

ReSAGPAPR WG Newsletter

Volume 3, Issue 2 October 31, 2013

Published by the Working Group on Remediation for Soil and Groundwater Pollution of Asian and Pacific Region

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Sri Lanka



R.O.C.(Taiwan)



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Vietnam

Message from Taiwan EPA



Mr. Hung-Teh Tsai (蔡鴻德)

Steering Committee Member of WG ReSAGPAPR

Executive Secretary

Soil and Groundwater Remediation Fund Management Board

Environmental Protection Administration, 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.(Taiwan). He has more experience on Administration, Site Supervision and Management.

Distinguished delegates of the Working Group on Remediation for Soil and Groundwater Pollution of Asian and Pacific Region (WG ReSAGPAPR), distinguished speakers, Ladies and Gentlemen:

It is my great pleasure to say some words at the opening ceremony of the 2013 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites. On behalf of the Taiwan EPA, I would like to extend my sincerely welcome all of you, **including 14 delegates from 9 country members of Working Group of ReSAGPAPR**. Your participations are very welcome and will make a great contribution to maintain our good environmental quality and human health in this region.

In the 3rd business meeting of the Working Group of ReSAGPAPR held on November 2, 2012, at Taipei, Working Group have approved this international training course to be held in this year. The

contents of this international training course **include 70 hours of technical sessions and one day study tour of contamination site in north Taiwan. The major contents of the courses include:**

- Survey techniques of soil contamination sites
- Remediation for soil contamination sites
- Survey techniques of groundwater contamination sites
- Remediation techniques for groundwater contamination sites
- Health risk assessment of soil and groundwater contaminated sites
- Management strategies for the regulation and Act, and
- Fund management board on soil and groundwater contaminated sites.

Taiwan EPA and Working Group of ReSAGPAPR have invited **28 speakers to share their knowledge and experience** on this international training course. The speakers include **11 distinguished**

professors from different universities in Taiwan to share the basic technical theories, hypothesis and models on this course. **Two speakers from Taiwan EPA** can share their experience on the management strategies related to remediation on soil and groundwater contaminated sites. More than **15 speakers from environmental consultant companies** from Taiwan, Australia, United States of America and European countries, can provide many case studies on the survey and remediation on soil and groundwater contamination sites in Taiwan and also in the world.

I hope all of you can learn the basic theory, models, and different remediation technologies to be applied to many case studies of the soil and groundwater contaminated sites. **All the courses have designed to leave at 10-20 minutes for general discussion on each topic** because you may have different

idea, concepts or culture to be discussed and to be applied to your country. You also can continue to contact with the speakers to get more information if you need.

Finally, I would like to express my grateful thanks to Distinguished Professor Zueng-Sang Chen, Department of Agricultural Chemistry of National Taiwan University, who is the chairman of Working Group of ReSAGPAPR. I also thank his service team for their contribution in this international training course of the WG of ReSAGPAPR.

I also thank all of you to come here to join this intensive courses of the WG for maintain our good environmental quality and health life in the Asia and Pacific regions. I also hope you have very good time in the next two weeks in Taipei.

Thank you.



Program

2013 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites

Date: Sep 30 to Oct 11, 2013

Venue: Howard International House Taipei (2F - Room 204)

Date	Morning Schedule	Afternoon Schedule
Sep. 30 (Mon.)	08:20-08:30 Opening Ceremony <i>Mr. Hung-Teh Tsai 蔡鴻德</i> <i>Taiwan EPA</i> <i>Prof. Zueng-Sang Chen 陳尊賢</i> <i>Chairman of ReSAGPAPR WG</i> 08:30-10:30 Sampling, Analyses, and Mapping of Soil Pollutants <i>Prof. Dar-Yuan Lee 李達源</i> <i>National Taiwan University</i> 10:50-12:20 The Case Studies of Investigations of Soil Contamination <i>Dr. Ming-Daw Che 車明道</i> <i>Apollo Technology Co., Ltd. 瑞昶</i>	13:30-14:40 Sampling Design for Contaminated Sites (part 1) <i>Prof. Tsun-Kuo Chang 張尊國</i> <i>National Taiwan University</i> 15:00-16:30 Sampling Design for Contaminated Sites (part 2) <i>Prof. Tsun-Kuo Chang 張尊國</i> <i>National Taiwan University</i>
Oct. 1 (Tue.)	08:10-10:10 Remediation of Soil Sites Contaminated by Heavy Metals and Organic Pollutants <i>Prof. Zueng-Sang Chen 陳尊賢</i> <i>National Taiwan University</i> 10:30-12:10 Case Studies of Remediation of Mercury Contaminated Soil <i>Dr. Yu-Ting (Phil) Wei 魏裕庭</i> <i>Apollo Technology Co., Ltd. 瑞昶</i>	13:30-14:40 Soil Investigation and Environmental Forensics <i>Dr. Shawntine Lai 賴宣婷</i> <i>MWH Americas Inc., Taiwan Branch</i> 15:00-16:30 Geographic Information System & Handheld Devices Application in Soil Contamination Investigation <i>Dr. Meredith Chen 陳宣婷</i> <i>Geographic Information Tech. Co., Ltd. 環興</i>

Program (continued)**2013 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites**

Date: Sep 30 to Oct 11, 2013

Venue: Howard International House Taipei (2F - Room 204)

Date	Morning Schedule	Afternoon Schedule
Oct. 2 (Wed.)	08:10-10:10 Application of Bioremediation & Phytoremediation on Petroleum Contaminated Site Restoration (Including Case Studies) <i>Dr. Frank Shan-Lin Hou 侯善麟</i> <i>CPC Corp. Taiwan /</i> <i>China Medical University</i> 10:30-12:10 Phytoremediation and Taiwan's Experience on Phytoextraction of Heavy Metal-Contaminated Soils <i>Dr. Hung-Yu Lai 賴鴻裕</i> <i>MingDao University 明道大學</i>	13:30-14:40 Remediation of Heavy Metal Polluted Soil and Case Study <i>Mr. Yen-Min Lin 林彥銘</i> <i>Taiwan Environment Science Co., Ltd</i> <i>台境</i> 15:00-16:30 Case Studies on Remediation for Soil Contamination Sites <i>Mr. Joseph Fan 范康登</i> <i>Pro. Vision Environmental</i> <i>Engineering Corp. 傑美</i>
Oct. 3 (Thu.)	08:10-10:10 Integrated Thinking and Technical Tool on Groundwater Investigation <i>Dr. Chih Huang 黃智</i> <i>Environmental Resources</i> <i>Management Group, Inc.</i> 10:30-12:10 Arsenic in the Groundwater of Taiwan <i>Dr. Sheng Wei Wang 王聖璋</i> <i>Sinotech Environmental Technology</i> <i>業興</i>	13:30-14:40 Application of High Resolution Site Characterization (HRSC) (part 1) <i>Dr. Chih Huang 黃智</i> <i>Environmental Resources</i> <i>Management Group, Inc.</i> 15:00-16:30 Application of High Resolution Site Characterization (HRSC) (part 2) <i>Dr. Chih Huang 黃智</i> <i>Environmental Resources</i> <i>Management Group, Inc.</i>
Oct. 4 (Fri.)	08:10-10:10 Groundwater Investigation and Case Study of Contaminated Sites <i>Ms. Rannie Kuo 郭綉娟</i> <i>Apollo Technology Co., Ltd. 瑞昶</i> 10:30-12:10 Issues and Countermeasures for the Investigation of Soil and Groundwater Contaminated with Chlorinated Hydrocarbon <i>Dr. Hsin-Chang Liu 劉興昌</i> <i>Apollo Technology Co., Ltd 瑞昶 /</i> <i>National Chiao Tung University 交</i> <i>通大學防災與水環境研究中心</i>	13:30-14:40 Contaminant Fate and Transport Remediation of Chlorinated-Solvent Contaminated Groundwater (part 1) <i>Prof. Jimmy Kao 高志明</i> <i>National Sun Yat-Sen University</i> 15:00-16:30 Contaminant Fate and Transport Remediation of Chlorinated-Solvent Contaminated Groundwater (part 2) <i>Prof. Jimmy Kao 高志明</i> <i>National Sun Yat-Sen University</i>

Program (continued)**2013 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites**

Date: Sep 30 to Oct 11, 2013

Venue: Howard International House Taipei (2F - Room 204)

Date	Morning Schedule	Afternoon Schedule
Oct. 7 (Mon.)	08:10-10:10 Health Risk Assessment and Sustainable Remediation <i>Prof. Hwong-wen Ma 馬鴻文</i> <i>National Taiwan University</i> 10:30-12:10 Green and Sustainable Remediation (GSR) <i>Ms. Tsai Wen Chiang 蔣在文</i> <i>Sinotech Environmental Technology 業興</i>	13:30-14:40 Groundwater Remediation (part 1) <i>Dr. Ku-Fan Chen 陳谷汎</i> <i>Apollo Technology Co., Ltd. 瑞昶/</i> <i>National Chi Nan University 暨南大學</i> <i>土木系</i> 15:00-16:30 Groundwater Remediation (part 2) <i>Dr. Ku-Fan Chen 陳谷汎</i> <i>Apollo Technology Co., Ltd. 瑞昶/</i> <i>National Chi Nan University 暨南大學</i> <i>土木系</i>
Oct. 8 (Tue.)	08:10-10:10 Groundwater Remediation Case Study: the First Gas Station Removed from Taiwan EPA List of Contaminated Sites <i>Dr. Chia-Hsin Li 李佳欣</i> <i>Sinotech Engineering Consultants, Ltd. 中興工程公司</i> 10:30-12:10 Remediation of a Chlorinated VOC Contaminated Site - Case Study <i>Mr. Dennis Tu 涂震江</i> <i>URS Greater China</i>	13:30-14:40 Groundwater Remediation using In-Situ Chemical Oxidation (part 1) <i>Prof. Tsair-Fuh Lin 林財富</i> <i>National Cheng Kung University</i> 15:00-16:30 Groundwater Remediation using In-Situ Chemical Oxidation (part 2) <i>Prof. Tsair-Fuh Lin 林財富</i> <i>National Cheng Kung University</i>
Oct. 9 (Wed.)	08:10-10:10 Bioremediation of Chlorinated Solvent Contaminated Groundwater <i>Dr. Shawntine Lai 賴宣婷</i> <i>MWH Americas Inc., Taiwan Branch</i> 10:30-12:10 Case Study on Integrated Groundwater Circulation Remediation Technologies <i>Dr. Chih Huang 黃智</i> <i>Environmental Resources Management Group, Inc.</i>	13:30-14:40 Using Risk Maps to Estimate Environmental Impact of Abandoned Factories (part 1) <i>Dr. Cogi, I-Chun, Chen 陳怡君</i> <i>Industrial Technology Research Institute 工研院</i> 15:00-16:30 Using Risk Maps to Estimate Environmental Impact of Abandoned Factories (part 2) <i>Dr. Cogi, I-Chun, Chen 陳怡君</i> <i>Industrial Technology Research Institute 工研院</i>

Program (continued)**2013 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites**

Date: Sep 30 to Oct 11, 2013

Venue: Howard International House Taipei (2F - Room 204)

Date	Morning Schedule	Afternoon Schedule
Oct. 10 (Thu.)	<p>08:10-10:10 Exposure Assessment involving the Fate of Pollutants and their Transferring through Food Web in Soil and Sediment <i>Prof. Shian-Chee Wu 吳先琪</i> <i>National Taiwan University</i></p> <p>10:30-12:10 Ecological Risk Assessment of Contaminated Sites <i>Prof. Colin S. Chen 陳士賢</i> <i>National Kaohsiung Normal University</i></p>	<p>13:30-14:40 Using Human Health Risk Assessment as the Basis for Soil and Groundwater Contamination Site Remediation and Management (part 1) <i>Mr. Bo-Wei Power Liang 梁栢璋</i> <i>Sinotech Engineering Consultants, Ltd.</i> <i>中興工程公司</i></p> <p>15:00-16:30 Using Human Health Risk Assessment as the Basis for Soil and Groundwater Contamination Site Remediation and Management (part 2) <i>Mr. Bo-Wei Power Liang 梁栢璋</i> <i>Sinotech Engineering Consultants, Ltd.</i> <i>中興工程公司</i></p>
Oct. 11 (Fri.)	<p>08:10-10:10 Collection Policy of Soil and Groundwater Pollution Remediation Fund in Taiwan <i>Mr. Cheng-Hsu Wang 王晟旭</i> <i>Sinotech Engineering Consultants, Ltd</i> <i>中興工程公司</i></p> <p>10:30-12:10 Introduction to Soil and Groundwater Pollution Remediation Act of Taiwan (part 1) <i>Dr. Hao-Chun Hung 洪豪駿</i> <i>Taiwan EPA</i></p>	<p>13:30-14:40 Introduction to Soil and Groundwater Pollution Remediation Act of Taiwan (part 2) <i>Dr. Hao-Chun Hung 洪豪駿</i> <i>Taiwan EPA</i></p> <p>15:00-16:20 General Discussion and Comments <i>Dr. Hao-Chun Hung 洪豪駿</i> <i>Taiwan EPA</i> <i>Prof. Zueng-Sang Chen 陳尊賢</i> <i>Chairman of ReSAGPAPR WG</i></p> <p>16:20-16:30 Closing Ceremony <i>Mr. Hung-Teh Tsai 蔡鴻德</i> <i>Taiwan EPA</i> <i>Prof. Zueng-Sang Chen 陳尊賢</i> <i>Chairman of ReSAGPAPR WG</i></p>

2013 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites

Sep 30 to Oct 11
Howard International House Taipei



Trainees



Australia



Dr. Dawit Nega *Bekele*
Research Associate
University of South Australia, CERAR

Dr. Dawit Nega *Bekele* completed his PhD in Civil and Environmental Engineering, Australia. He studied MSc in Water Resource Management, Germany. He achieved my Civil Engineering qualification in Ethiopia and practiced in the field for almost 5 years. He have substantial experience in Civil and Environmental Engineering in particular contaminated site assessment and remediation projects and environmental monitoring, data analysis and interpretation.



Indonesia

Ms. Melda Mardalina
Head
Division of Hazardouse Waste Management for Mining,
Energy and Petroleum and Gases
Ministry of Environment

Ms. Melda Mardalina is the Head of Hazardous Waste Management for Mining, Energy and Petroleum and Gases, she has been posting in division of Hazardous Waste Management especially for Mining, Energy and Oil and Gases sectors since February 2013. The activities of her division are monitoring of hazardous waste management from Mini and cleaning up the contaminated land.



Indonesia



Mr. Raden Budi Setiadi
First Environmental Inspector
Assistant Deputy Minister for Hazardous and Toxic Waste Management and
Contamination Recovery of Hazardous and Toxic Waste, Ministry of Environment

Mr. Raden Budi SETIADI is the First Environmental Inspector of Ministry if environment, his responsibilities involve: auditing and inspection to infrastructure services industries, manufacture industries, oil and gas industries, and agricultural industries looking for environmental compliance base on regulation, database collecting for hazardous wastes generation from agricultural industry and manufacture industry sources, updating profile of environment compliance of companies, database collecting for improvement environment audit and inspection, monitoring and inspecting for contamination recovery of Hazardous and Toxic waste. He received his Bachelor's degree of Mechanical Engineering, National Institute of Technology (ITENAS), Bandung, Indonesia in 2003.

Trainees (continued)



Korea

Ms. Minah Kim
Team Manager
Soil Environment Technology Center
Korea Environmental Industry and Technology Institute (KEITI)

Ms. Minah Kim has committed to enhance international environmental cooperation, which aims to facilitate the sustainable development and improvement of the environment among partner countries and Korea. Together with the Ministry of Environment of the Republic of Korea, she dedicated her efforts to exchange policy, industrial technology and industries as well as to promote private investment toward building the infrastructure in partner countries by securing various financial resources. Nowadays, she is in charge of managing national R&D programs and international cooperation specialized in the soil and groundwater field.



Malaysia



Mr. Amir Mizwan bin Mohd Akhir
Geologist
Minerals & Geoscience Department Malaysia, JMG

Mr. Amir Mizwan Mohd Akhir has been working for 4 years as geologist in Minerals & Geoscience Department Malaysia (JMG). His duty is on Geological Mapping and Hydrogeology Activities and responsible to carry out investigations on the exploration, development and monitoring of groundwater sources in Kelantan Basin (northern part of Peninsular Malaysia).



Malaysia

Ms. Zamila Abdul Rahman
Geologist
Mineral & Geoscience Department Malaysia

Ms. Zamila Abdul Rahman is a Geologist working at Mineral and Geoscience Department Malaysia, Kedah/Perlis/P.Pinang State Office. She received her Bachelor's Degree in Geology from The National University of Malaysia (UKM). She worked as Research Assistant in LESTARI, UKM which she published few papers on Geological Heritage Resources. During her position in Mineral and Geoscience Department, she has done work on Environmental Geology, Hydrogeology and Information Management.



Trainees (continued)



New Zealand



Ms. Tara Kelly
Analyst
Ministry for the Environment

Ms. Tara Kelly works as an analyst in the Operations Directorate at the Ministry for the Environment. She works across three work streams, namely contaminated sites, freshwater, and incident management. Her work involves administering the Fresh Start for Fresh Water Fund and the Contaminated Sites Remediation Fund. Through her work at the Ministry, she has obtained a strong understanding of fund administration, project management methodologies, and has had the opportunity to engage with a variety of people across local and central government, and iwi.



Thailand

Mr. Aroonkit Sitthichai
Environmental Practitioner Level
Water Quality Management Bureau
Pollution Control Department
Ministry of Natural Resources and Environment

Mr. Aroonkit Sitthichai has been working as an environmentalist (Practitioner Level) at Industrial Wastewater Division, Water Quality Management Bureau, Pollution Control Department, Thailand for 5 years. His responsibilities are survey and monitoring of groundwater contamination sites in Rayong Pollution Control Area, Map Ta Phut Industrial Estate.



Thailand



Ms. Onanong Chomsiri
Professional Scientist
Office of Science for Land Development
Land Development Department
Ministry of Agriculture

Ms. Onanong Chomsiri works in soil environment section, the office of soil development from land development department.. She graduated bachelor's degree of science major industrial chemistry from King Mongkut's university of technology north Bangkok and master's degree of science major chemical technology from Chulalongkorn university. She works at land development department (LDD) for 6 years. She works in soil environment section, the office of soil development from land development department. I am scientist and researcher. She has analyzed in soil environment section, analysis of heavy metal in soil with inductively coupled plasma optical emission spectrometry (ICP- OES). In field experiment, collected soil where is contaminated with heavy metal.

Trainees (continued)**Thailand**

Ms. Jutharat Khumnungkit
Head of Soil Environment Group
Office of Science for Land Development
Land Development Department
Ministry of Agriculture

Ms. Jutharat Khumnungkit graduated bachelor's degree major material science from Srinakharinvirot university and master's degree major soil science from kasetsart university. She is a scientist and works at land development department (LDD) for 15 years. She started the job in soil analysis section, regional office for land development department. And moved to the central; office of science for land development. She has analyzed in soil mineralogy section and soil physics section. Thence for retaliated the government policy , food safety year , by administered and corporate to certify agricultural inputs that have related to LDD and permitting to used logo(Q) for standard passing merchandise. After that she was promoted to head of organic agricultural administration section for 5 years. Thenceforth after reorganization nowadays she is head of soil environment section in office of science for land development.

**Thailand**

Mrs. Apaporn Siripornprasarn
Environmental Professional Level
Pollution Control Department
Ministry of Natural Resources and Environment

Mrs. Apaporn Siripornprasarn has been working as an environmentalist at Emergency Response and Remediation Section, Pollution Control Department, Thailand for 13 years. Her responsibilities are dealing with site remediation and emergency situation involving chemicals such as fire, explosion, illegal dumping.

Trainees (continued)**Vietnam**

Mr. Trinh Vu Quyet
Officer

Division of Planning and Project Management
Centre of Land Resources Investigation and Assessment
Department of International Cooperation and Science, Technology
General Department of Land Administration
Ministry of Natural Resources and Environment

Mr. Trinh Vu Quyet is a promising official of Division of Planning and Project Management of CoLRIA. He has a 4-years experience in various fields including: land management, land-use planning, land quality (includes land contamination and degradation), climate-change responses, project management, research management and international cooperation. He is good at technical issues and computer literature.

**Vietnam**

Ms. Kim Thi Thu Phuong
Official
Division of Water and Soil Pollution Control
Department of Pollution Control
Vietnam Environment Administration
Ministry of Natural Resources and Environment

Ms. Kim Thi Thu Phuong has a 4 years experience in various fields related to: developing pollution control plans/projects (including the soil and water environment management), researching and developing technical tools to support the water environment protection, developing and implementing the plans on control pollution of soil and ground water in Vietnam.

**Vietnam**

Mr. Tran Hong Co
Officer
Department of Science and Technology
Ministry of Natural Resources and Environment

Mr. Tran Hong Co is working in office of overcoming the consequences of toxic chemicals/dioxin on humans and environment. For environment, they have been implemented trial for selection a number of technologies for the treatment of dioxin contaminated soil in Viet Nam. In July to October 2012, he was involved in training of Mechano - Chemical technology course (New Zealand). At the same time, he has been researching and assessing this technology for his master's thesis.



Sampling, Analyses, and Mapping of Soil Pollutants

Time: 2013 Sep 30, 08:30-10:30



Prof. Dr. Dar-Yuan Lee
Distinguished Professor
Department of Agricultural Chemistry
National Taiwan University

Dr. Dar-Yuan Lee received his Ph.D. degree from Department of Soil and Environmental Sciences, University of California, Riverside. He is the Distinguished Professor of Department of Agricultural Chemistry, National Taiwan University (NTU) and former President of Chinese Society of Soil and Fertilizer Sciences (Taiwan). His researches focus on chemistry of trace elements in soils, remediation of heavy metal contaminated soils, and spatial variability of soil properties and Geostatistics. He served as Head of Department of Agricultural Chemistry,

NTU, Associate Editor of Journal of Environmental Quality, Secretary General of ESAFS, and International Committee Member of International Society for Trace Element Biogeochemistry. Dr. Lee was awarded Distinguished Research Award, National Science Council, Taiwan, and Distinguished Teaching Award, NTU.

Course outline:

1. Soil sampling:
 - Sampling purpose
 - Sampling site preliminary investigation
 - Sampling team and members' responsibility
 - Sampling design
 - Sampling tools/equipments
 - Sampling implementation (sample field screening/test)
 - Sample preservation and transportation
 - Sampling QA/QC
 - Sampling safety protection and pollution prevention
2. Soil sample analyses:
 - Heavy metal analyses
 - Organic chemical analyses
 - QA/QC for soil sample analyses
3. Mapping of soil pollutants:
 - Theory of geostatistics
 - Kriging for delineating contaminated areas



The Case Studies of Investigations of Soil Contamination

Time: 2013 Sep 30, 10:50-12:20



Dr. Ming-Daw Che
Vice Chairman
Apollo Technology Co., Ltd.

Dr. Che currently serves as vice chairman of Apollo Technology, a leading environmental consulting and engineering firm in Taiwan. He is also the senior adviser of energy technology at Taiwan Development Institute and a consulting expert of Taiwan’s EPA and BOE for making environmental and energy related regulations. Dr. Che was formerly the CTO of Environment and Development Foundation, and the laboratory director , senior manager ,and soil/groundwater remediation group leader of Energy and Resource Laboratory at Industrial Technology Research Institute, the largest nonprofit research organization in Taiwan. He received his PhD in Environmental Science from The Ohio State University in 1991.

Course outline:

1. Introduction
2. Case I: Agricultural Land
3. Case II: Industrial Plants
4. Case III: Gas Stations
5. Case IV: Waste Dumping Sites
6. Case V: Other Sites
7. Practices and Discussions
8. Conclusions



Sampling Design for Contaminated Sites

Time: 2013 Sep 30, 13:30-16:30



Prof. Dr. Tsun-Kuo Chang
Professor
Department of Bioenvironmental Systems Engineering
National Taiwan University

Dr. Tsun-Kuo Chang is a Professor at National Taiwan University. Dr. Chang received his B.S. and M.S from National Taiwan University and Ph.D. from Purdue University in Civil and Environmental Engineering. He joined the NTU Bioenvironmental Systems Engineering faculty in 1985. Dr. Chang's research interests include water and wastewater treatment, watershed Management, soil remediation, GIS application.

Course outline:

Goal: Maximize the effectiveness of site assessment

Learning Objectives: Improve confidence in project and site decision-making and manage risk more effectively. Achieve cleanup goals faster and at less cost.

Overview:

- 1: Introduction,
- 2: Developing a Statistically Based Sampling Strategy,
- 3: Sampling Plans for Site Characterization
- 4: Sampling Plan for Site Validation
- 5: Interpreting Sampling Results
- 6: The Use of Composite Sampling



Remediation of Soil Sites Contaminated by Heavy Metals and Organic Pollutants

Time: 2013 Oct 1, 08:10-10:10



Prof. Dr. Zueng-Sang Chen
Distinguished Professor
Pedology and soil environmental quality
Soil Survey and Remediation Laboratory
Department of Agricultural Chemistry
National Taiwan University

Prof. 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.

Course outline:

1. General introduction of the management of the soil remediation project and development and application of different technologies.
2. Remediation of soil sites contaminated by heavy metals by in-situ and ex-situ technologies, including: excavation, stabilization/solidification, attenuation, extraction, flushing, acid washing, oxidation/reduction, electrokinetics, vitrification, thermal desorption, pyrolysis, Phyto-remediation, phyto-stabilization, and etc.
3. Remediation of soil sites contaminated by organic pollutants by in-situ and ex-situ technologies, including: soil vapor extraction (SVE), attenuation, flushing, chemical oxidation/reduction, permeable reactive barrier (PRB), electrokinetics, land farming, bioremediation, thermal desorption, Phyto-remediation, phyto-stabilization, and etc.
4. Factors and assessment on selecting the best remediation technologies, including: technical factors and non-technical factors, Factors on affecting the options of remediation, factors and procedures on select the suitable or good remediation techniques
5. Discussion by simple case studies or different technologies



Case Studies of Remediation of Mercury Contaminated Soil

Time: 2013 Oct 1, 10:30-12:10



Dr. Yu-Ting (Phil) Wei
Manager
Technology Co., Ltd.

Dr. Yu-Ting (Phil) Wei, in Environmental Engineering from National Taiwan University, MS from Carnegie Mellon University in Computer-aided Engineering, and certificated Professional Engineer in Environmental Engineering in Taiwan. With twenty years of work experience, Dr. Wei is currently a senior manager at Apollo Technology, heading the research of treatment process for the remediation of mercury contaminated soil, and applying it onsite. Dr. Wei has published his researches on outstanding journals such as ES&T and Water Research, and contributed to a textbook chapter published by American Chemical Society. He specializes in chemical treatment of soil

and groundwater, development of nanoscale reagent for environmental application, modeling of nanoscale particle transport, and implementation of environmental information system.

Course outline:

This course identifies two different methods in treating two separate sites contaminated with mercury. At one site, physical and chemical washing treatments are adopted to treat soil onsite as contamination reduction pretreatments. After treatment, qualified soil is recycled to use onsite. Unqualified treated soil or sludge incurred during waste water treatment is temporarily stored for future heat treatment or other treatments. For the other site, rotary kiln in thermal treatment is used to vaporize mercury from soil. The process continues with emission air treatment to condense and collect mercury from emission.



Soil Investigation and Environmental Forensics

Time: 2013 Oct 1, 13:30-14:40



Dr. Shawntine Lai
Technical Lead
MWH Americas Inc., Taiwan Branch

Dr. Shawntine Lai had her undergraduate education (1998) and M.S. (2000) in National Taiwan University, Taiwan, and received Ph.D. (2005) from the University of Southern California, USA. She has over 8 years of international experience in environmental consulting, and was involved in soil and groundwater investigation and remedial action at numerous superfund sites in the United States during 2005 - 2010. Currently, she is a Technical Lead in MWH Americas Inc., Taiwan Branch, focusing on soil and groundwater remediation technologies. She was invited as the resource person by Andhra Pradesh Pollution Control Board in India to provide the Innovative Remediation Technologies Training in April 2013.

Course outline:

The objective of this course is to give a first insight into soil investigation from methodologies, soil sampling tools, to environmental forensics. This course is intended to develop an understanding of general engineering practice for site investigation and monitoring related to contaminated sites. In addition, we will discuss several case studies in environmental forensics, including the comparison of Pb isotopic compositions in different components of crops and farmland soil, compound specific isotope analysis for chlorinated solvent contaminated sites, and hydrocarbon forensics for TPH contaminated sites.



Geographic Information System & Handheld Devices Application in Soil Contamination Investigation

Time: 2013 Oct 1, 15:00-16:30



Ms. Meredith Chen
Project Manager
Geographic Information Technology Co., LTD

Ms. Chen is working for GI-Tech as a project manager in charge of marketing strategy, business development, and project management in the field of soil and ground water remediation. She is also responsible for handling international affairs and exchange on behalf of GI-Tech. Ms. Chen received a Master's degree from the department of renewable resources in University of Alberta, where she worked for Biodiversity & Landscape Modeling Group and research explaining macroecological patterns of biodiversity across a wide range of spatial and temporal scales. By using GPS and GIS, Ms. Chen has assisted in overseas field work of mapping invasive plant species

through Center for Habitat Restoration in San Francisco. Her specialties cover landscape designing, planning, and conservation and renewable resource management with working knowledge of GIS and RDMS (Relational Database Management System). She has ever participated in interdisciplinary projects comprising areas of biomass energy, low carbon development, and heavy metal contaminated remediation etc.

Course outline:

- I. Introduction (background, company profile, Lecturer introduction)
- II. A brief introduction of Geographic Information System
- III. A brief introduction of Hand-held Device System
- IV. A brief introduction of Contaminated Soil Investigation in Taiwan
- V. Case Study on Contaminated Soil Management System of National Agricultural Lands in Taiwan
- VI. Conclusion



Application of Bioremediation & Phytoremediation on Petroleum Contaminated Site Restoration (Including Case Studies)

Time: 2013 Oct 2, 08:10-10:10



Dr. Frank Shan-Lin Hou
Chief, Environmental Protection Section, Industrial Safety & Environmental Protection Dept., Marketing Business Div., CPC Corp. Taiwan
Assistant Professor, Department of Occupational Safety and Health, China Medical University

Over twenty years' experience as an environmental engineer, consultant, and academic, Dr. Hou is experienced in conducting environmental site assessment (phase I & II), site investigation, human health risk-based corrective action assessment, remedial investigation and feasibility study, pilot and full-scale design-build-test-operate of petroleum contaminated soil and/or groundwater remediation projects for *Chinese Petroleum Corporation (CPC) Taiwan*. During the past ten years(2003-2013), Dr. Hou has involved in projects of comprehensive site investigations, site characterization and environmental monitoring for unsaturated zone and aquifer, contaminant transport studies, and remedial actions for petroleum hydrocarbons contaminated sites. Apart from the experience within *Chinese Petroleum Corporation (CPC) Taiwan*, He has become a committee member of

professional consultant team for Soil and Groundwater Remediation Fund Board of Taiwan EPA since 2001 and worked together closely with EPA officers on the related regulatory issues. Dr. Hou has been invited to participate as a committee member of environmental engineering research project evaluators at Environmental Engineering Research Center of Sinotech Engineering Consultants, Inc. since 2003. Started from 2002, Dr. Hou is also a part-time Assistant Professor and gives Lecturers of Environmental Laws, Water and Wastewater Treatment, and Soil and Groundwater Remediation for undergraduates at Department of Occupational Safety and Health , China Medical University.

Course outline:

Bioremediation of petroleum contamination has been used by the petroleum industry for decades. Yet phytoremediation is an emerging technology that is too new to be widely accepted. There are many unknowns in petroleum phytoremediation. This Lecturer would focus on the potential for bioremediation and phytoremediation of petroleum-contaminated soils. In addition to the introduction of bioremediation and phytoremediation of petroleum pollutants, several examples which applied bioremediation as well as phytoremediation techniques in cases of accidental oil spill sites in Taiwan and other cases of ex-situ soil remediation dealing with petroleum contaminated soils from service stations are included. Topics that would be discussed in this Lecturer are listed as followings.

- Introduction to petroleum bioremediation and phytoremediation.
- Soil & Groundwater Pollution Caused by Petroleum Leakage
- Properties and Risks of Petroleum Contaminants
- Clean-up Goals
- Design and operation of bioremediation/phytoremediation system
- Monitoring of Petroleum Contaminated Site Remediation
- Case studies



Phytoremediation and Taiwan's Experience on Phytoextraction of Heavy Metal-Contaminated Soils

Time: 2013 Oct 2, 10:30-12:10



Prof. Dr. Hung-Yu Lai
Associate Professor
Department of Post-Modern Agriculture, MingDao University

Dr. Lai was graduated from Agricultural Chemistry of National Taiwan University on 2004. His major skill is the use of phytoextraction, one mechanism of phytoremediation, to restore the heavy metal-contaminated soils. Until 2012, there were more than 50 papers published in the SCI Journals or international conferences regarding this field. Dr. Lai also participate a large area in-situ experiment financially supported by EPA in Changhua County during 2005-2006 to investigate the feasibility of phytoremediation. Because his organization is located at Chunghua County, about 230 ha of croplands used to contaminate by heavy metals, he provided many suggestions for the EPB during the conduction of remediation.

Course outline:

This course will introduce the development and the current state of phytoremediation, the use of plants to remediate contaminated soils. Expect for the experimental results reported before, results of two or more case studies been in-situ conducted in Taiwan regarding phytoextraction will be also presented.



Remediation of Heavy Metal Polluted Soil and Case Study

Time: 2013 Oct 2, 13:30-14:40



Dr. Yen-Min Lin
Vice General Manager
Taiwan Environment Science Co., Ltd (TESC)

After graduated from Bachelor Degree in Environmental Engineering of National Chung-Hsing University in 1992, Dr. Lin got Master Degree in Environmental Engineering of National Chung-Hsing University. He has about 15 years experience in environment protection. Then he received MBA concentration on Financial Risk Management of University North Carolina at Charlotte.

Course outline:

- Heavy Metal Contaminated Soil Remediation Technology Overview
- Heavy Metal Contaminated Soil in Taiwan Remediation Technology Case Study
 - ✧ Sequential Extraction
 - ✧ Attenuation
 - ✧ Soil Washing and Treatment System
 - ✧ Phytoremediation
- Various Remediation Techniques Treated Soil Fertility Restore



Case Studies on Remediation for Soil Contamination Sites

Time: 2013 Oct 2, 15:00-16:30



Mr. Joseph Fan
General Manager
Pro. Vision Environmental Engineering Corporation

Mr. Joseph Fan is a senior soil and groundwater professional with over 20 years of experience as an environmental engineer. He has been extensively involved in the site characterization and remediation of soil/groundwater contaminated with a variety of hazardous substances including heavy metals, solvents, and petroleum hydrocarbons. Mr. Fan is proficient in soil/groundwater characterization and remediation, and aquifer testing. He has been instrumental in the design of well field, soil vapor extraction systems, soil venting processes and computer modeling of groundwater flow and solute transport. Mr. Fan has managed many projects involving site assessments, aquifer testing and remedial actions that have involved soil vapor extraction, carbon absorption, chemical oxidation, bioventing, electro-kinetic treatment, air sparging, and biological degradation. His

bioremediation experience includes aqueous and solid phases of biodegrading processes. Mr. Fan's specific project experience includes developing electro-osmosis treatment for contamination in soil having low permeability and collecting metals from aquifer. Additionally, he gave seminars of soil/groundwater remedial technologies in major hazardous material management conferences in Taiwan and US.

Course outline:

1. A Case history of Electro-kinetic Enhanced Bioventing of Gasoline in Clayey Soil.
 Heat Enhanced Bioventing, Ultra Violet Light Disinfection System, GAC Adsorbtion
2. A Case History of Advanced Vapor Extraction System Enhanced Biodegradation of Gasoline
3. A Case History of Electro-kinetic Enhanced Soil Washing of Cd, Cr, and Pb Contaminated Soil.



Integrated Thinking and Technical Tool on Groundwater Investigation

Time: 2013 Oct 3, 08:10-10:10



Dr. Chih Huang
Principal Consultant
Environmental Resources Management Group, Inc.

Dr. Huang has over 15 years of experience in soil and groundwater and contaminated site management. He is specialized in expedited site investigation, phase I and phase II environmental site assessment, surfactant application, ISCO related remediation, and human health risk assessment and 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 also helped the authority 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.

Course outline:

With the heterogeneity of subsurface conditions, understanding the contamination of groundwater through technical tools poses great challenge.

However, the basic toolbox is essential to groundwater investigation and remediation implementation that follows. The course will focus on the introduction of design methodology, monitoring well construction, and sampling/analysis of groundwater. Also, the concept on the interpretation related to the investigation data will be discussed. In general, the content will provide the basis for groundwater contamination investigation design and data collection.



Arsenic in the Groundwater of Taiwan

Time: 2013 Oct 3, 10:30-12:10

Dr. Sheng Wei Wang
Project manager
Sinotech Environmental Technology

Dr. Wang was born in 1979 and raised in Taiwan. Dr. Wang was formally trained in hydrogeochemical engineering and attended Department of Bioenvironmental System Engineering at National Taiwan University during 1997-2007. Dr. Wang's major is the biogeochemical cycling of arsenic in groundwater. Outstanding efforts of groundwater geochemistry researches have published on SCI journals since 2006. Dr. Wang is presently a project manager of Sinotech Environmental Technology, Ltd. and strives for groundwater and soil contaminant investigation, groundwater chemical hazardous assessment, environmental policy and water quality guideline planning, of Taiwan to facilitate the safety use of groundwater resource.



Course outline:

1. Occurrence of groundwater arsenic in Taiwan.
2. Distribution of chemical pollution from emerging industries.
3. Evaluation of heavy metal in farmland soil and water bodies.
4. Management of groundwater contamination

Contamination of groundwater arsenic (As) has been a critical health risk issue in many countries. The peripheral vascular disease, blackfoot disease, was worldwide first reported in 1960' in the southwestern Taiwan. At present, even though groundwater is not directly ingested by most inhabitants, it is still extensively provided to meet irrigation and aquacultural needs. Hence, the objectives of this course are to illustrate the distribution and mobilization of groundwater As, to summarize the researches of groundwater As issue in recently 50 years, and to express the current management strategy of As-contained groundwater in Taiwan.



Application of High Resolution Site Characterization (HRSC)

Time: 2013 Oct 3, 13:30-16:30



Dr. Chih Huang
Principal Consultant
Environmental Resources Management Group, Inc.

Dr. Huang has over 15 years of experience in soil and groundwater and contaminated site management. He is specialized in expedited site investigation, phase I and phase II environmental site assessment, surfactant application, ISCO related remediation, and human health risk assessment and 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 also helped the authority 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.

Course outline:

Site investigation programs are known for their seemingly endless phases of assessment and high degrees of uncertainty due to the use of traditional investigation tools and approaches. High Resolution Site Characterization (HRSC) offers an alternative approach to site investigation that significantly reduces uncertainty and enables development of cost effective solutions to address identified risks. Through the application of proven scientific principles, investigation approaches, and characterization tools, detailed two- or three- dimensional conceptual site models are generated to support effective decision making.



Groundwater Investigation and Case Study of Contaminated Sites

Time: 2013 Oct 4, 08:10-10:10



Ms. Rannie Kuo
Project Deputy Manager
Apollo Technology Co., Ltd.

Ms. Rannie Kuo has dedicated environment system management, especially in ground water contaminant transport and remediation. She has specific project experience includes soil and groundwater investigating project of EPA (including conducting field sampling), manufacturing facility Phase I and Phase II environmental site assessments. She also had two years of experience in charging for green product management in the Risk Management Department and for green designing in the new product development and had two years of experience for ISO system auditing in manufacturing facility.

Course outline:

- ✓ Groundwater hydrology:
 - Aquifer categories
 - Hydrogeological characterization
 - Hydraulic test
 - Field site application: pumping test
- ✓ Conceptual site model:
 - Introduction and development
 - Geological, groundwater flow and contamination conceptual model
 - Hydrogeological site investigation
- ✓ Contamination investigation:
 - Classification of contamination
 - Investigation of contamination
- ✓ Case Study:
 - LNAPL investigation
 - DNAPL investigation



Issues and Countermeasures for the Investigation of Soil and Groundwater Contaminated with Chlorinated Hydrocarbon

Time: 2013 Oct 4, 10:30-12:10



Dr. Hsin-Chang Liu
Assistant Researcher
Disaster Prevention and Water Environment Research Center
National Chiao Tung University

Dr. Liu received his Ph.D. degree from National Central University, Taiwan. He has More than ten years of Near-Surface Geophysics survey and Environment Geophysics survey experiences. His major research interests are geotechnical process monitoring and subsurface imaging. Mr. Liu is currently developing several new investigate techniques based on geophysics method for geotechnical and hydrological applications. Subsurface imaging by Ground-Penetrating Radar and electrical current are also under study.

Course outline:

Many site investigations have found that DNAPL is able to penetrate the low permeable layer such as clay or silt-clay layer in subsurface environment. The cumulated DNAPL within the low permeable layer will gradually diffuse to the high permeable layer to affect the accuracy of investigation and remedial design. As to the deeper zone affected by the penetration of DNAPL, the conventional sampling design investigating only the first unconfined aquifer is no longer suitable for DNAPL investigation. Precisely define the boundary and the distribution of high and low permeable layer is the key to conduct a successful DNAPL investigation. This study

would first discuss how DNAPL and its soluble-phase components invade into the low permeable layer based on the field observation. Then, the importance of geophysical technology is introduced with comparing to the limitations of bore-hole investigation. Last, the case studies on using geophysical technologies including geophysical well logging are introduced to snapshot the complex profile of DNAPL distribution for improving future application.



Issues and Countermeasures for the Investigation of Soil and Groundwater Contaminated with Chlorinated Hydrocarbon (continued)

Time: 2013 Oct 4, 10:30-12:10



Contaminant Fate and Transport Remediation of Chlorinated-Solvent Contaminated Groundwater

Time: 2013 Oct 4, 13:30-16:30



Prof. Dr. Jimmy Kao
Distinguished Professor
National Sun Yat-Sen University

Prof. Jimmy Kao is a distinguished professor with the Institute of Environmental Engineering at National Sun Yat-Sen University, Kaohsiung, Taiwan. Prof. Kao is also the President of Taiwan Association of Soil and Groundwater Environmental Protection. He received his MS and Ph.D. degrees in Civil and Environmental Engineering from North Carolina State University in 1989 and 1993, respectively. Prof. Kao has twenty years of experience as a researcher and environmental engineer in water quality modeling, watershed management, soil and groundwater remediation, contaminated site characterization, wastewater treatment, natural disaster investigation, and risk assessment. Prof. Kao received the

“Distinguished Researcher Award” from Taiwan National Science Council in 2012, and he is also the receiver of the “Distinguished Engineer Professor Award” from Chinese Institute of Engineers in 2012.

Course outline:

1. Contaminant fate and transport in groundwater
2. Groundwater contamination by chlorinated solvents
3. Remediation of chlorinated-solvent contaminated groundwater



Health Risk Assessment and Sustainable Remediation

Time: 2013 Oct 7, 08:10-10:10



Prof. Dr. Hwong-wen Ma
Professor and Director
Graduate Institute of Environmental Engineering, National Taiwan University.

Dr. Hwong-wen Ma teaches at the Graduate Institute of Environmental Engineering (GIEE), National Taiwan University. He is now Professor and Director of the GIEE. Dr. Ma obtained his PhD degree at the Department of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill. He had served as Chair of Environmental Planning and Management Committee, Chinese Institute of Environmental Engineering (CIEE), and is now Secretary-General of CIEE. Prof. Ma's research focuses on the development of integrated environmental assessment methods, which involve the combination of tools including risk assessment, material flow analysis, and life cycle assessment. The methods are applied to strategic environmental assessment, energy policy planning, and sustainable resource management.

Course Outline

In this course, the characteristics of contaminated sites and how the management of these sites may be facilitated by health risk assessment are introduced. The processes of health risk assessment are described and a case study is used to illustrate the application of risk assessment to derive information as a basis of site management, including how much and how cleanup should be conducted. Besides health risk, the other environmental impacts along the life cycle of remediation have received increasing attention. The concept of green and sustainable remediation is introduced, and then the implementation procedure and methods are shown with a case study.



Green and Sustainable Remediation (GSR)

Time: 2013 Oct 7, 10:30-12:10



Ms. Tsai Wen Chiang
Engineer
Sinotech Environmental Technology

Ms. Chiang (Full name: Tsai-Wen, Chiang) was born in 1987 in Taiwan, and completed a degree in Sociology and an Ecological Engineering Program from the National Taiwan university during 2005-2009. Miss. Chiang holds a master of Environmental Engineering and was formally trained in Life Cycle Assessment, Environmental impact and health risk Assessment. Currently, Ms. Chiang is an engineer of Sinotech Environmental Technology, Ltd. and devotes to raise the awareness of incorporating sustainable concepts into groundwater and soil contaminant investigation and remediation processes to ensure environmental, social and economic effects of the remedial activities are all taken into account in decision-making processes.

Course outline:

1. Introduction of Green and sustainable remediation
2. Global trend of GSR
3. Framework and Tools for implementing GSR
4. GSR groundwater remediation case studies

Most groundwater (GW) remediation sites need long term remediation projects which combines different remedies and management strategies. Traditional GW remedies consume a large amount of energy and the remediation costs are very high. The concept of green and sustainable remediation (GSR) has emerged in recent years. In Taiwan, GSR was defined as “any technique, strategy, or management plan that consider environmental, economic and social aspects, which can reduce environmental footprints, negative socio-economic impacts throughout the remediation process while still meeting the regulatory requirements.” In this course, the idea of GSR will be clearly illustrated and followed with an introduction of the world GSR trends. Successful GW remediation cases which incorporated GSR concepts and practices will also be introduced during the course.



Groundwater Remediation

Time: 2013 Oct 7, 13:30-16:30



Prof. Dr. Ku-Fan Chen
Associate professor
National Chi Nan University

Dr. Ku-Fan Chen received the B.S. degree in environmental science from Tunghai University, Taichung, Taiwan, in 1999, and the M.S. and Ph. D. degrees in environmental engineering from National Sun Yat-Sen University, Kaohsiung, Taiwan, in 2001 and 2006, respectively. From 2005 to 2006, he visited the Department of Civil and Environmental Engineering at Lehigh University, PA, USA, as a visiting scholar. In 2008, he joined the Department of Civil Engineering, National Chi Nan University (NCNU), Taiwan, and is currently an Associate Professor. Prior to joining NCNU, he worked for the Apollo Technology Co., Ltd., Taiwan, a company devoted to soil and groundwater remediation, as a Deputy Project Manager. Dr. Chen is a member of the Chinese Institute of Environmental Engineering and the Taiwan Association of Soil and Groundwater Protection, Taiwan. His research interests include soil and groundwater remediation, environmental nanotechnology, environmental molecular biotechnology, water resource and watershed management, noise

assessment and control.

Course outline:

This course provides an overview of groundwater contamination and introduces the principles of groundwater remediation technologies. Case studies are introduced to help students understand the practical application of groundwater remediation technologies. The course outline is as follows:

- I. Introduction to groundwater remediation (I): Groundwater contamination, physical and chemical technologies
- II. Introduction to groundwater remediation (II): Bioremediation and green remediation
- III. Case studies: I. Petroleum hydrocarbon remediation
- IV. Case Studies: II. Chlorinated hydrocarbon remediation



Groundwater Remediation Case Study: the First Gas Station Removed from Taiwan EPA List of Contaminated Sites

Time: 2013 Oct 8, 08:10-10:10



Dr. Chia-Hsin Li
Project Manager
Environmental Engineering Department II, Sinotech Engineering

Dr. Chia-Hsin Li received her Ph. D. degree from National Chung-Hsing University in Taiwan. She is a project manager of Sinotech Engineering Consultants, Ltd. She has many experiences in investigation and assessment of soil and groundwater pollution and planning and management of groundwater monitoring well networks; she has provided the related assessment and investigation for many projects sponsored by the Taiwan EPA.



Course outline:

In October 2006, a private gas station in Tainan City about 3.5 km² in area was declared a contaminated site by the Taiwan Environmental Protection Administration. The soil had been polluted by benzene, toluene, ethylbenzene, xylene and total petroleum hydrocarbon, and the groundwater by benzene, toluene, naphthalene and phenol. Sinotech Engineering Consultants, Ltd. was contracted to carry out soil and groundwater pollution investigation and remediation. After four years of remediation work, the site was removed from the EPA's list of contaminated sites in January 2011. It is the first among 55 contaminated gas stations in Taiwan to be successfully remediated since the promulgation of the Soil and Groundwater Pollution Remediation Act in February 2000.



Remediation of a Chlorinated VOC contaminated Site- Case Study

Time: 2013 Oct 8, 10:30-12:10



Mr. Dennis Tu
Office Manager, Environment of URS Greater China
Director, Site Investigation and Remediation
URS Greater China

Mr. Tu is Office Manager, Environment of URS Greater China, and currently based in Taipei. He is a Principal Environmental Engineer and Director of Site Investigation & Remediation. He has 22 years of experiences in environmental engineering and consulting in Taiwan, mainland China, South Korea and Japan. His expertise includes EHS due diligence and compliance assessment, soil & groundwater investigation, and remediation of contaminated land.

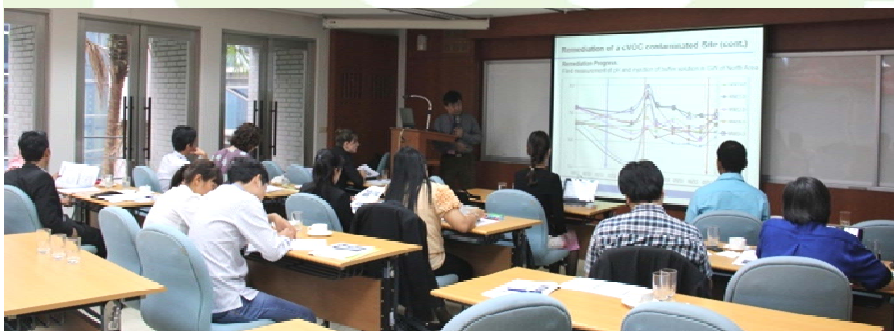
Mr. Tu is intimately familiar with environmental laws and regulations in Taiwan. He was participated in planning and development of the regulations on site investigation methods, and soil and groundwater standards for Taiwan EPA. He has completed more than 300 sites for environmental compliance audit and soil & groundwater investigations. Some of the contaminated sites are being remedied or completed remediation.

Course Outlines:

This course provides a discussion on how to manage a contaminated site, and what data gaps need to be filled up before developing and actually implementing the remediation approaches. A case study from investigation to remediation of a chlorinated VOC contaminated site is presented for reference.

The course topics include:

- CSI vs. CSI
- Management of Contaminated Site
- The Missing Link before Site Remediation
- Remediation of a cVOC contaminated Site- a Case Study
 - Site History and Background
 - Remedial Investigation and Conceptual Site Model
 - Development of Remediation Approaches
 - Remediation Progress and Performance
 - Planned Future Works
- Overview of URS in APAC Region



Groundwater Remediation using *In-Situ* Chemical Oxidation

Time: 2013 Oct 8, 13:30-16:30



Prof. Dr. Tsair-Fuh Lin
 Distinguished professor
 Department of Environmental Engineering,
 National Cheng Kung University

Dr. Ku-Fan Chen received the B.S. degree in environmental science from Tunghai University, Taichung, Taiwan, in 1999, and the M.S. and Ph. D. degrees in environmental engineering from National Sun Yat-Sen University, Kaohsiung, Taiwan, in 2001 and 2006, respectively. From 2005 to 2006, he visited the Department of Civil and Environmental Engineering at Lehigh University, PA, USA, as a visiting scholar. In 2008, he joined the Department of Civil Engineering, National Chi Nan University (NCNU), Taiwan, and is currently an Associate Professor. Prior to joining NCNU, he worked for the Apollo

Technology Co., Ltd., Taiwan, a company devoted to soil and groundwater remediation, as a Deputy Project Manager. Dr. Chen is a member of the Chinese Institute of Environmental Engineering and the Taiwan Association of Soil and Groundwater Protection, Taiwan. His research interests include soil and groundwater remediation, environmental nanotechnology, environmental molecular biotechnology, water resource and watershed management, noise assessment and control.

Course outline:

1. Fundamentals of *In-Situ* Chemical Oxidation (ISCO)- reaction and kinetics
2. Applications and limitations in groundwater remediation
3. Applied with other methods
4. Research Directions



Bioremediation of Chlorinated Solvent Contaminated Groundwater**Time: 2013 Oct 9, 08:10-10:10**

Dr. Shawntine Lai
Technical Lead
MWH Americas Inc., Taiwan Branch

Dr. Shawntine Lai had her undergraduate education (1998) and M.S. (2000) in National Taiwan University, Taiwan, and received Ph.D. (2005) from the University of Southern California, USA. She has over 8 years of international experience in environmental consulting, and was involved in soil and groundwater investigation and remedial action at numerous superfund sites in the United States during 2005 - 2010. Currently, she is a Technical Lead in MWH Americas Inc., Taiwan Branch, focusing on soil and groundwater remediation technologies. She was invited as the resource person by Andhra Pradesh Pollution Control Board in India to provide the Innovative Remediation Technologies Training in April 2013.

Course outline:

The course is intended to provide an introduction to various bioremediation technologies related to chlorinated solvent contaminated groundwater. A case study of a chlorinated solvent contaminated site will be discussed with special focus on groundwater investigation techniques, nature and extent of the contamination, microbial identification, identification and screening of remedial technologies, evaluation of the remedial approach, pilot test implementation, and full scale design. The objective is to provide general knowledge through selecting and designing a remediation approach based on the geological, chemical, and biological characterization of the site.



Case Study on Integrated Groundwater Circulation Remediation Technologies**Time: 2013 Oct 9, 10:30-12:10**

Dr. Chih Huang
Principal Consultant
Environmental Resources Management Group, Inc.

Dr. Huang has over 15 years of experience in soil and groundwater and contaminated site management. He is specialized in expedited site investigation, phase I and phase II environmental site assessment, surfactant application, ISCO related remediation, and human health risk assessment and 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 also helped the authority 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.

Course outline:

Groundwater circulation well (GCW) related technologies have been applied successfully for chlorinated volatile organic contaminants (CVOCs) in groundwater. The recent trend is to integrate the GCW system with designed substrates or reagents to leverage the characteristics of GCW systems. This development can extend the system function from remediation to polishing stages and leverage the cost of GCW system.



Using Risk Maps to Estimate Environmental Impact of Abandoned Factories

Time: 2013 Oct 9, 13:30-16:30

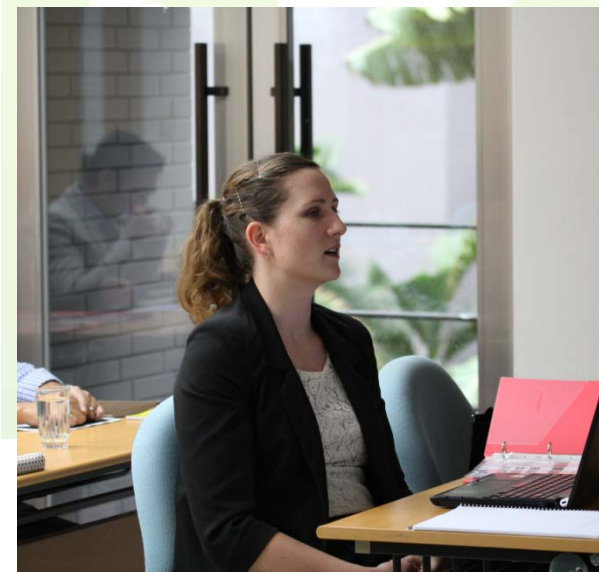


Dr. Cogi, I-Chun Chen
 Researcher
 Industrial Technology Research Institute

Researcher, I-Chun Chen, graduated from Institute of Environmental Engineering, National Taiwan University; she has a working experience of more than 10 years in risk assessment on soil and groundwater, particular for the domestic industrial pollution and soil contaminated site. Research topics have been in the country abandoned factory pollution potential investigation and screening assessment, contaminated site risk assessment and management, emerging contaminants in the environment of the toxicological properties of hormones, etc. Recently, she developed the risk maps, including climate change adaptation and environmental pollution risk areas to conduct the comprehensive analysis among the impact on the environment, economic and social costs.

Course outline:

1. Problems and challenges for management of abandoned factories
2. How to develop the simple risk screening system
3. Database of Environmental Vulnerability
4. Database of Land Use risk
5. Conclusions



Exposure Assessment Involving the Fate of Pollutants and Their Transferring through Food Web in Soil and Sediment

Time: 2013 Oct 10, 08:10-10:10



Prof. Dr. Shian-chee Wu
Professor
Graduate Institute of Environmental Engineering
National Taiwan University

After graduated from the Department of Agricultural Chemistry, National Taiwan University in 1974, Dr. Wu joined in a fine chemical company and later moved to the Sanitary Engineering Department, Taipei City Government as an engineer. In 1979 Dr. Wu got master degree from the Graduate Institute of Environmental Engineering, NTU in 1981. In the same year, Dr. Wu went to MIT. He got his PhD degree of Civil Engineering in 1986 and has been teaching in the Graduate Institute of Environmental Engineering, NTU since then. He had also been serving in EPAROC as a member of EIA

Committee, a member of Soil and Groundwater Clean-up Fund Committee, in Ministry of Education as the Secretary of Environmental Protection Division, and for international journals as a reviewer or an editor.

Course outline:

1. Introduction of exposure assessment
2. A case of As contaminated rice field
3. Bioaccumulation in vegetables
4. Estimation of the consumption rate of contaminated agricultural products
5. A case of PCB contaminated river sediment
6. Estimation of activity of contaminants
7. Bioaccumulation through food chain of biota



Ecological Risk Assessment of Contaminated Sites

Time: 2013 Oct 10, 10:30-12:10



Prof. Dr. Colin S. Chen
Professor
Department of Biotechnology
National Kaohsiung Normal University, Kaohsiung, Taiwan

Dr. Colin S. Chen is currently a professor in Department of Biotechnology, National Kaohsiung Normal University. He got his B.S. from National Taiwan University. He received his M.S. and Ph.D. degrees from Department of Environmental Engineering Sciences, University of Florida, USA. He was a senior environmental scientist in Exposure and Risk Assessment Division, Versa, Inc, Washington, D.C. He oversaw projects in ecological risk assessment and fate and transport of organic contaminants. His research interests is in the area of developing soil and groundwater remediation techniques, fate and transport of organic

pollutants in the subsurface environment, ecological risk assessment of rivers, pesticides, and contaminated sites, and environmental forensics.

Course outline:

This Lecturer course is designed to provide an overview of assessing risks posing threats to the natural environment. A detailed treatment of aquatic and terrestrial methods and procedures used to assess the ecological hazard of chemicals will be discussed. These include definition of risk assessment, a suggested conceptual framework for conducting ecological assessment directed toward the needed implementation of natural resource protection. Emphasis will be on quantitative methods useful to assess damage to aquatic, terrestrial and avian resources. The course emphasizes testing techniques, site assessment and monitoring procedures, regulatory requirements, and field and laboratory techniques. Application of model simulation and case studies will be addressed in the lecture.



Using Human Health Risk Assessment as the Basis for Soil and Groundwater Contamination Site Remediation and Management

Time: 2013 Oct 10, 13:30-16:30



Mr. Bo-Wei Power Liang
Engineer
Sinotech Engineering Consultants, Ltd.

Mr. Bo-Wei Power Liang is an Engineer of Sinotech Engineering Consultants, Ltd. He received his M.S. from New Jersey Institute of Technology. Over his 9-year career in the environmental engineering field, he has developed a wide variety of experiences in site investigation, soil and groundwater remediation, contaminated site management, risk assessment and environmental policy and legislation study.

Course outline:

- Risk assessment and Soil and Groundwater Pollution Remediation Act
- Introduction on Human Health Risk Assessment Protocol
- Human Health Risk Assessment Application
- On-line Human Health Risk Assessment Simulator
- Case Studies



Collection Policy of Soil and Groundwater Pollution Remediation Fund in Taiwan**Time: 2013 Oct 11, 08:10-10:10**

Mr. Cheng-Hsu Wang
Engineer
Sinotech Engineering consultants, Ltd

Mr. Wang started working in the Sinotech Engineering consultants, Ltd in 2010. Their team has been working on the auditing of statements of Soil and Groundwater Pollution Remediation Fees since 2001. They have been assisting the fee-payers to correctly report the remediation fee and supporting the EPA running the fees collection systems smoothly and continuously in these years.

Course outline:

- I. Introduction
- II. Collection Policy
 1. Demand of Funding
 2. Remediation Fund Provisions
 3. Collection Rates
 4. Expansion of Fee
 5. Incentive Recoup Policy
 6. Export Recoup Policy
 7. Collection Policy Comparison
- III. Current Collection Status
- IV. Conclusion and Recommendation

Summary:

To remediate the soil and ground water pollution in Taiwan, the Environmental Protection Agency has begun the collection of the soil and groundwater pollution remediation fee from the manufacturers and importers of officially announced substances in accordance with the amounts of manufactured and imported by such enterprises. A total of 7.9 billion NT dollars of remediation fee had been collected in the past 10 years. Since, the officially announced chemical substances are mainly organic substances; the remediation fund is mainly collected from the petrochemical industry. Therefore, the industry continued to reflect that the fee sources should be more fair and reasonable. In response with the industries' demands and to reflect the current statures of illegal dumping sites, a new version of the collection regulations was implemented in the July of 2010. Other than the originally regulated substances, steel, coal, copper, nickel, and industrial wastes from 13 industries were included in the regulated substances. The refunding mechanism of manufactured chemicals was also canceled.

After the revision, the number of fee-payers has increased from 1,200 to 4,500. The amount of remediation fee collected each quarter has increased to 252 million NT dollars, mainly due to the cancelation of refund of manufactured chemicals. The levied scale has achieved the objectives of the original planning. The proportion of the fund came from the petrochemical industry has decreased, which make the fee sources more reasonable.

Introduction to Soil and Groundwater Pollution Remediation Act of Taiwan

Time: 2013 Oct 11, 10:30-14:40



Dr. Hao-Chun Hung

**Senior Environmental Technology Specialist
Soil and Groundwater Remediation Fund,
Management Board, Environmental Protection Administration**

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. He has ten years of administrative and technological experience on soil and groundwater pollution investigation and remediation.

Course outline:

The Soil and Groundwater Pollution Remediation Act was promulgated and enforced in February 2000, and amended in 2010 in accordance with practical law enforcement needs. The core elements of this Act including preventive monitoring, contaminated site management, and remediation Fund will be introduced and discussed.



Field Trip on 2013 October 5

Time	Schedule
07:50~08:00	Get on the bus at <i>Howard Civil Service International House</i>
08:00~9:00	Going to <i>Taiwan Metals Mining Corporation Site</i>
09:00~11:00	Field study at Taiwan Metals Mining Corporation Site
11:30~12:00	Going to <i>Yu-Di-Ling Seafood Restaurant</i>
12:00~13:00	Lunch at Yu-Di-Ling Seafood Restaurant located at Keelung city
13:30~14:30	Going to <i>National Palace Museum</i>
14:30~17:00	Visit National Palace Museum
17:00~17:20 17:20~18:00	Going to <i>Shi-Lin Night Market</i> Send the participants who don't want to visit the night market back to Howard Civil Service International House

Field Study at Taiwan Metals Mining Corporation Site on 2013 Oct 5



Field Study at Taiwan Metals Mining Corporation Site on 2013 Oct 5 (continued)



Field Study at Taiwan Metals Mining Corporation Site on 2013 Oct 5 (continued)
Lunch at Yu-Di-Ling Seafood Restaurant



Interesting Sidelights of 2013 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites

General Discussion and Closing Ceremony





**General Discussion
and Closing Ceremony**



Welcome Dinner Party at Three Coins Restaurant on Oct 1



RESAG