7 MINING OPERATIONS

7.1 Zijinshan Gold Mine

Introduction. The Zijinshan gold mine is an open-pit operation which uses contract mining of waste and ore. The pit base in September 2003 was located at 730m RL while the top waste bench was at 1,050m RL. The base of the final pit will be 592m RL (Figure 7.1).

Figure 7.1 The Zijinshan Open Pit (September 2002)

Mine Design. The current pit design was completed by the company using an Inverse Distance Squared (IDS) interpolation of sample data and a cut-off grade of 0.5 g/t gold, however the company has constructed equipment (No. 3 plant) to process material with a grade as low as 0.3 g/t gold. Geological boundaries appear to have little influence in the pit design.

Mining Method. The current mining method at Zijinshan uses drilling and blasting, loading with excavators and transport by truck. Waste is transport horizontally by truck to the North section of the pit and tipped on to waste dumps. The Western waste dump currently extends vertically from 1,050m RL to 380m RL. Since 2002 Zijin has dozer the upper sections of the dump into terraces. Ore on upper benches is trucked to the No. 1 processing plant. Ore on lower benches is trucked horizontally and tipped into one of four ore passes. The ore is drawn out at the 520m RL by rail based ore trains, for processing in No. 2 processing plant. Material with a grade of 0.3-0.7g/t is now tipped from trucks into an ore pass in the pit, drawn out at the 520m RL level by conveyor and conveyed via a 1,300m long tunnel to the new No. 3 processing plant.

Geotechnical. The Zijinshan pit appeared to be designed conservatively and no slope stability problems were evident. The NERIN based their pit design for Zijinshan on 35 degree wall slopes. Practical experience has now allowed those slopes to be steepened to 54 degrees in the western wall, 35 degrees in the southern wall, with an overall pit average of about 40 degree slope angles. SRK saw no evidence of previous or pending wall failures in the current pit. The pit walls appeared to be stable at the current wall angles.

Contract Mining and Supervision. The Zijinshan gold mine uses three contractors under supervision from the company to operate the conventional open-pit mining equipment which extracts the waste rock and gold ores from the pit. The contractors work five days per week except for 7 public holidays. The intended work schedule for each year is 306 days in three shifts of eight hours. Operating costs are reduced by two practises: (1) reducing waste haulage by only trucking waste horizontally and tipping into large waste piles and (2) reducing ore haulage by tipping ore into a series of ore passes from the pit to the train loading level below.

Production and Operating Cost. In 2002 Zijinshan mined 23 million tonnes of waste and 9 million tonnes of ore at a grade of 0.87g/t gold. Metallurgical recovery was 81% and resulted in production of 7.2 tonnes of gold (232,000 ounces) at an operating cost of ¥1,225.9/oz (US$142.55/oz, based on an exchange rate of 1:8.6). The remaining ore reserves at Zijinshan gold mine plus the resources from the recently acquired South-East section are likely to be sufficient for 14 years of mine life at the currently scheduled production rate. Zijin plans to gradually increase its annual production from 9t of gold in 2003 to 10t per annum from 2004 until 2014 when production will pass to the new south-east section. SRK understands that the production plan is subject to change and Zijin may modify the above production plan from time to time for the best interest of Zijin's shareholders.

Mining Dilution and Mining Loss. Mining dilution was stated by the company at 18% and mining loss was 2% after inclusion of dilution material. The grade of dilution material was assumed by the company to be 0.25 g/t gold.

Low Grade Dump Leach. SRK was concerned that overburden wastes dumped over the pit edge into the upper catchment of Beikou River may cause mudslides in the future on account of its steep slope (angle of repose). Stabilisation of these slopes with vegetation is difficult and may not provide adequate long-term stability, which is recognised by the Company. A special project entitled 'Comprehensive Utilisation of Solid Wastes and Environmental Mitigation' was developed to address this problem. Consequently, the Company has constructed a dam in the Beikou River in the vicinity Xing Wu Xia Gully, downstream of the major embankment constructed in the Beikou valley, opposite Jiangshan Xia Gully and the dam opposite Shi Xie Li Gully. The Xing Wu Xia dam is designed to contain all mudflows should major slumping occur in the waste dump area. It is thus an important erosion control measure, designed to ensure that mudslides will not result in major environmental and safety consequences.

This dam also provides the opportunity to heap leach the overburden waste (known as low grade dump leach) which is known to have up to 0.7 grams of gold per tonne. A gold absorption and water treatment plant is being constructed in conjunction with the Xing Wu Xia dam. This will ensure that all run-off and seepage from upstream of the dam will be collected and treated before being released to the Beikou River. It is estimated that this will annually recover about 1.8 tonnes of gold per annum and that it will result in non-contaminated water being released to the environment. Part of this project involves construction of the No 3 processing plant.

The design and construction of the Xing Wu Xia dam appears to have been very well planned and it will ensure that potential erosion problems and water contamination from overburden wastes will be safely contained and not result in environmental or safety problems.

The Xing Wu Xia dam will be upstream of the Erjin Li dam that is proposed for commissioning of the Zijinshan copper development. This downstream development will provide further long-term stability and erosion protection to all of the wastes being deposited into the Beikou River. This will further prevent potential development of possible long-term environmental liabilities.

7.2 **Shuiyindong Gold Mine**

Introduction. Shuiyindong gold mine is a new underground operation. Construction of the Shuiyindong gold mine commenced in 2002. SRK visited the site during the construction phase (Phase I). Latest information supplied by Zijin shows that construction of three shafts (a main shaft 210m deep and two ventilation shafts to 1,200m RL), processing facilities, gold refinery, office block, laboratory and living quarters were completed in June 2003.

Production. Production commenced in June 2003 and by end of September 2003 Shuiyindong has mined 20215.67t of ore at an average grade of 16.76g/t Au, producing 338.87kg of gold. The ores were mainly mined from the development tunnels.

Phase II Expansion Plan. Shuiyindong Gold mine plans to increase its processing capacity to 600 tonnes of ore per day by July 2004, with an estimated total investment of less than 80M RMB.

Mining Method. The latest feasibility study was undertaken by NERIN in May 2002. The feasibility proposed a room & pillar mining method.

During site visit, SRK noted that the roof is flat lying shaly interbeds in bedded limey siltstone-very fine-grained sandstone, combined with low angle structures and bedding-parallel slip. SRK held discussions with site personnel about possible implications of the difficult roof conditions to the proposed mining method. SRK was informed that Zijin is investigating possible options to modify the mine design.

As the main shaft is within the influence zone of mining, an acceptable mining method will have to protect the infrastructure from damage as a result of subsidence. The mining costs will largely dependent on the mining method eventually chosen.

The mine plans to use mine water, existing creeks, and recycled tailings water. If all these water sources prove insufficient, then a reservoir will be constructed.

7.3 **Hunchun Copper-Gold Mine**

Introduction. The Hunchun Copper-Gold mine is located in Jilin Province, Yanbian Autonomous Region. It is a former copper-gold mine acquired by Zijin in 2002. The previously operated Beishan north mine was mined by open pit methods. Hunchun believes the economic strip ratio is 3t/1t waste to ore. The south Nanshan underground section of the Hunchun mine is depleted. Zijin is presently conducting a feasibility study regarding the exploitation of the remaining north Beishan deposit.

Production. Information supplied by Zijin shows mining operation at the Nanshan underground resumed in January 2003 and the plant started to processing ore in March 2003, following restructuring and upgrading of the plant. The mine, since resuming operation and by 31 August 2003, had produced a total of 137,500 tonnes of ore with an average gold grade of 1.14g/t and copper grade of 0.328%, and produced 119.74kg of gold and 350.092 tonnes of copper.

Mining. During the SRK visit to the site, the mine was not operating. The current pit design parameters are:

- Bench height: 10m
- Pit end slopes: 50°, wall slope angle: 70-75°, Cleaning bench: 10m wide.

For both waste and ore mining, it is proposed to use Hitachi PC400 hydraulic excavators with 2.6 m^3 bucket loading diesel powered trucks. The production capacity of a PC400 excavator is estimated at 1,300,000 - 1,600,000 tonnes per annum.

Expansion Plan. The mine is currently undertaking an expansion program which is designed to increase the processing capacity from its current 850tpd to 4,000 tpd by February 2004. The project is progressing within expectations. The mine has so far committed a total of 11M RMB to the expansion and upgrading projects.

Refinery. Zijin has decided to build a refinery in Hunchun and the project is well progressed.

Tailings Dam. The mine has raised the height of the existing tailings dam based on the design undertaken by the Changchun Gold Design and Engineering Institute and plans to raise additional 25m in height. The will provide additional capacity of 6.23 million cubic meters, sufficient at a daily production rate of 4,000 tonnes for 6 years. A new tailings dam with a capacity of 1.2 million cubic meters, adjacent to the existing tailings dam, has been constructed in May 2003.

7.4 **Paodaoling Gold Mine**

Introduction. The Paodaoling gold mine is currently an open pit mine and heap leach operation that is located in hilly terrain. Mining is done by contractors at a small scale using some quite basic drill and blast equipment. Steep access roads are easily affected by heavy rainfall and trucks of small capacity (10t) have a limited ability to deliver ore to the heap leach pads. Good quality excavators are evident but will need increasing fragmentation of the ore as the mineralisation tends towards the primary ore zone.

Production. In 2002 Paodaoling mined 152,000 tonnes of ore at a grade of 0.9g/t gold. With metallurgical recovery currently at about 81%, Paodaoling produced 101kg of gold at an operating cost of US$258/oz. During the initial 9 months of 2003, Paodaoling has mined 214,800 tonnes of ore with an average grade of 0.8g/t Au.

Grade Control. Grade control comprises routine sampling of blast hole drilling, combined with 2m chip-channel samples along mining benches. The working benches are not routinely geologically

mapped, so it is difficult to link mineralisation to the ore reserve model. Separate blasts were used for massive waste but small amounts of waste would be blasted with the ore and the muck pile re-sampled for gold grade.

Mining Factors:

Dilution — The ore lenses were described as being in the range of 1m to 4m wide. Therefore the mining equipment inspected on the mine-site and the nature of the orebody suggests that mining dilution would be in the range of 10-20%. Zijin have not provided any records of dilution calculations or reconciliations.

Recovery — Zijin were not able to provide any definitive data on orebody mining recovery, however SRK has estimated from the mineralisation style, drill hole spacing and the mining equipment used on site, that the mining recovery is likely to be in the range of 85% to 100%.

Phase II. Zijin has established a project team and engaged the Maanshan Design & Research Institute to investigate the feasibility of mining the primary ore. Zijin also plans to build a processing plant to treat the sulphide ore.

In SRK's opinion, the Paodaoling gold mine has a less than desirable ore reserve base and the surface oxidized ore reserve may support up to two more years of mine life at the current production. A feasibility study on the sulphide gold ore in conjunction with active exploration activities around the mine site could significantly increase the resource/reserve base, and extend the mine life.

7.5 **Advanced Development Projects**

7.5.1 *Zijinshan Copper Project*

Introduction. Zijin plans to develop the copper mine at a designed capacity of 10,000 tones ore per day. Engineering and construction of the Zijinshan copper mine is well progressed.

Testing Production. Production for testing purpose has commenced early in 2002. From September 2002 to the end of September 2003, 184,562.06 tonnes of ore at an average grade of 0.51% was mined and 949.059 tonnes of LME grade copper cathode was produced from the Zijinshan Copper Project.

Mining Method. The Zijinshan copper feasibility study suggests that a combination of room and pillar and open stope mining methods be utilised. Equipment selection is under consideration.

In SRK's opinion, Zijin would benefit from an updated feasibility study by considering the expanded open pit (inclusion of the recently acquired south-east section) of the Zijinshan gold mine, which sits above the copper deposits. An optimal design and well-coordinated management of the copper mine as an integral part of the overall Zijinshan gold mine planning could significantly reduce the development and production costs, hence reduce the risks associated with the copper project development.

7.5.2 *Ashele Copper-Zinc Project*

Introduction. Construction of the Ashele mine is well advanced. The main shaft designed for ore transport and an auxiliary shaft designed for personnel and materials transport are near completion and equipment purchase and installation is underway. Two ventilation shafts have also been completed. Construction of office and accommodation blocks is completed, and construction of the processing and plant facilities is in progress. A water diversion tunnel is being constructed from a new dam to be built to feed the reservoir tanks at the mine. Construction of tailings facilities has not commenced, and two proposed sites are still under consideration.

Geotechnical. The RQD index and rock mechanical parameters presented in the feasibility report indicate an overall good rock condition, with rock strength ranging from medium to relatively high level. Both the roof and wall rock surrounding the orebody is said in general to be continuous and stable, and the hydrogeology is simple and believed not to cause serious interruptions to the proposed mining operations. The level of geotechnical risk is rated by SRK as low.

Mining Method. According to the latest feasibility study on Ashele copper-zinc deposit, which was jointly undertaken by the ENFI and Urumqi Engineering & Design Institute of Nonferrous Metallurgy in June 2002, the orebody is planned to be mined in two phases. Phase I involves mining of the orebody (Categories B +C) above the 500mRL, which provides 9 years of production. Phase II involves mining of the orebody below the 500mRL, which would give an additional 10 years of mine production.

The feasibility study proposes a post pillar cut-and-fill method, which involves both large diameter and sublevel options depending on the rock conditions and thickness of the ore body. The study also investigated the possibility of employing the sublevel caving method and concluded that a post pillar cut-and-fill method would be more attractive.

In SRK's opinion, the proposed cut-and-fill method seems to be a feasible approach, given the level of technical risks involved in the sublevel caving and overall economic benefits. Optimal design of the mining method is likely to provide reduced mining loss and dilution. Materials used for filling are locally available but represent a high percentage of the overall mining costs.

In SRK's opinion, optimal design of the mining method is likely to provide reduced mining loss and dilution. SRK believes that potential risks during underground mining could include faulting and potential ignition hazard of massive pyrite material. Information supplied to SRK shows that testing is currently underway to define the ignition potential.

8 METALLURGY AND PROCESSING

8.1 Zijinshan Gold Mine

Ore from the Zijinshan Gold mine is currently processed at three plants located adjacent to the Zijinshan mine. Each of these plants are well run and are of a good standard. Fine material is separated by screens and processed using the standard carbon-in-leach ("CIL") process. The coarser fraction is processed by the heap leaching process. The gold recovery by heap leaching is approximately 80%,

which compares favourably with similar operations worldwide due to several favourable factors at Zijinshan including high leachability and a low proportion of fines. Operating costs are low due to low cyanide consumption, low lime consumption and low power consumption due to the maximum use of gravity flow (Figure 8.1).

The gold refinery is a modern facility and it has comprehensively equipped laboratories for quality control of the process and products and is accredited under ISO9002.

There appears to be low technical risk in processing both the current Zijinshan gold ore and lower grade material using the current combination of heap leaching for the coarser material and CIL for the "slimes". The Zijinshan flow sheet can be expected to continue giving excellent metallurgical results with low operating costs provided the ore quality does not deteriorate. The mine is not likely to encounter potentially deleterious constituents such as a higher proportion of clay or sulphide material in the ore as the open pit deepens. In 2002, the gold refinery was only operating at ~40% of its rated capacity and should have no difficulty processing the planned increased production.

8.2 **Shuiyindong Gold Mine**

The ore at the Shuiyindong project is refractory due to both the very fine nature of the gold mineralisation and its intimate association with iron sulphides. The proposed process of pressure oxidation for Shuiyindong has been routinely employed for gold ore treatment at other mines around the world. An innovative aspect of the proposed facility at Shuiyindong will be the use of alkaline pressure oxidation instead of the more common acid pressure oxidation. The risks are that the process will not perform to design and that the plant operating time will be low.

Production has commenced in June 2003 and by end of September 2003 Shuiyindong has mined 20,215.67t of ore at an average grade of 16.76g/t, producing 338.87kg of gold. A 90% of recovery rate has been achieved up to 25 August 2003.

8.3 **Hunchun Copper-Gold Mine**

Hunchun is an operating mine and plant with the expected metallurgical results confidently based on actual performance of the current smaller scale operation. Production from March to end of August 2003 was 2,607.44 tonnes of copper/gold concentrate.

The mine, by 31 August 2003, has produced 137,500 tonnes of ore with an average gold grade of 1.14g/t and copper grade of 0.328%, and produced 119.74kg of gold and 350.092 tonnes of copper. Metallurgical recovery rate for gold and copper for August 2003 was 70.6% and 79.52% respectively.

8.4 **Paodaoling Gold Mine**

The current practice of heap leaching at Paodaoling will only be viable while treating the oxidised zone. Gold recovery can be expected to drop significantly if material from the sulphide zone is placed on the leach heaps. It is likely that a process with a higher capital and operating cost will be needed for the sulphide zone.

8.5 **Advanced Development Projects**

8.5.1 *Zijinshan Copper Project*

The copper project at Zijinshan is using the bio-leaching of crushed ore on heap leach pads to treat low-grade, disseminated copper sulphides. Conventional solvent extraction and electrowinning is then used to produce cathode copper. The main risks in this process are a slow build-up of copper recovery and/or lower final recovery than expected, which has been the experience at mines in other countries. Large-scale testing of the bio-leaching process at the mine will reduce the risks associated with this process and is currently in progress. In 2002, 647.2 tonnes of LME grade copper cathode was produced from the Zijinshan Copper Project. By end of August 2003, 588.53 tonnes of copper cathode has been produced.

8.5.2 *Ashele Copper — Zinc Project*

The main technical risk in processing the Ashele massive sulphide ore is that the samples tested to develop the flow sheet are not representative of the whole orebody. SRK has been assured that the samples are representative, and predicted metallurgical results are in line with those expected from this type of deposit. The predicted metallurgical performance of the concentrates could be affected while the mine is in its development phase if the ore blend is different than that predicted in the feasibility study.

Zijin has suggested that the economics of Ashele, which will make a relatively low grade copper concentrate with high arsenic content, may be improved by further on-site processing to make copper metal. Several new but commercially unproved leaching technologies may possibly offer a less capital-intensive alternative to copper metal production than the conventional route of smelting and electrolytic refining.

9 WORKFORCE AND SAFETY

The total employment of the company in China as of 30 June, 2003 was 1,016. The Zijinshan mine (open pits and plants) employs 635, of which the mining department, processing department, and the maintenance department and the copper project team employs 39, 304, 28, and 30 respectively. The refinery at Zijinshan employs 104 and the research laboratory employs 59.

Safety records at the Zijinshan Gold mine indicate only one serious injury and two minor injuries since 2001. According to the company, there are no injuries or accidents on the other mines and projects operated by Zijin since 2002.

The company has a written workforce safety management policy and system. All employees complete a detailed medical examination annually. Records for 2001 show one serious injury (abrasions from falling rock) and one light injury (fall and twisted ankle). Records to date for 2002 show one light injury.

10 MANAGEMENT

In SRK's opinion, the Company's management and technical staff are very experienced and competent. The staff are generally well trained, and some staff with postgraduate degrees in geology, mining or related disciplines. All staff interviewed by SRK demonstrated good knowledge of their respective disciplines and were considered by Zijin management to be highly qualified professionals.

Management Structure. The mine is operated on a hierarchical management system with a board of directors and the CEO who has a number of General Managers in charge of departments including mining, processing, refining, research and laboratory, administration and accounting.

Management Team. The current senior management team of the Company is comprised of a group of well trained and very experienced geologists including Mr Chen Jinghe, Chairman of the Board of Directors, Mr Luo Yinnan, CEO, Mr Lan Fusheng, Vice President and Mr Zeng Xianhui, Vice President of the Company.

11 TECHNICAL INNOVATION, RESEARCH AND DEVELOPMENT

Zijin has committed to a major effort in research and development, particularly with an emphasis on metallurgy, in relation to all its mineral deposits. Zijin has built a special purpose, in-house technical center, the Zijin Research and Engineering Institute of Mining and Metallurgy, in Shanghang, Fujian Province. The institute employs 59 researchers, of which 7 are PhD students. The Institute has also developed collaborative research programs with 5 universities and 6 national engineering institutes in China. The Institute has experimental facilities for technical innovation, research and testing of bio-leaching, mineral processing and gold smelting.

Selected representative ore samples from Zijinshan copper, Ashele, Shuiyindong and Hunchun deposits have been transported to the institute where innovative methods of recovery are being tested. Several priority research programs are underway to improve gold recovery of ores from Zijin's various operations and projects.

12 UTILITIES AND LOCAL INFRASTRUCTURE

12.1 Electric Power

Zijinshan Gold and Copper Mine. Electrical power is supplied from the 110KV regional substation located on the nearby Jiuxian River and the mine has it its own 35KV transformer station which supplies more than 97% of its needs. The No. 2 process plant also has a small kW standby diesel generator for emergency use.

Shuiyindong Gold Mine. A 35Kw power transformer has been installed which connects to the national grid. A 300KVA power generator has been installed on site to supply electricity for the use of pumping waters from the main shaft, recycling water from tailings dam and processing plant.

Hunchun Copper-Gold Mine. Electrical power is currently supplied from the 66KV local Hunchun Power Station and the mine has its own transformer substation which provides sufficient electricity to meet the current mine needs but will be insufficient after the phase II expansion. An additional power line may be required which brings more power from the Hunchun Power Station to the mine.

Ashele Copper-Zinc Project. Electric power is supplied from the Shankou Hydro-electric station connected to the Altay regional grid and the mine has built two circuit 35,000 KVA transformer substation, which supplies sufficient electricity for the needs of mining and processing of the project.

12.2 **Water**

Zijinshan Gold and Copper Mine. The Zijinshan gold mine has an extensive water management system that includes a number of catchment dams. The mine also maximises the recycling of process water. Rainfall is sufficient to maintain any make-up water requirements so that the site supplies all of its own water requirements.

Shuiyindong Gold Mine. The Shuiyindong Gold mine is located in a mountainous, high rainfall, sub-tropical environment. The region receives an annual average rainfall of 1,352 millimetres, with a summer wet season from about May to October. Substantial amounts of rainfall also occur during the balance of the year. The mine plans to use mine water, existing creeks, and recycled tailings water. If all these water sources prove insufficient, then a reservoir will be constructed.

Hunchun Copper-Gold Mine. The mine area is hilly to mountainous and forested, surrounded by numerous creeks and springs. The Xiangfang River passes through the mine with sufficient water to provide all of the operational water requirements.

Ashele Copper-Zinc Project. The project area is noted for its arid environment and severe winters. The average annual evaporation is 2,065 millimetres, and greatly exceeds annual rainfall (178 millimetres). The largest nearest river is the Haba River, 3.5 kilometres to the east. The mine has developed a 7km long tunnel for directing water from the Haba River to the mine site. This should provide water sufficient to meet the needs of the project.

12.3 **Access and Transport**

Zijinshan Gold and Copper Mine. The Zijinshan Gold mine area is connected by concrete road from Shanghang county. The mine is located close to Jingmei village and the company and the local government have cooperated to construct a concrete road to the mine area. Roads on the mine site are generally of gravel and rock construction and are of reasonable condition compared to other mine roads in China. The mine has adequate road access for both incoming supplies and the transport of loaded carbon to the refinery.

Shuiyindong Gold Mine. The project is situated in hilly land on the Yungui Plateau, within karstic limestone country and agricultural areas. The mine has constructed a concrete road within the mine except for the access to the ventilation shafts. Access to the local main road is by gravel road, which is presently being upgraded by the mine.

Hunchun Copper-Gold Mine. The mine is located some 75km northeast from Hunchun city and 170km from Yanji, capital of Jilin Province, and 150km from nearest railway station. The mine connects to Hunchun city and the railway station by a concrete road of the Chinese national grade 3 standard, except for the 43km long section between the mine and Sandaogou which was build by the mine to a reasonable standard. The mine has adequate road access for transportation purposes.

Paodaoling Gold Mine. The mine connects to the national main road via Guichi and to the Chizhou Port of the Yangtze River. Access roads are easily affected by heavy rainfall and trucks of small capacity (10t) have a limited ability to deliver ore to the heap leach pads. The steep terrain restricts the ability to construct more direct access roads.

Ashele Copper-Zinc Project. The project is located near Ashele village, 31km NW of Habahe, in the northwest corner of Xinjiang Uygur Autonomous Region, with the capital city Urumqi located 720km SE of the mine. The project site is readily accessed by formed road from Habahe, via the Shankou hydro-electric station. The 16km section of the gravel road from the project site to the Shankou hydro-electric station has been upgraded.

APPENDIX 1 GLOSSARY OF TECHNICAL TERMS

Terms not included in this glossary are used in accordance with their definition in the Macquarie Dictionary.

Altered/Alteration	Relating to the change in mineralogical composition of the constituent rocks through physical or chemical means, especially by the action of hydrothermal fluids.
Alunite	A trigonal mineral, $KAl_3(OH)_6(SO_4)_2$; massive or disseminated; in pale tints; formed from sulfuric acid acting on potassium feldspar in volcanic regions (alunization), and around fumaroles.
Anomaly/anomalous	A departure from the expected or normal value. An abnormal concentration above the expected background.
Anticline	A fold, generally convex upward, whose core contains the stratigraphically older rocks.
Arsenopyrite	A monoclinic mineral, 8[FeAsS]; pseudo-orthorhombic, prismatic, and metallic silver-white to steel gray; the most common arsenic mineral and principal ore of arsenic; occurs in many sulfide ore deposits, particularly those containing lead, silver, and gold.
Basalt	A general term for dark-coloured mafic igneous rocks, commonly extrusive but locally intrusive (e.g., as dikes), composed chiefly of calcic plagioclase and clinopyroxene; the fine-grained equivalent of gabbro.
Blending	The mixing of materials from various sources to achieve a set of target Ore qualities for crusher feed.
Bornite	An isometric mineral, 1[Cu_5FeS_4]; metallic; brownish bronze tarnishing to iridescent blue and purple; brittle; massive; in hypogene and contact metamorphic deposits and mafic rocks; a valuable source of copper.
Carboniferous	An era of geological time in the middle of the Palaeozoic period, about from 345 to 280 million years before the present.
Calcite	A trigonal mineral, 4[$CaCO_3$] that is the major mineral in limestone, marble, chalk, spongy tufa, cave deposits, and carbonatite. It is also commonly found as a cementing mineral in many clastic sedimentary rocks, and as a minor mineral in some silicate igneous and metamorphic rocks.

Chalcopyrite	A tetragonal mineral, $CuFeS_2$; brass-yellow with bluish tarnish; massive; softer than pyrite; occurs in late magmatic hydrothermal veins and secondary enrichment zones; the most important source of copper.
Chlorite	Chlorites are associated with and resemble micas (the tabular crystals of chlorites cleave into small, thin flakes or scales that are flexible, but not elastic like those of micas); they may also be considered as clay minerals when very fine grained. Chlorites are widely distributed, esp. in low-grade metamorphic rocks, or as alteration products of ferromagnesian minerals.
Carbon-in-leach (CIL)	A process step wherein granular activated carbon particles much larger than the ground ore particles are introduced into the ore pulp. Cyanide leaching and precious metals adsorption onto the activated carbon occur simultaneously. The loaded activated carbon is mechanically screened to separate it from the barren ore pulp and processed to remove the precious metals and prepare it for reuse.
Country Rock	The rock enclosing or traversed by a mineral deposit. Originally a miners' term, it is somewhat less specific than host rock.
Covellite	A hexagonal mineral, CuS; metallic indigo blue with iridescent tarnish; soft; a supergene mineral in copper deposits; a source of copper.
Cut-off	The grade, quality or thickness, or combination of these, by which the limit of the Ore deposit are delineated.
Dacite	A fine-grained extrusive rock with the same general composition as andesite, but having a less calcic plagioclase and more quartz; according to many, it is the extrusive equivalent of granodiorite.
Density	The ratio of the dry mass of a substance to its volume.
Deposit	A mineralised body which has been delineated by appropriately spaced drilling and/or underground sampling to support a sufficient tonnage and average grade of metals. A specific example of "Mineralised Material". Must have secure tenure. Is not as well defined as reserves. Such a deposit does not qualify as a reserve, until a comprehensive evaluation based upon unit cost, grade, recoveries and other material factors conclude legal and economic feasibility.

Digenite	An isometric mineral, Cu_9S_5; blue to black; in veins with chalcocite; a source of copper.
Dilution	The contamination of ore with barren wall rock in stoping. The assay of the ore after mining is frequently 10% lower than when sampled in place.
Dip	The angle that a structural surface, eg. a bedding or fault plane, makes with the horizontal, measured perpendicular to the strike of the structure and the vertical plane.
Diorite	A group of plutonic rocks intermediate in composition between acidic and basic, characteristically composed of dark-colored amphibole (esp. hornblende), acid plagioclase (oligoclase, andesine), pyroxene, and sometimes a small amount of quartz; also, any rock in that group; the approximate intrusive equivalent of andesite. Diorite grades into monzonite with an increase in the alkali feldspar content.
Drill hole	A sample collected by boring a hollow tube into rock or soil and retrieving the contained material.
Enargite	An orthorhombic mineral, Cu_3AsS_4; dimorphous with luzonite, metallic gray-black; in vein and replacement copper deposits as small crystals or granular masses; an important ore of copper and arsenic; may contain up to 7% antimony;
ENFI	Beijing Engineering & Research Institute of Nonferrous Metals
Epithermal	Said of a hydrothermal mineral deposit formed within about 1km of the Earth's surface and in the temperature range of 50 to 200 degrees C, occurring mainly as veins. Also, said of that depositional environment.
Exhalative deposit	A deposit formed from the crystallisation of minerals from gas or vapours that formed beneath the surface of the Earth and escaped either through a conduit or fissure, or from molten lava or a hot spring.
Fire assay	The assaying of metallic ores, usually gold and silver, by methods requiring a furnace heat; commonly involves the processes of scorification, cupellation, etc.

Galena	An isometric mineral, 4[PbS]; cubic cleavage; forms cubes and octahedra, also coarse- or fine-grained masses; sp gr, 7.6; occurs with sphalerite in hydrothermal veins, also in sedimentary rocks as replacement deposits; an important source of lead and silver.
Goethite	An orthorhombic mineral, alpha-$Fe^{3+}O(OH)$; polymorphous with akaganeite, feroxyhyte, and lepidocrocite; dull to adamantine, varicolored with yellow ochre streak; a common weathering product of iron-bearing minerals; precipitates in bogs and springs; a major constituent of limonite and gossans, and a source of iron and a yellow ochre pigment. A hydrous oxide mineral of iron.
Grade	The relative amount of an ore mineral within a mineral deposit, commonly expressed as grams per tonne for a gold deposit.
Heap leaching	A process used for the recovery of copper, uranium, and precious metals from weathered low-grade ore. The crushed material is laid on a slightly sloping, impervious pad and uniformly leached by the percolation of the leach liquor trickling through the beds by gravity to ponds. The metals are recovered by conventional methods from the solution.
Hematite	A trigonal mineral, alpha -Fe_2O_3; red if earthy, reddish to bluish gray if massive, or bright metallic steel-gray in thin tablets or micalike flakes (specular hematite); invariably has red ochre streak.
Indicated Resource	See mineral resources.
Inferred Resource	See mineral resources.
Intercalated clays	Thin layers of clay contained with a larger geological unit
Intrusive	Of or pertaining to intrusion-both the processes and the rock so formed.
Intrusion	A mass of igneous rock that, while molten, was forced into or between other rocks.
IDS	Inverse Distance Squared estimation method, essentially a 'smoothing' technique used for resource/reserve estimation.
JORC	The Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, the Australian Institute of Geoscientists and the Australian Minerals Council, the developers of the JORC Code.

JORC Code	A Code developed by JORC (Australasian Code for Reporting of Mineral Resources and Ore Reserves, 1999 (JORC Code) (see www.ausimm.com.au/codes).
JORC Competent Person	A person qualified to issue a report under the JORC Code.
JORC Modifying factors	Factors to convert from resources to reserves, include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors.
Kriging	In the estimation of ore reserves by geostatistical methods, the use of a weighted, moving-average approach both to account for the estimated values of spatially distributed variables, and also to assess the probable error associated with the estimates.
Limestone	A sedimentary rock consisting chiefly (more than 50% by weight or by real percentages under the microscope) of calcium carbonate, primarily in the form of the mineral calcite. Common minor constituents include silica (chalcedony), feldspar, clays, pyrite, and siderite. Limestones are formed by either organic or inorganic processes.
Limonite	A rock composed of cryptocrystalline and amorphous hydrated iron oxyhydroxides, that is an oxidation product of iron (rust) or iron-bearing minerals, and may be pseudomorphous after them. It can be a minor ore of iron.
Marcasite	The orthorhombic dimorph of pyrite, FeS_2, having a lower specific gravity, less stability, and a paler colour. Often called white iron pyrites, coxcomb pyrites, and spear pyrites.
Massive	Term used to describe a mineral deposit that is characterised by a great concentration of ore in one place, as opposed to a disseminated or veinlike deposit.
Measured Resource	See mineral resources.
Metallurgy	The science and art of separating metals and metallic minerals from their ores by mechanical and chemical processes.
Metamorphism	The mineralogical, chemical, and structural adjustment of solid rocks to physical and chemical conditions that have generally been imposed at depth below the surface zones of weathering and cementation, and that differ from the conditions under which the rocks in question originated.

Mine disturbance areas	Any area of a mine which has been disturbed from its natural form prior to mining activity, including pits, roads, stockpiles and waste dumps.
Mineral Resources	The JORC Code reads "A concentration or occurrence of material of intrinsic economic interest in or on the Earth's crust in such form and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories".
Nanchang Institute	Nanchang Engineering & Research Institute of Nonferrous Metals
Open pit or O/P	An excavation or mine open to the sky.
Ore loss or mining loss	That part of an ore reserve which is not recovered during the mining process.
Ore Reserve	The JORC Code reads "The economically mineable part of a Measured or Indicated Mineral Resource. It includes diluting materials and allowances for losses which may occur when the material is mined. Appropriate assessments, which may include feasibility studies, must have been carried out, and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction could reasonably be justified. Ore Reserves are sub-divided in order of increasing confidence into Probable Ore Reserves and Proved Ore Reserves".
Overburden	That part of the planned surface mine production which is of no commercial value, also known as waste.
Permian age	An era of geological time at the end of the Palaeozoic period, from about 286 to 248 million years before the present.
Probable ore reserves	That part of a mineral resource known with sufficient confidence to be categorised as an Indicated Resource, and which can be mined, inclusive of dilution, from which valuable or useful minerals can be recovered economically. See Ore Reserve.

Proved ore reserves	That part of a mineral resource known with sufficient confidence to be categorised as an Measured Resource, and which can be mined, inclusive of dilution, from which valuable or useful minerals can be recovered economically. See Ore Reserve.
Pyrite	An isometric mineral, FeS_2, that commonly occurs (1) in veins, (2) as magmatic segregation, (3) as an accessory in igneous rocks and in metamorphic rocks, and (4) in sedimentary rocks including coal seams. It is a source of sulfur and sometimes includes gold.
Quartz	A trigonal silicate mineral, SiO_2.
RC drilling	Reverse Circulation drilling. A simple, cheap and fast form of air percussion drilling where the sample is returned via a central tube in the drill string to reduce contamination.
Reserves	That part of a deposit included in a comprehensive evaluation based upon unit cost, grade, recoveries and other material factors which conclude legal and economic feasibility. Includes estimation of mining loss and dilution. Divided into proved and probable (see Proved Ore Reserves and Probable Ore Reserves).
ROM (Run of Mine)	Ore delivered from the pit or mine which has not received any processing.
Sericite	A white, fine-grained potassium mica occurring in small scales as an alteration product of various aluminosilicate minerals, having a silky luster, and found in various metamorphic rocks (esp. in schists and phyllites) or in the wall rocks, fault gouge, and vein fillings of many ore deposits. It is commonly muscovite or very close to muscovite in composition, but may also include paragonite and illite.
Silica	The chemically resistant dioxide of silicon, SiO_2; occurs naturally as five crystalline polymorphs: trigonal and hexagonal quartz, orthorhombic and hexagonal tridymite, tetragonal and isometric cristobalite, monoclinic coesite, and tetragonal stishovite.
Sphalerite	An isometric mineral, ZnS, with Zn replaced by Fe with minor Mn, As, and Cd; trimorphous with wurtzite and matraite; perfect dodecahedral cleavage; resinous to adamantine; occurs with galena in veins and irregular replacement in limestone; a source of zinc.

Stockwork	A mineral deposit consisting of a three-dimensional network of planar to irregular veinlets closely enough spaced that the whole mass can be mined.
Stope	An underground excavation formed by the extraction of ore.
Strata	A series of beds or layers of rock.
Strike	The course or bearing of the outcrop of an inclined bed, vein, or fault plane on a level surface; the direction of a horizontal line perpendicular to the direction of the dip.
Tailings	The gangue and other refuse material resulting from the washing, concentration, or treatment of ground ore.
Tenement	Resource industry term for an identified piece of land temporarily possessed by an owner, who gains rights to explore for potential valuable minerals and/or to carry out mining operations within it.
Trench	A sample collected by excavation of an open trench with the sample collected along the walls.
Underground or U/G mine	A deposit which is accessed via shafts and adits below the land surface.
Veins	A mineral filling of a fault or other fracture in a host rock, in tabular or sheet like form, generally composed of quartz and/or carbonate.
Volcanic	Characteristic of, pertaining to, situated in or upon, formed in, or derived from volcanoes.
Waste	That part of the planned mine production which is of no commercial value, also known as overburden.
Water table	The upper surface of a zone of saturation within the earth's crust.

APPENDIX 2 ABBREVIATIONS AND UNITS

The list below sets forth the main abbreviations and units used in this report.

AAS	Atomic Absorption Spectrometry
AusIMM	The Australasian Institute of Mining and Metallurgy
Au	Gold
Cu	Copper
E	East
HKSE	The Stock Exchange of Hong Kong Limited
hr	hour
g/t	grams per tonne
JORC	The Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, the Australian Institute of Geoscientists and the Australian Minerals Council, refer to www.ausimm.com.au/codes
ktpa	thousand tonnes per annum
kW	kilowatts
m	meters
M	millions
MLR	Ministry of Land and Resources of the People's Republic of China
Mtpa	million tonnes per annum
N	North
NE	North-East
Pa	Pascals, a measure of pressure
n.a.	not applicable or not available
ppm	parts per million
RQD	Rock quality designation
S	South

SW	South-West
SRK	Steffen, Robertson and Kirsten (Australasia) Pty Ltd trading as SRK Consulting
t	metric tonne, equal to 1,000kg
tpa	tonnes per annum
tpd	tonnes per day
W	West
Yuan	The lawful currency of China, (¥), also known as Renminbi
Zijin	The Fujian Zijin Mining Industry Company Limited