An investigation into the relationship between exposure levels for persons working with Otto fuel, based on combined air and skin uptake estimates and the levels likely to show signs of health effects

Philip Johnson, 2005

ABSTRACT

The background to the study was to examine existing air monitoring and medical surveillance data (2000 to 2004) for workers with exposure to Otto fuel and compare to a non-exposed group.

Examination of the air monitoring records found that these were not adequate to estimate personal exposures. Additionally, Otto fuel was known to penetrate the gloves used by the workers and that skin absorption could be significant. As gloves were worn for only part of the process, surface contamination of ancillary work areas needed to be determined as part of the study.

The study was modified to incorporate air, skin and surface contamination monitoring for Otto fuel. The air monitoring technique was based on a published method for nitroglycerine using Tenax tubes. A commercial absorption patch was used for under-glove skin absorption determinations. Surface contamination was determined by use of surface swabs followed with a commercial nitrate colourimetric test.

The result of the determination of worker exposure is not conclusive, as the actual number of tests was small, but that both inhalation and skin absorption routes are likely. In worse case, skin contact could equal that of the inhalation route. Surface contamination is possible in ancillary work areas.

The surveillance data indicated that the incidence of kidney/liver function abnormalities and headache/visual disturbances in the period 2000-2004 is similar for the likely exposed group and the control group. No simple trend could be discovered.

These findings will lead to further work, including:

- Re-design of the present air-monitoring programme.
- Incorporation of the skin absorption determinations.
• Using historical medical surveillance data.
• Modification to record acute symptoms of exposure and to take into account factors associated with chronic kidney and liver disease, such as alcohol consumption.
• The results of this study also suggest that better information could be obtained by modifying the timing and number of haematological examinations and evaluation of the analytes chosen in the blood chemistry tests.