Monitored Natural Attenuation: A Short Course In Technology Application For The Restoration Of Contaminated Land And Groundwater.

Tuesday 31 May – Thursday 2 June 2011
At the University of Sheffield
The restoration of contaminated land and groundwater is an economic liability for many organisations. Engineered restorations are expensive and often technically difficult to complete in an acceptable time. The new risk-based approaches to evaluating management options for contaminated land encourage site owners to take into account the self-cleaning ability of many sites, with the prospect of significant reductions in costs by achieving more accurate assessment of risks to health and the environment. The decision on which technology to apply depends on legislation, the nature of the contamination, the environmental receptors under threat, the time scale and other operational constraints, and the understanding of the process affecting pollutant concentrations.

Natural attenuation is the combination of physical, chemical and microbiological processes that reduce the concentration, mass or toxicity of pollutants. Biodegradation is the most important process, but transport and dilution in groundwater, sorption and other chemical reactions can also be significant for different contaminants and circumstances. Predicting and assessing natural attenuation processes becomes a technology for site restoration, known as monitored natural attenuation (MNA). The high costs of installing and operating active restoration are replaced by the much lower costs of good site investigation and monitoring. However, the scientific and technical skills required to use natural attenuation are different from those usually applied to clean up contaminated sites.

Recent changes in environmental legislation mean that natural attenuation will become increasingly important in the management strategy and remediation design for contaminated land and groundwater. In certain cases, it may represent the only practical solution, whereas in others it will contribute to a staged remediation programme with other technologies, as part of a “treatment train” approach for site management. Appropriate training in this field can equip individuals and organisations with the necessary expertise to evaluate the potential benefits, undertake performance assessments and implement remedial design programmes for natural attenuation in a cost-effective and technically sound way.

Why you should do this course!

People attending this short course will gain the following knowledge, experience and skills:

- Understand the fundamental principles and basis for the application of natural attenuation.
- Gain an overview of the use of natural attenuation within the Environment Agency technical guidance for monitored natural attenuation in groundwater.
- Understand and use techniques required to implement the technical guidance and assess the performance of natural attenuation in groundwater, supported by case histories of contaminated sites.
- Put theory into practice for both hydrocarbon and chlorinated solvent pollution problems by undertaking simulation exercises using real data from field sites.
- Understand the behaviour of a range of key pollutants in the subsurface, including petroleum hydrocarbons, aromatic compounds, phenols and chlorinated solvents.
- Understand appropriate monitoring approaches and factors affecting data quality for the assessment of MNA.
- Apply decision-support modelling tools to interpret natural attenuation and predict the performance of MNA in groundwater.
- Candidates will also be provided with a free copy of newly developed decision-support software for MNA assessments in groundwater.
The mix of formal lectures and practical exercises will give you both fundamental knowledge and transferable skills, and you will be ready to apply natural attenuation concepts to contaminated sites.

This short course is endorsed by the Geological Society for training towards Continuing Professional Development. The course is designed, and will be invaluable, for those who would like an introduction to the fundamental ideas and processes involved in the application of natural attenuation to the remediation of contaminated sites. This might include local authority technical officers, regulatory authority officers, site owners or consultants. It will give you a valuable opportunity to meet the course tutors, who are leading academics and practitioners in the field, as well as others working with similar problems to yourselves, and we hope to see you in Sheffield.

MSc Training in Contaminant Hydrogeology and the Environmental Management of Urban Land and Water

This short course is also part of our MSc programmes, which include Contaminant Hydrogeology and Environmental Management of Urban Land and Water. Each module is taught in a three-week block, making intermittent study easy if you wish to take a degree part-time while working. If you are thinking of attending more than one short course as Continuing Professional Development, consider signing up for an MSc (12 modules plus dissertation), Diploma (12 modules) or Certificate (6 modules)! These courses have been approved by the Institution of Civil Engineers for accreditation leading to chartered engineer status. More information is available at http://www.shef.ac.uk/civil/pg/water.html or we can send you further information if you tick the box on the booking form.

Course Outline

Tuesday 31 May
- Evaluating MNA in groundwater using technical protocols and Environment Agency guidance
- Data quality issues and monitoring strategies for assessing MNA of plumes
- Group-based case study exercise applying technical protocols and guidance for MNA

Wednesday 1 June
- An industry view of the application of MNA for groundwater remediation, and some key lessons
- Decision-support modelling tools for MNA assessments in groundwater
- Exercises in applying decision-support modelling tools for MNA assessments in groundwater

Thursday 2 June
- Natural attenuation of chlorinated solvents
- Group-based exercises in MNA assessment for chlorinated solvent-contaminated sites
**About the lecturers**

**Steve Thornton** is a Reader in Environmental Engineering Science within the GPRG at Sheffield. He was formerly the Environment Agency Research Fellow in Natural Attenuation and is an internationally recognised expert in this subject area. He has over 20 years experience in contaminant hydrogeology, with particular interest in the application of natural attenuation for pollution management and field, laboratory and modelling research on the natural attenuation of landfill leachates and phenolic contaminants in the Sherwood Sandstone aquifer and other geological strata. His current research interests include the biodegradation of organic compounds in complex mixtures, monitoring and performance assessment of natural attenuation at fieldscale, attenuation of ammonium in landfill leachate and the natural attenuation of petroleum hydrocarbons and MTBE in the Chalk aquifer. He is a Visiting Professor at the College of Water Sciences in Beijing Normal University.

**Philip Morgan** is an Associate with The Sirius Group UK, a leading UK site investigation and land remediation company. He has over 18 years experience in contaminated soil and groundwater assessment, remediation, and environmental biotechnology gained in consultancy and in the oil and chemical industries. He has been actively involved in a wide range of projects on the impact, fate and remediation of contaminants in soil and groundwater and the design and operational improvement of industrial solid waste and wastewater treatment processes. An environmental biotechnologist by training, he maintains his leading-edge expertise in MNA and enhanced bioremediation technologies by active involvement in research projects and consortia in Europe and North America. Phil is Visiting Professor of Environmental Biotechnology in the GPRG at Sheffield, and chairman of the UK Bioremediation LINK Programme Management Committee.

**Jonathan Smith** is a hydrogeologist at Shell Global Solutions and Visiting Professor of Contaminant Hydrogeology in the GPRG at Sheffield. At Shell Jonathan is involved with a wide variety of soil and groundwater research, portfolio and site-specific risk assessment and management, and in Shell’s global advocacy programme. Prior to joining Shell, Jonathan spent 15 years at the

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**Booking form**

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I would like a place on this course  
Fee £750

*Continued overleaf.......*
I would like a list of accommodation

I would like further information on the MSc training programme

I enclose a cheque made payable to the University of Sheffield (* preferred option)

I would like to be invoiced at the above address

I would like to pay by credit card: Number on card

Date of expiry

Security no

Name on card

Signature on card

I am a Fellow of the Geological Society (* valid Fellowship number is required to qualify for course discount)

Fellowship number

I have the following special requirements (eg vegetarian, mobility problems)

Signed

Date

Environment Agency developing regulatory policy and guidance, including the Remedial Targets methodology and guidance on monitored natural attenuation (MNA). He chairs the CONCAWE soil and groundwater task force, and sits on numerous groups including the European Commission’s Working Group C on Groundwater Directive implementation, CLAIRE’s Technical & Research Group (TRG) and the Sustainable Remediation Forum-UK (SuRF-UK).

### Fees and booking

The course fee is £750 for the three days, inclusive of course notes, lunches, and refreshments. A list of bed and breakfast accommodation in hotels or guesthouses can be provided - tick the box on the booking form. Further details on this short course can be found at [http://www.shef.ac.uk/civil/shortcourses/emulw.html](http://www.shef.ac.uk/civil/shortcourses/emulw.html). Fellows of the Geological Society will receive a 10% discount on the course registration fee (fellowship number is required on the booking form).

Please complete the booking form overleaf and send it to:

**Pat Rayner**  
The University of Sheffield  
Department of Civil and Structural Engineering  
University of Sheffield  
Mappin Street  
Sheffield S1 3JD  
Tel: 0114 222 5758  
Fax: 0114 222 5793  
E-mail: p.rayner@sheffield.ac.uk

Cancellation of places should be made in writing to Pat Rayner before 6 May 2011. No refunds will be made for cancellations after this date but substitutes will be accepted. Please do not book non-refundable travel tickets until your course place has been confirmed.