

GeoDrilling

INTERNATIONAL



- **Water-well drilling**

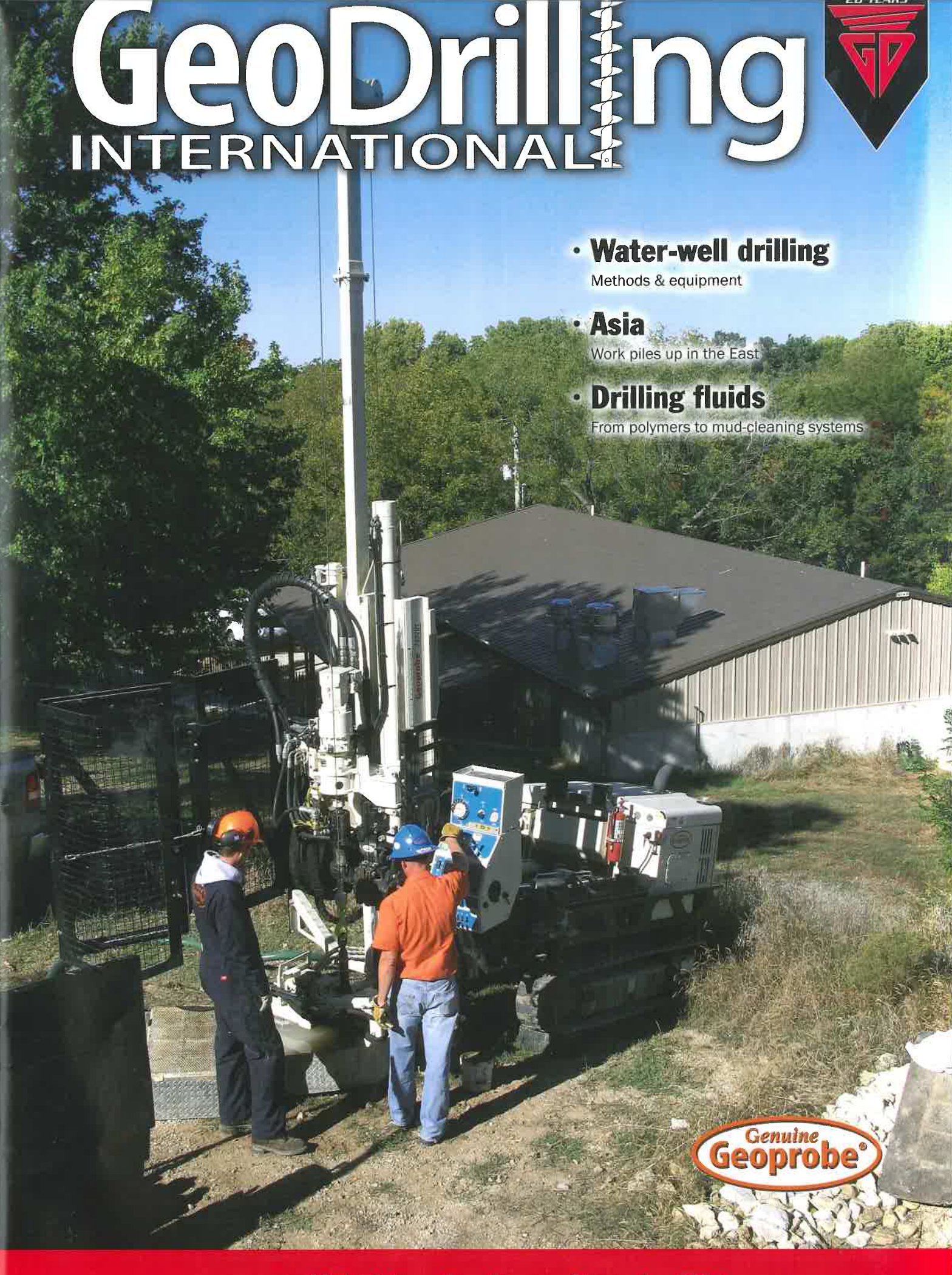
Methods & equipment

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Efficient wells

Boart Longyear uses dual-tube flooded reverse-circulation drilling to control high-yielding aquifers

A Boart Longyear drilling-service team performs dual-tube flooded reverse circulation to develop a well in Australia

Operating in mineral exploration and services for the mining industry, Boart Longyear specialises in both above- and below-ground dewatering systems, and has been using dual-tube flooded reverse-circulation drilling for over 30 years.

"Most contractors are familiar with flooded reverse-circulation water-well drilling; however, dual-tube flooded reverse circulation is different," says Mike Van Aacken, global water-services operation manager for Boart Longyear. "In fact, the difference in technique requires us to provide training specifically for the dual-tube method."

By installing deep-hole systems via dual-tube flooded reverse circulation, the



company is able to control high-producing aquifers that pump out thousands of gallons of water per minute.

It is different from conventional flooded reverse circulation, because the dual-tube method has the ability to return fluids at varying levels throughout the drill string. This flexibility allows the air exchange to adjust turbulence around the bit according to the ground formations.

The closer the fluid is turned around to the bit, the more turbulence is created. As

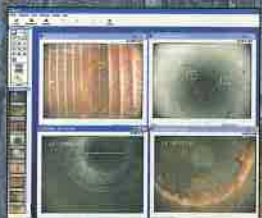
the fluid is returned further away from the bit, the turbulence lessens. Essentially, by adjusting where the fluid is being returned, the driller can regulate the pressure that drives the bit to best clean the cuttings from the well. This allows the hole to stay clean, which increases the penetration rate and bit life.

Static water levels are used in dual-tube flooded reverse circulation to prevent pressure against the ground formation; instead, it keeps the pressure within the

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drill string itself. This protects the integrity of the borehole. Boart Longyear also modifies its bits specifically for the dual-tube flooded reverse market. All this is in an effort to keep the borehole clean and minimise fluid migration into the aquifer.

"A unique weighted-bottom hole assembly creates a pendulum effect on the drill string, allowing the driller to keep the drill string in tension and never having to push the string into the ground," says Van Aacken. "This is important to keep the drill string straight. If the borehole isn't straight, a pump will not be able to fit down the hole, and there could be issues when setting the production casing."

Dual-tube flooded reverse circulation uses engineered mud that is in a contained system. This allows Boart Longyear to reuse the mud, which lessens the environmental impact. The system features a controlled discharge and the mud is nontoxic in the case of aquifer transfer.

"The dual-tube flooded reverse-circulation process is capable of drilling large-diameter holes in the most difficult ground conditions in a single pass, rather than multiple passes – which degrades the borehole," says Van Aacken.

The method provides better overall

well efficiency and production, ultimately saving mine sites downtime and money over the life of the well.

Deeper wells

As production advances to deeper targets, demand for deeper, larger-diameter wells has also risen. The Boart Longyear water-services drilling fleet offers pullback capacity of 70,000lb (31,751kg) to 700,000lb to manage down-hole tooling in large-diameter and deep-well applications. Wells are developed by installing casing, filter material and surface seals to regulatory specifications. These specifications require the use of a

swab to clean the well and settle the gravel pack.

The Boart Longyear mine water services are primarily utilised for monitoring water tables in and around the mine, supplying water needed in the mining process and/or lowering water tables to allow safe and efficient mining. Piezometers and other instrumentation can be installed in the holes for ground monitoring, and horizontal drains can be drilled to eliminate perched water, which causes pressure on mine pit walls.♥

"The dual-tube flooded reverse-circulation process can drill large-diameter holes in difficult ground conditions in a single pass"



Dual-tube flooded reverse-circulation drilling in Arizona

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