Sonic Rotary Demonstration

MWCC Conference
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Click [here](#) for link to video from demonstration
How Does It Work?

**STEP 1 - CORE BARREL ADVANCEMENT**
The core barrel is advanced using SONIC frequencies. Core barrels are available in single wall for dry coring, dual wall for hard rock sampling with water/air/drilling mud and finally core barrels are available with clear lexan liners.

**STEP 2 - OVER CASING**
After the core barrel is advanced, casing is advanced using SONIC frequencies over the core barrel, protecting the borehole integrity.

**STEP 3 - CORE RETRIEVAL**
The core barrel is retrieved, producing a nearly 100% highly representative undisturbed sample.

**STEP 4 - REPEAT PROCESS**
Steps 1-3 are repeated to desired TD, providing a continuous core sample with less than 1% deviation
GeoProbe 8150LS
## Advantages & Disadvantages

**Pros:**
- Excellent for challenging lithology (gravel, sands, thick unconsolidated/weathered bedrock, flowing/expanding horizons)
- Continuous logging
- Visibly identify water bearing zones
- No refusal—only limited by total number of drilling rods (EWI has 220’ of string)
- Compact footprint (25’ x 8’)
- Less investigation derived waste
- Can directionally drill (up to 45°)

**Cons:**
- Cannot calculate RQD or fracture alignment (vibrations result in fracturing of the core)
- May still be able to submit core sections for lab analysis of porosity & permeability (depending on geology)
- More expensive than air rotary (but cheaper than diamond coring)
SOIL SAMPLING WITH SONIC ROTARY: does soil get too hot for VOC sampling?

EWI tested in the field with digital instant read thermometer:
• If stop coring at bedrock surface (soil only), temperature of core around 70-75°F (4-inch soil core)
• Generally similar to soil temperatures within Dual Tube or MacroCores
• Split core open and collect samples for lab analysis from internal section of the core (see ASTM D6914 & D6640)
• In bedrock: friction in highly competent rock can cause heat—can use water while drilling to reduce temps
**Yeah, But What’s It Cost?**

**COMPARISON TO AIR ROTARY**

<table>
<thead>
<tr>
<th>Sonic Rotary</th>
<th>Air Rotary</th>
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<tbody>
<tr>
<td><strong>Scope:</strong> 4 wells to 80 feet,</td>
<td><strong>Scope:</strong> 4 wells to 80 feet,</td>
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<tr>
<td>with 60-feet of PVC Riser &amp; 20</td>
<td><strong>Steel Casing to 40 feet,</strong></td>
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<tr>
<td>feet of PVC Screen</td>
<td><strong>open hole 40-80’</strong></td>
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<td><strong>Schedule:</strong> 2 days</td>
<td><strong>Schedule:</strong> 4 days</td>
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<tr>
<td><strong>Estimate:</strong> $32,000</td>
<td><strong>Estimate:</strong> $28,500</td>
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- Only sonic rig located in the Midwest = significant cost savings in mobilization than previously available
Case Study: Rapid Roberts Osage Beach, Missouri

- Release discovered during routine W&M inspection
- Fuel-saturated soil near AST containment
- Point of release – pinhole in below-ground piping between remote fill ports & ASTs
- Estimate of 1700-3400 gallon loss (majority recovered via soil excavation)
- Vacuum recovery of LNAPL & vapor phase (8 recovery wells)
- Soil probing to identify free product pathway to stream (followed piping trench to a canopy drain)
- Complete domestic use pathway and stream protection pathway (onsite & offsite well)
Case Study: Rapid Roberts Osage Beach, Missouri

- Due to previous release at Site, knew unconsolidated groundwater would not be present (bedrock at 4-20 ft bgs)
- Four bedrock monitoring wells proposed – first water expected at ~60 ft bgs
- Roubidoux formation – sandstone possible, concern over keeping hole open
- Space & equipment weight also a concern – wells in grassy areas (over former excavated areas) and near wooded property boundary
- Sonic drill recommended over air rotary to address these concerns
Case Study: Rapid Roberts Osage Beach, Missouri

Next Steps:

- Review soil sampling results
- Groundwater sampling
- Stream & sediment sampling
- Continued LNAPL monitoring in recovery well network
- Continued sampling of onsite and off-site drinking water wells
- Additional soil & GW delineation as warranted
COMPLEMENTARY SERVICES/EQUIPMENT AVAILABLE AT EWI:

- Ground Penetrating Radar (GPR)
- Optical Image Profiler (OIP)
- Hydraulic Profiling Tool (HPT)
- Vacuum Trucks for LNAPL & Vapor Recovery
- Air Rotary Rig
- 4 GeoProbes (6620s - 7822DT V3)