

## Landfill Monitoring Application Note

### Improve Landfill Design with Continuous Water Level Monitoring

*Level TROLL® instruments provide critical data for expansion studies and daily operations*

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#### Application

Long-term ground water level measurements at solid waste landfill sites are used to determine highest measured ground water levels and rainfall/recharge relationships. Landfill design engineers and regulatory agencies use this data to assess the feasibility of expanding existing landfill sites and to develop site-specific design requirements.

#### Characterizing ground water for proposed landfill expansion

Before a municipal solid waste (MSW) landfill can be expanded, hydrogeologists and engineers must evaluate ground water conditions and behavior. These studies fulfill state and federal regulatory requirements and improve engineering plans. Hydrogeological landfill assessments determine:

- Site-specific geology and hydrogeology of the subsurface materials beneath the expansion area.
- Uppermost aquifer dynamics and potential presence of perched saturated zones.
- Ground water confining units.
- Ground water quantity and quality.
- Site-specific rainfall/recharge relationships.
- Potential contaminant migration pathways.
- Site-specific landfill liner design and underdrain issues.
- Optimum locations and depths for ground water monitoring systems.

Landfill design engineers conduct daily and monthly ground water level studies at landfill



sites to facilitate lateral expansions. Depending on regulations, consultants may monitor water levels for at least a year to determine the highest seasonal ground water elevations. Some regulations require daily monitoring of at least one expansion area piezometer.

The results of these water level studies are used to determine the need for landfill underdrains, ground water diversion trenches, engineered gravity feed systems, ground water cutoff structures, or other landfill design specifications. In addition, engineers can determine the disposal volume for an expansion, leachate contingency plans, and the potential for landfill liner failure.

#### Low-cost solutions add benefits

Consultants may be monitoring more than one landfill with numerous monitoring wells. Collecting data from many sites can pose staffing challenges. Technicians pressed for time to collect all the necessary data may make an occasional mistake or miss a measurement.

To reduce overall equipment and personnel costs and to improve the quality of data, In-Situ® Inc. now offers lower-cost water level monitoring solutions. These instruments allow data collection around-the-clock, instead of manual weekly or monthly measurements performed by field technicians.

In-Situ's Level TROLL® 300 and the new Level TROLL® 100 provide continuous, accurate data collection, eliminate chances for error, and reduce operating costs. Instruments can be programmed in the office and installed at key monitoring wells throughout a landfill. In addition, the Level TROLL 300 can be connected to telemetry platforms, such as In-Situ's TROLL® Link system, for remote data acquisition and alarming.

### Continuous data collection can reveal unknowns

Once a consultant installs Level TROLL® instruments at data-collection points, such as expansion piezometers and monitoring wells, the devices start collecting reliable data. Because Level TROLL instruments operate day and night, consultants can characterize ground water events in more detail and may discover aspects previously uncharacterized. A Level TROLL instrument can detect varying, and possibly subtle, trends in ground water system behavior. For example, continuous monitoring helps engineers understand:

- Recharge characteristics such as rates of rise and decline after precipitation.
- Site-specific geological formations that may not have been detectable with core samples or with geotechnical laboratory hydraulic conductivity tests.
- Generic landfill design features that may be precluded from use due to unique site conditions.

### Quality data helps develop leading-edge designs

With continuous level monitoring at several sites over extended periods, consultants acquire detailed knowledge of regional ground water issues. With this information, engineers can customize expansion designs to meet each

customer's budgetary and regulatory requirements. In addition, better designs extend landfill life and maintain ground water integrity.

### New solution reduces costs without skimping on reliability

In-Situ's newest level instrument, the Level TROLL 100, offers the reliability you demand at our lowest cost. Instrument set-up and data transfer are simplified via a docking station with either USB or RS-232 connections. The Level TROLL 100's non-vented design and corrosion-resistant Acetal alloy body allow deployments in all types of environmental waters. All Level TROLL 100s come standard with linear, fast linear, and event log testing and with three depth range options, including 0 to 30 feet, 0 to 100 feet, and 0 to 250 feet. For more information and full instrument specifications, please visit the Level TROLL instrument page at [www.in-situ.com](http://www.in-situ.com).



*Level TROLL 100 with docking station.*

#### For more information contact In-Situ Inc.

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