SRK was on the verge of a boom in South Africa when Andy Robertson departed for North America in August 1977. Over the following decade, it greatly expanded the range of services being offered, which was why it was able to support its sister operation in North America during the 1982 downturn. In spite of the worsening racial tensions, the firm grew across the country, and its increasingly solid reputation brought international work. It created a bankable brand in civil engineering as well as mining, with landmark projects and the widening scope of its work.
SRK also continued to attract the best and the brightest. Brian Wrench arrived at SRK in May 1977. After graduating from Natal University, he joined Frankpine as a site engineer on a paper mill piling contract and then worked for their in-house geotechnical investigation group (Soiltech) based in Durban.

He spent two years with Soil Mechanics in the U.K. before returning to Soiltech in Johannesburg, where he worked with Robertson. When Caldwell went to South America, Wrench took over the Transfil Fertilizer Plant project in Richards Bay. He also became more involved with Gemlab, providing oversight from the consulting practice perspective.

“While my main activities had been with geotechnical projects, we also had a big push working with industrial companies dealing with wastes that were present on their sites and looking hard to find ways to sell the material to others, if possible,” Wrench says. “Some wastes would have economic value and have constituent parts that could be reused. We also were involved in figuring out how to store materials so they were left in a safe condition.”

In September 1977, Stevenfield recruited Rick Skelton, who was planning manager at Nchango Mine, with an eye to developing the company’s mine planning and computing expertise. He invited him when SRK first started up, but Skelton didn’t have the confidence for consulting. Since then he had completed a postgraduate degree at the Royal School of Mines and worked for two years at Anglo American in Johannesburg. His projects included the feasibility studies for the Jeanetten and Letegang diamond mines, the Naracval gold mine and Amaas’s Amrot Galaxy project, which was the first strip mine being planned in South Africa to use large draglines. Skelton was one of mining’s first real computer experts.

“Most of my early work was involved with computer software in mining and the management of geological data,” he says. “SRK offered the career choice that I was looking for: developing my passion for computers and mining. Early projects included mine planning for Shangani, Orapa, Saipa, Letlhakane and Finsch. The feasibility study for Steffel’s Perring Mine was one of the early project evaluations carried out by the team.

Most pit planning projects required computer evaluation. The only commercial software was the RTZ Open Pit Design (OPD) system that ran on large IBM mainframes — desktop PCs had not yet been developed. SRK’s consulting staff encouraged the use of computers and development of software. After initially using the Wits University mainframes, which were slow and expensive, SRK agreed to invest in a Data General (DG) minicomputer that required its own air-conditioned facilities. Having a “live” in-house computing facility stimulated SRK’s development of a range of technical software.

A mathematician with expertise in modeling rock mechanics for stress analysis who was working with Kirsten and Stacey, Tony Diering was persuaded by Skelton to work on the development of the galini and mining software programs. “We thought that all the geological data manipulation and mathematics required was perfect for a computer,” Skelton explains. “It takes a long time to do the calculations behind the decisions we make as engineers. If you could simply change the parameters in a calculation and push a button — that would save a lot of time and manual effort. A computer with a good program allows you to consider more variables and options. Diering was the genius — I just provided the specifications and told him what we wanted the program to produce.”

A key project was the Buffalo Fluorspar Mine, which was facing closure because the main ore body was becoming depleted. SRK was appointed to perform a strategic life-of-mine (LOM) plan for the deposit. To evaluate the LOM options, SRK proposed developing an equivalent to the OPD software system, but written on the DG in-house machine, for considerably lower usage costs. The general manager at Buffalo supported SRK and approved the ZAR7.000 budget. Tony Diering was again SRK’s key analyst for writing the code. The final product was functionally far richer than any other that was available and it could run on the mini-computer.

“Although we had quoted the client a budget of ZAR7,000 on that first project, the final bill, given all the research and development, was nearly double — ZAR12,000. But the client happily paid, given the savings and profit reaped from the decisions made — ZAR12,000. But the client happily paid, given the savings and profit reaped from the decisions made.
from understanding the geological model and planning implications,” Skelton says. “The Buffalo Mine could economically mine and develop a low-grade ore body that had been ignored for development — the pit life was extended for many more years.”

The Dynamic Mine Planning System (DMIPS) was born, and SRK engineers were soon using the software and providing feedback for its development on other projects. Peter Franklin, a Camborne School of Mines — educated mining engineer who was employed by Gold Fields at Kloof, joined the mine planning team. He quickly took an interest in the new desktop HP 9845 machines and converted the DMIPS code to HP Basic with the additional objective of developing the mine-scheduling functionality. This was used for the Butteville Mine planning, and a program named Short Term Evaluation and Planning System (STEPS) was written to support the project. With these commercial uses and potential product sales, it was only natural SRK management invited Franklin to join the mine planning team. He had a Camborne mining education and technical background. In 1979, he moved into the office late in 1979. The city founded the Jwaneng Mine planning, and he supervised with the mainframe. After I wrote the computer cards, I would take them in big boxes over to the university and run them through the mainframe. I’d sit there and watch the girls until the printout came.”

When Mike Smith and John Robbertzitz landed a massive job in Welkom, one of the country’s biggest mining areas. The Dynamic Mine Planning System, DMIPS, created for Buffalo Fluorspar in Northern Transvaal and Nuclear Metallurgical in Argentina. Later, the team was joined by Gavin O’Connell-Jones, Chris Barnes, Eppie Salaja and Josh Stern. Around 1982, Gemcom in South Africa was approached by Mincom, an Australian mining software developer looking to expand the international market for its coal scheduling software. Gemcom was appointed agent for Mincom for its coal scheduling software products Geodas, Geolog, Miner2 and later Minestar. These products were supported by O’Connell-Jones (Geodas), Skelton (Miner2) and Andy MacDonald (Geolog).

The Mincom business product MIMS was also marketed with some success until Mincom opened its own office in South Africa in 1990. A North American base was considered better for developing and marketing the software because of the increasing sanctions against South Africa. In 1985, Dearing and Franklin moved to Vancouver to establish Gemcom Services Inc. DMIPS became the basis for PC-Mine, developed in Vancouver in 1985, and was sold to Gemcom Services, marketing its suite of products in Southern Africa. In 1994, SRK’s interest in Gemcom Services Inc. changed to a controlled subsidiary to minority shareholding. Gemcom Services was renamed Gemcom Software International in 1997 and listed as a public company on the Vancouver Stock Exchange.
Tony Dell, who had been with Rand Water, was hired in early 1978. Dell did his graduate work with Jennings while Steffen, Kirsten and Caldwell were lecturing at Wits. At the same time, he met Robertson, who was working with Frankipile and let Dell use its soil laboratory. “I was looking for some specific soil types and Andy gave me access to their files and I spent a couple of days there.”

From its inception, SRK did a lot of work for Rand Water — repairing water supply pipelines and stabilizing sections of the Vaal River. Inspecting the site of a retainer wall, Caldwell told Dell it seemed only natural that he join them.

Supply pipelines and stabilizing sections of the Vaal River. Inspecting the site of a retaining wall, Caldwell told Dell it seemed only natural that he join them.

Shortly after his arrival, Dell picked up the main office phone to find Jennings on the other end.

“He was a pretty intimidating guy,” he laughs, “a major deity. And he had this deep voice, like the voice of a god, and he said to me, ‘Who’s speaking?’ I said, ‘on the other end.

“‘It’s Tony Dell.’ Without missing a beat, he replied, ‘My, my, my, SRK is getting to be like an old boys’ club, isn’t it?’”

Jennings: “My, my, my, SRK is getting to be like an old boys’ club, isn’t it?”

Exodus/Opportunity

Unfortunately, the civil strife and racial tension in South Africa were forcing many local professionals to leave the country. Engineers led the exodus: In 1976 and 1977, the numbers of engineers emigrating totalled 483 and 736 respectively. The corresponding figures for medical doctors were 76 and 205, for accountants and auditors 81 and 150. Geotechnical engineers were at the front of the pack. South Africa had become an international pariah state. ‘That was one of the reasons behind Robertson’s move to North America — to provide a landing pad for the increasing number of SRK personnel who wanted out. By providing an exit strategy, the firm hoped it wouldn’t lose their expertise or its significant investment in their development.

As the local professionals left, many British ex-pats, starting with Connelly and Dorsey, joined SRK. U.K. graduates were willing to go global for better experience than what was available at home. Africa was a common destination.

Neal Rigby, who came aboard about a year after Middleton, was a prime example. In fact, the two men represented the twin streams of young professionals — South African and ex-pat — who joined the original partners to transform SRK from a Johannesburg firm into a global consultancy. Hailing from Warrington in northwest England, Rigby did his mining engineering degree and his PhD in rock mechanics at the University of Wales in Cardiff. From there, he joined Anglo-American’s coal division in South Africa.

Several months later, Stacey was in the U.K. recruiting and was given Rigby’s name. When he called the contact number, however, Stacey learned Rigby was already in South Africa. Stacey asked Hendrik Kirsten to track him down, which he did.

“I have no interest in another job,” Rigby told him. “Just have a chat and make yourself aware of what we’re doing,” Kirsten continued. “If there’s not an interest now, there may be in the future.”

Rigby: “Frankly, I was blown away by what I saw.”

But Kirsten was persuasive. “Why don’t you come to track him down, which he did.

“I’m just about to leave one and start another,”” but Kirsten was persuasive. “Why don’t you come to track him down, which he did.

“Frankly, I was blown away by what I saw,” he says. “The professionalism, the commitment, the dynamism, it was just a quite remarkable bunch of individuals, and I thought, ‘Wow! This is really something that does excite me.’ Even though I wasn’t looking for a job, I ended up joining SRK.”

Upon joining, Rigby was even more impressed with the intellectual achievement underpinning the company’s work and the egalitarianism. “Those elements were vital for the first generation of SRK professionals. Back in the bad old days, engineering consulting companies had this hierarchy of partners, associates and others, whereas SRK was different,” Tony Dell explains. “The partners never thought it was beneath them to get out in the field. Nobody was ever expected to do anything that senior partners wouldn’t do. There was that kind of camaraderie. The other thing that I didn’t find in other companies — there was this feeling that nobody was holding anything close to their chest. Everybody spoke about their projects openly and nobody worried about somebody else trying to hustle them or anything like that. There was this culture of co-operation, this culture of abundance, like there are enough projects to go around, don’t fret.”

Rigby: “Frankly, I was blown away by what I saw.”

South African Growth
Dick Stacey convinced Peter Terbrugge to sign on. Born in Vereeniging, where the Boers and British signed their peace treaty in 1902, Terbrugge had completed his honours degree at Wits. After graduation, he worked for a major road-building firm for a few years, before heading to Imperial College in London to do a master’s in engineering geology. That’s where he met Stacey, who was participating in the master’s course as an academic visitor. “I used to go to Dick’s place on a Sunday for lunch — his wife, Judy, would make a slap-up meal because I was a bachelor then,” says Terbrugge. “Dick tutored me on the highly theoretical part of the course in the afternoon and I ended up creaming it.”

Master’s degree in hand, Terbrugge returned to South Africa to work on the country’s first hydroelectric scheme. In 1979, Stacey called. Terbrugge accepted his offer.

In Over Your Head

“I didn’t actually know what the hell I was doing when I joined. I was in so far over my head,” Terbrugge laughs. “I learned to swim. We never had a spare moment in those days. We used to arrive in the morning and those of us who worked with Oskar would gather in his office. Mike Smith was a great raconteur. He had lots of stories and he would entertain us with them before we started the day. We used to roll with laughter. It was a fantastic dynamic.”

By comparison, Kirsten, who had more to do with the firm’s civil side, was all business. “If you approached Hendrik at five o’clock with a problem, you would sit down, and reel out your problem to him, and finish at say six o’clock. You then pushed off. You’d come back in the morning and that was it. He’s that kind of guy. He’s a super brain.”

Hendrik used to sleep from half nine until four in the morning and that was it. That’s how that guy: He’s a super brain.”

Hendrik Terbrugge loved the work ethic. “Almost everybody at SRK used to come in on Saturday morning. You just did it. You had work to do. It was often a time to discuss your issues with other guys. Someone used to go across the road and buy muffins for us and we’d have muffins and tea and a good old chum. Often we used to go for lunch and then the guys would drift off back home.”

Whether they realised it or not, those who had common cause with the founders and early partners of SRK were developing a culture. Their shared work, hard, play-hard, share-the-rewards values were becoming as much a part of SRK culture as the near-sacred Friday night happy hour.

By the end of the 1970s, the Plain Street offices were bustling six, often seven, days a week. The company’s first messenger and general office assistant, Elias Zwane, remembers the engineers being either out in the field and unreachable, or at their desks, madly preparing reports. There seemed to be no happy medium for them. In those days, there was no email or even facsimile transmission, and telephone service was erratic. Zwane collected the mail, carried packages to clients, made bank deposits and, once a week, he’d ride around collecting cheques from the mining companies. It was always hectic, he said.
Hendrik Kirsten designed the Kowyns Pass rock-fall solution and Peter Labrum oversaw its construction in 1979.

Geotechnics and Structures

Soils and foundations were core services from inception and SRK marketed its civil geotechnical expertise. It was hired, for instance, to deal with loose boulders periodically dislodged from the 120-metre-high rock face that loomed over the highway through the Kowyns Pass, which traverses the picturesque Drakensberg escarpment from Graskop to Hazyview.

Steffen and Rob Dorey investigated various ways of securing the loose rock. But the client opted for a rockfall shelter much like the snow avalanche chutes across mountain roads in Europe. Kirsten designed the shelter and a just-hired Peter Labrum oversaw its construction in 1979.

The son of a Zimbabwean bank manager, Labrum grew up moving around the country until he did his engineering degree at the University in Durban. He was initially turned down for a job because SRK was looking for another water engineer, but Kirsten phoned him back, saying they also needed a structural engineer.

Labrum left after a year or so to pursue his love of bridge building. Kirsten nagged him for nearly a decade to return to SRK before he finally agreed in 1989 and took over the firm’s structures and civil engineering division, founded by Peter Townshend.

Standard Bank approached Kirsten in 1978 about building a high-rise on the footwall of old mining stopes that effectively represented an almost vertical subterranean cliff face. On his advice, the bank acquired the near-worthless land for a fraction of the cost of prime land in the centre of the city and stabilised it to the satisfaction of the regulating authority by constructing 60-metre-deep mass concrete keys in the old workings. The six-storey services centre straddled the old mine workings and was the first major office building in Johannesburg to be built on undermined ground.

Hendrik Kirsten designed the Kowyns Pass rock-fall solution and Peter Labrum oversaw its construction in 1979.
Adrian Smith was a bona fide SRK star from the moment he joined in Johannesburg in April 1979. He had graduated with an honours degree in geology from the University of Durham, completed a postgraduate diploma in geochemistry at Oxford and his PhD in hydrochemistry at the University of London. Smith was a specialist in groundwater and surface-water pollution investigations as well as environmental impact assessments of waste-disposal operations. He was a pioneer in his field, assisting the mining and other industries to look at the application of science and engineering to solve some of their long-standing technical problems. He moved to SRK Vancouver in January 1982, and managed that office for some time before retiring to establish his own consulting firm around 1987.

PROFILE: Adrian Smith

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Over a career that spanned a quarter-century, he handled more than 300 projects in the United States, Canada, the U.K., France, Zimbabwe, Botswana, South Africa, Namibia, Zambia, Brazil and Australia. He published more than 60 papers and was a true world-leader in his field. It is no exaggeration to say that he contributed greatly to the profession’s thinking about geochemistry. The book he authored with colleagues Terry Muddler, Chemistry and the Environment, and Chris van Walsum, remains a definitive treatise in their field.

Smith served as an adjunct professor at the University of Waterloo, and was an associate editor of both the Canadian Geotechnical Journal and the Mining Environmental Magazine until his untimely death in late 1995.

SRK was an early adopter of emerging technologies as satellite remote-sensing. They led the way with an in-house digital imagery processing (DIP) capability. This integrated processing and interpretation of these satellite images assisted SRK in environmental impact assessments, surface and groundwater resource studies, and fracture trace mapping for large-scale geological investigations for tunnelling projects in remote areas.

There were 60 or so staff when Robertson left for Vancouver. Within two years of his departure, there were 100 staff and the firm had established its water-related services in South Africa with an in-house digital imagery processing (DIP) capability. The integrated processing and interpretation of these satellite images assisted SRK in environmental impact assessments, surface and groundwater resource studies, and fracture trace mapping for large-scale geological investigations for tunnelling projects in remote areas.

Middleton was an extraordinarily exciting period,” Middleton says. “We were developing mathematical models and writing computer programs to model hydrological processes, and then using them to simulate river flows in un-gauged catchments. The computer was still fairly new to the mining industry and everything had to be done with punch cards — who remembers punch cards? Wilf carried these many boxes of cards to the mainframe computer, which sat in a massive room in the central building with a huge air-conditioning unit to keep it cold. It didn’t ever get very warm.

And if you ever dropped a box of those cards you had to wait for them to get the program running. Wilf’s program crashed. “Middleton did a master’s degree and wrote his thesis on the Vaal River Basin, one of the most important water systems in South Africa; 40 percent of the GDP of the country was generated in the region. His newly developed expertise was invaluable in pioneering water-related services in SRK and developing an integrated surface water-groundwater offering — probably the first in South Africa, where surface water was the domain of the engineers and groundwater, the scientists. SRK was able to deal with more issues in greater depth and offered more insightful expertise. The application of science and engineering to solve some of their long-standing technical problems. The book he authored with colleagues Terry Muddler, Chemistry and the Environment, and Chris van Walsum, remains a definitive treatise in their field. Smith served as an adjunct professor at the University of Waterloo, and was an associate editor of both the Canadian Geotechnical Journal and the Mining Environmental Magazine until his untimely death in late 1995.

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Connelly and Chipps put together a business plan to purchase a Sun workstation, which was an expensive piece of equipment in those days. “We were a large project to develop hydrogeological maps and a GIS database for the Transkei,” Chipps says. “We purchased raw satellite data from NASA. This was really groundbreaking consulting in southern Africa.”

“Although focused on mining, we also took our knowledge of surface water, groundwater and chemistry into consulting outside the mining industry,” Middleton adds, “which I thought was a good thing at the time — providing water services and environmental liability work for groups like African Explosives and Chemical Industries.”

His interest in interpreting satellite images helps SRK’s involvement, begun in 1980, into consulting outside the mining industry. “This provided a huge boost to Groundwater database and a groundwater map. It proved to be an invaluable tool for climatologists, hydrogeologists, planning engineers and others involved with hydrological processes in South Africa. “We had seven different subcontractors with multiple drilling rigs operating for several months, seven days a week, over a very large area,” Connelly says. “This provided a huge boost to the development of groundwater services.”

Among the key people who joined the team were Allan Harley, Pierre Bourre and Chris Taylor. Publication was a key to the water section’s success. SRK organised a major conference on groundwater issues; it helped form the groundwater division of the Geological Society; it was active in the water division of the SA Institution of Civil Engineering; and SRK professionals offered themselves as experts, on television and other media. Given the importance of water resources in South Africa, the firm also proposed to the Department of Water Affairs and the Water Research Commission that it develop a nation-wide groundwater database and a groundwater map.

By 1986–1987

Chipps says:

**CHIPPS:**

**WE PURCHASED RAW SATELLITE DATA FROM NASA. THIS WAS REALLY GROUNDBREAKING CONSULTING IN SOUTHERN AFRICA**
White had his first contacts with SRK in 1981, when Gary Jones and Eben Rust went to Zimbabwe to undertake piezometer cone penetrometry testing of the 30-metre-bed near Chisumbanyo. Charlie Rae, then manager of SRK Zimbabwe, carried out seismic traverses as part of the investigations for this dam. Over the next few years, SRK (with Horst Marker taking over after Rae moved on) undertook geotechnical investigations for a number of the dams for which White was responsible.

In late 1986, Middleton offered White a position with SRK Johannesburg and he moved to South Africa to join SRK’s water group in March 1987. His first project was as resident engineer, under the guidance of Jonathan Levy and Jones, for the fast-track construction of the 20-metre-high Cathkin Park dam, built in 1987 for the Drakensberg Sun Hotel to supply water and support recreational activities. White’s return to Johannesburg from Natal coincided with SRK becoming involved in the upsurge of dam safety initiatives following a change in policy in July 1986 by the Department of Water Affairs, South Africa.

Underground Mining Rock Mechanics

In the early days, SRK rarely consulted on routine underground mining, rock-mechanics projects in South Africa. The mining companies had in-house capabilities that were adequate for dealing with the standard mining issues at planning and rock engineering problems typical of the tabular deposits in the gold and platinum mines. SRK was only approached when there were more difficult issues, or when massive mining was involved. An early example was an appointment by Gold Fields to investigate the rock-mechanics reasons for fracturing at the tunnel face and sidewalls in a gold mine at a depth of 2,000 metres. This led to the development of Dick Stacey’s extension-fracture-initiation criterion.

The group of SRK-ers that handled the early underground mining contracts included Kirsten, Stacey, Rigby, Andy Houghton, Chris Page, Essie Esterhuizen and Dave Ortlepp. Houghton had worked with Bezianou and CSR, and brought both geological engineering and rock engineering skills. Page joined SRK from the mines in Zambia. With a PhD in rock mechanics, he added considerable specialist capabilities. However, it was his practical experience and knowledge of underground mining methods that really provided value. These skills enabled him to move to Canada where they were in great demand. Before leaving, though, Page suggested to Stacey that they co-author a book documenting the tools and knowledge of underground mining methods that they employed daily. Together they wrote Practical Handbook for Underground Rock Mechanics, published in 1986 by Trans Tech in Switzerland. SRK also developed significant in-house numerical analysis capabilities before such packages were available commercially. Examples were the adaptation of Stacey’s 2D finite element analysis capable of modeling jointed rock and his 3D finite element program, which was adapted to fit on SRK’s mini-computer. Diering made a big contribution to the analysis capabilities — for his MS and PhD, he wrote unique 2D- and 3D-boundary element packages for SRK.

These capabilities enabled SRK to become involved in numerous “non-standard” projects. An example was the analysis of stress distributions around the block cave at Shabanie Mine in Zimbabwe. Several other projects in Zimbabwe made use of SRK’s sophisticated capabilities, including an investigation into the collapse of a crown pillar at Epoch Mine — which raised concerns about whether further development of the surface crater could impact surface infrastructure — and the selection of appropriate pillar and stope dimensions for the mining method at Shangani.

As well, Stacey became involved in the “stope core” project in the early 1980s. The mining industry in South Africa for the previous 50 years had been looking for economically viable ways of mechanically breaking the hard rock in the deep-level mines. The “stope core” was one such project that a subsidiary company of De Beers proactively pursued for a number of years with SRK’s assistance. The project unfortunately turned out to be uneconomic. However, Stacey learned a tremendous amount about stress-induced fracturing under constrained conditions, which made the project particularly worthwhile for SRK.

De Beers’s Premier Mine also financed SRK in the late 1980s to investigate rockburst and underground mining conditions; steel fibre–reinforced shotcrete would be equivalent to mesh-reinforced shotcrete as surface support in tunnels that are subjected to very large deformations. This was another novel problem and big challenge. Kirsten established an industry-funded Shortcrete Working Group that took the development program further for a number of years and showed, for example, that long polypropylene fibres were more suitable than steel fibres in some applications.

SRK became involved at El Teniente Mine in Chile, after a major rockburst in the early 1980s. This extended over about a six-year period and was part of a significant move by SRK into South America. Dennis Laubscher, Stacey and Ortlepp formed a three-man team to address El Teniente’s problem. They provided interpretations of the rockburst events and recommendations on seismic monitoring, rock support and a geotechnical department; supervised “rockburst testing of support by blasting underground; and designed a drop-weight dynamic testing system for rock support.

The dynamic testing of rock support at El Teniente led to further research and to contracts from the Safety in Mines Research Advisory Committee in South Africa. These occupied Ortlepp, Stacey and others for about 10 years. Their publications and their collaboration with individuals in Australia and Canada have been internationally recognised.
PROJECT: Nchanga Copper Mines, Republic of Zambia

CLIENT: Konkola Copper Mines plc

SCOPE: SRK has been involved with the Nchanga mines since the late 1960s when Oskar Steffen set up its soils lab and worked as the open pit manager. Since then, open pit studies have been carried out by Oskar, Horst Marker and Peter Terbrugge, as well as Alan Naismith and Bruce Murphy, both of whom held tenures at the mine before joining SRK. Mining the open pits at Nchanga has always been challenging due to the complicated nature of the geology, with the westerly plunging syncline having a shallow dipping south limb and a near vertical north limb, both containing moderate to highly folded zones. Slope design issues are exacerbated by the deep weathering and complexity of materials, which vary from soft soils to hard rock.

OUTCOME: SRK has helped manage the mine’s pit slopes and improve its geotechnical systems, including introducing safety-critical monitoring systems using radar technology. In addition to conducting regular reviews of both the open pit and underground mines, SRK is actively involved with engineering both aspects of Nchanga’s operations.

Ore Body
Overburden to remove
Additional cost
Steep slope
Safe slope

1970

right: The failure of the North wall which occurred in 1970, prior to SRK’s involvement at Nchanga in 1974. Since then SRK’s monitoring of the slope stability has provided early indicators that allowed adequate time to move equipment and personnel prior to expected slope failures.

far right inset: Well managed, engineered slope.

below: Modern open pit mine mapping technologies such as Slope Stability Radar (SSR). These systems track the movement of slopes in the mine and provide an early warning if movement accelerates prior to a slope failure.
Connelly and Middleton were among the first to appreciate the dawning regime of global environmental legislation. The practice started developing a suite of services within SRK to meet the need generated by the new green regulations. The firm recruited environmental specialists — John Shropley was the first.

Bryony Walmsley joined in November 1983. “I can still clearly remember holding myself in a chair in Oskar Steffen’s office as I realised he and Adrian Smith were offering me a job! The reason I was so excited was that I had been looking for a job as an environmental consultant in the U.K. for almost a year and had drawn a blank — why? Because incredible as it may seem now, environmental consultancies did not exist in the U.K. at that time. But now here I was on holiday in South Africa and being offered a job. There was a string attached, though — I had to start immediately as Adrian was about to move back to Vancouver, and he wanted me to start before he left.

I shared offices with the hydrogeology team — Dave Hughey and Alison Dehrman. After Adrian left in January 1984, Andy Ward became my boss.”

Walmsley started an in-house magazine, titled Journo, which profiled interesting projects, restaurant reviews, SRK office news, jokes, stories and other bits and pieces. “It was fun while it lasted but eventually the task was taken over by professionals as the company and its reputation went global,” she says.

In 1985, Andy Ward had left and Walmsley was reporting to Fanie Geldenhuis. Geldenhuis had singular knowledge and experience of pollution control, mine closure and rehabilitation planning, acidic mine drainage, waste management and the application of risk analysis in environmental management. He was the author of a number of cited publications, and his work for SRK took him to Brazil, Indonesia, Kamchatka, Mongolia, Siberia, Suriname and elsewhere. Regrettably, Geldenhuis passed away in 1995.

Under Geldenhuis, the team carried out several of the first environmental impact assessments done in South Africa; slowly building up a database of specialists and working closely with engineering specialists at SRK, especially the groundwater and hydrology departments.

One of the most memorable studies undertaken during the late 1980s was the development of catchment management plans for the rivers systems flowing into the Kruger National Park. The Department of Water Affairs was concerned that some of the perennial rivers in the park were drying up because of the irrigation practices in South Africa, slowly building up a database of specialists and working closely with engineering specialists at SRK, especially the groundwater and hydrology departments. One of the most memorable studies undertaken during the late 1980s was the development of catchment management plans for the rivers systems flowing into the Kruger National Park. The Department of Water Affairs was concerned that some of the perennial rivers in the park were drying up because of the irrigation practices in South Africa.

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The Visiting Specialist Scheme

Working with academics had started with Jennings and continued when Steffen arranged for Geoff Blight — the professor of construction materials at Wits who had oversight of the geotechnical discipline after Jennings retired — to participate on projects by coming to the office on a weekly basis. This was extended into the international arena.

It was a way of achieving technology and information transfer without big contracts that attracted attention. With South African mining companies leading the world, scholars were happy to visit below the radar. It was an innovative idea that kept SRK apprised of leading-edge work in spite of the embargos and anti-apartheid protests.

Kirsten administered the Visiting Specialist Scheme. The program included billing time on SRK projects, mentoring SRK staff, presenting short courses at universities and participating in seminars and symposia. The visitors included Ed Nowatzki of the University of Arizona, Joram Amir of Jerusalem, John Nelson and Dave McWhorter from Colorado State University, and Tom Haan from Ohio State University.

Nowatzki had worked on the landing gear and traction systems for NASA’s lunar module. He co-authored an authoritative book on soil mechanics for off-road vehicle engineering that became the standard reference. Amir consulted on everything from underground power stations and dams to bridges, buildings and salt pans. He was a specialist in piling and the sonic testing of piles. Nelson provided valuable insights into collapsible and expansive soils and into modeling seepage of pond water through tailings storages. McWhorter specialised in the use of mathematical models and laboratory experiments to solve flow problems in porous media. Haan was a water specialist.

Elias Zwane couldn’t believe he got to meet Nowatzki: “Everyone in South Africa listened to the radio as the Apollo spacecraft landed on the moon. It made me so happy and proud to have shaken the hand of the man who helped design the legs of the spaceship.”

To round out the company culture, there was an SRK soccer and hockey team, and a team in a business squash league on Wednesday nights. SRK fielded a team of runners in the annual consulting company relay race: Warwick coerced the less keen runners into participating. SRK also often had golf days.

Pretoria

In spite of the growth and proliferation of projects across the country, SRK was at first reluctant to move outside of Johannesburg, even though some of the staff, who lived in Pretoria less than an hour’s drive away, urged it. There were all sorts of practical barriers to expansion within the country. But it proved inevitable, and SRK formed a partnership with BL Wiid and Partners.

Ben Wiid and Kirsten had met as postgraduate students in the mid-1960s on an engineering geology course taught by Tony Brink. They were involved in 1973 in the development of a 24-storey building in South African Growth
downtown Johannesburg, close to the outcrop of old mine workings. They worked together again in 1978 on a nearby site where a seven-storey building was being constructed. Dick Stacey was also involved in that project. As a result of the long-standing association, Kirsten persuaded Wiid to form a partnership with SRK in 1978. Wiid was a friend of many at SRK. A racing car driver in his early days, an accomplished painter and a gourmet, he was an outstanding engineering geologist with excellent contacts. There was a lot of work as both Ekomo and Wiid were undergoing massive expansions in the area.

Gary Jones, who knew Steffen and Robertson from shared duties in the geotechnical division of the South African Institution of Civil Engineers, joined in 1981 from the Road Research Institute. Rob Pullen, one of the most senior engineers in the department of water affairs, also joined SRK. He started in Johan- nesburg and commuted from Pretoria. Together with Middleton, Pullen was instrumental in securing the Department of Water Affairs.

Unfortunately, the power-station boom and the basin studies came to an end; the work for other consultants prohibited by the government mining engineer. So the decision was reluctantly made in 1993 to merge back, with most of the staff, into the Johannesburg office.

Natal

SRK’s move into Durban was similarly driven by personal contacts. In that case, Kirsten and Stacey had a long association with Zakerwski Associates Incorporated (ZAI). One project they worked on was the Makro Wholesale Department Store to the west of Johannesburg on shallowly undermined land on which construction had until then been completely prohibited by the government mining engineer. Genie Sonnekus, a partner of ZAI, was the lead engineer, and that relationship convinced Kirsten that ZAI could benefit from SRK’s geotechnical expertise. He persuaded Wynndam Rodell, the managing director, in 1978 that a partnership of 51 percent for SRK and 49 percent for ZAI to create SRK Natal would be a good idea. Initially Schwartz flew to Durban one day a week to spend the day in the ZAI offices. Peter Allen was later recruited as the lead SRK engineer supported by Schwartz, from Johannesburg. The arrangement with ZAI lasted for only a year, after which SRK continued independently.

SRK Natal under Peter Allen focused mainly on foundation investigations and remained a small practice. Allen left SRK in the mid-1980s to consult on his own.

PROJECT: Lesotho Highlands Water Project

CLIENTS: The Lesotho Highlands Development Authority and the Trans Caledon Tunnel Authority of South Africa

SCOPE: The plan was to supply water from water-rich Lesotho to water-scarce South Africa, in particular the densely populated, highly industrialised Pretoria-Johannesburg-Vereeniging area.

During Phase 1A, SRK was a member of the consulting consortium that carried out the feasibility study and associated site investigation work, and the design and construction supervision for the building of:

- the Katse Dam, a 185-metre-high double-curvature concrete arch structure;
- the Transfer Tunnel, a 21-kilometre-long, segmentally lined tunnel that connected to the Delivery Tunnel South and carried the water to the Ash River Outfall from where it flowed into the Vaal Dam.

During Phase IB, SRK was a member of various consulting consortia responsible for the design and construction supervision of the:

- the Muela Diversion, a 25-metre-high weir and a 6-kilometre drill and blast, 4-metre horseshoe-shaped tunnel to divert water from the Matsoku River into the Katse Reservoir; and
- the Mohale Tunnel, a 32-kilometre-long, 5-metre-diameter bored tunnel, fully lined tunnel that carries water from the Mohale Dam into the Katse Reservoir.

OUTCOME: This major infrastructure project was completed successfully and is operating well.
Cape Town

In 1978, Kirsten also approached Charles Liebenberg, a renowned bridge engineer who founded Liebenberg & Stander (now L&S Consulting (Pty) Ltd.) in Cape Town. As with ZAK in Durban, he suggested SRK supply Liebenberg & Stander's long-standing needs for in-house geotechnical expertise.

Tony Dell, who had shortly before joined SRK in Johannesberg, was keen to move to Cape Town as manager of the local subsidiary, SRK Kaap. The work was done as a joint venture and kept most of the straightforward work to themselves. SRK bought out Liebenberg & Stander within a year and continued independently.

The new office quickly landed significant projects — the rural water supply work gave SRK the impetus to move into Port Elizabeth and East London to service those areas.

SRK bought them out within a year and continued independently. The Liebenberg & Stander partnership handed over all the difficult problems to the joint venture and kept most of the straightforward work to themselves. SRK bought out Liebenberg & Stander within a year and continued independently.

SRK bought out Liebenberg & Stander (now L&S Consulting (Pty) Ltd.) in Cape Town in 1993. Peter Rosewarne relocated to the Cape office from Johannesburg in early 1985 to set up a groundwater section there and handle the growing work in that area. Another ex-pat, from Brighton in the south of England, was a long-term, big-budget job. Later, SRK was asked to design a bridge from the coast to an island mine. Construction started in the 1990s and continued until 1997, when the project was completed.

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SRK Consulting 40 years in the Deep End

SRK Consulting

South African Growth
The wheels also taper to a smaller diameter on the rails. The flange spacing is narrower than the distance between the rails (the gauge), which allows some lateral movement.

The wheels also take a smaller diameter toward their outer face. When a rail car rolls around a corner, the centrifugal force pushes it toward the outer face. When a rail car enters a turn the centrifugal force pushes it toward the outside rail. This causes the outer wheel to ride on the rails. The flange spacing is narrower than the distance between the rails (the gauge), which allows some lateral movement.

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Another ex-pat hired in 1980, Allan Haines transferred to Cape Town from Johannesburg in 1983 to take over management of the project as the number of technical experts by the railway company. The firm was still very much characterised by personality and drive. People traded information daily — who was most persuasive, who wanted to do what, who did someone know? I think we should open an office here, I know so-and-so, let’s approach him or her. The project turned into a nightmare for Kirsten, Stacey and Ian Cameron-Clarke. The cavities in the dolomite absorbed an enormous amount of cement grout, hugely adding to the cost of the project. The relationship with Rand Water took a severe knock as a result.

Growing Pains

Organised decision making within SRK remained informal throughout the 1970s, but in the 1980s, the company’s growth changed that — informal throughout the 1970s, but in the 1980s, the firm was involved in sub-sidiary companies within South Africa, so there was a lot of interest in how the project’s growth and restructuring near the end of the decade.

As he grew in the firm’s career, he was taught me by my cousin-once-removed, Jack Caldwell, who taught me at Wits. And my cousin-once-removed, Jack Caldwell, who taught me at Wits.

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time and that there was little that I could do to change the management style that was being implemented at that time. I came to the conclusion that I did not fit in with the core of the business. The enterprise, which had always operated like an extended family, was starting to feel over-extended. It was tough to keep track of new people you passed in the hallway in Johannesburg, much less keep tabs on distant cousins in Denver or even Cape Town whom you had never met.

“What we were getting at that stage was pressure from the practice leaders saying we need to do our own manufacturing. ‘Decision making was centred in Jo’burg and there was some frustration with that.’ Tony Dell in Cape Town, Peter Allen in Pretoria and Stacey were saying: ‘We need to grow our offices ourselves and not be so dependent on Johannesburg.’”

Until 1979, SRK was a partnership, first among the three founders and later expanded to include Schwartz and Stacey. The partnership was then changed to an incorporated company, Steffen, Robertson and Kirsten Inc. With the satellite offices and growth across South Africa, it seemed like a natural progression in 1981 to create a South African holding company (Steffen, Robertson and Kirsten (South Africa) Inc.) and five regional operating companies. The holding company had grown at a compound rate of 80 percent and, as you can imagine, huge growth of that kind puts pressure on an organization.

“Over its first five years, SRK had grown from a compounded rate of 80 percent and, as you can imagine, huge growth of that kind puts pressure on an organization.”

“The new South African corporate structure initially facilitated broader employee ownership and provided greater opportunity for some of the younger staff who wanted more executive participation. Each company had a board of directors with the idea of opening the management of the company to the second generation.”

But success and expansion compelled corporate management to confront the daunting task of forging a corporate structure that no longer functioned as a family-style business; it faced cultural change, and that started to exact a personal and emotional toll. “Decisions made in the 1970s were not enough to sustain a company of such size, and co-ordinating the various SRK corporate units proved more difficult than anticipated. Con- tinuing as a business like any other: just trying to manage the overall business of many inter-connected practices, SRK would fail as surely as if the constitu- ent consultants began mismanaging or offering bad advice in their individual practices.

“The work of the Business Strategy Committee was defeated in various forums, culminating in a meeting of the South African holding company directors at Midrand in 1987. SRK’s leaders were understood to acknowledge that the management structure was hin- dering rather than enabling the firm’s development. They revisited the structure of the organization, determining the need for formal rules to avoid and resolve intra-company conflicts, and began to devote attention to the overall success and operations of the firm. SRK could no longer function as a family-style business, it faced the daunting task of forging a corporate structure that reflected its unique identity and values, one based on individual excellence, entrepreneurialism, consensus
and employee-ownership. This in-depth introspective process led to the concept of a partners group — leaders who were consultants in their own right, who would set strategy and formulate policy while ensuring that the culture and values of the organisation remained intact. In essence, a partnership within a corporate structure.

In response to these concerns and opportunities, in 1988, Midleton oversaw the re-amalgamation of the five South African operating companies into a single corporate entity, Steffen, Robertson and Kirsten (Consulting Engineers) Inc. He became the managing director of South Africa and gradually introduced systems, processes and policies appropriate for the consultancy. Many of these have since been implemented broadly across the group.

Andy Barrett was named Johannesburg office manager. Another South African from Wits, Barrett, who was from Jennings’s last graduating year of students, had joined SRK in late 1981. He built his career while simultaneously serving successfully in the army reserves.

“We had conscription in South Africa — 2 years full-time and 12 years of part-time involvement — and after I joined the company, I still had my part-time obligations to the military,” Barrett says. “I ended up running a regiment. When they were looking for someone to take on some management challenges, somebody on the strategy committee said, ‘You should think about Barrett — if he can run a regiment I’m sure he can contribute here as well.’”

Barrett relished the opportunity. In 1989, his peers recognised his organisational talent and created a new post for him, general manager.

“SRK South Africa was approaching 200 or so people at that stage,” Barrett explains. “Things weren’t getting done. The individuals who were responsible for aspects of the administration, accounting, quality control and marketing were client-focused. The business was going well, but we needed to improve our internal systems.”

SRK was a big organisation and needed more formal operational structures. Kirsten and Steffen were clearly in chairman–of-the-board–type roles and the second generation was managing the day-to-day operation of the company. But it was easy to become more corporate and lose the edge that made SRK so competitive — the brilliant intellectual free-spiritedness that set it apart.

How to retain energised individuals, attract top people, continue to be creative and not replicate the large firms that were too settled down, too structured, too policy-driven?

That was the challenge.