Oct 30 - Nov 2, 2012

2012 年土壤及地下水污染場址調查整治與管理國際研討會

2012 Taipei International Conference on Remediation and Management of Soil and Groundwater Contaminated Sites

Taipei, Taiwan

成果專輯

(ReSAGPAPR WG Newsletter)

(Volume 2, Issue 2. December 30, 2012)

Content

Conference Introduction

1. Background

2010 was the 10th anniversary of the Soil and Groundwater Pollution Remediation Act enforced in Taiwan. To celebrate the 10 years achievement and to continuously improve our technologies of investigation, remediation and management on soil and groundwater contaminated sites in Taiwan, Environmental Protection Administration of Taiwan (Taiwan EPA) organized an international Conference on the investigation, remediation and management of soil and groundwater contaminated sites in Taipei on October 27, 2010, and provided a platform for administrators, researchers, and environmental engineers from Asia and other countries for exchanging and promoting advanced concepts, technologies and products in this field.

More than 50 distinguished experts were invited from more than 20 countries to share their knowledge and experience in this conference. All honorable speakers focus on legislation, remediation technology and cases studies on the soil and groundwater contamination sites. They also delivered in-depth analyses, shared their experiences to enhance future scientific developments, and secured the sustainable utilization of soil and groundwater resources.

2. Situations changed after the Remediation Act was announced

Since the promulgation of the Soil and Groundwater Remediation Act developed in Taiwan in 2000, several other changes have been occurred in the last decade in Taiwan.

- The industries have learned that they have to pay a high price to cleanup the land they polluted if Taiwan EPA discovered they had caused the contamination and ordered them to complete the remediation within a certain period of time.

- Many universities and environmental consultant companies in Taiwan are offering soil and groundwater study programs for Master or Ph.D. degrees. Many universities also have established research centers for developing innovative remediation technologies.

- New investigation tools have been utilized in the laboratories and contaminated fields. Taiwan had used cable tool to install the groundwater monitoring wells, now Taiwan is able use the direct push or air hammer to install the groundwater monitoring wells in

everywhere.

- In order to reduce the cost, improve time effectiveness of investigation, and monitor pollutants in the soil and groundwater environments, Taiwan consultant companies have developed some innovative monitoring techniques in recent years, including MIP (membrane interface probe) to detect volatile contaminants, XRF (x-ray fluorescence) to detect heavy metals distribution, and field test kits to detect TPHs (total petroleum hydrocarbons) and explosive pollutants. According to the screening results, we only take the suspected portion of soil and groundwater samples for further confirmation to be conducted in the laboratory.

3. Achievements, milestones and future service for Asian countries

Taiwan has created some achievements and many milestones to share with other countries in this field for last decade, especially in Asia. The goals of Taiwan EPA future work are to revitalize the usage of the contaminated land with green remediation strategies, protect our resources by rigorously carrying out the regulations, provide training courses of advance technologies for our professionals, and share our experiences with other countries, especially for countries in East and Southeastern Asia. Therefore, a special meeting program was organized for East and South-Eastern Asian countries in the afternoon of October 27, 2011.

4. Special Meeting of East and South-Eastern Asian countries in October 27, 2011

This special meeting for East and South-Eastern Asian countries has been successful in bringing together for scientists and government officers in this region, including Japan, Korea, Philippines, Indonesia, Malaysia, Thailand and Taiwan. This meeting also let the countries realize and concur on the urgent need to establish a technical working group on Remediation for Soil and Groundwater Pollution of Asian Countries **(ReSAGPAC WG)**, and the working group was established in the closing remarks on October 27, 2011 in Taipei. The primary objectives of this working group would be to provide a technical-based network for Asian countries that is capable of exchange and cooperate of remediation techniques in Asia and to serve the remediation techniques for the changing and challenging social demands and to function as a rational platform for decision and policy makers to make informed decisions for risk-based assessment of the contamination sites in the future.

5. Closing remarks of special meeting

In the closing remarks of this special meeting program, all the participants of scientists and government officers from Asian countries agreed that Taiwan was approved as the Chairman, Japan is the Vice Chairman, and Korea is the Secretary General of this working group to serve in the first term (January 2011 to December 2012). Conference, training course or workshop as well as functions as a powerful and indispensable group for technology transfer can be organized in this region. Distinguished Professor Zueng-Sang Chen, serving at the Department of Agricultural Chemistry of National Taiwan University, has been appointed by Taiwan EPA as the chairman of the first term of this working group since January 2011.

6. Main objectives of the ReSAGPAC WG

The main objectives of the ReSAGPAC WG are proposed as:

- To establish a risk-based approach and sustainable land management network at the Asian level,
- To share the database of pollution sites, recycling use of natural resources including the sediments,
- To serve the wider context of the changing and challenging social demands, and
- To function as a rational platform for decision and policy makers to make the remediation on sites of soil and groundwater pollution.

7. Some programs were proposed to be organized

The chairman of ReSAGPAC WG began to discuss with Taiwan EPA officers in early 2011 and organize some programs for the first term of this working group, including:

- Business meeting of the ReSAGPAC WG(June 13, 2011 and June, 2012)
- First workshop on health risk assessment(June 14, 2011)
- Workshop on the remediation and risk-based assessment of sediments contaminated sites(June 15-16, 2011)

- Workshop on the Management strategies and developing the regulation of pollutants(November, 2011)

- Workshop and training courses to be organized by the Scientific Committee and Service and Communication Committee of Working Group(in June or other time in 2012)

- 2012 International Conference on the investigation, remediation and management of soil and groundwater contaminated sites at Taipei(October, 2012)

- Two field study tours on the oil and heavy metals contaminated sites in Taiwan(June 17 and November in 2011)

8. 2012 Taipei International Conference on Remediation and Management of Soil and Groundwater Contaminated Sites

In October 2012, Taiwan EPA provided the working group a great funding to invite 20 distinguished speakers and 15 international participants from 12 countries, especially from Australia, United Kingdom, and United States, to share their knowledge and experiences on regulations of pollutants, innovative technologies and management strategies for the contaminated sites of soil and groundwater pollution. The conference was held at the International Convention Center, National Taiwan University Hospital on October 30-31, 2012.

The goal of this conference is to provide a platform for administrators, researchers, and engineers from around Asia to exchange and promote advanced concepts, technologies, and products related to the remediation and management of soil and groundwater contaminated sites. Each invited speaker was requested to make two oral presentations in 2 days conference which are quite different compared to other international conferences. The only one reason is to give more benefits, not only for 550 local audiences in here but also for 35 international speakers and participants from 12 countries.

2012 Taipei International Conference on Remediation and Management of Soil and Ground Water Contaminated Sites and Soil and Groundwater Exhibition

October 30-31 2012

Location

NTUH International Convention Center

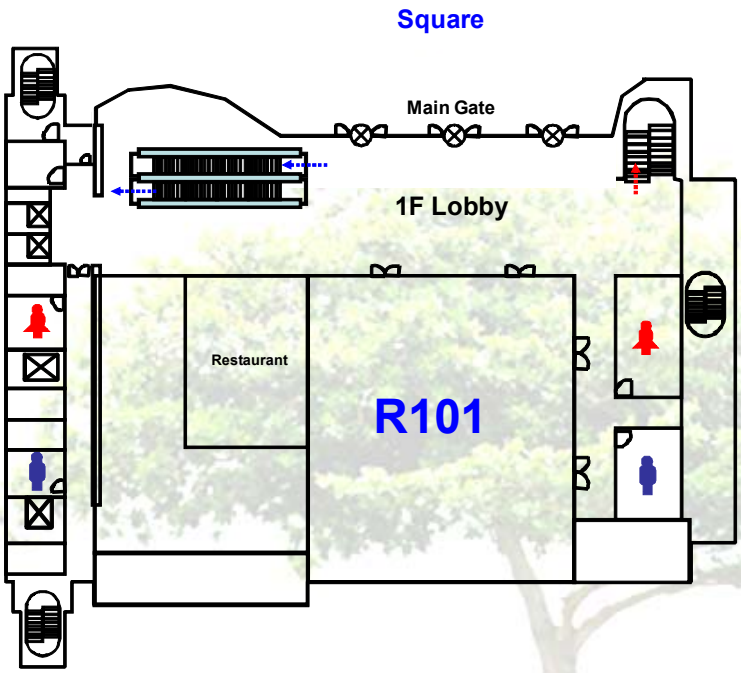
MRT

Danshui/Beitou (Red line):
Exit 2, National Taiwan University Hospital Station
Blue Line:
Exit 2, Shandao Temple Station

Bus Stop

MRT Shandao Temple Station：
0(south)/15/22/202/212/212(straight)/220/232/232/257/262/265/299/605/671
MRT NTU Hospital Station:
22/15/615/227/648/648(green)/208/208(straight)/37

NTUH International Convention Center Floor Plans



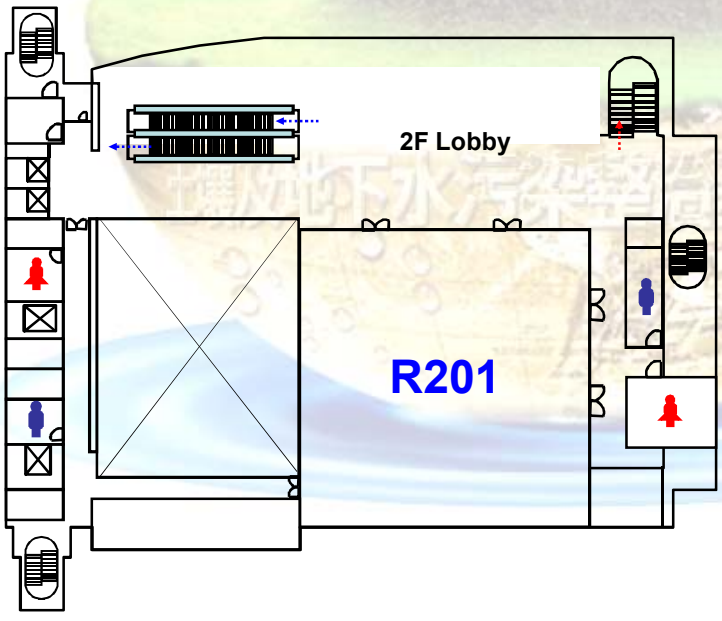
1F

R101

- October 30 (09:25-12:30)
  - Opening Ceremony of Conference & Session 1

Square

- October 30 (13:00-13:25)
  - Soil and Water Exhibition: Field Operation

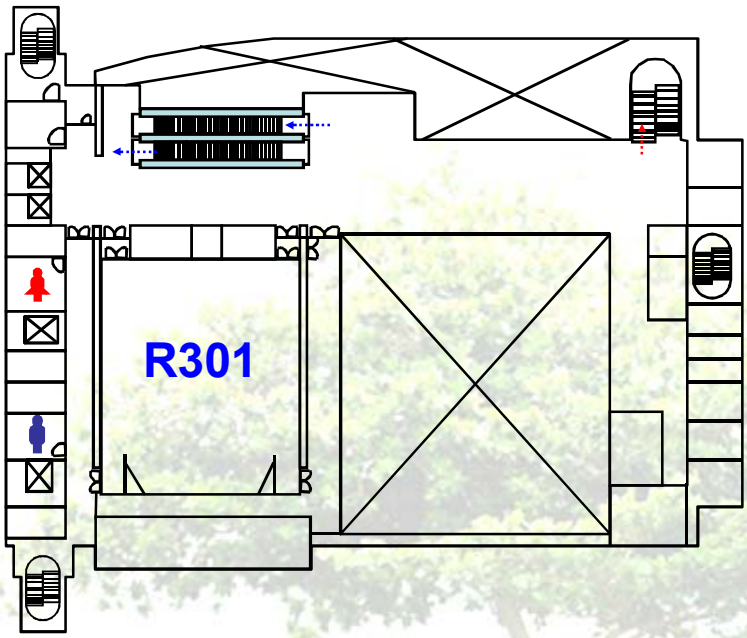


2F

Soil & Water Exhibition

October 30-31
- Exhibition in R201

October 30 (PM 12:30)
- Field Operation at Square (1F)



3F

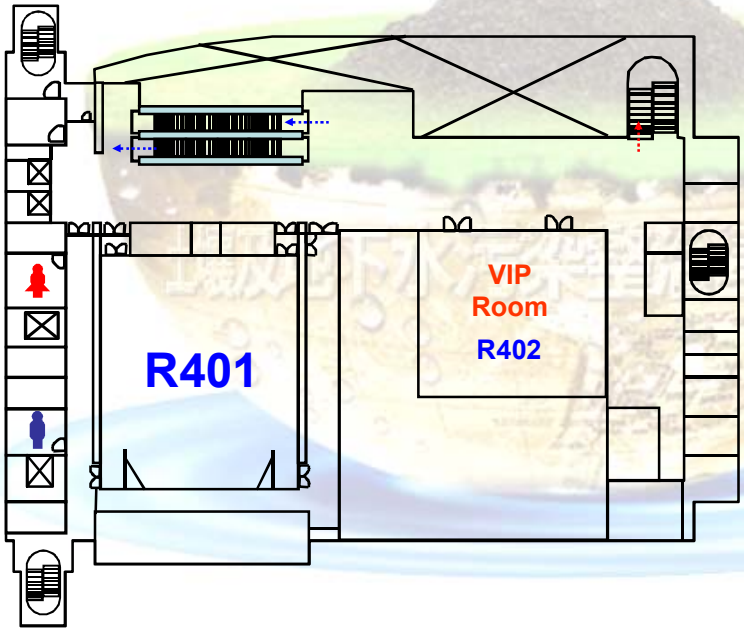
R301

-October 30

- Session 2 & 3

-October 31

- Session 6, 7, 10 & 12 (Closing Ceremony)



4F

R401

-October 30

- Session 4 & 5

-October 31

- Session 8, 9 & 11

R402

VIP Service Room

Accommodation Location

Leader Hotel Taipei

No. 83, Sec. 4, Roosevelt Rd., Taipei, Taiwan, R.O.C.
Tel: -2-8369-2858
Fax: -2-8369-2859
E-mail: ntu@leaderhotel.com

Local Organization of Conference

Conference Chairman

Zueng-Sang Chen, Ph.D.
Chairman of Working Group on the Remediation of Soil and Groundwater Pollution of Asian Countries (WG ReSAGPAC) (2011-2014)
c/o
Distinguished Professor of pedology and soil environmental quality
Department of Agricultural Chemistry, National Taiwan University, Taipei 10617, Taiwan
Tel: +886-2-3366-2117, +886-2-3366-9577, Fax: +886-2-3366-9576
soilchen@ntu.edu.tw; website http://Lab.ac.ntu.edu.tw/soilsc/

Local Organizing Committee

Prof. Dr. Chia-Shyun Chen, National Central University, Taiwan
Mr. Chun-Ming Chen, Soil and Groundwater Remediation Fund Management Board, Taiwan EPA
Prof. Dr. Colin S. H. Chen, National Kaohsiung Normal University, Taiwan
Mr. Jeng-Ren Ho, Soil and Groundwater Remediation Fund Management Board, Taiwan EPA
Dr. Chih Huang, ERM, Taiwan
Dr. Hao-Chun Hung, Soil and Groundwater Remediation Fund Management Board, Taiwan EPA
Dr. Spock Huang, MWH Taiwan Branch, America Inc.
Prof. Dr. Jimmy C.M. Kao, National Sun Yat-Sen University, Taiwan
Prof. Dr. Dar-Yuan Lee, National Central University, Taiwan
Prof. Dr. Tsair-Fuh Lin, National Cheng Kong University, Taiwan
Dr. Chih-Chung Liu, Sinotech Engineering Consultants, LTD., Taiwan
Prof. Dr. Chih-Jen Lu, National Chung Hsing University, Taiwan
Prof. Dr. Hwong-Wen Ma, National Taiwan University, Taiwan
Dr. Shih-Cheng Pan, Sinotech Environmental Technology LTD., Taiwan
Ms. L. F. Shih, Apollo Technology Co., LTD., Taiwan
Mr. Hung-Teh Tsai, Soil and Groundwater Remediation Fund Management Board, Taiwan EPA
Prof. Dr. Min-Chao Wang, Chaoyang University of Technology, Taiwan
Dr. Pei-Yao Wu, Industrial Technology Research Institute, Taiwan
Prof. Dr. Shian-Chee Wu, National Taiwan University, Taiwan
Prof. Dr. Kuei-Jyum Yeh, National Pingtung University of Science and Technology, Taiwan

Conference Secretariat

Dr. Yeong-Shing Wu, Sinotech Engineering Consultants, Inc., Taiwan. Tel: +886-2-2791-8858 ext 55, yswu@sinotech.org.tw
Ms. Astra Lin and Dr. Jeffery Chia-Hsing Lee, Department of Agricultural Chemistry, National Taiwan University, Taipei 10617, Taiwan. Tel: +886-2-3366-9577, +886-2-3366-4807, Astra_lin@hotmail.com (Ms. Lin), R89623414@ntu.edu.tw (Dr. Lee)
Ms. Chiu-Mei Chen, Sinotech Environmental Technology LTD., Taipei, Taiwan
Tel: +886-2-2769-8388 ext 20276, cmchen@mail.sinotech.com.tw

Program at a Glance

Time	October 30 (Tuesday)	
09:00-09:15	Opening Ceremony of Exhibition *Room 201*	
09:25-09:50	Opening Ceremony of Conference *Room 101*	
09:55-12:20	S1: Two Keynote Speeches *Room 101*	
12:20-13:30	Lunch at *Room 301 and 401* and Exhibition at *1st Floor and Room 201*	
	Room 301	*Room 401*
13:30-15:00	S2: Sustainable Management (1)	S4: Bioremediation
15:00-15:30	Coffee Break	Coffee Break
15:30-17:00	S3: Remediation of Heavy Metals	S5: Remediation of Sediments (1)

Time	October 31 (Wednesday)	
	Room 301	*Room 401*
09:00-10:00	S6: Phytoremediation and Remediation Market	S8: Remediation and Communication
10:00-10:30	Coffee Break	Coffee Break
10:30-12:00	S7: Sustainable Management (2)	S9: Remediation of Sediments (2)
12:00-13:30	Lunch (Room 301 and 401) and Exhibition (Room 201)	
13:30-15:30	S10: Remediation Case Studies	S11: Chemical Remediation and other Challenges
15:30-16:00	Coffee Break	Coffee Break
16:00-16:50	S12: General Discussion	
16:50-17:00	S12: Closing Ceremony	

Detailed Program

Day: October 30, 2012 (Tuesday)

09:00-09:15 Location: *Room 201*
Open ceremony of Soil and Groundwater Exhibition: opened by Minister Shen

09:25-13:30 Location: *Room 101*
Open ceremony of International Conference

09:25-09:30	Group photo with **Minister Dr. Shen, Stephen Shu-Hung** (Taiwan EPA)
09:30-09:35	Opening address by chairman, **Prof. Dr. Zueng-Sang Chen**
09:35-09:40	Opening address by **Minister Dr. Shen, Stephen Shu-Hung**
09:40-09:45	Opening address by **Mr. Christopher J. Marut** (**AIT**)
09:45-09:50	Opening address by **Mr. David Campbell** (**BTCO**)

Session 1: Plenary session

Location: ***Room 101***
Chairman: **Prof. Dr. Zueng-Sang Chen (陳尊賢)**, National Taiwan University/Taiwan

Time	Topics	Speaker
09:55-10:10	Realizing Sustainable Land Use through Soil and Groundwater Protection -The Vision of Taiwan EPA	**Dr. Shuenn-Chin Chang** (Taiwan EPA)
10:10-11:00	**Keynote Speech:** Advanced Site Remediation Technologies	**Prof. Dr. Ravi Naidu** (CRC CARE, Australia)
11:00-11:30	Coffee Break	
11:30-12:20	**Keynote Speech:** Regulation, Risk Assessment and Management as Part of Sustainable Remediation	**Dr. Phillip Crowcroft** (CL:AIRE / ERM, UK)
12:20-13:00	Lunch at ***Room 301*** at 3rd Floor and ***Room 401*** at 4th Floor	
13:00-13:30	Soil and Groundwater Exhibition at ***1st Floor*** (Field operation)	

Session 2: Sustainable Management: part 1

Location: ***Room 301***
Chairman: **Prof. Dr. Zueng-Sang Chen (陳尊賢)**, National Taiwan University/Taiwan

Time	Topics	Speaker
13:30-14:00	Development of the SuRF-UK Framework for Sustainable Remediation in the UK	**Dr. Brian Bone** (BEC / CL:AIRE / SuRF, UK)
14:00-14:30	Risk Assessment as a Tool in Driving Sustainable Management of Contaminated Land Issues	**Mr. Neil Donaldson** (ERM, Australia)
14:30-15:00	Technologies and Approaches for Sustainable Sediment Management	**Mr. Mark Travers** (ENVIRON Holdings, USA)
15:00-15:30	Coffee Break	

Detailed Program

Day: October 30, 2012 (Tuesday)

Session 3: Remediation of Heavy Metals

Location: ***Room 301***

Chairman: **Prof. Dr. Chih-Jen Lu (盧至人)**, National Chung Hsing University/Taiwan

Time	Topics	Speaker
15:30-16:00	Two UK Remediation Case Studies: Combined In-Situ Treatment of Groundwater, & Stabilization of Heavy Metal Contaminated Sludge	**Dr. Jon Burton** (CL:AIRE / RAW Group, UK)
16:00-16:30	Reuse/disposal of Agricultural Drainage Water with High Levels of Salinity and Toxic Trace Elements in Central California	**Dr. Gary Stephan Bañuelos** (USDA-ARS, USA)
16:30-17:00	Assessing the Link between the Geochemistry of Soils and the Bioaccessibility of Arsenic, Chromium and Lead in the Urban Environment	**Dr. Joanna Wragg** (BARGE / BGS, UK)

Session 4: Bioremediation

Location: ***Room 401***

Chairman: **Prof. Dr. Colin S. Chen (陳士賢)**, National Kaohsiung Normal University/Taiwan

Time	Topics	Speaker
13:30-14:00	Microvi BioTechnologies	**Mr. John Darmody** (MWH, Australia)
14:00-14:30	Enhanced Biobarrier for a Mixed CVOC Plume	**Mr. William Pickens** (MWH, USA)
14:30-15:00	Electrokinetic-Enhanced Bioremediation (EK–BIO) - An Innovative Bioremediation Technology	**Dr. James Wang** (Geosyntec Consultants, USA)
15:00-15:30	Coffee Break	

Session

Session 5: Remediation of Sediment: part 1

Location: ***Room 401***

Chairman: **Prof. Dr. Shian-Chee Wu (吳先琪)**, National Taiwan University/ Taiwan

Time	Topics	Speaker
15:30-16:00	Contaminated Sediment Remediation and Restoration: Comprehensive Approach	**Dr. Brian Mastin** (Southern Research Institute, Alabama, USA)
16:00-16:30	Historical Trends of Dioxin-like Compounds and Brominated Flame Retardants in Sediments Buried in Different Reservoir Systems in Taiwan	**Dr. Kai-Hsien Chi** (National Yang Ming University, Taiwan)
16:30-17:00	Innovative approaches to Dealing with Contaminated Sediments	**Mr. Jonathan Atkinson** (Environment Agency, UK)

Detailed Program

Day: October 31, 2012 (Wednesday)

Session 6: Phytoremediation and Risk assessment

Location: ***Room 301***

Chairman: **Prof. Dr. Min-Chao Wang (王敏昭)**, Chaoyang University of Technology/Taiwan

Time	Topics	Speaker
09:00-09:30	Use of Phytoremediation for both Managing Selenium and Producing Biofortified Plant Products and Biofuel under Adverse Soil Conditions	**Dr. Gary Stephan Bañuelos** (USDA-ARS, USA)
09:30-10:00	Risk Assessment of As in Soil and Groundwater for the Safety of Road Construction to Residents	**Prof. Dr. Jae E. Yang** (Kangwon National University, Korea)
10:00-10:30	Coffee Break	

Session 7: Sustainable Management: part 2

Location: ***Room 301***

Chairman: **Dr. Shih-Cheng Pan (潘時正)**, SINOTECH Environmental Technology LTD./Taiwan

Time	Topics	Speaker
10:30-11:00	Development, Validation and Application of a Harmonised BARGE Method	**Dr. Joanna Wragg** (BARGE / BGS, UK)
11:00-11:30	Self-Sustaining Treatment for Active Remediation (STAR): Overview and Case Study	**Dr. James Wang** (Geosyntec Consultants, USA)
11:30-12:00	On-site Remediation Technologies and Example of Remediation Sites	**Dr. Ryuzo Tazawa** (Shimizu Kensetsu, Japan)
12:00-13:30	Lunch at ***Room 301*** at 3rd Floor and ***Room 401*** at 4th Floor and Soil and Groundwater Exhibition at ***Room 201***	

Session 8: Remediation and Communication

Location: ***Room 401***

Chairman: **Prof. Dr. Hwong-Wen Ma (馬鴻文)**, National Taiwan University/ Taiwan

Time	Topics	Speaker
09:00-09:30	Remediation of the Lower Lea Valley and other Venues for the 2012 London Events and for a Lasting Legacy to the Local Communities	**Mr. Jonathan Atkinson** (Environment Agency, UK)
09:30-10:00	Outlook of Soil Contamination Countermeasures in Japan	**Dr. Ryuzo Tazawa** (Shimizu Kensetsu, Japan)
10:00-10:30	Coffee Break	

Detailed Program

Day: October 31, 2012 (Wednesday)

Session 9: Remediation of Sediments (2)

Location: ***Room 401***

Chairman: **Dr. Pei-Yao Wu (吳培堯)**, Industrial Technology Research Institute /Taiwan

Time	Topics	Speaker
10:30-11:00	Remediation of a Former Gasworks Using In-Situ Solidification Technology	**Mr. Bengt von Schwerin** (AECOM, Australia)
11:00-11:30	An-Shun Project Site: Sustainable Sediment Management	**Dr. Brian Mastin** (Southern Research Institute, Alabama, USA)
11:30-12:00	Management of Contaminated Sediments in Taiwan	**Dr. Meng-Der Fang** (Industrial Tech. Res. Insti., Taiwan)
12:00-13:30	Lunch at ***Room 301*** at 3rd Floor and ***Room 401*** at 4th Floor and Soil and Groundwater Exhibition at ***Room 201***	

Session 10: Remediation case studies

Location: ***Room 301***

Chairman: **Dr. Hao-Chun Hung (洪豪駿)**, EPA/Taiwan

Time	Topics	Speaker
13:30-14:00	Review of UK Guidance on Permeable Reactive Barriers	**Dr. Brian Bone** (BEC / CL:AIRE / SuRF, UK)
14:00-14:30	Landfill Remediation under 'Emergency Management' Circumstances	**Mr. Bengt von Schwerin** (AECOM, Australia)
14:30-15:00	Programmatic Approaches to Management of Contaminated Land Liabilities on Large Portfolios	**Mr. Neil Donaldson** (ERM, Australia)
15:00-15:30	Current Status of the Classification System of Early Warning Management for Industrial Parks	**Dr. Chia-Hsin Li** (Taiwan EPA)
15:30-16:00	Coffee Break	

Detailed Program

Day: October 31, 2012 (Wednesday)

Session 11: Chemical remediation and other challenges

Location: ***Room 401***

Chairman: **Prof. Dr. Kuei-Jyum Yeh (葉桂君)**, National Pingtung University of Science and Technology/Taiwan

Time	Topics	Speaker
13:30-14:00	Lessons Learned from Implementation of In-situ Chemical Oxidation Remediation	**Mr. William Pickens** (MWH, USA)
14:00-14:30	Resin Capsules for Monitoring Soil and Groundwater Pollution	**Prof. Dr. Jae E. Yang** (Kangwon National University, Korea)
14:30-15:00	A Discussion On Project Procurement	**Mr. John Darmody** (MWH, Australia)
15:00-15:30	Remediation in the UK: Maintaining Innovation in a Challenging Market	**Dr. Jon Burton** (CL:AIRE / RAW Group, UK)
15:30-16:00	Coffee Break	

Session 12

Location: ***Room 301***

Time	Topics	Chairman
16:00-16:50	**General Discussion**	**Prof. Dr. Jimmy C.M. Kao (高志明)** National Sun Yat-Sen University/Taiwan
16:50-17:00	**Closing Ceremony**	**Prof. Dr. Zueng-Sang Chen (陳尊賢)** National Taiwan University/Taiwan

2012 Taipei International Conference on Remediation and Management of Soil and Ground Water Contaminated Sites and Soil and Groundwater Exhibition

October 30-31 2012

Invited Speakers and Facilitators

Honored Guests

Shu-Hung Shen

Taiwan

Dr. Shu-hung Shen received his Ph.D. degree from Department of Chemical Engineering, National Taiwan University (NTU). He is the Minister of Environmental Protection Administration (EPA), Executive Yuan, R.O.C. (Taiwan). He has obtained Best Civil Servant Award of Executive Yuan, ROC (Taiwan); Engineering Award, Engineering Business Category, Chinese Institute of Environmental Engineering; Outstanding Contribution Award, Chinese Environmental Analytical Society in 1987, 2003, and 2005, respectively.

Hung-Teh Tsai

Taiwan

Mr. Hung-Teh Tsai received his M.S. from National Taiwan University. He is Technical Superintendant and Executive Secretary in Soil and Groundwater Remediation Fund Management Board (SGRFMB), Environmental Protection Administration, R.O.C. He has more experience on Administration, Site Supervision and Management.

Christopher J. Marut

USA

assumed the position of Director of the American Institute in Taiwan on September 13, 2012.

Over a 27-year Foreign Service career, Mr. Marut has developed a deep understanding of Asian affairs, including U.S.-Taiwan relations. Mr. Marut's most-recent assignment was Director of the Office of Australia, New Zealand and Pacific Island Affairs in the Bureau of East Asian and Pacific Affairs at the Department of State. Prior to that, he served as Deputy Consul General at the U.S. Consulate General in Hong Kong, and as Director of the Office of Regional and Security Policy in the Bureau of East Asian and Pacific Affairs.
Mr. Marut's other assignments in the Bureau of East Asian and Pacific Affairs have included Deputy Director for Economics in the Office of Chinese and Mongolian Affairs, Economic Counselor at the U.S. Embassy in Malaysia, Economic Officer at the U.S. Consulate General in Hong Kong, and Science and Technology Officer at the U.S. Embassy in Beijing. In addition, Mr. Marut previously served at AIT as a Consular Officer and Science and Technology Officer.
Prior to joining the Foreign Service, Mr. Marut was the Managing Director for China Operations for a large U.S.-based multinational medical equipment manufacturer.
Mr. Marut was born in Connecticut and educated at the University of Notre Dame, where he received his BBA in Finance and Business Economics, at the University of California, Berkeley, where he received an MBA, and at the College of Naval Warfare, where he received an MA in National Security and Strategic Studies.
Mr. Marut is accompanied to Taiwan by his wife Loretta. They have two grown children, Carolyn and Kenneth, both of whom were born in Taiwan.

David Campebell

UK

Feb 2009	Director, British Trade & Cultural Office, Taiwan
2008	Deputy High Commissioner, British High Commission, Canberra
2003 - 2007	Deputy High Commissioner and Director of Trade & Investment, British High Commission, Singapore
2000 - 2003	Deputy Head of Mission, British Embassy, Manila
1995 - 1999	Deputy (later Acting) Head of Human Rights Policy Department, Foreign & Commonwealth Office, London
1994	First Secretary, British Embassy, Belgrade
1989 - 1993	First Secretary, UK Mission to United Nations, Geneva
1987 - 1989	Foreign and Commonwealth Office, London, including South East AsiaDepartment, Human Rights Policy Department
1985 - 1987	Third, later Second Secretary, British High Commission, Guyana
1984 - 1985	Third Secretary, British Embassy, Budapest
1981	Entered Foreign & Commonwealth Office

Born in London in 1958, David Campbell has a Bachelor of Law (Honours) degree from the University of Bristol. His interests include travel, reading and the Arts.

Chairman of Working Group

Zueng-Sang Chen

Taiwan

Distinguished Professor
Pedology and soil environmental quality
Soil Survey and Remediation Laboratory
Department of Agricultural Chemistry
National Taiwan University
1, Sect. 4th, Roosevelt road, Taipei 10617
Taiwan.
Tel: (Office) (+886-2) 3366-9577 (or 3366-2117)
Fax: (Office) (+886-2) 3366-9576
Cell phone: +886-910-012-699
E-mail: soilchen@ntu.edu.tw
Lab. Website: http://Lab.ac.ntu.edu.tw/soilsc/

Zueng-Sang Chen is the Distinguished Professor of pedology and soil environmental quality (2007 to now), Department of Agricultural Chemistry (DAC) of National Taiwan University (NTU). He was the Associate Dean of College of Bioresources and Agriculture of NTU in 2007-2011 and Department Head of DAC/NTU in 2004-2007. He was awarded the Distinguished Agricultural Expert Award of Council of Agriculture of Taiwan in 2012, the ESAFS (East and Southeastern Federation of Soil Science Societies) Distinguished Award in 2009, NTU Distinguished Social Service Award in 2009, and the KIWANIS Distinguished Agricultural Expert Award in 2007. He primarily studied the soil genesis, soil environmental quality, the behavior and bioavailability of heavy metals in the soil-crop system, and using the phytoremediation on metals-contaminated sites.

He co-organized and hosted the 2nd ICOBTE at the Taipei Convention Centre in 1993, attended by over 430 participants from 30 countries. He also organized and hosted the 6th International Conference on the ESAFS at the NTU in 2003 (200+ participants from 12 countries) as well as the 14th International Conference on Heavy Metals in the Environment (ICHMET) at the NTU in 2008 (300+ participants from 35 countries). He was further awarded the Distinguished Teaching Professor Award of NTU in 2005, Distinguished Society Award of Chinese Society of Soil and Fertilizer Sciences (CSSFS) in 2008.

Invited Speakers

Bengt von Schwerin

Australia

Mr. Bengt von Schwerin is AECOM's Asia Pacific Remediation Services Director and is responsible for providing strategic planning, technical support, training and mentoring, promoting technical excellence and leading strategic opportunities and projects in the Asia Pacific region. He also coordinates all of the Environment Business Line Practices in ANZ (Remediation Services, Impact Assessment, Air Quality, Environmental Health& Safety and Corporate Advisory Services). This role includes leading major strategic business and growth opportunities, promoting innovation across the business, ensuring delivery of technical training programs, and promoting technical excellence across all discipline areas.

Brian Bone

UK

Dr. Brian Bone is Director of Bone Environmental Consultant Ltd. Brian has 19 years public service experience as regulator and scientist with Warwickshire County Council and the Environment Agency for England and Wales. His key focus is in the area of contaminated soil and groundwater remediation and the recovery of waste for construction. Brian received his BSc in Applied Geology from Strathclyde University and PhD in Volcanology/ Geochemistry from Lancaster University. He is deputy chair of CL:AIRE's Technology & Research Group and a member of SuRF-UK Steering Group.

Brian Mastin

USA

Dr. Brian Mastin has over 16 years of experience in the fields of dredge material management, contaminated sediment characterization and remediation/restoration, aquatic ecotoxicology, environmental compliance and permitting, design and performance evaluations of constructed wetland treatment systems, and ecological risk assessment. Dr. Mastin has provided sediment assessment, remediation, and restoration leadership for projects sponsored by the US EPA, US Army Corp of Engineers, ports and harbors, DOD installations, industrial facilities, and other waters contaminated with legacy pollutants. Recently, Dr. Mastin has been providing technical expertise in both Taiwan and China for the remediation of contaminated sediments and evaluation of beneficial reuse applications.

Chia-Hsin Li

Taiwan

Dr. Chia-Hsin Li received her Ph.D. degree from National Chung-Hsing University. She is an engineer of Sinotech Engineering Consultants, Ltd. She has many experiences in investigation and assessment of soil and groundwater pollution and planning and management of monitoring well networks.

Gary Stephan Bañuelos

USA

Dr. Gary Bañuelos is a plant/soil scientist at the USDA-ARS, Water Management Research Unit in California. Dr. Bañuelos began his work with the "green technology" with Professor H. Marschner in Germany, where he tested for radioactive vegetables contaminated from the Chernobyl disaster in 1986. He developed an integrated approach to field phytoremediation which also includes the development of biofuel and selenium biofortified products. He received his Master of Science in International Agriculture from California Technical University, Diploma in Plant Biology from the University of Tubingen, Germany, and Doctorate in Agriculture/Plant Nutrition at Hohenheim University, Germany as a National Science Foundation Fellow.

Jae Eui Yang

Korea

Dr. Jae E. Yang received his Ph.D degree from Montana State University. He is the President of International Union of Soil Science (IUSS), and he is also the professor of Soil Environmental Chemistry Department of Biological Environment, Kangwon National University. He has many experiences in environmental site assessment, remediation planning construction, and operation of soil remediation work.

James Wang

USA

Dr. James Wang has more than 15 years of experience in applied research and engineering practices in environmental remediation and waste management. With his particular expertise in environmental biological processes, Dr. Wang has been sponsored by government and industry for conducting applied research & development projects in developing innovative waste management and soil/groundwater remediation technologies. Before joining Geosyntec Consultants, Dr. Wang was an Assistant Professor at Northeastern University in Boston, Massachusetts, USA. He is a licensed professional engineer in server states. Dr. Wang is now based in Geosyntec Consultants' office in Washington DC metro area.

Joanna Wragg

UK

Dr. Joanna Wragg works in the area of contaminant fate and transport across medical geology, geodisposal and climate change themes. She has an international reputation in the field of bioaccessibility research, with respect to soil potentially harmful elements their solid phase distribution of contaminants. She has over 20 years' experience of analytical chemistry, research development and data interpretation techniques required for conducting multi-variate geo-analysis. Joanna Wragg is skilled in multi-disciplinary project work and management, combined with strong communication, organisation and administrative skills. She has over 100 papers, reports, presentations & posters, book chapters and published reviews throughout career to date (a full report list is available on request, selected outputs included) with over 350 citations and an h – index of 8.

John Darmody

Australia

Mr Darmody is a senior company officer with MWH with a record of proven leadership and a strong technical background in water and wastewater master planning, management and treatment. He has worked on all aspects of water and wastewater master planning and planning implementation programs including potable water, reclaimed water, stormwater and groundwater to ensure that communities in Asia, Middle East, the US and Australia utilized their water resources in the most efficient way possible.

Jon Burton

UK

As Technical Director with RAW Group, Jon provides support and advice on specialist areas including groundwater flow and contaminant transport modelling, hydrocarbon investigation and remediation and human health risk assessment.

Jon is responsible for the direction of the R&D programme for RAW across the UK and Ireland and is a key account manager for RAW. He has also provided expert witness services for key clients.

Jon has over 15 years' experience in the environmental field and on completion of his PhD, Jon worked with the Environment Agency as an Area Contaminated Land Officer enforcing contaminated land legislation and providing specialist advice on the investigation and remediation of contaminated land. Jon is a Member and Chartered Scientist with the Chartered Institute of Water and Environmental Management and also sits on the board and Technical Standards Committee for the UK Spill Association.

Jonathan Atkinson

UK

Having spent most of his youth in places like Africa, Chile and Fiji, after his BSc Honours degree in Environmental Sciences at Plymouth and postgrad Dilpoma in Soil and Water Engineering at Silsoe, Cranfield, Jonathan continued his travels by doing Voluntary Service Overseas in the Philippines and two short stints on soil projects in Papau New Guinea and Burkina Faso. He finally got his first permanent job at 30 with the KCC geotechnical group in the UK. After 2 years he moved to Pollution Control section in the KCC Waste Disposal Dept, which evolved into the Waste Regulation Authority. He joined the Environment Agency in 1996. He has worked on risk assessment of developed closed landfill sites, landfill engineering and environmental control enforcement on permitted sites, and contaminated land projects. He has managed a team of specialists and been a national technical specialist advisor on projects related to soil remediation and waste management as a regulator.

Kai Hsien Chi

Taiwan

Dr. Kai Hsien Chi received his Ph.D. degree from Graduate Institute of Environmental Engineering, NCU, Taiwan. His researches focus on persistent organic pollutants (POPs) analysis and effects of climate change on factors governing the environmental fate of POPs. Dr. Chi is the Assistant Professor of the Institute of Environmental and Occupational Health Sciences, NYMU.

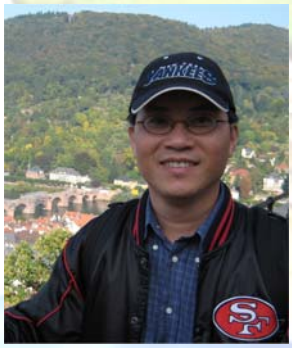
Mark Travers

USA

Mr. Mark Travers is the executive vice president of ENVIRON and has more than 30 years of experience in applied science and engineering, with particular emphasis in multi-media site assessment and remediation; municipal and hazardous waste management; environmental and geotechnical engineering, contaminated sediment assessment and remediation; construction engineering; mine and ore-processing site development and operation; natural resources restoration; construction management; and litigation support and expert testimony. Mark's experience includes projects with both private corporations and government organizations at various locations around the world in response to wide range of regulatory environments, including numerous projects in the Americas, Europe and Asia.

Meng-Der Fang

Taiwan



Dr. MENG-DER FANG received his Ph.D. degree from Department of Marine Environmental Engineering, NSYSU, Taiwan. He is the Senior Researcher and Manager of Department of Environmental Forensic, ITRI. His specialties are environmental analysis and fate of semi-volatile organic contaminants in aquatic environment.

Neil Donaldson

Australia

Neil Donaldson is the Asia Pacific Practice Managing Partner for Contaminated Site Management and is based in ERM's Brisbane office. Neil is also the Contract Managing Partner for the Shell Global Environmental Services Strategy Contract in Middle East Asia, providing a full range of contaminated site services to Shell in the region. In these roles Neil is responsible for the development and delivery of CSM services across the AP region.

Phillip Crowcroft

UK

Dr. Phillip Crowcroft is a Partner leading the Contaminated Site Management team based in the Manchester office. He has over 30 years experience in dealing with landfill closure and restoration, land contamination and brownfield regeneration. This experience has been developed through work as a specialist contractor, an environmental consultant and as a regulator. He has specialised in regulatory issues, keeping abreast of both UK and European legislation and providing advice on liability for landowners and users. A major area of work relates to the practical implementation of sustainable remediation systems to restore brownfield and landfill sites and allow beneficial future use

Ravi Naidu

Australia

CEO & Managing Director
CRC CARE Pty Ltd (Cooperative Research Centre for Contamination Assessment and Remediation of the Environment)
c/o
Professor, Department of Environmental Engineering
University of South Australia
Ph: +61 8 8302 5041 ; Mobile: 0407 720 257
Fax: +61 8 8302 3124
CRC for Contamination Assessment & Remediation of the Environment
Building X (Environmental Sciences Building),
University of South Australia,
Mawson Lakes, SA 5095,
Australia
E-mail: ravi.naidu@crccare.com
Web: www.crccare.com
Expert on: environmental contaminants, toxicology, bioavailability and remediation

Ryuzo Tazawa

Japan

Work experience and specialties:

- Soil and Groundwater Analysis and Investigation
- Risk Assessment at Contaminated Soil and Groundwater Sites
- Technical Consultation on Soil and Groundwater Remediation (Soil washing and In-situ technologies, Such as biological and physico-chemical methods)
- Planning and Assessment of Waste Management(Reduce-Reuse-Recycling)
- Planning and Management of Advanced Sewerage and Wastewater Treatment and Reuse System

Shuenn-Chin Chang

Taiwan

Dr. Shuenn-Chin Chang is the Deputy Executive Secretary of Soil and Groundwater Remediation Fund Management Board, Environmental Protection Administration, Executive Yuan, R.O.C. (Taiwan).

William Earl Pickens

USA

Mr. Pickens, Vice President and Principal Hydrogeologist at MWH, Americas, has over 27 years of experience in planning and implementing investigations and remediation projects at a wide variety of facilities, including: smelters, galvanizing and plating plants, uranium processing facilities, refineries, pipelines, and manufacturing and chemical distribution facilities. He has been responsible for the design and implementation of numerous innovative remedial technologies worldwide including in-situ chemical oxidation, air sparge, soil vapor extraction, bioventing, dual phase extraction, phytoremediation, and enhanced bioremediation.

Invited Facilitators and Members

Anukoon Suthapan

Thailand

Mr. Anukoon Suthapan is the Director for Industrial Wastewater Division,
Water Quality Management Bureau,
Pollution Control Department,
Ministry of Natural Resources and Environment,
Thailand.

Chih Huang

Taiwan

Dr. Huang joined Environmental Resources Management (ERM) as a principal consultant in 2012. Before joining ERM, he has worked a senior researcher in Sinotech Engineering Consultants, Inc. (Taiwan). He has over 15 years of experience in soil and groundwater and contaminated site management. Dr. Huang has managed and conducted variety site investigation, soil and groundwater remediation, risk assessment, and environmental policy study for both public and private sectors. He has also assisted in remediation projects resulting in the first control site and remediation sites delisted in Taiwan. He has helped TWEPA in contaminate sites risk assessment framework implementation and consultation since 2006. Dr. Huang has actively engaged in domestic brownfield policy and program including framework and regulatory design and implementation as well as future deployment strategies planning for Taiwan Environmental Administration.

Chih-Jen Lu

Taiwan

B.S., Feng Chia University, Taiwan (1975-1979)
M.S., University of Illinois, Urbana-Champaign, U.S.A. (1983-1985)
Ph.D., University of Houston, U.S.A. (1986-1989)
Associate Research Fellow, DCB, Taiwan (1989)
Associate Professor, National Chung Hsing University (1989-1994)
Professor, National Chung Hsing University (1994-)
Chairman, National Chung Hsing University (1997-2000,2006-2007)

- Biodegradation of synthetic organic compounds and bioregeneration of activated carbon
- Bioremediation of organic-contaminated groundwaters and soils
- Effects of the secondary carbon source on the biodegradation of SOCs

Colin S. Chen

Taiwan

Professor
Department of Biotechnology
National Kaohsiung Normal University
TEL: (+8867)7172930 ext 7312
Contact address: 62 Shen-Chung Rd, Yanchao, Kaohsiung 824, Taiwan
E-mail: cschen@nknu.edu.tw

Discipline: soil and groundwater remediation, Environmental chemistry, risk assessment
Research expertise: Soil and groundwater remediation, fate and transport of contaminants, risk assessment

Dick Raymond

USA

Dick Raymond is the President of Terra Systems, Inc. which is a bioremediation products and services company that is celebrating its 20 year anniversary. During the past 28 years, he has designed and managed numerous successful in-situ and ex-situ soil and groundwater remediation projects in the United States, Brazil, Japan, and Europe.
Dick is a co-founder of the Remediation Partners Consortium, a strategic alliance of complimentary remediation technology solution providers. He is also an affiliate member of the Alliance of Hazardous Materials Management Professionals (formerly the Academy of Certified Hazardous Materials Managers) and is a contributing member for the Sustainability in Remediation Forum (SURF).

Dick received his BA/BS degree from American University in Washington, D.C. and an Executive MBA from Temple University in Philadelphia, PA.

Fairda Malem

Thailand

Environmentalist
Environmental Research and Training Center
Department of Environmental Quality Promotion
Ministry of Natural Resources and Environment

Involved in major researches and implementation programmes addressing site characterization and remediation on contaminated soil and groundwater.

Hao-Chun Hung

Taiwan

Dr. Hao-Chun Hung received his Ph.D. degree from Department of Civil and Environmental Engineering, University of Wisconsin-Madison, USA. Currently he is a senior Environmental Technology Specialist of the Soil and Groundwater Remediation Fund Management Board of Taiwan EPA.

Hwong-Wen Ma

Taiwan

Graduate Institute of Environmental Engineering
National Taiwan University
No.1, Section 4, Roosevelt Road, Taipei 10617
Taiwan
Tel: +886-2- 2363-0406 or +886-2-3366-4384
Fax: +886-2- 2392-8830
E-mail: hwma@ntu.edu.tw

Jen-Shen Chou

Taiwan

Division Chief of Law Suit Executive Division
Soil and Groundwater Remediation Fund Management Board (SGRFMB)
Environmental Protection Administration of Taiwan
12F, 110, Yeng-Ping South Rd. Taipei 100
Taiwan
Email: jschou@epa.gov.tw

Jeng-Ren Ho

Taiwan

Mr. Jeng-Ren Ho received his bachelor degree from Department of Civil Engineering, NCU, Taiwan, and now he is studying at National Taiwan University for his Ph.D. degree in Environmental Engineering. He is the chief of technology evaluation section of Soil and Groundwater Fund Management Board, Taiwan EPA. His specialties are Environmental Planning and Management, Soil Pollution Remediation and Management, and the building and operation management of an incinerator.

Jimmy C.M. Kao

Taiwan

Professor, Institute of Environmental Engineering, National Sun Yat-Sen University

Ph.D., Department of Civil Engineering, North Carolina State University
M.S., Department of Civil Engineering, North Carolina State University
B.S., Department of Environmental Engineering, National Cheng-Kung University

Expertise:
Authorized instructor for environmental site assessment and risk-based correction action processes by ASTM.
Groundwater and soil remediation.
Remediation system design and application.
Natural bioremediation of contaminated sites.
Wetland and water resource management.

John Hunt

Australia

Dr Hunt is the Technical Manager for Thiess Services, where he is responsible for evaluation of site remediation tender requirements, assessment, approvals and licensing of remediation projects, community consultation, technical remediation solutions and remediation trouble shooting. Dr Hunt has been responsible for the development, management and supervision of the assessment, delineation and / or clean up and validation of a number of major contaminated industrial sites which combined value exceeds AU$1,000,000,000.

K.A.I.D. Silva

Sri Lanka

Dr. Silva did his basic degree in Agriculture and did a Postgraduate degree in the field of Natural Resources Management. Also, He has done a Postgraduate Diploma in the field of Wildlife Ecology and Management.
After 12 years of working as an Agriculture Officer, Dr. Silva joined the Ministry of Environment. Currently he is working as a Director in the Policy and Planning Division of the Ministry of Environment.

Karin Holland

USA

Karin Holland is responsible for leading the application of sustainability thinking to Haley & Aldrich's remediation services and has assisted multiple clients in the public and private sector with sustainable remediation projects, throughout the remediation lifecycle. Karin is the President of the Sustainable Remediation Forum (SURF) and chairs SURF's Technical Initiatives Committee. Karin earned a bachelor's degree in Natural Sciences from the University of Cambridge, United Kingdom and a master's degree in Law and Environmental Science from the University of Nottingham, United Kingdom. She is a LEED-Accredited Professional, an Envision^{TM} Verifier and Credentialed Professional and a Registered Lead ISO14001 Auditor.

Kuei-Jyum Yeh

Taiwan

Professor
Department of Environmental Science and Engineering
National Pingtung University of Science and Technology

Research Interests:
Environmental Chemistry
Advanced Oxidation Processes (AOPs)
Solid Waste Analysis
Pesticide Pollution Treatment and Analysis

Lee Fergusson

Australia

Dr Lee Fergusson is Chief Executive Officer of Virotec Global Solutions, an environmental remediation and waste treatment. He is the author of the 2010 book *Virotec: A Ten-Year Story of Success in Environmental Remediation*, originally commissioned by the Commonwealth Scientific and Industrial Research Organisation as part of the Australian Government's commitment to the "Asia-Pacific Partnership on Clean Development and Climate", and *ViroMine Technology: A Solution to the World's Mining Megawaste* published in 2012. His research on site remediation, sustainability and the environment have been published in international journals including *Chinese Journal of Geochemistry*, *Dredging and Port Construction*, *International Water, Power and Dam Construction*, *Journal of Environmental Quality*, *Remediation Australasia*, and *Waste Management and Environment*.

Mai Hanh Nguyen

Vietnam

University degree in Environmental Sciences, National University of Hanoi in 1997. Master's degree in Environmental Sciences, National University of Hanoi in 2006.
From 1997 to 2008, worked in Institute of Land Investigation and Planning (later renamed Center for Land Investigation and Planning). From 2008 to now, have been worked at Research Institute of Land Administration.
With over 14 years of experience in the field of land management, soil science, participated in 30 projects and researches in this field. Including MONRES's projects, researches on investigating and assessing the current situation of soil environment; modeling structural change in land usage; building contents and methods of quality control soil environment; climate change impacts on land and etc.

Maria Amber V. Hagada

Philippines

Ms. Hagada is a Science Research Specialist II presently assigned at the Office of the Director of the Environmental Management Bureau-Department of Environment and Natural Resources. She has training/knowledge/experience in the implementation of the following: Philippine Environmental Impact Statement (EIS) System (Presidential Decree 1586); Basel Convention for Transboundary Movement of Hazardous Waste and the Toxic Substances and Hazardous Waste and Nuclear Waste Control Act (Republic Act 6969); and Philippine Clean Water Act (Republic Act 9275). She is a member of the Scientific Committee and one of the Contact Persons for Communication of Working Group and Website Information.

Min-Chao Wang

Taiwan

Distinguished Professor
Department of Environmental Engineering and Management
Chaoyang University of Technology
Education Background:
Ph.D.: University of Saskatchewan Canada (1983-09 ~ 1987-07)
Master: National Chung Hsing University Taiwan (1972-09 ~ 1974-06)

Noemi A. Paranada

Philippines

Ms. Noemi A. Paranada is a Chief Environmental Management Specialist assigned at the Environmental Management Bureau – Region 4A (CALABARZON). As Chief Environmental Management Specialist, she is the Chief of the Environmental Impact Assessment Division. She also supervises the Adopt-a-River project in her Region. Under her jurisdiction are the provinces of Cavite, Laguna, Batangas, Rizal, and Quezon provinces. It is the region with the highest number of industrial estates.
Email: noemiparanada@yahoo.com

Pey-Horng Liu

Taiwan

- Ph.D. in Chemistry,1994, National Tsing Hua University
- M.S. in Chemistry, 1985, National Tsing Hua University

He is the manager of Introduction of Green Energy and Environment Research Laboratory, Industrial Technology Research Institute. He has many experiences in Remediation Planning, Design, Construction, and Operation of Remediation Work.

Pei-Yao Wu

Taiwan

Dr. Pei-Yao Wu received his Ph.D. degree from Department of Civil and Environmental Engineering, University of Utah, USA. He is currently a research fellow in the Green Energy and Environment Research Laboratories of the Industrial Technology Research Institute (ITRI). His specialties include soil and groundwater remediation, marine chemical spill response, and environmental dredging for sediment remediation. He has many hands-on experiences on groundwater remediation and environmental dredging with CDFs, and compiled 45 response handbooks of marine chemical spill response.

Shian-Chee Wu

Taiwan

Dr. Shian-Chee Wu received his Ph.D. degree from Massachusetts Institute of Technology, USA. He is the Professor of Graduate Institute of Environmental Engineering, NTU. His specialties are Environmental Pollutants Fate and Environmental Hazard Assessment.

Shih-Cheng Pan

Taiwan

Dr. Shih-Cheng Pan received his Ph.D. degree in Environmental Engineering from National Central University. He is currently the Technical Manager of Environmental Engineering Department (I), Sinotech Engineering Consultants Ltd., and the General Manager of Pin-Pro Corporation. Dr. Pan is also the Secretary in General of Taiwan Association of Soil and Groundwater Environmental Protection (TASGEP). Dr. Pan owned many years of field experience in the investigation and remediation of soil and groundwater contaminated sites related to chlorinated solvent and petroleum contamination. He also conducted several projects for Taiwan EPA including regional groundwater monitoring, and the investigation of military and aviation sites.

Wisjnuprapto

Indonesia

Dr. Wisjnuprapto's degree is in Sanitary Engineering that he has got from the Institut Teknologi Bandung (ITB), Indonesia. He got his second degree also in Sanitary Engineering from the Institute of Hydraulic Engineering (IHE) Delft, the Netherlands. And his third degree (Doctor) was done at the Institute Nationale des Science Appliquee (INSA) Toulouse, France in the field of Biological Wastewater Treatment Process.
He work in ITB since 1971, and in 1985-1998. He in-charged as Vice Director of the Inter University Center on Biotechnology, ITB that pushed him to a specialization of Environmental Biotechnology.

Zaharah Bt. Yahya Khan

Malaysia

Dr. Zaharah Bt. Yahya Khan is the Principal Assistant Secretary, Minerals and Geosciences Division, Ministry of Natural Resources and Environment (NRE) Malaysia.

Education:
BHsc. (Honors) Human Sciences, 2002, International Islamic University Malaysia
Diploma of Public Administration, 2003, National Institute of Public Administration (INTAN)

Employment experience:
Assistant Secretary, External Information Division
Ministry of Foreign Affairs of Malaysia, 2004
Assistant Secretary, Adjudication & Arbitration Division
Ministry of Foreign Affairs of Malaysia, 2004-2006
Senior Assistant Secretary. International Division
Ministry of Higher Education of Malaysia, 2006-2007
Principal Assistant Secretary, Mineral & Geosciences Division
Ministry of Natural Resources and Environment (NRE), 2010 -present.

Seminar Report

October 30, 2012

Opening Ceremony

Opening Address by Chairman of ReSAGPAC

Good morning, Distinguished invited speakers and participants, ladies and gentlemen:

It is a great pleasure for me to say some words at the opening ceremony of this international conference. On behalf of local **organizing committee** of this international conference and the Working Group on the Remediation of Soil and Groundwater Pollution of the Asian Countries (**WG ReSAGPAC**), I would like to extend my sincerely welcome all of you to join this conference and exhibition.

Taiwan EPA provided us a great funding to invite 15 distinguished speakers and 20 international participants from 13 countries, especially from Australia, United Kingdom, and United States, to share their knowledge and experiences on regulations of pollutants, innovative technologies and management strategies for the contaminated sites of soil and groundwater pollution.

We have a **very specially design for the invited speakers to make two oral presentation in 2 days conference** which are quite different compared to other international conferences. The only one reason is to **give more benefits**, not only for 500 local audiences in here but also for 40 international speakers and participants from 13 countries.

In next 2 days, we arranged the **oral presentations into 12 sessions,** including keynote speeches, sustainable management technologies for contaminated sites, remediation of heavy metals-contaminated sites, phytoremediation, bioremediation, remediation on sediments, and also many case studies of the contaminated sites in the world.

This year is The Soil and Groundwater Remediation Fund Management Board of Taiwan EPA to celebrate the **12th anniversary** of the promulgation of the Soil and Groundwater Remediation Act in Taiwan. Taiwan EPA had learned many **management strategies, experience, innovative and cost-effective technologies** for contamination sites in Taiwan in last decade, especially learned from USA, EU countries and Australia. Taiwan

EPA also wants to **share and transfer our experience and technologies to the East and Southeastern Asian countries**, therefore we have developed the working group on the Remediation of Soil and Groundwater Pollution of the Asian Countries (**WG ReSAGPAC**) in June of 2011 at Taipei, Taiwan.

It's a very important step for Taiwan EPA in the next 10 years to develop the better management strategies, new regulations of pollutants, innovative and risk-based approach remediation technologies for the contaminated sites in Taiwan.

In next two days, Taiwan EPA also provided an "**Environmental Exhibition on the Remediation for the Soil and Groundwater Pollution**" in next 2 days of this building. There are **50 booths** including 40 local instrumental companies and environmental consultant companies, also including 10 international companies to join this exhibition. **Taiwan EPA also provided 10 booths in a special zone** to show our achievements not only on management strategies but also on the actions to promote the remediation career on this field in Taiwan.

I would like to express our great thanks to **Mr. Hung-Teh Tsai**, who is the technical super-intendant and executive secretary of the Soil and Groundwater Remediation Fund Management Board of Taiwan EPA **and also thanks to his government officers** of the Fund management Board for their strong supporting on this conference and exhibition.

Finally, I would like to thank all the invited speakers and participants and **500 local participants** to enjoy this conference and exhibition in next 2 days.

Thank you.

Chairman of the Working Group on Remediation for Soil and Groundwater Pollution of Asian Countries (ReSAGPAC) (2011-2014)
Zueng-Sang Chen, Ph.D., signed on Oct 19, 2012

Distinguished Professor
Department of Agricultural Chemistry
National Taiwan University, Taipei 10617, TAIWAN
Email: soilchen@ntu.edu.tw

Opening Address by Minister of Taiwan EPA

Good morning, distinguished speakers and participants, ladies and gentlemen,

There is a Chinese proverb that says, "**It is a real pleasure to have friends visiting from afar**." As the Minister of the Taiwan Environmental Protection Administration, I would like to welcome all of you, especially the **36 invited speakers and participants from 13 countries**, including Australia, the United Kingdom, and United States, to join this international conference to celebrate our **12th anniversary** of the promulgation of the Soil and Groundwater Remediation Act in Taiwan. To our foreign friends, I sincerely hope you will have a wonderful time and experience Taiwan's hospitality in the next few days.

In 1983 when cadmium was discovered in the rice we ate, our government came to recognize the problem of soil pollution . Since then, more and more soil and groundwater contaminated sites have been found. As a result, in 1991 the Taiwan EPA started to draft our own regulations to manage soil and groundwater pollution. After nine years of efforts, **the Soil and Groundwater Remediation Act was promulgated on February 2, 2000**. And on February 3 in 2010, our legislative Yuan passed a major amendment of this ACT and included **sediments** as the additional environmental resources.

This Act not only allows us to establish regulations to protect our soil and groundwater resources, but we are also able to collect fees from the importers and manufacturers of the announced potential polluted substances to establish the Soil and Groundwater Remediation Fund, which enables us to carry out investigation and remediation work. Until now, **we have collected more than 200 million US dollars for the fund and our future target is at least 1 billion US dollars.**

Although we have ordered the polluters to cleanup the land they polluted, many sites still have not completed the cleanup work yet due to the limitation of technology and budget. The information of soil and groundwater quality collected from the investigations is stored in a GIS system. We are also **planning to produce a health risk map which will be generated by using the information in the database**. This information will show a property's human health risk level evaluated from the soil and groundwater quality information collected from the environmental parameters related to the risk assessment models.

Moreover, Innovative and cost-effective technologies have been developed and applied in the contaminated sites of Taiwan, such as using thermal desorption to

vaporize and then capture pollutants, inoculating microorganisms to decompose the organic pollutants, or carrying pollutants out of the groundwater by air sparging.

The cost-effective professional technologies are therefore in great demand. Many universities in Taiwan are offering graduate courses on remediation technologies for soil and groundwater pollution sites. Many universities have also established **Environmental Research Centers** for developing innovative remediation technologies. New investigation tools have been developed and utilized in laboratories.

The next steps and goals of our future work are to develop the **green remediation strategies and risk-based approach remediation technologies** for the contaminated sites, to protect our land by rigorously carrying out the regulations, provide training courses of advance technologies for our professionals, and share our technologies and experiences with other countries in Asia and the Pacific region.

I would like to express my appreciation to the USEPA and AIT (American Institute in Taiwan). In the last decade, the **USEPA has continuously supported us every step of the way to share with us your knowledge and experiences in regulations, technologies and management strategies** for the contaminated sites in Taiwan. Especially, you have shared your experiences through our annual training workshop on site remediation. I look forward to continuously working together with our American friends to build a better and cleaner world.

The Taiwan EPA is also providing an "**Environmental Exhibition on the Remediation for the Soil and Groundwater Pollution**" in the next 2 days in this building. You will find **50 booths** including 40 local instrumental companies and environmental consultant companies, and 10 international companies taking part in this exhibition. The **Taiwan EPA also provided 10 booths in a special zone** to show our achievements not only in management strategies but also in the actions to promote the remediation career in this field in Taiwan.

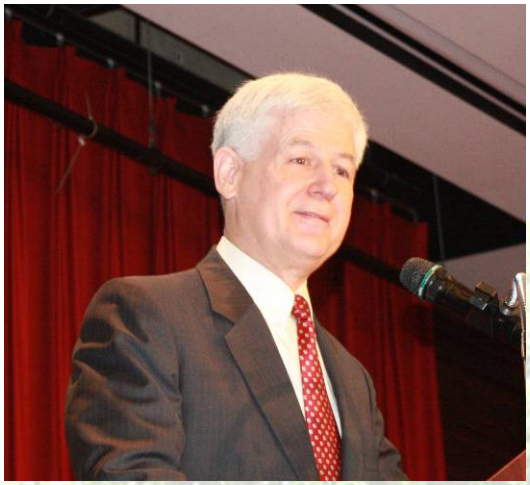
Lastly, I would like to **thank all the invited speakers and participants from 13 countries and nearly 500 local participants for coming to this conference and exhibition**. I also hope **all our foreign participants** will enjoy the conference, study tour, green remediation forum and business meeting of the working group of the Asian countries in the next few days in Taipei and Tainan.

Thank you.

Minister of
Environmental Protection Administration (EPA),
Executive Yuan
R.O.C. (Taiwan)

Shu-Hung Shen

Opening Address by Director of the American Institute in Taiwan



Minister Shen, Officials from Taiwan's Environmental Protection Administration and the U.S. Environmental Protection Agency, Ladies and gentlemen,

Good Morning. It is a pleasure and honor to speak here today.

For many economies, the process of industrialization and development went forward without appropriate safeguards in place to deal with the release of toxic chemicals and waste into the environment. But, ignoring the problem did not make it go away. Indeed, neglect compounded the problem.

Fortunately, our societies eventually came to acknowledge the need for change. We enacted new laws to deal with the challenges posed by the pollution of our air, water and land. In the case of the United States, in 1970 we founded the U.S. Environmental Protection Agency. A decade later, we enacted our Comprehensive Environmental Response, Compensation and Liability Act of 1980 which marked the beginning of our federal government's remediation efforts.

Here in Taiwan, although several decades of rapid economic development have taken a toll on the environment, it is encouraging – indeed exciting – to see that Taiwan has now established itself as a regional leader in environmental protection. In recent months, Taiwan has hosted a number of international workshops and symposiums that have included highly technical, valuable discussions on issues such as environmental information, mercury monitoring, greenhouse gas reduction, and E-waste. And today I am pleased to join you in opening this important international conference on site remediation.

Since Taiwan passed the Soil and Groundwater Remediation Act in the year 2000, more than 70 percent of the 2,231 declared contaminated sites island-wide have been restored in accordance with international standards.

U.S. environmental experts and scientists are pleased to have played a helpful role in Taiwan's transformation into a center of site remediation knowledge. And it is rewarding to see that Taiwan is now sharing that expertise with countries in the region.

Mastering site remediation has been a long journey for both the United States and for Taiwan, and we have an excellent record of cooperation in making that journey together. Indeed, our cooperation with Taiwan on environmental issues is a highlight of

our relationship. 2

I am delighted to note that the United States Environmental Protection Agency and Taiwan's Environmental Protection Administration next year will celebrate 20 years of collaboration. We have worked together on a wide variety of topics, including building strong environmental institutions and legal structures, combating climate change by limiting pollutants, improving air quality, expanding access to clean water, reducing exposure to toxic chemicals, and cleaning up hazardous E-waste.

This is a powerful testimony to the strong relationship between our two agencies. It demonstrates a common understanding that local environmental issues have a global impact.

After almost 20 years of cooperation, we look forward to continued collaboration with Taiwan on environmental issues. The American Institute in Taiwan is working hard, in concert with U.S. agencies in Washington, to support Taiwan's environmental protection efforts, including Taiwan's meaningful participation in the UN Framework Convention on Climate Change.

In the next few days, you are going to hear experts from across the globe who have come to Taiwan to discuss how science and technology can help remediate soil and groundwater contamination. It is a serious issue that confronts people around the world, and our cooperative efforts with Taiwan underscore the importance of strong leadership in designing sound policies to address these environmental problems.

As you begin your discussions about the formidable challenge of cleaning up contaminated sites, we are reminded of the immense challenges the world faces in protecting human health and the environment. We know from Taiwan EPA's success at site remediation that Taiwan is ready to be a leader in confronting these challenges.

And now is the time for leadership. The future of our planet depends on it. I wish you a very productive conference and a very pleasant stay in Taiwan.

Thank you.

Director of
American Institute in Taiwan (AIT),

Christopher J. Marut

Session 1: Plenary Session

Topics	Speaker
Realizing Sustainable Land Use through Soil and Groundwater Protection -The Vision of Taiwan EPA	**Dr. Shuenn-Chin Chang** (Taiwan EPA)

In Taiwan, industry has developed for over three decades. Because soil is the final receptor of water, air, and waste generated, protection the health of public and environment from subsurface contamination has been recognized to be the major environmental issue. On the evening of January 13th 2000, a full meeting of the Legislative Yuan completed the second and third reading of the Soil and Groundwater Pollution Remediation Act, officially bringing the new Act into law. The Legislature confirmed that the new Act will fully address groundwater pollution remediation, and established a system where soil and groundwater pollution sites will be divided into two categories. When levels of soil or groundwater pollution exceed set control standards, the site will be listed as a "control site", and the competent authority will be charged with taking steps to prevent further spread of pollution. Control sites assessed to be high risk will then be listed as "remedial sites", and the polluter or person involved with the land must remediate the site in accordance with regulations. Sale of the polluter or involved persons' land will also be prohibited.

In view of the fact that the flexibility of handling soil and groundwater polluted sites was in great need, Soil and Groundwater Pollution Remediation Fund was founded based on the related schemes of Superfund in the U.S. after taking the domestic situations of society, economy, and environment into a comprehensive consideration. The Fund was authorized by Article 28 of the Remediation Act to "levy soil and groundwater pollution remediation fees (herein referred to as the 'remediation fees') on manufacturers and importers in accordance with the amounts of officially announced chemical substances manufactured and imported by such enterprises." The nature of Soil and Groundwater Pollution Remediation Fund was to raise funds, which would be specially utilized for soil and groundwater pollution investigation, verification, necessary countermeasures, evaluation, regulation, control, remediation, quality monitoring, health risk evaluation and management, lawsuits involving the Fund, international environmental protection personnel and administrative management involving soil and groundwater pollution. Moreover, Soil and Groundwater Pollution Remediation Fund Management Board was established to be in charge of the management and operation of funds.

In summary, evolvement of soil and groundwater protection will continue at domestic and regional scales. We have to learn and progress through collaboration among regional and global partners and create the sustainable future with collective efforts and wisdom. Each one of us should keep playing the responsible role as the citizen of the globe.

Topics	Speaker
Keynote Speech: Advanced Site Remediation Technologies	**Prof. Dr. Ravi Naidu** (CRC CARE, Australia)

The recent poisoning of thousands of people through exposure to arsenic, asbestos (Naidu et al., 1996) and benzene has highlighted the massive challenge that contaminants pose for both human and environmental health. Globally, there are more than 3,000,000 potentially contaminated sites (Singh and Naidu 2012) which besides posing risks to the health and wellbeing of humans and the environment, also represent a large lost economic opportunity. Contamination is the legacy of industrialization, inadequate environmental laws and inconsistent and lacking enforcement. Although the potential impact of contaminants on the environment and human health was first recognised more than half a century ago, contaminated sites still pose major challenges in terms of site assessment and remediation. These challenges include:

(a) inadequacy in site characterisation and delineation of subsurface contamination including soil and ground water,
(b) lack of trialled and tested tools for estimating the mass flux of contaminants,
(c) cost of assessment and remediation, which is often hard to quantify,
(d) lack of advanced technologies for subsurface ground water remediation,
(e) inadequacy of policies supporting or defining end points for remediation, and
(f) fractured rocks and recalcitrant contaminants (such as DNAPLs) and their remedial endpoints.

There needs to be a far more consistent and global effort to develop site characterisation and sustainable but green remedial technologies if humanity is to avoid the health and environmental wellbeing penalties of spreading contamination driven by the combination of world population and economic growth, which are likely to double our use of resources by the mid-21st century. Additionally, the continued stress on available water resources, in both developed and developing countries and communities require that we further isolate contaminated ground and surface water from potable water resources while we continue to develop reliable remediation methods.

Topics	Speaker
Keynote Speech: Regulation, Risk Assessment and Management as Part of Sustainable Remediation	**Dr. Phillip Crowcroft** (CL:AIRE / ERM, UK)

The remediation of contaminated land presents a range of challenges which have the potential to impact the overall cost of the works. The Regulatory Framework in which we operate has a fundamental effect on the degree to which risk assessment can influence the outcome of the works. Risk assessment itself is seen as a fundamental part of deciding what remediation is needed, but the risk assessment is only as good as the information it is based on. This paper describes the recent changes in approach to assessing land contamination in the UK. It goes on to consider the value of undertaking High Resolution Site Characterization (HRSC) to deliver more sophisticated and accurate Conceptual Site Models, which in turn lead to more focused and sustainable remediation solutions. Such solutions can generate large cost savings in remediation at relatively small additional costs for investigation and assessment.

More sustainable site investigation approach has being delivered than traditional investigations, along with numerous other cost, time, safety and technical benefits provided by HRSC. Benefits at the remediation stage include performance certainty, reduced treatment zone and steam injection effort focused on areas of greatest contaminant mass. Design concepts proven during system operation include:

- **significant mass recovered in accordance with regulatory and client expectations,**
- **works delivered on time and budget, and**
- **regulatory 'approval' anticipated shortly.**

Remediation sustainability is environmental, social and economic approaches to remediate contamination sites. The aim of sustainable remediation is to get rapid and effective removal of pollution, lower carbon footprint than previous anticipated approach, minimal effect on neighbors, and 25% of the cost of alternative approach.

Session 2: Sustainable Management: Part 1

Topics	Speaker
Development of the SuRF-UK Framework for Sustainable Remediation in the UK	**Dr. Brian Bone** (BEC / CL:AIRE / SuRF, UK)

Sustainable development has driven much European and UK policy over the last few decades, for example in land use planning, waste and contaminated land management. The three elements of sustainable development (environment, society and economy) can be considered when assessing the likely impacts and benefits of undertaking any scheme, including remediation. SuRF-UK was set up in 2007 to support the application of sustainability principles for remediation in the UK, and has produced a number of documents including the first formal framework for assessing the sustainability of remediation strategies. SuRF-UK was set up to develop a sustainable remediation framework that leads to better remediation strategies and options appraisal, which are more explicitly linked to the goals of sustainable development. It is a collaboration of regulators, industry, academics and consultants.

A number of outputs have been produced and are available from http://www.claire.co.uk/surf to promote sustainable thinking in the UK remediation sector.

Although a voluntary framework, the SuRF-UK guidance is well-placed to support the new regulatory landscape in the UK introduced by recent planning and contaminated land (Defra 2012) guidance. Use of the framework may help improve stakeholder confidence in the "presumption in favor of sustainable development" that underpins the new planning framework. In addition, under the new contaminated land statutory guidance, the SuRF-UK framework may be used to support a decision on whether land is contaminated (a Stage A decision) and also support the selection of a sustainable, cost-effective remediation strategy.

Work continues on supporting the practical use of the SuRF-UK framework, including development of case studies and further guidance on good practice and Tier 1 (qualitative) assessment. An international network of SuRF networks is now well-established, with quarterly teleconferences to exchange ideas and solutions. This network is likely to grow as sustainable thinking and practice becomes embedded in the global remediation sector.

Topics	Speaker
Risk Assessment as a Tool in Driving Sustainable Management of Contaminated Land Issues	**Mr. Neil Donaldson** (ERM, Australia)

In the Asia Pacific region the use of risk assessment has evolved rapidly in some jurisdictions over the past decade to become an effective tool at the disposal of consultant when developing coherent strategy to manage liability for clients. Maturing contaminated land legislation has been key to enabling this evolution in some jurisdictions however, is has also been necessary for proactive advocacy by industry bodies and contaminated land practitioners to drive the acceptance and understanding of risk assessment techniques, especially where the legislative tools are less prescriptive or absent.

Based on a review of available data and development of a conceptual site model it was established that the primary risk driver to future site use was the vapour pathway. No offsite impacts were identified. On this basis vapour investigation and risk assessment was used to define:

- **Types of development possible without remediation based on building size and layout**
- **Types of development requiring protection from vapour intrusion**
- **Monitoring criteria to maintain 'no risk' status both on and off site**

Following the risk assessment, sensitivity analysis was used to derive building characteristics that gave a no risk prediction in the model, based on the same input vapour concentration. This approach allowed identification of an "envelope" around the development proposal within which the building designers could work, to make sure what they designed would not create a vapour risk. This is possible because the risk depends on floor construction, building volume and air exchange rate, all of which can be designed in. The advantage of this novel approach is that the designers can mitigate the risks in the building design avoiding the expense of incorporating vapour barriers of remediation design components which would, require ongoing maintenance and monitoring. This approach introduces the concept that the protection is intrinsic to the building design – based on the parameters established using the risk assessment.

Topics	Speaker
Technologies and Approaches for Sustainable Sediment Management	**Mr. Mark Travers** (ENVIRON Holdings, USA)

Sustainable sediment management is a comprehensive approach for addressing the long term management and conservation of sediments in a port or harbor, river or watershed. The goal is to maintain current and future economic and ecosystem-based services provided by the aquatic environment while balancing broader regional, environmental and societal needs.

Typically, sediments are managed on a project by project basis without the benefit of a comprehensive, sustainable strategy to reduce costs and improve environmental benefits. Several tools are emerging that attempt to evaluate sediment management practices that are sustainable such as practices that have either a net zero influence on the environment or enhance current conditions into the foreseeable future.

Net environmental benefit analysis (NEBA) is increasingly used to forecast different sediment management and remediation decisions. NEBA incorporates a set of specific quantified ecosystem service metrics in a framework that provides a scientific basis for balancing the investment costs and labour with the environmental and societal benefits imagined during decision-making. A NEBA identifies the breakpoints where costs become disproportionate to the benefits gained. By doing so sustainable sediment management activities can be identified that minimise impacts on ecological and human use services and maximise value to the public.

Resource foot printing is a tool that is much more focused on the evaluation of specific factors such as energy or land use, carbon and water. It is a framework for measuring the net change from baseline conditions or no-action to specific factors associated with the implementation of a sediment remedy. This paper summarises from an international perspective the existing and emerging technologies and tactics for developing a sustainable management strategy for sediments. The discussion draws from expertise and lessons learned in areas such as sediment transport, erosion control, flood control, dredging and dredged materials management, beneficial re-use, contaminated sediment treatment and management, ecology and habitat restoration, risk assessment and decision theory.

Session 3: Remediation of Heavy Metals

Topics	Speaker
Two UK Remediation Case Studies: Combined In-Situ Treatment of Groundwater, & Stabilization of Heavy Metal Contaminated Sludge	**Dr. Jon Burton** (CL:AIRE / RAW Group, UK)

Prior to January 2003, approximately 3,400 – 5,700 litres of diesel had escaped from a fractured oil-feed pipe that ran below ground adjacent to the pump house. Site investigation identified a plume of light non-aqueous phase liquid (LNAPL) and a much larger plume of dissolved phase hydrocarbons extending over 40 m from the area of the leak. Site investigation identified that the vast majority of the diesel was prevented from contaminating the main chalk aquifer by the presence of a layer of "putty" chalk. However, the presence of vertical migration pathways could not be ruled out and the presence of the LNAPL and dissolved phase hydrocarbons remained a risk to the aquifer and the public water supply abstraction. Therefore remediation was required.

Steel refining has a long history in the UK and as a consequence there are very large stockpiles of refinery waste that need to be treated so that the land can be reused. UK steel works facilities might store over 1 million m3 of refinery waste, taking up a considerable amount of land that is often required for redevelopment. Likewise, the waste contains heavy metals at concentrations that can pose a risk to health and the environment. We provide a review of quality data collected from refinery facilities in the UK where waste has been produced and compare with data collected from steel works waste in China. Treatability trials have been completed to assess stabilisation reagents and the treatment process to reduce the risk of harm to human health or the environment in accordance with national legislation.

Summary data is presented which indicates that these wastes can often be treated to allow reuse in the steel production process or as general civil engineering fill materials with minimal environmental risk. The results of the analysis of steel works wastes from the UK and China show some similarities but also marked contrasts in composition. These contrasts require serious consideration when planning treatment. Treatment trials for stabilisation/solidification of the wastes have been successful and indicate that appropriately designed stabilisation reagent formulations are able to reduce contaminant leaching to very low levels, below for example strict UK Environmental Quality Standards and Drinking Water Standards (DWS) and Chinese surface water discharge regulations.

Topics	Speaker
Reuse/disposal of Agricultural Drainage Water with High Levels of Salinity and Toxic Trace Elements in Central California	**Dr. Gary Stephan Bañuelos** (USDA-ARS, USA)

Agricultural drainage waters in the western San Joaquin Valley of Central California contained high levels of salts, boron (B) and selenium (Se). To investigate the plausibility of using plants as recipients for disposing of poor-quality drainage-waters, multi-year field studies were conducted to reuse drainage water on plants that are salt and B tolerant, and accumulate soluble Se from the drainage water.

The sustainability and success of a drainage-water reuse strategy is dependent on managing the ever-increasing accumulation of salts and using the appropriate plant species for the varied quality waters and soils. In central California, suitable plants must be salt- and B-tolerant, and be fairly low-maintenance to grow. Maas and Grattan (1999) have reviewed the effects of salinity on the yields of different crops, and clearly indicated that crop yields are a function of interactions between salinity and various soil, water and climatic conditions. When possible, the economic viability of selected crops and a low field maintenance requirement should be considered as two important criteria for the selection.

Irrigation management is essentially the most important strategy for reducing the volume of fresh water applied and drainage water produced in many agricultural regions worldwide. Since salts are imported from the central California soils with irrigation water, a means of ultimately isolating salts from productive agricultural soils is required for sustainability. Otherwise, salts will accumulate in soil root zone. When, however, drainage water is produced, re-using drainage water for irrigation on salt and B tolerant crops can not only dispose of drainage water that would otherwise be costly to discharge and but also reduce the requirement for good-quality irrigation water. Producing products of economical value from poor quality waters enhances the long-term, acceptance of this water reuse strategy.

Topics	Speaker
Assessing the Link between the Geochemistry of Soils and the Bioaccessibility of Arsenic, Chromium and Lead in the Urban Environment	**Dr. Joanna Wragg** (BARGE / BGS, UK)

In the UK, there are large areas of land that have relatively high concentrations of naturally occurring potentially harmful elements (PHE) such as arsenic (As), chromium (Cr) and lead (Pb) in the soil. A recently published British Geological Survey (BGS) geochemical soil atlas of England and Wales using soil samples collected for the National Soil Inventory (NSI), highlighted the extent to which the soil guideline value (SGV) of 32 mg kg-1 for residential land use for one of these PHE, As, was exceeded.

The newly validated Bioaccessibility Research Group of Europe (BARGE) unified BARGE method (UBM) has been applied to a small set of soils from the Northampton urban are of the United Kingdom (UK), with the aim of predicting potentially harmful element (PHE) bioaccessibility across the urban conurbation. In addition to predicting the PHE bioaccessibility, this study has begun to identify the source bioaccessibility inputs and mapped the spatial distribution of predicted PHE across the Northampton urban area.

Mapping of predicted bioaccessibility shows a clear anthropogenic input from a sewage works for all PHE of interest. Inclusion of a geology layer into the mapping process indicated a clear relationship between parent geology and PHE bioaccessibility for As and Cr. The main geological influence was the inferior oolite. For Cr, in addition to the geological influence, the previous industrial heritage of the location (the ironworks, shoemaking and tanneries) may be influencing the bioaccessibility results. Lead bioaccessibility appears to be related to anthropogenic inputs alone, as inputs from the roads and sewage works appear to be the main influences.

The MLR methodology is a useful tool for identifying the controls on PHE bioaccessibility. In conjunction with mapping information bioaccessibility prediction techniques allow for the identification of any anthropogenic inputs, the spatial distribution of PHE bioaccessibility and more importantly the identification of areas of potential concern.

Session 4: Bioremediation

Topics	Speaker
Microvi BioTechnologies	**Mr. John Darmody** (MWH, Australia)

There are several problems with conventional treatments. Biological processes are unreliable caused by microbial activity and losses of microorganism, produce sludge, and have large footprint. Physical processes generally produce secondary wastes, consume high energy and also produce large footprint. Chemical processes are expensive, produce secondary wastes and need post treatment. Membrane bioreactor technologies have the same problem as biological processes. All the conventional treatments have high lifecycle cost.

Microvi Biotechnology is a clean, low-cost, comprehensive and sustainable solution to water treatment with low lifecycle costs. Microvi addresses challenges of current technologies for organic and nitrogen removal through simple, yet elegant proprietary technology. Compared to conventional treatments, Microvi produce no secondary wastes and low foot print, require low energy, treat all dissolved contaminants with no organism loss and do not need post treatment. This approach can be applied for groundwater, drinking water, and industrial and municipal wastewater treatments.

Microvi MB-P and MB-CS Technology can effectively remove perchlorate/TCE without producing any waste stream. Various concentrations of perchlorate can be treated to non-detect. The removal rates of up to 99.99% of perchlorate at various concentrations were obtained. The cost reduction was around 50%.

Microvi MB-N_2 Technology can effectively remove nitrate without producing any waste stream. Greatly enhanced through intensified degradation of nitrate to nitrogen gas. The removal rates of up to 99% of nitrate ate various concentrations (10-1000 ppm) were obtained. The cost reduction was around 50%.

Topics	Speaker
Enhanced Biobarrier for a Mixed CVOC Plume	**Mr. William E. Pickens** (MWH, USA)

A biobarrier was installed at the downgradient boundary of a confidential industrial facility in Pennsylvania to prevent the off-site migration of chlorinated volatile organic compounds (CVOCs) in groundwater. The facility was used for the manufacture of various electrical components and equipment from 1924 to 2002. Operations during this time resulted in the contamination of soils and groundwater by a variety of CVOCs. The primary constituents of concern at the site are the CVOCs trichloroethylene (TCE) and tetrachloroethylene (PCE).

A Human Health Risk Assessment (HHRA) was conducted and site specific standards (SSS) were developed for the CVOCs that were detected at the site. TCE (maximum concentration in groundwater at the site was 3,500 µg/L) was the only CVOC detected at a concentration in groundwater above the SSS. TCE was also found to have migrated off-site at concentrations greater than the SSS. Therefore, a boundary control measure was determined to be necessary to prevent additional off-site migration of CVOCs.

A biological barrier (biobarrier) was selected as the most viable option to prevent off-site migration from the facility. The objective of the biobarrier was to decrease groundwater concentrations to below the SSS before they reached the property boundary by degrading the dissolved phase CVOCs through reductive dechlorination.

Topics	Speaker
Electrokinetic-Enhanced Bioremediation (EK–BIO) - An Innovative Bioremediation Technology	**Dr. James Wang** (Geosyntec Consultants, USA)

Effective delivery of remediation reagents is a critical component for successful implementations of various in-situ remediation technologies. Traditional injection methods are generally based on hydraulic advection mechanisms and often faced with limitations at site with low-permeability materials and/or highly heterogeneous geology. The transport of ionic substances, such as lactate, in an electric field in subsurface is relatively independent of hydraulic conductivity of the formation. Therefore, effective delivery can be achieved in areas where advective flow is limited. This presentation introduces a new technology (EK-BIO), which uses direct current (DC) electric fields to facilitate the subsurface transport of reagents. For a site in Skuldelev, Denmak, EK-BIO was evaluated and subsequently demonstrated as an innovative strategy for distributing electron donors and dechlorinating microorganisms (*Dehalococcoides*) in PCE-contaminated, low-permeability aquifer.

Based on the results of both bench-scale evaluation and field-scale pilot test, it has been demonstrated that EK-BIO can facilitate the transport of amendments (lactate and KB-1®) through clay soils. Concentrations of biomarkers increased significantly across the pilot test area compared to baseline levels. Significant reductive dechlorination of PCE to cis-1,2-DCE was achieved within the short pilot test duration, and complete dechlorination to ethene was observed in post-test monitoring.

The total power supply used in the pilot test (1,900 kW-hr) was equivalent of the energy needed for approximately ten 100-watt light bulbs operated for the same duration. This project demonstrated that EK-BIO can be engineered and applied cost-effectively at sites with low-permeability materials. This innovative technology offers an important remediation alternative at sites where in-situ remediation may face significant challenges.

Session 5: Remediation of Sediment: Part 1

Topics	Speaker
Contaminated Sediment Remediation and Restoration: Comprehensive Approach	**Dr. Brian Mastin** (Southern Research Institute, Alabama, USA)

The Xiawangang River is an artificial discharge channel constructed in the 1970s, approximately 4 km in length starting from an area of metal smelting and manufacturing and discharging into the Xiangjiang River. The width of the Xiawangang River ranges from 4 to 10 meters, water depth ranges from 0.1 to 1.5 meters, and average yearly flow is 4.3 m3/s. Sediment of the Xiawangang is contaminated with several metals including cadmium (Cd), lead (Pb), mercury (Hg), and arsenic (As) due to point and non-point discharges from this industrialized section of the watershed.

The overall objective of this project was to outline a sediment remediation and environmental rehabilitation approach for the Xiawangang River in order to decrease human health and environmental risks associated with metals-contaminated sediment. Sediment remediation at this site potentially included mechanical and/or hydraulic dredging depending on river access and hydrodynamics of the watershed.

The sediment remediation project proposed for the Xiawangang River required less than 10 workers with proper excavation equipment and technical guidance to safely remediate the Xiawangang River in 90 operational days. However, local contractors were not incentivized and chose to use 100s' of laborers, shovels, and wheelbarrows to remove contaminated sediments with minimum regard for human health (due to potential contaminant exposure) and/or safety (due to unsafe working conditions).

The upside to using manual labor for sediment excavation in China is there is a willing and able work force available everyday to work hard in extreme conditions. The downside of this work force is their overall inexperience working in difficult environmental and occupational conditions while supervised by inexperienced managers and no one with the ability to recognize risk(s) as they occur. The upside to using modern technology and equipment is the increased safety, increased performance efficiency, and reduced number of laborers in the exclusion zone. The downside is the lack of equipment, experienced operators, and experienced contractors in China, potential delays due to equipment break-downs and/or lack of spare parts, and the populace's slow acceptance of these approaches in lieu of labor-only execution. Overall, China is quickly recognizing the need for balance, simultaneously incentivizing local contractors to use more modern means to perform sediment remediation while maintaining a work force that is adequately trained to work safely in these difficult environments where equipment is not able to access.

Topics	Speaker
Historical Trends of Dioxin-like Compounds and Brominated Flame Retardants in Sediments Buried in Different Reservoir Systems in Taiwan	**Dr. Kai-Hsien Chi** (National Yang Ming University, Taiwan)

Dated sediment cores provide the reference record to investigate the historical input of persistent organic pollutants into the environment and identify possible sources in the vicinity area. In this study, two sediment cores, one at Feitsui Reservoir and the other at Sun Moon Lake (SML) were taken in 2008 and 2009 in north and central of Taiwan, respectively. Samples were Soxhlet-extracted and cleaned up by the CAPE Technologies coupled carbon-acid silica column, and the concentrations of seventeen 2,3,7,8-polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs), twelve dioxin-like polychlorinated biphenyls (DLPCBs), and twenty-four polybrominated diphenyl ethers (PBDEs) were measured by HRGC/HRMS in SIM mode. The concentrations of PCDD/Fs and DLPCBs in different depth of sediment cores ranged from 0.036 to 2.63 ng WHO-TEQ/kg and 0.021 to 0.251 ng WHO-TEQ/kg, respectively, at Feitsui Reservoir. The high values were detected from 1998 to 2000.

The results indicated that the increase in the PCDD/Fs and DLPCBs concentration of the sediment core was related to the operation of municipal solid waste incineration (MSWI) in the vicinity area of the Feitsui reservoir. Additionally, the concentrations of PCDD/Fs and DLPCBs measured in sediment core collected at Sun Moon Lake ranged from 1.14 to 4.42 ng WHO-TEQ/kg and 0.005 to 0.305 ng WHO-TEQ/kg, respectively. The high values were detected from 1971 to 1978. The results indicated that the variation of PCDD/Fs and DLPCBs contents in different depth of sediment core is similar to that of the pesticides (DDT, PCP and CNP) usage in Taiwan. OCDD contributed more than 95% to the total PCDD/Fs concentration in all samples, while PCB-118 was the most dominant congener of DLPCBs, followed by PCB-105 and PCB-77. In addition, the concentrations of 24 tri- through Deca-BDE congeners in the sediment core collected at Feitsui Reservoir range from 0.129 to 6.75 ng/g, followed by BDE-209, BDE-47 and BDE-99. The sediment core collected at SML range from 0.041 to 2.16 ng/g, followed by BDE-209, BDE-207 and BDE-183.

Topics	Speaker
Innovative approaches to Dealing with Contaminated Sediments	**Mr. Jonathan Atkinson** (Environment Agency, UK)

Historic contamination from industrial use and ship/boat building and maintenance has led to contaminated sediments in rivers and harbours of all sizes and shapes all over the world. . It's estimated that 20 percent of the top six inches of all sediment in U.S. rivers, lakes, streams and estuaries is contaminated. Europe-wide, the volume of dredged material is very roughly estimated at 200 million cubic metres per year. There are three types of dredging: capital, maintenance and remediation dredging. Contamination mainly leads to problems in maintenance dredging because given standards or regulations do not allow the free disposal in the aquatic system At the last conference in Taiwan two years ago we heard several papers on how complex and costly it was to remove contaminated sediments from places as diverse as Sydney harbour in Australia and stretches of the Mississippi river in the US. We heard of historic problems in places like Minimata, Japan Some of the problems are not so significant, the contaminated materials having been buried by clean sediment deposition in low flow systems and the contamination has little current impact on river bed fauna or the water quality and aquatic life that it supports. Others in more dynamic systems regularly release contaminants into the water column as particles or via diffusion into the water phase. This can impact river and marine flora and fauna and human use of water resources for consumption or recreation. We heard how in Sydney fishermen have been advised not to eat the fish they catch, similar advisories are issued by the Environment Protection Agencies and Public Health bodies in the US, Europe and worldwide.

The approach of a suspended curtain with a similar sandwich of treatment materials could also be used alongside traditional dredge applications where deeper, more complex contamination needs to be addressed, allowing removal of contaminated sediments while protecting the wider environment by controlling fugitive fluxes from the dredging operations. The appropriate approach will always be site specific and understanding of the dynamics of the fluvial/tidal systems, the bed sediments and sources of new sediment, deposition rates and disturbance mechanisms, as well as aquatic flora and fauna will be required. Alongside these surveys an understanding of channel use and dredging requirements for navigation and flood risk management will all impact on the particular approach required for sediment control and ensuring contaminated sediments do not create environmental impacts, but the tools available are increasingly innovative in this complex environment.

Session 6: Phytoremediation and Risk Assessment

Topics	Speaker
Use of Phytoremediation for both Managing Selenium and Producing Biofortified Plant Products and Biofuel under Adverse Soil Conditions	**Dr. Gary Stephan Bañuelos** (USDA-ARS, USA)

Interest in selenium (Se) remediation technology has escalated during the past two decades. Although not known to be essential for plants, selenium is essential but can be toxic for humans and animals at excessive concentrations. A major Se controversy in the 1980's emerged in central California when the general public and scientific community became aware of selenium's potential as an environmental contaminant. Consequently, a plant-based remediation technology, defined as 'phytoremediation,' received increasing recognition as a low-cost and environmentally friendly approach for managing soluble selenium in the soil and water environment. Sustainable long-term field phytoremediation of Se is, however, dependent upon acceptance and widespread use by growers. Producing products with economic value from plants used in the cleanup of selenium-contaminated soil would certainly be an additional benefit to the phytoremediation process, which could help sustain and expand its long-term use in selenium-laden soils in the Western USA, China and India. This paper discusses the production of selenium-biofortified plant products and biofuel from plants grown for the remediation of selenium under field conditions in the San Joaquin Valley, California.

Developing successful phytoremediation strategies for selenium or potentially other trace elements is dependent on selecting plants or crop rotations that are most effective for removing the potential contaminant, e.g. selenium, from the soil or waters over a long period of time. When possible, potential plant candidates should also be evaluated for the ability to realistically produce products that may have economical value as a selenium-biofortified food and feed supplement, or become useful from biofuel production. Chances for widespread acceptance and usage of phytoremediation technology could exacerbate if there are marketable products from the harvested plant. Using Brassica plants like canola, mustard, and broccoli for the phytoremediation of Se under field conditions could result in phyto-products enriched with the essential trace element in broccoli, feed meal, organic fertilizer, and also oil that can be used as a biofuel additive.

Topics	Speaker
Risk Assessment of As in Soil and Groundwater for the Safety of Road Construction to Residents	**Prof. Dr. Jae E. Yang** (Kangwon National University, Korea)

In southeastern part of Korea, there are large heavy industrial districts (Pohang and Ulsan City) where most of automobiles, steel manufacturing and ship building industries are located. In order to reduce the traffic burdens in surrounding of the industrial districts the Korea Express Co., Korean Government subsidiary, has started to construct the highway between the two cities. However, in the middle section of the road construction sites (Nokdong), high concentrations of arsenic (As) were detected in portable groundwater and rocks with exceeding the national safety guidelines of As, listed in Soil Environment Conservation Act (SECA). Rocks are from the underground tunnel excavation. Rock analysis on As was made after crushing the rocks into particle size less than 2mm in diameter. Therefore residents submitted the civil petition to the provincial government to halt the construction. Residents raised concerns on contamination of land and their health risk. Accordingly, the construction has been halted for several months causing huge amounts of economic losses to consultants etc.

EIA (Environmental Impact Assessment) results indicated that there is no direct evidence that As released from rocks can play as a secondary contaminant to diffuse to other environmental media. Scientific data from the EIA were provided but residents were still in against the construction since As is still detected in groundwater. As a final decision tool, risk assessment of As in soil and groundwater was conducted based on the Moe guideline to evaluate a potent impact on residents' health. Exposure pathways of As were intake of crops, soil ingestion, groundwater as drinking water. Conceptual model for risk assessment was based on guideline. Results indicated that only drinking groundwater posed a health threat and exposures from crop intake and soil ingestion were negligible.

Based on risk assessment, the portable groundwater having As concentration higher than criteria has been closed and prohibited to drink. After risk assessment, risk management and communication were very important to make residents understand the natural processes occurring in the construction site. Finally road construction could resume with risk assessment, communication and management.

Session 7: Sustainable Management: Part 2

Topics	Speaker
Development, Validation and Application of a Harmonised BARGE Method	**Dr. Joanna Wragg** (BARGE / BGS, UK)

The Bioaccessibility Research Group of Europe (BARGE) is a research network borne out of the identification of the need for the better estimation of risk via the human ingestion pathway, as identified by the European contaminated land community. The BARGE network has undertaken collaborative research to study the human bioaccessibility of soil contaminants and developed a harmonised in vitro physiologically-based bioaccessibility procedure for soils, called the Unified BARGE Method (UBM).

The network has undertaken an inter-laboratory trial to obtain an initial estimate of the within, and between, laboratory repeatability of the method. In parallel, the in vitro test has been validated for arsenic, cadmium and lead against a juvenile swine model, and has been subjected to testing to evaluate the sensitivity of the method to changes in operating parameters. This paper describes the background of the BARGE collaboration, a summary of initial methodological comparisons and the results of the standardisation and validation of the UBM.

Since its inception, the BARGE UBM has been applied by numerous organisations to bioaccessibility studies to provide some insight into the environmental mobility of potential harmful elements from soils. The methodology fulfilled the brief by enabling risk assessment practitioners to apply a standardised approach to land contamination issues.

Topics	Speaker
Self-Sustaining Treatment for Active Remediation (STAR): Overview and Case Study	**Dr. James Wang** (Geosyntec Consultants, USA)

Self-Sustaining Treatment for Active Remediation (STAR), a novel remediation approach for NAPLs embedded in porous media, is a smoldering combustion process that creates a combustion front that (i) initiates at a single location with the NAPL-occupied porous medium, (ii) initiates with a one-time, short-duration energy input, (iii) propagates through the NAPL-occupied medium in a self-sustained manner, and (iv) destroys the NAPL wherever the front passes.

More tests have demonstrated that NAPL smoldering process can be safely controlled and extinguished via external air supply control. A suite of 23 demonstration experiments showed that NAPL smoldering was successful across a range of soil types (including simple layered systems) and contaminants (including laboratory mixtures of dodecane, DCA/grease, TCE/oil, vegetable oil, crude oil, and mineral oil). STAR has been demonstrated to be highly effective for the treatment of soils contaminated with recalcitrant compounds such as coal tar and heavy petroleum hydrocarbons. Field pilot studies have demonstrated the robustness and effectiveness of the technology for both In Situ and Ex Situ applications.

This presentation provided an overview of the scientific principles behind Self-Sustaining Treatment for Active Remediation (STAR), and summarized the six years of proof-of-concept research that has been successfully conducted to date. In addition, this presentation will provide the design and results of an *in situ* STAR pilot study at a former cresol manufacturing facility in New Jersey that was designed to test STAR at a large scale and under saturated conditions (i.e., below ground surface and below the water table).

Topics	Speaker
On-site Remediation Technologies and Example of Remediation Sites	**Dr. Ryuzo Tazawa** (Shimizu Kensetsu, Japan)

Presentation is concerned about, "On-site remediation technologies and examples of remediation site". Contents of presentation are shown as below. 1st is the procedure of investigations and countermeasures in general. There are 3 opportunities (motivations) to be carried out investigations.

1) According to the Soil Law,

2) Ordinance in prefecture, and

3) Voluntarily.

2nd is remediation technologies and several examples of remediation site by Shimizu. 3rd is countermeasures and redevelopment of contaminated site in former factory site. 4th is further expectation for soil contamination countermeasures in Japan.

In Japan, excavation is mainly selected for countermeasures. Especially in selling and purchasing lands, excavation is required from purchaser and user of land. First point is, the potential of human health impacts could be managed to block human exposure pathway and to be off-limit into contaminated zone. These management must carry out appropriately and speedy. Second point is development and spread of on-site measures such as chemical red-ox, bioremediation etc.

Next items are important point to be developed and widely spread, including

- **In-situ technologies for clay and silt in soil property.**
- **Improvement of liability of in-situ technologies for heterogeneous subsurface and non homogeneous contaminants dispersion**

Session 8: Remediation and Communication

Topics	Speaker
Remediation of the Lower Lea Valley and other Venues for the 2012 London Events and for a Lasting Legacy to the Local Communities	**Mr. Jonathan Atkinson** (Environment Agency, UK)

After the Games the Olympic Park will be transformed into one of the largest urban parks created in Europe for more than 150 years. The new park will be connected to the tidal Thames Estuary to the south and the Hertfordshire countryside to the north.

- **The canals and waterways of the River Lee will be cleaned and widened, and the natural floodplains of the area will be restored to provide a new wetland habitat for wildlife and for birdwatchers and ecologists to enjoy.**
- **The park will be planted with native species, including oak, ash, willow, birch, hazel, holly, blackthorn and hawthorn, providing a home for wildlife in the middle of the city.**
- **The communities surrounding the Park will enjoy access to the open space via a network of canal towpaths, footpaths and cycle-ways.**
- **Ground remediation work will address a number of potential pollutant linkages resulting in general improvement to the local groundwater quality.**
- **New buildings and structures will have surfaces designed to reduce infiltration and its consequent potential for leaching of residual contamination that may affect controlled waters.**
- **Along many of the watercourses the existing river banks and walls will have been repaired with barriers to contamination migration built in. This will reduce the potential migration of any contaminants from shallow groundwater.**

Ode to the Olympics site at Stratford

An old man paused as he walked with his hound,
He stopped and sighed as he looked all around.
The path that he trod was all strewn with litter,
He cursed the folk who ought to know better.
All round about him were bramble and nettle
Nestled amongst great piles of scrap metal.
His thoughts strayed back to his far gone youth,
When the site had been marsh, with cows on the hoof.
Then there'd be birds, all kinds of wild fowl.
They'd wheeled through the sky as he sat on the style.

After the war they had dumped all the bits
The concrete and metal, crushed remains of the blitz.
Then there had grown an industrial stew
Scrap-yards and skips and a bus depot too.
He sighed and walked on, as he called to his dog
He'd far preferred it as grazing and bog.
He wrinkled his nose as they went past the river,
What once had been sparkling now looked like old liver
All sorts floated by, it was dirty and stank
He hurried on past, he thought it was rank.

But then time went by as it always will do
And changes took place to the urban-style view.
The depot and skips were taken away,
And men brought machines to dig in the clay.
They dug up the ground and cleared all the structures.
They cleaned all the soil in new-fangled washers.
As months drifted past, the site was re-modelled,
Stadium grew, as the river was coddled.
The Olympics was coming in two thousand and twelve
And the site was renewed as they dug and they delved.

Once more the old man walked by with his dog
And now others too, used the path for a jog.
The whole place felt different, alive with a future
He felt a new buzz, it seemed life was fitter.
Like the athletes many, who'd soon race for gold
The town of Stratford, had thrown off the old
The stadiums fine, bright things for the races
Alongside ran green paths and open wide spaces.
Sleek trains whispered by into the station
The area stood fresh, a showpiece for the nation.

Jonathan Atkinson
Environment Agency

Fair Taiwan

From lands afar we came again
To share the beauty of Taiwan
Met with courtesy and bright smiles
We soon forgot long travelled miles
We met together to share our skills
On how to treat past dumps and spills
Good data gathering is a must
To guide decisions and ensure trust
A risk based way is surely best
If works will pass the sustainable test
Across the world past deeds have spoiled
Our clean groundwater and rural soils
To clean the mess is now the task
A challenge for countries now to grasp
Good sampling and monitoring is surely key
But delivered outcomes must then be
Good law and guidance steers the way
While risk based pragmatism saves the day
Shared best practice helps us all
To gain success and not to fail
Cheap and quick is not success
If it causes society too much stress
Getting things right for all concerned
Is an important lesson we all have learned
In this special place it has been seen
That problems show beneath country green
But if everyone does the best they can
A new future beckons for Taiwan
By conference here it shares the best
So across east Asia others can pass the test
Working together countries can promote
Sustainable projects worthy of note
So thanks again to the EPA
For inviting us all to come and stay
To Minister Shen for a very fine dinner
Once again this trip is surely a winner.

Jonathan Atkinson
Environment Agency

Dreams Rekindled

What is life as one grows old
Do we sit and stare as life evolves
Do we walk and find we go nowhere
Or in quiet hardship have we pain to bear
Do our dreams just crumble into dust
As our energy ebbs and our bodies rust
Do we sigh and wish we had done more
Has life fully closed opportunities door
Not for folk in renewed Taiwan
Sighs die way as they shout “I can”
“I can” say old soldiers filled with pride
As they recall their youth and service lives
In uniform fresh they stand up tall
And march with renewed vigour one for all
“I can” say bikers filled with joy
As they join the throng and ride the road
With grins so wide and jackets black
They show that old folk have the knack
“I can” say those who like to bat
As they join the team with baseball cap
To gain a base or get home run
For older players is more fun
“I can” say those with ambition strong
To get new degrees or master song
With past lives too busy to do it all
Now time to study can them enthral
To read or write once was a trial
Now new skills learned do bring a smile
As old folk their life stories tell
Let us record how they did so well
And if in the past they did not reach
All life’s dreams that some did teach
Let us help them now to seize the day
So they can dreams realize and then say
“ I can, I have, I know, I will”
So old and young remember still
That life’s young dream won’t fade away
In bright Taiwan, inspiration is the way
May the youth of today recall the youth of the past
And all work for dreams that come true at last
May the dreams of our past be the promise of our future
As age brings wisdom and youth shares vigour

Jonathan Atkinson
Environment Agency

Topics	Speaker
Outlook of Soil Contamination Countermeasures in Japan	**Dr. Ryuzo Tazawa** (Shimizu Kensetsu, Japan)

Presentation of concerned about "Outlook of Soil Contamination countermeasures in Japan" is made. There are primary 3 subjects, in content of today's presentation. 1st is scope of countermeasures. In 2009 the Soil Law was revised partly. 2nd is outline of investigation and countermeasures in these ten years. 3rd is selected technologies to be implemented the countermeasures. 4th is expectation near future.

There are several problems to be solved. One is to reduce environmental impact and cost to be implemented investigations and countermeasures. Especially, two points are shown as below,

(1) improvement of liability on In-situ technologies, such as chemical red-ox method and bioremediation, and

(2) energy saving and cost reducing to be implemented countermeasures.

The other is to develop and spread of new technologies, including

(1) high liability and reasonable technologies,

(2) spread of risk management type measures, and

(3) low cost type measures for small factories that couldn't invest enough funds.

Finally, we have to prevent lands from becoming Brown Field. Therefore, appropriate and reasonable measures should be implemented.

Session 9: Remediation of Sediments: Part 2

Topics	Speaker
Remediation of a Former Gasworks Using In-Situ Solidification Technology	**Mr. Bengt von Schwerin** (AECOM, Australia)

The proposed upgrade of an existing carpark on a former gasworks site resulted in the site owner identifying significant residual gasworks impacts during the preliminary site investigations, despite remediation activities having been undertaken 16 years earlier. Subsequent detailed investigations undertaken by The Albury Gas Company, and proof of performance bench scale and field pilot trials of in situ solidification has enabled the selection of a remediation approach that is both cost effective, addresses the future site needs and meets the identified performance requirements necessary to address the EPA's 'Declaration of a Remediation Site' notice. Remediation works at the former Albury Gasworks Site have been undertaken in the past, but have never addressed the deeper impacts associated with historical activities nor the off-Site groundwater impacts. The proposed Site redevelopment and subsequent investigations provided better characterisation of the site and surrounding areas and enabled a pragmatic, cost effective, risk-based solution to be developed that met stakeholders' objectives. A rigorous remediation options screening and planning process and demonstrated proof of performance trials (both bench scale and field pilot trials) enabled the In Situ Solidification technology to be accepted by EPA for one of the first full scale implementations of its kind in Australia. The proposed remediation strategy and criteria adopted incorporates a holistic approach to managing the Site issues by addressing the impacted soil, deeper DNAPL impacts and impacted groundwater. Ex situ treatment of the worst impacted shallow soils and in situ solidification of the contaminant source material at depth will remove secondary sources resulting in groundwater contamination. These actions, complemented by a pump and treat groundwater treatment system that captures the worst impacted groundwater areas at and near the Site, and ongoing groundwater monitoring will result in water quality improvement and reduce the risk of vapour migration and enabling the EPA's Declaration of Remediation Site notice served on The Albury Gas Company to be removed.

The success of the remediation work to date has been founded on comprehensive investigations and rigorous planning involving all stakeholders. Importantly, community engagement started during the investigation program, with the project team remaining constant throughout all of the works, ensuring that the community was fully aware of all current and future proposed activities and ensuring that there are well established lines of communications, should any issues arise.

Topics	Speaker
An-Shun Project Site: Sustainable Sediment Management	**Dr. Brian Mastin** (Southern Research Institute, Alabama, USA)

Weston Solutions, Inc. (WESTON) and Weston Solutions Taiwan, Ltd. (WESTON Taiwan) in coordination with their Client have outlined a multi-phased approach for the investigation, design, and implementation of a full-scale project for the remediation of mercury (Hg) and dioxin contaminated sediment in Seawater Pond B at a Site in Tainan City, Taiwan. These sediments were contaminated by the manufacturing of chlorine, sodium hydroxide, and pentachlorophenol over a greater than 40-year period at the site which will require substantial remedial actions. The overall objective of the current phase of the remediation includes installation, operation, monitoring, and evaluation of the efficacy of hydraulic dredging, sand separation, soil washing, and dewatering to meet the refined mitigation goals of the Seawater Pond B site (< 10 mg/kg Hg, 500 ng-TEQ/kg Dioxin in situ) as defined by the Taiwan Environmental Protection Administration's (EPA) approved Site Remediation Plan.

The objective of this manuscript and ensuing presentation are to describe the results of the Seawater Pond B characterization study performed by the team last year as well as outline the sediment remediation plan currently being mobilized to the project site.

Overall, WESTON and WESTON Taiwan project managers will be onsite for the project's entirety to support and facilitate the project team's communication and decision-making, increase awareness of health-and-safety matters, as well as track and document operational progress and facilitate design-engineering support from global experts as needed. Challenges of supporting this remediation effort are mostly associated with the global distribution of technical resources designated to support this effort. Not only are the personnel spread-out around the globe, but manufacturers of vital pieces of equipment (e.g., IMS, Mitchell Marine, and Lane) are also headquartered half-way around the world. If resources are not available locally, it may require 2-4 days of operational down-time in order to communicate project needs and expedite shipment of a vital piece of equipment, spare part(s), and/or information from a manufacturer. Additionally, there will be a language barrier between onsite contractors, differences in project philosophy, work ethics, and health and safety requirements.

Topics	Speaker
Management of Contaminated Sediments in Taiwan	**Dr. Meng-Der Fang** (Industrial Tech. Res. Insti., Taiwan)

On January 13th 2000, the Legislative Yuan of Taiwan completed the second and third reading of the Soil and Groundwater Pollution Remediation Act, officially bringing the Act into law (EPA, 2000). This act brought a new system that soil and groundwater pollution sites would be divided into two categories: "pollution control sites" and "remedial sites". The former were the sites where levels of soil or groundwater pollution exceeded the set control standards and the later were sites that were assessed to be high in risk and the responsible parties involved with the land must remediate the site in accordance with the regulations. Ten years later, in February 2nd, 2010, major amendments were enacted in the Soil and Groundwater Pollution Remediation Act. One of the amendments aimed on establishing new articles for managing contaminated sediments in Taiwan.

In order to make the amended articles of the soil and groundwater remediation law work, it is necessary for the industry regulating authorities to investigate and assess sediments regularly for better understanding the quality of the sediments in waters. In addition, further assessment efforts should focus on areas such as the waterbody segments where the sampling station(s) were classified as Tier 1. When dealing with contaminated sediment management, one cannot consider only the sediment compartment without taking the water quality problems, potential risks to human and ecology into account. Also, a high level of inter-program coordination to develop integrated, cost-effective and science-based solutions that involve all stakeholders is required. In most cases, sediment contamination is the result of historical discharges of pollutants with continuous sources of ubiquitous contaminants. Therefore, source control and pollution prevention are the important issues in preventing contaminated sediments. In particular, pollution prevention is a key element in reducing the sources of contaminants that can end up in the sediments, potentially resulting in adverse effects to aquatic life or human health. Pollution prevention has proved to reduce costs, as well as pollution risks, through source reduction and recycling/reuse techniques. This effort relies on increased coordination among Taiwan EPA and the other stakeholders.

Session 10: Remediation Case Studies

Topics	Speaker
Review of UK Guidance on Permeable Reactive Barriers	**Dr. Brian Bone** (BEC / CL:AIRE / SuRF, UK)

A permeable reactive barrier (PRB) can be defined as "an engineered treatment zone of reactive material(s) that is placed in the subsurface in order to remediate contaminated fluids as they flow through it". The full scale implementation of PRB technology has a track record of almost two decades for the treatment of chlorinated hydrocarbons using zero valent iron. Uptake in the UK has been slow, but a number of initiatives have been developed to promote their use.

The Environment Agency recognised permeable reactive barrier (PRB) technologies as potentially cost-effective and sustainable approaches to the remediation of contaminated groundwater. As a result, a Research Fellowship was set-up with The Queen's University, Belfast and guidance on the design, use and monitoring of a PRB was published in 2002. Innovative approaches to PRB technologies have been developed in the UK and taken forward to full-scale implementation. These developments, although small in number, utilise a variety of reactive media to address a range of contaminants, including mixed contaminant plumes, and have been well disseminated as CL:AIRE Technology Demonstration Projects. However, many stakeholders remained uncertain and the perception of high uncertainty in the technology and the need for treatability studies were considered as barriers to uptake of PRB technology. Guidance was produced on how to conduct a treatability study, supported by an extensive literature review to establish the current status of PRB technology.

It is concluded that PRB technology has become established for some reactive media – contaminant systems, but that the technology continues to evolve and innovate. Lessons learned from established systems span over nearly two decades and some of the broad learning points can be applied to new and evolving designs. The prospect of system 'failure' should therefore be becoming less likely for sites that are well-characterised and systems designed using high quality information, as advocated in the UK guidance documents.

Topics	Speaker
Landfill Remediation under 'Emergency Management' Circumstances	**Mr. Bengt von Schwerin** (AECOM, Australia)

The migration of landfill gas has proven to pose serious public health and safety risks primarily due to the potential flammability of methane and asphyxiant properties of carbon dioxide. Fires and explosions, resulting in significant property damage have occurred in cases where methane gas at concentrations between 5% (lower explosive limit - LEL) and 15% (upper explosive limit – UEL) has migrated into structures or other areas where gas can accumulate and ignition sources exist.

On 9 September 2008 emergency management arrangements were implemented in response to advice received from the Victorian Environment Protection Authority (EPA) that a closed former landfill represented an imminent danger to residents in the neighboring residential estate. Approximately 45 relocations occurred as a result of the detection of methane gas attributable to the adjacent closed landfill. Concentrations detected were above the Lower Explosive Level trigger level (1%v/v) and the Upper Explosive Level (5%v/v) within homes and other locations scattered throughout the residential estate, with a maximum concentration within the Estate detected at 63% v/v.

Emergency management practices were implemented immediately and in just over 18 months AECOM had undertaken the management of all works, both on and off-site including replacement of existing leachate and landfill gas infrastructure, installing a new landfill cap, designing off-site venting, construction of an underground wall and trialing in-situ remediation approaches to dissipateresidual landfill gas off-site in order to reduce the potential explosive risk to neighboring residential homes.

The events surrounding the well-publicised residential evacuation and associated Emergency Management Measures have led to a change in landfill management practices and resulted in a review of residential developments and proposed development approvals near operating and former landfills across Australia.

Topics	Speaker
Programmatic Approaches to Management of Contaminated Land Liabilities on Large Portfolios	**Mr. Neil Donaldson** (ERM, Australia)

Land contamination can represent a material financial liability for a business to manage. For organisations operating industrial processes at many sites in multiple jurisdictions, administration of this liability represents a major governance issue with both: 1. Statutory environmental compliance obligations to ensure the organisation's licence to operate; and 2. Statutory financial reporting obligations to meet annual provisioning requirements.

Additionally, a detailed understanding of the risk and liability across an asset portfolio is important to making informed strategic business decisions on acquisition and divestment.

Contaminated soil and groundwater represent significant financial, legal and reputational risks that require strong and active management. For clients with multiple locations where past and/or current land use has increased the probability of soil and groundwater impact, one such management approach is look at the locations collectively as a portfolio or programme.

To achieve success, the Client and consultant must be in complete alignment on "what constitutes success" at the portfolio or programme level. Active and effective communication is critical in continually evaluating and validating the definition of success. Establishment of appropriate (and ideally, mutually-developed and agreed-to) KPIs to measure performance is critical in identifying adjustments and improvements. Tracking and reporting of performance against these KPIs should be the consultant's responsibility.

Further to the achievement of success, the Client's business objectives for each site must be clear in order for the consultant to establish appropriate strategy to achieve them. The consultant must establish controls to minimize the "bandwidth of variability" from its team. One effective mechanism is a single "virtual" location where all information associated with the programme is lodged. Regular structured communications between Client and consultant are critical, and must follow a regimented evaluation of performance against the agreed-to KPIs.

Topics	Speaker
Current Status of the Classification System of Early Warning Management for Industrial Parks	**Dr. Chia-Hsin Li** (Taiwan EPA)

In Taiwan, there are 152 industrial parks occupying 50% of total industrial land area. The parks can be classified in 7 categories, including public parks, private parks, export processing zones, local government-developed parks, science-based industrial parks, environmental technology parks, and agricultural technology parks.

According to the soil and groundwater monitoring data and the status of environmental management, 152 industrial parks in Taiwan are classified into 4-red light, 35-orange light and 113-yellow light industrial parks. In 2010-2012, 22 industrial parks were investigated and abnormal monitoring data of groundwater were detected in 10 parks. To deal with the pollution events, Taiwan EPA assembled the relevant government organizations to discuss and plan response measures, including a broad investigation, restricted use of groundwater, regulatory listing of the pollution sites, and the pollution cutoff along the boundary of the industrial parks. As for the red-light industrial parks with higher risks and dangers, Taiwan EPA planned the risk assessment and management measures, such as inquiring the food factories in and the residents around the industrial parks about the groundwater use, sample testing the groundwater quality, and informing them to stop using the polluted groundwater. The exposure pathways of the pollution are to be eliminated as fewer as possible and the goal of the risk management can be achieved.

As for the industrial parks with abnormal monitoring data, Taiwan EPA coordinated and integrated the administrative resources of the industrial and environmental protection competent authorities, and then formulated the "Standard Operation Procedures (SOP) for Reporting and Treatment of the Monitored Abnormal Event in an Industrial Park". The promotion strategies included: (1) the preliminary response measures adopted by the industry competent authority to assist the investigation on the source of the soil or groundwater pollutants, (2) to find out and order the polluters to implement pollution control or remediation plans, (3) offsite early-warning groundwater well networks as the defense of the industrial park (if there was a pollution expansion, the response measures should be initiated and the industry competent authority was ordered to implement pollution cutoff), and (4) public declaration of the pollution site to enhance the responsibilities of pollution response and improvement.

Session 11: Chemical Remediation and Other Challenges

Topics	Speaker
Lessons Learned from Implementation of In-situ Chemical Oxidation Remediation	**Mr. William Pickens** (MWH, USA)

MWH has conducted in-situ chemical oxidation (ISCO) projects at many different types of industrial facilities. Currently, MWH is performing ISCO operations at four different sites in North Americautilizing sodium permanganate, Fenton's Reagent, and sodium persulfate. Of the four sites, the site located in Denver, Colorado has been the mostly thoroughly studied and is, therefore, the primary focus of this paper. The findings and lessons learned at this site are consistent with other sites where ISCO has been performed. The Denver site is contaminated with chlorinated solvents from its former use as a chemical distribution facility and is currently being treated with $NaMnO_4$.

ISCO involves the introduction of chemical oxidants into the subsurface to destroy organic contaminants in soil and ground water, with the goal being to reduce the mass, mobility, and/or toxicity of contamination. Chemical oxidants that are commonly utilized include catalyzed hydrogen peroxide (modified Fenton's reagent), potassium and sodium permanganate, sodium persulfate, ozone, and proprietary blends of sodium percarbonates. Successful application of ISCO requires knowledge of oxidation processes for free phase and residual DNAPLs, the stability and reactivity of oxidants during transport in the subsurface, the subsurface effects on oxidant fate and DNAPL destruction, and the potential for coupling ISCO with pre- or post-ISCO remedial methods.The direct oxidation of separate phase DNAPLs is very limited. Nearly all destruction of organic contaminants is due to a mass transfer process that includes desorption and then dissolved phase oxidation reactions.

An added advantage of utilizing chemical oxidants is the potential for them to diffuse into low permeability zones and degrade the organic contaminants within the matrix. Since higher groundwater flow velocities facilitate dissolution and remediation of groundwater in higher permeability zones, contaminants in these zones are depleted faster than in low permeability zones. Once concentrations are reduced in the surrounding higher permeability zones, low permeability zones can then be a constant source of contaminant into the higher permeability zones as a result of concentration gradients and back diffusion. Even with the majority of the contaminant mass removed, back diffusion from the low permeability zones can result in dissolved plume concentrations above maximum contaminant levels. Studies have shown that permanganate can effectively diffuse into low permeability zones and oxidize contaminant mass due to the relatively longer stability of the permanganate ion in groundwater compared to most other oxidants.

Topics	Speaker
Resin Capsules for Monitoring Soil and Groundwater Pollution	**Prof. Dr. Jae E. Yang** (Kangwon National University, Korea)

Soil and groundwater contamination by various contaminants such as inorganic nutrients and heavy metals, and organic substances is a major environmental and health concern, but methods of direct, in situ evaluation of quantities and forms of these contaminants are generally highly limited. The resin capsule system (RCS) has been developed for use in the laboratory or in the field for inorganic chemicals, and its application has been extended to include organic chemicals by incorporation of carbonaceous, hydrophobic adsorbers in the capsules.

Use of the synthetic ion exchangers to study natural media has steadily increased. Since resins have been developed about sixty or seventy years ago, these materials allow researchers to adopt new and different ways in the environmental studies to solve the barriers that cannot be resolved through the conventional approaches. Various resins with different functionalities are available in these days which are suitable for monitoring of many chemicals' behaviors in soil and water environments, such as transport, fate, availability, speciation and transformation etc.

The potential use of the resin capsule system (RCS) for monitoring of inorganic and organic pollutants in the soil and groundwater system based on the result from batch type studies were discussed here. Several case studies provide the mechanistic background of the RCS for major contaminants (heavy metals and BTEX) and help understand how resins can be used to expand our understanding of soils and other environmental media.

Based on the results of cases introduced, RCS adsorbs the inorganic and organic substances from soil and water based on the mechanisms that occur in the natural environment, such as diffusion. These are verified from lab and field measurements as well as sensitivity analysis using kinetics and thermodynamics parameters. This supports RCS can be applied to monitor available fractions of contaminants in the contaminated environment.

Topics	Speaker
A Discussion On Project Procurement	**Mr. John Darmody** (MWH, Australia)

Project procurement is important because it influences costs, total investment and resistance to change in different stage of conducted programs. Traditional contracts have become very predictable since traditional bid processes and contracts drive contractors to: 1. Minimize bid price to win, 2. Find ways to shift risk to the owner, 3. seek out weaknesses in the contract, 4. find ways to increase revenue, 5. exploits changes and delays to maximize profit, and 6. lead to an adversarial relationship with the owner. Therefore, risk transfer and risk sharing both have their important place in project delivery.

Some project procurement strategies and their advantages and limits were introduced, including

1. traditional design-bid-build

2. Design-build

3. Engineer, Procure, Construction, Manage (EPCM)

4. Construction Manager at Risk

5. Alliance

The construction of risks to each member in the project is different between these strategies.

Different deliver options are available that can be chosen for soil and groundwater remediation projects. The options should be compared based on risk sharing, agency resources, project size and level of control.

Program management provides a tool to allow for standardization, cost savings, innovation, and control to be applied to a group of projects.

Topics	Speaker
Remediation in the UK: Maintaining Innovation in a Challenging Market	**Dr. Jon Burton** (CL:AIRE / RAW Group, UK)

In 1993, the UK Government Parliamentary Office of Science and Technology published estimates of between 50,000 and 100,000 potentially contaminated sites across the UK, with estimates of the extent of land ranging between 100,000 and 200,000 hectares. More recently, the Environment Agency for England and Wales estimated that about 300,000 hectares of land in England and Wales alone have had some form of historic use that could have caused contamination and this equates to approximately two per cent of the land area of England and Wales. The decline in the construction industry has resulted in an associated decline in the remediation of contaminated sites in the UK.

The contaminated land sector in the UK is continually looking at ways to improve remediation working practices. This includes assessment of how sustainability is measured and considered during remediation, how to rely less on excavation and removal techniques that involve disposing of large amounts of contaminated soil in landfills and to reuse material wherever possible, thus protecting the use of natural resources and protecting soil which is a finite resource. CL:AIRE provides a mechanism to enable companies to develop new remediation techniques and to link those companies with problem holders who can have confidence that the new techniques have been robustly reviewed and assessed. As a leading organisation within the contaminated land sector in the UK, CL:AIRE fulfils a need for objective, scientifically robust appraisals of remediation technologies and effective methods for monitoring and investigating sites. Within the organisation the Technology and Research Group (TRG) which consists of well-respected scientists, practitioners and regulators, provide the knowledge and experience to provide credible, third party appraisals of remediation technologies.

To ensure that the UK continues to develop innovative investigation and remediation solutions in a challenging market place, CL:AIRE has had to adapt to provide more than 'proof of principle' projects and now produces industry wide guidance and frameworks for use and application in the real world. In addition in association with the Environment Agency, CL:AIRE have also recently developed a series of interactive e-learning training courses intended to assist in maintaining and developing standards across the industry. It is against a backdrop of national economic decline and uncertainty, and reduction in funding sources that the UK remediation industry, assisted through CL:AIRE, continues to strive to raise standards and promote sustainable practices when remediating contaminated land.

Advertisement and News Report

The advertisement of the conference and environmental exhibition was carried twice on an international journal "Ground Water Monitoring and Remediation Journal" published on May 15 and August 15 in 2012. "The Liberty Times" (local media) also reported the conference and environmental exhibition on October 30, 2012.

continued from page 14

low oxygen or low pH, radium is more likely to dissolve and become present in the groundwater. Low oxygen conditions were prevalent in the Mid-Continent and Ozark Plateau Cambro-Ordovician aquifer systems, and low pH conditions were prevalent in the North Atlantic Coastal Plain aquifer system.

"Radium is a troubling contaminant in groundwater because it cannot be readily detected by taste or smell, nor are the analytical methods for measurement easily applied by non-experts," says USGS director Marcia McNutt. "This new-found correlation between radium contamination and low oxygen or low pH allows very simple tests to determine which groundwater sources are at risk from radium, and why."

In most aquifers used for drinking water supply, radium concentrations were below EPA standards, especially in the western United States.

Exposure to elevated levels of radium over long periods of time can increase the risk of cancer. Radium is derived from the common long-lived radioactive elements, uranium and thorium, which decay slowly to produce radioactive elements like radium. Groundwater flowing slowly through pores or cracks in underground rocks and sediments can dissolve radium-bearing minerals as it moves. Three commonly occurring types are radium-228, radium-226, and radium-224.

House, Senate Lawmakers Highlight Concerns with EPA's Authority in Potential Suit Settlements

Republican leaders of the House of Representatives' Transportation and Infrastructure Committee and Senate Environment and Public Works Committee have written to U.S. EPA Administrator Lisa Jackson regarding their concerns with the agency's recent pattern of choosing to settle activist lawsuits under terms that the EPA then uses to justify expanding its regulatory authority without the direction of Congress.

Sent by House Transportation and Infrastructure Committee Chairman John L. Mica (R-Florida), Senate Environment and Public Works Committee Ranking Member James Inhofe (R-Okahoma), House Water Resources and Environment Subcommittee Chairman Bob Gibbs (R-Ohio), and Senate Water and Wildlife Subcommittee Ranking Member Jeff Sessions (R-Alabama), the letter requests the EPA to answer a number of questions regarding the extent of its authority.

The EPA is reportedly in negotiations to settle two lawsuits that allege the agency has greater regulatory authority than what the lawmakers feel Congress provided under the Clean Water Act (CWA). The Congressmen are concerned that in choosing to not defend these cases in court, the EPA is effectively refusing to honor the limits of its authority under the CWA and could subsequently use the settlements as a basis for an expansion of jurisdiction beyond the CWA's parameters.

The two lawsuits in question were brought by the Conservation Law

The Advertisement in Ground Water Monitoring and Remediation Journal published on May 15,2012,

NEWSLINE

NGWA Peer-Review Journals Offering Open Access Opportunities

The National Ground Water Association is now offering authors of accepted papers in its technical journals, *Ground Water* and *Ground Water Monitoring & Remediation*, the opportunity to make their paper open access.

Open access is the free, permanent online access to the full text of research papers for anyone, anywhere. NGWA, with the aid of its publishing partner Wiley-Blackwell, is now offering a program called "OnlineOpen." Authors participating in it can make their papers available in the Wiley Online Library database to nonmembers and nonsubscribers. To do so, the author, the author's funding agency, or the author's institution pays a fee of $3000 to ensure that the paper will be available to everyone upon publication as well as deposited in the funding agency's preferred archive.

There is no requirement that authors inform upfront NGWA or the *GW* or *GWMR* editor-in-chief that they intend to make their paper available via OnlineOpen. All OnlineOpen papers are treated in the same way as other papers and go through the standard peer-review process and are accepted or rejected based on their own merit.

To learn more about open access at Wiley Online Library, visit *http://authorservices.wiley.com/bauthor/onlineopen.asp*.

Grundfos Breaks Ground on Major Water Conservation Initiative

Global pump manufacturer Grundfos celebrated the groundbreaking of a three-part project to recover and reduce irrigation water on June 6 in Fresno, California.

Mayor Ashley Swearengin and Councilman Larry Westerlund joined Grundfos in marking the beginning of construction on a new master plan that features water-conscious landscape, a natural filtration system, and two water detention basins—all part of an effort to boost the city's groundwater supply by completely eliminating the use of potable water for campus irrigation at Grundfos.

Dave Mortensen, senior vice-president of finance and quality manager for Grundfos, said the project demonstrated Grundfos' commitment to "take its own medicine" with respect to sustainability and the appropriate use of potable water.

"It is Fresno's largest scale complete removal of 'traditional' landscaping to be replaced with water-efficient landscaping," Mortensen said, "as well

continued on page 10

2012 Taipei International Conference on
Remediation and Management of Soil and Groundwater Contaminated Sites
&
Taipei Soil and Groundwater Exhibition

Free Registration!

More than 35 speakers and experts from 20 countries in America, Asia, Europe and Oceania will be invited.

For more information please visit:
http://www.sgw.epa.gov.tw/public/En/Default.aspx

Date: October 30-31, 2012
Venue: NTUH International Convention Center (Taipei, Taiwan, R.O.C.)
Organizer: Environmental Protection Administration, R.O.C. (Taiwan EPA); Taiwan Association of Soil and Groundwater Environmental Protection; SINOTECH Engineering Engineering Consultants, Inc.
Co-sponsor: Ground Water Monitoring & Remediation

8 Ground Water Monitoring & Remediation 32, no. 3/ Summer 2012 NGWA.org

The Advertisement in Ground Water Monitoring and Remediation Journal published on August 15, 2012.

B3 大社會 自由時報 2012年10月30日／星期二

椅變形女客摔傷 害她2年不能行房

餐廳判賠15萬

雙煞搶銀樓 不到1小時落網

唬帳戶涉林益世洗錢 婦被詐51萬元

玩家出面

遙控飛機 追查污染源

環保署盛大舉辦 污染場址整治國際研討會

國內外專業廠商雲集 2012台北土壤及地下水環境展』熱鬧登場

聯邦銀行 UNION BANK OF TAIWAN 20th

刷聯邦卡 天天享加油降價

即日起至101年12月31日

1.6元 1.4元 1元

不分平假日，電影票天天190元起

台灣菲酒停車場免費停車

簽單對中8好禮三重發

The article reported by “The Liberty Times” on October 30, 2012..

Conference Sidelights

Early Break and Introduction

Early Break and Introduction

Opening of Environmental Exhibition

Environmental Exhibition

Group Photo

Group Photo

Opening Address Given by Prof. Zueng-Sang Chen (Chairman of WG ReSAGPAC)

Opening Address Given by Minister Dr. Stephen Shu-Hung Shen (Taiwan EPA)

Opening Address Given by Director Mr. Christopher J. Marut (AIT)

Opening Address Given by Director Mr. David Campbell (BTCO)

Audience

Plenary Speech Given by Deputy Director General Dr. Shuenn-Chin Chang (Taiwan EPA)

Keynote Speech Given by Prof. Dr. Ravi Naidu (Australia)

Coffee Break

Coffee Break

Keynote Speech Given by Dr. Phillip Crowcroft (UK)

Discussions

Lunch Party

Equipment Display

Equipment Display

Invited Speech Given by Dr. Brian Bon (UK)

Invited Speech Given by Dr. John Darmody (Australia)

Discussions

Discussions

Discussions

Discussions

Invited Speech Given by Mr. Neil Donaldson (Australia)

Invited Speech Given by Mr. William Pickens (USA)

Invited Speech Given by Dr. James Wang (USA)

Session Chairman

Invited Speech Given by Mr. Mark Travers (USA)

In a Discussion

In a Discussion

Coffee Break

Invited Speech Given by Dr. Jon Burton (UK)

Invited Speech Given by Dr. Brian Mastin (USA)

In a Discussion

Invited Speech Given by Dr. Gary Stephan Bañuelos (USA)

Invited Speech Given by Dr. Kai-Hsien Chi (Taiwan)

In a Discussion

In a Discussion

Invited Speech Given by Dr. Joanna Wragg (UK)

Invited Speech Given by Mr. Jonathan Atkinson (UK)

In a Discussion

Environmental Exhibition

Environmental Exhibition

Environmental Exhibition

Environmental Exhibition

Invited Speech given by Dr. Ryuzo Tazawa (Japan)

Invited Speech Given by Prof. Dr. Jae E. Yang (Korea)

Invited Speech Given by Dr. Brian Mastin (USA)

Invited Speech Given by Mr. Bengt von Schwerin (Australia)

In a Discussion

In a Discussion

In a Discussion

In a Discussion

Invited Speech Given by Dr. Meng-Der Fang (Taiwan)

In a Discussion

In a Discussion

In a Discussion

Session Chairman

Invited Speech Given by Dr. Chia-Hsin Li (Taiwan)

Environmental Exhibition

Environmental Exhibition

Session Chairman

Session Chairman

In a Discussion

In a Discussion

Chairman of Conference

In a Discussion

In a Discussion

In a Discussion

In a Discussion

In a Discussion

In a Discussion

Audience

Coffee Break

Coffee Break

Coffee Break

On the Shuttle Bus

Dinner Party

Dinner Party

Dinner Party

Dinner Party

Field Tour of Contamination Site

Tainan City, Taiwan

Tour Sidelights

The Main Gate of An-Shun Site

Introduction of An-Shun Site

Introduction of An-Shun Site

Audience

Audience

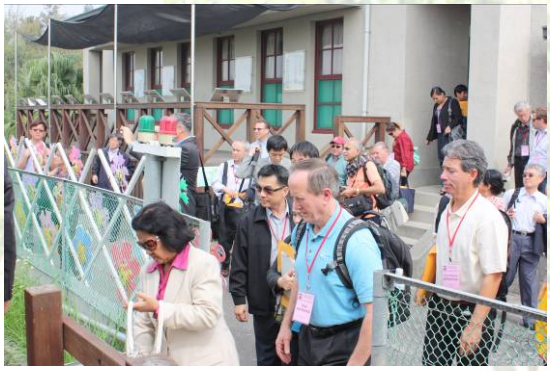
In a Discussion

Discussions

Site Visit

Site Visit

Site Visit



Site Visit

Equipment Introduction

Discussions

Site Introduction

Discussions

Site Introduction

Site Glance

Site Introduction

Site Glance

Site Visit

Site Glance

Discussions

Site Visit

Group Photo

2012 Taiwan Sustainable Remediation Forum

November 1, 2012. ***National Cheng Kung University, Tainan City, Taiwan***

Programme

Time	Topic	Speaker
14:10-14:30	Registration	
14:30-14:45	Opening Address	Mr. Hung-Teh Tsai (Taiwan EPA) Dr. Hwang-Jen Chang (EPB of Tainan City)
14:45-15:10	Who is SURF – Overview and Case Studies	Mrs. Karin Holland (Chairman of SURF)
15:10-15:35	Remediation of Inorganic and Organic Contaminants in Soil Using ViroSoil Technology: An Australian Perspective	Dr. Lee Fergusson (Virotec Global Solutions)
15:35-16:00	Development and Application of Sustainable Remediation Concepts and Practice in Australia	Dr. John Hunt (Thiess Services)
16:00-16:20	Coffee Break	
16:20-17:00	Main Forum	Prof. Colin S. Chen EPB of Tainan Prof. Zueng-Sang Chen Mr. Hung-Teh Tsai Mrs. Karin Holland Dr. Lee Fergusson Dr. John Hunt Dr. Ravi Naidu Dr. Brian Bone Mr. Dick Raymond

Forum Sidelights

Group Photo

Discussions

Chairman of Forum

Invited Honor Guests

Audience

Opening Address Given by Director General Mr. Hung-Teh Tsai

Audience

Invited Speech Given by Mrs. Karin Holland (USA)

Coffee Break

Coffee Break

Invited Experts

Invited Experts

Invited Experts

Invited Experts

Invited Experts

Discussions

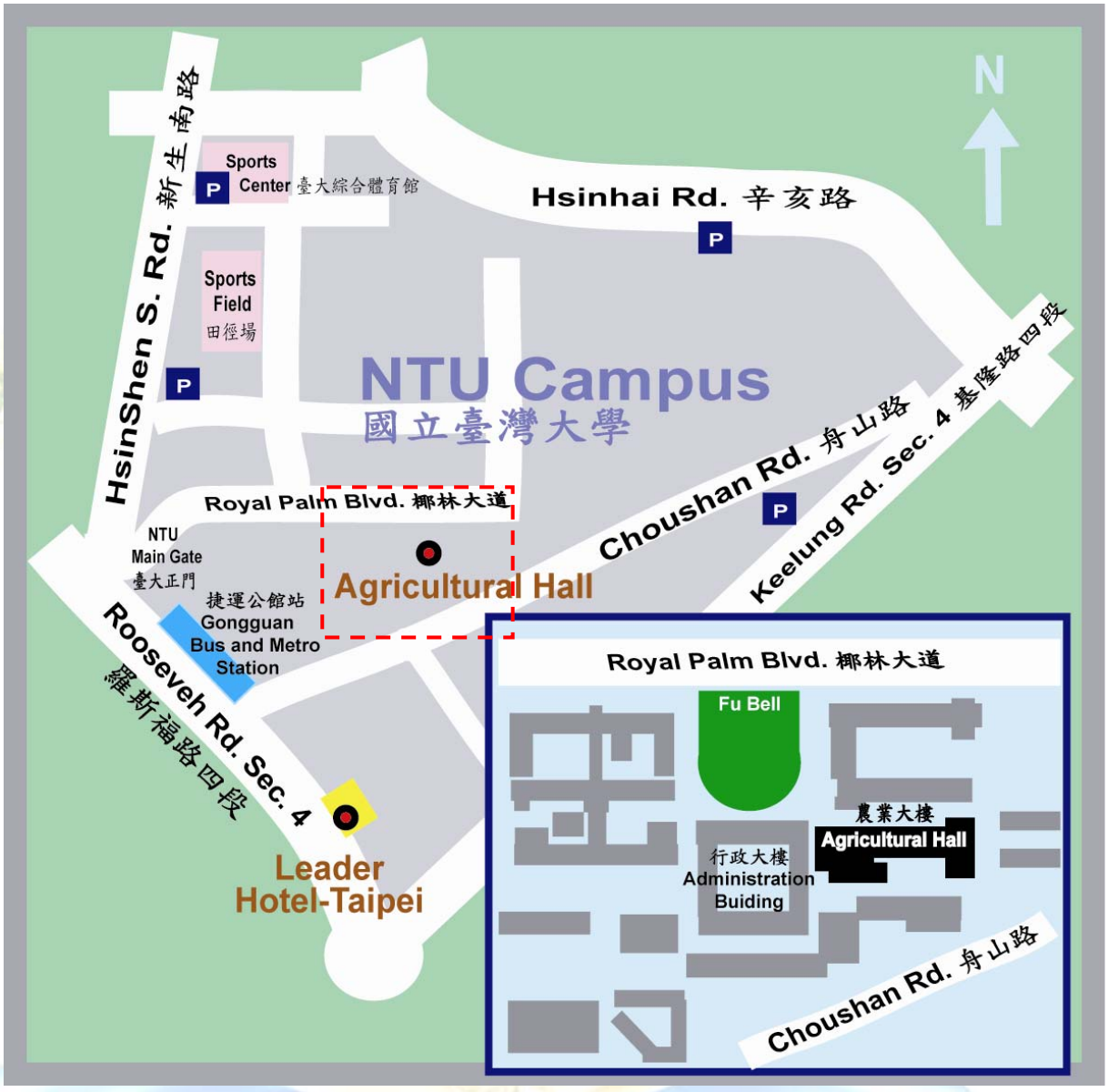
Business Meeting of Working Group

Agenda **November 2, 2012**

Time	Topics	Chairman
0830-0900	Registration	
0900-0905	Opening Ceremony	Prof. Zueng-Sang Chen Chairman of WG
0905-0915	**Introduction of the participants of WG:** ■ Steering Committee members of WG and ■ Service and Communication Committee members of WG ■ Observers from Australia and Sri Lanka	Prof. Zueng-Sang Chen Chairman of WG
0915-0945	**Discussion Item 1: More country members** ■ To agree more countries to join the WG start from January, 2013	Prof. Zueng-Sang Chen Chairman of WG
0945-1000	**Discussion Item 2: Sign the MOU** ■ To promote to sign the MOU between Taiwan EPA and Thailand and Vietnam in sometime of 2013 ■ To promote to sign the MOU between country members	Prof. Zueng-Sang Chen Chairman of WG
1000-1020	Coffee or tea break	
1020-1035	**Discussion Item 3: Activities in 2013** ■ To discuss the training program and workshop to be held in 2013	Prof. Zueng-Sang Chen Chairman of WG
1035-1050	**Discussion Item 4: Activities in 2014** ■ To discuss the major topics of conference and workshop to be held in 2014	Prof. Zueng-Sang Chen Chairman of WG
1050-1120	**Discussion Item 5: Summit Meeting** ■ To discuss the draft programs of Summit Meeting of Director General (or above) Level of country members of WG in 2014	Prof. Zueng-Sang Chen Chairman of WG
1130-1300	Lunch Party at Chinese restaurant in NTU campus	Prof. Zueng-Sang Chen Chairman of WG

Meeting Location

College Meeting Room (First meeting room at 3rd floor)
College of Bioresources and Agriculture
Agricultural Hall, National Taiwan University
Taipei, Taiwan



Business Meeting Sidelights

Group Photo

Chairman of WG ReSGPAC


Representatives of Member Country


Representatives of Member Country


Representatives of Member Country


Representatives of Member Country

Discussions

In a Discussion

Conclusions

1. The invited speakers, guests, and local participants gave their praise on the successful conference and exhibition on various occasions during or after the conference by words or by e-mails. They also showed their unanimous applause and deep impressions on Taiwan's efforts on promoting soil and groundwater pollution remediation in Asian region.

2. Invited experts and speakers from Australia all praise greatly for Taiwan EPA's outstanding achievements in soil and groundwater pollution remediation and its strategies management on the policy. No doubt that Taiwan has taken the leadership of Asia and can continue to serve as the hub of this field in Asian region, as Taiwan's accomplishments made by the government agency, universities, or environmental consultants are almost equal to those made by the consultant groups in Australia.

3. The invited representatives of the country members from the working group on the remediation of soil and groundwater pollution in the Asian countries (WG ReSAGPAC) also expressed their respects on the organization of this conference and exhibition during and after the conference.

4. The Asian and Pacific Sustainable Remediation Form held on Nov 1 had concluded that Taiwan can establish Surf-Taiwan to promote the activities on sustainable remediation technologies for contaminated sites in Taiwan and also on the development of the strategies, regulations and new directions of site-management in the future.

5. The local participants showed consentient praise and appreciation of the content and demonstration of the exhibition areas which was organized by Soil and Groundwater Pollution Remediation Fund Management Board of Taiwan EPA. The visitors also deeply appreciated on the organization which has included 14 international companies and 30 local companies to demonstrate their equipments and technologies in this exhibition and also included the oral presentations of the technologies performance by each company to get more understanding on their exhibition by all visitors.

6. Almost all the invited guests fully supported the program and participated every section of the conference and other activities. The social program and interaction activities between participants and invited speakers might be insufficient. We need to create some activities to increase this interaction in the next conference. Even though the communication information of each speaker was complete and clear, the local participants can still get more benefit by E-mails after the conference.

7. All the information, including texts of speeches and photos of this conference and the environmental exhibition are available on three public websites after the conference for sharing and downloading to expend the benefit of the conference.

8. The introduction, objectives, program, and brief conclusions of the speeches were edited in this “special report” of the conference and it is valuable for the policy makers, management strategy decisions, site managements, green or sustainable remediation and revision of regulations of pollutants in the future.

9. The third business meeting of the Working Group on Remediation for Soil and Groundwater Pollution of Asian Countries (WG ReSAGPAC) was held on Nov 2 during the conference. The important agreement is that the steering committee members approved to bring Australia and Sri Lanka into the steering committee as members of WG ReSAGPAC in January 2013. This agreement expands the country members of working group from 9 country members to 11 country members, including Taiwan, Japan, Korea, India, Philippines, Indonesia, Thailand, Malaysia, Vietnam, Australia and Sri Lanka.

10. Surf-Taiwan proposed the brief issues on the rational and background of “SURF-Asia” during the steering committee meeting on Nov 2 to promote to the establishment of SURF-Asia. The steering committee meeting had commitment on the establishment of SURF-Asia for this region. More detailed discussions will be arranged in the next business meeting in 2013.

11. The invited foreign guests kindly shared their observations and suggestions on the field study tour of An-Shun Site. Briefly, 2 items were suggested:
    - They were deeply interested and impressed on the background information of the visiting sites. There are many issues about the contamination history, remediation experiences, equipments, technologies and site managements on the contaminated site. It is worthy to be learned and discussed.
    - The related information and documents of the visiting contaminated site should be provided before they arrive Taiwan, not until they reached the site. Since the related information provided on site for discussion were still insufficient, the guests had difficulties to get the whole picture. If sufficient information can be provided via e-mail in advance, the experience will be well shared and learned, and consequently, the reply will be "a very satisfied journey of learning to the study sites”.

12. USEPA has listed ReSAGPAC as one of the key partners on the EPA's Taiwan page. Related information can be found from the link below:

    http://www.epa.gov/international/regions/Asia/taiwan/index.html

    The webpage is adapted below:

LEARN THE ISSUES | SCIENCE & TECHNOLOGY | LAWS & REGULATIONS | ABOUT EPA | SEARCH

International Programs

Contact Us | Share

- International Programs
- Basic Information
- Priorities
- Regions
- Resources
- Grants
- Visitors

You are here: EPA Home » International Programs » Asia/Pacific » Taiwan

Collaboration with Environmental Protection Administration Taiwan

Taiwan is one of the environmental leaders in the Asia Pacific region in key fields such as recycling and the management of electronic waste. The Environmental Protection Administration Taiwan (EPAT) EXIT Disclaimer collaborates with U.S. partners such as the American Institute in Taiwan (AIT) EXIT Disclaimer and the US EPA to address environmental challenges of common interest and concern to the United States, Taiwan and the Asia-Pacific Region.

EPA and EPAT have been collaborating for nearly two decades to help protect the environment and human health in the Asia-Pacific region and the United States. Because pollution is transported globally, these efforts also help protect human health of communities around the globe.

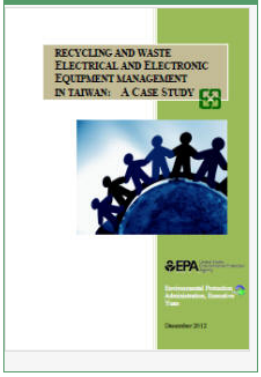
Current collaboration activities support EPA's International Priorities.

Explore our work with EPAT:

- Events
- Activities
- Key Partners
- Agreements
- Learn More About Taiwan

Key Events

New Taiwan Case Study



- **December 2012**: **New!** EPA is proud to present "Recycling and Waste Electrical and Electronic Equipment Management in Taiwan: A Case Study." (PDF) (32 pp, 1.3 M, About PDF Files) This case study documents the development and implementation of Taiwan's 4-in-1 Recycling Program, with a particular focus on the recycling of waste electrical and electronic equipment (WEEE). As a result of this program, waste quantities in Taiwan have decreased significantly. This report is intended to serve as an information resource for policymakers around the world who are seeking to improve the management of WEEE and other solid wastes. (Learn more about international efforts on Cleaning Up Electronic Waste (E-Waste).)
- **October 2012**: At an international e-waste workshop co-hosted by USEPA and EPA Taiwan (EPAT), participants from Asia, Africa and the Latin American/Caribbean regions decided to establish a formal network to share policy-level information on the management of waste electrical and electronic equipment (WEEE). This network will enable policymakers from around the world to learn about successful experiences that can be applied to support their own domestic efforts and complement the work of existing regional and international networks.
- **September 2012**: EPA Taiwan Minister Shen opened the second Regional Working-group on Environmental Information (RWGEI) EXIT Disclaimer in Taipei. The goal of the working-group is to provide a forum for information exchange and capacity building in the field of environmental information, which serves as input to and a foundation for environmental strategy and policy making.
- **April 2012**: Michelle DePass, EPA Assistant Administrator for International and Tribal Affairs, participated in an Earth Day event at Benjamin Franklin Elementary School (Lawrenceville, NJ), one of the pilot schools under Sustainable Jersey-Sustainable Taiwan pilot certification program.
- **March 2012**: Jane Nishida, Director of the Office of Regional and Bilateral Affairs, traveled to Taiwan to meet with counterparts in Taipei, Kaohsiung, and Tainan to advance planning and implementation of regional collaboration initiatives on air, water, and soil quality protection among other topics.
- **October 2011**: American Institute in Taiwan's Second Annual Clean Energy Forum, promoting energy efficiency, green technology, and sustainable growth. This event was opened with a video address given by EPA

Administrator Lisa Jackson.

- **October 2011**: EPA Chief Information Officer joined EPAT Minister Stephen Shen to launch a regional technical working-group on environmental information.
- **August 2011**: EPAT Minister Stephen Shen met with EPA Administrator Lisa Jackson in Washington, D.C. for talks highlighting regional partnership, and to launch collaboration with Sustainable Jersey. EXIT Disclaimer
- **June 2011**: EPA Assistant Administrator for International & Tribal Affairs, Michelle DePass, led a delegation of U.S. officials and community leaders to Taiwan to launch US EPA-EPAT collaboration on mercury, e-waste, children's health, site remediation, marine emissions reduction, and sustainable cities.
- **July 2011**: Delegation of experts from Taiwan visited the United States to learn about EPA's data management systems and Central Data Exchange.

Programs Supporting EPA's International Priorities

Building Strong Institutions and Legal Structures:

EPA experts have worked with colleagues from EPAT and other partners in the region to improve policy approaches to environmental topics, including the clean-up of contaminated sites, and regulations related to air and water quality.

Currently EPAT and EPA are working with regional partners to advance emerging priority areas, including improving Environmental Impact Assessments.

Partners from around the world joined EPA and EPAT to exchange expertise and collaborate on priorities and solutions to shared environmental challenges. (June 2011)

Combating Climate Change by Limiting Pollutants:

EPA collaborates with EPAT to share expertise in development and implementation of emissions cap and trade mechanisms.

Improving Air Quality:

EPA and EPAT have collaborated on air quality protection for nearly twenty years. Together with regional partners, experts from the two agencies are currently working to reduce air pollutant emissions from ships and ports operations.

EPA has also partnered with EPAT and the National Atmospheric Deposition Program (NADP) EXIT Disclaimer to improve the capacity for atmospheric mercury monitoring, data for analysis, and modeling, and the accuracy of mercury emissions inventories with other partners in the Asia-Pacific region.

Expanding Access to Clean Water:

Cleaning up contaminated sites reduces the impact of pollutants on groundwater sources. This improves ecological systems and the food supply both in Asia and the U.S.

To achieve this, EPA experts serve as technical trainers for a regional working group on the clean-up of contaminated sites, addressing topics such as technical approaches to forced-air remediation, bioremediation, and site clean-up law.

Reduce Exposure to Toxic Chemicals and Cleaning Up E-waste:

EPA and EPAT are facilitating the exchange of expertise among policymakers across the Asia-Pacific region and beyond. In June 2011, the first annual EPA-EPAT Regional Dialogue on Electronics Stewardship brought together experts from Japan, Nigeria, Ghana, Indonesia, Vietnam, El Salvador, among other countries.

Attendees were able to glean lessons from Taiwan's successful experience tackling its e-waste problem over the past 20 years; follow-up case studies and future meetings will serve as resources for regional partners and will hone in on key needs related to e-waste management.


EPA and experts from around the world visited this state of the art recycling facility in Taipei.

Key Partners EXIT Disclaimer

Environmental Protection Administration Taiwan
Taipei Economic and Cultural Representative's Office
American Institute in Taiwan
Sustainable Jersey
The Working Group on Remediation for Soil Groundwater Pollution of Asian Countries (ReSAG)

Agreements

EPA Collaborates with the Environmental Protection Administration Taiwan (EPAT) EXIT Disclaimer pursuant to its agreement as designated representative with the American Institute in Taiwan.

Learn More About Taiwan

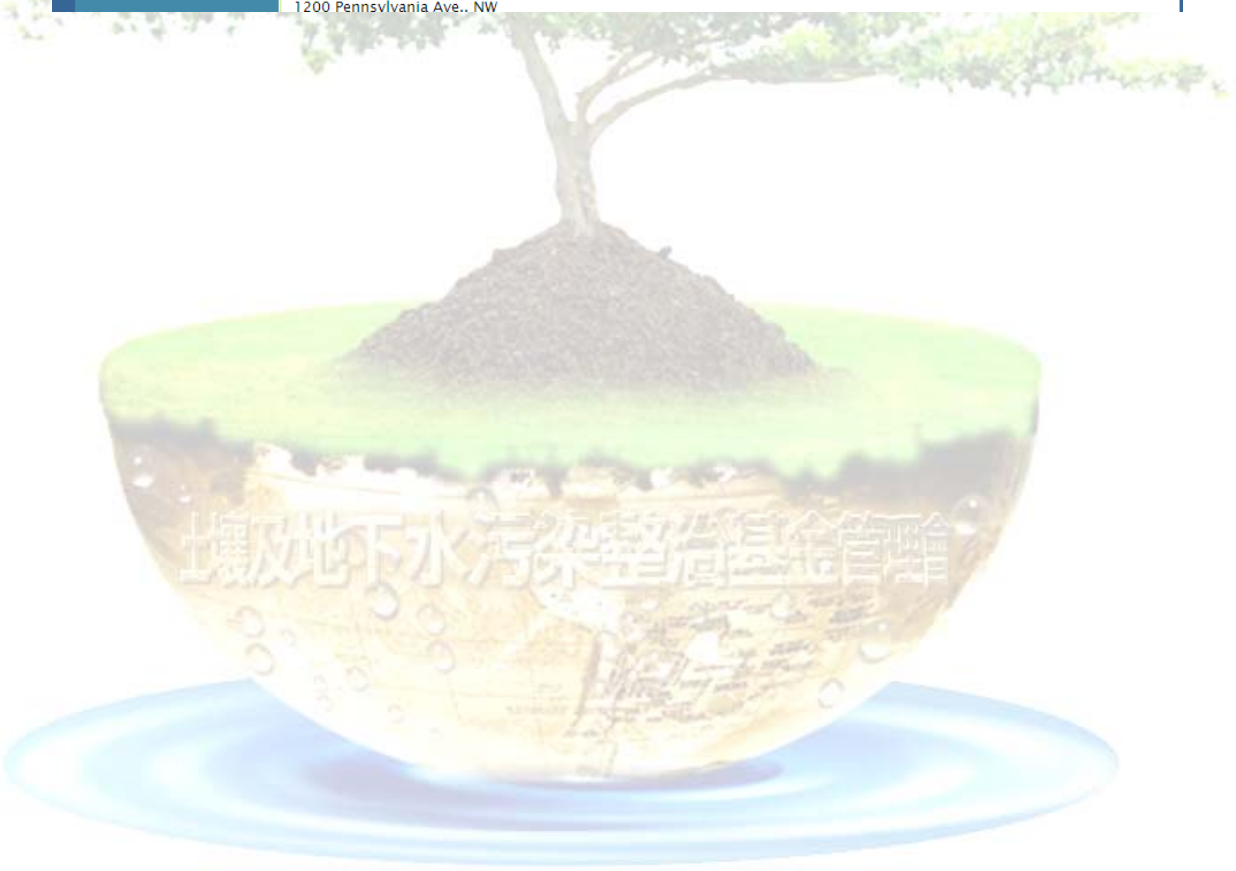
- Department of State Taiwan page
- The Central Intelligence Agency Taiwan Fact Page

Back to: **Asia/Pacific Islands**

Contacts

For additional information about EPA's work with EPAT, contact:

Justin Harris
Office of International and Tribal Affairs (2650R)
U.S. EPA
1200 Pennsylvania Ave., NW



2012 Taipei International Conference on Remediation and Management of Soil and Groundwater Contaminated Sites

Environmental Protection Administration
ROC (Taiwan)

Taiwan Association of Soil and
Groundwater Environmental Protection

The Working Group on Remediation for Soil and
Groundwater Pollution of Asian Countries

SINOTECH Engineering Consultants, Inc.
ROC (Taiwan)

Department of Agricultural Chemistry
National Taiwan University

Ground Water Monitoring & Remediation

national ground water association