

AFOEM Annual Training Meeting  
Friday, 3 May to Sunday, 5 May 2019  
Auckland, New Zealand

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EDUCATE. ADVOCATE. INNOVATE

Australian Faculty of  
Occupational and Environmental Medicine  
The specialist work doctors

# Exposure to Occupational Hygiene

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New Zealand Occupational Hygiene Society

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- ### Occupational Hygiene - Perceptions
- Dental
  - Nurses
  - Just monitoring
  - Legal compliance with standard

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### NZ Occupational Hygiene Society (NZOHS)

- Network of occupational hygiene professionals
- Supports and promotes professionalism, practice and recognition of the profession in NZ
- Launched in 1994
- Society members exist of professional Occupational Hygienists
  - Companies
  - Private consultants
  - Government organisations
  - Welcomes other H&S professionals, with an interest, to join




New Zealand Occupational Hygiene Society

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### Occupational Hygiene

‘The discipline of **anticipating, recognizing, 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.’

Reference: International Occupational Hygiene Association (IOHA), 2010.



The diagram is a circular flow with four arrows forming a clockwise cycle. The arrows are labeled: 'Anticipation' (top), 'Recognition' (right), 'Evaluation' (bottom), and 'Control' (left). In the center of the cycle is a circle labeled 'Industrial Hygiene'.

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## Occupational Hygienist

- **Observe** workplace processes, procedures, operations
- **Develop** strategies to evaluate work site
- **Assess** potential **worker** exposure
- Use direct reading instruments, sampling techniques to measure levels
- Assess/determine airborne exposure of contaminants
- **Evaluate** effectiveness of control strategies
- **Interpret** results of exposure evaluations
- **Work** in multidisciplinary **teams**
- **Advise, educate** and **train** managers or employers and employees

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## Occupational Health

- Dual nature of occupational health

```

    graph TD
      WA[Work Activity] --> E[Exposure]
      E --> D[Disease]
      E <--> OH[Occupational Hygiene]
      D <--> OM[Occupational Medicine]
      OH --- OHealth[Occupational Health]
      OM --- OHealth
    
```

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## Holistic approach to Occupational Health

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## Anticipation and Recognition

- Understand the process – what do they make, how, with what products, what sort of finishing?
- Have a look
- Discuss
- SDSs, research processes and hazards, previous monitoring, health monitoring, incident reports, employee feedback

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## Hazards and Risk Terms

- **Hazard** = Something that has the **potential** to cause harm (if not controlled).
  - Example: Welding = Fumes, heat, noise and UV radiation
- **Outcome/Consequence** = Harm that results from an uncontrolled hazard.
  - Example: Lung cancer, Acute and chronic respiratory disease
- **Exposure** = Analysis of **how often** and for **how long** employee(s) are or have been exposed to the hazard.
  - Example: Work 5 days a week for 8 hours a day

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## Examples of Risk Assessment Models

		Potential Consequences					
		L6	L5	L4	L3	L2	
Likelihood	Expected to occur regularly under normal circumstances	Almost Certain	Medium	High	Very High	Very High	Very High
	Expected to occur at some time	Likely	Medium	High	Very High	Very High	Very High
	May occur at some time	Possible	Low	Medium	High	High	Very High
	Not likely to occur in normal circumstances	Unlikely	Low	Low	Medium	Medium	High
	Could happen, but probably never will	Rare	Low	Low	Low	Low	Medium

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## 2.3 Biological agents

References: <http://www.secondwindturfilter.com/bioagents.html>  
<http://dovsheat.com/indoor-air-quality/>

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## 2.4 Ergonomic and psychological factors

References: <http://www.learnasy.info/NDME/MEM/Mod5/MEM30008A-EcoErgo/Ergonomics/Ergonomics.html>  
<https://www.quora.com/Does-being-taller-make-one-stronger>  
<https://www.totemp.com/workplace-fatigue/>

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## Evaluation

- Qualitative
- Or measure exposure (concentration of airborne contaminant in air that may be inhaled)
  - Techniques
  - Equipment
  - Interpretation/expertise (Occupational Hygiene)
  - Worst case vs statistically based
  - Legal requirements under GRWM

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## Exposure Potential

- Liquids – volatility
- Solids – dustiness
- Quantity
- Frequency and duration of use
- Controls in place

- UK COSSH control banding, exposure predictor band
- MOSHH, qualitative risk assessment

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## Health Risks

Gas, dust, noise, heat  
airborne contaminant

Workplace EXPOSURE

Health Risk

Manage the Risk? Substance? Exposure?

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## 3. Evaluation

### 3.1 Personal Monitoring

References: <https://www.youtube.com/watch?v=wffAuuVWYg>  
[http://www.pimsdaddy.com/personal-breathing-zone\\_30fpmVrUGagevch7CVPGMS8m\\*NgpW18bvw\\*scgphat/](http://www.pimsdaddy.com/personal-breathing-zone_30fpmVrUGagevch7CVPGMS8m*NgpW18bvw*scgphat/)

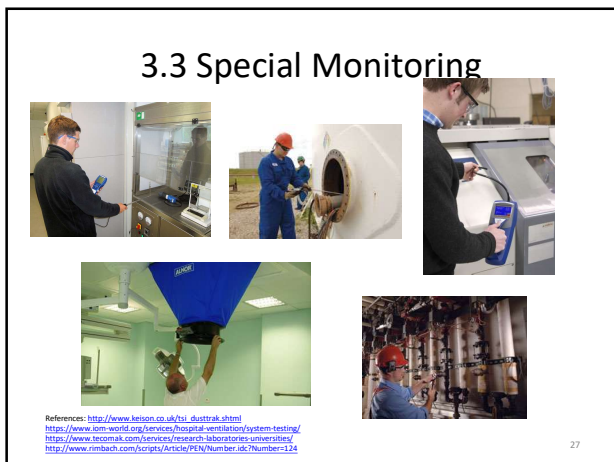
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### Measure Exposure?

- WES
  - If monitoring done
  - If relevant WES established
  - If monitoring provides valid comparison (duration, representative of normal/worst case, statistically valid)
  - If WES current and reflects international knowledge re health impacts
- Other health based criteria

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### 3.5 WES & BEIs

- Workplace Exposure Standard (WES)
 

Values that refer to the **airborne concentration** of substances at which it is believed that **nearly** all workers can be repeatedly exposed day after day **without coming to harm**.

The values are normally calculated on work schedules of five shifts of eight hours duration over a 40-hour work week.
- Biological Exposure Index (BEI)
 

Guidance values for assessing biological monitoring results. It indicates a concentration **below** which **nearly** all workers should **not experience adverse health effects** from exposure to a particular substance.

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### Assessing exposure – common errors

- Not identifying the real risks/substances (just monitoring things that are easy to monitor)
- Ignoring some tasks/ exposure scenarios
- Not accounting for exposure duration
- Assuming similar or same exposure for similar tasks
- Just considering NZ WES
- ASSUMPTIONS (non specific, blanks, accuracy)

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### Legal stuff

- Why assess exposure?
- “what is the limit”  
“if exceed WES, we will be prosecuted”
- Just manage it – control it, don’t need numbers
- Is monitoring required in new legislation?

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**4.4 Control**

Most effective

- Elimination** – Physically remove the hazard
- Substitution** – Replace the hazard
- Engineering Controls** – Isolate people from the hazard
- Administrative Controls** – Change the way people work
- PPE** – Protect the worker with Personal Protective Equipment

Least effective

Reference: <https://www.ishn.com/articles/107699-follow-the-hazards-control-hierarchy-to-reduce-welding-risks>

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**Example 1  
Elimination**

Reference: <https://www.busmagazine.com/article/welding-prosolutions-349>

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**Example 2  
Elimination**

> 85 dBA

65 to 80 dBA

Reference: <https://rtooler.com/best-quiet-air-compressor/>

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**Example 3  
Substitution**

80% VOC reduction

References: <http://www.businessdayonline.com/news/article/old-technology-hurting-local-input-sourcing-paint-industry/>  
<https://phx.com/news/2013-03-28-industry-water-based-plastic-chooses-ect.html>

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### Example 4 Substitution

**87 – 93 dBA**

Substitute metal with plastic

References: <http://www.sloetracksonsystem.com/belt-bucket-elevator-2338580.html>  
[https://publishing.cdbb.org/cases/cases/view/topic=HSE/92\\_jkbdoc-view=popup&ig-ent=https://publishing.cdbb.org/cases/cases/139307/118519p1/1/figure=118519p1\\_1\\_00000.jpg](https://publishing.cdbb.org/cases/cases/view/topic=HSE/92_jkbdoc-view=popup&ig-ent=https://publishing.cdbb.org/cases/cases/139307/118519p1/1/figure=118519p1_1_00000.jpg)  
<https://www.doubtrava.at/en/conveying-technology/components/bucket-elevator/>

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### Example 5 Engineering Controls

> Isolate (at the source)

References: <https://www.pharmaceuticalonline.com/doc/pharmaceutical-isolators-0001>  
<https://www.terrauniversal.com/glove-boxes/photosensitive-deposition.php>

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### Example 6 Engineering Controls

> Isolate (the worker)

Reference: <http://www.steel.com.au/products/uncoated-steel/hot-rolled-coil/formable-grades.html>

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### Example 7 Engineering Controls

> Automation

Reference: <https://engletechnologies.com/factory-automation-a-german-example/>

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### Example 8 Engineering Controls

> Local Exhaust Ventilation

References: <https://benker-aviva.co.uk/engineering-inspections/equipment/rev-couh.html>  
<http://www.cabovent.ca/applications/ventilation/engine-exhaust-hoods.html>  
<https://www.dvsnets.co.uk/>  
<https://www.knipex.com/en/ta/ta-laboratory-fume-hoods/665>  
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### Example 9 Administrative Controls

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### Example 10 PPE

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