

# Mining World



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# Finding value in heap leach pads efficiently

*A case study by Boart Longyear*

**Product:** LS600 sonic rig  
**Location:** Northwest Nevada  
**Application:** Sonic sampling and well installation of heap leach pad (gold)

As the value of minerals continues to rise in the marketplace, mining companies are revisiting their heap leach pads. A heap leach pad can contain a wealth of minerals that are waiting to be discovered. Boart Longyear Drilling Services has been contracted to implement its Trusonic programme to sample and install wells into targeted heap leach pads.

Heap leach pads are large piles of rock waste from a mine operation that receive further processing through a leaching solution to remove the mineral ore from the rock. The leaching solution is applied via an irrigation or sprinkler system to the top of the heap leach pad. The solution penetrates the heap leach pad and separates the mineral ore from the rocks. At the bottom of the heap leach pad is an impermeable liner that is angled to allow the solution to be collected in a reservoir and then be sent for further processing.

Using its latest sonic rig, the LS600, Boart Longyear can collect highly representative samples and achieve excellent sample recovery. Leach pads are made up mostly of unconsolidated material and the LS600 has proven effective in these conditions by producing 100% accurate in-situ core samples. The rig is also used to install wells in the heap leach pad.



Boart Longyear LS600 sonic rig

## *The challenge*

*To test ore recovery in one of the largest gold heap leach pads in the USA*

Boart Longyear was contracted to sample and install solution wells for the largest gold heap leach pad in the USA, located in Northwest Nevada. The heap leach pad is over 400 feet (122m) tall. To achieve that height the mine operation built up the heap leach pad via 50 foot (15.2m) lifts.

When constructing each level the haulers unavoidably crush and compress the previous top layer of the pad while adding material to the top of the pile. This creates a dense layer that causes a dam effect and does not allow the leaching solution to penetrate through the heap leach pad properly. The heap leach pad can then develop dry pockets where no leaching activity takes place — lowering the efficiency and return on investment.

## *The solution*

*Advanced sonic technology allows for sampling and well installation*

Boart Longyear was hired to detect dry zones in the leach pad and to reactivate the zones via solution enhancement wells. First the Boart Longyear Trusonic team drilled test holes to determine the depths of the dry zones and the specific lithological (physical characteristics of the ground) information.

These boreholes were 107m (350 ft) deep and were 15m to 23m (50 to 75 ft) above the heap leach pad liner. A continuous core sample was obtained by using the LS600 sonic rig. This allowed the Trusonic team to determine moisture concentration at accurate depths and to identify exposed ore.

Once depths of ore and moisture levels of the dry zones were indicated, Boart Longyear installed solution enhancement wells using an 11.5 cm (4.5 in) flush threaded well casing. The casings allowed the borehole to stay intact as an upper and lower k-packer were installed at specific depths. A 100-foot (30m) injection screen was placed between the k-packers to direct the leaching solution into targeted dry zones.

This process was repeated on an eight-week cycle with four weeks of solution and four weeks of rest. Once the cycle was completed, the k-packers and screen were moved to a new depth. The well would receive the solution at three heights, spanning 100 feet (30m) each time — bottom, middle, and top.

Over a three-year period, the Trusonic team, using the LS600 sonic rig, drilled 55 gravity flow solution wells to alleviate the fine unprocessed gold from the heap leach pad. This resulted in 6,100 oz of gold that equated to \$8M (\$1,300 per ounce average). The client paid for the project within the first 70 days and received a 400% internal rate of return (IRR).

### LS600 sonic rig

The LS600 sonic rig has the ability to efficiently penetrate the semi-crushed rock, cobbles, and clay found on heap leach pads and in mine dump sites. The LS600 samples are accurate to depth and commonly drilled dry without fluid circulation to minimise risks in sample cross-contamination. This creates a precise and continuous sample with near 100% recovery, less than 1% hole deviation, up to 80% waste reduction and faster penetration than conventional methods.

Sonic frequencies match the resonant energy of the ground, allowing the core barrel to advance in unconsolidated and difficult overburden formations. The LS600 can reach depths up to 182m (600 ft) while continuously casing the borehole. This makes the LS600 an optimal choice for multiple markets — exploration mining, environmental, geo-technical/geo-construction, water and mining.

### Trusonic

Trusonic is a complete sonic drilling system offered by Boart Longyear Drilling Services. It combines Boart Longyear's industry-leading sonic rigs with highly trained drillers who are certified through the Sonic University programme.

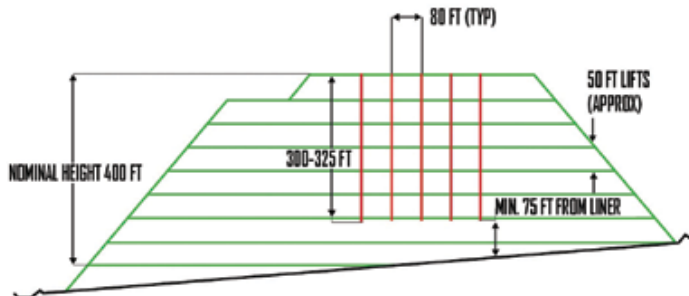
With over 120 sonic rigs operating worldwide, the Trusonic system is designed to achieve a high production rate and obtain the best quality samples from a wide range of sub-surface conditions. The sonic rigs, in concert with trained drillers, can reach depths over 700 feet while obtaining near 100% in-situ core samples.

### About Boart Longyear

With over 120 years of expertise, Boart Longyear is a provider of drilling services and products for the mining industry. It also has a substantial drilling and products presence in mine de-watering, environmental sampling, energy and oil sands exploration.

Boart Longyear is a global company headquartered in Salt Lake City, Utah, US, and is listed on the Australian Securities Exchange in Sydney, Australia. Sales in 2011 were over \$2.0 billion, and the company employs over 10,000 employees worldwide. Contract drilling services are conducted in over 40 countries, and exploration products are manufactured in seven global factories and sold to customers in over 100 countries.

Boart Longyear was a private company for over 85 years. In 1975, it was purchased by Anglo American, which was headquartered in Johannesburg, South Africa. Then in 2005, private equity purchased Boart Longyear from Anglo American and subsequently listed the company on the ASX in April of 2007.



Cross section of heap leach pad

# Hi-Force<sup>®</sup>

## HYDRAULIC TOOLS

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The Hi-Force ToughLift Jacking System and range of hydraulic tools offer the perfect solution for all maintenance jobs and breakdown repair work in the mining and construction industry.



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## Superior Industries targets sticky conveyor material

The Urathon return roll claims to shed sticky material, ensuring smoother conveyor belt alignment and less belt damage, making it ideal for use in the mining, aggregates and other bulk material handling industries.

US manufacturer Superior Industries told delegates at MINExpo recently that the unit was constructed of heavy-duty 87A durometer urethane, and that the Urathon return rollers offer up to three times the life of rubber disc-style idlers, and that the unit is available in standard and spiral disc options.

According to the company, the

Urathon return roll's non-stick properties prevent build-up of wet and sticky material on the roller discs, leading to smoother operation, greater productivity and minimised belt damage.

Superior Industries emphasises that material build-up is the leading cause of conveyor belt mis-tracking and damage. When excessive material accumulates, rollers can double in size, which can cause issues with belt alignment that lead to downtime.

The Urathon return roller also reduces downtime for change-outs and excessive maintenance,

effectively minimising overall costs. Both rolls are self-cleaning, and the spiral style offers an added cleaning action on the underside of the belt to further reduce maintenance requirements caused by carry-back material.

The standard roll is available in a 5, 6, or 7 inch diameters, while the spiral roll is offered in a 6 inch diameter. Both models are compatible with conveyor belts ranging from 18 to 96 inches (.45 – 2.44m) in width, and CEMA load rated at E, D, C or B.

## Reed Mine 30 mini pump

Reed, the California based concrete pump manufacturer, has designed its extremely compact Mine 30 pump for jobsites with very limited space. The concrete, grout and shotcrete pump - of dimensions length 96" (2,438 mm), width 46.5" (1181 mm) and height 64.7" (1,643 mm) - is small enough to be cross mounted on a truck or other carrier. Fork channels on the side and end come standard.

Reed's "S"-tube allows for pumping grout, flowable fill, pea-gravel concrete, shotcrete mixes, and "big rock" concrete with aggregates up to 1.5" (38 mm). The Mine 30 offers a maximum output of 30 yd<sup>3</sup> per hour (23 m<sup>3</sup> per hour) and 1172 psi (8.08 MPa) concrete pressure. The Mine 30 can be powered by an electric, diesel, or air motor.



Reed Mine 30

## Boart Longyear launches GTUMX diamond coring bits

Boart Longyear has launched the GTUMX diamond coring bit as the latest addition to its award-winning Ultramatrix (UMX) line. The GTUMX is designed for shallow holes and conventional drilling for both exploration and geo-technical applications.

Boart Longyear will launch an AXT size GTUMX bit first in the South Africa region, followed by additional bit size releases and expansion into the Asia Pacific, Europe and Latin America regions.

GTUMX diamond coring bits feature the Boart Longyear UMX formula. UMX bits use an advanced metallurgical formula that is impregnated with large synthetic diamonds. The formula optimises high penetration capabilities with longer bit life and allows the GTUMX to turn easily from one ground formation to another.

The GTUMX also has the unique



Boart Longyear's GTUMX diamond bit series

Razorcut design on the face of the bit. This speeds up exposure of the diamonds and enables the bit to begin cutting right out of the box.

The wide tapered waterways improve

surface flushing and cutting while reducing wear on the inner-diameter of the bit, particularly in broken, abrasive conditions.

Coming Soon! Miningworldlink Interactive Magazine.  
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