safe work australia

Health monitoring

Guide for benzene

safe work australia

Contents

Introduction

This guide is intended to be read by a registered medical practitioner with experience in health monitoring who is engaged by person conducting a business or undertaking (PCBU) to carry out or supervise health monitoring. It provides practical guidance to registered medical practitioners about requirements under the work health and safety (WHS) laws for health monitoring.

This guide applies to all workplaces covered by the WHS Regulations where health monitoring is required.

How to use this guide

This guide includes references to the legal requirements under the WHS Act and WHS Regulations. These are included for convenience only and should not be relied on in place of the full text of the WHS Act or WHS Regulations.

The words ‘must’, ‘requires’ or ‘mandatory’ indicate a legal requirement exists that must be complied with. The word ‘should’ is used in this guide to indicate a recommended course of action, while ‘may’ is used to indicate an optional course of action.

This guide provides information for those registered medical practitioners engaged by a PCBU to carry out or supervise health monitoring for workers. This guidance should be read in conjunction with the following:

- *Health monitoring guide for registered medical practitioners*
- *Health monitoring guides for hazardous chemicals*
- *Health monitoring guide for workers*
- *Health monitoring guide for persons conducting business or undertakings (PCBUs).*

Health monitoring under the WHS Regulations

In certain circumstances, the model WHS Regulations place duties on a PCBU to provide health monitoring to workers. These requirements arise if the worker is carrying out work with hazardous chemicals including lead and asbestos. In addition, the work being carried out must be the kind of work specified in the WHS Regulations. A PCBU has the duty to determine if health monitoring is required.

The WHS Regulations prescribe that health monitoring is carried out by or supervised by a registered medical practitioner with experience in health monitoring.

Benzene

Benzene (CAS 71-43-2) is a clear, colourless, highly flammable liquid that has a sweet petroleum like odour.

Work activities that may represent a high risk exposure

Under the Work Health and Safety (WHS) Regulations, benzene is listed as a restricted carcinogen and must not be used as a feedstock containing more than 50 per cent of benzene by volume, or for genuine research or analysis at concentrations greater than 0.1 per cent without authorisation from the relevant WHS regulator.

Benzene is an aromatic hydrocarbon and is a natural component of crude and refined petroleum. It can also be used as a solvent in manufacturing, paints, varnishes, lacquer thinners and gasoline.

Examples of work activities involving benzene that may require special attention when assessing exposure include:

- refining operations
    - for example maintenance of equipment used for handling benzene-containing refinery streams and sampling benzene-containing refinery streams in open containers
- chemical manufacturing
- handling, storage and transport of petrol
    - for example by filling rail tankers and top-filling road tankers with gasoline
- motor vehicle repair
    - for example working on vehicle fuel systems
- plastics and rubber manufacturing
- steel production
    - for example exposure to the by-product of coal coking, and
- firefighting
    - for example exposure to the emission from burning synthetic polymers like polyvinyl chloride and urethane foam.

Sources of non-occupational exposure

Benzene, together with the other aromatic hydrocarbons toluene, ethyl benzene and the xylenes, is a major component of petrol. The aromatics increase the octane rating of petrol to the level needed by engines to provide acceptable fuel economy and performances. Of these aromatics, benzene is normally a minority component.

Benzene can escape into the air, particularly from vehicle fuel systems and from filling stations. The major source of exposure for the general population is from vehicle exhausts because in addition to the benzene actually present in petrol, it is also produced by chemical reactions during combustion in the engine.

Benzene exposure has also been recognised as a potential risk in the coal seam gas industry, particularly where ‘fracking’ is being undertaken.

Cigarette smoke contains benzene and the World Health Organization has estimated a benzene intake of 30 µg/cigarette. Passive smoking particularly indoors will also contribute to benzene intake of non-smokers.

Food and drinking water contains either no or negligible amounts of benzene.

1. Health monitoring for benzene under the WHS Regulations

Collection of demographic, medical and occupational history

Records of personal exposure

Physical examination

Baseline blood sample for haematological profile

Urinary S-phenylmercapturic acid (S-PMA)

Health monitoring before starting work in a benzene process

Health monitoring for benzene may be required before the worker starts work so that changes to the worker's health can be detected.

Initial discussions about a health monitoring program should include:

- possible health effects from exposure to benzene,
- how to recognise and report symptoms, and
- what is involved in the health monitoring program, for example the frequency of testing and the tests that may be needed.

A physical examination should be carried out only if indicated by work and medical history. Benzene is a respiratory irritant and examination may indicate investigation of respiratory symptoms. However, spirometry may not be required at this stage.

A blood sample for a haematological profile should be used to record the worker's baseline status.

During exposure to a benzene process

2. Monitoring exposure to benzene

Where workers are exposed, suspected of being exposed or are concerned about exposure to benzene, the person conducting the business or undertaking (PCBU) has a duty to arrange a health monitoring appointment with a registered medical practitioner. For example, an appointment should be arranged following spills or loss of containment of benzene resulting in excessive exposure to workers or when workers develop symptoms of benzene exposure.

S-Phenylmercapturic acid (S-PMA) and trans-trans-muconic acid (t,t-MA) are two minor urinary metabolites of benzene that can be used as a measure of benzene exposure.

S-PMA is a highly specific marker for benzene exposure. It has greater specificity than other markers, such as phenol, that are unsuitable as markers for biological monitoring for benzene exposure unless very high levels of exposure to benzene have occurred. At or below the workplace exposure standard, the urinary phenol derived from benzene is considerably less than that from endogenous sources.

A spot urine test can be used to determine levels of S-PMA relative to creatinine. A spot urine test for S-PMA should be performed at the end of a work shift. The half-life of S-PMA in urine is approximately nine hours. This needs to be considered when interpreting the urinalysis data.

Where urinalysis is carried out, the following value should be considered when assessing exposure to benzene:

Biological exposure standard for benzene[1]

Urinary S-PMA:

11.8 µmol/mol creatinine (25 µg/L)

As tobacco smoke contains benzene, inhalation of tobacco smoke will cause elevated background values of S-PMA. The normal background level of S-PMA for a non-smoker is around 2.0 µg/g creatinine (1 µmol/mol creatinine) and for a smoker is 3.6 µg/g creatinine (1.7 µmol/mol creatinine).

If spot urine testing reveals S-PMA levels greater than 11.8 µmol/mol creatinine (25 µg/L), the registered medical practitioner should consider taking a blood sample to compare the haematological profile with the worker's baseline haematological profile.

Other health monitoring methods

Other tests that may be used to test the worker's exposure to benzene:

- urinary t,t-MA, or
- blood benzene levels.

The metabolite, t,t-MA, may also be useful for biological monitoring of benzene exposure. However, as t,t-MA is also a metabolite of sorbic acid and sorbitol, compounds that can be found in certain foods including cheese, syrup, jelly, cake, dry fruits and soft drinks, the test is not specific for benzene exposure.

If urinalysis for t,t-MA is performed, the following value may be used as a guide for assessing exposure to benzene:

Urinary t,t-MA[2]*:*

500 µg/g creatinine

Sampling at end of shift is recommended. Smokers will have higher levels of urinary t,t-MA than non-smokers which needs to be considered when interpreting the results. Urinary t,t-MA levels may be a more sensitive measure of benzene exposure than urinary S-PMA levels, and can be used as a confirmatory test.

Blood benzene concentrations may be used as an indicator of benzene exposure. At the cessation of exposure, the half-life of benzene in blood is short (30 minutes) and sampling time is crucial; sampling immediately at the end of exposure is preferable. Blood benzene levels may be used as a confirmatory test for benzene exposure.

For workers exposed to relatively high levels of benzene, complete blood analysis can be used to monitor possible changes related to exposure.

Workplace exposure standard

The workplace exposure standard for benzene is:

- eight hour time weighted average (TWA) of 1 ppm (3.2 mg/m^3).

A physical examination and urinary testing may be indicated if the results of air monitoring indicate frequent or potentially high exposure (half of the TWA or above).

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[1] See Chemical analysis branch handbook, 9th Edition, Workplace and biological monitoring exposure analysis, WorkCover NSW (PDF 3.39MB) for more details. Molecular weight of S-PMA, 239.289; molecular weight of creatinine, 113.12.

[2] American Conference of Governmental Industrial Hygienists (ACGIH) (2017) Documentation of the Biological Exposure Indices, 7th Ed, Cincinnati.

Removal from work

Where the results of a medical examination indicate the worker is displaying symptoms of exposure to benzene or where results of biological monitoring indicate exposure that may cause adverse health effects, the registered medical practitioner should consider recommending the worker be removed from benzene-related work.

A spot urine test with a level of S-PMA of greater than 11.8 µmol/mol creatinine in urine (25 µg/L) may indicate the worker has been occupationally exposed to benzene. If this occurs, the registered medical practitioner should consider recommending the worker be removed from the benzene work, taking into account other benzene exposure factors including the confounding factors and symptoms described below.

In both of these instances the PCBU should be informed and conduct a review of control measures.

When removal from benzene-related work is indicated the registered medical practitioner must provide the PCBU with the following recommendations:

- the worker should be removed from work with benzene, and
- the PCBU should review control measures and carry out recommended remedial action.

The worker must be informed of the results of the health monitoring.

Return to work

Should a worker be removed from benzene-related work, they must not return until the registered medical practitioner has:

- assessed them as medically fit, and
- made a recommendation to the PCBU that the worker can return to remediated benzene-related work.

This assessment should take into consideration the clinical condition of the worker, the worker's urinary S-PMA levels and remediation of the circumstances that led to the symptoms if possible.

At termination of work in a benzene process

3. Final medical examination

A final medical examination should be carried out.

A blood sample should be taken and results compared with the worker's baseline haematological profile. Workers with haematological abnormalities should be advised to seek continuing medical monitoring.

Workers with health conditions or continuing symptoms due to benzene exposure should be advised to seek continuing medical examinations as organised by the registered medical practitioner supervising the health monitoring program.

A health monitoring report from the registered medical practitioner should be provided to the PCBU as soon as practicable after the completion of the monitoring program, and at regular intervals for longer term or ongoing health monitoring processes. The report must include:

- the name and date of birth of the worker
- the name and registration number of the registered medical practitioner
- the name and address of the PCBU who commissioned the health monitoring
- the date of the health monitoring

- any test results that indicate whether or not the worker has been exposed to a hazardous chemical
- any advice that test results indicate that the worker may have contracted an injury, illness or disease as a result of carrying out the work that triggered the requirement for health monitoring
- any recommendation that the PCBU take remedial measures, including whether the worker can continue to carry out the type of work that triggered the requirement for health monitoring, and
- whether medical counselling is required for the worker in relation to the work that triggered the requirement for health monitoring.

Potential health effects following exposure to benzene

4. Route of occupational exposure

The primary routes of benzene exposure are via inhalation and skin absorption.

Accidental ingestion may be possible, especially when eating or smoking with contaminated hands.

5. Target organ/effect

The target organs and potential effects of benzene exposure include:

Table 1 Target organs and potential effects of benzene exposure

Target organ	Effect
Blood/bone marrow	• Bone marrow depression (anaemia, leukopaenia, thrombocytopaenia, pancytopenia or aplastic anaemia) • Leukaemia (particularly acute myeloid leukaemia) • Possible increased risk of non-Hodgkin's lymphoma and multiple myeloma
Central nervous system (CNS)	• Solvent intoxication • Acute CNS depression with drowsiness • Dizziness, headaches and vomiting • Chronic solvent neurotoxicity • Coma and death
Respiratory system	• Irritation
Skin	• Irritation
Eyes	• Irritation

6. Acute effects

Acute exposure to high concentrations of benzene vapours can result in irritation of the skin, eyes and respiratory system and in central nervous system depression and arrhythmias.

CNS

The acute effects from exposure to high levels of benzene (500 to 1000 ppm) are:

- central nervous system depression
- narcosis

- unconsciousness
- coma, and
- death.

Symptoms of solvent intoxication include:

- headache
- nausea and vomiting
- dizziness
- slurred speech
- euphoria
- fatigue
- unsteady gait
- incoordination
- weakness
- irritability
- disorientation
- confusion
- loss of consciousness, or
- death.

Benzene concentrations of approximately 20,000 ppm are fatal to humans within five to ten minutes. Massive exposure (20,000 ppm for five minutes) can cause:

- pulmonary oedema, and
- respiratory arrest.

Exposures of 50 to 150 ppm for five hours can cause:

- headaches
- lassitude, or
- general weakness.

Respiratory system

All organic solvents irritate the respiratory tract to some degree as a consequence of the defatting action of solvents. Respiratory tract irritation from solvents is usually confined to the upper airways, including the nose and sinuses. Symptoms of irritation of the upper respiratory tract are marked by sore nose and throat, cough and possibly chest pain.

7. Chronic effects

Benzene is both haematotoxic and leukaemogenic by a range of mechanisms involving the bone marrow haematopoietic cell populations. The haematotoxic effects of benzene largely involve cytotoxic damage to the bone marrow stem cells.

Chronic exposures to levels of 100 to 500 ppm have resulted in depression of bone marrow haemopoiesis leading to anaemia, leucopoenia, thrombocytopenia or pancytopenia.

For bone marrow depression, the lowest observed adverse effect level in humans is 7.6 ppm based on minimal blood count changes in otherwise healthy workers.

Metabolites of benzene are thought to be responsible for most of the toxic effects associated with benzene exposure. The molecular mechanisms underlying leukaemogenesis appear to involve clastogenic effects. Leukaemia cell populations are monoclonal (resulting from a single cell or cell type) and are found to have distinct chromosomal abnormalities thought to be due to interference by benzene metabolite with chromosomal separation during cell division.

Benzene may be present as a contaminant in mixed solvents and health effects may be due to exposure to the mixture. These health effects include:

CNS

Neurotoxicity with symptoms including:

- personality or mood changes
- fatigue
- decreased motivation
- difficulty in concentration, or
- impairment in memory.

Skin

Almost all organic solvents are primary skin irritants as a result of defatting of the skin. Up to 20 per cent of cases of work-related dermatitis are caused by solvents.

Liver

Organic solvents may cause hepatocellular damage if there is exposure in sufficient dose for sufficient duration.

Kidneys

There are reports of renal effects in exposed workers. Chronic exposure to a number of solvents may result in mild renal tubular dysfunction evidenced by impaired re-absorption of proteins, glucose and amino acids by the proximal tubule. A characteristic sign of renal tubular dysfunction is an increased excretion of low molecular weight proteins in the urine including β_2-microglobulin.

8. Carcinogenicity

Benzene has been classified as a Category 1A carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as it has been shown to cause cancer in humans.

Haematologic neoplasms including acute myelogenous leukaemia (AML) have been documented to occur with chronic exposures as low as 10 ppm benzene. Several reports suggest exposure to benzene may be related to non-Hodgkins lymphoma and multiple myeloma.

9. GHS classification

The following GHS health hazard classification for benzene has been taken from Safe Work Australia's Hazardous Chemicals Information System.

Hazard category

Carcinogenicity – category 1A

Germ cell mutagenicity – category 1B (may cause genetic defects)

Specific target organ toxicity (repeated exposure) – category 1
(causes damage to organs through prolonged or repeated exposure)

Eye irritation – category 2

Skin irritation – category 2

Aspiration hazard – category 1

Source documents

Agency for Toxic Substances and Disease Registry (2007); Toxicological Profile for Benzene; US Department of Health and Human Services; Public Health Service (PDF 10.36MB).

Australian Government Department of the Environment and Energy.

American Conference of Governmental Industrial Hygienists (ACGIH) (2011) *Documentation of the Threshold Limit Values and Biological Exposure Indices, Benzene*, 7th edition, Cincinnati.

American Conference of Governmental Industrial Hygienists (ACGIH) (2017) Documentation of the Biological Exposure Indices, 7th Ed, Cincinnati.

American Petroleum Institute (1996) *Biological mechanistic considerations relevant to benzene induced leukemogenesis*, ACGIH TLV Committee.

Chemical analysis branch handbook, 9th Edition, Workplace and biological monitoring exposure analysis, WorkCover NSW (PDF 3.39MB).

Health Protection Agency (2007); Benzene – Toxicological overview (PDF 57KB).

Institute of Petroleum (1993) *Guidelines for Health Surveillance and Biological Monitoring for Occupational Exposure to Benzene*, Occupational and Environmental Medical Sub-committee of the Institute of Petroleum, London,.

International Programme on Chemical Safety (1993) *Environmental Health Criteria 150*: Benzene, International Programme on Chemical Safety, World Health Organization, Geneva.

Lauwerys, R.R. and Hoet, P. (2001) *Industrial Chemical Exposure Guidelines for Biological Monitoring*, 3rd Ed, Lewis Publishers, Boca Raton.

National Industrial Chemicals Notification and Assessment Scheme (2001) Benzene, *Priority Existing Chemical Assessment Report No.21*.

Oil Companies' European Organisation for Environmental and Health Protection (1993) *Guidelines for the Health Surveillance of Workers Exposed to Benzene in the Petroleum Industry Report No. 93/59*, Oil Companies' European Organisation for Environmental and Health Protection, Brussels.

PubChem Open Chemistry Database, Compound Summary for CID 241 Benzene.

Safe Work Australia (2013); *Workplace Exposure Standards for Airborne Contaminants* (PDF 873KB).

Safe Work Australia; *Hazardous Chemicals Information System*.

US National Library of Medicine (2016); Solvents, acute toxic effect.

Health monitoring report

Benzene

This form contains confidential information and must not be disclosed to another person except in accordance with the Work Health and Safety Regulations or with consent of the worker

Health monitoring report – Benzene

This health monitoring report is a confidential health record and must not be disclosed to another person except in accordance with the Work Health and Safety Regulations or with the consent of the worker.

There are two sections. Complete both sections and all questions as applicable.

Section 1 A copy of this section should be forwarded to the person conducting the business or undertaking (PCBU) who has engaged your services.

Section 2 may contain confidential health information. Information that is required to be given to the PCBU should be summarised in Section 1.

Section 1 – A copy of this section to be provided to the PCBU

Person conducting a business or undertaking

Company/organisation name: Click here to enter text.

Site address: Click here to enter text.

Suburb: Click here to enter text. **Postcode:** Click here to enter text.

Site Tel: Click here to enter text. **Site Fax:** Click here to enter text.

Contact Name: Click here to enter text.

Other businesses or undertakings engaging the worker ☐N/A
(include a separate section for each PCBU)

Company/organisation name: Click here to enter text.

Site address: Click here to enter text.

Suburb: Click here to enter text. **Postcode:** Click here to enter text.

Site Tel: Click here to enter text. **Site Fax:** Click here to enter text.

Contact Name: Click here to enter text.

Worker details (tick all relevant boxes)

Surname: Click here to enter text. **Given names:** Click here to enter text.

Date of birth: Click here to enter a date. **Sex:** ☐ Male ☐ Female

Address: Click here to enter text.

Suburb: Click here to enter text. **Postcode:** Click here to enter text.

Current job: Click here to enter text.

Tel (H): Click here to enter text. **Mob:** Click here to enter text.

Date started employment: Click here to enter a date.

Employment in benzene risk work (tick all relevant boxes)
(information provided by the PCBU)

☐ New to benzene work

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☐ New worker but not new to benzene work

☐ Current worker continuing in benzene work

Worked with benzene since: Click here to enter a date.

Risk assessment completed: ☐ Yes ☐ No

Work environment assessment (tick all relevant boxes) (information provided by the PCBU)

Date of assessment: Click here to enter a date.

Benzene industry/use

☐ Refining

☐ Chemical Industry

☐ Petrol Industry

☐ Automotive Industry

☐ Plastics/Rubber Manufacturing

☐ Steel Industry

☐ Emergency Services

☐ Other (specify): Click here to enter text.

Other chemicals the worker may be exposed to: Click here to enter text.

Controls		
Eye protection	☐ Yes	☐ No
Emergency eye wash	☐ Yes	☐ No
Wear gloves	☐ Yes	☐ No
Respirator use	☐ Yes	☐ No
Respirator type	Click here to enter text.	
Local exhaust ventilation	☐ Yes	☐ No
Overalls/work clothing	☐ Yes	☐ No
Laundering by employer	☐ Yes	☐ No
Wash basins and showers (with hot and cold water)	☐ Yes	☐ No
Other please specify		

Health monitoring results

Biological monitoring results

Include/attach test results that indicate whether or not the worker has been exposed

Date	Tests performed	Recommended action or comment
Click here to enter a date.	Click here to enter text.	Click here to enter text.
Click here to enter a date.	Click here to enter text.	Click here to enter text.
Click here to enter a date.	Click here to enter text.	Click here to enter text.
Click here to enter a date.	Click here to enter text.	Click here to enter text.

Comments about health monitoring results (for example any early indications or diagnosis of injury, illness or disease): Click here to enter text.

Recommendations (by registered medical practitioner) (tick all relevant boxes)

Further/additional health monitoring for worker

☐ This is the final health monitoring report

☐ Repeat health assessment in Click here to enter text. month(s) / Click here to enter text. week(s)

☐ Counselling required

☐ Medical examination by registered medical practitioner. On Click here to enter a date.

☐ Referred to Medical Specialist (respiratory/dermatology/other). On Click here to enter a date.

Recommendations to PCBU

☐ The worker is suitable for work with benzene

☐ Review workplace controls

☐ The worker should be removed from work with benzene. On Click here to enter a date.

☐ The worker is fit to resume work. On Click here to enter a date.

☐ Biological monitoring results indicate unacceptably high exposure levels

Specialist's name: Click here to enter text.

Additional comments or recommendations: Click here to enter text.

Registered medical practitioner (responsible for supervising health monitoring)

Name: Click here to enter text.

Signature:

Date: Click here to enter a date.

Tel: Click here to enter text. **Fax:** Click here to enter text.

Registration Number: Click here to enter text.

Medical Practice: Click here to enter text.

Address: Click here to enter text.

Suburb: Click here to enter text. **Postcode:** Click here to enter text.

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Section 2 – This section to be retained by the registered medical practitioner

Person conducting a business or undertaking

Company/organisation name: Click here to enter text.

Site address: Click here to enter text.

Suburb: Click here to enter text. **Postcode:** Click here to enter text.

Site Tel: Click here to enter text. **Site Fax:** Click here to enter text.

Contact Name: Click here to enter text.

Other businesses or undertakings engaging the worker ☐N/A

Company/organisation name: Click here to enter text.

Site address: Click here to enter text.

Suburb: Click here to enter text. **Postcode:** Click here to enter text.

Site Tel: Click here to enter text. **Site Fax:** Click here to enter text.

Contact Name: Click here to enter text.

Worker details (tick all relevant boxes)

Surname: Click here to enter text. **Given names:** Click here to enter text.

Date of birth: Click here to enter a date.

Sex: ☐ Male ☐ Female ☐ Pregnant/breastfeeding

Address: Click here to enter text.

Suburb: Click here to enter text. **Postcode:** Click here to enter text.

Current job: Click here to enter text.

Tel (H): Click here to enter text. **Mob:** Click here to enter text.

Date started employment: Click here to enter a date.

Past employment and exposure details (tick all relevant boxes)

Have you ever worked in any of the following jobs?

If you answered 'yes' to any of the questions, please advise if you experienced any symptoms such as cough or wheeze or asthma when working.

			Comments (all 'yes' answers)
Mining, underground mining, tunnelling or quarrying	☐ No	☐ Yes	Click here to enter text.
Grinding or foundry work	☐ No	☐ Yes	Click here to enter text.
Smelter or refinery	☐ No	☐ Yes	Click here to enter text.
Cotton mill with grain or hay	☐ No	☐ Yes	Click here to enter text.

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			Comments (all 'yes' answers)
In any timber industry, furniture or woodworking trades and exposed to wood dusts	☐ No	☐ Yes	Click here to enter text.
Manufacturing of chemicals, or pharmaceuticals	☐ No	☐ Yes	Click here to enter text.
Cement works	☐ No	☐ Yes	Click here to enter text.
Textile factory	☐ No	☐ Yes	Click here to enter text.
Making or processing clutch or brake linings	☐ No	☐ Yes	Click here to enter text.
Other (please specify)	☐ No	☐ Yes	Click here to enter text.

In any of your past workplaces were you were exposed to:

			Comments (all 'yes' answers)
Asbestos	☐ No	☐ Yes	Click here to enter text.
Silica	☐ No	☐ Yes	Click here to enter text.
Mineral or metal dust	☐ No	☐ Yes	Click here to enter text.
Other dusts	☐ No	☐ Yes	Click here to enter text.
Degreasers	☐ No	☐ Yes	Click here to enter text.
Dyes	☐ No	☐ Yes	Click here to enter text.
Formaldehyde	☐ No	☐ Yes	Click here to enter text.
Paint remover	☐ No	☐ Yes	Click here to enter text.
Solvents	☐ No	☐ Yes	Click here to enter text.
Cleaning fluids	☐ No	☐ Yes	Click here to enter text.
Isocyanates	☐ No	☐ Yes	Click here to enter text.
Metal fumes	☐ No	☐ Yes	Click here to enter text.
Adhesives	☐ No	☐ Yes	Click here to enter text.
Rubber cement	☐ No	☐ Yes	Click here to enter text.
Roofing materials	☐ No	☐ Yes	Click here to enter text.
Lacquer	☐ No	☐ Yes	Click here to enter text.
Plastics	☐ No	☐ Yes	Click here to enter text.
Resins	☐ No	☐ Yes	Click here to enter text.
Paints	☐ No	☐ Yes	Click here to enter text.
Pesticides	☐ No	☐ Yes	Click here to enter text.
Have you worked around or driving heavy commercial vehicles	☐ No	☐ Yes	Click here to enter text.

			Comments (all 'yes' answers)
Have you worked in areas where there was exposure to radiation, or in hot or cold environments	☐ No	☐ Yes	Click here to enter text.

General health questionnaire (tick all relevant boxes)

			Comments (all 'yes' answers)
Did you suffer any incapacity lasting two weeks or longer in the last two years	☐ No	☐ Yes	Click here to enter text.
Have you ever had any operations or accidents or been hospitalised for any reason	☐ No	☐ Yes	Click here to enter text.
Are you currently being treated by a doctor or other health professional for any illness or injury	☐ No	☐ Yes	Click here to enter text.
Are you currently receiving any medical treatment or taking any medications. Please detail.	☐ No	☐ Yes	Click here to enter text.
Are you pregnant or breast-feeding, or contemplating pregnancy	☐ No	☐ Yes	Click here to enter text.
Do you currently smoke	☐ No	☐ Yes	Click here to enter text.
Do you practice personal hygiene at work, for example nail biting, frequency of hand washing, eating or smoking, clean shaven, shower and change into clean clothes at end of shift	☐ No	☐ Yes	

Specific health questions (tick all relevant boxes)

Do you have or have you ever had:			**Comments** (all 'yes' answers)
Blurred vision or other vision problems	☐ No	☐ Yes	Click here to enter text.
Itchy eyes, runny or congested nose	☐ No	☐ Yes	Click here to enter text.
Wheezing, bronchitis or asthma now or in the past	☐ No	☐ Yes	Click here to enter text.
Any other lung or respiratory conditions (emphysema, pneumonia or sinusitis)	☐ No	☐ Yes	Click here to enter text.
Liver disease (including alcohol related or other hepatitis)	☐ No	☐ Yes	Click here to enter text.
Anaemia or other blood disorders	☐ No	☐ Yes	Click here to enter text.
Chronic fatigue or tiredness	☐ No	☐ Yes	Click here to enter text.

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Do you have or have you ever had:			**Comments** (all 'yes' answers)
Significant weight loss	☐ No	☐ Yes	Click here to enter text.
Any neurological condition affecting nerves in your feet or hands, your coordination or balance	☐ No	☐ Yes	Click here to enter text.
Dizziness, slurred speech	☐ No	☐ Yes	Click here to enter text.
Skin disorders or dermatitis	☐ No	☐ Yes	Click here to enter text.
Any form of cancer	☐ No	☐ Yes	Click here to enter text.
Any other significant health conditions	☐ No	☐ Yes	Click here to enter text.

General health assessment (if applicable)

Height: Click here to enter text. cm **Weight:** Click here to enter text. kg

BP: Click here to enter text. / Click here to enter text. mmHg

Urinalysis

Blood: ☐ Normal ☐ Abnormal

Protein: Click here to enter text.

Sugar: Click here to enter text.

Referred for further testing

☐ No ☐ Yes

Cardiovascular system			**Medical comments** (for all yes/abnormal)
Blood pressure	☐ Normal	☐ Abnormal	Click here to enter text.
Heart rate	☐ Normal	☐ Abnormal	Click here to enter text.
Heart sounds	☐ Normal	☐ Abnormal	Click here to enter text.
Murmurs present	☐ No	☐ Yes	Click here to enter text.
Evidence of cardiac failure/oedema	☐ No	☐ Yes	Click here to enter text.
Respiratory system			
Breathing normal and regular in character	☐ Yes	☐ No	Click here to enter text.
Auscultation normal	☐ Yes	☐ No	Click here to enter text.
Signs of past/present respiratory disease	☐ No	☐ Yes	Click here to enter text.
Skin			
Eczema, dermatitis or allergy	☐ No	☐ Yes	Click here to enter text.
Skin cancer or other abnormality	☐ No	☐ Yes	Click here to enter text.
Evidence of nail biting	☐ No	☐ Yes	Click here to enter text.
Other	☐ No	☐ Yes	Click here to enter text.

This form contains confidential information and must not be disclosed to another person except in accordance with the Work Health and Safety Regulations or with consent of the worker

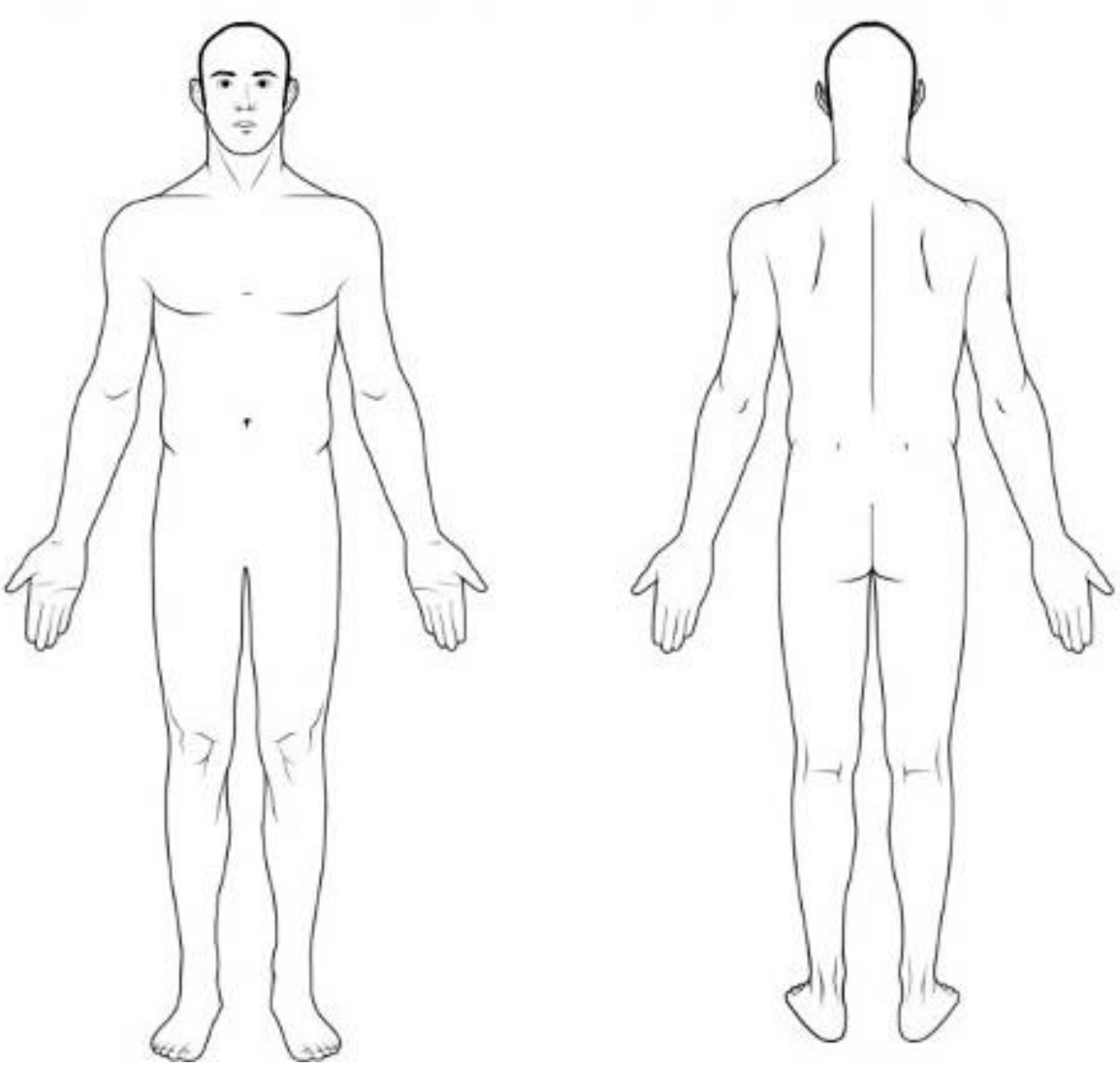

Figure 1 Template of the human body to indicate the location of abnormalities

Eye			**Medical comments** (for all abnormal)
Evidence of eye irritation	☐ No	☐ Yes	Click here to enter text.

Biological monitoring results

Include/attach at least the previous two test results (if available)

Date	**Tests performed**	**Recommended action or comment**
Click here to enter a date.	Click here to enter text.	Click here to enter text.
Click here to enter a date.	Click here to enter text.	Click here to enter text.
Click here to enter a date.	Click here to enter text.	Click here to enter text.
Click here to enter a date.	Click here to enter text.	Click here to enter text.

Other medical history, family medical history, current medication, comments, tests or recommendations (use separate sheet if necessary)

Click here to enter text.

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Registered medical practitioner (responsible for supervising health monitoring)

Name: Click here to enter text.

Signature:

Date: Click here to enter a date.

Tel: Click here to enter text. **Fax:** Click here to enter text.

Registration Number: Click here to enter text.

Medical Practice: Click here to enter text.

Address: Click here to enter text.

Suburb: Click here to enter text. **Postcode:** Click here to enter text.