

Fundamental Contaminant Chemistry

A review of chemistry principles essential for understanding contaminant behavior in the environment

Course I.D. CHEM-403A (Course 1 of 3 in a Series)

September 23, 2008, 8:30 A.M. to 5 P.M. (1 Day)

Courtyard by Marriott

Bitterroot Room

4559 North Reserve Street

Missoula, MT

***Instructor:** Erick McWayne, Northwest Environmental Training Center*

Description: This course provides participants with an overview of key chemistry concepts associated with environmental contamination and provides a foundation for understanding contaminant transport and fate. This material is intended for environmental professionals who are not chemists, but who require a fundamental understanding of chemistry principles for their work. This course is recommended for all environmental professionals working with contaminated soil and water with minimal formal training in the subject. It is also recommended for project managers seeking a review of the subject.

Course Topics:

Overview of Physical and Chemical Properties of Chemicals	Chemical Equilibrium, Kinetics, and Thermodynamics
Electronegativity and Electron Affinity	Empirical, Chemical, and Structural Formulas
Chemical Bonding	Mass-Based and Mole-Based Concentrations
Mono and Polyatomic Ions	Properties of Carbon and Organic Molecules
Solubility and Precipitation (Polarity and Bonding of Solvents and Solutes)	Functional Groups - Alcohols, Aldehydes, Amines, Aromatics, Ethers, Ketones, and Organometallics
Chemical Reactions	Organic IUPAC Nomenclature
Stoichiometry (balancing reactions)	BTEX - Benzene, Toluene, Ethylbenzene, and Xylene
Oxidation States and Oxidation-Reduction Reactions	Organic Reactions

This course is part of a series, and is immediately followed by the [Contaminant Chemistry and Transport in Soil and Groundwater Workshop \(CHEM-403B\)](#), September 24-25, 2008. Attendees may register for any of these courses individually or the whole series, and a discount applies when registering for more than one course in a series. Courses 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.

After completing this course, participants will be able to:

- Apply chemistry principles to environmental issues
- Describe ionic and covalent chemical bonding
- Understand chemical solubility in polar and nonpolar solvents
- Identify common physical and chemical properties that affect chemical fate and transport in soil and water
- Express contaminant concentrations in terms of mass and moles
- Understand the concepts of chemical equilibrium, kinetics, and thermodynamics
- Describe the structure of common organic chemical contaminants using diagramming methods such as the condensed structural formula
- Identify and name simple organic chemicals using the International Union of Pure and Applied Chemistry nomenclature system

About the Instructor: Mr. McWayne has extensive experience with soil, groundwater, and geophysical investigations for the characterization of contaminant transport and fate. As an environmental consultant, Mr. McWayne served as a 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.

Prerequisites: Some college level chemistry is required (even if it was a long time ago).

Education Level: Fundamental review

Course Materials: Each participant will receive a copy of the course proceedings including notes and reference material on the first day of the course.

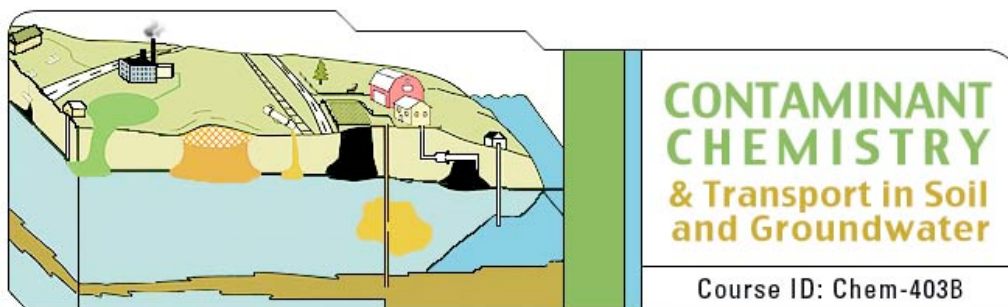
Continuing Education Units: 0.7

What to Bring: Scientific calculator, mechanical pencil, coffee mug and water bottle (to reduce waste). Please wear comfortable clothing appropriate for the prevailing weather.

Registration: \$250 (*\$195 reduced tuition is available for Native American tribes; government employees; nonprofits; students; and [NAEP](#), [NEBC](#), [RMAEP](#) members). An additional discount applies when registering for CHEM-403A, CHEM-403B. You may register via the link below 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 3 business days prior to the event. No refunds are issued for cancellations occurring less than 3 business days before the start day. Course registration fees and cancellation policy are subject to change without notice.

Disability Accommodations: To request disability accommodations, please contact us at info@nwetc.org or (206) 762-1976 at least 30 days prior to the event.



Contaminant Chemistry and Transport in Soil and Groundwater - An Overview of Petroleum, Chlorinated Hydrocarbon, and Metal Behavior in the Environment

Course I.D. CHEM-403B (Course 2 of 3 in a Series)
 September 24-25, 2008, 8:30 A.M. to 5 P.M. (2 Days)
 Courtyard by Marriott
 Bitterroot Room
 4559 North Reserve Street
 Missoula, MT

Instructor: Erick McWayne, Northwest Environmental Training Center

Description: This course provides participants with an overview of key concepts essential to understanding environmental contamination and provides a fundamental understanding of the release and transport of chemicals in soil and groundwater. This material is intended for environmental professionals who are not chemists, but who require a fundamental understanding of contaminant behavior and monitoring parameters for their work. This course is recommended for all environmental professionals working with contaminated soil and water with minimal formal training in this subject. The course material will greatly enhance on-the-job training. It is also recommended for project managers seeking a review of the subject.

Course Topics:

Contaminant Chemistry Overview	Vapor Transport
- Functional Groups, Chemical Properties, and Hazards	- Vapor Pressure, Solubility, Molecular Weight, and Vapor Density
Transport Mechanisms	- Contact Surface and Henry's Law Partitioning
- Advection	- Vapor Diffusion and Air-Filled Porosity
- Mechanical Dispersion	Natural Attenuation
- Diffusion (Chemical Dispersion)	- Overview of Natural Attenuation Processes
Contaminant Solubility Rules	- Biodegradation Pathways for Common Contaminants
- Molecular Geometry	Focus on Metals Contamination
- Effective Solubility	- pH and Mobility
3- and 4-Phase Equilibrium Partitioning	- Dissolved and Particulate Forms
- Adsorption and Absorption	- Cation Exchange
- Definitions of K_d , K_{oc} , f_{oc} , K_{ow} , and KH	- Complexation, Chelation, and Ligands
- NAPL One Percent Rule	- Hydrated Metals as Acids
- Molar Fraction Calculations	Focus on Hydrocarbon Contamination



MONTANA

Accommodations near
Courtyard by Marriott
Bitterroot Room
4559 North Reserve Street
Missoula, MT

<u>Courtyard Marriott</u> 4559 N Reserve St. Missoula, MT http://www.marriott.com	(406) 549-5260	<u>Hampton Inn</u> 4805 North Reserve St Missoula, MT 59808 http://www.hamptoninn.com	(406) 549-1800
<u>Comfort Inn</u> 4545 N. Reserve St. Missoula, MT 59808 http://www.comfortinn.com	(406) 542-0888	<u>Ruby's Inn & Convention Center</u> 4825 N Reserve St Missoula, MT 59808 http://rubys.montana.com	(406) 721-0990
<u>Super 8 N Reserve</u> 4703 North Reserve St. Missoula, MT 59808 http://www.super8.com	(406) 549-1199	<u>Hilton Garden Inn</u> 3720 North Reserve Street Missoula, MT 59808 http://www.hiltongardeninn.com	(406) 532-5300



MONTANA

Directions to:

Courtyard by Marriott

Bitterroot Room
4559 North Reserve Street
Missoula, MT

Parking: Complimentary on-site parking

Directions from West (Spokane):

Merge onto I-90 E
Take exit 101 for Reserve St. toward US-93 S/Hamilton/I-90-BL
Turn right at I-90-BL/N Reserve ST/US-93/US-93 N
End at 4559 N Reserve ST.

Directions from East (Billings):

Merge onto I-90 W
Take exit 101 for Reserve St/US-93 S/ toward Hamilton
Turn Left at I-90-BL/N Reserve ST/US-93/US-93 N
End at 4559 N Reserve St.

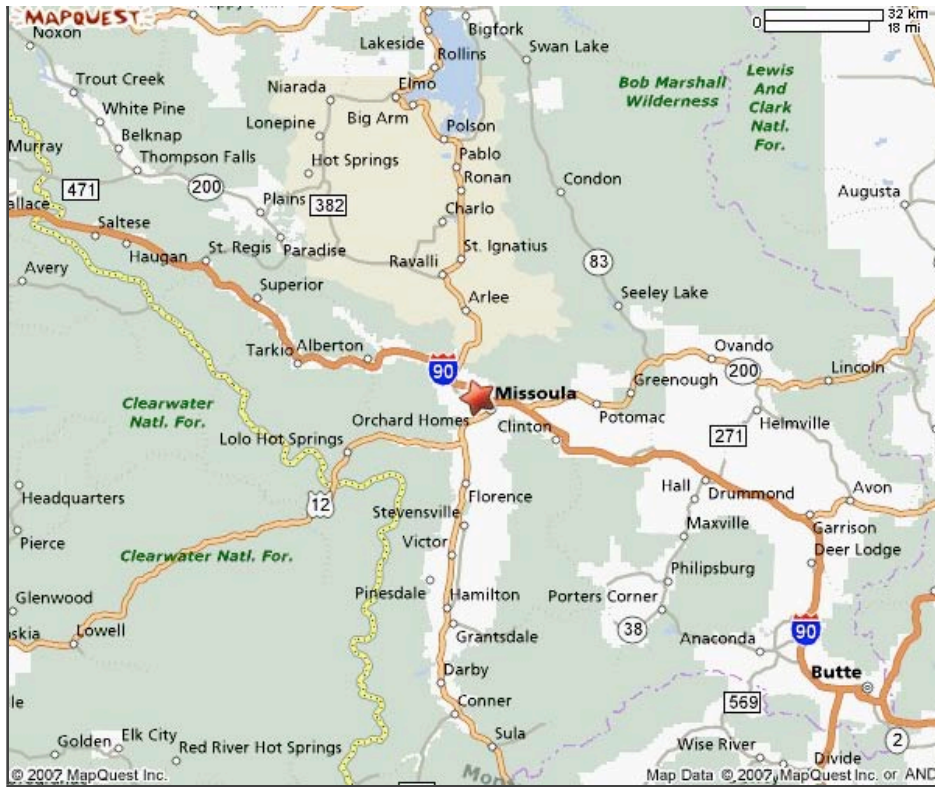
Directions from South (Boise):

Merge onto ID-55
Turn right at Railroad Ave.
Turn Left at Pine St
Slight Lieft at E Lake St
Turn right at ID-55/Norris Ave.
Continue on US-95
Slight right at ID-13/W Main St. follow to ID-13
Turn right at US-12
Turn left at US-12/US-93
Turn Left at S Reserve St/US-93
End at 4559 N Reserve St.

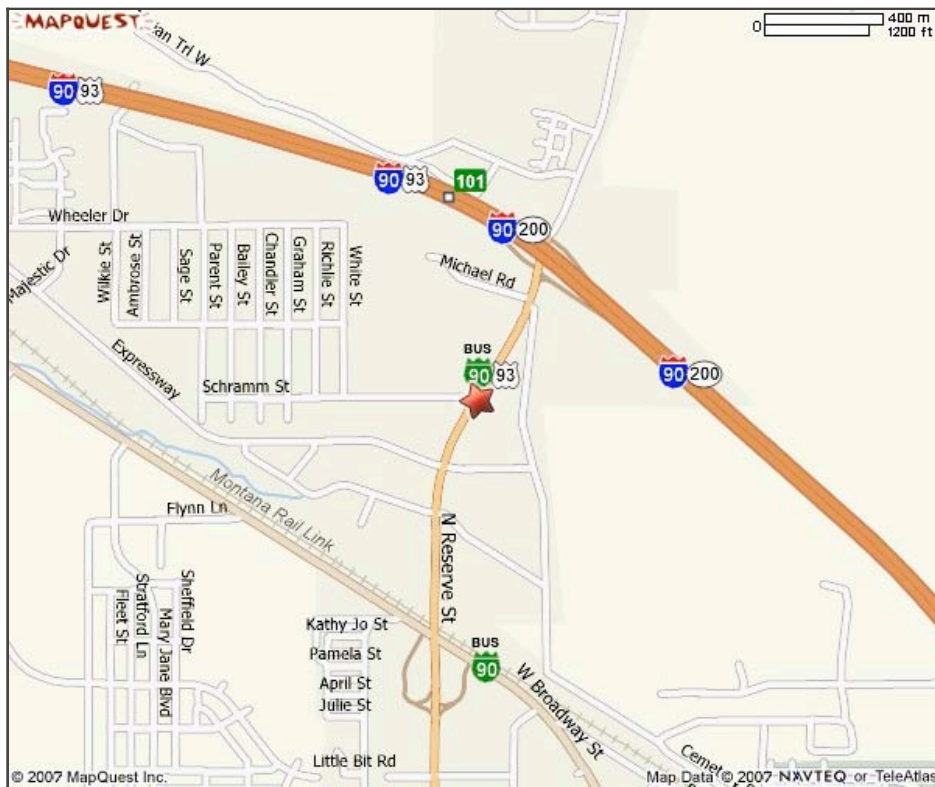
Directions from South (Idaho Falls):

Merge onto I-15 N toward Butte/Roberts
Take exit 121 to merge onto I-90 W toward Missoula
Take exit 101 for Reserve St/US-93 S/ toward Hamilton
Turn Left at I-90-BL/N Reserve ST/US-93/US-93 N
End at 4559 N Reserve St.

REGIONAL MAP:



CITY MAP:



STREET MAP:

