:

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



## 4 Reclamation

---

### 4.1 Roles and Responsibilities

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

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

The environmental protection and reclamation objectives of the Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia are to ensure the following:

- 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; and
- mining and mitigation requirements associated with metal leaching and acid rock drainage (ML/ARD) are conducted in a manner which prevents significant impacts to downstream or on-site biota and minimizes any reduction in post-mining productive capability of the site.

In order to achieve these objectives, the reclamation section:

- conducts detailed technical reviews of new projects or 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 Code;
- inspects mine reclamation activity;
- administers reclamation security deposits on behalf of the Province of British Columbia;
- organizes and participates on/in a number of provincial committees and activities which conduct technology transfer, review Ministry practices, and enhance government/industry/public/academia co-operation, including the Technical and Research Committee on Reclamation, the

Annual Mine Reclamation Symposium, the Selenium Task Force and the Annual ML/ARD Workshop; and

- participates on 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.

#### 4.1.1 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 is provided from other areas of government on geotechnical and mining issues, biological and effluent discharge, and offsite requirements.

## 4.2 Summary of Activities

#### 4.2.1 PERMITTING

The reclamation section enforces the reclamation provisions of the Mines Act through permit conditions and detailed technical reviews aimed at finding environmentally sound, economically viable solutions that enable industry to remain internationally competitive without compromising the province's rigorous environmental standards.

During 2010, permitting activity remained constant with 30 permit amendments being issued. One amendment, Copper Mountain, saw the restart of an old mine.

Type	Permits	Amendments	Total
Metal	0	11	11
Coal	0	19	19
Quarries/Sand & Gravel	0	0	0
Total	0	30	30

Permit amendments were made for Elkview, Fording River, Coal Mountain, Greenhills, Line Creek, Willow Creek, Quinsam, Brule, Wolverine, Copper Mountain, Max, Kemess and Mt. Milligan Mines.

Under the Environmental Assessment Act, reviews were conducted for the Morrison and Roman Coal projects. The reclamation staff also participated on technical working groups for KSM, Chu, Line Creek, Harper Creek, Kitsault and Raven projects.

#### **4.2.2 CO-OPERATION AND CONSULTATION WITH STAKEHOLDERS**

The reclamation section works closely with industry, other government agencies, First Nations and the public to inform them of our activities and ensure that all concerns are considered. For mine applications involving mechanical disturbance of the land surface and/or watercourses, applications are referred to other government agencies, the public, and First Nations where their interests are affected. Additionally, the reclamation section provides regular information and assistance to the Ministry of Environment, Ministry of Transportation and Infrastructure, Environment Canada, First Nations and the public on technical issues involving reclamation.

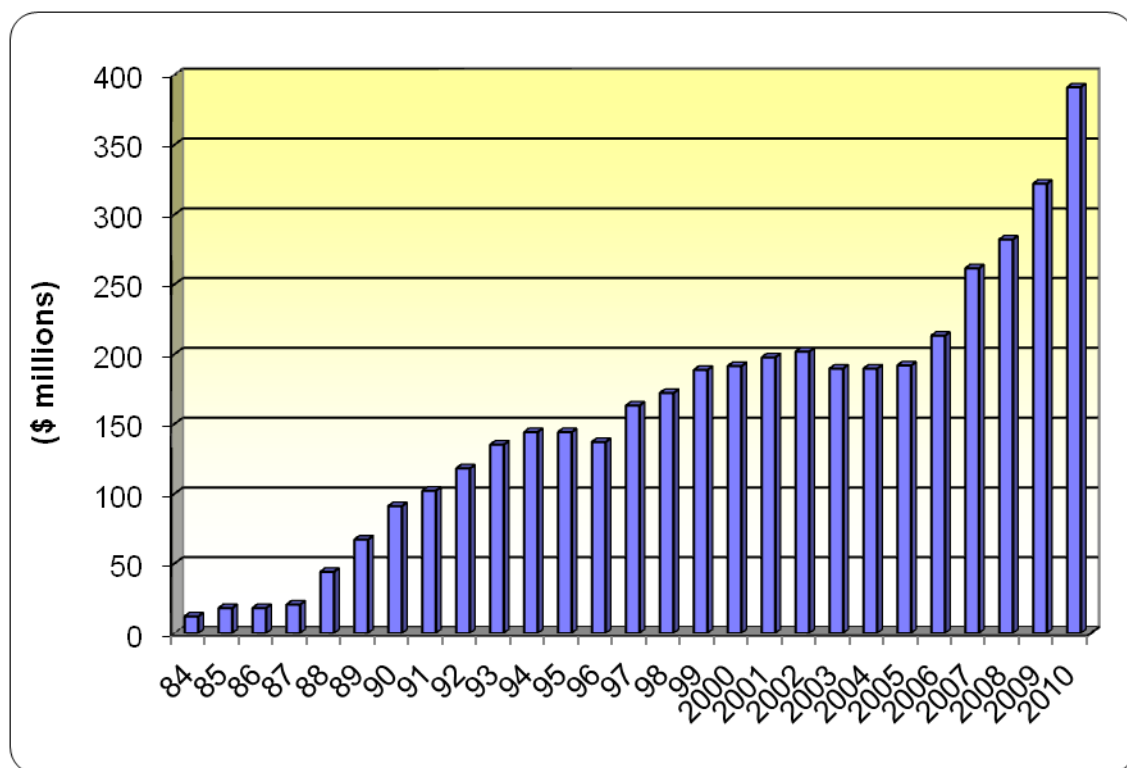
Co-operation facilitated by the reclamation section between industry, the public, government, and the academic community continues to result in a constructive climate for exchanging and disseminating new technology.

#### **4.2.3 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 also inform the public of regulatory conditions and environmental-protection requirements.

#### **4.2.4 RECLAMATION SECURITIES AND FUNDS**

All mines operating in B.C. must deposit security 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 true costs of reclamation. The total value of securities held by the province rose from \$10 million in 1984 to more than \$391 million by the end of 2010.



**Figure 4: Reclamation Security Deposits Held by the Province (Initiation to 2010)**

#### **4.2.5 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 are drawn from the Ministry of Energy, Mines and Petroleum Resources, the Ministry of Environment, the Environmental Assessment Office, mining companies, the Mining Association of B.C., 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.

#### **4.2.6 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 (IGWG). The Advisory Committee consists 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.

#### **4.2.7 MINE RECLAMATION SYMPOSIUM**

The 34th Annual Mine Reclamation Symposium was held from September 20 to 22, 2010 in Courtenay, B.C. This year's theme was "Reclamation from Planning to Closure". Delegates had the opportunity to tour the Mount Washington Remediation Site and BHP's Island Copper Mine.

#### **4.2.8 THE ANNUAL BRITISH COLUMBIA MINE RECLAMATION AWARDS**

The annual Mine Reclamation Award and up to five citations are awarded for outstanding achievement in mine reclamation and have been presented at the British Columbia Mine Reclamation Symposium every year since 1977.

The 2009 British Columbia Jake McDonald Mine Reclamation Award was presented at the 34th Annual Mine Reclamation Symposium in September 2010 to Lehigh Materials for their outstanding reclamation achievements at the Sechelt Mine.

Five citations were also handed out at the 2010 Mine Reclamation Symposium:

- the Mineral Exploration Citation was awarded to Alpha Gold Corp. for their work on the Alpha Gold Lustdust property;
- the Coal Mining Citation was awarded to Teck Coal Ltd. for their work at Elkview Operations;
- the Metal Mining Citation was awarded to Northgate Minerals Corp. for their work at the Kemess South Mine;
- the Quarry Citation was awarded to CertainTeed Gypsum Canada for their work at the Windermere Mining Operation.

#### **4.2.9 METAL LEACHING AND ACID ROCK DRAINAGE WORKSHOP**

The 17th annual Metal Leaching and Acid Rock Drainage Workshop was held in Vancouver on December 2 and 2, 2010. This year, the workshop's theme was "New Developments and Innovations in Drainage Treatment". The workshop was organized by the Ministry of Energy Mines and Petroleum Resources, Natural Resources Canada and the Mine Environment Neutral Drainage (MEND) Program in association with TRCR and the International Network for Acid Prevention (INAP).

### 4.3 Industry Reclamation Record

Since the late 1960s, land occupied by the mining industry has steadily grown. Major coal and metal mines, which occupied less than 1,000 hectares in 1969, had, by the end of 2010, expanded to cover 46,826 hectares. Reclamation (where revegetation has been successfully established for one year or more) has occurred on over 44% of this disturbed land, or 20,701 hectares (Figure 5).

Metal mines have disturbed 24,257 hectares, and 11,516 hectares (or 47%) of this land have been reclaimed (Figure 6). Coal mines have disturbed 22,569 hectares, and 9,185 hectares (or 40%) have been reclaimed (Figure 7). A sharp increase in disturbance and reclamation at mines reflects the construction and development of new mines and the closure and commencement of mine reclamation at others.

The data presented in Figures 5, 6 and 7 indicate that disturbance has been increasing at a faster rate than reclamation. This can largely be explained by the expansion of the mining industry during the past four decades.

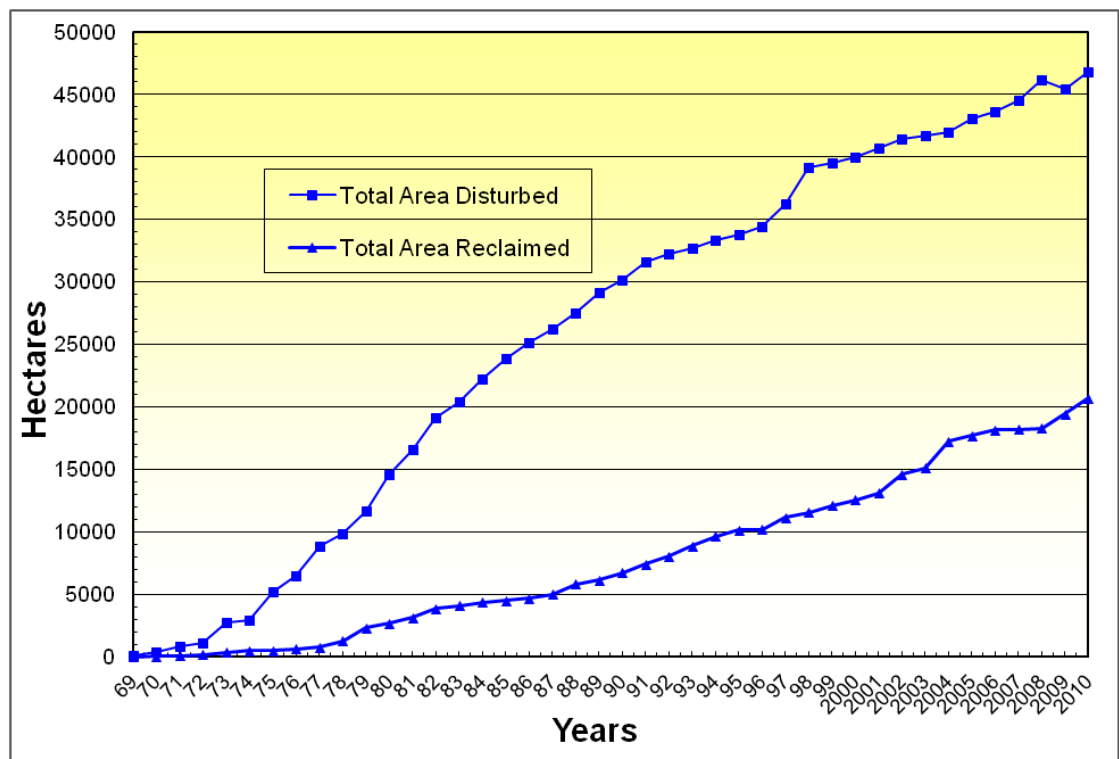


Figure 5: Area Disturbed and Reclaimed by Metal and Coal Mines in B.C., 1969–2010

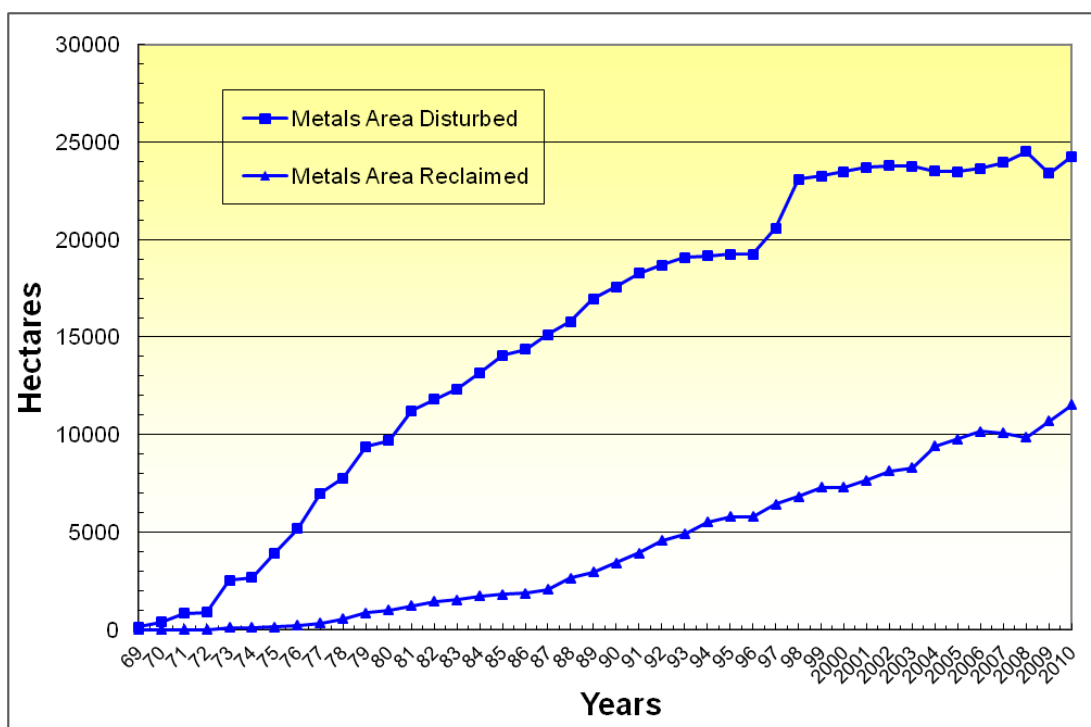


Figure 6: Area Disturbed and Reclaimed by Metal Mines in B.C., 1969–2010

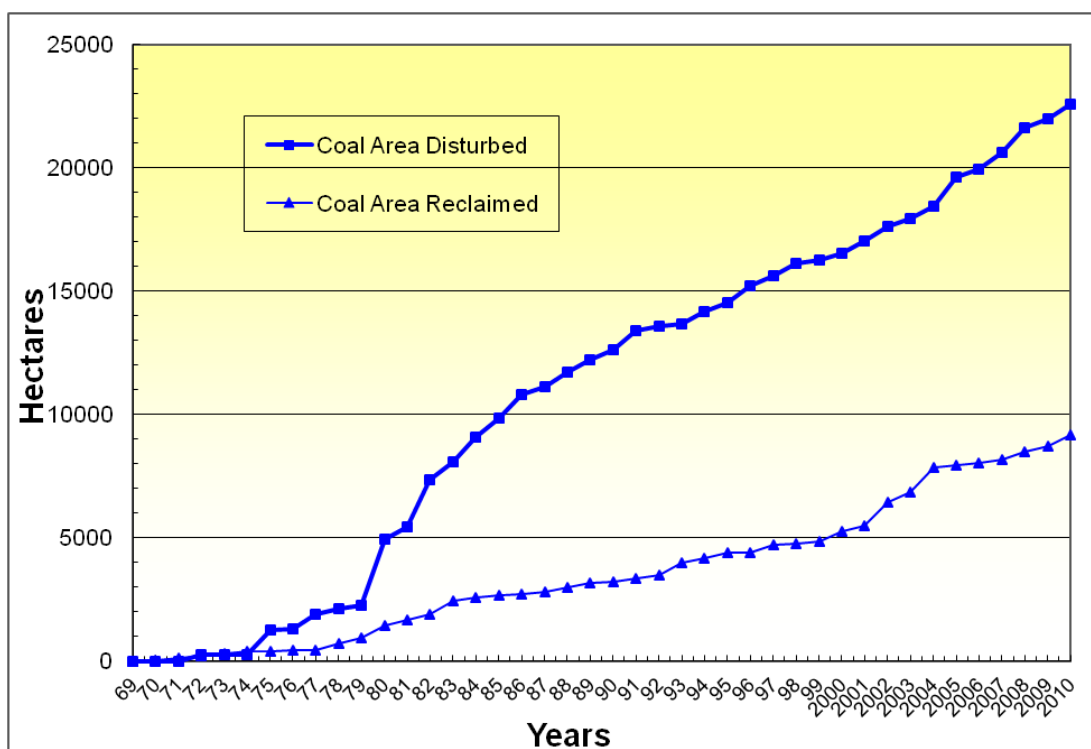


Figure 7: Area Disturbed and Reclaimed by Coal Mines in B.C., 1969–2010

## 4.4 Geotechnical

### 4.4.1 ROLES AND RESPONSIBILITIES

The geotechnical section is responsible for completing inspections at operating and closed mines with the focus on performance of tailings dams, waste dumps, excavations and foundations. Mining projects are reviewed for public health and safety, the safety of mine workers and for protection of land and watercourses.

The geotechnical section provides technical review of proposed mine developments for project approval under the B.C. Environmental Assessment Act and technical review of applications for approval under the Mines Act. The section also tracks geotechnical incidents and carries out follow-up reviews, and responds to mine road enquiries.

The geotechnical section provides geotechnical advice and develops policy for the following:

- Tailings impoundments and dams, sediment control structures, waste rock dumps, and soil overburden dumps;
- Open pits and underground developments;
- Mine roads;
- Risk evaluation for worker protection and public health and safety; and
- Environmental impact of geotechnical projects.

### 4.4.2 SUMMARY OF ACTIVITIES

In 2010, the geotechnical section

- co-ordinated inspections by Ministry staff and contractors;
- issued permits or permit amendments for construction and operation of major structures associated with tailings impoundments and waste rock dumps;
- undertook environmental assessment reviews for several new mine projects; and
- provided input and data for the Audit Teams to follow up at the mines audited.



## 5 For More Information

---

### Ministry Resources

Information about the Ministry of Energy and Mines and copies of Ministry publications are available via the following:

#### MINISTRY WEBSITE

[www.gov.bc.ca/ener](http://www.gov.bc.ca/ener)

#### QUEEN'S PRINTER PUBLICATIONS INDEX WEBSITE

[www.crownpub.bc.ca](http://www.crownpub.bc.ca)

### Enquiry BC

Enquiry BC is a provincial call centre that provides services to all British Columbia residents, on behalf of provincial government ministries, Crown corporations and public agencies. Hours of operation for Enquiry BC are 7:30 a.m. to 5 p.m., Monday through Friday.

- In Victoria: 250-387-6121
- In Vancouver: 604-660-2421
- Elsewhere in British Columbia: 1-800-663-7867
- Outside British Columbia: 1-604-660-2421
- Email address: [EnquiryBC@gov.bc.ca](mailto:EnquiryBC@gov.bc.ca)

Telephone Device for the Deaf (TDD)

- In Vancouver: 604-775-0303
- Elsewhere in British Columbia: 1-800-661-8773

### Mining Operations

Further information on the activities of the various mining companies can be found in the Canadian and American Mines Handbook, which is published annually by Northern Miner Press at [www.northernminer.com](http://www.northernminer.com), or from individual mining operations.

In addition, you can contact the Mining Association of British Columbia (MABC) ([www.mining.bc.ca](http://www.mining.bc.ca)) and/or the Coal Association of Canada (CAC) ([www.coal.ca](http://www.coal.ca)) for annual reports on the status of those sectors.