

# Health monitoring

*Guide for chromium (inorganic)*



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# 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.

## Chromium (inorganic)

Chromium (CAS 7440-47-3) is a steel-grey metal that exists in a number of oxidation states, including

- the free metal
- trivalent chromium compounds (Cr[III]), and
- hexavalent chromium compounds (Cr[VI]).

The solubility of Cr(VI) compounds varies widely from very water soluble to insoluble. The water soluble compounds include chromic acid, chromium trioxide and the monochromates and dichromates of sodium, potassium, ammonium, lithium, caesium and rubidium.

### Work activities that may represent a high risk exposure

Under the Work Health and Safety (WHS) Regulations, chromium and its compounds are listed as a restricted hazardous chemical and must not be used for abrasive blasting at concentrations greater than 0.5 per cent without authorisation from a relevant WHS regulator. Chromate is also listed as a restricted hazardous chemical and must not be used for wet abrasive blasting without authorisation from a relevant WHS regulator.

Cr(VI) is the most common form found in the workplace. Elemental chromium and Cr(III) compounds may also be found but to a lesser extent. Cr(III) and Cr(VI) compounds have very different toxicity profiles with Cr(III) less toxic than Cr(VI).

Examples of work activities involving chromium compounds that may require special attention include:

- welding, cutting and hard-facing of stainless steel
- manual metal arc welding of high chromium steels
- chrome plating
- refractory production
- addition of cement to gravel and sand to make concrete
- leather tanning
- timber preservation using, for example, copper chrome arsenic
- chromate use in the textile industry, and
- chrome pigment use, for example in paints.

### Sources of non-occupational exposure

Cr(III) is a naturally-occurring element found in rocks, plants and soil. Chromium is an essential nutrient and foods high in chromium include green beans, broccoli and high bran breakfast cereals. In urban areas, chromium is in the air from fossil fuel combustion. All of these sources could contribute to urinary chromium levels. Smoking also increases urinary chromium levels.

## 1. Health monitoring for chromium under the WHS Regulations

Collection of demographic, medical and occupational history

Physical examination with emphasis on the respiratory system and skin

Weekly skin inspection of hands and forearms by a competent person

Urinary chromium

Cr(VI) compounds are more toxicologically potent than Cr(III) or metallic chromium. Generally, health monitoring methods are designed to protect for serious adverse effects

from Cr(VI) and should also be protective for adverse effects from Cr(III) or metallic chromium.

In this guide, 'chromium' is used to refer to chromium, Cr(VI) and Cr(III), with specific information provided where data is available.

## Health monitoring before starting work in an inorganic chromium process

Health monitoring for chromium 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 chromium
- 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.

An initial physical examination should place emphasis on the respiratory system and skin if work and medical history indicates this is necessary, for example through the presence of symptoms.

Chromium compounds may be skin or respiratory sensitisers and previous work history with the chemical and symptoms of sensitisation should be investigated. In particular, the worker should be advised that the development of skin abnormalities and any respiratory symptoms should be reported to the registered medical practitioner even if they occur between regular monitoring. It is recommended that baseline skin examinations and spirometry be carried prior to starting work where exposure to chromium compounds may occur.

## During exposure to an inorganic chromium process

### 2. Monitoring exposure to chromium

Where workers are exposed, suspected of being exposed or are concerned about exposure to chromium compounds, 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 any chromium compounds resulting in excessive exposure to workers or when workers develop symptoms of chromium exposure.

The primary route of occupational exposure to chromium compounds is the inhalational route. The extent of inhalational absorption is dependent on the particle size and solubility of the compound. In general, absorption is higher for soluble chromium compounds compared with insoluble compounds and higher for soluble Cr(VI) compounds than soluble Cr(III) compounds due in part to differences in the capacity to penetrate biological membranes. Cr(VI) in soluble compounds in the form of fumes, vapours or mists are readily absorbed by inhalation.

Dermal absorption of Cr(III) and Cr(VI) has also been reported for some compounds. The estimated oral absorption is much lower: less than or equal to 10 per cent for Cr(VI) and less than or equal to 2 per cent for Cr(III).

Following absorption by any route, Cr(VI) is reduced to Cr(III) by a variety of agents. The primary route of excretion is via the urine as Cr(III) for absorbed Cr(III) compounds or both Cr(III) and Cr(VI) for absorbed Cr(VI) compounds. The urinary excretion profile of chromium is triphasic with half-lives of seven hours, 15–30 days and 3–5 years. Cr(VI)

appears to be eliminated at a slower rate than Cr(III). Delayed excretion occurs due to sequestration of chromium in various tissues. The relationship between chromium in air samples and chromium in urine is well-established.

The following test should be used to assess the worker's level of exposure to chromium:

- end of shift urinary chromium level.

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

### **Biological exposure standard for inorganic chromium<sup>1</sup>**

*Urinary chromium:*

10 µmol/mol creatinine (5 µg/L)

Total chromium in urine reflects a combination of environmental and dietary exposure and occupational exposure to Cr(III) and Cr(VI).

During a workday with continuous chromium exposure, urinary levels of chromium rise and then start declining following exposure. The elimination of chromium is not complete overnight. Therefore, both pre-shift and post-shift levels of urinary chromium increase during the working week. Urine samples should be collected at the end of shift at the end of the working week. The value above can be compared with end of week urinalysis data.

Care should be taken during sample collection to avoid contamination from air and exposed skin and clothing. Samples should be collected after the worker showers and changes clothes.

A comparison of post-shift and pre-shift urinary chromium levels would provide a better indication of daily exposure, while urinary chromium levels at the end of shift at the end of week represents past exposure and exposure during the past few days. Nonetheless, regardless of the source of exposure urinary chromium levels should not exceed 10 µmol/mol creatinine (5 µg/L) in an exposed worker.

Urinary chromium levels in non-occupationally exposed individuals have been reported to be generally less than 1 µg/L. This level can vary between individuals, depending on smoking status and intake from the diet. Urinary chromium levels can increase during pregnancy.

Urinary chromium levels may not be predictive for local irritant effects on the respiratory tract and skin. Therefore, routine health monitoring should include assessments for skin changes or respiratory effects.

The registered medical practitioner should work with the PCBU to ensure worker's exposed skin is inspected weekly by a competent person. Particular attention should be placed on the skin of the hands and forearms. Where skin abnormalities occur, the PCBU should arrange for the worker to see the registered medical practitioner.

Any persistent respiratory symptoms exhibited by the worker should be reported to the registered medical practitioner supervising health monitoring, even if they occur between scheduled appointments. As occupational asthma is a potential outcome for inhalational exposure to chromium, spirometry should be performed.

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<sup>1</sup> See [Chemical analysis branch handbook, 9th Edition, Workplace and biological monitoring exposure analysis, WorkCover NSW \(PDF 3.39MB\)](#) for more details

### Other health monitoring methods

Monitoring chromium in urine is the most widely used biological exposure monitoring method for this element. However, the following method has also been considered:

- blood erythrocyte levels of chromium.

While Cr(VI) can pass through the erythrocyte membrane, Cr(III) cannot. Therefore, total chromium in erythrocytes is assumed to be reflective of Cr(VI) levels in blood and would be more specific for monitoring occupational exposure to Cr(VI) than urinary chromium levels. This test would be suitable as a confirmatory test for Cr(VI) exposure.

However, chromium concentrations are generally low, making reliable analyses difficult and there is insufficient validated information to support the use of this method as a quantitative indicator of Cr(VI) exposure. No biological exposure guidance values have been published for this method.

### Workplace exposure standard

The workplace exposure standard for chromium compounds are:

**Table 1** Workplace exposure standards for various cobalt compounds

Chromium compound	Eight hour time weighted average (TWA; mg/m <sup>3</sup> )
Chromium (II) compounds (as Cr)	0.5
Chromium (III) compounds (as Cr)	0.5
Chromium (metal)	0.5
Chromium (VI) compounds (as Cr), certain water insoluble	0.05
Chromium (VI) compounds (as Cr), water soluble	0.05

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).

**NOTE:** Chromium compounds are readily absorbed through the skin and air monitoring results may not be a true indication of exposure.

### Removal from work

Where a medical examination indicates the worker is displaying symptoms of exposure to chromium or where results of biological monitoring indicate exposure that may cause adverse health effects (that is, a urinary chromium level greater than 10 µmol/mol creatinine), the registered medical practitioner should consider recommending the worker be removed from chromium-related work.

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

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

As smoking, diet and previous work history may significantly contribute to urinary chromium levels, it may be difficult to attribute the source of chromium exposure in certain workers solely to workplace exposure. In these circumstances, the above recommendations should still be made. Examination of air monitoring results would be

included in the review of control measures, and may help ascertain the contribution of the workplace to overall chromium exposure.

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

### **Return to work**

Should a worker be removed from chromium-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 chromium-related work.

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

## **At termination of work in an inorganic chromium process**

### **3. Final medical examination**

A urine sample should be collected on the last day of the worker's final shift, and a final medical examination should be carried out at the same time or as soon as possible thereafter. Emphasis should be placed on the skin and respiratory system and any other organs or systems that were indicated during the health monitoring program.

Workers with health conditions or continuing symptoms due to chromium 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 inorganic chromium**

### **4. Route of occupational exposure**

Work-related exposure generally occurs through inhalation and via skin contact.

Accidental ingestion may be possible.



## 5. Target organ/effect

The target organs and potential effects of chromium exposure include:

**Table 2** Target organs and potential effects of chromium exposure

Target organ	Effect
<b>Skin and mucous membranes</b>	<ul style="list-style-type: none"> <li>• Sensitisation and allergic contact dermatitis</li> <li>• Skin and mucous ulcerations</li> <li>• Perforation of nasal septum</li> </ul>
<b>Respiratory system</b>	<ul style="list-style-type: none"> <li>• Irritation</li> <li>• Allergic asthma</li> <li>• COPD</li> <li>• Lung cancer</li> </ul>
<b>Gastrointestinal</b>	<ul style="list-style-type: none"> <li>• Abdominal pain</li> <li>• Duodenal ulcers</li> <li>• Gastritis</li> <li>• Stomach cramps</li> </ul>
<b>Kidney</b>	<ul style="list-style-type: none"> <li>• Renal tubule damage</li> </ul>
<b>Liver</b>	<ul style="list-style-type: none"> <li>• Hepatic necrosis</li> </ul>

## 6. Acute effects

### Irritant and corrosive effects

Some chromium (VI) (aerosols, dusts, liquid) irritates or even corrodes the skin and the mucous membranes of the eyes and respiratory tract.

#### *Chrome ulcers (chrome 'holes')*

Skin ulcers (chrome holes or ulcers) have been reported in workers exposed to Cr(VI) compounds. Chrome ulcers are deep, round holes, clearly marked, usually at the base of the nails, the finger joints, the skin between the fingers, the back of the hand and the forearm (may also appear at other sites). The lesions are only slightly painful, tend to be clean but they take a long time to heal and scars are left.

#### *Perforation of the nasal septum*

Inhalation of Cr(VI) (predominantly chromic acid) may cause painless ulceration of the nasal cavity, accompanied by a nasal discharge.

### Allergic dermatitis

Allergic contact dermatitis from chromium exposure is well known in printers, cement workers, metal workers, painters, textile workers and leather tanners. Chromate sensitivity, once induced, may prove difficult to deal with in multiple settings and is very persistent once developed.

### Respiratory effects

Inhaled chromium compounds can be respiratory tract irritants resulting in airway irritation and airway obstruction. Respiratory sensitisation may develop. This results in generalised bronchospasm and typical asthmatic attacks occurring with subsequent low exposure levels to dusts, aerosols or welding fumes. Effects occur at much lower concentrations for Cr(VI) compared to Cr(III).

Intense exposure to chromic acid particulates or chromate dust may give rise to pulmonary oedema. Shortness of breath, coughing or wheezing may occur.

### **Hepatic effects**

Acute Cr(VI) exposures can result in hepatic necrosis.

## **7. Chronic effects**

### **Chronic obstructive pulmonary disease**

Prolonged inhalation of Cr(VI) particulates can cause chronic respiratory irritation with hyperaemia, chronic inflammation of the lung, chronic bronchitis, bronchopneumonia, and emphysema. The effect on respiratory function could be a reduction in FEV<sub>1</sub> and maximal expiratory flow. There is a possibility of complication in the form of an infection. This effect can be separate to the development of asthma.

### **Lung cancer and other cancers**

Cr(VI) compounds are known to or presumed to cause cancer in human subjects. In workers, inhalation of Cr(VI) has been shown to cause lung cancer. There is no epidemiological evidence to suggest exposure to Cr(III) or metallic chromium increases the risk of lung cancer.

### **Gastrointestinal effects**

Abdominal pain, duodenal ulcers (possibly following irritation of the gastric mucosa), gastritis, stomach cramps and frequent indigestion have been reported in workers exposed to Cr(VI) fumes.

### **Nephrotoxicity**

Increased levels of biomarkers of renal tubular damage (retinol binding protein,  $\beta_2$ -microglobulin and N-acetyl- $\beta$ -D-glucosaminidase activity) have been reported in the urine of workers chronically exposed to Cr(VI) compounds.

Occupational exposure to Cr(III) or metallic chromium does not appear to be associated with adverse renal effects.

### **Hepatotoxicity**

Data indicate chronic exposure to Cr(VI) compounds can cause hepatic effects:

- hepatic necrosis, and
- increased numbers of Kupffer cells.

## **8. Carcinogenicity**

Most Cr(VI) compounds have been classified as either Category 1A or Category 1B carcinogens according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as they have been shown or are presumed to cause cancer in humans.

There is considerable epidemiological evidence exposures to Cr(VI) compounds in chromate production, chromium plating and zinc chromate pigment manufacture have led to a clear excess in mortality from lung cancer.

Cases of sinonasal cancer have been reported in epidemiological studies involving workers engaged in chromate production, chromate pigment production and chromium plating.

For further information on specific chromium compounds, refer to Safe Work Australia's Hazardous Chemical Information System or the relevant safety data sheet.

## 9. GHS classification

Different chromium compounds may have different health hazard classifications. The specific chromium compound to which a worker is exposed will need to be reviewed to ensure appropriate identification of the health hazards. For the GHS classification of a specific chromium compound, refer to Safe Work Australia's Hazardous Chemical Information System or the relevant safety data sheet for detailed information.

### Source documents

Agency for Toxic Substances and Disease Registry (2000) *Toxicological Profile for Chromium*, Agency for Toxic Substances and Disease Registry, United States Department of Health and Human Services, Public Health Service, Atlanta.

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

Baruthio, F. (1992) Toxic Effects of Chromium and its Compounds. *Biological Trace Element Research* 32: 145-53.

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

Norseth, T (1986) The Carcinogenicity of Chromium and its Salts—editorial', *British Journal of Industrial Medicine* 43: 649-51.

Rosenman K.D. and Stanbury M (1996) Risk of Lung Cancer Among Former Chromium Smelter Workers. *American Journal of Industrial Medicine* 29(5): 491-500.

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

Safe Work Australia; [Hazardous Chemicals Information System](#).



# Health monitoring report

*Chromium (inorganic)*

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 – Chromium (inorganic)

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**  
(include a separate section for each PCBU)

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

**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.

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

**Type of chromium:**

- Cr(III); trivalent       Cr(VI); hexavalent       Other (specify): [Click here to enter text.](#)
- New to chromium work
- New worker but not new to chromium work
- Current worker continuing in chromium work

**Worked with chromium 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.](#)

**Chromium industry/use**

- Welding/Fabrication       Chrome plating
- Hard facing       Refractory production
- Concreting       Leather industry
- Timber preservation       Textile industry
- Chrome pigment manufacture or use (e.g. in paints)
- Other (specify): [Click here to enter text.](#)

**Other chemicals the worker may be exposed to:** [Click here to enter text.](#)

**Controls**

Wear gloves	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Respirator use	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Respirator type	<a href="#">Click here to enter text.</a>	
Local exhaust ventilation	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Overalls/work clothing	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Laundering by employer	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Wash basins and showers (with hot and cold water)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Other please specify		

**Health monitoring results**

**Biological monitoring results**

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

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

Date	Tests performed	Recommended action or comment
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	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 chromium (inorganic)
- Review workplace controls
- The worker should be removed from work with chromium (inorganic). 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.

**Type of chromium:**

Cr(III); trivalent

Cr(VI);  
hexavalent

Other (specify): Click here to enter text.

### Past employment/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)**

Welding, cutting and hard-facing  
of stainless steel

No

Yes

Click here to enter text.

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			Comments (all 'yes' answers)
Manual metal arc welding of high chromium steels	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Chrome plating	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Refractory production	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Addition of cement to gravel and sand to make concrete	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Leather tanning	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Timber preservation using, for example, copper chrome arsenic	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Chromate use in the textile industry	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Chrome pigment use, for example in paints.	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Other (please specify)	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.

### General health questionnaire (tick all relevant boxes)

Did you suffer any incapacity lasting two weeks or longer in the last two years	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Have you ever had any operations or accidents or been hospitalised for any reason	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Are you currently being treated by a doctor or other health professional for any illness or injury	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Are you currently receiving any medical treatment or taking any medications. Please detail.	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Do you currently smoke	<input type="checkbox"/> No	<input type="checkbox"/> 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	<input type="checkbox"/> No	<input type="checkbox"/> Yes	

### Specific health questions (tick all relevant boxes)

#### Do you have or have you ever had:

Blurred vision or other vision problems	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Itchy eyes, runny or congested nose	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.

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Shortness of breath on exertion	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Wheezing, bronchitis or asthma now or in the past	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Any other lung or respiratory conditions (emphysema, pneumonia or sinusitis)	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Allergies, hay fever, or allergic bronchitis	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Does anyone in your immediate family (blood relatives only) have asthma, hay fever or eczema	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Abnormal breathing sounds at night, snoring or choking in your sleep or sleep apnoea	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Breathing problems, nasal blockage, nose bleeds or lump in nose	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Kidney or bladder disease	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Chronic fatigue or tiredness	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Significant weight loss	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Skin disorders or dermatitis	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Any form of cancer	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.
Any other significant health conditions	<input type="checkbox"/> No	<input type="checkbox"/> Yes	Click here to enter text.

### Respiratory questionnaire (tick all relevant boxes)

	Yes	No	Details
<b>Cough and Phlegm</b>			
1	<input type="checkbox"/>	<input type="checkbox"/>	Do you usually cough first thing in the morning Click here to enter text.
2	<input type="checkbox"/>	<input type="checkbox"/>	Do you usually cough during the day or at night Click here to enter text.
<b>If no go to Q9</b>			
3	<input type="checkbox"/>	<input type="checkbox"/>	Do you cough like this on most days for as much as three months of the year Click here to enter text.
4	<input type="checkbox"/>	<input type="checkbox"/>	Do you usually bring up phlegm from your chest first thing in the morning Click here to enter text.
5	<input type="checkbox"/>	<input type="checkbox"/>	Do you usually bring up phlegm from your chest at any other time of the day or night Click here to enter text.
<b>If no go to Q9</b>			

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		Yes	No	Details
6	Do you bring up phlegm like this on most days for as much as three months each year	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
7	In the past three years have you had a period of increased cough and phlegm lasting for three weeks or more	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
8	If Yes, have you had more than one such period	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
<b>Breathlessness</b>				
9	Do you get short of breath when hurrying on level ground or walking up a slight hill	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
<b>If no go to Q13</b>				
10	Do you get short of breath walking with other people of your own age on level ground	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
11	Do you have to stop for breath when walking at your own pace on level ground	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
12	Have you at any time in the last 12 months been woken at night by an attack of shortness of breath	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
<b>Wheezing and chest tightness</b>				
13	Have you had attacks of wheezing or whistling in your chest at any time in the last 12 months	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
14	Have you ever had attacks of shortness of breath with wheezing	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
15	If Yes, was your breathing absolutely normal between attacks	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
<b>Smoking</b>				
16	Do you or did you smoke more than one cigarette/day; a cigar/week; two oz. pipe tobacco/month)	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
<b>If no proceed to <i>General health assessment</i></b>				
17	Do (did) you inhale smoke	<input type="checkbox"/>	<input type="checkbox"/>	If yes, indicate: <input type="checkbox"/> Slightly <input type="checkbox"/> Moderately <input type="checkbox"/> Deeply

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	Yes	No	Details
18			Click here to enter text.
19	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
<b>If no go to Q24</b>			
20			Click here to enter text.
21			Click here to enter text.
22			Click here to enter text.
23			Click here to enter text.
24	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
<b>If no go to Q27</b>			
25			Click here to enter text.
26	<input type="checkbox"/>	<input type="checkbox"/>	
27	<input type="checkbox"/>	<input type="checkbox"/>	
<b>If no go to Q29</b>			
28			Click here to enter text.
29	<input type="checkbox"/>	<input type="checkbox"/>	
<b>If no go to Q31</b>			
30			Click here to enter text.
31	<input type="checkbox"/>	<input type="checkbox"/>	
32			Click here to enter text.

**Registered medical practitioner to provide comments for any 'Yes' responses (reference Question number):**

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

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## Urinalysis

**Blood:**  Normal  Abnormal

**Protein:** [Click here to enter text.](#)

**Referred for further testing**

**Sugar:** [Click here to enter text.](#)

No  Yes

<b>Cardiovascular system</b>			<b>Medical comments</b> (for all yes/abnormal)
Blood pressure	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal	<a href="#">Click here to enter text.</a>
Heart rate	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal	<a href="#">Click here to enter text.</a>
Heart sounds	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal	<a href="#">Click here to enter text.</a>
Murmurs present	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<a href="#">Click here to enter text.</a>
Evidence of cardiac failure/oedema	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<a href="#">Click here to enter text.</a>
<b>Respiratory system</b>			
Breathing normal and regular in character	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<a href="#">Click here to enter text.</a>
Auscultation normal	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<a href="#">Click here to enter text.</a>
Signs of past/present respiratory disease	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<a href="#">Click here to enter text.</a>

## Spirometry

At least three technically acceptable manoeuvres should be obtained with the highest and second highest FEV<sub>1</sub> and FVC within 0.15 L (within 0.100 L for those with an FVC of equal to or less than 1.0 L)<sup>2</sup>. Use best result for FEV<sub>1</sub> and FVC, even if from different tests.

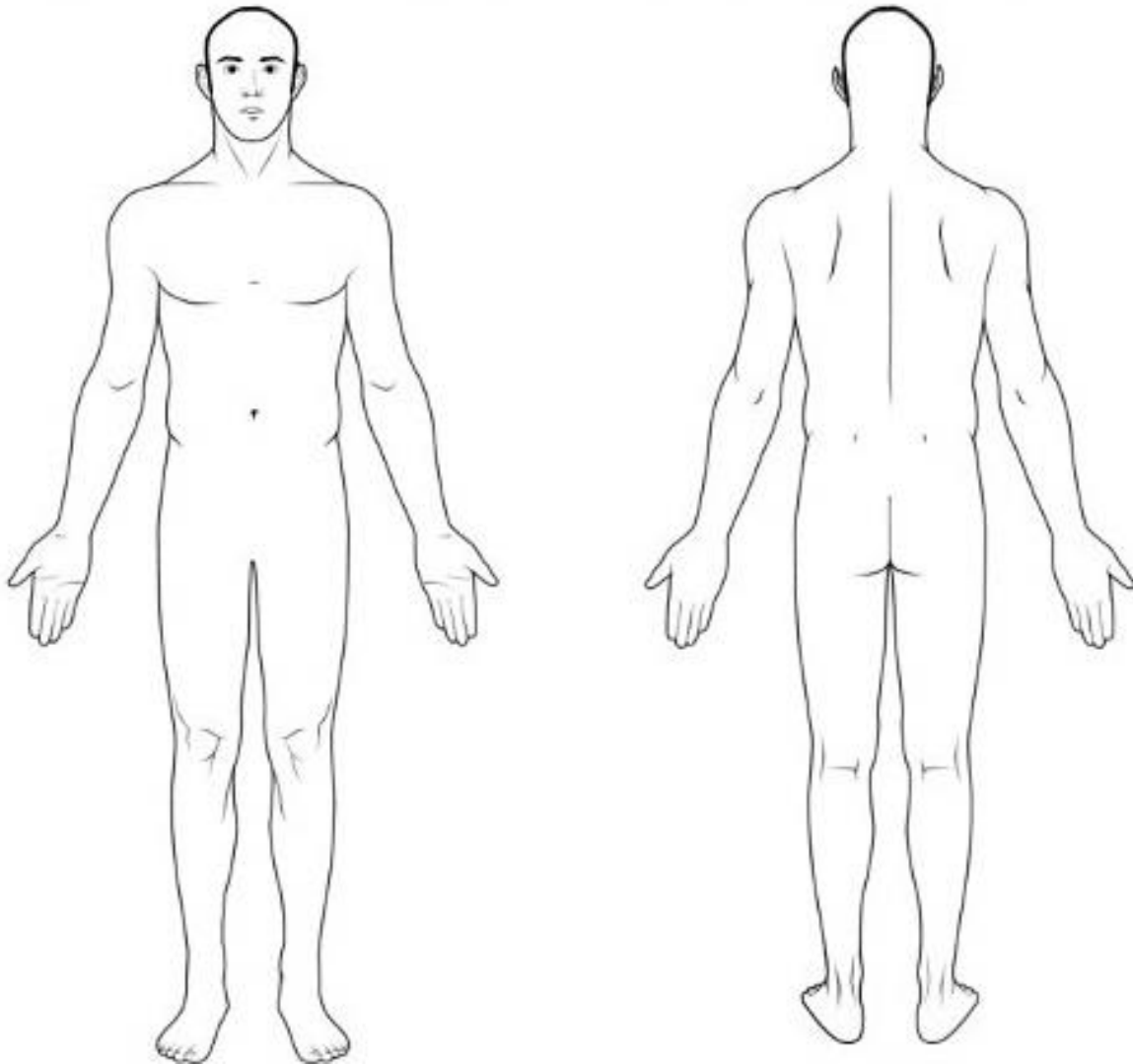
	<b>Actual</b>	<b>Predicted</b>	<b>% Predicted</b>	
<b>FEV<sub>1</sub></b>	<a href="#">Click here to enter text. L/min</a>	<a href="#">Click here to enter text. L/min</a>	<a href="#">Click here to enter text. %</a>	<a href="#">Click here to enter text.</a>
<b>FVC</b>	<a href="#">Click here to enter text. L/min</a>	<a href="#">Click here to enter text. L/min</a>	<a href="#">Click here to enter text. %</a>	<a href="#">Click here to enter text.</a>
<b>FEV<sub>1</sub>/FVC</b>	<a href="#">Click here to enter text. L/min</a>	<a href="#">Click here to enter text. L/min</a>	<a href="#">Click here to enter text. %</a>	<a href="#">Click here to enter text.</a>
		<b>Yes</b>	<b>No</b>	
Spirometry quality acceptable	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">Click here to enter text.</a>
Spirometry normal	<input type="checkbox"/>	<input type="checkbox"/>		<a href="#">Click here to enter text.</a>

<b>Nervous system</b>			<b>Medical comments</b> (for all yes/abnormal)
Muscular tone, co-ordination	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal	<a href="#">Click here to enter text.</a>
Tremor	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<a href="#">Click here to enter text.</a>

<sup>2</sup> Miller MR, Hankinson J, et al, 'Standardisation of spirometry', Series 'ATS/ERS Task Force: Standardisation of Lung Function Testing', Brusasco V, Crapo R, Viegi G (eds), Number 2 in this series, Eur Respir J, vol. 26, pp 319-338, 2005. <http://www.thoracic.org/statements/resources/pfet/PFT2.pdf>.

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Actual	Predicted		% Predicted
<b>Skin</b>			
Eczema, dermatitis or allergy	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<a href="#">Click here to enter text.</a>
Skin cancer or other abnormality	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<a href="#">Click here to enter text.</a>
Evidence of nail biting	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<a href="#">Click here to enter text.</a>
Other	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<a href="#">Click here to enter text.</a>



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

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**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
<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter text.</a>	<a href="#">Click here to enter text.</a>
<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter text.</a>	<a href="#">Click here to enter text.</a>
<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter text.</a>	<a href="#">Click here to enter text.</a>
<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter text.</a>	<a href="#">Click here to enter text.</a>

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

[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.](#)