

Ministry of Labour Risk Assessment Initiatives

Workplace Safety North Mining Health and Safety Conference

April, 2018

Sujoy Dey, Ph.D.,
Corporate Risk Officer,
Prevention Office,
Ontario Ministry of Labour

Robert Barclay, M. Eng., P. Eng.
Mining Engineer,
Northern Region,
Ontario Ministry of Labour

Contents

- Introduction
- The Ontario Mining Health, Safety and Prevention Review
- The Underground Mining Sub-Sector Risk Assessment
- The Surface Mining Sub-Sector Risk Assessment
- Future Mining Sector Risk Assessments
- Preliminary Findings from the Ground Control Root-Cause Analysis Session
- Risk Assessments Led by the Ministry of Labour for Other Sectors
- Occupational Health and Safety Legislation Requiring Risk Assessments
- Ministry of Labour Guideline for Risk Assessment and Management
- Role of the Ministry of Labour's Corporate Risk Officer
- Expected Impact of Adopting a Risk-Based Approach

Introduction

Since 2012, the M.O.L. has undertaken a number of initiatives to promote and foster the application of risk assessment and management approaches for the purposes of advancing workplace health and safety.

These initiatives are characterized by the following action items:

- The creation of a position referred to as Corporate Risk Officer.
- A Mining Sector risk assessment carried out as part of the Mining Health, Safety and Prevention Review (i.e. the M.H.S.P.R.) that was led by the M.O.L. throughout 2014 and 2015.
- A surface mining risk assessment in 2016.
- A series of root-cause analysis sessions to allow for a better understanding of the causal factors and corresponding controls for high-risk health and safety hazard themes that were identified as part of the risk assessment that was conducted for underground mining as part of the M.H.S.P.R.
- Formal risk assessments in a number of other sectors, including the Construction, Agriculture, Forestry and Health Care Sectors.
- The introduction of health and safety legislation (i.e. sections 5.1, 5.2 and 5.3 under Regulation 854) that requires Mining Sector employers to conduct formal risk assessments on an annual basis.
- The development of a risk assessment and management guideline which corresponds to this new legislation.

The Ontario Mining Health, Safety and Prevention Review

- The M.H.S.P.R. was led by the M.O.L. throughout 2014 and in the early part of 2015.
- The purpose of the M.H.S.P.R. was to develop a better understanding of the health and safety needs of the Ontario Underground Mining Sub-Sector, resulting in more responsive M.O.L. and stakeholder initiatives.
- The final report for the M.H.S.P.R. includes eighteen recommendations. Two of these recommendations, namely Recommendations 1.1 and 1.2, ~~will require both~~ *recommends* that the M.O.L. and Mining Sector stakeholders ~~to~~ more rigorously apply risk-based approaches towards advancing health and safety in the Sector. Recommendations 1.1 and 1.2 read as follows:
 - 1.1 -The Ministry of Labour supported by all relevant health and safety system partners and subject matter experts, to undertake a Mining Sector risk assessment with employers and labour every three years.
 - 1.2 - The Ministry of Labour to require employers in the Mining Sector to conduct risk assessments, which would include measures and procedures to control the risks identified in the assessment as likely to expose a worker to injury and illness. The joint health and safety committee representative or workers, be consulted on the risk assessment. Employer risk assessments are to be done as often as necessary to ensure programs that result from the assessment continue to protect workers.

The Underground Mining Sub-Sector Risk Assessment

- A formal Sub-Sector risk assessment was conducted as part of the M.H.S.P.R. and involved risk-ranking over two hundred and fifty health and safety hazards, situations and conditions that are common in underground mining in Ontario.
- The salient points regarding the execution of this risk assessment are as follows:
 - It led by the M.O.L. was conducted on June 13th, 2014. Its purpose was to risk-rank key health and safety hazards and risk events associated with underground mining in Ontario.
 - The session participants consisted of subject matter experts from both labour and employer stakeholder groups, M.O.L and Workplace Safety North (W.S.N.).
 - Prior to the session, the M.O.L elicited health and safety hazard and event statements which would be risk-ranked at the session. Approximately four hundred hazard statements were initially submitted out of which two hundred and sixty-three were finally were risk-ranked at the session after accounting for any duplication or out-of-scope statements. These statements were then grouped into twenty-nine categories.
 - These statements were risk-ranked during the session using a standard five by five risk matrix and commonly accepted health and safety likelihood and consequence criteria.
 - Each of the hazard and event statements was voted upon electronically by the session participants to determine its associated level of risk.

The Underground Mining Sub-Sector Risk Assessment

Standard Five by Five Risk Matrix and Commonly Accepted Health and Safety Likelihood and Consequence Criteria:

LIKELIHOOD	DESCRIPTION
Almost Certain [5]	Unwanted event is almost certain to happen in the next year [or 90% or greater chance of occurrence]
Very Likely [4]	High probability for unwanted event to occur in the next year [or between 50%-90% chance of occurrence]
Likely [3]	It is possible for unwanted event to occur in the next year [or between 20%-50% chance of occurrence]
Unlikely [2]	Low probability for unwanted event to occur in the next year [or between 5%-20% chance of occurrence]
Rare [1]	Very low probability for unwanted event to occur in the next year [or less than 5% chance of occurrence]

CONSEQUENCE	DESCRIPTION
Extreme [5]	Fatality or Permanent Disability [or extreme impact/importance]
Major [4]	Serious Event/ Critical Injury or Critical Illness [or major impact/importance]
Moderate [3]	Temporary Disability (Lost Time): Injury/Illness [or moderate impact/importance]
Minor [2]	First Aid Treatment (No Lost Time) [or minor impact/importance]
Low [1]	No injury or illness [or negligible impact/importance]

Risk = Likelihood x Consequence

	Almost Certain (5)	5	10	15	20	25
	Very Likely (4)	4	8	12	16	20
	Likely (3)	3	6	9	12	15
	Unlikely (2)	2	4	6	8	10
	Rare (1)	1	2	3	4	5
LIKELIHOOD		Low (1)	Minor (2)	Moderate (3)	Major (4)	Extreme (5)
		CONSEQUENCE				

Risk Rating
Critical
High
Moderate
Low

The Underground Mining Sub-Sector Risk Assessment

The top ten out of 263 risk events identified by the underground mining risk assessment were as follows:

1. Rockbursts underground.
2. Large vehicle and pedestrian or small vehicle interaction is common and lethal.
3. Loose rock at face continues to kill and injure workers underground.
4. Existing underground mines in Ontario are becoming deeper and incurring higher extraction ratios. These situations can result in various forms of ground instability.
5. High faces not scaled and secured to protect workers.
6. The mobile equipment employed in many underground mines is getting bigger. Bigger equipment can often result in poorer operator visibility (i.e. more and larger blind spots). This can result in collisions with other vehicles or contact with pedestrians.
7. Exposure to hazardous substances (i.e. dusts, materials and metals), gases and fumes, biological materials or physical hazards (i.e. vibration, noise, cold, heat stress and light).
8. Working shift work resulting in disrupted sleeping patterns.
9. A fall of ground while installing ground support.
10. Supervisors in some mines in Ontario lack proper experience and training. Inexperienced and improperly trained supervisors pose a threat to themselves and their direct-report workers.

The Underground Mining Sub-Sector Risk Assessment

- The top ten risk categories based on the highest ranked risk within that category were as follows:
 1. Ground Control
 2. Mobile Equipment
 3. Occupational Disease
 4. Fatigue
 5. Training
 6. Ventilation
 7. Lockout/Guarding
 8. Mine services
 9. Water Management
 10. Hoisting

The Surface Mining Sub-Sector Risk Assessment

- Stakeholders representing surface mining interests in the Ontario Mining Sector expressed concerns that the M.H.S.P.R. and its 2014 risk assessment focussed only on underground mining.
- In response to this concern, the M.O.L. elected to organize and lead a surface mining risk assessment session. The surface mining risk assessment session followed the same process as the underground mining risk assessment session.
- The top ten out of 141 risk events identified by the surface mining risk assessment were as follows:
 1. Silica.
 2. Excessive dust from crushing and screening operations.
 3. Distracted driving.
 4. Slips, trips, and falls from different elevations.
 5. Fatigue (seasonal).
 6. Lack of maintenance of equipment.
 7. Freeing jammed material from crusher.
 8. Dysfunctional internal reporting system (i.e. the I.R.S.).
 9. Lack of tire safety.
 10. Electrical contact.

The Surface Mining Sub-Sector Risk Assessment

The top ten risk categories based on the highest ranked risk within that category were as follows:

1. Occupational Disease
2. Mobile equipment
3. Slips, Trips, and Falls
4. Fatigue
5. Maintenance
6. Crushing and Screening
7. Internal Responsibility System (i.e. the I.R.S.)
8. Electrical
9. Training
10. Working Alone

Future Mining Sector Risk Assessments

- As stated above, M.H.S.P.R. Recommendation 1.1 requires that the M.O.L. lead a Mining Sector risk assessment every three years.
- In response to this recommendation, in late 2017, the M.O.L. initiated a formal Mining Sector risk assessment. Rather than repeat a risk-ranking exercise, the 2017 risk assessment involved conducting root-cause analyses for four of the top ranking health and safety hazard themes identified through the 2017 risk assessment.
- These four health and safety themes were:
 - Ground Control
 - Mobile Equipment
 - Occupational Disease
 - Water Management

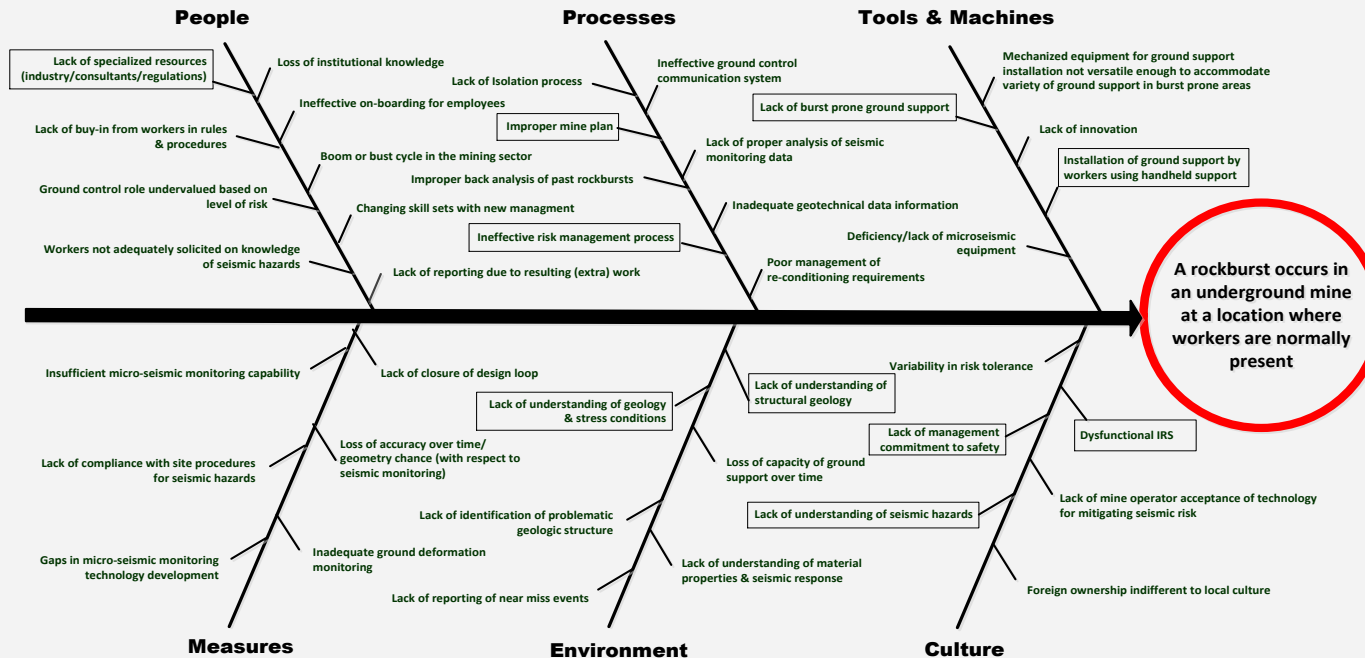
Future Mining Sector Risk Assessments

- The root-cause analysis conducted for each of these hazard themes is to involve the following steps:
 - For each hazard theme, an unwanted event is to be defined which represents a high risk unwanted event for that theme.
 - For the unwanted event in question, the causal factors are to be identified by a root-cause analysis team, according to six conventional causal factor categories (i.e. people, processes, tools and machines, measures, environment and culture).
 - Once all of the causal factors contributing to the unwanted event have been identified, the root-cause analysis team is to determine appropriate controls for the causal factors.
- Subsequent to the completion of a root-cause analysis, a detailed review of its findings is to take place, primarily to identify causal factors and controls for a particular unwanted event that may appear in more than one category.

Findings from the Ground Control Root-Cause Analysis Session

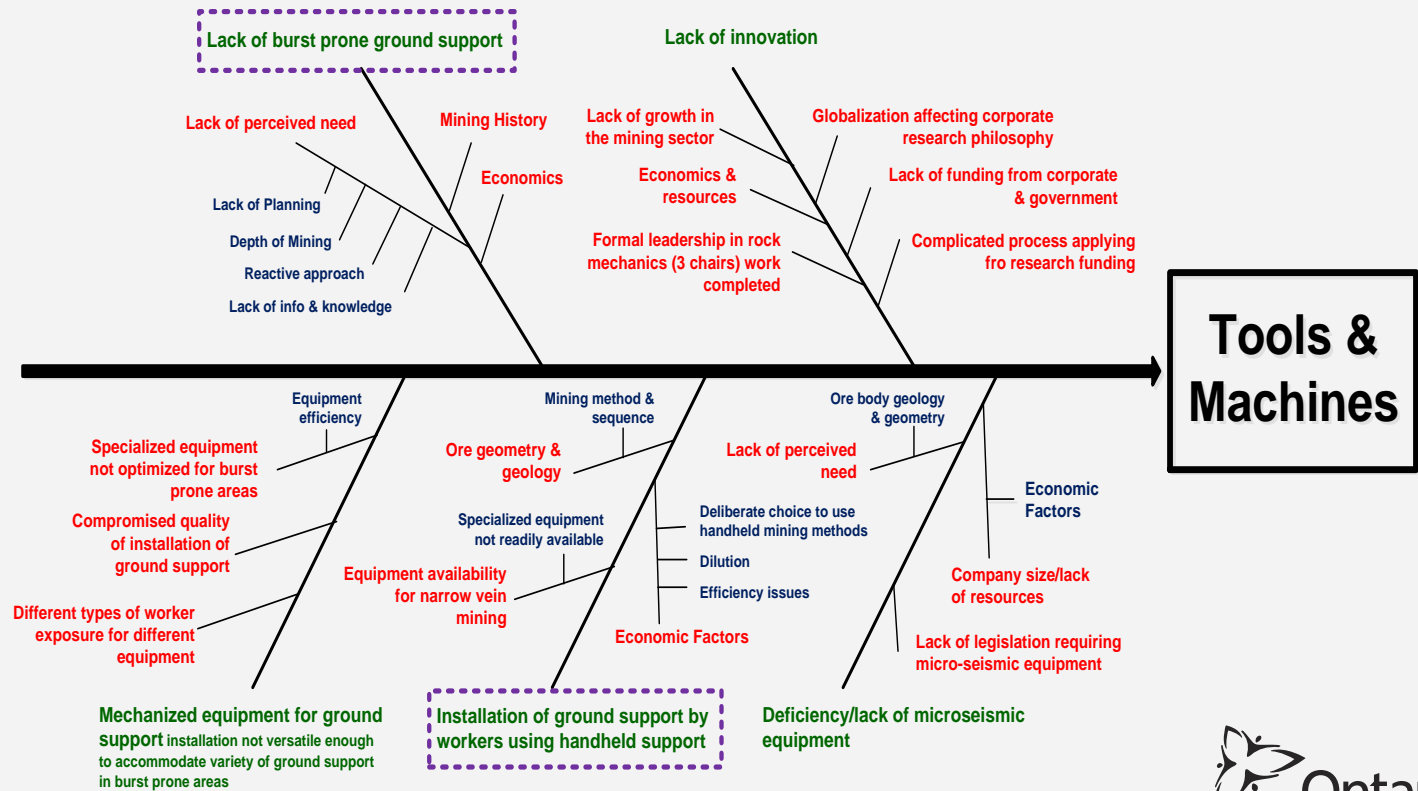
Session Fish-Bone Diagram:

Mining Root Cause Analysis for Ground Control



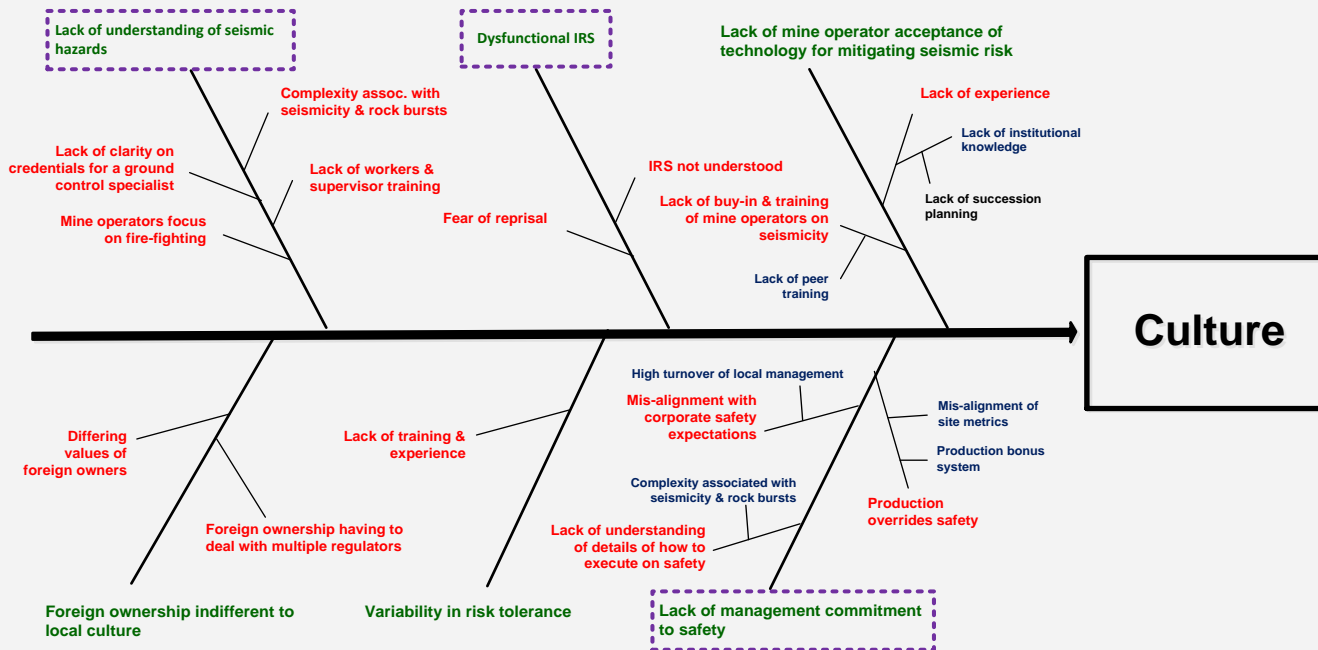
Findings from the Ground Control Root-Cause Analysis Session

Fish-Bone Diagram for Tools and Machinery Category:



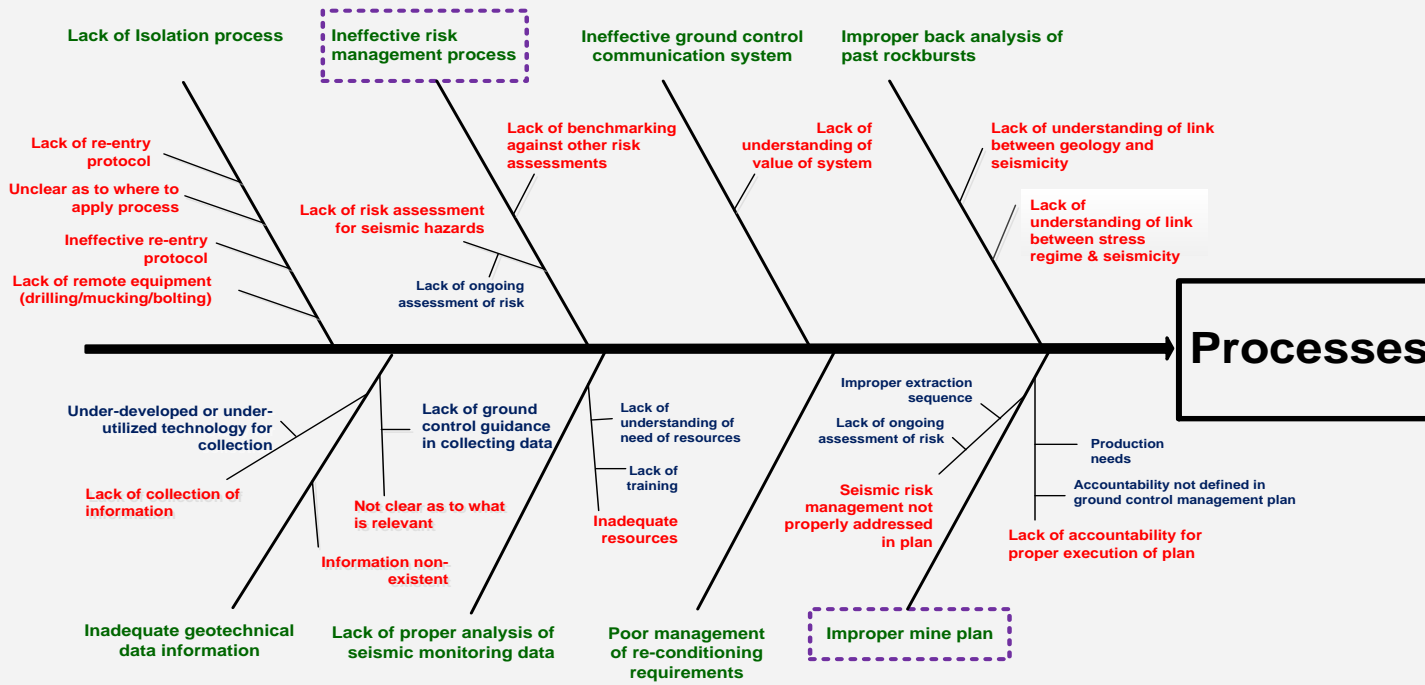
Findings from the Ground Control Root-Cause Analysis Session

Fish-Bone Diagram for Culture Category:



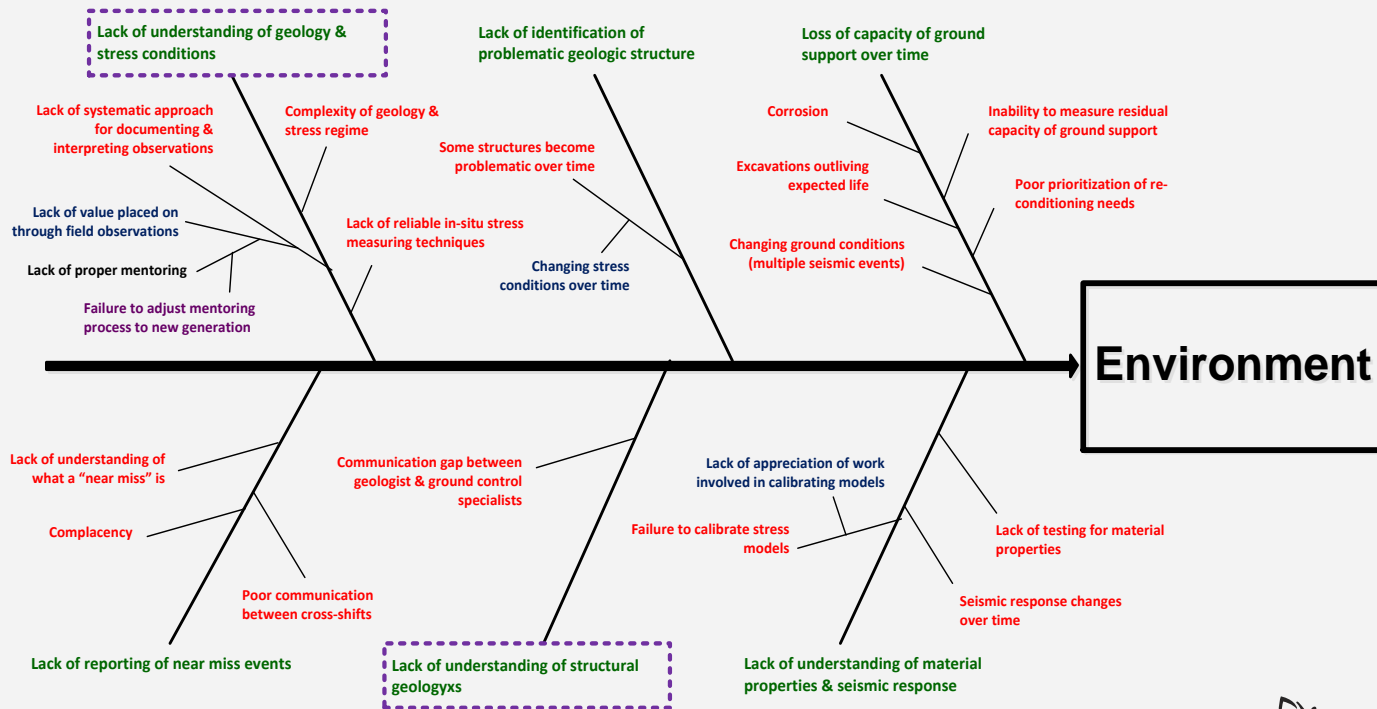
Findings from the Ground Control Root-Cause Analysis Session

Fish-Bone Diagram for Processes Category:



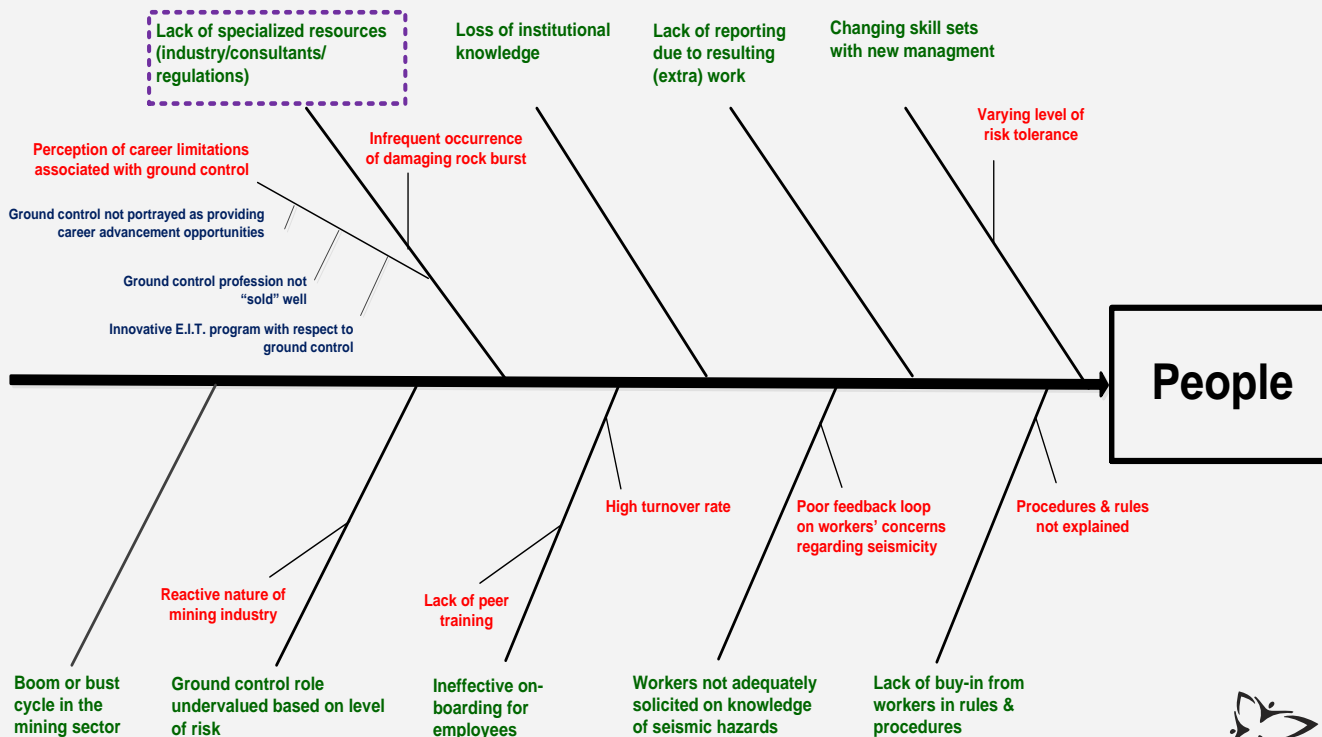
Findings from the Ground Control Root-Cause Analysis Session

Fish-Bone Diagram for Environment Category:



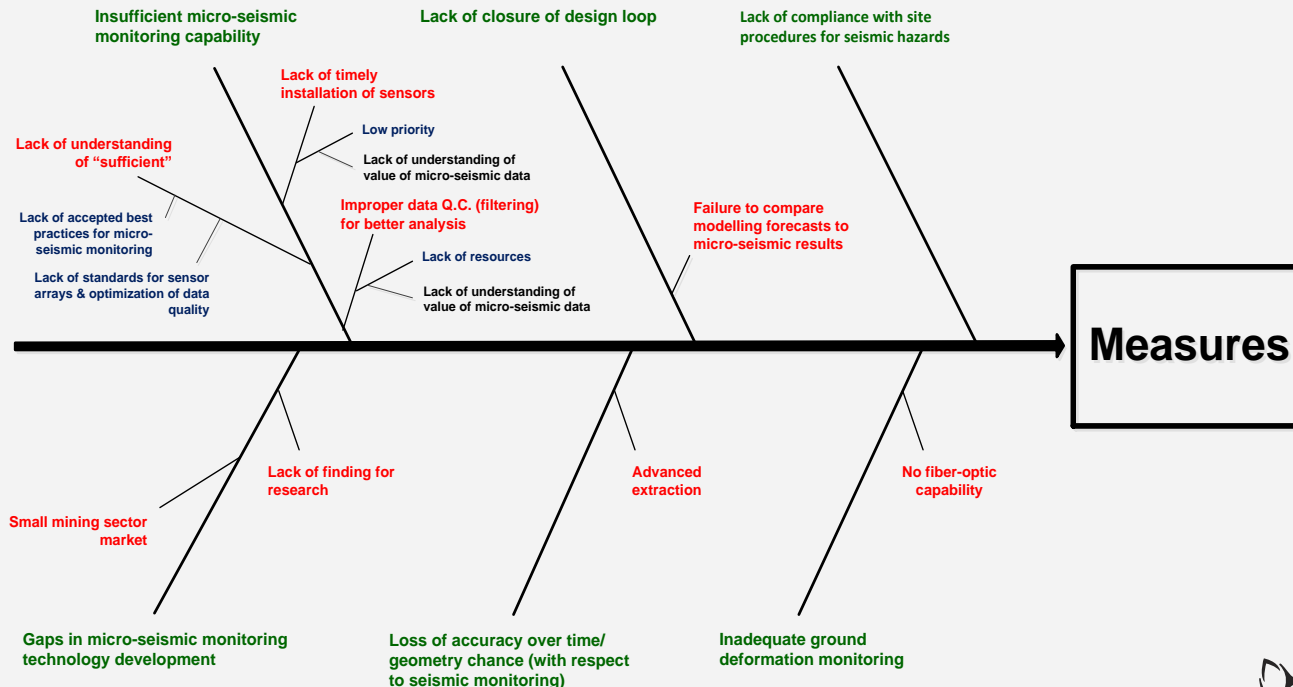
Findings from the Ground Control Root-Cause Analysis Session

Fish-Bone Diagram for People Category:



Findings from the Ground Control Root-Cause Analysis Session

Fish-Bone Diagram for Measures Category:



Risk Assessments Led by the Ministry of Labour for Other Sectors

- In addition to the aforementioned Mining Sector risk assessments that were led by the M.O.L., These were the:
 - Construction Sector (Roofing and Low-rise residential construction)
 - Agriculture Sector (Flowers and Vegetable greenhouses)
 - Forestry Sector (Sawmills and Logging)
 - Health Care Sector (Hospitals)

Occupational Health and Safety Legislation Requiring Risk Assessments

- As mentioned previously, according to M.H.S.P.R. Recommendation 1.2, the M.O.L. is to require that Mining Sector employers conduct formal risk assessments for worker health and safety purposes.
- In response to this recommendation, the M.O.L. introduced the following three new sections (i.e. Sections 5.1, 5.2 and 5.3) in Regulation 854 (i.e. the Regulation for Mines and Mining Plants) under the Ontario Occupational Health and Safety Act:

5.1 (1) An employer shall conduct a risk assessment of the workplace for the purpose of identifying, assessing and managing hazards, and potential hazards, that may expose a worker to injury or illness.

(2) A risk assessment must take into consideration the nature of the workplace, the type of work, the conditions of work at that workplace and the conditions of work common at similar workplaces.

(3) The results of an assessment must be provided, in writing, to the joint health and safety committee or the health and safety representative, if any.

(4) If no joint health and safety committee or health and safety representative is required at the workplace, the results of an assessment must be communicated to workers at the workplace and provided, in writing, to any worker at the workplace who requests them.

(5) The requirement in subsection (1) to conduct a risk assessment is in addition to any specific assessments required by the Act or any Regulation made under it.

Occupational Health and Safety Legislation Requiring Risk Assessments

5.2 (1) An employer shall, in consultation with the joint health and safety committee or the health and safety representative, if any, develop and maintain measures to eliminate, where practicable, or to control, where the elimination is impracticable, the hazards, and potential hazards, identified in a risk assessment conducted under subsection 5.1 (1).

(2) The measures referred to in subsection (1) shall be put in writing and shall include each of the following, as applicable and reasonable in the circumstances:

1. Substitution or reduction of a material, thing or process
2. Engineering controls
3. Work practices
4. Industrial hygiene practices
5. Administrative controls
6. Personal protective equipment

(3) Personal protective equipment shall only be used as a measure if the measures referred to in paragraphs 1 to 5 of subsection (2) are not obtainable, are impracticable or do not eliminate or fully control hazards and potential hazards.

5.3 (1) The risk assessment required by section 5.1 must be reviewed as often as necessary and at least annually.

(2) When conducting the review, the employer shall ensure that,

- (a) New hazards or new potential hazards are assessed;
- (b) Existing hazards or potential hazards that have changed are re-assessed; and
- (c) The measures required by section 5.2 continue to effectively protect the health and safety of workers.

(3) Subsections 5.1 (3) and (4) and section 5.2 apply with necessary modifications in respect of any new hazards and potential hazards and any existing hazards or potential hazards that have changed.

Occupational Health and Safety Legislation Requiring Risk Assessments

- Sections 5.1, 5.2 and 5.3 came into force on January 1st, 2017. As of this date, all Ontario workplaces to which Regulation 854 apply are expected to comply with this new legislation. The normal process for amending Regulation 854 was applied in order to introduce Sections 5.1, 5.2 and 5.3 into the Regulation. This process involves the following steps:
 - Consultation with stakeholders.
 - The development of a proposed amendment, based on the findings from research and stakeholder feedback.
 - The seeking of Cabinet approval for a proposed amendment.
 - The signing, filing and publication of the amendment upon approval by the Lieutenant Governor.
- For amendments to Regulation 854, stakeholder input was achieved through consultation with the Mining Legislative Review Committee (M.L.R.C). This is a bi-partite committee consisting of members who represent both Labour and Employer stakeholder groups from the Ontario Mining Sector. The committee's mandate is to provide advice to the Ministry of Labour on Mining Sector health and safety matters.
- Sections 5.1, 5.2 and 5.3 can be found in the Ontario Public Service "E-Laws" website. This website includes all Ontario statutes and legislation.

Ministry of Labour Guideline for Risk Assessment and Management

- The M.O.L. has prepared a guideline to assist Ontario Mining Sector stakeholders towards effectively complying with Sections 5.1, 5.2 and 5.3 of Regulation 854.
- This guideline is not a legal document, but rather is intended to provide stakeholders with a clearer understanding of their obligations with respect to Sections 5.1, 5.2 and 5.3.
- It is structured according to the conventional format for M.O.L. guidelines and provides:
 - An explanation of the benefits of a risk-based approach for advancing workplace health and safety;
 - A suggested framework for conducting a risk assessment;
 - A discussion on methods for ensuring that effective controls are adopted for mitigating risks associated with workplace health and safety hazards;
 - An explanation of the role of the various workplace parties in assessing and managing workplace health and safety hazards.
- The M.O.L. Risk Assessment and Management guideline is accessible through the M.O.L. website.

Next Steps: Pulling Together To Mitigate The Risk

- ✓ In order to act on the results and reduce the identified risks effectively, employers, workers, HSA, and MOL staff come together to attack each risk from all known and available angles:

The GOAL = Put a STRANGLEHOLD on EACH RISK

