

# **SRK News**

## **SRK's 30th Anniversary**

No. 33  
SRK Consulting's  
International Newsletter  
[www.srk.com](http://www.srk.com)



**E**stablished in January 1974, SRK looks back with pride on the past three decades and forward with enthusiasm to SRK's prospects in the years ahead.

**T**his newsletter is a celebration of SRK's past 30 years. Profiles are presented for some 80 projects; these projects illustrate the range of services covered by the practice and include some that are, and have been, pivotal in the development of the SRK Group.

Clients have sought SRK's advice on projects from the high Andes through the Russian tundra to the deserts of Africa; projects ranging from developing hypotheses on ore genesis through project development, operations improvement and, increasingly, mine closure.

SRK CEO Brian Middleton comments, "The respect and trust of our clients has been an inspiration and a driving force in the evolution of our business. We are thankful for their support, encouragement, counsel and friendship."

The practice has always recognized that it can only be as good as the staff we are able to attract, develop and retain. This is reinforced every time SRK gains a good team member. SRK founding partner Oskar Steffen comments, "We are and have been privileged to work with outstanding professional technical and support staff throughout the world. Encouraging talented individuals to attain their potential remains our most important task."

SRK Group Chairman Neal Rigby concludes, "We look forward to our next three decades with confidence and enthusiasm. The future will continue to be an exciting one. For the minerals industry, key challenges include increasing returns for shareholders and improving the image from an environmental perspective. For infrastructure industries a myriad of opportunities exist for improvements. We believe the technologies are available for project owners to significantly enhance performance in these areas; at SRK, we are up to these challenges."

# Africa

## Bafokeng Tailings Dam



**W**hen the Bafokeng tailings dam failed in 1974, liquefied tailings flowed into an adjacent shaft, killing 13 people underground.

In 1975 SRK designed a new tailings impoundment to meet a probability of annual loss of life at less than 1 in a million. The complex has operated successfully for more than 25 years; the 40m high decant towers will soon be extended to 80m. This design set South African industry standards.

## EARS Project



**T**he Environmental Analysis & Remote Sensing (EARS) project provided the first structurally consistent view of the basins of Egypt, highlighting the control of basin architecture by basement fabric. It included a study of the Red Sea and the structure and stratigraphy of the Jurassic of the Western Desert. EARS resulted in drilling success for one client and, later, a very large gas discovery.

## Hex River



**T**he Hex River Tunnel connects Kleinstraat and De Doorns on the main north-south South African rail system. The tunnel was advanced by drilling and blasting. SRK reviewed the contractor's blast design, established whether blasting practice was responsible for reducing the rate of tunnel advance and suggested alternative blast patterns and practices.

The project led to the founding of SRK's Cape Town office in 1979 and contributed to its continued growth.

## Merriespruit

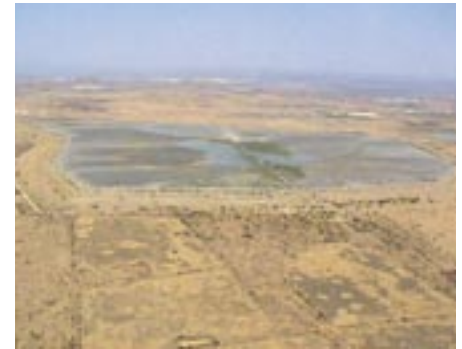


**T**he failure of the Merriespruit tailings dam at Harmony Gold Mine at Welkom in 1994 caused extensive damage and loss of life at a nearby mine residential township.

SRK was immediately called in and developed post failure stability measures, safety barriers to protect the undamaged portions of the township, and investigated the cause of the failure.

Remedial work began seven days later as SRK proposed ongoing safety measures to deal with possible further flows.

## Platinum Tailings



**F**rom the late 1970's, SRK has been involved with numerous tailings disposal projects in the platinum-rich Rustenburg and Polokwane areas. This work includes:

- Tailings dams and return water dams at Rustenburg Section, Union Section, Aquarius-Kroondal and Lonmin, with extensions at Lebowa-Atok and Amandelbult Section.
- Tailings dams and extensions at Lonmin and Potgietersrust, with remining at Impala's Barplats Mine.

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## Nchanga Mine

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The Nchanga Mine is one of the largest copper-producing mines in the world, using both open pit and underground extraction. SRK has since its inception in 1974 been involved in evaluating the stability of the interim pit slopes.

Underground extraction using block caving has undermined part of the pit.

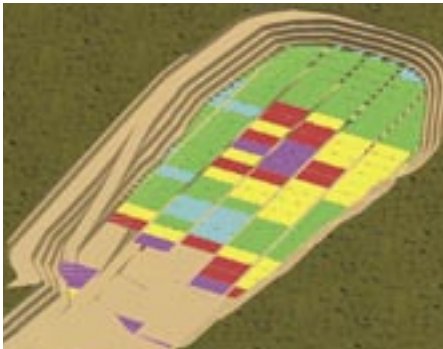
SRK is assessing the caving system and undermined slope stability to allow extension of the caving further under the open pit, and is designing the final pit slopes.



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## Mineral Sands

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**SRK** has been involved in many mineral sands projects, beginning with geotechnical work on the mining/dredge ponds at Richards Bay Minerals in the 1980's. Other projects include Hillendale, Wavecrest, Fairbreeze (in South Africa), Kwale (Kenya), Moma, Tigen and Corridor Sands (Mozambique), where work has ranged from technical reviews, resource estimation, mining designs, geotechnics, tailings disposal, environmental assessments, and water supply studies.

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## Lesotho Project

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This project transfers water from the mountain highlands of Lesotho to the highly industrialized, but water-poor, Witwatersrand region. In the first phase, SRK was involved in work on the 180m high concrete arch Katse Dam and appurtenant structures, and approximately 100km of transfer and delivery tunnels. Our role was to investigate options, undertake site investigations, prepare designs, tender drawings and documents, adjudicate tenders and perform construction inspections.

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## Ceres Dam

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Located on the Koekedouw River upstream of Ceres in the Western Cape, this dam is 62m high and is designed to supply 17 million m<sup>3</sup>/annum (cubics per meter), including a portion allocated to emerging farmers.

The dam is the first in South Africa to have an asphalt-concrete core; to be funded by both private and state sources and by permit, to release water for the environment. Built on the site of the old dam, challenges included maintaining water supply during construction.

# Africa

## Standard Bank Superblock



The Standard Bank Administration Building was constructed on land on which the Main Reef/Main Reef Leader and South Reef stopes outcropped, causing undermining and foundation

problems. This led the authorities to severely restrict development. SRK inspected the accessible old underground workings, and proposed a stabilization method, constructing in-stope concrete

pillars. SRK used a pseudo-three dimensional method of stress analysis to space and size the pillars. Authorities approved the stabilization method; the structure has been in use since 1984.

## Kowyn's Pass



Kowyn's Pass near Graskop in the Eastern Transvaal has a history of cliff instability. Instead of anchoring the unstable boulders, SRK proposed a rockfall shelter. The costs were comparable to the anchoring methods, so the client accepted SRK's alternative.

SRK completed the design, tender and construction supervision for the project – a first in South Africa. The road beneath the rockfall shelter has been open to traffic ever since 1980.

## Skorpion Mine



The feasibility study for Anglo American's Skorpion Mine and refinery in Namibia was managed by Reunion Mining as part of a "buy-in" agreement with Anglo American. SRK audited this study as it was prepared to ensure that it satisfied the requirements stipulated in this agreement.

The mine was commissioned in September 2003 and is now a world class, low cost, zinc producer.

## Geita Gold Mine



SRK has been involved with AngloGold Ashanti's 600koz per annum Geita Gold Mine in Tanzania since 1996, when Ashanti bought rights to the licence from Cluff Resources. Later, when Ashanti purchased SAMAX and added the Kukuluma and Matandani prospects, we valued both parties' relative interests in the project. Since then, SRK has completed environmental studies, audited the project for debt financing, and designed and supervised the technical completion tests that confirmed the project had met its production targets.

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## Maguga Dam

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This clay-core rockfill-type dam, at 115m high, is the second highest embankment dam in Southern Africa.

It falls within a large catchment which experiences cyclonic rainfall; the design challenge for flood flows was solved with a very large labyrinth spillway of 15000m<sup>3</sup>/s.

Built for irrigation, it also supplies water to Pigg's Peak and can provide hydropower.



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## Eskom/Kriel

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In 1987 the Eskom power generating authority in South Africa invited tenders for the privatization of ash disposal from the Kriel thermal station, their first privatization initiative. Each year, Kriel burns 9 million tonnes of coal, generates 3000 MW/hour, and produces 2.5 million tonnes of ash. As part of a consortium, SRK was contracted to design and operate the facility for 10 years. During this period, SRK improved the facility to meet more stringent environmental and safety legislation.

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## Ghana Mines

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Goldfields Ghana Limited (GFGL) operates the Tarkwa open pit/heap leach gold mine and the Damang open pit/CIL plant. In 1996, SRK authored the original Tarkwa feasibility study and has since worked closely with GFGL. In 2002, SRK completed the Tarkwa strategic analysis study. GFGL is now constructing a new CIL plant and moving from contractor to owner-mining. GFGL and SRK recently completed a strategic analysis at Damang, investigating additional mining prospects. SRK provided technical services including geotechnics and pit slope design.

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## AECI

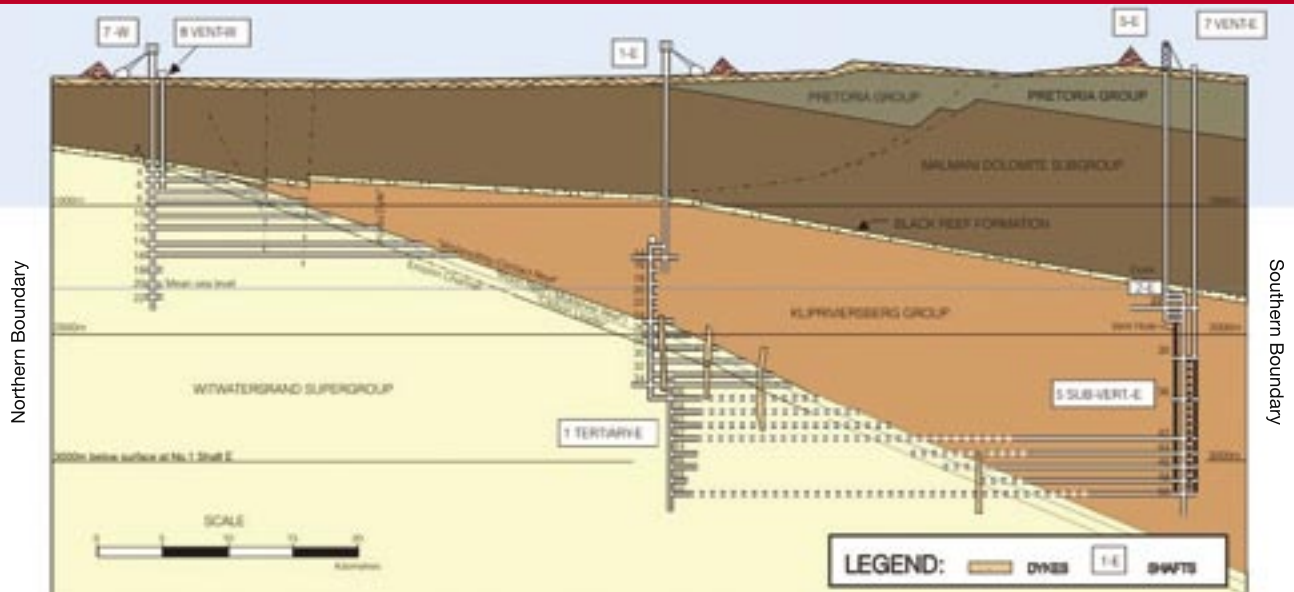
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AECI has manufactured explosives and chemicals for the last 100 years on numerous sites. However, waste handling practices in the past do not always meet today's standards. As a result, the soil, groundwater and surface water is contaminated in differing degrees. With AECI, SRK identified the nature and extent of contamination at more than 200 sites, and is designing and implementing remedial measures. A computer-based land management information system has been developed to monitor the process.

# Africa

## Mining Finance



**SRK** has been the independent technical advisor and competent person to some groundbreaking transactions, including the formation of Gold Fields

Limited (merger of Goldfields of South Africa and Gengold) and of AngloGold (and its acquisition of Minorco's gold assets), the listing of Kumba Resources,

ARM Gold and Harmony, the merger of ARM and Harmony and the recent acquisition of Avgold by the merged entity.

## De Beers Mines



**S**ince its South African inception in 1974, SRK has been involved with the De Beers group, providing services for open pit slope design, ramp stability, geotechnics, water supply and tailings dam design and implementation.

Sites include: the Finsch, Koffiefontein, Cullinan and Venetia mines in South Africa, and the Lethlakane, Orapa and Jwaneng open pits in Botswana.

## Sishen Iron Ore



**I**n the early 1990's SRK conducted a review of the Sishen Life-of-Mine Plan for Iscor, now Kumba Resources.

During the 2003/2004 financial year Sishen produced 27.5 million tonnes of product and 60 million tonnes of waste. Their long, medium and short term plans range from one week to 10 years. SRK analyzed all aspects of the Life-of-Mine Plan and made recommendations. This review, one of the first to be performed in the world, led to the establishment of SRK's due diligence team.

## SAB Miller



**F**or more than 20 years, SRK has been an active partner with SAB Miller, the second largest malt brewer in the world. This association primarily concerns water and wastewater management, reducing their water to beer ratios from >10:1 to a present industry standard of <5:1, achieving substantial savings. Optimizing fresh water intake at the beginning of the process is important, as is minimizing the wastewater generated at the end. SRK has helped as SAB expanded into Russia, China, eastern Europe, as well as more than 10 countries on the African continent.

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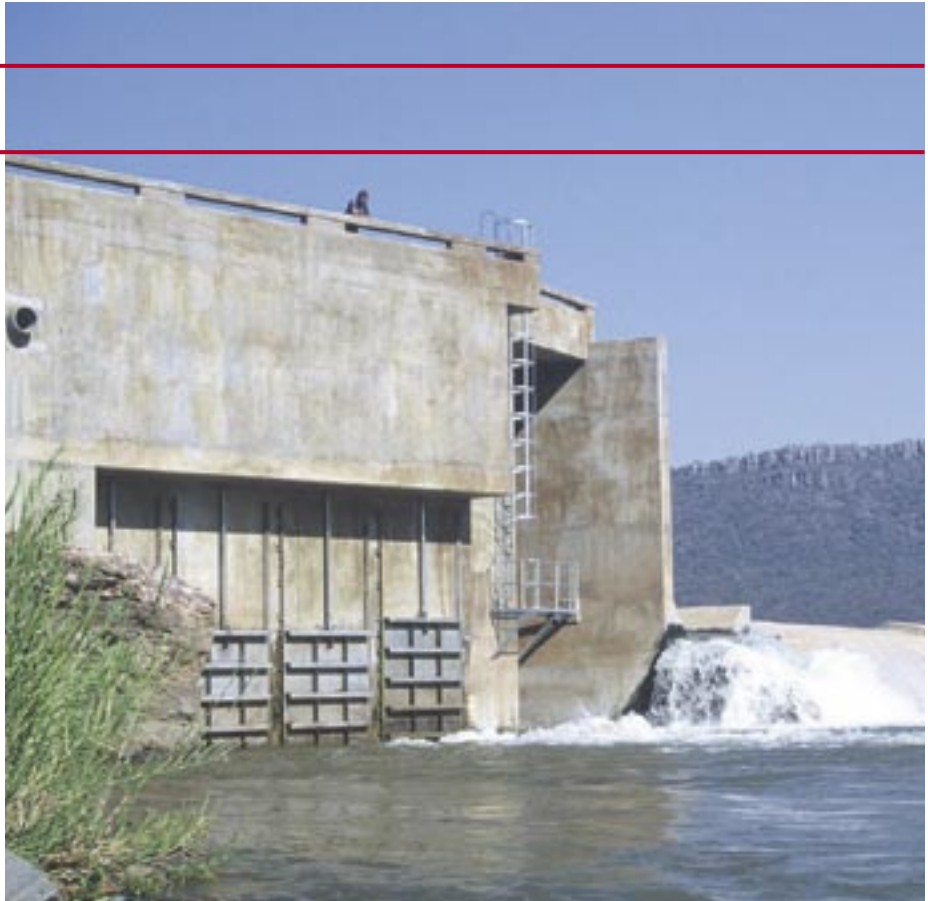
## Lebalelo Pipeline

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**T**he Lebalelo Pipeline transports raw water from the Olifants River to mining operations at the Bushveld complex.

It includes: a river offtake weir, a de-silting facility and storage dam, high level and secondary pumpstations, connecting steel pipelines, a concrete reservoir and five earth dams.

It also supplies water to 1.3 million rural people, a function identified as crucial for sustainable development in the region.



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## Stormwater

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**B**ased on national and international experience, SRK's innovative approach to stormwater management benefits clients and communities in developed areas by identifying and ranking "at risk" areas, reducing flooding and potential liability claims expeditiously, reducing potential flood damage costs and capital expenditure. And in undeveloped (developing) areas, with SRK's help, authorities can create an integrated catchment approach, manage flood-prone areas and select appropriate development strategies.

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## Environment

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**A** State of the Environment Report (SoER) provides governments with credible information on the condition of economic, social and natural environments. SoERs monitor the effectiveness of policies and programs designed to improve the quality of life and monitor progress towards achieving sustainable development. SRK's involvement in SoERs for the Gauteng Province, the Ekurhuleni Metropole, the Midrand Municipality, the Western Cape Metropole and the Knysna Municipality is influencing policy development in South Africa.

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## Research

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**I**n recent years interest in the research and application of constructed wetlands for waste water treatment has grown. The systems offer an efficient and adaptable option to treat domestic effluent, upgrade conventional pond systems and treat a range of effluents, including Acid Mine Drainage.

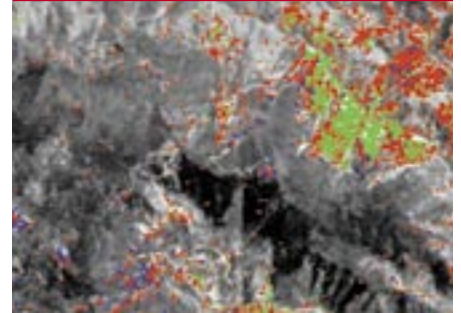
SRK has been involved in developing the design, implementation, management and operation of these systems, as it has for a variety of R&D projects for major organizations and research bodies.

## AFCAN Tanjianshan



**SRK's** Cam McCuaig, Principal Geologist, at the AFCAN Tanjianshan project site which lies on the northern edge of the Himalayan plateau, Qinghai province, China. SRK developed a structural model for Tanjianshan focusing on the timing, kinematics and 3D geometry of the fault system that hosts gold mineralization. The model, used to assess risk and potential upside to resources, has provided successful targets to identify further mineralization. SRK is also assisting with geotechnical engineering advice.

## Remote Sensing



**SRK** used a remote sensing application for the mineral exploration of approximately 7,000km<sup>2</sup> in Turkey for Tuprag, a subsidiary of Eldorado. Five ASTER images were analyzed according to the clay mineral spectra. Several enhancement methods were applied to the images, including selective principal component analyses, decorrelation stretching, and color transformation. The promising areas were identified as GIS-ready products that the client could make use of immediately.

## Jinfeng Deposit



**SRK's** Andrew Ham, geologist, mapping a road exposure at Sino Gold's Jinfeng gold deposit in southern China. A detailed review of structural ore controls in this Carlin-style gold system was completed. Leapfrog models, field mapping and updated interpretations of cross-sections were used to constrain the geological model prior to resource estimation. Results were also used to focus Sino's near-mine exploration program.

## Chalco



**SRK's** Chalco team in China. When the SRK competent person report supported the listing of the Aluminium Corporation of China (Chalco) on the New York and Hong Kong stock exchanges, it raised SRK's profile.

At the time (mid-2001), China was becoming more active in Western affairs. China has since joined the World Trade Organization, won the 2008 Olympics bid, and become a focus for exploration, mining and minerals demand.

## Sukhoi Log



**SRK** conducted a full feasibility study and bankable document for developing one of the largest unmined gold deposits in the world in remote northern Siberia. SRK examined the open pit mine site, developed the mining plan, verified the process, recommended necessary infrastructure, and conducted environmental assessments. A close working relationship with the Russian Government, scientific institutes and western funders helped to incorporate their requirements.



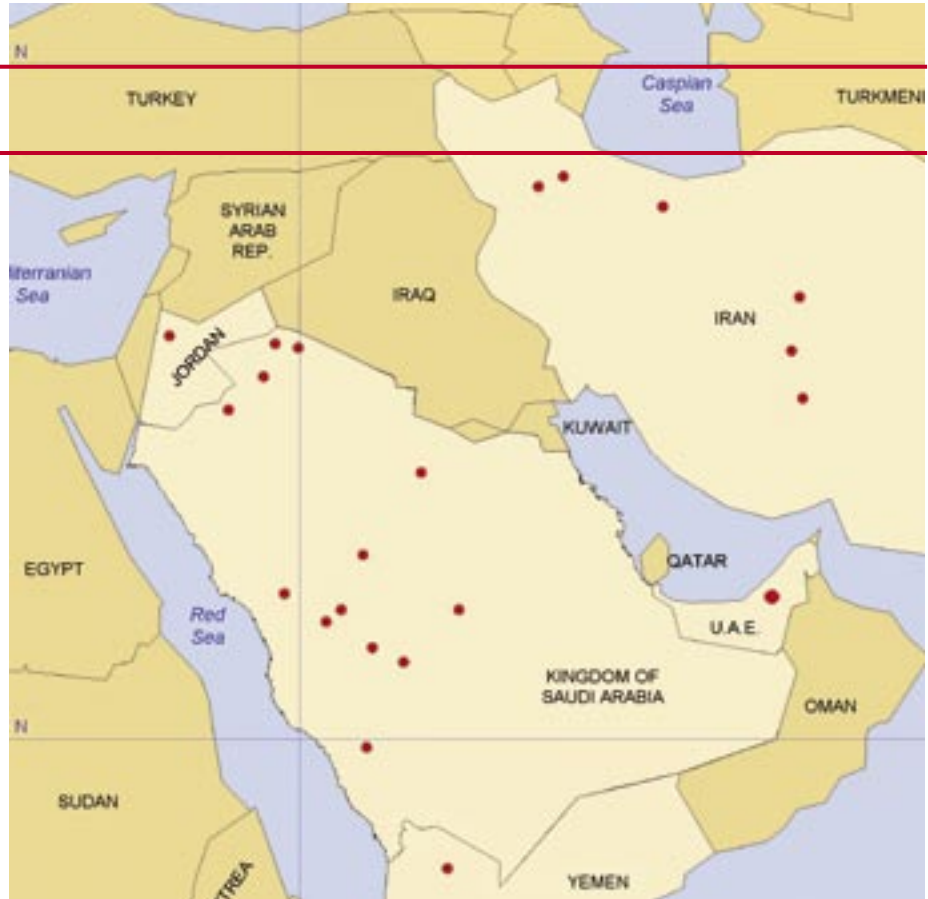
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## Middle East

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**SRK** has had a close association with the Middle East, in particular Iran, Saudi Arabia and Yemen, since the early 1990's. These projects include work directly for the state organisations and ministries: Mahd Ad Dahab and Ma'aden, Saudi Arabia; the Ministry of Industries and Mines and Iranian Mines; the Minerals Industries Development and Renovation Organisation; and the private sector.

The projects have included gold (Al Hajar, Al Amar, Mahd, As Suk, Sukhaybarat); copper (Sungun, Sar Cheshmeh); iron ore (Chador Malu, Gol-e-Gohar, Kermanshah); zinc (Angouran, Zanjan) and industrial minerals (Esfordi phosphate, Zarghat magnesite, Umm Wa'al and Jalannid phosphate).



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## Sterlite

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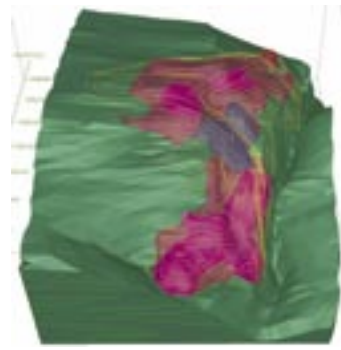


**W**hen Sterlite Industries India decided to list its resources businesses on the London Stock Exchange (LSE) as Vedanta Resources, SRK was chosen to prepare the Independent Engineers' report for the Listing Particulars. Together with specialist associates, SRK reviewed each asset and prepared an independent opinion of projections and cashflow forecasts. Vedanta Resources, listed on 5 December 2003, was the largest mining IPO in the world that year and the second largest on the LSE.

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## Angouran

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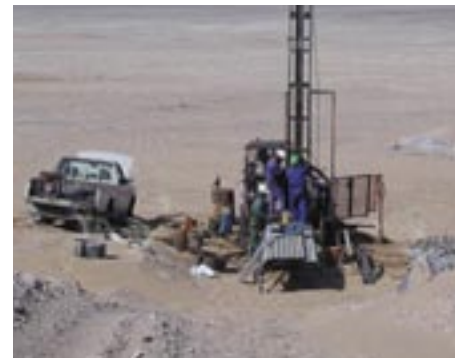
**T**he Angouran zinc oxide and sulphide deposits in Iran are world-class in terms of both tonnage and grade.

In 2002-2003 SRK undertook a feasibility study including the design and supervision of definition drilling, 3D resource modelling, ore variability estimates, pit optimisation, tailings disposal, and environmental impact assessment.

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## Ma'aden

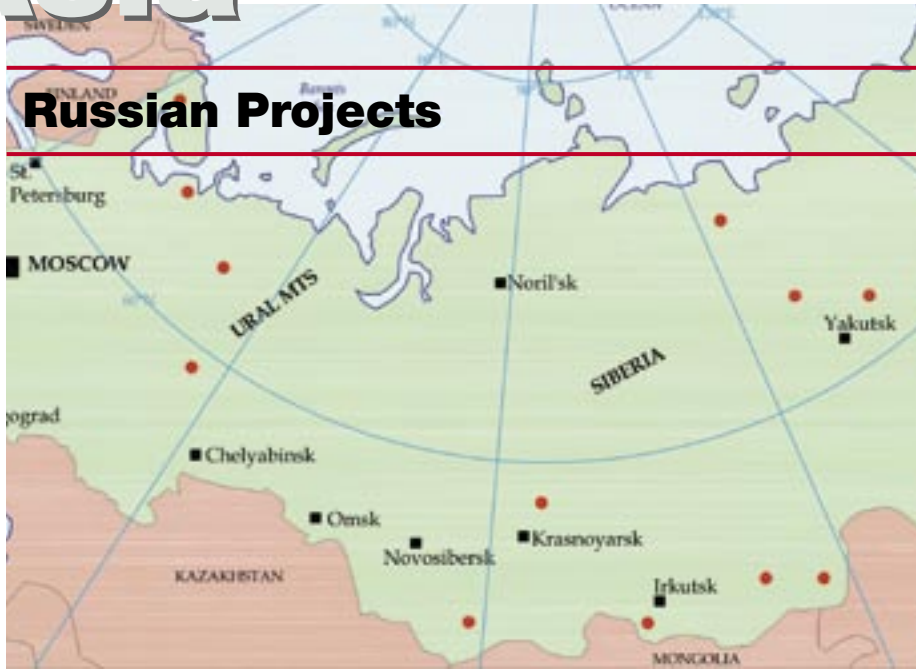
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**SRK** has carried out environment baseline studies on all the active and proposed mine sites for Ma'aden, the State Mining Company in Saudi Arabia.

Environmental Impact Statements have been done for three sites, and more are at the proposal stage. SRK is busy conducting water supply studies for two proposed new developments which, in the desert, pose quite a challenge.

# Asia



## Russian Projects

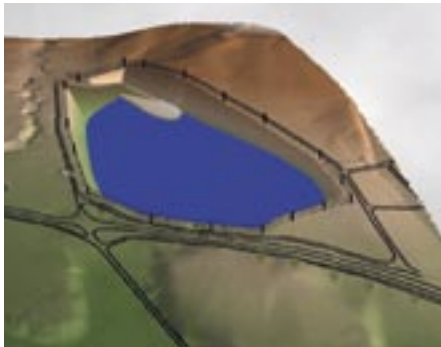


## Iron Ore Mining

**S**ystem Capital Management (SCM) recently privatized two large iron ore mining and processing complexes in Krivoy Rog, Ukraine. SRK is working with SCM on a strategic analysis of the mining and concentrator/pelletizing operations, computerizing geological and planning data for the possible reopening of No 4 Pit. SRK is also assessing the replacement or renewal of sinter plant capacities at two SCM metallurgical plants near Donetsk.

**T**he number of projects SRK carries out in Russia has increased rapidly over the last few years. Clients include companies in the mining and investment community based in Russia as well as internationally. Projects include CPRs, project finance reviews and bankable feasibility studies. The Russian mining sector is growing in importance both to SRK and the mining industry as a whole.

## Lafarge Quarry



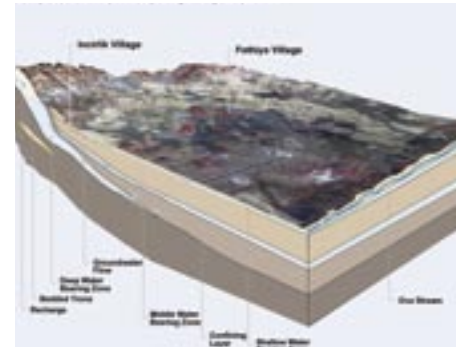
**SRK** developed a quarry rehabilitation plan in central Anatolia for Lafarge-Turkey. The project team adopted a comprehensive approach to meet current regulations following national, international and European Union standards and Lafarge's Quarry Rehabilitation Policy. The plan was based on geological, geotechnical and environmental studies. The team used flowcharts and 3D diagrams to outline the steps needed to return the site to acceptable post-mining land use.

## Ovacik Gold Mine



**SRK** was contracted to make a dewatering assessment for the open pit of the Ovacik Gold Mine in western Turkey. The team designed a field investigation program, drilled pumping and observation wells and conducted aquifer tests. The site was then characterized using the data collected and a 3D groundwater model was developed. A system was designed to dewater the pit using this model.

## Kazan Trona



**SRK** assisted Rio Tinto in applying for operation and development permits including environmental permits for the Kazan Trona Project in Turkey. Trona is a carbonate mineral used in the glass industry.

SRK completed supporting engineering studies during the preparation of the Environmental Impact Assessment (EIA) which has been submitted to initiate the EIA procedure.

## Caving Operations

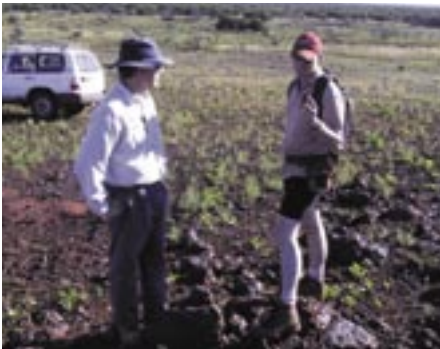


Since the late 1990's SRK's Perth mining group has focused mainly on caving projects (sub level cave and block cave), completing over 20 projects in 8 countries,

covering studies, operational reviews and due diligence. For example, one such study provided the blueprint for the establishment of Newcrest's successful

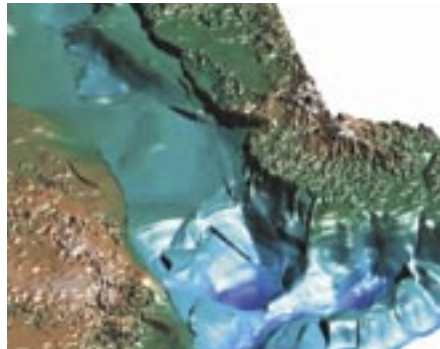
Ridgeway Mine. SRK has assisted many mines in their transition from open pit to large underground caving operations.

## Pilbara Iron Ore



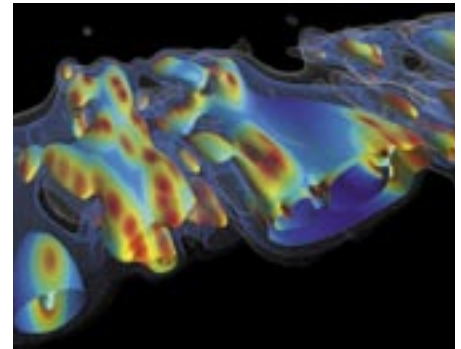
SRK's Paul Hodkiewicz, geologist (left), and Fortescue Metals Group (FMG) geologist in the field. To fast-track the exploration program and identify targets along the +200km strike length of tenements in the project area, Western Australia, FMG must investigate the structural and stratigraphic controls of mineralization in the Nammuldi Member of the Marra Mamba Iron Formation and structural controls on the continuity of ore-grade mineralization, and determine their timing and movement sense.

## Sydney Basin



SRK recently completed a regional study and basin model of Sydney Basin and the eastern part of the Gunnedah Basin for coal exploration and mining entities. This project's major focus was to investigate the relationship between regional-scale basement features and known local structural risks, to reduce geological uncertainty. In addition to the four initial sponsors, to date five other organizations including coal mining companies, Coal Seam Methane (CSM) explorers and government research departments have acquired the study's results.

## Leapfrog



Leapfrog software is SRK Australasia's latest R&D investment success story. Leapfrog eliminates the task of manually digitizing resource models from drillhole data. Based on 3D interpolation technology, Leapfrog can generate accurate grade models in a matter of minutes to hours, compared to days or weeks if the information was manually digitized.

For more information: [www.leapfrog3d.com](http://www.leapfrog3d.com) or email Jun Cowan at [jcowan@leapfrog3d.com](mailto:jcowan@leapfrog3d.com).

# Europe

## Konttijarvi



**SRK's** Paul Hodkiewicz, geologist (second from left), with Gold Fields and Arctic Platinum geologists at the Konttijarvi Platinum Group Elements (PGE) deposit, on

the Arctic Circle in central Finland. This long-term project started out as a regional structural interpretation of the Portimo Layered Igneous Complex, and later

developed into a program of detailed mapping of trench exposures to delineate deposit-scale structural and hydrothermal controls on remobilized PGE mineralization.

## British Coal



**T**he projects associated with privatizing British Coal's assets in 1994/5 were pivotal in developing SRK (UK). On behalf of R J Budge (RJB Mining) and Barclays (BZW), SRK deployed a team of over 50 engineers, geologists and environmental scientists to assess and value 144 mine properties, including all underground and open pit mines in England, Wales and Scotland. As a result, RJB Mining, with a syndicate of banks led by BZW, bid successfully for the English coal assets and formed UK Coal.

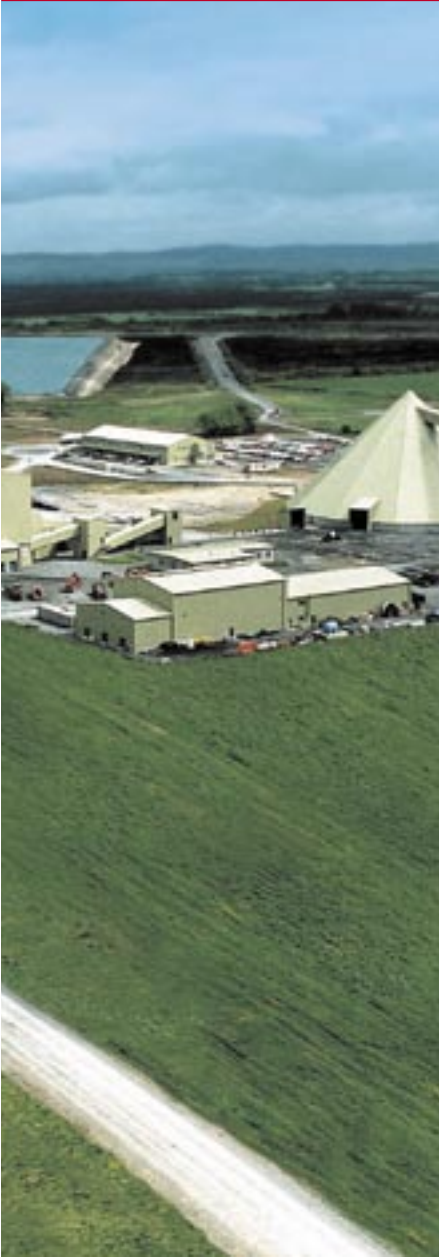
## Penderyn Quarry



**T**o access resources below the water table, Hanson Quarry Products needed not only to monitor the effects on the local environment but protect a Site of Special Scientific Interest and an abstraction borehole.

Beginning in 1996, SRK established the baseline conditions before dewatering and subsequently designed and installed a monitoring network. Dewatering began in 1999 and monitoring continues today under SRK's management.

## Lisheen



The Lisheen lead-zinc feasibility and design studies, undertaken between 1991 and 1999 in Ireland, helped establish SRK as a significant force in the UK and Europe with developers and the financial community. From this early stage, SRK was involved in a number of technical assessments for the conceptual mine design. SRK continued to provide assistance into the construction phase for new stakeholders.

## UK Quarries



The 1999 UK Quarries Regulations require all surface mineral operators to appraise the stability of their excavations, tips, stockpiles and lagoons.

Since 2001, SRK has carried out geotechnical assessments of over 150 quarries throughout the UK, and this work continues. Our in-house computer program, QRisk, was developed specifically to examine the risk profile of hard rock quarries

## Wismut

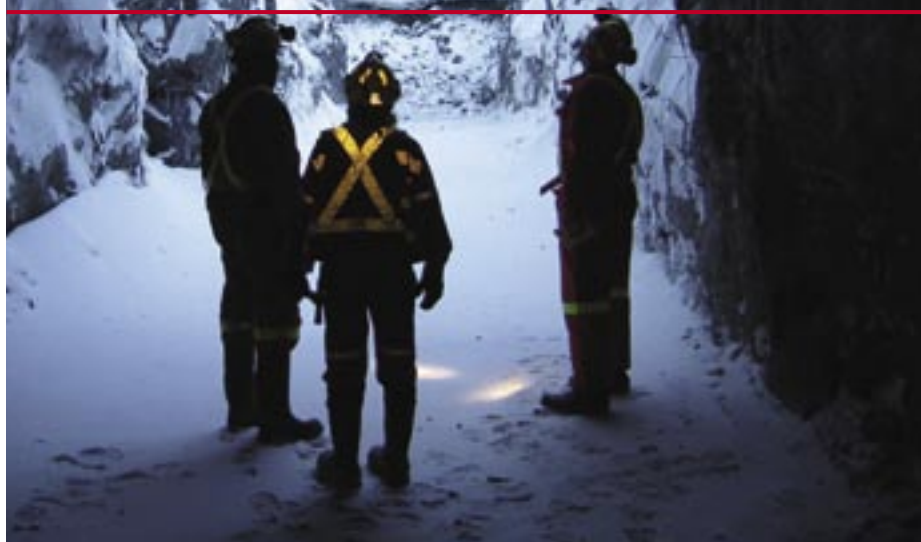


SRK recently marked its tenth year as a consultant on the projects being carried out by WISMUT GmbH, in the former East Germany.

The projects involve decommissioning, closure and remediation of three uranium mining districts. SRK has assisted WISMUT in developing and implementing closure and remediation projects with a total value of several hundred million dollars.

# North America

## Ekati



Since 1998, BHP Billiton Diamonds has mined diamonds at the Ekati Diamond Mine near Lac de Gras in Canada's Northwest Territories. Current operations are based on mining multiple pipes by the open pit method. Some pipes are now being converted to underground mining, as pits deepen. Since 1999 SRK has worked with BHP Billiton's team to select and design appropriate underground mining methods for individual kimberlite pipes.

## San Manuel



The BHP Copper San Manuel Mine is a former underground and open pit mine located in south central Arizona. BHP Copper retained SRK to evaluate closure options and prepare the necessary engineering and environmental documentation. SRK personnel from throughout North America, South America and the U.K. contributed to this project, including specialists in groundwater hydrology, aqueous geochemistry and mining engineering.

## Duval Canal



In September 1998, Phelps Dodge Sierrita, Inc. (PDSI) experienced a significant storm event at their major copper mine in southern Arizona that resulted in damage to the Duval Canal, a lined surface water conveyance 3.2 miles long, linking the mill and the tailing impoundment area.

SRK designed a new canal to meet the PDSI environmental objectives of surface and groundwater protection.

## Red Dog Mine



The Red Dog Mine, near Kotzebue, Alaska, is the world's largest zinc producer. Since 1998, SRK has assisted Cominco Alaska and Teck Cominco Alaska Inc. with several projects at the site, including long-term investigations of acid rock drainage. In 2003, SRK was selected to act as the primary consultant for the development of a closure and reclamation plan.

## Langlois Mine



The Langlois underground zinc mine in northwestern Quebec, in production since 1995, had become uneconomic by 2000, when Breakwater Resources hired SRK to prepare a feasibility study to bring the mine back to profitability. SRK developed concepts and options to introduce only those changes required to address the most serious operating problems. Risk was reduced by relying on historical productivities and costs.

## Britannia Mine



**T**he Britannia Mine, located just north of Vancouver, Canada, was once the largest copper producer in the British Empire. More recently, it has been characterized as the largest uncontrolled source of metal pollution in North America.

SRK first developed a closure plan for the site in 1994, and is currently working with Golder Associates, Klohn Crippen and the provincial government to collect, store and treat contaminated water.

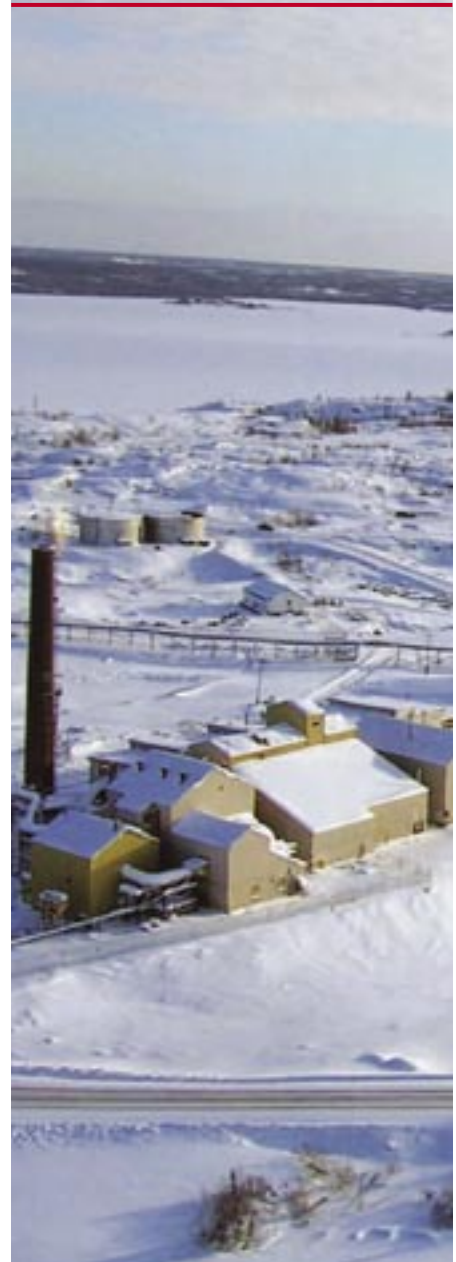
## Standard Mine



**A**pollo Gold retained SRK to undertake the detailed design for permitting and construction of the heap leach pad at their new Standard Mine, Nevada.

This new greenfields project is located approximately 10 miles south of Apollo Gold's existing Florida Canyon Mine. The pad is constructed on steep ground in an area of high seismicity. Construction began in May 2004; ore stacking is planned for the third quarter 2004.

## Giant Mine

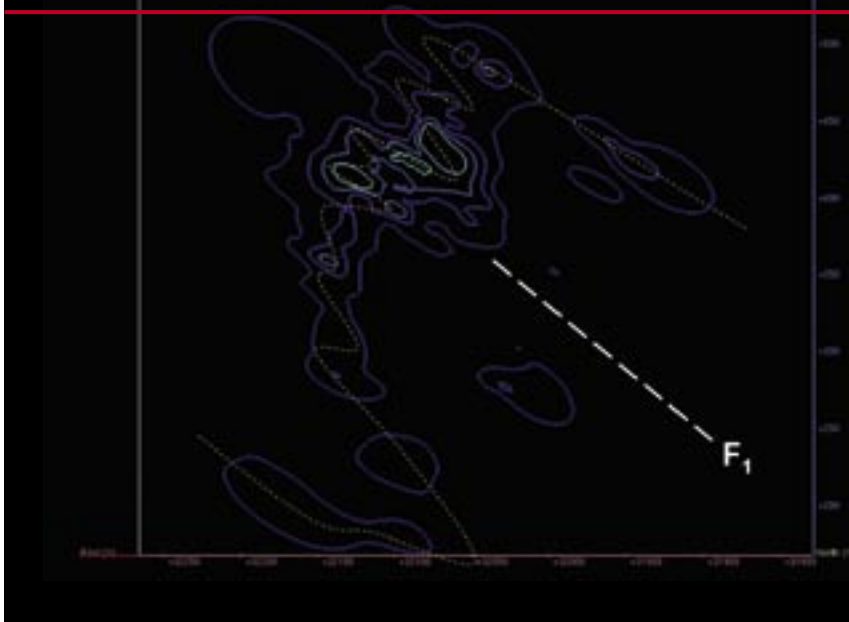


**R**oasting of the arsenopyrite ore at the Giant Mine, in Canada's Northwest Territories, produced 237,000 tonnes of arsenic trioxide dust.

The dust is stored underground in mined-out stopes and chambers. Since 1999, as Technical Advisor to the Giant Mine Project Team, SRK has been involved in developing, communicating and licensing a long-term plan for dealing with the highly toxic material.

# North America

## Alamo Dorado



Pan American Silver is in the process of updating the final feasibility study of their 35 million tonne silver-gold deposit at Alamo Dorado in Sonora, Mexico.

Using detailed structural mapping, combined with 3D Leapfrog modeling of grade distributions, SRK produced a geological model of the complexly folded

deposit that served to guide a recent drilling campaign and was incorporated into the new resource model.

## Victor



De Beers recently completed a feasibility study of the Victor Diamond Project, the only advanced diamond project in Ontario. The Victor kimberlite is located in the lowlands of northern Ontario, approximately 100km west of James Bay.

The harsh environment poses challenges for the mine design. SRK, with Itasca and HCl consultants, has assisted De Beers with mine design and hydrogeology since the prefeasibility stage.

## Chino Mines



In 1995, Chino Mines Company, a subsidiary of Phelps Dodge Corporation, retained SRK to assess potential human health and ecological risks associated with historic smelter and processing emissions in New Mexico.

This project required close coordination between state and federal regulators as well as the involvement of other technical specialists.

## Uranium Projects



SRK is preparing uranium mill Title II (commercial energy fuel) sites for license termination and transfer to the US Department of Energy. At Panna Maria, we expect approval of our application for Alternate Concentration Limits (ACLs) in 2005, with license termination and transfer in 2006 – a first for the State of Texas. At nearby Conquista, SRK will apply for ACLs in 2005, with license termination and transfer in 2012.





## Robinson Mining

**T**he Robinson Mining District in Nevada has been mined since the late 1800's. SRK became involved in 1996 with BHP operations, which incorporated selected use of waste rock from new mining operations to stabilize and close historic facilities. When operations temporarily ceased in mid-1999, active closure planning began. SRK provided detailed engineering and permitting assistance to meet all regulatory requirements and maintain strategic facilities as operating assets. With sale of the property to Quadra Mining Ltd., SRK has provided help with "re-start" engineering design and permitting for resumed operations.



## 20 Years at Faro

**SRK** has worked at the Faro Mine, a major zinc and lead producer in Canada's Yukon Territory, since the mid-1980's, and is currently assisting Deloitte & Touche Inc. and the Federal and Yukon governments to prepare a comprehensive closure plan.

Recent projects range from basic geochemical studies to supervising the engineering and construction for breaching a major fresh water supply dam.

## Bagdad Mine



**P**helps Dodge Corporation retained SRK to complete the Aquifer Protection Permit, a comprehensive groundwater permit program, for the Bagdad open pit mine in Yavapai County, Arizona.

Challenges in the permit process include maintaining operator flexibility to modify the mine plan during the life of mine with appropriate modifications to the permit.

## Molycorp Questa



**SRK's** Larry Cope, senior hydrogeologist, inspects innovative underground instrumentation to record groundwater inflow to an underground mine in New Mexico. In this project, flow data were combined with water quality information to create a water and constituent load balance for the mine. Experts provided geochemical interpretations for the project.

## Brewery Creek



**T**he Brewery Creek Mine was a gold producer located near Dawson in the Yukon Territory, and operated the most northerly heap leaching process in Canada.

SRK directed investigations and prepared documents for licensing of the project in the early 1990's, and has recently been retained for advice and review of closure measures.

# South America

## Bauxite Mines



**B**HP Billiton intends to develop two new bauxite mines in Suriname. A feasibility study was completed in September 2004, and SRK is managing an ongoing Environmental Impact Assessment under trying field conditions of rainforest and swamp.

Ecology, water management and NGO issues are of key importance. SRK expects to play a significant ongoing role in the future expansion of bauxite mining in Suriname.

## MLP Tailings



**M**inera Los Pelambres retained SRK to assist in developing the conceptual engineering design for three proposed dam sites and the basic engineering design for Quebrada Seca, the preferred option. A core group of specialists and a large support team, working in Santiago, designed the tailings impoundment, tailings distribution systems and tunnels, with related investigations. SRK continues work on the tunnel design for the Mauro site.

## Codelco



**I**n 2003, SRK reviewed the geology and resource models of Codelco Norte's Chuquicamata and Radimiro Tomic open-cut copper mines and the Mansa Mina advanced exploration project in the Atacama Desert in Chile.

Chuquicamata is the world's largest open-cut copper mine. Government owned and run, Codelco Norte provides a substantial percentage of Chile's GDP.

## Los Pelambres



**A**s part of an overall expansion plan for the Los Pelambres Mine, this study included water management, hydrochemical modeling and stability analyses.

During closure the waste dumps in the pit area will hold up to 1300 million tons at a height of up to 600m. Large-scale in-situ geomechanical testing was required to characterize the waste rock, which included boulder-size fragments.

## Andina



**SRK** opened a project office at the Codelco-Chile Andina Division in 1996 and established a resident team for environmental management support, implementing ISO 14000 standards. SRK is currently in its third service period at the site.

The Santiago environmental team also assisted the Salvador Division of Codelco in 2003 to successfully implement an EMS and achieve ISO 14001 certification.

## Santiago Subway



**B**y the end of 2005, 38.6km of tunnels and surface lines need to be constructed to extend Line 4 of the Santiago subway. SRK's participation with the construction company OHL and the Consortia Ferrovial-Agroman-Besalco and Vial y Vives-Echeverría Izquierdo-Icafal includes optimizing the underground excavation method and modifying the construction methods for the stations. Key issues have been time and cost saving.

## Pascua Lama



**B**arrick Chile retained SRK to carry out site investigations for the Pascua Lama Project, located at more than 5000 mamsl, in the Cordillera de Los Andes, Argentina, near the border with Chile. Work included foundation assessment, establishing geotechnical design criteria and design of the planned 2.75km long conveyor tunnel, making recommendations for site grading, building footings and assessing the avalanche risk.

## Cerro Matoso



**SRK** was retained by a syndicate of project lending banks led by Barclays Capital to undertake a technical due diligence of the existing operations and planned expansion of the Cerro Matoso Mine. The principal objective was to verify that the expansion plans were based on adequate data and formulated according to sound mining, smelting and engineering principles and good environmental practice.

## El Teniente Pit



**SRK** completed exploratory engineering and scoping studies for the profile and conceptual phases of the Open Pit Project for the El Teniente Division of Codelco-Chile. Fieldwork began with a pilot geotechnical drilling program to set standards for collecting the field data in following phases.

This project is noteworthy as a serious study for combining major open pit and underground mining.

## U/G Tailings



**SRK** studied the feasibility of depositing the tailings from a concentrator plant into stopes of an underground mine in northern Chile.

This study included the evaluation of different options for tailings dewatering, conduction and transport, and the assessment of the possible impact on groundwater in the La Ligua Valley, an important zone for the production of agricultural products for export.

# Anniversaries



## Southern Africa

**SRK** (SA) Chairman Peter Terbrugge cuts the cake at the 30th anniversary celebration of SRK in Johannesburg. SRK (SA) operates out of eight offices in South Africa and one in Harare, Zimbabwe, with some 250 staff to provide comprehensive services in geology, mining, water, environment, geotechnics and waste.



## North America

**SRK** (NA) started in Vancouver, Canada in 1978 and celebrated its 25th anniversary in 2003. SRK now consults from three Canadian and five US offices, through approximately 100 professionals. Major focus areas include engineering studies, due diligence, independent reporting, permitting and mine closure.



## Australasia

**SRK** Australasia started in Perth in 1994 and after 10 years now provides a full range of services, with offices also in Brisbane and Sydney. For the second consecutive year, SRK has been honoured as a finalist in the Telstra and Australian Government Small Business Awards for business excellence.



## Turkey

**SRK** Turkey started in 2001 as a branch office of SRK US working mainly on the Kazan project for Rio Tinto. The Ankara office quickly expanded their client base to include several other Turkish and international companies. SRK Danışmanlık ve Mühendislik was established as a separate company in mid 2004.



## Chile

**SRK** Chile was established in Santiago in 1994 under the joint ownership of SRK Consulting and NCL. Today, SRK's staff in Chile includes around 40 engineers, geologists, scientists and support staff covering geology, geotechnics, water and the environment, mainly for mining and other industries.



## United Kingdom

**SRK** (UK) based in Cardiff since 1988, has a staff of more than 50 engineers, scientists, geologists and support staff focusing on geology, resource estimation, mining engineering, mineral processing, environmental and water management, geotechnical engineering and mine economic modelling, as well as due diligence and independent competent person reporting. In 1998, SRK (UK) was awarded the Queens Award for Export Achievement.

## New Offices

**SRK** offices are now open in Belo Horizonte, Brazil and Beijing, China. The Brazil office will initially focus on geology, resources and mining engineering (contact Bek Nader, [bnader@srk.com.br](mailto:bnader@srk.com.br)). The China office will initially provide technical support to foreign listings of Chinese companies, as well as geotechnical and geological consulting (contact Yonglian Sun, [ysun@srk.com.au](mailto:ysun@srk.com.au)).

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