MEMO

To: Phill Wilkinson, Senex Energy

From: Dana McCue, EHS Support

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

Date: 25 January 2026

Re: Chemical Risk Assessment for Atlas Stage 3 Gas Project – CI 1001 Corrosion Inhibitor

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This technical memorandum provides a chemical risk assessment of the chemicals in Corrosion Inhibitor 1001 (CI 1001), a drilling additive product proposed to be used in coal seam gas (CSG) operations (production wells, drilling completions and workovers, exploration and core holes, production operations and 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 production wells, drilling completions and workovers, exploration and core holes, production operations and abandonment) to MNES. No hydraulic fracturing is proposed for the Senex Atlas Stage 3 Development and CI 1001 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 CI 1001, 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 CI 1001.

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[1]. 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 CI 1001 (**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

[1] https://senexenergy.com.au/news/atlas3/

documents contained within the CRAF, the risk assessment includes the following components for the different Tiers of Chemicals (**Table 2**).

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 CI 1001 as a drilling additive. Exposure was assessed for the constituents of potential concern (COPCs) identified in CI 1001 during the drilling process. The chemicals identified in CI 1001 are detailed in **TABLE 3**. The SDS for CI 1001 is included as **Attachment 2**.

TABLE 3 CI 1001 CHEMICALS

Chemical Name	CAS No.
Triethanolamine	102-71-6

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**, triethanolamine 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 CI 1001 used during CSG operations (defined as production wells, drilling completions and workovers, exploration and core holes, production operations and 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 operations 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 a Tier 1 chemical (refer **Attachment 3**).

The chemical risk assessment completed for the chemical indicated negligible risks and effects of chemicals used during CSG operations (production wells, drilling completions and workovers, exploration and core holes, production operations and 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
General PBT Assessment Step					
Combined PBT Assessment Category	**Not a PBT**	**Not a PBT**	**Not a PBT**	**Identified as a PBT**	**N/A**
Chemical Databases of Concern Assessment Step					
Listed as a chemical of concern on relevant databases	**Not listed as a chemical of potential concern on the following databases:** - 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.	**Not listed as a chemical of potential concern on the following databases:** - 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.	**Listed as a chemical of concern on the following databases:** - 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.	**Listed as a chemical of concern on the following databases:** - 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.	**Chemicals noted in the Rotterdam Accord including:** - octabromodiphenyl ether - pentabromodiphenyl ether - perfluorooctane sulfonic acid - perfluorooctane sulfonates - perfluorooctane sulfonamides - perfluorooctane sulfonyls - polybromated biphenyls - short chain chlorinated paraffins - tetramethyl lead - tributyl tin compounds **Chemicals banned in the State of Queensland including**: - Benzene* - Toluene* - Ethylbenze* - Xylene*
Identified as Polymer of Low Concern	Yes (no further assessment required)	No	No	No	N/A
Persistence Assessment Step					
Persistence	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
Other Persistence Concerns - Chemical identified as potentially accumulating in soil and posing risks	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
Bioaccumulative Assessment Step					
Bioaccumulative	**Does not Bioaccumulate as defined by:** - Aquatic - BAF < 2000 or BCF < 2000 or log KoW < 4.2 (if BAF and BCF are not avaliable) -Terresterial - log Koa < 6 and log Kow < 2 - Food Chain Bioaccumation Potential - BMF < 1	**Does not Bioaccumulate as defined by:** - Aquatic - BAF < 2000 or BCF < 2000 or log KoW < 4.2 (if BAF and BCF are not avaliable) -Terresterial - log Koa < 6 and log Kow < 2 - Food Chain Bioaccumation Potential - BMF < 1	**Does not Bioaccumulate as defined by:** - Aquatic - BAF < 2000 or BCF < 2000 or log KoW < 4.2 (if BAF and BCF are not avaliable) -Terresterial - log Koa < 6 and log Kow < 2 - Food Chain Bioaccumation Potential - BMF < 1	**Does Bioaccumulate as defined by:** - Aquatic - BAF ≥ 2000 or BCF ≥ 2000 or log KoW ≥ 4.2 (if BAF and BCF are not avaliable) -Terresterial - log Koa ≥ 6 and log Kow ≥ 2 - Food Chain Bioaccumation Potential - BMF > 1	N/A
Toxicity Assessment Step					
Toxicity	Acute Toxicity: 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	Acute Toxicity: 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	Acute Toxicity: 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	Acute Toxicity: 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	N/A
	Chronic Toxicity: 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	Chronic Toxicity: 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	Chronic Toxicity: 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	Chronic Toxicity: 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
RISK ASSESSMENT ACTIONS REQUIRED					
RISK ASSESSMENT ACTIONS REQUIRED	**Hazard Assessment only.** Do screening only and note it meets the above criteria. Develop toxicological profile	**Hazard Assessment and Qualitative Assessment Only**. 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	**Quantitative Risk Assessment:** Complete PBT, qualitative and quantitative assessment of risk. Quantitative assessment of risk will consider only Category 3 chemicals in end use determination.	**Quantitative Risk Assessment and Full Life Cycle Assessment**: 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	**Banned from Use on Project.** Would reguire specific assessment process and require extensive consultation prior to assessment.

* Above levels pescribed 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., mortaility, 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

SAFETY DATA SHEET

According to Safe Work Australia

Revision: 14-01-2026

Corrosion Inhibitor 1001

Section 1: Product and Company Identification

1.1 Product identifier

Product name **CI (Corrosion Inhibitor) 1001**

1.2 Uses and uses advised against

Use(s) Applied in drilling fluids for Corrosion Inhibition.

1.3 Details of the supplier of the product

Supplier name **COHO Resources**

Address L5 455 Upper Edward St, Spring Hill, 4000

Telephone 0447 725 362

1.4 Emergency telephone number(s)

Emergency 0447725362

Section 2: Hazard Identification

Hazard Category Eye irritation Skin irritation Specific target organ toxicity (single exposure)	 category 2A category 2 category 3
Pictogram Codes and Signal Word GHS07;	 Warning
Hazard Statement Codes H319; H315; H335	 Causes serious eye irritation; Causes skin irritation; May cause respiratory irritation
	

Section 3: Composition /Information On Ingredients

Cas No	**% Weight**	**Name**
102-71-6	60 – 70	Triethanolamine
7732-18-5	30 - 40	Water

Section 4: First Aid Procedures

Eyes	Hold eyelids apart and flush eyes with water for at least 15 minutes. Get medical attention if irritation persists.
Skin	Wash thoroughly with soap and water. Remove contaminated clothing. If irritation develops, seek medical attention.
Ingestion	Drink water to dilute. Never give anything by mouth to an unconscious person. Seek medical attention.
Inhalation	If exposed to a high concentration of chemical, remove to fresh air and restore breathing. If not breathing give artificial respiration. Seek medical attention.
Other Instructions	Sensitive individuals should avoid further contact. If irritation persists, seek medical attention. Persons seeking medical attention should carry a copy of this MSDS with them.

Indication of any immediate medical attention and special treatment needed

For acute or short-term repeated exposures to highly alkaline materials:

- Respiratory stress is uncommon but present occasionally because of soft tissue edema.
- Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary.
- Oxygen is given as indicated.
- The presence of shock suggests perforation and mandates an intravenous line and fluid administration.
- Damage due to alkaline corrosives occurs by liquefaction necrosis whereby the saponification of fats and solubilization of proteins allow deep penetration into the tissue.

Alkali continues to cause damage after exposure. INGESTION:

- Milk and water are the preferred diluents
- No more than 2 glasses of water should be given to an adult.
- Neutralising agents should never be given since exothermic heat reaction may compound injury.
- Catharsis and emesis are contra-indicated.
- Activated charcoal does not absorb alkali.
- Gastric lavage should not be used. Supportive care involves the following:

- Withhold oral feedings initially.
- If endoscopy confirms transmucosal injury start steroids only within the first 48 hours.
- Carefully evaluate the amount of tissue necrosis before assessing the need for surgical intervention.
- Patients should be instructed to seek medical attention whenever they develop difficulty in swallowing (dysphagia). SKIN AND EYE:
- Injury should be irrigated for 20-30 minutes.
- Eye injuries require saline. [Ellenhorn & Barceloux: Medical Toxicology] For amines:

Certain amines may cause injury to the respiratory tract and lungs if aspirated. Also, such products may cause tissue destruction leading to stricture. If lavage is performed, endotracheal and/or esophagoscopic control is suggested.

- No specific antidote is known.
- Care should be supportive and treatment based on the judgment of the physician in response to the reaction of the patient.

Laboratory animal studies have shown that a few amines are suspected of causing depletion of certain white blood cells and their precursors in lymphoid tissue. These effects may be due to an immunosuppressive mechanism.

Some persons with hyperreactive airways (e.g., asthmatic persons) may experience wheezing attacks (bronchospasm) when exposed to airway irritants.

Lung injury may result following a single massive overexposure to high vapour concentrations or multiple exposures to lower concentrations of any pulmonary irritant material.

Health effects of amines, such as skin irritation and transient corneal edema (“blue haze,” “halo effect,” “glaucopsia”), are best prevented by means of formal worker education, industrial hygiene monitoring, and exposure control methods. Persons who are highly sensitive to the triggering effect of non-specific irritants should not be assigned to jobs in which such agents are used, handled, or manufactured.

Medical surveillance programs should consist of a pre-placement evaluation to determine if workers or applicants have any impairments (e.g., hyperreactive airways or bronchial asthma) that would limit their fitness for work in jobs with potential for exposure to amines. A clinical baseline can be established at the time of this evaluation.

Periodic medical evaluations can have significant value in the early detection of disease and in providing an opportunity for health counseling. Medical personnel conducting medical surveillance of individuals

potentially exposed to polyurethane amine catalysts should consider the following: Health history, with emphasis on the respiratory system and history of infections

- Physical examination, with emphasis on the respiratory system and the lymphoreticular organs (lymph nodes, spleen, etc.)
- Lung function tests, pre- and post-bronchodilator if indicated
- Total and differential white blood cell count
- Serum protein electrophoresis

Persons who are concurrently exposed to isocyanates also should be kept under medical surveillance. Pre-existing medical conditions generally aggravated by exposure include skin disorders and allergies, chronic respiratory disease (e.g. bronchitis, asthma, emphysema), liver disorders, kidney disease, and eye disease.

Broadly speaking, exposure to amines, as characterized by amine catalysts, may cause effects similar to those caused by exposure to ammonia. As such, amines should be considered potentially injurious to any tissue that is directly contacted.

Inhalation of aerosol mists or vapours, especially of heated product, can result in chemical pneumonitis, pulmonary edema, laryngeal edema, and delayed scarring of the airway or other affected organs. There is no specific treatment.

Clinical management is based upon supportive treatment, similar to that for thermal burns.

- Persons with major skin contact should be maintained under medical observation for at least 24 hours due to the possibility of delayed reactions

Section 5: Fire Fighting Measures

Extinguishing Media	Carbon dioxide, dry chemical, foam and water spray or fog. Use water to cool fire-exposed containers
Fire fighting procedures	Normal fire fighting procedures may be used
Unusual fire and explosion Hazards	May form explosive dust-air mixtures.

Section 6: Accidental Spill / Release Measures:

Steps to be taken if the material is released or spilled	Wear proper protective equipment. Contain the spill and minimize dust. Re-package or recycle if possible, or place in a suitable waste container.

Waste Disposal method	The material must be disposed as per regulations of the local laws.
Environmental precautions	Avoid discharge into drains/sewers or waterways
Reporting	Please follow Local Laws
Methods of cleaning up	Recover the product by absorbing with sand, shoveling or sweeping. Use of water wash down after spill clean is not recommended.

Section 7: Handling and Storage

Handling	Handling and use in accordance with good occupational hygiene and safety practice.
Storage Incompatible products	Strong oxidizing and reducing agents
Storage	Store in a cool dry place, stable under normal storage conditions
Packaging materials	Steel Drums/Barrels/Plastic containers

Section 8: Occupational Control Measures / Personal Protection

Control parameter

Occupational Exposure Limits (OEL)

Ingredients data Source	Ingredient	Material Name	TWA	STEL	Peak	Notes
Malaysia Permissible Exposure Limits	Triethanolamine	Triethanolamine	5 mg/m3	Not available	Not available	Not available

Emergency limits Ingredients	Material name	TEEL-1	TEEL-2	TEEL-3
Triethanolamine	Triethanolamine	15 mg/m3	51 mg/m3	1100 mg/m3

Ingredients	Original IDLH	Revised IDLH
Triethanolamine	Not available	Not available

Respiratory	Wear a high efficiency particulate respirator when exposure exceeds the recommended limits.
Ventilation	Supply natural or mechanical ventilation adequate to keep exposures below the recommended exposure limits.

Skin	Wear appropriate gloves and long protective clothing. Wash thoroughly after handling. Wash clothes and clean shoes before reuse
Eyes	Wear safety glasses with side guards. Insure proper fit for best Protection
Other Protective Equipment	Ordinary measures of personal hygiene should be observed. Avoid contact with eyes, skin and clothing and inhalation of dust.

Section 9: Physical and Chemical Characteristics

Information on basic physical and chemical properties Appearance		Colourless to light yellow liquid	
Physical state	Liquid	**Relative density (Water = 1)**	1.0 – 1.12
Odour	Characteristics	**Partition coefficient (n-octanol /water)**	Not available
Odour threshold	Not available	**Auto-ignition temperature (°C)**	Not available
pH (as supplied)	9 - 11	**Decomposition temperature (°C)**	Not available
Melting point / freezing point (°C)	Not available	**Viscosity (cPs)**	Not available
Initial boiling point and boiling range (°C)	Not available	**Molecular weight (g/mol)**	Not applicable
Flash point (°C)	Not available	**Taste**	Not available
Evaporation rate	Not available	**Explosive properties**	Not available
Flammability	Not available	**Oxidizing properties**	Not available
Upper explosive limit (%)	Not available	**Surface tension (dyn/cm or mN/m)**	Not available

Lower explosive limit (%)	Not available	**Volatile component (%vol)**	Not available

Section 10: Stability and Reactivity

Stability	Stable under normal conditions of use
Materials to avoid	Strong oxidizers and reducing agents
Hazardous decomposition products	No dangerous reaction , decomposition known with common products
Hazardous Polymerization	Will not occur

Section 11: Toxicological Information

Acute Toxicity	Not known
Eyes	May cause Irritation to the Eyes
Skin	Skin irritation may occur in sensitive individuals after repeated or prolonged contact.
Inhalation	Excessive or repeated inhalation may cause respiratory irritation.
Ingestion	Not to be swallowed. It may cause headache, dizziness drowsiness.

Triethanolamine

TOXICITY	**IRRITATION**
Dermal (rat) LD50: >18080 mg/kg	Eye (rabbit) : 0.1 ml
Oral (rat) LD50: 5559.6 mg/kg	Eye (rabbit) : 10 mg - mild
Eye (rabbit): 5.62 mg – SEVERE (minor conjunctival irritation minor iritis, no corneal injury*, no irritation*)	
Skin (human): 15 mg/3d (int)- mild	
Skin (rabbit): 4h occluded	
Skin (rabbit): 560 mg/24hr – mild with significant discharge	

Legend	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from

		RTECS - Register of Toxic Effect of chemical Substances	
Acute Toxicity	x	**Carcinogenicity**	√
Skin Irritation/ Corrosion	√	**Reproductivity**	x
Serious Eye Damage/ Irritation	√	**STOT - Single Exposure**	√
Respiratory or Skin sensitisation	√	**STOT - Repeated Exposure**	x
Mutagenicity	x	**Aspiration Hazard**	x

Section 12: Ecological Information

Toxicity Ingredients	**Endpoint**	**Test Duration (hr)**	**Species**	**Value**	**Source**
Triethanolamine	EC50	96	Algae or other aquatic plants	169mg/l	1
BCF	1008	Fish	<0.4		7
EC50	72	Algae or other aquatic plants	>107<260mg/l		2
EC50	48	Crustacea	565.2 – 658.3 mg/l		4
LC50	96	Fish	11800mg/l		2
NOEC(ECx)	Not Available	Fish	>1mg/l		2
Legend		Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data		

Persistence and degradability Ingredients	Persistence: Water / Soil	Persistence: Air
Triethanolamine	LOW	LOW

Bioaccumulative potential Ingredients	Bioaccumulation
Triethanolamine	LOW (BCF = 3.9)

Mobility in soil Ingredients	Mobility
Triethanolamine	LOW (KOC = 10)

Section 13
Disposal Considerations

Waste treatment methods

Product / Packaging Disposal	Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked. A Hierarchy of Controls seems to be common – the user should investigate: • Reduction • Reuse • Recycling

- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some others means. Shelf-life consideration should also be applied in making decision of this type.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.

- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible or consult manufacturer for recycle options.
- Consult State Land Waste Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorized landfill.

Section 14
Transport Information

The material is not regulated for transport of Dangerous Goods: ADR, IATA

Section 15
Regulations Information

NO regulations applicable	
Precautionary Labeling	WARNING! Contains liquid material May cause eye, skin and respiratory tract irritation.
Precautions for transportation handling and Storage	Protect Drums/Barrels from heat and excessive moisture. Minimize exposure during use

Section 16
Additional Information:

Disclaimer

This SDS is prepared in accord with the Safe Work Australia guidelines for GHS7

The information contained in this safety data sheet is provided in good faith and is believed to be accurate at the date of issuance. COHO Group Pty. Ltd makes no representation of the accuracy or comprehensiveness of the information and to the full extent allowed by law excludes all liability for any loss or damage related to the supply or use of the information in this material safety data sheet. The user is cautioned to make their own determinations as to the suitability of the information provided to the circumstances in which the product is used.

Attachment 3 Chemical Register

Attachment 3
Chemical Register

Chemical Name	CAS No.	Overall PBT Assessment[1]	Chemical Databases of Concern Assessment Step		Persistence Assessment Step		Bioaccumulative Assessment Step	Toxicity Assessment Step			Tier[3]	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[2]	Chronic Toxicity[2]			Completion and Workover	Exploration and Core Holes	Production Operations	Monitoring Wells	Drilling additive - CSG Production Well	Abandonment
Triethanolamine	102-71-6	Not a PBT	No	No	No	No	No	No	1	1	1	Low	X	X	X		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

TRIETHANOLAMINE

This dossier on triethanolamine presents the most critical studies pertinent to the risk assessment of triethanolamine in its use in coal seam gas extraction activities. This dossier does not represent an exhaustive or critical review of all available data. The majority of information presented in this dossier was obtained from 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 – Triethanolamine is classified as a **tier 1** chemical and requires a hazard assessment only.

1 BACKGROUND

Triethanolamine, or TEA, is a viscous organic compound that is both a tertiary amine and a triol, a molecule with three alcohol groups. TEA is often used to facilitate lubricant formation in the drilling process.

It is readily degradable, does not persist in the environment and is of low toxicity to aquatic organisms.

2 CHEMICAL NAME AND IDENTIFICATION

Chemical Name (IUPAC): 2,2’,2”-nitrilotriethanol

CAS RN: 102-71-6

Molecular formula: $C_6H_{15}NO_3$ or $(CH_2OHCH_2)_3N$

Molecular weight: 149.19 g/mol

Synonyms: Triethanolamine; 2,2’,2”-nitrilotriethanol; 2,2’,2”-nitrilotris[ethanol]; ethanol, 2,2’,2”-nitrilotri- (8Cl); ethanol, 2,2’,2”-nitrilotris- (9Cl); nitrilotriethanol; TEA; tris(beta-hydroxyethyl)amine; tris(2-hydroxyethyl)amine

3 PHYSICO-CHEMICAL PROPERTIES

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

Table 1 Overview of the Physico-chemical Properties of Triethanolamine

Property	Value	Klimisch Score	Reference
Physical state at 20°C and 101.3 kPa	Colourless to pale-yellow liquid with an amine-like odour.	2	ECHA
Melting Point	20.5°C @ 101.3 kPa	2	ECHA
Boiling Point	336.1°C @ 101.3 kPa	2	ECHA
Density	1125 kg/m^3 @ 20°C	2	ECHA

Property	Value	Klimisch Score	Reference
Vapor Pressure	Negligible	2	ECHA
Partition Coefficient (log K_{ow})	-1.9 @ 25°C [Experimental]	2	ECHA
Dissociation Constant (pKa)	7.86 @ 25°C	2	ECHA
Water Solubility	>1,000 g/L @ 20°C	2	ECHA
Viscosity	929.82 mPa s@ 20°C 203.28 mPa s @ 40°C	2	ECHA

4 DOMESTIC AND INTERNATIONAL REGULATORY INFORMATION

A review of international and national environmental regulatory information was undertaken (Table 2). This chemical 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 triethanolamine.

Based on an assessment of hazards, NICNAS identified the substance as a chemical of low concern to the environment (DoEE, 2017a). Chemicals of low concern are unlikely to have adverse environmental effects if they are released to the environment from coal seam gas operations.

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

A. Summary

Triethanolamine is readily biodegradable and has a low potential to bioaccumulate. Triethanolamine will not adsorb significantly to suspended solids and sediments in water and would be highly mobile in soil.

B. Biodegradation

Triethanolamine is readily biodegradable. In an OECD 301E test, there was 96% degradation after 19 days (ECHA). [Kl. score = 2]

Triethanolamine was completely degraded after incubation in municipal activated sludge for 1 or 5 days (West and Gonsior, 1996). The rate constants in all test batches for degradation and

mineralisation were reported to be >0.359. Thus, triethanolamine is readily biodegradable. [Kl. score = 2]

If a chemical is found to be readily biodegradable, it is categorised as Not Persistent since its half-life is substantially less than 60 days (DoEE, 2017b).

C. Environmental Distribution

No experimental data are available for triethanolamine. Using KOCWIN in EPISUITE™ (USEPA, 2017), the estimated soil organic carbon partition coefficient (K_{oc}) value from log K_{ow} of -2.48 is 0.3046 L/kg. The estimated K_{oc} value from the molecular connectivity index (MCI) is 10 L/kg.

If released to water, based on its low K_{oc} and high water solubility values, triethanolamine is likely to remain in water and not adsorb to sediment. It is also not expected to adsorb to soil and has the potential to be highly mobile.

D. Bioaccumulation

Triethanolamine has been tested in a bioconcentration flow-through fish (OECD 305) test using *Cyprinus carpio*. The BCF was determined to be <0.4 and <3.9 at triethanolamine concentrations of 2.5 and 0.25 mg/L, respectively (ECHA). [Kl. score = 2]

Based on the log K_{ow} (-2.48) and the calculated BCF, bioaccumulation is not to be expected.

6 ENVIRONMENTAL EFFECTS SUMMARY

A. Summary

Triethanolamine has low acute toxicity concern to aquatic organisms.

B. Aquatic Toxicity

Acute Studies

Table 3 lists the results of acute aquatic toxicity studies conducted on triethanolamine.

Table 3 Acute Aquatic Toxicity Studies on Triethanolamine

Test Species	Endpoint	Results (mg/L)	Klimisch Score	Reference
Pimephales promelas	96-h LC_{50}	11,800	2	ECHA
Ceriodaphnia dubia	48-h EC_{50}	610	2	Warne and Schifko, 1999
Desmodesmus subspicatus	72-h EC_{50}	512 (neutralised) 216 (un-neutralised)	2	ECHA

Chronic Studies

In a 21-day *Daphnia* reproduction test, the NOEC for mortality is 16 mg/L, the NOEC for reproduction rate was 125 mg/L, and the NOEC for reproduction on the appearance of first offspring was 250 mg/L (Kuehn *et al.*, 1989) [Kl. score = 2].

C. Terrestrial Toxicity

No studies are available. According to Regulation (EC) 1907/2006, Annex IX, Section 9.4.1 to 9.4.3, Column 2, studies on the toxicity to terrestrial organisms do not need to be conducted as the substance is considered to be readily biodegradable (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).

Triethanolamine is readily biodegradable; thus, it does not meet the screening criteria for persistence.

The BCF values for triethanolamine in fish was <3.9; thus, it does not meet the criteria for bioaccumulation.

The NOEC or EC_{10} values from chronic aquatic toxicity studies on triethanolamine are >0.1 mg/L. Thus, triethanolamine does not meet the criteria for toxicity.

The overall conclusion is that triethanolamine is not a PBT substance.

B. Other Characteristics of Concern

No other characteristics of concern were identified for triethanolamine.

8 SCREENING ASSESSMENT

Chemical Name	CAS No.	Overall PBT Assessment [1]	Chemical Databases of Concern Assessment Step		Persistence Assessment Step		Bioaccumulative Assessment Step	Toxicity Assessment Step			Risk Assessment Actions Required[3]
			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 [2]	Chronic Toxicity[2]	
Triethanolamine	102-71-6	Not a PBT	No	No	No	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

Department of the Environment and Energy [DoEEa]. (2017). *Environmental risks associated with surface handling of chemicals used in coal seam gas extraction in Australia*. Prepared by the Chemicals and Biotechnology Assessments Section (CBAS), in the Chemicals and Waste Branch of the Department of the Environment and Energy as part of the National Assessment of Chemicals Associated with Coal Seam Gas Extraction in Australia, Commonwealth of Australia, Canberra. https://www.dcceew.gov.au/sites/default/files/documents/technical-report-number-14-environmental-risks.pdf

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B. Abbreviations and Acronyms

°C	degrees Celsius
AICS	Australian Inventory of Chemical Substances
BCF	bioconcentration factor
CAS RN	Chemical Abstract Services Registry Number
COC	constituent of concern
EC	effective concentration
ECHA	European Chemicals Agency
EU	European Union
g/cm^3	grams per cubic centimetre
g/L	grams per litre
IChEMS	Industrial Chemicals Environmental Management Standard
IUPAC	International Union of Pure and Applied Chemistry
KOCWIN™	USEPA organic carbon partition coefficient estimation model
kPa	kilopascal
L/kg	litres per kilogram
LC	lethal concentration
MCI	molecular connectivity index
mg/L	milligrams per litre
mm^2/s	square millimetres per second
NICNAS	National Industrial Chemicals Notification and Assessment Scheme
NOEC	no observed effect concentration
OECD	Organisation for Economic Co-operation and Development
PBT	Persistent Bioaccumulative Toxic
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SGG	Synthetic Greenhouse Gases
TEA	triethanolamine
USEPA	United States Environmental Protection Agency

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9 February 2026

EHS Support

Attn: Joe Hayes

Independent Peer Review of Chemical Risk Assessments – Tier 1 Chemical CI1001

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 corrosion inhibitor 1001 (CI 1001) 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 CI 1001 proposed for the Atlas Stage 3 works.

One Tier 1 Chemical Risk Assessments relevant to CI 1001 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.
Tier 1 chemicals	
Triethanolamine	102-71-6

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

Dr Jackie Wright

jackie@enrisks.com.au

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

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_{10} and $PM_{2.5}$ 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_{10} and $PM_{2.5}$ 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.

Work History

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

Education

BE (Hons)	University of Sydney, Bachelor of Engineering (Hons)	1989
PhD	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 methamhetamine 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 UUsed 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 ($PM_{2.5}$) 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 DeVaull 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. Kostecki and James Dragun, 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.

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 remeidation 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.

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 or 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 4th 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, 3rd 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, 3rd 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_2 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.

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