**Non-threshold Genotoxic Carcinogens –PUBLIC survey**

**This survey relates to the model WHS laws which have been implemented in all jurisdictions except Victoria.**

**Noting that there are differences between the model WHS Regulations and the Victorian Occupational Health and Safety Regulations, Victorian PCBUs and workers are welcome to make a submission regarding the model WHS Regulations. However, any specific feedback on the Victorian regulations should be directed to WorkSafe Victoria.**

## Survey on the use and regulation of non-threshold genotoxic carcinogens

#### About genotoxic carcinogens

Some carcinogens can cause cancer and birth defects by interfering with normal body processes and mutating (altering) DNA. These are known as genotoxic carcinogens.

There is a subset of genotoxic carcinogens for which no safe exposure threshold or dose can be established based on current scientific knowledge -these are termed non-threshold genotoxic carcinogens (NTGCs). Any exposure to an NTGC, even for a short period, could result in a person developing cancer. As with other carcinogens, the onset of cancer due to exposure to an NTGC may occur years after the person’s last exposure.

#### Current regulation of carcinogens in the workplace – model WHS laws

The [model WHS Act](https://www.safeworkaustralia.gov.au/doc/model-work-health-and-safety-act) requires a PCBU to eliminate risks to health and safety (including from exposure to carcinogens), so far as is reasonably practicable; and if this is not reasonably practicable, to minimise those risks so far as is reasonably practicable.

Further, the [model WHS Regulations](https://www.safeworkaustralia.gov.au/doc/model-whs-regulations) prescribe a range of specific requirements for PCBUs supplying, using, handling or storing carcinogens. These include:

* + **Workplace exposure standards** – a PCBU must ensure that no person at the workplace is exposed to a substance or mixture in an airborne concentration that exceeds the exposure standard for the substance or mixture in the [*Workplace exposure standards for airborne contaminants*](https://www.safeworkaustralia.gov.au/safety-topic/managing-health-and-safety/exposure-standards-airborne-contaminants)(regulation 49)*.* (Note that the WES are currently under [review](https://www.safeworkaustralia.gov.au/safety-topic/managing-health-and-safety/workplace-exposure-standards-chemicals/workplace-exposure-standards-review))
  + PCBUs must also ensure that **air monitoring** is carried out to determine the airborne concentration of any chemical that has an exposure standard, if there is uncertainty about whether the exposure standard would be exceeded, or monitoring is necessary to determine whether there is a risk of health.
  + **Prohibitions and restrictions** on the supply, use, handling or storage of certain carcinogens listed in Schedule 10 to the model WHS Regulations.
    - Use, handling and storage of chemicals listed in Table 10.1 of Schedule 10 (prohibited carcinogens) are prohibited unless the chemicals are being used for genuine research or analysis and the WHS regulator has authorised the use, handling or storage (regulation 380, 384).
    - Use, handling and storage of chemicals listed in Table 10.2 of Schedule 10 for the specific purposes described in that table (restricted carcinogens) are prohibited unless the WHS regulator has authorised the use, handling or storage (regulation 381, 384). Use, handling and storage of these chemicals for purposes other than those listed in Table 10.2 do not require authorisation by a WHS regulator.
    - Suppliers must not supply prohibited or restricted carcinogens unless the person to be supplied has provided evidence that a WHS regulator has issued them with an appropriate authorisation or exemption (regulation 340).
    - The chemicals listed in Table 10.3 of Schedule 10 (restricted hazardous chemicals) must not be used, handled or stored for the specific purposes described in that table (regulation 382). Use, handling and storage of these chemicals for purposes other than described in Table 10.3 are not restricted.
  + PCBU must provide [**health monitoring**](https://www.safeworkaustralia.gov.au/safety-topic/managing-health-and-safety/health-monitoring)to a worker if they use, handle, generate or store hazardous chemicals and there is a significant risk to the worker's health because of exposure to those chemicals (regulation 368).
    - Schedule 14 to the model WHS Regulations is a prescribed list of hazardous chemicals requiring health monitoring and the relevant health monitoring methods.
    - Health monitoring for other hazardous chemicals, including carcinogens, must also be undertaken if there are valid techniques for detecting the effect of the exposure on the worker's health.

##### *Non-threshold genotoxic carcinogens (NTGCs)*

The review of the [*Workplace exposure standards for airborne contaminant*s](https://www.safeworkaustralia.gov.au/safety-topic/managing-health-and-safety/exposure-standards-airborne-contaminants) identified 33 chemicals as NTGCs with evidence of use in Australian workplaces. Of these:

* + 25 of the identified NTGCs have an exposure standard
  + seven are listed in Schedule 10 as either a prohibited carcinogen, restricted carcinogen or restricted hazardous chemical, and
  + five are listed in Schedule 14, requiring health monitoring.

(Note some NTGCs are in more than one of the groups identified above.)

As there is no safe level of exposure for NTGCs, Safe Work Australia Members (Members) agreed as part of the review of the [*Workplace exposure standards for airborne contaminants*](https://www.safeworkaustralia.gov.au/safety-topic/managing-health-and-safety/exposure-standards-airborne-contaminants)that exposure standards would not be set for NTGCs going forward. This includes removing any existing exposure standards for NTGCs from the model WHS laws.

Members agreed to further consideration of whether NTGCs should be subject to additional regulation, including whether they should be included in Schedule 10 and/or Schedule 14 to the model WHS Regulations.

#### About this survey

Safe Work Australia is seeking to understand whether NTGCs are present in Australian workplaces, in what quantities and for what purpose.

Specifically, we are seeking information on:

* + which NTGCs are used in Australian workplaces
  + the quantity of each NTGC in the workplace
  + how they are currently used, including the industries and processes
  + , and
  + the control measures currently in place to minimise the risks to workers from exposure to NTGCs.

We are also seeking stakeholder feedback on the current regulatory requirements in place under the model WHS laws to protect workers from exposure to carcinogens in Australian workplaces.

Feedback from anyone with an interest is welcome. We are especially keen to hear from WHS regulators, PCBUs that supply, use, generate, handle or store NTGCs, and workers who may be exposed to these carcinogens.

#### How we will use survey responses

Safe Work Australia will use the survey responses to inform further consideration of options under the model WHS laws to better protect workers from exposure to NTGCs.

## Demographic information to be collected as part of the survey

1. Your details (leave blank if you wish to remain anonymous)
   * Title, First Name, Surname:
   * Organisation name, if applicable:
   * Email:
   * Contact number, including area code:
2. This submission is written on behalf of an:

🞅 Individual

🞅 Organisation

1. Which of the following categories best describes you? Choose more than one if applicable.

☐ Person conducting a business or undertaking/employer

☐ User of chemicals

☐ Supplier of chemicals

☐ Manufacturer of chemicals

☐ Health and safety representative

☐ Industry representative

☐ Occupational hygienist

☐ Health or medical professional

☐ Academic – laboratory or desk-based researcher

☐ Community organisation or member of a local community

☐ Testing laboratory representative

☐ Professional or peak body representative

☐ Government agency representative

☐ Trade union representative

☐ Worker

☐ Other – please specify: Click here to enter text.

1. Which jurisdiction is your workplace in or do you supply chemicals to? Choose more than one if applicable.

☐ Commonwealth

☐ Australian Capital Territory

☐ New South Wales

☐ Northern Territory

☐ Queensland

☐ South Australia

☐ Tasmania

☐ Victoria

☐ Western Australia

☐ Outside of Australia

1. What industry do you operate in[[1]](#footnote-1)? Choose more than one if applicable.

☐ Agriculture, Forestry and Fishing

☐ Mining

☐ Manufacturing

☐ Electricity, Gas, Water and Waste Services

☐ Construction

☐ Wholesale trade

☐ Retail trade

☐ Accommodation and Food Services

☐ Transport, Postal and Warehousing

☐ Information Media and Telecommunications

☐ Financial and Insurance Services

☐ Rental, Hiring and Real Estate Services

☐ Professional, Scientific and Technical Services

☐ Administrative and Support Services

☐ Public Administration and Safety

☐ Education and Training

☐ Health Care and Social Assistance

☐ Arts and Recreation Services

☐ Other Services - please specify: Click here to enter text.

## Survey questions

### A – WHS regulator questions

Operation of Schedule 10 and associated regulations

1. For the prohibited and restricted carcinogens provided in **Tables A and B** (reproduced fromtables 10.1 and 10.2 of Schedule 10 to the model WHS Regulations), and in relation to the last 10 calendar years (2013-2022 inclusive):
2. Select the carcinogens for which authorisations for use were granted.
3. For each authorised carcinogen, specify the number of authorisations issued and those where the authorisation was subject to additional conditions.
4. Describe the types of conditions imposed.
5. Specify any carcinogens from **Table A and B** for which a refusal to grant an authorisation was issued and specify how many refusals were issued per carcinogen.
6. Describe the reasons for refusals.
7. Specify any carcinogens from **Table A and B** for which authorisations for use have been cancelled and specify how many cancellations were issued per carcinogen.
8. Describe reasons for cancellations.
9. For the restricted hazardous chemicals in **Table C** (reproduced from table 10.3 of Schedule 10), and in relation to the last 10 calendar years (2013-2022, inclusive):
10. Select the restricted hazardous chemicals for which exemptions for use were granted in this period and specify how many were issued per chemical.
11. For each restricted carcinogen, specify the number of exemptions issued and those where the exemption was subject to additional conditions.

* Describe the types of conditions imposed.

1. Specify any restricted hazardous chemicals from **Table C** for which a refusal to grant an exemption was issued in this period and specify how many refusals were issued.

* Describe the reasons for refusals.

1. Were any exemptions cancelled?
   * Please specify how many cancellations were issued per chemical.
   * Describe the reasons for cancellations.
2. Do you recognise authorisations and exemptions issued by WHS regulators in other jurisdictions?
3. Do you have any feedback on the operation of the model WHS Regulations relating to prohibited and restricted carcinogens, and restricted hazardous chemicals (Schedule 10 and regulations 340 and 380–384)?
4. Have you undertaken compliance activities or audits in relation to regulation 387 of the model WHS Regulations?

Under this regulation, PCBUs are required to provide workers, at the end of their engagement, a statement indicating the name of the prohibited or restricted carcinogen (see **Tables A and B**) to which they may have been exposed and when they may have been exposed, as well as access to records of exposure and advice on future health assessments?

Operation of Schedule 14 and associated health monitoring regulations

1. Have you in the last 10 calendar years (2013-2022 inclusive) received any health monitoring reports from PCBUs in relation to any of the chemicals in **Tables D and E**? If yes, for which chemicals and how many reports have been received?
2. Do you have any feedback on the operation of the model WHS Regulations relating to health monitoring (Schedule 14 and regulations 368, 370 and 406)?

Regulation of non-threshold genotoxic carcinogens (NTGCs)

1. Do you support the inclusion of the 33 identified NTGCs (**Table E**) in Schedule 10 to the model WHS Regulations?

If yes, should they be handled as prohibited carcinogens, restricted carcinogens or as restricted hazardous chemicals? Please describe the reasons why.

If yes to inclusion as either restricted carcinogens or restricted hazardous chemicals, please describe the restricted use for each NTGC.

If no, please describe the reasons why.

1. Do you agree that the 33 identified NTGCs (**Table E**) should be subject to specific health monitoring requirements through inclusion in Schedule 14? If yes, are you aware of methods to measure the health effects of exposure for each of the chemicals?
2. What other policy options should be considered to minimise risks to workers from exposure to NTGCs?

### B – PCBU questions

1. How many workers do you employ or engage:

🞅 0 to 19

🞅 20 to 199

🞅 200+

1. For the non-threshold genotoxic carcinogens (NTGCs) listed in **Table E** below:
2. Which, if any, did you supply - whether as a pure substance or as a component of a product or article - in the last 5 calendar years (2018-2022 inclusive)?
3. For each NTGC supplied:

* Which sectors or industries did you supply it to?
* How much did you supply over the last 5 calendar years?
* What [control measures](https://www.safeworkaustralia.gov.au/safety-topic/managing-health-and-safety/identify-assess-and-control-hazards/managing-risks) have you put in place to prevent worker exposure?

1. For the NTGCs listed in **Table E** below:
2. Select the NTGCs your workplace used, generated, handled or stored in the last 5 calendar years, 2018-2022 inclusive.
3. For each NTGC selected:
   * + Is it stored, handled and/or used as a pure substance?
     + Is it stored, handled and/or used and present as an ingredient in a mixture?
     + Is it created as a by-product of a process or generated via a process in the workplace?

Example: Coal tar pitch volatiles and polycyclic aromatic hydrocarbons may be generated by the combustion of fossil fuels.

* + - Is it present in a finished product or article with the potential to be released during normal use and storage?

Examples: Chromium VI compounds incorporated into a welding rod may be released into the atmosphere during welding. Polyvinyl chloride products may contain residual vinyl chloride content that is released into the surroundings over time.

* + - Describe the purpose and activity for which the NTGC is used, handled, or stored.
    - What is the average quantity of each NTGC used, generated, handled or stored at the workplace each year?
    - In relation to each NTGC that is, or has been, present at your workplace:
      * what [control measures](https://www.safeworkaustralia.gov.au/safety-topic/managing-health-and-safety/identify-assess-and-control-hazards/managing-risks) have you put in place to prevent worker exposure?
      * would it be possible to eliminate the NTGC from your workplace? If not, please explain why.
      * have you undertaken air monitoring in the past 5 years? If so, for which NTGCs and what were the results?
      * have you undertaken surface wipe sampling in the past 5 years? If so, for which NTGCs and what were the results?
      * have you undertaken health monitoring in the past 5 years? If so, were any reports required to be provided to the WHS regulator[[2]](#footnote-2)?

1. Do you have any feedback on the operation of the model WHS Regulations relating to prohibited and restricted carcinogens, and restricted hazardous chemicals (Schedule 10 and regulations 340 and 380–384) (see **Tables A-C**)?
2. Have you provided workers, at the end of their engagement, a statement indicating the name of the prohibited or restricted carcinogen (see **Tables A and B**) to which they may have been exposed and when they may have been exposed, as well as access to records of exposure and advice on future health assessments? (Regulation 387)
3. Do you have any feedback on the operation of the model WHS Regulations relating to health monitoring (Schedule 14 and regulations 368, 370 and 406) (see **Table D**)?
4. Do you support the inclusion of the 33 identified NTGCs (**Table E**) in Schedule 10 to the model WHS Regulations?

If yes, should they be handled as prohibited carcinogens, restricted carcinogens or as restricted hazardous chemicals? Please describe the reasons why.

If yes to inclusion as either restricted carcinogens or restricted hazardous chemicals, please describe the restricted use for each NTGC.

If no, please describe the reasons why.

1. Do you agree that the 33 identified NTGCs (**Table E**) should be subject to specific health monitoring requirements through inclusion in Schedule 14? If yes, are you aware of methods to measure the health effects of exposure for each of the chemicals?
2. What other policy options should be considered to minimise risks to workers from exposure to NTGCs?

### C – Worker questions

1. Please describe your occupation and the work you do.
2. Considering the list of non-threshold genotoxic carcinogens (NTGCs) at **Table E**:
3. Are you aware if any of these chemicals are, or may be, present in your workplace?

If yes, please select which ones?

1. Did you use or handle the selected NTGCs (either as a pure substance or as part of a mixture)?

If yes:

* were you aware that you the chemical was an NTGC?
* are you aware of the risk of cancer associated with exposure to the NTGC(s)?
* are you aware of how to eliminate or minimise your exposure to the NTGC(s)?

1. What control measures does your PCBU use to ensure you are not exposed to the NTGC(s)?
2. Is air monitoring conducted in your workplace for any of these NTGCs?

If yes, for which of the NTGCs?

1. Does your PCBU provide you with health monitoring in relation to any of these NTGC(s)?

If yes:

* for which NTGCs?
* are you aware of any adverse health findings in the health monitoring reports? (Yes/No/Prefer not to say)

1. Do you have any feedback on the operation of the model WHS Regulations relating to prohibited and restricted carcinogens, and restricted hazardous chemicals (Schedule 10 and regulations 340 and 380–384) (see **Tables A-C**)?
2. Do you have any feedback on the operation of the model WHS Regulations relating to health monitoring (Schedule 14 and regulations 368, 370 and 406) (see **Table D**)?
3. Do you support the inclusion of the 33 identified NTGCs (**Table E**) in Schedule 10 to the model WHS Regulations?
   1. If yes, should they be handled as prohibited carcinogens, restricted carcinogens or restricted hazardous chemicals (see Schedule 10 and regulations 340 and 380-384)? Please describe the reasons why.
   2. If yes to inclusion as either restricted carcinogens or restricted hazardous chemicals, please describe the restricted use for each NTGC.
   3. If no, please describe the reasons why.
4. Do you agree that the 33 identified NTGCs (**Table E**) should be subject to specific health monitoring requirements through inclusion in Schedule 14? If yes, are you aware of methods to measure the health effects of exposure for each of the chemicals?
5. What other policy options should be considered to minimise risks to workers from exposure to NTGCs?
6. Have you ever received from a previous PCBU, at the end of your engagement, a statement indicating the name of the prohibited or restricted carcinogen (see **Tables A and B**) to which you may have been exposed and when you may have been exposed, as well as access to records of exposure and advice on future health assessments?

### D – Other interested party questions

1. Do you have any feedback on the operation of the model WHS Regulations relating to prohibited and restricted carcinogens, and restricted hazardous chemicals (Schedule 10 and regulations 340 and 380–384) (see **Tables A-C**)?
2. Do you have any feedback on the operation of the model WHS Regulations relating to health monitoring (Schedule 14 and regulations 368, 370 and 406) (see **Table D**)?
3. Do you support the inclusion of the 33 identified NTGCs (**Table E**) in Schedule 10 to the model WHS Regulations?
   * If yes, should they be handled as prohibited carcinogens, restricted carcinogens or as restricted hazardous chemicals? Please describe the reasons why.
   * If yes to inclusion as either restricted carcinogens or restricted hazardous chemicals, please describe the restricted use for each NTGC.
   * If no, please describe the reasons why.
4. Do you agree that the 33 identified NTGCs (**Table E**) should be subject to specific health monitoring requirements through inclusion in Schedule 14? If yes, are you aware of methods to measure the health effects of exposure for each of the chemicals?
5. What other policy options should be considered to minimise risks to workers from exposure to NTGCs?

# Table A – Prohibited carcinogens

(From Table 10.1 in Schedule 10 to the model WHS Regulations)

|  |  |  |
| --- | --- | --- |
| **Item** | **Prohibited carcinogen** | **CAS number** |
| 1 | 2-Acetylaminofluorene | 53-96-3 |
| 2 | Aflatoxins | N/A |
| 3 | 4-Aminodiphenyl | 92-67-1 |
| 4 | Benzidine and its salts (including benzidine dihydrochloride) | 92-87-5  531-85-1 |
| 5 | bis(Chloromethyl) ether | 542-88-1 |
| 6 | Chloromethyl methyl ether (technical grade which contains bis(chloromethyl) ether) | 107-30-2 |
| 7 | 4-Dimethylaminoazobenzene (Dimethyl Yellow) | 60-11-7 |
| 8 | 2-Naphthylamine and its salts | 91-59-8 |
| 9 | 4-Nitrodiphenyl | 92-93-3 |

# Table B – Restricted carcinogens

(From Table 10.2 in Schedule 10 to the model WHS Regulations)

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Restricted carcinogen** | **CAS number** | **Uses that require authorisation by a WHS regulator** |
| 1 | Acrylonitrile | 107-13-1 | All |
| 2 | Benzene | 71-43-2 | All uses involving benzene as a feedstock containing more than 50% of benzene by volume  Genuine research or analysis |
| 3 | Cyclophosphamide | 50-18-0 | When used in preparation for therapeutic use in hospitals and oncological treatment facilities, and in manufacturing operations  Genuine research or analysis |
| 4 | 3,3'-Dichlorobenzidine and its salts (including 3,3'-Dichlorobenzidine dihydrochloride) | 91­-94-1  612-83-9 | All |
| 5 | Diethyl sulfate | 64-67-5 | All |
| 6 | Dimethyl sulfate | 77-78-1 | All |
| 7 | Ethylene dibromide | 106-93-4 | When used as a fumigant  Genuine research or analysis |
| 8 | 4,4'-Methylene bis(2-chloroaniline)  (MOCA) | 101-14-4 | All |
| 9 | 3-Propiolactone (Beta-propiolactone) | 57-57-8 | All |
| 10 | o-Toluidine and  o-Toluidine hydrochloride | 95-53-4  636-21-5 | All |
| 11 | Vinyl chloride monomer | 75­01-4 | All |

# Table C – Restricted hazardous chemicals

(From Table 10.3 in Schedule 10 to the model WHS Regulations)

|  |  |  |
| --- | --- | --- |
| **Item** | **Restricted hazardous chemical** | **Uses not permitted unless an exemption from a WHS regulator has been granted** |
| 1 | Antimony and its compounds | For abrasive blasting at a concentration of greater than 0·1% as antimony |
| 2 | Arsenic and its compounds | For abrasive blasting at a concentration of greater than 0·1% as arsenic  For spray painting |
| 3 | Benzene (benzol), if the substance contains more than 1% by volume | For spray painting |
| 4 | Beryllium and its compounds | For abrasive blasting at a concentration of greater than 0·1% as beryllium |
| 5 | Cadmium and its compounds | For abrasive blasting at a concentration of greater than 0·1% as cadmium |
| 6 | Carbon disulphide (carbon bisulphide) | For spray painting |
| 7 | Chromate | For wet abrasive blasting |
| 8 | Chromium and its compounds | For abrasive blasting at a concentration of greater than 0·5% (except as specified for wet blasting) as chromium |
| 9 | Cobalt and its compounds | For abrasive blasting at a concentration of greater than 0·1% as cobalt |
| 10 | Free silica (crystalline silicon dioxide) | For abrasive blasting at a concentration of greater than 1% |
| 11 | Lead and compounds | For abrasive blasting at a concentration of greater than 0·1% as lead or which would expose the operator to levels in excess of those set in the regulations covering lead |
| 12 | Lead carbonate | For spray painting |
| 13 | Methanol (methyl alcohol), if the substance contains more than 1% by volume | For spray painting |
| 14 | Nickel and its compounds | For abrasive blasting at a concentration of greater than 0·1% as nickel |
| 15 | Nitrates | For wet abrasive blasting |
| 16 | Nitrites | For wet abrasive blasting |
| 17 | Radioactive substance of any kind where the level of radiation exceeds 1 Bq/g | For abrasive blasting, so far as is reasonably practicable |
| 18 | Tetrachloroethane | For spray painting |
| 19 | Tetrachloromethane (carbon tetrachloride) | For spray painting |
| 20 | Tin and its compounds | For abrasive blasting at a concentration of greater than 0.1% as tin |
| 21 | Tributyl tin | For spray painting |

# Table D – Hazardous chemicals requiring health monitoring

(From Tables 14.1 and 14.2 in Schedule 14 to the model WHS Regulations)

|  |  |  |
| --- | --- | --- |
| **Hazardous chemicals (other than lead) requiring health monitoring** | | |
| **Item** | **Hazardous chemical** | **Type of health monitoring** |
| 1 | Acrylonitrile | Demographic, medical and occupational history Records of personal exposure Physical examination |
| 2 | Arsenic (inorganic) | Demographic, medical and occupational history  Records of personal exposure Physical examination with emphasis on the peripheral nervous system and skin  Urinary inorganic arsenic |
| 3 | Benzene | Demographic, medical and occupational history  Records of personal exposure  Physical examination Baseline blood sample for haematological profile |
| 4 | Cadmium | Demographic, medical and occupational history  Records of personal exposure  Physical examination with emphasis on the respiratory system  Standard respiratory questionnaire to be completed  Standardised respiratory function tests including for example, FEV1, FVC and FEV1/FVC  Urinary cadmium and β2-microglobulin  Health advice, including counselling on the effect of smoking on cadmium exposure |
| 5 | Chromium (inorganic) | 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 |
| 6 | Creosote | Demographic, medical and occupational history  Health advice, including recognition of photosensitivity and skin changes  Physical examination with emphasis on the neurological system and skin, noting any abnormal lesions and evidence of skin sensitisation  Records of personal exposure, including photosensitivity |
| 7 | Crystalline silica | Demographic, medical and occupational history  Records of personal exposure  Standardised respiratory questionnaire to be completed  Standardised respiratory function test, for example, FEV1, FVC and FEV1/FVC  Chest X-ray full size PA view |
| 8 | Isocyanates | Demographic, medical and occupational history  Completion of a standardised respiratory questionnaire  Physical examination of the respiratory system and skin  Standardised respiratory function tests, for example, FEV1, FVC and FEV1/FVC |
| 9 | Mercury (inorganic) | Demographic, medical and occupational history  Physical examination with emphasis on dermatological, gastrointestinal, neurological and renal systems  Urinary inorganic mercury |
| 10 | 4,4'-Methylene bis (2-chloroaniline) (MOCA) | Demographic, medical and occupational history  Physical examination  Urinary total MOCA  Dipstick analysis of urine for haematuria  Urine cytology |
| 11 | Organophosphate pesticides | Demographic, medical and occupational history including pattern of use  Physical examination  Baseline estimation of red cell and plasma cholinesterase activity levels by the Ellman or equivalent method  Estimation of red cell and plasma cholinesterase activity towards the end of the working day on which organophosphate pesticides have been used |
| 12 | Pentachlorophenol (PCP) | Demographic, medical and occupational history  Records of personal exposure  Physical examination with emphasis on the skin, noting any abnormal lesions or effects of irritancy  Urinary total pentachlorophenol  Dipstick urinalysis for haematuria and proteinuria |
| 13 | Polycyclic aromatic hydrocarbons (PAH | Demographic, medical and occupational history  Physical examination  Records of personal exposure, including photosensitivity  Health advice, including recognition of photosensitivity and skin changes |
| 14 | Thallium | Demographic, medical and occupational history  Physical examination  Urinary thallium |
| 15 | Vinyl chloride | Demographic, medical and occupational history  Physical examination  Records of personal exposure |
| **Lead requiring health monitoring** | | |
| **Item** | **Lead** | **Type of health monitoring** |
| 1 | Lead (inorganic) | Demographic, medical and occupational history  Physical examination  Biological monitoring |

# Table E - Non-threshold genotoxic carcinogens identified through the review of the *Workplace exposure standards for airborne contaminants*

|  | **NTGC** | **CAS number** | **Known uses/process** | **Relevant industries** | **Has a workplace exposure standard? (A)** | **Listed in Schedule 10? (A)** | **Listed in Schedule 14? (B)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | Acrylamide | 79-06-1 | Used industrially to synthesise polyacrylamide. Also used in production of dyes, organic compounds, ore processing and in textile manufacturing. Often a pre-cursor or an intermediate in these reactions. | Various. Notably chemical manufacturing, mining, and textiles. | Yes | No | No |
| **2** | Acrylonitrile  (Vinyl cyanide) | 107-13-1 | Used as a precursor or intermediate for synthesising polymers for industrial synthetic rubbers, and separating fatty acids and vegetable oils | Various. | Yes | Yes - 10.2 (restricted carcinogen) | Yes |
| **3** | Allyl chloride  (3-Chloro-1-propene) | 107-05-1 | Allyl chloride is often found as a chemical intermediate in many industries. It is used in the preparation of polymers and plastics, oil production, pharmaceuticals, and catalysts. | Various. | Yes | No | No |
| **4** | Allyl glycidyl ether  (AGE, Allyl 2,3-epoxypropyl ether) | 106-92-3 | Often used as a monomer to synthesise different types of polymers. It is normally used in preparation for resins and rubber. | Various. | Yes | No | No |
| **5** | Anisidine (o, p- isomers)  (Methoxyaniline) | 29191-52-4 | See specific isomers below. | | | | |
| **6** | o-Anisidine | 90-04-0 | Manufacturing of dyes - it is nitrated to give 4-nitroaniside. A precursor for heartwood indicator. | Various | Yes (if captured by Anisidine,  o-, p- isomers) | No | No |
| **7** | p-Anisidine | 104-94-9 | Used in the manufacturing of azo dyes (R-N=N-R') functional group. Also used for biomedical research purposes. | Various | Yes (if captured by Anisidine,  o-, p- isomers) | No | No |
| **8** | Benzidine | 92-87-5 | Synthetical chemical used in the production of textiles, paints, inks, and pharmaceuticals. It also has uses in the test for blood in faeces. | Textiles and pharmaceuticals | No | Yes - 10.1 (prohibited carcinogen) | No |
| **9** | (bis)chloromethyl ether | 542-88-1 | NIL | Unknown | Yes | Yes - 10.1 (prohibited carcinogen) | No |
| **10** | 1,3-Butadiene | 106-99-0 | Principally used in the manufacture of automobile tyres. A precursor for the main polymer to manufacture tyres. | Automotive | Yes | No | No |
| **11** | Catechol  (Pyrocatechol, o-Dihydroxybenzene) | 120-80-9 | Used in the production of pesticides and as a precursor for perfumes and pharmaceuticals. | Various | Yes | No | No |
| **12** | beta-Chloroprene  (2-Chloro-1,3-butadiene) | 126-99-8 | Used as a monomer/precursor to produce polychloroprene, a synthetic rubber. | Various | Yes | No | No |
| **13** | Chromium VI compounds (including zinc chromates) | Various, includes  7440-47-3  (Cr metal), 18540-29-9  (Cr (VI)) and others (>30) | Primarily used as pigments in dyes, paints, inks, and plastics. | Various | Yes | Yes - 10.3 (restricted hazardous chemical) | Yes |
| **14** | Coal tar pitch volatiles  (as benzene solubles) | 65996-93-2 | Liberated in the processing of coal in power stations. | Energy and others | Yes | No | No |
| **15** | 1,2-Dibromo ethane (ethylene dibromide) | 106-93-4 | Used as an "anti-knock' additive in leaded fuels - increases the fuel’s octane rating. Also used as a fumigant, in waterproofing, dyes, and as resins. | Energy and others | No | Yes - 10.2 (restricted carcinogen) | No |
| **16** | 3,3'-Dichlorobenzidine | 91-94-1 | Used in the production of yellow pigments in printing inks. | Textiles | No | Yes - 10.2 (restricted carcinogen) | No |
| **17** | Diethyl sulfate | 64-67-5 | Liberated as an intermediate in the processing of dyes. | Textiles | No | Yes - 10.2 (restricted carcinogen) | No |
| **18** | Dimethylcarbamoyl chloride | 79-44-7 | Liberated as an intermediate in the processing of dyes and in pharmaceuticals. | Various | No | No | No |
| **19** | Dimethyl sulfate | 77-78-1 | Precursor in the synthesis of pharmaceuticals, and dyes. | Pharmaceutical | Yes | Yes - 10.2 (restricted carcinogen) | No |
| **20** | Dinitrotoluene | 25321-14-6 | Used as a plasticiser or burn rate modifier in propellants. Increases the elasticity of the propellant mixture, solidifying it to an extent | Various | Yes | No | No |
| **21** | Ethylene dichloride  (1,2-Dichloroethane) | 107-06-2 | Used as a precursor to produce vinyl chloride monomer, which is then used to synthesise the polymerisation of PVC and VCM | Various | Yes | No | No |
| **22** | Ethylene oxide  (Oxirane) | 75-21-8 | Used as a precursor to synthesise other chemicals in various industries. Sterilisation of medical equipment | Various | Yes | No | No |
| **23** | Ethylenimine  (Aziridine) | 151-56-4 | Intermediate in the production of triethylene-melamine. It can also be polymerised to poly ethylenimine. | Various | Yes | No | No |
| **24** | Hydrazine  (Diamine) | 302-01-2 | Precursor in the synthesis of pharmaceuticals and dyes. Also, it can be used to make catalysts for rockets | Explosives/propellants | Yes | No | No |
| **25** | Lead chromate (as Cr) | 7758-97-6 | Primarily used as a pigment in paints. Also used in the ceramic manufacturing industry | Chemical manufacturing | Yes | Yes - 10.3 (restricted hazardous chemical) | No |
| **26** | 4,4’-Methylene bis(2-chloroaniline)  (MOCA, MBOCA, 2,2'-Dichloro-4,4'-methylenedianiline) | 101-14-4 | Curing agent in polyurethane production | Plastics | Yes | Yes - 10.2 (restricted carcinogen) | Yes |
| **27** | 2-Nitrotoluene | 88-72-2 | Generally used as a precursor or derivative for the precursor of azo dyes | Various | Yes | No | No |
| **28** | Propane sultone | 1120-71-4 | Precursor and an intermediate in the production of dyes and insecticides | Various | No | No | No |
| **29** | Polycyclic aromatic hydrocarbon (PAH) mixture when containing benzo[a]pyrene | 50-32-8 (benzo[a]pyrene) | Liberated through the incomplete combustion or pyrolysis of coal and other organic material | Various | No | No | Yes |
| **30** | Tetranitromethane  (TNM) | 509-14-8 | Oxidising agent with applications in rocketry and additive to diesel fuel | Various | Yes | No | No |
| **31** | Urethane | 51-79-6 | Used in liquid form as a coating and adhesive. Also used as a plasticiser in plastics and explosives | Various | No | No | No |
| **32** | Vinyl bromide  (Bromoethylene) | 593-60-2 | Precursor for the manufacturing of flame retardant synthetic fibres | Various | Yes | No | No |
| **33** | Vinyl chloride, monomer  (Chloroethylene) | 75-01-4 | Used in the polymerisation reaction to synthesise polyvinyl chloride (PVC) | Used in the polymerisation reaction to synthesise polyvinyl chloride (PVC) | Yes | Yes - 10.2 (restricted carcinogen) | Yes |

*Footnote (A)*

Model WHS Regulations 49 and 50.

*Footnote (B)*

Schedule 10: Prohibited carcinogens, restricted carcinogens and restricted hazardous chemicals(model WHS Regulations 340 and 380–384)

*Note: The prohibition of the use of carcinogens listed in table 10.1, column 2 and the restriction of the use of carcinogens listed in table 10.2, column 2 apply to the pure substance and where the substance is present in a mixture at a concentration greater than 0·1%, unless otherwise specified.*

* Table 10.1 Prohibited carcinogens
* Table 10.2 Restricted carcinogens
* Table 10.3 Restricted hazardous chemicals

*Footnote (C)*

Schedule 14: Requirements for health monitoring(model WHS Regulations 368, 370 and 406)

1. List of industries derived from the [Australian and New Zealand Standard Industrial Classification](https://www.abs.gov.au/statistics/classifications/australian-and-new-zealand-standard-industrial-classification-anzsic/2006-revision-2-0/introduction) maintained by the Australian Bureau of Statistics. [↑](#footnote-ref-1)
2. The health monitoring report must be provided to the regulator if it contains: (a) any advice that test results indicate that the worker may have contracted a disease, injury or illness related to working with the NTGC; or (b) any recommendation that the PCBU take remedial measures. [↑](#footnote-ref-2)