

## BOOKING FORM

Natural Attenuation: a short course in technology application for the restoration of contaminated land and groundwater

**3-5 June 2008**

Return to Pat Rayner at the address overleaf

Name
Job title
Organisation
Address
Telephone
Fax
Email

I would like a place on this course  **Full Price £695**

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
Expiry date on card
3 digit security code on card
Name on card
Signature on card
I have the following special requirements (eg vegetarian, mobility assistance)
Signed
Date

## 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.

## FEEES AND BOOKING

The course fee is £695 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, but we can't take responsibility for your choice.

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](mailto:p.rayner@sheffield.ac.uk)

Cancellation of places should be made in writing to Pat Rayner before 6 May 2008. 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.

## YOU MAY BE INTERESTED IN OUR OTHER COURSES

Risk Assessment	12-14 February 2008
NAPLs	11-13 March 2008
In-Situ Groundwater Remediation	6-8 May 2008

Details from Pat Rayner as above



# MONITORED NATURAL ATTENUATION

Presented by the Groundwater Protection and Restoration Group



**3-5 June 2008**  
at the University of Sheffield

## BACKGROUND - THE ISSUES

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 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 a risk assessment context and 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, including petroleum hydrocarbons, aromatic compounds, phenols and chlorinated solvents.
- Understand appropriate monitoring approaches and factors affecting data quality for the assessment of MNA.
- The mix of formal lectures and practical exercises will give you both fundamental knowledge and transferable skills, and you will be ready to go away and apply natural attenuation concepts to contaminated sites.
- Candidates will also be provided with a **free** copy of newly developed decision-support software for MNA assessments in groundwater.

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 technology to the remediation of contaminated sites. This includes 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.

## COURSE OUTLINE

### Tuesday 3 June

- Natural attenuation within a risk framework
- UK Environment Agency technical guidance for implementing MNA
- Evaluating MNA in groundwater using technical protocols and Environment Agency guidance
- Group-based case study exercise applying technical protocols and guidance for MNA

### Wednesday 4 June

- Data quality issues and monitoring strategies for assessing MNA of plumes
- Decision-support tools for MNA assessments in groundwater
- Exercises in applying decision-support modelling tools for MNA assessments in groundwater

### Thursday 5 June

- Natural attenuation of chlorinated solvents
- Group-based exercises in MNA assessment for chlorinated solvent-contaminated sites

## ABOUT THE LECTURERS

**David Lerner** is Professor of Environmental Engineering at the University of Sheffield, leader of the Groundwater Protection and Restoration Group (GPRG), and Director of the Catchment Science Centre. His research concerns the nature and fate of organic contaminants in the subsurface, and includes projects on the risks from chlorinated solvent DNAPLs, risk assessment for urban groundwater, and natural attenuation as a risk reduction mechanism.

**Philip Morgan** is an Associate with The Sirius Group UK, a leading UK site investigation and land remediation company. He has over 16 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.

**Steve Thornton** is Senior Lecturer 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 16 years experience in contaminant hydrogeology, with particular interest in the application of natural attenuation technology 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.

**Alwyn Hart** is a Principal Scientist in the Environment Agency's Science Group. His current work areas include the fate and transport of perfluorinated surfactants in groundwater, virus transport in groundwater and the derivation of groundwater source protection zones around major abstractions. Alwyn has managed several of the Agency research projects on natural attenuation, including input to the SIREN research site.