

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

2011



Ministry of
Energy, Mines
and Natural Gas



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1 Principal Mining Functions

1.1 Mining Health and Safety Function

1.1.1 MANDATE/ACTIVITIES

The Province derives its mining health and safety 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, which comprises labour, industry and government representatives. This committee, chaired by the Chief Inspector of Mines, ensures the Code remains current as new technologies, mining practices and health and safety concerns emerge. The latest version of the Code was released in December 2008.

The Province's key priority, with respect to mine health and safety, is to ensure the health and safety of workers and the public. In keeping with this mandate, the mine health and safety function encompasses the following responsibilities:

- review 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 health and safety program implementation at mines;
- data collection 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.

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 Mines, 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, closure and reclamation 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
- review of draft legislation and policies being developed by other agencies.

In addition to fulfilling health and safety functions outlined in section 1.1 of this report above, Inspectors of Mines from the Ministry of Energy, Mines and Natural Gas (EMNG) 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, First Nations and affected stakeholders 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 as required.

The Province has been working to refine the authorizations process for major mine projects to make it more efficient. Proponents of major mine projects are now encouraged to bundle multiple applications for authorizations to enable a co-ordinated review through Mine Development Review Committees (MDRCs).

A project-specific MDRC is formed for each major mine proposal in British Columbia once the project reaches the Mines Act permitting stage. The MDRC is chaired by the Ministry of Forests, Lands and Natural Resources (FLNRO) project manager assigned to the major mine project and includes representatives from EMNG, FLNRO, the Ministry of Environment, and other relevant provincial agencies. Individual MDRCs may also include representatives from local government, First Nations, or federal agencies. In 2011, EMNG collaborated extensively with FLNRO to provide training and mentoring for project managers and other FLNRO staff who are involved in the co-ordinated authorizations process for major mines.

Inspectors of mines and other provincial staff also provide guidance and assistance to companies and individuals exploring for minerals, and monitor exploration and mining activities in order to provide advice to government.

1.2.2 2011 SECTOR HIGHLIGHTS

A global recovery in commodity prices helped fuel growth in B.C.'s mineral exploration and mining sector in 2011. According to Natural Resources Canada, the production value of B.C. mining rose to \$8.6 billion in 2011, a 20% increase over 2010. Estimates generated by the Province's regional geologists indicated that exploration expenditures in British Columbia were over \$460 million for 2011. This was also another busy year for mine development, with approximately 20 large projects moving through the permitting process.

In August 2011, the Province released *Canada Starts Here: The BC Jobs Plan*. It identified mining as one of British Columbia's eight key sectors for continued economic growth and contains a number of targets related to mineral exploration and mining, including the following:

- eight new mines and nine mine expansions by 2015
- Reduce the backlog of permit applications (Notices of Work) for exploration
- Maintain an average 60-day turnaround time for processing Notices of Work for exploration from 2013 onwards

Throughout 2011, the mining administration function was modified in order to make progress on these BC Jobs Plan commitments.

Increased exploration and mining activity means increased benefits for communities, First Nations and the provincial economy. It also means that government's mining health and safety and administration functions are more important than ever. British Columbia's *Mineral Exploration and Mining Strategy*, released by the Province in May 2012, builds on commitments made in the BC Jobs Plan and helps guide the Province's mining health and safety and administration functions as they continue to develop to meet the needs of this dynamic sector.



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 for mines in British Columbia.

The Health, Safety and Reclamation Code for Mines in British Columbia requires Mine Managers to 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 hazards can include 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 also provide assistance in program development.

A written preventative training program that educates 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 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 2011, there was one person in the OH group with a specialty in industrial hygiene.

2.1.3 SUMMARY OF ACTIVITIES

In 2011, the OH group

- conducted onsite inspections of mines to fulfill its mandate to monitor workplace conditions;
- participated in health and safety audits at mines;
- responded to worker concerns regarding exposures to health hazards such as respirable silica; and
- organized the Mine Safety Awards.

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 in B.C. 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 2011, 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 mechanical and electrical engineering section also worked with the provincial audit group and participated in or provided input for four new mine audits in 2011.

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 of 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 2011, mechanical 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). Standards were finalized in 2011 for both the mobile crane and the articulating boom crane.

Electrical Engineering

In 2011, electrical inspectors performed electrical inspections at major mines and large sand and gravel operations across the province, as well as at some smaller sand and gravel/quarry operations. Several new operations required extra inspections and reviews 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 2011 review committee for CSA Standard M421-11 (Use of Electricity in Mines). This standard was completed in 2011.

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 Code 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 mine plans by conducting superior research and introducing innovative techniques to restore the land.

2.3.2 MINE RESCUE COMPETITIONS

The 56th annual Provincial Mine Rescue and First Aid Competition was held at the Revelstoke Community Centre in Revelstoke on June 11, 2011. 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 sector.

Underground Mine Rescue – Overall Winner

The overall winner of the Underground Mine Rescue trophy in 2011 was New Gold Inc.'s New Afton mine rescue team.

Surface Mine Rescue – Overall Winner

The team from Teck's Elkview Operations won the overall Surface Mine Rescue Trophy in 2011.

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 2011, the mine rescue team from Teck's Elkview Operations won the award for best bench for a surface team.

Underground Bench Competition

The underground bench competition originated in 1978. This competition is held in memory of the late Barry Abbott, Captain of the Cominco HB mine rescue team, which won the Canadian Championship in 1976. In 2011, the Barry Abbot Memorial Trophy was won by the mine rescue team from New Gold Inc.'s New Afton mine.

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. New Gold Inc.'s New Afton mine rescue team won the Keith Bracewell Memorial Award in 2011.

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 component of the underground mine rescue competition.

Underground First Aid

This award, known as the Sullivan Cup, was originally introduced by Cominco Ltd. to recognize the best first aid by an underground mine rescue team. In 2011, the Sullivan Cup was presented to the mine rescue team from Myra Falls.

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 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 2011 three-person first aid winning team was from Quinsam Coal Corporation. Quinsam Coal Corporation also won the 2011 Kathy Lofstrom Memorial Trophy for best coach of a first aid team.

2.3.4 50TH ANNUAL MINE SAFETY AWARDS

The 50th Annual Mine Safety Awards were handed out to 15 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, 2011. Recipients were celebrated at a banquet in Revelstoke, B.C. on June 9, 2012. 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 2011.

Large Underground Mine Safety Award

This award was created in 2010 to recognize safety excellence in underground mines 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 worker 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 2011 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. The 2011 recipient was Teck's Line Creek 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. The recipient for 2011 was Walter Energy Western Coal's Brule 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 2011 award was shared by six mines:

- Central Aggregates (Lafarge Canada Inc.)
- Coquitlam Sand and Gravel (Lafarge Canada Inc.)
- Orca Sand and Gravel Ltd.
- Pit D (Allard Contractors Ltd.)
- Pitt River Quarries (Division of Lafarge Canada Inc.)
- Sechelt Mine (Lehigh Materials)

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 an injury-frequency ratio of zero. There were a total of six mines that qualified for certificates for work conducted in 2011:

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

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.

At the 50th annual Mine Safety Awards, three Ministry of Energy, Mines and Natural Gas employees were awarded with the Chief Inspector's Recognition Award for outstanding career contributions to health and safety: Richard Booth, Garry MacDonald and Terry Paterson.

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 to British Columbia mines in 2012 (for 2011 performance).

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. 2011 board members were A. Hoffman, E. Taje, R. Thorpe, R. Booth and D. Howe. 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 reviews of suspended certificates;
- administering blasting certificates; and
- reviewing qualifications and ensuring certification validity among other provinces.

2.4.2 SHIFTBOSS CERTIFICATES

The following table summarizes shiftboss certification activity in 2011:

Activity	New Certificates
Examinations written (surface)	76
Examinations written (underground)	56
Number passed (surface)	76
Number passed (underground)	56
Total permanent certificates issued	264

One shiftboss certificate was suspended in 2011.

2.4.3 TOTAL UNDERGROUND COAL FIREBOSS CERTIFICATIONS

No underground coal fireboss certificates were issued in 2011.

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 193 blasting certificates were issued in 2011, and 3 blasting certificates were suspended.

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 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 2011:

Type	Number Issued
Underground mine rescue	41
Surface (open-pit) mine rescue	268
Gravel pit mine rescue	5
Total certificates issued	314

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 Mine 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 237 dangerous occurrences entered into MMS in 2011, compared to 184 dangerous occurrences entered in 2010.

Location of Incident	Number of Incidents Reported	% of Total Incidents Reported
Pit	119	50.2
Plant/Mill	33	13.9
Maintenance (Shop)	17	7.2
Maintenance (Field)	14	5.9
Highwall	1	0.4
Dump	18	7.6
Tailings Pond	2	0.8
Office	2	0.8
Dry	2	0.8
Underground General	2	1.1
Underground Face	1	0.4
Underground Outbye/Haulage Drift	0	0.0

Work Practice Contributing to Incident	Number of Incidents Reported	% of Total Incidents Reported
Equipment Failure	56	24.0
Inadequate Planning	70	30.0
Inadequate Management	48	20.0
Inadequate Equipment	35	15.0
Poor Work Standards	49	21.0
Abuse or Misuse	6	3.0
Training	67	28.0
Not Following Work Procedures	114	48.0
Operator Error	140	59.0

Equipment Involved	Number of Incidents Reported	% of Total Incidents Reported
Haul Truck	62	26.2
Grader	6	2.5
Loader	13	5.5
Shovel	19	8.0
Dozer	36	15.2
Drill, Surface	11	6.0
Drill, Underground	1	0.4
Pickup	13	5.5
LHD	0	0.0
Conveyer	6	2.5
Electrical	18	7.6
Explosives	9	3.8
Excavator/Backhoe	11	4.6
Crane	8	3.4
Forklift	1	0.4
Water Truck	1	0.4
Scraper	2	0.8
Service Truck	7	3.0

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	253	n/a
Number of Persons Injured	38	n/a
Average Time Into Shift (minutes)	90	n/a
Near Miss	99	42.0
Fire	14	6.0
Geotechnical	3	2.0
Fatality (Mining Related)	0	-
Fatality (Non-mining)	4	-

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

According to WorkSafeBC data, the 2011 total estimated injury rate (weighted average) at open pit coal, open pit metal and underground mines in British Columbia was 1.29. This is an increase from 2010's estimated injury rate of 1.12. 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 2011, the estimated injury rate for open pit metal mines decreased from 1.8 in 2010 to 1.5, and increased for open pit coal mines from 0.6 to 0.9. The estimated injury rate for underground mines rate also increased, from 1.5 in 2010 to 2.9 in 2011.

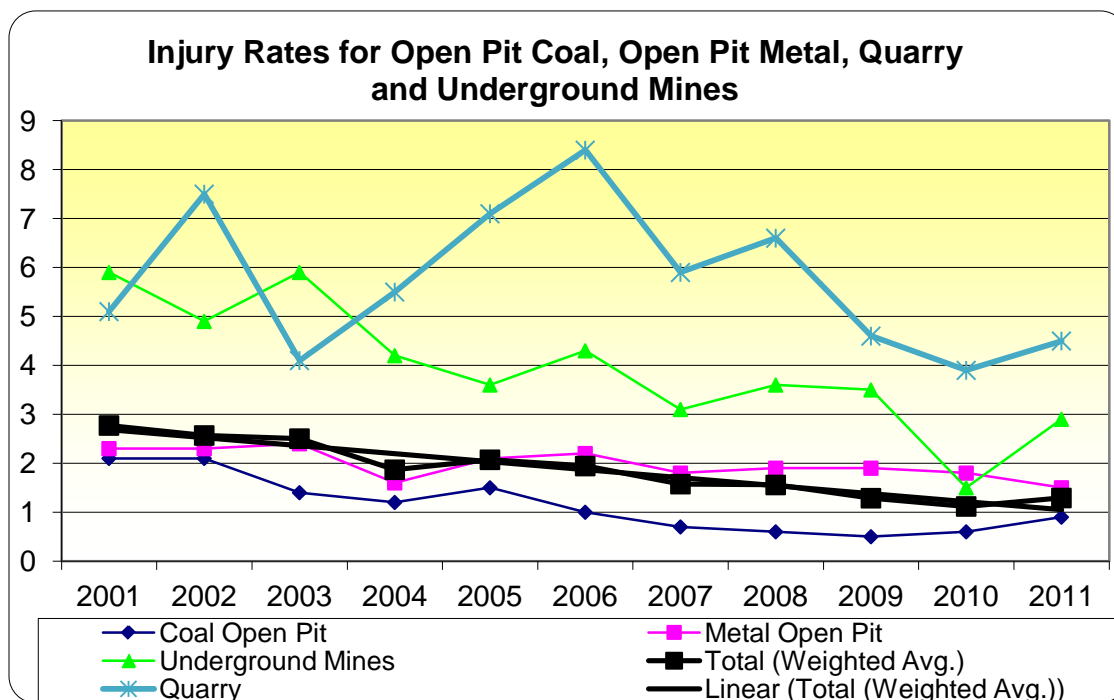


Figure 1: Injury Rates for Open Pit Coal, Open Pit Metal, Quarry, and Underground Mines in British Columbia, 2001–2011

To date, WorkSafeBC has accepted a total of 171 short-term disability, long-term disability and fatal claims for 2011, up from 128 in 2010. There was also an increase in worker days lost from 8,108 in 2010 to 8,880 in 2011.

2.5.3 FATALITIES

There were no mine operation-related fatalities in B.C. in 2011.



3 Administration

3.1 Summary of Mine Production

The tables below summarize production and average employment at major mines in British Columbia in 2011.

2011 Production: Coal Mines	Annual Rated Plant Capacity (Tonnes)	Actual Tonnes Produced	% of Capacity	Days Mill Operated	Average Employment ¹	Contract Employment
Coal Mountain	3,050,000	2,189,000	57%	208	226	-
Elkview	4,400,000	5,460,000	83%	302	841	-
Fording River	8,701,000	7,535,000	90%	328	1,071	-
Greenhills	5,100,000	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	7
Willow Creek	2,500,000	661,000	26%	274	102	408
Wolverine	1,500,000	1,925,000	55%	365	477	-

2011 Production: Metal & Precious Metal Mines	Annual Rated Mill Capacity (Tonnes)	Actual Tonnes Milled	% of Capacity	Days Mill Operated	Average Employment ¹	Contract Employment
Copper Mountain	12,775,000	3,566,000	28%	122	304	-
Endako	10,980,000	10,652,000	97%	365	386	-
Gibraltar	20,075,000	15,180,000	76%	354	472	10
Highland Valley Copper	49,640,000	42,284,000	85%	366	1,190	164
Huckleberry	7,000,000	5,930,000	85%	365	228	-
Mount Polley	7,790,000	7,244,000	99%	365	370	-

Source: PricewaterhouseCoopers, Forging Ahead: The Mining Industry in British Columbia 2011 (Mining Industry Survey)

¹ Average number of employees working during fiscal year.

3.2 Mine Visits

The Mine 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.

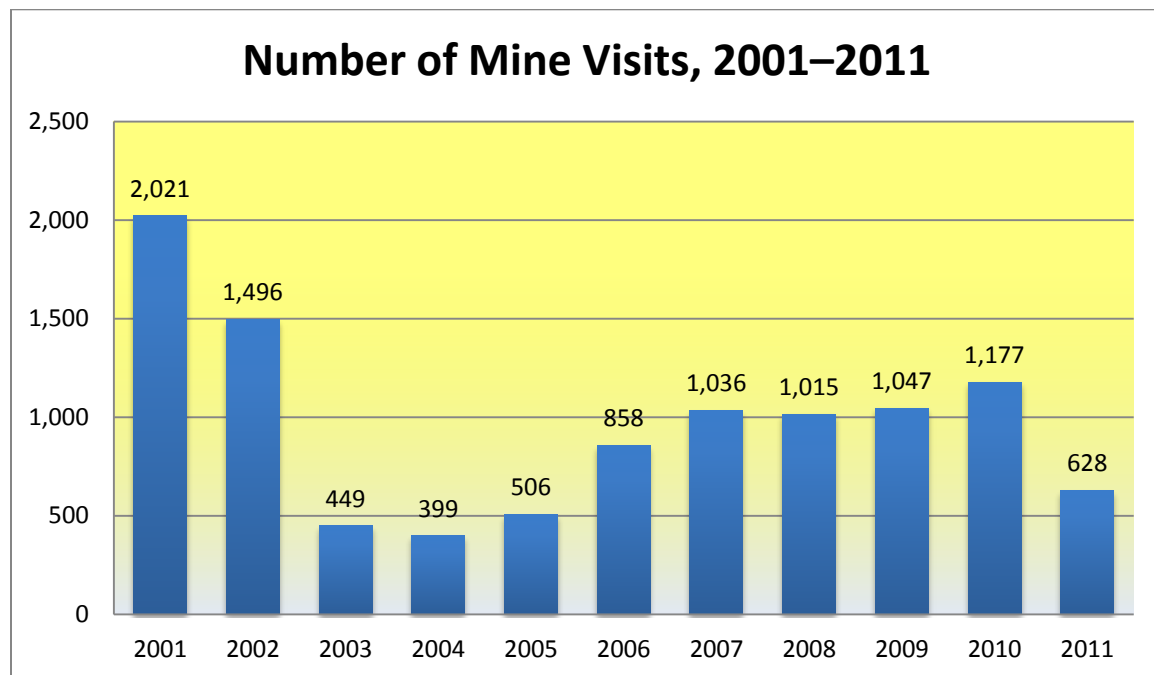


Figure 2: Number of Mine Visits, 2001–2011

In 2011, Inspectors of Mines made 628 visits to mines, conducted 494 inspections, issued 1,687 health and safety orders, and shut down 61 pieces of equipment. Inspectors also issued 61 environmental orders during the year. The following table provides a summary of MMS data on visits to mines made in 2011 by mine type.

Mine Type	Inspections	H&S Orders	Equipment Shutdowns	Environmental Orders	Dangerous Occurrence	Investigations	Training	Other
Abandoned	3	0	0	1	0	0	0	1
Custom Mill	3	3	1	1	6	1	0	2
Coal - Surface	30	135	2	0	159	0	6	12
Coal - Underground	9	31	0	5	0	0	1	1
Coal - Exploration	6	30	1	1	3	0	0	1
Exploration - Surface	58	165	8	14	16	0	2	11
Exploration - Underground	15	77	0	1	2	0	0	0
Industrial Minerals - Surface	20	84	0	7	3	0	0	1
Industrial Minerals - Underground	0	0	0	0	0	0	0	0
Metal Leach - Surface	1	0	0	0	0	0	0	1
Metal Mine - Surface	40	124	3	4	33	2	4	16
Metal Mine - Underground	21	149	5	0	2	0	3	14
Non- Assignable/ Unidentified	0	6	0	0	0	0	0	0
Placer - Surface	39	65	0	12	0	0	0	3
Placer - Underground	1	0	0	0	0	0	0	0
Rock Quarry	69	202	5	3	4	0	0	9
Sand/Gravel Pit	179	622	36	16	1	3	0	22
TOTALS	494	1693	61	65	229	6	16	72

3.3 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 sections of the Code. 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 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 increase compliance with the Code and continue to improve their health and safety practices.

In 2011, four follow-up audits were conducted at the following mines: Baymag, Quinsam, Highland Valley Copper, and Orca Sand and Gravel. Additionally, one initial audit was conducted at the Copper Mountain mine.

3.4 Notices of Work

The following Notices of Work and permit information were entered into MMS in 2011.

Type	Notice of Work Applications	Permits Issued	Average # of Days To Issue
Mineral/Coal (Exploration)	615	344	100
Mineral/Coal (other)	81	46	78
Placer	270	153	94
Sand & Gravel	175	130	145
Total	1,141	673	104

The breakdown of the 2011 Notices of Work by area is as follows:

Region	Placer	Sand & Gravel	Mineral & Coal	Total
Central/Northeast	37	59	187	283
Northwest	63	19	160	242
South Central	137	44	168	349
Southeast	28	25	150	203
Southwest	5	28	31	64
Total	270	175	696	1,141

The breakdown of the 2011 Notices of Work by month is as follows:

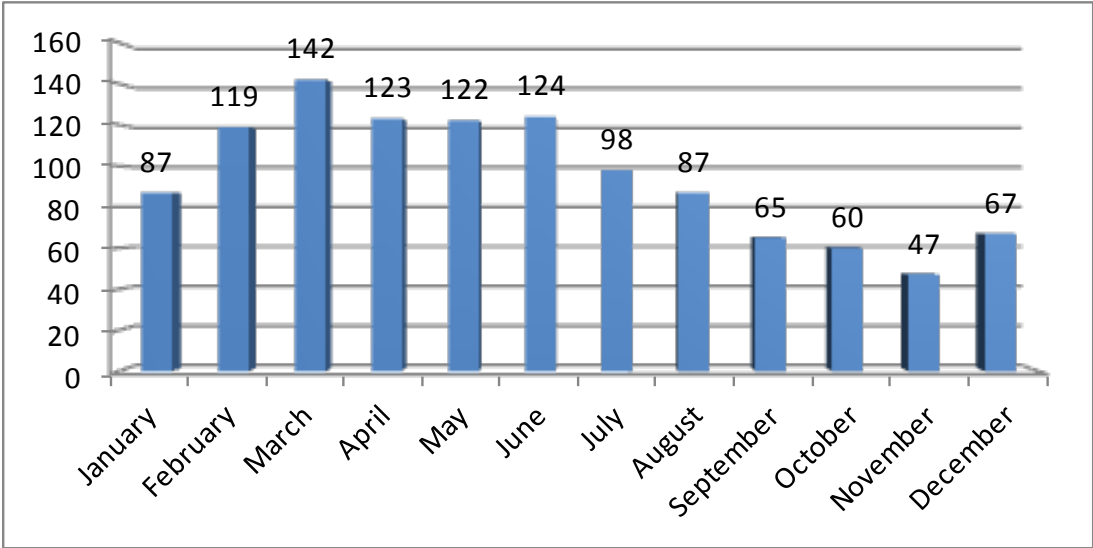


Figure 3: 2011 Notices of Work by Month

The areas covered by the regions are as follows:

- 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



4 Reclamation

4.1 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.

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 completed.

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

- 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 that prevents significant impacts to downstream or onsite biota as 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 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 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;
- organizes and participates in various provincial committees and activities that review and highlight ministry practices, as well as government

cooperation with industrial, public and academic institutions (examples include the Technical and Research Committee on Reclamation, the Annual Mine Reclamation Symposium, the Selenium Task Force and the Annual ML/ARD Workshop).

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 for biological and effluent discharge and offsite requirements is provided from other areas of government.

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 British Columbia's rigorous environmental standards.

During 2011, activity remained steady with 25 permit amendments being issued, including amendments allowing for expansions at five mine operations: Fording River, Mount Polley, Highland Valley Copper, Willow Creek and Huckleberry. Other permit amendments were issued to Greenhills, Line Creek, Quinsam, Wolverine, Max, Myra Falls, Basin Coal, Riondel, Tulsequah, Trend and Equity Silver mines. One new permit was issued to Barkerville Gold Mines Ltd. for the Bonanza Ledge project.

Type	Permits	Amendments	Total
Metal	1	12	13
Coal	0	11	11
Quarries/Sand & Gravel	0	1	1
Total	1	24	25

Under the Environmental Assessment Act, reviews were conducted for the Morrison and Roman Coal projects. The reclamation staff also participated in technical working groups for KSM, Chu Molybdenum, 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 \$458 million by the end of 2011.

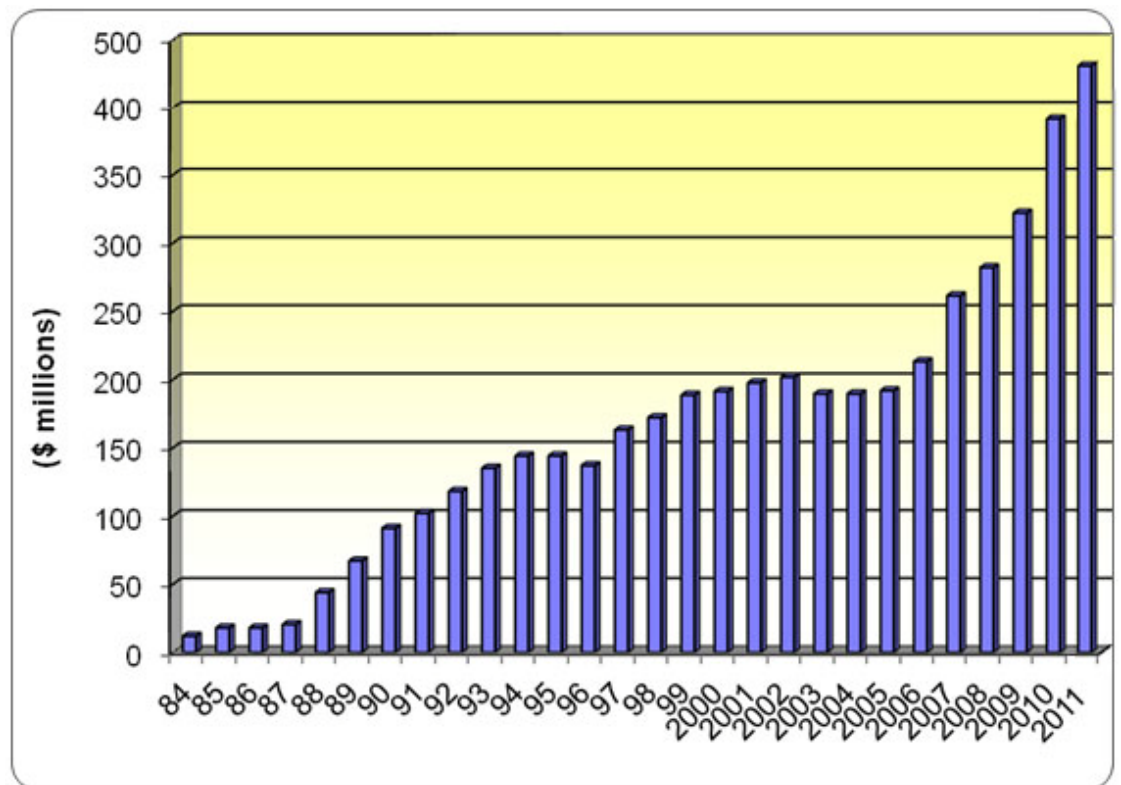


Figure 4: Reclamation Security Deposits Held by the Province (Initiation to 2011)

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 Natural Gas, the Ministry of Environment, the Environmental Assessment Office, mining companies, the Mining Association of British Columbia, 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. 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 35th Annual Mine Reclamation Symposium was held in collaboration with the 6th Annual Mine Closure conference at the historic Fairmont Chateau Lake Louise in Alberta September 18–21, 2011. The conference offered delegates the opportunity to participate in eight pre-conference short courses, fifteen plenary speeches, a total of 124 technical presentations during five parallel breakout sessions, a tour of Suncor’s fully reclaimed tailings impoundment in Fort McMurray, and two post-conference tours to Hinton, Alberta and Kimberley, British Columbia.

4.2.8 THE ANNUAL BRITISH COLUMBIA MINE RECLAMATION AWARDS

The Jake McDonald 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 2010 British Columbia Jake McDonald Mine Reclamation Award was presented at a reception in Vancouver on November 30, 2011 to Northgate Minerals Corporation for their outstanding reclamation achievements at the Kemess South Mine, located approximately 300 km northwest of Prince George.

Two additional citations were handed out at the 2011 Mine Reclamation Symposium:

- The Metal Mining Citation was awarded to Thompson Creek Metals Company for recognizing the value of direct placement of salvaged soil at their Endako Mine, located approximately half way between Prince George and Smithers.
- The Sand and Gravel Citation was awarded to Lafarge Canada Inc. for their innovative practices, partnership development, and commitment to progressive reclamation at Abbotsford Gravel Sales Ltd.

4.2.9 METAL LEACHING AND ACID ROCK DRAINAGE WORKSHOP

The 18th annual Metal Leaching and Acid Rock Drainage Workshop was held in Vancouver on November 30 and December 1, 2011. The theme of this year’s workshop was “Evolution of Mine Drainage Chemistry and Performance Mitigation”. The workshop was organized by the Ministry of Energy Mines and Natural Gas, Natural

Resources Canada and the Mine Environment Neutral Drainage (MEND) program in association with the BC Technical and Research Committee on Reclamation.

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 2011, expanded to cover 49,414 hectares. Reclamation (where revegetation has been successfully established for one year or more) has occurred on over 40% of this disturbed land, or 19,885 hectares (Figure 5).

Metal mines have disturbed 25,649 hectares, and 11,408 hectares (or 447%) of this land have been reclaimed (Figure 6). Coal mines have disturbed 23,765 hectares, and 9,473 hectares (or 35%) have been reclaimed (Figure 7). An increase in disturbance and decrease in reclamation at mines reflects the construction and development of new mines and the expansion and redevelopment at older mines.

The data presented in Figures 5, 6 and 7 indicates the expansion of the mining industry during the past four decades.

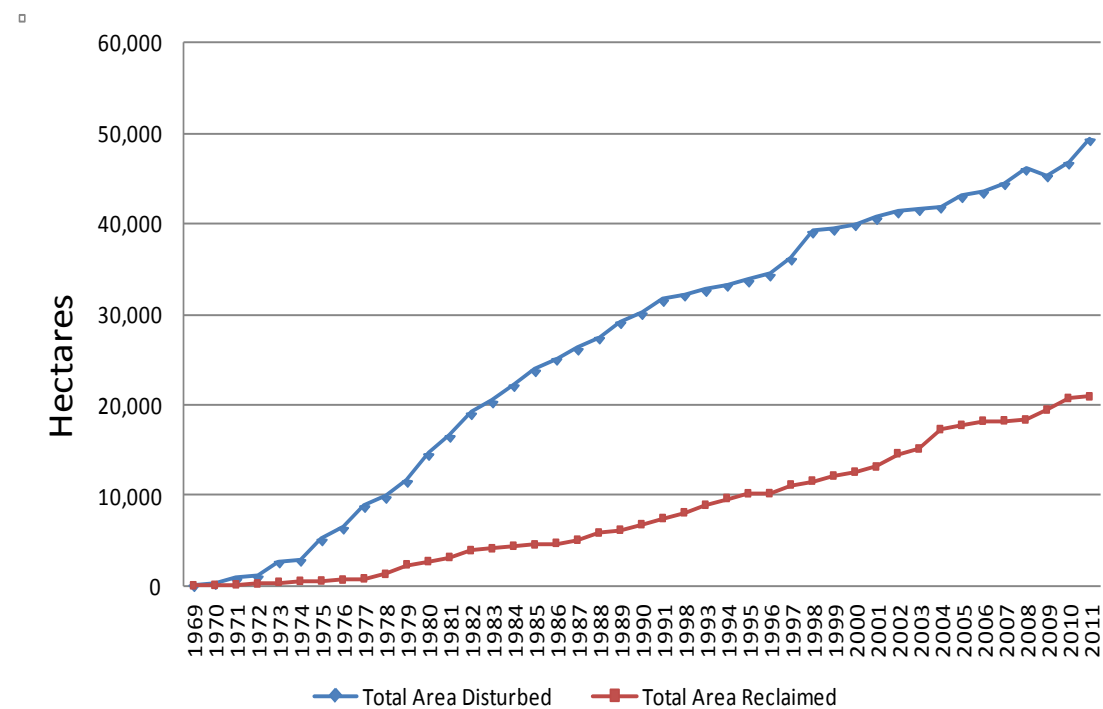


Figure 5: Area Disturbed and Reclaimed by Metal and Coal Mines in B.C. (1969–2011)

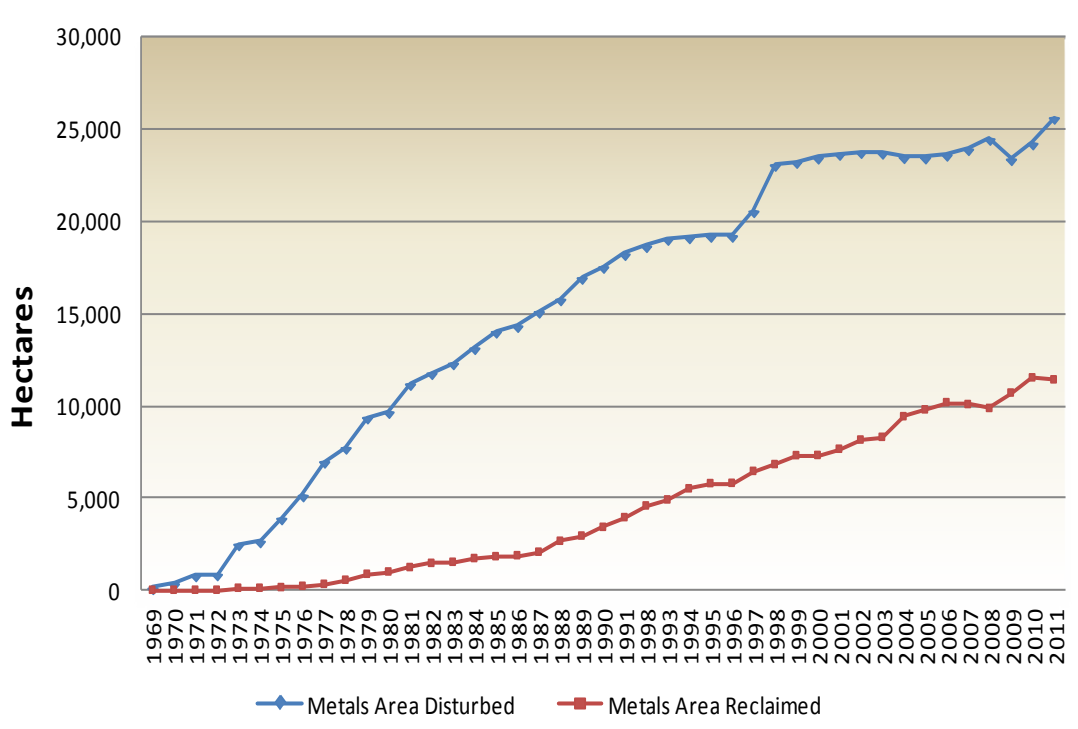


Figure 6: Area Disturbed and Reclaimed by Metal Mines in B.C. (1969–2011)

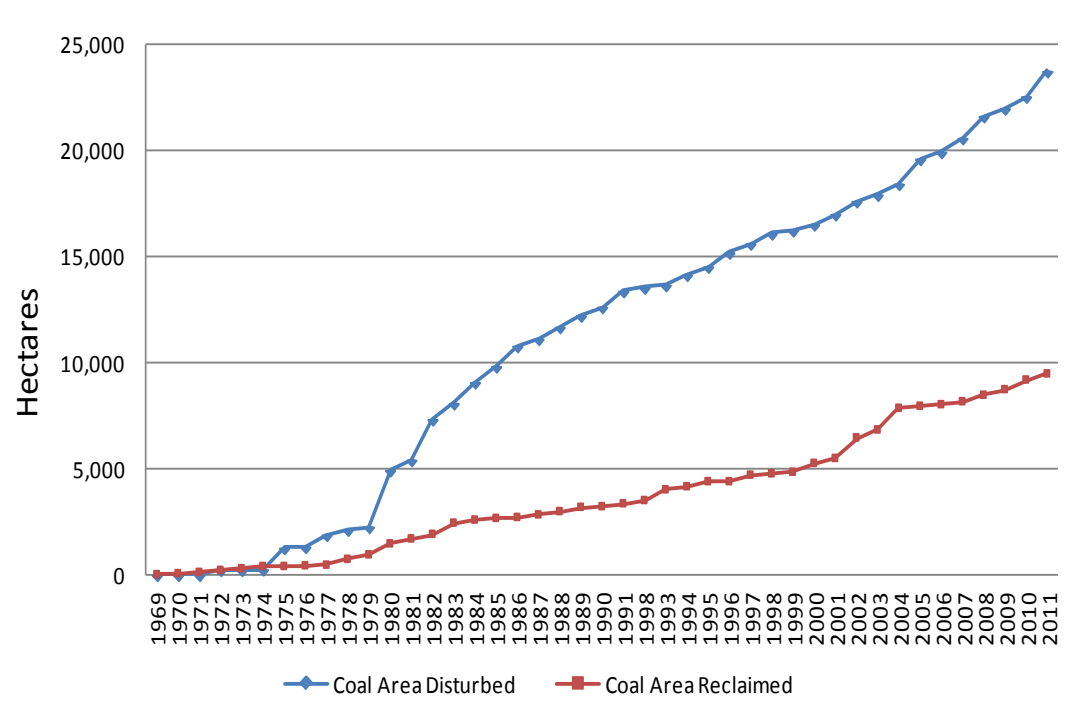


Figure 7: Area Disturbed and Reclaimed by Coal Mines in B.C. (1969–2011)

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 rock dumps, open pit slopes, and underground openings. Mining projects are reviewed for the health and safety of the public and mine workers and for protection of the environment.

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

The Geotechnical Section provides geotechnical advice and policy development for the following:

- Tailings impoundments, dams, and sediment control structures;
- 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.

4.4.2 SUMMARY OF ACTIVITIES

In 2011, the geotechnical section

- co-ordinated geotechnical inspections by ministry staff and contractors;
- developed geotechnical permit conditions for the construction and operation of major mine structures including tailings impoundments and waste rock dumps;
- undertook environmental assessment reviews for new mine projects; and
- reviewed annual reports for tailings facilities, waste rock dumps and pit walls.



5 For More Information

Ministry Resources

Information about the Ministry of Energy, Mines and Natural Gas and copies of Ministry publications are available from the following resources.

MINISTRY WEBSITE

www.gov.bc.ca/ener

QUEEN'S PRINTER PUBLICATIONS INDEX WEBSITE

www.crownpub.bc.ca

Enquiry BC

Enquiry BC is a provincial call centre that, on behalf of provincial government ministries, provides services to all British Columbia residents, 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

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, or from individual mining operations.

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