



Annual Report of the Chief Inspector of Mines 2006



Ministry of
Energy, Mines and
Petroleum Resources

A Message From the Chief Inspector



The Chief Inspector of Mines is appointed by the Minister of Energy, Mines & Petroleum Resources to administer and enforce the *Mines Act* and the Health, Safety and Reclamation Code for Mines in British Columbia.

The purpose of the Code is fourfold:

- Protect employees and others from undue risks to their health and safety;
- Safeguard the public from risk associated with mining;
- Protect and reclaim land and watercourses affected by mining; and
- Monitor the extraction of mineral and coal resources and ensure maximum extraction with a minimum of environmental disturbance.

The Chief Inspector of Mines is also the director of the Mining Health & Safety Function, which operates through a central office in Victoria and four regional offices: Cranbrook, Kamloops, Prince George and Smithers; and a satellite office in Fernie. In October of 2006, Mr. Fred Hermann, Chief Inspector since 1995, retired from the Ministry. The position was filled on an interim basis by Mr. Ricci Berdusco, until a permanent appointment was made the following year.

One of the key responsibilities of the office is an annual report detailing the status of mines and mining activities in the Province of British Columbia. I am pleased to transmit this Annual Report for 2006.

The Ministry and the office of the Chief Inspector will continue to work closely with industry, workers, and the community to ensure that the province continues to enable the extraction of our many valuable mineral resources with the highest standards of safety, environmental responsibility, and community sustainability. This effort continues to ensure that mining is among the safest heavy industries in the Province of British Columbia.

Respectfully Submitted,



Douglas E. Sweeney
Chief Inspector of Mines

Table of Contents



1	Principal Mining Functions	1
1.1	Mine 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
2	Health & Safety	3
2.1	Occupational Health Group	3
2.1.1	Roles and Responsibilities	3
2.1.2	Structure and Organization	3
2.1.3	Summary of Activities	3
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	5
2.3.3	First Aid Competitions	7
2.3.4	44th Annual Safety Awards	8
2.3.5	45th Annual Safety Awards	9
2.3.6	Certificates of Achievement	9
2.3.7	National Safety Awards - John T. Ryan Trophies	10
2.4	Examinations and Certifications	10
2.4.1	Board of Examiners	11
2.4.2	Shiftboss Certificates	11
2.4.3	Shiftboss Certificate Suspensions	11
2.4.4	Total Underground Coal Fireboss Certifications	11
2.4.5	Blasting Certificates	11
2.4.6	Mine Rescue Certifications	12
2.5	Accidents and Incidents	12
2.5.1	Dangerous or Unusual Occurrences	12
2.5.2	Fatalities	15

3	Administration	16
3.1	Summary of Mine Production	16
3.2	Volume of Inspections	17
3.3	Audit Program	19
3.4	Notices of Work	19
4	Reclamation	21
4.1	Roles and Responsibilities	21
4.1.1	Structure and Organization	22
4.2	Summary of Activities	22
4.2.1	Permitting	22
4.2.2	Cooperation and Consultation with Stakeholders	23
4.2.3	Metal Leaching and Acid Rock Drainage (ML/ARD)	23
4.2.4	Reclamation Securities and Funds	23
4.2.5	Technical and Research Committee on Reclamation	24
4.2.6	National Orphaned/Abandoned Mine Initiative (NOAMI)	24
4.2.7	Mine Reclamation Symposium	25
4.2.8	The Annual British Columbia Mine Reclamation Award	25
4.2.9	Metal Leaching and Acid Rock Drainage Workshop	26
4.3	Industry Reclamation Record	26
4.4	Geotechnical/Mining Roads	29
4.4.1	Roles and Responsibilities	29
4.4.2	Summary of Activities	29
5	For More Information	30



1 Principal Mining Functions

1.1 Mine Health and Safety Function

1.1.1 MANDATE/ACTIVITIES

The Mining Health & 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, composed of representatives from labour, industry and government, and chaired by the Chief Inspector. The code review committee ensures that the Code remains current with new technology, mining practices and health and safety concerns. The current edition of the Code was released in 2003, with a reprint in 2004 updating the uranium/thorium section.

With respect to health and safety, the key mandate of the division is to ensure the health and safety of workers and the public. In order to accomplish this mandate, the division functions include:

- review of health and safety related aspects of mining and exploration proposals;
- mine inspections and the monitoring of mining activity for conformance with the *Mines Act* and Code;
- the approval of mine plans with regard to health and safety concerns;
- the completion of audits to evaluate how well a health and safety program has been implemented at a mine;
- the 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 health and safety.

Additional guidance for Division activities is derived from the *B.C. Mining Plan*. The *Mine Plan* centres on the promotion of four Cornerstones:

- Focus on communities and First Nations
- Protecting workers, protecting the environment
- Achieving global competitiveness
- Assuring 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. The station is under the supervision of the local Mines Inspector in Kamloops, and the Director of Health and Safety in Victoria.

1.2 Mining Administration Function

1.2.1 MANDATE/ACTIVITIES

The Mining and Minerals Division 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. This mandate includes the review of applications and issuance of permits under Section 10 of the *Mines Act* for all mining activities 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. Division 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.

In addition to health and safety functions, branch inspectors address environmental and social sensitivities of proposed and permitted mines. The process for review of *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.

The BC mining industry continued to break records in 2006. Tonnage production, revenues, employment, exploration, and commodity prices all trended upwards across nearly all resource categories. A total of 12 applications were in the Environmental Assessment Office review process and four more were undergoing public review. British Columbia continued to reflect a significant upturn in minerals-related exploration activity, with an estimated \$265 million investment in exploration.

2 Health & Safety



2.1 Occupational Health Group

2.1.1 ROLES AND RESPONSIBILITIES

The Health, Safety and Reclamation Code for Mines in B.C. requires that mine managers develop 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 were exposed in the workplace. This includes, among others, dusts, silica, respirable combustible dust, noise, gases and fumes, radiation (ionizing and non-ionizing) and heat/cold stress. The Occupational Health (OH) group also makes comparative measurements to ensure companies follow proper methodology and obtain accurate results.

Underground mine ventilation and workplace hazardous materials information system programs are also included in the group's responsibilities. Training and assistance in program development is provided as needed. Audiometric technician training is scheduled periodically as needed.

A written, preventative training program to educate Occupational Health and Safety Committee (OHSC) 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 low back injury, repetitive strain, overexertion or vibration-induced injuries. Training must include a practical component using tools to identify and quantify 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 2006 there were three people in the OH group with specialties in industrial hygiene, engineering and human factors/ergonomics.

2.1.3 SUMMARY OF ACTIVITIES

In 2006 the OH group:

- conducted frequent on-site inspections of mines to fulfill their mandate to monitor workplace conditions;
- responded to ongoing concerns of noise and dust of neighbours of sand and gravel operations;

- maintained and input data to the Mining Operations Branch audiometric database, which records the results of hearing tests that are undertaken at mine sites across the province;
- provided training courses for mines' industrial audiometric technicians;
- utilized a masters co-operative education student to assist in a revising the Workplace Monitoring Procedures Manual;
- updated and added web and print resources for use by industry and the public to enhance awareness of and education in Occupational Health hazards, including musculoskeletal disorder (MSD) identification and control;
- conducted MSD Prevention training to safety representatives from BC mines;
- organized the Open Pit and Small Underground 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 the applicable codes and standards, and that the equipment is maintained and operated in acceptable condition so that its operation causes no hazard to people or property.

2.2.2 STRUCTURE AND ORGANIZATION

In 2006 there were two staff members in the mechanical/electrical group. During 2006 there was a lot of activity with new coal mines, and the demand on this small group to keep up with design, approval and construction of the new mines, or rehabilitated and improvements to existing operations remains an on-going challenge. The mechanical and Electrical group also worked with the audit group and participated at or provided input for 8 audits during 2006, which further stretched their limited resources.

2.2.3 SUMMARY OF ACTIVITIES

Mechanical Engineering

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

equipment demands a high level of skill from those who operate and maintain the equipment. Branch 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. The branch endeavours to keep abreast of the many changes and innovations. In addition, inspectors, in collaboration with the mines, have to ensure that people operating equipment are aware of how equipment modifications may affect its operating functions, and ensure operators, maintenance and supervisors understand the consequences of failures occurring in installed control or sensing systems.

Electrical Engineering

The inspector performed electrical inspections at all major mines including the larger sand and gravel operations as well as some of the smaller operations. The new mines opening in the Northeast (Wolverine, Trend, Pine Valley), along with DRC-Afton, required extra inspections and review of engineering specifications and drawings. They also required considerable time in the review of their new equipment and installations to ensure compliance with the necessary BC and Canadian code requirements.

2.3 Competitions and Awards

2.3.1 ROLES AND RESPONSIBILITIES

The primary mandate of the Mining Health & 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 work.

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 Ministry of Energy and Mines, mining is one of B.C.'s safest heavy industries.

Mine rescue competitions, first-aid competitions, and safety awards all contribute to the overall climate of safety. 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 Provincial Mine Rescue competitions are judged by mine inspectors and industry personnel who are responsible for all aspects of worker and public safety in B.C.'s mining industry. This year's competition was held in Campbell River on June 10, 2006.

Open Pit Mine Rescue Competition

The East Kootenay Zone competitions were held in Fernie on May 12, 2006. The winning teams that moved forward to the Provincial Competition were as follows:

- Greenhills Operations -- Elk Valley Coal Corporation
- Fording River Operations -- Elk Valley Coal Corporation

The North/South Central Zone competition was held in Campbell River on June 8, 2006. The winning teams that moved forward to the Provincial Competition were as follows:

- Endako Mines Ltd.
- Highland Valley Copper
- Gibraltar Mine Ltd.
- Kemess Mines Ltd.

Underground Mine Rescue Competition

The following teams competed in the underground mine rescue competition held on June 10, 2006 in Campbell River.

- Eskay Creek
- Myra Falls Operations
- Quinsam Coal Mine

The overall winner was *Eskay Creek Mine – Barrick Gold, Inc.*

Surface Mine Rescue Champions

The team from *Highland Valley Copper* won the 2006 surface mine competition. Team members were: Wolf Nickel (Manager), Gerry Wong (Coach), Dirk Werring (Captain), Dale Konowalchuk (Vice Captain), Neal Rideout, John Brennan, Steve Hippisley, Peter Drescher, and Rob Rudkowsky (Spare).

Surface Bench Competition

The surface bench competition originated in 1995. The trophy is awarded to the surface mine rescue team that excels at the practical bench competition. The practical bench task is designed to test the individual team members on their knowledge and practical skills in mine rescue equipment and techniques. The competition is held in memory of Maurice Boisse, Mine Rescue Team Coach, Island Copper Mine. The team from *Kemess Mines* won the award in 2006.

Underground Mine Rescue Champions

Three underground mine rescue teams competed in the provincial competitions in 2006:

- Eskay Creek Mine – Barrick Gold
- Myra Falls Operations
- Quinsam Coal Mine

Eskay Creek won the Underground Competition. The USWA Mine-Mill Award for best coordinator went to *Michael Kendall*. Team members included John Kinyon (manager), John Arnold (Coach), Peter Devolder (Captain), Tom Cheveldave (Vice Captain), Nigel King, Martin Rozell, Mitch Carter, Clark Millner, and Jason Houle (spare).

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 whom, in 1976, won the Canadian Championship. In 2006 the award was won by the team from *NVI Mining--Myra Falls Operations*.

Obstacle and Recovery

A new award was provided by Quinsam Coal Mine in recognition of the contribution made by Keith Bracewell to the Underground Mine Rescue. 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. In 2006 the Keith Bracewell Award was won by *Eskay Creek Mine – Barrick Gold*.

2.3.3 FIRST AID COMPETITIONS

In the first-aid category there are two separate competitions: three-person first-aid competition, and the first-aid component of the underground and surface mine rescue competition. The judging of the first-aid component is in conjunction with the provincial surface and underground mine rescue competition.

Underground First Aid

This award was previously introduced by Cominco Ltd. for the best first aid by an underground mine rescue team. The award, known as the "Sullivan Cup," was presented to *NVI Mining – Myra Falls Operations*.

Three-Person First Aid

The first provincial miner's three-person first-aid competition was first held in 1978. After doing a short written exam the three team members render first aid. The St. John's standard course is the training standard, and only those who work in or about a mine are permitted to enter this competition. This competition was designed as an extension of training for workers in basic first-aid skills, in order that they may assist their fellow workers at the face or at the work place in the event of an injury or medical emergency.

The 2006 Three-Person First Aid winning team was from *Kemess Mines*.

Elaine Wolfson of *Kemess Mines* won the Kathy Lofstrom Trophy for Best Coach of a First Aid Team.

2.3.4 44TH ANNUAL SAFETY AWARDS

The presentation of awards at the for the statistical year of 2005 took place at the Ambrosia Catering and Event Centre on Monday April 24th, 2006.

Historically these awards were reported in the following year's Annual Report; beginning with this edition, winners will be reported for the current statistical year. To accommodate this change, both the 2005 and the 2006 winners will be presented in this edition of the Annual Report. Winners of the 2005 awards are listed below.

Small Underground Mines

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 the province. The award is given to the mine having the lowest compensable accident rate after working from 2,500 to 30,000 shifts per year, at least one third of which were underground. The mine must have operated for at least nine months during the calendar year. A fatality automatically disqualifies a mine for that year. The 2005 winner was *Quinsam Coal Corporation - Quinsam Coal*.

The John Ash Award - Open-Pit Mines and Quarries

Is presented to the mine that has worked more than 1,000,000 hours in a year and attained the lowest compensable injury frequency rate. The 2005 winner was *Highland Valley Copper*.

The Edward Prior Safety Award - Open-Pit Mines and Quarries

Is presented to the mine with the lowest compensable injury frequency rate for 200,000 to 1,000,000 hours worked. The 2005 award was won by the *Elk Valley Coal Corporation - Line Creek Operations*.

The Stewart-O'Brian Safety Award - Open-Pit Mines and Quarries

Is presented to the mine with the lowest compensable injury frequency rate for 35,000 to 200,000 hours worked. The 2005 award was shared by seven mines:

- BCB Canada Inc. – Windermere Mining Operation
- Construction Aggregates Ltd. - Producers Pit
- Construction Aggregates Ltd. – Sechelt Mine
- Lafarge Canada Inc. – Central Aggregates
- Texada Quarrying Ltd.
- Western Canadian Coal – Dillon Mine
- Western Canadian Coal – Perry Creek

2.3.5 45TH ANNUAL SAFETY AWARDS

The presentation of awards at the 45th Annual Mine Safety Awards for the statistical year of 2006 took place at the Marriott Inner Harbour Hotel in Victoria on Monday April 16, 2007.

Small Underground Mines

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 the province. The award is given to the mine having the lowest compensable accident rate after working from 2,500 to 30,000 shifts per year, at least one third of which were underground. The mine must have operated for at least nine months during the calendar year. A fatality automatically disqualifies a mine for that year. The 2006 winner was *Quinsam Coal Corporation, Quinsam Coal*.

The John Ash Award - Open-Pit Mines and Quarries

Is presented to the mine that has worked more than 1,000,000 hours in a year and attained the lowest compensable injury frequency rate. The 2006 winner was *Elk Valley Coal Corporation, Elkview Operations*.

The Edward Prior Safety Award - Open-Pit Mines and Quarries

Is presented to the mine with the lowest compensable injury frequency rate for 200,000 to 1,000,000 hours worked. The 2006 award was won by the *Elk Valley Coal Corporation, Coal Mountain Operations*.

The Stewart-O'Brian Safety Award - Open-Pit Mines and Quarries

Is presented to the mine with the lowest compensable injury frequency rate for 35,000 to 200,000 hours worked. The award was shared by four mines:

- Certain Teed Gypsum Canada Inc. – Windermere Mining Operation
- Lafarge Canada Inc. – Central Aggregates
- Texada Quarrying Ltd.
- Western Canadian Coal – Dillon Mine

2.3.6 CERTIFICATES OF ACHIEVEMENT

Certificates of achievement are presented to those mines with a zero compensable injury frequency rate and which have accumulated 15,000 to 35,000 employee hours. Historically these awards were reported in the following year's Annual Report; beginning with this edition, winners will be reported for the current statistical year. To accommodate this change, both the 2005 and the 2006 winners will be presented in this edition of the Annual Report.

There were a total of eight mines that qualified for certificates for work conducted in 2005:

- Allard Contractors Ltd. – Mission Pit
- Butler Brothers Supplies Ltd. – Duncan
- Butler Brothers Supplies Ltd. – Sooke Pit
- Hub City Paving Ltd. – Cassidy Pit
- Imperial Paving Ltd. – Ross Road Pit
- Jack Cewe – Jervis Inlet
- Steelhead Aggregates Ltd. – Steelhead
- Valley Rite Mix – Cannon Contracting

There were a total of eight mines that qualified for certificates for work conducted in 2006:

- Allard Contractors Ltd. – Mission Pit
- Allard Contractors Ltd. – Haney Pit
- Ash Grove Cement Company – Blubber Bay Quarry
- Butler Brothers Supplies Ltd. – Keating Pit
- Division of Lafarge Canada – Coquitlam Sand and Gravel
- Graymont Western Canada Inc. – Pavilion Quarry
- Jack Cewe – Jervis Inlet
- Plateau Construction Ltd. – Harper Ranch Quarry

2.3.7 NATIONAL SAFETY AWARDS - JOHN T. RYAN TROPHIES

The John T. Ryan trophies are awarded by the Mine Safety Appliances Canada Limited as a memorial to the founder of the company. The trophies were 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. This year the national trophy for coal mines went to *Western Canadian Coal – Dillon Mine*. The regional metal mine trophy went to *Barrick Gold Corp., Eskay Creek Mine*.

2.4 Examinations and Certifications

Section 26 of the *Mines Act* requires that every person employed at a mine, where required by the Code, be under the daily supervision of a person who holds a valid and appropriate certificate as required by 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 regarding their current knowledge of the Code.

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. During 2006, F.W. (Fred) Hermann chaired the board; Ricci Berdusco took over in September. Board members were R. Booth, A. Hoffman, E. Taje, and D. Morgan as secretary. The board is responsible for examination of applicants for shiftboss certificates and certificates of competency, for considering applications for interchange certificates of competency, for issuing certificates and for conducting a review of all suspended certificates. The board is also responsible for administering blasting certification.

2.4.2 SHIFTBOSS CERTIFICATES

The Shiftboss Certification activity in 2006 is summarized in the following table:

Activity	New Certificates
Examinations written (surface)	36
Examinations written (underground)	6
Number passed (surface)	36
Number passed (underground)	6
Number of permanent certificates Issued	42

2.4.3 SHIFTBOSS CERTIFICATE SUSPENSIONS

Shiftboss certificate suspensions relate to Part 1.13.12 of the Code. In 2006 there were two suspensions of shiftboss certificates. Mr. V. Kapinus and Mr. K. McMurren at the Afton Gold project for the use of equipment in a location for which it was not approved.

2.4.4 TOTAL UNDERGROUND COAL FIREBOSS CERTIFICATIONS

There were no applications for underground Coal Fireboss Certifications in 2006.

2.4.5 BLASTING CERTIFICATES

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

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

Blasting certificates are now valid for 5 years. Provisional certificates can be issued for a period not exceeding 90 days. There were 51 blasting tickets issued in 2006.

Blasting Certificate Suspensions

Suspensions are under Parts 8.2.6 and 8.2.7 of the Code. During 2006, there was one blasting certificate suspended. Blasting Certificate #42686, Loren Towes, was suspended for six months as a result of fly rock incidents.

2.4.6 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 Mining Operations Branch is responsible for certifying miners in several categories of mine rescue, as listed below. The following Mine Rescue Certificates issued in 2006:

Type	Number Issued
Underground mine rescue	4
Surface (open-pit) mine rescue— <i>new</i>	182
<i>Recertification</i>	13
Gravel pit mine rescue	0
Total Certificates Issued	199

2.5 Accidents and Incidents

2.5.1 DANGEROUS OR UNUSUAL OCCURRENCES

In 2006 the accident module of the MMS system has continued to develop. The inspector has the responsibility to determine which incidents should be included. This has been

influenced by workload and with staff reductions the Occupational Health and Safety Committees (OHSC) at the mines have been the primary incident investigation tool, with less involvement from the branch inspectors and consequently less incidents entered into the system.

The following accident information is produced from the MMS represents all of the year 2006 as input by each office. There were 96 dangerous occurrences entered in 2006.

The percentage is useful in that it may be compared to subsequent years as the system is developed.

Location of Incident	Number of Incidents Reported	Per Cent of Total Incidents Reported
Pit	43	44.3%
Plant / mill	9	9.3
Maintenance (Shop)	7	7.2
Underground general	4	4.1
Maintenance (Field)	3	3.1
Tailings pond	1	1.0
Underground outbye / haulage drift	1	1.0
Highwall	0	-
Dump	0	-
Office	0	-
Dry	0	-
Underground face	0	-

Work Practice Contributing to Incident	Number of Incidents Reported	Per Cent of Total Incidents Reported
Operator Error	33	34.0%
Poor Work Standards	28	28.9
Not Following Work Procedures	28	28.9
Equipment Failure	16	16.5
Inadequate Management	9	9.3
Inadequate Planning	7	7.2
Training	6	6.2
Inadequate Equipment	4	4.1
Abuse Or Misuse	0	-

Equipment Involved	Number of Incidents Reported	Per Cent of Total Incidents Reported
Haul Truck	23	23.7%
Service Truck	8	8.2
Loader	7	7.2
Shovel	6	6.2
Drill, Surface	6	6.2
Dozer	4	4.1
Pickup	4	4.1
Explosives	4	4.1
Electrical	3	3.1
Grader	2	2.1
Conveyor	2	2.1
Crane	1	1.0
Water Truck	1	1.0
Drill, Underground	0	-
LHD	0	-
Excavator/Backhoe	0	-
Forklift	0	-
Scraper	0	-

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

General Incident Information	Number of Incidents Reported	Per Cent of Total Incidents Reported
Number of Persons Involved	89 persons	n/a
Average Time Into Shift (minutes)	47 minutes	n/a
Number of Persons Injured	12 persons	n/a
Near Miss	17	17.5%
Fire	18	10.0
Geotechnical	3	3.1
Fatality (Mining Related)	1	1.0
Fatality (Non Mining)	1	1.0

2.5.2 FATALITIES

There were five (5) fatalities recorded at mines in B.C. in 2006.

On May 17, 2006 four persons died at the inactive Sullivan Mine Site. The deaths occurred when they entered an oxygen deficient atmosphere at a drainage measuring point at the base of a reclaimed dump. The persons were Doug Erickson, contractor; Bob Newcombe, Sullivan employee; and Kim Weitzel and Shawn Courier, both employees of the BC Ambulance Service. A full accounting of the Sullivan Mine event can be accessed at http://www.mediaroom.gov.bc.ca/sullivan_mine/sullivan_mine.htm.

On July 7, 2006 Ken Sandberg was fatally injured while operating a Shotcrete machine underground at Myra Falls Mine.

3 Administration



3.1 Summary of Mine Production

The tables below summarize production and average employment at major British Columbia mine sites in 2006.

2006 Production: Coal Mines¹

	Annual Rated Plant Capacity (Tonnes)	Actual Production (Tonnes)	Percent of Capacity	Days Mill Operated	Average Employment	Contract Employment
Basin	400,000	91,000	23%	0	35	-
Coal Mountain	3,434,000	2,226,000	65%	195	179	-
Elkview	7,000,000	4,752,000	68%	260	801	-
Fording River	10,416,000	7,695,000	74%	309	893	-
Greenhills	5,300,000	4,131,000	78%	282	477	-
Line Creek	3,600,000	2,342,000	65%	262	293	-
Quinsam Coal	1,560,000	665,000	43%	236	91	-
Dillon	960,000	721,000	75%	240	65	-
Willow Creek	3,000,000	675,000	23%	318	39	100

2006 Production: Metal & Precious Metal Mines¹

	Annual Rated Mill Capacity (Tonnes)	Actual Tonnes Milled	Percent of Capacity	Days Mill Operated	Average Employment	Contract Employment
Endako	10,950,000	9,700,000	89%	365	253	4
Eskay Creek	109,000	123,000	113%	347	90	-
Gibraltar	13,413,000	10,885,000	81%	365	285	8
Highland Valley Copper	49,640,000	45,356,000	91%	365	963	92
Huckleberry	7,117,000	6,646,000	93%	365	227	-
Kemess South	19,238,000	18,234,000	95%	333	358	142
Mount Polley	7,300,000	6,235,000	85%	365	320	40
Myra Falls	1,460,000	925,000	63%	360	419	-

¹ PricewaterhouseCoopers. *The Mining Industry in British Columbia*. 2006.

3.2 Volume of Inspections

The Mine Management System (MMS) allows tracking of mine visits and the issuance of orders at mines. The following figures represent inspections performed by the Mining Operations Branch. When an inspector conducts a mine site inspection, the inspector passes on to other branches information they may need to attend to. Note the number of inspections is not an indicator of the relative volume of activity of each office. Some regions contain a few very large mining operations, whereas others contain hundreds of smaller operations. Therefore, the length of time to conduct an inspection varies from region to region.

As can be seen in Figure 1, the graph of inspections and staff by year, there has been a significant reduction in the number of inspections that corresponded to the reduction in staff over the years, but with the added staff and the use of contractors the number of inspections and inspector visits has increased in 2006.



In 2006 the mines branch had 858 inspector visits to mines, conducted 604 inspections and mines inspectors issued 1,510 health and safety orders and shut down 36 pieces of equipment. Inspectors also issued 239 environmental orders during the year. The following were recorded for 2006 in the MMS.

Mine Type	Inspections	H&S Orders	Equipment Shutdowns	Environmental Orders	Dangerous Occurrence	Investigations	Training	Meeting	Other
Custom Mill	8	17	0	0	0	0	0	0	0
Coal -- Surface	114	318	7	0	54	0	2	6	6
Coal-Underground	16	0	0	2	0	1	1	3	4
Coal Exploration	3	14	0	0	0	0	0	1	0
Exploration-Surface	110	113	1	70	3	1	0	1	0
Exploration-Underground	15	18	0	3	1	0	0	0	1
Industrial Minerals -- Surface	59	155	1	17	3	2	0	0	0
Industrial Minerals -- Underground	2	7	0	0	1	0	0	0	1
Metal Leach-Surface	10	0	0	0	0	0	0	2	0
Metal Mine - Surface	95	250	6	5	22	0	1	1	1
Metal Mine-Underground	30	118	3	9	10	2	1	1	0
Non Assignable/Unidentified	5	2	0	0	0	0	0	0	0
Placer-Surface	54	27	2	21	0	0	0	0	0
Placer-Underground	6	20	0	0	0	0	0	0	0
Rock Quarry	55	101	1	18	0	4	0	2	2
Sand/Gravel Pit	189	350	15	94	2	0	1	0	0
TOTALS	604	1510	36	239	96	10	6	17	12

3.3 Audit Program

The safety audit program is designed to investigate how well a safety and health program has been implemented at a mine. The audit program has been revised to reflect the new 2003 Code and to put more emphasis on the findings of branch staff through document search and interviews to determine the facts. The report reflects the views of the mines branch who draw their conclusions as a result of the interviews with management and staff and research of the mines records.

In 2006 the ministry conducted a total of 8 audits at the following mines: Pine Valley Coal, Endako Mines, Mount Polley, Coal Mountain, Quinsam, Texada Quarries, Moberly Silica and Mighty White Dolomite.

The audits looked at policy and procedures, training records and the quality of application at the worksite. As the year unfolded there were improvements made to the Audit process that allowed the mine and the Ministry to better sort the audit results for follow up by the local inspector during their inspections in the months following the audit.

3.4 Notices of Work

The following Notices of Work and permit information were entered into MMS in 2006.

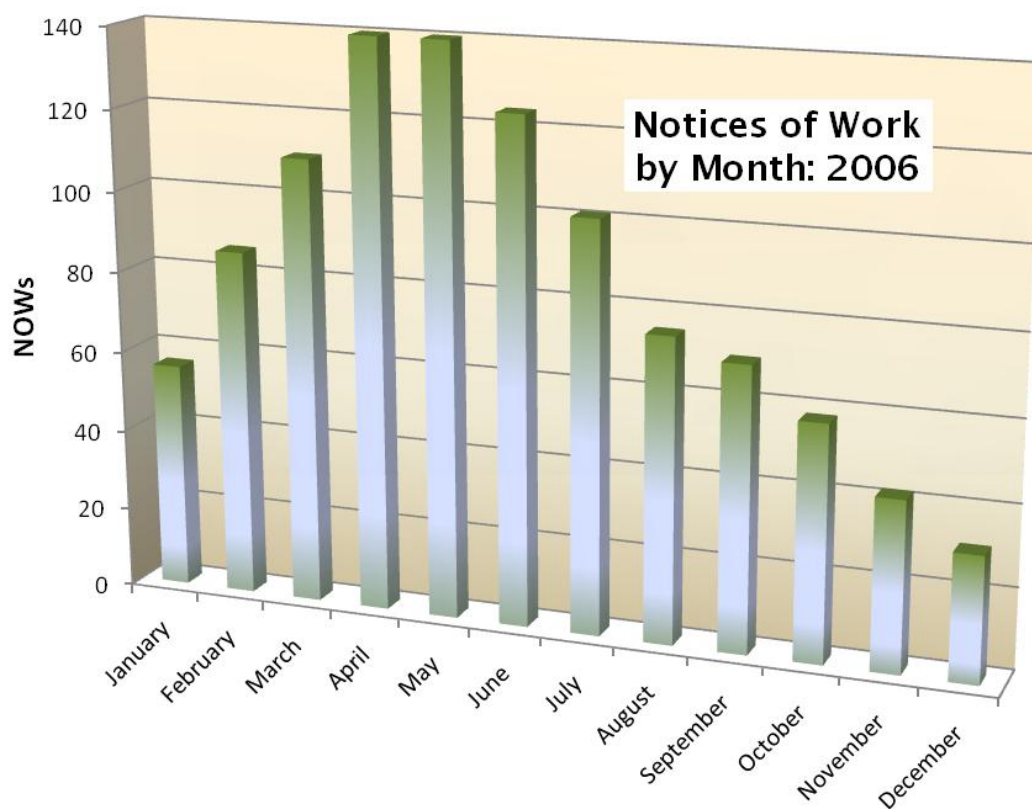
Type	Notice of Work Applications	Permits Issued	Average Days To Issue
Mineral/Coal (Exploration)	520	381	40
Mineral/Coal (other)	113	91	30
Placer	256	195	36
Sand & Gravel	161	120	58
Total	1050	787	40

The breakdown of the 2006 Notice of Work by area is as follows:

Region	Placer	Sand & Gravel	Mineral & Coal	Total
Kootenay	15	16	85	116
Central	22	64	130	216
Southwest	6	36	57	99
Northeast	157	38	173	368
Northwest	6	36	57	99
Total	206	190	502	898

The areas covered by the regions are as follows:

- Southwest Nanaimo, Lower Mainland and Vancouver Island areas
- Central Kamloops, Okanagan and Thompson areas
- Kootenay Cranbrook, Fernie and Elk Valley areas
- Northeast Prince George, Omineca, Horsefly and Valemont areas
- Northwest Smithers, Skeena and Queen Charlottes 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 BC. Since 1969, mining companies have been required by law to reclaim all lands disturbed by mining. BC was one of the first jurisdictions in Canada to enact mine reclamation legislation, and the first to extend this policy to exploration sites. Reclamation and environmental protection are the responsibility of each mining company. 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 permit conditions are completed.

The environmental protection and reclamation objectives of the province's *Mines Act* and Code are to ensure:

- land and watercourses on mine sites in BC are reclaimed to a level equal to that which existed prior to mining;
- disturbed lands and water courses are re-integrated into the surrounding landscape;
- 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 *Mines Act*;
- inspects mine reclamation activity;
- administers reclamation security deposits on behalf of the provincial government;
- organizes and participates in a number of provincial committees and activities which conduct technology transfer, review Ministry practices, and enhance government/industry/public/academia cooperation, including the Technical and Research Committee on Reclamation, the Annual Reclamation Symposium, Selenium Task Force and the Annual ML/ARD Workshop

- participates in national and international committees conducting research and technology transfer, including the national Mine Environment Neutral Drainage (MEND) Committee and National Orphaned and Abandoned Mines (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 metal leaching and acid rock drainage. Technical assistance is provided from within the Ministry on geotechnical and mining issues and by the Ministry of Environment (MOE) on biological and effluent discharge, offsite requirements.

The Reclamation Section began the year with a staff complement comprised of three, a senior mine review geologist, mine reclamation inspector and one administrative staff located at headquarters.

4.2 Summary of Activities

4.2.1 PERMITTING

The 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 2006, permitting activity remained high. One new permit was issued for the Ascot Sand & Gravel Mine, and 32 amendments were made to existing permits.

Type	Permits	Amendments	Total
Metal	0	21	21
Coal	0	10	10
Quarries/Sand & Gravel	1	1	2
Total	1	32	33

Permit revisions were made at Kemess, Goldstream, Bamberton, Cewe, Wolverine, Apple Bay, Craigmont, Pine Valley, Myra Falls, Basin Coal, Samatosum, Kitsault, Fording River, Line Creek, Huckelberry, Cusac, Premier, QR and Quinsam.

Under the *Environmental Assessment Act*, reviews were conducted for Davidson, Kutcho Creek, Schelt Carbonate, Gething Coal, Mount Milligan, Lodgepole, Morrison, Mount Klappan, Schaft Creek, Hermann, Galore and Ruby Creek projects. The section also organized and/or participated on public committees reviewing activities at the Brenda, Quinsam, Equity Silver and Sullivan mines.

4.2.2 COOPERATION AND CONSULTATION WITH STAKEHOLDERS

The 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 reclamation permits involving mechanical disturbance of the land surface, applications are referred to other government agencies, the public, and First Nations where their interests are affected. The section provides regular assistance to MOE, MOT, Environment Canada, First Nations and the public on ML/ARD issues and reclamation.

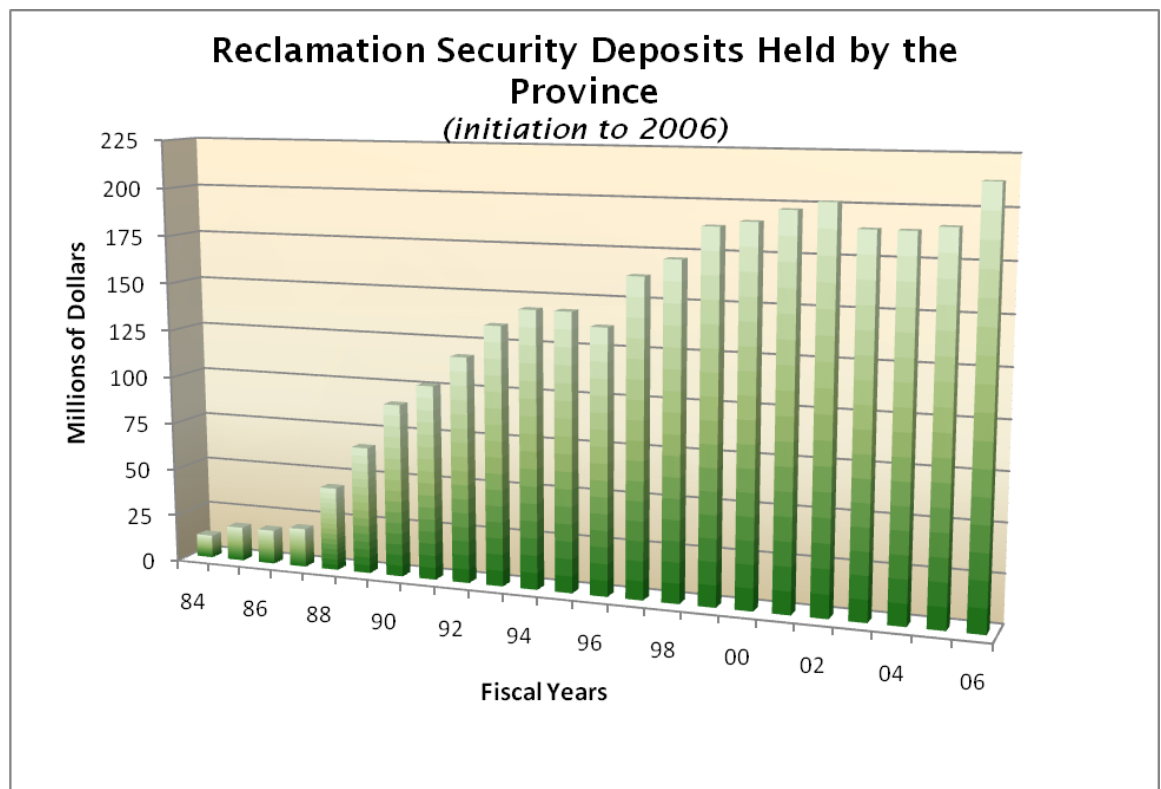
Cooperation facilitated by the reclamation section between industry, the public, government, and the academic community continues to result in a constructive climate for information exchange and dissemination of new technology.

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

The Ministry has produced 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. These documents indicate what constitutes acceptable mine design and adequate technical evidence. They 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 BC must deposit security with the government to ensure that reclamation costs do not fall on provincial taxpayers (i.e., 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 \$213.1 million by the end of 2006.



4.2.5 TECHNICAL AND RESEARCH COMMITTEE ON RECLAMATION

This committee has been active in promoting and fostering reclamation research and information exchange for more than two decades. Members are drawn from the Ministry of Energy, Mines and Petroleum Resources, Ministry of Environment, Environmental Assessment Office, mining companies, the Mining Association of B.C., Natural Resources Canada, the University of B.C., and Thompson Rivers University. This committee has been responsible for the organization of the annual B.C. Mine Reclamation Symposium for the past 30 years.

4.2.6 NATIONAL ORPHANED/ABANDONED MINE INITIATIVE (NOAMI)

The National Orphaned/Abandoned Mines Advisory Committee was struck in March 2002 at the request of Canadian Mines Ministers. The Advisory Committee has been 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 Mines Ministers 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 of Energy and Mines represents the Province of British Columbia on the Advisory Committee.

4.2.7 MINE RECLAMATION SYMPOSIUM

The 30th Annual Mine Reclamation Symposium was held from June 19 to 22, 2006 in Smithers, B.C. with a theme of “Case Studies of Reclamation and Environmental Protection.” Delegates had the opportunity to tour the Kemess South Mine, or the Endako and the Huckleberry operating mines.

4.2.8 THE ANNUAL BRITISH COLUMBIA MINE RECLAMATION AWARD

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

The recipient of the 2006 British Columbia Jake McDonald Mine Reclamation award was presented to Elk Valley Coal Corporation for their outstanding reclamation achievements at Fording River Operations.

Fording River operations is Canada’s largest producer of metallurgical coal and they have consistently made reclamation a priority by setting high standards for achieving reclamation goals and the re-creation of pre-disturbance values. Since its first implementation of reclamation research in 1969, Fording River Operations has been a leader in mine reclamation in the Province of British Columbia. Approximately 600 of 4000 hectares of disturbance have been reclaimed to date.

Nowhere else in the province has a mine committed on a large scale to reclaiming such a variety of challenging and specific land uses, such as moderate-yield commercial forestry, high-value wildlife habitat (elk winter range) and reclamation of riparian and in-stream habitat. Fording River has supported these commitments with substantial investment and effort in the field of reclamation research and has conducted on-site targeted reclamation research and monitoring for over 35 years. The results of this effort are that Fording River operations has pioneered the development of techniques for successfully establishing forest stands on coal mine waste and for significantly increasing the productivity of these stands through ground cover management and of research into high elevation establishment of critical wildlife habitat components such as tree stands for thermal regulation and forage shrub species. In this way, the operation has significantly contributed to the current state of reclamation knowledge in the province

Fording River Operations has placed an important priority on the re-establishment of fish and wildlife habitat. From the creation of a ground water channel in an old gravel extraction area to the development of shrub species on the steep slopes of the proposed winter ranges, the wildlife reclamation work at the mine shows an important understanding of key ecological elements and a dedication to detail. The Fording River mine currently supports a diversity of wildlife including elk, bears, sheep and a host of other species.

Resloping of waste rock dumps continues to be the major challenge at the Fording River Operations. Although legacies from earlier mining continue to present a challenge, innovative waste placement methods help to reduce the costs associated with this activity.

Three citations were also awarded:

- Metal mine reclamation - was awarded to Highland Valley Copper for the Highland Valley Mine.
- Coal mine reclamation - was awarded to Elk Valley Coal Corporation for the Elkview Operations.
- Mineral Exploration reclamation - was awarded to NovaGold Canada Inc. for their work on the Galore Creek property.

4.2.9 METAL LEACHING AND ACID ROCK DRAINAGE WORKSHOP

The 13th annual workshop was held in Vancouver on November 29 and 30th, 2006. This year, the workshop theme was “Challenges with Open Pits and Underground Workings.”

4.3 Industry Reclamation Record

The mining industry in BC currently consists of large-scale open pit metal mines, open pit coal mines, two underground metal mines and one underground coal mine.

Since the late 1960's, 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 2006, expanded to cover 43,598 hectares. Reclamation (where revegetation has been successfully established for one year or more) has occurred on over 41 percent or 18,191 hectares (Figure 1).

Metal mines have disturbed 23,645 hectares, and 10,171 hectares (or 43 percent), have been reclaimed (Figure 2).

Coal mines have disturbed 19,953 hectares, and 8021 hectares (or 40 percent) have been reclaimed (Figure 3). The sharp increase in disturbance and reclamation at metal mines during the late 1990's reflects the construction and development of three new mines at

Huckleberry, Mt. Polley, and Kemess South and the closure and commencement of mine reclamation at others.

The data presented in Figures 1, 2 and 3 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 35 years.

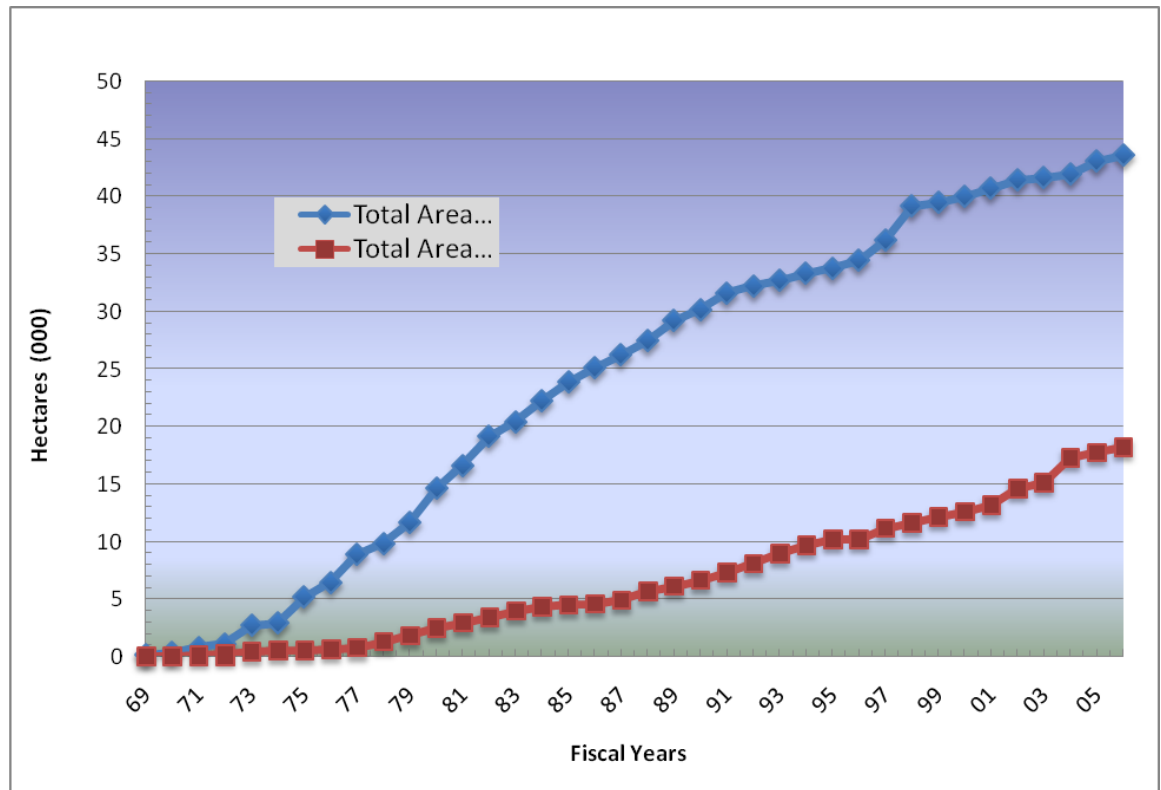


Figure 1. Land Disturbed and Reclaimed by Metal and Coal Mines in BC, 1969-2006

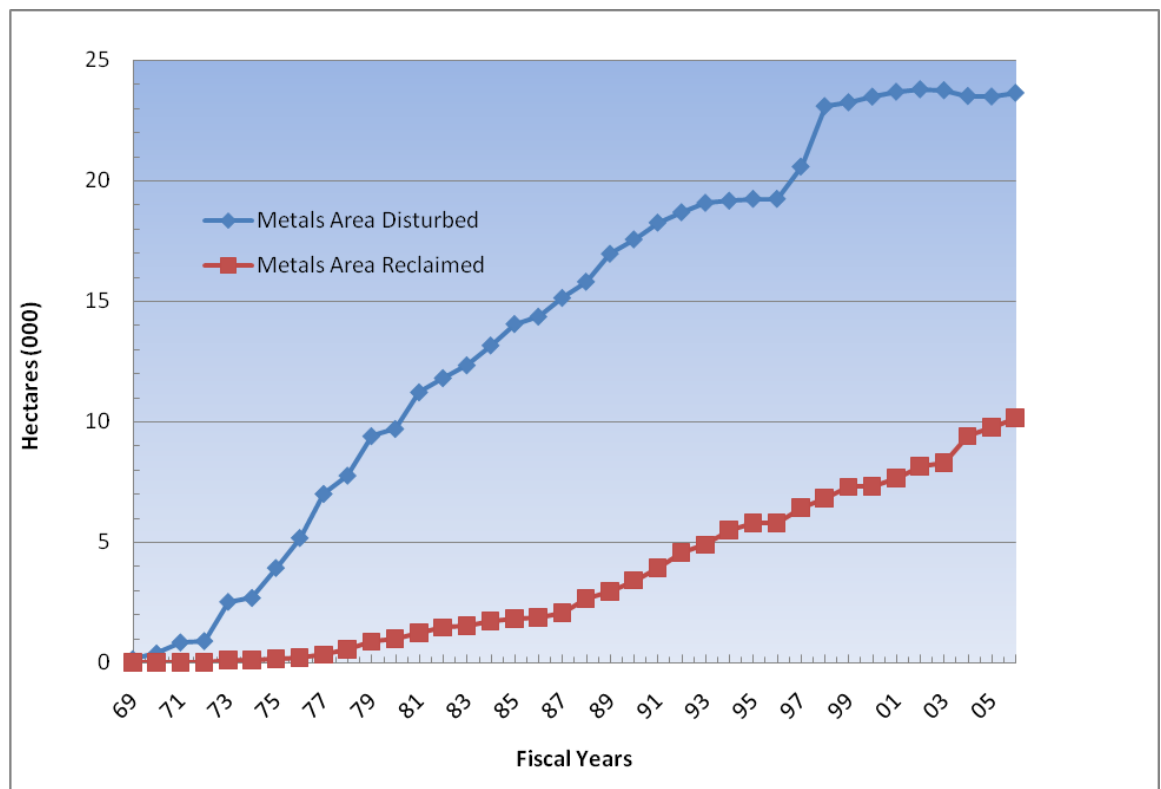


Figure 2. Area Disturbed and Reclaimed by Metal Mines in BC, 1969–2006

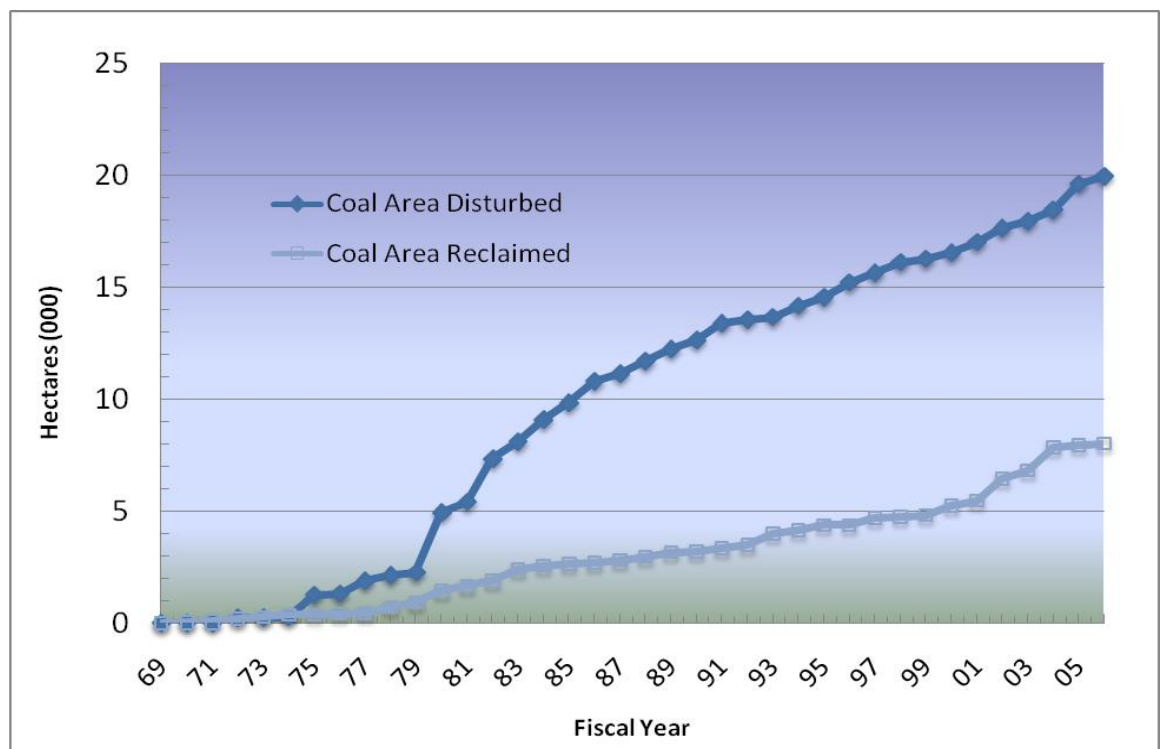


Figure 3. Area Disturbed and Reclaimed by Coal Mines in BC, 1969–2006

4.4 Geotechnical/Mining Roads

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 mining developments for project approval under the BC Environmental Assessment Act and technical review of applications for approval under the *Mines Act*.

The geotechnical section tracks geotechnical incidents and carries out follow up reviews. The section also responds to mine road enquiries.

The geotechnical section provides geotechnical advice and develops policy for:

- Tailings impoundments and dams, sediment control structures, waste rock dumps, soil overburden dumps;
- Open pit and underground development;
- 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 2006 the geotechnical section:

- Conducted 18 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

Information about the Ministry and copies of Ministry publications are available through the following options:

Ministry Web site

www.gov.bc.ca/empr

Queen's Printer Publications Index Web site:

www.publications.gov.bc.ca

Communications Division

PO Box 9324 STN PROV GOVT
Victoria, B.C. V8W 9N3
Phone: (250) 952-0606
Fax: (250) 952-0627

Mining Operations

Further information on the activities of the various mining companies can be found in the *Canadian and American Mines Handbook* published annually by Northern Miner Press at www.northernminer.com, or from each mining operation.

In addition, you may contact the Mining Association of B.C. (www.mining.bc.ca) and the Coal Association of Canada (www.coal.ca) for annual reports on the status of those sectors.

Photo Credit: *Power Shovel at Sullivan Mine, c.1944*. Image B-05340 courtesy of Royal BC Museum, BC Archives. Used by permission.