

Grout curtain

Grouting - Sonic drilling

McCOOK RESERVOIR - PHASE 1

CHICAGO - USA



Construction of a grout curtain using computer controlled injection



Sonic core drilling machines on the working platform

The Mc Cook reservoir is one of the main components of an extremely extensive wastewater and stormwater collection system that serves the town of Chicago and 51 neighbouring towns. It has a completed capacity of 27 million m³. The basin's water tightness relies on an enclosure comprising a bentonite slurry wall that descends through the overburden soils down to a depth of 18 to 22m keyed on the top of rock, supplemented by a two-line grout curtain

OWNER:	METROPOLITAN WATER RECLAMATION OF GREATER CHICAGO
CLIENT:	U.S. ARMY CORPS OF ENGINEERS, CHICAGO, IL
CONTRACTOR:	NICHOLSON CONSTRUCTION COMPANY
DURATION OF WORKS:	NOVEMBER 2006 - NOVEMBER 2008

MAIN QUANTITIES:

- 137,200m of rock perforation
- 49,400m of casing through the overburden soils (18,600m using sonic drilling technology)
- 3,350m of rock coring

bored into rock down to a maximum depth of 99m.

The US Army Corps of Engineers awarded Nicholson Construction, the American subsidiary of Solétanche Bachy the contract for the first section of the works. This comprised the construction of a 2,500m two-line grouted curtain. A later section of the works involving a similar grout curtain length will encircle the entire reservoir. Both lines of boreholes follow the curtain and are tilted at an angle of 15° from the vertical, in opposite directions.

Grouting was computer controlled using the Solétanche Bachy GROUT I.T.® system. This system measures, records and displays in real time a large number of grouting settings such as the amount of grout, the volume of each component in the grout mix, nominal pressure and true pressure, the Equivalent Lugeon, etc. Above all, it is used to monitor production efficiently by displaying the progress on the grouting using graphic views which can provide a summary of treatment completion by depth and along each grout line. The GROUT I.T.®



Cubex QXW 810 drilling rig

system, extensively used on the Group's sites, had been specially adapted to the specific characteristics of the American market: systematic use of rotary pumps on a closed loop ("return line" system) and injection controlled using "Equivalent Lugeon" criteria at low pressures .

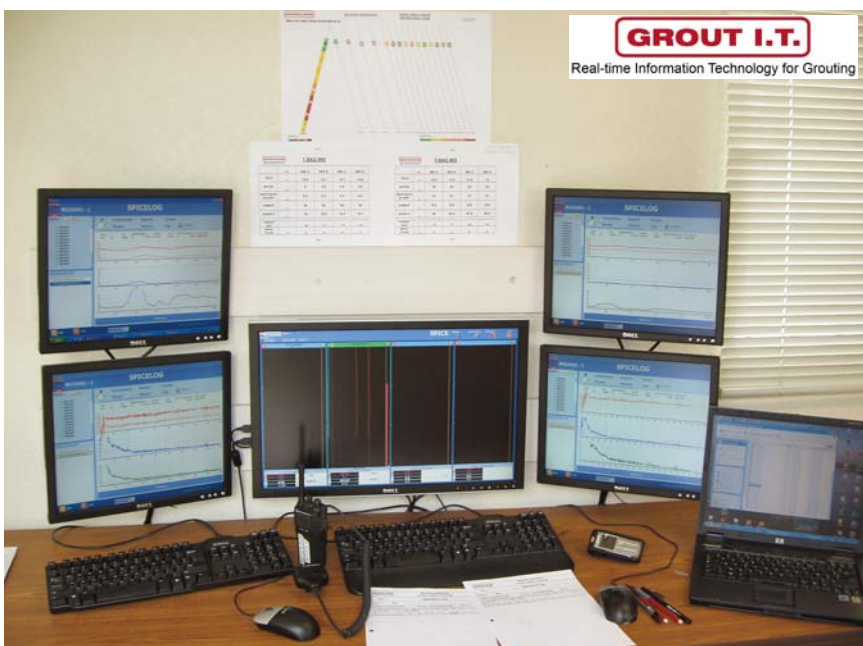
Two technologies were used when putting grouting boreholes in place:

1 - The sonic drilling method used to lay piping in the superficial terrain.

This technique makes use of high frequency mechanical vibrations generated by a special rotary drilling head. When the vibrations reach resonance, they fluidise the soil particles and destroy their resistance. The first few metres are core-drilled and then destructive drilling is used. This process allows us to drill through both superficial terrain and rock.

2 - The water activated drilling system used for drilling through rock.

Two new drilling machines were specially adapted for use with this technique and equipped with high pressure pumps. The drilling unit included a hydraulic system, computerized supervision and a touch screen. These units used a new water pressure activated drilling system with a 3" 7/8 inch cutter.



GROUT I.T.® system: control unit