

Monitored Natural Attenuation for Groundwater Remediation and Management

25 - 27 October 2011



The use of monitored natural attenuation (MNA) as a remediation and/or site management approach requires a sound understanding of natural attenuation mechanisms in order to evaluate their potential efficacy in achieving remedial goals. Many regulatory agencies recognize MNA as a viable remediation or management approach, but this alternative must be supported by adequate evidence of its effectiveness. Such evidence requires adequate site characterization to determine solute plume behavior and includes an evaluation of natural attenuation processes, making realistic estimates of attenuation rates and source decay rates, and designing an adequate monitoring program to show that natural attenuation is occurring as expected.

The three (3) day short course will provide the conceptual and technical background necessary to evaluate natural attenuation mechanisms and their interaction with source and transport processes at sites with organic and inorganic chemicals. It will also provide in-depth discussions of the mechanisms of natural attenuation, data collection and analysis, quantification of contaminant transport and fate processes, and regulatory considerations involved in implementing MNA as a remedy or management strategy for groundwater contamination. The course stresses practical information, guidelines, and state-of-the-art tools useful for evaluating natural attenuation and applying MNA as a remediation approach.

The education level for the course is intermediate. Participants should have a basic understanding of hydrogeology, an understanding of contaminant fate and migration, and some experience with remediation. This course is intended for personnel involved with writing and implementing regulations, hydrogeologists, environmental engineers, microbiologists, project managers, graduate students, and others involved with contaminated site restoration.

Presenters

Todd Wiedemeier

President and Technical Director of T.H. Wiedemeier & Associates, Evergreen, CO

Zach Dickson

Senior Consultant of T.H. Wiedemeier & Associates, Evergreen, CO

Course Venue

CQ at Karstens

123 Queen St, Melbourne, Vic

cqfunctions.com.au

Course Fees

ACLCA members \$1,650 pp (incl GST)

\$1,500 for early-birds registering before 9 September 2011

The cost for non-members is \$1,850 pp (incl GST) and \$1,700 for early-birds

The course includes course notebook, certificate of attendance and full catering during the course (morning and afternoon teas and lunch). Register online at www.aclca.org

Contact information

For more information contact Louisa Nicholls of ACLCA Vic on 03 9509 5949 or email: aclcavic@ozemail.com.au

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Course Outline and Schedule

Day 1



7:30 - 8:00 Registration

8:00 - 10:00 Overview of Natural Attenuation as a Remediation Approach (S1-THW)

- » Overview of natural attenuation
- » Geochemistry and microbiology
- » Basic components of natural attenuation as a remediation approach

10:00 - 10:15 Break

10:15 - 11:00 Sources Zones (S2-THW)

- » Sources and nature of releases
- » Relation of solute plumes to hydrogeology
- » Dynamics of solute plumes in groundwater
- » Strength and duration of NAPL sources

11:00 - 12:00 Non-Destructive Natural Attenuation Mechanisms (S3-WZD)

- » Transport processes - advection, diffusion, dispersion
- » Sorption and volatilization

12:00 - 1:00 Lunch

1:00 - 2:30 Introduction to Destructive Natural Attenuation Mechanisms - Degradation and Transformation Processes (S4-THW)

- » Basics of chemical reaction mechanisms and rates
- » Abiotic reactions
- » Microbially mediated reactions - biodegradation

2:30 - 3:00 Break

3:00 - 5:00 Biodegradation of Petroleum Hydrocarbons (S5-WZD)

- » Hydrocarbon oxidation
- » Aerobic and anaerobic biodegradation



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Day 2



8:00 - 10:00 Degradation of Chlorinated Solvents (S6-THW)

- » Biological Degradation
- » Reductive dechlorination
- » Patterns of chlorinated solvent biodegradation
- » Abiotic Degradation

10:00 - 10:30 Break

10:30 - 12:00 Natural Attenuation of Other Contaminants (S7-WZD)

- » Inorganic contaminants
- » Other organic contaminants (chlorobenzenes, chlorophenols, etc.)

12:00 - 1:00 Lunch

1:00 - 2:00 Lines of Evidence for Evaluating Natural Attenuation and MNA (S8-THW)

- » Contaminant data
- » Geochemical indicators
- » Molecular Biological Tools
- » Stable isotopes

2:00 - 3:30 Site Characterization for Evaluating Natural Attenuation (S9-WZD)

- » Approaches to site characterization
- » Field parameters and methods
- » Laboratory parameters and methods
- » Data interpretation
- » Evaluating evidence of natural attenuation

3:30 - 3:45 Break

3:45 - 5:00 Evaluation of Contaminant and Daughter Product Data (S10-WZD)

- » Plots of Concentration versus Time and Distance
- » Isopleth Maps
- » Molar Fraction Plots

5:00 - 5:30 Questions and Answer Session



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Day 3



8:00 – 9:00 Use of Geochemistry to Evaluate Natural Attenuation (S11-WZD)

- » Introduction to Geochemistry
- » Why Geochemistry is Important for Biodegradation
- » Use of Geochemistry to Help Elucidate Biodegradation Pathways

9:00 – 10:15 Use of Isotopes to Evaluate Natural Attenuation (S12-THW)

- » Introduction to Isotope Geochemistry
- » Why Isotopes Provide Unequivocal Evidence of Degradation
- » Using Compound-Specific Isotope Analyses to Evaluate Degradation Pathways

10:15 – 10:30 Break

10:30 – 12:00 Use of Molecular Biological Tools to Evaluate Natural Attenuation (S13-THW)

- » Introduction to Molecular Biological Tools
- » Using Molecular Biological Tools to Elucidate Biodegradation Pathways

12:00 – 1:00 Lunch

1:00 – 2:15 Evaluation of Mass Flux (S14-WZD)

- » Overview of Mass Flux Calculations
- » Types of Mass Flux Calculations
- » Uses of Mass flux Calculations

2:15 - 3:15 Using Models to Evaluate Natural Attenuation (S15-THW)

- » Introduction to Models
- » Types of Models
- » Applicability to the Evaluation of Natural Attenuation

3:15 – 3:45 Break

3:45 – 5:00 Selecting and Implementing an MNA Remedy (S16-THW/WZD)

- » Considerations for selecting a natural attenuation remedy
- » Defining remedial goals and exit strategies
- » Interaction with other remedial options
- » Regulatory perspectives
- » Developing Long-Term Monitoring Plans for Monitored Natural Attenuation (WZD)
- » Components of a natural attenuation monitoring plan
- » Locating long-term monitoring wells
- » Selecting monitoring parameters and frequency