

CADMIUM

BASELINE HEALTH MONITORING BEFORE STARTING WORK IN A CADMIUM PROCESS

Workers must be informed about the potential health effects associated with exposure to cadmium. This should include counselling on the effect of smoking on cadmium exposure.

1. **Collection of demographic data**
2. **Work history**
3. **Medical history**

Administration of a standardised respiratory questionnaire. Two examples are the International Union Against Tuberculosis' *Bronchial Symptoms Questionnaire 1986* [1] or the Medical Research Council's *Questionnaire on Respiratory Symptoms 1986* [2].

4. **Physical examination**

A physical examination will be conducted, with an emphasis on the respiratory system.

5. **Investigation**

The following tests will be used to test the worker's baseline exposure:

- Standardised respiratory function tests - FEV₁¹, FVC² and FEV₁/FVC³.
(**Note:** the normal ranges for predictive values should be stated.)
- A spot urine for cadmium will be conducted and the results will be corrected for creatinine. Where there is 5 µg or more cadmium per gram of creatinine, repeat urine tests should be performed at the same time of the day.
- A urine β₂-microglobulin test will be conducted and the results will be corrected for creatinine.

Note: There may be abnormal values for some renal markers [3] at thresholds of urinary cadmium between 3 and 5 µg/g of creatinine.

BACKGROUND INFORMATION ON CADMIUM EXPOSURE

The measurement of cadmium in urine estimates chronic exposure. However, it may provide no information on exposure during the first year of exposure. In the workplace, the lungs are the major route of absorption of aerosols, dusts and fumes containing cadmium. The main route of elimination of cadmium is renal. Renal tubular damage from cadmium or renal tubular dysfunction of other aetiologies results in increased renal elimination of cadmium.

■ 1 Forced expiratory volume in one second

■ 2 Forced vital capacity

■ 3 Tiffeneau index

DURING EXPOSURE TO A CADMIUM PROCESS

6. Monitoring exposure to cadmium

COMPARISON OF RESULTS WITH BASELINE LEVEL

Work-related exposure to cadmium can be assessed by monitoring urine. Two methods can be used:

- measurement of cadmium in urine as $\mu\text{g/g}$ of creatinine
- assessment of β_2 -microglobulin as $\mu\text{g/g}$ of creatinine.

A spot urine for cadmium and urine β_2 -microglobulin will be conducted annually and compared against the worker's baseline levels measured at the start of the health monitoring process.

ACTION LEVEL

Where testing results show a level of a level of $3 \mu\text{g}$ cadmium or more per gram of creatinine in urine or more than $200 \mu\text{g}$ β_2 -microglobulin per gram creatinine:

- repeat urine tests should be conducted at the same time of the day to confirm results
- a medical examination should be performed
- the person conducting a business or undertaking must review control measures and carry out recommended remedial action
- the worker must be informed of the results of the health monitoring.

The information on **blood cadmium** is scant compared with that on urinary cadmium. Cadmium concentration in blood reflects recent exposure over months. The action level is $5 \mu\text{g/L}$.

REMOVAL LEVEL

Where results of urine testing indicate a level of cadmium in urine above $5 \mu\text{g}$ per gram of creatinine or the level of β_2 -microglobulin exceeds $1000 \mu\text{g}$ per gram creatinine, the following action should be carried out:

- a medical examination should be performed and the registered medical practitioner should consider whether the worker should be removed from cadmium work
- urine tests should be repeated every six months until the level falls below $3 \mu\text{g}$ cadmium per gram creatinine and β_2 -microglobulin is less than $200 \mu\text{g}$ per gram creatinine
- the person conducting a business or undertaking should review control measures and carry out recommended remedial action
- the worker must be informed of the results of health monitoring.

RETURN TO WORK

The worker must not return to cadmium work until they have been assessed as medically fit to return to work by the medical practitioner supervising the health monitoring.

7. Medical examination

A medical examination should be conducted every two years and will include:

- medical history and counselling on the additional cadmium burden from smoking
- physical examination
- respiratory function tests.

AT TERMINATION OF WORK IN A CADMIUM PROCESS

8. Final medical examination

A final medical examination will be conducted and workers with a history of raised β_2 -microglobulin should be advised to seek continuing medical monitoring.

SUPPLEMENTARY INFORMATION ON CADMIUM

9. Work activities that may represent a high risk exposure

Examples of work activities involving cadmium and its compounds which require special attention include:

- processes like welding, soldering, oxy-cutting and smelting
- welding or oxy-cutting of cadmium alloy and cadmium plate
- the use of cadmium-silver alloys for silver soldering or brazing
- electroplating
- manufacture of cadmium alloys
- extraction of cadmium from mineral ore smelters
- opening containers and weighing out cadmium powders
- charging cadmium powders into process plant
- grinding, discharging and packaging cadmium powders
- working with nickel-cadmium batteries
- manufacture and handling of paints and plastics containing cadmium pigments and the recycling of these plastics
- textile production.

Special attention should be given to acute exposures, including high temperature processes where cadmium fumes are evolved.

10. Non-work sources

The general population may be exposed to cadmium through food like potatoes, grain cereal products and seafood.

The average intake of cadmium for Australian males is 30 μg per day and about 1 μg of cadmium is absorbed.

The use of superphosphate fertiliser has resulted in addition of cadmium to the soil in some agricultural areas. Plants take up and retain cadmium from soil; fish and shellfish take up and retain cadmium from water.

Tobacco, like other plants, takes up cadmium, which is then inhaled in the smoke. Each cigarette contains about 1 to 2 µg cadmium and about 10 per cent of this is absorbed. People in high traffic areas may have elevated levels of cadmium.

POTENTIAL HEALTH EFFECTS FOLLOWING EXPOSURE TO CADMIUM

11. Route of entry into the body

The primary route of entry of cadmium into the body is through inhalation. Respiratory absorption of cadmium fumes ranges from 25 to 50 per cent. Only small cadmium particles are absorbed by the alveoli, and these small particles are typically found in fumes and cigarette smoke. As noted above, about 10 per cent of the cadmium in cigarettes is absorbed during smoking.

There is some risk of ingestion if personal hygiene is inadequate. Gastrointestinal absorption ranges from three to seven per cent, and absorption may be increased in the presence of calcium and iron deficiency. Percutaneous absorption is not significant. Cadmium does not pass through the placenta.

12. Target organ/effect

Kidney – proximal renal tubular dysfunction, proteinuria, renal calculi.

Respiratory tract – irritation, pneumonitis, pulmonary oedema, metal fume fever, chronic obstructive airways disease.

Bones – osteomalacia and osteoporosis secondary to hypercalciuria, hyperphosphaturia and decreased 1-hydroxylation of 25-hydroxy vitamin D in tubular cells.

Stomach – acute gastroenteritis.

Liver – elevation of hepatic enzymes.

13. Acute effects [4]

Acute cadmium poisoning has been reported among workers after exposure to the intensely irritating fume of heated cadmium with symptoms delayed for several hours. Signs include severe tracheobronchitis, pneumonitis, and pulmonary oedema. The mortality rate for the acute pulmonary disease is about 20 per cent. Average airborne concentrations responsible for fatal cases have been estimated at 50 mg/m³ for a period of about one hour. Relatively mild cases resemble metal fume fever.

High ingestion exposure of soluble cadmium salts causes acute gastroenteritis. The amount of cadmium absorbed is probably very limited due to vomiting and the consequential short presence of cadmium in the gastrointestinal tract.

14. Chronic effects

Long-term work-related exposure to cadmium has caused severe chronic effects, predominantly in the lungs and kidneys. Kidney effects are described as tubular dysfunction rather than florid renal disease or renal failure. Renal toxicity may be caused by chronic inhalation or chronic ingestion of cadmium. Commonly, the proximal renal tubules are affected resulting in urinary excretion of low molecular weight proteins like β_2 -microglobulin. Increased excretions are predictive of an acceleration of age-related decline of the glomerular filtration rate. A raised urinary excretion of β_2 -microglobulin is not specific to renal dysfunction induced by cadmium. The differential diagnosis includes renal disorders like diabetic nephropathy or excessive production in some cancers and autoimmune disorders.

The accumulation of cadmium in the renal cortex leads to renal tubular dysfunction. This occurs at levels of exposure much lower than previously thought. Cadmium-induced tubular proteinuria is irreversible, and continued exposure may lead to glomerular damage with decreased glomerular filtration rate. Several studies of both occupationally and environmentally exposed populations have shown cadmium exposure as low as 2-4 nmol/mmol creatinine (approximately equivalent to 2-4 $\mu\text{g/g}$ creatinine) is associated with the occurrence of tubular proteinuria. The Cadmibel study randomly selected 1700 subjects in Belgium and demonstrated a 10 % probability of tubular dysfunction when cadmium excretion exceeded 2-3 μg cadmium/g creatinine.

Increased incidence of calcium containing renal calculi has occurred in work-related exposed groups. Overt bone disease, like osteomalacia and osteoporosis, is related to hypercalciuria and hyperphosphaturia. Decreased 1-hydroxylation of 25-hydroxy vitamin D in tubular cells has been recorded particularly in post-menopausal women deficient in calcium (Itai-Itai disease).

Lung changes are primarily characterised by chronic obstructive airway disease. Early minor changes in ventilatory function tests may progress with continued cadmium exposure to respiratory insufficiency.

The anaemia observed in association with cadmium exposure has been a mild reversible depression of haemoglobin.

15. Carcinogenicity

Genotoxic effects have been observed in animals exposed to cadmium chloride *in vivo* and in human cells exposed *in vitro* to cadmium chloride or cadmium sulfide [5]. There are reports [5] of increased chromosomal aberrations occurring in peripheral blood lymphocytes of workers exposed to cadmium in the metal industry. However, some of these workers also had concomitant exposure to other metals like zinc, copper and lead.

Results of studies [5] conducted in the United Kingdom, United States and Sweden on the incidence of lung cancer in cadmium-exposed workers provide consistent evidence long-term work-related exposure to cadmium may contribute to the development of lung cancer. However, in some of these studies observations from exposed workers have been difficult to interpret because of confounding factors.

A number of early studies (pre 1965) reported an increased risk for prostatic cancer among workers employed in a plant manufacturing cadmium-nickel batteries in the United Kingdom. However, results of other studies, including a later study in the same plant, a similar plant in Sweden and a United States population-based case-control study on prostate cancer, do not support the suggestion from earlier studies of a causal relationship [5].

16. Carcinogen, germ cell mutagen and reproductive toxicant classifications⁴

The following are some cadmium-containing chemicals with GHS carcinogenicity, germ cell mutagenicity and reproductive toxicity classifications:

- Cadmium (non-pyrophoric) and cadmium oxide (non-pyrophoric): Carc. 1B, Muta. 2, Repr. 2
- Cadmium (pyrophoric): Carc. 1B, Muta. 2, Repr. 2
- Cadmium chloride: Carc. 1B, Muta. 1B, Repr. 1B
- Cadmium fluoride: Carc. 1B, Muta. 1B, Repr. 1B
- Cadmium sulphate: Carc. 1B, Muta. 1B, Repr. 1B
- Cadmium sulphide: Carc. 1B, Muta. 2, Repr. 2
- Cadmium cyanide: Carc. 2
- Cadmium fluorosilica (cadmium hexafluorosilicate(2-)): Carc. 2
- Cadmium formate (cadmium diformate): Carc. 2
- Cadmium iodide: Carc. 2.

KEY

Abbreviation	Meaning	Hazard statement
Carc. 1B	Carcinogenicity Category 1B	May cause cancer
Carc. 2	Carcinogenicity Category 2	Suspected of causing cancer
Muta. 1B	Germ Cell Mutagenicity Category 1B	May cause genetic defects
Muta. 2	Germ Cell Mutagenicity Category 2	Suspected of causing genetic defects
Repr. 1B	Reproductive Toxicity Category 1B	May damage fertility, may damage the unborn child
Repr. 2	Reproductive Toxicity Category 2	Suspected of damaging fertility, suspected of damaging the unborn child

The International Agency for Research on Cancer [5] classification for cadmium and cadmium compounds is Group 1; carcinogenic to humans. According to the International Agency for Research on Cancer this category is used only when there is sufficient evidence of carcinogenicity in humans.

-
- 4 This classification information is provided on an advisory basis and is taken from the European Union's Annex VI to Regulation (EC) No 1272/2008, updated by the 1st Adaption to Technical Progress to the Regulation. Other hazard classes and categories may apply - see <http://esis.jrc.ec.europa.eu/index.php?PGM=cla>. These classifications are legally binding within the European Union.

REFERENCED DOCUMENTS

1. Respiratory Disease Committee of the International Union Against Tuberculosis, *IUAT Bronchial Symptoms Questionnaire*, International Union Against Tuberculosis, 1986.
2. Medical Research Council Committee on Research into Chronic Bronchitis, *MRC Questionnaire on Respiratory Symptoms*, Medical Research Council, 1986.
3. Lauwerys RR, Hoet P, *Industrial Chemical Exposure Guidelines for Biological Monitoring*, 3rd Ed, Lewis Publishers, Boca Raton, 2001.
4. International Programme on Chemical Safety, *Environmental Health Criteria 134: Cadmium*, International Programme on Chemical Safety, World Health Organization, Geneva, 1992.
5. International Agency for Research on Cancer, *IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Volume 58: Beryllium, Cadmium, Mercury and Exposures in the Glass Manufacturing Industry*, International Agency for Research on Cancer, Lyon, 1993.

FURTHER READING

- Agency for Toxic Substances and Disease Registry, *Case Studies in Environmental Medicine: Cadmium Toxicity*, Agency for Toxic Substances and Disease Registry, United States Department of Health and Human Services, Public Health Service, Atlanta, 2008.
- Buchet JP, Lauwerys R, Roels H, Bernard A, Bruaux P, Claeys F, Ducoffre G, De Plaen P, Staessen J, Amery A, Lijnen P, Thijs L, Rondia D, Sartor F, Saint Remy A, Nick L, 'Renal effects of cadmium body burden of the general population', *Lancet*, vol 336, pp 699-702, 1990.
- Health and Safety Executive (United Kingdom), *Cadmium: Health and Safety Precautions*, Guidance Note EH 1, Health and Safety Executive, London, 1995.
- Jarup L, 'Cadmium overload and toxicity', *Nephrology Dialysis Transplantation*, vol 17 (supplement 2), pp 35-39, 2002.

HEALTH MONITORING REPORT CADMIUM

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 if applicable.

Section 1 is to be forwarded to the PCBU who has engaged your services. A copy of laboratory report(s) must be attached > > >

Section 2 may contain confidential information which may not be relevant to the health monitoring program being carried out. This section should be retained by the medical practitioner. Information which is required to be given to the PCBU should be summarised in part 7 of section 1.

SECTION 1 - THIS SECTION TO BE RETURNED TO THE PCBU			
1. PERSON CONDUCTING A BUSINESS OR UNDERTAKING			
Company / Organisation name:			
Site address:			
Suburb:		Postcode:	
Site Tel:	Site Fax:	Contact Name:	
2. OTHER BUSINESSES OR UNDERTAKINGS ENGAGING THE WORKER			
Company / Organisation name:			
Site address:			
Suburb:		Postcode:	
Site Tel:	Site Fax:	Contact Name:	
3. WORKER (✓) all relevant boxes			
Surname:		Given names:	
Date of birth: DD/MM/YYYY		Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female	
Address:			
Suburb:		Postcode:	
Current Job:		Tel(H):	Mob:
Date started employment : DD/MM/YYYY			
4. EMPLOYMENT IN CADMIUM RISK WORK (✓) all relevant boxes			
1. <input type="checkbox"/> New to cadmium work			
2. <input type="checkbox"/> New worker but not new to cadmium work			
3. <input type="checkbox"/> Current worker continuing in cadmium work			
4. Worked with cadmium since DD/MM/YYYY			
5. Satisfactory personal hygiene (for example nail biting, frequency of hand washing)		<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. Risk assessment completed		<input type="checkbox"/> Yes	<input type="checkbox"/> No

HEALTH MONITORING REPORT CADMIUM

5. WORK ENVIRONMENT ASSESSMENT		(✓) all relevant boxes																											
Date of assessment: DD/MM/YYYY																													
Cadmium Industry	<input type="checkbox"/> Smoker <input type="checkbox"/> Ex-smoker <input type="checkbox"/> Non-smoker																												
<input type="checkbox"/> Welding/Fabrication <input type="checkbox"/> Electroplating <input type="checkbox"/> Cadmium Manufacture/ Extraction <input type="checkbox"/> Battery Construction/ Disposal <input type="checkbox"/> Plastics/Paints <input type="checkbox"/> Textile Industry <input type="checkbox"/> Other (specify):	Controls: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Wear gloves</td> <td style="width: 25%;"><input type="checkbox"/> Yes</td> <td style="width: 25%;"><input type="checkbox"/> No</td> </tr> <tr> <td>Respirator use</td> <td><input type="checkbox"/> Yes</td> <td><input type="checkbox"/> No</td> </tr> <tr> <td>Local exhaust ventilation</td> <td><input type="checkbox"/> Yes</td> <td><input type="checkbox"/> No</td> </tr> <tr> <td>Overalls / work clothing</td> <td><input type="checkbox"/> Yes</td> <td><input type="checkbox"/> No</td> </tr> <tr> <td>Laundering by employer</td> <td><input type="checkbox"/> Yes</td> <td><input type="checkbox"/> No</td> </tr> <tr> <td>Wash basins & showers (with hot & cold water)</td> <td><input type="checkbox"/> Yes</td> <td><input type="checkbox"/> No</td> </tr> <tr> <td>Smoking or eating in workshop</td> <td><input type="checkbox"/> Yes</td> <td><input type="checkbox"/> No</td> </tr> </table> Personal hygiene: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Clean Shaven</td> <td style="width: 25%;"><input type="checkbox"/> Yes</td> <td style="width: 25%;"><input type="checkbox"/> No</td> </tr> <tr> <td>Shower & change into clean clothes at end of shift</td> <td><input type="checkbox"/> Yes</td> <td><input type="checkbox"/> No</td> </tr> </table>		Wear gloves	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Respirator use	<input type="checkbox"/> Yes	<input type="checkbox"/> No	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 & showers (with hot & cold water)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Smoking or eating in workshop	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Clean Shaven	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Shower & change into clean clothes at end of shift	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Wear gloves	<input type="checkbox"/> Yes	<input type="checkbox"/> No																											
Respirator use	<input type="checkbox"/> Yes	<input type="checkbox"/> No																											
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 & showers (with hot & cold water)	<input type="checkbox"/> Yes	<input type="checkbox"/> No																											
Smoking or eating in workshop	<input type="checkbox"/> Yes	<input type="checkbox"/> No																											
Clean Shaven	<input type="checkbox"/> Yes	<input type="checkbox"/> No																											
Shower & change into clean clothes at end of shift	<input type="checkbox"/> Yes	<input type="checkbox"/> No																											
6. BIOLOGICAL MONITORING RESULTS Include at least the previous two test results (if available)																													
Date	Tests performed	Recommended Action and/or Comment																											
1. DD/MM/YYYY	Respiratory function test	FEV ₁ _____ ; FVC_____ ; FEV ₁ /FVC_____																											
2. DD/MM/YYYY																													
3. DD/MM/YYYY																													
4. DD/MM/YYYY																													
5. DD/MM/YYYY																													
6. DD/MM/YYYY																													
7. DD/MM/YYYY																													
8. DD/MM/YYYY																													

HEALTH MONITORING REPORT CADMIUM

7. RECOMMENDATIONS (by Medical Practitioner)		(✓) all relevant boxes
1. <input type="checkbox"/> Suitable for work with cadmium		
2. <input type="checkbox"/> Counselling required		
3. <input type="checkbox"/> Review workplace controls		
4. <input type="checkbox"/> Repeat health assessment in _____ month(s) / _____ week(s)		
5. <input type="checkbox"/> Removal from work with cadmium	On DD/MM/YYYY	
6. <input type="checkbox"/> Medical examination by Medical Practitioner	On DD/MM/YYYY	
7. <input type="checkbox"/> Fit to resume work	From DD/MM/YYYY	
8. <input type="checkbox"/> Referred to Medical Specialist (respiratory/ dermatology/other):	On DD/MM/YYYY	
Specialist's name:		
Additional comments or recommendations arising from health monitoring:		
Medical Practitioner (responsible for supervising health monitoring)		
Name:	Signature	Date: DD/MM/YYYY
Tel:	Fax:	Registration Number:
Medical Practice:		
Address:		
Suburb:	Postcode:	

SECTION 2 - THIS SECTION TO BE RETAINED BY THE MEDICAL PRACTITIONER			
This questionnaire also allows for recordings of a more general health assessment at the end, if applicable.			
1. PERSON CONDUCTING A BUSINESS OR UNDERTAKING			
Company / Organisation name:			
Site address:			
Suburb:			Postcode:
Site Tel:	Site Fax:	Contact Name:	
2. OTHER BUSINESSES OR UNDERTAKINGS ENGAGING THE WORKER			
Company / Organisation name:			
Site address:			
Suburb:			Postcode:
Site Tel:	Site Fax:	Contact Name:	
3. WORKER (✓) all relevant boxes			
Surname:		Given names:	
Date of birth: DD/MM/YYYY	Sex:	<input type="checkbox"/> Male	<input type="checkbox"/> Female
Address:			
Suburb:			Postcode:
Current Job:	Tel(H):	Mob:	
Date started employment : DD/MM/YYYY			

This questionnaire is based on the MRC (UK) Respiratory Questionnaire 1986, which has been extensively validated. This questionnaire is intended to be completed by an interviewer rather than by the patient. Additional questions have been added to cover clinical aspects of bronchial hyper-responsiveness validated by the Department of Occupational and Environmental Medicine, National Lung Institute¹.

The British Occupational Health Research Foundation (BOHRF)² concluded that in the clinical setting, questionnaires that identify symptoms of wheeze and/or shortness of breath which improve on days away from work or on holidays have a high sensitivity, but relatively low specificity for occupational asthma.

Preamble

I am going to ask some questions, mainly about your chest. I would like you to answer **yes** or **no** whenever possible.

If the subject is disabled from walking from any condition other than heart and lung disease, please begin questionnaire at **Question 5** and mark the adjacent box.

■ 1 Venables KM, Farrer N, Sharp L, Graneek BJ, Newman Taylor AJ, 'Respiratory Symptoms Questionnaire for Asthma Epidemiology: Validity and Reproducibility', *Thorax*, vol 48, pp 214-219, 1993.

■ 2 The British Occupational Health Research Foundation (BOHRF), *Guidelines for Prevention, Identification and Management of Occupational Asthma: Evidence Review and Recommendations*, London 2004. www.bohrf.org.uk

4. BREATHLESSNESS AND WHEEZING		
During the last month:		
1. Are you troubled by shortness of breath when hurrying on level ground or walking up a slight hill?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. If Yes to 1 - Do you get short of breath walking with other people of your age on level ground?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. If Yes to 2 - Do you have to stop for breath when walking at your own pace on level ground?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. If you run, or climb stairs fast do you ever		
a. cough?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. wheeze?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. get tight in the chest?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5. Is your sleep ever broken		
a. by wheeze?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. difficulty in breathing?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. Do you ever wake up in the morning (or from your sleep if a shift worker)		
a. with wheeze?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. difficulty with breathing?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7. Do you ever wheeze		
a. if you are in a smoky room?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. if you are in a very dusty place?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
8. If Yes to either Q5, Q6, Q7 - Are your symptoms better		
a. at weekends (or equivalent if shift worker)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. when you are on holidays?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If Yes to Question 8 , please record details of any occupational exposure to respiratory hazards e.g. isocyanates, wood dust, aluminium pot room or asbestos, in Additional notes .		
5. COUGH		
9. Do you usually cough first thing in the morning in winter?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
10. Do you usually cough during the day/ or at night / in the winter?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
11. If Yes to Q9 or Q10 - Do you cough like this on most days for as much as three months each year?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. PHLEGM		
12. Do you usually bring up phlegm from your chest first thing in the morning in winter?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

13. Do you usually bring up any phlegm from your chest during the day / or at night / in winter?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
14. If Yes to Q12 or Q13 - Do you bring up phlegm like this on most days for as much as three months each year?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7. PERIODS OF COUGH AND PHLEGM		
15. In the past three years, have you had a period of (increased) cough and phlegm lasting for three weeks or more?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
16. If Yes to Q15 - Have you had more than one such episode?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
8. CHEST ILLNESSES		
17. During the past three years, have you had any chest illness that has kept you from your usual activities for as much as a week?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
18. If Yes to Q17 - Did you bring up more phlegm than usual in any of these illnesses?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
19. If Yes to Q18 - Have you had more than one illness like this in the past three years?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
9. PAST ILLNESSES		
20. Have you ever had, or been told that you have had any of the following?		
a. An injury, or operation affecting your chest?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Heart problems?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Bronchitis?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Pneumonia?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
e. Pleurisy?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
f. Asthma?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
g. Other chest trouble?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
h. Hay fever?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
10. TOBACCO SMOKING		
21. Do you smoke?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If No to Q21		
22. Have you ever smoked as much as one cigarette a day for as long as one year?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
23. How old were you when you started smoking regularly? _____		
24. a. Do (did) you smoke manufactured cigarettes?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If Yes to Q24a: How many do (did) you usually smoke per day? _____		
b. on weekdays? _____	c. at weekends? _____	

HEALTH MONITORING REPORT CADMIUM

25. Do (did) you smoke any other forms of tobacco? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If Yes to Q25, record details under Additional notes		
11. FOR EX-SMOKERS		
26. When did you give up smoking? Month _____ Year _____		
Additional notes: 		
12. GENERAL HEALTH ASSESSMENT (if applicable)		
Symptoms of:	Comments	Further testing?
Skin disorders		<input type="checkbox"/> Yes <input type="checkbox"/> No
Respiratory disorders		<input type="checkbox"/> Yes <input type="checkbox"/> No
Any history of kidney stones or renal disease		<input type="checkbox"/> Yes <input type="checkbox"/> No
Irritation of eyes, nose or throat		<input type="checkbox"/> Yes <input type="checkbox"/> No
Cough		<input type="checkbox"/> Yes <input type="checkbox"/> No
CNS		<input type="checkbox"/> Yes <input type="checkbox"/> No
Others		<input type="checkbox"/> Yes <input type="checkbox"/> No
Height _____cm Weight _____kg Bp ____/____mmHg		<input type="checkbox"/> Yes <input type="checkbox"/> No
13. OTHER MEDICAL HISTORY, FAMILY MEDICAL HISTORY, CURRENT MEDICATION, COMMENTS, TESTS OR RECOMMENDATIONS (use separate sheet if necessary)		
Medical Practitioner (responsible for supervising health monitoring)		
Name:		Signature
		Date: DD/MM/YYYY
Tel:	Fax:	Registration Number:
Medical Practice:		
Address:		
Suburb:		Postcode: