

# Technical Note

## Remediation Applications

January 2010

### **Biosparging and Air Sparging Using Level TROLL® and TROLL® 9500 Instruments**

#### **Introduction**

In biosparging, air (or oxygen) and nutrients (if needed) are injected into the saturated zone to increase the biological activity of the indigenous microorganisms. It can be used to reduce concentrations of petroleum constituents that are dissolved in groundwater, adsorbed to soil below the water table, and within the capillary fringe.

Air sparging is an in-situ remedial technology that reduces concentrations of volatile constituents in petroleum products that are adsorbed to soils and dissolved in groundwater. This technology involves the injection of air into the subsurface saturated zone, enabling a phase transfer of hydrocarbons from a dissolved state to a vapor phase. The air is then vented through the unsaturated zone.

For both procedures, typical parameters of interest include: water level, borehole pressure, and dissolved oxygen (DO). These three parameters can be measured and recorded using a combination of Level TROLL and TROLL 9500 instruments. The Level TROLL is also capable of measuring temperature. Additionally, the sub-2" TROLL 9500 is capable of measuring temperature, conductivity, pH, and oxidation-reduction potential.

#### **Equipment Required**

- Level TROLL 500 or 700 with gauged pressure sensor and vented submersible cable
- TROLL 9500 with internal barometric pressure and RDO® optical DO sensor and vented submersible cable

- Two TROLL® Com cable connect communication devices
- Two 2" well docks
- Two well cap cable holders
- Win-Situ® 4 software for the PC, or Pocket-Situ 4 software for the RuggedReader® handheld PC
- Win-Situ® 5 software for the PC, or Win-Situ® Mobile software for the RuggedReader handheld PC

#### **Method**

##### **Instrument Deployment**

The Level TROLL 500 or 700 is deployed to monitor water level. Install it underwater at a depth such that it will remain underwater throughout the test.

The TROLL 9500, with internal barometric pressure and RDO sensor, monitors borehole pressure and DO, respectively.

Install the Level TROLL and TROLL 9500 instruments on vented, submersible twist-lock cables. Connect each submersible cable to a TROLL Com cable connect communication device. Install the TROLL Com devices so that the blue vent hole is inside the well. However, ensure that the TROLL Com will not be underwater at any time.

Thread the TROLL Com through the well cap cable holder, so that the serial port or USB port is exposed to the surface. Seal the USB or serial ports in a plastic bag with a desiccant package to protect the connector when not in use. (For detailed instructions on this procedure, see the Technical Note *Soil Vapor Extraction: Using Level TROLL Instruments in SVE Systems.*)

## Software Setup

Use Win-Situ® Mobile software on a RuggedReader® handheld PC or Win-Situ® 5 software on a laptop PC to program the Level TROLL® instrument. To program the TROLL® 9500 instrument, use Pocket-Situ 4 software on a RuggedReader or Win-Situ® 4 software on a PC. For the remainder of this document, the term 'PC' will be used to represent either a RuggedReader or a laptop PC.

### Program the Level TROLL Instrument

1. Connect the TROLL Com device to the PC and launch Win-Situ Mobile or Win-Situ 5 software.
2. Synchronize the Level TROLL clock to the PC.
3. Program an internal data log from the Logging Page. Define the parameters to include, the units of measurement, and the logging rate.
4. Configure the Level channel as desired and program the log for a scheduled start.
5. Disconnect the TROLL Com device from the PC.
6. Place the serial port/USB connector in a sealed plastic bag with a desiccant package in order to protect the connector from moisture and dirt.

### Program the TROLL 9500 Instrument

1. Connect the TROLL Com device to the PC and launch Pocket-Situ 4 or Win-Situ 4 software.
2. Synchronize the TROLL 9500 clock to the PC.
3. Program an internal data test using the Tests branch in the navigation tree. Define the parameters to include, the units of measurement, and the logging rate.
4. Define the log so that it has the same scheduled start time as the Level TROLL instrument.
5. Disconnect the TROLL Com device from the PC.
6. Place the serial port/ USB connector in a sealed plastic bag with a desiccant package in order to protect the connector from moisture and dirt.

After both instruments are programmed for internal data logging and the TROLL Com device is stored in the plastic bag, the test can begin.

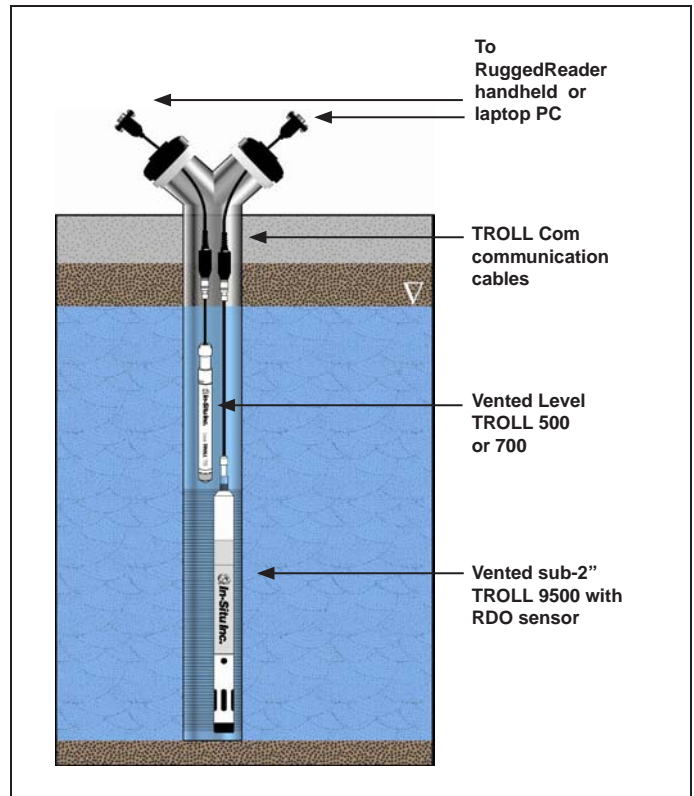


Figure 1. Deployment of Level TROLL and TROLL 9500 instruments in a 2" injection well.



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