



# SWS Enews



Water Solutions in Perspective

May 2007

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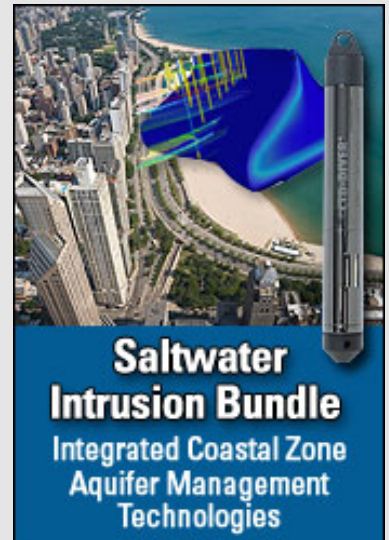
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Plan and mitigate potential impacts to coastal zone freshwater aquifers with the Saltwater Intrusion Bundle.  
[Learn more!](#)

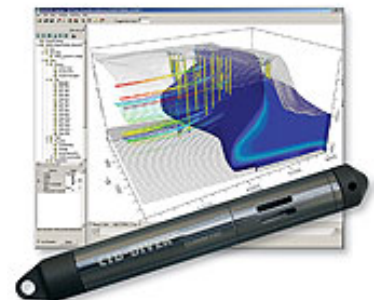
## Product News

### The Saltwater Intrusion Bundle

The "[Saltwater Intrusion Bundle](#)" is a pre-packed suite of sensors and software products that offer advanced features and capabilities for efficiently addressing challenges related to coastal zone aquifer management. Consisting of our industry trusted Diver\* groundwater dataloggers, and our globally recognized [Visual MODFLOW Pro](#) groundwater modeling program, the Saltwater Intrusion Bundle provides the field data and simulation power for efficiently planning and mitigating potential impacts to coastal zone freshwater aquifers.

#### With the Saltwater Intrusion Bundle, users can:

- Continuously monitor and acquire field data regarding the vertical and spatial distribution of saltwater concentrations, groundwater elevations, and temperature
- Record and understand the physical influences to increased saltwater intrusion (eg. groundwater pumping, tidal fluctuations, recharge, etc.)
- Acquire input and calibration data for groundwater modeling and simulation



Visual MODFLOW + CTD-Diver

- Predict the dynamic and complicated nature of density-driven saltwater migration into freshwater aquifers
- Evaluate various techniques for mitigating saltwater intrusion (eg. optimizing pumping rates, freshwater injection, etc.)

**What's included in the Saltwater Intrusion Bundle:**

- 5 to 10 x CTD-Diver and/or Cera-Diver dataloggers
- 1 x Baro-Diver
- 1 x license of [Visual MODFLOW Pro](#)
- 5 to 10 x Diver Data Cable (DDC)
- 1 x DDC for Baro-Diver
- 1 x DDC to PC Interface cable
- 1 x LoggerDataManager software
- 1 x Pocket-Diver Manager software

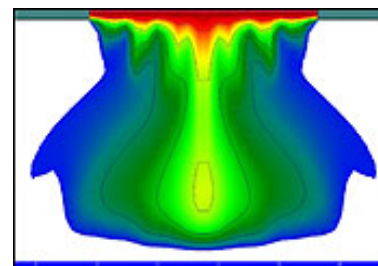
Learn more about Diver dataloggers - [Click here](#)

Learn more about Visual MODFLOW Pro - [Click here](#)

[Contact us](#) for a Saltwater Intrusion Bundle quote today!

Available in North and Latin America

\* - conductivity only available with CTD-Diver



Saltwater Intrusion Simulation using Visual MODFLOW Pro



CERA-Diver



**Get your Integrated Monitoring Solutions CDROM Today!**

Fill out our [online form](#) to receive your complimentary Monitoring Services CDROM!

For more information, contact us:

Phone: +1-519-746-1798

Email: [sws-sales@slb.com](mailto:sws-sales@slb.com)

Website: [http://www.waterloohydrogeologic.com/equipment/groundwater\\_dataloggers.htm](http://www.waterloohydrogeologic.com/equipment/groundwater_dataloggers.htm)

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Consulting Services News

**Multilevel Monitoring for Resource Management**

The Orange County Water District (OCWD) in Southern California, USA, is responsible for supplying clean water to more than 2 million residents in a 380-mi<sup>2</sup> [970-km<sup>2</sup>] service area. The facilities have the capacity to recharge approximately 250,000 ac-ft [3.1x10<sup>3</sup>m] of water per year by percolation along the channel of the Santa Ana River and off-channel basins. Groundwater supplies more than 60% of the total water demand in the area and managing this groundwater resource is the OCWD's number one priority.

Management of groundwater over a large area is an involved process. Each year, OCWD monitors groundwater levels, production, and recharge quantities to evaluate groundwater storage changes in the basin, replenishes the basin, and conducts an assessment program to pay for operating expenses and the cost of the imported replenishment water. The district has an ongoing effort to increase available local water supplies through innovative programs such as expanding the capacity of existing percolation facilities, treating poor-quality water to make it useable, and reclaiming water.

The geology of the groundwater basin consists of alternating layers of uncemented fine- and coarse-grained sediments in a synclinal trough that plunges toward the northwest. Wellbores typically penetrate 10 to 15 different water-bearing layers over a depth of up to 1,500 ft [460 m]. By the mid-1980s, OCWD had determined that information on the piezometric level and water quality of each aquifer layer was required to optimize management of the recharge, storage, and recovery of groundwater.

[Click here to read the complete case study.](#)

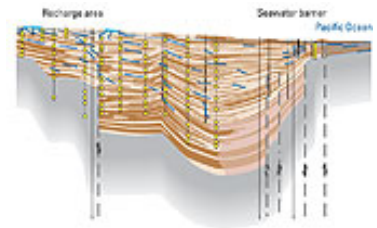
## SWS Exhibiting at Workshops & Conferences Around the World

### Upcoming Events

- [CSPG-CSEG Joint Convention - Let it Flow](#)  
**Dates:** May 14-17, 2007  
**Location:** Calgary, Alberta
- [Vancouver Rocks 1st Canada-US Rock Mechanics Symposium](#)  
**Dates:** May 27-31, 2007  
**Location:** Sheraton Wall Centre - Vancouver, BC



Orange County Water District facilities along the channel of the Santa Ana River



Detailed groundwater monitoring improves insight into groundwater flow within the OCWD service area in Southern California.



[Learn more about our Consulting Services!](#)

For more information, please contact:

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Email: [sws-services@slb.com](mailto:sws-services@slb.com)

Website: [www.waterloohydrogeologic.com/consulting/consulting\\_services.htm](http://www.waterloohydrogeologic.com/consulting/consulting_services.htm)

## Environmental and Groundwater Modeling Course Line-Up

Schlumberger Water Services has finalized its calendar of training course locations and dates for 2007. We will be offering a full suite of Professional Short Courses on topics ranging from groundwater modeling using finite difference (Visual MODFLOW) and finite element (FEFLOW), to GIS data management for environmental professionals, aquifer performance test analysis, water quality data management, contaminated site risk assessment and regulatory review of hydrogeology studies. We will also be offering some specific customized courses that were tailored to meet the needs of specific industry sectors. As in other years, we will be offering all of our standard SWS "Open Enrolment" courses at our training facilities in Waterloo, Ontario, Canada as well as at various selected venues around the world.

If you are interested in one of our courses, or if you would like to discuss a customized "On-site Training Course", simply contact our Training Department at [sws-training@slb.com](mailto:sws-training@slb.com) and we will work with you to develop a course that provides the content, topics, laboratory exercises and software that you require.

Can't make it to one of our Open Enrollment Courses? Call us about our [On-Site Custom](#) Courses designed to suit your specific needs!



[Download](#) our 2007 Training Course Schedule!

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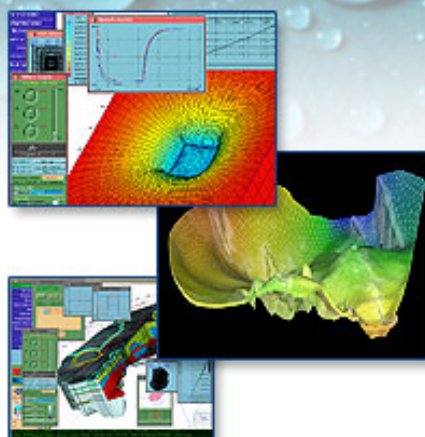
### TRAINING COURSE SPOTLIGHT!

## Finite Element Groundwater Modeling

Advanced Applications for Saturated/Unsaturated Flow & Transport, Density-Dependent Flow and Heat Transport



**Advanced applications of groundwater flow and contaminant transport models using the Finite Element method are covered in this 4-day hands-on course. This course provides a more complete understanding of the use and applicability of finite elements in groundwater modeling**



Course Details: [Visit our website for more details](#)

Registration: [Register online today!](#)

## COUPLED GEOCHEMICAL & TRANSPORT MODELING COURSE

August 6-10, 2007, Colorado

The course is designed to introduce the participants to the model-based quantification of a wide range of water quality problems from various industries and disciplines, e.g., contaminant hydrology, mining and water supply

### Taking this short course will help groundwater practitioners:

- Understand the basics of coupled geochemical transport modeling.
- Learn how to apply state-of-the-art models to real-world water quality problems.
- Apply the theoretical framework with hands-on experience in the computer lab.
- Use the modeling tools MODFLOW, MT3DMS, PHREEQC-2 and PHT3D (which couples MT3DMS and PHREEQC-2).
- Approximately half the time of the course is devoted to computer labs. Simplified exercises that are based on real-world problems will help participants to translate theory into practice.

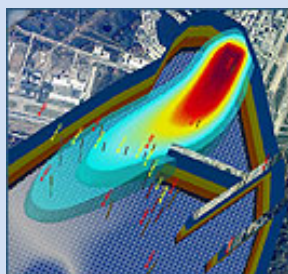
### International Groundwater Modeling Center

Phone: +1 303 273-3103

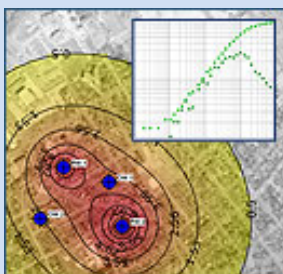
Fax: +1 303 384-2037

Email: [igwmc@mines.edu](mailto:igwmc@mines.edu)

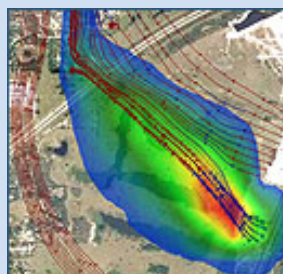
## OTHER POPULAR COURSES OFFERED AROUND THE WORLD...



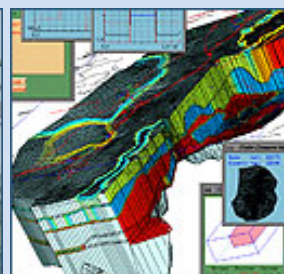
Applied Groundwater Flow & Contaminant Transport Modeling



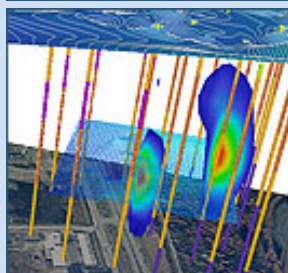
Aquifer Test Analysis



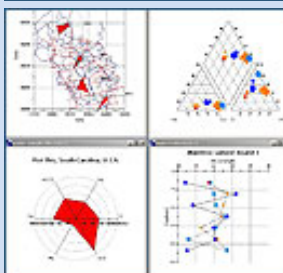
Contaminated Site Risk Assessment and Groundwater Modeling



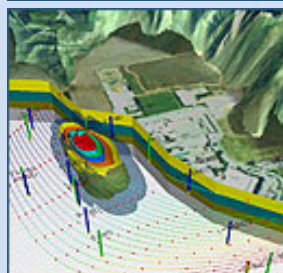
Finite Element Groundwater Modeling



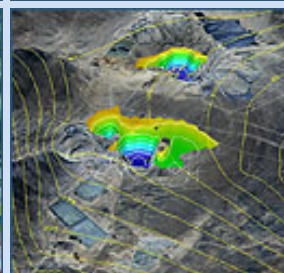
Making Sense of Environmental Data with HydroGeo Analyst



Water Quality Data Management & Modeling



Regulatory Review of Hydrogeology Studies



Modeling for the Mining Industry

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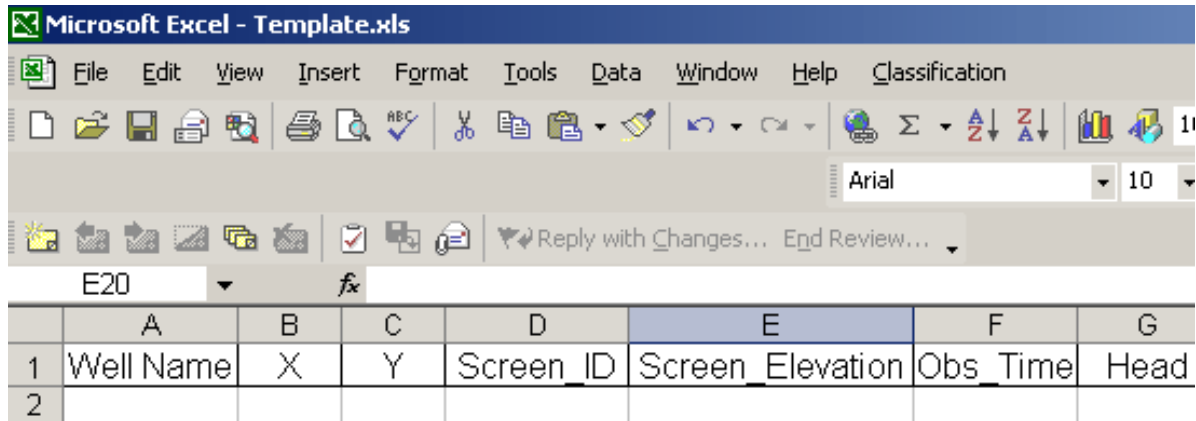
## Tips & Tricks

### Importing Diver Data into Visual MODFLOW v4.2

Once you have exported the .MON file from the Logger Data Manager (refer to the [Visual FAQ](#)), you can import this data into Visual MODFLOW v4.2 as head observations.

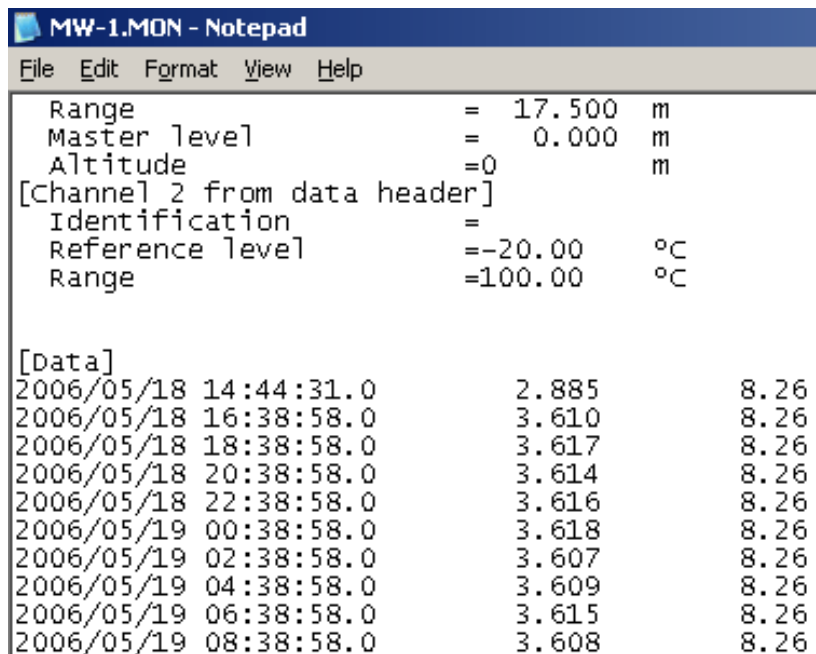
Please follow the steps below to modify the .MON file to allow this information to be easily imported into Visual MODFLOW

1. Create a new Excel Spreadsheet with the following headers: Well Name, X, Y, Screen ID, Screen Elevation, Observation Time and Head.



2. Enter data for the following fields Well Name, X, Y, Screen ID and Screen Elevation based on your knowledge of the site.

3. In the .MON file the date and time are recorded. This time data must be converted to the same unit as the Visual MODFLOW model is using (i.e. days). In this example the diver data time is in the following format: Date and Time



This data must be converted to the time units defined by the Visual MODFLOW simulation, in this example, days. We can assume for this example that the first day of simulation starts at midnight on the first day of the water level observations.

4. Convert the times from the diver data file into the time in days and enter this into the spreadsheet.
5. Copy and paste the water level readings to the corresponding times in the spreadsheet.
6. Copy the data for the Well Name, X, Y, Screen ID and Screen Elevation values for each water level entry.

| Well Name | X   | Y    | Screen_ID | Screen_Elevation | Obs_Time | Head  |
|-----------|-----|------|-----------|------------------|----------|-------|
| MW-1      | 300 | 1635 | A         | 16.5             | 0.58     | 2.885 |
| MW-1      | 300 | 1635 | A         | 16.5             | 0.66     | 3.61  |
| MW-1      | 300 | 1635 | A         | 16.5             | 0.75     | 3.617 |
| MW-1      | 300 | 1635 | A         | 16.5             | 0.833    | 3.614 |
| MW-1      | 300 | 1635 | A         | 16.5             | 0.92     | 3.616 |
| MW-1      | 300 | 1635 | A         | 16.5             | 1        | 3.618 |
| MW-1      | 300 | 1635 | A         | 16.5             | 1.08     | 3.607 |
| MW-1      | 300 | 1635 | A         | 16.5             | 1.16     | 3.609 |

Multiple wells may be added to each spreadsheet, provided that each row contains all of the required information for each column.

7. In Visual MODFLOW, add this data as a new head observation well. In Visual MODFLOW select Input>Wells>Head Observation Wells.

8. From the toolbar on the left hand side select Import Obs. and browse to the appropriate file.

9. Map the columns to the appropriate fields and ensure that you remove the headers from the import. Select next:

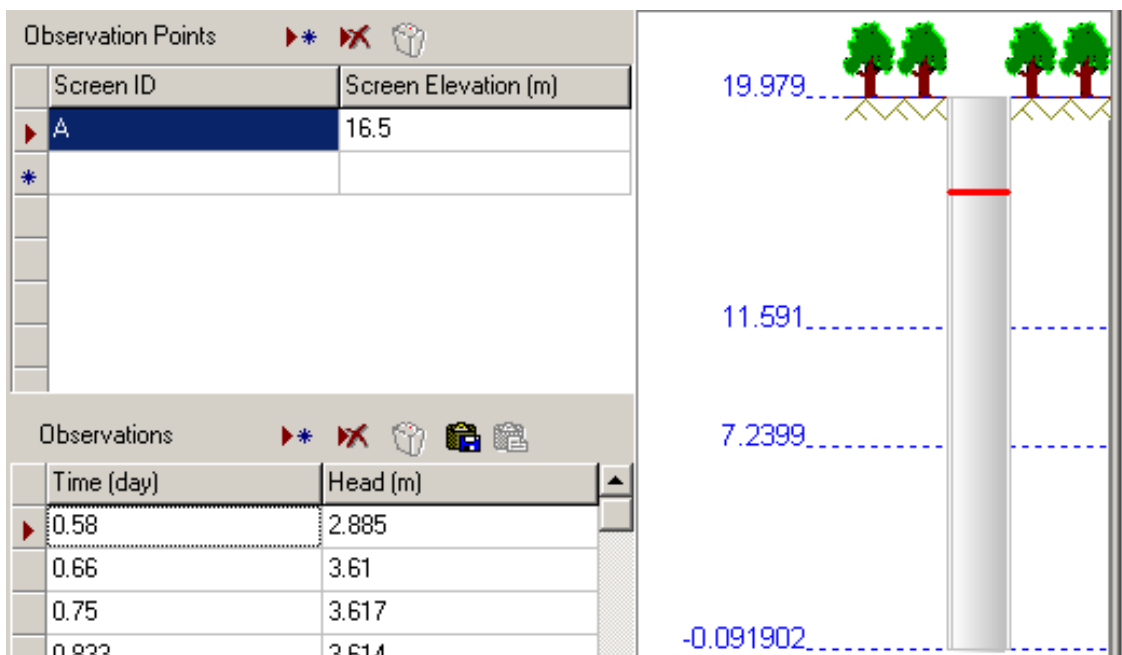
|  | Required Data          | Match to column number... | Fill |
|--|------------------------|---------------------------|------|
|  | Well Name              | 1                         |      |
|  | X co-ordinate [m]      | 2                         |      |
|  | Y co-ordinate [m]      | 3                         |      |
|  | Screen ID              | 4                         |      |
|  | Screen Elevation [m]   | 5                         |      |
|  | Observation Time [day] | 6                         |      |
|  | Head [m]               | 7                         |      |

| No. | WellName #1 | X #2 | Y #3 | Screen_ID #4 | Screen_Elevation #5 | Obs_Time #6 | Head #7 |
|-----|-------------|------|------|--------------|---------------------|-------------|---------|
| 2   | MW-1        | 300  | 1635 | A            | 16.5                | 0.58        | 2.885   |
| 3   | MW-1        | 300  | 1635 | A            | 16.5                | 0.66        | 3.61    |
| 4   | MW-1        | 300  | 1635 | A            | 16.5                | 0.75        | 3.617   |
| 5   | MW-1        | 300  | 1635 | A            | 16.5                | 0.833       | 3.614   |
| 6   | MW-1        | 300  | 1635 | A            | 16.5                | 0.92        | 3.616   |
| 7   | MW-1        | 300  | 1635 | A            | 16.5                | 1           | 3.618   |
| 8   | MW-1        | 300  | 1635 | A            | 16.5                | 1.08        | 3.607   |
| 9   | MW-1        | 300  | 1635 | A            | 16.5                | 1.16        | 3.609   |
| 10  | MW-1        | 300  | 1635 | A            | 16.5                | 1.24        | 3.615   |
| 11  | MW-1        | 300  | 1635 | A            | 16.5                | 1.36        | 3.608   |
| 12  | MW-1        | 300  | 1635 | A            | 16.5                | 1.5         | 3.608   |

A validation screen will appear, highlighting any invalid entries. Select Finish to import the data.

10. The new observation wells will appear in the model domain. Verify the observations in these wells by selecting 'Edit Obs.' from the left hand toolbar.



For more information, please contact:  
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 Email: [sws-support@slb.com](mailto:sws-support@slb.com)  
 Website: [www.waterloohydrogeologic.com/support.htm](http://www.waterloohydrogeologic.com/support.htm)

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**Thank you for reading Water Solutions in Perspective.**

For more information about Waterloo Hydrogeologic, please visit: [www.waterloohydrogeologic.com](http://www.waterloohydrogeologic.com)



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1. On your Outlook menu bar, go to: Actions > Junk E-Mail > Add Sender's Domain to Safe Sender's List.
2. After adding the "waterloohydrogeologic.com" domain, go to Tools > Options > Security tab > Download Pictures section > Change Automatic Download Settings button.
3. Select "Permit downloads in e-mail messages from senders and to recipients defined in the Safe Senders and Safe Recipients Lists used by the Junk E-mail filter."

