

H₂O

Water is becoming a critical issue to all worldwide, not least the mining industry. John Chadwick considers two broad areas: supply, delivery and handling; and environmental management

Mines in many countries are facing water restrictions due to both environmental and social constraints. This century there has been much talk of the industry's 'licence to operate'. Water management and conservation must be an integral part of this consideration. Otherwise, mining companies may lose public 'licence to operate'. For instance, currently Ecuador is seeking to ban any mining that could affect a water source.

Here we review some innovations that are reducing consumption in mining and processing operations, as well as some of the latest technologies. We also take a good look at keeping water clean.

In what may turn out to be a ground breaking initiative, AMIRA International is in discussion with Chile's Consejo Minero over a series of projects designed to improve water efficiency in the minerals industry. AMIRA has proposed three projects which collectively could have a dramatic impact on the volumes of water the copper industry requires, particularly in areas where it is in short supply. Success with

these projects will set Chile on the path to being a world centre of excellence for research into water management in mining. The results will also spin off into other sectors of the industry.

AMIRA's Copper Technology Road Map team identified water management as a key issue. Water is used extensively in copper mining and processing and in many areas, including arid, high altitude regions of Chile, water is becoming a scarce resource. This has commercial impacts – there are instances where production has been curtailed by lack of water and others where producers are having to resort to expensive desalination – but it also impacts on the social and environmental acceptance of mining. Excessive use by the industry can mean less water for other purposes.

The three projects cover:

P881A: Controlling Evaporation Loss in Copper Mineral Processing Plants will:

- Assess the effectiveness of floating covers, shade cloths and wind breakers as evaporation mitigation technologies

- Assess evaporation loss from process water storages such as SX ponds and tailings dams
- Characterise the local climate at selected sites to determine the impact on evaporation rates
- Develop predictive models for water evaporation under various climatic conditions and locations.

P968: Flotation of Copper Ores in Saline Water: saline water has been used for mineral flotation in Chile, Western Australia and in Indonesia and in heap leaching in Chile. Its use to float molybdenum is also promising. However, there is a lack of comprehensive, codified information that would allow companies to propose use of saline water in a large scale copper concentrator with confidence. This project aims to research:

- Rougher flotation of copper and molybdenum minerals in saline waters
- The influence of salt concentrations on the flotation and depression of important copper ore minerals including chalcopyrite, molybdenite, and pyrite
- Frother behaviour in the saline waters used above

GHT 4x4 FILTER PRESS DESIGNED FOR CONCENTRATE AND TAILING FILTRATION



Advantages:

- High dry solids percentage
- Designed for heavy duty applications
- Mixed-membrane and full membrane plate packs available
- Four hydraulic jacks
- Automatic pressure distribution
- Automatic cloth washing

DIEMME S.p.A

Via Bedazzo 15-48022 Lugo (RA) Italy Ph+39 0545 206111 Fax+39 0545 28358

www.diemme-spa.com/filtration
filterdiv@diemme-spa.com

■ The effect of salinity on the flocculation, sedimentation and the rheology of copper tailings.

P996: **Instrumentation and Control for Thickeners:** Water recovery from tailings is an important element in reducing water use. For this to occur, better management of thickeners is desirable, but currently this is inhibited by the lack of appropriate instruments. In particular there is a lack of on-line monitoring for key processes of flocculation and bed consolidation. The objectives of this project are to:

- Establish instruments and protocols for measuring or inferring the key thickener parameters
- Develop knowledge of the dynamics of thickener responses to process variations
- Develop model-based control schemes and incorporate them into a thickener simulation package
- Design and implement a mobile instrumented pilot plant that can be transported to sponsor sites for demonstration.

In another industry/academia combination, Siemens VAI and the TU Bergakademie Freiberg (Technical University for Mining and Technology) are co-operating to develop innovative solution concepts for mine water problems.

Acid mine drainage (AMD) or acid rock drainage (ARD) is typically characterised by high sulphate and toxic metal contents. The whole process is promoted by micro-organisms like *acidithiobacillus ferrooxidans* which are living on pyrite by metabolising iron and sulphur to sulphuric acid.

Technological development offers a broad scope of activities in different scientific disciplines at Freiberg:

Microbiologists (Chair of Environmental Microbiology, Prof. M. Schlömann) currently perform studies on the optimisation of bioreactors treating mine waters with sulphate reducing bacteria that can neutralise acidic mine waters by generation of alkalinity and immobilise dissolved metals by precipitation as sulphides.

Hydrogeochemists (Chair of Hydrogeology, Prof. B. Merkel) work on design and testing of sensors for the online monitoring of mine and process waters, in particular for sulphate, carbon dioxide and the redox potential.

Chemists (Chair of Analytical Chemistry, Prof. M. Otto) perform investigations on micropollutants in mine waters with respect to inorganic but also, in particular, organic compounds. On the one side target compounds will be identified and on the other side cost effective monitoring techniques will be developed.

Engineers (Chair of Thermal and Environmental Engineering, Prof. G. Härtel) are investigating new approaches to treat mine waters. Dissolved sulphate is particularly interesting for treatment since future regulations concerning water quality standards will be stricter than before. Therefore a wide range of water treatment technologies was searched for appropriate treatment devices and membrane technology was found to meet the necessary requirements.

Still in the pipeline is a Service Centre for Mine Water Technology that will assist customers with an on-call-service for any mine water related problems.

Delivering water

Going deeper into the mining market, ITT says it is set to grow its underground pump business by offering mining companies new and better ways to get 'nuisance water' out of drifts and shafts. The company says the solution is submersible dewatering pumps. Mine water is salty, corrosive and just plain nasty, which is why pump fitters spend much of their time on foot and in boats checking the condition of the dozens or hundreds of pumps that populate mine shafts.

"A mine dewatering pump can last one week or ten years depending on how clean the water is," says Michael Hjelm, Mining Manager for ITT's

Water & Wastewater business. "Water management is a huge headache for mine companies, so they are always looking for pumps that deliver quality and durability."

By delivering strong drainage capabilities and long life, Flygt-brand dewatering and drainage pumps from ITT are the top sellers for companies that operate below the surface of the earth, the company reports. It has been that way since the 1940s, when a young Flygt engineer, Sixten Englesson invented the world's first submersible pump.

ITT reports "mining customers are flocking to the new line of Flygt 2600 pumps with the patented Duraspin™ hydraulic system that provides three times more wear-resistance than any other drainage pump on the market. They are, as Hjelm says, radically engineered for durability.

"I'm happy with the new 2600 series," says Jamie McLaughlan, the Mine Pumping Supervisor at Mount Isa mine in Australia. "We're currently getting a longer run life, and they also provide a significant weight decrease, which helps in transporting these pumps throughout the underground environment."

At Mount Isa, ITT representatives are on call 24 hours a day to assist in an emergency. This type of "glocal" support – local support on a global scale – is another reason ITT is a major part of miner's



lives, it says. Mine drainage and dewatering is a \$1.2 billion market. ITT expects the mining market to grow 15 to 20% annually for the next few years – "and ITT is finding ways to tap further into the revenue vein."

First, it's looking for the best way to move into the main drainage pump market. Right now, ITT provides Flygt dewatering pumps to remove water from the ramps, walls and shaft bottom. But in every mine, there is a main

ITT Flygt pumps at Mount Isa mine in Australia

drainage pump that collects all the water from these smaller pumps and sends it to the surface.

In some of the deepest mines, these main drainage pumps have to lift water nearly a mile to the surface. ITT has Vogel and Goulds brand pumps that can handle this heavy load, and recently the Flygt sales people began cross-selling them as part of a "One ITT" solution for mine owners.

 **grindex**

The new Grindex pumps.
At least your dewatering won't hit any obstacles.

The new generation of Grindex pumps deliver performance designed for the toughest industries. They offer all the benefits you've come to expect from Grindex pumps: durability, ease of use, and unmatched reliability thanks to the SMART motor protection system. And we've added some innovative new features, such as a revolutionary hydraulic design that dramatically reduces the performance drop caused by long-term wear.

Welcome to trouble-free dewatering.

www.grindex.com

"Our pumps can provide the pressure needed to get this nuisance water out of the deepest shafts," says David Peschell, Global Marketing Manager for mining for ITT's Industrial Process business, which provides Goulds Pumps to the market.

ITT is also looking to expand its service offerings. With a new total pump management offering, ITT services all the pumps in the mine – regardless of brand – so that customers can concentrate on the business of mining. The company just signed a huge pump management contract with a mine in Peru.

With innovative new products, worldwide service capabilities and broader service contracts, ITT aims to double its revenues from mine dewatering pumps in the next few years.

On surface, ITT pumps are moving chemical soups and mining slurry through the processing plant. Corrosive, salty mine water is nothing compared to the torture that ITT industrial pumps and valves are subjected to in processing plants. To capture more business, ITT is expanding its knowledgeable slurry sales force in South Africa, Brazil, Russia and Australia, and building a line of larger slurry pumps and valves that will hit the market in 2009. "With the

Hose Solutions manufactures Boreline Flexible Drop Pipe, designed to replace the rigid risers used with submersible pumps



mineral prices on the rise, mines are handling more volume and need bigger pumps to handle the flow," says David Peschell, IP's

global marketing manager for mining.

"We have a reputation for robust products and now just need to super size our product and service offerings."

Hose Solutions manufactures Boreline Flexible Drop Pipe, designed to replace the rigid risers used with submersible pumps. It is ideal for use in permanent and temporary installations. Boreline is a high pressure, high strength hose, available in diameters from 25 through 203 mm. Pumps can be set between 120 and 300 m, without support ropes or cables.

In one underground mine application, aggressive and contaminated water that comes from the operation is pumped into a settling pond. Solids are allowed to settle while a number of sprayers assist in maximising evaporation. Hundreds of wells around the circumference of the pond prevent seepage into the aquifer of the local town. They form a closed-loop system where all underground water is pumped to the surface and back into the pond.

The aggressive water conditions ruled out the use of steel tubing which was corroding in less than 12 months while the chemical composition of the water rendered PVC and similar materials useless. Fibreglass seemed to 'do the trick' but every time a pump



Engineering and building success...



For information:

Susan Riley
Manager, BD-Mining
+1.303.771.0900
mining@ch2m.com

...with services spanning the mining lifecycle

For more than 60 years, CH2M HILL has met client needs by developing innovative solutions, designing and constructing fit-for-purpose facilities and infrastructure, optimizing performance, controlling costs, and delivering safely. With complete mining lifecycle capabilities, we plan, design, build, expand, modernize, and operate mining infrastructure and processing facilities. And, when your assets reach the end of their useful life, we decommission, decontaminate, and demolish them—remediating and restoring the environment for new uses.

ch2mhill.com/mining



Siemens mobile purification system in Florida

is pulled, damage would occur at the joints where tools are used to grip and loosen or tighten the tube.

Another solution had to be found. This was Boreline, which is totally non-corrosive, is available for deep pump settings and has no joints and is installed in one continuous length. The existing rigid tubing was removed, followed by the re-installation of a new pump on Boreline Flexible Drop Pipe.

Larox Flowsys notes that peristaltic pumps (like its new Larox LPP-M) pump are excellent for clean water, high solids slurries and also highly viscous materials. "Peristaltic pumps will never lose their prime and in fact are very good for high suction lift applications. Peristaltic pumps do not rely on check or any valves for that matter for normal operation. These pumps actually operate as their own shut off device when the pump is stopped. When the pump is stopped the hose is under compression from the roller, thus no flow can occur through the

pump. When operating with high vapour pressure (low NPSH) fluids peristaltic pumps excel due to the fact that they do not suffer from vapour blocks. Vapour blocks occur when there are trapped gases in liquid or in cases when the sudden pressure loss temporarily takes the pressure under the vapour pressure of the liquid. These gases may accumulate in one point in the system creating vapour blocks or loss of prime. Peristaltic pumps can also run dry for any length of time without damage to the pump.

"Peristaltic pumps used as thickener or clarifier underflow pumps are recommended for any thickened slurries, sludges, grids or thickening applications. Peristaltic pumps are widely used in mineral processing applications where solids content exceeds 30% or particle size causes reliability issues. The control properties of peristaltic pumps in underflow applications with high positive pressure in suction side are excellent due to the fact, that pump's flow rate is directly proportional to the pump speed."

Saving water

Dust control is another area of high water consumption. Recently GE Water & Process Technologies honoured Newmont Mining with a 2008 Ecomagination Leadership Award for reducing its annual water footprint by over 284

THE SOLUTION YOU'VE BEEN LOOKING FOR

Larox Peristaltic Pumps for Demanding Duties

Larox Peristaltic Pumps offer unbeatable process benefits, such as

- **Wear resistance**
- **Highest possible flow volume per compression**
- **Wide control range and excellent control properties**
- **Simple installation and easy maintenance**
- **No check valves – No clogging**
- **Dry run capability**
- **Savings in operation costs**



LPP-T Pumps

Designed for industrial pumping, the Larox LPP-T Pumps are perfect for slurries with high solid content, abrasive, corrosive, viscous and crystallizing media.

LPP-D Pumps

The trailblazing Larox LPP-D Pumps for Dosing have a high turndown ratio making them ideal for dosing and flow control. They provide accurate dosing in all process conditions as the pump discharge flow is irrespective of the pipeline pressure.

LPP-M Pumps

Newest member of the Larox Pump family is ideal for accurate metering. LPP-M Pumps have an exact flow per revolution and they are equipped with a patented tube leak detector system.



LAROX FLOWSYS OY, P.O. Box 338, FI-53101 Lappeenranta, FINLAND, Tel. +358 201 113 311

info@larox.fi • www.larox.fi/flowsys



million litres. GE's DusTreat helped Newmont substantially reduce its annual direct operating costs by eliminating nearly 90% of the water applied to control dust on haul roads. Similarly, the program helped reduce potential runoff to the nearby Rodeo Creek, improve safety and visibility on the mine's haul roads and decrease the total amount of 'fugitive dust' at the mine. The collaborative effort also led to a reduction in the number of times trucks needed to apply water to the dry roads -- decreasing it from 18 times per day to just twice a week.

GE DusTreat is part of GE's broad portfolio of water-savings solutions for the mining industry. Today, GE's mining portfolio includes: dust control solutions, material flow aids, process scaling and corrosion prevention, solid/liquid separations, cooling and boiler water treatments and water and power needs for remote mining operations.

Over in Australia, a new water truck system that is safe, sustainable and reliable has been developed at Rio Tinto Coal Australia's (RTCA) Mount Thorley Warkworth (MTW) mine. "The new system uses up to a third less water than the old models, making them less of a drain on environmental resources," said MTW Maintenance Planner Matthew Little, who developed the water carts. "They are also safer to use as operators can set the water to output evenly during spot sprays and automatically adjust the output according to road conditions and speed. This means operators don't have to take their eyes off the road.

"The water cannons are now able to spray water and foam 65 m away - three times further than the old models - making them effective first response vehicles in the event of a fire." He said the increased pressure also means roads are covered in a single pass rather than

having to double back as was the case with the old design.

Another key outcome has been better levels of reliability. The water cart fleet is running at high availability levels, thanks to fewer breakdowns from component failures arising from stress and heat. MTW Maintenance Manager Warwick Gloster said "Given this success, we're currently speaking to other RTCA sites about getting on board. The water cart design has even travelled to Western Australia, where it's being used on a mine site over there."

Tailings water

Linatex engineered systems are ideal for treatment and recovery of coarse tailings from a range of mining operations including iron ore, coal, alumina and mineral sands as well as part of a more integrated solution for other tailings treatment possibilities. The technology uses Linatex expertise in design and supply of equipment that concentrates the waste stream (through cyclone separators featuring the Linatex G4 hydrocyclone used as a separator complete with fishtail) and combines this with the Linatex dewatering screen which dries the waste to a powder-like consistency enabling disposal or re-use. Such dewatering solutions substantially reduce the load on downstream thickeners or tailings dams and substantially improve the environmental management of mining operations. The additional feature of these dewatering plants is that they are essentially modular in design hence enabling throughputs from small to large to cater for all mine site requirements. Linatex's substantial experience in sand plant technology built up over 50 years is what the dewatering technology is all based on and the equipment is ideally suited given its maximum resistance to abrasion, offering extended plant uptime.

The Linatex team has assisted with the development of dewatering solutions for a number of sites for companies including some of the major mining houses like Alcoa and BHP and has also been prominent in developing dewatering solutions for coal mines in China in the recent past which has resulted in substantial improvement in treatment options for this huge underground coal mining issue.

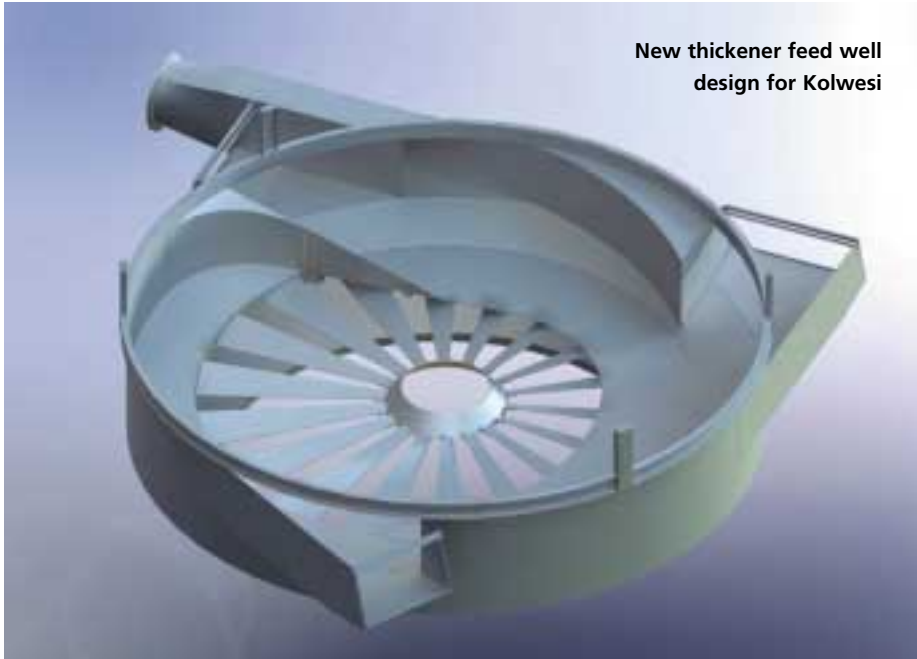
Considering another feature in this issue, Linatex has held a major share of the cyclone market in Australia for many years and still has many cyclones in operation, especially in Western Australian iron ore. With a team of specialists in its Perth office, Linatex decided to further optimise its cyclone design to maximise efficiency, optimise commissioning and operational performance and of course reduce wear rates even further. Lead by Perth based Mark Lockyer (Global Product Manager for Cyclones) the global design team developed the new cyclone design (Linatex G4 Cyclone) using all the benefits of various global Linatex cyclones designs and extracted the best features to produce a design that has seen Linatex win numerous project awards in recent years from many of the engineering houses around Perth and indeed the rest of Australia and as far afield as Russia, China and Chile to name just a few.

Advanced thickeners

Outotec is designing state-of-the-art thickening technology for First Quantum Minerals' Kolwezi project in the Democratic Republic of Congo. The company says "this thickening technology will be a world first," and includes nine high-rate and high compression thickeners for the cobalt and copper tailings project.

Outotec's Australian Thickener Manager, Duncan Wyatt, said: "The strength of our relationships in Africa is testimony to our thickening technology, ability to supply and support customers/projects in remote locations and the fact that Outotec's global reach ensures even remote projects such as this are supported by local and highly experienced Outotec offices. The unique expertise and customer focus of our thickening team also played a vital role in this project."

Outotec's technology for Kolwezi project includes a 42-m pre-leach high-rate thickener. In a world first, the new Directional Autodil™ system will be combined with the company's leading edge vane feedwell system. "The Directional Autodil system, recently globally patented by Outotec, has demonstrated outstanding advances in flocculant dispersion and effective feed dilution. The system has also undergone rigorous CFD testing by Australia's CSIRO. The system will be applied in the



New thickener feed well design for Kolwezi

Kolwezi project, which is expected to reach an annual production capacity of 5,000 t of cobalt and 30,000 t of copper for 50 years," explains Richard Triglavcanin, Outotec's Global Manager Thickening Technology.

"The technology is a significant advance because, other than some minor design changes, feedwells in high-rate thickeners have changed little in the past 15 years. Modern high-rate thickeners generally incorporate some form of internal dilution into the feedwell to dilute the feed and improve flocculation. Directional Autodil advances this process by delivering dilution water into the feedwell in a controlled manner based on feed density, so that it complements the flow of the slurry feed. There is, therefore, a strong flow pattern within the top half of the feedwell, ensuring optimised mixing of high density slurry feed and dilution water, together with flocculant.

"The shelf and vanes of this innovative design produce both upper and lower zones in the feedwell. Vanes on the angle act as baffles to enhance mixing and dissipate the energy of the incoming flows. The bottom half of the feedwell is less turbulent and ideal for aggregate growth prior to exiting the feedwell," says Triglavcanin.

Water management

The pollution of water due to acid mine drainage (AMD) in areas of South Africa where there are mines has over the years grown to such proportions that it has become a major environmental problem. Mintek and its technology partner Atomaer (RSA) are currently commissioning a mine water treatment pilot plant at Randfontein, west of Johannesburg. The technology employed will be evaluated by

Western Utilities Corp for application in its project to treat contaminated water in the western, central and eastern areas of the Witwatersrand goldfield.

Using Mintek's unique SAVMIN™ process, and incorporating Atomaer's Filblast® reactor technology, the plant has a capacity to treat 4 m³/h of contaminated water and represents the largest pilot evaluation of this technology to date. The plant is of a size that will demonstrate the engineering performance as well as the process chemistry, enable accurate determination of operating efficiency and cost, and ensure reliable engineering scale-up to full commercial application.

The plant, which comprises a number of reactor and settling tanks, covers an area of about 200 m², next to Harmony's Number 8

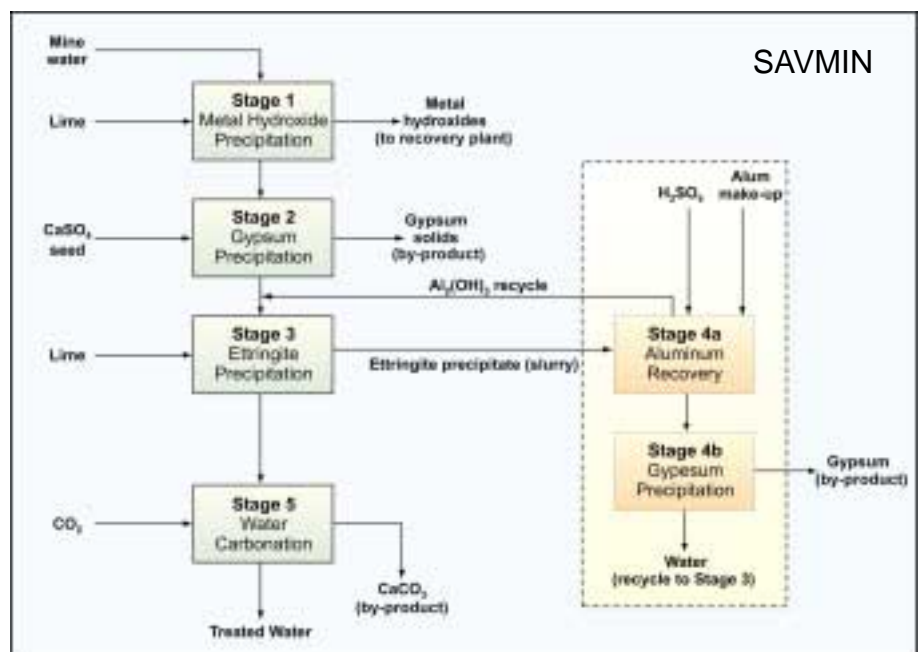
shaft. Built on skids, this compact plant is totally portable and can be transported on ten flat bed trucks to any mining location.

Developed by Mintek over a period of nine years, the SAVMIN process is a novel technology to treat polluted mine water (acid mine drainage). SAVMIN's process chemistry comprises five stages and is based on the selective precipitation of insoluble complexes at different stages during the process.

Siemens Water Technologies has been supporting the Florida Department of Environmental Protection's remediation initiative for the Piney Point fertiliser plant. This is the site of an inactive fertiliser facility. Following bankruptcy filing by the parent company in 2001, the state of Florida took responsibility for the site and its closure. Heavy rainfalls and a tropical storm demanded immediate treatment and disposal methods be implemented. The potential for breach of the pond dikes and hundreds of millions of litres of acidic water releasing into Tampa Bay prompted the need for remedial services.

Siemens provided a solution to treat the waste water using part of an extensive mobile treatment fleet. The water being treated contained high TDS with tremendous scaling potential at a low pH. The mobile equipment included high rate clarification using ballasted floc reactor technology, followed by filtration units, reverse osmosis (RO) and demineralisation. The contract was performance based, with guarantees on discharge water quality following treatment with the Siemens system.

Siemens provided a quick, complete on-site treatment solution. Strategic solutions included numerous options for removing the waste water



off-site by truck hauling, barging and use of existing lime treatment and aeration systems. Siemens provided a unique treatment solution based on the patented high rate clarification process using ballasted floc reactor technology coupled with RO, which had not previously been used as the treatment standard for this type of water. Siemens helped reduce the volume of waste water at the site to facilitate closure.

BioteQ is in the final stages of commissioning two metal recovery plants, one in Dexing mine in joint venture with Jiangxi Copper in China, and the Mt. Gordon mine in Australia which is owned by Aditya Birla. Both plants are designed to treat AMD to recover copper, using BioteQ's unique ChemSulphide® process. The process uses a chemical sulphide reagent to selectively recover metals dissolved in waste water and leach solutions. This produces a saleable metal product and clean water that complies with the strictest environmental regulations and can be discharged to the environment. By using BioteQ's ChemSulphide process, metal recovery rate is greater than 99% and recovered metal products are high grade and suitable for refining.

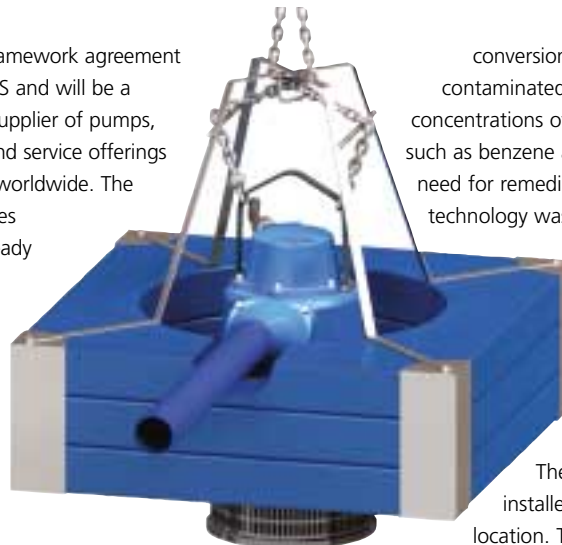
As China's largest copper mining operation, Dexing is setting a new standard in waste water treatment that, it is hoped, will have significant impact on mining operations in China moving forward. The plant is budgeted to produce 700,000 lb of copper over the balance of 2008, with production gradually rising to 3.6 Mlb/y over the next several years.

As of March 31, the water treatment plant at the Mt. Gordon mine in Australia, had already produced 88,000 lb of copper inventory. The plant is budgeted to produce 800,000 lb of copper and 70,000 lb of cobalt/nickel product this year. This is a build-own-operate project. The plant is designed to recover copper in a pure copper product as well as cobalt and nickel in a combined product. Following metal recovery, the water is further treated by standard evaporation methods to maintain the mine site's water balance.

BioteQ agreed to install an evaporation system in return for increasing its share of net revenues from the sale of metals recovered from 50% to 90%. The plant is expected to meet BioteQ's three-year payback criteria. BioteQ has provided the capital cost of the plant and is responsible for all operating costs, in exchange for 90% of net revenues from the sale of metals recovered.

Veolia Water Solutions & Technologies (VWS) claims to be "the leading international water treatment company, designing and building water treatment plants and customised solutions." ABS Group has signed a three-year

global framework agreement with VWS and will be a priority supplier of pumps, mixers and service offerings to VWS worldwide. The companies have already worked together and Ronald Sol,



ABS has introduced a new range of floating pontoons, which with its modular system will cover pumps from 50 to at least 500 kg. Often submersible drainage pump installations in pits need to have the pump floating close to the surface. Such applications can improve the efficiency of the pump and keep pump wear to a minimum.

Strategic Purchasing Director at VWS says "ABS has shown itself well able to meet our need for quality products and efficient service. ABS has proven its ability and competence, and it is therefore now natural to enter into a deeper and worldwide agreement."

VWS MPP Systems is a business unit of VWS, specialised in developing, marketing, manufacturing and servicing water purification systems based on macro porous polymers (MPP). The Macro Porous Polymer Extraction (MPPE) system is a highly effective, fully automated, remote controlled and guaranteed technology for removing hydrocarbons by means of extraction in an MPP bed.

MPPE technology is especially effective for groundwater applications. It removes a broad range of compounds and is able to cope with unexpected higher influent compositions at no additional costs. It is insensitive for dissolved iron and therefore does not create a chemical waste (sludge). MPPE technology is ideal for hotspot remediation as it specifically removes the toxic content (non-polar compounds). It does not change the rest of the water environment in the treated groundwater stream to be re-injected to the ground. In this way an ideal environment is created in the re-injected groundwater to enhance biodegradability and further remediation by natural attenuation.

Chemie Park Schwarze Pumpe, which is part of the systematic rehabilitation of decommissioned lignite mining operations in the former East Germany, is using MPPE technology for groundwater treatment. The groundwater from the former brown coal

conversion site, has become contaminated and contains high concentrations of various toxic compounds, such as benzene and polyaromatics, hence the need for remediation work to take place. The technology was chosen after two years of intensive testing.

Only extraction of the poisonous organics takes place and the remaining water environments remains unchanged which enhance biodegradability.

There are now five units installed on specific hotspots on the location. The idea is when such a hotspot has been remediated enough to allow further natural attenuation, the (mobile) unit can be moved to another hotspot location. Sometimes a surfactant or alcohol enhanced aquifer remediation is applied in combination with MPPE to remove concentrated Dense Non Aqueous Phase Liquids (DNAPL).

Water for miners to drink

In South Africa, with an extensive reputation in the financing, designing, construction and operation of water treatment plants, VWS Envig also delivers solutions tailored to smaller applications. Supported by its research and development capabilities, the company offers a range of package plant technology products.

Package plant technology is characterised by its compactness, cost-effectiveness, and mobility, and is ideal for use in remote locations. Depending on requirements, these plants are capable of producing high quality, potable water and are also able to process sewage.

Using package plant technology in remote locations is ideal. "We have deployed these solutions on-site at mines throughout Africa." One such installation was in Zambia for Lumwana Mining. With construction of this new copper mine underway, a potable water treatment plant was required to serve the employee camp. The plant, which has a capacity of 350 m³/day, has been operational since 2006," explains Wayne Taljaard, General Manager - Engineered Systems, VWS Envig.

"We recently concluded a deal with Lumwana to supply another package plant to accommodate the growth that is taking place. The camp is developing into a town with more and more people moving onto site. Based on the success of the first plant, we were awarded the tender to supply a similar plant," says Taljaard.

The second package plant was installed and commissioned in October/November last year. It has a capacity of 350 m³/day and works in tandem with the existing facility. **IM**