Significance of Occupational Hygiene for Queensland: past and present

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What creates occupational hygiene hazards in workplaces?

- **Chemical hazards** (>70,000 products)
- **Physical agent hazards**
  - Noise, non-ionising radiation, ionising radiation, heat, cold, vibration
- **Biological hazards**
  - Transmissible diseases from others at workplaces, including workers and others (Hepatitis, HIV)
  - Zoonotic diseases
  - Direct contact with pathogens causing disease
    - Legionnaires disease
    - Mould and endotoxins
    - Melioidosis
Why are hygiene hazards so difficult to deal with?

• Workplaces cannot see the hazard
• Workplaces cannot identify the level of risk
• Workplaces do not see the disease outcome
• Many other non-workplace causes of disease and workplace causation is unrecognised
• Cost can be transferred from employer to the worker and the community
Why is it so important to pursue occupational hygiene?

- 8-10 times more workers die from work-related illness than from accidents
- Long latency of some diseases
  - medical intervention often occurs after worker is ill
- Occupational hygiene intervention
  - major preventative tool for securing health of worker
- Necessary to understand exposure and disease outcome
- Can achieve good outcomes only by long history of measurement of exposure and intervention
Important outcomes for Queensland workers due to hygiene intervention

Older advances

• Prevention of lead poisoning in workers through reduction in lead exposure in battery factories, ship and bridge painting

• Prevention of leptospirosis amongst cane cutters by change of harvesting methods

• Large reduction in risk to abrasive blasters from substituting TiO$_2$ for SiO$_2$ (sand)
Important outcomes for Queensland workers due to hygiene intervention

More recent – following intensive hygiene investigations

• Control of UV radiation to outdoor workers (34,000 non-melanoma skin cancers per year in Australia)
• Control of excessive noise exposure in entertainment
• Control of blood borne diseases in hospitality industry
Radiation – ionising and non-ionising

- UV radiation very important for Australian outdoor workers
  - Audits show some Queensland workers exposed X5 time limit

- Radiofrequency non-ionising radiation in plastics, timber, metal processing industries
  - Audits identified
    - Most operators overexposed
    - Nearby workers also exposed
Biological hazard hygiene interventions

- Hospitality industry
  - Needle stick injuries
Biological hazard hygiene interventions

- Funeral industry
  - Respiratory sensitisation, infectious diseases
Important outcomes for Queensland workers due to hygiene intervention

- Reduction in dust disease (silicosis and pneumoconiosis) in miners
  - Long term improvement in underground ventilation
  - Long term reduction in dust exposure levels
    - Research 1969 to 1984 into use of gravimetric dust and respirable surface area dust monitoring

- Reduction in respiratory disease in asbestos workers
  - reduced asbestos fibre exposures for workers greatly reduced the risk of asbestosis
  - Living longer (68 yr to 84 yr) raised the risk of mesothelioma
Figure 16: Incidence of malignant mesothelioma cases in Australia, 1945–1999, and extrapolation to 2020 assuming maximum at 2010.

Source: Leigh and Driscoll, 2003
New cases of Mesotheloma by Sex & Year

<table>
<thead>
<tr>
<th>Year Diagnosis</th>
<th>Number of New Cases</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
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<tbody>
<tr>
<td>1979</td>
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<td>1984</td>
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<td>1999</td>
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<tr>
<td>2004</td>
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</tbody>
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Department of Justice and Attorney-General
Hygiene activities with asbestos

- Australia’s first asbestos regulations in 1971 were in Queensland
  - Pursuit of reduced asbestos fibre exposures for workers
  - Contribution to development of asbestos counting techniques
  - Regular asbestos monitoring in asbestos production plants
Critical roles where occupational hygiene has been involved

Developing
  – Practical control technologies
  – Exposure Standards
  – Developing workable regulations

Undertaking
  – Workplace Assessment
  – Training of workers
Roles for occupational hygiene in the present & future
Why is occupational hygiene important in today’s workplaces?

- Implementing the National OH&S Strategy
- New regulations – modern regulations are based on occupational hygiene concepts
- Developing guidance materials
- Investigating emerging health problems
- Managing health risks in workplaces
Why is WHSQ undertaking programs involving occupational disease?

National OHS Strategy 2002 -2012 (NOHSC)
– Established national priorities

1. Reduce high incidence/severity risks
2. Develop the capacity of business operators & workers to manage OHS effectively
3. Prevent occupational disease more effectively
4. Eliminate the hazards at the design stage
5. Strengthen the capacity of government to influence OHS outcomes
National OH&S Strategy 2002-2012: 8 priority occupational diseases

- 8 areas identified in national research reports (2006)
  - Musculoskeletal disorders
  - Mental disorders (stress)
  - Cardiovascular disease
  - Respiratory disease*
  - Infectious and parasitic diseases*
  - Contact dermatitis
  - Noise induced hearing loss*
  - Occupational cancer*

- 6 of these require occupational hygiene intervention
How is hygiene being used in the OHS strategy?

• **Respiratory Disease**
  
  Silica exposure profiling in
  
  foundries
  
  tunnelling
  
  construction industry
  
  - Isocyanate exposure profiling
    
    Wood floor finishing
    
    Insulation installer
How is hygiene being used in the OHS strategy?

- Occupational cancer
  - Wood dust exposures
  - Silica exposures
  - Auditing management and removal of asbestos
How is hygiene being used in the OHS strategy?

- Noise induced hearing loss
  - Noise exposure profiling in
    - metal manufacturing
    - Transport industry

- Infectious parasitic diseases
  - Hendra virus in equine (horse-related) industries
  - Legionella prevention from cooling tower operation
How is hygiene being used in the OHS strategy?

• Infectious diseases
  – Hendra virus
    • Disease transmitted from bats which infects horses
      – Passed from infected horses to humans
      – veterinarians and horse handlers
  – Legionnaires’ Disease
    • Water cooling towers on air-conditioning plants and industrial plants
Hygiene intervention - the foundry program

- To see if dust levels have been reduced over last 2 – 3 decades (from 1981 – 2009)
- See if risk is being more competently controlled
- Identify where attention needs to be paid to further reduce risk from Respirable Crystalline Silica (RCS)
Average RCS exposures
\( \text{mg/m}^3 \) over the 2 survey periods

<table>
<thead>
<tr>
<th>SEG</th>
<th>Mean RCS concentration &lt;2002 mg/cubic m</th>
<th>Mean RCS concentration 2009 mg/cubic m</th>
<th>Relative average performance</th>
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</thead>
<tbody>
<tr>
<td>Moulders</td>
<td>0.03</td>
<td>0.03</td>
<td>No change</td>
</tr>
<tr>
<td>Sand plant, mix and reclaim</td>
<td>0.18</td>
<td>0.08</td>
<td>Much better</td>
</tr>
<tr>
<td>Shot &amp; abrasive blasting</td>
<td>0.06</td>
<td>0.16</td>
<td>Worse</td>
</tr>
<tr>
<td>Shakeout and knockout</td>
<td>0.09</td>
<td>0.03</td>
<td>Much better</td>
</tr>
<tr>
<td>Fettling and grinding</td>
<td>0.13</td>
<td>0.02</td>
<td>Much better</td>
</tr>
<tr>
<td>Furnace men</td>
<td>0.05</td>
<td>0.05</td>
<td>No change</td>
</tr>
</tbody>
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Compliance trends

• 2004 Exposure Standard $0.2 \text{ mg/m}^3 \rightarrow 0.1 \text{ mg/m}^3$

• 1981-2002 non-compliance was 28% (nominal, but probably real i.e. little RPE used)

• 2009 non-compliance down to 21% (nominal, but actually better at about 14.5% because of greater RPE use)

• 48% of monitored dust concentrations $\geq 0.5$ the adjusted Exposure Standard
Controls - Use of RPE

• 1981 to 2002 RPE use 8%
• 2009 RPE use 26%

In 2009
• Of all workers, 21% (16) required significant control because of high exposures
• Of all workers, 14.5% (11) wore no RPE in conditions ranging up to 3X the ES for RCS
Hygiene intervention – the tunnelling program

- Brisbane has 10 year + program
- Assess extent of risk for different tasks
- Determine the level of control
Geometric mean of RCS concentrations in mg/m³ for 7 main SEGs over all sites

mg/cubic m

Road header open cab
Road header closed cab
Shotcreter
Drilling, bolters & workers
Fitters boilermakers & electricians
Drivers & crane operators
Supervisors
Hygiene compliance intervention – wood dust

- Cabinet making, saw milling, furniture manufacture, truss manufacture, trade schools
- Softwood dust exposures (ES 5 mg/m³)
  - 0.5 mg/m³ (with wide GSD 2.5 - 3.9)
- Hardwood dust exposures (ES 2 mg/m³)
  - Cross bench saws 1 mg/m³
  - Breakdown saws 2 mg/m³
- Need to improve cleanup procedures
- Need to improved training on health issues and controls
Hygiene intervention – asbestos audits

• Safework Australia aim – asbestos free workplaces in Australia
  – Asbestos Management Code of Practice
  – Safe Removal of Asbestos Code of Practice

• WHSQ has undertaken 2 audits
  – Compliance with Management Code in general industry (about 54% compliance to date)
  – Asbestos removal from schools (very high levels of compliance)
Noise induced hearing loss – metal manufacturing

- $1 \times 10^6$ Australian workers exposed to hazardous noise levels (in absence of hearing protection)
- Audit program: 67% claimed noise a problem, 81% did not monitor
- Generally few formalised noise management programs
- Little audiometric testing of workers
- Tendency to overprotect
WHSQ Hendra virus audit program

• Audit program was initiated in response to continuing Hendra virus incidents and associated human infection resulting from occupational exposure.

• Targeted the veterinary industry and horses
  – Hendra virus response plan
  – training, use of protective equipment
  – infection control practices on healthy horses
  – Infection control for contact with sick horses
  – Client information provided.
Further information

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