



CANADIAN MINERAL EXPLORATION HEALTH & SAFETY

Annual Report 2010/2011



Health & Safety Policy Guidelines for Junior Mineral Exploration Companies

These guidelines are designed to assist boards of junior exploration companies in setting up effective health and safety policies and protocols within the company. The guidelines are not standards and are not exhaustive. AME BC and PDAC have set the targets of zero fatalities and lowered lost time accidents for the exploration industry. Companies that have health and safety programs are more likely to help industry achieve those targets.

1. DUTIES OF BOARD OF DIRECTORS

- The Board of Directors should ensure that a health and safety program is in place.
- It may be preferable to appoint one director who will monitor and report to the Board on health and safety implementation.
- Alternatively the company could strike a health and safety committee of the Board.
- The Chairman of the Board should initiate education for all Directors as to their responsibilities and liabilities with respect to health and safety in the workplace. This would include all of the following:
 - Understanding of federal Bill C-45, which contains Amendments to the Criminal Code affecting the criminal liability of organizations
 - Understanding of regulations for the area(s) in which the company operates, and those specific to mineral exploration and mining
 - Understanding of the policies of appropriate professional associations with respect to health and safety in the workplace
 - Training on response to serious accident at worksite, including emergency response, but also response to media questions
- The Directors of the company should have a high level understanding of the health and safety risks in company workplaces.
- The Board should be notified as soon as possible on all serious accidents in the workplace (medical aids, lost time injuries, fatalities).
- The Board should allot resources towards health and safety program in the company.
- The Board should ensure that the organization has a Health and Safety mission statement, policy, and plan that implements health and safety protocols and checks periodically that they are appropriate. There should be health and safety targets within the plan.
- The policy should be signed at least by the chairman and preferably the whole Board.

- Any mission statement or policy could be incorporated within a general corporate mission statement and/or policy with respect to sustainable development.
- Consider an external review of health and safety policies and procedures.
- Make sure all work places, irrespective of jurisdiction, have the same levels of health and safety standards.

2. REPORTING

- Board meetings should include a report on health and safety performance prior to technical reviews.
- The Board of Directors, the director, or committee appointed to monitor health and safety procedures, should review with the COO or equivalent the records of statistics.
- Statistics should include hours worked, near misses, first aids, medical aids as well as workdays lost, and fatalities.
- Statistics should be maintained with monthly or quarterly reports.
- Accident records should be detailed and signed. Actions taken subsequent to accidents should be recorded.
- The annual report of the company, any interim reports (quarterly reports) and the website should include a summary of health and safety performance, along with the health and safety policy statement.
- In case of serious accident, if the company does not have the capacity to investigate the causes itself, external auditing should be completed.
- Operating groups or project teams should be encouraged to have safety meetings as follows:
 - Prior to project reports;
 - Once a month; **and**
 - Short “Toolbox” or “tailgate” meetings each day at the worksite.Minutes should be kept for safety meetings.
- Documentation should exist at three levels – office, management and field.

3. TRAINING

- Train the Board in field health and safety risks and procedures (as well as social, community and environment).
- Put a training plan in place to ensure that all workers have appropriate training for the tasks to be completed.
- Have safety leadership training as well as task specific training.
- Do not allow work to start without training.
- Have workers sign that they have received training and safety manuals. Insist on signatures that manuals have been read.
- All workplaces must comply with federal and provincial regulations with respect to health and safety.

4. DUE DILIGENCE CHECKLIST

Questions the Board of Directors should ask the Chief Operating Officer, Vice President-Exploration, or equivalent.

- ☐ Do you have a corporate health and safety policy?
- ☐ Do you have a corporate health and safety plan?
- ☐ Does the Board understand its responsibilities and liabilities?
- ☐ Does the Board have appropriate insurance in place?
- ☐ Does the Board request a health and safety report from the COO or equivalent prior to other discussions?
- ☐ Does the Board of Directors annually audit the plan with the COO or equivalent?
- ☐ Is the audit documented in writing, signed and dated?

- ☐ Does the Board audit the plan in addition to the annual audit in cases of serious accident?
- ☐ Do all projects have a designated health and safety leader, manager or monitor (not necessarily a job title)? Is the person told to shut down work if it is unacceptably unsafe?
- ☐ Does the designated health and safety leader know who to report to in case of accident?
- ☐ Do all worksites (camps, drills, etc) and regional offices have a valid, tested emergency response plan?
- ☐ Does the response plan include immediate 24/7 communication with COO or equivalent?
- ☐ Are all contractors required to include health and safety to at least the company standards in contracts?
- ☐ Before work starts, has there been an assessment and documentation of the health and safety risks?
- ☐ Are workers inducted for health and safety prior to starting work and supplied with necessary personal protective equipment?
- ☐ Are all employees given the appropriate training for the tasks required?
- ☐ Who documents training, including names, dates and course topics?
- ☐ Are training records kept?
- ☐ Are employees and contractors given an appropriate health and safety manual?
- ☐ Do employees sign that they have read the manual?
- ☐ Is there auditing of the contractor's worksite and action taken if required?
- ☐ Are health and safety statistics kept?
- ☐ Are the statistics publicly released (minimum: annual report)?



Health & Safety Guiding Principles

The Association for Mineral Exploration British Columbia (AME BC) recognizes that health and safety are fundamental cornerstones of the mineral exploration and mining sector. In pursuit of preventing incidents among its members, AME BC encourages the promotion of sound and responsible business practices to ensure everyone's right to a healthy and safe workplace.

In conducting their activities, AME BC members should strive to:

1. Communicate these guiding principles about health and safety to our members, communities of interest, aboriginal peoples, relevant regulatory agencies and international stakeholders.
2. Manage their activities to ensure accountability and compliance with applicable permits, laws and regulations. In the absence of regulation, best management practices will be applied to reduce health and safety risks.
3. Implement health and safety codes of practice, policies, programs, guidelines and procedures established jointly by industry and government to ensure identification of health and safety risks and the implementation of reasonable mitigation, monitoring, emergency planning, transparent auditing and reporting.
4. Identify and manage health and safety hazards and risks during all phases of the mineral exploration and mining cycle and will actively encourage all employees to consider their own safety as well as the safety of others.
5. Allocate the appropriate resources to meet health and safety goals and will support and conduct appropriate research to improve health and safety performance.
6. Actively investigate health and safety incidents to ensure that the rights of the employer and the rights of the employee are upheld in the pursuit of zero incidents occurring in the workplace.
7. Continuously seek opportunities to improve health and safety performance through adherence to these principles and will regularly report progress to other members, communities of interest, aboriginal peoples, relevant regulatory agencies and international stakeholders.
8. Support the joint AME BC-PDAC Canadian Mineral Exploration Health and Safety Award program to recognize commitment, innovation and leadership in the industry.

"Have a safe day, everyday."

Approved by the Board of Directors, Association for Mineral Exploration British Columbia, June 16, 2009

Robert Stevens, Chairman

Gavin C. Dirom, President & CEO

Canadian Mineral Exploration Health & Safety Annual Report 2010/2011

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Message from the AME BC and PDAC Health & Safety Committees

January 2012

The Association for Mineral Exploration British Columbia (AME BC) and the Prospectors & Developers Association of Canada (PDAC) are pleased to present the sixth *Canadian Mineral Exploration Health & Safety Annual Report*. The objectives of the report are to track health and safety trends and lay the foundation for increasing health and safety awareness and improving standards of practice in the mineral exploration industry.

The year 2010 was the first-fatality free year in mineral exploration in Canada since 1999, a true achievement. The incident rate edged higher in 2010 with 1.7 lost workday incidents per 200,000 hours compared to 1.5 incidents per 200,000 hours in 2009. The accomplishment of a fatality-free record in 2010 is tempered greatly by ten fatalities in the 2011 year. Our congratulations go to those who have achieved exemplary safety records over the past two years. Our thoughts, however, are also with the families, friends, and colleagues of the deceased.

Throughout the year, AME BC and the PDAC received information on the health and safety practices of 205 mineral exploration and mining companies, diamond drilling companies and geological surveys active throughout Canada. Of these, 81 organizations active in mineral exploration in Canada took the time to analyze their health and safety performance during 2010 and submit their results through a voluntary questionnaire. Although this number is down from the number of reporting companies in the 2009 survey, companies based their analysis on 613,237 person days of employment – the highest number of person days recorded since 2005. We congratulate the 61 companies who reported lost workday free records; and in particular, we congratulate Quadra FNX Mining Ltd. for recording 185,234 hours of exploration work without a lost workday incident, up from their record of 99,792 hours of exploration work without a lost workday incident in 2009. Most importantly, we thank all survey participants for their commitment to the health and safety of their workers.

Survey participants in 2010 reported 48 lost workday incidents resulting in a total of 976 lost workdays. This compares to 27 lost workday incidents in 2009, 45 lost workday incidents in 2008 and 60 lost workday incidents in 2007. These lost workday incidents should serve as learning opportunities for companies active in mineral exploration and development – tables outlining the circumstances of each incident are included in this report.

AME BC and the PDAC encourage all companies to set a target of zero incidents, every day. This report should act as a reference that can be used toward achieving this goal.

We encourage all companies active in mineral exploration in Canada to participate in the 2011 Canadian Mineral Exploration Health & Safety Survey. A copy of the survey is included in this report and is also available online.

We thank participants for their support and hope that you find the report of interest and value. If you have any suggestions for improvement of future reports please contact Jonathan Buchanan, Director, Communications & Public Affairs, at AME BC, at 604.630.3923 or jbuchanan@amebc.ca.

Message des comités de la santé et de la sécurité de l'AME BC et de PDAC

Janvier 2012

L'Association for Mineral Exploration British Columbia (AME BC) et l'Association canadienne des prospecteurs et entrepreneurs (PDAC) ont le plaisir de présenter le sixième *Rapport annuel sur la santé et la sécurité dans le secteur canadien de la prospection minérale*. Ce rapport fait le suivi des tendances en matière de santé et de sécurité et jette les bases nécessaires à une plus grande sensibilisation en ce domaine et à l'amélioration des normes de pratique dans le secteur de la prospection minérale.

L'année 2010 a été la première année durant laquelle aucun décès n'a été déploré dans le secteur canadien de la prospection minérale depuis 1999. C'est une grande réussite. Le taux d'incidents a été légèrement supérieur en 2010, avec 1,7 incident occasionnant une perte de journée de travail par tranche de 200 000 heures, en comparaison de 1,5 incident pour le même nombre d'heures en 2009. Les excellents résultats de 2010 sont toutefois assombris par les dix décès survenus en 2011. Tout en félicitant les entreprises qui ont présenté un dossier exemplaire en matière de sécurité au cours des deux dernières années, nous offrons nos condoléances aux familles, aux amis et aux collègues des travailleurs décédés.

Tout au long de l'année, l'AME BC et PDAC ont reçu des données sur les pratiques en santé et en sécurité de 205 compagnies de prospection, sociétés minières, entreprises de forage au diamant et sociétés de levés géologiques actives au Canada. De ce nombre, 81 compagnies de prospection minérale ont pris le temps d'analyser leur rendement en matière de santé et de sécurité en 2010 et de présenter leurs résultats dans un questionnaire facultatif. Bien que les entreprises aient été moins nombreuses à remplir le questionnaire par rapport à 2009, elles ont basé leur analyse sur 613 237 journées-personnes de travail, soit le plus grand nombre de journées-personnes déclarées depuis 2005. Nous félicitons les 61 compagnies qui n'ont signalé aucune perte de journée de travail, tout particulièrement Quadra FNX Mining Ltd., qui a déclaré 185 234 heures de travail de prospection sans incident occasionnant la perte d'une journée de travail, par rapport aux 99 792 heures de travail d'exploration sans incident déclarées par la compagnie en 2009. Plus encore, nous remercions aussi tous les participants au sondage, pour l'importance qu'ils accordent à la santé et à la sécurité de leurs employés.

Les participants au sondage de 2010 ont signalé 48 incidents qui ont occasionné une perte totale de 976 journées de travail, contre 27 incidents en 2009, 45 incidents en 2008 et 60 en 2007. Ces incidents doivent servir d'enseignement aux compagnies actives dans la prospection et la mise en valeur des minéraux. Des tableaux exposant les circonstances de chaque incident sont joints au rapport.

L'AME BC et PDAC encouragent toutes les compagnies à se donner comme objectif d'éviter totalement les incidents, chaque jour. Le présent rapport pourra guider leurs efforts vers cet objectif.

Nous invitons toutes les compagnies actives dans le secteur de la prospection minérale au Canada à participer au Sondage sur la santé et la sécurité dans le secteur canadien de la prospection minérale 2011. On trouvera copie du sondage dans le présent rapport et en ligne.

Nous remercions les participants pour leur appui et espérons que le rapport vous sera utile. Si vous désirez proposer des améliorations aux prochains rapports, veuillez communiquer avec Jonathan Buchanan, Directeur, Communications et affaires publiques, AME BC, au 604-630-3923 ou à jbuchanan@amebc.ca.

Acknowledgements

Survey Participants

We thank the following companies for reporting on their 2010 safety performance in the Canadian Mineral Exploration Health & Safety Survey. We also thank those who answered the questionnaire regarding safety programs; their names are on page 36.

Altius Resources Inc.	Liverton, Timothy
Amarc Resources Ltd.	Lorraine Copper Corp.
Anglo American Exploration (Canada) Ltd.	Mega Uranium Ltd.
AREVA Resources Canada Inc.	New Millennium Capital Corp.
Aurizon Mines Limited	Newfoundland and Labrador Geological Survey
Avalon Rare Metals Inc.	Noront Resources Ltd.
Baffinland Iron Mines Corporation	Northern Freegold Resources Ltd.
BCGold Corp.	Northern Tiger Resources
Bell Copper Corp	Northgate Minerals Corporation
BHP Billiton Canada Inc.	Nova Scotia Department of Natural Resources
Bitterroot Resources Ltd.	Ontario Geological Survey
Boart Longyear	Pacific Bay Minerals Ltd
British Columbia Ministry of Energy & Mines - Geological Survey	Pitchstone Exploration Ltd.
Bureau de l'exploration géologique du Québec	Prodigy Gold Inc.
Canada Zinc Metals Corp.	Purepoint Uranium Group Inc.
Capstone Mining Corporation	Quadra FNX Mining Ltd.
Cariboo Rose Resources Ltd	Queenston Mining Inc.
Castle Resources Inc	Quinlan Prospecting Inc.
Cornerstone Resources Inc.	Rambler Metals & Mining Canada Ltd.
De Beers Canada Inc. - Exploration Division	Royal Nickel Corporation
Detour Gold Corporation	Sabina Gold & Silver Corp.
Eagle Hill Exploration Corporation	Serengeti Resources Inc
Eastfield Resources Ltd.	Silver Quest Resources Ltd.
Endurance Gold Corp	Silver Spruce Resources Inc.
Equity Exploration Consultants Ltd.	SLAM Exploration Ltd
FB Drilling	Teck
Fjordland Exploration Inc.	TerraLogic Exploration
Fladgate Exploration Consulting Corporation	Titan Uranium Inc
Fronteer Gold Inc.	Treasury Metals Inc.
Geodex Minerals Ltd.	Tri Origin Exploration
Goldbrook Ventures Inc.	TTM Resources Inc.
Goldcorp Inc	Vale
Golden Valley Mines Ltd.	Vancouver Island Exploration
Gossan Resources Limited	Virginia Mines Inc.
Hard Creek Nickel Corporation	Vismand Exploration Inc.
Hawthorne Gold Corp	Votorantim Metals Canada Inc.
Huakan International Mining Inc.	Wallbridge Mining Company Limited
Hy-Tech Drilling Ltd	Watts, Griffis and McQuat
IAMGOLD Corporation	Xstrata Copper
Imperial Metals Corporation	Yukon Zinc Corporation
Lake Shore Gold Corp.	

AME BC and PDAC thank the following for making the sixth annual *Canadian Mineral Exploration Health & Safety Survey* and *Annual Report* possible.

AME BC Health & Safety Committee

Matthew Pickard, Sabina Gold & Silver, Chair
 Marke Wong, Tarsis Resources Capital Corp., Vice-Chair
 Henry Awmack, Equity Exploration Consultants Ltd.
 Rob Brown, Septemus Consulting Ltd.
 Angie D'Amato, Callinex Mines Inc.

Greg Dawson, Colorado Resources Ltd.
 Maria Gabriel, Anglo American
 Tony Horton, Silver Standard
 Bryan Lundale, Safety Authority of BC
 Ian Paterson, Consulting Geologist
 Rob Pease, Sabina Gold & Silver
 Harvey Tremblay, Hy-Tech Drilling

Matt Turner, Archer Cathro
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 Gavin C. Dirom, AME BC, Staff Support

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 Rory Clark, Teck
 Brent Czornobay, Vale Inco
 Craig Johnson, Barrick Gold Corporation
 Bill Krasnozov, Boart Longyear
 Martin Lenters, BHP Billiton
 Mike MacDonald, Government of Nova Scotia
 Courtney Mitchell, CSM Consulting

Ian Paterson, Consulting Geologist
 Rob Pease, Sabina Gold & Silver Corp.
 Marc Perron, ExpAir International
 Matthew Pickard, Sabina Gold & Silver Corp.
 Steve Roberts, Watts, Griffis & McQuat Ltd.
 Robert Schafer, HDI
 Brand Stewart, Freeport-McMoRan Exploration
 Corporation
 Karen Sutherland, Barrick Gold Corporation
 Lise Thompson, 1984 Enterprises Inc.
 Ed Yarrow, Anglo American Exploration (Canada) Ltd.
 Bernarda Elizalde, PDAC, Staff Support
 Karen Mulchinock, PDAC, Staff Support
 Emily Nunn, PDAC, Staff Support
 Lesley Williams, PDAC, Staff Support

Survey Support

Kathleen Brow, AME BC
 Greenfield Services Inc.
 IdeaLever Solutions

2010 in Review

Surface Exploration and Geological Work: A Summary

Respondents reported 205,856 person days of activity in 2010, up from 194,582 person days of activity in 2009.

There were 23 lost workday incidents reported through the survey, up from 11 lost workday incidents in 2009, but equal to 23 lost workday incidents in 2008. The frequency rate per 200,000 exposure hours was 2.5, up significantly from 1.2 in 2009, but down significantly from 3.3 in 2008.

There were 514 lost workdays. As in previous years, lost-time workdays were centered on the support services required for mineral exploration. Lost workday incidents were attributed to field assistants (139 days), line cutters (62 days), geologists (54 days compared to no lost workdays in 2009), a surveyor (40 days), geophysicists (40 days), a cook (9 days), and other support (170 days). Improper lifting was the lead cause of lost workday incidents (8 incidents), and field work, slips and falls and tool use were the causes of 4 incidents each. As in 2009, improperly lifting core boxes is a key cause of such incidents.

Surface Drilling: A Summary

Respondents reported 275,874 days in 2010, up from 150,276 days in 2009, and 211,770 person days of activity in 2008.

There were 21 lost workday incidents reported through the survey, up from 15 lost workday incidents, and equal to 21 lost workday incidents in 2008. Despite the increase in reporting, there were fewer lost workdays reported – 369 down from 398 in 2009. The lost workday incident frequency rate per 200,000 exposure hours was 1.6, down from 2.1 in 2009 and the lowest frequency rate reported since surface drilling and underground work were separated in the survey in 2007.

Drilling machinery and equipment continues to be a leading cause of lost workday incidents, along with slips and falls and tool use – at four incidents each. One reporting company has reported developing a rod handler to reduce lost work day incidents related to equipment.

Underground Exploration: A Summary

Respondents reported 131,507 days in 2010, up from 31,134 person days of activity in 2009, and 40,030 person days in 2008.

The incident frequency in underground mineral exploration remains very low at 0.6 in 2010, compared to 0.8 in 2009 and 0.5 in 2008. There were four lost workday incidents (compared to one fatal incident in 2009) resulting in 93 lost workdays. The most severe incident occurred when a driller was pinched between a power pack and a drift wall that had fallen off a rail car, resulting in 63 lost workdays.

Preventive Measures and Recommendations

Although some incidents are specific to a particular line of work, most can occur in a variety of environments. Slips and falls are routinely the leading cause of incidents. Bruises and muscular injuries are the leading nature of incidents, followed closely by cuts.

The leading preventive measures that could be taken to prevent incidents of 2010 from occurring can be summarized as follows:

- 1) Check that proper equipment and procedures are in place, are functioning properly, and are used in **all** operations;
- 2) Check that employees use appropriate personal protective equipment (PPE) and caution in all situations;
- 3) Eliminate unnecessary driving or use extreme caution while driving in hazardous conditions;
- 4) Use extra caution in slippery environments, particularly over logs and in steep terrain;
- 5) Do not lift or carry heavy objects without assistance;
- 6) Use ergonomic lifting techniques; **and**
- 7) Do not rush any aspect of a program. Train employees fully in all of their duties.

It is also important to note that employers are legally responsible to ensure that all employees and contractors:

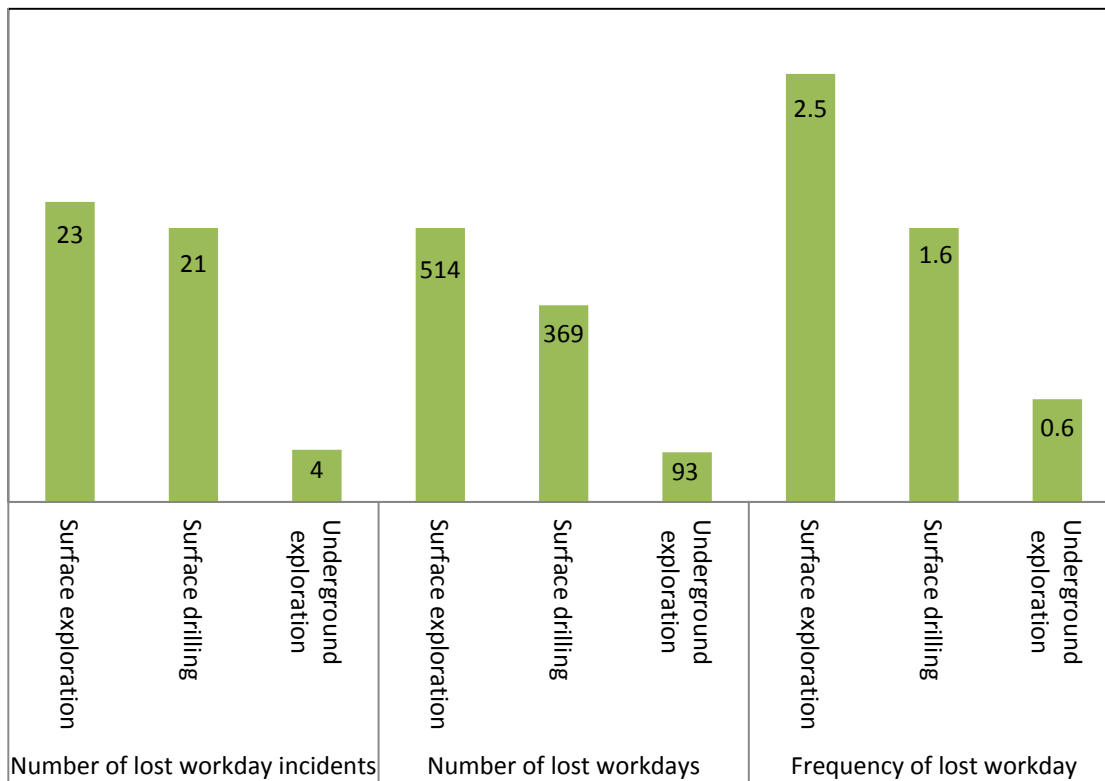
- o have safety programs in place;
- o provide personal protective and safety equipment;
- o adequately train and supervise personnel; **and**
- o ensure employees and contractors follow safe work guidelines.

Employers are criminally liable under the *Criminal Code of Canada* for criminal acts or negligence in the workplace. For further information, visit the Bill C-45 page of the Canadian Centre for Occupational Health and Safety website at www.ccohs.ca/oshanswers/legisl/billc45.html.

Standardized drilling training such as the Ontario Common Core Training surface drilling training can improve the safety of drilling programs. The Canadian Diamond Drilling Association has also developed the Drilling Excellence Certification initiative, which is scheduled to be underway in 2012, to certify companies that have a health and safety, environmental and quality management system. Visit www.cdda.ca for details on both initiatives.

Finally, incidents without lost workdays provide opportunities for companies to develop and improve their health and safety programs.

Figure 1: Mineral Exploration Safety Statistics Summary 2010



Discussion of Questionnaire Results

Results of the survey for each province and territory are available in Table 1, and have been summarized in Figure 1 above.

AME BC and PDAC received information on the health and safety practices and performance of organizations active in every province and territory with active mineral exploration programs in 2010 (i.e. with the exception of Prince Edward Island). While 205 mineral exploration and mining companies, diamond drilling companies and geological surveys active throughout Canada reported on their health and safety practices, 81 organizations active in mineral exploration in Canada took the time to analyze their health and safety performance during 2010 and submit their results through a voluntary questionnaire. Although the number of reporting companies is down from the number of reporting companies in the 2009 survey, companies based their analysis on 613,237 person days of employment – the highest number of person days recorded since 2005. These organizations included companies that were exploring for metals (including uranium), coal, and potash as well as government geological surveys, drilling companies, and consultants. See Figure 2a for a historical record of survey participation.

Table 1: Canadian Mineral Exploration Safety Statistics by Province and Territory 2010

Province	Category	NL	NS	NB	QC	ON	MB	SK	AB	BC	YT	NT	NU	N/A	Canada
Questionnaires returned from active orgs		10	4	3	14	26	3	10	1	29	13	4	7	1	81
Person days of activity	Surface exploration	13,362	867	1,458	54,008	65,383	1,330	8,137	0	26,574	8,689	3,985	13,683	8,380	205,856
	Surface drilling	26,977	374	1,320	27,928	115,326	1,360	33,699	28,224	19,946	5,941	4,739	10,040	0	275,874
	Underground exploration	7,339	0	0	4,836	69,507	17,680	29,399	0	2,043	302	401	0	0	131,507
	Total	47,678	1,241	2,778	86,772	250,216	20,370	71,235	28,224	48,563	14,932	9,125	23,723	8,380	613,237
Equivalent no. of exposure hours	Surface exploration	138,988	7,176	11,762	460,208	571,489	10,640	67,108	0	259,644	81,232	39,850	132,652	83,797	1,864,546
	Surface drilling	280,148	3,712	10,666	277,164	1,080,043	10,880	298,440	282,240	189,884	59,048	45,948	100,400	0	2,638,573
	Underground exploration	73,390	0	0	38,688	682,250	153,800	293,990	0	17,190	3,020	4,010	0	0	1,266,338
	Total	492,526	10,888	22,428	776,060	2,333,782	175,320	659,538	282,240	466,718	143,300	89,808	233,052	83,797	5,769,457
Number of Fatalities	Surface exploration	0	0	0	0	0	0	0	-	0	0	0	0	0	0
	Surface drilling	0	0	0	0	0	0	0	0	0	0	0	0	-	0
	Underground exploration	0	-	-	0	0	0	0	-	0	0	0	-	-	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Lost Workday Incidents	Surface exploration	0	0	0	8	8	0	1	-	5	0	0	1	0	23
	Surface drilling	0	0	0	2	7	0	3	0	8	0	1	0	-	21
	Underground exploration	0	-	-	3	1	0	0	-	0	0	0	-	-	4
	Total	0	0	0	13	16	0	4	0	13	0	1	1	0	48
Number of Lost Workdays	Surface exploration	0	0	0	115	133	0	85	-	160	0	0	21	0	514
	Surface drilling	0	0	0	23	71	0	51	0	223	0	1	0	-	369
	Underground exploration	0	-	-	30	63	0	0	-	0	0	0	-	-	93
	Total	0	0	0	168	267	0	136	0	383	0	1	21	0	976
Frequency of Lost Workday Incidents	Surface exploration	0.0	0.0	0.0	3.5	2.8	0.0	3.0	-	3.9	0.0	0.0	1.5	0.0	2.5
	Surface drilling	0.0	0.0	0.0	1.4	1.3	0.0	2.0	0	8.4	0.0	4.4	0.0	-	1.6
	Underground exploration	0.0	-	-	15.5	0.3	0.0	0.0	-	0.0	0.0	-	-	-	0.6
	Total	0.0	0.0	0.0	3.4	1.4	0.0	1.2	0.0	5.6	0.0	2.2	0.9	0.0	1.7

Definitions and notes for Table 1:

-**Frequency of lost workday incidents:** Number of lost workday incidents per 200,000 exposure hours.

-Number of hours per day worked is 10 unless otherwise reported by participants.

-Abbreviations: NL – Newfoundland & Labrador; NS – Nova Scotia; NB – New Brunswick; QC – Quebec; ON – Ontario; MB – Manitoba; SK – Saskatchewan; AB – Alberta; BC – British Columbia; YT – Yukon; NT – Northwest Territories; NU – Nunavut; N/A – not available; national data not separated according to province worked.

-Number of questionnaires per province/territory does not add up to Canadian total as many companies worked in multiple jurisdictions.

Figure 2: Canadian Mineral Exploration Health and Safety Participation Overview

Figure 2a: Reporting Summary 2005-2010

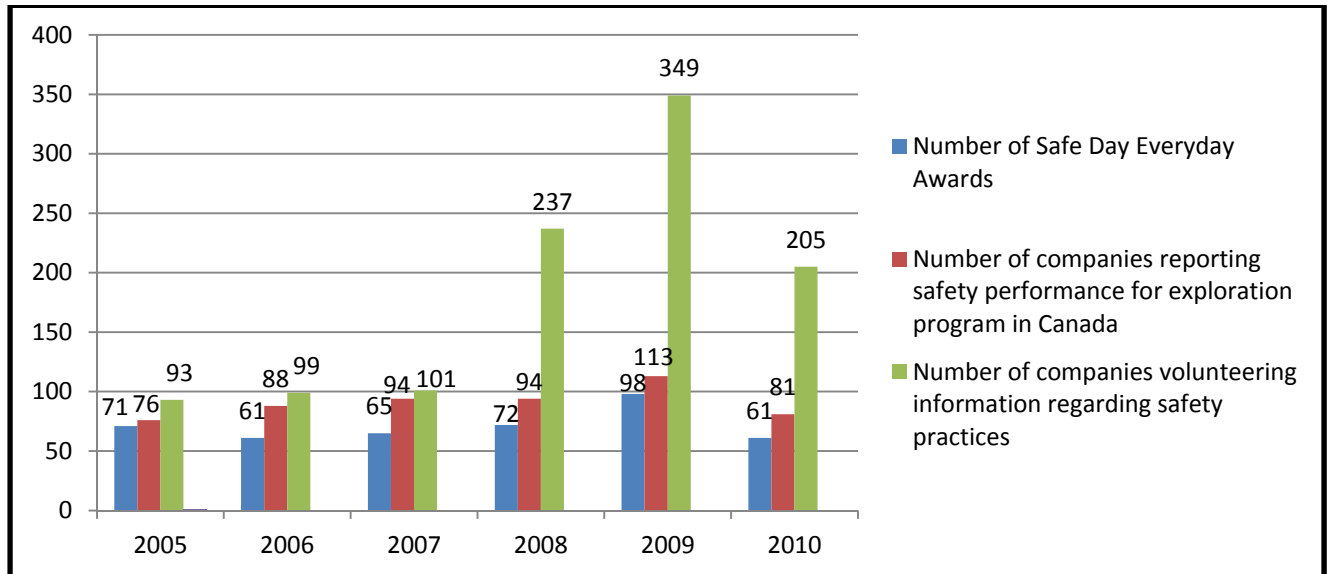
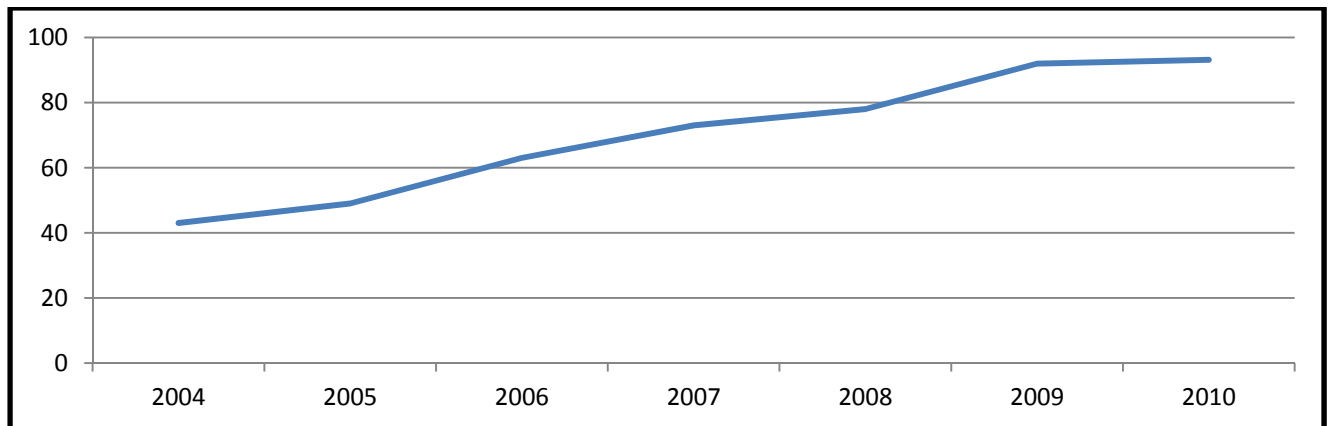


Figure 2b: Percentage of organizations with safety program



There has been a gradual increase in the proportion of companies with a health and safety program over the past seven years (see Figure 2b). Currently 93% of respondents declare that they have a health and safety program up from 49% in the initial year of the national survey in 2005, and 43% in the 2004 survey of companies active in BC & Yukon. Furthermore, 91% of respondents reported discussing safety issues at staff meetings, up from 86% in 2009 and 85% in 2008. Only 46% of organizations reported discussing near misses at staff meetings, down from 69% in 2009. However, 85% of those organizations who also reported on their safety performance reported discussing near misses at staff meetings – identical to 2008.

The ultimate objective is a sincere “Yes” in 100% of replies to all three of these questions.

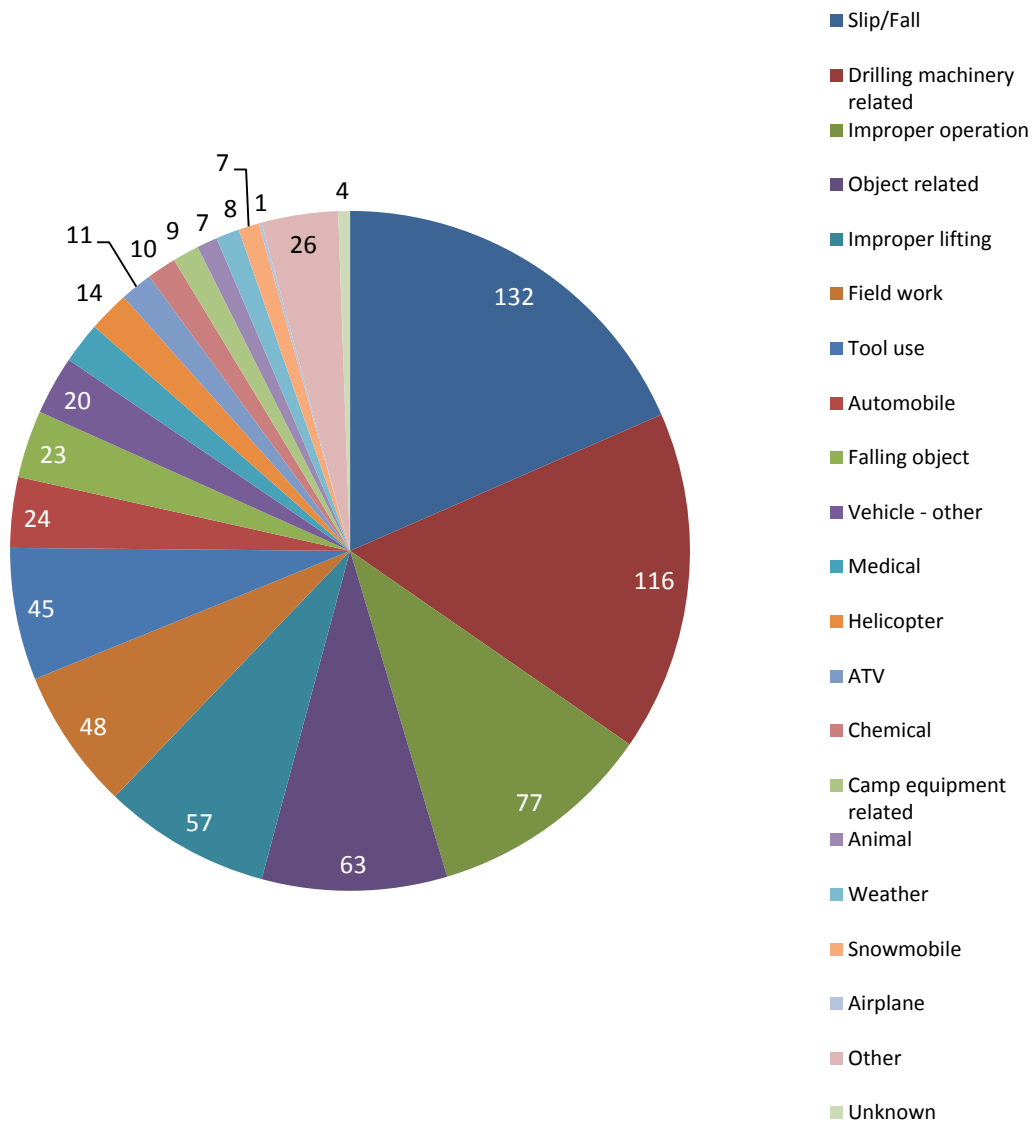
Cause of Incidents

The causes of all incidents are illustrated in Figure 3.

Slips and falls are consistently the single leading cause of incidents. Mineral exploration activity presents a number of slippery surfaces (e.g. ice, wet drill decks, boulders, logs) and opportunities for falls (e.g. uneven terrain including steep slopes, muskeg, and snow). The use of tools and equipment through various causes (drilling machinery, improper operation, tool use, vehicle related incidents, and camp equipment) combined, however, accounted for 323 incidents – nearly half of 719 incidents, consistent with 2009.

Personnel should always use the required equipment properly – many cuts and other injuries are caused by using improper equipment or by not using caution when handling sharp objects or machinery.

Figure 4: Cause of incident

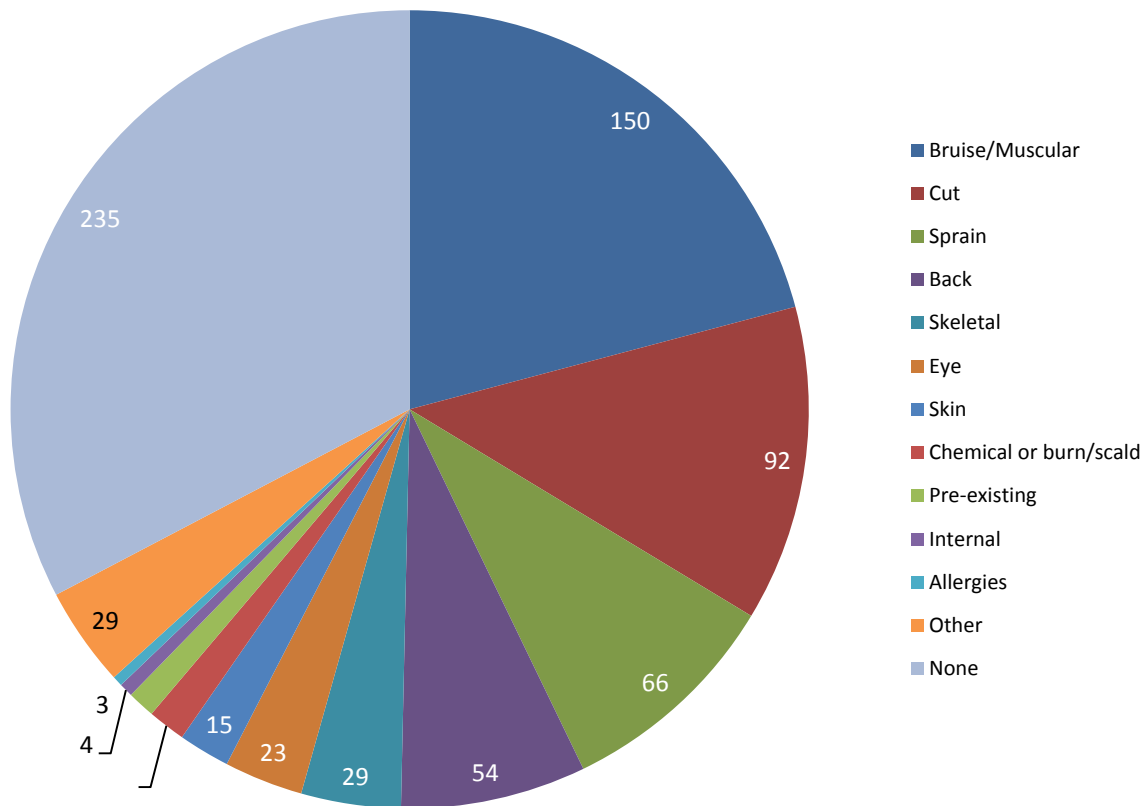


Nature of Injuries

The nature of lost workday incidents is illustrated in Figure 4.

Bruises and muscular injuries replaced cuts as the leading type of injuries in 2010. Both types of injuries are often related to several of the leading causes of injuries: slips and falls, and misuse of tools and equipment. Bruises and muscular injuries continued to be the second highest cause, and tend to result from the same causes.

Figure 4: Nature of Injuries



**Table 2: Lost Workday Incidents
in Surface Exploration and Geological Work
2010 Summary Report**

Date	Prov./Terr	Occupation	Type	No. of Lost Workdays	Nature of Injury	Cause	Description	Action Taken
Jun	BC	Field Assistant	MA	120	Bruise/ Muscular	Field Work	Worker injured knee when stepping over a log.	Time off, rest and physiotherapy.
Sep	SK	Other	FA	85	Back	Improper Lifting	Back injury sustained from lifting heavy box.	Acquired lifting aids and training.
Sep	ON	Line Cutter	MA	58	Cut	Tool Use	Cutter lost balance on uneven ground while cutting. Saw cut side of ankle to the bone	Review procedure while cutting line
Jul	QC	Surveyor	MA	40	Sprain	Field Work	Worker stepped on a rock and twisted his knee.	Clear the work area and keep it clear.
Apr	ON	Geophysicist	MA	30	Back	ATV	Worker injured his lower back and buttocks as a result of him landing upon rock outcrop and loose cobble after he jumped off his ATV as it began to tip onto its right-hand side after striking a large rock while descending a steep, rough section of a bush trail.	Worker was taken to the hospital for assessment, and was off work for 30 days followed by 90 days of modified duties.
Jun	QC	Geologist	MA	30	Back	Field Work	Back ache amplified by walk.	Employee was given office work and was sent to a chiropractor.
Jun	NU	Other	MA	21	Skeletal	Improper Operation	Very experienced operator was working in very high winds. The operator went to close door of the excavator and wind caught door, slamming it shut. The employee's wrist was jammed between the door and arm rest of seat causing wrist to fracture.	Investigation results showed poor operator positioning, putting worker in a pinch point position. Safety meeting was held to discuss incident and what to look for in all equipment when opening and closing doors in high winds.
Jan	ON	Other	MA	20	Back	Improper Lifting	Core logging assistant was moving core box (approx 40 lbs) from table to pallet in the afternoon.	Review of incident and ergonomic best practices at crew meeting. Action to purchase a pallet jack to position pallet closer to table.

Jan	BC	Other	MA	17	Internal	Improper Lifting	Hernia was developed from carrying core boxes.	Time off and rest.
Apr	BC	Other	MA	15	Bruise/ Muscular	Improper Lifting	Worker injured neck and shoulders due to repetitive lifting.	Time off and physiotherapy
May	QC	Geologist	MA	10	Back	Improper Lifting	Back pain from manipulating core boxes.	Action to review method of work for this task.
Aug	QC	Field Assistant	MA	10	Sprain	Slip/Fall	Slip.	Ice and bandage.
Mar	ON	Geophysicist	MA	10	Sprain	Tool Use	Employee was hammering steel rod in the ground whe he strained his back.	Review of technique for doing the task. Review proper body position for task. Complete risk assessment for this task.
Aug	QC	Cook	MA	9	Skeletal	Slip/Fall	Worker fell while going out on ATV.	Hospital.
Nov	ON	Other	MA	9	Skeletal	Improper Lifting	Worker injured wrist while moving core trays.	Modified duty until cleared for normal duties.
Jun	QC	Field Assistant	MA	8	Bruise/ Muscular	Field Work	Muscular laceration following incident.	Medical doctor and office work.
Jul	BC	Geologist	MA	7	Cut	Automobile	Returning to camp at dusk, truck fishtailed and rolled as it turned corner on loose gravel/washboard road.	Immediately held a health and safety meeting to review vehicle safety and rescue protocols; to address causes of incidents; ways to avoid future incidents. Implemented restrictions to driving hours and created a check-in/out policy.
Jul	QC	Geologist	MA	7	Sprain	Slip/Fall	Slip.	Ice and bandage and office work.
Apr	ON	Line Cutter	MA	4	Cut	Tool Use	Experienced cutter cut leg with machete while cutting picket.	No specific action.
Jan	ON	Other	MA	1	Skeletal	Improper Lifting	Worker dropped log on foot.	Medical Aid
Jun	QC	Field Assistant	MA	1	Sprain	Slip/Fall	Slip on wet floor.	Ice and bandage.
Dec	ON	Other	MA	1	Bruise/ Muscular	Improper Lifting	There was swelling in neck, shoulders and arm after moving core trays.	Action to reinforce proper lifting.
Jul	BC	Other	MA	1	Eye	Tool Use	A machinist had a piece of metal fall from his into his eye. Originally he thought he welder's flash, but optometrist found rust in his eye.	Hazard alert was issued.

**Table 3: Lost Workday Incidents in Surface Drilling
2010 Summary Report**

Date	Prov./Terr	Occupation	Type	No. of Lost Workdays	Nature of Injury	Cause	Description	Action Taken
Aug	BC	Driller Helper	MA	150	Bruise/ Muscular	Drilling Machinery Related	Helper hurt wrists with repetitive strain injury while handling rods.	Decision has been made to build rod handler to help prevent future incidents.
Apr	ON	Driller Helper	MA	54	Skeletal	Tool Use	Worker suffered severe lacerations to the abdomen and a fractured nose, when the pipe wrench he was using to change the shoe bit became dislodged and struck the worker in the abdomen and causing him to fall forward and break his nose on the chuck.	Worker was given proper medical treatment and the scene was frozen and the incident was investigated.
Mar	SK	Driller	MA	49	Skeletal	ATV	Employee was driving ATV from camp to drill site when the ATV flipped and he was thrown from the ATV	Replaced ATVs with side by side utility vehicles with seat belts, rollover protection structure and helmet.
Aug	BC	Driller Helper	FA	30	Bruise/ Muscular	Other	Helper was walking in the dark, and stubbed his foot on a rock. This helper did not return to work.	Remind crews to use provided flashlights.
Jul	BC	Drill Helper	MA	30	Skeletal	Other Object Related	The employee stepped on the end of a loose board that the drillers had been using as a gangway to the drill. The board flipped up and hit the employee in the thumb, causing a fracture in the bone.	Thumb was bandaged by on site Level III occupational first aid attendant. Employee then left site.
Nov	QC	Driller Helper	MA	13	Back	Improper Operation	Worker tried to hold a rod that was falling and then he felt back pain.	Training provided.
Sep	ON	Driller Helper	MA	11	Back	Drilling Machinery Related	While performing work near the core table the driller helper was struck with a broken drive shaft from the engine on the drill.	The drill should be locked out immediately.
May	QC	Driller Helper	MA	10	Bruise/ Muscular	Slip/Fall	When unscrewing the rod, the wrench stripped off, and the worker fell down.	Advised employee to pay attention to the work he's doing.
Aug	BC	Driller Helper	MA	5	Skeletal	Improper Operation	New helper broke his finger, which was caught between core tube and tower.	Action to review procedure.

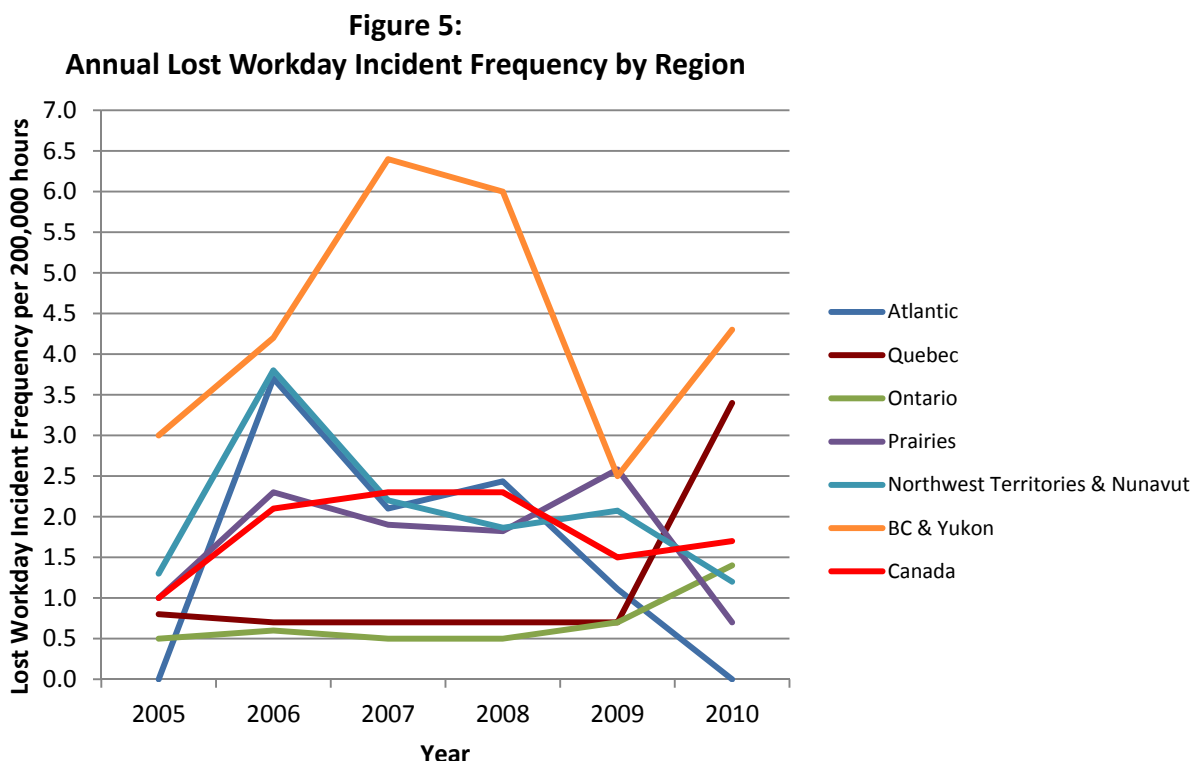
Jun	BC	Driller Helper	MA	3	Other	Drilling Machinery Related	Helper had sore wrists - tendonitis - from pulling rods and emptying core tube. Worker went home to rest and did not return to work.	Issued Hazard Alert; this incident increased importance of developing rod handler.
Nov	ON	Driller	MA	2	Other	Drilling Machinery Related	Pressure hose blew off near the worker's ear.	Medical Aid.
May	BC	Driller Helper	MA	2	Back	Slip/Fall	Patient woke up beside the water truck; he had fallen from top - approximately 10 feet.	Patient was examined; there was tenderness between shoulder blades pain when lifting arms and in lower back. Patient was driven to hospital by co-worker; hospital recommended going home for treatment.
Nov	BC	Driller	MA	2	Bruise/ Muscular	Slip/Fall	Patient fell from top of water truck and was unconscious. It was unknown exactly how long; the patient had a tender, stiff lower neck.	Ensured no blurred vision, strange smell or taste; patient was transported to hospital for X-rays.
Apr	ON	Driller	MA	1	Eye	Other Object Related	Stick stuck into eye.	Medical Aid.
Jul	ON	Driller Helper	MA	1	Cut	Tool Use	Worker slipped while cutting a bolt with a hacksaw.	Medical Aid.
Oct	ON	Driller Helper	MA	1	Eye	Chemicals	Worker got bentonite in eyes while mixing.	Medical Aid.
Feb	SK	Driller	FA	1	Bruise/ Muscular	Tool Use	While using snipe with pipewrench, the joint broke and the snipe struck the worker's leg.	Hazard alert explaining why snipes shouldn't be used with wrenches was issued.
Mar	SK	Driller	FA	1	Cut	Improper Operation	Driller was pulling ice auger out of track, hand slipped on the screw part, and he was cut.	Action to remind crews that gloves are available and need to be used.
Mar	ON	Driller Helper	MA	1	Other	Slip/Fall	Helper tripped and when he put his hand down, put it on a nail.	Hazard alert to reiterate importance of good housekeeping was issued.
Jul	NT	Driller Helper	MA	1	Cut	Falling Object	A big gust of wind came up and blew over 3 rods off the rod rack. The helper was hit in the arm, causing a cut.	Action to review procedure with helper and provide training; hazard alert was issued.
Jul	BC	Driller Helper	MA	1	Cut	Tool Use	Helper cut his finger with a utility knife.	Knife safety awareness training.

**Table 4: Lost Workday Incidents in Underground Exploration
2010 Summary Report**

Date	Prov./Terr	Occupation	Type	No. of Lost Workdays	Nature of Injury	Cause	Description	Action Taken
Sep	ON	Driller Helper	MA	63	Skeletal	Drilling Machinery Related	Driller and helper where moving an LM 90 power pack. Helper was pushing two flat cars with the loci. The flat car carrying the power pack derailed. Driller placed wooden wedges and rocks under the flat car wheels to attempt to rerail. Helper moved the loci. Driller went between the drift wall and the flat car.	Helper moved the loci. The flat car shifted. The power pack came off the flat car (it was not secured). The driller was pinched between the power pack and drift wall. ACTION: Re-trained employee on re-railing loci cart procedure.
Apr	QC	Driller	MA	16	Cut	Slip/Fall	Worker fell, and landed on nail on a dismantled floor.	Action to remove nails immediately when dismantling wood floors.
Oct	QC	Driller	MA	8	Other	Improper Operation	Driller felt pain in his shoulder when he was at changing the drill pipe tube.	Review the method for that task.
Jul	QC	Geologist	MA	6	Cut	Improper Operation	Worker was hit by hose as he was pulling on it.	Held meeting with employee on working method.

Trends

Figure 5 shows trends over the last five years in lost workday incident frequency. The year 2010 saw a departure from trends in the past as injury rates declined in the Northwest Territories, Prairies, and Atlantic Provinces but increased in Quebec, BC & Yukon and Ontario. The latter regions saw high levels of exploration and mine development in 2010, which may have been factors.



Generally, from year to year, it appears that there are four main factors that can be attributed to the differences between geographic regions. Incident rates are:

- 1) Higher in areas requiring helicopter access with cliffs, fast-flowing streams, snow and ice
- 2) Higher in areas with wild animals such as bears and wolves
- 3) Higher when helicopter evacuation from remote areas is required for medical access
- 4) Lower in areas of brownfield exploration
- 5) Lower as variables are removed (e.g. weather, easily accessible infrastructure)

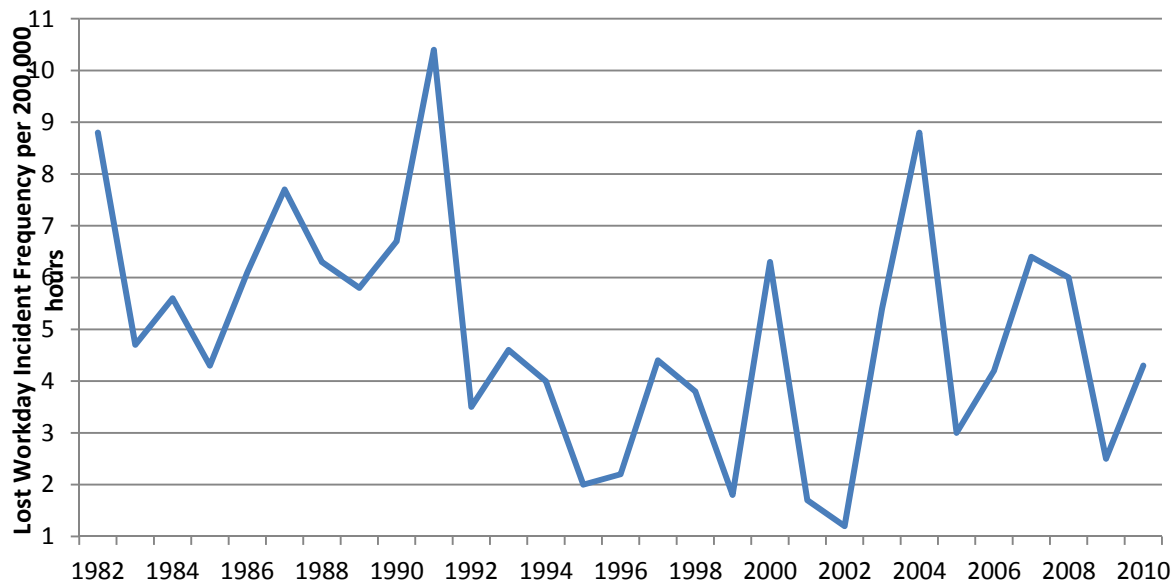
However, incidents in areas of brownfield can be severe; the deaths of three miners in 2009 in a shaft that was being rehabilitated where a water pump was broken serves as a reminder.

The overall injury frequency nationwide in mineral exploration – 1.7 in 2010 and 1.5 in 2009 – continues to be below the rate across all industries. The Association of Workers' Compensation Boards of Canada reports that the national injury rate for 2009 was 1.82, down from 2.12 in 2008 and 2.26 in 2007¹. (This rate is based on 100 person years, which is equivalent to 200,000 hours, the measure used in the mineral exploration survey.)

¹ Association of Workers' Compensation Boards of Canada. *Key Statistical Measures*.
<https://aoc.awcbc.org/KsmReporting/KsmSubmissionReport/2>. National 2010 frequency rate data unavailable as of February 2012.

Figure 6 shows trends in lost workday incident frequency in British Columbia and Yukon since the British Columbia & Yukon Chamber of Mines (now AME BC) began its *Annual Report: Safety in Mineral Exploration in Western Canada*. Generally, incident rates have been higher in times of high activity in the mineral exploration sector, although there is a subtle downward trend. Higher activity generally means that there is a greater number of inexperienced employees working in exploration. The incident rate peaked at 10.4 in 1991 and hit a low of 1.2 in 2002.

Figure 6: Annual Lost Workday Incident Frequency in BC & Yukon 1982-2010



Fatalities 1980-2011: An Overview

AME BC and PDAC have compiled information on fatal incidents in mineral exploration by seeking information from exploration companies working in Canada (Table 5) and the rest of the world (Table 6). The data is not complete, and input is sought from members of the industry to update the data.

The analysis given below on exploration fatalities in Canada should be taken in the context that the database is not complete; however, the basic trends are still instructive.

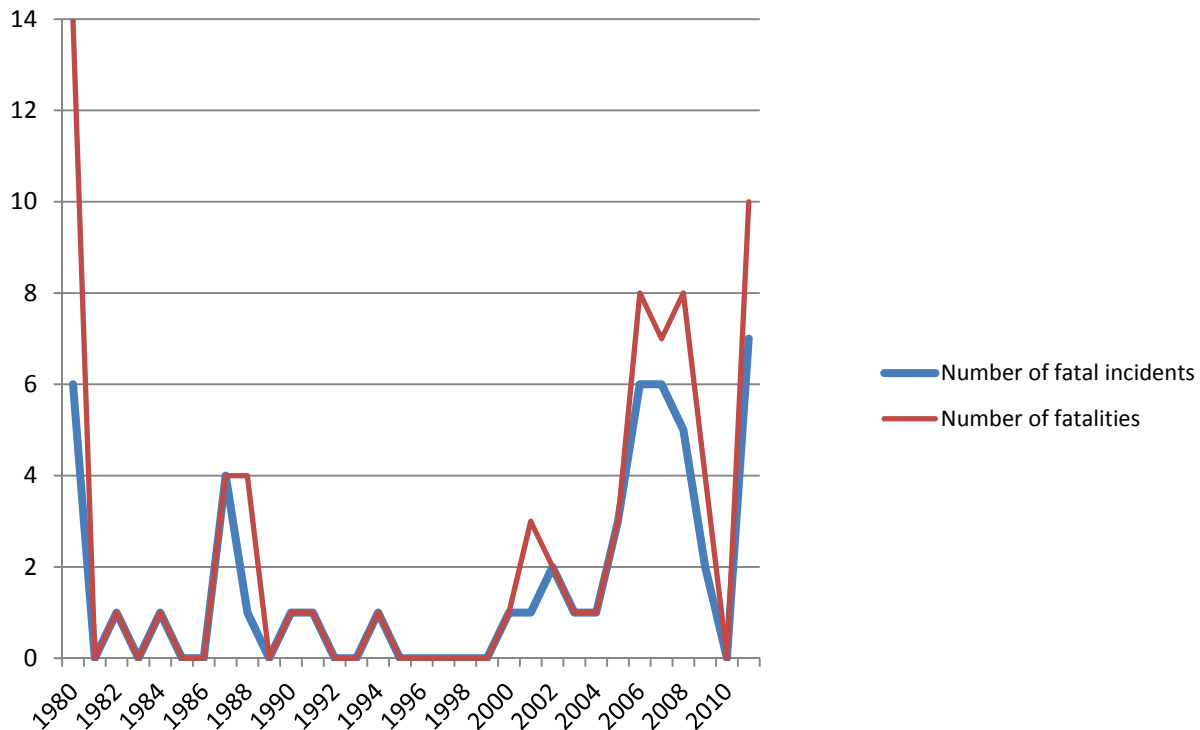
The objective of a fatality listing in mineral exploration activities is to highlight the principal events that can result in fatalities. The industry itself can then develop protocols and methodologies to prevent reoccurrence of these events. The reader should note that the data includes various categories of workers who may have been employed by contractors, rather than directly by an exploration company. Thus, pilots of aircraft and employees of drilling companies are included. Aircraft accidents are only included if directly connected with exploration. People are listed as *Geologist* (where the profession is known), *Field* (all employees in field, but not geologist, pilot or driller), *Pilot*, or *Driller* (all drill company employees).

Fatalities in Mineral Exploration

Figure 7 illustrates the trend in fatalities in mineral exploration in Canada over time from 1980 to the present. The data prior to 1980 is clearly incomplete and would be misleading. There were no fatalities in 2010, but there were ten fatalities in 2011 – the highest number in any year since 1980. Although this record is due in part to a booming

global mineral exploration and development sector, we hope also increased vigilance by mineral exploration companies and contractors will reverse this record - permanently.

**Figure 7: Fatalities in Mineral Exploration in Canada
1980-2011**



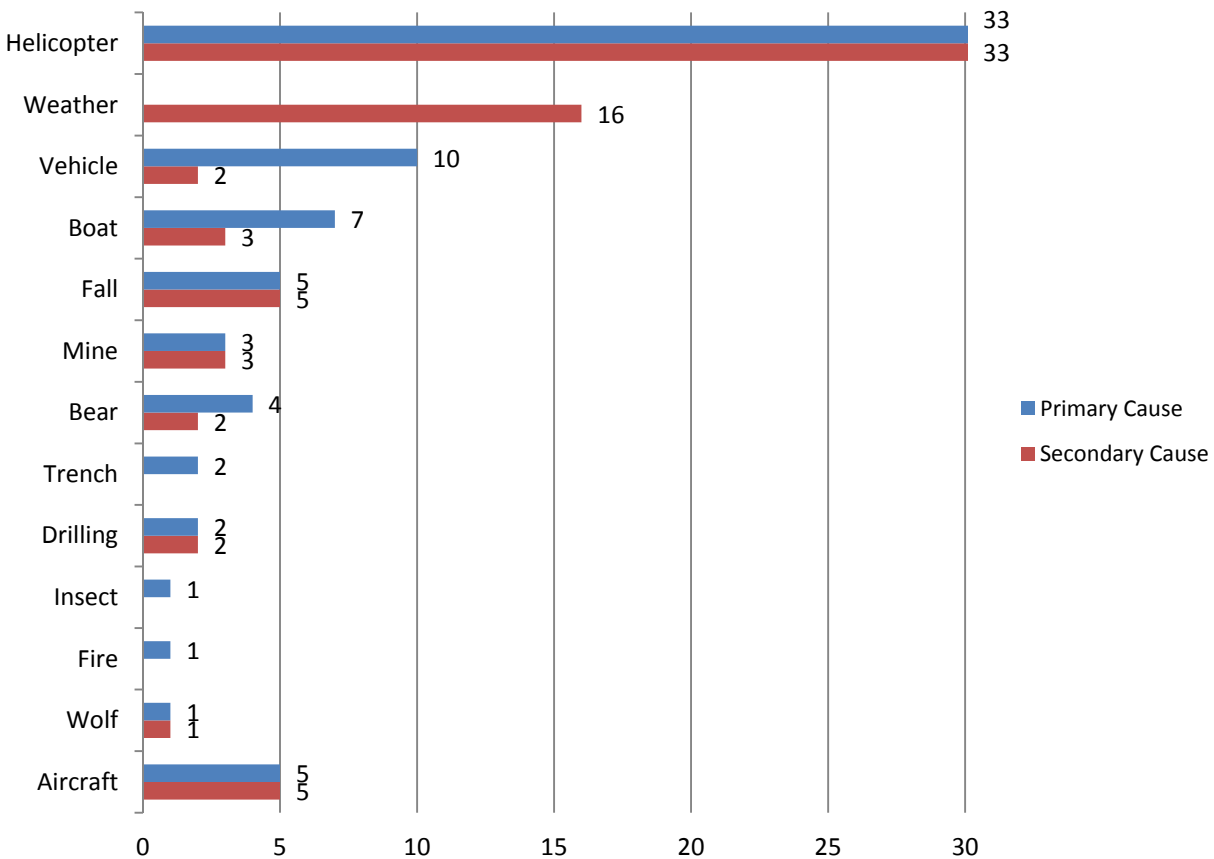
The graph shows the following points:

- There have been 75 fatalities involved in mineral exploration in Canada since 1980. Note that these include fatalities for ancillary activities such as helicopter services, geophysical surveys, and logging.
- There is no clear indication of a trend over time. Years with high exploration activity, however, tend to have higher numbers of fatalities.
- Only 12 of the past 32 years – including 2010 - had zero fatalities.
- The year 2011 tied with 1980, 2006, and 2007 in having the highest number of fatal incidents since 1980.

Despite increased safety awareness over the past 30 years, the data suggests that industry has not managed to make exploration significantly safer in relation to fatalities. This fact is clearly a challenge for all concerned to take action.

The fatalities have been classified by primary and secondary cause as outlined in Figure 8.

Figure 8: Fatalities in Mineral Exploration in Canada by Primary and Secondary Cause 1980-2011



The main cause of each fatality is listed as the primary cause. A different secondary cause is listed in cases where the secondary cause contributed significantly to the fatality. In cases where few details are available, or where there was not secondary aggravating cause, then the secondary cause is listed as the same as the primary. Thus, for a helicopter accident where no details are available then the secondary cause is listed as *Helicopter*. However, for a helicopter accident where the people involved survived the crash, but died due to exposure in poor weather, *Weather* is listed as the secondary cause. Where a vehicle accident related to icy roads, then the secondary cause is listed as *Weather*.

The data shows that helicopters are the prime cause of fatalities in exploration. This is exacerbated by the fact that helicopter accidents often cause multiple fatalities. It is interesting that fixed wing accidents, here noted as *Aircraft*, have only caused one exploration fatality in the period.

For the second highest primary category, boats, it should be observed that most fatalities occurred in the 1980s, and this likely relates to the fact that boats have since been used less in exploration over time.

Although weather is not prime cause of any of the fatalities, weather is the most important factor in the secondary category. This indicates that preexisting issues – such as helicopter or vehicle problems – have been aggravated by weather. In Canada this usually relates to winter but also relates to sudden changes in the weather, such as wind that was a contributing factor to four boating fatalities in 1988.

Transportation overseas continues to be a major contributor to fatalities overseas. In 2010, eleven personnel including the directors of a mining company perished when their plane crashed en route from Cameroon to an iron ore project in the Republic of Congo. In 2011, five of six fatal incidents were related to transportation.

It is suggested that exploration field crews need to be cognizant of these underlying factors and that any exploration safety manuals, training, and protocols take into account these statistics.

If you have any information to add to this database, please contact AME BC or the PDAC.

Table 5: Fatalities in Mineral Exploration in Canada 1980-2011

Company	Year	Prov/ Terr	Cause	Category 1	Category 2	No. of Deaths	Personnel
Government	1980	NS	Trench collapse/rainstorm	Trench	Weather	2	Geologist/Field
Major	1980	MB	Geologist drowning trying to swim to shore	Boat	Boat	1	Geologist/Field
Other	1980	ON	Prospector died from carbon monoxide in mine shaft	Mine	Gas	1	Geologist/Field
Other	1980	BC	Walked into tail rotor of helicopter	Helicopter	Helicopter	1	Geologist/Field
Other	1980	BC	Helicopter accidents (2)	Helicopter	Helicopter	9	Pilot/Geologist/Field
Other	1982	BC	Canoe related drownings	Boat	Boat	1	
Major	1984	ON	Truck rolled on ice road	Vehicle	Weather	1	Driller
Major	1987	BC	Bear mauling	Bear	Bear	1	Driller
Other	1987	BC	Fall from box of pick-up truck	Vehicle	Fall	1	Geologist/Field
Other	1987	BC	Fall from cliff	Fall	Fall	1	Geologist/Field
Other	1987	BC	Fall into crevasse while glissading	Fall	Fall	1	Geologist/Field
Other	1988	BC	Canoe related drownings	Boat	Weather	4	Geologist/Field
Other	1990	BC	ATV turnover	Vehicle	ATV	1	Geologist/Field
Other	1991	BC	Wasp sting, allergic reaction	Insect	Wasp	1	Geologist/Field
Major	1994	ON	Vehicle on ice	Vehicle	Weather	1	Geologist/Field
Major	2000	NT	Tower dropped while slinging	Drilling	Helicopter	1	Driller
Major	2001	NT	Helicopter crash - cause uncertain	Helicopter	Helicopter	3	Pilot/Geologist/Field
Major	2002	ON	Geophysicist killed in fall on cliff/wet weather	Fall	Weather	1	Geologist/Field
Other	2002	BC	Bear mauling/oil drilling site	Bear	Drilling	1	Driller
Other	2003	ON	Small plane crash	Aircraft	Aircraft	1	Geologist/Field
Other	2004	BC	Rock fall at exploration project	Mine	Fall	1	Miner
Major	2005	QC	Driller: bulldozer through ice	Drilling	Weather	1	Driller
Other	2005	BC	Bear mauling	Bear	Vehicle	1	Field
Other	2005	SK	Wolf mauling	Wolf	Wolf	1	Field
Government	2006	YT	Geologist struck by rotor of helicopter during toe-in pickup	Helicopter	Helicopter	1	Geologist
Other	2006	YT	Bear mauling	Bear	Bear	1	Field
Other	2006	BC	Helicopter crash - broken transmission mount	Helicopter	Helicopter	3	Pilot/Driller/Helper
Other	2006	QC	Boat related drowning	Boat	Boat	1	Field
Other	2006	SK	Helicopter crash into lake	Helicopter	Helicopter	1	Field

Other	2006	SK	Helicopter crash during slinging operation	Helicopter	Helicopter	1	Pilot
Other	2007	SK	Helicopter crash into lake	Helicopter	Helicopter	2	Pilot/Geologist/Field
Junior	2007	NL	Helicopter crash during slinging operation	Helicopter	Helicopter	1	Pilot
Other	2007	NU	Drowning	?	Weather	1	Driller
Junior	2007	NT	Worker drowned when truck fell through ice	Vehicle	Weather	1	Field
Junior	2007	BC	Helper died in tent fire at end of season	Fire	Weather	1	Driller
Other	2007	ON	Road builder fell through ice when plowing ice to build winter road	Vehicle	Weather	1	Roadbuilder
Other	2008	BC	Helicopter plunged into river	Helicopter	Helicopter	4	Pilot/Geologist/Field/Driller
Major	2008	BC	Logger killed on exploration project	Fall	Fall	1	Logger
Other	2008	BC	Pilot killed in slinging incident	Helicopter	Drilling	1	Pilot
Other	2008	YT	Helicopter crashed in river	Helicopter	Helicopter	1	Pilot
Other	2008	NT	Helicopter crashed near lake	Helicopter	Helicopter	1	Driller
Junior	2009	QC	Field technician died in crash	Vehicle	Vehicle	1	Field
Junior	2009	QC	Miners drowned in underground shaft.	Mine	Mine	3	Miner
Other	2011	SK	Worker drowned when bulldozer fell through ice	Vehicle	Weather	1	Driller
Other	2011	SK	Worker drowned when plane engine failed and plane crashed	Aircraft	Aircraft	1	Field
Junior	2011	BC	Pilot and geological contractors killed in helicopter crash	Helicopter	Helicopter	3	Pilot/Field
Junior	2011	NT	Pilots killed when plane crashed	Aircraft	Aircraft	2	Pilot
Other	2011	ON	Pickup truck fell through ice	Vehicle	Weather	1	-
Other	2011	QC	Helicopter crash upon descent	Helicopter	Helicopter	1	-
Other	2011	YT	Plane bringing supplies to exploration crashed	Aircraft	Aircraft	1	Pilot

Table 6: Fatalities Abroad in Mineral Exploration 1990-2011

Company	Year	Country	Cause	Category 1	Category 2	No. of Deaths	Personnel
Major	1990	Chile	Aircraft crash/hypothermia	Aircraft	Weather	4	Pilot/Geologist/Field
Major	1991	Chile	Boat capsized in squall	Boat	Boat	1	Geologist/Field
Other	1992	Australia	Driller was caught between mast and truck when moving drill mast	Drilling	Drilling	1	Driller
Major	1994	Chile	Vehicle accident/sleeping/alcohol	Vehicle	Alcohol	1	Geologist/Field
Other	1994	Ecuador	Helicopter crash - weather/pilot error	Helicopter	Weather	5	Pilot/Geologist/Field
Other	1995	Australia	Driller caught between rotating rods and mast	Drilling	Drilling	1	Driller
Major	1996	Philippines	Shot by guerrillas	Security	Security	1	Geologist
Major	1996	Turkey	Truck rolled	Vehicle	Vehicle	1	Driller
Other	1997	Australia	Helicopter crash, blade hit geologist standing by	Helicopter	Helicopter	1	Geologist/Field
Other	1997	Australia	Vomiting, unconscious due to heat exhaustion	Weather	Weather	1	Geologist/Field
Major	2000	Chile	Snowstorm	Weather	Weather	2	Driller

Major	2000	Argentina	Truck driven off the road	Vehicle	Vehicle	1	Driller
Major	2002	Chile	Murder of two geologists by thieves	Security	Security	2	Geologist
Major	2003	Chile	Vehicle accident/sleeping	Vehicle	Vehicle	1	Geologist
Other	2003	Mexico	Geologist swarmed by bees	Insects	Bees	1	Geologist
Junior	2004	Eritrea	Murdered	Security	Security	1	Geologist/Field
Midsized	2005	Chile	Aircraft crash/hypothermia	Aircraft	Weather	6	Pilot/Geologist/Field
Junior	2008	Chile	Helicopter crash	Helicopter	Helicopter	1	Field
Major	2008	Papua New Guinea	Mudslide onto exploration camp	Weather	Weather	10	Geologist/Field/Other
Junior	2010	Republic of Congo	Aircraft crash en route to executive site visit of exploration project	Aircraft	Aircraft	11	Pilot/Geologist/Other
Junior	2010	United States	Driller helper's clothing caught in moving drill equipment	Drilling	Drilling	1	Driller

Incident Alerts

Travel and Transportation

The majority of fatalities in mineral exploration has resulted from travel and transportation related incidents, including traverses. Helicopters have resulted in 33 fatalities since 1980 – including four in 2011 – and boat-related incidents have resulted in six fatalities, caused by hypothermia and drowning. Aircraft were involved in four fatalities in 2011; two of the three incidents were in built-up areas. Vehicle-related incidents (automobile, ATV, and bulldozer) are often life threatening and account for eight fatal incidents.

All explorers have a responsibility not only for their own safety, but for that of their co-workers and those working under their supervision. In travel-related situations, would-be or actual passengers must be prepared to express their concerns in support of aborting any travel by air, land or water, whether planned or in progress, for safety reasons with the expectation that their concerns will be given unbiased consideration by management.

Four falls into crevasses in the last 40 years by exploration personnel not adequately equipped or trained in glacier travel have resulted in four fatalities. By contrast, a well-equipped and trained mountaineering expedition into the Mount McKinley area in Alaska experienced 70 falls into crevasses without loss of life.

Helicopters

Since 1980, 33 people have been killed in such incidents throughout Canada including 16 over a three-year period from 2006 to 2008. Fourteen incidents without lost time were reported in 2010 compared to only 2 in 2009,, 4 in 2008, 16 in 2007, and 4 in 2006.

For detailed safety guidelines, refer to the AME BC *Safety Guidelines for Western Canada*, and the Helicopter safety sticker. The guidelines and sticker are available online at www.amebc.ca/policy/health-and-safety/health-and-safety-resources.aspx; hard copies are available from the AME BC office. Refer also to the PDAC Excellence in Health and Safety toolkit at www.pdac.ca/e3plus/English/toolkits/hs/16-aircraft.aspx.

A variety of publications including brochures, educational packages, posters, newsletters, and videos for helicopter safety is available from Transport Canada at <http://www.tc.gc.ca/eng/civilaviation/publications/tp4263-tp4263-4455.htm>.

Toe-in Pick-up Guidelines

Shortly after a fatality during a toe-in pick-up in July 2006, AME BC issued the following guidelines for toe-in pick-ups:

- Toe-in pick-ups carry a higher degree of risk and should be avoided if at all practical. In the past, especially towards the end of the field season, field crews sometimes became less energetic and as a consequence progressively less consideration is given in looking for flat spots for conventional landings. More and more they expect the pilot to pluck them off almost any slope, regardless of risk. Crews should get in the habit of finding the best possible pick-up spot on flat ground with good approaches throughout the field season.
- The pick-up locations must be approved by the pilot – by radio if you have one. If you are not in radio contact with the pilot and if the helicopter does not land, it is because he or she does not like your choice of pick-up point. The pilot will go and find a good landing spot and you will have to walk.
- Toe-in pick-ups should only be done with experienced crews that have built up a solid working relationship with the pilot. If the pilot expects to do toe-in pick-ups he or she will have talked about it in advance at the safety briefing as well as prior to embarkation and disembarkation. If the pilot doesn't mention any preferences regarding toe-in disciplines then you should ask.
- If there are two or more people expecting to be picked up at a toe-in site, it is important that they are in a cluster in such a position that they can be in eye contact with the pilot. Remember - **"See the pilot see you."** In most cases of toe-in pick-ups, the crew will be at right angles to the length of the machine and on the opposite side of the pilot. The pilot may prefer that all crew enter and exit on the opposite side from the pilot, to preserve weight balance.
- The crew will be crouched, hats removed, equipment stowed in pack and ready to move slowly and confidently one at a time into the machine with their packsacks when they get the nod from the pilot.
- Never walk upslope at a helicopter landing site – the reason is obvious. You should always be in a position to step up on the skid – never stepping down on the skid.
- A passenger who is present in the aircraft at a toe-in site can help those who are climbing aboard by arranging seat belts at readiness and lifting and stowing packsacks in the cabin.
- All movements around the helicopter should be done slowly and efficiently. Weight transfer onto a skid that is not grounded should not be sudden.
- Sometimes it may be necessary to move around to the other side of the machine to access a cargo door or get in at a door on the other side. This can be awkward and time consuming especially if the machine has an antenna at the front or the terrain is steep. Never duck under the tail boom – you will be well out of sight of the pilot and may get a hot exhaust blast if the machine is a 500D. Avoid going around to the other side of the helicopter if this is possible.
- **THE PILOT IS THE PERSON TO MAKE ALL DECISIONS WHEN IT COMES TO THE HELICOPTER AND ITS CAPABILITIES – NO EXCEPTIONS**

All-Terrain Vehicles (ATVs) and Utility Vehicles (UTVs)

All-terrain vehicles continue to be a perennial cause of lost workday incidents. In 2010, there were 3 incidents resulting in 88 lost workdays. There were 9 incidents without lost workdays where ATVs were reported as the incident cause.

The following guidelines have been adapted from AME BC's *Safety Guidelines*; increasingly companies are switching to four-wheeled utility vehicles (UTVs), which have rollover protection as well as cargo capacity.

- **Use four-wheeled ATVs only.** Three-wheeled ATVs have not been available in Canada and the USA for many years, but are often available in developing countries. Three-wheeled ATVs should not be used under any circumstances, as they have been responsible for many serious incidents.
- Utility vehicles (UTVs) with rollover protection are strongly recommended.

- Utility vehicles such as Mules, Bobcat UTVs or Argos, are more stable, and carry more people and cargo than ATVs.
- If ATVs or UTVs are used in the field, we highly recommend taking a training program from Canada Safety Council certified instructors. For information, see <http://canadiansafetycouncil.org/training>.
- Always make a pre-ride inspection before you start the engine.
- Do not ride fast on unfamiliar terrain or when visibility is limited. Never ride headlong past your limit of visibility. It is sometimes impossible to see obstructions, holes, and depressions. Always exercise caution.
- If carrying loads or towing a trailer, follow the manufacturer's rated vehicle capacity for loads and speeds.
- Most ATVs are designed to be ridden only by the operator. Their design does not permit carrying a passenger safely, as attested by the many injuries experienced by passengers.
- In particular, avoid the more obvious pitfalls, i.e. steep, rocky or irregular slopes, unsafe speeds, and exceeding your physical capability in righting an overturned ATV.
- Wear a government-certified crash helmet, scuff-resistant clothing, gloves, and goggles or face shields.
- Insure all ATVs. Check the insurance requirements in each province or territory - \$1,000,000 (minimum) in insurance is recommended.
- Ensure that all ATVs and personnel meet the current provincial or territorial legislation. British Columbia is the only jurisdiction in North America that does not license ATVs.
- No horse play or racing should be permitted – too many incidents have resulted.
- Loading and unloading ATVs from flatbed or pickup trucks can be hazardous. Make sure ramps provide good traction and are securely attached to the truck. ATVs may slide off when ramps are wet, muddy, or icy. Winch them on and off, if possible.
- Special hazards include the following:
 - Sprains or back injuries may occur when picking up a fallen ATV.
 - Burns may result from contact with exposed exhaust pipes.
 - Blind corners on narrow trails or roads may cause collisions with other vehicles or persons unless particular care is exercised – slow down!
 - Unless goggles are worn, overhanging branches may lead to serious eye injuries.
 - When crossing small streams, the depth of water and the type and condition of the banks and stream bed should be checked as they can cause spills.
 - Be aware of the possibility of fallen trees across your trail.
 - Be aware that ATV country is usually bear country – be bear aware.
- The ATV is a valuable aid to the prospector or geologist, and its limitations should be respected.

Slips and Falls

Slips and falls have caused over 40% of lost workday incidents reported in the AME BC and AME BC/PDAC safety reports. Two fatalities have occurred over the years, one from a fall on precipitous terrain and the other from a fall into a crevasse. Two other fatalities were directly related to vehicles: one to a fall from the back of a pick-up truck and another from crushing by an overturned ATV. Other fatalities not generally attributed to falls, but directly related, include falls into cold or fast-moving water from boats, which resulted in death from hypothermia and/or drowning.

The principal preventive strategies are:

- Development and implementation of a safety-awareness attitude with a constant effort to recognize and avoid potentially hazardous conditions.
- Adequate footwear with an emphasis on traction and support for most exploration work and hard-toe cover, as required.
- Special precaution in winter conditions, particularly on drill sites.

West Nile Virus and Sun Protection

Exploration personnel commonly work in environments where sunscreen and insect repellents have to be applied to avoid exposure to sunburn, skin cancer, and West Nile virus. In this type of environment, experienced workers generally wear long pants, long sleeved shirts, and a hat with a big floppy brim. This means that exposure to the sun and mosquito bites is limited to the neck and face and the backs of hands: lotion application is thus minimized.

Recent research (2007) has demonstrated that it is not advisable to apply insect repellent (DEET products) and sunscreen at the same time as, the repellent penetrates the skin in far greater amounts and the sunscreen loses some of its protective ability. High absorption of DEET by the body can lead to toxic effects leading to dizziness, rashes and headaches. If both sunscreen and repellent must be applied, it is recommended that the sunscreen be applied first and the repellent 30 minutes later. Use a product with 35% DEET or less.

Eye Injuries

Eye injuries seldom receive the attention they deserve – they are not fatal, and are not generally reported by the media. However, they are very serious in nature and are easily preventable. One company active in the United States noted that eye injuries and flushes were the most common injury on their drilling team, attributable to improper use of personal protection equipment, mainly using glasses instead of goggles.

The year 2008 was the worst year for eye injuries in the history of the national survey. A heavy duty mechanic rubbed grease and a metal sliver into an eye, resulting in 16 lost workdays. A twig scratched the cornea of a snowmobile operator who was not wearing eye protection. Both these incidents could have been averted by wearing the proper equipment. In 2010, there were three incidents each resulting in a lost workday.

The following are guidelines from AME BC's *Safety Guidelines*. The guidelines can be summarized as, "Always wear the appropriate personal protective equipment."

- Wear safety glasses at all times while breaking or hammering rock, core splitting, blasting, using a chainsaw, or when visiting mining operations.
- Wear goggles or a face shield attached to a hard hat when hooking up helicopter sling loads.
- Wear safety glasses with wide shields or goggles when handling chemicals (e.g. battery acid) or corrosive materials (e.g. grout), boosting batteries, or using ultraviolet lamps for extended periods.
- Wear high quality polarizing sunglasses when working at high altitude, or on glaciers, snowfields, and water.

Animals

Bears

On the first day of the field season in 2006, a worker in Yukon was mauled and killed by a grizzly bear as he passed within five metres of two bear cubs. Bears also killed mineral exploration workers in 1987 and 2005.

The principal preventive remedies and recommended procedures in the event of encounters with bears include the following:

- Avoid encounters by awareness of areas where bears are present in large numbers.
- Conceal food odours at camps and incinerate garbage.
- Make noise while traversing (use cans of rocks, air horns, etc.).
- Be alert for bear signs.
- Be prepared for an encounter by taking training courses and reading relevant literature.

- Carry bear bangers or a canister of the bear repellent Counter Assault or an equivalent bear spray in a readily accessible location. (See **CAUTIONARY NOTE** below.)
- Have a firearm available at camp and knowledge where to shoot to kill or disable a bear in the event of an emergency. Experience in the safe use of firearms is essential. Note that in Canada, only people who hold a PAL (Possession and Acquisition Licence) or POL (Possession Only Licence) can carry firearms.
- If an attack is unavoidable, be prepared to follow the recommended procedure to survive mauling. This may involve fighting off an aggressive predatory bear with anything at hand.

The use of bear spray is recommended in the event of an attack by a bear. In both 1993 and 1994, two individuals credited the use of bear spray in saving their lives, one of them being seriously injured during the encounter. Employees must practice with bear spray at the beginning of each season and be conscious of wind direction and the optimum distance for spray use. Also recommended is Gary Shelton's *Bear Encounter Survival Guide*, available in bookstores. Mr. Shelton also advocates the use of a firearm, which federal and provincial government agencies actively discourage field employees from carrying.

Two highly recommended videos entitled "Staying Safe in Bear Country" and "Working in Bear Country" were produced by Magic Lantern and are available through <http://www.macecanada.com/canada/video1.htm> or www.yukonbooks.com. The government of Yukon bear safety website at <http://www.environmentyukon.gov.yk.ca/camping/bearsafety.php> and the University of Alberta Earth & Atmospheric Sciences bear safety website at <http://safety.eas.ualberta.ca/node/13> are also excellent sources of information.

CAUTIONARY NOTE: BEAR BANGERS MAY BE DEFECTIVE

Bear bangers, which are devices used to scare away bears, may explode prematurely during use, causing injury to the operator. These are small explosive cartridges which are screwed to the end of a pencil-sized launcher and activated by a trigger. Once activated, the bear banger is launched about 40 metres by a propellant, at which point the main explosive charge explodes with a loud noise.

Failed bear bangers have exploded within several feet of the launch tube, temporarily deafening the operator and presenting dangers of burns and shrapnel.

The bear banger is normally white coloured, sold in packages of six stored inside a clear plastic pouch, and has a shelf life of about two years. **All** of the devices that failed during use and testing had a **grey discolouration**, probably caused by the propellant leaking from within the cartridge. Any bear bangers showing evidence of discolouration should be safely discarded and replaced with new devices in a sealed package. The devices that failed were only one and a half years old, so it is important to inspect and test-fire all bear bangers.

It is also important to check the compatibility of cartridge and firing mechanism. A rim-firing cartridge will not be fired by a centre firing mechanism or vice versa. Always test fire in a safe place before use.

Please note that bear bangers are considered dangerous goods, and are subject to Transport Canada regulations. See <http://www.tc.gc.ca/eng/civilaviation/standards/commerce-dangerousgoods-news-notices-15-1560.htm>.

Wolves

In November 2005, a geological engineering student at the University of Waterloo was killed by wolves while walking near a remote exploration camp at Points North Landing near Wollaston Lake, Saskatchewan. A coroner's inquest in 2007 confirmed that this was the first documented case of a fatal wolf attack in North America.

Like other animals, wolves are attracted to garbage. It is recommended that camps incinerate garbage daily and remove the remains to a legal dump or bury them in a suitable pit that, when full, is at least one metre deep, and is

allowed in the land use permit. The British Columbia Ministry of Environment recommends the following measures if a wolf is encountered (available at www.env.gov.bc.ca/bcparks/explore/misc/wolves/wolfsaf.html):

- Do not allow the wolf to approach any closer than 100 metres.
- Raise your arms and wave them in the air to make yourself appear larger.
- When in a group, act in unison to send a clear message to the wolves they are not welcome.
- Back away slowly. Do not turn your back on the wolf.
- Make noise. Throw sticks, rocks, and sand at the wolf.

Wasps

A geologist died suddenly in 1991 from a massive allergic reaction (anaphylactic shock) following a single wasp sting in a remote area. It is possible that the fatality could have been avoided had epinephrine been available for an immediate emergency injection. Other potentially fatal allergic reactions, some of which are extremely rare, can be caused by drugs (penicillin, codeine, aspirin, sulpha antibiotics, etc.), certain foods and plants, or other insect bites.

The principal preventive measure is an awareness of possible susceptibility to specific allergic reactions and the immediate availability of epinephrine (usually available as an auto-injector such as an EpiPen). Concerned individuals should consult a physician to determine whether they are allergic to epinephrine or other antihistamines. People with auto-injectors should carry them at all times and make sure that they have not expired. If they have a very serious allergy, they should carry more than one EpiPen, as one dose may not be sufficient. An EpiPen should also be included in first aid and survival kits. Co-workers should be instructed how to use the EpiPen in case the victim is unable to do so.

Resources

Safety Guidelines and Manuals

A comprehensive source of safety information for mineral exploration is AME BC's *Safety Guidelines for Mineral Exploration in Western Canada*. Although the booklet has a western Canadian focus, it is generally applicable throughout Canada, and copies of the manual have been provided to companies operating in the USA and Latin America. A fourth edition of *Safety Guidelines* was released in 2006, and over 26,000 copies have been distributed over the past 30 years. The guidelines are available online at <http://www.amebc.ca/policy/health-and-safety/safety-guidelines/safety-mineral-exploration-western-canada.aspx> and from the AME BC office. AME BC members are entitled to one free copy. Additional copies can be purchased at a cost of \$5.00 each (plus shipping and GST).

More detailed information is available in the new e3 Plus Health & Safety in Exploration Toolkit developed by the Health & Safety Committee of the PDAC. This toolkit is available online at www.pdac.ca/e3plus.

The PDAC will launch the PDAC Field Safety Pocket Guide at the PDAC 2012 Convention. The pocket manual will be available in English, French and Spanish. It is a portable handbook that can be easily carried in the field. The waterproof and tear-resistant guide includes a variety of safe fieldwork practices that will increase ones awareness of the risks, hazards and dangerous situations inherent in exploration work. The PDAC strongly believes that in improving awareness, accidents can be reduced so the industry can continue to have a safe day, every day. If you would like to order a copy, please go to www.pdac.ca and download the order form. The first five copies are free and additional copies cost \$5 + shipping. For further information, contact kmulchinock@pdac.ca

Safety Checklists, Stickers, and Cards

AME BC has prepared safety checklists, stickers, and cards to assist in preparedness in the field. A general safety checklist, survival kit checklists, and procedures in the event of a serious incident or fatality are on pages 180 to 182 and 184 of the *Safety Guidelines*. Waterproof stickers covering transportation safety, field work and traversing safety, communication, helicopter safety, and environmental considerations for drilling are available from the AME BC office or in Adobe Acrobat .pdf format at <http://www.amebc.ca/policy/health-and-safety/health-and-safety-resources.aspx>.

Workshops & Courses

Safety Workshops

The AME BC Health & Safety Committee holds annual safety workshops. Exploration Safety for Project Managers is scheduled for Friday, March 30, 2012, and Introduction to Exploration Safety is scheduled for Saturday, March 31, 2012. Registration forms for both workshops will be at www.amebc.ca.

First Aid Training

All personnel involved in mineral exploration should have current First Aid training that is applicable to their work. This usually includes Level 1 or Standard First Aid and a transportation endorsement. In general, first aid training within a crew or camp must meet, and should exceed, local Workers Compensation Board requirements.

Highly recommended for all exploration personnel is a course on Wilderness First Aid designed to provide participants with the confidence and knowledge required to deal with basic emergencies in wilderness settings.

Wilderness First Aid Training

The PDAC will be holding Wilderness First Aid courses in 7 locations on May 5 and 6, 2012. The locations are Toronto, Thunder Bay, Sudbury, Val d'Or, Gatineau, Winnipeg and Yellowknife. Once the participants have successfully passed the course, a certification in Wilderness First Aid, as well as a *Heart and Stroke Foundation of Canada* certification in CPR/AED and Anaphylaxis & Epinephrine will be issued.. The certification will be valid for three years and is accepted across Canada. Contact Karen Mulchinock at the PDAC for further details: kmulchinock@pdac.ca.

In Vancouver, a 40-hour course is offered by Wilderness Alert (1.800.298.9919; www.wildernessalert.com).

For courses on Occupational Health & Safety, please consult the following websites:

- Workplace Safety North – www.masha.on.ca/links.aspx
- Canadian Centre for Occupational Health and Safety – www.ccohs.ca
- CanOSH – www.canoshweb.org/Training/training.html
- websites of local postsecondary institutions

Information on additional resources is welcome; please contact AME BC or the PDAC.

Basic Emergency Response Plan Guidelines for British Columbia

AME BC has worked with the British Columbia government to develop a set of *Basic Emergency Response Guidelines*. The guidelines were released in May 2007. Please note that these guidelines are designed to complement the standards of the *Health, Safety and Reclamation Code for Mines in British Columbia* (HSRC). The guidelines are not exhaustive and may require adaptation for use in other jurisdictions.

Introduction:

In developing an Emergency Response Plan for your operation in accordance with the *Health, Safety and Reclamation Code for Mines in British Columbia* some basic factors must be considered. This guide, although not all-inclusive, is designed to assist the Mine Manager or person in charge of the exploration site in developing a workable plan for an operation. Although operations may be similar, each operation is unique, and may have a different plan in place to accommodate the site, the type of operation, the personnel, the level of training available, transportation, climate, and equipment available on site.

The plan once completed must be filed with the Chief Inspector as per the HSRC.

Components of the Plan:

I: Mine/Operation Information:

The following list identifies basic information that should be in the plan as it applies to a mining operation:

Note: A Mine is a place as defined under the Mines Act [RSBC 1996] Chapter 293. Sites where mechanical disturbance of ground and/or exploration drilling occur and any place defined as a mine by the Chief Inspector are included in this definition.

- Name of the Mine and the company with a mailing address and contact telephone numbers; (fax and e-mail if applicable)
- Name of the Mine Manager as appointed under the Mines Act
- Mine number and permit number
- Type of operation, i.e. underground, surface, quarry, exploration, sand and gravel, placer
- Location of the property (UTM or Latitude/Longitude)
- Number of employees on site, including management and contractors
- Accurate mine plans showing and identifying areas should be maintained on site and made available to responding teams, personnel, or agencies.

II: Hazard Analysis of Operation:

This section should identify all potential emergencies that could occur on the site. These emergencies may be broadly broken into five basic types. Each operation may choose to include more detail; others may break the five types into fewer or more than five types.

1. Fire/Explosion
2. Injury to workers
3. Environmental
4. Climate
5. Equipment failure

III: Emergency Equipment

In this section, list the emergency equipment available on site to deal with identified potential emergencies/hazard. Also include other sources of equipment that may be necessary. Some examples are:

- Fire pumps and extinguishers
- First Aid supplies

- Forest fire fighting supplies
- Rescue equipment (e.g. stretcher that can be fitted in helicopter or vehicle)
- Equipment that can be assigned to an emergency task (e.g. a dozer or excavator used to build roads and trails can be pressed into service to dam or dyke a flood).
- Industrial ambulance or emergency transport vehicle.
- Outside sources of specific equipment

IV: Trained Personnel

In this section, list the availability on site of trained personnel capable of dealing with the identified potential emergencies/hazards.

- Contact information for on site First Aid
- Identify other sources of trained personnel (i.e. back-up teams, other agencies such as local fire department, local search and rescue, and provincial ambulance)

V: Implementation of the Plan and Incident Command

Clearly define how persons involved in an emergency are to access and implement the plan: (*Preplan basic response guidelines based on hazard assessment*)

- First steps, including who to call and how to call, and when to call
- Identify who will be responsible for implementing the emergency plan.
- Identify who will be in charge of conducting the emergency operation.
- Define all communication systems to be used (i.e. two-way radio, cell phone, satellite phone).
- Assign tasks by function and how the function will be filled. Examples include:
 - call-outs and communication with other access road users including logging companies
 - arranging assistance from other agencies or operations
 - required notification (e.g. Mines Inspectors (Health and Safety), Provincial Emergency Plan personnel, etc.)
- Include an Emergency Notification and Mobilization Chart.

VI: Directions to Site:

Provide clear written directions to the site; include maps that can be used for navigation. This is particularly important in remote areas. If using a radio controlled logging road, include radio frequencies and call-out procedures.

For exploration sites, marshalling points should be established. Coordinates of such points should be provided, and helicopter landings areas should be identified or established

- Clearly define how these directions will be communicated to those who may not be familiar with the area or roads and are called in to assist.
- Identify who has been given copies of the directions in advance.
- On long road transport of injured workers, identify and mark on the map possible transfer sites for Provincial Ambulance.

VII: Contact Lists:

Set a stand alone page with all contact information for all agencies listed, in addition to Company contacts. The following is not all-inclusive.

- Mine Manager
- Corporate Head Office
- First Aid, phone, or radio channel
- Emergency personnel
- Outside agencies (Federal, Provincial, or Local Government contacts)
- Equipment suppliers
- Transport companies, including air service (float plane or helicopter)
- Back-up rescue team if applicable

VIII: Training

Include a provision for training all persons on site in the application of the plan.

IX: Records:

Supplementary to the plan are all the records associated with it. Therefore, the following records should be maintained on site.

- Training
- Equipment checks
- Implementation if applicable.
- Incident debriefing if applicable.

Conclusion:

This guide is not all inclusive, and must be adapted to each site according to the risk assessment. It is imperative that the Mine Manager update the plan as may be required, from time to time due to changes in personnel, equipment, mine plan changes, or locations. It is also good practice to test the emergency preparedness plan with all affected persons. In some cases, evacuation drills are required, and **if the site requires the evacuation drill, the evacuation procedure must be posted and communicated to all affected personnel.**

References:

Mines Act. http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96293_01

Health, Safety and Reclamation Code for Mines in British Columbia. *[Revised in 2008]*.
<http://www.empr.gov.bc.ca/Mining/HealthandSafety/Pages/HSRC.aspx>

Canadian Mineral Exploration Health & Safety Awards

The Canadian Mineral Exploration Health & Safety Awards trace their roots to 1983 when the BC & Yukon Chamber of Mines (now AME BC) first recognized the commitment of mineral exploration companies active in British Columbia and Yukon to health and safety. The awards program was expanded nationwide for the year 2005 in cooperation with PDAC.

David Barr Award

In 2005, the AME BC Health & Safety Committee initiated the **David Barr Award in recognition of Excellence in Leadership and Innovation in Mineral Exploration Health and Safety**.

Michael Gunning is the 2011 recipient of the **David Barr Award**. A commitment to health and safety has permeated his 25-year career in mineral exploration and geological research. He has captivated audiences through AME BC's Introduction to Exploration Safety workshop for the past six years, and in 2009, also developed a safety workshop for Saskatchewan's mining industry.

Past recipients are as follows:

2005	David Barr
2006	Imperial Metals Corporation
2007	Ian Paterson
2008	Bill Mercer
2009	Doug Flynn
2010	Harvey Tremblay
2011	Michael Gunning

Safe Day Everyday Gold Award

The 2010 recipient of the **Safe Day Everyday Gold Award** (formerly the Annual Safety Award) for the highest number of hours worked without a lost workday incident is Quadra FNX Mining Ltd. for recording 185,234 hours of exploration work without a lost workday incident, up from their record of 99,792 hours of exploration work without a lost workday incident in 2009.

Past recipients are as follows:

2005	FNX Mining Company Inc.
2006	Exploration Division of De Beers Canada Inc.
2007	Exploration Division of De Beers Canada Inc.
2008	Northgate Minerals Corporation
2009	FNX Mining Company Inc.

Safe Day Everyday Award

The **Safe Day Everyday Award** (formerly the Exploration Safety Award) is presented to 61 companies for operating throughout 2010 without a lost workday. Terra Logic Exploration (formerly Bootleg Exploration) and Vismant Exploration are recipients for the sixth consecutive year. The number of consecutive years in which a company has received the award is in parentheses.

Altius Resources Inc. (3)	Mega Uranium Ltd. (2)
Anglo American Exploration (Canada) Ltd. (2)	New Millennium Capital Corp. (4)
Avalon Rare Metals Inc.	Newfoundland and Labrador Geological Survey
BCGold Corp. (3)	Northern Freegold Resources Ltd.
Bitterroot Resources Ltd. (3)	Northern Tiger Resources (2)
British Columbia Ministry of Energy and Mines - Geological Survey (5)	Nova Scotia Department of Natural Resources (4)
Canada Zinc Metals Corp.	Ontario Geological Survey (3)
Capstone Mining Corporation (2)	Pacific Bay Minerals Ltd (2)
Cariboo Rose Resources Ltd (2)	Pitchstone Exploration Ltd. (3)
Castle Resources Inc (2)	Purepoint Uranium Group Inc. (2)
Cornerstone Resources Inc.	Quinlan Prospecting Inc.
Detour Gold Corporation	Rambler Metals & Mining Canada Ltd. (4)
Eagle Hill Exploration Corporation (2)	Royal Nickel Corporation
Eastfield Resources Ltd. (2)	Silver Quest Resources Ltd.
Endurance Gold Corp	Silver Spruce Resources Inc.
Equity Exploration Consultants Ltd. (2)	SLAM Exploration Ltd (2)
FB Drilling (2)	Teck (3)
Fjordland Exploration Inc. (4)	TerraLogic Exploration (6)
Fladgate Exploration Consulting Corporation (3)	Titan Uranium Inc (2)
Fronteer Gold Inc. (2)	Treasury Metals Inc. (2)
Geodex Minerals Ltd. (2)	Tri Origin Exploration (5)
Goldbrook Ventures Inc.	TTM Resources Inc. (3)
Golden Valley Mines Ltd.	Vancouver Island Exploration (2)
Gossan Resources Limited (4)	Virginia Mines Inc.
Hard Creek Nickel Corporation (2)	Vismant Exploration Inc. (6)
Hawthorne Gold Corp (3)	Votorantim Metals Canada Inc. (2)
Huakan International Mining Inc.	Wallbridge Mining Company Limited (2)
IAMGOLD Corporation (2)	Watts, Griffis and McQuat (5)
Timothy Liverton	Xstrata Copper
Lorraine Copper Corp.	Yukon Zinc Corporation (2)

Appendix: Canadian Mineral Exploration Health & Safety Survey 2010 Participants

We thank companies who reported on their safety programs either through the online or paper questionnaire and/or through a telephone survey. Companies who also reported on their safety performance are listed on page 6.

Abacus Mining & Exploration Corp	Compliance Energy Corp	Laurion Mineral Exploration Inc.
Adex Mining Inc	Copper Fox Metals Inc	Leeward Capital Corp
Adriana Resources Inc	Copper Reef Mining Corp	Timothy Liverton
Advanced Explorations Inc	Cornerstone Resources Inc.	Lorraine Copper Corp.
Agnico-Eagle Mines Ltd	De Beers Canada Inc. - Exploration Division	Majestic Gold Corp
Alexandria Minerals Corp	Denison Mines Corp	Manicouagan Minerals Inc
Alexis Minerals Corp	Detour Gold Corporation	Mega Uranium Ltd.
Altair Ventures Inc	Donner Metals Ltd	Merc International Minerals Inc
Altius Resources Inc.	Durfeld Geological Management Ltd.	Mustang Minerals Corp
AM Gold Inc	Eagle Hill Exploration Corporation	Nebu Resources Inc
Amarc Resources Ltd.	Eastfield Resources Ltd.	New Millennium Capital Corp.
Anglo American Exploration (Canada) Ltd.	Endurance Gold Corp	Newfoundland and Labrador Geological Survey
Apex Geoscience Ltd	Equity Exploration Consultants Ltd.	NioGold Mining Corp
Arcus Development Group Inc	FB Drilling	Noront Resources Ltd.
AREVA Resources Canada Inc.	Finlay Minerals Ltd	North Country Gold
Ascot Resources Ltd	Fjordland Exploration Inc.	Northern Freegold Resources Ltd.
Astral Mining Corp	Fladgate Exploration Consulting Corporation	Northern Tiger Resources
Aura Silver Resources Inc	Fortune Minerals Ltd	Northern Tiger Resources Inc
Auramex Resource Corp	Fronteer Gold Inc.	Northgate Minerals Corporation
Aurizon Mines Limited	Galena Capital Corp	Nova Scotia Department of Natural Resources
Aurora Energy Resources Inc.	Geodex Minerals Ltd.	NovaGold Resources Inc
Avalon Rare Metals Inc.	Gibraltar Mine	Nuinsco Resources Ltd
Baffinland Iron Mines Corporation	Gitennes Exploration Inc	Nuna Logistics
Barker Minerals Ltd	Global Hunter Corp	Ontario Geological Survey
Barkerville Gold Mines Ltd	Golconda Resources Ltd	Osisko Mining Corp
Barrick Gold Corp	Goldbrook Ventures Inc.	Pacific Bay Minerals Ltd
Bayswater Uranium Corp	Goldcorp Inc	Pacific Ridge Exploration Ltd
BCGold Corp.	Golden Hope Mines Ltd	Peat Resources Ltd
Bell Copper Corp	Golden Valley Mines Ltd.	Pelangio Exploration Inc
Benton Resources Corp	Goldstone Resources Inc	Pitchstone Exploration Ltd.
BHP Billiton Canada Inc.	Gossan Resources Limited	Platinex Inc
BHP Billiton Diamonds Inc	Grande Cache Coal Corp	Probe Mines Ltd
Bison Gold Exploration Inc	Hard Creek Nickel Corporation	Prodigy Gold Inc.
Bitterroot Resources Ltd.	Hawthorne Gold Corp	Prophecy Resource Corp
Black Panther Mining Corp	Houston Lake Mining Inc	Puget Ventures Inc
Blue Note Mining Inc	Huakan International Mining Inc.	Pure Nickel Inc
Boart Longyear	Huldra Silver Inc	Purepoint Uranium Group Inc.
Boxxer Gold Corp	Hy-Tech Drilling Ltd	Quadra FNX Mining Ltd.
Bralorne Gold Mines Ltd	IAMGOLD Corporation	Queenston Mining Inc.
Brigus Gold Corp	Imperial Metals Corporation	Quinlan Prospecting Inc.
British Columbia Ministry of Energy & Mines - Geological Survey	Indicator Minerals Inc	Rainy Mountain Royalty Corp
Bua Capital Management	Inspiration Mining Corp	Rambler Metals & Mining Canada Ltd.
Bureau de l'exploration géologique du Québec	International Bethlehem Mining Corp	Redhill Resources Corp
Canada Zinc Metals Corp.	International Millennium Mining Corp	Redstar Gold Corp
Canadian International Minerals Inc	International Nickel Ventures Corp	Regent Ventures Ltd
Canadian Zinc Corp	Jazz Resources Inc	Richmont Mines Inc
CanAlaska Uranium Ltd	JNR Resources Inc	Richmont Mines Inc
Capstone Mining Corporation	Kaminak Gold Corp	Rocktech Resources Inc
Cariboo Rose Resources Ltd	Kinross Gold Corp	Royal Nickel Corporation
Castle Resources Inc	Kirkland Lake Gold Inc	Ryan Gold Inc
Cayenne Gold Mines Ltd	Kiska Metals Corp	Sabina Gold & Silver Corp.
Claude Resources Inc	Klondike Silver Corp	Sable Resources Ltd
Cogitore Resources Inc	Knight Resources Ltd	Sage Gold Inc
Columbia Yukon Explorations Inc	Kootenay Gold Inc	Serengeti Resources Inc
Commander Resources Ltd	Kria Resources Ltd	Shell Albian Sands
	Lake Shore Gold Corp.	Silver Quest Resources Ltd.

Silver Spruce Resources Inc.
 Sirios Resources Inc
 Skyline Gold Corp
 SLAM Exploration Ltd
 SOQUEM
 Southern Pacific Resource Corp
 Stratabound Minerals Corp
 Sultan Minerals Inc
 Swift Resources Inc
 Tarsis Resources Ltd
 Teck
 TerraLogic Exploration
 TerraNotes Ltd

Threegold Resources Inc
 Timmins Gold Corp
 Titan Uranium Inc
 Titan Uranium Power Corp
 TNR Gold Corp
 Torch River Resources Ltd
 Total E&P Canada Ltd
 Treasury Metals Inc.
 Tri Origin Exploration
 TTM Resources Inc.
 Typhoon Exploration Inc
 Vale
 Vancouver Island Exploration

Verona Development Corp
 Victory Nickel Inc
 Virginia Mines Inc.
 Vismand Exploration Inc.
 Votorantim Metals Canada Inc.
 Wallbridge Mining Company Limited
 Watts, Griffis and McQuat
 White Tiger Mining Corp
 Wildcat Exploration Ltd
 Xstrata Copper
 Yorbeau Resources Inc
 Yukon Zinc Corporation



Canadian Mineral Exploration Health & Safety Survey 2011

In completing this form please note the following:

- The form should be completed by junior companies, major companies, government geological surveys, diamond drilling contractors, geophysical contractors, and any other companies or contractors carrying out exploration related activities in Canada.
- We ask companies to submit in the spaces below a close estimate of the number of person days worked in 2011 by company employees and contractors for the following:

- Surface exploration and geological field work which includes line-cutting, geophysical, geochemical, trenching, etc.
- Surface drilling
- Underground exploration including underground drilling, mining, and geological work

Please include the names of contractors so that we do not duplicate information. These names will not be published.

- Complete all the required fields; (*) indicates required fields.
- If you have any questions about the form please contact Jonathan Buchanan at 604-630-3923 or jbuchanan@amebc.ca.
- All information will be kept confidential, and Personal Information Protection and Electronic Documents Act mandates will be maintained.

Name of Person & Company Responsible for Safety (*Required Fields)

*Name:			
*Title:			
*Company Name:			
E-mail:			
<u>Address Information</u>			
Phone:			
*Street Address:			
Street Address 2:			
*City:			
*Province/Territory:		Postal Code:	
*Does your organization have a Health and Safety Program: Yes ___ No ___ *Does your organization discuss safety at staff meetings or hold safety meetings? Yes ___ No ___ *Do you discuss recent near misses at staff meetings? Yes ___ No ___			
*Reporting Period:	2011		

Company:			
Names of Contractors:			
Estimated mineral exploration expenditures in Canada in 2011		\$	
Provide total Person – Days worked (e.g. number of employees multiplied by number of days worked) in each province or territory for both employees and contractors			
Worksite Location 1:	Prov./Terr.	Days worked:	PERSON DAYS WORKED EMPLOYEES CONTRACTORS
	_____	a) Surface exploration and geological work:	_____
		b) Surface drilling:	_____
		c) Underground exploration:	_____
	Length of workday in hours (e.g. 8, 10, 12): _____		
Worksite Location 2:	Prov./Terr.	Days worked:	PERSON DAYS WORKED EMPLOYEES CONTRACTORS
	_____	a) Surface exploration and geological work:	_____
		b) Surface drilling:	_____
		c) Underground exploration:	_____
	Length of workday in hours (e.g. 8, 10, 12): _____		
Worksite Location 3:	Prov./Terr.	Days worked:	PERSON DAYS WORKED EMPLOYEES CONTRACTORS
	_____	a) Surface exploration and geological work:	_____
		b) Surface drilling:	_____
		c) Underground exploration:	_____
	Length of workday in hours (e.g. 8, 10, 12): _____		
Worksite Location 4:	Prov./Terr.	Days worked:	PERSON DAYS WORKED EMPLOYEES CONTRACTORS
	_____	a) Surface exploration and geological work:	_____
		b) Surface drilling:	_____
		c) Underground exploration:	_____
	Length of workday in hours (e.g. 8, 10, 12): _____		

If additional space is required attach additional copies

Did you experience any incidents (either lost-time or without lost-time)?

*Yes__ No__

*If YES, please complete the following form.

Corporate and personal information will not be published

If additional space is required attach additional copies.

Date (month-day-year)	Location	Prov/Terr	Occupation	Employee or Contractor (please specify)	Type	Lost Time (Specify number of days)	Nature of Injury	Cause of Injury	Description of Incident (include factors such as experience, training, time of day that may have contributed)	Action Taken

Occupation:

1-Driller
2-Driller Helper
3-Miner
4-Geologist
5-Field Assistant
6-Geophysicist
7-Line Cutter
8-Surveyor
9-Cook
10-Other

Type:

1-NM (near miss)
2-FA (first aid)
3-MA (medical aid)

Nature of Injury:

1-Sprain
2-Cut
3-Skeletal
4-Bruise/Muscular
5-Allergies
6-Substance Abuse
7-Frostbite
8-Eye
9-Chemical or
Burn/Scald

10-Pre-existing

Illness/Seizure
11-Back
12-Hyperthermia
13-Skin
14-Internal
15-Fatality
16-Other
17-None

Cause of Injury:

1-Slip/Fall
2-Airplane
3-Helicopter
4-Snowmobile
5-Automobile
6-ATV
7-Vehicle (Other)
8-Boat
9-Improper Lifting
10-Falling Object
11-Other Object Related
12-Drilling Machinery
Related

13-Camp Equipment

Related
14-Tool Use
15-Weather
16-Field Work
17-Animal
18-Chemicals
19-Improper operation
(e.g. did not follow
procedures)
20-Drowning
21-Medical Condition
22-Other
23-None

Date: _____

Company: _____

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