McCook Reservoir is a part of the gigantic Chicago Underflow Plan, which started in the seventies. A major part of the work includes the overburden cut-off wall, where a grout curtain is installed to minimize the flow of water in and out of the reservoir.

Part of a gigantic plan
The McCook Reservoir Project is located in Illinois, USA and is a 38 million m³ (10 billion gallon) reservoir that will capture combined sewer overflows that cause flooding and watercourse contamination in Chicagoland and benefits the greater Chicago area. It is a part of the gigantic Chicago Underflow Plan, designed to protect the city of Chicago from flooding. Underground tunnels connect the reservoirs to the sewer system of the city.

Thoroughly tested
A test project was conducted to compare the water-powered DTH hammer and rotary drilling methods. The primary objective of the McCook Reservoir grouting test was to evaluate the effectiveness of grouting in this geologic environment while determining the most appropriate drilling method to complete the perimeter grouting of the proposed reservoir. This included grouting of the upper bedrock and integration with the overburden cut-off wall that was constructed previously.

Wassara’s water-powered DTH hammer was chosen as it is the most cost effective drilling method for the deep holes required. The quality control indicated that Wassara had an average hole deviation of just over 1%.

The test program consisted of two parallel rows of grout holes, each row containing 128 holes drilled to a depth of 135 meters. One line was drilled with Wassara, the other using rotary drilling. The two rows were 300 meters (1000ft.) apart. The test results showed that the Cubex rig with Wassara’s drilling system was 100% more efficient than the rotary drilling method.

The report concluded that:
- “The water driven, down-hole hammer drilling is the most cost effective drilling method for the deep holes required.”

The complete test results are available in the report “STATE-OF-ART GROUTING FOR A GROUNDWATER BARRIER” by Black & Veatch and U.S. Army Corps of Engineers.

CASE STUDY
Fulfilling production requirements
Luca Barison is Project Executive at the McCook Reservoir Project for Nicholson

“When you start to use something new you never know if it is going to work, says Barison. We have compared the air driven hammer and core drilling with the water driven hammer, and we find that the water hammer best supports the production necessary to complete the work economically while maintaining water as the preferred flushing medium for rock grouting.”

Borehole accuracy
The allowed borehole deviation was set to 4% at full length. The quality control indicated that Wassara had an average hole deviation of just over 1%.

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**WATER-POWERED DRILLING IN THE DEMANDING MCCOOK RESERVOIR**

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**Fulfilling production requirements**
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**Equipment used**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTH hammer</td>
<td>Wassara W80</td>
</tr>
<tr>
<td>Drill bit</td>
<td>Ø 95 mm (3.75&quot;)</td>
</tr>
<tr>
<td>Pump</td>
<td>Pratissoli</td>
</tr>
<tr>
<td>Drilling fluid</td>
<td>Clean water</td>
</tr>
<tr>
<td>Rig</td>
<td>Cubex QXW 810</td>
</tr>
<tr>
<td>Drill pipe</td>
<td>Wassara 3000 mm (with O-rings), OD 76mm</td>
</tr>
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<td>Borehole length</td>
<td>135 meters (455 ft.)</td>
</tr>
<tr>
<td>Scope of drilling</td>
<td>266 000 meters (874 000 ft.)</td>
</tr>
<tr>
<td>Geologic formation</td>
<td>Limestone</td>
</tr>
</tbody>
</table>

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**The McCook Reservoir**
(Photo by U.S. Army Corps of Engineers)

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**The Cubex rig in action**

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**CASE STUDY**