Mining and Minerals Division

Annual Report
of the
Chief Inspector of Mines
2005

BRITISH COLUMBIA
The Best Place on Earth

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 the *Mines Act* and the Health, Safety and Reclamation Code for Mines in British Columbia.

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.

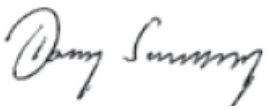
One of the key responsibilities of the office is an annual report detailing the status of mines and mining activities in the Province of British Columbia. I am pleased to transmit this Annual Report for 2005.

British Columbians can be very proud of the mining industry in our province. It is focused on the four Cornerstones of the *B.C. Mining Plan*:

- Focus on communities and First Nations
- Protecting workers, protecting the environment
- Achieving global competitiveness
- Assuring access to land

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.

Respectfully Submitted,



Douglas E. Sweeney
Chief Inspector of Mines

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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.

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.

Two thousand and five was another impressive year for the mining industry, with 11 applications in the Environmental Assessment Office review process. Commodity prices for nearly all metals and types of coal rose substantially over the year, as did net mining revenues. British Columbia experienced a significant upturn in minerals-related exploration activity, continuing the trend from last year toward a resurgence in exploration spending. This increase in exploration has brought an elevated workload for the branch to permit and inspect these operations.

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 2005 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 2005 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 conduct research on coal dust exposure of underground miners;
- conducted MSD Prevention training to safety representatives from several mines;
- organized the Open Pit and Small Underground Awards Competition and Awards Dinner.

2.2 Mechanical Engineering, 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 in acceptable condition so that its operation causes no hazard to people or property.

2.2.2 Structure and Organization

In 2005 there were two staff members in the mechanical/electrical group. The demand on this small group to keep up with new mines being constructed or rehabilitated and improvements to existing operations remains an ongoing challenge.

2.2.3 Summary of Activities

Mechanical Engineering

Delivery of new machinery and equipment to mines, together with the steady upgrading of much of the existing items, results in mines in British Columbia 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 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 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 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. The

inspector participated in developing the new audit process for major mines and participated in audits at Myra Falls, Mount Polley and Huckleberry.

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 Kamloops on June 11, 2005.

Zone Competition

The East Kootenay Zone competitions were held in Sparwood and all the teams came from the Elk Valley Coal Corporation. The participating teams were as follows:

- Line Creek
- Greenhills
- Elkview
- Coal Mountain
- Fording River

The North / South / Central Zone competition was held in Kamloops on June 9, 2005. The participating Mine Rescue teams were as follows:

- Endako Mines Ltd.
- Imperial Metals Corp. - Huckleberry Mine
- Highland Valley Copper
- Northgate Exploration Ltd. - Kemess Mine
- Texada Quarrying Ltd.
- Gibraltar Mines

- Quinsam Coal (3-person first aid team only)

Provincial Competition

The first, second and third placed teams from two regional zones became eligible to compete in the provincial competition on June 11, in Kamloops, B.C. These teams were:

- Elkvalley Coal Corp. – Fording River Operation
- Elkvalley Coal Corp. – Greenhills Operations
- Kemess Mines
- Endako Mines
- Gibralter Mines
- Highland Valley Copper

Surface Mine Rescue Champions

The team from *Elkvalley Coal Corp. – Fording River Operation* won the 2005 surface mine competition. Team members were: Bruce Dingreville (Coach), Dale Roberts (Captain), Rory Marshall (Vice Captain), Jeff Scott, D'Arcy Lewis, Dean Borgen, Dennis Cooper, and Doug McLean (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 *Elkvalley Coal Corp. – Fording River Operation* won the award in 2005.

Underground Mine Rescue Champions

Three underground mine rescue teams competed in the provincial competitions in 2005:

- Boliden Westmin (Canada) Ltd. - Myra Falls Operations
- Barrick Gold Mine - Eskay Creek Mine
- Quinsam Coal Corporation - Quinsam Mine

In 2005, *Boliden Westmin (Canada) Ltd. – Myra Falls Operations* won the competition. Team members were Al Day (Coach), Rick Kretzschmar (Captain), Greg Palmer (Vice Captain), Gary Boutilier, Pat Langlois, Rory McFadden, and Joe Fic.

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 2005 the award was won by the team from *Myra Falls Operations.*

Underground Bench Technician

No competition was held.

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 *Barrick Gold Mines Ltd. – Eskay Creek Mine*.

Three-Person First Aid

The first provincial miner's three-person first-aid competition was held in 1978. After doing a short written exam the three team members render first aid. The St. John'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.

Competing teams at the provincial level were as follows:

- Elk Valley Coal Corp. – Coal Mountain Operations
- Elk Valley Coal Corp. – Fording River Operations
- Highland Valley Copper
- Texada Island Quarry
- Kemess Mines
- Endako Mines

The 2005 Three-Person First Aid winning team was from *Elk Valley Coal Corp. – Coal Mountain Operations.*

2.3.4 The National Western Regional Competitions

To improve Canada's mine rescue mutual aid response capability, the national mine rescue committee, consisting of representatives from across Canada, divided the country into three specific regions - East, Central and West. The rationale is based on the expediency of responding with teams and equipment from adjacent provinces and territories and to coordinate procedures within those jurisdictions.

The national western regional committee, consisting of representatives from Alberta, B.C., Saskatchewan, Northwest Territories, United States and the Yukon Territories, in conjunction with the city of Fernie (sponsor of the event), initiated underground and surface mine rescue competitions in 1993. The competitions are conducted on a biennial basis and serve to provide a medium for mine rescue teams to exercise their skills and to promote and coordinate an interchange of procedures and training standards.

The Sixth National Western Regional Mine Rescue Competition was held in Fernie, B.C. on September 9-10, 2005; the next is due in 2007.

The teams eligible to compete in 2005 were the underground and surface mine rescue winners from the 2004 and 2005 provincial, territorial and United States competition events.

The following teams competed in the Underground Competition:

- Boliden Westmin - Myra Falls Operations, Campbell River, BC (copper)
- Barrick Gold Corp. - Eskay Creek Mine, Smithers, BC (gold)
- Atomic Energy of Canada Ltd., Pinawa, MB (granite)
- Agrium-Vanscoy Potash Operations, Vanscoy, SK (potash)
- Inco Thompson – Thompson, MB (nickel)
- Inco Ltd. West Mines – Copper Cliff, ON (nickel)
- Lucky Friday – Mullan, ID (silver, lead, zinc)
- Ekati Diamond Mine – Yellowknife, NWT (diamonds)
- Colonsay Mine – Colonsay, SK (potash)

The overall winner was: *Boliden Westmin - Myra Falls Operations, Campbell River, BC*

The following teams competed in the Surface Mine Competition:

- Luscar Ltd. - Poplar River Mine, Coronach, SK (coal)
- Highland Valley Copper, Logan Lake, BC (copper)
- Ekati Diamond Mine – Yellowknife, NWT (diamonds)
- Syncrude Canada Ltd., Team 501, Fort McMurray, AB (oil)
- Highvale Mine, Seba Beach, AB (coal)
- Elk Valley Coal Corp.- Fording River Operations 'F' shift, Elkford, BC (coal)

The overall winner was: *Highland Valley Copper, Logan Lake, BC*

2.3.5 Safety Awards Competition

The presentation of awards at the 43rd (2004) Annual Mine Safety Awards took place at the Harbour Towers Hotel in Victoria on Monday April 18, 2005. The winners for 2004 were as follows:

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 2004 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 2004 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 2004 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 eight mines:

- Allard Contractors Ltd. – Pit "D"
- Ash Grove Cement Company – Blubber Bay Quarry
- BPB Canada Inc. – Windermere Mining Operations
- Lafarge Canada Inc. – Central Aggregates
- Lehigh Northwest Materials Construction Aggregates Ltd. – Producers Pit
- Okanagan Aggregates – Okanagan Pit
- Pitt River Quarries Ltd. – Pitt River Quarry
- 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. There were a total of eight mines that qualified for certificates for work conducted in 2004:

- Allard Contractors Ltd. – Mission Pit
- Butler Brothers Supplies Ltd. – Duncan
- Butler Brothers Supplies Ltd. – Keating Pit
- Hub City Paving – Cassidy Pit
- Jack Cewe – Jervis Inlet
- Plateau Construction Ltd – Harper Ranch Quarry
- Steelhead Aggregates – Skway Pit
- Valley Rite Mix – Cannon Contracting

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 2005, F.W. (Fred) Hermann chaired the board, with R. Booth, A. Hoffman and D. Morgan administrator and members. 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 2005 is summarized in the following table:

Activity	New Certificates
Examinations written	50
Number passed	50
Number of permanent certificates Issued	50

2.4.3 Shiftboss Certificate Suspensions

Shiftboss certificate suspensions relate to Part 1.13.12 of the Code. In 2005 there were no shiftboss certificate suspensions.

2.4.4 Total Underground Coal Fireboss Certifications

There were two applications for underground Coal Fireboss Certifications in 2005; two Coal Fireboss certificates were issued, these are included in the totals above.

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 33 blasting tickets issued in 2005.

Blasting Certificate Suspensions

Suspensions are under Parts 8.2.6 and 8.2.7 of the Code. During 2005, there were no suspensions of any blasting certificates.

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 2005:

Type	Number Issued
Underground mine rescue	0
Surface (open-pit) mine rescue	138
Gravel pit mine rescue	8
Total Certificates Issued	146

2.5 Accidents and Incidents

2.5.1 Dangerous or Unusual Occurrences

In 2005 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 2005 as input by each office. There were 183 dangerous occurrences in 2005.

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	89	48.6 %
Plant / Mill	22	12.0
Maintenance (Shop)	8	4.4
Maintenance (Field)	7	3.8
Highwall	3	1.6
Dump	3	1.6
Tailings Pond	1	0.5
Office	0	-
Dry	0	-
Underground General	6	3.3
Underground Face	1	0.5
Underground Outbye / Haulage Drift	1	0.5

Work Practice Contributing to Incident	Number of Incidents Reported	Per Cent of Total Incidents Reported
Operator Error	65	36 %
Equipment Failure	49	27
Poor Work Standards	47	26
Not Following Work Procedures	35	19
Inadequate Planning	15	8
Inadequate Management	15	8
Training	12	7
Inadequate Equipment	2	1
Abuse or Misuse	0	0

Equipment Involved	Number of Incidents Reported	Per Cent of Total Incidents Reported
Haul Truck	50	27.3%
Dozer	19	10.4

Shovel	14	7.7
Loader	9	4.9
Pickup	9	4.9
Service Truck	8	4.4
Electrical	5	2.7
Crane	5	2.7
Conveyor	4	2.2
Explosives	4	2.2
Grader	2	1.1
Excavator/Backhoe	2	1.1
Water Truck	2	1.1
Drill Surface	1	0.5
LHD	1	0.5
Forklift	1	0.5
Scraper	1	0.5
Drill Underground	0	0.0

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	161 persons	n/a
Average Time Into Shift (minutes)	103 minutes	n/a
Number of Persons Injured	35 persons	n/a
Near Miss	18	n/a
Fire	18	10.0 %
Geotechnical	8	4.0
Fatality (Mining Related)	2	1.1
Fatality (Non Mining)	0	0.0

2.5.2 FATALITIES

Feb 4, 2005, Raymond Hollingsworth, driller, was electrocuted at Rocky Point Pit when the drill he was operating touched a hydro line.

October 20, 2005, Terry Twast, dozer operator at Greenhills Mine, was fatally injured when the dozer he was operating fell from the work area into the bottom of the pit.

3 Administration

3.1 Summary of Mine Production

The tables below summarize production and average employment at major British Columbia mine sites in 2005.

2005 Production: Coal Mines[1]	Annual Rated Plant Capacity (Tonnes)	Actual Production (Tonnes)	Percent of Capacity	Days Mill Operated	Average Employment	Contract Employment
Basin	400,000	45,000	11%	0	45	-
Coal Mountain	3,717,000	2,350,000	63	212	178	-
Elkview	7,000,000	6, 013,000	86	287	784	-
Fording River	10,416,000	9,205,000	88	336	870	-
Greenhills	5,300,000	5,014,000	95	334	507	-
Line Creek	3,600,000	2,578,000	72	241	280	9
Quinsam Coal	780,000	763,000	98	257	-	-
Dillon	960,000	284,000	30	95	39	14
Willow Creek	2,000,000	84,000	4	45	8	20

2005 Production: Metal & Precious Metal Mines[1]	Annual Rated Mill Capacity (Tonnes)	Actual Tonnes Milled	Percent of Capacity	Days Mill Operated	Average Employment	Contract Employment
Bralorne	37,000	8,600	23%	135	40	5
Endako	10,950,000	9,604,000	88	365	244	15
Eskay Creek	91,000	103,000	113	365	125	-
Gibraltar	13,250,000	10,769,000	81	365	266	30
Highland Valley Copper	49,640,000	50,666,000	102	365	892	99
Huckleberry	7,483,000	6,651,000	93	365	224	-
Kemess South	19,168,000	17,995,000	94	327	333	142
Mount Polley	7,300,000	4,814,000	66	298	282	14
Myra Falls	1,460,000	925,000	63	360	411	-

[1] PricewaterhouseCoopers. *The Mining Industry in British Columbia*. 2005.

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 corresponds to the reduction in staff.

In 2005 the mines branch conducted 506 inspections and mines inspectors issued 1,437 orders and shut down 48 pieces of equipment. The following were recorded for 2005 in the MMS.

Mine Type	Inspections	H&S Orders	Equipment Shutdowns	Environmental Orders	Dangerous Occurrence	Investigations	Training	Meeting	Other
Custom Mill	8	30	1	0	0	0	0	0	1
Coal -- Surface	86	402	8	0	128	0	1	12	0
Coal-Underground	6	20	1	0	0	0	0	2	4
Coal Exploration	14	68	2	0	2	0	0	1	0
Exploration-Surface	61	66	0	39	1	0	0	1	2
Exploration-Underground	16	39	0	10	0	0	0	0	0
Industrial Minerals -- Surface	42	149	5	10	0	3	0	2	1
Industrial Minerals -- Underground	3	5	0	0	0	0	0	0	0
Metal Leach-Surface	5	0	0	0	0	0	0	1	1
Metal Mine - Surface	62	206	12	2	17	0	0	1	2
Metal Mine-Underground	53	179	0	9	13	0	0	3	1
Non Assignable/ Unidentified	3	8	0	0	0	0	0	0	0
Placer-Surface	19	14	0	11	0	0	0	0	0
Placer-Underground	0	0	0	0	0	0	0	0	0
Rock Quarry	20	50	4	1	1	5	0	3	2
Sand/Gravel Pit	108	201	15	42	0	1	0	3	0
TOTALS	**506**	**1,437**	**48**	**124**	**165**	**6**	**1**	**29**	**14**

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 2004 there were two audits performed, the first was a trial of the new process at Quinsam Coal mine where the management and staff critiqued our methods and report to ensure that the audit findings would be of value to the industry and the mine in particular.

The second audit was at the Bralorne mine following the fatal accident that occurred there. The audit looked at their policy and procedures and how well they were applying them.

3.4 Notices of Work

The following Notices of Work and permit information were entered into MMS in 2005.

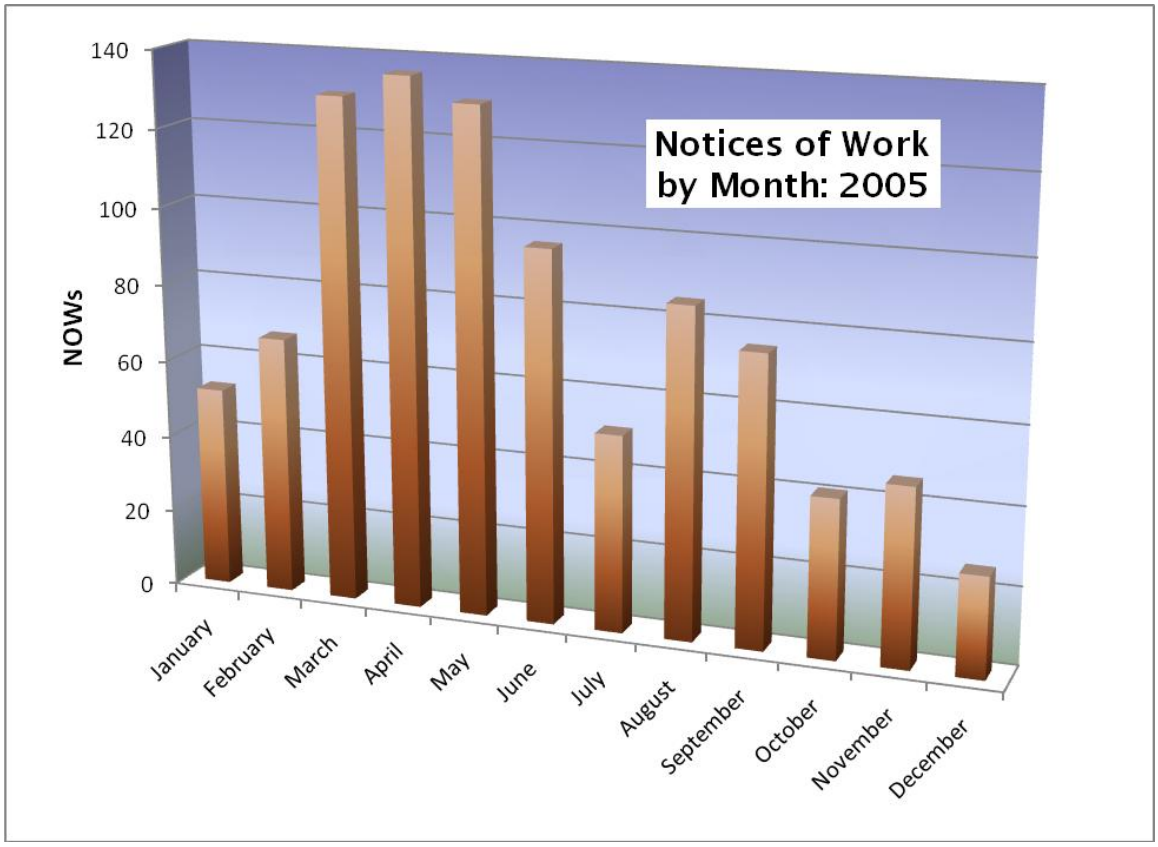
Type	Notice of Work Applications	Permits Issued	Average Days To Issue
Mineral and Coal (Exploration)	461	295	36
Mineral and Coal (other)	96	84	55
Placer	240	176	46
Sand & Gravel	138	100	76
Total	**935**	**655**	**47**

The breakdown of the 2005 Notice of Work by area is as follows:

Region	Placer	Sand & Gravel	Mineral & Coal	Total
Kootenay	17	12	88	117
Central	20	42	109	171
Southwest	1	36	37	74
Northeast	136	34	142	312
Northwest	66	14	179	259
Total	**240**	**138**	**555**	**933**

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 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 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.

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.

4.1.1 Structure and Organization

The Reclamation Section began the year with a staff complement comprised of four, a senior reclamation agrologist, 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 2005, permitting activity remained high. Four new permits were issued for the Wolverine Coal Mine, Trend Coal Mine, Orca Sand & Gravel, and the MAX Molybdenum Mine, and 28 amendments were made to existing permits in 2005:

Type	Amendments
Metal	16
Coal	10
Quarries	2
Total	28

Permit revisions were made at Snip Mine, Highland Valley, Myra Falls, Pinchi Lake, Mt. Polley, Cusac, Huckleberry, Moberley Silica, Gallowai Bul River, Island Copper, Craigmont, Goldstream, Kemess Mine, Dillon, Fording River, Basin Coal, Wolverine, Line Creek, Elkview, Fording River, Apple Bay and Eagle Rock.

Under the *Environmental Assessment Act*, reviews were conducted for Brule, Swamp Point, Davidson, Kutcho Creek, Schelt Carbonate, Cogburn Magnesium and Bear River

Gravel 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.

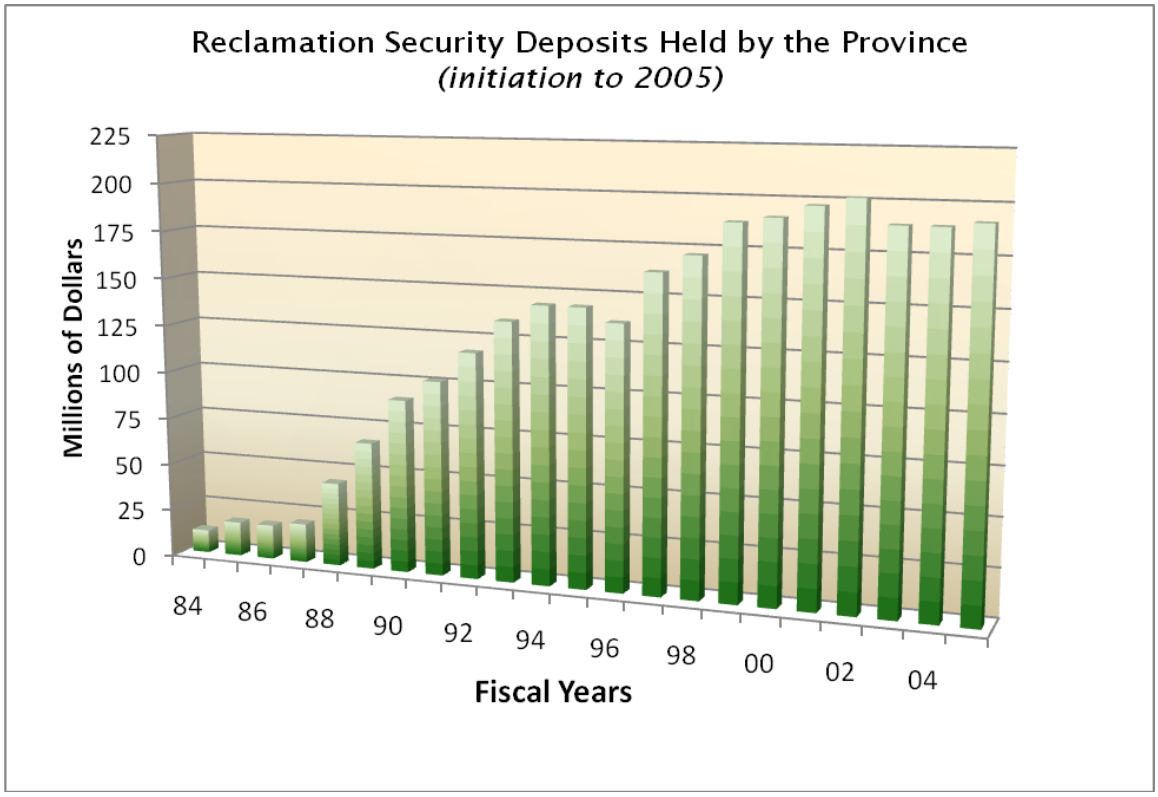
Cooperation facilitated by the reclamation section between industry, the public, government, and the academic community continues to result in a constructive climate for information exchange and dissemination of new technology.

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 $191.8 million by the end of 2005.



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 29 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 29th Annual Mine Reclamation Symposium was held from September 19 to 22, 2005 in Abbotsford, B.C. with a theme of "The Many Facets of Mine Reclamation." Delegates toured several reclaimed sand and gravel pits with final land use ranging from regional parks, to forage and field crops, to a successful vineyard.

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 British Columbia Jake McDonald Mine Reclamation award was North American Metals Corp. for their outstanding reclamation achievements at the Golden Bear Mine.

The Golden Bear Mine is located in remote, steep, mountainous terrain, 240 kilometres west of Dease Lake. This gold mine operated between 1990 and 2002 as an underground and open pit gold mining operation, using both conventional milling and heap leaching technologies.

Virtually all of the major reclamation requirements for the minesite were completed in 2004. Some of the recent highlights of the program include completion of the tailings impoundment soil cover, construction of an engineered spillway, removal of the Totem Heap Leach facility, removal of the Fleece Bowl dam and reclamation of the water storage area. Reclamation of more than 50 hectares of road disturbance is also largely complete. As well, all waste rock dumps have been resloped and all of the minesite infrastructure has been removed.

Re-vegetation will not occur in some of the very high elevation areas, but recontoured piles will increasingly blend-in with the surroundings. Lower elevation regions have been seeded and planted with native species and are expected to do well over time. A program to monitor the site for revegetation success and water quality, which continues to meet government permit requirements, is in place.

North American Metals Corp. has done an excellent reclamation job in this very remote and expensive area to work. The company and its contractors, were commended for their strong commitment to reclamation and environmental responsibility.

Four citations were also awarded:

- *Metal mine reclamation* - awarded to Teck Cominco Ltd. and the Ministry of Sustainable Resource Management for the Muskwa Kechika Joint Project.

- *Coal mine reclamation* - awarded to Elk Valley Coal Corporation for the Fording River Operations.
- *Mineral exploration reclamation* - awarded to Noranda Inc. for their work on the Kerr-Sulphurets property.
- *Quarry mine reclamation* - awarded to Monteith Bay Resources Ltd. for their fine reclamation efforts at their Monteith Bay Quarry.

4.2.9 Metal Leaching and Acid Rock Drainage Workshop

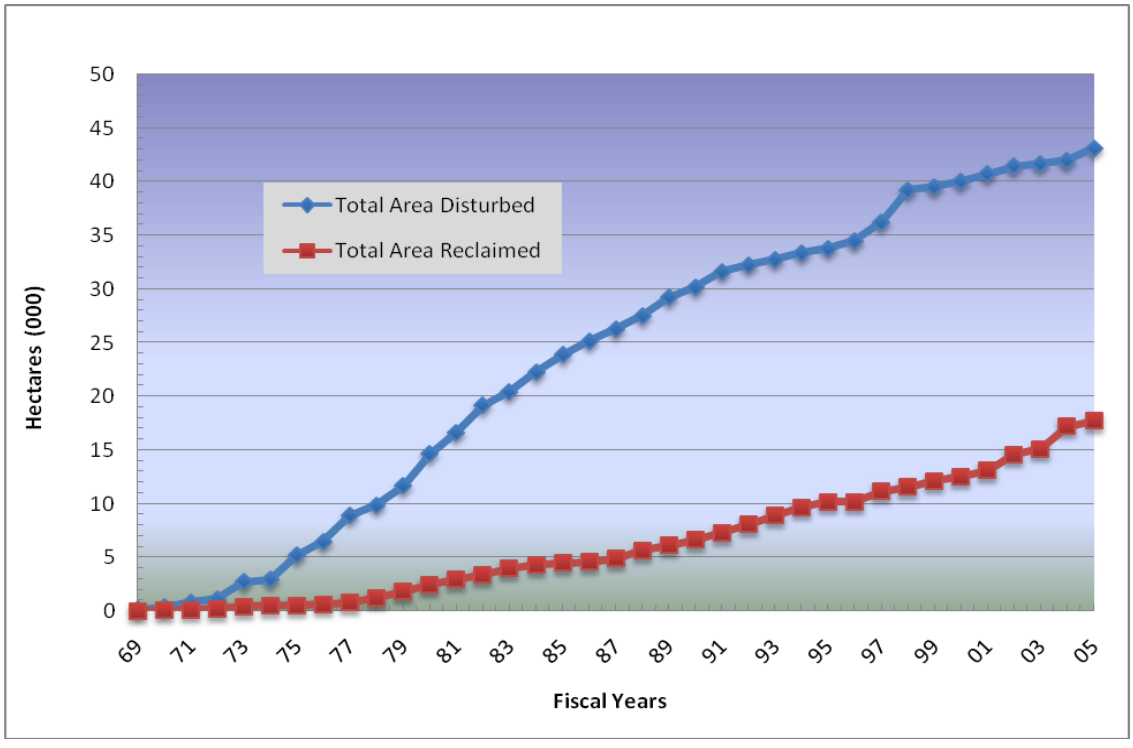
The 12th annual workshop was held in Vancouver on November 30 and December 1, 2005. This year, the workshop theme was "Challenges in the Prediction of Drainage Chemistry from Rock Weathering."

4.2.10 Industry Reclamation Record

The mining industry in BC currently consists of large-scale open pit metal mines, open pit coal mines, 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 2005, expanded to cover 43,121 hectares. Reclamation (where revegetation has been successfully established for one year or more) has occurred on over 41 percent or 17,729 hectares (Figure 4.1).

Figure 4.1 - Land Disturbed and Reclaimed by Metal and Coal Mines, 1969 – 2005



Metal mines have disturbed 23,494 hectares, and 9,781 hectares (or 41 percent), have been reclaimed (Figure 4.2).

Coal mines have disturbed 19,627 hectares, and 7,948 hectares (or 40 percent) have been reclaimed (Figure 4.3). The sharp increase in disturbance and reclamation at metal mines during the late 1990s 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 4.1, 4.2 and 4.3 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 4.2 - Land Disturbed and Reclaimed by Metal Mines in BC, 1969 – 2005

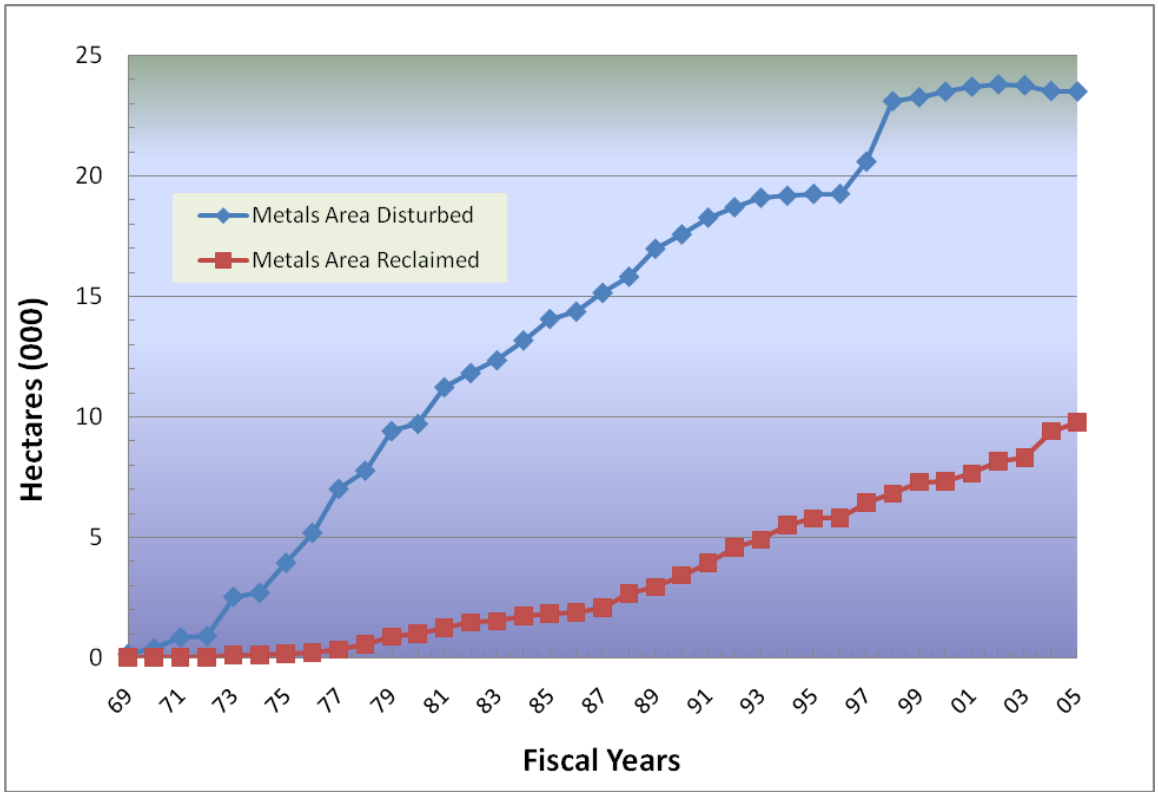
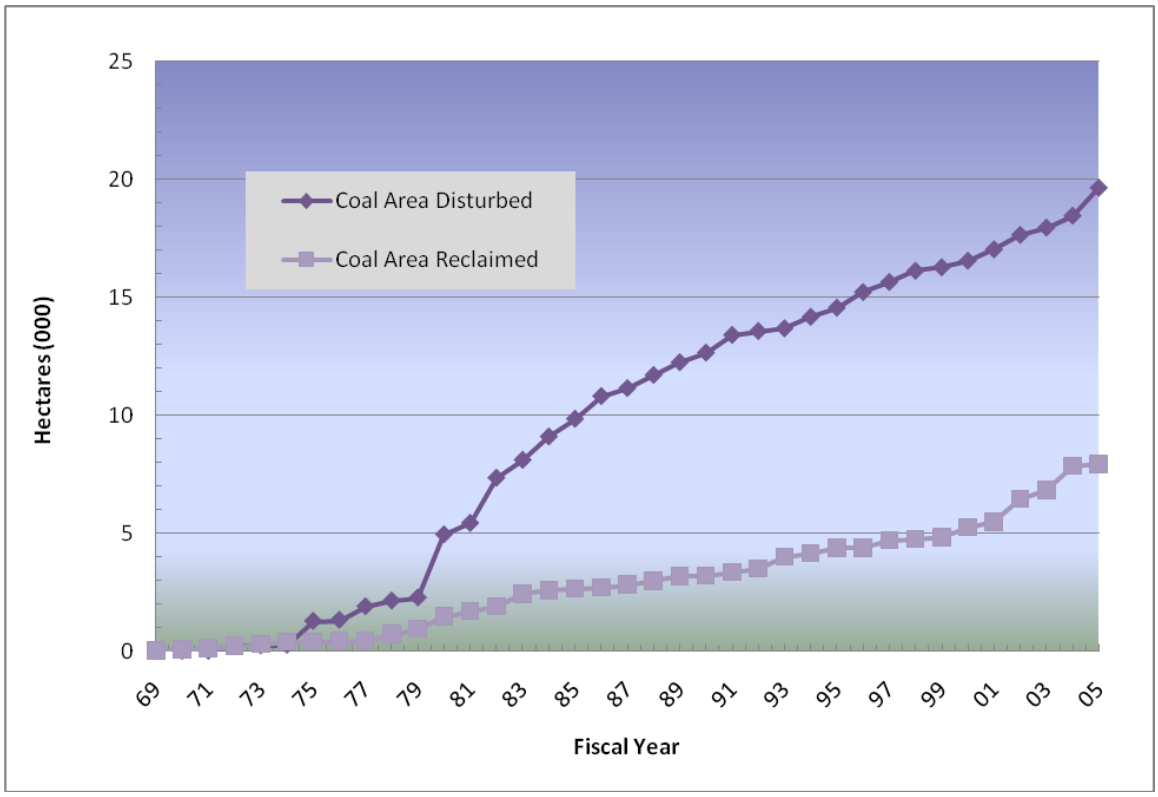


Figure 4.3 - Area Disturbed and Reclaimed by Coal Mines in BC, 1969 - 2005



4.3 Geotechnical/Mining Roads

4.3.1 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.

4.3.2 Summary of Activities

In 2005 the geotechnical section:

- Conducted 31 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
- 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

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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.