

## SRK's 40th Anniversary

1974 - 2014

SRK Consulting, an independent, global company providing services to the mining and water resource industries, celebrated 40 years of business. From its small, 1974 beginnings in Johannesburg, South Africa, it has grown into an international company with more than 1,500 employees.

"We are grateful to our clients for the opportunities they have provided us," said Andy Barrett, SRK Group CEO. "Our company's reputation and track record have been built largely on their projects, and we thank them for their trust and confidence."

Group Chairman Mike Armitage adds that SRK's achievements can be attributed to its people.

"We have been able to add value to our clients' projects by attracting and retaining talented professionals, some of whom are world leaders in their fields," he said.

SRK's multi-disciplinary approach covers all aspects of the mining industry from grass-roots exploration to mine closure, including environmental and social studies. Key projects illustrating the company's service breadth are featured in this newsletter.

Also highlighted are examples where SRK's expertise, experience and independence have benefitted its clients.

Looking ahead, Armitage said: "Our ongoing success will depend on us continuing to employ quality technical people and retaining the trust of our clients."

"We will keep investing time and energy in our staff members, helping them reach their potential through exposure to a range of commodities, mining methods, and technologies in a variety of climates," he said. "Our clients' trust will depend on our continued ability to add value to their projects. This is essential for every mandate."

No. 50  
SRK Consulting's  
International  
Newsletter



left to right:  
Hendrik Kirsten,  
Andy Robertson,  
Oskar Steffen

## Africa

### Upgrading of the Quinera (Gonubie) Wastewater Treatment Works

The Buffalo City Metropolitan Municipality (BCMM) in East London, SA, faces strong demand for residential development in the Quinera area south of the N2 highway. This area, together with the Beacon Bay and Gonubie areas, is served by the Quinera (Gonubie) Wastewater Treatment Works. Aware that the works was nearing the limit of its installed capacity (both in terms of effluent treatment and sludge management) and concerned about its possible overloading, the BCMM placed a moratorium on any new developments until the capacity of the works could be determined and increased.

BCMM appointed SRK to investigate and report on the capacity of the works and to estimate the future loading. The findings of the report were published in September 2005, with a recommendation to upgrade the works' capacity from 6 to 18 Ml/d. It was estimated that this increase in the volumetric and organic loading of the works would meet the requirements of future developments in the Quinera and Gonubie areas for the next 15 years.

SRK was appointed as the principal consultant for the project design and implementation, including civil and structural design, process design, tender documentation, construction monitoring, and administration. SRK appointed a specialist sub-consultant to help with the project's electrical and mechanical design. The final phase of the project was completed in September 2014.

The existing works had to remain fully operational while the upgrades were taking place. This was also the first plant in the Eastern Cape that used fine bubble aeration as opposed to surface aeration. Fine bubble aeration is significantly more energy efficient and requires a smaller footprint than conventional surface aeration.



### Karoo aquifers

In September 2011, Shell appointed SRK to lead a team of experts on Karoo aquifers in South Africa to carry out an evaluation of available data on groundwater in their shale gas licence application areas. This resulted in the publication of the first Karoo Groundwater Atlas, volumes 1 & 2, and development of various innovative GIS-based approaches to investigation and management of groundwater resources. This work will develop into detailed site evaluations once exploration licenses are awarded.



### Bafokeng tailings dam

When the Bafokeng platinum tailings dam in Rustenburg, SA 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 35 years. The 40m-high decant towers have been raised to 80 meters in height with some innovative settlement designs to provide access and maintain the decanting of the pool water during construction of the tower raises.





### Belinga

In April 2014, SRK began managing and executing exploration work for the Belinga iron ore project in northeastern Gabon. Initially the work involved refurbishing and expanding the abandoned field camp and installing infrastructure. This work facilitated a programme of regolith and geological mapping as well as ground magnetic and resistivity geophysical surveys. Surface drilling is the next step. SRK has set up a project office in Libreville, together with a field support facility in Makokou. The logistics for this project has been a challenge given the remote location in mountainous terrain and the high canopy rainforest.



### Platinum tailings

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

- Tailings dams and return water dams at Rustenburg Section, Union Section, Aquarius-Kroondal, Marikana, Everest and Blue Ridge Mines. Lonmin Western Platinum and Eastern Platinum Mines, with extensions at Lebowa-Atok, Amandelbult and Mogalakwena Sections and Ngezi Mine in Zimbabwe.
- Tailings dams and extensions for re-mined tailings at Rustenburg and Union Sections.



### Hopefield wind farm

Umoyo Energy (RF) (Pty) Ltd appointed SRK as the geotechnical engineers for the first wind farm to be commissioned in South Africa (1 Feb 2014). The Hopefield wind farm involved the construction of 37 wind turbines (1.8 MW) with hub heights of 95m. The turbines were founded on mass gravity foundation bases placed about 3m below surface. SRK was involved in all geotechnical aspects of the project, as well as on-site verification and approval of the founding conditions prior to casting the foundations.



### Air separation unit plant

Air Liquide appointed SRK for civil engineering, geotechnical and environmental aspects for an air separation unit at Highveld Steel, Witbank, SA. The plant will supply liquid oxygen, nitrogen, argon and gaseous oxygen. SRK designed concrete structures and containers for storing and moving the liquids and gases using approximately 7760t of concrete and 384t of steel. The site designs included earthworks, dewatering, roads, drainage, and technical and administrative buildings, over the 3-hectare site. The project was completed mid-2014.

## ... Africa

### Alchemy community empowerment initiative

Anglo American Platinum appointed SRK as part of the team of consultants, managers and line function specialists at corporate and mine levels, to provide advisory services to the Alchemy project. The objectives of the project are to facilitate meaningful community development that will outlast mining at four of the company's South African operations, and to assist with community development in distant areas which are a source of labour. The initiative has several ground-breaking elements: community shareholding in Anglo American Platinum itself, which makes the participating communities the third-largest Anglo American Platinum shareholder;

establishing locally-based development trusts, co-designed with community representatives, and providing significant community representation on the Boards of Trustees. This innovative model allows for a cashless transfer of shares, an immediate flow of funds from dividends and other sources, and an integrated development planning process led by the development trusts.

SRK's advisory services include social baseline research, organisational design, development planning, stakeholder engagement and setting up development trusts. The SRK team has been involved since the initiative began in 2009.

Alchemy has won wide recognition as an innovative development model for potentially sustainable community empowerment, with applications in South Africa and beyond. Clearly, Alchemy represents a different and positive way of engaging with government and communities around community development.

Alchemy received two awards from the International Association for Public Participation (IAP2) in 2014: Core Values Project of the Year (Southern Africa) and Core Values Project of the Year (International).



### Liberia iron ore export

In November 2013, Sable Mining appointed SRK to manage the Environmental Impact Assessment (EIA) for the Liberia iron ore export project. Sable is developing a 25-year Life of Mine plan for the deposit at Mount Nimba, Guinea, from where the ore will travel by rail to Port of Buchanan, Liberia. New rail, port and handling facilities will be required. The EIA will comply with the International Finance Corporation's Performance Standards, with streamlined *environmental and/or social assessment* considering transboundary effects into Guinea and Côte d'Ivoire.



### Madaouela uranium

SRK was retained in 2009 to provide technical assistance on the 100% Goviex owned Madaouela project in Niger. The project is at the feasibility study level and will initially start with the completion of the environmental baseline and ESIA based on the completed mine design. Other work to be undertaken in the feasibility study will be a review of inputs, pilot plant execution and updated economic evaluation.



### Garafiri bauxite

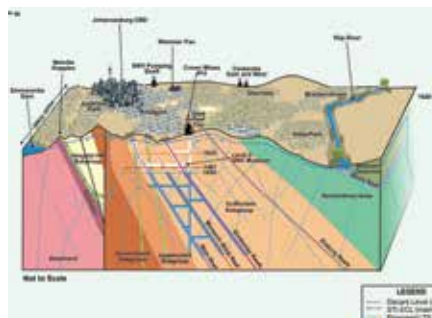
Since 2009, SRK has completed multiple phases of work on the Garafiri project in Guinea. The first being the supervision and design of exploration drilling from 2009-2010. SRK implemented industry best practice logging and sampling protocols and quality control procedures and organised the final exploration database. Next, SRK completed two mineral resource estimates following JORC Code standards, completed a conceptual study for the project, designed a sampling program to characterise bauxite and reported on the results. Since 2013, SRK has reviewed a 3rd party feasibility study on the project and planned licence relinquishment drilling and is currently completing a multi-disciplinary technical study for submission to the ministry.





## MINTEK

In the last quarter of 2013, MINTEK appointed SRK to provide engineering and design services for mine rehabilitation projects at several derelict/abandoned asbestos mine sites in the Limpopo and Northern Cape Provinces, SA. SRK deployed a multidisciplinary team to assist in identifying site-specific risks for which remedial measures are required. This experience has reinforced SRK knowledge about appropriate and practical solutions when dealing with contaminated sites and the need to use a dynamic approach that is tailored to the risks presented by specific factors at each site.



## Acid Mine Drainage

Early in 2012, SRK was appointed by the Dept. of Water and Forestry, now Dept. of Water and Sanitation, to assess the qualities and quantities of mine waste water in the northern Goldfields of the Witwatersrand Basin as part of the feasibility study to develop appropriate water treatment solutions. The project team included water treatment specialists, geologists and hydrogeologists. This assessment was completed by August 2013. This experience has enhanced SRK's knowledge on understanding problems and solutions associated with the increasing recognition of AMD in the mining industry.



## Nacala rail corridor

In January 2012, Vale, one of the world's premier mining companies, appointed SRK as the Project Management Consultants and Engineer under the FIDIC conditions of contract for the Nacala Corridor Railway Project Section 3 in Malawi. Section 3 involved construction of a 140km railway line through virgin ground. Section 5 in Malawi was added in mid-2013 and involved rehabilitation of 100km of existing railway line. SRK was responsible for health and safety, scheduling, monitoring quality and costs during the construction phase, documentation, social and environmental management, and elements of re-design.

## ... Africa



### Investigation of sites for nuclear power stations

In late 2007, SRK was appointed by Eskom (South African Electricity Supply Commission) to investigate, characterise and prepare licensing documents for three sites for the potential establishment of new nuclear power stations. The project was completed mid 2015 with the submission of Site Safety Reports. SRK was directly responsible for geotechnics, geohydrology, hydrology, water supply, and ecology and also managed sub-consultants who were responsible for meteorology, coastal engineering and oceanography, demography, land use and radiological impacts.



### Sega Project open pit slope design, Amara Mining

This gold project in Burkina Faso involved the acquisition, analysis and interpretation of existing data to generate geotechnical drilling locations for rock mass characterisation studies. A detailed geotechnical and structural logging exercise was carried out and samples selected for analysis. A structural, kinematic and limit equilibrium analysis of data resulted in the completion of a detailed technical report outlining the open-pit slope parameters to be adhered to. This work was performed during 2012.



### Cambambe hydroelectric

In late 2012, SRK was appointed by HSBC Bank plc to undertake the pre-financial close Environmental and Social Due Diligence of the Cambambe Dam Hydroelectric project on the Kwanza River in Angola. This entailed a gap analysis of the Environmental and Social Impact Assessment to assess the project's compliance against Good International Industry Practice. SRK identified a number of critical gaps and compiled an Environmental and Social Action Plan (ESAP) recommending methods to close gaps. SRK was subsequently appointed to undertake a series of five ESAP Compliance Audits, tracking construction, commissioning and early operation of the project, through to June 2017.

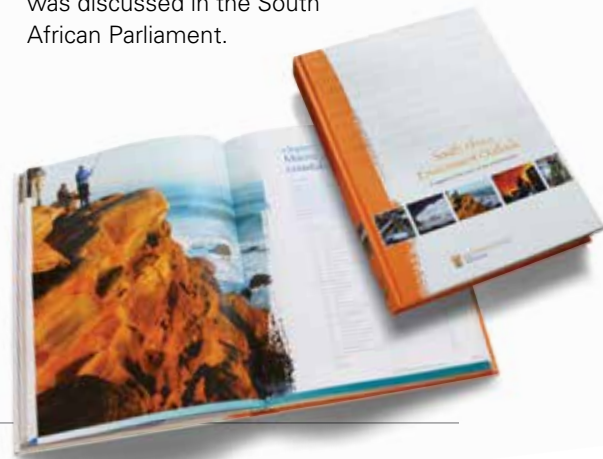


## Compilation of the National State of the Environment Report for South Africa

In 2004, SRK was commissioned by the South African Government to report on the drivers and state of South Africa's biophysical and social environments. The team hosted stakeholder workshops to solicit technical input, views and opinions from civil society, government business, NGOs and academia and reported on policy responses addressing environmental and social change. The report highlighted the initiatives presently underway for policy makers, areas where action was needed, and presented a long-term environmental outlook for South Africa to 2025.

The team of over 30 experts reported on biodiversity and ecosystem health, inland water, land, marine and coastal resources, human settlements and environmental governance. SRK managed and facilitated the process culminating in 2006 in the published report: *South Africa Environment Outlook*. The report became a principal information source in the Southern African Development Community Regional Environmental Education Programme, run by the Wildlife and Environment Society of South Africa in the Global Environment Outlook (GEO-4) prepared by the United Nations Environment Programme and in the National Strategy for Sustainable

Development in South Africa. It was also presented in a number of leading national newspapers and journals and was discussed in the South African Parliament.



### Zanaga iron ore

Zanaga plans to mine, process and transport 30Mtpa of iron ore concentrate by slurry pipeline. This project is located in the Republic of Congo some 300km northeast of Pointe Noire. From 2009 to 2014, SRK managed the multi-disciplinary project and conducted geotechnical and hydrogeological investigations and analysis to support the multi-staged mining plans with ore blend targets for production quality. Thirty-year life-of-mine plans were produced for the mineral resource of 6,800Mt.



### South African National Disaster Management Centre

An increase in disaster declarations due to floods and storms in South Africa prompted the National Disaster Management Centre to appoint independent consultants to assist with verifying disaster damage to uninsured infrastructure. Since 2011, SRK has carried out verification projects in seven Provinces and has been appointed to develop a GIS-based management tool for monitoring and evaluating all recovery and mitigation projects the Treasury has funded since 2010.



### Avocet Mining: Inata gold mine remediation

In 2012, SRK inspected some multi-bench and bench-scale failures in the North and Central pits of this mine in Burkina Faso. The failure mechanism involved the interaction of foliation planes, basal planes and orthogonal joints. Also, daylighting of non-persistent basal planes interacting with steeply dipping westerly foliation planes which served as tension cracks or release surfaces, played a major role. An assessment of the hydrogeological parameters of the mine site was conducted before making recommendations for slope stability remedial work.

## Asia

### NI 43-101 Report, Zijin Mining Group

In 2012, SRK was retained by Zijin Mining Group, one of the largest gold and copper producers in China, to produce an NI 43-101 Report for public news release on the company's seven major mines located in various provinces in China. In addition, SRK produced annual resource and reserve updates for these seven mines. To reconcile the resources and reserves previously reported under the Chinese national code with Canadian National Instrument 43-101 and CIM definition, SRK carried out gap analysis, data verification, and re-estimation of resources and reserves.



### Fuwan silver

Minco Silver Corporation retained SRK in 2007 to carry out a Preliminary Economic Assessment for its Fuwan Silver Project in Guangdong Province, China. Based on the information available at that stage, SRK concluded that the Fuwan Project is technically and economically viable as an underground mining operation with the capacity to support a processing rate of the order of 2,500 tpd.



### Eruu Gol iron mine

SRK was commissioned by Lung Ming Holdings in 2008 to carry out an open pit optimisation and design study, prepare a production schedule, and convert JORC Resources to JORC Reserves for the Eruu Gol Iron Mine Project in Selenge Province, Mongolia. SRK proposed three mining options for the project: 12Mtpa, 15Mtpa and 20Mtpa. SRK worked on this world-class iron ore deposit, defining the project's potential for fund raising, equity transaction and eventually its public listing on international stock exchanges.



### Olon Ovoot gold mine

In 2007, SRK was appointed by Mongol Gazar to conduct a geotechnical assessment and provide open-pit design recommendations for the Olon Ovoot gold mine in Mongolia. The team carried out empirical and numerical analyses to assess appropriate preliminary geotechnical pit-slope design parameters. In order to develop and maintain pit wall slopes with an acceptable probability of failure, important considerations and practical recommendations on slope management were also provided.





### Ciemas gold

Wilton Resources Corporation Limited commissioned SRK in 2014 to evaluate their Ciemas gold project in West Java, Indonesia, and produce an Independent Qualified Person's Report. The report facilitated the company's reverse takeover of Catalyst-listed Hartawan Holdings Limited on the Singapore Stock Exchange. SRK recommended and supervised quality assurance and quality control by verifying data, the supplemental exploration program and upgrading resource categories, collecting and verifying site drilling and assay data, and re-modelling the deposits of Pasir Manggu West, Cibatua, Cikadu, and Sekolah.



### Hanking Mining Ltd's IPO listing

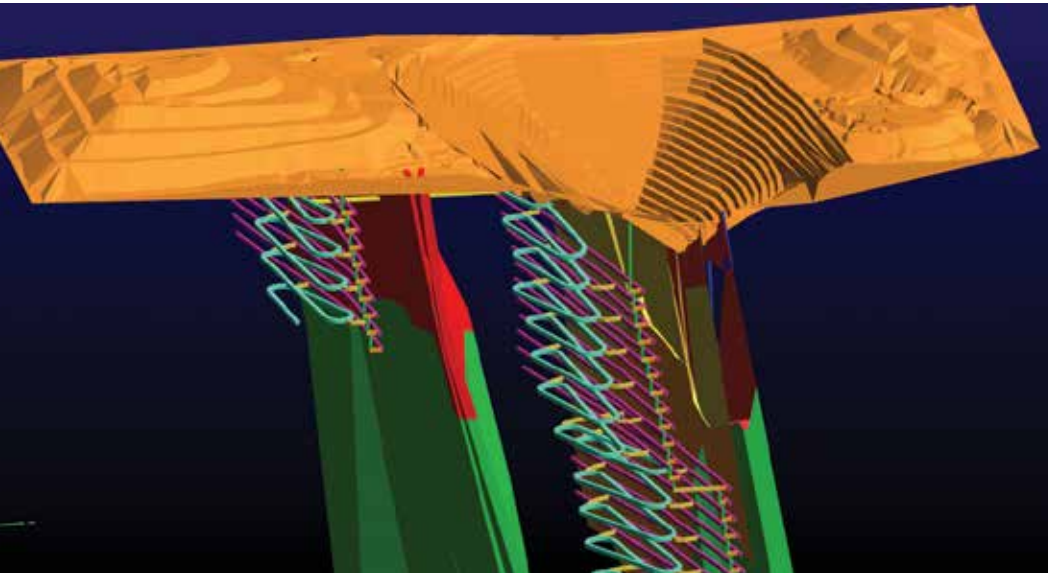
In 2011, SRK produced an independent technical review report on Hanking Mining Ltd's iron ore properties in Liaoning Province, China for their IPO listing on the Hong Kong Stock Exchange (HKEx). Hanking, one of the largest iron ore producers in northeastern China, successfully raised \$148 million in September 2011 even as numerous other deals were withdrawn.



### Coal mining

An International banking organisation, representing a large consortium, commissioned SRK in 2013 to undertake an independent technical review of a significant coal mining operation in Central Kalimantan. The SRK scope of services included exploration, resource and reserve models and estimates, mining, geotechnical, mine planning, infrastructure, logistics, and financial modelling. SRK's initial report provided a basis for the client to prepare and negotiate updated commercial agreements. This project is ongoing and requires periodic site visits to verify site conditions and progress.

## ... Asia



### Chromite feasibility study

Balasore Alloys (BAL) commissioned SRK to undertake a feasibility study and prepare a Detailed Project Report (DPR) for its underground chromite properties in Odisha. SRK initiated the project in 2012 with a strategic analysis of the Kaliapani mine then guided an extensive program to generate new exploration data for the feasibility study. The underground mine will be situated below an existing open pit; a DPR was recently submitted. Since then, BAL has undertaken detailed engineering through a design institute in China. Simultaneously, SRK initiated the feasibility study for BAL's other leasehold south of Kaliapani. SRK continues to review the detailed engineering work.



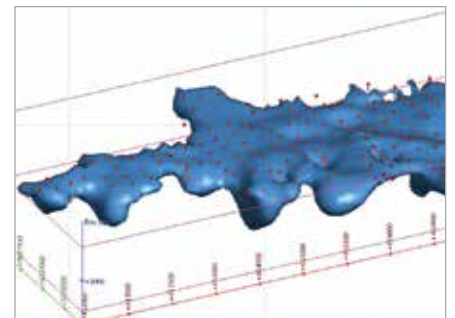
### Tethyan Copper Company's Reko Diq

This project in Balochistan, Pakistan involved mining and processing copper and gold ore to generate a concentrate, which would be transported through a 680km pipeline to a dedicated marine terminal at the port of Gwadar. From 2007 to 2010, SRK managed a team of global specialists who prepared an Environmental and Social Impact Assessment that complied with Pakistan requirements, while taking into account IFC Performance Standards and the corporate standards of its owners, Barrick Gold Corp. and Antofagasta PLC.



### Review of nickel refinery

Citigroup, for the purpose of the project's financing, commissioned SRK in 2008 to review the environmental and social performance of a nickel refinery operation in Shaanxi Province, China, according to the Environmental, Health, and Safety Performance Standards and Guidelines for the International Finance Corporation and The Equator Principles. The review identified the most significant environmental management liabilities and potential risks.



### QA/QC and resource estimation

In 2013, SRK was retained by Hengshi Mining Ltd to conduct an exploratory QA/QC and resource estimation for its four iron ore deposits in Hebei and Liaoning Provinces, China. Over 400 million tonnes of iron ore resources were estimated in the four deposits. The projects were successfully listed on the Hong Kong Stock Exchange in 2013.





## Afghanistan

SRK, in conjunction with the US Task Force for Business and Stability Operations, has been active in Afghanistan since 2011. This work has been undertaken to assist the Afghan government in developing and marketing their mineral deposits. The work involves field visits, technical reports, delivery of training courses and acting as technical advisors in the tender/bidding process for mining contracts in some of these commodities.



## Graphite mineral resource

SRK has provided support in 2013 and 2014 to PT Grafindo Nusantara to delineate a maiden graphite mineral resource in West Kalimantan. This involved site work including technical assistance with drilling, core logging and sampling the graphite mineralisation. Based on the results, a geological model of the graphite lodes was developed, and a 20x5m block model of interpolated total graphitic carbon was achieved in the “inferred” resource category, following JORC (2012) guidelines. SRK continues to support the project to build increased confidence in the mineral resource.



## Coal India Limited's IPO

In 2010, when the Government of India divested 10% of its equity in CIL, SRK, as an Independent Engineer, conducted an audit of CIL's coal resources and reserves and prepared an Independent Technical Report for CIL's Initial Public Offering of shares to the public, following the guidelines set out in the 2004 JORC Code. The mineral assets included CIL's active opencast and underground mining operations and undeveloped coal blocks located in 25 major coalfields across India.



## Vieng Kham gold project

In 2012, United Mining and Minerals Company requested support and on-site exploration oversight and management of their Vieng Kham gold project in northern Lao PDR. Over three years SRK provided step-by-step guidance and strategic planning to help develop the project. SRK's involvement included desktop interpretation of historic data, planning and supervising airborne geophysical acquisition, structural mapping, stream sediment and soil sampling. Based on these datasets, a drilling campaign was conducted, with project oversight provided by SRK.

## Australasia

### Jack Hills iron ore expansion

SRK was appointed by Crosslands Resources in 2010 to undertake a Definitive Feasibility Study of the Jack Hills expansion project in Western Australia. It is expected the project will produce more than 20 million tonnes per annum of iron ore concentrates and DSO (Direct Shipping Ore) products, with an expected mine life of 39 years. SRK contributed to the mine planning, geotechnical engineering and resource estimation services.



### Legacy Iron

Legacy Iron Ore Ltd commissioned SRK in 2011 to provide an independent technical assessment and valuation report on the company's mineral assets. The assets included projects with Inferred Resources and early stage exploration properties that were targeted for iron, gold and base metal mineralisation across Western Australia. SRK's approaches included analysis of comparable transactions and a geological risk method to provide a valuation range reflecting the inherent risks associated with exploration stage properties. The report, prepared using the guidelines of the VALMIN Code, was provided to Legacy shareholders to support a cornerstone investment offer in the company.



### Osborne copper/gold

In 2011, SRK prepared a series of Technical Reports in line with Canadian National Instrument 43-101 reporting standards, for mining activities for Inova Resources, formerly Ivanhoe Australia, at the Osborne copper/gold project in north-western Queensland. Over a three-year period the project advanced from a Preliminary Environmental Assessment to reporting Mineral Reserves for the project. The project is now owned by Shanxi Donghui.



### Gloucester Basin gas

AGL Energy selected SRK in 2010 to conduct a preliminary groundwater assessment and conceptual hydrogeological model of the Gloucester Basin, New South Wales. The goal was to review the hydrogeological regimes particularly within the Gloucester Stage 1 Gas Field Development Area. SRK conducted a desktop review and initial site visit, collected water level and quality data, and working from an initial conceptual hydrogeological model, designed a ground and surface water monitoring network. The study evaluated the potential groundwater impacts from the development of Coal Seam Gas in the Gloucester Basin and helped develop long-term water management strategies for the project.





### Karara iron ore

During the period 2007 to 2014, SRK completed the feasibility design for Karara Iron Ore Mine's filtered tailings storage facility in Western Australia, and provided detailed design, an operations manual and operational engineering assistance. After a comparative study, SRK designed a unique 'dry stacking' facility combining a conveyor and stacking arrangement with truck transport and disposal. The landform created allows concurrent closure and an expandable footprint that reduced upfront costs. SRK's surface water management design included expandable clean water diversion and retention dam. SRK helped with the TSF commissioning and ongoing operational assistance.



### OkTedi copper-gold

Between 2006 and 2013, SRK supported studies for this large copper-gold open-pit operation in Papua New Guinea, through geological mapping, hydrogeological testing and rock mass characterisation. The studies include slope and underground design for a geotechnical domain model, cutback design, considering shifts in stability as the mine reaches the final depth and a depressurisation study. SRK completed an investigation of a 5-km drainage tunnel to divert water from the pit floor without expensive pumping, mine scheduling studies and detailed open pit: underground interaction studies using numerical modelling to develop a sub-level cave beneath the current pit.



### Mt Mason hematite

SRK was commissioned by Jupiter Mines in 2011 to provide feasibility study proposals and resource reviews for their Mt Mason hematite deposit in the Yilgarn region of Western Australia. The proposals included the earth science technical disciplines of the feasibility study, including resource estimation, surface and groundwater, geochemistry, geotechnical engineering, mine planning and financial modelling.



### Xstrata Frieda River Limited

Xstrata undertook a feasibility study for a greenfield copper mine and related infrastructure in Sandaun and East Sepik Provinces, Papua New Guinea. The deposit lies in rugged, jungle-covered upland terrain where the Ok Ewai and Nena rivers form the Frieda River. SRK led the tailings and waste containment design components of the study, assessing the hydrogeological conditions, and the infiltration rate from the proposed tailings pond and seepage under the dams. SRK inspected the site in September 2010, and March 2011 to review third party drilling and testing. SRK analysed and interpreted data, undertook numerical modelling to assess the infiltration rate and recommended additional works before the construction stage.

## Europe

### Udokan copper

Udokan is one of the largest undeveloped copper deposits in the world in terms of metal contained with a JORC Ore Reserve of 16Mt of contained copper in an open pit reserve. Since 2010, SRK's work on this project in the Zabaikal region of Russia, has included supervising the drilling program, preparing the geological model, developing optimum pit slopes, developing optimum pit slopes and pit contours. SRK prepared geological, geotechnical, hydrogeological, mining and environmental sections of the feasibility study and managed environmental and social baseline studies and executed an Environmental and Social Impact Assessment.



### SUEK

From 2005 to 2011, Siberian Coal Energy Company (SUEK OJSC) commissioned SRK to prepare JORC Code-compliant Resource and Reserve statements for its coal mining assets in the Russian Federation. In 2011, SUEK operated 17 underground mines and 12 open pits, producing both lignite and hard thermal coal, along with associated coal washing operations. The sites were spread over seven regions from the Kuznetsk Basin in central Siberia to the Far East. SRK mobilised several multidisciplinary teams from the UK, US and Russian practices to undertake extensive site visits and hold detailed due diligence meetings at SUEK's head offices in Moscow.



### Koza Gold Corporation

SRK began work with Koza in 2009, preparing a Competent Person's Report for its initial listing on the Istanbul Stock Exchange, followed by annual audits of their mineral resources and reserves. Koza's multiple mining assets are located in the Ovacık, Mastra, Kaymaz and Himmetdede Districts in Turkey. Mines are planned for Akbastepe in the Söğüt and Mollakara in the Diyarin District. SRK is also supporting Koza in developing the heap leach design for the Himmetdede property and the metallurgical testwork and process design for the Akbastepe project.



photo: Markus Trienke

### Sakatti, Anglo American

Situated 150km north of the Arctic Circle in Finland, the Sakatti deposit is a grassroots Copper-Nickel-PGE discovery made by Anglo American plc in 2009. Since April 2014, SRK has been assisting Anglo American in modelling the geology of this complex mineral system, as a basis for preparing a maiden Mineral Resource estimate for the project, in accordance with JORC Code guidelines.





### York potash

Sirius Minerals' York Potash project will exploit the significant polyhalite resource located under north-east England. Among the largest underground mines in the world, York Potash will be the first underground mine to be developed in the UK for over a decade. In 2012, SRK undertook an independent review of a scoping study completed earlier that year. Since then, as technical studies have progressed, SRK has undertaken geological modelling and mine design, produced mineral resource and ore reserve estimates and managed the geology and mining elements of the feasibility study to be issued in 2015.



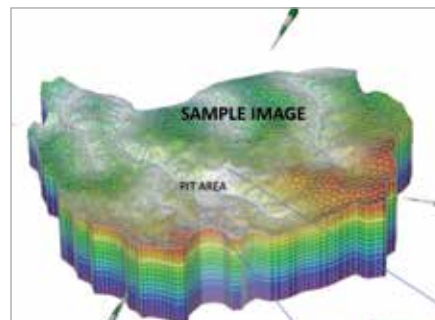
### 1st Uranium mining in Turkey

The Temrezli in-situ recovery uranium mining project is located approximately 200 kilometers east of Turkey's capital, Ankara. Controlled by Australia-based Anatolia Energy Ltd. through its wholly-owned Turkish subsidiary, Adur Madencilik Ltd. Sti., this will be the first such mine in Turkey. SRK has been conducting baseline studies in phases since 2009 to assess hydrogeological impacts, collect environmental and social baseline data and conduct ESIA studies. The studies explored risks related to in-situ recovery uranium mining and supported this method at Temrezli. The EIA process will commence early in 2015.



### Lisina phosphate

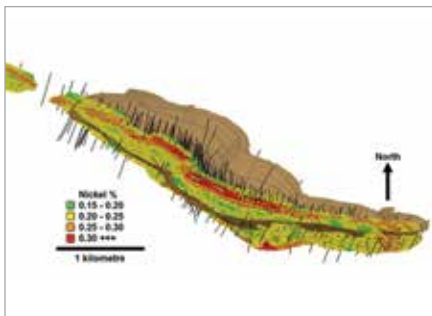
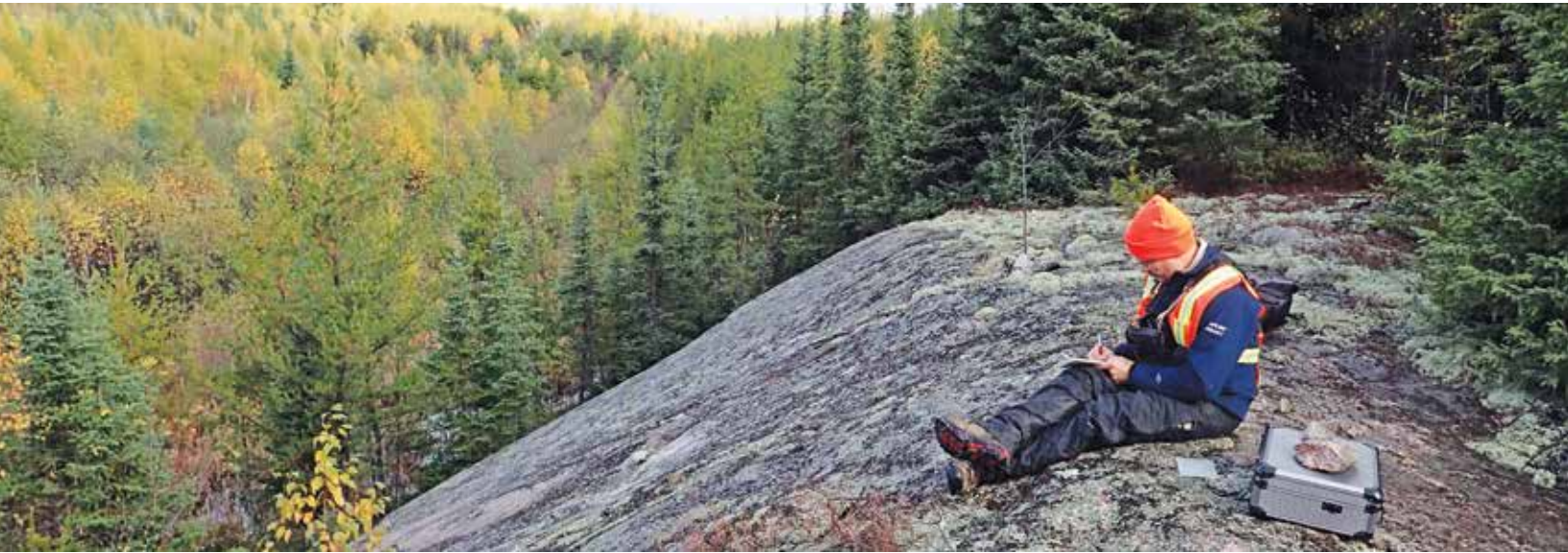
SRK has been involved in developing the Lisina phosphate project in Serbia since 2009. SRK has provided on-going advice and support to the Company owners as the project has advanced. We are developing the project from the exploration stage to the Serbian feasibility study stage. SRK's input is intended to ensure that all information and technical studies are aligned with international requirements and International Reporting Codes, such as the JORC code (2012).



### Yenipazar

Aldridge Minerals retained SRK in August 2011 to carry out specialist studies for its Yenipazar project in Turkey where recovery of copper, lead and zinc concentrates, together with gold dore bar containing silver, was planned. These studies covered environmental baseline data collection, hydrogeological surveys and assessments, investigating mine water supply, impact assessments of waste geochemistry, environmental permitting, social baseline and stakeholder engagement studies. An EIA Positive Statement was obtained early in 2014. SRK also prepared land acquisition plans and SEIA statement reports to meet IFC requirements.

## North America



### Royal Nickel's Dumont project

Involved since the pre-feasibility stage of the project in 2010, SRK was commissioned to generate a mineral resource model to support the feasibility study on the Dumont Nickel project. Dumont is one of the world's largest undeveloped nickel sulphide projects. SRK developed an advanced mineral resource model for this complex polymetallic sulphide environment. To support the mine design and the economic analysis of the project, a geometallurgical model was also generated by bridging the gap between the geostatistics and the metallurgy. The feasibility study was published in July 2013.



### Vale structural geology support

The Sudbury Basin is the second largest nickel district in the world. In 2005, Vale Ontario Operations retained SRK to provide structural geological support to their Sudbury operations comprising six operating mines in the district: Totten, Creighton, Stobie, Garson, Coleman, and Copper Cliff Mines. SRK provides Vale with structural inputs to geotechnical studies, mine seismicity, and near-mine exploration, as well as structural training courses for exploration and production staff.



### Giant mine closure

Fifty years of roasting the arsenic-bearing gold ore at Giant Mine, near Yellowknife, produced 237,000 tonnes of arsenic trioxide dust that was stored underground. The federal government assumed responsibility for the site when the operator went into receivership. SRK has acted as senior technical advisor for the project since 2000, developing plans for long term management of the arsenic dust and for closure of the rest of the site. Ground freezing will be used to isolate the arsenic dust and a full-scale test of the plan was recently completed under SRK's direction.





## Nuclear Waste Management Organization (NWMO) structural geology investigations

Since 2011, SRK has been involved in the geoscientific site evaluations for NWMO's Adaptive Phased Management (APM) project. The NWMO is implementing APM, which is Canada's plan for the long-term management of used nuclear fuel. The ultimate objective of APM is the containment and isolation of used nuclear fuel in a deep geological repository in a suitable rock formation. Potential candidate sites will ultimately be assessed against a number of site evaluation factors, both technical and social in nature. The geoscientific suitability of candidate areas will be

assessed in steps over many years, involving initial desktop studies followed by field studies.

To date, SRK's role with NWMO has included geological mapping and desktop structural geological interpretations of multiple remotely-sensed datasets for communities currently involved in the site selection process. These are the principal methods for assessing the distribution, physical characteristics, and tectonic history of faults and other discontinuities, identifying structural domains, and comparing the structural characteristics of different subareas.

SRK has built a unique method for the desktop interpretations that evaluates confidence, reproducibility, and interpretation bias. First, two interpreters construct interpretations of individual datasets individually; then, the results are integrated, allowing the reproducibility between interpreters and different datasets to be evaluated. SRK's methodology incorporates an understanding of the structural history of the region and knowledge of structural geometries, balancing, cross-cutting and age-relationships.



### Inuvik to Tuktoyaktuk

SRK is providing geochemical advisory services to the Government of the Northwest Territories for the construction of the Inuvik to Tuktoyaktuk Highway. The 138km highway will be a public all-weather road that provides access to the Arctic coast. It is being constructed using granular materials sourced from numerous borrow pits along its length. The client receives advice on metal leaching and acid-rock drainage potential in order to construct the highway in an environmentally responsible manner.



### Cortez Hills gold

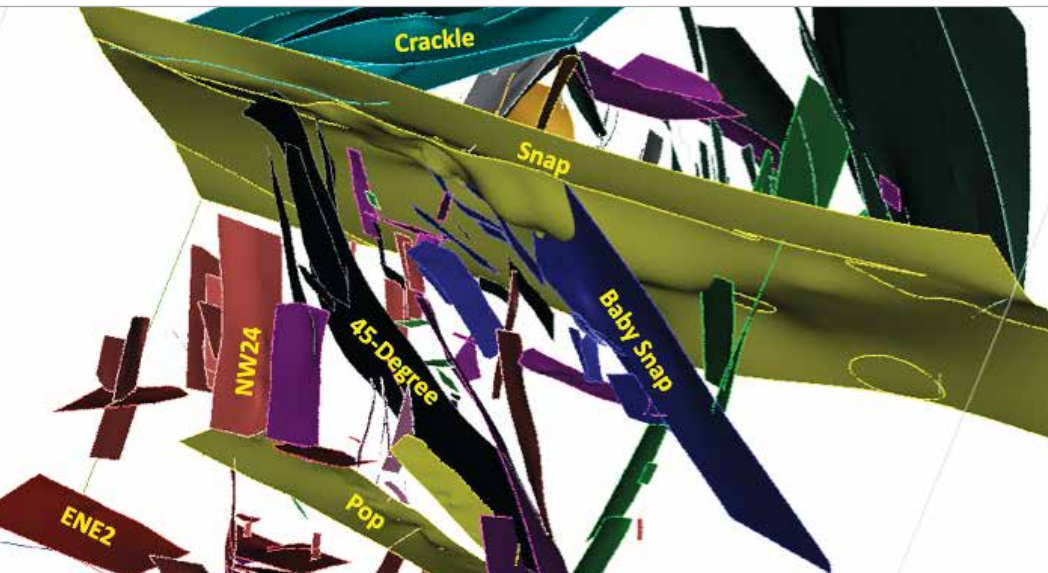
Since 2006 to the present, SRK has prepared the Plan of Operations for the Cortez site. Tasks included reconciling existing disturbance levels, identifying and tracking proposed disturbance, preparing operation plans to comply with 43 CFR 3809.401, and describing reclamation activities and environmental protection measures. SRK prepared a Standard Reclamation Cost Estimator bond cost for the life-of-mine and prepared post-reclamation topography visuals to depict the final topography.



### Cliffs Natural Resources

SRK has worked with Cliffs Natural Resources Inc. since 2006 on multiple properties, including but not limited to United Taconite, Northshore, Tilden, Bloom Lake, Wabush, and Hibbing. Services range from fatal flaw assessments, resource and reserve estimations, operations development, short and long-term mine planning, technical reports and related studies, and the development of internal best practices. Most recent work includes valuing leases and resource validation work.

## ... North America



### De Beers structural study

The Snap Lake kimberlite is a diamondiferous dyke intrusion located in the Northwest Territories, Canada. SRK has been involved in the project since before De Beers Canada acquired it in 2000. The deposit dips from the shore under the lake at nearly 15 degrees, making it a technically challenging mine. Construction began in 2005 and production began in 2008. The Snap Lake kimberlite intrudes a complex, brittle structural system, related to pre-existing faults. Mining the kimberlite is further complicated by local zones of weak rock mass. SRK's involvement was strongly focused on characterising the rock mass and understanding the geometry of the fault system through 2014.



### Hycroft gold-silver

Since 2010, SRK has completed a comprehensive groundwater resource study to support water supply development, dewatering and permitting at the Hycroft Mine in Nevada, including the design and management of a field investigation and testing program to support hydrologic characterisation of multiple hydrothermally-altered volcanic rock packages and deep, penetrating hydrothermally-influenced faults. The characterisation program included installing and hydraulic testing in 39 deep penetrating wells and piezometers, installing and monitoring the instrumentation boreholes, and hydraulic tests (packer testing) across multiple geologic units and faults that influence the project.



### Mount Hope molybdenum

SRK was retained in 2005 to provide environmental baseline studies (wildlife, vegetation, etc.), geochemistry, hydrogeology, and mine waste baseline studies and provide permitting expertise for the Mount Hope project located in north-central Nevada. SRK has been involved since the initial study phase of the project and has completed numerous permitting and environmental studies in preparation for mine design and 43CFR-3809, NEPA, and state permitting. SRK's field work and data analysis were used to develop a plan of operations that addressed key environmental issues and included mitigation of all significant impacts identified.



### Cameco: conditional simulation

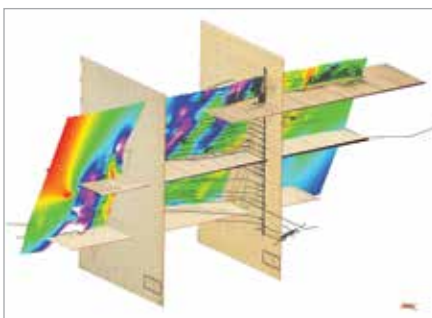
Since 2011, SRK has worked with Cameco Corporation to quantify uncertainty in uranium grades for exploration and operation projects in Australia and Canada. This work involves geostatistical analysis for constructing conditional simulation models of grades. Often, these models are benchmarked against conventional resource models to determine the uncertainty distributions for pounds  $U_3O_8$ . Recently, SRK learned that Cameco is using the conditional simulation model at the Cigar Lake operation as the basis for both short-range and long-range production planning.





### Goderich salt

Since 2011, SRK has assisted Compass Minerals in geomechanical and mine design improvements at their operations in Ontario. Recently, SRK looked at various alternative salt mining extraction and material handling options for the underground Goderich Mine. SRK worked with equipment manufacturers and mine operations staff to develop a mine model that generated productivities, capital costs and operating costs, comparing over 6 different alternatives to their current mining process. The results demonstrated that a more continuous mining system, vs. existing batch mining and haulage system, would significantly benefit the company through cost reduction, increased productivity and reduced diesel emissions.



### Madsen gold

From 1938 until its closure in 1976, the Madsen gold mine in Ontario produced more than 2.4 million ounces of gold. SRK was commissioned by Claude Resources in March 2008 to convert the mine's wealth of historical, paper-based geological data into a modern 3D geological model for the Madsen Gold project. Using scanned and geo-referenced cross-sections and maps of the deposit, SRK rapidly developed a 3D geological model. The model fundamentally improved understanding of the controls on gold mineralisation and formed the basis of a 3D mineral resource model.



### NioCorp: Elk Creek niobium

Beginning in 2014, SRK worked with NioCorp Developments Ltd. to develop its Elk Creek niobium project in Nebraska, including a review of the extensive work completed by MolyCorp in the 1970s and 1980s. NioCorp, with SRK's support, began Phase 1 of a drilling program, which is a key part of the company's overall development program, designed to enhance the classification of the deposit and to support an updated NI 43-101 Technical Report on resources. SRK is currently conducting a full feasibility on the Elk Creek project.



### Hope Bay gold

Doris North will be the first mine operating on the 80km Hope Bay Greenstone Belt in Nunavut. Since 2002, SRK has helped advance this gold project from the initial scoping study, through environmental assessment, regulatory approval, detailed engineering and construction quality assurance. SRK has also provided geotechnical (rock and permafrost), hydro technical and waste management engineering, geochemistry, hydrogeology and overall regulatory guidance. Design included two precedent setting frozen core dams: the first, completed in 2012, which has been functioning in accordance with expectations. SRK continues consulting towards developing more mines along the Belt.

## South America



### Túnel Sur – Los Bronces, Tunnelling: TBM vs Drill & Blast

The comprehensive development of this project in Chile began in 2007, continued into 2012 and covered the conceptual stage to supervising construction of an 8km exploration tunnel with a 4.5m excavation diameter with TBM. This study included the conceptual and basic engineering for drill & blast and TBM. SRK also developed the bidding package, supported the contractor selection process and the technical inspection of works such as operational control of the excavation cycle with TBM, geological-geotechnical control of the tunnel, and topographic, quality and cost control.



### Tucano gold

From 2010 to 2015, SRK undertook the feasibility, detail design and construction supervision of the Tap D in-pit tailings facility for the Tucano gold project in Brazil. After advising Beadell Resources on the efficient operation of the facility to maximise in-pit tailings occupation, SRK designed and prepared construction documentation for the West Pond and the North Mill Pond above ground TSFs. Both facilities are currently under construction, with SRK providing technical support to the site personnel and contractors responsible for construction.



### Boa Esperança

Mineração Caraíba S.A.'s Boa Esperança project is located in the municipality of Tucumã, Pará State, Brazil. The deposit is a mineralised breccia body containing copper, cobalt and molybdenum and is considered to be a variant of the hydrothermal type of deposit known as iron-oxide-copper-gold (IOCG). In 2012, SRK led a full feasibility study including a NI 43-101 Technical Report. SRK's work continued including pit slope evaluation and, most recently, a mineral resource update in 2013.



### Miraflores gold

In 2013, the Miraflores field programme near Quinchia, Columbia, piggybacked the exploration drilling, gathering data on rock strengths and fracturing to determine variations in rock mass quality. The data was analysed to provide pit slope and bench design parameters, and pillar and stope dimensions for underground mine design. The programme included 2D and 3D numerical modelling of pit stability, as well as stress modelling of the underground mining sequence to assess the mine design. The 3D modelling was unique, as it required an assessment of the interaction between open-pit and underground mine while they are developed concurrently.



## Pascua-Lama gold

Since 2012, SRK has worked at the Pascua-Lama project, on the border of Chile and Argentina, owned by Barrick Gold, providing geotechnical advice for the process plant foundations and acting as the Technical Manager of the binational tunnel construction. Within this context, SRK has worked on blasting design optimisation, hydrogeological modelling and water management during the construction and operation of the tunnel, and environmental assessment of tunnel wastes. On the Pascua side, SRK has used strict rock-structure interaction analysis to optimise the concrete structure of the crusher building and the shafts.



## Tunnels for the Mauro tailings dam project

In mid-2004, Minera Los Pelambres requested SRK to carry out the detailed engineering of 4 tunnels in Chile: Las Ánimas II, 3.5km; Coirón, 2.5km; La Guardia, 2.4km and Evacuador, 3.3km-long. Geotechnical and engineering design, technical specifications, bid and permit documents, as well as cost estimates and construction schedules, were developed. SRK provided advice during contractor selection and technical site inspection during construction as part of the service. The project was completed in early 2005.



## Buenos Aires underground

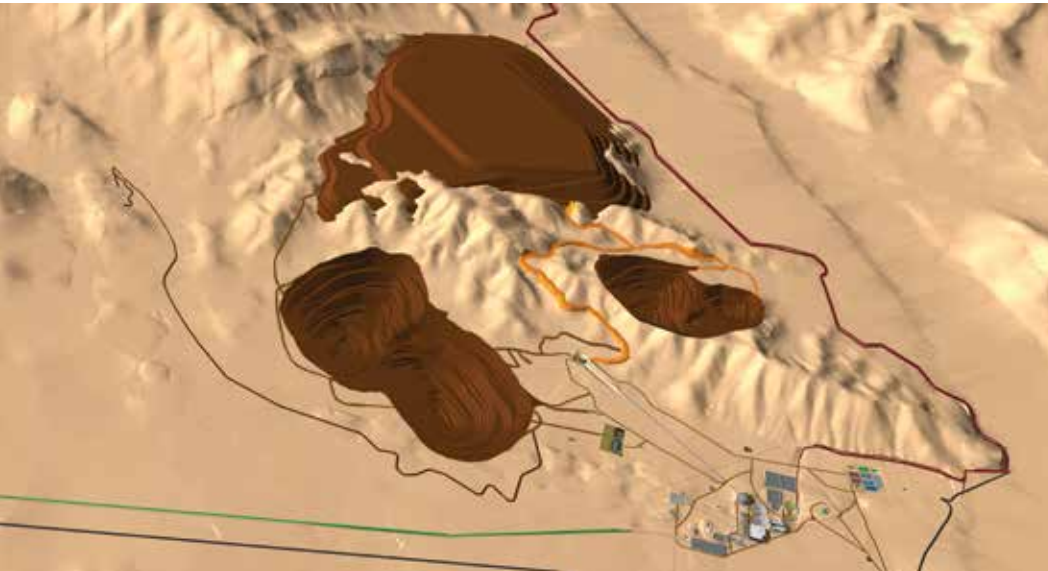
The professional team of SRK has been working on the construction and extension of the underground network of the city of Buenos Aires for more than 15 years. Currently, SRK is working together with the government of Buenos Aires and the contractor company, Techint-Dycasa, on detailed engineering, including the definition of the construction and excavation procedures, support systems design, cavern and cut and cover stations, production shafts, the ventilation system and access ramps.



## Risk evaluation, Nueva Andina II expansion project

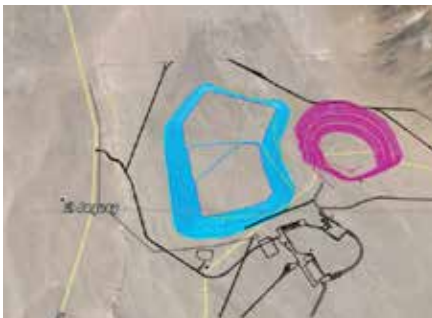
In 2008, this copper project began in Chile at the pre-feasibility level. During the study, 26 alternative options were developed and evaluated in terms of the production rate of the expansion, underground and open-pit alternatives, process plant locations, associated infrastructure and impacts of the 70km-long tunnels in the project schedule. SRK carried out a quantitative risk analysis of all the options and their impact on the economic model. The preferred option was taken forward to another engineering stage.

## ... South America



### Dominga iron ore

In 2011, SRK commenced a pre-feasibility engineering study for Andes Iron's Dominga project in Chile. The study was completed in late 2013, based on a 95ktpd iron ore mine with two pits. The work included resource estimation, pit slope geotechnics, mine design and production schedule, Fe-Cu mineral processing, power and water supply. It also involved a reverse osmosis water treatment plant and a 26km-long slurry pipeline for transporting iron concentrate, a filter plant, tailings dam and port, as well as capex, opex and economic evaluation.



### Pampa de Pongo iron ore

SRK has been working on developing this iron ore mining project since mid-2013. The project, located in Peru, is owned by Jinzhao Mining Peru. Jinzhao's detailed exploration work indicated that the project is amenable to open-pit mining. Recently, SRK completed a mine feasibility study using the IPCC system for ore production. The Pampa de Pongo project will produce 22.5 million tons of final product per year, corresponding to 36 million tons of run-of-mine, moving more than 280 million tons of ore plus waste in some years. This volume characterises it as one of the biggest mining projects currently under development in the world.



### Toroparu gold

SRK is currently providing mining consulting services to Sandspring Resources Ltd. (a Canadian based company) for their Toroparu gold project, located in northwestern Guyana. A feasibility study for the project is in progress. It calls for an open-pit mine with twin processing streams including flotation (copper and gold) and CIL (gold), for a combined processing rate of 23,000tpd, and a 15-year mine life.



### Cerro Matoso nickel

From 2008 to 2012, the project included a technical audit of available hydrogeological data, and developing and implementing a field hydrogeological program in Colombia. The goal was to use 3D groundwater modelling to assess possible groundwater inflow rates, pore pressure distribution for pit slope analysis, and the potential impact to the groundwater and surface-water systems along a 7km-long highwall adjacent to a major river. SRK worked with CMSA to optimise the mine design and production schedule, including the estimate of mining capital and operating costs. These estimates were used in selecting the preferred mine equipment fleet and mining schedule for long-term mine development.



## Multi-continent projects

### Eurasian Resources Group (ERG)

SRK has been involved with ERG (formerly ENRC) since 2006, including experience with its assets in Kazakhstan and internationally. As the company has acquired more assets over the years, SRK has made regular site visits to the company's facilities and projects, while undertaking a variety of technical review mandates. Following the company's transformation in late 2013, SRK continued to work with ERG, completing the annual Resources and Reserves audit for JORC compliant reporting, and various technical mandates directly for the company's assets.



### Independent review of the Falconbridge Ltd. worldwide exploration portfolio

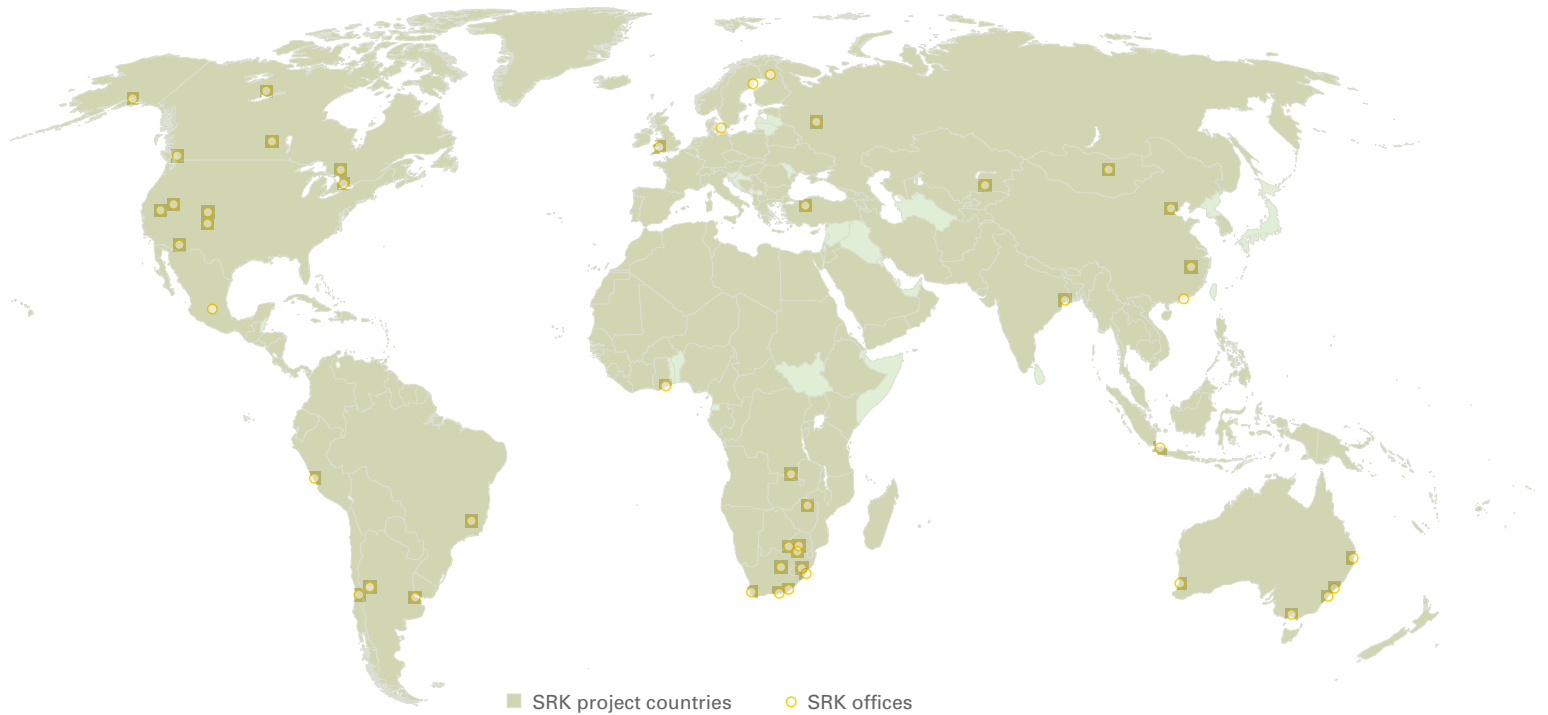
In connection with the acquisition of Falconbridge Ltd., the integration planning team of Xstrata plc commissioned SRK in July 2006 to provide technical guidance for the evaluation of Falconbridge's exploration assets.

SRK's assignment was to complete a desktop review of Falconbridge's greenfield exploration assets with a view towards summarising the characteristics of the portfolio, providing an independent assessment of their realisable value and commenting on the capabilities of the exploration team.

The challenge of this unique assignment was to mobilise an experienced and credible team capable of reviewing a worldwide portfolio containing early- to development-stage exploration assets and prepare a timely technical overview.

SRK's unique worldwide presence was instrumental in mobilising five teams to visit six regional exploration offices in five countries on three continents. Within six weeks, a team of 14 SRK geologists had reviewed over 60 active exploration projects in 14 countries to assess their merit, rank the portfolio on the basis of qualitative metrics – essentially the perceived potential of yielding a positive discovery – and provide a “fair market value” opinion, based on a market approach and comparative transaction analysis.

Although subjective and based on a very limited review, the ranking utilised by SRK provided a first-order independent overview of the portfolio which was suitable to guide Xstrata in realising the value of the Falconbridge exploration assets. Critical to this assignment was SRK's capacity to mobilise quickly a credible review team and deliver a timely technical review. This was completed in November 2006.



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