

Sonic Drill Helps Students Reveal Glacial Secrets

In the summer of 2009, Dan Kelleher and Ken Borrell of the Midwest Geosciences group drove 20 hours from their home city of Waverly, Minn., to the University of Calgary in Calgary, Alberta, to experience their first sonic borehole in Canada.

Midwest Geo was offering one of its workshops on glacial successions for more than 50 geologists from Canada and the United States. The course teaches the principles of sedimentary depositions, the effects of sedimentary weathering and the methods to describe those elements on boring logs.

The workshop also allows the university's geological, engineering and environmental sciences students to identify the same geological units in different boreholes in the region.

"The sonic drill was awesome," says Kelleher, a hydrogeologist and project manager with Midwest Geo and co-founder of the company.



"The company that actually drilled in Calgary was Crater Lake Drilling from Red Deer, Alberta, working with personnel from Sonic Drilling Ltd. of Surrey, British Columbia. The crew did a world-class job of carefully sampling and providing 100-percent core recovery, which makes teaching sedimentary sequences much easier," adds Kelleher.

First, the team drilled a pilot hole the day before the course, to better understand the geology of the region. Next, for the instructional hole, Kelleher had the sonic rig drill down 100 feet. The continuous core then was placed from end to end on a table, enabling them to analyze it, and read the story of the sediments below.

"The soil core is remarkable when inspecting it in this manner," says Kelleher. "The sedimentary story is so much easier to read and the geologic history is apparent, even to those without a science background."

Developed by Ray Roussy, president of the Sonic Drill Corp. and Sonic Drilling Ltd., sonic drills use water instead of drilling mud to case the hole. Looking much like a conventional air or mud rotary drill rig, a sonic can be easily recognized by its drill head, which is slightly larger than a standard rotary head. It is this drill head that allows rapid drilling through most geological formations through a combination of forces including rotary motion, oscillation and vibration. In environmental investigations like the Calgary workshop, high sample recovery rates combined with large sample volumes increase subsurface resolution.

"The sonic's wide sample diameter of 4.5-inches allows for large-volume samples," says Kelleher. "That is priceless when geologic conditions are comprised of buried large gravel and cobbles. Plus, the rapid sampling rate often does not reduce the sample recovery, yielding financial benefits for appreciable-sized projects."

Although the Calgary instructional hole was drilled only to 100 feet, sonic drill rigs are capable of providing uninterrupted core samples to 300 feet and beyond.