

# ON THE LEVEL



Water Monitoring News and Updates

## Solinst®

High Quality  
Groundwater  
and Surface Water  
Monitoring  
Instrumentation

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SPRING 2008

## Which Water Level Meter is Right for You?



The popular Model 101 is the most accurate and reliable of the Solinst Water Level Meters. It uses non-stretch, flat tape with easy-read, permanently embossed markings stamped into the tape every 1/100 ft or millimeter. This model is perfect for clients who require highly accurate, repeatable measurements. The P6 submersible, pressure-rated probe is an option, making the 101/P6 Water Level Meter the recommended choice for those wishing to measure depth to water as well as total well depth.



The narrow, lower-cost Model 102 is ideal if access space is a concern. It has a choice of 1/4" or 3/8" (6.4 mm or 10 mm) diameter probes. Both have segmented weights, excellent for snaking past pumps and down narrow diameter tubes. The lower cost of the Model 102 is a significant advantage, but is offset by fewer markings and thus lower accuracy. Low-profile markings every 5 ft or 1 m are permanently bonded to the heavy-duty jacket on the coaxial cable.

**If durability combined with repairability is important to you, Solinst Water Level Meters give you both.**

## Levelloggers Valuable Tool in West Coast Intertidal Study

Researchers from the Biology Department at Villanova University in Pennsylvania, USA, and the Zoology Department at Oregon State are studying the growth and survival effects of intertidal elevation and wave shock on purple sea urchins (*Strongylocentrotus purpuratus*).

The study is being carried out at seven locations on the west coast of North America: Mabens Beach, British Columbia, Canada; Bodega Marine Reserve, California; Punta Baja, Baja California; and four other locations off the coasts of California and Oregon.

Dr. Michael Russell, professor at Villanova University, says that the overall aim of the study is to determine if large-scale/long-term fluctuations in ocean conditions can be detected as demographic changes in an intertidal organism. The study integrates historical records of life history characteristics with on-going monitoring of physical and biological processes.



Solinst Levellogger installed in a vented protective housing.

At each study location, a subset of tidepools was chosen with differing tidal and wave exposures. Some of the pools contain tagged sea urchins that were studied in the 1980's.

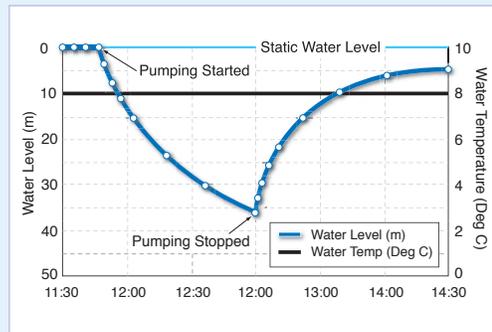
Solinst Levellogger Gold data loggers were selected for this project. Each tidepool was instrumented with a Levellogger Gold to record accurate temperature and pressure readings, in order to document intertidal elevations and pressures from wave action.

(Continued on Page 2)



## Simplify Your Pump Test with a Levelogger Gold

Before the advent of pressure transducers with data loggers, field technicians and drilling contractors were relegated to hours, or even days on site during conventional pumping tests, continuously monitoring water level fluctuations in a vast array of observation wells. Often requiring running from well to well, readings were taken by hand with Water Level Meters. This was time consuming and Subject to human error.



Baseline, Pumping and Recovery Data

Now, with instrumentation such as the Levelogger Gold, data collection is automated, and data analysis simplified. The Levelogger Gold can be programmed with a customized sampling schedule that sets the rates at which water level data is collected for a number of separate intervals. That is to say, you can customize different sampling rates and durations to record water level readings before, during and after the pumping test (baseline, pumping and recovery), as shown in the example at left.

Using a similarly programmed Barologger to record atmospheric pressure fluctuations during pumping tests provides the easiest and most accurate way to compensate Levelogger data. A compensation wizard in the Levelogger Software is used to adjust your data. Compensated data can be viewed directly or exported for use in other programs.

**Schedule Setup Window**

Schedule

Interval: 60 Minute(s)

Duration: 48 Hour(s)

**Pumping**

- 30 sec(s) for 3 min(s)
- 60 sec(s) for 15 min(s)
- 15 min(s) for 120 min(s)
- 30 min(s) for 10 hour(s)
- 60 min(s) for 48 hour(s)

**Recovery**

- 30 sec(s) for 3 min(s)
- 60 sec(s) for 15 min(s)
- 15 min(s) for 120 min(s)
- 30 min(s) for 10 hour(s)
- 60 min(s) for 48 hour(s)

Buttons: Add, Delete, Update, Open, Save

Readings Available: 39805

Run Time: 5 day(s) 36 min(s)

Buttons: OK, Cancel

## More Pump Test Pointers

When using a Levelogger Gold or Levelogger Junior to perform a pumping test, there are a few important things you should consider:

- Select a Levelogger with the appropriate pressure range
- Deploy to a depth beyond maximum expected drawdown
  - It must be submerged for the entire pumping test
- Deploy Levelogger above pump to minimize interference from pump motors and turbulence
- In adjacent observation wells, suspension wire deployment is adequate
  - Reduces costs
- If using a Direct Read Cable the Levelogger can be started at any time
  - Can view and store real-time data with a laptop



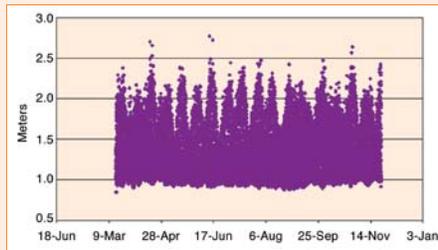
View Real-Time Readings on the Levelogger Gold

- If using a suspension wire, Leveloggers may be started before deployment, or set using the 'future start' option
- Use a standard Water Level Meter (Model 101) for initial and final water level measurements
  - Record date and time
  - Used to adjust data to depth to water or elevation measurements using the 'Manual Data Adjustment' option of the Levelogger Software
- Be sure to record recovery data once steady state is reached and pumping is stopped
  - Considered to be most valuable for determining aquifer transmissivity.

## Leveloggers in Intertidal Study (continued from page 1)



Preparing Levelogger Housing for Study



2007 Levelogger Pressure Readings

Fieldwork began in March of last year. Leveloggers were installed by drilling holes in the rock of the tidepools. Stainless steel pipes were used to house each of the Leveloggers in the holes. The pipes were cemented in place using waterproof epoxy and holes drilled in the caps to let sufficient water enter the housings.

Leveloggers are set to record temperature and pressure readings over the course of one year. Storm duration data and maximum pressure change from wave energy will then be used to correlate with sea urchin growth. So far, researchers are pleased with the use of Leveloggers in the study, and are looking forward to interpreting the data this spring.

Acknowledgements: Solinst would like to thank Dr. Michael Russell of Villanova University for providing details of this study and consent to publish this article.



Register your Levelogger Software at: [www.solinst.com/Registration/](http://www.solinst.com/Registration/) to receive e-mail notifications of new software and firmware features and updates from Solinst.

## CMT Defines Vertical Gradients and Contamination at a UK Landfill Site



White Young Green Environmental Limited (WYG) is an experienced environmental consulting firm operating in the United Kingdom. WYG was given the task of developing a cost effective means to isolate and reliably sample groundwater quality, and obtain hydraulic head data from various zones, in a complex geological setting, to give detailed vertical gradients. The investigation took place at a former landfill site in Southern England that was destined for commercial re-development.

The project's scope was largely driven by environmental contamination. Traditional groundwater monitoring approaches were considered, but nested and clustered wells, proved to be either expensive or, in the case of nested wells, unreliable. WYG selected the Solinst 7-Channel CMT (Continuous Multichannel Tubing) as a more suitable option, installing a total of 19 Systems between 10 m and 25 m (33 ft and 82 ft) below grade. Five to seven screened zones were monitored in each of

the 19 Systems. These screened ports were surrounded by approximately 0.5 m (20") of sand and isolated using layers of bentonite between the sand packs.

WYG found that experienced personnel were able to construct a seven port CMT System in approximately 30 minutes. Although initial material costs to install the CMT Systems were higher than the nested well option, it was concluded that had WYG attempted to gather data of the same reliability using nested wells, if at all feasible, the estimated time on site would have been two to four times longer. In summary, a substantial cost savings was realized due to the reduced drilling and installation time using the CMT system versus traditional nested installations. This was complimented further by reducing the site engineers required time in the field supervising the installation.

Although still in the early stages of data interpretation, the quality of the data provided by the CMT installations appears to be consistent. WYG indicate that using CMT Systems has allowed for a much more detailed understanding of groundwater flow characteristics, identifying multiple contaminant plumes in this application. The high resolution data provided by CMT systems was instrumental in assisting the study team to determine the complex groundwater flow regimes on site.

*Acknowledgements: Solinst Canada wishes to thank Jason Morrissey of WYG for providing the details and assessment of CMT system performance in this project, and Waterra UK for their technical assistance.*

## Levellogger Gold Utilized in Water Resource Projects in Qatar



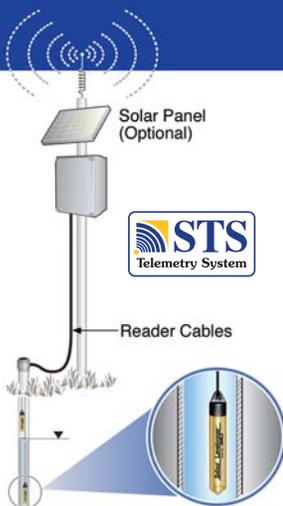
Gulf Laboratories Co., established 35 years ago, operates out of Doha, Qatar, and provides geotechnical and hydrogeological consulting services for water resource and development projects in the region.

Currently, Gulf Laboratories Co. have more than 40 Levellogger Gold units operating in the field for a variety of applications. They have been very pleased with their use of Levelloggers in a number of pumping tests as part of ground investigations being conducted for construction projects in Doha. The data collected by Solinst Levelloggers during the pumping tests provides valuable input into dewatering scheme design. Examples of projects that have benefited from Levellogger technology are Dubai Tower, Al Quds Tower, and the Barwa Financial District in Doha.

In addition, Levelloggers have been used for tidal monitoring, and for long-term groundwater monitoring and pumping tests as part of the Lusail Development groundwater investigations Project. Andrew Slate, general manager of Gulf Laboratories, states: "Levelloggers are very easy to program with the software provided" and that he is very satisfied with how well they have withstood the saline environments they are exposed to.

*Acknowledgements: Solinst would like to thank Andrew Slate of Gulf Laboratories for providing details on project applications and Levellogger performance.*

## New STS Telemetry



Traditionally, telemetry systems only offered basic one-way communication. The new Solinst STS Gold Telemetry System offers the flexibility of two-way communication between the remote station and home station computer, providing a new level of control, diagnostic and upgrade ability.

Designed for use with Levelloggers, STS Telemetry has cellular, radio and satellite communication options. Intuitive software makes the system easy to setup, operate and manage your data. Added features, such as alarm notification, IP addressability, remote diagnostic reporting, and remote firmware upgrades make it easy to maintain the System, while simplifying data collection and management. Power usage is minimized through electronic design and limited modem on-time, using a 'data push' methodology. Power can be supplied through a 12V battery with options for solar panel recharging, or by direct mains connection.

## Bladder Pump or Double Valve Pump Can you tell the difference? Which is Right for You?

Both have their advantages. Integra® Bladder Pumps have low flow capability and ensure that no drive gas comes into contact with sample water, making them ideal, and approved by regulators worldwide for VOC sampling. Select a Bladder Pump for higher regulator acceptance and lower flow rates. Double Valve Pumps provide greater flow rates, as well as low flow capabilities, better performance in silty water, and are low maintenance, with no bladder to replace and fewer parts to decontaminate. Select a Double Valve Pump for faster purging, and operation in harsher environments.



	Integra Bladder Pump	Double Valve Pump
<b>Pump Material</b>	<b>Pump Diameter</b>	
PVC	1.66" (42 mm)	1.66" (42 mm)
316 Stainless Steel	1" and 1.66" (25 mm and 42 mm)	5/8" and 1.66" (16 mm and 42 mm)
PTFE		3/8" (9.5 mm)
<b>Pump Material</b>	<b>Maximum Depth</b>	
PVC	100 ft (30 m)*	100 ft (30 m)
316 Stainless Steel	500 ft (150 m)*	500 ft (150 m)
<b>Pump Diameter</b>	<b>Maximum Flow Rate</b>	
3/8" (9.5 mm)		250 (ml/min)
5/8" (16 mm)		800 (ml/min)
1" (25 mm)	1000 (ml/min)	
1.66" (42 mm)	1500 (ml/min)	3500 (ml/min)

\* Deeper with Drop Tube. (See tip below.)

### Extend Your Pumping Depth

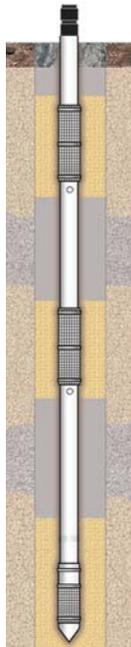
Stainless Steel Integra Bladder Pumps can lift from depths of 500 ft (150 m) below grade, and PVC models from 100 ft (30 m). Samples can be obtained from greater depths using a drop tube assembly. This places the screened filter intake of the pump as deep as necessary to access the sample zone required. Easily installed without tools on existing pumps, even in the field. Pumps are operated in the same manner, maintaining sample integrity.

### Integra Bladders Teflon or LDPE?

Solinst Integra Bladder Pumps have been long known to have Teflon® bladders backed with a 10-year warranty. These are ideal for dedication and VOC monitoring. Solinst also offers an inexpensive disposable polyethylene bladder, for clients who use a portable pump, or prefer to replace bladders at regular intervals, to prevent cross-contamination. Replacement is fast and easy, with no special tools or equipment required.

## Comparing Multilevel Systems

The benefits of depth discrete monitoring have been known for years. Which Solinst system will suit your application?



### The CMT System (Since 1999)

CMT offers in-field design flexibility, low cost and is easy to install. The number of monitoring ports, port locations, install depths, and monitoring strategy, can all be accommodated and designed right in the field. The single tube offers effective sealing. The 7-Channel is 1.7" (43 mm) and the 3-Channel is 1.1" (28 mm).



### The Waterloo System (Since 1983)

Waterloo Systems have a modular design that gives a similar flexibility to application as that of the CMT. Their design is much more suited, however, for deeper installations. The engineered seals and dedicated sampling and level monitoring capabilities have been used to 1000 ft (300 m). They are ideal for use in bedrock and for long term monitoring.

	CMT	Waterloo
<b>Ideal Depth</b>	20 ft – 100 ft (6 m – 30 m)	200 ft – 1000 ft (60 m – 300 m)
<b>Typical Borehole</b>		
Overburden	> 3.25" (8.3 cm) dia. (direct push)	> 5" (12.5 cm) dia.
Bedrock	> 3.25" (8.3 cm) dia.	3" (7.6 cm) to 4" (10 cm) dia.
<b>Isolating Zones</b>		
Engineered Packers	3-Channel	✓
Layers of Sand & Bentonite	✓	✓
Direct Burial	✓	✓
<b>Max# of Sampling Zones</b>	7	24
<b>Measuring Depth to Water</b>		
< 20 ft (6 m) below ground	102 Water Level Meter	102 Water Level Meter
> 20 ft (6 m) below ground	102 Water Level Meter	Vibrating Wire Transducer
<b>Groundwater Sampling</b>		
Dedicated	- 1/4" Mini Inertial Pump - 3/8" Micro DVP	- Bladder Pump - 5/8" DVP
Portable	- Peristaltic Pump - 1/4" Mini Inertial Pump - 3/8" Micro DVP	- Peristaltic Pump - 1/4" Mini Inertial Pump - 3/8" Micro DVP

## Come See Solinst Equipment

For more, visit:  
[www.solinst.com/Tradeshows/](http://www.solinst.com/Tradeshows/)

### April 28-May 1

Federal Contaminated Sites National Workshop  
Vancouver, BC, Canada Booth #70

### May 18-22

2008 National Monitoring Conference  
Atlantic City, NJ, USA Booth #201

### May 19-22

Battelle: Remediation of Chlorinated & Recalcitrant Compounds  
Monterey, CA, USA Booth #108

### June 10-12

Triad Investigations  
Amherst, MA, USA Booth #17

## Share Your Success Stories

Would you like to share your success or interesting applications using Solinst products? We would love to hear your feedback. Just visit our website at: [www.solinst.com/Feedback/](http://www.solinst.com/Feedback/), or call to speak with a member of our Technical Sales Team.