

Low Pressure Bottom Hole Sample Collection for Complex Water Characterization

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Water is a key factor for all oil sands operations, in particularly with mining where operations need water to be heated and mixed with chemicals and ore to allow for separation and extraction of the bitumen from the sand and water. In-situ operations require water for their boilers which needs to be treated prior to going through the boiler system for down hole injection. In order to meet their water needs, producers will either utilize the Athabasca River or secondarily, drill wells specifically to produce water which will be used in the extraction portion of the process. To design a process plant in an oil sands mining operation it is essential that the water chemistry of the source water is fully understood. In order to fully evaluate the source water it is required to pull representative water samples and have them analyzed in an accredited lab.

A common issue with sampling water source wells in the oil sands is often related to the fact that the wells are very shallow which in turn causes the formation water to have low pressure. Instead of installing a pump downhole to produce the fluid to surface a new technology has been developed which is capable of sampling at low pressures down to 10psig and obtain representative water samples for analysis. The sample capture system is lowered down hole to a specified depth where the water can be captured under low pressure, aquifer conditions in an inert, pressurized sampling container. The chamber automatically seals the sample to be brought back to surface under pressure capturing both common water chemistry parameters such as salts and metals, as well as volatile components such as dissolved hydrocarbons, hydrogen sulfide, and other inert gases.

The primary advantages of this technology are:

- **Low Pressure Sampling** - Reducing the need for extra equipment to be installed to flow water to the surface for sampling.
- **Inert Container:** The sample is taken into inert cylinders allowing H₂S analysis.
- **Pressurized Sampling:** Allowing for full chemical and volumetric analysis of dissolved gases.
- **Extended Sampling Programs:** The system can remain onsite taking consecutive samples while the lab processes the previous captures.

The tool can be used for many different applications including a recent project where a number of different samples were taken from multiple different depths and locations. The objective was to determine the variation in source water from different wells as well as the influence of depth. Samples were taken from 5 different wells with 1 of the wells having 2 different depths being sampled. The system allowed enough sample to be collected to obtain representative water and gas samples for full characterization, ultimately allowing the producer to make necessary decisions to future plant designs and considerations.

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Todd Zurowski graduated from the University of Calgary in 2012 with a degree in Mechanical Engineering. Todd is a member of APEGA, CHOA, and SPE. He began his career with AGAT in May of 2012 and began as a project engineer. During his time as project engineer he managed the SCAL and PVT labs running different compositional and optimization studies including some large yearlong projects. In 2014 he moved over to the role of Technical Adviser where he is responsible for providing technical support to the business development team as well as setting up customized studies for individual clients. He is also part of the business development team where he is responsible for the maintenance of many in house companies as well as attracting new business from potential clients.

