

# MEMO

To: Phill Wilkinson, Senex Energy

From: Dana McCue, EHS Support

CC: Jacob Cumpstay, Senex Energy  
Joe Hayes, EHS Support

Date: 12 January 2026

Re: Chemical Risk Assessment for Atlas Stage 3 Gas Project – CM302 Cementing Additive

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This technical memorandum provides a chemical risk assessment of the chemicals in CM302, a cementing additive product proposed to be used in coal seam gas (CSG) operations (drilling and completions and well abandonment) within the Senex Energy (“Senex”) Atlas Stage 3 Development. This document was prepared in accordance with the Chemical Risk Assessment Framework (CRAF; Klohn Crippen Berger, 2024a) and the *Senex Atlas Stage 3 DCCEEW PD Response Drilling Chemical Risk Assessment* (“March 2024 CRAR”; Klohn Crippen Berger, 2024b) for chemical risk assessments for this area.

The CRAF incorporates best practice risk assessment methodologies for the assessment of the potential impacts of the chemicals proposed to be used in CSG operations on Matters of National Environmental Significance (MNES).

This assessment process is designed to align with national guidance and other regulatory frameworks and assesses the full lifecycle of chemicals that are stored, handled, used and/or disposed during or following drilling and hydraulic fracturing activities. Accidental release scenarios are not included; however, the outcomes of the assessment will be used to inform emergency response actions.

## Goals

The aim of the chemical risk assessment is to evaluate the potential risks and effects of chemicals used during CSG operations (defined as drilling and completions) to MNES. No hydraulic fracturing is proposed for the Senex Atlas Stage 3 Development and CM302 is not proposed for use in water treatment.

The goal of the chemical risk assessment is to demonstrate that potential risks to MNES, associated with the chemicals within CM302, a product proposed for use in CSG operations, have been eliminated or reduced as much as is reasonably practicable. In addition, potential risks to non-MNES receptors (for example residents, agricultural workers and livestock) will be assessed where an activity results in exposure to water resources and there is potential for a complete exposure pathway to the non-MNES receptor (e.g., drilling and completion activities near a water bore used for drinking water). Effects to terrestrial MNES and water resource MNES will be assessed via the identification of potentially complete exposure pathways to soils.



## Approach

As noted above, formal assessments must be conducted on each chemical in accordance with the CRAF (Klohn Crippen Berger, 2024a). This technical memo serves as an addendum to the March 2024 CRAR and follows the assessment methodology outlined in the CRAF for the chemicals present within CM302.

The framework for the chemical risk assessment involves a two-step process:

- Step 1 – classification of chemicals
- Step 2 – assessment of chemicals

The criteria to be used in the chemical category classification within this framework is provided in Appendix 1 of the CRAF (**Attachment 1**). Consistent with the CRAF, chemicals categorised as Tier 1 chemicals are designated as ‘low concern’ chemicals. Chemicals categorised as Tier 2 or Tier 3 chemicals are designated as ‘potential concern’ or ‘potentially high concern’ chemicals, respectively.

Based on the Tier classification of the chemical (and its potential toxicity, persistence and bioaccumulation potential in the environment), different levels of assessment are conducted with the most robust assessment conducted on the highest classification. Consistent with the screening matrix in Appendix 1 of the CRAF (**Table 1**):

- Chemicals previously assessed by national (e.g. NICNAS) or international regulators and considered to be of low hazard, and therefore low risk for human health and the environment to not require further assessment pursuant to the CRAF.
- Tier 1 chemicals, which are effectively low toxicity and therefore low hazard, would be subject to only the screening assessment.
- Tier 2 chemicals, in addition to the screening assessment, will be subjected to a qualitative risk assessment.
- Tier 3 chemicals will be subject to an additional quantitative risk assessment.

A Register of Assessed Chemicals has been developed and is published and maintained on Senex’s website and includes chemicals assessed in the March 2024 CRAR<sup>1</sup>. The Register of Assessed Chemicals will, for each published chemical, provide a summary of the outcomes of the screening assessment, including the Tier (and Risk Level) categorisation, the activities the chemical has been assessed for (i.e. drilling and completions and/or production operations) and the assessed end use/fate of the chemical. Toxicological information for all chemicals will be re-evaluated approximately every 5 years.

Chemicals evaluated in this assessment were identified based on a review of the safety data sheet (SDS) for CM302 (**Attachment 2**). A Register of Assessed Chemicals for chemicals evaluated in this risk assessment is included in **Attachment 3** and was developed for inclusion in the online Register of Assessed Chemicals (**Attachment 3**).

In the development of this screening assessment, toxicological profiles have been developed for all chemicals (Tier 1 through 3) and these are provided in **Attachment 4**. Consistent with the guidance documents contained within the CRAF, the risk assessment includes the following components for the different Tiers of Chemicals (**Table 2**).

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<sup>1</sup> <https://senexenergy.com.au/news/atlas3/>



**TABLE 1 ASSESSMENT AND REPORTING REQUIREMENTS BY TIER**

Tier	Risk Category	Screening Assessment and Categorisation	Toxicological Profile	Qualitative Risk Assessment	Quantitative Risk Assessment	Prohibited from Use on Project
1	Low Concern	X	X			
2	Potential Concern	X	X	X		
3	Potentially High Concern	X	X	X	X	
Prohibited From Use	Very High Concern					X

**TABLE 2 QUALITATIVE AND QUANTITATIVE RISK ASSESSMENT COMPONENTS**

Tier 2 (Qualitative Risk Assessment)	Tier 3 (Quantitative Risk Assessment)
Problem Formulation and Issue Identification Hazard Assessment Risk Communication and Management	Problem Formulation and Issue Identification Hazard Assessment Exposure Assessment Risk Characterisation Risk Communication and Management

## Screening Assessment Findings

### Chemical Classification and Risk Assessment

Senex is proposing to use CM302 as a cementing additive. Exposure was assessed for the constituents of potential concern (COPCs) identified in CM302 during the drilling process. The chemicals identified in CM302 are detailed in **TABLE 3**. The SDS for CM302 is included as **Attachment 2**.

**TABLE 3 CM302 CHEMICALS**

Chemical Name	CAS No.
Sodium metasilicate, pentahydrate	10213-79-3

The chemical identified for evaluation as part of this chemical risk assessment was reviewed using the approved CRAF provided in **Attachment 1**. Based on the tier classification of the chemical (and its potential toxicity, persistence and bioaccumulation potential in the environment), different levels of assessment are conducted with the most robust assessment conducted on the highest classification.

The findings of the screening assessment based on the CRAF is included in the Register of Assessed Chemicals provided as **Attachment 3**. This table documents the chemicals assessed, the key findings



from the hazard assessment, the classification Tier determined, the activities the chemical has been assessed for (i.e. drilling and completions) and the assessed end use/fate of the chemical.

As presented in the Register of Assessed Chemical in **Attachment 3**, sodium metasilicate, pentahydrate was assessed as a Tier 1 chemical and requires a hazard assessment only and development of a toxicological profile (risk assessment dossier).

The toxicological profile to support this assessment is provided in **Attachment 4**. This is a critical data source for first responders (including emergency services) in the event of a release during transportation (determined to be the highest probability release event), Senex operators and the regulatory community.

## Summary

The aim of this chemical risk assessment was to evaluate the potential risks and effects of chemicals in CM302 used during CSG extraction (drilling, completions and well abandonment) to MNES. The goal of the chemical risk assessment was to demonstrate that potential risks to MNES associated with the chemicals used in CSG extraction have been eliminated or reduced as much as is reasonably practicable.

The life cycle of the drilling and completion and production was assessed specifically for the proposed operations and included:

- storage, usage (e.g., blending, injection), and recovery of chemicals throughout operations; beneficial reuse of recovered drilling fluids and cuttings for well lease rehabilitation; and,
- storage of produced water.

In accordance with the CRAF an evaluation of all chemicals proposed for use was conducted, with one (1) chemical classified as Tier 1 chemicals (refer **Attachment 3**).

The chemical risk assessments completed for the chemical indicated negligible risks and effects of chemicals used during CSG operations (drilling and completions and well abandonment) to MNES when appropriate management and mitigation controls were in place. Should assessments of additional chemicals indicate additional management control, the EMP and associated management plans will be updated accordingly.

In general, the management practices adopted and implemented by Senex are appropriate and have eliminated or reduced as much as is reasonably practicable the potential risks to MNES associated with the chemicals used in CSG extraction.

## References

Klohn Crippen Berger. (2024a). Atlas Stage 3 DCCEEW PD Response Chemical Risk Assessment Framework. Final. Revision 1. March.

Klohn Crippen Berger. (2024b). Atlas Stage 3 DCCEEW PD Response Drilling Chemical Risk Assessment. Final. Revision 2. March.



## Attachment 1 CRAF Screening Matrix

**Attachment 1**  
**Summary of Chemical Risk Assessment Framework**

Criteria	Category 1	Category 2	Category 3	Category 4	Category 5
<b>General PBT Assessment Step</b>					
<b>Combined PBT Assessment Category</b>	<b>Not a PBT</b>	<b>Not a PBT</b>	<b>Not a PBT</b>	<b>Identified as a PBT</b>	<b>N/A</b>
<b>Chemical Databases of Concern Assessment Step</b>					
<b>Listed as a chemical of concern on relevant databases</b>	<b>Not listed as a chemical of potential concern on the following databases:</b> - European Union Substance of Very High Concern (EU SVHC). - US National Toxicology Program (US NTP) Report on Carcinogens or International Agency Research on Cancer (IARC) Monographs. - European Commission Endocrine Disruptors Strategy - list of Category 1 substances with endocrine disrupting capacity. - Chemical Substances Control Law of Japan (CSCL) Class I and II Specified Chemical.	<b>Not listed as a chemical of potential concern on the following databases:</b> - European Union Substance of Very High Concern (EU SVHC). - US National Toxicology Program (US NTP) Report on Carcinogens or International Agency Research on Cancer (IARC) Monographs. - European Commission Endocrine Disruptors Strategy - list of Category 1 substances with endocrine disrupting capacity. - Chemical Substances Control Law of Japan (CSCL) Class I and II Specified Chemical.	<b>Listed as a chemical of concern on the following databases:</b> - European Union Substance of Very High Concern (EU SVHC). - US National Toxicology Program (US NTP) Report on Carcinogens or International Agency Research on Cancer (IARC) Monographs. - European Commission Endocrine Disruptors Strategy - list of Category 1 substances with endocrine disrupting capacity. - Chemical Substances Control Law of Japan (CSCL) Class I and II Specified Chemical.	<b>Listed as a chemical of concern on the following databases:</b> - European Union Substance of Very High Concern (EU SVHC). - US National Toxicology Program (US NTP) Report on Carcinogens or International Agency Research on Cancer (IARC) Monographs. - European Commission Endocrine Disruptors Strategy - list of Category 1 substances with endocrine disrupting capacity. - Chemical Substances Control Law of Japan (CSCL) Class I and II Specified Chemical.	<b>Chemicals noted in the Rotterdam Accord including:</b> - octabromodiphenyl ether - pentabromodiphenyl ether - perfluorooctane sulfonic acid - perfluorooctane sulfonates - perfluorooctane sulfonamides - perfluorooctane sulfonyls - polybromated biphenyls - short chain chlorinated paraffins - tetramethyl lead - tributyl tin compounds  <b>Chemicals banned in the State of Queensland including:</b> - Benzene* - Toluene* - Ethylbenzene* - Xylene*
<b>Identified as Polymer of Low Concern</b>	Yes (no further assessment required)	No	No	No	N/A
<b>Persistence Assessment Step</b>					
<b>Persistence</b>	Not persistent as defined by: Air - Half life < 2 days Water - Half life < 60 days Soil and Sediment - Half life < 6 months	Not persistent as defined by: Air - Half life < 2 days Water - Half life < 60 days Soil and Sediment - Half life < 6 months	Persistent as defined by: Air - Half life ≥ 2 days Water - Half life ≥ 60 days Soil and Sediment - Half life ≥ 6 months	Persistent as defined by: Air - Half life ≥ 2 days Water - Half life ≥ 60 days Soil and Sediment - Half life ≥ 6 months	N/A
<b>Other Persistence Concerns - Chemical identified as potentially accumulating in soil and posing risks</b>	No potential concerns with accumulation in soil and impacts on flora and fauna	No potential concerns with accumulation in soil and impacts on flora and fauna	Potential concerns with accumulation in soils based on ANZECC assessment b (for example metals such as Cd)	Potential concerns with accumulation in soils based on ANZECC assessment b (for example metals such as Cd)	N/A
<b>Bioaccumulative Assessment Step</b>					
<b>Bioaccumulative</b>	<b>Does not Bioaccumulate as defined by:</b> - Aquatic - BAF < 2000 or BCF < 2000 or log KoW < 4.2 (if BAF and BCF are not available) - Terrestrial - log Koa < 6 and log Kow < 2 - Food Chain Bioaccumulation Potential - BMF < 1	<b>Does not Bioaccumulate as defined by:</b> - Aquatic - BAF < 2000 or BCF < 2000 or log KoW < 4.2 (if BAF and BCF are not available) - Terrestrial - log Koa < 6 and log Kow < 2 - Food Chain Bioaccumulation Potential - BMF < 1	<b>Does not Bioaccumulate as defined by:</b> - Aquatic - BAF < 2000 or BCF < 2000 or log KoW < 4.2 (if BAF and BCF are not available) - Terrestrial - log Koa < 6 and log Kow < 2 - Food Chain Bioaccumulation Potential - BMF < 1	<b>Does Bioaccumulate as defined by:</b> - Aquatic - BAF ≥ 2000 or BCF ≥ 2000 or log KoW ≥ 4.2 (if BAF and BCF are not available) - Terrestrial - log Koa ≥ 6 and log Kow ≥ 2 - Food Chain Bioaccumulation Potential - BMF > 1	N/A
<b>Toxicity Assessment Step</b>					
<b>Toxicity</b>	<b>Acute Toxicity:</b> Fish -96h LC 50 > 10 mg/L Invertebrates - 48h EC50 > 10 mg/L Algae and other aquatic plants -72 or 96h ErC50 > 10 mg/L  <b>Chronic Toxicity:</b> Fish NOEC or ECx > 1 mg/L Invertebrates NOEC or ECx > 1 mg/L Algae and other aquatic plants -NOEC or ECx > 1 mg/L	<b>Acute Toxicity:</b> Fish -96h LC 50 > 1 to < 10 mg/L Invertebrates - 48h EC50 > 1 to < 10 mg/L Algae and other aquatic plants -72 or 96h ErC50 > 1 to < 10 mg/L  <b>Chronic Toxicity:</b> Fish NOEC or ECx > 0.1 to < 1 mg/L Invertebrates NOEC or ECx > 0.1 to < 1 mg/L Algae and other aquatic plants -NOEC or ECx > 0.1 to < 1 mg/L	<b>Acute Toxicity:</b> Fish -96h LC 50 ≤ 1 mg/L Invertebrates - 48h EC50 ≤ 1 mg/L Algae and other aquatic plants -72 or 96h ErC50 ≤ 1 mg/L  <b>Chronic Toxicity:</b> Fish NOEC or ECx ≤ 0.1 mg/L Invertebrates NOEC or ECx ≤ 0.1 mg/L Algae and other aquatic plants -NOEC or ECx ≤ 0.1 mg/L	<b>Acute Toxicity:</b> Fish -96h LC 50 ≤ 1 mg/L Invertebrates - 48h EC50 ≤ 1 mg/L Algae and other aquatic plants -72 or 96h ErC50 ≤ 1 mg/L  <b>Chronic Toxicity:</b> Fish NOEC or ECx ≤ 0.1 mg/L Invertebrates NOEC or ECx ≤ 0.1 mg/L Algae and other aquatic plants -NOEC or ECx ≤ 0.1 mg/L	N/A
<b>RISK ASSESSMENT ACTIONS REQUIRED</b>					
<b>RISK ASSESSMENT ACTIONS REQUIRED</b>	<b>Hazard Assessment only.</b> Do screening only and note it meets the above criteria. Develop toxicological profile	<b>Hazard Assessment and Qualitative Assessment Only.</b> Do screening only and note it meets the above criteria. Develop toxicological profile and PNECs for water and soil and provide qualitative discussion of risk	<b>Quantitative Risk Assessment:</b> Complete PBT, qualitative and quantitative assessment of risk. Quantitative assessment of risk will consider only Category 3 chemicals in end use determination.	<b>Quantitative Risk Assessment and Full Life Cycle Assessment:</b> Need to demonstrate that the chemical cannot be substituted. If retained will need to conduct a full life cycle quantitative risk assessment including food chain risk assessment	<b>Banned from Use on Project.</b> Would require specific assessment process and require extensive consultation prior to assessment.

\* Above levels prescribed in the Queensland Environment Protection Act 1994

N/A - Not Applicable

ANZECC Australian and New Zealand Environment and Conservation Council

BAF = bioaccumulation factor

BCF = bioconcentration factor

BMF = biomagnification factor

Cd = cadmium

EC = effect concentration

ECx = effect concentration at x% effect (e.g., mortality, inhibition of growth, reproduction) is observed compared to the control group.

ErC50 = the concentration of test substance which results in a 50 percent reduction in growth rate (ErC50) relative to the control within 72 hours exposure

h = hour

Koa = octonal-air partition coefficient

Kow = octonal-water partition coefficient

LC = lethal concentration

mg/L = milligrams per litre

NOEC = no observed effect concentration

PBT = persistent, bioaccumulative, and toxic

PNEC = predicted no effects concentration



## Attachment 2 Safety Data Sheet



## SECTION 1: IDENTIFICATION

- 1.1 Product identifier:** CM302  
Sodium metasilicate pentahydrate  
CAS: 10213-79-3  
**Other means of identification:**  
Not available
- 1.2 Recommended use of the chemical and restrictions on use:**  
Relevant uses: Chemical industry. For professional users only.  
Uses advised against: All uses not specified in this section or in section 7.3
- 1.3 Details of manufacturer or importer:**  
Fusion Technologies (Australia) Pty  
Unit 3, 1472 Boundary Road  
Wacol, Queensland 4076, Australia  
Phone: +61 460 047 656  
<https://www.fusiontechinc.net/>  
Technical Inquiries: help@fusiontechinc.net
- 1.4 Emergency phone number:** **AU 1800 033 111 NZ 0800 734 607 (ALL HOURS)**

## SECTION 2: HAZARD(S) IDENTIFICATION

### 2.1 Classification of the hazardous chemical:

#### WHS:

Classification of this product has been carried out in accordance with Model Work Health and Safety Regulations (Hazardous Chemicals) Amendment 2022

Acute Tox. 4: Acute toxicity if swallowed, Category 4, H302  
Eye Dam. 1: Serious eye damage, Category 1, H318  
Met. Corr. 1: Corrosive to metals, Category 1, H290  
Skin Corr. 1A: Skin corrosion, Category 1A, H314  
STOT SE 3: Respiratory tract toxicity, single exposure, Category 3, H335

### 2.2 Label elements, including precautionary statements:

#### WHS:

Danger



#### Hazard statements:

Acute Tox. 4: H302 - Harmful if swallowed.  
Met. Corr. 1: H290 - May be corrosive to metals.  
Skin Corr. 1A: H314 - Causes severe skin burns and eye damage.  
STOT SE 3: H335 - May cause respiratory irritation.

#### Precautionary statements:

P234: Keep only in original container.  
P280: Wear protective gloves/face protection/protective clothing/respiratory protection/protective footwear.  
P301+P330+P331: IF SWALLOWED: rinse mouth. Do NOT induce vomiting.  
P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.  
P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P403+P233: Store in a well-ventilated place. Keep container tightly closed.  
P501: Dispose of contents and / or containers in accordance with regulations on hazardous waste or packaging and packaging waste respectively.

### 2.3 Other hazards which do not result in classification:

Not available

## SECTION 3: COMPOSITION AND INFORMATION ON INGREDIENTS, IN ACCORDANCE WITH SCHEDULE 8

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### SECTION 3: COMPOSITION AND INFORMATION ON INGREDIENTS, IN ACCORDANCE WITH SCHEDULE 8 (continued)

#### 3.1 Substances:

**Chemical description:** Miscellaneous products

In accordance with Schedule 8 (WHS Regulations), the product contains:

Identification	Chemical name/Classification	Concentration
CAS: 10213-79-3	<b>Sodium metasilicate pentahydrate</b> Eye Dam. 1: H318; Met. Corr. 1: H290; Skin Corr. 1B: H314; STOT SE 3: H335 - Danger	100 %

To obtain more information on the hazards of the substances consult sections 11, 12 and 16.

#### 3.2 Mixtures:

Non-applicable

### SECTION 4: FIRST AID MEASURES

#### 4.1 Description of necessary first aid measures:

Request medical assistance immediately, showing the SDS of this product.

##### By inhalation:

Remove the person affected from the area of exposure, provide with fresh air and keep at rest. In serious cases such as cardiorespiratory failure, artificial resuscitation techniques will be necessary (mouth to mouth resuscitation, cardiac massage, oxygen supply, etc.) requiring immediate medical assistance.

##### By skin contact:

Remove contaminated clothing and footwear, rinse skin or shower the person affected if appropriate with plenty of cold water and neutral soap. In serious cases see a doctor. If the product causes burns or freezing, clothing should not be removed as this could worsen the injury caused if it is stuck to the skin. If blisters form on the skin, these should never be burst as this will increase the risk of infection.

##### By eye contact:

Rinse eyes thoroughly with lukewarm water for at least 15 minutes. Do not allow the person affected to rub or close their eyes. If the injured person uses contact lenses, these should be removed unless they are stuck to the eyes, as this could cause further damage. In all cases, after cleaning, a doctor should be consulted as quickly as possible with the SDS of the product.

##### By ingestion/aspiration:

Request immediate medical assistance, showing the SDS of this product. Do not induce vomiting, because its expulsion from the stomach can be hazardous to the mucus of the main digestive tract, and its inhalation, to the respiratory system. Rinse out the mouth and throat, as they may have been affected during ingestion. In the case of loss of consciousness do not administrate anything orally unless supervised by a doctor. Keep the person affected at rest.

#### 4.2 Symptoms caused by exposure:

Acute and delayed effects are indicated in sections 2 and 11.

#### 4.3 Medical attention and special treatment:

Not available

### SECTION 5: FIREFIGHTING MEASURES

#### 5.1 Suitable extinguishing equipment:

##### Suitable extinguishing media:

Product is non-flammable under normal conditions of storage, handling and use. In the case of combustion as a result of improper handling, storage or use preferably use polyvalent powder extinguishers (ABC powder), in accordance with the Regulation on fire protection systems.

##### Unsuitable extinguishing media:

Non-applicable

#### 5.2 Specific hazards arising from the chemical:

As a result of combustion or thermal decomposition reactive sub-products are created that can become highly toxic and, consequently, can present a serious health risk.

#### 5.3 Special protective equipment and precautions for fire fighters:

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## SECTION 5: FIREFIGHTING MEASURES (continued)

Depending on the magnitude of the fire it may be necessary to use full protective clothing and individual respiratory equipment. Minimum emergency facilities and equipment should be available (fire blankets, portable first aid kit,...)

### Additional provisions:

Act in accordance with the Internal Emergency Plan and the Information Sheets on actions to take after an accident or other emergencies. Destroy any source of ignition. In case of fire, refrigerate the storage containers and tanks for products susceptible to inflammation, explosion or BLEVE as a result of high temperatures. Avoid spillage of the products used to extinguish the fire into an aqueous medium.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures:

#### For non-emergency personnel:

Sweep up and shovel product or other means and place in container for reuse (preferred) or disposal

#### For emergency responders:

Wear protective equipment. Keep unprotected persons away. See section 8.

### 6.2 Environmental precautions:

This product is not classified as hazardous to the environment. Keep product away from drains, surface and underground water.

### 6.3 Methods and materials for containment and cleaning up:

It is recommended:

Sweep up and shovel product or other means and place in container for reuse (preferred) or disposal

### 6.4 Reference to other sections:

See sections 8 and 13.

## SECTION 7: HANDLING AND STORAGE

### 7.1 Precautions for safe handling:

#### A.- General precautions for safe use

Comply with the current legislation concerning the prevention of industrial risks. Keep containers hermetically sealed. Control spills and residues, destroying them with safe methods (section 6). Avoid leakages from the container. Maintain order and cleanliness where dangerous products are used.

#### B.- Technical recommendations for the prevention of fires and explosions

Due to its non-flammable nature, the product does not present a fire risk under normal conditions of storage, manipulation and use.

#### C.- Technical recommendations on general occupational hygiene

Do not eat or drink during the process, washing hands afterwards with suitable cleaning products.

#### D.- Technical recommendations to prevent environmental risks

It is recommended to have absorbent material available at close proximity to the product (See subsection 6.3)

### 7.2 Conditions for safe storage, including any incompatibilities:

#### A.- Specific storage requirements

Minimum Temp.: 5 °C

Maximum Temp.: 40 °C

Maximum time: 6 Months

#### B.- General conditions for storage

Avoid sources of heat, radiation, static electricity and contact with food. For additional information see subsection 10.5

### 7.3 Specific end use(s):

Except for the instructions already specified it is not necessary to provide any special recommendation regarding the uses of this product.

## SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

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**SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION (continued)**

**8.1 Exposure control measures:**

Substances whose occupational exposure limits have to be assessed in the workplace:

Nuisance dust: Inhalable dust 10 mg/m<sup>3</sup> // Respirable dust 4 mg/m<sup>3</sup>

**8.2 Engineering controls:**

A.- Individual protection measures, for example personal protective equipment (PPE)

As a preventative measure it is recommended to use basic Personal Protection Equipment. For more information on Personal Protection Equipment (storage, use, cleaning, maintenance, class of protection,...) consult the information leaflet provided by the manufacturer. For more information see subsection 7.1.

All information contained herein is a recommendation which needs some specification from the labour risk prevention services as it is not known whether the company has additional measures at its disposal.

B.- Respiratory protection

Pictogram	PPE	Remarks
 Mandatory respiratory tract protection	Filter mask for gases, vapours and particles	Replace when an increase in resistance to breathing is observed and/or a smell or taste of the contaminant is detected.

C.- Specific protection for the hands

Pictogram	PPE	Remarks
 Mandatory hand protection	Chemical protective gloves (Material: Nitrile, Breakthrough time: > 480 min, Thickness: 0.11 mm)	Replace the gloves at any sign of deterioration.

D.- Eye and face protection

Pictogram	PPE	Remarks
 Mandatory face protection	Face shield	Clean daily and disinfect periodically according to the manufacturer's instructions. Use if there is a risk of splashing.

E.- Bodily protection

Pictogram	PPE	Remarks
 Mandatory complete body protection	Disposable clothing for protection against chemical risks	For professional use only. Clean periodically according to the manufacturer's instructions.
 Mandatory foot protection	Safety footwear for protection against chemical risk	Replace boots at any sign of deterioration.

F.- Additional emergency measures

Emergency measure	Standards	Emergency measure	Standards
 Emergency shower	ANSI Z358-1 ISO 3864-1:2011, ISO 3864-4:2011	 Eyewash stations	DIN 12 899 ISO 3864-1:2011, ISO 3864-4:2011

**Environmental exposure controls:**

In accordance with the community legislation for the protection of the environment it is recommended to avoid environmental spillage of both the product and its container. For additional information see subsection 7.1.D

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## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties:

For complete information see the product datasheet.

#### Appearance:

Physical state at 20 °C:	Solid
Appearance:	Granulated
Color:	<input type="checkbox"/> White
Odor:	Odourless
Odour threshold:	Not available *

#### Volatility:

Boiling point at atmospheric pressure:	Not available *
Vapour pressure at 20 °C:	Not available *
Vapour pressure at 50 °C:	Not available *
Evaporation rate at 20 °C:	Not available *

#### Product description:

Density at 20 °C:	Not available *
Relative density at 20 °C:	0.85 - 1.05
Dynamic viscosity at 20 °C:	Not available *
Kinematic viscosity at 20 °C:	Not available *
Kinematic viscosity at 40 °C:	Not available *
Concentration:	Not available *
pH:	>12 (at 1 %)
Vapour density at 20 °C:	Not available *
Partition coefficient n-octanol/water 20 °C:	Not available *
Solubility in water at 20 °C:	Not available *
Solubility properties:	Water-soluble
Decomposition temperature:	Not available *
Melting point/freezing point:	72 °C

#### Flammability:

Flash Point:	Non-applicable
Flammability (solid, gas):	Not available *
Autoignition temperature:	Not available *
Lower flammability limit:	Not available *
Upper flammability limit:	Not available *

#### Explosive (Solid):

Lower explosive limit:	Not available *
Upper explosive limit:	Not available *

#### Particle characteristics:

Median equivalent diameter:	Not available *
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### 9.2 Other information:

#### Information with regard to physical hazard classes:

Explosive properties:	Not available *
Oxidising properties:	Not available *
Corrosive to metals:	H290 May be corrosive to metals.
Heat of combustion:	Not available *

\*Not available due to the nature of the product, not providing information property of its hazards.

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## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES (continued)

Aerosols-total percentage (by mass) of flammable components: Not available \*

### Other safety characteristics:

Surface tension at 20 °C: Not available \*

Refraction index: Not available \*

\*Not available due to the nature of the product, not providing information property of its hazards.

## SECTION 10: STABILITY AND REACTIVITY

### 10.1 Reactivity:

No hazardous reactions are expected because the product is stable under recommended storage conditions. See section 7 from Safety Data Sheet.

### 10.2 Chemical stability:

Chemically stable under the indicated conditions of storage, handling and use.

### 10.3 Possibility of hazardous reactions:

Under the specified conditions, hazardous reactions that lead to excessive temperatures or pressure are not expected.

### 10.4 Conditions to avoid:

Applicable for handling and storage at room temperature:

Shock and friction	Contact with air	Increase in temperature	Sunlight	Humidity
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

### 10.5 Incompatible materials:

Acids	Water	Oxidising materials	Combustible materials	Others
Avoid strong acids	Avoid direct impact	Precaution	Not applicable	Not applicable

### 10.6 Hazardous decomposition products:

See subsection 10.3, 10.4 and 10.5 to find out the specific decomposition products. Depending on the decomposition conditions, complex mixtures of chemical substances can be released: carbon dioxide (CO<sub>2</sub>), carbon monoxide and other organic compounds.

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects:

#### Dangerous health implications:

In case of exposure that is repetitive, prolonged or at concentrations higher than recommended by the occupational exposure limits, it may result in adverse effects on health depending on the means of exposure:

#### A- Ingestion (acute effect):

- Acute toxicity: The consumption of a considerable dose can cause irritation in the throat, abdominal pain, nausea and vomiting.
- Corrosivity/Irritability: Corrosive product, if it is swallowed causes burns destroying the tissues. For more information about secondary effects from skin contact see section 2.

#### B- Inhalation (acute effect):

- Acute toxicity : Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous for inhalation. For more information see section 3.
- Corrosivity/Irritability: Prolonged inhalation of the product is corrosive to mucous membranes and the upper respiratory tract

#### C- Contact with the skin and the eyes (acute effect):

- Contact with the skin: Above all, skin contact may occur as fabrics of all thicknesses can be destroyed, resulting in burns. For more information on the secondary effects see section 2.
- Contact with the eyes: Produces serious eye damage after contact.

#### D- CMR effects (carcinogenicity, mutagenicity and toxicity to reproduction):

- CONTINUED ON NEXT PAGE -



## SECTION 11: TOXICOLOGICAL INFORMATION (continued)

- Carcinogenicity: Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous for the effects mentioned. For more information see section 3.  
IARC: Not available
- Mutagenicity: Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous for this effect. For more information see section 3.
- Reproductive toxicity: Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous for this effect. For more information see section 3.

### E- Sensitizing effects:

- Respiratory: Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous with sensitising effects. For more information see section 3.
- Skin: Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous for this effect. For more information see section 3.

### F- Specific target organ toxicity (STOT) - single exposure:

Causes irritation in respiratory passages, which is normally reversible and limited to the upper respiratory passages.

### G- Specific target organ toxicity (STOT)-repeated exposure:

- Specific target organ toxicity (STOT)-repeated exposure: Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous for this effect. For more information see section 3.
- Skin: Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous for this effect. For more information see section 3.

### H- Aspiration hazard:

Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous for this effect. For more information see section 3.

### Other information:

Not available

### Product-specific toxicological information:

Acute toxicity		Genus
LD50 oral	847 mg/kg	Rat

### Specific toxicology information on the substances:

Not available

## SECTION 12: ECOLOGICAL INFORMATION

The experimental information related to the eco-toxicological properties of the product itself is not available

Based on available data, the classification criteria are not met, as it does not contain substances classified as hazardous for this effect. For more information see section 3.

### 12.1 Ecotoxicity:

Not available

### 12.2 Persistence and degradability:

Not available

### 12.3 Bioaccumulative potential:

Not available

### 12.4 Mobility in soil:

Not available

Water-soluble

### 12.5 Results of PBT and vPvB assessment:

Non-applicable

### 12.6 Other adverse effects:

Not described

## SECTION 13: DISPOSAL CONSIDERATIONS

### 13.1 Disposal methods:

- CONTINUED ON NEXT PAGE -



## SECTION 13: DISPOSAL CONSIDERATIONS (continued)

### Waste management (disposal and evaluation):

Consult the authorized waste service manager on the assessment and disposal operations. In case the container has been in direct contact with the product, it will be processed the same way as the actual product. Otherwise, it will be processed as non-hazardous residue. Waste should not be disposed of to drains. See epigraph 6.2.

### Regulations related to waste management:

Legislation related to waste management:

Basel Convention (Hazardous Waste)

Hazardous Waste (Regulation of Exports and Imports) Act 1989 and Amendments

## SECTION 14: TRANSPORT INFORMATION

### Transport of dangerous goods by land:

With regard to ADG Code:



<b>14.1 UN number:</b>	UN3253
<b>14.2 Proper shipping name or Technical Name:</b>	DISODIUM TRIOXOSILICATE
<b>14.3 Transport hazard class:</b>	8
Labels:	8
<b>14.4 Packing Group:</b>	III
<b>14.5 HAZCHEM code:</b>	2X
<b>14.6 Special precautions for user</b>	
Physico-Chemical properties:	see section 9
<b>14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:</b>	Not available

### Transport of dangerous goods by sea:

With regard to IMDG 41-22:



<b>14.1 UN number:</b>	UN3253
<b>14.2 Proper shipping name or Technical Name:</b>	DISODIUM TRIOXOSILICATE
<b>14.3 Transport hazard class:</b>	8
Labels:	8
<b>14.4 Packing Group:</b>	III
<b>14.5 Marine pollutant:</b>	No
<b>14.6 Special precautions for user</b>	
Special regulations:	Not available
EmS Codes:	F-A, S-B
Physico-Chemical properties:	see section 9
Limited quantities:	5 kg
Segregation group:	SGG18
<b>14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:</b>	Not available

### Transport of dangerous goods by air:

With regard to IATA/ICAO 2024:

- CONTINUED ON NEXT PAGE -



## SECTION 14: TRANSPORT INFORMATION (continued)



<b>14.1 UN number:</b>	UN3253
<b>14.2 Proper shipping name or Technical Name:</b>	DISODIUM TRIOXOSILICATE
<b>14.3 Transport hazard class:</b>	8
Labels:	8
<b>14.4 Packing Group:</b>	III
<b>14.5 Environmental hazards for Transport Purposes:</b>	No
<b>14.6 Special precautions for user</b>	
Physico-Chemical properties:	see section 9
<b>14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:</b>	Not available

## SECTION 15: REGULATORY INFORMATION

### 15.1 Safety, health and environmental regulations:

#### Specific provisions in terms of protecting people or the environment:

It is recommended to use the information included in this safety data sheet as data used in a risk evaluation of the local circumstances in order to establish the necessary risk prevention measures for the manipulation, use, storage and disposal of this product.

#### Industrial Chemicals Act 2019:

Industrial Chemicals (Notification and Assessment) Act 1989

## SECTION 16: OTHER INFORMATION

#### Legislation related to safety data sheets:

This safety data sheet has been designed in accordance with WHS regulations and Code of Practice for the Preparation of Safety Data Sheets for Hazardous Chemicals.

#### Texts of the legislative phrases mentioned in section 2:

H290: May be corrosive to metals.  
H302: Harmful if swallowed.  
H318: Causes serious eye damage.  
H335: May cause respiratory irritation.  
H314: Causes severe skin burns and eye damage.

#### Texts of the legislative phrases mentioned in section 3:

The phrases indicated do not refer to the product itself; they are present merely for informative purposes and refer to the individual components which appear in section 3

#### WHS:

Eye Dam. 1: H318 - Causes serious eye damage.  
Met. Corr. 1: H290 - May be corrosive to metals.  
Skin Corr. 1B: H314 - Causes severe skin burns and eye damage.  
STOT SE 3: H335 - May cause respiratory irritation.

#### Advice related to training:

Minimal training is recommended to prevent industrial risks for staff using this product, in order to facilitate their comprehension and interpretation of this safety data sheet, as well as the label on the product.

#### Principal bibliographical sources:

<http://www.safeworkaustralia.gov.au/>

#### Abbreviations and acronyms:

- CONTINUED ON NEXT PAGE -



#### SECTION 16: OTHER INFORMATION (continued)

ADG: Australian Code for the Transport of Dangerous Goods by Road and Rail  
IMDG: International maritime dangerous goods code  
IATA: International Air Transport Association  
ICAO: International Civil Aviation Organisation  
COD: Chemical Oxygen Demand  
BOD5: 5-day biochemical oxygen demand  
BCF: Bioconcentration factor  
LD50: Lethal Dose 50  
CL50: Lethal Concentration 50  
EC50: Effective concentration 50  
Log-POW: Octanol-water partition coefficient  
Koc: Partition coefficient of organic carbon  
IARC: International Agency for Research on Cancer

The information contained in this safety data sheet is based on sources, technical knowledge and current Australian legislation, without being able to guarantee its accuracy. This information cannot be considered a guarantee of the properties of the product, it is simply a description of the security requirements. The occupational methodology and conditions for users of this product are not within our awareness or control, and it is ultimately the responsibility of the user to take the necessary measures to obtain the legal requirements concerning the manipulation, storage, use and disposal of chemical products. The information on this safety data sheet only refers to this product, which should not be used for needs other than those specified.

END OF SAFETY DATA SHEET



## Attachment 3 Chemical Register

**Attachment 3  
Chemical Register**

Chemical Name	CAS No.	Overall PBT Assessment <sup>1</sup>	Chemical Databases of Concern Assessment Step		Persistence Assessment Step		Bioaccumulative Assessment Step	Toxicity Assessment Step			Tier <sup>3</sup>	Risk Level	Assessed Drilling Activity(ies)					
			Listed as a COC on relevant databases?	Identified as Polymer of Low Concern	P criteria fulfilled?	Other P Concerns	B criteria fulfilled?	T criteria fulfilled?	Acute Toxicity <sup>2</sup>	Chronic Toxicity <sup>2</sup>			Completion and Workover	Exploration and Core Holes	Production Operations	Monitoring Wells	Drilling additive - CSG Production Well	Abandonment
Sodium metasilicate, pentahydrate	10213-79-3	Not a PBT	No	No	NA	No	No	No	1	1	1	Low					X	X

**Footnotes:**

- 1 - PBT Assessment based on PBT Framework.
- 2 - Acute and chronic aquatic toxicity evaluated consistent with assessment criteria (see Framework).
- 3 - Tier 1 – Hazard Assessment only

**Notes:**

PBT = Persistent, Bioaccumulative and Toxic  
 B = bioaccumulative  
 P = persistent  
 T = toxic



## Attachment 4 Tier 1 Risk Assessment Dossier

## DISODIUM METASILICATE SODIUM METASILICATE, PENTAHYDRATE

This dossier on disodium metasilicate and sodium metasilicate, pentahydrate presents the most critical studies pertinent to the risk assessment of these substances in their use in coal seam gas extraction activities. It does not represent an exhaustive or critical review of all available data. The information presented in this dossier was obtained from the OECD-SIDS documents on Soluble Silicates, which includes disodium metasilicate and sodium metasilicate, pentahydrate (OECD, 2004); and the ECHA database that provides information on chemicals that have been registered under the EU REACH (ECHA). Where possible, study quality was evaluated using the Klimisch scoring system (Klimisch *et al.*, 1997).

Screening Assessment Conclusion – Disodium metasilicate and sodium metasilicate, pentahydrate are each classified as a **tier 1** chemical and require a hazard assessment only.

### 1 BACKGROUND

Disodium metasilicate and its hydrate sodium metasilicate, pentahydrate are both disodium salt soluble silicates. Once in aqueous solution, all soluble silicates are subject to the same molecular speciation.

Disodium metasilicate and sodium metasilicate, pentahydrate are inorganic substances and therefore not amenable to biodegradation. They are not expected to bioaccumulate and are of low toxicity concern to aquatic and terrestrial organisms.

### 2 CHEMICAL NAME AND IDENTIFICATION

**Chemical Name (IUPAC):** Disodium oxosilanebis(olate)

**CAS RN:** 6834-92-0

**Molecular formula:**  $\text{Na}_2\text{O}_3\text{Si}$

**Molecular weight:** Not applicable; disodium metasilicate is comprised of infinite chains of  $\text{Na}_2\text{O}_3\text{Si}$  units of variable length.

**Molar ratio:** 1.0.

**Synonyms:** Disodium metasilicate; Disodium oxosilanebis(olate); sodium metasilicate; sodium metasilicate anhydrous; silicic acid, disodium salt (anhydrous)

**Chemical Name (IUPAC):** Sodium metasilicate, pentahydrate

**CAS RN:** 10213-79-3

**Molecular formula:**  $\text{Na}_2\text{O}_3\text{Si} \cdot 5\text{H}_2\text{O}$

**Molecular weight:** Not applicable, see anhydrous disodium metasilicate.

**Molar ratio:** 1.0

**Synonyms:** Disodium silicate pentahydrate; sodium silicate hydrate; Silicic acid, disodium salt, pentahydrate

### 3 PHYSICO-CHEMICAL PROPERTIES

Key physical and chemical properties for the substances are shown in Table 1.

**Table 1 Overview of the Physico-Chemical Properties of Disodium Metasilicate\* and Sodium Metasilicate, pentahydrate**

Property	Disodium Metasilicate	Klimisch Score	Reference	Sodium Metasilicate, pentahydrate	Klimisch Score	Reference
Physical state at 20°C and 101.3 kPa	Colourless or white solid (granules)	-	ECHA	Crystalline powder with water of crystallisation	-	OECD
Melting Point	1089°C (pressure not indicated)*	2	ECHA	72.2°C (pressure not indicated)	-	OECD
Boiling Point	Not applicable	-	ECHA	Not applicable	-	OECD
Density	2,610 kg/m <sup>3</sup> @ 20°C	2	ECHA	1,750 kg/m <sup>3</sup> @ 20°C	-	OECD
Vapor Pressure	1.03 Pa @ 1175°C	2	ECHA	Not available, low due to significant amounts of hydration water (43%)	-	OECD
Partition Coefficient (log K <sub>ow</sub> )	Not applicable	-	ECHA	Not applicable	-	OECD
Dissociation Constant (pKa)	9.9, 11.8, 12 @ 30°C	2	ECHA	Not available	-	OECD
Water Solubility	210 g/L @ 20°C	2	ECHA	610 g/L @ 30°C	-	OECD
Viscosity	Not applicable	-	ECHA	Not applicable	-	OECD

\*Anhydrous form of disodium metasilicate

Sodium silicate is produced by fusing high purity quartz sand (SiO<sub>2</sub>) and sodium carbonate or soda (Na<sub>2</sub>CO<sub>3</sub>) at temperatures of 1,300 to 1,500°C. The product that is formed is an amorphous glass that can be dissolved in water to produce silicate solutions. Various products of sodium silicate are obtained by varying the mixing ratio of quartz and soda. Sodium silicates are therefore characterized primarily by the SiO<sub>2</sub> to Na<sub>2</sub>O ratio, or molar ratio (MR). Soluble silicates are generally not distinct

stoichiometric chemical substances (with a specific chemical formula and molecular weight), but as glasses or aqueous solutions of glasses (OECD, 2004).

Disodium metasilicate is a crystalline silicate, produced exclusively in the sodium form, by controlled crystallization of silicate solutions. The MR of disodium silicate is 1.0. Disodium metasilicate can be prepared in anhydrous form (CAS RN 6834-92-0), or with water of crystallization as the pentahydrate (CAS RN 10213-79-3) (OECD, 2004).

Disodium metasilicate and sodium metasilicate, pentahydrate are readily solubilized in water. In the solubilized form, they are indistinguishable from solubilized amorphous silicates (e.g., sodium silicate). Upon dissolution in water, the substances forms sodium ions (Na<sup>+</sup>) and molecular speciation of silicates. Depending on both pH and concentration the respective solutions contain varying proportions of monomeric tetrahydral ions, oligomeric linear or cyclic silicate ions (OECD, 2004).

#### 4 DOMESTIC AND INTERNATIONAL REGULATORY INFORMATION

A review of international and national environmental regulatory information was undertaken (Table 2). Disodium metasilicate is listed on the Australian Inventory of Chemical Substances – AICS (Inventory). No conditions for its use were identified. No specific environmental regulatory controls or concerns were identified within Australia and internationally for disodium metasilicate. Sodium metasilicate, pentahydrate is not listed on the Inventory.

NICNAS has assessed disodium metasilicate in an Inventory Multi-tiered Assessment and Prioritisation (IMAP) Tier 1 assessment and concluded that it poses no unreasonable risk to the environment<sup>1</sup>.

**Table 2 Existing International Controls**

Convention, Protocol or other international control	Listed Yes or No?
Montreal Protocol	No
Synthetic Greenhouse Gases (SGG)	No
Rotterdam Convention	No
Stockholm Convention	No
REACH (Substances of Very High Concern)	No
United States Endocrine Disrupter Screening Program	No
European Commission Endocrine Disruptors Strategy	No

#### 5 ENVIRONMENTAL FATE SUMMARY

Disodium salt soluble silicates readily dissolve in water to sodium ions (Na<sup>+</sup>) and molecular speciation of silicates. Dissolved silica from commercial soluble silicates is indistinguishable from natural dissolved silica. Silica (SiO<sub>2</sub>) represents about 59% of the elemental composition of the earth's crust. Similar percentages are obtained for many sediments and soils (Jackson, 1964). Compounds of silicon and oxygen are ubiquitous in the environment; it is present in inorganic matter, like minerals and soils and in organic matter.

<sup>1</sup> <https://services.industrialchemicals.gov.au/assessment-detail/?id=fdd8433e-f36b-1410-8e4e-00f1fcf8411a>

Silica is found in all natural waters and the median values in the U.S. were reported to be 17 mg SiO<sub>2</sub>/L for ground waters and 14 mg SiO<sub>2</sub>/L for streams (Davis, 1964). The world-wide concentration in rivers is 13 mg SiO<sub>2</sub>/L (Edwards and Liss, 1973).

Disodium metasilicate and sodium metasilicate, pentahydrate are inorganic substances and therefore are not amenable to biodegradation. They are not expected to bioaccumulate.

## 6 ENVIRONMENTAL EFFECTS SUMMARY

### A. Summary

Disodium metasilicate and sodium metasilicate, pentahydrate are of low toxicity concern to aquatic and terrestrial organisms.

### B. Aquatic Toxicity

#### Acute Studies

Table 3 lists the results of acute aquatic toxicity studies conducted on disodium metasilicate. No aquatic toxicity data was available for sodium metasilicate, pentahydrate.

**Table 3 Acute Aquatic Toxicity Studies on Disodium Metasilicate**

Test Species	Endpoint	Results (mg/L)	Klimisch Score	Reference
<i>Danio rerio</i> (previous name <i>Brachydanio rerio</i> )	96-hour LC <sub>50</sub>	210	2	ECHA; OECD, 2004
<i>Gambusia affinis</i>	96-hour LC <sub>50</sub>	2,320	2	ECHA
<i>Brachydanio rerio</i>	96-hour LC <sub>50</sub>	1,108*	2	OECD, 2004
<i>Oncorhynchus mykiss</i>	96-hour LC <sub>50</sub>	260 – 310*	2	OECD, 2004
<i>Daphnia magna</i>	48-hour EC <sub>50</sub>	1,700*	2	ECHA; OECD, 2004
<i>Scenedesmus subspicatus</i>	72-hour EC <sub>50</sub>	>345.4 (growth rate)*	2	ECHA; OECD, 2004

\*sodium silicate (CAS RN 1344-09-8)

#### Chronic Studies

Fish and algae were found to be the most sensitive species with similar acute toxicity. For algae, the chronic NOEC for biomass was determined to be 35 mg/L. Silica is found in European rivers in mean concentrations of 7.5 mg SiO<sub>2</sub>/L. Therefore, the NOEC for fish in chronic toxicity tests is expected to be comparable to the NOEC for algae. Further testing was determined to be not appropriate (ECHA).

### C. Terrestrial Toxicity

There are no studies on disodium metasilicate or sodium metasilicate, pentahydrate. A honeybee acute contact toxicity study according to (USEPA, 2012) has been conducted on AgSil™ 25 potassium silicate solution (29.1% potassium silicate in water). The 48-hr LD<sub>0</sub> was 25 µg/animal and the 48-hr LD<sub>50</sub> was >25 µg/animal (ECHA).

## **7 CATEGORISATION AND OTHER CHARACTERISTICS OF CONCERN**

### **A. PBT Categorisation**

The methodology for the Persistent, Bioaccumulative and Toxic (PBT) substances assessment is based on the Australian and EU REACH Criteria methodology (IChEMS, 2022; ECHA, 2023).

Disodium metasilicate and sodium metasilicate, pentahydrate are inorganic compounds that dissociate completely to sodium and silicate ions in aqueous solutions. Biodegradation is not applicable to these inorganic ions; both sodium and silicate ions are also ubiquitous and are present in most water, soil and sediment. For the purposes of this PBT assessment, the persistent criteria are not considered applicable to these inorganic compounds.

Sodium and silicate ions are essential to all living organisms and is ubiquitous in the environment. Therefore, disodium metasilicate and sodium metasilicate, pentahydrate are not expected to bioaccumulate.

No chronic toxicity data exist on disodium metasilicate and sodium metasilicate, pentahydrate; however, the acute  $E(L)C_{50}$  values for disodium metasilicate and read-across substance sodium silicate are  $>1$  mg/L in fish, invertebrates and algae. Therefore, disodium metasilicate and sodium metasilicate, pentahydrate do not meet the screening criteria for toxicity.

The overall conclusion is that disodium metasilicate and sodium metasilicate, pentahydrate are not PBT substances.

### **B. Other Characteristics of Concern**

No other characteristics of concern were identified for disodium metasilicate and sodium metasilicate, pentahydrate.

## 8 SCREENING ASSESSMENT

Chemical Name	CAS No.	Overall PBT Assessment <sup>1</sup>	Chemical Databases of Concern Assessment Step		Persistence Assessment Step		Bioaccumulative Assessment Step	Toxicity Assessment Step			Risk Assessment Actions Required <sup>3</sup>
			Listed as a COC on relevant databases?	Identified as Polymer of Low Concern	P criteria fulfilled?	Other P Concerns	B criteria fulfilled?	T criteria fulfilled?	Acute Toxicity <sup>2</sup>	Chronic Toxicity <sup>2</sup>	
Disodium metasilicate	6834-92-0	Not a PBT	No	No	NA	No	No	No	1	1	1
Sodium metasilicate, pentahydrate	10213-79-3	Not a PBT	No	No	NA	No	No	No	1	1	1

**Footnotes:**

1 - PBT Assessment based on PBT Framework.

2 - Acute and chronic aquatic toxicity evaluated consistent with assessment criteria (see Framework).

3 - Tier 1 - Hazard Assessment only.

**Notes:**

NA = not applicable

PBT = Persistent, Bioaccumulative and Toxic

B = bioaccumulative

P = persistent

T = toxic

## 9 REFERENCES, ABBREVIATIONS AND ACRONYMS

### A. References

Davis, S.N. (1964). Silica in streams and ground water. *Am. J. Sci.* 262: 870–891.

Edwards, A. M. C., and Liss, P. S. (1973). Evidence of buffering of dissolved silicon in fresh waters. *Nature* 243: 341–342.

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Klimisch, H.J., Andreae, M., and Tillmann, U. (1997). A systematic approach for evaluating the quality of experimental and toxicological and ecotoxicological data. *Regul. Toxicol, Pharmacol.* 25:1–5.

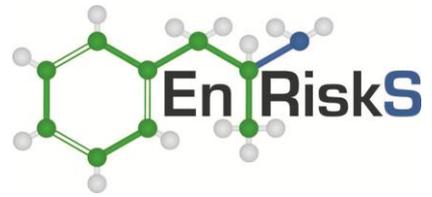
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### B. Abbreviations and Acronyms

°C	degrees Celsius
AICS	Australian Inventory of Chemical Substances
CAS RN	Chemical Abstract Services Registry Number
COC	constituent of concern
EC	effective concentration
ECHA	European Chemicals Agency
EU	European Union
g/L	grams per litre
hPa	hectopascal
IChEMS	Industrial Chemicals Environmental Management Standard
IMAP	Inventory Multi-tiered Assessment and Prioritisation

IUPAC	International Union of Pure and Applied Chemistry
kg	kilogram
kg/m <sup>3</sup>	kilograms per cubic metre
kPa	kilopascal
L	litre
LC	lethal concentration
LD	lethal dose
m	metre
mg/L	milligrams per litre
MR	molar ratio
NICNAS	The National Industrial Chemicals Notification and Assessment Scheme
OECD	Organisation for Economic Co-operation and Development
PBT	Persistent, Bioaccumulative and Toxic
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SGG	Synthetic Greenhouse Gases
SIDS	Screening Information Data Set
USEPA	United States Environmental Protection Agency
µg	micrograms



13 February 2026

EHS Support

Attn: Joe Hayes

Environmental Risk Sciences Pty Ltd  
P.O. Box 2537  
Carlingford Court, NSW 2118

Phone: +61 2 9614 0297  
[www.enrisks.com.au](http://www.enrisks.com.au)

## Independent Peer Review of Chemical Risk Assessments – Tier 1 Chemical CM302

Dr Jackie Wright, Director of Environmental Risk Sciences Pty Ltd (enRiskS) has been commissioned by EHS Support (EHS) to undertake an independent peer review of the Chemical Risk Assessments (CRA) that has been completed by EHS Support for the CM302, a cementing additive product within the Senex Energy Atlas Stage 3 Development.

Dr Jackie Wright has over 35 years' experience in human health and environmental risk assessment in Australia. Jackie holds a PhD in public health and is a Fellow of the Australasian College of Toxicology and Risk Assessment. A CV for Dr Jackie Wright is included in **Attachment A**.

A Chemical Risk Assessment Framework (CRAF) for the Atlas Stage 3 has been prepared for Senex Energy (Senex). The CRAF provides the framework for the chemical risk assessment process, specifically the classification of chemicals as Tier 1, Tier 2, Tier 3 and Tier 4, and the requirements that need to be addressed in the chemical risk assessments completed for each classification level. The CRAF includes checklists for use in the peer review of the chemical risk assessments.

This review relates to the product CM302 proposed for the Atlas Stage 3 works.

One Tier 1 Chemical Risk Assessments relevant to CM302 was provided for review. Comments were provided as a result of the peer-review process, and the assessments updated. This review has been undertaken by Dr Jackie Wright.

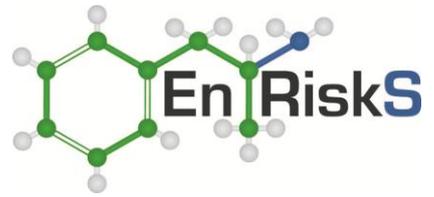
Tier 1 assessments include chemicals that are not persistent or bioaccumulative and are of low toxicity where a hazard assessment and screening level assessment is required. A Tier 1 assessment requires the development of a toxicological profile, which is presented in a chemical dossier. The chemical dossier has been reviewed.

The review process undertaken includes consideration of whether the correct level of assessment has been completed for the chemicals.

The chemical assessed in this review is listed in **Table 1**.

**Table 1: List of chemicals reviewed**

Chemical name	CAS No.
<b>Tier 1 chemicals</b>	
Sodium metasilicate, pentahydrate	10213-79-3



The peer review process has been undertaken as follows:

- Undertake a detailed review of the Tier 1 chemical dossier, in line with the classification criteria and checklists provided in the CRAF. Review comments, along with any relevant notes, have been documented in the peer-review checklist. The review process has included checking that the classification of the chemical is appropriate, and if there is the basis for the classification to be revised. No chemicals required reclassification from Tier 1 to Tier 2.

The Tier 1 chemical risk assessment did not require any revisions.

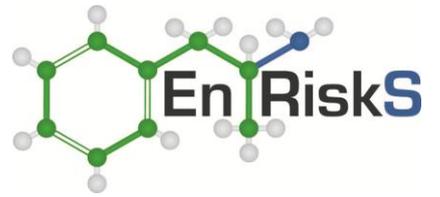
Peer review checklists have been provided to EHS that detail the review process undertaken for the chemical evaluated.

Based on the peer review completed for the Tier 1 chemical risk assessment reviewed (as listed in **Table 1**), the following is concluded:

- The chemical assessed is correctly categorised as Tier 1.
- The chemical risk assessment has been prepared appropriately, in accordance with the requirements of the CRAF, and provide an evaluation of each chemical consistent with current scientific knowledge.
- Risks relevant to the use of Tier 1 chemicals have been appropriately assessed.

Yours sincerely,

Dr Jackie Wright (Fellow ACTRA)  
Principal/Director  
Environmental Risk Sciences Pty Ltd



**Attachment A: CV for Dr Jackie Wright**

Director/Principal  
Environmental Risk Sciences Pty Ltd  
(+61 2) 9614 0297

## Professional Profile

Jackie Wright has more than 35 years' experience in human health and ecological risk assessment in Australia. Experience includes leading and developing a national risk practice group for a major consultancy, training staff, providing technical (and toxicological) direction, developing technical standards and guidance, developing appropriate risk models, providing peer-review and expert evidence.

Areas of expertise include human and eco-toxicological review and evaluation of chemicals in line with Australian regulatory requirements, human health and ecological risk assessment, health impact assessment, impact of exposure to air and noise pollution, exposure modelling, indoor air quality assessment, fate and transport assessment, air dispersion modelling, environmental chemistry, environmental monitoring, and the assessment of air emissions and air toxics. Human health assessments have included a large number and wide range of sites that involve the evaluation of emissions to air, waste sites, residential and recreation areas, operating industrial plants as well as other industrial plants that have been closed and are in the process of property sales or redevelopment and remediation. Ecological assessments have included screening level and detailed assessments of contamination, potential for contamination and remediation of contamination in soil and the aquatic environment. Risk assessments, ecological and human health, have been conducted for review by regulatory agencies (including Contaminated Land Auditors), with Jackie also providing expert support on both human health and ecological risk assessments (including detailed aquatic eco-toxicological assessments) for a number of Auditors in NSW, Victoria, South Australia, Western Australia and Queensland.

Jackie has been heavily involved in the development of national guidance and investigation levels as presented in the National Environment Protection Measure (NEPM) for Site Contamination (1999 amended 2013), CRC CARE Technical Guidance on Petroleum Vapour Intrusion and Silica-Gel Cleanup, Australian Crime Commission Assessment and Remediation of Clandestine Drug Laboratories (2011) and Australian Voluntary Code of Practice, Assessment, remediation and validation: Former clandestine drug laboratories and other methamphetamine contaminated properties.

In addition, she has extensive experience in the assessment of vapour migration and intrusion, detailed evaluation of exposure by occupational, residential and recreational groups including the application of probability distributions to human health risk assessments. Jackie has also been involved in a number of key projects that require regular risk communication with interest groups, including resident action groups.

- Toxicological (human and ecological) Review and Assessment
- Human Health Risk Assessment
- Environmental Risk Assessment
- Exposure Assessment and Modelling
- Occupational Exposure Assessment
- Clandestine Drug Laboratories and Public Health Issued from Drug Exposures
- Vapour Intrusion
- Indoor Air
- Health Impact Assessment
- Wellbeing Assessment
- Health impacts of air and noise pollution
- Environmental Chemistry, Fate and Transport
- Risk Communication
- Air Dispersion Modelling

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## Professional Accomplishments

### Toxicology and Risk Assessment

- 2005 to 2025 (ongoing process of development and revision) - Prepared over 50 toxicity summaries for a range of chemicals relevant to the inclusion and assessment of these chemicals within human health and ecological risk assessments in accordance with Australian guidance. Toxicity summaries prepared provide detail on the chemical use, sources, exposures, chemical properties, ecotoxicity (terrestrial and aquatic), environmental fate and transport, health effects, review and identification of appropriate data relevant to acute and chronic exposures by the inhalation, oral and dermal routes, including assessment of carcinogenicity and genotoxicity. Range of compounds assessed includes particulate matter, petroleum compounds, chlorinated compounds, asbestos, metals and more obscure industry-specific compounds. More specific, detailed review of arsenic dose-response has been undertaken based on current studies.
- 2014/2015 – conducting detailed toxicological review of TCE, particularly in relation to the quantification of inhalation dose-response.
- 2009 to 2013 – provided detailed toxicological review, determination of appropriate dose-response values, and derivation of proposed 2013 NEPM Soil Health Investigation Levels (HILs), including the interim soil gas HILs, and input into the petroleum Health Screening Levels (HSLs). The review included significant update and revision to Schedules B4 and B7 and involved incorporation of all comments from regulators, industry and the public.
- 2009 and ongoing – Detailed review of the toxicity of a range of illicit drugs relevant to the assessment of environmental exposures or public health impacts of exposure to second or third-hand exposures
- 2010 – provided detailed review of toxicological interactions, biomonitoring data and human exposure to metals (and metal mixtures) for a site in Tasmania.
- 2006 to 2025 (and ongoing) - Presentation and collaboration with regulatory bodies in Australia (New South Wales Environmental Protection Authority [EPA], New South Wales Department of Health and Victorian EPA) with regards to the approach adopted and information presented with toxicity summaries (addressing human health and aquatic toxicity where required) for key, high profile assessments.

### Exposure and Risk Assessment (Human Health and General Environmental)

- 1992 to 2025 (ongoing) - Project management and evaluation of human health and environmental risks associated with over 350 contaminated sites in all states of Australia utilising national guidance that include NEPM, enHealth, ANZECC and NH&MRC guidance. Sites include operational sites as well as other industrial areas proposed for redevelopment for industrial, recreational or residential use. Most of the sites assessed are associated with petroleum contamination, chlorinated hydrocarbons, polycyclic aromatic hydrocarbons (PAHs) and metals. Other sites include those impacted with dioxins, phthalates, PCBs and PFOS/PFOA.
- 2011 to 2025 (ongoing) – Conduct of asbestos risk assessments, relevant to contaminated land and materials/recovered materials for reuse. These include assessments of risks to human health using a screening level assessment and detailed site-specific assessments (where required). Assessments have also included consideration of risk management measures relevant to preventing or minimising exposure to asbestos fibres.
- 1995 to 2025 (ongoing) - Detailed assessment and ongoing evaluation of risks to human health associated with contamination issues derived from the Orica Botany

site in Sydney. A number of assessments have been undertaken over a period of 17 years and has involved detailed review of risks to residents (including groundwater extraction and use), workers and recreational users of a large area affected by the discharge of contamination in shallow and deep groundwater to surface water within a drain and an estuary, historically deposited sediments and volatile chlorinated compounds in air. The assessment of risk has been tied closely with ongoing monitoring with detailed exposure reviews, including the collection of additional data and ongoing review of methods, being undertaken for many key aspects of the project. The process required evaluation within context of the NEPM (1999) and enHealth (2002) guidance with regular liaison with the NSW OEH, NSW Department of Health and independent reviewers.

- 2009 to 2015 - Derivation of national guidelines for the investigation and remediation of clandestine drug laboratories in Australia. The work involved the derivation of investigation levels, protective human health and the environment (terrestrial and aquatic), associated with former clandestine drug laboratories in Australia. Project required identification of key indicator compounds from over 200 base, intermediate and waste products that may be associated with over 20 different drug manufacturing methods. This required consideration of human health and environmental toxicity, behaviour/fate and transport in the environment and manufacturing methods. Guidelines were derived for indoor surface residues, indoor air, outdoor soil and the environment (local waterways and soil) for residential, commercial and recreational areas. The guidelines developed have been published by the Australian Government in April 2011. Further development of state guidelines, such as those from NSW Health have been undertaken to 2015.
- 2019 – Development of Australian Voluntary Code of Practice, Assessment, remediation and validation: Former clandestine drug laboratories and other methamphetamine contaminated properties, as published by Environmental Health Australia. The publication of these guidelines has included a range of workshops to share information and better understand issues and data gaps in the management of drug affected properties.
- 2017 to 2025 – Review of a range of issues relating to exposures to illicit drugs by the public and provision of expert advice to understand exposure, toxicity and potential for adverse effects.
- 2010 to 2024 – Detailed evaluation of community exposures and risks to PM<sub>10</sub> and PM<sub>2.5</sub> derived from urban (combustion) sources as well as crustal (mining) sources. A number of urban projects have been completed, including major road infrastructure projects such as NorthConnex, WestConnex M4 East, WestConnex New M5, WestConnex M4-M5 Link, F6 Stage 1, Western Harbour Tunnel, Beaches Link and Great Western Highway in NSW and West Gate Tunnel and North East Link in Victoria and rail infrastructure projects including the Moorebank Intermodal Terminal and Botany Rail Duplication in NSW and the Suburban Rail Loop East in Victoria. These infrastructure projects have involved the development and researching of appropriate methodologies for the assessment of particulate exposures, with particular focus on community exposures and risks. The work has also considered detailed assessments related to other criteria pollutants that include ozone, nitrogen oxides, sulphur dioxide, particulate matter and other combustion products (such as polycyclic aromatic hydrocarbons and volatile organic compounds). Projects have involved detailed review of current literature in relation to the health effects and the identification and use of appropriate dose-response relationships relevant to the quantification of relevant health endpoints, with consultation conducted with stakeholders, including state health departments and the community. Works undertaken for the West Gate Tunnel, North East Link and Suburban Rail Loop East included the panel inquiry (presentation and

- attendance at the inquiry).
- 2018-2019 – Detailed assessment of particulate risks associated with power station emissions, including detailed critical peer review of public commentary papers as well as published papers and the available research underlying current understanding of health impacts from changes to particulate matter in urban and rural air environments.
  - 2010 to 2024 – Detailed assessment of health impacts associated noise, as generated from major road or rail infrastructure or from aircraft noise. These assessments require an understanding of various noise guidelines, as well as current literature on the health effects of noise on the community. Assessments have included qualitative, semi-quantitative as well as quantitative assessments of risk and population incidence utilising published exposure-response relationships.
  - 2016 to 2018 – Detailed assessment of roadway and tunnel design features to ensure public health is protected. This has included assessment of exposures to nitrogen dioxide and the build-up of carbon dioxide (in-cabin) in long tunnels, design of long tunnels to ensure public safety from fatigue and monotony and design of roadways to ensure flicker effects do not adversely affect road users.
  - 2015 to 2025 – conduct of detailed human health and ecological risk assessments for a range of sites (in particular airport and defence sites) where PFAS issues are of potential concern both on the site and in relation to offsite migration, discharge and exposure. Work has involved detailed evaluations and the development of site-specific guidelines and management measures within the context of a moving regulatory environment.
  - 2020 to 2024 – Detailed assessment of risks to human health and the environment in relation to the proposed reuse of materials in road infrastructure (considered a wide range of materials proposed for reuse, in a variety of use scenarios).
  - 2008 to 2014 - Detailed evaluation of human health and environmental issues associated with a former chlor-alkali plant. The assessment involved detailed evaluation of mercury fate and transport with use of specialised data collected and analysed by CSIRO and liaison with experts on mercury issues from the CSIRO. Assessment considered environmental issues associated with the presence of mercury in groundwater and discharge to an urban (highly modified) environment, as well as issues associated with mercury (elemental and inorganic) in soil and groundwater with respect to fate and transport, human health and environmental issues.
  - 2010 to 2015 (with ongoing advice to 2023) – Conduct of a detailed Health Impact Assessment in relation to major rail infrastructure development proposal at Moorebank. The HIA involved consultation with stakeholders, in particular local councils, NSW Health and the community, with all aspects of the proposal being address in relation to health impacts, both positive and negative. The HIA was peer reviewed by the University of NSW and an international expert. Ongoing advice relates to construction and operational management of PFAS.
  - 2016 to 2018 – Literature review and assessment of community health impacts associated with landfill gas emissions, and emissions from water to energy facilities.
  - 2018 to 2025 – Conduct of a number of detailed human health risk assessment or health impact assessments in relation to the proposed development of waste-to-energy facilities in NSW, Victoria and Queensland. A number of the projects have been approved.
  - 2011 – Quantitative assessment of risks to human health associated with the placement of remediated soil that contains residual levels of radiological contamination, beneath a proposed commercial/industrial development in South Australia.
  - 2011 to 2016 – Detailed evaluation and development of chemical risk assessments

for a range of products/compounds utilised during coal seam gas operations in NSW and Queensland.

- 2017 to 2018 – Panel member on the WA Government Technical Enquiry on hydraulic fracturing.
- 2010 – Detailed assessment of risks (including detailed assessment of toxicity of individual compounds and mixtures) to human health associated with the presence of nitrate, nitrite and perchlorate contamination in drinking water (international project).
- 2009 to 2025 (and ongoing) – Expert support for contaminated land Auditors located in New South Wales, Victoria, Queensland, South Australia and Western Australia. Expert support has included review of human health and ecological risk assessments for a range of projects and issues.
- 2000 to 2024 - Detailed evaluation of risks to human health and the environment associated with redevelopment of large a number of gasworks sites in New South Wales and Victoria. Projects have involved the evaluation of the vapour migration pathway, including the collection of relevant soil gas and vapour emissions data to quantify exposure consistent with the proposed developments. The process required liaison with relevant site auditors, Vic EPA, SA EPA, NSW EPA and NSW Department of Health as required.
- 1995 to 2024 - Detailed evaluation, modelling and risk assessment of a number of landfill and waste depots in Australia (in New South Wales, Australian Capital Territory, Queensland and Victoria). This includes proposed waste destruction technologies, proposed waste depots and landfills, operational landfills, composting operations and closed landfills with assessments considering workers, residents and recreational users of the site and surrounding areas. Assessments undertaken have considered issues associated with the presence of a wide range of chemicals, landfill gas emissions, leachate generation and leaks, stormwater management, bioaerosols and other pathogens and bacteria.
- 1995 to 2025 (ongoing process as vapour issues are relevant for many projects) - Evaluation of vapour migration (and vapour intrusion) from numerous sources including contaminated soils and groundwater (dissolved phase and free phase) for many different chemicals, and subsequent assessment of human health risks associated with the estimated vapour concentrations. In addition, Jackie has developed and managed various techniques for the direct measurement of vapour migration in residential, recreational and industrial settings as part of the risk assessment process.
- 2009 to 2024 - Detailed evaluation of public health issues associated with recreational exposures to arsenic, lead and/or PAHs in surface soil in primary/secondary schools, sporting areas and children's playgrounds. Provision of technical advice along with appropriate general advice relevant for presentation to the public and responses to questions from the general public.
- 1995 to 2021 - Evaluation of human health risks associated with potential exposure to emissions from coal mining activities, including the assessment of potential risks and health effects associated with exposure to fine particulates.
- 1998 to 2009 - Evaluation of human health risks associated with the existence of, and potential remediation of encapsulated scheduled waste materials located near residential and recreational areas. The assessment has involved ongoing monitoring, review of toxicity and exposures on an ongoing basis, review of remediation options and risks derived from the application of preferred remediation options. The encapsulation has now been remediated.
- 2007 to 2013 – Assessment of risks to human health and the environment associated with the re-use of water (including irrigation uses) from a groundwater treatment plant located in Sydney.
- 2000 to 2005 - Evaluation of human health risks associated with a number of

- contaminated sites located in Abu Dhabi, Spain and Azerbaijan. These risk assessments involved assessment of human health risks using USEPA guidance as well as WHO guidance.
- 2005 to 2024 - Project management of large human health risk assessment associated with the redevelopment of explosives and munitions factories and firing ranges within various areas of NSW and Victoria.
  - 1995 to 1998 - Evaluation of human health risks associated with off-site accumulation of lead from historical deposition associated with a former operating lead paint site located within a residential area in Sydney. Project involved the review of lead exposure and toxicity, identification and agreement to lead action levels relevant for residential properties located close to and further away from the former source.
  - 1995 - Evaluation and coordination of a multi-pathway health risk analysis for a large contaminated site in Sydney involving the use of probabilistic risk assessment methodology.
  - 2000 to 2005 - Conducting a feasibility assessment for a waste destruction facility in Sydney, using a probabilistic risk assessment methodology. Conduct of a detailed health risk assessment associated with the operation of the selected technology, including presentation to the Commission of Enquiry. Subsequent review of the process and exposures in relation to placing the facility within a rural area (as opposed to an urban area) and consideration of other multi-pathway exposures.
  - 1993 - Assessment of risks to human health and the environment associated with sewage sludge incinerators at North Head and Malabar Sewage Treatment Plants.
  - 1992 to 2025 (and ongoing) - Determination of preliminary remediation goals for numerous contaminated sites based on risk criteria.
  - 1995 to 2025 (and ongoing) - Development of air sampling procedures and techniques to collect air data relevant to the further assessment of vapour migration pathways in a range of areas. This includes the collection of ambient air, soil gas data (active and passive and sub slab) and flux emissions.

### **Ecological Risk Assessment**

- 1998 to 2025 (ongoing) - Derivation of risk-based criteria for a range of projects that are based on the protection of the aquatic environment. Evaluations have considered the potential for physical parameters (turbidity, pH, dissolved oxygen) and contaminants (principally metals, polycyclic aromatic hydrocarbons [PAHs], PFAS, petroleum compounds and chlorinated compounds). The evaluations include the potential for contaminants to leach from soil, migrate to groundwater and potentially discharge to a receiving environment (considered both marine and freshwater [including ephemeral] systems). Some of the assessments have required review and consideration of fate and transport modelling.
- 2009 to 2025 (ongoing) – Identification and derivation of investigation levels protective the terrestrial and aquatic environments associated with former clandestine drug laboratories in Australia. Ecological Tier 1 levels (based on available ecotoxicological data primarily from overseas studies) were identified and proposed for use in remediation guidelines with additional guidance provided in relation to sites where more detailed assessments of environmental risk issues needs to be conducted.
- 2010, 2011 and 2012 – Conduct (co-presenter) of lectures at the University of Sydney for the Risk Assessment (Human Health and Ecological) module for undergraduates, School of Geosciences. Ecological risk assessment lectures addressed basic principles and frameworks, stressors, fate and transport, bioaccumulation, uptake, derivation of ANZECC Guidelines, reviewing available ecotoxicological studies and conduct of statistical analysis using the CSIRO

- Burrlioz software for establishing water guidelines.
- 2010 to 2011 – Expert witness in relation to ecotoxicological impacts of initial works proposed for the Barangaroo site in NSW.
  - 2010 - Assessment and derivation of water criteria for petroleum hydrocarbons relevant to the protection of the terrestrial and aquatic environments from the reuse of urban run-off for irrigation or a public park and associated runoff into a lake. Assessment required a detailed assessment of not only phytotoxicity, but levels at which grass growth would be affected to the extent by which grass cover on an important AFL playing field would be affected.
  - 2009 to 2011 – Detailed review of screening level risk ecological assessment (supporting studies and outcomes) for the discharge of contaminated groundwater into a sensitive marine environment in South Australia. Review required detailed consideration of the local environment, consideration that appropriate ecological indicator species have been selected, consideration of the range of urbanisation stressors within the environmental and potential for groundwater discharges to result in adverse effects to the aquatic environment, over and above those from urbanisation.
  - 2008 to 2010 - Detailed evaluation of environmental fate and transport issues associated with a former chlor-alkali plant. The assessment involved detailed evaluation of mercury fate and transport with use of specialised data collected and analysed by CSIRO and liaison with experts on mercury issues from the CSIRO. Assessment considered ecotoxicological risks associated with the presence of mercury in groundwater and discharge to an urban (highly modified) environment.
  - 1992 to 2025 (and ongoing) - Determination of preliminary remediation goals for numerous contaminated sites based on risk criteria. In relation to environmental risk issues, this has included the identification of appropriate and screening level criteria that are protective of fresh and marine environments and phytotoxic effects. Where necessary more detailed evaluations of ecotoxicological effects have been considered. This has included the design of suitable surveys and sampling programs (including microtox, microalgae, fish, crustacean, amphipod (sediments), plant and earthworm), interpretation of information and data from these studies, discussion of results with relevant regulatory parties, uncertainty analysis and reporting. These studies have been conducted for the assessment of petroleum hydrocarbon, cyanide, inorganics, ammonia, chloride, phosphorous and nitrate concentrations in soil and discharges from groundwater.
  - 2000 to 2008 - Detailed evaluation of risks to human health and the environment (particularly aquatic species and sediments) associated with redevelopment of large a number of gasworks sites in New South Wales and Victoria. The project in NSW involved collaboration with sediment experts to determine the nature and extent of sediment contamination, potential for adverse ecotoxicological effects and requirements for remediation. The process required liaison with relevant site auditors and the DECCW (formerly NSW EPA) as required.
  - 2007 - Assessment of risks to terrestrial and aquatic (marine water) environments associated with the re-use of water from a groundwater treatment plant located in Sydney. Water is proposed to be reused for a range of proposes that include industrial water (where it may be directly discarded to the marine environment) and irrigation where the water may affect terrestrial species and runoff may enter local water ways. The assessment considered available ecotoxicological data and guidelines available from Australian and International studies (where relevant to Australian species).

### **Contaminant Transport**

- All of the projects listed above have involved the assessment of contaminant transport in at least one media. More specific examples are listed below:
- Vapour partitioning and transport assessed for petroleum compounds, including the development of a national database of petroleum vapour data, related to over 300 petroleum impacted sites, and detailed review of the database in conjunction with technical specialists from the USEPA. The database developed has been peer-reviewed by the USEPA and has been incorporated into the USEPA technical review of data from both the US and Australia for the purpose of determining screening distances.
- Vapour partitioning and transport assessed for chlorinated compounds at numerous contaminated sites, including the assessment of vapour risk issues at the Orica Botany site from 1994 to 2024.
- Review and use of groundwater fate and transport modelling conducted in support of numerous detailed risk assessment outcomes. Reviews have been conducted for the purpose of ensuring these models adequately address the potential movement of contaminants from a source to a point of discharge, utilising appropriate inputs and site data.
- 2008 to 2014 - Detailed evaluation of mercury fate and transport in groundwater and air (mercury vapour) with use of specialised data collected and analysed by CSIRO and liaison with experts on mercury issues from the CSIRO. Assessment considered environmental issues associated with the presence of mercury in groundwater and discharge to an urban (highly modified) environment, as well as issues associated with mercury (elemental and inorganic) in soil and groundwater with respect to fate and transport, human health and environmental issues.

### **Air Emissions and Vapour Assessment**

- Jackie Wright is experienced in all aspects of determining air quality, including monitoring, assessing and modelling soil gas, vapour emissions and emissions from stacks and other fugitive sources. Projects include analysing dust emissions from a number of quarries and coal mines, motor vehicle emissions; modelling vapour emissions from motor vehicles and sources such as creeks, ponds and waste areas; and assessing odour emissions from sewage treatment plants, landfills and other agricultural/industrial facilities.
- 2020 to 2025 – Assessment of inhalation exposures to drug residues derived from contaminated materials and within properties, prior to and post remediation.
- 2012 to 2013 – Development of petroleum vapour intrusion guidance for Australia in conjunction with CRC CARE. The project has involved the development of clear, prescriptive guidance that incorporates current science on the assessment of petroleum vapour intrusion. The guidelines being developed have been presented at a series of PVI training workshops (supported by ALGA and CRC CARE) run in Sydney, Melbourne and Perth.
- 2009 to 2022 - Development of a petroleum vapour database to assist in the interpretation and understanding of the behaviour of petroleum vapours in the subsurface environment. The database is unfunded and independent and has been interpreted by Jackie as well as industry experts in Australia and the US. The database has been peer-reviewed by the USEPA, and incorporated into the USEPA publication on the use of field data (from the US, Canada and Australia) to support and develop vertical exclusion/separation distances (refer to the following website for the USEPA review and access to the database developed: <http://www.epa.gov/oust/cat/pvi/> ). This data has been used to support the development of screening distances that are being incorporated into guidance being developed in Australia and the US.

- 2005 to 2025 (ongoing) - Preparation of conceptual site models and completing screening level modelling (using published models such as Johnson & Ettinger) for the assessment of vapour migration and intrusion issues on a wide range of sites (over 200) affected by petroleum and chlorinated hydrocarbons.
- 2010 to 2025 – Detailed evaluation of community exposures and risks to PM<sub>10</sub> and PM<sub>2.5</sub> derived from urban (combustion – associated with road and rail infrastructure) sources as well as crustal (mining) sources. A number of urban projects have also considered community exposures and risks to other criteria pollutants that include ozone, nitrogen oxides and sulphur dioxide. Projects have involved detailed review of current literature in relation to the health effects and appropriate dose-response relationships relevant to the quantification of relevant health endpoints, with consultation conducted with stakeholders, including state health departments.
- 1995 to 2025 (ongoing) - Development of methods and approaches for the sampling and assessment of vapour (e.g. soil gas, flux emissions, indoor and ambient air). Works conducted has involved the conduct of field activities for the purpose of collecting this data.
- 1995 to 2025 (ongoing) - Interpretation and assessment of vapour data for the purpose of characterising inhalation exposures in a range of scenarios. These include existing buildings and proposed developments.

#### **Risk Communication**

- 2000 to 2025 (ongoing) - Jackie Wright has experience in the preparation and presentation (communication) of risk outcomes from a number of key projects across Australia to a range of community groups. These groups include workers and unions, residents and community action groups. Successful communication with stakeholders and the community on controversial projects including infrastructure, coal seam gas and other mining projects has been required.

#### **Air Quality Assessment**

- 1990 to 1995 – Air dispersion modelling and air quality impact assessment conducted for various mining (coal mining and quarry activities) and transport (major roadways) in NSW and Victoria. Projects included the development of emissions inventories, setting up and running air dispersion models and reporting.
- 2011 to 2015 - Air dispersion modelling conducted for the assessment of exposures (and risks to human health) to crop, grain and timber fumigants. The assessment have been undertaken based on trial data, with scaling to address commercial application.
- 2010 to 2018 - Air dispersion modelling conducted for the assessment of exposures (and risks to human health) to grain fumigants, timber fumigants, hydrogen sulphide, chlorinated compounds, silica and dust (particulate) emissions from a range of facilities. Modelling has been conducted using Screening level and mode detailed Ausplume and Calpuff dispersion modelling packages.
- 2010 to 2025 - Review of air dispersion modelling undertaken for a range of projects. The reviews have been undertaken to determine if the assessments are adequate for the purpose of understanding and characterising community health impacts. In some cases, the review has been undertaken as part of a larger assessment of public health impacts. Projects have included communication of the air quality assessment and health impact assessment to community groups.

#### **Noise Impact assessment**

- 2019 to 2022 - Systematic review of health impacts of transport noise for Waka Kotahi NZ Transport Agency in New Zealand. The work has involved a detailed systematic review of the evidence in published and grey literature in relation to the

health effects of transport noise (road, rail and air) and whether the evidence is sufficient to support quantification of health impacts using exposure-response functions. The review has considered recent literature and the GRADE system of review to establish the robustness of the available publications and strength of evidence. This review considered the most recent reviews completed by the WHO and enHealth in 2018.

- 2014 to 2021 - Detailed Evaluation of Community Exposure and Risk to impacts associated with transport infrastructure projects for Transport for NSW and Transurban/Western Distributor Authority/ North East Link Authority in Victoria, Australia. Health impact assessments have included a detailed assessment of impacts from noise during construction and operation. This included a detailed review of current science in relation to health impacts of construction noise, as well as road transport noise sources. In some assessments quantitative risk assessment was required to be undertaken to address impacts on community health. Projects have included: NorthConnex (road - NSW); WestConnex projects - M4 East, New M5, M4-M5 Link (road - NSW); F6 Stage 1 (road - NSW); Gateway project (road and rail – NSW); Western Harbour Tunnel and Beaches Link (road - NSW); West Gate Tunnel (road -Victoria); North East Link (road – Victoria).
- 2016 to 2017 - Brisbane Airport Corporation, Queensland, Australia. Conduct of a review of the health impacts of aircraft noise as these relate to the identification and use of exposure response relationships for assessing health impacts, particularly related to flight paths near major airports.

### Expert Witness

- Expert witness at Inquiry and Advisory Committee (IAC) hearings for mining and infrastructure projects in Victoria, specifically:
  - Avonbank Mineral Sands Project (2023), expert in relation to wellbeing
  - Goschen Rare Earths and Mineral Sands Project (2024), expert in relation to human health and wellbeing
  - Fosterville Sustained Operations Project (2024), expert in relation to human health and wellbeing.
  - Western Renewables Link (2025), expert in relation to wellbeing impacts.
  - Warracknabeal Energy Park (2025), expert in human health and wellbeing.
- Commonwealth of Australia ats The Trust Company Limited and Qube RE Services Pty Ltd, Supreme Court Proceedings No. 2021/00351160 (2025).
- Hallam Road Waste Transfer Station, VCAT P145/2025, hearing at Victorian Civil and Administrative Tribunal (2025).
- Long Term Containment Facility at Nowingi, case presented in VCAT. The proponent was Major Projects Victoria, approvals application WA58772.
- Lend Lease (Millers Point) Pty Ltd and Orsats Australians for Sustainable Development Inc., Land and Environment Court Proceedings, 40965 of 2010 (NSW).
- Seppanen&Seppanen v Ipswich City Council, Minister for Economic Development Queensland and Queensland Urban Utilities (2016).
- Westgate Tunnel Project, Expert Witness, Inquiry and Advisory Committee (IAC) hearings (Victoria, August-September 2017).
- Child care centre project, Provision of advice as expert witness for ACT Government Solicitor (2017).
- Caltex Petroleum Pty Ltd v Campbelltown City Council Environment, Resources and Development Court Proceedings No 258 of 2015 (2017 to 2019) (SA).
- North East Link Expert Witness, Inquiry and Advisory Committee (IAC) hearings, Expert Witness (Victoria, 2019).

- Clermont Quarries Pty Ltd v Isaac Regional Council, ECL Dalby Pty Ltd, Chief Executive, Department of State Development, Manufacturing, Infrastructure and Planning and Environment Court (Qld), Expert witness (2019 - 2020).

### **Parliamentary inquiries**

- Provided submissions to the following inquiries:
  - Parliament of NSW, Select Committee on PFAS Contamination in Waterways and Drinking Water Supplies Throughout New South Wales – also appeared before committee (2025)
  - Parliament of Australia, Select Committee on PFAS (2025)
  - Parliament of NSW, Select Committee on Proposed Energy from Waste Facilities – also appeared before committee (2025).

### **Teaching**

- 2009, 2010, 2012, 2013 to 2025 – Conduct of lectures at the University of Technology Sydney as part of the Contaminated Site Assessment and Management (CSARM) Professional Development Short Course, Risk Based Site Assessment.
- 2023 and 2025 – Human Health Risk Assessment module for ENV3016, Pollution in Practice. Fenner Lecture – Australian National University
- 2025 – University of Western Sydney, Clandestine Drug Laboratories Masterclass and Workshop
- 2025 – CRC CARE Risk to Remediation Course, Human Health Risk Assessment
- 2020 and 2022 – Toxicological Risk Assessment lecture to UNSW School of Business.
- 2022 – Environmental Health Australia, Workshop: Methamphetamine testing and remediation
- 2017 – ALGA Risk Assessment Training Course: New Zealand
- 2010 to 2012 – Conduct of lectures at the University of Sydney for the Risk Assessment (Human Health and Ecological) module for undergraduates, School of Geosciences.
- 2014 – ACLCA (Qld) Training Course on Vapour Intrusion and Landfill Gas Assessment (organising and teaching) – May 2014.
- 2014 and 2015 – ACLCA (SA and VIC) Training Course on Vapour Intrusion (teaching) – June 2014.
- 2013 and 2015 – ALGA Training Course on Vapour Intrusion (teaching).
- 2013 and 2015 – Vapour Intrusion Short Course. Training Course conducted at CleanUp 2013 and 2015, CRC CARE (teaching).
- 2016 – Clandestine laboratories – risk assessment (teaching) ALGA and ACTRA (separate workshops).
- 2014-2018 – Short courses/branch forums for ALGA – various issues regarding PFAS assessment, vapour intrusion, bioaccessibility methods, clandestine laboratories.
- 2016 and 2018 – Short course for WasteMINZ – bioaccessibility methods.
- 2010-2011 – Basic and Advanced Risk Assessment Course for Queensland Branch of the Australian Contaminated Land Consultants Association.

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## Work History

<b>Principal/Director/ Owner</b>	Environmental Risk Sciences Pty Ltd	2008 (current)
<b>Adjunct Lecturer</b>	Flinders University	2016 (current)
<b>Principal Environmental Scientist</b>	URS Australia, North Sydney, NSW (formerly Woodward-Clyde)	1992 to 2008
<b>Project Engineer</b>	Sydney Water, Sydney, NSW	1991-1992
<b>Environmental Scientist</b>	Nigel Holmes & Associates, Sydney NSW	1990-1992
<b>Assistant</b>	Dames & Moore, Crows Nest, NSW	1988-1990

## Education

<b>BE (Hons)</b>	University of Sydney, Bachelor of Engineering (Hons)	1989
<b>PhD</b>	Public Health, Health and Environment, Flinders University	2016

## Professional Accreditation

Fellow of the Australasian College of Toxicology and Risk Assessment (ACTRA)

## Professional Development

American College of Toxicology - Virtual Advanced Comprehensive Toxicology Online training course (25 modules) (2021)

Invited member of task force - WA EPA scientific inquiry into fracking in WA (2018)

Clandestine laboratory safety and investigator training and synthesis run by the Clandestine Laboratory Investigators Association (8-hour course, 2011)

Ecological Risk Assessment Course run through AEHS and credited by University of Massachusetts Boston (2010)

Mid-America Toxicology Course (35 hours, 2010)

Dose-Response Boot Camp run by Toxicology Excellence for Risk Assessment (TERA) (5 day course, 35 hours, 2008)

Vapor Intrusion Assessment and Mitigation Short Course run by Air & Waste Management Association (4 hours, 2006)

USEPA Human Health Risk Assessment Short Course (24 hours, 1995)

## Committees and Affiliations

IChEMS Advisory Committee, 2024 - current

Member and Fellow (former committee member, remains co-opted committee member), Australasian College of Toxicology and Risk Assessment (since 2007).

Member, Australian Land and Groundwater Association (ALGA) (since 2010, now Life

Member).

Clean Air Society of Australia and New Zealand (re-joined 2015)

Member, Environmental Health Australia (since 2011).

Member, SETAC (Asia Pacific) (since 2011).

Member, Air & Waste Management Association (since 2006).

Member, Association for Environmental Health and Sciences Foundation (since 1997).

## **Awards**

2024: Honorary Life Member ALGA

2020: Winner of Best Case Study (principal author), Australia New Zealand Policing Advisory Agency and National Institute of Forensic Science

2017: Winner of Best Case Study (principal author), Australia New Zealand Policing Advisory Agency and National Institute of Forensic Science

2017: Winner of ALGA Outstanding Leadership by a Woman in the Contaminated Land & Groundwater Industry

2017: Finalist of ALGA Outstanding Individual in the Contaminated Land & Groundwater Industry

## **Publications**

### Peer-reviewed journal articles:

Dawson M. L. et al 2025, Estimating safe doses of perfluorooctane sulfonate (PFOS): an international collaboration. Archives of Toxicology, published online 3 October 2025.

Kerry, G.L., Ross, K.E., Walker, G.S. and Wright, J., 2025. Determining extent and distribution of methamphetamine in cars: Air vs. surface vs. fabrics. Forensic Chemistry 42 (2025) 100628.

Burgoon, L. D. et al 2023, Range of the perfluorooctanoate (PFOA) safe dose for human health: An international collaboration, Regulatory Toxicology and Pharmacology, online 29 October 2023.

Kuhn, E.J., Ross, K.E., Walker, G.S., Whiley, H. and Wright, J., 2023. Thirdhand Exposure to Methamphetamine Syndrome: Symptoms Resulting from Environmental Exposure to Methamphetamine Contamination Arising from Manufacture or Use. Journal of Environmental Health, Volume 86, No. 3, October 2023.

Kuhn, E.J., Walker, G.S., Whiley, H. Wright, J. and Ross, K.E., 2023. Evaluation of commercially available methamphetamine presumptive tests for site contamination. Toxicology Communications, Volume 7, No. 1.

Kerry, G.L., Ross, K.E., Wright, J.L. and Walker, G.S., 2022. A Review of Methods Used to Detect Methamphetamine from Indoor Air and Textiles in Confined Spaces. Toxics, 10, 710.

Kuhn, E.J., Walker, G.S., Whiley, H. Wright, J. and Ross, K.E., 2021. Overview of Current Practices in the Methamphetamine Testing and Decontamination Industry: An Australian Case Study. International Journal of Environmental Research and Public Health 18, 8917.

- Wright, J., B. Symons, J. Angell, K. E. Ross and S. Walker, 2021. Current practices underestimate environmental exposures to methamphetamine: inhalation exposures are important. *Journal of Exposure Science & Environmental Epidemiology* 31: 45-54.
- Kuhn, E.J., Walker, G.S., Wright, J., Whiley, H. and Ross, K.E., 2021. Public health challenges facing Environmental Health Officers during COVID-19: methamphetamine contamination of properties. *Australian and New Zealand Journal of Public Health*, 45: 9-12.
- Wright, J., M. Kenneally, K. Ross and S. Walker, 2020. Environmental Methamphetamine Exposures and Health Effects in 25 Case Studies. *Toxics* 8 (3): 61.
- Wright, J., G. S. Walker and K. E. Ross, 2019. Contamination of Homes with Methamphetamine: Is Wipe Sampling Adequate to Determine Risk? *International Journal of Environmental Research and Public Health* 16 (19): 3568.
- Kuhn, E. J., G. S. Walker, H. Whiley, J. Wright and K. E. Ross, 2019. Household Contamination with Methamphetamine: Knowledge and Uncertainties. *International Journal of Environmental Research and Public Health* 16(23): 4676.
- Capon, A. and J. Wright, 2019. An Australian incremental guideline for particulate matter (PM<sub>2.5</sub>) to assist in development and planning decisions. *Public Health Research & Practice* 29 (4).
- Wright, J., Kenneally, M. E., Edwards, J.W. and Walker, S., 2017. Adverse Health Effects Associated with Living in a Former Methamphetamine Drug Laboratory — Victoria, Australia, 2015. *Morbidity and Mortality Weekly Report (MMWR)* January 6, Vol.65, No. 52, p1470-1473
- Wright, J., Edwards, J. and Walker, S., 2016. Exposures associated with clandestine methamphetamine drug laboratories in Australia. *Reviews on Environmental Health*, 31(3): 329-352.
- Lahvis, M.A., Hers I., Davis, R.V., Wright, J. and DeVaul G.E., 2013. Vapor Intrusion Screening at Petroleum UST Sites. *Groundwater Monitoring & Remediation*.
- Wright J. and Howell M., 2003. "Volatile Air Emissions from Soil or Groundwater – Are They as Significant as Model Say They Are?". In *Contaminated Soils*, Volume 8, Edited by Edward J. Calabrese, Paul T. Kosteki and James Dragan, p375-393.
- Gorman J., Mival K., Wright J. and Howell M., 2003, Developing Risk-Based Screening Guidelines for Dioxin Management at a Melbourne Sewage Treatment Plant. *Water, Science and Technology*, Vol 47 No 10, pp 1-7.
- Wright J., and Howell M., 1995, "Health Risk Assessment - Practical Applications Related to Air Quality Issues". *Clean Air*, Volume 29, No. 2, May 1995.

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Government and industry publications:

IICRC, 2025. ANSI/IICRC S900-2025, Standard for Professional Remediation of Precursors, Drug Residues, and Associated Chemical Waste. First Edition. Consensus Body Member.

Environmental Health Australia, 2019. Australian Voluntary Code of Practice, Assessment, remediation and validation: Former clandestine drug laboratories and other methamphetamine contaminated properties. Principal author.

CRC CARE, 2018. Weathered Petroleum Hydrocarbons (Silica Gel Clean-up), CRC CARE Technical Report no. 40, CRC for Contamination Assessment and Remediation of the Environment, Newcastle, Australia. Principal author.

NSW Health, 2015. NSW Remediation Guidelines for Clandestine Drug Laboratories and Hydroponic Drug Plantation. Principal author.

CRC CARE, 2013. Petroleum Vapour Intrusion (PVI) Guidance. CRC Care Technical Report No 23, CRC for Contamination Assessment and remediation of the Environment, Adelaide, Australia. Principal author.

NEPM 2013 Revision (released in 2013), Schedule B4 (Guideline on Site-Specific Health Risk Assessment Methodology) and Schedule B7 (Guideline on Derivation of Health-Based Investigation Levels). Primary author of toxicological evaluations and derivation of health investigation levels and contributing author to the Schedules (conducting full revision/rework of both Schedules, including responding to public comments and comments from state health agencies).

Australian Government, 2011. Guidelines for Environmental Investigations, Remediation and Validation of former Clandestine Drug Laboratory Sites [Guidelines], April 2011. Primary author of toxicological evaluations and derivation of remediation guidelines using risk based approach and listed contributor to main document.

Davis G.B., Wright J. and Patterson B.M., 2009. Field Assessment of Vapours, CRC CARE Technical Report no. 13, CRC for Contamination Assessment and remediation of the Environment, Adelaide, Australia.

Invited lectures

Wright, J. 2025. Keynote: Risk assessment – why do we care? New Zealand WasteMINZ Conference, Christchurch 2025.

Wright, J. 2020 to 2022. Toxicological risk assessment. Guest lecture to University of New South Wales School of Business.

Wright, J., 2013. Petroleum Vapour Intrusion Guidance in Australia. AEHS 23rd Annual International Conference on Soil, Water, Energy, and Air and AEHS Foundation Annual Meeting, March 18-21, 2013, Mission Valley Marriott, San Diego, California. Invited lecture

Wright, J., 2012. Evaluation of the Australia Hydrocarbon VI Data Base: Exclusion Criteria. AEHS 22nd Annual International Conference on Soil, Water, Energy, and Air and AEHS Foundation Annual Meeting, March 19-22, 2012, Mission Valley Marriott, San Diego, California. Invited lecture.

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Articles

Jarman R., Wright, J., Manning, T., Goldsworthy, B. and Langdon, K. 2025. PFOS – a case study. Inside Waste Feb/Mar 2025, p18-21.

Conference Proceedings (Oral Presentations - selected):

Wright, J. (2025) Is EfW safe for the community. WMMR Energy from Waste Conference, Gold Coast June 2025

Wright, J. (2021) Weathered Petroleum – Assessing the toxicity of polar metabolites vs petroleum hydrocarbons. ACTRA Annual Scientific Meeting, Sydney 26-27 August 2021

Wright, J. (2021) Risk Assessment and CSMs? Presentation to ACLCA – Western Australian branch meeting

Wright, J. (2020) Clan labs and meth contaminated properties - Risks and issues. Environmental Health Australia, Professional Development Workshop

Wright, J. and Manning, T. (2020) Basements, Really, you thought THAT was a good idea !!!!. ALGA Ecoforum 2020

Wright, J. (2020) Attenuation Factors and VI. ACLCA Webinar, 29 April 2020

Wright, J. and Manning, T. (2020) Chlorinated Hydrocarbons - Myths and Realities. ACTRA webinar (industry training) 27 February 2020

Wright J. and Stratford, M. (2020) Methamphetamine Risk Management Industry Voluntary Code of Practice. ACTRA webinar (industry training) 20 February 2020

Wright, J. and Manning, T. (2018) Perplexing guidelines: What it means for measurement, RACI PFAS Symposium, November 2018

Wright, J. (2018) Contrasting current contamination issues: Inside the home – methamphetamine, ALGA Regional Conference, Townsville October 2018

Wright, J. (2018) Contrasting current contamination issues: Outside the home – PFAS, ALGA Regional Conference, Townsville October 2018

Capon, A. and Wright, J. (2018) An Australian incremental guideline for particulate matter less than or equal to 2.5 micrometres (PM2.5). ACTRA Conference, October 2018

Manning, T. and Wright, J. (2018) Contaminated Land Risk Assessment and the Building Code of Australia, Ecoforum October 2018

Jarman, R., Wright, J., Manning, T. and Pendergast, D. (2016). Using oral bioaccessibility testing to refine exposure assessment for carcinogenic PAHs in soil. EcoForum, October 2016.

Manning, T., Wright, J., Jarman, R. and Bowles, K. (2016) Per and poly fluorinated alkyl substances – where are we, ecologically speaking? SETAC AU October 2016.

Jarman, R., Manning, T., and Wright J. (2016). Setting toxicity reference values for PFAS – what can we learn from TOXCAST and TOX21. ACTRA Annual Scientific Meeting, September 2016.

Manning, T., Wright, J., Jarman, R. and Bowles, K. (2016) Per and poly fluorinated alkyl substances – the Australian Story. EmCon 2016 September 2016.

Manning, T. and Wright, J. (2016). Particulate Risk Assessments – Issues and Challenges. EcoForum, October 2016.

Manning, T. and Wright, J. (2015). Review of Ecological Investigation Levels for Total Petroleum Hydrocarbons. 6th International Contaminated Site Remediation Conference (Cleanup 2015), September 2015.

Manning, T. and Wright, J. (2015). Particulate Risk Assessments – Issues and Challenges. 22nd Clean Air and Environment Conference, September 2015.

Wright, J. and Manning, T. (2015). Bioavailability/Bioaccessibility – Practical Considerations. ALGA Workshop, Use of Bioavailability and Bioaccessibility Techniques to Refine Assessment of Human Health Risk, November 2015.

Wright, J. and Manning, T. (2015). PAHs and Bioaccessibility. ALGA Workshop, Use of Bioavailability and Bioaccessibility Techniques to Refine Assessment of Human Health Risk, November 2015.

Manning, T. and Wright, J. (2014). Contaminated Land – How do environmental guidelines get used? SETAC-AU Conference Adelaide September 2014.

Manning, T. and Wright, J. (2014). Use of Health Impact Assessment in Environmental Impact Statements. Ecoforum Conference Gold Coast October 2014.

Wright J., 2014. Particulate Risk Assessments – Issues and Challenges. ACTRA Annual Scientific Meeting, Sydney October 9-10 2014.

Wright J. and Manning T., 2014. Health Impact Assessment – Role in EIS. Keynote presentation. Ecoforum, 29-31 October 2014, Gold Coast.

Wright J. and Manning T., 2014. Addressing Risk Perceptions through Risk Assessment. Ecoforum, 29-31 October 2014, Gold Coast.

Wright J. and Manning T., 2014. Vapour Assessment for TCE. Ecoforum, 29-31 October 2014, Gold Coast.

Wright J., Howell J. and Newell P., 2014. Assessment and Remediation of Illegal Drug Laboratories. Ecoforum, 29-31 October 2014, Gold Coast.

Wright, J., 2014. Clandestine Drug Laboratories – Understanding Exposures and Public Health. The Second International Conference on Law Enforcement and Public Health, Amsterdam 5-8 October 2014.

Wright, J. 2014. ASC NEPM – Implementation. AEBN (Australian Environment Business Network) Conference on Managing Contaminated Land, September 2014.

Wright, J. 2014. Managing Vapours – The Issues to Consider for Developers and Councils. AEBN (Australian Environment Business Network) Conference on Managing Contaminated Land, September 2014.

Wright, J., 2012. Exposure and Risk Issues associated with Clandestine Drug Laboratories – development of guidelines. British Occupational Hygiene Society (BOHS), Occupational Hygiene 2012 Conference, 24-26 April 2012, Mercure Holland House Hotel, Cardiff.

Wright, J., 2012. Risks of Not remediating Clandestine Drug Laboratories. 66th Annual Western Australian Environmental Health Australia (WA) State Conference Environmental Health: Imagine Life Without Us, 28-30 March 2012.

Wright, J., 2011. Establishing exclusion criteria from empirical data for assessing petroleum hydrocarbon vapour intrusion. CleanUp 2011: Proceedings of the 4<sup>th</sup> International Contaminated Site Remediation Conference, 11-15 September, Adelaide, Australia.

Wright, J., 2010. Review of Petroleum Vapour Data from Australia. Abstract presented at Ecoforum 2010, 3<sup>rd</sup> ALGA Annual Conference 23-24 February 2010.

Wright, J., 2010. Interpretation and Use of Soil Gas and other Vapour Data. Abstract presented at Ecoforum 2010, 3<sup>rd</sup> ALGA Annual Conference 23-24 February 2010.

Weaver T., Hassell T., Wright J., Stening J. and Apte S., 2009. Speciation and Geochemical Modelling as a Tool to Refine a Risk Assessment for Mercury in Groundwater. Presented at EcoForum, Sydney 28-30 April 2009.

Wright J. and Robinson C., 2009. The Reality of Sampling and Assessing Vapour Intrusion on Petroleum Sites. Presented at Air & Waste Management Association's Vapor Intrusion 2009, January 27-29 2009, San Diego CA.

Wright J., Lee A. and Howell M., 2008. Role of Risk-Based Concentrations in Assessment and remediation of Contaminated Sites. Presented at EcoForum, Gold Coast, 27-29 February 2008.

Wright J., Howell M. and Barnes J., 2006. Risk Assessment – Important Tool for Managing Issues on Contaminated Sites or Just a Task. Presented at Enviro06, Melbourne 2006.

Hall, A, Wright J. and Calabrese N, 2006. Ray Street Landfill – Audit Acceptance Levels for CO<sub>2</sub> in Redeemed Soils. Presented at Enviro06, Melbourne 2006.

Wright J. and Howell M., 2004. "Evaluation of Vapour Migration Modelling in Quantifying Exposure". Presented at Enviro04, Sydney March 2004.

Lee A., Howell M., and Wright J. 2004. "TPH – Analysis, Guidelines and Risk Assessment" Presented at Enviro04, Sydney March 2004.

Pershke D., van Merwyk T., Graham-Taylor S., Wright J., Mitchell T., and Elliot P., 2004. "Health Risk Assessment: Broadening the Horizons of the Traditional Health and Safety Approach", Presented at Enviro04, Sydney March 2004.

Wright J., Buchanan V., and Howell M., "Health Risk Assessment using Probability Density Functions". Presented at the AWWA Waste and Wastewater Conference, Brisbane 1998.

Wright J. and Buchanan V., 1996, "Uptake of Organics and Inorganics into Edible Fruit and Vegetable Crops". Presented at Intersect-96 International Symposium on Environmental Chemistry and Toxicology, Royal Australian Chemical Institute and the Australian Society for Ecotoxicology, 14-16 July 1996.

Wright J. and Howell M., 1995, "Risk Based Approach to Assessment and Management of Air Quality Issues Associated with Contaminated Sites and Hazardous Waste". Presented at Waste

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Management Institute (New Zealand) Inc., 7th Annual Conference and Exhibition, 31 October - 3 November, 1995.

Harrington J F, Clark L T and Wright J, 1994, "The Incineration of Sludge and its Effect on Ambient Air Quality in the Evaluation of Risk Factors for Primary School Children". Presented at Australia and New Zealand Clean Air Conference, Perth 1994.

Royston D, Clark L T and Wright J, 1993, "Chlorinated Dioxins and Furans from Combustion Sources: A review". Poster presented at the Sixth Conference of Asia Pacific Confederation of Chemical Engineering, Melbourne, 1993.