Occupational Hygiene in Mining in Africa

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SASOM-MEDICHEM Joint Congress 2019
I declare the following Conflict of Interest:

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<tr>
<th>Type</th>
<th>Company</th>
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<tr>
<td>Employment full time / part time</td>
<td>Anglo American plc.</td>
</tr>
<tr>
<td>Research Grant (P.I., collaborator or consultant; pending and received grants)</td>
<td>None</td>
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<tr>
<td>Other research support</td>
<td>None</td>
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<tr>
<td>Speakers Bureau / Honoraria</td>
<td>None</td>
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<tr>
<td>Ownership interest (stock, stock-options, patent or intellectual property)</td>
<td>None</td>
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<td>Consultant / Advisory Board</td>
<td>North West University Wits University University of Wollongong</td>
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Content

• Background
• History of occupational hygiene in the South African Mining Industry
• Legislative frameworks
• Skills and Resources
• International Council for Mining and Metals (ICMM)
• Critical Control Management
• Innovative approaches
• Challenges and opportunities
Occupational Hygiene

Occupational hygiene is the discipline of

- anticipating,
- recognising,
- evaluating and
- controlling

health hazards in the working environment with the objective of protecting worker health and well-being and safeguarding the community at large.
Mining

- Underground mining
- Open cut / open pit mining
- Quarries
- Processing plants
- Smelters & Refineries
- Reclamation
- Sea mining
- Sand mines
- Exploration
Africa

- Second largest continent
- 54 countries
Summary – diseases related to mining

There is a significant disease burden in mining.

This burden may be hard to recognise.

Lung cancer, Chronic Obstructive Pulmonary Disease (COPD), silicosis and Coal Workers Pneumoconiosis (CWP) are the main problems resulting in death.

MSDs and noise-induced hearing loss are also likely to be important causes of disability.

Other disease issues:
• Dermatitis
• Mental illness
• Tuberculosis

Technology…
Mining industry disease deaths - 2013

Prof Driscoll, ICMM H&S Forum 2015
Fatalities from occupational disease in mining

2017 Total Recordable deaths in the SAMI

- South Africa Mineral Resources 2017 Health and Safety Statistics
- ~1065 total recorded deaths from occupational injury and diseases in 2017 in the South African Mining Industry
  - 90 work-related deaths (fatalities) (8.5%)
  - 975 deaths due to occupational disease (91.5%)
  - 652 diagnosed cases of silicosis
History

- 1886 – mining started on the Witwatersrand with a few small diggings

- 1898 – first deep level shaft (3000ft)

- 1902 – first report on dust by the Government Mining Engineer

- 1903 – Miner Commission Report included a reference to the dangers of “the inhalation of small Silica particulates”

- 1904 – Chamber of Mines “Anti-Dust Device” competition

- 1905 – First dust preventative regulations published (and withdrawn in 1906 because the workforce objected to them)

- 1908 – New Regulations on the prevention of dust promulgated

- 1910 – Provision for hospital care & treatment of miners with Phthisis
• 1912-1919 – Mines Phthisis Commission undertake extensive investigations into improving methods of dust measurement and dust control
  - Appointment of “dust samplers”

• 1930 – International Conference of Silicoses, Jnb. 13-27 August
  Convened by the international Labour Office of the League of Nations

• 1914 – Systematic dust sampling to be undertaken by a member of staff of the mine
  - Official appointed must be called “Dust Inspector”
  - Directly responsible to the Manager
  - Granted a corresponding status of Senior Shift Boss
Legislative frameworks in Africa

A few observations…

- Restricted legal frameworks, if any
- Where some type of legal framework is in place, often these focus predominately on the safety issues with inadequate provision for the management of health hazards and risk and are out dated (pre 1970’s)
- Main emphasis and focus is on regulating the compensation for incidents and occupational diseases rather than the prevention thereof
- Inadequate structures to define the occupational hygiene function in both government, mines and industries
- Fragmented approach amongst government Ministries in terms of Health and Safety.
- No specific governing / certification bodies.
Legislative frameworks

South Africa

- Extended legal framework (Mine Health and Safety Act, Regulations, Mandatory Guidelines, etc.)
- Prescribed competencies and legal appointments
- Detailed occupational hygiene programme requirements (incl. RA, sampling strategies, statistical analysis, etc.)
- Statutory reporting requirements
- Defined ministry… national and regional level
- Mine Health and Safety Council and Committees
- South African Minerals Council… Group Environment Engineers (GEEs)
- MHSC Industry Milestones
Skills & Resources

• Tertiary qualifications in occupational hygiene mostly limited to South African Universities
• National diploma and BTech degree in Environmental/Public Health….
• Wits MPH/MSc Exposure Science
• North West University, Potchefstroom, SA… MSc, PhD
• 4 year full-time BSc Occupational Hygiene degree
• NWU… Occupational Hygiene and Health Research Initiative
• NIOH & CSIR research entities
• Wits / Anglo American Chair in Occupational Hygiene
• OHTA courses
• Professional registration… SAIOH
ICMM at a glance

Representing 27 member companies, with responsibility for 1,000+ sites in some 80 countries

With the support of over 30 regional and commodities associations we strengthen environmental and social performance across the mining and metals industry.
ICMM Health work 2019+

What are we doing

• Focus is clear: Zero fatalities and serious diseases

• Ambition: Demonstrating improved performance on health related issues will have a positive effect on those that work in the industry and a positive influence on society’s perception of ICMM members and the mining and metal industry.

• Continue implementation of critical control management and health risk management (videos & guidance)

• Benchmarking of relevant data

• Sharing amongst peers – on critical control management and a range of other vital topics

• Working with OEMs linked to vehicle interaction – how can we stop fatalities
Critical control management (CCM)

Critical control management is an integral part of risk management with a focus on the critical few risks and associated critical few controls.

Focus:
- catastrophic risks
- fatal risks

Does not replace classic, overall risk management process.
The CCM process (is based on...)

- having clarity on those controls that really matter: **critical** controls
- defining the performance required of the critical controls – what the critical control has to do to prevent the event occurring
- deciding what needs to be checked or verified to ensure the critical control is working as intended
- assigning accountability for implementing the critical control – who has to make it work?
- reporting on the performance of the critical controls
- Leadership support is essential.
Critical control management in Health

- Baseline OHRA
- PUE
- Causes & Consequences
- Controls
- Corrective Actions
- Control Deficiencies
- Critical controls
- Monitoring activity

Critical controls

Monetary activity

Deficiencies

Corrective actions

Controls

Causes & Consequences

Baseline OHRA

PUE
Innovative approaches
Innovative approaches
Innovative approaches
Innovative approaches

- Workforce exposed over the OEL (A)
- Workforce exposed at 50-99% of the OEL (B)

Inhalable Hazards

- Workforce exposed to >105 dB (A)
- Workforce exposed to >85 dB (A)
- Workforce exposed to >82 dB (A)
Challenges and opportunities

- Awareness and understanding of occupational hygiene
- Occupational hygiene… the “poor cousin” of the Health & Safety family
- Resources
  - people & skills
  - equipment, instrumentation & laboratory services
- Primary focus on legal compliance rather than a pro-active approach to identifying and managing health risks and controls
- Education and training
- Research
- Legislative frameworks
- Emerging risks
New approach to an old problem

- Focus on the mechanism of release & proactive engineering and operational control solutions rather than reactive health and occ. hygiene risk management solutions
- Move away from sampling, legal compliance & research as the only objective
- Capitalise on existing systems (safety, maintenance, supply chain…)
- Control focused approach
  - Where and why are people being exposed?
  - Do we have controls in place?
  - How do we monitor and manage the controls?
- Measurements are important, but what we need is less monitoring and much more controlling!
- Move from consequence (disease) management to cause (exposure) management
- From a “damage” model to a “prevention” model