



Bio-monitoring in surface treatments



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Overview of presentation

- 1 – Background
- 2 – Outcomes
- 3 – Difficulties / Issues
- 4 – Conclusions
- 5 – Q&As

1 - Background

2002 – UK Regulatory Authority begins programme to reduce workplace illness – focus on cancer, respiratory and skin disease,

2004 – FIT3 – Fit for Work, Fit for Life, Fit for Tomorrow.

2007 – Disease Reduction Programme (DRP) – workplace carcinogens – Hexavalent chrome & compounds ranked 7th

2009 – Biological Monitoring Programme begins

2013 – First report published – HSE RR963 – over 3000 samples

2 – Outcomes

- When a good standard of exposure control exists, periodic BM checks have provided evidence that it is possible to carry out chrome electroplating with very little occupational exposure to these metals \approx background levels
- Monitoring programmes can reduce exposure and improve risk awareness
- The main routes of exposure were dermal & ingestion due to poor personal hygiene
- Further study of better industrial hygiene practices would be beneficial.

2 – Outcomes

- UK BMGV 10 μ mol / mol creatinine (90th percentile from previous studies)
- No occupational exposure not more than 3 μ mol / mol creatinine

| | Electroplaters | Non-chromium workers |
|--|----------------|----------------------|
| Workers (n) | 180 | 152 |
| Measurements (n) | 1197 | 706 |
| Geometric mean (μ mol / mol creatinine) | 3.4 | 1.32 |

3 – Difficulties / Issues

Types of process

Chromium electroplating – 2 distinct types, hard and decorative (Over 99% of decorative coating is not chromium – copper & nickel base coats with chromium metal top coat).

Anodising, passivation, pre-treatment, sealing, conversion coatings.
Maybe electrolytic or simple dip process

Types of process equipment

Barrel, rack or spray

Automatic, semi-automatic, manual

Many different combinations & variables

3 – Difficulties / Issues

- 1 – Can only measure total chromium
- 2 – Education & training – what do the results mean?
- 3 - Biological monitoring is a measurement of exposure. It is not a measurement of ill health
- 4 – Need informed consent – Privacy issues
- 5 – Sample contamination
- 6 – Costs – similar to air monitoring but 2 samples per shift required
- 7 – Suitable testing laboratories
- 8 – Different responses from employees – uptake, excretion rates etc

3 – Further Difficulties / Issues

1 – No biological monitoring data for trivalent chromium even though there are National Biological Monitoring Guidance Values for total chromium. Trivalent chromium not previously seen as a H&S issue.

2 – No biological monitoring data for borates although this was undertaken at a boric acid manufacturing plant in Turkey but not representative exposure conditions to surface engineering plants.

4 – Conclusions

- 1 – Costs similar to personal air monitoring but many variables
- 2 – Biomonitoring picks up all exposure routes but only total chromium
- 3 – Employees can respond differently to substance take-up & excretion
- 4 – Good where there is reliance on PPE, particularly re. dermal exposure
- 5 – Good for checking your risk management measures are working and particularly
- 6 – Good for identifying poor personal hygiene
- 7 – Research required for trivalent chromium and borates



**THANK YOU
FOR
YOUR
ATTENTION!
ANY QUESTIONS?**

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