Some blending of slightly above average sulphur ore with slightly lower than average sulphur ore may be required to provide the process with the required gold to sulphur ratio and total sulphur content required.

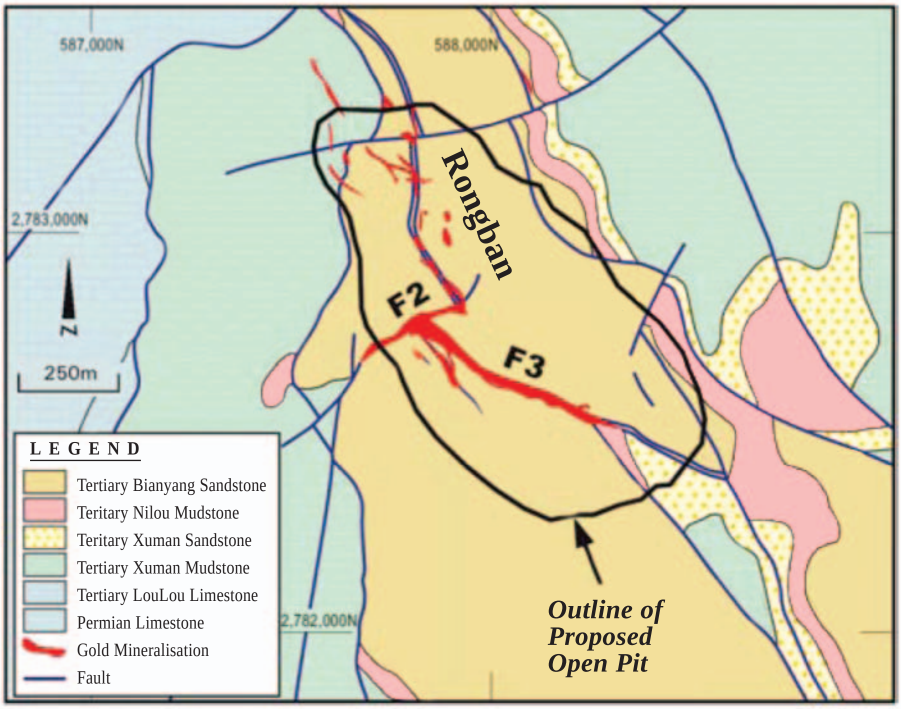

Figure 4-2: Major Structures at Surface in the Jinfeng Project Area (Source: Sino Gold Limited Dec 2005 Quarterly Report)

4.3 Controls on Mineralisation

The geology of the Jinfeng deposit forms the basis of exploration for similar deposits in similar structural settings with in Guizhou Province and Guangxi Province, with a particular focus on the Laizhishan Dome and the potential within trucking distance of the Jinfeng processing plant.

The controls on mineralisation are adequately understood such that the Jinfeng deposit can be efficiently mined by open-pit and underground methods. Earlier work on the controls on mineralisation was completed in conjunction with SRK Consulting, and more recently by in-house Sino exploration geologists. The key characteristics of the deposit are understood both by the project development teams and by the regional exploration teams. Gold mineralisation occurred during or immediately after the third of a series of compressive deformation episodes identified at Jinfeng (SRK, 2004). The relationship between the host structure and gold mineralisation is the subject of ongoing research for the exploration teams.

The controls on mineralisation at Jinfeng within preferentially mineralised faults is well understood for this deposit. The intersection between the F2 and F3 faults and the location of the Xuman sandstone units in the hangingwall of the F3 fault are important controls on mineralisation (see Figure 4-3). As a result, there are a number of thicker, high grade pods at intersections of the F3 with the F7 and F2 at Jinfeng. In addition, it has been observed that within individual structures such as the F3 there is a strong control on gold mineralisation by numerous late shear zones that compartmentalise higher grade and thicker zones of mineralisation within the F3 (SRK, 2004). This overprinting relationship may have a fundamental control on the location of the Resource within an early (extension) fault which is strongly overprinted by late faults (compression).

Within the deposit there is a strong correlation between gold and sulphur (in the form of sulphide). Mercury and antimony are later than the gold-forming events, although there remains a spatial correlation between mercury, antimony and gold as a result of common controls by the major faults. The distribution of arsenic within the deposit is less well understood. High arsenic can occur without high gold, although high gold values will more commonly be associated with higher arsenic. Arsenic distribution is not directly proportional to gold because the late overprint of mercury (orpiment and realgar mineralisation) which does not contain gold but is associated with some of the arsenic mineralisation.

Figure 4-3 shows the main ore zone in the proposed open-pit on the F3 fault and the main ore zones at depth in the F3 and at the intersection of the F3 with the F7-F20 fault system. The Section was constructed from surface mapping by SRK and drill core logging by Sino geologists (SRK, 2004).

At Rongban, narrower, moderately dipping faults host narrower zones of silicification, sulphide replacement and accompanying gold mineralisation. Figure 4-4 illustrates the numerous moderately dipping mineralised faults that have been defined by exploration drilling.

The Rongban faults are likely to be a result of activation of thrust faults during the two major NE-SW-directed compression events that have been observed at Jinfeng. By comparison, the F3 structure is likely to be an early fault, formed during Basin development, which has subsequently been reactivated during and after the compression events.

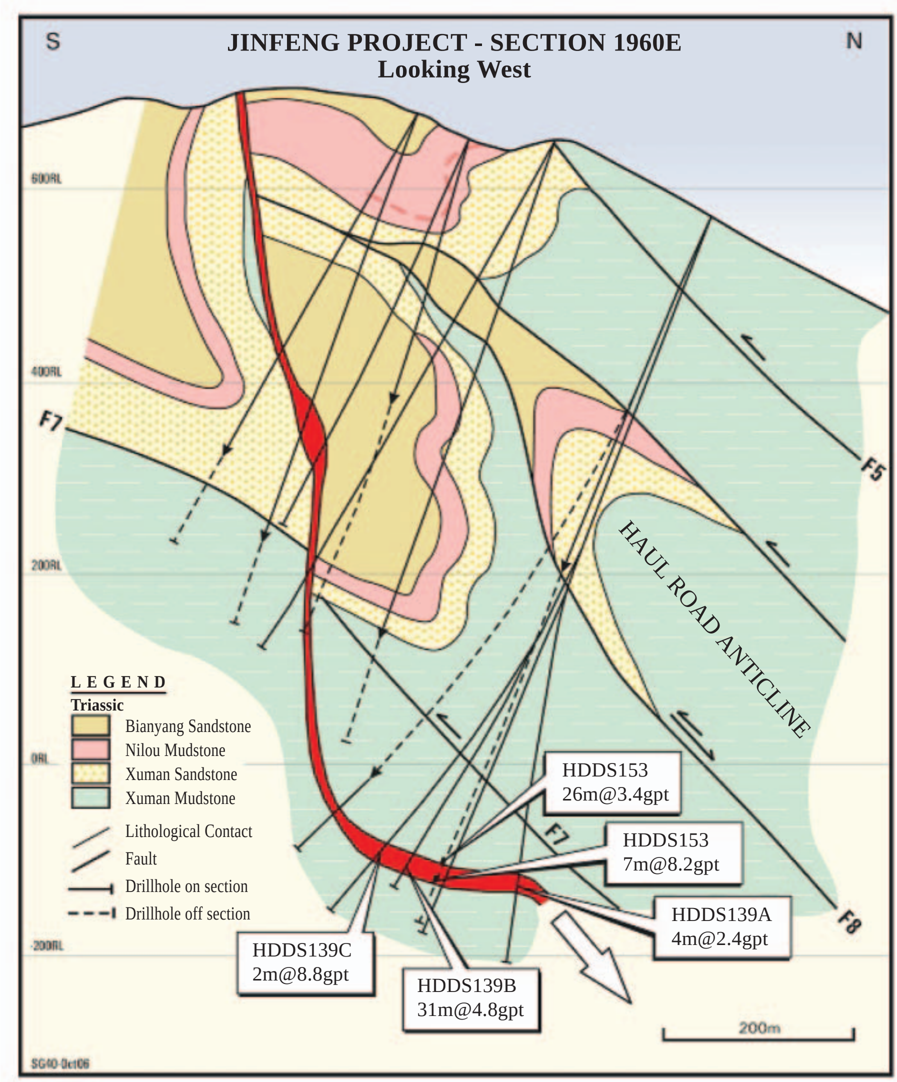

Figure 4-3: Section 1960E through the Jinfeng Deposit

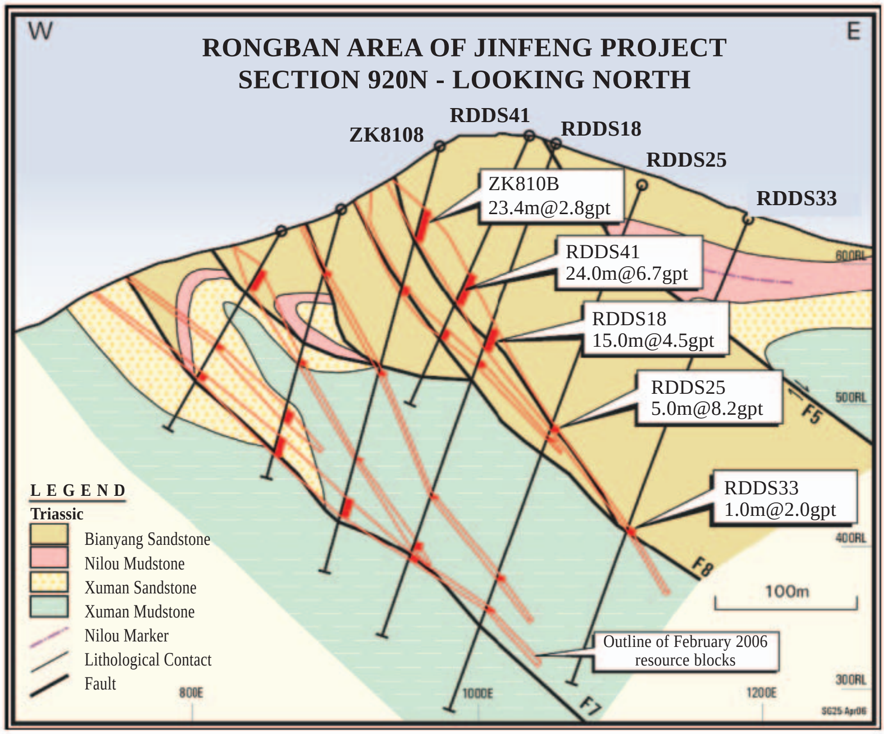

Figure 4-4: Drill Section of the Rongban Fault Controlled Mineralisation (Source: Sino Gold Limited March 2006 Quarterly Report)

4.4 Data Collection and Methods

Initial discovery of Jinfeng was in the early 1980's by following up on the source of regional stream sediment surveys. Subsequently Brigade 117 defined a 1.5Moz deposit by mapping, surface trenching, development of a number of exploration adits and drilling. From 2002 Sino has been further delineating the Resource and incrementally adding to the size of the deposit.

4.4.1 *Geophysics*

Regional gravity, regional magnetic and detailed IP geophysical techniques have been employed at Jinfeng to assist with the exploration work undertaken. It is not expected that geophysical techniques will be employed during mining or during the deep drilling exploration on the Mine Lease.

4.4.2 *Surface*

Initial surface work by Brigade 117 involved the collection and analysis of a regional stream sediment survey. Follow-up of a significant anomaly was sourced back to the prominent topographic high where the current Resource is exposed at surface. Detailed geological mapping, rock chip sampling and trenching at surface was started by Brigade 117 and has been extended by Sino during more recent exploration in the Mine Lease and surrounding exploration licence.

Geological mapping and sampling of the deposit was possible in shallow surface mines that extended to the base of weathering (approximately 15 to 20m below surface). There are no reliable estimates of the amount of gold or mercury that were recovered from these workings.

The current Jinfeng pre-strip pit is routinely mapped by the project geologists to assist in identifying the limits to zones of mineralisation. Mark up of the mineralised domains will initially be done by the survey team based on blast hole sample analyses. It is expected that the geologists will be responsible for visually identifying the limits to the mineralised material in the pit after mark up by the survey team.

4.4.3 ***Underground***

Brigade 117 developed a number of exploration adits into the upper parts of the deposit in the 1980's, mapped and sampled the walls of the adits and provided insights into the variability in distribution of gold mineralisation and controls on mineralisation. Reconnaissance mapping and analysis of sampling (SRK, 2004) revealed a strong control on thicker and higher-grade mineralisation in the F3 (main ore zone) between zones of strong shear faulting. The F3 has a strong control on the location of gold mineralisation, however the later shear zones partition the gold within the F3 structure.

Brigade 117 sampled and analysed only for gold in the adits. Sino drilled a number of horizontal drill holes between cross cuts into the adits which allowed a check on the gold assay and also allowed for analysis of sulphur, arsenic, mercury and antimony of the mineralised zone in this part of the deposit, which will likely fall within the Stage 1 open-pit.

There was no underground development by Sino at Jinfeng at the time of writing this report, however Sino indicated the decline was expected to commence in November 2006.

4.4.4 ***Drilling and Sampling***

Drilling at Jinfeng was started by Brigade 117 and has been continued by Sino.

Brigade 117 drilled 77 diamond drill holes from surface and 176 holes underground (from the adits), predominantly into the upper parts of the deposit and sampled half-core for gold only. Only those parts of the drill core that were considered likely to contain at least some gold were analysed. The remainder of the core was not sampled. The lack of sulphur and arsenic analyses in the upper parts of the deposit provides a gap in the information base in that part of the deposit. This has been partly infilled by surface reverse circulation (RC) drilling in the pit and horizontal drill holes within the adits, completed by Sino. The sulphur model will be generated in future by the grade control drilling program from blast holes drilled within the open-pit.

Sino have drilled 170 of diamond drill holes from surface and 14 horizontal underground drill holes (from the Brigade 117 adits) and have cut and sampled half-core for Au, As, S, Hg and Sb. The drill core is predominantly NQ size (47.6mm diameter, approximately 70% of the core taken). PQ size core (85mm diameter) and HQ size core (63.5mm diameter) have also been taken. Only those parts of the drill core that were considered likely to contain at least some gold were analysed. The remainder of the core is not analysed at this stage.

In addition to the exploration and delineation drill holes, Sino have drilled a number of closely spaced, angled RC holes (40m along strike by 40m down dip) within the F3 shear zone at surface to provide some grade control and additional information on S and As for the initial open-pit mining. There is reported good reconciliation between the grades and tonnages so far returned from the close spaced RC drilling and the blast hole samples in the top benches of the pit. More RC sample analyses were expected at the time of writing this report. As the mine proceeds, it is expected that the angled RC holes will not be required.

Blast hole grades and geological mapping from previously mined benches will be used as a guide to determine the likely position of ore blocks ahead of blast hole sampling on current benches.

A break down of the number of samples and number of analyses returned from each element is shown in Table 4-4. In the upper part of the pit (Stage 1), approximately one third of the samples that have been analysed for Au have also been analysed for As, S, Hg and Sb. In the lower part of the pit (Stage 2) approximately half of the samples that have been analysed for Au have also been analysed for As, S, Hg and Sb.

Table 4-4: Number of Samples by Source, Structural Zone and Element for the Stage 1 (Upper) and Stage 2 (Lower) Parts of the Proposed Open-pit

Samples by Source	Total	Stage 1 Pit	Stage 2 Pit
Adit Channel Sample	1,321	1,071	250
Diamond Drill Hole	2,240	863	1,377
Surface Trench	918	747	171
Total	**4,479**	**2,681**	**1,798**
Samples by Domain	**Total**	**Stage 1 Pit**	**Stage 2 Pit**
F2	262	256	6
F3	3,404	2,108	1,296
F20	127	85	42
F8	109	65	44
Rongban	577	167	410
Total	**4,479**	**2,681**	**1,798**
Samples by Element	**Total**	**Stage 1 Pit**	**Stage 2 Pit**
Gold (Au)	4,479	2,681	1,798
Sulphur (S)	1,695	857	838
Arsenic (As)	1,771	870	901
Mercury (Hg)	1,695	857	838
Antimony (Sb)	1,695	857	838

4.4.5 *Blast Hole Sampling*

Blast holes drilled vertically into the open-pit are done on a 5m (along strike) by 4m (across strike) staggered array. Over the area where the main zone of mineralisation is expected, the future blast hole drilling will be closed to a staggered array of 2.5m across strike by 4m along strike for the purposes of gaining a closer spaced samples of the mineralised domains.

Blast holes are drilled and blasted to 5m vertical depth within the ore domains in preparation for expected 2.5m mining benches. Sampling of the blast hole material for analysis of gold, sulphur, arsenic, mercury and antimony is done using a hollow stainless steel tube by taking a section through the blast hole fragment pile (cone) deposited on the floor of the pit by the blast hole rig. The tube is pushed into the pile and extracted with the sample in the tube. This is done a number of times in different locations around the circumference of the pile to obtain a sample of the blast hole material for that blast hole. The sample is analysed for Au, S, As, Hg and Sb and the results used for determining the mine block Au, As and S grades, assigning ore categories and to assist identifying the limit of the mineralised domain.

4.5 Ore Categories

For grade control purposes, ore categories are assigned and marked up in the open cut mine for the mineralised domain ahead of digging. Ore block limits and categories are determined by:

- Ordinary Kriging of the blast hole sample assays for Au, As, S, Hg, Sb
- Blocks that are less than 1.5g/t Au are expected to be mined as waste
- Blocks that are above the 1.5g/t Au cut off but contain As greater than acceptable limit of 5,000ppm are expected to be mined as waste, or may be sent to a high As stockpile for possible later blending with low As material. The As levels must be maintained below acceptable limits defined by the processing technique to optimise oxidation of the sulphide and liberate the gold (see section 7: Metallurgical and Processing Assessment)
- Blocks that are above the 1.5g/t Au cut off but contain low sulphur (S less than 1.5%) are expected to be stockpiled for possible later blending with high sulphur material. The sulphur grades must be maintained within limits defined by the processing techniques, which aim to oxidise the sulphides to liberate the gold (see section 7: Metallurgical and Processing Assessment)
- Blocks that are above the 1.5g/t cut off but contain high sulphur (S greater than 2.25%) are expected to be stockpiled for possible later blending with low sulphur material.
- For blocks that are within processing specification for As (As less than 5,000ppm), and S (S between 1.5% and 2.25%), there are three ore categories expected to be assigned, being "Low Grade" (Au 1.5 to 3g/t), "Normal Grade" (Au 3g/t to 8g/t) and "High Grade" (greater than 8g/t Au).

A summary of the ore categories is shown in Table 4-5.

Table 4-5: Ore Categories Defined from Blast Hole Samples following the Procedure Outlined above

	Au		S		As		Sb	Hg
Ore Category	Low Limit ppm	Upper Limit ppm	Low Limit %	Upper Limit %	Low Limit ppm	Upper Limit ppm	ppm	ppm
Low Gold	1.5	3	1.5	2.25	0	5,000	<500	<450
Normal	3	8	1.5	2.25	0	5,000	<500	<450
High Gold	8	>8	1.5	2.25	0	5,000	<500	<450
Low Sulphur	1.5	>1.5	0	1.5	0	5,000	<500	<450
High Sulphur	1.5	>1.5	2.25	>2.25	0	5,000	<500	<450
High Arsenic	1.5	>1.5	1.5	2.25	5,000	>5,000	>500	>450

4.6 Resource Estimation

A Resource estimate of the Jinfeng deposit has been made using drill hole, underground adit, underground drill hole and surface trenching results. A break down of the February 2006 Resource estimate is shown in Table 4-6. The Resource is made in accordance with the JORC Code.

Table 4-6: Resource Estimation as at February 2006 using a 2.0g/t Au Block Cut off Grade

Category	Tonnes	Gold Grade	Contained Gold
	('000)	*(g/t)*	*('000 oz)*
Measured Resource	13,420	5.3	2,287
Indicated Resource	7,766	4.1	1,029
Total of Measured and Indicated	**21,186**	**4.9**	**3,316**
Inferred Resource	4,144	5.4	722
Total of Measured, Indicated and Inferred	**25,330**	**5.0**	**4,038**

Since 2001 when Sino took control of the project, Mineral Resources have been increased by exploration as shown in Figure 4-5.

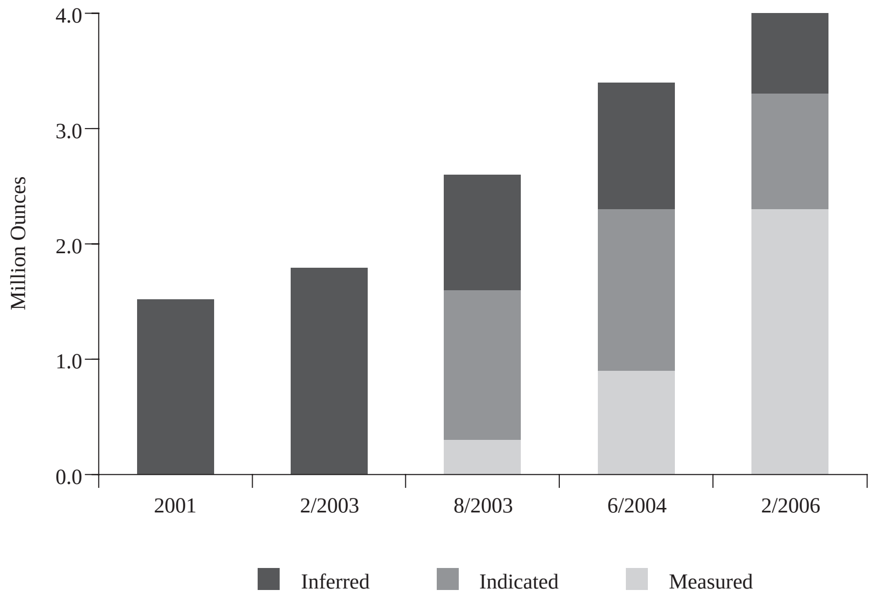

Figure 4-5: Increase in Mineral Resource Estimates from 2001 to February 2006

4.7 Jinfeng Mine Lease Exploration Potential

Exploration at Jinfeng is targeting the continuation of the deposit at depth to extend the known underground Resource down-dip and down-plunge at the intersection of the F3 with the F7, which plunges east-south-east. Deep drill holes are completed with Boart Longyear LF90 drill rigs (2) and employ "Navidrill" directional drilling expertise. It is expected that approximately 36 drill holes will be completed in 2007, with each of these hole having total depths of 850 to 900m.

Best results from the deep drilling program are shown in Table 4-7. Results from hole HDDS151 demonstrate the shoots of deeper mineralisation are open to the east from section 2080E, where this hole was drilled.

In SRK's opinion, the continuing deep drilling program at Jinfeng is well constrained by the geological models and is optimised to incrementally increase the Resource in the deeper parts of the underground deposit. Additional drilling in the Rongban area aims to extend the deposit to the north-west and at depth. Gold mineralisation at Rongban is concentrating of extending the mineralisation hosted by narrow faults in this area. It is expected that exploration at Rongban will be finished during 2006.

The results in Table 4-7 have been released since March 2005 when the deep exploration program commenced. Intersections are calculated using a 1 g/t Au cut off. Blending of high sulphur and high arsenic material may be required before processing.

Table 4-7: Deep Exploration Diamond Drill Core Sample Results

Hole	Width down hole *(m)*	Au *(g/t)*	S *(%)*	As *(ppm)*	From *(m)*
HDDS103	5.0	4.0	3.3	3,430	526
and	3.0	9.2	2.8	9,422	567
HDDS103A	2.0	7.4	2.9	2,235	516
and	5.0	6.0	3.0	10,036	522
HDDS126	47.0	11.6	2.4	2,426	678
HDDS131	29.0	6.8	2.6	4,715	605
HDDS133	12.0	7.7	2.8	6,251	705
HDDS139	7.0	3.3	2.2	1,925	611
and	9.0	4.0	3.8	1,444	694
HDDS139A	4.0	2.4	1.7	2,514	637
HDDS139B	4.0	1.5	2.6	1,738	646
and	31.0	4.8	2.6	5,067	693
and	5.0	3.0	1.5	1,523	736
HDDS139C	3.0	1.8	2.4	2,327	707
and	2.0	8.8	2.9	2,774	723
and	3.0	2.7	2.0	2,197	742
HDDS143	13.0	1.9	1.1	2,174	407.4
HDDS145	4.0	6.1	2.4	1,343	466
and	10.0	4.7	2.5	12,226	482
HDDS150	4.0	1.6	2.3	1,879	417
and	2.0	2.4	2.0	2,703	440
and	8.0	3.3	2.1	1,912	461
HDDS151	7.0	8.2	2.3	1,441	597
HDDS153	26.0	3.4	2.4	3,718	696
and	7.0	8.2	3.2	6,760	727
Weighted Averages		**6.1**	**2.5**	**3,934**	

5. GEOTECHNICAL ENGINEERING

The geotechnical conditions at Jinfeng Mine were assessed by SRK over a three day period between 14 October and 16 October 2006.

Geotechnical observations and opinions that are given in this report are based on a review of available information and onsite discussions with Messrs John Chen, Ross Jenkins, Joe Skrypniuk and Feng Jun Bo. Information that was made available to SRK and reviewed for the purposes of this report are documented in the references section.

At the time of the SRK site visit the mine development/operations status, as applicable to geotechnical issues, was as outlined below:

- **Open-pit:** Excavation commenced to a level of approximately 720m. The maximum pit wall height was about 30m. All slopes in weathered material. No production at time of visit.
- **Underground Operation:** No mining. Design available and Sino anticipated commencement of decline within about a month. Site investigation in progress for shafts.
- **Plant Area:** Earthworks and foundations completed. Superstructure under construction. Completion expected in about January to February 2007.
- **Office and Accommodation:** Earthworks and foundations completed. Superstructure under construction. Completion expected within about one month.
- **Access Roads:** Formed and being maintained.
- **Tailings Delivery and Water Return Pipelines:** Under construction.
- **Tailings Storage Embankments (CIL and Float):** Under construction, but behind schedule due to heavy rainfall and flood damage. Sino anticipate facilities to be operational in February 2007.
- **Water Diversion Tunnels:** Completed.

5.1 Overview of Geotechnical Conditions

5.1.1 *Topography and Hydrology*

The topography of the region has two distinct styles that are influenced by the underlying geology. The Jinfeng mine area is located on the watershed between the Beipan River to the east and the Luofan River to the west.

To the west of Jinfeng mine, where the lithology is predominately Permian karstic limestone, the topography is rugged and has features that are typical of Karst. The range of elevation is from approximately 350mRL to nearly 1,150mRL. Sinkholes are common and are commonly very large. Surface water is somewhat intermittent within this terrain, with many water courses flowing in cave systems below surface. During the wet season, according to Sino site personnel, very large flows can develop in subterranean river systems.

Golder (2003) has formed the opinion that this will not have a direct impact on the mine-site, although it is an issue for the access road to the mine and possibly for the future location of infrastructure.

The topography at the Jinfeng mine site is not as rugged as it is within areas underlain by Karst. There are, however, substantial topographic variations from about 400mRL to 760mRL with natural slopes ranging from 20 to 35°. The Jinfeng mine area is underlain by Triassic sandstones, siltstones and mudstones. The amount of surface water in creek beds is normally limited unless heavy rain occurs. Most rainfall is likely to be shed to the major rivers in a very short period of time. However, the water supply for local rice terraces appears to be perennial.

Golder (2003) have noted that "A review of the local literature and observations at the mine site indicate very few natural landslides within the Triassic Lithologies. Those that do occur are usually associated with areas of artificial over-steepening such as road cuttings and are limited to a maximum height of perhaps 50m. They appear to be mostly bedding or fault plane related and most likely occurred during heavy rain."

At the time of the SRK site visit evidence of natural slope instabilities was observed at a number of locations. The scale of these instabilities is not known. During the site visit SRK observed that slope failures and areas of instability associated with road cuttings were common. SRK note that the rugged topography and numerous cuttings that are required for the development and operation of Jinfeng presents a risk. SRK are of the view that this risk can be properly managed by identifying areas most susceptible and implementing appropriate procedures and/or engineering works. Proper management of storm water is also important. During discussions with on-site personnel SRK formed the opinion that Sino has a good appreciation of the risks associated with natural slope failure.

5.1.2 *Geology*

A schematic section through the Huangchanggou prospect, as interpreted by the Sino Jinfeng Geology Department, is given in Figure 4-3. From this figure it can be seen that the geology of the Huangchanggou prospect is highly folded and faulted.

The interpreted local Jinfeng stratigraphy (Lannigou Middle Triassic) that is expected to be intersected by the mining operations is summarised in Table 5-1.

Table 5-1: Lannigou Middle Triassic Local Stratigraphy (after Sino Gold, 2006)

Formation Name	Member	Thickness	Map Code	Description
Bianyang		>270m	T_{2by}	Dominated by thick to medium thick, minor massive bedded fine-grained quartz sandstone, siltstone and wacke interbedded with mudstone and claystone. Clastic components are dominated by quartz grains with minor feldspar, anatase and rutile. Matrix minerals include clay, carbonate and silica. Host sequence for economic Au mineralisation.
Nilou		10 to 50m	T_{2nl}	Considered a local marker horizon. Grey to dark grey thin bedded claystone to mudstone containing abundant bivalve and plant fragment fossils. Interbedded with limestone and muddy limestone to 10m thick. Can host Au mineralisation with favourable structure.
Xuman	Unit 4 Subunit 4	30 to 110m	${T_{2xm}}^{4-4}$	Light grey to grey thick to massive fine sandstone, siltstone and muddy siltstone. Common claystone interbeds. Coarse cubic to aggregated fine-grained diagenetic pyrite common. May host Au mineralisation.
	Unit 4 Subunit 3	50 to 210m	${T_{2xm}}^{4-3}$	Mudstone with fine siltstone interbeds. May host Au mineralisation with favourable structure.

The structural evolution of the Lannigou area is reported, by Sino, to have involved four stages of stress orientation from north-south, to east-west, to northeast-southwest and then northwest-southeast. The interaction of these stress orientations has resulted in the formation of the Laizhishan Dome short axial anticline, the Banchang Thrust and a series of steeply dipping reverse faults.

The main fault orientations in the Lannigou area are northwest-southeast, northeast-southwest and north-south. The northwest-southeast faults include the F3 fault which is the main mineralised zone of the Huangchanggou prospect. Dips are generally steep (65 to 85°) to the north-east but the F3 structure is overturned and dips steeply to the southwest in its upper portions but changes dip to a consistent steep north-east dip below approximately 600mRL. Structures in this orientation have been described as reverse faults with a dextral strike-slip component as a result of northeast to southwest oriented compression.

The north-south oriented structures are also compressive reverse faults. The F1fault has a shallow to moderate dip to the west and forms a boundary between the Permian carbonaceous sediments to the west and Middle Triassic clastic sediments to the east. The F7 and F9 faults have moderate to steep dips to the east (45 to 70°).

5.1.3 *Rock Mass*

Golder (2003) has made an evaluation of rock mass characteristics for the purposes of surface and underground mine design.

Sino has a geological database that includes measured discontinuities, a description of discontinuity characteristics, and other rock properties including Rock Quality Designation (RQD). A summary of the measured RQD by rock types and stratigraphy within the FW and HW, that was extracted from the Sino database is given in Table 5-2.

Table 5-2: RQD Summary by Stratigraphy for FW and HW (SRK, 2006)

	FW		HW	
Formation	**% of Rock**	**Average RQD**	**% of Rock**	**Average RQD**
T2by	49%	62%	91%	42%
T2nl	6%	64%	5%	30%
T2xm4-3	22%	52%	2%	23%
T2xm4-4	23%	49%	2%	42%

The structure of the Sino Jinfeng Geology Department database, and the type of information that has been recorded, does not allow ready application of rock mass classification systems to the data. However, by consideration of the available information an *estimate* of the rock mass quality value (Q) has been made as summarised in Table 5-3. Figure 5-1 shows that the FW rocks as a whole are, on the basis of the available information, likely to be more competent and require less support.

Table 5-3: Interpreted Rock Mass Quality Value in FW and HW (SRK, 2006)

Parameter	FW	HW	Comment
RQD	55	24	Average RQD for area used
Jn	9	12	—
Jr	2	1.5	—
Ja	2	2	—
Jw	0.66	0.66	—
SRF	2.5	2.5	—
Equivalent Dimension D^e	2.7	2.7	Assumes a ESR of 1.8 and height of 5m
Q	1.6	0.4	—
Description	Poor	Very Poor	—

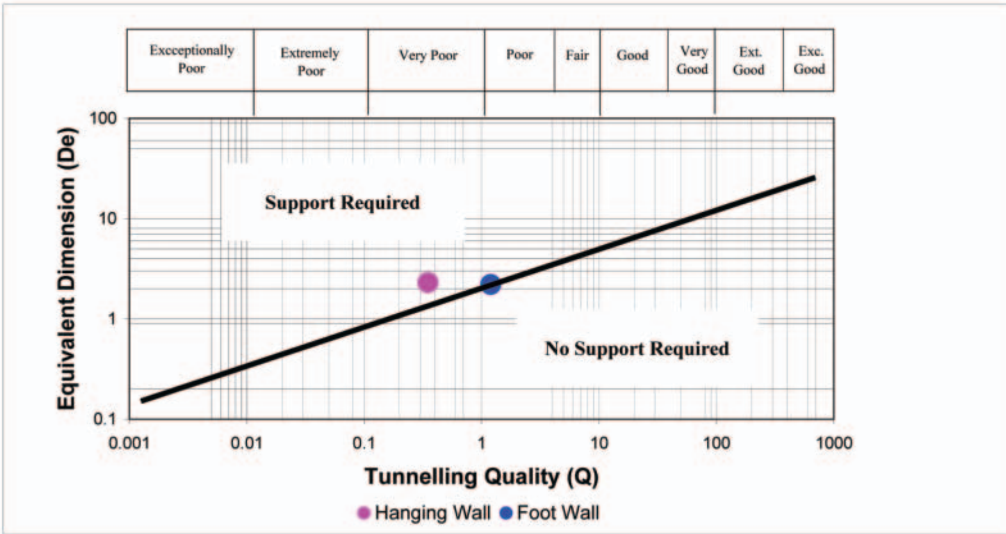

Figure 5-1: Possible FW and HW Support Requirements (SRK, 2006)

According to Golder (2003) the Modified Stability Number (N') range across the Jinfeng deposit is generally from 1 to 3. These values suggest that very limited unsupported spans will be possible during stoping operations.

5.1.4 *Seismicity and In-situ Stress*

The Guizhou Metallurgical Design and Research Institute (2005) state that the site falls within the "6° Seismic Zone" and in accordance with the Seismicity Code the site is categorised as "Class 1". As such, their design allows for earthquake-induced accelerations of 0.05g.

Golder (2003) comment that the "earthquake activity recorded in the area is low and infrequent, although it does occur". They adopted an acceleration of 0.1g for the purpose of the analysis for open-pit design.

Golder (2003) noted that there were no site specific in-situ stress measurements and estimated stress characteristics from available literature. They also recommended that site specific testing was carried out.

SRK consider that to reduce the risks associated with underground mining it is appropriate to establish the in-situ stress regime by site specific testing. SRK did not sight any evidence of in-situ stress testing, and it was understood from site personnel that in-situ stress testing has not yet been carried out, but is planned to be completed in the future.

5.1.5 *Groundwater*

The 117 Team of Guizhou Metallurgical Design and Research Institute (MGMR) has made an assessment of groundwater conditions at Jinfeng. This was done in 1993. MGMR make the observation that the static groundwater level typically occurs at between 3 and 23m below ground level, and that the piezometric surface mirrors the topography. Golder (2003) based their mine design recommendations on the observations and interpretations made by MGMR.

Two main regional aquifers have been identified, namely:

- Carboniferous Permian carbonate rock aquifer, and

- Triassic clastic rock aquifer.

In addition to the aquifers identified above, a series of faults were identified. It has been assumed that these will act as aquifers.

At Jinfeng the open-pit and underground mining is to be within the Triassic clastic rock unit. This sequence is made up of inter-bedded sandstone, siltstone and mudstone. The upper 5 to 10m of this unit is typically weathered and is inferred to be more permeable than the fresh rock. Golder was of the opinion that there was uncertainty as to whether the entire rock mass is saturated (i.e. groundwater pressure is greater than atmospheric everywhere below the water table) or if there are a number of perched groundwater lenses that only exist during and just following the wet winter months.

The most permeable aquifer sequence in the area is the Permian carbonate rock unit which is approximately 1km to the west of the boundary of the open-pit. Given the low permeability of the clastic rocks Golder is of the view that there is not expected to be any significant hydraulic connection to the open-pit or the underground operations.

On the basis of field observation and short term airlift recovery tests (done by MGMR) it has been interpreted that the rock mass (Triassic clastic rock unit) at Jinfeng has a hydraulic conductivity of less than 0.01m/day. To improve confidence in design Golder has recommended that further work was carried out to obtain a better understanding of the groundwater conditions and their potential impact on mining.

Golder have specifically identified that wall stability of the Jinfeng open-pit is expected to be sensitive to groundwater pressure, and that an understanding of the likely magnitude of groundwater pressure is essential to the design process. This information would be used to design wall depressurisation measures.

For the purposes of the underground mining operation, the selection of pumps has assumed that underground water will include:

- 182m^3/day): Underground water
- 660m^3/day: Water used during the ore production and mine development at 0.3m^3/tonne ore
- 780 m^3/d: Free backfill water (peak 1350m^3/d x 87% free x 2/3 released on the same day); and
- 4921 m^3/d: 20% of rainwater in the pit below RL580 in an once every 10 year event.

Daily water is 1622 m^3/d under normal conditions, and its maximum value is 6543 m^3/d. The design capacity under normal conditions is 85m^3/h, and maximum capacity is 340 m^3/h.

In the information that was reviewed by SRK there was no evidence of additional hydro-geological assessments having been done. Groundwater conditions (pore pressures and potential for inflows) are in SRK's opinion currently poorly understood, as identified by Golder. However, it is judged by SRK that the risks to the overall project as a result of this are low. This opinion is based on the observations that have been documented with regard to groundwater inflow in existing abandoned underground workings. Further hydro-geological investigation is considered to be required to properly evaluate the impact of groundwater and dewatering requirements in the underground operation.

From discussion with site personnel it is understood that it has been assumed that there will not be a requirement for the installation of horizontal drains in the pit wall. During the very early phases of open-pit formation this is likely to be a valid assumption. However, as the pit becomes larger, SRK anticipates that there may be a requirement for the installation of weepholes and horizontal drains to maintain pit wall stability. SRK is of the opinion that it is important for additional hydro-geological information to be obtained. This would include a requirement for long term groundwater monitoring. The monitoring program should be designed to provide information for both the surface and underground operation. It is appropriate to implement a groundwater monitoring program during the early phases of mining.

5.2 Open-pit

At the time of the SRK site visit, excavation within the open-pit had commenced (Figure 5-2) and the floor level was at an elevation of about 720mRL, with interim pit walls of up to about 30m having been formed. Competent rock had not yet been exposed in the pit, and the mining fleet was not operating. At the time of the site visit there was ponded water on the pit floor from recent rainstorm events. No evidence of water seepage from the pit slopes was sighted.

Figure 5-2: Photograph Showing Open-pit as at 15 October 2006

5.2.1 *Background*

The mining schedule commences as an open-pit operation, with production rates designed to achieve a ramp up to match process feed requirements. Underground mining is scheduled to commence approximately 18 months after the open-pit start, and attains full production in Year 3. Excavation rates in the open-pit reduce from Year 5 onwards, as the strip ratios decrease.

To defer some of the waste stripping to later years, the open-pit has been designed in two stages. The first stage is designed to 520mRL, and the second stage extends to 450mRL. The first stage has slightly steeper wall angles and lower wall heights, apart from the south wall.

Bench heights in the final pit will be 20m, with mining of waste planned at 10m. Ore will be mined using 5m operating bench heights, with 2.5m flitches to optimise ore extraction.

Within the pit, the haul road width varies from 20m for most of its length to 14m near the bottom of the pit, with a nominal 10% gradient. Haul road widths outside the pit are 20m wide. The external haul road enters the open-pit mining area at 580mRL and reaches its highest at the top of a ridge at 730mRL.

5.2.2 *Open-pit Design*

Golder (2003) was commissioned by Sino to provide geotechnical recommendations for the design of the open-pit. The work that Golder did took into account the results of the MGMR work and included geotechnical site investigation (limited drilling, surface mapping, and underground mapping in old mine workings to compliment the work done by MGMR). Golder formed the opinions that:

- Most of the identified mechanisms of likely wall failure are controlled by geological structure. The actual potential and extent of possible failures will be strongly dependent on the persistence of the structural features. The available structural data suggests that bedding and faults F2 and F3 will be the dominant and most persistent structural features. Unfavourably oriented bedding and faults surfaces were therefore interpreted to have the potential to produce wall scale instability

- There will be a need for good management of surface water flows during times of seasonal high rainfall to ensure that water flow into the slopes is minimised

- The highest walls in the proposed pit will be the west and east walls as they represent the continuation of the approximately east-west oriented ridge line.

Key issues that have potential to impact on pit wall stability, as identified by Golder, included the:

- Accuracy of the current Sino geological model, in particular the interpretations of bedding plane dips, the location and geometry of the interpreted folds, and the location and extent of the major fault structures

- Interpreted shear strength of the major structural features

- Variability of the topography which causes great variability of wall height and hence the normal stress across any potential failure plane

- Likelihood that groundwater pressures will occur and be sustained within the walls as a result of the low permeability of the rock mass. Further studies are required to assess this further — the design recommendations given below are based on the assumption that fully depressurized conditions will be achieved

- Fact that the stress regime is low and unlikely to be able to provide significant constraint to the walls. The quality of blasting needs therefore to be good

Golder has assessed the potential pit wall failure mechanisms and their scale within four Sectors of the planned open-pit. A summary of the results of this assessment is given in Table 5-4.

Table 5-4: Summary of Interpreted Wall Instability Mechanisms

Wall	Mechanism of Instability	Likely Scale
South	Planar Sliding — bedding	Overall wall and multi-batter
	Wedge	Batter scale
West	Planar — joints and faults	Batter scale
	Wedge	Batter scale
North	Toppling — controlled by bedding	Overall wall and multi-batter scale
	Planar — controlled by bedding	Batter scale where bedding dips out of the pit wall
East	Wedge	Batter scale

The overall wall angles recommended by Golder are summarised in Table 5-5.

Table 5-5: Summary of Wall Slope Angles as Recommended by Golder

Position in the Pit	Recommend Wall Angle	Preliminary Design Angle
South Wall	21° to 48°	38°
West Wall	45°	34°
North Wall — Stage 1	50°	45°
— Stage 2	45°	50°
East Wall	45°	36 to 38°

Matrix Consulting (2004) considers that the open-pit slopes will be influenced by low material strengths in clay and mudstone sequences, and that bedding planes form the main planes of weakness. In their assessment they consider that the south wall may be susceptible to sliding failures and the north wall may be susceptible to toppling failure. Matrix Consulting note that pit wall stability elsewhere will be dependent on the orientation of bedding relative to the more prominent faults and joints and make an important observation that joint persistence is typically less than 10m as inferred from field mapping. According to Matrix (2004) local groundwater conditions can be expected to increase the potential for localised failure where aquifers are confined and exert pressures greater than atmospheric pressure upon wall faces. To limit the risk of large scale pit wall instability, the pit wall was apparently designed for inter-ramp and overall wall slopes as described below:

- South wall faces developed parallel to bedding, with wall dips in the range of 21 to 48°
- West wall angles limited to a maximum overall slope of 45°
- North wall angles limited to a maximum of 50° in the first stage of the open-pit, followed by a maximum slope of 45° in the second stage, and
- East wall angles limited to a maximum of 45°

A schematic typical section through the pit, as envisaged by Matrix Consulting, is shown in Figure 5-3.

Figure 5-3: Schematic Section Through Open-pit (Matrix Consulting, 2004)

During the site visit SRK was provided with a three dimensional (3D) model showing the current design pit shell. An isometric view of the design pit shell, showing current topography, is presented in Figure 5-4. Typical pit design parameters, as measured from the Sino 3D model, are given in Table 5-6.

SRK notes that, on the whole, the design pit shell is consistent with the consultant geotechnical design recommendations. The open-pit design has been prepared with the input from reputable and experienced specialist geotechnical consultants. From discussions with Sino site personnel SRK understands that Sino anticipates further and ongoing specialist input, and that this has been allowed for in the budget.

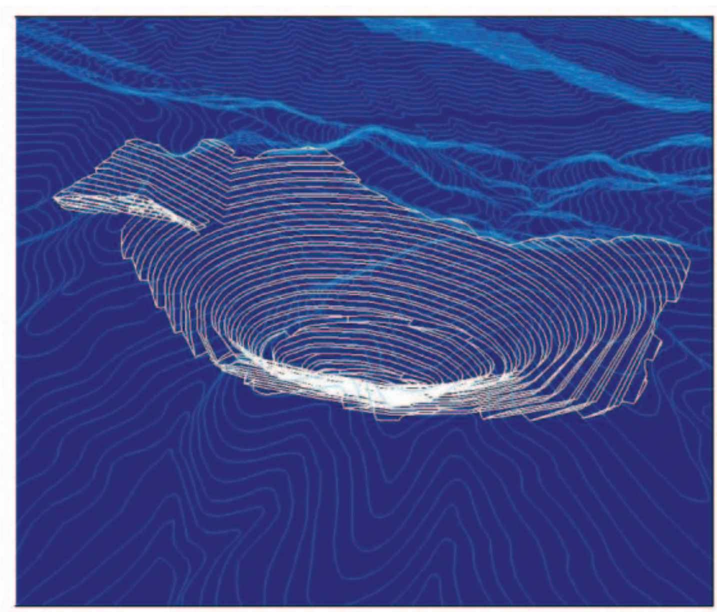

Figure 5-4: Isometric View of Open-pit Shell to North East (Sino Gold. 2006)

Table 5-6: Measured Open-pit Design Parameters

Consideration	Observation
Maximum Crest Level	750m (in ESE Sector)
Floor Level	430m
Maximum Overall Pit Wall Height	320m (in ESE Sector)
Ramp	Spiral, entry in West at Level 580m
Ramp Width	17m (above level 480m), 10m (below level 480m)
Average Ramp Grade	1:10.46
Overall Pit Wall Angle	41.6° to 43.8°
Upper Pit Wall Angle	35° in South Sector above ramp, 45° to 46° in other Sectors above ramp
Lower Pit Wall Angle	56° for 80m high bench stack below ramp in South Sector 48° for 60m high bench stack below ramp in North Sector
Bench Height	20m
Bench Angle	Approximately 65°
Berm Width	Typically 8m to 11m, but 20m in South Pit Sector

5.3 Underground Mine

At the time of the SRK site visit, underground mining operations were not yet in progress. It is, however, understood that development of the underground mining operation is scheduled to commence in November 2006 (start of main decline construction). Site investigation at the site of the proposed East Vent Raise was in progress at the time of the SRK site visit.

5.3.1 *Background*

According to Matrix Consulting (2004) the underground mine plan allows for 443 stopes, with an average production capacity of 150 tonnes per day per heading, including backfill time. Stopes are progressively backfilled upon completion of mining, with some stopes backfilled immediately where the mining sequence and alignment allow this to occur.

A number of mining methods are employed, depending on the stope width and the direction of mining. Mining of a 100m long ore drive is expected to take between 17 and 20 shifts, for overhand cut-and-fill stopes, and up to 44 shifts for underhand cut-and-fill. A backfill cycle may take around 14 shifts.

The targeting of the orebody in underground mining, and the use of a variety of underground mining methods, results in a relatively constant production rate from the underground mining activity once it is established.

5.3.2 *Design*

Sino has designed the underground mining operation taking the geotechnical recommendations given by Golder (2003) and other specialist consultants (for example SRK, 2006) into account. A 3D model showing the planned underground mine layout has been made available to SRK. Figure 5-5 shows an isometric view of the planned underground mining operation.

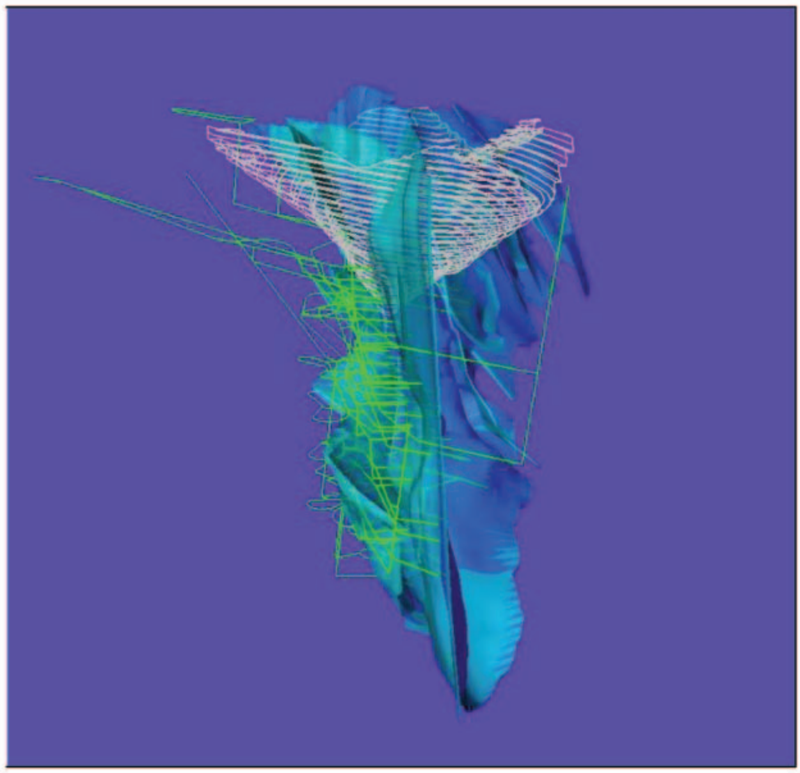

Figure 5-5: Isometric View Showing Underground Mine Layout (Sino Gold, 2006)

The design layout shown in Figure 5-5 has given consideration to the various consultant recommendations.

Portal

The portal for the main decline is located at RL560 in the southwest of the FW of the orebodies. The portal is located outside the 200m fly-rock zone for the open-pit. Figure 5-6 shows the main decline portal area. At the time that the portal location was visited no indications of instability on the hill slope were observed.

Figure 5-6: Photograph Showing Main Decline Portal Area, 15 October 2006

Sino has indicated that the location of the portal is such that they do not expect constraints to road traffic.

Detailed portal design information was not sighted by SRK. However, from discussions with site personnel, it is understood that Sino are expecting to provide reinforcement to the portal area. This is likely to include rock bolts and shotcrete/fibrecrete.

Decline

At the time of the site visit SRK were advised that geotechnical conditions were being assessed using purpose drilled sub-vertical boreholes equally spaced along the design alignment. The results of the investigation were not yet available.

The main decline is straight from surface to approximately 520mRL, followed by a zig-zag decline to the bottom of the mine, currently designed at 50mRL. The decline has the following design parameters:

- Cross section 5.0m wide x 5.2m high for straights, 5.6m wide x 5.2m high for curves
- Gradient of 1 in 7 for straights and curves
- Centerline radius of 25m on curves

- Level access at 20m intervals
- First 15m of decline with a gradient of 1 in 25 up to prevent storm water from entering the decline

From the available information it is understood that the design cross section of the decline (Figure 5-7) has been based on the relevant Chinese Mine Regulations, including requirements for ventilation and a 1.2m wide walkway for pedestrians. The main decline is designed to be three-element arch shape and this can be modified to suit ground conditions if required.

Standard ground support for the decline is shown in Figure 5-8. The design has anticipated that standard ground support will be as follows:

- **First pass:** Splitsets and mesh for temporary support. Hole depth is 3m, but 2m long splitsets will be installed initially. Spacing is 1.1m x 1.2m.
- **Second pass:** 3m long cement grouted rock bolts installed inside the splitsets. The grouted rockbolts will be installed manually at a distance from the decline face to avoid disruption of other decline development activities.

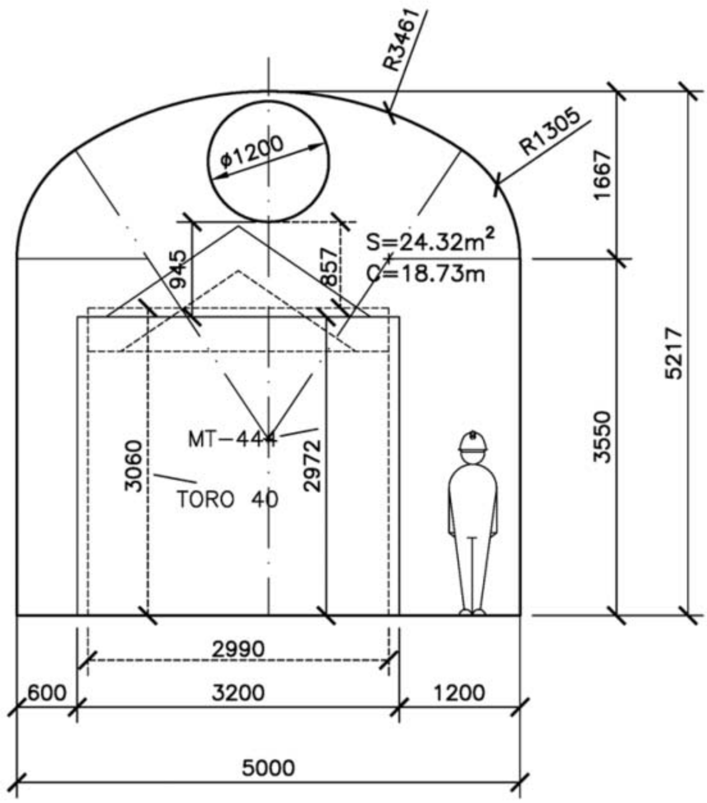

Figure 5-7: Main Decline Cross Section (Sino-NERIN, 2004)

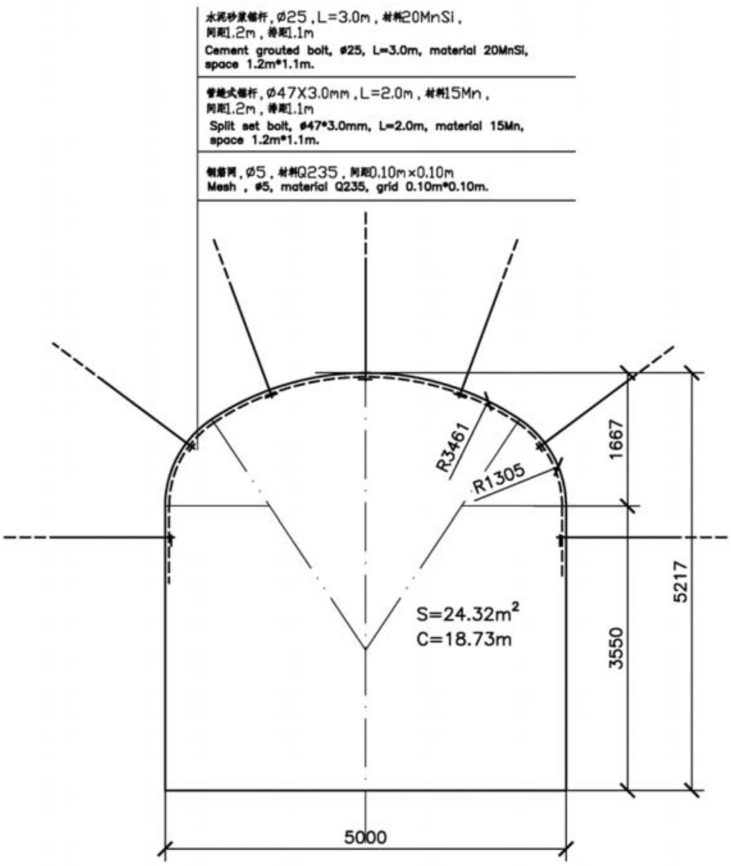

Figure 5-8: Main Decline Support (Sino-NERIN, 2004)

On the basis of available information SRK judge that the design underground standard support is within the expected range for the anticipated conditions. There is also scope to modify the support to suit ground conditions.

AMC Resource Consultants Pty Ltd (AMC) (2004) has made an assessment of the support requirements for the Jinfeng underground operation. A summary of their recommendations is given in Table 5-7. From this table it can be seen that AMC anticipate a need for shotcrete in the upper levels of the decline and also where the decline passes through fault zones. SRK considers this recommendation to be appropriate.

Table 5-7: AMC Support Recommendations (2004)

Excavation	Span (width x height) — Metres	ESR	Bolt length (end anchored) — Effective length range	Rock Surface Support
Decline — 520-450 RL	5 x 5.2	1.6	(1.7) 2–2.4m	Mesh, rock bolt (e.g. Splitsets) spaced 1m apart, 75-100mm layer shotcrete
Decline — Below RL 450	5 x 5.2	1.6	(1.7) 2–2.4m	Mesh, rock bolt (e.g. Splitset) spaced 1m-1.5m apart, in fault breccia zones refer to 520-450 RL shotcrete requirements
Truck FW drive West & East — 520-450 RL	5 x 5.2	1.6	(1.7) 2–2.4m	Mesh, rock bolt (e.g. Swellex or grouted end anchored rebar) spaced 1m — 1.5m apart, 50-100mm layer shotcrete
Crosscuts — FW — RL 520-450	4 x 4.5	1.6	(1.6) 2–2.4m	Mesh, rock bolt (e.g. Swellex or grouted end anchored rebar) spaced 1m apart, 100mm layer shotcrete
Crosscuts — FW — RL 520-450 Shear Zone	4 x 4.5	1.6	(1.6) 2.4–3m	Mesh, rock bolt (e.g. Swellex or grouted end anchored rebar) spaced 1m apart, 100mm layer shotcrete
Crosscuts — FW — below RL 450	4 x 4.5	1.6	(1.6) 2–2.4m	Mesh, rock bolt (e.g. Splitsets), spaced 1m apart
Crosscuts — FW — Below RL 450 Shear Zone	4 x 4.5	1.6	(1.6) 3m	Mesh, rock bolt (e.g. Swellex or grouted end anchored rebar), spaced 1m apart, 50-100mm layer shotcrete
Ore Drifts — RL 520-450 Shear Zone	4 x 4.5	1.6	(1.6) 3m	Mesh, rock bolt (e.g. Swellex or grouted end anchored rebar), spaced 1m apart, 100mm layer shotcrete
Ore Drifts — Below RL 450 Shear Zone	4 x 4.5	1.6	(1.6) 3m	Mesh, rock bolt (e.g. Swellex or grouted end anchored rebar), spaced 1m apart, 50-100mm layer shotcrete
Decline Crosscut Intersections RL 520-450	5.7-6 x 5.2	1.6	(1.8) 2.4–3m	Mesh, rock bolt (e.g. Swellex or grouted end anchored rebar), spaced 1m apart, 100mm layer shotcrete
Decline Crosscut Intersections Below RL 450	5.7-6 x 5.2	1.6	(1.8) 2.4–3m	Mesh, rock bolt (e.g. Swellex or grouted end anchored rebar), spaced 1m apart, 50-100mm layer shotcrete
HW Cable Support Drive	3.5x4.5	2	(1.3) 1.8–2.4m	Mesh, rock bolt (e.g. Splitsets), spaced 1.5m apart. Stope HW support: single strand bulb, 10-12m long, spaced 2.5m apart along dip and strike

Shafts and Raises

According to Golder (2003) there is no precedent for shaft sinking at Jinfeng to provide a basis for design guidelines. They were therefore of the opinion that drilling of pilot holes at shaft locations was important. This opinion was supported by AMC (2004). At the time of the SRK site visit a drill rig was established at the East Vent Raise location, and drilling was in progress to determine geotechnical conditions at the selected location. Results of drilling were not available, but it is understood that the drill hole had intersected a significant fault zone at a depth of about 50m below ground level.

The feasibility design has allowed for four individual vertical ventilation shafts. Typical design details for ventilation shafts are shown in Figure 5-9.

From discussion with site personnel it is understood that all the shafts and long raises will be installed by contractors, using a blind shaft sinking method. SRK is of the opinion that using specialist contractors and proving geotechnical conditions prior to construction will reduce the risks associated with shaft and raise formation.

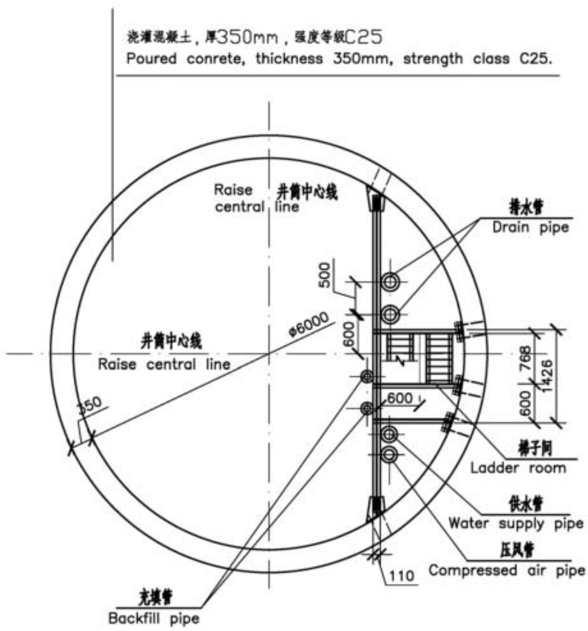

Figure 5-9: Plan View Showing Shaft Design Section (Sino-NERIN, 2004)

Access Development

Access development will be approximately north south (i.e. normal to the ore body, but not necessarily cross-cutting many of the major structural elements). Golder (2003) has anticipated that reinforcement for a 5m wide north trending cross-cut will need to adopt at least the same reinforcement as that for the decline.

The Sino-NERIN feasibility study (2004) indicates that:

- There will be a FW drive developed off the decline on each level and that typical length for a FW drive is approximately 600m

- On each level, the FW drive will be mined at 1:50 up from a sump at a location central to the orebodies
- Stopes will be accessed via crosscuts developed from the FW drives. The maximum gradient for an access crosscut is 1 in 7.
- Minimum crosscut length is 50m.
- There will be a crosscut every 100m along the orebody strike. It will pass through the entire sequence of the orebodies on that easting
- Crosscuts on adjacent levels will be offset to improve the flexibility of stope sequencing on the levels.

The features listed above are consistent with the Golder (2003) recommendation.

Stopes and Pillars

Sino has selected the mining method taking Golder (2003) geotechnical assessment into account. According to the feasibility study two forms of CAF mining methods have been selected. These are:

- Overhand CAF for a majority of the underground stopes (see Figure 5-10 and Figure 5-11), and
- Underhand CAF for stopes within the crown pillars for narrow ore bodies.

AMC (2004) notes that: "With respect to mining method selection, the Golder report made an attempt to provide a guideline by determining critical hydraulic radiuses. These however are indicative and more work is required to quantify and clarify the mining method selection.

There is potential for caving operation above the RL 450 line and a supported benching stoping method below this level from preliminary analysis. A cut and fill operation above and below 450 RL (i.e. rock mass condition seem to worsen towards the east) is also possible. However a risk analysis on the clay content within the rockmass must be conducted and could add risk to the caving operation.

In areas of very poor ground conditions, the selection of a cut/drift and fill method seems reasonable, however AMC has some concerns about the cable bolt design and their effectiveness within the ore zone. Alternative rock support and reinforcement methods could be sourced to accommodate or overcome practical mining and logistical problems foreseen with this recommendation. In addition to this, the option of leaving pillars intact should be seriously considered until such time more detailed information with regard to intact rock strength and apparent stress conditions are obtained.

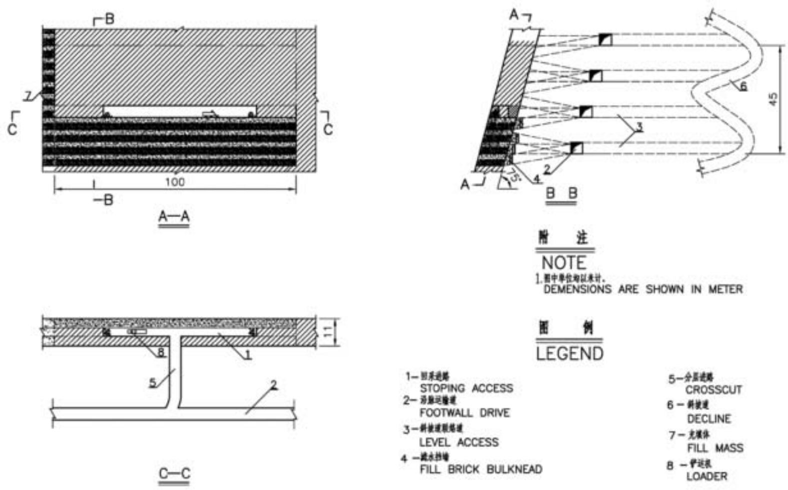

Figure 5-10: Longitudinal CAF Mining Method (Sino-NERIN, 2004)

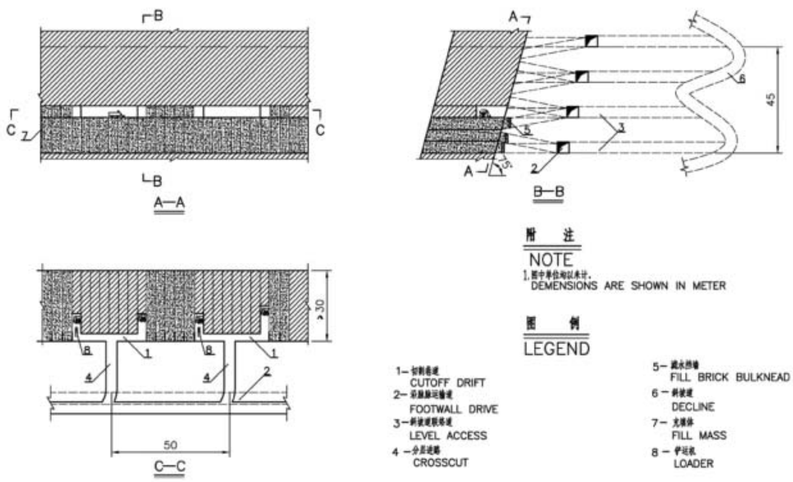

Figure 5-11: Transverse CAF Mining Method (Sino-NERIN, 2004)

Standard stope dimensions for the overhand CAF, used for the design and cost estimate (Sino-NERIN, 2004), are summarised in Table 5-8.

Table 5-8: Standard Stope Dimensions

Parameter	Longitudinal CAF	Transverse CAF
Height	5m	5m
Length	2 x 50m*	30m
Width	4m	5m

* For longitudinal CAF, stope length is typically 100m with a central access crosscut supported by cable bolts in the back.

AMC (2004) state that in their opinion the Q value for the FW rock mass should be about 1.69 and not 3 as quoted by Golder (2003), and that this reduces the stability number from 1.89 to 0.57. This implies that, in terms of stope design, the hydraulic radius should have been 2.5 with strike and dip spans limited to 10m whilst the calculated value given in the Golder (2003) report indicates a hydraulic radius of 2.05 and strike and dip span limited to 8m. However AMC (2004) consider that the discrepancy is not that serious provided that the Q' values actually are as low as currently indicated for most of the rockmass for the Jinfeng project.

SRK is of the opinion that the selected mining methods and design are appropriate for the interpreted geotechnical conditions, and that there will be scope to modify them during the mining phase to take account of actual conditions. This is normal practice.

5.3.3 *Main Access to Site*

The main access road to the site and plant has been constructed as a "Class 4" road by Provincial Government. From discussions on site, SRK understands that Provincial Government will also have responsibility for maintaining this road.

In order to form the main access road there has been a requirement to construct substantial cut and fill embankments. SRK is of the opinion that there will be a requirement to carry out substantial maintenance works over the life of the road to remediate slope failures. For example, the unstable cut slope shown in Figure 5-12.

Figure 5-12: Unstable Slope on Main Access Road to Plant, 15 October 2006

5.3.4 *Access to Tailings Storage Facilities*

An access road between the plant and Tailings Storage areas has been constructed by Sino during the development of the mine (Figure 5-13). This road is an all weather road with a gravel wearing course. It was formed on a steeply sloping hill side, and as such there are a number of steep cuts and fill embankments.

The tailings discharge and water return pipeline alignment follows the access road alignment. Pipes are located on the outside (i.e. down slope side) of the alignment and are located on steel supports that are founded at up to about 2m below ground level.

Figure 5-13: Access Road to Tailings Storage Areas, 15 October 2006

From discussion with site personnel it is understood that there have been a number of slope failures along the tailings access road. At the time of the SRK site visit a number of failures or incipient failures of slopes and embankment/retaining structures (for example Figure 5-14 and Figure 5-15) were observed. Access to the CIL Tailings Storage facility was not possible by vehicle due to debris on the road.

Figure 5-14: Recent Failure on Access Road to CIL Storage Facility, 15 October 2006

Figure 5-15: Incipient Failure of Retailing Structure on CIL Storage Facility Access Road, 15 October 2006

SRK considers that the access road to the tailings storage facilities will require considerable maintenance over the life of the mine. There is also considerable risk of loss of the road and tailings discharge/water return pipelines. This risk will require careful management, and it is considered important to carry out a geotechnical hazard survey to properly identify potential areas of instability and the risks associated with the areas identified. From discussions with site personnel it is understood that Sino are aware of the risks and are planning to conduct a hazard survey. Sino has also identified alternative emergency access routes.

5.4 Tailings Storage Facility

5.4.1 *Jinfeng TSF's Risk Level*

The final design embankment height for TFS's at Jinfeng is greater than 15m. According to the ICOLD classification, the Jinfeng TSF embankments are therefore considered to be large. For a TSF of greater than 15m in height the design is expected to require rigorous and technically based justification.

The Western Australian Department on Industry and Resources has developed a classification system for tailings storage facilities. Following this system, the Jinfeng TSF's are considered to be a Category 1 structure (see Table 5-9 and Table 5-10).

Design and operating requirements for Category 1 and 2 TSF's (as defined by the height/hazard rating matrix in Table 5-9 and Table 5-10) are similar, and the specific differences in supporting documentation, design approach, construction control, and operating procedures are differences in the level of detail. For a Category 1 TSF, considerably more detail is required.

Under the Western Australian Department on Industry and Resources requirements both Categories 1 and 2 require design documentation and construction input from suitably qualified and experienced geotechnical and engineering specialists. It is the responsibility of the geotechnical and/or engineering specialist involved in the design of Category 1 and 2 facilities to determine the level of geotechnical and other professional input appropriate to the specified rating of the site. This should include consideration of the most severe and unfavourable combination of static and dynamic loads, where appropriate.

Construction of Category 1 and 2 facilities should be performed under the supervision of a suitably qualified geotechnical or engineering specialist. The specialist should produce an as-constructed report to confirm that the construction met the design intent. During operation, a geotechnical or engineering specialist should audit and review Category 1 and 2 facilities on a yearly and two-yearly basis, respectively.

Table 5-9: Tailings Dam Hazard Rating for Jinfeng

(Note: Blue cells indicates perceived hazard level for Jinfeng Facilities)

	Hazard Rating		
Type of Effect	**High**	**Significant**	**Low**
	Uncontrolled Releases or Seepage		
Loss of Human Life	Location such that contamination of a water supply likely to be used for human consumption and consumption of the contaminated water is expected.	Location less critical but contamination of a water supply likely to be used for human consumption and consumption of the contaminated water is possible but not expected.	No contamination of a water supply likely to be used for human consumption expected.
Loss of Stock	Location such that contamination of a water supply likely to be used for stock consumption and consumption of the contaminated water is expected.	Location less critical but contamination of a water supply likely to be used for stock consumption and consumption of the contaminated water is possible but not expected.	No contamination of a water supply likely to be used for stock consumption expected.
Environmental Damage	Location such that damage to an environmental feature of significant value is expected.	The significance of the environmental feature is less or damage is possible but not expected.	No environmental features of significance or no damage expected.
	Embankment Failure		
Loss of Human Life	Loss of life expected because of community or other significant developments.	No loss of life expected, but the possibility recognised. No urban development and no more than a small number of habitable structures down stream.	No loss of life expected.

Type of Effect	Hazard Rating High	Significant	Low
Direct Economic Loss	Severe economic loss such as serious damage to communities, industrial, commercial or agricultural facilities, important utilities, mine infrastructure, the storage itself or other storages downstream.	Appreciable economic loss, such as damage to secondary roads, minor railways, relatively important public utilities, mine infrastructure, the storage itself or other storages downstream.	No significant economic loss, but possible limited damage to agricultural land, minor roads, mine infrastructure, etc.
Indirect Economic Loss	Storage essential for services and repairs not practicable.	Repairs to storage practicable.	Repairs to storage practicable. Indirect losses not significant.

Table 5-10: Category of Jinfeng TSF's

Hazard Rating		Tailings Storage Category High	Significant	Low
Maximum Embankment Height	>15 m	1	1	1
	5–15 m	1	2	2
	<5 m	1	2	3

NOTE: Blue cell indicates perceived category for Cangshan Facility

NERIN, a design institute that is registered under Chinese Law, was commissioned to carry out the investigation, design and construction overview of the Jinfeng TSF's. Golder has been involved in the project since inception and has acted in a technical advisory role for all aspects of the location, investigation, design, construction and operation of the tailings facilities. Under Chinese law Golder is apparently not permitted to be a TSF designer. Sino site personnel have advised that Golder has had a significant input to the final arrangement and design of the tailings storages.

From the dam safety perspective, it is apparent that Golder has had a long involvement with the design and operation of the tailings storage facility at the Jinfeng mine. They have a good working knowledge of Chinese design, construction and mine operation practices.

The TSF designs have been developed by NERIN and Golder after considering a number of different options. The design process has also been subjected to a peer review in March 2006. The outcomes of the review were reported on by URS in April 2006.

Under Chinese Law there is a requirement for quality control of construction projects. This law requires geotechnical investigation and design to be carried out by a licensed body. It also requires construction monitoring by an independent third party. The construction supervising agency at Jinfeng is Zhengye who are present at site on a 24 hour basis. At the time of the site visit SRK observed sample construction monitoring records. These included the results of compaction and in-situ density tests.

Sino has indicated that the designs will comply with the Australian National Committee on Large Dams (ANCOLD) 1996 Guidelines for the Design of Dams for Earthquakes. As per IFC requirements, the dam designs are subject to international third party reviews. SRK has sighted evidence of the third part review.

From the information made available to SRK it is apparent that there is a high level of consultant interaction for the design of the TSF's at Jinfeng. The design has included input from reputable and experienced designers. Both design and construction are being carried out to meet the requirements of Chinese Law. These factors are expected to minimise the risks associated with the construction and operation of TSF's.

5.4.2 ***Background Information***

From the information made available to SRK it is understood that the Jinfeng Mine will produce about 13.5 million tonnes (dry weight) of tailings over a 13 year mine life. There will be two main tailings streams:

- About 11.5Mt of flotation tailings, and
- About 2 Mt of CIL tailings.

The CIL circuit uses cyanide in the gold-winning process, and the tailings stream will contain a small residual of cyanide. The flotation circuit includes a micro-biological process which requires chemically neutral and clean input water, and which in particular cannot tolerate cyanide. The tailings management system is therefore required to be designed so that effluent from the CIL tailings does not enter the flotation system. To achieve this separation there will be two TSF's. The layout that has been selected by Sino incorporates both facilities in the same stream valley, with the flotation storage being upstream of the CIL storage (Figure 5-16).

Both TSF's will be formed by the construction of an earth and rockfill embankment across the valley, with the embankments being designed to be raised in several stages over the life of the mine. The TSF embankments are to be constructed in a number of stages using a combination of downstream and centreline raises. SRK is of the opinion that these methods of construction are reliable and appropriate for site conditions.