SRNL SAVANNAH RIVER NATIONAL LABORATORY

techbriefs

BaroBall™

Control Valve with Volume Flow Measurement

Barometric pumping is a remediation technique that removes volatile contaminants from soil in the vadose zone, above the water table.

The BaroBall™ control valve increases the efficiency of barometric pumping and allows natural soil gas to flow out of an underground well, while restricting air flow from the surface into the well. Air flowing into the well from the surface will dilute and possibly spread contaminants still present in the subsurface.

Background

Wells screened in the unsaturated zone have been observed to inhale ambient air and exhale soil gas. These natural air flows in wells are determined by barometric pressure fluctuations, permeability of the subsurface, and depth of the well screen. The difference between surface and subsurface pressures is the driving force for these flows.

The BaroBall™ control valve uses a ping-pong ball to provide low cracking pressure for outflow and to seal the well during inflow. When atmospheric pressure is higher than the pressure in the well (flow into the well), the ball is forced down and seals against the valve seat, thus closing the valve. When the pressure in the well is greater than the surface pressure, the ball rises on the stream of air and allows airflow. The pressure required to open the valve (cracking pressure) is related to the weight of the ball and is approximately 1 mbar. The valve is a simple, inexpensive mechanical device requiring minimal maintenance.

at a glance

- **low-cost alternative treatment technique**
- **simple design**
- **easy to install**
- **easy to maintain**
- **U.S. patent 5,641,245**
- **U.S. patent 6,425,298**
- **Canadian patent 2,221,770**

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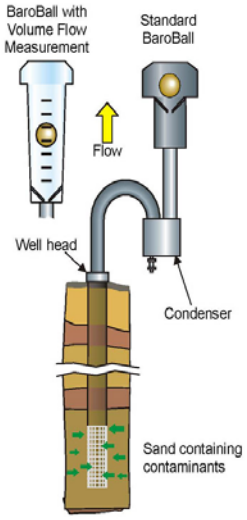
In-line condenser prevents condensation



In-line condenser between the well and the valve prevents moisture condensation in the valve that could cause the valve to freeze in one position during cold weather. The condenser holds the condensed water that is produced when warmer, moist air from the subsurface is cooled in the valve tubing during cold weather. The condensate can be drained periodically with a valve in the bottom of the condenser.

Volume control measurement

A new feature has been added to the BaroBall™ valve to incorporate the ability to measure the volume of air passing through the valve without hindering its operation. The new design consists of a tapered column that permits the ping-pong ball to rise in the column in proportion to the flow rate. By periodically recording these flows along with vapor concentrations, the overall performance of the passive remediation system can be evaluated.

Technology transfer

The Savannah River National Laboratory (SRNL) is the U.S. Department of Energy's (DOE) applied research and development laboratory at the Savannah River Site (SRS). With its wide spectrum and expertise in areas such as homeland security, hydrogen technology, materials, sensors, and environmental science, SRNL's cutting edge technology delivers high dividends to its customers.

The management and operating contractor for SRS and SRNL is Savannah River Nuclear Solutions, LLC. SRNS is responsible for transferring its technologies to the private sector so that these technologies may have the collateral benefit of enhancing U.S. economic competitiveness.

Partnering opportunities

SRNS invites interested companies with proven capabilities in this area of expertise for possible licensing arrangements with SRNS to manufacture and market this technology. Interested companies will be requested to submit a business plan setting forth company qualifications, strategies, activities, and milestones for commercializing this invention. Qualifications should include past experience at bringing similar products to market, reasonable schedule for product launch, sufficient manufacturing capacity, established distribution networks, and evidence of sufficient financial resources for product development and launch.

BaroBall™ is currently licensed on a Non-Exclusive basis to Durham Geo Slope Indicator Company, located in Stone Mountain, GA. Additional information on the device can be found at:
http://www.durhamgeo.com/Ground-Water/gw_intro.html

for more information

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