ON THE LEVEL

Water Monitoring News and Updates

Solinst®

High Quality Groundwater and Surface Water Monitoring Instrumentation

IN THIS ISSUE

SPRING 2010

New Product Release From Solinst!

Model 464 Easy-to-Use Electronic Pump Control Unit

The New Model 464 Pump Control Unit is designed to work with Solinst Pneumatic Pumps to provide high quality groundwater samples.

- Very easy to operate
- 125 psi output
- Pre-set flow rates
- Saves up to 99 user-created flow rates
- Uses 4 AA alkaline batteries, that last for 40,000 drive/vent cycles (100 hours)
- Can operate manually, no power required
- Quickly connects to pump and compressed gas source

Solinst **Bladder Pumps** have low flow capability and ensure that no drive gas comes into contact with sample water, which makes them ideal for VOC sampling. Using a Model 464 Pump Control Unit, along with a Solinst 12V Compressor, allows very slow compression of the bladder. This causes less disturbance to the sample water, providing higher quality samples.

Next Olympic Site Uses Levelogger Gold And Junior

Photo Courtesy of: London 2012

As the Olympic torch is passed from our hands in Canada, huge efforts are underway for the 2012 Summer Olympics set to take place in London, England. In preparation for the games, a new Olympic Park is being constructed in Stratford, East London. In the works since 2005, the Park spans 500 acres and features a new stadium to seat a crowd of 80,000.

The grounds chosen for the venue are located on a Brownfield site with an extensive history of industrial use. As such, the area required remediation prior to commencing construction of the Park.

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Automatic or Manual Barometric Compensation of Your Levelogger Data

Automatic Barometric Compensation

Submersed Leveloggers measure total or absolute pressure (water column equivalent + barometric pressure). In order to accurately determine the true changes in water level only, barometric pressure fluctuations must be taken into account.

The simplest method to accomplish this is by the use of a Barologger suspended above high water level in one well on-site (approximate coverage is 20 miles (30 km) and within an elevation of 1000 ft (300 m)). This records ambient barometric fluctuations over time and allows quick and intuitive barometric compensation via the software wizard, using the data files from both the Barologger and any Leveloggers in the area.

Manual Barometric Compensation

If an on-site Barologger is not available, your data can be compensated using alternate barometric data (e.g. from a local weather station).

To accomplish an accurate manual barometric compensation, the atmospheric pressure station should not be greater than 20 miles (30 km) away and within an elevation change of 1000 ft (300 m). In addition, the date and time of the barometric data should cover the range of data collected by the Levelogger.

Since most atmospheric pressure devices output barometric data in inches of Hg or kPa, the data must be converted to feet or meters of water. Then 31.17 ft or 9.50 m must be subtracted, since Leveloggers only record readings above that value.

Conversion from Inches of Hg to Feet of water column equivalent:
Example: 30 inches of Hg:
30 Inches of Hg x 1.1330 = 33.99 - 31.17 = 2.82 feet H_2O

Conversion from kPa to meters of water column equivalent:
Example: 101.40 kPa:
101.40 kPa x 0.1022 = 10.36 - 9.50 = 0.86 meters H_2O

** Values in red denote pressure conversion factors; consult the Levelogger User Guide to obtain common pressure conversions*

Once the final calculated barometric pressure values are obtained, they are subtracted from the Levelogger data set. Since the Levelogger data can be easily exported as a .csv (comma separated value) file using Levelogger Software, all manual corrections can be performed in an external spreadsheet program, such as Excel.

In an example where the uncompensated Levelogger data is a water level of **10 ft**, from the calculation above, the manual compensation for a barometric pressure of 30 inches of Hg, would be: **10 ft – 2.82 ft = 7.18 ft.**

CMT Used to Measure Mass Flux at a Complex Site

CMT System being installed in a monitoring well

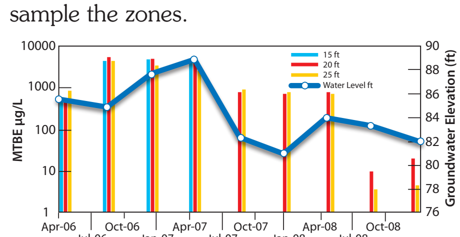
In a town in the Piedmont physiographic province, in the mid Atlantic, a proposed water supply well was contaminated with methyl tert butyl ether (MTBE). The well is located down gradient of several gas service stations with multiple known sources of MTBE. As such, a remedial effort was required by Virginia Department of Environmental Quality to clean up the gas station sites in order to protect the well from further contamination.

Gannett Fleming, an engineering consulting firm, was retained for investigation and remediation work at one of the service stations. As part of the VA DEQ corrective action process, Gannett needed to develop an on-site MTBE remedial endpoint. The geology of the site consists of silty sand overlying fractured rock. Due to this complex geology, as well as the presence of multiple MTBE sources in the town and general lack of hydrogeological data, the use of a numerical or analytical model was determined to be unsuitable. The mass flux model was selected to be the most appropriate method to calculate on-site cleanup levels protective of the down gradient potable well.

Mass flux is an estimate of the rate of mass flowing through a cross sectional area in groundwater, measured in unit of mass per time (grams per day). To calculate mass flux, a transect of monitoring wells perpendicular to groundwater flow is required to define the vertical and horizontal extent of a contaminant plume over time. To accurately determine the mass flux of this site, CMT multilevel monitoring wells were installed across the site to delineate MTBE concentrations.

A total of eight CMT wells were installed in a transect. Seven wells were installed in March of 2006, and an additional well was installed in August of 2007. All of the CMTs were 7-channel and monitored 4 to 6 zones depending on the depth of the drilled hole. The wells were completed with sand packs around the sample ports and bentonite backfill between the sampling zones. Some of the CMT wells were installed across the bedrock surface with some sampling zones in the overburden and some in fractured bedrock.

Beginning in April 2006, water elevation measurements and groundwater samples from each of the zones in the CMTs were taken quarterly. A peristaltic pump with 1/4" ID polyethylene tubing was used to purge and sample the zones.



With mass flux values successfully calculated, remedial activities began in 2007. Groundwater extraction was started in 2007 and soil vapor extraction in 2008. Currently, the CMT wells continue to be gauged and sampled every three months to monitor mass flux during the on-going remediation efforts.

Acknowledgments: Solinst thanks Kenneth T. Guttman and Donna K. Beares of Gannett Fleming for providing the details of this application.

New RRL Gold Radio Telemetry System

The Solinst **RRL Gold Radio Telemetry System** offers a very simple and inexpensive method of local telemetry. The wireless system is designed to collect real-time water level data, logged by up to four Solinst Leveloggers and send it via short-distance radio to your computer.

The RRL Gold is excellent for small, closed loop networks, such as mine sites and landfill monitoring networks. Systems save time and money by limiting the need to travel to each remote location for data collection.

RRL Gold stations can communicate over distances up to 30 km (20 miles) line-of-sight. Each RRL Station is interchangeable, and can be programmed, using an intuitive software wizard, as a Home Station, Remote Station or Relay Station.

Data collected is stored in an Access database on the Home Station computer, and can be exported for use in other programs, allowing self-management of data.

Next Olympic Site Uses Levelogger Gold and Junior

(continued from page 1)

As part of the environmental assessment and remediation process, groundwater level measurements were required for two separate projects. The first project required long-term monitoring in boreholes across the entire site, with some of the boreholes influenced by tidal fluctuations.

The data loggers will be submerged for several years, and may be exposed to saline or potentially contaminated groundwater. The Levelogger Gold was chosen for this application. The data loggers provide the accuracy, robust memory, and durable zirconium nitride coating to handle the demanding conditions.

The second project included 3 weeks of pumping tests in 36 separate wells. Due to the large number of wells, the contractors required instruments that provided reliable, automated water level measurements - at a reasonable cost. The low cost Levelogger Junior was ideal. The Levelogger Junior provided the benefit of automated sampling, which minimized the time spent by personnel in the field, and ultimately reduced the cost of the project significantly.

Photo Courtesy of: London 2012

The Levelogger Gold and Levelogger Junior are both high quality instruments that provide data the user can have confidence in. Each has different features and advantages, which suited the individual applications perfectly. The high quality data loggers, along with the technical expertise of Waterra UK, made these projects more manageable and provided the critical data needed for such a high profile and prestigious event.

Levelogger Aids in Design and Monitoring of a Stream Restoration Project

Over the last two years, researchers in the Department of Civil and Environmental Engineering at the University of Louisville have been conducting an extensive assessment on a stream in Oldham County, Kentucky. The stream, which can be classified as “headwater”, has a drainage area of about 2.8 square miles (7.2 square kilometers) at the upstream end. The purpose of the assessment is to collect data which will aid in the design and define the objectives of a stream restoration project. The main channel to be restored is approximately 2,700 feet (825 m) long, with several small tributaries.

A number of Solinst Leveloggers are being used at various locations along the project site. Two monitoring wells adjacent to the main channel are each equipped with a Levelogger Gold to record the changes in groundwater levels, every 15 minutes. Three Leveloggers are located in the channel bed to monitor flow levels with time. The Leveloggers are attached to metal plates, which are bolted to concrete blocks installed flush with the streambed. They are set to record every 5 minutes. Groundwater and stream flow readings are being correlated to assess the interaction between flow in the channel and flow in the aquifer.

Levelogger installed flush with the streambed

Of these Leveloggers installed in the streambed, one is set next to a turbidity probe and a water sampling device used to collect suspended sediment samples and turbidity readings. In addition to flow measurements taken with an ADV (Acoustic Doppler Velocimetry) device, this data is being used to build a stage-discharge relation for the site.

Leveloggers are also stationed on the abutments of two bridges along the main channel. They are set inside vented PVC tubes, and are also used to measure flow levels. The data collected from these and the other Leveloggers in the streambed were used to calibrate a 1-dimensional flood study model. Modeling the effects of the project on the 100-year flood elevations along and adjacent to the channel is a permitting requirement for the restoration project.

During the assessment, the Levelogger data is being downloaded in the field using a Leveloader Gold data transfer device. Researchers are also using a Barologger Gold at the site to obtain barometric pressure readings to compensate the Levelogger data.

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Levelogger Aids in Restoration Project

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Once the restoration is complete, the data collected during the assessment period will be compared with monitoring data to evaluate the efficacy of the design and construction techniques. Construction for the project started last fall.

Photo at left: Duncan Gatenbee, an undergraduate research student, downloads data using a Leveloader Gold.

Acknowledgement: Solinst thanks William S Vesely, of the University of Louisville for providing the photos and details of this project.

Bladder Pumps Exceed Sampling Criteria

A nuclear power facility in England has an extensive groundwater monitoring well network that requires regular sampling. Golder Associates, the project team who developed the network, wished to update their sampling equipment and protocols to improve efficiency, while maintaining accuracy and high safety standards. A set of objectives was defined to help determine the ideal solution:

- Minimize purge volumes and wastewater disposal
- Sampling possible by one technician
- Economical and easy to maintain
- Control flow rates to lessen spillage
- Ensure high quality of sample

Upon review, Solinst **Bladder Pumps** were selected, as they are able meet all of the outlined objectives. With the use of a Solinst Pump Controller, the pumps can be easily adjusted to provide a continuous output of 100 ml/min or less.

Over 120 Bladder Pumps were purchased for use at the facility.

At a low level nuclear waste processing facility located in the same region, more than 50 monitoring wells require regular groundwater sampling. Solinst Bladder Pumps were again selected for the job. Initially, twenty-five dedicated pumps were installed in selected wells, and a small portable version was purchased for convenient sampling from other wells. With the success of the initial pump installations, numerous additional pumps have been installed since.

Both these locations adhere to very high requirements in terms of operational standards in order to comply with a demanding combination of technical, disposal, and safety criteria. Using Solinst Bladder Pumps, the project teams successfully introduced low flow sampling protocols, which allowed them to meet all of their goals and provided numerous advantages, including:

- Reduced purge volumes
- Less time required to obtain each sample
- More representative samples
- Improved quality control
- Cost savings

Thanks is extended to Waterra UK for providing expert technical support and field assistance to the project teams tasked with instrumenting these two critically sensitive locations.

Come See Solinst Equipment (for more visit: www.solinst.com/Tradeshows/)

Date	Event	Place
June 15-18, 2010	Toward Sustainable Groundwater in Agriculture	San Francisco, CA
June 15-17, 2010	Green Remediation Conference	Amherst, MA
Sept 1-4, 2010	Arizona Hydrological Society Symposium	Tucson, AZ

Water Level Meters "Second to None"

James Sullivan, Staff Environmental Scientist with GeoTrans Inc., has been very satisfied with the use of Solinst instruments in a variety of groundwater monitoring projects:

"The reliability of **Solinst Water Level Meters** is second to none when it comes to accuracy, precision and durability. In the groundwater field I have utilized several different types of water level meters, and the Solinst meters fit all purposes when it comes to taking hydraulic field measurements. I use the Solinst Model 102 Coaxial Cable Water Level Meter for multilevel monitoring wells, due to the coaxial slim design and weighted end, which makes it easy to tag the water column in narrow diameter monitoring devices.

In one ongoing study, utilizing Solinst **Levelogger Gold** transducers, I use the Solinst Model 101 and Model 102 Water Level Meters to measure the depth to the water in over seventy-five wells. The data from the water level meter and the transducer data are read, and then a simple calculation is performed to get the water level elevation. The accuracy of the measurements never ceases to amaze me. The overall reliability, ease of use, and ability to check the transducer measurements with some simple math and a monitoring point elevation is always a benefit to any groundwater research."

- James Sullivan, Staff Environmental Scientist, GeoTrans Inc.

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