出國報告（出國類別：會議）

參加澳洲「International CleanUp Conference, Adelaide 2024（合併第 10 屆土壤及地下水污染整治國際會議與第 4 屆國際 PFAS 會議）」

服務機關：環境部環境管理署
姓名職稱：張良麗 環境技術師兼副分組長
派赴國家：澳洲阿得雷德
出國期間：113 年 9 月 14 日 至 113 年 9 月 21 日
報告日期：113 年 12 月 3 日

摘要

本次赴澳洲阿得雷德參加「International CleanUp Conference, Adelaide 2024（合併第 10 屆 CleanUp 土壤及地下水污染整治國際會議與第 4 屆國際 PFAS 會議）」，由澳洲環境污染評估與整治合作研究中心(The Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, crcCARE)主辦，研討會總計共有 209 場口頭發表、51 篇海報展示發表，以及約 300 多人相關領域人員參與，並安排 1 場現地技術參訪。

本次研討會議主題涵蓋污染場址之管理策略、新興污染物、風險評估及生物有效性、氣候變遷與污染場址調適、礦區污染土地、各國 PFAS 管理策略檢測分析及風險評估等。本署發表 1 篇海報論文「運用 DGT 技術評估底泥重金屬污染物之生態風險(Exploring The Ecological Risk For Metal Contamination In Sediments Through The Application Of DGT Technique)」，主要內容為我國於現地應用 DGT 技術評估現地底泥中重金屬濃度對水生生物生態風險之試驗成果。

藉由本次研討會議之參與及現地技術參訪，瞭解各國均持續關切土壤及地下水污染相關之國際交流合作與民眾風險溝通等議題，且 PFAS 為目前國際間極為關注之污染物，各國均已陸續投入大量研究及調查資源以釐清其對於環境與人體健康之影響，並持續發展檢測分析、污染整治技術及管理策略，可作為我國未來推動執行相關工作之參考。此外，經由研討會參與及海報論文發表，也增加與國外相關領域專業人士之交流，提升我國於國際間之能見度。

目次

一、目的

「International CleanUp Conference, Adelaide 2024」由澳洲環境污染評估與整治合作研究中心(The Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, crcCARE)主辦。本次研討會以「創新行動：引領整治作業革命(Innovation in action: Leading the cleanup revolution)」作為主軸，並包含第 10 屆 CleanUp 土壤及地下水污染整治國際會議與第 4 屆國際 PFAS 會議。

本次研討會議討論議題面向相當多元，包含污染場址之管理策略、新興污染物、風險評估及生物有效性、氣候變遷與污染場址調適、礦區污染土地、各國 PFAS 管理策略檢測分析及風險評估等。透過參與此項澳洲最大規模的污染場址管理與整治國際會議，可瞭解澳洲目前土壤及地下水污染整治技術發展現況，汲取世界各國、澳洲政府與民間機構在污染土地整治、管理及再利用之推動與實務經驗，及國際最新 PFAS 管理議題及調查研究現況，有助於掌握國際管理趨勢與奠定未來環境調查之基礎。

二、過程

（一）研討會議

本次「International CleanUp Conference, Adelaide 2024（合併第 10 屆 CleanUp 土壤及地下水污染整治國際會議與第 4 屆國際 PFAS 會議）」，於 2024 年 9 月 15 日至 19 日，於澳洲阿得雷德會議中心舉行。經主辦單位統計，本次會議與會人員約 300 多人，且會議之論文發表相當踴躍，總計安排 5 處中大型會議廳，在 3 天研討會議中計有 209 場口頭發表、51 篇海報展示發表，會議內容整體相當豐富；並安排 1 處大型展覽廳提供土壤及地下水污染整治領域檢測分析、技術顧問機構、整治工程業者提供各界專業技術之交流及展示。本次會議參與行程如表 1 所示，研討會議現場相關照片如圖 1 所示，以下綜整本署參與之各場次主題演講以及 PFAS 相關議題論文口頭發表演講重點內容整理如下：

1. 「一個地球，健康一體：揭示土壤污染對地球的影響(One Planet, One Health: Uncovering the impact of pollution from the soil to the soul)」，此篇為開幕式之主題演講，為本(2024)年度土壤與地下水污染整治國際會議揭開序幕，由聯合國糧食及農業組織(Food and Agriculture Organization of the United Nations, FAO)土地和水事務部官員，同時也是全球土壤夥伴關係秘書處成員 Natalia Rodriguez Eugenio 演講，演講中特別強調地球上人口預估於 2030 年前會達到 85 億人，但人類 95%糧食卻都僅仰賴地球上表層數公分土壤，因此避免環境污染特別是土壤受到污染，將會是維繫全球食品安全的重要課題。

2. 「全球土壤夥伴關係及其應對土壤污染的技術網絡(Global Soil Partnership And Its Technical Network In Tackling Soil Pollution)」主題演講【演講者：FAO 之土壤污染國際顧問 Sergejus Ustinov】

   (1) 聯合國全球土壤夥伴關係(Global Soil Partnership, GSP)成立於 2012 年，旨在發展互動夥伴關係，以加強所有利害關係人之間的合作和協同。GSP 任務是改善對地球有限土壤資源治理，以確保健康及肥沃的土壤，實現糧食安全世界，並依據每個國家對其自然環境的主權支持土壤提供生態系統服務。GSP 希望可解決所有土壤威脅，包括土壤污染，並尋求實施永續土壤管理、恢復及保護土地的行動。

(2) 2018 年 FAO 與 GSP 發起全球土壤污染研討會，匯集最先進訊息，聚集所有利害關係人，尋找實現零污染未來的解決方案，並建立國際土壤污染網(International Network on Soil Pollution, INSOP)，以團結利害關係人。INSOP 匯集世界各地政府、學術界、私人部門、非政府組織和其他利害相關者，以收集、協調與傳遞現有的土壤污染訊息，並尋求可保護土壤生態系服務功能的解決方案。截至 2024 年 7 月，INSOP 已擁有來自 130 個國家 1,200 多名成員，積極推動其 2023 至 2025 年之工作。

(3) INSOP 關注土壤污染之生命周期，從採樣規劃、環境風險評估到對農民進行永續土壤管理和基於生態系統解決方案應用的培訓。INSOP 最新之推動進展包括全球土壤污染物閾值分析、農藥及微量元素分析標準作業程序、整治行動清單、全球土壤醫生計畫、以及 FAO 針對土壤污染評估、監測和風險溝通最新發展之技術準則。

3. 「除了 PFAS! 衡量對社區至關重要的事(Anything But PFAS)」主題演講【演講者：澳洲維多利亞州環保局首席環境科學家兼執行主任麥覺理大學 Mark Patrick Taylor 教授】

(1) Mark Patrick Taylor 教授長期投入環境污染與民眾健康調查研究，提倡環境健康之觀念。例如運用微量元素及鉛同位素研究分析不同區域蜂蜜生產環境之影響，特別是礦區、空氣污染等、以及澳洲紅酒中鉛同位素變化，進而瞭解環境污染物對農作物及人體健康之影響。

(2) 透過長期對於 PFAS 之研究，發現消防人員工作時間與血液分析可確認長期暴露確實會造成血液中 PFOS 含量顯著增加，且服務 10 年以上的消防員血液中 PFOS 濃度會大幅增加。幸運的是，雖然近年對於 PFAS 風險危害有更多的評估及更清楚的認知與瞭解，但因消防泡沫中主要成分的改變，以及對 PFOS 等高危害性 PFAS 物質管理措施的增加，實際上近 20 年來人體血液中 PFAS 濃度已有逐年降低的趨勢。

(3) 透過對於民眾家園前後院土壤、菜圃土壤及家中落塵中 PFAS 濃度之調查及研究，可確認民眾家園後院或菜圃土壤中 PFAS 濃度均不高，而民眾家中落塵中 PFAS 濃度則相對較高，且不同家戶中的濃度變異

相差甚大，顯示民眾家中使用之物品、生活器具中所含 PFAS 物質均為可能影響民眾健康之重要因素，應有必要加強相關商品之檢驗及提供民眾選購資訊參考。

4. 「土壤污染防制及管理：歐盟的作法(EU Policy On Soil Health And Contamination)」主題演講【演講者：歐盟土壤保護與永續土地利用政策官員 Bavo Peeters】

(1) 健康的土壤對於實現歐盟氣候中和目標、應對生物多樣性喪失、預防和減輕乾旱、洪水及其他自然災害之影響、保護人類健康以及確保糧食安全至關重要。然而，歐盟 60%~70%的土壤目前狀況不佳。歐盟估計有 280 萬處潛在污染場址，但僅 138 萬處場址被發現與紀錄，其中 98%位於 11 個成員國中。歐盟內部土壤污染場址之位置和污染情形仍然處於很大程度的未知，而土壤退化每年造成歐盟數百億歐元的損失，因此需要採取緊急政策行動。

(2) 依循 2019 年綠色政綱(Green Deal)，歐盟執委會陸續於 2020 年及 2021 年訂定「生物多樣性策略(Biodiversity strategy) 」及「2030 歐盟土壤策略(The Soil Strategy for 2030) 」，並於 2023 年提出「土壤監測法案(Soil Monitoring Law)」，為土壤管理制定長期願景目標，目標於 2050 年恢復歐盟所有土壤的健康且更具有韌性，因此需要保護、永續使用、並恢復良好的土壤品質，以應對本世紀以來的氣候變遷影響。其中健康的土壤係指其具有良好的物理、化學及生物狀態，並可提供各種生態服務功能。主要的做法包含對於開挖之土壤加以分類控管其用途、減少土壤受水泥阻絕封實、避免及減少土壤受到化學物質之污染、避免土壤劣化及沙漠化、提高土壤之生物多樣性、參與千分之四倡議計畫、推動永續土壤管理等，包含自願和具有法律約束力之措施。

(3) 歐盟執委會將提出一項有關土壤健康立法提案，以實現「2030 歐盟土壤策略」之目標。這是繼 2006 年土壤框架指令提案失敗後的第二次嘗試。此一長期一致性的土壤監測架構將使成員國能夠採取措施應對已退化的土壤。永續土壤管理應成為歐盟常態，成員國需確定

哪些做法應由土壤管理者實施，哪些做法應予禁止，因其會導致土壤退化。各國也必須實施土地徵用緩解原則，成員國亦需識別潛在污染場址，以進行調查並解決其對人類健康和環境造成之不可接受風險。

(4) 目前，歐盟執委會、成員國及各利害關係人正在成功實施「2030 歐盟土壤策略」，如「土壤監測法案(Soil Monitoring Law) 」提案已得到歐盟理事會及歐洲議會的積極回應。歐盟三個機構間的三方對話將於 2024 年下半年開始，以就法案文本達成最終妥協，一旦獲得通過，新法律將可迅速生效。

5. 「PFAS: 從全球角度檢視管理策略(PFAS: Management Strategy Viewed Through A Global Lens)」論文口頭發表演講

(1) 管理 PFAS 對於人類健康和環境影響需要考慮居家、商業、工業和環境來源的接觸。隨著我們逐漸認知到越來越多的介質中均存在 PFAS，且 PFAS 的種類及數量不斷增加，政府面臨著對其進行管理的挑戰，環境從業者也面臨著尋找解決方案的挑戰。世界各國，包含澳洲、歐洲、英國、日本、新加坡、加拿大和美國管理 PFAS 的方法與策略雖因 PFAS 定義、文化差異和歷史環境釋放而各不相同，但均都致力於減少 PFAS 之人類和與生態暴露。

(2) 在管理法規的架構上，並非所有國家都具備可限制環境中化學品的法律基礎。當政府內部有多個組織共同參與 PFAS 管理時，我們發現管理實體內部之間均存在差異。例如在美國、加拿大和澳州，可能存在聯邦和州或省之差異，而即使在美國聯邦機構內部，PFAS 也沒有單一的定義。

(3) 在 PFAS 的製造與使用上，隨著時間的推移，為了回應國際公約及各國的法規，化學品製造商生產越來越廣泛的含有多氟化和非目標化合物的產品，且生產 PFAS 地區與僅使用 PFAS 地區有著不同的理念。此外，由於某部分監管驅動因素，製造商生產的全氟化合物越來越少，取而代之的是名副其實的前驅物和非目標化合物。

(4) 總結而言，各國政府及其各監管機構正在競相管理 PFAS，因為民眾迫切質疑什麼是安全的。同時，科學家們也正在努力收集所需數據，以瞭解 PFAS 化學類別的複雜性，並尋找最佳方案來識別及解決我們已知和尚未瞭解的 PFAS 暴露問題。

6. 「歐盟的政策架構如何預防和管理 PFAS 污染？(How Does EU'S Policy Framework Tackle Prevention And Management Of PFAS Pollution?)」論文口頭發表演講

(1) 歐盟近期認知到 PFAS 是廣泛的環境污染物，並對人類健康構成風險，因此採取了多項監管措施對其進行管理。這些措施的連貫性受到 PFAS 多樣性和普遍存在的挑戰，這也使歐盟在化學風險監管評估中採用合理、協調及透明方法（例如「一種物質一評估」）的努力變得更加複雜。

(2) 本研究結果指出，歐盟決定 PFAS 監管門檻的基本原理在不同法律框架中存在很大差異且並不總是透明的，例如即使在相似暴露環境下，不同 PFAS 閾值中使用的健康保護基準也可能相差三個數量級。這很容易使得遵守這些閾值的廠商和監管機構、或解釋 PFAS 環境數據及其對人類健康影響的相關利害團體感到困惑。這種不一致也會影響監管決策的合理性以及歐盟化學品風險評估政策目標的實現。PFAS 監管閾值的巨大差異也使不同各方處於不平等的地位，可能會對那些需要遵守最嚴格環境品質標準的實體帶來相當大的經濟影響，或使那些未受到良好監管的食品對消費者帶來不必要的健康風險。

(3) 本研究亦指出目前各界對於管理 PFAS 所需的健康保護基準尚未達成共識，歐盟最近採用的容許攝取量過於謹慎，特別是在應用於現有之污染管理時。依據分析結果，本研究提出一些可行的解決方案。例如，不為所有環境分區訂定相同之 PFAS 閾值，而是為成員國提供考量環境背景因素的靈活性，例如估算閾值所採用之區域背景濃度及國家食品消費率，採用風險-收益分析可以在不損害風險評估科學基礎、歐盟政策框架或公共衛生合法性的情況下解決上述許多問題。

(4) 根據本研究的發現，呼籲歐盟就目前和擬議中的 PFAS 閾值之科學基礎和政策依據應進行公開對話，以促進對這些化學品的合理監管與實踐永續管理。

表 1　本次參與研討會議行程

日期	行程內容概要
9 月 14 日 9 月 15 日	啟程，由臺灣桃園國際機場(TPE)出發抵達 澳洲墨爾本國際機場(MEL)後轉機至阿得雷德機場(ADL)
9 月 15 日	報到暨簡易歡迎茶會
9 月 16 日	**參加「2024 CleanUP Conference」** 1. 主題演講「一個地球，健康一體：揭示土壤污染對地球的影響」、「全球土壤夥伴關係及其應對土壤污染的技術網絡」 2. 參與研討會「PFAS 之宿命及流佈傳輸」、「環境政策及指引」、「氣候變遷與自然災害管理」等議題論文口頭發表演講 3. 參與海報展示
9 月 17 日	**參加「2024 CleanUP Conference」** 1. 主題演講「除了 PFAS! 衡量對社區至關重要的事」 2. 參與研討會「PFAS 管理政策」、「PFAS 整治」等議題論文口頭發表演講 3. 參與海報展示
9 月 18 日	**參加「2024 CleanUP Conference」** 1. 參與研討會「最近出現和新出現的污染物」、「PFAS 風險及毒性」、「風險特徵與生物有效性」等議題論文口頭發表演講 2. 主題演講「土壤污染防制及管理：歐盟的作法」
9 月 19 日	**參加「2024 CleanUP Conference」技術參訪** 參訪阿得雷德近郊前 Brompton 煤氣工廠整治作業
9 月 20 日	回程，由澳洲阿得雷德機場(ADL)出發 至雪梨國際機場(SYD)轉機
9 月 21 日	抵達臺灣桃園國際機場(TPE)

	
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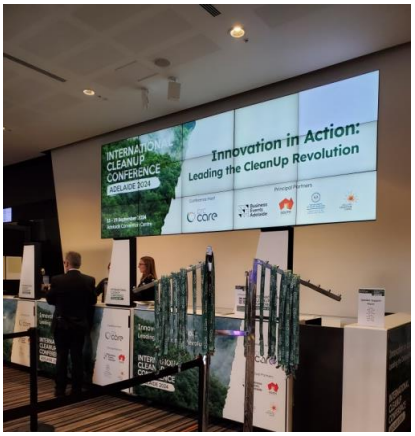
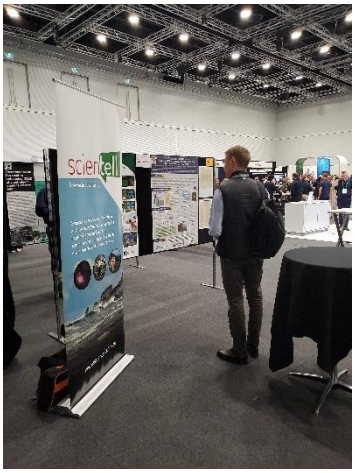
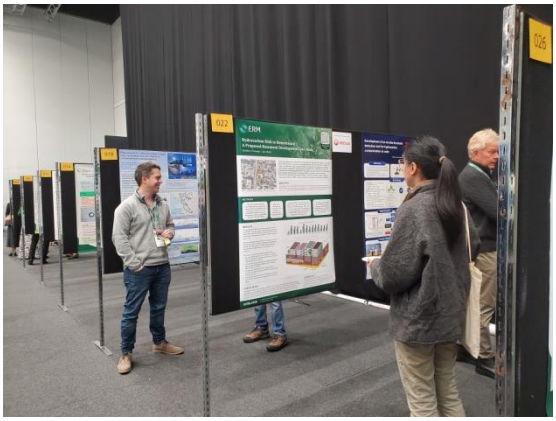
	
Day0 研討會會場報到	Day0 研討會會場報到
	
Day 1 開幕式 澳洲南澳大利亞州 副州長 Susan Close 致詞	Day 1 主題演講 一個地球，健康一體： 揭示土壤污染對地球的影響 （FAO 之土地和水事務部官員 Natalia Rodriguez Eugenio 演講）

圖 1 研討會相關照片 (1/4)

	
Day 1 主題演講 全球土壤夥伴關係及其應對 土壤污染的技術網絡 （FAO 之土壤污染國際顧問 Sergejus Ustinov 演講）	Day 1 口頭報告演講 PFAS 之宿命及流佈傳輸議題
	
Day 2 主題演講 除了 PFAS 衡量對社區至關重要的事 （澳洲維多利亞州環保局首席環境科學家 兼執行主任 Mark Patrick Taylor 演講）	Day 2 口頭報告演講 PFAS 管理政策議題
	
Day 3 口頭報告演講 PFAS 風險及毒性議題	Day 3 閉幕式 本次研討會議主席 Ravi Naidu 致詞

圖 1 研討會相關照片 (2/4)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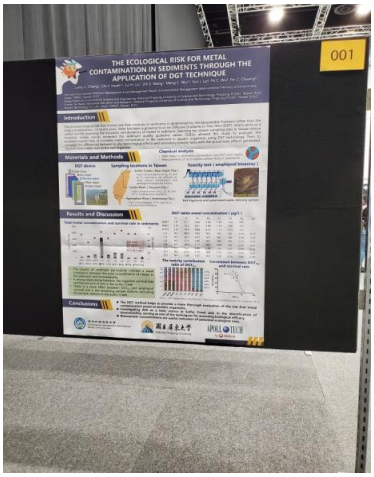
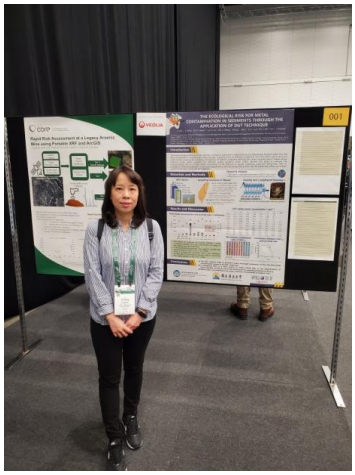
	
本署海報發表展示	與本署發表海報合影
	
與 FAO 之土地和水事務部官員 Natalia Rodriguez Eugenio 合影	與研討會議主席 Ravi Naidu 合影

圖 1 研討會相關照片 (3/4)

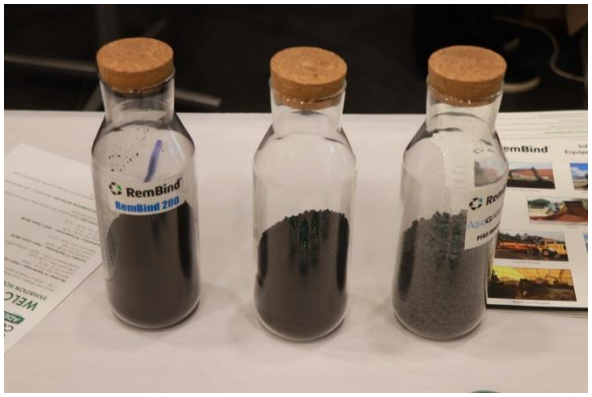
	
PFAS 處理技術廠商現場商品展示	PFAS 水處理技術廠商現場設備展示
	
不同顆粒大小 PFAS 吸附材料商品展示	環境技術顧問機構攤位展示
	
與會來賓茶會技術交流	與會來賓茶會技術交流

圖 1 研討會相關照片 (4/4)

（二）本署海報發表

本次研討會議中，本署發表 1 篇海報論文「運用 DGT 技術評估底泥重金屬污染物之生態風險(Exploring The Ecological Risk For Metal Contamination In Sediments Through The Application Of DGT Technique)」，主要內容概述如下，海報如圖 2 所示。

1. 底泥中重金屬及其混合物的生態毒理學風險取決於生物有效性而非總濃度。近年來，人們越來越常運用「擴散式梯度薄膜技術（DGT）」評估底泥中重金屬的不穩定性和其動態變化特性。本研究在臺灣十個歷史調查結果超過底泥品質指標值的河川底泥採樣點，利用 DGT 技術評估現地底泥中不穩定的重金屬濃度對水生生物的生態風險，並以底泥毒性試驗物種端足蟲（Hyalella azteca）為試驗生物評估比較現地毒理效應和實驗室毒性試驗結果之間的差異性。
2. 本研究結果顯示，阿公店溪採樣點（AGD1~AGD3）中 DGT-Cu 濃度的毒性貢獻程度足以解釋無脊椎動物之死亡率且具有顯著的相關性，這與過往文獻資料證實 DGT-Cu 濃度具有強烈暴露濃度-反應關係的結果一致。
3. 老街溪採樣點（LJ1~LJ4）中毒性貢獻率僅次於 DGT-Cu 的 DGT-Hg 的毒性貢獻率與無脊椎動物的存活率進行比較，也可以發現 DGT-Hg 濃度與老街溪中無脊椎動物的存活率具高度相關，與先前的研究結果一致。
4. 由於磺溪的自然背景條件，本研究亦透過檢測酸揮發性硫化物（AVS），以研究可能的毒性來源，結果顯示，生物存活率與磺溪流域採樣點（SF1~SF3）的酸揮發性硫化物含量之間存在密切關係。
5. 由本研究結果可知，DGT 方法有助於更全面地評估重金屬污染對底棲生物造成的風險，且增加 AVS 的調查評估有助於確認磺溪的生物毒性危害來源，是評估生物有效性的技術之一。

THE ECOLOGICAL RISK FOR METAL CONTAMINATION IN SEDIMENTS THROUGH THE APPLICATION OF DGT TECHNIQUE

Liang Li. Chang[1], Chi Y. Hsieh[2,3], Jui H. Liu[1], Zih S. Wang[1], Meng C. Wu[2,3], Yun J. Lai[4], Po C. Wu[4], Pei C. Chuang[4]

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[2]Department of Environmental Science and Engineering, National Pingtung University of Science and Technology, Pingtung 912301, Taiwan, R.O.C.
[3]Center for Water Resources Education and Research, National Pingtung University of Science and Technology, Pingtung 912301, Taiwan, R.O.C.
[4]Apollo Technology Co., Ltd., Taipei 104427, Taiwan, R.O.C.

Introduction

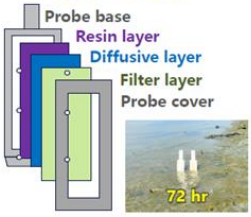
The ecotoxicological risk that metals and their mixtures in sediments is determined by the bioavailable fractions rather than the total concentrations . In recent years, there has been a growing focus on Diffusive Gradients in Thin films (DGT), which serve as a useful tool for assessing the instability and dynamics of metals in sediment. Selecting ten stream sampling sites in Taiwan whose historical survey results exceeded the sediment quality guideline values (SQGs) allowed this study to evaluate the ecotoxicological risks of unstable metal concentration in the sediment to aquatic organisms using DGT technology. Then, to compare the differences between in situ toxicological effects and laboratory toxicity tests with the actual toxic effects generated, *Hyalella azteca* was used as the test organism.

Materials and Methods

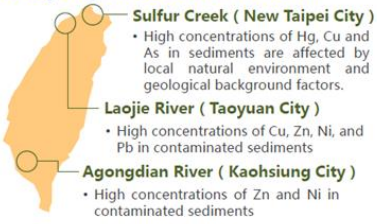
Chemical analysis

- Total metal in sediments, porewaters, and DGT resin layers.
- Measurements of acid volatile sulfide (AVS) in sediments.

DGT device



Sampling locations in Taiwan

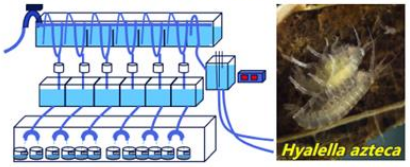


Sulfur Creek (New Taipei City)
- High concentrations of Hg, Cu and As in sediments are affected by local natural environment and geological background factors.

Laojie River (Taoyuan City)
- High concentrations of Cu, Zn, Ni, and Pb in contaminated sediments

Agongdian River (Kaohsiung City)
- High concentrations of Zn and Ni in contaminated sediments

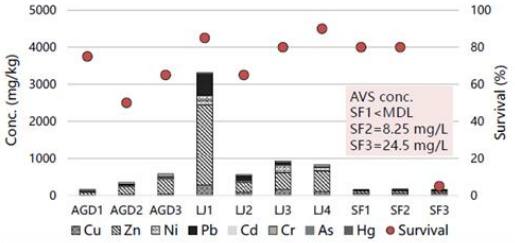
Toxicity test (amphipod bioassay)



Test organism and automated water delivery system

Results and Discussion

Total metal concentration and survival rate in sediments

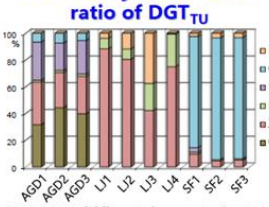


- ✓ The results of sediment bio-toxicity indicate a weak correlation between the total concentration of metals in the sediment and bioavailability.
- ✓ A strong relationship between the organism survival rate and the amount of AVS in the Sulfur Creek.
- ✓ There is a dose effect between DGT_{TU} and amphipod survival rate in the remaining sample stations, excluding the sample stations in the Sulfur Creek.

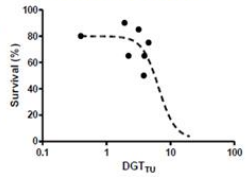
DGT-labile metal concentration (μg/L)

	Cu	Zn	Ni	Pb	Cr	Cd	As	Hg
AGD1	1.87	21.7	4.66	5.69	1.65	1.82	ND	–
AGD1	2.20	15.2	4.01	3.44	1.53	1.46	ND	–
AGD3	2.03	16.4	4.98	4.33	1.17	0.93	ND	–
LJ1	ND	46.6	5.62	ND	ND	ND	0.76	0.15
LJ2	ND	32.2	4.22	ND	ND	ND	0.18	0.36
LJ3	ND	5.21	3.40	ND	ND	ND	0.21	0.35
LJ4	ND	26.2	11.7	ND	0.85	ND	0.29	0.02
SF1	ND	13.1	2.90	2.05	1.65	2.87	0.05	0.24
SF2	ND	6.53	1.75	ND	1.10	3.21	0.72	0.35
SF3	ND	7.34	1.65	ND	1.22	3.16	0.68	0.34

The toxicity contribution ratio of DGT_{TU}



Correlation between DGT_{TU} and survival rate



DGT_{TU}: DGT-labile metal concentration / Hazardous concentrations for 5% of species (HC_5).

Conclusions

- **The DGT method helps to provide a more thorough evaluation of the risk that metal contamination poses to benthic organisms.**
- **Investigating AVS as a toxic source in Sulfur Creek aids in the identification of bioavailability, serving as one of the techniques for assessing biological efficacy.**
- **Bioavailable concentrations are useful indicators of potential ecological risks.**

環境部環境管理署
Environmental Management Administration
Ministry of Environment

國立屏東大學
National Pingtung University

APOLLO TECH by VEOLIA

圖 2 本署發表海報

（三）技術參訪

本次研討會議於 9 月 19 日安排一場污染場址整治作業參訪，地點為阿得雷德近郊之 Brompton 煤氣工廠，參訪照片如圖 3 所示。此工廠前於 1863 年至 1960 年代初期供應阿得雷德之工業用和家庭用天然氣，亦為目前南澳大利亞僅存 19 世紀煤氣廠，因其具有工業歷史特殊性，故於整治作業規劃上需同時考量污染程度、污染物危害性以及工廠遺構等文化資產之保存需求，且所有整治工程作業均須先行取得核准。由於施工地點周邊緊鄰民宅，主要開挖施工作業先行於施工地點搭設大型帳篷並於帳篷中施作，並裝設大型抽氣管將惡臭難聞之煤焦油氣抽送至帳篷外之燃燒室處理後排放，且於場址周界設置噴霧系統，並長期監測空氣品質。

	
技術參訪 Brompton 煤氣工廠整治作業簡報說明	技術參訪 整治作業概況現場解說
	
技術參訪 污染土壤挖除作業大型密閉帳篷及煤焦油揮發性有機物抽氣燃燒排放	技術參訪 帳篷內污染土壤挖除作業情形
	
技術參訪 完成改善區域土石分類及回填	技術參訪 煤氣工廠文化史蹟遺構保留

圖 3 技術參訪活動照片

三、心得與建議

1. FAO 所建置之全球土壤夥伴關係及其應對土壤污染技術網絡近年大量投入相關資源對於未開發及開發中之國家土壤污染問題提出各項專業技術上協助，並建置相關技術手冊及土壤醫生計畫等；我國目前持續協助東亞及東南亞國家相關土壤污染合作事宜，亦可參考相關作法及資源投入。

2. 本次研討會約有近半數之口頭發表或海報展示發表主題與 PFAS 議題相關，涵蓋各國管理策略、污染流布調查、檢測分析技術、毒性及風險評估、整治技術等，顯示 PFAS 污染物已為各界所關注，各國均已陸續投入大量研究及調查資源以釐清其對於環境與人體健康之影響。惟受限於 PFAS 物質種類眾多以及其降解轉化特性尚未能充分瞭解，在管理政策推動上各國多仍以 PFOA、PFOS、PFHxS 等已明確確認其危害之項目著手，其他毒理資料較少或尚未有充分研究資料之 PFAS 物質項目，則仍處於資料蒐集或調查評估階段工作。

3. 經本次會議參與瞭解 PFAS 為目前國際間極為關注之污染物重點之一，不論在污染調查、檢測分析、對環境及人體健康影響、廢棄物掩埋場之滲漏液監測、水及廢水處理乃至於土壤處理等議題，均面臨極大之挑戰，建議我國可從 PFAS 相關產品使用後廢棄端與環境影響面向加以考量，進一步對於相關產業工廠、乃至於農業環境等進行環境流布之調查評估，且針對相關污染物之處理技術著手辦理相關研究發展或技術引進以處理 PFAS 污染問題。

4. 民眾對於環境污染物危害影響及認知仍著重於對其自身或生活上可能面臨之風險危害性，因此在調查評估作業上，除環境介質或污染物之流布調查外，應跨單位整合相關調查資源或研究，進一步瞭解如對於食品、農作物或居家生活環境之影響程度，以進一步連結環境污染物於環境上與人體健康之關聯性。

5. 相較於歐美，澳洲因人口較少（約 2,700 萬人）且土地面積廣大（約臺灣 200 多倍），在環境管理策略上，原則以優先針對所有可能對人類健

康造成危害影響的污染物和廢棄物進行處理，並以民眾切身相關之農作物、食品、生活環境的污染物為對象開展相關之研究或法規政策，且透過環保單位長期以來完整之數據揭露與風險溝通，讓民眾充分瞭解環境品質概況及關注議題，建議可做為我國研擬相關新興環境污染物管理策略之參考。

附錄 「International CleanUp Conference, Adelaide 2024」會議手冊

INTERNATIONAL CLEANUP CONFERENCE

ADELAIDE 2024

Innovation in Action:
Leading the Cleanup Revolution

Program Handbook

15-19 September 2024
Adelaide Convention Centre
www.adelaide2024cleanupconference.com

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The 10th International Contaminated Site Remediation Conference

Incorporating the 4th International PFAS Conference

International CleanUp Conference 2024 Program Handbook

To make sure we live up to our own environmental goals, CleanUp 2024 is providing only a small printed handbook with a program overview included. To access all of the speaker and session information, we recommend you download the official conference app (see below). You can also download a full version of the program at adelaide2024cleanupconference.com/program.

Conference app

The official CleanUp 2024 conference app includes information and abstracts for sessions and presenters. You can also star sessions you wish to attend, create your own agenda, make connections with fellow colleagues and more!

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Wireless internet is available in all session rooms, foyers and exhibition hall of the Adelaide Convention Centre for the duration of International CleanUp Conference 2024.

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Welcome

On behalf of crcCARE and the CleanUp 2024 Organising Committee, I invite you to join us for the biennial International CleanUp Conference on 15-19 September 2024 at the Adelaide Convention Centre, Adelaide, Australia.

The CleanUp 2024 conference in Adelaide will provide a high-profile platform to strengthen existing relationships and introduce businesses and services to hundreds of stakeholders from across the region. Site contamination and remediation professionals have a critical role to play in preventing serious harm to human health and the environment, and CleanUp 2024 will showcase world-class work on the remediation of existing and emerging contaminants.

It will also take place at a critical juncture. Concerns about PFAS chemicals continue to grow, with regulators in many parts of the world proposing tighter restrictions or bans, and PFAS-related class action proceedings occurring in the US and Australia. The success of our efforts to assess, prevent, and remediate all types of contamination is also playing an increasingly important role in ensuring the success of the shift to a net-zero, nature-positive, and circular economy.

For example, we are gradually shifting towards circular economy paradigm, but we must do so in a way that doesn't result in new complex contaminants that have negative economic repercussions. In particular, we need to ensure our use of waste-derived and recycled-content materials doesn't result in contamination from asbestos, PFAS, or other chemicals.

Sometimes, the task of dealing with contamination will provide opportunities for win-win sustainability benefits, and we must be constantly on the look-out for these. Potential opportunities include converting biosolids to biochar, which could provide a nutrient-rich fertiliser in which carbon is permanently locked up, and any PFAS contaminants are destroyed.

The essential, rapid shift to clean power will also present new challenges, as we develop ways to efficiently and effectively remediate large coal-fired power station sites, and prepare them for new productive uses, including clean renewable energy generation. In addition, the increasing number of climate change-related natural disasters, such as severe flooding, creates new contamination dangers that must be assessed and managed.

Our capacity to restore nature – at long-last recognised as a task of great urgency – will also frequently depend on our success in remediating contaminated land. In addition, advances in big data and artificial intelligence are poised to transform aspects of our work. Underlying all these developments, is the constant need to engage fully and respectfully with local communities, from the assessment process, during decision-making on clean-up methods, and through to post-clean-up monitoring.

The urgency of these various challenges makes it especially important to ensure policy-making and regulatory action on pollution at the local, national and global level is science-based, and this will be a key theme of the conference. The presence of academic researchers (including PhD students), environmental consultants, regulators, government personnel and industry leaders at CleanUp 2024 will ensure the latest scientific findings on assessment and remediation are widely disseminated.

World-class venue: CleanUp 2024 will be held in Adelaide, South Australia, with the city's Convention Centre as the host venue. The Adelaide Convention Centre is regarded as one of the world's most modern, flexible and technologically advanced events centres, and is a striking landmark in Adelaide's Riverbank precinct.

A full complement of meals and refreshments served during program breaks will provide ideal opportunities to network with delegates, sponsors and exhibitors. The highly anticipated conference gala dinner on Tuesday 17 September will offer stellar opportunities to socialise and network. Adelaide is surrounded by picturesque hills, boasts a beautiful coastline, is renowned for its fine restaurants. It is also the gateway to four premium wine regions.

I look forward to welcoming you for what will be the region's most important site contamination conference in 2024.

Laureate Professor Ravi Naidu

Ravi Naidu

Chair, CleanUp 2024 Conference Organising Committee Managing Director and CEO, crcCARE Global Innovation Chair and Director, Global Centre for Environmental Remediation, University of Newcastle

crcCARE

crcCARE (formerly the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment) is a multi-partner Australian research organisation developing innovative technologies and guidance for the assessment, prevention and remediation of contaminated soil, water and air. World-class researchers at crcCARE work with industry on global contamination issues, engaging with major end users such as the Department of Defence, the mining and petroleum industries, environmental regulators, government organisations, small to medium enterprises and environmental consultants.

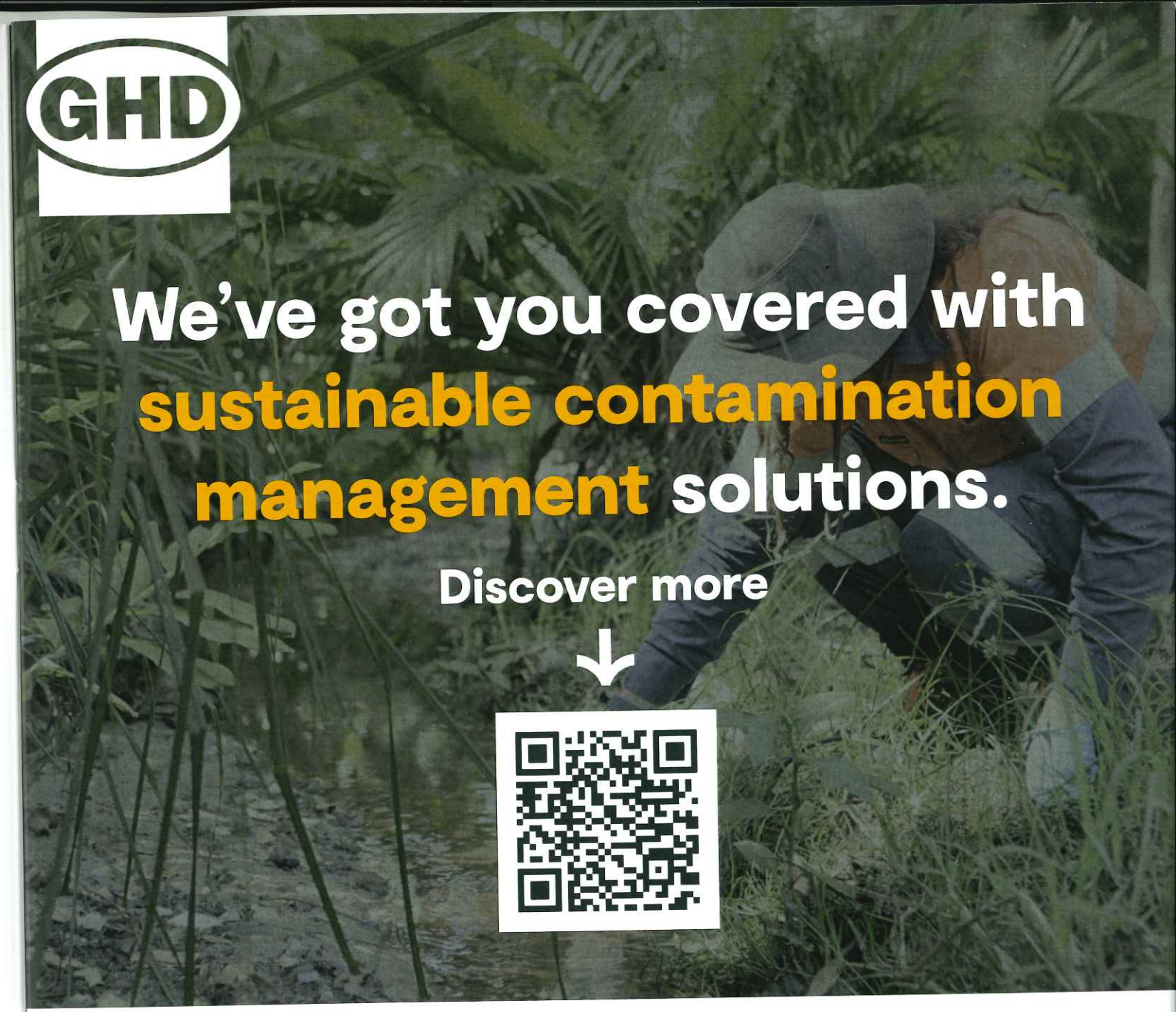
crcCARE's research program is complemented by a focus on educating and training postgraduate research students and industry professionals. In so doing, crcCARE supports the growth of highly qualified researchers and decision-makers in the area of environmental risk assessment and remediation.

For more information, visit www.crcCARE.com.

Global Centre for Environmental Remediation

The Global Centre for Environmental Remediation (GCER) aims to safeguard people's social, economic and physical health and wellbeing by developing innovative, cost-effective and sustainable technologies and solutions that reduce the impact of pollutants on the environment. A leading proponent of risk-based and in situ approaches to the clean-up or management of contaminated sites, GCER is leading a more rational, effective and affordable approach to contamination science and clean-up. In addition to research, GCER offers PhD and research masters, masters by coursework and honours programs. GCER graduates enter the workforce ready to take up challenging positions in the field of environmental risk assessment and remediation of contaminated sites.

For more information, visit www.newcastle.edu.au/research-and-innovation/centre/gcer



As well as human health and environmental impacts, site contamination can have major economic, legal and planning implications for landowners and the wider community.

A pragmatic, tailored approach is the key to reaching an outcome that minimises impact.

Our services are delivered by teams of integrated professionals based locally and across the globe.

Our mobility and global reach means that you will have access to the right people in all contaminated land disciplines including chemistry, hydrogeology, toxicology, soil science, risk assessment and remediation technologies. We serve our clients and community with aim to make **sustainable contamination management** a seamless part of our creative and innovative solutions.

We understand that contaminated land, groundwater and surface water issues can become a material distraction, consuming valuable organisational resources. The cornerstone of our approach is to apply **pragmatic, innovative and cost effective** solutions to neutralise the issue, allowing clients to focus on core business. Our objective is to maximise value by providing quality advice and solutions tailored to clients' specific requirements.

→ The Power of Commitment

General Information

Registration desk opening times

Registration is located in the ground floor Foyer M inside the western entrance of the Adelaide Convention Centre. Opening times are:

› Sunday 15 September 3:00pm – 6:00pm

› Monday 16 September 7:30am – 5:45pm

› Tuesday 17 September 8:00am – 5:15pm

› Wednesday 18 September 8:00am – 4:00pm

Notes to presenters

Presenters are requested to report to the registration desk. You will be directed to the Speaker Support area where your presentation will be downloaded and verified. Please meet with your session chairperson in the session room 10-15 minutes prior to the commencement of the session.

The Speaker Support room will be open during the following times:

› Sunday 15 September 3:00pm – 6:00pm

› Monday 16 September 7:30am – 5:00pm

› Tuesday 17 September 7:30am – 5:00pm

› Wednesday 18 September 7:30am – 3:00pm

If possible, please check-in your presentation material well before your presentation.

Special dietary requirements

If you have advised the organisers of a special dietary requirement, this information has been forwarded to the catering staff. However, it is your responsibility to identify yourself to staff.

Barista

Let our professional baristas treat you and your guests to delicious and expertly prepared freshly ground coffee - free all day, Monday to Wednesday in the Exhibition Hall from 8:00am. Proudly sponsored by WSP.

Name tags

Name tags and lanyards were distributed during registration. For security purposes and to facilitate recognition, please wear your name tag at all conference functions.

Dress standard

Smart casual dress is suggested for conference sessions and social functions.

Smoking

The Conference has designated this to be a non-smoking environment for all sessions and social functions.

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- Phycology
- PFAS
- Chemistry
- Radiochemistry
- Water & soil
- Asbestos
- Mould
- Air & gas
- Vapour intrusion

Where to find us

Booth: #23-24

Session 2A: PFAS Analytics

14:05 - Nathan Camilleri

15:20 - Dr Andrew Wright

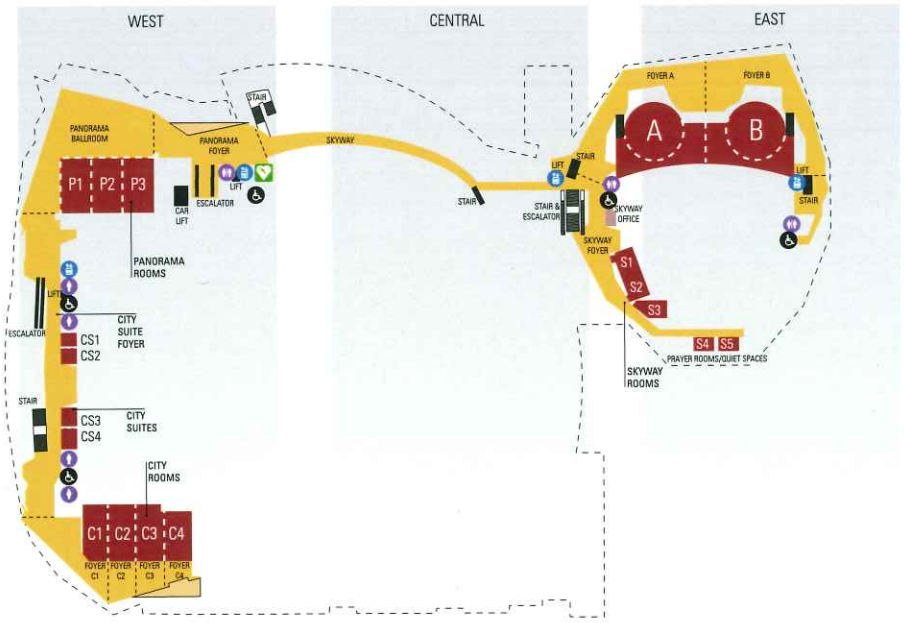
1300 781 744

au.sales.enviro@sgs.com

www.sgs.com/en-au

Venue map

UPPER LEVEL



GROUND LEVEL

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SCALE

Updated: 16 May, 2024

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Trade Exhibition

The trade exhibition is located in Hall L on the ground floor of Adelaide Convention Centre's west wing. Please take the time to visit the booths and discuss the wide range of innovative products and services on offer.

Agilent Technologies Pty Ltd — Booth 36

Agilent offers advanced environmental testing solutions, providing precise and reliable analysis for air, water, and soil, ensuring compliance with regulations and promoting sustainability.

Air-Met Scientific — Booth 3

Australian owned and operated, Air-Met Scientific is a market leader in the supply, service, rental and engineering of OHS and environmental monitoring equipment.

Airwell Group — Booth 19

Airwell provide air displacement pumping equipment for PFAS, LNAPL & DNAPL recovery applications. Airwell have a range of solutions to suit any application or project.

ALS Limited — Booth 13 & 14

For decades, ALS has delivered world class testing and analytical solutions via cutting-edge technology, innovative methods, and global teams' expertise ensuring service excellence.

CDM Smith Australia — Booth 35

Environmental consultancy that delivering high-quality service through our expert team and offering comprehensive environment, water, and social services for every project stage.

crcCARE — Booth 25 & 26

Innovative science for a cleaner planet. crcCARE performs research, develops technologies and provides best-practice strategies for assessing, cleaning up and preventing contamination of soil, water and air.

Datanest — Booth 7

Datanest is industry-leading software offering customizable workflow solutions for environmental consultants, streamlining everything from data collection to automated report delivery, exceedance tables and maps.

ECT2 — Booth 8

ECT2 are a customer-centric, technology agnostic company designing water treatment systems that not only address PFAS, but other contaminants such as 1,4-Dioxane, solvents and metals.

Envirolab Booth 5

Envirolab/MPL Laboratories specialize in testing for the Environmental & OHS sectors. Our testing includes Asbestos, ASS, Organics, Inorganics, Metals, PFAS & Drugs in Waters, Soils, Air and OHS testing including DPM, Quartz, Methamphetamines, Dust & Paint. With Laboratories in Sydney, Melbourne, Perth & Auckland and offices in Darwin, Brisbane & Adelaide, we are able to service all your testing needs.

Enviropacific Booth 22

Enviropacific is a vertically integrated, environmental services business delivering specialist engineering and applied science solutions in soil remediation, water treatment and resource recovery.

EPA SA Booth 17

The South Australian EPA protects, restores and enhances the environment through the risk-based regulation of pollution, waste, noise and radiation.

ESdat Booth 2

ESdat is a secure cloud-based system that supports professionals from multiple industry sectors in effectively collecting, managing and interpreting environmental data for reliable decision-making.

Eurofins Enviromental Testing Australia Pty Ltd Booth 10

Eurofins is a world leader providing analytical testing services across multiple industries. Our highly qualified team provide quality services, accurate and timely results.

HUESKER Australia Booth 20

HUESKER Australia offers the Australasian region unparalleled expertise in Geosynthetic Engineering, development, manufacturing, supply, and installation, with a rich history spanning over 163 years. HUESKER specialize in tailoring project-specific solutions for various industries, including Mining, Roads & Pavements, Environmental, and Hydraulic engineering applications.

Industrial Environmental Booth 37

Industrial Environmental is a specialist environmental services contractor with national reach. Experienced in commercially realistic, practical remediation technologies, we are focused on delivering projects that offer flexibility and maximise opportunities for the reuse of materials from contaminated sites.

Land Insight Booth 32

Land Insight's comprehensive environmental and climate data unlocks fast, simple, and reliable analysis of the risks associated with any land or property in Australia.

Lotsearch Booth 39

Lotsearch are the leading provider of environmental risk and planning reports across Australia.

National Measurement Institute (NMI) Booth 38

The National Measurement Institute (NMI) is Australia's peak measurement body. We maintain and regulate Australia's measurement system, develop and maintain measurement standards, and deliver world-class measurement products and services.

PEAK Scientific Booth 1

PEAK Scientific, a global leader in laboratory gas generators, provides high-quality solutions for analytical labs, offering exceptional service and supporting sustainable science worldwide.

Rembind Booth 40

RemBind® provides a range of products for the remediation of PFAS contaminated soil and groundwater. Come and see our latest products at Booth 40!

SGS Australia Booth 23 & 24

We are SGS - the world's leading testing, inspection and certification company. Our accredited environmental laboratory solutions enable you to operate competitively and responsibly.

Shimadzu Australasia Booth 9

Since 1875, Shimadzu has been pursuing leading-edge science and technologies in analytical instruments including chromatographs and mass spectrometers. Shimadzu has many initiatives towards solving today's environmental challenges.

Symbio Laboratories Booth 6

Symbio Laboratories is a leading Australian provider of food, agricultural, environmental, and water analytical testing services, delivering reliable, accurate results with a commitment to quality and innovation.

Tablogs Booth 33

TabLogs streamlines the borehole logging process out in the field, provides powerful analysis, and generates professional reports tailored to your company's preferences in moments.

Tellus Booth 31

Tellus operates Australia's only geological repository. Ideally suited for solid remediation projects when the material composition is not suited to traditional disposal pathways or destruction.

Thermo Fisher Scientific Booth 4

Thermo Fisher Scientific is the world leader in serving science, enabling customers to make the world healthier, cleaner and safer.

The Water and Carbon Group Booth 34

The Water and Carbon Group provides opportunities to engineer positive social and environmental outcomes stemming from a shift in how a project is approached.

crc care

Is your site contaminated by PFAS?

Some firefighting foam used for many years at airports and fire training facilities contained the potentially toxic per- and polyfluoroalkyl substances (PFAS). In many cases, these chemicals have spread to groundwater, drinking water, plants and animals, affecting local communities and is the focus of investigations by regulatory bodies. In many cases, these chemicals have spread to groundwater, drinking water, plants and animals.

THERE IS A SOLUTION.

Ensure the safety of your air facility through remediation of soil and water with matCARE. Developed by crcCARE, matCARE is a proven on-site solution that remediates PFAS-contaminated soil and wastewater. matCARE has been used successfully at four large air facilities across Australia, with each site benefiting from a site-specific remediation plan that could be implemented quickly for optimal results.

matCARE does a far better job than granular activated carbon and other technologies currently available, with a much smaller amount required. Around 90% cheaper than landfill, matCARE remediation is a cost-effective solution. And with crcCARE's scientific foundation, matCARE provides the safest solution to ensure toxins are removed from soil and water, protecting everyone who comes in contact with the facility.

To find out more about matCARE™ email admin@crccare.com or call +61 (2) 4055 312.

matCARE

CleanUp 2024 Program Overview

SUNDAY

8:00 – 5:00pm	Exhbition and Poster Display - Hall L				
WORKSHOPS					
9:00 – 12:30pm	**WORKSHOP 1**	**WORKSHOP 2**	**WORKSHOP 3**	**WORKSHOP 4**	**WORKSHOP 5**
	City Room 1	City Room 2	City Room 3	City Room 4	Room LB1
	Advances in PFAS Analytical Chemistry, Data Interpretation, and Effective Management of PFAS in Groundwater	Site Characterization, Mass Flux, Incremental Sampling Methodology, Artificial Intelligence in Site CleanUp, and Balancing Legacy and Emerging Contaminants In Site CleanUp	Human Health Risk Assessment – the How to Guide	Data and PFAS Analytics – AI Approach and Case Studies	Faster, Better, Cheaper: Risk-Based Investigation and Remediation (STARTS 8:00am)
1:30 – 5:00pm	**WORKSHOP 1**	**WORKSHOP 2**	**WORKSHOP 3**	**WORKSHOP 6**	
	City Room 1	City Room 2	City Room 3	City Room 4	
	Advances in PFAS Analytical Chemistry, Data Interpretation, and Effective Management of PFAS in Groundwater	Site Characterization, Mass Flux, Incremental Sampling Methodology, Artificial Intelligence in Site CleanUp, and Balancing Legacy and Emerging Contaminants In Site CleanUp	Human Health Risk Assessment – the How to Guide	ASBestos-IN-Soil (ASBINS) Master Class	
3:00 – 6:00pm	Registration - Foyer M Speaker Support - Foyer M				
5:30 – 6:30pm	Welcome Drinks - Foyer M				

MONDAY

7:30am	Exhibition and Poster Displays Open - Hall L Speaker Support - Foyer M Registration - Foyer M				
OFFICIAL CONFERENCE OPENING - Hall N					
8:45 – 9:00am	Traditional Welcome to Country Ceremony				
9:00 - 9:15am	Official Conference Opening & Welcome				
9:15 – 10:00am	**Commemorative Brian Robinson Lecture: One Planet, One Health: Uncovering the impact of pollution from the soil to the soul** Ms. Natalia Rodriguez Eugenio, Global Soil Partnership, Food and Agriculture Organization of the United Nations				
10:00 – 10:15am	**Global Soil Partnership and its Technical Network in Tackling Soil Pollution** Sergejus Ustinov, Food and Agriculture Organization of the United Nations (FAO), Rome, Italy				
10:15 - 10:45am	Morning Tea and Poster Viewing - Hall L				
CONCURRENT SESSION 1					
	Hall N	City Room 1	City Room 2	City Room 3	City Room 4
10:45 - 12:15pm	Session 1A PFAS Analytics	Session 1B PFAS Fate and Transport	Session 1C Advances in Site Characterisation and Implications to Conceptual Site Models	Session 1D Recent Advances in Remediation Technologies	Session 1E Environmental Policy and Guidance
12:15 – 1:15pm	Lunch and Poster Viewing - Hall L				
PLENARY SESSION 1 - Hall N					
1:15 – 2:00pm	**Plenary Session 1: Theory-to-Practice: Soil Ecosystem Services for Delivering a Healthy Environment** Dr Brent Clothier, Principal Scientist, Plant & Food Research, New Zealand Life Cycle Management Centre, Massey University				
2:00 – 2:05pm	Move to sessions rooms				
CONCURRENT SESSION 2					
	Hall N	City Room 1	City Room 2	City Room 3	City Room 4
2:05 - 3:35pm	Session 2A PFAS Analytics	Session 2B PFAS Groundwater Modelling	Session 2C Advances in Site Characterisation and Implications to Conceptual Site Models	Session 2D Recent Advances in Remediation Technologies	Session 2E Environmental Policy and Guidance
3:35 – 4:05pm	Afternoon Tea and Poster Viewing - Hall L				
CONCURRENT SESSION 3					
	Hall N	City Room 1	City Room 2	City Room 3	City Room 4
4:05 – 5:35pm	Session 3A PFAS Exposure	Session 3B PFAS Remediation	Session 3C Advances in Site Characterisation and Implications to Conceptual Site Models	Session 3D Recent Advances in Remediation Technologies	Session 3E Climate Change and Natural Disaster Management
5:35 - 6:35pm	Drinks and Poster Session - Hall L				
6:45pm	CleanUp in The Pub				

TUESDAY

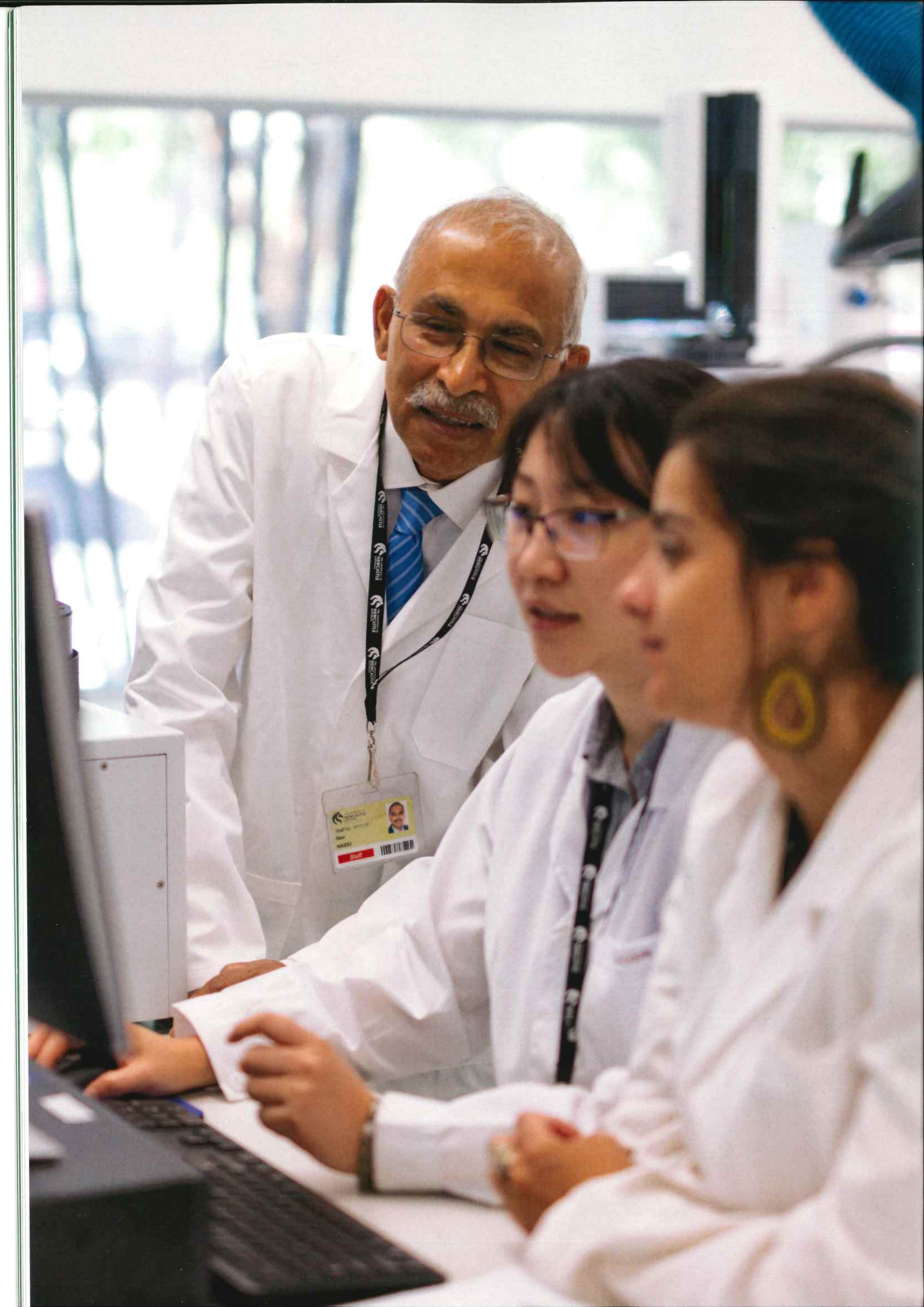
7:30am	Speaker Support - Foyer M				
8:00am	Exhibition and Poster Displays Open - Hall L Registration - Foyer M				
PLENARY SESSION 2 - Hall N					
9:00 - 9:15am	Welcome Day 2				
9:15 - 10:00am	**Plenary Session 2: Anything But PFAS** Professor Mark Taylor, Chief Environmental Scientist and Executive Director, EPA, Victoria				
10:00 - 10:30am	Morning Tea and Poster Viewing - Hall L				
CONCURRENT SESSION 4					
	Hall N	City Room 1	City Room 2	City Room 3	City Room 4
10:30 - 12:15pm	Session 4A PFAS Policy	Session 4B PFAS Remediation	Session 4C Diffuse Pollution	Session 4D Recent Advances in Remediation Technologies	Session 4E Case Studies
12:15 – 1:15 pm	Lunch and Poster Viewing - Hall L				
CONCURRENT SESSION 5					
	Hall N	City Room 1	City Room 2	City Room 3	City Room 4
1:15 - 2:45pm	Session 5A PFAS Policy	Session 5B PFAS Remediation	Session 5C Diffuse Pollution	Session 5D Mining and ESG	Session 5E Case Study
2:45 – 3:15pm	Afternoon Tea and Poster Viewing - Hall L				
CONCURRENT SESSION 6					
	Hall N	City Room 1	City Room 2	City Room 3	City Room 4
3:15 – 5:00pm	Session 6A Mining and ESG	Session 6B PFAS Remediation	Session 6C ACLCA Session for Early Career Professionals	Session 6D Recently Emerged and Emerging Contaminants	Session 6E Case Study
6:30 - 7:00pm	Pre-dinner Drinks - Foyer M				
7:00pm - 11:30pm	Gala Dinner - Panorama Ballroom				

WEDNESDAY

7:30am	Speaker Support - Foyer M				
8:00am	Exhibition and Poster Displays Open - Hall L Registration - Foyer M				
PLENARY SESSION 3 - Hall N					
9:00 - 9:15am	Welcome Day 3				
9:15 - 10:00am	**Plenary Session 3: Plastics, Endocrine Disrupting Chemicals and Health: Effects on the Neuroendocrine System** Marina Fernandez, PhD, Associate Researcher, The Instituto de Biología y Medicina Experimental, Argentina				
10:00 - 10:30am	Morning Tea and Poster Viewing - Hall L				
CONCURRENT SESSION 7					
	Hall N	City Room 1	City Room 2	City Room 3	City Room 4
10:30 - 12:15pm	Session 7A PFAS Risk and Toxicity	Session 7B PFAS Biosolid	Session 7C Legacy Contaminants	Session 7D Recently Emerged and Emerging Contaminants	Session 7E One Health and Communication
12:15 – 1:05pm	Lunch and Poster Viewing - Hall L				
CONCURRENT SESSION 8					
	Hall N	City Room 1	City Room 2	City Room 3	City Room 4
1:05 - 2:50pm	Session 8A PFAS Risk and Toxicity	Session 8B Waste and Circular Economy	Session 8C Legacy Contaminants	Session 8D Recently Emerged and Emerging Contaminants	Session 8E Risk Characterisation including Bio Availability
2:50 – 3:15pm	Afternoon Tea and Poster Viewing - Hall L				
PLENARY SESSION 4 & 5- Hall N					
3:15 - 3:45pm	**Plenary Session 4: Caring for Land and Water' as Cherished by the Indigenous Community** Professor Peter Radoll FRSN MAICD, Radoll & Associates Williamstown, Australia				
3:45 - 4:15pm	**Plenary Session 5: Preventing and managing soil contamination: the EU approach** Dr Bavo Peeters Policy officer - Soil team Directorate-General for Environment of the European Commission, Brussels (Virtual)				
4:15 - 4:45pm	**Conference Closing** Award Presentations, Delegate Prize Announcements, Closing Remarks				

THURSDAY

9:00 - 4:30pm	**Technical Tour** Departing from West entrance of Adelaide Convention Centre (Meet at 8:30am for a 9:00am departure)	**PFAS Research Symposium (Invite only)** **City Rooms 1-2**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Chair, CleanUp Conference Series

Mr Ratin Mathur
Program Chair

International organising committee

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crcCARE / University of Newcastle, Australia

Mr Naji Akladiss
Retired Project Manager, Maine Department of Environmental Protection, USA.

Professor Paul Nathanail
Land Quality Management, UK

Scott Warner
BBJ Group, USA

Professor Ming Hung Wong
Education University of Hong Kong

Dr Brent Clothier
Plant & Food Research and Massey University, New Zealand

Marina Fernandez
PhD, Associate ResearcherI (IByME-CONICET), Argentina

Bavo Peeters
Policy officer - Soil team, Directorate-General for Environment of the European Commission Brussels

Jussi Reinikainen
Finnish Environment Institute (Syke), Finland

Michael Stopford
ANCORED, UK

Prof. Dr. Christian Zwiener
University of Tuebingen, Germany

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UN FAO, Rome, Italy

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Forest Research Institute, Malaysia

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crcCARE / University of Newcastle

Mr Ratin Mathur
crcCARE

Dr Ayanka Wijayawardena
University of Newcastle

Conference Manager

Event Studio

www.eventstudio.com.au

EVENT STUDIO

Social Program

Welcome Drinks

› Date: Sunday 15 September 2024

› Time: 5 30pm – 6:30pm

› Location: Foyer M, Adelaide Convention Centre

Networking Drinks and Poster Session

› Date: Monday 16 September 2024

› Time: 5 35pm – 6 35pm

› Location: Hall L, Adelaide Convention Centre

Sponsored by

VEOLIA

CleanUp in the Pub 2024

› Date: Monday 16 September 2024

› Time: 7:00pm

› Location: Please assemble in Foyer M, Registration desk at 6:45pm ready for departure.

Scientific conferences provide a platform for delegates to share and discuss research findings, exchange ideas and insights, and network.

To enhance these opportunities, this year we're holding the second CleanUp in the Pub. Participants will be divided into teams. Each team will have a chair and rapporteur to facilitate the discussion and take notes. The discussion topics will be provided to each team in an unbiased selection process.

On the day of the event, crcCARE will sponsor the first drink to kick off the discussion on the selected topic. CleanUp in the Pub will end at 9:00pm so we can collate the valuable information provided. Registrants are welcome to continue their conversations at the discussion spaces, which are booked until at least 11:00pm.

On the afternoon of Wednesday 18 September, we'll hold a session to prioritise environmental challenges and research needs based on the pub discussions.

Technical Tour

› Registraion Fee: $135 - Lunch included

› Date: Thursday 19 September 2024

› Departure: Arrive at 8:30am for 9:00am departure

› Location of departure: West entrance of Adelaide Convention Centre

› Return to Adelaide Convention Centre: 4:30pm

› Dress code: Participants are required to wear long pants, long-sleeved tops shirt and closed shoes (no sandals or thongs).

Participants will attend the former Brompton Gasworks site led by MAB and Senversa viewing the remaining structures and prior remedial activities. The tour will finish with a visit to Penfold Winery Estate in Magill to enjoy wine tastings and a technical presentation of their waste water management.

^ Photo attribution: South Australian Tourism Commission


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99%
13X
50%

The Gala Dinner is proudly sponsored by AECOM

CleanUp 2024 Gala Dinner

The Conference Gala Dinner is the highlight of the CleanUp social program and includes recognition of industry excellence with the presentation of the 2024 CARE Award and the Agilent- crcCARE Award for Innovation in Analytical Sciences, along with the winners of the crcCARE High School Essay Competition. Tickets include a three-course meal, drinks and entertainment.

› Date: Tuesday 17 September 2024

› Time: 6 30pm pre-dinner drinks (Foyer M) for a 7 00pm start

› Dinner Location: Panorama Ballroom, Adelaide Convention Centre

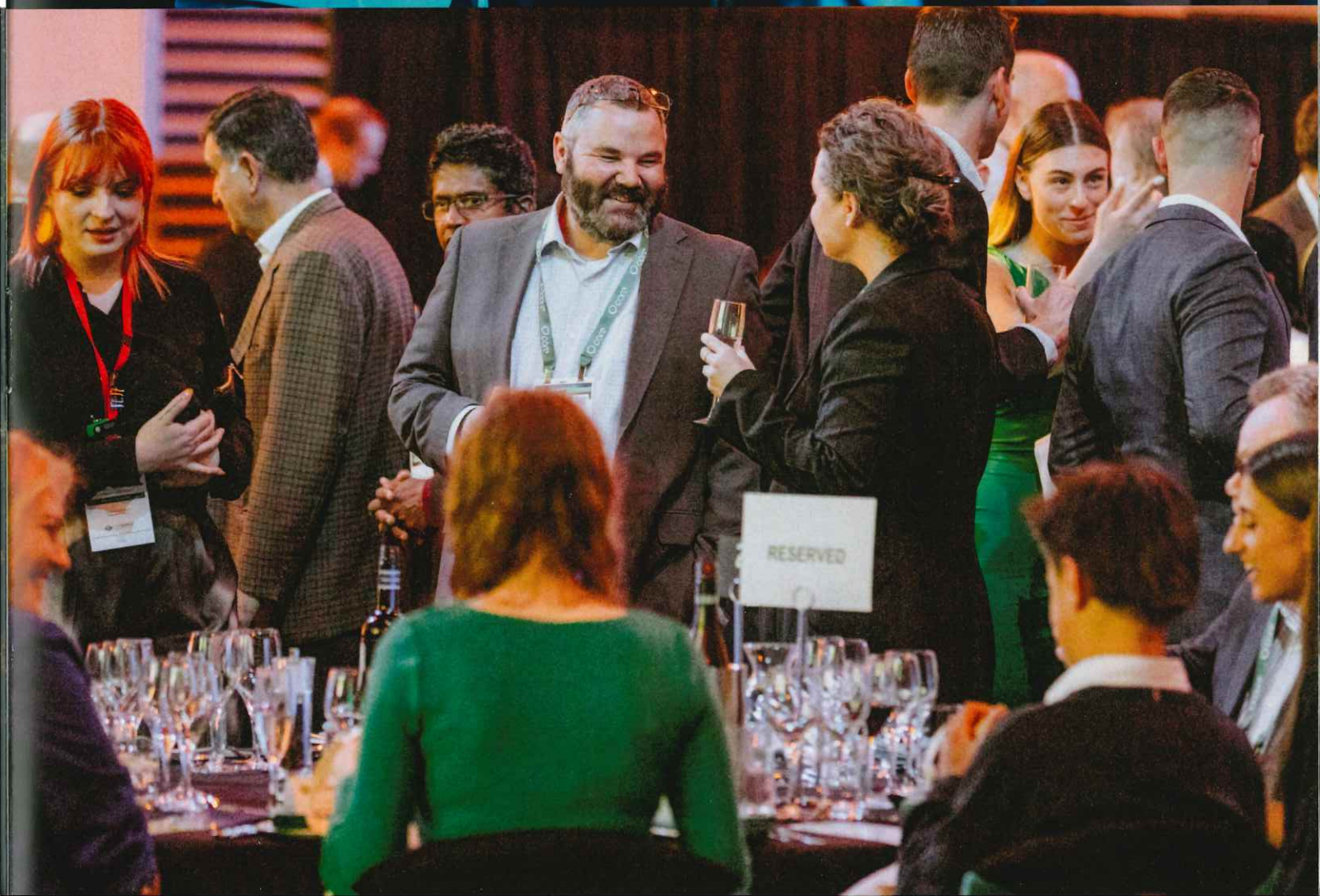
Master of Ceremonies: Wayne Phillips

Wayne Phillips is a former Australian cricketer, who played in 27 Tests and 48 ODIs from 1982 to 1986 as a batsman and wicket-keeper.

Over the course of a first class career that spanned thirteen years Wayne Phillips collected experiences and tall tales that ensure any chance to listen to him speak is both interesting and entertaining.

Entertainment: The Cast

Chloe and her team bring an infectious energy that you'll love and want to dance to! You can't beat experience, and The Cast has plenty of it. With a powerful live sound, dynamic performances, and Chloe's unique, personal interaction with the crowd, The Cast always leaves everyone wanting more!


RESERVED

The Commemorative Brian Robinson Lecture

We are pleased to announce Ms. Natalia Rodriguez Eugenio, Global Soil Partnership, Food and Agriculture Organization of the United Nations, as this year's Brian Robinson speaker.

Dr Brian Robinson AM devoted his working life to improving Victoria's environment and shaping the direction of environmental protection in Australia.

Born in Northern Ireland, Brian first came to Australia in 1968 to complete his PhD in Chemistry at the University of Melbourne. After a period as a research chemist with DuPont in the UK, he returned to Australia in 1973 to play a key role in the Westernport Bay Environmental study. It was here, working on one of the largest environmental studies of its type, that he consolidated his passion for the environment and his lifelong commitment to shaping a sustainable Victoria.

Brian joined Environment Protection Authority (EPA) Victoria in 1975 and was appointed Chairman in 1986. It was he, more than anyone else, who made EPA Victoria the nation's leading environment protection agency. For more than 30 years he strived to ensure resource efficiency and sustainable goods and services. Over his last decade, his interests spread to identifying financial drivers for environmental improvements and ways of fully engaging local communities in sustainability issues.

Recognised nationally and internationally as one of the strongest and most articulate advocates for cleaner production, Brian realised very early in his career that a robust, high-quality environment was central to the prosperity of society and individual enterprise. Guided by his commitment to serving the people, Brian remains the longest serving Chairman/CEO of EPA Victoria and is remembered as a humane and visionary leader with outstanding scientific and management skills. Brian dedicated his professional life to improving environmental health. He worked to ensure access for all to reliable, relevant information about the environment, and to provide people with the opportunity to participate in decisions on protecting it.

Sadly, Brian Robinson passed away on 1 May 2004. A valedictory celebration of his achievements was held in the Great Hall of the National Gallery of Victoria, attended by 1200 people. Politicians of all persuasions sang his praises. Bureaucrats and captains of industry spoke of his capabilities. All were unanimous in their appreciation of his ability and his charm. His sheer niceness, it seems, oiled the machinery he constructed to reconcile differing interests.
He worked what miracles he could for the environment, and for people's quality of life. Brian's voice was loud and his passion was clear.

The Commemorative Brain Robinson Lecture was inaugurated in 2009 at the 3rd International Contaminated Site Remediation Conference. In 2024, the organising committee wishes to acknowledge the efforts of an environmental hero whose vision, ideas and leadership were a force of global sustainability.

The Commemorative Brain Robinson Lecture is part of the official CleanUp 2024 opening on Monday 16 September, beginning at 9:15am in Hall N, ground floor of Adelaide Convention Centre's west wing.

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CleanUp 2024 Awards

CleanUp 2024 provides a chance for us to recognise the achievements of our best and brightest via several awards, the winners of which will be announced at the Gala Dinner on Tuesday night.

The **CARE Award** recognises and celebrates researchers and environmental consultants who develop innovative technologies and approaches for monitoring, assessing and remediating environmental contamination. The awards showcase success stories that inspire innovators and investors whose mission is to ensure sustainability of our environment.

Noting the recent recognition by the United Nations Food and Agriculture Organization of the potentially catastrophic risk that contamination poses to both environmental and human health, the CARE Award seeks to inspire industry, businesses, communities, local governments, schools and individuals to take action towards a more sustainable future.

Agilent

crc care | Innovative science for a cleaner planet

The **Agilent-crcCARE Award** for Innovation in Analytical Sciences recognises the best research paper by an early-career* researcher presenting a reliable analytical, rapid and easy-to-use method for the analysis of a challenging analyte – be it an emergent or conventional contaminant.

*Current students (honours, masters and PhD) or researchers who have completed PhD within the last 5 years.

The **crcCARE High School Essay Competition** aims to inspire young students to recognise the importance of a clean environment to our wellbeing and to understand how easily human activities can jeopardise environmental sustainability. The crcCARE High School Essay Competition invites high school students (years 7 to 12) to submit an essay in the following category:

› **The Dr Roneal Naidu Award** - How can innovative technologies help clean up emerging contaminants, such as pharmaceuticals and micro-nano plastics, to protect human health and the environment?

ACLCA NSW Achiever Award 2024

The ACLCA NSW Achiever Award offers an exceptional opportunity for young professionals to build their profile and advance their career in the industry. Previous winners consistently provide positive feedback on the experience, particularly highlighting the opportunity to present to ACLCA NSW members and, subsequently, at a large conference alongside other state ACLCA winners.

This award is open to young professionals under 32 years of age with less than 5 years of experience in the CLM industry. Participants will have the chance to present at our annual Achiever Award event.

Prize: The winner will have their name added to our perpetual trophy, receive a $1,000 cash prize, and receive up to $2,000 in sponsorship to attend the CleanUp Conference in Adelaide, where they will present at a special ACLCA Early Career Professionals session.

CleanUp 2024 Awards

crcCARE – GHD Peter Nadebaum Award for Excellence

Dr Nadebaum, a Senior Technical Director of GHD, worked for more than 40 years' in contaminated land assessment and remediation. His depth of experience spans health and environmental risk assessment, environmental management of industrial facilities, industrial waste and wastewater treatment, air emission assessment and design of air pollution control systems, environmental impact assessment, and statutory approvals for establishing new facilities. He has published and presented more than 200 papers.

The Peter Nadebaum Award recognizes individuals who have demonstrated exceptional technical and educational contributions to the field of contamination assessment, remediation, and management. This prestigious award is open to professionals, consultants, students, and academics who have shown thought leadership and innovative solutions to real-world environmental challenges.

CleanUp 2022 Award Winners

The 2022 CARE Award

Awarded to **Gavin Scherer,** AECOM

The 2022 crcCARE High School Essay Competition

The Dr Roneal Naidu Award on Chemical Contamination and its effect on food quality and human health. Awarded to:

Taya Crommelin, Wesley College Melbourne

The crcCARE award for writing on contamination of our planet: how can we ensure a clean and safe environment for future generations? Awarded to:

Jordan Makris, Wesley College Melbourne


Phil Hoffmann
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The globalCARE Alliance™ Join The Fight Against Chemical Contamination Of Our Planet

At CleanUp 2015, crcCARE Managing Director Professor Ravi Naidu launched crcCARE's globalCARE Alliance™.

globalCARE is a scientific initiative to define, quantify, set limits to, help clean up, and devise new ways to curb the growing impact of chemical contamination on human health and the environment.

globalCARE is an international alliance of leading scientific, government, industry and community organisations and individuals dedicated to making ours a cleaner, healthier and safer planet.

If you are interested to learn more or have your organisation join the globalCARE Alliance, please visit www.crcCARE.com/globalcare or contact Ravi at ravi.naidu@crcCARE.com.

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WELCOME TO ADELAIDE!

Adelaide Convention Centre is proud to support the International CleanUp Conference 2024 and welcomes delegates to Adelaide, South Australia.

Ranked one of the world's safest, beautiful and most liveable cities, Adelaide is a clean, green destination that takes sustainability very seriously, with a mission to become the world's first carbon neutral city.

Adelaide Convention Centre shares this commitment, with environmental sustainability and social responsibility embedded through all aspects of our business.

As the world's first convention centre to achieve EarthCheck's coveted Master certification – we're proud to support our state's sustainability – and that of our shared global home.

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