ISOCYANATES

ABOUT THESE GUIDELINES

These guidelines set out the minimum requirements for health surveillance for isocyanates to achieve compliance with sections 10(2)(d) and (e) of the Health and Safety in Employment Act. They form part of a series of documents supporting the *Approved Code of Practice for the Management of Substances Hazardous to Health in the Place of Work.* The contents of this pamphlet should be read with the supporting publication *An Introduction to the Guidelines for Workplace Health Surveillance*. Other specific guidelines are available for each of the following substances hazardous to health:

- Cadmium;
- Inorganic arsenic;
- Lead;
- Mercury;
- MOCA (4,4-Methylene bis (2-chloroaniline)); and
- Organophosphate pesticides.

These publications may be reviewed from time to time as more information becomes available, or the need for specific health surveillance for other substances is recognised.

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1. HEALTH SURVEILLANCE FOR ISOCYANATES

WORK ACTIVITIES THAT MAY REPRESENT A HIGH RISK EXPOSURE

Isocyanates are compounds containing one or more -N=C=O groups, which can combine with other compounds containing alcohol groups. The largest volume use of isocyanates is in the production of polyurethane foams.

Examples of work activities involving isocyanates which require special attention when assessing exposure include:

- All stages of manufacture and use where free isocyanates are released as vapours, aerosols and mists;
- Spraypainting; and
- Processes where heat decomposition of polyurethane products occur, such as welding, heat removal of electrical insulating varnishes and hot-wire cutting of urethane foam.

Health surveillance should be extended to all processes where significant exposure to isocyanates in the form of vapour or aerosol may occur. This includes spray painters using isocyanate-based paint systems.

WHO SHOULD CARRY OUT THE HEALTH SURVEILLANCE?

It is the employer's responsibility to arrange for health surveillance. This surveillance is to be carried out under the supervision of a doctor (preferably with qualifications in occupational medicine, e.g. Dip Ind Health(DIH), Dip Occup Health Pract (DOHP), Dip Occup Med (DOM) or Fellow, Australasian Faculty of Occup Med (FAFOM)) or a suitably qualified occupational health nurse with an ongoing referral relationship with a suitably qualified and experienced doctor. The results shall be made available to the employee.

BASELINE HEALTH SURVEILLANCE AT THE TIME OF EMPLOYMENT IN AN ISOCYANATE PROCESS

Note: While it is the employer's responsibility to ensure that health surveillance is carried out, it is recommended that the following sections be completed by a medical provider and the results given to the employer:

1. Personal details

- Name and address of **employer**
- Name and address of **employee**
- Date of birth
- Gender
- Address
- Date of starting with present employer

- Places of previous service

2. Occupational history

- Past work history, including previous exposure to isocyanates
- Potential current exposure
- Whether suitable personal protective equipment is provided and used (For spraypainting with isocyanate based paints a full facepiece air-line respirator or equivalent is required.)

3. Medical history

- Previous history of asthma, hayfever or eczema
- Smoking history

4. Baseline assessment

- Presence of symptoms (see Health Surveillance Questionnaire in appendix A)
- Peak flow measurement

5. Physical examination

- Physical examination with emphasis on the respiratory system

6. Health advice

The medical provider should inform the employee of the potential health effects associated with exposure to isocyanates, the appropriate symptoms and the appropriate means of protection. Persons with a history of asthma, atopic conditions or impaired lung function should be advised of the risks involved in working with isocyanates.

HEALTH SURVEILLANCE DURING EXPOSURE TO AN ISOCYANATE PROCESS

7. Annual survey

The employer will arrange for a medical provider to regularly (no less than annually) survey all exposed workers for skin and respiratory symptoms potentially related to isocyanate use (see appendix A for Health Surveillance Questionnaire). Positive symptoms must be followed by an appropriate medical assessment.

8. Monitoring of symptoms

In the event of respiratory symptoms being positive the employer will organise further monitoring. This will consist of monitoring four peak flows per day for two weeks (both at work and away from work).

a) The employee must be well-trained in doing the peak flows.

b) The employee records the best of three blows on each occasion.

c) Recommended times to do the peak flows are:

- Before work;
- During work;
- Immediately after work; and
- On retiring at night.

Peak flows should also be carried out:

- On request of the employee; or
- If the employer becomes concerned about the health and wellbeing of an employee (e.g, an employee is having a lot of “colds”, is coughing continuously, etc.).

An example of a chart for recording peak flow measurements is included in appendix A.

9. Other tests for respiratory function

Peak flow recordings can be supplemented with formal lung function testing of Forced Expiratory

Volume (one second) (FEV_1) and Forced Vital Capacity (FVC), both before and after broncho-dilation at the discretion of the medical provider.

10. Diagnosis and notification to OSH

The peak flow results are to be evaluated by the medical provider.

If the medical provider feels that any of the peak flow recordings are a cause for concern, then OSH should be notified.

Note: The employer has a legal obligation to notify OSH as soon as possible when an employee is diagnosed as suffering from a condition such as occupational asthma.

11. Health advice

Those workers sensitised to isocyanates should be strongly advised against further exposure.

STORAGE OF HEALTH SURVEILLANCE RESULTS

The employer should ensure that health surveillance results are maintained for all present and past employees who work or have worked with isocyanates. Where the employer is no longer associated with an isocyanate process, the records should be made available to the nearest OSH office.

APPENDIX A: HEALTH SURVEILLANCE QUESTIONNAIRE

CHEST SYMPTOMS

1. Have you had wheezing or whistling in your chest in the last 12 months?

No ❑ Go to Question 4

Yes ❑ Go to Question 2

2. Have you been breathless when the wheezing was present?

No ❑

Yes ❑

3. If you answered yes to Question 1, have you had this wheezing or whistling when you did not have a cold?

No ❑

Yes ❑

4. Do you have a persistent cough?

No ❑ Go to Question 6

Yes ❑ Go to Question 5

5. If yes to question 4, do you tend to cough up phlegm on most days?

No ❑

Yes ❑

6. Do you have shortness of breath?

No ❑ Go to Question 8

Yes ❑ Go to Question 7

7. If yes to question 6, which of these describes your shortness of breath? (tick more than one if you need to)

❑ I get short of breath walking on the flat.

❑ I get short of breath walking up a slight incline.

❑ I get more shortness of breath than other people my age.

8. Have you been woken by an attack of shortness of breath any time in the last twelve months?

No ❑

Yes ❑

9. Are you currently taking any medicines for asthma?

(e.g. inhalers, aerosols or pills)

No ❑

Yes ❑

10. If you would like to make any comments please use this space:-

DERMATITIS

1. Do you have any current or previous history of eczema/dermatitis affecting the bends of the elbows or knees?

No ❑

Yes ❑

2. Does the dermatitis go away or markedly improve with time away from work?

No ❑

Yes ❑

3. Are there particular activities at work which cause it to flare up?

If yes, please specify

No ❑

Yes ❑ _____

4. Is the dermatitis itchy?

No ❑

Yes ❑

5. Are there any chemicals/materials which you think might aggravate/cause your dermatitis?

If yes, please specify

No ❑

Yes ❑ _____

6. What areas of your body are typically affected by the dermatitis?

The top of your hands ❑

Palms ❑

Fingers ❑

Forearm ❑

The top of your feet ❑

The soles of your feet ❑

Face ❑

Neck ❑

Other ❑ please specify _____

7. Did you suffer from eczema or dermatitis as a child?

No ❑

Yes ❑

APPENDIX B: POTENTIAL HEALTH EFFECTS FOLLOWING EXPOSURE TO ISOCYANATES

ROUTE OF ENTRY INTO THE BODY

The route of isocyanate entry into the body is through inhalation and skin absorption.

ACUTE AND CHRONIC EFFECTS

Health effects may follow acute or chronic exposure to isocyanates. Isocyanates can cause respiratory sensitisation and lead to occupational asthma. Isocyanates splashes in the eyes can cause severe chemical conjunctivitis. Isocyanates are also mild skin irritants, and can cause dermatitis. Sensitisation of the skin may occur, but this is not common. 4,4-Di-isocyanate dicyclohexyl methane is an exception, being a potent skin sensitiser.

In sufficiently high concentrations in the air, isocyanates have a primary irritant effect on the respiratory tract.

Sensitised workers may exhibit asthmatic symptoms when subsequently exposed to atmospheric concentrations well below the Workplace Exposure Standard. Exposure of sensitised workers may initiate reduction in respiratory capacity immediately on exposure, some hours later, or both. There is evidence that for sensitised workers, recurrent exposures may result in impairment of ventilatory function and poor recovery.

Other health effects may include liver and kidney dysfunction.

APPENDIX C: FURTHER READING

DOCUMENTS AVAILABLE FROM OSH

Approved Code of Practice for the Safe Use of Isocyanates

A Guide to the Management of Occupational Asthma

OTHER SOURCES OF INFORMATION

Bernstein IL, Chan-Yeung M, Malo JL and Bernstein DI (eds), *Asthma in the Workplace,* Marcel Dekker Inc, New York, 1993.

Lauwerys RR, and Hoet P, *Industrial Chemical Exposure: Guidelines for Biological Monitoring,* 2nd ed, Lewis Publishers, Boca Raton, 1993.

Worksafe Australia, *Isocyanates,* Australian Government Publishing Service, Canberra, 1990.