ON THE LEVEL

Water Monitoring News and Updates

Solinst®

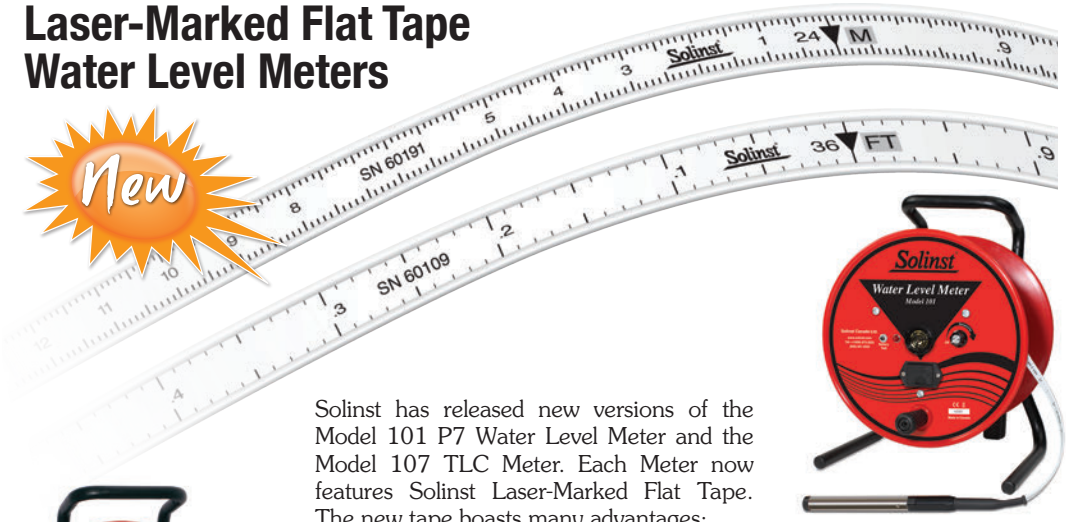
High Quality Groundwater and Surface Water Monitoring Instrumentation

IN THIS ISSUE

FALL 2012

Product Advancement From Solinst!

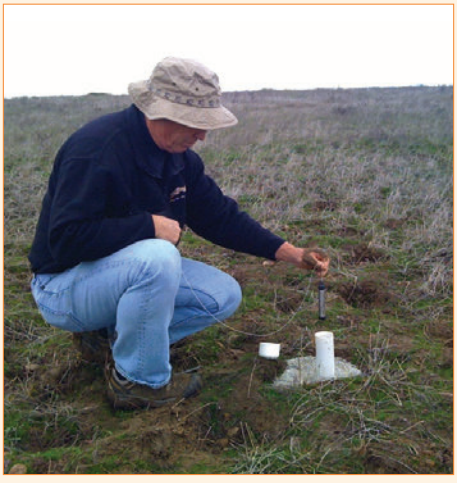
Laser-Marked Flat Tape Water Level Meters



Solinst has released new versions of the Model 101 P7 Water Level Meter and the Model 107 TLC Meter. Each Meter now features Solinst Laser-Marked Flat Tape. The new tape boasts many advantages:

- Accurate markings each mm or every 1/100 ft.
- Certified Traceable to National Standards
- Durable, non-stretch PVDF Flat Tape
- Suitable in a wider range of environments
- Enhanced dog bone design that reduces adherence to wet surfaces
- Increased tensile strength, abrasion resistance and electrical efficiency
- Allows the TLC Meter to be available in lengths to 1000 ft. (300 m)
- Pressure proof tape splice option

Levelogger Proves Useful in Ecohydrological Research



Vernal wetlands are temporary pools of water that fluctuate seasonally with complex hydrological processes. They receive inputs from precipitation, runoff, and subsurface flow, and are influenced by geology, soil, and climate. This creates a unique habitat for diverse flora, amphibians and insects, including some threatened and endangered species.

The Institute for Ecohydrology Research in Davis, California is conducting research to develop the most accurate and reliable method to measure the hydrological functioning and performance of natural and created vernal pool wetlands. They are using Solinst Leveloggers at various sites to demonstrate to the Department of Defense and other federal U.S. facilities, a cost-effective method of collecting superior hydrological data.

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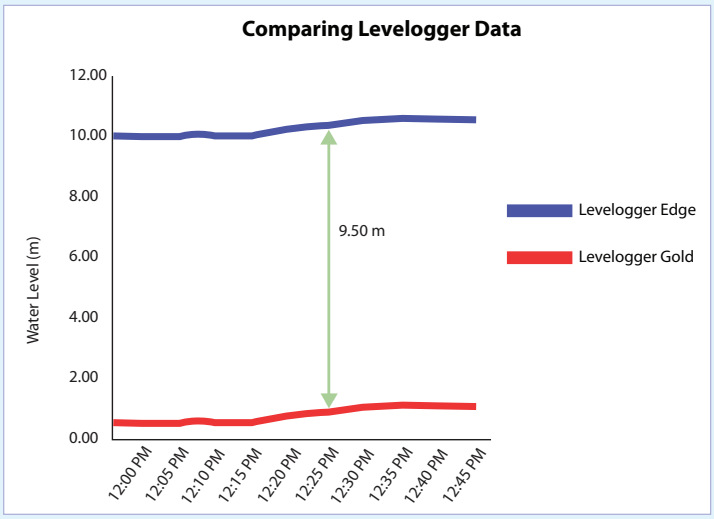
Levelogger Edge vs. Gold: Offset Differences Explained

Have you noticed a difference in raw water level (pressure) readings when comparing data recorded by the latest Levelogger Edge line versus previous models?

The reason is that the Levelogger Gold, Junior and LTC Junior, provide water column equivalent values above the datalogger's zero point of 9.5 m/ 950 cm/ 31.17 ft. The latest Levelogger Edge models have no zero point offset; therefore, while each model measures the same pressure, the data will appear different. (See the graph at right.)

Do you need to consider this during data interpretation?

Not if you are using the latest Version 4 Levelogger Software. Barometric Compensation between the same, or a mix, of Levelogger models automatically considers this zero point offset difference.



When comparing water level data from a Levelogger Edge and a Levelogger Gold, the Edge data displays higher values, but the two loggers are actually recording the same pressure. The Levelogger Gold is reading values above its zero point offset of 9.50 m. The Levelogger Edge has no offset.

Levelogger Proves Useful in Ecohydrological Research

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Top: Vernal pool wetland during spring season with slotted PVC pipes containing Levelogger Juniors at a research site near Sacramento, California

Bottom: Vernal pool wetland in wet season with slotted PVC pipes containing Levelogger Junior at research site near Sacramento, California

Currently, their on-going research includes a Department of Defense Environmental Security Technology Certification Program (ESTCP) demonstration project at Beale Air Force Base. There are 130 Leveloggers already being used. Future plans to implement Leveloggers in an environmental consultation and monitoring project are underway.

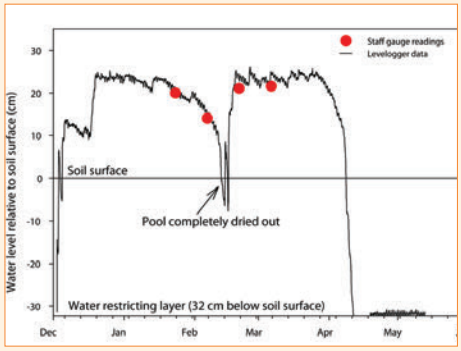
Leveloggers are also being used for research at Travis Air Force Base, where 20 Leveloggers have been installed. In addition, a project at Mather Field has over 20 Leveloggers being used to measure vernal pool hydrology, and have been for five consecutive years.

At these sites, Levelogger Junior F15/M5 Models are installed in slotted PVC pipes, and positioned on top of water restricting soil layers. They are placed in upland and vernal pool wetlands, and set to record either surface or subsurface data. The water level data is collected once at the end of each wet season. The Leveloggers are removed from the field after the pools completely dry out and, from there taken to their office to download data.

Leveloggers allow the automatic collection of hourly water level data, compared to traditional staff gauge or water level meter measurements that are manually collected on a less frequent basis. The main benefit of using Leveloggers for monitoring vernal pools is the ability to continuously record water during the entire wet season. This is not possible with the traditional monitoring methods.

Niall McCarten, Executive Director of the Institute, is pleased with the results of the research so far: "We have found the Solinst Leveloggers to be very user friendly, cost-effective, and reliable. This technology provides a much higher scientific data standard than existing methods for monitoring wetlands." From the continuous datasets, they are able to see if the vernal pools experience any mid-season dry-outs, which can be detrimental for invertebrate species living in the pools.

Overall, the information they gain can be used to better understand the differences between natural and created wetlands, and lead to more efficient design and implementation of pools created for compensatory mitigation purposes.



Hourly Levelogger data compared to less frequent manual staff gauge readings

Solinst thanks Niall McCarten Ph.D., Executive Director of the Institute for Ecohydrology Research, for providing the details of these projects.

New Biofoul Screen for the Levelogger

The Biofoul Screen is designed to let water freely flow through to the pressure and conductivity sensors.

During extended deployments, especially in saltwater environments, there is the risk that Leveloggers will encounter biofouling on the pressure and conductivity sensors.

The new Biofoul Screen is designed to fit onto the sensor end of any Levelogger model. The natural anti-fouling characteristics of copper protects the sensors from build-up of unwanted microorganisms, plants, algae, or organisms such as barnacles or mussels, which could affect the reliability of the sensor readings.

The Biofoul Screen is an affordable option, reducing the need for maintenance, and lengthening the time that a Levelogger can be deployed. It improves the long-term performance of the Leveloggers and ensures reliable water level and conductivity measurements.

Waterloo Emitters Provide an Ongoing Solution

Waterloo Emitters were installed as a fence to cut-off migration of a contaminant plume.

An aquifer in Central Ontario became contaminated with BTEX and PCH F1 (Petroleum Hydrocarbons – Fraction #1[i]) from leaking underground infrastructure linked to a gas station. The groundwater in the aquifer flows between 3 -13 meters a year, as such, a voluntary cleanup of the aquifer was initiated to remediate the plume source, and to stop the dissolved plume phase from moving off-site.

The unconfined aquifer consists of fine sand, with the water table approximately 16 meters below ground surface. The contaminant plume extends approximately from the water table to 2 -3 meters below, and is about 40 meters wide.

It is a commercial site, so the client needed a solution that was not highly visible and had minimal site disturbance, or disruption to normal site activities. Because the dissolved plume is located deep within the subsurface, and after initial geochemical testing showed that the plume was oxygen-limited, the Solinst Waterloo Emitter was chosen as the primary remedial device for the dissolved phase plume.

In the summer of 2009, 58 Waterloo Emitters were installed in 29 wells. Two Emitters were installed in each well. The wells were spaced 1.5 meters apart, and positioned as a fence down gradient from the source, perpendicular to groundwater flow.

The Emitters were installed in 4" PVC wells that had screens across and below the water table, with allowances for seasonal fluctuations. 3.8" diameter Waterloo Emitters were used, some with LDPE tubing, while in the higher flux areas of the plume, more diffusive silicon tubing was used. Oxygen is supplied to the Emitters using cylinders stored in a secured shed at surface.

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LTC Levelogger Junior Used to Monitor Hydrofracturing in Elk County

The Clarion River was once thought to be the most polluted waterway in Pennsylvania. Now, after decades of cleanup efforts, it has sections designated as part of the National Wild and Scenic River program in the USA. Communities value it for recreation, habitat for wildlife, and in Elk County, Pennsylvania, the tributaries and underground springs that flow into the Clarion River are the primary source of drinking water.

In recent years, there has been increasing development of the Marcellus Shale in the area, including hydrofracking. This has spurred a new monitoring program into action.

Elk County Conservation District's Watershed Specialist, Kim Bonfardine, is leading the Elk County Water Monitoring Project. The Project is designed to collect baseline water quality data throughout Elk County. This encompasses all watersheds the County crosses, portions of the Allegheny forest, and other tributaries of the Allegheny and Susquehanna Rivers.

LTC Levelogger Junior dataloggers are calibrated in the field before deployment

The program aims to gather pre-drilling water quality data. It will also provide on-going real-time data to act as an alarm system for any changes in water quality, or pollution events that may occur as nearby operations intensify.

One hundred percent of funding for the program is being provided through grants from two private, local foundations; the Colcom Foundation in Pittsburg and Stackpole-Hall Foundation in St. Marys.

The program includes the use of the Solinst LTC Levelogger Junior to monitor changes in water level, temperature, and conductivity in rivers and streams. Conductivity readings provide a general indication of the water quality, while the water level and temperature readings may be used to provide background information when any spikes or significant changes in conductivity readings are noticed.

The project started by placing the Leveloggers in various streams, for two weeks each season to record baseline data, and to track any seasonal changes.

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LTC Levelogger Junior Used to Monitor Hydrofracturing

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The Leveloggers are being circulated throughout the watersheds to ensure baseline data is collected in all areas of the County.

Currently, twelve LTC Levelogger Junior dataloggers are installed, and set to record every 15 minutes. Some Leveloggers are installed for 6 months, and some are to be deployed for up to a year to collect long-term data.

The Leveloggers are installed in PVC housings, and held in place using a foam sleeve. The PVC housings are tethered to a metal stake using a length of wire. The stakes are used to secure the housings in the deeper parts of the streams.

Kim Bonfardine has been pleased with the performance of the Leveloggers, saying "the ease-of-use, and simplicity of calibration and data downloading have been very positive factors, they are accomplished in the field with the use of a laptop and Levelogger Software."

A goal of the program is to create an online database that is accessible to all residents of Elk County. The database will include all new data collected, as well as historical data dating back to the 1940's.

The program will allow the watershed to be monitored in real-time, and allow trends to be tracked. It will help ensure a safe, clean water supply in Elk County.

Solinst thanks Elk County Conservation District Watershed Specialist Kim Bonfardine for providing the details of this project.

Emitters Provide an Ongoing Solution

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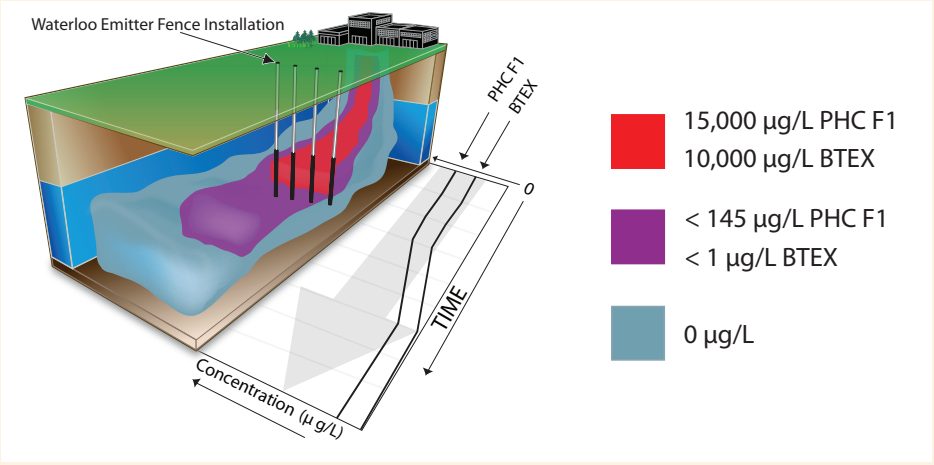

Groundwater flowing to the Emitter fence has much higher concentrations of BTEX and PHC F1 compared to the treated groundwater flowing down gradient from the fence.

The results have been "extremely good", according to Rick McGregor of InSitu Remediation Services Ltd. The system was originally designed to treat Petroleum Hydrocarbon concentrations of about 5,000 µg/L, yet the system has effectively treated 3 times that. In addition, maintenance has been kept to a minimum, and iron precipitation found on the Emitters has not affected their function.

Independent consultants have been monitoring the performance of the Emitters on a quarterly schedule. They collect samples of groundwater down and up gradient, which are analyzed for a variety of inorganic and organic parameters.

Initial Dissolved Oxygen (DO) concentrations were below 1 mg/L. After the Emitters were installed, DO levels increased to more than 12 mg/L, with no changes in concentration over time. Groundwater flowing to the Emitter fence has concentrations of greater than 10,000 µg/L of BTEX and approximately 15,000 µg/L of PHC F1. The treated groundwater down gradient of the fence, has concentrations of less than 1 µg/L BTEX and less than 145 µg/L PHC F1.

The client and InSitu Remediation Services have been very pleased with the results: "The Emitters have provided a cost-effective and robust method for delivering oxygen to the PHC plume while minimizing [operation and maintenance] costs. The system continues to be as effective 3 years after installation as it was on Day 1 with no increase in costs".

[i]"Fraction" refers to the equivalent normal straight-chain hydrocarbon (nC) boiling point ranges (Fraction #1: nC6 to nC10) according to the CCME, 2008.

Solinst thanks Rick McGregor, of InSitu Remediation Services Ltd, for providing the details of this project.

No-Purge Discrete Zone Sampling

No-Purge sampling can be defined as sampling groundwater from a well without any removal of water before sampling. This sampling method is gaining acceptance by many regulatory agencies. Methods are based on the principle that groundwater that flows through a screen into a well, maintains equilibrium with the adjacent water bearing unit. Sampling at the screened interval should result in representative samples, without the need for purging.

When compared to conventional sampling methods, no-purge sampling can eliminate health and safety concerns, as well as reduce costs. There is no purge water to handle or dispose of, and the equipment required is typically simpler and easier to transport. Less labour and shorter sampling times are also benefits.

The Model 425 Discrete Interval Sampler is a no-purge instrument that allows groundwater sampling from specific depths, without mixing of water from different levels. The stainless steel sampler is pressurized before being lowered to prevent water from entering until the desired zone is reached, pressure is released and the sampler fills with water from the discrete zone.

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