

Proceedings

7th International Contaminated Site Remediation Conference

CleanUp 2017

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Incorporating the 1st International PFAS Conference
Crown Melbourne | 10–14 September 2017

Cooperative Research Centre for Contamination Assessment and Remediation of the Environment

September 2017

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ISBN: 978-1-921431-58-6

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These proceedings should be cited as:

CRC CARE 2017, 7th International Contaminated Site Remediation Conference incorporating the 1st International PFAS Conference: Program and Proceedings, CleanUp 2017 Conference, Melbourne, Australia, 10 - 14 September 2017.

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WELCOME

On behalf of CRC CARE and the conference organising committee, I am delighted to welcome you to CleanUp 2017, the 7th International Contaminated Site Remediation Conference.

It's hard to believe that two years have passed since we gathered in Melbourne for the previous iteration of what I firmly believe to be the leading international meeting on contaminated site remediation.

Since 2015, I'm happy to report that the CleanUp series has grown enormously. Initiated in 1996 under the banner of Soil Contamination Research Australasia Pacific (SCRAP), the CleanUp series is now a truly global event. In the past 12 months, CRC CARE has co-hosted CleanUp conferences in China, India and Indonesia, with events scheduled for Korea and India in 2018.

This biennial get-together in Australia remains the flagship event of the CleanUp series, which has consistently grown in size, scope and quality. This year is no exception. As always, the organising committee has prepared a scientific and educational program that encompasses the most pressing issues of contaminated site assessment, management and remediation. In addition, we have added an extra focus on one of the most burning contamination topics of recent times: per- and poly-fluorinated alkyl substances, or PFAS.

CleanUp 2017 incorporates the 1st International PFAS Conference. As you would no doubt be aware, some PFAS have received prominent recent news coverage, particularly perfluorooctanesulfonate (PFOS) and perfluorooctanoic acid (PFOA). These chemicals, found in some aqueous film-forming foams (AFFFs) used to fight fires, have gained attention as contamination has been detected in areas in and around numerous fire-training facilities worldwide. However, PFAS encompass many more chemicals than just those found in AFFFs. There is an increasingly urgent need to establish guidance, legislation and technologies to deal with PFAS contamination. In response, the PFAS conference will explore problems, issues, environmental behaviour, policy challenges and management of this important class of emerging contaminants. You will notice in the program schedule that all sessions belonging to the PFAS conference are highlighted purple.

We are very happy to have secured the Crown Conference Centre as the CleanUp venue. This world-class facility not only allows presenters to put their work in the very best light, but also provides numerous formal and informal networking opportunities – often the most valuable part of any conference.

The Conference has again been very well supported by our sponsors and exhibitors, without whom CleanUp 2015 would not be possible. We also extend our thanks to the members of the various organising committees who have generously given their time and expertise. Finally, a big thank you to Plevin and Associates, who have worked with us for over a decade to help make CleanUp the success it has become.

Professor Ravi Naidu

Chair, CleanUp 2017 Conference Organising Committee

Managing Director and CEO, CRC CARE

Global Innovation Chair and Director, Global Centre for Environmental Remediation, University of Newcastle



The Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) is a multi-partner Australian research organisation developing innovative technologies to assess, prevent and remediate the contamination of soil, water and air. World-class researchers at CRC CARE work with industry on global contamination issues, engaging with major end users such as the mining and petroleum industries, environmental regulators, government organisations, small-to-medium enterprises and consultants.

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

For more information, visit www.crccare.com

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Mr Frederic Cosme, Golder Associates

Dr Jayant Keskar, Enpro Envirotech
Pty Ltd

PROGRAM OVERVIEW

	Conference Hall 1	Conference Hall 2	Conference Hall 3
Sunday 10 September 2017	8:30 – 10:00	Workshop 1- Keys to Success for Cost-Effective Remediation	Workshop 2- How to develop a weight-of-evidence framework to ensure effective data collection when assessing risk to the environment
			Workshop 5 - Assessment, Management and Remediation of Per- and Polyfluoroalkyl Substances (PFAS) Contaminated Sites
	10:00 – 10:30	Morning Tea	
	10:30 – 12:30	Workshop 1 continues	Workshop 2 continues
			Workshop 5 continues
	12:30 – 13:00	Lunch	
	13:00 – 14:30	Workshop 1 continues	Workshop 2 continues
			Workshop 5 continues
Monday 11 September 2017	14:30 – 15:00	Afternoon Tea	
	15:00 – 17:00	Workshop 1 continues	Workshop 2 continues
			Workshop 5 continues
	17:00 – 18:45	Welcome reception, Official conference opening and Commemorative Brian Robinson Lecture by Professor Paul Nathanail, University of Nottingham	
Tuesday 12 September 2017	8:30 – 10:00	PLENARY SESSION 1: ON THE NATURE AND IMPLICATIONS OF GROUNDWATER CONTAMINATION, John Cherry, University of Guelph (Conference Halls 1, 2 and 3)	
	10:00 – 10:30	Morning Tea	
	10:30 – 12:10	1A - International approaches to managing PFAS	1B - Future of remediation industry
			1C - Advances in vapour intrusion and volatiles assessment, management and remediation
	12:10 – 13:10	Lunch	
	13:10 – 14:50	2A - Approaches to dealing with PFAS in Australia	2B - Advances in PFAS remediation technologies
			2C - Advances in vapour intrusion and volatiles assessment, management and remediation
	14:50 – 15:20	Afternoon Tea	
	15:20 – 17:00	3A - Human health and ecological risks from PFAS contamination	3B - Fate and transport of PFAS in the environment
			3C - Advances in vapour intrusion and volatiles assessment, management and remediation
Tuesday 12 September 2017	17:00 – 18:00	Drinks and poster session	
	8:30 – 10:00	PLENARY SESSION 2: - Exhibition Hall MINIMISING THE ENVIRONMENTAL IMPACTS OF CONTAMINATION AND HAZARDOUS SUBSTANCES IN NSW, Mark Gifford, NSW EPA (Conference Halls 1, 2 and 3)	
	10:00 – 10:30	Morning Tea	
	10:30 – 12:10	4A - Remediation and management of PFAS	4B - PFAS case studies
			4C - Greenhouse gas emission and mitigation
	12:10 – 13:10	Lunch	
	13:10 – 14:50	5A - Improving PFAS risk assessments	5B - Advances in analysis and measurement of contaminants
			5C - Advances in chlorinated hydrocarbon contaminated site assessment, remediation and management
	14:50 – 15:20	Afternoon Tea	
	15:20 – 17:00	6A - Improving PFAS risk assessments	6B - Advances in amendment formulation and delivery
			6C - Advances in chlorinated hydrocarbon contaminated site assessment, remediation and management
	18:30 – 19:00	Pre-dinner drinks – Level 2, Pre-function area	
	19:00 – 23:00	Conference Gala Dinner – Conference Halls 1, 2 and 3	

■ International PFAS Conference session

Meeting Room 11	Meeting Room 12	Meeting Room 13	Meeting Room 15	Meeting Room 16
Workshop 4 - Integrated DNAPL-LNAPL site characterisation and tools selection	Workshop 3 - Bioremediation of chlorinated DNAPL source zones	Workshop 9 - Characterisation and Evaluation of Vapour Intrusion	Workshop 10 - Molecular biological tools: when, where, and how to use qPCR, CSIA, SIP, and next generation sequencing	
Workshop 4 continues	Workshop 3 continues	Workshop 9 continues	Workshop 10 continues	
Workshop 7 - Characterisation and remediation in fractured rock	Workshop 6 - Innovative visualisation, modelling and optimisation tools for improving remediation efficiency	Workshop 9 continues	Workshop 8 - Integrated DNAPL site strategy with the use of mass flux and mass discharge	
Workshop 7 continues	Workshop 6 continues	Workshop 9 continues	Workshop 8 continues	
1D - Risk-based Corrective Action	1E - Risk assessment and management of landfills	1F - ACLCA session on young professionals	1G - Contaminant mass flux and discharge	1H - Advances in in-situ remediation
2D - Assessment and remediation of contaminants in fractured rocks	2E - Bottlenecks for remediation	2F - Fate and transport of pharmaceuticals and drugs in the environment	2G - Advances in waste management	2H - Advances in in-situ remediation
3D - Biochar and biochar-assisted remediation	3E - Advances in human health risk assessment	3F - Advances in remediation and management of contaminated sites	3G - Advances in waste management	3H - Advances in monitoring natural attenuation
4D - Regulatory considerations in landuse planning and management	4E - Advances in site characterisation	4F - Advances in sampling of environmental matrices	4G - Advances in emerging contaminants	4H - Bioavailability and bioaccessibility of contaminants
5D - Advances in the assessment, remediation and management of petroleum hydrocarbon contaminated sites	5E - Advances in site characterisation	5F - Sustainability in environmental site assessment and remediation	5G - Advances in emerging contaminants	5H - Bioavailability and bioaccessibility of contaminants
6D - Geostatistical approaches to environmental investigation	6E - Advances in site characterisation	6F - Managing environmental issues in agriculture	6G - Advances in emerging contaminant	6H - Education and training in environmental risk assessment and remediation

PROGRAM OVERVIEW continued...

Wednesday 13 September 2017	8:30 – 10:00	PLENARY SESSION 3: EXPERT PANEL HOSTED BY BERNIE HOBBS FOR ABC RADIO NATIONAL'S 'BIG IDEAS' - THOUSANDS OF NEW CHEMICALS A YEAR: HOW DO WE PROTECT OURSELVES? (Conference Halls 1, 2 and 3)		
	10:00 – 10:30	Morning Tea		
	10:30 – 12:10	7A - Developments in PFAS Analysis	7B - Advances in ecological risk assessment	7C - Advances in nanotechnology for environmental remediation
	12:10 – 13:10	Lunch		
	13:10 – 14:50	8A - Understanding PFAS in the environment	8B - Remediation engineering: Improving design and operation of groundwater remediation systems	8C - THE UNSESSION
	14:50 – 15:20	Afternoon Tea		
	15:20 – 17:00	CLOSING PLENARY SESSION (Conference Halls 1, 2 and 3) – Plenary lecture by Professor Ravi Naidu		
Thursday 14 September 2017	9:00 – 17:00	Technical tour 1: Remediation tour		
		Technical tour 2: Analytical tour		

■ International PFAS Conference session

7D - LNAPL Natural
source zone depletion

7E - Case studies on
contaminant assessment,
remediation and
management

7F - Assessment and
remediation of heavy
metal contaminated sites

7G - Development of
national remediation
framework in Australia

7H - Recent research
on environmental
contamination by HDR
students and early career
researchers

8D - Determining LNAPL
remediation end points

8E - Case studies on
contaminant assessment,
remediation and
management

8F - Mine site
rehabilitation and
remediation

8G - On-site assessment
of contaminants

8H - Recent research
on environmental
contamination by HDR
students and early career
researchers

DETAILED PROGRAM – WORKSHOPS AND CONFERENCE OPENING

08:00	Registration			
Full Day Workshops				
08:30	WK 1	Keys to Success for Cost-Effective Remediation Room: Conference Hall 1	WK 2	How to develop a weight-of-evidence framework to ensure effective data collection when assessing risk to the environment Room: Conference Hall 2
10:00	Morning tea			
10:30	Workshop 1 continues		Workshop 2 continues	
12:30	Lunch			
13:00	Workshop 1 continues		Workshop 2 continues	
14:30	Afternoon tea			
15:00	Workshop 1 continues		Workshop 2 continues	
17:00	Full Day Workshops close			
Morning Workshops				
08:30	WK 3	Bioremediation of chlorinated DNAPL source zones Meeting Room 12	WK 4	Integrated DNAPL-LNAPL site characterisation and tools selection Meeting Room 11
10:00	Morning tea			
10:30 -12:30	Workshop 3 continues		Workshop 4 continues	
12:30	Morning Workshops close			
12:30	Lunch			
Afternoon Workshops				
13:00	WK 6	Innovative visualisation, modelling and optimisation tools for improving remediation efficiency Meeting Room 12	WK 7	Characterisation and remediation in fractured rock Meeting Room 11
14:30	Afternoon tea			
15:00	Workshop 6 continues		Workshop 7 continues	
17:00	Afternoon Workshops close			
Official conference opening				
17:00	Welcome Reception			
17:30	Official Opening			
17:45	Commemorative Brian Robinson Lecture Professor Paul Nathanail, University of Nottingham			
18:45	Close			

WK 5 Assessment, Management and
Remediation of Per- and Polyfluoroalkyl
Substances (PFAS) Contaminated Sites
Room: Conference Hall 3

WK 9 Characterisation and Evaluation of Vapour Intrusion
Room: Meeting Room 13

Workshop 5 continues

Workshop 9 continues

Workshop 5 continues

Workshop 9 continues

Workshop 5 continues

Workshop 9 continues

WK 10 Molecular biological tools: when, where,
and how to use qPCR, CSIA, SIP, and next
generation sequencing
Meeting Room 15

Workshop 10 continues

WK 8 Integrated DNAPL site strategy with the use
of mass flux and mass discharge
Meeting Room 15

Workshop 8 continues

DETAILED PROGRAM

MONDAY 11 SEPTEMBER 2017

08:00	Registration
08:30	Official Conference Opening
08:45	PLENARY SESSION 1: Conference Hall 1, 2 and 3 ON THE NATURE AND IMPLICATIONS OF GROUNDWATER CONTAMINATION, John Cherry, University of Guelph

10:00 **Morning tea**

CONCURRENT SESSIONS 1A - 1H

	1A - International approaches to managing PFAS Room: Conference Hall 1 Chair: Naji Akladiss, Maine Department of Environment Protection	1B - Future of remediation industry (Sponsor: Ventia Utility Services) Room: Conference Hall 2 Chair: Emmylou Cooke
10:30	1A.1 KEYNOTE: PFAS RESEARCH AND DEVELOPMENT OPPORTUNITIES: A UNITED STATES PERSPECTIVE, Rula Deeb, Geosyntec Consultants	1B.1 KEYNOTE: REMEDIATION IN THE 2050s - WILL THE MILLENNIALS HAVE ANY PROBLEMS LEFT TO SOLVE?, John Hunt, Ventia Utility Services
10:50		
11:10	1A.2 REGULATING LEGACY PFAS CONTAMINATION IN NORWAY—GOVERNMENT ACTIONS, ITS RELATION TO OTHER REGULATIONS OF PFAS IN NORWAY, AND RISK ASSESSMENT FROM A NATIONAL PERSPECTIVE, Thomas Hartnik, Norwegian Environment Agency	1B.2 REMEDIAL INNOVATION AND PSEUDO-INNOVATION OR ZEN AND THE ART OF REMEDIATION AUDITING, Jason Clay, Servensa
11:30	1A.3 PFOS, PFOA AND PFAS IN CANADA: PAST, PRESENT AND POSSIBILITIES, Rita Mroz, Environment & Climate Change Canada	1B.3 EMERGING CONTAMINANTS - LIFE AFTER PFAS, Karl Bowles, NSW Office of Environment and Heritage
11:50	1A.4 REGULATION AND OTHER MEASURES ON PFAS IN SWEDEN, Jenny Ivarsson, Swedish Chemicals Agency	1B.4 SITE CONTAINMENT AND OFF-SITE DISPOSAL – POST-DESIGN LIFE CONSIDERATIONS AND IMPLICATIONS FOR THE AUSTRALIAN MARKET, Mark Bennett, Ventia Pty Ltd
12:10	Lunch	

■ International PFAS Conference session

1C - Advances in vapour intrusion and volatiles assessment, management and remediation

Room: Conference Hall 3

Chair: Jonathan Medd, Golder Associates

1D - Risk-based Corrective Action

Room: Meeting Room 11

Chair: David Blackmore, NSW Department of Planning & Environment - Resources & Geoscience

1C.1 **KEYNOTE:** OPTIMIZATION OF VAPOUR INTRUSION DECISION-MAKING: CRITIQUE OF TYPICAL VI POLICY & GUIDANCE, Bart Eklund, AECOM

1D.1 **KEYNOTE:** UTILIZING THE RBCA FRAMEWORK TO ESTABLISH DEFENSIBLE CLEANUP GOALS FOR REMEDIATION, Charles CC Lee, University of Newcastle

1C.2 INCREASING CERTAINTY IN VAPOUR INTRUSION ASSESSMENTS, Paul Nicholson, Geosyntec Consultants

1D.2 BENEFITS AND LIMITATIONS OF RISK BASED CORRECTIVE ACTION, DEMONSTRATED THROUGH CASE STUDIES, Sarah Richards, Coffey Services Australia Pty Ltd

1C.3 TRICHLOROETHENE (TCE) VAPOUR MITIGATION PILOT TRIAL OVERVIEW, Mitchell Talbot, South Australian Environment Protection Authority (EPA)

1D.3 RISK-BASED MANAGEMENT OF DERELICT MINES, Peter Sanderson, University of Newcastle

1C.4 AN AUSTRALIAN FIRST? RETROSPECTIVE VAPOUR MITIGATION SYSTEM INSTALLATION TO RESIDENTIAL PROPERTIES, Justin Kerr, Coffey Services Australia Pty Ltd

1D.4 HOW ACHIEVABLE IS MY REMEDIATION GOAL? PRACTICALITIES OF IMPLEMENTING RISK BASED REMEDIATION, Sophie Wood, Environmental Resources Management Australia

DETAILED PROGRAM

MONDAY 11 SEPTEMBER 2017

CONCURRENT SESSIONS 1A - 1H				
1E - Risk assessment and management of landfills			1F - ACLCA young professionals	
Room: Meeting Room 12			Room: Meeting Room 13	
Chair: Nanthi Bolan, University of Newcastle			Chair: Clinton Smiljanic, ACLCA	
10:30	1E.1	EVALUATION OF GROUNDWATER RISKS FROM CLOSED LANDFILLS AND WASTEWATER TREATMENT FACILITIES IN THE VICTORIAN IRRIGATED RIVERINE PLAINS, Alana Tranter, Jacobs	1F.1	THE COX PENINSULA REMEDIATION PROJECT, Ben Grasso, ACLCA Victoria
10:50	1E.2	LANDFILL GAS RISK ASSESSMENT - UNDERSTANDING REASONABLE WORST CASE CONDITIONS, Stephen Cambridge, EHS Support Pty Ltd	1F.2	FVPDM: A PRACTICAL APPROACH TO ASSESS GROUNDWATER AND CONTAMINANT MASS FLUX UNDER VARIABLE HYDRAULIC CONDITIONS, Alex Savaglia, ACLCA SA
11:10	1E.3	REDEVELOPMENT OF A LANDFILL - DEVELOPING THE CONCEPTUAL SITE MODEL FOR PERTH STADIUM, Ivan Kwan, Golder Associates Pty Ltd	1F.3	PERMEABLE REACTIVE BARRIERS FOR THE REMEDIATION OF PETROLEUM HYDROCARBON CONTAMINATED GROUNDWATER IN THE ANTARCTIC, Benjamin Freidman, ACLCA QLD
11:30	1E.4	DEVELOPMENT OF AN ASTM GUIDE ON BENEFICIAL USE OF COAL COMBUSTION RESIDUALS STORED IN IMPOUNDMENTS AND LANDFILLS, Gwen Eklund, Eklund Environmental LLC	1F.4	SITE MATURITY JOURNEY, Daniel Wong, ACLCA NSW
11:50	1E.5	PHYTOCAPPING: A COST-EFFECTIVE AND SUSTAINABLE LANDFILL CAPPING OPTION, Kartik Venkatraman, Acacia Waste Management Solutions Pty Ltd	1F.5	HOW IS DECLINING RAINFALL AFFECTING HYDROLOGICAL CONTAMINANT EXPORT BEHAVIOUR IN WESTERN AUSTRALIA'S SOUTH WEST?, Cameron Ritchie, ACLCA WA
12:10	Lunch			

1G - Contaminant mass flux and discharge

Room: Meeting Room 15

Chair: Ken de Greene, Golder Associates

1H - Advances in in-situ remediation

Room: Meeting Room 16

Chair: Dora Taggart, Microbial Insights

1G.1 **KEYNOTE:** AUSTRALIAN GUIDANCE ON FLUX-BASED ASSESSMENT AND MANAGEMENT OF GROUNDWATER, Bruce Kennedy, CRC CARE

1H.1 **KEYNOTE:** APPLICATION OF N-ZVI-BIOCHAR COMPOSITE FOR IN-SITU GROUNDWATER TREATMENT, Mengfang Chen, Chinese Academy of Science

1G.2 DIFFERENTIATING GROUNDWATER SOURCES USING MASS FLUX, Ken Kiefer, ERM

1H.2 A TALE OF TWO SITES: A BIOREMEDIATION PARADOX, Jonathan Ho, AECOM

1G.3 EVALUATION OF GROUNDWATER AND CONTAMINANT MASS FLUX TO A MARINE ENVIRONMENT USING FLUORESCENT DYE TRACER TEST, Zoe Thiele, Golder Associates

1H.3 LOW PH IMPACTS ON ENHANCED IN SITU BIOREMEDIATION, Sarah Schiess, Geosyntec Consultants Pty Ltd

1G.4 COMPREHENSIVE AND INNOVATIVE GUIDANCE FOR DNAPL SITE CHARACTERIZATION AND REMEDIATION: OVERVIEW OF RECENT ITRC PRODUCTS, Ryan Wymore, CDM Smith

1H.4 IN SILICO ANALYSIS FOR 1,4-DIOXANE TOXICITY AND BIODEGRADATION, Suresh Subashchandrabose, University of Newcastle

DETAILED PROGRAM

MONDAY 11 SEPTEMBER 2017

CONCURRENT SESSIONS 2A - 2H			
	2A - Approaches to dealing with PFAS in Australia		2B - Advances in PFAS remediation technologies
	Room: Conference Hall 1		Room: Conference Hall 2
	Chair: Bruce Kennedy, CRC CARE		Chair: Rula Deeb, Geosyntec Consultants
13:10	2A.1	KEYNOTE: RISK-BASED ASSESSMENT, MANAGEMENT AND REMEDIATION OF PFOS AND PFOA, Peter Nadebaum, GHD	2B.1 KEYNOTE: DEVELOPMENTS IN THERMAL TREATMENT OF POLY-FLUOROALKYL SUBSTANCES PFAS, John Lucas, University of Newcastle / Ventia
13:30			
13:50	2A.2	PFAS REMEDIATION IN AUSTRALIA, Andrew McNee, Department of the Environment and Energy	2B.2 REACTIVE TRANSPORT MODEL (ISR-MT3DMS) FOR IMPROVING REMEDIATION EFFECTIVENESS, Grant Carey, Porewater Solutions
14:10	2A.3	PER- AND POLY- FLUOROALKYL SUBSTANCES (PFAS) INVESTIGATION, DEPARTMENT OF DEFENCE, Luke McLeod,	2B.3 SUSTAINABLE REMOVAL OF PFAS FROM GROUNDWATER USING REGENERABLE ION EXCHANGE MEDIA AND ON-SITE DESTRUCTION OF PFAS BY PLASMA TREATMENT, Nathan Hagelin, Amec Foster Wheeler
14:30	2A.4	PFAS: THE WESTERN AUSTRALIA EXPERIENCE, Jason Clay, Senversa	2B.4 PFAS WATER TREATMENT PROCESS INNOVATION TESTED, Pearce Anderson, InSite Remediation Services
14:50	Afternoon tea		

■ International PFAS Conference session

2C - Advances in vapour intrusion and volatiles assessment, management and remediation

Room: Conference Hall 3

Chair: Bart Eklund, AECOM

2C.1 **KEYNOTE:** REVIEW OF VI MODELS FOR CRAWL-SPACE HOMES, Jackie Wright, Environmental Risk Sciences

2C.2 **KEYNOTE:** RISK ASSESSMENT 102: WHEN ONE SITE IS REALLY TWO (OR MORE), Jean Meaklim, Greencap Pty Ltd

2C.3 PREDICTIVE SOIL VAPOUR ASSESSMENT, Graham Smith, WSP Australia

2D - Assessment and remediation of contaminants in fractured rocks

Room: Meeting Room 11

Chair: Naji Akladiss, Maine Department of Environment Protection

2D.1 **KEYNOTE:** EVALUATING HYDRAULIC CONNECTIVITY IN FRACTURED BEDROCK FROM METERS TO KILOMETERS, Matthew Becker, California State University Long Beach

2D.2 **KEYNOTE:** GROUNDWATER REMEDIATION IN FRACTURED ROCK: CHALLENGES TO SOLUTIONS, James Studer, InfraSUR LLC

2D.3 ENHANCED BIOREMEDIATION OF CHLORINATED SOLVENTS IN FRACTURED BEDROCK AQUIFERS, Dora Taggart, Microbial Insights

DETAILED PROGRAM

MONDAY 11 SEPTEMBER 2017

CONCURRENT SESSIONS 2A - 2H			
2E - Bottlenecks for remediation		2F - Fate and transport of pharmaceuticals and drugs in the environment	
Room: Meeting Room 12		Room: Meeting Room 13	
Chair: Kerry Scott, CRC CARE		Chair: Ajit Sarmah, University of Auckland	
13:10	2E.1	KEYNOTE: CHOOSING THE RIGHT REMEDIAL APPROACH WHEN SITE CONSTRAINTS LIMIT YOUR CHOICES, Brendan Brodie, ERM	2F.1 KEYNOTE: PHARMACEUTICALS AND OTHER EMERGING CONTAMINANTS IN SEWAGE: AN OVERVIEW OF CURRENT CLEAN-UP TECHNIQUES, R&D APPROACHES AND NEEDS, Volker Birke, University of Wismar
13:30			
13:50	2E.2	REMEDIAL DESIGN INVESTIGATION - RAISING THE BAR FOR THE INDUSTRY, Matthew Clutterham, Ventia	2F.2 THE TIP OF THE ICEBERG! WHAT AUSTRALIA'S ONGOING FASCINATION WITH METH MEANS FOR THE ASSESSMENT AND CLEAN-UP INDUSTRIES, Miles Stratford, MethSolutions
14:10	2E.3	LEGAL IMPEDIMENTS TO THE EFFECTIVE MANAGEMENT OF RESIDUAL CONTAMINATION, Elizabeth Wild, Henry Davis York	2F.3 SORPTION AND DEGRADATION OF ANTIDIABETIC DRUG METFORMIN AND ITS TRANSFORMATION PRODUCT GUANYLUREA IN SOILS, Rowena Briones, University of Auckland
14:30	2E.4	COMMUNITY AND STAKEHOLDER ENGAGEMENT AND TECHNICAL INVESTIGATION, THE DUAL NATURE OF CONTAMINATED LAND PROJECTS, Adam Anderson, Aurecon	2F.4 FATE OF PHARMACEUTICALS AND PERSONAL CARE PRODUCTS IN A WASTEWATER TREATMENT PLANT DURING HEAVY RAINFALL EVENT, Lokesh Padhye, University of Auckland
14:50	Afternoon tea		

2G - Advances in waste management

Room: Meeting Room 15

Chair: Simon Leake, SESL Australia Pty Ltd

2H - Advances in in-situ remediation

Room: Meeting Room 16

Chair: Mengfang Chen, Chinese Academy of Sciences

2G.1 **KEYNOTE:** ORGANIC RECYCLING TO BENEFIT AGRICULTURAL PRODUCTION AND ENVIRONMENTAL PROTECTION, Nanthi Bolan, University of Newcastle

2H.1 **KEYNOTE:** DESIGN AND IMPLEMENTATION OF FULL-SCALE IN-SITU CHEMICAL OXIDATION OF TETRACHLOROETHENE IN SOIL AND GROUNDWATER USING SURFACTANT-ENHANCED SODIUM PERMANGANATE AT AN URBAN LOCATION, Karnam Ramanand, Brown and Caldwell

2G.2 REDUCING WASTE DISPOSAL THROUGH IMPROVED BACKGROUND SOIL CHARACTERISATION - FINDINGS FROM A MAJOR BACKGROUND SOIL SURVEY, VICTORIA, Hannah Mikkonen, RMIT and CDM Smith

2H.2 PERMEABLE REACTIVE BARRIERS ERECTED EVERY DAY MAY KEEP SERIOUS ISSUES ON PROPER AND SUSTAINABLE REMEDIATION OF A LOT OF CONTAMINATED SITES AWAY, Volker Birke, University of Wismar

2G.3 THE ROLE OF GEOLOGICAL REPOSITORIES IN THE ENVIRONMENTALLY SOUND MANAGEMENT OF HAZARDOUS WASTE, Richard NcAree, Tellus Holdings Ltd

2H.3 IN SITU CHEMICAL OXIDATION OF CARBON DISULFIDE USING ACTIVATED SODIUM PERSULFATE, Ian Ross, Arcadis

2G.4 APPLICATION OF BIOENERGY FOR ENERGY OR MATERIALS: FUTURE PERSPECTIVE THROUGH ENERGY EFFICIENCY, Abdeen Omer, Energy Research Institute

2H.4 IN SITU GASWORKS REMEDIATION - CHALLENGES AND INNOVATIONS, Ben Kay, Enviro Pacific Services

DETAILED PROGRAM

MONDAY 11 SEPTEMBER 2017

CONCURRENT SESSIONS 3A - 3H			
	3A - Human health and ecological risks from PFAS contamination Room: Conference Hall 1 Chair: Belinda Goldsworthy, Ramboll Environ Australia		3B - Fate and transport of PFAS in the environment Room: Conference Hall 2 Chair: Nathan Hagelin, AMEC FOSTER WHEELER
15:20	3A.1	KEYNOTE: BIOMONITORING OF HUMAN EXPOSURE TO EMERGING ENVIRONMENTAL CONTAMINANTS, Kurunthachalam Kannan, Wadsworth Center	3B.1 UNDERSTANDING FATE AND TRANSPORT OF PFAS TO DEVELOP EFFECTIVE CONCEPTUAL SITE MODELS, Ian Ross, Arcadis
15:40			3B.2 PFAS OCCURRENCE, FATE AND TRANSPORT IN THE ENVIRONMENT, Doug Ahearne, Senversa Pty Ltd
16:00	3A.2	PFAS IN THE ENVIRONMENT: IMPLICATIONS FOR HUMAN EXPOSURE, Andrea Hinwood, Laura-Lee Innes, EPA Victoria	3B.3 BIOACCUMULATION FACTORS FOR PFAS IN AUSTRALIAN ENVIRONMENTS, Victoria Lazenby, Arcadis Australia Pacific Pty Ltd
16:20	3A.3	ECOTOXICITY OF PERFLUOROALKYL SUBSTANCES- NEW INSIGHTS, Megharaj Mallavarapu, University of Newcastle	3B.4 ADSORPTION OF PERFLUOROALKANOIC ACID (PFOA) USING GRAPHENE-BASED MATERIALS, Supriya Lath, University of Adelaide
16:40	3A.4	HUMAN HEALTH RISK ASSESSMENT FOR PER- AND POLYFLUOROALKYL SUBSTANCES IN THE UNITED STATES OF AMERICA, Barrie Selcoe, CH2M	3B.5 SORPTION OF PFOS IN SOILS VARYING IN PHYSIOCHEMICAL AND MINERALOGICAL PROPERTIES, Yanju Liu, University of Newcastle
17:00	Poster Session - Exhibition Hall		

3C - Advances in vapour intrusion and volatiles assessment, management and remediation

Room: Conference Hall 3

Chair: Jackie Wright, enRiskS

3C.1 **KEYNOTE:** REDUCING UNCERTAINTY IN VAPOUR INTRUSION RISKS AND CONSERVATISM IN CHLORINATED HYDROCARBON SITE DECISION MAKING, Ken Kiefer, ERM

3C.2 **KEYNOTE:** DEVELOPMENT AND FIELD APPLICATION OF A NEW SULFIDIZED NANOIRON FORMULATION FOR CHLORINATED VOLATILE ORGANIC COMPOUND DEGRADATION, Denis O'Carroll, UNSW

3C.3 ASSESSING VAPOUR RISK FROM SHALLOW COAL TAR AND DEGRADED HYDROCARBON SOURCES, Katie Richardson, Senversa

3D - Biochar and biochar-assisted remediation (Sponsor: University of Newcastle)

Room: Meeting Room 11

Chair: Nanthi Bolan, University of Newcastle

3D.1 **KEYNOTE:** THE LOVE-HATE RELATIONSHIP OF PYROLYSIS BIOCHAR IN CONTAMINANT REMEDIATION- A PERSPECTIVE, Ajit Sarmah, University of Auckland

3D.2 CADMIUM SOLUBILITY AND BIOAVAILABILITY IN BIOCHAR-AMENDED SOILS, Fangjie Qi, University of Newcastle, Australia

3D.3 USING BIOCHAR TO REMEDIATE SOILS CONTAMINATED BY PB, Pacian Netherway, RMIT University

3D.4 BIOCHAR-DESIGNING TO SIMULTANEOUSLY IMPROVE CARBON RETENTION, CONTROLLED NUTRIENT RELEASE, AND SOIL REMEDIATION, Ling Zhao, Shanghai Jiao Tong University

DETAILED PROGRAM

MONDAY 11 SEPTEMBER 2017

CONCURRENT SESSIONS 3A - 3H			
3E - Advances in human health risk assessment Room: Meeting Room 12 Chair: Blair McDonald, Golder Associates		3F - Advances in remediation and management of contaminated sites Room: Meeting Room 13 Chair: Karnam Ramanand, Brown and Caldwell	
15:20	3E.1	KEYNOTE: CONTAMINANT EXPOSURE TO HUMAN HEALTH IMPLICATIONS: ENVIRONMENTAL GEOCHEMISTRY OF MERCURY AND FOOD CONSUMPTION, Ming Hung Wong, The Education University of Hong Kong	3F.1 KEYNOTE: TRENDS IN ENVIRONMENTAL REMEDIATION, Heather Rectanus, Battelle
15:40			
16:00	3E.2	DECISION MAKING AT CONTAMINATED SITES: ISSUES AND OPTIONS IN HUMAN HEALTH RISK ASSESSMENT, Barrie Selcoe, CH2M	3F.2 IS "INNOVATIVE PUMP AND TREAT" AN OXYMORON? – A CASE STUDY, Andrew Cooper, Orica Ltd
16:20	3E.3	DIFFERENTIAL TOXICITY EFFECT OF ARSENIC SPECIES ON GUT MICROBIOME, ESCHERICHIA COLI, Shiv Bolan, Global Centre for Environmental Remediation	3F.3 REMEDIATION OF MERCURY CONTAMINATION AT A FORMER CHLORALKALI PLANT IN NSW USING INTEGRATED CAP AND CONTAINMENT TECHNOLOGIES, Gavan Butterfield, Golder Associates
16:40	3E.4	EVALUATION OF ENVIRONMENTAL METHAMPHETAMINE EXPOSURE THROUGH HAIR ANALYSIS, Jackie Wright, Flinders University	3F.4 RE-ASSESSING REMEDIAL TARGETS BASED ON CHANGES IN TOTAL RECOVERABLE HYDROCARBONS MIXTURES DURING REMEDIATION, Ken Kiefer, ERM
17:00	Poster Session - Exhibition Hall		

3G - Advances in waste management (Sponsor: SESL Australia Pty Ltd)

Room: Meeting Room 15

Chair: John Hunt, Ventia Utility Services

3H - Advances in monitoring natural attenuation

Room: Meeting Room 16

Chair: Peter Beck, GHD

3G.1 **KEYNOTE:** REBUILDING FUNCTIONAL SOIL: THE ROLE OF WASTES, Simon Leake, SESL Australia Pty Limited

3H.1 **KEYNOTE:** A PARADIGM SHIFT IN METHODS TO MONITOR PETROLEUM NATURAL ATTENUATION, Tom Palaia, CH2M

3G.2 BENEFICIAL REUSE OF REMEDIATED SOILS BETWEEN TWO SEPARATE REMEDIATION PROJECTS IN SYDNEY, NSW, Michael Nicholls, SESL Australia Pty Limited

3H.2 IDENTIFICATION OF NATURAL ATTENUATION MECHANISMS AND RATES USING ADVANCED TOOLS, Julie Konzuk, Geosyntec Consultants

3G.3 THERMAL DESORPTION - THE MOVE FROM MOBILE TO FIXED TREATMENT FACILITIES AND ITS IMPLICATIONS FOR THE AUSTRALIAN MARKET, Mark Bennett, Ventia Utility Services

3H.3 EXAMINING THE VALUE OF INORGANIC ELECTRON ACCEPTORS AS INDICATORS OF NATURAL ATTENUATION IN HYDROCARBON PLUMES, Nivari Jayasinghe, WSP Australia Pty Limited

3G.4 ASBESTOS: A DISCUSSION ON SITE-SPECIFIC HEALTH RISK ASSESSMENT, Nathan Aust, Regional EnviroScience

3H.4 BACTERIA ASSISTED PHYTOREMEDIATION OF TANNERY WASTEWATER BY SPIRODELA POLYRRHIZA (L.) SCHLEID., Piyush Malaviya, University Of Jammu

DETAILED PROGRAM

TUESDAY 12 SEPTEMBER 2017

08:00	Registration			
08:45	PLENARY SESSION 2: Conference Hall 1, 2 and 3 (Sponsor: NSW EPA) MINIMISING THE ENVIRONMENTAL IMPACTS OF CONTAMINATION AND HAZARDOUS SUBSTANCES IN NSW, Mark Gifford, NSW EPA			
10:00	Morning tea			
CONCURRENT SESSIONS 4A - 4H				
	4A - Remediation and management of PFAS (Sponsor: University of Newcastle) Room: Conference Hall 1 Chair: Megharaj Mallavarapu, University of Newcastle		4B - PFAS case studies Room: Conference Hall 2 (Sponsor: GHD) Chair: Andrew Kohlrusch, GHD	
10:30	4A.1	KEYNOTE: IN SITU TREATMENT OPTIONS FOR PFAS-CONTAMINATED GROUNDWATER, Kurt Pennell, Tufts University	4B.1	KEYNOTE: PFAS STRATEGIC MANAGEMENT FLYOVER: LESSONS LEARNED FROM >100 DOD SITES, Nathan Hagelin, AMEC FOSTER WHEELER
10:50				
11:10	4A.2	IN SITU TREATMENT OPTIONS FOR PFAS-CONTAMINATED GROUNDWATER, Cheng Fang, CRC CARE, GCER, UON	4B.2	10 YEARS OF PFOS-REMEDICATION IN SWEDEN - EXPERIENCES GAINED WITH REGARD TO RISK ASSESSMENT, CONTAMINATION MAPPING AND PFAS- REMEDICATION, Andreas Woldegiorgis, WSP Sweden
11:30	4A.3	IN-SITU STABILIZATION OF PFAS IN GROUNDWATER, Peter Storch, Arcadis	4B.3	PFAS REMOVAL OPTIONS FOR DRINKING WATER TREATMENT: AN OVERVIEW AND CASE STUDY, Yaode Yan, Hunter H2O
11:50	4A.4	APPROACH AND PRACTICE OF COUPLING SEPARATION AND DESTRUCTION TECHNOLOGIES FOR PFAS TREATMENT, Dora Chiang, AECOM	4B.4	A CASE STUDY: EMERGENCY RESPONSE TO PFAS CONTAMINATION IN OVER 250 DOMESTIC WATER WELLS, Michael Smith, VT Dept. Environmental Conservation
12:10	Lunch			

■ International PFAS Conference session

4C - Greenhouse gas emission and mitigation		4D - Regulatory considerations in landuse planning and management	
Room: Conference Hall 3		Room: Meeting Room 11	
Chair: Nanthi Bolan, University of Newcastle		Chair: Arminda Ryan, NSW EPA	
4C.1	KEYNOTE: COAL FIRED POWER STATIONS: MANAGING EMISSIONS AND WASTES, Kenneth Sajwan, Savannah State University	4D.1	THE EU HORIZON 2020 INSPIRATION EUROPEAN'S STRATEGIC RESEARCH AGENDA FOR SPATIAL PLANNING, LAND USE AND SOIL SYSTEMS MANAGEMENT, Paul Nathanail, University of Nottingham
		4D.2	FISHERMANS BEND: REGIONAL-SCALE GROUNDWATER ASSESSMENT AND REGULATORY CONSIDERATIONS, Anne Northway, EPA Victoria
4C.2	ENERGY PRODUCTION FROM DIFFERENT TYPES OF ENERGY CROPS UTILIZING NUTRIENTS FROM RECYCLED WATER, Sonia Shilpi, University of Newcastle	4D.3	COLLABORATIVE APPROACH TO PRECINCT REMEDIATION PLANNING - ADVANCING ALIGNMENT OF VISION, TECHNOLOGY, AND REGULATIONS, Christian Wallis, CDM Smith
4C.3	ULTRA HIGH SURFACE AREA ACTIVATED CARBONS PREPARED FROM BIOMASS FOR HIGH PRESSURE CO2 ADSORPTION, Gurwinder Singh, CRCCARE	4D.4	HUNTER COUNCILS JOIN FORCES IN A CONTAMINATED LAND PROGRAM, Anna Lundmark, Hunter Councils
4C.4	ESTIMATION OF CO2 EMISSIONS FROM BIOSOLID LAND APPLICATION, Hasintha Wijesekara, Global Centre for Environmental Remediation (GCER)	4D.5	MANAGEMENT OF CONTAMINATED LAND RISKS IN GENERALIZED REZONING PROCESSES: WHAT CAN SYDNEY AND MELBOURNE LEARN FROM EACH OTHER?, Derek Langgongs, Jacobs Group (Australia) Pty Ltd

DETAILED PROGRAM

TUESDAY 12 SEPTEMBER 2017

CONCURRENT SESSIONS 4A - 4H			
4E - Advances in site characterisation Room: Meeting Room 12 Chair: Dan Ombalski, Directed Technologies Drilling, Inc.		4F - Advances in sampling of environmental matrices Room: Meeting Room 13 Chair: Ryan Wymore, CDM Smith	
10:30	4E.1	KEYNOTE: INNOVATIVE VISUALIZATION METHOD FOR DELINEATING BIODEGRADATION ZONES IN GROUNDWATER, Grant Carey, Porewater Solutions	4F.1 KEYNOTE: VARIABILITY AND UNCERTAINTY ASSOCIATED WITH SAMPLING, ANALYSIS, AND RISK ASSESSMENT, Naji Akladiss, Maine Dept. of Environmental Protection
10:50			
11:10	4E.2	HIGH RESOLUTION TECHNIQUES FOR GEOENVIRONMENTAL CHARACTERIZATION OF A SITE WITH METHANE IN THE SUBSOIL, Leandro Gomes de Freitas, Institute for Technological Research	4F.2 FAILURE OF VALIDATION OF ORGANIC SITE CONTAMINATION USING CONVENTIONAL BULK SOIL SAMPLING: INTRODUCING A BETTER METHOD, Adrian Heggie, WSP Australia
11:30	4E.3	OPTIMIZE GROUNDWATER MONITORING NETWORK USING FRACTAL SINGULARITY INDEX TECHNIQUE, Hamed Esfahani, James Cook University	4F.3 UNDERWATER DRONE SAMPLING TO ASSESS HYDROCARBON IMPACTS AND NATURAL ATTENUATION IN A MARINE PIPELINE, Scott Robinson, AECOM
11:50	4E.4	MEASURING BEDROCK FRACTURE HYDRAULICS AND GEOMECHANICS USING LOW FREQUENCY FIBER OPTIC DISTRIBUTED ACOUSTIC SENSING (DAS), Matthew Becker, California State University Long Beach	4F.4 THE USE OF THE PASSIVE SOIL VAPOUR SAMPLING METHOD TO IDENTIFY SOURCE AREAS AND QUANTIFY IMPACT OF CHLORINATED HYDROCARBON COMPOUNDS, Nivari Jayasinghe, WSP Australia Pty Limited
12:10	Lunch		

4G - Advances in emerging contaminants

Room: Meeting Room 15

Chair: Tamzen Macbeth, CDM Smith

4G.1 **KEYNOTE:** SUMMARY OF 1,4-DIOXANE TREATMENT TECHNOLOGIES, William DiGuseppi, CH2M HILL

4G.2 PROBING THE ENVIRONMENTAL FATE OF ACESULFAME, Kelvin Leung, Hong Kong Baptist University

4G.3 SOIL MIXING OF EMERGING CONTAMINANTS, Marika Sallot Des Noyers, Menard Oceania

4G.4 OZOFRACTIONATIVELY CATALYSED REAGENT ADDITION PERFORMANCE IN REMOVAL OF PFAS FROM 3 CONTAMINATED WATERS, Michael Dickson, Evocra

4H - Bioavailability And Bioaccessibility Of Contaminants

Room: Meeting Room 16

Chair: Dora Taggart, Microbial Insights

4H.1 **KEYNOTE:** GEOCHEMICAL CONTROLS ON THE BIOACCESSIBLE FRACTIONS OF SELECTED ELEMENTS IN LONDON SOILS, Mark Cave, British Geological Survey

4H.2 BIOAVAILABILITY OF BENZO[A]PYRENE IN SOILS USING A SWINE MODEL, Luchun Duan, University of Newcastle

4H.3 CAN LEAD ENTER INDEPENDENTLY IN THE PRESENCE OF ZINC INTO HUMAN BODY? A STUDY ON EFFECT OF ZINC ON LEAD BIOAVAILABILITY, Ayanka Wijayawardena, University of Newcastle

4H.4 SPECIATION AND BIOACCESSIBILITY OF LEAD IN SHOOTING RANGE SOILS OF CHINA, Yeling Li, University of Science and Technology of China

DETAILED PROGRAM

TUESDAY 12 SEPTEMBER 2017

CONCURRENT SESSIONS 5A - 5H			
	5A - Improving PFAS risk assessments (Sponsor: GHD) Room: Conference Hall 1 Chair: Matthew Rousseau, GHD		5B - Advances in analysis and measurement of contaminants (Sponsor: Agilent Technologies) Room: Conference Hall 2 Chair: Mahmud Rahman, University of Newcastle
13:10	5A.1	PROVISIONAL GUIDELINE VALUES FOR PFOS IN SOIL AND GROUNDWATER, AND THE NEED FOR OTHER TOOLS FOR ASSESSMENT OF PFAS CONTAMINATED SOIL, Michael Pettersson, Swedish Geotechnical Institute	5B.1 KEYNOTE: COMPREHENSIVE WORKFLOW FOR THE SCREENING AND IDENTIFICATION OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFASS) IN AUSTRALIAN WATERS, Tarun Anumol, Agilent Technologies
13:30	5A.2	COLLABORATING WITH PFAS-IMPACTED COMMUNITIES FOR TECHNICAL OUTCOMES, Sharon Suzor, AECOM	
13:50	5A.3	PFAS CONTAMINATION - HOW MUCH WILL IT COST POLLUTERS? QUANTIFYING CLAIMS ARISING FROM PFAS CONTAMINATION, Sarah Mansfield, Henry Davis York Lawyers	5B.2 IDENTIFYING ANALYTICAL PROBLEMS WITH HYDROCARBON TESTING THROUGH PROFICIENCY TESTING, Raluca Iavetz, National Measurement Institute
14:10	5A.4	FATE AND TRANSPORT OF PFAS, CONCEPTUAL AND NUMERICAL MODELS, Mark Clough, GHD	5B.3 IMPROVING MEASUREMENT USING PROFICIENCY TESTING, LUMINITA ANTIN, National Measurement Institute
14:30	5A.5	USES OF 2003-2014 NHANES DATA TO DETERMINE THE ASSOCIATIONS BETWEEN POLYFLUOROALKYL SUBSTANCES AND CHOLESTEROL, Zhaomin Dong, University of Newcastle	5B.4 QUANTIFICATION OF PERFLUORINATED COMPOUNDS IN ENVIRONMENTAL WATER SAMPLES BY MATRIX-ASSISTED LASER DESORPTION/IONISATION TIME OF FLIGHT MASS SPECTROMETRY, Brooke Dilmetz, Molecular Life Sciences, University of Adelaide
14:50	Afternoon tea		

5C - Advances in chlorinated hydrocarbon contaminated site assessment, remediation and management

Room: Conference Hall 3

Chair: Eric Bergeron, Golder Associates

5D - Advances in the assessment, remediation and management of petroleum hydrocarbon contaminated sites

Room: Meeting Room 11

Chair: Greg Davis, CSIRO

5C.1 **KEYNOTE:** THE CHANGING PARADIGM OF CHLORINATED SOLVENT REMEDIATION, Kent Sorenson, CDM Smith

5D.1 **KEYNOTE:** WHAT IS GOING ON HERE? NEWLY APPRECIATED WEATHERING MECHANISMS IN MACONDO WELL OIL, Gregory Hall, U.S. Coast Guard Academy

5C.2 IMPORTANCE OF UNUSUAL DICHLOROETHYLENE ISOMER RATIOS AND SEWER LEAKAGE TO AN IN SITU REMEDIATION, James Studer, InfraSUR, LLC

5D.2 EVOLUTION OF RISK BASED SOIL AND GROUNDWATER PORTFOLIO MANAGEMENT, Tanya Astbury, Viva Energy Australia Pty Ltd

5C.3 MANAGING CHC AT EDINBURGH DEFENCE PRECINCT - A RISK BASED APPROACH, Mark Donaghey, CRC CARE

5D.3 AMENDMENT-BASED BIOSTIMULATION ENHANCES DEGRADATION OF PETROLEUM HYDROCARBON-CONTAMINATED FINE GRAINED SOIL: A LABORATORY MICROCOSM STUDY, Mezbaul Bahar, University of Newcastle

5C.4 THE LEARNINGS FROM THREE YEARS OF WIDE-SCALE CHC ASSESSMENT, Andrew Pruszinski, SA Environment Protection Authority

5D.4 NOVEL FIELD APPLICATION OF A SMALL SCALE TREATMENT TRIAL, Shane Giliam, WSP Australia

DETAILED PROGRAM

TUESDAY 12 SEPTEMBER 2017

CONCURRENT SESSIONS 5A - 5H			
		5E - Advances in site characterisation Room: Meeting Room 12 Chair: Grant Carey, Porewater Solutions	5F - Sustainability in environmental site assessment and remediation Room: Meeting Room 13 Chair: Bruce Kennedy, CRC CARE
13:10	5E.1	KEYNOTE: STATE OF THE ART: THE EVOLUTION OF HDD FOR THE INSTALLATION OF HORIZONTAL WELLS, Dan Ombalski, Directed Technologies Drilling, Inc.	5F.1 KEYNOTE: SUSTAINABILITY AND SUSTAINABLE: A WORLD OF DIFFERENCE, Paul Nathanail, University of Nottingham
13:30			
13:50	5E.2	ADVANCED DIAGNOSTIC TOOLS TO SUPPORT MONITORED NATURAL ATTENUATION FOR DNAPL PLUME IN BEDROCK, Tamzen Macbeth, CDM Smith	5F.2 CAN REMEDIATION REALLY BE SUSTAINABLE - A GASWORKS CASE STUDY, Adam Fletcher, Ventia Pty Ltd
14:10	5E.3	APPLYING A RANGE OF INVESTIGATIVE TECHNIQUES TO ASSESS GROUNDWATER IMPACT IN A REMOTE AREA, Dora Kovacs, ERM Australia	5F.3 RISK-BASED SUSTAINABLE MANAGEMENT AND REMEDIATION OF PFOS, Peter Nadebaum, GHD
14:30	5E.4	NUCLEAR MAGNETIC RESONANCE: A NEW FORENSIC/ DIAGNOSTIC TOOL IN OUR TOOLBOX?, Julie Konzuk, Geosyntec Consultants	5F.4 A REVIEW OF PFAS REMEDIATION METHODS, THEIR CHARACTERISTICS AND SUSTAINABILITY METRICS, Charles Grimison, Ventia
14:50	Afternoon tea		

5G - Advances in emerging contaminants		5H - Bioavailability and bioaccessibility of contaminants	
Room: Meeting Room 15		Room: Meeting Room 16	
Chair: Belinda Goldsworthy, Ramboll Environ Australia		Chair: Luchun Duan, University of Newcastle	
5G.1	KEYNOTE: GUIDELINES FOR THE ASSESSMENT AND REMEDIATION OF MTBE, Lyn Denison, DLA Environmental Services	5H.1	KEYNOTE: STUDY DESIGN CONSIDERATIONS, POLICY, AND DATA GAPS FOR BIOAVAILABILITY OF ORGANIC CHEMICALS IN SOIL, Yvette Lowney, Yvette Wieder Lowney
5G.2	ASSESSMENT OF NATURAL ATTENUATION OF MTBE AFTER SHUT DOWN OF A BIOBARRIER SYSTEM, Heather Rectanus, Battelle	5H.2	DEVELOPMENT OF A CONSERVATIVE METHOD TO ASSESS LEAD BIOACCESSIBILITY FROM PM10 AND PM2.5 SIMULATING A HUMAN INHALATION SCENARIO, Farzana Kastury, Future Industries Institute, University of South Australia
5G.3	PFOS AND PFOA ECOLOGICAL GUIDELINE VALUES - CONSIDERATIONS FOR DERIVATION, Carolyn Brumley, Golder Associates	5H.3	A PRELIMINARY ASSESSMENT OF THE RELATIONSHIP BETWEEN CLAY-ASSOCIATED ORGANIC MATERIAL AND PAH BIOACCESSIBILITY IN SOIL: FOCUS ON HIGHLY SEQUESTERED PAH RESIDUES, Anthony Umeh, Global Centre for Environmental Remediation
5G.4	RISK-BASED MANAGEMENT AND REMEDIATION OF BENZO(A)PYRENE, Peter Nadebaum, GHD	5H.4	EFFECTS OF SOURCE MATERIALS ON DESORPTION KINETICS OF PAHS FROM CONTAMINATED SOILS, Linbo Yu, Global Centre for Environmental Remediation (GCER)

DETAILED PROGRAM

TUESDAY 12 SEPTEMBER 2017

CONCURRENT SESSIONS 6A - 6H			
	6A - Improving PFAS risk assessments (Sponsor: GHD) Room: Conference Hall 1 Chair: Fraser Watt, GHD		6B - Advances in amendment formulation and delivery Room: Conference Hall 2 Chair: Sreenivasulu Chadalavada, CRC CARE
15:20	6A.1	PFAS OCCURRENCE GLEANED FROM EVALUATIONS OF OVER 1,000 POTENTIAL PFAS RELEASE LOCATIONS, Bill DiGuseppi, CH2M HILL	6B.1 ELECTROKINETIC FIELD TRIAL FOR AMENDMENT EMPLACEMENT AND CONTAMINANT DEGRADATION, Denis O'Carroll, UNSW
15:40	6A.2	IMMOBILISATION OF PFC IMPACTED SOILS, Adrian Scott, Enviropacific Services	6B.2 DEMONSTRATION OF PERMEABILITY ENHANCEMENT TECHNOLOGY FOR IN SITU REMEDIATION AT THREE LOW PERMEABILITY SITES, Kent Sorenson, CDM Smith
16:00	6A.3	ENVIRONMENTAL HEALTH RISK CHARACTERISATION COMPARISON FROM PFOS EXPOSURE USING A MULTIPLE LINES OF EVIDENCE APPROACH, Amanda Lee, AECOM	6B.3 IS IT IMMOBILISED?, Danielle Toase, Ventia
16:20	6A.4	PFOS AND PFOA HEALTH BASED DECONTAMINATION CRITERIA FOR FIRE FIGHTING APPLIANCES, Eric Friebe, GHD	6B.4 IN SITU BIOREMEDIATION CASE STUDIES - TAILORING AMENDMENT APPLICATION TO OPTIMISE AND MAINTAIN TREATMENT CONDITIONS, Daniel Hodges, Golder Associates
16:40	6A.5	SAMPLING SITES POTENTIALLY CONTAMINATED BY PFAS- OVERREACTING OR UNRAVELING THE ISSUE?, Victor Arias, University of Newcastle	6B.5 HOLLOW SPHERE SILICA NANO-BULLET: TO KILL OR PROTECT THE ENVIRONMENT, A PESTICIDE DELIVERY PERSPECTIVE, Md Nuruzzaman, University of Newcastle and CRC CARE
17:00	Sessions close		
18:30	Pre-dinner drinks followed by Conference Gala Dinner at 19:00		

6C - Advances in chlorinated hydrocarbon contaminated site assessment, remediation and management

Room: Conference Hall 3

Chair: Heather Rectanus, Battelle

6C.1 **KEYNOTE:** CHARACTERISTICS OF CHLORINATED SOLVENT SOURCE ZONES & PLUMES IN SEDIMENTARY ROCK: IMPLICATIONS FOR REMEDIATION, MONITORING AND SOURCE WATER PROTECTION, Beth Parker, University of Guelph

6C.2 **KEYNOTE:** INNOVATIVE DIAGNOSTIC TOOLS FOR NAPL CHARACTERISATION AND REMEDIATION, Tamzen Macbeth, CDM Smith

6C.3 CHLORINATED SOLVENT INVESTIGATIONS IN A LOW-YIELDING ENVIRONMENT, Mark Chapman, AECOM

6D - Geostatistical approaches to environmental investigation

Room: Meeting Room 11

Chair: Kurt Pennell, Tufts University

6D.1 **KEYNOTE:** DESIGN OPTIMISATION OF ENVIRONMENTAL CONTAMINATION PROJECTS USING MASSIVELY PARALLEL SOLUTION METHODS, Larry M. Deschaine, HydroGeoLogic

6D.2 A MACHINE LEARNING APPROACH TO GEOSTATISTICS APPLIED TO CONTAMINANTS IN SOILS, Mark Cave, British Geological Survey

6D.3 THE CONCEPT OF DECISION AREA OR VOLUME IN THE CONTEXT OF STATISTICALLY BASED SAMPLE PATTERN DESIGN AND DATA ASSESSMENT, Peter Beck, GHD

6D.4 BETTER THAN HUMAN: CAN WE MAKE BETTER PREDICTIONS ABOUT SITE CONTAMINATION THROUGH APPLIED DATA ANALYTICS?, Andrew Barker, CDM Smith

DETAILED PROGRAM

TUESDAY 12 SEPTEMBER 2017

CONCURRENT SESSIONS 6A - 6H			
6E - Advances in site characterisation		6F - Managing environmental issues in agriculture	
Room: Meeting Room 12		Room: Meeting Room 13	
Chair: Matthew Becker, California State University Long Beach		Chair: Prashant Srivastava, CRC CARE	
15:20	6E.1	KEYNOTE: THE STATE OF MOLECULAR BIOLOGICAL TOOLS: LEAPS FORWARD AND LESSONS LEARNED, Dora Taggart, Microbial Insights	6F.1 BIOCHAR IN COMBINATION WITH COMPOST ENHANCED MAIZE GROWTH ON CONTAMINATED SOIL AND TRANSFORMED PB TO NON-TOXIC FORM AT THE CELLULAR LEVEL, Sifau Adejumo, University of Ibadan, Ibadan
15:40			6F.2 BIOCHAR MODULATES THE HEAVY METAL TOXICITY ON MICROORGANISMS AS MEASURED BY MICROBIAL CARBON USE EFFICIENCY, Yilu Xu, University of Newcastle
16:00	6E.2	PROVEN APPROACH TO ASSESS THE AGE, LOCATION, AND VAPOR INTRUSION (VI) POTENTIAL OF VOC SOURCES BENEATH LARGE BUILDINGS, Craig Cox, Cox-Colvin & Associates, Inc.	6F.3 ARSENIC ACCUMULATION AND UPTAKE IN DIFFERENT RICE VARIETIES, Md Zahangir Hossain, Global Centre for Environmental Remediation
16:20	6E.3	CONTINUOUS MONITORING PROVIDES OPPORTUNITY TO QUANTIFY AND REDUCE MEASUREMENT UNCERTAINTY IN ENVIRONMENTAL MONITORING OF CONTAMINATED SITES, Alastair Reed, HydroTerra Pty Ltd	6F.4 INFLUENCE OF WATER MANAGEMENT STRATEGIES ON CADMIUM ACCUMULATION IN RICE, Syfullah Shahriar, GCER, UoN
16:40	6E.4	BEYOND COMPLIANCE: A MULTI-FACETED APPROACH TO MONITORING PROVIDES A COST-EFFECTIVE APPROACH TO DERIVING MULTIPLE-LINES OF EVIDENCE FOR REMEDIATION, Richard Campbell, HydroTerra Pty Ltd	6F.5 GROUNDWATER QUALITY ASSESSMENT OF CULTIVATED LANDS IRRIGATED WITH POST METHANATED DISTILLERY EFFLUENT IN WESTERN UTTAR PRADESH OF INDIA, Uday Pratap Shahi, Sardar Vallabhbhai Patel University of Agriculture & Technology
17:00	Sessions close		
18:30	Pre-dinner drinks followed by Conference Gala Dinner at 19:00		

6G - Advances in emerging contaminant

Room: Meeting Room 15

Chair: Joytishna Jit, CRC CARE

6H - Education and training in environmental risk assessment and remediation (Sponsor: University of Newcastle)

Room: Meeting Room 16

Chair: Ravi Naidu, CRC CARE/University of Newcastle

6G.1 TREATMENT OF AFFF-IMPACTED GROUNDWATER USING AN ELECTROCHEMICAL AND BIOLOGICAL TREATMENT TRAIN, Ryan Wymore, CDM Smith

6H.1 Ravi Naidu, CRC CARE/University of Newcastle

6G.2 THE ANGIOSUPPRESSIVE EFFECT OF PHOTO-DEGRADED PRODUCTS OF ACESULFAME, Patrick Yue, Department of Biology, Hong Kong Baptist University

6H.2 Paul Nathanail, University of Nottingham

6G.3 SCIENTIFIC LEARNINGS FOLLOWING PREPARATION OF PFAS AND PESTICIDES AQUATIC ECOSYSTEM GUIDELINES, Kirsten Broadgate, Golder Associates

6H.3 Monica Esposito, University of Newcastle

6G.4 TREATMENT OF POLY- AND PERFLUOROALKYL SUBSTANCES IN GROUNDWATER USING GRANULAR ACTIVATED CARBON, Michelle Crimi, Clarkson University

6H.4 Belinda Goldsworthy, Ramboll Environ Australia

6G.5 LEARNINGS FROM A PFAS GROUNDWATER TREATMENT SYSTEM AT A FEDERAL AIRPORT SITE IN QUEENSLAND, Andrew Thomas, Enviropacific Services

6H.5 Andrew Pruszinski, SA EPA

DETAILED PROGRAM

WEDNESDAY 13 SEPTEMBER 2017

08:00	Registration
08:45	PLENARY SESSION 3: Conference Hall 1, 2 and 3 Expert panel hosted by Bernie Hobbs for ABC Radio National's 'Big Ideas' - Thousands of new chemicals a year: how do we protect ourselves?
10:00	Morning tea

CONCURRENT SESSIONS 7A - 7H		
	7A - Developments in PFAS Analysis Room: Conference Hall 1 Chair: Raja Dharmarajan, University of Newcastle	7B - Advances in ecological risk assessment (Sponsor: Golder Associates) Room: Conference Hall 2 Chair: Naomi Lee, NSW EPA
10:30	7A.1 PFAS PROFICIENCY TESTING: BETTER MEASUREMENT, BETTER MANAGEMENT, Daniel Slee, National Measurement Institute	7B.1 KEYNOTE: SOLUTIONS FOR MANAGING RISKS TO THE RECEIVING ENVIRONMENT, Blair McDonald, Golder Associates Ltd
10:50	7A.2 AFFF ANALYSIS WITH TOF-CIC, TOPA & LC-MS/MS: CONNECTING THE DOTS, Robert Symons, Eurofins mgt	
11:10	7A.3 VALIDATION OF SOIL LEACHING PROTOCOLS FOR DETERMINING PFAS MOBILITY IN SOILS, Karl Bowles, NSW OEH	7B.2 NEW GENERATION OF TOOLS AND APPROACHES FOR ECOLOGICAL RISK ASSESSMENT OF EMERGING CONTAMINANTS, Anupama Kumar, CSIRO
11:30	7A.4 ASSESSMENT OF PFAS IN SOIL AND GROUNDWATER: DIRECT COMPARISON OF NEW ANALYTICAL TECHNOLOGIES FOR COMPREHENSIVE ANALYSIS OF PFAS INCLUDING PRECURSORS, Ian Ross, Arcadis	7B.3 COMPETITIVE AND MULTISPECIES MODELS FOR DEVELOPMENT OF TERRESTRIAL BIOTIC LIGAND MODELS, Dane Lamb, GCER
11:50	7A.5 DEVELOPMENT OF A FAST METHOD FOR THE ANALYSIS OF PFAS COMPOUNDS, James Pyke, Agilent Technologies	7B.4 PATHWAY FORENSICS: NEW DIRECTION FOR ASSESSING CONTAMINANT MIGRATION TO ECOLOGICAL AQUATIC RECEPTORS, Frederic Cosme, Golder Associates
12:10	Lunch	

■ International PFAS Conference session

7C - Advances in nanotechnology for environmental remediation		7D - LNAPL Natural source zone depletion (Sponsors: E-Flux and CH2M)	
Room: Conference Hall 3		Room: Meeting Room 11	
Chair: Megharaj Mallavarapu, University of Newcastle		Chair: Robert Lenhard, CSIRO	
7C.1	A DIPPING METHOD FOR IMPROVING NZVI IMMOBILIZATION ONTO ELECTROSPINNING NANOFIBER MAT, Ho Kyong Shon, University of Technology Sydney	7D.1	KEYNOTE: SOURCE ZONE NATURAL DEPLETION: INITIAL COMPARISON OF DEGRADATION RATES AND MEASUREMENT TECHNIQUES, Greg Davis, CSIRO
7C.2	EFFECT OF TiO ₂ NANOPARTICLES ON CELL VIABILITY AND MORPHOLOGY OF MURINE REPRODUCTIVE CELLS, Chamila Samarasinghe, Global Centre for Environmental Remediation		
7C.3	APPLICATION OF NANOPARTICLES FOR THE DETOXIFICATION OF WATER CONTAMINANTS, Sudeep Shukla, Amity University Haryana	7D.2	A COMPARISON OF NATURAL SOURCE ZONE DEPLETION AND ACTIVE REMEDIATION RATES, Tom Palaia, CH2M
7C.4	IRON NANOPARTICLES, METALLIC MUSCLES FOR CLAY: STRENGTHENING THE ARSENIC REMEDIAL EFFICIENCY, Kh Ashraf Uz-Zaman, University of Newcastle	7D.3	SOURCE ZONE NATURAL ATTENUATION MICROBIAL PROCESSES AND OVERVIEW OF SZNA FLUX-BASED METHODS, Julio Zimbron, E-Flux
7C.5	GREEN REMEDIATION OF MIXED CONTAMINANTS USING SURFACE-TAILORED ORGANOCLAYS, Bhabananda Biswas, Future Industries Institute	7D.4	LNAPL SOURCE ZONE NATURAL ATTENUATION AS DELINEATION TOOL AND REMEDY: USING SURFICIAL CO ₂ EFFLUX TO HELP CHARACTERIZE AND MANAGE LNAPL SITES, Matthew Rousseau, GHD

DETAILED PROGRAM

WEDNESDAY 13 SEPTEMBER 2017

CONCURRENT SESSIONS 7A - 7H			
		7E - Case studies on contaminant assessment, remediation and management Room: Meeting Room 12 Chair: Kent Sorenson, CDM Smith	7F - Assessment and remediation of heavy metal contaminated sites Room: Meeting Room 13 Chair: Piyush Malaviya, University of Jammu
10:30	7E.1	THE MACDONALDTOWN GASWORKS REMEDIATION: A CASE STUDY OF COMMUNITY ENGAGEMENT, Catherine Fletcher, Ventia Utility Services Pty Ltd	7F.1 THE EFFECT OF LEAD IN SOIL ON CRIME DEPRIVATION IN DERBY, LEICESTER AND NOTTINGHAM, Mark Cave, British Geological Survey
10:50	7E.2	HIVE MIND: LESSONS FROM 25 YEARS OF CONTAMINATED SITE REMEDIATION, Emmylou Cooke, Ventia Utility Services Pty Ltd	7F.2 RANKING CONTAMINATED SITES BY RISK - A CASE STUDY OF SHOOTING RANGES IN VICTORIA, Victor Kabay, Environment Protection Authority Victoria
11:10	7E.3	DEVELOPING OPERATIONAL SITE-SPECIFIC GROUNDWATER TRIGGER LEVELS AND REMEDIATION CRITERIA AT AN ALUMINA REFINERY, Andrew Howes, Golder Associates	7F.3 PARAMETER OPTIMISATION OF SHOOTING RANGE REMEDIATION TECHNOLOGY FOR STRONGLY WEATHERED CLAY RICH TROPICAL SOIL: FIELD SCALE RESEARCH, Kandasamy Thangavadiel, CRC CARE
11:30	7E.4	INNOVATIVE DESIGN OF A GROUNDWATER CONTAINMENT AND TREATMENT SYSTEM INSTALLED IN THE NORTH COAST OF NSW, Pedro Balbachevsky, AECOM Australia Pty Ltd	7F.4 TAKE YOUR BEST SHOT - THE CHALLENGE OF REMEDIATING AND MANAGEMENT OF LEAD IMPACTED SHOOTING RANGES, VICTORIA, Christian Wallis, CDM Smith
11:50	7E.5	CURRENT STATUS AND FUTURE APPROACH OF ENVIRONMENTAL REMEDIATION IN COLOMBIA, Alfonso Rodriguez, R3 Environmental Technology Colombia SAS	7F.5 INORGANIC ARSENIC IN RICE AND CANCER RISK, Mohammad Mahmudur Rahman, University of Newcastle
12:10	Lunch		

7G - Development of national remediation framework in Australia		7H - Recent research on environmental contamination by HDR students and early career researchers	
Room: Meeting Room 15		Room: Meeting Room 16	
Chair: Kerry Scott, CRC CARE		Chair: Suresh Subhashchandrabose, University of Newcastle	
7G.1	KEYNOTE: NATIONAL FRAMEWORK FOR REMEDIATION - DEVELOPMENT AND FINALISATION, Bruce Kennedy, CRC CARE	7H.1	ESTIMATION OF SAFE MERCURY LEVELS IN SOIL BY SPECIES SENSITIVITY DISTRIBUTION APPROACH, Khandaker Rayhan Mahbub, University of Technology Sydney
7G.2	ESTABLISHING REMEDIATION OBJECTIVES FOR SITES: BEST PRACTICES FROM AUSTRALIA, Joytishna Jit, CRC CARE / University of South Australia	7H.2	PLANT UPTAKE AND RISK ESTIMATION OF HEAVY METALS IN CCA TREATED TIMBER AFTER REMEDIATION FOR UTILISATION AS GARDEN MATERIALS, Yanju Liu, University of Newcastle
7G.3	COST BENEFIT AND SUSTAINABILITY ANALYSIS TOOL, Luke Clements, CH2M	7H.3	CHEMODYNAMICS AND PHYTOTOXICITY OF BINARY METAL(LOID) MIXTURES AT LOW-TOXIC EFFECT CONCENTRATIONS, Mohammed Kader, GCER, University of Newcastle
7G.4	IDENTIFYING AND ASSESSING CONTAMINATED SITE REMEDIATION OPTIONS, Peter Nadebaum, GHD	7H.4	LEACHING BEHAVIOUR OF HEAVY METAL(LOIDS) IN CCA TREATED TIMBER AND ITS IMMOBILISATION, Jianhua Jason Du, GCER
		7H.5	GEOCHEMICAL PARTITIONING AND MOBILITY OF TRACE METALS IN SEDIMENTS OF A HIGHLY IMPACTED TROPICAL LAGOON, Amii Useese, University of Lagos

DETAILED PROGRAM

WEDNESDAY 13 SEPTEMBER 2017

CONCURRENT SESSIONS 8A - 8H			
	8A - Understanding PFAS in the environment Room: Conference Hall 1 Chair: Michael Smith, VT Dept. Environmental Conservation		8B - Remediation engineering: Improving design and operation of groundwater remediation systems (Sponsor: Golder Associates) Room: Conference Hall 2 Chair: Larry M. Deschaine, HydroGeoLogic
13:10	8A.1	PFAS SERUM HALF-LIFE IN SHEEP OF DIFFERENT AGES AND GENDER, Roger Drew, ToxConsult Pty Ltd	8B.1 KEYNOTE: IMPROVING DESIGN AND OPERATION OF GROUNDWATER REMEDIATION SYSTEMS, Eric Bergeron, Golder Associates Ltd
13:30	8A.2	PFAS MEASUREMENT IN BIOTA AND HUMANS: BEST PRACTICES FROM A CASE STUDY IN SAN FRANCISCO, Bharat Chandramouli, SGS AXYS	
13:50	8A.3	DETERMINATION OF PFAS IN VICTORIAN WASTEWATER UTILIZING TARGETED AND UNTARGETED ANALYSIS, Timothy Coggan, RMIT University	8B.2 MANAGING A COMPLEX REMEDIATION PROJECT IN AN EVOLVING ENVIRONMENT, Camillo Coladonato, Dow Chemical
14:10	8A.4	BALANCING POLLUTION FROM FIRES AGAINST POLLUTION FROM FIREFIGHTING - WHAT IS THE NEW NORM?, Mike Willson, Willson Consulting	8B.3 RECENT DEVELOPMENTS IN IDENTIFICATION OF UNKNOWN CONTAMINATION SOURCES AND MONITORING NETWORK DESIGN FOR CONTAMINATED GROUNDWATER SYSTEMS, Bithin Datta, James Cook University
14:30	8A.5	Two case studies on PFAS, Vanja Alling, Norwegian Environment Agency	8B.4 ORICA BOTANY GROUNDWATER CLEANUP: A CASE STUDY OF ADAPTIVE REMEDIATION MANAGEMENT, James Fairweather, Orica Limited
14:50	Afternoon tea		

8C - THE UNSESSION

Room: Conference Hall 3

Chair: Paul Nathanail, University of Nottingham

8D - Determining LNAPL remediation end points

Room: Meeting Room 11

Chair: Tom Palaia, CH2M

An unsession is a session with no structure - yet. The session content will be determined by conference delegates suggesting topics and then voting on which ones to cover.

A BLANK unposter space will be provided for delegates to suggest topics to cover during the unsession. The most popular topics will be taken forward and the Conversation Driver will ensure the right amount is spent on each one.

RULES

There are only two rules at an unsession:

1. Nobody is giving a presentation – unsessions are all about conversations;
2. If a session does not inspire attendees and they are not contributing, they should get up and find a different one. (It's called the Law of Two Feet.)"

8D.1 **KEYNOTE:** A PREDICTIVE ANALYTICAL MODEL TO EXPLORE THE ENDPOINT FOR SUBSURFACE LNAPL RECOVERY: MODEL DESCRIPTION, Robert Lenhard, CSIRO

8D.2 A PREDICTIVE ANALYTICAL MODEL TO EXPLORE THE ENDPOINT FOR SUBSURFACE LNAPL RECOVERY: MODEL TESTING AGAINST NUMERICAL SIMULATIONS, John Rayner, CSIRO

8D.3 MODELLING LNAPL RECOVERY METHODS TO DETERMINE EFFECTIVE ENDPOINTS, Kaveh Sookhak Lari, CSIRO

8D.4 VACUUM ENHANCED LNAPL RECOVERY SYSTEM - PORT MELBOURNE, Tom O'Callaghan, Enviropacific Services

DETAILED PROGRAM

WEDNESDAY 13 SEPTEMBER 2017

CONCURRENT SESSIONS 8A - 8H				
8E - Case studies on contaminant assessment, remediation and management Room: Meeting Room 12 Chair: Mark Donaghey, CRC CARE			8F - Mine site rehabilitation and remediation Room: Meeting Room 13 Chair: Kenneth Sajwan, Savannah State University	
13:10	8E.1	DESIGN AND IMPLEMENTATION OF PFAS PLANT UPTAKE STUDY AT THE RAAF BASSE WILLIAMTOWN, Rachael Casson, AECOM	8F.1	SURVEY OF MINE PIT LAKE FEATURES IN THE PILBARA, Wijnand Germs, ERM
13:30	8E.2	GRANULAR ACTIVATED CARBON: A PROVEN SOLUTION FOR PFAS TREATMENT, Jenalle Brewer, Calgon Carbon	8F.2	MINE TAILING DRAINAGE: A BOTTOMS UP APPROACH USING HDD DRILLING AND INSTALLATION METHODS, Dan Ombalski, Directed Technologies Drilling
13:50	8E.3	PFAS SOIL AND WATER TREATMENT AND MANAGEMENT: A REVIEW OF OPTIONS UNDER EVOLVING REGULATORY FRAMEWORKS, Annette Nolan, Ventia	8F.3	HARNESSING HYPERACCUMULATIVE PLANTS TO REMEDIATE AGRICULTURAL SOILS CONTAMINATED BY METALS MINE DISCHARGE, Charles CC Lee, University of Newcastle
14:10	8E.4	BEST PRACTICE MANAGEMENT OF ASBESTOS IN SOIL UNDER A STRINGENT REGULATOR AND PUBLIC, Will Magnus, Enviropacific Services	8F.4	REHABILITATING MERCURY CONTAMINATED MINING LANDS IN COLOMBIA USING BIOCHAR, Alfonso Rodriguez, R3 Environmental Technology Colombia SAS
14:30	8E.5	NATURALLY OCCURRING ASBESTOS: A REVIEW OF THE ISSUES AND RISKS, Juliet Duffy, Regional EnviroScience	8F.5	SIMULATION OF REACTIVE GEOCHEMICAL SPECIES AND RADIONUCLIDES TRANSPORT TO EVALUATE THE SOURCE TERM IN A CONTAMINATED AQUIFER OF AN ABANDONED URANIUM MINE SITE, Michael Hayford, James Cook University
14:50	Afternoon tea			
PLENARY SESSION 4: Conference Hall 1, 2 and 3				
15:20	Conference closing session			
17:00	Conference closes			

8G - On-site assessment of contaminants		8H - Recent research on environmental contamination by HDR students and early career researchers	
Room: Meeting Room 15		Room: Meeting Room 16	
Chair: James Studer, InfraSUR LLC		Chair: Sudeep Shukla, Amity University	
8G.1	KEYNOTE: IDENTIFICATION AND DELINEATION OF NAPLS USING LASER-INDUCED FLUORESCENCE (LIF), David Heicher, Dakota Technologies	8H.1	HYDROCARBON TOXICITY ASSESSMENT IN FRESH AND WEATHERED SOILS USING OECD PLANTS AND NATIVE AUSTRALIAN GRASSES, Muhammad Khan, University of South Australia
8G.2	APPLICATION OF XRF AS A SCREENING TOOL FOR THE ASSESSMENT OF CCA CONTAMINATED SITES, Leandro Gomes de Freitas, IPT	8H.2	ACCUMULATION OF AS, CD, CU, PB, AND ZN IN NATIVE PLANTS GROWING ON CONTAMINATED THAI NGUYEN SITES, Ngoc Son Hai Nguyen, University of Newcastle
8G.3	IS XRF WORTH THE HYPE AND EXPENSE?, Bryden Tiddy, Coffey Services Australia Pty Ltd	8H.3	BIOAVAILABILITY OF ARSENIC FROM RICE: SIGNIFICANCE OF RICE GENOTYPES, Shofiqul Islam, University of Newcastle
8G.4	A METHOD FOR SEPARATION OF HEAVY METAL SOURCES IN GROUNDWATER USING XRF PROFILES AND HYDROGEOCHEMICAL INDICATORS: FISHERMANS BEND, AUSTRALIA, Emily Hepburn, RMIT University	8H.4	8H.4: PLANTS TREATMENT WITH PERFLUOROALKYL AND POLYFLUOROALKYL SUBSTANCES (PFASs): UPTAKE AND EFFECTS ON GROWTH AND MORPHOLOGY, Nisha Sharma, University of Padova
		8H.5	REMEDIATION OF PHENOL CONTAMINATION IN OGONILAND, NIGERIA., Abadi Rufus Ndukari, University of Brighton

POSTER SESSION

17:00, MONDAY, 11 SEPTEMBER 2017 | EXHIBITION HALL

P1	ENERGY EFFICIENT DESIGNS IN BUILDINGS: CLEANER AND GREENER ENERGY TECHNOLOGIES, SUSTAINABLE DEVELOPMENT AND ENVIRONMENT, Abdeen Omer, Energy Research Institute	P6	SUSTAINABLE TREATMENT OPTIMISATION, Graham Smith, WSP Australia
P2	UTILISATION OF FIPRONIL, AN ORGANOCHLORINE PESTICIDE AS NUTRIENT SOURCE AND BIODEGRADATION BY BACTERIA IN CARDAMOM PLANTATION SOILS OF IDUKKI, KERALA, INDIA, Salom Gnana Thanga Vincent, University of Kerala	P7	SIGNIFICANCE AND SCOPE OF FLORAL WASTE MANAGEMENT IN INDIA, Ganga Mathian, Tamil Nadu Agricultural University
P3	PULVERISED BIOFUELS FLAME PROPAGATION IN COMPARISON TO COALS, Muhammad Azam Saeed, University of Engineering and Technology, Lahore, Pakistan	P8	PFAS OCCURRENCE IN ENVIRONMENTAL MEDIA ASSOCIATED WITH AFFF RELEASES AT MULTIPLE US MILITARY INSTALLATIONS, Nathan Hagelin, Amec Foster Wheeler
P4	REMEDIATION OF PHENOL CONTAMINATION IN OGONILAND, NIGERIA., Ndukari Abadi Rufus, University of Brighton	P9	FATE AND TRANSPORT MODELLING OF PFOS IN A FRACTURED CHALK AQUIFER TOWARDS A LARGE SCALE DRINKING WATER ABSTRACTION, Ian Ross, Arcadis
P5	AUGMENTING MICROBIAL POPULATIONS TO ENHANCE TREATMENT, Graham Smith, WSP Australia	P10	REMEDIATION OF POLY- AND PERFLUORO ALKYL SUBSTANCES: DEVELOPING REMEDIATION TECHNOLOGIES FOR EMERGING CHALLENGES, Ian Ross, Arcadis

P11 INVESTIGATION AND REMEDIATION OF MULTIPLE PFAS SOURCE ZONES AT AN AIRPORT TO SAFEGUARD A WATER SUPPLY, Ian Ross, Arcadis

P16 ANTIBIOTIC RESIDUES IN FISH FARMS EFFLUENT: ECOLOGICAL RISK ASSESSMENT, Moyosore Akinsulire, University of Lagos

P12 IN SITU CHEMICAL OXIDATION VIA ACTIVATED PERSULFATE FOR REMEDIATION OF MULTIPLE ORGANIC CONTAMINANTS, Ian Ross, Arcadis

P17 NITRIC OXIDE AMELIORATE ADVERSE EFFECTS OF ARSENIC-INDUCED STRESS ON YIELD PARAMETERS IN MUNGBEAN, Pradeep Kumar Shukla, Sam Higginbottom University of Agriculture, Technology and Sciences

P13 REDUCTION OF POLYBROMINATED DIPHENYLEETHERS IN THEIR CONTAMINATED SOIL BY MICROSCALE ZERO-VALENT IRON, Chien Ying Yang, University of Newcastle

P18 INFORMATION FOR CLIMATE CHANGE AND ENVIRONMENTAL REMEDIATION ADAPTATION: LESSONS AND NEEDS IN FIJI, Deeksha Krishna, FNU

P14 SILVER NANOPARTICLES AND NEEM EXTRACT SYNERGISM FOR EFFECTIVE ELIMINATION OF TOXIC CHEMICALS FROM STANDARD SURFACE STERILIZATION PROCEDURE, Pragati Misra, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad

P19 IMPACT OF LAND USE ON SOIL ORGANIC CARBON FRACTIONS AND CO₂ EFFLUX, Hasintha Wijesekara, GCER

P15 BIOAUGMENTATION OF A MOVING BED BIOFILM REACTOR BY SPECIFIC BIOFILM-FORMING, PHENOL-DEGRADING BACTERIA FOR ASSESSING OF PHENOL DEGRADATION, Sahar Irankhah, Alzahra University

P20 EFFECTS OF ARBUSCULAR MYCORRHIZAL FUNGI ON METALS UPTAKE, PLANT GROWTH AND YIELD OF FINGER MILLET WITH INCREASING ZN AND CD CONCENTRATIONS IN SOIL, Deeksha Krishna, Fiji National University

P21 URBAN LEAD CONTAMINATION- NOT AS "DIFFUSE" AS PERCEIVED - FINDINGS FROM A VICTORIAN BACKGROUND SOIL SURVEY, Hannah Mikkonen, RMIT and CDM Smith

P26 GREEN SYNTHESIZED BIOCOMPATIBLE ANODE IN MFCS FOR SUSTAINABLE WASTEWATER TREATMENTS AND ELECTRICITY RECYCLING, YING CHENG, Global Centre for Environmental Remediation

P22 ENVIRONMENTAL MODELING APPLIED TO CHEMICAL SPILLS, Leandro Gomes de Freitas, IPT

P27 MAGNETICALLY-EXTRACTABLE MAGNETITE-SILICA-TITANIA PHOTOCATALYST AND ITS APPLICATION IN THE DEGRADATION OF 4-CHLOROPHENOL, Alexandre de Oliveira Jorgetto, Sao Paulo State University

P23 TOWARDS SUSTAINABLE REMEDIATION IN THE 21ST CENTURY: DEFINED MECHANOCHEMICAL REDUCTIVE DEHALOGENATION AT ROOM TEMPERATURE IN A BALL MILL, Volker Birke, University of Wismar

P28 USING SOIL PROPERTIES TO PREDICT LEAD BIOAVAILABILITY, Kaihong Yan, Global Centre for Environmental Remediation, University of Newcastle

P24 SORPTION OF NORFLOXACIN ONTO HUMIC ACID EXTRACTED FROM SEWAGE SLUDGE COMPOST, Kai Yang, Advanced Materials Institute, Shandong Academy of Sciences

P29 PHYSIOLOGICAL ASPECTS OF CADMIUM ACCUMULATION IN RICE, Abu Bakkar Siddique, University of Newcastle

P25 DEVELOPMENT AND VALIDATION OF REMEDIATION TECHNOLOGIES FOR ORGANOCHLORINATED COMPOUNDS IN SOIL, Leandro Gomes de Freitas, Institute for Technological Research

P30 EFFECT OF POTAMOGETON CRISPUS L. ON BIOAVAILABILITY AND BIODEGRADATION ACTIVITY OF PYRENE IN AGED AND UNAGED SEDIMENTS, Fanbo Meng, Global Centre for Environmental Remediation

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P32 DUST PLUME DISPERSION STUDIES USING
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P33 A HANDHELD INFRARED TECHNOLOGY
FOR MEASURING TOTAL PETROLEUM
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MINE SITE COSTS Richard Stewart Ziltek Pty Ltd

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GRANULAR ACTIVATED CARBON: A PROVEN SOLUTION FOR PFAS TREATMENT

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INTRODUCTION

Per- and Poly-fluoroalkyl substances (PFAS) are fluorinated man-made chemical species that are persistent in the environment and chemically stable. These chemicals (such as perfluorochemicals (PFCs), perfluorooctanesulfonate (PFOS) and perfluorooctanoic acid (PFOA)) have been used in the production of carpeting, clothing, and food packaging due to their ability to repel stains, grease and water. Contaminated ground and surface waters have been identified near the manufacturing sites of these products, as well as near the facilities utilizing Aqueous Fire Fighting Foams (AFFF). In May 2016, the U.S. EPA established a Health Advisory Exposure limit of PFOA and PFOS of 70 ppt (ng/L) concentration. Globally, many other agencies (Health, Environmental and Defense) are conducting epidemiological studies to better understand the health effects of PFAS and to determine whether regulation is necessary and at what level. This paper will examine the efficacy of Granular Activated Carbon (GAC) for the treatment of PFOA, PFOS and other, shorter chain PFAS molecules. Data will be presented on what activated carbon properties are important for removing PFAS from waste water and drinking water applications and how different carbon types will impact removal efficiency. Test methodology and results will be discussed in detail. In addition, data on field installations will be presented.

METHODS

Experimental Study

While many sources cite GAC as a preferred technology for the removal of PFOA and PFOS, other sources have questioned GAC's ability to remove smaller chain PFAS compounds (i.e. C-4 and C-6 chains). To confirm GAC's capability for removing shorter chain PFAS as well as PFOA and PFOS, a laboratory study was conducted to determine the relative efficacy of four different GAC products for the removal of PFOS, PFOA, PFHxS, PFHxA, PFBS, and PFBA. The study utilized Rapid Small Scale Column Testing (RSSCT) to determine the relative performance of various GAC types for the removal of the aforementioned PFAS compounds.

RSSCT Design

RSSCT is a technique employed to simulate the carbon treatment of a wide range of waters and wastewaters (Crittenden et al. 1986). The procedure uses a miniature carbon-filled column to model adsorption breakthrough for a larger adsorption system. For the purpose of this study, the RSSCT design simulated the performance of a fixed GAC bed at 10 minutes of EBCT (empty bed contact time) with a TOC loading of 0.16 ppm. The design parameters of the study are highlighted in Table 1.

RESULTS AND DISCUSSION

Each column was run to 100,000 bed volumes, which represents > 600 simulated days of operation and the treatment of over 500 million gallons of water. Of the GAC products tested, the virgin, re-agglomerated coal based 12x40 material exhibited the best performance for all PFAS compounds evaluated. Figure 1 illustrates the performance of the various product types tested for removing PFOA. Figure 2 below specifically shows the performance of the virgin, re-agglomerated 12x40 product for the 6 different PFAS molecules. With the exception of PFBA, the effluent concentration for the PFAS tested was non-detect for up to 60,000 bed volume.

Table 1. RSSCT Design Parameters

	F-400	CMR F-400	OLC 12x40	F-600	DSR-C 8x30
Particle Diameter (R_{LC} , mm)	1.11	1.06	1.09	1.11	1.30
Particle Diameter (R_{SC} , mm)	0.1219	0.1209	0.1193	0.1236	0.1215
AD (g/mL)	0.561	0.527	0.539	0.6	0.557
Small Column Diameter (m)	0.622	0.622	0.622	0.622	0.622
Scaling Factor (R_{LC}/R_{SC})	82.66	76.8	82.9	80.8	114.48
EBCT _{SC} (min)	0.121	0.130	0.121	0.124	0.09
Reynolds _{LC}	12.70	12.14	12.45	12.73	14.90
Velocity _{SC} (m/hr)	16.5	16.5	16.5	16.5	16.5
Length _{SC} (m)	0.033	0.0358	0.0332	0.0340	0.024
Q (mL/min)	8.36	8.36	8.36	8.36	8.36
Weight carbon _{SC} (g)	0.567	0.574	0.543	0.620	0.407
Volume of Carbon _{SC} (mL)	1.01	1.088	1.008	1.034	0.73

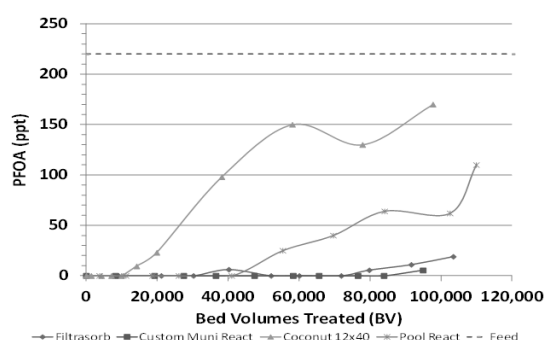


Fig. 1. Efficacy for Removing PFOA

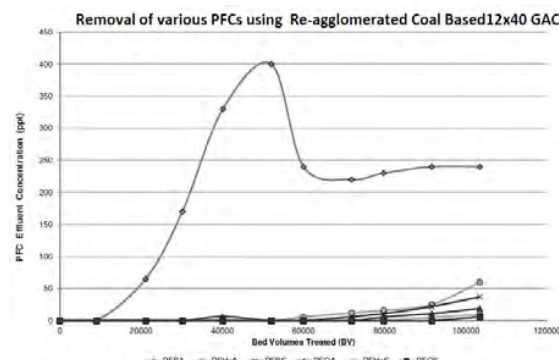


Fig. 2. Efficacy for Removing PFAS

CONCLUSIONS

- 1) GAC is an effective technology to remove both long chain and short chain PFAS compounds to non-detect levels
- 2) Virgin, re-agglomerated coal 12x40 significantly outperformed direct activated coconut 12x40 for all PFAS tested (PFOS, PFOA, PFHxS, PFHxA, PFBS, and PFBA)
- 3) RSSCT Testing of the source water is highly recommended to determine carbon usage rates and overall treatment costs

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Crittenden, J. C., Berrigan, J. K., Hand, D. W., 1986. Design of Rapid Small-Scale Adsorption Tests for a Constant Surface Diffusivity. *Journal of the Water Pollution Control Federation*, 58:4:312.

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