Scenario – Stage 1

• You have identified that there is a significant hearing loss trend at a local plastics factory
• There is also a couple of cases of significantly reduced lung function and you have concerns regarding sensitisation and one worker complaining about his eye sight

First steps – ask me for more information if needed.

CASE STUDY

• Plastics Industry
• Overview of site provided
  – Plastic extrusion
  – Finishing

Stage 1 Results

Scenario – Stage 1
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
Scenario – Stage 2
Previous assessments
- Noise levels < 85 dBA (no knowledge of whether adjusted for 12 hr shifts)
- Dust – one sample ~10xWES
- Styrene – all below WES
- Nothing else ever tested

Case Study – Health hazards recognised
- Resin mixing, extrusion –
  - Polyurethane, polyester
  - Styrene, isocyanates, acetone, organic peroxides, toluene, fillers
- Part cleaning – methylene chloride
- Noise (throughout)
- Finishing, dust, silica (respirable?)

Stage 2 Results

Stage 2 results - What are they?
- Styrene

Stage 2 results - Standards - Styrene
- NZ WES styrene 50 (TWA), 100 (STEL) need to adjust for 12 hr shift
- ACGIH TLV, European standards mostly 20 ppm (8hr TWA), 40 ppm (STEL or ceiling)
- Potential effects to hearing and vision <20 ppm
- Probable carcinogen (NTP 2011)

Stage 3: IF/What and How Would you Monitor
- Given the previous information
Stage 3 results?

Stage 3 - Methods

- Styrene not well retained on charcoal – use badges/tubes that are pre-treated (6 wks to get to NZ)
- Respirable crystalline silica, respirable dust (samplers)
- Noise dosimetry
- PID (styrene, acetone) – note: conversions etc
- LEL other gases
- Colorimetric tubes
- Isocyanates – specific methodology

Stage 3 - Styrene - methods

- PID –
  - Immediate, datalogging
  - Non-specific
  - Check specific activities, locations
  - Convert (with badge results)
- Colorimetric tubes
  - Immediate
  - Specific
- Badges/ charcoal tubes
  - Full shift exposure vs WES
  - Specific, accurate?

Stage 4 Interpretation

- Results are given on next slides
- Interpretation is required – is there a health risk
- Should further controls be implemented
- What about further monitoring
  - Exposure monitoring
  - Health surveillance

Scenario – Stage 4

Results - styrene

- Mixing shifts 10 to 20 ppm (badges)
- Up to 600 ppm cgeq on PID, incl STEL 200 ppm
- 2 hr exposure during cleaning – 46 ppm (charcoal)
- Is the WES exceeded? Is the employer required to reduce exposure? Could health impacts be occurring? Actions?

Results - Noise

- Most levels 80 to 85 dBA
- 12 hour shifts
- Dosimetry results – almost all ~85 dBA (adjusted for 12 hr shift)
- Some tasks >90 dBA (v short duration)
Results – Silica and Dust

• RCS all below detection limit
• Detection limit exceeded proposed WES in one case
• One respirable dust 50% of WES when adjusted for 12 hr shift
• Findings on site – very fine, not crystalline

Interpretation/ Conclusions

• NZ Standards NOT exceeded other than noise
• Health effects likely (methylene chloride, noise)
• Ototoxicity
• Health effects possible (styrene, nanoparticulate silica dust, respirable dust, isocyanates)
• Health effects unlikely (acetone)

Controls

• Elimination of methylene chloride by using kerosene based degreaser/parts cleaning
• Reduction of noise levels through buy quiet policies, further maintenance of equipment, use of plastic parts instead of metals in conveying systems
• Ongoing use of hearing protection in areas in which noise is greater than 80 dBA

Stage 4 Interpretation - Results

Interpretation/ Conclusions

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Further monitoring

• Exposure monitoring for isocyanates
• Baseline and regular monitoring of hearing and lung function
• Biological monitoring for styrene – end of shift, mandelic acid in urine
• If exposure to TDI (toluene diisocyanate) is possible, biological monitoring for toluene diamine in urine, end of shift,
End of Case study – key references and links

- WESs and BEIs
- NZOHS – including links to training courses
  - https://nzohs.org.nz/
- OHTA Training Modules, including Basic Principals
  - Note: Basic Principals Course held in Auckland 11-14th June (NZOHS web site)

Occupational Hygiene – Careers

- Certification (COH, CIH)
  - specific training (post grad), 5 years experience, examination (written, verbal), competency
- New pathways - intermediate options
- OHTA – OH Learning. NZOHS running courses
  - Poss qual in specific field (e.g., noise assessment)

Health Related Hazards