

## BOOKING FORM

NAPLs: The Migration, Characterisation And Remediation Of Non-Aqueous Phase Liquids In The Subsurface

11-13 March 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 about the Masters 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

This Short Course is a part of our MSc in Contaminant Hydrogeology and MSc in Environmental Management of Urban Land and Water, both technically focused programmes offering full or part time progression to postgraduate qualifications. We co-run a limited number of our modules each year as CPD Short Courses, but if you're interested in any of our other courses for further professional development, we can usually accommodate you. Please see our website at <http://www.shef.ac.uk/civil/pg/water.html> for a list of modules and more information about our MSc options. Alternatively, tick the box on the booking form if you would like more information posted to you.

## FEES 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 if needed.

Please complete the booking form and return it to:

Pat Rayner  
Civil and Structural Engineering  
University of Sheffield  
Mappin Street  
Sheffield S1 3JD  
Tel: 0114 222 5758  
Fax: 0114 222 5793  
email: [p.rayner@shef.ac.uk](mailto:p.rayner@shef.ac.uk)

## FURTHER INFORMATION

The GPRG has developed an educational website on DNAPLs at the web address below. It includes an animated presentation on the issues and conceptual models, together with links to research groups and other sites dealing with regulatory issues and case studies. This website has been financially supported by EPSRC and the Environment Agency.

<http://www.shef.ac.uk/dnapl/>



## YOU MAY BE INTERESTED IN OUR OTHER COURSES

Risk Assessment	12-14 February 2008
In Situ Groundwater Remediation	6-8 May 2008
Natural Attenuation	3-5 June 2008

Details available from Pat Rayner at the above address or at [www.shef.ac.uk/civil/shortcourses](http://www.shef.ac.uk/civil/shortcourses)



## REMEDICATION OF NON-AQUEOUS PHASE LIQUIDS

Presented by the Groundwater Protection and Restoration Group



11-13 March 2008  
at the University of Sheffield

## THE ISSUES

Non-Aqueous Phase Liquids (NAPLs) such as the halogenated hydrocarbons used in drycleaning and industrial degreasing (DNAPLs), hydrocarbon fuels and aromatic solvents (LNAPLs) and neutrally buoyant coal tars and creosotes are widespread in our environment. Because of their low solubility, NAPL sources can emit toxic contaminants to groundwater for many decades if not managed properly. However, because of their physiochemical properties, NAPL migration is complex and pinpointing sources is not straightforward. DNAPL sources are especially problematic because they can penetrate deep below the water table, following paths not always concurrent with groundwater flow. With the recent changes to environmental regulations, managing NAPL sources is a rapidly growing concern. All too often, misguided attempts to remediate such sources have resulted in poor performance or worse: remobilisation of NAPL that may result in becoming inaccessible or impacting sensitive aquifers. Appropriate training can mitigate the financial and environmental consequences of failure, leading to more cost effective, sustainable development.

## WHY YOU SHOULD DO THIS COURSE!

This is the only Professional Development Short Course offered in the UK dedicated solely to NAPL fate, transport and remediation. NAPL behaviour is a complex issue, influenced by the interplay between various factors. On this course, you will gain a conceptual understanding of what controls the migration, distribution, and dissolution of NAPLs in both unconsolidated and fractured rock geology. You will learn how to conduct effective NAPL source zone characterisations and appreciate the advantages and disadvantages of many common remedial approaches. You will use your new understanding of the science governing NAPL behaviour to explore real-world NAPL examples. The knowledge you will gain on this course will provide you with the bedrock you need to make intelligent NAPL management decisions.

We have a strong group of leading authorities that will deliver lectures drawing on their world-class expertise and experience, both academic and practical. We use real physical models to demonstrate some key points, giving

you the chance to actually see NAPL behaviour. Besides gaining cutting-edge knowledge, this course is a chance to network with your colleagues in the consulting and regulatory arenas as well as our internationally recognised experts.

## WHO SHOULD ATTEND?

Technical and managerial staff from consultancies, remediation contractors, site owners, the Environment Agency and local authorities have all found the course extremely useful in the past. New postgraduate students can get an efficient jump-start on the subject from leading researchers in a subject that is rarely taught in the UK.

## COMMENTS FROM PREVIOUS DELEGATES INCLUDE

“Met and exceeded my expectations”  
“**Happily was more practical than expected**” “Very good lecturers and good organisation, fun!” “**Interesting, informative and well presented**” “...the course was very intensive, but really enjoyable and very informative” “**Very well rounded course with very good lecturers**”

## TOPICS COVERED

- Introduction to NAPL chemistry and physics governing subsurface movement, distribution and dissolution
- NAPLs in detail: LNAPLs and DNAPLs, geologic controls on transport, typical occurrence and distribution
- Source zone characterisation: strategies, core analysis, geophysics, partitioning tracer tests
- NAPL fate: dissolution, ageing effects on mobility
- NAPLs in fractured media: UK fractured rock geology, matrix effects
- NAPL source remediation: pure-phase recovery, biological and abiotic in situ remediation, migration control, rationale and cost-benefit analyses
- Case studies illustrating NAPL behaviour and remediation

## ABOUT THE LECTURERS

**Ryan Wilson** is a Lecturer in the Department of Civil and Structural Engineering at the University of Sheffield. His research interests include contaminant plume evolution from NAPLs, treatment of NAPL sources, reactive transport and remediation of groundwater plumes, and NAPL source zone hydraulics. He pioneered the use of partitioning tracers to characterise NAPLs *in situ*.

**Neil Thomson** is a Professor in the Civil Engineering Department at the University of Waterloo, Canada. His research interests include the fate and transport of NAPLs and dissolved contaminants in both porous and fractured media, development and assessment of source zone remediation technologies, and development and application of simulation tools.

**Gary Wealthall** is Senior Scientist at the British Geological Survey. A University of Sheffield PhD graduate, he developed an integrated approach to predicting the depth of penetration of DNAPLs in fractured aquifers through multi-scale discontinuity analysis, stochastic discrete fracture network modelling and the application of a novel fully 3-D two-phase invasion-percolation model. He brings a wealth of experience to bear on the characterisation of fractured aquifers and aquitards, which is developed from a wide range of research projects, in the UK, Europe and North America.