

Monitored Natural Attenuation

of Petroleum and Chlorinated Hydrocarbons in Soil and Groundwater



Monitored Natural Attenuation of Petroleum and Chlorinated Hydrocarbons in Soil and Groundwater

Course ID: GHYD-410 (Course 3 of 3 in a series)
June 19 - 20, 2008, 8:30 A.M. to 5 P.M. (2 Days)
Westbridge One Conference Center
10260 Westheimer Road, 6th Floor
Houston, Texas 77042

Instructor: *Erick McWayne, Northwest Environmental Training Center*

Description: This course provides participants with an overview of the science and best practices for implementing monitored natural attenuation. The course sections focus specifically on monitored natural attenuation of petroleum hydrocarbons, fuel oxygenates, and chlorinated hydrocarbons in soil and groundwater. Software tools for natural attenuation analysis and methods for enhancing natural attenuation will also be discussed.

About the Instructor: *Erick McWayne* has over 12 years of professional experience managing contaminated soil and groundwater and teaching on the subject. As an environmental consultant, Mr. McWayne served as project manager for remedial investigation and feasibility studies at numerous Department of Defense and other client sites. He currently serves as Executive Director of the Northwest Environmental Training Center and teaches workshops in transport and fate, environmental chemistry, and hydrogeology across the country.

Course Topics:

Overview of Monitored Natural Attenuation (MNA)

- Physical, Chemical, and Biological Processes
- Advantages and Disadvantages
- EPA Policy on MNA

Geochemical Context for MNA

- Geochemical Processes
- Redox Zonation and Biodegradation Efficiency

Biodegradation of Petroleum Hydrocarbons and Fuel Oxygenates

- Determining Site Specific Assimilative Capacity (TEA Evaluation)
- Phase Considerations (LNAPL, dissolved, sorbed, and vapor)
- BTEX and Fuel Oxygenate Plume Behavior and Degradation Rates
- Daughter Products (toxicity and mobility)
- Geochemical Indicators

Biotransformation and Degradation of Chlorinated Hydrocarbons

- Determining Site Specific Assimilative Capacity
- Phase considerations (DNAPL, dissolved, sorbed, and vapor)
- Plume Behavior
- Daughter Products (toxicity and mobility)
- Geochemical Indicators

Implementing MNA

- Groundwater Monitoring Plan Requirements
- Well Position and Number: How many wells are enough?
- Determining Trends in Contaminant Mass
- Tracking Geochemical Indicators
- Refining the Conceptual Site Model
- Selecting and Implementing Primary Source Control
- Evaluating Natural Attenuation and Plume Status
- Collecting Lines of Evidence for Natural Attenuation
- Using Institutional Controls
- Risk Management

Addressing Commingled Plumes

- Impact on Plume Geometry
- Geochemical Indicators
- Degradation Rates

Remediation by Enhanced Natural Attenuation

- Air Sparging
- ORC and HRC
- Enzyme Injection
- Fertilizer Application and Cometabolization
- Emerging Technologies

Criteria for Success and Site Closure

- Understanding the Persistence of Contaminant Mass
- Understanding Variations in Groundwater Velocity and

Site Hydrogeology and MNA Efficiency

- Groundwater Velocity Characterization
- Estimating Mechanical and Chemical Dispersion
- Assessing Sorptive Capacity of Aquifer Solids
- Microbiologic Testing - When is it necessary?

Natural Attenuation Feasibility Study

- Establishing Remediation Goals
- Evaluating Plume Characteristics
- Source Decay and Removal
- Predicting Plume Behavior
- Measuring and Estimating Degradation Rates
- Interpreting Geochemical Tracers
- Using Fate and Transport Models
- Developing the Conceptual Site Model

Direction

- Correlating Groundwater Elevation with Contaminant Concentrations
- Cross Contamination Challenges and Forensics
- Rapid Site Assessment Technologies
- Adaptive Management
- Completing MNA and Demonstrating Site Restoration

MNA Case Studies and Interactive Exercises (throughout both days)

Summary of MNA as a Remedial Action

The course will begin each day at 8:30 A.M. and end at 5 P.M. Attendees will be given the opportunity to apply the course material during hands on exercises offered throughout the course.

Intended Audience: This course is intended for environmental professionals seeking an improved understanding of the science and best practices associated with implementing monitored natural attenuation.

Prerequisites: Familiarity with general hydrogeology concepts, and contaminant chemistry and transport is essential.

Course Materials: Attendees will receive a binder containing workshop proceedings and reference material.

Continuing Education Units: 1.3

What to Bring: Pen or pencil, scientific calculator, coffee mug, and a water bottle (to reduce waste). Please wear comfortable clothes appropriate for the prevailing weather. Lunch will be on your own. There are numerous restaurants within walking distance. Drinks and snacks will be provided each day.

Registration: \$495 (*\$395 reduced tuition is available for Native American tribes; government employees; nonprofits; students; and NAEP, NEBC, NWAEP members). A registration form is included with this PDF. You may register online at www.nwetc.org or by calling the Northwest Environmental Training Center at 206-762-1976.

Cancellation Policy: *Registration fees are fully refundable up to 30 days prior to the event and 50 percent refundable (or 100% credit) thereafter up to the day prior to the event. Registration may occur up to the day prior to the event provided that space is available.*

Northwest Environmental Training Center, 501(c)(3)

A nonprofit program of the Northwest Environmental Education Council
650 S. Orcas Street, Suite 220, Seattle, Washington 98108
Phone: (206)762-1976, Fax: (206)762-1979
www.nwetc.org

Directions to:



Westbridge One Conference Center

10260 Westheimer Road, 6th Floor
Houston, TX 77042

From IAH - George Bush Intercontinental Airport / Houston Airport

Slight right at JFK Blvd (signs for US-59/Airport exit/I-45/Hardy Toll Rd/Airport Hotel)
Turn right at Beltway 8 / N Sam Houston Pkwy E (signs for Beltway 8 / W I-45)
Merge onto Beltway 8 W / Sam Houston Pkwy W via the ramp on the left to I-45
Continue on Sam Houston Tollway W (Toll road)
Take the exit toward Westheimer Rd / Richmond Ave
Merge onto Beltway 8 / W Sam Houston Pkwy S
Turn left at Westheimer Rd

From Points East: Via I-10 W (Beaumont)

Take I-10 W toward Houston
Take the exit onto W Park Tollway / Westpark Tollway (Toll road)
Take the exit toward Sam Houston Tollway
Turn right at Beltway 8 / W Sam Houston Pkwy S
Turn right at Westheimer Road

From Points South: Via I-45 N (Galveston)

Take I-45 N toward Houston
Take exit 32 toward Sam Houston Tollway
Keep left at fork, follow signs for Sam Houston Tollway W and merge onto Sam Houston Tollway W (Toll road)
Take the exit toward Westheimer Road (Partial toll road)
Merge onto Beltway 8 / W Sam Houston Pkwy S
Turn right at Westheimer Road

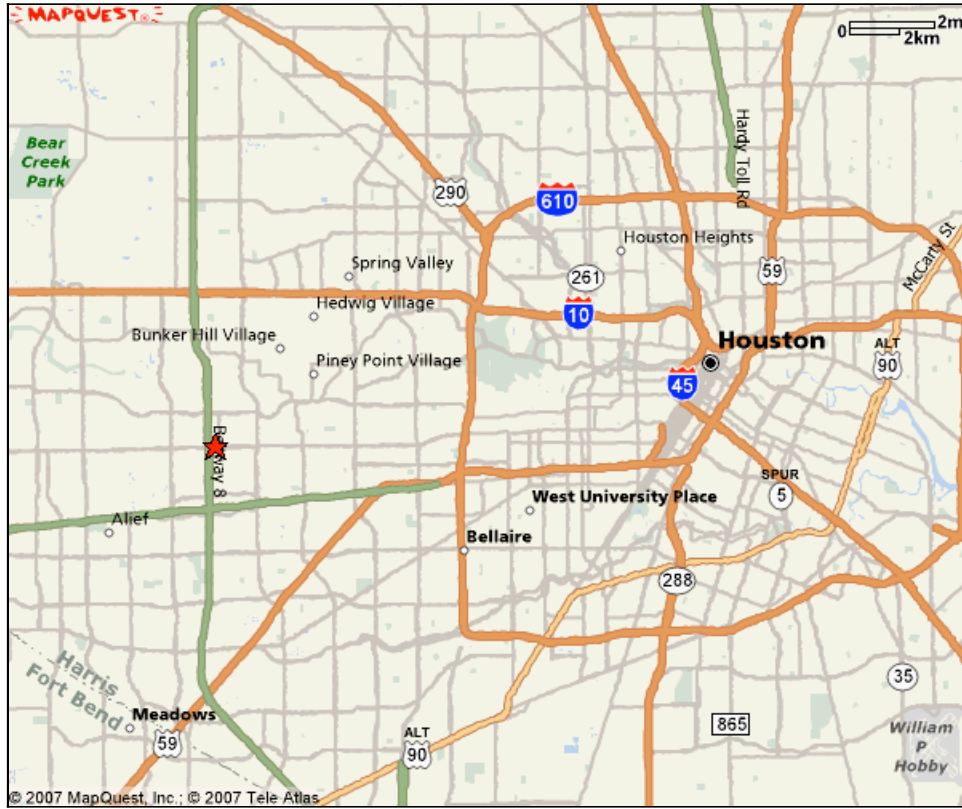
From Points North: Via I-45 S (Dallas)

Take I-45 S toward Houston
Take exit 60B to merge onto Sam Houston Tollway W (Toll road)
Take the exit toward Westheimer Road / Richmond Ave
Merge onto Beltway 8 / W Sam Houston Pkwy S
Turn left at Westheimer Road

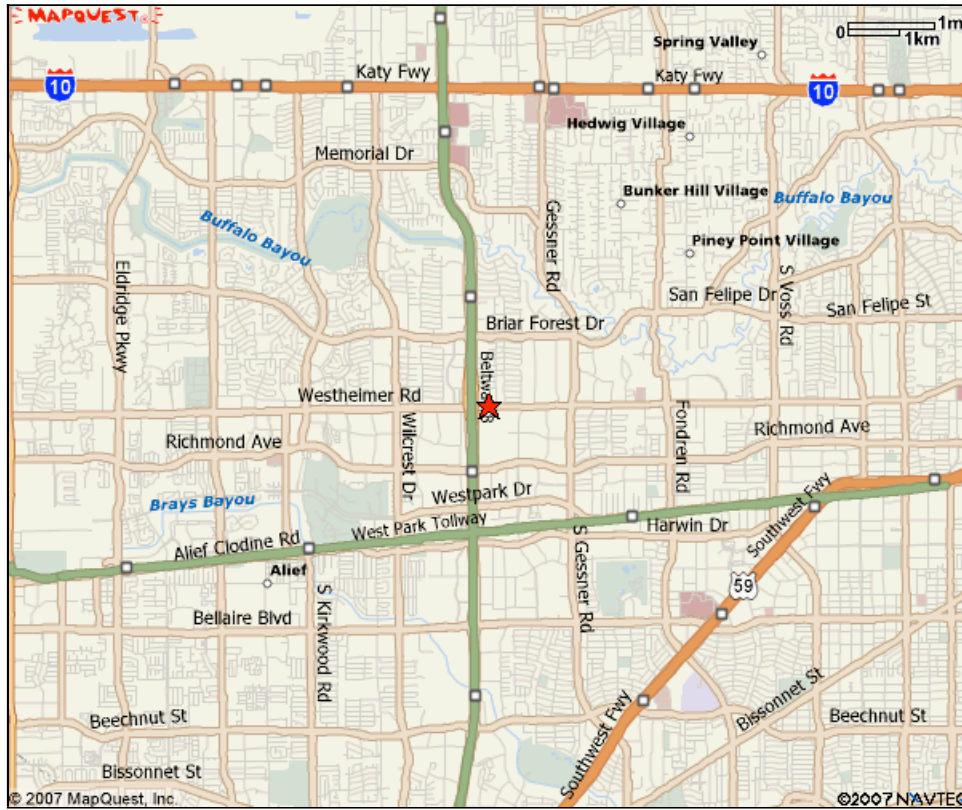
From Points West: Via I-10 E (San Antonio)

Take I-10 E toward Houston
Take exit 756 toward Sam Houston Tollway S
Merge onto W Sam Houston Tollway S (Toll road)
Take the exit toward Westheimer Rd / Richmond Ave
Merge onto Beltway 8 / W Sam Houston Pkwy S
Turn left at Westheimer Road

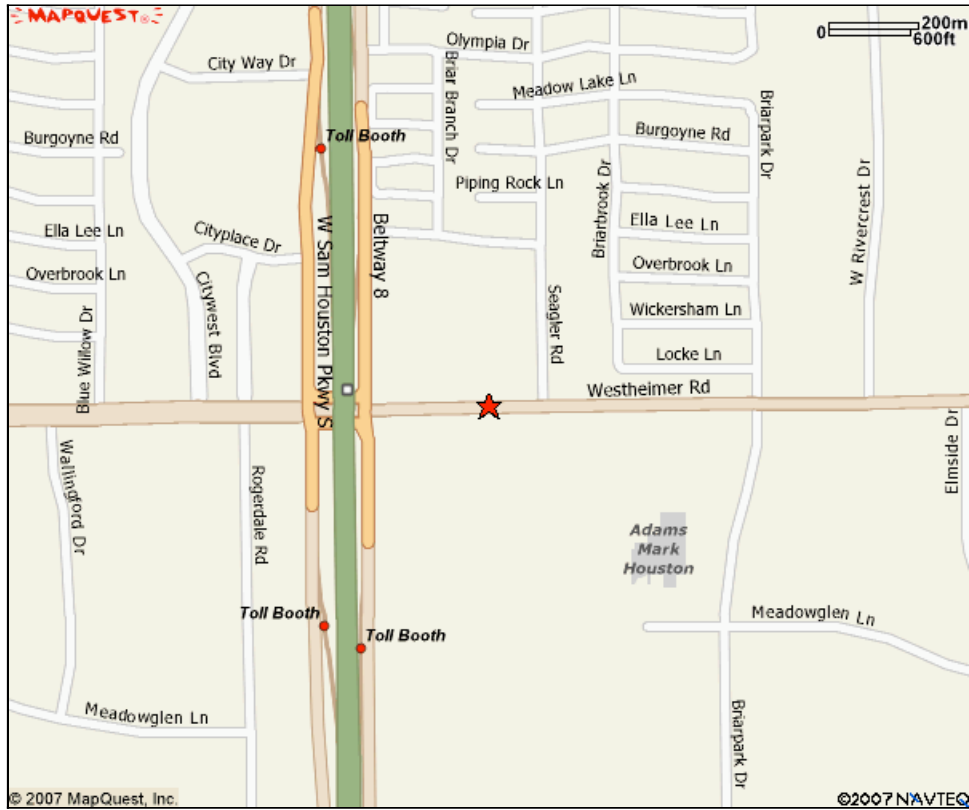
REGIONAL MAP:



CITY MAP:



STREET MAP:



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Houston, Texas | ACCOMMODATIONS near Westbridge One Conference Center

Westbridge One Conference Center 10260 Westheimer Road, 6th Floor Houston, TX 77042 (Workshop Location)			
Fairfield Inn - Westchase 2400 W Sam Houston Pkwy S Houston, TX www.marriott.com/houfc	(713) 334-2400	Hilton Houston Westchase 9999 Westheimer Road Houston, TX www.hilton.com	(713) 974-1000
Homewood Suites Hotel 2424 Rogerdale Road Houston, TX www.homewoodsuites.com	(713) 334-2424	Houston Marriott Westchase 2900 Briarpark Drive Houston, TX www.marriott.com/houwm	(713) 978-7400
Courtyard by Marriott - Houston Westchase 9975 Westheimer Road Houston, TX www.marriott.com/houwc	(713) 784-3003	Residence Inn by Marriott - Westchase 9965 Westheimer Road Houston, TX www.marriott.com/houwt	(713) 974-5454
Holiday Inn Express - Beltway 8 2930 W Sam Houston Pkwy S Houston, TX www.hiexpress.com	(713) 785-3899	Red Roof Inn - Westchase 2960 W Sam Houston Pkwy S Houston, TX www.redroof.com	(713) 785-9909

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NORTHWEST ENVIRONMENTAL TRAINING CENTER

650 S Orcas Street, Suite 220, Seattle, Washington 98108

Ph: (206)762-1976, Fax: (206)762-1979

www.nwetc.org

REGISTRATION FORM

Name: _____ Today's Date: _____

Agency/Organization: _____

Street Address: _____

Street Address (cont'd): _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Email: _____ Title: _____

Monitored Natural Attenuation of Petroleum & Chlorinated Hydrocarbons \$ _____

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Registration: \$495 (\$395*)

*Reduced rates for Native American Tribes; nonprofits; government; students; and NEBC, NAEP and TAEP members.

Payment Method: Check PO Credit Card (Visa Mastercard) Total: \$ _____

Credit Card or PO #: _____ Exp: _____

Notes: Please make checks payable to Northwest Environmental Training Center.

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