Princeton Groundwater, Inc.
P.O. Box 273776
Tampa, Florida 33688

ADDRESS CHANGE/REMOVAL: Please e-mail us at: address@princeton-groundwater.com or fax us at (813) 925-4353 or phone us at (813) 964-0800

PRINCETON GROUNDWATER PRESENTS...

The Groundwater Pollution and Hydrology Course

East Coast
February 27 - March 2, 2012
Tampa, FL
West Coast
March 12-16, 2012
San Francisco, CA

The Remediation Course

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Next Courses

The Groundwater Pollution and Hydrology Course

- March 12-16, 2012 San Francisco,CA
- July 23-27, 2012 San Francisco, CA

The Remediation Course

- October 22-26, 2012 Miami, FL

For more information or brochures, visit our website: http://www.princeton-groundwater.com or e-mail: Info@princeton-groundwater.com

Are you a member of the National Ground Water Association? If not, contact NGWA at (800) 551-7379 or ngwa@ngwa.org or visit their website at http://www.ngwa.org for information about this organization.

PRINCETON GROUNDWATER PRESENTS TWO COURSES...

The Groundwater Pollution and Hydrology Course

Robert W. Cleary
Princeton Groundwater, Inc.

John A. Cherry
University of Guelph

Michael C. Kavanaugh
Geosyntec Consultants

Richard P. Brownell
ARCADIS

Bernard H. Kueper
Queen's University

David Kaminski
QED Environmental Systems

East Coast
February 27 - March 2, 2012
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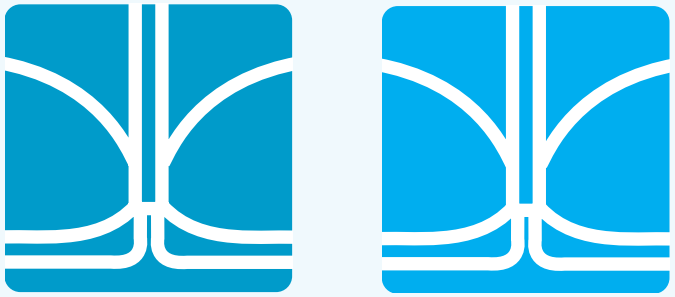
The Remediation Course



Robert W. Cleary
Princeton Groundwater, Inc.

Bernard H. Kueper
Department of Civil Engineering
Queen's University

Gregory J. Rorech
Progressive Engineering & Construction, Inc.

Michael C. Kavanaugh
Geosyntec Consultants

Richard P. Brownell
ARCADIS

Murray D. Einarson
AMEC Geomatrix

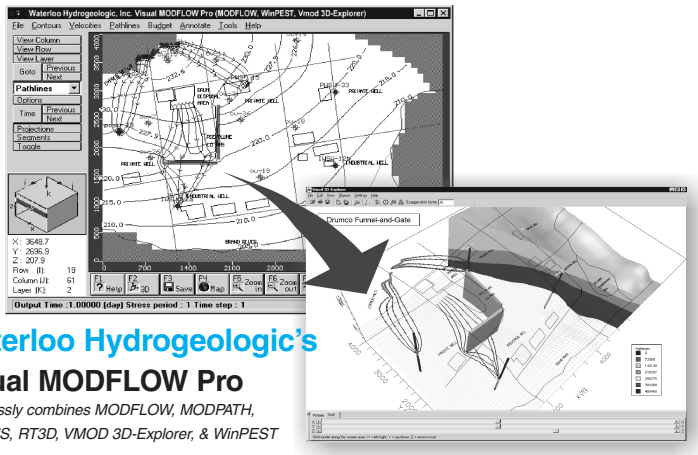
West Coast
J ^v 4*. ., 201 /
I ^p Sbd^p) KS

Coordinated by; Princeton Groundwater, Inc.
P.O. Box 273776
Tampa, Florida 33688-3776
(813) 925-4353
www.princeton-groundwater.com

Course Topics:

The Groundwater Pollution and Hydrology Course

- **Overview and Introduction to Groundwater Pollution and Hydrology**
- **Fundamental Concepts of Groundwater Flow and Contamination**
- **Advanced Concepts and Principles of Groundwater Flow, Fate and Transport and Natural Attenuation (Anisotropy, Refraction, Lenses, Non-Horizontal Flow, Hydrodynamic Conditions, Multi-Phase Partitioning, Dispersion, Retardation, Biodegradation, etc.)**
- **Cleanup Goals, Guidelines and Standards in the Current Regulatory Context (RCRA, CERCLA, SARA, and others)**
- **Groundwater Monitoring: Fundamental Principles, Data Quality Objectives, Field/Laboratory Quality Assurance and Quality Control Procedures, Drilling Methods, Monitoring Well Designs, Sampling Devices and Techniques, Preservation and Decontamination Procedures, Data Validation and Interpretation**
- **Remediation Strategies for RCRA, Superfund and Brownfield Sites; Risk Based Decision Making; Use of Models in Technology Selection; Fluid Flushing Technologies; Application of Advanced Treatment Technologies to Aquifers and Unsaturated Zones**
- **Illustrative Case Histories of Groundwater Contamination, Cleanup and Management Costs and Aquifer Restoration Alternatives, including Monitored Natural Attenuation, Bioremediation and Permeable Reactive Barriers**
- **DNAPL's (Dense Non-Aqueous Phase Liquids): Occurrence, Movement and Implications with Respect to Site Monitoring and Remediation in Sedimentary Deposits, Clay Aquitards and Fractured Rock; Concepts Illustrated by Laboratory and Field Experiments with Emphasis on Chlorinated Solvents and Creosote**
- **Ground-Water Monitoring and Sampling Technology: Optimizing Monitoring Well and Screen Placement Through 3-D Site Characterization and Conceptual Site Models; Drilling and Direct-Push Technology for Monitoring Well Installation; Monitoring Well Design, Construction and Development - Chemical Interference Sources; Casing and Screen Materials; Well Screen and Filter Pack Design and Installation; Annular Seals; Surface Protection; Well Development Methods; Ground-Water Purging and Sampling Methods and Equipment - Well-Volume Purging; Low-Flow Purging and Sampling; Sampling Low-Yield Wells; Purging and Sampling Equipment Biases and Limitations**
- **Wellhead Protection under the Safe Drinking Water Act Amendments: Theory and Practice**
- **Theory and Practice of Mathematical Modeling in Groundwater Pollution and Hydrology: Emphasis on Practical Applications**
- **Pumping Tests in Confined, Leaky-Confined and Water Table Aquifers to Determine Aquifer Parameters; Slug Test Methods and Practices; Laboratory and Field Permeameters; Borehole Dilution and Flowmeters to Determine Vertical Velocity Stratification**
- **Fundamental Concepts and Theory of Water and Chemical Movement in the Unsaturated Zone; Laboratory Methods and Field Equipment to Characterize Soils and Sample Water/Gases in the Vadose Zone**
- **Introduction to Popular Software Programs and their Applications in Groundwater Pollution and Hydrology**
- **Field Techniques: Geophysical Methods, Soil Gas Sampling, Soil and Hard Rock Sampling/Coring Techniques, Multi-Level Samplers, Portable Gas Chromatographs, Mini-Piezometers, Seepage Pans to Measure River/Lake Fluxes and Hydraulic Conductivities, Dispersion Coefficient Measurements in the Field, Gasoline Evaluation Equipment, Expedited Site Characterization Techniques, etc.**



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Phone: (519) 746-1798

This May Be The Only Groundwater Course You Will Ever Need!

Instructors

Robert W. Cleary was a Professor of Civil Engineering at Princeton University and a Professor of Geosciences at the University of Sao Paulo, Brazil. He received his Ph.D. degree in Chemical Engineering and is currently a groundwater consultant and an adjunct professor in the groundwater program of the University of Waterloo. His research interests and practical experience include all aspects of groundwater contamination, remediation hydrology, modeling, site characterization, litigation support and remediation strategies. In addition to numerous technical articles and reports, he has authored several book chapters dealing with groundwater hydrology and modeling. Considered one of the outstanding teachers in the field, he is the principal lecturer in the National Ground Water Association's *MODFLOW* course and Princeton Groundwater's *Groundwater Pollution and Hydrology* and *Remediation* courses.

Bernard H. Kueper has a Ph.D.from the University of Waterloo and is a full professor in the Department of Civil Engineering at Queen's University. His research focuses on the subsurface behavior and clean-up of dense, non-aqueous phase liquids (DNAPLs) such as chlorinated solvents, PCB oils, and creosote. This work is focused on both unconsolidated geologic deposits, such as sands and gravels, as well as fractured clay and rock. Dr. Kueper has carried out laboratory experimentation, field work, and numerical modeling to study the specific processes which govern the subsurface fate of these liquids, as well as methods of site remediation. Dr. Kueper has published extensively in these areas and has lectured on the topics of DNAPL behavior and remediation in professional short-courses in Canada, the U.S.A., Switzerland, Denmark, and Great Britain. Current work includes the evaluation of waterflooding, surfactant flooding and alcohol flooding as methods of in-situ DNAPL removal, as well the measurement of capillary pressure and relative permeability curves in fractured rock. Dr. Kueper is a licensed professional engineer who also serves as a technical consultant to private industry. This work has included providing technical expert testimony in court and at public hearings, meetings with U.S.E.P.A. and state regulatory agencies, oversight of site investigation activities, and the preparation of a variety of technical documents.

Gregory J. Rorech P.E. specializes in the evaluation, development, design and implementation of both conventional and innovative remediation technologies. Mr. Rorech has been utilizing his chemical engineering expertise to assist industrial and municipal clients with environmental and process concerns for more than 25 years. In 1999, he founded Progressive Engineering and Construction, Inc. located in Tampa, Florida. As an owner of Progressive Engineering and Construction, Inc., Mr. Rorech is responsible for directing the firm's current work at CERCLA, RCRA, hydrocarbon and consent order sites throughout the United States and South America. Mr. Rorech's expertise with site assessments, remedial strategy development, regulatory negotiation, economic analysis, innovative design, implementation and operation enables him to develop cost effective closure strategies for his clients. Remedial technologies recently implemented include in-situ biological remediation, phytoremediation, air sparging, permeable treatment barriers, enhanced vacuum extraction, chemical oxidation, ion exchange, reverse osmosis, electrochemical precipitation, monitored natural attenuation, enhanced reductive dechlorination, vacuum extraction, land farming, and biological and physical treatment units for liquids and vapor. Mr. Rorech is a contributing author on five books and has written extensively on groundwater and soil remediation technologies.

Michael C. Kavanaugh is Principal at Geosyntec Consultants. located in the Oakland, CA office. He is a chemical and environmental engineer with over 35 years of consulting experience. Dr. Kavanaugh has been project engineer, project manager, principal-in-charge, technical director or technical reviewer on over 200 projects covering a broad range of environmental issues. He has co-authored over 35 peer reviewed technical publications, edited two books, and has made over 100 presentations to technical audiences, legislative bodies, and public advocacy groups. He has chaired two boards under the National Research ouncil, the Water Science and Technology Board from 1989 to 1991 and the Board on Radioactive Waste Management from 1998 to 2000. Dr. Kavanaugh has a B.S. and a M.S. in Chemical Engineering from Stanford and UC Berkeley, respectively and a PhD in Civil/Environmental Engineering from UC Berkeley. He was a Peace Corps volunteer in Guatemala from 1964 to 1966. He is a registered professional engineer in California and Michigan and a Board Certified Environmental Engineer by the American Academy of Environmental Engineers. Dr. Kavanaugh is also a Consulting Professor in the Civil and Environmental Engineering Department of Stanford University. He was elected to the National Academy of Engineering in 1998.

Richard P. Brownell is Vice President and Technical Director of Hazardous Wastes Program for ARCADIS. He is a civil and environmental engineer and has provided a broad range of services to private and public sector clients for over 30 years. He has authored and coauthored over 60 technical papers on a wide range of environmental topics and presented training on hazardous waste regulations and other topics. Mr. Brownell is a registered professional engineer in New York,New Jersey, Connecticut and several other states, and a Diplomat (DEE) of the American Academy of Environmental Engineers. As a Technical Director for ARCADIS he reviews all major site investigation, remediation and brownfields activities for the firms nationwide practice. He has a Bachelor of Civil Engineering Civil Engineering from Rensselaer Polytechnic Institute, an MS of Civil Engineering/Sanitary from Stanford University, and an MBA in Management from New York University. Dr. Kavanaugh and Mr. Brownell have jointly prepared material for these courses. Dr. Kavanaugh will teach west coast courses. Mr. Brownell will teach the same material in east coast courses.

Murray D. Einarson is a senior consultant with AMEC Geomatrix Consultants in Oakland, California, and an Assistant Consulting Professor in the Department of Civil and Environmental Engineering at Stanford University. He has a B.A. in geology from the University of California, Santa Barbara, and an M.Sc. in hydrogeology from the University of Waterloo. Mr. Einarson has over 20 years of experience as an environmental consultant, and is a registered geologist in California. Mr. Einarson's professional interests focus on developing and promoting superior methods and technologies for environmental site characterization and in situ remediation, including developing better ways to characterize and remediate sites with dissolved plumes. His professional interests focus on developing and promoting superior methods and technologies for environmental site characterization and in situ remediation. He is currently the project manager for UC Davis's ethanol controlled release experiment at Vandenberg Air Force Base, California. He has published over a dozen technical papers, and is a co-author of US EPA's 1997 guidance document "Expedited Site Assessment Tools for Underground Storage Tank Sites — A Guide for Regulators," and an ASTM Standard on Accelerated Site Characterization. He is a frequent lecturer for US EPA, California State regulatory agencies, and industry groups.

John A. Cherry holds geological engineering degrees from the University of Saskatchewan and the University of California, Berkley and a Ph.D. in hydrogeology from the University of Illinois. He was a faculty member at the University of Manitoba for four years before joining the faculty at the University of Waterloo in 1971 where his research focused on field studies of the migration and fate of contaminants in groundwater and groundwater remediation. He retired from the University of Waterloo in 2006 and was granted the title Distinguished Professor Emeritus in 2007. He co-authored the textbook "Ground Water" with R.A. Freeze (1979) and co-edited and co-authored several chapters in the book "Dense Chlorinated Solvents and Other DNAPLs in Groundwater" (1996). In addition to research concerning subsurface contaminant behaviour, he has participated in development of several technologies for groundwater monitoring and remediation and co-holds several patents. He is a Fellow of the Royal Society of Canada and has received awards for groundwater contamination research from scientific and engineering societies in Canada, the United States and the U.K. He held the Research Chair in Contaminant Hydrogeology at the University of Waterloo (1996-2006) and is currently the Director of the University Consortium for Field-Focused Groundwater Contamination Research, established in 1988, and is an adjunct professor in the School of Engineering at the University of Guelph.

David Kaminski is Senior Vice President at QED Environmental Systems. Over the past 25 years, he has designed and installed groundwater water pumping and sampling systems for sites throughout the United States, Canada, Europe, Australia and South America. Mr. Kaminski has developed new devices and methods for groundwater sampling and groundwater remediation applications and has been awarded four US patents. He has also published several journal and conference papers on groundwater sampling practices and pumping system design. Mr. Kaminski has presented hundreds of seminars, short courses on groundwater sampling for leading industry professional organizations, universities and regulatory agencies worldwide. He is a member of the standards organization ASTM International and was Chairman of ASTM's Ground Water Sample Collection committee 1990 - 2008, during which time he co-authored several standards on monitoring well purging methods and sampling device selection. Mr. Kaminski is also a member of the National Ground Water Association, the Solid Waste Association of North America, and the California Groundwater Resource association.

The Groundwater Pollution and Hydrology Course

Introduction

Groundwater quality is a national priority issue of immense and ever-growing proportions. The Federal government has passed strict, comprehensive and long-term legislation such as the Resource Conservation and Recovery Act (RCRA), the Superfund Amendments and Reauthorization Act (SARA), the Safe Drinking Water Act and the Pollution Prevention Act. Many state governments have passed even stricter regulations to protect groundwater quality and to clean up currently polluted aquifers.

These laws and regulations affect all sources of groundwater contamination, including chemical industries, gasoline stations, industrial landfills and lagoons, refineries, hazardous solid waste management units, municipal and private solid waste activities, nuclear waste disposal practices, mining practices and pesticide/fertilizer agricultural practices. In addition, many state laws, banks and insurance companies require groundwater quality site assessments before commercial property can be financed or sold. The magnitude and extent of the problem is reflected in EPA's National Priorities List, which now numbers over 1200 sites, with an average cleanup cost of over $20 million per location. This list grows each year as new sites are added through state and federal groundwater programs.

Hundreds of lawsuits against private industries, such as the Woburn, Massachusetts case involving the leukemia deaths of several children (documented in the book and film, *A Civil Action*), have brought a public awareness and determination which has rarely been seen in past environmental issues involving water and air pollution. A measure of this concern is the vigorously enforced state and federal regulations which cover all aspects of the problem from prevention to cleanup.

The tens of billions of dollars being spent on groundwater pollution problems in the U.S. has made it the number one priority among environmental issues. In Europe, over $5 billion per year is being spent to reverse the current damage done by groundwater pollution and to prevent groundwater contamination.

Groundwater Short Courses

The widespread interest in groundwater has seen the offering of many two- and three-day training courses dealing with various aspects of the problem. There are very few one-week courses. The advantages of a longer course include time to cover and absorb more aspects of this expanding field and the opportunity for in-depth technical learning. Groundwater legislation, natural attenuation, risk assessment, wellhead protection techniques, monitoring equipment, DNAPL research, remediation alternatives and applications of computers have grown to such an extent in the last several years that intensive one-week courses, with a few early evening sessions, are needed to adequately cover all of these new developments. Most groundwater professionals prefer in-depth knowledge that they can apply as soon as they return to work. They also prefer a course notebook which is written and carefully covered in a textbook fashion and which will serve as a familiar guide or resource manual after the course. For those who are willing to take a week out of their busy schedules, the course meets these preferences with unparalleled technical information and applied knowledge.

Course Description

The course is the only one-week course being offered in the U.S. or Europe which comprehensively covers all aspects of groundwater pollution and hydrology from theory to practice. The instructors are recognized as the top six leading experts and teachers in the field and collectively have over 100 years of practical experience. The course is the established standard among groundwater training courses and for this reason has consistently had the largest attendance of all courses offered anywhere in groundwater.

Over 1,000 pages of lecture notes have been written specifically for this course. Practical aspects are particularly emphasized through the study of illustrative case histories of groundwater contamination and remediation developed by Geosyntec, ARCADIS and others. Based on the results of several hundred projects, these lectures stress a practical approach to cleanup which is acclaimed by industry and regulators alike.

One of the most widespread and difficult problems in groundwater contamination and remediation today is dense non-aqueous phase liquids (DNAPLs). Dr. John Cherry is recognized as one of top researchers in the world dealing with applied research assessment and remediation of DNAPLs. Dr. Cherry will present the basic concepts underlying the occurrence, behavior and movement of DNAPLs in sedimentary deposits and fractured rocks as well as the very latest field and laboratory results dealing with the difficult problem of DNAPL remediation.

The course will also cover the latest theory and applications of ASTM's RBCA (Risk Based Corrective Action), including Monitored Natural Attenuation and Tiers 1, 2 and 3 in assessing groundwater contamination and establishing cleanup criteria.

Over 1000 slides are shown throughout the entire course. Among groundwater professionals, the Princeton Course is considered a ***must course*** of outstanding educational value.

The Remediation Course

Course Objective

The objective of this course is to teach remediation from the key methodologies to collect hydrogeochemical data, through selecting and designing remediation systems based on geological and biological effects and air/water carriers. In addition, participants will use computers to simulate remediation hydrology, groundwater pathways, capture zones, mass transport, natural attenuation, and alternative remediation designs.

Course Description

Princeton Groundwater's Remediation Course is the most comprehensive course on remediation available. Every aspect of this important subject is covered from three-dimensional hydrogeochemical characterization, through practical details of all remediation technologies to computer-simulated remedial alternatives such as Natural Attenuation, Pump & Treat, Funnel & Gate, Interceptor Trenches and complete Hydraulic Containment using barriers and capping. The course also covers many essential topics which are not found in any other courses or books.

For example, most professional hydrogeologists consider heterogeneity to be the single most important factor that influences remedial performance. Many remedial systems have failed because the spatial variability of the site's hydrogeology was not accounted for in the site hydrogeological conceptual model, yet this topic is not covered in other courses.

Throughout the U.S. there are tens of hundreds of examples where poor hydraulic and chemical characterization of an aquifer, source, and plume have resulted in unacceptable remedial performance, yet it is uncommon for these topics to be covered in depth in available remediation courses and books.

Finally, cost effective designs depend on the capability to evaluate the feasibility of many alternatives in a short time. Models are an important tool in this analysis, yet the software packages to do this are not taught concurrently in other current remediation courses.

The Remediation Course uniquely integrates the topics of heterogeneous geohydrology, aquifer / source / plume characterization, remediation technologies / strategies / designs, and computer simulation software. The result is the premier course on remediation.

PRINCETON GROUNDWATER PRESENTS ...

The Groundwater Pollution and Hydrology Course

Application

3.7 CEUs

Check Location Desired:

☐ East Coast: Tampa, FL
February 27 - March 2, 2012
☐ West Coast: San Francisco, CA
March 12-16, 2012

Princeton Groundwater, Inc.
P.O. Box 273776
Tampa, Florida 33688
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Cardholder Name_____

Cardholder Billing Address _____

City _____State_____Zip_____

Full payment due no later than 2 weeks prior to course.

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Princeton Groundwater, Inc. is not affiliated with Princeton University

Who Should Attend

The course is designed for groundwater hydrologists, geologists, engineers, chemists, environmental scientists, state/federal regulators, project managers, compliance/regulatory program managers for industry and technical experts.

The emphasis is on acquiring an extensive working knowledge of the concepts, principles and professional practices underlying groundwater pollution, hydrology and remediation. Although some areas are necessarily surveyed in the interest of time, technical depth is the norm in the majority of sessions. Like any short course, some experience is helpful but not necessary as the course teaches basic principles before dealing with more advanced topics. The course succeeds in significantly enhancing the technical skills of all the participants without losing the neophytes and without boring those with 15 years of practical experience. This is the highest rated course in the industry - no course teaches so much!

Registration and Course Fee

Early registration is strongly advised for this popular course. Enrollment is limited and applications will be accepted in the order they are received. Please mail the attached application form with check or credit card information, purchase order or training authorization. For those requiring time to obtain authorization, we suggest faxing the same application form with payment to follow. Confirmed participants will receive an acknowledgement letter. The registration fee is $1,595 and is payable in advance. It covers all course materials and coffee breaks. It does not include meals and hotel room expenses. Please make checks payable to *Princeton Groundwater, Inc.* The full fee is due two weeks before the first day of class unless prior arrangements for invoicing have been made. **This fee will be fully refunded if cancellation is received 2 weeks before the course, thereafter 50% of the fee will be refunded.** Substitutions may always be made.

Hotel Accommodations

A block of rooms has been reserved at a substantially reduced rate in both locations. You must, however, make your reservation at least **1 month** before the course, preferably sooner - **the block sells out fast.** Identify yourself as being with the **Princeton Groundwater course.** On the East coast,the course will be held in Tampa, FL at the Embassy Suites Tampa\USF; call them at (813) 977-7933. On the West coast, the course will be held at the Hotel Kabuki in San Francisco; call them at (415) 922-3200 or (800) 533-4567.

Course Schedule

With some exceptions, the class generally meets daily from 8:00 A.M. to 11:30 A.M. and from 1:00 P.M. to 4:30 P.M. Monday through Thursday with half-hour coffee breaks at 9:30 A.M. and 2:30 P.M. and lunch from 11:30 A.M. to 1:00 P.M. Friday begins at 8:00 A.M. and the course ends at 1:00 P.M. with a break at 10:00 A.M. After a short break, Monday extends until 6:00 P.M Due to the exceptional amount of material, two early evening sessions will be held on Tuesday (4:45 P.M. to 7:30 P.M.) and Thursday (4:45 P.M. to 6:30 P.M.). The early Thursday evening session is a lecture on DNAPLs in fractured rocks and also an open session with Professor Cherry where participants may discuss particular DNAPL problems and/or the course material.

Course Materials and Continuing Education Units

Students will receive over 1.000 pages of lecture notes in an attractive binder. In addition, they will be given a certificate of satisfactory completion and qualify to receive 3.7 Continuing Education Units (CEUs). A record is kept of these units and transcripts may be requested at a later date.

Course Topics:

The Remediation Course

- **Fundamental and Advanced Concepts of Remediation Hydrogeology [Microgeology Effects, Lenses, Non-Horizontal Flow, Anisotropy, Refraction....]**
- **Fundamental and Advanced Concepts of Fate and Transport (Natural Attenuation) of Dissolved Contaminants: Advection, Dispersion, Decay, Sorption, Retardation, Multi-Phase Partitioning...**
- **Field Methods to Determine Remediation Design Hydraulic Parameters: Kh, Kv, Kx, Ky, Kz, Sy, Ss and vadose zone air permeabilities**
- **DNAPL and LNAPL Source Zones and Dissolved Plumes**
- **Limitations and Biases of Traditional Characterization and Monitoring of Dissolved Contaminant Plumes**
- **Flux-Based (Mass Discharge rates) Corrective Action and Remediation Vs. Risk-Based Correction Action (RBCA) Based on Monitoring Well Concentrations**
- **The Remedial Investigation (RI)/Feasibility Study (FS) Process. A Case History Illustrating All Steps**
- **Expedited, High-Resolution Plume Characterization Field Equipment and Multilevel Monitoring to Collect 3D Data to Support Mathematic Models and Remediation Designs**
- **Two-Dimensional vs. Three-Dimensional Capture Zones of Contaminant Plumes, Including Tidal Influences**
- **Strategic Approach to Cost Effective Remedial Design: Life Cycle Cost Assessments, Operational Constraints, Risk Based Remedial Decisions, Brownfields Application**
- **Bioremediation: Pathways, Stoichiometry, Kinetics, Engineering Design for In Situ Applications, Limitations and Natural Attenuation**
- **Remediation and Control Using "Water As A Carrier": The Proper Use of Pump and Treat Systems**
- **Factors Controlling the Performance of Pump and Treat**
- **Monitored Natural Attenuation: Limitations And Applications In Remediation**
- **Remediation Using "Air As A Carrier": Vapor Extraction Systems, Vacuum Enhanced Systems, Air Sparging Remediation Designs**
- **Ex Situ Treatment Technologies**
- **Principles of Advanced Remediation Systems: Fracturing, Reactive Walls, Waterloo's Funnel and Gate, Reactive Zones, Phytoremediation and Enhancements To The Basic Carrier Remediation Designs**
- **DNAPL Migration in Heterogeneous Porous Media**
- **DNAPL Movement and Characterization in Fractured Hard Rock**
- **Practical Design and Operation of Soil Vapor Extraction and Air Sparging Pilot Studies Through Detailed Case Histories**
- **Practical Calculations Involving Remediation Designs of Vapor Extraction, Air Sparging Systems and Enhanced Vapor Recovery (High Vacuum)**
- **Permeable Treatment Walls and In Situ Chemical Oxidation**
- **Use of Water Flooding and Thermal Technologies for NAPL Removal**
- **Remediation Applications of the U.S.G.S.'s MODFLOW using Waterloo Hydrogeologic Inc.'s Visual MODFLOW**
- **Computer Simulation of Exposure Pathways: for Initial Risk Assessment**
- **Computer Simulation of Capture Zones in Homogeneous and Heterogeneous Aquifers subject to Sources, Sinks and Boundary Conditions**
- **Computer Simulation of Natural Attenuation Accounting for Advection, Dispersion, Sorption and Decay Effects with an Application in Risk-Based Corrective Action (RBCA)**
- **Bioscreen AT. Using the EPA's and Air Force's corrected Bioscreen and Natural Attenuation to Establish Remediation Cleanup Goals**

What You Will Learn

- Practical remediation strategies and options drawn from hundreds of case histories.
- The geological and hydrochemical factors applicable to remedial designs for cleaning up soil and groundwater.
- Field methods to fully characterize aquifers, source zones and plumes to allow selection and design of effective remedial measures and set achievable cleanup levels.
- Ability to select remediation systems based on variable hydrogeology, life cycle design, air/water carriers, biodegradation, and monitored natural attenuation for dissolved phase, light and dense non-aqueous phase liquids (NAPLs).
- Strategic approach to cost effective remedial design.
- Hands-on experience with 2D and 3D computer simulations of flow and mass transport for applications in remediation strategies, design and field investigations. Natural attenuation simulations for use in Risk-Based Corrective Action (RBCA) studies.

This May Be The Only Remediation Course You Will Ever Need!

PRINCETON GROUNDWATER PRESENTS...

The Remediation Course

Application

3.8 CEUs

Location:

Las Vegas, NV
May 7 - 11, 2012

Princeton Groundwater, Inc.
P.O. Box 273776
Tampa, Florida 33688
Phone: (813) 964-0800
Fax: (813) 925-4353
E-mail:Info@princeton-groundwater.com
Website: http://www.princeton-groundwater.com

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☐ **Fax Reservation**

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(Check for $1,595 and this original application form to follow)

☐ Check enclosed for $1,595, payable to **Princeton Groundwater, Inc.**

☐ VISA ☐ MasterCard Card #_____Exp. Date_____Code____

Cardholder Name_____

Cardholder Billing Address _____

City _____State_____Zip_____

Full payment due no later than 2 weeks prior to course.

Princeton Groundwater, Inc. is not affiliated with Princeton University

Please Cut Along Dotted Line.

Who Should Attend

The course is designed for groundwater geologists, engineers, hydrologists, and microbiologists working as project managers, regulators or consultants to industry or government. Some technical background and experience in groundwater contamination problems is presumed. Those who have taken Princeton Groundwater's *The Groundwater Pollution and Hydrology Course* should be well prepared as ***this course is the next step.*** The emphasis is on acquiring a comprehensive working knowledge of the concepts, principles and professional practices underlying groundwater remediation.

Registration and Course Fee

Please mail the attached application form with check, purchase order or training authorization. For those requiring time to obtain authorization, we suggest faxing the form to reserve your spot early. Confirmed participants will receive an acknowledgement letter. The registration fee is $1,595 and is payable in advance unless prior arrangements for invoicing or payment have been made. **This fee will be fully refunded if cancellation is received 2 weeks before the course, thereafter 50% of the fee will be refunded.** Substitutions may always be made. The fee covers all course materials, use of computers/software and coffee breaks. The software packages may be purchased separately at a discount for course participants.

Hotel Accommodations

A block of rooms has been reserved at a substantially reduced rate. You must, however, make your reservation at least 1 month before the course, referably sooner - **the block sells out fast.** Identify yourself as being with **Princeton Groundwater's Remediation Course.** The course on the East coast will be held at the DoubleTree by Hilton Hotel Miami Airport, for reservations call them at (305)261-3800. The course on the West coast will be held at the Tropricana Hotel in Las Vegas, NV, call them at (702)739-2222.

Course Schedule

With some exceptions, the class generally meets daily from 8:00 P.M. to 11:30 A.M. and from 1:00 P.M. to 4:30 P.M. Monday through Thursday with half-hour coffee breaks at 9:30 A.M. and 2:30 P.M. and lunch from 11:30 A.M. to 1:00 P.M. After short breaks at 4:30 P.M., Monday extends to 6:00 P.M. and Tuesday extends to 7:00 P.M. Due to the exceptional amount of material, after a short break, the class on Wednesday goes to 6:00 P.M., followed by a one hour dinner break and additonal lectures from 7:00 P.M. to 8:50 P.M. The formal part of the course ends on Thursday at 5:15 P.M. Friday is an optional hands-on computer laboratory session from 8:00 A.M. to 4:30 P.M. Students will be introduced to the practical remediation applications of Visual Modflow, MT3D and the EPA/Air Force's Bioscreen software packages.

Course Materials and Continuing Education Units

Students will receive a specially written course notebook with all the lecture material. They will also receive a separate computer laboratory manual [step by step format]. They will be given a certificate of satisfactory completion and qualify to receive 3.8 Continuing Education Units (CEUs).