

WHI E-News Topics

2003 September Edition

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Waterloo Hydrogeologic, Inc. (WHI) is a recognized leader in the development and application of environmental software and services.



[Download](#) your free copy today!



[Download](#) a demo now!

Product News

New Free Software Reduces Research Time and Organizes Field Data

Do you need to quickly reference or catalog parameter values for soil properties, chemical properties, drinking water standards, and other "common" model data? Are you wasting valuable time searching for these values?

WHI now offers an alternative to countless hours spent searching for references - Enviro-Base Lite or Enviro-Base Pro!

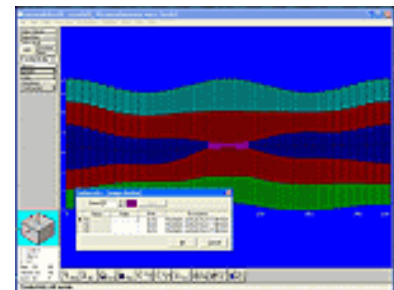
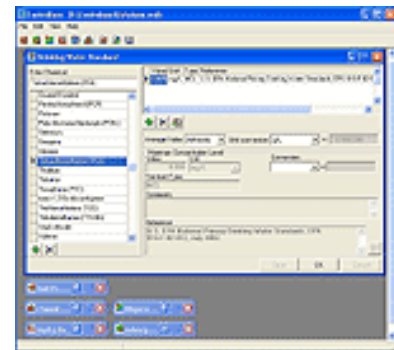
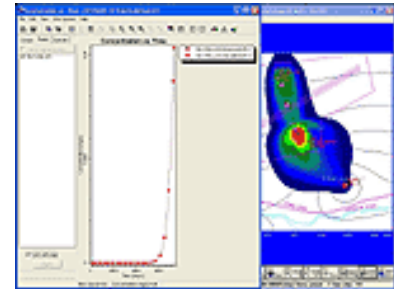
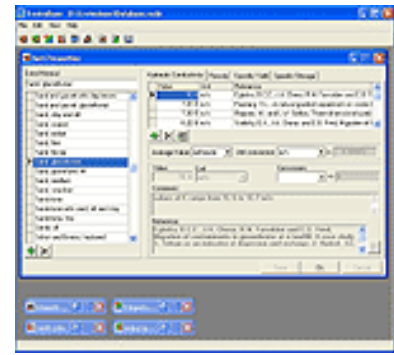
Enviro-Base Lite is a FREE Windows-based reference tool that provides you with over 458 property listings for 173 standard chemicals and 86 materials. All values contained in Enviro-Base Lite are referenced and may be averaged or converted into other units.

Enviro-Base Pro extends the functionality of Enviro-Base Lite by giving you the ability to edit and store newly referenced data for future use. Enviro-Base Pro users may also export data sets into a Microsoft Excel spreadsheet.

Enviro-Base Lite and Pro provide you with a readily searchable database of referenced data that simplifies report writing and model generation.

Download your free copy of Enviro-Base Lite here:
www.waterloohydrogeologic.com/free_downloads_form.htm

Or purchase your own copy of Enviro-Base Pro here today:
www.waterloohydrogeologic.com/software/enviro_base_pro/enviro_base_pro_pricing_ordering.htm



For more information about our Enviro-Base Pro or Enviro-Base Lite software, visit our website or contact us today:

Website: www.waterloohydrogeologic.com/software/enviro_base_pro/enviro_base_pro_ov.htm

Email: sales@waterloohydrogeologic.com

Phone: (519) 746-1798

AquaChem Version 4.0 Released!

AquaChem v.4.0 delivers improved functionality and greater flexibility for storing, analyzing, plotting and modeling water quality and aqueous geochemical data.

Features and Benefits:

Data Management: AquaChem uses an MS Access(tm) relational data management system to ensure data integrity, improve performance, and provide the flexibility to add an unlimited number of organic/inorganic chemicals with customizable units - **NEW**.

Water Quality Standards: Water quality exceedences are automatically highlighted following built-in guidelines from the United States EPA, World Health Organization (WHO), and Canadian Council of Ministers of the Environment (CCME); or customize your own water quality guidelines - **NEW**.

Analysis Plots: AquaChem offers 19 plotting methods used for water quality data analysis and reporting, including:

- Piper, Durov, and Ternary, Scatter, Histogram, and Time-Series (multi-parameters or multi-stations) - **NEW**.
- Schoeller, Ludwig-Langelier, Geothermometer, Giggenbach Triangle, Box and Whisker, Wilcox, and Depth Profile - **NEW**.

Built-in Tools: Several time-saving utilities are included for unit conversions, species conversion, concentration decay calculations, volumetric concentration conversions, and quality assurance - **NEW**.

Reports: Create professional reports using the Report Designer, or save reports to .HTML, .CSV, .TXT, or .RTF formats, including:

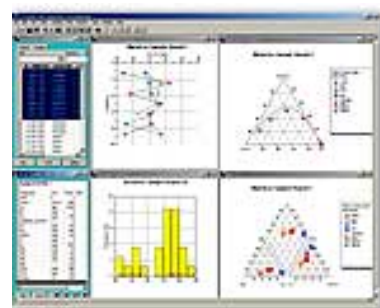
- Statistics - including the Mann-Kendall test for determining temporal trends - **NEW**.
- Sample Comparison, Correlation and Mixing
- Reliability Check - for evaluating the validity of calculated values - **NEW**.
- Source Rock Deduction - **NEW**.

Geochemical Modeling: Built-in link to PHREEQC v.2.8 for calculating saturation indices, pH values, or Eh values of selected samples and automatically storing them in the database; or launching the USGS PHREEQC-I program for more complex scenarios - **NEW**.

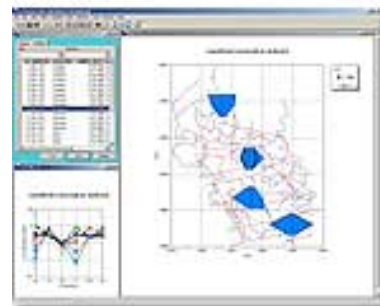
[AquaChem](#) is the most complete software package available for aqueous geochemical data analysis, plotting and modeling!



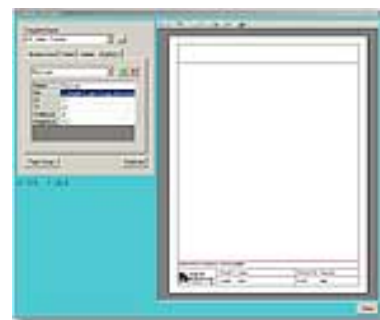
Automatic highlighting of exceedences.



Standard water quality plots.



Stiff graphs over site map.



Print Template Designer preview.

For more information about our AquaChem software, visit our website or contact us today:

Website: www.waterloohydrogeologic.com/software/aquachem/aquachem_ov.htm

Email: sales@waterloohydrogeologic.com

Phone: (519) 746-1798

WHI to Begin Distributing Solinst Field Equipment

On June 7, 2003, Waterloo Hydrogeologic, Inc. (WHI) and Solinst Canada Ltd came to an 'Agreement in Principle' to work together. Solinst is a well known manufacturer of groundwater and surface water instrumentation. Under the agreement, WHI will offer enhanced integration between Solinst equipment and WHI software products. WHI has already implemented a complete import feature within [AquiferTest Pro v.3.5](#), making it easier to connect with Solinst's industry-leading [Levelogger 3001 Series](#).

"We anticipate that this new alliance will drive environmental technologies to a new level. It is a natural fit for both companies; both of us have been offering environmental solutions to the same focused group of environmental professionals for many years," says Dr. Guiguer.

With the addition of equipment to our line of products, WHI will be able to better serve you in all your groundwater and surface water needs. We look forward to working with Solinst under this new agreement!



[Solinst Canada Ltd.](#) has been manufacturing high quality groundwater instrumentation since 1980 when the late founder, Doug Belshaw, recognized the need for innovative and easy-to-use instrumentation for the growing hydrogeology field.



For more information about this agreement, please contact:

Dr. Nilson Guiguer, Ph.D., President, WHI

Email: nguiguer@waterloohydrogeologic.com

Phone: (519) 746-1798



Consulting News

WHI Assists the Republic of Botswana



Between July 28th and August 6th, 2003, Jim Graham, Manager of Environmental Information Systems at WHI, traveled to the Republic of Botswana to assist in the development and implementation of a national database designed to store pumping test data for use within WHI's [AquiferTest](#) and [Visual MODFLOW](#)

applications.

Recognizing the importance of managing hydrogeological data in a central repository that is accessible by all interested parties, the Government of Botswana contracted a local company, Aqualogic (pty), to design and implement the SQL Server database and a graphical user interface to store all aspects of a pumping test analysis. Aqualogic requested WHI to assist in the design, testing, review, and documentation of this national database because of WHI's combined strengths in software design, training and consulting for the groundwater industry.



In addition to the database development work, Jim also provided four days of professional training to the Department of Water Affairs and the Department of Geologic Survey staff on AquiferTest and Visual MODFLOW. These departments manage the water resources for the country where the

Kalahari Desert covers 84% of the land with the majority of cities and towns relying on groundwater as a municipal water source. WHI is proud to be involved with this exciting and proactive work.



For more information about this project, please contact:
Jim Graham, M.A.Sc., P.Eng.
Environmental Information Systems Manager
Email: JGraham@waterloohydrogeologic.com
Phone: (519) 746-1798

WHI Consulting Capabilities Presented at 2003 Conferences

WHI consulting staff participates in a variety of conferences, symposiums, workshops, and forums. At these events, we present papers, participate in discussion groups, and/or exhibit our groundwater modeling and data management capabilities.

Recent events included...

Ontario Ground Water Association Annual Convention 2003

Lindsay, Ontario
April 11-13, 2003
www.ogwa.ca

Identifying Watershed Sensitivities to Water Availability; Canada-Ontario Water Use and Supply Workshop

Toronto, Ontario
May 13-14, 2003
www.on.ec.gc.ca/water/water-us e/

In Situ and On-Site Bioremediation, Seventh International Symposium

Orlando, Florida
June 2-5, 2003
www.battelle.org/environment/er/conferences/biosymp/

Water Stewardship: How Are We Managing?; Canadian Water Resources Association 56th Annual Conference

Vancouver, British Columbia
June 11-13, 2003
www.cwra.org

Water Is Key in 2003; Florida Association for Water Quality Control 2003 Conference

Naples, Florida
June 11-13, 2003
www.fawqc.com

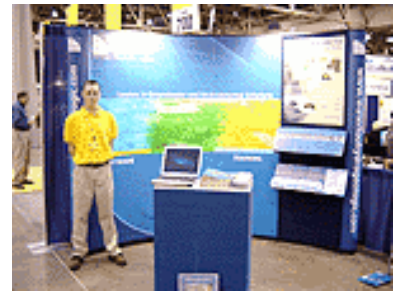
Upcoming events include...

3rd Annual Grand River Watershed Water Forum

Cambridge, Ontario
September 12, 2003
www.grandriver.ca

MODFLOW and More 2003: Understanding through Modeling; International Ground Water Modeling Conference and Workshops

Golden, Colorado
September 17-19, 2003
typhoon.mines.edu/events/modflow2003/modflow2003.shtml



4th Joint IAH-CNC and CGS Groundwater Specialty Conference

Winnipeg, Manitoba

September 28 - October 1, 2003

home.cc.umanitoba.ca/~cgsman/cgs2003/

Protecting the Source From Upstream to Downstream; A.D. Latornell Conservation Symposium

Alliston, Ontario

November 12-14, 2003

www.latornell.ca

Ground Water in Coastal Zones: Availability, Sustainability, and Protection; NGWA 2003 Ground Water Expo

Orlando, Florida

December 9-12, 2003

www.ngwa.org

For more information about WHI's Consulting activities and capabilities, visit our website or contact us today:

Website: www.waterloohydrogeologic.com/consulting/consulting_services.htm

Email: consulting@waterloohydrogeologic.com

Phone: (519) 746-1798

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Training News

Upcoming Course Series - Join Us Down Under!

Don't miss this opportunity to participate in the following course series in New Zealand or Australia this November...

Auckland, New Zealand:

Groundwater Modeling	Nov 11-13
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Model Calibration Using WinPEST	Nov 14
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Melbourne, Australia:

Groundwater Modeling	Nov 18-20
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Model Calibration Using WinPEST	Nov 21
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Advanced Groundwater Modeling	Nov 24-26
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To check out the full course descriptions or to register, visit:

<http://www.waterloohydrogeologic.com/training/training.htm>

Upcoming Professional Courses

Dates/Locations

Groundwater Modeling



3D Groundwater Flow and Solute Transport Modeling Using Visual MODFLOW Pro.

Simple to complex applications of groundwater flow and contaminant transport models are covered in this hands-on course. Ideally suited for people with beginner or intermediate level modeling experience who wish to advance their modeling knowledge and who's responsibilities include model review, planning, and project management.

[Concepcion, Chile](#)
[Sept 23-26](#)

[Pretoria, South Africa](#)
[Sept 29-Nov 1](#)

[Braunfels, Germany](#)
[Oct 14-17](#)

[England](#)
[Oct 27-30](#)

[Auckland, New Zealand](#)
[Nov 11-13](#)

[Melbourne, Australia](#)
[Nov 18-20](#)

[Register Now](#)

Model Calibration Using PEST



Applied to MODFLOW and Other Numeric Models.

This course teaches strategies for calibrating groundwater models, the most time-consuming, challenging and critical phase of a modeling study. You will learn about model calibration issues in general and also how to use the parameter estimation software package PEST, which has been developed to enhance our ability to calibrate models and to understand the limits of that calibration.

[Braunfels, Germany](#)
[Oct 17](#)

[England](#)
[Oct 30](#)

[Auckland, New Zealand](#)
[Nov 14](#)

[Melbourne, Australia](#)
[Nov 21](#)

[Register Now](#)

Advanced Groundwater Modeling



Applying Innovative Techniques and Avoiding Common Pitfalls using MODFLOW-2000, MODPATH, & MT3D.

The advanced course builds on the topics covered in "Groundwater Modeling" and develops a higher level of skill in building and troubleshooting groundwater flow models. Ideal for "Groundwater Modeling" graduates or experienced modeling professionals.

[Ostrava, Czech Republic](#)
[Sept 8-11](#)

[Concepcion, Chile](#)
[Sept 29-1](#)

[Melbourne, Australia](#)
[Nov 24-26](#)

[Register Now](#)



[For our full 2003 training schedule, click here!](#)

For more information about our course offerings, visit our website or contact us at:
Website: www.waterloohydrogeologic.com/training/training.htm
Email: training@waterloohydrogeologic.com
Phone: (519) 746-1798

Tips & Tricks

Accelerating Research with Enviro-Base Pro or Lite

The Challenge: Obtaining referenced data, for use in developing a computer model, when field data is not available.

A common issue experienced by groundwater modelers is the inability to locate referenced values for soil properties, chemical properties, drinking water standards, and other "common" data. Searching through textbooks and the Internet can be time consuming at best, and having to compile lists of data and their references is cumbersome.

The Solution: Enviro-Base Pro or Lite software, an all-inclusive database of referenced properties.

[Enviro-Base Pro and Enviro-Base Lite software](#) provides modelers with a robust database of information that includes 458 property listings for 173 standard chemicals and 86 materials. All values contained in the database are referenced, and may be averaged or converted into other units by the user.

The database is comprised of values collected from 457 respected sources, and includes W.H.O. and United States EPA data. Having so many properties compiled into one easy-to-search database simplifies the task of locating applicable information when trying to generate a model without site-specific data.

The extended functionality of Enviro-Base Pro allows users to modify the database by editing existing values, or adding new parameters. The default database may be expanded to include a user's site-specific information, or a new database of site information may be created using the Enviro-Base Pro template.

Example 1: Unknown Hydraulic Conductivity values in a discontinuous aquifer.

When faced with assigning hydraulic property values to geological units that lack field-measured data, a modeler can refer to the Soil Properties

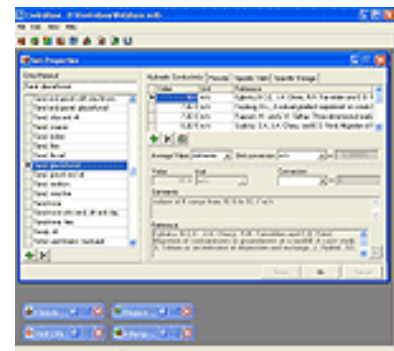


Figure 1A and 1B: Representative values of Hydraulic Conductivity in the Enviro-Base Pro Soil Properties listing, as required by Visual MODFLOW.

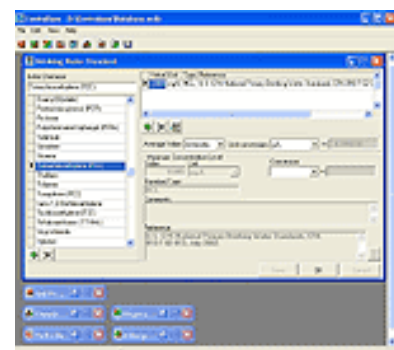


Figure 2A and 2B: Concentration vs. Time calculated at a municipal well, compared with the United States EPA Guidelines in the Enviro-Base Pro Drinking Water Standards listing.

listings of Enviro-Base Pro or Lite. Browsing through 49 different soil types offers you a wide range of choices, and multiple referenced values assist in selecting the most appropriate value to use in each simulation. (See Figures 1A and 1B.)

Example 2: Water Quality Standard data required to determine whether Maximum Contaminant Level (MCL) will be exceeded.

Studies of plume migration often focus on the potential effects on water-supply wells down-flow of the contaminant source. The ability to quickly reference United States EPA guidelines for MCL allows you to determine if, based on the simulation, remedial action will be required. (See Figures 2A and 2B.)

Enviro-Base Pro and Lite provide you with a readily searchable database of referenced data that simplifies report writing and model generation.

For more information about this tip, contact us at:

Email: techsupport@waterloohydrogeologic.com

For more information about Enviro-Base Pro and Lite, visit our website or contact us today:

Website: www.waterloohydrogeologic.com/software/enviro_base_pro/enviro_base_pro_ov.htm

Email: sales@waterloohydrogeologic.com

Phone: (519) 746-1798

Download your free copy of Enviro-Base Lite here:

[www.waterloohydrogeologic.com/
free_downloads_form.htm](http://www.waterloohydrogeologic.com/free_downloads_form.htm)

Or purchase your own copy of Enviro-Base Pro here today:

[www.waterloohydrogeologic.com/
software/enviro_base_pro/
enviro_base_pro_pricing_ordering.htm](http://www.waterloohydrogeologic.com/software/enviro_base_pro/enviro_base_pro_pricing_ordering.htm)

For more information about this tip, contact us at:
Email: techsupport@waterloohydrogeologic.com

For more information about Enviro-Base Pro and Lite, visit our website or contact us today:
Website: www.waterloohydrogeologic.com/software/enviro_base_pro/enviro_base_pro_ov.htm
Email: sales@waterloohydrogeologic.com
Phone: (519) 746-1798

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Technical Highlights

Using MODFLOW-SURFACT to Simulate Transport from an Immobile Depleting NAPL Phase

Feature Guest Column by Sarah Frost, P.G., Project Hydrogeologist, HydroGeoLogic, Inc., Herndon, VA

MODFLOW-SURFACT is capable of simulating transport of multiple solute species in multiple phases, with adsorption, degradation, and generation of transformation products. Transport occurs in both air and water phases, for contaminants, which dissolve and volatilize from an immobile depleting NAPL phase.

The following study was conducted by HydroGeoLogic, Inc., using MODFLOW-SURFACT, to examine the effectiveness of various treatment schemes on a DNAPL spill consisting initially of PCE (which decays to TCE, DCE, and VC). The schemes were evaluated in their ability to remove DNAPL with minimal time and effort, and in meeting compliance constraints (i.e., no contaminant above 0.01 mg/L should migrate beyond the site boundary). Here are the results of this study....

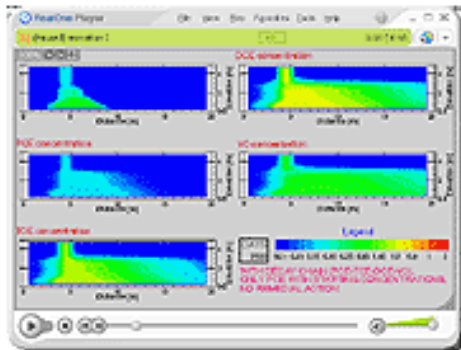


[HydroGeoLogic, Inc.](#) is an environmental engineering and technical services firm, headquartered in Herndon, Virginia. Since its inception, HydroGeoLogic, Inc. has developed several advanced modeling codes to support a wide range of environmental consulting projects. This includes development of MODFLOW-SURFACT, a code that extends the simulation capabilities of the popular USGS MODFLOW code, for more advanced modeling projects such as the

Ambient Conditions:

Animation 1 demonstrates how NAPL plume dissolves, and how PCE decays and migrates through the system with no active treatment. PCE decays to its daughter products TCE, DCE, and VC, which violate compliance, although they are removed from the saturated zone by 19,000 days. Some DCE and VC remain in the unsaturated zone at 20,000 days.

Animation 1:

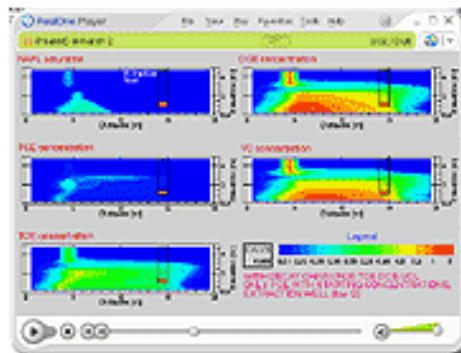


(To view the animation on the WHI website, click on the image.)

Low-Rate Extraction Well:

Animation 2 simulates the effects of a down-gradient extraction well in the saturated zone with a relatively low rate of pumping. PCE and TCE meet compliance requirements, but DCE and VC do not. The unsaturated zone is unaffected by ambient conditions.

Animation 2:



(To view the animation on the WHI website, click on the image.)

High-Rate Extraction Well:

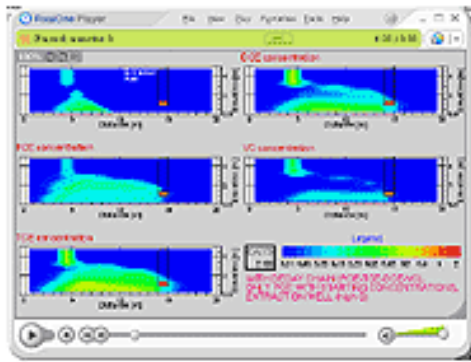
In Animation 3, a higher rate of pumping is tested. NAPL products do not reach the compliance point and are removed from the saturated zone within a shorter time, however the unsaturated zone is unaffected.

Animation 3:

one described in this article."

[MODFLOW-SURFACT](#) is a comprehensive three-dimensional finite-difference flow and contaminant transport model based on the USGS modular groundwater flow model, MODFLOW.

[Visual MODFLOW Pro](#) is a 3D groundwater flow and contaminant transport modeling application that combines MODFLOW, MODPATH, MT3DMS, RT3D, WinPEST, and the VMOD 3D-Explorer. Visual MODFLOW Pro also now incorporates MODFLOW-SURFACT for increased functionality and improved performance. For details call (519) 746-1798.

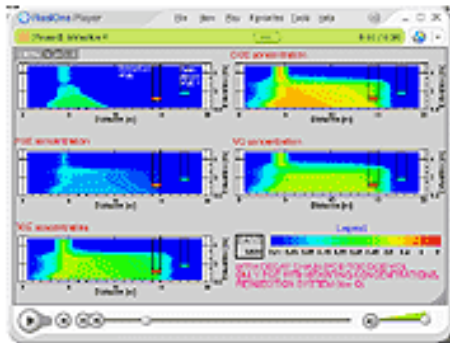


(To view the animation on the WHI website, click on the image.)

Barrier:

Animation 4 examines the effects of a down-gradient low-pumping rate extraction well and an injection well down-gradient of the extraction well. The injection well acts as a barrier, however this is accomplished by way of dilution. None of the NAPL products breach compliance, but the unsaturated zone is unaffected.

Animation 4:

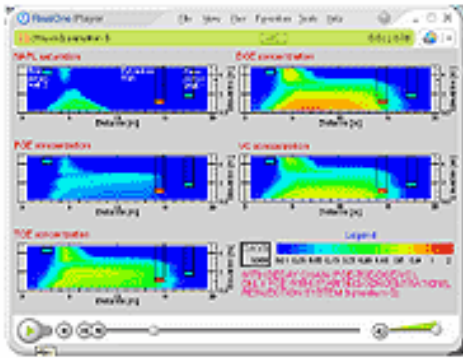


(To view the animation on the WHI website, click on the image.)

Flush and Barrier:

Animation 5 examines the above-barrier case with inclusion of an injection well up-gradient of the unsaturated zone NAPL. The barrier works effectively as per the previous scenario, and the flushing of NAPL within the unsaturated zone is effective in removing residuals therein.

Animation 5:

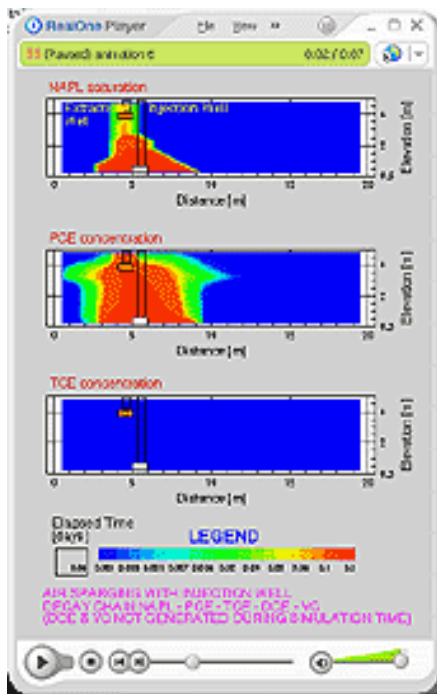


(To view the animation on the WHI website, click on the image.)

Air Sparging:

In Animation 6, an injection well is placed below the water table with an extraction well located in the unsaturated zone ($Q_{injection} = Q_{extraction}$). The upper boundary is a paved surface (no-flow). The volatilized NAPL components are forced up with the sparge and spread laterally (due to the paved surface). NAPL is removed from the site so quickly that DCE and VC are not produced. However, the extraction well did not control spread of volatilized contaminants through the unsaturated zone, and detrimental effects are noted to result from this treatment.

Animation 6:



(To view the animation on the WHI website, click on the image.)

This study certainly demonstrates MODFLOW-SURFACT's ability to simulate transport of multiple solute species in multiple phases, with adsorption, degradation, and generation of transformation products.



WHI is pleased to consider contributions to our upcoming Feature Guest Columns; if you are interested in writing one of our upcoming features, please contact: Martin Draeger mdraeger@waterloohydrogeologic.com

For more information about this article or risk assessment strategies, please contact:
Sarah Frost, P.G., Project Hydrogeologist
HydroGeoLogic, Inc., Herndon, VA
Email: sfrost@hgl.com
Website: www.hgl.com



Thank you for reading this month's edition of WHI E-News!
For more information about our products and services...

[Visit our Website](#) - See what Waterloo Hydrogeologic Inc. has to offer!

[Software Division](#) - Check out our groundwater modeling software.

[Consulting Division](#) - Visit our Consulting Division on the web to see how we can help you.

[Training Division](#) - Visit our Training Division on the web to find a course in your area.

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