

# A small survey of exposure to stainless steel welding fume

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Specific aims and objectives for the project were:

- To visit a representative group of workplaces carrying out welding of stainless steel, scoping the various control strategies proposed in COSHH Essentials for welding, hot work and allied processes.
- To assess compliance with good occupational hygiene practice by:
  - occupational hygiene observations;
  - air monitoring for total inhalable particulate, total and hexavalent chromium, nickel and other metals; and
  - biological monitoring for chromium and nickel.
- Make recommendations for improvements to controls and monitoring where appropriate.

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# EXECUTIVE SUMMARY

## Objectives

To visit a representative group of workplaces carrying out welding of stainless steel, scoping the various control strategies proposed in COSHH Essentials for welding, hot work and allied processes.

To assess compliance with good occupational hygiene practice by;

- Occupational hygiene observations

- Air monitoring for total inhalable particulate, total and hexavalent chromium, nickel and other metals

- Biological monitoring for chromium and nickel

Make recommendations for improvements to controls and monitoring where appropriate.

To gather information on current stainless steel welding processes and exposures.

To assess the utility of biological monitoring as an exposure assessment tool for stainless steel welding.

## Main Findings

Telephone interviews, conducted with 52 companies, indicate that for stainless steel, Tungsten Inert Gas (TIG) and Metal Inert Gas (MIG) welding accounted for around 90% of welding. Although over half of the companies providing information performed some Manual Metal Arc (MMA) welding, it did not constitute more than 15% of the total welding for any individual company. Flux Cored Arc (FCA) welding was used only by specialist companies for specific applications, and accounted for less than 5% of all stainless welding amongst the companies surveyed.

Approximately 30% of the companies surveyed by telephone use no Local Exhaust Ventilation (LEV) for stainless welding at any time. More than two thirds of these companies did not conduct any form of health surveillance. The organisations surveyed were almost all Small to Medium Enterprises (SMEs), with an average of 6 workers welding stainless in each company, although not all of these would weld stainless exclusively.

A total of 10 site visits were made to 8 different companies. These revealed:

Breaches of occupational exposure limits were uncommon, even where exposure control strategies were judged to be inadequate.

A significant proportion of companies were not controlling stainless welding fume exposures in accordance with COSHH essentials welding guidance.

There appears to be a common perception within industry that TIG welding of stainless steel does not require engineering control.

Based on our findings from on site surveys and phone enquiries the TIG welding of stainless steel is not generally carried out in accordance with the COSHH essentials guidance. Measured exposures for those carrying out these tasks were well within current exposure limits.

A significant proportion of sites welding stainless steel have adequate exposure controls available, but for various reasons these controls are not used or are used incorrectly. Reasons for this include a reluctance to regularly reposition the LEV hood as the job progresses and a common misconception that LEV can affect the weld quality such that that LEV is not used or positioned so far away from the weld that it is not effective.

There have been no significant changes in welding practices, or the use of exposure controls, since the previous HSL study on stainless welding, conducted in 1999.

Biological monitoring results above the Biological Monitoring Guidance Value (BMGV) were generally associated with exposure controls that could be improved.

Biological monitoring results showed that exposure can be well controlled by use of Respiratory Protective Equipment (RPE).

Biological monitoring is a useful aid to the assessment of exposure to chromium and nickel in welding but due to the long half-lives care needs to be taken interpreting results and actions should be based on the trends in results.

## **Recommendations**

This is a factual report, no recommendations are made.

























Figure 7. Variation in urinary chromium

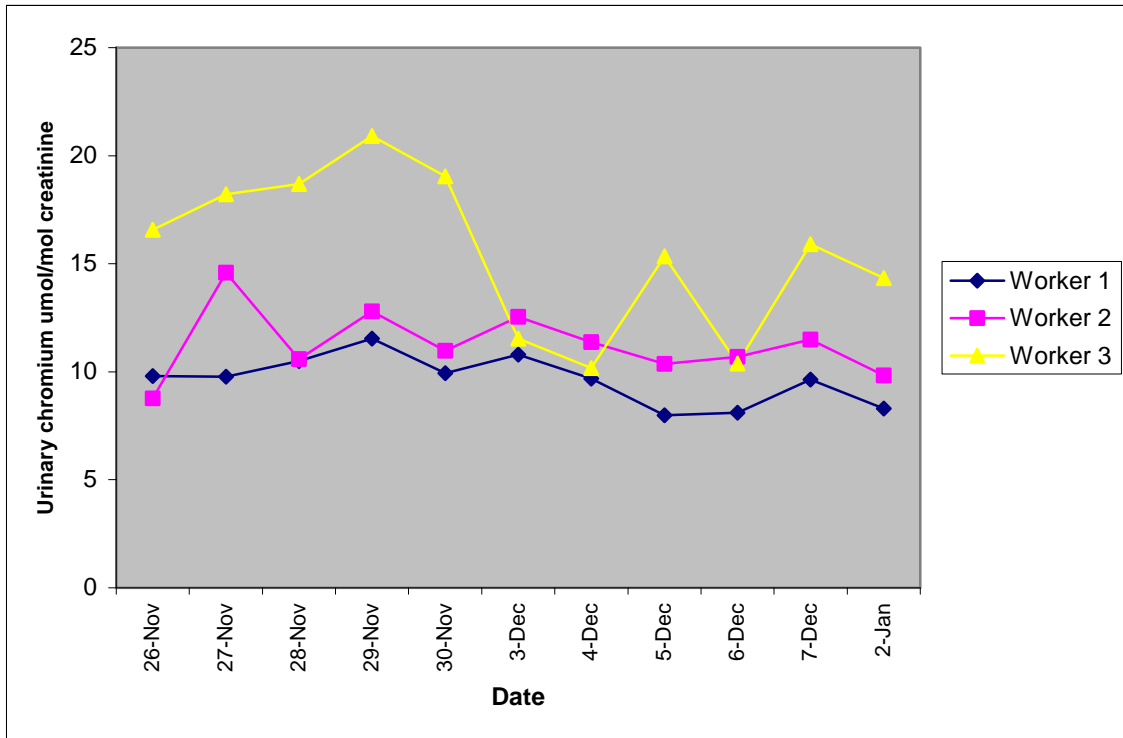
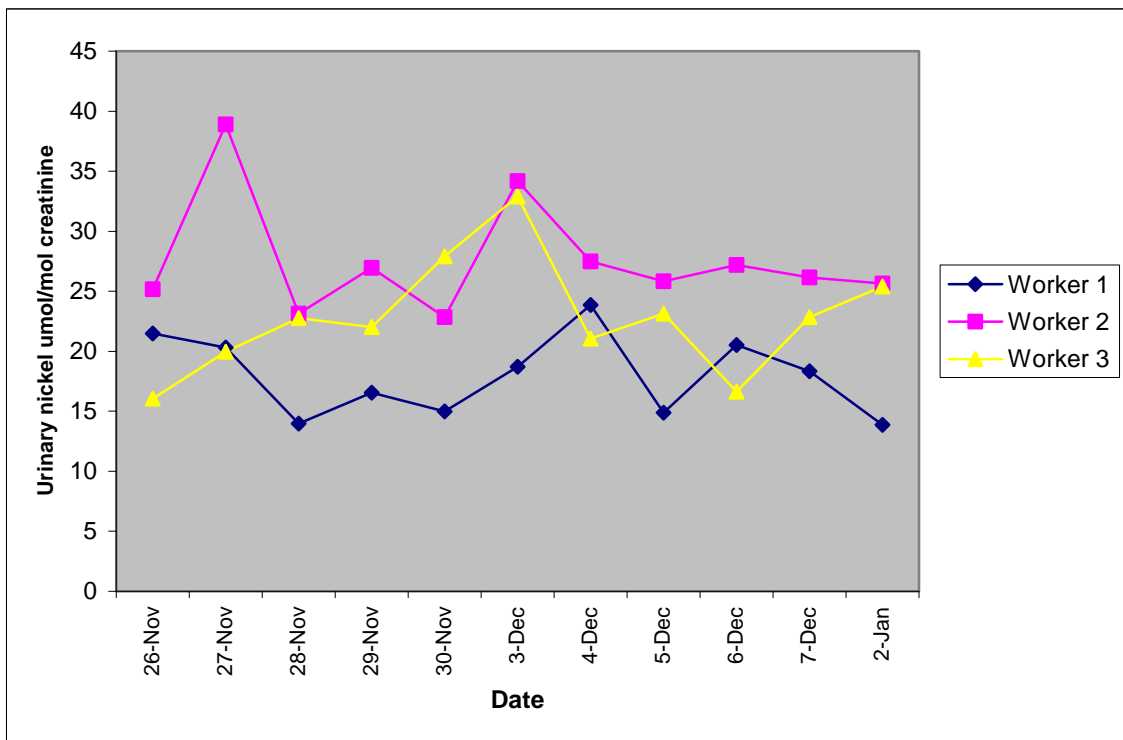


Figure 8. Variation in urinary nickel































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