Industrial use lead by-products: Human health tier II assessment

28 June 2019

Chemicals in this assessment

Chemical Name in the Inventory	CAS Number
Lead alloy, base, dross	69011-59-2
Lead alloy, base, dross (Pb, Sn)	69011-60-5
Lead, dross, antimony rich	69029-45-4
Lead, dross, bismuth rich	69029-46-5
Lead, antimonial	69029-50-1
Lead, antimonial, dross	69029-51-2
Lead, dross	69029-52-3
Slags, lead reverbatory smelting	69029-58-9
Flue dust, lead refining	69029-67-0
Lead ores, sintered	69029-74-9

Chemical Name in the Inventory	CAS Number
Residues, lead smelting	69029-79-4
Residues, precious metal recovery lead refining	69029-80-7
Slags, lead smelting	69029-84-1
Slags, precious metal recovery lead refining	69029-85-2
Lead, zinc dross	94551-60-7

Preface

This assessment was carried out by staff of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) using the Inventory Multi-tiered Assessment and Prioritisation (IMAP) framework.

The IMAP framework addresses the human health and environmental impacts of previously unassessed industrial chemicals listed on the Australian Inventory of Chemical Substances (the Inventory).

The framework was developed with significant input from stakeholders and provides a more rapid, flexible and transparent approach for the assessment of chemicals listed on the Inventory.

Stage One of the implementation of this framework, which lasted four years from 1 July 2012, examined 3000 chemicals meeting characteristics identified by stakeholders as needing priority assessment. This included chemicals for which NICNAS already held exposure information, chemicals identified as a concern or for which regulatory action had been taken overseas, and chemicals detected in international studies analysing chemicals present in babies' umbilical cord blood.

Stage Two of IMAP began in July 2016. We are continuing to assess chemicals on the Inventory, including chemicals identified as a concern for which action has been taken overseas and chemicals that can be rapidly identified and assessed by using Stage One information. We are also continuing to publish information for chemicals on the Inventory that pose a low risk to human health or the environment or both. This work provides efficiencies and enables us to identify higher risk chemicals requiring assessment.

The IMAP framework is a science and risk-based model designed to align the assessment effort with the human health and environmental impacts of chemicals. It has three tiers of assessment, with the assessment effort increasing with each tier. The Tier I assessment is a high throughput approach using tabulated electronic data. The Tier II assessment is an evaluation of risk on a substance-by-substance or chemical category-by-category basis. Tier III assessments are conducted to address specific concerns that could not be resolved during the Tier II assessment.

These assessments are carried out by staff employed by the Australian Government Department of Health and the Australian Government Department of the Environment and Energy. The human health and environment risk assessments are conducted and published separately, using information available at the time, and may be undertaken at different tiers.

This chemical or group of chemicals are being assessed at Tier II because the Tier I assessment indicated that it needed further investigation.

For more detail on this program please visit:**www.nicnas.gov.au**

Disclaimer

NICNAS has made every effort to assure the quality of information available in this report. However, before relying on it for a specific purpose, users should obtain advice relevant to their particular circumstances. This report has been prepared by NICNAS using a range of sources, including information from databases maintained by third parties, which include data supplied

ACRONYMS & ABBREVIATIONS

Grouping Rationale

The chemicals in this assessment are by-products of industrial lead production and transformation. These processes result in UVCB substances (chemicals of unknown or variable composition, complex reaction products and biological materials) with high lead contents and a number of metals such as arsenic, antimony or cadmium. These metals are present either in elemental form or in oxide form. While most of the chemicals are solid, a few of them may produce inhalation exposure (flue dust, lead refining; lead ores, sintered). However, they are all expected to have similar toxicity, resulting primarily from the presence of lead oxide and lead metal (Lead REACH Consortium).

The following descriptions are available (ChemID Plus):

- **Lead alloy, base, dross (CAS No. 69011-59-2)**: A scum formed on the surface of molten lead-base alloys. Includes those cases in which aluminium is used to remove arsenic, nickel and antimony.
- **Lead alloy, base, dross (Pb, Sn) (CAS No. 69011-60-5)** Oxides formed during melting, refining, and casting of solders. Major constituents are oxides of tin, lead and antimony; minor constituents are iron, nickel, sulfur, arsenic, copper and silver.
- **Lead, dross, antimony rich (CAS No. 69029-45-4)**: A scum or slag formed on the surface of molten lead during the process of removing antimony along with arsenic by oxidation with air. It consists of antimony, arsenic and lead oxides.
- **Lead, dross, bismuth rich (CAS No. 69029-46-5)**: A scum formed on the surface of molten lead during the process of removing bismuth by the addition of calcium and magnesium. It consists of lead containing calcium and magnesium bismuthides.
- **Lead, antimonial (CAS No. 69029-50-1)**: Product from treatment of antimony slag from softening furnace and baghouse product with soda ash and coal.
- **Lead, antimonial, dross (CAS No. 69029-51-2)**: A scum formed on the surface of antimonial lead. Consists primarily of sodium arsenate and sodium antimonate with some lead oxide and free caustic soda.
- **Lead, dross (CAS No. 69029-52-3)**: A scum formed on the surface of molten lead.
- **Slags, lead reverbatory smelting (CAS No. 69029-58-9)**: By-product from the smelting of lead ores, scrap lead or lead smelter dross. Consists primarily of oxides and silicates of antimony and lead.
- **Flue dust, lead refining (CAS No. 69029-67-0)**: By-product of refining lead ores or lead from secondary sources obtained from baghouse and electrostatic precipitator and as slurry from scrubbers.
- **Lead ores, sintered (CAS No. 69029-74-9)**: Sinter formed by heating finely divided lead concentrates and fluxes to a softening condition to agglomerate without fusion.
- **Residues, lead smelting (CAS No. 69029-79-4)**: Residues from processing equipment used in a lead refinery. Consist primarily of lead and lead oxide.
- **Residues, previous metal recovery lead refining (CAS No. 69029-80-7)**: Residues from treating lead refinery ores and residues containing precious metals with sodium boroplumbate followed by thermal fusion.
- **Slags, lead smelting (CAS No. 69029-84-1)**: Slag formed as the feed progresses through the blast furnace in lead smelting. Consists primarily of metallic elements and oxides of calcium, magnesium and silicon.
- **Slags, precious metal recovery lead refining (CAS No. 69029-85-2)**: Inorganic slags produced from treatment of calcined scrap metals and oxides with borax, litharge and sodium carbonate followed by fusion.

- **Lead, zinc dross (CAS No. 94551-60-7)**: Not available.

Import, Manufacture and Use

Australian

The chemicals in this assessment have site-limited use only.

Australia is one of the major producer and exporter of lead in the world (Geoscience Australia), with mines located in Broken Hill, Mount Isa and Hilton in Queensland and McArthur River in the Northern Territory. Lead mining and processing are highly mechanised. During processing and refining, chemicals are added to lead ore, generating layers of impurities and lead by-products.

International

The following international uses have been identified through: the European Union (EU) Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) dossiers; Galleria Chemica; and the Lead REACH Consortium.

The chemicals in this assessment have site-limited use only.

Some of the chemicals in this group are well-known lead by-products, generated and used under strictly controlled conditions (Lead REACH Consortium):

- Lead alloy, base, dross (Pb, Sn) (CAS No. 69011-60-5)
- Lead, dross, antimony rich (CAS No. 69029-45-4)
- Lead, dross, bismuth rich (CAS No. 69029-46-5)
- Lead, antimonial, dross (CAS No. 69029-51-2)
- Lead, dross (CAS No. 69029-52-3)
- Slags, lead reverbatory smelting (CAS No. 69029-58-9)
- Flue dust, lead refining (CAS No. 69029-67-0)
- Slags, lead smelting (CAS No. 69029-84-1)

The other chemicals are expected to be produced and used in similar conditions.

Restrictions

Australian

No known restrictions have been identified for the chemicals.

However, the chemicals are covered by the generic entry 'LEAD COMPOUNDS' in Schedules 5, 6 and 10 of the Poisons Standard — *the Standard for the Uniform Scheduling of Medicines and Poisons* (SUSMP).

The chemicals are also covered by the entry 'LEAD' in Schedule 4 (SUSMP, 2019).

Schedule 4 — Prescription Only Medicine

LEAD for human therapeutic use.

Schedule 4 chemicals are 'substances, the use or supply of which should be by or on the order of persons permitted by State or Territory legislation to prescribe and should be available from a pharmacist on prescription' (SUSMP, 2019).

Schedule 5 — Caution

LEAD COMPOUNDS in preparations for use as hair cosmetics.

Schedule 5 chemicals are 'substances with a low potential for causing harm, the extent of which can be reduced through the use of appropriate packaging with simple warnings and safety directions on the label' (SUSMP, 2019).

Schedule 6 — Poison

LEAD COMPOUNDS **except**:

a) when included in Schedule 4 or 5;

b) in paints, tinters, inks or ink additives;

c) in preparations for cosmetic use containing 100 mg/kg or less of lead;

d) in pencil cores, finger colours, showcard colours, pastels, crayons, poster paints/colours or coloured chalks containing 100 mg/kg or less of lead; or

e) in ceramic glazes when labelled with the warning statement: CAUTION – Harmful if swallowed. Do not use on surfaces which contact food or drink. Written in letters not less than 1.5 mm in height.

Schedule 6 chemicals are 'substances with a moderate potential for causing harm, the extent of which can be reduced through the use of distinctive packaging with strong warnings and safety directions on the label' (SUSMP, 2019).

Schedule 10 (previously Appendix C) — Substances of such danger to health as to warrant prohibition of sale, supply and use

LEAD COMPOUNDS in paints, tinters, inks or ink additives **except** in preparations containing 0.1 per cent or less of lead calculated on the non-volatile content of the paint, tinter, ink or ink additive.

Schedule 10 chemicals are 'substances which are prohibited for the purpose or purposes listed for each poison' (SUSMP, 2019).

Customs Prohibitions

Lead or lead compounds are listed in Schedule 2 — Goods the importation of which is prohibited unless the permission in writing of the Minister or an authorised person has been granted [Customs (Prohibited Imports) Regulations, 1956].

International

No restrictions exist for the chemicals; however, the risk of exposure to lead and lead compounds has been recognised internationally, which has resulted in broad restrictions regarding occupational and public exposure.

These chemicals are not individually listed but are covered by the entry 'Lead and its compounds' on the following (Galleria Chemica):

- ASEAN Cosmetic Directive Annex II Part 1—List of substances which must not form part of the composition of cosmetic products;
- EU Cosmetics Regulation 1223/2009 Annex II—List of substances prohibited in cosmetic products;
- New Zealand Cosmetic Products Group Standard—Schedule 4: Components cosmetic products must not contain; and
- Health Canada List of prohibited and restricted cosmetic ingredients (The Cosmetic Ingredient ‘Hotlist’).

Lead compounds are listed on Annex XVII of the REACH Regulation, setting restrictions on the manufacture, placing on the market and use of lead compounds as follows: 'Shall not be placed on the market or used in any individual part of jewellery articles if the concentration of lead (expressed as metal) in such a part is equal to or greater than 0.05 % by weight' (ECHA).

Three of the chemicals in this group are also covered by the restrictions on arsenic compounds under Annex XVII REACH: Entry 19 – Arsenic compounds (ECHA):

- lead alloy, base, dross (CAS No. 69011-59-2)
- lead antimonial, dross (CAS No. 69029-51-2)
- flue dust, lead refining (CAS No. 69029-67-0)

Existing Worker Health and Safety Controls

Hazard Classification

The chemicals in this group are not individually listed on the Hazardous Chemical Information System (HCIS) (Safe Work Australia). However, they are covered by the entry 'lead compounds with the exception of those specified elsewhere in this database' in the HCIS, with the following hazard categories and hazard statements for human health:

- Acute toxicity – Category 4; H302 (Harmful if swallowed)
- Acute toxicity – Category 4; H332 (Harmful if inhaled)
- Reproductive toxicity – Category 1A; H360Df (May damage the unborn child. Suspected of damaging fertility)
- Specific target organ toxicity (repeated exposure) – Category 2; H373 (May cause damage to organs through prolonged or repeated exposure)

Exposure Standards

Australian

No specific exposure standards are available for the chemicals.

Lead, inorganic dusts and fumes (as lead) have the following exposure standards reported (Safe Work Australia):

• Time Weighted Average (TWA)—0.15 mg/m³ for lead compounds (as lead).

• Short-Term Exposure Limits (STEL)—No specific exposure standards are available.

International

No specific exposure standards are available for the chemicals.

For lead and its inorganic compounds in general, the following exposure limits were identified (Galleria Chemica):

• TWA = 0.05 mg/m³ (Bulgaria, Canada, China, Denmark, Iceland, Malaysia, Norway, Poland, Russia, Taiwan, USA)

• TWA = 0.10 mg/m³ (Austria, Estonia, France, Japan, South Africa, Sweden, Switzerland)

- TWA = 0.15 mg/m³ (Argentina, Egypt, EU (Directive 98/24/EC), Hungary, India, Ireland, Mexico, Malta, Netherlands, Philippines, Singapore, Spain)
- TWA = 0.20 mg/m³ (Thailand)
- STEL = 0.10 mg/m³ (Austria)
- STEL = 0.15 mg/m³ (Canada)
- STEL = 0.45 mg/m³ (Argentina, Egypt)
- STEL = 0.8 mg/m³ (Switzerland)

Health Hazard Information

No toxicological data are available for the chemicals in this assessment, which are complex UVCB substances. Some well-known metal elements are in the composition of these chemicals, among which lead (Pb) is the most prominent overall (Lead REACH Consortium).

For the purpose of this assessment, toxicity information will be mainly derived from lead oxides, a group of sparingly soluble lead compounds previously assessed under the IMAP Program (NICNAS a). Based on the information available (Lead REACH Consortium), the chemicals in this assessment contain variable amounts of metals which are mostly present as alloys and/or oxide form. Considering the typical composition and concentration ranges in metals of eight of the chemicals, the most significant drivers for toxicity besides lead oxide could be antimony oxides, arsenic oxides, cadmium oxides and nickel oxides, although their presence will vary in each of the UVCB chemical.

For a typical concentration of lead (Pb) of 85 % (range 0.5–90 %) in lead, alloy, base, Sn, Pb, dross (CAS No. 69011-60-5), the corresponding typical amount of lead oxides is estimated at 50 % (range 10–85 %) (Lead REACH Consortium). Given the complexity to determine the exact composition of metal oxides in the chemicals, only a qualitative hazard assessment approach is proposed here. Hazard classifications are determined based on the availability of lead from the substances. Producers of the substances should determine on a case by case basis whether additional risks arise from the presence of other metal species. Due to the variability in the compositions of the chemicals, at this stage the chemicals are not recommended for classification for acute toxicity, skin/eye irritation and skin sensitisation, although related effects could be associated with use of these chemicals. They are, however, recommended for classification for repeated dose toxicity, carcinogenicity, mutagenicity and reproductive toxicity based on the significant contents in lead (Pb) and related oxides.

This assessment should be read in conjunction with the following, previously published IMAP assessments, all of which are available at **www.nicnas.gov.au**:

- Lead oxides (NICNAS a).
- Antimony trioxide (Sb2O3) (NICNAS b).
- Arsenic pentoxide and arsenic acid (NICNAS c).
- Cadmium oxide (CdO) (NICNAS d).
- Nickel oxide (NICNAS e).

Toxicokinetics

Inorganic lead compounds can be absorbed orally, dermally or via inhalation (NICNAS, 2007). Lead oxides in particular are reported to be bioavailable in the rat (NICNAS a). The dermal route is assumed to be the least efficient, while inhalation of lead

particles could occur. Inhalation is particularly relevant for lead compounds such as flue dust, lead refining (CAS No. 69029-67-0).

Acute Toxicity

Oral

No data are available on the chemicals. Lead oxides and antimony trioxide are not considered harmful following acute oral exposure (NICNAS a; NICNAS b). Arsenic oxide and cadmium oxide are both considered toxic if swallowed, with median lethal doses (LD50) in the rat of 8 mg/kg bw and 72–296 mg/kg bw, respectively (NICNAS c; NICNAS d). The chemicals could potentially show similar properties, depending on the concentrations of arsenic and cadmium oxides.

Dermal

No data are available on the chemicals. Arsenic oxide is considered harmful following acute dermal exposure, but none of the other metals in elemental or oxide form are considered hazardous to the skin. Given the expected lower concentrations of arsenic compared to other metals in the UVCBs, the chemicals are expected to have low acute dermal toxicity.

Inhalation

No data are available on the chemicals. Lead oxides and antimony trioxide are not considered harmful following acute inhalation exposure (NICNAS a, NICNAS b). Arsenic oxide is considered toxic and cadmium oxide fatal if inhaled. The chemicals could potentially show arsenic and cadmium oxides toxicity to a lesser extent, depending on the concentrations of arsenic and cadmium oxides. This is particularly relevant for flue dust, lead refining.

Corrosion / Irritation

Skin Irritation

No data are available on the chemicals. Arsenic oxide is corrosive to the skin and eyes. However, given the expected lower concentrations of arsenic compared to other metals in the UVCBs, it is unlikely that the chemicals will exhibit the same properties. They could potentially be irritating to the skin and eyes if they contained significant amounts of arsenic.

Eye Irritation

No data are available on the chemicals.

Sensitisation

Skin Sensitisation

No data are available on the chemicals. Nickel oxide is classified as a skin sensitiser (HCIS); however, the available data on nickel oxide were insufficient to support the classification (NICNAS e). It is therefore unlikely that the chemicals in this assessment will exhibit skin sensitising properties based on the presence of nickel oxide only. However, given the lack of data on the chemicals themselves, the potential for skin sensitisation cannot be excluded.

Repeated Dose Toxicity

Oral

No data are available on the chemicals. Lead oxides are considered harmful following repeated oral exposure, because lead (Pb) is a well-known systemic toxicant.

Inorganic lead (Pb) has multiple modes of action, with the following major targets (NICNAS, 2007):

- Central nervous system.
- Haematological system.
- Renal system.

The chemicals in this assessment are expected to show similar properties given the high amount of lead (Pb) in these UVCBs. Classification for STOT RE 2 is warranted for the chemicals in this assessment.

Cadmium oxide is classified as STOT RE 1 in the HCIS, and cadmium is reported to be present at ranges of 0–20 % in some of the chemicals, although the typical concentration of cadmium is around 0.02–5.44 % (Lead REACH Consortium). Due to the variability in the compositions of the chemicals, at this stage the chemicals are not recommended for classification in category 1.

Dermal

No data are available on the chemicals.

Inhalation

No data are available on the chemicals.

Genotoxicity

See **Carcinogenicity** section.

Carcinogenicity

No data are available on the chemicals. Lead oxides are classified as carcinogenic, mutagenic and toxic for reproduction based on the existing evidence on lead compounds (NICNAS a). Considering that lead oxides are major components of the chemicals in this assessment, classification for carcinogenicity, mutagenicity and reproductive toxicity is warranted for all of the chemicals in this group, based on the rules of classification for mixtures in the Globally Harmonised System of Classification and Labelling of Chemicals (GHS). Although the concentrations of lead oxides are not known in each of the chemicals, the available information about their composition indicates that elemental lead (Pb) is present at a minimum typical concentration of 3 % in eight of the chemicals (Lead REACH Consortium).

Reproductive and Developmental Toxicity

See **Carcinogenicity** section.

Risk Characterisation

Critical Health Effects

The critical health effects for risk characterisation include systemic long-term effects:

- carcinogenicity;
- mutagenicity; and
- reproductive toxicity and developmental toxicity.

The chemicals can also cause harmful effects following repeated exposure.

Public Risk Characterisation

Given the uses identified for these chemicals, it is unlikely that the public will be exposed. Hence, the public risk from these chemicals is not considered to be unreasonable.

Occupational Risk Characterisation

Some of the chemicals in this assessment have been reported to be used under strictly controlled conditions. No data are available on the others, although all of the chemicals are expected to be restricted to site-limited use.

During product formulation, oral, dermal, ocular and inhalation exposure might occur, particularly where manual or open processes are used. These could include transfer and blending activities, quality control analysis, and cleaning and maintaining equipment. Worker exposure to the chemicals at lower concentrations could also occur while using formulated products containing the chemicals. The level and route of exposure will vary depending on the method of application and work practices employed.

Given the critical health effects, the chemicals could pose an unreasonable risk to workers unless adequate control measures to minimise oral, dermal, ocular and inhalation exposure are implemented. The chemicals should be appropriately classified and labelled to ensure that a person conducting a business or undertaking (PCBU) a workplace (such as an employer) has adequate information to determine the appropriate controls.

The data available support an amendment to the hazard classification in the HCIS (Safe Work Australia) (refer to **Recommendation** section).

NICNAS Recommendation

Assessment of these chemicals is considered to be sufficient, provided that the recommended amendment to the classification is adopted, and labelling and all other requirements are met under workplace health and safety and poisons legislation as adopted by the relevant state or territory.

Regulatory Control

Work Health and Safety

In August 2016, Safe Work Australia published a decision in relation to a regulation impact statement (RIS) proposing to reduce the current regulatory thresholds for blood lead removal levels for lead risk workers and reduce the workplace exposure standards for dusts and fumes of inorganic lead from 0.15 mg/m³ to 0.05 mg/m³. Should the RIS proposal be adopted, the Model Work Health Safety Regulations will be amended and the transition period for compliance with the regulatory requirements is recommended to be 2 years from adoption (Safe Work Australia, 2016).

Currently, the health risk to workers from the chemical is controlled when correct classification and labelling are considered, and adequate control measures to minimise occupational exposure and protective clothing are implemented. Safe Work Australia (SWA) encourages working safely with lead and promotes the National Code of Practice for the Control and Safe Use of Inorganic Lead at Work [NOHSC: 2015 (1994)] and the National Standard for the Control of Inorganic Lead at Work [NOHSC:1012 (1994)]. These codes of practice, in addition to the Model Work Health Safety Regulations (2016) are available from the SWA website.

The chemicals are recommended for classification and labelling aligned with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as below. This does not consider classification of physical hazards and environmental hazards.

From 1 January 2017, under the model Work Health and Safety Regulations, chemicals are no longer to be classified under the Approved Criteria for Classifying Hazardous Substances system.

The classification proposed below is based on read-across principles and the existing classification for lead oxides. The PCBU should determine whether additional hazards arise due to the presence of metals other than lead and classify accordingly. Should more information become available on the composition of the UVCBs, or should empirical data become available for these chemicals, indicating a lower or higher classification is appropriate, these may be used to amend the recommended classification for the chemicals.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Repeat Dose Toxicity	Not Applicable	May cause damage to organs through prolonged or repeated exposure - Cat. 2 (H373)
Genotoxicity	Not Applicable	Suspected of causing genetic defects - Cat. 2 (H341)
Carcinogenicity	Not Applicable	Suspected of causing cancer - Cat. 2 (H351)
Reproductive and Developmental Toxicity	Not Applicable	May damage the unborn child. Suspected of damaging fertility - Cat. 1A (H360Df)

[a] Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)].

[b] Globally Harmonized System of Classification and Labelling of Chemicals (GHS) United Nations, 2009. Third Edition.

[*] Existing Hazard Classification. No change recommended to this classification

Advice for industry

Control measures

Control measures to minimise the risk from oral, dermal, ocular and inhalation exposure to the chemicals should be implemented in accordance with the hierarchy of controls. Approaches to minimise risk include substitution, isolation and engineering controls. Measures required to eliminate, or minimise risk arising from storing, handling and using a hazardous chemical depend on the physical form and the manner in which the chemicals are used. Examples of control measures that could minimise the risk include, but are not limited to:

- using closed systems or isolating operations;
- using local exhaust ventilation to prevent the chemicals from entering the breathing zone of any worker;

- health monitoring for any worker who is at risk of exposure to the chemicals, if valid techniques are available to monitor the effect on the worker's health;
- air monitoring to ensure control measures in place are working effectively and continue to do so;
- minimising manual processes and work tasks through automating processes;
- work procedures that minimise splashes and spills;
- regularly cleaning equipment and work areas; and
- using protective equipment that is designed, constructed, and operated to ensure that the worker does not come into contact with the chemicals.

Guidance on managing risks from hazardous chemicals are provided in the *Managing risks of hazardous chemicals in the workplace—Code of practice* available on the Safe Work Australia website.

Personal protective equipment should not solely be relied upon to control risk and should only be used when all other reasonably practicable control measures do not eliminate or sufficiently minimise risk. Guidance in selecting personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

Obligations under workplace health and safety legislation

Information in this report should be taken into account to help meet obligations under workplace health and safety legislation as adopted by the relevant state or territory. This includes, but is not limited to:

- ensuring that hazardous chemicals are correctly classified and labelled;
- ensuring that (material) safety data sheets ((M)SDS) containing accurate information about the hazards (relating to both health hazards and physicochemical (physical) hazards) of the chemicals are prepared; and
- managing risks arising from storing, handling and using a hazardous chemical.

Your work health and safety regulator should be contacted for information on the work health and safety laws in your jurisdiction.

Information on how to prepare an (M)SDS and how to label containers of hazardous chemicals are provided in relevant codes of practice such as the *Preparation of safety data sheets for hazardous chemicals—Code of practice* and *Labelling of workplace hazardous chemicals—Code of practice*, respectively. These codes of practice are available from the Safe Work Australia website.

A review of the physical hazards of these chemicals has not been undertaken as part of this assessment.

References

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National Industrial Chemicals Notification and Assessment Scheme (NICNAS) c. Inventory Multi-tiered Assessment and Prioritisation (IMAP) Human Health Tier II Assessment for Arsenic pentoxide and arsenic acid. Accessible at: **www.nicnas.gov.au**

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Last Update 28 June 2019

Chemical Identities

Chemical Name in the Inventory and Synonyms	**Lead alloy, base, dross** antimony and arsenic concentrates (secondary nonferrous plant) lead alloy, dross arsenic-nickel dross
CAS Number	69011-59-2
Structural Formula	**No Structural Diagram Available**

Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Lead alloy, base, dross (Pb, Sn)** high copper dross low copper dross solder dross
CAS Number	69011-60-5
Structural Formula	**No Structural Diagram Available**
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Lead, dross, antimony rich** lead refinery softener slag antimony slag from softening furnace
CAS Number	69029-45-4
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Lead, dross, bismuth rich** bismuth refinery caustic dross lead refinery bismuth liquation dross lead refinery bismuth dry dross
CAS Number	69029-46-5
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Lead, antimonial** antimonial lead

CAS Number	69029-50-1
Structural Formula	No Structural Diagram Available
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Lead, antimonial, dross** caustic nickel dross detinning dross lead refinery antimony copper dross lead refinery calcium desilverizing dross lead refinery caustic arsenic dross
CAS Number	69029-51-2
Structural Formula	No Structural Diagram Available
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Lead, dross** copper dross (lead refinery) lead refining caustic dross lead refinery pyrite dross lead smelter dross smelter dross (lead)
CAS Number	69029-52-3
Structural Formula	**No Structural Diagram Available**
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Slags, lead reverbatory smelting** copper dross slag high tin slag lead refinery reverberatory furnace slag reverberatory furnace slag
CAS Number	69029-58-9
Structural Formula	**No Structural Diagram Available**
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Flue dust, lead refining** blast furnace spray chamber dust litharge dusts and residues lead blast furnace baghouse dust lead refinery arsenic baghouse dust lead reverberatory furnace fumes, dusts and cleanings
CAS Number	69029-67-0
Structural Formula	**No Structural Diagram Available**
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Lead ores, sintered** lead sinter lead smelter sinter calcines, lead ore conc. lead smelter sinter cake and sinter fines sinter cake, lead smelter
CAS Number	69029-74-9
Structural Formula	**No Structural Diagram Available**

Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Residues, lead smelting** lead blast furnace barrings lead refinery oxides
CAS Number	69029-79-4
Structural Formula	**No Structural Diagram Available**
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Residues, precious metal recovery lead refining** sodium boroplumbate, fusion products
CAS Number	69029-80-7
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Slags, lead smelting** blast furnace slag (lead) lead smelter slag secondary lead smelting blast furnace slag
CAS Number	69029-84-1
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Slags, precious metal recovery lead refining** inorganic slag

CAS Number	69029-85-2
Structural Formula	No Structural Diagram Available
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Lead, zinc dross**
CAS Number	94551-60-7
Structural Formula	No Structural Diagram Available
Molecular Formula	Unspecified
Molecular Weight	

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