Groundwater Remediation: From Hydrogeologic Site Concepts to Applied Numeric Models

Date: 23rd, 24th September 2017
Schedules: 9:00 – 17:00
Minimum and maximum number of participants: 15/30
Price: 250 EUR/ students 150 EUR (includes lunches and refreshments during breaks)
Instructors: Neven Kresic and Alex Mikszewski, Amec Foster Wheeler, USA

All attendees should bring their own laptop computer

This 2-day hands-on groundwater modeling workshop will explain in detail numeric modeling concepts applied to groundwater remediation. Attendees will learn how to build conceptual and numeric models in visual (GIS) environment including interpolation of field data. Free fully functional copy of Processing MODFLOW software will be provided to all attendees who will build their own models and learn how to use the program. The topics covered will include 1) numerical flow model design based on hydrogeologic conceptual site model, including all necessary input parameters; 2) running, calibrating, & using flow models; 3) design of contaminant fate and transport models including all necessary input parameters; 4) model applications for remediation including: pump & treat for cleanup and hydraulic containment; monitored natural attenuation/bioremediation; permeable reactive barriers; and fluids/nutrients injection/recirculation. Additional topics will include vadose zone modeling (soil to groundwater leaching estimates using public-domain program VS2DTI) and problems associated with non-aqueous phase liquids (DNAPL and LNAPL). All attendees will receive disks with various software programs and course materials. No previous knowledge of groundwater modeling is required, but solid foundation in hydrogeology is highly recommended.

Workshop agenda:
Day 1 Saturday morning (09:00 – 13:00)
15 minutes break
   Numerical Flow Model Construction Based on Hydrogeologic Conceptual Site Model
   a. Initialization & Site base maps
   b. Layering & Gridding
   c. Boundary Conditions & Packages
   d. Input Parameters & Initial Conditions
   e. Observations/Targets
Lunch break (13:00 – 14:00)
Day 1 Saturday afternoon (14:00 – 17:00)
15 minutes break
   Running, Calibrating, & Using the Flow Model
   a. Solver
   b. Understanding & Visualizing Model Output
c. Calibration & Sensitivity Analysis

d. Particle tracking

e. Application: Pump & Treat for Containment

Vertical Wells: Extraction & Injection
Horizontal Wells/Drains/Trenches

**Day 2 Sunday morning (09:00 – 13:00)**

*15 minutes break*

Fate & Transport Model Construction

a. Source & Contaminant Plume Assignment

b. Parameters: Dispersion, Diffusion, Sorption, Contaminant Decay/Degradation

c. Solver/time setup/observations

d. Running the model

Lunch break (13:00 – 14:00)

**Day 2 Sunday afternoon (14:00 – 17:00)**

*15 minutes break*

Model Applications for Remediation

a. Pump & Treat for Cleanup and Hydraulic Containment

b. Monitored Natural Attenuation/Bioremediation

c. Permeable Reactive Barriers

d. Fluids/Nutrients Injection/Recirculation

Additional Topics

a. Vadose Zone Modeling: Soil to Groundwater Leaching (VS2DTI)

b. NAPL Issues/Dissolution

**About Instructors:**

**Neven Kresic,** Ph.D., PG is a Senior Principal and Hydrogeology Practice Leader at Amec Foster Wheeler with over 30 years of experience in hydrogeology and groundwater modeling, remediation, and resource development. He has worked with U.S. and international clients, including federal, state, and local agencies; industries such as water, transportation, and power utilities; and oil, petrochemical, chemical, mining, and construction companies. In addition to numerous scientific and professional papers, Dr. Kresic has authored best-selling textbooks *Hydrogeological Conceptual Site Models: Data Analysis and Visualization by CRC/Taylor & Francis (2013)*, and *Hydrogeology and Groundwater Modeling, Second Edition by CRC/Taylor & Francis (2007).* He has instructed international workshops and academic courses in groundwater modeling, remediation and conceptual site development around the world, and is co-Chair of the Karst Commission of the International Association of Hydrogeologists, past Vice President for International Affairs of the American Institute of Hydrology, and committee member of the Groundwater Management and Remediation Specialty Group of the International Water Association.
Alex Mikszewski, PE is a Senior Remediation Engineer and groundwater modeler at Amec Foster Wheeler with over 10 years of experience in environmental consulting and groundwater remediation. He was a NNEMS Fellow in the US EPA Superfund Office, and co-authored a best-selling textbook, *Hydrogeological Conceptual Site Models: Data Analysis & Visualization*, published by CRC/Taylor & Francis in 2013. He has instructed workshops in groundwater modeling, remediation, and conceptual site model development in the United States and abroad, including at the 2014 and 2016 Battelle Conferences in California. He is currently a member of the ITRC workgroup Geostatistics for Remediation Optimization, focusing on practical applications in consulting such as long-term groundwater monitoring optimization.