ReSAGPAPR WG NEWSLETTER

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Soil and Groundwater Pollution of Asian and Pacific Region

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Member Countries：

Message from Taiwan EPA

Ms. Ying-Ying Lai (賴瑩瑩)

Executive Secretary (Director General)
Soil and Groundwater Remediation Fund
Management Board
Environmental Protection Administration

Ms. Ying-Ying Lai received her M.S. degree of Institute of Natural Resources Management from the National Taipei University of Taiwan. Currently she serves as the Executive Secretary of the Soil and Groundwater Remediation Fund Management Board, Environmental Protection Administration, R.O.C. (Taiwan). Executive Secretary Lai has extensive experience on waste minimization, waste recycling and resource recovery.

Opening address for the open ceremony of training course

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 2016 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 9 delegates from 8 country members of Working Group of ReSAGPAPR and 7 delegates from Taiwan Environmental Consultant companies. 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 6th Steering Committee meeting of the Working Group of ReSAGPAPR held on December 7, 2015, at Taipei, Working Group have approved this international training course to be held in this year. The contents of this international training course include 48 hours of technical sessions and one day study tour of contamination site in north Taiwan. The major contents of the courses include:

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

Taiwan EPA and Working Group of ReSAGPAPR have invited 24 distinguished speakers to share their knowledge and experience on this international training course. The speakers include 10 distinguished professors from different universities in Taiwan to share the basic technical theories, hypothesis and models on this course. One speakers from Taiwan EPA can share their experience on the management strategies related to remediation on soil and groundwater contaminated sites. More than 13 speakers from environmental consultant companies from Taiwan 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 5 to 10 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 8 days in Taiwan.

Thank you.

Message from the Chairman of ReSAGPAPR WG

Prof. Zueng-Sang Chen (陳尊賢)

Chairman
Working Group on the Remediation of Soil and Groundwater Pollution of Asian and Pacific Region (WG ReSAGPAPR) (2011-2016)
Distinguished Professor of pedology and soil environmental quality
Department of Agricultural Chemistry
National Taiwan University

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), Taiwan. 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.

Dear Friends

It is my great pleasure to say some words for this Newsletter of Working Group of ReSAGPAPR. In the 6th Steering Committee meeting of the Working Group of ReSAGPAPR held on December 7, 2015, at Taipei, Working Group have approved "*2016 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites*" to be held in March 2016. The contents of this international training course include 48 hours of technical sessions and one day study tour of contamination site in north Taiwan. The major contents of the courses include (1) survey techniques of soil contamination sites, (2) remediation for soil contamination sites, (3) survey techniques of groundwater contamination sites, (4) remediation techniques for groundwater contamination sites, (5) health risk assessment of soil and groundwater contaminated sites, (6) management strategies for the regulation and Act, and (7) fund management board on soil and groundwater contaminated sites.

Taiwan EPA and Working Group of ReSAGPAPR have invited distinguished speakers to share their knowledge and experience on this international training course, including distinguished professors from different universities of Taiwan, speakers from Taiwan EPA, and also speakers from International and local environmental consultant companies.

You can learn all the contents of training course through the website of this working group of ReSAGPAPR.

Thank you.

Zueng-Sang Chen, May 31, 2016

Program

2016 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites

Date: March 21-28, 2016

Venue: Meeting Room 205, Howard Civil Service International House, Taipei, Taiwan

Date	March 21 (Mon.)	
Morning Schedule	08:20-08:30	**Opening Ceremony** ***Ms. Ying-Ying Lai*** *Executive Secretary (Director General), Environmental Protection Administration of Taiwan* ***Prof. Dr. Zueng-Sang Chen*** *Chairman of ReSAGPAPR WG*
	08:30-10:30	**Sampling, Analyses, and Mapping of Soil Pollutants** ***Prof. Dr. Dar-Yuan Le*** *National Taiwan University*
	10:50-12:20	**The Case Studies of Investigations at Soil Contamination Sites** ***Dr. Ming-Daw Che*** *Apollo Technology Co., Ltd.*
Afternoon Schedule	13:30-14:40	**Sampling Design for Contaminated Sites-A case study of Guandu Arsenic -tainted site** ***Prof. Dr. Tsun-Kuo Chang*** *National Taiwan University*
	15:00-16:30	**Geographic Information System & Handheld Devices Application in Soil Contamination Investigation** ***Ms. Ying-Chieh Fen*** *Geographic Information Technology Co., Ltd.*

Date	March 22 (Tue.)	
Morning Schedule	08:10-10:10	**Remediation of Soil Sites Contaminated by Heavy Metals and Organic Pollutants** ***Prof. Zueng-Sang Chen*** *National Taiwan University*
	10:30-12:10	**Case Studies of Remediation of Mercury Contaminated Soil** ***Dr. Yu-Ting (Phil) Wei*** *Apollo Technology Co., Ltd.*
Afternoon Schedule	13:30-14:40	**Contaminant Fate and Transport in Groundwater** ***Prof. Dr. Jimmy Kao*** *National Sun Yat-Sen University*
	15:00-16:30	**Case Studies on Remediation for Soil Contamination Sites** ***Mr. Joseph Fan*** *Pro. Vision Environmental Engineering Corp.*

Program

2016 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites

Date: March 21-28, 2016

Venue: Meeting Room 205, Howard Civil Service International House, Taipei, Taiwan

Date	March 23 (Wed.)
Morning Schedule	08:10-10:10 **Integrated Thinking and Technical Tools on Groundwater Investigation** ***Dr. Chih Huang*** *InnoFusion Environmental Management Co., Ltd.* 10:30-12:10 **Issues and Countermeasures for the Investigation of Soil and Groundwater Contaminated with Chlorinated Hydrocarbon** ***Dr. Hsin-Chang Liu*** *National Chiao Tung University*
Afternoon Schedule	13:30-14:40 **Investigation and Remediation of a Chlorinated Solvent Contaminated Site: A Case Study** ***Dr. Yao-Tsung Chen*** *Apollo Technology Co., Ltd.* 15:00-16:30 **Groundwater Remediation using *In-Situ* Chemical Oxidation** ***Prof. Dr. Tsair-Fuh Lin*** *National Cheng Kung University*

Venue: Meeting Room 204, Howard Civil Service International House, Taipei, Taiwan

Date	March 25 (Fri.)
Morning Schedule	08:10-10:10 **Groundwater Remediation Case Study: the First Gas Station Removed from Taiwan EPA List of Contaminated Sites** ***Dr. Chia-Hsin Li*** *Sinotech Engineering Consultants, Ltd.* 10:30-12:10 **Remediation of a Chlorinated VOC Contaminated Site- Case Study** ***Mr. Dennis Tu*** *AECOM*
Afternoon Schedule	13:30-14:40 **Application of Bioremediation & Phytoremediation on Petroleum Contaminated Site Restoration (Including Case Studies)** ***Dr. Frank Shan-Lin Hou*** *CPC Corp. Taiwan / China Medical University* 15:00-16:30 **Bioremediation of Chlorinated Solvent Contaminated Groundwater** ***Dr. Shawntine Lai*** *MWH Americas Inc., Taiwan Branch*

Program

2016 International Training Courses on Survey and Remediation of Soil and Groundwater Contaminated Sites

Date: March 21-28, 2016

Venue: Meeting Room 204, Howard Civil Service International House, Taipei, Taiwan

Date	March 26 (Sat.)	
Morning Schedule	08:10-10:10	**Health Risk Assessment and Sustainable Remediation** ***Prof. Dr. Hwong-wen Ma*** *National Taiwan University*
	10:30-12:10	**Exposure Assessment Involving the Fates of Pollutants and their Transferring through Food Webs in Soil and Sediment** ***Prof. Dr. Shian-Chee Wu*** *National Taiwan University*
Afternoon Schedule	13:30-14:40	**Sustainable Contaminated Site Remediation: Theories and Approaches** ***Prof. Dr. Colin S. Chen*** *National Kaohsiung Normal University*
	15:00-16:30	**Ecological Risk Assessment of Contaminated Sites** ***Prof. Dr. Colin S. Chen*** *National Kaohsiung Normal University*

Date	March 28 (Mon.)	
Morning Schedule	08:10-10:10	**Using Human Health Risk Assessment as the Basis for Soil and Groundwater Contamination Site Remediation and Management** ***Mr. Bo-Wei Power Liang*** *Sinotech Engineering Consultants, Ltd.*
	10:30-12:10	**Case Studies in Application of HHRA to Contaminated Site Management** ***Dr. Chih Huang*** *InnoFusion Environmental Management Co., Ltd.*
Afternoon Schedule	13:30-14:40	**Introduction to Soil and Groundwater Pollution Remediation Act in Taiwan** ***Mr. Bo-Wei Power Liang*** *Sinotech Engineering Consultants, Ltd.*
	15:00-16:00	**Collection Policy of Soil and Groundwater Pollution Remediation Fund in Taiwan** ***Mr. Yu-Ting Chen*** *Taiwan EPA*
	16:00-16:10	**Closing Ceremony** ***Ms. Ying-Ying Lai*** *Executive Secretary (Director General), Environmental Protection Administration of Taiwan* ***Prof. Zueng-Sang Chen*** *Chairman of ReSAGPAPR WG*

Trainees

Australia

Ms. Heidi Hessling

Site Contamination Officer
Environment Protection Authority (South Australia)

Ms. Heidi joined the Site Contamination Branch of the South Australian EPA as a university graduate 3 ½ years ago. During this time Heidi has been involved in the regulation of site contamination across metropolitan Adelaide metropolitan and some of the more remote country towns of South Australia. Heidi's experience also includes community engagement with residents, local councils, private businesses and community groups within urban areas where impacts from historical contamination has been identified.

Indonesia

Mrs. Mutiara Siadari

Head of Section for Decontamination of Hazardous Waste Contamination from Mining and Energy Sector
Directorate General for Domestic Waste, Hazardous Waste and Hazardous Substances Management

Mrs. Mutiara Siadari has work at Hazardous unit for 2 years and for this Head of Section for Decontamination of Hazardous Waste Contamination from Mining and Energy Sector position just for 6 month. This is a new Directorate, previously was one of task in Deputy Assistant for Hazardous Management and Land Contamination. Her University degree from Biology Educational, Riau University in 1996, and master degree from environmental Sciences, Indonesia University in 2000.

Trainees (continued)

Malaysia

Mrs. Asminah Rajuli

Senior Geologist
Mineral and Geoscience Department

Mrs. Asminah Rajuli is 48 years old and mother of 3 children. She has been working as a geologist for 20 years attach with Mineral and Geoscience Department of Malaysia. She is involving groundwater development project for clean water supply in Malaysia. She also participated in water forum and meeting at national and South East Asia level. She also has opportunity to attend the groundwater training KIGAM, Korea, in 2012.
Starting this year, she will lead a basin study project in Malaysia. Focus of the project is to obtain groundwater reserve of the area and risk of groundwater contamination. She hopes by attending this workshop at Taiwan, she will gain knowledge that can be applied to her project.

New Zealand

Mr. David Jackson

Analyst, Waste & Resources
Ministry for the Environment.

Mr. David Jackson's current role with the Ministry for the Environment involves providing the Ministry with technical advice on contaminated land and administering the Contaminated Sites Remediation Fund, which provides regional councils with funding to remediate contaminated sites that pose a risk to human health and the environment.
He has been in his current role since 2015. Before then he worked for Fonterra Dairy cooperative testing product samples and environmental monitoring. He received his degrees in chemistry and biochemistry from the University of Canterbury, where he did postgraduate work in organic synthesis (carbohydrate chemistry).

Trainees (continued)

Philippines

Ms. Marife L. Castillo

Officer
Community Environment and Natural Resources Office (CENRO)
Olongapo City
Department Of Environment and Natural Resources

Being the CENR Officer, Ms. Marife L. Castillo is a member of the Executive Committee of several Multi-Partite Monitoring Teams which oversees the performance and activities of industries within her area of jurisdiction. The one-week training course will provide her additional knowledge on the prevention and proper management of soil and groundwater pollution.

Philippines (Malaysian, Registered by the Philippine government)

Mr. Stephen Teong

Consultant
Shell Global Solutions (Malaysia) Sdn. Bhd.
Menara Shell, No. 211, Jalan Tun Sambanthan.

Mr. Stephen Teong has more than 8 years of professional experience in environmental consultancy services specialising in contaminated land management / soil and groundater assessment which entails environmental site assessment, emergency spill response, trend analysis, human health risk assessment, LNAPL assessment, groundwater hydraulic conductivity analysis, groundwater monitoring, DNAPL assessment and validation soil sampling. He has a bachelor's degree in Environmental Science from University Malaysia Sabah. He joined Shell in 2014, currently holding the role as a scientist in the soil and groundwater technical team.

Trainees (continued)

Sri Lanka

Dr. Mohamed Ismail Mohammed Mowjood

Professor of Biosystems Engineering
Head, Department of Agricultural Engineering
Faculty of Agriculture
University of Peradeniya

Dr. Mohamed Ismail Mohammed Mowjood graduated from the University of Peradeniya, Sri Lanka. He has jointed the Department of Agricultural Engineering, Faculty of Agriculture, University of Peradeniya, Sri Lanka, as an Assistant Lecturer in 1992. He completed his MSc and PhD in the Faculty of Agriculture, Yamagata University, Japan, in 1997 and 2000, respectively.
At present, he serves as the Head of the Department of Agricultural Engineering. He teaches subjects related to soil and water engineering. He does research on water pollution, monitoring and control through phytoremediation. He has 3 children (2 boys and girl). He enjoys reading and site seeing.

Taiwan

Ms. Jessie Chen

Project Engineer
Pro. Vision Environmental Engineering Corporation

Ms. Jessie Chen comes from Taichung. Her completed her master's degree in Environmental Engineering at Polytechnic Institute of New York University, Brooklyn, New York, USA.
She has over six years' experience in the environmental engineering consulting including Soil and Groundwater Pollution investigation, evaluation, and remediation and Phase I/II environmental site assessment and environmental due diligence.
During her career, she has been involved in more than the projects including contamination investigating for chemical manufacturing site, Kuo-Ching Chemical Co. Ltd., sediment investigation for China Petrochemical Development Corporation, and carried out several projects of Phase I/II Environmental Site Assessment for global companies, and other key projects related to groundwater investigation and remediation including former RCA Plant Site groundwater remediation for TCE Television Taiwan td. (TCE TVT).

Trainees (continued)

Taiwan

Mr. Leo Li

Project Engineer

Pro. Vision Environmental Engineering Corporation

Mr. Leo Li comes from Taipei. He completed his master degree in Civil Engineering, National Taiwan University, in 2012. His research topic is the entry mode strategies for subsidiaries of international engineering firms in China: Institutional theory perspective. By this strategy management issue, it form the concept of strategies analysis in him.

He has two year experience in the environmental engineering consulting and the project he has been involved including audit and evaluation of control and management of soil and groundwater pollution remediation fund associated with nation-wide project 2014 and 2015 which focus on the government's events planning, preparing and carrying out and other projects like the pollution improvement supervising and verification task in the "pollution improvement project for soil pollution control sites at Taoyuan County" and the air pollution control project of construction engineering in Kao-sheng city also expand his scope of work in soil and groundwater pollution remediation.

Taiwan

Ms. Eva Liu

Project Engineer

Pro. Vision Environmental Engineering Corporation

Ms. Eva Liu graduated from TamKang University and majored in Water Resource and Environmental Engineering for both Bachelor and Master degrees.

She has two years' experience in the environmental consulting including Soil and Groundwater Pollution investigation, evaluation and remediation.

During her career, she has been involved in the projects including pollution improvement project for Chlorine soil pollution control sites at Taoyuan, farmland soil pollution control sites at Taoyuan, Taiwan.

Trainees (continued)

Taiwan

Ms. Ci-Jie Ruan

Engineer
Apollo Technology Co., Ltd.

【Education】

- Master of Science: Environmental Engineering, National Taiwan University, Taiwan, July 2013.
- Bachelor of Science: Chemical Engineering, National Tsing Hua University, Taiwan, June 2011.

【Experience】

- **2013-Present Engineer, Apollo Technology Co., Ltd.**
  - Conducted the soil remediation of heavy metal pollution in farmlands of Taoyuan City.

Taiwan

Ms. Ke-Hsin Yu

Engineer
Taiwan Environment Scientific Co., LTD

Education

M.Sc. (2013) Environmental Engineering, University of New Haven, U.S.A.
B.Sc. (2008) Environmental Engineering, National ILan University, Taiwan.

Professional Experience

2013 to present Taiwan Environment Science Co., Ltd. (TESC) (Taiwan)
Position: Senior Engineer
Activities: Projects execution of Taiwan EPA, Soil and Groundwater Pollution Remediation Fund Management Board

- Soil and groundwater industry market information collection and analysis.
- International exchange project execution.
- Soil and groundwater pollution investigation.

Professional Accreditation

2009 Qualified certificate for exclusive personnel of waste water treatment (Class A) (Taiwan)

Trainees (continued)

Thailand

Mr. Kulaputt Srisukh

Environmentalist (Practitioner Level)
Water Quality Management Bureau
Pollution Control Department

Mr. Kulaputt Srisukh has been working as an environmentalist (Practitioner Level) at Industrial Wastewater Division, Water Quality Management Bureau, Pollution Control Department, Thailand, for 6 years. His responsibilities are survey and monitoring of groundwater contamination sites in Rayong Pollution Control Area, Maptaput Industrial Estate. Survey techniques of soil and groundwater contamination sites are significantly important. He expects that the training course on "Survey and Remediation of Soil and Groundwater Contaminated Sites" will be very useful for his work.

Vietnam

Mr. Pham Hong Tinh

Project Manager
Land Resources Inventory and Assessment Center
General Department of Land Administration, MONRE.

Mr. Pham Hong Tinh graduated from Hanoi National University of Education (HNUE) in Hanoi with a Bachelor's degree in 2004 and received his Master's degree from Ehime University in Matsuyama (Japan) in 2008. He is being a PhD candidate in mangrove ecology at HNUE.

He started working for Land Resources Inventory and Assessment Center, General Department of Land Administration, MONRE, in 2013 as a project manager and is particularly interested in exploring issues related to land resources.

Training Course

Time: 2016 Mar 21, 08:30-10:30

Topic: Survey of soil pollution

【Sampling, Analyses, and Mapping of Soil Pollutants】

Distinguished Professor Dr. Dar-Yuan Lee

Distinguished Professor & Associate Dean
Dept. of Agricultural Chemistry,
College of Bioresources and Agriculture,
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 and Associate Dean of Department of Agricultural Chemistry, College of Bioresources and Agriculture, National Taiwan University (NTU), President of Chinese Society of Environmental Analysis, 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 American Society of Agronomy Fellow, 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/equipment
   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

Training Course (continued)

Time: 2016 Mar 21, 10:50-12:20

Topic: Survey of soil pollution

【The Case Studies of Investigations at Soil Contamination Sites】

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. Dr. Che earned his PhD in Environmental Science from Ohio State University in 1991. He has over 25 years of expertise in soil and groundwater investigation and remediation at hundreds of sites in Taiwan.

Course outline:

1. Introduction
2. Investigation Methods and Technologies
3. Case I: Agricultural Land
4. Case II: Industrial Plant
5. Case III: Gas Station
6. Case IV: Waste Dumping Site
7. Case V: Other Sites
8. Conclusions
9. Discussions

Training Course (continued)

Time: 2016 Mar 21, 13:30-14:40

Topic: Survey of soil pollution

【Sampling Design for Contaminated Sites-A case study of Guandu Arsenic -tainted site】

Professor 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 goals faster and at less cost.
- Overview:
  1: Introduction,
  2: Developing Sampling Strategy,
  3: Sampling Plans for Site Characterization
  4: Sampling Plan for Site Validation
  5: Interpreting Sampling Results

Training Course (continued)

Time: 2016 Mar 21, 15:00-16:30

Topic: Survey of soil pollution

【Geographic Information System & Handheld Devices Application in Soil Contamination Investigation】

Ms. Ying-Chieh Feng

Project Manager

Geographic Information Technology Co., Ltd.

Ms. Feng is working for GI-Tech as a project manager in charge of curating exhibition and project management in the field of soil and ground water remediation. Ms. Feng received a Master's degree from the department of bioenvironmental system engineering in National Taiwan University, where she worked for ecology & conservation laboratory and research using filter-feeding bivalve *Corbicula fluminea* bioaccumulation to assess the metallic pollution in urban rivers. By using GPS and GIS, Ms. Feng had assisted in field work on project of control and investigation project for national agricultural land with high potential of heavy metal pollution (III). She has participated in interdisciplinary projects comprising areas of contamination survey, heavy metal contaminated remediation and establishment of agricultural production cloud and development countermeasure.

Course outline:

I. General 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 *Farmland Soil Contamination Management System in Taiwan*
VI. Conclusion

Training Course (continued)

Time: 2016 Mar 22, 08:10-10:10

Topic: Remediation of soil pollution

【Remediation of Soil Sites Contaminated by Heavy Metals and Organic Pollutants】

Distinguished Professor Dr. Zueng-Sang Chen

Distinguished Professor

Pedology and soil environmental quality
Soil Survey and Remediation Laboratory
Department of Agricultural Chemistry
National Taiwan University

Dr. 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.

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, electro-kinetics, vitrification, thermal desorption, pyrolysis, Phytoremediation, phytostablization, 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, Phytoremediation, phytostablization, 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.

Training Course (continued)

Time: 2016 Mar 22, 10:30-12:10
Topic: Remediation of soil pollution

【Case Studies of Remediation of Mercury Contaminated Soil】

Dr. Yu-Ting (Phil) Wei

Manager
Apollo 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.

Training Course (continued)

Time: 2016 Mar 22, 13:30-14:40

Topic: Remediation of groundwater pollution

【Contaminant Fate and Transport in Groundwater】

Distinguished Professor Dr. Jimmy Kao

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

- Ph.D., Department of Civil Engineering, North Carolina State University (1993)
- Coordinator, Environmental Engineering Program, Ministry of Science and Technology, Taiwan (2013-2016)
- President, Chinese Institute of Environmental Engineering (2015-2016)
- President, Taiwan Association of Soil and Groundwater Environmental Protection (2013/2-2015/2)
- Director, Institute of Environmental Engineering, National Sun Yat-Sen University, Taiwan (2006 - 2009)
- Project Manager, Environmental Science and Engineering Division, Geophex, Ltd., NC, USA (1993 - 1997)

Course outline:

1. Mechanisms and theories of contaminant fate and transport in groundwater
2. Modeling of contaminant fate and transport in groundwater

Training Course (continued)

Time: 2016 Mar 22, 15:00-16:30
Topic: Remediation of soil pollution

【Case Studies on Remediation for Soil Contamination Sites】

Mr. Joseph Fan

General Manager
Pro. Vision Environmental Engineering Corporation

Mr. Joseph Fan received his master degree from Colorado State University in Fort Collins. He is a senior soil and groundwater professional with over 22 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:

Through case histories introduce basic design concept for soil remediation work. The design concept will consider with different contaminants, such as heavy metals and volatile compounds, also considerate with different soil formation, such as clayey or sandy soil, to evaluate the remediation design. For soil remediation process will not apply only one technic but combined several and with right sequence. In this course will not only introduce conventional remediation technics, such as SVE and Bioremediation, but also advanced electro-kinetic technic for clayey soil.

During remediation operation, what are the key parameters we should measure in the field to evaluate the effective of the work, and what are the important events we should aware for O&M of the equipment. This is not a theory course but a very practical field remediation experience sharing. The case histories will include the following topics,

1. A Case History of Electro-kinetic Enhanced Bioventing of Gasoline in Clayey Soil,
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.

Training Course (continued)

Time: 2016 Mar 23, 08:10-10:10

Topic: Survey of groundwater pollution

【Integrated Thinking and Technical Tools on Groundwater Investigation】

Dr. Chih Huang

General Manager

InnFusion Environmental Management Co. Ltd.

Dr. Huang serves as the general manager in InnoFusion Environmental Management Co., Ltd. (iFEM). He has previously served as a Technical Director in the Contaminated Site Management practice for Environmental Resources Management (ERM) and as Deputy Manager for Sinotech Engineering Consultants, Inc. He has over 20 years of experience in soil and groundwater and contaminated site management. He is specialized in high resolution site characterization (HRSC), integrated remediation solutions, 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. In the technical side, he is specialized in surfactant flushing, ISCO and enhanced bioremediation for NAPL contamination. He has developed onsite TPH screening kit and surfactant formulation for soil washing and flushing applied in the field. Dr. Huang has also actively engaged in governmental environmental policy and program, including brownfield and risk-based contaminated site management regulatory design for Taiwan Environmental Protection Administrative.

Course outline:

Site investigation is one of the critical factors to warrant the success of remediation. The resolution of the investigation and the interpretation of the results can be influential to the remediation design that follows. In this course, the recent development of high resolution site investigation (HRSC) will be discussed and the tools to assist the realization of HRSC will be introduced. Also, the differences between the traditional site investigation and HRSC will be compared. So that, the application of HRSC can be better understood and the environmental professions can more integrated thinking in investigation planning and handle more diverse investigation tools.

Training Course (continued)

Time: 2016 Mar 23, 10:30-12:10

Topic: Topic: Survey of groundwater pollution

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

Dr. Hsin-Chang Liu

Assistant Researcher

Disaster Prevention and Water Environment Research Center, National Chiao Tung Univ.

- Ph.D., 2009, Graduate Institute of Geophysics, National Central University, Taiwan
- More than ten years of Near-Surface Geophysics survey and Environment Geophysics survey experiences.
- Major research interests are geotechnical process monitoring and subsurface imaging. He 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 the geophysical technologies including geophysical well logging are introduced to snapshot the complex profile of DNAPL distribution for improving future application.

Training Course (continued)

Time: 2016 Mar 23, 13:30-14:40

Topic: Remediation of groundwater pollution

【Investigation and Remediation of a Chlorinated Solvent Contaminated Site: A Case Study】

Dr. Yao-Tsung Chen

Project Manager

Apollo Technology Co., Ltd.

Mr. Chen is a project manager in Apollo Tech., a well-known company in subsurface contamination investigation and remediation. He earned his Ph. D. from National Chung Hsing University and had done deep research on site investigation contaminated with chlorinated solvents during his study in university.

Mr. Chen also has been in the soil and groundwater remediation committee of Changhua County since 2010 and mainly takes part in cases of chlorinated solvents contaminated site. Now he is in charge of an EPA project applying a surgical remediation approach on a complex chlorinated contaminated site at Yong Kang of Tainan, Taiwan.

Course outline:

The course will be based on a case study. The history of investigation and remediation of a complex site with contaminants of chlorinated solvents, including PCE, TCE, DCE, VC, TCA, and DCA, and with multiple layers of low permeability strata will be introduced. The case study will include four parts, those are brief history of the site, evaluation of the investigation tools applied, performance of remediation measures, and performance of an innovative injection method to overcome the difficulty for traditional injection resulted from the multiple layers of low permeability strata.

Training Course (continued)

Time: 2016 Mar 23, 15:00-16:30

Topic: Remediation of groundwater pollution

【Groundwater Remediation using *In-Situ* Chemical Oxidation】

Distinguished Professor Dr. Tsair-Fuh Lin

Distinguished professor
Department of Environmental Engineering
National Cheng Kung University

Dr. Lin joined National Cheng Kung University (NCKU) after receiving his doctoral degree from University of California, Berkeley in 1995. He is the director of Global Water Quality Research Center at NCKU, and the president of Taiwan Association of Soil and Groundwater Environment Protection (2015-2016). Dr. Lin has received many outstanding teaching and research awards from NCKU and several national and international organizations. He is a Fellow in Academy of Educators, NCKU, a Fellow of IWA, and is the recipient of the 2015 International Honorary Member Award of the American Academy of Environmental Engineers and Scientists. He is the editor in chief of *Sustainable Environment Research* (2015-), an associate editor of *Water Science and Technology* (2012-), and an editorial board member of *Chemosphere* (2016-).

Course outline:

1. Fundamentals of *In-Situ* Chemical Oxidation (ISCO)- reaction and kinetics
2. Applications and limitations in groundwater remediation
3. Applications in Taiwan
4. Technology guidelines

Training Course (continued)

Time: 2016 Mar 25, 08:10-10:10

Topic: Remediation of groundwater pollution

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

Dr. Chia-Hsin Li

Project Manager
Environmental Engineering Department II
Sinotech Engineering Consultants, Ltd.

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 km^2 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.

Training Course (continued)

Time: 2016 Mar 25, 10:30-12:10
Topic: Remediation of groundwater pollution
【Remediation of a Chlorinated VOC Contaminated Site- Case Study】

Mr. Dennis Tu

Executive Director, China Environment
AECOM

Mr. Dennis Tu is the Executive Director of Environment for AECOM in China with more than 24 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. Dennis Tu is intimately familiar with environmental laws and regulations in Taiwan and mainland China. He has participated in planning and development of the regulations on site investigation methods, and soil and groundwater standards for Taiwan EPA. Dennis Tu has completed more than 300 sites for environmental compliance audit and soil & groundwater investigations. Some of the contaminated sites managed by Dennis Tu in mainland China and Taiwan are being remedied or completed remediation.

Course outline:

This course provides a discussion on how to manage a contaminated site, and what data gaps need to be filled 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 chlorinated VOC 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 AECOM in APAC Region

Training Course (continued)

Time: 2016 Mar 25, 13:30-14:40

Topic: Remediation of soil pollution

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

Dr. Frank Shan-Lin Hou

Deputy Director / Assistant Professor
CPC Corporation / 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 fifteen years（2001-2016）, 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 lectures 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 lecture 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 lecture 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

Training Course (continued)

Time: 2016 Mar 25, 15:00-16:30

Topic: Remediation of groundwater pollution

【Bioremediation of Chlorinated Solvent Contaminated Groundwater】

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 10 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.

Training Course (continued)

Time: 2016 Mar 26, 08:10-10:10

Topic: Health risk assessment of pollution sites

【Health Risk Assessment and Sustainable Remediation】

Professor 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 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

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.

Training Course (continued)

Time: 2016 Mar 26, 10:30-12:10

Topic: Health risk assessment of pollution sites

【Exposure Assessment Involving the Fates of Pollutants and their Transferring through Food Webs in Soil and Sediment】

Professor Dr. Shian-chee Wu

Professor

Graduate Institute of Environmental Engineering, National Taiwan University

Dr. Wu graduated from the Department of Agricultural Chemistry, National Taiwan University (NTU). Dr. Wu joined in a fine chemical manufacturing company in 1976 and transferred to the Sanitary Engineering Department, Taipei City Government as an engineer in 1979. Dr. Wu received his master degree from the Graduate Institute of Environmental Engineering, NTU in 1981. He got his PhD degree in Civil Engineering from Massachusetts Institute of Technology (MIT) in 1986 and has been teaching in the Graduate Institute of Environmental Engineering, NTU since then. He had also been serving in EIA Committee of EPA (Taiwan), being as a member of Soil and Groundwater Clean-up Fund Committee, and in Ministry of Education as the Secretary of Environmental Protection Division. Dr. Wu's research interests are focused on modeling the fates of organic pollutants in the environment and the dynamic change of the algal speciation in subtropical reservoirs.

Course outline:

1. Transport and transfer of pollutants in soil and groundwater aquifers
2. The transformation of pollutants in soils
3. The problems due to heterogeneity of the subsurface matrixes
4. Transfer of pollutants from soils to biota
5. Estimation the intake rates of products grown on site`
6. The exposure through food web

Training Course (continued)

Time: 2016 Mar 26, 13:30-14:40

Topic: Health risk assessment of pollution sites

【Sustainable Contaminated Site Remediation: Theories and Approaches】

Professor 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, Kaohsiung, Taiwan. 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. in 1997 to 1998.

He oversaw projects in ecological risk assessment and fate and transport of organic contaminants. He is currently the convener of SuRF Taiwan to promote green and sustainable remediation and collaborates with international community. His research interests is in the area of developing soil, groundwater and sediment remediation techniques, fate and transport of organic pollutants in the subsurface environment, ecological and health risk assessment in contaminated sites, and environmental forensics.

Course outline:

1. Green and Sustainable Remediation (GSR)
2. GSR development road map
3. GSR framework
4. GSR tools
5. Case studies
6. Challenges for promoting GSR

Training Course (continued)

Time: 2016 Mar 26, 15:00-16:30
Topic: Health risk assessment of pollution sites
【Ecological Risk Assessment of Contaminated Sites】

Professor 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, Kaohsiung, Taiwan. 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. in 1997 to 1998.
He oversaw projects in ecological risk assessment and fate and transport of organic contaminants. He is currently the convener of **SuRF Taiwan** to promote green and sustainable remediation and collaborates with international community. His research interests is in the area of developing soil, groundwater and sediment remediation techniques, fate and transport of organic pollutants in the subsurface environment, ecological and health risk assessment in contaminated sites, and environmental forensics.

Course outline:

This lecture is designed to provide an overview of assessing risks posing threats to the natural environment. Framework of ecological risk assessment 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 also 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. A case study recently conducted will be addressed.

Training Course (continued)

Time: 2016 Mar 28, 08:10-10:10

Topic: Health risk assessment of pollution sites

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

Mr. Bo-Wei Power Liang

Project Manager
Sinotech Engineering Consultants, Ltd.

Mr. Bo-Wei Power Liang is currently a project manager of Sinotech Engineering Consultants, Ltd. He received his Master's degree in environmental engineering from New Jersey Institute of Technology. Over his 11-year career in the environmental engineering field in U.S. and Taiwan, 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:

The concept of human health risk assessment (HHRA) was incorporated into the Soil and Groundwater Pollution Remediation Act (SGPRA) when it first promulgated in 2000. Even though numerous contaminated sites had been discovered over the years, but the knowledge and the application of HHRA involved in contaminated sites were still lacking. This course provides an overview of HHRA concept and how it applies to site remediation and management. Additionally, some major accomplishments Taiwan EPA had achieved, such as establishing HHRA executing framework, protocol and tools, will also be addressed.

Training Course (continued)

Time: 2016 Mar 28, 10:30-12:10

Topic: Health risk assessment of pollution sites

【Case Studies in Application of HHRA to Contaminated Site Management】

Dr. Chih Huang

General Manager

InnFusion Environmental Management Co. Ltd.

Dr. Huang serves as the general manager in InnoFusion Environmental Management Co., Ltd. (iFEM). He has previously served as a Technical Director in the Contaminated Site Management practice for Environmental Resources Management (ERM) and as Deputy Manager for Sinotech Engineering Consultants, Inc. He has over 20 years of experience in soil and groundwater and contaminated site management. He is specialized in high resolution site characterization (HRSC), integrated remediation solutions, 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. In the technical side, he is specialized in surfactant flushing, ISCO and enhanced bioremediation for NAPL contamination. He has developed onsite TPH screening kit and surfactant formulation for soil washing and flushing applied in the field. Dr. Huang has also actively engaged in governmental environmental policy and program, including brownfield and risk-based contaminated site management regulatory design for Taiwan Environmental Protection Administrative.

Course outline:

Human Health Risk Assessment (HHRA) is one of the critical tools for risk-based management including contaminated site, regulation and policy research, and food safety. While professions are familiar with the basis of HHRA, this course is intended to demonstrate the application of HHRA in the real world through several case studies related to the contaminated site management. The purposes and processes of the cases will be introduced and the discussions on the challenges will be facilitated during the course.

Training Course (continued)

Time: 2016 Mar 28, 14:00-15:10
Topic: Act and management strategies of pollution sites
【Introduction to Soil and Groundwater Pollution Remediation Act in Taiwan】

Mr. Bo-Wei Power Liang

Project Manager
Sinotech Engineering Consultants, Ltd.

Mr. Bo-Wei Power Liang is currently a project manager of Sinotech Engineering Consultants, Ltd. He received his Master's degree in environmental engineering from New Jersey Institute of Technology. Over his 11-year career in the environmental engineering field in U.S. and Taiwan, 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:

Soil and Groundwater Pollution Remediation Act (SGPRA) was enacted in 2000 to address the concerns of subsurface contamination. SGPRA was created for the purpose of preventing and remediating soil and groundwater contamination. An effective contaminated land management framework, which includes sites identification, inventory, classification and remediation management, is established. SGPRA also provides a well-defined funding mechanism to support remediation of sites with no responsible parties identified.

Training Course (continued)

Time: 2016 Mar 28, 15:30-16:30

Topic: Remediation foundation and it's management

【Collection Policy of Soil and Groundwater Pollution Remediation Fund in Taiwan】

Mr. Yu-Ting Chen

Officer
Taiwan EPA

Mr. Yu Ting Chen received his B.S. degree of Department of Financial and Economic Law from the Chung Yuan Christian University of Taiwan. He has experience on collecting and managing soil and groundwater remediation fund, and establishing policies for more than 5 years.

Course outline:

- Where does the money come from ?
- How do we collect it ?
- How do we use it ?

Study Tour - Program

March 24, 2016 Thursday

08:20-08:30	Get on the bus at Howard Civil Service International House
08:30-09:30	Travelling time by bus
09:30-11:00	Visit the RCA Site, Taoyuan, Taiwan
11:00-11:30	Travelling time by bus
11:30-13:00	Lunch
13:00-13:30	Travelling time by bus
13:30-15:00	Visit Tea Research and Extension Station
15:00-15:30	Travelling time by bus
15:30-17:00	Visit Yingge Ceramics Museum
17:00-18:00	Back to Taipei
18:00-20:00	Dinner

Study Tour – Interesting Sidelights

Date: March 24, 2016

Visit Location: RCA Site, Taoyuan, Taiwan

Departure to the RCA Site

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

Introduction of RCA site

Question & Discussion

Question & Discussion

Question & Discussion

Study Tour – Interesting Sidelights (continued)

Date: March 24, 2016

Visit Location: RCA Site, Taoyuan, Taiwan

Introduction of monitoring instrument

Introduction of monitoring instrument

Introduction of monitoring instrument

Introduction of monitoring instrument

Group Photo

Study Tour – Interesting Sidelights (continued)

Date: March 24, 2016

Visit Location: Tea Research and Extension Station (TRES), Taoyuan, Taiwan.

TRES introduction

Taste tea

Introduction of different kinds of tea

Taste tea

Group Photo

Study Tour – Interesting Sidelights (continued)

Date: March 24, 2016

Visit Location: Yingge Ceramics Museum (YCM), New Taipei, Taiwan

Visit YCM

Visit YCM

Photo at the YCM

Group Photo

Study Tour – Interesting Sidelights (continued)

Date: March 24, 2016

Lunch at BEST01 TEA GARDEN (壹等賞茶園餐廳), Taoyuan, Taiwan

Dinner at Daw Shiang Tsuen (北平稻香村), Taipei, Taiwan

Interesting Sidelights – Opening Ceremony

Date: March 21, 2016

Venue: Meeting Room 205, Howard Civil Service International House, Taipei, Taiwan

Interesting Sidelights – Closing Ceremony

Date: March 28, 2016

Venue: Meeting Room 204, Howard Civil Service International House, Taipei, Taiwan

Interesting Sidelights – Welcome dinner party

Date: March 21, 2016
Location: Ji Pin Shiuan Restaurant 極品軒餐廳
(No.18, Hengyang Rd., Zhongzheng Dist., Taipei 100, Taiwan)

Interesting Sidelights – Farewell dinner party

Date: March 28, 2016
Location: Howard Civil Service International House
(No. 30, Sec. 3, Shin-Sheng South Road. Taipei, 106, Taiwan)