Technical Review of CITIC Dameng Manganese Properties in Guangxi Zhuangzu Autonomous Region, China and Moyen-Ogooue, Gabon

for

CITIC DAMENG HOLDINGS LIMITED

SRK Project Number SCN146

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EXECUTIVE SUMMARY

CITIC Dameng Holdings Limited ("CITIC Dameng", "the Company" or "the Client") commissioned SRK Consulting Limited ("SRK") to undertake an independent expert review of all relevant technical aspects of two manganese operating mines and associated metallurgical and processing plants in Guangxi Zhuangzu Autonomous region, People's Republic of China (PRC) and one manganese operating mine in Moyen-Ogooue province, Gabon, Africa.

Outline of work program

The work program involved two phases:

Phase 1: review of information provided, site visit and inspection of CITIC Dameng's properties, discussions with Company employees, geological brigade professionals and consultants who conducted the geological exploration and feasibility study.

Phase 2: analysis of provided data, writing a draft report and finalizing the report.

Results

Overall

CITIC Dameng Holdings Limited has the largest manganese resources and reserves in China with 22% of total indicated Chinese and reserves. The Company is aggressive in exploring manganese resources overseas. CITIC Dameng has three mining licences, two operating mines, two ore processing plants, one manganese powder processing plant, three ferroalloy smelters, three electrolytic manganese plants, one electrolytic manganese dioxide plant, and one manganese sulphate facility in operation. The Company has one manganese mine with associated ore processing plant in Gabon; one electrolytic manganese plant in Tiandeng, and one Mn_3O_4 plant, one lithium manganite plant and one lithium cobaltite plant in Chongzuo, which are all under construction. Details of these properties with historical design capacity and actual production in 2009 are described below:

Mine, Concentrator & Plant	Product	Historical Designed Capacity (tpa)	2009 Actual Production (t)
Daxin Project			
Daxin operating mine	Mn ore	1,000,000	814,999
Daxin concentrator	Mn concentrate	1,000,000	664,289
Daxin Mn powder processing plant	Mn concentrate powder	450,000	603,970
Daxin Mn sulphate plant	Mn sulphate	20,000	18,567
Daxin electrolytic Mn plant	Electrolytic Mn	55,000	60,881
Daxin electrolytic Mn dioxide (EMD) plant	Electrolytic Mn dioxide	10,000	8,164
Start electrolytic Mn plant	Electrolytic Mn	20,000	9,960
Tiandong electrolytic Mn plant	Electrolytic Mn	20,000	2,198
Dabao ferroalloy smelter	Si-Mn alloy ($FeMn_{60}Si_{14}$)	12,000	10,139

Mine, Concentrator & Plant	Product	Design Capacity (tpa)	Actual Capacity (tpa)
Tiandeng Project			
Tiandeng operating mine	Mn ore	180,000	294,100
Tiandeng concentrator	Mn concentrate	180,000	160,807
Tiandeng ferroalloy smelter	$FeMn_{68}Si_{17}$	50,000	480,141
Tiandeng electrolytic Mn plant(1)	Electrolytic Mn	30,000	Under construction
Chongzuo Mn_3O_4 plant(2)	Mn_3O_4	30,000	Under construction
Chongzuo $LiMn_2O_4$ plant(3)	$LiMn_2O_4$ for battery	600	Under construction
Chongzuo $LiCoO_2$ plant(4)	$LiCoO_2$ for battery	1,000	Under construction
Qinzhou Project			
Qinzhou ferroalloy smelter	Si-Mn alloy (FeCr55C10)	50,000	41,585
Bembélé Project			
Bembélé operating mine(5)	Mn ore	1,150,000	Under construction
Bembélé concentrator(6)	Mn concentrate	1,150,000	Under construction

Notes:

(1) Tiandeng is under construction and is expected to operate in first quarter of 2012

(2) Chongzuo Mn_3O_4 plant is expected to operate by the end of October 2010

(3) Chongzuo $LiMn_2O_4$ plant is expected to operate by the end of October 2010

(4) Chongzuo $LiCoO_2$ plant is expected to operate by the end of October 2010

(5) Bembélé mine is under construction and is expected to commence production by the end of first quarter 2011

(6) Bembélé concentrator is under construction and is expected to commence production by the end of first quarter 2011

The mines, concentrators and smelters operated by CITIC Dameng in Guangxi Zhuangzu autonomous region of China are well integrated and well managed operations. The operating standards at the sites are generally comparable to good national and/or international industry practice. The plants under construction and those designed will continue to apply the same or more advanced technology and should achieve similar or better results to those achieved historically.

As of June 30, 2010, the Measured, Indicated and Inferred Mineral Resources for the three mines were 8.28Mt at an average Mn grade of 23.76%, 91.46Mt at an average Mn grade of 23.41% and 16.46Mt at an average Mn grade of 28.34%, respectively. The low-grade Measured and Indicated Mineral Resources were 197,282t with an average Mn grade of 11.28% and 253,079t with an average Mn grade of 10.77%, respectively. The Proved and Probable Ore Reserves were estimated at 8.025Mt at an average Mn grade of 21.57% and 88.775Mt at an average Mn grade of 21.43%, respectively. In addition, the Proved and Probable low grade Ore Reserves were 190,145t with an average Mn grade of 10.60% and 243,924t with an average Mn grade of 9.20%, respectively. The Resources and Reserves were estimated in compliance with the JORC code.

The Daxin Project includes four open pit mining areas and one underground mine area. Tiandeng is an open pit mine and Bembélé is also an open pit mine. Generally, open pit mining and shrinkage mining methods have been adopted with mining recoveries of 86 to 93% and mining dilutions of 6 to 12%. A conventional ore processing flow sheet including crushing, washing and drying is used in the ore processing plants to produce manganese concentrates. The ore processing plants achieve average manganese recovery rates of 80.65% for oxidized ore at Tiandeng, 88.3% for oxidized ore and 93.34% for carbonate ore at Daxin. The projected manganese recovery rate of 90% for oxidized at Bembélé is the test results from the feasibility study.

The technologies used in the Daxin manganese sulphate plant and electrolytic manganese dioxide plant, the Daxin, Start and Tiandong electrolytic manganese plants, and the Dabao, Tiandeng and Qinzhou smelters are of industry standards. These plants and smelters are all well managed and consistently produce high quality products. The average recovery rates in 2009, which are within the acceptable range for the manganese industry as specified in China, are shown in the following table.

			Electrolytic Mn Plants			Smelters		
Item	Daxin Mn Sulphate Plant	Daxin EDM Plant	Daxin	Start	Tiandong	Dabao	Tiandeng	Qinzhou
Recovery Rate %	76.99	75.99	78.28	71.00	71.95	77-82	77-82	85-90

The strengths of CITIC Dameng include high self-sufficiency from established vertical integration based on mining and developing mineral deposits, to on-site processing allowing economical operations with production of good quality concentrates. Concentrates are used to produce a series of high quality manganese downstream products.

CITIC Dameng's mines, concentrators, smelters, and support facilities have achieved reasonably acceptable accident statistics. SRK considers that CITIC Dameng is committed to safety training and providing safety equipment and monitoring. Statistics compare well with other mining companies in China.

Workforce numbers at CITIC Dameng were 5679 on March 31, 2010. This figure includes the following employees: 145 in Company headquarters administration, 298 in the mining department, 325 in the ore processing plant and tailings dams, 287 in the manganese powder plant, 2174 in the electrolytic manganese plant, 2196 in the electrolytic manganese dioxide (EMD) plant, 174 in the manganese sulphate plant, and 1080 employees in the smelters. Annual staff turnover is estimated at 8% of the workforce. Based on past experiences, there have been no problems with sourcing skilled workers.

A number of the Company's technical management personnel have worked at the mine for more than three years. They have a thorough knowledge of the geology and mining conditions in the mine, and can employ suitable techniques and experience from a range of plants and smelters.

As part of their development program, the Company has committed to a greening program at the mines and plants with improvements in dust control, waste water and sewage treatment. Once implemented, these practices will demonstrate the Company's responsible approach towards environmental protection.

Geology

Both the Daxin and Tiandeng deposits and Bembélé property are typical sedimentary manganese deposits. Regionally the Daxin manganese mine area is located at the southeast (SE) part of a syncline-named Shangyin-Xialei and are generally lithologically controlled by the Upper Devonian Sequence of argillaceous limestone and siliceous limestone. The Tiandeng manganese mine is in the Ronghua compound syncline and lithologically is controlled by the Early Triassic Beisi formation of siliceous mudstone. It is the host structure of ore-bearing strata. The main strata in the mine area include Triassic breccia limestone, siliceous limestone, sandstone, mudstone and tuff. The Bembélé Manganese Mine is located in the Ogooue synclinoria and lithologically controlled by the Proterozoic Ogooue group of manganese-bearing and graphitic quartz schist and phyllite, and manganese-iron nodule bearing siltstone. All three deposits on the mining licence area are shown as a thick/thin bedding or tabular shape with local swelling and pinching. The deposits have relatively stable dimensions both along strike and down dip.

Daxin manganese mine:

Three ore bodies have been delineated by previous geological brigades. The ore bodies dip to the southwest (SW) at an average angle of 70 degrees (°) in the southern limb and to the northwest (NW) at an average angle of 25° in the northern limb. They are parallel to each other with stable continuity along both strike and down dip. Manganese oxide ore is in the upper part of the ore bodies and manganese carbonate ore is localized in the lower part of the ore bodies.

Ore body 1 is about 9000 meters (m) long and 0.50 to 3.23m thick with an average thickness of 1.77m in the south (S) and an average thickness of 1.34m in the north (N). Manganese grades for manganese oxide ore range from 19.94 to 46.94% with an average grade of 36.74%. Manganese grades in the manganese carbonate ore range between 14.48 and 34.32% with an average grade of 22.00% Mn.

Ore body 2 is about 9000m long and 0.60 to 4.96m thick with an average thickness of 2.49m in the S and an average thickness of 1.46m in the N. Manganese grades for manganese oxide ore range from 28.36 to 40.84% with an average grade of 35.23%. Manganese grades in the manganese carbonate ore range between 15.46 and 30.05% with an average grade of 22.92% Mn.

Ore body 3 is about 9000m long and 0.50m to 3.13m thick with an average thickness of 1.77m in the S and 1.10m in the N. Manganese grades for manganese oxide ore range from 19.94 to 46.94% with an average grade of 30.50%. Manganese grades in the manganese carbonate ore range between 13.77 and 27.08% with an average grade of 18.06% Mn.

Tiandeng manganese mine:

Tiandeng manganese mine consists of four mining areas: Tuoren East, Tuoren West, Luli, and Dongmeng with four to six ore bodies of different lengths, widths and thicknesses defined in each mining area.

Tuoren East: Six manganese mineralized bodies of I, II, III, IV, V, and X with bedded or folded shapes were defined in this field. The mineralized bodies dip either to the NW or northeast (NE) with dip angles of 27 to 72°. The length of the mineralized bodies ranges from 1192 to 2677m, average width ranges from 43 to 167m, and average thickness is between 0.74 to 4.71m. The average grade of ore bodies in the Tuoren East mining area is 17.94% Mn.

Tuoren West: Seven manganese mineralized bodies of I, II, III, IV, V, IX, and X with bedded shapes were defined in the mine area. The mineralized bodies dip either to the NW or NE with dip angles of 10 to 75°. The length of the mineralized bodies ranges from 256 to 1920m, average width ranges from 55 to 156m, and average thickness is between 1.11 to 4.46m. The average grade of ore bodies in the Tuoren West mining area is 18.24% Mn.

Luli: Five manganese mineralized bodies of I, II, III, IV, and V were defined in the mine area. They are controlled by an approximately westeast (WE) extending anticline. The mineralized bodies dip either to the NW or NE at angles of 11 to 63°. The length of the mineralized bodies ranges from 1220 to 2880m, average width ranges from 53 to 91m, and average thickness is between 1.28 to 4.14m. The average grade of the ore bodies in the Luli mining area is 17.36% Mn.

Dongmeng: Four manganese mineralized bodies of I, II, IV, and V were defined in the mine area. They are hosted in the west (W) part of the nearly WE trending Dongmeng compound syncline. The mineralized bodies dip either to the NW or the NE at angles of 14 to 71°. The length of the

mineralized bodies ranges from 1580 to 2840m, average width ranges from 54 to 74m and average thickness is between 1.32 to 4.73m. The average grade of the ore bodies in the Dongmeng mining area is 15.91% Mn.

Bembélé Manganese Mine:

Three ore bodies of I, II, and III were defined through trenches, shallow shafts and drill holes by No. 1 Geological Exploration Institute of the China Bureau of Metallurgical and Geological Exploration (No. 1 Brigade). Details of these ore bodies are described below:

Ore body I is specified as a thick tabular, oxidized and leached sedimentary manganese ore body which is located in the SE slope of Bembélé Mountain. Its footwall rock is ferromanganese siltstone and hangwall rock is quartz schist. The ore body is more than 3000m long, 150 to 1350m wide, with an average thickness of 2.92m. It trends to the NE (20° to 60°E) and dips to the SE at angles of 15 to 42° with an average grade of 36.75%.

Ore body II is specified as a secondary enrichment cumulus manganese orebody located at the SE slope of Bembélé Mountain. It is about 3000m long with a maximum width of 925m, average thickness 1.33m and average grade of 15.55%.

Ore body III is a tabular, oxidized and leached sedimentary manganese ore body in Menduman area. It is about 600m long, 100m wide and has an average thickness of 3.54m. It trends to the SE (110°E) and dips to SW at angles of 34 to 44° with an average grade of 26.28%.

Resource and Reserve Estimates

SRK has inspected a number of portals, tunnels, bore holes and shallow shafts, and trenches which show the exposure of the internalization at three mines. SRK also reviewed all original geological databases including geological survey and mapping at different scales, drill holes, shallow shafts, adits and trenches logging; sampling methodologies and sample preparation and assaying; assay quality control and quality assurance; the geological interpretation, mineral resource estimation procedures and parameter applied by Nos. 2 and 4 Nanning Geological Brigades and Nanning Geological Survey Institute for the Daxin mine, No. 273 Guangxi Geological Brigade and Nanning Geological Survey for the Tiandeng mine, and No. 1 Geological Exploration Institute for the Bembélé mine. These Geological Brigades and Geological Survey Institute are qualified and approved Chinese independent geological consultants, who have used methods and procedures which comply with Chinese standards for resource estimation.

The three manganese mines are typical sedimentary-type deposits and the manganese grades have low variability throughout the mineralized bodies. SRK considers that the exploration programs provides a reasonable basis to estimate the mineralized bodies at Daxin, Tiandeng and Bembélé mines, and that the analytical methods used for these deposits produced acceptable results with no material bias.

SRK has reviewed the grade thickness comparisons conducted by the Company between the geological and actual mined-out mineralized blocks at Daxin and Tiandeng mines in 2009. The average relative errors are 8.8% for open-pit and 6.1% for underground at Daxin mine, and 5.7% at Tiandeng mine. These data are within 10% and are acceptable. SRK also reviewed the cut-off grade, minimum mining thickness and maximum waste thickness for Bembélé mine and found the parameters acceptable.

SRK conducted verifications on original/previous exploration engineering and sample verifications at the three mines. For sample verification, it included selecting the core pulp samples and re-sampling

on site using channelling method. The core pulp samples were sent to the ASL Chemex ("ASL") laboratories in Guangzhou, PRC for analysis; whereas the recollected samples were sent to ASL for preparation and analysis. Pulp samples were also sent to the SGS CSTC Standards Technical Services Co. Ltd ("SGS") Guangzhou, PRC for external check analysis.

SRK required all samples to be reground to -200 mesh. The standard and blank samples were provided by the ASL. SRK also visited both laboratories to ensure the quality assurance and quality control procedures were being followed. Samples were decomposited using sodium peroxide fusion ("FUS-PER05") and were assyed using the inductively coupled plasma-atomic emission spectroscopy ("ICP-AES") method. Both the ASL and SGS laboratories are internationally-recognized analytical branches for ASL and SGS.

The comparisons of results between the original core samples and SRK core pulp samples, and the SRK channelling samples assayed from ASL and SGS show that the relative differences between them are less than 10% with an average of less than 5%. These results of data verification indicate that the original database is sound and reliable for the purposes of resource estimation.

Based on reviewing the deposit geology, drilling and sampling data, and procedures and parameters used for the estimation of mineral resources, and SRK's data verifications at the three mines, SRK is of the opinion that the mineral resources estimated under the 1999 Chinese mineral resource system for the three manganese deposits by Chinese Geological Brigades conform to the equivalent JORC Mineral Resource categories (The comparison of the Chinese and JORC systems is provided in Appendix II). The economic portion of the Measured and Indicated Mineral Resources can accordingly be used to estimate Proved and Probable Ore Reserves.

Ore Resource Estimate

The manganese ore resources of the three mines were estimated by the Geological Brigades using the polygonal method on plane and/or longitudinal projection maps. The technical parameters generally used to estimate the manganese resources include cut-off grade, minimum mineable thickness and maximum allowed waste thickness; they are reviewed in this report and are summarized in the following table.

Mine	Cut-off Grade	Minimum Mineable Thickness	Maximum Waste Thickness
Daxin	12%	0.5m	0.3m
Tiandeng	8%	0.5m-0.7m	0.5m
Bembélé	10%	1.0m	1.0m

The Mineral Resource estimates under the JORC Code as June 30, 2010 for Daxin, Tiandeng and Bembélé Manganese Mine are summarized in the table below. The Measured, Indicated and Inferred Mineral Resources of the three mines in total were 8.28Mt at an average Mn grade of 23.70%, 91.46Mt at an average Mn grade of 23.41% and 16.46Mt at an average Mn grade of 28.34%, respectively. Mineral Resources were 197,282t with an average Mn grade of 11.28% and 253,079t with an average Mn grade of 10.77%, respectively. The Measured and Indicated Mineral Resources can be used for Ore Reserve estimation and mine planning. No materials changes have occurred since June 30, 2010.

Mine	Ore Type	Mining Block	Category	Ore Grade Type	Resource (t)	Average Grade (%)	
						Mn	Fe
Daxin	Manganese Oxide	South Block	Measured	N1+N2+N3+N4	1,705,309	29.26	9.33
			Indicated	N1+N2+N3+N4	1,273,808	33.21	9.45
		North-Middle Blocks	Inferred	N1+N2+N4	434,200	21.23	8.85
	Manganese Carbonate	South Block	Measured	M1+M2+M3	5,886,604	22.78	6.35
			Indicated	M1+M2+M3	40,674,017	21.18	6.23
		North-Middle Blocks	Indicated	M1+M2+M3	27,886,306	20.45	6.37
Subtotal			Measured		***7,591,913***	***24.24***	***7.02***
			Indicated		***69,834,131***	***21.11***	***6.35***
			Inferred		***434,200***	***21.23***	***8.85***
Tiandeng	Manganese Oxide	Tuoren East	Measured	T1	112,284	18.83	4.59
			Indicated	T1	111,902	17.98	4.60
			Inferred	T1+T2+T3	1,084,288	12.84	7.80
		Tuoren West	Measured	T1	291,354	19.03	7.02
			Indicated	T1+T2	305,483	19.69	4.94
			Measured*	T3	178,430	11.42	15.94
			Indicated*	T3	110,608	10.18	10.42
			Inferred	T1+T2+T3	1,007,011	16.26	7.74
		Luli	Measured	T1	183,758	18.28	6.62
			Indicated	T1	404,982	17.47	6.12
			Measured*	T3	18,852	10.00	12.74
			Indicated*	T3	15,208	9.78	14.13
		Dongmeng	Measured	T1+T2	95,698	16.16	6.82
			Indicated	T1+T2	2,216,421	16.12	9.83
			Indicated*	T3	127,263	11.41	8.74
			Inferred	T1+T2+T3	1,558,520	13.98	10.29
Subtotal			Measured		***683,094***	***18.39***	***6.48***
			Indicated		***3,038,787***	***16.73***	***8.65***
			Inferred		***3,649,819***	***14.27***	***8.84***
			Measured*		***197,282***	***11.28***	***15.63***
			Indicated*		***253,079***	***10.77***	***9.80***
Bembélé	Manganese Oxide	I	Indicated	I	14,197,850	37.98	14.31
			Inferred	I	10,500,070	35.08	15.64
		II	Indicated	II	3,528,180	15.48	30.34
			Inferred	II	1,186,870	15.76	29.98
		III#	Indicated	III	862,080	26.28	11.6
			Inferred	III	685,600	26.28	11.63
Subtotal			Indicated		***18,588,110***	***33.17***	***17.23***
			Inferred		***12,372,540***	***32.74***	***16.80***
Total			**Measured**		**8,275,007**	**23.76**	**6.98**
			Indicated		**91,461,028**	**23.41**	**8.64**
			Inferred		**16,456,559**	**28.34**	**14.82**
			Measured*		**197,282**	**11.28**	**15.63**
			Indicated*		**253,079**	**10.77**	**9.80**

Indicated Mineral Resources of 862,080t (average grades: 26.28%Mn and 11.60%Fe) and Inferred Mineral Resources of 685,600t (average grades: 26.28%Mn and 11.63%Fe) at the Bembélé mine is not in the mining licence area but is within the exploration tenement area.

* Signifies the low-grade Measured and Indicated Mineral resources.

Ore Reserve Estimate

Ore reserves are estimated based on the mining recovery rate and dilution rate for the three mines. Both parameters are cited from feasibility study reports and combination of actual mining operation records as shown in the table below.

	Daxin Mine		Tiandeng Mine	Bembélé Mine
	Open-pit	Underground Mining	Open-pit	Open-pit
Ore Recovery Rate	93%	86%	90.50%	95%
Dilution Rate	7%	12%	6.50%	5%

By June 30, 2010, the Proved and Probable Ore Reserves were 8.025Mt at an average Mn grade of 21.57% and 88.775Mt at an average Mn grade of 21.43%, respectively. In addition, the Proved and Probable low grade Ore Reserves were 190,145t with an average Mn grade of 10.60% and 243,924t with an average Mn grade of 9.20%, respectively. No materials changes have occurred since June 30, 2010.

Mine	Ore Type	Mining Block	Category	Ore Grade Type	Ore Reserve (t)	Average Grade (%)	
						Mn	Fe
Daxin	Manganese Oxide	South Block	Proved	N1+N2+N3+N4	1,696,953	27.35	8.72
			Probable	N1+N2+N3+N4	1,267,566	31.04	8.83
	Manganese Carbonate	South Block	Proved	M1+M2+M3	5,669,977	20.34	5.67
			Probable	M1+M2+M3	39,177,213	18.91	5.57
		North-Middle Blocks	Probable	M1+M2+M3	26,860,090	18.26	5.69
Sub-total			Proved		*7,366,930*	*21.95*	*6.37*
			Probable		*67,304,869*	*18.88*	*5.68*
Tiandeng	Manganese Oxide	Tuoren East	Proved	T1	108,222	17.68	4.31
			Probable	T1	107,854	16.89	4.32
		Tuoren West	Proved	T1	280,814	17.87	6.59
			Probable	T1+T2	294,432	18.49	4.64
			Proved*	T3	171,975	10.72	14.97
			Probable*	T3	106,607	9.56	9.78
		Luli	Proved	T1	177,111	17.16	6.22
			Probable	T1	390,332	16.40	5.75
			Proved*	T3	18,170	9.39	11.96
			Probable*	T3	14,658	9.18	13.27
		Dongmeng	Proved	T1+T2	92,236	15.17	6.41
			Probable	T1+T2	2,136,242	15.14	9.23
			Probable*	T3	122,659	10.71	8.21
Sub-total			Proved		*658,383*	*17.27*	*6.09*
			Probable		*2,928,859*	*15.71*	*8.12*
			Proved*		*190,145*	*10.60*	*14.68*
			Probable*		*243,924*	*10.12*	*9.20*
Bembélé	Manganese Oxide	I	Probable	I	14,162,355	36.17	13.63
		II	Probable	II	3,519,360	14.74	28.90
		III	Probable	III	859,925	25.03	11.05
Sub-total			Probable		*18,541,640*	*31.59*	*16.41*
Total			**Proved**		**8,025,313**	**21.57**	**6.35**
			Probable		**88,775,368**	**21.43**	**8.00**
			Proved*		**190,145**	**10.60**	**14.68**
			Probable*		**243,924**	**10.12**	**9.20**
			Proved+Probable		**96,800,681**	**21.44**	**7.86**
			Proved+Probable*		**434,069**	**10.33**	**11.60**

Notes:

* Signifies the low-grade Proved and Probable Ore Reserves.

Mining

Mining proposed at Daxin, Tiandeng and Bembélé mines is technically viable based on the location and geometry of the ore bodies. Two conventional mining methods are currently used; open pit and shallow hole shrinkage stoping.

The technical parameters of the open pit mining method for Daxin, Tiandeng and Bembélé open pits are considered by SRK to be appropriate. For Daxin underground mine, the shallow hole shrinkage method with a stope height of 40m and length of 50m along the strike is considered by SRK to be appropriate. Production from shrinkage stopes has two stages with miners entering the stope and systematically drilling and firing ore with only the swell material drawn out of the stope in the first stage. This allows miners to work off the broken ore to advance the stope vertically. Once all the stope ore has been broken, stope production reaches its second stage of full draw. All ore is pulled from the stope to empty the stope of ore. If ground conditions of the stope are poor, there could be an influx of dilution or loss of ore.

At Daxin mine, the average ore recovery and dilution rates are 93% and 7%, respectively for open-pit, and 86% and 12% for underground. The average stripping ratio for the Daxin open-pit was 14.3:1 in 2009. For the Tiandeng mine, the average ore recovery and dilution rates are 90.5% and 6.5%, respectively. The average stripping ratio for the Tiandeng open-pit was 2.47:1 in 2009. At Bembélé mine, the average ore recovery and dilution rates were planned in feasibility study at 95% and 5%, respectively. The average stripping ratio for the Bembélé open-pit is 1.52:1.

From discussions with mine personnel it is understood that very little geotechnical input has been provided to the project to date and that provision has not been made for ongoing geotechnical management. The superintendent of Daxin mine was of the opinion that further geotechnical work was required, and SRK fully supports this opinion.

CITIC Dameng's operations are technically viable with sufficient reserves and resources to provide growth potential. Infrastructure is sound and capable of supporting the proposed expansion project. There is opportunity for further growth and optimization, and the Company has indicated it is keen and has the vision to expand production.

Metallurgical and processing

Ore processing plants: Supported by its resource advantages, the Company has built a series of manganese plants including ore concentrating, refining, electrolysis, and smelting and has ambitious plans on the manganese industrialization market.

The Company owns three mines — Daxin and Tiandeng in Guangxi Zhuangzu autonomous region of China and Bembélé in Gabon, Africa. Daxin and Tiandeng mines, like the majority of Chinese manganese mines, are relatively low-grade manganese and need to be beneficiated. Ore grade in the Bembélé mine is higher than the Daxin and Tiandeng mines and only needs to be simply washed through spiral classifiers to gravitationally beneficiate the ore. The following table shows the technical index details of the Daxin and Tiandeng ore processing plants in 2009 and planned parameters for Bembélé when it is constructed and commissioned in 2011.

	Daxin		Tiandeng	Bembélé
Item	Oxidized ore	Carbonate ore	Oxidized ore	Oxidized ore
Ore treated (tpa)	162,427	648,341	303,466	1,150,000
Concentrate yield (tpa)	128,771	536,373	170,166	758,800
Yield ratio %	79.28	82.73	45.32	65.98
Feed ore grade % Mn	28.82	20.28	17.50	31.70
Concentrate grade % Mn	32.10	22.88	25.81	43.00
Mn recovery rate %	88.31	93.34	80.65	89.50

Note: 1. The Bembélé ore processing plant has a designed ore processing capacity of 1,150,000tpa

SRK observed that the ore processing methods/flowsheets and applied equipments in the Daxin and Tiandeng concentrators and the designed Bembélé concentrator are rational and are environmentally friendly as the ores are treated via physical processes without adding any reagents.

The Company has established a series of plants to treat concentrates into a range of manganese products and is planning to build more of the same and different manganese product plants. SRK has inspected all operating plants and plants under construction during site visits.

Manganese sulphate plant: The producing technique of manganese sulphate is traditional and mature. Daxin manganese sulphate plant with a capacity of 25,000tpa produces a high-quality manganese product ($MnSO_4 \bullet H_2O$). This plant has made CITIC Dameng one of the largest manganese sulphate manufactures in the world.

Electrolytic manganese plants: Daxin, Start and Tiandong electrolytic manganese plants adopt a similar technical flowsheet. A total capacity of the three plants has reached 101,000tpa (excluding the Tiandeng plant with a capacity of 30,000tpa), which makes the Company the largest manganese metal production enterprise in China. Dameng has a professional and skilled engineering team, which has excellent knowledge and experience of manganese metal electrolysis procedures and has introduced a number of innovations in the production process, despite these plants being constructed at different times and with different equipment allocation.

Ferroalloy plants: Daxin and Tiandeng silico-manganese smelters and Qinzhou ferrochromiun smelters have adopted traditional techniques for production. Considering the growing demand from the Chinese steel market especially from the North Bay (Baihai) steel industry, these two products from CITIC Dameng have a promising market. However, the equipments at these plants are outdated. It is SRK's opinion that the plants need to be upgraded and improved, including the replacement of outdated equipment.

Electrolytic manganese dioxide (EMD) plant and other plants: The Daxin EMD plant has a capacity of 10,000tpa has operated since 2009. The Chongzuo Mn_3O_4 plant is under construction. The Chongzuo lithium manganese oxide ($LiMn_2O_4$) and lithium cobalt oxide ($LiCoO_2$) plants are

planned. The EMD, $LiMn_2O_4$ and $LiCoO_2$ are cathode manufacturing materials for high-performance batteries, and these products have been encouraged by China. Mn_3O_4 is the raw material for Mn-Zn soft magnets, which is in high demand for high-performance magnetic material for modern electronics industry.

All these products have a relative high technical content and added value. SRK observes that the CITIC Dameng has high level techniques and advanced equipment for production, and SRK believes that the Company can produce quality products and develop more high-standard manganese products by utilizing its own technical capability.

Environmental

The significant environmental aspects of the CITIC Dameng (Daxin, Chongzuo, Tiandeng Tiandong, Qinzhou and Bembélé) Projects are generally managed in accordance with Chinese (Gabonese) National environmental requirements and international practice guidelines. The following issues with the projects were noted during the environmental review:

- Water management:
  - Daxin Mine — management of future Daxin mine dewatering impacts on the surrounding groundwater resource.
  - Start Electrolytic Plant — management of site drainage/waste water discharges to the Xialei River.
- Waste water:
  - Start Electrolytic Plant — confirm the management and final disposal of chromium bearing wastewater (i.e. is it reused on site or taken off site for disposal).
- Air emissions — management of significant air emissions from the Dabao Smelter.
- Hydrocarbon storage and handling — the storage facilities for fuels and oils do not have secondary containment. This is both a Chinese requirement and recognized international industry practice.
- Greenhouse Gas emissions — there is currently no accounting/inventory of the Greenhouse Gas emissions for the Daxin, Chongzuo, Tiandeng, Tiangdong and Qinzhou Projects. It is a Chinese policy directive to reduce Greenhouse Gas emissions and the recognized international industry practice utilized to facilitate this process is to undertake an emission inventory.
- Acid rock drainage (ARD) — while no ARD issues were observed during the site visit, there was no geochemical characterization undertaken of the waste rock for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé Projects to determine the potential for acid generation. Geochemical characterization of waste rock is a recognized international industry practice.
- Environmental Management Plans (EMP) — there are no operational EMP's for the Daxin, Chongzuo, Tiandeng, Tiandong and Qinzhou Projects, which incorporate the environmental monitoring and management requirements for each project.
- Contaminated sites assessment — there is no process in place to assess and manage potentially contaminated areas for the Daxin, Chongzuo, Tiandeng, Tiandong and Qinzhou Projects. Assessing and managing potentially contaminated area is a recognized international industry practice.

- Rehabilitation and closure planning — The EIA approvals state that site rehabilitation should be undertaken. It is a recognized industry practice to plan for and document a site's rehabilitation and closure requirements. SRK was provided with 2 contracts ("design contracts of land rehabilation plan") for conducting rehabilitation works for the Daxin and Tiandeng project's sites between CITIC Dameng and Nanning Zhonggui Water and Soil Conservation Technology Inc. The contracts were signed on June 1, 2010. While the contracts for these plans demonstrates CITIC Dameng's ongoing intent to improve their rehabilitation of project site areas they do not constitute a Mine Closure Plan that comprises the measures required to manage mine closure. There are currently no documented closure and rehabilitation plans for the Daxin, Chongzuo, Tiandeng, Tiandong and Qinzhou Projects. This is not in conformance with recognized international industry practice.

SRK makes the following recommendations in respect of the environmental compliance and management for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé Projects:

- Air emissions:
  - Dabao Smelter — upgrade the Dabao Smelter facility and improve management practices, to ensure that air emissions meet EIA approval conditions.
- Water management:
  - Daxin Project — further quantify the potential impacts of the Daxin underground mine dewatering on the surrounding groundwater resources and users. Establish and implement a program to monitor the actual impacts of the underground mine dewatering on the surrounding groundwater resources and users, and establish remedial measures to manage these impacts as they occur.
- Wastewater management:
  - Start Project — assess and improve the management of site drainage/waste water to ensure there are no discharges to the Xialei River. Confirm the management and final disposal of chromium bearing wastewater (i.e. is it reused on site or taken off site for disposal).
  - Qinzhou Project — develop management plans to address the management of the site drainage system, oily wastewater and construct the three stage sewage treatment system as per EIA conditions and undertake a monitoring programme to ensure internal and discharges water quality.
- Hydrocarbon management:
  - Rationalize and upgrade hydrocarbon storage through constructing dedicated facilities that have secondary containment.
- Acid rock drainage (ARD):
  - While no ARD issues associated with the storage of waste rock and process tailings/ residues were observed during the site visit, it is recommended that a geochemical characterization of the waste rock, tailings and residues is undertaken. This would determine the potential for acid generation and confirm that the risk of ARD is low, and also confirm the suitability of the waste rock for reuse in construction.

- Contaminated sites:
    - Establish and implement an assessment and management process for contaminated areas.
- Site closure planning and rehabilitation:
    - Develop and implement an operational Rehabilitation and Closure Plan for each project.
- Greenhouse Gas emissions:
    - Develop initiatives to account for Greenhouse Gas emissions for each project.

Social

Daxin Projects: The Daxin Projects are located near the Xialei Town, within the Daxin County, in the Guangxi Zhuang Autonomous Region. The Start Electrolytic Manganese Plant is located near the Huruun Town within the Jingxi County, approximately 10 kilometers to the west of the Xialei Town. The relationship with the Daxin County and Jingxi County and other local statutory bodies is reported to be positive. No formal notices of breach of environmental conditions for either project have been sighted as part of this review.

The population of the Daxin County and the Jingxi County is predominantly comprised of the Zhuang cultural minority along with Han Chinese. There are no reported significant cultural heritage sites, within or surrounding the Daxin Manganese Projects. There are a total of seven villages within the boundary of Mining Licence No. 1000000620030. CITIC Dameng Mining has not reported any issues associated with these villages, including any outstanding compensation issues.

Public consultation programs on the development of the Daxin Projects were completed as part of the EIA reports. The results of the programs showed that community support for the projects was high. However, the concerns were expressed for the potential water pollution, air/dust pollution and land disturbance impacts arising from the project.

In addition to the above general public consultation, there have also been specific community concerns raised over the location/development of the Daxin Manganese Oxide Plant. CITIC Dameng Mining has stated that these concerns were raised in 2006 and have now been addressed through a separate and dedicated public consultation program. No other records of public complaints in respect to the environmental management of the Daxin Projects have been sighted as part of this review.

Chongzuo Projects: The Chongzuo Project is located within the Industrial Park just outside Chongzuo City. There are no communities living in close vicinity to the industrial park. The predominant land use in the park is industrial uses and surrounding the industrial park is mainly agricultural land use.

CITIC Dameng reported to SRK that community consultant and public participation would be carried out by the park management administration. The development of the industrial park is a provincial government initiative to bring development and business to the surrounding local area. There are no reported significant cultural heritage sites, within or surrounding the Chongzuo Projects.

Tiandeng Projects: The Tiandeng Project is located adjacent to the Daren Village (approximately one kilometer from the project site) within the Chongzuo City and Tiandeng County. The relationship with the Tiandeng County and Chongzuo City and other local statutory bodies is reported to be positive. No notices of breach of environmental conditions for either project have been sighted as part of this review.

Qinzhou Project: The Qinzhou Manganese Project is located approximately 250 kilometers south of Nanning City within the Guangxi Province in the industrial district of Qinzhou Harbour City. In 2003/2004 the Qinzhou EPB issued two written environmental breaches (stop work orders) for the construction of the Qinzhou Project without an EIA and government approval. These issues have now been resolved and the current relationship with the local government is reported to be good. No records of public complaints in respect to the environmental management of the Qinzhou Projects have been sighted as part of this review.

Bembélé Project: The Bembélé mine and concentrator site is located approximately 22km north of Ndjole in Moyen-Ogooue Province of Gabon. It is administratively governed by Ndjole town. The property can be accessed via a logging road of 36km from Ndjole to the mine site. The Ogooue River flows through the east of Ndjole to the Port-Gentil Harbor. The EIA states a public consultation and community assessment was conducted as part of the assessment.

Occupational health and safety

The CITIC Dameng project has been assessed in accordance with a series of decrees from the State and Provincial Safety Supervision Bureau and methods for inspection and completion acceptance over safety facility constructions in non-coal mines.

Company safety records indicate that from January 2005 to December 31, 2008, the Company recorded one fatality, no major injuries and 43 minor injuries. The fatality that was recorded was due to operating a machine contrary to instructions. The statistics compare well with other mining companies in China.

Operating Cost

Major cash operating cost inputs to the project are consumables (raw materials and/or chemical reagents), on and off-site administration, and electricity, water and other services. The average electrical power costs of the Company in 2009 were 0.4312 Renminbi per kilowatt hour (RMB/kWhr) to 0.7813RMB/kWhr. Most water usage is provided by the Company while the cost of living water is about 25 Renminbi per tonne (RMB/t) and expected to increase to 31RMB/t. This is paid annually at a negotiated price of 100,000 Renminbi (RMB) which is expected to rise in subsequent years. The average salary for workers is 25,000RMB per year (RMB/a) and ranges between 20,000 to 200,000RMB/a for management staff. The cash cost to produce one tonne of concentrate for mining and processing combined with transportation between mine and concentrator in 2009 was 139.62 RMB/t for open-pit, 119.11 RMB for underground at Daxin mine and 55.48 RMB/t for Tiandeng mine. The cost to produce one tonne of manganese powder in 2009 was 74.69 RMB (see table below).

		Daxin Mining					
Year	Unit	Open-pit	Underground	Daxin Concentrator	Daxin Mn Powder Plant	Tiandeng Mining	Tiandeng Concentrator
2008	RMB	88.84	88.16	30.99	103.08	17.98	36.75
2009	RMB	112.16	91.64	27.46	74.69	18.34	37.14
2010.1-6 . . .	RMB	80.66	98.74	25.01	73.38	19.88	41.50

At the electrolytic manganese plants, the cash costs of producing one tonne of corresponding product with an industrially acceptable purity in 2009 were 7,998 RMB for Daxin, 11,179 RMB for Start and 11,640 RMB for Tiandong. In 2009, the cash costs of producing one tonne of manganese sulphate and electrolytic manganese dioxide (EMD) was 2,443 RMB and 5,665 RMB, respectively. For the smelters, the cash costs of producing one tonne of alloy corresponding product with an industrially acceptable purity in 2009 were 4,500 RMB for Dabao 6,717 RMB for Tiandeng and 6,855 RMB for Qinzhou, respectively (see the following table).

		Daxin Mn	Electrolytic Plant			Daxin	Smelter		
Year	Unit	Sulphate Plant	Daxin	Start	Tiandong	EMD Plant	Dabao	Tiandeng	Qinzhou
2008	RMB	2,923.49	10,560.25	13,156.93			6,980.77	9,180.30	10,962.05
2009	RMB	2,443.62	7,998.57	11,179.70	11,640.70	5,665.80	4,500.17	6,717.74	6,855.77
2010.1-6 ..	RMB	2,619.47	9,325.19	11,603.25	11,534.06	5,589.23	5,147.82	8,697.84	8,608.95

Capital Cost and Investment

CITIC Dameng plans to invest approximately 2,716.12M RMB from 2010 to 2012 in ongoing projects (1,592.09M RMB) including expanding current mining and concentrating operations, Bembélé concentrator and other plan constructions; new projects development and constructions (1,008.60M RMB) covering Daxin 800,000tpa underground mining development, Daxin, Tiandong and Start electrolytic Mn plants expansions; and technical innovation projects (115.43M RMB). Table 10-4 lists the details of the capital costs and investment areas, from 2010 to 2012. In SRK's opinion, the proposed capital investments are sufficient and likely to achieve CITIC Dameng's stated targets if the capital is in place.

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Disclaimer

The opinions expressed in this report have been based on information supplied to SRK by CITIC Dameng Holdings Limited. The opinions in this report are provided in response to a specific request from CITIC Dameng. SRK has exercised all due care in reviewing the supplied information. While SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them.

Opinions presented in this report apply to the site's conditions and features as they existed at the time of the SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

1 INTRODUCTION AND SCOPE OF REPORT

CITIC Dameng Holdings Limited ("CITIC Dameng", or "the Company" or "the Client") commissioned SRK Consulting ("SRK") to undertake an independent review of the exploration, geology and resources/reserves, mines, ore processing plants, alloy smelters, and environmental issues of two operating manganese mines, the Daxin manganese mine and the Tiandeng manganese mine in Guangxi Zhuangzu autonomous region of China, and one operating manganese mine, the Bembélé Manganese Mine in Moyen-Ogooue province, Gabon, Africa. The SRK's Independent Technical Report ("ITR") is required for inclusion in documents for a proposed listing ("Proposed Listing") on the Main Board of the Stock Exchange of Hong Kong Limited ("HKSX").

The Daxin and Tiandeng operating mines are wholly-owned by the Company, and the Bembélé operating mine is 51% owned by the Company.

2 PROGRAM OBJECTIVES AND WORK PROGRAM

2.1 Program Objectives

The program objectives were to review available data, participate in a site visit, and provide the Company with both a verbal and written report.

Summary of Principle Objectives

The principle objective of this report is to provide the Company with an Independent Expert Report ("IER") suitable for inclusion in documents for the purpose of the proposed listing ("Proposed Listing") of shares of CITIC Dameng Holdings Ltd on the main board of the Stock Exchange of Hong Kong Limited ("HKSE").

Outline of Work Program

The work program involved two phases:

Phase 1: to review information provided, take site visit and inspect CITIC Dameng's properties, discuss with Company employees, geological brigade professionals and consultants who conducted the geological exploration and feasibility study, and conduct the survey engineering, samples and resources verifications on these properties.

Phase 2: to analyze the data provided by the Company and generated by SRK, writing a draft report, consideration of the Client's feedback and finalizing the report.

2.2 Reporting Standard

This Report has been prepared to comply with the listing rules of The HKSE. The Report has also been prepared to the standard of a Technical Assessment Report under the guidelines of the VALMIN Code. The VALMIN Code is the code adopted by the Australasian Institute of Mining and Metallurgy (AusIMM) and the standard is binding upon all AusIMM members. The VALMIN Code incorporates the JORC Code for the reporting of Mineral Resources and Ore Reserves.

This Report is not a Valuation Report and does not express an opinion as to the value of mineral assets. Aspects reviewed in this Report do include product prices, socio-political issues and environmental considerations. SRK does not express an opinion regarding the specific value of the assets and tenements involved.

2.3 Work Program

SRK is not professionally qualified to opine upon and/or confirm that CITIC Dameng has 100% control of the underlying tenements and/or has any unresolved legal matters relating to any transfer of ownership or associated fees and royalties. SRK has therefore assumed that no legal impediments regarding the relevant tenements exist and that CITIC Dameng has legal rights to all underlying tenements as purported. Assessing the legal tenure and right to prospects of CITIC Dameng is the responsibility of legal due diligence conducted by entities other than SRK.

2.4 Work Program

The work program for this project consisted of review of data provided by the Company; travel to the project sites in Daxin and Tiandeng counties, Guangxi Zhuangzu autonomous region, China and Bembélé district, Moyen-Ogooue province of Gabon; inspection of operations; collection of related documents; discussions with employees, geological brigade professionals and consultants to the Company; verifications on the original survey engineering, samples and resources of these properties; and analysis of data and preparation of this report.

2.5 Project Team

The SRK team members and their technical area of responsibility and titles are shown in Table 2-1.

Table 2-1: SRK Team Members and Responsibility

Consultant	Title and Responsibility
Dr Yiefei Jia	Principal Consultant/geology and resource estimates, project manager, report compilation
Liqin Yu	Geologist/assisting geological data collection & verification
Lanliang Niu	Senior Processing & Metallurgical Engineer/processing review
Quiji Huang	Senior Mining Engineer/mining review
Yonggang Wu	Mining Engineer/engineering survey verification
Andrew Lewis	Senior Environmental Engineer, environmental & permit review
Chris Huang	Technical Interpreter for Andrew Lewis and project coordinator
Mike Warren	Principal Consultant/peer review and quality control

Yiefei Jia, *PhD, MAusIMM,* is a principal consultant, with over 18 years geological experience in exploration, development, and scientific research of various types of mineral deposits, including precious metals (Au, Ag, and PGE), base metals (Co, Ni, Cu, Zn, Pb), as well as other metal deposits in different geological settings in North America, Australia and China. He also has extensive experience in project management, exploration design and resources assessment and has coordinated a number of due diligence projects with technical reports either for fund raising or overseas stock listing such as on HKSE. ***Dr Jia was the project manager for this report.***

Liqin Yu, BSc, is geologist with SRK China's Beijing Office. He was graduated from Chang's University. He is engaged in drawing all kinds of maps of geology by computer. He is skilled in applications of MapInfo, MapGIS, CorelDRAW, ArcGIS, AutoCAD, Photoshop software. ***He assisted assisting Dr Jia in reviewing the geology and resource and data verification.***

Huang Qiuji, *B.Eng.,* is a senior mining engineer with SRK Consulting China, graduated from Central South University of Mining and Metallurgy in 1982. He used be mining directors for a few gold mines in the southwest region of China. After that he joined the Gold Administration Bureau of Guangxi province

in charge of the supervision and direction of mine construction mine planning and mining technology developing. Mr Huang is an expert on mine construction, mining technology, mine production and mine planning. ***Mr.Huang was responsible for the mining review.***

Mr. Yonggang Wu, MSc, is a mining engineer with SRK Consulting China. He received his master's degree in mine engineering from the Jiangxi University of Science and Technology in 2007. He is specialized in mine cartography software including "MineSight", "ArcGIS", and "AutoCAD". He had been involved in the Xiongcun copper mine resource estimation project in Tibet in 2006. ***He was responsible for the engineering survey verification.***

Lanliang Niu, BEng, MAusIMM is a senior mineral processing engineer, who graduated in 1987 from Beijing University of Science and Technology majoring in ore processing. He has worked on the industrial testing of gold leaching with low grade ores, managed or participated in processing and metallurgical testing for more than 10 precious and non-ferrous metals. After joining SRK, he is responsible for the ore processing and metallurgical scope of work and involved in many key projects ***He reviewed the metallurgical and processing aspects of the projects for this report.***

Andrew Lewis, BEng, MAusIMM is a senior environmental engineer with SRK Consulting China. He has worked extensively in China and Asia for nearly a decade. He has worked on a wide variety of different projects ranging from technology transfer to environmental health and safety. His current focus is on environmental compliance, permitting, auditing and impact assessments on mining projects in China and Mongolia. He also works on environmental management systems, pollution prevention/mitigation and remediation of contaminated sites. ***Mr. Lewis is responsible for the review of environmental issues.***

Mike Warren, BSc (Mining Eng), MBA, FAusIMM, FAICD, is a mining engineer with over 30 years experience. He specializes in open pit and underground mining analysis, due diligence reports and mine evaluations. Mr Warren is a JORC Code competent person and principal consultant (project evaluation) with SRK Australia. ***He completed the Peer Review of the report to ensure its quality.***

Many documents were provided in Mandarin. The SRK team included translator, Mr "Chris" Huang who has some experience in the environmental industry.

The SRK team was provided with some historical data and technical reports prior to traveling to inspect the mine site. They were provided in both digital and printed form. The team members visited the Daxin and Tiandeng mines, processing plants and smelters in Guangxi Zhuangzu autonomous region of China over a six day period between April and May 2010. In June 2010 the team members visited the Bembélé mine and processing plant in Moyen-Ogooue province of Gabon over a seven day period. During the site visits the team inspected the physical aspects of the project, held discussions with employees and consultants of the Company and collected additional data. After data analysis, the team members provided written reports which were compiled into a draft report and was reviewed by Mike Warren as required by SRK's peer review and quality management procedures. The draft report was also reviewed for factual content by CITIC Dameng.

Statement of Qualification of the Competent Person, Dr Yiefei Jia:

As the author of portions of the Report for CITIC Dameng Holdings Ltd. on certain mineral properties in Liaoning province, the People's Republic of China, I, Yiefei Jia, do hereby certify that:

- I am employed by, and carried out the assignment for SRK Consulting China Limited, located at:

  B1205 COFCO Plaza
  8 Jianguomen Nei Dajie
  Beijing, People's Republic of China 100005
  Phone: 86-10-8512 0365, Fax: 86-10-8512 0385, Email: yjia@srk.cn

- I graduated with a Bachelor's degree in Geology and Geochemistry from Jilin University, China (B.Sc.) in 1987, a Master's degree in Geochemistry from Jilin University, China (M.Sc.) in 1990, and a Doctor's degree in Geology and Geochemsitry from the University of Saskatchewan, Canada (Ph.D.) in 2001.

- I am a member of the Australasian Institute of Mining and Metallurgy (MAusIMM) (No. 230607).

- I have been directly involved in geological research and mineral exploration for more than 18 years.

- I have read the definition of "competent person" set out in HKEx listing rules and certify that by reason of my education, affiliation with a professional associations (as defined in the listing rules) and past relevant work experience, I fulfill the requirements to be a "competent person" for the purposes of the technical report.

- I have visited the CITIC Dameng's properties.

- I am the primary author responsible for the preparation and compilation of the report, and supervising Mr. Jinhui Liu, Mr. Pengfei Xiao and Mr Hong Gao to prepare geology and resource section, and ore processing section.

- I have had no previous involvement with the CITIC Dameng's Project. I have no interest, nor do I expect to receive any interest, either directly or indirectly, in the CITIC Dameng's Project, nor in the securities of CITIC Dameng Holdings Limited.

- I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Technical Report, the omission to disclose which makes the Technical Report misleading.

- I am independent of the issuer applying all of the tests in sections 18.21 and 18.22 of the listing rules of HKEx.

- I consent to the filing of the Technical Report with HKEx and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Mr Mike Warren. Mr Lanliang Niu and Mr. Andrew Lewis are also independent competent persons on overall quality control, ore processing, and environmental and social issues. Their qualifications have been outlined in the short bios above.

2.6 Statement of SRK Independence

Neither SRK nor any of the authors of this Report has any material, present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK's fee for completing this Report is based on its normal professional daily rates plus reimbursement of incidental expenses. Payment of that professional fee is not contingent upon the outcome of the Report.

None of SRK or any authors of this report have any direct or indirect interest in any assets which had been acquired, or disposed of by, or leased to any member of the Company or any of the Company or any of its subsidiaries within the two years immediately preceding the issue of this transaction.

None of SRK or any authors of this report has any shareholding, directly or indirectly in any member of the Group or any right (whether legally enforceable or not) to subscribe for or to nominate persons to subscribe for securities in any member of the Group.

2.7 Warranties

CITIC Dameng has warranted to SRK that full disclosure has been made of all material information and that, to the best of their knowledge and understanding, such information is complete, accurate and true. SRK has no reason to doubt these warranties.

2.8 Consents

SRK consents to this Report being included, in full, in documents that CITIC Dameng proposes to submit to the HKSE, in the form and context in which the technical assessment is provided, and not for any other purpose.

SRK provides this consent on the basis that the technical assessments expressed in the Executive Summary and in the individual sections of this Report are considered with, and not independently of, the information set out in the complete Report and the cover letter.

2.9 SRK Experience

SRK Consulting is an independent, international consulting group with extensive experience in preparing independent technical reports for various stock exchanges around the world (see www.srk.com for a review). SRK is a one-stop consultancy offering specialist services to mining and exploration companies for the entire life cycle of a mining project, from exploration through to mine closure. Among SRK's more than 1,500 clients are most of the world's major and medium-sized metal and industrial mineral mining houses, exploration companies, banks, petroleum exploration companies, agribusiness companies, construction firms and government departments.

Formed in Johannesburg, South Africa, in 1974 SRK now employs more than 900 professionals internationally in 39 permanent offices on six continents. A broad range of internationally recognized associate consultants complements the core staff.

SRK Consulting employs leading specialists in each field of science and engineering. Its seamless integration of services, and global base, has made the company a world's leading practice in due diligence, feasibility studies and confidential internal reviews.

The SRK Group's independence is ensured by the fact that it holds no equity in any project and that its ownership rests solely with its staff. This permits the SRK Group to provide its clients with conflict-free and objective recommendations on crucial judgment issues.

SRK China was established in early 2005, and has mainly worked on Chinese mining projects independently or together with SRK's other offices, mainly SRK Australasia (see www.srk.cn and www.srk.com.au for a review). We have prepared dozens of independent technical reports on mining projects for various companies who acquired Chinese projects or who completed public listings on overseas stock exchanges. A summary list is shown in Table 2-2.

Table 2-2: Recent Reports by SRK for Chinese Companies

Company	Year	Nature of Transaction
Yanzhou Coal Limited (company listed on the Stock Exchange of Hong Kong Limited)	2000	Sale of Jining III coal mine by parent company to the listed operating company
Chalco (Aluminium Corporation of China)	2001	Listing on the Stock Exchange of Hong Kong Limited and New York Stock Exchange
Fujian Zijin Gold Mining Company	2004	Listing on the Stock Exchange of Hong Kong Limited
Lingbao Gold Limited	2005	Listing on the Stock Exchange of Hong Kong Limited
Yue Da Holdings Limited (company listed on the Stock Exchange of Hong Kong Limited)	2006	Proposed acquisition of shareholding in mining projects in P.R. China
China Coal Energy Company Limited (China Coal)	2006	Listing on the Stock Exchange of Hong Kong Limited
Sino Gold Mining Limited	2007	Dual listing on the Stock Exchange of Hong Kong Limited
Xinjiang Xinxin Mining Industry Company Limited	2007	Listing on the Stock Exchange of Hong Kong Limited
Espco Technology Holdings Limited	2008	An acquisition of shareholding in Tongguan Taizhou Gold-Lead projects in P.R. China
Kiu Hung International Holdings Limited	2008	An acquisition of shareholding in coal projects in inner Mongolia, PRC
China Shenzhou Mining and Resources Inc	2008	Listing (SHZ) on the American Stock Exchange
Green Global Resource Ltd	2009	An acquisition of shareholding in iron project in Mongolia
Ming Fung Jewellery Group Holdings Ltd	2009	An acquisition of shareholding in gold project in Inner Mongolia, P.R. China

3.0 Forward Looking Statements

Estimates of Mineral Resources, Ore Reserves and mine and processing plant production are inherently forward-looking statements, which, being projections of future performance will necessarily differ from actual performance. The errors in such projections result from inherent uncertainties in the interpretation of geologic data, variations in the execution of mining and processing plans, the ability to meet construction and production schedules due to many factors including weather, availability of necessary equipment and supplies, fluctuating prices and changes in regulations.

The possible sources of error in forward-looking statements are addressed in more detail in the appropriate sections of this report. Also provided in the report are comments on the risks inherent in the different areas of mining and processing operations.

3 LOCATION AND PROJECTS

3.1 Projects in Guangxi Zhuangzu Autonomous Region, China

3.1.1 Location and Access

Daxin Manganese Mine:

Daxin mine site and processing plant is located approximately 50km west of Daxin county, Guangxi Zhuangzu autonomous region, PRC. It is governed administratively by the town of Xialei. Its geographical coordinates are approximately 22°54'N to 22°56'N latitude and 106°40'E to 106°46'E longitude. The property is accessed via national highway (G075) of about 40km from Nanning, the capital city of Guangxi Zhangzu autonomous region, and a provincial concrete road (S213) of 170km connecting Daxin county. The project area is shown in Figure 3-1 and Figure 3-2.

Figure 3-1: Location Maps of Guangxi Autonomous Region, PRC

Tiandeng Manganese Mine

Tiandeng mine site and processing plant is located approximately 20km north of Tiandeng county, Guangxi Zhuangzu autonomous region, PRC. Its geographical coordinates are approximately 22°54′N to 22°56′N latitude and 106°40′E to 106°46′E longitude. The property is easily accessed via national highway (G075) of about 130km from Nanning, the capital city of Guangxi Zhangzu autonomous region, and a local gravel-paved road followed by a partially concrete road of 45km to the mine site. The project area is shown in Figure 3-2.

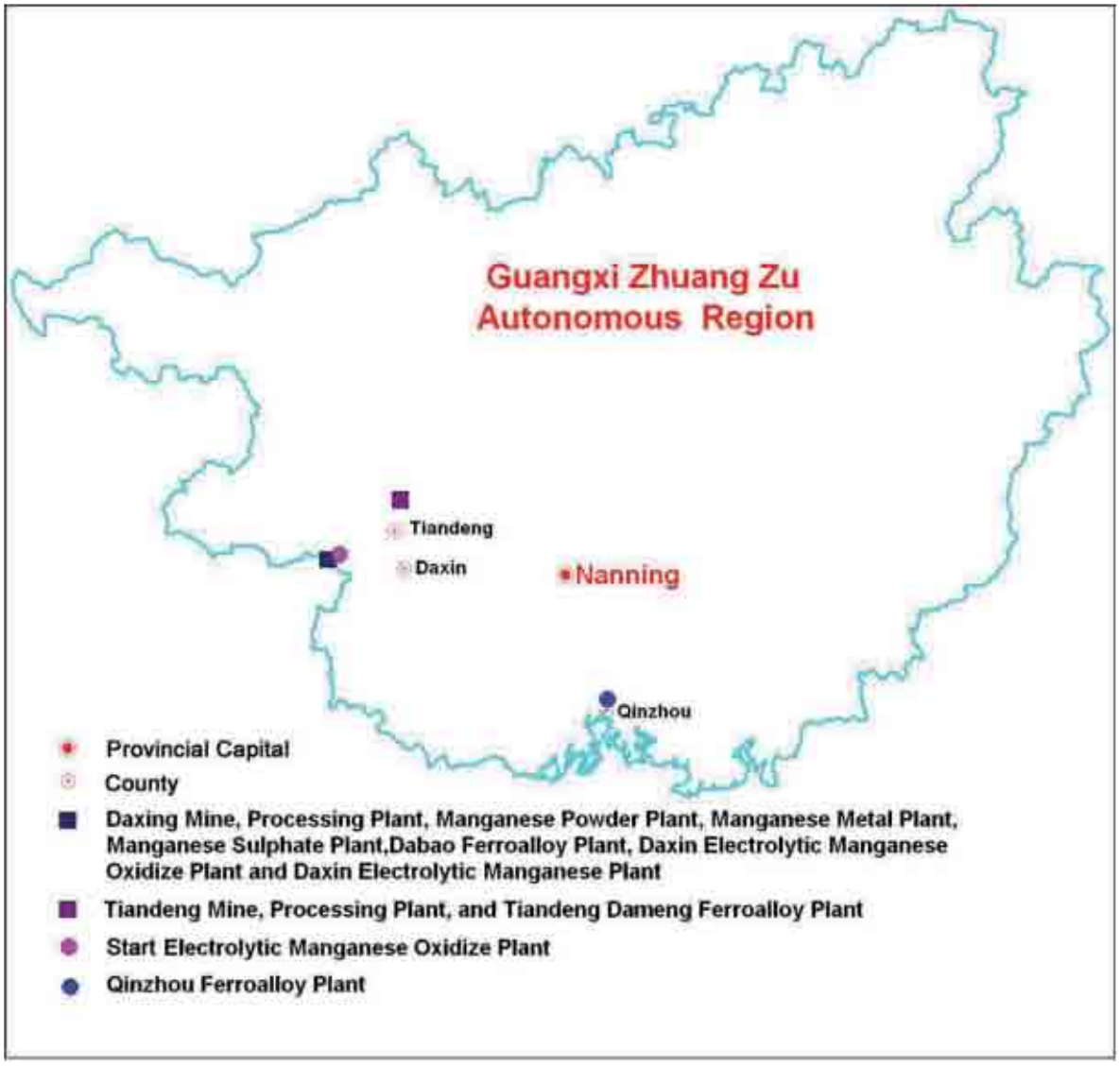

Figure 3-2: General Location Map

The locations of Daxin and Tiandeng mines and associated metallurgical and processing plants are indicated in solid squares. The locations of the ferroalloy smelters and other plants are indicated in solid circles.

3.1.2 Climate and Physiography

The project area has a subtropical and mountainous humid climate with a relatively cool spring and autumn and warm to hot summer. The annual average temperature is about 20 degrees centigrade

(°C). The annual precipitation ranges from 1349 to 1917mm mainly concentrated between May and September, with average annual evaporation of 1216.4mm. There are no frost seasons during the year.

The mines are located in a mountainous region with elevations ranging from 241 to 845m above sea level ("ASL"), with relief of 600m; higher in altitude in the west than the east. The main river is the Xialei River passing through the mining area from the west to the east, then converging into the Heihe River.

In the mining district, there is a small population consisting mainly of the Zhuangzu minority people. The local economy is heavily based on agriculture with the main crops of rice and corn. There are major power grids adjacent to the projects and a power line extends to the property area. Electricity is provided by the Southern Electrified Wire Netting Company.

3.2 Bembélé Manganese Mine in Moyen-Ogooue Province, Gabon

3.2.1 Location and Access

The Bembélé mine site and processing plant is located approximately 32km north of the town of Ndjole in Moyen-Ogooue province of Gabon (Figure 3-3). It is governed administratively by Ndjole. Its geographical coordinates are approximately 00°07'35"N to 00°14'17"N latitude and 10°45'00"E to 11°12'00"E longitude. The mine site can be accessed via a logging road of 36km from Ndjole. The Ogooue River flows through the east of Ndjole to the Port-Gentil harbor.

Figure 3-3: Location Maps of Bembélé, Gabon

3.2.2 Climate and Physiography

The Bembélé project area is located in the central west part of Gabon with a typical equatorial rainforest climate. The temperature is high and wet with annual average temperature of 26°. The annual precipitation ranges from 1600 to 3000mm, mostly occurring between March and May and between September and November.

The Bembélé project area is located in virgin forest with well developed vegetation. Much of the project area is mountainous with hill slopes exceeding 25°. Generally elevations range from 750 to 100m ASL, with relief of 654m. The area is rich in water resources with creeks and streams that flow to the Ogooue River. There are no residents in the mining district. About 10,000 people live locally on the hills of the mountain near Ndjole. Electricity is supplied by the government for lighting only. There are only two logging companies, a few processing and maintenance companies and commercial shops. Living materials are dependent on imports and are expensive compared to local earnings.

3.3 Mining Licenses

CITIC Dameng's manganese projects includes two mining licenses for Daxin and Tiandeng mines in Guangxi Zhuangzu autonomous region, PRC, and one mining licence for Bembélé mine in Moyen-Ogooue province, Gabon, Africa. The Company owns three ore processing plants with each operating mine; three ferroalloy plants in Daxin and Jingxi counties and Qinzhou city, respectively; one electrolytic manganese oxidize plant, two electrolytic manganese plants and one manganese sulphate facility in Daxin county. Table 3-1 summarizes information of the mining licenses. Copies of original permits are provided in Appendix 1.

Table 3-1: Details of Properties Owned by CITIC Dameng

Licence No.	Property name	Area[2] (km)	Expiry date	Designed capacity (tpa)	Production in 2009 (tpa)	Percentage owned by CITIC Dameng
Operating manganese mines						
1000000620030	Daxin	10.616	21/01/2035	1,000,000	814,999	100
C1000002008122120001473	Tiandeng	4.5948	02/12/2024	500,000	294,100	100
N° 001235/PR/MMEPRH /SG/ DGMG/DEPM	Bembélé	20.000	05/12/2017	1,150,000	—	51

4 GEOLOGICAL AND MINERAL INVENTORY ASSESSMENT

4.1 Daxin Manganese Mine

4.1.1 Regional Geology

As shown on the map below, Figure 4-1, Daxin manganese mine is located in an area at the southeast part of the Shangyin-Xialei syncline. The syncline extends west to east and its axis dips east at a very low angle. Main strata spread over the area are the Devonian and the Carboniferous limestone, argillaceous limestone, siliceous limestone, clastic limestone and mudstone. Overlying rocks are the Quaternary alluvium, proluvium, and aeolian sedimentary sequences. Manganese mineralization mainly occurs in the Upper Devonian Sequence of argillaceous limestone and siliceous limestone. Faults and folds are well developed around the area. Volcanic rocks are not very common but there are some mafic intrusions which are composed of dolerite and basalt.

This region in the Guangxi Zhuangzu autonomous region of China is known as a district of manganese mineralization. The manganese properties, including Daxin and Tiandeng mines, are sedimentary-type deposits, and lithologically are controlled by the Upper Devonian and the Lower Triassic dark bedded siliceous mudstone and limestone and clastic limestone. Regionally there are also a number of deposits and/or occurrences such as silver, tin, lead-zinc, and bauxite mineral deposits.

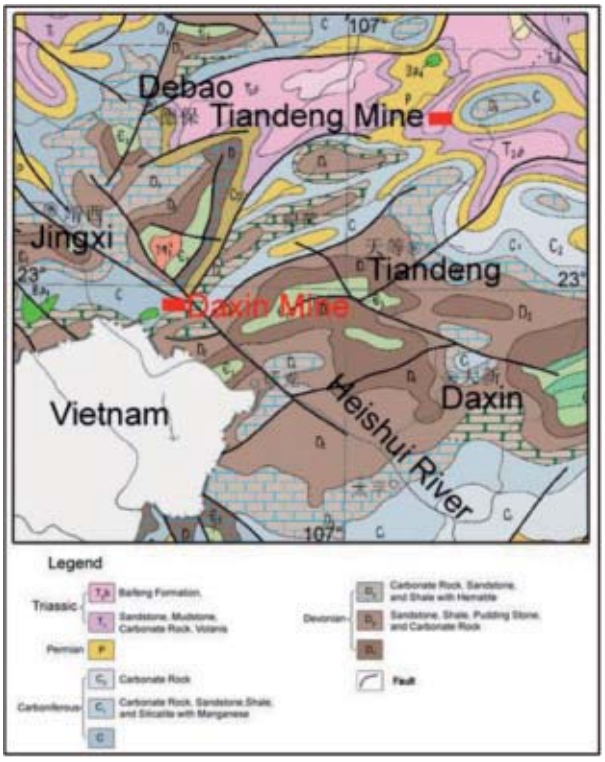

Figure 4-1: Regional Geological Map of Daxin and Tiandeng Mines

4.1.2 Geology of Daxin Manganese Mine

The main strata within the mining area are the Devonian and Carboniferous carbonates (Figure 4-2). From oldest to youngest they include the Middle Devonian Dongganling Formation (D_2d), made up of dark grey to grey bedded limestone with silicalite interlayers, and light grey thick-bedded limestone with dolomite; the Upper Devonian Liujiang Formation (D_3l), composed of dark-grey to grey siliceous bedded limestone with silicalite interlayers, and clastic limestone; the Upper Devonian Wuzhishan Formation (D_3w), consisting of mudstone and argillaceous limestone in the lower part, the manganese oxide and manganese carbonate ore bodies in the middle part, and siliceous limestone and silicalite in the upper part.

The overlying strata are the Lower Carboniferous Yanguang Formation (C_1y) that consists of siliceous mudstone and argillaceous limestone with siliceous interlayers in the lower part, siliceous limestone and mudstone, and clastic limestone in the upper part and the Lower Carboniferous Datang Formation (C_1d), composed of dark grey to grey siliceous and clastic limestone with siliceous interlayer. The Upper Carboniferous Huanglong Formation (C_2h) is made up of dark grey to grey limestone with siliceous interlayer and the Quaternary alluvium, proluvium, and aeolian sediments.

The mine area is located in the southeast limb of a large-scale west to east trending syncline. It is about 9km long and 2.0 to 2.5km wide. A large amount of small scale folds were discovered and

delineated by a previous drilling program which has caused the shape of ore bodies in the mine area to be more complex. A few small-sized mafic intrusions of dolerite and basalt are also shown in the mine area.

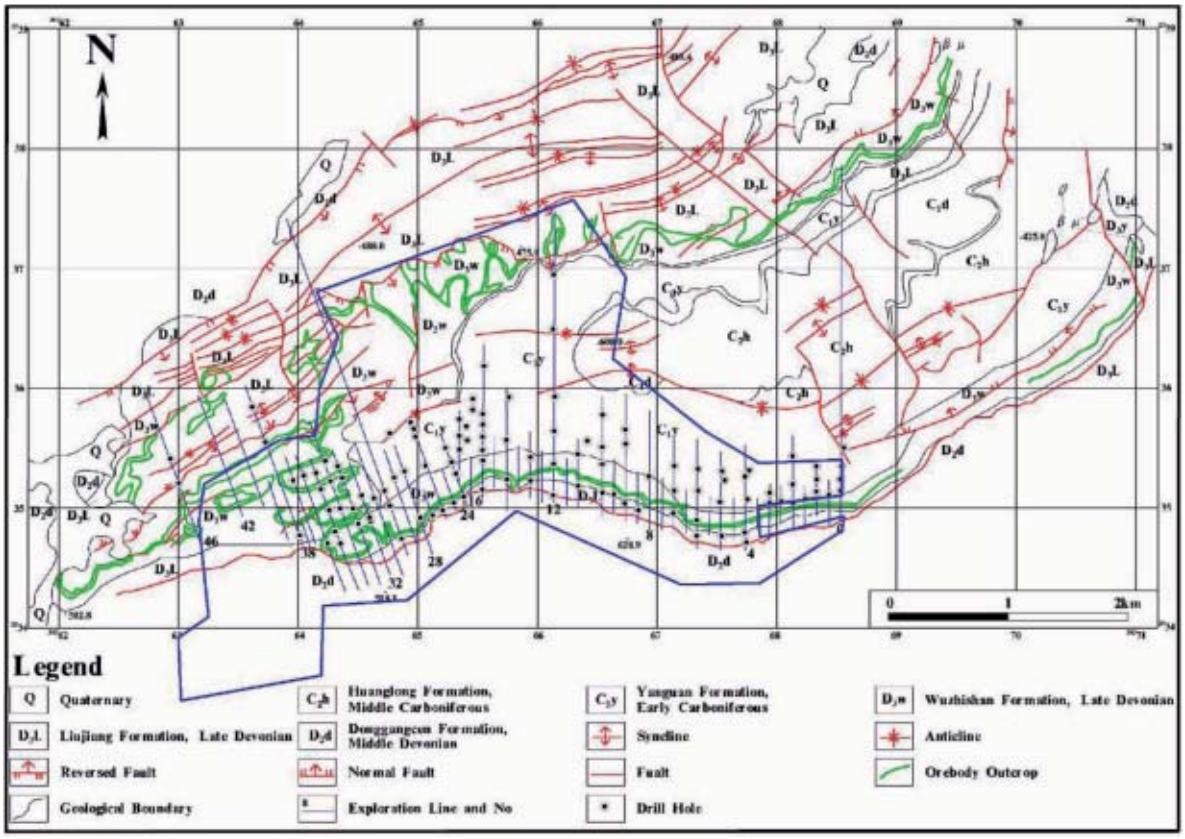

Figure 4-2: Geological Map of Daxin Mine

4.1.3 Orebody Geology

Controls on Mineralization

Manganese ore bodies were hosted in the bedded limestone of the middle part of the Late Carboniferous Wuzhishan formation. The ore bodies are continuous and stable along both strike and downdip with bedded shapes. Three manganese ore bodies had been defined and were controlled by the large scale Shangyin-Xialei syncline and small scale folds. As shown on Figure 4-2, the manganese mineralized zone is about 9.0km long along the southern and northern limbs of Shangyin-Xialei syncline. The manganese mineralized bodies dip southwest at an average angle of 70° in the southern limb and northwest at an average angle of 25° in the northern limb. Three bedded manganese ore bodies, parallel to each other with stable continuity have been defined in the mine area. Manganese oxide ore occupies the upper part of the ore bodies and manganese carbonate ore is localized in the deep part of the ore bodies.

Ore body 1

Ore body 1 is 0.50 to 3.23m thick, with an average thickness of 1.77m in the south and of 1.34m in the north. It is located between exploration lines 4 and 34 in the southern mine area and is thicker than other ore bodies of the mine area (Figure 4-3 and Figure 4-5). Manganese grades for manganese oxide ore range from 19.94 to 46.94% with an average grade of 36.74%. Manganese grades in the manganese carbonate ore range between 14.48 and 34.32% with an average grade of 22.00%.

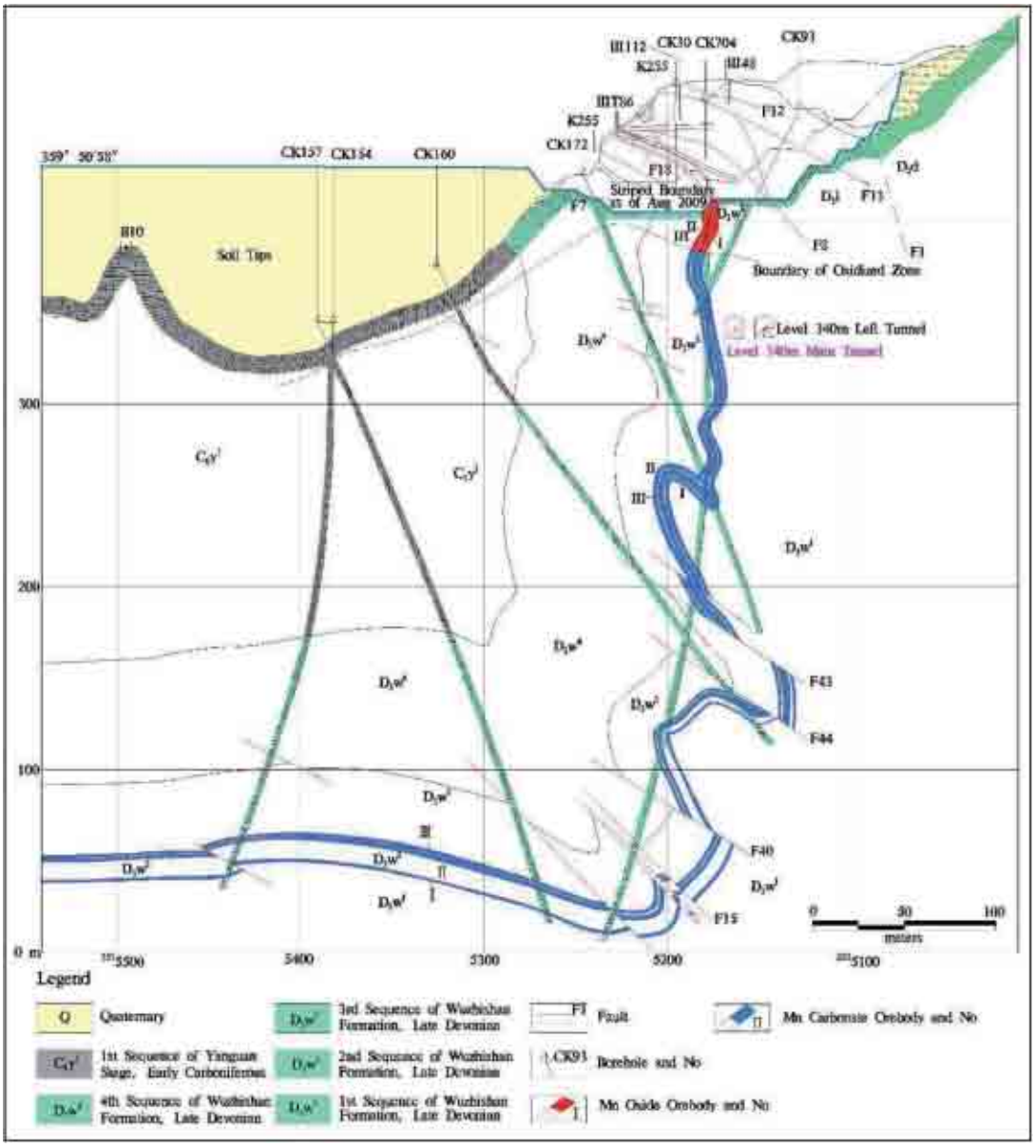

Figure 4-3: Cross Section of Exploration Line 13

Ore body II

Ore body II is 0.60 to 4.96m thick, with an average thickness of 2.49m in the south and 1.46m in the north. The thickest part of the ore body is 3.5m and is located between exploration lines 5 and 9 in the southern mine area (see Figure 4-4). Manganese grades for manganese oxide ore range from 28.36 to 40.84% with an average grade of 35.23%. Manganese grades in the manganese carbonate ore range between 15.46 and 30.05% with an average grade of 22.92%.

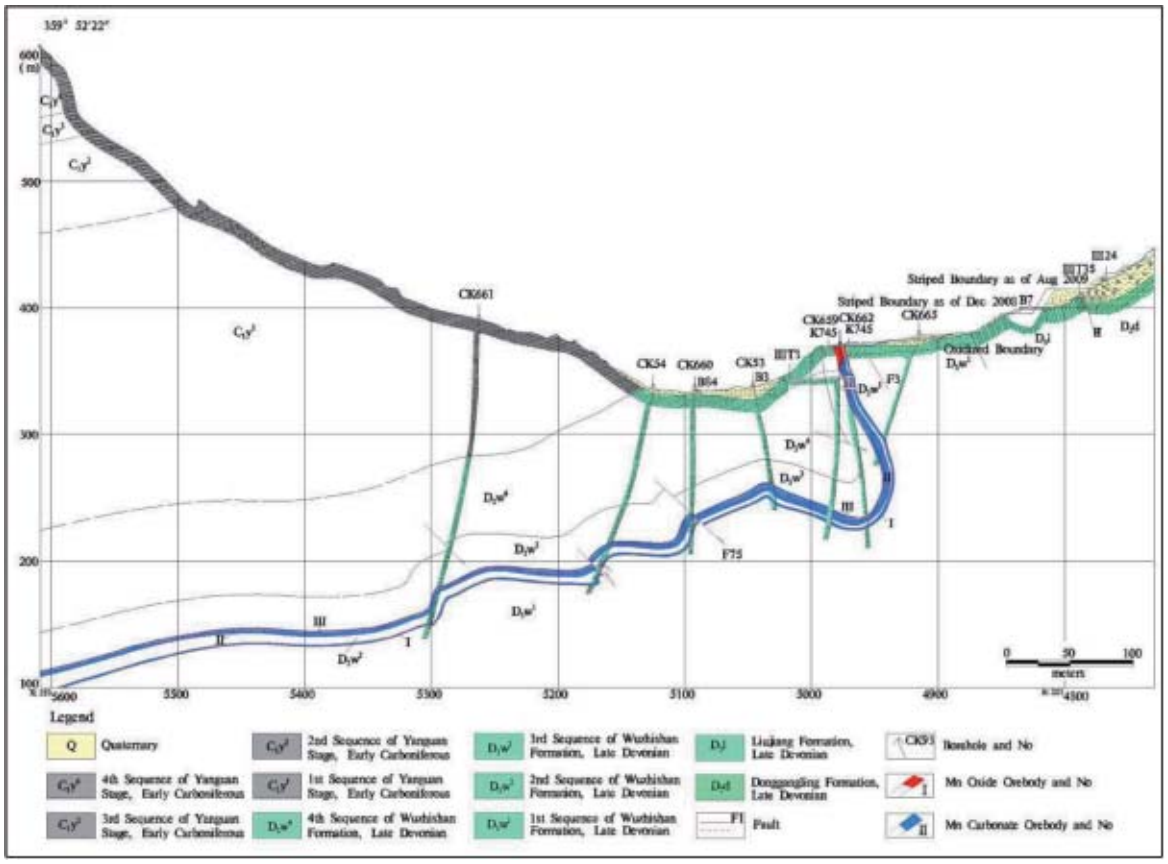

Figure 4-4: Cross Section of Exploration Line 7

Ore body III

Ore body III is about 0.50 to 3.13m thick with average thicknesses of 1.77m in the south and 1.10m in the north. It is located between exploration lines 1 and 26 in southern mine area and is thicker than other ore bodies of the mine area (Figure 4-3 and Figure 4-5). Manganese grades for manganese oxide ore range from 19.94 to 46.94% with an average grade of 30.50%. Manganese grades in the manganese carbonate ore range between 13.77 and 27.08% with an average grade of 18.06%.

Mineralogy

Ore minerals at Daxin are mainly manganese minerals which can be divided into two large categories of manganese oxide and manganese carbonate. The former are mainly comprised of pyrolusite, psilomelane and ramsdellite, and gangue minerals are mainly quartz, chalcedony, kaolinite and hydromica. The later are mainly comprised of rhodochrosite, manganocalcite, and kutnohorite, with less sursassite and manganhumite, and gangue minerals mainly include quartz, chlorite, biotite, calcite, dolomite, muscovite and actinolite etc.

Manganese carbonate ore is mainly characterized by a fine-grained texture and massive structure, while manganese oxide ore is mainly characterized by microaphanitic texture and gel structures.

The useful elements consist of manganese and associate component of iron (Fe 0.71-12.77%) in metallic minerals, and the harmful element is phosphorus (P 0.1-2.5%; corresponding to P/Mn ratio ≤ 0.004) which is lower than other deposits.

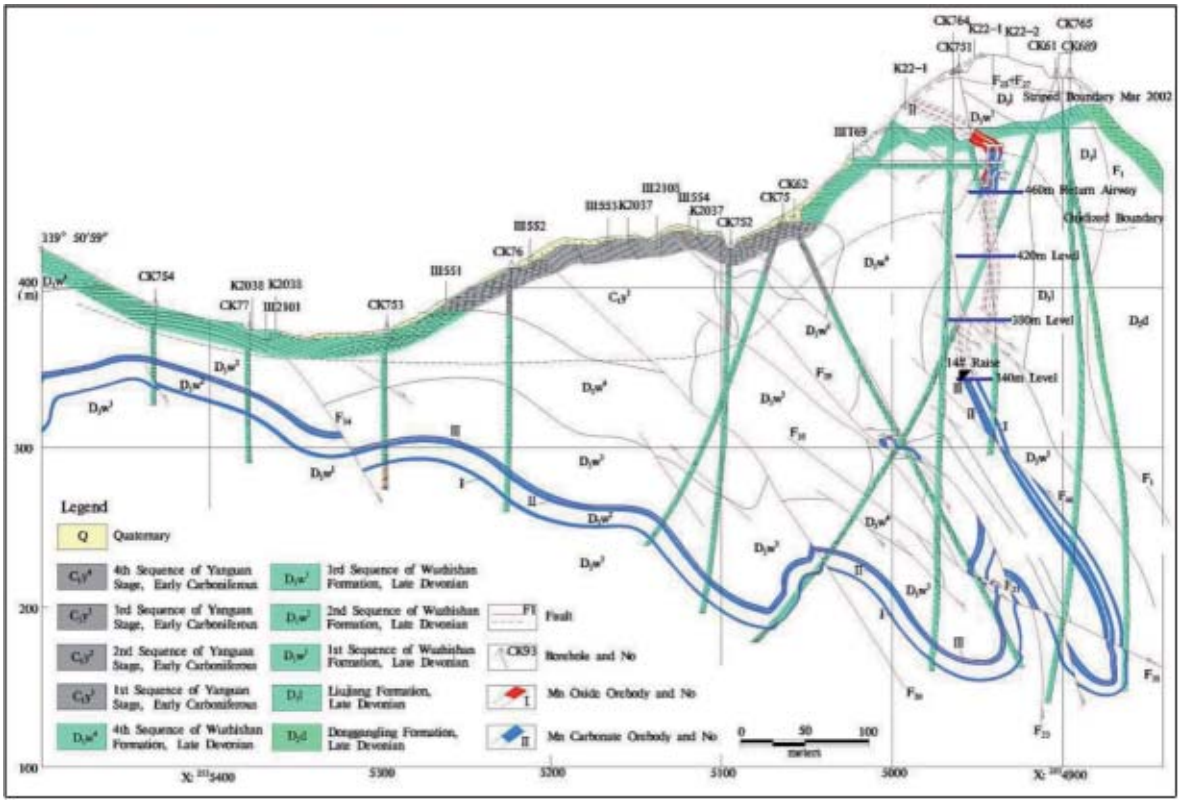

Figure 4-5: Cross Section of Exploration Line 26

4.1.4 Sampling, Analytical Procedures and Quality Control

A total of 8,459 samples from trenches (71,524.57m), shallow wells (7,528.22m), adits (8,759.87m) and drill cores (390 holes with 93,095.28m footage) were collected for resource/reserve estimate in the Daxin manganese mine from March 1962 to June 1983 by No 2 and No 4 Geological Brigades of Guangxi Bureau of Geology and Mineral Resource.

Trench samples were collected from fresh rocks in the floor of trenches by the channeling method. The channel section size is 10cm long by 5cm wide. Sample length normally range from 0.20 to 0.70m. Wall rock and ore units were sampled separately. Samples were taken from drilling cores by splitting along the core axis. The sample length is generally between 0.20 and 1m. Core recovery rate was more than 65% for all whole cores and more than 75% for mineralized intervals in the southern mine area, and more than 70% for all whole cores and more than 78% for mineralized intervals in the northern mine area.

Samples taken before 1968 and after 1972 were prepared and analyzed by the Central Laboratory of Guangxi Bureau of Geology and Mineral Resources and the Analytical Laboratory of No 4 Nanning Geological Brigade, respectively. Each sample was crushed by a jaw crusher to 3 to 5mm and

pulverized by a roller crusher to -200 mesh. Four items including Mn, Fe, P and SiO_2 were assayed in the laboratories using the ferro-sulphate volumetric analysis method, potassium chromate volumetric analysis, molybdenum-phosphovanadate colorimetric, and fluorine-potassium silicate volumetric methods.

For quality control, 846 samples were selected for internal checking and 423 samples were chosen and sent to the Central Laboratory of Hunan Bureau of Geology for external checking. Both results were acceptable. The analytical quality complies with Chinese National Analytical Standards.

4.1.5 Resource/Reserves Estimation under Chinese Code

In 1999, the Chinese Government established a new resource category system, the Chinese National Standard for Solid Mineral Resources/Reserves Classification (GB/T17766-1999). It is a three-digit system, where the last digit indicates the geological certainty: 1 stands for measured mineral resource; 2 for indicated mineral resource; 3 for inferred resource; and 4 for predicated resource. Daxin, Tiandeng and Bembélé mines have all adopted this resource category system. This system is somewhat different from the criteria used in defining a resource under the JORC Code. The comparison between different systems is provided in Appendix 2.

Nos. 2 and 4 Nanning Geological Brigades of Guangxi Bureau of Geology and Mineral Resources and Nanning Geological Survey Institute of Chinese Bureau of Metallurgy and Exploration (who are all qualified and approved Chinese independent geological consultants) have used methods and procedures which comply with Chinese standards for resource estimation.

Resource/Reserve Category

The resource/reserve estimate of Daxin manganese mine was conducted by No 2 Nanning Geological Brigade and No 4 Nanning Geological Brigade in the 1980s. Exploration drilling grids of 100m×50m, 200m×100-200m, and 400m×200m were used to estimate category B resource, category C resource, and category D resource, respectively. In November 2008, a resource/reserve audit for Daxin manganese mine was completed by Nanning Geological Survey Institute of Chinese Metallurgical and Exploration Bureau. Its resource categories are based on the General Rules for Rationalizing Solid Minerals and Geological Prospecting (GB/T13908-2002) and Geological Exploration Regulations for Iron, Molybdenum and Chromium Ore Deposits (DZ/T0200-2002). An exploration drilling grid (drill spacing) of 100m×50m was used to estimate 111b category resource. 122b category resources were estimated based on an exploration grid of 200m×100 to 200m or 400m×200m according to the different complexity of ore bodies. 333 category resources were estimated based on an exploration grid of 800m ×400m.

Cut-off's

The latest reserve/resource estimates for Daxin manganese mine were conducted by Nanning Geological Survey Institute of Chinese Metallurgical and Exploration Bureau in November 2009. The following technical parameters were used to estimate manganese resources/reserves (Table 4-1):

Table 4-1: Technical Parameters of Resource/Reserve Estimates at Daxin Mn Mine

Ore Type	High Grade Oxide Ore	Low Grade Oxide Ore	Iron-Manganese Oxide Ore	Poor Grade Oxide Ore	High Grade Carbonate Ore	Low Grade Carbonate Ore	Iron-Manganese Carbonate Ore	Poor Grade Carbonate Ore
Symbol	N1	N2	N3	N4	M1	M2	M3	M4
Cut-offs: Mn (%)		10	12	10		12	12	12
Average Grade in Single Engineering (%)	≥30	≥18	≥15	<18	≥25	≥15	≥15	<15
Mn+Fe (%)			≥30				≥25	
Mn/Fe	≥3				≥3			
Allowed P Content of per 1% Mn	≤0.006		≤0.2% (Total P)		≤0.005		≤0.2% (Total P)	
SiO_2 (%)	≤35		≤25		≤25		≤25	
Minimum Mineable Thickness (m)	0.5							
Maximum Horse Thickness (m)	0.3							

Reserves/Resources Estimation

Based on features of the three ore bodies of Daxin manganese operating mine, a polygonal method with plane projection was used to estimate resources by Nanning Geological Survey Institute in November 2009 (Figure 4-6 and Figure 4-7). By the end of August 2008, manganese oxide resources in the 111b, 122b and 333 categories were 1.742Mt at an average grade of 29.26% Mn, 1.282Mt with an average grade of 33.21% Mn and 0.432Mt with an average grade of 21.23% Mn, respectively. Manganese carbonate resources in 111b and 122b categories were 5.919Mt at an average grade of 22.78% Mn and 69.140Mt at an average grade of 20.88% Mn, respectively (Table 4-2).

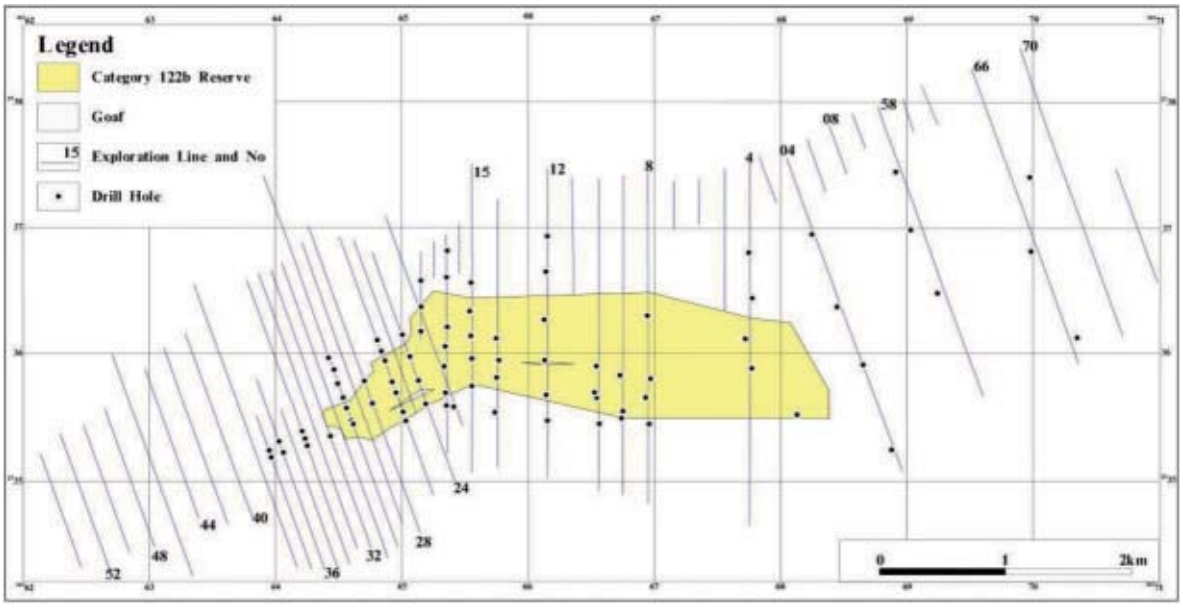

Figure 4-6: Planemetric Projection Map of Daxin Mine (Northern Part)

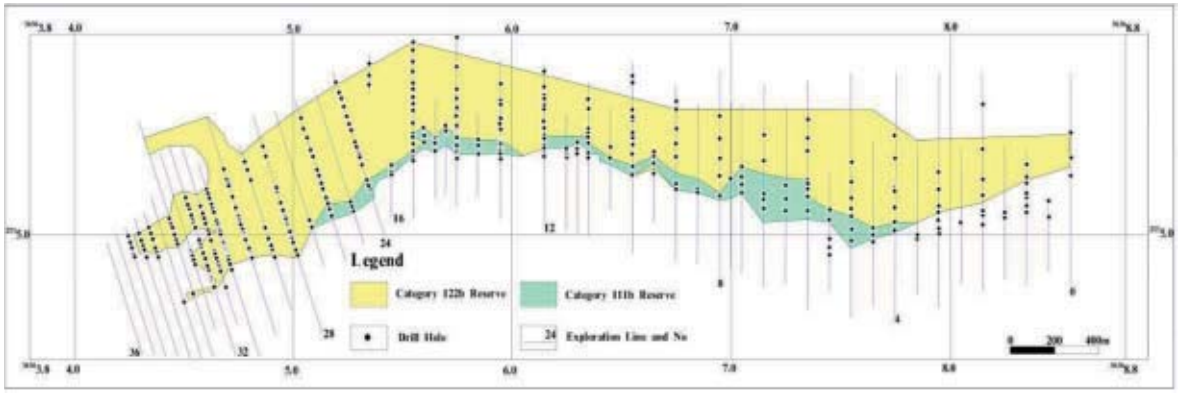

Figure 4-7: Planemetric Projection Map of Daxin Mine (Southern Part)

Table 4-2: Resource/Reserve of Daxin Mine as of November 30, 2009 — Chinese Code

Ore Type	Mining Block	Ore Body	Resource/ Reserve Category	Ore Grade Type	Resource/Reserve (t)	Average Grade (%)	
						Mn	Fe
Manganese Oxide	South Block	I	111b	N1	291,400	35.98	8.24
			111b	N2	138,800	28.61	8.04
			122b	N1	418,700	35.50	8.46
			122b	N2	3,000	26.61	12.68
			122b	N3	400	34.03	14.24
		II	111b	N1	56,800	32.96	8.76
			111b	N2	663,000	27.84	8.71
			111b	N3	127,700	35.83	12.17
			122b	N1	429,900	34.52	9.12
			122b	N2	66,400	29.06	9.14
			122b	N3	78,200	31.96	13.34
		III	111b	N1	7,400	37.09	11.94
			111b	N2	398,100	25.74	10.88
			111b	N3	9,600	31.64	13.24
			111b	N4	48,900	15.91	7.38
			122b	N1	57,200	32.83	10.18
			122b	N2	165,400	26.75	9.84
			122b	N3	62,300	32.58	11.89
	North-Middle Block	I	333	N1	13,900	31.62	8.68
			333	N2	185,300	17.12	7.6
			333	N4	2,900	17.12	7.6
		II+III	333	N1	6,000	33.52	6.2
			333	N2	197,800	24.68	10.39
			333	N4	28,300	16.67	7.06
Subtotal		**111b**		**N1+N2+N3+N4**	**1,741,700**	**29.26**	**9.33**
		122b		**N1+N2+N3+N4**	**1,281,500**	**33.21**	**9.45**
		333		**N1+N2+N4**	**434,200**	**21.23**	**8.85**
Manganese Carbonate	South Block	I	111b	M1	513,800	29.14	5.30
			111b	M2	201,300	18.73	5.23
			111b	M3	1,033,900	22.50	5.31
			122b	M1	2,364,700	26.53	5.75
			122b	M2	1,371,300	17.89	4.59
			122b	M3	10,080,100	21.98	5.48
			122b	M4	107,700	14.57	5.15
		II	111b	M1	843,300	22.70	6.30
			111b	M3	2,256,500	23.93	7.05
			122b	M1	283,300	26.90	7.43
			122b	M2	1,620,300	19.65	5.81
			122b	M3	13,569,700	22.56	6.68
		III	111b	M2	502,200	16.63	6.42
			111b	M3	567,900	19.98	6.82
			122b	M2	6,407,900	17.42	6.36
			122b	M3	5,143,700	19.57	7.13
			122b	M4	152,200	13.78	6.09
	North-Middle Block	I	122b	M2	6,389,700	21.36	6.03
			122b	M3	4,623,900	22.23	5.19
		II	122b	M1	1,446,700	27.16	7.24
			122b	M2	285,800	17.43	4.93
			122b	M3	7,594,400	21.53	7.20
		III	122b	M2	7,162,600	16.22	6.37
			122b	M3	536,200	19.14	7.52
Subtotal		**111b**		**M1+M2+M3**	**5,918,900**	**22.78**	**6.35**
		122b		**M1+M2+M3+M4**	**69,140,200**	**20.88**	**6.29**

Based on the monthly mining records, a total of 44,083t of manganese oxide ore and 612,173t of manganese carbonate ore in 111b and 122b category resources were mined out from November 2009 to June 30, 2010 (see Table 4-3). By June 30, 2010, the remaining manganese oxide ore resources in 111b, 122b and 333 categories were estimated at 7.59Mt at an average grade of 24.24% Mn, 69.83Mt at an average grade of 21.11% Mn and 0.43Mt at an average grade of 21.23% Mn, respectively. The remaining manganese carbonate resources in 111b and 122b categories were estimated at 7.887Mt at an average grade of 22.78% Mn and 68.763Mt at an average grade of 20.88% Mn, respectively (Table 4-4).

Table 4-3: Mined-out Resource/Reserves at Daxin Mine — Chinese Code*

Mine	Ore Type	Mining Block	Resource/ Reserve	Ore Grade Type	Resource/Reserve (1,000t)	Average Grade (%)	
						Mn	Fe
Daxin	Manganese Oxide	South Block	111b	N1+N2+N3+N4	36,391	29.26	9.33
			122b	N1+N2+N3+N4	7,692	33.21	9.45
	Manganese Carbonate	South Block	111b	M1+M2+M3	32,296	22.78	6.35
		North-Middle Block	122b	M1+M2+M4	426,883	21.18	6.23
			122b	M1+M2+M3	152,994	20.45	6.37

* The mined out resource/reserve are between September 2008 and March 2010

Table 4-4: Remained Resource/Reserve at Daxin Mine as of June 30, 2010 — Chinese Code

Ore Type	Mining Block	Category	Ore Grade Type	Resource/Reserve (t)	Average Grade (%)	
					Mn	Fe
Manganese Oxide	South Block	111b	N1+N2+N3+N4	1,705,309	29.26	9.33
		122b	N1+N2+N3+N4	1,273,808	33.21	9.45
	North-Middle Blocks	333	N1+N2+N4	434,200	21.23	8.85
Manganese Carbonate	South Block	111b	M1+M2+M3	5,886,604	22.78	6.35
		122b	M1+M2+M3+M4	40,674,017	21.18	6.23
	North-Middle Blocks	122b	M1+M2+M3	27,886,306	20.45	6.37
Total		111b		7,591,913	24.24	7.02
		122b		69,834,131	21.11	6.35
		333		434,200	21.23	8.85

4.1.6 Resource/Reserve Estimation under JORC Code

Ore Resource/Reserve — JORC Code Classification System

The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, prepared by the Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia in September 1999 and revised in December 2004 ("the JORC Code") is a mineral resource/ore reserve classification system that has been widely used and is internationally recognized. The JORC Code is used by SRK to report the Mineral Resources and Ore Reserves of the CITIC Damengs Daxin manganese mine in this technical report.

A mineral resource is defined in the JORC Code as an identified in-situ mineral occurrence from which valuable or useful minerals may be recovered. Mineral resources are classified as Measured, Indicated or Inferred according to the degree of confidence in the estimate:

- A Measured resource is one which has been intersected and tested by drill holes or other sampling procedures at locations which are close enough to confirm continuity and where geoscientific data are reliably known;
- An Indicated resource is one which has been sampled by drill holes or other sampling procedures at locations too widely spaced to ensure continuity, but close enough to give a reasonable indication of continuity and where geoscientific data are known with a reasonable level of reliability; and
- An Inferred resource is one where geoscientific evidence from drill holes or other sampling procedures is such that continuity cannot be predicted with confidence and where geoscientific data may not be known with a reasonable level of reliability.

An ore reserve is defined in the JORC Code as that part of a Measured or Indicated Mineral Resource which could be mined and from which valuable or useful minerals could be recovered economically under conditions reasonably assumed at the time of reporting. Ore reserve figures incorporate mining dilution and allow for mining losses and are based on an appropriate level of mine planning, mine design and scheduling. Proved and Probable Ore Reserves are based on Measured and Indicated Mineral Resources, respectively. Under the JORC Code, Inferred resources are deemed to be too poorly delineated to be transferred into an ore reserve category, and therefore no equivalent possible ore reserve category is recognized or used.

The general relationships between Exploration Results, Mineral Resources and Ore Reserves under the JORC code are summarized in Figure 4-8. The Ore Reserves are quoted as comprising part of the total Mineral Resource rather than the Mineral Resources being additional to the Ore Reserves quoted. The JORC Code allows for either procedure, provided the system adopted is clearly specified. In this report, all of the Ore Reserves are included within the Mineral Resource statements.

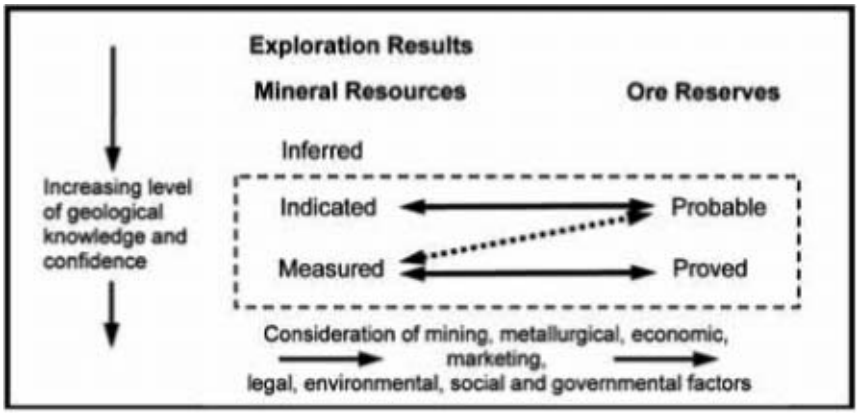

Figure 4-8: Schematic Ore Resources and Their Conversion to Ore Reserves

Review on Original Geological Database

SRK has reviewed original geological databases including geological survey and mapping at scales of 1:10,000, 1:5,000, and 1:2,000; drill holes (380 holes with 93,095m footage), shallow wells (624 wells with 7,528.22m footage), adits (8,769.87m), and trenches (71,524.57m) logging; sampling

methodologies and sample preparation and assaying; assay quality control and quality assurance; the geological interpretation, mineral resource estimation procedures and parameters applied by No 2 and No 4 Nanning Geological Brigades and Nanning Geological Survey Institute. As the Daxin manganese mine is a sedimentary-type deposit and the manganese grades are consistent throughout the mineralized bodies, SRK considers that these exploration programs provides a reasonable basis to estimate the mineralized bodies at the Daxin mine, and that the analytical methods used for the deposit produced acceptable results with no material bias.

Based on reviewing the deposit geology, drilling and sampling data, and procedures and parameters used for the estimation of mineral resources, SRK is of the opinion that the mineral resources estimated under the 1999 Chinese mineral resource system for the Daxin manganese deposit by Chinese Geological Brigades conform to the equivalent JORC Mineral Resource categories. The economic portion of the Measured and Indicated Resources can accordingly be used to estimate Proved and Probable ore reserves.

Verifications on mineralized blocks

The Company has conducted thickness and grade comparisons between geological and actual mined-out ore blocks at Daxin mine in 2009. They show the actual mined-out Mn grades of mineralized blocks are close to those provided in the exploration reports (see Table 4-5 and Table 4-6). The average relative errors are 8.83% for open-pit oxidized blocks and 6.10% for the underground carbonate ore blocks. Both values are within the reasonable and acceptable limits. SRK believes that the data indicate a reliable resource estimate at Daxin mine by the Chinese geological brigades.

Table 4-5: Comparisons between the Geological and Actual Mined-out Block Thickness and Grade at Daxin Mine (Open-pit Oxidized Ore)

Orebody No	Block No	Thickness (m)			Grade (%)			Level (ASL)
		Geological	Mined-out	Relative Error (%)	Geological	Mined-out	Relative Error (%)	
I	6	1.61	1.80	11.41	38.68	37.66	2.64	385m
II+III	409, 508	5.24	5.80	10.69	35.36	42.00	18.78	385m
II+III	109, 208	5.81	4.30	25.99	35.35	33.23	6.00	385m
II+III	109, 207	5.15	5.30	2.91	31.20	32.16	3.08	385m
II+III	104, 207	6.48	6.00	7.41	30.30	30.20	0.33	385m
I	14	0.90	1.20	33.33	40.03	40.73	1.75	395m
II+III	114, 213	5.59	5.20	6.98	33.00	36.56	10.79	395m
I	2	1.08	1.30	20.37	41.46	35.19	15.12	405m
II+III	201	4.38	5.30	21.00	32.44	29.36	9.49	405m
I	302	1.12	1.30	16.07	31.57	34.24	8.46	365m
II+III	402, 502	3.99	5.30	32.83	33.68	35.79	6.26	365m
I	304	1.78	1.50	15.73	36.56	40.63	11.13	365m
II+III	404, 504	6.12	5.80	5.23	35.43	36.32	2.51	365m
I	305	1.76	1.60	9.09	42.23	42.10	0.31	365m
II+III	405, 505	5.80	6.20	6.90	35.20	35.58	1.08	365m
I	29	1.52	1.60	5.26	46.42	36.89	20.53	365m
II+III	119, 219	5.60	6.20	10.71	37.21	32.22	13.41	365m
I	322	2.03	1.60	21.18	32.40	31.56	2.59	365m
II+III	421, 532	3.61	3.90	8.03	30.42	29.86	1.84	365m
I	321	1.46	1.20	17.81	34.69	31.96	7.87	475m
II+III	422, 536	4.13	4.00	3.15	33.71	30.87	8.42	475m
I	325	0.79	1.20	51.90	31.67	34.01	7.39	475m
II+III	537, 424	3.58	4.00	11.73	31.01	25.57	17.54	475m
I	322	1.27	1.50	18.11	36.26	36.77	1.41	485m
I	332	1.32	1.30	1.52	31.11	30.43	2.19	485m
II+III	161(E), 541	3.72	3.80	2.15	23.21	20.51	11.63	495m
I	329	1.57	1.20	23.57	27.58	38.40	39.23	505m
II+III	567, 437	2.78	3.20	15.11	18.43	18.00	2.33	505m
I	331	1.15	1.30	13.04	26.18	28.26	7.94	505m
II+III	435, 336	2.97	3.00	1.01	18.30	20.78	13.55	505m
I	340	1.13	1.20	6.19	25.48	28.01	9.93	505m
II+III	557, 438	2.58	3.00	16.28	25.77	28.35	10.01	505m
I	77	1.94	1.60	17.53	22.16	21.53	2.84	415m
II+III	255, 251	3.44	4.80	39.53	21.52	19.25	10.55	415m
I	86, 87	1.84	1.60	13.04	17.79	18.08	1.63	425m
II+III	252, 162	2.70	4.80	77.78	20.35	21.99	8.06	425m
I	525	1.36	1.60	17.65	20.93	18.68	10.75	475m
II+III	536, 425	2.79	4.80	72.04	25.00	22.25	11.00	475m
Average					**30.79**	**30.68**	**8.43**	

Table 4-6: Comparisons between the Geological and Actual Mined-out Block Thickness and Grade at Daxin Mine (Underground Carbonate Ore)

Orebody No	Block No	Thickness (m)			Grade (%)			Level (ASL)
		Geological	Mined-out	Relative Error (%)	Geological	Mined-out	Relative Error (%)	
I	260-2#	1.71	1.83	7.02	22.53	21.68	3.77	260m
II+III		4.47	4.93	10.29	22.93	21.92	4.40	
I	280-3#	1.95	2.13	9.23	22.1	19.63	11.18	280m
II+III		3.69	5.23	41.73	23.73	21.26	10.41	
I	380-2#	1.47	2.26	53.74	24.28	21.18	12.77	380m
II+III		2.9	4.85	67.24	22.14	22.31	0.77	
I	380-1#	1.64	2.16	31.71	21.5	20.82	3.16	380m
II+III		3.86	5.38	39.38	22.78	22.17	2.68	
I	340-13#	1.48	2.15	45.27	20.24	18.19	10.13	340m
II+III		5.79	4.92	15.03	20.38	20.02	1.77	
Average					**22.26**	**20.92**	**6.10**	

SRK's Verifications — Checking Samples

SRK team designed verification plan after discussion with the Company's professional geologists.

The verification includes selecting 43 the core pulp samples and re-sampling 36 samples on site using channeling method nearly the original sample locations. All samples are sent to the ASL Chemex in Guangzhou, PRC for preparation and analysis and also selected some samples are sent to the SGS CSTC Standards Technical Services Co. Ltd ("SGS") Guangzhou, PRC for external checking analysis.

SRK required all samples to be reground to -200 mesh. The standard and blank samples are provided by the ASL Chemex. SRK has also visited both laboratories to ensure the quality assurance and quality control. Samples are decomposed using sodium peroxide fusion ("FUS -PER05") and are assayed using inductively coupled plasma-atomic emission spectroscopy ("ICP -AES") method. Both laboratories are internationally -recognized analytical branches for ASL and SGS.

The comparison between the original results of the core and trench samples and the SRK verification samples are listed in Appendix 6. Overall, the relative differences between the original and SRK results are less than 10% for both Mn and TFe (see Figure 4-9). These results of data verification indicate that the original database is sound and reliable for the purposes of resource estimation.

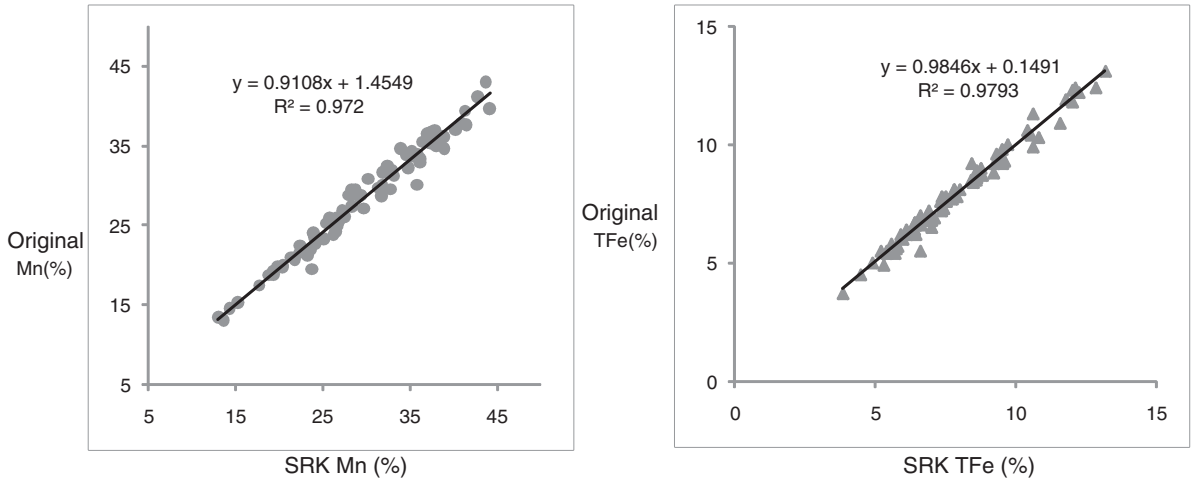

Figure 4-9: Relationship of Original Results and SRK Verification at Daxin Mine

Ore Resource Estimation

The Mineral Resource estimates under the JORC Code as of June 30, 2010 for Daxin manganese mine are summarized in Table 4-7. The Measured, Indicated and Inferred Mineral Resources are 7.59Mt with an average Mn grade of 24.24%, 69.83Mt with an average Mn grade of 21.11% and 434,200t at an average Mn grade of 21.23%, respectively. The Measured and Indicated Mineral Resources can be used for Ore Reserve estimation and mine planning.

Table 4-7: Ore Resource Summary at Daxin Mine — JORC Code, as of June 30, 2010

Ore Type	Mining Block	Category	Ore Grade Type	Resource/Reserve (t)	Average Grade (%)	
					Mn	Fe
Manganese Oxide	South Block	Measured	N1+N2+N3+N4	1,705,309	29.26	9.33
		Indicated	N1+N2+N3+N4	1,273,808	33.21	9.45
	North-Middle Blocks	Inferred	N1+N2+N4	434,200	21.23	8.85
Manganese Carbonate	South Block	Measured	M1+M2+M3	5,886,604	22.78	6.35
		Indicated	M1+M2+M3+M4	40,674,017	21.18	6.23
	North-Middle Blocks	Indicated	M1+M2+M3	27,886,306	20.45	6.37
Total		**Measured**		**7,591,913**	**24.24**	**7.02**
		Indicated		**69,834,131**	**21.11**	**6.35**
		Inferred		**434,200**	**21.23**	**8.85**

Ore Reserve Estimation

Ore reserves are estimated based on the mining recovery rate of 93% and dilution rate of 7% for open-pit ore and the mining recovery rate of 86% and dilution rate of 12% for underground. As of June 30, 2010, the Proved and Probable Ore Reserves at Daxin mine were 7.40Mt at an average Mn grade of 21.95% and 67.31Mt at an average Mn grade of 18.88%, respectively (Table 4-8)

Table 4-8: Ore Reserve Summary at Daxin Mine — JORC Code, as of June 30, 2010

Ore Type	Mining Block	Category	Ore Grade Type	Reserve (1,000t)	Average Grade (%)	
					Mn	Fe
Manganese Oxide	South Block	Proved	N1+N2+N3+N4	1,696,953	27.35	8.72
		Probable	N1+N2+N3+N4	1,267,566	31.04	8.83
Manganese Carbonate	South Block	Proved	M1+M2+M3	5,669,977	20.34	5.67
		Probable	M1+M2+M3+M4	39,177,213	18.91	5.57
	North-Middle Blocks	Probable	M1+M2+M3	26,860,090	18.26	5.69
Total		**Proved**		**7,366,930**	**21.95**	**6.37**
		Probable		**67,304,869**	**18.88**	**5.68**
		Proved+Probable		**74,671,799**	**19.18**	**5.75**

4.1.7 Previous Exploration History

Daxin manganese deposit was discovered by local people in 1958. No 903 Geological Brigade of Nanning Bureau of Geology conducted a general survey in the area, completing an exploration report with resource estimates including manganese oxide ore of 9.0405Mt in C+D category resource and manganese carbonate ore of 52.8327Mt.

From March 1962 to February 1967, No 214 Geological Brigade of Guangxi Bureau of Geology completed a comprehensive exploration program in the Daxin manganese mine area. During this period the strata, structure, both manganese oxide ore bodies and manganese carbonate ore bodies were investigated and studied. No 214 Geological Brigade compiled a detailed exploration report with resource estimates including manganese oxide ore of 8.2161Mt in category B+C resource and 1.2402Mt in category D resource, and manganese carbonate ore of 41.4636Mt in category B+C resource and 27.6076Mt in category D resource.

From September 1972 to March 1978, an additional exploration was done by No 2 Geological Brigade on the southern limb of the Shangyin-Xialei fold. A geological exploration report was completed with resource calculations in December 1976. Estimated resources were 5.3144Mt for manganese oxide ore in category B+C+D resource and 70.667Mt for manganese carbonate ore in category B+C resource.

From the end of 1981 to July 1985, No 2 and No 4 Geological Brigades of Guangxi Bureau of Geology conducted a detailed exploration program on the whole Daxin manganese mine area and a geological report with resource estimates was completed and authorized.

By the end of 1985, No 2 and No 4 Geological Brigades conducted geological mappings of 27.35 square kilometers (km^2) at 1:5,000 scale and 4.31km^2 at 1:2,000 scale, respectively. They

completed 68,493m of drilling, 7622m of adits, 68,054m^3 of trenching, and 7253m of shallow wells in the mine area. A total of 83.96Mt of manganese ore was defined and estimated within the Daxin manganese mining licence area.

4.1.8 Exploration Potential

In SRK's opinion the strata, structure, and ore bodies of Daxin manganese mine had been well investigated and well studied. Within the Daxin mining licence, the potential for further exploration is limited. SRK recommends that the Company should conduct exploration work in surrounding areas and if possible acquire surrounding manganese properties which are owned by other companies.

The Company has to record its geological information in a non-digital format. SRK recommends all geological information including reports, maps and sample assay results be digitized as digital information can allow easy transfer of important information, not only for guiding exploration but also for mining development. Now the Company has accepted the recommendations and commence to do so.

4.2 Tiandeng Manganese Mines

4.2.1 Regional Geology

Tiandeng manganese mine is located at the south side of the west-east trending Youjiang thrust-fold belt. It forms part of the South China Quasi-plate (see Figure 4-1). Folds are the main structures which are well-developed over the mine area. The Ronghua compound syncline is the host structure of ore-bearing strata. The main strata in the mine area include the Triassic breccia limestone, siliceous limestone, sandstone, mudstone and tuff; Permian limestone and muddy stone; and Quaternary alluvium, proluvium, and aeolian sediments (Figure 4-1).

Like Daxin manganese mine, the Tiandeng manganese property is a typically sedimentary deposit. It is lithologically controlled by the Early Triassic Beisi formation of siliceous mudstone.

4.2.2 Geology of Tiandeng Manganese Mine

The main strata within the licensed mining area are the Lower-Triassic Baisi formation and the Mid-Triassic Baipeng formation. The former is composed of dark grey siliceous tuff and mudstone in the upper part, dark bedded siliceous mudstone containing 10 manganese ore-bearing mudstone layers in the middle part, and dark grey bedded siliceous tuff with interbedded siltstone and mudstone layers in the lower part. The latter consists of grey bedded sandstone, siltstone and shale in the upper part and dark grey bedded calcareous mudstone, siltstone and shale in the middle part. The Lower-Permain Maokou formation and Upper Permain Heshan formation are composed of grey limestone and crystallitic limestone containing conglomerate and quartz interlayers and grey bedded limestone, mudstone and shale (Figure 4-10).

The west-east trending folds of the Dongmeng syncline, Diruo anticline, Wushushan syncline and Jiangcheng anticline are well developed in the mine area. The first three are the host structure for ore bodies in the Tiandeng mine. The south-north trending and north-west trending faults have reconstructed the manganese ore bodies in the mine area. Volcanic rocks are very sparse in the mine area (Figure 4-10).

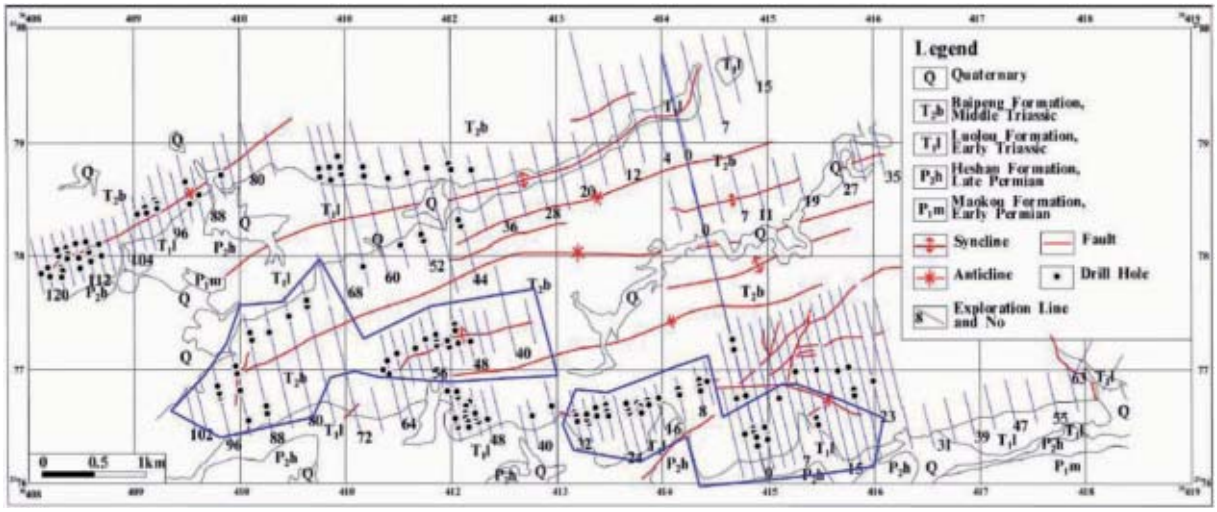

Figure 4-10: Detailed Geology of Tiandeng Manganese Mine

4.2.3 Orebody Geology

Controls on Mineralization

Ten manganese mineralized bodies or layers, (I to X) were defined by No 273 Geological Brigade in the Tiandeng mining licence area. I to IV are the main mineralized bodies with lengths and average thicknesses defined by sampling of 44.4km and 2.04m, 45.4km and 3.48m, 21.9km and 2.18m, and 47.2km and 3.87m, respectively. These mineralized ore bodies were folded and locally displaced by the south-north and north-west trending faults.

There are four mining areas in the Tiandeng manganese mine including Tuoren East, Tuoren West, Luli, and Dongmeng. The characters of mineralized bodies in these four mining fields are given below.

Tuoren East:

Six manganese mineralized bodies named I, II, III, IV, V, and X with bedded or folded shapes were defined in this field (Figure 4-11 and Figure 4-12). These mineralized bodies dip either to the north-west or north-east with dip angles of 27 to 72°. The length, width, and thickness of each mineralized body are shown in Table 4-9. The average Mn grade of ore bodies in the Tuoren East mining area is 17.94%.

Table 4-9: Characters of Mineralized Bodies at Tuoren East Area

Mineralized body	Length (m)	Width(m)			Average thickness(m)
		Minimum	maximum	Average	
I	2677	15	305	167	3.84
II	2465	14	265	159	4.71
III	2195	17	230	147	3.37
IV	2144	15	165	108	4.25
V	1192	6	91	43	0.74
X	556 ~ 2470	15	205	155	1.47

Tuoren West

Seven manganese mineralized bodies named I, II, III, IV, V, IX, and X with bedded shapes were defined in the mine area (Figure 4-11 and Figure 4-12). These mineralized bodies dip either north-west or north-east with dip angles of 10 to 75°. The average Mn grade of ore bodies in the Tuoren West mining field is 18.24%. The length, width, and thickness of each mineralized body are shown in Table 4-10.

Table 4-10: Characters of Mineralized Bodies at Tuoren West

Mineralized body	Length (m)	Width(m)			Average thickness(m)
		Minimum	Maximum	Average	
I	1920	25	240	120	2.70
II	1920	28	180	100	5.31
III	1920	30	160	100	2.47
IV	1920	30	160	97	4.46
V	430	87	160	116	1.11
IX	256			55	1.21
X	1480	50	270	156	1.66

Luli

Five manganese mineralized bodies named I, II, III, IV, and V were defined in the mine area. They are controlled by an approximately west-east extending anticline. These mineralized bodies dip either northwest or northeast with dip angles of 11 to 63° (Figure 4-11 and Figure 4-12). The average Mn grade of ore bodies in Luli mining field is 17.36%. The length, width, and thickness of each mineralized body are shown in Table 4-11.

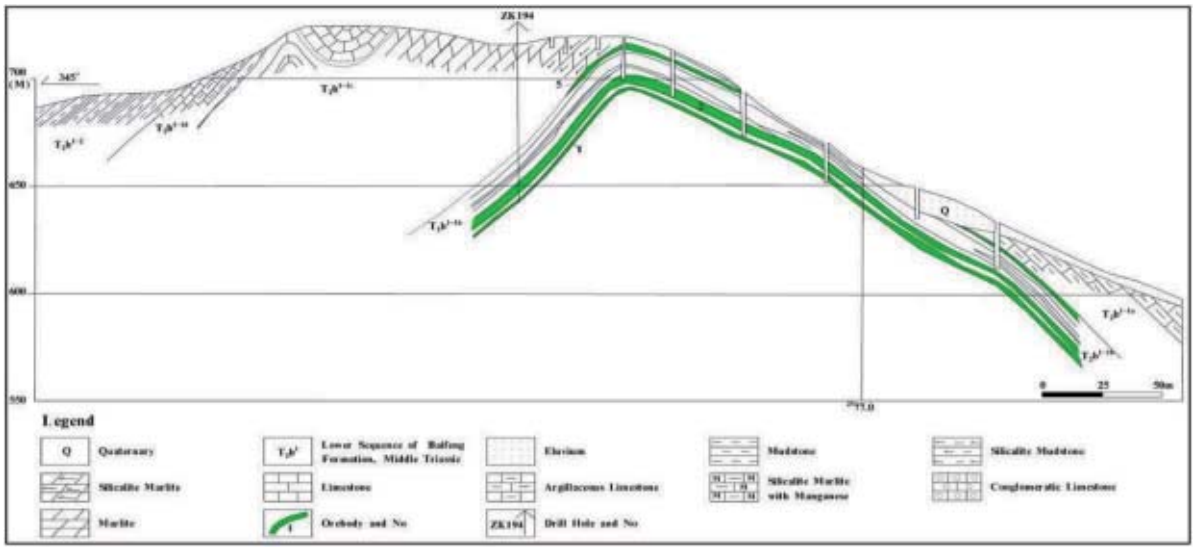

Figure 4-11: Cross Section of Exploration Line 62

Table 4-11: Characters of Mineralized Bodies at Luli

Mineralized body	Length (m)	Width(m)			Average thickness(m)
		Minimum	Maximum	Average	
I	1220	22	160	82	2.08
II	1300	20	172	91	4.14
III	2720	15	236	87	1.85
IV	2880	20	238	90	4.03
V	1460	22	183	53	1.28

Dongmeng

Four manganese mineralized bodies of I, II, IV, and V were defined in the mine area. They are hosted in the west part of the nearly west-east trending Dongmeng compound syncline (Figure 4-11 and Figure 4-12). These mineralized bodies dip either north-west or north-east with dip angles of 14 to 71°. The average Mn grade of ore bodies in the Dongmeng mining area is 15.91%. The length, width, and thickness of each mineralized body are shown in Table 4-12.

Table 4-12: Characters of Mineralized Bodies at Dongmeng

Mineralized body	Length (m)	Width(m)			Average thickness(m)
		Minimum	Maximum	Average	
I	1580	23	142	74	1.32
II	2840	20	150	74	2.49
IV	2840	10	140	74	4.73
V	2170	20	135	54	1.33

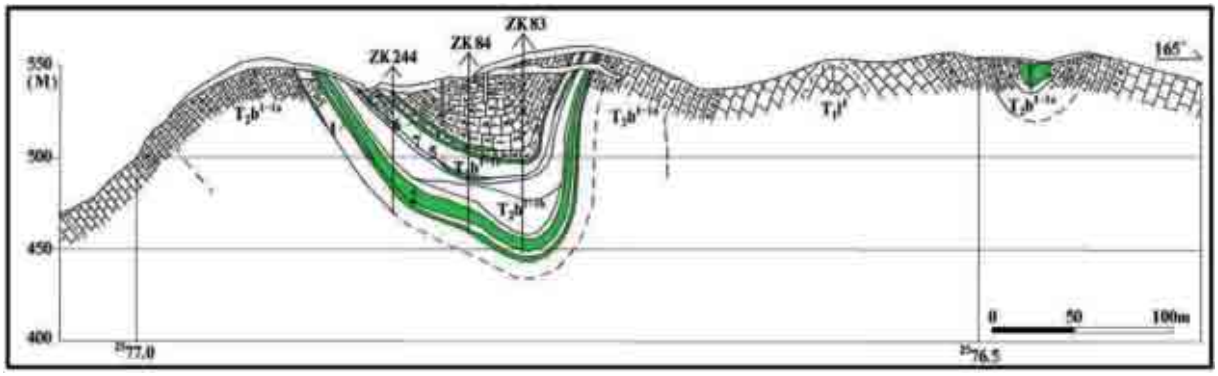

Figure 4-12: Cross Section of Exploration Line 96

Mineralogy

Metallic minerals in manganese oxide ore mainly include oxidized manganese carbonate, lithiophorite and pyrolusite. Gangue minerals are comprised of quartz and kaolinite with a few limonite, muscovite and chlorite.

The oxide ore in Tiandeng mine is characterized by mainly amorphous and micro-cryptocrystalline textures, and massive and laminated structures.

The useful elements consist of Mn and associate component of iron (Fe; 4.45 to 8.59%) in metallic minerals, and the harmful element is phosphorus (P; 0.057 to 0.204%; corresponding to P/Mn ratio ≤ 0.004), which is also low.

4.2.4 Sampling, Analytical Procedures and Quality Control

A total of 10,776 samples from trenches (40,302m), shallow wells (6,413.55m), adits (3,978.3m) and drill cores (227 holes with 16,533.53m footage) were collected for resource/reserve estimate in the Tiandeng manganese mine from January 1979 to September 1981 by No 273 Geological Brigades of Guangxi Bureau of Geology and Mineral Resource.

Trench samples were collected from fresh rocks in the floor of trenches by the channeling method. The channel section size is 10cm long by 5cm wide. Sample length normally range from 0.20 to 0.70m. Wall rock and ore unit were sampled separately. Samples were taken from drilling cores by splitting along the core axis. The sample length is generally between 0.20 and 1.00m. The average core recovery rates are 76.2% all cores and 81.7% for mineralized core intervals.

Samples, preparation and analysis were completed by No 273 Geological Brigade of Guangxi Metallurgical and Geological Exploration Company. Each sample was crushed by a jaw crusher to 3 to 5mm and pulverized by a roller crusher to -200 mesh. Four items including Mn, Fe, P and SiO_2 were assayed in the laboratories using ferro-sulphate volumetric analysis method, potassium chromate volumetric analysis method, molybdenum-phosphovanadate colorimetric method, and fluorine-potassium silicate volumetric method, respectively.

For quality control, a total of 1089 samples were selected for internal checking and 614 samples were chosen and sent to the Analytical Laboratory of Guangxi Metallurgical and Geological Institute for external checking. Both results returned were acceptable. The analytical quality complied with the Chinese National Analytical Standards.

4.2.5 Resource/Reserve Estimation under Chinese Code

Resource/Reserve Category

The resource/reserve estimate of Tiandeng manganese mine was conducted by No 273 Guangxi Metallurgical and Geological Exploration Company in 1982. Exploration drilling grids of 100m × 75m, 200m × 50 to 75m, and 400m × 50m and 200m × 200m were used to estimate category B resource, category C resource, and category D resource, respectively. In July 2008, a resource/reserve audit for Tiandeng manganese mine was completed by Nanning Geological Survey Institute of Chinese Metallurgical and Exploration Bureau. Its resource categories are based on the General Rules for Rationalizing Solid Minerals and Geological Prospecting (GB/T13908-2002) and Geological Exploration Regulations for Iron, Molybdenum and Chromium Ore Deposits (DZ/T0200-2002). An exploration drilling grid (drill spacing) of 100 to 150m×50 to 100m was used to estimate 111b category resource. 122b category resources were estimated based on an exploration grid of 200m to 300m × 100m to 200m. 333 category resources were estimated based on an exploration grid of 400m × 200m to 400m or surface engineering grid of 200m × 200m.

No. 273 Guangxi Metallurgical and Geological Exploration Company and Nanning Geological Survey Institute of Chinese Bureau of Metallurgy and Exploration (who are all qualified and approved Chinese independent geological consultants) have used methods and procedures which comply with Chinese standards for resource estimation.

Cut-off's

According to the confirmed reserves/resource estimation report conducted by Nanning Geological Survey Institute of Chinese Metallurgical and Exploration Bureau in July 2008, the following technical parameters used to estimate manganese oxide ore reserves/resources were proposed (Table 4-13):

Table 4-13: Technical Parameters of Resource/Reserve Estimates at Tiandeng Mn Mine

Ore Type	Manganese Oxide Ore	Iron-Manganese Oxide Ore	Low-Grade Oxide Ore
Symbol	T1	T2	T3
Cut-offs: Mn (%)	≥8	≥8	≥8
Industrial Grade: Mn (%)	≥12	≥10	Manganese Oxide Ore: <12 Iron-Manganese Oxide Ore: <10
Iron Content (%)	<11		
Average Grade in Single Engineering (%)	≥30	≥18	≥15
Allowed P Content of per 1% Mn	≤0.009		
Minimum Mineable Thickness (m)	0.5	1.0	
Maximum Horse Thickness (m)	0.5	1.0	

Estimate of Reserves/Resources

Based on features of the three ore bodies of Tiandeng manganese operating mine including the Tuoren East and Tuoren West, Luli, and Dongmeng mining areas, a polygonal method with longitudinal projection was used to estimate resources by Nanning Geological Survey Institute in July 2008 (Figure 4-13 and Figure 4-14). By the end of June 2008, 111b category resource was 0.96Mt at an average grade of 18.56% Mn, 122b category resource was 3.34Mt at an average grade of 16.96% Mn, and 333 category resource was 3.65Mt at an average grade of 14.27% Mn

(Table 4-14). In addition, the 2S21 and 2S22 category resources were 182,074t with an average grade of 11.41% Mn and 253,079t with an average grade of 10.77% Mn, respectively (Table 4-14)

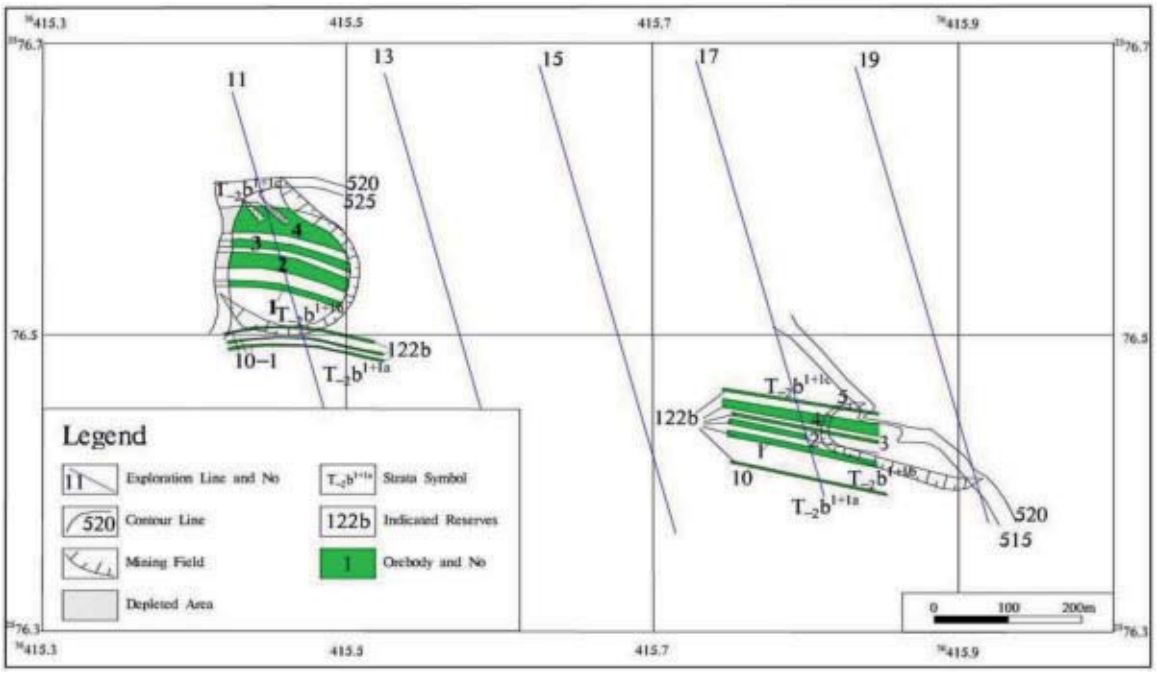

Figure 4-13: Plane Projection Map of Tuoren East 1

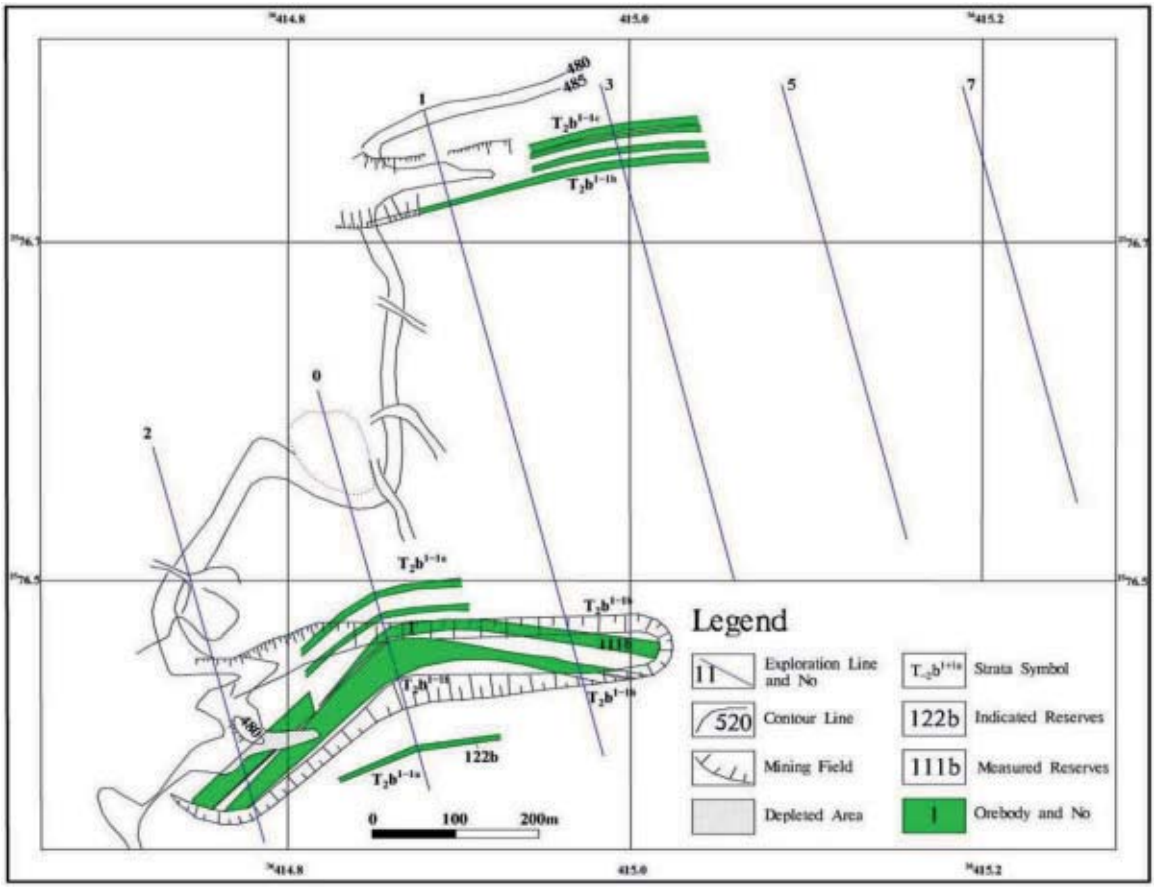

Figure 4-14: Plane Projection Map of Tuoren East 2

Table 4-14: Resource/Reserve Estimate of Tiandeng Mine as of July 2008 — Chinese Code

Mining Block	Ore Body	Resource/ Reserve Category	Ore Grade Type	Resource/ Reserve (t)	Average Grade %	
					Mn	Fe
Tuoren East	I+II+III+IV	111b	T1	491,443	19.03	7.02
	I+II+III+IV	122b	T1	529,326	19.69	4.94
	I+II+III+IV+V+X1+X2+X3	333	T3	178,430	11.42	15.94
Tuoren West	I+II+III+IV+V+X1+X3	111b	T3	110,608	10.18	10.42
	I+II+III+IV+V+IX1+IX2	122b	T1+T2+T3	1,007,011	16.26	7.74
	V+IX2+X1+X2	2S21	T1	187,078	18.83	4.59
	V+IX2+X1+X2+X3	2S22	T1	188,768	17.98	4.60
	I+II+III+IV+V+V1+IX1+IX2+X1+X2+X3	333	T1+T2+T3	1,084,288	12.84	7.80
Luli	I+II+III+IV	111b	T1	183,758	18.28	6.62
	I+II+III+IV	122b	T1	404,982	17.47	6.12
	I+V	2S21	T3	18,852	10.00	12.74
	I+V	2S22	T3	15,208	9.78	14.13
Dongmeng	I+II+IV+V+IX1	111b	T1+T2	95,698	16.16	6.82
	I+II+IV+V+VI	122b	T1+T2	2,216,421	16.12	9.83
	I+IV+VI	2S22	T3	127,263	11.41	8.74
	I+II+IV+V+VI+VII+IX1+IX2+X1	3333	T1+T2+T3	1,558,520	13.98	10.29
Total		**111b**		**957,977**	**18.56**	**6.45**
		122b		**3,339,497**	**16.96**	**8.31**
		2S21		**182,074**	**11.41**	**15.76**
		2S22		**253,079**	**10.77**	**9.80**
		333		**3,649,819**	**14.27**	**8.84**

Based on the monthly mining records, a total of 575,593t of manganese oxide ore at Tiandeng Mn mine in 111b and 122b category resources was mined out and lost between July 2008 and June 30, 2010. The details are listed in Table 4-15.

Table 4-15: Mined-out Resource/Reserves at Daxin Mine — Chinese Code

Mining Block	Ore Body	Resource/ Reserve Category	Ore Grade Type	Resource/ Reserve (1,000t)	Average Grade (%)	
					Mn	Fe
Tuoren East	I+II+III+IV	111b	T1	74.794	18.83	4.59
	I+II+III+IV	122b	T1	76.866	17.98	4.60
Tuoren West	I+II+III+IV+V+X1+X3	111b	T1	200.089	18.52	7.02
	I+II+III+IV+V+IX1+IX2	122b	T1+T2	223.843	18.93	4.94
Total		**111b**		**274.883**	**18.98**	**6.36**
		122b		**300.710**	**19.26**	**4.85**

As of June 30, 2010, the remaining resources in 111b, 122b and 333 categories were 683,094t at an average grade of 18.39% Mn, 3.04Mt at an average grade of 16.73% Mn, and 3.65Mt at an average grade of 14.27% Mn, respectively (Table 4-16). In addition, the 2S21 and 2S22 category resources were 197,282t with an average grade of 11.28% Mn and 253,079t with an average grade of 10.77% Mn, respectively (Table 4-16).

Table 4-16: Remained Resource/Reserve at Tiandeng Mine as of June 2010 — Chinese Code

Mining Block	Ore Body	Resource/ Reserve Category	Ore Grade Type	Resource/ Reserve (t)	Average Grade (%)	
					Mn	Fe
Tuoren East	I+II+III+IV	111b	T1	112,284	18.83	4.59
	I+II+III+IV	122b	T1	111,902	17.98	4.60
	I+II+III+IV+V+X1+X2+X3	333	T1+T2+T3	1,084,288	12.84	7.80
Tuoren West	I+II+III+IV+V+X1+X3	111b	T1	291,354	19.03	7.02
	I+II+III+IV+V+IX1+IX2	122b	T1+T2	305,483	19.69	4.94
	V+IX2+X1+X2	2S21	T3	178,430	11.42	15.94
	V+IX2+X1+X2+X3	2S22	T3	110,608	10.18	10.42
	I+II+III+IV+V+V1+IX1+IX2+X1+X2+X3	333	T1+T2+T3	1,007,011	16.26	7.74
Luli	I+II+III+IV	111b	T1	183,758	18.28	6.62
	I+II+III+IV	122b	T1	404,982	17.47	6.12
	I+V	2S21	T3	18,852	10.00	12.74
	I+V	2S22	T2	15,208	9.78	14.13
Dongmeng	I+II+IV+V+IX1	111b	T1+T2	95,698	16.16	6.82
	I+II+IV+V+VI	122b	T1+T2	2,216,421	16.12	9.83
	I+IV+VI	2S22	T3	127,263	11.41	8.74
	I+II+IV+V+VI+VII+IX1+IX2+X1	333	T1+T2+T3	1,558,520	13.98	10.29
Total		**111b**		**683,094**	**18.39**	**6.48**
		122b		**3,038,787**	**16.73**	**8.65**
		2S21		**197,282**	**11.28**	**15.63**
		2S22		**253,079**	**10.77**	**9.80**
		333		**3,649,819**	**14.27**	**8.84**

4.2.6 Resource/Reserve Estimation under JORC Code

Review on Original Geological Database

SRK has review all original geological database including geological survey and mapping at scales of 1:10,000, 1:5,000, and 1:2,000; drill holes (227 holes with 16,533.53m footage), shallow shafts (558 wells with 6,413.55m footage), adits (3,978.3m), and trenches (40,302m) logging; sampling methodologies and sample preparation and assaying; assay quality control and quality assurance; the geological interpretation, mineral resource estimation procedures and parameter applied by No. 273 Nanning Geological Brigades and Nanning Geological Survey Institute. Also the Tiandeng manganese mine is sedimentary-type deposit and the manganese grades are generally stable throughout the mineralized bodies, SRK considers that these exploration programs provides a

reasonable basis to estimate the mineralized bodies at the Tiandeng mine, and that the analytical methods used for the deposit produced acceptable results with no material bias.

Based on reviewing the deposit geology, drilling and sampling data, and procedures and parameters used for the estimation of mineral resources, SRK is of the opinion that the resources estimated under the 1999 Chinese category system for the Tiandeng manganese deposit by Chinese Geological Brigades conform to the equivalent JORC Mineral Resource categories. The economic portion of the Measured and Indicated Mineral Resources can accordingly be used to estimate Proved and Probable Ore Reserves.

Verifications on mineralized blocks

The Company has conducted the grade comparisons between the geological and actual mined-out mineralized blocks at Tuoren East and Tuoren West of Tiandeng Mine in 2008, 2009 and January-March 2010 (Table 4-17). They show the actual mined-out Mn grades of mineralized blocks are close to those provided in the exploration reports. The average relative errors are 3.36%, 5.70% and 6.44%, respectively. These values are within the reasonable and acceptable limits. SRK believes that the data indicate a reliable resource estimate by the Chinese geological brigades.

Table 4-17: Manganese Grade Comparison between the Geological and Actual Mined-out Mining Block at Tiandeng Mine

Mining Block	Geologic Grade (%)	Mined-out Grade (%)	Relative Error (%)	Mining Loss (%)	Dilution Rate (%)
		Year 2008			
No. 1	16.61	16.29	1.93	7.81	1.90
No. 2	17.30	16.90	2.31	9.96	2.30
No. 3	18.99	18.05	4.95	9.50	4.90
No. 4	18.50	17.71	4.27	9.27	4.27
Average	**17.85**	**17.24**	**3.36**	**9.14**	**3.34**
		Year 2009			
No. 1	16.78	15.91	5.18	9.50	5.18
No. 2	17.56	16.51	5.98	9.58	5.98
No. 3	18.38	17.39	5.39	9.44	5.39
No. 4	19.15	17.95	6.27	9.82	6.27
Average	**17.97**	**16.94**	**5.70**	**9.59**	**5.71**
		Year 2010.1-3			
No. 1	18.80	17.59	6.44	9.86	6.44

SRK's Verifications — Check Samples

SKR took three compositie samples using the channelling method near the original sampling locations. The sample preparation and analysis conducted by ASL as well. The original sample results and SRK verification samples are listed in Table 4-18. The relative differences between the original and SRK are less than 6% for both Mn and TFe, with averages of 2.76% and 4.90%, respectively. These results of data verification indicate that the original database is sound and reliable for the purposes of resource estimation.

Table 4-18: Assay Results of SRK's Checking Samples (Channelling Samples on Site) at Tiandeng Mine

		SRK Results (ALS)		SRK Results (SGS)		ALS-SGA		Relative Error (%)	
Orebody No.	Sample No.	Mn (%)	TFe (%)	Mn (%)	TFe (%)	Mn (%)	TFe (%)	Mn	Tfe
II	H洞84#-II-1	18.90	6.60	18.75	6.84	0.15	-0.24	0.79	3.64
IV	H洞84#-IV-1	5.81	24.30	5.47	22.90	0.34	1.40	5.85	5.76
IV	H洞92#-V-1	16.65	3.40	16.38	3.58	0.27	-0.18	1.63	5.29
		Average						**2.76**	**4.90**

Ore Resource Estimation

The Mineral Resource estimates under the JORC Code as of June 30, 2010 for Tiandeng manganese mine are summarized in Table 4-19. The Measured, Indicated and Inferred Mineral Resources are 683,094t with an average Mn grade of 18.39%, 3.04Mt with an average Mn grade of 16.73% and 3.65Mt at an average Mn grade of 14.27%, respectively. The low grade Measured and Indicated Mineral Resources are 197,282t with an average Mn grade of 11.28% and 253,079t with an average Mn grade of 10.77%. The Measured and Indicated Mineral Resources can be used for Ore Reserve estimation and mine planning.

Table 4-19: Ore Resource Summary at Tiandeng Mine — JORC Code, as of June 30, 2010

Ore Type	Mining Block	Category	Ore Grade Type	Resource (t)	Average Grade (%)	
					Mn	Fe
Manganese Oxide	Tuoren East	Measured	T1	112,284	18.83	4.59
		Indicated	T1	111,902	17.98	4.60
		Inferred	T1+T2+T3	1,084,288	12.84	7.80
	Tuoren West	Measured	T1	291,354	19.03	7.02
		Indicated	T1+T2	305,483	19.69	4.94
		Measured*	T3	178,430	11.42	15.94
		Indicated*	T3	110,608	10.18	10.42
		Inferred	T1+T2+T3	1,007,011	16.26	7.74
	Luli	Measured	T1	183,758	18.28	6.62
		Indicated	T1	404,982	17.47	6.12
		Measured*	T3	18,852	10.00	12.74
		Indicated*	T3	15,208	9.78	14.13
	Dongmeng	Measured	T1+T2	95,698	16.16	6.82
		Indicated	T1+T2	2,216,421	16.12	9.83
		Indicated*	T3	127,263	11.41	8.74
		Inferred	T1+T2+T3	1,558,520	13.98	10.29
Total		**Measured**		**683,094**	**18.39**	**6.48**
		Indicated		**3,038,787**	**16.73**	**8.65**
		Inferred		**3,649,819**	**14.27**	**8.84**
		Measured*		**197,282**	**11.28**	**15.63**
		Indicated*		**253,079**	**10.77**	**9.80**

* signifies the low-grade Mineral Resources.

Ore Reserve Estimation

Ore reserves were estimated based on the mining recovery rate of 90.5% and dilution rate of 6.5% for the Tiandeng mine. As of June 30, 2010, the Proved and Probable Ore Reserves are 658,383t at an average Mn grade of 17.27% and 2.93Mt at an average Mn grade of 15.71%, respectively (Table 4-20). In addition, the Proved and Probable low grade Ore Reserves are 190,145t with an average Mn grade of 10.60% and 243,924t with an average Mn grade of 10.12%, respectively.

Table 4-20: Ore Reserve Summary at Tiandeng Mine — JORC Code, as June 30, 2010

Ore Type	Mining Block	Category	Ore Grade Type	Reserve (t)	Average Grade (%)	
					Mn	Fe
Manganese Oxide	Tuoren East	Proved	T1	108,222	17.68	4.31
		Probable	T1	107,854	16.89	4.32
	Tuoren West	Proved	T1	280,814	17.87	6.59
		Probable	T1+T2	294,432	18.49	4.64
		Proved*	T3	171,975	10.72	14.97
		Probable*	T3	106,607	9.56	9.78
	Luli	Proved	T1	177,111	17.16	6.22
		Probable	T1	390,332	16.40	5.75
		Proved*	T3	18,170	9.39	11.96
		Probable*	T3	14,658	9.18	13.27
	Dongmeng	Proved	T1+T2	92,236	15.17	6.41
		Probable	T1+T2	2,136,242	15.14	9.23
		Probable*	T3	122,659	10.71	8.21
Total		**Proved**		**658,383**	**17.27**	**6.09**
		Probable		**2,928,859**	**15.71**	**8.12**
		Proved*		**190,145**	**10.60**	**14.68**
		Probable*		**243,924**	**10.12**	**9.20**

* signifies the low-grade ore reserves.

4.2.7 Previous Exploration History

Tiandeng manganese deposit was discovered in 1956 by local farmers. Dongping Manganese Geological Brigade of Guangxi Bureau of Geology conducted exploration work between 1956 and 1959. During the period of exploration, a total of 4869m for 39 drill holes, 1250m of declines, 2570m of adits, 14,805m^3 of trenches, 142km^2 of 1:50,000 geological mapping, 58.1km^2 of 1:2000 topographic survey, and 1.35km^2 of 1:2000 geological mapping were completed by the geological brigade in Tiandeng manganese mine and surrounding area. In addition 5434 samples were collected and assayed. The exploration report was compiled with resource estimation including 5.142Mt manganese oxide ore in C1+C2 category resources.

From January 1979 to September 1981, further exploration was carried out by No 273 Guangxi Metallurgical and Geological Exploration Company in Tiandeng manganese mine. During the period of exploration a total of 16,533.53m for 213 drill holes, 1389.3m of declines, 25,880.25m of adits, 14,805m^3 of trenches, 6413.55m of wells, 58.1km^2 of 1:2000 topographic survey, and 57km^2 of 1:10,000 topographic survey were completed by the geological brigade in Tiandeng manganese mine and surrounding area. In addition 10,606 samples were collected and assayed. Some samples were collected for special purposes such as density, lithology and processing testing. An exploration report with resource estimate was compiled and submitted in December 1982. The estimated resource was 16.2234Mt in B+C+D category resources.

From January to March 1998, Nanning Geological Survey of Southern Bureau of Geology and Exploration also conducted detailed exploration in the Tuoren East and Tuoren West areas. An exploration report with resource estimate of 4.165Mt in B+C+D category resources was compiled and approved by the Mineral and Resources Committee of Guangxi Zhuangzu Autonomous Region in December 1998.

4.2.8 Potential Exploration

In SRK's opinion the strata, structure, and ore bodies of Tiandeng manganese mine have been well investigated and studied. Within the mining licence, the potential for further exploration tends to be limited. SRK recommends that the Company apply for the undergrounds exploration permits at Tuoren East and Tuoren West if possible.

The Company has to date recorded its geological information in a non-digital format. SRK recommends all geological information including reports, maps and sample assay results should be digitized as digital information can allow easy transfer of important information, not only for guiding exploration but also for mining development. Now the Company has accepted the recommendations and commence to do so.

4.3 Bembélé Manganese Mine

4.3.1 Regional Geology

Regionally, the mine area is involved in two geological platforms — the Ndjole massif and Ogooue massif. The Ndjole massif is in the west limb of the Ogooue synclinorium. They belong to two distinct paleosedimentary basins, which are composed of contemporaneous Proterozoic metamorphic rocks. The Proterozoic Ndjole group includes five formations. They are, from bottom to top, the Pna formation, consisting of mica schist, metamorphosed quartzose and conglomerate; the Pnb formation, made up of chlorite schist in the lower part and quartzite with black shale interlayer; the Pnc formation of sugary grained quartzite and pyroclastic rocks; the Pnd formation of arkose with chlorite schist interlayer; and the Pne formation of sandstone with siltstone and black shale interlayer (Figure 4-15).

4.3.2 Geology of Bembélé Manganese Mine

Stratum in the mine area is the Pox formation of the Proterozoic Ogooue Group (see Figure 4-16). This formation, lithologically from bottom to top, consists of conglomerate, fine-grained metamorphosed quartzose sandstone, manganese-bearing and graphitic quartz schist, manganous and ferruginous siltstone, and lumpy and/or banded manganese ore bodies. In the property area the folding structure is simple and is shown as a gently wavy monocline dipping to the south-east. There are two groups of faulted structures; one trending north-east (20°E to 30°E) and south-west at angles of 60 to 80° and the other trending north-west (20°W) and dipping north-east or south-west at an angle of about 80°. Magmatic activities are not developed.

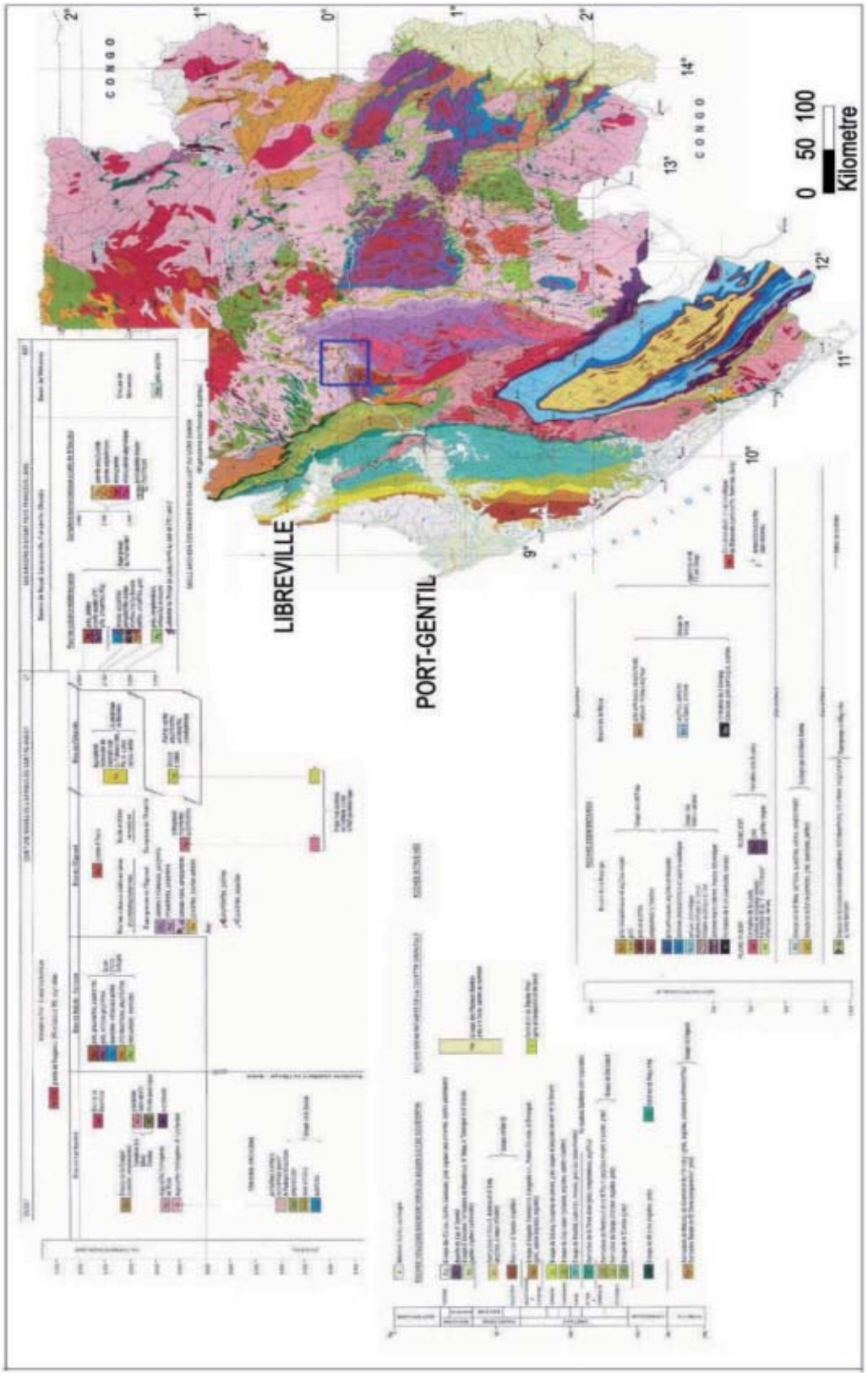

Figure 4-15: Regional Geological Map of Moyen-Ogooue

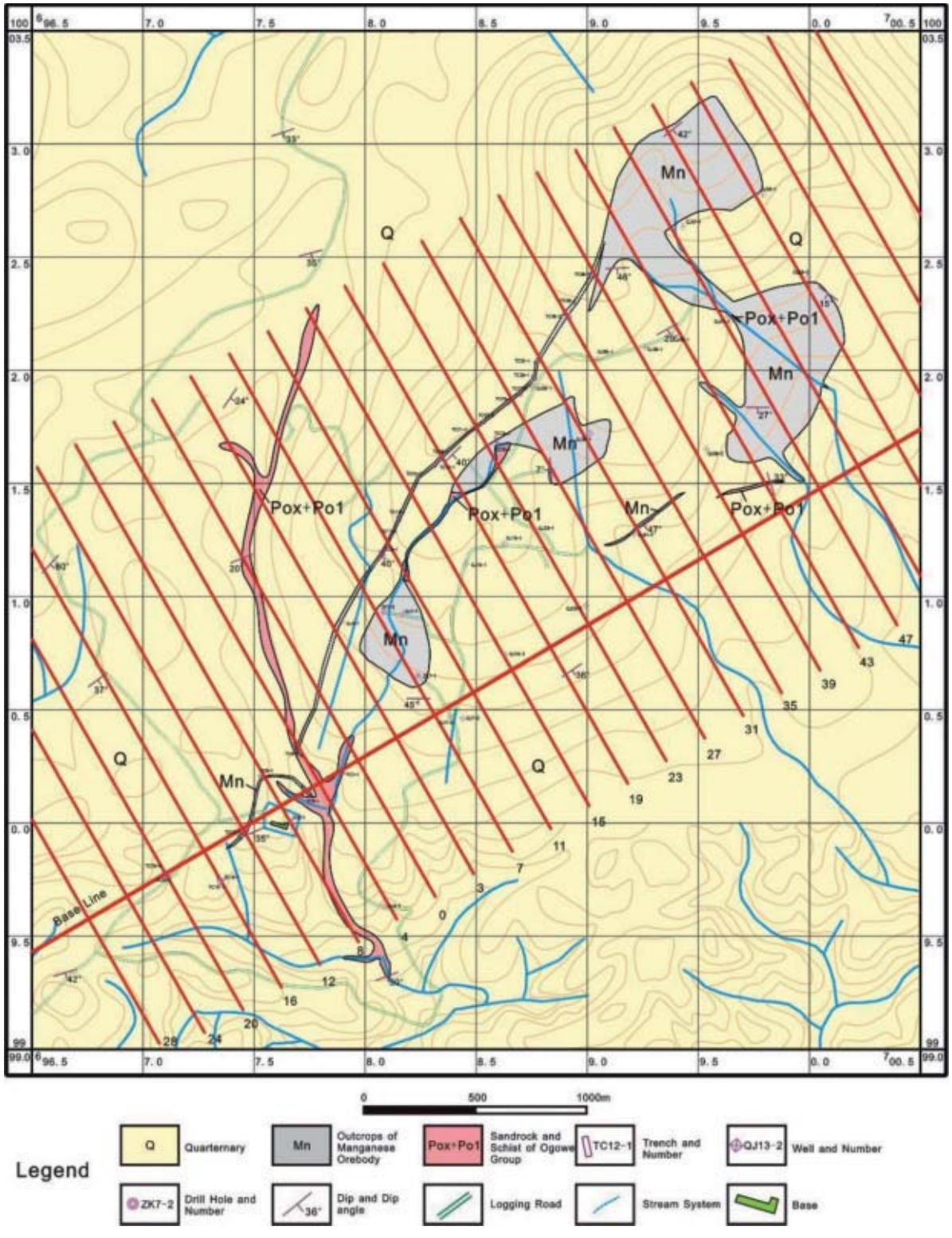

Figure 4-16: Geological Map of Bembélé Mine

4.3.3 Orebody Geology

Controls on Mineralization

Most of the manganese ore bodies are covered by Quaternary loose sediments and a humous layer. In the Bembélé mine, three ore bodies were defined by No 1 Geological Exploration Institute of the China Bureau of Metallurgical and Geological Exploration. The oxidized and leached sedimentary manganese ore body is specified as ore body I and the secondary enrichment cumulus manganese ore body in the Quaternary system is specified as ore body II (Figure 4-17). The oxidized and leached sedimentary manganese ore body in the Menduman section was specified as ore body III. Characteristics of the ore bodies are described below.

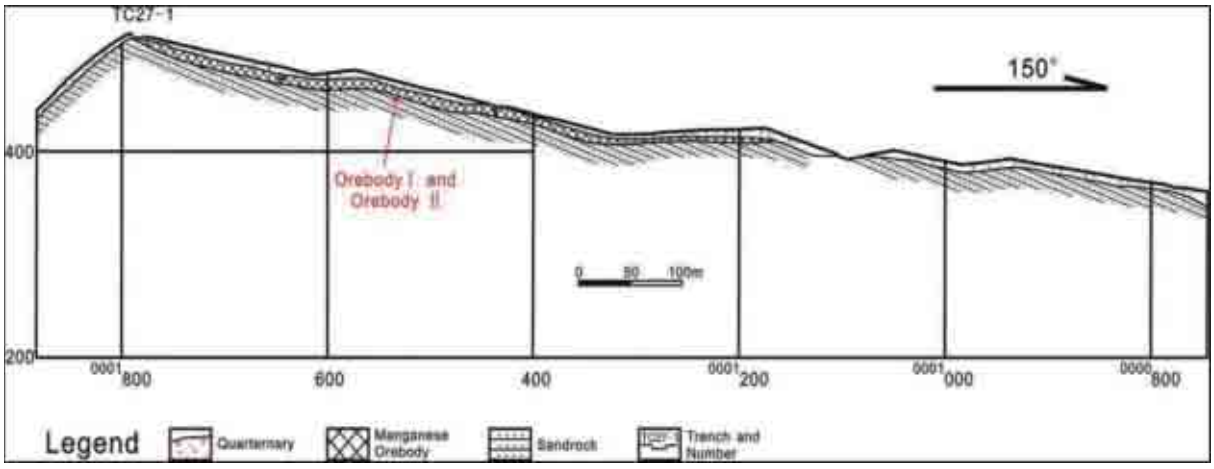

Figure 4-17: Cross Section Map on Exploration Line 27#

Orebody I

Ore body I is thick and tabular and is located in the south-east slope of Bembélé Mountain. Its footwall rock is ferromanganese siltstone and hangingwall rock is quartz schist. The ore body is more than 3000m long and 150 to 1350m wide with an average thickness of 2.92m. It trends north-east (20°E to 60°E) and dips to the south-east at angles of 15 to 42°. The average Mn grade is 36.75%.

Ore body II

Orebody II is distributed at the south-east slope of Bembélé Mountain. It is about 3000m long with a maximum width of 925m and an average thickness of 1.33 m. The average Mn grade is 15.55%.

Ore body III

Ore body III is also a tabular ore body located in the Menduman section. It is about 600m long and 100m wide with an average thickness of 3.54m. It trends south-east (110°E) and dips to the south-west at angles of 34 to 44°. The average Mn grade is 26.28%.

Mineralogy

Metallic minerals in ore bodies I and II are mainly pyrolusite, psilomelane, and manganese silicate minerals and minor iron minerals of hematite and limonite. Gangue minerals are mainly quartz with minor clay minerals. In ore body III, metallic minerals consist mainly of pyrolusite, psilomelane, and manganese silicate minerals and minor limonite. Gangue minerals are mainly quartz with minor clay minerals.

The oxide ore in Bembélé mine is characterized by earthly and colloform textures and massive structure for ore bodies I and III, and brecciform texture and massive structure in ore body II.

The useful elements are iron (Fe 11.63 to 30.34%) and cobalt (Co 0.050 to 0.058%). Both grades are higher enough to be considered "industrial grades" and should be economically recoverable. The harmful elements are sulphur (S 0.053%), arsenic (As 0.000015%), phosphorus (P 0.25% to 0.53%; corresponding to P/Mn ratio ≤ 0.004), and silica (SiO_2). These grades of harmful elements are not high.

4.3.4 Sampling, Analytical Procedures and Quality Control

A total of 386 samples were collected from trenches (915.4m), shallow shafts (65.35m), and four holes of drilling cores of 502.74m for resource estimates. Core recovery rate was generally more than 98%, where the recovery rate for mineralized intervals was more than 91%. Samples were taken from trenches and shallow shafts by the channelling method. The channel section size is 10cm long by 3 to 10cm wide. Channels were chipped horizontally on one wall of the trench/shaft. Sample length normally ranges from 0.50 to 2m. Samples were taken from drilling cores by sample-cutting the whole core, with each sample length of 1m. Wall rock and ore units were sampled separately.

Sample preparation and analysis was completed by No 1 Geological Brigade. Each sample was crushed by a jaw crusher to 3 to 5mm and pulverized by a roller crusher to -200 mesh. Four items including Mn, Fe, P and SiO_2 were assayed in the laboratories using the ferro-sulphate volumetric analysis, potassium chromate volumetric analysis, molybdenum-phosphovanadate colorimetric, and fluorine-potassium silicate volumetric methods, respectively.

For quality control, 30 samples were selected for internal checking and 30 samples were sent to the Analytical Laboratory of Guangxi Metallurgical and Geological Institute for external checking. Both results returned were acceptable. The analytical quality complies with the Chinese National Analytical Standards.

4.3.5 Resource/Reserve Estimation under Chinese Code

The resource/reserve estimate of Bembélé Manganese Mine was conducted by No 1 Geological Exploration Institute of the China Bureau of Metallurgical and Geological Exploration in August 2006. Based on detailed geological exploration, Bembélé mine is a large type of sedimentary manganese deposit according to the General Rules for Rationalizing Solid Minerals and Geological Prospecting (GB/T13908-2002) and Geological Exploration Regulations for Iron, Molybdenum and Chromium Ore Deposits (DZ/T0200-2002). An exploration grid of 200m × 200m was used to estimate 332 category resources. The 333 category resources were estimated based on an exploration grid of 400m × 400m.

No 1 Geological Exploration Institute of the China Bureau of Metallurgical and Geological Exploration (who are all qualified and approved Chinese independent geological consultants) has used methods and procedures which comply with Chinese standards for resource estimation.

Cut-offs

According to the confirmed reserves/resource estimation report conducted by No 1 Brigade in August 2006, the following technical parameters used to estimate manganese oxide ore reserves/ resources were proposed (Table 4-21).

Estimate of Reserves/Resources

Based on features of the three ore bodies of Bembélé manganese operating mine, No 1 Geological Brigade used a polygonal method with plane projection and/or longitudinal projection to estimate

resources (Figure 4-18 and Figure 4-19). By the end of June 2008, the 332 category resource was 18.59Mt at an average grade of 33.17% Mn; and 333 category resources was 12.37Mt at an average grade of 32.74%Mn (Table 4-22).

Table 4-21: Technical Parameters of Resource/Reserve Estimates

Industrial Classification		H-Grade Mn Ore			L-Grade Mn Ore	Fe-Mn Ore		
Grade		I	II	III		I	II	III
Mn (%)	Cut-offs	≥30			10 to 15	≥20		10
	Single Engineering	40	35	30	18	25	20	15
Mn+Fe (%)						50	40	30
Mn/Fe		6	4	3				
P/Mn		≤0.004	≤0.005	≤0.006		≤0.2%(∑P)		
SiO_2 (%)		≤15	≤25	≤35		≤25		
minimum minerable		0.5 to 0.7m						
maximum band thickness		0.5m						

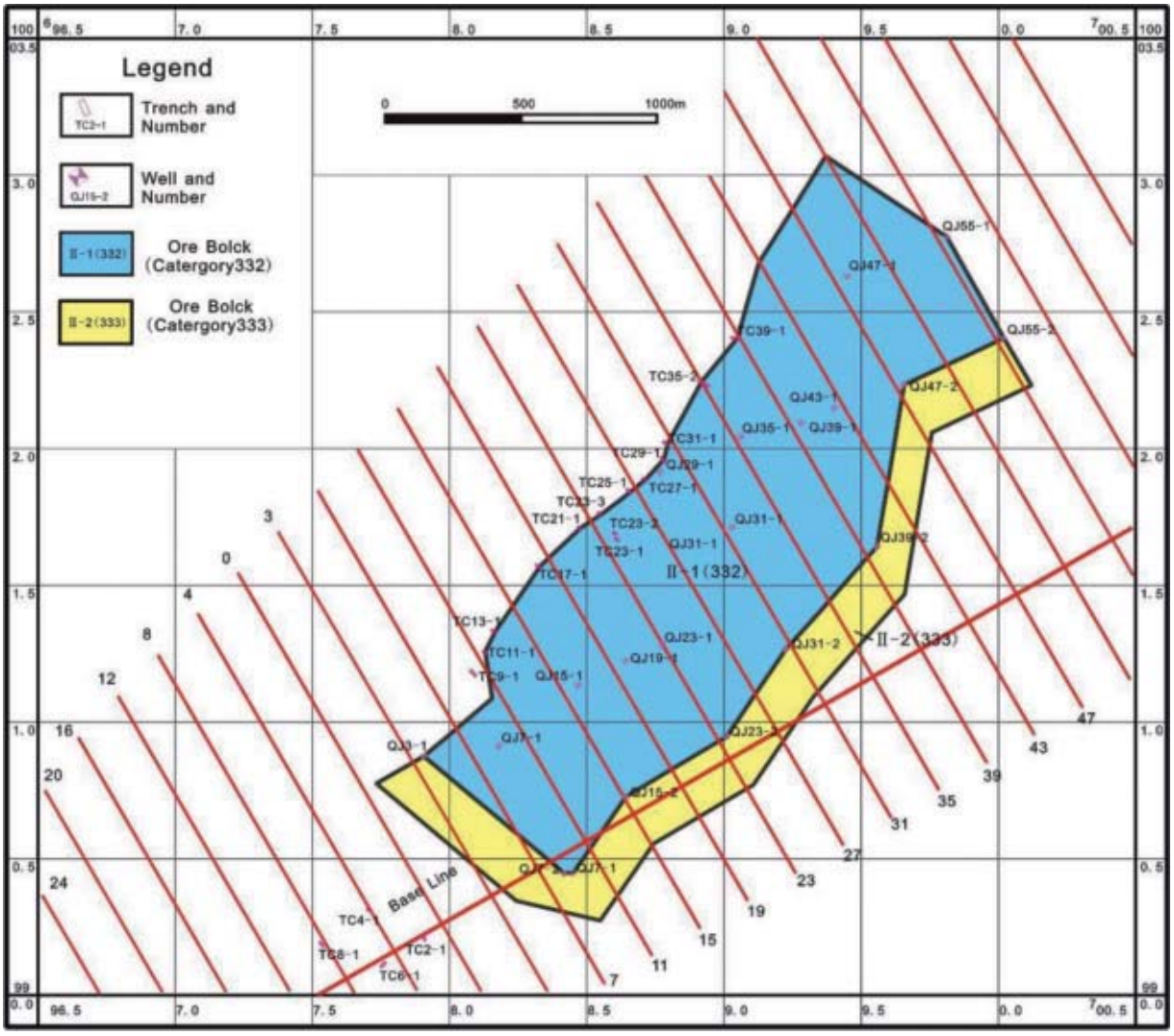

Figure 4-18: Plane Projection Map of Ore body II

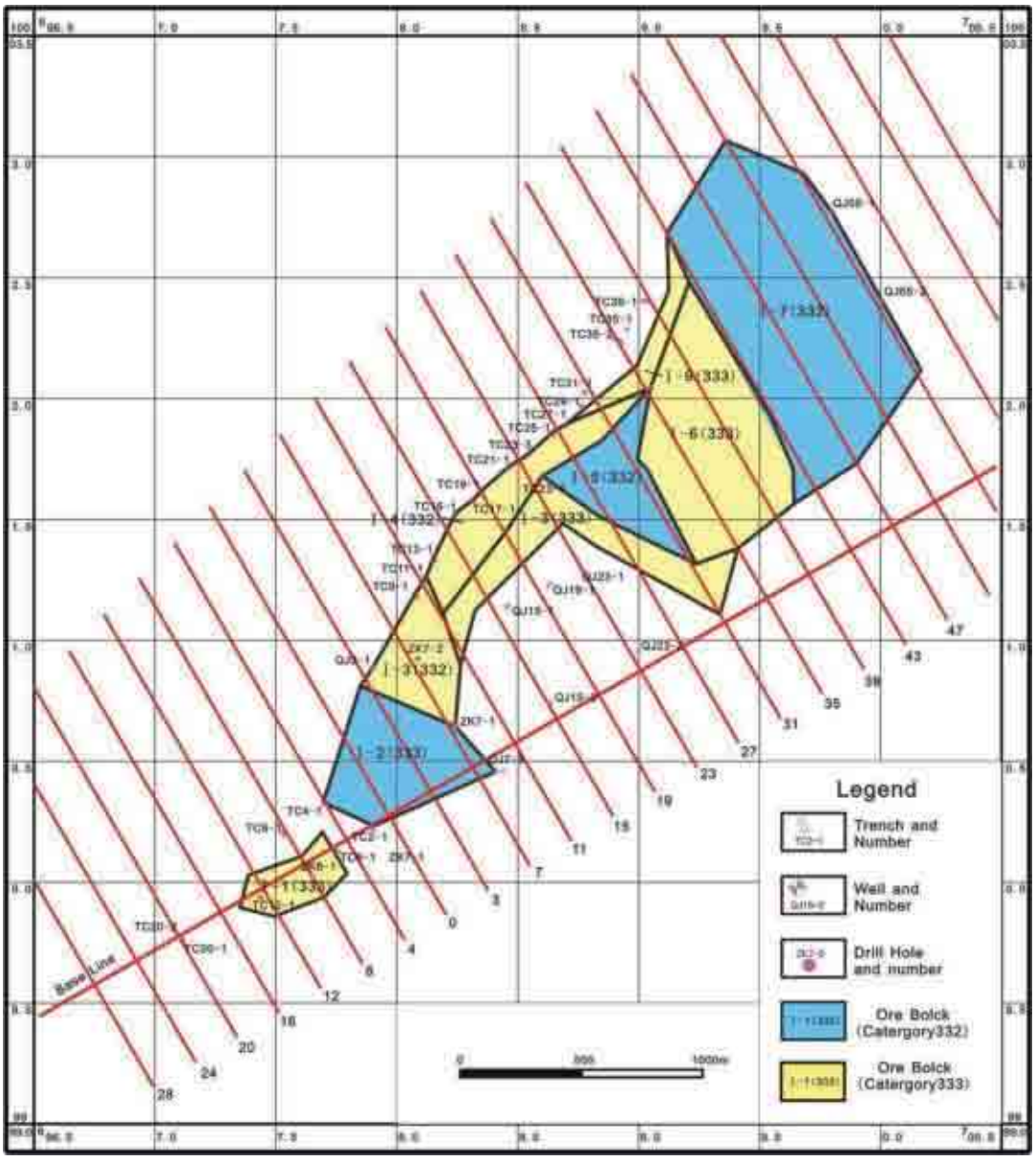

Figure 4-19: Plane Projection Map of Ore body I

Table 4-22: Resource/Reserve Estimate of Bembélé Mine as of June 2008-Chinese Code

Ore Type	Mining Block	Category	Ore Grade Type	Resource/Reserve (1,000t)	Average Grade (%)	
					Mn	Fe
Manganese Oxide	I	332	I	14,197.85	37.98	14.31
		333	I	10,500.07	35.08	15.64
	II	332	II	3,528.18	15.48	30.34
		333	II	1,186.87	15.76	29.98
	III[#]	332	III	862.08	26.28	11.6
		333	III	685.6	26.28	11.63
Total		**332**		**18,588.11**	**33.17**	**17.23**
		333		**12,372.54**	**32.74**	**16.80**

[#] Resources of 862,080t (average grades: 26.28%Mn and 11.60%Fe) in 332 category and 685,600t (average grades: 26.28%Mn and 11.63%Fe) in category 333 at the Bembélé mine is not in the mining licence area but is within the exploration tenement area.

4.3.6 Resource/Reserve Estimation under JORC Code

Review on Original Geological Database

SRK has review all original geological database including geological survey and mapping at scale of 1:10,000; drilled holes (4 holes with 502.74m footage), shallow shafts (65.35m), and trenches (915.4m) logging; sampling methodologies and sample preparation and assaying; assay quality control and quality assurance; the geological interpretation, mineral resource estimation procedures and parameter applied by No 1 Geological Exploration Institute of the China Bureau of Metallurgical and Geological Exploration. Also the Bembélé Manganese Mine is sedimentary-type deposit and the manganese grades are generally stable throughout the mineralized bodies, SRK considers that these exploration programs provides a reasonable basis to estimate the mineralized bodies at the Tiandeng mine, and that the analytical methods used for the deposit produced acceptable results with no material bias,

Based on reviewing the deposit geology, drilling and sampling data, and procedures and parameters used for the estimation of mineral resources, SRK is of the opinion that the mineral resources estimated under the 1999 Chinese mineral resource category system for the Tiandeng manganese deposit by Chinese Geological Brigades conform to the equivalent JORC Mineral Resource categories. The economic portion of the Measured and Indicated Mineral Resources can accordingly be used to estimate Proved and Probable ore reserves.

SRK's Verifications — Check Samples

SRK team designed verification plan after discussion with the Company's professional geologists. The verification includes selecting 10 the core and trench pulp samples and re-sampling 12 samples on site using channelling method nearly the original sample locations. All samples are also sent to the ASL Chemex in Guangzhou, PRC for preparation and analysis. The sample preparation and analysis are same as those of Daxin and Tiandeng Mines.

The comparison between the original results of the core and trench samples and the SRK verification samples are listed in Appendix 6. Overall, the relative differences between the original and SRK results are less than 10% for both Mn and TFe (see Figure 4-20). These results of data verification indicate that the original database is sound and reliable for the purposes of resource estimation.

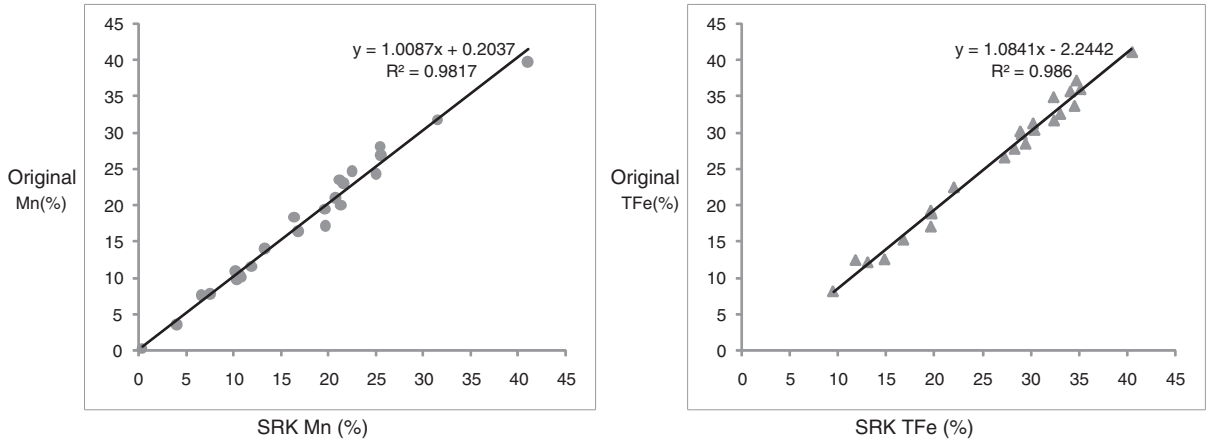

Figure 4-20: Relationship of Original Results and SRK Verification at Bembélé Mine

Ore Resource Estimation

The Mineral Resource estimates under the JORC Code as of June 30, 2010 for Bembélé Manganese Mine are summarized in Table 4-23. The Indicated and Inferred Mineral Resources are 18.59Mt with an average Mn grade of 33.17% and 12.37Mt at an average Mn grade of 32.740%, respectively. Only the Indicated Mineral Resources can be used for ore reserve estimation and mine planning.

Table 4-23: Ore Resource Summary at Bembélé Mine — JORC Code, as of June 30, 2010

Ore Type	Mining Block	Category	Ore Grade Type	Resource (1,000t)	Average Grade (%)	
					Mn	Fe
Manganese Oxide	I	Indicated	I	14,197.85	37.98	14.31
		Inferred	I	10,500.07	35.08	15.64
	II	Indicated	II	3,528.18	15.48	30.34
		Inferred	II	1,186.87	15.76	29.98
	III#	Indicated	III	862.08	26.28	11.6
		Inferred	III	685.6	26.28	11.63
Total		**Indicated**		**18,588.11**	**33.17**	**17.23**
		Inferred		**12,372.54**	**32.74**	**16.80**

Resources of 862,080t (average grades: 26.28%Mn and 11.60%Fe) in Indicated Category and 685,600t (average grades: 26.28%Mn and 11.63%Fe) in Inferred Category at the Bembélé mine is not in the mining licence area but is within the exploration tenement area.

Ore Reserve Estimation

Ore Reserves are estimated based on the mining recovery rate of 95% and dilution rate of 5% cited from the feasibility study. As of March 31, 2010, the Probable Ore Reserves were 18.54Mt at an average Mn grade of 31.59% (Table 4-24).

Table 4-24: Ore Reserve Summary at Bembélé Mine — JORC Code, as of March 31, 2010

Ore Type	Mining Block	Category	Ore Grade Type	Resource (1,000t)	Average Grade (%)	
					Mn	Fe
Manganese Oxide	I	Probable	I	14,162.36	36.17	13.63
	II	Probable	II	3,519.36	14.74	28.90
	III	Probable	III	859.92	25.03	11.05
Total		**Probable**		**18,541.64**	**31.59**	**16.41**

4.3.7 Previous Exploration History

Bembélé Manganese Mineralization was discovered between February 1956 and January 1957 by the French Cosson exploration team in the Bembélé district.

From October to November 2004, No 1 Geological Brigade conducted geological surveys in this area.

From January to April 2005, No 1 Geological Brigade conducted detailed geological and geophysical mapping. The brigade also conducted detailed geological exploration work including trenching and shallow/deep hole drilling programs, and compiled a geological report with resource estimation in October 2005.

4.3.8 Potential Exploration

In SRK's opinion the strata, structure and ore bodies of Bembélé Manganese Mine have been relatively well investigated including a pre-feasibility study. Within the mining licence and exploration tenement areas, the potential for further exploration to find more ore bodies tends to be very encouraging and SRK recommends that the Company conducts more exploration work within its mining licence area. This may not only upgrade the 333 category resource to a 332 category resource but also increase the opportunity for more 333 category resources. Within the Bembélé exploration tenement area, more manganese resources is likely to be discovered through further exploration.

The Company has, up until now, recorded its geological information in a non-digital format. SRK recommends all geological information including reports, maps and sample assay results be digitized as digital information can allow easy transfer of important information, not only for guiding exploration but also for mining development.

5 MINING ASSESSMENT

5.1 Introduction

CITIC Dameng has three operating manganese mines; it includes the Daxin mine and Tiandeng mine located in Guangxi Province, P.R. China and the Bembélé mine situated in Moyen-Ogooue Province, Gabon. The Company holds a total manganese resource/reserve of over 100Mt, which takes up 22% of the total manganese resource/reserve in China.

Daxin manganese mine is located in the Xialei town, Daxin County of Guangxi Province. Currently there are four open-pits (south pit, middle pit, northwest pit and southwest pit) and one underground production system. The designed capacity for open pit mining and underground mining in total is 1,000,000tpa. In 2009, a total of 814,999t ore was mined at Daxin mine.

Tiandeng manganese mine is located in the Dongping town, Tiandeng County and partially in the town of Rudong County in Guangxi Province. The Tiandeng mine is an open-pit mine. The historical designed mining capacity is 180,000tpa. In 2009, a total of 294,100t ore was mined at Tiandeng mine.

Bembélé Manganese Mine is located in the north of Ndjole city, Moyen-Ogooue Province, Gabon. The Bembélé mine will be an open-pit mine. The designed mining capacity is 1,150,000tpa. SRK was informed the operation will commence by the end of first quarter of 2011.

5.2 Daxin Manganese Mine

Daxin mine was discovered in 1958 and was mined by local people. From 1963 the mine operated with a small mining capacity by Guangxi Manganese Mine Company. After innovation between 1984 and 1992, it achieved an open pit mining capacity of 300,000tpa. In 2004, after further development, the Company set a target to reach an open pit mining capacity of 400,000tpa and underground mining capacity of 600,00tpa.

5.2.1 Hydrogeology

Daxin mine is located in a low mountain area, with the highest mountain elevation in the mining district of 845.1m ASL. Topography is high in the west and lower in the east. Xialei and Bukang rivers are the two main surface water bodies. Xialei River runs from north-west to south-east passing the east edge of Daxin mining tenement cross-cutting all strata in the deposit. The maximum flow of the river is greater than 59.3 cubic meters per second (m^3/s) with a minimum flow of 5.08m^3/s. The lowest elevation is 241.1m ASL which is also the base level of erosion and drainage level of the ground and surface water in the mine. Three steams at the west of the mine flow east to the exploration line 15# and feed into Bukang River. It runs along the south side of the syncline to exploration line 0#. The river drains the run-off and ground water in the mine with flows of between 0.336m^3/s and 0.0232m^3/s.

Based on drilling data, the aquifer parameters are estimated by the steady flow method between 22761.16m^3 per day (m^3/d) and 947.21m^3/d at three mining areas between exploration lines 0# and 8#, 8# and 24#, and 24# and 34# on three levels of 330m, 270m and 150m, respectively.

5.2.2 Geotechnical Engineering

The depth of oxidized belt is generally between 1 and 165m with average of 78m. The weathered ore body footwall and hanging wall rocks are mainly mudstone, and manganese mudstone intercalated with siliceous rocks. The compression strength of strong weather belt is 0.98-29.4Mpa, which is extremely unstable. The compression strength of slightly weathered belt is 29.4-58.8 Mpa, which is semi-hard and unstable, and relevant support is required during development. The primary rock is hard and stable with compression strength over 98.1 Mpa (see Table 5-1).

The mechanical properties of ore including density, natural slope angle and humidity are listed in Table 5-2. The coefficient of volumetric expansion is 1.55 to 1.57 and the coefficients of hardness range from 9.6 to 27.9.

Table 5-1: Strength Test Results

Ore Bed	Rock/Ore	Compression Strength (MPa)				Shearing Strength (MPa)	
		Vertical		Horizontal			
		Strength	Value	Strength	Value	Vertical	Horizontal
III	Mn Carbonate	R5	237.76	R4	167.17	15.01	11.69
Inter-bed II	mudstone/ limestone	R3	72.1	R3	72.05	7.48	4.6
II	Mn Carbonate	R4	127.24	R3	94.21	17.98	11.51
Inter-bed I	Siliceous limestone	R4	172.18	R4	133.00	24.58	21.83
I	Mn Carbonate	R4	116.73	R4	179.3	24.55	25.57

Notes: R5-Very or extremely hard; R4-hard; R3-hard

Table 5-2: Mechanical Properties of Ore Beds at Daxin Mine

Item	Unit	Ore Bed		
		III	II	I
Density	t/m^3	3.04	3.15	3.15
Hardness	f	9.6 - 27.9		
coefficient of volumetric expansion	K	1.55 - 1.57		
Natural slope angle	°	46 - 53		
Humidity	%	0.8 - 0.9		

5.2.3 Ore Reserves Estimation

Cut-off Grade, Ore Recovery and Dilution

The cut-off grade as outlined in the feasibility study is 15%. It is described in detail in Section 4.4.6 and is shown in Table 4-1.

Based on similar mines, ore recovery and dilution for Daxin mine are estimated at 93% and 7% for the open pit, and 86% and 12% for underground mining. Based on the characters of the mineralized bodies at Daxin mine, the recovery rate and dilution rate are acceptable.

Ore Reserve Estimation

The Company's Mineral Resources and Ore Reserves estimates are detailed in Section 4.1.6 and are shown in Table 407 and Table 4-8.

5.2.4 Mining Equipment

The mine equipment consists of open pit and underground mining equipment purchased since 2003, and is listed in Table 5.2.

Table 5-3: Main Equipment in Daxin Mine

Underground mining			Open pit mining		
Item	Model	Quantity	Item	Model	Quantity
Winch	0.6T	1	Hitachi hydraulic shovel	ZX200	2
Electric car	10T	3	Hitachi hydraulic shovel	ZX330	3
Ore car	S-8	1	Volvo hydraulic shovel	EC360	2
Wheel loader	LZ-80	1	Volvo hydraulic shovel	EC460	1
Electric loader	Z-30	1	Bulldozer	T180	3
Ore car	3-8	1	Bulldozer	JY220	1
Explosive charger	BQF-100	1	Bulldozer	AD220-3	2
Vibratory ore-drawing machine	F2C-23/1.2-3	7	Bulldozer	23	1
Passenger car	PRC-18-50	2	Truck		46
Underground jumbo	zas -100D	1	Loader	ZL50C	4
Scrapper	2DPJ-30	2	Loader	ZL40B	1
Scrapper	2DPJ-15	1	Drilling rig	KQ150	6
Ore car	$0.75m^3$	10	Air compressor	VHP750	4
Dumping ore car	$1.2m^3$	21	Drilling rig	D7ROC	1
Dumping ore car	$2m^3$	35	Drilling rig	CM760D	1
Rock drill	YGZ-90	6			

5.2.5 Open Pit Mining

Daxin open pit mine includes four mining zones — east, middle, south-west and north-west. By the end of 2009, the south-west zone has been in operation for 18 years. About 2.81Mt of ore has been extracted from it, including 0.75Mt of manganese oxide ore and 2.06Mt of manganese carbonate ore. The east and middle zones have been operating for 23 years with 5.30Mt of raw ore extracted. Of the raw ore, 3.55Mt was manganese oxide ore and 1.76Mt was manganese carbonate ore. The north-west zone has been operating for 16 years, with a total of 0.84Mt of raw ore extracted. Of the raw ore, 67,500t was manganese oxide ore and 777,600t was manganese carbonate ore.

8.96Mt of raw ore has been mined out of the whole mine, including 3.37Mt of manganese oxide ore and 5.59Mt of manganese carbonate ore. The total waste rock generated is 127.54Mt, with the south-west, east and middle, and north-west contributing 42.14Mt, 77.34Mt, and 8.05Mt, respectively. The historical average stripping ratio is 14.23:1.

It is planned that the total stripping quantity in 2010 will be 9.95Mt, of which 9.3Mt will be waste rock and 0.65Mt of ore. This is at a stripping ratio of 14.3:1.

Open Pit Mining Parameters:

Because of the mining technical conditions and the current mining situation, a low slope ratio mining method has been adopted where the technique is simple and management is easy.

- Bench height: The bench height is set as 10m to match the deposit conditions and the equipment selected. There are no height variances between different benches although bench heights should be varied to better separate ore from waste rock when encountering complex ore bodies;
- Bench face angle: The bench face angle is designed at 65°;
- Best working bench width: To ensure normal operation, the minimum working bench width was set at 30m. The open pit is developed into two or three different levels.
- Access development: The width of the access is designed at 20m; and
- Ore loss: The geologic setting of the deposit is relatively complex, where bands less than 0.5m thick cannot be separated. During mining, there will be some loss of ore and mixing of waste rock. The forecast loss rate is about 10%.

Mining Technique:

Drilling and blasting: the near surface ore and rocks are highly weathered and can be extracted by shovel without drilling and blasting. The deep buried manganese carbonate ore and rock, which has a hardness coefficient of about 10 to 15, needs to be first drilled and blasted. Generally 70% of the ore needs to be blasted and 30% of the ore can be extracted directly by shovels. Table 5-4 shows the blast hole parameters.

Table 5-4: Blast Hole Parameters

Drill rig model	Rock strength (f)	Bench height (m)	Blast hole diameter (mm)	Bench face angle (°)
CM351	10~15	10	150	65
Blast hole angle (°)	**Toe burden (m)**	**Blast hole space (m)**	**Blast hole depth (m)**	**Deepest hole (m)**
70	4	4	12.5	25

Loading: ore and rock are loaded by 1.6m^3 hydraulic excavators which have a working extension length of 15m and an annual capacity of 0.8 to 0.9Mt. The blasting capacity is 7 to 10 times more than the loading capacity. Bulldozers are used for stockpiling, pave access road and work on benches.

The open pits are equipped with eight excavators and seven bulldozers which can guarantee current mine production. SRK is satisfied that the benches are developed with good control ensuring the benches are kept clean and in good condition. All sequences are well organized.

Ore and waste transport: the mine is equipped with 46 Hongyan-type dump trucks. Ore is hauled from the open pit to Daxin concentrator, which is 6.5km away from the open pit. There are two waste dumps, Buxin and Bukang. Waste haulage distances for the middle mining zone, east mining

zone, south-west mining zone and north-west mining zone are 900m, 1200m, 1200m, and 400m, respectively. The access road is about 8m wide with a slope angle of 8°.

SRK noted during the site visit that the road condition needs to be improved because it will hamper ore and waste transport during the wet season.

Waste Dump:

There are two waste dumps in the mine, Buxi and Bukang. Buxin waste dump is in the center of the middle and south-west mining zones. It is located in the Banji Mountain valley at an elevation of 410m ASL and has a length of 1170m. SRK noted that this waste dump has been operating for many years and is still a good place for dumping waste. Bukang waste dump is on the other side of the Banji Mountain at an elevation of 335m ASL and has a dumping capacity of 35 million m^3.

During the site visit, SRK observed that the surface of the waste dump is flat, the slope is well managed and there is no sign of breaking and cracking.

Figure 5-1: Buxin Waste Dump

Mine Drainage:

All four mining zones are located on mountain slopes, so run-off water can be drained out of the working faces by gravity. In the later mining stages, the east and middle mining zones are located on elevations between 345 and 285m ASL and the south-west and north-west mining zones are located on elevations between 395m and 385m ASL. Run-off water in these areas will need to be drained by pumps in the future. SRK noted that drainage routes are built on the surface around the mining zones to divert surface water.

Slope Management:

All bench heights at Daxin mine are 10m. The mine slopes are 43 to 44° at the east and middle mining zones, 43° at the south-west and north-west mining zones with an ultimate bench angle of 60°. The safety berm and cleaning bench widths at all the mining zones are 4m and 7m respectively (see Figure 5-2).

During the site visit SRK noted good conditions on the slopes of the Waste dump without any significant breaking and sliding. The slopes are under proper management with vegetation growing on them.

Water and Electricity Supply:

10kV electricity is reduced to 380V and transmitted to all the mining zones. Water is mainly used for drilling and surface dust control.

Figure 5-2: Scheme of Southwest Mining Zone

5.2.6 Underground Mining

The underground working faces are located from 340m to 420m levels with an interval of 40m in height between exploration lines 13# and 27#. There are 50 mining stopes (ore blocks) and each stope is 50m long and 40m high. Two to three mining stopes can be mined at the same time by middle to deep hole drills, Scrapers and vibrating ore feeding machines.

Mining method

The natural ore body dip angle is 50°, bulk ore density is 3.13t/m^3, rock bulk density is 2.7t/m^3, the Protodikonov's Hardness Coefficient of Rock is 8 to 15 and the coefficient of volumetric expansion

is 1.5. Considering equipment conditions, the shallow hole shrinkage method is an acceptable way to extract ore by fan-shaped middle to deep hole drilling, scraping and vibrating ore feeding machines. The average ore recovery rate and dilution are 82 and 18%, respectively.

Stope Preparation and Mining

The development drifts are at the footwall of the ore body. At every 60m long interval there is a cross-cut (i.e., drawpoint) through the ore body. It collects a raise which is used as an ore pass. The ore pass is equipped with a vibrating ore feeding machine to feed the ore to the ore car. The electronic scraper is used for collecting broken ore to the ore pass (see Figure 5-3).

Drilling and Blasting

Ore blocks are mined from bottom to top. The YGZ-90 rock driller is used for drilling blast holes which are 50 to 60mm in diameter and designed in a fan shape with high density and depths varying from 1m to 1.5m. Ammonium nitrate fuel oil ("ANFO") is used as the explosive with detonator cord MS connectors used for safety reasons.

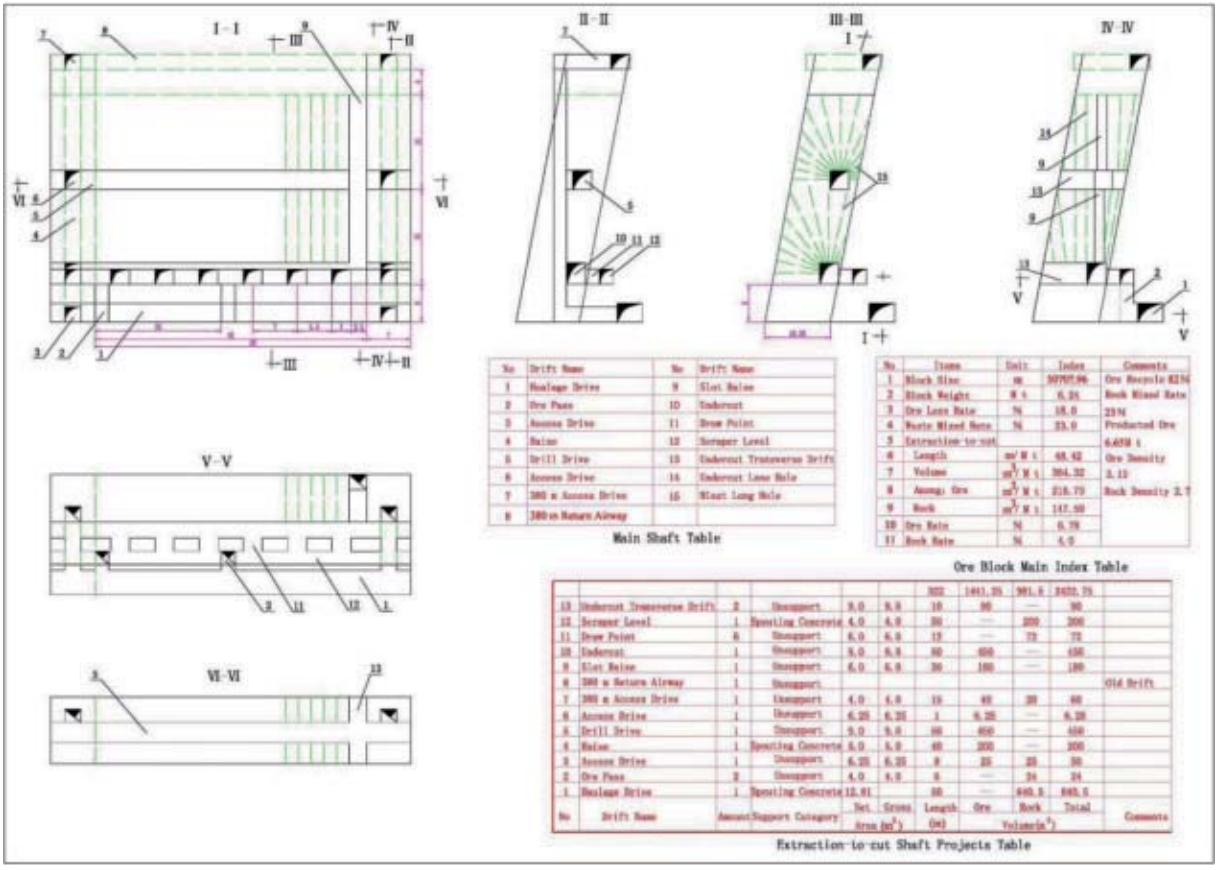

Figure 5-3: Scheme of Shrinkage Stoping Mining Method

Ore Extracting and Loading

Blasted ore and waste are excavated by the ZDPJ-28 model Scraper with a capacity of 70t per shift. The ore is loaded into 1.2m^3 and 2m^3 dumping cars by the FZC-2.3/1.2-3 vibrating loaders through ore passes. Ore and waste are hauled by a ZK10-7/250-2 electric locomotive, with ore transported to the concentrator and waste hauled to the waste dump.

Pillar recovery

For safety reasons on the working faces, about 4 to 6m wide pillars are reserved in each stope. Pillars take one third of the total Ore Reserves, which need to be recovered to minimise ore loss. After work has finished in each stope, pillars are recovered in a retreating direction. Part of the pillar fragment remains temporarily to support the stope walls.

Ventilation

Fresh air enters the mine through the 340m level adit. After ore blasting, polluted air escapes through the air shaft via the 380m level adit to the 420m level adit. It is then exhausted to the surface by fans. SRK noted during the site visit that ventilation was of a suitable standard.

Mine Drainage

Hydrogeology in the mine is very simple with both the 340 and 380m levels above the water table. Underground water comes mainly from water from the rock driller and surface water seepage. There are drainage channels and/or ditches on each level sending underground water out from the mine. The drainage channels are covered and cleaned as necessary. During SRK's visit effective drainage system conditions were noted.

Electricity supply

A 35/10kV substation within the mine site supplies 10kV electricity to the whole mine. Electricity is transformed by a SJ10-400/10/0.4kV transformer at the portal of the 340m level adit for industrial use underground and on the surface.

Underground and surface lighting source is from the 380/36V transformer.

5.2.7 SRK's Conclusions

Daxin mine is the largest manganese mine in China and has relatively a long mine history, having first been mined privately then operated by the state. A detailed exploration and feasibility study have been completed for the mine, after many years of operation; the mine has achieved a high standard of management, operation and safety which were observed during the site visit.

5.3 Tiandeng Manganese Mine

5.3.1 Introduction

Tiandeng mine is located mainly in Dongping town, Tiandeng County and partially in the town of Rudong County in Guangxi province. The project covers an area of 4.5958km^2, and is connected by some gravel roads. It is 170km to Chongzuo railway station in the south, 175km to Nanning in the south-east and 63km to Pingguo rail station (Nankun line) in the east.

Tiandeng mine is one of the largest manganese oxide ore mines in China based on its resources and reserves reviewed by SRK, and the publicly disclosed information regarding resources and reserves of other major manganese oxide ore mines in China. The mine, including four mining areas of Tuoren West, Tuoren East, Luli and Dongmeng, was discovered in 1956, mined privately in 1958 and operated by the state in 1973. The mineral resource is a shallow buried, easy to extract and easily concentrated to obtain saleable manganese ore products. Only two mining areas, Tuoren West and Tuoren East are under operation. Other two mining areas are under preparation for operating.

5.3.2 Hydrogeology

In the Tiandeng mining tenement, 98.4% of the deposit is above the regional base erosion level, so groundwater will not cause any damage to the mine. Regionally it is in a sub-tropical climate; hot and rainy during summer and dry during other seasons. The annual precipitation is between 1349 and 1917mm. Due to low vegetation coverage and high slope gradient, most run-off water is drained through the rivers with only a minority supplying groundwater. SRK was informed that groundwater in the deposit is supplied by precipitation which is limited to a certain level.

5.3.3 Geotechnical Engineering

All four mining areas in Tiandeng mine are manganese oxide ore and are located above the oxidation level. The dip angle of the ore body is 35°. Bulk densities of the ores and rocks are 1.92 to 1.99t/m^3 and 2.2t/m^3 respectively. The coefficient of volumetric expansion and hardness coefficient are 1.5 and 1 to 2 for the ore and 1.6 and 2 to 6 for the wall rocks.

Folds and faults are not well-developed. The ore bodies dip from 30 to 50° with the dip angles affecting the stability of the rock and ore bodies. There are two groups of fracture structures trending north-west and north-east, but they are far from the open pit, and only their sub-faults and joints affect the stability of ore bodies and wall rocks.

In summary, the geotechnical conditions in the mine are at the medium to complex level. SRK recommends that an evaluation of geotechnical factors is needed when the Company prepares future mine designs and production plans.

5.3.4 Ore Reserve Estimation

Cut-off Grade, Ore Recovery and Dilution

The cut-off grade as outlined in the feasibility study is more than 8%, which is described in **Error! Reference source not found.** of the Section 4.5.6. Ore recovery and dilution for the Tiandeng mine are estimated at 90.5% and 6.5%, respectively.

Ore Reserve Estimation

The Company's Mineral Resources and Ore Reserves estimates are detailed in Section 4.2.6 and are shown in Table 4-19 and Table 4-20.

5.3.5 Mining Method

The mine is located in the low hills of a mountain with slope angles between 10 and 25°. The ore bodies are shallow buried and highly oxidized to a depth of 50 to 60m. The open pit mining method is used for the mine. It is designed as a 10m high bench, 50 to 60° bench angle and 45 to 50° slope angle.

5.3.6 Mine Production Description

Tiandeng mine has four mining areas with a total stripping quantity in 2009 of 1.01Mt. This includes 0.74Mt of waste rock and 0.27Mt of ore with a stripping ratio of 2.47:1. The feed grade is 12% and the annual manganese ore concentrate is 160,800tpa at an average grade of 25.81% Mn.

5.3.7 Mining Technique and Equipment

The rock and ore are weak and basically do not need any blasting as they can be excavated directly by hydraulic shovels. Ore is hauled to the concentrator and waste rock to the waste dump using 10 to 15 dumping trucks. The mine has four mining areas — Tuoren East, Tuoren West, Luli and Dongmeng, and three waste dumps. The average haulage distances are 2km for transporting ore and 0.8km for waste. Table 5-5 shows equipment used in Tiandeng open pit mine.

Table 5-5: Equipment Used in Tiandeng Mine

Equipments	Model	Quantity
Loader	ZL50C	2
Bulldozer	T180	2
Bulldozer	T220	1
Excavator	ZAXIS330	1
Generator	YN30	1
Air compressor	3/5	1
Drill rig	AC CM351	1
Air compressor	IR VHP750	1
Road roller	CLG620	1

5.3.8 Slope Management

Slope safety is one of the most important issues in an open pit. Due to the good geological condition, the slopes stay in good shape without any cracking or sliding. The slope angles of the four mining zones of Tuoren East, Tuoren West, Luli and Dongmeng are 40°, 42 to 44°, 42 to 44° and 40 to 42°, respectively. The slope consists of two safety berms and one cleaning bench in the middle that forms the final wall with a slope angle of 42°.

At Tuoren East mining area the highest elevation of the slope is 590m ASL and the lowest is 484m ASL with a relief of 104m. At Tuoren West mining area the highest elevation of the slope is 588m ASL, the lowest point is 510M ASL with a relief of 78m. During the site visit, SRK observed good conditions on the slopes (Figure 5-4).

Figure 5-4: Scheme of Tuoren East Mining Area

5.3.9 Mine Drainage

The deposit is buried above the regional water table. All working faces are connected with the surface, where water can gravitate from the pit to the surface. The regional water accumulation is the only issue of concern.

5.3.10 Waste Dump

Three waste dumps, No 1, No 2 and No 3 are in service. No 1 dump is some distance from the mine and is rarely used. No 2 dump is used most frequently. As the waste is weak, SRK noted dump subsidence during the site visit and observed good management of the dump where the slope is standard and access is good. No. 3 is about 3.5km from the mine site and is under construction.

5.3.11 Water and Electricity Supply

Electricity for the mine is sufficient and is sourced from Dongping 35Kv substation and transmitted to the mine via 10kv line grid for the concentrator and mine site. Water supply for both industrial and domestic use is pumped from Quantang River and stored in head tanks.

5.3.12 Conclusion and Suggestions

During the site visit SRK observed good geological conditions; simple mining operation; proper operation sequence; good slope and dumping management; qualified and trained staff; and good safety statistics. A promising profit can be expected, however, the Company can improve in the following areas:

- More exploration needs to be conducted in the adjacent area to increase the mine resource and mine life;
- Luli and Dengmeng zones need to be put into production as soon as possible to sustain a continuity of ore output; and
- Access conditions to the working face and dump need to be improved at Tiandeng mine to support good production.

5.4 Bembélé Manganese Mine

5.4.1 Introduction

Bembélé mine is located in the north of Ndjole city, Moyen-Ogooue province. The mine area is 32km from the Ndjole city railway station. Ogooue River traverses Gabon, passing through the east part of Ndjole city. The ports of Port-Gentil and Libreville can be directly reached along this river. The river is an important water route for the transportation of timber (Figure 3-3).

5.4.2 Hydrogeology

The mine area is located in the middle and west part of Gabon. It has a typical equatorial rainforest climate with an annual average temperature of 26°C and annual precipitation of between 1600 and 3000mm. The highest and lowest elevations of the Bembélé Mountain are 754 and 100m ASL. Ore bodies found in the Bembélé Mountain are located at elevations of 754 to 190m ASL. Bembélé Mountain is the source of the Mesange River. During the wet season, the Quaternary sequence is basically saturated and well-grown with gullies, and all surface run-offs and brooks traverse into Mesange River and its branches. The river is 3 to 10m wide and flows from north to south all year round, with flow rates of 1.0 to 10m^3/s. The river and all its branches flow into the mother river of Gabon-Ogooue River.

The Quaternary sand and soil layer is 1 to 5m thick and is generally saturated due to the wet season. Part of the precipitation seeps into the underground, but most of the water flows into brooks along the slope, finally flowing into the river.

The base rock weathered zone is usually 10 to 15m thick and mainly consists of sandstone, silty sandstone, and carbonaceous quartz-schist. Under long-term weathering and leaching, most of rocks contain amounts of underground water-confined water. According to hydrological analysis of drilling cores, the flow rates are between 2.0 and 2.5t/h.

5.4.3 Geotechnical Engineering

The main strata of the Bembélé mine area are metamorphosed sandstone and argillaceous siltstone and carbonaceous quartz-schist. They gently dip at angles of 15 to -35°. The ore bodies are about 3m thick at the top of these formations and are exposed at the surface along the slope, which is suitable for open-pit mining.

The footwall rocks of ore bodies detailed above may be easily weathered and eroded which may have adverse influences on mining. SRK was informed that, as the rock formation has a gentle dip angle, it does not cause serious landslide.

5.4.4 Ore Reserve Estimation

Cut-off Grade, Ore Recovery and Dilution

The cut-off grade as outlined in the feasibility study is more than 15%, which is described in Section 4.3.5 and shown in Table 4-21. Based on similar mines, ore recovery and dilution for Bembélé mine are designed to be 95% and 5%, respectively.

Ore Reserve Estimation

The Company's Mineral Resources and Ore Reserves estimates are detailed in Section 4.3.6 and are shown in Table 4-23 and Table 4-24.

5.4.5 Mining Method

The mine is located on a relatively low mountain hillside with a slope angle lower than 30° and between 10° and 25°. The ore bodies are shallow buried and highly oxidized to a depth of between 50 to 60m. According to geological and topographic conditions, open pit mining is suitable for these geotechnical conditions which can be designed as a 10m high bench, 50 to 60° bench angle and 45 to 50° slope angles.

Mine life

Within the mining area, the total ore tonnage is 30.96Mt. The designed production capacity is 1,150,000 tpa and mine life is 30 years. The designed stripping ratio is 1.52:1.

5.4.6 Mining Description

Bench Height

The bench height depends on the working parameters of the excavator, ore body geometry and other factors. The ore body, most of which is about 3m thick, has its outcrop along the slope or close to the surface. In order to reduce the mine stripped quantities, maximize ore recovery and reduce ore loss, the bench height is designed at 5m.

Bench slope angle

According to the mine's ore and rock properties, the working bench slope angle is specified at 65°.

Width of working bench

The working bench width is the prerequisite for realizing the normal working of a mining area and depends on the muck-pile width, transportation equipment size and working safety width. The minimum working platform width is 25m.

Length of working line

In order to meet the drilling, blasting, and loading requirements, the working line is specified as 150m long.

5.4.7 Mining Equipment

The main equipment used for Bembélé mining operation is shown in Table 5-6.

Table 5-6: Equipment Used in Bembélé Mine

Equipment	Model No.	Quantity
Down-the-hole drill	ATLAS ROC-F9	2
Excavator	VOIVO 460	3
Hydraulic breaking hammer	VOIVO 460	2
Tipping truck	Steyr S280/K25/8*4	41
Bulk explosive charging truck	Be-8	1
Water sprinkling truck	8t	1
Refueling truck	DD401Y	2
Bulldozer	TD22	3
Production commanding truck	DD401Y	2
Equipment maintenance truck	DD401Y	1
Road roller	18T	1

5.4.8 Mining Procedure

Drilling

According to the physical and mechanical properties of rock and ore, mine production capacity and existing equipment, the ATLAS ROC-F9 down-the-hole drill can be used for rock drilling, with a hole diameter (Φ) of 90mm, and hole depth of 6 to 6.5m. The ROC-F9 down-the-hole drill can reach comprehensive drilling efficiency in rock and ore. According to hole drill quantities and considering the working conditions and abandoned rate of medium depth holes, two ROC-F9 down-the-hole drills can be used for rock drilling purposes. The hydraulic excavator associated with the hydraulic hammer can be used for cleaning the side slope.

Blasting

Millisecond multiple-row holes blasting technology is applicable. The ANFO explosive or emulsion explosive can be used to blast sections with high moisture content. The emulsion explosive can be used, with the non-electric detonator, for blasting in holes and sections one by one. Based on ore output of 1Mtpa, and rock stripping output of 1.50Mtpa, medium-depth holes may adopt the nonel-tube non-electric blasting system, blasting 30 times each month. Explosive consumption for each blasting is 900kg, with about 50 holes blasted each time., The minimum safety distance for deep hole blasting is 200m when blasting along the mountain slope, with the safety distance for downward flying stones increasing by 50%. It was specified that the blasting safety guarding range along the downward direction is 300m, and for other directions is 200m. After blasting, large-size blocks should be treated to secondary breaking using the hydraulic excavator associated with the breaking hammer.

Loading

Based on mine production capacity, the VOLVO460 hydraulic excavator with a scoop capacity of 2.1m^3 is suitable for ore loading and rock loading purposes. The hydraulic excavator has a long service life and low operating costs. For auxiliary work, two TD22 bulldozers can be used for transporting blasting materials and explosives.

Transportation

All working faces in mining area use 28t tipping trucks for transportation purpose, and all three benches can be simultaneously mined. All benches can be interconnected through road, the ore can be transported to the ore dressing plant through the road, and the stripped waste rock can be directly transported to the dumping site. A small amount of surface soil can be stored in the lowland area outside of the mining boundary as standby soil for mine area greening and reclaiming purpose. All benches have interconnected road passageways for drilling and transporting of equipment. The road has two lanes with a road surface width of 10m and minimum turning radius of 20m.

5.4.9 Mine Drainage

The main water at the mine is from precipitation which can be drained through gravity flow mode, as the mine is always in the slope open-pit condition. The drainage ditch can be built on a safety platform to introduce surface through-flow outside of the mining area, for the fixed side slope. To prevent accumulated bench water on the working platform, the vertical slope of the bench should be kept at 2 to 3%.

5.4.10 Slope Management

The slope management parameters of the final side slope in the open-pit mining area are listed in Table 5-7.

Table 5-7: Slope Parameters

Item	Unit	Index	Remark
Height of bench	m	5	
Bench slope angle	(°)	65	
Width of safety platform	m	≥4	
Final side slope angle	(°)	15 - 42	Ore body with the deep angle
Longitudinal slope of road	%	8	
Length of gentle slope section	m	60 - 80	
Radius of switch-back curve	m	20	
Width of road	m	10	
Maximum length of limited slope	m	300	

Side slope management is an important link for mine production. The side slope needs to be flattened with no overcutting and undercutting problems, to reduce the influence of blasting to the internal geologic structure of the side slope. This may occur after blasting and during shoveling and loading to the side slope line. After the side slope is formed, routine maintenance must be provided, according to completed side slope management regulations and technical measures. If any problems occur, the side slope must be disposed of immediately. The side slope must also be integrated with the water-intercepting system to ensure its safety and stability.

5.4.11 Conclusions and Recommendations

Bembélé Manganese deposit is of large scale, as Huazhou Company owns exploration right covering a bigger area, the geological resource level may be potentially increased and the mine developing prospecting is also expandable. The designed mining capacity is 1.15Mtpa (3500tpd) which is quite comparable in manganese industry. The hot climate and virgin forest environment may cause some adverse issues to mine operation, but still, the general developing prospecting is favorable.

It is SRK's opinion that the FSR compiled by Guangxi industrial architecture design research & institute, the general degree is low, which is insufficient of systematic calculation and data analysis, therefore the conclusion may have massive differences and error to actual mining. The parameters are reasonable and the equipment selection is also fit the mine capacity. As a result of the mining area is covered by heavy vegetation, the mine topographic survey was done by using the GPS localization which leads to relative big error, which will cause adverse impact to mine design. Although the stripping ratio is low, vegetation elimination and removing will may be costly. Formal and specific waste dump site design has not been made within the FSR, which is obvious that only one waste dump site set up in such big mining area is neither realistic nor unreasonable. SRK suggests that, for long term cost saving the location finding and design work should be initiated as soon as possible, and for reducing transportation workload, the company may also consider that carrying on the rough machining to the manganese concentrate.

6 METALLURGICAL AND PROCESSING ASSESSMENT

6.1 Description of Metallurgical and Processing Facilities

Supported by the resource advantages, a series of manganese plants including ore concentrators, electrolysis and smelters have been built. The Company has ambitious plans for manganese industrialization and Figure 6.1 indicates its existing and planned manganese products.

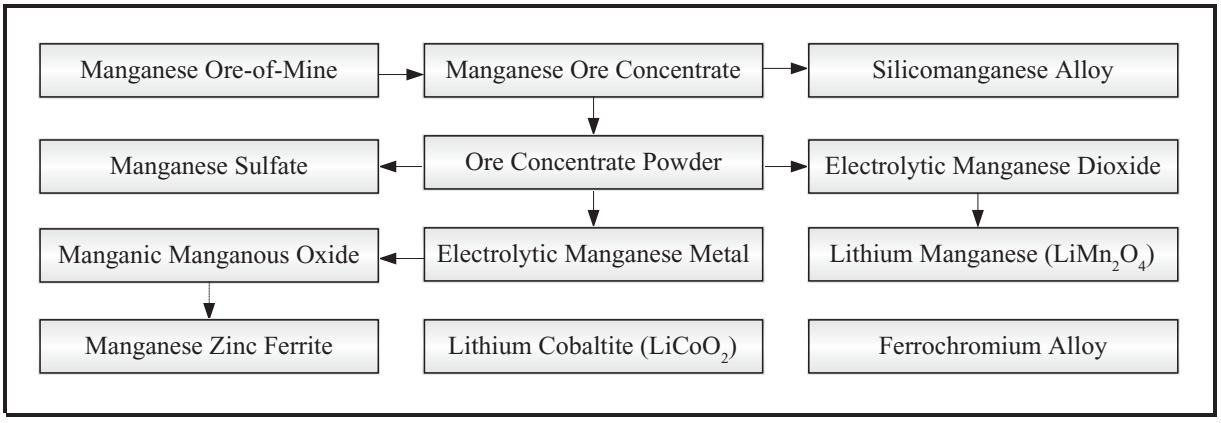

Figure 6-1: Scheme of Existing and Planned Manganese Products

6.1.1 Operating Plants and Facilities

CITIC Dameng has two operating concentrators (Daxin and Tiandeng), one manganese powder processing plant (Daxin), one manganese sulphate facility (Daxin), three electrolysis manganese plants (Daxin, Start and Tiendong), one electrolytic dioxide (EMD) plant (Daxin), and three smelters (Dabao, Tiandeng and Qinzhou). The products and capacities of these operating plants are listed in Table 6-1.

6.1.2 Plants under Construction

The plants which are under construction include the Tiandeng electrolytic Mn plant, Chongzuo Mn_3O_4 plant, Chongzuo $LiMn_2O_4$ plant, and Chongzuo $LiCoO_2$ plant. The Bembélé concentrator is and is expected to operate by the end of first quarter 2011. Details of these plants are shown in Table 6-1.

6.1.3 Research and Development (E&D)

The Company employs 450 technical staff and Chinese manganese experts as consultants and has participated in the drafting, revising and reviewing of national standards for electrolytic manganese metal, manganese dioxide powers for battery use and chemical manganese dioxide powders. The Company has its own research and development department employing 120 full-time researchers and is equipped with high standard testing monitoring equipment. It provides technical support on technical upgrading and new product development and is also a member of the Guangxi Manganese Industrial Project Research Center.

Table 6-1: Summary of Operating plants and Plants under Construction

Concentrator and Plant	Product	Historical Designed Capacity (tpa)	Status
Daxin Project			
Daxin concentrator	Mn concentrate	1,000,000	664,289
Daxin Mn powder processing plant	Mn concentrate powder	450,000	603,970
Daxin Mn sulphate plant	Mn sulphate	25,000	18,567
Daxin electrolytic Mn plant	Electrolytic Mn	55,000	60,881
Daxin electrolytic Mn dioxide (EMD) plant	Electrolytic Mn dioxide	10,000	8,164
Start electrolytic Mn plant	Electrolytic Mn	20,000	9,960
Tiandong electrolytic Mn plant	Electrolytic Mn	20,000	2,198
Dabao ferroalloy smelter	Si-Mn alloy ($FeMn_{60}Si_{14}$)	12,000	10,139
Tiandeng Project			
Tiandeng concentrator	Mn concentrate	180,000	160,807
Tiandeng ferroalloy smelter	$FeMn_{68}Si_{18}$	50,000	480,141
Tiandeng electrolytic Mn plant	Electrolytic Mn	20,000	Under construction
Chongzuo Mn_3O_4 plant	Mn_3O_4	10,300	Under construction
Chongzuo lithium manganite plant	$LiMn_2O_4$ for battery	600	Under construction
Chongzuo lithium cobaltite plant	$LiCoO_2$ for battery	1,000	Under construction
Qinzhou Project			
Qinzhou ferroalloy smelter	Si-Mn alloy ($FeCr_{55}C_{10}$)	50,000	41,585
Bembélé Project			
Bembélé concentrator	Mn concentrate	758,800	Under construction

6.2 Daxin Concentrator

The Daxin concentrator is located at the Xialei mine area, Daxin County of Guangxi Province. Its total processing capacity is 1,000,000tpa. The panorama of the Daxin concentrator is shown in Figure 6-2. The winding corridor at the mountain foot covers the belt conveyor of 800m.

Figure 6-2: An Overview of the Daxin Concentrator

6.2.1 Oxidized Ore Concentrate Production Techniques and Index

Metallic minerals of manganese oxide ore are comprised mainly of pyrolusite, psilomelane and ramsdellite, with less iron minerals of limonite and hematite. Gangue minerals are mainly quartz, chalcedony, kaolinite and hydromica. Manganese oxide ore is featured by mainly microaphanitic and very fine-grained texture and gel structures. Ore is extracted by open pit mining and after being hauled to the concentrator by truck, it goes through the flow sheet as indicated in Figure 6-3.

By primary crushing, mineral particle size is reduced from 400mm to less than 100mm. The crushed ore is washed by two unit double-spiral classifiers which gravitationally separate ore. The soil slurry flows into one of the spiral classifiers where fine manganese minerals are recovered and tails are pumped to the TSF. The washed feeds are crushed and screened twice to obtain particles of less than 7mm, which go through stage jigs to produce two products. Tails are separated by two stage permanent magnetic drums to recover metallurgical fine manganese ore concentrate. Coarse tails are also generated, which are hauled by truck to the tailings dump.

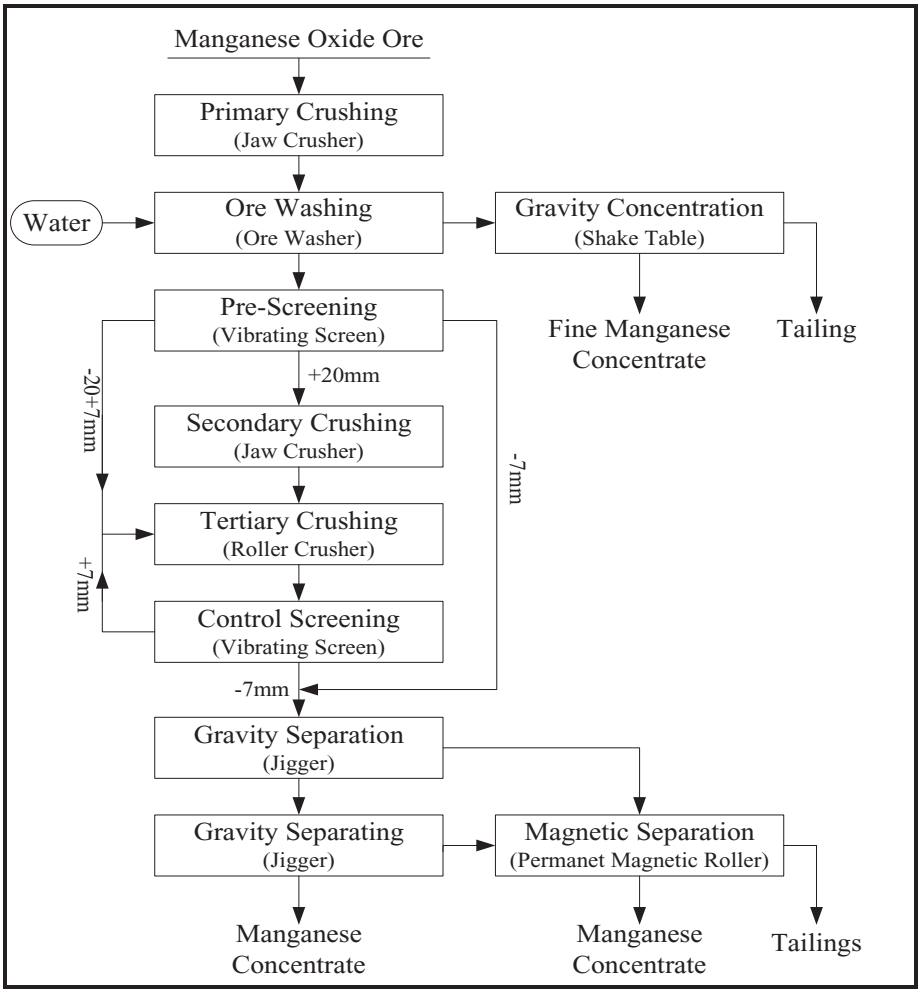

Figure 6-3: Daxin Manganese Oxide Ore Processing Flow Sheet

The flow sheet has undergone sophisticated laboratory technology. In 2009, this line has processed 162,427t of ore and produced 128,771tpa of all types of concentrates, which are used for metallurgy, battery and chemical based the different Mn grades of concentrates. Table 6-2 is shown the average production index in 2009. The average Mn grade of total concentrate is 32.10% with an average Mn recovery of 88.31%. To produce 1.0t concentrate will consume 1.26t primary (oxidized) ore.

Table 6-2: Index of Product Components in 2009

Product	Yield (t)	Yield Rate (%)	Man Grade (%)	Mn Recovery Rate (%)
Metallurgical concentrate	99,867	61.37	31.13	66.32
Battery concentrate	3,215	1.98	40.87	2.82
Chemical concentrate	25,689	15.82	34.86	19.17
Total concentrate	128,771	79.28	32.10	88.31
Tailing	33,656	20.72	16.25	11.69
Raw ore	162,427	100.00	28.82	100.00

6.2.2 Carbonate Ore Concentrate Production Techniques and Index

Metallic minerals of manganese carbonate ore are comprised mainly of rhodochrosite, manganocalcite, and kutnohorite, with less sursassite and manganhumite, and gangue minerals including quartz, chlorite, biotite, calcite, dolomite, muscovite and actinolite. Manganese carbonate ore is characterized by a fine-grained texture and massive structure. Underground ore is hauled by trucks to the carbonate ore lines in the concentrator. Figure 6-4 is the old processing flow sheet with a capacity of 300,000tpa. Figure 6-5 shows the new processing line with a capacity of 600,000tpa. The flow sheets of two lines are similar.

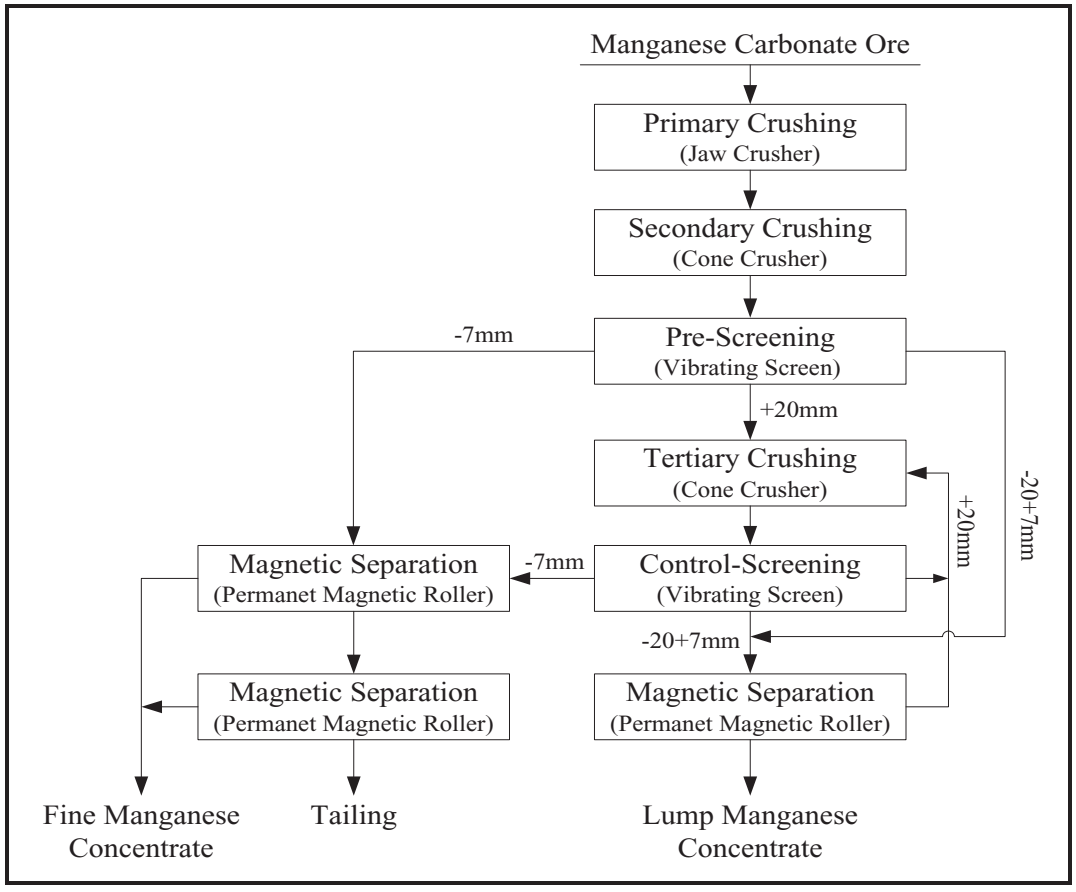

Figure 6-4: Daxin Old Manganese Carbonate Ore Processing Flow Sheet

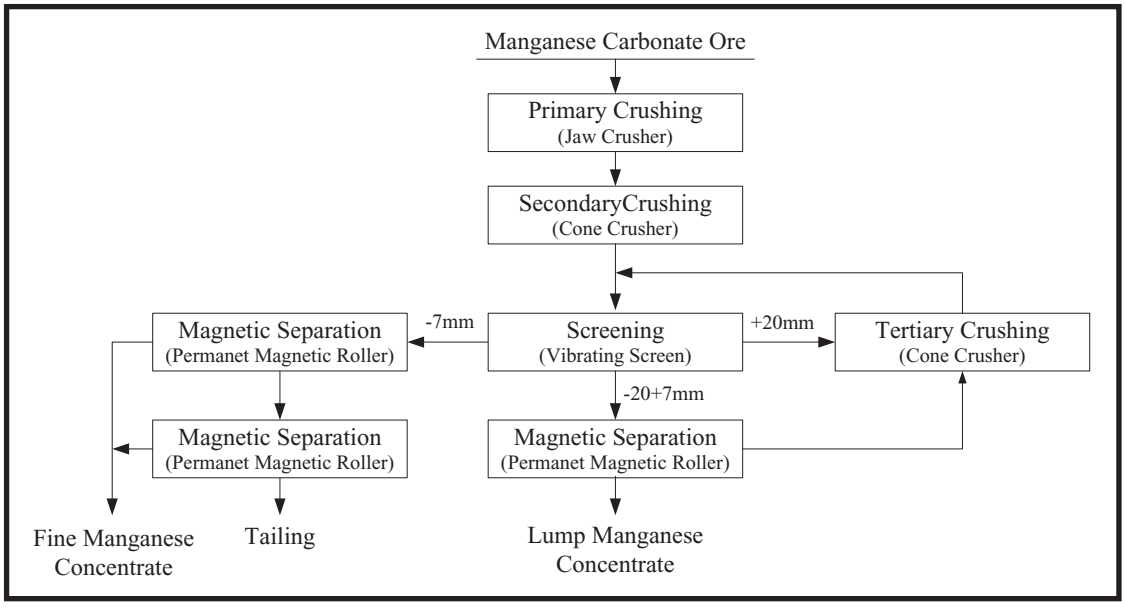

Figure 6-5: Daxin New Manganese Carbonate Ore Processing Flow Sheet

After three stages crushing, ore is classified into three categories by a double stage vibrating screen. The three categories are 0 to 7mm, 7 to 20mm and larger than 20mm. Particles larger than 20mm go through tertiary crushing and are fed back to the vibrating screen. The 0 to 7mm sized ore is separated by two stages of permanent magnetic drums to produce a fine concentrate and a tailing. The concentrate is filtered and hauled to the manganese powder plant and the tailing is pumped to the TSF. Particles sized between 7 and 20mm are separated by permanent magnetic drums to produce a coarse concentrate and a tailing which is fed to the tertiary crusher.

The flow sheet has been reviewed by many Chinese scientific institutes and has been verified as practical with advanced equipment in use. In 2009, this production line has processed 648,341t of raw ore and produced 536,373t of manganese carbonate. Table 6-3 is shown the production index in 2009. The average Mn grade of concentrate is 22.88% with an average Mn recovery of 93.34%. To produce 1.0t concentrate will consume 1.21t primary (carbonate) ore.

Table 6-3: Index of Carbonate Ore Concentrate in 2009

Product	Yield (t)	Yield Rate (%)	Mn Grade (%)	Mn Recovery Rate (%)
Concentrate	536,373	82.73	22.88	93.34
Tailing	111,968	17.27	7.82	6.66
Raw ore	648,341	100.00	20.28	100.00

6.2.3 Equipments of Daxin Concentrator

Table 6-4 lists the main equipment at Daxin ore processing plant. Advanced Metso-Mineral jaw crushers and cone crushers have been introduced. High-field permanent magnetic roller separators were adopted in recent years at Daxin ore processing plant.

Table 6-4: Main Equipments at Daxin Concentrator

Operating	Equipments	Size (Quantity)	Power (kW)
Feeding	Loader	ZL50 (2)	
Primary crushing	Jaw crusher	C80 (2)	75
		PE600×900 (1)	110
		GP100s (2)	75
		HP200 (1)	132
Secondary crushing	Cone crusher	PYT-1217 (1)	110
Tertiary crushing	Drum crusher	2PGX-610 (1)	30
Washing	Spiral ore washing machine	CXK1600×763 (2)	37
Primary screening	Vibrate couch	1.5M x 4.5M (8)	2
Secondary screening	Vibrate screen	2YAH2160 (1)	30
		2YAH1530 (4)	7.2
Concentrating	Jigger	2LTC (4)	4.4
	Magnetic drum	DPMS (36)	2.2

6.2.4 Daxin Ore Processing Costs

Table 6-5 details the Daxin ore processing cash costs in 2008 to June 2010. The costs are mainly from workforce employment, consumables, electricity, water and other services, on and off-site administration, environmental protection and monitoring; transportation of workforce and non-income taxes, royalties and other governmental charges. The total cash costs for the processing plant to produce one tonne of concentrate in 2008, 2009 and Jan.-Jun. 2010 are 30.99RMB, 27.46RMB and 25.01RMB, respectively.

Table 6-5: Daxin Ore Processing Costs of 2008 to 2010.1-6

Daxin Concentrator	2008	2009	2010.1-6
Workforce employment	10.84	8.57	8.31
Consumables	1.94	1.32	0.16
Fuel, electricity, water and other services	3.44	4.73	5.31
On and off-site administration	13.16	11.68	9.99
Environmental protection and monitoring	0.20	0.11	0.14
Transportation of workforce	0.11	0.05	0.12
Product marketing and transport	0.55	0.49	0.42
Non-income taxes, royalties and other governmental charges	0.55	0.44	0.43
Contingency allowances	0.18	0.08	0.14
Total	**30.99**	**27.46**	**25.01**

6.2.5 Water and Power Supply

Water supply: fresh water is sourced from Xialei River which has a minimum flow rate of 5.08m³/s. A water recycling system is in place to supply decanted water from the TSF to the concentrator. Water supply to the concentrator is sufficient.

Electricity supply: mine electricity is supplied from two sources — the hydropower station on the other side of the river and Ningxi 110kV substation via a 35kV exclusive overhead line. In addition, a 220kV substation equipped with two units of 80000kVA transformer was built by the Company in Xialei in 2002 to supply power for mine production.

A 35/10kV substation equipped with two units of 3150kVA transformers operates in the mine to supply 10kV electricity to all open pits, concentrator and manganese powder plant.

6.2.6 Tailings Storage Facility (TSF)

The TSF is located 1km north of the concentrator in Nongsong valley in a depression developed in the D2d aquifer. Tailing slurries are pumped from the concentrator to the TSF through a tunnel in the mountain and coarse tailing sand is hauled to the dump by trucks.

The TSF has a volume of 1.79 million m³. This volume can be as large as 2.16 million m³ after construction of an 11.2m long dam is completed at the opening of the depression. SRK observed good conditions at the TSF which has been operating for more than eight years. With the development of technology and an increasing Manganese price, tailings may be re-concentrated to make a profit.

6.3 Tiandeng Concentrator

6.3.1 Introduction

Tiandeng Mn mine is located in the Dongpin town, Tiandeng County of Guangxi Province. The mine contains manganese oxide ore in the upper part, which has been mined so far. Metallic minerals are mainly oxidized manganese carbonate, lithiophorite, and pyrolusite. Gangue minerals are comprised of quartz and kaolinite with a few limonite, muscovite and chlorites.

The oxidized ore in Tiandeng mine are characterized by mainly amorphous and micro-cryptocrystalline textures, and massive and laminated structures. The mineral aggregation is sized from 25 to 180mm in diameter. This type of ore is easily separated. Ore is extracted by open pit mining and hauled by truck to a stockpile at the concentrator which is fed by loaders. The concentrator flow sheet is shown in Figure 6-6. Table 6-6 lists the main equipments at the Tiandeng concentrator.

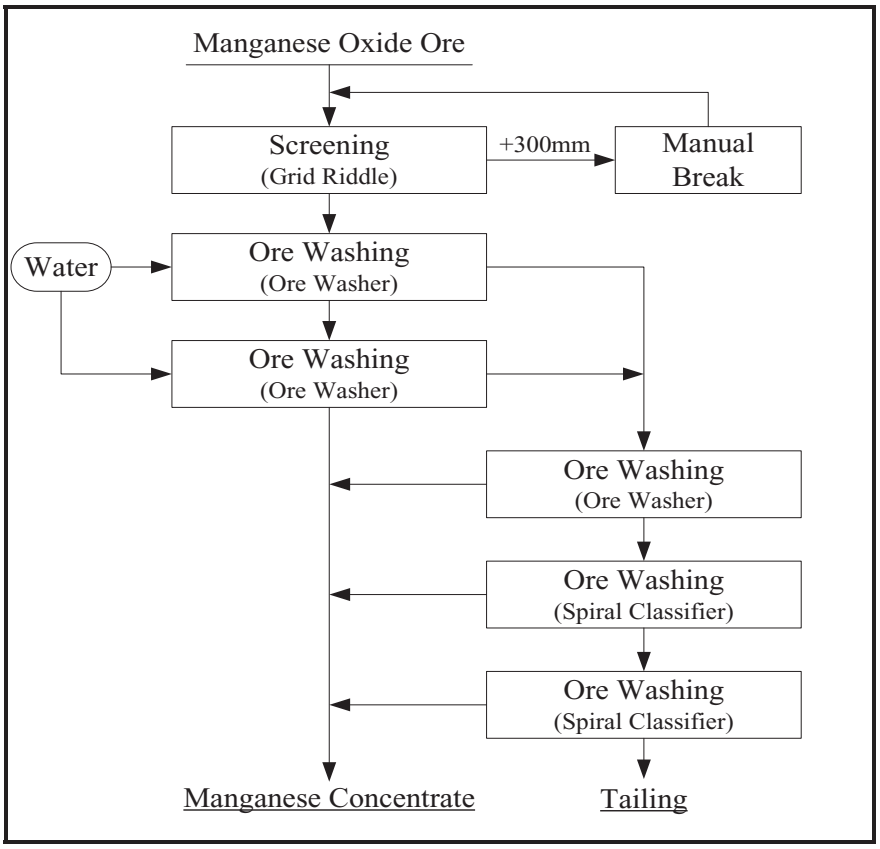

Figure 6-6: Tiandeng Ore Processing Flow Sheet

Ore is fed to the 300mm x 300mm horizontal steel grizzly opening. Oversized ore is broken by hand and undersized ore is flushed by high pressure water to three units of double spiral classifiers to gravitationally separate the ore. The underflow is washed in two units of the same spiral classifiers to produce a concentrate which will be classified by a vibrate screen to generate one lump of concentrate (grain size >7mm) and one of fine concentrate (grain size <7mm). The overflow from the two prior wash stages is treated with another spiral classifier to a fine ground concentrate. The final overflow is gravitated to the TSF.

Table 6-6: Tiandeng Concentrator Equipments

Operation	Equipments	Model	Quantity
Feeding	Loader	ZL50	3
Primary screening	Grizzly	300×300	1
Primary washing	Spiral ore washer	F540×4600	3
Cleaning	Spiral ore washer	F540×4601	2
Classifying	Vibrate screen	2ZD-1530	1
1st scavenging	Spiral ore washer	F380×4601	2
2nd scavenging	Spiral classifier	F750	2
3rd scavenging	Spiral classifier	F300	1

6.3.2 Technical Index

As manganese mineral aggregation is big in size and the gangue is earthy and easily separated, the concentrating process is very simple with only four stages of washing required to produce high quality concentrates. The production technique indexes for 2009 are shown in Table 6-7. In 2009, the processing plant processed 303,466t of ore and produced 170,166t of concentrate at an average grade of 25.81%. The manganese recovery rate was 80.65%. To produce 1.0t concentrate will consume 1.83t oxidized ore.

Table 6-7: Tiandeng Concentrator Technical Index — 2009

Product	Yield (t)	Yield rate (%)	Mn grade (%)	Mn recovery rate (%)
Concentrate	170,166	54.68	25.81	80.65
Tailing	133,300	45.32	7.47	19.35
Raw Ore	303,466	100.00	17.50	100.00

6.3.3 Tiandeng Ore Processing Costs

The costs are mainly from workforce employment, consumables, electricity, water and other services, on and off-site administration, environmental protection and monitoring; transportation of workforce and non-income taxes, royalties and other governmental charges (see Table 6-8). The total cash costs for the processing plant to produce one tonne of concentrate in 2008, 2009 and Jan.-Jun. 2010 are 36.75RMB, 37.14RMB and 41.50RMB, respectively.

Table 6-8: Tiandeng Ore Processing Costs of 2008 to 2010.1-6

Tiandeng Concentrator	2008	2009	2010.1-6
Workforce employment	8.49	10.74	7.31
Consumables	4.91	3.66	3.63
Fuel, electricity, water and other services	2.97	2.27	3.14
On and off-site administration	2.07	2.85	3.33
Environmental protection and monitoring	0.29	0.25	0.88
Transportation of workforce	0.00	0.00	0.00
Product marketing and transport	1.39	0.66	1.46
Non-income taxes, royalties and other governmental charges	16.65	16.71	21.75
Contingency allowances	0.00	0.00	0.00
Total	**36.75**	**37.14**	**41.50**

6.3.4 Water and Power Supply

Water is sourced from Dongping River 1.5km away using three units of 155m³/h, 90kW water pumps via a pipeline to a water tank at the concentrator. To produce one ton of concentrate will consume 6m³ water. As there is no addition of any reagents during ore processing, decanted water from the TSF is not reused and can be discharged directly.

Electricity is sourced from the local grid via a 10kV overhead line from Dongping and transformed by a 380/220V transformer.

6.3.5 Tailings Storage Facility

The TSF has been operating for more than 35 years. It is located near the concentrator. The dam was built by a rock-filling embankment, with an original height of 38m and efficient volume of 3.18 million m³. For safety reasons, the dam was redesigned by the Changsha Designing Institute in 2006 with the height increased to 44m and volume increased by 0.88 million m³ to a total volume of 4 million m³. There is still volume remaining of 1.8 million m³ and a life span of more than eight years at current production rates.

6.4 Bembélé Concentrator

6.4.1 Concentrate production Technique

Bembélé mine contains manganese oxide ore. Metallic minerals are mainly pyrolusite, psilomelane, and manganese silicate minerals and minor iron minerals of hematite and limonite. Gangue minerals are mainly quartz with minor clay minerals. The oxide ore in Bembélé mine is characterized by earthy and colloform textures and massive structure. This type of ore is easily separated from waste. Ore is extracted by open pit mining and hauled by truck to the stockpile in the concentrator and fed by loaders.

According the feasibility study report, there are two designed technical flow sheets: (1) two crushing stages without washing (coarse and meddle grains) each with a vibrate screen to produce concentrates. This flow mainly processed the ore types of I and III; and (2) the crushed raw ore is washed in two units of the same spiral classifiers to produce a concentrate. The method is to process the type II ore. The concentration flow sheet is indicated in Figure 6-7 and the main equipments are listed in Table 6-9.

Table 6-9: Main Equipments of Bembélé Concentrator

Operating	Equipments	Size	Quantity
Feeding	Loader	ZL50	4
Crushing	Jaw crusher	Mesto-C80	2
		Mesto-GP100S	2
Washing	Spiral ore washing machine	ϕ2200 x 8400	4
screening	Vibrate couch	ZYAH1842	2
Dewatering	Spiral separation	ϕ1500	5

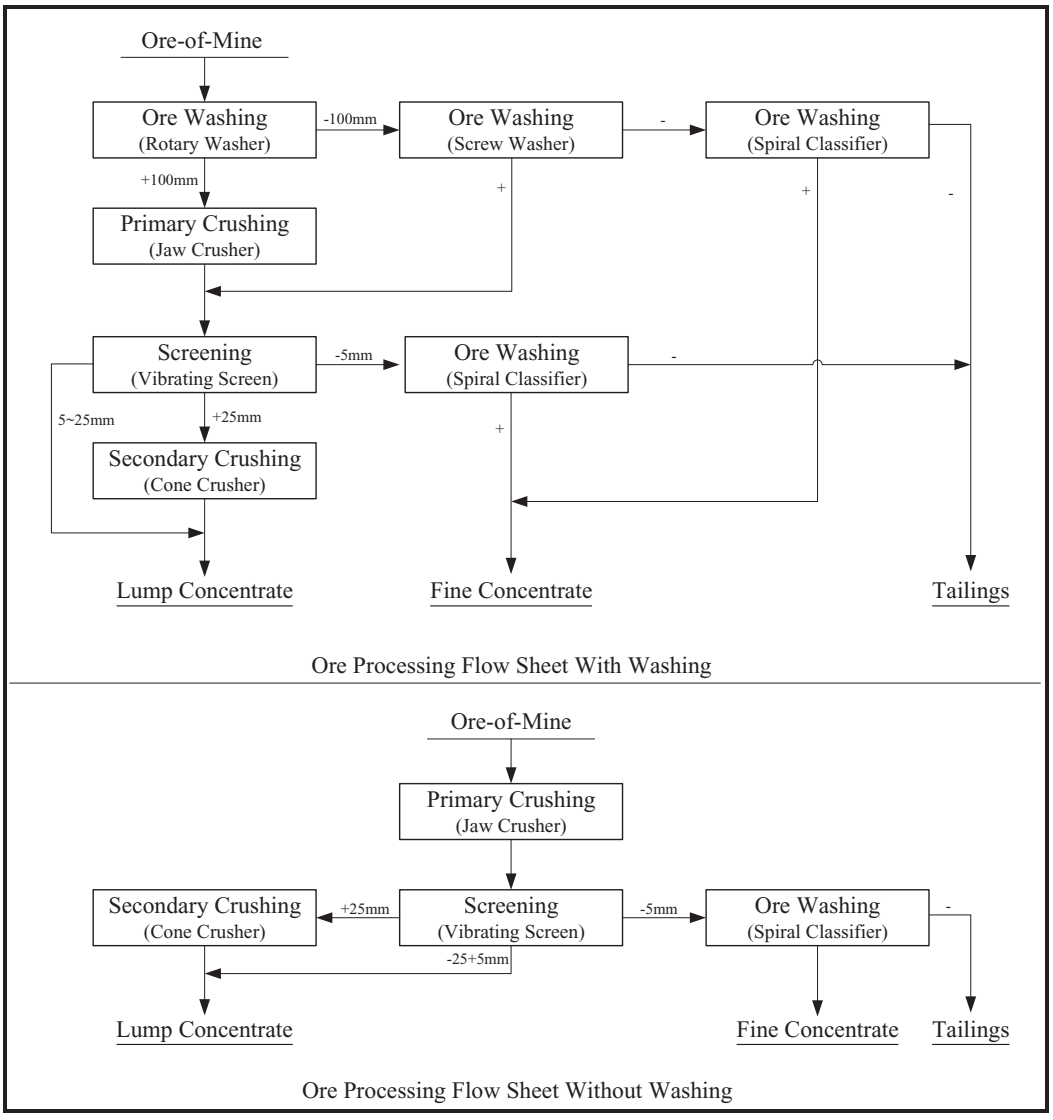

Figure 6-7: Bembélé Ore Processing Flow Sheet

6.4.2 Technical Index

The designed ore processing plant capacity is to process 1,150,000tpa of ore and produce 758,800tpa of concentrate at an average Mn grade of 43.00% with an average recovery rate of 89.85% (see Table 6-10). To produce 1.0t concentrate will consume 1.52t oxidized ore.

Table 6-10: Bembélé Ore Processing Technical Index

Product	Yield (t)	Yield Rate (%)	Mn Grade (%)	Mn Recovery Rate (%)
Concentrate	758,800	65.98	43.00	89.50
Tailing	391,200	34.02	9.78	10.50
Raw ore	1,150,000	100.00	31.70	100.00

6.4.3 Bembélé Ore Processing Costs

The cash ore processing costs forecast in the feasibility study report, including diesel consumption, labor costs and spare parts are listed in Table 6-11. The total cash processing cost for producing one tonne of concentrate are forecast at 128.75RMB for 2011 and 102.52RMB for 2012.

Table 6-11: Bembélé Ore Processing Costs

Bembélé Concentrator	2011	2012
Workforce employment	20.89	9.75
Consumables	18.45	19.37
Fuel, electricity, water and other services	13.58	14.26
On and off-site administration	42.46	25.77
Environmental protection and monitoring	1.50	1.5
Transportation of workforce	0.00	0.00
Product marketing and transport	0.00	0.00
Non-income taxes, royalties and other governmental charges	30.87	30.87
Contingency allowances	1.00	1.00
Total	**128.75**	**102.52**

6.4.4 Infrastructure and Utility Supply

Water supply: the designed ore processing capacity is 1,150,000tpa. Water consumption is forecast at 350m^3 per hour, including 10% unpredictable consumption. Recycled water consumption is 194m^3 per hour. Water is taken from the Misango River and the Company proposes to build a small reservoir and a pump house in the river about 1.3km from the concentrator. This will provide a 156m^3/h water supply to the concentrator.

Recycled water comes from the TSF by pumps located 1300m from the concentrator.

Electricity supply: there is no local electricity source. During early production stages electricity will be generated by four units of 500kW diesel generators. The Company may consider building a hydropower station to supply production power as many branches run into the Misango River from a height of 2000m.

6.4.5 Tailings Storage Facility

Bembélé TSF is designed to be built below the level of the concentrator. In early stages of production, tailings can flow into the dump by gravity. Topographically, the TSF is in the mountain valley of Bembélé. It is proposed to build two rock-filling permeable dams with a designed ultimate dam height of 45m, a capacity of 7 million m^3 and a lifespan of 35 years.

6.5 Conclusions and Recommendations on Concentrators

The flow sheet adopted by Daxin and Tiandeng is simple and practical and illustrates that they can treat their ore properly at low cost. The flow sheet can be adjusted to produce different product ranges as the market demands. SRK thinks that both ore processing plants have the potential to expand their capacities based on the aspect of resource site, water and power and access.

Due to the quality of the ore, only concentrates with Mn grades between 22% and 44% are produced, and much manganese is lost in tailings, especially at the Daxin. SRK recommends that the

Company should continuously test and research to obtain a better manganese recovery rate, especially fine manganese. The Company has already been working on this issue with some results. The two lines at Daxin are still in trial production but when they reach full production it will be possible for them to achieve the designed yield and also have potential for further expansion.

Raw ore in Bembélé mine contains very high grades of manganese. SRK recommends that the raw ore be treated simply by gravitational separation using spiral classifiers to achieve a grade of concentrate higher than 40% Mn.

SRK observed that ore in the Daxin and Tiandeng concentrators and the designed Bembélé concentrator is environmentally friendly as it is treated via physical processes without adding any reagents.

6.6 Daxin Manganese Powder Processing Plant

Daxin manganese powder processing plant produces different size fractions of manganese concentrate powders with grain sizes of less than 120 mesh or 0.124mm. Different manganese ore are treated into ranges of powder products for different uses by dry grinding, e.g. the powers with 90% grain size <0.124mm and 100% grain size <0.55mm for batteries and 90% grain size <0.124mm for manganese sulphate and electrolytic manganese dioxide). The majority of these powders will be used as feed for other CITIC Dameng plants with only a small portion sold to other companies.

The technique can be described as follows: concentrates (both oxide Mn and carbonate Mn) are first dried in the drum dryer to reduce moisture to less than 5% and then ground in grinders that form a closed circuit with a cyclone separator. Every grinder is equipped with one cyclone separator and one bag dust collector to collect dust and protect the environment.

The plant was built up from the original 45,000tpa to the present yield of 680,000tpa by gradually adding and upgrading equipments (see Table 6-12 for details).

Table 6-12: Main Equipments at Daxin Manganese Powder Plant

Operating	Equipments	Size (Quantity)	Power (kW)
Grinding	Grinder	HRM1300 (1)	577.9
		HRM1580 (4)	791.8-812.2
	Mill	4R3215 (1)	85.25
		4R3215 (5)	93.85
		4R3215 (1)	99.35
		4R3215 (1)	90.75
		4R3215 (1)	110.05
Drying	Dryer	ϕ1.5m x 12m (2)	22.2
		ϕ1.9m x 15m (1)	51.0
		ϕ1.9m x 15m (1)	79.57
		ϕ2.4m x 23m (1)	177.47

The cash costs are mainly from workforce employment, consumables, electricity, water and other services, on and off-site administration, environmental protection and monitoring; transportation of workforce and non-income taxes, royalties and other governmental charges (see Table 6-13). The total cash costs for the powder processing plant to produce one tonne of concentrate in 2008, 2009 and Jan.-Jun. 2010 are 103.08RMB, 74.69RMB and 73.38RMB, respectively.

Table 6-13: Daxin Manganese Powder Plant Costs of 2008, 2009 and 2010.1-6

Daxin Powder Processing Plant	2008	2009	2010.1-6
Workforce employment	16.63	14.47	13.52
Consumables	28.23	17.52	18.73
Fuel, electricity, water and other services	18.45	17.72	20.13
On and off-site administration	15.13	12.98	8.51
Environmental protection and monitoring	0.50	0.35	0.29
Transportation of workforce	0.14	0.18	0.12
Product marketing and transport	22.33	10.41	10.80
Non-income taxes, royalties and other governmental charges	1.26	0.90	0.97
Contingency allowances	0.40	0.16	0.30
Total	**103.08**	**74.69**	**73.38**

6.7 Daxin Manganese Sulphate Facility

The plant has two production lines to make $MnSO_4 \bullet H_2O$ from manganese oxide ore powder. The plant has an annual yield of 25,000t of manganese sulphate and is the one of biggest producers and exporters in the world for this product. As manganese sulphate is used as feed for many manganese products, its market demand is currently very positive.

The plant uses conventional and mature technology to make manganese sulphate with consistently good qualities. The equipment adopted is generally used in China; however SRK was concerned at observing a narrow operating platform which may cause safety issues.

6.7.1 Processing Technique

Figure 6-8 shows the production technical process and the equipments used are listed in Table 6-14. The technical processes include five steps as documented below.

Reducing Roasting

Manganese oxide from the powder plant is mixed with 20% coal powder and roasted in the rotary kiln for three hours at 800 to 850°C to render the MnO_2 to MnO (from Mn (IV) to Mn (II). The reverting rate is between 89.5 and 92.5%.

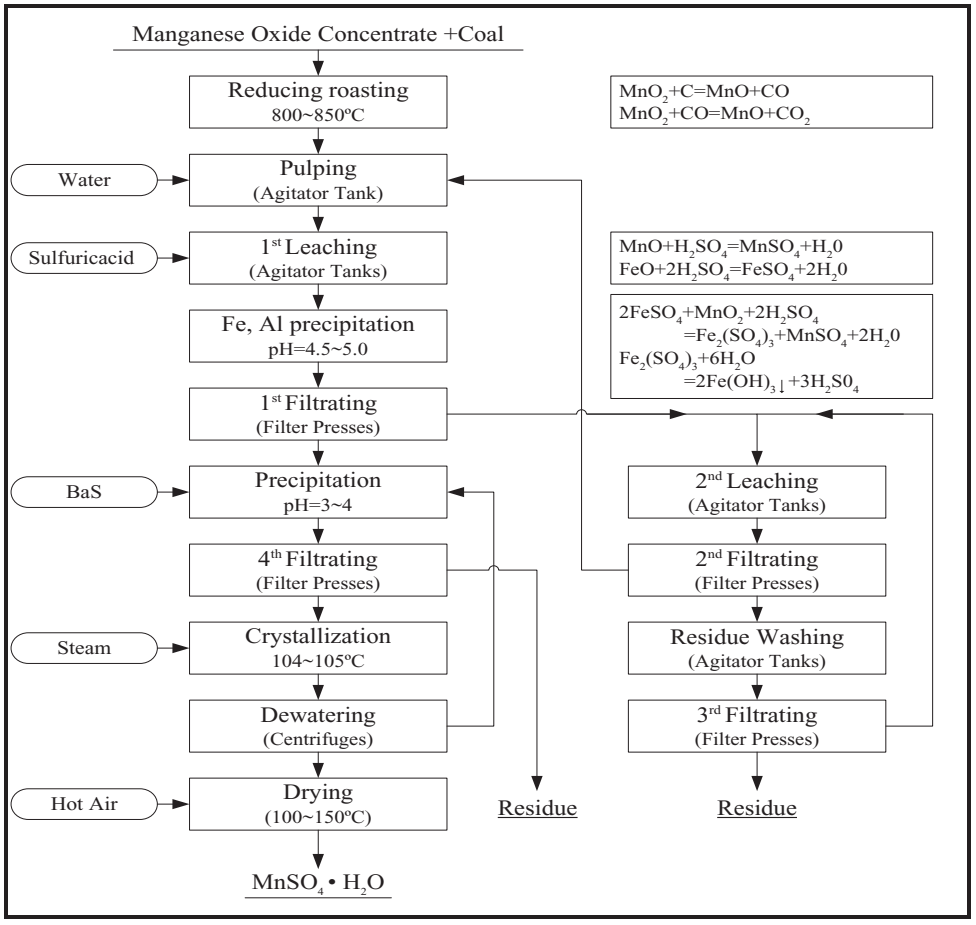

Figure 6-8: Daxin Manganese Sulphate Flow Sheet

Leaching and Washing

The roasted powder is mixed with water to make a slurry. In the next step sulphuric acid is added to the slurry to achieve a solution with a solid to liquid ratio of 1:4.5 to 5.5 and ore to acid ratio of 1:0.7 to 0.75. After two hours reaction time, water soluble manganese sulphate is generated. At the same time many other metals which become water soluble, need to be removed. Iron (II) in the solution is oxidized to iron (III) by the remaining Mn (IV). By adjusting the PH in the solution to 4.5 to 5.0, iron (III) will form a water insoluble hydrate with Al (III). Solid and slurry are separated by using a pressure filter with the solid residue washed to recover additional solutions and the residue from this stage hauled by truck to the TSF. The solutions are prepared for the next stage.

Purification

By adding barium sulphide (BaS), heavy metal ions will precipitate, with the residue pressed filtered and stored. After 12 hours standing time, the solution will have a manganese concentration of 100 to 120 grams per litre ("g/l").

Crystallization, Dehydration and Dryness

The purified solution is heated at about 105°C by vapour to become crystallized. The crystal is filtered by a centrifugal filter and dried by hot air at about 100-150°C to generate a hydro manganese sulphate monohydrate product.

Table 6-14: Main Equipments of Daxin Manganese Sulphate Plant

Equipment	Model	Quantity
Rotary Kiln		8
Reverberator		1
Boiler	4t/h	2
	10t/h	1
Pulping tank	ϕ 2×2m	2
Leaching tank	ϕ 2.5×2.5m	8
Sulphuric acid tank	200m³	1
Press filter	60m²	6
Sulphuring tank	60m³	3
Precipitation tank	100m³	3
Crystallization tank	ϕ 2.2×2.2m	10
Centrifuge	ϕ1200mmm	3
Air dryer		1

The Company has been working on new technology called "Microwave roasting technology" to alleviate the high energy consuming and environmentally polluting thermal rotary kiln. Tests have shown good results in energy saving and it is predicted that this technology will be used industrially very soon.

6.7.2 Technical Index

Table 6-15 shows the production data of year 2009. It yields 18,567t manganese sulphate with purity of 98.45% and manganese recovery rate of 76.99%.

Table 6-15: Manganese Sulphate Production Data — 2009

Item	Unit	Value
Manganese sulphate yield	t	18,567
$MnSO_4 \bullet H_2O$ purity	%	98.45
Manganese ore powder consumption	t	22,200
Mn Grade	%	32.48
(Mn^{2+}) Leaching rate	%	92.00
Residue cleaning recovery rate	%	98.50
Residue Mn grade	%	9.19
Residue moisture	%	35.12
Mn recovery rate	%	76.99

6.7.3 Product Quality

According to the Chinese Standard System, the product quality made by Daxin is higher than the Chinese standard (see Table 6-16).

Table 6-16: Daxin Manganese Sulphate Quality

	Daxin Quality		Standard	
Item	Common	Exquisite	Industrial	Feeding
$MnSO_4 \bullet H_2O$ (%) ≥	98.55	98.59	98	98
Mn (%) ≥	32.04	32.05	31.8	31.8
Fe (%) ≥	0.0011	0.0011	0.004	
Cl^- (%) ≤			0.005	
As ppm ≤	0.21	0.13		5
Pb ppm ≤	8	8		50
Non-water soluble (%) ≤	0.019	0.02	0.05	0.05
pH value	5.73	5.48	5.0-6.5	
Particle size 0.25mm (%) ≥				95

6.7.4 Manganese Sulphate Product Costs

Table 6-17 shows the cash costs of producing one tonne of manganese sulphate in 2008 to June 2010. The total cash costs for the manganese sulphate plant are 2,923.49RMB/t in 2008, 2,443.62RMB/t 2009, and 2,619.47RMB/t for Jan. to Jun. 2010, respectively.

Table 6-17: Daxin Manganese Sulphate Costs of 2008, 2009 and 2010.1-6

Daxin Manganese Sulphate Plant	2008	2009	2010.1-6
Workforce employment	181.59	300.58	279.10
Consumables	1829.39	1188.45	1370.28
Fuel, electricity, water and other services	304.82	429.95	444.00
On and off-site administration	272.33	295.17	258.77
Environmental protection and monitoring	8.00	12.12	8.00
Transportation of workforce	3.63	3.74	2.83
Product marketing and transport	270.51	176.16	209.38
Non-income taxes, royalties and other governmental charges	40.24	31.86	35.89
Contingency allowances	12.98	5.58	11.21
Total	**2,923.49**	**2,443.62**	**2,619.47**

6.7.5 Residue Treatment

Filtration residue is hauled by truck and stored in the Bukang TSF. This residue is hazardous as it contains nickel and cobalt, and could be sold to professional processing companies for further treatment.

The TSF is shared by the Daxin Manganese sulphate plant and the Daxin electrolysis plant. The TSF has a total volume of 4 million m^3, an effective volume of 2.66 million m^3 and a service life of 13 years at current production rates. The residue hauled by trucks to the dump is in the form of clay containing 37% moisture. The starter dam is 17m high and embanked by mining waste rock and lined. A secondary dam is being built by bagged residue with a total designed dam height of 65m.

6.8 Electrolysis Manganese Plants

6.8.1 Introduction

SRK inspected the Daxin electrolysis plants in Xialei town of Daxin County, the Start electrolysis plant in Hurun town of Jinxi County, and the Tiandong electrolysis plant in Linfeng town of Tiandong County, Guangxi Province.

Daxin electrolysis plant has two subsidiary plants. No. 1 plant was started in 1999 with a capacity of 4,000tpa in one production line, expanding to a capacity of 23,000tpa of manganese metal flake (99.80% recovery rate) in five production lines in 2007. No. 2 plant was started in 2008 with a production capacity of 35,000tpa in three lines.

Start Electrolysis Plant commenced in 2003 with production capacity of 16,000tpa in four lines. Tiandong electrolysis plant has two production lines with a capacity of 20,000tpa.

The technologies used in the four plants are the same, and are described in the following sections of this report.

6.8.2 Flow Sheet

The flow sheet is described in Figure 6-9. The procedure includes leaching, iron removing, filtrating, purifying, electrolysis and treating.

Leaching

By adding barren recycled electrolyte, sulphuric acid and manganese carbonate ore powder to the reaction tank, in proper proportions, manganese carbonate will react with sulphuric acid to generate water soluble manganese sulphate. The reaction will increase the temperature in the solution to 55 to 65°C and accelerate the reaction. At the same time, iron, aluminium, magnesium, cobalt and copper as impurities will precipitate. The leaching process will last for 12 hours.

Iron Removing

By adding manganese dioxide, iron (II) is rendered to iron (III) and Mn (IV) is rendered to Mn (II) which reacts with sulphuric acid into manganese sulphate. By adding ammonia to the solution to adjust the pH value to 6.5 to 7.0, iron (III) forms iron hydrate and precipitates that can be removed by filtration.

Filtration

By using press filtering, the solid is separated from the liquid and transported to and stored in the TSF. The liquid will go into sulphuration tank for further purification (see Figure 6-10).

Leachate Purification

By adding dimethylamino sulphonate, ions of copper, cadmium, copper, nickel and zinc will precipitate and be removed by press filtration. The filtrate will stand for more than 30 hours and be filtered for the second time to remove more precipitate with the filtrate stored in the head tanks.

Electrolysis

Before electrolysis, selenium dioxide is added to the solution to depress manganese (II) being oxidized. The solution is filled in a series of diaphragm cells with 4.2 to 4.6 voltage direct current for 24 hours, adding ammonia to keep a constant pH. The manganese precipitates on the steel cathode (Figure 6-11).

Treating

When a cathode reaches a certain thickness of manganese metal, it will be removed. To prevent oxidation the cathode will be treated in a 3% concentration of potassium dichromate solution, and then dried in the air, washed and dried in the oven at 105°C. The dried cathode will then be knocked by hammers with the falling flakes being the final product.

The peeled cathode will be polished and reused. The barren solution contains a certain amount of sulphuric acid and manganese sulphate and will be recycled in the **process.**

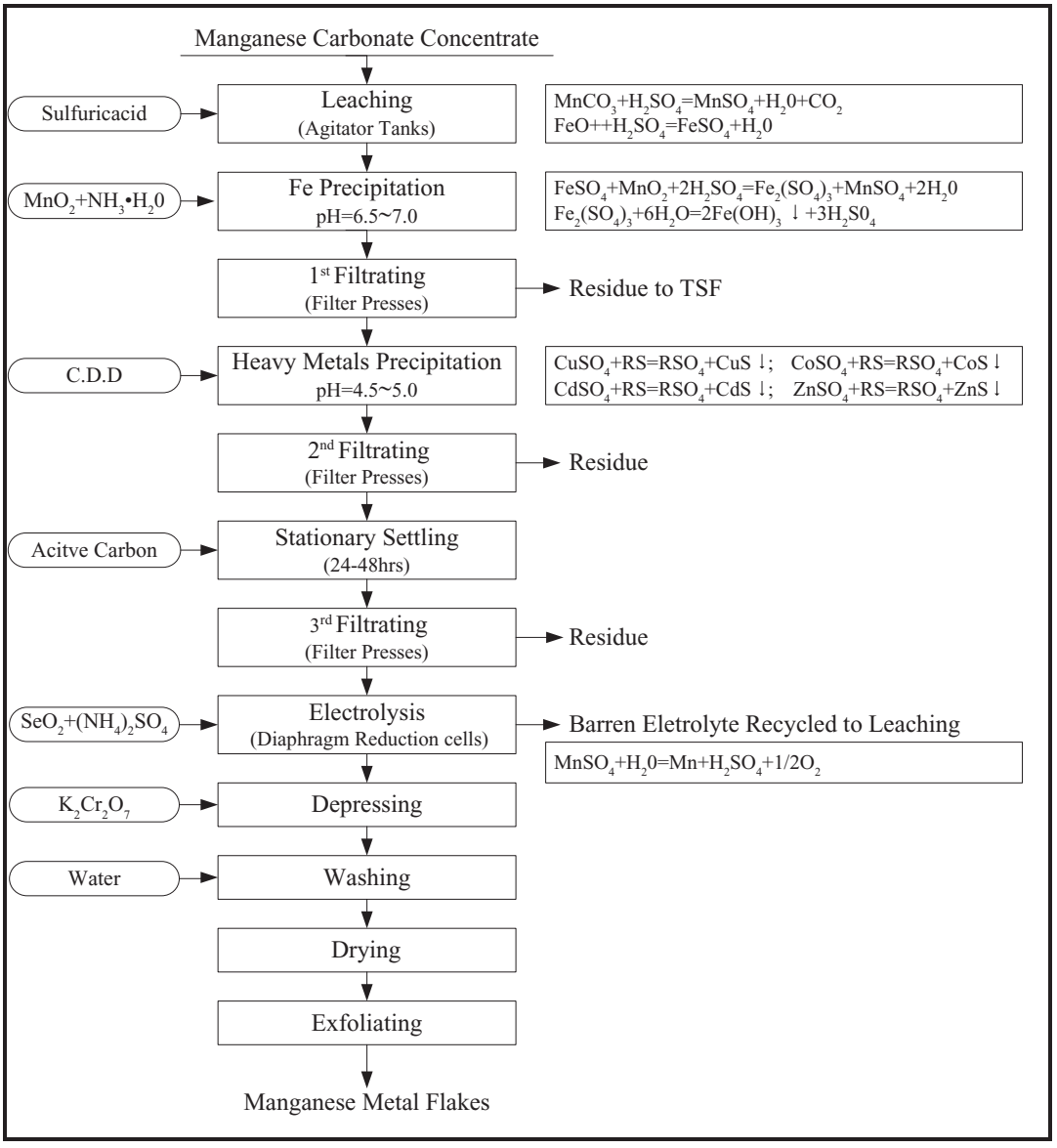

Figure 6-9: Electrolytic Manganese Flow Sheet

Figure 6-10: Press Filtration Shop at Tiangong Electrolysis Manganese Plant

Figure 6-11: Electrolysis Shop at Start Electrolysis Plant

6.8.3 Main Equipments

The main equipments used in Daxin, Tiandong and Start electrolysis plants are listed in Table 6-18.

Table 6-18: Main Equipment in Daxin, Tiandong and Start Electrolysis Plants

Equipments	Model	Daxin Quantity	Start Quantity	Tiandong Quantity
Raw material preparation				
Jaw Crusher	PE220 X 350MM, 15kW			1
	PE250 X 400MM, 17kW			1
Rotary dryer	f1.9 X 15m			1
Centrifugal fan	M6-31, 250kW			1
RM1580 mill	RM1580, 355kW			1
Screw feeding machine	LX-400, 7.5kW			3
Reaction and Filtration				
Liquid ammonia storage tank	100m^3	2	1	2
	35m^3	2	2	
Sulphuric acid storage tank	100m^3	1	2	4
	300m^3	1		
Reaction trough	100m^3	2	2	
	150m^3, 30kW	14	4	
	250m^3, 45kW	17		9
Chamber filter press	350/1500, 11kW	40	2	4
	250/1250, 5.5kW	8	8	4
	140/1000, 4kW		5	5
Electrolysis				
Commute transformer	12064kVA			1
	11989kVA			1
	6300kVA	5	1	
	1482kVA	5		
	4000kVA		1	
	3000kVA		1	
Commute tank	10kA/430V	12		
	7200A/300V	10		
	KES-2X11270A/432V			4
Electrolysis tank	8600X770X1060mm			18
		968		
Cyclic dryer	100kW	22		8
Polisher	Kkhhs-3500A/18V	10		4
Washer	7.5kW			8

6.8.4 Technical Index

In 2009, Daxin, Start and Tiandong electrolytic manganese plants produced 60,881t, 9,960t, and 2,198t, respectively, of manganese metal. Manganese purity and recovery rate is 99.86% and 78.28% for the Daxin plant, 99.80% and 71.00% for the Start plant, and 99.83% and 71.95% for the Tiandong plant. The required technical index for producing one tonne of manganese metal is shown in Table 6-20. The quality of manganese metal product is listed in Table 6-20.

Table 6-19: Technical Index of Electrolysis Plants

Product	Item	Unit	Daxin	Start	Tiandong
Manganese metal	Yield	t	1	1	1
	Purity	Mn (%)	99.87	99.80	99.83
$MnCO_3$ ore powder	Consumption	t	6.91	7.73	8.30
	Grade	Mn (%)	16.87	16.00	16.72
MnO_2 powder	Consumption	t	0.30	0.83	0.23
	Grade	Mn (%)	29.79	19.00	28.63
MnO powder	Consumption	t	0.57	0.47	0.45
	Grade	Mn (%)	29.79	20	20
Residue	Quantity	t	5.23	7.73	5.81
	Grade	Mn (%)	4.23	3.5	5.36
Leaching rate		(%)	95.00	85.00	93.36
Washing recovery		(%)	99.00	95.00	90.23
Electrolysis		(%)	95.00	95.00	98.14
After treatment recovery		(%)	98.00	98.00	99.00
Total Mn recovery		(%)	78.28	71.00	71.95

Table 6-20: Electrolytic Manganese Quality

	Chemical components									
	Mn					Si			Fe	
	I	II	C	S	P	I	II	Se	I	II
YB/T051 -2003	No less than					No larger than				
DJMnA	99.94	99.9	0.01	0.035	0.001	0.0015	0.01	0.0005	0.006	0.01
DJMnB	99.88	99.8	0.02	0.02	0.001	0.004	0.01	0.07	0.01	0.02
DJMnC	99.9	99.9	0.02	0.04	0.001	0.008	0.01	0.001	0.01	0.02
DJMnD	99.8	99.7	0.03	0.035	0.001	0.01	0.02	0.08	0.01	0.03
Daxin	99.88		0.0064	0.0157	0.00044	0.0027		0.0616	0.0078	
Start	99.88		0.014	0.023	0.0026	0.003		0.071	0.0057	
Tiandong	99.83		0.01	0.031	0.001	0.003		0.067	0.01	

6.8.5 Electrolytic Manganese Product Costs

To produce electrolytic manganese, the manganese carbonate concentrate as raw material, metallurgical manganese powder and chemical manganese powder as accessory material, and other chemical reagents are used (see Table 6-19). In 2009, the total cash costs for producing one tone electrolytic manganese at Daxin, Start and Tiandong plants were 7,998.57 RMB, 11,179.70 RMB and 11,640.70 RMB, respectively (Table 6-21).

Table 6-21: Electrolytic Manganese Product Costs of 2008, 2009 and 2010.1-6

Electrolytic Manganese Plants	Daxin			Start			Tiandong	
	2008	2009	2010.1-6	2008	2009	2010.1-6	2009	2010.1-6
Workforce employment	649.98	659.54	702.82	545.17	474.73	497.20	1123.89	600.45
Consumables	5882.19	3570.19	4396.01	8121.98	5475.84	6835.44	4638.16	6749.97
Fuel, electricity, water and other services	3071.81	3040.36	3344.19	2833.64	2729.67	3126.86	3792.46	3685.84
On and off-site administration	540.75	343.75	460.96	562.99	521.52	509.36	2046.33	310.47
Environmental protection and monitoring	59.12	62.35	62.16	11.89	687.86	60.58	0.00	137.51
Transportation of workforce	3.50	6.29	9.87	0.00	0.00	0.00	0.00	0.62
Product marketing and transport	139.18	182.21	165.62	473.43	431.89	381.45	39.86	33.77
Non-income taxes, royalties and other governmental charges	161.61	113.93	139.89	607.83	858.19	192.36	0.00	15.43
Contingency allowances	52.10	19.96	43.66	0.00	0.00	0.00	0.00	0.00
Total	**10,560.25**	**7,998.57**	**9,325.19**	**13,156.93**	**11,179.70**	**11,603.25**	**11,640.70**	**11,534.06**

6.8.6 Residue Treatment

The Daxin leaching residue containing 28.5% moisture will be hauled by trucks and stored in the same TSF as the Daxin manganese sulphate.

The Start plant has its own TSF that was built on a slope embanked by a U shape dam. The designed dam height is 15.8m including 2m buried underground. The total volume of this dump is 102,000m^3. In 2006 the Company commissioned Changsha Designing Institute to redesign the dam to increase its height to 25.8m. Total volume was increased to 173,000m^3 and remaining volume of 95,000m^3 with 170,000t of residue. The remaining volume can only support current production for less than two years. A new TSF will need to be built very soon.

6.8.7 Conclusions and Recommendations

Electrolytic manganese has been widely used in steel making, non-ferrous metallurgy, light industry and electronic industries. China manufactures more manganese than any other country and its exports account for more than 80% of the world market. Manganese electrolysis is a high energy consuming industry, and the Chinese Government has developed a very strict permit system for this industry.

CITIC Dameng has applied appropriate technology to produce electrolytic manganese metal that is energy efficient and cost-cutting. The resource advantage of CITIC Dameng and the constant concentrate at grade of 22% can support stable follow-up production. The Company produces a range of products in grades C and D and is planning to increase production and expand its products ranges to grades A and B, which SRK believes is possible.

A total capacity of the three plants has reached 101,000tpa (excluding the Tiandeng plant with a capacity of 30,000tpa), which makes the Company the largest manganese metal production enterprise in China, as of June 30, 2010. Dameng has a high-level professional skill engineer team, which has fully master manganese metal electrolysis procedures and has made a lot of innovation in the production, although these plants were constructed in different times and in different equipment allocation.

6.9 Ferromanganese Alloy Plants

6.9.1 Introduction

SRK inspected two silico-manganese alloy smelters, Dabao smelter in Xialei town, Daxin County and Tiandeng smelter in Tiandeng County, and one HD ferrochromium alloy smelter, Qinzhou Guixin smelter in the harbor district of Qinzhou. All three plants have adopted the same type of low chimney half closed electric thermal furnace to make ferrous alloy.

Dabao smelter produces 15,000tpa silico-manganese alloy of brand FeMn60Si14 from manganese oxide ore concentrate from Daxin mine via a 6300kVa furnace. Tiandeng smelter produces 50,000tpa of FeMn68Si17 silico-manganese alloy from manganese oxide ore concentrate from Tiandeng mine via a 6300kVA furnace and two 9000kVA furnaces. The plant has an ISO9001 quality management certificate.

Guixin smelter is conveniently located near Qinzhou harbor for the Company to import high carbon chromite ore from countries such as South Africa, Sudan, Turkey, Amman and Australia, where there are good supplies. The smelter produces 60,000tpa of ferrochromium alloy from four 6300kVA thermal furnaces which can also be used to make ferronickel alloy.

6.9.2 Technical Flow Sheet

Production involves ore conditioning, melting, slagging, molding, mold releasing, cooling and breaking. Details are documented below.

Ore Blending

The silico-manganese alloy feeds are manganese ore, silica, limestone, and dolomite. Ferrochromium alloy feeds are chromite, silica, coke, limestone and dolomite. Coke is used as reducer to render manganese and chromium in the ore to metal.

All feeds are stored separately and weighed before mixing (see Figure 6-12).

Melting

Solids are charged manually through the roof of the furnace and three electrodes carry the current through the furnace roof into the charge. The electric arc melts the charge. Feeds are continuously charged to the furnace and alloy is regularly discharged from the bottom of the furnace.

Each furnace is 5.2 to 6.2m in diameter, and 2 to 2.3m high and the three graphite electrodes are 750 to 1000mm in diameter. Each furnace is equipped with one transformer of either 6300kVA or 9000kVA. Temperatures are automatically controlled at 1300 and 1750°C respectively for silico-manganese and ferrochromium alloys.

A half enclosed hood is placed to collect fume and dust and reduce heat lost from the furnace. A water cooling system is installed on the hood to prevent damage from overheating.

Slag separation

Melts are discharged from the bottom opening of the furnace into a container where the slag stays and the metals flow into molds before being cooled and broken into alloy products. The slag can also be sold as a by-product.

Figure 6-12: An Overview of Ore Bending at Guixin Alloy Plant

6.9.3 Smelting Technical Index

Smelting technical indexes are listed in Table 6-22. The alloy products of Dabao, Tiandeng, and Guixin are $FeMn_{60}Si_{14}$, $FeMn_{68}Si_{18}$, and $FeCr_{55}C_{10}$, respectively. The manganese recovery rates are 77-82% for the Dabao and Tiandeng smelters and the chromium recovery rates range from 85 to 90%.

Table 6-22: Technical Index of Smelters

Item	Unit	Dabao	Tiandeng	Guixin
Unit of ore consumption	t	2.75	2.88	2.44
Head grade (Mn or Cr)	%	30.14	31.35	39-41
Product trademark		FeMn60Si14	FeMn65Si17	FeCr55C10
Product Mn or Cr grade	%	60.00	65.00	56.37
Waste Mn or Cr grade	%	12-14	12-14	5-7
Mn or Cr recovery rate	%	77-82	77-82	85-90

6.9.4 Ferromanganese Alloy Product Costs

Material consumptions for producing one tonne of alloy in Dabao, Tiandeng and Qinzhou smelters are listed in Table 6-23. Cash operating costs in 2009 for producing one tonne of alloy are 4,500.17RMB for Dabao smelter, 9,180.30RMB for Tiandeng smelter and 6,855.77RMB for Qinzhou smelter. Main costs are consumables and fuel, electricity, water and other services (Table 6-23).

Table 6-23: Costs of 2008, 2009 and 2010.1-6 at Three Smelters

	Dabao			Tiandeng			Qinzhou		
Smelters	**2008**	**2009**	**2010.1-6**	**2008**	**2009**	**2010.1-6**	**2008**	**2009**	**2010.1-6**
Workforce employment	202.31	212.97	114.06	148.49	197.17	246.82	179.60	182.72	171.67
Consumables	4226.21	2648.42	3027.38	6657.47	4487.05	5473.41	7484.92	4012.50	6142.31
Fuel, electricity, water and other services	2406.37	1468.95	1803.81	2029.99	1831.73	2667.39	2949.81	2453.42	1999.00
On and off-site administration	114.32	146.06	172.30	245.49	129.64	219.57	154.78	78.73	83.82
Environmental protection and monitoring	3.22	7.70	12.19	1.54	1.54	2.22	29.58	32.38	43.69
Transportation of workforce	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Product marketing and transport	0.00	0.00	0.00	80.68	67.63	86.07	80.08	71.64	148.30
Non-income taxes, royalties and other governmental charges	28.35	16.07	18.07	16.65	2.98	2.36	83.28	24.37	20.17
Contingency allowances				0.00	0.00	0.00	0.00	0.00	0.00
Total	**6,980.77**	**4,500.17**	**5,147.82**	**9,180.30**	**6,717.74**	**8,697.84**	**10,962.05**	**6,855.77**	**8,608.95**

6.9.5 Conclusions and Recommendations

Silico-manganese is used as a reduction agent and additive in steel making. High carbon ferrochromium is also an important additive in steel alloy casting to improve mechanical qualities. As there is a growing demand from the Chinese steel market, especially from the North Bay (Baihai) steel industry, these two products from CITIC Dameng have a very promising market.

The government has strict permits for the very high energy consuming ferroalloy smelting industry. Although the Dabao plant is in the mining area and has the advantage of being close to the resource, it only has one 6300kVA electric arc furnace with very limited production and controls on pollution. SRK recommends that the Company consider redesigning and constructing the plant according to national permit standards.

Tiandeng plant has an advantage as it is in close proximity to the mineral resources and a large proportion of high grade ore. The plant is upgrading its feed capacity and environmental protection technology. SRK suggests the Company upgrade its furnace capacity above 12500kVA or 25000kVA to expend production and increase product market shares.

Guixin plant is located near the harbour and the Company is planning to better utilize this transportation. Due to new town planning the plant needs to relocate to an industrial zone 10km to the east. The Company proposes to upgrade the factory according to updated government permit conditions.

6.10 Daxin Electrolytic Manganese Dioxide (EMD) Plant

SRK inspected the Daxin electrolytic manganese dioxide (EMD) plant, which is located in Xialei town, Daxin County, Guangxi Province. It is also situated in the Daxin mine area and is about 3km away from the Daxin manganese powder processing plant. The EMD plant has a signed production capacity of 10,000tpa including two production lines. The Company plans to increase the capacity to 20,000tpa by the end of 2010 and 30,000tpa in 2012.

In 2009, the plant produced 8,164t EMD, which all meet the quality requirement of non-mercury alkali manganese battery.

6.10.1 EMD Processing Flowsheet

Figure 6-13 shows the production technical processing procedure; it includes manganese carbonate concentrate leaching by sulphuric acid, leaching solution purifying, electrolysis process for EMD and the final product processing. The first two processes are basically same as the electrolysis process of electrolysis, while electrolysis for EMD is quite opposite to manganese metal electrolysis. It is conducted on the positive plate of electrolytic bath to get EMD. Details are documented in the following.

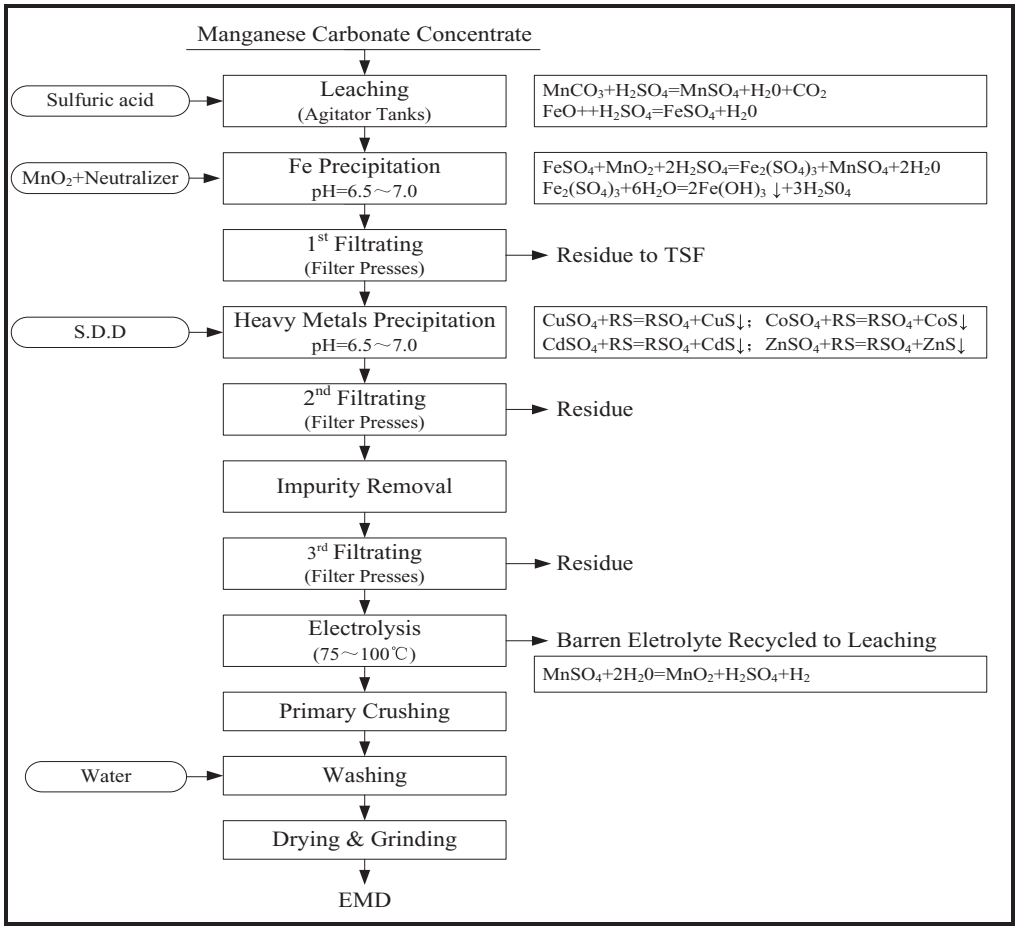

Figure 6-13: EMD Technical Flowsheet

Manganese carbonate concentrate with 85% of partial size less than 100 mesh produced from manganese concentrate plant will be mixed with electrolyte solution firstly, and sent to the agitator tanks for leaching process after having been added by sulphuric acid and heated by 60°-95°C steam. Then, MnO_2 and lime water are added for leaching solution neutralization and the Fe will be removed. After precipitation and filter, the manganese sulphate solution is obtained and the generated residue will be sent to TSF for storage. Heavy metals contained in the manganese sulphate solution will be further removed by purifiers getting pure manganese sulphate solution which will be accessed to electrolytic bath to get MnO_2 products on positive plate under 70°-100°C. After washing, peeling off, drying and crushing the EMD from positive plate, they will be the final products and are packed for sale. **Figure 6-14** shows part of chemical combination and electrolysis workshop.

Figure 6-14: An Overview of Chemical and Electrolysis Workshop

6.10.2 EMD Technical Index

EMD technical indexes are listed in Table 6-24. The EMD product is 8,163.97t with MnO_2 purity of 91.55% in 2009. The manganese recovery rate is 75.99%.

Table 6-24: EMD Technical Index in 2009

EMD Product	t	8163.97
EMD Purity	MnO_2,%	91.55
Consumed $MnCO_3$ Ore Powder	t	33869.90
Mn Grade in $MnCO_3$ Powder	Mn,%	19.46
Consumed Chemical Mn Powder	t	2401.62
Mn Grade in Chemical Mn Powder	Mn,%	36
Residue	t	22015.435
Mn Grade in Residue	Mn,%	5.04
Water content in residue	%	23.89
Leaching rate	Mn,%	92
Electrolysis recovery rate	Mn,%	70
Recovery rate after treatment	Mn,%	98
Total recovery rate	Mn,%	75.99

6.10.3 EMD Product Costs

Table 6-25 is listed the main materials consumption of producing one tonne of EMD and the production cash costs for one tonne of EMD in 2009 and January to June of 2010. The costs may largely depend on the consumable prices and fuel, electricity, water and other services.

Table 6-25: EMD Production Costs in 2009 and 2010.1-6

Daxin Electrolytic Mn Dioxide Plant	2008	2009	2010.1-6
Workforce employment		964.96	1014.79
Consumables		1853.94	1657.83
Fuel, electricity, water and other services		1679.14	1745.99
On and off-site administration		780.77	833.30
Environmental protection and monitoring		75.93	79.39
Transportation of workforce		5.76	8.12
Product marketing and transport		191.82	118.14
Non-income taxes, royalties and other governmental charges		96.56	100.33
Contingency allowances		16.92	31.33
Total		**5,665.80**	**5,589.23**

6.11 Other Manganese Product Facilities

The Chongzuo lithium manganese oxide ($LiMn_2O_4$) and lithium cobalt oxide ($LiCoO_2$) plants and the Chongzuo manganic manganous oxide plant (Mn_3O_4) plant are expected to be operated by the end of October 2010. The $LiMn_2O_4$ and $LiCoO_2$ are cathode manufacturing materials for high-performance battery, and these products have been encouraged by China as well. Mn_3O_4 is the raw material for Mn-Zn soft magnet, which is in turn the indispensable high-performance magnetic material for modern electronics industry.

All these products have a relative high technical contents and added value. SRK views that the CITIC Dameng has a high level technique and advanced equipment for the production, and believes that the Company can produce qualified products and develop more high-technique manganese products depending on its own technical capability.

7 MAJOR CONTRACTS AND AGREEMENTS

7.1 Mining Contracts

Daxin mine: the Company has two mining contracts with Guangxi Mining Company Ltd and Wenzhou Construction Group Co at Daxin mine. The mining contracts include development of tunnels for exploration and mining stopes for production. Duties to be performed and quality of work is specified in the contract and other duties can be added to the contracts as required. Clauses included in the contract indicate both rewards and penalties which apply if production quantities or qualities meet or do not meet contract requirements.

Tiandeng mine: there is no mining contract for Tiandeng mine. All mining development and mining activities are completed by the Company's own employees.

Bembélé mine: during the site visit, SRK was told that two mining contracts are planned, one from a local contractor and the other from China.

7.2 Supply Contracts

Supplies of consumable materials such as diesel fuel and reagents for metallurgical and processing plants and other plant are generally purchased at market prices on short-term contracts with a term of one year.

7.3 Transport Contracts

Ore Transport: for both Daxin and Tiandeng mines are provided by a fleet of 20t trucks. The Company proposes that 20 trucks will be active at any one time and 10 trucks will be on standby or in maintenance.

Ore transport between mine and concentrator designed for the Bembélé mine is provided by a feet of 20t trucks. The concentrate will be transported by a fleet of 20t trucks to Ndjole train station from concentrator, then to OWENDO harbour by train

Product Transport: There are two production transport contracts using trucks to transport the manganese sulphate, the manganese product and discharge manganese powder (also ferroalloys in Daxin, Tiandeng and Qinzhou) to internal plants for use.

Concentrates from Bembélé ore processing plant are designed to be transported to China by rail and ship.

7.4 Product Sales Contracts

The Company provided SRK with examples of product sales contracts which indicated that the majority of sales are planned to be "on-the-spot". The Company indicated that the rising market price for manganese benefited a company with exposure to the spot price. The option of fixing some sales contracts if manganese prices were to decline was accepted by the Company as a logical risk management option.

7.5 Workforce Contracts

Employees of the Company are usually employed on three-year contracts, which are standard for many companies in China. If contracts are signed, the employer is required to make payment for workers' welfare including three major insurances (pension, medical and work compensation) that are required by Chinese law. SRK was informed that CITIC Dameng has fully complied with the Chinese labor law. The contracts also specify the responsibilities of the employer and employee and define the liabilities of each party.

8 WORKFORCE

8.1 Workforce Numbers

Workforce numbers at the end of June 2010 are shown Table 8-1. The required workforce numbers for Bembélé mining department and ore processing plant are also forecast by CITIC Dameng.

Table 8-1: Workforce Numbers

Department/Plant	Work area	Number of persons
Company headquarters	Company Headquarters(1)	145
Mining department	Daxin	187
	Tiandeng	35
	Bembélé(2)	76
Ore processing department	Daxin	174
	Tiandeng	54
	Bembélé(2)	44
Electrolytic manganese plant	Start	512
	Daxin	1263
	Tiandong	452
Manganese powder plant	Daxin	287
Manganese sulphate plant	Daxin	174
Electrolytic manganese dioxide plant	Daxin	1196
Smelter	Tiandeng	460
	Dabao	136
	Qinzhou	484
Total		**5679**

Notes:

(1) This number has included the 38 staff from the Chongzuo subsidiary company.

(2) The workforce numbers at Bembélé mine and associated ore processing plant are planned numbers.

8.2 Assessment of Workforce

Based on the law of the Chinese National Ministry and the work contract regulations of Guangxi Bureau of Work and Social Security, all Company staff and employees have signed work contracts. The Company also transacts endowment, medical, work injury, unemployment and bearing insurance plus housing accumulation funds for employees. SRK was informed during the site visit that the Company staff and contractors are relatively stable.

As of March 31, 2010, workforce numbers including management staff and the truck fleet were 298 for mines, 325 for ore processing plants, 287 for manganese powder processing plant, 2174 for electrolytic manganese plant, 174 for manganese sulphate facility, 1080 for ferroalloy plants, and 1196 for electrolytic manganese dioxide (EMD) plant. The total staff turnover is about 8 % per year with this figure mostly from farmers. SRK was informed during the site visit that the Company is planning to decrease the turnover rate and build more stable management and production teams by further improving safety conditions and increasing salary levels.

9 OCCUPATIONAL HEALTH AND SAFETY ("OH&S")

9.1 OH&S Permits

Projects in China are required to comply with three levels of OH&S policy and regulations, including central government, provincial government and local government. Certain safety permits are required for operating mines, processing plants, ferroalloy plants, electrolytic manganese plants, and other plants.

CITIC Dameng's project has been assessed in accordance with No. 18 [2005] Decree from the State Safety Supervision Bureau, *Methods for Inspection and Completion Acceptance over Safety Facility Constructions in Non-coal Mines*; Nos. FM00-0186 [2006] and FM00-04163 [2006] Decree from Guangxi Zhangzu Autonomous District Safety Production Supervision Bureau, *Safety Production License of Manganese Open Pit and Underground Mining of CITIC Dameng*.

9.2 Safety Procedures and Training

CITIC Dameng has a safety monitoring division with 25 full time employees. There are four workshops including 11 people responsible for mining safety, six people for processing plants, four people for tailing dams and four people responsible for ferroalloy plants. Each workshop has a safety committee and written safety goals are required. The Company has promulgated the *Safety Production, Environmental Protection Rules and Regulations* of CITIC Dameng No 64 [2006] and the *Safety Accident First Aid Measure* of CITIC Dameng No. 64 [2006]. All employees must accept a three-level safety education program with monthly, seasonal, half yearly, and annual review of safety responsibilities for each workshop, which are conducted by officers from the safety monitoring division.

New employees must take part in either half day, full day or two day safety training and checking depending on their experience level and work field. A certificate or licence, for example for the use of explosives, must be obtained before being able to work in that area. Employees hold regular safety meetings of 10 minutes with previous shift workers in their work area before the start of each shift. Previous shift workers are required to complete a written and signed safety record to advise the incoming shift about prevailing work conditions.

During site visits, SRK noted that safety signage and personal protective equipment (PPE) were provided to employees. However, SRK notes that improved utilization of PPE and other strategies can be employed to reduce health and safety risks to the workforce. Accordingly, CITIC Dameng has indicated a desire and intention to improve the appropriate use of PPE by employees.

9.3 Historical Safety Records

The CITIC Dameng sites, including mines, concentrators, ferroalloy plants and support facilities have achieved accident statistics as shown in Table 9-1. In 2007, the mine had sixteen minor injuries and in 2008 two serious injuries and nine minor injuries were recorded. In 2009, two minor injuries occurred. There are no accidents from January to March 2010.

SRK was informed that CITIC Dameng's safety records indicate that between 2007 and March 2010, the Company recorded two serious injuries and 27 minor injuries. The recorded serious injuries occurred because the employees were operating a machine contrary to instructions.

Table 9-1: CITIC Dameng Accident Statistics, 2007 to 2010.1-3

Type	2007		2008		2009		2010.1-3	
	E	C	E	C	E	C	E	C
Minor	6	10	3	4	0	2	0	0
Serious	0	0	0	2	0	0	0	0
Fatal	0	0	0	0	0	0	0	0
Total	6	10	3	6	0	2	0	0

E = Employees, C = Contractors

SRK considers the above accident statistics to show that CITIC Dameng is committed to safety training, provision of safety equipment and safety monitoring. It is SRK's view that more needs to be done to improve the safety records and reducing and/or avoiding minor injuries and CITIC Dameng fully supports SRK's suggestions.

10 PRODUCTION, OPERATING AND CAPITAL COSTS

10.1 Production History

Daxin and Tiandeng mine's are both in operation with Daxin mine producing 2,000 to 2,500t/d of ore to feed the 2,500t/d concentrator. Tiandeng mine has a mining capacity of about 1,000 to 1,500t/d to feed the 1,200t/d concentrator. CITIC Dameng's total designed capacity for mineral processing is about 4,000t/d, which treats over 1,000,000 to 1,500,000tpa of manganese ore. Historical production records are shown in Table 10-1.

Table 10-1: Historical Production Records of Mines and Associated Plants

Mine/Plant	Item	Unit	2008	2009	2010.1-6
Daxin Mn Mine	Ore Mined	t	703,190	814,999	449,994
	Ore Grade	Mn (%)	22.30	22.81	20.80
	Ore Treated	t	684,800	810,768	417,015
	Concentrate	t	490,113	664,289	380,526
	Concentrate	Mn (%)	24.23	24.66	22.60
	Reovery Rate	(%)	77.82	88.67	91.25
Tiandeng Mn Mine	Ore Mined	t	399,270	294,100	45,600
	Ore Grade	Mn (%)	17.60	17.50	17.66
	Ore Treated	t	399,200	303,466	35,026
	Concentrate	t	175,131	160,807	26,270
	Concentrate Grade	Mn (%)	27.42	25.81	24.60
	Reovery Rate	(%)	68.31	80.65	87.38
Dabao Ferroalloy	Quantity	t	9,492	10,139	7,266
	Reovery Rate	Mn (%)	85.06	85.81	86.06
Tiandeng Ferroalloy	Quantity	t	37,468	48,141	18,047
	Reovery Rate	Mn (%)	80.50	81.50	79.69
Qinzhou Ferroalloy	Quantity	t	33,158	41,585	20,982
	Reovery Rate	Mn (%)	86.83	87.32	84.95
Daxin Electrolytic Plant	Quantity	t	41,396	60,881	28,199
	Reovery Rate	Mn (%)	75.59	78.28	78.27
Start Electrolytic Plant	Quantity	t	13,421	9,960	7,145
	Reovery Rate	Mn (%)	69.40	71.00	71.50
Tiandong Electrolytic Plant	Quantity	t		2,198	6,894
	Reovery Rate	Mn (%)		71.25	71.95
Daxin Mn Sulphate Plant	Quantity	t	25,345	18,567	11,867
	Reovery Rate	Mn (%)	79.60	76.99	78.27
Daxin EMD Plant	Quantity	t		8,164	5,001
	Reovery Rate	Mn (%)		75.99	76.05
Daxin Powder Processing Plant	Quantity	t	461,613	603,970	355,407

10.2 Operating Costs

CITIC Dameng management provided cash operating cost analysis including mining operation, ore processing and manganese powder processing plants, manganese sulphate plant, electrolytic manganese plants, and smelters. Consumption of reagents and other materials in the costs are based on prices obtained by suppliers in China. Information regarding salary scales was used to calculate labor costs. Power consumption and costs were based on local standards.

10.2.1 Mining and Processing Costs

Mining is conducting by open pit and underground mining techniques utilizing the services of mining contractors and the Company's own employees. For the mining and tunneling (development), contractors are responsible for partly providing the necessary production and support equipment as well as all direct labor and front line supervision. CITIC Dameng generally provides explosives to the contractors at their own expense. The Company also provides power and water supplies for mining operations carried out by contractors. The mining contracts are signed based on the amount of ore mined and its quality control such as the average grade as well as loss rate and dilution rate. Tunnelling (development) contracts are signed based on the footage of a certain height × width tunnel that the contractor is required to complete. Safety and environmental issues are also detailed in the contract to define liabilities and responsibilities for both parties.

The operating costs for mining (cost per tonne ore), ore processing (cost per tonne concentrate) and manganese powder processing (cost per tonne manganese powder) sectors at Daxin and Tiandeng are estimated based on mine and plant monthly production data. Table 10-2 shows the operating costs of mining. The major cash operating costs for mining and ore processing come from consumables, on and off site administration, labour, and product transportation. It is of SRK's opinion that the cash operating costs for mining and ore processing plants at Daxin and Tiandeng are reasonable and are within average of the Chinese mining industries. The relatively higher open-pit mining costs at Daxin are resulted from the higher stripping ratio.

Table 10-2: Mining Operating Costs and Processing Costs (RMB/t) — 2008, 2009 and 2010

Item	Daxin Mining					
	Open Pit			Underground		
Cash Operating Cost	2008	2009	2010.1-6	2008	2009	2010.1-6
Workforce employment	7.77	14.74	4.50	9.42	10.49	11.22
Consumables	29.72	38.42	36.84	30.47	31.92	31.99
Fuel, electricity, water and other services	0.18	0.16	0.36	2.03	2.13	2.13
On and off-site administration	46.43	53.75	35.07	40.41	41.37	47.25
Environmental protection and monitoring	0.00	0.00	0.00	0.00	0.00	0.00
Transportation of workforce	0.30	0.25	0.25	0.05	0.04	0.05
Product marketing and transport	2.44	2.83	1.85	4.06	4.26	4.26
Non-income taxes, royalties and other governmental charges	1.51	1.71	1.37	1.30	1.22	1.41
Contingency allowances	0.49	0.30	0.43	0.42	0.21	0.44
Total	**88.84**	**112.16**	**80.66**	**88.16**	**91.64**	**98.74**
Depreciation	**13.98**	**16.28**	**15.78**	**0.00**	**0.00**	**0.00**

Item	Daxin Concentrator			Daxin Mn Powder Plant		
Cash Operating Cost	2008	2009	2010.1-6	2008	2009	2010.1-6
Workforce employment	10.84	8.57	8.31	16.63	14.47	13.52
Consumables	1.94	1.32	0.16	28.23	17.52	18.73
Fuel, electricity, water and other services	3.44	4.73	5.31	18.45	17.72	20.13
On and off-site administration	13.16	11.68	9.99	15.13	12.98	8.51
Environmental protection and monitoring	0.20	0.11	0.14	0.50	0.35	0.29
Transportation of workforce	0.11	0.05	0.12	0.14	0.18	0.12
Product marketing and transport	0.55	0.49	0.42	22.33	10.41	10.80
Non-income taxes, royalties and other governmental charges	0.55	0.44	0.43	1.26	0.90	0.97
Contingency allowances	0.18	0.08	0.14	0.40	0.16	0.30
Total	**30.99**	**27.46**	**25.01**	**103.08**	**74.69**	**73.38**
Depreciation	**6.65**	**5.71**	**5.52**	**4.71**	**3.80**	**5.62**

Item	Tiandeng Mining			Tiandeng Concentrator		
Cash Operating Cost	2008	2009	2010.1-6	2008	2009	2010.1-6
Workforce employment	3.22	3.56	2.26	8.49	10.74	7.31
Consumables	1.42	2.58	1.12	4.91	3.66	3.63
Fuel, electricity, water and other services	0.05	0.06	0.13	2.97	2.27	3.14
On and off-site administration	1.98	2.55	7.14	2.07	2.85	3.33
Environmental protection and monitoring	0.14	0.12	0.44	0.29	0.25	0.88
Transportation of workforce	0.00	0.00	0.00	0.00	0.00	0.00
Product marketing and transport	3.60	4.07	2.00	1.39	0.66	1.46
Non-income taxes, royalties and other governmental charges	7.56	5.40	6.79	16.65	16.71	21.75
Contingency allowances	0.00	0.00	0.00	0.00	0.00	0.00
Total	**17.98**	**18.34**	**19.88**	**36.75**	**37.14**	**41.50**
Depreciation	**6.92**	**14.46**	**20.97**	**2.56**	**2.54**	**4.68**

Note:

* Daxin underground mining is outsourced to contractors and therefore has no depreciation costs

10.2.2 Electrolytic Manganese and Electrolytic Manganese Dioxide Costs

The operating costs for producing the manganese sulphate ($MnSO_4$), electrolytic manganese (metal Mn), and electrolytic manganese dioxide (EMD), and ferroally are estimated based on the plants' monthly operating data. The major costs are from consumables, and fuel, electricity and water and other services (Table 10-3). Compared with the operating cost at the Dabao smelter, the relatively higher operating costs at Tiandeng and Qinzhou smelters are resulted from consumable materials, which are partly sourced from overseas.

Table 10-3: $MnSO_4$, Metal Mn, EMD and Ferroally Costs (RMB/t)

Item	Daxin $MnSO_4$ Plant			Daxin Electroyltic Mn Plant		
Cash Operating Cost	2008	2009	2010.1-6	2008	2009	2010.1-6
Workforce employment	181.59	300.58	279.10	649.98	659.54	702.82
Consumables	1,829.39	1,188.45	1,370.28	5,882.19	3,570.19	4,396.01
Fuel, electricity, water and other services	304.82	429.95	444.00	3,071.81	3,040.36	3,344.19
On and off-site administration	272.33	295.17	258.77	540.75	343.75	460.96
Environmental protection and monitoring	8.00	12.12	8.00	59.12	62.35	62.16
Transportation of workforce	3.63	3.74	2.83	3.50	6.29	9.87
Product marketing and transport	270.51	176.16	209.38	139.18	182.21	165.62
Non-income taxes, royalties and other governmental charges	40.24	31.86	35.89	161.61	113.93	139.89
Contingency allowances	12.98	5.58	11.21	52.10	19.96	43.66
Total	**2,923.49**	**2,443.62**	**2,619.47**	**10,560.25**	**7,998.57**	**9,325.19**
Depreciation	**84.00**	**129.99**	**111.63**	**570.56**	**756.86**	**668.75**

Item	Daxin EMD Plant			Start Electroyltic Mn Plant		
Cash Operating Cost	2008	2009	2010.1-6	2008	2009	2010.1-6
Workforce employment	n/a	964.96	1,014.79	545.17	474.73	497.20
Consumables	n/a	1,853.94	1,657.83	8,121.98	5,475.84	6,835.44
Fuel, electricity, water and other services	n/a	1,679.14	1,745.99	2,833.64	2,729.67	3,126.86
On and off-site administration	n/a	780.77	833.30	562.99	521.52	509.36
Environmental protection and monitoring	n/a	75.93	79.39	11.89	687.86	60.58
Transportation of workforce	n/a	5.76	8.12	0.00	0.00	0.00
Product marketing and transport	n/a	191.82	118.14	473.43	431.89	381.45
Non-income taxes, royalties and other governmental charges	n/a	96.56	100.33	607.83	858.19	192.36
Contingency allowances	n/a	16.92	31.33	0.00	0.00	0.00
Total	**n/a**	**5,665.80**	**5,589.23**	**13,156.93**	**11,179.70**	**11,603.25**
Depreciation	**n/a**	**1,791.72**	**1,577.89**	**383.10**	**523.07**	**464.75**

Item	Tiandong Electrolytic Mn Plant			Dabao Smelter		
Cash Operating Cost	2008	2009	2010.1-6	2008	2009	2010.1-6
Workforce employment	n/a	1,123.89	600.45	202.31	212.97	114.06
Consumables	n/a	4,638.16	6,749.97	4,226.21	2,648.42	3,027.38
Fuel, electricity, water and other services	n/a	3,792.46	3,685.84	2,406.37	1,468.95	1,803.81
On and off-site administration	n/a	2,046.33	310.47	114.32	146.06	172.30
Environmental protection and monitoring	n/a	0.00	137.51	3.22	7.70	12.19
Transportation of workforce	n/a	0.00	0.62	0.00	0.00	0.00
Product marketing and transport	n/a	39.86	33.77	0.00	0.00	0.00
Non-income taxes, royalties and other governmental charges	n/a	0.00	15.43	28.35	16.07	18.07
Contingency allowances	n/a	0.00	0.00	0.00	0.00	0.00
Total	**n/a**	**11,640.70**	**11,534.06**	**6,980.77**	**4,500.17**	**5,147.82**
Depreciation	**n/a**	**0.00**	**1279.95**	**48.69**	**66.36**	**58.92**

Item	Tiandeng Smelter			Qinzhou Smelter		
Cash Operating Cost	2008	2009	2010.1-6	2008	2009	2010.1-6
Workforce employment	148.49	197.17	246.82	179.60	182.72	171.67
Consumables	6,657.47	4,487.05	5,473.41	7,484.92	4,012.50	6,142.31
Fuel, electricity, water and other services	2,029.99	1,831.73	2,667.39	2,949.81	2,453.42	1,999.00
On and off-site administration	245.49	129.64	219.57	154.78	78.73	83.82
Environmental protection and monitoring	1.54	1.54	2.22	29.58	32.38	43.69
Transportation of workforce	0.00	0.00	0.00	0.00	0.00	0.00
Product marketing and transport	80.68	67.63	86.07	80.08	71.64	148.30
Non-income taxes, royalties and other governmental charges	16.65	2.98	2.36	83.28	24.37	20.17
Contingency allowances	0.00	0.00	0.00	0.00	0.00	0.00
Total	**9,180.30**	**6,717.74**	**8,697.84**	**10,962.05**	**6,855.77**	**8,608.95**
Depreciation	**84.20**	**76.07**	**110.28**	**96.95**	**104.95**	**127.40**

10.3 Capital Costs and Investments

From 2010 to 2012, CITIC Dameng plans to invest approximately 2,716.12M RMB in ongoing projects (1,592.09M RMB) including expanding current mining and concentrating operations, Bembélé concentrator and other plan constructions; new projects development and constructions (1,008.60M RMB) covering Daxin 800,000tpa underground mining development, Daxin, Tiandeng, Tiandong and Start electrolytic Mn plants expansions; and technical innovation projects (115.43M RMB). Table 10-4 lists the details of the capital costs and investment areas from 2010 to 2012. In SRK's opinion, the proposed capital investments are sufficient and likely to achieve CITIC Dameng's stated targets if the capital is in place.

The production capacities and production forecast between 2010 and 2012 are listed in Table 10-5.

Table 10-4: Capital Costs and Investments between 2010 and 2012

Project Name	Total (10,000RMB)	2010 - 2012 Plan (10,000RMB/Year)			
		Subtotal	2010	2011	2012
Ongoing Projects					
Bembélé Manganese Mine Development and Concentrator Construction	49,489	35,337	23,979	8,783	2,574
Tiandeng Electrolytic Mn Plant 30,000tpa Technical Innovation	39,260	31,094	11,594	19,499	—
Beibuwan Ferroalloy Plant 160,000tpa Low CSi-Mn Alloy Construction (Phase I - 80,000tpa)	49,981	20,703	703	—	20,000
Daxin EMD Production Capacity Expansion from 10,000tpa to 30,000tpa & Technical Innovation	34,614	34,614	4,919	8,783	20,912
Chongzuo 30,000tpa Manganic Manganous Oxide (Mn_3O_4) Plant	18,000	18,000	6,675	4,392	6,933
Daxin 600,000tpa Underground Mining (Carbonate Ore)	32,717	16,743	3,953	5,479	7,311
CITIC Dameng Headquarter Office Building Construction	7,709	2,718	1,955	764	—
Sub-total	231,771	159,209	53,777	47,701	57,731
New Projects					
Daxin Central North Region 800,000tpa Underground Mining Development, Concentrator and Powder Plant (Carbonate Ore)	60,000	35,965	—	15,965	20,000
Daxin 60,000tpa Electrolytic Mn Plant Construction (Phase I - 30,000tpa)	65,000	47,238	—	21,959	25,280
Tiandong Electrolytic Mn Plant Capacity Expansion from 20,000tpa to 30,000tpa	7,000	7,000	—	4,392	2,608
Start Electrolytic Mn Plant Capacity Expansion from 17,000tpa to 30,000tpa	10,657	10,657	791	4,392	5,475
Sub-total	142,657	100,860	791	46,707	53,363
Technical Innovation Projects					
Daxin Concentrator Capacity Expansion from 300,000tpa to 600,000tpa	3,450	3,450	300	3,150	—
Daxin Mn Sulphate Plant Nos. 1 & 2 Lines	1,500	1,500	—	1,500	—
Daxin Electrolytic Mn Plant No. 5 Line	600	600	600	—	—
Daxin, Tiandeng and Iandong Electrolytic Mn Plants: High temperature Furnaces	6,000	5,993	1,200	1,249	3,544
Sub-total	11,550	11,543	2,100	5,899	3,544
Other			4,465		
Total Investments	**385,978**	**271,612**	**61,133**	**100,307**	**114,637**

Table 10-5: Production Capacity and Production Forecast, 2010 to 2012

Mine/Plant	Unit	2010	2011	2012
Daxin Mine				
Oxidized Ore (Open-Pit)				
Capacity	1000t	200	200	200
Ore Mined	1000t	150	150	150
Mn Grade	%	28.0	28.2	28.2
Stripping Ratio		12.8:1	11.3:1	11.5:1
Carbonate Ore (Open-Pit)				
Capacity	1000t	500	500	450
Ore Mined	1000t	500	500	450
Mn Grade	%	19.8	19.1	19.1
Stripping Ratio		12.8:1	11.3:1	11.5:1
Carbonate Ore (Underground)				
Capacity	1000t	300	300	350
Ore Mined	1000t	300	300	350
Mn Grade	%	16.32	16.8	16.8
Tiandeng Mine				
Oxidized Ore (Open-Pit)				
Capacity	1000t	500	500	500
Ore Mined	1000t	120	300	300
Mn Grade	%	17.7	15.9	15.9
Stripping Ratio		9.5:1	9:1	9:1
Bembélé Mine				
Oxidized Ore (Open-Pit)				
Capacity	1000t	—	1,150	1,150
Ore Mined	1000t	—	530	1,150
Mn Grade	%	—	31.70	31.70
Stripping Ratio		—	1.63:1	1.52:1
Daxin Concentrator				
Oxidized Ore (Open-Pit)				
Capacity	1000t	100	100	100
Contrentrate	1000t	86	86	86
Contrentrate Grade	%	35.9	34.1	34.1
Recovery Rate	%	73.5	70.0	70.0
Daxin Concentrator				
Carbonate Ore (Open-Pit)				
Capacity	1000t	600	600	600
Contrentrate	1000t	580	580	580
Contrentrate Grade	%	20.8	20.9	20.9
Recovery Rate	%	85	83	83.7
Tiandeng Concentrator				
Oxidized Ore (Open-Pit)				
Capacity	1000t	180	180	180
Contrentrate	1000t	58	120	120
Contrentrate Grade	%	25	25	25
Recovery Rate	%	75	75	75
Bembélé Concentrator				
Oxidized Ore (Open-Pit)				
Capacity	1000t	—	758.8	758.8
Contrentrate	1000t	—	349.7	758.8
Contrentrate Grade	%	—	43.00	43.00
Recovery Rate	%	—	89.50	89.50

Mine/Plant	Unit	2010	2011	2012
Daxin Mn Powder Processing Plant				
Capacity	1000t	680	680	680
Production	1000t	650	650	650
Electrolytic Mn Plants				
Daxin				
Capacity	1000t	65	65	95
Production	1000t	65	65	95
Start				
Capacity	1000t	17	30	30
Production	1000t	14	20	30
Tiandeng				
Capacity	1000t	0	30	30
Production	1000t	0	17	30
Tiandong				
Capacity	1000t	20	20	20
Production	1000t	15	20	20
Daxin Manganese Sulphate Plant				
Capacity	1000t	25	25	25
Production	1000t	18	22	22
Smelters				
Dabao				
Capacity	1000t	12	12	12
Production	1000t	11	12	12
Tiandeng				
Capacity	1000t	50	50	50
Production	1000t	32	48	48
Qinzhou				
Capacity	1000t	60	60	60
Production	1000t	33	50	50
Daxin Electrolytic Mn Dioxide Plant				
Capacity	1000t	20	20	30
Production	1000t	11	20	30
Chongzuo Lithium Manganese oxide Plant				
Capacity	1000t	0.6	0.6	0.6
Production	1000t	0.2	0.6	0.6
Chongzuo Lithium Cobalt oxide Plant				
Capacity	1000t	1.0	1.0	1.0
Production	1000t	0.2	0.6	1.0
Chongzuo Manganic Manganous Oxide Plant				
Capacity	1000t	10	10	30
Production	1000t	2	10	30

10.4 Forecasts of Operating Costs

Table 10-6 shows the forecast on the operating costs of mining and ore processing plants at Daxin, Tiandeng and Bembélé mines, and as well as a series of manganses product plants between the second half of 2010 and 2012. The major coasts are from the consumables, on and off-site administration, and product marketing and transport. On a whole, SRK believes that forecast on the operating costs at the three mines are reasonable.

Table 10-6: Cash Operating Costs between 2010.7-12 and 2012

Item	Daxin Mining					
	Open Pit			Underground		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	4.59	4.63	4.63	0.99	1.00	1.00
Consumables	37.58	37.95	37.95	43.27	44.74	44.74
Fuel, electricity, water and other services	0.37	0.37	0.37	0.00	0.00	0.00
On and off-site administration	31.71	31.96	31.96	48.59	47.90	47.90
Environmental protection and monitoring	0.14	0.14	0.14	0.14	0.14	0.14
Transportation of workforce	0.25	0.25	0.25	0.05	0.05	0.05
Product marketing and transport	5.80	5.92	5.92	5.80	5.97	5.97
Non-income taxes, royalties and other governmental charges	1.40	1.41	1.41	1.43	1.45	1.45
Contingency allowances	0.44	0.44	0.44	0.45	0.45	0.45
Total	**82.27**	**83.08**	**83.08**	**100.72**	**101.71**	101.71
Depreciation	**16.10**	**16.25**	**16.25**	**0.00**	**0.00**	**0.00**

Note: * Daxin underground mining is outsourced to contractors and therefore has no depreciation costs

Item	Daxin Concentrator			Daxin Mn Powder Plant		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	8.47	8.55	8.55	13.79	13.93	13.93
Consumables	0.16	0.16	0.16	19.10	19.29	19.29
Fuel, electricity, water and other services	5.42	5.47	5.47	20.53	20.73	20.73
On and off-site administration	4.81	4.80	4.80	8.68	8.77	8.77
Environmental protection and monitoring	0.14	0.14	0.14	0.29	0.30	0.30
Transportation of workforce	0.13	0.13	0.13	0.13	0.13	0.13
Product marketing and transport	5.80	5.92	5.92	11.02	11.13	11.13
Non-income taxes, royalties and other governmental charges	0.44	0.45	0.45	0.99	1.00	1.00
Contingency allowances	0.14	0.14	0.14	0.31	0.31	0.31
Total	**25.51**	**25.76**	**25.76**	**74.84**	**75.58**	**75.58**
Depreciation	**5.63**	**5.68**	**5.68**	**5.73**	**5.79**	**5.79**

Item	Tiandeng Mining			Tiandeng Concentrator		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	8.85	9.60	9.60	20.05	11.58	11.58
Consumables	9.85	3.52	3.52	3.16	3.68	3.68
Fuel, electricity, water and other services	0.17	10.92	10.92	4.87	2.32	2.32
On and off-site administration	10.59	3.00	3.00	0.80	2.95	2.95
Environmental protection and monitoring	0.22	0.20	0.20	1.34	0.32	0.32
Transportation of workforce	0.00	0.00	0.00	0.00	0.00	0.00
Product marketing and transport	16.91	5.20	5.20	2.67	1.26	1.26
Non-income taxes, royalties and other governmental charges	0.50	4.40	4.40	12.49	20.00	20.00
Contingency allowances	0.00	0.00	0.00	0.00	0.00	0.00
Total	**47.08**	**36.84**	**36.84**	**45.39**	**42.11**	**42.11**
Depreciation	**7.16**	**17.44**	**17.44**	**6.46**	**3.16**	**3.16**

Item	Bembélé Mining			Bembélé Concentrator		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	n/a	17.08	7.97	n/a	20.89	9.75
Consumables	n/a	23.22	24.38	n/a	18.45	19.37
Fuel, electricity, water and other services	n/a	12.97	13.62	n/a	13.58	14.26
On and off-site administration	n/a	27.43	21.80	n/a	42.46	25.77
Environmental protection and monitoring	n/a	0.98	0.98	n/a	1.50	1.5
Transportation of workforce	n/a	0.00	0.00	n/a	0.00	0
Product marketing and transport	n/a	0.00	0.00	n/a	0.00	0
Non-income taxes, royalties and other governmental charges	n/a	0.00	0.00	n/a	30.87	30.87
Contingency allowances	n/a	1.00	1.00	n/a	1.00	1
Total	**n/a**	**82.68**	**69.75**	**n/a**	**128.75**	**102.52**
Depreciation	**n/a**	22.740	10.480	**n/a**	**27.17**	**12.68**

Note: * For the Bembélé concentrator, cash operating costs above do not include concentrate transportation and marketing costs. Base on the feasibility study, the costs for production, marketing and transportation from the concentrator to China (which include railway transportation from concentrator site to port in Gabor and sea transportations from port in Gabor to local markets in China) are forecasted to be 755.95 RMB/t concentrate in 2011 and 705.33 RMB/t in 2012. Transportation and marketing cost above include depreciation of 94.91RMB/t in 2011 and 44.29 RMB/t in 2012.

Item	Daxin MnSO4 Plant			Daxin Electroyltic Mn Plant		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	285.45	287.47	287.47	716.88	723.91	723.91
Consumables	1,388.25	1,411.39	1,411.39	4,483.93	4,527.89	4,527.89
Fuel, electricity, water and other services	448.90	457.32	457.32	3,411.07	3,444.52	3,444.52
On and off-site administration	266.83	266.53	266.53	470.18	474.79	474.79
Environmental protection and monitoring	8.00	8.24	8.24	63.40	64.02	64.02
Transportation of workforce	2.83	2.92	2.92	10.07	10.17	10.17
Product marketing and transport	205.63	215.67	215.67	168.94	170.59	170.59
Non-income taxes, royalties and other governmental charges	35.89	36.97	36.97	142.69	144.08	144.08
Contingency allowances	11.21	11.55	11.55	44.54	44.97	44.97
Total	**2,653.00**	**2,698.06**	**2,698.06**	**9,511.69**	**9,604.95**	**9,604.95**
Depreciation	**114.98**	**114.98**	**114.98**	**682.13**	**688.81**	**688.81**

Item	Daxin EMD Plant			Start Electroyltic Mn Plant		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	1,035.09	1,045.24	1,045.24	479.82	494.21	509.04
Consumables	1,690.99	1,707.56	1,707.56	6,582.23	6,779.69	6,983.08
Fuel, electricity, water and other services	1,780.91	1,798.37	1,798.37	3,021.36	3,112.00	3,205.36
On and off-site administration	849.97	858.30	858.30	456.50	470.20	484.30
Environmental protection and monitoring	80.98	81.77	81.77	54.29	55.92	57.60
Transportation of workforce	8.28	8.37	8.37	0.00	0.00	0.00
Product marketing and transport	120.50	121.68	121.68	341.87	352.13	362.69
Non-income taxes, royalties and other governmental charges	102.34	103.34	103.34	172.40	177.57	182.90
Contingency allowances	31.95	32.27	32.27	0.00	0.00	0.00
Total	**5,701.02**	**5,756.91**	**5,756.91**	**11,108.47**	**11,441.72**	**11,784.97**
Depreciation	**1609.45**	**1625.23**	**1625.23**	**416.52**	**429.02**	**441.89**

Item	Tiandong Electrolytic Mn Plant			Tiandeng Electrolytic Mn Plant		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	666.13	657.90	677.63	n/a	660.00	660.00
Consumables	6,996.89	7,100.73	7,313.74	n/a	7,100.00	7,100.00
Fuel, electricity, water and other services	3,262.87	3,542.45	3,648.72	n/a	3,600.00	3,600.00
On and off-site administration	460.03	409.58	421.87	n/a	410.00	410.00
Environmental protection and monitoring	48.36	88.11	90.74	n/a	90.00	90.00
Transportation of workforce	4.93	3.23	3.32	n/a	3.50	3.50
Product marketing and transport	57.54	49.06	50.52	n/a	50.00	50.00
Non-income taxes, royalties and other governmental charges	107.43	71.14	73.26	n/a	72.00	72.00
Contingency allowances	0.00	0.00	0.00	n/a	0.00	0.00
Total	**11,604.18**	**11,922.18**	**12,279.80**		**11,985.50**	**11,985.50**
Depreciation	**874.97**	**1075.18**	**1107.44**	**n/a**	**880.00**	**880.00**

Item	Dabao Smelter			Tiandeng Smelter		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	114.06	116.34	124.68	243.00	247.86	252.82
Consumables	3,050.81	3,111.83	3,153.49	4,173.26	4,256.73	4,341.86
Fuel, electricity, water and other services	1,806.30	1,842.43	1,867.43	2,146.23	2,189.15	2,232.94
On and off-site administration	172.30	175.74	180.74	132.53	136.41	139.14
Environmental protection and monitoring	15.37	7.09	7.25	1.21	1.60	1.60
Transportation of workforce	0.00	0.00	0.00	0.00	0.00	0.00
Product marketing and transport	0.00	0.00	0.00	75.00	76.50	78.03
Non-income taxes, royalties and other governmental charges	19.31	19.42	23.00	4.00	4.08	4.16
Contingency allowances	0.00	0.00	0.00	0.00	0.00	0.00
Total	**5,178.15**	**5,272.84**	**5,356.59**	**6,775.23**	**6,912.33**	**7,050.55**
Depreciation	**81.21**	**72.00**	**73.80**	**85.00**	**86.70**	**88.43**

Item	Qinzhou Smelter			Chongzuo LiMn2 O4 Plant		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	205.76	191.07	191.07	1,669.67	1,669.67	1,669.67
Consumables	7,168.81	6,737.10	6,737.10	18,714.24	18,714.24	18,714.24
Fuel, electricity, water and other services	2,008.60	2,001.99	2,001.99	2,168.66	2,168.66	2,168.66
On and off-site administration	166.29	173.07	173.07	32.86	33.52	33.85
Environmental protection and monitoring	28.84	36.79	36.79	19.12	19.50	19.70
Transportation of workforce	0.00	0.00	0.00	3.50	3.57	3.61
Product marketing and transport	172.31	150.00	150.00	300.00	306.00	309.06
Non-income taxes, royalties and other governmental charges	23.97	108.70	108.70	15.50	15.81	15.97
Contingency allowances	0.00	0.00	0.00	10.23	10.43	10.54
Total	**9,774.58**	**9,398.70**	**9,398.70**	**22,933.78**	**22,941.40**	**22,945.29**
Depreciation	**148.62**	**147.31**	**147.31**	**1363.75**	**1363.75**	**1363.75**

Item	Chongzuo LiCoO2 Plant			Chongzuo Mn3 O4 Plant		
Cash Operating Cost	2010.7-12	2011	2012	2010.7-12	2011	2012
Workforce employment	2,222.67	2,222.67	2,222.67	175.00	175.00	175.00
Consumables	203,366.26	203,366.26	203,366.26	9,829.84	9,829.84	9,829.84
Fuel, electricity, water and other services	3,848.66	3,848.66	3,848.66	278.85	278.85	278.85
On and off-site administration	39.12	40.29	40.70	10.32	10.63	10.95
Environmental protection and monitoring	19.12	19.69	19.89	25.83	26.99	27.89
Transportation of workforce	3.50	3.61	3.64	1.50	1.55	1.59
Product marketing and transport	300.00	309.00	312.09	300.00	309.00	318.27
Non-income taxes, royalties and other governmental charges	16.37	16.86	17.03	23.90	24.62	25.36
Contingency allowances	11.56	11.79	119.09	8.63	8.80	8.89
Total	209,827.26	209,838.83	209,950.03	**10,653.87**	**10,665.28**	**10,676.64**
Depreciation	**1218.25**	**1218.25**	**1218.25**	**707.1**	**707.1**	**707.1**

11 UTILITIES AND INFRASTRUCTURE

11.1 Road Assess and Transport

Daxin manganese mine: the Daxin manganese project is located approximately 250km east and south of Naning, the capital of Guangxi Zhuangzu autonomous region, PRC (Figure 3-2). Nanning airport, a major Chinese airport has several direct daily flights between most Chinese cities and Nanning. The mining site, concentrator plant and metallurgical plants all have good access to main roads.

Tiandeng manganese mine: Tiandeng manganese mine and associated metallurgical and processing plant are located approximately 200km northwest of Nanning, the capital of Guangxi Zhuangzu autonomous region, PRC (Figure 3-2). Nanning airport, a major Chinese airport has several direct daily flights between most Chinese cities and Nanning. The mining site, concentrator plant and metallurgical plants all have good access to main roads.

Bembélé Manganese Mine: Bembélé Manganese Mine is located 300km east of Libreville, the capital city of Gabon (Figure 3-3). The mine can be accessed via a national concrete road (250km) to Ndjole city and a local gravel road (50km) from Ndjole city to the mine site.

11.2 Electrical Power Supply

Daxin and associated metallurgical and processing plants

Power supply for the mine and metallurgical and processing plant in Daxin county is operated by the Company with power sourced from the Southern Electrical Wire Netting Company at market prices by the provincial grid, which is transmitted at 330,000V. This power line is transmitted at 10,000V through the CITIC Dameng substation. The capacity of 10,000V is sufficient for operation of Daxin mine and processing plant, ferroalloy plant, electrolytic manganese plant, electrolytic manganese oxidize plant, manganese sulphate facility, and all associated activities. Electrical power is connected to Daxin mine and associated plants by overhead wires from the transformer at CITIC Dameng's substation between 2 and 5km away.

Tiandeng and associated metallurgical and processing plants

Power supply for the mine and metallurgical and processing plant in Tiandeng county is operated by the Company with power sourced from the Southern Electrical Wire Netting Company at market prices by the provincial grid, which is transmitted at 330,000V. This power line is transmitted at 10,000V through the Dongping substation. The capacity of 10,000V is sufficient for operation of Tiandeng mine and processing plant, ferroalloy plant, and all associated activities. Electrical power is connected to Tiandeng mine and associated plants by overhead wires from the transformer at Dongping substation, a distance of 4.2km.

Bembélé and associated ore processing plant

CITIC Dameng plans to install four 500KW electricity generators to provide power supplies to both Bembélé mine and concentrator. The generators are 3km from the mining operation site and 1km from the concentrator.

11.3 Water Supply

Water supply for Daxin ore processing plant is provided from the nearby Xialei River. Water for living purposes is provided by pumping from underground water. Water used for Tiandeng ore

processing plant is provided by pumping from Quantang River and water for living purposes is provided by pumping underground water. Water supply for Bembélé ore processing plant is provided by pumping from one branch or creek of the Misang River.

Water for the Dabao ferroalloy plant and Daxin manganese sulphate plant, electrolytic manganese plant, electrolytic manganese oxide plant, and ferroalloy plants is sourced from the Xialei River. Water for Tiandeng ferroalloy plant is sourced from the Quantang River and water for Qinzhou ferroalloy plant is tap water sourced from Qinzhou's water supply.

11.4 Diesel Supply

Daxin and Tiandeng mines and associated plants: diesel fuel is provided by retail outlets Zuochong Petroleum Filiale and Daxin Petroleum Filiale, at usual retail prices. The Company uses its own tank trucks to transport fuel to the mine sites and plants.

Bembélé mine and associated plant: the Company has signed a diesel supply contract with Petro-Gabon for diesel to be supplied by Petro-Gabon at 20XAF/litre below market price.

11.5 Explosive Supply

In China explosives are supplied by the provincial government under strict controls. There are no alternative sources of explosives supply.

11.6 Accommodation

CITIC Dameng provides accommodation for both metallurgical and processing employees and contract miners at both Daxin and Tiandeng mines and associated metallurgical and processing plants. Local farmer employees live in their own homes. CITIC Dameng is looking at future options to build new apartments or renting homes from nearby towns for employees at Daxin and Tiandeng mines. The Company will provide accommodation for employees of the Bembélé project.

11.7 Workshops and Repair Facilities

CITIC Dameng has its own maintenance workshops at both the Daxin and Taindeng manganese projects including a mechanical engineering installation company, work area repair shop, service shop in manganese plant, service shop in manganese sulphate, service shop in processing plants and a service shop in manganese powder processing plant. The Company employs a number of tradesmen who are trained in repair and maintenance of equipment on site. Parts, which cannot be found in the workshop or made on site, are sourced from Nanning and other major cities in China.

12 ENVIRONMENTAL ASSESSMENT

Overall, CITIC has made much improvement in permitting compliance and operational conformance to National legislative requirements and industry best practices at their project sites between the time of SRK's initial site visit (2008) and the recent update site visit (May 2010). CITIC has also improved their environmental management capability during the afore stated time through the development and expansion of Environmental Departments and Management Protocols.

The significant environmental aspects for the Daxin, Chongzou, Tiandeng, Tiandong (Manganese) and Qinzhou (Ferrochromium) Projects in China are associated with the mining, concentrating, smelting and refining of manganese and ferrochromium alloy. The significant environmental aspects for the Bembélé Manganese Mine project in Gabon, Africa are associated with the mining and concentrating of manganese ore. These project operations collectively constitute the "CITIC Dameng Mn Projects" as referred to in this report.

The Daxin, Chongzuo, Tiandeng and Tiandong Manganese Projects are located between 100 and 250km to the west of Nanning City, Guangxi Province. The Qinzhou Ferrochromium Project is located with the Qinzhou Harbour City Industrial district, approximately 250km south of Nanning City, Guangxi Province. The Bembélé Manganese Mine project is located at Moyen Ogooue in the Bembele Mountains approximately 160km east from Libreville, Gabon, Africa.

The Daxin Projects comprise the:

- Daxin Mine and Concentrator — 600,000tpa manganese ore mined and processed, 300,000tpa of manganese concentrate produced, owned by CITIC Dameng Mining Company Limited (CITIC Dameng Mining).
- Manganese Powder Plant — capacity of 400,000tpa, owned by CITIC Dameng Mining.
- Daxin Electrolytic Manganese Plant — 60,000tpa electrolytic manganese produced, owned by CITIC Dameng Mining.
- Daxin Manganese Sulphate Plant — 25,000tpa manganese sulphate produced, owned by CITIC Dameng Mining.
- Daxin Electrolytic Manganese Oxide Plant — 10,000tpa manganese oxide, owned by CITIC Dameng Mining.
- Dabao Ferrous Alloy Smelter — 15,000tpa manganese ferrous alloy, owned by Dabao Company Limited (60% CITIC Dameng Mining).
- Start Electrolytic Manganese Plant — 20,000tpa electrolytic manganese, owned by Start Company Limited (71% CITIC Dameng Mining).

The Chongzuo Projects comprise the:

- Electrolytic Lithium — Cobalt Project — 1,000tpa, CITIC Dameng Mining, Chongzuo Sub-Company (100% CITIC Dameng Mining).
- Electrolytic Lithium — Manganese Project — 600tpa CITIC Dameng Mining, Chongzuo Sub-Company (100% CITIC Dameng Mining).
- Electrolytic Mn_3O_4 Project — 30,000tpa CITIC Dameng Mining, Chongzuo Sub-Company (100% CITIC Dameng Mining).

The Tiandeng Projects comprise the:

- Taindeng Mine and Concentrator — 500,000tpa manganese ore mined and processed, 90,000tpa manganese concentrate produced, owned by CITIC Dameng Mining, Tiandeng Sub Company Limited (100% CITIC Dameng Mining).
- Tiandeng Ferrous Alloy Smelter — 50,000tpa manganese ferrous alloy, owned by Tian Iron Company Limited (100% CITIC Dameng Mining).
- Tiandeng Electrolytic Manganese Plant — 30,000tpa electrolytic manganese produced, owned by CITIC Dameng Mining, Tiandeng Sub Company Limited (100% CITIC Dameng Mining).

The Tiandong Project comprises the Tiandong Electrolytic Mn Project (20,000tpa) — owned by CITIC Dameng Mining, Tiandong Sub-Company (100% CITIC Dameng).

The Qinzhou Project comprises the Qinzhou Ferrous Alloy Smelter (50,000tpa of ferrochromium alloy), owned by Qinzhou City Guixin Ferrous Alloy Company Limited — CITIC Dameng Mining, Qinzhou Sub Company Limited (100% CITIC Dameng Mining).

The Bembélé Mine and Concentrator Project are still in development — mining has not yet begun and construction work is in the initial stages of development. The project is owned by Hua Zhou Dameng Industry and Mine Trading Company (CICMHZ).

12.1 Environmental Review Objective and Scope

The objective of this environmental due diligence review is to identify and or verify the existing and potential environmental liabilities and risks, and assess any associated proposed remediation measures for the CITIC Dameng Mn Projects in China and Gabon.

Environmental compliance and conformance for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé Projects was determined through the review of the project's environmental management performance against:

- Chinese projects — Chinese national environmental regulatory requirements (Appendix 3).
- Gabonese project — Gabonaise national environmental regulatory requirements (Appendix 4).
- World Bank/International Finance Corporation (IFC) environmental standards and guidelines (see Appendix 5).
- Internationally recognized environmental management practices.

The methodology that was applied for this environmental review of the CITIC Dameng Mn Projects comprised a combination of document review, site visits and interviews with Company technical representatives. An initial site visit was undertaken in 2008 and an update site visit was undertaken in May, 2010 to Guangxi project sites and June, 2010 to the Bembélé site in Gabon.

12.2 Status of Environmental Approvals and Permits

12.2.1 Daxin Projects

SRK was provided with copies of business licenses for CITIC Dameng's operations which cover their individual industrial operations. The parent company CITIC Dameng Mining Co Ltd's license (No. 0656650) was issued by the Guangxi Zhuang Autonomous Region Industrial and Commercial Bureau on Aug 19, 2005 and expires on the Aug 19, 2035.

The Mining Licence No. 1000000620030 for the Daxin Manganese Mine was issued to CITIC Dameng Mining by the Guangxi National Land and Resource Ministry in February 2006 (expiry February 2035). The Mining Licence covers an area of 10.616 km^2 and encompasses the Daxin mining and mineral processing facilities as well as the Dabao smelting facility. The Daxin Manganese Oxide Plant is located adjacent to the Xialei Town and is outside of the mining licence area. The approved mining method is open pit and underground at a production rate of 300,000tpa.

The Environmental Impact Assessment (EIA) report for the original 300,000tpa Daxin Manganese Mine Project was produced by the Guangxi Environment Conservation Institute and Nanning Environmental Monitoring Station in July 1990. This EIA was approved by the Guangxi Environmental Protection Bureau (EPB) on the September 1, 1990.

An updated EIA report for the Daxin Manganese Mine Underground Mining, Concentrating, and Manganese Powder Project has been produced by the Chongzuo City Environmental Scientific Institute in May 2007. This EIA was approved by the Guangxi Zhuang Autonomous Region EPB (Guihuanguanzi 2007-468) on November 13, 2007.

The latest EIA report for the 30,000tpa Daxin Electrolyte Manganese Expansion Project was produced by Guangxi Zhuang Autonomous Region Environmental Scientific Institute in May 2007. This EIA was approved by the Guangxi Zhuang Autonomous Region EPB on the June 30, 2007. SRK was also provided with approvals for previous EIA's for the Daxin Electrolyte Manganese lines; Guangxi Zhuang Autonomous Region EPB approval (Guihuanguanzi [2001] No.55) for 4,000tpa original project — issued on May 30, 2001, Chongzuo City EPB approval (Guihuanguanzi [2003] No.2) for 4,000tpa expansion project — issued on October 13, 2003, Chongzuo City EPB approval (Guihuanguanzi [2004] No.3) for 10,000tpa expansion project — issued on May 26, 2004, Chongzuo EPB approval (Guihuanguanzi [2004] No.4) for 5,000tpa expansion project — issued on May 28, 2004.

The EIA Table report for the Guangxi Daxin Manganese Mining Company Limited, 10,000tpa Manganese Sulphate Plant Expansion Project was produced by the Beihai City Blue Ocean Environmental Protection Service Company (Grade B) in June 2003. This EIA Table was approved by the Nanning District Administration Office EPB on the July 13, 2003. CITIC Dameng also provided SRK with another 5,000tpa EIA Table for the original production line completed September 28, 1999. The approval for this EIA Table was issued by the Guangxi Zhuang Autonomous Region EPB on November 15, 1999.

The EIA report for the 10,000tpa Daxin Electrolyte Manganese Oxide Project was produced by Beihai Bilan Oceanic Environment Protection Service Company in February 2002. This EIA was approved by the Guangxi Autonomous Region EPB on the April 10, 2002.

The EIA Table report for the Dabao Ferrous Alloy 1x6300KVA Smelter Project was produced by Nanning Environmental Protection Science and Research Institute on November 14, 2004. The approval for this EIA was granted by the Chongzuo City EPB on the December 28, 2004.

During the construction of the project, the Chongzuo City EPB stated there was a violation against the "Environmental Impact Assessment Law" regarding the "Three Simultaneous" regulation, and that the company should immediately allocate sufficient capital to complete the unfinished and non-sufficient EP facilities. SRK observed during the site visit that EP facilities have been upgraded to meet project approval conditions.

The EIA report for the Guangxi Start Manganese Materials Company Limited, 20,000tpa Electrolyte Manganese Technical Improvement Project was produced by Beihai City Blue Ocean Environmental Protection Service Company in July 2001. This EIA was approved by the Chongzuo City EPB on the March 15, 2004.

SRK was provided with a Water and Soil Conservation Plan (WSCP) produced by Nanning Zhonggui Water and Soil Conservation Technology Co Ltd in November 2008, which covers all of the Daxin project operations. The approval for this WSCP (Guishuishuibaohan [2008] No.122) was issued by the Guangxi Zhuang Autonomous Region Water Bureau on December 10, 2008.

SRK was provided with an Environmental Check Acceptance Opinion for the Daxin 300,000tpa Mine/Concentrator/powder plant project issued by the Daxin County EPB (Dec 10, 1992) for review. No Final Check Acceptance was provided for the Daxin underground mine to SRK for review.

SRK was provided with an Environmental Check Acceptance Opinion for the original Daxin 4,000tpa electrolytic Manganese project issued by the Chongzuo City EPB (Nov 21, 2006) and the Final Environmental Check Acceptance Approval issued by the Guangxi Zhuang Autonomous Region EPB (Guihuanguanzi [2006] No.46) on Nov 28, 2006 for review. SRK was provided with a Final Check Acceptance Approval for the expansion projects (No.2,3,4 and 5 lines) issued by the Chongzuo EPB (Chonghuanzi [2006] No.22) on November 21, 2006. The Final Environmental Check Acceptance Approval (Guihuanyanzi [2010] No.39) for the 30,000tpa expansion project was issued by the Guangxi Zhuang Autonomous Region EPB on May 10, 2010.

No Final Check Acceptance for any of the Manganese Sulphate production lines or the Manganese Oxide plant was provided to SRK for review.

The Monitoring Report of the Final Checking of Start 20,000tpa Electrolyte Manganese Project was produced by the Monitoring Station of Guangxi Baise City, in May 2007. SRK was provided with an Environmental Check Acceptance Opinion for the Start project issued by the Baise City EPB (May 19, 2007) for review.

The Discharge Permit of CITIC Dameng Company Limited, Daxin Sub-Company, was issued by the Daxin County EPB on the February 2, 2010, valid until February 3, 2011. This Temporary Discharge Permit covers the Daxin Sub Company facilities. The Dabao Ferrous Alloy Smelter is covered under another Temporary Discharge Permit issued by the Daxin County EPB on the August 6,2009, expiring on August 6, 2010.

The Pollution Discharge Permit for the Start Electrolytic Manganese Project was issued by the Jingxi County EPB on the April 14, 2010, valid until March 2011.

A total of 20 Land Use Permits have been issued to CITIC Dameng Mining by the Daxin Land and Resource Bureau to cover all of the facilities for the Daxin Manganese Projects (with the exception of the Start Electrolytic Manganese Plant). These permits were issued on the October 18, 2005 and expire in October 2055. No Land Use Permit was provided for the Manganese Oxide Plant to SRK for review. The Start Electrolytic Manganese Plant has 2 Land Use Permits for the electrolytic plant and TSF which were issued by the Jiangxi County National Land Resource Bureau on June 30th 2003 (No. 012194929) and Nov 30th 2001 (No. 012187002) which were provided for review.

12.2.2 Chongzuo Projects

SRK was informed an EIA for the 10,000tpa Chongzuo Electrolytic Mn_3O_4 Project was produced but SRK was not provided with this EIA for review. The approval though for this EIA (Guihuanguanzi [2008] No.269) was issued by the Guangxi Zhuang Autonomous Region EPB on October 14, 2008. SRK notes though that the Feasibility Study was conducted at a production capacity of 30,000tpa.

CITIC Dameng reported to SRK that the EIA's for the 1,000 tpa Electrolytic Lithium — Cobalt Project and the 600 tpa Electrolytic Lithium — Manganese Project are currently being conducted, so are not available for review at this time.

CITIC Dameng also stated as the project is located within the Chongzuo Industrial Development Park, a WSCP for the whole industrial park is being conducted (covering all projects within the park) by the Chongzuo Industrial Development Park.

CITIC Dameng reported to SRK that the industrial park management were going to conduct a WSCP for the whole site that would encompass all operations within it. SRK was provided no information as to when this assessment will be conducted. CITIC also reported the Final Check Acceptance for the Chongzuo Project will be conducted after construction is complete.

CITIC Dameng also stated that as the project site is within the industrial park, Land Use Permits and discharge permits are not required; Water Use Permits also are not required as water is sourced from the industrial park's. city water supply.

12.2.3 Tiandeng Projects

CITIC Dameng Co Ltd Tiandeng Co (CITIC Dameng subsidiary) business license (No. 450000400001418) was issued by the Guangxi Zhuang Autonomous Region Industrial and Commercial Bureau on in March, 2008.

Tiandeng County Dameng Ferroalloy Co Ltd (CITIC Dameng subsidiary) business license (No. 451425200000337) was issued by the Tiandeng County Industrial and Commercial Administration Bureau on the April 30th 2008.

Mining Licence No. C1000002008122120001473 for the Tiandeng Manganese Mine was issued by the Guangxi National Land and Resource Ministry on December 02, 2008 (expiry December 02, 2024). The Mining Licence covers an area of 4.5958 km^2. The approved mining method is open pit at a production rate of 250,000tpa.

No EIA report for the Tiandeng 250,000tpa Manganese Mining and Concentrating Project has been sighted as part of this review. However, an EIA approval issued by the Guangxi Zhuang Autonomous Region EPB on April 15, 1993 was provided for review.

The EIA Table report for the Tiandeng 20,000tpa Ferrous Alloy Smelter Project was produced by the Beihai City Blue Ocean Environmental Protection Service Company in February 2003. An updated EIA Table report for the Tiandeng Manganese Ferrous Alloy Smelter Expansion (from 1×6,300KVA to the addition of 2×9,000KVA) Project was produced by the Nanning District Environmental Scientific Institute in November 2004. Approval of the updated November 2004 EIA Table for the Expansion Project was granted by the Chongzuo City EPB in December 2004.

The EIA report for the 30,000tpa Tiandeng Electrolyte Manganese Project was produced by Guangxi Zhuang Autonomous Region Academy of Environmental Sciences in August 2009. This EIA was approved by the Guangxi Autonomous Region EPB (Guihuanguanzi [2009] 267) on September 24, 2009.

The WSCP covering all of the Tiandeng Project operations was prepared by the Nanning Zhonggui Water and Soil Conservation Technology Co Ltd in November 2008. The approval for this WSCP (Guishuishuibaohan [2008] No.123) was issued by the Guangxi Zhuang Autonomous Region Water Department on December 9, 2008.

Five Land Use Permits have been issued to CITIC Dameng Mining by the Tiandeng Land and Resource Bureau to cover all of the original facilities for the Tiandeng Projects. These permits were issued on the November 11, 2005 and expire in October 2055. Another 2 Land Use Permits were issued on August 18, 2008 (valid until December 28, 2057) for the new Electrolytic Mn Plant currently under construction. The Tiandeng Mine has also been issued 2 waste discharge permits by the Tiandeng County, the first (no permit number) from September 2002 until September 2009 and the second (No. 2008-A-05) from June 2008 to June 2009. SRK was not provided with any updated copies of these discharge permits during the SRK project update.

SRK was provided with an Environmental Check Acceptance Opinion stating the project has passed the approval assessment for the Tiandeng Smelter issued by the Chongzuo EPB (Oct 9, 2006). SRK was also provided with the Final Check Acceptance assessment report for the Tiandeng Mine and Concentrator completed by the Tiandeng County Environmental Protection Monitoring Station (EPMS) in December 2008. The Approval for this Final Check Acceptance (Guihuanyanzi [2009] No.79) was issued by the Guangxi Zhuang Autonomous Region EPB on September 14, 2009. CITIC Dameng will also need to conduct Final Check Acceptance assessments for the new electrolytic manganese production line project site once construction is complete and the operation moves to trial production.

12.2.4 Tiandong Projects

SRK was informed that the 20,000tpa Tiandong Electrolytic Manganese Plant was owned and operated by CITIC Dameng Mining Co Ltd Daxin Co (CITIC Dameng subsidiary) business license (No. 0499912) was issued by the Guangxi Zhuang Autonomous Region Industrial and Commercial Bureau on the Feb 4th 2008.

The EIA for the Tiandong 20,000tpa Electrolytic Mn Project was produced by the Guangxi Baise City Environmental Protection Institute in August 2007. The approval for this EIA (Guihuanguanzi [2008] No.9) was issued by the Guangxi Zhuang Autonomous Region EPB on January 16, 2008.

The WSCP for the Tiandong 20,000tpa Electrolytic Mn Project was produced by the Guangxi Baise Water Resources and Electric Power Design Institute in May 2007. The approval for this WSCP (Baishuishuibao [2007] No.8) was issued by the Guangxi Baise City Water Bureau on May 14, 2007.

Two Land Use Permits which cover the Tiandong Project site issued on May 10, 2010 (valid until May 28, 2060) were provided for review. SRK was also provided with a Water Use Permit (including industrial and domestic) issued on November 17, 2009 (valid until November 16, 2015) by the Tiandong County Water Bureau to source 80,000m^3/year from the Darenquan River.

No Final Check Acceptance has yet been conducted for the Tiandong Project as the plant is still undergoing trial production. CITIC Dameng informed SRK that they will conduct the assessment shortly, before they move to formal production.

12.2.5 Qinzhou Projects

Guangxi Qinzhou City Guixin Metallurgical Co Ltd (CITIC Dameng subsidiary) business license (No. 460700200004727) was issued by the Qinzhou City Industrial and Commercial Administration Bureau on the April 8th 2008. Construction Approval of Qinzhou City Guixin Ferrous Alloy Company Limited, 60,000tpa Ferrochromium Ferrous Alloy Project was issued by the Qinzhou Development and Reform Committee on the December 24, 2003.

An EIA Scope Table report for the Qinzhou City Guixin Ferrous Alloy Company Limited 4x6300KVA Boilers Project was produced by the Laibin City Environmental Scientific Institute in February 2004. It should be noted this EIA Scope Table is only a scoping document for the production of the full project EIA. This EIA Scope Table report was approved by the Qinzhou City EPB on the April 15, 2004.

A full updated EIA report for the Qinzhou City Guixin Ferrous Alloy Company Limited 4x6300KVA Boilers Project (60,000tpa) was produced by the Laibin City Environmental Scientific Institute in December 2005. This EIA Report was then approved by the Qinzhou City EPB on the December 22, 2005.

On the May 9, 2006, the Environmental Protection Group of the Qinzhou Smelter produced a monitoring and assessment report entitled the *Checking Result of Environment Protection Issues of 60,000tpa Ferrous Alloy Project*. On the May 10, 2006 the Qinzhou City EPB granted further approval for the *Gross Discharging Volume of High Carbon Ferrous Alloy and Sulphur Dioxide* on the May 10, 2006. This approval constitutes an amended to the original approval conditions, allowing for the substitution of high carbon chromium ferrous alloy for original silicon manganese ferrous alloy, and the discharging of 25tpa of sulphur dioxide.

The Monitoring Report of the Final Checking for Qinzhou City Ferro Alloy Company Limited 4x6300KVA Boilers Project was produced by the Qinzhou City Environmental Monitoring Station in May 2006. The Qinzhou City EPB issued the Final Check Approval of Qinzhou City Guixin Ferrous Alloy Company Limited, 60,000tpa Ferrochromium Alloy Project's Environmental Protection on the May 10, 2006.

No WSCP and the associated approval for the Qinzhou Smelter Project have been sighted as part of this review.

The Water/Air Discharge Permit for the Qinzhou Smelter Project was issued by the Qinzhou City EPB on the May 12, 2006 (expiry May 11, 2009). The issuing of this permit was followed up by the Qinzhou City EPB producing the *Testify Report of Waste water, Air and Solid Discharging Situation of Qinzhou Company Limited,* on the June 25, 2006.

The Land Use Permit for the Qinzhou Smelter Project was issued to the Guangxi Qinzhou City Guixin Metallurgy Company limited by the Qinzhou Land and Resource Bureau on the September 6, 2005 (expiry September 2054).

12.2.6 Bembélé Projects

A Mining Permit No. G3-223 for the Bembélé Manganese area deposit was issued to CICMHZ by the Republic of Gabon on December 5, 2007 valid for a period of ten years. The Mining Permit covers an area of 20 square km.

CICMHZ contracted TEREA — Experts on Land Environment Enhancement, Libreville, Gabon to conduct the EIA for the Bembélé Manganese project, which was completed in December 2008. The approval for EIA (No.494/MEFEDD/SG/DGEPN/CE-DECDE) was issued by the Director General of Environment and Nature Protection on behalf of the Ministry of Water, Forests, Environment and Sustainable Development on March 30, 2010. SRK has been provided with a copy of the scoping document and contract for conducting EIA assessments for the projects Access Road, Rail load-out and Port facilities between CICMHZ and TEREA.

CICMHZ also provided SRK with a copy of their Extractive Industries Transparency Initiative (EITI) submission of their royalty payments to the Gabonese government for 2008 (submitted Oct 22, 2009) as requested by the government in line with the EITI reporting requirements. PricewaterhouseCoopers has been retained to review and report on the EITI.

No other documents, permits, etc regarding environmental compliance have been provided for review at this time as the project is still in initial stages of development.

12.3 Environmental Compliance and Conformance

Overall, CITIC has made much improvement in permitting compliance and operational conformance to National legislative requirements and industry best practices at their project sites between the

time of SRK's initial site visit and the recent update site visit. CITIC has also improved their environmental management capability during the afore stated time through the development and expansion of Environmental Departments and Staff at the individual project sites and the development of Environmental Management Plans (EMP), Environmental Management Regulation, Environmental Training, Water Management Protocols and operating procedures.

12.3.1 Daxin Projects

The May 2007 EIA reports for the Daxin Manganese Mine Underground Mining, Concentrating, and Manganese Powder Project states the following in respect to the production rates:

'*mining and concentrating rate expands from 300,000tpa to 600,000tpa (transferring from surface mining to underground mining, ore processing changing from manganese dioxide to carbonate manganese). Simultaneously, the manganese powder processing expands from 155,000tpa to 600,000tpa*'.

The current approved mine production rate at the Daxin Manganese Mine, as specified in Mining Licence No. 1000000620030, is 300,000tpa. Application will need to be made to Guangxi National Land and Resource Ministry to increase the approved mine production rate in Mining Licence No. 1000000620030 to 600,000tpa.

The current operations of the Daxin Electrolyte Manganese Projects are generally in compliance with the EIA approval conditions. SRK was able to confirm CITIC had actioned the majority of items, bringing the project into compliance with National legislation during the SRK project update site visit.

The current operations of the Daxin Manganese Sulphate Projects are generally in compliance with the EIA approval conditions. SRK was able to confirm CITIC had actioned the majority of items, bringing the project into compliance with National legislation during the SRK project update site visit.

The current operation of the Dabao Ferrous Alloy Project is generally in compliance with the EIA approval conditions. SRK was able to confirm CITIC had actioned the majority of items, bringing the project into compliance with National legislation during the SRK project update site visit.

During the construction of the project, there was a violation against the "Environmental Impact Assessment Law" regarding the "Three Simultaneous" regulation, that the company should immediately allocate sufficient capital to complete the unfinished and non-sufficient EP facilities. SRK was able to verify that these have now been completed and implemented as per approval requirements, except for gas monitoring equipment.

The current operation of the Daxin Manganese Oxide Project is generally in compliance with the EIA approval conditions. SRK was able to confirm CITIC had actioned the majority of items, bringing the project into compliance with National legislation during the SRK project update site visit.

The current operations of the Daxin Electrolytic Manganese Projects are generally in compliance with the EIA approval conditions. SRK was able to confirm CITIC had actioned the majority of items, bringing the project into compliance with National legislation during the SRK project update site visit.

12.3.2 Chongzuo Projects

The Chongzuo Project was at the time of SRK's update site visit still under construction, so assessment of implemented EIA and approval conditions was only partially capable. The current developments though at the Chongzuo Projects are generally in compliance with the EIA approval conditions.

12.3.3 Tiandeng Projects

The current operation of the Tiandeng Manganese Mine and Concentrator is in compliance with the EIA approval conditions. However, it is worth noting that at this stage, there is no documented plan or design for the rehabilitation of the Tiandeng TSF.

The Tiandeng Manganese Ferrous Alloy Smelter Expansion (6300KVA to 2×9000KVA) EIA Table predominantly addresses construction impacts, rather than operational aspects and impacts of the expansion project and also includes information on a different project (Hunan Ferroalloy smelter) as assessment information for the Tiandeng smelter project.

The current operation of the Tiandeng Smelter Project is generally in compliance with the EIA approval conditions. SRK was able to confirm CITIC had actioned the majority of items, bringing the project into compliance with National legislation during the SRK project update site visit.

12.3.4 Tiandong Projects

The Tiandong Project was at the time of SRK's update site visit just completing construction, so assessment of implemented EIA and approval conditions was only partially capable. The current developments though at the Tiandong Projects are generally in compliance with the EIA approval conditions.

SRK was able to confirm CITIC had actioned the majority of items, bringing the project into compliance with National legislation during the SRK project update site visit.

12.3.5 Qinzhou Projects

The current operation of the Qinzhou Smelter Project is generally in compliance with the EIA approval conditions. SRK was able to confirm CITIC had actioned the majority of items, bringing the project into compliance with National legislation during the SRK project update site visit.

It is worth noting that the smelting process at the Qinzhou Project was changed to produce ferrochromium alloy in 2005 and the EIA has not assessed impacts from the new process, negating the EIAs applicability. No EPB assessment or approval documentation in relation to this change of process has been sighted as part of this review. SRK recommends that CITIC Dameng Mining seek written confirmation from the Qinzhou City EPB in relation to the applicability of the project's EIA and associated approval conditions.

12.3.6 Bembélé Projects

CICMHZ's Bembélé Manganese project is still in the development stage, with the mine site and processing plant under construction and a basic mine camp, amenities being constructed at the time of SRK's update site visit. CICMHZ have stated they will comply with legal requirements as stated in Gabon and Chinese legislation regarding the development of mines and industrial processing plants. The EIA Scoping document states, "due to agreements between Gabon and the World Bank, the project will also need comply with International industry standards" as represented by the Equator Principles.

SRK did observe a lack of management to international industry standards as concerns hydrocarbon storage. Motor oil was stored within 205 liter drums, with no secondary containment and a reasonable amount of spills and leaks evident. SRK recommends be remediated and prevented by constructing secondary containment for these storages along with using and maintaining the waste oily water collection system.

12.3.7 General Compliance and/or Conformance Issues

The following noted items, while not covered within the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé project approval conditions; either do not meet Chinese (or Gabonese — Bembélé) environmental requirements and or do not conform to recognized international industry practices:

- Hydrocarbon storage and handling — the storage facilities for fuels and oils do not have secondary containment (stored in open in ad-hoc manner at most sites). This is both a Chinese (& Gabonese) requirement and recognized international industry practice.

- Greenhouse Gas emissions — there is currently no accounting/inventory of the Greenhouse Gas emissions for the Daxin, Chongzuo, Tiandeng, Tiandong and Qinzhou Manganese Projects. It is a Chinese policy directive to reduce Greenhouse Gas emissions and the recognized international industry practice utilized to facilitate this process is to undertake an emission inventory.

- Acid rock drainage (ARD) — while no ARD issues associated with the storage of waste rock and process tailings/residues were observed during the site visit, there was a minor ARD issue associated with a small concentrate stockpile at the Tiandeng site. This stockpile was located in a separate area and CITIC Dameng Mining stated that the leaching was a result of long term storage and that this would be rectified. There has been no geochemical characterization undertaken of the waste rock, tailings or leach residue to determine the potential for acid generation and confirm that the risk of ARD generation is low. This item has not yet been regulated or standardized in Chinese regulation but is recognized as an international industry practice that is a part of planning for mine closure.

- Contaminated sites assessment — A contaminated sites assessment should also be conducted for areas of suspected contamination and an assessment process for continued management should also be implemented. This item has not yet been regulated or standardized in Chinese regulation but is recognized international industry practice that is a part of progressive mine closure.

Rehabilitation and closure planning — The EIA approvals state that site rehabilitation should be undertaken. It is a recognized industry practice to plan for and document a site's rehabilitation and closure requirements. SRK was provided with 2 contracts ("design contracts of land rehabilitation plan") for conducting rehabilitation works for the Daxin and Tiandeng project's sites between CITIC Dameng and Nanning Zhonggui Water and Soil Conservation Technology Inc. The contracts were signed on June 1, 2010, and the scope of work covered the mining and associated metallurgical & processing plants of the Daxin and Tiandeng project sites for an area of 4.43ha and 1.55ha, respectively. While the contracts for these plans demonstrates CITIC Dameng's ongoing intent to improve their rehabilitation of project site areas they do not constitute a Mine Closure Plan that comprises the measures required to manage mine closure. There is currently no documented operational closure and rehabilitation plan for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé Manganese Projects that meet recognized industry practices.

12.4 Land Disturbance

The Daxin Mine project area has a significant history of mining land disturbance. Mining and mineral processing in the project area has been occurring since the 1950's (i.e. the Guangxi Daxin Manganese Mine was established in October of 1959). CITIC Dameng reported to SRK that they do keep a registry of land disturbances and areas of rehabilitation for any of their Daxin project sites or facilities.

The current total operational area is recorded in the Daxin Mine and Concentrator EIA as being 186.4 hectares (1.864 km^2 — approximately 17% of the area of Mining Licence No. 1000000620030). The breakdown for this operational area is given as 161.1 hectares for the mine and concentrator (including the Longsong Gou TSF) and 25.3 hectares for the four refining plants (i.e. the Electrolytic Manganese Plant, Manganese Sulphate Plant, Electrolytic Manganese Oxide Plant and the Dabao Ferrous Alloy Smelter). The Manganese Sulphate Plant EIA Table states the Plant was constructed upon the old workshop/maintenance site; therefore no new land was disturbed to construct the plant. No documented areas of current operational land disturbance have been sighted.

The Daxin Mine and Concentrator EIA states that underground mining will not cause any significant land subsidence.

The Daxin Electrolytic Plant is located within the Daxin project area just south and east of the Manganese Sulphate Plant. The Daxin Electrolytic EIA states that the operational area for the plant is 5.38 hectares.

The Daxin Manganese Oxide Plant is located approximately one kilometer from the Xialei Town and 1.5km from the Daxin Mine and Concentrator. The plant is about 110m west of the Heishu River and 50m east of the Longsong TSF. The Daxin Manganese Oxide EIA does not provide an estimated current operational area for the Plant.

The Start Electrolytic Plant is located approximately 10km from the Xialei Town. The Start EIA does not provide an estimated current operational area for the Start Electrolytic Plant.

No predicted or current operational record land disturbance area has been sighted for the Tiandeng Mine-Concentrator Project. No EIA or associated approval was provided for review, so no information regarding land disturbance areas is available for review. CITIC Dameng reported to SRK that they do keep a registry of land disturbances and areas of rehabilitation for any of their Tiandeng project sites or facilities.

The Tiandeng Smelter EIA Table states the project area is 2.74 hectares, with a construction area of 1.0128 hectares, no description of what this constructed area comprises has been provided. No other information on current or predicted land disturbance areas has been sighted for the Tiandeng Smelter.

The Qinzhou Smelter EIA states, the facilities were constructed in two phases, the first covering an area of 53260.4 m^2 and the second 66666.7 m^2 (this second phase appears to not have been constructed though), totalling 119927.1 m^2. The EIA also states total project area as 53260.4 m^2 and a construction area of 10738 m^2. These areas include; electric furnace room (3000m^2), material selecting workshop (2800m^2), power distribution station (300m^2), production stacking yard (10000m^2), raw materials stacking yard (10000m^2), slag yard (2000m^2), dormitory (3240m^2), offices (1290m^2) and assaying lab (108m^2).

Information on transformer cooling ponds, fresh water tank and slag sluicing ponds was reported as volumes — although the figures appear to be areas.

CITIC Dameng reported to SRK that they do keep a registry of land disturbances and areas of rehabilitation for any of their Qinzhou project site or facilities. SRK believes these estimates of disturbance to be unreliable and recommends updating survey data on existing facilities and their areas to confirm actual areas of project disturbance.

No information on land disturbance for the Bembélé project has yet been provided by CICMHZ for review. CITIC Dameng reported to SRK that they do keep a registry of land disturbances and areas of rehabilitation for any of their Bembélé project site or facilities.

CICMHZ currently has an exploration permit covering 20km^2 which they are responsible for any land disturbances caused via exploration activities. At the time of SRK's site visit, land disturbances evidenced were vegetation clearing for access and project site roads, residential/office/vehicles storage and maintenance areas, processing plant site and some mine development work. No estimates for current disturbances for these areas were provided for review.

SRK recommends recording areas of disturbance as project development proceeds to better define the extent of the company's responsibility for rehabilitation of these disturbed areas. This information can be used in overall mine planning and design for a more cost effective progressive rehabilitation plan.

12.5 Waste Rock and Tailings Management

12.5.1 Daxin and Chongzuo Projects

The Daxin mine comprises four mining areas — the east open pit, the west open pit, the west underground mine and the central mining area which is mined via a hydro-mining technique (comprising high pressure water cannons and on-site primary screening). The mined ore is trucked to the to the Daxin concentrator.

The waste rock generated from mining in the east and west areas, is disposed of to a central waste rock dump area comprising four dumps. No documented waste rock design has been sighted. The waste rock slurry generated from the hydro-mining in the central area, drains into an adjacent natural depression which serves as a TSF for this slurry material. No documented design for this waste rock slurry TSF has been sighted.

The Daxin Mine and Concentrator EIA (May 2007) states that the present ore to waste stripping ratio is 1:8 and that the mine generates 2,400,000 tonnes of waste rock per year. This EIA also states that the current waste rock storage capacity for the mine is at 20% of the total capacity. The EIA does not provide any estimates of tonnages for the waste rock slurry generated from the hydro-mining, or any comments on the TSF storage capacity. No current operational tonnages for waste rock and the waste rock slurry have been sighted.

Some geochemical assessment of the waste rock was undertaken as part of the Daxin Mine and Concentrator EIA (May 2007). This assesses the metals content in the waste rock and includes a water leaching test. The EIA concludes that the metals content in the waste rock is low and the leaching potential is also low. However, there is no assessment of the sulphur content of the waste rock and the associated potential for the generation of Acid Rock Drainage (ARD). SRK recommends that a full geochemical assessment of the waste rock be undertaken that includes an assessment of the potential for ARD generation.

The Daxin Mine EIA states that the there have been no groundwater pollution incidents associated with the four waste rock dumps. The EIA also states that as the proposed mine expansion will utilize the same waste rock dumps, the proposed dumping of waste rock will not have significant environmental impact on the groundwater.

The Daxin concentrator produces dry tailings (coarse reject) and wet tailings (fines reject). The initial dry tailings are stockpiled for reprocessing, with the final dry tailings sold for reuse in construction (i.e. after reprocessing becomes uneconomical). The wet tailings are pumped approximately one kilometer away to Longsong Gou TSF for disposal.

The Daxin Mine EIA notes that the concentrator process is a wet magnetic process that does not utilize chemical reagents, and that the main pollutants in the tailings waste water stream are sediment, manganese and iron.

The Daxin Mine EIA states that the 600,000tpa concentrator is designed to generate approximately 143,000tpa of tailings (i.e. solid tailings only, excludes tailings water). The Daxin Mine EIA states that the Longsong Gou TSF has a design storage capacity of 1,780,000 m^3, which can be expanded to 2,160,000 m^3 after the construction of 11.2m dyke. The Daxin Mine EIA also states that the service life for the Longsong Gou TSF is approximately 22 years (i.e. based on solid tailings volume and assuming that the tailings water is recovered). CITIC Dameng stated during the site visit that the service life for the Longsing Gou TSF is presently approximately 15 years. The Daxin Mine EIA also states that the storage capacity for the Longmin Gou TSF is approximately 7,080,000 m^3.

Some geochemical assessment of the tailings was undertaken as part of the Daxin Mine and Concentrator EIA (May 2007). This assesses the metals content in the tailings. The EIA concludes that the metals content in the tailings is low. However, there is no assessment of the sulphur content of the tailing and the associated potential for the generation of ARD. SRK recommends that a full geochemical assessment of the tailings be undertaken that includes an assessment of the potential for ARD generation.

The Daxin Mine EIA states that there have been no incidents of groundwater or surface water pollution resulting from the use of the Longsong TSF to date. The EIA also makes the statement that the Nongmin TSF has very similar geological characteristics to the Longsong TSF. However, as there is no geological information available for the Nongmin TSF and no evaluation of the potential groundwater impacts has been carried out as part of the Daxin Mine EIA. The EIA recommends that CITIC Dameng Mining carry out this geological assessment and provide an evaluation report to the Guangxi EPB prior to constructing the Nongmin TSF. No hydrogeological assessment of the proposed Nongmin TSF has been sighted as part of this review. SRK supports the Daxin Mine EIA recommendation of completing a hydrogeological assessment of the proposed Nongmin TSF and submitting this to the Guangxi EPB prior to commencement of construction.

The Daxin Manganese Oxide EIA states, 40,000tpa of filter residue, 15,200tpa of slag and 1,200tpa of purification residue will be produced by the project. The main composition of the filter residue is reported in the project EIA to be SiO_2, $CaSO_4$, $MgSO_4$, etc and a small amount of $(NH4)_2SO_4$. No information is presented concerning slag and purification residue.

The EIA states when the plant begins operation residue will either be pumped to the Longsong TSF or transported to one of the Daxin WRD for storage. Slag will reportedly be transported to one of the WRD for storage and/or be used road consolidation.

The Daxin Manganese Sulphate Project EIA approval states, "*slag/residue will be produced and the dam should employ anti-seepage measures and be leakage proof. The dam should be and reliable, and it should be designed and constructed by a qualified institute. Surrounding the dam diversion drains should be constructed to prevent surface run-off for entering the facility*".

Solid waste products generated by the Dabao smelter are slags and ash which are collected and settled out in the sedimentation pond. The EIA approval states, the 600m^3 cooling water/

sedimentation circulation pond is not large enough and needs to be enlarged to 2000m^3. SRK during the update site visit observed this had been done and the pool was maintained or cleaned out once it had become full.

The Daxin Electrolytic Plant EIA states that the solid wastes for the plant comprise filter and leaching residues. The estimated annual production rate for the filter residue waste is 177,000tpa. The EIA states that this residue waste is classified as a general solid waste, which has a water content of 25% and contains mainly silica, manganese oxide, calcium sulphate and iron hydroxide. The filtering residues are transported Bukang residue TSF, which is approximately four km from the plant. This residue TSF covers an area of 14 hectares and has a storage capacity 4,000,000 m^3 with a service life of 28 years.

The Daxin Electrolytic Plant will also produce approximately 430tpa of chromium bearing residue which is classified as a hazardous waste and is stored in a concrete lined storage pool/facility in line with Chinese requirements. This is the final secure disposal point for this hazardous waste. There is no requirement stated in the Daxin Electrolytic Plant EIA and approval to have this hazardous waste taken off site for final disposal.

The Start Electrolytic Plant EIA Report states that the solid wastes for the plant comprise filter and leaching residues. The estimated annual production rate for the filter residue waste is 120,000tpa. The EIA states that this residue waste is classified as a general solid waste, which has a water content of less than 28% and contains mainly silica, manganese oxide, calcium sulphate and iron hydroxide. This filter residue is stored in a purpose built residue reservoir or TSF. This residue TSF has an approximate storage capacity of 180,000 m^3 and service life of 8 years. The EIA states that the residue TSF should include the following design parameters:

- Have safe reliable dam wall that will prevent reside discharge
- Stormwater/flood diversion and drainage channels around the facility.
- Seepage collection.
- Signage designating as a residue storage facility.

The above design parameters were observed in the operating residue TSF during the site visit.

The EIA report also states that the Start Electrolytic Plant will also produce approximately 0.66 tonnes (660 kilograms) of leaching residue per year and that this residue waste contains Chromium and is classified as a hazardous waste. The EIA states that this leach residue waste is deoxidized with iron sulphate, neutralized and then stored in a high density polyethylene (HDPE) lined and covered hazardous waste storage facility, in accordance with Chinese requirements. The approval for the Start Electrolytic Plant EIA states that any waste water containing chromium and anode slime should be treated separately and sent off site to a qualified waste collection agent for safe disposal. It is not stated in the EIA report that this requirement also includes any chromium waste water generated from the leach residue waste storage facility.

12.5.2 Tiandeng and Tiandong Projects

There are three waste rock dumps in use at the moment and because the waste rock is generally not competent rock, the dumps are experiencing some subsidence and slumping. CITIC Dameng have stated that they do not have records of the waste rock tonnages being produced from the mining activities at the Tiandeng Mine.

There has also been no separate stockpiling of top soil for later use in site rehabilitation and revegetation. During the site visit, CITIC Dameng Mining stated that the Tiandeng TSF has a total storage capacity is 3,310,000 m^3 and that the current capacity is 2,760,000 m^3, with a remaining service life of approximately 8 years. Return water is collected within the dam and returned through a decant and pump station located near the dam wall. A flood bypass drain is located adjacent to the dam wall. CITIC Dameng has stated that they do not have records of the tailings tonnages being produced via their mining-concentrating activities at the Tiandeng Mine.

Solid waste products generated by the Tiandeng smelter are slags and dust collected by the furnace dust bag house that is reportedly feed back to the smelter after Pelletization to recover residual Mn. The project EIA states 60,000tpa of slag will be generated by the project. Slag is stockpiled by the side of the Mine TSF and is stated to be reused as necessary in formulating the correct feed mix to the furnaces.

No geochemical characterization or the potential for acid drainage and metal leaching has been carried out on the waste rock, tailings or slags produced by the Tiandeng projects. SRK recommends that a full geochemical assessment of the tailings, waste rock and smelter slags be undertaken that includes an assessment of the potential for ARD generation.

12.5.3 Qinzhou Projects

Solid waste products generated by the Qinzhou smelter are slags and dust collected by the furnace dust collection devices that is according to the EIA settled out in the sedimentation pond. The project EIA states 60,000tpa of slag will be generated by the project and will be sold for use as a raw product feed by a nearby cement factory, in line with Chinese Government directives of reutilizing wastes as resources. There is no operational data though on the amount of slag generated for the Qinzhou project.

The Qinzhou EPB stated in the inspection and checking report (May [2006] No.45) on the project that surface water drainages had been constructed around the slag piles to contain any leached drainage, but these drains were not containment drains discharging site drainage to the adjacent stream with no treatment. Any leached drainage was collected along with all other plant drainage and discharged off-site into the adjacent stream with no treatment, in non-compliance with project approval conditions.

12.5.4 Bembélé Projects

CICMHZ's Bembélé project is in the initial develop phase and mine designs are yet to be finalized. No information / estimates of total waste rock have yet been assessed. The mine will employ strip mining to exploit the ore. CICMHZ has stated that the ore body is on average 1 meter below the ground surface and is generally 3 meter thick (in depth). CICMHZ plans to store waste rock beside the pit as it progresses, until it can be backfilled behind the proceeding strip mine pit. There will be some depression in the final land form, but CICMHZ states it will not impact the environment or local fauna as it will be over a wide area such that it will not be readily observable. No geochemical characterization or ARD potential of waste rock has so far been undertaken, although ore assays report state ore Sulphur levels to average 0.053% and Arsenic levels to be 0.000015%.

Initial design parameters reported, estimate 300,000tpa of tailings will be produced via ore processing operations. Tailings will be conducted to a purpose built II stage TSF, stated to be designed at a storage capacity of 7Mm^3. At the time of SRK's site visit construction on this facility had not yet commenced. No TSF design or feasibility reports were provided for review. No geochemical assessment of the tails has yet been conducted or the potential for them to develop ARD or leach metals.

12.6 Water: Aspects and Impacts

12.6.1 Daxin and Chongzuo Projects

Assessment and monitoring of surface water and groundwater quality for the Daxin Projects has been undertaken as part of the project EIA reports (the results of which are discussed below). However, no other internal operational monitoring results of surface water and groundwater quality have been sighted as part of this review. SRK recommends including the monitoring of groundwater and surface water quality for the Daxin Manganese Projects within site operational environmental monitoring programs.

The main river in the Daxin Manganese Mine project area is the Xialei (Luoshui) River. The Daxin Mine EIA states that the existing water quality of the Xialei River is poor and does meet the Chinese National water quality standard. The EIA attributes this poor water quality to the historical mining activity and the direct discharge of sewage from the Xialei town.

The Bukang Stream, which flows into the Xialei River, is the other main surface water feature in the project area. The Bukang stream originates as the Bukang Spring, which is located within the upstream area of the Daxin Mine site and is the project's domestic and process make up water source. The Bukang Stream flows through the Daxin Project site area (i.e. collecting site drainage water). The upstream area of the Bukang Stream also receives the underground mine dewatering and the mine and processing plants surface drainage. The Daxin Mine EIA also refers to waste water discharges to the Bukang Stream occurring in this upstream area from the leach residue storage facility.

The area of the Bukang Stream just downstream of the site has a small sedimentation/water collection dam. This dam collects the site drainage water (process water drainage), stormwater, treated sewage wastewater and the general stream flow. After treatment by settling, the collected water is then pumped for reuse in the processing plants. The Daxin Project site operates on a policy of zero surface water discharge. However, some flows downstream of the site occur during peak surface water flows/site flooding situations. Minimal stormwater diversion is applied at the Daxin Project site due to its location within the base of the Bukang Valley (there is some flood diversion employed in the upstream mine areas) and the surface water collection system utilized.

CITIC Dameng Mining has stated that the open pit mining in the east and west areas is above the water table, and that there is no requirement for dewatering of these mining areas. They have further stated that there are minor water flows generated from the adits in the underground mining in the west area and that there is also no requirement for pumping of this mine water and no measurement of flow volumes. This mine water is discharged directly to the environment with no collection and/or treatment. There also is no monitoring of the quality of this mine water discharge.

The Daxin Mine EIA gives the final average dewatering rate for the mine open pit as 8,908 tonnes per day (approximately 371 cubic m per hour). However, CITIC Dameng have stated that there is currently no open pit dewatering. The EIA also states that the amount of mine water generated in the early stages of the underground mining operations will be small but will increase significantly as the mining deepens. The EIA estimates that final underground mine dewatering will be 6,200 cubic m per day (approximately 258 cubic m per hour) and that this will have a significant impact on the surrounding aquifer and groundwater resource. However, the EIA does also state that dewatering the open pit and underground mine will not impact significantly on the quality of the surrounding groundwater. No program to manage the potential impact on the surrounding groundwater resources and users has been sighted as part of this review.

The Daxin Manganese Oxide EIA states the projects daily water consumption to be 2,640 tonnes of which an amount unspecified is planned to be recycled water sourced from the Longsong TSF and the fresh make up water sourced from the Bukang Stream.

The Daxin Manganese Oxide project EIA states waste water produced by the project will consist of 1,152t/d of concentrate filter washing waste water and 576t/d of washing waste water from the electrolysis process. These waste water streams are reported to be going to be discharged to the Longsong TSF. The EIA states plant drainage, waste water and surface run-off will be separated and managed individually. Treatment measures reported consist of neutralization with lime and sedimentation. No information pertaining to water monitoring has been provided for review.

The Daxin Manganese Sulphate Project EIA provided for review contains no information pertaining to the $MnSO_4$ project's water consumption or waste water production. SRK has been provided no other information on water consumption or waste water production for the Daxin $MnSO_4$ project, or fates, treatment and monitoring of these waste waters.

The Daxin $MnSO_4$ project EIA approval states, *"The content of manganese in Xialei River and Bukang River has exceeded the permits, so the sewage with manganese should be 100% recycled, no discharging. As for the centrifugal mother liquid and the filtering and washing water, a water collection and sedimentation tank should be built for sedimentation treatment and recycled use. Water collection ditches should be built around the combination filtering workshop, crystallization workshop and product packaging workshop. As for the floor washing water and other waste liquid, it should be collected, after sedimentation treatment, and it can be used for leaching process"*.

SRK has been provided no information on water consumption or waste water production for the Dabao Smelter. No project EIA (only an EIA approval) has been provided for review and CITIC Dameng stated they have no data concerning water consumption or waste water production for the project. The Bukang stream which flows through the project site and down through the other Daxin project sites is the project's domestic and process make up water source.

The Dabao EIA approval states industrial water needs to be 100% recycled and cannot be discharged from the project site. It also states the $600m^3$ cooling and sedimentation pond is insufficient to manage the amount of industrial water and needs to be enlarged to $2000m^3$, this was observed to be the case at the time of SRK's update site visit. The EIA approval also states the water treatment facilities need to be sealed off against the in-flow of surface run-off waters. Diversion drains and containment measures observed at site only partially facilitated this function.

The Daxin Electrolytic Plant EIA states that the process wastewater will not be discharged, but treated and reused in the following manner:

- The equipment cooling water is cooled and reused in the cooling process.

- Wastewater containing chromium (generated in rinsing electrolysis workshop and any waste water recovered from the chromium bearing residue) is collected and pumped into a dedicated storage and treatment pool. Treatment is via ferrous sulphate and ammonia for reduction and precipitation of contaminants. After precipitation and filtration, the treated wastewater is then reused. The collected residue is transferred to the chromium residue storage facility.

- Waste water containing manganese (generated from the filtration process) is collected and pumped into a sedimentation pond. After settling, the waste water is reused in the filtration process and the solids are sent to the leaching process.

The Start Electrolytic Manganese Plant is located approximately 200m to the north east of the Xialei River. The Start Plant EIA states the Xialei River is the make-up water source for the plant and the main water source for the general area (i.e. supplying all industrial and agricultural water). The existing water quality of the Xialei River in this area is poor and similar to that in Daxin area, and like the Daxin area, this poor water quality is mainly attributed to the local historical mining and mineral processing activities.

Stormwater management for the Start Plant comprises upstream stormwater diversion drains and an internal stormwater drainage system. The site stormwater drainage discharges into the Xialie River, there is no treatment of this stormwater before it is discharged off site. It was observed during the site visit that the process drainage water system is segregated from the stormwater drainage system (i.e. process water spillages are collected separately as process waste water).

The Start EIA states that the main process waste water sources for the plant are from filter cloth washing water, polar plates wash water, electrolytic tank and silicon rectifier cooling water, grade wash water and spillages in the cell room. The EIA also states that the volume of process waste water generated is approximately 140 m^3 per day. This process waste water is collected then treated prior to recycling, through neutralization with lime and sedimentation. All residues from this treatment are collected and disposed of in the residue storage facility. The cooling water is just cooled before recirculation.

The approval for the Start Electrolytic Plant EIA states that any waste water containing chromium and anode slime should be treated separately and sent off site to a qualified waste collection agent for safe disposal. This is inconsistent with waste water management described in the EIA report, which states that '*Chromium-containing waste water should be specially handled*' but does not specify that this waste water is disposed off site in line with the EIA approval conditions.

12.6.2 Tiandeng and Tiandong Projects

SRK has been provided no current information on water consumption or waste water production for the Tiandeng Mine or concentrator. No project EIA (or associated approval) has been provided for review and CITIC Dameng stated they have no data concerning water consumption or waste water production for the project. However, project EIA Table states that total water consumption for the Tiandeng Smelter is 7580m^3/day. Industrial water usage is stated to be 7500m^3/day, comprised of 7140m^3/day of recycled water (from TSF) and 360m^3/day of fresh make-up water; for a recycling rate of 95.2%. Domestic water usage is estimated to be 80m^3/day.

The Tiandeng mine employs hydraulic excavators to wash the ore, transport as a slurry to the primary separators before being transported to the concentrators for processing. Waste water from the mining and concentrating operations all flows to the TSF where it settles out sediments before being returned for reuse. The project EIA Table states living water supply is pumped from the nearby Daren Village (approximately one kilometer form the project site), via a supply agreement.

Waste water from the slag quenching pool will be pumped to the purification tank for liquid waste and then recycled after temperature reduction and sedimentation, with no outward discharge. The EIA Table estimates an amount of 89,600tpa will be produced.

12.6.3 Qinzhou Projects

Domestic and Industrial (make-up) water is supplied by Qinzhou Harbour Water Supply Company. According to the project EIA, total industrial water consumption is estimated at 21720m^3/day; made

up of 20640m³/day of recycled water and 1080m³/day of fresh make up water. This constitutes a recycle rate of 95% if the project is operated per design. Domestic water consumption was estimated to be 16m³/day.

Industrial waste water sources as stated by the project EIA comprise furnace cooling water, slag cooling water and furnace spray de-dusting wastewater. Furnace cooling and slag cooling water is reported to be completely contained and recycled with no discharge. De-dusting water is reported to be treated via a sedimentation pond before reuse. The Qinzhou Smelter is required to maintain a zero discharge policy with regards to waste water. During SRK's site visit discharges of these waste waters were taking place via overflows, due to inadequate controls and management. These discharges were flowing directly into as local stream adjacent to the project site that was also being used for aquaculture. There has been no monitoring of these discharges to present, besides initial test work estimating water quality. The EIA predicts that if these waste waters are discharged directly; suspended solids, COD, Lead, Cadmium and arsenic will be 25.5, 6.5, 2.6, 2.1, and 2.1 times higher than Chinese standards, respectively.

The project EIA stated, stockpiling areas would incorporate diversion/collection drains to manage surface water drainage within the site. The Inspection and Checking Results on Environmental Protection (May 9, 2006. Ref. No.45), states these drains have been constructed as per EIA conditions and then contradicts itself by going on to recommend these facilities be constructed. SRK evidenced no containment/diversion drains about the stockpiling areas and site as a whole, save for some normal drainage which discharged along with the projects sewage and industrial waste waters to the adjacent stream. Grey water also discharges at the same point. None of these waste water sources undergo any treatment before discharging to the stream next to site. The EIA states the marine discharge point will be near the Qishierjing Mangroves in the Maowei Sea, but that it would not be greatly impacted upon as sewage would be treated before being discharged and that industrial waste water wouldn't be discharged. Seeing that untreated waste waters are being discharged there is a risk to these mangroves and their associated fish spawning grounds. There has been no actual assessment of the actual risk posed by project impacts to them at this stage.

SRK recommends, constructing site surface water drainage in line with the project EIA and its approval conditions, better manage the site water balance in relation to industrial cooling water usage to stop overflows from occurring and/or build a secondary pond to collect overflows as per EIA conditions and undertake a monitoring programme to ensure internal and discharges water quality are known, so appropriate management action can be taken.

12.6.4 Bembélé Projects

CICMHZ estimated industrial water usage for the project will be used for ore processing at rate of 350m³/hr. The project design calls for 196m³/hr of this water to be recycled from the TSF and the other 156³/hr to be made up from the Misango River as the fresh source, constituting a 68% water recycle rate. CICMHZ stated an in-river reservoir will be constructed along the Misango River at a distance of 1.3km from site. Domestic water will be sourced from the same reservoir, but will treated via purification equipment prior to use.

Waste water from processing will be conducted to the TSF where solids will be allowed to settle out before being pumped back as return water. Grey water from showers and other domestic uses is currently discharging directly to the Misango River. Sewage is currently and will continue to be treated by septic system before being released to the Misango River.

Surface water flows were reported to be going to be managed with diversion drain. At the time of SRK's site visit these were evident around the site or roads, although some problems with their

construction and flow patterns were noticeable. Mine water is also surface water from precipitation and is reported to be going to be drained to surface water site drains that will discharge into the Misango River.

12.7 Air Emissions

No operational monitoring of air emissions for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé Projects has yet been undertaken.

12.7.1 Dust Emissions

Daxin Projects: The Daxin Mine EIA states that the existing levels of total suspended particulates (TSP) within and surrounding the Daxin Project area elevated and have been over the Chinese National air quality standard. The EIA mainly attributes these elevated dust levels to fugitive dust from vehicle movements on roads and unsealed areas.

The Daxin Mine EIA states that the manganese ore has high moisture content, the wet processing method also allows for water spraying during primary (dry) crushing and the secondary crushing (grinding) is wet. In addition the bag house dust collectors are also used in the ore crushing, grinding and drying circuits. The EIA concludes that the combination of these factors results in minimal dust generation resulting from materials handling. These dust management measures were in operation during the site visit and no significant dust issues associated with material handling were observed.

Dust management measures were observed being applied as required during the site visits. Significant spillages of mine materials were observed on roads and materials handling areas though.

Dust generated from the Daxin Manganese Sulphate and Manganese Oxide project comes mainly from handling, transfer points, crushing and transportation. The project EIA's only very briefly mentions dust generation and only in relation to construction activities, not operational activities. No information has been provided concerning impacts from dust generation from the Daxin $MnSO_4$ and MnO_2 projects. Neither has any operational monitoring been undertaken to assess the amount of dust that is being generated for the Daxin $MnSO_4$ and MnO_2 projects or fates of that dust.

Dust generated from the Dabao smelting project comes mainly from handling, transfer points, crushing and transportation. A dust bag-house collection system had been installed at the Dabao smelter and was in operation. No operational monitoring been undertaken to assess the amount of dust that is being generated for the Dabao Smelter project or fates of that dust.

There are no significant dust emissions associated with the operation of the Daxin Electrolytic Plant as the grinding and drying process is undertaken in the Daxin Concentrator and Powder Plant.

The main dust source for the Start Electrolytic Plant is mainly from the grinding and drying process. This dust is collected via a bag house and the collected dust is then returned to the process. This dust collection was observed during the site visit and was operating well. There was also some potential for dust generation from spillages of materials on the roads, however, no significant dust emissions from these sources were observed during the site visit.

Chongzuo Projects: The Chongzuo project was under construction during SRK's update site visit, so no operational dust management measures were able to be reviewed. Dust generation was being adequately managed during the construction period and CITIC Dameng stated dust bag-houses would be installed to collect dust from processing generation points.

Tiandeng Projects: No information (or EIA and associated approval) on dust generation or suppression measures for the Tiandeng Mine-Concentrator project has been provided for review. Mining though incorporates no explosives or excavation as a hydraulic mining method is employed which would reduce the possibility of dust generation from mining activities. Ore processing also incorporates wet magnetic processing, which reduces the possibility for dust generation.

Dust generated from the Tiandeng smelting project comes mainly from handling, transfer points, crushing and transportation. The project EIA Table makes no assessment of the impact from these dust sources. No operational monitoring has been undertaken to assess the amount of dust that is being generated for the Tiandeng Smelter project.

Tiandong Project: The main dust source for the Tiandong Electrolytic Plant is mainly from the grinding and drying process. This dust is collected via a bag house and the collected dust is then returned to the process. This dust collection was observed during the site visit and was operating well. There was also some potential for dust generation from spillages of materials on the roads, however, no significant dust emissions from these sources were observed during the site visit.

Qinzhou Projects: The Qinzhou project EIA states, dust generation comes mainly from handling, transfer points, crushing, screening and sintering of feed materials. The EIA states water will be sprayed about site at dust generation points and then the projects dust emissions can meet the grade II standard of the *Ambient Air Quality Standard (GB3095-1996)*. Due to the wet weather at the time of SRK's site visit it is not possible to comment on these dust control measures or their effectiveness.

Bembélé Project: The Bembélé Mine EIA states dust bag-house collectors will be used in the ore crushing, grinding and drying circuits. The EIA concludes that the combination of these factors results in minimal dust generation resulting from materials handling. These dust management measures were in operation during the site visit and no significant dust issues associated with material handling were observed.

CICMHZ has stated they will use water sprays to suppress dust generation around the site along with greening measures. Ore processing also incorporates wet magnetic processing, which reduces the possibility for dust generation. Dust generation will occur mainly in the dry season (approx. 6 months a year). SRK evidenced dust generation along access roads at the time of the site visit to be the only dust issue at present. Road hardening measures would help alleviate this impact during operation.

12.7.2 Gas Emissions

Daxin Projects: Waste gas is generated from the burning of coal in boilers at the Manganese Powder Plant. The main pollutants are particulate matter and sulphur dioxide. Low sulphur coal (i.e. sulphur content lower than 0.6%) is used to keep sulphur dioxide levels low and bag house dust collectors are installed to treat the gas emissions. The dust collection in the Manganese Powder Plant was in operation during the site visit and no significant dust issues were. The boilers were not in operation during the site visit.

The project EIA states, gas emissions from the Daxin Manganese Sulphate project come from industrial coal-fired boilers (Model DZL4-1.25-AII). The EIA reports 8500tpa of low-sulphur coal will be consumed in processing and that a total gas emission of 96.39Mm^3/a including 224.34tpa and 190.52tpa of SO_2 and particulate matter, respectively.

The Daxin $MnSO_4$ project EIA states, *"the concentrations of SO_2 and particulate matter are relatively high in boiler waste gas, and dust removal and desulphurization shall be performed before discharge. The waste gas will be discharge through two 30m chimneys after reaching related standards and there is a 10m distance between the two chimneys"*. According to the Daxin $MnSO_4$ project EIA gaseous emissions discharged post-treatment are designed to be within the limits of the *Ambient Air Quality Standard (GB3095-1996)*.

The Manganese Oxide Project EIA states gas emissions will come from boilers and will consist mainly of particulate matter, sulphur dioxide and carbon dioxide, not information on amounts emitted though has been provided for review. The EIA reports, waste gas treatment will employ the use of a WenQiuLi water film granite centrifugal desulphurization dust collector.

Gas emissions at the Dabao project site come from the one 6300KV electric furnaces. The project EIA approval states, a great amount of gaseous and particulate matter emissions will be generated that definitely will exceed the permits, therefore the company should construct proper dust collecting facilities to make sure the final discharge meet the permits. SRK observed a dust bag-house collection system had been installed at the Dabao smelter in line with EIA approval conditions.

The project EIA approval states, a monitoring station needs to be constructed at the chimney discharge point, but this was not evidenced during SRK's site visit. No operational monitoring has been undertaken to assess the amount of dust that is being generated for the Dabao Smelter project.

The Daxin Electrolytic Plant EIA states that the main gas emissions are sulphuric acid mist and ammonia. The sulphuric acid mist is generated mainly from the electrolytic cells. This is collected and discharged via an exhaust fan and a 15 meter high stack with filtration. Ammonia gas is generated by the volatilization of the electrolytic solution in the electrolytic cells and the liquid ammonia in the buffer pool. And the discharge of ammonia gas is a fugitive emission.

The Start EIA report states that the sources of gas emissions for the Start Electrolytic Plant are from the leaching circuit (sulphuric acid mist and dust) and the cell room (sulphuric acid mist and sulphuric oxide). The generation of sulphuric acid mist is reduced via the addition of sulphate to the leach liquor and the use of foam covered tanks in the cell room. Exhaust fans are then used to ventilate these areas and remove any acid mists generated. Dust is collected via a bag house.

Chongzuo Projects: As the Chongzuo was under construction at the time of SRK's update site visit and not yet operational no gas emissions were being produced other than from machinery used to construct the plant. The project EIA reports exhaust fans and dust bag-houses will be installed to manage gas emissions.

Tiandeng Projects: Gas emissions at the Tiandeng Smelter project come from 3 electric furnaces (1x6300KVA, 2x9000KVA) and are discharged via 6 chimneys. The project EIA Table states the main gaseous components of the furnace emissions are PM, F, CO, SO_2, H_2S and NOX. Due to emissions before the expansion project being above standard, bag house filter systems were then employed for capturing and treating stack emissions. Dust collected by the bag house will be returned to the smelter for smelting.

No statement of assessment against the projects emissions meeting the *Emission Standard of Atmospheric Pollutants from Industrial Furnace (GB9078-1996)* or *Comprehensive Emission Standard of Atmospheric Pollutants (GB16297-1996)* was made within the project EIA. No monitoring of actual emissions has been undertaken except by the Chongzuo EPB as part of the inspection programme for developing the EIA Table.

Tiandong Project: The project EIA report states that the sources of gas emissions for the Tiandong Electrolytic Plant are from the leaching circuit (sulphuric acid mist and dust) and the cell room (sulphuric acid mist and sulphuric oxide). The generation of sulphuric acid mist is reduced via the addition of sulphate to the leach liquor and the use of foam covered tanks in the cell room. Exhaust fans are then used to ventilate these areas and remove any acid mists generated. Dust is collected via a bag house. SRK notes these measures had been implemented at site.

Qinzhou Projects: Gas emissions at the Qinzhou project site come from the four 6300KV electric furnaces. The project EIA states, the main pollutants are particulate matter and gases. The project adopts high energy venturi wet method de-dusting to manage furnace emissions which are discharged via 40m high chimneys. The system is stated to have a de-dusting efficiency of 80-98% (taken as 90% in the project EIA).

The EIA states, sulphur dioxide will rarely be produced due to using low-S content coking coal and organic-S being easily volatilized at high temperatures and the sulphur generally existing in the slag product. The EIA then goes on to say, using the venturi de-dusting system the SO_2 discharge will be reduced by a third and the estimated emission loading was 4kg/h.

No statement of assessment against the projects emissions meeting the *Emission Standard of Atmospheric Pollutants from Industrial Furnace (GB9078-1996)* or *Comprehensive Emission Standard of Atmospheric Pollutants (GB16297-1996)* was made within the project EIA. The EIA approval though did state the projects emissions must meet the grade II standard of the *Emission Standard of Atmospheric Pollutants from Industrial Kiln (GB9078-1996)*. The Qinzhou project has authorization from the Qinzhou EPB (Discharge Permit [2006] No.41) to discharge 25tpa of SO_2 to the atmosphere. No monitoring of actual emissions has been undertaken except by the Qinzhou EPB as part of the checking inspection on environmental protection measures (May 9th 2006).

Bembélé Project: Gas emissions at the Bembélé Mine-Concentrator project site are mainly from the generated by mobile and fixed plants and were reported by CICMHZ to be negligible. No Bembélé Mine-Concentrator EIA was available for review at the time of SRK's site visit, so no information on gas emissions and associated management measures is available for review at this time. Assessment of the impacts from these gas emissions are though included within the Bembélé EIA scoping document.

12.7.3 Greenhouse Emissions

There is no Chinese National legislative requirement (or Gabonese) for a project to estimate its Greenhouse Gas emissions or to implement any emissions reductions. As such none of the project environmental assessment documentation reviewed address the issue of Greenhouse Gas emissions. However, energy efficiency and the reduction of Greenhouse Gas emissions are now considered as Chinese National policy directives. In addition, these are also components of IFC environmental requirements and are considered as internationally recognized environmental management practices. Therefore, SRK recommends that consideration be given to developing initiatives to account for Greenhouse Gas emissions for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé Projects.

12.8 Noise Emissions

No operational monitoring of noise emissions for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé Projects has yet been undertaken. No public complaints in relation to noise emissions from any of the Project sites, have been sighted as part of this review.

The main noise sources for the CITIC Projects are materials handling equipment/fixed plant, blasting, fans, machinery, conveyors, furnace arcs, mobile equipment (including transport/haulage vehicles), pumps and air compressors.

Daxin Projects: The Daxin Mine EIA states that there are no noise sensitive residences within 300m of the project boundary and that all environmental (residential) noise levels measured at the time of the EIA production are within the Chinese National standard.

The project EIA assessment of noise levels at 4 points around the project boundary indicates the only compliance problem is at night, with noise levels just above standard for the *Standard of Boundary Noise of Industrial Enterprise (GB12348-90)*. Stated measures to control noise impacts include; shock absorption equipment, vibration and sound isolation for all machinery.

No EIA for the Dabao project has been provided for review; therefore no information is available concerning an assessment of noise sources and estimated levels being generated by the Dabao smelter project or impacts it may have upon the surrounding environment. SRK notes though that they were minimal.

Similar to the Daxin Mine and Concentrator there are no noise sensitive residences within 200m of the project boundary and all environmental (residential) noise levels measured at the time of the EIA production are within the Chinese National standard.

The Start EIA states that the site's noise management comprises the use of low-noise generating equipment and the use of noise reduction/hearing protection for workers in high noise areas. The environmental point noise monitoring presented in the Start EIA states that all boundary and receptor monitoring sites meet Chinese national standards.

Chongzuo Projects: The Chongzuo Projects are being constructed within an industrial park outside of town remote from any residences; therefore SRK sees no significant noise impacts beyond the confines of the project site itself.

The project EIA states that the site's noise management comprises **the** use of low-noise generating equipment, insulating high-noise equipment/facilities and the use of noise reduction/hearing protection for workers in high noise areas.

Tiandeng Projects: No Tiandeng Mine-Concentrator EIA was provided for review, so no information is available as to the projects estimated noise emissions or management measures for reducing the impact of noise on the surrounding environment. SRK notes noise generation was minimal and remote.

The Tiandeng Smelter EIA Table states, noise levels at the site boundary are around 65-80 Db(A). This is above the stipulated level 2 standard of the *Standard of Boundary Noise of Industrial Enterprise (GB12348-90)*. The EIA Table though concludes that there are no residences, besides worker dormitories in the assessment area and therefore there is no impact besides that to staff.

The EIA Table states some limit controls implemented, such as vehicles drive slowly, apply soundproofing, vibration cushioning, and noisy equipment use be strictly controlled during lunch and after 10pm.

Tiandong Project: The Tiandong Project has been constructed in an area remote from any residences; therefore SRK sees no significant noise impacts beyond the confines of the project site itself.

The project EIA states that the site's noise management comprises the use of low-noise generating equipment, insulating high-noise equipment/facilities and the use of noise reduction/hearing protection for workers in high noise areas.

Qinzhou Projects: The project EIA states continuous noise is 86 Db(A) and intermittent noise is between 85-105 Db(A).

Reported management measures include, adopting noise elimination, vibration prevention and soundproofing methods and equipment. To control furnace operations noise generation the EIA advises employing experienced operators that can manage furnace variations effectively such that intermittent noise will be reduced. Greening the site is also suggested. The EIA makes no mention of whether the project will meet requirements of the *Standard of Boundary Noise of Industrial Enterprise (GB12348-90)*.

Bembélé Project: The Bembélé Project is being constructed within a remote area of jungle away from any residences; therefore SRK sees no significant noise impacts to people, although noise impacts upon wildlife will still occur in and around the project site itself.

The project EIA states that the site's noise management comprises the use of low-noise generating equipment, insulating high-noise equipment/facilities and the use of noise reduction/hearing protection for workers in high noise areas.

12.9 Hazardous Materials Management

The CITIC Dameng different project facilities employ different reagents, hazardous materials for the differing industrial processes. Common to all projects is the use of hydrocarbons (diesel, oils and lubricants. SRK observed at project sites that diesel was stored within above ground tanks, none of which had secondary containment for spills except for the Tiandong and Bembélé projects. Oils are stored in 205 liter drums in various locations around the processing plant and the workshop facilities. Maintenance of the spilt oil collection system was not managed and the facilities were in disrepair. SRK recommends that the storage of hydrocarbons be rationalized to designated storage areas/facilities and that these areas/facilities are constructed with appropriate secondary containment.

CITIC Dameng stated explosives used for mining operations are stored within purpose built warehouses. The explosives magazines have been constructed further than the required 300m from the nearest facility.

The following lists reagents used at different processing plant and smelters as reported in project documentation and CITIC Dameng:

- Barium sulphide; Ammonia (liquid); Nitric acid; Industrial phosphoric acid;
- Manganese oxide powder; Concentrated Sulphuric acid; Ammonia (liquid);
- Sodium Dimethyl Dithiocarbamate (SDD); Sulphur Dioxide (liquid);
- Potassium Dichromate; Selenium Dioxide; Chromite; Silica; Coke
- Dolomite and electrode paste

The different CITIC Dameng Project's EIAs provided storage and handling requirements for process reagents used within certain industrial processes by the different projects; these measures are as:

- Transportation:
    - Transport must be by agents certified for hazardous chemicals transportation and using only competent and experienced personnel.
    - Containers should be bonded well with vibration damping measures.
    - Drivers should be familiar with the route, and drive slowly in built habitation areas and sensitive places.
    - Vehicles should be equipped with spillage and emergency response equipment and with appropriate signage.
    - Containers should be safe and secure.
- Storage:
    - Facilities should be designed and constructed to meet safety standards.
    - Facilities should be inspected, monitored and maintained regularly.
    - Tanks should be designed and constructed to meet safety standards and inspected regularly for any leakage.
    - Storage facilities are to have spill and emergency response equipment.
    - Responsibility for the management of the storage facilities are to be assigned to employees.
    - Employees must receive training in handling of hazardous materials and in spill and emergency response.

The storage facilities inspected during the site visit generally meet these measures; however, the maintenance of these facilities appeared to low. No documented facility maintenance program and inspection records were sighted as part of this review. However, as some facilities were new and or being commissioned, the assessment of the maintenance of these facilities was limited.

12.10 Waste Management

12.10.1 Waste Oil

Waste oil is generated through the servicing and maintenance of mobile equipment and fixed plant. It was stated that for the Daxin, Chongzuo, Tiandeng, Tiandong and Qinzhou projects that waste oil generated by the operations is sent off site to a third party recycling agent. CICMHZ stated waste oil generated at the Bembélé site will be collected and sold for reuse, but details concerning this practice were not available for review at the time of SRK's site visit. The collected waste oil is stored in 205 litre drums within various uncontained areas around the site, prior to transport off site. No volumes of waste oil generated and no contracts or receipts of sale for the site's waste oil recycling have been sighted as part of this review.

12.10.2 Solid Waste

Daxin Projects: The process for the management of general solid domestic and industrial wastes for the Daxin projects comprises on site landfill. These landfill facilities were not sighted during the site visits. However, dedicated rubbish collection points within and around each site were noted and that there was limited uncontrolled rubbish dumping throughout the sites.

The Start EIA does not provide any measures in respect to the site's management of general solid domestic and industrial wastes. Rubbish is collected and disposed of off site in the Huruun Town/ Jingxi County facilities. Dedicated rubbish collection points were observed within the site and there was limited uncontrolled rubbish dumping through the sites.

Chongzuo Projects: CITIC Dameng reported that general solid domestic rubbish will be collected by the industrial park management for disposal at a county landfill. As the project facilities were under constructing during SRK's update site visit no observation of site rubbish management practices was able, although CITIC Dameng stated they would place sufficient rubbish collection points about site.

Tiandeng Projects: CITIC Dameng Mining stated that solid waste is separated by hand for recyclable materials then remainder burnt. No Tiandeng Mine-Concentrator EIA was provided for review; hence no information was available on solid waste management and disposal measures for review. The Smelter EIA Table states, domestic waste (reported as producing 109.5tpa) will be used as fertilizer after centralized processing and has little impact on the environment. Of course only biodegradable wastes can composted and hence used as fertilizer — the EIA Table makes no mention of the fate of non-biodegradable wastes, such as plastics. SRK was unable to verify either of these statements during the site visit. Limited domestic waste was noticed about the site though.

Tiandong Project: Solid wastes (excluding process wastes) from the Qinzhou project comprise domestic refuse and scrap iron. CITIC Dameng reported that rubbish is buried within a landfill by the site. This landfill facility was not sighted during the site visits. However, dedicated rubbish collection points within and around each site were noted and that there was limited uncontrolled rubbish dumping throughout the sites.

Qinzhou Project: Solid wastes (excluding process wastes) from the Qinzhou project comprise domestic refuse and scrap iron. Rubbish at site was well managed with enough collection points and is collect by the local council and taken to the county landfill. Scrap iron was evident about site in numerous locations, with no centralized collection site. It is reportedly sold to a third party for recycling in line with Chinese standards and recognized international practices.

Bembélé Project: Domestic solids waste being produced at site currently are in a very small amount. They are at present being piled in a few collection points around the site. CICMHZ has stated rubbish generated at site will be land-filled, although they did not know where the facility would be constructed. The company will need to obtain a landfill permit from the government for legal operation of the facility.

12.10.3 Sewage and Oily Waste Water

The CITIC Dameng Project's EIA's make limited reference to sewage generation and final fate besides a couple of estimates. SRK did observe at the various sites though, that septic sewage systems that comprise anaerobic acidification, sedimentation and filtration were in use and sewage was only discharged after treatment. No monitoring of any of the discharge from the septic systems at site has taken place.

Sewage from the Daxin sites was discharged to the Bukang Stream; sewage from the Start Project site was observed being discharged to an unlined pond located at the site boundary and was stated to be reused about site. The Chongzuo site was reported to SRK to be connected to the industrial park's sewage system CITIC Dameng reported sewage from the Tiandeng facilities is discharged to the TSF after being treated in a septic sewage tank system. The Tiandong site has also constructed a septic system for the collection and treatment of sewage and it was reported to SRK that the discharge would be used for greening about the site after treatment. Sewage produced at the Qinzhou site is collected and treated via septic system before being released to the district sewage network. SRK observed that a septic system had been installed at the Bembélé site that discharged into the Misango River next to the project site.

The oily waste water produced by the CITIC Dameng Projects is generated mainly from the washing of plant areas and equipment and by the lack of containment of hydrocarbons during storage and handling. No oily water separation equipment/facilities are in place at any of the project sites except for at Bembélé, although it is not been used or maintained there.

SRK recommends, developing management plans to address the management of oily wastewater and construct the 3 stage sewage treatment system as per EIA conditions and undertake a monitoring programme to ensure internal and discharges water quality. SRK recommends incorporating the management of oily waste water into site operational Environmental Management Plans.

12.11 Contaminated Sites Assessment

While there was evidence of hydrocarbon contamination to soil/water was observed during the site visits they are relatively contained, there was also significant ore spillage within each site and a limited amount of uncontrolled rubbish dumping about site which has the potential to generate contaminated areas. There is no process in place for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou or Bembélé Projects to assess and remediate these areas of suspected contamination. SRK recommends that a contaminated sites assessment and management process be developed for all the CITIC Dameng Projects and that it be included within the EPMP.

12.12 Environmental Protection and Management Plan

The purpose of an operational Environmental Protection and Management Plan (EPMP) is to direct and coordinate the management of the project's environmental risks. The EPMP documents the establishment, resourcing and implementation of the project's environmental management programs. The site environmental performance is monitored and feedback from this monitoring is then utilized to revise and streamline the implementation of the EPMP.

12.12.1 Daxin Projects

The Daxin Mine EIA states that a Clean Production Management Plan should be developed for the Daxin Mine and Concentrator. It proposes that this plan should include the following elements:

- Measures to monitor energy usage (power consumption), reduce energy consumption and increase energy efficiency.
- Measures to monitor water usage and reduce water consumption.
- Area/job specific safety and environmental training plan.
- Emergency measures for accidents and abnormal production situations.

- Collect the ore processing wastewater, treat this through sedimentation then reuse this waste water for dust suppression.
- Develop a TSF reclamation/rehabilitation plan that includes a dedicated TSF reclamation fund and the involvement of reclamation specialists in design and supervision.
- Undertake mine backfilling.
- Use the large-scale highly effective dust collection (bag house) system.
- Establish an environmental management system in accordance with ISO14001, that incorporates an environmental management handbook, and environmental procedures and work instructions.

This proposed plan covers the management aspects of an EPMP but does not cover the monitoring component. However, the Daxin Mine EIA also proposes that the Chongzuo City Environmental Protection Supervision Station be commissioned or site internal resources establish and implement an operational environmental monitoring program.

The combination of the above management and monitoring plans would constitute an operational EPMP. However, these operational plans have not been sighted as part of this review.

No EPMPs have been prepared or commissioned for the Daxin Manganese Sulphate project operations that SRK is aware of. The incomplete EIA and its approval make no mention or recommendation to develop such operational plans to manage and prevent impacts to the environment from their operations.

No EPMPs have been prepared or commissioned for the Dabao Smelter project operations that SRK is aware of. The Smelter EIA approval makes no mention or recommendation to develop such operational plans to manage and prevent impacts to the environment from their operations.

The Daxin Electrolytic EIA proposes that a Clean Production Management Plan and an operational environmental monitoring plan, similar to those outlined above for the Daxin Mine and Concentrator, be developed for the Daxin Electrolytic Plant. These operational plans have not been sighted as part of this review.

The Start EIA refers to the following operational environmental monitoring program:

- Air emissions — TSP, acid mist, and sulphur dioxide. Monitoring sites — one site 20 to 50m upwind of the site boundary and two sites 20 to 50m downwind of the site boundary. Monitoring frequency — once a month.
- Waste water — pH, total manganese, hexavalent chromium and suspended solids. Monitoring sites — drainage discharge points of the passivation, chemical, and electrolytic facilities. Monitoring frequency — once a week.
- Noise — noise levels at the site boundary. Monitoring frequency — once a week.

The Start EIA also refers to the following operational environmental management system/plan that should include the following:

- Environmental protection responsibilities.
- Management system of waste water treatment and discharge.

- Environmental monitoring system.
- Waste discharge reporting system.
- Pollution accidents handling system.
- Environmental education system.
- Accidents/emergency handling systems.

No documented operational EPMP for the Start project that covers the above elements has been sighted as part of this review.

12.12.2 Chongzuo Projects

No EPMPs have been prepared or commissioned for any of the Chongzuo project operations that SRK is aware of due to the project being under construction at the time of SRK's update site visit. The EIA makes no mention or recommendation to develop such operational plans to manage and prevent impacts to the environment from their operations.

SRK recommends, developing an EPMP along with a monitoring programme plan and other necessities of an operational environmental department to identify, quantify and manage the operations impacts on the surrounding environment.

12.12.3 Tiandeng Projects

No EPMPs have been prepared or commissioned for any of the Tiandeng Mine, Concentrator or Smelter project operations that SRK is aware of. The Smelter EIA Table makes no mention or recommendation to develop such operational plans to manage and prevent impacts to the environment from their operations.

SRK recommends, developing an EPMP along with a monitoring programme plan and other necessities of an operational environmental department to identify, quantify and manage the operations impacts on the surrounding environment.

12.12.4 Tiandong Projects

No EPMPs have been prepared or commissioned for any of the Tiandong project operations that SRK is aware of due to the project just completing development. The EIA makes no mention or recommendation to develop such operational plans to manage and prevent impacts to the environment from their operations.

SRK recommends, developing an EPMP along with a monitoring programme plan and other necessities of an operational environmental department to identify, quantify and manage the operations impacts on the surrounding environment.

12.12.5 Qinzhou Projects

The Qinzhou project Industrial Entry Application Report (May, 2006) provides Management Measures for Environmental Protection as an EPMP, but does not constitute an operational management or protection plan. Monitoring is not mentioned in the scope. The content of these measures is restricted to the following elements:

- Environmental Protection organs should be under a comprehensive department.
- Environmental Protection Managers should be electricians

- Electrician is in charge of site works, maintenance and operation of environmental protection facilities.
- Shift foreman is in charge of daily inspection of environmental protection facilities.
- Electrician is in charge of the operation and daily maintenance of de-dusting equipment.
- If there is any problem, the electrician should be informed for maintenance.
- Operation of de-dusting equipment should comply with the Venturi equipment manual.
- In normal conditions, clear the sedimentation tank once a year and re-feed the sediment to the furnace.
- The comprehensive department in charge of environmental protection should keep relations with the EPB and be familiar with relevant environmental protection laws and regulations.
- Compile environmental protection plans and submit them to management for approval and implementation.

These measures do constitute an operational environmental management plan and are ill-conceived. A qualified and capable environmental engineer would be requisite to manage an environmental department, be familiar with environmental laws and regulations, etc… An electrician is not qualified or experienced in environmental management. The lack of which could attribute the poor understanding of requirements to adequately satisfy Chinese environmental laws and regulations.

SRK recommends, a qualified Environmental Manager be placed in charge of an actual environmental department (working with other departments, such as maintenance) that is appropriately financed to carry out their responsibilities, such as developing actual environmental management, monitoring and protection plans, along with other necessities of an operational environmental department.

12.12.6 Bembélé Projects

No EPMP has so far been developed for the Bembélé Project as it is still in the initial stages of development. It is though a requirement of the Gabonese Environmental Code that such plans are developed for industrial/mining projects. CICMHZ's contract with TEREA for developing the project EIA states an Environmental Management Plan will be developed for the project along with the EIA itself. EPMP's are operational plans though that need be amended as projects progress to address issues that evolve through the life of a project, therefore, CICMHZ will need to update the working EPMP at regular intervals or when new developments at site take place.

12.13 Emergency Response Plan

Daxin Projects: The proposed Daxin Mine, Concentrator and Electrolytic Plant EIA's Clean Production Management Plans sections include some emergency response provisions. In addition the Daxin EIA's also undertake a risk analysis and identifies the following risks and potential emergencies:

- Flooding.
- Safety accidents with electrical equipment.
- Geological disasters and earthquake hazards. The safety of industrial sites.

- Lightning.
- TSF safety/stability.
- The road embankment safety of the site boundary and roads within the mining area.

An ERP for the Daxin mine was provided for review that covers the above mentioned content requirements of an ERP, which has been approved by management on the March 7th 2007 (No.17 — Guangxi Daxin Mn Mining Co. Ltd.). No other documented operational ERP for the Daxin Projects has been sighted that incorporates the above risks/potential emergencies and the general elements of a recognized international ERP.

The proposed operational environmental management system/plan as specified in the Start EIA covers emergency response planning. However, this document has not been sighted as part of this review. An ERP for the Start electrolysis project was provided for review that covers the afore-mentioned content requirements of an ERP, which was approved by management on the May 1st 2006 (No.7 — Guangxi Start Mn Material Co. Ltd.) An Ammonia ERP was also provided for review that covers the afore-mentioned requirements of an ERP, which was approved by management on the May 1st, 2006 (No. 6 — Guangxi Start Mn Material Co. Ltd.).

Chongzuo Projects: No ERP have been prepared or commissioned for any of the Chongzuo project operations as the project was under construction at the time of SRK's update site visit. The project EIAs makes no mention or recommendation to develop such operational plans to manage environmental accidents/emergencies resulting from their operations.

SRK recommends, developing an ERP along with other necessities of an operational environmental department to identify, quantify and manage the operational risks and possible impacts resulting from environmental accidents/emergencies on the surrounding environment.

Tiandeng Projects: No ERP have been prepared or commissioned for any of the Tiandeng Mine, Concentrator or Smelter project operations. The Smelter EIA Table makes no mention or recommendation to develop such operational plans to manage environmental accidents/emergencies resulting from their operations.

SRK recommends, developing an ERP along with other necessities of an operational environmental department to identify, quantify and manage the operational risks and possible impacts resulting from environmental accidents/emergencies on the surrounding environment.

Tiandong Projects: An initial ERP had been prepared for the Tiandong project operations as the project was completing construction at the time of SRK's update site visit. The project EIAs makes brief mention or recommendation to develop such operational plans to manage environmental accidents/emergencies resulting from their operations.

SRK recommends, developing an ERP along with other necessities of an operational environmental department to identify, quantify and manage the operational risks and possible impacts resulting from environmental accidents/emergencies on the surrounding environment.

Qinzhou Project: The Qinzhou project does not have an operational Emergency Response plan in line with the industry best practices. The project Industrial Entry Application Report (May, 2006) provides emergency response provisions, but are on the whole safety related and do not address environmental issues, the contents which are limited to the following elements:

- Once an emergency or malfunction alarm sounds, recovery and rescue procedures will take place ASAP.

- When an accident occurs, the Environmental Protection Department and Chairman of the Board must be notified.
- If injuries and/or deaths occur, rescue and medical transportation shall be the primary task.
- Emergency response capital reserve and working shift schedule are well prepared. The working shift is equipped with mobile phones. Special staff are assigned for rescue and recovery.
- Environmental Protection and Safety training for the production department is conducted and prevention tasks are highly emphasized.
- The Environmental Emergency Response Plan is practiced regularly, which is organized by the production department.
- The recovery and remedial works will be implemented after the emergency is controlled.
- Accidents should be recorded and reported, be truthfully investigated and analyzed, the duties and responsibilities should be ascertained and the person in charge should be punished.

No documented operational ERP has been sighted that incorporates the general elements of a recognized international ERP that focus on the risks/potential emergencies of an environmental accident/incident.

SRK recommends, Qinzhou consult a professional environmental organization to help them understand the issues, what an ERP is and provide advice on how they can develop an actual one for their operation that deals with their specific issues.

Bembélé Project: No ERP has as yet been prepared or commissioned for the Bembélé Mine-Concentrator project operations as the project is still in its initial stages of development. ERP's are a requirement though of the Gabonese Environmental Code for industrial/mining projects; so will need to be developed for compliant operation. The project EIA contract and scoping document make no mention of developing an ERP along with the EIA and EPMP.

SRK recommends, developing an ERP along with other necessities of an operational environmental department to identify, quantify and manage the operational risks and possible impacts resulting from environmental accidents/emergencies on the surrounding environment.

12.14 Site Closure Planning and Rehabilitation

The Chinese requirements for mine closure are covered under Article 21 of the Mineral Resources Law (1996), the Rules for Implementation of the Mineral Resources Law of the People's Republic of China (2006), the Land Use Regulations of the People's Republic of China (1986.6.25) and the Land Rehabilitation Regulation issued by the State Council on October 21, 1988. In summary these legislative requirements cover the need to conduct land rehabilitation, to prepare a site closure report and submit a site closure application for assessment and approval.

The recognized international industry practice for managing site closure is to develop and implement an operational site closure planning process and document this through an operational Closure Plan. While this site closure planning process is not specified within the Chinese National requirements for mine closure, the implementation of this process for a Chinese mining project will:

- Facilitate achieving compliance with these Chinese National legislative requirements; and
- Demonstrates conformance to a recognized international industry management practice.

While CITIC Dameng is currently compliant with Chinese requirements for conducting rehabilitation work (predominantly revegetation of disturbed areas), there is currently no operational closure planning process in place for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé Projects or documented rehabilitation and closure plans that cover the above components that from the recognized industry standard and practices outlined in Appendix 6. There are though some proposed rehabilitation measures specified within the various project EIA's and approvals that provide a basis for a closure planning process and an operational plan for rehabilitation works which are summarized below:

- Develop a TSF rehabilitation plan.
- Undertake revegetation of industrial area and waste rock dumps at mine closure.
- Establish a financial accrual process for the funding of the site rehabilitation.
- Construct sedimentation dams below waste rock dumps.
- Construct flood diversion channel around the mining area and drainage channels within the mining area.
- Complete the backfilling of mine tunnels at the end of mining.
- Backfill the open pit as much as possible at the end of mining.

SRK was provided with 2 contracts ("design contracts of land rehabilitation plan") for conducting rehabilitation works for the Daxin and Tiandeng project's sites between CITIC Dameng and Nanning Zhonggui Water and Soil Conservation Technology Inc. The contracts were signed on June 1, 2010, and the scope of work covered the mining and associated metallurgical & processing plants of the Daxin and Tiandeng project sites for an area of 4.43ha and 1.55ha, respectively. The contract states the design work will generate the following: 1. Land rehabilitation report; 2. Land disturbance survey and forecast; 3. Land rehabilitation planning map; 4. Construction design drawings; 5. 1:10000 Land disturbance survey map.

While the contracts for these plans demonstrates CITIC Dameng's ongoing intent to improve their rehabilitation of project site areas they do not constitute a Mine Closure Plan that comprises the measures required to manage mine closure from project beginning through to actual closure and decommissioning, inclusive of post-closure monitoring and management.

No information regarding rehabilitation plans or contracts for such has been provided to SRK for review for CITIC Dameng's Chongzuo, Tiandong, Qinzhou or Bembélé projects. SRK has been informed by CITIC Dameng that they have internal budgeting system for annual rehabilitation work, although SRK has not been provided with any information on this budgeting system or funding process.

SRK recommends that consideration be given to developing and implementing operational Rehabilitation and Closure Plans for the Daxin, Chongzuo, Tiandeng, Tiandong, Qinzhou and Bembélé Projects in line with Chinese (Gabonese — Bembélé) requirements and recognized international industry practice, inclusive of progressive rehabilitation work and final closure decommissioning, final landform designs and rehabilitation measures and an appropriate funding plan.

12.15 Evaluation of Environmental Risks

The sources of inherent environmental risk are project activities that may result in potential environmental impacts. These project activities have been previously described within this report.

12.15.1 Daxin Projects

In summary the most significant environmental risks for the Daxin Projects are:

- Disposal/storage of waste rock, concentrate tailings, smelter slag and leach residues.
- Water discharges (i.e., mine dewatering, industrial waste water and stormwater runoff).
- Dust generation.
- Hazardous materials management
- Land disturbance and rehabilitation.
- Hydrocarbon management.
- Land contamination.

The environmental risks associated with waste rock/tailings/slag/leach residue disposal, water discharges, dust generation and land disturbance and rehabilitation can be effectively managed if the EIA and approval conditions are met. The environmental risks associated with the storage and handling of hydrocarbons and the potential for generating contaminated sites can be managed if the relevant recognized international industry practices are adopted.

12.15.2 Chongzuo Projects

In summary the most significant environmental risks for the Chongzuo Projects are:

- Waste Water — management of discharges of plant drainages, cooling water overflows and sewage to local stream.
- Containment of stockpiles — raw products and slags.
- Hazardous Material management
- Air Emissions — maintenance of dust collection system.
- Land disturbance and rehabilitation.
- Hydrocarbon management.
- Land contamination.

The environmental risks associated with waste water discharges, stockpile containment, hazardous material and air emissions, can be effectively managed if the EIA and approval conditions are met, so far only air emissions are being managed as per approval conditions. The environmental risks associated with the storage and handling of hydrocarbons and the potential for generating contaminated sites can be managed if the relevant recognized international industry practices are adopted.

12.15.3 Tiandeng Projects

In summary the most significant environmental risks for the Tiandeng Mine-Concentrator and Smelter Projects are:

- Disposal/storage of waste rock, concentrate tailings, smelter slag and leach residues.
- Surface Water Management — lack of diversion drains and separation of different waste water flows.
- Hazardous Material management
- Hydrocarbon Management.
- Air Emissions — management of Bag House filter system and chimney size capable of managing stack emissions. Currently emissions from furnace side openings occurring.
- Land disturbance and rehabilitation.
- Land contamination.

The environmental risks associated with surface water management, stockpile containment, hazardous materials and air emissions, can be effectively managed if the EIA and approval conditions are met, so far only air emissions are being managed as per approval conditions. The environmental risks associated with the storage and handling of hydrocarbons and the potential for generating contaminated sites can be managed if the relevant recognized international industry practices are adopted.

12.15.4 Tiandong Projects

In summary the most significant environmental risks for the Tiandong Projects are:

- Waste Water — management of discharges of plant drainages, cooling water overflows and sewage to local stream.
- Containment of stockpiles — raw products and slags.
- Hazardous Material management
- Air Emissions — maintenance of dust collection system.
- Land disturbance and rehabilitation.
- Hydrocarbon management.
- Land contamination.

The environmental risks associated with waste water discharges, stockpile containment, hazardous material and air emissions, can be effectively managed if the EIA and approval conditions are met, so far only air emissions are being managed as per approval conditions. The environmental risks associated with the storage and handling of hydrocarbons and the potential for generating contaminated sites can be managed if the relevant recognized international industry practices are adopted.

12.15.5 Qinzhou Projects

In summary the most significant environmental risks for the Qinzhou Projects are:

- Waste Water — untreated discharges of plant drainages, cooling water overflows and sewage to local stream.
- Containment of stockpiles — raw products and slags.
- Air Emissions — maintenance of Venturi dust collection system.
- Land disturbance and rehabilitation.
- Hydrocarbon management.
- Land contamination.

The environmental risks associated with waste water discharges, stockpile containment and air emissions, can be effectively managed if the EIA and approval conditions are met, so far only air emissions are being managed as per approval conditions. The environmental risks associated with the storage and handling of hydrocarbons and the potential for generating contaminated sites can be managed if the relevant recognized international industry practices are adopted.

12.15.6 Bembélé Projects

In summary the most significant environmental risks for the Bembélé Mine-Concentrator Project are:

- Disposal/storage of waste rock and concentrate tailings.
- Surface Water Management — diversion drains and separation of different waste water flows.
- Disruption of water and sediment regimes of rivers.
- Hydrocarbon Management.
- Land disturbance and deforestation.
- Impacts on Biodiversity in the project area.
- Land and water contamination.

The environmental risks associated with surface water management, stockpile containment and waste emissions, can be effectively managed if the EIA and approval conditions are met and EPMP measures are practiced. The environmental risks associated with the storage and handling of hydrocarbons and the potential for generating contaminated sites can be managed if the relevant recognized international industry practices are adopted.

13 SOCIAL ASSESSMENT

13.1 Social and Community Interaction

13.1.1 Daxin Projects

The Daxin Projects are located near the Xialei Town, within the Daxin County, in the Guangxi Zhuang Autonomous Region. The Start Electrolytic Manganese Plant is located near the Huruun Town within the Jingxi County, approximately 10km to the west of the Xialei Town.

The population of the Daxin County area is predominantly comprised of the Zhuang cultural minority (over 90%) along with Han Chinese. There are no reported significant cultural heritage sites, within or surrounding the Daxin Manganese Projects.

The land use for the Daxin project general surrounding area is a combination of mining and agriculture. There are a total of seven villages within the boundary of Mining Licence No. 1000000620030. The Buji, Bukang and Zhugeng Villages are all within the Bukang Stream valley, and are respectively located approximately 300m, 2.5km and 4km away from the Daxin Mine site boundary. All these villages are owned by the Daxin Mine and are primarily used as logistical support facilities for the mine. The Longnanshang, Longniang, Longmin, and Baisuo Villages are located in an adjacent valley approximately 1 to 2.2km away from the Daxin mine site boundary. CITIC Dameng Mining has not reported any issues associated with these villages, including any outstanding compensation issues.

Public consultation programs on the development of the Daxin Projects were completed as part of the EIA reports. The results of the programs showed that community support for the projects was high. However, the concerns were expressed for the potential water pollution, air/dust pollution and land disturbance impacts arising from the project. The following suggestions were made by the program respondents:

- Wastewater and waste residues should not be drained into the surrounding surface water.
- Waste gas must be treated to meet emission standards.
- Support the expansion and enhancement of the environment protection management and social conditions for the Xialei Town.
- Participate in and contribute to, resolving regional environmental issues such surface water pollution and air pollution.

In addition to the above general public consultation, there have also been specific community concerns raised over the location/development of the Daxin Manganese Oxide Plant. CITIC Dameng Mining has stated that these concerns were raised in 2006 and have now been addressed through a separate and dedicated public consultation program. No other records of public complaints in respect to the environmental management of the Daxin Projects have been sighted as part of this review.

The Dabao Smelter is located just upstream (Bukang Stream) from the Daxin Electrolytic Manganese project site. No EIA has been provided for review, so no information is available as to whether any community/social assessment has taken place or whether the public has had any participation in the projects planning, etc.

The Start Electrolytic Manganese Plant is located near the Huruun Town within the Jingxi County, approximately 10km to the west of the Xialei Town.

The population of the Jingxi County area is similar to the Daxin County and area is predominantly comprised of the Zhuang cultural minority along with Han Chinese. There are no reported significant cultural heritage sites, within or surrounding the Start Electrolytic Manganese Plant.

13.1.2 Chongzuo Projects

The land use surrounding the Start Manganese Plant is a combination of mining and agriculture. The Huruun Town is the main residential area near the Start Manganese Plant.

The Chongzuo Project is located within the Industrial Park just outside Chongzuo City. There are no communities living in close vicinity to the industrial park. The predominant land use in the park are industrial uses and surrounding the industrial park is mainly agricultural.

CITIC Dameng reported to SRK that community consultant and public participation would be carried out by the park management administration. The development of the industrial park is a provincial government initiative to bring development and business to the surrounding local area.

No information was provided for review on the ethnicity of people living and working in the area. There are no reported significant cultural heritage sites, within or surrounding the Chongzuo Projects.

13.1.3 Tiandeng Projects

No Tiandeng Mine-Concentrator EIA has been provided for review, therefore no information is available as to social-community interaction, etc for review for this part of the project. The Smelter EIA Tables though does provide information on the social environment and the interaction between it and the project along with public participation summary.

The Tiandeng Project is located adjacent to the Daren Village (approximately one kilometer from the project site) within the Chongzuo City and Tiandeng County. The predominant land use around the project area is agricultural and mining, with mining development (especially Manganese) being promoted within the county to develop industry and employment opportunities.

The Tiandeng Smelter EIA Table states a grade one national protection plant (Golden Camellia) exists in Tiandeng county along with other grade two national protection plants, but no survey of the actual project site has been conducted to assess whether any of these species are present within the project site. The EIA Table goes on to state that vegetation in the area is sparse with exposed soil, this was not the case as evidenced at the time of SRK's site visit with vegetation being lush with a high percentage of vegetative surface cover in areas that had not experienced disturbance.

A public participation community assessment was carried out as part of the Smelter EIA Table, which consisted mainly of visiting cadres and people from surrounding towns and villages and asking their opinions and suggestions on the project. Survey respondents reported they were not happy with furnace emissions from the original project and wanted management/protection measures put in place when the project was to be expanded — as was carried out in the project expansion with the construction of a bag house filter for the furnace emissions. On the whole, people responded positively to the project as they were in favor of developing the area's economy, job opportunities and to make use of the area's local resources to the full.

No information was provided for review on the ethnicity of people living and working in the area. There are no reported significant cultural heritage sites, within or surrounding the Tiandeng Projects.

13.1.4 Tiandong Projects

The Tiandong Project is located approximately 1km NW from Long Sang Village. The people in the surrounding vicinity are predominately Zhuang ethnicity. Land use surrounding the project is mainly agricultural with mango and sugarcane being the predominant crops grown.

The project EIA included a public participation/community consultation process and feedback which indicate the majority of stakeholders are supportive of the project. CITIC Dameng also reported to SRK that they will in the near future develop some social development/support programs for the surrounding local communities.

There are no reported significant cultural heritage sites, within or surrounding the Tiandong Projects. CITIC Dameng also stated no non-compliance notices had been issued to the project

13.1.5 Qinzhou Projects

The Qinzhou Smelter Project is located approximately 130km south of Nanning City within the Guangxi Province. The smelter was constructed within a large industrial park by Qinzhou Harbour (but will according to CITIC relocate in 3-4 years). The project EIA has not included any public consultation or community assessment on the projects social impacts to the area.

The surrounding land use in the project area is mainly industrial, although there are people living in temporary settlements adjacent to the smelter and aquaculture is being practiced in the waterway next to the project site where the site waste water is being discharged.

No information was provided for review on the ethnicity of people living and working in the area. There are no reported significant cultural heritage sites, within or surrounding the Qinzhou Project.

13.1.6 Bembélé Project

The Bembélé mine-concentrator site is located approximately 22km north of Ndjole down in Moyen-Ogooue Province of Gabon. It administratively is governed by the Ndjole town. The property can be accessed via a logging road of 36km from Ndjole down to the mine site. The Ogooue River flows through the east of Ndjole to the Port-Gentil Harbor. The EIA states a public consultation and community assessment was conducted as part of the assessment.

The surrounding land use of the project area is natural habitat (jungle) with no industry or agriculture. The nearest communities are about 30kms away, so are unlikely to be affected by the projects development, except via passing traffic of site transports. As the project develops and begins to operate, Gabonese people will be employed in the project at about 75% of staff levels.

13.2 Cultural Minorities and Heritage

There are no scenic spots, historical sites or minority groups reported around the CITIC Dameng project sites in China or Gabon. No records of cultural heritage sites located within or near the project area, were sighted as part of this review.

13.3 Relationship with Local Government

13.3.1 Daxin Projects

The relationship with the Daxin County and Jingxi County and other local statutory bodies is reported to be positive.

No notices of breach of environmental conditions for either project have been sighted as part of this review.

Dabao Smelter received a notice of violation against the EP Law for not constructing EP facilities in line with the 3 simultaneousness policy. They were directed to rectify this situation before the project's final check acceptance.

13.3.2 Tiandeng, Tiandong and Chongzuo Projects

The relationship with the Tiandeng County and Chongzuo City and other local statutory bodies is reported to be positive.

No notices of breach of environmental conditions for either project have been sighted as part of this review.

13.3.3 Qinzhou Projects

The current relationship with the Qinzhou City and other local statutory bodies is reported to be positive. However, there have been two written environmental breaches served on the Company by the Qinzhou City EPB during 2003/2004. Both are relation to the Company constructing the project without an EIA and government approval. The following references to these breaches are noted in the Qinzhou City EPB December 2005 approval report:

- In December 2003 the Qinzhou City Guixin Ferrous Alloy Company Limited commenced construction of the project without the approval of the Qinzhou EPB.

- In response to this situation, a notice was sent to the company stating that the construction should stop and that an EIA report should be submitted to the Qinzhou EPB. The company did not comply with this directive and continued with the project construction and commenced production of the Qinzhou Smelter Project 'without suitable environmental facilities installed'.

- A second stop work/halt production notice and order to submit an EIA was then sent to the company, which resulted in the company producing the full updated EIA report during 2005.

13.3.4 Bembélé Project

The relationship with the Gabonese county and central government and other local statutory bodies is reported to be positive.

No notices of breach of environmental conditions for this project have been sighted as part of this review.

GLOSSARY OF TERMS AND ABBREVIATIONS

%	percent
°	degree
°C	degrees Centigrade
Adit	A tunnel underground from a portal, usually close to horizontal
ARD	Acid Rock Drainage
ASL	above sea Level
ANFO	Ammonium nitrate/fuel oil
AusIMM	Australasian Institute of Mining and Metallurgy
C	The chemical symbol for carbon
CICMHZ	Hua Zhou Dameng Industry and Mine Trading Company
CITIC Dameng	CITIC Dameng Holdings Limited
c.o.g.	Cut-off grade, the minimum grade of a mineral in a deposit which is able to be mined and processed economically
cm	centimeter
Cu	The chemical symbol for copper
deposit	Earth material of any type; either consolidated or unconsolidated, that has accumulated by some natural process or agent.
E	east
EEO	Equal Employment Opportunities
EHS	Environmental Health and Safety Guidelines
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EPB	Environmental Protection Bureau
EPMP	Environmental Protection and Management Plan
ERP	Emergency Response Plan
FS	Feasibility study
Geological Brigade	Integrated Geological Brigade of Shaanxi Development Bureau of Geology and Mineral Resources
h	hectares
HDPE	high density polyethylene
HKSE	the Stock Exchange of Hong Kong Limited
IER	Independent Expert Report
IFC	World Bank/International Finance Corporation
IPO	Initial Public Offering
ITR	Independent Technical Review or Report
JORC Code	Joint Ore Reserves Committee Code
kg	kilogram, equivalent to 1,000 grams
kg/cm^2	one kilogram per square centimeter
km	kilometers, equivalent to 1,000 meters
km^2	square kilometers
kV	Kilovolts
kW	Kilowatt, equivalent to 1,000 watt
kWhr	Kilowatts per hour
kWh/t	Kilowatt hours per tonne
L	Litre
LOM	Life of mine
m	meters
M	million

m/set/year	million sets per year
m^2	square meters
m^3	cubic meters
m^3/day	cubic meters per day
m^3/min	cubic meters per minute
m^3/sec	cubic meters per second
m^3/tonne	cubic meters per tonne
mm	millimeters
M/RMB	million Renminbi
MLR	Ministry of Land and Resources of PRC
Mn	The chemical symbol for Manganese
Mt	million tonnes
Mtpa	million tonnes per annum
N	north
NE	Northeast
NEE	Northeast-east
No. 1 Brigade	No. 1 Geological Exploration Institute of the China Bureau of Metallurgical and Geological Exploration.
No. 2 Brigade	No. 2 Geological Brigade of Guangxi Bureau of Geology Brigade
NNE	North north-east
NNW	North north-west
NS	North south
NW	North west
pa	per annum
Pb	The chemical symbol for lead
Portal	An opening in the side of a hill or mountain that leads to a tunnel or adit
/d	per day
/t	per tonne
PPE	Personal protective equipment
PRC	People's Republic of China
QA/QC	quality assurance/quality control
Q-System	A standard method of comparing rock strength
RL	see mRL
RMB	Renminbi, the legal currency of China, also known as Yuan
RMB/a	Renminbi per year
RMB/kWhr	Renminbi per kilowatt hour
RMB/m	Renminbi per month
RMB/t	Renminbi per tonne
ROM	run of mine — meaning the ore as it leaves the mine, before any processing
RQD	Rock Quality Designation, a standard for comparing rock strength characteristics
S	south, also the chemical symbol for sulphur
SE	southeast
S&EIA	Social and Environmental Impact Assessment
S&EMS	Social and Environmental Management Systems
SEPC	State Electric Power Co Ltd
SO_2	The chemical symbol for sulphur dioxide
SRK	SRK Consulting (China) Ltd
SS	suspended solids

Stope	An underground excavation which is planned or from which ore has been removed in a series of steps.
SW	southwest
SWCP	Soil and Water Conservation Plan
t	tonne, equal to 1,000kg
t/d	tonnes per day
the "Report"	Independent Expert Report
t/m^3	tonnes per cubic meter
t/km	tonnes per kilometer
TMn	total manganese grade
tpa	tonnes per annum
tph	tonnes per hour
TSF	Tailings Storage Facility
USD	United States dollars
V	Volts
Valmin Code	Code for the Technical Assessment and Valuation of Mineral and Petroleum Assets and Securities for Independent Expert Reports
W	west
WE	westeast
WWTP	waste water treatment plants

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Daxin Project

Daxin Mine and Concentrator

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2. Chongzuo City Environmental Scientific Institute, *Environmental Impact Assessment Report for Daxin Manganese Mine Underground Mining, Concentrating, Manganese Powder Project, File Number [2006] No 017,* May 2007 (sent to trans agency).

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9. Resource/Reserve Geological Audit Report of Xialei Manganese Mine in Daxin County of Guangxi Province, Nanning Geological Survey Institute of Chinese Metallurgical and Geological Exploration Bureau, July 2004.

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Daxin Electrolytic Manganese Plant

11. Guangxi Zhuang Autonomous Region Environmental Scientific Institute, *Environmental Impact Assessment Report of 30,000tpa Electrolyte Manganese Project of CITIC Dameng Company Limited, Daxin Sub-Company, File Number GXHBS- 2007-03-024,* May 2007.(sanding in June 11,)

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Daxin Manganese Sulphate Plant

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25. Monitoring Station of Guangxi Baise City, *Monitoring report of Final Checking of Start 20,000tpa Electrolyte Manganese Project, File Number [2007-B029],* May 2007.

Tiandeng Projects

Tiandeng Mine and Concentrator

26. Guangxi Zhuang Autonomous Region Industry and Commerce Administration Bureau, *Business Licence of CITIC Dameng Mining Company Limited, Tiandeng Sub Company, File Number No 0498262,* March 31, 2008.

27. Manganese Oxide Resource/Reserve Audit Report of Doping Mine (Tuoren East Field, Tuoren West Field, Luli Field, Dongmeng Field) in Tiandeng County of Guangxi Province as of 2007, CITIC DAMENG HOLDINGS LTD., December 31, 2007.

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31. Chongzuo City Environmental Protection Bureau, *Approval of Environmental Impact Assessment Report for Tiandeng Manganese Mine, 250,000tpa Mining and Concentrating, File Number [1993] No 11,* April 5, 1993.

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34. Changsha Designing Institute of National Chemical Industry Ministry, *Tailings Storage Facility Engineering Design of Tiandeng Manganese Mine, File Number HC05G20*, February 2006.

35. Chongzuo City Center for Disease Control, *Monitoring Report of Dust and Sound Hazardous in Working Area*, August 3, 2007.

Tiandeng Ferrous Alloy Smelter

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40. Chongzuo City Environmental Protection Bureau, *Check Opinion of Waste Discharging Situation of Tiandeng Ferrous Alloy Company Limited, File Number 2006 No 16*, October 9, 2006.

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42. Chongzuo City Environmental Protection Monitoring Station, *Air Pollution Environmental Monitoring Report of Tiandeng Ferrous Alloy Company Limited, File Number [2008] No 061*, March 6, 2008.

Qinzhou Project

Ferrous Alloy Smelter

43. Qinzhou Development and Reform Committee, *Approval of Qinzhou City Guixin Ferrous Alloy Company Limited, 40,000tpa Manganese Group Ferrous Alloy Project, File Number[2003]No 13*, December 24, 2003

44. Qinzhou Guixin Company Limited, Industry Entry Application Document of Ferrous Alloy Project, May 2006.

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46. Qinzhou City Environmental Protection Bureau, *Approval of Environmental Impact Assessment Scope Table Report of Qinzhou City Guixin Ferrous Alloy Company Limited, Manganese/ Chromium Group Ferrous Alloy Project, File No[2004 16]*, April 15, 2004.

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53. Qinzhou City Environmental Protection Bureau, *Testify Report of Waste water, Air and Solid Discharging Situation of Qinzhou Company Limited,* June 25, 2006.

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Gabon Project

Bembélé Mine and Concentrator

59 Detailed Geological Survey Report of Manganese Deposit in Monbely and Surrounding Area of Gabon, No.1 Geological Exploration Institute of Chinese Metallurgical and Geological Exploration Bureau, August 15, 2006.

60 Feasibility Study of Open Pit Mining on Manganese Mine in Gabon of Nibo Huazhou Mining Ltd., Exploration and Mining Design Institute of Ma anshan Mining Institute, September 28, 2006;

APPENDICES

Appendix 1: Mining License

中华人民共和国

采矿许可证

（副本）

证号：1000000620030

采矿权人：中信大锰矿业有限责任公司

地　　址：广西崇左市石林路

矿山名称：中信大锰矿业有限责任公司大新锰矿

经济类型：中外合资经营企业

开采矿种：锰矿

开采方式：露天开采、地下开采

生产规模：30.00万吨/年

矿区面积：10.616平方公里

有效期限：贰拾玖年自2006年2月28日至2035年2月21日

发证机关

（采矿登记专用章）

二○○六年二月二十八日

中华人民共和国国土资源部印制

矿区范围拐点坐标：

点号	X坐标	Y坐标
1	2534890.00	36363170.00
2	2535190.00	36363220.00
3	2535570.00	36363840.00
4	2535610.00	36364150.00
5	2535990.00	36364185.00
6	2536425.00	36364335.00
7	2536810.00	36364150.00
8	2537570.00	36366310.00
9	2536910.00	36366736.00
10	2536250.00	36366625.00
11	2535630.00	36367425.00
12	2535380.00	36367850.00
13	2535400.00	36368550.00
14	2535100.00	36368550.00
15	2535018.00	36367850.00
16	2534755.00	36367850.00
17	2534918.00	36368550.00
18	2534800.00	36368550.00
19	2534360.00	36367850.00
20	2534350.00	36367200.00
21	2534975.00	36365830.00
22	2534240.00	36364920.00
23	2534175.00	36364215.00
24	2533610.00	36364184.00
25	2533380.00	36363020.00
26	2533910.00	36362995.00
27	2534090.00	36363260.00

备注：井巷工程至地表

开采深度：由625米至-20米标高　共有27个拐点圈定

中华人民共和国

采矿许可证

(副本)

证号：C1000002008122120001473

采矿权人：中信大锰矿业有限责任公司

地　　址：广西崇左市石林路

矿山名称：中信大锰矿业有限责任公司天等锰矿

经济类型：中外合资经营企业

开采矿种：锰矿

开采方式：露天开采

生产规模：25万吨/年

矿区面积：4.5958平方公里

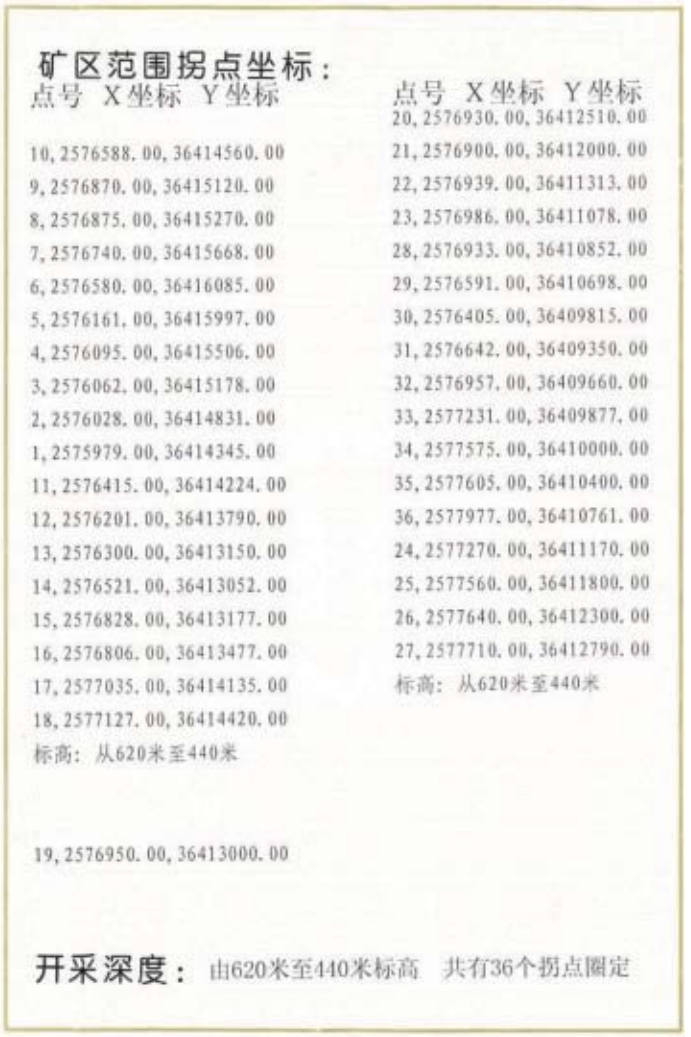
有效期限：拾陆年 自2008年12月02日至2024年12月02日

发证机关

(采矿登记专用章)

二〇〇八年十二月二日

中华人民共和国国土资源部印制



矿区范围拐点坐标：

点号	X坐标	Y坐标
10	2576588.00	36414560.00
9	2576870.00	36415120.00
8	2576875.00	36415270.00
7	2576740.00	36415668.00
6	2576580.00	36416085.00
5	2576161.00	36415997.00
4	2576095.00	36415506.00
3	2576062.00	36415178.00
2	2576028.00	36414831.00
1	2575979.00	36414345.00
11	2576415.00	36414224.00
12	2576201.00	36413790.00
13	2576300.00	36413150.00
14	2576521.00	36413052.00
15	2576828.00	36413177.00
16	2576806.00	36413477.00
17	2577035.00	36414135.00
18	2577127.00	36414420.00
19	2576950.00	36413000.00
20	2576930.00	36412510.00
21	2576900.00	36412000.00
22	2576939.00	36411313.00
23	2576986.00	36411078.00
28	2576933.00	36410852.00
29	2576591.00	36410698.00
30	2576405.00	36409815.00
31	2576642.00	36409350.00
32	2576957.00	36409660.00
33	2577231.00	36409877.00
34	2577575.00	36410000.00
35	2577605.00	36410400.00
36	2577977.00	36410761.00
24	2577270.00	36411170.00
25	2577560.00	36411800.00
26	2577640.00	36412300.00
27	2577710.00	36412790.00

标高：从620米至440米

开采深度：由620米至440米标高　共有36个拐点圈定

DEPM/26/09/2007

PRESIDENCE DE LA REPUBLIQUE

MINISTERE DES MINES, DE L'ENERGIE, DU PETROLE ET DES RESSOURCES HYDRAULIQUES

SECRETARIAT GENERAL

DIRECTION GENERALE DES MINES ET DE LA GEOLOGIE

DIRECTION DE L'ECONOMIE ET DE LA PROPRIETE MINIERE

B.P. 576 LIBREVILLE
TEL. : 76-39-20
N° 001135/PR/MMEPRH/SG/DGMG/DEPM.

REPUBLIQUE GABONAISE
UNION-TRAVAIL-JUSTICE

VISA Département Juridique

PRESIDENCE DE LA REPUBLIQUE LE CHEF DU DEPARTEMENT JURIDIQUE

PRIMATURE Conseiller Juridique SECRETARIAT GENERAL DU GOUVERNEMENT

DECRET

Portant attribution d'un permis d'exploitation minières N° **G3-223 dit « Manganèse Bembélé»** à la Société **CICMHZ**

LE PRESIDENT DE LA REPUBLIQUE, CHEF DE L'ETAT

VISA :

S.G.G. PRIMATURE SECRETAIRE GENERAL DU GOUVERNEMENT

Vu la Constitution ;

Vu les Décrets n°s 000168/PR et 000169/PR du 24 et 25 Janvier 2007, fixant la composition du Gouvernement, ensemble les textes modificatifs subséquents ;

Vu la Loi n°005/2000 du 12 Octobre 2000, portant Code Minier en République Gabonaise ;

Vu l'Ordonnance n°003/2002/PR du 26 Février 2002, modifiant et complétant la Loi n°005/2000 du 12 Octobre 2000, portant Code Minier en République Gabonaise ;

Vu la Loi n°007 /2002 du 22 Août 2002, portant ratification de l'Ordonnance n°003/2002/PR du 26 Février 2002, modifiant et complétant la loi n°005/2000 du 12 Octobre 2000, portant Code Minier en République Gabonaise ;

Vu la Loi n°008/2005 du 30 Mars 2005, modifiant et complétant la Loi n°005/2000 du 12 Octobre 2000, portant Code Minier en République Gabonaise, modifiée par l'ordonnance n°003/2002/PR du 26 Février 2002 et par la Loi de ratification n°007/2002 du 22 Août 2002, fixant les taux des taxes et droits fixes applicables aux titres et autorisations du régime minier et du régime des carrières ;

VISA :
S.G.P.R

PRESIDENCE DE LA REPUBLIQUE Le Secrétaire Général

Vu le Décret n°001085/PR/MMEPRH du 17 Décembre 2002, fixant les conditions d'application de la Loi n°005/2000 du 12 Octobre 2000, modifiée et complétée par l'Ordonnance n°003/2002/PR du 26 Février 2002, portant Code Minier en République Gabonaise ;

Vu le Décret n°00269/PR/MMEPRH du 03 Mai 2000, portant attributions et organisation du Ministère des Mines, de l'Energie, du Pétrole et des Ressources Hydrauliques ;

Vu le Décret n°00650/MMEPRH/SG/DGMG/DEPM du 18 Septembre 2006 portant attribution d'un permis de recherche minière à la Société **CICMHZ** valable pour le Manganèse dans la province du Moyen Ogooué ;

Vu la demande du permis d'exploitation minière, introduite par la Société **CICMHZ**

Sur rapport du Ministre des Mines, de l'Energie, du Pétrole et des Ressources Hydrauliques.

D E C R E T E

Article 1er : Il est institué et attribué à la Société **CICMHZ** un permis d'exploitation minières valable pour le **Manganèse**.

Ce permis dit « **MANGANÈSE BEMBÉLÉ** » se situe dans la province du Moyen Ogooué et porte le N° **G3-223**.

Article 2 : Le permis d'exploitation minière N° **G3-223** est accordé pour une période de dix (10) ans à compter de la date de signature du présent Décret. Il peut, à la demande du titulaire, faire l'objet de plusieurs renouvellements pour une durée de cinq ans chacun.

Article 3 : Les points **A, B, C** et **D** délimitent le polygone d'exploitation. Leurs coordonnées UTM (WGS 84), fuseau 32 S, sont les suivantes :

Points	X	Y
A	0° 03' 00"	10° 46' 00"
B	0° 03' 00"	10° 49' 00"
C	- 0° 01' 00"	10° 49' 00"
D	- 0° 01' 00"	10° 46' 00"

La superficie de la zone ainsi délimitée est réputée égale **20 km²**.

Article 4: La Société **CICMHZ** s'engage à fournir à la Direction Générale des Mines et de la Géologie, des rapports semestriels et annuels concernant l'activité déployée sur ledit permis.

Article 5 : Dans le cadre de la législation en vigueur, la société **CICMHZ** s'engage à conduire ses activités suivant les méthodes agrées par l'industrie minière. Elle doit en outre prendre toutes les mesures nécessaires pour protéger l'environnement, empêcher tout risque de pollution des nappes souterraines et du réseau hydrographique, préserver le patrimoine forestier et assurer au mieux la sauvegarde de la faune dans la présente zone minière.

Article 6 : La Société **CICMHZ** s'engage à réhabiliter au fur et à mesure de l'avancement de l'exploitation, son site minier conformément à la réglementation en vigueur en la matière.

Article 7: A la fin de l'exploitation du gisement, la Société **CICMHZ** s'engage à fournir à la Direction Générale des Mines et de la Géologie, toutes informations géologiques et une carte détaillée à l'échelle de 1/200.000e de la zone couvrant leur permis ainsi que la notice explicative de ladite carte.

Article 8 : Une convention minière doit être établie entre l'Etat et la Société **CICMHZ** conformément à l'Article 35 nouveau de l'Ordonnance n° 003/2002/PR , modifiant et complétant la Loi n° 005/2000 du 12 Octobre 2000, portant Code Minier en République Gabonaise.

Article 9 : Le Ministre des Mines, de l'Energie, du Pétrole et des Ressources Hydrauliques est chargé de l'application du présent Décret qui sera enregistré, publié au Journal Officiel de la République Gabonaise et communiqué partout où besoin sera./-

Fait à Libreville, le 05 DEC. 2007

Par le Président de la République,
Chef de l'Etat

EL HADJ OMAR BONGO ONDIMBA.-

Le Premier Ministre,
Chef du Gouvernement

Jean EYEGHE NDONG.-

Le Ministre des Mines, de l'Energie, du Pétrole
et des Ressources Hydrauliques

Richard Auguste ONOUVIET.-

Le Ministre d'Etat, Ministre de l'Economie,
des Finances, du Budget et de la Privatisation

Paul TOUNGUI.-

Ampliations :

Présidence CAB	3
J.O.	3
MMEPRH	3
DGMG	6
Impôts	2
Gouverneur du Moyen Ogooué	2
Intéressé	2/21

Appendix 2: Chinese Resource and Reserve Standards

Categorization of Mineral Resources and Ore Reserves

The system for categorization of mineral resources and ore reserves in China is in a period of transition which commenced in 1999. The traditional system, which is derived from the former Soviet system, uses five categories based on decreasing levels of geological confidence — Categories A, B, C, D and E. The new system (Rule 66) promulgated by the Ministry of Land and Resources (MLR) in 1999 uses three dimensional matrices, based on economic, feasibility/mine design and geological degrees of confidence. These are categorized by a three number code of the form "123". This new system is derived from the UN Framework Classification proposed for international use. All new projects in China must comply with the new system, however, estimates and feasibility studies carried out before 1999 will have used the old system.

Wherever possible, the Chinese Resource and Reserve estimates have been reassigned by SRK to categories similar to those used by the JORC Code to standardize categorization. Although similar terms have been used, SRK does not mean to imply that in their present format they are necessarily classified as 'Mineral Resources' as defined by the Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (the "JORC Code").

A broad comparison guide between the Chinese classification scheme and the JORC Code is presented in the following table.

JORC Code	Chinese Resource Category	
Resource Category	Previous system	Current system
Measured	A, B	111, 111b, 121, 121b, 2M11, 2M21, 2S11, 2S21, 331
Indicated	C	122, 122b, 2M22, 2S22, 332
Inferred	D	333
Non-equivalent	E	334

Definition of the New Chinese Resource and Reserve Category Scheme

Category	Denoted	Comments
Economic	1	Full feasibility study considering economic factors has been conducted
	2	Pre feasibility to scoping study which generally considers economic factors has been conducted
	3	No pre feasibility or scoping study conducted to consider economic analysis
Feasibility	1	Further analysis of data collected in "2" by an external technical department
	2	More detailed feasibility work including more trenches, tunnels, drilling, detailed mapping
	3	Preliminary evaluation of feasibility with some mapping and trenches
Geologically controlled	1	Strong geological control
	2	Moderate geological control via closely-spaced data points (e.g. small scale mapping)
	3	Minor work which is projected throughout the area
	4	Review stage

Relationship between JORC Code and the Chinese Reserves System

In China, the methods used to estimate the resources and reserves are generally prescribed by the relevant government authority, and are based on the level of knowledge for that particular geological style of deposit. The parameters and computational methods prescribed by the relevant authority include cut-off grades, minimum thickness of mineralization, maximum thickness of internal waste, and average minimum 'industrial' or 'economic' grades required. The resource classification categories are assigned largely on the basis of the spacing of sampling, trenching, underground tunnels and drill holes.

In the pre 1999 system, Category A generally included the highest level of detail possible, such as grade control information. However, the content of categories B, C and D may vary from deposit to deposit in China, and therefore must be carefully reviewed before assigning to an equivalent "JORC Code type" category. The traditional Categories B, C and D are broadly equivalent to the 'Measured', 'Indicated', and 'Inferred' categories that are provided by the JORC Code and USBM/ USGS systems used widely elsewhere in the world. In the JORC Code system the 'Measured Resource' category has the most confidence and the 'Inferred' category has the least confidence, based on increasing levels of geological knowledge and continuity of mineralization.

<table>
<tr><td colspan="2">Old Chinese Classification</td><td colspan="2">A & B</td><td colspan="2">C</td><td colspan="2">D</td><td>E & F</td></tr>
<tr><td colspan="9">New Chinees Classification</td></tr>
<tr><td rowspan="2">"E" Economic Evaluation (100)</td><td>Designed mining loss accounted</td><td>Recoverable Reserve (111)</td><td>Probable Recoverable Reserve (121)</td><td></td><td>Probable Recoverable Reserve (122)</td><td></td><td></td><td></td></tr>
<tr><td>Designed mining loss not accounted (b)</td><td>Basic Reserve (111b)</td><td>Basic Reserve (121b)</td><td></td><td>Basic Reserve (122b)</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Marginal Economic (2M00)</td><td>Basic Reserve (2M11)</td><td>Basic Reserve (2M21)</td><td></td><td>Basic Reserve (2M22)</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Sub-Economic (2S00)</td><td>Resource (2S11)</td><td>Resource (2S21)</td><td></td><td>Resource (2S22)</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Intrinsically Economic (300)</td><td>—</td><td>—</td><td>Resource (331)</td><td></td><td>Resource (332)</td><td>Resource (333)</td><td>Resource (334)</td></tr>
<tr><td colspan="2">"F" Feasibility Evaluation</td><td>Feasibility (010)</td><td>Pre-Feasibility (020)</td><td>Scoping (030)</td><td>Pre-Feasibility (020)</td><td>Scoping (030)</td><td>Scoping (030)</td><td>Scoping (030)</td></tr>
<tr><td colspan="2" rowspan="2">"G" Geological Evaluation</td><td colspan="2">Measured</td><td colspan="2">Indicated</td><td rowspan="2">Inferred (003)</td><td rowspan="2">Predicted (004)</td></tr>
<tr><td colspan="2">(001)</td><td colspan="2">(002)</td></tr>
<tr><td colspan="2" rowspan="5">JORC</td><td colspan="4"></td><td colspan="2">Unclassified or</td></tr>
<tr><td colspan="4"></td><td colspan="2">Exploration Potential</td></tr>
<tr><td colspan="3"></td><td colspan="3">Inferred</td><td></td></tr>
<tr><td></td><td colspan="2">Probable Reserve or Indicated Resource</td><td colspan="4"></td></tr>
<tr><td colspan="2">Proved/Probable Reserve or Measured Resource</td><td colspan="4"></td></tr>
</table>

Appendix 3: Chinese Environmental Legislative Background

The Chinese *Mineral Resources Law (1996), Rules for Implementation of the Mineral Resources Law of the People's Republic of China (2006)* and *Environmental Protection Law (1989)* provide the main legislative framework for the regulation and administration of mining projects within China. The *Environmental Protection Law (1989)* provides the main legislative framework for the regulation and administration of mining projects environmental impacts.

The following articles of the *Mineral Resources Law (1996)* summarize the specific provisions in relation to environmental protection:

- ***Article 15 Qualification & Approval:***

Anyone who wishes to establish a mining enterprise must meet the qualifications prescribed by the State, and the department in charge of examination and approval shall, in accordance with law and relevant State regulations examine the enterprise's mining area, its mining design or mining plan, production and technological conditions and safety and environmental protection measures. Only those that pass the examination shall be granted approval.

- ***Article 21 Closure Requirements***

If a mine is to be closed down, a report must be prepared with information about the mining operations, hidden dangers, land reclamation and utilization, and environmental protection, and an application for examination and approval must be filed in accordance with relevant State regulations.

- ***Article 32 Environmental Protection Obligations of Mining License Holders:***

In mining mineral resources, a mining enterprise or individual must observe the legal provisions on environmental protection to prevent pollution of the environment. In mining mineral resources, a mining enterprise or individual must economize on the use of land. In case cultivated land, grassland or forest land is damaged due to mining, the mining enterprise concerned shall take measures to utilize the land affected, such as by reclamation, tree and grass planting, as appropriate to the local conditions. Anyone who, in mining mineral resources, causes losses to the production and well-being of other persons shall be liable for compensation and shall adopt necessary remedial measures.

The following articles of the *Environmental Protection Law (1989)* summarize the specific provisions for environmental protection in relation to mining:

- ***Article 13 Environmental Protection:***

Units constructing projects that cause pollution to the environment must observe the state provisions concerning environmental protection for such construction projects. The environmental impact statement on a construction project must assess the pollution the project is likely to produce and its impact on the environment and stipulate the preventive and curative measures; the statement shall, after initial examination by the authorities in charge of the construction project, be submitted by specified procedure to the competent department of environmental protection administration for approval. The department of planning shall not ratify the design plan descriptions of the construction project until after the environmental impact statement on the construction project is approved.

- ***Article 19 Statement of requirement for Environmental Protection:***

Measures must be taken to protect the ecological environment while natural resources are being developed or utilized.

- ***Article 24 Responsibility for Environmental Protection:***

Units that cause environmental pollution and other public hazards shall incorporate the work of environmental protection into their plans and establish a responsibility system for environmental protection, and must adopt effective measures to prevent and control the pollution and harms caused to the environment by waste gas, waste water, waste residues, dust, malodorous gases, radioactive substances, noise, vibration and electromagnetic radiation generated in the course of production, construction or other activities.

- ***Article 26 Pollution Prevention & Control:***

Installations for the prevention and control of pollution at a construction project must be designed, built and commissioned together with the principal part of the project. No permission shall be given for a construction project to be commissioned or used, until its installations for the prevention and control of pollution are examined and considered up to the standard by the competent department of environmental protection administration that examined and approved the environmental impact statement.

- ***Article 27 Report on Pollution Discharge:***

Enterprises and institutions discharging pollutants must report to and register with the relevant authorities in accordance with the provisions of the competent department of environmental protection administration under the State Council.

- ***Article 38 Violation Consequences:***

An enterprise or institution which violates this Law, thereby causing an environmental pollution accident, shall be fined by the competent department of environmental protection administration or another department invested by law with power to conduct environmental supervision and management in accordance with the consequent damage; in a serious case, the persons responsible shall be subject to administrative sanction by the unit to which they belong or by the competent department of the government.

The following are other Chinese laws that provide environmental legislative support to the *Minerals Resources Law (1996)* and the *Environmental Protection Law (1989)*:

- *Environmental Impact Assessment (EIA) Law (2002).*
- *Law on Prevention & Control of Atmospheric Pollution (2000).*
- *Law on Prevention & Control of Noise Pollution (1996).*
- *Law on Prevention & Control of Water Pollution (1996).*
- *Law on Prevention & Control Environmental Pollution by Solid Waste (2002).*
- *Forestry Law (1998).*
- *Water Law (1988).*
- *Water & Soil Conservancy Law (1991).*

- *Water Conservancy Industrial Policy (1997).*
- *Land Administration Law (1999).*
- *Protection of Wildlife Law (1989).*
- *Energy Conservation Law (1998).*
- *Electric Power Law (1995).*
- *Management Regulations of Prevention & Cure of Tailings Pollution (1992).*
- *Management Regulations of Dangerous Chemical Materials (1987).*

The relevant environmental protections related to Chinese legislation that are required to be utilized for a project's design are a combination of the following national design regulations and emissions standards:

- *Environment Protection Design Regulations of Construction Project (No.002) by Environment Protection Committee of State Council of PRC (1987).*
- *Regulations on the Administration of Construction Project Environmental Protection (1998).*
- *Regulations for Quality Control of Construction Projects (2000).*
- *Regulations for Environmental Monitoring (1983).*
- *Regulations on Nature Reserves (1994).*
- *Regulations on Administration of Chemicals Subject to Supervision & Control (1995).*
- *Regulations on Management of Chemicals Subject to Supervision & Control (1995).*
- *Environment Protection Design Regulations of Metallurgical Industry (YB9066-55).*
- *Comprehensive Emission Standard of Wastewater (GB8978-1996).*
- *Environmental Quality Standard for Surface Water (GB3838-1988).*
- *Environmental Quality Standard for Groundwater (GB/T14848-1993).*
- *Ambient Air Quality Standard (GB3095-1996).*
- *Comprehensive Emission Standard of Atmospheric Pollutants (GB16297-1996).*
- *Emission Standard of Atmospheric Pollutants from Industrial Kiln (GB9078-1996).*
- *Emission Standard of Atmospheric Pollutants from Boiler (GB13271-2001) — II — stage coal-fired boiler.*
- *Environmental Quality Standard for Soils (GB15618-1995).*
- *Standard of Boundary Noise of Industrial Enterprise (GB12348-90).*

- *Emissions Standard for Pollution from Heavy Industry; Non-Ferrous Metals (GB4913-1985).*
- *Control Standard on PCB's for Wastes (GB13015-1991).*
- *Control Standard on Cyanide for Waste Slugs (GB12502-1990).*
- *Standard for Pollution Control on Hazardous Waste Storage (GB18597-2001).*
- *Identification Standard for Hazardous Wastes-Identification for Extraction Procedure Toxicity (GB5085.3-1996).*
- *Standard of Landfill and Pollution Control of Hazardous Waste (GB 18598-2001).*

Appendix 4: Gabon Environmental Code (Abridged)

LAW No 16/93 (Protection and Improvement of the Environment)

Article 67: Any work (industrial, agricultural, mining, urban or rural) likely to cause any damage to the environment is subject to an Environmental Impact Study to be reviewed by the Minister in charge of the Environment.

DECREE No 539 (EIA regulations)

Article 1: This decree regulates EIAs

DEFINITIONS

Article 2: This decree defines:

Environment: Surroundings (i.e. soils, water and atmosphere) with which living beings foster a dynamic relationship.

Impact on the Environment: any change or modification which a project could cause on the environment, and on rural communities' traditional rights, customs and uses.

Environmental Management Plan, or **EMP**, is plan integrated into the EIA, and which summarizes the plans and budget which the Promoter is committee to putting in place to eliminate, reduce or compensate the negative impacts of his/her project on the human and natural environment.

Environmental Audit, Objective, periodical and documented analysis and evaluation of an installation's activities aimed at:

1. Measuring emitted pollution
2. Checking the relevance/adequacy of environmental protection measures put in place to eliminate, reduce or compensate the negative impacts of a project's activities
3. Ensuring operational control of practices and techniques used by a company when such practices and techniques are likely to affect the environment

Environmental Impact Assessment, or **EIA**, an assessment of direct or indirect impact of a project on ecological balance, quality of live of populations living in and around a project footprint area.

Within the framework of this study, a Promoter or his/her proxy should:

- submit a Project notice to the Environment Administration in order for specific guidelines for the EIA to be designed
- organize, for the purpose of designing specific guidelines, a site visit of the project footprint area
- present the project to communities using simples, concrete and accessible means of communication
- organize, for purposes described above, public consultations for which announcement should be made by means of posters or other audio-visual means
- provide minutes of each consultation meeting, each of which should be signed by a local authority or by the Minister in charge of the Environment or their representatives.

Article 3: EIAs are a compulsory requirement for projects relating to:

- works aimed at retaining, regularizing or storing water (eg. dams, pipelines, chemical, domestic, toxic and dangerous waste treatment etc)
- building of medical centers which can accommodate more than 200 patients
- building of mortuaries
- building of schools which can accommodate more than 1000 learners or students
- management of urban areas or community relocation facilities
- main roads in urban areas, national roads and highways
- oil and gas pipelines
- rail road and related infrastructure
- airport facilities for commercial use
- ports and their extensions
- activities relating to the Energy sector, i.e. petroleum and gas exploration, thermal power station, and other infrastructure providing calorific power of up to 50MW, hydro-electric power station, storage of natural gas and fossil fuel, storage of destruction was radioactive waste
- forestry and agriculture-related activities such as irrigation, farming, forest-clearing, re-forestation,
- husbandry and fishing-related activities
- mining activities, in particular: deep drilling, geothermic drilling, drilling for waste storage, hydrocarbon exploration and exploitation, drilling for water supply, open pit mines and quarries, underground mining, mining infrastructure, metal storage facilities

- activities and projects relating to the industries sector, in particular industrial infrastructure of all kind: refinery, metal production of ferrous and non-ferrous metals, production and treatment of rubber, pharmaceutical products, sugar production, beverages of all kind etc
- tourism related activities such as holiday resorts, hotels and motels, touristique infrastructure
- other activities which fall under Article 48 of Law No 16/93

This list is subject to any amendment by the minister.

DECREE No 543 (Classified Infrastructure)

Article 2: The following fall under the category of classified infrastructure: plants, workshops, storehouses, construction sites, and generally any industrial, agricultural, mining, artisanal, commercial private or public infrastructure, which may cause disturbance, affect health or the quality of the environment

Article 3: Infrastructure listed above, which may cause health risks and/or affect the quality of the environment, are subject to an authorization by the Minister in charge of the Environment.

Such an authorization may be a function of the distance between the infrastructure and settlements, public venues and building, watercourses, roads, water channelling

Article 5: Any person wishing to exploit or put in operation infrastructure requiring an authorization should submit a request to the Minister of the Environment. Five copies of this request should be submitted and should consist of the following:

- for a natural person, his/her names, surname and address, and for a corporate body, the address of their headquarters etc…
- details of the location of the infrastructure
- nature and volume of activities which the applicant proposes to achieve
- manufacturing methods, and raw materials to be used, products to be manufactured in order to assess the risks that the infrastructure poses
- waste water management and other waste management systems

Article 6: The application for authorization should be accompanied by the following:

- a 1:10 000 map or 1:20 000 map showing the location of the infrastructure
- a 1:2 500 map showing infrastructure buildings, access roads, water points, ecological and cultural sites
- a 1:200 map showing infrastructure layout
- an EIA which complies with legislation
- a risk assessment which describes the risks of accident and mitigation measures
- a notice stipulating conformance of the infrastructure to Personnel Health and Safety standards

Article 7: Every application should be followed by a Public Consultation exercise initiated by the Governor of the Province where the infrastructure will be established, according to conditions set by the Minister of the Environment A report concerning the public consultation should be submitted to the Minister of the Environment, the Governor or the Préfet

Article 8: The authorization is granted in the form of a decree, which may provide conditions within which this authorization can be exercised.

The local authorities under whose jurisdiction the infrastructure will be established will be given a copy of the authorization.

Article 9: The Minister of the Environment should be notified of any changes or modification which may affect initial plans for the infrastructure and its operations

Article 10: Unless otherwise stipulated, the authorization become null and void when the classified infrastructure is still not operational three years after the issuing of the authorization or has not been exploited for two consecutive years.

Appendix 5: World Bank/IFC Environmental Standards and Guidelines

In seeking to obtain project financing or to list on a stock exchange, these institutions themselves require the proponent to comply with such documents as the Equator Principles and the IFC Performance Standards and Guidelines. This is exemplified by the following preamble from the Equator Principles (July 2006):

Project financing, a method of funding in which the lender looks primarily to the revenues generated by a single project both as the source of repayment and as security for the exposure, plays an important role in financing development throughout the world. Project financiers may encounter social and environmental issues that are both complex and challenging, particularly with respect to projects in the emerging markets.

The Equator Principles Financial Institutions (EPFIs) have consequently adopted these Principles in order to ensure that the projects we finance are developed in a manner that is socially responsible and reflect sound environmental management practices. By doing so, negative impacts on project-affected ecosystems and communities should be avoided where possible, and if these impacts are unavoidable, they should be reduced, mitigated and/or compensated for appropriately. We believe that adoption of and adherence to these Principles offers significant benefits to ourselves, our borrowers and local stakeholders through our borrowers' engagement with locally affected communities. We therefore recognize that our role as financiers affords us opportunities to promote responsible environmental stewardship and socially responsible development. As such, EPFIs will consider reviewing these Principles from time-to-time based on implementation experience, and in order to reflect ongoing learning and emerging good practice.

These Principles are intended to serve as a common baseline and framework for the implementation by each EPFI of its own internal social and environmental policies, procedures and standards related to its project financing activities. We will not provide loans to projects where the borrower will not or is unable to comply with our respective social and environmental policies and procedures that implement the Equator Principles.

The following Tables provide a brief summary of the Equator Principles and the IFC Performance Standards respectively. These documents are used by the EPFI's and stock exchanges in their review of the social and environmental performance of proponent companies.

Table A4-1: Equator Principles

Equator Principles	Title	Key Aspects (Summary)
1	Review and Categorization	Categorize such project based on the magnitude of its potential impacts and risks
2	Social and Environmental Assessment	Conduct a Social and Environmental Assessment (Assessment?. The Assessment should also propose mitigation and management measures appropriate to the nature and scale of the proposed project.
3	Applicable Social and Environmental Standards	The Assessment will refer to the applicable IFC Performance Standards, and applicable Industry Specific EHS Guidelines (HS Guidelines? and overall compliance with same.
4	Action Plan and Management System	Prepare an Action Plan (AP) which addresses the relevant findings of the Assessment. The AP will describe and prioritise the actions, mitigation measures, corrective actions and monitoring to manage the impacts and risks identified in the Assessment. Maintain a Social and Environmental Management System that addresses the management of these impacts, risks, and corrective actions required to comply with host country laws and regulations, and requirements of the applicable Standards and Guidelines, as defined in the AP.
5	Consultation and Disclosure	Consult with project affected communities. Adequately incorporate affected communities? concerns.
6	Grievance Mechanism	Establish a grievance mechanism as part of the management system. to receive and resolve concerns about the project by individuals or groups from among project-affected communities. Inform the affected communities about the grievance mechanism in the course of the community engagement process and ensure that the mechanism addresses concerns promptly and transparently, and is readily accessible to all segments of the affected communities.
7	Independent Review	Independent social or environmental expert will review the Assessment, AP and consultation process to assess Equator Principles compliance.

Equator Principles	Title	Key Aspects (Summary)
8	Covenants	Covenant in financing documentation: a) to comply with all relevant host country social and environmental laws, regulations and permits; b) to comply with the AP during the construction and operation of the project; c) to provide periodic reports not less than annually, prepared by in-house staff or third party experts, that (i) document compliance with the AP, and (ii) provide compliance with relevant local, state and host country social and environmental laws, regulations and permits; and d) to decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan.
9	Independent Monitoring and Reporting	Appoint an independent environmental and/or social expert, or require that the borrower retain qualified and experienced external experts to verify its monitoring information.
10	EPFI Reporting	Each EPFI adopting the Equator Principles commits to report publicly at least annually about its Equator Principles implementation processes and experience, taking into account appropriate confidentiality considerations.

Table A4-2: IFC Performance Standards

IFC Performance Standard	Title	Objective (Summary)	Key Aspects (Summary)
1	Social and Environmental Assessment and Management Systems	Social and EIA and improved performance through use of management systems.	Social & Environmental Management System (S&EMS). Social & Environmental Impact Assessment (S&EIA). Risks and impacts. Management Plans. Monitoring. Reporting. Training. Community Consultation
2	Labor and Working Conditions	EEO. Safety and Health	Implement through the S&EMS. HR policy. Working condition. EEO. Forced & child labor. OH&S.
3	Pollution Prevention and Abatement	Avoid pollution. Reduce Emissions.	Prevent pollution. Conserve resources. Energy efficiency. Reduce waste. Hazardous materials. EPR. Greenhouse Gases

IFC Performance Standard	Title	Objective (Summary)	Key Aspects (Summary)
4	Community Health, Safety and Security	Avoid or minimize risks to community.	Implement through the S&EMS. Do risk assessment. Hazardous materials safety. Community exposure. ERP
5	Land Acquisition and Involuntary Resettlement	Avoid or minimize resettlement. Mitigate adverse social impacts	Implement through the S&EMS. Consultation. Compensation. Resettlement planning. Economic displacement
6	Biodiversity Conservation and Sustainable Natural Resource Management	Protect and conserve biodiversity	Implement through the S&EMS. Assessment. Habitat. Protected areas. Invasive species.
7	Indigenous Peoples	Respect. Avoid and minimize impacts. Foster good faith	Avoid adverse impacts. Consultation. Development benefits. Impacts to traditional land use. Relocation.
8	Cultural Heritage	Protect cultural heritage	Heritage Survey. Site avoidances. Consultation.

Appendix 6: Summary Background Information on Some Key Internationally Recognized Environmental Management Practices

The following provides background information on some key internationally recognized environmental management practices*:

- **Land disturbance** — The main impact on the surrounding ecological environment is due to disturbance and contamination caused by surface stripping, waste rock and tailings storage, processing plant drainage, processing waste water, explosions, transportation and associated buildings that are erected. If effective measures are not taken to manage and rehabilitate the disturbed areas, the surrounding land can become polluted and the land utilization function will be changed, causing an increase in land degradation, water loss and soil erosion.

* Internationally Recognized Environmental Management Practices refers to the body of information developed by many countries and states practices or standards that are recognized by professionals around the world. These have been developed into a number of international standards such as the IFC or World Bank standards and equator principles. Stock Exchange and financial institutions around the world have also become signatories of these standards. Collectively, SRK refers to them as "recognized industry standards".

- **Flora and fauna** — Land disturbance from the development of mining and mineral processing projects may also result in impacts to or loss of flora and fauna habitat. The project development EIA should determine the extent and significance of any potential impacts to flora and fauna habitat. Where these potential impacts to flora and fauna habitat are determined to be significant, the EIA should also propose effective measures to reduce and manage these potential impacts.

- **Contaminated Sites Assessment** — The assessment, recording and management of contaminated sites within mining or mineral processing operations, is a recognized international industry practice (i.e. forms part of the IFC Guidelines) and in some cases a National regulatory requirement (e.g. an Australian environmental regulatory requirement). The purpose of this process is to minimize the level of site contamination that may be generated throughout a project's operation while also minimizing the level and extent of site contamination that will need to be addressed at site closure.

    - A contaminated site or area can be defined as; '*An area that has substances present at above background concentrations that presents or has the potential to present a risk of harm to human health, the environment or any environmental value*'.

    - Contamination may be present in soil, surface water or groundwater and also may affect air quality through releases of vapours or dust. Examples of typical contaminated areas within a mining/mineral processing project are spillages to soil/water of hydrocarbons and chemicals, and uncontained storage and spillages to soil/water of ores and concentrates. The process to assess and record the level of contamination basically involves a combination of visual (i.e. suspected contamination observed from spillages/releases) and soil/water/air sampling and testing (i.e. to confirm contaminant levels). Once the level of contamination is defined, the area's location and contamination details are then recorded within a site register.

    - Remediation/clean up of contamination areas involves the collection and removal of the contaminated materials for treatment and appropriate disposal, or in some cases the in-situ treatment of the contaminated (e.g. use of bioremediation absorbents on hydrocarbon spillage). The other key component to the management of contaminated areas is to also remove or remedy the source of the contamination (e.g. place hydrocarbon storage and handling within secondary containment).

- **Environmental Protection and Management Plan** — The purpose of an operational Environmental Protection and Management Plan (EPMP) is to direct and coordinate the management of the project's environmental risks. The EPMP documents the establishment, resourcing and implementation of the project's environmental management programs. The site environmental performance is monitored and feedback from this monitoring is then utilized to revise and streamline the implementation of the EPMP.

- **Emergency Response Plan** — The IFC describes an emergency as 'an unplanned event when a project operation loses control, or could lose control, of a situation that may result in risks to human health, property, or the environment, either within the facility or in the local community'. Emergencies are of a scale that have operational wide impacts, and do not include small scale localized incidents that are covered under operational area specific management measures. Examples of an emergency for a mining/mineral processing project are events such as pit wall collapse, underground mine explosion, the failure of a TSF or a large scale spillage/

discharge of hydrocarbons or chemicals. The recognized international industry practice for managing emergencies is for a project to develop and implement an Emergency Response Plan (ERP). The general elements of an ERP are:

- Administration — policy, purpose, distribution, definitions of potential site emergencies and organizational resources (including setting of roles and responsibilities).
- Emergency response areas — command centers, medical stations, muster and evacuation points.
- Communication systems — both internal and external communications.
- Emergency response procedures — work area specific procedures (including area specific training).
- Checking and updating — prepare checklists (role and action list and equipment checklist) and undertake regular reviews of the plan.
- Business continuity and contingency — options and processes for business recovery from an emergency.

- **Site Closure Planning and Rehabilitation** — The recognized international industry practice for managing site closure is to develop and implement an operational site closure planning process and document this through an operational Closure Plan. This operational closure planning process should include the following components:
  - Identify all site closure stakeholders (e.g. government, employees, community etc.).
  - Undertake stakeholder consultation to develop agreed site closure criteria and post operational land use.
  - Maintain records of stakeholder consultation.
  - Establish a site rehabilitation objective in line with the agreed post operational land use.
  - Describe/define the site closure liabilities (i.e. determined against agreed closure criteria).
  - Establish site closure management strategies and cost estimates (i.e. to address/reduce site closure liabilities).
  - Establish a cost estimate and financial accrual process for site closure.
  - Describe the post site closure monitoring activities/program (i.e. to demonstrate compliance with the rehabilitation objective/closure criteria).

Appendix 7: SRK Verification Data

Assay Results of the Original and SRK Samples at Maxin Mine

Orebody No.	Sample No.	Original Results		SRK Results		Original-SRK		Relative Error (%)	
		Mn (%)	TFe (%)	Mn (%)	TFe (%)	Mn (%)	TFe (%)	Mn	Tfe
III	13-7	42.80	3.85	41.30	3.70	1.50	0.15	3.50	3.90
I	12-2	25.44	7.52	25.30	7.70	0.14	-0.18	0.55	2.39
II	12-6	32.45	7.36	32.60	7.80	-0.15	-0.44	0.46	5.98
III	12-11	26.57	7.31	26.10	7.60	0.47	-0.29	1.77	3.97
III	12-12	27.43	6.86	26.20	6.90	1.23	-0.04	4.48	0.58
I	11a-2	38.00	7.80	35.10	7.90	2.90	-0.10	7.63	1.28
II	11a-6	36.24	7.52	33.50	7.60	2.74	-0.08	7.56	1.06
II	11a-7	38.78	8.47	36.30	8.40	2.48	0.07	6.40	0.83
I	10-2	38.95	5.70	34.80	5.40	4.15	0.30	10.65	5.26
III	10-11	21.78	5.57	20.70	5.80	1.08	-0.23	4.96	4.13
I	10a-1	37.36	9.23	35.40	9.20	1.96	0.03	5.25	0.33
I	10a-4	26.40	10.52	24.30	10.40	2.10	0.12	7.95	1.14
II	10a-6	22.56	9.36	22.10	9.40	0.46	-0.04	2.04	0.43
III	10a-12	20.44	6.18	20.00	6.30	0.44	-0.12	2.15	1.94
III	10a-16	29.23	7.43	28.80	7.30	0.43	0.13	1.47	1.75
III	10a-17	26.18	8.58	23.80	8.50	2.38	0.08	9.09	0.93
II+III	6a-10	23.24	6.95	21.30	6.80	1.94	0.15	8.35	2.16
II+III	9-6	31.80	12.83	30.20	12.40	1.60	0.43	5.03	3.35
I	9a-4	40.23	12.23	37.10	12.20	3.13	0.03	7.78	0.25
II+III	9a-6	25.10	6.44	23.40	6.60	1.70	-0.16	6.77	2.48
II+III	9a-7	34.82	11.56	32.30	10.90	2.52	0.66	7.24	5.71
II+III	9a-9	44.16	6.44	39.80	6.20	4.36	0.24	9.87	3.73
II+III	9a-10	32.74	9.59	29.60	9.30	3.14	0.29	9.59	3.02
II+III	9a-11	20.35	11.76	19.85	11.90	0.50	-0.14	2.46	1.19
II+III	8-8	34.51	6.82	34.00	7.00	0.51	-0.18	1.48	2.64
I	8-4	22.40	6.63	22.50	6.60	-0.10	0.03	0.45	0.45
II+III	8-9	35.18	9.52	34.50	9.20	0.68	0.32	1.93	3.36
II+III	8-11	41.48	7.10	37.80	6.90	3.68	0.20	8.87	2.82
II+III	8-12	33.18	5.74	31.30	5.60	1.88	0.14	5.67	2.44
II+III	8-13	21.40	8.42	21.00	9.20	0.40	-0.78	1.87	9.26
I	6a-2	21.71	5.40	20.90	5.50	0.81	-0.10	3.73	1.85
II+III	6a-5	23.87	6.47	24.10	6.70	-0.23	-0.23	0.96	3.55
II+III	6a-6	24.15	7.73	22.70	7.70	1.45	0.03	6.00	0.39
II+III	6a-7	27.22	6.14	26.90	6.20	0.32	-0.06	1.18	0.98
I	8-5	33.98	5.98	34.70	6.00	-0.72	-0.02	2.12	0.33
II+III	6a-9	13.60	13.17	13.05	13.10	0.55	0.07	4.04	0.53
I	34-2	18.79	6.53	18.80	6.70	-0.01	-0.17	0.05	2.60
II+III	34-5	17.72	4.48	17.45	4.50	0.27	-0.02	1.52	0.45
II	30-4	31.90	7.35	31.80	7.20	0.10	0.15	0.31	2.04
I	30-8	28.23	7.80	29.00	8.10	-0.77	-0.30	2.73	3.85
II+III	8-7	43.72	6.39	43.20	6.40	0.52	-0.01	1.19	0.16
II+III	29-4	29.41	8.47	28.90	8.40	0.51	0.07	1.73	0.83
I	29-7	28.74	8.75	29.60	9.00	-0.86	-0.25	2.99	2.86
I	H11a-1-I-1	28.30	5.20	29.60	5.50	-1.30	-0.30	4.59	5.77
II+III	H11a-1-II+III-2	19.30	7.80	19.28	8.10	0.02	-0.30	0.10	3.85

Orebody No.	Sample No.	Original Results Mn (%)	Original Results TFe (%)	SRK Results Mn (%)	SRK Results TFe (%)	Original-SRK Mn (%)	Original-SRK TFe (%)	Relative Error (%) Mn	Relative Error (%) Tfe
I	H10#-4-I-1	33.00	7.50	32.00	7.80	1.00	-0.30	3.03	4.00
I	H10#-2-I-1	37.00	8.60	36.60	8.60	0.40	0.00	1.08	0.00
II+III	H9#-5-II+III-1	36.40	10.60	35.60	11.30	0.80	-0.70	2.20	6.60
II+III	H9#-4-II+III-1	36.10	10.80	33.00	10.30	3.10	0.50	8.59	4.63
I	H9#-3-I-1	41.30	7.90	39.50	7.80	1.80	0.10	4.36	1.27
II+III	H9#-3-II+III-2	35.80	9.70	34.00	10.00	1.80	-0.30	5.03	3.09
II+III	H9a-5-II+III-1	26.80	8.40	25.60	8.50	1.20	-0.10	4.48	1.19
I	H9a-4-I-1	31.40	7.00	29.80	6.50	1.60	0.50	5.10	7.14
II+III	H9a-2-II+III-1	35.20	10.40	33.70	10.60	1.50	-0.20	4.26	1.92
II+III	H9a-2-II+III-2	24.00	12.00	23.50	11.80	0.50	0.20	2.08	1.67
II	H8#-6-II-1	35.80	10.60	30.20	9.90	5.60	0.70	15.64	6.60
II+III	H7a-1-II+III-2	37.40	12.10	36.90	12.40	0.50	-0.30	1.34	2.48
II+III	H6#-2-II+III-2	37.20	9.30	36.70	9.60	0.50	-0.30	1.34	3.23
II	H6#-1-II-2	31.70	8.00	28.80	8.10	2.90	-0.10	9.15	1.25
I	H6#-I-1	30.20	5.90	30.90	6.20	-0.70	-0.30	2.32	5.08
II	H6a-3-II-1	29.40	6.90	28.90	7.10	0.50	-0.20	1.70	2.90
III	H6a-3-III-1	25.80	9.50	26.00	9.80	-0.20	-0.30	0.78	3.16
II	H6a-II-1	37.80	8.60	37.10	8.90	0.70	-0.30	1.85	3.49
III	H6a-III-1	40.90	9.20	37.90	8.80	3.00	0.40	7.33	4.35
I	H5#-I-1	38.40	12.00	36.20	12.30	2.20	-0.30	5.73	2.50
II	H5#-II-1	38.90	8.80	36.20	8.70	2.70	0.10	6.94	1.14
III	H5#-III-1	37.30	6.40	35.40	6.70	1.90	-0.30	5.09	4.69
II+III	HS30-II+III-2	14.30	5.40	14.60	5.40	-0.30	0.00	2.10	0.00
II	HS31a-II-1	19.85	6.90	19.90	7.20	-0.05	-0.30	0.25	4.35
III	HS31a-III-1	23.70	6.60	19.52	5.50	4.18	1.10	17.64	16.67
II	HS32-II-1	23.60	5.80	22.10	5.70	1.50	0.10	6.36	1.72
III	HS32-III-1	15.25	5.90	15.30	6.10	-0.05	-0.20	0.33	3.39
I	HN29-I-1	29.70	5.30	27.20	4.90	2.50	0.40	8.42	7.55
II	HN29-1-II-1	22.30	6.40	21.60	6.70	0.70	-0.30	3.14	4.69
III	HN29-1-III-1	13.00	4.90	13.44	5.00	-0.44	-0.10	3.38	2.04
II	HN29-2-II-1	26.60	7.00	25.10	6.80	1.50	0.20	5.64	2.86
III	HN29-2-III-1	19.35	6.60	18.90	7.00	0.45	-0.40	2.33	6.06
II	HN29-3-II-1	28.30	7.80	27.50	7.80	0.80	0.00	2.83	0.00
II	HN30-II-1	28.00	6.10	28.90	6.40	-0.90	-0.30	3.21	4.92
Average								**4.32**	**2.98**

Assay Results of the Original and SRK Samples at Bembélé Mine

Sample No.	Original Results Mn (%)	Original Results TFe (%)	SRK Results Mn (%)	SRK Results TFe (%)	Original-SRK Mn (%)	Original-SRK TFe (%)	Relative Error (%) Mn	Relative Error (%) TFe
QJ02	4.09	40.48	3.68	41.10	0.41	-0.62	10.02	1.53
QJ06	6.64	35.13	7.69	36.00	-1.05	-0.87	15.81	2.48
QJ10	21.29	29.04	20.10	29.80	1.19	-0.76	5.59	2.62
QJ14	16.79	34.51	16.50	33.70	0.29	0.81	1.73	2.35
MH102	25.06	29.44	24.40	28.50	0.66	0.94	2.63	3.19
MH106	20.76	19.63	21.10	17.10	-0.34	2.53	1.64	12.89
MH110	21.64	16.79	23.10	15.30	-1.46	1.49	6.75	8.87
MH114	22.51	9.49	24.80	8.20	-2.29	1.29	10.17	13.59
MH132	10.24	13.09	11.05	12.20	-0.81	0.89	7.91	6.80

	Original Results		SRK Results		Original-SRK		Relative Error (%)	
Sample No.	Mn (%)	TFe (%)	Mn (%)	TFe (%)	Mn (%)	TFe (%)	Mn	TFe
MH138	25.45	27.26	28.20	26.60	-2.75	0.66	10.81	2.42
MH144	10.37	32.39	9.89	31.70	0.48	0.69	4.63	2.13
MH146	41.01	14.83	39.90	12.60	1.11	2.23	2.71	15.04
MH164	21.22	19.62	23.60	19.30	-2.38	0.32	11.22	1.63
MH168	13.29	34.08	14.20	35.70	-0.91	-1.62	6.85	4.75
MH172	0.37	11.83	0.35	12.50	0.02	-0.67	5.41	5.66
MH176	19.72	32.34	17.25	34.90	2.47	-2.56	12.53	7.92
MH180	25.54	22.02	27.00	22.50	-1.46	-0.48	5.72	2.18
MH184	7.60	28.89	7.90	30.20	-0.30	-1.31	3.95	4.53
MH188	11.88	30.37	11.70	30.40	0.18	-0.03	1.52	0.10
MH192	10.67	33.03	10.45	32.60	0.22	0.43	2.06	1.30
MH196	10.85	34.71	10.21	37.20	0.64	-2.49	5.90	7.17
MH200	16.40	30.22	18.50	31.30	-2.10	-1.08	12.80	3.57
MH204	19.66	28.30	19.60	27.80	0.06	0.50	0.31	1.77
MH208	31.51	19.72	31.90	18.90	-0.39	0.82	1.24	4.16
Average							**6.24**	**4.94**