ACTRA
2026 Newcastle, NSW

PROGRAM AND ABSTRACTS BOOKLET

18th Annual Scientific Meeting
& Continuing Education Day

In the mix: Advances in the toxicology and risk assessment of mixtures

Annual Scientific Meeting:
Thursday 3 & Friday 4 September 2026

Continuing Education Day:
Wednesday 2 September 2026

The NEX, Newcastle, NSW
www.actra.org.au

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Our team of specialists offer a range of services, including *(eco)*toxicology advice on chemical exposures *(in air, water, soil, food, consumer products and medicines)*, health risk assessments and chemical registration support, through to geochemistry advice, land resource assessments, erosion and landform evolution assessments.

We are proud to support the SETAC AU / ACTRA conference and foster continuing education and professional development.

Scan the QR code to find out more

SLR

GENERAL INFORMATION

Conference Venue

Wednesday 2 – Friday 4 September

The NEX – Newcastle Exhibition & Convention Centre (Room: The EXtra)

309 King Street Newcastle West

Networking Drinks and Dinner

Wednesday 2 September – 5.30pm – 9.00pm

Honeysuckle Hotel

Lot 31 Wharf C, Honeysuckle Drive, Newcastle

This not a formal part of the CE Day Registration and is on a pay as you go basis with food and drinks available to order from the venue. The Honeysuckle Hotel is an easy 600m walk from the conference venue.

Conference Dinner presented by Frangos Toxicology and Nature Tech

Thursday 3 September – 7.00pm – 10.30pm

Newcastle City Hall

290 King Street, Newcastle NSW 2300

The Newcastle City Hall is an easy 700m walk from the conference venue.

Name Badge

Each delegate will receive a name badge which can be collected from the registration desk. Your name badge should be worn at all times, including the conference dinner. It indicates your registration profile and is your official pass to the conference and catering sessions.

WIFI Details

WIFI: NEX
Password: events2026

Registration desk

Please visit the registration desk if you require assistance throughout the conference.

Dietary requirements

Dietary requirements advised during registration will be available on a separate catering table during the conference. For the conference dinner, please make yourself known to the catering staff. Please speak with the venue catering staff if you require assistance.

Exhibition and Poster Presentations

Exhibitor stands and poster presentations will be open throughout the conference. We encourage delegates to take the opportunity to visit during breaks.

Social Channel (Discord)

Got questions about the conference for no one in particular, or looking to talk with like-minded tox/RA enthusiasts? Join the ACTRA Discord server and chat with fellow attendees!

Certificate of Attendance

Attendance certificates are available on request from the conference manager, please email actraasm@associationprofessionals.com.au. Please note that the attendance certificate won't include the sessions attended and delegates should keep a record of the sessions attended.

Privacy Policy

By registering for this conference relevant details will be stored on a database held by Association Professionals and ACTRA. Details provided during registration may be used to update registrants about the ASM and CE Day. Details may also be used in future marketing by ACTRA such as educational events. A list of delegates (name and organisation) will be available to conference sponsors and exhibitors. Please email the conference secretariat if you do not wish your details included in the delegate lists or if you do not want to receive information about future ACTRA professional development.

Disclaimer

ACTRA and the ACTRA ASM Organising Committee will not accept liability for damages of any nature sustained by participants or loss or damage to their personal property as a result of the conference or related events. Neither ACTRA or the ACTRA ASM Organising Committee are responsible for any loss or damage as a result of alteration to the program, cancellations or postponement of the conference due to unforeseen occurrence or any other event that results in staging of the conference being impractical or impossible.

Delegates are encouraged to take out their own insurance as necessary to cover potential losses.

WELCOME

We welcome you all to ACTRA's 18th Annual Scientific Meeting (ASM) and Continuing Education Day taking place on 2-4 September at the NEX, Newcastle, NSW. The theme of this year's ASM is *"In the mix: advances in the toxicology and risk assessment of mixtures"*.

We hope to bring together scientists, researchers, industry representatives, policymakers, consultants, and practitioners to focus on one of the most complex challenges in contemporary toxicology. Real-world exposures rarely occur in isolation. Instead, humans and ecosystems are exposed to dynamic and diverse mixtures of chemicals, pharmaceuticals, and environmental stressors. Understanding how these mixtures interact, and how best to assess and manage their risks, is central to protecting public health and the environment.

The conference will explore aspects such as the following.

- Mechanisms of mixture toxicity: Understanding how components in mixtures interact at the molecular and cellular levels, including additive, synergistic and antagonistic effects that influence overall toxicity.
- Environmental and human exposure assessment: Evaluating real-world exposure scenarios to complex mixtures from air, water, soil, and food / consumer products and methods for assessing risk of harm.
- Regulatory frameworks and risk assessment strategies: Current guidance and challenges for setting guideline/guidance values for mixtures for protecting public health and the environment.
- From data to decisions: Exploring how data integration, including new approach methodologies, computational modelling, omics technologies, and high-throughput methods, can be applied in evolving mixture risk assessment frameworks.

Many thanks to Dr Belinda Goldsworthy (RACTRA, enRisks) and Katie Richardson (RACTRA, Senversa and ACTRA Vice-President) as co-chairs of the 2026 ASM Organising Committee, and its members and sub-committees including:

- *Di Marco Student Travel Grant, Posters and Abstracts:* Assoc. Prof. Slade Matthews (FACTRA; The University of Sydney), Katie Richardson, Prof. Paul Wright (FIUPAC, FACTRA; RMIT University and ACTRA Immediate Past President).
- *Sponsorship and Marketing:* Dr Maria Davoren (Davoren Environmental), Mirella Goetzmann (RACTRA; Netgate Toxicology and Edith Cowan University, ECU), Dr Belinda Goldsworthy, Tarah Hagen (FACTRA; SLR Consulting and ACTRA President).
- *Social:* Sheridan Chapman (DRC Environmental), Tarah Hagen.
- *Program:* Dr Rhian Cope (FACTRA; SLR Consulting and ACTRA Secretary), Dr Ian Delaere (FACTRA, Expotox Pty Ltd) and all of the above.

Conference organising support was provided by Judy Somes from Association Professionals.

Our sincerest thanks to the following sponsors for their generous financial support and also for supporting their staff to attend the ACTRA ASM & CE Day: Gold ASM and CE Day Sponsor – SLR Consulting Australia Pty Ltd; Silver ASM Sponsors – Botanical Resources Australia and Victorian Department of Health; Di Marco Student Travel Grant Sponsors – Dr Peter Di Marco of Benchmark Toxicology Services Pty Ltd and enRisks; ASM Conference Dinner Sponsor – Frangos Toxicology and Nature Tech; Name Badge and Lanyard Branding Partner – Senversa; Keynote Presenter Partner – Accord Australasia; Notebook and Pen – enRisks; CE Day Catering Brand Partner – Senversa; Display stands – Envirolab Group and Perlastic Australia Pty Ltd.

The impressive scientific program features presentations from several invited national and international speakers, including (in order of appearance in the program): Dr Antti Mikkonen, EPA Victoria; Katie Richardson, Senversa; Kara Fry, EPA Victoria; Dr Szabina Stice, US Food and Drug Administration; Dr Thomas Simones, Maine CDC; Barbara Astmann, Maine CDC; Dr Jorge Numata, German Federal Institute For Risk Assessment (BfR); Dr Dennis Paustenbach, TRC Companies (our international plenary speaker); Dr Rhian Cope, SLR Consulting Australia; Peter Knott, GCG Health Safety & Hygiene; Denise Bloch, BfR; Dr Elvis Okoffo, University of Queensland; Dr Cassandra Rauert, University of Queensland; Assoc. Prof. Brad Clarke, The University of Melbourne; Naomi Cooper (FACTRA), Senversa; Hannah Gerstmyer, University of Sydney; and Dr Emily Sansoni, NSW Poisons Information Centre. We also have a panel discussion on mixture toxicology and risk assessment chaired by Tarah Hagen and featuring Dr Dennis

Paustenbach, Dr Rhian Cope, Dr Jen Martin (FACTRA, EPA Victoria) and Dr Brian Priestly (Emeritus FACTRA). Many thanks to all of these experts for their contributions to the ASM and CE days.

The ASM also provides a forum for ACTRA members and non-members to submit papers on various research topics and other commentaries. This year there are ten submitted oral presentations, four poster presentations, as well as the winner and runner up of the student travel grant. The ACTRA Di Marco Student Travel Grant was initially put forward by ACTRA in 2015. Its aim is to encourage postgraduate students in toxicology and/or risk assessment to participate more fully in ACTRA activities. ACTRA acknowledges the generous ongoing support of Dr Peter Di Marco from Benchmark Toxicology Services and also enRisks as co-sponsor of the 2026 travel grant. This year, a travel grant has been awarded to Thomas Griffiths of the University of Western Australia on the topic of "Bliss Synergism of Five Toxic Lipid Peroxidation-Derived Aldehydes in *Saccharomyces cerevisiae*".

Please note that the first part of the ACTRA Annual General Meeting (AGM), referred to in the program as a member's meeting, will be held as a face-to-face event this year during the ASM lunch break on Thursday 3 September. All ACTRA members in Newcastle that day are encouraged to attend in-person to hear what the Executive Committee has been doing to plan and progress the activities of ACTRA. At the member's meeting, we will also be announcing the newly elected members of the committee.

We are looking forward to seeing as many of you as possible in person in Newcastle. We hope you will take this opportunity to enjoy some stimulating science, as well as the exciting social program that includes a networking event and the ASM Dinner and dancing at the beautiful Newcastle City Hall.

We hope you will join us and contribute to fruitful learning and discussion, meaningful connections, and an inspiring exchange of ideas.

Sincerely,

Tarah Hagen
ACTRA President

Dr Belinda Goldsworthy and **Katie Richardson**
Conference Co-chairs



ACKNOWLEDGEMENTS

Acknowledgement of Country

We in ACTRA respect and acknowledge the Traditional Custodians and their Ancestors of the unceded lands and waters across Australia where we conduct our business, and their Elders, past and present.

The Conference Organising Committee Gratefully Acknowledges the Conference Sponsors for Their Generous Support

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PERLASTIC AUSTRALIA

CONTINUING EDUCATION DAY

PROGRAM

WEDNESDAY 2 SEPTEMBER, 2026

TIME	TOPIC	CHAIRPERSON / PRESENTER
8:15am	**Registration: Tea/Coffee**	
	Day Chair: Dr Antti Mikkonen, EPA Victoria Assistant Day Chair: Katie Richardson RACTRA, Senversa (ACTRA Vice President)	
9:00am	Welcome – Introduction to the day	Tarah Hagen FACTRA, SLR Consulting Australia Pty Ltd (ACTRA President)
9:10am	Introduction to uptake of chemicals and chemical mixtures in food	Dr Antti Mikkonen, EPA Victoria Katie Richardson RACTRA, Senversa (ACTRA Vice President)
10:30am	**MORNING TEA**	
11:00am	Drawing the line: Applying the threshold of toxicological concern (TTC) in environmental health risk assessment	Dr Szabina Stice, US FDA *Virtual Presentation* Kara Fry, EPA Victoria Dr Antti Mikkonen, EPA Victoria
12:00pm	**LUNCH**	
1:00pm	Bridging simplicity and complexity: Static and dynamic livestock PFAS models in practice (includes interactive exercise)	Dr Thomas Simones, Maine CDC Barbara Astmann, Maine CDC *Virtual Presentation* Dr Antti Mikkonen, EPA Victoria
2:00pm	Laying the foundation: transfer of contaminant mixtures to chicken eggs	Katie Richardson RACTRA, Senversa (ACTRA Vice President)
3:00pm	**AFTERNOON TEA**	
3:30pm	Transfer to foods of animal origin: web-based tool for multiple contaminants and livestock types	Dr Jorge Numata, German Federal Institute for Risk Assessment (BfR) *Virtual Presentation*
4:30pm	Wrap up	Dr Antti Mikkonen, EPA Victoria Katie Richardson RACTRA, Senversa (ACTRA Vice President) Kara Fry, EPA Victoria
5:00pm	**Close of Continuing Education Day**	
5:30-9:00pm	**Networking Drinks and Dinner** Honeysuckle Hotel Lot 31 Wharf C, Honeysuckle Drive, Newcastle *Pay as you go. Order food and drinks at the venue.*	

Introduction to uptake of chemicals and chemical mixtures in food

Antti Mikkonen

Environment Protection Authority (EPA) Victoria

Katie Richardson

Senversa Pty Ltd, Melbourne, VIC

Contaminant mixtures in the environment can transfer into foodstuffs, and pose risks to consumers of these foodstuffs. Estimating contaminant transfer into foodstuffs is complex, and highly dependent on chemical properties and variable exposure (which can be difficult to estimate). This session will introduce the themes and objectives for the day, and provide a high-level introduction to the principles and approaches for assessing food contamination risk, with a focus of estimating the uptake of chemical mixtures into foods. Material covered will include:

- Introduction to uptake of chemicals and chemical mixtures in food
- Framing food contamination risk: from environmental concentrations to human exposure and decision-making
- Conceptual models linking sources, pathways, and food products (crops, livestock, eggs)
- Key drivers of exposure variability, including environmental conditions, farm practices, and animal behaviour
- Fundamentals of uptake and bioaccumulation modelling across major food pathways
- Strengths, limitations, and inherent biases of modelling approaches in food risk assessment
- Establishing a foundation for interpreting and applying models throughout the day



Dr Antti Mikkonen

Principal Health Risk Advisor, Environment Protection Authority (EPA) Victoria

Antti Mikkonen is a Principal Health Risk Advisor at EPA Victoria with over 15 years' experience in environmental consulting, research, and regulation. Antti is an Adjunct Associate Professor at RMIT university and has a PhD in pharmacology/ risk assessment from UniSA. His role at EPA is centered around the assessment and management of public health risks from chemicals. Antti is also actively engaged in research with a primary focus on exposure science and development of TK models to inform regulatory decision making and policy.



Katie Richardson RACTRA

National Risk Assessment Practice Leader, Senversa Pty Ltd and ACTRA Vice-President

Katie Richardson leads Senversa's risk assessment practice, bringing over two decades of expertise in human health and ecological risk assessments. Her recent work includes projects for industry, government, water authorities and defence; often in remote locations where complex exposure pathways (including into foodstuffs and ecosystems) demand efficient and pragmatic solutions. Katie is recognised by the Australasian College of Toxicology and Risk Assessment (ACTRA) on their Professional Register and currently serves as ACTRA's Vice President.

Drawing the line: Applying the threshold of toxicological concern (TTC) in environmental health risk assessment

Szabina Stice

Food and Drug Administration, USA

Kara Fry

Environment Protection Authority (EPA) Victoria

History and evolution of the TTC

- Development of the recently released US FDA Expanded Decision Tree
- Opportunities for TTC to support EHRAs

Interactive exercise: Use the EDT toolkit, crop data and Australian exposure parameters to conduct a screening-level risk assessment for edible crops

The Threshold of Toxicological Concern (TTC) is a risk assessment approach that uses chemical structure and toxicity data from related chemicals to establish an exposure level below which adverse health effects are unlikely. The TTC provides a practical framework for assessing the risk from chemicals with limited toxicological data, and as a screening tool in environmental health risk assessments (EHRAs).

The TTC concept and the Cramer Decision Tree underpinning it have evolved considerably over time. Most recently, the US FDA developed the Expanded Decision Tree (EDT). The EDT incorporates contemporary toxicological datasets and updated mechanistic knowledge to overcome key limitations of the previous approach. These advances allow a broader range of chemicals to be classified into one of six classes of chronic toxic potential, each with an associated threshold of concern, expanding the applicability of TTC in EHRAs.

This session will focus on the EDT as a tool to support risk assessors. Material covered will include:

- Evolution of the TTC concept
- Development of the US FDA Expanded Decision Tree (EDT)
- Opportunities for TTC to support environmental health risk assessments

Interactive exercise: Put the EDT into practice using real-world EPA Victoria monitoring data, Australian exposure parameters and the EDT toolkit to conduct a screening-level risk assessment of emerging contaminants in edible crops.



Dr Szabina Stice

Senior Toxicologist, Food and Drug Administration, USA

Dr Szabina Stice is a senior toxicologist at the U.S. Food and Drug Administration with more than 21 years of experience in regulatory science, toxicology, and analytical chemistry. She holds a PhD in Chemistry from Florida International University and an M.S. in Pharmacy, with a concentration in Pharmaceutical Sciences, from the University of Florida, as well as graduate certificates in clinical toxicology, pharmaceutical chemistry, drug discovery and development, ADMET, and forensic drug chemistry. Her work focuses on food chemical safety, emerging technologies, and the practical application and development of computational toxicology tools to support regulatory decision-making. Dr Stice spearheaded the development of the Expanded Decision Tree, a modernized framework for chemical screening, prioritization, and safety assessment. Her contributions also extend internationally through her work with JECFA, OECD, and ILSI Europe.



Kara Fry

Senior Health Risk Advisor, Environment Protection Authority (EPA) Victoria

Kara is Senior Health Risk Advisor at the Environment Protection Authority (EPA) Victoria. In this role she conducts and reviews human health risk assessments, leads emerging contaminants research and develops science-driven policy for managing chemicals in the Victorian environment. She has also recently started a PhD with the Queensland Alliance for Environmental Health Sciences on modelling PFAS exposure in the Australian population.

Bridging simplicity and complexity: Static and dynamic livestock PFAS models in practice (includes interactive exercise)

Antti Mikkonen[1], Barbara Astmann[2], Thomas Simones[2], Dr. Andy Smith[2], Dr Jen Martin[1]

[1]Environmental Protection Authority Victoria, Australia; [2]Maine Center for Disease Control, Augusta, ME

Managing PFAS contamination in livestock systems requires modelling tools that are both scientifically robust and fit for purpose. This presentation compares two complementary approaches developed by Maine CDC and EPA Victoria to estimate PFOS concentrations in beef cattle.

Maine CDC's static intake-to-tissue model adapts a U.S. EPA framework to estimate PFOS in beef tissue from environmental contamination. It integrates soil-to-forage transfer, feed and incidental soil ingestion, and PFOS transfer to muscle tissue over a defined exposure window. EPA Victoria's dynamic toxicokinetic model simulates daily PFOS uptake and elimination across an animal's lifespan, accounting for seasonal feeding patterns, changing exposure conditions, and population variability.

Both models were evaluated using data from a PFAS-impacted beef farm in Maine with well-characterized contamination, exposure histories, and tissue measurements. Predictions aligned with observed PFOS concentrations while providing different insights. Strengths, limitations, and fit-for-purpose applications will be discussed, alongside an interactive static-model exercise based on a Victorian beef grazing farm.



Dr Antti Mikkonen

Principal Health Risk Advisor, Environment Protection Authority (EPA) Victoria

Antti Mikkonen is a Principal Health Risk Advisor at EPA Victoria with over 15 years' experience in environmental consulting, research, and regulation. Antti is an Adjunct Associate Professor at RMIT university and has a PhD in pharmacology/ risk assessment from UniSA. His role at EPA is centered around the assessment and management of public health risks from chemicals. Antti is also actively engaged in research with a primary focus on exposure science and development of TK models to inform regulatory decision making and policy.



Barbara Astmann

Toxicologist, Maine Center for Disease Control and Prevention (Maine CDC), USA

Barbara Astmann is a toxicologist at Maine CDC, where she primarily works on modeling PFAS agronomic exposure pathways. Her work focuses on understanding the transfer of PFAS through agricultural systems to investigate potential impacts to food safety and public health. Barbara holds a Bachelor of Science in Environmental Engineering from Clemson University, and a Master of Science in Civil/Environmental Engineering from the University of Kentucky.



Dr Thomas Simones

Assistant State Toxicologist, Maine Center for Disease Control and Prevention (Maine CDC), USA

Tom Simones is the Assistant State Toxicologist at the Maine Center for Disease Control and Prevention (Maine CDC). He joined the Maine CDC toxicology group in 2013 and works on human health risk assessments, well water contaminant issues, fish consumption advisories, and is a lead toxicologist on PFAS issues in Maine. Tom received his doctorate in Toxicology from the University of Montana.Laying the foundation: transfer of contaminant mixtures to chicken eggs

Laying the foundation: Transfer of contaminant mixtures to chicken eggs

Katie Richardson

Senversa Pty Ltd, Melbourne, VIC

Many people keep backyard chickens, and where contaminants are present in soil (in which chickens forage) or in water drunk by chickens, there is the potential for transfer of contaminants to eggs, and for risks to consumers of home-produced chicken eggs. This can be a significant pathway with the potential to drive risks, but is rarely considered in the available environmental screening criteria. This session will provide an overview of approaches for assessing risks from chicken egg consumption pathways, including estimating the transfer of contaminant mixtures from the environment (water, soil, biota) into eggs. Topics covered will include:

- Why should we be concerned about transfer into eggs?
- Which contaminants and contaminant groups are a potential issue?
- Risk assessment approaches for chicken egg consumption
- Approaches for estimating egg concentrations from contaminant concentrations in water, soil and biota
- Example transfer calculations for different contaminants
- Invertebrate ingestion as a key pathway where chickens have access to impacted soil: strategies for estimating exposure



Katie Richardson RACTRA

National Risk Assessment Practice Leader, Senversa Pty Ltd and ACTRA Vice-President

Katie Richardson leads Senversa's risk assessment practice, bringing over two decades of expertise in human health and ecological risk assessments. Her recent work includes projects for industry, government, water authorities and defence; often in remote locations where complex exposure pathways (including into foodstuffs and ecosystems) demand efficient and pragmatic solutions. Katie is recognised by the Australasian College of Toxicology and Risk Assessment (ACTRA) on their Professional Register and currently serves as ACTRA's Vice President.

Transfer to foods of animal origin: web-based tool for multiple contaminants and livestock types

Jorge Numata

German Federal Institute for Risk Assessment (BfR), Germany

Many substances of relevance for human health risk assessment exhibit shared characteristics: they can pose adverse effects on human health and may be transferred from orally exposed food-producing animals into edible products, which can represent a significant source of overall dietary exposure in humans. A central challenge in assessing and managing the risks associated with these substances lies in quantifying their transfer from feed, drinking water, and ingested soil into specific food products. In this context, ConTrans (Contaminant Transfer Estimator) provides a valuable tool. Transfer refers to the movement of a chemical hazard, including any relevant biotransformation products, from the oral intake of a food-producing animal into edible tissues or products.

ConTrans is a web-based application that applies toxicokinetic modeling approaches to estimate the transfer of chemical contaminants from feed, water, and soil ingestion into animal-derived foods such as milk, meat, eggs, and liver. The currently implemented modules are parameterized using in vivo datasets, while the overall framework remains adaptable to incorporate models derived from new approach methodologies as they become available. Several modules generate median estimates along with associated confidence or credible intervals, supporting uncertainty-informed risk assessments under both steady-state and dynamic exposure conditions, including depuration phases. At present, ConTrans includes modules for per- and polyfluoroalkyl substances (PFAS), dioxins and polychlorinated biphenyls (including non-dioxin-like PCBs), mycotoxins, plant toxins, and selected elements across key livestock species. The platform enables risk assessors to conduct transfer estimations via a web interface without requiring programming skills and is accessible at http://ConTrans.bfr.bund.de – For participation in this session's exercise, prior registration is required via

https://akademie.bfr.berlin/427925



Dr Jorge Numata

Senior Scientist, German Federal Institute for Risk Assessment (BfR), Germany

Dr Jorge Numata is a senior researcher at the German Federal Institute for Risk Assessment (BfR) in Berlin, Germany, where he specializes in toxicokinetics, pharmacokinetics, and computational methods for human health risk assessment. He has a background in chemical engineering, bioinformatics, and theoretical chemistry. He has published extensively on mathematical models for human health risk assessment and specializes in toxicokinetic models for the transfer of chemical and biochemical contaminants in farm animals. These simulations help us understand how chemical contaminants accumulate in foods of animal origin. They are based on combinations of models for animal nutrition, growth, physiology, and the absorption, distribution, metabolism, and excretion of relevant substances. Jorge Numata leads modeling projects on the toxicokinetics of farm animals at the BfR. He also chairs the EU Member States Initiative Group on PFAS, Risk Assessors Team, which aims to promote knowledge sharing on this significant class of substances among risk assessment institutions in Europe.

ANNUAL SCIENTIFIC MEETING

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THURSDAY 3 SEPTEMBER, 2026 – PROGRAM

TIME	TOPIC	CHAIRPERSON / PRESENTER
08:00am	**Registration: Tea/Coffee**	
	Session 1. Introduction to mixture toxicology and risk assessment Chair: Tarah Hagen FACTRA, SLR Consulting Australia Pty Ltd (ACTRA President)	
09:00am	Acknowledgement of Country Welcome Address	Tarah Hagen FACTRA, SLR Consulting Australia Pty Ltd (ACTRA President) Conference co-chairs: Dr Belinda Goldsworthy RACTRA, enRisks Katie Richardson RACTRA, Senversa (ACTRA Vice President)
09:15am	Plenary Presentation: Review of historical approaches to how mixtures are assessed for purposes of risk assessment	Dr Dennis Paustenbach TRC Companies
10:15am	**MORNING TEA**	
	Session 2. Mechanisms of mixture toxicity and regulatory assessment strategies Part 1 Chair: Associate Professor Slade Matthews FACTRA, Sydney Pharmacy School, The University of Sydney	
10:45am	Mechanisms of mixture toxicity	Dr Rhian Cope FACTRA, SLR Consulting Australia Pty Ltd (ACTRA Secretary)
11:15am	Plenary Presentation: Can four decades of experience with dioxins inform scientists and regulatory agencies about how to regulate PFAS.	Dr Dennis Paustenbach TRC Companies
12:05pm	Abstract Presentation: Options for Assessing PFAS Mixtures in Drinking Water (and Other Media)	Dr Maryam Moslehi RACTRA, SLR Consulting Australia Pty Ltd
12:20pm	Abstract Presentation: In the Mix: Identifying Drivers of Toxicity in Treated Wastewater Discharges	Stina Nikolaysen RACTRA, Senversa
12:35pm	**LUNCH**	**ACTRA Meeting (1:00pm-1:45pm)**

TIME	TOPIC	CHAIRPERSON / PRESENTER
	Session 3. Di Marco Student Travel Grant Award Chair: Prof Paul Wright FACTRA, RMIT University (ACTRA Immediate Past President)	
1:45pm	Bliss Synergism of Five Toxic Lipid Peroxidation-Derived Aldehydes in *Saccharomyces cerevisiae*	**1st place** Thomas Griffiths, The University of Western Australia
2:00pm	Acute metabolic disturbance, but chronic re-equilibration in oysters exposed to 17ß-estradiol and nonylphenol	**Runner up** Dr Sazal Kumar University of Newcastle
	Session 4. Quantifying mixture exposure and risk Chair: Dr Maria Davoren, Davoren Environmental	
2:15pm	Occupational exposures to mixtures and chronic disease	Peter Knott, GCG Health Safety & Hygiene
2:45pm	Abstract Presentation: Snap-shot investigations into common urban, agricultural, and industrial contaminants in NSW catchments	Dr Cameron Jennings, NSW Environment Protection Authority, and Danielle Hill, NSW Department of Climate Change, Energy, the Environment and Water
3:00pm	Abstract Presentation: Beyond the matrix – re-thinking surface screening for residual contaminants	Sarah Leviston RACTRA, CDM Smith
3:15pm	**AFTERNOON TEA**	
	Session 5. Mechanisms of mixture toxicity and regulatory assessment strategies Part 2 Chair: Dr Rhian Cope FACTRA, SLR Consulting Australia Pty Ltd (ACTRA Secretary)	
3:40pm	Mixture risk assessment *(virtual)*	Denise Bloch, Bundesinstitut für Risikobewertung (BfR), Germany
4:10pm	Practical exercise on mixture assessment / allocation factors	Denise Bloch, Bundesinstitut für Risikobewertung (BfR), Germany
4:40pm	Abstract Presentation: Adding TFA into the mix. Do we need to include TFA in PFAS Environmental Risk Assessments?	Judith Barnes, Senversa
4:55pm	Abstract Presentation: A copper, a nickel and a lead walk into a pub(lic hospital's water supply). What happens next?	Dr Phil Choi, Queensland Health
5:10pm	**Day 1 wrap-up and discussion** Dr Belinda Goldsworthy RACTRA, enRisks	
5:30pm	**Close of Day 1 of ASM**	
7:00 - 10:30pm	**ASM conference dinner presented by Frangos Toxicology and Nature Tech** Newcastle City Hall – Banquet Room 290 King St, Newcastle NSW 2300	

ANNUAL SCIENTIFIC MEETING

FRIDAY 4 SEPTEMBER, 2026 – PROGRAM

TIME	TOPIC	CHAIRPERSON / PRESENTER
8:30am	**Registration: Tea/Coffee**	
	Session 6. Microplastics as complex exposure mixtures: from measurement uncertainty to human health risk Chair: Professor Paul Wright FACTRA, RMIT University (ACTRA Immediate Past President)	
9:00am	Human exposure pathways to micro and nanoplastics: implications for health and decision-making	Dr Elvis Okoffo, Queensland Alliance for Environmental Health Sciences, University of Queensland
9:30am	Analytical challenges and uncertainty in detecting micro/nanoplastics in environmental and biological samples (30 mins)	Dr Cassandra Rauert, Queensland Alliance for Environmental Health Sciences, University of Queensland
10:00am	Moving from measurement to prioritization for plastic-related chemicals (30 mins)	Associate Professor Brad Clarke, School of Chemistry, The University of Melbourne
10:30am	**MORNING TEA**	
	Session 7. Mixtures in the environment: agriculture, ecosystems and beyond Chair: Sheridan Chapman, DRC Environmental	
10.45am	FAO/WHO JMPR approach to agrochemical residues in food and feed	Dr Rhian Cope FACTRA, SLR Consulting Australia Pty Ltd (ACTRA Secretary)
11.15am	Single chemical and mixture effects of three veterinary antibiotics on freshwater invertebrate test species	Naomi Cooper FACTRA, Senversa
11.45am	Abstract Presentation: Risk assessment of PFAS mixture through exposure of pastoral livestock products using literature data	Dr Yanju Liu, University of Newcastle/crcCARE
12:00pm	**Poster Platform**	
	Complexities of nano/microplastics: Sorption/ de-sorption mechanisms and their potential implications	Andrew Cossey, Senversa
	Physiologically based pharmacokinetic modelling of enantiomeric tramadol and its active metabolite across CYP2D6 phenotypes	David Stewart-Yates, Murdoch University
	A Framework for Assessing Human Health- and Livestock Risks from Bioaccumulative Environmental Contaminants in Data-Limited Scenarios	Isabella Gore, EPA Victoria
	Overregulation: when does it become too much?	Sheridan Chapman, DRC Environmental
12.10pm	**LUNCH**	

TIME	TOPIC	CHAIRPERSON / PRESENTER
12.55pm	**Session 8. Panel Discussion: Mixture toxicology and risk assessment.** Chair: Tarah Hagen FACTRA, SLR Consulting Australia Pty Ltd (ACTRA President) Dr Dennis Paustenbach, TRC Companies Dr Rhian Cope FACTRA, SLR Consulting Australia Pty Ltd (ACTRA Secretary) Dr Jen Martin FACTRA, EPA Victoria Dr Brian Priestly Emeritus FACTRA **Session 9. Organic and solvent mixtures: toxicity and risk** Chair: Ian Delaere FACTRA Expotox Pty Ltd	
1.55pm	Petroleum distillates and residues	Hannah Gerstmyer, University of Sydney
2.25pm	Abstract Presentation: A screening framework to identify solvent constituents that drive chroming behaviour in aerosol spray paints	John Frangos FACTRA, Frangos Toxicology
2.40pm	Abstract Presentation: How low can you go with a TRV – and can you guess the VOC?	Ruth Jarman RACTRA, enRiskS
2:55pm	**AFTERNOON TEA**	
	Session 10. In the community: predicting and communicating public health risks Chair: Dr Belinda Goldsworthy RACTRA, enRisks	
3:10pm	Predicting high-risk novel benzodiazepines: a surveillance study of novel benzodiazepine detections and a case series of bromazolam exposures in New South Wales, Australia	Dr Emily Sansoni Royal Prince Alfred Hospital & NSW Poisons Information Centre
3.40pm	Abstract Presentation: Artificial Intelligence–Supported Risk Communication in Low-Trust Environmental Incidents	Dr Craig Dalton, University of Newcastle
3:55pm	Discussion and Questions Day 2 wrapup Dr Belinda Goldsworthy RACTRA, enRisks Katie Richardson RACTRA, Senversa (ACTRA Vice President)	
4.15pm	**Close of Day 2 of ASM** Tarah Hagen FACTRA, SLR Consulting Australia Pty Ltd (ACTRA President)	

Review of historical approaches to how mixtures are assessed for purposes of risk assessment

Dennis Paustenbach

Toxicology and Risk Exposure, TRC Companies, Jackson, Wyoming, USA

All of us are exposed to a variety of mixtures every day in our foods, the workplace, air, water, and the overall environment. Indeed, most of us are almost never exposed to a single chemical. However, due to the infinite number of combinations, rarely are mixtures studied toxicologically or have new risk assessment methods been developed. Now that it appears that the future of toxicology will largely be driven by *in-vitro* methods and AI, the study of mixtures has caught the attention of toxicologists because both approaches offer the hope of unravelling the nearly infinite number of situations where exposures exist. This presentation will review the methods that have been used since the 1960s to characterize the risks due to mixtures; which have remained largely unchanged (except for similar groups, such as the dioxins, PAHs, etc). Then, some of the more recent proposals and papers on the topic, which may give us insight as to where this area of toxicology and risk assessment are headed, will be discussed.



Dr Dennis Paustenbach CIH DABT

Chief Scientist, Toxicology and Risk Exposure, TRC Companies, USA

Dr Dennis Paustenbach is a board-certified toxicologist and industrial hygienist with nearly 35 years of experience in risk assessment, environmental engineering, ecotoxicology, and occupational health. He was the President of ChemRisk, LLC, the largest toxicology and health risk assessment consulting firm in the U.S. which specialized in human and ecological risk assessment of consumer products, contaminated sites, pharmaceuticals and medical devices. Dr Paustenbach has been an invited technical reviewer for prominent journals and of proposed regulations. He has published approximately 300 peer-reviewed articles and written more than 50 book chapters in the fields of industrial hygiene, human and aquatic toxicology, engineering, and risk assessment. His textbook (3rd edition) entitled "Human and Ecological Risk Assessment: A textbook of case studies" was recently updated (2024). Dennis sold Paustenbach and Associates to the TRC Companies in 2024 and currently manages the product sustainability, toxicology and risk assessment practices. Dennis has a BS in Chemical Engineering from the Rose Polytechnic Institute, an MS in industrial hygiene and toxicology from the Univ of Michigan, and a PhD in toxicology from Purdue University. He did post-doctoral work at Harvard University and the Wright-Patterson Air Force Base.

Mechanisms of mixture toxicity

Rhian Cope

SLR Consulting Australia Pty Ltd, Canberra, ACT

This presentation will provide a theoretical introduction to the mechanistic aspects of mixture toxicology. Broadly mechanisms of mixture toxicology can be divided into dispositional/toxicokinetic mechanisms such as metabolic interactions, transporter interactions and depletion of defence reserves (e.g. glutathione), and toxicodynamic mechanisms (target-site effects) involving cellular and/or receptor sites. Toxicodynamic mechanisms can result in seemingly simple effects such as additivity, synergism, potentiation, antagonism or independent action. However, underneath these seemingly simple effects a series of complex pathways and/or mechanisms can occur.



Dr Rhian Cope BVSc BSc DABT DABVT FACTRA

Technical Director, SLR Consulting Australia Pty Ltd, Canberra, ACT, and ACTRA Secretary

While Dr Cope is a veterinarian by training (1989, University of Queensland) she has spent most of her professional career as a toxicologist. Following obtaining her veterinary qualification Dr Cope pursued further training as a radiation toxicologist/photobiologist (PhD, University of Sydney 1996). She is a Diplomate of the American Board of Toxicology, a Diplomate of the American Board of Veterinary Toxicology, and a Fellow of the Australasian College of Toxicology and Risk Assessment. Dr Cope has held academic positions at the University of Illinois and Oregon State University. Dr Cope is a former Principal Toxicologist for the Australian Pesticides and Veterinary Medicines Authority and a monographer for the WHO Joint Pesticides Meeting on Pesticides Residues in Food. Dr Cope is currently a Technical Director at SLR Consulting. In total Dr Cope has over 150 peer-reviewed publications and expert reports in various areas of toxicology.

Can four decades of experience with dioxins inform scientists and regulatory agencies about how to regulate PFAS?

Dennis Paustenbach

Toxicology and Risk Exposure, TRC Companies, Jackson, Wyoming, USA

Regulations founded on incomplete or misinterpreted science often result in unintended consequences. For nearly all 50 years that the PCDD/PCDF chemicals were on the front page of newspapers, there has been a lack of scientific consensus on the adverse health effects. Today, it would appear that PFAS is going down the same road. Despite their distinctly different chemical structures, the dioxins, particularly 2,3,7,8-TCDD, and PFOA/PFOS, share notable similarities: environmental persistence, biological recalcitrance, slightly unpredictable acute toxicity, a lack of genotoxicity, and suggestive data on adverse health effects in humans; across a wide range of doses. Both substances display varying degrees of acute toxicity across species, and both have been associated with the onset of wasting syndrome in certain animals at fairly high doses; but wasting syndrome is not seen in humans. Although there is moderate to high acute toxicity in multiple animal species for both families of chemicals, there is low acute toxicity in humans. In humans, both compounds interact with fatty acid metabolism. The evidence indicates that both are either weakly genotoxic or non-genotoxic. The dioxins were regulated in a heavy-handed manner despite scientific uncertainty regarding their human health risks over a range of exposure levels, as well as a lack of consensus on dose-response relationships, thresholds for adverse effects, and human relevance of high-dose animal studies. The regulatory actions that occurred with the dioxins ultimately resulted in substantial economic and societal costs, even in the face of much uncertainty. This presentation examines the parallels between the development of scientific understanding of the health hazards and eventual regulation of dioxins and PFAS chemicals.



Dr Dennis Paustenbach CIH DABT

Chief Scientist, Toxicology and Risk Exposure, TRC Companies, USA

Dr Dennis Paustenbach is a board-certified toxicologist and industrial hygienist with nearly 35 years of experience in risk assessment, environmental engineering, ecotoxicology, and occupational health. He was the President of ChemRisk, LLC, the largest toxicology and health risk assessment consulting firm in the U.S. which specialized in human and ecological risk assessment of consumer products, contaminated sites, pharmaceuticals and medical devices. Dr Paustenbach has been an invited technical reviewer for prominent journals and of proposed regulations. He has published approximately 300 peer-reviewed articles and written more than 50 book chapters in the fields of industrial hygiene, human and aquatic toxicology, engineering, and risk assessment. His textbook (3rd edition) entitled "Human and Ecological Risk Assessment: A textbook of case studies" was recently updated (2024). Dennis sold Paustenbach and Associates to the TRC Companies in 2024 and currently manages the product sustainability, toxicology and risk assessment practices. Dennis has a BS in Chemical Engineering from the Rose Polytechnic Institute, an MS in industrial hygiene and toxicology from the Univ of Michigan, and a PhD in toxicology from Purdue University. He did post-doctoral work at Harvard University and the Wright-Patterson Air Force Base.

Options for Assessing PFAS Mixtures in Drinking Water (and Other Media)

Maryam Moslehi and Tarah Hagen

SLR Consulting Australia Pty Ltd, East Melbourne, VIC

There is a recognised gap in current methodologies for assessing the potential health impacts of exposure to mixtures of per- and poly- fluorinated alkyl substances (PFAS) in drinking water and other environmental media. Existing approaches typically rely on compound-by-compound evaluations, which are complex, resource-intensive, and impractical when numerous PFAS are detected simultaneously.

As part of the October 2024 Evaluation for Australian Drinking Water Guidelines (ADWG) Chemical Fact Sheets for the National Health and Medical Research Council (NHMRC), SLR undertook a review of approaches to assess PFAS mixtures in drinking water including available methodologies, international agency approaches, and potential strategies for deriving the sum of multiple PFAS drinking water guideline.

Based on the review four potential strategies were identified.

1. First, adopting a PFAS mixture DWG from an overseas jurisdiction offers a pragmatic screening tool; however, these values are generally not health-based and may be lower than existing Australian DWGs (e.g. PFOA), limiting their suitability for direct application.
2. Second, a surrogate mixture approach using existing DWGs is a simple and rapid option. While differences between Australian guideline values for key PFAS (e.g. PFOS and PFOA) preclude a single surrogate for total PFAS, this method may be applicable for grouping compounds such as perfluorocarboxylic acids (PFCAs) and perfluorosulfonic acids (PFSA).
3. Third, data-driven approaches, such as the hazard index method, provide a scientifically robust framework but are constrained by data availability and effort required.
4. Finally, a combined approach is proposed, integrating surrogate grouping with hazard index calculations. This hybrid method enables assessment of PFAS mixtures based on measured concentrations, can be standardised, and lends itself to automation, offering a practical solution for regulatory application.



Dr Maryam Moslehi RACTRA

Associate Consultant – Toxicologist & Risk Assessor, SLR Consulting Australia Pty Ltd

Maryam is a Toxicologist and Risk Assessor at SLR Consulting Australia with a PhD in Molecular Biochemistry and over 10 years of experience in environmental science, consultancy and research. She specialises in quantitative and qualitative human health and ecological risk assessment, including chemical exposure assessment across environmental media, toxicological evaluation, exposure modelling, data analysis and development of toxicological profiles. Maryam has worked alongside leading toxicologists in Australia and has contributed to a wide range of projects supporting evidence-based environmental and public health decision-making. She is a Registrant of the Australasian College of Toxicology and Risk Assessment (RACTRA) and currently serves as Chair of the ACTRA Education Committee, where she leads the organisation of the ACTRA webinar series.

In the Mix: Identifying Drivers of Toxicity in Treated Wastewater Discharges

Stina Nikolaysen

Senversa Pty Ltd, Melbourne, VIC

Keywords: Risk assessment of mixtures in the environment

Theme/Subtheme: Risk assessment of mixtures in the environment

Treated wastewater (TWW) is a complex mixture that includes a range of metals, nutrients and emerging contaminants, presenting challenges for conventional single-chemical risk assessment approaches. This study assessed risks to an aquatic ecosystem associated with the discharge of TWW to a river using a multiple lines of evidence framework.

The assessment integrated chemical characterisation of TWW and river water, ecological surveys of the receiving environment, and direct toxicity testing of the whole effluent using a suite of environmentally relevant freshwater species. Targeted Toxicity Identification and Evaluation (TIE) procedures were subsequently applied to help identify the constituents most likely driving observed toxicity.

The results highlighted unexpected patterns of toxicity that were not predicted by chemical data alone, prompting a re-evaluation of the relative importance of key mixture components. The study demonstrates the value of combining field, laboratory and diagnostic tools to more accurately characterise mixture toxicity. It also provides practical insights to inform management of TWW discharges, with a focus on prioritising constituents that disproportionately contribute to ecological risk.



Stina Nikolaysen MSc RACTRA

Senior Associate Risk Assessor, Senversa Pty Ltd

Stina is a Senior Associate Risk Assessor at Senversa and a Registrant of ACTRA. She has been the technical lead on numerous qualitative and quantitative ecological risk assessments (ERA) and human health risk assessments (HHRA) relating to diverse contaminants, including metals and other inorganic chemicals, petroleum hydrocarbons, solvents, and per- and poly fluorinated alkyl substances (PFAS). She undertakes a weight of evidence approach to risk assessment, considering multiple lines of evidence such as analytical data, toxicology, the environmental values of the receiving environment and sensitivity of receptors of concern. Stina is on the expert support team (for risk assessment) for several of Senversa's contaminated site auditors.

Prior to completing her Master of Science, Stina worked in medical research in the fields of cancer genetics and pulmonary inflammation.

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Toxicology and Risk Assessment Inc (ACTRA) has been established since July 2006.

ACTRA aims to:

- **advance the study and applications of toxicology and health risk assessment as professional scientific disciplines, and**
- **cultivate (and maintain) the highest standards of professional practice and ethics in persons engaged in the sciences of toxicology and health risk assessment.**

Membership of ACTRA is open to those working in the fields of toxicology and risk assessment. All members receive electronic newsletters, monthly updates and subsidised meeting, workshop and webinar registration fees, and access to the members' only area of the website.

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Di Marco Student Travel Grant Award – 1st Place

Bliss Synergism of Five Toxic Lipid Peroxidation-Derived Aldehydes in *Saccharomyces cerevisiae*

Thomas Griffiths[1] **and Philip Burcham**[1,2]

[1]*Department of Pharmacy, The University of Western Australia, Perth, WA, Australia* [2]*Division of Pharmacology and Toxicology, The University of Western Australia, Perth, WA*

Keywords: acrolein, aldehydes, synergism
Theme/Subtheme: Biogenic aldehyde toxicity

Introduction: Lipid peroxidation (LPO) involves the disordered cleavage of unsaturated fatty acids into disparate smaller toxic aldehydes. These LPO-derived aldehydes contribute to sustained human and wildlife toxicity as relatively long-lived mediators of toxicity from metals, organic pollutants and nanomaterials. LPO-derived aldehydes attack various distinct biomolecular targets within the cell including cell membrane proteins, cytosolic proteins and genomic DNA.

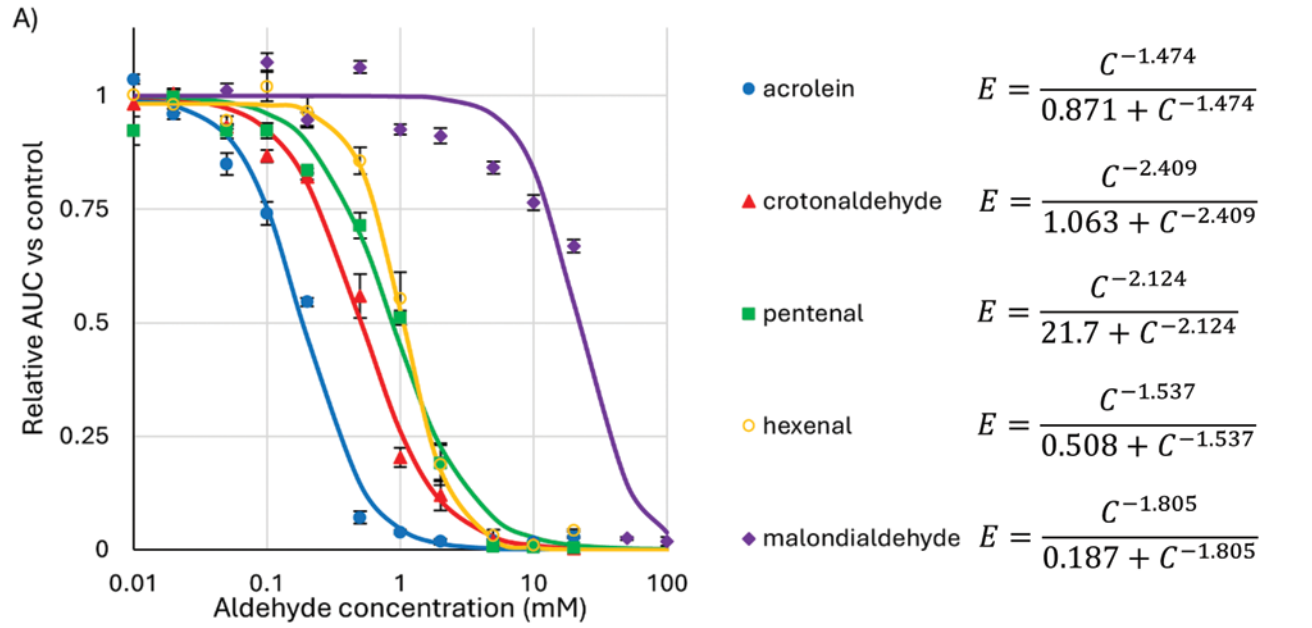
Aim: This study aims to assess the mixture effects of defined LPO-derived aldehyde mixtures on the growth of a model yeast organism.

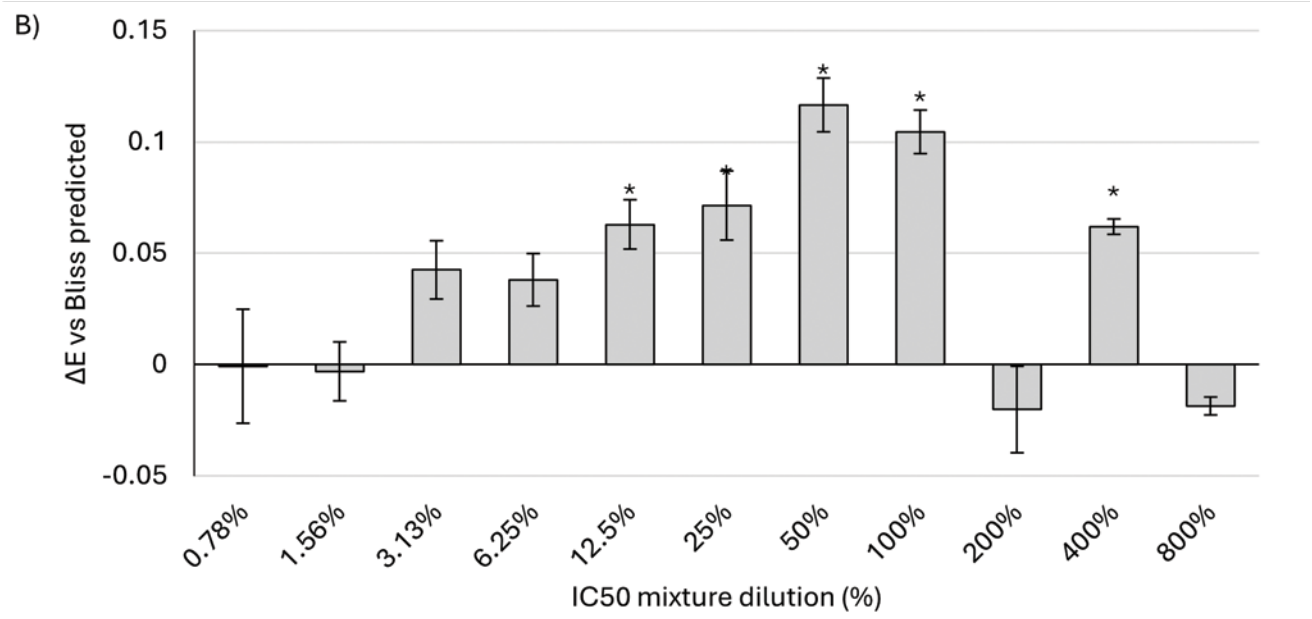
Method: Eleven-point dose-response curves for growth suppression in *Saccharomyces cerevisae* were constructed for five lipid-derived aldehyde toxicants—acrolein, (2E)-crotonaldehyde, (2E)-pentenal, (2E)-hexenal and malondialdehyde (n=4). A $\log_2$ dilution series of a base mixture consisting of each aldehyde at one fifth of its respective IC_{50} was constructed to probe for Bliss independent synergistic effects (n=8).

Results: There was a significant excess effect above that predicted by the Bliss independence model between the base mixture dilutions of 12.5–100%. There was no significant Bliss synergism at the 200% dilution but Bliss synergism returned at 400%.

Discussion. This five-toxicant mixture of LPO-derived aldehydes displayed complex joint actions. Significant Bliss synergism was observed at several lower concentrations (12.5–100% of the base mixture) and at one higher concentration (400% of the base mixture). The abrupt disappearance of synergism at 200% may point towards the activation of saturable detoxification mechanisms.

This research was supported by the Commonwealth through an Australian Government Research Training Program Scholarship [DOI: https://doi.org/10.82133/C42F-K220] and by The Medical Advances Without Animals Trust (MAWA) through a Supplementary Doctoral Scholarship.







Thomas Griffiths MPharm (2026 Di Marco Student Travel Grant Award Winner)

PhD Candidate, Department of Pharmacy, The University of Western Australia

Thomas Griffiths is a pharmacist and PhD candidate in the Molecular Toxicology Laboratory at the University of Western Australia. After completing his MPharm at the University of Western Australia he completed his pharmacist intern training split between community pharmacy practise and research in the Mol Tox Lab. Thomas' PhD research focusses on the joint toxic effects of aldehyde mixtures and the burgeoning therapeutic class of "aldehyde scavenger" drugs. By highlighting the joint toxic effects of aldehyde mixtures, he hopes to steer drug discovery efforts towards scavenger drugs with more broadly protective effects and help to overcome the historically lacklustre performances of the class.

Di Marco Student Travel Grant Award – Runner up

Acute metabolic disturbance, but chronic re-equilibration in oysters exposed to 17ß-estradiol and nonylphenol

Sazal Kumar[1], Wayne A. O'Connor[2], Allison C. Luengen[3], Frederic D.L. Leusch[4], Steven D. Melvin[4], Chenglong Ji[5], Junfei Zhan[6] and Geoff R MacFarlane[1]

[1]School of Science, University of Newcastle, Callaghan, NSW

[2]NSW Department of Primary Industries and Rural Development

[3]Department of Environmental Science, University of San Francisco, CA, USA

[4]Australian Rivers Institute, School of Environment and Science, Griffith University, Brisbane, QLD

[5]Key Laboratory of Coastal Environmental Processes and Ecological Remediation, Yantai Institute of Coastal Zone Research, Yantai, Shandong, PR China

[6]Key Laboratory of Ecological Restoration and Conservation of Coastal Wetlands in Universities of Shandong, Yantai, Shandong, PR China

Keywords: Acute; Chronic; Pulse
Theme/Subtheme: Mechanisms of mixture toxicity: time-dependent metabolic adaptation

In estuarine environments, aquatic organisms are frequently exposed to estrogenic endocrine-disrupting chemicals (EEDCs), including 17ß-estradiol (E2) and nonylphenol (NP), which can alter physiological and metabolic processes. This study investigated the metabolic responses of Sydney rock oysters, Saccostrea glomerata, using proton nuclear magnetic resonance (1H NMR) based metabolomics following acute (14 days), pulse (14 days exposure, followed by 14 days depuration), and chronic (continuous 28 days) exposure to E2 (200 ng/L) and NP (5000 ng/L). Significant metabolic perturbations were observed only after acute exposure to both E2 and NP. Energy- and stress-related metabolites, including adenosine monophosphate, succinate, acetoacetate, and glutamate, were significantly elevated relative to controls, indicating increased energetic demand associated with oxidative and osmotic stress responses. In contrast, metabolite profiles from pulse and chronic exposure treatments were not significantly different from controls, suggesting a time-dependent metabolic adaptation in oysters. The comparatively slower metabolic recovery observed under NP exposure may reflect its lower biodegradability and persistence relative to E2. Overall, these findings demonstrate the capacity of oysters to progressively re-equilibrate their metabolome during prolonged EEDC exposure, highlighting adaptive metabolic plasticity in estuarine molluscs.



Dr Sazal Kumar (2026 Di Marco Student Travel Grant Award Runner Up)

Casual Academic, School of Science, University of Newcastle, NSW

Sazal Kumar recently completed his PhD at the University of Newcastle (UoN), Australia, and currently works as a Casual Academic at UoN. His research focuses on environmental pollution, metabolomics, and aquatic ecotoxicology, particularly the impacts of endocrine-disrupting chemicals and emerging contaminants on marine organisms and ecosystem health.

Occupational exposures to mixtures and chronic disease

Peter Knott

GCG Health Safety and Hygiene, Newcastle, NSW

Over the working life of individuals, exposures to multiple chemical substances at varying time points and in varying concentrations and combinations occur. Traditionally their effects have been investigated by examining single substances at a time. The development of many chronic diseases are affected by occupational exposures and we have examined a selection, specifically cognitive performance, gastrointestinal dysfunction, lung function, and metabolic health, alongside the lifetime occupational histories of participants in the Hunter Community Study. Novel statistical methods such as Bayesian Kernel Machine Regression, weighted quantile sum regression and Quantile g-computation are now available for investigating the joint and individual effects of components in a mix of exposure variables. By applying these methods we identified a window of susceptibility from welding fume exposure in mid-life to cognitive performance in retirement, investigated the impact of cumulative exposures to mineral dusts on ROME III classified Irritable Bowel Syndrome, lowered insulin sensitivity driven by a mixture containing formaldehyde and welding fume and lower FEV1 z-score from cumulative exposures to mixtures containing animal dusts, quartz and mineral dusts. Mixture components with inflammatory or oxidative effects featured prominently and quantifying the overall effect of a mixture may be more suited to addressing chronic disease than single component analyses.



Peter Knott COH FAIOH

Principal Hygienist, GCG Health Safety and Hygiene

Peter is a Certified Occupational Hygienist (COH) and Fellow of the Australian Institute of Occupational Hygienists. His career in occupational hygiene spans aluminium smelting, aluminium processing and fabrication, power generation, PPE manufacturing and mining in Australia and internationally. He is currently employed as Principal Hygienist with GCG Health Safety Hygiene. Peter has tertiary qualifications in Chemistry, Environmental Health and Epidemiology, and is currently a doctoral student in Clinical Epidemiology researching the effect of lifetime occupational exposures to chemical mixtures on selected chronic diseases.

Snap-shot investigations into common urban, agricultural, and industrial contaminants in NSW catchments

Cameron Jennings[1] and Danielle Hill[2]

[1]NSW Environment Protection Authority (EPA), Sydney, NSW

[2]NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), Sydney, NSW

Keywords: Catchment, Health, Contamination

The NSW Environment Protection Authority (EPA) is the chief environmental regulator and environmental steward for NSW. We work with the community, industry, businesses and other government agencies to protect and enhance NSW's environment. One element of our role is to investigate the presence of contaminants in the environment that may impact environmental and human health.

Nambucca River and estuary are situated in the Nambucca Valley Local Government Area on the mid-north coast of NSW. Nambucca River flows along an 87 km course, with a catchment covering 1,426 km2 encompassing several towns including Nambucca Heads, Macksville, Taylors Arm, Bowraville, Scotts Head and Valla Beach. The estuarine or tidal section of the Nambucca basin constitutes about 20% of the total catchment, with major tributaries to Nambucca River including Taylors Arm and Warrell Creek. The greater area is under the cultural stewardship of the Gumbaynggirr Nation.

The Nambucca River estuary is of high ecological importance, providing habitat for 33 migratory bird species, and encompasses threatened vegetation communities including saltmarsh, swamp oak forest and littoral rainforest. Several threatened and critically endangered frogs and birds are also known to live in the area. Importantly, this catchment is subject to a number of stressors including urban and agricultural runoff, sewage overflows, debris and litter, climate change and climate-related disasters. These stressors may have wide-ranging impacts on the value of the waterway including an impact to water and sediment quality, and the greater aquatic ecosystem.

The EPA, in partnership with the NSW Department of Climate Change, Energy, the Environment and Water – Ecotoxicology, undertook a snapshot, single point in time, health check of the Nambucca catchment, by investigating the presence of over 200 common urban, agricultural, and industrial contaminants in the water body. We will be presenting on the 'Health Check of Catchment' approach and recent findings.



Dr Cameron Jennings

Senior Officer, NSW Environment Protection Authority (EPA)

Cameron received a PhD from the Biochemistry Department at Latrobe University in 2002. He went on to complete a Post Doctoral fellowship on malaria pathogenesis in the Duraisingh Laboratory at Harvard University, before returning to Australia as a senior scientist at Immune System Therapeutics in Sydney. Following a passion for environmental science and policy, Cameron completed a post-graduate diploma and other studies in energy and environmental science and worked as an environmental consultant in Newcastle for several years. Cameron led the contaminated land portfolio at Lake Macquarie City Council for 7 years, with a focus on investigating and managing the legacy of lead contaminated soil and hazardous by-products from the decommissioned Pasminco Cocle Creek Smelter in Boolaroo. In this role, he was an advisor to the Lake Macquarie Lead Expert Working Group, which was responsible for developing the 22 recommendations to manage the legacy of lead contamination in the area. Cameron is now a Senior Officer at the NSW Environment Protection Authority. His role has included managing the delivery of the 22 recommendations of the Lake Macquarie Lead Expert Working Group, and participating in and/or leading numerous area-wide contaminant investigations across the state. Some of his recent projects include a catchment-wide contamination snapshot for Lake Illawarra, and area-wide soil investigations in Captains Flat, Leadville, and the Cadia valley.



Danielle Hill

Senior Scientist, NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW)

Danielle Hill is a Senior Scientist and acting Team Leader Ecotoxicology in NSW DCCEEW's Environmental Forensics team. As part of the Environmental Forensics team, Danielle is involved in the assessment of environmental harm from pollution events, provision of advice on ecotoxicology technical reports, and catchment scale monitoring of contaminants. Danielle is also completing her PhD with Griffith University and ANSTO, where her research focusses on the biokinetics and biodistribution of contaminants in amphibians.

Beyond the matrix – re-thinking surface screening for residual contaminants

Sarah Leviston[1] and John Frangos[2]

[1]CDM Smith, Richmond, VIC

[2]Frangos Toxicology, Moonee Ponds, VIC

Theme/Subtheme: Human health risk assessment and exposure assessment for surface residues.

Contaminant residues on surfaces such as walls and equipment can be present in a number of scenarios, such as operational exposures in mining and following fire events.

Contaminant sampling and risk assessment is often based on the sample matrix and fate and transport properties of the contaminant, along with evaluation of source, pathway, receptor relationships (with focus on complete exposure pathways to the receptor). Tier 1 criteria and health-based risk assessment processes are generally well defined for receptor exposure to dust, soil and water (via direct contact pathways).

However, when we consider residual contaminants on surfaces that cannot be physically collected or are not airborne, such as residual dusts or tarry residues, other sample collection methods and analytical laboratory quantification are undertaken, such as the collection of swabs. Swabs are typically collected from surfaces over 10 x 10 cm, with results expressed as mg/100cm2. These results do not correlate with any contaminated land criteria (such as the HILs) and they are not able to be assessed using the same model calculations. Rather, for each relevant pathway a transfer efficiency factor (TEF) is applied to allow calculation of the measured surface residue (mg/100cm2) into an estimated daily dose (mg/kg/day), drawing on pathway-specific TEFs from the World Trade Centre (WTC) and Pentagon assessments (Gaborek et al., 2001).

This presentation looks at the TEF approach for the assessment of health risks for contaminant residues on surfaces (using swabs) and provides insight into the applicability of these methods to provide a 'lines of evidence' approach to support contaminated land assessment and/or remediation.



Sarah Leviston RACTRA

Technical Practice Lead – contamination and remediation, CDM Smith

Sarah has over 20 years' experience in the contaminated land industry, with a primary background in contaminated land assessment, remediation and environmental risk assessment. Sarah is the Technical Practice Lead for contamination and remediation at CDM Smith. Sarah is a Registrant of ACTRA and has practical experience with multiple aspects of human health, ecological and chemical risk assessment for a broad range of contaminants (metals, organic compounds, inorganic compounds and per-and poly fluoroalkyl substances (PFAS)).

Mixture risk assessment

Denise Bloch

German Federal Institute for Risk Assessment, Berlin, Germany

Strategies for chemical mixture risk assessment (MRA) include component-based and whole mixture approaches. Component-based MRA is applied where the composition of the mixture is known. It is commonly based on the principle of additivity, which assumes a similar mode of action for all mixture components and derives their combined risk by accounting for the concentration and potency of each substance in the mixture. Component-based approaches often include grouping strategies, such as Cumulative Assessment Groups (CKGs) or Common Kinetic Groups (CKGs). CAGs are target organ and endpoint-based. For example, they allow to address all components in a mixture with effects on the liver or, more specifically, liver steatosis. CKGs highlight the potential for interaction between mixture components. For example, a liver toxicant is metabolised by a specific CYP enzyme, while another mixture component inhibits this enzyme. This potential for interaction can highlight the need for whole mixture testing. In contrast to the component-based approach, it evaluates interactions between substances in a mixture. Moreover, it allows for the MRA of mixtures of (partially) unknown composition. However, it is also more resource-intensive.

The presentation provides an overview of component-based and whole mixture approaches, including grouping and refinement strategies. It introduces tiered MRA strategies that include the mixture allocation factor (MAF) and higher tier refinement options. Finally, it provides a case study on a new approach methodology (NAM)-based plant protection product risk assessment strategy for agricultural operators.

The presentation is followed by an exercise which illustrates the advantages and disadvantages of different MAF calculation approaches. MAFfactor, MAFceiling and MAFexact will be calculated. Participants will discuss application scenarios for each and the potential regulatory benefits and impacts of lower tier component-based MRA strategies as well as how to overcome their limitations.



Dr Denise Bloch

Head of Junior Research Group 'NAM-based assessment of mixture toxicities', Department Pesticides Safety, Federal Institute for Risk Assessment (BfR), Germany

Denise Bloch serves as leader of a junior research group at the German Federal Institute for Risk Assessment (BfR) in Berlin. Her research is dedicated to advancing the regulatory risk assessment of mixtures using New Appraoch Methodologies (NAMs).

She currently serves as the co-chair of ILMERAC, an international liaison group focused on methods for risk assessment of chemicals in food and feed.

Her background is in biogeochemistry, which she studied at ETH Zurich in Switzerland. After her PhD on active efflux transporters and their role in mixture toxicokinetics at the Helmholtz Centre for Environmental Research in Leipzig, Germany, she worked as a plant protection product regulator at BfR before taking on the role as a research group leader. Her team combines in silico screening, physiologically-based kinetic modelling and in vitro testing to derive toxicological threshold values for mixtures with a special interest in liver toxicity and gut-liver organs-on-a-chip.

Adding TFA into the mix. Do we need to include TFA in PFAS Environmental Risk Assessments?

Judith Barnes

Senversa Pty Ltd, Melbourne, VIC

Keywords: trifluoroacetic acid (TFA)
Theme/Subtheme: Environmental and human exposure assessment: Evaluating real-world exposure scenarios to complex mixtures from air, water, soil, and food / consumer products and methods for assessing risk of harm.

Evolving toxicity data and regulatory responses to per- and polyfluoroalkyl substances (PFAS) continue to provide uncertainty for the practical evaluation of PFAS risk. The recent classification of trifluoroacetic acid (TFA) by the European Chemicals Agency (ECHA) means the need to include TFA in our assessments requires re-evaluation. ECHA has identified TFA as a Category 1B reproductive toxicant based on adverse effects on foetal development, and has further classified it as a persistent, mobile and toxic (PMT) substance, as well as very persistent and very mobile (vPvM). These classifications highlight its potential to cause widespread and long-term contamination of both surface water and groundwater at levels that may be of concern.

TFA is not routinely included in environmental sampling programs in Australia, where assessments have largely focused on legacy PFAS associated with firefighting foams. However, TFA can be formed through the degradation of a wide range of PFAS in products such as refrigerants, pesticides, industrial solvents and pharmaceuticals. Its formation in the atmosphere and subsequent deposition contribute to TFA's ubiquitous presence in the environment. This high background load presents challenges in distinguishing site-specific sources and evaluating associated risks.

Fluorinated pesticides may represent a relevant point source of TFA in Australia, noting their widespread use across agriculture, horticulture, forestry, urban pest control and turf management, with over 90 fluorinated pesticides approved for use since 1990. Historically it has been assumed that the environmental levels of TFA are below those associated with toxicity however the recent classification as a reproductive toxicant warrants reassessment of this assumption.

This presentation examines environmental concentrations, sources and toxicological data for TFA in the Australian context to identify when its inclusion in environmental risk assessments should be considered.



Judith Barnes

Principal Risk Assessor, Senversa Pty Ltd

Judith has been working within the contaminated sites sector for twenty five years, over the last twenty years she has specialised in human health risk assessment. Her experience has included risk assessment, site assessment and remediation.

What keeps Judith interested in contaminated land risk assessment is the variety of issues, chemicals and projects that she gets to work on and she loves the problem-solving aspect of the job. Judith is currently Senversa's NSW Lead for vapour assessment and risk assessment. In this role, she works closely with Senversa's contaminated land auditors providing technical and interpretative advice on the risk assessment aspects of their Audits. In addition to the technical aspect, Judith enjoys working with diverse stakeholders to build an effective team and achieve the best outcome. She is also passionate about the visibility and promoting women in STEM.

A copper, a nickel and a lead walk into a pub(lic hospital's water supply). What happens next?

Phil Choi

Queensland Health, Brisbane, QLD

Keywords: Heavy metals, Water

Theme / subtheme: Theme 1: Risk assessment of mixtures in the environment, food, consumer products and you! Subtheme: heavy metals

Theme 2: From data to decisions: how data integration, modelling, and interpretation lead to actionable risk assessments.

Theme 3: Exposome of mixtures: evaluating real-world exposures to complex mixtures

Reticulated drinking water can sometimes contain elevated concentrations of metals. Following concerns about the quality of tap water in healthcare facilities, Queensland Health undertook a survey of metals in tap water from over 300 facilities across the state. Water was sampled at random times of the day from outlets that may be used for drinking or food preparation, and tested for a panel of 26 metals. Of the 2,000+ samples analysed, 94% were in compliance with the Australian Drinking Water Guidelines. In this presentation we will discuss the co-occurrence of certain metals, risk factors for elevated levels, the relevant exposure pathways in the facilities tested, and implications for health risk assessment. As a part of the survey, healthcare facility managers were provided guidance to allow them to further investigate, identify and manage exposure from metals. This audit was an important first step towards reducing exposure to metals for people who may consume reticulated water from healthcare facilities.



Dr Phil Choi

Advanced Environmental Health Scientist, Queensland Health, QLD

As an advanced environmental health scientist at Queensland Health, Phil is a generalist risk assessor and regulatory scientist. He produces and reviews chemical and microbial risk assessments for public health issues related to water and wastewater. Some call him 'the wastewater guy' – a reflection of his area of expertise, not his personal hygiene. When he is not involved in incident response or policy issues, he enjoys initiating or supporting projects that address knowledge gaps in public health.

Human exposure pathways to micro and nanoplastics: implications for health and decision-making

Elvis Okoffo

Queensland Alliance for Environmental Health Sciences, University of Queensland, Woolloongabba, QLD

Microplastics (MPs, <5 mm) and nanoplastics (NPs, <1 µm) are increasingly recognized as emerging contaminants of concern due to their widespread occurrence and growing evidence of human exposure. However, accurately characterizing exposure pathways remains challenging because of analytical limitations, particularly for nanoplastics. Recent advances in analytical chemistry are improving our ability to quantify these particles across environmental and consumer matrices, providing new insights into the sources and magnitude of human exposure. This presentation will highlight recent advances in analytical methods and exposure assessment developed to investigate human exposure to MPs and NPs. Innovative workflows integrating pyrolysis–gas chromatography–mass spectrometry (Py-GC-MS), asymmetric flow field-flow fractionation (AF4), nanoparticle tracking analysis (NTA), and electron microscopy have enabled the detection, characterization, and quantification of plastics across a broad size range, including particles smaller than 1 µm. Drawing on recent studies, I will discuss key exposure pathways associated with drinking water, food contact materials, disposable paper cups, plastic kettles, and household dishwashers, among others. These studies demonstrate that everyday consumer products can contribute to human exposure and highlight the importance of considering both particle number and polymer mass when assessing exposure. I will also discuss how advances in analytical methods are improving confidence in nanoplastic measurements and enabling more robust assessments of exposure across complex environmental and consumer matrices. Understanding where, how, and to what extent people are exposed to MPs and NPs is fundamental for informing human health research, exposure mitigation strategies, and evidence-based policy.



Dr Elvis Okoffo

ARC DECRA Research Fellow, Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland

Dr Elvis Okoffo is an ARC DECRA Research Fellow at the Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Australia. His research focuses on developing innovative analytical methods to detect, characterize, and quantify microplastics, nanoplastics, and associated contaminants in complex environmental and biological matrices. He has pioneered advanced analytical workflows that integrate techniques such as pyrolysis–gas chromatography–mass spectrometry (Py-GC-MS), and complementary nanoparticle characterization methods to improve the analysis of complex plastic mixtures. His research aims to advance our understanding of environmental and human exposure to plastics by investigating their occurrence, sources, transport, fate, and exposure pathways across environmental, drinking water, food, and biological systems.

Analytical challenges and uncertainty in detecting micro/nanoplastics in environmental and biological samples

Cassandra Rauert

Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Woolloongabba, QLD

It is globally recognised that micro and nanoplastics (MNPs) are pervasive in the environment and that we are continually exposed to these contaminants. As such, scientific, public and regulatory interest in our exposures has dramatically increased. More recently, there has been increasing interest in human biomonitoring studies, primarily aimed at determining links with adverse health outcomes. But has the jump to human biomonitoring studies raced ahead too quickly? Do we have access to the methods or analytical techniques needed to be able to provide these links confidently?

This presentation will discuss the analytical developments in the field of microplastic analysis, current challenges and limitations that the field faces, with a discussion of what a collaborative path forward that improves the science may look like.



Dr Cassandra Rauert

Senior Research Fellow, The University of Queensland

Dr Cassandra Rauert is a Senior Research Fellow at the Queensland Alliance for Environmental Health Sciences (QAEHS), University of Queensland. She is the microplastics project lead in the Minderoo Centre-Plastics and Human Health, investigating human exposure to microplastics and developing new methods for detecting micro and nanoplastics in human matrices. Her other research interests include the impact of tyre road wear particles and their chemical additives on the environment and developing novel biomonitoring methods for assessing human exposure to chemicals of concern.

Moving from Measurement to Prioritization for Plastic-Related Chemicals

Bradley O. Clarke

Australian Laboratory for Emerging Contaminants, School of Chemistry, University of Melbourne, VIC

Keywords: Plastics-related chemicals; Chemical prioritization; PMBT; Hazard and exposure assessment; Non-target screening

The growing complexity of plastics-related chemicals poses a major challenge for environmental monitoring, risk assessment, and regulatory decision-making. Existing chemical inventories remain highly fragmented, with substantial gaps in hazard information, limited exposure context, and weak links to real-world analytical screening data. Here, we present an integrated and transparent prioritization workbench for systematically evaluating plastics-related chemicals based on combined hazard and exposure evidence. The workflow first harmonizes record-level information from multiple public databases into a unified and auditable chemical evidence infrastructure, reducing identifier mismatches and improving traceability. Hazard is assessed using a semi-quantitative PMBT framework covering persistence, mobility, bioaccumulation, and toxicity, following a curated-database-first and QSAR-fallback strategy to address data gaps. Exposure potential is evaluated through multiple complementary evidence streams, including human biomonitoring, food contact migration, production volume, patent activity, and literature frequency. A key feature of the platform is its connection to non-target screening workflows. Through a public-facing dashboard, users can upload candidate chemical lists and rapidly contextualize detected or suspected compounds within the integrated hazard–exposure prioritization matrix. This enables analytical results to be translated into interpretable, risk-relevant evidence, supporting more dynamic and targeted environmental surveillance. By moving beyond static chemical lists toward a transparent, evidence-linked prioritization infrastructure, this work provides a practical framework for identifying plastics-related chemicals of concern and guiding future monitoring, research, and risk management efforts.



Associate Professor Brad Clarke

Associate Professor, School of Chemistry, University of Melbourne

Brad Clarke is an Associate Professor of Environmental Science and Analytical Chemistry at the University of Melbourne (Australia) and Chief Investigator at the Australian Laboratory for Emerging Contaminants (ALEC). His research focuses on assessing risks to public health and the environment from pollution, with an emphasis on synthetic contaminants such as per- and polyfluoroalkyl substances (PFAS), microplastics, and flame retardants. He also specialises in the development and application of advanced mass spectrometry techniques. Brad is passionate about industry-engaged research, conducting both applied and fundamental studies that address real-world environmental challenges. He has published over 87 peer-reviewed journal articles and book chapters, which have attracted more than >8,500 citations and an h-index of 42. His work appears in leading environmental science journals, including Environmental Science & Technology, Journal of Hazardous Materials, Environment International, and Water Research. Previously, Brad was the Senior Program Manager for the Environmental Science degree at RMIT University and held postdoctoral research positions at Imperial College London and the University of Arizona.

FAO/WHO JMPR approach to agrochemical residues in food and feed

Rhian Cope

SLR Consulting Australia Pty Ltd, Canberra, ACT

This presentation will provide an introduction to the FAO/WHO JMPR approach to deriving human health risk assessment points of departure for dietary exposure risk assessment. This will include the process of identifying major and minor metabolites in laboratory animal studies, handling genotoxic and non-genotoxic metabolites, approaches for data rich metabolites, approaches for handing metabolites with no data, metabolites that can be covered by data on the parent compound and metabolites that require separate health-based guidance values to those of the parents.



Dr Rhian Cope BVSc BSc DABT DABVT FACTRA

Technical Director, SLR Consulting Australia Pty Ltd, Canberra, ACT, and ACTRA Secretary

While Dr Cope is a veterinarian by training (1989, University of Queensland) she has spent most of her professional career as a toxicologist. Following obtaining her veterinary qualification Dr Cope pursued further training as a radiation toxicologist/photobiologist (PhD, University of Sydney 1996). She is a Diplomate of the American Board of Toxicology, a Diplomate of the American Board of Veterinary Toxicology, and a Fellow of the Australasian College of Toxicology and Risk Assessment. Dr Cope has held academic positions at the University of Illinois and Oregon State University. Dr Cope is a former Principal Toxicologist for the Australian Pesticides and Veterinary Medicines Authority and a monographer for the WHO Joint Pesticides Meeting on Pesticides Residues in Food. Dr Cope is currently a Technical Director at SLR Consulting. In total Dr Cope has over 150 peer-reviewed publications and expert reports in various areas of toxicology.

Single chemical and mixture effects of three veterinary antibiotics on freshwater invertebrate test species

Naomi Cooper

Senversa Pty Ltd, Melbourne, VIC

The widespread use of veterinary pharmaceuticals in animal husbandry has raised growing concerns about detrimental effects to non-target organisms. In this study we examined the acute and chronic effects of three veterinary antibiotics (erythromycin, tylosin and sulfamethazine) in single, binary and tertiary mixtures to two species of cladocerans, *Daphnia magna* and *Ceriodaphnia dubia*, and to larvae of the midge, *Chironomus dilutus*. Acute median lethal concentrations (48-h LC_{50}) ranged from 87 mg/L (sulfamethazine) to 566 mg/L (tylosin) for *D. magna* and 77 mg/L (sulfamethazine) to 444 mg/L (tylosin) for *C. dubia*. For the midge, 96-h LC_{50} values for each of the chemicals alone was 256 mg/L for erythromycin and >1000 mg/L for tylosin and sulfamethazine. The 10-day EC_{50} values for *D. magna* reproduction ranged from 5.7 mg/L (sulfamethazine) to 193 mg/L (tylosin), while for *C. dubia* these values ranged from 2.4 mg/L (sulfamethazine) to 321 mg/L (tylosin). Effects on growth and survival of *C. dilutus* in 10-day bioassays were only observed for erythromycin and sulfamethazine, with EC_{50} values all greater than 200 mg/L. No chronic effects were observed for midges exposed to tylosin at concentrations up to 500 mg/L. Combining the antibiotics in mixture generally reduced their acute and chronic LC and EC_{50} values. The lowest EC_{50} value generated was 1 mg/L sulfamethazine for *C. dubia* reproduction in a 7-day bioassay with sulfamethazine and tylosin in combination. Still, toxic unit calculations indicated predominantly additive interactions between the three antibiotics. Overall, the effects concentrations generated were well above reported water concentrations, indicating these chemicals may present a low level of risk to the aquatic organisms assessed in this study.



Naomi Cooper FACTRA

Senior Associate Environmental Toxicologist, Senversa Pty Ltd

Naomi is an Environmental Toxicologist with over 25 years' experience in private and university sectors. During this time Naomi has developed broad research, consulting and technical skills and experience in environmental assessments and investigations. Naomi's key experience has included development of water quality guidelines for Australia and New Zealand, ecological risk assessments on a range of contaminants in freshwater and marine environments and terrestrial settings, designing and overseeing site contamination assessments on different media (soil, groundwater, surface water, sediment and porewater) and for clients with multiple sites. Naomi's roles have ranged from field staff to ecological risk assessor and project manager. Naomi is a fellow of the Australian College of Toxicology and Risk Assessment (FACTRA). Previously Naomi worked at Oklahoma State University as a Research Scientist / Lab Manager in the Ecotoxicology and Water Quality Research Laboratory. In the laboratory, Naomi undertook research involving the assessment of wastewater effluents, metals, veterinary antibiotics, pesticides and other contaminants on aquatic organisms. She also worked with a number of different industries assessing their wastewater discharge into the environment. Naomi in that role developed an excellent understanding of key environmental issues and relevant legislative requirements.

Risk assessment of PFAS mixture through exposure of pastoral livestock products using literature data

Yanju Liu, Simon Awoyemi, Chuks Odoh and Ravi Naidu

School of Science, University of Newcastle and crcCARE, Callaghan, NSW

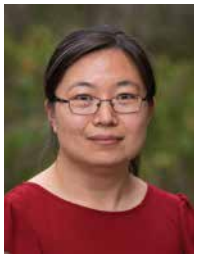
Theme/Subtheme: Risk assessment of mixtures in the environment, food, consumer products and you!
PFAS

Per- and polyfluoroalkyl substances (PFASs) are persistent, mobile contaminants that are increasingly detected in agricultural and pastoral systems, posing risks to food safety and human health. Evidence indicates that PFAS enter pastoral land through multiple pathways, including biosolid application, contaminated irrigation water, and atmospheric deposition, and subsequently accumulate in soil, groundwater, and biota. Due to their high mobility and resistance to degradation, PFASs can be readily transferred from soil to grazing plants and further bioaccumulated in livestock through ingestion of contaminated feed and water. Consequently, PFAS have been detected in animal-derived products such as meat, milk, and eggs, which represent important dietary exposure pathways for humans.

This study develops a conceptual exposure model to quantify human health risks associated with PFAS-contaminated pastoral systems. The model integrates key transfer pathways, including soil-to-forage uptake, forage-to-livestock bioaccumulation, and livestock-to-human dietary exposure via animal products. Such a framework enables the linkage between environmental concentrations and human intake, supporting a mechanistic understanding of exposure dynamics across the soil–plant–animal–human continuum.

Human health risk characterisation for PFAS is complex due to compound-specific toxicities and the co-occurrence of multiple PFAS in environmental and food matrices. For example, the European Food Safety Authority has established a group tolerable weekly intake of 4.4 ng/kg body weight per week for selected PFAS (PFOA, PFOS, PFNA, and PFHxS), reflecting mixture-based toxicity outcomes rather than individual compounds. A wide range of PFAS compounds are routinely detected in animal products, necessitating cumulative risk assessment approaches. Methods such as the relative potency factor approach have been proposed to account for mixture effects and improve risk characterisation.

Based on available occurrence, exposure, and toxicological data, this study applies a mixture-based risk assessment framework to estimate human exposure to PFAS via animal products produced on impacted pastoral land.



Dr Yanju Liu

Senior Research Fellow, School of Science, University of Newcastle and crcCARE

Dr Yanju Liu is a Senior Research Fellow in the School of Science at the University of Newcastle and crcCARE. Her research focuses on environmental chemistry and remediation, with expertise in contaminant fate and transport, environmental soil chemistry, toxicity assessment, and risk-based management of contaminated soils. The multidisciplinary projects that she worked on aimed to understand how contaminants behave in soil, and how these processes influence exposure, toxicity and risks. Her research work also aims to improve the effectiveness and sustainability of site management by integrating mechanistic understanding with practical solutions. She collaborates with academic, government and industry partners on projects addressing emerging contaminants, metal and metalloid pollution, and soil health. Her research contributes to advancing scientific knowledge while informing policy and best practice for contaminated site risk assessment and remediation.

POSTER PLATFORM

Complexities of nano/microplastics: Sorption/de-sorption mechanisms and their potential implications

Andrew Cossey

Senversa Pty Ltd, Melbourne, VIC

Keywords: Microplastics; sorption; de-sorption
Theme/subtheme: Microplastics as complex exposure mixtures: from measurement uncertainty to human health risk

Microplastics (typically 5mm – 1µm in size) and nanoplastics (<1µm) are ubiquitous, and transported between, terrestrial, estuarine, coastal and marine environments, across all continents. Degradation, physical and chemical weathering, increased mobility and interactions with other chemicals dynamically alter their environmental impacts. Critically, they have the ability to act as a vector (source or sink) for other pollutants. Because of their large specific surface area, hydrophobicity, and as a result of other weathering processes and biofilms, microplastics and nanoplastics can adsorb various contaminants. Exposure to micro- and nanoplastics can therefore result in direct exposure to these contaminants, and these contaminants can then desorb to act as a source for pollutants within the environment.

Since 2020, research on microplastics and their sorption and de-sorption characteristics and mechanisms have increased exponentially. This presentation presents a high-level summary, based on literature review, of:

- the mechanisms involved in sorption and de-sorption of contaminants to and from micro- and nanoplastics
- key factors which influence these processes, and therefore the risk profile associated with micro- and nanoplastics
- potential implications for human health and environmental risk assessment approaches for micro- and nanoplastics



Andrew Cossey

Environmental Scientist, Senversa Pty Ltd

Andrew is an Environmental Scientist with experience in environmental assessment and remediation, geochemistry and geotechnical assessments. Andrew has led a wide range of field programs and has extensive experience in soil remediation, particularly with heavy metals, hydrocarbons and explosives. Andrew's professional interests include environmental chemistry, risk assessment and data science.

Physiologically based pharmacokinetic modelling of enantiomeric tramadol and its active metabolite across CYP2D6 phenotypes

David Stewart-Yates[1], Slade Matthews[2], John Coumbaros1 and Garth Maker[1]

[1]School of Medical, Molecular and Forensic Sciences, Murdoch University, Murdoch, WA

[2]Sydney Pharmacy School, Faculty of Medicine and Health, University of Sydney, Sydney, NSW

Keywords: Toxicology, metabolism, pharmacogenomics

Tramadol (TM) is a centrally acting opioid analgesic, commonly implicated in drug overdose, driving under the influence or drug facilitated sexual assault investigations (Fernando et al 2026). Interpretation of tramadol concentrations in clinical and forensic toxicology poses a number of challenges owing to the impact of inter-individual variation in drug disposition and response, much of which is attributable to drug-gene interaction. The purpose of the present study was to develop a racemic and enantiomeric physiologically based pharmacokinetic (PBPK) model for tramadol and its active metabolite, O-desmethyltramadol, and to predict the effect of CYP2D6 phenotype on enantiomeric drug exposure. A PBPK model of racemic and enantiomeric tramadol and O-desmethyltramadol has been developed in PK-Sim® software, using sixteen clinical reference studies. Good model performance was shown through goodness-of-fit plots, low average geometric mean fold errors (GMFE) of predicated against observed for AUClast (1.39) and Cmax (1.54), and low mean relative deviation (MRD) (1.49) across all models. For the drug-gene interaction simulations, 35 out of 40 and 36 out of 40 of the predicted Cmax and AUClast were within two-fold of the observed values. Overall, this study presents the applicability for the use of PBPK modelling and simulation in improving interpretation of toxicological results within forensic science by providing a more individualised approach. Further, the novel model can be employed in future drug-drug interaction simulations.

Fernando H et al. (2026). J. Toxicol. Environ. Health Sci., 14: 1-23.



David Stewart-Yates

PhD Candidate, School of Medical, Molecular and Forensic Sciences, Murdoch University

David Stewart-Yates is a PhD candidate in toxicology and pharmacometrics at Murdoch University, Western Australia. His research focuses on drug-facilitated sexual assault, with an emphasis on tramadol pharmacokinetics and physiologically based pharmacokinetic modelling. His overall aim is to improve forensic interpretation of toxicological data to support more accurate, individualised, and evidence-based justice outcomes.

POSTER PLATFORM

A Framework for Assessing Human Health- and Livestock Risks from Bioaccumulative Environmental Contaminants in Data-Limited Scenarios

Isabella Gore, Kara Fry and Antti Mikkonen

Environment Protection Authority (EPA) Victoria

Assessing risks to human health from food derived from livestock exposed to environmental contaminants remains a key challenge for regulators, particularly where data is limited. This study presents a modelling framework that integrates dynamic exposure estimation with body burden (adapted from Mikkonen et al., 2023) to quantify the relationship between contaminant concentrations (antimony) in livestock inputs and subsequent human dietary exposure, using a modified United States Environment Protection Agency (U.S. EPA) Preliminary Remediation Goal (PRG) equation for calculating soil screening levels for radionuclides (U.S. EPA, 2017).

A methodology was developed that combines (i) derivation of livestock-specific (animal welfare as well as human consumption) toxicity reference values, (ii) dynamic estimation of animal intake rates under realistic environmental conditions using allometric scaling, and (iii) transfer factors linking external exposure to contaminant accumulation in edible tissues. These components were integrated into a quantitative framework to predict tissue concentrations across a range of exposure scenarios and to estimate human dietary intake under varying consumption patterns. Risk characterisation was conducted using established health-based guidance values and hazard quotient approaches.

The modelling demonstrates how dynamic representations of livestock exposure, incorporating variability in water intake, growth, and environmental conditions, can refine estimates of contaminant transfer to the food chain compared with static assumptions. Linking these exposure estimates to body burden models enables variable modelling of how contaminants partition into edible tissues and ultimately contribute to human dietary exposure.

This provides an adaptable framework for evaluating risks to livestock health, food safety, and human health in data-limited scenarios. It highlights the value of integrating exposure science with bioaccumulation modelling to assess emerging or poorly characterised contaminants in agricultural systems. The framework is readily transferable to other bioaccumulative contaminants and settings, offering a practical tool for protecting both food safety and beneficial land uses.



Isabella Gore

Health Scientist, Environment Protection Authority (EPA) Victoria

Isabella Gore is a Health Scientist for the Victorian EPA's Environmental Public Health Branch in the Chemical Risk Team. Her work integrates exposure science, toxicology, and modelling to evaluate risks to livestock, food safety, and human health.

Overregulation: when does it become too much?

Sheridan Chapman

DRC Environmental, Kew East, VIC

Keywords: Regulation, risk

The aim of regulation is to keep people and the environment safe, but what happens when it goes overboard? A case study of hazard vs. risk and the burden of overregulation of minor contamination on business operators.

A potentially contaminated site with multiple contaminants and multiple exposure pathways. A very comprehensive sampling plan and ongoing monitoring requirements. Multiple instances of regulator involvement. But what was the actual risk, and the outcome? When does regulation shift from protection to burden?



Sheridan Chapman

Senior Environmental Consultant – Risk Assessment, DRC Environmental

Sheridan has been a contaminated land consultant for 15 years, but has also wandered into health and safety, hazardous chemicals, occupational hygiene and other areas that have piqued her interest. She has Masters degrees in Environmental Science and in Occupational Hygiene/Toxicology and enjoys it when she gets weird questions that require a bit of research to work out the answers.



Dr Dennis Paustenbach CIH DABT

Chief Scientist, Toxicology and Risk Exposure, TRC Companies, USA

Dr Dennis Paustenbach is a board-certified toxicologist and industrial hygienist with nearly 35 years of experience in risk assessment, environmental engineering, ecotoxicology, and occupational health. He was the President of ChemRisk, LLC, the largest toxicology and health risk assessment consulting firm in the U.S. which specialized in human and ecological risk assessment of consumer products, contaminated sites, pharmaceuticals and medical devices. Dr Paustenbach has been an invited technical reviewer for prominent journals and of proposed regulations. He has published approximately 300 peer-reviewed articles and written more than 50 book chapters in the fields of industrial hygiene, human and aquatic toxicology, engineering, and risk assessment. His textbook (3rd edition) entitled "Human and Ecological Risk Assessment: A textbook of case studies" was recently updated (2024). Dennis sold Paustenbach and Associates to the TRC Companies in 2024 and currently manages the product sustainability, toxicology and risk assessment practices. Dennis has a BS in Chemical Engineering from the Rose Polytechnic Institute, an MS in industrial hygiene and toxicology from the Univ of Michigan, and a PhD in toxicology from Purdue University. He did post-doctoral work at Harvard University and the Wright-Patterson Air Force Base.



Dr Rhian Cope BVSc BSc DABT DABVT FACTRA

Technical Director, SLR Consulting Australia Pty Ltd, Canberra, ACT, and ACTRA Secretary

While Dr Cope is a veterinarian by training (1989, University of Queensland) she has spent most of her professional career as a toxicologist. Following obtaining her veterinary qualification Dr Cope pursued further training as a radiation toxicologist/photobiologist (PhD, University of Sydney 1996). She is a Diplomate of the American Board of Toxicology, a Diplomate of the American Board of Veterinary Toxicology, and a Fellow of the Australasian College of Toxicology and Risk Assessment. Dr Cope has held academic positions at the University of Illinois and Oregon State University. Dr Cope is a former Principal Toxicologist for the Australian Pesticides and Veterinary Medicines Authority and a monographer for the WHO Joint Pesticides Meeting on Pesticides Residues in Food. Dr Cope is currently a Technical Director at SLR Consulting. In total Dr Cope has over 150 peer-reviewed publications and expert reports in various areas of toxicology.



Dr Jen Martin FACTRA

Chief Environmental Scientist, Environment Protection Authority (EPA) Victoria

Dr Jen Martin is EPA Victoria's Chief Environmental Scientist. She has worked in the field of contaminated land and human health risk assessment, across private and public sectors, for over 20 years. She holds a PhD in Bioinorganic Chemistry from the Royal College of Surgeons in Ireland, Postgraduate Diploma in Medical Toxicology and is a Fellow of the Australasian College of Toxicology and Risk Assessment. Dr Martin leads the Science Division at EPA and has a strong interest in research programs that target greater understanding of a chemical's mode of action, bioavailability, and exposure dynamics to enhance modern risk assessment tools and enable public health outcomes. She is Chair of the Heads of Environment Protection Authority (HEPA) Science Committee, which supports cross-jurisdictional collaboration and knowledge sharing between EPAs throughout Australasia, and supports HEPA in a strategic science advisory capacity. Dr Martin also represents EPA Victoria as a partner in The Solving Plastic Waste Cooperative Research Centre, established in July 2024 to assist in solving Australia's plastic waste problem by enhancing end-user driven collaboration which addresses the current challenges across the entire plastics value chain.



Dr Brian Priestly FACTRA

ACTRA Emeritus Fellow and Life Member

Brian Priestly is an ACTRA Emeritus Fellow and Life Member. He served as the inaugural ACTRA President and has helped organise and presented at many ACTRA Annual Scientific Meetings and workshops. While he has now retired from full-time work, he is still active in ACTRA activities. His career of some 60 years includes some consultancy work, University positions in pharmacology, toxicology and health risk assessment, and senior government appointments and expert committee activities in toxicology and chemicals management programs.

Petroleum distillates and residues

Hannah Gerstmyer

School of Chemistry, University of Sydney, Sydney, NSW

Petroleum distillates and residues contain thousands of overlapping constituents that fluctuate unpredictably based on crude source and refining processes. As a result, they are described by manufacturing processes, raw materials, physical properties, or carbon number ranges rather than specific constituent data. This poses an ongoing cheminformatics challenge for federal regulators like the Australian Chemicals Introduction Scheme (AICIS) who rely on accurate substance characterisation to manage hazard data for public safety. Existing modelling strategies for petroleum products are unsuitable for QSAR models that typically expect a single, fixed structure per sample. Attempts to reduce their complexity for more efficient modelling require detailed spectroscopic characterisation to be accurate. This talk discusses these regulatory issues and introduces cheminformatics frameworks designed to (a) organise what analytical data is available for petroleum substances, and (b) map their chemical and biological profiles in a way that facilitates toxicological risk assessment.

It describes a methodology for scraping limited constituent data from public chemical databases and regulatory reports. The organisation of this heterogenous information into a computer-readable format is described, focussing on the development of a custom, dictionary-based 'petroleum fingerprint'. The fingerprint is designed to capture multiple levels of structural specificity, ranging from specific SMILES structures to broad descriptors such as 'contains polyaromatic hydrocarbons'.

Clustering petroleum substances according to their fingerprint produces distinct groups influenced by aromaticity, paraffin chain length, cyclisation, and heteroatom content. The talk will evaluate the overlap of these groups with bioactivity and manufacturing classifications, investigating how fingerprint design can be altered to predict *in vitro* toxicity. Ultimately, it will highlight how a fingerprinting approach facilitates scalable, *in silico* hazard screening of petroleum distillates and residues, helping regulators prioritise substances for further testing to reduce environmental and health risks.



Hannah Gerstmyer

Honours Student, School of Chemistry, University of Sydney

Hannah Gerstmyer is an Honours student at the University of Sydney. As an undergraduate, she worked with the Australian Industrial Chemicals Introduction Scheme (AICIS) to develop cheminformatics strategies for *in silico* hazard screening of complex petroleum products. She was awarded the ASCEPT Special Interest Group Prize for Toxicology in 2025 and currently studies hydrophobic polymers.

A screening framework to identify solvent constituents that drive chroming behaviour in aerosol spray paints

John Frangos

Frangos Toxicology, Moonee Ponds, VIC

Keywords: Volatile substance abuse, Solvent mixtures, chroming

Chroming — the deliberate inhalation of aerosol spray paint to achieve a change in mental state — is a persistent and harmful form of volatile substance abuse, with the highest prevalence in young and socially vulnerable populations. Aerosol spray paints are industrial chemical mixtures, typically containing between five and ten solvents plus a hydrocarbon propellant. Not every constituent contributes equally to abuse potential; the behaviour is driven by a small subset of solvents whose physicochemical properties favour rapid central nervous system uptake. Where those constituents can be identified and substituted, the mixture itself becomes a leverage point for harm reduction — an approach with established precedent in the substitution of high-aromatic petrol with low-aromatic Opal fuel in remote Australian communities.

This presentation describes a screening framework to triage candidate formulation ingredients by their propensity to support chroming. The framework applies three sequential physicochemical criteria: vapour pressure (proxy for inhalable dose from a discharged aerosol), blood-to-air partition coefficient (proxy for pulmonary absorption rate), and blood-to-brain partition coefficient (proxy for selective central nervous system uptake and the rapidity of euphoric onset that abusers seek). Applied to 22 candidate ingredients across alcohols, ketones, esters, glycol ethers, aromatic and aliphatic hydrocarbons, and hydrocarbon propellants, the framework partitioned ingredients into three categories: unlikely to support chroming, low likelihood, and constituents of concern requiring detailed assessment. Toluene emerged as the dominant driver — its blood-to-brain partition coefficient is approximately an order of magnitude above any other ingredient considered, consistent with its historical and continuing role as the marker solvent for chroming. Mixture interactions, including the role of propellants, were also considered. The framework offers a tractable, evidence-based pathway to identify and reformulate the constituents that drive abuse, while preserving product function.



John Frangos MAppSc(Toxicology) FACTRA

Principal Toxicologist, Frangos Toxicology

John Frangos is the Director of Frangos Toxicology, an independent consultancy providing toxicology, regulatory and risk-assessment advice to industry and government. He holds primary degrees in chemistry and pharmacology, and a Masters in Toxicology. Over more than three decades of consulting practice, including as Principal Consultant and Director of Toxikos Pty Ltd, John has advised on the hazard classification of industrial substances, the toxicological assessment of mixtures and formulated products, and the regulatory pathways for new and existing chemicals in Australia and internationally. His work has covered consumer products, industrial chemicals, pesticides, and pharmaceuticals. The work described in this presentation was conducted for an Australian aerosol coatings manufacturer and developed a framework that links the physicochemical properties of individual solvent ingredients to their potential role in chroming behaviour. The framework draws on partition coefficient data from the international toxicology literature and is designed to be reusable by industry during product development. John has presented and published on volatile substance abuse, mixture toxicology, and hazard classification, and has provided expert evidence and regulatory submissions in Australia and overseas.

How low can you go with a TRV – and can you guess the VOC?

Ruth Jarman

Environmental Risk Sciences (enRisks) Pty Ltd, Carlingford, NSW

Key words: Vapour risk assessment, toxicity reference value, volatile organic compound

This presentation will outline the selection of a toxicity reference value (TRV) for a mystery volatile organic compound (VOC) for use in a contaminated sites human health (vapour) risk assessment (VRA).

A detailed assessment was required for this VOC as there was no recognised Australian TRV, and different TRVs had been derived by 5 international organisations, based on animal toxicity datasets showing similar critical effects and similar points of departure. All international TRVs were low, and all adopted different data and/or different assumptions for deriving the TRV.

The selection of the most appropriate TRV for the VRA considered the following:

- VOC characteristics
- background concentrations in air
- route of exposure and key adverse health effects following exposure
- evaluations by the WHO, ATSDR, TCEQ, OEHHA and IRIS, including chosen critical studies, critical effects, points of departure and uncertainty and modifying factors
- carcinogenicity classification
- consistency with the Australian policy position.

The rationale behind the selection of the most appropriate TRV for the VRA will be explained.

Can you guess the VOC?



Ruth Jarman RACTRA

Senior Consultant, Environmental Risk Sciences (enRisks) Pty Ltd, Carlingford, NSW

Ruth has close to 20 years' experience in providing practical high-level advice on toxicology and human health and ecological risk assessment to assist those in the environmental and contaminated land Industries. She is a Registered member of ACTRA and is now glad she never took up cigarette smoking.

Predicting high-risk novel benzodiazepines: a surveillance study of novel benzodiazepine detections and a case series of bromazolam exposures in New South Wales, Australia

Emily Sansoni

Royal Prince Alfred Hospital & NSW Poisons Information Centre, Sydney, NSW

Objective: Novel benzodiazepines are increasingly detected in poisonings presenting to hospital and forensic data. Their relative potencies remain poorly defined. Bromazolam has emerged in recent reports of severe toxicity. We sought a method to identify higher-risk novel benzodiazepines, and to provide a description of the clinical effects of bromazolam exposures.

Methods: A prospective observational public health surveillance study examined time trends in laboratoryconfirmed detections of novel benzodiazepines and alprazolam (benzodiazepines of interest) using police seizure data (physical drug samples) and a clinical surveillance program (clinical samples) from January 2019 to December 2024. All laboratory confirmed detections of benzodiazepines of interest in blood, urine, or physical drug samples were included. A case series described forty-eight hospital patients with confirmed bromazolam exposure between January 2023 and December 2024. A minimum clinical dataset was used to describe the demographics, clinical effects, drug co-detections, treatments and outcomes of bromazolam-related hospital presentations. Secondary analyses measured the relationship between clinical effects and bromazolam blood concentrations and opioid co-detection.

Results: The median number of benzodiazepines of interest detected in physical drug samples was 265/year (range 230-301), and 16/year in clinical samples (range 11-36). Common novel benzodiazepines were bromazolam, etizolam, clonazolam, flualprazolam and bromonordiazepam. In both datasets, annual detections of alprazolam and etizolam were down-trending, clonazolam and flualprazolam showed a rise and fall pattern, and bromazolam and bromonordiazepam up-trending. Among the 48 hospital cases with bromazolam detected, severe outcomes were frequent, including coma (36/48), respiratory failure (34/48), and endotracheal intubation (25/48). Multiple substances were detected in all but one patient. Bromazolam blood concentrations were poorly predictive of clinical effects. Opioid co-detection was not associated with significantly worse outcomes.

Conclusions: Novel benzodiazepine detections changed with time. Bromazolam may be a current concern due to its increasing detections and severe clinical outcomes. However, polysubstance use likely contributed to these outcomes.



Dr Emily Sansoni

Toxicology Fellow, Royal Prince Alfred Hospital & NSW Poisons Information Centre

Emily is an emergency medicine physician working in Shellharbour and a post-graduate toxicology fellow working in Sydney, NSW. Emily developed an interest in clinical toxicology during her emergency medicine training at Royal Prince Alfred Hospital and started a toxicology fellowship there in 2024. She joined the NSW Poisons Information Centre in 2026. Emily enjoys combining the breadth of emergency medicine with the opportunity to develop subspecialist expertise in toxicology. Her current research interests include novel benzodiazepines, and the use of cholinesterase inhibitors for treatment of anticholinergic delirium in paediatric patients.

Artificial Intelligence–Supported Risk Communication in Low-Trust Environmental Incidents

Craig Dalton

School of Medicine and Public Health, University of Newcastle, NSW

Keywords: risk communication; artificial intelligence

Background: Risk communication is the public-facing output of risk-assessment, yet is far less systematised. Toxic environmental incidents in low-trust communities pose acute communication challenges: affected populations hold diverse, deeply felt concerns, while organisational approval, legal review, and media management frequently delay or dilute messaging. Best practice recommends pre-testing communications with representative stakeholders, but this is rarely feasible during fast-moving incidents, leaving communicators to draft high-stakes statements without structured feedback. Large language models (LLMs) may help close this gap.

Methods: An agentic framework drawing on multiple commercial LLMs was developed to review and stress-test draft risk-communication material. Its knowledge base combined evidence-based risk-communication principles, derived from the author's practitioner guide on working with integrity in low-trust environments, with a set of community personas synthesised from public-relations and environmental-advocacy research. The system was applied to a real-world case: a gas turbine facility's first web statement, issued ten days after a major diesel fume emission. The agent assessed alignment with best practice, identified strengths and weaknesses, and generated simulated responses from six diverse community personas.

Results: The statement was judged technically accurate but lacking in emotional resonance, timeliness, transparency, and mechanisms for two-way engagement. Simulated reactions centred on frustration at the ten-day delay, demands for real-time monitoring data and independent oversight, and anxiety about vulnerable groups and long-term health effects. The analysis yielded seven concrete recommendations spanning timeliness, transparency, empathy, engagement, proactive alerts, follow-up forums, and independent review.

Conclusion: AI-driven, persona-based review can rapidly surface anticipated public concerns, strengthen message clarity, and support organisational uptake of best practice when conventional stakeholder testing is impractical. Frontline evaluation across diverse incidents is now required to establish real-world utility. The platform will be demonstrated in real time during the presentation.



Dr Craig Dalton

Conjoint Associate Professor, School of Medicine and Public Health, University of Newcastle, NSW

Dr Craig Dalton is a public health physician and epidemiologist with over 25 years' experience working with communities, health agencies and government on infectious disease and toxicological risks. His work spans outbreak investigation, surveillance system design, environmental health controversies and practical risk communication in situations where trust is fragile, evidence is contested and community anger is understandable. Craig is author of "How NOT to Piss Off a Community: How to work in low-trust environments with integrity and compassion", a plain-language guide for professionals communicating about hazards, uncertainty and public concern. His focus is on helping agencies move beyond technically correct messages toward communication that is respectful, transparent, responsive and less likely to alienate the people most affected by decisions during major public health emergencies and crises.

PO Box 7345
Beaumaris VIC 3193

Phone: 03 9586 6034

Email: actraasm@associationprofessionals.com.au