

Beyond Safety in Mining: What about Occupational Hygiene?

**WSN 2018 Mining Health and Safety Conference
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Agenda

- Why this topic?
- How about Safety in Mining?
- What is Occupational Hygiene?
- What about Occupational Hygiene in Mining?



Why This Topic?

- I attended a 2-day “Health and Safety Excellence in Mining” in Toronto in July 2013
- Lot of presentations & measureable outcomes in safety
- Attendance targeted to senior-level delegates (SVP, VP, Global Director, Corporate Director, ED, Group Advisor)
- Many great presentations – focussed on safety culture, safety performance, safety behaviour, safety leadership,.....and why not?.....Important!!



Day One | Wednesday, July 24, 2013

- 8:00 Registration and Morning Coffee
- 8:45 Opening Remarks

STRENGTHENING THE FRAMEWORK FOR HEALTH AND SAFETY PLATFORMS TO ALIGN WITH ORGANIZATIONAL GOALS

9:00

Balancing Key Aspects of Cultural Change with Technical Systems to Achieve Optimal Health and Safety

- Implementing a Values Based Safety culture through Courageous Safety Leadership methodologies
- Achieving balance between the cultural and technical sides of safety by shifting focus to high potential incidents
- Creating consistency by aligning corporate and standard protocols to ensure a continuously improved, proactive approach to safety
- Developing investigative requirement standards for root cause identification that can be leveraged across all sites to reveal gaps and enable proactive safety management

Bob Kelly, Vice President, Health and Safety

Teck Resources

9:45

Roundtable Discussion

Overcoming Organizational Barriers to Health and Safety Excellence

- Demonstrating the connection between reduced workers compensation costs and 'train to work' programs
- Linking strategic outcomes to health and safety risk enablers
- Developing a program that is fit for the business and adequately satisfies stakeholders expectations

IMPLEMENTING CRITICAL COMPONENTS OF STRONG LEADERSHIP TO OPTIMIZE HEALTH AND SAFETY CULTURE

2:15

Developing Operational Safety Leaders to Enhance Safety Culture and Performance

- Leadership training as a good and necessary investment
- Understanding responsibility, authority and accountability
- Promoting the Internal Responsibility System
- Job pride development
- Clearly communicating safety expectations at the on-set of a project through completion

Derek Budge, CRSP, Director, Health, Safety and Environment

Redpath Mining

3:00 Networking Break

3:30

Panel Discussion

Enabling Safety Leaders to Align Internal Stakeholders to Common Goals While Promoting Pride in Workmanship

- Adopting innovative leadership programs to strengthen relationships between workers and supervisors
- Implementing behavior-based supervisory training to address human factor risk
- Transferring risk ownership and decision making capabilities to the supervisory level
- Developing communication strategies that create HSE messaging channels from the Board room to the front line

Panelists:

Rick Urenda, Corporate Director, Safety and Training

Pan American Silver Corp.

Jon Lessard, MSc, CSP, Senior Director, HSSEC, North America Global Mining and Metallurgy

SNC Lavalin

4:30

Cultivating Effective Leadership at all Management Levels to Ensure Engagement

How About Safety in Mining?

- **Mine safety** refers to management of operations and events within mining industry, for protecting miners by minimizing hazards, risks & accidents. Most safety issues related to mining are addressed in relevant laws, compliance & best practices considered for best possible protection of mining workers. Employers abide by laws & practices to ensure maximum observances of safety.

How About Safety in Mining?

The following topics typical when discussing mine safety:

- **General safety** - general aspects of safety which are common to all types of mines (electrical and machine safety)
- **Occupational safety and health** - Issues particularly associated to the mining. These include: blasting explosives, ergonomics, diesel and dust control and hearing loss etc.
- **Process and production safety** - Safety within the processes associated with mining
- **Workplace safety** - Safety issues directly related to the workplace (Ex. ventilation)
- **Fire and explosion safety** - In particular, the risks associated to fires and explosions in the mining industry
- **Structural safety** - Safety in mine construction and geologic characterization
- **Environmental safety** - Issues of environmental safety (direct or indirect impact of the mining industry)

How About Safety in Mining?

What “Safety” tends to address:

- Safety management system
- Disaster prevention – catastrophic failures
- Explosives - blow something up (safely)
- Major injury/fatality – big yellow trucks



What's Missing? -Occupational Hygiene

- Occupational Hygiene = industrial hygiene (same thing)
- What's OH?.....

Anticipation, Recognition, Evaluation, Control & Prevention of hazards from work that may result in injury, illness or affect the well being of workers.

- Science and an Art – professional judgment (ROH, CIH)
- Workplace Exposures.....to Chemical, Physical, Biological, Ergonomic and/or Psychosocial Agents

What About Occupational Hygiene?

- Process of Exposure Science
 - What is the substance?
 - How hazardous or toxic?
 - Processes involved
 - Routes of entry?
 - Acute or Chronic?
 - Does it have an OEL?
 - Likelihood of exposure? Dose/response
 - Controls in place?



risk = hazard + outrage
Peter Sandman

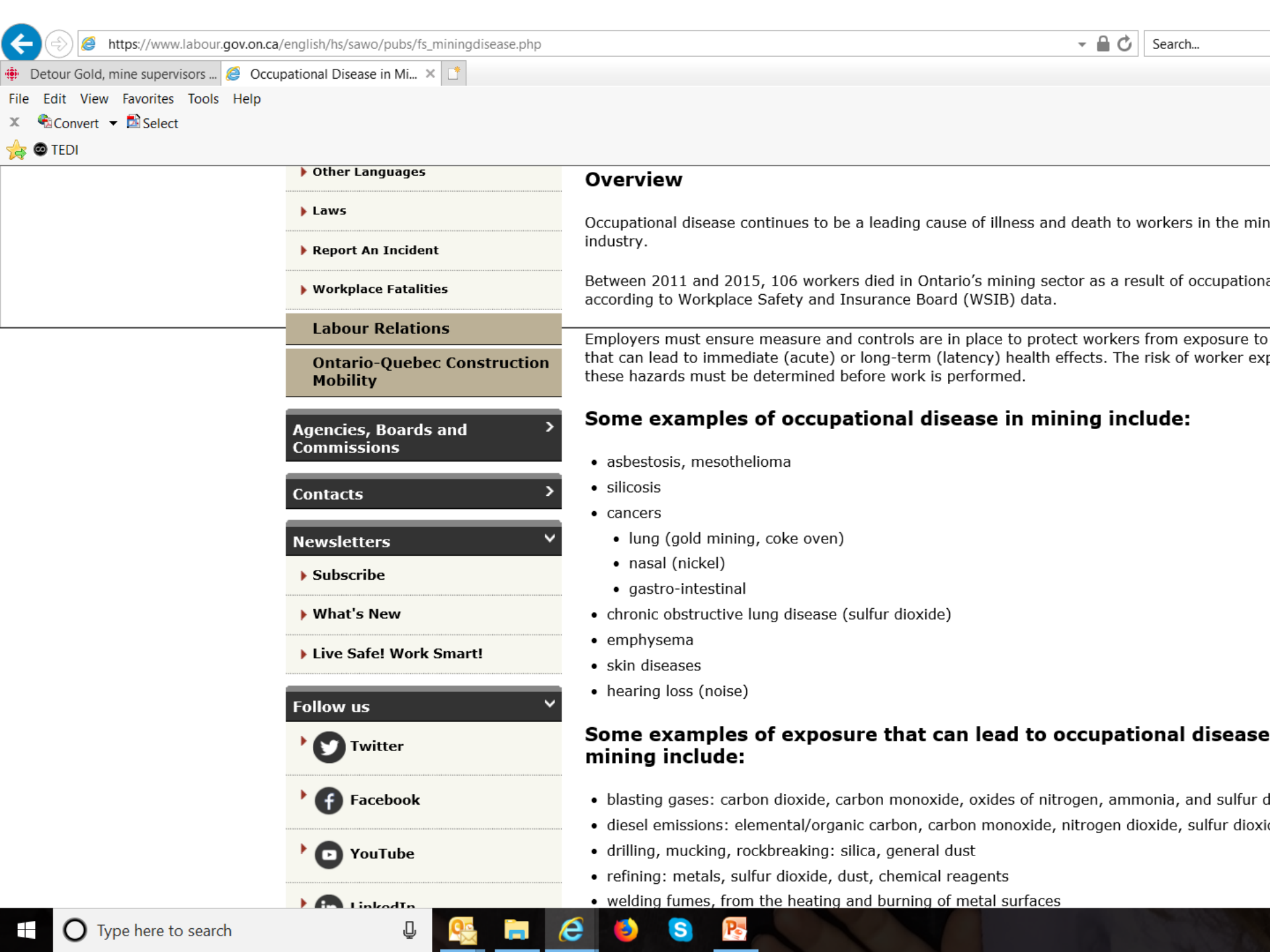
What About Occupational Hygiene?

- Occupational Illness and Diseases (mining)
 - Noise induced Hearing Loss
 - Hand-arm vibration syndrome
 - Coal dust
 - Asbestosis
 - Silicosis
 - Lung Diseases
 - Cancer
- Measurement of exposures; SEG's; Controls; Surveillance;

Workers need to understand their exposures & risk

Much is known – not always communicated or worker protection

-MOL "Occupational Disease in Mines" published in Jan 2016, updated June 2017



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Overview

Occupational disease continues to be a leading cause of illness and death to workers in the mining industry.

Between 2011 and 2015, 106 workers died in Ontario's mining sector as a result of occupational disease according to Workplace Safety and Insurance Board (WSIB) data.

Employers must ensure measure and controls are in place to protect workers from exposure to hazards that can lead to immediate (acute) or long-term (latency) health effects. The risk of worker exposure to these hazards must be determined before work is performed.

Some examples of occupational disease in mining include:

- asbestosis, mesothelioma
- silicosis
- cancers
 - lung (gold mining, coke oven)
 - nasal (nickel)
 - gastro-intestinal
- chronic obstructive lung disease (sulfur dioxide)
- emphysema
- skin diseases
- hearing loss (noise)

Some examples of exposure that can lead to occupational disease in mining include:

- blasting gases: carbon dioxide, carbon monoxide, oxides of nitrogen, ammonia, and sulfur dioxide
- diesel emissions: elemental/organic carbon, carbon monoxide, nitrogen dioxide, sulfur dioxide
- drilling, mucking, rockbreaking: silica, general dust
- refining: metals, sulfur dioxide, dust, chemical reagents
- welding fumes, from the heating and burning of metal surfaces



Occupational Exposure Limits

- OEL = Exposure level to a chemical substance to which it is believed a worker can be exposed day after day for a working lifetime without adverse effects
- OELs are a tool
- Very difficult to establish true exposure assessment
- Evidence-based planning shift to 'impact' & targets
- Links between exposure & illness/disease

Myths & Misconceptions

- Risk of dying from Cyanide exposure at mining operation (ref. Terry Mudder 2009):
 - < bike accident in Beijing,
 - < struck by lightning in Florida,
 - < trampled by elephant in Kenya,
 - < attacked & eaten by crocodile in Australia
- ➔ Maintenance worker died of acute cyanide intoxication (2015)
- Diesel exhaust emissions:
 - In 2012, WHO classified as 'known to cause cancer in humans'
 - Before that: signs of exposure:
 - Irritated eyes or difficulty breathing
 - White, blue, or black smoke; visible haze; noticeable odor
 - Air sampling (diesel particulate matter; CO, NO₂)

- Respiratory Disease Prevention:
 - Nanoparticles – are they more toxic than larger respiratory particles?
 - Elimination of coal worker's pneumoconiosis – lower the OEL for coal dust and silica
 - Changing work organization – overtime, extended shift – affects respiratory



- Noise Induced Hearing Loss Prevention:
 - Production & process equipment evolution – more noisy
 - Requires more comfortable hearing protection for warm envt, longer shifts
 - Many miners have significant hearing loss
 - Mixed exposures (noise + fuel + other vapors) and combined effects of mixed noise (continuous + impulse-impact noise) environments.

- Muscular-Skeletal Injury Prevention
- Traumatic Injury Prevention
- Mine Disaster Prevention
- Ground Failure Prevention



Occupational Exposures (mining)

- Noise
- Diesel Exhaust
- Particulate Matter
- Silica, Asbestos
- Metals
- Various chemicals (reagents,)

“Weight of the Evidence OR Wait for the Evidence” (KH)

Example: McIntyre Powder

- Inhalation by miners of microscopic particles of aluminium powder (protective coating?) to prevent silicosis
- Now alleged to cause neurological conditions & other issues





Why Occupational Hygienists & Health & Safety Professionals?

Workers need to know about the hazards/risks related to occupational exposures in mining

Workers need to be protected in multiple ways (hierarchy of controls)

THANK YOU

Questions... Comments....



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