

JINSHAN GOLD MINES, INC.

**CHANG SHAN HAO (CSH)
GOLD PROJECT
INNER MONGOLIA, PRC**

**MINE ENGINEERING AND
DEVELOPMENT STUDY**

PREPARED FOR:

**Jinshan Gold Mines, Inc.
Suite 654-999 Canada Place
Vancouver, British Columbia
Canada V6C 3E1**

PREPARED BY:

**Joseph M. Keane, P.E.
K D Engineering
7701 N. Business Park Drive
Tucson, Arizona 85743**

**Document No. Q382-02-028.01R1
Project No. 382-02
19 October 2005**

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 SUMMARY	1
2.0 INTRODUCTION AND TERMS OF REFERENCE	8
3.0 DISCLAMER	9
4.0 PROPERTY DESCRIPTION AND LOCATION	10
5.0 ACCESSIBILITY, CLIMATE, INFRASTRUCTURE & PHYSIOGRAPHY	13
6.0 HISTORY	14
7.0 GEOLOGICAL SETTING	18
8.0 DEPOSIT TYPES	24
9.0 MINERALIZATION	27
10.0 EXPLORATION	29
11.0 DRILLING	30
12.0 SAMPLING METHOD AND APPROACH	41
13.0 SAMPLE PREPARATION, ANALYSIS AND SECURITY	43
14.0 DATA VERIFICATION	44
15.0 ADJACENT PROPERTIES	50
16.0 MINERAL RESOURCE AND RESERVE ESTIMATES	51
17.0 OPEN PIT MINING OPERATIONS	65
18.0 HEAP LEACH FACILITY DESIGN AND CONSTRUCTION	92
19.0 MINERAL PROCESSING AND METALLURGICAL TESTING	95
20.0 HYDROGEOLOGICAL / ENVIRONMENTAL CONSIDERATIONS ...	147

TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Page</u>
21.0 CAPITAL COST ESTIMATES	154
22.0 BASE CASE ECONOMIC ANALYSIS	171
23.0 INTERPRETATION AND CONCLUSIONS	195
24.0 RECOMMENDATIONS	197
25.0 REFERENCES	198
26.0 DATE AND CERTIFICATE	202
27.0 APPENDICES	
Appendix 1 - Operating Cost Details	
Appendix 2 - Leach Pad Construction Estimate	
Appendix 3 - Pilot Heap Leach Report	
Appendix 4 - METCON Research Report - Gravity, Flotation, and Concentrate Cyanidation	
Appendix 5 - Plot Plan and Process Flow Sheets	
Appendix 6 - Process Design Criteria	
Appendix 7 - Major Process Equipment List	
Appendix 8 - Golder Associates Design Report	
Appendix 9 - Process Operating Cost Spreadsheets	
Appendix 10 - Hydrogeological Review	
Appendix 11 - Capital Cost Spreadsheets	
Appendix 12 - Project Schedule	
Appendix 13 - Golder Associates Phase 1 (Pre-Feasibility) Pit Slope Study	
Appendix 14 - Results from 1999 Trench and Drill Hole Program	
Appendix 15 - Hazen Research Work Index Report	
Appendix 16 - Mine Plan Drawings Years 1 through 8	
Appendix 17 - Mine Boundary Coordinates	

LIST OF TABLES

Table 1.1	Total CSH Gold Project Mineral Resource
Table 1.2	Mine Production Schedule
Table 1.3	Initial Construction Costs
Table 1.4	Future Sustaining Construction Costs
Table 1.5	Total Initial and Future Sustaining Project Costs
Table 1.6	Cash Operating Cost
Table 1.7	Pre-Tax Net Percent Value US\$ 400 per Ounce
Table 1.8	Pre-Tax Net Percent Value US\$ 440 per Ounce
Table 6.1	Extracted Tonnes
Table 6.2	Estimated Past Gold Production
Table 7.3.1	Stratigraphic Sequence of the Bayan Obo Group, Inner Mongolia, China
Table 8.4.1	Semi-Quantitative ICP Scan Results
Table 9.1.1	Gold Association Weight Percent
Table 11.1	Total Drilling Data
Table 11.2	1999 Summary Drill Results, 0.5 g/t Au Cutoff
Table 11.3	2002 Drill Holes
Table 11.4	Significant Drill Intercepts, 2002 Program, 0.30 g/t Au Cutoff
Table 11.5	2003 Drill Holes
Table 11.6	2004 Drill Holes (in GK19 Coordinates)
Table 11.7	Drill Intercepts, 2003 Program, 0.030 g/t Au Cutoff
Table 11.8	Drill Intercepts, 2004 Program, 0.030 g/t Au Cutoff
Table 14.2.1	SGS Lakefield Research, Bulk Sample Test Results
Table 14.3.2.1	Basic Statistics of the Standards and Blanks
Table 14.3.2.2	Basic Statistics for Drill Core, Course Rejects and Pulp Duplicates
Table 16.3.4.1	Resource Classification Parameters, NE Zone
Table 16.3.4.2	Resource Classification Parameters, SW Zone
Table 16.3.5.1	Northwest Zone Resources by Category, 2005 Resource Model
Table 16.3.5.2	Southwest Resource by Category, 2005 Resource Model
Table 16.3.5.3	Oxide Resources by Category, 2005 Resource Model
Table 16.3.5.4	Sulfide Resources by category, 2005 Resource Model
Table 16.3.5.5	Total Resource by Category, 2005 Resource Model
Table 17.1.1	Resource Summary - Northeast Zone
Table 17.1.2	Resource Summary - Southwest Zone
Table 17.2.1	Pit Optimization Criteria
Table 17.2.2	Slope Design Sectors
Table 17.2.3	Cutoff Grades
Table 17.2.4	Summary LG Pits Optimized on Measured and Indirect Reporting Measured, Indicated and Inferred Resources
Table 17.4.1	Mineral Resources
Table 17.5.1	Mine Production Schedule - Part 1
Table 17.5.2	Mine Production Schedule - Part 2
Table 17.9.1	Mine Staffing

LIST OF TABLES (Continued)

Table 17.10.1	Mine Operating Costs
Table 17.11.1	Mine Capital Costs
Table 19.1.3.1	Bottle Roll Test Results
Table 19.1.4.1	Metallic Screen Analysis
Table 19.1.4.2	Oxide Composite Head Sample Screen Analysis
Table 19.1.4.3	Sulfide Composite Head Sample Screen Analysis
Table 19.1.4.4	ICP Scan Analysis
Table 19.1.4.5	Bond Work Index Data
Table 19.1.4.6	Whole Ore Leach Program
Table 19.1.5.1	Metallic Screen Assay Results
Table 19.1.5.2	Minus 1 Inch Head Samples
Table 19.1.5.3	Minus 1/4 Inch Head Samples
Table 19.1.5.4	Additional Head Sample Assays
Table 19.1.5.5	Head Sample ICP Assays
Table 19.1.5.6	Agitated Leach Test Results
Table 19.1.5.7	Column Leach Test Results
Table 19.1.6.1	DDH 57 Physical Characteristics
Table 19.1.6.2	Bulk Density and Water Saturation Data
Table 19.1.6.3	Semi-Quantitative Spectra Scan Analysis
Table 19.1.6.4	Atomic Absorption Assays
Table 19.1.6.5	Bottle Roll Test Data
Table 19.1.6.6	Column Leach Results
Table 19.1.9.1	Oxide Composite Column Leach Results
Table 19.1.9.2	Sulfide composite Column Leach Results
Table 19.1.9.4	Sulfide Columns
Table 19.1.10.1	Grind Size Evaluation Oxide Ore
Table 19.1.10.2	Grind Size Evaluation Sulfide Ore
Table 19.1.10.3	Cyanide Leach Study Sulfide Ore
Table 19.1.11.1	Cyanide Leach Study - 100 Mesh - Oxide Ore
Table 19.1.11.2	Cyanide Leach Study - 100 Mesh - Sulfide Ore
Table 19.1.11.3	Cyanide Leach Study - 400 Mesh
Table 19.2.1	Oxide Columns
Table 19.2.2	Sulfide Columns
Table 19.3.3.1	Test Heap Data Summary
Table 19.3.3.2	Test Heap Extraction Predictions
Table 19.4.1	Gold Extraction Estimates
Table 19.4.2	Calculated Gold Production by Ore Type using the 20,000 tonne per day Mine Plan
Table 19.7.1	Average Process Unit Operating Costs (Life of Mine)
Table 19.7.2	Jinshan Project Staffing Levels & Salary Schedules Process & Laboratory - Crushed Heap Leach
Table 19.7.3	Power Load and Consumption
Table 19.7.4	Process Consumable Items

LIST OF TABLES (Continued)

Table 19.7.5	Crusher Work and Abrasion Indices
Table 19.7.6	Support Equipment Operating Costs
Table 19.7.7	Maintenance Supplies - Process Area Cost Basis
Table 19.8.1	General & Administration Annual Costs
Table 20.1.1	Hydrology and Water Use Studies in Progress
Table 20.1.2	Aquifer Types
Table 21.1.1	Initial Construction Costs
Table 21.2.2	Future Sustaining Construction Costs
Table 21.3.1	Total Initial and Future Sustaining Project Costs
Table 21.7.1.1	Water Requirements
Table 21.9.1	External Contracts

LIST OF FIGURES

Figure 1.1	Sensitivity Analysis
Figure 4.1	CSH 217 Property Location within Inner Mongolia
Figure 4.2	Jinshan Gold Mines Site
Figure 7.3.1	CSH 217 Property Geology
Figure 8.1:	Drilling Program Map of the CSH 217 Deposit
Figure 11.1	Drill Hole Collar and Trench Locations, 1999 and 2002 Drilling Campaigns
Figure 11.2	Drill Hole Locations, Northeast Zone
Figure 11.3	Drill Hole Locations, Southwest Zone
Figure 14.3.2.1	Distribution of Values from Three Types of Duplicate Assays
Figure 17.2.1	Wall Slope Design Sectors
Figure 17.2.2	Unsmoothed Pit Limits - ROM
Figure 17.2.3	Unsmoothed Pit - Three Stage Crushing
Figure 17.2.4	Unsmoothed Pit Three Stage Crushing - Discounted
Figure 17.2.5	Unsmoothed Pit ROM - Weathered
Figure 17.3.1	General Arrangement
Figure 17.3.2	Final Pit Design 864
Figure 17.3.3	Internal Phase Pit Design 866
Figure 17.3.4	Cross Section East 355700
Figure 17.5.1	Mine Production Schedule
Figure 19.1.4.1	SGS LRL Preg Robbing Data
Figure 19.2.1.1	Oxide Column Number 1 - $P_{80} = 55$ mm
Figure 19.2.1.2	Oxide Column Number 2 - $P_{80} = 55$ mm
Figure 19.2.1.3	Oxide Column Number 3 - $P_{80} = 25$ mm
Figure 19.2.1.4	Oxide Column Number 4 - $P_{80} = 25$ mm
Figure 19.2.1.5	Oxide Column Number 5 - $P_{80} = 6$ mm
Figure 19.2.1.6	Oxide Column Number 6 - $P_{80} = 6$ mm
Figure 19.2.2.1	Sulfide Column Number 8 - $P_{80} = 75$ mm
Figure 19.2.2.2	Sulfide Column Number 9 - $P_{80} = 75$ mm
Figure 19.2.2.3	Sulfide Column Number 10 - $P_{80} = 25$ mm
Figure 19.2.2.4	Sulfide Column Number 11 - $P_{80} = 25$ mm
Figure 19.2.2.5	Sulfide Column Number 12 - $P_{80} = 6$ mm
Figure 19.2.2.6	Sulfide Column Number 13 - $P_{80} = 6$ mm
Figure 19.3.1.1	ROM Test Heap
Figure 19.3.1.2	ROM Gold Extraction Prediction
Figure 19.3.2.1	Crushed Pilot Heap Data
Figure 19.3.2.2	Crushed Heap Gold Extraction Prediction
Figure 19.4.1	Jinshan Gold Mines Extraction Estimates
Figure 22.1	20,000 tpd Pre-Tax Sensitivity IRR
Figure 22.2	20,000 tpd Pre-Tax Sensitivity NPV@ 10%
Figure 22.3	Total Capital Cost - Percent
Figure 22.4	Total Operating Cost - Percent
Figure 22.5	Total Capital Cost - US\$

LIST OF FIGURES (Continued)

Figure 22.6	Total Operating Cost - US\$
Figure 22.7	Production - Material Movement
Figure 22.8	Production - Metal to Dore
Figure 22.9	Average Combined Head Grades
Figure 22.10	ROM Heap & Crush Head Grades
Figure 22.11	Pre-Tax Cash Flow Summary
Figure 22.12	Pre-Tax Internal Rate of Return

Glossary

Centimeter	cm
Cubic centimeter	cm ³
Cubic meter	m ³
Day	d
Days per week	d/wk
Days per year (annum)	d/a
Degree	°
Degrees Celsius	°C
Gram	g
Grams per tonne	g/t
Greater than	>
Hectare (10,000 m ²)	ha
Hour	h
Hours per day	h/d
Kilogram	kg
Kilograms per cubic meter	kg/m ³
Kilograms per hour	kg/h
Kilograms per square meter	kg/m ²
Kilograms per tonne	kg/t
Kilometer	km
Kilometers per hour	km/h
Less than	<
Liter	L
Meter	m
Meters above sea level	masl
Meters per minute	m/min
Meters per second	m/s
Metric ton (tonne)	t
Micrometer (micron)	µm
Millimeter	mm
Million	M
Million tonnes	Mt
Minute (plane angle)	'
Minute (time)	min
Ounce	oz
Percent	%
Pound(s)	lb
Second (plane angle)	"
Second (time)	s
Square centimeter	cm ²
Square kilometer	km ²
Tonnes per day	t/d
Tonnes per hour	t/h
Tonnes per year	t/a
Year (annum)	a

1.0 SUMMARY

The Chang Shan Hao (CSH) Gold Project, also known as the CSH 217 Gold Project or the 217 Project, is located in Inner Mongolia, Peoples Republic of China approximately 650 kilometers northwest of Beijing and 126 Kilometers north-westerly from the city of Baotou.

The CSH Gold Project is operated by the Ningxia Pacific Mining Co Ltd (NPM). NPM is a Sino-foreign joint venture between Jinshan Gold Mines Inc. (Jinshan) of Canada and Brigade 217 of the Northwest Geological Bureau of the China National Nuclear Corporation (CNNC). Jinshan and Ivanhoe Mines Ltd. (Ivanhoe) are currently investigating the property under a 50-50 joint venture agreement and collectively have a 96.5 percent interest in the property. On 7 September 2005 Jinshan and Ivanhoe entered into an agreement-in-principle which provides that Jinshan will acquire Ivanhoe's interest in a number of joint venture projects including the CSH Project, in consideration for the issuance to Ivanhoe of a number of Jinshan shares. This transaction is scheduled to close in late 2005. Two additional payments of US\$ 1 million are payable to CNNC. US\$ 1 million is to be paid when a decision to start construction is made. The second US\$ 1 million payment is due 30 days following commencement of commercial mining operations.

Jinshan has engaged K D Engineering (KDE), an independent engineering firm located in Tucson, Arizona, to prepare an initial development study of the CSH Gold Project. The KDE study was prepared to a pre-feasibility standard pursuant to Canada's National Instrument 43-101 and was based on the following:

- Two site visits conducted in March and June 2005
- Geological and mining estimates completed by Mr. Mario Rossi and Mr. John Nilsson, qualified persons retained by Jinshan
- Site cost estimates for infrastructure completed by Beijing General Institute of Mining and Metallurgy (BGRIMM), a major Chinese engineering firm.
- Heap leach facility design and cost estimates completed by Golder Associates, an independent engineering firm retained by KDE. Mr. Russell Browne was the qualified geotechnical engineer responsible for this aspect of the study.
- Consumable cost estimates provided by BGRIMM
- Chinese labor cost estimates provided by the Jinshan staff
- Metallurgical test results from previous investigations and available results from the ongoing column leach tests being performed in China under the supervision of METCON Research, a United States based metallurgical testing organization.

- Engineering design and equipment lists for the processing plant and a 20,000 tonne per day crushing plant developed by KDE. The responsible person for this part of the study was Mr. Joseph M. Keane.
- KDE examined the results of an ongoing pilot test program being conducted at the mine site. Run-of-mine oxide (weathered) ore was under leach for 112 days as of 6 October 2005 and 19,960 grams of gold have been extracted from the 47,800 tonne heap indicating a gold extraction of 64.6 percent. A 57,000 tonne sample of the same material was passed through a primary crusher and has been under leach for 101 days as of 6 October 2005. Gold extraction is estimated at 63.6 percent yielding 21,420 grams of recovered gold.

Mineral resources at the CSH Gold Project have been estimated by Mr. Mario E. Rossi. The total mineral resources at various grades are noted below:

Table 1.1 Total CSH Gold Project Mineral Resource										
	Measured		Indicated		Measured+Indicated			Inferred		
Cutoff (g/t)	Mt	Au Grade (g/t)	Tons (x1000)	Au Grade (g/t)	Tons (x1000)	Au Grade (g/t)	Million Ounces Au	Tons (x1000)	Au Grade (g/t)	Million Ounces Au
0.3	22.4	0.75	82.3	0.74	104.7	0.73	2.46	52.4	0.74	1.25
0.4	20.7	0.78	76.5	0.76	97.2	0.76	2.38	42.9	0.83	1.14
0.5	17.6	0.84	65.0	0.81	82.7	0.82	2.18	36.5	0.89	1.04
0.6	13.7	0.92	50.4	0.88	64.1	0.89	1.83	31.4	0.95	0.96
0.7	10.3	1.01	37.3	0.97	47.7	0.98	1.50	24.6	1.03	0.81
0.8	7.7	1.10	26.9	1.05	34.6	1.06	1.18	19.8	1.10	0.70
0.9	5.7	1.19	18.6	1.14	24.3	1.16	0.91	14.7	1.19	0.56
1.0	4.1	1.28	12.6	1.24	16.8	1.25	0.68	10.0	1.30	0.42

It should be noted that the economic evaluation developed herein excludes inferred resources.

Based on the mineral resources calculated, estimated pit slopes, gold recovery from column testing, and operating cost estimates made for this study, the following mine production schedule was produced by Nilsson Mine Services.

Table 1.2
Mine Production Schedule

Period		1	2	3	4	5	6	7	8	Total
Mine Production										
Weathered Leach ROM	t x 1000	7,080.0	5,774.9							12,855
Gold Grade	g/t	0.71	0.74							0.73
Fresh Leach ROM	t x 1000	20.0	1,325.1							1,345.1
Gold Grade	g/t	0.80	0.75							0.75
Total Leach ROM	t x 1000	7,100.0	7,100.0	-	-	-	-	-	-	14,200.0
Gold Grade	g/t	0.72	0.75	-	-	-	-	-	-	0.73
Weathered Leach Crushed	t x 1000			2,469.9	1,285.7	32.8	-	229.8	310.1	4,328.3
Gold Grade	g/t			0.72	0.70	0.67	-	0.82	0.71	0.72
Fresh Leach Crushed	t x 1000			4,630.1	5,814.3	7,067.2	7,100.0	6,870.2	2,267.5	33,749.4
Gold Grade	g/t			0.79	0.73	0.68	0.75	0.91	0.82	0.78
Total Crushed Ore	t x 1000			7,100.0	7,100.0	7,100.0	7,100.0	7,100.0	2,577.7	38,077.7
Gold Grade	g/t	-	-	0.77	0.73	0.68	0.75	0.91	0.81	0.77
Combined Ore Production	t x 1000	7,100.0	7,100.0	7,100.0	7,100.0	7,100.0	7,100.0	7,100.0	2,577.7	52,277.7
Gold Grade	g/t	0.72	0.75	0.77	0.73	0.68	0.75	0.91	0.81	0.76
Waste	t x 1000	10,751.1	11,184.4	11,207.2	7,445.2	4,615.3	2,821.7	1,199.0	863.5	50,087.4
Total Material	t x 1000	17,851.1	18,284.4	18,307.2	14,545.2	11,715.3	9,921.7	8,299.0	3,441.2	101,019.9

The mine plan and production schedule were developed in August 2005 based on drilling completed through 2004 and a gold price of US\$ 400 per ounce. The gold recovery estimates used for the mine plan were based on the METCON Research column test results through August 2005 and ongoing ROM and crushed ore pilot heap results.

The project as presented in this development report document involves an open pit gold mine and heap leach operation to process a relatively large tonnage of low grade material. Mining will be by a local contract mining company or companies for the life of the project. As indicated in Table 1.2, the planned ore production rate is 7.1 million tonnes per year for just over seven years. Peak material movement (ore plus waste) is 18.3 million tonnes per year during the first three years of operation. During the first two years of operation it is planned that Run-of-Mine (ROM) oxidized ore will be trucked directly to the leach pad. A crushing plant required to efficiently process the fresh or sulfide ore that becomes available after production year two, will be constructed during the first two years of operation.

Capital costs for the project were estimated by KDE based on the study completed by BGRIMM coupled with an independent assessment of the leach pad, gold recovery plant and crushing facility. KDE used BGRIMM's costs for the infrastructure and other in country costs. KDE provided flowsheets and process equipment lists as a basis for the plant capital cost estimate.

It is anticipated that capital expenditures for the CSH Gold Project will occur in two phases. Since oxidized ore will be treated at the run-of-mine size distribution, the initial capital costs will be associated with development of the initial stage of the leach pad and the processing plant together with all required infrastructure. The following Table 1.3 presents the initial construction costs.

Table 1.3 INITIAL CONSTRUCTION COSTS			
Item	Plant Equipment US\$	Contracts & Material US\$	TOTAL US\$
DIRECT COST			
Land Acquisition	-	459,000	459,000
Infrastructure	921,000	4,841,100	5,762,100
Mining	-	1,920,300	1,920,300
Heap Leach Pad & Ponds	31,500	7,941,800	7,973,300
Processing Plant	4,152,800	1,169,200	5,322,000
Direct Cost	5,105,300	16,331,400	21,436,700
INDIRECT COST			
Feasibility & Detail Engineering	-	1,987,500	1,987,500
Procurement	-	160,000	160,000
Construction Management	-	1,097,800	1,097,800
Field Office Expense & Construction Support	-	226,956	226,956
Commissioning & Training	-	186,200	186,200
Initial Fill (1.5% of Direct Costs)	-	321,600	321,600
Startup	-	55,000	55,000
Mobile Equipment	-	338,000	338,000
Spare Parts (5% of Equipment Cost)	-	255,300	255,300
Owners Cost (5 % of Direct Cost)	-	1,071,800	1,071,800
Indirect Cost	-	5,700,156	5,700,156
Initial Direct & Indirect Costs	5,105,300	22,031,556	27,136,856
Contingency 17%	867,901	3,745,365	4,613,266
TOTAL INITIAL PROJECT COST	5,973,201	25,776,921	31,750,122

The preceding tabulation indicates that the initial expenditure to commence operations is US\$ 31.8 million.

Metallurgical testwork has indicated that the sulfide, or fresh, ore will require size reduction by crushing in order to optimize gold extraction. It is anticipated that this crush size will be 100 percent passing 12 millimeters or 80 percent passing 8 millimeters. In order to accomplish this size reduction task at a throughput of 20,000 tonnes per day, a modern crushing circuit using 800 horsepower secondary and tertiary crushers has been specified. The capital cost for this crushing facility together with required mining equipment and the necessary leach pad expansion is given in the following Table 1.4.

Table 1.4 FUTURE SUSTAINING CONSTRUCTION COSTS			
Item	Plant Equipment US\$	Contracts & Material US\$	TOTAL US\$
DIRECT COSTS			
Infrastructure	-	-	-
Mining	56,500	63,500	120,000
Heap Leach Pad & Ponds	31,500	5,078,300	5,109,800
Crushing Plant	6,455,000	3,480,200	9,935,200
Sustaining Direct Cost	6,543,000	8,622,000	15,165,000
INDIRECT COSTS			
Feasibility & Detail Engineering	-	973,500	973,500
Procurement	-	85,600	85,600
Construction Management	-	900,800	900,800
Field Office Expense & Construction Support	-	178,016	178,016
Commissioning & Training	-	144,500	144,500
Initial Fill (1.5% of Direct Costs)	-	227,500	227,500
Startup	-	157,100	157,100
Mobile Equipment	-	139,000	139,000
Spare Parts (5% of Equipment Cost)	-	298,700	298,700
Owners Cost (3% of Direct Cost)	-	455,000	455,000
Sustaining Indirect Cost	-	3,559,716	3,559,716
Sustaining Direct & Indirect Costs	6,543,000	12,181,716	18,724,716
Contingency 17%	1,112,310	2,070,892	3,183,202
TOTAL SUSTAINING PROJECT COST	7,655,310	14,252,608	21,907,918

The preceding table indicates that the cost expenditure required to purchase mining equipment, expand the leach pad, and install a crushing plant during the first two years of operation will be US\$ 21.9 million.

The following Table 1.5 presents an estimate of total capital expenditures for the complete project.

Table 1.5 TOTAL INITIAL AND FUTURE SUSTAINING PROJECT COSTS			
Item	Plant Equipment US\$	Contracts & Material US\$	TOTAL US\$
Total Initial Project Cost	5,973,201	25,776,921	31,750,122
Total Sustaining Project Cost	7,655,310	14,252,608	21,907,918
TOTAL INITIAL AND FUTURE SUSTAINING PROJECT COSTS			53,658,040

The preceding tabulation indicates that a total project expenditure of US\$ 53.7 million will be required to process both oxide and sulfide ores at the CSH Gold Project in an environmentally sound and metallurgically appropriate fashion.

Operating costs are detailed in the financial analysis section of this report. Cash operating costs are summarized in the following Table 1.6.

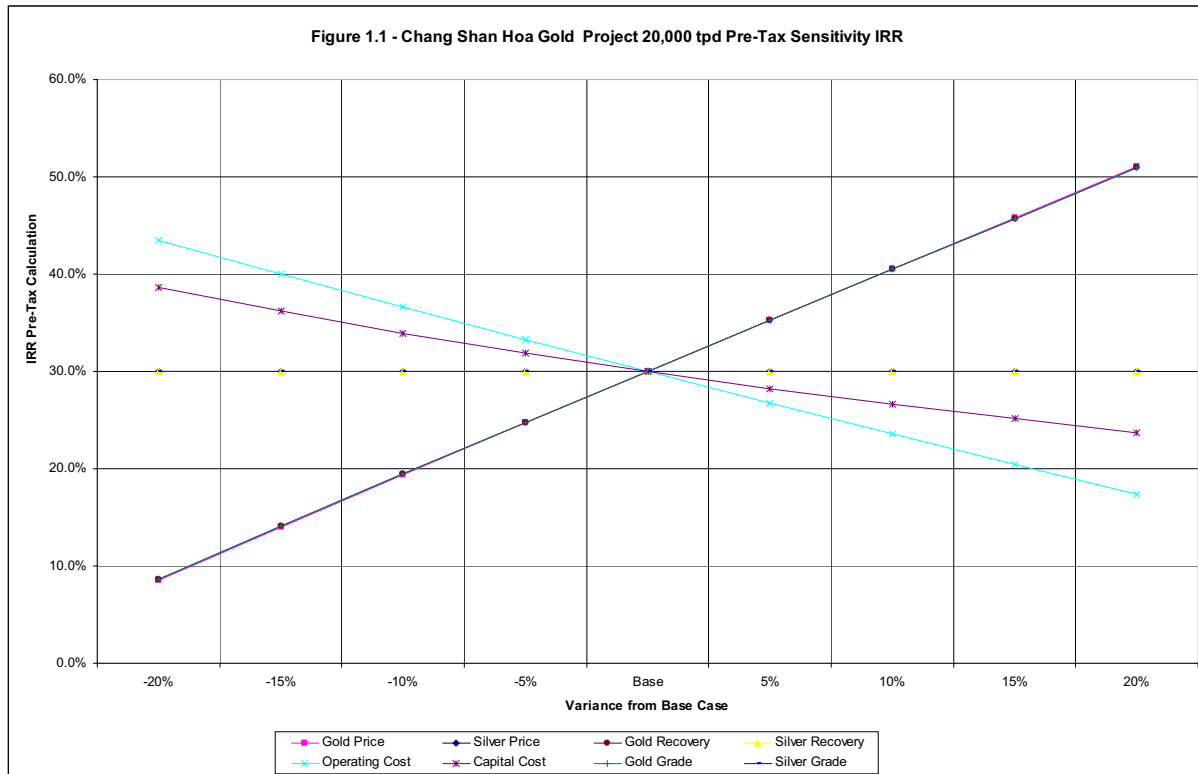
Table 1.6 Cash Operating Cost		
Item	US\$/Tonne Ore	RMB/Tonne Ore
Mining	2.23	18.06
Processing	1.16	9.40
G & A	0.55	4.52
Total	3.94	31.98

The estimated cash operating cost for the CSH Gold Project is US\$ 3.94 per tonne. Using a foreign exchange of 8.1 Yuan per US Dollar gives a cash operating cost of 31.98 Yuan per tonne of ore treated.

Nilsson Mine Services has provided an economic analysis spreadsheet which is made part of this report. The following Table 1.7 summarizes the net present value and calculated internal rate of return based on the capital and operating cost estimates given above and a gold price of US\$ 400 per ounce.

Table 1.7 Pre-Tax Net Present Value US\$ 400 per Ounce	
Discount Rate %	NPV US\$ x 1000
0	103,009
5	62,267
10	37,432
15	21,474
20	11,172
Calc IRR	30.0%

A sensitivity analysis was also conducted and is represented by the following Figure 1.1.



The preceding graph indicates that the project economics are very sensitive to the gold price and somewhat less sensitive to changes in capital and operating costs. For example, the price for gold in August 2005 was approximately US\$ 440 per ounce. If that gold price is used in the economic analysis, the economics of the project change as follows.

Table 1.8 Pre-Tax Net Percent Value US\$ 440 per Ounce	
Discount Rate %	NPV US\$ x 1000
0	140,205
5	89,491
10	52,452
15	36,718
20	23,023
Calc IRR	40.5%

The preceding tabulation indicates that using the August 2005 price of gold increases the project internal rate of return to 40.5 percent.

Based upon the information contained herein, KDE recommends that Jinshan proceeds with the project. Efforts could be undertaken to crush the pad over liner material and transport silty material to the pad site in preparation for pad construction. It should be noted that the lead time for the delivery of crushing equipment is currently in excess of 12 months. Consequently, a purchase selection decision regarding the crushing plant equipment assemblage should be made some time in late 2006.

2.0 INTRODUCTION AND TERMS OF REFERENCE

Jinshan Gold Mines has commissioned K D Engineering Co., Inc. (KDE) of Tucson, Arizona to provide a development study for the CSH Gold Project located in the Nei Mongol Autonomous Region of Northern China. Contributions to this report were made by a number of organizations and individuals. Mr. Joseph M. Keane, P.E. has overall responsibility for the report contents except for contributions noted below. Mr. Keane visited the property on 1 to 4 April 2005 and 7 to 9 June 2005.

Geological contributions to the development study were made by Mr. Mario E. Rossi, MSc. Min. Eng. of Geosystems International, Inc. in Delray Beach, Florida and he was responsible for Sections 16.1 through 16.3. Mr. Rossi visited the property during the period 6 to 8 July 2004.

Efforts associated with mining engineering and project economics were provided by Mr. John W. Nilsson, P. Eng. of Nilsson Mine Services Limited of Pitt Meadows, British Columbia, Canada. Mr. Nilsson developed Section 17.0 and the economic evaluation spreadsheet used in Section 22.0. Mr. Nilsson visited the property on 22 to 24 October 2004 and 7 to 9 June 2005.

Mr. Russell Browne, P.E. of Golder Associates was responsible for the geotechnical work associated with the design of the leach pad and solution reservoirs as given in Section 18.0, Appendix 2, and Appendix 8. Mr. Browne visited the property 1 to 4 April 2005 and 10 through 12 June 2005.

Additional important contributions to the report were provided by KDE personnel and those employed by Jinshan Mines, in particular, Paul Blair, Hu Long, James Lincoln, and Steve McMullan.

During the study, the exchange rate of the RMB (the RMB or Remnimbi is also known as the yuan) to the US\$ has fluctuated slightly. The rate used in this study ranged from 8.1 to 8.2 RMB per one US\$.

3.0 DISCLAIMER

No Disclaimer Statement was necessary for the preparation of this report.

4.0 PROPERTY DESCRIPTION AND LOCATION

The CSH Gold Project (formerly known as the 217 Project) covers an area of 35.93 square kilometers in the Nei Mongol Autonomous Region of northern China. The property is held by a single Exploration Permit (No. 0100000220028) centered at latitude 41°40'North, longitude 109°14'East. The present permit, issued to the Ningxia Pacific Mining Co. Ltd. in Yinchuan, is valid until 3 August 2006 and can be renewed by payment of bi-annual rental fees thereafter. Surface rights for mining purposes are not included in the Permit but can be acquired for a purchase price based on negotiations with the land owner and county government.

Ningxia Pacific Minerals Co. Ltd., a fully licensed joint venture company; has been formed between Jinshan Gold Mines Inc. (96.5 percent) and Brigade 217 of the Northwest Geological Bureau of the China National Nuclear Corporation (3.5 percent), who will receive two additional payments of US\$ 1 million. The first payment is required when a decision to start construction is made and the second payment is to be made 30 days following commencement of commercial mining operations. All property work is being carried out through Ningxia Pacific. Ivanhoe is currently a 50-50 joint partner in Jinshan's interest in the CSH Project; however Ivanhoe and Jinshan have entered into an agreement-in-principle where by Jinshan will acquire Ivanhoe's interest in exchange for the issuance to Ivanhoe of a number of Jinshan shares. This transaction is scheduled to close by the end of 2005.

The existing Exploration Permit gives Ningxia Pacific the right to carry out all exploration work currently contemplated. The Exploration Permit concession has not been legally surveyed. A permit was acquired in 2004 to mine up to 100,000 tonnes of ore for process testing purposes. Ningxia Pacific is in the process of acquiring a Mining Permit for a major open pit, heap leach mine.

Unlicensed mining on the CSH 217 site by Brigade 208 of the Northwest Geological Bureau of the China National Nuclear Corporation (CNNC) has been conducted on an on-and-off basis since 1997. This has been undertaken with the apparent knowledge and tacit agreement of various local government and provincial agencies. This mining activity has largely been confined to the Southwest Zone of the CSH Gold Project, and occurred in two distinct periods: 1997-1999 and 2002-early 2004. It is estimated that approximately 360,000 tonnes have been mined from shallow open pits and leached on pads at three different facilities. It is estimated that about 6,000 ounces of gold may have been recovered from these operations over the last five to six years. Although these operations are significant in terms of the scale of operations relative to typical artisan mining operations, the effect on the CSH Gold Project as currently outlined is not material.

There are no recognized environmental problems that might preclude or inhibit mining operations in this area; although given the past mining activities; environmental baseline studies are underway to clearly identify potential environmental issues. The potential consequences of the four types of previous mining activity described in greater detail in Section 6 are:

Alluvial placer mining of alluvial sediments in the Chang Shan Hao drainage and Mélange River resulted in considerable disturbance of the natural flow of the ephemeral rivers, increased water loss through increased evaporation, and possibly metals and salt pollution of groundwater by disturbance of the sediments. This is currently being evaluated.

Artisan mining activity in small pits and workings within the Northeast Zone was limited to shallow (less than 10 meter depth) excavations by hand to mine free gold in oxide ore. This work created limited disturbance of soil and vegetation within the planned pit excavation. Thus, its environmental impact will be negligible.

Large scale mining and heap leaching by Brigade 208 on the Southwest Zone may have a significant environmental impact as the mining practices likely did not meet Chinese regulations. Mining by Brigade 208 is illegal according to the 1988 Mines Act. Jinshan could possibly inherit liability for the Brigade 208 mining activities. Jinshan will assess the situation and consider this possibility in its environmental plan for the site.

Test mining by Brigade 217 on the Northeast Zone constructed five small test heap leach pads for a total of approximately 30,000 tonnes of mined ore. Leach pads were constructed according to applicable Chinese regulations for the time period (1995 - 1997) including an HDPE membrane and surrounding drainage catchments ditches. These test leach pads are within the expected excavation area for the Northeast Zone so there will be no long-term environmental impact.

See Figure 4.1 showing the property location within Inner Mongolia.

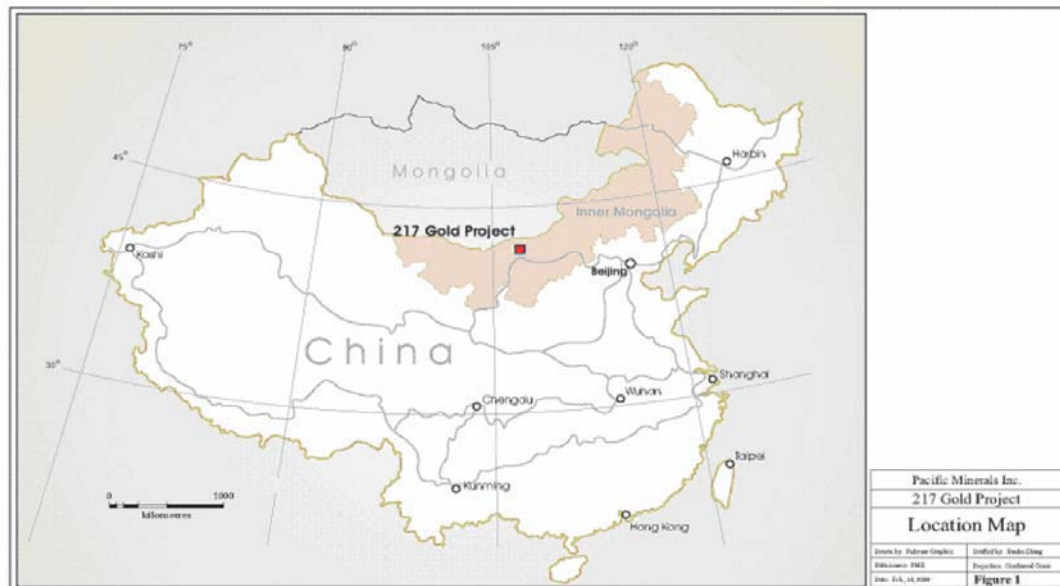


Figure 4.1 - CSH 217 Property Location within Inner Mongolia

The following Figure 4.2 depicts the location of the open pit mine, leach pads, process facilities, and infrastructure items. The mine boundary point coordinates are given in Appendix 17.

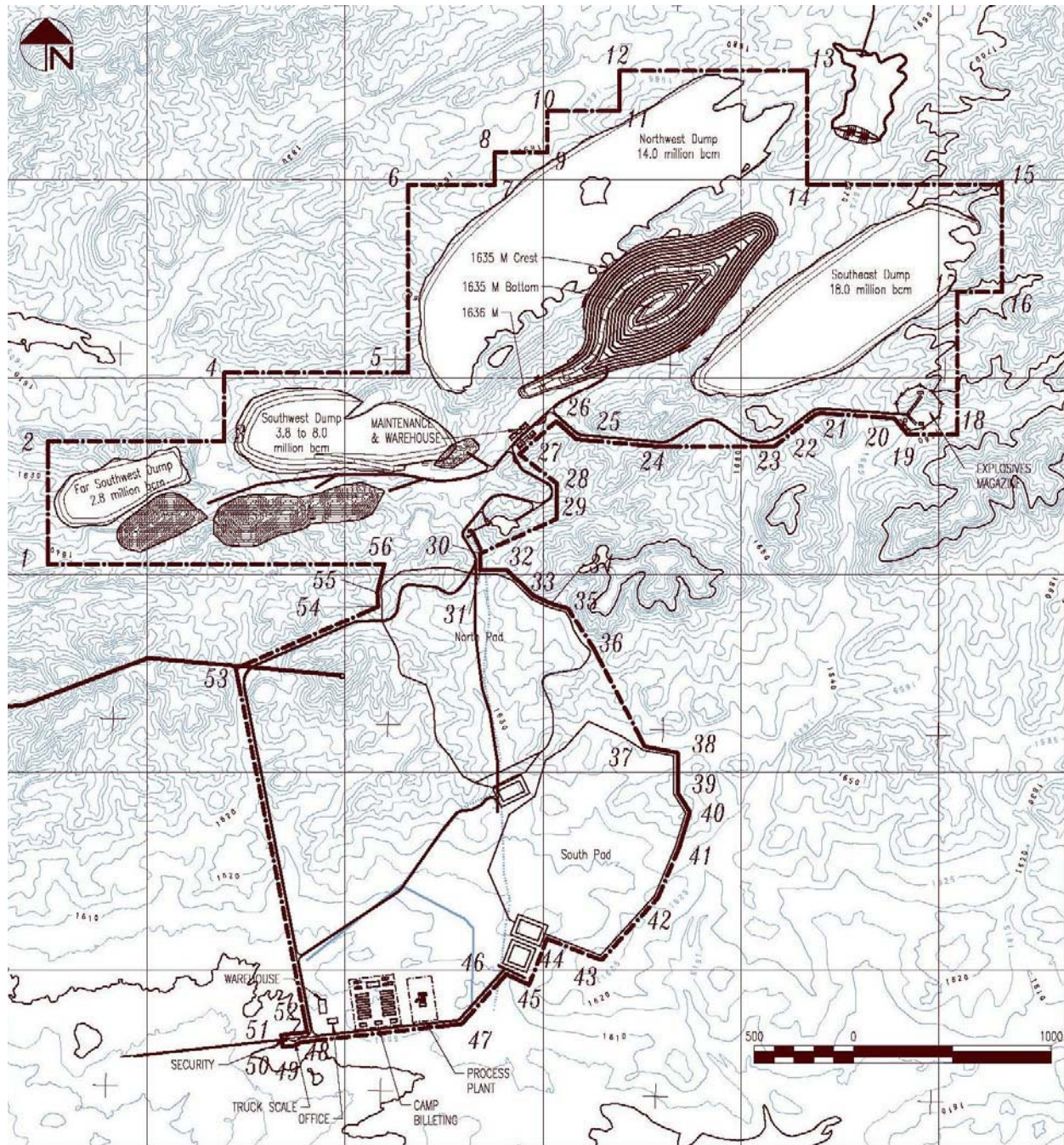


Figure 4.2 - Jinshan Gold Mines Site

5.0 ACCESSIBILITY, CLIMATE, INFRASTRUCTURE & PHYSIOGRAPHY

The CSH Gold Project is located some 650 kilometers northwest of Beijing and 125 kilometers north-northwest of the city of Baotou (population of 1.5 million). Baotou is the most important industrial city in the Nei Mongol Autonomous Region of northern China. Baotou is serviced by daily scheduled airline flights from Beijing.

The project area is readily accessed from Baotou on paved roads north for approximately 150 kilometers and then west on paved and mostly dirt roads for approximately 50 kilometers. Depending on traffic and weather conditions, total driving time is from 3 to 4 hours.

The Exploration Permit area is characterized by gently rolling hills with elevations ranging from 1550 to 1750 meters above sea level. The climate is semi-desert with average annual precipitation of 230 millimeters. The summers are dry and comfortable with temperatures rarely exceeding 30 °C. The winters are cold and windy with temperatures down to -25°C. Winter conditions prevail from early October through mid-March but snowfall is minimal. The leach pad and processing facility have been designed for year round operations.

Vegetation consists of sparse desert grasses with scrub bushes; there are no natural trees except along the river channels and flats. Outcrop exposure is 20 to 50 percent on the rocky hills and very little outcrop is noted in the dry drainages, which are invariably covered with alluvium and loess deposits. There are few inhabitants within the general area and most of the land is being used by sheepherders for sheep and goat grazing. There are a few small herds of free ranging horses and there are a few domestic cattle. There are no grasses in the mine area due to previous artisan mining activities and thus no grazing in the area of planned mining.

There is ample land available for mine infrastructure purposes including waste disposal areas, heap leach pad areas, processing plant sites and mine infrastructure. The necessary land will need to be purchased through an arrangement with the Wulate government and the local sheepherders.

The city of Baotou is a major steel-making center and is the principal service and supply center for the general area. Most equipment and skilled labor will likely be available in Baotou for a major mine development. For current purposes, a year-round mine development camp has been established in the village of Xin Hu Re located 10 kilometers southwest of the property.

The main water sources for the project are water from dewatering the pit excavation and the underground workings, water from the groundwater aquifer just north of Xin Hu Re and alluvial aquifers in the Molenghe River channel. The government will extend an existing power line to Xin Hu Re Village. Jinshan will extend that power line to the mine site.

6.0 HISTORY

The general area of the property has undergone a long history of small-scale alluvial gold mining. More recently, the local artisan miners have conducted small-scale bedrock mining for gold through shallow surface cuts following narrow gash filling quartz vein structures. The following summary was adapted from the summary description by Fuchter (2004).

The prospect now covered by the CSH Gold Project was originally discovered by a geological team of the Bureau of Geology and Mineral Resources of Inner Mongolia during a regional stream sediment sampling program in the 1980's. Brigade 217 of the Northwest Geological Bureau of the China National Nuclear Corporation (CNNC) acquired the CSH 217 prospect in the early 1990's and explored the property from 1992 through 1998. Exploratory work completed by Brigade 217 included soil and rock geochemical surveys, surface trenching, the driving of a 188-meter long decline, and the heap leaching of a 30,000 tonne test sample on site.

Attention focused on hard-rock occurrences and deposits after regional geological mapping was completed at a scale of 1:200,000 in the mid 1960's as part of the National Mapping Program. This work led to follow-up programs instituted by the provincial bureaus of various ministries as described in detail below:

- In the 1970's, Brigade 512 of the Inner Mongolia Bureau of Geology and Mineral Resources conducted follow-up work on the placer workings in the CSH 217 area. The Brigade conducted geological mapping and carried out trenching as part of the exploration program, and discovered gold mineralization associated with extremely narrow quartz veinlets and stringers. Brigade 512 considered the mineralization to be too small and discontinuous for further interest, and consequently abandoned the area.
- In the early 1980's, Brigade 214 of the CNNC undertook a systematic drainage geochemical survey of the region at a scale of 1:200,000. This work led to the identification of a number of geochemical anomalies, including those associated with:
 - a) Quartz veins west of Laoyanhao;
 - b) Disseminated mineralization and quartz stringers at CSH 217;
 - c) Quartz veins at Bayinhatei; and,
 - d) Quartz veins in the Reservoir Area
- In 1991, Brigade 217 of the Northwest Geological Bureau of the CNNC was assigned to follow-up on these anomalous areas. After abandoning the West Laoyanhao anomaly due to low tenor of the quartz veins, Brigade 217 focused on the CSH 217 area.
- Between 1992 and 1993, Brigade 217 carried out geological mapping, grid geochemical sampling, and magnetic surveying at a scale of 1:10,000 over

the CSH 217 property. In addition, 6,000 cubic meters of excavations in four trenches and five pits was carried out. This work identified significant areas of mineralization, and in 1994, a 188 meter decline was developed to test mineralization in the Northeast Zone of the CSH 217 property. On the basis of these programs, Brigade 217 estimated that the deposit contained five tonnes (~160,000 oz) of gold down to minus 80 meters below surface and nine to 10 tonnes (~300,000 oz) of gold down to minus 120 meters below surface. These Chinese resource estimations do not comply with Canadian NI 43-101, and do not qualify as mineral resources under that guideline.

- Between 1995 and 1997, Brigade 217 undertook leaching tests that indicated that recoveries of between 55-60 percent could be expected on run-of-mine (ROM) material.
- In 1998, Brigade 217 entered into a joint venture with Mr. Wang Kong, a Chinese individual resident in Vancouver, Canada. Mr. Wang Kong agreed to finance a drilling program. However, the program was abandoned and further funding withheld when the drill rig failed to drill beyond 80 meters in the first hole.
- In 1999, Brigade 217 entered into another joint venture, with a Canadian consortium called Southwestern - Global Pacific Joint Venture (SWGP). SWGP not only covered the 36 square kilometer area of the CSH 217 property held by Brigade 217 but also conducted a regional program under an agreement with the Inner Mongolia Exploration Bureau of the China National Non-Ferrous Corporation (CNFC) on exploration permit areas known as the Haoya areas. These permits covered some 342 square kilometers surrounding the CSH 217 property and the combined areas were operated as a single project known as the Haoya Project.

Work completed during the 1999 campaign included satellite imagery, geological mapping, extensive surface trenching, lithogeochemistry (greater than 3,000 samples), and the drilling of 10 widely spaced diamond drill holes totaling 2,797 meters. Details of this drilling are found in Section 13 of the Fuchter (2004) report. The 1999 program confirmed the presence of a major low-grade, gold-bearing zone of mineralization trending westerly across the CSH 217 property with widths up to 150 meters. This suggested a significant potential for a large tonnage, low-grade open pit gold target.

The SWGP joint venture agreement was terminated in 2000 largely due to the downturn in the mining industry and lack of investor interest as a consequence of low gold prices. The onerous payments and large work commitments that were due were difficult to justify under such circumstances.

- In 2002, Pacific Minerals Inc. acquired the project, and a major drilling campaign comprising some 4,997 meters in 23 diamond drill holes was completed. The drilling was guided by previous geological mapping and trenching as well as by magnetic and electro-magnetic surveys undertaken

by Pacific Minerals. In addition, a 3/4 tonne bulk sample from earlier core and surface trenches was sent to Lakefield Research in Canada for preliminary metallurgical test work.

During 2003, a third campaign of diamond drilling was undertaken by Pacific Minerals to further test the Northeast Zone. Additional metallurgical samples of oxide and sulfide core were sent to Lakefield Research as well as to the metallurgical laboratories of Brigade 217 in Yinchuan, Ningxia Province, PRC.

In March 2004, Pacific Minerals Inc. changed its name to Jinshan Gold Mines Inc.

In addition to the above mentioned exploration activities, four types of mining activities have taken place on the CSH 217 property since alluvial mining for gold was first documented. These activities are:

- Alluvial or placer mining;
- Artisan mining;
- Unlicensed hard rock mining, and;
- Limited, but permitted, trial mining and leaching tests.

Alluvial mining has taken place along the full length of the Chang Shan Hao Creek that drains the Chang Shan Hao valley from east to west. Although alluvial mining has been halted on the property, the nature of the disturbances and the condition of the disturbed alluvial material indicate considerable activity in the recent past. The drainage system has not only been modified along its length but also across the width of the valley generally for about 30 to 50 meters. Moreover, mining activity has not been confined strictly to the sands and gravels but also to bank deposits. It is estimated that some 3,000 to 4,000 ounces of placer gold have been recovered from the property.

Artisan mining flared briefly from 1993 to 1998, and developed from the discovery of mineralization through the exploration efforts of Brigade 217. As exploration trenches exposed mineralization, artisan mining commenced with "high grading" veinlets in surface oxides and sulfide stringers on a very selective basis. It is estimated that 4,000 to 6,000 ounces of gold have been recovered from artisan operations on the property.

Unlicensed mining by Brigade 208 of the CNNC has occurred in two distinct periods: 1997-1999 and 2002-2004. Mining by Brigade 208 has been confined to the Southwest Zone where a number of shallow open pits have been mined to a maximum depth of about 30 meters. Run-of-mine (ROM) ore has been leached on pads in three different locations, termed here Plant I, Plant II, and Plant III. Plant I is located less than 50 meters south of a line of pits in the eastern section of the Southwest Zone whereas Plant III lies immediately west of the most westerly pit in the western section of the Southwest Zone. Plant II is located between Plants I and III. Leach pad tonnages have been estimated on the basis of rough measurements made by pacing and/or estimating distances and heights of various heaps and assuming a density of 1.6 for heaped ROM material. Estimates of the tonnage treated at each facility are as follows:

Table 6.1 Extracted Tonnes	
Plant I	125 000t
Plant II	65 000t
Plant III	170 000t
TOTAL	360 000t

Assuming a grade of 0.8 grams per tonne gold for ROM ore and a maximum recovery of 65 percent, it is estimated that Brigade 208 has recovered about 6,000 ounces of gold over an operational period of some five to six years.

Limited trial mining and test leaching was undertaken by Brigade 217 on the Northeast Zone from 1995-1997. Some 30,000 tonnes were mined from various shallow pits in the Northeast Zone, and ROM ore was leached on four heaps. It is estimated that an additional 500 ounces of gold have been recovered from this trial mining/test leaching exercise. Total historic production from the CSH 217 property is estimated as follows:

Table 6.2 Estimated Past Gold Production	
Alluvial Mining	3 500oz
Artisanal Mining	5 000oz
Unlicensed Heap Leaching	6 000oz
Trial Mining / Test Leaching	500oz
TOTAL	15 000oz

7.0 GEOLOGICAL SETTING

7.1 Regional Geology

The CSH Gold Project is located within the North China Gold Belt extending along the northern margin of the North China Craton, where Proterozoic and Phanerozoic rifting, subduction and collision occurred. Deformation is characterized by major east-striking reverse fault zones within the cratonic margin, such as the local Gaoletu Fault within the immediate CSH Gold Project area. Archean and Early Proterozoic gneisses, schists, amphibolites and banded iron formations outcrop over about one-third of the area between North Korea and central Inner Mongolia. The Archean rocks were deformed and metamorphosed to amphibolites and granulite facies during the Zhongtiao Orogeny around 1.8 Ga. Regionally, the rock units are comprised of low-grade, metamorphosed Proterozoic quartzites, shales and limestones plus unmetamorphosed Paleozoic rocks. These units occur as accretionary complexes surrounding the Early Proterozoic and older basement rocks. The complex extends northward into Mongolia and becomes part of the broader Mongolian-Great Hinggan Fold Belt located between the North China and Siberian Cratons. Continental basinal sediments, commonly coal-bearing, and sub aerial volcanic rocks of Permian through Cretaceous age unconformably overlie the Proterozoic sequences in valleys adjacent to uplifted Precambrian basement.

Magmatic activities were associated with the rifting, subduction and collision along the North China Craton margin. Emplacement of 1.7 to 1.4 Ga alkalic intrusions north of the city of Baotou include syenites and carbonatite sills, which were intruded during a rifting event probably associated with the world-class rare earth-iron deposits at Bayan Obo, approximately 60 kilometers east-northeast of the CSH Gold Project site. Widespread calc-alkaline to alkalic granitoid plutons were emplaced through the region in multiple orogenies (from Caledonian to Hercynian to Yanshanian). The Yanshanian orogeny is recognized in the eastern portion of the North China Craton. This orogeny is related to subduction of the Izanagi Ocean Plate beneath the North China Craton. The resulting magmatic arc now lies beneath the North China sea between China and Japan. Back arc magnetism extended for another 1,000 kilometers inland and is recorded by the widely distributed Yanshanian granitoids.

7.2 Relationship between the North China and Tianshan Gold Belts

The southern edge of the Alaid Orogenic Zone contains a remarkable 1,000 kilometer long curvilinear belt of large world-class gold deposits (i.e., Muruntau, Kumtor) in the Tianshan Mountains extending from Uzbekistan through parts of Kyrgyzstan, Kazakhstan, Tajikistan and into Northwestern Xinjiang Autonomous Region. The Tianshan and Altayshan Belts join with the North China Gold Belt in Inner Mongolia. Numerous gold deposits occur in these belts, which formed during the latter stages of the closure of the Turkestan Paleo-ocean. This combined gold belt is unique in the world in terms of its strike extent.

The belt is considered to be the product of a prolonged history of interaction between cratonic blocks and oceanic arc terrains to the north. In the North China Gold Belt, there is

evidence that gold mineralization occurred during several orogenic events in the Early to Late Paleozoic and Mesozoic. This history of repeated tectonic activity provides the structural preparation for later hydrothermal fluids, which deposit gold along slip planes, fractures and associated zones of weakness. This is believed to be instrumental at Muruntau, where Carboniferous hydrothermal fluid flow produced zones of sheeted quartz veins focused by permeability contrasts along pre-existing (Caledonian) thrust planes.

7.3 Geology of the CSH 217 Deposit

Gold mineralization within the CSH Gold Project area is hosted by Middle to Upper Proterozoic metasedimentary rocks of the Bayan Obo Group. A type section for the Bayan Obo Group was established in the vicinity of the Bayan Obo rare earth-iron mine located approximately 60 kilometers east-northeast of the CSH Gold Project. The Bayan Obo Group is dominated by clastic sedimentary formations intercalated with carbonate rich rocks including sandstones, greywackes, and slates with dolomite and limestone (Table 7.3.1).

Erathem	Group	Formation	Member	Mapping Code	Lithology	Ref. BGMR/s members (1991)
Middle-Upper Proterozoic	Bayan Obo	Hujirtu	Pt2-3 hj4	hu4	Grey thick metamorphic quartzose sandstone intercalated with siltstone and limestone	4-13
			Pt2-3 hj3	hu3	Dark grey silty slate	3
			Pt2-3 hj2	hu2	Upper grey green zoisite hornfels and actinolite hornfels; Lower light grey garnet skarn and dark grey zoisite hornfels	2
			Pt2-3 hj1	hu1	Dark grey algal mat lamellar limestone and sandstone lens	1
		Baiyinbaolage	Pt2-3 by3	by3	Grey metamorphic quartzose sandstone intercalated with sericite slate	10-14
			Pt2-3 by2	by2	Calcareous and phosphoric slate, silty slate and metasiltstone	2-9
			Pt2-3 by1	by1	Grey meta-quartzose sandstone	1
		Bilute	Pt2-3 b4	b4	Carbonaceous and siliceous slate intercalated with metasiltstone	8-15
			Pt2-3 b3	b3	Dark grey meta-quartzose sandstone intercalated with slate; dark grey contemporaneous breccia and conglomerate	6-7
			Pt2-3 b2	b2	Dark grey sericite slate intercalated with silty slate and metasiltstone Carbonaceous slate	3-5
			Pt2-3 b1	b1	Dark grey meta-quartzose sandstone intercalated with metasiltstone Dark grey sericite slate intercalated with metasiltstone	1-2
		Halabougete	Pt2-3 h3	h3	Dolomite and Limestone intercalated with calcareous or cherty slate	19-25
			Pt2-3 h2	h2	Sandstone and limestone intercalated with algal-mat lamellar limestone	3-18
			Pt2-3 h1	h1	Light grey calcareous feldspatic quartzose sandstone	1-2
		Jianshan	Pt2-3 j3	j3	Dark grey sericite slate intercalated with feldspatic wacke and limestone	9-12
			Pt2-3 j2	j2	Meta-feldspatic quartzose sandstone	3-8
			Pt2-3 j1	j1	Silty slate and carbonaceous slate intercalated with ferriferous silty slate and sericite felsic slate	1-2
		Duhala	Pt2-3 d2	d2	Light grey meta-quartzose sandstone	3-5
			Pt2-3 d1	d1	Upper meta-feldspatic wacke intercalated with sericite slate; Lower dark grey meta-conglomerate and feldspatic quartzose sandstone	1-2

Revised from Regional Geology of Inner Mongolia (BGMR of Inner Mongolia, 1991)

Proterozoic carbonaceous metasedimentary rocks host the CSH 217 gold mineralization in the south limb of the CSH syncline (Figure 2). The syncline is one of the most prominent structural features in a major east-west trending fold belt.

Within the project area, only the middle portion of the Bayan Obo Group is represented. The stratigraphic units outcropping on the CSH Gold Project are, from oldest to youngest, the Jianshan, Halahougete and Bilute Formations.

The Jianshan Formation is comprised of black carbonaceous slate, silty slate, andalusite hornfels, phyllitic schists, metasiltstone and quartz wacke. The units mainly outcrop in the western, northern and southern portions of the CSH 217 property. The contact with overlying calcareous clastic rocks is gradational. A number of small high-grade gold veins occur in this unit and have historically been mined by the artisan miners.

The Halahougete Formation is comprised of thin to medium bedded dolomitic limestone intercalated with cherty slate and calcareous sandstone, siltstone and slate. The Formation outcrops extensively on the property and underlies the Bilute Formation in generally sharp contacts.

The Bilute Formation can be subdivided into four lithological members as outlined below from youngest to oldest.

1. b4 calcareous and carbonatized black phyllite and schist
2. b3 metasiltstone, metasandstone and sedimentary breccia
3. b2 carbonaceous phyllite, and andalusite-garnet schist with minor metasiltstone and metagreywacke
4. b1 carbonaceous metasiltstone

All of the significant gold mineralization on the property occurs within the b₂ unit of the Bilute Formation. The footwall section contains a consistent andalusite-garnet schist horizon, which has been encountered in most of the drill holes at depth. This sequence dips to the north at 82°±10° in the Northeast Zone, but is overturned in the Southwest Zone, where the bedding has been deformed in proximity to a major fault zone.

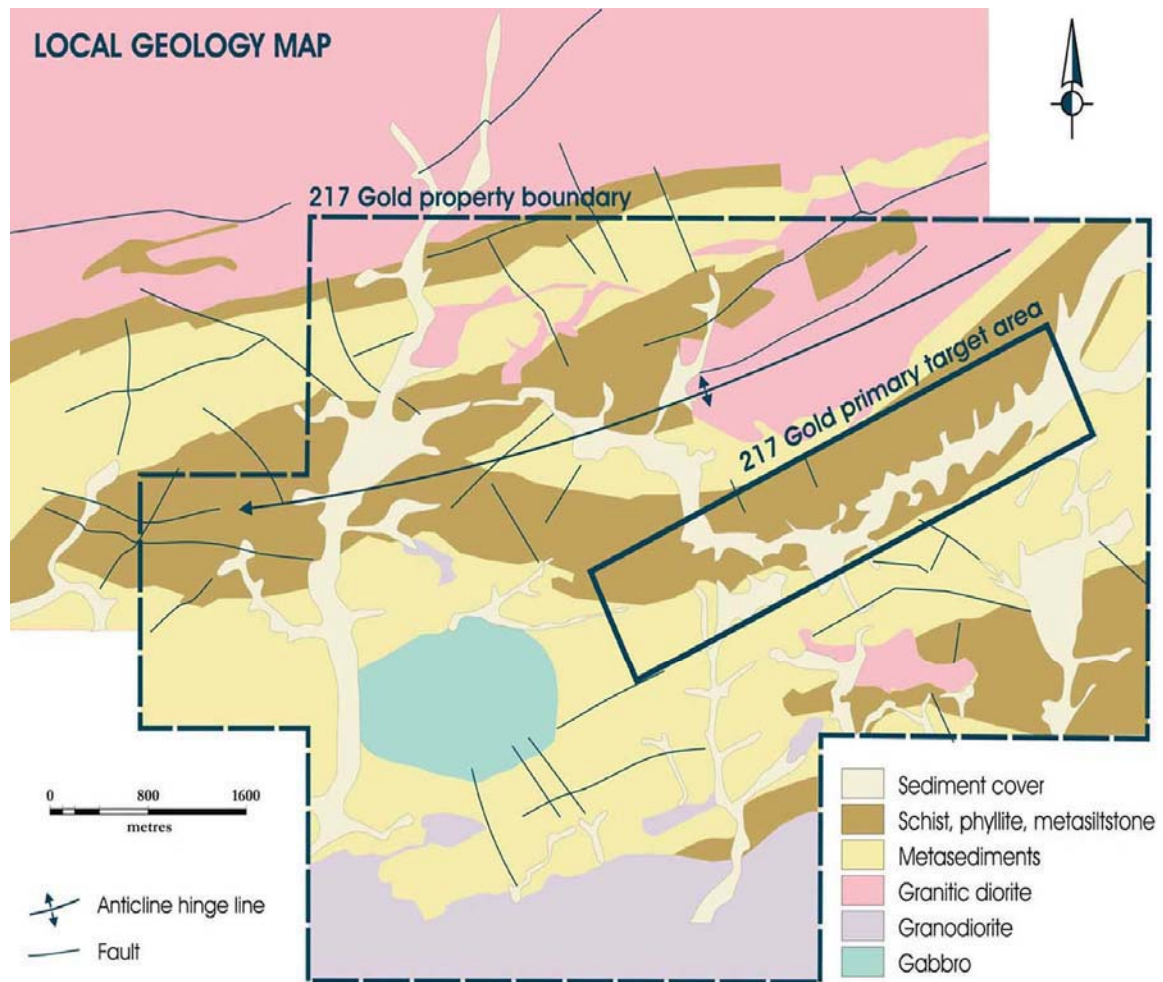


Figure 7.3.1: CSH 217 Property Geology.

7.4 **Intrusive Rocks**

Intrusive rocks within the CSH 217 property area were emplaced during the Late Caledonian, Hercynian and Indosinian Orogenies (413 to 205 Ma). These major composite granitoid batholiths occur to the north and south of the metasedimentary units hosting the CSH 217 gold mineralization.

Within the area of mineralization, numerous igneous bodies, traditionally described as dykes of various compositions are present within the metasedimentary sequence. These bodies include diabase, lamprophyre, diorite, aplite and pegmatite. The pegmatite and some diorite bodies cross cut original bedding planes, however the lamprophyre and some other diorite bodies are concordant with the bedding as indicated in the drill cores. All of these intrusive units are barren of gold values.

In the Northeast Zone, drilling has identified an abundance of lamprophyre bodies in the hanging wall rocks above the mineralized zone. The quantity of lamprophyre material gradually decreases going down the stratigraphic section through the gold bearing sections. The lamprophyres in the lower footwall mineralized sections are relatively sparse and less consistent.

Although many of the lamprophyre dykes can be followed on surface over hundreds of meters, they exhibit little vertical continuity in the drill holes. Drill core data suggest that the lamprophyre bodies are rather flat lenses in shape. All are concordant with the original bedding. The texture of these dykes is quite variable; some are quite fresh and massive, most are moderately to strongly foliated, and some show remnant amygdaloidal textures. A petrographic report prepared by R.N. England (13 May 2003) has indicated these dykes are quite variable with their composition ranging from ultramafic to felsic. The orientation of the lamprophyre bodies, and bedding where preserved, is slightly different from the mineralization trend, with about 10° differences in both strike and dip directions. Most of the contacts are knife sharp with no evidence of any alteration selvage within the host sediments. It is suggested that these lamprophyres are actually discontinuous volcanic flows and tuffs, which were emplaced periodically during the original sedimentary cycle.

8.0 DEPOSIT TYPES

8.1 Deposition Characteristics

The CSH 217 deposit is a bulk tonnage, low-grade style of gold mineralization hosted within a ductile-brittle shear zone in Proterozoic sediments. The following Figure 8.1 reveals the general deposit orientation and drill hole location. The gold mineralization was controlled by and emplaced along a major south westerly trending ductile-brittle shear zone.

The diamond drill cores suggest that the ductile-brittle shear zone crosscuts the original bedding structure at about 10°. The shear zone is parallel to the foliation of the regional metamorphism, which is also parallel to the synclinal fold axis. This deformation style is typical of many greenstone and slate-belt terrains where shear zones were developed from the process of folding. Folding continued beyond the point of rupture, with the strain taken up in the developing shear zone. The quartz-sulfide veinlets were boudinaged within the foliation and were formed during the deformational history.

Within the south westerly trending ductile-brittle shear zone, a major fault zone (F1) consisting of three to four fracture zones with several discrete breaks parallels the mineralization longitudinally. Most of the fracture zones can be traced from section to section, and are confined within the 0.2 grams per tonne gold envelope. There is no evidence of significant post-mineral displacements of the mineralized zones, other than the F2 fault separating the Northeast and Southwest Zones.

The F2 fault trends west-southwest, dips south-southeast with uncertain relative vertical displacement. The fault crosses the four kilometer long CSH 217 mineralized zones in the Central Zone. The structure is evidenced by topography, dislocation of stratigraphy, presence of a breccia zone, the dragging to the north of the east end of the Southwest Zone, and from the continuation of the fault to the north of the Northeast Zone. Interpolation from the projected locations of the mineralized zones on opposite sides of the fault suggests a horizontal displacement of about 300 meters.

8.2 Ore Types

The ore body is divided into oxide and sulfide ores. The transition surface is about 40-70 meters below the surface vertically. Above the transition surface, most iron sulfides were oxidized to limonite.

8.3 Gold Deportment

Gold has been observed in the oxide ore zone mainly as liberated particles and as fine inclusions within arsenopyrite. Fewer occurrences of gold were observed in the oxide material than in the sulfide ore.

Gold observed in sulfide ore zone samples occurred as fine locked grains or attachments to arsenopyrite. Gold was also observed as attachments and inclusions with

pyrrhotite and as liberated particles. The few large liberated grains distort the weight distribution. On rare occasions fine inclusions of a bismuth-bearing mineral, with gold inclusions, were observed within arsenopyrite.

8.4 Ore Elemental Composition

The ore mainly contains gold with minor silver, copper, lead, zinc, and mercury. Semi quantitative ICP 30 element scan results are shown in Table 8.4.1.

Table 8.4.1 Semi Quantitative ICP Scan Results					
Element	Oxide	Sulfide	Element	Oxide	Sulfide
Ag	<10	<10	Mn	590	820
Al	82000	82000	Mo	<20	<20
As	<75	<75	Na	4500	4600
Ba	550	540	Ni	27	33
Be	2.3	2.3	P	700	660
Bi	<20	<20	Pb	<50	<50
Ca	8500	9400	Sb	<20	<20
Cd	<5	<5	Se	<100	<100
Co	21	24	Sn	<100	<100
Cr	67	77	Sr	130	120
Cu	130	94	Ti	3100	3200
Fe	43000	54000	Tl	<100	<100
K	37000	36000	V	100	100
Li	<10	<10	Y	<20	<20
Mg	12000	140000	Zn	65	75

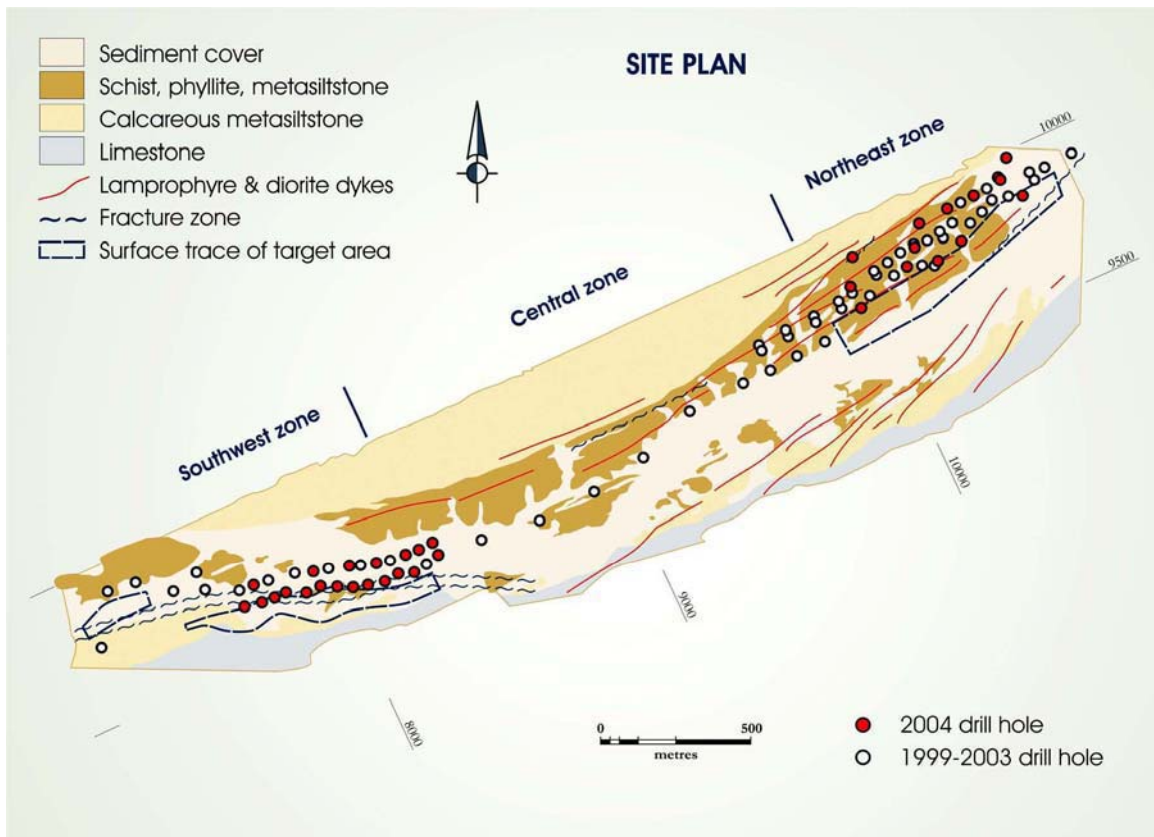


Figure 8.1: Drilling Program Map of the CSH 217 Deposit

9.0 MINERALIZATION

The host rocks to the gold mineralization on the CSH 217 property are mainly carbonaceous phyllites, andalusite schists, and slates within the lower members of the Bilute Formation. In the Northeast Zone the dip of the mineralization is steeply north at 82-87 degrees, in the Central Zone the dip is near vertical, and in the Southwest Zone the dip is overturned to the south at 85 to 88 degrees.

The gold mineralization is concentrated in thin (1 to 10 mm) sulfide and quartz-sulfide seams/veinlets, stringers, and boudinaged lenses, which are concordant with the bedding and foliation and trend along the shear zone. Significant vein quartz has been noted in drill core associated with the higher-grade gold sections. In most cross-sections, the higher grade intervals show relatively consistent dip angles in the mineralized zones.

The principal type of mineralization is native gold occurring directly with the sulfides in the seams and in association with the quartz vein material. Mineralogical work by SGS Lakefield on composite oxide and sulfide samples found 77 percent of gold was free in the sulfide composite and 100 percent of the gold was free in the oxide sample (SGS Lakefield Research Limited, 22 January 2003). Pyrite and pyrrhotite are the most abundant sulfides with their total content generally ranging between one and two percent. Trace amounts of arsenopyrite, chalcopyrite, sphalerite and galena have been reported.

The hydrothermal alteration of the host rocks is rather weak, with only chlorite and silica alteration apparent in the drill cores. The host rocks also contain abundant sericite, and andalusite crystals in the footwall schists are up to 3 centimeters in length. Development of the andalusite is likely to be related to original alumina content and regional metamorphism. Also, occasionally there are mineralized sections within the andalusite schist.

Surface work and diamond drilling have tested the mineralized zones and host stratigraphy over a continuous strike length of 4.6 kilometers. The mineralized sections are variable in width achieving a maximum width of 150 meters in the eastern part of the property. The vertical extent of the mineralization is at least 260 meters as the maximum vertical drilling depth to date is 260 meters.

A few late crosscutting structures have been recognized trending northwesterly but none have resulted in any major dislocation of the target stratigraphy. Also, a few shallow dipping, southwest trending small-scaled faults were observed in the Southwest Zone as exposed by the Brigade 208 mining. Displacement of these faults is rather insignificant, which may have locally dislocated the near-surface mineralization longitudinally.

9.1 Mineralogy

General petrographic work has been completed by England (2003) and by SGS-Lakefield (2002), which is considered the most representative since it processed composite samples of oxide and sulfide material. Using heavy liquid separation, polished sections were prepared for quantitative image analysis that produced the following data:

Table 9.1.1 Gold Association Weight Percent					
Association Summary		Sulfide Comp		Oxide Comp	
Type of Association		# of Grains	%Mass	# of Grains	%Mass
1	Association with Non-opaque	1	0.3	0	0
2	Association with Arsenopyrite	16	19.8	4	0.0
3	Association with Pyrrhotite	1	2.7	0	0
4	No Association (Free)	2	77.2	2	100.0

Gold has also been observed as free flecks up to 2 millimeters in size directly associated with the sulfides in both the stringers and in the quartz vein material. Trace amounts of gold have been seen as inclusions within arsenopyrite crystals.

10.0 EXPLORATION

The exploratory work completed by or on behalf of Jinshan prior to 2004 is described in detail in Section 6, and is briefly summarized below:

In 2002, Jinshan Gold Mines (previously Pacific Minerals) completed geophysical surveys along the length of the shear zone structure, including a ground magnetic survey and a TEM survey. A diamond drilling program with a total of 4,997 meters in 23 holes delineated a substantial low-grade zone of gold mineralization with good continuity in the northeast portion of the property. The drilling results demonstrated good potential for a low grade, bulk tonnage gold deposit at the CSH 217 property. Also, a 3/4 tonne bulk sample was assembled and shipped to SGS Lakefield for preliminary metallurgical testing.

In 2003, Jinshan Gold Mines shipped an additional one tonne sample to SGS Lakefield for leach testing and drilled an additional 33 diamond drill holes totaling 6,056 meters. The majority of these holes were drilled on 100 or 200 meter spaced sections to test the structure along strike in the Southwest Zone. A few of these holes were located to in-fill the previous drilling in the Northeast Zone. The results of the 2003 drill program supported the potential for an extensive and contiguous, low-grade mineralized zone that justified more detailed drilling in 2004.

In 2004, Jinshan completed 35 diamond drill holes totaling 6,598 meters of infill and confirmation drilling. The Northeast Zone and part of the Southwest Zone were drilled to 50 meter sections. The drilling program has established the continuity of both the Northeast and the Southwest Zones. The 2004 infill drilling and the previous drilling results have provided substantial data for the resource modeling. A resource modeling program was followed and completed in early 2005.

11.0 DRILLING

The total drilling to date on the CSH 217 property is summarized as follows:

Table 11.1 Total Drilling Data		
	No. of Holes	Meters
1999 - Southwestern Gold	10	2,797
2002 - Pacific Minerals	23	4,997
2003 - Pacific Minerals	33	6,056
2004 - Jinshan Gold Mines	35	6,598
Totals	101	20,448

All of the drilling to date has been completed with the equivalent of HQ core equipment producing cores approximately 60 millimeter in diameter.

In 1999, Southwestern Gold tested the mineralized zone with diamond drilling to a vertical depth of 260 meters and along a strike for 3.7 kilometers (Table 11.2). This drill program outlined a mineralized zone up to 150 meters wide in the Northeast Zone.

Pacific Minerals and later Jinshan conducted diamond drill programs using modern Longyear and Boyles Bros. equipment complete with wire line, mudding systems, and double and triple wall rods.

From July to November 2002, Pacific Minerals completed a program of 23 diamond drill holes totaling 4,997 meters (Tables 11.3 and 11.4). Two Chinese contract drilling companies were utilized using Longyear P-38 machines with double and triple wall HQ equipment. Core recoveries averaged better than 98 percent with output averaging 30-40 meters per machine per 24-hour shift. All the holes were surveyed to accurately define dips and directions with varying depths. The drill holes were targeted as follows:

- Northeast Zone: 20 holes (4506.39 meters) - nominally drilled on 50 meter centers testing the known gold-bearing shear zone.
- Southwest Zone: 1 hole (195.12 meters) - testing the southwestern extension of the known gold-bearing shear zone.
- Geophysical Anomalies: 2 holes (305.26 meters) - testing a long linear magnetic anomaly which proved to be caused by a non gold-bearing pyrrhotite horizon in sediments.

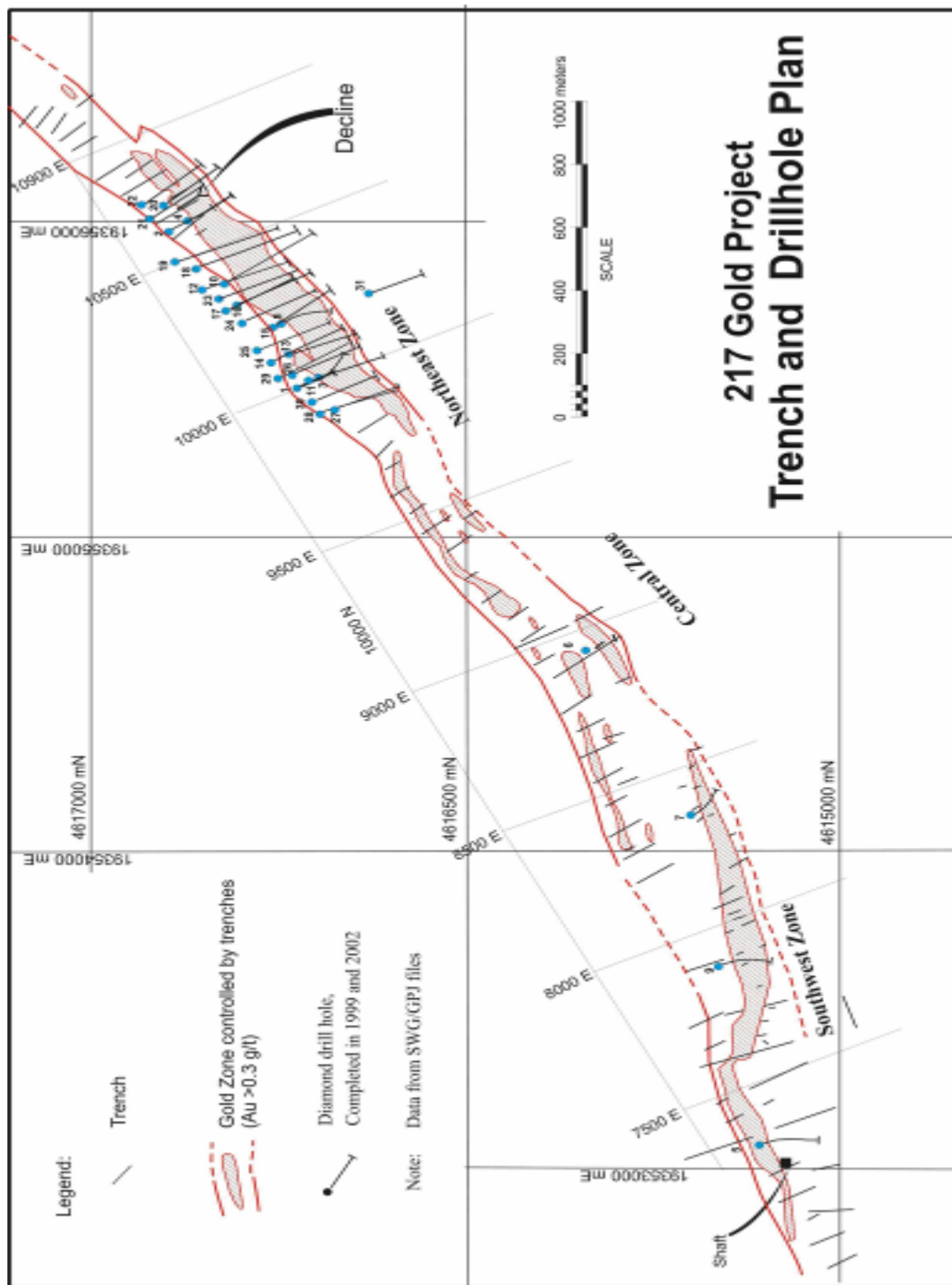
Figure 11.1 shows the location of existing trenches and drill holes after the 2002 drilling campaign.

Table 11.2
1999 Summary Drill Results, CSH Gold Project, 0.5 g/t Au cutoff

Hole ID	Coordinates	Total depth (m)	From (m)	To (m)	Interval (m)	Langfang (China) Assays (g/t Au)	Chemex (Canada) Assays (g/t Au)	Est. True Thickness (m)
CSH-1	10,000E; 9,799N	212.92	56.00	77.68	21.68	2.96	1.40	12.0
CSH-1			148.65	212.92	64.27	0.93	0.98	40.0
CSH-2	10,600E; 9,868N	220.01	105.73	136.94	31.21	0.56	0.98	16.0
CSH-2			185.81	220.01	34.20	0.87	0.87	17.0
CSH-3	10,600E; 9,742N	308.29	17.19	290.74	273.55	0.92	0.76	136.0
Incl.			17.19	222.06	204.87	1.01	0.82	82.0
CSH-4	10,600E; 9,812N	272.52	41.67	91.42	49.75	0.74	0.64	21.0
CSH-5	7,299E; 9,877N	302.00	17.9	46.09	28.19	1.20	n/a	7.0
CSH-5			133.6	165.45	31.85	0.75	n/a	18.0
CSH-6	9,800E; 9,530N	224.67	78.58	84.58	6.00	1.16	n/a	3.0
CSH-6			144.58	148.58	4.00	1.95	n/a	2.0
CSH-7	8,350E; 9,534N	304.44	30.64	63.00	32.36	1.17	n/a	12.0
CSH-7			116.00	156.00	40.00	1.11	n/a	13.0
CSH-7			181.00	201.00	20.00	1.13	n/a	6.0
CSH-8	10,200E; 9,766N	300.51	55.00	228.00	173.00	1.01	0.81	112.0
CSH-9	7,850E; 9,698N	350.65	210.00	248.00	38.00	1.37	0.79	17.0
CSH-10	10,403E; 9,813N	301.00	34.00	100.00	66.00	1.16	1.15	36.5
CSH-10			138.00	72.00	34.00	0.98	0.82	23.0
Total		2,797						

Table 11.3 2002 Drill Holes, CSH Gold Project						
Hole ID	East	North	Elev	AZ	Dip	Total Depth (m)
CSH-11	9999.05	9751.80	1666.45	155	-48	326.12
CSH-12	10399.99	9832.85	1672.85	155	-45	174.04
CSH-13	10098.93	9779.14	1657.99	155	-45	229.52
CSH-14	10098.47	9829.09	1665.99	155	-65	330.82
CSH-15	10197.10	9770.92	1667.43	155	-45	189.22
CSH-16	10297.33	9824.45	1672.06	155	-45	209.12
CSH-17	10297.06	9847.63	1671.75	155	-60	275.22
CSH-18	10451.08	9849.44	1671.22	155	-45	184.64
CSH-19	10496.92	9872.11	1667.97	155	-45	195.29
CSH-20	10652.60	9872.96	1674.09	155	-45	150.24
CSH-21	10647.99	9904.83	1672.07	155	-60	174.44
CSH-22	10700.19	9897.51	1678.33	155	-60	199.59
CSH-23	10349.24	9848.11	1666.27	155	-45	208.60
CSH-24	10248.07	9837.90	1672.87	155	-45	213.52
CSH-25	10150.58	9841.88	1663.96	155	-60	278.02
CSH-26	10047.26	9806.61	1665.45	155	-45	235.62
CSH-27	9896.65	9751.33	1654.71	155	-45	196.19
CSH-28	9897.65	9776.98	1665.85	155	-60	240.34
CSH-29	10046.77	9819.69	1667.10	155	-60	280.72
CSH-30	9949.52	9783.77	1664.20	155	-45	215.12
CSH-31	10208.02	9453.40	1674.79	155	-45	149.84
CSH-32	7208.77	9750.70	1650.77	155	-45	185.12
CSH-33	7207.89	9751.20	1650.83	335	-45	155.42
TOTAL						4996.77

Table 11.4 Significant Drill Intercepts, 2002 Program, CSH Gold Project, 0.30 g/t Au cutoff						
Hole ID	From	To	Intercept Length (m)	Grade (g/t Au)	Grade (g/t Au), waste @ 0.0g/t	Estimated True Thickness (m)
CSH-11	4.65	155.60	150.95	0.84	0.82	113.97
CSH-11	176.40	191.17	14.77	0.61	0.61	11.15
CSH-12	40.50	142.66	102.16	0.65	0.64	80.50
CSH-13	33.20	198.87	165.67	0.64	0.61	130.55
CSH-14	102.60	114.05	11.45	0.83	0.81	6.07
CSH-14	144.36	176.95	32.59	1.11	1.10	17.27
CSH-14	185.70	330.23	144.53	0.83	0.81	76.60
CSH-15	4.00	127.80	123.80	0.74	0.70	97.55
CSH-16	58.30	165.10	106.80	0.78	0.74	84.16
CSH-17	55.93	71.82	15.89	0.67	0.66	9.57
CSH-17	100.24	259.00	158.76	0.80	0.78	95.57
CSH-18	22.97	33.09	10.12	0.60	0.60	7.97
CSH-18	58.50	130.50	72.00	0.74	0.71	56.74
CSH-19	45.81	159.42	113.61	0.83	0.81	89.52
CSH-20	29.84	110.90	81.06	0.72	0.69	63.88
CSH-21	95.50	172.22	76.72	0.67	0.65	46.19
CSH-22	67.54	106.54	39.00	0.73	0.72	23.48
CSH-22	121.94	147.14	25.20	0.71	0.71	15.17
CSH-23	83.70	171.13	87.43	1.02	1.00	68.89
CSH-24	57.23	75.86	18.63	0.74	0.73	14.68
CSH-24	93.30	212.85	119.55	0.66	0.64	94.21
CSH-25	121.60	278.02	156.42	0.81	0.79	94.16
CSH-26	17.00	30.47	13.47	0.93	0.93	10.61
CSH-26	80.84	177.12	96.28	0.81	0.78	75.87
CSH-27	59.81	185.50	125.69	0.76	0.74	99.04
CSH-28	32.00	56.66	24.66	0.61	0.59	14.85
CSH-28	103.69	116.00	12.31	0.80	0.80	7.41
CSH-28	139.99	240.34	101.05	0.65	0.64	60.83
CSH-29	41.42	66.55	25.13	0.66	0.65	15.13
CSH-29	133.88	162.10	28.22	0.86	0.81	16.99
CSH-29	171.70	274.00	102.30	0.83	0.80	61.58
CSH-30	11.62	37.92	26.30	0.50	0.47	20.72
CSH-30	48.72	60.69	11.97	0.68	0.61	9.43
CSH-30	89.49	200.14	110.65	0.80	0.78	87.19
CSH-33	61.75	71.75	10.00	0.70	0.70	7.88
CSH-33	112.30	124.30	12.00	1.30	1.30	9.19



**Figure 11.1 - Drill Hole Collar and Trench Locations
1999 and 2002 Drilling Campaigns, CSH Gold Project**

The drill holes completed during 2003 and 2004 are listed in Tables 11.5 and 11.6, respectively, showing their final co-ordinates, elevations, collar dips, core recovery and final depths. Tables 11.7 and 11.8 show the drill hole intercepts for a cutoff grade of 0.30 grams per tonne gold. As shown on the assay and geological sections in Appendix 14, the drill holes were drilled southerly at -45° and -60° to intersect the mineralized strata dipping at 80° - 85° to the north. As a result, the drill holes cut the target zone at moderate angles and

the intercepts are 25-65 percent greater than the true thickness. Where stated in this report, the widths and thicknesses given are true values as measured on section.

In 2004, the Huafeng Drilling Company from Sichuan completed 6,598 meters of drilling with two drill rigs in less than 3 months. All up production, including moving time, averaged 37.4 meters per machine per 24 hours. Additionally, overall core recovery was over 98 percent, and only three holes were lost due to bad ground conditions.

Table 11.5
2003 Drill Holes, CSH Gold Project

Hole ID	East	North	Elev	Dip	Azimuth	Depth (m)	Recovery (%)	No. of Samples
CSH-34	9499.46	9664.74	1647.7	-45°	155°	138.32	93.9	79
CSH-35	9298.83	9652.75	1644.0	-45°	155°	127.27	96.6	60
CSH-36	9097.25	9579.11	1640.5	-45°	155°	141.02	96.0	71
CSH-37	8901.94	9544.47	1649.1	-45°	155°	142.92	95.5	80
CSH-38	8699.25	9532.83	8699.25	-45°	155°	123.62	99.5	61
CSH-39	8497.34	9553.15	1632.3	-45°	155°	138.62	98.8	66
CSH-40	8299.46	9556.62	1637.4	-45°	155°	135.52	93.6	81
CSH-41	8099.12	9643.56	1626.2	-45°	155°	193.52	97.7	104
CSH-42-1	7850.94	9709.99	1627.2	-45°	155°	51.92	96.1	27
CSH-42	7890.04	9708.92	1630.7	-45°	155°	257.32	99.1	143
CSH-43	7700.02	9732.61	1632.0	-45°	155°	195.42	96.2	109
CSH-44	7500.08	9820.77	1631.6	-45°	155°	131.72	98.0	73
CSH-45	7302.60	9911.36	1645.8	-45°	155°	202.52	98.3	114
CSH-47	9802.92	9675.63	1655.6	-45°	155°	121.82	99.8	70
CSH-48	9801.19	9744.24	1658.0	-45°	155°	208.72	99.0	115
CSH-49	9802.12	9768.63	1663.9	-60°	155°	293.62	99.1	168
CSH-50	9698.10	9669.35	1653.5	-45°	155°	122.12	95.6	69
CSH-51	9697.26	9741.67	1663.6	-45°	155°	202.42	99.5	123
CSH-52	9697.34	9765.09	1665.3	-60°	155°	282.52	99.6	172
CSH-53	9599.24	9667.15	1649.5	-45°	155°	122.57	99.0	70
CSH-54	9600.79	9736.10	1658.1	-45°	155°	205.02	98.4	127
CSH-55	9598.96	9753.36	1660.1	-60°	155°	285.92	98.9	169
CSH-56	10800.93	9903.76	1665.9	-45°	155°	109.12	99.4	59
CSH-57	10001.49	9751.78	1666.4	-48°	155°	140.92	94.4	metallurgical samples only
CSH-58	8194.28	9616.16	1625.9	-45°	155°	191.82	99.0	104
CSH-59	7997.55	9677.66	1623.2	-45°	155°	214.22	98.4	121
CSH-60	10497.60	9913.56	1671.0	-60°	155°	278.22	99.4	169
CSH-61	10399.74	9907.70	1680.5	-60°	155°	297.82	99.3	181
CSH-62	10202.10	9842.64	1668.2	-60°	155°	318.42	99.3	203
CSH-63	7800.33	9723.78	1627.4	-45°	155°	229.82	97.7	135
CSH-64	7598.28	9780.82	1632.5	-45°	155°	130.42	95.5	69
CSH-65	7595.12	9845.90	1625.7	-45°	155°	110.12	97.4	76
CSH-66	7397.08	9899.85	1636.5	-45°	155°	210.92	97.6	121
TOTAL						6,056.3m	98.05%	3389

Table 11.6
2004 Drill Holes, CSH Gold Project (in GK19 coordinates)

Hole ID	Easting	Northing	Elevation	Dip	Az	Depth (m)	Recovery (%)	No. of Samples
CSH-67	355945.674	4616690.604	1664.400	-45°	155°	146.5	98.7	79
CSH-68	355911.724	4616751.333	1667.384	-45°	155°	233.1	99.0	130
CSH-69	355917.511	4616743.996	1666.875	-60°	155°	280	99.4	167
CSH-70	355833.008	4616691.689	1675.641	-45°	155°	230	98.4	136
CSH-71	355794.504	4616541.032	1663.014	-45°	155°	115.2	97.8	70
CSH-72	355743.884	4616645.567	1676.766	-45°	155°	273.3	99.8	181
CSH-73	355718.086	4616473.178	1666.989	-45°	155°	139.1	96.9	89
CSH-74	355654.264	4616594.280	1670.500	-45°	155°	311.1	99.3	213
CSH-75	355616.398	4616451.849	1658.937	-45°	155°	169.4	98.5	94
CSH-76	355466.203	4616315.070	1663.344	-45°	155°	151.1	96.5	88
CSH-77	355431.745	4616383.623	1661.389	-60°	155°	302.2	99.2	195
CSH-78	356000.611	4616694.857	1669.499	-45°	155°	104.6	96.4	59
CSH-79	355938.178	4616818.894	1673.173	-45°	155°	273.7	99.7	165
CSH-80	355641.213	4616516.459	1666.777	-45°	155°	239	98.3	168
CSH-81	355435.751	4616482.568	1673.129	-45°	155°	330.3	95.8	212
CSH-82	354083.660	4615475.636	1635.290	-45°	155°	168.2	99.5	92
CSH-83	354064.061	4615513.790	1627.216	-45°	155°	174.7	99.5	100
CSH-84	354019.384	4615490.718	1627.120	-45°	155°	226.6	99.7	125
CSH-85	354004.670	4615414.425	1636.513	-45°	155°	110.4	98.6	57
CSH-86	353976.563	4615473.824	1625.439	-45°	155°	220.2	99.5	123
CSH-87	353953.372	4615409.786	1630.426	46°	164°	126.9	97.6	63
CSH-88	353908.371	4615383.339	1625.957	-45°	155°	102.4	96.4	53
CSH-89	353879.695	4615443.575	1626.125	-45°	155°	223.8	99.6	125
CSH-90	353852.505	4615371.086	1623.758	-45°	155°	134.1	96.4	73
CSH-91	353803.674	4615362.871	1625.567	-45°	155°	135.2	98.4	75
CSH-92	353790.006	4615434.369	1623.086	-45°	155°	233.5	100.0	139
CSH-93	353751.231	4615363.985	1629.355	-45°	155°	139.3	99.5	85
CSH-94	353695.496	4615364.524	1631.587	-45°	155°	148.2	97.4	94
CSH-95	353672.500	4615412.128	1624.966	-45°	155°	223.7	98.6	120
CSH-96	353650.065	4615340.802	1628.952	-45°	155°	139.6	99.9	80
CSH-97	353582.251	4615339.902	1621.642	-45°	155°	144.2	100.0	86
CSH-98	353545.141	4615323.289	1621.680	-45°	155°	143.2	99.9	90
CSH-99	353504.434	4615306.699	1627.454	-45°	155°	148.2	99.9	82
CSH-100	353476.353	4615363.560	1626.617	-45°	155°	214.6	99.9	116
CSH-101	353446.679	4615292.184	1629.792	-45°	155°	142.2	99.9	68
TOTAL						6,597.8	98.8%	3892

All drill holes were surveyed using a Sperry-Sun single-shot survey instrument providing a photographic record of the hole angle and direction at 50 meter intervals. The camera and compass were inserted through the rods and extended below the drill string on an aluminum extension to escape the magnetic effect of the drill rods. The magnetic effect of the pyrrhotite content of the mineralization on the borehole directional survey is not considered significant, as the boreholes generally did not extend into the (deeper) pyrrhotite zone, and the incremental surveys down the hole are consistent.

All drill holes have been surveyed by a contractor from Yinchuan providing accurate collar co-ordinates for each drill collar with elevations to a tenth of a meter. The collar location of boreholes were surveyed using a laser total station and tied to survey control points established with differential GPS. Figures 5 and 6 show the drill hole locations for the Northeast and the Southwest Zones respectively, including the more recent 2004 drilling.

Of the 35 holes drilled in 2004, 15 holes were drilled in the Northeast Zone and 20 holes in Southwest Zone. Most of the holes were drilled at a 45° angle with only two holes drilled at 60° towards the southeast. Drilling started on 20 April 2004 and finished 16 July 2004. All the cores were logged by geologists and sampled at the site. The procedure of core logging and sampling involved:

1. fitting the core together in the trays, then measuring core recovery and RQD of each run;
2. describing texture and mineralogy of the lithological units, and measuring angles of foliation and/or bedding to core axis in each unit;
3. estimating percentage of quartz veinlets and sulfide or oxide content, and identifying weathered rock and fresh rock interface; and,
4. sample intervals were then marked up by the geologist, and then one half of the core was cut using a diamond saw and sent to the Langfang laboratory for preparation, while the other half of the core was stored on site.

Table 11.7
Drill Intercepts, 2003 Program, CSH Gold Project, 0.30 g/t Au cutoff

Hole ID	From	To	Intercept Length (m)	Grade (g/t Au)	Grade (g/t Au), waste @ 0.0g/t	Estimated True Thickness (m)
CSH-34	78.00	100.24	22.24	0.53	0.50	15.99
CSH-37	49.00	59.30	10.30	0.71	0.70	7.16
CSH-38	60.80	102.02	41.22	0.80	0.74	28.65
CSH-39	112.26	126.26	14.00	0.64	0.64	9.73
CSH-40	38.42	51.42	13.00	1.25	1.18	9.04
CSH-40	69.72	101.74	32.02	0.99	0.98	22.25
CSH-40	111.28	135.52	24.24	0.62	0.58	16.85
CSH-41	120.35	131.16	10.81	0.81	0.81	7.51
CSH-41	149.38	193.52	44.14	0.89	0.83	30.68
CSH-42	104.42	127.62	23.20	0.88	0.85	16.40
CSH-42	147.38	160.62	13.24	0.89	0.88	9.36
CSH-42	178.87	208.86	29.99	0.62	0.61	21.20
CSH-43	68.72	158.02	89.30	1.09	1.04	62.06
CSH-43	176.04	195.42	19.38	1.54	1.51	13.47
CSH-44	20.80	34.32	13.52	0.71	0.71	9.56
CSH-45	58.76	76.00	17.24	0.97	0.97	11.98
CSH-45	91.51	153.71	62.20	0.83	0.82	43.23
CSH-47	22.65	36.40	13.75	0.53	0.53	10.84
CSH-47	47.97	117.33	69.36	0.66	0.63	54.66
CSH-48	3.24	16.25	13.01	1.15	1.15	10.39
CSH-48	70.74	95.10	24.36	0.64	0.61	19.46
CSH-48	111.62	178.08	66.46	0.71	0.69	53.10
CSH-49	141.41	273.41	132.00	0.71	0.69	79.46
CSH-50	65.34	94.22	28.88	0.85	0.84	23.08
CSH-51	128.15	141.05	12.90	0.77	0.76	10.69
CSH-51	152.51	185.83	33.32	0.64	0.64	27.62
CSH-52	200.80	238.12	37.32	0.71	0.68	23.47
CSH-52	250.25	272.72	22.47	0.71	0.71	14.13
CSH-53	81.62	95.75	14.13	0.58	0.56	11.57
CSH-54	156.30	182.62	26.32	0.65	0.62	21.29
CSH-55	192.94	204.00	11.06	0.67	0.67	6.66
CSH-55	214.82	269.80	54.98	0.77	0.74	33.10
CSH-56	27.54	43.54	16.00	0.76	0.76	12.61
CSH-56	51.54	90.00	38.46	0.45	0.40	30.31
CSH-58	139.00	191.82	52.82	0.83	0.79	36.71
CSH-59	108.26	134.30	26.04	0.50	0.45	18.10
CSH-59	187.14	199.33	12.19	0.86	0.85	8.47
CSH-60	126.64	150.00	23.36	0.62	0.60	14.06
CSH-60	179.17	217.38	38.21	0.71	0.70	23.00
CSH-60	231.34	278.22	46.88	0.85	0.84	28.22
CSH-61	131.26	158.42	27.16	0.71	0.67	16.35
CSH-61	172.04	239.67	67.63	0.78	0.77	40.71
CSH-61	257.23	277.88	20.65	0.51	0.48	12.43
CSH-62	42.71	59.33	16.62	0.51	0.50	10.24
CSH-62	102.21	122.06	19.85	0.95	0.95	12.23
CSH-62	142.42	249.59	107.17	0.98	0.97	66.02
CSH-62	254.91	268.86	13.95	0.61	0.58	8.59
CSH-63	70.50	101.81	31.31	1.06	1.02	21.76
CSH-63	116.04	152.51	36.47	0.64	0.61	25.35
CSH-64	107.60	130.42	22.82	0.89	0.88	15.86
CSH-66	51.03	73.12	22.09	1.16	1.14	15.35
CSH-66	88.16	128.66	40.50	1.34	1.33	28.15

Table 11.8
Drill Intercepts, 2004 Program, CSH Gold Project, 0.30 g/t Au cutoff

Hole ID	From	To	Intercept Length (m)	Grade (g/t Au)	Grade (g/t Au), waste @ 0.0g/t	Estimated True Thickness (m)
CSH-67	20.00	138.00	118.00	0.64	0.62	92.98
CSH-68	96.00	222.00	126.00	0.66	0.62	99.29
CSH-69	180.00	251.20	71.20	0.70	0.67	42.86
CSH-70	126.80	226.00	99.20	0.76	0.74	78.17
CSH-71	6.00	107.95	101.95	0.78	0.76	80.34
CSH-72	121.18	258.07	136.89	0.77	0.76	107.87
CSH-73	7.50	125.12	117.62	0.71	0.68	92.68
CSH-74	121.95	296.19	174.24	0.75	0.73	137.30
CSH-75	20.00	129.10	109.10	0.83	0.81	85.97
CSH-76	24.50	151.12	126.62	0.83	0.80	99.78
CSH-77	38.13	302.21	264.08	0.85	0.83	158.98
CSH-78	7.90	18.77	10.87	0.54	0.54	8.45
CSH-78	38.67	83.77	45.10	0.82	0.81	35.04
CSH-79	143.36	156.32	12.96	0.74	0.69	10.21
CSH-79	176.56	218.42	41.86	0.66	0.62	32.99
CSH-79	227.47	259.74	32.27	0.58	0.56	25.43
CSH-80	20.50	37.52	17.02	0.76	0.74	13.41
CSH-80	66.30	239.02	172.72	0.75	0.73	136.10
CSH-81	139.94	155.64	15.70	0.70	0.69	12.37
CSH-81	195.08	330.29	135.21	0.89	0.88	106.55
CSH-82	75.72	88.92	13.20	0.71	0.68	9.17
CSH-82	115.76	131.95	16.19	1.04	1.02	11.25
CSH-83	148.00	169.65	21.65	0.93	0.90	15.05
CSH-84	153.00	173.00	20.00	0.72	0.69	13.90
CSH-84	190.00	206.20	16.20	0.84	0.83	11.26
CSH-85	30.12	51.52	21.40	0.78	0.78	14.87
CSH-85	67.12	108.19	41.07	0.90	0.88	28.54
CSH-86	158.00	187.80	29.80	1.31	1.28	20.71
CSH-86	202.10	220.22	18.12	1.09	1.09	12.59
CSH-87	49.17	110.72	61.55	0.70	0.67	42.78
CSH-88	4.50	19.11	14.61	0.73	0.72	10.15
CSH-88	59.90	95.32	35.42	1.11	1.09	24.62
CSH-89	115.20	143.60	28.40	0.93	0.92	19.74
CSH-89	167.00	197.00	30.00	0.93	0.89	20.85
CSH-90	5.15	44.78	39.63	0.87	0.73	27.54
CSH-91	5.20	40.42	35.22	0.58	0.53	24.48
CSH-92	170.00	207.85	37.85	1.11	1.07	26.31
CSH-93	61.00	73.50	12.50	0.98	0.91	8.69
CSH-94	36.90	47.00	10.10	0.92	0.90	7.02
CSH-94	59.00	120.40	61.40	0.83	0.78	42.67
CSH-95	103.97	167.05	63.08	0.83	0.80	43.84
CSH-95	187.32	205.80	18.48	1.09	1.05	12.84
CSH-96	33.00	94.35	61.35	0.91	0.86	42.64
CSH-97	33.90	42.65	8.75	0.92	0.92	6.08
CSH-97	61.00	107.00	46.00	1.10	1.07	31.97
CSH-98	11.84	36.90	25.06	1.34	1.31	17.42
CSH-98	60.00	108.00	48.00	0.62	0.59	33.36
CSH-99	22.92	43.17	20.25	1.04	1.00	14.07
CSH-100	119.24	164.62	45.38	1.07	1.05	31.54
CSH-100	174.77	186.77	12.00	0.90	0.90	8.34
CSH-101	14.50	35.22	20.72	1.25	1.18	14.40

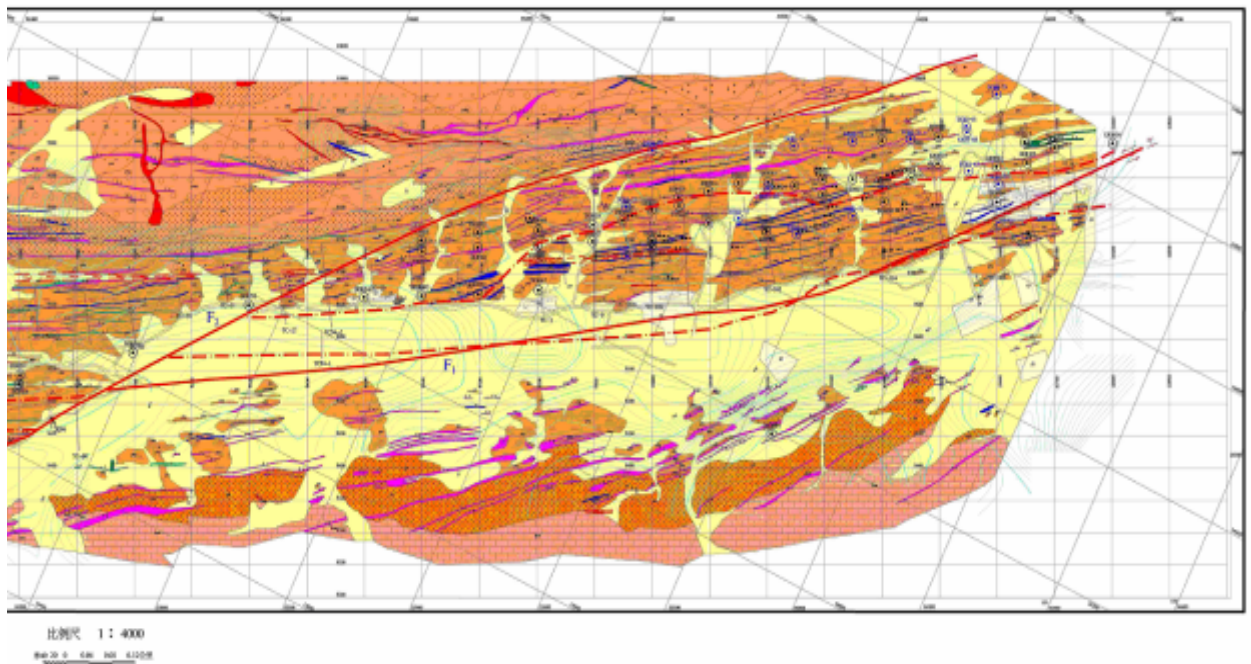


Figure 11.2
Drill Hole Locations, Northeast Zone, CSH Gold Project

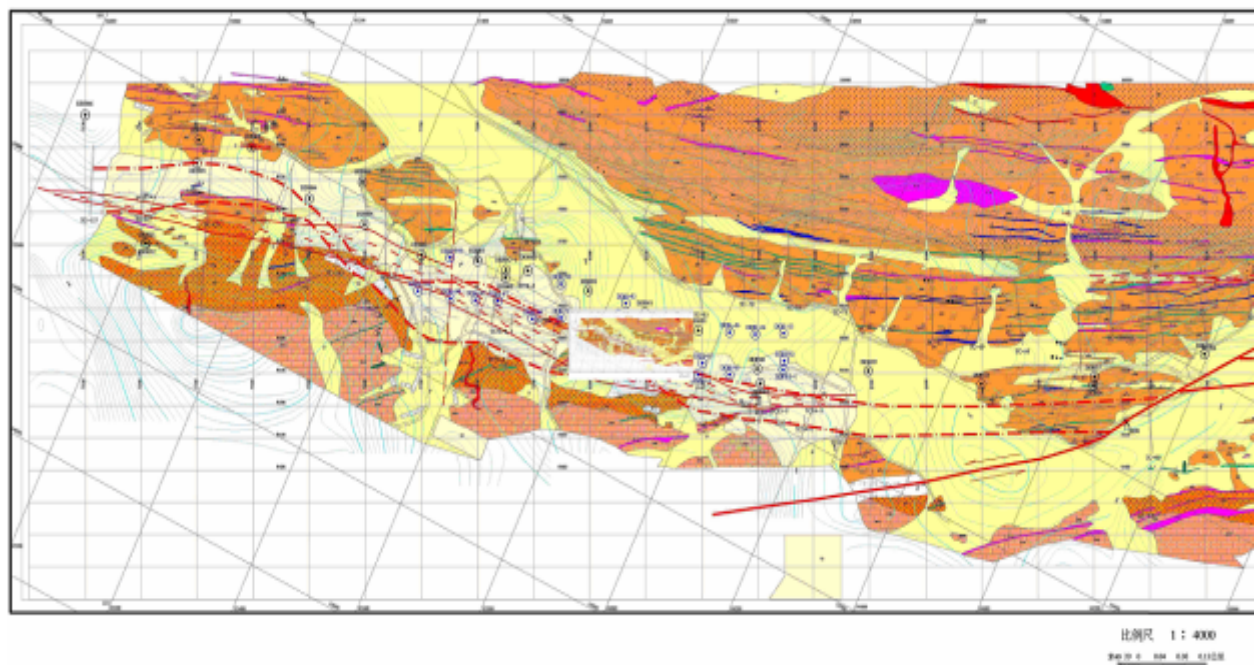


Figure 11.3
Drill Hole Locations, Southwest Zone, CSH Gold Project

12.0 SAMPLING METHOD AND APPROACH

Drilling at the CSH Gold Project has been 100 percent diamond core drilling. With the exception of Drill Hole 57, which was drilled for metallurgical purposes, the procedure included the following sequence:

1. The core was logged in detail including all rock characteristics and descriptions, RQD information, intervals alteration, etc.;
2. The core was sawn in half with a diamond saw based on sample intervals selected by the geologist;
3. The half core samples were sent to a preparation laboratory for crushing and pulverizing; and split into a 500 to 1000 gram sample pulp and forwarded to an assay laboratory;
4. The prepared sample pulp was submitted to the chosen laboratory for assay; and,
5. The remaining half of the core was retained on site in a secured and protected storage facility for future use and reference. Duplicate samples were taken from the saved half core when this type of sampling was utilized.

Drill core sampling was every two meters, as a general guideline, unless obvious geologic breaks, structures or rock type changes dictated a different sample interval. Maximum sample lengths were three meters and minimum sample lengths were 0.22 meters. The overall actual sample interval for all drilling campaigns averages 1.60 meters for the Northeast Zone, and 1.68 meters for the Southwest Zone.

The large diameter core (63.5 millimeters) was drilled to provide adequate sample size and sample weight for representative sampling. The average weight of a half core sample for a two meter interval is 7.0 kilogram, and this amount of material ensures good sample representation.

The following information was recorded by the field geologist for all geological samples collected for analysis and for reference samples:

1. Sample Numbers
 - Field Sample Number
 - Laboratory Sample Number
 - Duplicate Sample Number
2. Date of Sample Collection
3. Local Name of Sample Site.
4. Geologist.

5. Easting, Northing, Elevation Coordinates, dip angle and azimuth.

6. Rock Description

Rock Name

Alteration / Weathering

Mineralogy

Mineralization

Oxidation; and Percent sulfides

7. Sample Information:

Number

Type

Method

Dimensions

Environment

Size Fraction

8. Other Comments

A discussion of drilling parameters has been presented in Section 11 of this report. In addition, the 1999 drilling by Southwestern Gold produced variable core recoveries and therefore caution has been used in dealing with the data from these initial 10 drill holes. The 2004 drilling program drilled in the same general area with good recoveries and assay results generally supported the 1999 results. The 2002-2004 drilling campaigns attained 98 percent core recovery, which is considered very good.

Prior to 2004, a total of 3,389 core samples were shipped to the laboratory each weighing about 2 kilograms. An additional 3,892 samples were shipped for analyses in the 2004 drilling program. The drill core samples were analyzed by ALS Chemex in Vancouver or other reputable laboratory using standard fire assay techniques with AAS finish.

13.0 SAMPLE PREPARATION, ANALYSIS AND SECURITY

All samples were taken and handled by Ningxia Pacific's geological staff in a manner acceptable by current professional practice.

A written log or description was prepared for each sample and an appropriate identification number was assigned. The sample reference number is unique, and uses two part sample tags. The detachable part of the sample tag was enclosed in the sample bag, and the number was also written on the outside of the bag with indelible marker. Samples were packed and sealed in the field in plastic bags. Prior to shipment, the samples were stored in a safe locked area at the main base camp. There has never been any observation, evidence or suggestion at any time that any of these samples had been tampered with in any manner.

All of the core samples were trucked directly to the Langfang Laboratory at the Institute of Geophysical and Geochemical Exploration located at the Langfang Research Centre, Hebei Province, about a one-hour drive east of Beijing. This is a laboratory fully certified by the Chinese Government, which is known and respected for its analytical work both in China and abroad. To maintain the chain of custody of the samples, each leg of the route from the field to the laboratory used itemized delivery notes and shipping waybills. Samples were delivered to the laboratory directly by Jinshan personnel. At no time during the shipping from the field to the laboratory were the samples out of the direct supervision of Jinshan personnel.

The entire sample as received at Langfang was crushed to minus 10 mesh and then rolled, quartered, and split to produce a 500 gram sample for shipment to Canada for assaying by ALS Chemex in North Vancouver.

At ALS Chemex, the samples were ground and pulverized to minus 100 mesh with the gold content being determined using the standard Chemex screened metallic fire assay techniques on one-assay tonne (30 gm) samples. Under this procedure, Chemex conducts three fire assays on each sample using an AA finish. One assay is carried out on the greater than 100 mesh material and two are completed on the less than 100 mesh fraction. Taking the respective weights into account, the gold values are then back calculated to give the original gold content.

Standards and blanks are run consistently and these checks are designed by Jinshan geologists and executed by ALS Chemex in-house to assure their quality control. Additionally, the numerous unmineralized lamprophyre intersections in the core served as blank checks and these consistently returned values less than 0.05 grams per tonne gold.

It is the opinion of the qualified persons that produced this report that the sampling, sample preparation, security, and analytical procedures are all within applicable industry standards.

14.0 DATA VERIFICATION

As part of the data quality assurance and quality control procedures (QA/QC), a duplicate sampling program was introduced into the 2003 and 2004 drilling program. On a random basis, every 5th to 10th sample was sent in duplicate from the minus 10 mesh material at Langfang Laboratory for assaying by ALS Chemex. A total of 454 duplicate samples (13.4 percent of the total number of assays) were sent for assay checks, and are described below.

Variations in the duplicate sample results were noted from the duplicate check sample program. Statistical analyses of the QA/QC data indicate a confidence level for individual samples above 0.20 grams per tonne gold at plus or minus ($\pm$) 25 percent. This result was confirmed by a more recent heterogeneity test, indicating that the sampling protocols used to date can result in variations of up to 50 percent in individual assay grades. Such variability is common in most gold mining operations worldwide when mined blocks are reconciled against predicted block grades. Not only are grades commonly not the same, the actual location of the predicted grade blocks may be somewhat different in three dimensional space. However, there generally is good reconciliation when considering large volumes and production tonnages such as on a bench, month, quarter, or annual basis. The variability of individual assays is quickly reduced when considering numerous sample lots or groups of samples, as with composites for grade estimation, and more so at the time of estimating resources.

It is also important to note that the re-assaying of standards may indicate a conservative grade bias. Check assays using standards of known values indicate a 5 percent lower value from the ALS Chemex laboratory compared with the known value for the low grade standard. There has been no compensation for this lower grade variance as these differences are with only the low grade standard.

An additional drilling program was undertaken at the CSH site in 2005. Data from that program are not yet available and these data are not included in this project development report.

14.1 Constitutional Heterogeneity of the Gold Mineralization

The intrinsic variability of the gold mineralization has been evident in most aspects of sampling and assaying on the CSH 217 property. All the metallurgical test labs working on this material reported significant variability and encountered problems in establishing actual head assay grades of their bulk sample material. Eventually they have relied on calculated head grades based on final test results.

A heterogeneity test was performed on oxide mineralization from a bulk sample obtained in the Northeast Zone. The results of this test allowed Jinshan to optimize sampling protocols in future drill programs in order to decrease the variability observed in future drill hole sampling. The main conclusions of this test are:

1. The variability observed in the data is partly due to suboptimal sampling protocol, which can be improved.
2. The intrinsic (constitutional) variability of the gold mineralization is not as high as other gold deposits, such as epithermal and coarse gold deposits.
3. The 350 kilogram bulk sample tested shows that overall there is no bias in the assaying procedure, and that the fine particle sizes contain the most significant portion of the gold.

The variability observed has two main sources: (1) intrinsic mineralization variability, due to the free gold particles observed, which are mostly in the range of 40 to 60µm in size, but with occasional particles up to 400µm. Sampling this type of material requires that large sample masses be reduced to small grain sizes before splitting can take place; and, (2) the sub-optimal sampling protocol used to date, which introduces additional variability as discussed above. The observed variability of the database can be reduced through better sampling protocols and equipment.

14.2 Bulk Sampling

Bulk sample test results provided by SGS Lakefield Research have provided the following data:

Table 14.2.1 SGS Lakefield Research Bulk Sample Test Results			
	Expected Grade from Drill Hole Assays	Duplicate Head Grade Samples by LR	Calculated Head Grade from Testing by LR
Oxide bulk sample	1.04g/t	0.76g/t	1.12g/t
Sulfide bulk sample	0.90g/t	1.08g/t 0.67g/t	0.97g/t

From the above, it appears that for both bulk samples the calculated head grades are about 8 percent higher than anticipated from the drill data. This is in agreement with past experience and other bulk samples to date, but it is an observation that cannot be quantified at this point in time. However, when also considering the QA/QC data discussed in this report and the results from the pilot mining operation, it provides an indication that the drill hole samples are adequate for the preparation of resource estimates, although they may be underestimating in-situ gold grade.

14.3 Database Quality Assurance/Quality Control (QA/QC)

14.3.1 QA/QC prior to the 2004 Drill Campaign

The assay duplicate information for the drilling available to date represents about 13 percent of the total meters drilled in 2003, which was the first QA/QC program implemented by Jinshan Gold Mines after acquiring the project from Southwestern Gold. The 13 percent

translates to approximately 3 percent of the total intervals in the database (adding up the 1999, 2002, and 2003 drilling) that have gold grades above 0.2 grams per tonne gold. Although this is at the low end of the 3 to 5 percent range for check material usually recommended for gold deposits, the qualified person, Mr. Mario Rossi, does not believe that this reduces the confidence on the database, given the good results obtained. Additional details are given in the preliminary project assessment report filed with SEDAR on 15 April 2005.

Both the pulp and coarse reject duplicates indicate little or no bias, with a 25 percent average relative precision, and with approximately 50 percent of the intervals with worse than 20 percent absolute relative deviation. By comparison, and considering duplicates that include sample preparation errors (below -10 mesh) in a deposit of this type, it is normally expected that 80 percent of the total number of duplicates have a 20 percent or less absolute relative deviation.

The more significant problem, however, is reflected by the initial 10 diamond drill holes (drilled in 1999). Recovery is very low (71.8 percent for weathered rock and 88.2 percent for unweathered rock) and the Langfang Laboratory data used in modeling are on average 0.118 grams per tonne gold biased high with respect to the corresponding Chemex duplicate assays. The average absolute relative deviation for the duplicate samples above 0.2 grams per tonne is 40 percent. However, this issue is no longer a concern, since subsequent drilling has confirmed and reproduced the original 10 Southwestern drill holes.

A similar problem occurs with the trench data available. The assays were conducted by the Langfang Laboratory but the assay procedure was conducted on a 10 gram sample size (instead of the 30 gram industry standard of North America). Further the rough channel sampling procedure in a trench is a less reliable sampling method than diamond drill core. This makes comparing the two databases more problematic. Given the low confidence and limited spatial influence in the resource model, the trench data were not used for resource modeling.

14.3.2 Control Samples, 2004 Campaign

The 2004 QA/QC program utilized blanks, duplicates and reference standards. The total frequency of control samples into the stream was 18 percent, which includes 12 percent duplicate samples, 4 percent standard samples and 2 percent blank samples.

Blank sample material was collected from a quartzite outcrop located southeast of the orebody at 41°38'59.5"N/109°16'25.2"E. Five representative grab samples from the quartzite were analyzed by ALS Chemex in Vancouver for 41 element ICP and AA 23. All samples returned less than 0.005 parts per million gold (Batch No VA04029077). Three types of duplicates were inserted: quartered core at the Ningxia Pacific core laboratory in Xin Hu Re split from coarse reject (-5 millimeters), and the fine reject (-20 mesh) by IGGE Langfang. IGGE Langfang inserted two reference standards: one low grade (OREAS 52P @ 0.183 grams per tonne gold) and one high grade (OREAS 17Pb @ 2.56 grams per tonne gold). The Certified Reference Material was obtained from Ore Research and Exploration (Pty) Limited of Australia. Standard sample preparation and round robin analyses for these standards are available as backup documentation.

The basic statistics that describe results of the blank checks and the standards are shown in Table 14.3.2.1. The corresponding summary for the duplicate checks is shown in Table 14.3.2.2. Note the good reproduction of the standard average values, with a slight bias for the low-grade standard.

The assays of blank material indicate there is no significant contamination in the sample preparation or analysis and that the laboratory detection limit (LDL) for the entire process is considered to be 0.05ppm. Two blank samples assayed above the LDL (0.09 and 0.10ppm) for two different sample batches. As the second blank sample in the two anomalous batches above assayed below the LDL, and the anomalous assays are well below the mineralized geologic threshold at 0.20 grams per tonne gold. Therefore, it is concluded that contamination is not significant in any of the assays.

Table 14.3.2.1 Basic Statistics of the Standards and Blanks							
OREAS 17Pb			OREAS 52P			Blank	
	Jinshan	OREAS		Jinshan	OREAS		
N =	52	47	N =	56	79	N =	88
Mean	2.559	2.560	Mean	0.174	0.183	Mean	0.027
Median	2.590	2.580	Median	0.180	0.18	Median	0.025
Mode	2.670	2.580	Mode	0.180	0.17	Mode	0.025
Count Mode	11	14	Count Mode	25	20	Count Mode	86
St. Deviation	0.142	0.145	St. Deviation	0.055	0.013	St. Deviation	0.011
Max	2.870	2.760	Max	0.500	0.21	Max	0.100
Min	2.130	1.960	Min	0.040	0.157	Min	0.025
95% conf	0.039	0.041	95% conf	0.014	0.003	95% conf	0.002
(Mean – Std) /Std	-0.04%			-4.92%			

Comments on the statistical treatment of the check sample data:

1. The mean of the assays of the high-grade standard OREAS 17Pb is 2.559 grams per tonne, well within the reported acceptable tolerance range of 2.54 to 2.58 grams per tonne. The Student t test shows there is a 75 percent probability that these samples are from the same population (i.e. there is no significant difference between the assay values from ALS compared to the round robin results).
2. The mean and median of the high-grade reference samples assayed at ALS Chemex is nearly identical to the round robin assays for the OREAS sample, but the ALS Chemex assays are not a normal distribution around the mean value and display a gap between 2.70 to 2.80 grams per tonne gold. The cause of this gap is probably normal statistical variance for a small sample population and is not considered a fault in the analytical procedures.

3. The mean of assays of the low grade standard OREAS 52b is 0.174 ppm which is approximately 5 percent lower than the acceptable tolerance range of 0.179 to 0.187ppm. A Student-t test shows a 17 percent probability that these samples are from the same population (i.e. there is a significant difference between the sub-populations).
4. The low bias of the low-grade standard suggests that assays of low-grade drill core may be underestimated. As there were only two standard sample grades analyzed, it cannot be determined if the analytical bias is linear. As the low-grade standard sample is close to the important geological threshold of 0.22 grams per tonne, this analytical bias may affect geological and resource modeling.
5. Drill core duplicate analyses from quartered core have a standard deviation of 0.428 grams per tonne, which confirms the high intrinsic heterogeneity of the mineralization as noted earlier.
6. Duplicate analyses of the coarse reject (0.875 grams per tonne) and fine reject (0.865 grams per tonne) also show high variances, being affected by both a sub-sampling protocol and the high constitutional heterogeneity of the mineralization.

Table 14.3.2.2 Basic Statistics for Drill Core, Coarse Rejects and Pulp Duplicates			
	All Inclusive Averages		
	Fine Reject	Coarse Reject	Drill Core
Number	108	108	109
Mean	0.030	-0.038	0.013
Count Mode	34	32	39
St. Deviation	0.865	0.875	0.428
Max	4.115	2.790	1.810
Min	-3.100	-5.845	-2.530
95% Conf	0.163	0.165	0.080

The qualified person, Mr. Mario Rossi, believes that if the project advances, further QA/QC programs should be implemented, including the use of a second laboratory for pulp and coarse (-10 mesh or -5 mesh) duplicates. Further, no less than three standards at more relevant grades should be used. These may include the current low-grade standard (OREAS 52P), a mid-grade standard at about 0.5 or 0.6 grams per tonne, and a high-grade standard, but much lower than OREAS 17P, for example in the 1.2 grams per tonne range. Also, further enhancements proposed include establish acceptance protocols and re-assaying criteria during the diamond drilling program.

The following Figure 14.3.2.1 presents the distribution of values of three types of duplicate assays described above.

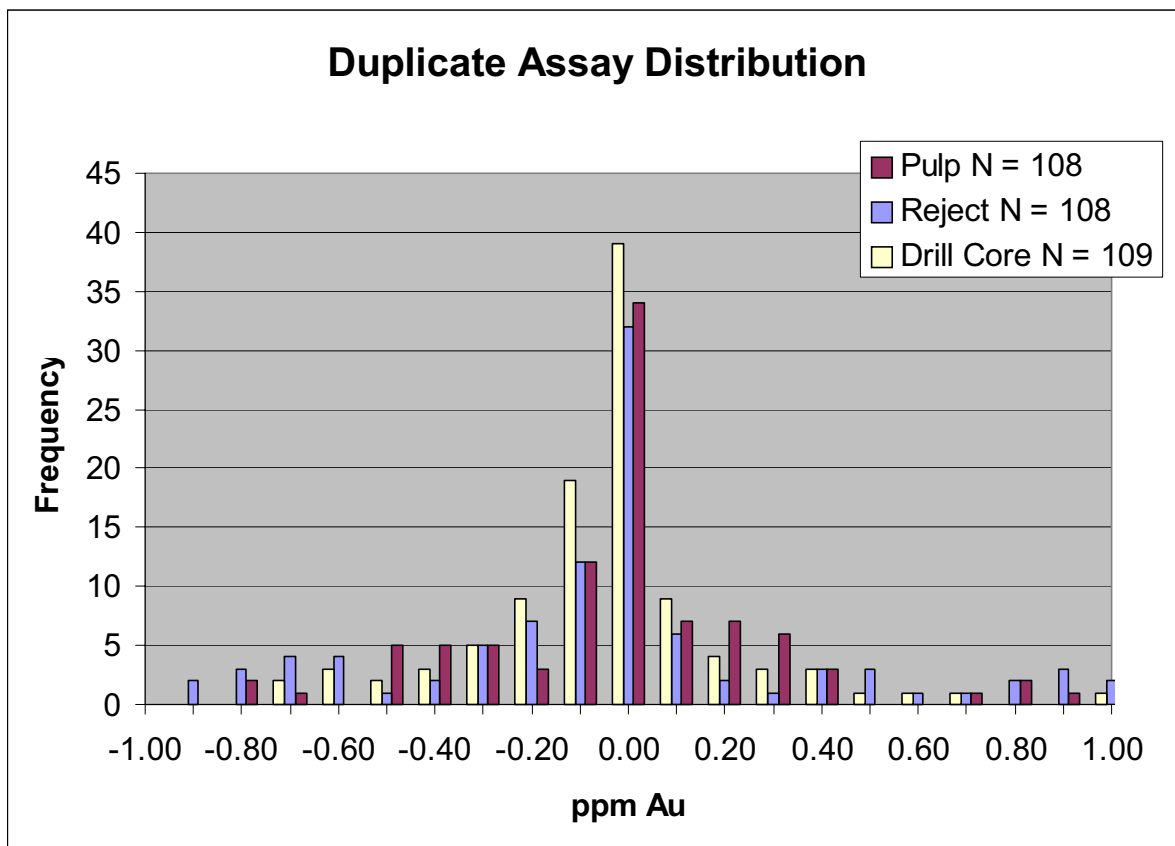


Figure 14.3.2.1
Distribution of Values from the Three Types of Duplicate Assays

15.0 ADJACENT PROPERTIES

Not applicable

16.0 MINERAL RESOURCE AND RESERVE ESTIMATES

16.1 Database and Geologic Model

The mineral resource used in this development study was derived entirely from a resource estimate contained in a document filed with SEDAR on 15 April 2005 entitled "Preliminary Assessment of the Chang Shan Hao 217 Gold Project, Nei Mongol, Peoples' Republic of China". There have been no changes between the resource defined in the 15 April 2005 filing and the resource used in this project development study.

16.1.1 Assay Database

The database used to estimate the resources consists of a total of 98 inclined surface drill holes, covering the entire CSH 217 deposit (Southwest and Northeast zones), which dip in between about 75° to 45° to the south in rotated mine grid coordinates. In December of 2004, all the drill hole collars were resurveyed with a total station tied to control points established with differential GPS system in the summer of 2004. The newly surveyed drill collar coordinates and elevation data were used in the current database.

Sampling interval is mostly 2 meters down the hole, although there are a significant number of exceptions to this: the overall average length of the assayed interval is 1.68 meters. In addition, there are three underground adits from which about 100 channel samples have been taken. These samples are too few to reliably assess their quality by comparison with the other DDH samples. They have not been used for the geologic modeling and resource estimation.

The assay gold database (11,528 gold values) shows that the gold distribution is relatively well behaved (in comparison with other gold deposits), with few samples representing an outlier population. The average overall gold grade for the Northeast zone (weighted by sample length) is 0.51 grams per tonne, with a standard deviation of 0.71, and a coefficient of variation¹ (CV) of 1.40. Approximately 75 percent of the assay data are below 0.68 grams per tonne, and 50 percent of the data are below 0.33 grams per tonne. There are few high-grade values, the maximum being 26.49 grams per tonne.

16.1.2 Database Integrity

The overall integrity of the database was deemed very good after spot checking against the original gold assays certificates and geologic logs, three errors were found.

The contracted drilling team, Sichuan Huafeng, reported that the instrument used for the down-the-hole survey is an Eastman-Kodak single shot camera, made in Germany. The camera has a magnetic angle unit that measures azimuth and dip. The value is recorded

¹ The coefficient of variation is defined as $CV = \sigma / m$, and represents a measure of variability that is unit-independent. This is a variability index that can be used to compare different and unrelated distributions.

inside the camera, and the measured values can be read after the film is developed. The stated measuring accuracy is 0.1 degrees, and reading accuracy is 0.5 degrees, which is adequate for resource estimation.

16.1.3 Specific Gravity

In early July 2003, a suite of 31 representative core samples was selected and sent to the 217 laboratory in Yinchuan for specific gravity determinations.

The specific gravity values were obtained using the hot wax coating method, with varying density values for the various rock types. The resource model uses the following values:

Oxides	–	2.65
Sulfides	–	2.75

16.1.4 Ore Controls and Estimation Domains

The known geology of the CSH217 Project offers some elements that can be used as mineralization controls at the time of estimating resources:

- There is a demonstrable difference between the oxide and the sulfide mineralization in the Northeast zone, both in terms of general statistics and in terms of spatial continuity. This difference is not observed in the Southwest zone. Therefore, it is reasonable to estimate separately oxide and sulfide mineralization in the Northeast, but not so in the Southwest zone.
- A 0.20 grams per tonne envelope was used because of mining and economic considerations, but with the added geologic component that it is thought to represent a reasonable footwall and hanging wall contact for the gold mineralization. In other words, this model assumes that there is no mineralization of interest outside the 0.20 grams per tonne envelope. This control was, in addition to the oxide/sulfide boundary, the main control for the proposed CSH217 resource model.

Several statistical analyses were carried out to describe the differences and similarities of the estimation domains defined, which included histograms and quantile-quantile (Q-Q) plots.

16.1.5 Oxide/Sulfide Boundary

The sulfide-oxide interface is an irregular surface ranging from 30 to 70 meters below ground level. This was defined by logging the point in each drill hole below which all the sulfides are fresh and above which most of the sulfides have been converted to rusty limonite. In most holes this is a very sharp, well-defined line.

The sulfides above the interface have been totally converted to oxides. In a very few holes, some scattered sulfides remain within the oxide section. These sections are generally short and irregular with little continuity. The current data do not suggest any significant tonnages of mixed mineralization types.

The boundary between weathered and fresh rock was defined on each of the geologic cross sections as individual polygons. The sections include both assays and geology along with the oxide and sulfide boundary interface, spaced every 50 meters from 9,900E through 10,700E in the Northeast Zone and from 7700E through 8350E in the Southwest Zone. The oxide/sulfide interface line was drawn on each section by connecting between drill holes, then extending the line horizontally to either side. A three-dimensional solid oxide/sulfide interface was created by wire framing the oxide/sulfide interface lines from section to section, which define the lower limit of the oxidation solid and the upper limit of the sulfide solid.

The oxide and sulfide solids were then utilized to back-tag the drill holes assays and composites, thus coding the estimation database with the basic information required to match to the block model during the interpolation process. The lower limit of the sulfide solid was then defined to be 1,400 meters in the Northeast Zone and 1300 meters in the Southwest Zone, which was also chosen, as the lower limit of the 0.20 grams per tonne envelope by the authors.

16.1.6 Grade Envelopes at Gold = 0.20 grams per tonne

Waste is defined as material with less than 0.20 grams per tonne gold grade over a minimum 6 meter horizontal width (thickness of the steep dipping zones), considered a likely half-bench height and the minimum mining width to selectively remove waste.

The mineralization zone boundaries were interpreted for the purpose of bounding the modeling exercise and for use in the calculation of resources. The polygons were drawn on each section to outline the 0.20 grams per tonne gold mineralization envelopes. The basic criterion for defining the envelopes was based on assays being greater than 0.20 grams per tonne. However, if part of a drill hole within this envelope had an interval that was less than the minimum mining width (defined above), whose weighted average grade was less than 0.20 grams per tonne, that interval was included as internal dilution using its individual assay values.

The 0.20 grams per tonne gold mineralization envelopes can be traced from section to section as a consistent 50-100 meters wide zone. Mineralized blocks have been defined outside of the hanging wall and footwall of this zone, under the condition that they had a thickness greater than the minimum mining width at a weighted average grade ≥ 0.20 grams per tonne gold. Initially, it was anticipated that these splays would be fairly isolated; however these units appear to be continuous where they exist.

16.2 Statistical Analysis and Variography

16.2.1 Compositing

Two-meter long composites were obtained from the original assay data, and coded using the modeled geology as oxide/sulfide and as inside/outside the 0.20 grams per tonne envelope. Several studies on composite lengths were completed in 2004, comparing the impact of dilution and grade variability according to composite length. All composites less than 1 meter in length were discarded from the database. The main conclusions derived from the composites statistics are:

- In the case of the Northwest zone, the variability in oxide mineralization is higher than in the sulfide zone. This is not the case in the Southwest zone, where the variability of both types of mineralization is similar.
- The relative abundance of oxides in the Southwest zone is much smaller than for the Northeast zone. In the Northeast zone, about 22 percent of the composites are coded as oxides, while in the Southwest zone this percentage is 13 percent.
- The overall average gold grade of the 2 meter composites is approximately 0.66 grams per tonne for the SW zone and the NE sulfide mineralization, while the NE oxide mineralization has a slightly lower grade of 0.61 grams per tonne.

16.2.2 Gold High Grade Assays Study

The impact of high grades in the CSH 217 project is limited, since the high-grade population is small. The analysis was based on the cumulative probability curve and a quantity of metal graph by gold cutoff grades. At a 3.0 grams per tonne cutoff, about 0.89 percent of the total meters represent about 8.6 percent of the total gold metal in the deposit. This ratio is considered low if compared to most gold deposits, where typically one or two percent of the data may represent 20-30 percent of the metal contained. In the Southwest zone, 0.43 percent of the total meters are above 5.0 grams per tonne cutoff, containing about 7.7 percent of the total gold.

The gold composites were capped to 5.0 grams per tonne in both zones. This grade capping choice affects 3.6 percent and 7.7 percent of the original Northeast and Southwest gold content, respectively.

16.2.3 Variography

In preparation for the implementation of the grade estimation method chosen, several correlograms for gold grades were run using the 2 meter composites. These included correlograms for the gold grade above 0.20 grams per tonne in the Northeast zone and in the Southwest zone. The Northeast correlogram model for gold greater than 0.20 grams per tonne was to be used for both the oxide and the sulfide grade estimation, since a better description of spatial continuity is achieved. In addition, two 0.20 grams per tonne indicator variograms were also required, one for the Northeast zone and one for the Southwest zone. Finally, a correlogram model for the overall gold distribution was also

obtained, as a tool to aid in the later classification of the resources, and also to provide a model for the internal dilution study as described below.

The main conclusions and observations obtained from the variography are:

- Correlations for the 2 meter composites are 50 meter to 75 meter for sulfides, and about 30-50 meters for oxides. Relative nuggets effects are 40 percent of total variance for sulfides, and 50 to 60 percent for oxide mineralization. There is much better continuity along strike and down dip, and sulfides are more continuous than oxides.
- The indicator variogram models for the 0.2 grams per tonne provide an indication of how continuous the mineralized zones are. For both zones, the variogram ranges indicate that the correlation of the 0.2 grams per tonne envelope can average the equivalent of at least three cross sections, between 150 and 200 meters. This is a statistical confirmation of the geologic observations mentioned earlier in this Section, as well as provides confidence on the continuity of both mineralized zones.
- The short continuity is confirmed by down-the-hole correlograms. For oxides, 70 percent of the total variance is reached at about 35 meters. In sulfide mineralization there is better continuity, with approximately 70 percent of the variance being reached at approximately 50 meters. The ranges for the remaining 30 percent of the variance are much longer and no less than 150 meters.
- The anisotropies and ellipses of continuity for each variogram were checked against known geology and its expected behavior. As expected, along-strike (ENE in rotated coordinates) and down dip (70° or steeper to the North) are the two main directions. There is much less continuity in the across-strike direction.

16.2.4 Internal Dilution

Consideration of the volume-variance correction is necessary because mineralization will be mined on volumes different than the volume of the composites used in grade estimation, and it may also be different than the volume of each block in the resource model. This is internal dilution, or the mixing of mineralization and waste within a block.

The block size that represents the minimum volume that could be mined is called the Selective Mining Unit (SMU). In the case of the CSH project, it has been assumed that 6 meter benches are likely to be used. In this evaluation, the loading equipment considered for the mine operation indicates that a minimum mining width of 6 by 6 meters can be assumed. Therefore, the SMU assumed in this resource model update is 6 x 6 x 6 meters (216 cubic meters).

Using the appropriate correlogram, global corrected distributions were found for the assumed 6 x 6 x 6 meters SMU, and also for an alternative 10 x 10 x 6 meters SMU. Variance reduction factors of 0.62 to 0.68 were observed. When the 2 meters composites

and the two SMU distributions considered are compared, it is seen that, at a gold cutoff of 0.50 grams per tonne, the expected internal dilution is 18 percent (relative) drop in grade and 3 percent relative gain in tonnage when comparing the 2 meter composites to the 6 x 6 x 6 meters SMU for the Northeast zone. When comparing the two SMUs, there is an additional 3 percent relative loss in grade and a 1 percent relative gain in tonnage when using a 10 x 10 x 6 meters SMU. The expected dilution varies with cutoff, as expected, but does not necessarily increase with higher cutoffs. Slightly larger dilution values are found for the Southwest zones.

16.3 Resource Block Model

16.3.1 Block Model Definition

The Chang Shan Hao 217 resource block model was defined as a single large block model combining both mineralization zones. This was done to facilitate the handling of the resource model and later pit optimization and mine planning work. The model has the following limits, referred to the southwest, lower corner of the block:

- Minimum Easting: 352,500E
- Maximum Easting: 356,500E
- Minimum Northing: 4,614,500N
- Maximum Northing: 4,617,200N
- Minimum Elevation: 1,210 meters
- Maximum Elevation: 1,690 meters

The block size chosen was 12.5 x 12.5 x 6 meters, intended to reflect drill hole spacing available, and according to Journel and Huijbregts (1978) recommendations. It is a small block for areas where sections are at 100 meters spacing, although these are few, and if estimated, they have been classified as inferred resources.

The block model defined allowed for definition of sub-blocks at the contacts between the oxide/sulfide interface, at topography, and also at the 0.20 grams per tonne mineralized envelope contact. The maximum number of sub blocks allowed was 2 x 2 x 2, which implies a minimum sub-block size of 6.25 x 6.25 x 3 meters. The purpose of the sub-blocking is to incorporate geologic contact dilution wherever appropriate and according to the geologic model used. However, the model was regularized to the nominal 12.5 x 12.5 x 6 meters before reporting resources and pit optimization.

16.3.2 Indicator-Modified Ordinary Kriging (IMOK)

IMOK belongs to a family of similar grade estimation methods used in resource estimates, and it involves the following steps:

- Definition of the mineralized and un-mineralized grade populations, using a grade threshold. For the CSH217 project, a 0.20 grams per tonne threshold was chosen, allowing within the interpreted envelope the presence of two distinct populations. The grade threshold is used to define an indicator variable, which

takes the value of 1 if the grade is larger or equal to the grade threshold, and 0 otherwise.

- The proportion of the block that is mineralized is predicted by kriging the indicator variable is kriged using the corresponding indicator variogram. This estimation provides a value between 0 and 1 for each block, which is interpreted as the estimated proportion of material within the block that is mineralized.
- The grade of the mineralized portion of each block is estimated using only the nearby composites above the mineralization threshold, the corresponding correlogram model, and using ordinary kriging. Every block inside the mineralized envelope receives a grade for that proportion of the block that is mineralized. In the case of the Northeast zone, this was done separately for oxides and sulfides.

The final block grade is obtained by diluting the contained metal in each block (mineralized tonnage of the block, times the mineralized grade for that block) with the un-mineralized portion of the block, which in this case is assumed to have a grade of 0.0 grams per tonne. The average gold grade of the composites inside the mineralized envelope that are less than 0.2 grams per tonne is 0.09 grams per tonne and 0.1 grams per tonne for the Northeast and Southwest zones respectively, which introduces a degree of conservatism in the grade estimation process.

16.3.3 Estimation Plans

Three estimation passes were used to estimate the resource model. Each pass is done using a varying degree of requirements before any given block can be estimated. Thus, better block-by-block estimation can be achieved by using more restrictions on those blocks that are closer to drill holes, and thus better informed. Also, since the passes are based on decreasing levels of information, the pass provides an initial indicator for resource classification.

Data selection was done using octant searches it helps to avoid over-influence of individual drill holes in areas with redundant information. In all cases, block kriging was performed, and block discretization used was 2 x 2 x 2 points within each block.

For the kriging of the mineralized indicator, the 2 meter composites were first transformed to 0 and 1 as explained above. Two separate kriging runs were done, one for each zone, using the corresponding variogram models, considering only blocks within the 0.20 grams per tonne envelope, and using ordinary kriging on the indicators.

In the case of the Northeast zone, a hard boundary between oxides and sulfides was used. This boundary is “softened” at the time of re-blocking the original sub-blocks along the contact to the nominal 12.5 x 12.5 x 6 meter blocks.

16.3.4 Resource Classification

Under the CIM definitions (CIM Standards on Mineral Resources and Reserves Definitions and Guidelines, August 2000), *measured resources* require that “quantity, grade, density, shape, and physical characteristics need to be established with confidence sufficient to allow the appropriate application of technical and economic parameters” such that production planning and the evaluation of the economic viability of the deposit is possible. In the case of *indicated resources*, the level of confidence should be sufficient to allow for the application of appropriate technical and economic parameters, mine planning, and economic evaluation.

The most important factors affecting resource classification are:

- *Geologic* continuity, which is considered significant because the lateral limits of the mineralized envelope can be interpreted confidently for no less than three cross sections at a time, 150 meters or more. The continuity evidenced by the correlogram of the 0.20 grams per tonne gold grade indicator confirms this, as its total range is just below 200 meters in the along-strike direction. The indicator variogram for the SW zone indicates a somewhat smaller range, but still larger than the equivalent of three sections.
- The correlogram models confirm the gold *grade* continuity. The gold grade for both zones evidence continuity of up to 45 meters for about 67 percent of the total variance in the NE zone, 71 percent of the total variance in the SW zone, and about 150 meters or better for 85 percent of the total variance.
- The 2004 drilling confirmed expected results. The anticipated grade ranges for the new drilling were found in the general areas and at levels as expected.
- The CSH 217 is a low-grade deposit. In terms of statistical variability, it ranks well below any typical epithermal and/or vein-type gold deposit, and including most of the Nevada gold mines. Given CSH 217's low CV, the current drill spacing is of good density and compares well with other operating gold mines.

All these factors combined allowed the authors to use the following criteria to classify the resources (refer to Tables 16.3.4.1 and 16.3.4.2 below):

- To achieve the measured classification in this case, the resources must be estimated according to the following criteria:
 - a) Northeast Zone: blocks must have been estimated within an ellipsoid that is 40 meters x 16 x 28 meters (along-strike, across-strike, and dipping at -70°), with a minimum of 5 and a maximum of 8 composites, and with the additional restriction of 2 composites maximum per octant defined.
 - b) Southwest Zone: blocks must have been estimated within an ellipsoid that is 35 meters x 17 x 28 meters (along-strike, across-strike, and

dipping at -70°), with a minimum of 5 and a maximum of 8 composites, and with the additional restriction of 2 composites maximum per octant defined.

- To achieve the indicated category, the resources must be estimated according to the following criteria:
 - a) Northeast Zone: the blocks must have been estimated within an ellipsoid that is 120 meters x 48 x 84 meters (along-strike, across-strike, and dipping at -70°), with a minimum of 3 and a maximum of 10 composites, and with the additional restriction of 3 composites maximum per octant defined.
 - b) Southwest Zone: the blocks must have been estimated within an ellipsoid that is 100 meters x 50 x 80 meters (along-strike, across-strike, and dipping at -70°), with a minimum of 3 and a maximum of 10 composites, and with the additional restriction of 3 composites maximum per octant defined.
- To achieve the inferred classification, the resources must be estimated according to the following criteria:
 - a) Northeast Zone: the blocks must have been estimated within an ellipsoid that is 200 meters x 80 x 140 meters (along-strike, across-strike, and dipping at -70°); they need to have been estimated with a minimum of 2 composites, a maximum of 12, with additional restriction of 3 composites maximum per octant defined.
 - b) Southwest Zone: the estimation must have occurred using an ellipsoid that is 200 meters x 100 x 160 meters (along-strike, across-strike, and dipping at -70°); they need to have been estimated with a minimum of 2 composites, a maximum of 12, with additional restriction of 3 composites maximum per octant defined.

In addition, the anisotropies of the search ellipsoids mimic (although they are less anisotropic and orientated on the average strike direction of the mineralization) the anisotropy ellipses derived from the correlogram models.

All blocks not estimated under any of those conditions remain un-estimated, and are currently considered waste, the same as all blocks outside the mineralization envelope. Almost 10 percent of the blocks defined within the mineralization envelope do not have an estimated gold grade.

Table 16.3.4.1 Resource Classification Parameters, NE Zone					
Category	Search in X, Y, and Z	Rotation Angles of the Ellipsoid, GSLib convention	Min No. of Comps	Max No. of Comps	Max. No. of Comps/Octant)
Measured	40x16x28m	45°/0 ° /-70 °	5	8	2
Indicated	120x48x84m	45 ° /0 ° /-70 °	3	10	3
Inferred	200x80x140m	45 ° /0 ° /-70 °	2	12	3

Table 16.3.4.2 Resource Classification Parameters, SW Zone					
Category	Search in X, Y, and Z	Rotation Angles of the Ellipsoid, GSLib convention	Min No. of Comps	Max No. of Comps	Max. No. of Comps/Octant)
Measured	35x17.5x28m	80 ° /0 ° /-70 °	5	8	2
Indicated	100x50x80m	80 ° /0 ° /-70 °	3	10	3
Inferred	200x100x160m	80 ° /0 ° /-70 °	2	12	3

In addition to using the criteria described above, additional constraints were imposed. For the Northeast zone these are:

- If the block is located east of the coordinate E356120, the block is classified as inferred.
- If the block is located between elevations 1450 and 1500 meters and has been classified as measured, set the block as indicated.
- If the block is below the 1450 meters elevation, it is classified as inferred.

In the case of the Southwest zone, the additional conditions were:

- If the block is east of E354150, then it is classified as inferred.
- If the block is located between coordinates E353150 and E353350, it is classified as inferred.
- If the block is between elevations 1400 and 1500 meters and was originally classified as measured, it is re-classified to indicated.
- If the block is below the 1400 meters elevation, it is classified as inferred.

The amount of measured and indicated resources in the NE zone is more significant than in the SW zone. Measured resources tend to be more disjointed, since they can only be found in those areas where the blocks can be estimated with a search distance of 40 meters or better, mainly around the section lines. Indicated resources are much more continuous, particularly through the NE zone, and enclosing measured resources. There is relatively little amount of measured resource in the SW zone, only in those areas where the

there are 2 or 3 drill holes clustered. Overall inferred resources in the SW zone are close to 50 percent of the total estimated tonnage.

16.3.5 Geologic Resources and Grade-Tonnage Curves

The assessment presented in this section lists inferred mineral resources that are considered too speculative in nature to have economic considerations applied to them that would enable them to be categorized as mineral reserves. These inferred mineral resources have not been included in the economic analysis. Tables 16.3.5.1 and 16.3.5.2 show the overall resources for the gold diluted resources in the Northeast and Southwest zones, respectively. Tables 16.3.5.3 and 16.3.5.4 show the oxide and sulfide resources, also split by category, and Table 16.3.5.5 summarizes the overall estimated resource for the CSH Gold Project.

The Oxide resource represents a small percentage of the total CSH Resource. In terms of ounces of gold, and considering for example the 0.50/t cutoff, there are about 370,000 ounces of oxide gold (or 17 percent of the total) in the measured and indicated categories, and 1.80 million ounces of sulfide gold (or 83 percent of the total) classified as measured and indicated. In terms of project development, although the oxide resources would be the first ones to be processed, the bulk of the resource is sulfide mineralization, and so its metallurgical recovery is a key parameter in project economics.

There are significant measured and indicated resources in the Northeast zone, not as much in the Southwest zone, which is more variable and also has less drilling to date. Also, the estimated grades of the resources are lower compared to prior estimates. However, they are not unexpectedly so, particularly considering the estimation methodology and that they include an estimated 18 percent dilution.

The authors are unaware of any known environmental, legal, permitting, title, taxation, socio-economic, marketing, political, mining, metallurgical, infrastructure or other relevant issues that could materially effect the estimate of mineral resources.

Table 16.3.5.1										
Northeast Zone Resources by Category, 2005 Resource Model										
Measured			Indicated		Measured+Indicated			Inferred		
Cutoff (g/t)	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	Million Ounces Au	MTons	Au Grade (g/t)	Million Ounces Au
0.3	16.8	0.73	60.9	0.70	77.7	0.71	1.77	28.8	0.76	0.70
0.4	15.6	0.76	57.3	0.72	72.9	0.73	1.71	24.4	0.83	0.65
0.5	13.2	0.82	48.0	0.77	61.2	0.78	1.53	21.9	0.87	0.61
0.6	10.0	0.90	36.3	0.85	46.3	0.86	1.28	19.2	0.92	0.57
0.7	7.4	1.00	25.9	0.93	33.3	0.94	1.00	16.1	0.97	0.50
0.8	5.4	1.09	17.9	1.01	23.3	1.02	0.76	12.7	1.03	0.42
0.9	3.9	1.18	11.6	1.09	15.5	1.11	0.55	9.1	1.10	0.32
1.0	2.8	1.28	7.3	1.18	10.0	1.21	0.39	5.3	1.21	0.21

Table 16.3.5.2
Southwest Resource by Category, 2005 Resource Model

Measured			Indicated		Measured+Indicated			Inferred		
Cutoff (g/t)	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	Million Ounces Au	MTons	Au Grade (g/t)	Million Ounces Au
0.3	5.6	0.80	21.4	0.81	27.0	0.80	0.69	23.6	0.72	0.55
0.4	5.1	0.84	19.2	0.86	24.3	0.85	0.66	18.5	0.82	0.49
0.5	4.5	0.89	17.0	0.91	21.5	0.91	0.63	14.6	0.92	0.43
0.6	3.7	0.97	14.1	0.98	17.8	0.98	0.56	12.2	0.99	0.39
0.7	2.9	1.05	11.5	1.06	14.4	1.06	0.49	8.5	1.14	0.31
0.8	2.3	1.14	9.1	1.14	11.4	1.14	0.42	7.1	1.22	0.28
0.9	1.8	1.22	7.0	1.23	8.8	1.23	0.35	5.6	1.32	0.24
1.0	1.4	1.30	5.4	1.32	6.7	1.31	0.28	4.6	1.39	0.21

Table 16.3.5.3
Oxide Resources by Category, 2005 Resource Model

Measured			Indicated		Measured+Indicated			Inferred		
Cutoff (g/t)	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	Million Ounces Au	MTons	Au Grade (g/t)	Million Ounces Au
0.3	4.0	0.71	14.9	0.71	18.9	0.71	0.43	3.8	0.60	0.07
0.4	3.5	0.76	13.8	0.74	17.3	0.74	0.41	2.9	0.68	0.06
0.5	2.9	0.83	11.7	0.79	14.5	0.80	0.37	2.4	0.72	0.06
0.6	2.1	0.92	9.0	0.86	11.2	0.87	0.31	1.7	0.80	0.04
0.7	1.6	1.02	6.8	0.93	8.4	0.95	0.26	1.1	0.87	0.03
0.8	1.2	1.11	4.7	1.01	5.9	1.03	0.20	0.7	0.94	0.02
0.9	0.9	1.21	3.6	1.09	3.9	1.12	0.14	0.3	1.05	0.01
1.0	0.6	1.30	1.9	1.18	2.6	1.21	0.10	0.2	1.14	0.01

Table 16.3.5.4
Sulfide resources by category, 2005 Resource Model

Measured			Indicated		Measured+Indicated			Inferred		
Cutoff (g/t)	Mtons	Au Grade (g/t)	MTons	Au Grade (g/t)	Mtons	Au Grade (g/t)	Million Ounces Au	MTons	Au Grade (g/t)	Million Ounces Au
0.3	20.7	0.69	67.4	0.73	85.8	0.74	2.04	48.6	0.75	1.17
0.4	18.0	0.74	62.7	0.76	79.9	0.77	1.98	40.0	0.84	1.08
0.5	14.4	0.81	53.3	0.81	68.1	0.82	1.80	34.0	0.90	0.98
0.6	10.9	0.90	41.4	0.89	52.9	0.90	1.53	29.7	0.96	0.92
0.7	8.1	0.99	30.5	0.98	39.3	0.98	1.24	23.5	1.04	0.79
0.8	5.9	1.08	22.3	1.06	28.8	1.07	0.99	19.0	1.11	0.68
0.9	4.2	1.17	15.6	1.15	20.4	1.16	0.76	14.3	1.19	0.55
1.0	3.0	1.26	10.7	1.25	14.2	1.26	0.58	9.8	1.30	0.41

Table 16.3.5.5 Total Resource by Category, 2005 Resource Model										
	Measured		Indicated		Measured+Indicated			Inferred		
Cutoff (g/t)	Mtons	Au Grade (g/t)	Tons (x1000)	Au Grade (g/t)	Tons (x1000)	Au Grade (g/t)	Million Ounces Au	Tons (x1000)	Au Grade (g/t)	Million Ounces Au
0.3	22.4	0.75	82.3	0.74	104.7	0.73	2.46	52.4	0.74	1.25
0.4	20.7	0.78	76.5	0.76	97.2	0.76	2.38	42.9	0.83	1.14
0.5	17.6	0.84	65.0	0.81	82.7	0.82	2.18	36.5	0.89	1.04
0.6	13.7	0.92	50.4	0.88	64.1	0.89	1.83	31.4	0.95	0.96
0.7	10.3	1.01	37.3	0.97	47.7	0.98	1.50	24.6	1.03	0.81
0.8	7.7	1.10	26.9	1.05	34.6	1.06	1.18	19.8	1.10	0.70
0.9	5.7	1.19	18.6	1.14	24.3	1.16	0.91	14.7	1.19	0.56
1.0	4.1	1.28	12.6	1.24	16.8	1.25	0.68	10.0	1.30	0.42

16.3.6 Statistical and Graphical Validation of the Block Model

An extensive graphical validation was done on the block model, which serves several purposes:

- Checks the reasonableness of the estimated grades, based on the kriging plan and the nearby composites.
- Checks that the estimated blocks carry indeed the envelope and oxide/sulfide codes as interpreted and modeled, and that topography has been properly accounted for.
- Checks that the general drift and the local grade trends of the block model, compared to the drift and local grade trends of the composites.

Cross sections and plans were used to check the block model on the computer screen, showing the block grades, the composite data, the oxide/sulfide surface, and the 0.20 grams per tonne envelope used to define the volume within which the interpolation took place. No evidence of any block being wrongly estimated was found: every block grade can be explained as a function of the surrounding composites, the correlogram models used, and the kriging plan applied.

Several statistical analyses were used to validate the 2005 resource model, which are shown in Appendix F. Only a few examples are shown in this report, the remaining validation work is available as background information. The plots of gold grade trends of the original 2 meter composites (gold equal to or greater than 0.20 grams per tonne) versus the estimated block grades (for the mineralized portion of the block) show how closely the estimated block grades reproduce the grade trends observed in the original 2 meter composite grades. Some additional observations are:

- In the case of the trend on the Easting direction (N-S 100 meter slices) the matching in the SW zone (Easting equal or greater than 54200) is poorer than in

the NE zone. This is a clear indication of the differences in drilling, as well as the more variable mineralization of the SW zone.

- In the case of trends in the Northing direction, the match up is reasonable, but less indicative because of the geometry of the deposit.
- In the case of the vertical trends, which have been analyzed grouping two benches at a time, the match is very close, with the exception of the 1408 meter elevation, where the anomalous high-grade composites appear. However, the block model has successfully limited their influence, partly due to the capping explained above.

These and other statistical checks not presented here indicate that the block model grades behave as expected, with an adequate degree of smoothing, and without obvious anomalous values. It is globally unbiased, and internally consistent with the composites and correlogram models used to create it.

17.0 OPEN PIT MINING OPERATIONS

A mine plan for the CSH Gold Project has been developed by Nilsson Mine Services Ltd. (NMS). This plan has been prepared for a heap leach processing rate of 20,000 tonnes per day. There are two ore types found at the CSH Project Site. Near surface material has been weathered along mineral bearing fractures. This ore type is referred to as "oxide" or as being oxidized. At depth the ore is fresh and is referred to as "sulfide". During the initial two years of the mine plan, ore will be delivered run of mine (ROM) to the heap leach pad. A three stage crushing plant will be available during year three through to the end of the mine life.

During the life of the mine approximately 53 million tonnes of ore at an average grade of 0.76 grams per tonne will be placed upon the heap for processing. Approximately 50 million tonnes of waste will be placed upon waste dumps.

Mining and ore delivery will be undertaken by local mining contractors. Supervision of the contractors and grade control activities will be managed by Jinshan engineering staff.

17.1 Resource Model

The geological resource model used for the purposes of mine planning has been prepared by GeoSystems International Inc. (GSI). The resources are summarized in the table below.

**TABLE 17.1.1
RESOURCE SUMMARY - NORTHEAST ZONE**

	<i>Measured</i>		<i>Indicated</i>		<i>Measured+Indicated</i>			<i>Inferred</i>		
<i>Cutoff (g/t)</i>	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	Million Ounces Au	MTons	Au Grade (g/t)	Million Ounces Au
0.3	16.8	0.73	60.9	0.70	77.7	0.71	1.77	28.8	0.76	0.70
0.4	15.6	0.76	57.3	0.72	72.9	0.73	1.71	24.4	0.83	0.65
0.5	13.2	0.82	48.0	0.77	61.2	0.78	1.53	21.9	0.87	0.61
0.6	10.0	0.90	36.3	0.85	46.3	0.86	1.28	19.2	0.92	0.57
0.7	7.4	1.00	25.9	0.93	33.3	0.94	1.00	16.1	0.97	0.50
0.8	5.4	1.09	17.9	1.01	23.3	1.02	0.76	12.7	1.03	0.42
0.9	3.9	1.18	11.6	1.09	15.5	1.11	0.55	9.1	1.10	0.32
1.0	2.8	1.28	7.3	1.18	10.0	1.21	0.39	5.3	1.21	0.21

**TABLE 17.1.2
RESOURCE SUMMARY - SOUTHWEST ZONE**

	<i>Measured</i>		<i>Indicated</i>		<i>Measured+Indicated</i>			<i>Inferred</i>		
<i>Cutoff (g/t)</i>	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	MTons	Au Grade (g/t)	Million Ounces Au	MTons	Au Grade (g/t)	Million Ounces Au
0.3	5.6	0.80	21.4	0.81	27.0	0.80	0.69	23.6	0.72	0.55
0.4	5.1	0.84	19.2	0.86	24.3	0.85	0.66	18.5	0.82	0.49
0.5	4.5	0.89	17.0	0.91	21.5	0.91	0.63	14.6	0.92	0.43
0.6	3.7	0.97	14.1	0.98	17.8	0.98	0.56	12.2	0.99	0.39
0.7	2.9	1.05	11.5	1.06	14.4	1.06	0.49	8.5	1.14	0.31
0.8	2.3	1.14	9.1	1.14	11.4	1.14	0.42	7.1	1.22	0.28
0.9	1.8	1.22	7.0	1.23	8.8	1.23	0.35	5.6	1.32	0.24
1.0	1.4	1.30	5.4	1.32	6.7	1.31	0.28	4.6	1.39	0.21

17.2 Open Pit Optimization

Pit optimization of the CSH Gold Project has been undertaken using Medsystem® software. A complex wall slope Lerchs Grossman algorithm has been used to develop unsmoothed ultimate pit limits. These limits were used as a guide to develop mine designs. This section describes the economic input parameters to this pit optimization and the resulting pit configuration.

Optimization Input Parameters

The pit optimization input parameters are summarized in Table 17.2.1 Pit Optimization Criteria.

▪ Metal Price

The gold price used in the optimization was US\$ 400 per ounce. Refining and offsite costs were estimated to be US\$ 2.00 per ounce.

▪ Metallurgical Recovery

Process metallurgical recoveries were provided by KDE for ROM and crushed material in weathered and fresh resources types. ROM recoveries are expected to be 80 percent and 50 percent respectively for Weathered and Fresh material. Three stage crushing improves recoveries in both Weathered and Fresh material to 90 percent and 70 percent respectively.

TABLE 17.2.1 PIT OPTIMIZATION CRITERIA			
Case		ROM Heap Leach	1/2/3 Crush, Wash, Gravity, Heap Leach
Ore Production	t x 1000	20.0	20.0
Weathered Ore Recovery	%	80.0%	90.0%
Fresh Ore Recovery	%	50.0%	70.0%
Operating Cost and Fee Estimate			
Mine Waste Contracting	RMB/t	9.58	9.58
Mine Engineering	RMB/t	0.41	0.41
Mine Ore Contracting	RMB/t	10.25	10.29
Mine Ore Subtotal	RMB/t	10.66	10.70
Processing Cost	RMB/t	5.47	8.41
Pad Construction	RMB/t	1.48	1.48
G&A Expense	RMB/t	4.07	4.07
Mineral Resource Tax	RMB/t	0.60	0.60
Water Usage Charges	RMB/t	0.07	0.07
Reclamation & Soil Fund	RMB/t	0.02	0.02
Government Fees & Donations	RMB/t	0.05	0.05
Plant, Pad and G&A	RMB/t	11.75	14.70
All Onsite Costs	RMB/t	22.42	25.40

TABLE 17.2.1 PIT OPTIMIZATION CRITERIA			
Case		ROM Heap Leach	1/2/3 Crush, Wash, Gravity, Heap Leach
Operating Cost and Fee Estimate			
Mine Waste Contracting	\$US/t	\$1.168	\$1.168
Mine Engineering	\$US/t	\$0.050	\$0.050
Mine Ore Contracting	\$US/t	\$1.251	\$1.305
Mine Ore Subtotal	\$US/t	\$1.301	\$1.355
Processing Cost	\$US/t	\$0.666	\$1.026
Pad Construction	\$US/t	\$0.180	\$0.180
G&A Expense	\$US/t	\$0.496	\$0.496
Mineral Resource Tax	\$US/t	\$0.073	\$0.073
Water Usage Charges	\$US/t	\$0.008	\$0.008
Reclamation & Soil Fund	\$US/t	\$0.003	\$0.003
Government Fees & Donations	\$US/t	\$0.006	\$0.006
Plant, Pad and G&A	\$US/t	\$1.433	\$1.792
All Onsite Costs	\$US/t	\$2.734	\$3.148
Other Parameters			
Gold Price	US\$/ounce	\$400.00	\$400.00
Refining/off-site costs	US\$/ounce	\$2.00	\$2.00
Mining Cost Increment Ore	RMB/t	0.13	0.13
Mining Cost Increment Ore	\$US/t	\$0.016	\$0.016
Mining Cost Increment Waste	RMB/t	0.14	0.14
Mining Cost Increment Waste	\$US/t	\$0.017	\$0.017
Entrance Bench - Global	Elevation	1636	1636
Slope Design Sectors	See Slopes Table		
Exchange	RMB/\$US	8.2	

▪ Operating Costs

Mining

Mine operating costs were estimated based upon quotes from Hongdai Guanddong Hongda Blasting Engineering Co., China Second Metallurgical Construction Co., and Wenzhou Tongye Construction Engineering Co. contract mining companies. Unit mining rates were based upon 20,000 tonnes per day production schedule and an average 1 kilometer haulage distance. Mining unit rates are shown in Table 17.2.1, Pit Optimization, Economic Input Parameters. An additional allowance was made for Mine Engineering. Also, a bench increment was applied to adjust operating costs with depth in the mine and base mine. Contract mining costs were also adjusted for dump and pad locations greater than 1 kilometer from the open pit. Cost details are provided in Appendix 1.

Processing

Processing cost estimates were provided by K D Engineering and are shown in Table 17.2.1, Pit Optimization Economic Input Parameters. Process cost for ROM was

estimated to be US\$ 0.66 per tonne. Process cost for crushed material was estimated to be US\$ 1.06 per tonne. These costs have been adjusted upwards slightly since the pit limits were defined and these changes have been incorporated in the financial analyses. Details are provided in Appendix 1.

General and Administration

General and Administration expenses were estimated by K D Engineering to be US\$ 0.55 per tonne. Details are provided in Appendix 1.

Pad Construction

The Phase 1 Leach Pad has a capacity of 25.0 million tonnes and will cost US\$ 8.8 million or US\$ 0.30 per tonne of ore. The Phase 2 Leach Pad will hold 20.0 million tonnes and is estimated to cost US\$ 5.8 million or US\$ 0.28 per tonne of ore. Details can be found in Appendix 2.

Exchange Rate

Operating costs were developed in Chinese currency and converted to a US\$ basis using an exchange rate of 8.11 to 8.2 RMB/\$US.

▪ Sustaining Capital

Sustaining capital was assumed to be negligible on a unit cost basis as mining equipment will be contractor owned, the heap leach pads will be a capitalized operating expense and the crushing spread capital in Year 2 was considered a stand alone investment item.

▪ Local Taxes and Fees

At the time of pit optimization local taxes and fees were still subject to final negotiation. However, allowances were made for Mineral Resource Taxes, Water Usage Charges, Reclamation & Soil Fund and Government Fees & Donations.

These values have been refined and adjusted in the final cash flow analyses.

The 217 Brigade retains a 3.5 percent Net Profits Interest in the project. This interest is not reflected in the optimization cost basis.

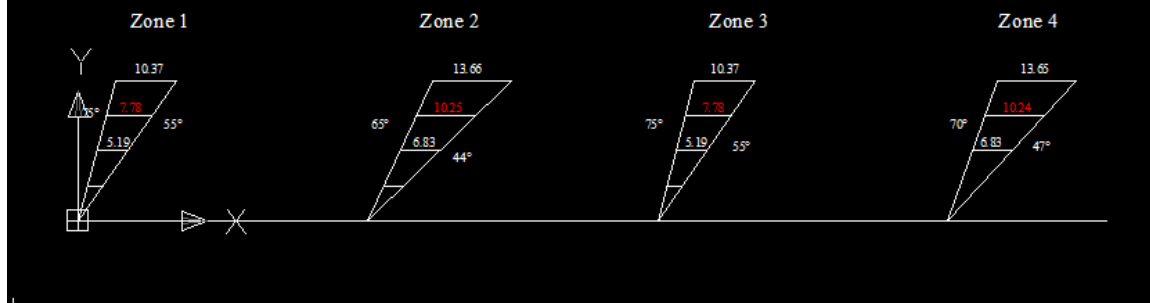
▪ Overall Wall Slopes

Wall slope design recommendations were provided during June 2005 by Golder Associates. These slope recommendations were developed for a pit design incorporating 12 meter benches. The resource model was developed for a 6 meters bench height. Minor adjustments were made to the design criteria to standardize a triple 6 meter bench interval between berms while honoring the recommended face angles and inter-ramp slopes. The footwall was flattened by 3 degrees as an allowance for the haulage road access.

The slope design criteria are summarized in Table 17.2.2 Slope Design Sectors.

Unit	Blasting Practice	Bench Face	Recommended Slope Configuration				Overall Including Ramp	Slope Code	Design Slope Configuration			
			Bench Configuration	Berm Interval	Catch Bench Width	Inter-Ramp Angle			Bench Configuration	Berm Interval	Catch Bench Width	Inter-Ramp Angle
		°		m	m	°				m	m	°
Oxidized Footwall	Inclined Pre-split	75	Double	24.0	10.3	55	55	1	Triple	18.0	7.78	55
Oxidized Hanging Wall	Vertical Trim Blast	65	Single	12.0	7.0	44	44	2	Triple	18.0	10.25	44
Fresh Footwall	Inclined Pre-split	75	Double	24.0	10.3	55	52	3	Triple	18.0	7.78	55
Fresh Hanging Wall	Vertical Pre-split	70	Single	12.0	7.0	47	44	4	Triple	18.0	10.24	47

217 Project Slope Parameters



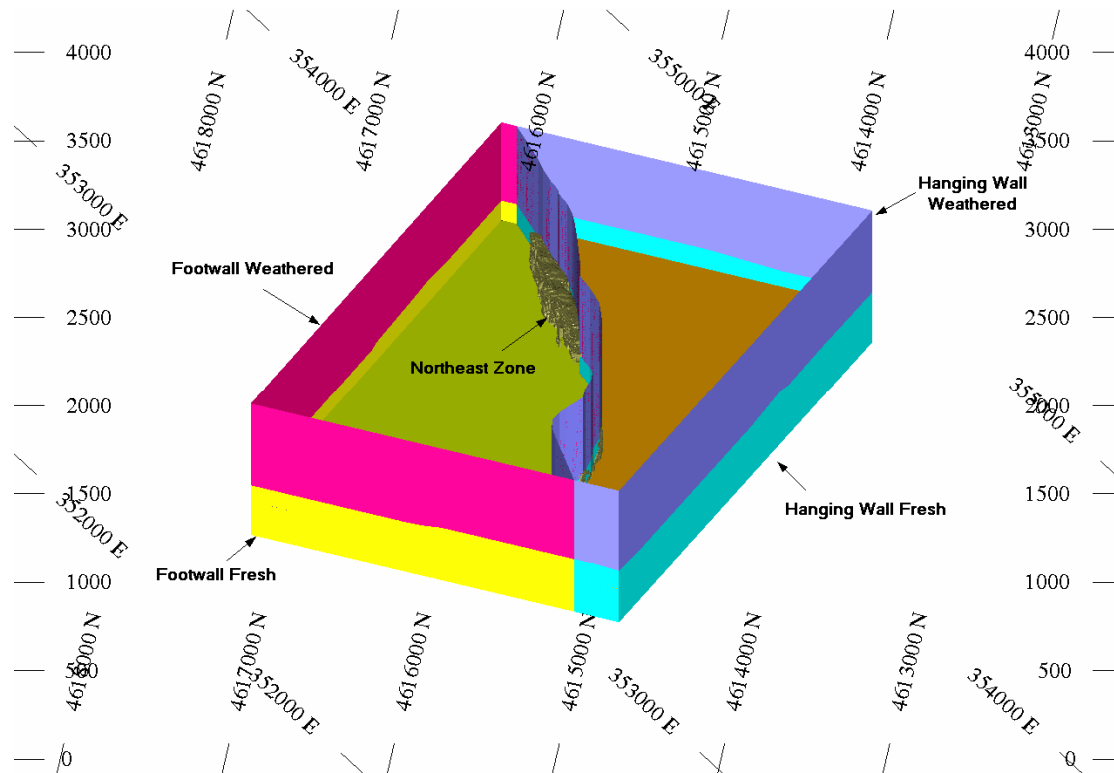


FIGURE 17.2.1
WALL SLOPE DESIGN SECTORS

▪ Discounting

Final pit limits have been determined for undiscounted and discounted block model net values. As it generally takes several years to reach the bottom of a deep pit phase, the economics of stripping waste near surface to release ore at depth can be impacted by the impact of discounting. In other words, in some cases mining marginal blocks at depth may not improve overall project economics. As a test of the sensitivity of pit limit economics to the impact of discounting, additional pits limits were evaluated after discounting costs and revenues at a rate of 8 percent per annum for an average sinking rate of 13 benches per year.

▪ Cutoff Grades

The calculated cutoff grades for the base case optimization criteria are summarized in the table below.

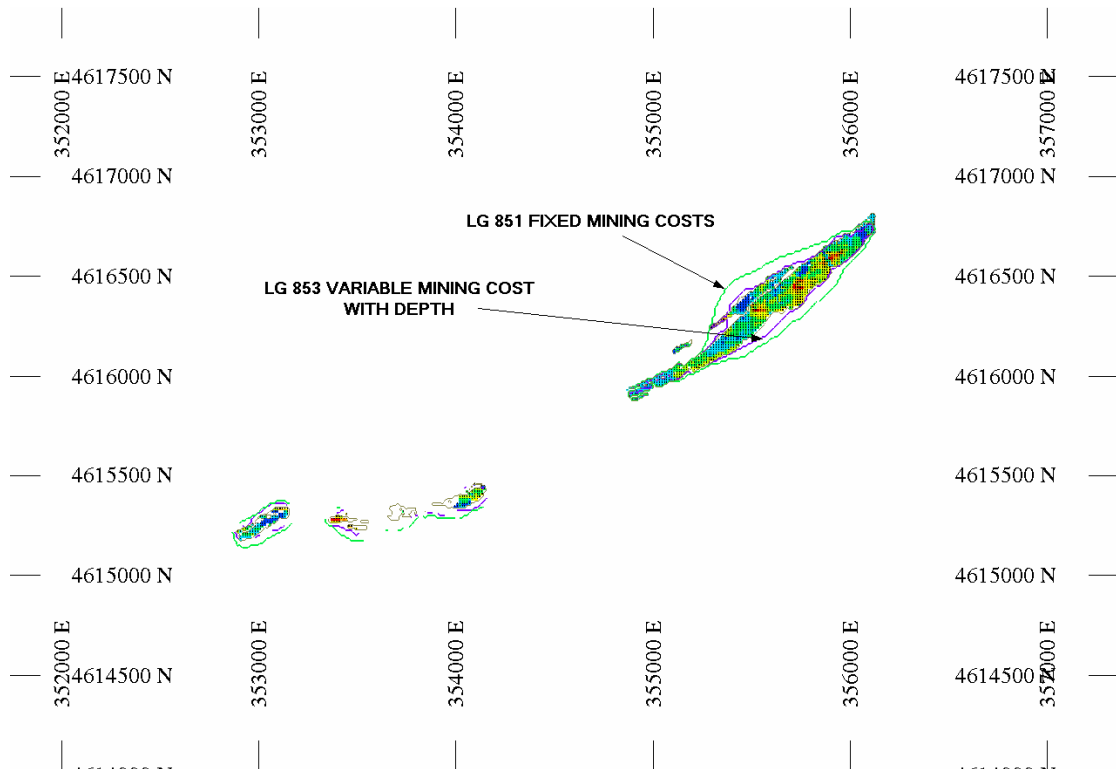
Table 17.2.3 Cutoff Grades			
Cut-off Grade		ROM Heap Leach	1/2/3 Crush, Wash, Gravity, Heap leach
Weathered			
Plant, Pad and G&A	Au g/t	0.14	0.16
All Ore Related Onsite Costs	Au g/t	0.27	0.27
Fresh			
Plant, Pad and G&A	Au g/t	0.22	0.20
All Ore related Onsite Costs	Au g/t	0.43	0.35

Discussion of Optimization Results

A series of potential pit limits were generated using a Lerchs Grossman graph theory based algorithm. ROM and crushed variants were evaluated for fixed mining costs and variable mining costs - increasing with depth. In addition a discounted version was run for the crushed variant. A Weathered only pit limit was also generated. These pit limits were defined for measured and indicated resources. The in-situ resources including inferred class material are summarized in Table 17.2.4. The inferred material was not included in the project economic assessment. Additional detailed reports are referenced in the Attachment Section.

▪ Run of Mine Ore Pit Limit

The ROM pit limits are shown in the plan view figure below. The LG 851 limit is based upon fixed mining costs while the LG 853 limit is based upon a US\$ 0.016/t/bench increase in mining costs with depth.



**FIGURE 17.2.2
UNSMOOTHED PIT LIMITS – ROM**

**TABLE 17.2.4
SUMMARY LG PITS Optimized on Measured and Indicated
Reporting Measured, Indicated and Inferred Resources**

CASE	PIT	INSITU ORE (BCMS)	INSITU ORE (TONNES)	RUN MINE (TONNES)	WASTE TOTAL (TONNES)	S/R	ROM Au g/t	INSITU SG t/m3	GRADES NET \$US/t
ROM Fixed Cost	LG 851	22,858,453	62,142,241	62,142,241	43,726,867	0.70	0.78	2.72	5.81
Crush Fixed Cost	LG 852	27,535,022	74,992,192	74,992,192	69,799,573	0.93	0.76	2.72	7.31
ROM Variable Cost	LG 853	13,043,353	35,185,731	35,185,731	13,459,408	0.38	0.78	2.70	6.46
Crush Variable Cost	LG 854	20,574,337	55,895,404	55,895,404	35,375,798	0.63	0.78	2.72	7.62
Crush Variable Cost Discounted	LG 855	19,748,081	53,627,129	53,627,129	31,567,104	0.59	0.78	2.72	7.62
ROM Variable Cost Weathered Only	LG 856	6,510,675	17,253,287	17,253,287	7,547,711	0.44	0.73	2.65	7.50

▪ **Ore Crushing Pit Limit**

The crushed ore pit limits are shown in the plan view figure below. The LG 852 limit is based upon fixed mining costs while the LG 854 limit is based upon a \$US 0.016/t/bench increase in mining costs with depth.

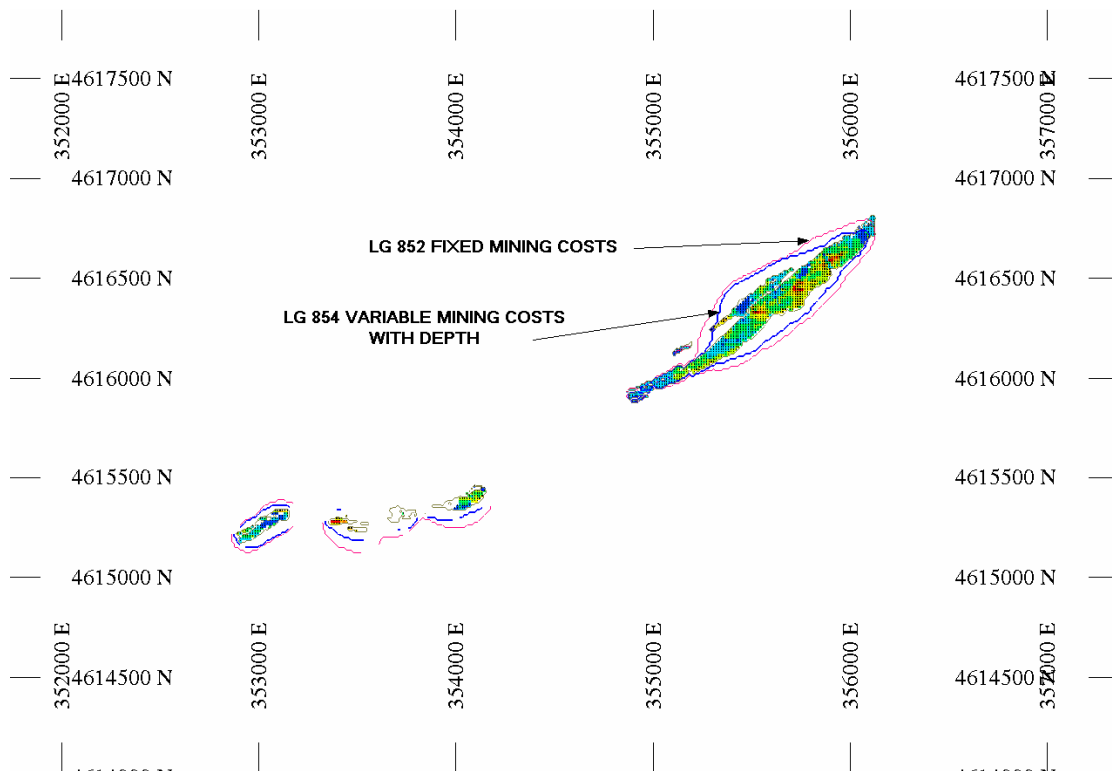


FIGURE 17.2.3
UNSMOOTHED PIT - THREE STAGE CRUSHING

A discounted variation of the crushed ore pit limit was developed to test the sensitivity of the pit limit to time value of money. An 8 percent discount rate was applied with a sinking rate of 13 benches/year corresponding with a 4 year final phase mining rate. This pit is shown in the figure below.

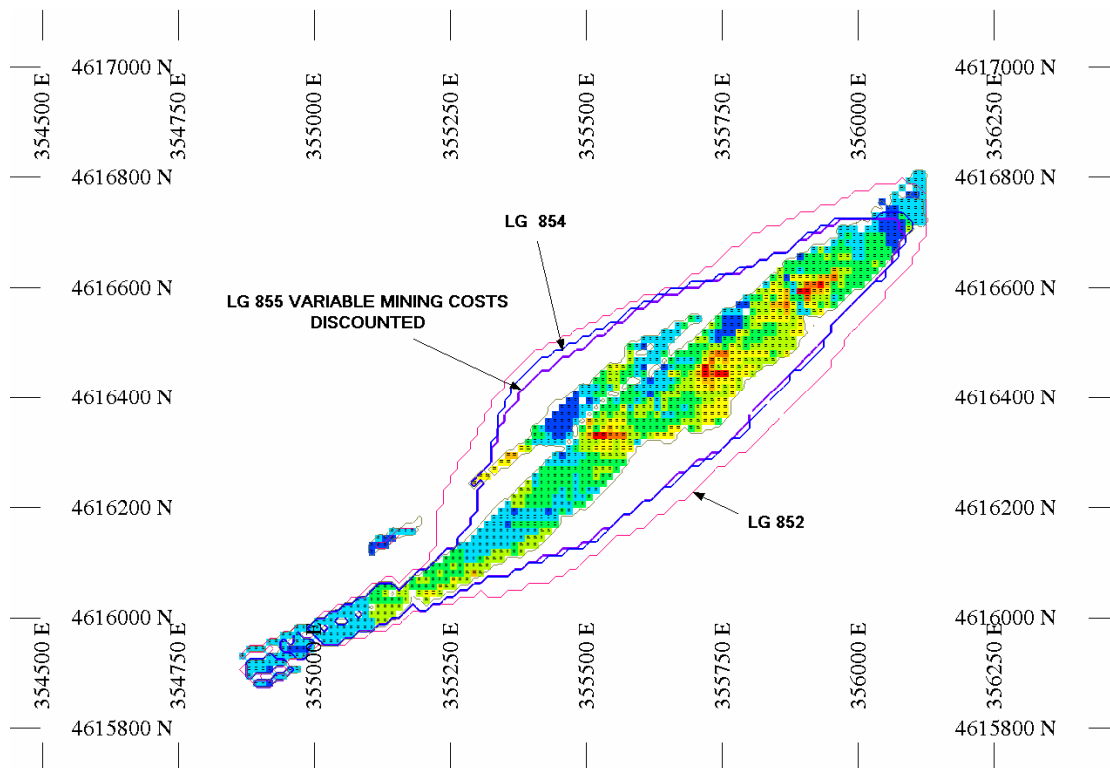


FIGURE 17.2.4
UNSMOOTHED PIT THREE STAGE CRUSHING - Discounted

▪ **Weathered Ore**

The ROM pit limits defined for LG 851 and LG 853 include Weathered and Fresh ore types. The LG 856 pit limit, in the Northeast area, shown in the figure below is based upon Weathered ore only.

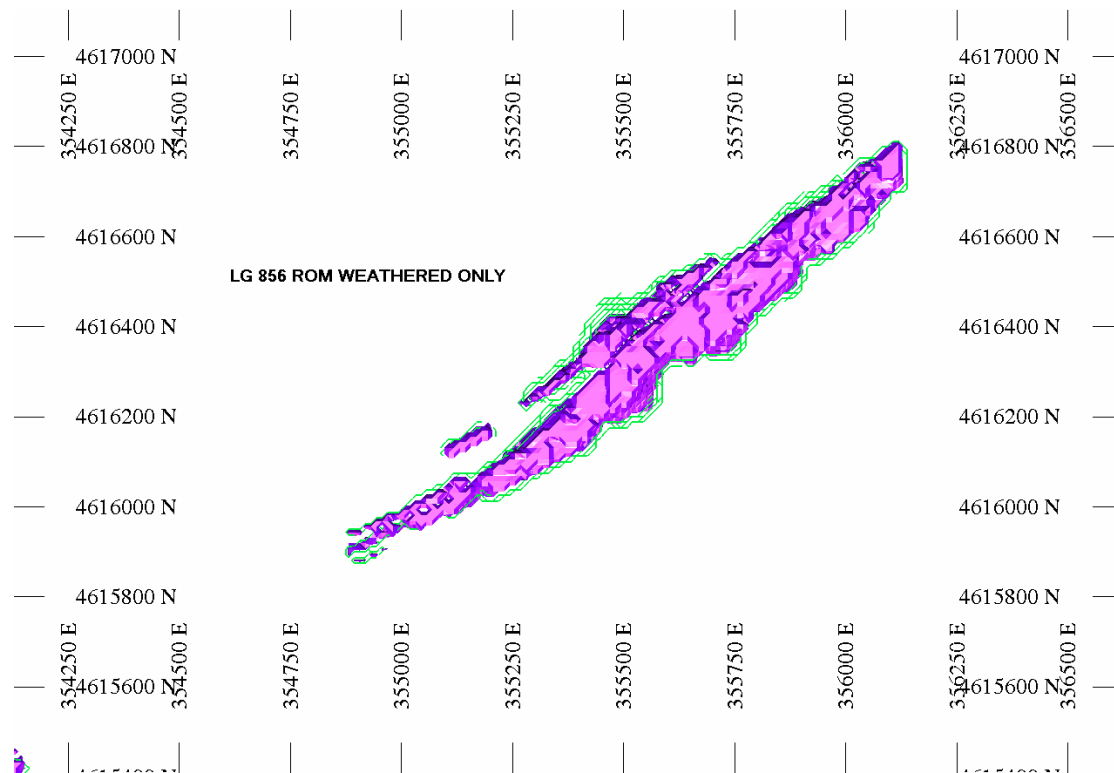
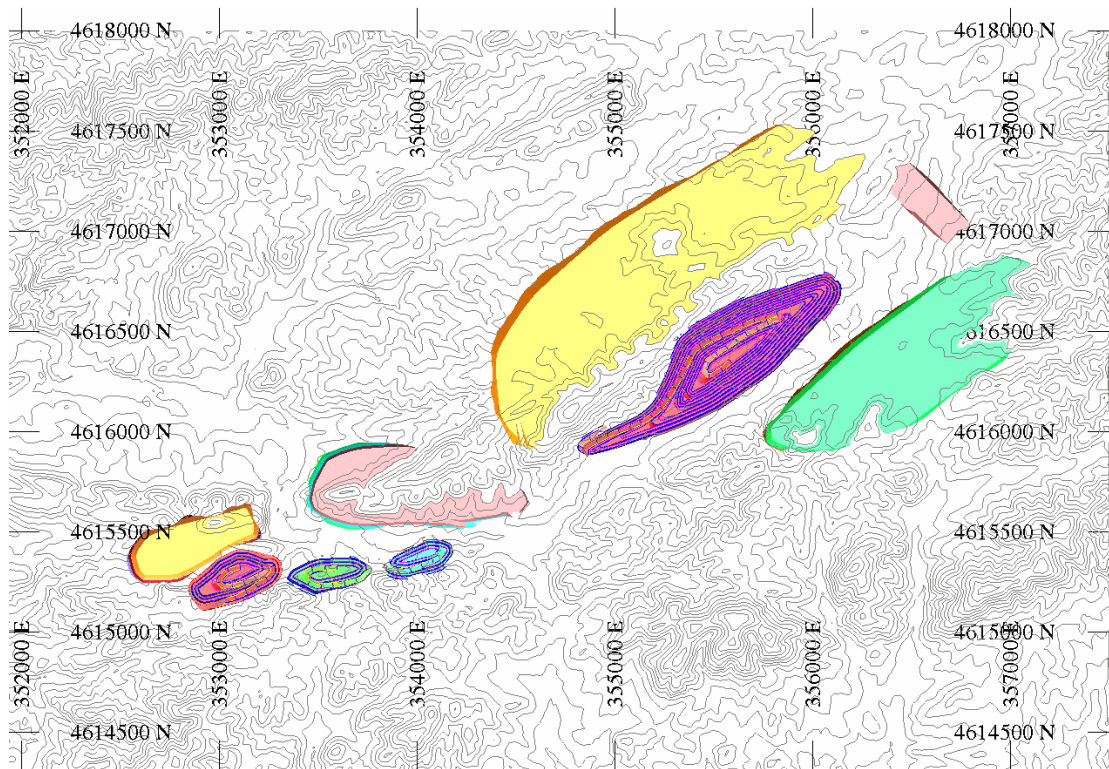


FIGURE 17.2.5
UNSMOOTHED PIT ROM - Weathered

17.3 Mine Design

Updated mine designs have been prepared for the Northeast Zone. The Southwest designs remain the same as the earlier scoping studies as the limits are similar and additional exploration is required in this area. A model update is planned for the fall of 2005.



**FIGURE 17.3.1
GENERAL ARRANGEMENT**

Bench Height

The mining bench height will be 6 meters. Final walls were designed for triple benching between variable berm width of 7.8 meters and 10.25 meters depending on design sector.

Ramp and Haul Road Design

The haul roads within the open pit have been designed at 10 percent maximum grade. The haul road width allowance is 22 meters. This width exceeds requirements for smaller tandem axle trucks to be employed by the contractors but provides an opportunity to increase the scale of the haulage trucks later in the mine life.

Open Pit Slopes

Open pit inter-ramp wall slope design recommendations have been provided by Golder & Associates. The sectors incorporated in the design are summarized in the Table 17.2.3 in the section above.

▪ Pit Design

The Northeast Pit has been designed to the approximate limit of the Variable Mining Cost un-smoothed LG pit limit on the south and between the Variable and Fixed Cost limit on the north side where the main ramp will be located. Access to the pit will be from the west. The final pit is shown in Figure 17.3.2.

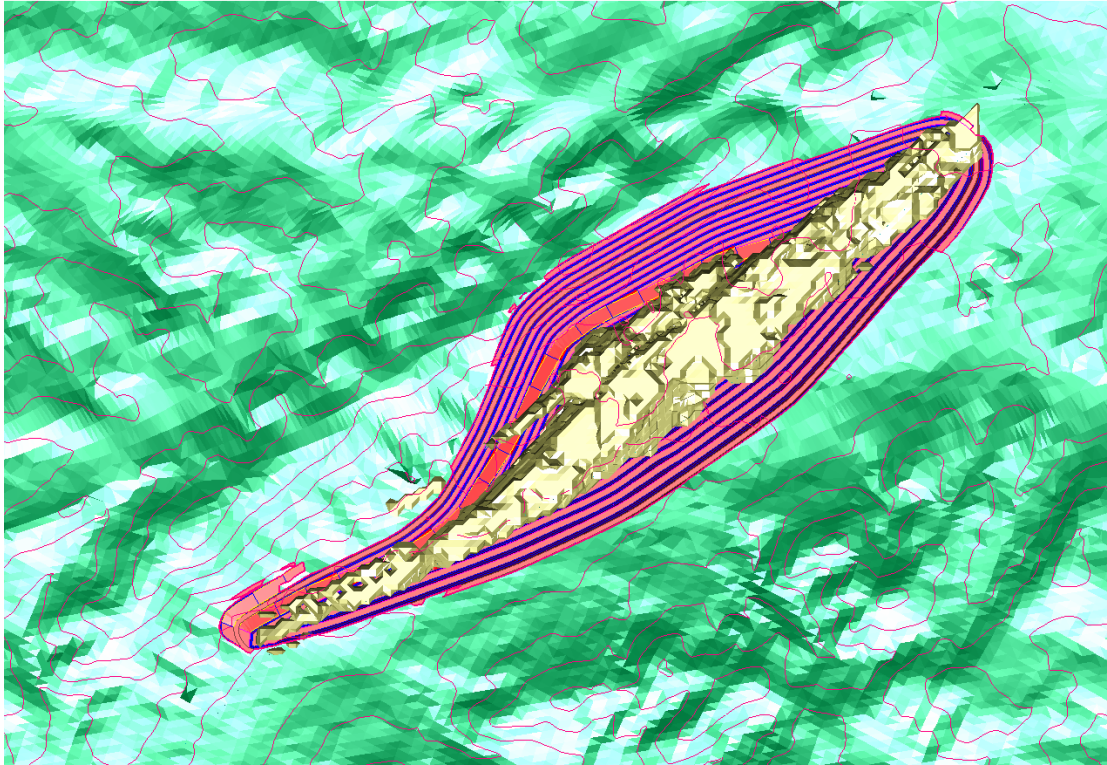


FIGURE 17.3.2
FINAL PIT DESIGN 864

An internal pit development phase was developed focusing on the near surface weathered material. This design extends to the final phase limit on the southeast side and access is from the southwest. This internal phase leaves an 80 meters wide pushback to the north to the final pit limit as shown in the following Figure 17.3.3.

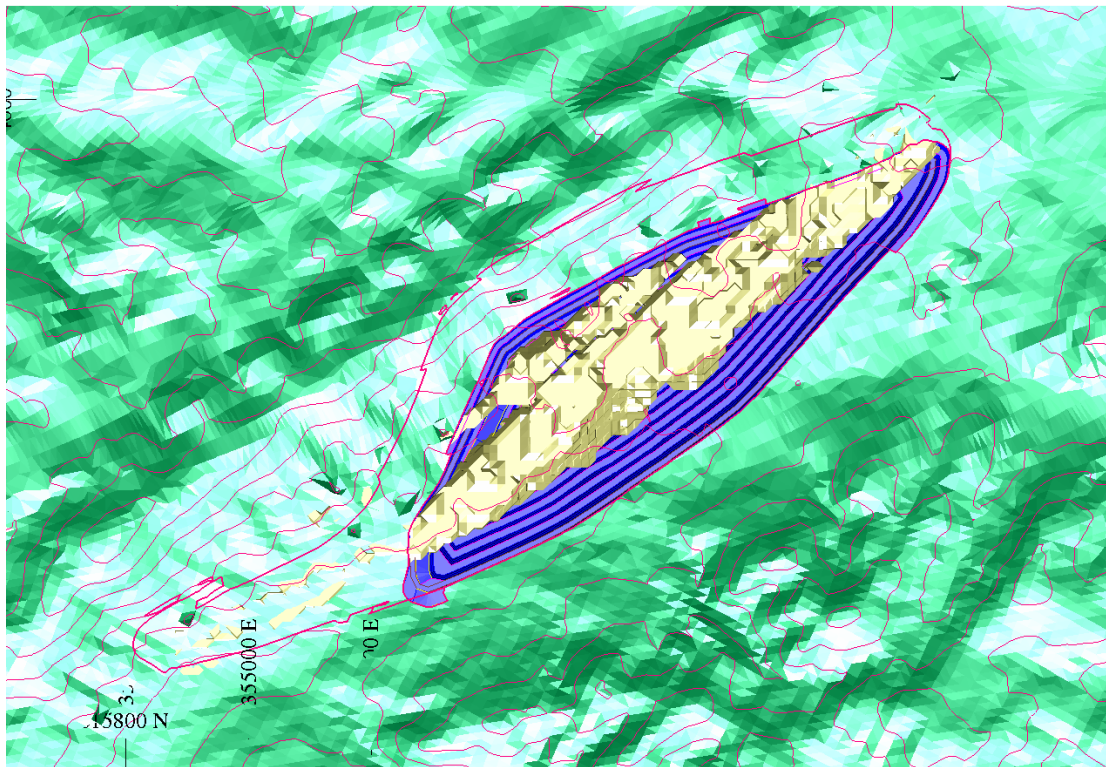


FIGURE 17.3.3
INTERNAL PHASE PIT DESIGN 866

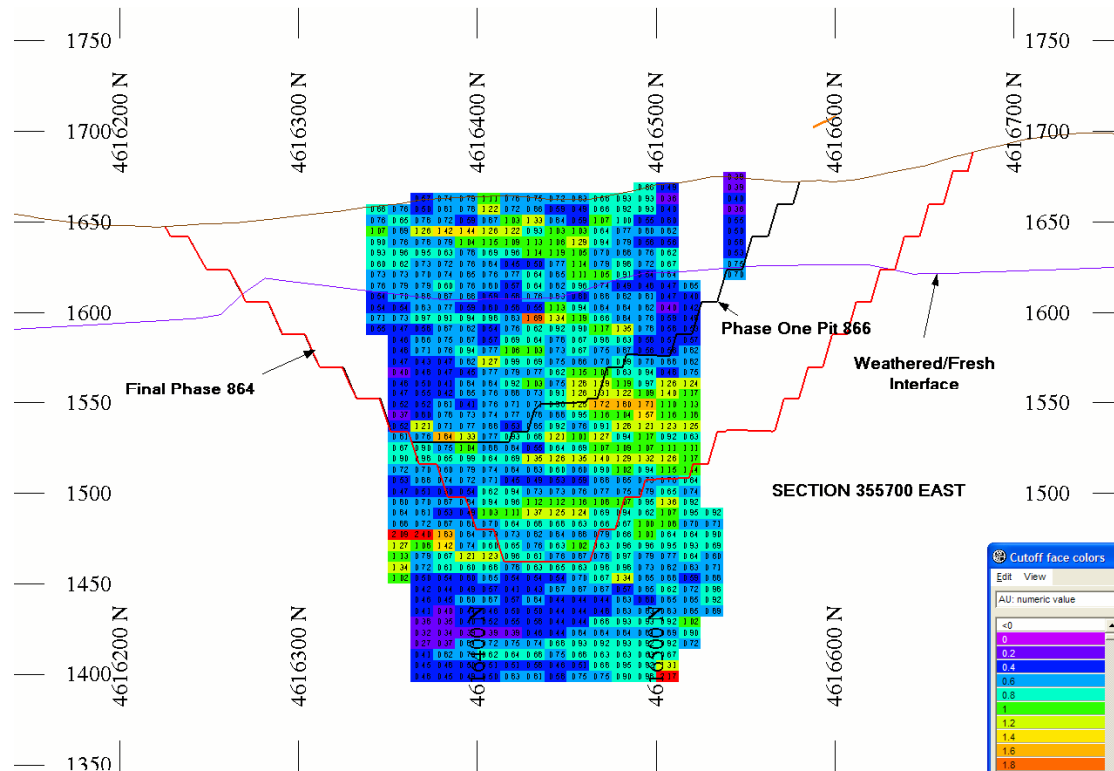


FIGURE 17.3.4
CROSS SECTION EAST 355700

Waste Dump Design

A total of 50 million tonnes of waste will be mined in the current plan. There is no long range low grade stockpile material. Waste dumps have been located southeast and northwest of the Northeast Pit. In addition, two smaller waste dumps have been located in the Southwest Pit area. In summary, 17 million tonnes has been allocated to the Southeast dump and 24 million tonnes has been allocated to the Northwest Dump and the balance will be placed in the Southwest dumps.

The waste dumps are relatively extensive laterally but are not considered high dumps. The dumps will typically reach a maximum height of 40 meters.

17.4 Resource Estimate

Mineral resources have been reported for the final pit designs. These resources include measured and indicated resources only. Weathered Ore has been reported at a cutoff grade of 0.16 grams per tonne gold and Fresh ore has been reported at a cutoff grade of 0.22 grams per tonne. As the process will change from ROM heap leach to three stage crushing followed by heap leach there may in fact be some areas of the deposit that may fall into a process overlap period. Sorting this material and its associated cutoff grades will be a short range planning issue to be sorted out during operations. The mineral resources are summarized in Table 17.4.1.

Table 17.4.1 Mineral Resources								
Summary								
Weathered Material								
		CUTOFF Au g/t	INSITU ORE (BCMS)	INSITU ORE (TONNES)	ROM MINE (TONNES)	Au g/t	SG t/m3	NETT1 \$US/t
Measured	>=	0.16	1,453,003	3,850,458	3,850,458	0.72	2.65	7.36
Indicated	>=	0.16	5,031,212	13,332,713	13,332,713	0.73	2.65	7.45
Subtotal	>=	0.16	6,484,216	17,183,172	17,183,172	0.73	2.65	7.43
Fresh Material								
		CUTOFF Au g/t	INSITU ORE (BCMS)	INSITU ORE (TONNES)	ROM MINE (TONNES)	Au g/t	SG t/m3	NETT2 \$US/t
Measured	>=	0.22	4,137,567	11,378,312	11,378,312	0.78	2.75	6.98
Indicated	>=	0.22	8,624,068	23,716,189	23,716,189	0.77	2.75	6.92
Subtotal	>=	0.22	12,761,638	35,094,501	35,094,501	0.77	2.75	6.94
Summary								
		CUTOFF Au g/t	INSITU ORE (BCMS)	INSITU ORE (TONNES)	ROM MINE (TONNES)	Au g/t	SG t/m3	NETT1/2 \$US/t
Measured	>=	variable	5,590,570	15,228,770	15,228,770	0.76	2.72	7.08
Indicated	>=	variable	13,655,280	37,048,902	37,048,902	0.76	2.71	7.11
Subtotal	>=	variable	19,245,854	52,277,673	52,277,673	0.76	2.72	7.10

17.5 Mine Production Schedule

Pre-Production Stripping

The deposit is open to surface and ore will be mined on the initial benches. Pre-production development activities will include the following:

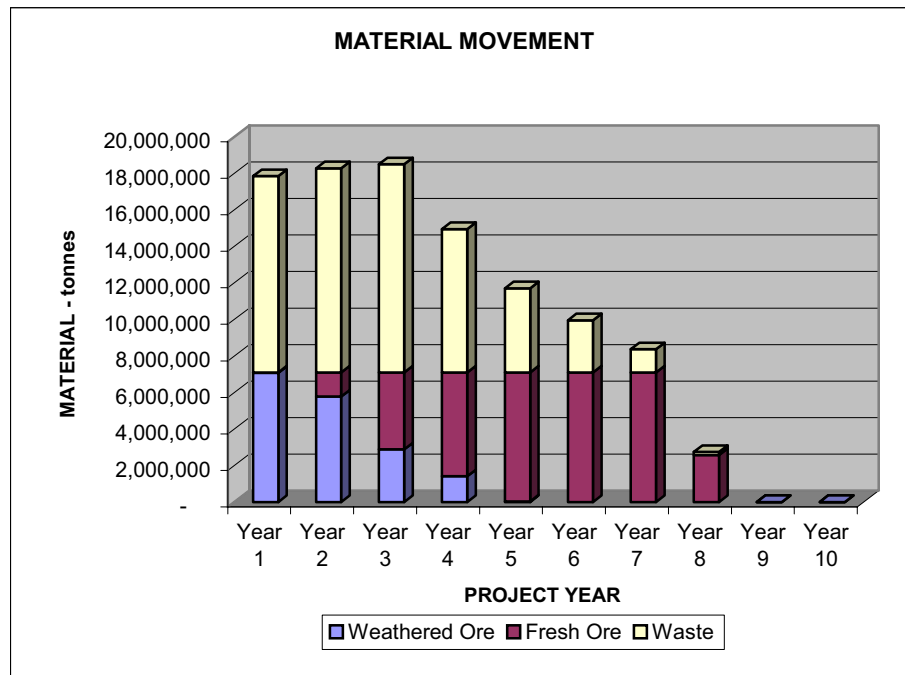
- Diversion ditching
- Starter dam core for the water diversion upstream of the Northeast pit
- Culvert installation beneath main haul road to heap leach pad
- Access road construction to the heap leach pad
- Access road construction to powder magazines
- Access road construction to waste dump
- Fencing and security at the powder magazines
- Water supply installation for road and pit dust control
- Engineering office construction
- Maintenance and fuel storage facility installation

Annual Mine Production Schedule

The mine production schedule has been developed for 20,000 tonnes per day ore to process - either ROM initially or crusher feed in Year 3. A phase in period for start-up and commissioning of the crushing plant is anticipated but this does not impact the mine schedule. Overall mine production will average 18.2 million tonnes per annum during the first three years and then taper off as the lower benches of the Northeast Pit will be

primarily ore. An emphasis has been placed on recovering Weathered ore in the first two years of the schedule hence the majority of the strike length of the deposit will be opened up during this period.

The production schedule summary is shown in the figure and table below. Measured and Indicated resources have been scheduled.



**FIGURE 17.5.1
MINE PRODUCTION SCHEDULE**

Mine development drawings are on file at the Jinshan mine site and can be obtained from Nilsson Mine Services.

TABLE 17.5.1
MINE PRODUCTION SCHEDULE – Part 1

Phase 1		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Total
ROM Resource	tonnes	7,025,057	3,928,524	3,466,736	4,116,605	3,725,320	2,636,765	-	-	24,899,007
Gold	g/t	0.72	0.75	0.78	0.86	0.71	0.72	-	-	0.75
Weathered Resource	tonnes	7,005,083	2,857,995	737,212	150,210	-	-	-	-	10,750,499
Gold	g/t	0.72	0.75	0.88	0.96	-	-	-	-	0.74
Fresh Resource	tonnes	19,974	1,070,529	2,729,524	3,966,395	3,725,320	2,636,765	-	-	14,148,508
Gold	g/t	0.80	0.75	0.75	0.86	0.71	0.72	-	-	0.76
Waste	tonnes	9,068,806	3,215,000	2,250,371	1,888,595	1,007,700	411,115	-	-	17,841,587
Phase 2		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Total
ROM Resource	tonnes	74,943	83,618	1,672,067	2,983,395	3,374,680	4,463,235	7,100,000	2,577,673	22,329,611
Gold	g/t	0.49	0.48	0.62	0.65	0.65	0.70	0.89	0.89	0.76
Weathered Resource	tonnes	74,943	83,618	1,611,789	1,256,387	32,768	-	-	-	3,059,506
Gold	g/t	0.49	0.48	0.63	0.69	0.67	-	-	-	0.65
Fresh Resource	tonnes	-	-	60,278	1,727,008	3,341,912	4,463,235	7,100,000	2,577,673	19,270,105
Gold	g/t	-	-	0.58	0.63	0.65	0.70	0.89	0.89	0.78
Waste	tonnes	1,682,293	1,224,979	7,936,428	5,965,014	3,604,206	2,444,912	1,264,669	167,140	24,289,640
Phase 3		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Total
ROM Resource	tonnes	-	640,564	776,715	-	-	-	-	-	1,417,279
Gold	g/t	-	0.66	0.77	-	-	-	-	-	0.72
Weathered Resource	tonnes	-	624,064	229,774	-	-	-	-	-	853,838
Gold	g/t	-	0.66	0.82	-	-	-	-	-	0.70
Fresh Resource	tonnes	-	16,500	546,941	-	-	-	-	-	563,441
Gold	g/t	-	0.53	0.75	-	-	-	-	-	0.74
Waste	tonnes	-	1,152,075	440,376	-	-	-	-	-	1,592,451

**TABLE 17.5.2
MINE PRODUCTION SCHEDULE – Part 2**

Phase 4		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Total
ROM Resource	tonnes	-	882,076	966,993	-	-	-	-	-	1,849,069
Gold	g/t	-	0.79	0.78	-	-	-	-	-	0.79
Weathered Resource	tonnes	-	881,475	310,135	-	-	-	-	-	1,191,610
Gold	g/t	-	0.79	0.71	-	-	-	-	-	0.77
Fresh Resource	tonnes	-	601	656,858	-	-	-	-	-	657,459
Gold	g/t	-	0.62	0.82	-	-	-	-	-	0.82
Waste	tonnes	-	1,874,897	660,321	-	-	-	-	-	2,535,218
Phase 5		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Total
ROM Resource	tonnes	-	1,565,218	217,489	-	-	-	-	-	1,782,707
Gold	g/t	-	0.77	0.79	-	-	-	-	-	0.77
Weathered Resource	tonnes	-	1,327,718	-	-	-	-	-	-	1,327,718
Gold	g/t	-	0.77	-	-	-	-	-	-	0.77
Fresh Resource	tonnes	-	237,500	217,489	-	-	-	-	-	454,989
Gold	g/t	-	0.77	0.79	-	-	-	-	-	0.78
Waste	tonnes	-	3,717,472	111,004	-	-	-	-	-	3,828,476
Total		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Total
ROM Resource	tonnes	7,100,000	7,100,000	7,100,000	7,100,000	7,100,000	7,100,000	7,100,000	2,577,673	52,277,673
Gold	g/t	0.72	0.75	0.74	0.77	0.68	0.71	0.89	0.89	0.76
Weathered Resource	tonnes	7,080,026	5,774,870	2,888,910	1,406,598	32,768	-	-	-	17,183,171
Gold	g/t	0.71	0.74	0.72	0.72	0.67	-	-	-	0.73
Fresh Resource	tonnes	19,974	1,325,130	4,211,090	5,693,402	7,067,232	7,100,000	7,100,000	2,577,673	35,094,502
Gold	g/t	0.80	0.75	0.76	0.79	0.68	0.71	0.89	0.89	0.77
Waste	tonnes	10,751,099	11,184,423	11,398,500	7,853,609	4,611,906	2,856,027	1,264,669	167,140	50,087,372
Total	tonnes	17,851,099	18,284,423	18,498,500	14,953,609	11,711,906	9,956,027	8,364,669	2,744,813	102,365,045
Strip Ratio		1.51	1.58	1.61	1.11	0.65	0.40	0.18	0.06	0.96

17.6 Contract Mining

General

Mining of the open pit will be undertaken by a contractor or contractors. Power will not be available during the first two years of operation hence a diesel power mining fleet will be required. Jinshan Gold Mines engineering staff will survey blastholes and crest advance in the open pit. They will also be responsible for grade control and mine design. The contractor will drill, blast, load and haul ore and waste to designated road construction

sites, dumps, heap leach pads and/or crusher locations as specified by the engineering staff.

Drilling

Production drilling will be carried out on a 6 meters high mining bench. Drilling near final walls will be undertaken using wall control blasting methods to achieve maximum face angles as specified by Golder Associates. Multiple benches will be combined between catch berms. Drill holes will be sampled and assayed for grade control.

Blasting

Blasting will be undertaken by the contractor to achieve fragmentation suitable for a 42 x 60 inch jaw crusher. Oversize will be reduced and shall not be allowed to accumulate on active mining benches.

Loading

As noted above, it will not be possible to electrify the pit until Year 3 when power is brought in for the crushing plant. Hence, wheel loaders and diesel excavators will be the loading units of choice. Ore and waste will be loaded to trucks and hauled from the mine to dumps and process sites. Walls will be scaled.

Hauling

End dump haulage trucks will be used to haul material from the open pit. They will also be used to haul product from the crushing plant to the heap leach pad. A hopper will be used to store crushed ore and deliver material to the haulage trucks.

Roads and Dumps

Haulage roads will be built as required to reach dumps, heaps and the crusher. These roads will primarily be fill construction using waste material. They will be built as part of normal mine operations rather than as civil construction projects. Roads and dumps will be maintained by a grader, water truck and dozers as required.

17.7 Mine Services

Mine Maintenance Facility

A mine maintenance facility will be provided by the contractor to suit the equipment fleet selected to perform the work.

Fuel Storage

Fuel storage facilities will be provided by the contractor. These facilities will be provided with suitable containment in the event of a fuel spill. Oil storage and used oil disposal facilities will also be provided by the contractor.

Explosives Magazines and AN/FO Storage

Explosives magazines will be located southeast of the open pit area and provided with fencing and a guard post.

Pit Power

As noted elsewhere in this report, pit power will be available if required when the crushing plant is commissioned after Year 2 in the mine schedule.

Mine Dewatering

An estimate of the mine dewatering requirements has been made by Jinshan, and confirmed by the authors of this report, and is described as follows.

“The main primary porosity type aquifer with the highest water storage capacity and highest transmissivity is in the alluvial and colluvial sediments in the Chang Shan Hao ephemeral river valley. The soil profile aquifer (including transported and residual material) is widespread but thin and generally unsaturated.

There is also a small perched aquifer which runs on top of the silt in the river valleys, but this is seasonal and considered in conjunction with the alluvial aquifer.

Secondary porosity fractured type aquifers also occur in the crystalline bedrock. These aquifers have low storage capacity but may have high transmissivity and could account for significant water inflow into the excavation. May also transmit groundwater from outside of surface catchment area.

All of the aquifers are hydraulically connected and should be considered together for water resource estimation and abstraction scenarios. All aquifers are considered phreatic and unconfined.

Rain events are local and intense and only occur during a short rainy season. Most of the rainfall is dispersed as surface runoff (i.e. little direct infiltration), which causes flash flooding. Groundwater recharge to the main aquifer (alluvium) is both direct infiltration and runoff from higher elevations. Rainfall directly into the excavation may cause flooding during the short rainy season.

There are five sources of water influx which should be quantified to estimate mine dewatering: soil profile, fractured bedrock, Chang Shan Hao river alluvium, surface runoff, and direct rainfall into the excavation.

For dewatering of the ultimate pit excavations, pumping should first drawdown the SWL and consume the useable (mineable) capacity of the combined aquifer system. Ongoing pumping should then only be required for the recharged (sustainable) portion.

This estimate assumes the surface runoff will be diverted and will not flood the pit.

After initial drawdown of the SWL, will probably only require 3 pumping wells and a sump pump in the pit for maintenance. Two wells suitable for pumping were installed by Baogang as part of the detailed water resource estimation study (8.5 inch screen, 10 inch casing, 150 meter depth). These pump wells are located in the centre and downstream of the mining excavations. Each of these wells can be installed with electric submersible pumps with 10 cubic meters per hour 16 hour duty capacity. May also consider an upstream well, or possibly sand point pump at the flood control dam site. Sump pump in the bottom of the pit will probably be relatively small capacity and only operate for short time periods."

In addition to the direct pit dewatering efforts, a diversion ditch will be located upstream of the open pit and a waste "plug" installed in the valley bottom to slow down any flash floods that could impact the pit operations.

17.8 Mine Engineering

Survey

Mine engineering group will include surveyors to monitor dump progress, heap advance and crest advance. Blasthole surveys will be undertaken to ensure designs are honored and samples located correctly.

Geology & Grade Control

Geologists and samplers will be responsible for grade control and monitoring of changes in geology and structure in the mining areas. They will also prepare resource estimate updates.

Mine Planning

Short, intermediate and long range mine planning will be undertaken by staff mine engineers and technicians.

17.9 Manpower

The mine staff are summarized in the table below. A total of 14 people will be required in the engineering group.

Table 17.9.1 Mine Staffing		
Chief Engineer	Expatriate	1
Engineer	Local	2
Geologist	Local	2
Technician	Local	1
Surveyor	Local	2
Surveyor Helper	Local	2
Sampler	Local	2
Clerk	Local	2
Subtotal Nationals		14

17.10 Operating Costs - Owner Engineering and Management

The mine operating cost basis is summarized in the following table.

Table 17.10.1 Mine Operating Costs					
Item		#	RMB	US\$	US\$ Total/year
Minesite Staff					
Engineer	Local	2	116,400	\$ 14,353	\$ 28,705
Geologist	Local	2	116,400	\$ 14,353	\$ 28,705
Technician	Local	1	18,000	\$ 2,219	\$ 2,219
Surveyor	Local	2	24,000	\$ 2,959	\$ 5,919
Surveyor Helper	Local	2	24,000	\$ 2,959	\$ 5,919
Sampler	Local	2	36,000	\$ 4,439	\$ 8,878
Clerk	Local	2	36,000	\$ 4,439	\$ 8,878
Subtotal Nationals		13			\$ 89,223
General Benefits					
Subtotal National Wages					\$ 89,223
Fringe Benefits (re: Gerke Report)	49.0%				\$ 43,719
Summary					
Subtotal Staff & Labor Cost					\$ 132,943
Office Expenses & Miscellaneous					
Mine Planning Software					\$ 15,000
Computer Hardware and Supplies					\$ 20,000
GPS, Survey Equipment & Supplies					\$ 5,000
Communications					\$ 12,000
Consulting - Geotech, Resources etc.					\$ 100,000
Verification Surveys - Flyovers etc					\$ 25,000
Subtotal					\$ 177,000
Contingency					
Subtotal Before Contingency					\$ 309,943
Contingency	25.0%				\$ 77,486
GRAND TOTAL					\$ 387,428
Unit Cost					
Annual Production Rate	tpa				7,100,000
Unit Cost	US\$/t ore				\$ 0.05
Exchange	RMB/US\$				8.11
Summary					
Contract Mining Cost Waste			9.58		\$ 1.18
Contract Mining Cost Ore			10.25		\$ 1.26
Total Cost Ore					\$ 1.32

Note: Chief Engineer expatriate salary included in the G&A costs.

In addition to the unit basis above, an adjustment was made based upon average bench elevation. An increase of \$0.017/t/bench below the entrance bench was made to compensate for the changing haulage conditions at depth.

Dewatering operating costs have not been added as the water will be used in the process and would not be more expensive than make-up water derived from other sources.

Additional cost summaries are shown in the cash flow analyses.

17.11 Capital Costs - Initial and Sustaining

The capital costs for mine are limited in the base case as mining equipment will be provided by a contractor. Capital cost estimates are summarized in the table below.

Table 17.11.1 Mine Capital Cost					
PRE-PRODUCTION STRIPPING					
			Units	Unit Cost \$US	\$US x 1000
					\$ -
Subtotal					\$ -
HAULAGE ROADS					
			Units	Unit Cost \$US	\$US x 1000
Pit to NW Dump NE Access	N/C				\$ -
Pit to NW Dump NW Access	N/C				\$ -
Pit to SE Dump	N/C				\$ -
Pit to South Pad			2500	\$ 25.00	\$ 62.5
Pit to Engineering Offices			550	\$ 25.00	\$ 13.8
Culverts			2	\$ 50,000	\$ 100.0
Subtotal					\$ 176.3
MINE OFFICE					
			Units	Unit Cost \$US	\$US x 1000
Mine Office - Based Upon BGRIMM			1	\$ 7,500.00	\$ 137.5
Subtotal					\$ 137.5
MINE EQUIPMENT					
			Units	Unit Cost \$US	\$US x 1000
					\$ -
Subtotal					\$ -
LIGHT VEHICLES					
			Units	Unit Cost \$US	\$US x 1000
Pickup Trucks			4	\$ 30,000.00	\$ 120.0
Subtotal					\$ 120.0
ENGINEERING SYSTEMS					
			Units	Unit Cost \$US	\$US x 1000
Computers			15	\$ 5,000	\$ 75.0
Plotters			2	\$ 10,000	\$ 20.0
Software Mine Planning			2	\$ 45,000	\$ 90.0
Software Office Package			15	\$ 500.00	\$ 7.5
Survey Instruments GPS			3	\$ 1,500	\$ 4.5

Table 17.11.1 Mine Capital Cost					
Survey Instruments Level			1	\$ 1,500	\$ 1.5
Survey Instruments Total Station etc.			1	\$ 30,000	\$ 30.0
Radios			15	\$ 500	\$ 7.5
Phones			12	\$ 300	\$ 3.6
Furniture drafting tables etc.			1	\$ 50,000	\$ 50.0
					\$ -
Subtotal					\$ 289.6
EXPLOSIVES STORAGE					
			Units	Unit Cost \$US	\$US x 1000
Magazines			3	\$ 20,000	\$ 60.0
Fencing			700	\$ 20.00	\$ 14.0
Guard Station			1	\$ 5,000	\$ 5.0
Access Road			2000	\$ 25.00	\$ 50.0
Subtotal					\$ 129.0
DIVERSION DITCHES AND DAMS					
	Length meters	Depth meters	Volume m ³	Unit Cost \$US	\$US x 1000
Interception Ditch NE	1600	4	12800	\$ 3.50	\$ 44.8
Dam Core	400	8	38400	\$ 8.00	\$ 307.2
Subtotal					\$ 352.0
DEWATERING					
			Units	Unit Cost \$US	\$US x 1000
Generator			4	\$ 6,000	\$ 24.0
Wells			1	\$ 22,500	\$ 22.5
Pipeline 4" Buried to Plant			4800	\$ 12.00	\$ 57.6
Submersible Pumps			3	\$ 5,000	\$ 15.0
Pit Sump Pump			2	\$ 20,000	\$ 40.0
Subtotal					\$ 159.1

Additional engineering is required to improve the diversion ditch layout and haulage road detail. As noted elsewhere in the report, pre-stripping requirements are minimal as the ore outcrops in the starter pit area and roads will be built for the most part as waste fill placement. The road to the heap leach pad is required immediately but even this road can be pioneered initially for construction and upgraded during the course of mining in Year 1.

17.12 Risks and Opportunities

The following items represent project risk:

- Estimates of contract mining costs provided by potential contractors have been used in the mine evaluation.

- Current schedule is for 20,000 tpd commencing in Year 1. There may be a significant ramp-up period that needs to be discussed with potential contractors.

The following items may be considered project opportunities:

- Developing a third Phase in the Northeast Pit may allow deferring some stripping at the expense of operating space and increased sinking rates.
- Another permanent ramp in the east end of the Northeast Pit may reduce the length of some of the waste haulage profiles.

17.13 Conclusions and Recommendations

Conclusions

A mine plan and production schedule has been developed for a process rate of 20,000 tonnes per day. The schedule appears achievable from the point of view of ore release, sinking rates and available working space. The mine life will be just over seven years. A total of 52.3 million tonnes of ore with an average grade of 0.76 grams per tonne gold will be placed on the heap leach pads. The total waste mined will be 50.1 million tonnes for a strip ratio of 0.96:1. It is estimated that a total of 929,000 ounces of gold will be recovered.

This plan assumes contractor mining forces and presents costs associated with pre-qualification estimates. These costs will change when firm bids are tendered for the 20,000 tonnes per day schedule variant.

Recommendations

The inferred resources within the pit designs, which have not been used in the economic development included herein, should be drilled to bring them to measured or indicated classifications.

Additional exploration should be undertaken in the Southwest Pit Areas.

Owner operated mining equipment should also be evaluated at some point in the future. The current proposals are for a five year period. Cash flow analyses show a similar IRR for owner operated equipment and a slight improvement in NPV.

18.0 HEAP LEACH FACILITY DESIGN AND CONSTRUCTION

The CSH heap leach facility will be constructed about 3 km south of the main ore deposit on relatively flat terrain. Two potential leach pad sites have been identified and are referred to as the North Pad and the South Pad. The South Pad will be large enough to contain the currently-identified measured and indicated resources of 52 million tonnes. Accordingly, the South Pad will be constructed, as described in the following paragraphs, and the North Pad will only be developed in the future should further pad capacity be required. The following describes the design of the South Pad, simply referred to as the leach pad.

18.1 Location

The leach pad site was selected based on: a sufficiently large area to contain 52 million tonnes of ore; close proximity to the ore deposit; relatively flat terrain for ease of construction and ease of stacking and operation; and the close proximity of soils that can be used as a bedding layer for the leach pad liner. In addition, the leach pad site provides sufficient slope for gravity solution flow, and the leach pad was sited outside of major drainages to minimize the impact from storm flows during operation and after closure.

18.2 Capacity

The CSH heap leach pad, as designed, will provide an ultimate ore capacity of 56 million tonnes and will be constructed in two or more phases. Capacity was based on an average stacked ore density of 1.7 tonnes per cubic meter and a maximum heap height of 70 meters. In initial lifts, run-of-mine ore will be stacked on the pad through end dumping of haul trucks in approximately 10 meter lifts, and at an average annual rate of 7.1 million tonnes per year. Crushed ore will be placed in subsequent years after the crushing circuit has been constructed.

The leach pad will be lined with a synthetic liner to maximum solution recovery and minimize the potential for impacting groundwater. Phase 1 of the leach pad will be constructed with a lined surface area of about 440,000 square meters which will provide a capacity of 15 million tonnes for the first three 10-meter lifts. Subsequent phases of pad expansion will provide a total leach pad area of about 750,000 square meters. Lifts of ore will be stacked to provide benches between lifts around the perimeter of the heap to provide an average overall ore slope of 2.5H:1V (horizontal to vertical). The 2.5H:1V slopes will provide operational and post-closure stability of the heap. The 2.5H:1V sideslopes were determined based on stability analyses with a design basis of achieving a static factor-of-safety against instability of at least 1.4, and a dynamic factor-of-safety of at least 1.05. Dynamic stability analyses modeled the effects of earthquake loading using a peak acceleration of 0.10g given that the site is in an Earthquake Zone 7.

18.3 Solution Management

Solution will be applied to the ore on the pad at an average rate of about 6 liters per hour per square meter, but may be applied at a maximum short-term rate of about 10 liters

per hour per square meter. Solution will be collected by a drainage system placed above the synthetic pad liner, which will in-turn direct pregnant solution flows to a pregnant pond located at the south end of the leach pad. The pregnant pond will be constructed within the pad as an "internal pond." Ore placed within the pond will serve to insulate pregnant solution during cold winter months to prevent freezing of the solution. Pond solution capacity will be provided by the pore space within the ore placed in the pond. The pregnant pond will be fitted with three pipe risers. Turbine pumps placed in the pipe risers will pump pregnant solution to the plant at an average rate of 700 cubic meters per hour. The pregnant pond will have a depth of 10 meters in addition to 1 meter of freeboard (total depth of 11 meters), and has been designed with a maximum combined ore and solution capacity of 110,000 cubic meters, or a solution capacity of 33,000 cubic meters assuming an ore porosity of 0.3.

During upset conditions, such as a power or pump outage, or a severe storm event, solution can flow by gravity from the pregnant pond to an external lined "event pond" located south of the pad and pregnant pond. The event pond will be 6 meters deep in addition to a 0.6 meter freeboard allocation (6.6 meters total depth) and has been sized to have a capacity of about 80,000 cubic meters below the freeboard depth. This includes a 33,600 cubic meter allowance for a 48 hour power outage assuming full draindown from the heap at a rate of 700 cubic meters per hour, combined with a volume of 44,800 cubic meters developed from a 100-year, 24-hour storm event falling on the pad. The storm event volume conservatively assumed that the 100-year, 24-hour storm event of 98 millimeters would fall on the pad shortly after Phase 1 construction of 440,000 square meters, and that all of the storm water falling on the pad would report to the event pond.

18.4 Geotechnical Conditions

Subsurface geology at the leach pad site was explored by Golder Associates and Baogang Geological Institute in June 2005. Subsurface geology over much of the Phase 1 pad site consists of a thin cover (generally less than 1 meter) of silt soils or sand soils overlying bedrock. Bedrock outcrops at the ground surface in the higher elevations along the east side of the Phase 1 pad. Bedrock outcrops over much of the Phase 2 pad site, but is covered with a thin cover of silt in lower elevations. Site bedrock either consists of granite (predominantly in the Phase 1 area) or a lightly metamorphosed limestone (predominantly in the Phase 2 area). The surficial cover soils are Aeolian (wind-deposited) in origin and are predominantly silt and fine sandy silt. Ground water was not observed in any of our borings or test pits to the maximum 10 meter depth of exploration. Except for sparse low tufts of grass, the site has no vegetation.

18.5 Leach Pad Liner System

The lining and solution collection system for the leach pad will include (from the bottom to the top): a 300 mm layer of liner bedding soil; a 2 mm thick high density polyethylene (HDPE) geomembrane liner; and a 600 mm layer of crushed liner cover fill.

Some minor site grading will be required prior to liner system placement in the leach pad area. Grading will involve smoothing the surface of rock outcrops and performing minor cutting and filling where needed to promote positive gravity solution flow in the solution

collection and distribution system above the liner. Local silt and sandy silt soils will be used for the 300 mm liner bedding layer. Local silt and sandy silt soils have been tested by Golder in the laboratory to provide a permeability in the range of 10^{-4} centimeters per second (cm/sec) to 10^{-6} cm/sec when compacted, but are predominantly in the range of 10^{-5} to 10^{-6} cm/sec. In many areas of the pad, the in-place silt and sandy silt soils can be used for the lower 150 mm of liner bedding by reworking and compaction in-place. The balance of the liner bedding, including the full 300 mm thickness where rock is exposed at the ground surface, can either be borrowed from deeper silt and sandy silt deposits within the pad footprint, or from a borrow identified within the future "North Leach Pad" site, about 1 km northwest of the leach pad. Liner cover fill used for the 600 mm layer placed over the geomembrane pad liner will be a high-permeability crushed and screened gravel product produced on-site using a portable crushing and screening plant. Feed material will either be rock excavated from the pregnant and event pond excavations, or rock mined locally from within the pad site or from within the mine pit area.

18.6 Solution Collection

The solution collection system will consist of pipe placed within the 600 millimeter liner cover fill layer above the geomembrane liner. Primary solution collection will be from 100 millimeter perforated pipes placed at a spacing of about 15 meters across the entire lined pad. The 100 millimeter pipes will convey flow to larger manifold pipes (between 200 millimeter and 600 millimeter in diameter), which will in-turn convey pregnant solution flows to the pregnant pond.

18.7 Pond Liner Systems

The pregnant pond lining system will consist of the following (from the bottom to the top): a 300 millimeter thick layer of liner bedding (silt and sandy silt soil); a 1.5 millimeter HDPE secondary geomembrane liner; a leak detection layer consisting of a 300 millimeter thick layer of porous sand in the base of the pond and a non-woven geotextile (filter fabric) placed on the pond sideslopes; a 2 millimeter HDPE primary geomembrane liner; a non-woven geotextile (filter fabric) to protect the primary liner from damage from the overlying liner cover fill and ore; and a minimum thickness of 600 millimeter of liner cover fill. Ore or crushed rock will be placed above the liner cover fill.

The event pond will be lined with a 2 millimeter HDPE primary liner placed on a 300 millimeter thick layer of liner bedding (silt and sandy silt soil).

Stormwater runoff from areas upslope of the heap leach facility will be routed around the facility using diversion ditches channels. The channels have been designed to convey the runoff from a 100-year, 24-hour storm event of 98 millimeters.

Engineering drawings that depict the heap leach system are provided in Appendix 8. Appendix 8 also provides the complete engineering design and specification for the leach pad and ponds.

19.0 METALLURGICAL TESTING AND MINERAL PROCESSING

The following is a discussion of the metallurgical testing and mineral processing aspects of the proposed CSH Project.

19.1 Metallurgical Testwork Discussion

19.1.1 Initial Brigade 217 Metallurgical Studies

Laboratory metallurgical tests for CSH oxide ore were conducted by the Physical and Chemical Analysis and Testing Center of the Brigade 217, China National Nuclear Corporation and Hengyang No. 6 Research Institute during exploration activities in early 1995. A number of column tests were undertaken and it was demonstrated that the oxide ore had the potential for gold extraction by cyanidation using heap leaching. The initial results were erratic and Brigade 217 conducted a pilot heap leach program at the mine site in 1995. Three test heaps were prepared with run-of-mine ore. The grade of the material in each of the heaps was 0.90 grams per tonne while the tonnage was 1,230, 2,580 and 2,748 tonnes respectively. Gold extraction for each heap was 42.83 percent in 12 days, 46.17 percent in 25 days, and 64.67 percent in 32 days. The onset of winter weather curtailed the test program but the pilot heaps indicated the amenability of the CSH oxide ore to heap leaching. Information concerning this test program is provided in a document entitled "Detailed Exploration Report at Hu-Yao-Er-Hu-Dong Gold Mine, Wulate, Inner Mongolia by Brigade 217, Northwest Geological Exploration Bureau, CNNC, March 2003".

19.1.2 Additional Tests Performed by Brigade 217

In 2001, agitation and column tests for CSH Project oxide ore were conducted by Brigade 217. The oxide sample procured had a grade of 2.95 grams of gold per tonne. The agitation leach test had a size distribution of approximately 75 percent passing 200 mesh. Gold extraction from this sample was 91.9 percent in 36 hours of leach time.

Column tests were conducted at particle size distributions of minus 30, minus 10, and minus 5 millimeters. Leach time ranged from 312 to 408 hours. Cyanide consumption ranged between 0.90 and 1.10 kilograms per tonne. Gold extraction levels were 84 percent for the minus 30 millimeter sample, 87.6 percent for the minus 10 millimeter sample and 90.6 percent for the minus 5 millimeter sample. Details regarding this test program are contained in a document entitled "Testwork Report on Small Scale Column Tests for the Ore from the Hu-Yao-Er-Hu-Dong Gold Mine, Wulate, Inner Mongolia by Brigade 217, October 2001.

19.1.3 International Metallurgical and Environmental Inc. (IME) (1999)

The following work was completed by IME, an independent metallurgical laboratory, in 1999 on drill samples from the CSH Gold Project:

- Composite preparation
- Mineralogical examination

- Gravity testwork using a centrifugal concentrator
- Flotation testwork on gravity tailing
- Bottle roll cyanidation tests on coarse samples

Based on the sample description contained in the IME report, 600 kg of oxide material and 600 kg of sulfide material were obtained from the Southwest Gold project in China in 1999. Information provided by the 217 Brigade reveals that the oxide samples were taken from a trench (near the pilot pit). Sulfide samples were taken from the decline (at eastern side of the NE zone) at approximately 40 meters below the surface. Also some samples were taken from HQ drill core. Although the samples are considered representative of the mineralogical species found in the deposit, they are less representative in a spatial sense, since they have been taken from two very specific locations, and also the two samples assayed had higher gold head grades than the expected grade to be fed to the plant, particularly with respect to oxides.

The material received by IME was crushed to minus 1 inch, minus 1/2 inch and minus 1/4 inch in preparation for heap leach amenability testing. No gold head analysis was completed. Back calculated gold heads from the various tests ranged from 0.65 grams per tonne to 1.8 grams per tonne averaging 1.2 grams per tonne for the oxide composite and 0.60 to 1.2 grams per tonne averaging 0.84 grams per tonne for the sulfide composite.

Mineralogical examination of the oxide sample indicated the material was predominately quartz and mica, devoid of sulfide but containing 10 percent limonite and 6 to 8 percent graphite. The sulfide sample was very similar but free of limonite, containing instead discrete, fully liberated grains of pyrite, plus minor pyrrhotite and arsenopyrite. The same graphite mineralization and concentration was also noted in the sulfide composite.

IME conducted gravity separation tests using a centrifugal concentrator and hand panning to produce a final gravity concentrate. Results from a single test on the oxide composite indicate that 63 percent of the gold in the composite was recovered by gravity.

Other tests evaluating gravity recovery followed by flotation of gold and sulfides were also conducted. The gold recovery by gravity followed by flotation was 91 percent for oxides and 81.4 percent for sulfides.

Amenability to heap leaching was tested by coarse bottle roll tests. The tests are summarized below:

Table 19.1.3.1 Bottle Roll Test Results							
ORE	Crush Size p80 mm	Leach Time Hours	Reagent Consumption		Head g Au / t	Tail g Au / t	Au Recovery %
			kg NaCN/t	kg CaO/t			
OXIDE	25	96	0.41	1.5	1.800	1.350	25.4
OXIDE	25	168	1.14	3.06	1.000	0.350	65.8
OXIDE	12	96	0.41	1.65	1.200	0.620	49.8
OXIDE	3.4	96	0.47	1.5	1.500	0.650	56.6
OXIDE	0.6	96	0.59	2.85	1.100	0.220	80.2
SULFIDE	25	96	0.32	1.35	0.600	0.450	30.6
SULFIDE	25	168	1.14	3.06	0.600	0.350	65.8
SULFIDE	12	96	0.29	1.50	1.200	0.860	27.0
SULFIDE	3.4	96	0.50	1.35	1.100	0.560	49.8
SULFIDE	0.6	96	0.46	2.25	0.900	0.230	74.8

Extending the leach time from 96 to 168 hours significantly improved the leach recovery on the material crushed to minus 25 mm. IME suggested this was due to slow leaching coarse gold in the samples. Reagent consumptions are considered low for this type of test.

19.1.4 SGS Lakefield Research Program for 2002 - 2003

In May of 2003, SGS Lakefield Research Limited (SGS LRL), an independent metallurgical laboratory, issued a report describing testwork completed on drill samples from the CSH Gold Project received 12 September 2002.

The following testwork was carried out by in 2002-2003 by SGS LRL:

- Composite preparation and head sample analysis
- Mineralogical examination
- Bond work index determination
- Gravity testwork using a centrifugal concentrators
- Direct (whole ore) cyanidation tests on ground samples
- Preg-robbing test

The sample shipment consisted of approximately 425 kg of split drill core. The drill core intervals were from three holes, DDH03, 08 and 10. A list of all samples shipped to SGS LRL is included in the original SGS LRL report, which is available in Jinshan's Vancouver office. These samples are considered representative of the gold mineralization at CSH, since they sample different mineral species and gold grade ranges, and also adequately represent the spatial distribution of gold grades.

SGS LRL prepared one oxide and one sulfide composite for analysis and evaluation. For the head analysis, two 500 gram samples were split out and screened metallics analyses at 150 mesh were completed. Results of the metallic screen analysis are summarized below:

Table 19.1.4.1 Metallic Screen Analysis											
Comp	Average		Individual Sample		+150 Mesh			-150 Mesh			
	Calculated Head		Calculated Head		Assays			Assays			
	Au,g/t	Ag,g/t	Au,g/t	Ag,g/t	Mass%	Au,g/t	Ag,g/t	Mass%	Au,g/t	Ag,g/t	
Oxide	1.04	1.13	1.19	0.89	3.98	6.63	2.99	96.0	1.01,	0.92	0.50 1.10
Oxide			0.90	1.36	4.84	6.77	2.63	95.2	0.57	0.63	1.30 <0.5
Sulfide	0.97	0.72	1.16	0.76	4.63	4.92	1.97	95.4	0.98	0.97	0.70 0.70
Sulfide			0.78	0.67	5.25	1.55	2.00	94.8	0.58	0.90	<0.5 0.60

Results indicate 10 to 40 percent of the gold in these samples is in the plus 150 mesh material. A significant variance between the analysis on duplicate samples on the minus 150 mesh material is also noted. The results of the head assay calculated from the assayed head sample size fraction is shown in the following tables. The results, 0.71 grams per tonne for the oxide and 1.35 grams per tonne for the sulfide, vary widely from the metallic screen analysis noted above and indicate the magnitude of the difficulty determining the head value of the material.

Table 19.1.4.2 Oxide Composite Head Sample Screen Analysis						
Size		% Wt.	Assays, g/t		% Distribution	
Mesh	µm		Au	Ag	Au	Ag
14	1,180	15.2	0.29	<0.5	6.2	12.2
20	850	11.9	1.82	0.8	30.5	15.2
35	425	16.5	0.29	<0.5	6.8	13.2
100	150	11.2	0.35	<0.5	5.5	9
400	38	15.4	1.71	0.5	37.1	12.3
Pan	-38	29.8	0.33	0.8	13.9	38.2
Total	-	100	0.71	0.63	100	100

Table 19.1.4.3 Sulfide Composite Head Sample Screen Analysis						
Size		% Wt.	Assays, g/t		% Distribution	
Mesh	µm		Au	Ag	Au	Ag
14	1,180	22.3	0.42	<0.5	6.9	17.4
20	850	13.7	1.26	0.5	12.8	10.7
35	425	19.9	0.55	<0.5	8.1	15.6
100	150	14.5	5.34	<0.5	57.4	11.4
400	38	12.7	1.17	0.8	11	15.9
Pan	-38	16.9	0.3	1.1	3.7	29
Total	-	100	1.35	0.64	100	100

Weighted average gold head grades from the testwork (gravity separation and direct cyanidation tests) were 1.14 grams per tonne gold for the sulfide composite and 0.63 grams per tonne for the oxide composite. The degree of head variation from test to test was significant making interpretation of results difficult.

In addition to gold and silver analyses, head samples of each composite were submitted for 30 element ICP scan analysis as well as carbon and sulfide. The analyses are shown in the table below:

Table 19.1.4.4 ICP Scan Analysis					
Element	Composite		Element	Composite	
	Sulfide	Oxide		Sulfide	Oxide
Ag, g/t	<5	<5	Mo, g/t	<20	<20
Al, g/t	83,000	91,000	Na, g/t	3,700	4,000
As, g/t	<50	<50	Ni, g/t	36	37
Ba, g/t	520	620	P, g/t	720	380
Be, g/t	2.5	2.7	Pb, g/t	<50	<50
Bi, g/t	<20	<20	Sb, g/t	<20	<20
Ca, g/t	6,900	5,200	Se, g/t	<100	<100
Cd, g/t	<5	<5	Sn, g/t	<100	<100
Co, g/t	22	16	Sr, g/t	100	95
Cr, g/t	140	150	Ti, g/t	3,000	3,200
Cu, g/t	65	61	Tl, g/t	<100	<100
Fe, g/t	53,000	45,000	V, g/t	120	97
K, g/t	35,000	40,000	Y, g/t	15	9.8
Li, g/t	<15	<15	Zn, g/t	76	79
Mg, g/t	13,000	12,000	*C (g), %	1.35	1.02
Mn, g/t	710	590	*S ⁻ , %	0.88	0.20

* The S⁻ and C(g) analyses were completed near the end of the test program. These were not part of the ICP scan analyses suite.

A mineralogical investigation of the composites indicated that gold observed in the sulfide composite occurred as fine locked grains or attachments to arsenopyrite or free gold. Gold observed in the oxide composite mainly occurred as liberated particles and as fine inclusions within arsenopyrite. Fewer occurrences of gold were observed in the oxide composite than in the sulfide composite. In both the oxide and sulfide composites, the large liberated grains control the gold distribution.

Bond work index data from the 2002-2003 program are summarized below:

Table 19.1.4.5 Bond Work Index Data				
Composite	Particle Size		Ball Mill Work Index @ 150 mesh	
	Feed F80 µm	Product P80, µm	Imperial	Metric
Oxide	1,912	58	5.1	5.6
Sulfide	2,038	65	8.6	9.5

The work index data indicate the material is relatively soft.

SGS LRL ran gravity concentration tests and concluded that both the oxide and sulfide composites responded very well to gold recovery by gravity separation. Gold recoveries ranged from 44 percent from the oxide composite to 63 percent from the sulfide composite.

SGS LRL ran tests evaluating whole ore agitated leaching on ground pulp. On the sulfide composite, they concluded that very high gold extraction (~98 percent) and reasonably fast kinetics were achievable. The response by the oxide composite indicated lower ultimate extraction (~88 percent) and slower leach kinetics. This was felt to be potentially due to preg-robbing activity, which was tentatively confirmed in a single preg-robbing test completed on the oxide composite gravity tailing. Cyanide and lime consumption for both the composites tested were low at less than 0.8 kg / tonne for both lime and sodium cyanide. As discussed under the head sample and analysis section, a significant nugget effect on the gold analysis was noted during the test program. Results from the whole ore leach program are summarized below:

Table 19.1.4.6 Whole Ore Leach Program											
	Test No	Feed Size p80 microns	NaCN kg / tonne	CaO kg / tonne	% Au Recovery			Residue g Au / t	Calc Head		
					Gravity Recovery	Gravity + CN Leach			g / t CN Feed	g / t O'all	
						8hr	24 hr				48 hr
Whole Ore											
Sulfide	CN-1	74	0.77	0.45	--	73	94	97.9	<0.02	--	0.93
Oxide	CN-2	55	0.35	0.69	--	59	80	87.7	0.09	--	0.73
Gravity Tailing											
Sulfide	CN-3	136	0.43	0.41	58.4	91	93	97.2	0.03	0.45	1.07
Sulfide	CN-4	77	0.42	0.44	63.2	92	95	96.2	0.04	0.37	1.02
Oxide	CN-5	140	0.52	0.76	43.7	--	--	95	0.03	0.34	0.63

The preg-robbing test completed was performed by contacting oxide material, a portion of material fed to Test CN-5 with synthetic pregnant solution at 2.6 mg gold/liter. Results from the test are shown in the graph below and indicate that the oxide material has a preg-robbing tendency. Further work is required to quantify this tendency in a heap leach scenario.

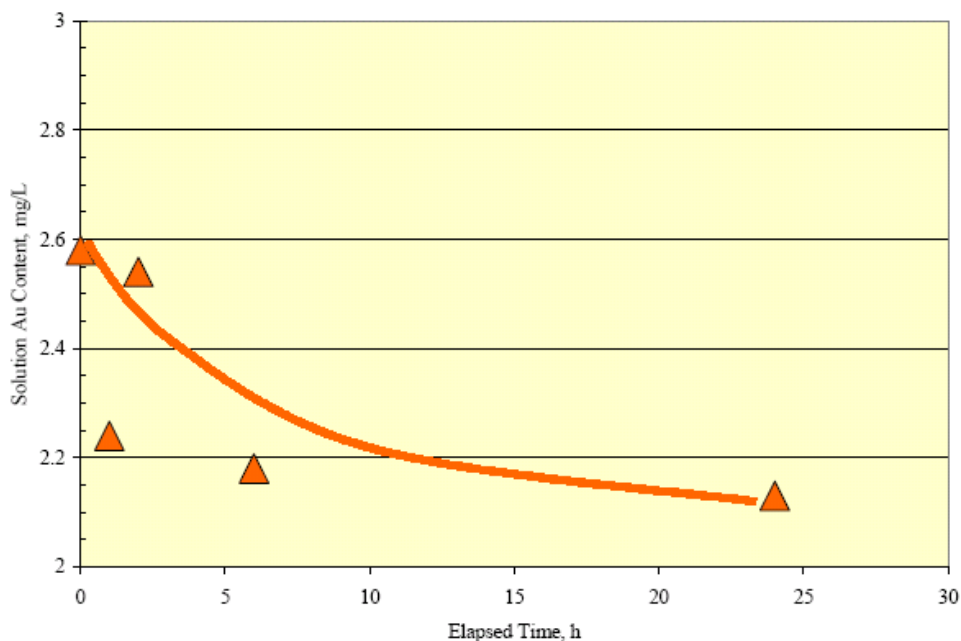


Figure 19.1.4.1: SGS LRL Preg Robbing Data

19.1.5 2003 - 2004 SGS LRL Program

In February of 2004, SGS LRL reported results from a second test program on samples received from the CSH Gold Project on 18 July 2003.

The following testwork was carried out in 2003-04 by SGS LRL:

- Composite preparation and head sample analysis
- Mineralogical examination
- Standard and CIL whole ore leach tests
- Heap leach amenability
- Column leach tests
- Cyanide destruction
- Environmental analysis

The sample shipment consisted of approximately 955 kg of split drill core. The drill core intervals were from holes DDH110, 130, 150, 160, 190, 200, 260, 270 and 271. A total of 113 meters of material were combined into the oxide composite and 169 meters of core were combined into the sulfide composite. A list of all samples shipped to SGS LRL and a description how the composites were prepared is included in the original SGS LRL report on file in Jinshan's Vancouver office.

For the head analysis, two 1,000 gram representative minus 10 mesh samples were split out and screened metallics analyses at 150 mesh were completed. Results of the metallic screen analysis are summarized below:

Table 19.1.5.1 Metallic Screen Assay Results								
	Average Calculated Head	Individual Sample Calculated Head	+150 Mesh		-150 Mesh		% Au Distribution	
				Assays		Assays		
Comp	Au,g/t	Au,g/t	Mass%	Au,g/t	Mass%	Au,g/t	+150 Mesh	-150 Mesh
Oxide	1.22	0.76	3.17	5.61	96.8	0.79 0.41	23.4	76.6
Oxide		1.69	2.71	44.60	97.3	0.49 0.50	71.5	28.5
Sulfide	0.97	1.16	3.53	13.30	96.5	0.64 0.63	43.4	56.6
Sulfide		0.78	3.77	2.33	96.2	0.64 0.57	13.1	86.9

These metallics screen head analysis also indicated the presence of coarse gold in the composites. It is also interesting to note the variance in the minus 150 mesh fractions among duplicate samples. Comparison of the metallic screen results to the calculated results from the assayed screen fractions also indicates the magnitude of the nugget effect. This effect must be considered when analyzing results from the various test programs.

Table 19.1.5.2 Minus 1 Inch Head Samples						
	Oxide Composite			Sulfide Composite		
Size Fraction	%Mass Retained	Assay g Au/t	% Au Distribution	%Mass Retained	Assay g Au/t	% Au Distribution
+5/8"	22.7	0.61	13.00	22.2	0.32	9.4
+1/2"	19.5	0.83	15.10	19.7	0.93	24.6
+3/8"	16.7	1.63	25.40	15.0	0.58	11.7
+ 3 Mesh	13.0	1.23	15.00	13.6	0.91	16.6
+ 8 Mesh	15.7	1.36	19.90	15.9	0.78	16.6
- 8 Mesh	12.3	1.01	11.70	13.7	1.14	21.1
Total	100.0	1.07	100.00	100.0	0.74	100.0

Table 19.1.5.3 Minus 1/4 Inch Head Samples						
	Oxide Composite			Sulfide Composite		
Size Fraction	%Mass Retained	Assay g Au/t	% Au Distribution	%Mass Retained	Assay g Au/t	% Au Distribution
+ 6 Mesh	20.1	0.81	12.4	23.6	0.84	21.3
+ 10 Mesh	19.5	1.06	15.8	22.1	0.70	16.7
+ 20 Mesh	18.1	1.09	15.1	16.7	1.01	18.0
+ 48 Mesh	15.3	0.94	11.0	13.6	0.81	11.9
+ 200 Mesh	10.0	4.81	36.7	9.6	2.06	21.3
- 200 Mesh	17.0	0.69	9.0	14.4	0.70	10.8
Total	100.0	1.31	100.0	100.0	0.93	100.0

Quantitative analysis of other elements of interest, including sulfide and organic carbon are noted in the table below:

Table 19.1.5.4 Additional Head Sample Assays			
Element		Oxide Comp	Sulfide Comp
Au, g/t	Screened Met.	1.22	0.88
	From Testwork ¹	1.12	0.97
S ₍₁₎ , %		0.68	1.39
S ⁼ , %		0.49	1.00
S ^o , %		0.19	0.49
SO ₄ , %		<0.4	<0.4
C _(T) , %		1.47	1.50
C(g), %		1.23	1.25
CO ₃ , %		0.98	1.22
TOC, %		1.26	1.24
Hg, g/t		<0.3	<0.3
Specific Gravity		2.96	2.97
In-Situ Bulk Density ²		2.81	2.78

¹ Weighted average of all tests reported in this document

² Determined by the wax immersion method

Both composites were also submitted for ICP analysis. Results are tabulated below:

Table 19.1.5.5 Head Sample ICP Assays					
Element	Oxide	Sulfide	Element	Oxide	Sulfide
Ag	<10	<10	Mn	590	820
Al	82000	82000	Mo	<20	<20
As	<75	<75	Na	4500	4600
Ba	550	540	Ni	27	33
Be	2.3	2.3	P	700	660
Bi	<20	<20	Pb	<50	<50
Ca	8500	9400	Sb	<20	<20
Cd	<5	<5	Sc	<100	<100
Co	21	24	Sn	<100	<100
Cr	67	77	Sr	130	120
Cu	130	94	Ti	3100	3200
Fe	43000	54000	TL	<100	<100
K	37000	36000	V	100	110
Li	<10	<10	Y	<20	<20
Mg	12000	14000	Zn	65	75

Results of the quantitative and ICP analysis indicate a very clean ore with low concentrations of sulfide and organic carbon that was considered when designing the process.

To determine the response of the new composites to agitated leach cyanidation, SGS LRL ran tests as summarized in the following table.

Table 19.1.5.6 Agitated Leach Test Results								
Comp	Test No.	Direct CN or CIL	Feed Size p80 microns	Reagents		% Au Rec 48 hr	Residue g Au / t	Calc Head g Au / t
				NaCN kg / tonne	CaO kg / tonne			
Sulfide	CN-9 & 10	Direct CN	66	0.42	0.58	80.6	0.2	1.27
	CN-13	CIL	75	1.01	0.62	96.6	0.024	1.02
Oxide	CN-11 & 12	Direct CN	79	0.27	0.72	85.7	0.12	0.85
	CN-14	CIL	75	0.5	0.84	96.5	0.03	0.86

SGS LRL also noted the effect of CIL on the extraction and noted that both the oxide and sulfide material may be somewhat preg-robbing.

The principal focus of the 2003 test program was to determine the heap leach characteristics of the ore. To begin the investigation, coarse bottle roll tests were run at minus 1 inch, minus 3/4 inch, minus 1/2 inch and minus 1/4 inch for 17 days. Interpretation of results from the coarse bottle roll test program was difficult due to inconsistent residue analysis. For this reason, column tests at minus one inch and minus 1/4 inch were run to provide data for comparison.

Results from small (six inch diameter, 50 kg) column leach tests conducted at SGS LRL are summarized below:

Table 19.1.5.7 Column Leach Test Results							
Composite	Test No.	Particle Size	Reagent Consumption		Gold Extraction Percent	Residue g Au / tonne	Calculated Head g Au / tonne
			NaCN kg / tonne	CaO kg / tonne			
Oxide	HL-1	-1 inch	1.27	1.55	47.00	0.62	1.17
	HL-2	-1/4 inch	1.52	3.59	84.20	0.17	1.08
Sulfide	HL-3	-1 inch	1.04	1.20	45.10	0.58	1.05
	HL-4	-1/4 inch	0.99	1.32	73.10	0.25	0.94

Results indicate good recovery at fine crush sizes, but lower recovery at coarser crush size, although metal was still being recovered when the tests were terminated after 83 days of leaching. It should also be noted that the solution application rate was approximately two times higher during the column test than normal industrial practice, thus leading to high reagent consumption. SGS Lakefield noted that coarse gold present in the material led to difficulty obtaining accurate gold analysis.

Additional information from the 2003 test program is summarized below:

Abrasion Index	
Oxide Composite	0.0794
Sulfide Composite	0.0927

The abrasion index indicates the ore to be slightly abrasive and low metal consumption rates in crushing are projected. Samples from the 2004 drill program were tested for acid generating potential. The results indicate a positive acid generating potential and additional long term kinetic tests are required to determine if the material will be acid generating. Test evaluating chlorination and sulfur dioxide -air processes to oxidize cyanide indicated typical reagent consumption and efficiency for both processes.

19.1.6 Yinchuan Metallurgical Testing

One drill hole (DDH57) was drilled in 2003 solely for metallurgical purposes. This hole twinned a previous drill hole (DDH11). The core length was 140 meters. The following table presents the physical characteristics of the DDH57 sample.

Table 19.1.6.1 DDH 57 Physical Characteristics				
Sample	Length meters	Weight kg	gpt Au	% -200 M @ 10 mesh
Oxide	6.65 - 93.92	646	0.72	13
Sulfide	96.62 - 140	313	0.53	20

Bulk density and water saturation data were also determined for three different size distributions of oxide composite and two different size distributions of the sulfide composite. The data are given in the following Table 19.1.6.2.

Table 19.1.6.2 Bulk Density and Water Saturation Data			
Sample	Size mm	Bulk Density t/cu m	Moisture Uptake Wt. %
Oxide	50	1.59	5.0
	25	1.70	12.4
	10	1.82	12.0
Sulfide	25	1.76	13.0
	10	1.84	12.0

Both composites were subjected to analytical procedures. The following Table 19.1.6.3 is a semi-quantitative ICP analysis.

Table 19.1.6.3 Semi-quantitative Spectra Scan Analyses			
Element	Oxide - 1 ppm	Oxide - 2 ppm	Sulfide ppm
Ag	0.272	0.266	0.328
As	94.7	114.8	35.1
B	99.3	121	124
Ba	568	525	496
Be	3.5	2.1	2.8
Bi	1.11	0.89	0.95
Cd	0.188	0.248	0.146
Ce	124	122.1	107.7
Co	17.4	16.8	14.5
Cr	91.3	92.8	101.6
Cu	75.9	89.1	57.5
Fe	600	520	530
Ga	22.0	24.7	22.9
Ge	2.6	2.7	3.0
Hg	10.2	9.1	3.5
In	0.109	0.087	0.082
La	53.3	45.8	56.7
Li	21.1	23.9	22.0
Mn	540	612	569
Mo	4.16	4.50	1.79
Nb	15.1	17.4	58.8
Ni	56.2	65.5	40.8
P	1034	1205	668
Pb	14.3	12.6	13.2
Pd	<0.1	<0.1	<0.1
Pt	<0.1	<0.1	<0.1
Sb	0.26	0.15	0.4
Se	15.1	13.7	12.1
Sn	3.49	3.72	4.47
Sr	160.3	156.1	117.1
Th	16.1	17.1	27.5
Ti	3,824	3,683	4,633
U	26.1	29.8	35.3
V	133.1	144.5	142.6
W	7.45	9.68	25.83
Y	28.0	37.8	62.8
Yb	2.6	2.5	7.6
Zn	70.9	85.4	100.4
Zr	149	132	142

The semi-quantitative ICP analyses has a number interesting features. The presence of copper, arsenic, mercury, lead, and zinc are noted. In order to quantify the presence of these elements, an atomic absorption analytical procedure was used. Information generated by atomic absorption analysis is given in the following Table 19.1.6.4.

Table 19.1.6.4 Atomic Absorption Assays		
Element	Oxide Composite ppm	Sulfide Composite ppm
Ag	0.65	0.91
As	81.9	40.0
Cu	81.4	57.1
Hg	7.8	3.7
Fe	607.1	557.1
Pb	10.3	11.6
Zn	70.5	100.7

The presence of copper and arsenic in a gold sample can sometimes cause excess cyanide consumption and/or influence the dissolution rate of gold. The presence of mercury at a level of eight times that of gold in the oxide composite and four times that of gold in the sulfide composite has an impact upon the process design. A retort to treat the electrolytic precious metals sludge has been added to the process flowsheet.

A number of bottle roll tests were conducted on the oxide and sulfide composites. That information is summarized in the following Table 19.1.6.5.

Table 19.1.6.5 Bottle Roll Test Data				
Sample	No. of Tests	Grind microns	Duration Hrs	Avg Gold % Extraction
Oxide	3	75	36	95
Sulfide	2	75	36	92

The results of the bottle roll tests showed an elevated level of gold extraction from both oxide and sulfide composites. There is no evidence of a "preg robbing" tendency in either sample.

A total of five column leach tests (3 on oxide composite and 2 on the sulfide composite) were conducted. The following Table 19.1.6.6 summarizes the results of that testing program.

Table 19.1.6.6 Column Leach Results					
Ore	Crush Size p80 mm	Leach Time Days	Head gpt Au	Tail gpt Au	Au Recovery %
Oxide	10	66	0.726	0.146	79.9
Oxide	25	66	0.741	0.185	75.1
Oxide	50	66	0.726	0.250	65.6
Sulfide	10	41	0.840	0.219	74.0
Sulfide	25	66	0.842	0.273	67.6

Gold recovery results for both oxide and sulfide material were considered to be very encouraging.

19.1.7 Jinshan Pilot Heap Program

To obtain further representative samples suitable for testing at a coarse size distribution, a test pit in the center of the main deposit was excavated by Jinshan Gold Mines in 2004 using mining methods similar to those anticipated for commercial production. Two pilot scale heap leach tests of 50,000 tonnes of oxide mineralization each were placed on test pads at the mine site in 2004. The first pilot heap was Run-of-Mine (ROM) material, the second was jaw crushed through 125 millimeters before being placed on the heap. Results of the pilot leach program are discussed in the following Section 19.3.

Additionally, a 60 tonne representative sample of the crushed material was collected as the test heaps were constructed and this material was used by METCON Research to formulate an oxide composite for large scale column testing at the Baogang Technical Institute in Baotou.

19.1.8 2005 METCON Research Program

As the on-site test program mentioned above was being developed in mid-2004, individual samples were taken from the material being mined and delivered to the test heaps. This material was put aside for column testing. Jinshan Gold Mines delivered 872 individual bags to the Baogang Technical Institute representing an oxide composite sample. The maximum weight of an individual sample was 244 kilograms and the minimum weight was 2.7 kilograms. The entire delivery comprising the composite weighed 18,519 kilograms. The oxide composite sample used for column testing was prepared as follows:

- The entire sample was screened at 150 millimeters. Material coarser than 150 millimeters was crushed by hand so that the entire sample passed 150 mm. The minus 150 mm material was then screened on 100 mm, 75 mm, 50 mm, 25 mm, 12 mm, 9.5 mm, 6.4 mm, 4.0 mm, and Tyler 10 mesh using a screening machine. Each fraction was weighed and saved separately. The particle size distribution was calculated.
- The assumption was made that the P_{100} of 150 millimeters was approximately equal to a P_{80} of approximately 100 millimeters. Sufficient material from each

screen fraction was split out and saved to prepare to three test charges each weighing 1,367 kilograms. Two test charges were used for column leach testing and one test charge was prepared for head screen analysis.

- The remaining sample was converted into a size distribution of 80 percent passing 25 millimeters by crushing the plus 100 millimeter samples through that screen size and redistributing the screen fractions. A new particle size distribution was recalculated and three test charges, each of 1,367 kilograms, were prepared by reconstituting individual screen fractions. Two test charges were utilized for column leach testing and one test charge was prepared for head screen analysis.
- The remainder of the sample was converted to a size distribution of approximately P_{80} equal to 6 millimeters by crushing the plus 12 millimeter material through that size and then redistributing the crushed material to its appropriate size fraction. Sufficient material to prepare four test charges at this size distribution were saved. Three test charges were used for column leaching and the other for head sample analytical determination.
- The last column was made by preparing a column test charge from the P_{80} equal 6 millimeter material and removing the 100 mesh material.
- Each individual screen fraction from the head screen assay analysis charge was crushed to 100 percent minus 10 mesh using a laboratory jaw crusher and a laboratory gyratory crusher. A one kilogram portion of the minus 10 mesh material from each individual screen fraction was split out and pulverized individually to produce a fire assay pulp.
- The oxide composite column tests were leached for a period of 90 days and then washed with fresh water. Work on the oxide columns commenced on 5 March 2005 and the columns began to be dismantled on 27 June 2005.

The sulfide composite sample arrived at the Baogang Technical Institute on 9 March 2005. The sample arrived in 783 bags that were procured by sampling the sulfide portion of the ore body. This ore horizon was accessed by driving a decline and a crosscut into the ore body. Each bag was split into two portions with one portion being reserved for column testing. The sample preparation procedure used for the sulfide ore was similar to that employed for the oxide material. The 80 percent passing sizes for the sulfide composite were 75 mm, 25 mm, and 6 mm.

The sulfide composite column leach tests were operated for a total of 120 days and leaching was concluded in mid-August 2005.

19.1.9 Column Test Results

As of the end of July 2005 the oxide composite column tests have been concluded after 90 days of leaching. Sulfide column leach tests have been concluded and the leached residue assays are expected by the end of October 2005.

It is possible to project gold extraction levels from mature column leach tests. This effort was undertaken by KDE and the results are presented herein.

Oxide Composite Results

The following Table 19.1.9.1 summarizes the column leach tests performed on the oxide composite.

Table 19.1.9.1 Oxide Composite Column Leach Results						
Test No.	Crush Size 80% Passing	Leach Day	Head Assay, g/t Au ⁽³⁾	Indicated Extraction Au, %	Consumption, kg/t	
					NaCN	CaO
CL-01	55 mm	91	0.76	83.65	0.193	1.435
CL-02	55 mm	91	0.76	82.21	0.216	1.383
CL-03	25 mm	91	0.88	90.01	0.142	1.392
CL-04	25 mm	91	0.88	90.18	0.162	1.360
CL-05	6 mm	90	0.88	91.59	0.175	1.408
CL-06	6 mm	90	0.88	87.93	0.230	1.351
CL-07	6 mm	90	0.89	93.08	0.150	1.404

Note: CL-07 had the minus 100 mesh material removed

An examination of Table 19.1.9.1 indicates that after 90 days under leach gold extraction varied for the oxide composite between 82 and 92 percent. The conclusion is reached that given sufficient leaching time, gold extractions from the oxide composite will eventually approach 80 percent or higher. Graphical presentation of the oxide composite leach results are given in Section 19.2.1 of this report.

Sulfide Composite Results

The sulfide composite samples have been subjected to column leaching for a period of 120 days. The following Table 19.1.9.2 presents the 120 day leach results for the sulfide composite material.

Table 19.1.9.2 Sulfide Composite Column Leach Results						
Test No.	Crush Size 80% Passing	Leach Day	Head Assay, g/t Au ⁽³⁾	Indicated Extraction Au, %	Consumption, kg/t	
					NaCN	CaO
CL-08	75 mm	120	0.56	48.82	0.35	1.16
CL-09	75 mm	120	0.56	48.78	0.25	1.12
CL-10	25 mm	120	0.60	59.28	0.22	1.10
CL-11	25 mm	120	0.60	56.98	0.25	1.10
CL-12	6 mm	120	0.51	79.67	0.36	1.08
CL-13	6 mm	120	0.51	79.66	0.35	1.09
CL-14	6 mm	120	0.50	80.20	0.24	1.10

An examination of the preceding tabulation reveals an obvious dependency of the rate of gold extraction upon size distribution. After 120 days the 75 millimeter material showed a gold extraction of approximately 48 percent, the 25 millimeter material indicated a gold extraction of approximately 58 percent, whereas the 6 millimeter gold extraction approached 80 percent.

Graphical presentations of the sulfide composite leach data along with projected gold extraction equations are contained in Section 19.2.2 of this report.

Extraction Projections

As explained elsewhere, it is possible to project gold extraction from oxide and sulfide composites with a reasonable degree of accuracy using a logarithmic curve fitting algorithm. That approach was taken and extraction projections were made for the CSH ore types. The following Table 19.1.9.3 presents information associated with the oxide ore.

Table 19.1.9.3 Oxide Columns						
Column	1	2	3	4	5	6
P ₈₀ - mm	55	55	25	25	6	6
Leach Days	Estimated Percent Gold Extraction					
30	62.77	60.66	59.01	64.02	69.99	69.12
60	73.27	70.69	67.96	73.79	77.96	75.61
90	79.41	76.56	73.20	79.51	82.63	79.41
120	83.77	80.72	76.92	83.57	85.94	82.11
150	87.15	83.95	79.80	86.72	88.51	84.20
180	89.91	86.59	82.16	89.29	90.61	85.91

The projection given above indicates that gold extraction should approach the high 80 percent range for oxide ore types. It is suggested that this be discounted in the design calculations due to the fact that much of the oxide will be run-of-mine material and actual industrial scale heap leaching is not quite as efficient as the tight control regime present in column leaching. This information coupled with ongoing gold extraction from oxide test heaps at the mine site has led to the adoption of an extraction level of 80 percent for oxide ore types.

A similar projection was made for the sulfide columns. This information is provided in Table 19.1.9.4.

Table 19.1.9.4 Sulfide Columns						
Column	8	9	10	11	12	13
P ₈₀ - mm	75	75	25	25	6	6
Leach Days	Percent Gold Extraction					
30	34.26	34.92	43.79	42.96	51.42	49.64
60	40.63	40.90	50.56	49.36	64.08	62.93
90	44.18	44.23	54.34	52.94	71.14	70.35
120	46.70	46.59	57.02	55.47	76.15	75.61
150	48.66	48.43	59.10	57.44	80.03	79.69
180	50.26	49.93	60.80	59.04	83.21	83.03

The projection given above for sulfide ore shows the dependency of gold extraction upon size distribution. Obviously, sulfide ore should be subjected to crushing prior to placement on the leach heap. It is recommended that a closed circuit tertiary crushing system be installed that has the capability of reducing the size of the sulfide ore to 100 percent passing 12 millimeters.

19.1.10 Gravity, Flotation, and Concentrate Cyanidation

Oxide and sulfide composites from the CSH Gold Project were used for a number of metallurgical tests at METCON Research in Tucson, Arizona. Four separate tests were conducted on each composite sample. Each sample was ground through 10 mesh and subjected to gravity concentration using an Archimedes spiral. This device simulates gravity concentration by panning. Four separate subsamples of each composite were treated in this way. The tailings from gravity concentration were individually ground through 65, 100, 150, and 200 mesh. Each sample was subjected to rougher and cleaner flotation producing a flotation concentrate. The concentrates produced from the sulfide composite were then individually subjected to cyanidation.

Test details are contained in Appendix 4 of this report. A summary of the oxide composite testwork is given in the following Table 19.1.10.1.

Table 19.1.10.1 - SUMMARY OF METALLURGICAL RESULTS Jinshan Gold Mines - METCON Project No. M-667-02 Gravity Separation - Flotation Grind Size Evaluation Oxide Ore				
Test ID: FS1-Ox-01	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ -65 mesh	Gravity Concentrate (1)	0.11	96.00	15.93
	1st. Cleaner Concentrate	8.09	4.95	60.16
	1st. Cleaner Tail	7.38	0.44	4.88
	Rougher Tail	84.42	0.15	19.03
	Calculated Head	100.00	0.66	100.00
	Assay Head		0.91	
Test ID: FS1-Ox-02	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ -100 mesh	Gravity Concentrate (1)	0.39	31.00	22.03
	1st. Cleaner Concentrate	10.92	2.83	55.70
	1st. Cleaner Tail	6.72	0.13	1.57
	Rougher Tail	81.97	0.14	20.69
	Calculated Head	100.00	0.52	100.00
	Assay Head		0.91	
Test ID: FS1-Ox-03	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ -150 mesh	Gravity Concentrate (1)	0.33	24.00	13.86
	1st. Cleaner Concentrate	12.00	3.25	67.50
	1st. Cleaner Tail	8.22	0.15	2.13
	Rougher Tail	79.44	0.12	16.50
	Calculated Head	100.00	0.57	100.00
	Assay Head		0.91	
Test ID: FS1-Ox-04	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ -200 mesh	Gravity Concentrate (1)	0.24	94.00	31.54
	1st. Cleaner Concentrate	12.00	3.20	53.92
	1st. Cleaner Tail	8.74	0.10	1.23
	Rougher Tail	79.03	0.12	13.32
	Calculated Head	100.00	0.71	100.00
	Assay Head		0.91	

Remarks: Gravity Concentration was conducted at particle size 100% minus 10 mesh.

An examination of the preceding tabulation reveals that between 13 and 20 percent of the gold in the oxide composite sample remained in the rougher flotation tailing. The combined gravity and rougher flotation concentrate contained 75 to 80 percent of the gold present in the composite head sample. Gold extraction increased with decreasing size distribution.

The following Table 19.1.10.2 is a summary of the gravity concentration and flotation testwork performed on the sulfide composite.

Table 19.1.10 2 - SUMMARY OF METALLURGICAL RESULTS Jinshan Gold Mines - METCON Project No. M-667-02 Gravity Separation - Flotation Grind Size Evaluation Sulfide Ore				
Test ID: FS1-S-01	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ -65 mesh	Gravity Concentrate (1)	1.23	10.70	28.75
	1st. Cleaner Concentrate	9.03	2.40	47.19
	1st. Cleaner Tail	6.95	0.16	2.42
	Rougher Tail	82.79	0.12	21.64
	Calculated Head	100.00	0.46	100.00
	Assay Head		0.51	
Test ID: FS1-S-02	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ -100 mesh	Gravity Concentrate (1)	1.51	12.00	26.69
	1st. Cleaner Concentrate	12.02	3.22	56.98
	1st. Cleaner Tail	6.46	0.23	2.19
	Rougher Tail	80.00	0.12	14.13
	Calculated Head	100.00	0.68	100.00
	Assay Head		0.51	
Test ID: FS1-S-03	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ -150 mesh	Gravity Concentrate (1)	0.94	12.00	20.77
	1st. Cleaner Concentrate	12.57	2.48	57.34
	1st. Cleaner Tail	5.29	0.10	0.97
	Rougher Tail	81.20	0.14	20.91
	Calculated Head	100.00	0.54	100.00
	Assay Head		0.51	
Test ID: FS1-S-04	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ -200 mesh	Gravity Concentrate (1)	1.70	6.98	22.95
	1st. Cleaner Concentrate	14.36	2.08	57.87
	1st. Cleaner Tail	5.68	0.09	0.99
	Rougher Tail	78.26	0.12	18.19
	Calculated Head	100.00	0.51	100.00
	Assay Head		0.51	

Remarks: Gravity Concentration was conducted at particle size 100% minus 10 mesh.

The preceding tabulation reveals that 14 to 21 percent of the gold present in the sulfide composite feed reported to the rougher flotation tailing. The combined gravity and flotation concentrate contained 75 to 80 percent of the gold present in the feed. The feed size distribution did not greatly influence the test results.

As mentioned above, the flotation concentrates produced from the sulfide composite were subjected to cyanidation. The results of that study are given in the following Table 19.1.10.3.

Table 19.10.1.3 - SUMMARY OF METALLURGICAL RESULTS Cyanide Leach Study Ambient 48 hr. Bottle Roll Leach Tests on 1st. Cl. Concentrate Sulfide Ore - "Jinshan" Project METCON Project No. M-667-02								
Test Number	Dump Sample ID	Head (1st. Cl. Conc.)		Reagent Consumption		Leach Time (hr)	Cumulative Extraction	
		Calculated Au (g/tonne)	Assayed Au (g/tonne)	NaCN (kg/t)	CaO (kg/t)		Au (%)	Au (g/t)
FS1-S-AL01	Sulfide 1st. Cl. Conc. P ₈₀ = 65 mesh	2.84	2.40	2.362	2.521	48	96.85	2.75
FS1-S-AL02	Sulfide 1st. Cl. Conc. P ₈₀ = 100 mesh	2.96	3.22	1.863	2.168	48	97.65	2.89
FS1-S-AL03	Sulfide 1st. Cl. Conc. P ₈₀ = 150 mesh	2.03	2.48	1.997	2.380	48	97.56	1.99
FS1-S-AL04	Sulfide 1st. Cl. Conc. P ₈₀ = 200 mesh	1.82	2.08	1.623	1.775	48	96.17	1.75

Between 92 and 94 percent of the gold present in the cleaner flotation concentrate was dissolved when treated with sodium cyanide. There does not appear to be a preg-robbing component in the sulfide composite material.

This test program reveals that it is unlikely that beneficiation by gravity concentration, froth flotation and concentrate cyanidation is applicable to the CSH Gold Project ore. It is estimated that a 20,000 tonne per day single product flotation concentrator would have a capital cost of US\$ 125 to US\$ 150 million. These beneficiation techniques would add US\$ 1.50 to US\$ 2.00 per tonne ore treated.

19.1.11 Oxide and Sulfide Composite Bottle Roll Tests

There has been a suggestion that "preg-robbing" components may be present in CSH ore. In order to check that possibility, a number of bottle roll tests were conducted at METCON Research in Tucson, Arizona. Both oxide and sulfide composite bottle roll tests were conducted at a P₈₀ size of 100 mesh. The test program consisted of the following four tests for each composite:

- A standard bottle roll cyanidation test at 33 percent solids and ambient temperature that was conducted for 48 hours.
- A duplicate of the preceding test.
- A standard cyanidation test with 5 kilograms per tonne activated carbon added to the test slurry with other conditions equal to the standard test.

- A standard cyanidation test was performed with 5 kilograms per tonne of Portland cement added to the slurry.

The following Table 19.1.11.1 summarizes the bottle roll cyanidation tests performed on the oxide composite.

Table 19.1.11.1 - Cyanide Leach Study, P₈₀ = 100 Mesh Ambient 48 hr. Bottle Roll Leach Tests on Column Feed Oxide Composite - "Chang Shan Hao" Project METCON Project No. M-667-02					
Test Number	Sample ID	Calc. Head Au (g/t)	Reagent Consumption		Au Extraction (%)
			NaCN (kg/t)	CaO (kg/t)	
BR-Ox-01	Oxide Composite Standard Test	0.82	0.064	2.253	96.35
BR-Ox-02	Oxide Composite Standard Test (2)	0.74	0.115	2.273	95.98
BR-Ox-03	Oxide Composite With Activated Carbon	0.83	0.200	2.191	94.00
BR-Ox-04	Oxide Composite With 5 kg/t Portland Cement	1.02	0.139	0.100	87.27

The standard bottle roll test at a P₈₀ of 100 mesh gave an extraction of 96 percent of the gold in the oxide composite. The addition of activated carbon or Portland cement did not impact the gold extraction in a positive manner.

The following Table 19.1.11.2 presents the summary of the bottle roll test program performed on the sulfide composite sample.

Table 19.1.11.2 - Cyanide Leach Study, P₈₀ = 100 Mesh Ambient 48 hr. Bottle Roll Leach Tests on Column Feed Sulfide Composite - "Chang Shan Hao" Project METCON Project No. M-667-02					
Test Number	Sample ID	Calc. Head Au (g/t)	Reagent Consumption		Au Extraction (%)
			NaCN (kg/t)	CaO (kg/t)	
BR-S-01	Sulfide Composite Standard Test	0.74	0.172	1.544	94.56
BR-S-02	Sulfide Composite Standard Test (2)	0.74	0.189	1.628	93.23
BR-S-03	Sulfide Composite With Activated Carbon	0.46	0.271	1.628	91.22
BR-S-04	Sulfide Composite With 5 kg/t Portland Cement	0.60	0.168	0	93.26

The standard bottle roll tests performed on the sulfide composite resulted in a gold extraction level of approximately 94 percent. The addition of activated carbon or Portland cement did not have a positive impact on these very high recovery levels.

The final bottle roll tests on the oxide and sulfide composites were conducted at a P₈₀ of 400 mesh with and without activated carbon. The results of that study are presented in the following Table 19.1.11.3.

**Table 19.1.11.3 - Cyanide Leach Study, $P_{80} = 400$ Mesh
Ambient 48 hr. Bottle Roll Leach Tests on Column Feed
Oxide and Sulfide Composites - "Chang Shan Hao" Project
METCON Project No. M-667-02**

Test Number	Sample ID	Calc. Head Au (g/t)	Reagent Consumption		Au Extraction (%)
			NaCN (kg/t)	CaO (kg/t)	
BR-Ox-05	Oxide Composite Standard Test	1.04	0.207	2.544	95.18
BR-Ox-06	Oxide Composite With Activated Carbon	0.66	0.394	2.678	98.50
BR-S-05	Sulfide Composite Standard Test	0.66	0.384	2.134	95.41
BR-S-04	Sulfide Composite With Activated Carbon	0.53	0.543	2.175	98.10

At 400 mesh the standard bottle roll gives extractions from both oxide and sulfide composites of greater than 95 percent. With the addition of 5 kilograms per tonne activated carbon these extraction levels increased to 98 percent.

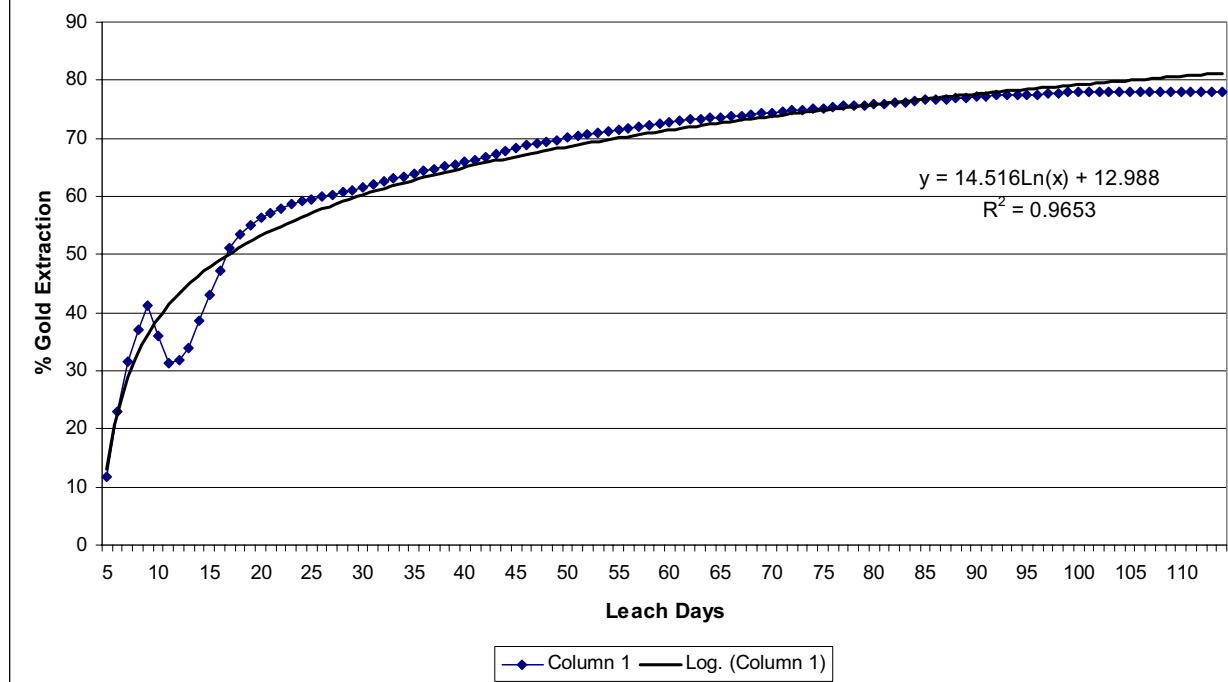
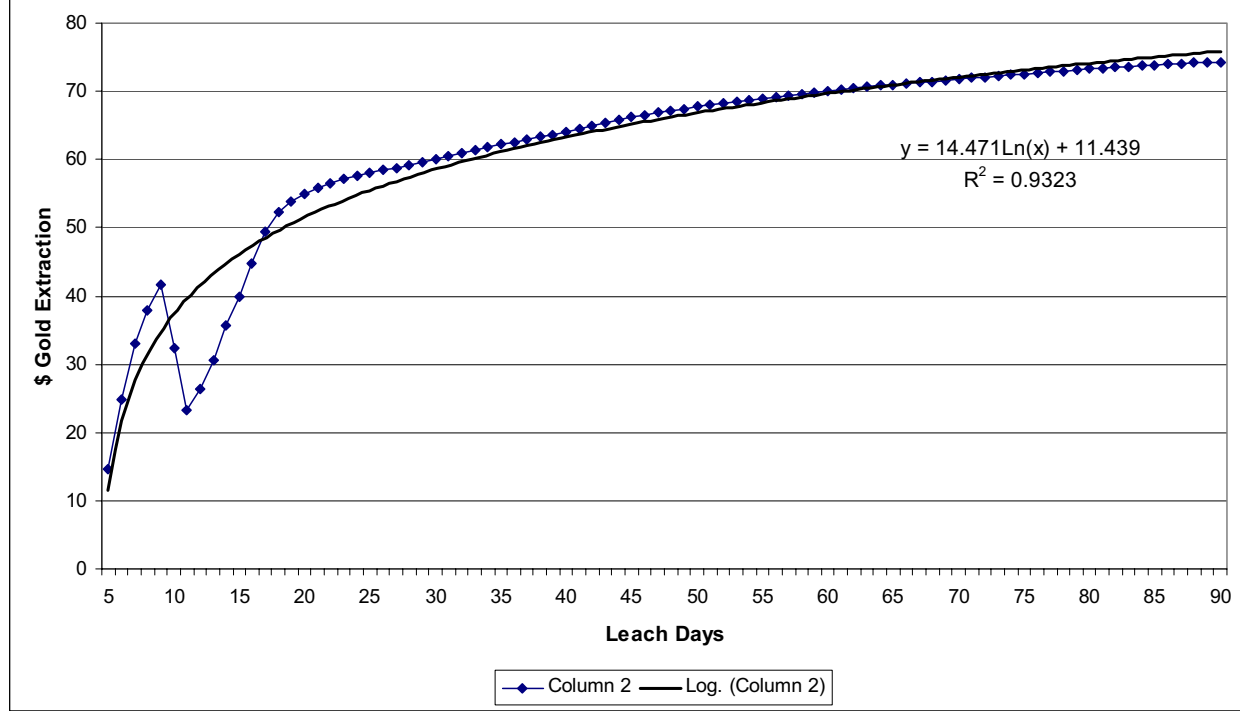
The bottle roll tests conducted on the CSH oxide and sulfide composites demonstrated the absence of "pre-robbing" components in the ore.

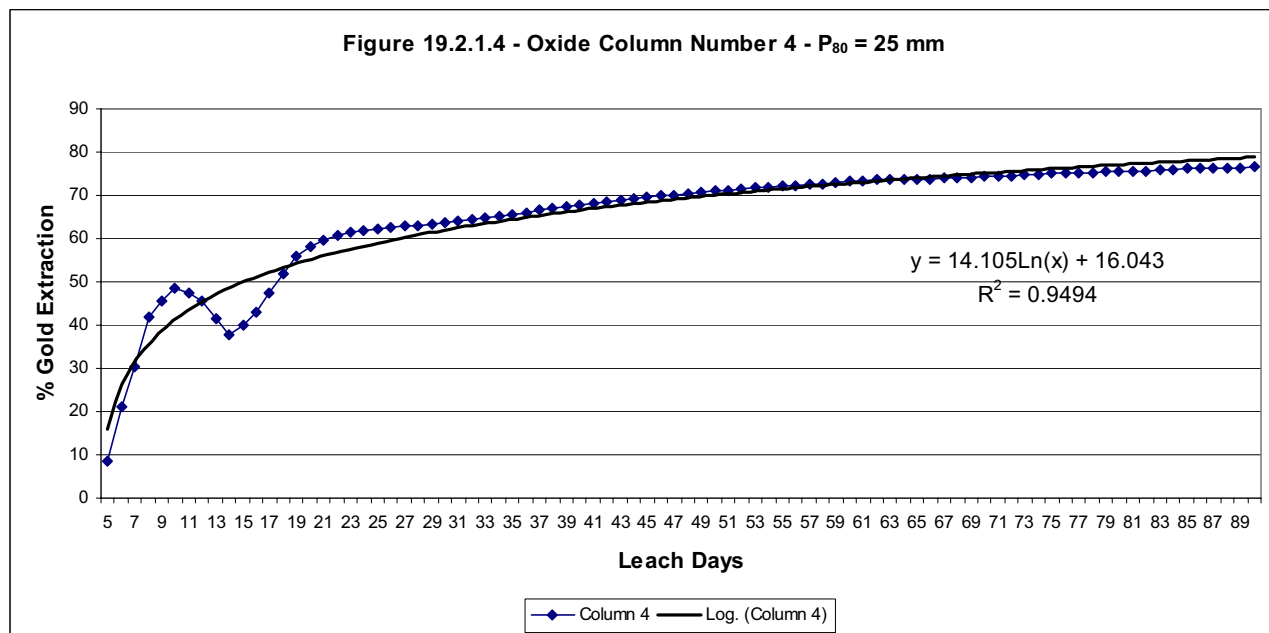
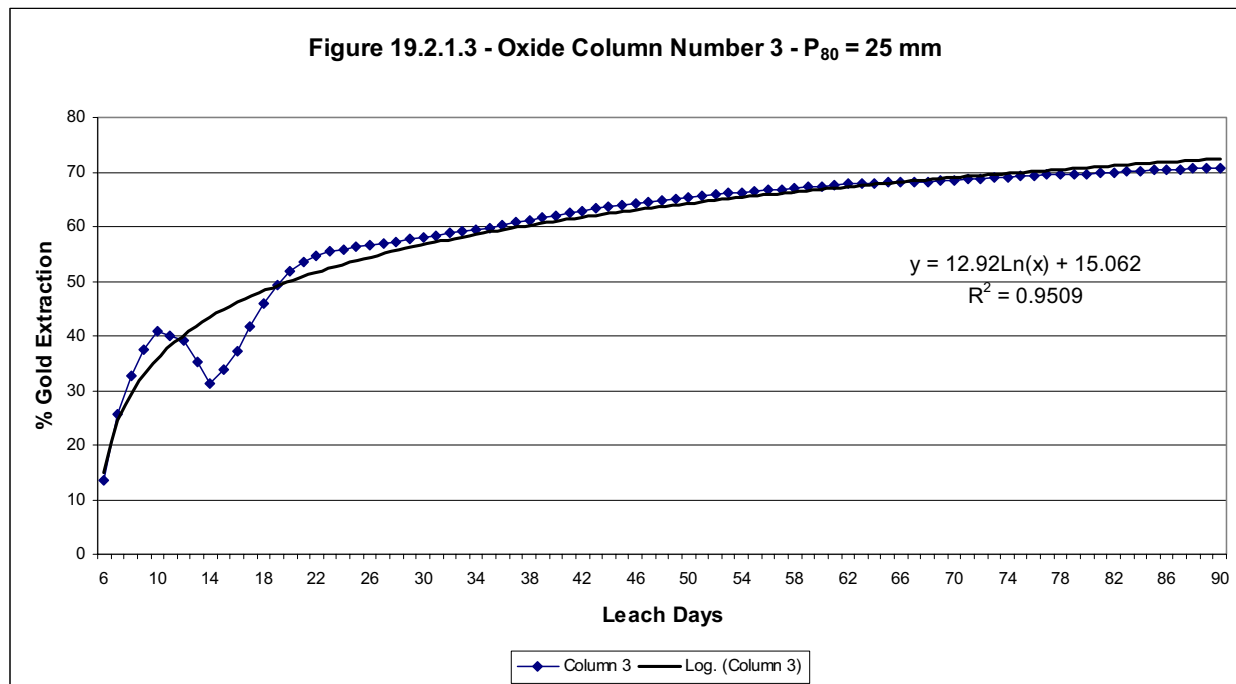
19.2 Gold Extraction Estimate Procedures

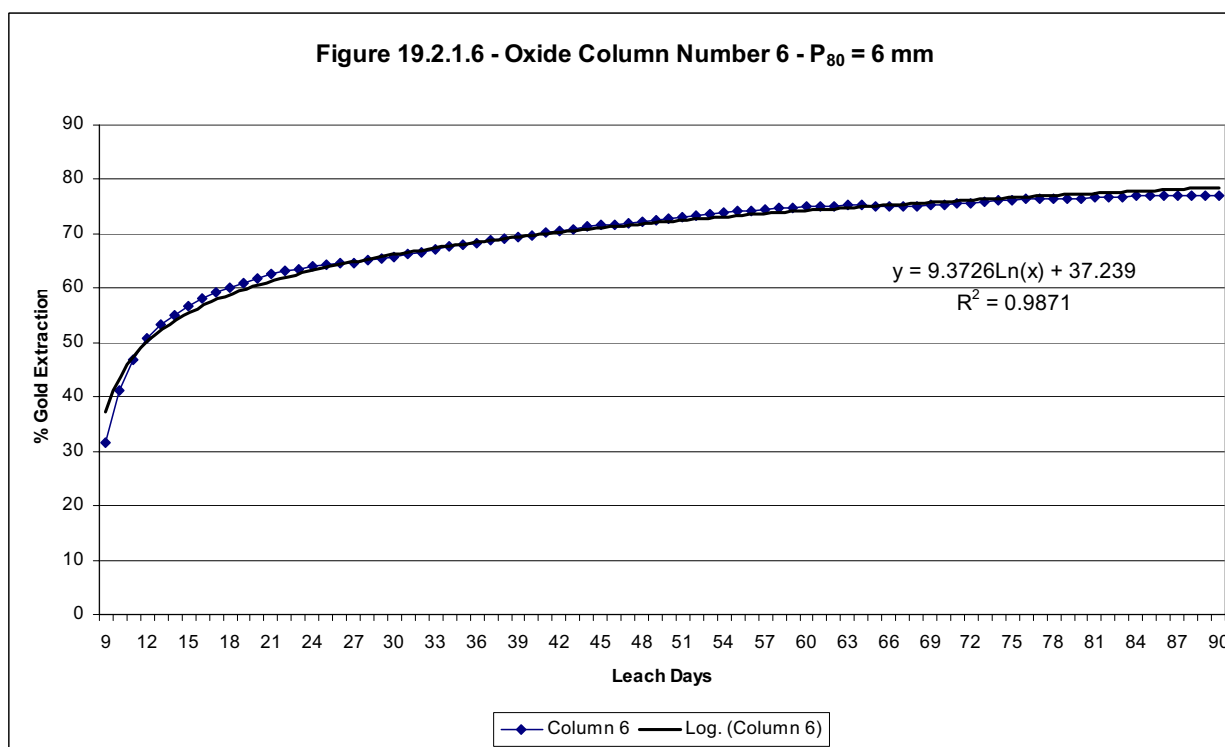
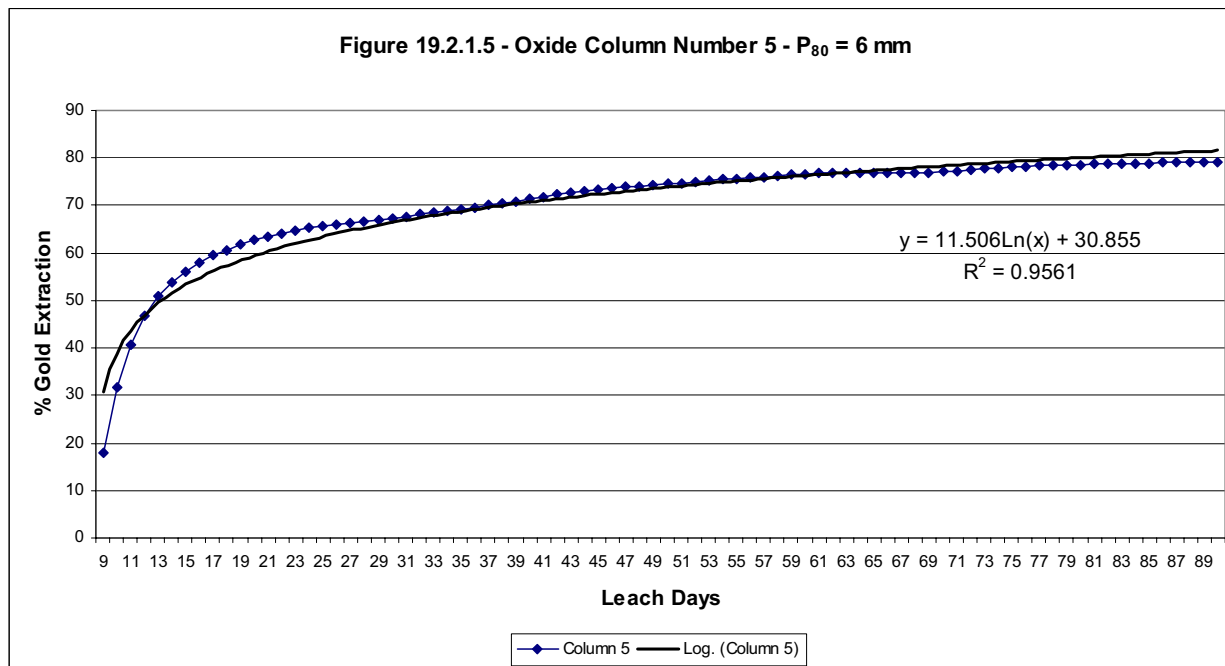
Gold extraction percentages for various CSH Project ore types have been derived from column testwork and pilot heaps that are being leached at the mine site.

19.2.1 Oxide Column Tests

A column test program employing an oxide ore composite from the CSH Project was conducted at the Baogang Mineral Institute in Baotou, Inner Mongolia for a period of 90 days. The main variable that was investigated in this test program was the ore size distribution. Eighty percent passing sizes (P_{80}) of 55, 25, and 6 millimeters were investigated. Each size distribution was studied using duplicate column test samples. The results of that study are given in the following Figures 19.2.1.1 through 19.2.1.6.

Figure 19.2.1.1 - Oxide Column Number 1 - $P_{80} = 55$ mm**Figure 19.2.1.2 - Oxide Column Number 2 - $P_{80} = 55$ mm**





The preceding figures include trend line equations and the R Squared (R^2) statistic. KDE uses a logarithmic curve fitting routine in order to predict gold extraction at leach times that are longer than the column test leaching period. The R^2 statistic is a measure of the accuracy of the logarithmic curve match to the actual data. A perfect fit gives a R^2 statistic of 1.0. Trend line data that have a R^2 statistic greater than 0.9 are considered to be an excellent fit between the derived equation and the actual data.

The next step in the gold extraction estimation procedure is to apply the trend line equation to periods greater than the column leach period. This procedure resulted in the development of the following Table 19.2.1.

Table 19.2.1 Oxide Columns						
Column	1	2	3	4	5	6
P ₈₀ - mm	55	55	25	25	6	6
Leach Days	Estimated Percent Gold Extraction					
30	62.77	60.66	59.01	64.02	69.99	69.12
60	73.27	70.69	67.96	73.79	77.96	75.61
90	79.41	76.56	73.20	79.51	82.63	79.41
120	83.77	80.72	76.92	83.57	85.94	82.11
150	87.15	83.95	79.80	86.72	88.51	84.20
180	89.91	86.59	82.16	89.29	90.61	85.91

An examination of the preceding tabulation reveals that if the column test data is projected using the method described herein the projected gold extraction for individual column tests varies between 82 to 90 percent. It is interesting to note that size distribution has only a modest influence on the projected gold extraction for the oxide ore composite.

19.2.2 Sulfide Ore Composite

A sulfide ore composite was subjected to column leaching at the Baogang Mineral Institute. That study is ongoing and data are available for 112 days of leaching. It is anticipated that this test program will be concluded after column irrigation for 120 days. The results of that sulfide composite column test program are summarized in the following figures.

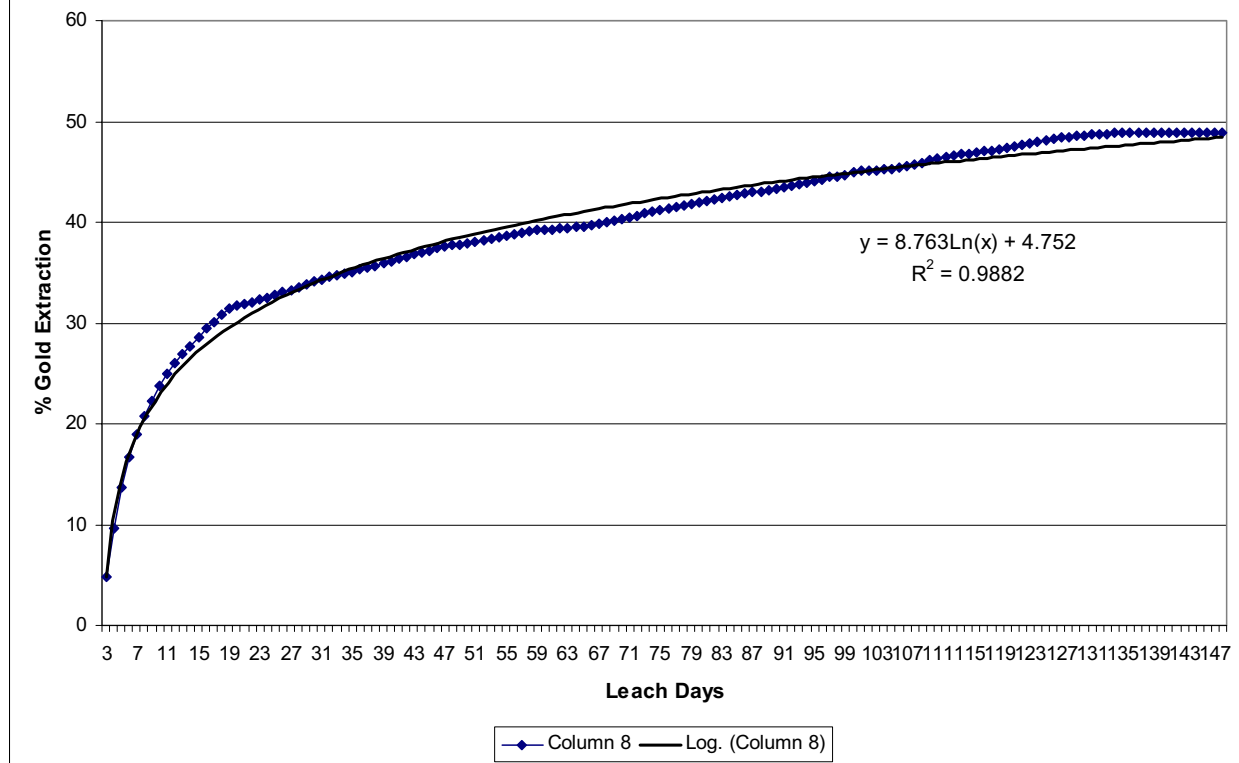
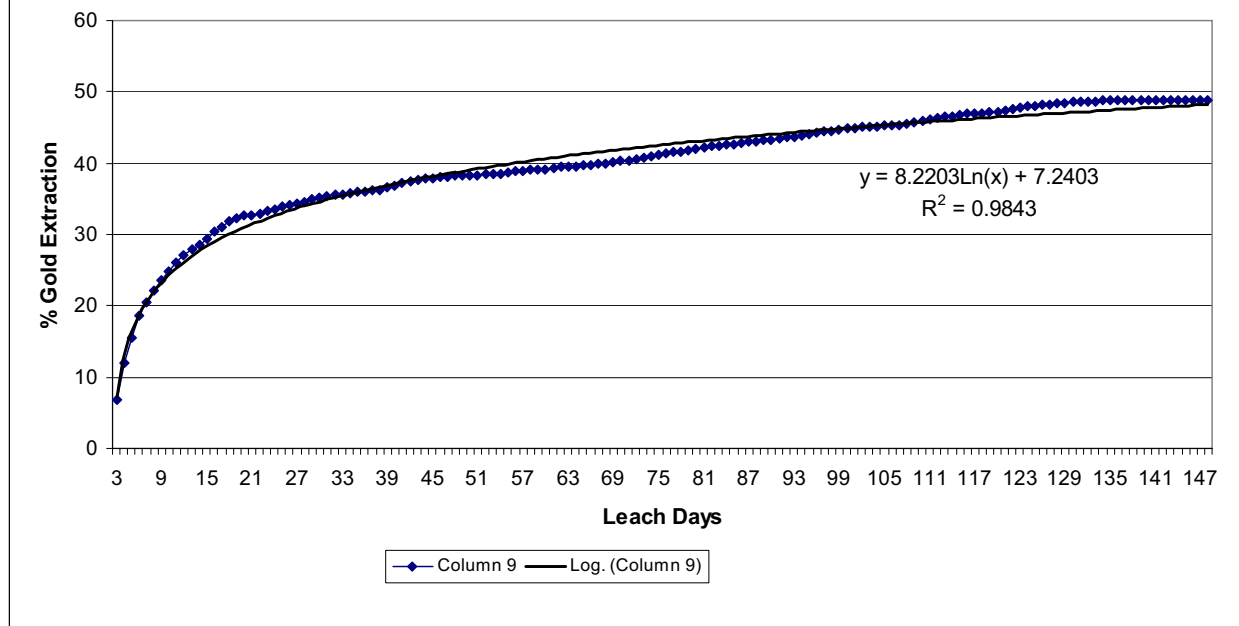
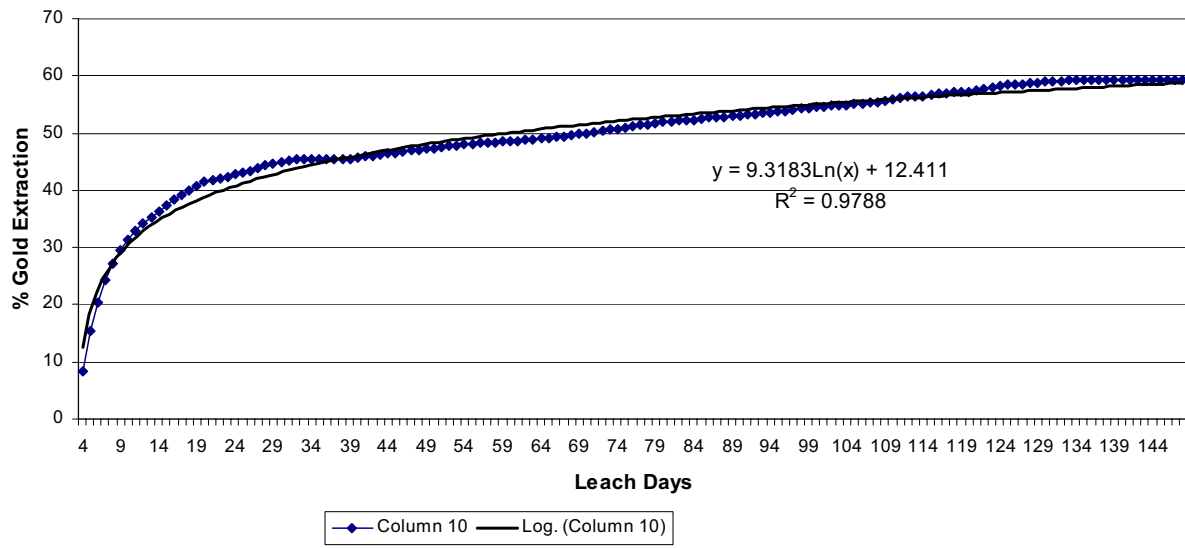
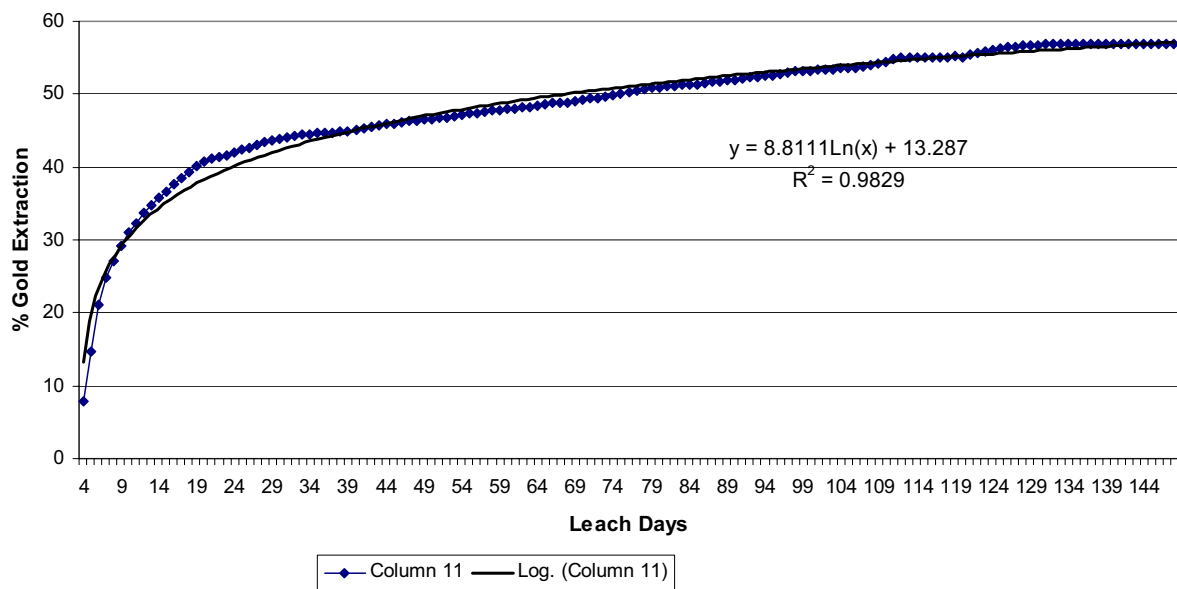
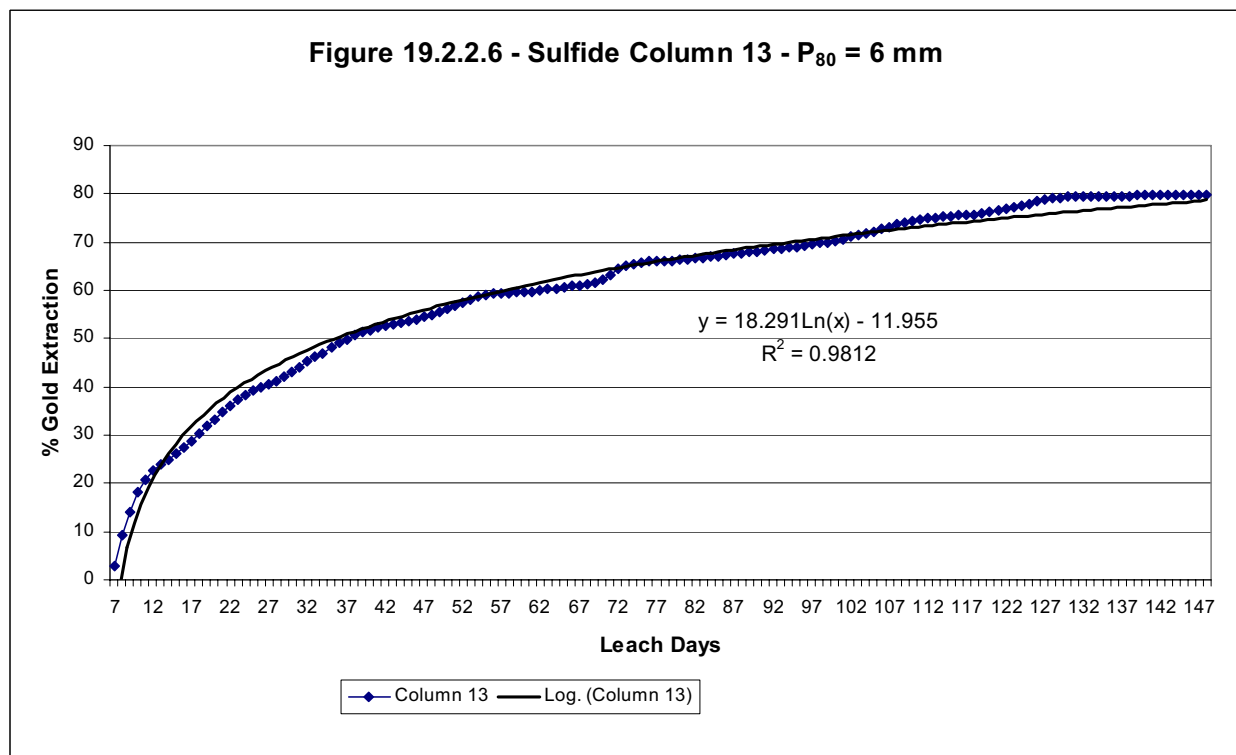
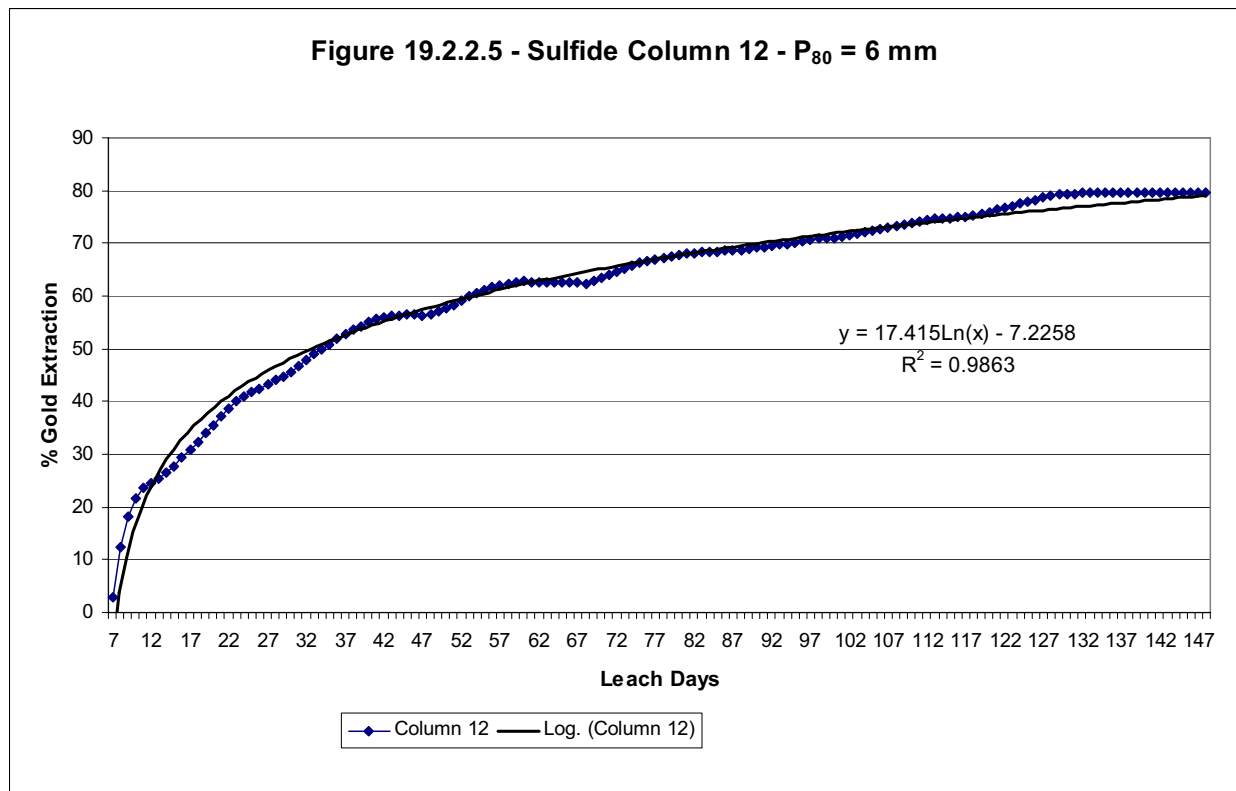
Figure 19.2.2.1 - Sulfide Column 8 - $P_{80} = 75$ mm**Figure 19.2.2.2 - Sulfide Column 9 - $P_{80} = 75$ mm**

Figure 19.2.2.3 - Sulfide Column 10 - $P_{80} = 25$ mm**Figure 19.2.2.4 - Sulfide Column 11 - $P_{80} = 25$ mm**



An examination of the preceding figures reveals that gold extraction from the sulfide ore composite is definitely influenced by particle size distribution. The natural logarithmic

trend line equations all match the actual data very closely. The equations were used to project expected gold extraction and that information is summarized in the following Table 19.2.2.

Table 19.2.2 Sulfide Columns						
Column	8	9	10	11	12	13
P ₈₀ - mm	75	75	25	25	6	6
Leach Days	Percent Gold Extraction					
30	34.26	34.92	43.79	42.96	51.42	49.64
60	40.63	40.90	50.56	49.36	64.08	62.93
90	44.18	44.23	54.34	52.94	71.14	70.35
120	46.70	46.59	57.02	55.47	76.15	75.61
150	48.66	48.43	59.10	57.44	80.03	79.69
180	50.26	49.93	60.80	59.04	83.21	83.03

The projected gold extraction from the sulfide composite is strongly influenced by particle size distribution. At an 80 percent passing size of 75 millimeters, the projected extraction of gold will be approximately 50 percent after 180 days of continuous leaching. When the feed size distribution decreased to a P₈₀ of 25 millimeters the projected gold extraction is approximately 60 percent after a leach time of 180 days. At a P₈₀ of 6 millimeters, the projected gold extraction after 180 days of leaching exceeds 83 percent.

The column test results are important in that the tests prove that the oxide ore size distribution does not make a substantial contribution to gold extraction kinetics or the ultimate quantity of gold dissolved. The reverse is true for the sulfide composite. Extraction of gold from the sulfide material is definitely influenced by particle size distribution and a closed circuit tertiary crushing regime for this ore type is indicated.

19.3 Pilot Heap Studies

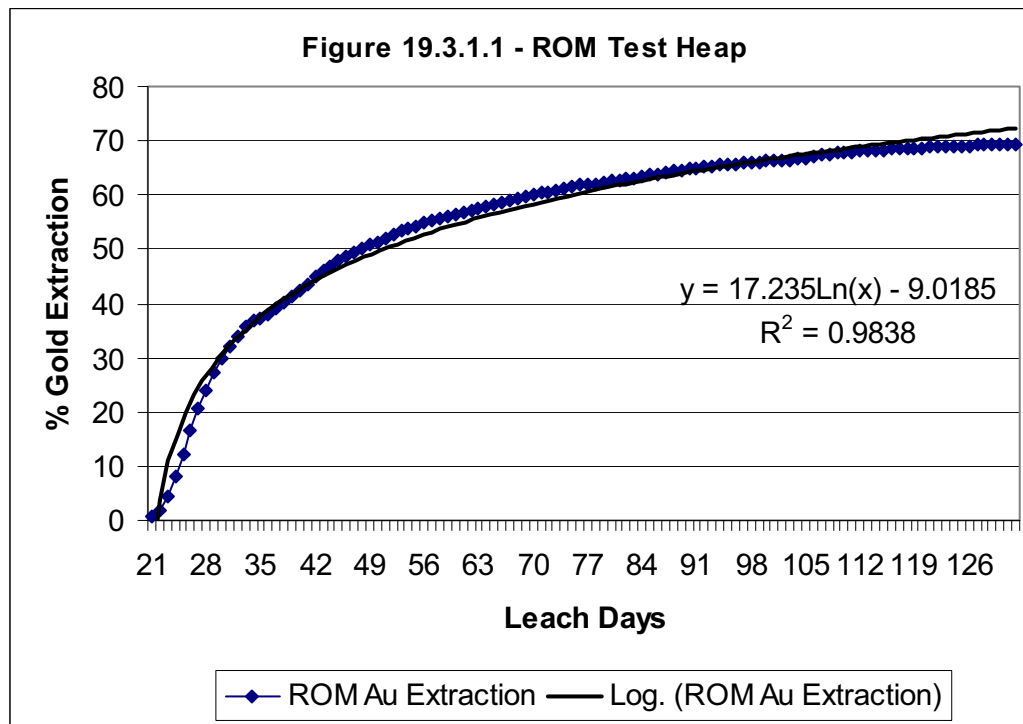
During the summer of 2004 two test heaps were constructed at the Jinshan Gold Mines site. One heap contained run-of-mine (ROM) ore and the other was passed through a primary crusher. Details of heap construction are given in Appendix 3. Following is a description of the testwork that is ongoing with these test heaps.

19.3.1 ROM Heap

Statistics regarding the ROM heap are given below. Heap irrigation began with a solution adjusted to the proper pH but without cyanide. Irrigation commenced on 25 May 2005 and the heap effluent plus make-up water was recirculated to the heap through 14 June 2005. On 15 June 2005 cyanide was added to the heap leach solution. Gold appeared in solution two days later and the pregnant solution was passed through carbon columns in order to remove the gold. Analytical data are available for the period through 6 October 2005 giving a total of 132 irrigation days and 112 days during which gold was produced from the heap. Analytical information and metallurgical summaries for the test

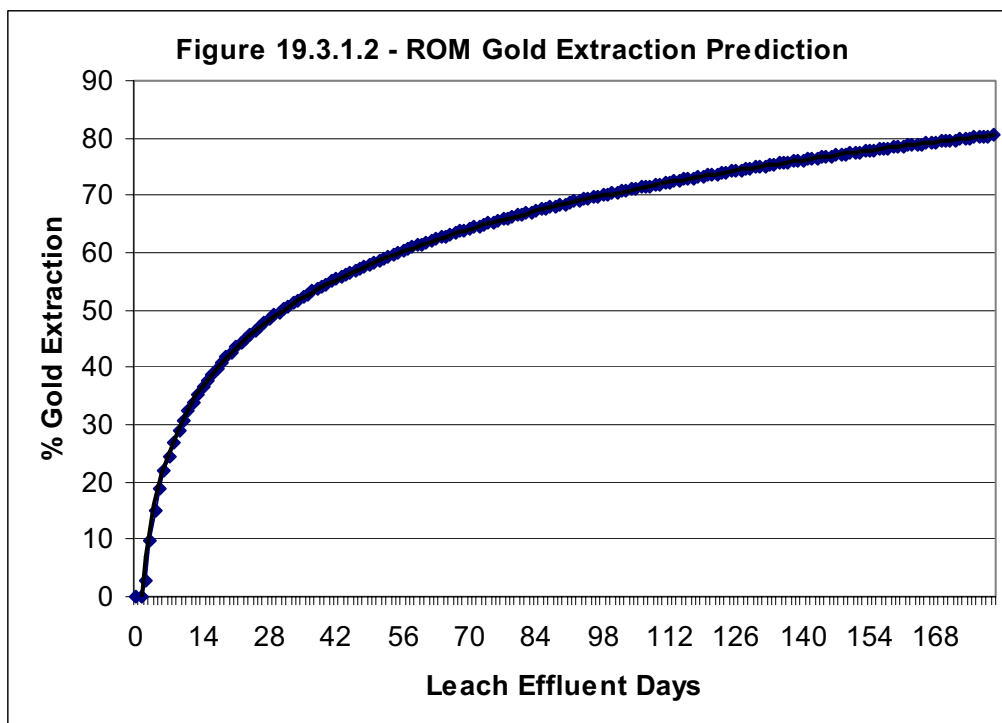
heap have been developed by Scott Bennett and this information was used in this assessment.

The following Figure 19.3.1.1 plots the cumulative ROM gold extraction from the ROM test heap.



A logarithmic trend line is also provided for the ROM test heap extraction data.

A logarithmic trend line equation has been applied to a leach period of 180 days as shown in the following Figure 19.3.1.2.

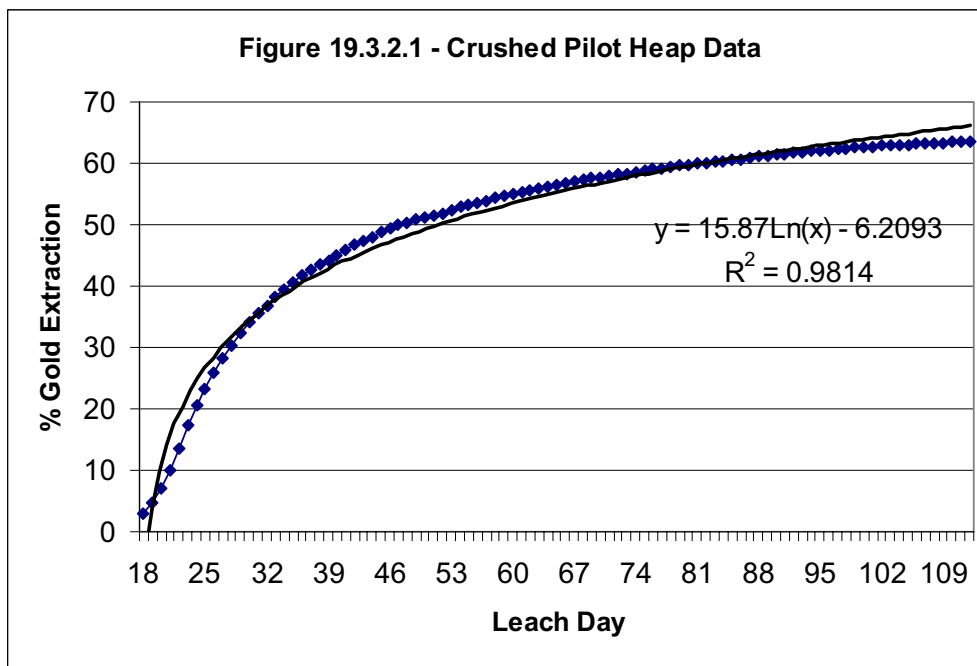


An examination of the ROM gold extraction prediction reveals that the gold recovered should reach 80 percent after a continuous leach period of 180 days.

19.3.2 Crushed Heap

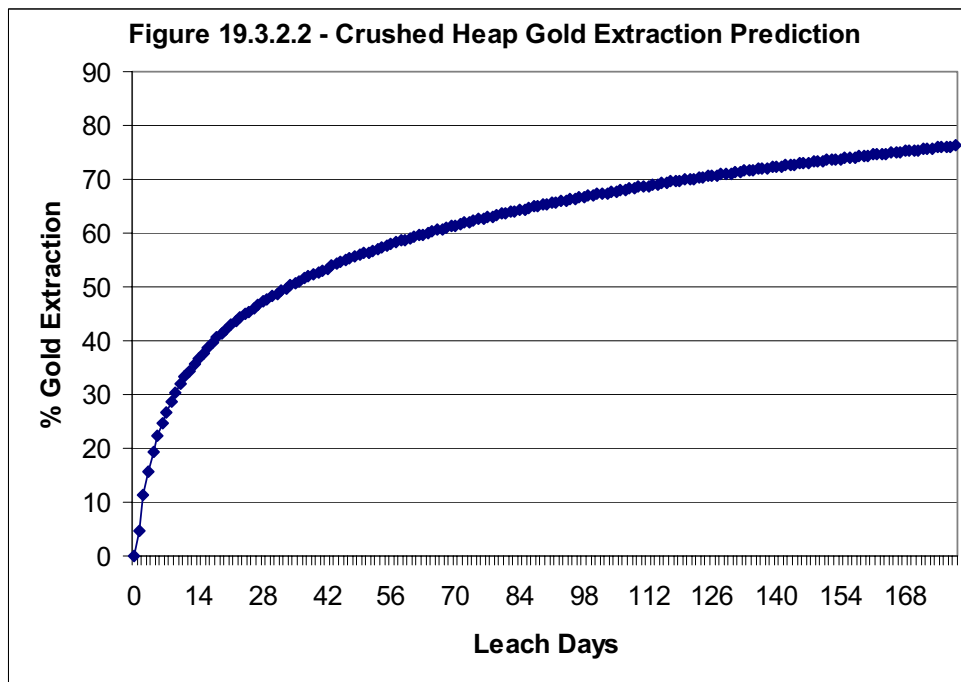
The crushed ore heap began to be irrigated on 21 June 2005. Cyanide was added to the recirculating solution on 28 June and gold appeared in the PLS immediately thereafter. As with the ROM heap, pregnant leach solution was passed through carbon columns then recirculated to the leach heap after the cyanide concentration was adjusted. As of 6 October 2005 the crushed pilot heap has been contacted with solution for 44 days and pregnant solution containing gold has been produced for 37 days.

The available extraction information is provided in the following Figure 19.3.2.1.



In addition to the raw data, a logarithmic trend line has been developed for the crushed pilot heap extraction data.

The following Figure 19.3.2.2 uses the derived data trend line to predict gold extraction for primary crushed ore after 180 continuous leach days.



The preceding figure predicts that the gold extraction after 180 continuous days will be over 76 percent.

19.3.3 Test Heap Summary

The ROM and crushed test heaps have been under irrigation for a number of months at the Jinshan Gold Mines site. The following Table 19.3.3.1 provides a summary of information relative to these test heaps and the ongoing leaching program.

Table 19.3.3.1 Test Heap Data Summary		
Item	ROM	Crushed
P ₈₀ - mm	300	120
Tonnes	47,800	57,000
Height - m	6.0	5.0
Assay - gpt Au	0.704	0.746
Total grams Au	33,644	42,522
Irrigation Days	132	108
Leach Days	112	101
Grams Au Extracted	19,960	21,420
% Au Extraction	64.61	63.55

The test program began with a process of wetting the heaps with water at an elevated pH without cyanide. After the heap had been moistened, leach solution containing cyanide was applied. The preceding tabulation indicates that almost 65 percent of the gold content of the ROM test heap has been extracted in 112 leach days. Slightly over 63 percent of the gold contained in the crushed ore test heap has been extracted in 101 days of leaching.

Based on the available test data it is possible to predict the ultimate recovery from the ROM and crushed ore test heaps. The equations that were developed as outlined herein were used to calculate the expected gold extraction at 30 day intervals up to 180 leach days. This information is given in the following Table 19.3.3.2.

Table 19.3.3.2 Test Heap Extraction Predictions		
Effluent Days	% Au Extraction	
	ROM	Crushed
30	49.60	47.77
60	61.55	58.77
90	68.54	65.20
120	73.49	69.77
150	77.34	73.31
180	80.48	76.20

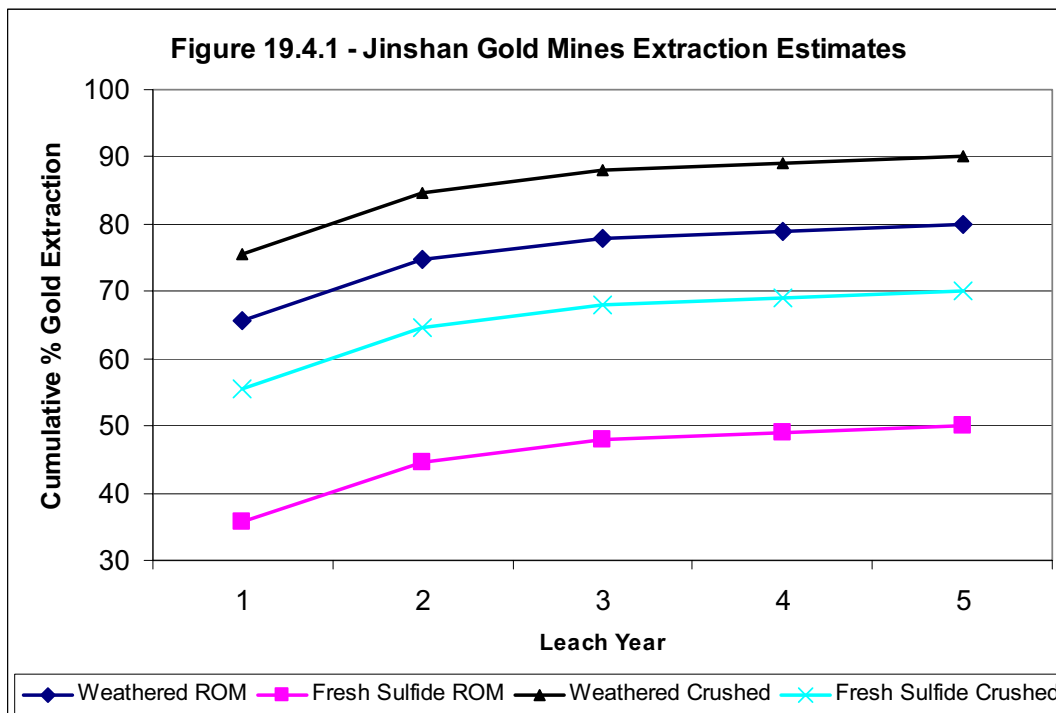
19.4 Extraction By Ore Type

Experience has indicated that it is not appropriate to directly apply the leaching rate curves from column testing to industrial scale leach heaps. KDE has developed a technique based upon actual extraction data encountered in the field compared to column leach

studies. Column leach tests are carefully controlled and involve only a few tonnes of ore for individual leach columns. In an industrial operation leach heaps may involve millions of tonnes of material and at the Jinshan Gold Mines site will eventually result in leach heaps having a height of up to 70 meters. As the leach heap increases in volume, leach solution can become attenuated. In addition, not all of the ore in place on a heap is continuously under irrigation. Usually only 25 to 30 percent of the leach heap surface is being irrigated at any given time. The remainder of the leach heap is being drained, having emitters placed, being surfaced ripped, or being covered with a fresh lift of ore.

In order to introduce a level of conservatism into the heap leach program, KDE has developed a family of curves for each of the Jinshan Gold Mines ore types. These curves assume that a period of five years is necessary to completely leach any specific ore type. The leach curves used are presented in the following Table 19.4.1 and Figure 19.4.1.

Table 19.4.1 Gold Extraction Estimates					
Leach Year	Cumulative Percent Gold Extraction				
	1	2	3	4	5
Weathered ROM	65.6	74.7	78.0	79.0	80.0
Sulfide ROM	35.6	44.7	48.0	49.0	50.0
Weathered Crushed	75.6	84.7	88.0	89.0	90.0
Sulfide Crushed	55.6	64.7	68.0	69.0	70.0



The preceding figure and tabulation represent the annual extraction levels to be used for different Jinshan Gold Mines ore types. It is currently planned that the heap will be stacked with run-of-mine oxidized ore for the first two years of operation. Construction will

commence on a crushing system during the second year of operation. It is anticipated that this crushing facility will be available to treat sulfide ores when these materials are encountered in the open pit mine.

In order to establish the project economics, the anticipated gold production from each ore type must be calculated. The following Table 19.4.2 is such a calculation derived from the 20,000 tonne per day mine plan produced by Nilsson Mine Services, Ltd.

Table 19.4.2 Calculated Gold Production by Ore Type using the 20,000 tonne per day Mine Plan													
Ore Type	Operating Year	1	2	3	4	5	6	7	8	9	10	11	12
Weathered ROM													
	Kg Placed	5,061.97	4,297.92										
	Kg Leached	3,322.30	458.99	167.50	52.18	48.60							
			2,820.84	389.71	142.22	44.31	41.27						
Sulfide ROM													
	Kg Placed	16.02	995.08										
	Kg Leached	5.71	1.45	0.53	0.17	0.15							
			354.57	90.23	32.93	10.26	9.55						
Weathered Crushed													
	Kg Placed			1,776.90	897.64	21.86		189.55	219.32				
	Kg Leached			1,343.92	161.12	58.80	18.32	17.06					
					678.91	81.39	29.70	9.25	8.62				
						16.54	1.98	0.72	0.23	0.21			
								143.36	17.19	6.27	1.95	1.82	
									165.88	19.89	7.26	2.26	2.11
Sulfide Crushed													
	Kg Placed			3,658.47	4,270.14	4,807.49	5,294.00	6,263.60	1,866.99				
	Kg Leached			2,035.30	331.73	121.06	37.72	35.13					
					2,375.59	387.19	141.30	44.02	41.00				
						2,674.53	435.92	159.08	49.56	46.16			
							2,945.19	435.92	159.08	49.56	46.16		
								3,484.60	567.95	207.26	64.57	60.14	
									1,038.66	169.29	61.78	19.25	17.93
Combined	Total Kg Placed	5,077.99	5,293.01	5,435.38	5,167.78	4,829.35	5,294.00	6,453.15	2,086.31				
	Cum Placed Kg	5,077.99	10,371.00	15,806.37	20,974.15	25,803.50	31,097.50	37,550.65	39,636.96	39,636.96	39,636.96	39,636.96	39,636.96
Combined	Total Kg Leached	3,328.01	3,635.85	4,027.19	3,774.84	3,442.82	3,660.94	4,329.14	2,048.15	498.64	181.72	83.47	20.03
	Cum Leached Kg	3,328.01	6,963.86	10,991.05	14,765.89	18,208.71	21,869.65	26,198.79	28,246.94	28,745.58	28,927.30	29,010.77	29,030.80
	% Extraction	65.54	67.15	69.54	70.40	70.57	70.33	69.77	71.26	72.52	72.98	73.19	73.24

Table 19.4.2 represents the expected gold production from the industrial scale heap leach project at the Jinshan Mines site. As stated previously, a conservative approach has been utilized in which projected column test recovery curves have been extended over a leach time of five years.

19.5 Mineral Processing

For this evaluation, the CSH Project has been designed as a heap leach operation utilizing a multiple-lift, single-use leach pad. The oxide ore mined during the first two years will be processed by run-of-mine (ROM) heap leaching. Sulfide ore mined later will be processed by crushing and heap leaching. A plot plan and flowsheets for the Jinshan operation are attached as Appendix 5.

ROM oxide ore will be trucked to the leach pad. Lime, required for pH control during the leach process, will be added to the trucks on the way to the leach pad.

Fresh run-of-mine sulfide ore is dumped into the crusher dump pocket and discharged onto a grizzly screen. Grizzly oversize is crushed in a jaw crusher. Grizzly undersize and crusher discharge are conveyed to the coarse ore stockpile. Stockpiled ore will be reclaimed and fed to a closed circuit secondary and tertiary crushing circuit. The crushed ore, at minus 12 millimeters, will discharge to a surge bin before it is loaded into trucks and hauled to the pad for leaching. Lime will be added to the crushed ore before it is conveyed to the crushed ore surge bin.

Both ROM and crushed ore will be stacked on the pad using trucks and bulldozers. The ore will be placed on the pad in 10 meter lifts. The solution ponds associated with the heap leach facility are designed for cold weather operation and are sized to contain projected rainfall amounts. An additional external solution pond is included to contain leach solution in excess of that required for normal operations.

Pregnant solution from the leach, operating at a nominal rate of 635 cubic meters per hour, will be pumped from the pregnant solution pond to a carbon adsorption-desorption-recovery (ADR) plant to recover the gold and silver from solution. Adsorption will take place in one train of six carbon adsorption columns in series. Solution will flow from each adsorption stage to the next stage by gravity. Carbon will be advanced countercurrent to the solution flow by a carbon advance pump. Each carbon column is approximately 3.8 meters in diameter and 4.5 meters high and is sized to contain two tonnes of carbon. Barren solution discharging from adsorption will flow to a barren tank from which it will be pumped to the ore heap for further leaching. High strength cyanide solution will be injected into the barren solution to maintain the cyanide concentration at the desired level.

Loaded carbon from the adsorption circuit will be transferred to the acid wash vessel and washed with dilute (3 percent) hydrochloric acid before elution. The acid will be removed from the carbon by washing with fresh water. After acid washing, the carbon will be pumped to the elution vessel. The pressurized Zadra process will be used for gold elution. Hot strip solution at 135 to 150 °C containing about 2 percent sodium hydroxide will be circulated through the carbon elution vessel to recover the precious metals from the carbon.

Precious metals will be recovered from the strip solution by electrowinning. When the electrowinning cell is appropriately loaded with gold, the stainless steel wool cathodes will be washed with high pressure water inside the cells to flush the gold and silver from the

cathodes. The gold mud slurry then flows to a holding tank and to a pressure filter. The stripped cathodes will be returned to the electrowinning cells. The filter cake will be treated in a retort to dry the cake and recover mercury that has dissolved from the ore and has precipitated during electrolysis. The dried product from the retort will be melted in an induction furnace and poured into 500 oz to 1,000 oz doré bars. Doré assaying approximately 90 to 95 percent gold plus silver, and 5 to 10 percent impurities will be produced and shipped to commercial facilities for refining.

The stripped carbon will be transferred by pressure eduction from the elution column over a screen and into the reactivation furnace feed tank. Carbon reactivation will be accomplished in an electric rotary kiln-type furnace.

Facilities for mixing and adding reagents to the process and elution circuits, and facilities for adding new carbon and short-term storage of stripped and regenerated carbon are included in the process design.

The process can be easily expanded by installing additional adsorption columns or a second adsorption train as appropriate. Additional elution vessels and electrowinning cells can also be added if required to increase production.

19.5 Process Operations

For this evaluation the CSH Gold Project has been designed as a heap leach operation utilizing a multiple-lift, single-use leach pad. The oxide ore mined during the first two years will be processed by run-of-mine (ROM) heap leaching. Sulfide ore, mined after year two, will be processed by crushing and heap leaching. Both ROM and crushed ore will be hauled by truck and placed on the pad. Solution to leach the gold from the ore will be distributed by a buried drip irrigation system. The solution will collect in a double lined pond designed to operate in the harsh conditions and be pumped to a process plant inside a heated building. Precious metal will be recovered from the leach solution in a carbon adsorption plant and the gold and silver recovered will be refined into a doré bar. The process design criteria are presented in Appendix 6. Flowsheets depicting the operation are provided in Appendix 5. The major equipment components are listed in Appendix 7. A general description of each major section follows.

19.5.1 Primary Crushing

The primary crusher flowsheet is attached as Drawing 10-F-01 in Appendix 5. The planned equipment is noted on the Equipment List (see Appendix 7).

Trucks hauling ore from the mine will initially be 16 tonne capacity. In the future, trucks of 90 tonnes are planned. To allow for this wide variance and allow some surge capacity for ore delivery from the mine, a large 180 tonne dump pocket is planned. Ore will be fed from the dump pocket to the crushing circuit by a large apron feeder. The feeder will discharge to a grizzly screen. The screen oversize will be fed to a jaw crusher. A rock breaker is provided to facilitate crusher operations. The grizzly screen undersize and the crushed material will be combined and conveyed to a coarse ore stockpile. A bag house will collect dust generated in the area.

19.5.2 Fine Crushing

The fine crushing flowsheet is attached as Drawing 15-F-01 in Appendix 5. The planned equipment is noted in Appendix 7.

Ore will be reclaimed from the coarse ore stockpile by one of two apron feeders and fed to the secondary crusher feed screen at a nominal rate of 1000 tonnes per hour. Screen oversize will be fed to the secondary crusher. The secondary crusher is a HP-800. Secondary crusher discharge will join the discharge from the two tertiary crushers and will be conveyed to the splitter and split to one of two tertiary screens. The tertiary screen oversize will be crushed in one of the two HP-800 tertiary crushers and be recycled to the tertiary screens. The secondary and tertiary screen undersize will discharge from the crushing circuit and be conveyed into the crushed product storage bin. The target crusher discharge size is 80 percent passing 8 millimeters. Lime, required for the leaching operation, will be added to the crushed ore before it is stored in the crushed product bin. Ore will be hauled from the crushed product storage bin to the leach pad by 16 to 90 tonne trucks.

Three dust collectors are provided to collect dust from the fine crushing circuit. A crane to facilitate maintenance in the crushing circuit is also provided. Two magnets are also strategically placed to remove any tramp iron from the ore.

19.5.3 Ore Placement and Leaching

The leaching flowsheet is attached as Drawing 20-F-01. The planned equipment is noted in Appendix 7.

Crushed and ROM ore will be stacked on the pad using mine haul trucks and bulldozers. ROM ore will be hauled directly from the open pit to the leach pad during the first two years of operation. The haul trucks will stop briefly under a lime silo with a rotary valve and weigh hopper to have the appropriate amount of dry lime added to the ROM ore prior to the truck continuing to the heap. Lime will be added to the crushed ore before it is loaded into the haul trucks.

The ore haul trucks will operate on the pad on top of the lift being constructed. Ramps will be constructed to reach the top of the lift. The trucks will direct-dump the ore on the current lift and low ground pressure (LGP) D7 dozers will push the ore over the edge of the lift to form an expanding heap. The stacked ore will be cross-ripped with the dozers prior to leaching. Ten-meter lifts will be stacked to a maximum total ore heap height of 70 meters. Haul roads will be constructed approximately 1.0 meter higher than the heap surface. Once a haul road is no longer required, this material will be dozed over the surrounding heap surface and the roadway will be thoroughly cross-ripped to minimize compaction.

Prior to stacking a new lift over the top of an old one, the top of the old lift will be cross-ripped to break up any cemented sections and to redistribute fines that may have been mobilized.

Following stacking of the ore, the heap will be irrigated with leach solution and the resulting gold-bearing solutions collected. The leach pad will be a multiple-lift, single-use type pad.

The basic components of the leach pad include:

- A stable, compacted earth foundation;
- A compacted soil sub-base of low permeability material which serves to protect the geomembrane liner from rips and punctures and forms part of the composite lining system;
- A 2-mm thick LLDPE geomembrane liner;
- A cushion layer (over liner) of material on top of the geomembrane liner that forms a suitable working surface and protects the geomembrane from damage during stacking;
- A series of perforated plastic drainpipes, which are placed on top of the geomembrane, under the cushion layer during stacking, to collect leach solutions.

Golder Associates, Inc., is responsible for the design of the leach pad. Additional information can be found in the Golder Report attached as Appendix 8.

Barren solution from the plant will be applied to the newly stacked ore to begin the leaching process. Solution will be applied using buried drip emitters. The drip emitters will facilitate cold weather operation and reduce water loss due to evaporation. A relatively low irrigation rate of 6 liters per hour per square meter is planned. The total irrigation time planned, based on results from the test program, for the first phase of leaching is 90 days. Additional leach time will be available during secondary leach cycles.

Gold bearing solution will flow to the pregnant solution pond. As noted in the Golder report, the pregnant solution pond is designed to facilitate operation during the harsh winter at the CSH Gold Project. An excess solution pond is also provided to store solution that may be generated during unusual storm events.

Pregnant solution collected in the pregnant solution pond is pumped to the plant to recover the gold values.

19.5.4 CIC Adsorption, Carbon Elution and Refining

The CIC Adsorption, Carbon Elution and Refining flowsheet is attached as Drawing 30-F-01 in Appendix 5. The planned equipment is noted in Appendix 7.

Pregnant solution from the pregnant solution pond will be pumped to the plant, which is located in a heated building to facilitate operation during cold weather. The solution will

pass through a sampler and trash screen. From the trash screen the solution will flow through one train of five adsorption columns in series. Each column is 3.8 meters in diameter and 4.2 meters high. The columns will contain two tonnes of carbon each. Solution flow will be counter current to the carbon flow. Carbon will be pumped on a periodic basis through the adsorption train, from the fifth stage to the fourth stage and so on to the first stage. On average, 3.25 tonnes of carbon will move through the adsorption circuit to the elution circuit daily. Solution from the fifth adsorption stage will flow through a safety screen to and sampler to the barren solution tank. The barren solution tank is sized for 30 minutes of total retention time, which will allow time for circuit upsets. Reagents required for leaching, including cyanide and antiscalant, will be added to the barren solution tank.

Loaded carbon from the first adsorption column, with a design total metal loading of 4 kg per tonne of carbon, will be pumped to either the acid wash or elution circuit. The acid wash circuit is described in Section 20.1.5. Both elution vessels have a two tonne carbon capacity. Nominally, 1.5 batches will be processed through the elution circuit daily. The pressure ZADRA process will be used for the precious metal elution process. Eluate will be pumped from the strip solution tank and heated in a series of plate and frame heat exchangers to approximately 135 °C at a flow rate of 2 bed volumes per hour. A diesel fired hot water heater will supply heat to the system. The elution cycle will take 12 to 16 hours to complete. Additional time is required to cool the column and transfer the carbon through the vessels. Two elution vessels are provided to allow sufficient capacity in the elution circuit.

Eluate from the strip vessel will pass through heat exchangers to recover heat from the solution and cool the eluate before electrowinning. Precious metal will be recovered by electrowinning onto stainless steel cathodes. The eluate passes through the electrowinning cell and returns to the strip solution tank where caustic, cyanide and antiscalant are added as required and the solution is pumped back to the strip vessel. The metal plated on the cathodes will be washed from the cathodes periodically with water. Two electrowinning cells are provided so that one is in operation while metal is being recovered the standby unit. The metal flushed from the cathode will be filtered, and dried in the retort.

The dried metal sludge will be mixed with fluxes and melted in an induction furnace. Molten metal and slag will be poured into molds. It is anticipated that the refinery will operate 5 days per week with melting operations occurring one day per week. The final product from the refinery is a doré product containing approximately 90 percent precious metal. The induction furnace gasses will be collected, passed through a scrubber and discharged to the atmosphere. The refinery includes a vault door and equipment to facilitate the refining process and recovery of metal from the slag.

19.5.5 Carbon Handling

The Carbon Handling flowsheet is attached as Drawing 40-F-01 in Appendix 5. The planned equipment is noted in Appendix 7.

Tanks in the carbon handling circuit have been sized for a two tonne carbon batch. The acid wash circuit is designed so that each batch of carbon can be acid washed. After carbon is transferred into the acid wash column, but before any acid is introduced, fresh

water is circulated through the bed of carbon to remove entrained cyanide solution. Dilute acid solution is then prepared in the mix tank, and circulation is established between the acid wash vessel and the acid mix tank. Concentrated hydrochloric acid is pumped into the recycle stream to achieve and maintain a pH ranging from 1.0 to 2.0.

After acid washing has been completed the carbon is rinsed with dilute caustic solution to remove any residual acid. Total time required for acid washing a 2-tonne batch of carbon is 4 to 6 hours. After acid washing is complete, a pump will transfer the carbon to the carbon-sizing screen.

19.5.6 Reagents

The CIC Adsorption, Carbon Elution and Refining flowsheet is attached as Drawing 40-F-01 in Appendix 5. The planned equipment is noted in Appendix 7.

Lime is required to control the pH during leaching. It is anticipated that lime will be received in two-tonne bulk bags. A bulk pebble lime system has been provided. Lime will be conveyed into the storage silo. To add lime to the ROM trucks a system capable of delivering the lime required to the trucks with minimum delay is planned. When the crushing plant is built, the lime will be added to the ore on the conveyor. This will allow intimate blending of the lime and the ore.

Dry sodium hydroxide flakes will be delivered to the site in 25-kg bags or 190 liter barrels. A twenty percent caustic solution will be mixed on an as needed basis. The caustic will be pumped to the strip solution tank, the cyanide mix tank, the acid wash system, and the barren solution tank as required.

Cyanide will be delivered to the site in 22 kilogram drums, but larger containers are being considered. Cyanide will be mixed daily. The mix tank is equipped with a mechanical agitator and has a capacity of 10.5 cubic meters. The mixed solution is pumped to the cyanide storage tank, which has a 70 cubic meter capacity. From the storage tank, cyanide is pumped to the barren solution tank, or the strip solution tank.

Diesel storage and day tanks and associated pumps provided to supply diesel to the hot water heater.

19.6 Gold Marketing

It is anticipated that the doré bullion produced at the mine site will be sold to a Chinese refinery or will be exported to a foreign refinery.

19.7 Operating Costs

Operating costs for the CSH Project have been estimated based upon the information presented in the previous sections using project specific staffing, salary, wage, and benefit requirements; unit consumption of materials, supplies, power, and water; and supply cost estimates provided by Beijing General Institute of Mining and Metallurgy (BGRIMM) in their 2005 study, where possible.

The operating costs have been estimated and presented without added contingency allowances based upon the design and operating criteria present in this report. The processing, laboratory and support operating costs are considered to have an accuracy range of +/-25 percent.

Operating costs have been based upon information obtained from the following sources:

- Project metallurgical test work and process engineering;
- A mining plan based upon proven and probable resources;
- Project operating and maintenance supplies and materials cost estimates from KDE or BGRIMM
- Labor rates provided by Jinshan.
- Operating experience from other mines of a similar nature;
- Recent KDE and Jinshan project file data;

ROM ore will begin stacking in 2006 during the 2nd or 3rd quarter, but is considered as part of the pre-production phase. Irrigation of the ROM ore will commence during the 3rd quarter of 2006. Operating costs were applied to this ROM ore processed in 2005 to account for any direct costs. The start of the operation phase of the project has been defined as the point where stacking of leach-grade ore on the first lift begins.

All costs are presented in Chinese currency (RMB) based on 2005 3rd quarter costs. An exchange rate of 8.1 RMB per US dollar was used when costs were supplied in US Currency.

The average life-of-mine (LOM) operating costs for the production of gold at the CSH Project, separated by crushed ore type and ROM ore, are presented in Table 19.7.1.

Table 19.7.1		
Average Process Unit Operating Costs (Life of Mine)		
	ROM Oxide RMB / Tonne	Crushed Leach RMB / Tonne
Labor	0.71	0.82
Primary Crushing		0.61
Fine Crushing		2.44
Stacking	0.10	0.10
Leaching	0.32	0.32
CIC and Carbon Stripping	0.58	0.56
Refining	0.09	0.09
Carbon Handling	0.12	0.12
Reagents	3.68	4.67
Laboratory	0.36	0.36
Support Services	0.23	0.23
Total	6.21	10.32

Included in this report as Appendix 1 are the operating cost estimation spreadsheets used to develop the costs presented above. The spreadsheets contain the details of operating cost estimation procedures.

Labor

Table 19.7.2 presents the staffing levels for the process.

Table 19.7.2 Jinshan Project Staffing Levels & Salary Schedules Process & Laboratory - Crushed Heap Leach							
Area	Job Title	Number	Annual Base Pay		Burdens	Total	Total Annual Cost, RMB
			Salary	Hourly			
PROCESS							
Supervision							
	Process Manager	1	60,000		25,800	85,800	85,800
	Maintenance Superintendent	1	45,000		19,350	64,350	64,350
	Administrative Technician	2	36,000		15,480	51,480	102,960
	Mill General Foreman	4	36,000		15,480	51,480	205,920
	Shift Foreman	8	36,000		15,480	51,480	411,840
	Process Maintenance Foreman	8	36,000		15,480	51,480	411,840
Crushing							
	Primary Crusher Operator	4		18,000	7,740	25,740	102,960
	Secondary/Tertiary Crusher Operator	8		18,000	7,740	25,740	205,920
	Crusher Helper	16		18,000	7,740	25,740	411,840
Heap/ROM Leach							
	Heap Leach Operator	4		18,000	7,740	25,740	102,960
	Reagent Operator - Heap Leach	4		18,000	7,740	25,740	102,960
	Reagent Operator - ROM	0		18,000	7,740	25,740	-
	Dozer Operator - ROM & Heap Leach	4		18,000	7,740	25,740	102,960
	Piping Crew - Heap Leach	8		18,000	7,740	25,740	205,920
	Piping Crew - ROM Leach	0		18,000	7,740	25,740	-
	Day Laborers	16		18,000	7,740	25,740	411,840
Recovery Plant							
	Recovery Plant Operator	8		18,000	7,740	25,740	205,920
	Refining Operator	2		18,000	7,740	25,740	51,480
	Shift Laborer	8		18,000	7,740	25,740	205,920
Process Maintenance							
	Mechanic	8	18,000		7,740	25,740	205,920
	Mechanic Helper	8		18,000	7,740	25,740	205,920
	Electrician	8	18,000		7,740	25,740	205,920
	Electrician Helper	8		15,000	6,450	21,450	171,600
	Instrumentation Technician	8	36,000		15,480	51,480	411,840
	SUBTOTAL PROCESS	146					4,594,590
LABORATORY							
	Chief Metallurgist	1	45,000		19,350	64,350	64,350
	Chemist	6	36,000		15,480	51,480	308,880
	Lab Technician	8	36,000		15,480	51,480	411,840
	Metallurgical Testing Helper	8		18,000	7,740	25,740	205,920
	Shift Sample Buckers	8		18,000	7,740	25,740	205,920
	SUBTOTAL LABORATORY	31					1,196,910
	TOTAL	177					5,791,500
	TOTAL, RMB / tonne						0.82

Personnel

Labor requirements are estimated to be a total of 177 persons: 146 are in the process area and 31 in the laboratory.

Provisions for benefits are included in Table 19.7.2. The benefits and burdens are based on 43 percent of the base annual wages. The 43 percent rate was estimated based on discussions with Jinshan personnel and on actual benefit and burden rates for existing operations in China.

The hourly employees are budgeted to come from the local towns and villages. The wage estimates are based upon a 48-hour workweeks.

19.7.3 Power

For the purposes of operating cost estimation by area, the power consumption used in a given section has been estimated based upon installed power factored for operating schedule, availability, operating utilization and load factor.

The unit power cost was estimated to be 0.30 RMB/kwh for the CSH217 Project, was provided in the BGRIMM study and includes all applicable taxes and tariffs.

Total average power consumption was estimated to be approximately 3.9 kWh per tonne for crushed ore and 1.8 kWh per tonne for ROM ore. Therefore, the average power cost was estimated at about 1.18 and 0.53 RMB per tonne, for crushed and ROM operations respectively. Total attached power was estimated to be 3.3 MW. Power costs are presented for each section as shown in Table 19.7.3.

Table 19.7.3 Power Load and Consumption				
Area	Load kW	Average Consumption kWh/Yr	Avg. Consumption Crushed Ore KWh/tonne	Avg. Consumption ROM Ore KWh/tonne
Primary Crushing	303	2,192,345	0.31	-
Fine Crushing	1,833	13,028,112	1.83	-
Leaching	118	1,010,860	0.14	0.14
CIC and Carbon Stripping	327	2,806,431	0.40	0.40
Refining	61	526,124	0.07	0.07
Carbon Handling	104	891,384	0.13	0.13
Reagents	14	122,076	0.02	0.02
Laboratory	142	710,000	0.10	0.10
Service and Support	43	213,000	0.03	0.03
General and Administrative	740	6,350,000	0.89	0.89
Total	3,684	27,850,332	3.92	1.78

19.7.4 Consumable Items

Operating supply requirements have been estimated based upon unit costs and consumption, where possible, and have been broken down by area and ore type. Presented in the sections below are the assumptions and unit costs associated with the development of the operating cost estimate. All taxes and freight are included. Reagent consumptions were derived from testwork performed by SGS LRL and KDE and from the Design Criteria established by KDE. Other costs were estimated from past KDE experience with similar operations. Consumption of major consumable items is shown by ore type in Table 19.7.4.

Table 19.7.4 Process Consumable Items			
Item	Consumption Unit	Sulfide	ROM
Crusher Liners – Primary	kg/t	0.002	0
Crusher Liners - Fine Crush	kg/t	0.017	0
Lime	kg/t	2	1.5
NaCN	kg/t	0.4	0.3
Antiscale Agent	Ppm	6	6
Carbon	kg/t carbon	30	30
HCl	l/strip	800	800
NaOH	kg/strip	70	70
Fluxes	kg/oz	0.15	0.15
Fuel Oil – Boiler	kg/strip	500	500

Operating costs for these items have been distributed based on tonnage, gold production from ore types or strip (elution) batches as appropriate.

Crusher Liners

Abrasion or Crushing Work Index test information is presented in the following Table 19.7.5. Note the wide variation between samples taken in 2003 and 2004. Crushing equipment was sized using the higher work index values.

Table 19.7.5 Crusher Work and Abrasion Indices			
Sample	Bond Work Index kWh/tonne	Abrasion Index	Calc. Liner Wear (lb/kWh)
Oxide Composite 2003 (Ball Mill)	5.6		
Sulfide Composite 2003 (Ball Mill)	9.5		
Oxide Composite 2004 (Crusher)	14.7	0.0794	0.027
Sulfide Composite 2004 (Crusher)	17.6	0.0927	0.028

Based upon the calculated liner wear shown above, liner wear in the three-stage crushing circuit is projected to be as follows:

- Jaw crusher: 0.002 kilograms per tonne crushed at an average cost of 93.2 RMB per kg delivered (wear weighted).
- Secondary and tertiary crushers: 0.017 kilograms per tonne crushed an average cost of 54.7 RMB per kg delivered (wear weighted).

Wear weighted /kg for the jaw crusher are based on 50 percent usable wear weight and a 7 percent charge for freight. The estimated cost and weight for one set of jaw plates is US\$ 17,950 and 3,380 kg (about \$5.31/kg).

Wear weighted /kg for the cone crushers are based on 60 percent usable wear weight and a 7 percent charge for freight. The estimated cost and weight for one set of cone liners is US\$ 34,500 and 9,225 kg (about \$3.74/kg).

Lime (ROM Ore)

The unit consumption of lime is expected to be 1.5 kilograms per tonne for ROM ore and 2.0 kilogram per tonne for sulfide. The lime will be supplied locally. A delivered lime price of 0.25 RMB/kg is provided in the BGRIMM report.

Leaching

- **Pipe, Fitting and Emitters**

The heap pipe costs include expenses for broken pipe, fittings and valves and abandoned tubing. The heap piping cost was estimated to be 0.246 RMB / tonne for both crushed and ROM ore, and was based on previous detailed studies conducted by KDE on similar projects.

- **Cyanide**

Sodium cyanide consumption was estimated to average 0.4 kilograms per tonne for crushed ore and 0.3 kilograms per tonne for oxide ROM ore. These totals, are based on the column leach tests. A delivered price of 10 RMB per kilogram was provided in the BGRIMM study.

- **Antiscale Agent (Scale Inhibitor)**

Antiscale consumption was based on dosage rates of 6 parts per million being added to the barren leach solution and carbon elution system. It was assumed that no antiscale reagent would be required in the pregnant solution. Jinshan Gold Mines provided the antiscalant price of 15 RMB per kilogram based on recent delivered prices.

- **Carbon**

Carbon consumption was estimated to be 3 percent, or 30 kilogram per tonne of carbon, of the amount of carbon stripped. This value is based on a review of published consumption data for heap leach gold operations. The delivered price for carbon of 7 RMB/kg was provided in the BGRIMM study.

- **Hydrochloric Acid**

Hydrochloric acid will be required for acid washing of the carbon. Based upon acid washing 2 tonne batches of carbon, a consumption of 200 to 300 liters of acid per strip (100 to 133 liters/tonne carbon) was used, depending on the type of ore and the quantity of lime added. For the purposes of this study, the delivered cost of hydrochloric acid of 0.8 RMB/L was provided in the BGRIMM study.

- **Caustic Soda and Sodium Cyanide**

Caustic and sodium cyanide will be required in the stripping process. Sufficient caustic to make an approximate 1 percent caustic strip solution and cyanide to make about a 1 to 2 gram/liter NaCN solution will be required. It was estimated that an average of 70 kg caustic and 20 kg of NaCN would be required for each 2 batch. The delivered reagent costs of 0.22 RMB/kg for caustic and 10RMB/kg NaCN was provided in the BGRIMM study.

- **Smelting Fluxes**

It has been estimated that 0.15 kg of mixed fluxes per ounce of gold produced will be required. The estimated delivered cost of these fluxes, which include borax, silica, niter, and soda ash, has been estimated at 3 RMB /kg delivered.

- **Antiscale Agent (Scale Inhibitor)**

Antiscale requirements were based on adding 6 ppm to the strip solution pump. The average strip solution flow was estimated to be 20-m³/hr during an elution cycle.

- **Diesel Fuel**

Diesel fuel is required for operation of the strip solution heater. The estimated consumption for each elution cycle is 500 kg based on the heat required and 16 hour elution cycle. The delivered fuel price of 4 RMB /kg was provided in the BGRIMM study.

Laboratory

Fire assaying and solution assaying of samples will be conducted on-site in the laboratory. It was estimated that approximately 90,000 samples from mined material,

crushed ore and metallurgical accounting will require assaying each year. KDE estimated that about 73,000 mine samples would require analysis per year. This averages out to about 200 fire assays per day. Solution assays will also be required. It was estimated that some 130 solution samples would be assayed each day. The costs of supplies for fire assays were estimated to be 20 RMB per sample (including carbons and ore/waste samples) and 5 RMB for each solution assay.

Fuels

▪ Diesel

Diesel fuel will be required for heavy equipment operation and has been estimated at 4 RMB per kg. delivered.

Mobile equipment requiring significant amounts of diesel fuel includes the heap leach loader and dozers. The cost for diesel fuel is included in the hourly operating cost for these units.

The primary plant power supply will be from the national power grid. A diesel-fueled backup generator will be in place, but only used when line power fails. It was assumed that fuel cost for running the backup power system would be minimal and no additional costs were added.

▪ Gasoline

Gasoline will be required for small surface vehicles and maintenance trucks. The cost of gasoline is included in the per-hour or per-kilometer operating cost for this equipment.

19.7.6 Mobile Equipment

Numerous pieces of support equipment are required for the project. These include passenger vehicles and pickups, a cleanup loader, maintenance and electrician trucks, bulldozers, a tracked front end loader, a backhoe and a forklift. The cost to operate and maintain each item has been estimated using, where possible, data sheet information. Otherwise, allowances have been made based upon experience in similar operations.

In general a cost for fuel, lubrication, tires, parts, and maintenance of 1.2 RMB per kilometer has been used for each small vehicle and pickup. The remainder of the mobile units is also estimated based upon an allocation of operating hours per year. These unit costs are intended to include the cost of fuel, lubrication, tires, parts and maintenance. The unit cost per hour used for each type of vehicle is presented in Table 19.7.6.

Operating costs for the mobile equipment has been distributed based on the unit cost basis and the tonnage ratios of the various ore types.

Table 19.7.6 Support Equipment Operating Costs	
Vehicle or Equipment	Cost Basis
Pickups	1.2 RMB per kilometer
Maintenance Vehicles	1.5 RMB per kilometer
LGP D7 Bulldozers	260.00 RMB per hour
430D Backhoe	35.0 RMB per hour
Forklift	32.0 RMB per hour
Bobcat Loader	40.0 RMB per hour

Ore will be stacked on the heap using mine haul trucks. LGP dozers will smooth the heap and rip the surface before solution application. Hourly operating costs for bulldozers were estimated using information from the CAT Performance Handbook.

19.7.7 Repair Materials

The maintenance costs used in this study are factored, based upon a percentage of the cost of equipment for a given facility, or factored from data obtained from other operations, as applicable. Operating costs for these items are distributed based on ore type tonnage, gold production from ore types or strip (elution) batches as appropriate. It is likely that the potential for inaccuracy within the overall operating cost estimate is highest in the maintenance supply area, since the final capital cost estimate was not available when the operating cost estimates were made.

Processing Operations

Based upon data from other operations, operating costs for the following areas have been factored as shown in Table 19.7.7 and distributed based on tonnage for the ores processed:

Table 19.7.7 Maintenance Supplies - Process Area Cost Basis	
Operating Area	Cost Estimate Basis
Crushing	Based upon 14% of equip., electric & instrumentation capital cost
Leaching and CIC	Based upon 7% of equip., electric & instrumentation capital cost
Elution, Carbon Handling and Refining	Based upon 14% of equip., electric & instrumentation cap. cost
Reagents	Based upon 14% of equip., electric & instrumentation cap. cost

Laboratory

An allowance of 0.1 RMB per tonne has been made for incidental maintenance parts and other supplies in the laboratory, based upon operating mine data.

Power Generation

No provision for maintenance supplies for the power generation system has been made since it will only operate on stand-by. Naturally it will be tested and maintained, but the cost is insignificant to the overall project.

19.8 General and Administration

Mine site G & A cost estimates are summarized in the upper portion of the following Table 19.8.1. As noted in the table, Jinshan anticipates the general manager, chief engineer, and plant superintendent will be expatriates. All other site personnel will be Chinese nationals. The G & A staffing level is based on Jinshan experience to date at the site and KDE experience with operations of similar size. The wages indicated in the table were based on the current wages paid by Jinshan for both expatriates and local personnel.

G & A cost estimates associated with a Baotou office are also summarized in Table 19.8.1. It is planned that an expatriate accountant will head this office. Local purchasing and accounting will be conducted from this office. Wages for this office and the cost for the Baotou office rent are based on Jinshan experience. The burden for Chinese nationals is estimated at 49 percent based on the Gerke report.

The camp cost is based on the average number of people in the camp each day and quotation from a local vendor, currently supplying the Jinshan camp with similar services. An allowance for the operating cost for vehicles to support the operation is provided. The estimate is based on 15 vehicles traveling 15,000 kilometers per year.

Table 19.8.1 General & Administration Annual Costs					
Item	Classification	#	RMB	US\$	US\$ Total/year
Minesite Staff					
General Manager	Expatriate	1		174,000	174,000
Chief Engineer	Expatriate	1		140,000	140,000
Plant Superintendent	Expatriate	1		140,000	140,000
Subtotal Expatriate		3			454,000
Administration Supervisor	Local	1	116,400	14,353	14,353
Janitors & Labor	Local	5	18,000	2,219	11,097
Cooks	Local	3	24,000	2,959	8,878
Drivers	Local	4	24,000	2,959	11,837
Accountants & Clerks	Local	6	36,000	4,439	26,634
Public Relations	Local	2	36,000	4,439	8,878
Assistant to General Manager	Local	1	64,800	7,990	7,990
Director Safety, Environmental	Local	1	84,000	10,358	10,358
Safety Inspectors	Local	4	48,000	5,919	23,674
Chief Security	Local	1	48,000	5,919	5,919
Security Guards	Local	8	26,400	3,255	26,042
Human Resources Director	Local	1	84,000	10,358	10,358
Human Resources Assistants	Local	3	42,000	5,179	15,536
Chief Warehouseman	Local	1	60,000	7,398	7,398
Warehouseman	Local	5	36,000	4,439	22,195
Subtotal Nationals		46			211,147
Total Mine Staff		49			665,147
Baotou Office Staff					
Chief Accountant	Expatriate	1		100,000	100,000

Table 19.8.1
General & Administration Annual Costs

Item	Classification	#	RMB	US\$	US\$ Total/year
Subtotal Expatriate		1			100,000
Office Manager	Local	1	54,000	6,658	6,658
Accountants & Clerks	Local	6	36,000	4,439	26,634
Drivers	Local	1	24,000	2,959	2,959
Purchasing Agent	Local	1	60,000	7,398	7,398
Buyer	Local	2	42,000	5,179	10,358
Expediter	Local	1	30,000	3,699	3,699
Clerk	Local	3	36,000	4,439	13,317
Subtotal Nationals		15			71,023
Total Baotou Staff		16			171,023
General Benefits					
Subtotal National Wages					282,170
Fringe Benefits (re: Gerke Report)	49%				138,263
Summary					
Subtotal Staff & Labor Cost					974,434
Camp Maintenance and Supplies					
Pro-rated for Site	People on Site	250		2,500	625,000
Light Vehicle Operation					
		Units	km	\$/km	
Pickup Trucks	Vehicles	15	15,000	0.25	56,250
Rent and Office Supplies					
Baotou	(from 2005 Budget)				18,659
Yinchaun	(Estimate)				12,000
Subtotal					30,659
Head Office Charges					
Vancouver / Beijing Office	Expatriate	4		100,000	400,000
Public Relations					
Public Relations Expense					50,000
Contingency					
Subtotal Before Contingency					3,110,776
Contingency	25%				777,694
GRAND TOTAL					3,888,470
Unit Cost					
Annual Production Rate	tpa				7,100,000
Unit Cost	US\$/t ore				0.55
Exchange	RMB/US\$				8.11

20.0 HYDROGEOLOGICAL / ENVIRONMENTAL CONSIDERATIONS

A Water Resource Estimation was completed in December 2004 by Environmental Resources Management (ERM) of Shanghai, PRC. A complete Water Resource Estimation is currently being conducted by the Baogang Survey Institute in Baotou, Inner Mongolia. Golder Associates has made an initial assessment of the hydrological work being performed in the vicinity of the mine site. That report is attached as Appendix 10.

A Soil and Water Conservation Study has been completed and a draft report submitted to Jinshan by ERM. The results of this study are not presented in the current report as the report has not been finalized as of this writing. A Chinese Regulatory Environmental Impact Study (EIA) is currently being conducted by ERM and results will not be reported until the report is finalized. An International Environmental and Social Impact Study will be completed as soon as the Chinese Regulatory Environmental Impact Study is finalized.

20.1 Hydrogeology and Water Demand Estimation

Design Principles

The following principles will be considered in the water acquisition design:

- Ensure reliable water supply to meet demands for full scale mining operation
- Maximize water conservation and recycling measures for a zero discharge facility; and
- Minimize environmental and social impact by abstraction and use of water in balance with recharge

Regulatory Framework

Existing legislation which specifically regulates water use for industrial projects includes:

- Water Law enacted 1988, revised 2002;
- Detailed Rules for the Implementation of the Law on the Prevention and Control of Water Pollution enacted 1989, revised 2000;
- Law on Water and Soil Conservation enacted 1991;
- Law of Peoples Republic of China on Prevention and Control of Water Pollution 1988, amended 1996;
- GBJ27-88 Code for Hydrogeological investigation of water supply;

- GB12719-91 Exploration Specification of Hydrogeology and Engineering Geology in Mining Areas; and
- GB50027-2001 Standard for Hydrogeological Investigation of Water Supply

Table 20.1.1	
Hydrology and Water Use Studies in Progress	
Investigation	Scope
Water Resource Estimation	Conceptual study of available resources
Soil and Water Conservation	Quantification of soil and water disturbance and calculation of compensation
Detailed Water Resource	Quantification of water resources
Wellfield Design and Abstraction Engineering	Abstraction scenarios and design criteria
Water Permit Application	Approval of water sources for projected water requirements (estimated at <1Mm ³ per year)

Climate

The CSH Gold Project is located on the Inner Mongolian Plateau at an average elevation of 1550 to 1750 meters above sea level and has a typical continental interior climate in semi-desert conditions. Annual rainfall averages 212.5 millimeters which is far exceeded by the estimated evapotranspiration of 2500 millimeters per year. Most of the rainfall (greater than 70 percent) occurs in the brief period between July and September.

Aquifer Types

There are several types of aquifers in the CSH 217 Project Area which have been considered in the various hydrology and water balance studies. These are listed in Table 20.1.2 below.

Table 20.1.2		
Aquifer Types		
Aquifer Type	Geological Characteristics	Hydrological Characteristics
Soil+ Weathered Layer	Widespread but thin (<5m), mostly transported (aeolean and colluvial) with thin residual soil profile, thicker weathered layer developed on granitic bedrock	Primary porosity type aquifer, SWL generally below this layer, rainfall mostly surface runoff, high potential storage capacity, local perched aquifer above silt layers
Ephemeral River Channel	Lower layers cleanly washed alluvial sand and gravel, upper layers silt from aeolean and topsoil erosion due to widespread overgrazing and deforestation	Primary porosity type aquifer, high permeability, periodic (seasonal) recharge, ephemeral flow reduces evaporation, susceptible to pollution from surface, recharged from upstream catchment
Fractured bedrock	Late tectonic brittle fracturing, general NE/NW direction, partly controls surface drainage pattern	Secondary porosity type aquifer, low storage capacity but high transmissivity, important concern for pit dewatering
Lacustrine/Alluvial	Cleanly washed sand and gravel from granitic headlands	High transmissivity and storage capacity, recharged from local runoff

Recharge

Recharge to the soil and weathered layer aquifer is by direct infiltration. Recharge to the alluvial and lacustrine aquifers is by direct infiltration and surface flow, and recharge to fractured bedrock type aquifers is indirect by hydraulic contact with alluvial and weathered layer aquifers. Recharge considerations will be included in the Baogang Survey Institute and Golder Associates studies.

Aquifer Storage Capacity

Estimated storage capacity of the major aquifers will be included in the Baogang Survey Institute Study and the Golder Associates Study.

Water Demand

The water demand estimated by KDE and BGRIMM is approximately 2,800 cubic meters per day or approximately 1.0 million cubic meters per annum.

Water Balance

To prevent the drawdown of the regional water table which would interfere with local usage, the objective of the mining operation is to abstract water in balance with recharge so that the operation is sustainable and has minimal environmental impact.

20.2 Environmental Concerns

Jinshan have a corporate commitment to minimize environmental impact of mining activities to meet or exceed both Chinese and International regulations and guidelines. The guidelines used to develop an environmental management plan include the following:

- Minimization or prevention by engineering design;
- Monitoring of climate and groundwater contaminants;
- Remediation of pre-existing conditions;
- Mitigation of planned impacts; and
- Emergency Response plan in case of chemical spill, flood, or fire

20.2.1 Environmental Studies

Jinshan have commissioned several studies related to the environment, demonstrating both compliance with local and international norms and a corporate commitment to environmental protection.

The following studies have been completed or are ongoing at the time of writing this report (October 2005):

Study	Consultant	Scope
Soil and Water Conservation Assessment (SWC)	Environmental Resource Management (ERM)	Determination of soil and water resource impacts and disturbance and a closure plan
Chinese Regulatory EIA	Environmental Resources Management (ERM)	Baseline study of pre-existing conditions and assessment of impact based on final mine design
International Environmental and Social Impact Assessment (ESIA)	To be determined	Based on the Chinese EIA but using reporting guidelines from World Bank
Geological Disaster Assessment (GDA)	Nei Mongol Research Institute for Water and Environment	limitation of environmental damage caused by natural occurrences (eg. earthquake, flood) and man-made structural failure (eg. tailings dam collapse)
Cultrual and Heritage Survey	Nei Mongol Culture and Heritage Bureau	protected cultural relics in the mining area
Impact of Previous Mining Activities	Jinshan Gold Mines (internal study)	Documentation of previous artisanal, alluvial and hardrock mining and heap leaching
Environmental Baseline Database	Jinshan Gold Mines (internal environmental database)	Database of chemical analyses of rocks and water, routine groundwater sampling

The Soil and Water Conservation Study (SWC) study is a precursor to filing the Regulatory EIA, both of which are required to obtain a mining license. The draft of the SWC study by ERM is currently being revised.

The Draft EIA study from ERM has recently been received and is under review by Jinshan. The International ESIA is not required as part of the permitting process and will be completed after the EIA study is finalized.

20.2.2 Environmental Liabilities from Previous Mining

The Solid Waste Pollution Prevention Law, amended in December 2004, effective from 1 April 2005 states that Jinshan is responsible for any pre-existing environmental impact.

Five types of previous mining activity on the property which have impacted the environment include: small scale alluvial mining, small scale artisan mining, mining by the Brigade 208, mining by the Brigade 217, and test mining in 2004 by Ningxia Pacific for pilot plant leaching material. These activities are described in further detail below:

- Small scale mining of alluvial sediments in the ChangShanHao and Molenghe River resulted in disturbance of the natural flow of the ephemeral rivers, however, any increased water loss through increased evaporation, increase in heavy metals and other disturbance of the sediments is not well documented for this report;

- Small scale artisan mining activity on the Northeast Zone is limited to shallow (less than 10 meter depth) excavations dug by hand to mine free gold in oxide ore, there is limited disturbance of soil and vegetation and all occurs within the planned pit excavation so environmental will be impact negligible;
- Large scale mining and heap leaching (estimated 360,000t) by Brigade 208 on the Southwest Zone may have some environmental impacts as the mining practices may not have met Chinese regulations. However, these impacts are not as yet reported and are not addressed in this report. The mining by Brigade 208 was illegal according to the Mines Act 1988, but was permitted by the local county Government.
- Test mining by Brigade 217 on the Northeast Zone included construction of five small test heap leach pads for a total of approximately 30,000 tonnes of mined ore. Leach pads were constructed according to applicable Chinese regulations for the time period (1995-1997) including an impermeable membrane and surrounding drainage catchment ditches. These test leach pads are within the planned excavation for the Northeast Zone so there will be no long term environmental impact.
- Ningxia Pacific completed test mining of approximately 100,000 tonnes from the Northeast Zone in 2004 and the company is presently leaching two test pads; the first is a ROM pad and the second is a crushed ore pad. The leach pad construction was properly permitted and used modern design criteria. Any potential groundwater contamination is regularly monitored from downstream boreholes. After the leaching is completed, the pads will be treated by appropriate methods to insure the residual CN content is below regulatory limits.
- Two leach pads (208D and 208E) which were mined by Brigade 208 were shut down in 2005.

In general, the impact of the historical mining activity is considered minimal. Removal of industrial waste is planned as part of the general site cleanup during the construction phase.

20.2.3 Acid Mine Drainage

The potential for Acid Mine Drainage (AMD) was studied by Lakefield Research (Lakefield, 2004). Results of Acid-Base Accounting (ABA) indicate that the ore and leach tailings are likely to generate very minimal amounts AMD due to the low sulfide content of the ore and dry climatic conditions. Therefore, AMD will not be a major concern and can be handled by normal industry practices.

20.2.4 Other Environmental Considerations

Environmental pollution from windblown material will be limited by dust control systems (eg. water/chemical spraying, road aggregate) during the mining period and revegetation of disturbed areas with indigenous species for longer term control.

Social Impact on the mine operations will be evaluated as part of the ESIA study.

There will be considerable economic and social impact on surrounding communities, particularly XinHuRe village, due to the large workforce during the construction and operation phases.

20.2.4 Environmental Monitoring Program

To identify potential environmental pollution problems at an early stage, a comprehensive program of environmental monitoring is planned for all stages of the mine development, operation, and closure. The primary monitoring technique is sampling and analysis of ground and surface water in the immediate mining area and surrounding region. Analysis of potential contaminants including heavy metals and cyanide will indicate if there is a potential pollution problem. Any potential problem will be addressed immediately.

Geochemical analyses of surface and groundwater (Fe, Mn, Cu, Zn, sulfate, Cl, Hg, Cd, Cr+6, As, nitrate, fluoride) were conducted as part of the water resource estimation study (Xie, 2004). All analytical results meet the Chinese National Standard GB-5749-85 for drinking water with the exception of nitrate which is thought to be due to the use of nitrogen for agricultural purposes.

Sampling by Jinshan from test boreholes in the mining area drilled by the Baogang Institute as part of the detailed water resource investigation indicate there are no major concerns in the immediate mining area, but there are slightly anomalous mercury levels in the Molenghe River.

20.2.6 Immediate Actions

The Following immediate actions are planned or being implemented on the CSH project site:

- Upgrade and maintain access roads to prevent wandering of tracks around rain washouts;
- Establish a groundwater monitoring database of water levels and chemical data;
- Continuing regional water point survey, including surveying of all locations where water is being abstracted by local residents.
- Monitor the groundwater and local weather continuously through the winter season to build an environmental baseline database;

- Monitor old leach pads from historical mining activities, and conduct modifications to drainages to prevent flooding and uncontrolled run-off. Revegetation to reduce windblown dust and stabilize slopes;
- Cleanup of trash and waste materials from previous mining activities, including steel barrels, piping, and temporary housing;
- A perimeter fence will be erected surrounding the active mining and pad areas as soon as the land acquisition is completed. This will prevent injury to livestock during the construction phase and mining period.
- Quality control tests of local environmental analytical laboratories will be undertaken to select and monitor an appropriate laboratory for environmental monitoring samples; and
- An inspection by the local Environmental Protection Monitoring Station in Bameng is required at the time of submittal of the EIA plan.

21.0 CAPITAL COST ESTIMATES

21.1 Phase 1 Estimate

It is envisioned that the CSH Gold Project will evolve in two phases. The south leach pad will be constructed first and will be stacked with run-of-mine oxidized ore from the open pit mine. This procedure will continue for approximately two years until a crushing installation can be completed. The following Table 21.1.1 summarizes the initial construction costs associated with construction of the south pad, the processing facility, and required infrastructure and utilities.

Table 21.1.1 INITIAL CONSTRUCTION COSTS			
Item	Plant Equipment US\$	Contracts & Material US\$	TOTAL US\$
DIRECT COST			
Land Acquisition	-	459,000	459,000
Infrastructure	921,000	4,841,100	5,762,100
Mining	-	1,920,300	1,920,300
Heap Leach Pad & Ponds	31,500	7,941,800	7,973,300
Processing Plant	4,152,800	1,169,200	5,322,000
Direct Cost	5,105,300	16,331,400	21,436,700
INDIRECT COST			
Feasibility & Detail Engineering	-	1,987,500	1,987,500
Procurement	-	160,000	160,000
Construction Management	-	1,097,800	1,097,800
Field Office Expense & Construction Support	-	226,956	226,956
Commissioning & Training	-	186,200	186,200
Initial Fill (1.5% of Direct Costs)	-	321,600	321,600
Startup	-	55,000	55,000
Mobile Equipment	-	338,000	338,000
Spare Parts (5% of Equipment Cost)	-	255,300	255,300
Owners Cost (5 % of Direct Cost)	-	1,071,800	1,071,800
Indirect Cost	-	5,700,156	5,700,156
Initial Direct & Indirect Costs	5,105,300	22,031,556	27,136,856
Contingency 17%	867,901	3,745,365	4,613,266
TOTAL INITIAL PROJECT COST	5,973,201	25,776,921	31,750,122

An examination of the preceding tabulation indicates a cost of US\$ 27.1 million without contingency. The addition of a 17 percent contingency brings the total estimated cost to US\$ 31.8 million that will be required to initiate the project.

21.2 Phase 2 Estimate

As soon as practical, a crushing plant will be constructed. It is envisioned that this facility will be capable of processing 20,000 tonnes and will use modern high efficiency primary, secondary, and tertiary crushers with the final stage being operated in closed circuit. It is also anticipated that the project will phase out contract mining after approximately two years and will purchase appropriate mining equipment to undertake the mining task. The following Table 21.2.2 is a summary of the estimated future sustaining capital cost.

Table 21.2.2 FUTURE SUSTAINING CONSTRUCTION COSTS			
Item	Plant Equipment US\$	Contracts & Material US\$	TOTAL US\$
DIRECT COSTS			
Infrastructure	-	-	-
Mining	56,500	63,500	120,000
Heap Leach Pad & Ponds	31,500	5,078,300	5,109,800
Crushing Plant	6,455,000	3,480,200	9,935,200
Sustaining Direct Cost	6,543,000	8,622,000	15,165,000
INDIRECT COSTS			
Feasibility & Detail Engineering	-	973,500	973,500
Procurement	-	85,600	85,600
Construction Management	-	900,800	900,800
Field Office Expense & Construction Support	-	178,016	178,016
Commissioning & Training	-	144,500	144,500
Initial Fill (1.5% of Direct Costs)	-	227,500	227,500
Startup	-	157,100	157,100
Mobile Equipment	-	139,000	139,000
Spare Parts (5% of Equipment Cost)	-	298,700	298,700
Owners Cost (3% of Direct Cost)	-	455,000	455,000
Sustaining Indirect Cost	-	3,559,716	3,559,716
Sustaining Direct & Indirect Costs	6,543,000	12,181,716	18,724,716
Contingency 17%	1,112,310	2,070,892	3,183,202
TOTAL SUSTAINING PROJECT COST	7,655,310	14,252,608	21,907,918

Purchasing the appropriate mining equipment, constructing the north leach pad, and installing a modern crushing facility will cost an estimated US\$ 18.7 million. Addition of a 17 percent contingency brings the total estimated cost for future sustaining activities and construction requirements to US\$ 21.9 million.

21.3 Total Phase 1 and Phase 2 Capital Cost Estimate

The following Table 21.3.1 presents the sum of the estimated capital cost investment for both phases of the CSH Gold Project.

Table 21.3.1 TOTAL INITIAL AND FUTURE SUSTAINING PROJECT COSTS			
Item	Plant Equipment US\$	Contracts & Material US\$	TOTAL US\$
Total Initial Project Cost	5,973,201	25,776,921	31,750,122
Total Sustaining Project Cost	7,655,310	14,252,608	21,907,918
TOTAL INITIAL AND FUTURE SUSTAINING PROJECT COSTS			53,658,040

It is estimated that the capital requirement for a 20,000 tonne per day CSH Gold Project including a 17 percent contingency will be US\$ 55.1 million. These funds will be dispersed over a period of approximately three years. The capital cost back-up information is attached in Appendix 11.

21.4 Basis of Capital Cost Estimate

Estimating Scope

Development of the capital cost estimate for engineering, procurement and construction of the proposed facility is discussed in this section. The scope is based on purchasing new equipment from the US and China and installing the facility in China. The facility cost will be itemized up into the following areas:

- Infrastructure
- Mining
- Heap Leach Pad and Ponds
- Process Plant
- Crushing Plant

Battery Limits

The battery limits for the cost estimate include the areas listed above along with an estimate for land acquisition costs.

References

The following references were used to develop the cost estimate:

- BGRIMM Study
- Data collected during site visit to BGRIMM office
- Cost data from a mining project estimated in China
- In-house cost data from previous projects
- Vendor Budget quotes for the process equipment
- Crusher equipment costs from a recent project in the US
- Drawings provided by BGRIMM and KDE for the flow sheets, site layout single line drawing and general arrangements

Direct Costs

Direct costs have been estimated as follows:

- **Quantities** - Partial civil quantities for structures, foundations, earthwork, concrete, steel and architectural items were from take-offs from drawings performed by KDE and Jinshan Gold Mines. Building costs were taken from the BGRIMM Study. Allowance has been made for miscellaneous items not defined based on historical data from similar projects or factored based the existing KDE database.
- **Land Cost** - The land cost was based on the BGRIMM Study cost estimate.

- **Infrastructure** - Support facilities and equipment were included in the Infrastructure Area and includes water and electrical supply, administration buildings, Man Camp for 500 people, warehousing, maintenance facilities, fuel storage, guard shacks and other items that do not fit into other classifications. This includes costs from the BGRIMM Study and estimates from KDE.
- **Equipment.** Budget quotations for the Process Equipment were obtained. Remaining equipment costs were based on historical information from previous projects estimated by KDE.
- **Construction Materials** - Construction material costs reviewed in China are considerably less than in the US and are listed below.
 - **Concrete** - Installed concrete costs in China are estimated to be US\$ 100 - US\$ 140 per cubic meter based on information received from previous projects in China and discussions with BGRIMM.
 - **Structural Steel** - Fabricated and installed structural steel cost in China was estimated to be US\$ 0.50 per pound based on information received from previous projects.
 - **Buildings** - Structural steel buildings were assumed to be between US\$ 8 to US\$ 15 per square ft based on information received from previous projects and discussions with BGRIMM.
 - **Electrical, Instrumentation, and Piping in Process Plant Area** - The electrical and instrumentation was based on US pricing for similar work. BGRIMM provided costs in the infrastructure area to bring electric power to the plant site. An allowance was provided for on-site power generation for partial process plant and emergency pumping in the mine area.
- **Construction Labor** - The labor rate of US\$ 3.00 per hour was based on the average built up labor rate and the details are included in the cost estimate. For labor productivity it was assumed that the location would utilize three times the people for the same work in the US and reduce the amount of construction equipment. Overtime costs were assumed to be at the same rate based on information received from BGRIMM.
- **Construction Equipment Usage** - Rental equipment costs were estimated based on US rates and then reduced by 30 percent. These costs were primarily for large crane usage and include fuels, lubes, and routine maintenance.
- **Freight** - Freight was assumed to be 5 percent of equipment and construction materials.

- **Construction Consumables** - Construction consumables were assumed to be 13.5 percent of the labor cost.

Indirect Costs

Indirect costs have been estimated as follows.

- **Feasibility and Detail Engineering** - These costs were developed separately and are incorporated in this estimate. This cost also included an allowance to complete the feasibility study and basic engineering.
- **Procurement** - Procurement activities in the US will require one person working for six weeks time while the procurement in China will require two people 18 weeks to assist in preparing RFQ packages, issuing contracts, reviewing bids, issuing contracts and expediting materials and equipment.
- **Construction Management** - Construction Management consists of three expatriates for 18 weeks and a team from China for 20 weeks. Additional personnel were also included to assist with safety, scheduling, warehouse, QA/QC and disciplined engineers as required.
- **Field Office Expense** - Field office expense includes two vehicles that will be issued to plant supervision after construction is completed. This category also includes surveying, geotechnical support, temporary power, mobilize and demobilize and insurance on rental equipment and all other costs necessary to support the construction effort. Also included are temporary facilities for the construction manager teams use, plus any other facilities or services that the construction contractors will not provide.
- **Commissioning and Training** - It was assumed that one process engineer and two training engineers are required for several months. Training manuals translated into Chinese were also included as well as an allowance for vendor equipment personal. This also includes assuring the project systems are ready for startup. Includes contractor support labor, vendor representatives, engineering contractor representatives, and miscellaneous repair materials
- **Initial Fills** - Initial fills were assumed to be 1.5 percent of the direct cost.
- **Start-up Support** - It was assumed that one startup engineer will be required to lead the startup effort for a period of four weeks. This effort includes all costs associated with running the systems until they are stable and can be ramped up to full production. Includes Climax project and corporate labor, engineering contractor support, and operating supplies. Climax normally estimates the startup period (with input from the engineers).

- **Mobile Equipment** - The minimum mobile equipment required was included in the indirect costs and included three forklifts, one heavy duty forklift, one 8 ton crane, one 3 ton flatbed truck, two trailer mounted welders, two pickup trucks and one bobcat.
- **Capital Spares and Initial Warehouse Stock** - Capital equipment spares and initial warehouse stock was estimated at 5 percent of equipment cost.
- **Owners Costs** - This will include Jinshan Gold Mines costs to direct, monitor and review the progress of the project over a two year period. For this estimate Owners costs were factored at 7.5 percent of the Direct Cost. The allowance is for permit fees, cost of Climax/PD labor and consultants associated with acquiring all operating permits for the project. This also includes corporate staff project management/oversight labor, expenses, project financing costs, recruiting, pre-production payroll and related expenses. Anything that does not fit into the previous classifications is also included in this allowance such as legal and accounting consultant costs.
- **Duties, Import Fees and Taxes** - Due to lack of information on the duties, import fees and taxes these were excluded from the estimate at this time.

Escalation

All costs are based on the 3rd quarter of 2005. Costs can be escalated to the timeframe where the project development efforts are estimated to start. It was assumed this will be evaluated on a non-escalated model.

Contingency

Contingency is applied as a factor against all direct and indirect costs, and not distributed back to the project areas. Based on the following accuracy assumptions the overall contingency applied to the cost estimate is 20 percent.

Civil & Earthwork	20%
Concrete & Structural	20%
Equipment & Installation	12%
Piping & Ducting	20%
Electrical & Instrumentation	15%
Remaining Items	20%
Weighted Average Contingency	16%
Storm/Weather Conditions	1%
Total Built Up Contingency	17%

Exclusions

This estimate excludes the following:

- Permits, royalties and licenses
- Environmental costs, Testing & Monitoring
- Metallurgical Testing
- Development of a natural gas source
- Power backup except for the system required for partial process plant and emergency pumping requirements
- Escalation
- Taxes, Duty & Import Fees

21.5 Geotechnical Basis of Estimate - Heap Leach Pad and Ponds

The following information was provided by Golder Associates Inc. (Golder) for the Initial and Sustaining Construction of the CSH Gold Project heap leach and pond facility. All construction was assumed to be completed at present cost in United States dollars with no adjustments made to the time value of money. The unit rates developed for this estimate are for year 2005 construction and were not adjusted to reflect future costs.

The estimated construction costs were based on all work being performed by an outside contractor. Unit costs were developed using the equipment/material rates and Chinese labor rates provided by K D Engineering, and by estimating production rates and labor and equipment requirements. Material costs, where required, were based on Chinese material costs where available (in the case of geomembrane liner) or on US material costs (in the case of piping) when Chinese costs were not readily available. Unit labor costs include a 43 percent burden. Equipment costs used include fuel, oil, and maintenance. Unit costs for labor, equipment, and materials include a 10 percent profit mark-up by the contractor. See Appendix 11 for the spreadsheets used to develop the unit rates of selected items.

Earthwork quantities were roughly estimated based on grading plans developed by Golder and from topographic data supplied by Jinshan at a 0.5 meter contour interval based on the local survey data of the pad area. Soils information and excavation conditions were estimated from observations conducted during Golder's geotechnical field investigation. Geomembrane, piping, and geosynthetic quantities were obtained from drawings developed by Golder from the draft pad design. Variance in actual construction quantities should be noted consistent with the industry standards for this level of design effort.

A 20 percent contingency has been included in the costing to cover project uncertainties associated with pad and pond construction inherent with this level of design and cost development.

The following describes each cost item presented in the engineer's cost estimate, which was attached as Appendix 11 in this report

- **Earthworks Mobil and Demobilize** - Includes mobilization and demobilization of labor and equipment, set-up of temporary utilities required for construction (including a portable crushing and screening plant), and site clean-up after project completion. Work to be performed by the Contractor.
- **Surveying** - Includes survey control, slope and grade staking, and as-built documentation. Work to be performed by the Contractor.
- **Import Structural Fill for Heap Leach Pad** - Structural fill required for the construction in mass grading areas. Material may be imported from overburden in the pit area or another borrow site developed close to the leach pad. Includes placement, moisture conditioning, and compaction. Work to be performed by the Contractor.
- **Local Soil Excavation and Structural Fill for Heap Leach Pad** - Excavation of native materials in cut soil areas within the leach pad footprint. Includes excavation, hauling, moisture conditioning, and compaction. Work to be performed by the Contractor.
- **Local Rock Excavation and Structural Fill for Heap Leach Pad** - Excavation of native materials in cut rock areas within the leach pad footprint. Includes drilling/blasting, excavation, hauling, moisture conditioning, and compaction. Work to be performed by the Contractor.
- **Surface Preparation for Soil Liner and Structural Fill** - Includes scarifying, moisture-conditioning, and compacting of the subgrade surface for placement of structural fill, liner bedding fill, and riprap for the leach pad, access roads, and diversion channels. Work to be performed by the Contractor.
- **Liner Bedding for Heap Leach Pad** - Excavation either from within the pad footprint or from the borrow area within the North pad footprint. Hauling, moisture-conditioning, placement, and compaction on the leach pad. Does not include costs associated with construction of the haul/access roads. Includes topsoil stripping and development of the borrow site. Work to be performed by the Contractor.
- **Liner Cover Fill for Heap Leach Pad** - Includes excavation of material, crushing/screening, hauling, and placement of a minimum 0.6 meters of cover material over the heap leach pad liner. Work to be performed by the Contractor, including crushing and screening using a portable plant on-site.
- **Coarse Drain Fill** - Includes excavation of material, crushing/screening, hauling, and placement of a minimum 0.6 meters of cover material over the toe of the heap leach pad liner. Work to be performed by the Contractor, including crushing and screening using a portable plant on-site.

- **Leak Detection Sand** - Hauling and placement of leak detection sand under leak detection pipes on the leach pad. Assumes that a screened product is available within 50 kilometers of the site. Work to be performed by the Contractor.
- **Local Soil Excavation and Structural Fill For Pond Construction** - Excavation of native materials in soil cut areas and placement as fill for pond construction. Includes excavation, hauling, moisture-conditioning, placement, and compaction. Work to be performed by the Contractor.
- **Local Rock Excavation and Structural Fill For Pond Construction** - Excavation of native materials in rock cut areas for pond construction and placement in the pond or Phase 1 pad areas. Includes drilling and blasting, excavation, hauling, moisture-conditioning, placement, and compaction. Work to be performed by the Contractor.
- **Liner Bedding for Ponds** - Excavation from an off-site borrow, hauling, moisture-conditioning, placement, and compaction in the ponds. Assumes use of a borrow site at the North Pad site. Includes topsoil stripping and development of the borrow site. Work to be performed by the Contractor.
- **Liner Cover Fill for Ponds** - Includes excavation of material, crushing/screening, hauling, and placement of a minimum 0.6 meters of cover material over the liner in the pregnant pond. Work to be performed by the Contractor, including crushing and screening using a portable plant on-site.
- **Channel Protection Riprap** - Includes excavation of rock material excavated in the pad and pond areas, sorting, hauling, and placement of rip-rap in diversion channels. Work to be performed by the Contractor.
- **Soil Excavation** - Excavation of native materials in soil cut areas for diversion construction. Includes excavation, hauling, and compaction of material for access road or leach pad construction. Work to be performed by the Contractor.
- **Rock Excavation** - Excavation of native materials in rock cut areas for diversion construction. Includes drilling and blasting, excavation, hauling, and compaction of material for access road and leach pad construction. Work to be performed by the Contractor.
- **Heap Leach Pad Primary Liner (80 mil HDPE)** - Supply and installation of smooth HDPE liner for the leach pad and ponds. Includes submittals, off-loading, storage, and testing. Work to be performed by the Contractor.
- **Heap Leach Pad Secondary Liner (60 mil HDPE)** - Supply and installation of smooth HDPE liner for the ponds. Includes submittals, off-loading, storage, and testing. Work to be performed by the Contractor.

- **Non-Woven Geotextile on Slopes** - Supply and installation of non-woven geotextile on the slope of the pregnant pond. Includes submittals, off-loading, storage, and testing. Work to be performed by the Contractor.
- **4-inch Diameter Solution PCPE Pipe, Smooth Interior** - Supply and installation of perforated gravity solution collection piping on the leach pad. Includes pipe, pipe fittings, and end caps. Work to be performed by the Contractor.
- **15-inch Diameter Solution PCPE Pipe, Smooth Interior** - Supply and installation of perforated gravity solution collection piping in the main solution collection channels on the leach pad. Includes pipe, pipe fittings, end caps, and elbows. Work to be performed by the Contractor.
- **24-inch Diameter Solution Header HDPE Pipe** - Supply and installation of non-perforated gravity solution collection piping in the solution collection channel along the toe of the leach pad. Includes pipe and welding of HDPE pipe. Work to be performed by the Contractor.
- **2-inch PVC Leak Detection Piping** - Supply and installation of perforated and non-perforated pipe, fittings, end caps, tees, and elbows, and risers for the leach pad leak detection system. Work to be performed by the Contractor.
- **Other Pipes and Pipe Assembly and Fittings** - Supply and installation of all other minor pipes and pipe appurtenances on the pad and ponds, including the 24-inch HDPE pipe fittings. Work to be performed by the Contractor.
- **24-inch Diameter Steel Pipe Riser Assembly** - Supply and installation of three 24-inch diameter. Steel Pipe Risers in the pregnant pond. Work to be performed by the Contractor.
- **Construction Quality Assurance** - Testing and inspection during construction of the heap leach facilities. Includes labor and laboratory testing. Not included are costs associated with construction management. Work to be performed by the Engineer.
- **Engineering Support** - Miscellaneous services provided by the Engineering during construction of the heap leach facilities. Includes labor for a full-time on-site field engineer. Not included are costs associated with construction management. Work to be performed by the Engineer.

21.6 Fast-Track Schedule

For strategic reasons, Jinshan Gold Mines is interested in evaluating the possibility of developing this project on an accelerated pace. The schedule assumes that critical path items will be done prior to winter and then construction will continue in April 2006. An accelerated schedule was prepared and included in this report. It shows a compressed

schedule for basic engineering and detailed design. Procurement will begin immediately after evaluation of this Development Study prior to the completion of permit acquisition and detailed engineering design. Even with this accelerated schedule, start-up is anticipated no earlier than 3rd quarter 2006. During the feasibility study the reasonableness of this schedule must be assessed. Schedule details are given in Appendix 12.

21.7 Water, Power, and Infrastructure

21.7.1 Water Supply

Two sources of water supply are the basis for this evaluation of the CSH Gold Project. The primary source will be ground water and alluvial aquifers from the Mo Leng River channel. The second source will be ground water available due to the mine dewatering effort. Studies to quantify the sustainable water resource from these two sources are currently in progress. If these two sources are not capable of providing the required water, additional water would be available if the Xinhure reservoir were reconstructed or if ground water more distant from the mine were exploited. No costs for additional pumps or pipeline or to rebuild the Xinhure reservoir have been provided in this study.

The estimated fresh water requirements to support a 20,000 tonne per day heap leach operation are summarized in Table 21.7.1.1 below.

Table 21.7.1.1 Water Requirements	
	Tonnes Per Day
Ore Processing	2,420
Human and Camp Use	100
Mine Use	300
Total	2,820

A well at the edge of the Mo Leng River basin is planned to provide water for the operation. The elevation at the site selected is 1,555 meters and the well design pumping rate is 125 cubic meters per hour. A booster station is planned to pump the well discharge water 5.2 kilometers to the 1,000 cubic meter storage tank at the mine. The elevation of the mine water head tank is 1,676 meters. A spare well and booster pump are provided to allow a standby pump in both locations.

The mine dewatering supply will also be pumped to the head tank for use in the process.

Water required for the process will be routed to the leach operation. Water for consumption will be filtered and sterilized. A fire water supply and distribution system will also be provided.

21.7.2 Power Supply

Power for the region is generated at the Wu Lashan electricity power station and supplied to the national grid. The Xi Doupu substation, in the middle of Wu Late, is located 82 kilometers from the CSH Gold Project. The Xi Doupu substation is a 110kv substation with one 16,000kVA and one 7,500kVA transformer. The Electricity Administration Bureau of Ba Yan Zhuoer city has approved a 110kv line to the Xinhure area, approximately 10 kilometer from the mine. The line will be completed in 2005. Three voltages levels 110kV, 35 kv and 10kv will be available to supply electricity to the CSH Gold Project and the neighboring areas.

Jinshan Gold Mines will be responsible for the 10 kilometer power line from Xinhure substation to the mine. BGRIMM recommended the 35 kv line based on their assessment of the project needs and costs. The cost for the 10 kilometer of line and related site distribution has been included in the capital costs for this assessment.

21.7.3 Telecommunications

The cost for a telephone exchange is included in this estimate. The capacity of the planned system is 120 lines. These handsets will be distributed through the mine, process building, administration office and camp.

21.7.4 Taxes

The principal taxes affecting foreign mining operations are:

- General "enterprise" income tax level of 33 percent, three percent of which is charged at the local level.
- "Special economic zones" receive preferential treatment with rates of 15 percent.
- Other exemptions can apply; however, precious metals appear to be excluded from these benefits.
- Resource Tax is based on product categories and the level of production. For gold, KDE has been informed that a rate of 2RMB/tonne would apply.
- Mineral Royalty is negotiable, but usually falls in the range of three to four percent based on a Net Smelter Return formula excluding off-site costs for transport of metal, sales and marketing, etc.
- Precious metals appear to attract a special and higher level of factoring than other mineral resources.
- Mining Area Usage Fee is only applicable to petroleum operations.

In China, the actual rates of taxation and applicable royalties vary significantly from province to province and are subjected to a significant amount of negotiation with the relevant authorities. A meaningful assessment of all these issues has not been attempted at this level of study.

21.8 China Gold Market

In technical reports of this nature it is common to include information concerning the markets for the project production and the nature and material terms of any agency relationships.

This section covers only the marketing of gold in China and not the macroeconomics of international gold prices.

21.8.1 Technical Considerations

Gold produced from the CSH mining operation will be in the form of doré bars of an estimated 90 percent gold content with minor silver and other metal impurities. Doré bars will be poured at the site produced from cathode gold from an electrowinning circuit.

The general practice in China is to sell either loaded carbon or cathode gold (sponge or sludge) to an upgrading facility. Sales of the unrefined product ties up money in the time taken for processing, and there will be shrinkage at each processing stage. The best option is considered to be to produce doré bars at the mine site and sell directly to the refinery.

The ultimate domestic market for the gold is the Shanghai Gold Exchange (SGE). Gold sold on the SGE must be refined to 9995 or 9999 fine ingots of 50 grams, 100 grams, 1 kilogram, and 12.5 kilograms with minimum volume of 6 kilograms per transaction.

21.8.2 Chinese Gold Market

The gold market in China has been liberalized by reforms to banking legislation, reorganization of Government departments and committees, and the founding of the SGE. Sales of gold by primary domestic producers are on a commercial basis at World prices to any of the 108 members of the SGE.

The present members of the SGE include 13 commercial banks, 24 gold miners, 61 consumer units, eight refineries and two mints from 26 regions in China. There are no foreign or WFOE allowed as members of the SGE.

Only members can trade on the exchange, and transactions are limited to spot trades (i.e. no forward selling or contracts). There are no Government imposed limits or quotas on gold transactions. Members of the SGE may both import and export gold.

21.8.3 Supply and Demand

China is in the top five gold producing countries in the world, with an estimated 189.81 tonnes of gold in 2002 (ref: Gold Bureau of the State Economic and trade Commission).

The China Geological and Mineral Survey Bureau estimates the gold resources of Chinese ten major provinces to be over 11,000 tonnes and the country's prospective gold resources at around 15,000 tonnes.

China is a net importer of gold (110t in 2002), with an estimated domestic consumption mostly for jewelry of up to 300t/a.

21.8.4 Financial Considerations

All gold sales on the SGE are in RMB at a rate at World prices by the PBoC according to an unstipulated formula. Gold sales on the SGE are exempt from VAT, but all transactions are subject to a 0.06 percent commission.

The settlement is done by China's four state-run banks, namely, the Industrial and Commercial Bank of China, the Bank of China, the Construction Bank of China and the Agricultural Bank of China.

Gold sales on the SGE are all made in Renminbi (RMB) which is not an internationally traded currency. The value of the RMB was pegged to the US Dollar but is now valued on a basket of international currencies.

Although the domestic sales of gold has been liberalized, there is still considerable Government control on the market by settling all transactions in RMB and fixing the foreign exchange rate.

Other economic factors such as repatriation of profits, taxation, time value of money and gold lease rates are not covered in this discussion.

21.8.5 Sales

There is no requirement for gold produced at CSH217 to be sold within Nei Mongol province, but taxes must be paid locally.

Two potential gold buyers have been investigated: Inner Mongolia Qiankun Gold and Silver Refinery Share Company Limited in Hohhot, and Brigade 217 of the Northwest Geological Bureau of the China National Nuclear Corporation (CNNC).

The Qiankun refinery in Hohhot are one of only two gold refineries in China which meet the purity standards for international trade specified by the London Bullion Market Association Goods Delivery List.

Qiankun only accept doré bars with greater than 90 percent gold content, and charge RMB0.40/g plus 0.1 percent of the gold processed (i.e. for refining 1 kilogram of gold they will charge RMB400 + approximately RMB40). Credits are given for silver at 90 percent of the SGE spot price. Qiankun will also collect the doré bars from the site and securely transport to Hohhot. The Qiankun refinery can either buy the gold directly or sell on the SGE acting as our agent.

Brigade 217 will accept loaded carbon and will charge RMB4.00/g for desorption. The refining costs to produce 9995 gold is RMB1.5/g and RMB2.0/g for 9999 gold. Transportation from the site to the refinery in Yinchuan is included, but security in transit is at additional (unspecified) cost.

21.8.6 Summary

There are no major obstacles seen for the domestic sales of gold in China from production of the CSH 217 gold deposit.

21.8.7 References

GFMS Limited, China Financial Services, and World Gold Council Far East Regional Office, 2004: The Gold Market in China: A New Beginning, http://www.gfms.co.uk/publications_china_report.htm

Grabbe, O, 2005: The Gold Market, <http://www.orlingrabbe.com/gold1.htm>, last accessed 27 July 2005.

Shanghai Gold Exchange, 2004: <http://www.sge.sh>, last accessed 19 July 2005.

Tse Pui-Kwan, 2002: The minerals industry of China, in: US Geological Survey Minerals Yearbook, 22p

21.9 Contracts

The following is a list of external contracts awarded or planned for the CSH Gold Project development with estimated costs. Some tasks may not have specific contract documents and are based on ad hoc consulting arrangements.

Table 21.9.1 External Contracts			
Task/Element	Contractor/Consultant	Summary of Objectives	Status
Prime Engineering Contractor	KD Engineering Co., Inc.	Overall planning and supervision of engineering works	ongoing
Engineering Study	Beijing General Research Institute for Mining and Metallurgy (BGRIMM)	Detailed engineering design and economics	ongoing
Resource Report (China)	Brigade 217 of the Northwest Geological Bureau of the China National Nuclear Corporation (CNNC)	Conversion of exploration license to mining lease	ongoing
Resource Report (NI43-101 Canada)	Geosystems International Mario Rossi	Calculation of resource estimate to end 2004 drilling campaign	Complete

Table 21.9.1 External Contracts			
Task/Element	Contractor/Consultant	Summary of Objectives	Status
Geological Disaster Assessment	Nei Mongol Autonomous Region No. 1 Hydrogeology and Engineering Geology Institute	Assessment of earthquake, flood, tsunami and other natural disasters and failure of man-made constructions	Complete
Water Resource Estimation	Earth Resource Management ERM (Shanghai)	Conceptual study to identify primary water sources	Complete
Soil & Water Conservation	Earth Resource Management ERM (Shanghai)	Quantification of amount of soil and water disturbance and usage including closure plan	In revision using BGRIMM design
Chinese Regulatory EIA	Earth Resource Management ERM (Beijing)	Assess impact of all mining operations with respect to compliance with current Chinese regulations	-Filed Scoping Study -Expert Panel review accepted -scoping study -Chinese EIA revised to new BGRIMM design Cannot be filed before SWC is accepted
International ESIA	Earth Resource Management ERM (Beijing)	Using Chinese regulatory EIA as the guide, revised to meet international reporting standards for potential use for bankable feasibility	Shelved pending completion of Chinese EIA and SWC
Detailed Water Resource Investigation	Baogang Geological Survey Institute (Baotou)	Quantification of water sources identified in Preliminary WRE	-field work near completion -final report scheduled for 4Q2005
Water Abstraction Scenario and Wellfield & Reticulation Design	TBA	Economical and sustainable water supply design. Necessary to obtain water abstraction permit	Not yet awarded
Cultural Heritage Survey	Nei Mongol Cultural and Heritage Bureau	Nei Mongol Cultural and Heritage Bureau	Not yet awarded
Topocadastral Survey - Control Points	Ningxia Survey Team	-1:200 scale survey of crusher and pilot leach pad areas -Differential GPS survey of Ikonos control points for rectification of DEM -establishment of permanent survey control points with differential GPS around mine development area	complete
Ikonos DEM	Pacific Geomatics	Acquisition of programmed Ikonos stereo image, orthorectification and calculation of DEM	complete
Topocadastral Survey - Leach Pad and Mining Areas	Baogang Geological Survey Institute	1:1,000 scale survey of mine and leach pad areas	complete
Geotechnical Field Investigation	Baogang Survey Institute Limited	Drilling, trenching and mapping of pad area, supervised by Golder Associates	complete
Decline and Crosscut Mining	Brigade 217 of the Northwest Geological Bureau of the China National Nuclear Corporation (CNNC)	Designed to obtain sufficient fresh sulfide material for bulk metallurgical testing	complete
Decline and Crosscut Dewatering	Brigade 217 of the Northwest Geological Bureau of the China National Nuclear Corporation (CNNC)	Dewatering of crosscut during detailed mapping and sampling	complete
Column Tests	Baogang Metallurgical Laboratory	-Seven crush and screen sizes each of oxide and sulfide ore	-Oxide columns complete

Table 21.9.1 External Contracts			
Task/Element	Contractor/Consultant	Summary of Objectives	Status
		-recovery estimation calculation by KDE	-Sulfide columns in progress
Flotation Test	KD Engineering Reno		In progress
Oxide Heterogeneity Test	Baogang Metallurgical Laboratory Mario Rossi	Determine the cause of assay variability of oxide ore	complete
Sulfide Heterogeneity Test	Baogang Metallurgical Laboratory Mario Rossi	Determine the cause of assay variability of sulfide ore	Sample preparation complete, on hold until mine lab constructed
Slope Stability	Graeme Major Golder Associates Reno	Assess slope stability for final design of open cast pit	-Preliminary field assessment complete -Drilling of geotechnical holes planned
Leach Pad Design	Golder Associates	Design of leach pads and ponds for full scale operation	In progress
Pit Optimization	John Nilsson	Based on Resource Model 2004 by Mario Rossi	In progress
Mining Schedule Optimization	Dave Tutton	Scheduling of mining based on optimized pit design	In progress
Resource Infill Drilling 2005	Brigade 217 of the Northwest Geological Bureau of the China National Nuclear Corporation (CNNC)	Infill drilling to upgrade inferred to indicated resource 3500m HQ 14 holes	In progress

22.0 BASE CASE ECONOMIC ANALYSIS

INTRODUCTION

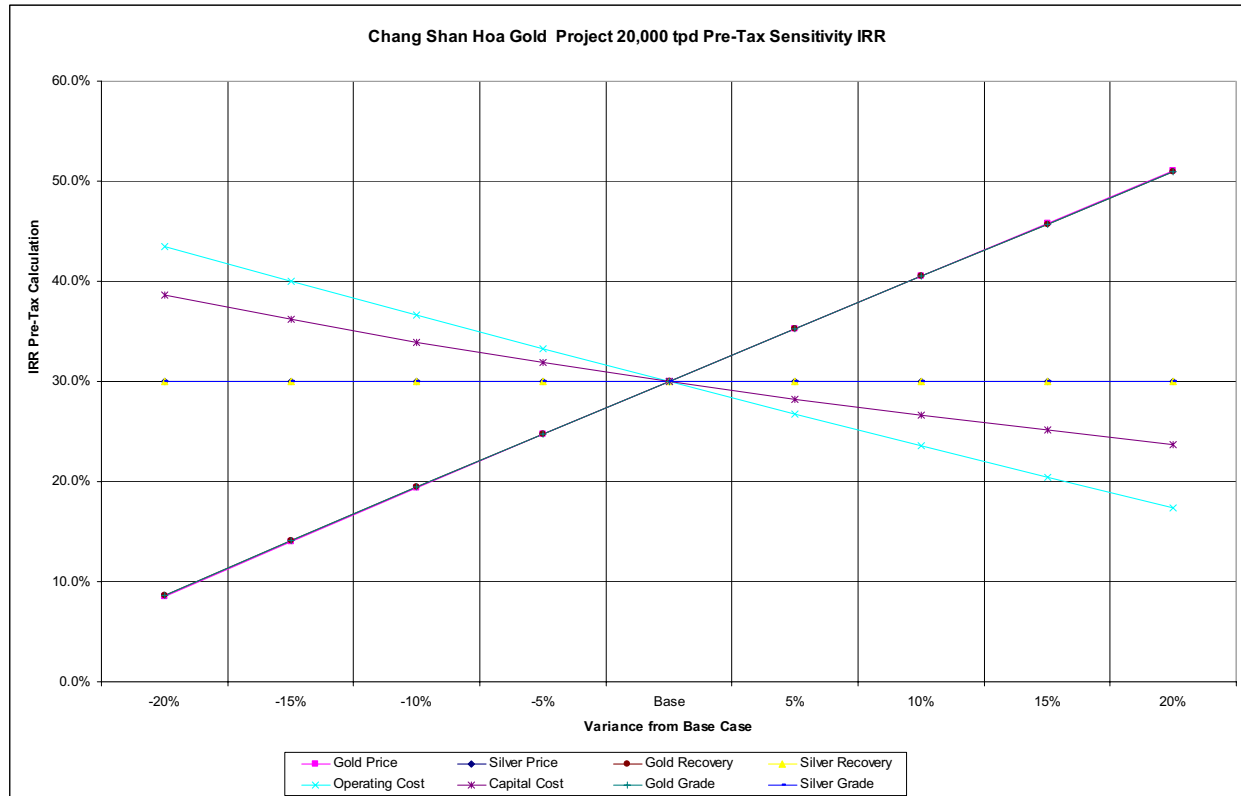
CASHFLOW MODEL JINSHAN GOLD MINES - CHANG SHAN HAO GOLD PROJECT

MODEL 1 - RUN OF MINE FOLLOWED BY THREE STAGE CRUSHING

Exchange Rate RMB/US\$ **8.11** Adjusted July 28, 2005 XD Jiang

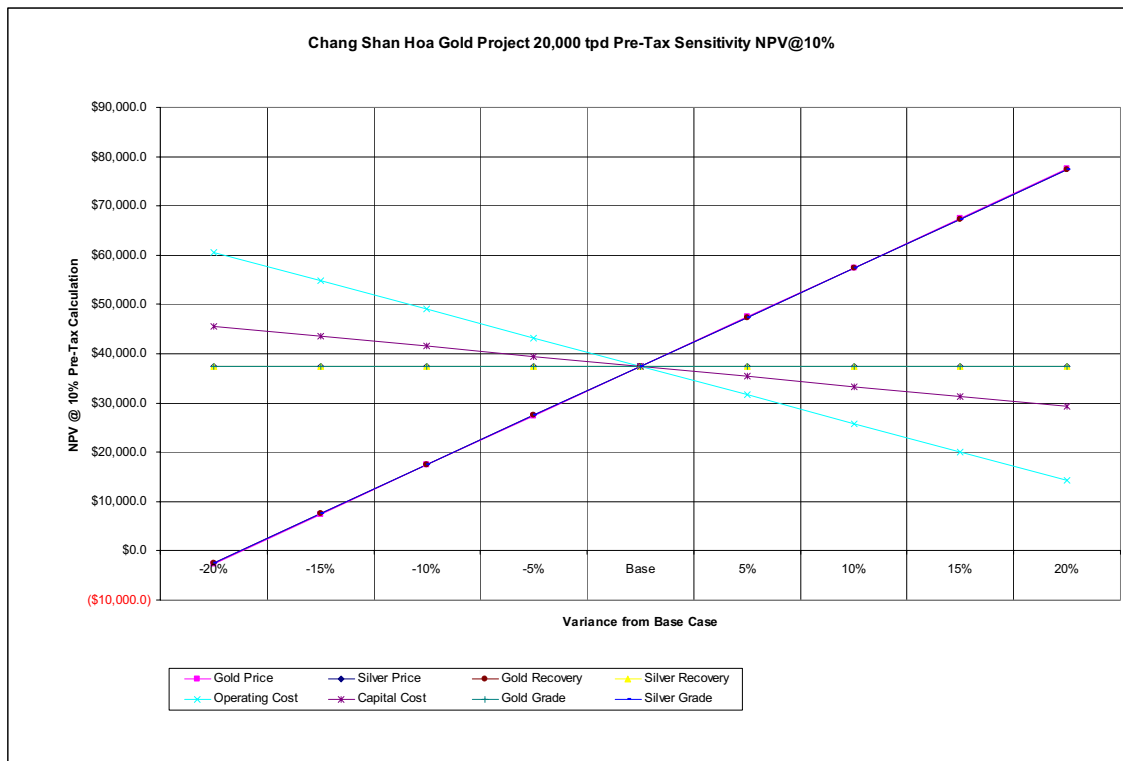
Pre-Tax Cash Flow Model - Taxation Sections Removed

Process Operating Costs	Process Cost Summary July 26.xls	KD Engineering
Recovery Data	Revised Recovery Curve.xls	KD Engineering - August 11 - Verified August 19
General & Administration Costs	As Per Paul Blair Spreadsheet with adjustments	
Pad Construction	Cost estimate Sum R5.xls Reduced Contingency	Golder KD - NMS modified sheet August 11
Plant Capital	COST EST 8-19-05.xls	KD Engineering
Schedule	Model Current.xls	NMS
Mining Costs	Variable Unit Rate Input - See Mining Cost Sheet for detail. Cost incorporate an additional \$0.017/t/bench beyond Year 5 when contract expires Updated Manpower List August 8, 2005 Increased Changed basis to 6 contractor average and split between W/O Updated with new quotes	Contractor Pre- Qualification Basis - August 10 Update Yinshan NMS August 11 NMS August 25
Capital Cost	Corrected contingency sum Updated KD Capital Costs - Model Shown Above Moved 500,000 t to prestripping for heap overliner & roads	NMS August 8 NMS August 19 NMS August 10
Note: Contract Mining Quotes based upon a 5 Year Contract. Not likely one would purchase equipment for 2 remaining years of mining.		
	Corrected Mine Unit Operating Cost in the CF Sheet Summary Table	NMS August 19 Changed
Capital Cost	Added BGRIMM proposal changes	KDE August 26
Operating Cost	Revised Plant and G&A Op Cost after end of ore placement	KDE August 26

IRR Sensitivity - 20KROM3STAGE 400

Sensitivity		-20%	-15%	-10%	-5%	Base	5%	10%	15%	20%
Gold Price	(\$ x 1000)	8.6%	14.0%	19.4%	24.7%	30.0%	35.3%	40.5%	45.8%	51.1%
Silver Price	(\$ x 1000)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Gold Recovery	(\$ x 1000)	8.7%	14.1%	19.4%	24.7%	30.0%	35.3%	40.5%	45.7%	51.0%
Silver Recovery	(\$ x 1000)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Gold Grade	(\$ x 1000)	8.7%	14.1%	19.4%	24.7%	30.0%	35.3%	40.5%	45.7%	51.0%
Silver Grade	(\$ x 1000)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Operating Cost	(\$ x 1000)	43.5%	40.0%	36.6%	33.3%	30.0%	26.8%	23.6%	20.4%	17.3%
Capital Cost	(\$ x 1000)	38.6%	36.2%	33.9%	31.9%	30.0%	28.3%	26.6%	25.1%	23.7%

NPV Sensitivity - 20KROM3STAGE 400



Sensitivity		-20%	-15%	-10%	-5%	Base	5%	10%	15%	20%
Gold Price	%	(\$2,609.5)	\$7,400.8	\$17,411.0	\$27,421.3	\$37,431.6	\$47,441.9	\$57,452.2	\$67,462.4	\$77,472.7
Silver Price	%	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6
Gold Recovery	%	(\$2,409.3)	\$7,550.9	\$17,511.1	\$27,471.4	\$37,431.6	\$47,391.8	\$57,352.1	\$67,312.3	\$77,272.5
Gold Grade	%	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6
Silver Grade	%	(\$2,409.3)	\$7,550.9	\$17,511.1	\$27,471.4	\$37,431.6	\$47,391.8	\$57,352.1	\$67,312.3	\$77,272.5
Silver Recovery	%	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6	\$37,431.6
Operating Cost	%	\$60,633.8	\$54,833.2	\$49,032.7	\$43,232.1	\$37,431.6	\$31,631.0	\$25,830.5	\$20,029.9	\$14,229.4
Capital Cost	%	\$45,594.6	\$43,553.9	\$41,513.1	\$39,472.4	\$37,431.6	\$35,390.8	\$33,350.1	\$31,309.3	\$29,268.6

SENSITIVITY FACTORS

Gold Price	1.00
Silver Price	1.00
Gold Recovery	1.00
Silver Recovery	1.00
Gold Grade	1.00
Silver Grade	1.00
Operating Cost	1.00
Capital Cost	1.00

Mine Schedule Input

20KROM3STAGE 400

Period		-2	-1	1	2	3	4	5	6	7	8	Total
Mine Production												
Weathered Leach ROM	t x 1000			7,080.0	5,774.9							12,855
	g/t			0.71	0.74							0.73
Fresh Leach ROM	Gold Grade	-	-									-
	Silver Grade											1,345.1
Total Leach ROM	t x 1000	-	-	20.0	1,325.1							0.75
	g/t	-	-	0.80	0.75							-
Weathered Leach Crushed	Gold Grade	-	-	7,100.0	7,100.0	-	-	-	-	-	-	14,200.0
	Silver Grade	-	-	0.72	0.75	-	-	-	-	-	-	0.73
Fresh Leach Crushed	t x 1000					2,469.9	1,285.7	32.8	-	229.8	310.1	4,328.3
	g/t					0.72	0.70	0.67	-	0.82	0.71	0.72
Total Crushed Ore	t x 1000					4,630.1	5,814.3	7,067.2	7,100.0	6,870.2	2,267.5	33,749.4
	g/t					0.79	0.73	0.68	0.75	0.91	0.82	0.78
Combined Ore Production	Gold Grade	-	-	-	-	7,100.0	7,100.0	7,100.0	7,100.0	7,100.0	2,577.7	38,077.7
	Silver Grade	-	-	-	-	0.77	0.73	0.68	0.75	0.91	0.81	0.77
Waste	t x 1000	-	-	7,100.0	7,100.0	7,100.0	7,100.0	7,100.0	7,100.0	7,100.0	2,577.7	52,277.7
	g/t	-	-	0.72	0.75	0.77	0.73	0.68	0.75	0.91	0.81	0.76
Total Material	t x 1000	-	500.0	10,251.1	11,184.4	11,207.2	7,445.2	4,615.3	2,821.7	1,199.0	863.5	50,087.4
	g/t	-	500.0	17,351.1	18,284.4	18,307.2	14,545.2	11,715.3	9,921.7	8,299.0	3,441.2	101,019.9
Cumulative Ore to Pad		-	-	7,100.0	14,200.0	21,300.0	28,400.0	35,500.0	42,600.0	49,700.0	52,277.7	
			Pad 1 Build			Pad 2 Build						

Cash Flow Model

20KROM3STAGE 400

Period		-2	-1	1	2	3	4	5	6	7	8	9	10	11	Total
Process Days				355	355	355	355	355	355	355	129				
Mine Production															
Waste	tx 1000	-	500.0	10,251.1	11,184.4	11,207.2	7,445.2	4,615.3	2,821.7	1,199.0	863.5	-	-	-	50,087.4
Total Material	tx 1000	-	500.0	17,351.1	18,284.4	18,307.2	14,545.2	11,715.3	9,921.7	8,299.0	3,441.2	-	-	-	101,019.9
Weathered Ore	tx 1000	-	-	7,080.0	5,774.9	2,469.9	1,285.7	32.8	-	229.8	310.1	-	-	-	17,183.2
Fresh Ore	tx 1000	-	-	20.0	1,325.1	4,630.1	5,814.3	7,067.2	7,100.0	6,870.2	2,267.5	-	-	-	35,094.5
2820 Make-up Water Requirement	tx 1000	-	-	1,001.1	1,001.1	1,001.1	1,001.1	1,001.1	1,001.1	1,001.1	363.8	-	-	-	7,371.5
Process Recovery															
80.0% Weathered Leach ROM Gold	kg	-	-	4,049,575	3,438,338	-	-	-	-	-	-	-	-	-	7,487.9
50.0% Fresh Leach ROM Gold	kg	-	-	8,011	497,542	-	-	-	-	-	-	-	-	-	505.6
90.0% Weathered Leach Crush Gold	kg	-	-	-	-	1,599,713	807,875	19,676	-	170,593	197,389	-	-	-	2,794.7
70.0% Fresh Leach Crush Gold	kg	-	-	-	-	2,560,930	2,989,096	3,365,241	3,705,801	4,384,522	1,306,894	-	-	-	18,312.5
Gold Recoverable	kg	-	-	4,057,59	3,935,88	4,160,14	3,796,97	3,384,92	3,705,80	4,555,11	1,504,28	-	-	-	29,100.7
Gold Recoverable	ounces	-	-	130,454	126,541	133,752	122,075	108,828	119,144	146,450	48,364	-	-	-	935,609.1
Recovery Time Based - Gold - KD Relationship				65.5%	67.2%	69.5%	70.4%	70.6%	70.3%	69.8%	71.3%	72.5%	73.0%	73.2%	
Gold Recovered	ounces	-	-	107,001	116,900	129,491	121,339	110,718	117,715	139,155	65,787	16,057	5,862	2,676	932,703
Equivalent Gold Net Value Based	ounces	-	-	107,001	116,900	129,491	121,339	110,718	117,715	139,155	65,787	16,057	5,862	2,676	932,703
Revenue															
\$400.00 Gold Revenue	\$ x 1000	-	-	\$42,800.5	\$46,760.2	\$51,796.5	\$48,535.4	\$44,287.4	\$47,086.0	\$55,662.2	\$26,314.9	\$6,422.8	\$2,344.8	\$1,070.5	\$373,081.0
\$2.00 Refining & Transportation	\$ x 1000	-	-	(\$214.0)	(\$233.8)	(\$259.0)	(\$242.7)	(\$221.4)	(\$235.4)	(\$278.3)	(\$131.6)	(\$32.1)	(\$11.7)	(\$5.4)	(\$1,865.4)
NR Net Revenue	\$ x 1000	-	-	\$42,458.8	\$46,386.8	\$51,382.9	\$48,147.8	\$43,933.7	\$46,710.0	\$55,217.7	\$26,104.8	\$6,371.5	\$2,326.1	\$1,061.9	\$370,102.0
Gold Net Revenue	\$/ounce	-	-	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81
Silver Net Revenue	\$/ounce	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Revenue - Gold Equivalent	\$/ounce	-	-	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81	\$396.81
Operating Costs															
Benchies from Entrance	\$ x 1000	-	-	-	-	-	-	-	15.00	21.00	24.00	-	-	-	
Base Contractor Mobilization	\$ x 1000	-	(\$16.6)	(\$7,861.0)	(\$6,411.8)	(\$2,742.3)	(\$1,427.5)	(\$36.4)	-	(\$337.1)	(\$470.9)	-	-	-	(\$16.6)
\$1.110 Mining Weathered Ore	\$ x 1000	-	-	(\$23.1)	(\$1,530.1)	(\$5,346.3)	(\$6,713.7)	(\$8,160.5)	(\$10,008.8)	(\$10,385.6)	(\$3,543.5)	-	-	-	(\$19,287.0)
\$1.155 Mining Sulfide Ore	\$ x 1000	-	(\$498.2)	(\$10,213.2)	(\$11,143.1)	(\$11,165.8)	(\$7,417.6)	(\$4,598.2)	(\$3,530.8)	(\$1,622.6)	(\$1,212.6)	-	-	-	(\$45,711.6)
\$0.996 Mining Waste	\$ x 1000	-	-	(\$5,435.3)	(\$5,435.3)	-	-	-	-	-	-	-	-	-	(\$51,402.0)
\$0.766 Process ROM Leach Ore	\$ x 1000	-	-	-	-	(\$9,036.5)	(\$9,036.5)	(\$9,036.5)	(\$9,036.5)	(\$9,036.5)	(\$3,280.7)	(\$800.7)	(\$292.3)	(\$133.5)	(\$10,870.6)
\$1.273 General & Administration	\$ x 1000	-	-	(\$3,888.5)	(\$3,888.5)	(\$3,888.5)	(\$3,888.5)	(\$3,888.5)	(\$3,888.5)	(\$3,888.5)	(\$1,411.7)	(\$344.6)	(\$125.8)	(\$57.4)	(\$49,689.5)
\$0.548 Total Operating Cost	\$ x 1000	-	(\$514.8)	(\$27,421.0)	(\$28,408.8)	(\$32,179.4)	(\$28,483.8)	(\$25,720.0)	(\$26,464.6)	(\$25,270.3)	(\$9,919.4)	(\$1,145.3)	(\$418.1)	(\$190.9)	(\$29,158.8)
OC Operating Cost - Gold Equivalent	\$/ounce	-	(\$514.8)	(\$27,421.0)	(\$28,408.8)	(\$32,179.4)	(\$28,483.8)	(\$25,720.0)	(\$26,464.6)	(\$25,270.3)	(\$9,919.4)	(\$1,145.3)	(\$418.1)	(\$190.9)	(\$29,158.8)
Capitalized		-	-	(\$256.3)	(\$243.0)	(\$348.5)	(\$234.7)	(\$232.3)	(\$224.8)	(\$181.6)	(\$150.8)	(\$71.3)	(\$71.3)	(\$71.3)	(\$21.0)
Net Operating Margin = NR-OC	\$ x 1000	-	\$1,00	\$15,037.8	\$17,978.0	\$19,203.5	\$19,664.1	\$18,213.8	\$20,245.4	\$29,947.4	\$16,185.4	\$5,226.2	\$1,908.0	\$871.0	\$164,480.6
Mining Cost - Annual Average all Materials	\$/mined	-	\$1.00	\$1.04	\$1.04	\$1.05	\$1.07	\$1.09	\$1.36	\$1.49	\$1.52	-	-	-	\$1.15
Capital Costs															
100 Land Acquisition	\$ x 1000	-	(\$459.0)	-	-	-	-	-	-	-	-	-	-	-	(\$459.0)
200 Infrastructure Site & General	\$ x 1000	-	(\$5,762.1)	-	-	-	-	-	-	-	-	-	-	-	(\$5,762.1)
300 Mining	\$ x 1000	-	(\$1,920.2)	-	-	-	(\$120.0)	-	-	-	-	-	-	-	(\$2,040.2)
400 Heap Leach Pads - Golder Detail	\$ x 1000	-	(\$7,973.3)	-	-	(\$5,109.7)	-	-	-	-	-	-	-	-	(\$13,083.0)
500 Crushing Plant	\$ x 1000	-	-	-	(\$9,935.2)	-	-	-	-	-	-	-	-	-	(\$9,935.2)

		Period														Total
Process Days		-2	-1	1	2	3	4	5	6	7	8	9	10	11		
		355														
600	Processing Plant															
700	Project Indirect Costs		(\$5,322.0)												(\$5,322.0)	
	\$ x 1000		(\$5,700.2)												(\$9,259.9)	
1000	Project Contingency		(\$4,613.3)												(\$7,796.4)	
	\$ x 1000		(\$2,294.1)												(\$7,796.4)	
TC	Total Capital		(\$31,750.0)												(\$53,657.9)	
	\$ x 1000		(\$31,750.0)												(\$53,657.9)	
Working Capital Changes																
WC	(Additions) & Reductions		\$35.3	(\$8,626.4)	(\$900.9)	(\$973.7)	\$544.6	\$849.8	(\$633.6)	(\$2,179.6)	\$6,127.1	\$4,264.8	\$947.7	\$544.9	\$0.0	
Royalty & Government Compensation																
	217 Brigade Percent of Profits															
	Resource Compensation Fee (NSR)															
	\$ x 1000															
	Mineral Resource Tax (US\$/t ore mined)															
\$0.074	Water Usage															
	\$ x 1000															
\$0.007	Payments to 217 Brigade															
	\$ x 1000															
\$0.038	One Time Payment to Local Government															
	\$ x 1000															
\$0.004	Annual Payment to Local Government															
	\$ x 1000															
\$0.014	Land Acquisition Compensation															
	\$ x 1000															
\$0.019	Land Compensation for Water Pipeline															
	\$ x 1000															
\$0.001	Total Royalty & Compensation															
	\$ x 1000															
R																
Pre-Tax Cash Flow																
	Cash Flow = NR+OC+TC+WC+R															
	Cumulative Cash Flow															
Pre-Tax Net Present Value																
	\$ x 1000		\$103,008.53													
	5.0%		\$62,567.13													
	10.0%		\$37,431.60													
	15.0%		\$21,474.07													
	20.0%		\$11,171.63													
Pre-Tax Internal Rate of Return																
	Calculated IRR															
	Cumulative IRR															

Summary	
Mine Gate Value of All Ore	
Mining Cost	
Processing Cost	
General & Administration	
Cash Operating Cost	
Cash Operating Margin	
Capital Cost	
Royalty	
Cash Surplus	

Capital Cost Estimate

20KROM3STAGE 400

Code	Land Acquisition	Period	Contingency	-2	-1	1	2	3	4	Total
100	Land Acquisition	\$ x 1000								
	105 Land Acquisition	\$ x 1000	17.0%		\$459.0					\$459
	Subtotal	\$ x 1000			\$459.0					\$459
200	Infrastructure Site & General	\$ x 1000								
	205 Offsite Road, Forestation & Geotechnical	\$ x 1000	17.0%		\$256.2					\$256
	210 Ancillary Buildings & Structures	\$ x 1000	17.0%		\$1,522.8					\$1,523
	215 Equipment	\$ x 1000	17.0%		\$1,829.3					\$1,829
	220 Piping & Ducting	\$ x 1000	17.0%		\$137.0					\$137
	225 Power Supply	\$ x 1000	17.0%		\$1,704.2					\$1,704
	230 Consumables	\$ x 1000	17.0%		\$17.4					\$17
	235 Crane Rentals	\$ x 1000	17.0%		\$138.0					\$138
	240 Freight Allowance	\$ x 1000	17.0%		\$71.0					\$71
	245 Additional Labor	\$ x 1000	17.0%		\$86.2					\$86
	Subtotal	\$ x 1000			\$5,762.1					\$5,762
300	Mining	\$ x 1000								
	305 Pre-Production Stripping	\$ x 1000	17.0%		\$514.8					\$515
	310 Mine Haul Roads	\$ x 1000	17.0%		\$238.8					\$239
	315 Mine Equipment	\$ x 1000	17.0%							
	320 General Mine Administration Office	\$ x 1000	17.0%		\$137.5					\$138
	325 Light Vehicles	\$ x 1000	17.0%		\$120.0			\$120.0		\$240
	330 Engineering Systems	\$ x 1000	17.0%		\$289.6					\$290
	335 Explosives Storage	\$ x 1000	17.0%		\$129.0					\$129
	340 Diversion Ditches	\$ x 1000	17.0%		\$368.0					\$368
	345 Pit Dewatering	\$ x 1000	17.0%		\$122.6					\$123
	Subtotal	\$ x 1000			\$1,920.2			\$120.0		\$2,040
400	Heap Leach Pads - Golder Detail	\$ x 1000								
	405 Site Preparation	\$ x 1000	17.0%		\$60.0			\$60.0		\$120
	410 Heap Leach Pad Earthworks	\$ x 1000	17.0%		\$3,172.5			\$2,552.4		\$5,725
	415 Structures	\$ x 1000	17.0%		\$70.0					\$70
	420 Pond Earthworks	\$ x 1000	17.0%		\$1,096.2					\$1,096
	425 Water Diversion Earthworks	\$ x 1000	17.0%		\$21.1			\$17.8		\$39
	430 Geosynthetics, Leach Pad and Ponds	\$ x 1000	17.0%		\$2,424.9			\$1,837.5		\$4,262
	435 Fencing	\$ x 1000	17.0%		\$137.0			\$137.0		\$274
	440 Piping	\$ x 1000	17.0%		\$487.4			\$215.0		\$702
	445 Distribution Piping Allowance	\$ x 1000	17.0%		\$400.0			\$200.0		\$600
	450 Electrical & Instrumentation	\$ x 1000	17.0%		\$90.1			\$90.1		\$180
	455 Construction and Engineering	\$ x 1000	17.0%							
	460 Additional Labor	\$ x 1000	17.0%		\$14.1					\$14
	Subtotal	\$ x 1000			\$7,973.3			\$5,109.7		\$13,083
500	Crushing Plant	\$ x 1000								
	505 Site Earthworks	\$ x 1000	17.0%				\$75.9			\$76
	510 Structures	\$ x 1000	17.0%				\$1,088.4			\$1,088
	515 Primary Crushing	\$ x 1000	17.0%				\$1,332.4			\$1,332
	520 Fine Crushing	\$ x 1000	17.0%				\$5,113.6			\$5,114

Code	Period		Contingency	-2	-1	1	2	3	4	Total
		\$ x 1000	17.0%				\$206.5			\$207
	525 Piping	\$ x 1000	17.0%				\$801.8			\$802
	530 Electrical & Instrumentation	\$ x 1000	17.0%				\$127.2			\$127
	535 Consumables	\$ x 1000	17.0%				\$223.0			\$223
	540 Equipment Rentals	\$ x 1000	17.0%				\$338.4			\$338
	545 Freight Allowance	\$ x 1000	17.0%				\$628.0			\$628
	550 Additional Labor	\$ x 1000	17.0%				\$9,935.2			\$9,935
	Subtotal	\$ x 1000								
600	Processing Plant	\$ x 1000								
	605 Site Earthworks	\$ x 1000	17.0%		\$16.0					\$16
	610 Structures	\$ x 1000	17.0%		\$416.6					\$417
	615 Leaching	\$ x 1000	17.0%		\$289.1					\$289
	620 C/C and Carbon Stripping Package	\$ x 1000	17.0%		\$3,226.8					
	625 Piping	\$ x 1000	17.0%		\$121.2					\$121
	630 Electrical & Instrumentation	\$ x 1000	17.0%		\$860.1					\$860
	635 Consumables	\$ x 1000	17.0%		\$38.3					\$38
	640 Equipment Rentals	\$ x 1000	17.0%		\$140.0					\$140
	645 Freight Allowance	\$ x 1000	17.0%		\$25.0					\$25
	650 Additional Labor	\$ x 1000	17.0%		\$188.9					\$189
	Subtotal	\$ x 1000			\$5,322.0					\$5,322
700	Project Indirect Costs	\$ x 1000								
	705 Feasibility & Detail Engineering	\$ x 1000	17.0%		\$1,987.5		\$973.5			\$2,961
	710 Procurement	\$ x 1000	17.0%		\$160.0		\$85.6			\$246
	715 Construction Management	\$ x 1000	17.0%		\$1,097.8		\$900.8			\$1,999
	720 Field Office Expense	\$ x 1000	17.0%		\$227.0		\$178.0			\$405
	725 Commissioning & Training	\$ x 1000	17.0%		\$186.2		\$144.5			\$331
	730 Initial Fill	\$ x 1000	17.0%		\$321.6		\$227.5			\$549
	735 Start-Up	\$ x 1000	17.0%		\$55.0		\$157.1			\$212
	740 Mobile Equipment	\$ x 1000	17.0%		\$338.0		\$139.0			\$477
	745 Spare Parts	\$ x 1000	17.0%		\$255.3		\$298.7			\$554
	750 Owners Costs	\$ x 1000	17.0%		\$1,071.8		\$455.0			\$1,527
	Subtotal	\$ x 1000			\$5,700.2		\$3,599.7			\$9,260
1000	Project Contingency	\$ x 1000								
	1100 Land Acquisition	\$ x 1000			\$78.0					\$78
	1200 Infrastructure Site & General	\$ x 1000			\$979.6					\$980
	1300 Mining	\$ x 1000			\$326.4			\$20.4		\$347
	1400 Heap Leach Pads - Golder Detail	\$ x 1000			\$1,355.5			\$868.7		\$2,224
	1500 Crushing Plant	\$ x 1000					\$1,689.0			\$1,689
	1600 Processing Plant	\$ x 1000			\$904.7		\$605.2			\$905
	1700 Project Indirect Costs	\$ x 1000			\$969.0					\$1,574
	Subtotal	\$ x 1000			\$4,613.3		\$2,294.1	\$868.7	\$20.4	\$7,796
	TOTAL	\$ x 1000			\$31,750.0		\$15,789.1	\$5,978.4	\$140.4	\$53,658
	Cumulative Total	\$ x 1000			\$31,750	\$31,750	\$47,539	\$53,518	\$53,658	
Check Direct & Indirect Costs		\$ x 1000			\$27,136.8		\$13,494.9	\$5,109.7	\$120.0	\$45,861

Pad Construction Unit Rates

20KROM3STAGE 400

Item No.	Item	Units	Unit Cost	Reference
100	Site Preparation			
105	Earthworks Mobil. and Demobil. (includes crushing plant)	EA	\$30,000	
110	Surveying	months	\$6,000	
200	Heap Leach Pad Earthworks			
205	Import Structural Fill for Heap Leach Pad	m ³	\$7.00	
210	Local Soil Excavation to Structural Fill for Heap Leach Pad	m ³	\$3.50	
215	Local Rock Excavation to Structural Fill for Heap Leach Pad	m ³	\$5.50	
220	Surface Preparation for Soil Liner Fill & Struct Fill	m ³	\$0.30	
225	Liner Bedding for Heap Leach Pad	m ³	\$4.00	
230	Liner Cover Crushing and Placement	m ³	\$8.00	
235	Coarse Drain Fill Crushing and Placement	m ³	\$8.00	
240	Leak Detection Sand	m ³	\$45.00	
300	Pond Earthworks			
305	Local Soil Excavation and Structural Fill for Ponds	m ³	\$3.50	
310	Local Rock Excavation and Structural Fill for Ponds	m ³	\$5.50	
315	Liner Bedding for Ponds	m ³	\$4.00	
320	Liner Cover for Ponds	m ³	\$8.00	
400	Water Diversion Earthworks			
405	Channel Protection Riprap	m ³	\$10.00	
410	Soil Excavation	m ³	\$3.50	
415	Rock Excavation	m ³	\$5.50	
500	Geosynthetics, Leach Pad and Ponds			
505	Heap Leach Pad Primary Liner (80 mil HDPE Smooth)	m ²	\$5.25	
510	Heap Leach Pad Secondary Liner (60 mil HDPE Smooth)	m ²	\$5.00	
515	Non-Woven Geotextile on Slopes	m ²	\$2.00	
600	Piping			
605	4-inch Dia. Solution PCPE Pipe, Smooth Interior	m	\$3.00	
610	15-inch Dia. Solution Header PCPE Pipe, Smooth Interior	m	\$24.00	
615	24-inch Dia. Solution Header HDPE Pipe	m	\$125.00	
620	2-inch Dia. Perf. PVC Leak Detection Pipe	m	\$8.00	
625	Other Pipes & Pipe Assembly and Fittings (10% of Pipe Cost)	EA	Varies	
630	24-inch Dia Steel Pipe Riser Assembly	EA	\$25,000	
700	Construction and Engineering			
705	Construction Quality Assurance	months	\$50,000	
710	Engineering Support	months	\$30,000	

Pad Construction Capital Phase 1

20KROM3STAGE 400

Item	Quantity	Units	Unit Cost	Item Cost	Subtotal
Site Preparation					\$60,000
Earthworks Mobil. and Demobil. (includes crushing plant)	1	EA	\$30,000	\$30,000	
Surveying	5	months	\$6,000	\$30,000	
Heap Leach Pad Earthworks					\$3,172,450
Import Structural Fill for Heap Leach Pad	39,000	m ³	\$7.00	\$273,000	
Local Soil Excavation to Structural Fill for Heap Leach Pad	50,000	m ³	\$3.50	\$175,000	
Local Rock Excavation to Structural Fill for Heap Leach Pad	30,000	m ³	\$5.50	\$165,000	
Surface Preparation for Soil Liner Fill & Struct Fill	440,000	m ³	\$0.30	\$132,000	
Liner Bedding for Heap Leach Pad	120,000	m ³	\$4.00	\$480,000	
				\$1,920,00	
Liner Cover Crushing and Placement	240,000	m ³	\$8.00	0	
Coarse Drain Fill Crushing and Placement	2,700	m ³	\$8.00	\$21,600	
Leak Detection Sand	130	m ³	\$45.00	\$5,850	
Pond Earthworks					\$1,096,220
Local Soil Excavation and Structural Fill for Ponds	30,000	m ³	\$3.50	\$105,000	
Local Rock Excavation and Structural Fill for Ponds	155,000	m ³	\$5.50	\$852,500	
Liner Bedding for Ponds	11,400	m ³	\$4.00	\$45,600	
Liner Cover for Ponds	11,640	m ³	\$8.00	\$93,120	
Water Diversion Earthworks					\$21,125
Channel Protection Riprap	0	m ³	\$10.00	\$0	
Soil Excavation	3,600	m ³	\$3.50	\$12,600	
Rock Excavation	1,550	m ³	\$5.50	\$8,525	
Geosynthetics, Leach Pad and Ponds					\$2,424,900
				\$2,299,50	
Heap Leach Pad Primary Liner (80 mil HDPE Smooth)	438,000	m ²	\$5.25	0	
Heap Leach Pad Secondary Liner (60 mil HDPE Smooth)	19,400	m ²	\$5.00	\$97,000	
Non-Woven Geotextile on Slopes	14,200	m ²	\$2.00	\$28,400	
Piping				\$0.00	\$487,390
4-inch Dia. Solution PCPE Pipe, Smooth Interior	30,000	m	\$3.00	\$90,000	
15-inch Dia. Solution Header PCPE Pipe, Smooth Interior	3,500	m	\$24.00	\$84,000	
24-inch Dia. Solution Header HDPE Pipe	1,300	m	\$125.00	\$162,500	
2-inch Dia. Perf. PVC Leak Detection Pipe	4,800	m	\$8.00	\$38,400	
Other Pipes & Pipe Assembly and Fittings (10% of Pipe Cost)	1	EA	\$37,490.00	\$37,490	
24-inch Dia Steel Pipe Riser Assembly	3	EA	\$25,000.00	\$75,000	
Construction and Engineering					\$280,000
Construction Quality Assurance	5	months	\$50,000	\$250,000	
Engineering Support	1	months	\$30,000	\$30,000	
Sub Total All Items =					\$7,542,085
Contingency Costs=	17.0%				\$1,282,154
Total All Costs =					\$8,824,239
Ore Capacity (M. Tons) to 70 m Heap					25.0
Unit Cost without contingency		\$US/t		\$	0.30
Usable Lined Surface Area		m ²			400,000
Unit Cost without contingency		\$US/m2		\$	18.86

Pad Construction Capital Phase 2

20KROM3STAGE 400

Item	Quantity	Units	Unit Cost	Item Cost	Subtotal
Site Preparation					\$60,000
Earthworks Mobil. and Demobil. (includes crushing plant)	1	EA	\$30,000	\$30,000	
Surveying	5	months	\$6,000	\$30,000	
Heap Leach Pad Earthworks					\$2,552,350
Import Structural Fill for Heap Leach Pad	20,000	m ³	\$7.00	\$140,000	
Local Soil Excavation to Structural Fill for Heap Leach Pad	30,000	m ³	\$3.50	\$105,000	
Local Rock Excavation to Structural Fill for Heap Leach Pad	10,000	m ³	\$5.50	\$55,000	
Surface Preparation for Soil Liner Fill & Struct Fill	385,000	m ³	\$0.30	\$115,500	
Liner Bedding for Heap Leach Pad	105,000	m ³	\$4.00	\$420,000	
				\$1,680,000	
Liner Cover Crushing and Placement	210,000	m ³	\$8.00	0	
Coarse Drain Fill Crushing and Placement	4,100	m ³	\$8.00	\$32,800	
Leak Detection Sand	90	m ³	\$45.00	\$4,050	
Pond Earthworks					\$0
Local Soil Excavation and Structural Fill for Ponds	0	m ³	\$3.50	\$0	
Local Rock Excavation and Structural Fill for Ponds	0	m ³	\$5.50	\$0	
Liner Bedding for Ponds	0	m ³	\$4.00	\$0	
Liner Cover for Ponds	0	m ³	\$8.00	\$0	
Water Diversion Earthworks					\$17,770
Channel Protection Riprap	0	m ³	\$10.00	\$0	
Soil Excavation	2,500	m ³	\$3.50	\$8,750	
Rock Excavation	1,640	m ³	\$5.50	\$9,020	
Geosynthetics, Leach Pad and Ponds					\$1,837,500
				\$1,837,500	
Heap Leach Pad Primary Liner (80 mil HDPE Smooth)	350,000	m ²	\$5.25	0	
Heap Leach Pad Secondary Liner (60 mil HDPE Smooth)	0	m ²	\$5.00	\$0	
Non-Woven Geotextile on Slopes	0	m ²	\$2.00	\$0	
Piping					\$215,028
4-inch Dia. Solution PCPE Pipe, Smooth Interior	25,000	m	\$3.00	\$75,000	
15-inch Dia. Solution Header PCPE Pipe, Smooth Interior	3,100	m	\$24.00	\$74,400	
24-inch Dia. Solution Header HDPE Pipe	160	m	\$125.00	\$20,000	
2-inch Dia. Perf. PVC Leak Detection Pipe	3,260	m	\$8.00	\$26,080	
Other Pipes & Pipe Assembly and Fittings (10% of Pipe Cost)	1	EA	\$19,548.00	\$19,548	
24-inch Dia Steel Pipe Riser Assembly	0	EA	\$25,000.00	\$0	
Construction and Engineering					\$280,000
Construction Quality Assurance	5	months	\$50,000	\$250,000	
Engineering Support	1	months	\$30,000	\$30,000	
Sub Total All Items =					\$4,962,648
Contingency Costs= 17.0%					\$843,650
Total All Costs =					\$5,806,298
Ore Capacity (M. Tons) to 70 m Heap					20.0
<i>Unit Cost without contingency</i>		\$US/t		\$	0.25
Usable Lined Surface Area		m ²			350,000
<i>Unit Cost without contingency</i>		\$US/m2		\$	14.18

Pad Construction Total Phase 1 and Phase 2

20KROM3STAGE 400

Item No.	Item	Quantity	Units	Unit Cost	Item Cost	Subtotal
100	Site Preparation					\$120,000
105	Earthworks Mobil. and Demobil. (includes crushing plant)	2	EA	\$30,000	\$60,000	
110	Surveying	10	months	\$6,000	\$60,000	
200	Heap Leach Pad Earthworks					\$5,724,800
205	Import Structural Fill for Heap Leach Pad	59,000	m ³	\$7.00	\$413,000	
210	Local Soil Excavation to Structural Fill for Heap Leach Pad	80,000	m ³	\$3.50	\$280,000	
215	Local Rock Excavation to Structural Fill for Heap Leach Pad	40,000	m ³	\$5.50	\$220,000	
220	Surface Preparation for Soil Liner Fill & Struct Fill	825,000	m ³	\$0.30	\$247,500	
225	Liner Bedding for Heap Leach Pad	225,000	m ³	\$4.00	\$900,000	
230	Liner Cover Crushing and Placement	450,000	m ³	\$8.00	\$3,600,000	
235	Coarse Drain Fill Crushing and Placement	6,800	m ³	\$8.00	\$54,400	
240	Leak Detection Sand	220	m ³	\$45.00	\$9,900	
300	Pond Earthworks			\$0.00		\$1,096,220
305	Local Soil Excavation and Structural Fill for Ponds	30,000	m ³	\$3.50	\$105,000	
310	Local Rock Excavation and Structural Fill for Ponds	155,000	m ³	\$5.50	\$852,500	
315	Liner Bedding for Ponds	11,400	m ³	\$4.00	\$45,600	
320	Liner Cover for Ponds	11,640	m ³	\$8.00	\$93,120	
400	Water Diversion Earthworks					\$38,895
405	Channel Protection Riprap	0	m ³	\$10.00	\$0	
410	Soil Excavation	6,100	m ³	\$3.50	\$21,350	
415	Rock Excavation	3,190	m ³	\$5.50	\$17,545	
500	Geosynthetics, Leach Pad and Ponds			\$0.00		\$4,262,400
505	Heap Leach Pad Primary Liner (80 mil HDPE Smooth)	788,000	m ²	\$5.25	\$4,137,000	
510	Heap Leach Pad Secondary Liner (60 mil HDPE Smooth)	19,400	m ²	\$5.00	\$97,000	
515	Non-Woven Geotextile on Slopes	14,200	m ²	\$2.00	\$28,400	
600	Piping			\$0.00		\$702,418
605	4-inch Dia. Solution PCPE Pipe, Smooth Interior	55,000	m	\$3.00	\$165,000	
610	15-inch Dia. Solution Header PCPE Pipe, Smooth Interior	6,600	m	\$24.00	\$158,400	
615	24-inch Dia. Solution Header HDPE Pipe	1,460	m	\$125.00	\$182,500	
620	2-inch Dia. Perf. PVC Leak Detection Pipe	8,060	m	\$8.00	\$64,480	
625	Other Pipes & Pipe Assembly and Fittings (10% of Pipe Cost)	1	EA	\$57,038.0	\$57,038	
630	24-inch Dia Steel Pipe Riser Assembly	3	EA	\$25,000.0	\$75,000	
700	Construction and Engineering					\$560,000
705	Construction Quality Assurance	10	months	\$50,000	\$500,000	
710	Engineering Support	2	months	\$30,000	\$60,000	
Sub Total All Items =						\$12,504,733
Contingency Costs= 17.0%						\$2,125,805
Total All Costs =						\$14,630,538
Ore Capacity (M. Tons) to 70 m Heap						45.0
Unit Cost without contingency			\$US/t		\$ 0.28	
Usable Lined Surface Area			m ²		750,000	
Unit Cost without contingency			\$US/m2		\$ 16.67	

Working Capital Calculation

20KROM3STAGE
400

Period		-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	Total
Product Inventory																
Days of Gold Inventory		30	days													
Production		ounces		107,001	116,900	129,491	121,339	110,718	117,715	139,155	65,787	16,057	5,862	2,676	-	932,703
Sales		ounces		98,207	116,087	128,456	122,009	111,591	117,140	137,393	71,817	20,144	6,700	2,938	220	932,703
Inventory		ounces		8,795	9,608	10,643	9,973	9,100	9,675	11,437	5,407	1,320	482	220	-	
Days of Silver Inventory		30	days													
Production		ounces		-	-	-	-	-	-	-	-	-	-	-	-	-
Sales		ounces		-	-	-	-	-	-	-	-	-	-	-	-	-
Inventory		ounces		-	-	-	-	-	-	-	-	-	-	-	-	-
Inventory Value		\$ x 1000		\$3,489.8	\$3,812.6	\$4,223.3	\$3,957.4	\$3,611.0	\$3,839.2	\$4,538.4	\$2,145.6	\$523.7	\$191.2	\$87.3	\$0.0	\$30,419.3
Change in Inventory Value		\$ x 1000		\$3,489.8	\$322.8	\$410.6	(\$265.9)	(\$346.4)	\$228.2	\$699.3	(\$2,392.8)	(\$1,621.9)	(\$332.5)	(\$103.9)	(\$87.3)	(\$90.0)
Accounts Receivable																
Delay in Payment		60	days													
Accounts Receivable		\$ x 1000		\$6,979.5	\$7,625.2	\$8,446.5	\$7,914.7	\$7,222.0	\$7,678.4	\$9,076.9	\$4,291.2	\$1,047.4	\$382.4	\$174.6	\$0.0	\$60,838.7
Change in Receivables		\$ x 1000		\$6,979.5	\$645.7	\$821.3	(\$531.8)	(\$692.7)	\$456.4	\$1,398.5	(\$4,785.7)	(\$3,243.8)	(\$665.0)	(\$207.8)	(\$174.6)	\$0.0
Accounts Payable																
Delay in Payment		25	days													
Accounts Payable		\$ x 1000		\$35.3	\$1,878.1	\$2,204.1	\$1,950.9	\$1,761.6	\$1,812.6	\$1,730.8	\$679.4	\$78.4	\$28.6	\$13.1	\$0.0	\$14,118.9
Change in Payable		\$ x 1000		\$35.3	\$1,842.9	\$258.3	(\$253.1)	(\$189.3)	\$51.0	(\$81.8)	(\$1,051.4)	(\$601.0)	(\$49.8)	(\$15.6)	(\$13.1)	\$0.0
Working Capital Requirements																
(I+AR-AP)		\$ x 1000		\$8,591.1	\$9,492.0	\$10,465.7	\$9,921.1	\$9,071.3	\$9,704.9	\$11,884.5	\$5,757.4	\$1,492.6	\$544.9	\$248.8	\$0.0	
Change in Working Capital																
Change		\$ x 1000		\$8,626.4	\$900.9	\$973.7	(\$544.6)	(\$849.8)	\$633.6	\$2,179.6	(\$6,127.1)	(\$4,264.8)	(\$947.7)	(\$544.9)	\$0.0	(\$90.0)

General & Administration Annual Costs

Item		#	RMB	US\$	US\$ Total/year
Minesite Staff					
General Manager	Expatriate	1		174,000	174,000
Chief Engineer	Expatriate	1		140,000	140,000
Plant Superintendent	Expatriate	1		140,000	140,000
Subtotal Expatriate		3			454,000
Administration Supervisor	Local	1	116,400	14,353	14,353
Janitors & Labor	Local	5	18,000	2,219	11,097
Cooks	Local	3	24,000	2,959	8,878
Drivers	Local	4	24,000	2,959	11,837
Accountants & Clerks	Local	6	36,000	4,439	26,634
Public Relations	Local	2	36,000	4,439	8,878
Assistant to General Manager	Local	1	64,800	7,990	7,990
Director Safety, Environmental	Local	1	84,000	10,358	10,358
Safety Inspectors	Local	4	48,000	5,919	23,674
Chief Security	Local	1	48,000	5,919	5,919
Security Guards	Local	8	26,400	3,255	26,042
Human Resources Director	Local	1	84,000	10,358	10,358
Human Resources Assistants	Local	3	42,000	5,179	15,536
Chief Warehouseman	Local	1	60,000	7,398	7,398
Warehouseman	Local	5	36,000	4,439	22,195
Subtotal Nationals		46			211,147
Total Mine Staff		49			665,147
Baotou Office Staff					
Chief Accountant	Expatriate	1		100,000	100,000
Subtotal Expatriate		1			100,000
Office Manager	Local	1	54,000	6,658	6,658
Accountants & Clerks	Local	6	36,000	4,439	26,634
Drivers	Local	1	24,000	2,959	2,959
Purchasing Agent	Local	1	60,000	7,398	7,398
Buyer	Local	2	42,000	5,179	10,358
Expediter	Local	1	30,000	3,699	3,699
Clerk	Local	3	36,000	4,439	13,317
Subtotal Nationals		15			71,023
Total Baotou Staff		16			171,023
General Benefits					
Subtotal National Wages					282,170
Fringe Benefits (re: Gerke Report)	49%				138,263
Summary					
Subtotal Staff & Labor Cost					974,434
Camp Maintenance and Supplies					
Pro-rated for Site	People on Site	250		2,500	625,000
Light Vehicle Operation					
		Units	km	\$/km	
Pickup Trucks	Vehicles	15	15,000	0.25	56,250

Rent and Office Supplies					
Baotou	(from 2005 Budget)				18,659
Yinchaun	(Estimate)				12,000
Subtotal					30,659
Head Office Charges					
Vancouver / Beijing Office	Expatriate	4		100,000	400,000
Public Relations					
Public Relations Expense					50,000
Contingency					
Subtotal Before Contingency					3,110,776
Contingency	25%				777,694
GRAND TOTAL					3,888,470
Unit Cost					
Annual Production Rate	tpa				7,100,000
Unit Cost	US\$/t ore				0.55
Exchange	RMB/US\$				8.11

Base Case - Processing Cost

Item	ROM Oxide RMB / tonne	Crushed Leach RMB / tonne	ROM Oxide US\$ / tonne	Crushed Leach US\$ / tonne	ROM Oxide US\$ Total/year	Crushed Leach
Labor	0.71	0.82	0.088	0.101	625,250	714,118
Primary Crushing		0.61	-	0.075	-	535,005
Fine Crushing		2.44	-	0.300	-	2,132,181
Stacking	0.10	0.10	0.013	0.013	91,048	91,048
Leaching	0.32	0.32	0.039	0.039	278,819	278,791
CIC and Carbon Stripping	0.58	0.56	0.072	0.069	509,867	487,413
Refining	0.09	0.09	0.012	0.012	82,098	82,098
Carbon Handling	0.12	0.12	0.015	0.015	109,196	107,310
Reagents	3.68	4.67	0.453	0.576	3,217,952	4,087,433
Laboratory	0.36	0.36	0.045	0.045	318,012	318,012
Support Services	0.23	0.23	0.029	0.029	203,048	203,048
Total	6.21	10.32	0.766	1.273	5,435,290	9,036,457
Process Rate	tpa	7,100,000				
Exchange Rate	RMB / \$US	8.11				

Base Case - Mining Cost

Item		#	RMB	US\$	US\$ Total/year
Minesite Staff					
Engineer	Local	3	116,400	14,353	43,058
Geologist	Local	3	116,400	14,353	43,058
Technician	Local	3	18,000	2,219	6,658
Surveyor	Local	3	24,000	2,959	8,878
Surveyor Helper	Local	3	24,000	2,959	8,878
Sampler	Local	3	36,000	4,439	13,317
Clerk	Local	3	36,000	4,439	13,317
Subtotal Nationals		21			137,164
General Benefits					
Subtotal National Wages					137,164
Fringe Benefits (re: Gerke Report)	49.0%				67,210
Summary					
Subtotal Staff & Labor Cost					204,374
Office Expenses & Miscellaneous					
Mine Planning Software					15,000
Computer Hardware and Supplies					20,000
GPS, Survey Equipment & Supplies					5,000
Communications					12,000
Consulting - Geotech, Resources etc.					100,000
Verification Surveys - Flyovers etc					25,000
Subtotal					177,000
Contingency					
Subtotal Before Contingency					381,374
Contingency	25.0%				95,344
GRAND TOTAL					476,718
Unit Cost					
Annual Production Rate	tpa				7,100,000
Unit Cost	US\$/t ore				0.07
Exchange	RMB/US\$				8.11
Summary					
Contract Mining Cost Waste			8.08		1.00
Contract Mining Cost Weathered Ore			8.46		1.04
Contract Mining Cost Fresh Ore			8.82		1.09
Overhaul to Pad One					
Total Cost Weathered Ore					1.11
Total Cost Fresh Ore					1.15

Base Case - Capital Cost Mine Area

PRE-PRODUCTION STRIPPING					
Scheduled Operating Costs YR -1					\$ 514.8
Subtotal					\$ 514.8
HAULAGE ROADS					
Pit to NW Dump NE Access	N/C				\$ -
Pit to NW Dump NW Access	N/C				\$ -
Pit to SE Dump	N/C				\$ -
Pit to South Pad			2500	\$ 50.00	\$ 125.0
Pit to Engineering Offices			550	\$ 25.00	\$ 13.8
Culverts			2	\$ 50,000	\$ 100.0
Subtotal					\$ 238.8
MINE OFFICE					
Mine Office - Based Upon BGRIMM			1	\$ 137,500	\$ 137.5
Subtotal					\$ 137.5
MINE EQUIPMENT					
					\$ -
Subtotal					\$ -
LIGHT VEHICLES					
Pickup Trucks			4	\$ 30,000	\$ 120.0
Subtotal					\$ 120.0
ENGINEERING SYSTEMS					
			Units	Unit Cost \$US	\$US x 1000
Computers			15	\$ 5,000	\$ 75.0
Plotters			2	\$ 10,000	\$ 20.0
Software Mine Planning			2	\$ 45,000	\$ 90.0
Software Office Package			15	\$ 500.00	\$ 7.5
Survey Instruments GPS			3	\$ 1,500	\$ 4.5
Survey Instruments Level			1	\$ 1,500	\$ 1.5
Survey Instruments Total Station etc.			1	\$ 30,000	\$ 30.0
Radios			15	\$ 500	\$ 7.5
Phones			12	\$ 300	\$ 3.6
Furniture drafting tables etc.			1	\$ 50,000	\$ 50.0
					\$ -
Subtotal					\$ 289.6
EXPLOSIVES STORAGE					
			Units	Unit Cost \$US	\$US x 1000
Magazines			3	\$ 20,000	\$ 60.0

Fencing			700	\$ 20.00	\$ 14.0
Guard Station			1	\$ 5,000	\$ 5.0
Access Road			2000	\$ 25.00	\$ 50.0
Subtotal					\$ 129.0

DIVERSION DITCHES AND DAMS

	Length meters	Depth meters	Volume m ³	Unit Cost \$US	\$US x 1000
Interception Ditch NE	1000	4	8000	\$ 3.50	\$ 28.0
Dam Core			42500	\$ 8.00	\$ 340.0
Subtotal					\$ 368.0

DEWATERING

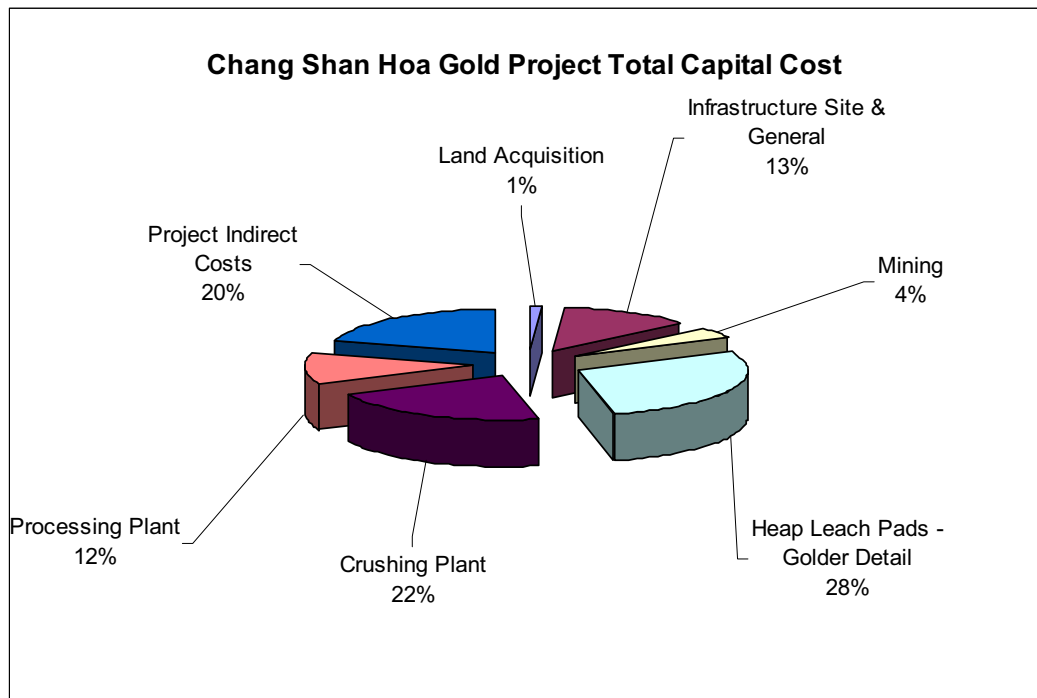
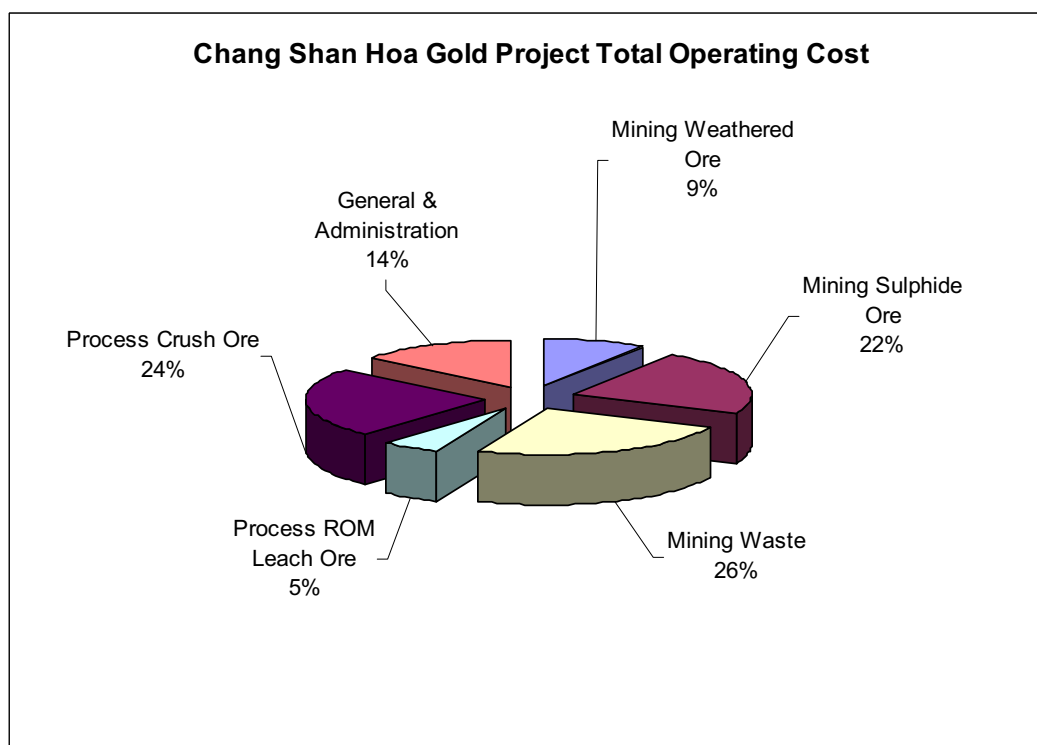
			Units	Unit Cost \$US	\$US x 1000
Generator			3	\$ 6,000	\$ 18.0
Wells			1	\$ 22,500	\$ 22.5
Pipeline 4" to Plant Area			4800	\$ 12.00	\$ 57.6
Submersible Pumps			3	\$ 1,500	\$ 4.5
Pit Sump Pump			2	\$ 10,000	\$ 20.0
Subtotal					\$ 122.6

SUMMARY

Total					\$ 1,920.2
-------	--	--	--	--	-------------------

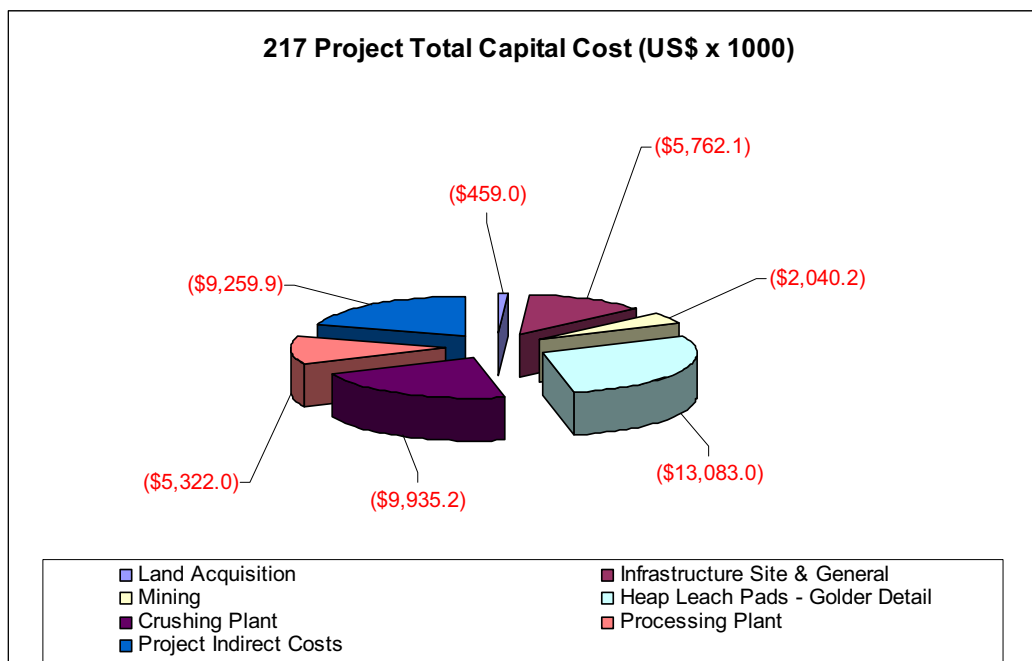
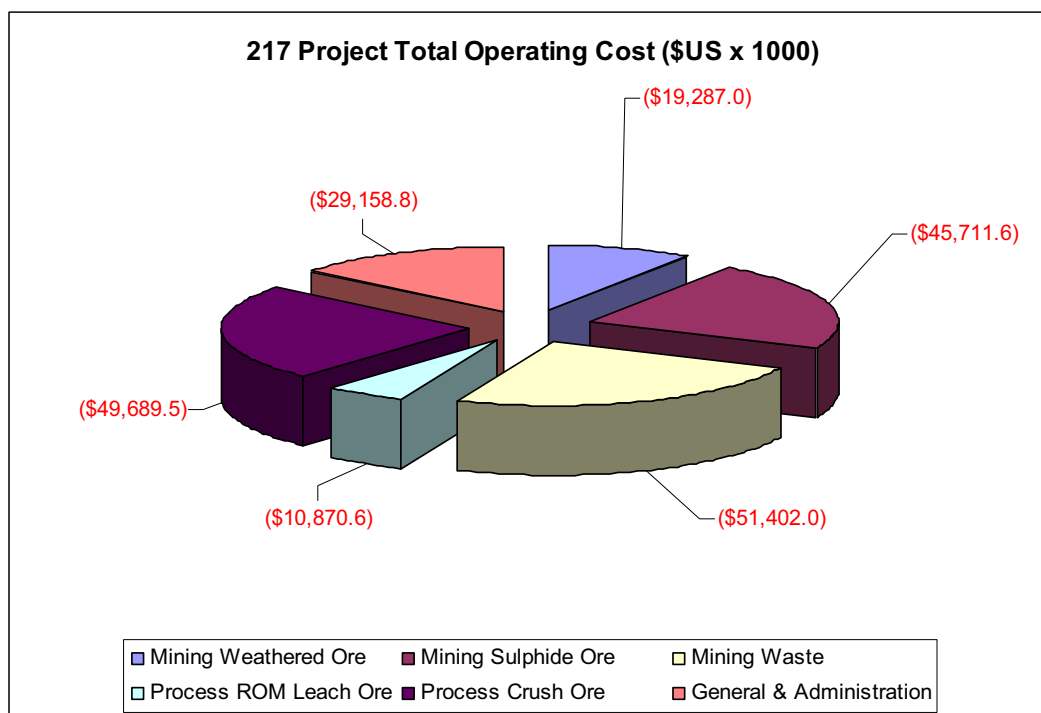
Base Case - Cost Model

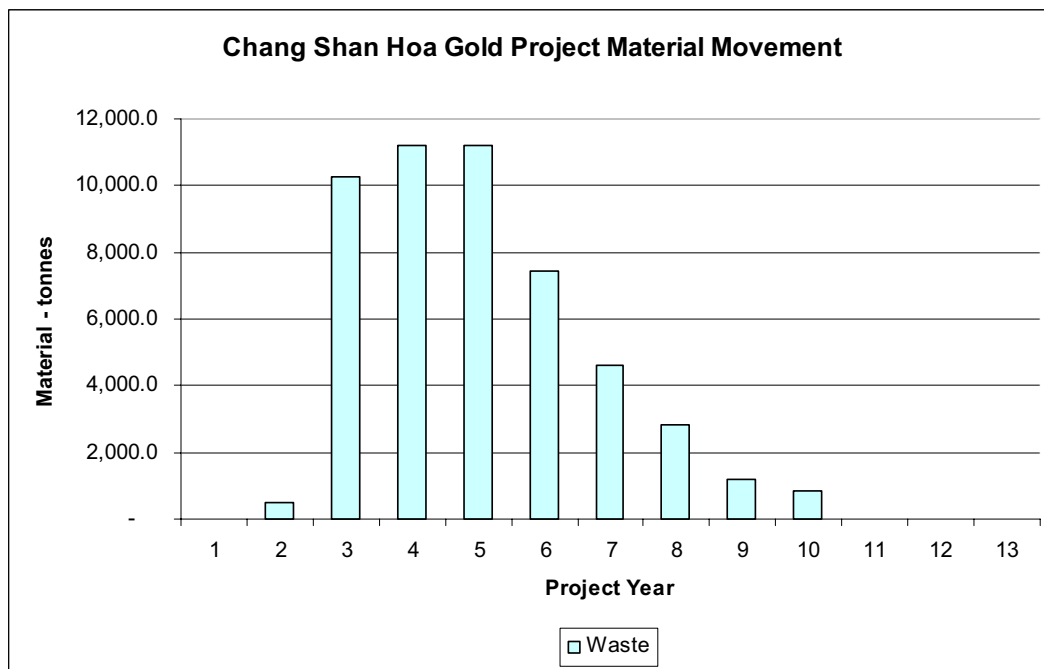
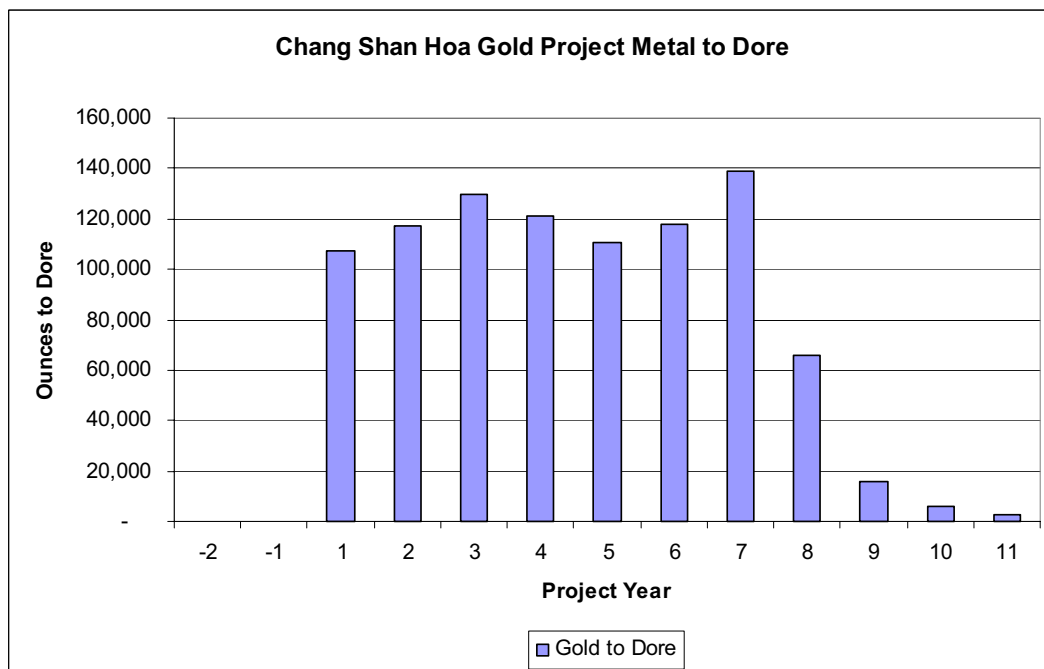
20KROM3STAGE 400

**Figure 22.3: Total Capital Cost - Percent****Figure 22.4: Total Operating Cost - Percent**

Base Case - Cost Model

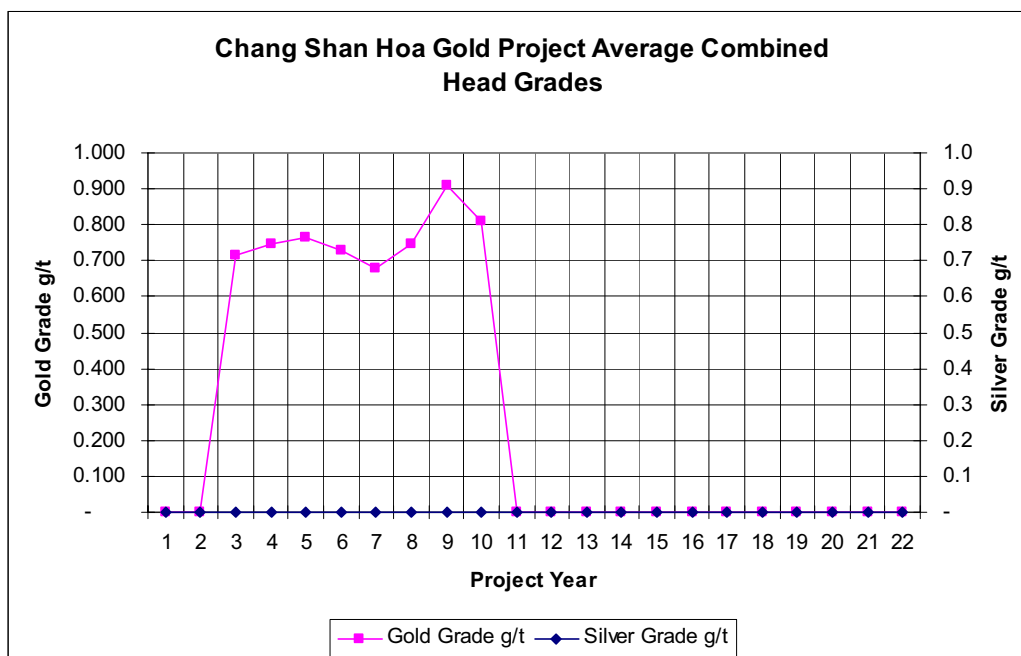
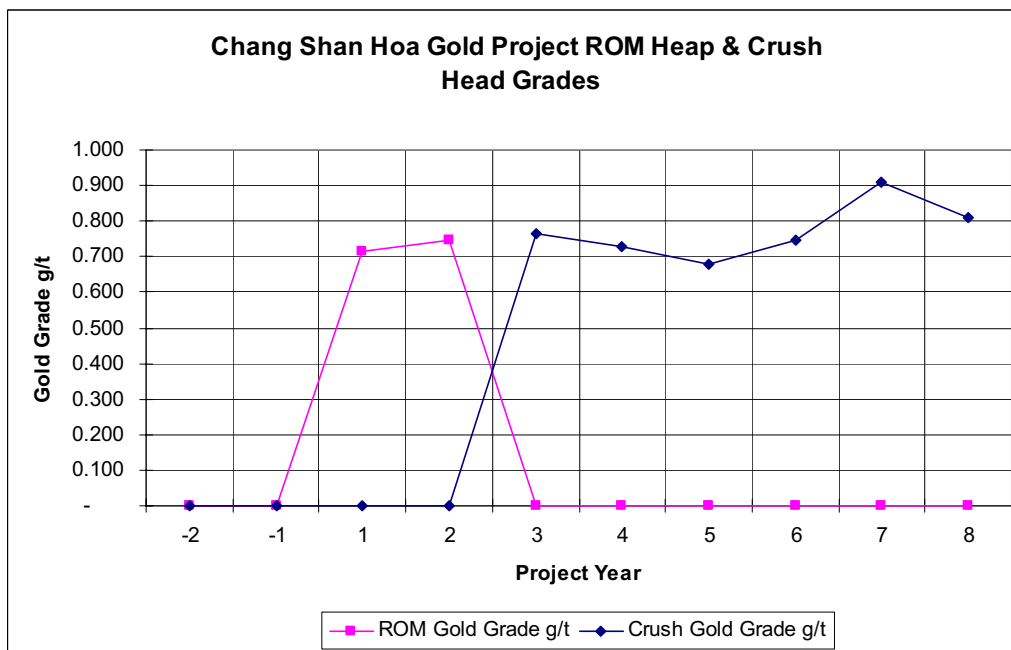
20KROM3STAGE 400

**Figure 22.5: Total Capital Cost - US\$****Figure 22.6: Total Operating Cost - US\$**

Production 20KROM3STAGE 400**Figure 22.7: Production - Material Movement****Figure 22.8: Production - Metal to Dore**

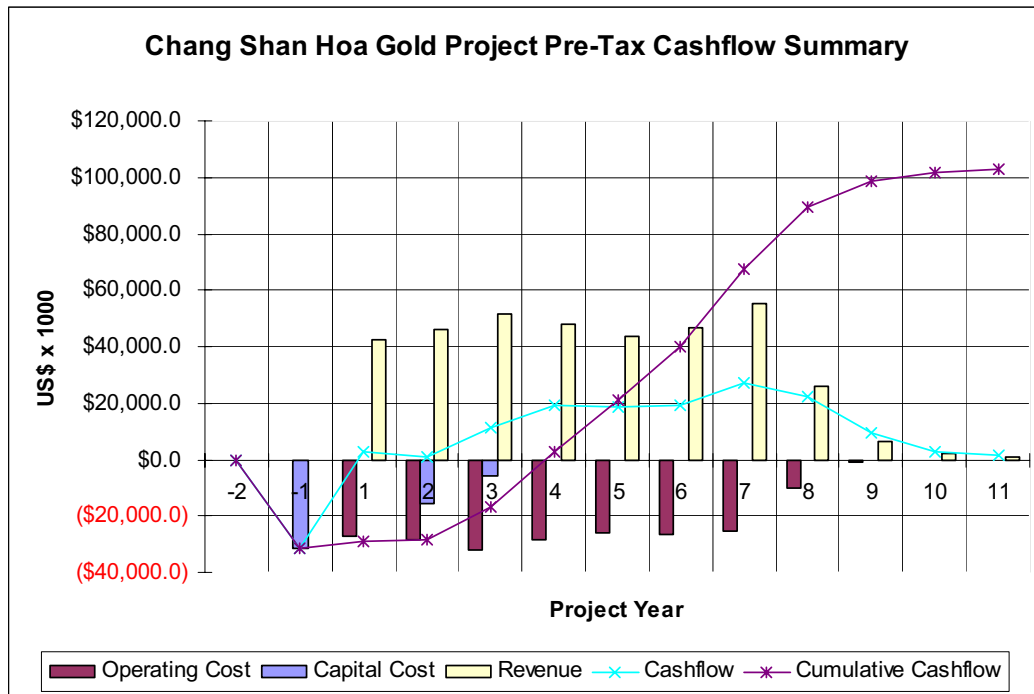
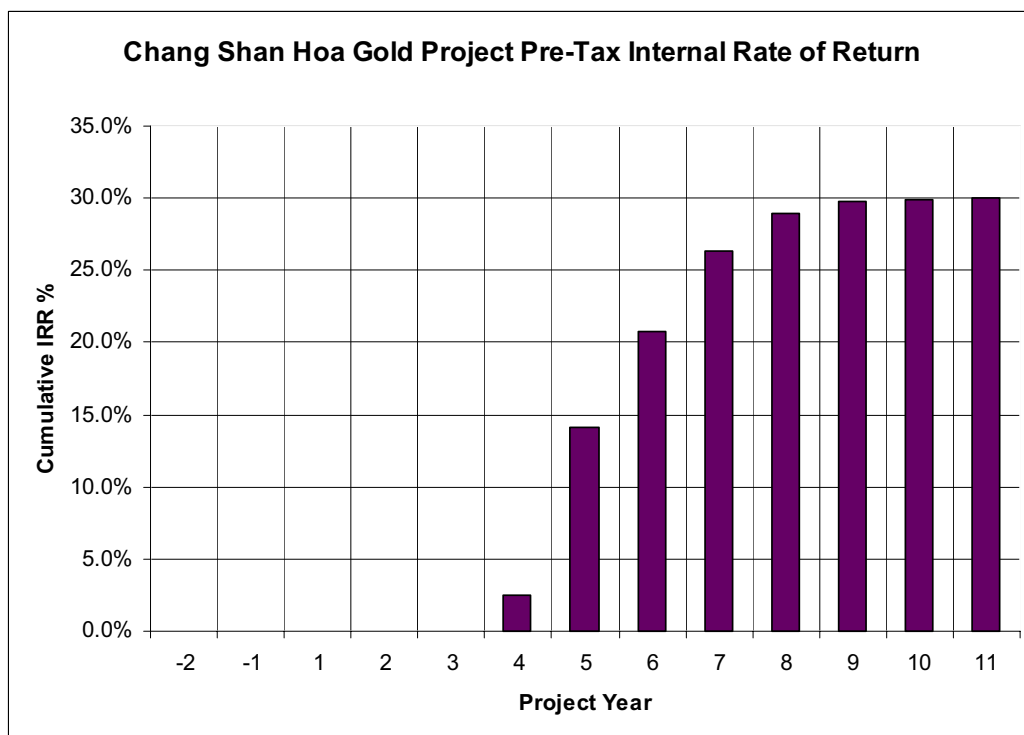
Heads

20KROM3STAGE 400

**Figure 22.9: Average Combined Head Grades****Figure 22.10: ROM Heap & Crush Head Grades**

Cash Flow Model

20KROM3STAGE 400

**Figure 22.11: Pre-Tax Cash Flow Summary****Figure 22.12: Pre-Tax Internal Rate of Return**

23.0 INTERPRETATION AND CONCLUSIONS

23.1 Mineral Resources

The deposit in the northeast area is well delineated, and although some potential exists for down-dip and lateral extensions, as for example a smaller splice of mineralized material, it is not considered to be significant. However, some additional drilling will be necessary to prove up the lower elevations of the deposit, currently mostly classified as inferred mineralization.

The 2004 drilling campaign confirmed the southwest zone as a target that adds significant value to the property under the economic scenarios analyzed. One attractive aspect of the southwest zone is that it has higher gold grades. However, about 50 percent of the estimated resource is still in the inferred category and needs confirmation, in addition to those portions of the mineralized envelope that haven't been estimated. The gold mineralization in the southwest zone is more variable, with narrower zones, and currently drilled at 100 meter sections or less. The 2005 drilling is partially intended to prove up the southwest zone, laterally and at depth.

23.2 Data Handling and QA/QC Programs

As the project progresses, smooth data transfers, proper backups, and documentation of procedures in place will be even more important. For example, the authors have not confirmed the quality of the computerized database with respect to laboratory certificates, even though it is perceived as being good or very good. Independent checks on about 10 percent of the database did not find any significant errors.

Also, the sampling protocols have been improving according to the results of the Heterogeneity Test completed in early 2004, including the purchasing of additional equipment for the mine laboratory.

23.3 Open Pit Mining Operations

A mine plan and production schedule has been developed for a process rate of 20,000 tonnes per day. The schedule appears achievable from the point of view of ore release, sinking rates and available working space. The mine life will be just over seven years. A total of 52.3 million tonnes of ore with an average grade of 0.76 grams per tonne gold will be placed on the heap leach pads. The total waste mined will be 50.1 million tonnes for a strip ratio of 0.96:1. It is estimated that a total of 929,000 ounces of gold will be recovered.

This plan assumes contractor mining forces and presents costs associated with pre-qualification estimates. These costs will change when firm bids are tendered for the 20,000 tonnes per day schedule variant.

23.4 Metallurgical Testing and Mineral Processing

The initial metallurgical testing program investigated a number of different beneficiation techniques to process the CSH ores. Processing technologies that were suggested and/or subjected to initial testing included run-of-mine heap leaching, open circuit secondary crushing followed by heap leaching, closed circuit tertiary crushing followed by heap leaching, crushing followed by desliming with gravity concentration for the fine fraction and heap leaching for the coarser material, and grinding followed by a combination of gravity concentration, flotation, and cyanidation.

An extensive column leach test program was conducted at the Baogang Technical Institute in Baotou, Inner Mongolia in 2004 and 2005. The information derived from that testing program revealed that the oxidized ore (also termed weathered ore) was relatively insensitive to particle size distribution and gave acceptable gold extraction rates and levels. Consequently, for the purpose of the development report mineral processing flowsheet it was assumed that the oxidized ore would be treated by a run-of-mine heap leach.

Column tests were also conducted at the Baogang Technical Institute on sulfide ore (also termed fresh ore) that was extracted from a decline into the sulfide portion of the ore body. These tests were initiated in early 2005 and the program concluded in October 2005. Results of that test program revealed that gold extraction was influenced by particle size distribution. Test data and heap leach projections indicated that acceptable gold extraction rates and levels required crushing the sulfide ore to a size distribution of 80 percent passing 8 millimeters. Based on this information, an equipment assemblage was developed to crush an average of 20,000 tonnes per day of sulfide ore to the size distribution mentioned above.

Substantiating the selected beneficiation scheme are two large test heaps under leach at the Jinshan mine site. These test heaps have been under leach during the summer and fall of 2005 and projections from actual performance indicate that the gold extraction from this run-of-mine oxide ore will exceed 80 percent.

As a consequence of the column test program and the pilot heaps, gold extraction levels of 80 percent for run-of-mine oxide ore and 70 percent for closed circuit tertiary crushed sulfide ore were used in the development report.

The CSH ore body is low grade. It is unlikely that gold could be economically extracted if fine grinding was required as part of the beneficiation scheme. The differential gold extraction between heap leaching and fine grinding plus flotation or direct cyanidation would likely not offset the capital and operating cost increases imposed by grinding.

24.0 RECOMMENDATIONS

As a result of considerable effort by Jinshan Gold Mines employees and geological, mining, geotechnical, mineral processing, and environmental consultants sufficient technical information is available to produce this development report. It is acknowledged that this engineering study qualifies as a pre-feasibility level information document according to Canadian National Instrument 43-101.

The economic model utilized in this report indicated a before tax rate of return of 30 percent at an assumed gold price of US\$ 400 per ounce. If the gold price used in the economic evaluation, which excludes inferred resources, is increased to US\$ 440 per ounce (a price that prevailed in August 2005) then the before tax rate of return increases to over 40 percent.

Based upon the information developed by the financial model, it is considered prudent to proceed with the project to develop sufficient information so that a technical report can be produced that will qualify as a feasibility study according to the definition in the National Instrument 43-101. That definition is as follows:

"Feasibility study means a comprehensive study of a deposit in which all geological, engineering, operating, economic, and other relevant factors are considered in sufficient detail that it could reasonably serve as the basis for a final decision by a financial institution to finance development of the deposit for mineral production."

Ongoing work necessary to achieve sufficient information to produce a feasibility study, excluding the purchase of capital equipment, as defined above will require the following efforts, which are expected to cost between US\$ 1.5 and US\$ 2.0 million:

- Additional infill drilling
- Reclassification of the resource as dictated by the infill drilling
- Finalization of all aspects of the leaching and metallurgical processes
- Completion of sufficient engineering design for acquisition of fixed price bids for contract mining, leach pad development, process plant design, power and water acquisition, and all required infrastructure components.

The authors of this report are of the opinion that the character of the CSH Gold Project is of sufficient merit to carry out the aforementioned items and it is recommended that the CSH Project be funded such that all required information to produce a feasibility study document can be developed.

25.0 REFERENCES

- **Andrew, R.L., 1980.** *Supergene alteration and gossan textures of base-metal ores in southern Africa*; Mineral Science and Engineering, vol. 12, No. 4, pp.193-215.
- **BFMR, 1991.** *Bureau of Geology and Mineral Resources of Inner Mongolia Autonomous Region: Regional Geology of Inner Mongolia Autonomous Region*, Geological Memoirs, Series 1, Number 25, p. 725, 1991.
- **BGRIMM, Project 416-2005, Engineering Study Report on Haoyaoerhudong Gold Mine**, Wulatezhonggi, Inner Mongolia, June 2005.
- **Chao, E.C.T., Back, J.M., Minkin, J.A., Tatsumoto, M., Junwen Wang, Conrad, J.E., McKee, E.H., Xonglin Hou, Qingrun Meng and Shengguang Huang.** *The Sedimentary Carbonate-Hosted Giant Bayan Obo Ree-Fe-NB Ore Deposit of Inner Mongolia, China: A Cornerstone Example for Giant Polymetallic Ore Deposits of Hydrothermal Origin*; U.S. Geological Survey Bulletin, 2143, 1997.
- **Cheng, X.C.** *Summary report, Abuda Gold Prospect, Inner Mongolia, China.* Southwestern Gold Corporation and Global-Pacific Minerals Inc., February, 33p., 1999.
- **Cheng, X.C. and Paterson, J.,** *Summary Report, Haoya Gold Project*, Inner Mongolia, China, March 2000.
- **Coughlin, T.** *Regional Stratigraphic Setting of the Inner Mongolia Study Area, Exploration Implications and Targeting Criteria.* A technical report for Southwestern Gold Corporation, 1997, p. 34.
- **Deustch, C.V.,** *DECLUS: a FORTRAN 77 Program for Determining Optimum Spatial Declustering Weights*, Computers & Geosciences, 15(3): 325-332, 1989.
- **Deustch, C.V., and Journel, A.G.,** *GSLIB: A Geostatistical Software Library and User's Guide*, Oxford University Press, New York, 340p., plus CD-ROM, 1997.
- **England, R. N., 2003,** *Petrographic Notes For 46 Samples For The 217 Gold Project*, Inner Mongolia.
- **Froidevaux, R., and Journel, A.G.,** *Prediction of Local Ore Recoveries and Ore-Waste Ratios at the Silver Bell Uranium Mine*, Mathematical Geology, vol. 14, pp. 645-660, 1982.
- **Froidevaux, R., and Journel, A.G.,** *Prediction of Local Ore Recoveries and Ore-Waste Ratios at the Silver Bell Uranium Mine*, Mathematical Geology, vol. 14, pp. 645-660, 1982.

- **Fuchter, W.H.**, *Past Production From the CSH Property, Nei Mongol, China*, An Internal Report to Jinshan Gold Mines, June 2004.
- **Geological Exploration Brigade 412, CNNC Inner Mongolia**. *Outline Geology and Statistics of Gold Grade at Abuda Prospect*, Damao Banner of Inner Mongolia Autonomous Region, 1997.
- **GeoSystems International**, *Sample heterogeneity analysis*, Memo JSH04-09, for Jinshan Gold Mines, 23p., December 2004.
- **GeoSystems International and Kirkham Geosystems**, *Resources Model Update, 217 Gold Project*, Internal Report to Pacific Minerals Inc., January 2004.
- **Independent Engineers of Australia**, *Phase1: Overview of Project 217*, November 1, 2003, 20pp., Internal Report to Pacific Minerals, Inc.
- **Isaaks, E.H.**, *SAGE2001 Documentation*, www.isaaks.com, 68pp, 2001.
- **Isaaks, E.H., and Srivastava, R.M.**, *An Introduction to Applied Geostatistics*, Oxford University Press, 561p, 1989.
- **Journel, A.G., and Huijbregts, Ch.J.**, *Mining Geostatistics*, Academic Press, 600p, 1978.
- **Lakefield, 2004**, An investigation of gold recovery from 217 gold samples, for Pacific Minerals Inc, Report No LR10481-002, Progress Report No 1, 29p plus appendices.
- **Lin Tan, Xiaohong Zhang, Zhanjiang Wu and Jinlong Wang**. *Ore Deposits, Mineralogy and structural Geology of Bayan Obo Niobium-Rare-Earth-Iron Mine*, Inner Mongolia Autonomous Region, Field Trip Guide of 30th International Geological Congress Vol. 4, pp. T103.1-37, 1996.
- **Miller, L.D., Goldfarb, R.J., Nie, F., Hart, C., Miller, M.L., Yang, Y. and Liu, Y.**, *North China Gold, a Product of Multiple Orogens*; n SEG Newsletter, n. 33, 8 p, 1998.
- **Mineralium Deposita**, Vol. 37, No. 3-4. April 2002. *Tectonics and metallogeny of gold deposits in China*, pp. 248-418.
- **Mullens**. *Targeting and Prospectivity of the Inner Mongolia Cooperative Area*, A Technical Report for the Haudi Mining Company, A Joint Venture Between Southwestern Gold Corporation, Global Pacific Minerals Inc. and CNNC, Inner Mongolia, 14 pp, 1997.
- **Nanchang Engineering & Research Institute of Nonferrous Metal (NERIN)**, *Engineering Report, 217 Gold Project, Nei Mongol, P.R. of China*, November 2003.

- **Page, M. (Exploration Services International)**, Petrological Reports for Jinshan Gold Mines Nos. 2005-01 and 2005-01, February 2005.
- **Rossi, M.E. and Parker, H.M.**, *Estimating Recoverable Reserves: Is It Hopeless?*, presented at the Forum 'Geostatistics for the Next Century', Montreal, Quebec, Canada, June 3-5, 1993.
- **Rossi, M.E., Parker, H.M., and Roditis, Y.S.**, *Evaluation of Existing Geostatistical Models and New Approaches in Estimating Recoverable Reserves*, presented at the XXIV APCOM'93, Montreal, Quebec, Canada, 1993.
- **Rossi, M.E., Tutton, D.A., and Nilsson, J.W.** *Preliminary Assessment of the Chang Shan Hao 217 Gold Project, Nei Mongol, People's Republic of China*, filed with SEDAR dated April 15, 2005.
- **Sengör, A.M.C., Natal'in, B.A. and Burtman, V.S.** 1993. *Evolution of the Altaid Tectonic Collage and Palaeozoic Crustal Growth in Eurasia*; in *Nature*, v. 364, pp. 299-307.
- **SGS Lakefield Research Limited, 2002.** *Mineralogical Determination of Gold Deportment in Two Composites from the 217 Project*, Report for Pacific Minerals Inc.
- **Srivastava, R.M., and Parker, H.M.**, *Robust Measures of Spatial Continuity*, in M. Amstron, Ed., *Geostatistics*, pp. 295-308, Reidel, Dordrecht, Holland, 1988.
- **Technical Report on the Chang Shan Hao 217 Gold Project**, December 2004, Jinshan Mines Team.
- **Wang, H.**, Chief compiler. 1985. *Atlas of the Paleogeography of China*; Beijing Institute of Geology.
- **Wang, H. and Mo, X.** *An Outline of the Tectonic Evolution of China*; Episodes, v. 18, pp. 6-16, 1995.
- **Westervelt, RD, 1004**, A summary review report on the 217 Gold Project, Nei Mongol, Peoples Republic of China, for Pacific Minerals Inc, 52p.
- **Westervelt, RD, 2002**: *A Summary review report on the 217 gold project, Nei Mongol, P.R. of China*, for Pacific Minerals Inc., 182p.
- **Westervelt, R.D.**, *A Supplemental Report on the Diamond Drilling Programs on the 217 Gold Project, Nei Mongol, P.R., of China*, February 2003, Vancouver, 98p.
- **Westervelt, R.D.**, *A Summary Review Report on the 217 Gold Project, Nei Mongol, P.R., of China*, February 18, 2004, Vancouver, 365p.

- **Xie, Shaun**, *Preliminary Water Resource Investigation: 217 gold Mining Project, Inner Mongolia, China*, Ref: S-24122, Environmental Resources Management for Jinshan Gold Mines Inc., 2004, 31p.
- **Xie, Shaun**, *Soil and Water Conservation Investigation: ChangShanHao 217 gold Project, Inner Mongolia, China*, Ref: S-24122, Environmental Resources Management for Jinshan Gold Mines Inc., 2005, 70p.
- **Xie, Shaun, 2004**, Preliminary Water Resource Investigation: 217 gold Mining Project, Inner Mongolia, China, Reference: S-24122, Environmental Resources Management for Jinshan Gold Mines Inc, 31p.
- **Xie, Shaun, 2005**, Soil and Water Conservation Investigation: ChangShanHao 217 gold Project, Inner Mongolia, China, Reference: S-24122, Environmental Resources Management for Jinshan Gold Mines Inc, 70p.
- **Yeqi Cheng, Yiming Zhao and Wenwei Lin**. 1995. Iron Deposits of China; Mineral Deposits of China, Vol. 3, edited by the Editorial Committee of Mineral Deposits of China, pp. 1-112.
- **Zhao, Chunjing and Zhitong Li**. *The Granites of Central Inner Mongolia in Paleozoic Plate Tectonics, Collection of papers on plate tectonics of North China*, Shengyang Institute of Geology and Mineral Resources, Sheggyan, China, V.2, pp. 80-100, 1987.

26.0 DATE PAGE & CERTIFICATE**DATE**

The effective date of this report is 19 October 2005.

CERTIFICATES

Certificates for the following individuals are attached

**Joseph M. Keane, P.E.
Mario Rossi, P. Geo.
John Nilsson, P. Eng.
Russell Browne, P.E.**

CERTIFICATE of AUTHOR

I, Joseph M. Keane, P.E. do hereby certify that:

1. I am President of:

K D Engineering Co., Inc.
7701 N. Business Park Drive
Tucson, Arizona 85743
Telephone: 520-579-8315
Fax: 520-579-8315
E-Mail: jkeane@kdengco.com

2. I graduated with a degree of Bachelor of Science in Metallurgical Engineering from the Montana School of Mines in 1962. I obtained a Master of Science in Mineral Processing Engineering in 1966 from the Montana College of Mineral Science and Technology. In 1989 I received a Distinguished Alumni Award from that institution.
3. I am a member of the Society for Mining, Metallurgy, and Exploration, Inc. (SME) and the Instituto de Ingenieros de Minas de Chile. I am a registered professional metallurgical engineer in Arizona and nine other states.
4. I have worked as a metallurgical engineer for a total of 43 years since my graduation from university.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the final assembly of the technical report titled "Jinshan Gold Mines, Inc., Chang Shan Hao (CSH) Gold Project, Inner Mongolia, PRC" (the Technical Report) dated 19 October 2005. I am directly responsible for the preparation of Sections 1.0 and 19.0 and made contributions to Section 21.0. I visited the property twice in conjunction with the Technical Report. The first visit was from 1 to 4 April 2005 and the second was from 7 to 9 June 2005.
7. I have not had prior involvement with the property that is the subject of the Technical Report.

7701 N. Business Park Drive
Tucson, AZ 85743

Telephone: (520) 579-8315
Facsimile: (520) 579-3686
E-Mail: jkeane@kdengco.com

8. 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.
9. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.
10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Dated this 19th Day of October 2005



Signature of Qualified Person

Joseph M. Keane

Print Name of Qualified Person



Nilsson Mines Services Ltd.
Telephone: 604 465 0703
Fax: 604 465 0731
Email: jnilsson@shaw.ca

CERTIFICATE OF AUTHOR

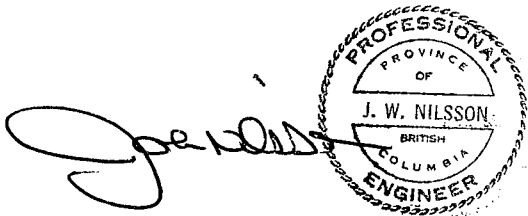
I, John Nilsson P.Eng., do hereby certify that:

1. I am President of:

Nilsson Mine Services Ltd.
20263 Mountain Place
Pitt Meadows, British Columbia
V3Y 2T9
2. I graduated with a Bachelors degree in Geology from Queen's University in 1977. In addition, I have obtained a Masters degree in Mining Engineering from Queen's University in 1990.
3. I am a member of the Association of Professional Engineers of British Columbia.
4. I have worked as a geologist and mining engineer for a total of 28 years since my graduation from university.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education and affiliation with a professional association (as defined in NI 43-101) and relevant work experience, I fulfill the requirements to be a "qualified person" for the purpose of NI 43-101.
6. I am responsible for Section 17.0 and the economic evaluation spreadsheet in Section 22.0 of the report entitled: "Jinshan Gold Mines, Inc., Chang Shan Hao Gold Deposit, Inner Mongolia, PRC" (the Technical Report) dated 19 October 2005.
7. I have had prior involvement with the property that is the subject of the Technical Report. I was responsible for the preparation of the estimation of resources and in-pit resources at the CSH Gold Deposit for the technical report filed on SEDAR on April 20, 2005. In July 2003, I performed preliminary pit optimization work. In July 2004, I performed pit design for the small-scale mining of the NE zone.
8. I visited the site of the Chang Shan Hao Gold Deposit in October 22-24, 2004 and June 7-9, 2005.

9. I am not aware of any material fact or material change 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.
10. I am independent of the issuer applying all tests in section 1.5 of National Instrument 43-101.
11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Dated this 19th Day of October, 2005.

A handwritten signature in cursive script, appearing to read 'John Nilsson', is written over a circular professional engineer stamp. The stamp is for the Province of British Columbia and contains the text 'PROFESSIONAL ENGINEER', 'J. W. NILSSON', and 'BRITISH COLUMBIA'.

John Nilsson, P.Eng.

Golder Associates Inc.

6165 Ridgeview Court, Suite F
Reno, NV USA 89509
Telephone (775) 828-9604
Fax (775) 828-9645



CERTIFICATE of CO-AUTHOR

I, Russell A. Browne, P.E do hereby certify that:

1. I am a Senior Project Manager of:

Golder Associates Inc.
6165 Ridgeview Court, Suite F
Reno, Nevada 89509
Telephone: 775-828-9604
Fax: 775-828-9645
Email: rbrowne@golder.com

2. I graduated with a Bachelor of Science degree in Civil Engineering from California Polytechnic State University at San Luis Obispo in 1981. I graduated with a Master of Science degree in Civil/Geotechnical Engineering from University of California at Berkeley in 1985.
3. I am a member of the Society for Mining, Metallurgy, and Exploration (SME), and the American Society of Civil Engineers (ASCE) and am a registered professional Civil Engineer in the United States of America in Nevada and Washington states.
4. I have worked as an engineer for a total of 23 years since my graduation from university, 17 of which have been in the mining industry designing heap leach facilities and other process and waste containment facilities.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of *Section 18-Heap Leach Facility Design and Construction*, *Appendix 2 - Leach Pad Construction Estimate*, and *Appendix 8 - Design Report for the South Heap Leach Facility, CSH Gold Project*, all parts of the technical report titled *Jinshan Gold Mines, Inc., Chang Shan Hao (CSH) Gold Project, Inner Mongolia, PRC* dated October 19, 2005. I visited the property twice in conjunction with the Technical Report. The first visit was from April 1 to 4, 2005 and the second was from June 10 to 12, 2005.
7. I have not had prior involvement with the property that is the subject of the Technical Report.

8. 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.
9. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.
10. I have read National Instrument 43-101 and Form 43-101F1, and the portions of the Technical Report for which I am responsible have been prepared in compliance with that instrument and form.

Dated this 19 Day of October, 2005.

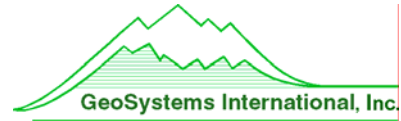


Signature of Qualified Person



Russell A. Browne

Printed Name of Qualified Person



Mario E. Rossi
GeoSystems International, Inc.
15998 Mataro Bay Ct.,
Delray Beach, FL, 33446, USA
Telephone: 561-495-8797
Fax: 561-498-1262
Email: mrossi@geosysint.com

CERTIFICATE of AUTHOR

I, Mario E. Rossi, Min. Eng., MSc, do hereby certify that:

1. I am Principal Geostatistician of:

GeoSystems International, Inc
15998 Mataro Bay Ct
Delray Beach, Florida, USA,
33446.

2. I graduated with a Master of Science degree in geostatistics from Stanford University, California, USA, in 1988. In addition, I have obtained a Mining Engineering degree from the University of San Juan, Argentina, in 1985.
3. I am a member of the Canadian Institute of Mining and Metallurgy (CIMM), a fellow of the Australian Institute of Mining and Metallurgy (AusIMM, Australia), a member of the Society of Mining Engineers (SME, USA), a member of the International Association of Mathematical Geology (IAMG), and a member of the Geological Society of America (GSA).
4. I have worked as a geostatistician for a total of 16 years since my graduation from university, and as a mining engineer for an additional 2 years.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of section 16.1 through 16.3 of the technical report titled Chang Shan Hao (CSH) Gold Project, Development Study, and dated October 19, 2005 (the "Technical Report") relating to the Chang Shan Hao 217 property. I visited the Chang Shan Hao 217 property on July, 2004 for 3 days.
7. I have had prior involvement with the property that is the subject of the Technical Report. The nature of my prior involvement was to prepare preliminary resource estimates, and to prepare a Technical Report filed on SEDAR on April 20th, 2005.
8. 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.
9. I am independent of the issuer applying all of the tests in section 1.5 of National Instrument 43-101.

10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Dated this 19th Day of October, 2005.

A handwritten signature in black ink, appearing to read "Mario E. Rossi". The signature is fluid and cursive, with a prominent "M" and "R".

Signature of Qualified Person

Mario E. Rossi

Print name of Qualified Person

27.0 APPENDICES

APPENDIX 1

OPERATING COST DETAILS

Base Case - Mining Cost

Item		#	RMB	US\$	US\$ Total/year
Minesite Staff					
Engineer	Local	3	116,400	14,353	43,058
Geologist	Local	3	116,400	14,353	43,058
Technician	Local	3	18,000	2,219	6,658
Surveyor	Local	3	24,000	2,959	8,878
Surveyor Helper	Local	3	24,000	2,959	8,878
Sampler	Local	3	36,000	4,439	13,317
Clerk	Local	3	36,000	4,439	13,317
Subtotal Nationals		21			137,164
General Benefits					
Subtotal National Wages					137,164
Fringe Benefits (re: Gerke Report)	49.0%				67,210
Summary					
Subtotal Staff & Labor Cost					204,374
Office Expenses & Miscellaneous					
Mine Planning Software					15,000
Computer Hardware and Supplies					20,000
GPS, Survey Equipment & Supplies					5,000
Communications					12,000
Consulting - Geotech, Resources etc.					100,000
Verification Surveys - Flyovers etc					25,000
Subtotal					177,000
Contingency					
Subtotal Before Contingency					381,374
Contingency	25.0%				95,344
GRAND TOTAL					476,718
Unit Cost					
Annual Production Rate	tpa				7,100,000
Unit Cost	US\$/t ore				0.07
Exchange	RMB/US\$				8.11
Summary					
Contract Mining Cost Waste			8.08		1.00
Contract Mining Cost Weathered Ore			8.46		1.04
Contract Mining Cost Fresh Ore			8.82		1.09
Overhaul to Pad One					
Total Cost Weathered Ore					1.11
Total Cost Fresh Ore					1.15

Base Case - Processing Cost

Item	ROM Oxide RMB / tonne	Crushed Leach RMB / tonne	ROM Oxide US\$ / tonne	Crushed Leach US\$ / tonne	ROM Oxide US\$ Total/year	Crushed Leach
Labor	0.71	0.82	0.088	0.101	625,250	714,118
Primary Crushing		0.61	-	0.075	-	535,005
Fine Crushing		2.44	-	0.300	-	2,132,181
Stacking	0.10	0.10	0.013	0.013	91,048	91,048
Leaching	0.32	0.32	0.039	0.039	278,819	278,791
CIC and Carbon Stripping	0.58	0.56	0.072	0.069	509,867	487,413
Refining	0.09	0.09	0.012	0.012	82,098	82,098
Carbon Handling	0.12	0.12	0.015	0.015	109,196	107,310
Reagents	3.68	4.67	0.453	0.576	3,217,952	4,087,433
Laboratory	0.36	0.36	0.045	0.045	318,012	318,012
Support Services	0.23	0.23	0.029	0.029	203,048	203,048
Total	6.21	10.32	0.766	1.273	5,435,290	9,036,457
Process Rate	tpa	7,100,000				
Exchange Rate	RMB / \$US	8.11				

General & Administration Annual Costs

Item		#	RMB	US\$	US\$ Total/year
Light Vehicle Operation					
		Units	km	\$/km	
Pickup Trucks	Vehicles	15	15,000	0.25	56,250
Rent and Office Supplies					
Baotou	(from 2005 Budget)				18,659
Yinchaun	(Estimate)				12,000
Subtotal					30,659
Head Office Charges					
Vancouver / Beijing Office	Expatriate	4		100,000	400,000
Public Relations					
Public Relations Expense					50,000
Contingency					
Subtotal Before Contingency					3,110,776
Contingency	25%				777,694
GRAND TOTAL					3,888,470
Unit Cost					
Annual Production Rate	tpa				7,100,000
Unit Cost	US\$/t ore				0.55
Exchange	RMB/US\$				8.11

APPENDIX 2

LEACH PAD CONSTRUCTION ESTIMATE

Pad Construction Unit Rates

15KROM3STAGE 400

Item No.	Item	Units	Unit Cost	Reference
100	Site Preparation			
105	Earthworks Mobil. and Demobil. (includes crushing plant)	EA	\$30,000	
110	Surveying	months	\$6,000	
200	Heap Leach Pad Earthworks			
205	Import Structural Fill for Heap Leach Pad	m ³	\$7.00	
210	Local Soil Excavation to Structural Fill for Heap Leach Pad	m ³	\$3.50	
215	Local Rock Excavation to Structural Fill for Heap Leach Pad	m ³	\$5.50	
220	Surface Preparation for Soil Liner Fill & Struct Fill	m ³	\$0.30	
225	Liner Bedding for Heap Leach Pad	m ³	\$4.00	
230	Liner Cover Crushing and Placement	m ³	\$8.00	
235	Coarse Drain Fill Crushing and Placement	m ³	\$8.00	
240	Leak Detection Sand	m ³	\$45.00	
300	Pond Earthworks			
305	Local Soil Excavation and Structural Fill for Ponds	m ³	\$3.50	
310	Local Rock Excavation and Structural Fill for Ponds	m ³	\$5.50	
315	Liner Bedding for Ponds	m ³	\$4.00	
320	Liner Cover for Ponds	m ³	\$8.00	
400	Water Diversion Earthworks			
405	Channel Protection Riprap	m ³	\$10.00	
410	Soil Excavation	m ³	\$3.50	
415	Rock Excavation	m ³	\$5.50	
500	Geosynthetics, Leach Pad and Ponds			
505	Heap Leach Pad Primary Liner (80 mil HDPE Smooth)	m ²	\$5.25	
510	Heap Leach Pad Secondary Liner (60 mil HDPE Smooth)	m ²	\$5.00	
515	Non-Woven Geotextile on Slopes	m ²	\$2.00	
600	Piping			
605	4-inch Dia. Solution PCPE Pipe, Smooth Interior	m	\$3.00	
610	15-inch Dia. Solution Header PCPE Pipe, Smooth Interior	m	\$24.00	
615	24-inch Dia. Solution Header HDPE Pipe	m	\$125.00	
620	2-inch Dia. Perf. PVC Leak Detection Pipe	m	\$8.00	
625	Other Pipes & Pipe Assembly and Fittings (10% of Pipe Cost)	EA	Varies	
630	24-inch Dia Steel Pipe Riser Assembly	EA	\$25,000	
700	Construction and Engineering			
705	Construction Quality Assurance	months	\$50,000	
710	Engineering Support	months	\$30,000	

Pad Construction Capital Phase 1

15KROM3STAGE 400

Item	Quantity	Units	Unit Cost	Item Cost	Subtotal
Site Preparation					\$60,000
Earthworks Mobil. and Demobil. (includes crushing plant)	1	EA	\$30,000	\$30,000	
Surveying	5	months	\$6,000	\$30,000	
Heap Leach Pad Earthworks					\$3,172,450
Import Structural Fill for Heap Leach Pad	39,000	m ³	\$7.00	\$273,000	
Local Soil Excavation to Structural Fill for Heap Leach Pad	50,000	m ³	\$3.50	\$175,000	
Local Rock Excavation to Structural Fill for Heap Leach Pad	30,000	m ³	\$5.50	\$165,000	
Surface Preparation for Soil Liner Fill & Struct Fill	440,000	m ³	\$0.30	\$132,000	
Liner Bedding for Heap Leach Pad	120,000	m ³	\$4.00	\$480,000	
Liner Cover Crushing and Placement	240,000	m ³	\$8.00	\$1,920,000	
Coarse Drain Fill Crushing and Placement	2,700	m ³	\$8.00	\$21,600	
Leak Detection Sand	130	m ³	\$45.00	\$5,850	
Pond Earthworks					\$1,096,220
Local Soil Excavation and Structural Fill for Ponds	30,000	m ³	\$3.50	\$105,000	
Local Rock Excavation and Structural Fill for Ponds	155,000	m ³	\$5.50	\$852,500	
Liner Bedding for Ponds	11,400	m ³	\$4.00	\$45,600	
Liner Cover for Ponds	11,640	m ³	\$8.00	\$93,120	
Water Diversion Earthworks					\$21,125
Channel Protection Riprap	0	m ³	\$10.00	\$0	
Soil Excavation	3,600	m ³	\$3.50	\$12,600	
Rock Excavation	1,550	m ³	\$5.50	\$8,525	
Geosynthetics, Leach Pad and Ponds					\$2,424,900
Heap Leach Pad Primary Liner (80 mil HDPE Smooth)	438,000	m ²	\$5.25	\$2,299,500	
Heap Leach Pad Secondary Liner (60 mil HDPE Smooth)	19,400	m ²	\$5.00	\$97,000	
Non-Woven Geotextile on Slopes	14,200	m ²	\$2.00	\$28,400	
Piping					\$487,390
4-inch Dia. Solution PCPE Pipe, Smooth Interior	30,000	m	\$3.00	\$90,000	
15-inch Dia. Solution Header PCPE Pipe, Smooth Interior	3,500	m	\$24.00	\$84,000	
24-inch Dia. Solution Header HDPE Pipe	1,300	m	\$125.00	\$162,500	
2-inch Dia. Perf. PVC Leak Detection Pipe	4,800	m	\$8.00	\$38,400	
Other Pipes & Pipe Assembly and Fittings (10% of Pipe Cost)	1	EA	\$37,490.00	\$37,490	
24-inch Dia Steel Pipe Riser Assembly	3	EA	\$25,000.00	\$75,000	
Construction and Engineering					\$280,000
Construction Quality Assurance	5	months	\$50,000	\$250,000	
Engineering Support	1	months	\$30,000	\$30,000	
Sub Total All Items =					\$7,542,085
Contingency Costs=	17.0%				\$1,282,154
Total All Costs =					\$8,824,239
Ore Capacity (M. Tons) to 70 m Heap					25.0
<i>Unit Cost without contingency</i>		\$US/t		\$	<i>0.30</i>
Usable Lined Surface Area		m ²			400,000
<i>Unit Cost without contingency</i>		\$US/m2		\$	<i>18.86</i>

Pad Construction Capital Phase 2

15KROM3STAGE 400

Item	Quantity	Units	Unit Cost	Item Cost	Subtotal
Site Preparation					\$60,000
Earthworks Mobil. and Demobil. (includes crushing plant)	1	EA	\$30,000	\$30,000	
Surveying	5	months	\$6,000	\$30,000	
Heap Leach Pad Earthworks					\$2,552,350
Import Structural Fill for Heap Leach Pad	20,000	m ³	\$7.00	\$140,000	
Local Soil Excavation to Structural Fill for Heap Leach Pad	30,000	m ³	\$3.50	\$105,000	
Local Rock Excavation to Structural Fill for Heap Leach Pad	10,000	m ³	\$5.50	\$55,000	
Surface Preparation for Soil Liner Fill & Struct Fill	385,000	m ³	\$0.30	\$115,500	
Liner Bedding for Heap Leach Pad	105,000	m ³	\$4.00	\$420,000	
Liner Cover Crushing and Placement	210,000	m ³	\$8.00	\$1,680,000	
Coarse Drain Fill Crushing and Placement	4,100	m ³	\$8.00	\$32,800	
Leak Detection Sand	90	m ³	\$45.00	\$4,050	
Pond Earthworks					\$0
Local Soil Excavation and Structural Fill for Ponds	0	m ³	\$3.50	\$0	
Local Rock Excavation and Structural Fill for Ponds	0	m ³	\$5.50	\$0	
Liner Bedding for Ponds	0	m ³	\$4.00	\$0	
Liner Cover for Ponds	0	m ³	\$8.00	\$0	
Water Diversion Earthworks					\$17,770
Channel Protection Riprap	0	m ³	\$10.00	\$0	
Soil Excavation	2,500	m ³	\$3.50	\$8,750	
Rock Excavation	1,640	m ³	\$5.50	\$9,020	
Geosynthetics, Leach Pad and Ponds					\$1,837,500
Heap Leach Pad Primary Liner (80 mil HDPE Smooth)	350,000	m ²	\$5.25	\$1,837,500	
Heap Leach Pad Secondary Liner (60 mil HDPE Smooth)	0	m ²	\$5.00	\$0	
Non-Woven Geotextile on Slopes	0	m ²	\$2.00	\$0	
Piping					\$215,028
4-inch Dia. Solution PCPE Pipe, Smooth Interior	25,000	m	\$3.00	\$75,000	
15-inch Dia. Solution Header PCPE Pipe, Smooth Interior	3,100	m	\$24.00	\$74,400	
24-inch Dia. Solution Header HDPE Pipe	160	m	\$125.00	\$20,000	
2-inch Dia. Perf. PVC Leak Detection Pipe	3,260	m	\$8.00	\$26,080	
Other Pipes & Pipe Assembly and Fittings (10% of Pipe Cost)	1	EA	\$19,548.00	\$19,548	
24-inch Dia Steel Pipe Riser Assembly	0	EA	\$25,000.00	\$0	
Construction and Engineering					\$280,000
Construction Quality Assurance	5	months	\$50,000	\$250,000	
Engineering Support	1	months	\$30,000	\$30,000	
Sub Total All Items =					\$4,962,648
Contingency Costs=	17.0%				\$843,650
Total All Costs =					\$5,806,298
Ore Capacity (M. Tons) to 70 m Heap					20.0
<i>Unit Cost without contingency</i>		\$US/t		\$	0.25
Usable Lined Surface Area		m ²			350,000
<i>Unit Cost without contingency</i>		\$US/m2		\$	14.18

Pad Construction Total Phase 1 and Phase 2

15KROM3STAGE 400

Item No.	Item	Quantity	Units	Unit Cost	Item Cost	Subtotal
100	Site Preparation					\$120,000
105	Earthworks Mobil. and Demobil. (includes crushing plant)	2	EA	\$30,000	\$60,000	
110	Surveying	10	months	\$6,000	\$60,000	
200	Heap Leach Pad Earthworks					\$5,724,800
205	Import Structural Fill for Heap Leach Pad	59,000	m ³	\$7.00	\$413,000	
210	Local Soil Excavation to Structural Fill for Heap Leach Pad	80,000	m ³	\$3.50	\$280,000	
215	Local Rock Excavation to Structural Fill for Heap Leach Pad	40,000	m ³	\$5.50	\$220,000	
220	Surface Preparation for Soil Liner Fill & Struct Fill	825,000	m ³	\$0.30	\$247,500	
225	Liner Bedding for Heap Leach Pad	225,000	m ³	\$4.00	\$900,000	
230	Liner Cover Crushing and Placement	450,000	m ³	\$8.00	\$3,600,000	
235	Coarse Drain Fill Crushing and Placement	6,800	m ³	\$8.00	\$54,400	
240	Leak Detection Sand	220	m ³	\$45.00	\$9,900	
300	Pond Earthworks			\$0.00		\$1,096,220
305	Local Soil Excavation and Structural Fill for Ponds	30,000	m ³	\$3.50	\$105,000	
310	Local Rock Excavation and Structural Fill for Ponds	155,000	m ³	\$5.50	\$852,500	
315	Liner Bedding for Ponds	11,400	m ³	\$4.00	\$45,600	
320	Liner Cover for Ponds	11,640	m ³	\$8.00	\$93,120	
400	Water Diversion Earthworks					\$38,895
405	Channel Protection Riprap	0	m ³	\$10.00	\$0	
410	Soil Excavation	6,100	m ³	\$3.50	\$21,350	
415	Rock Excavation	3,190	m ³	\$5.50	\$17,545	
500	Geosynthetics, Leach Pad and Ponds			\$0.00		\$4,262,400
505	Heap Leach Pad Primary Liner (80 mil HDPE Smooth)	788,000	m ²	\$5.25	\$4,137,000	
510	Heap Leach Pad Secondary Liner (60 mil HDPE Smooth)	19,400	m ²	\$5.00	\$97,000	
515	Non-Woven Geotextile on Slopes	14,200	m ²	\$2.00	\$28,400	
600	Piping			\$0.00		\$702,418
605	4-inch Dia. Solution PCPE Pipe, Smooth Interior	55,000	m	\$3.00	\$165,000	
610	15-inch Dia. Solution Header PCPE Pipe, Smooth Interior	6,600	m	\$24.00	\$158,400	
615	24-inch Dia. Solution Header HDPE Pipe	1,460	m	\$125.00	\$182,500	
620	2-inch Dia. Perf. PVC Leak Detection Pipe	8,060	m	\$8.00	\$64,480	
625	Other Pipes & Pipe Assembly and Fittings (10% of Pipe Cost)	1	EA	\$57,038.00	\$57,038	
630	24-inch Dia Steel Pipe Riser Assembly	3	EA	\$25,000.00	\$75,000	
700	Construction and Engineering					\$560,000
705	Construction Quality Assurance	10	months	\$50,000	\$500,000	
710	Engineering Support	2	months	\$30,000	\$60,000	
Sub Total All Items =						\$12,504,733
Contingency Costs= 17.0%						\$2,125,805
Total All Costs =						\$14,630,538
Ore Capacity (M. Tons) to 70 m Heap						45.0
Unit Cost without contingency			\$US/t	\$ 0.28		
Usable Lined Surface Area			m²	750,000		
Unit Cost without contingency			\$US/m2	\$ 16.67		

APPENDIX 3

PILOT HEAP LEACH REPORT

CSH Project Inner Mongolia, China

PILOT HEAP LEACH CAMPAIGN

DRAFT

Prepared by

Hu Long and Paul Blair

July, 2005



JINSHAN GOLD MINES INC.

INTRODUCTION

Based on the metallurgical works from the Lakefield Research and 217 Brigade, it was proposed that heap leach process is the best option for the CSH gold project by NERIN's pre-feasibility study.

Samples for the column test at the Lakefield were taken from 8 drilling cores, which covered all NE zone, and composed to approximately 1g/t. The results show that gold extractions for the oxides reached 47% at 1 inch in 83 days and 84% at ¼ inch in 75 days respectively, and gold extraction for sulfides in 83 days reached 45% at 1 inch and 73% at ¼ inch, respectively. The results are summarized in the following tables.

Column Test Results at the Lakefield

Comp	Time Day	Particle Size	Reagent Consumption kg/t of CN Feed		Total % Au Extraction	Residue Au, g/t	Head Calc. Au, g/t
			NaCN	CaO			
Oxide	83	-1 inch	1.27	1.55	47.0	0.62	1.17
	75	-1/4 inch	1.52	3.59	84.2	0.17	1.08
Sulphide	83	-1 inch	1.04	1.20	45.1	0.58	1.05
	83	-1/4 inch	0.99	1.32	73.1	0.25	0.94

A whole drilling core was used for the column test at 217 Bbrigade in Yinchunag, China. The results show that gold extractions for oxides in 93 days reached 65.6.0% for –50 mm, an average of 75.1% for –25 mm, and an average of 79.9% for –10 mm, respectively. Gold extractions for sulfides in 93 days were up to an average of 67.6% for –25mm and 74.4% for -10mm, respectively. The results are summarized in the following tables.

Column Test Results in Yinchuan

Comp	Time Day	Particle Size	Reagent Consumption kg/t of CN Feed		Total % Au Extraction	Residue Au, g/t	Head Calc. Au, g/t
			NaCN	CaO			
Oxide	93	- 50mm	0.85	1.18	65.6	0.250	0.726
	93	- 25mm	1.11	1.19	75.1	0.185	0.741
	93	- 10mm	0.80	1.34	79.9	0.146	0.726
Sulphide	93	- 25mm	0.82	1.04	67.6	0.273	0.840
	93	- 10mm	0.40	1.30	74.4	0.219	0.842

Although the results from the column tests are attractive, there is still a risk to use these numbers for a big scale engineering design, say 15,000t/day. A pilot heap leach campaign for oxide ore was proposed last year. The purposes of the campaign are to verify the results from the labs, and gather and provide precise parameters in each

section, including mining, crushing, metallurgical process, and costs, for the final engineering design. Furthermore, the best opportunity in improving grade appears to lie in the as-yet-unquantified nugget effect of coarse gold influencing the head value. Also, representative samples were taken for the metallurgical tests.

PILOT CAMPAIGN

The pilot was designed by NERIN initially, then it was revised by Northeast University and John Nilsson for the mining design. All equipments and manpower were sourced in China.

Mining

Open Pit

Mining was contracted to 217 Brigade, which sub-contracted to a Yinchuan team. The mining contractor moved on the site on July 20, 2004 and finished mining on Oct 6, 2004. The proposed mining rate was 500 t/day. The equipments used by the contractor included two $\Phi 80\text{mm}$ percussion drillers, two 1m^3 backhoes, one loader, two 140HP bulldozers, and ~16 truckers ranging from 12 to 40t. Oxide ore was mined between 9900 to 10000 section (mine grid) with an elevation of 1664 to 1643, which is representative for whole ore body. The ore grade was controlled by JV geologists. Two sampling methods were used for the grade control. Initially the sampling was followed the procedure proposed by Mario Rossi, in which samples were taken from percussion blasting holes (PBH). It was found it's difficult to take representative samples from PBH due to the driller used and strong wind. It was determined to use traditional Chinese channel sampling/face sampling. The cutoff was 0.35 g/t. Some assay results are shown in the table below

	Au ppm	St. Dev.
PBH Total Ave	0.759	1.202
Channels	0.797	0.703

Total approximately 102,000t oxide ore was mined and 108,000t waste was moved. ROM with a top size around 300 mm was placed on the East pad/ROM pad. Every second truck is being placed on a stockpile for the crusher. Thus, the grade on ROM pad and West pad/crushed pad should be similar.

Decline

The decline was initially designed by John Nilsson and revised by several consultants later. The mining was awarded to 217 Brigade. The decline was started July 24, 2004 and finished March 4, 2005. The decline was driven 300m @18° to an estimated depth of about 90 meters to the crosscut location. Total length of the crosscut is 92m, which substantially transverses the ore body in the Northeast zone. The crosscut follows a plane comparable to the cross section of 3 diamond drill holes (DDH-15, DDH-62 & DDH-80).

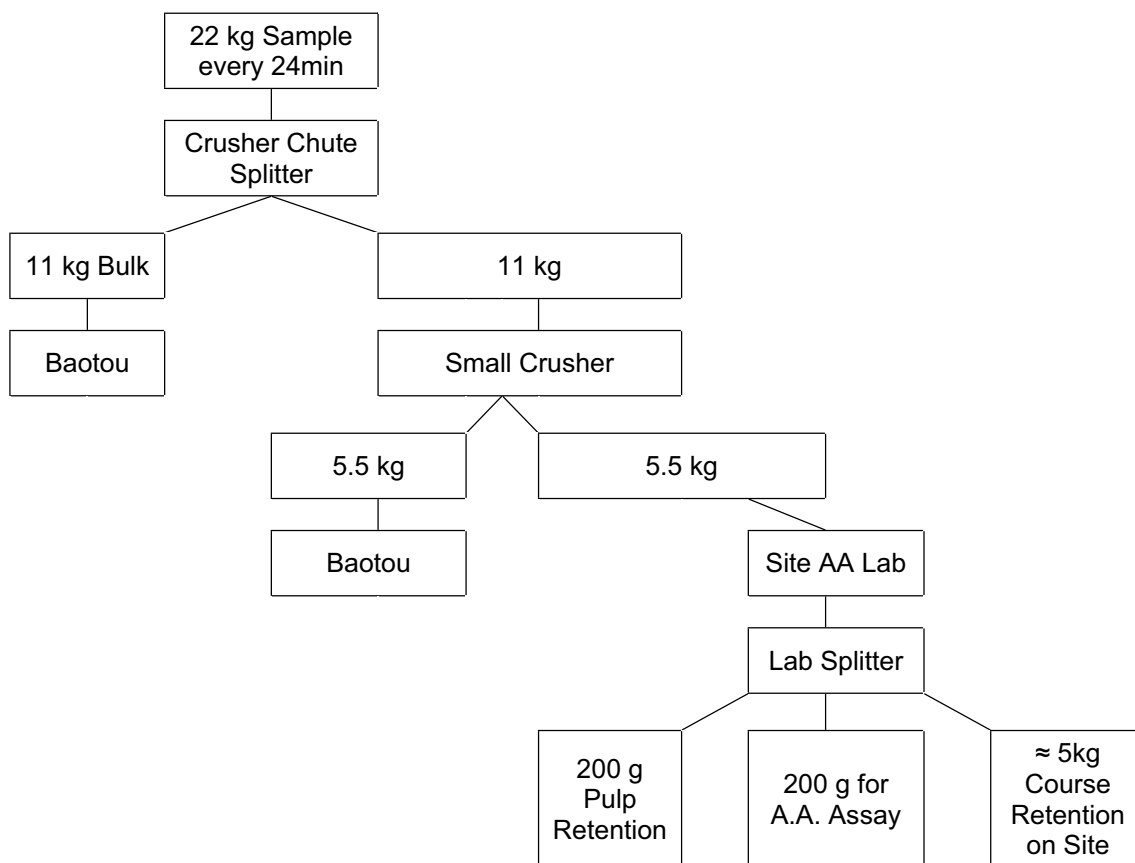
Approximately 0.8t bulk sample per blast was taken from the crosscut for the sulphide column tests. Total of 36t sulphide sample were shipped to Baotou for the tests. The sample was taken 7 t of the channel samples were also taken from both walls of the crosscut for comparison to the 3 diamond drill holes mentioned above. Solid oriented samples were also taken.

Crushing and Sampling for Oxides

A jaw crusher with a capacity of 50t/h was installed on site in October, 2004. Ore from the stockpile was crushed to a top size 100mm, and then trucked to the crushed pad.

Crushed sample was taken from the conveyor by a sampling cart at every 20 minutes interval. Manual collection car was slid into the crusher discharge stream for several seconds collecting a highly variable mass of sample that averaged 22kg. See Flow Sheet for description of sampling procedure. The sample collected was discharged directly from the ore car to a “pant leg” type splitter; one half was bagged and shipped to Baotou for the column tests; the other half of the sample was further crushed to -10mm, split, and bagged for gold assays. The remaining coarse rejects was bagged and sent to Baotou for the metallurgical tests.

Crusher Sampling Flow Sheet



Total 2940 crusher-stream samples were taken from October 13 to December 8, 2004 during the time the crusher was operative. Total weight estimated was about 65 tons, with half or about 32 tons being single stage crush and sent to Baotou, while other half was double crushed with half or about 16 tons going to Baotou, while other half was sent for gold assay at the site. Assay results from the site lab show a grade of 0.67g/t for the crushed pad.

Heap Leach

Leach pad/ponds was designed by Professor Wang of Northeast University. The ore was treated on two similar test leach pads, one treating run-of-mine ore and the other treating ore that has been jaw crushed through 100 mm top size. The pad was constructed with 30cm clay, 1mm HPDE liner, 20cm sand and 20cm very coarse rock (>100mm) protective layer. The areas of ROM and crushed pads are 6,000 m² with 47,000t ore and 8,300 m² with 55,000t ore respectively. The lift of each pad is approximately 6 meters. Three ponds, namely pregnant (12x8x2.5m), barren (12x8x2.5m), and flood (24x8x2.5m), were built for each pad. Each pad has a gold absorption system. The system consists of three carbon columns. Each column contains 750kg activated carbon. ½ inch dripper is used with a space of 0.6 meter.

3 kg/t of lime (65% purity) was initially added during stacking heap for ROM pad and on the belt during crushing for crushed pad last year. However most of lime was blown due to strong wind last year. Thus, 1 kg of lime (85% purity) was added on the tops of heaps during loosing the heaps this year before leaching.

Both heaps were initially soaked with untreated water until the pH was a nominal 9.8 before cyanide was added. Soaking of the ROM Pad began on May 22, and soaking of the Crushed Pad began on June 4. Cyanide was added on June 15 for the ROM pad and June 28 for the crushed pad at 300ppm concentration. Barren pH is maintained at 10.5 and pregnant at 9.8.

CaCO₃ scaling was noted on the drippers during the fresh water application, and began inhibiting flow after 3 weeks. Anti-scalant was added June 26 to the ROM Pad, and June 27 to the Crushed Pad (PESA, Tianqing Chemical Co., Beijing), and is currently added at the rate of 0.35 kg/hr. Scaling appears to be under control.

Solution application rate is currently 0.006 m³/m²/hr on the ROM pad and 0.005 m³/m²/hr on the Crushed Pad. Percolation is very good, and flow rates will be increased.

APPENDIX 4

METCON RESEARCH REPORT GRAVITY, FLOTATION, AND CONCENTRATE CYANIDATION

METCON Research

***7701 N. Business Park Drive
Tucson, Arizona 85743***

***Telephone: (520) 579-8315
Facsimile: (520) 579-7045***

23 August 2005
FG-004-05

Jinshan Gold Mines Inc.
Suite 654-999 Canada Place
Vancouver, B.C.
Canada V6C 3E1

Attention: Mr. Hu Long, Ph.D

Subject: Oxide/Sulfide Samples
Beneficiation and Leach Studies
METCON Project No. M-667-02

Dear Mr. Long:

This letter report is written to document results from metallurgical testing conducted on samples designated as oxide and sulfide column leach tests feed samples.

1.0 INTRODUCTION

A request for proposal (RFP) was received from Jinshan Gold Mines Inc. (JGM) representative Mr. Hu Long to conduct beneficiation by gravity-flotation and agitated leach studies on oxide and sulfide samples. These samples were originated from the "Chang Shan Hao" project (CSH) in Wulatezhong Qi, Inner-Mongolia province in China. A proposal from METCON Research (METCON) was submitted on 25 April 2005 (document EI-012-05). This letter report outlines the gravity-flotation and agitated leach results obtained.

2.0 SUMMARY

The main objective in conducting this study was to preliminarily evaluate whether a specific gravity concentration, flotation and concentrate cyanide leach processing technique would provide increased gold recoveries when compared to a conventional agitated cyanide leach process. A second objective was to evaluate the "preg-robbing" characteristics of the oxide and sulfide samples. Pursuant to these objectives, JGM provided specific instructions for the processing techniques to be utilized in this study. METCON provided recommendations regarding the conventional methodologies to be used for test control purposes. The following Sections 2.1, 2.2 and 2.3 provide a summary of the results obtained in this study.

2.1 Sample Preparation Procedure and Analytical Summary

A total of 150 kilograms oxide and sulfide composite samples (Column leach test feed) were received by METCON on 6 June 2005. The two samples delivered were at 80 percent passing 6 millimeters crush size. A 20 kilogram representative test charge was split and submitted for subsequent ball mill Bond Work Index determination. The work index will be reported under separate cover. The remaining 130 kilogram reject sample was stage crushed to 100 percent passing 10 mesh (1.7 mm). The 10 mesh crushed sample was subdivided into 1 and 4.5 kilogram test charges for grind calibration, head assay and flotation testing. A 1 kilogram test charge was pulverized to approximately 95 percent passing 150 mesh and submitted for standard "gold fire assay/AA finish" and "Metallic" gold assay procedures. The analytical results are presented in the following Table 2.1.

Table 2.1 Gold Head Assay Comparison						
Sample ID	"Metallic" Assay					Std. Fire/AA Finish Assay (g/t)
	Gold Calculated Assay (g/t)	Screen Fraction		Gold Distribution (%)		
		+150 mesh	-150 mesh	+150 mesh	-150 mesh	
		Assay (g/t)	Assay (g/t)			
Oxide	0.92	37.89	0.73	20.62	79.38	0.46
Sulfide	0.51	5.95	0.42	19.38	80.62	0.37

The analytical results indicate the following:

- A "Metallic" assay technique for the head samples submitted for this evaluation indicated higher gold contents. Approximately 20 percent of the gold reported to the plus 150 mesh fraction.
- A standard fire assay with AA finish technique showed lower gold contents for oxide and sulfide head samples.

2.2 Metallurgical Summary of Results

Oxide and sulfide composites from the CSH Gold Project were utilized for a number of metallurgical tests at METCON. Four separate tests were conducted on each composite sample. A total of four 4.5 kilogram test charges at minus 10 mesh crush size were subjected to gravity concentration using an Archimedes spiral. The gravity concentrate was weighed and submitted for assay and the tailings from gravity concentration were individually ground to 65, 100, 150, and 200 mesh. Each ground sample at the specified grind size was subjected to rougher and cleaner flotation producing a first cleaner flotation concentrate. The flotation was carried out identically in all four ground samples as follows:

- Rougher flotation time, 10 minutes
- First cleaner flotation time, 7 minutes
- pH range from 6.5 to 7.5
- Scheme of Reagents: PAX (30 g/t), AF3477 (15 g/t), AP-407 (2 g/t), AF-25 (18 g/t), and MIBC (11 g/t)
- Sulfuric acid as pH modifier

Test details are appended to this report. A summary of the oxide composite test work is given in the following Table 2.2.1.

Table 2.2.1 SUMMARY OF METALLURGICAL RESULTS Gravity Separation - Flotation Grind Size Evaluation - Oxide Ore				
Test ID: FS1-Ox-01	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P ₈₀ 65 mesh	Gravity Concentrate (1)	0.11	96.00	15.93
	1st. Cleaner Concentrate	8.09	4.95	60.16
	1st. Cleaner Tail	7.38	0.44	4.88
	Rougher Tail	84.42	0.15	19.03
	Calculated Head	100.00	0.66	100.00
	Assay Head		0.91	
Test ID: FS1-Ox-02	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P ₈₀ 100 mesh	Gravity Concentrate (1)	0.39	31.00	22.03
	1st. Cleaner Concentrate	10.92	2.83	55.70
	1st. Cleaner Tail	6.72	0.13	1.57
	Rougher Tail	81.97	0.14	20.69
	Calculated Head	100.00	0.52	100.00
	Assay Head		0.91	
Test ID: FS1-Ox-03	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P ₈₀ 150 mesh	Gravity Concentrate (1)	0.33	24.00	13.86
	1st. Cleaner Concentrate	12.00	3.25	67.50
	1st. Cleaner Tail	8.22	0.15	2.13
	Rougher Tail	79.44	0.12	16.50
	Calculated Head	100.00	0.57	100.00
	Assay Head		0.91	
Test ID: FS1-Ox-04	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P ₈₀ 200 mesh	Gravity Concentrate (1)	0.24	94.00	31.54
	1st. Cleaner Concentrate	12.00	3.20	53.92
	1st. Cleaner Tail	8.74	0.10	1.23
	Rougher Tail	79.03	0.12	13.32
	Calculated Head	100.00	0.71	100.00
	Assay Head		0.91	

Remarks: Gravity Concentration was conducted at particle size 100% minus 10 mesh.

The gravity concentration and flotation data outlined in the above Table 2.2.1 indicate the following:

- The combined gravity and rougher flotation concentrates contained approximately 76 to 86 percent of the gold originally present in the composite oxide head sample.
- The gold present in the rougher flotation tailings ranged from 14 to 22 percent. This amount of gold represents the quantity that would be lost when the described process is applied to the oxide composite.
- The gold recoveries increased slightly at finer particle size distributions.

The following Table 2.2.2 is a summary of the gravity concentration and flotation test work performed on the sulfide composite.

Table 2.2.2 SUMMARY OF METALLURGICAL RESULTS Gravity Separation - Flotation Grind Size Evaluation - Sulfide Ore				
Test ID: FS1-S-01	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ 65 mesh	Gravity Concentrate (1)	1.23	10.70	28.75
	1st. Cleaner Concentrate	9.03	2.40	47.19
	1st. Cleaner Tail	6.95	0.16	2.42
	Rougher Tail	82.79	0.12	21.64
	Calculated Head	100.00	0.46	100.00
	Assay Head		0.51	
Test ID: FS1-S-02	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ 100 mesh	Gravity Concentrate (1)	1.51	12.00	26.69
	1st. Cleaner Concentrate	12.02	3.22	56.98
	1st. Cleaner Tail	6.46	0.23	2.19
	Rougher Tail	80.00	0.12	14.13
	Calculated Head	100.00	0.68	100.00
	Assay Head		0.51	
Test ID: FS1-S-03	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ 150 mesh	Gravity Concentrate (1)	0.94	12.00	20.77
	1st. Cleaner Concentrate	12.57	2.48	57.34
	1st. Cleaner Tail	5.29	0.10	0.97
	Rougher Tail	81.20	0.14	20.91
	Calculated Head	100.00	0.54	100.00
	Assay Head		0.51	
Test ID: FS1-S-04	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	Au
METALLURGICAL BALANCE Grind size P₈₀ 200 mesh	Gravity Concentrate (1)	1.70	6.98	22.95
	1st. Cleaner Concentrate	14.36	2.08	57.87
	1st. Cleaner Tail	5.68	0.09	0.99
	Rougher Tail	78.26	0.12	18.19
	Calculated Head	100.00	0.51	100.00
	Assay Head		0.51	

Remarks: Gravity Concentration was conducted at particle size 100% minus 10 mesh.

The gravity concentration and flotation data outlined in the above Table 2.2.2 indicate the following:

- The combined gravity and flotation concentrate contained 75 to 84 percent of the gold present in the feed.
- The gold present in the rougher flotation tailings was in a 14 to 22 percent range. This gold would be lost if the described beneficiation technique is applied to the sulfide concentrate.
- The grind size did not appear to influence the gold recovery.

The flotation concentrates produced from the sulfide composite were subjected to cyanidation with activated carbon. A summary of results is presented in the following Table 2.2.3

Table 2.2.3 SUMMARY OF METALLURGICAL RESULTS Preliminary Cyanide Leach Study Ambient 48 hr. Bottle Roll Leach Tests on 1st. Cl. Concentrate Sulfide Ore								
Test Number	Sample ID	Head (1st. Cl. Conc.)		Reagent Consumption		Leach Time (hr)	Extraction	
		Calculated Au (g/t)	Assayed Au (g/t)	NaCN (kg/t)	CaO (kg/t)		Au (%)	Au (g/t)
FS1-S-AL01	Sulfide 1st. Cl. Conc P ₈₀ 65 mesh	2.84	2.40	2.362	2.521	48	96.85	2.75
FS1-S-AL02	Sulfide 1st. Cl. Conc. P ₈₀ 100 mesh	2.96	3.22	1.863	2.168	48	97.65	2.89
FS1-S-AL03	Sulfide 1st. Cl. Conc. P ₈₀ 150 mesh	2.03	2.48	1.997	2.380	48	97.56	1.99
FS1-S-AL04	Sulfide 1st. Cl. Conc. P ₈₀ 200 mesh	1.82	2.08	1.623	1.775	48	96.17	1.75

The cyanide leach tests data outlined in the above Table 2.2.3 indicate the following:

Gold extractions of 96 to 98 percent were achieved when the flotation concentrate was leached with sodium cyanide.

2.3 Cyanide Agitated Leach Testing

Standard bottle roll tests were conducted with and without activated carbon to determine the presence of a preg-robbing component. This is an accepted test in the mining industry for preliminary evaluation of the amenability of precious metal bearing materials to recovery of gold by a cyanidation process. The results are summarized below:

Table 2.3.1 SUMMARY OF METALLURGICAL RESULTS Preliminary Cyanide Leach Study Ambient 48 hr. Bottle Roll Leach Tests on Column Feed Oxide Ore										
Test Number	Sample ID	Grind Size	Head		Leach Residue Assay (g/t)	Reagent Consumption		Leach Time (hr)	Extraction	
			Calculated Au (g/t)	Assayed Au (g/t)		NaCN (kg/t)	CaO (kg/t)		Au (%)	Au (g/t)
BR-Ox-05	Oxide Composite	P ₈₀ 400 mesh	1.04	0.91	0.05	0.207	2.544	48	95.18	0.99
BR-Ox-06	Oxide Composite w/Activated Carbon	P ₈₀ 400 mesh	0.66	0.91	0.01	0.394	2.678	48	98.50	0.65

Table 2.3.2 SUMMARY OF METALLURGICAL RESULTS Preliminary Cyanide Leach Study Ambient 48 hr. Bottle Roll Leach Tests on Column Feed Sulfide Ore										
Test Number	Sample ID	Grind Size	Head		Leach Residue Assay (g/t)	Reagent Consumption		Leach Time (hr)	Extraction	
			Calculated Au (g/t)	Assayed Au (g/t)		NaCN (kg/t)	CaO (kg/t)		Au (%)	Au (g/t)
BR-S-05	Sulfide Composite	P ₈₀ 400 mesh	0.66	0.51	0.03	0.384	2.134	48	95.41	0.63
BR-S-06	Sulfide Composite w/Activated Carbon	P ₈₀ 400 mesh	0.53	0.51	0.01	0.543	2.175	48	98.10	0.52

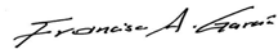
The cyanide leach tests data outlined in the above tables indicate the following:

- The gold extraction ranged from 95.18 to 98.5 percent for both oxide and sulfide samples. The samples leached in the presence of activated carbon provided marginally higher levels of extractions for the oxide and sulfide samples.
- The bottle roll test data reveal that there is no significant "preg robbing" material in either the oxide or sulfide composite samples.

Page 7
Jinshan Gold Mines Inc.
23 August 2005
FG-004-05

The analytical data and all calculations performed in this evaluation are included with the attachments. We trust that this information fulfils your request for preliminary evaluation of the flowsheet provided in the recovery of precious metals from the materials submitted for this evaluation. Should you have any questions in regard to the information included in this report, please do not hesitate to contact the writer.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Francisco A. Garcia".

Francisco A. Garcia
Chemical Engineer

FG:mch
Attachments

METCON Research

CLIENT : Jinshan Gold Mines Inc.

SAMPLE: Oxide Sample (Column Leach Tests Feed)

DATE: 07/06/05

OBJECTIVE : Quantification of coarse gold.

METHOD : Pulverize sample and screen at 150 mesh.

Fire assay the entire + 150 mesh screen fraction ("metallics" portion) and report g/tonne Au.
Blend the -150 mesh screen fraction, fire assay (1 A. T.) and report analyses g/tonne Au.

FEED WEIGHT : 498.16 g

FEED SIZE : Pulverized

PROJECT No. : M-667-02

PROJECT Name : "Chang Shan Hao"

METALLURGICAL RESULTS					
SAMPLE IDENTIFICATION	PRODUCT	WEIGHT		Assays (g/t)	Content (mg)
		(grams)	(%)		
		2.48	0.50	Au	Au
		495.68	99.50	37.89	0.094
				0.73	0.362
	Calculated Head	498.16	100.00	0.91	0.456
					100.00

Remarks :

METCON Research

CLIENT : Jinshan Gold Mines Inc.

SAMPLE: Sulfide

DATE: 07/06/05

OBJECTIVE : Quantification of coarse gold.

METHOD : Pulverize sample and screen at 150 mesh.

Fire assay the entire + 150 mesh screen fraction ("metallics" portion) and report g/tonne Au.

Blend the -150 mesh screen fraction, fire assay (1 A. T.) and report analyses g/tonne Au.

FEED WEIGHT : 499.71 g

FEED SIZE : Pulverized

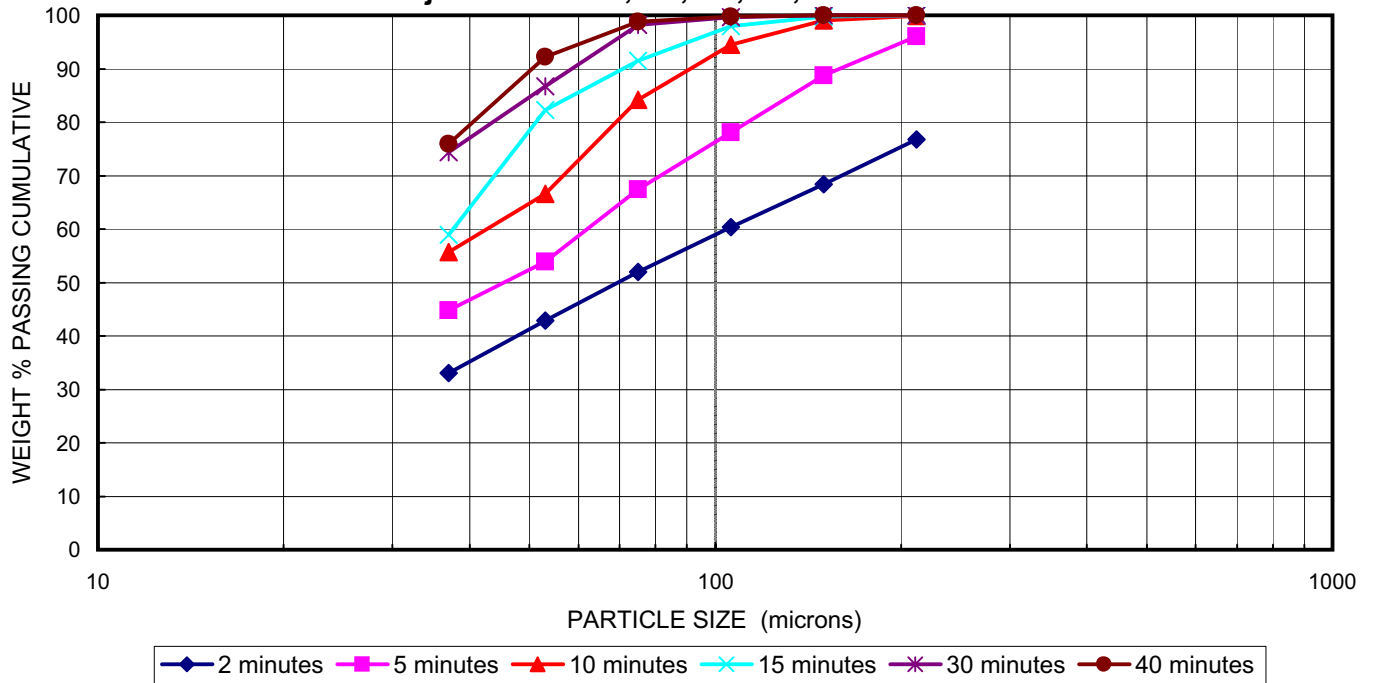
PROJECT No. : M-667-02

PROJECT Name : "Chang Shan Hao"

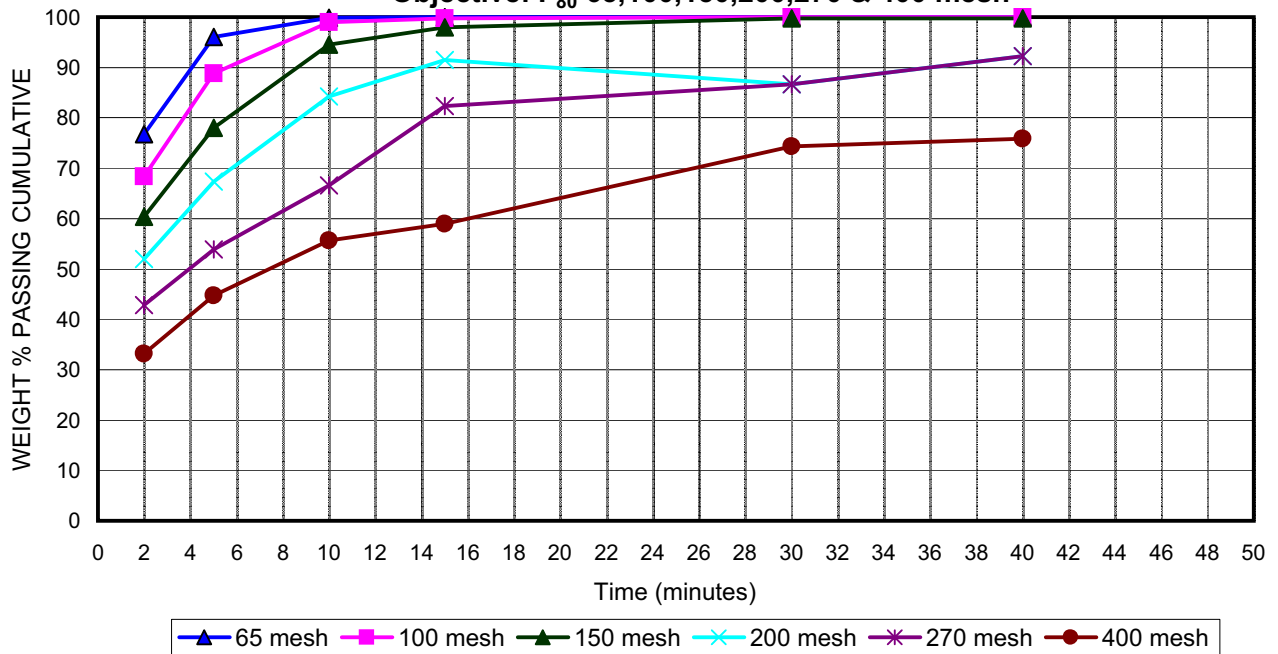
METALLURGICAL RESULTS						
SAMPLE IDENTIFICATION	PRODUCT	WEIGHT		Assays (g/t)		Distribution (%)
		(grams)	(%)	Au	Au	
Sulfide	+ 150 mesh	8.34	1.67	5.95	0.050	19.38
	- 150 mesh (1)	491.37	98.33	0.42	0.206	80.62
	Calculated Head	499.71	100.00	0.51	0.256	100.00

Remarks :

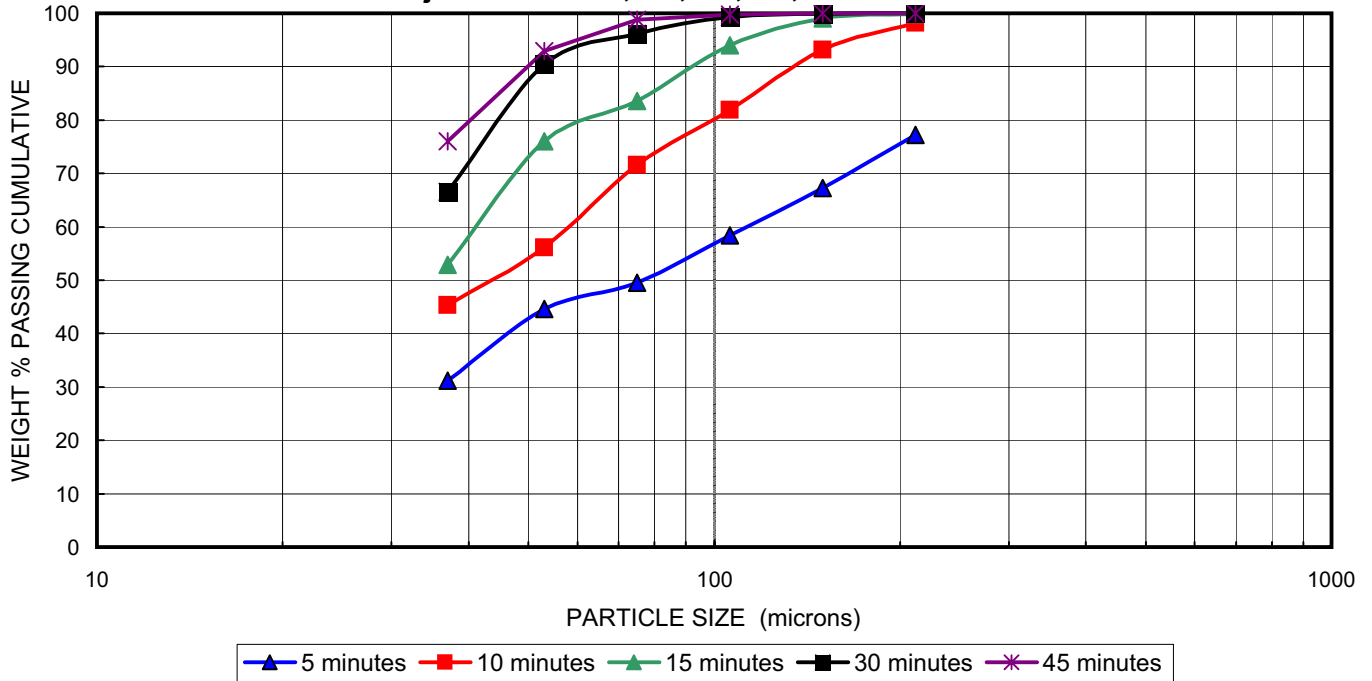
Rod Mill Grind Calibration Chart
Oxide Sample-Project No. M-667-02
Objective: P₈₀ 65,100,150,200,270 & 400 mesh



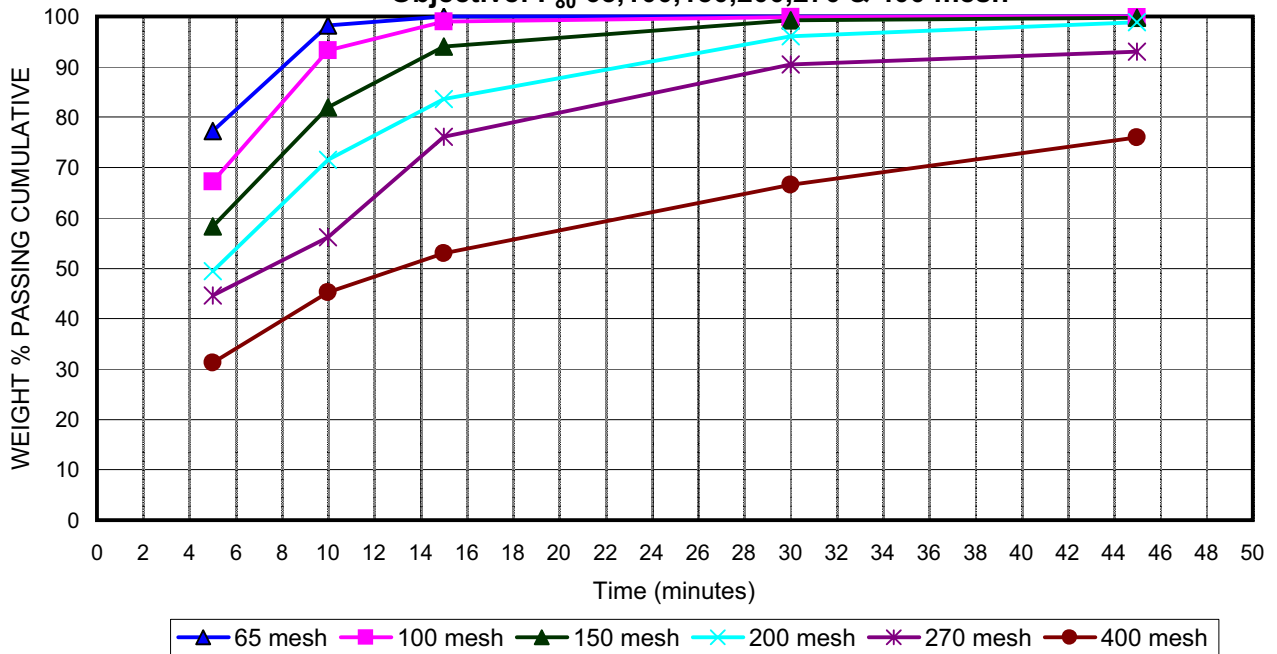
Rod Mill Grind Calibration Chart
Oxide Sample-Project No. M-667-02
Objective: P₈₀ 65,100,150,200,270 & 400 mesh



Rod Mill Grind Calibration Chart
Sulfide Sample-Project No. M-667-02
Objective: P₈₀ 65,100,150,200,270 & 400 mesh



Rod Mill Grind Calibration Chart
Sulfide Sample-Project No. M-667-02
Objective: P₈₀ 65,100,150,200,270 & 400 mesh



SUMMARY OF METALLURGICAL RESULTS

Jinshan Gold Mines - METCON Project No. M-667-02

Gravity Separation - Flotation

Grind Size Evaluation

Oxide Ore (Column Leach Test Feed)

Test ID: FS1-Ox-01	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	
METALLURGICAL BALANCE Grind size P ₈₀ 65 mesh	Gravity Concentrate (1)	0.11	96.00	15.93
	1st. Cleaner Concentrate	8.09	4.95	60.16
	1st. Cleaner Tail	7.38	0.44	4.88
	Rougher Tail	84.42	0.15	19.03
	Calculated Head	100.00	0.66	100.00
	Assay Head		0.91	

Test ID: FS1-Ox-02	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	
METALLURGICAL BALANCE Grind size P ₈₀ 100 mesh	Gravity Concentrate (1)	0.39	31.00	22.03
	1st. Cleaner Concentrate	10.92	2.83	55.70
	1st. Cleaner Tail	6.72	0.13	1.57
	Rougher Tail	81.97	0.14	20.69
	Calculated Head	100.00	0.52	100.00
	Assay Head		0.91	

Test ID: FS1-Ox-03	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	
METALLURGICAL BALANCE Grind size P ₈₀ 150 mesh	Gravity Concentrate (1)	0.33	24.00	13.86
	1st. Cleaner Concentrate	12.00	3.25	67.50
	1st. Cleaner Tail	8.22	0.15	2.13
	Rougher Tail	79.44	0.12	16.50
	Calculated Head	100.00	0.57	100.00
	Assay Head		0.91	

Test ID: FS1-Ox-04	Products	Weight (%)	Assays	Distribution (%)
			Au (g/tonne)	
METALLURGICAL BALANCE Grind size P ₈₀ 200 mesh	Gravity Concentrate (1)	0.24	94.00	31.54
	1st. Cleaner Concentrate	12.00	3.20	53.92
	1st. Cleaner Tail	8.74	0.10	1.23
	Rougher Tail	79.03	0.12	13.32
	Calculated Head	100.00	0.71	100.00
	Assay Head		0.91	

Remarks:

Gravity concentration was conducted at particle size 100% minus 10 mesh.

METCON RESEARCH

FLOTATION TEST DATA LOG

OBJECTIVE	Conventional Gravimetric Separation Tail flotation Ro. And 1st. Cleaner Flotation . Fixed reagents Grind size evaluation		PROJECT No. M-567-02
CLIENT/PROJ. SAMPLE I.D.	Jinshan Gold Mines Composite (sample): Oxide		DATE 07/04/05
FEED WEIGHT	4415.94 grams		TEST No. FSI-Ox-Flot-01
FEED SIZE	Minus 10 mesh		
GRIND SIZE	Approximate 80% Passing 65 Mesh or Actual Results		
		OPERATION MACHINE CELL SIZE (ml) SPEED (rpm)	
		Rougher 1 st Cleaner DECO D-1 DECO D-1 8000 4000 14000 1400	

CONDITIONS AND REAGENTS

	CONDITIONS				REAGENT ADDITION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	Time Min.	Solids (%)	Initial pH	Final pH		H2SO4 (kg/tonne)	PAX (g/tonne)	3477 (g/tonne)	AP-407 (g/tonne)	AF-25 (g/tonne)	MIBC (g/tonne)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

Remarks:

METALLURGICAL RESULTS

[illegible]

Remarks:

METCON RESEARCH INC.
7701 BUSINESS PARK DRIVE
TUCSON , ARIZONA 85743

SCREEN ANALYSIS RESULTS

Jinshan Gold Mines

Milling Option

Project Number: M-667-02

SCREEN ANALYSIS			Sample: Rougher Tail from Test FS1-Ox-01						
NOMINAL OPENINGS			Sample Weights (kg)	Weight Distribution (%)	Cumulative Weight Retained (%)	Cumulative Weight Passing (%)	Gold		
Millimeters	Inches	Tyler Mesh					Assay (g/t)	Content	Distribution (%)
0.212	0.0082	65	150.74	15.14	15.14	84.86	0.20	0.030	21.70
0.15	0.0058	100	84.08	8.45	23.59	76.41	0.30	0.025	18.16
0.106		150	104.20	10.47	34.06	65.94	0.25	0.026	18.75
0.075		200	94.78	9.52	43.58	56.42	0.15	0.014	10.23
0.045		325	197.87	19.88	63.45	36.55	0.09	0.018	12.82
M I N U S		325	363.81	36.55	100.00		0.07	0.026	18.33
TOTALS			995.48	100.00					100.00
CALCULATED ASSAY COMPOSITE ASSAY							0.14 0.15		

REMARKS:

METCON RESEARCH

FLOTATION TEST DATA LOG

OBJECTIVE	Conventional Gravimetric Separation Tail flotation Ro. And 1st. Cleaner Flotation . Fixed reagents Grind size evaluation		PROJECT No. M-567-02
CLIENT/PROJ. SAMPLE I.D.	Jinshan Gold Mines Composite (sample): Oxide		DATE 07/04/05
FEED WEIGHT	4215.01 grams		TEST No. FS1-Ox-Flot-02
FEED SIZE	Minus 10 mesh		
GRIND SIZE	Approximate 80% Passing 100 Mesh or Actual Results		
		OPERATION MACHINE CELL SIZE (ml) SPEED (rpm)	
		Rougher 1 st Cleaner DECO D-1 DECO D-1 8000 4000 14000 1400	

CONDITIONS AND REAGENTS

[illegible]

Remarks:

METALLURGICAL RESULTS

[illegible]

Remarks:

METCON RESEARCH INC.
7701 BUSINESS PARK DRIVE
TUCSON , ARIZONA 85743

SCREEN ANALYSIS RESULTS

Jinshan Gold Mines

Milling Option

Project Number: M-667-02

SCREEN ANALYSIS			Sample: Rougher Tail from Test FS1-Ox-02						
NOMINAL OPENINGS			Sample Weights (kg)	Weight Distribution (%)	Cumulative Weight Retained (%)	Cumulative Weight Passing (%)	Gold		
Millimeters	Inches	Tyler Mesh					Assay (g/t)	Content	Distribution (%)
0.212	0.0082	65	98.41	9.87	9.87	90.13	0.20	0.020	14.85
0.15	0.0058	100	78.31	7.86	17.73	82.27	0.28	0.022	16.54
0.106		150	112.41	11.28	29.01	70.99	0.23	0.026	19.50
0.075		200	107.74	10.81	39.82	60.18	0.15	0.016	12.19
0.045		325	216.12	21.69	61.51	38.49	0.12	0.026	19.56
M I N U S		325	383.59	38.49	100.00		0.06	0.023	17.36
TOTALS			996.58	100.00					100.00
CALCULATED ASSAY COMPOSITE ASSAY							0.13 0.14		

REMARKS:

METCON RESEARCH

FLOTATION TEST DATA LOG

OBJECTIVE Conventional Gravimetric Separation Tail flotation Ro. And 1st Cleaner Flotation . Fixed reagents Grind size evaluation				PROJECT No. M-667-02
CLIENT/PROJ. SAMPLE ID. FEED WEIGHT FEED SIZE GRIND SIZE	Jinshan Gold Mines Composite (sample): 4387.93 grams Minus 10 mesh	OPERATION MACHINE CELL SIZE (ml) SPEED (rpm)	Rougher 1 st Cleaner DECO D-1 DECO D-1 8000 4000 1400 1400	DATE TEST No. 07/05/05 FS1-Ox-Flot-03

CONDITIONS AND REAGENTS

OPERATION	CONDITIONS				REAGENT ADDITION												
	Time Min.	Solids (%)	Initial pH	Final pH	H2SO4 (kg/tonne)	PAX (g/tonne)	3477 (g/tonne)	AP-407 (g/tonne)	AF-25 (g/tonne)	MIBC (g/tonne)							
Grind	7	60				18.2	11	1	12	7							
Condition	5	39	7.73	6.70	0.23												
Ro. Flotation (1)	5		6.78	7.60													
Condition	5		7.60	6.95	0.20	9.1	4	1	6	4							
Ro. Flotation (2)	5		6.95	7.64													
Condition	5		7.44	6.62	0.05												
1st. Cl. Flotation	7		6.78	7.92													

Remarks:

METALLURGICAL RESULTS

[illegible]

Remarks:

METCON RESEARCH INC.
7701 BUSINESS PARK DRIVE
TUCSON , ARIZONA 85743

SCREEN ANALYSIS RESULTS

Jinshan Gold Mines

Milling Option

Project Number: M-667-02

SCREEN ANALYSIS			Sample: Rougher Tail from Test FS1-Ox-03						
NOMINAL OPENINGS			Sample Weights (kg)	Weight Distribution (%)	Cumulative Weight Retained (%)	Cumulative Weight Passing (%)	Gold		
Millimeters	Inches	Tyler Mesh					Assay (g/t)	Content	Distribution (%)
0.212	0.0082	65	14.87	1.49	1.49	98.51	0.25	0.004	3.03
0.15	0.0058	100	41.92	4.21	5.70	94.30	0.30	0.013	10.26
0.106		150	111.96	11.25	16.95	83.05	0.27	0.030	24.67
0.075		200	129.85	13.04	30.00	70.00	0.19	0.025	20.14
0.045		325	254.90	25.61	55.60	44.40	0.08	0.020	16.64
M I N U S		325	441.96	44.40	100.00		0.07	0.031	25.25
TOTALS			995.46	100.00					100.00
CALCULATED ASSAY COMPOSITE ASSAY							0.12 0.12		

REMARKS:

METCON RESEARCH INC.
7701 BUSINESS PARK DRIVE
TUCSON , ARIZONA 85743

SCREEN ANALYSIS RESULTS

Jinshan Gold Mines

Milling Option

Project Number: M-667-02

SCREEN ANALYSIS			Sample: Rougher Tail from Test FS1-Ox-04						
NOMINAL OPENINGS			Sample Weights (kg)	Weight Distribution (%)	Cumulative Weight Retained (%)	Cumulative Weight Passing (%)	Gold		
Millimeters	Inches	Tyler Mesh					Assay (g/t)	Content	Distribution (%)
0.212	0.0082	65				100.00			
0.15	0.0058	100	14.31	1.44	1.44	98.56	0.13	0.002	1.64
0.106		150	74.67	7.50	8.94	91.06	0.24	0.018	15.81
0.075		200	137.02	13.76	22.70	77.30	0.19	0.026	22.97
0.045		325	297.16	29.85	52.55	47.45	0.10	0.030	26.22
M I N U S		325	472.34	47.45	100.00		0.08	0.038	33.35
TOTALS			995.50	100.00					100.00
CALCULATED ASSAY COMPOSITE ASSAY							0.11 0.12		

REMARKS:

SUMMARY OF METALLURGICAL RESULTS
Jinshan Gold Mines - METCON Project No. M-667-02
Gravity Separation - Flotation
Grind Size Evaluation
Sulfide Ore (Column Leach Test Feed)

Test ID: FS1-S-01	Products	Weight (%)	Assays		Distribution (%)	
			Au (g/tonne)		Au	
METALLURGICAL BALANCE Grind size P ₈₀ 65 mesh	Gravity Concentrate (1)	1.23	10.70		28.75	
	1st. Cleaner Concentrate	9.03	2.40		47.19	
	1st. Cleaner Tail	6.95	0.16		2.42	
	Rougher Tail	82.79	0.12		21.64	
	Calculated Head	100.00	0.46		100.00	
	Assay Head		0.51			

Test ID: FS1-S-02	Products	Weight (%)	Assays		Distribution (%)	
			Au (g/tonne)		Au	
METALLURGICAL BALANCE Grind size P ₈₀ 100 mesh	Gravity Concentrate (1)	1.51	12.00		26.69	
	1st. Cleaner Concentrate	12.02	3.22		56.98	
	1st. Cleaner Tail	6.46	0.23		2.19	
	Rougher Tail	80.00	0.12		14.13	
	Calculated Head	100.00	0.68		100.00	
	Assay Head		0.51			

Test ID: FS1-S-03	Products	Weight (%)	Assays		Distribution (%)	
			Au (g/tonne)		Au	
METALLURGICAL BALANCE Grind size P ₈₀ 150 mesh	Gravity Concentrate (1)	0.94	12.00		20.77	
	1st. Cleaner Concentrate	12.57	2.48		57.34	
	1st. Cleaner Tail	5.29	0.10		0.97	
	Rougher Tail	81.20	0.14		20.91	
	Calculated Head	100.00	0.54		100.00	
	Assay Head		0.51			

Test ID: FS1-S-04	Products	Weight (%)	Assays		Distribution (%)	
			Au (g/tonne)		Au	
METALLURGICAL BALANCE Grind size P ₈₀ 200 mesh	Gravity Concentrate (1)	1.70	6.98		22.95	
	1st. Cleaner Concentrate	14.36	2.08		57.87	
	1st. Cleaner Tail	5.68	0.09		0.99	
	Rougher Tail	78.26	0.12		18.19	
	Calculated Head	100.00	0.51		100.00	
	Assay Head		0.51			

Remarks: Gravity concentration was conducted at particle size 100% minus 10 mesh.

METCON RESEARCH

FLOTATION TEST DATA LOG

OBJECTIVE	Conventional Gravimetric Separation Tail flotation Ro. And 1st. Cleaner Flotation . Fixed reagents			PROJECT No. M-667-02
	Grind size evaluation			
CLIENT/PROJ.	Jinshan Gold Mines			DATE TEST No. Fst-S-Flot-01
SAMPLE ID.	Composite (sample);			
FEED WEIGHT	4396.97 grams			
FEED SIZE	Minus 10 mesh			
GRIND SIZE	Approximate 80% Passing 65 Mesh or Actual Results			
			OPERATION MACHINE CELL SIZE (ml) SPEED (rpm)	Rougher 1 st Cleaner DECO D-1 DECO D-1
				8000 4000 14000 1400

CONDITIONS AND REAGENTS

	CONDITIONS				REAGENT ADDITION														
	Time Min.	Solids (%)	Initial pH	Final pH		H2SO4 (kg/tonne)	PAX (g/tonne)	3477 (g/tonne)	AP-407 (g/tonne)	AF-25 (g/tonne)	MIBC (g/tonne)								
OPERATION																			
Grind	6	60					18.2	11	1	12	7								
Condition	5	39	8.10	7.08		0.14													
Ro. Flotation (1)	5		7.08	7.95															
Condition	5		7.95	6.98		0.21	9.1	4	1	6	4								
Ro. Flotation (2)	5		7.10	7.98															
Condition	5		7.80	6.84		0.09													
1st. Cl. Flotation	7		6.90	8.04															
															</				

Remarks:

METALLURGICAL RESULTS

PRODUCTS		WEIGHT		ASSAYS			CONTENTS			DISTRIBUTION (%)		
		(g)	(%)	Au (g/l)			Au (mg)			Au (%)		
1st. Cl. Concentrate		401.79	9.14							66.22		
Ro. Concentrate (calc.)		711.18	16.17	2.4			0.964			69.62		
1st. Cl. Tail		309.39	7.04	1.43			0.050			3.40		
Ro. Tail		3685.79	83.83	0.16			0.442			30.38		
Calc. Head		4398.97	100.00	0.12			1.456			100.00		
Assay Head		4396.97		0.33								

Remarks:

METCON RESEARCH INC.
7701 BUSINESS PARK DRIVE
TUCSON , ARIZONA 85743

SCREEN ANALYSIS RESULTS

Jinshan Gold Mines

Milling Option

Project Number: M-667-02

SCREEN ANALYSIS			Sample: Rougher Tail from Test FS1-S-01						
NOMINAL OPENINGS			Sample Weights (kg)	Weight Distribution (%)	Cumulative Weight Retained (%)	Cumulative Weight Passing (%)	Gold		
Millimeters	Inches	Tyler Mesh					Assay (g/t)	Content	Distribution (%)
0.212	0.0082	65	214.57	21.53	21.53	78.47	0.17	0.037	30.02
0.15	0.0058	100	103.53	10.39	31.92	68.08	0.23	0.024	19.60
0.106		150	108.84	10.92	42.85	57.15	0.19	0.021	17.02
0.075		200	87.79	8.81	51.66	48.34	0.17	0.015	12.28
0.045		325	158.53	15.91	67.57	32.43	0.08	0.013	10.44
M I N U S		325	323.19	32.43	100.00		0.04	0.013	10.64
TOTALS			996.45	100.00					100.00
CALCULATED ASSAY COMPOSITE ASSAY							0.12 0.12		

REMARKS:

METCON RESEARCH

FLOTATION TEST DATA LOG

OBJECTIVE	Conventional Gravimetric Separation Tail flotation Ro. And 1st. Cleaner Flotation. Fixed reagents			PROJECT No. M-567-02
	Grind size evaluation			
	Jinshan Gold Mines			
	Composite (sample):			
	4416.04 grams			
CLIENT/PROJ. SAMPLE I.D.	Sulfide			DATE 07/04/05 TEST No. FSI-Ox-Flot-02
FEED WEIGHT	Rougher 1 st Cleaner			
FEED SIZE	DECO D-1 DECO D-1			
GRIND SIZE	8000 4000 14000 1400			
Approximate 80% Passing 100 Mesh or Actual Results				

CONDITIONS AND REAGENTS

	CONDITIONS				REAGENT ADDITION														
	Time Min.	Solids (%)	Initial pH	Final pH	H2SO4 (kg/tonne)	PAX (g/tonne)	3477 (g/tonne)	AP-407 (g/tonne)	AF-25 (g/tonne)	MIBC (g/tonne)									
OPERATION																			
Grind	8	60				18.1	11	1	12	7									
Condition	5	39	7.97	7.08	0.21														
Ro. Flotation (1)	5		7.08	7.93															
Condition	5		7.93	6.98	0.15	9.1	4	1	6	4									
Ro. Flotation (2)	5		7.05	7.97															
Condition	5		7.60	6.70	0.03														
1st. Cl. Flotation	7		6.76	8.04															

Remarks:

METALLURGICAL RESULTS

[illegible]

Remarks:

METCON RESEARCH INC.
7701 BUSINESS PARK DRIVE
TUCSON , ARIZONA 85743

SCREEN ANALYSIS RESULTS

Jinshan Gold Mines

Milling Option

Project Number: M-667-02

SCREEN ANALYSIS			Sample: Rougher Tail from Test FS1-S-02						
NOMINAL OPENINGS			Sample Weights (kg)	Weight Distribution (%)	Cumulative Weight Retained (%)	Cumulative Weight Passing (%)	Gold		
Millimeters	Inches	Tyler Mesh					Assay (g/t)	Content	Distribution (%)
0.212	0.0082	65	131.89	13.23	13.23	86.77	0.11	0.015	12.00
0.15	0.0058	100	108.67	10.90	24.14	75.86	0.22	0.024	19.78
0.106		150	132.55	13.30	37.43	62.57	0.21	0.028	23.03
0.075		200	105.36	10.57	48.00	52.00	0.17	0.018	14.82
0.045		325	186.47	18.71	66.71	33.29	0.09	0.017	13.89
M I N U S		325	331.77	33.29	100.00		0.06	0.020	16.47
TOTALS			996.71	100.00					100.00
CALCULATED ASSAY COMPOSITE ASSAY							0.12 0.12		

REMARKS:

METCON RESEARCH

FLOTATION TEST DATA LOG

OBJECTIVE	Conventional Gravimetric Separation Tail flotation Ro. And 1st Cleaner Flotation . Fixed reagents Grind size evaluation			PROJECT No.	M-567-02
CLIENT/PROJ.	Jinshan Gold Mines	OPERATION	Rougher	DATE	07/03/05
SAMPLE ID.	Composite (sample);	MACHINE	DECO D-1	TEST No.	F51-S-Flot-03
FEED WEIGHT	4430.22 grams	CELL SIZE (ml)	8000		
FEED SIZE	Minus 10 mesh	SPEED (rpm)	1400		
GRIND SIZE	Approximate 80% Passing 150 Mesh or Actual Results				

CONDITIONS AND REAGENTS

[illegible]

Remarks:

METALLURGICAL RESULTS

[illegible]

Remarks:

METCON RESEARCH INC.
7701 BUSINESS PARK DRIVE
TUCSON , ARIZONA 85743

SCREEN ANALYSIS RESULTS

Jinshan Gold Mines

Milling Option

Project Number: M-667-02

SCREEN ANALYSIS			Sample: Rougher Tail from Test FS1-S-03						
NOMINAL OPENINGS			Sample Weights (kg)	Weight Distribution (%)	Cumulative Weight Retained (%)	Cumulative Weight Passing (%)	Gold		
Millimeters	Inches	Tyler Mesh					Assay (g/t)	Content	Distribution (%)
0.212	0.0082	65	43.66	4.39	4.39	95.61	0.18	0.008	6.95
0.15	0.0058	100	84.80	8.52	12.91	87.09	0.17	0.014	12.74
0.106		150	144.41	14.52	27.43	72.57	0.23	0.033	29.36
0.075		200	125.78	12.64	40.07	59.93	0.18	0.023	20.01
0.045		325	223.08	22.42	62.50	37.50	0.09	0.020	17.75
M I N U S		325	373.10	37.50	100.00		0.04	0.015	13.19
TOTALS			994.83	100.00					100.00
CALCULATED ASSAY COMPOSITE ASSAY							0.11 0.14		

REMARKS:

METCON RESEARCH

FLOTATION TEST DATA LOG

OBJECTIVE	Conventional Gravimetric Separation Tail flotation Ro. And 1st. Cleaner Flotation. Fixed reagents			PROJECT No. M-567-02
	Grind size evaluation			
CLIENT/PROJ.	Jinshan Gold Mines			DATE TEST No. FST-S-Flot-04
SAMPLE ID.	Composite (sample):			
FEED WEIGHT	4388.46 grams			
FEED SIZE	Minus 10 mesh			
GRIND SIZE	Approximate 80% Passing 200 Mesh or Actual Results			

CONDITIONS AND REAGENTS

	CONDITIONS				REAGENT ADDITION														
	Time Min.	Solids (%)	Initial pH	Final pH		H2SO4 (kg/tonne)	PAX (g/tonne)	3477 (g/tonne)	AP-407 (g/tonne)	AF-25 (g/tonne)	MIBC (g/tonne)								
OPERATION																			
Grind	15	60					18.2	11	1	12	7								
Condition	5	39	7.76	6.74		0.26													
Ro. Flotation (1)	5		7.03	7.80															
Condition	5		6.76	6.76		0.22	9.1	4	1	6	4								
Ro. Flotation (2)	5		6.76	7.87															
Condition	5		7.52	6.55		0.06													
1st. Cl. Flotation	7		6.55	7.95															

Remarks:

METALLURGICAL RESULTS

PRODUCTS	WEIGHT		ASSAYS			CONTENTS			DISTRIBUTION (%)		
	(g)	(%)	Au			Au	(mg)		Au		
1st. Cl. Concentrate	641.26	14.61	2.08								
Ro. Concentrate (calc.)	894.80	20.39	1.52						75.11		
1st. Cl. Tail	253.54	5.78	0.09				1.357		76.39		
Ro. Tail	3493.66	79.61	0.12				0.023		1.28		
Calc. Head	4388.46	100.00	0.40				0.419		23.61		
							1.776		100.00		

METCON RESEARCH INC.
7701 BUSINESS PARK DRIVE
TUCSON , ARIZONA 85743

SCREEN ANALYSIS RESULTS

Jinshan Gold Mines

Milling Option

Project Number: M-667-02

SCREEN ANALYSIS			Sample: Rougher Tail from Test FS1-S-04						
NOMINAL OPENINGS			Sample Weights (kg)	Weight Distribution (%)	Cumulative Weight Retained (%)	Cumulative Weight Passing (%)	Gold		
Millimeters	Inches	Tyler Mesh					Assay (g/t)	Content	Distribution (%)
0.212	0.0082	65	186.56	18.73	18.73	81.27	0.23	0.043	39.17
0.15	0.0058	100	20.73	2.08	20.82	79.18	0.19	0.004	3.60
0.106		150	62.45	6.27	27.09	72.91	0.19	0.012	10.83
0.075		200	98.54	9.90	36.98	63.02	0.15	0.015	13.49
0.045		325	219.19	22.01	59.00	41.00	0.09	0.020	18.01
M I N U S		325	408.32	41.00	100.00		0.04	0.016	14.91
TOTALS			995.79	100.00					100.00
CALCULATED ASSAY COMPOSITE ASSAY							0.11 0.12		

REMARKS:

SUMMARY OF METALLURGICAL RESULTS

Preliminary Cyanide Leach Study

Ambient 48 hr. Bottle Roll Leach Tests on 1st. Cl. Concentrate

Sulfide Ore - "Chang Shan Hao" Project

METCON Project No. M-667-02

Test Number	Sample ID	Head (1st. Cl. Conc.)		Reagent Consumption		Leach Time (h)	EXTRACTION	
		Calculated Au (g/t)	Assayed Au (g/t)	NaCN (kg/t)	CaO (kg/t)		Au (%)	Au (g/t)
FS1-S-AL01	Sulfide 1st. Cl. Concentrate, grind size P80 65 mesh	2.84	2.40	2.362	2.521	48	96.85	2.75
FS1-S-AL02	Sulfide 1st. Cl. Concentrate, grind size P80 100 mesh	2.96	3.22	1.863	2.168	48	97.65	2.89
FS1-S-AL03	Sulfide 1st. Cl. Concentrate, grind size P80 150 mesh	2.03	2.48	1.997	2.380	48	97.56	1.99
FS1-S-AL04	Sulfide 1st. Cl. Concentrate, grind size P80 200 mesh	1.82	2.08	1.623	1.775	48	96.17	1.75

Remarks:

METCON RESEARCH, INC.

Bottle Roll Leach Test Data Log

OBJECTIVE :

Preliminary 1st. Cleaner Concentrate from Flotation Cyanide Leach, at different grind size.
With 5 g activated carbon

CLIENT :

Jinshan Gold Mines

SAMPLE I.D. :

Sulfide 1st. Cl. Concentrate, grind size P80 65 mesh

FEED WEIGHT :

99.89 grams

FEED SIZE :

Grnd size 80 Percent Passing 65 mesh

PROJECT NO. : M-667-02

DATE BEGIN : 07/15/05

DATE END : 07/17/05

TEST No. : FS1-S-AL01

CONDITION AND REAGENTS

OPERATION	SLURRY CONDITIONS				REAGENT ADDITION				PREGNANT SOLUTION ASSAY			
	Volume (liter)	Percent Solids	Leach Period(hr)	pH Initial	pH Final	NaCN (g)	CaO (g)	NaCN (g/l)	CaO (g/l)	pH		
Conditioning	0.410	20	0	8.18	11.08		0.410		0.100			
Pregnant Solution (1)	0.410	20	4	10.81	11.24		0.000	0.82	0.04	10.75		
Pregnant Solution (1)	0.410	20	24	11.15	11.51	0.170	0.160	0.59	0.09	11.09		
Pregnant Solution	0.370		48		10.72			0.69	0.06	10.90		
Wash Solution (2)	0.270							0.12	0.04	10.48		
Cyanide and Lime Consumption (kg/tonne)						2.362	2.521					

REMARKS:

(1) 40 ml Aliquot sample was removed after 4 and 24 hours of leaching

(2) Three stage water wash (3 x 100 ml)

METALLURGICAL RESULTS

PRODUCT	VOLUME (ml)	WEIGHT (g)	ASSAYS (ppm-g/t)		CUMULATIVE CONTENT				CUMULATIVE EXTRACTION (4)			
			Au		Au (mg)				Au (%)		Au (g/t)	
4 hr. Pregnant Leach	410		0.010		0.004				1.45		0.04	
24 hr. Pregnant Leach	410		0.009		0.004				1.44		0.04	
48 hr. Pregnant Leach	370		0.009		0.004				1.44		0.04	
Wash Solution	270		0.001		0.004				1.54		0.04	
Loaded Carbon		5.98	45.16		0.274				96.85		2.75	
Leach Residue		99.04	0.09		0.009				3.15			
Calc. Head			2.84		0.283				100.00			
Assay Head (4)		99.89	2.40		0.240							

REMARKS:

(3) Percent extraction based on calculated head (solutions plus loaded carbon plus leach residue contents)

(4) Composite assay head

METCON RESEARCH, INC.

Bottle Roll Leach Test Data Log

OBJECTIVE : Preliminary 1st. Cleaner Concentrate from Flotation Cyanide Leach, at different grind size.
With 5 g activated carbon

CLIENT : Jinshan Gold Mines
SAMPLE I.D: Sulfide 1st. Cl. Concentrate, grind size P80 100 mesh
FEED WEIGHT: 99.91 grams
FEED SIZE : Grind size 80 Percent Passing 100 mesh

PROJECT NO : M-667-02
DATE BEGIN : 07/15/05
DATE END : 07/17/05
TEST No. : FS1-S-AL02

OPERATION	SLURRY CONDITIONS					REAGENT ADDITION					PREGNANT SOLUTION ASSAY				
	Volume (liter)	Percent Solids	Leach Period(hr)	pH Initial	pH Final	NaCN (g)	CaO (g)	NaCN (g/l)	CaO (g/l)	pH	NaCN (g/l)	CaO (g/l)			
Conditioning	0.410	20	0	8.20	11.03			0.400	0.070						
Pregnant Solution (1)	0.410	20	4	10.74	11.05	0.000	0.030	0.82	0.04	10.69	0.53	0.09	11.17		
Pregnant Solution (1)	0.410	20	24	11.18	11.56	0.180	0.160	0.78	0.07	11.14	0.15	0.04	10.67		
Pregnant Solution	0.380		48		11.08										
Wash Solution (2)	0.290														
Cyanide and Lime Consumption (kg/tonne)						1.863	2.168								

REMARKS: (1) 40 ml Aliquot sample was removed after 4 and 24 hours of leaching
(2) Three stage water wash (3 x 100 ml)

PRODUCT	VOLUME (ml)	WEIGHT (g)	ASSAYS (ppm-g/t)				CUMULATIVE CONTENT				CUMULATIVE EXTRACTION (3)			
			Au				Au (mg)				Au (%)			Au (g/t)
4 hr. Pregnant Leach	410		0.010				0.004				1.39			0.04
24 hr. Pregnant Leach	410		0.009				0.004				1.38			0.04
48 hr. Pregnant Leach	380		0.009				0.004				1.41			0.04
Wash Solution	290		0.001				0.004				1.51			0.04
Loaded Carbon		5.76	49.29				0.288				97.65			2.89
Leach Residue		99.25	0.07				0.007				2.35			
Calc. Head			2.96				0.295				100.00			
Assay Head (4)		99.91	3.22				0.321							

REMARKS: (3) Percent extraction based on calculated head (solutions plus loaded carbon plus leach residue contents)
(4) Composite assay head

METCON RESEARCH, INC.

Bottle Roll Leach Test Data Log

OBJECTIVE : Preliminary 1st. Cleaner Concentrate from Flotation Cyanide Leach, at different grind size.
With 5 g activated carbon

CLIENT : Jinshan Gold Mines
SAMPLE I.D.: Sulfide 1st. Cl. Concentrate, grind size P80 150 mesh
FEED WEIGHT: 99.91 grams
FEED SIZE : Grind size 80 Percent Passing 150 mesh

PROJECT NO. : M-667-02
DATE BEGIN : 07/15/05
DATE END : 07/17/05
TEST No. : FS1-S-AL03

CONDITION AND REAGENTS

OPERATION	SLURRY CONDITIONS				REAGENT ADDITION				PREGNANT SOLUTION ASSAY			
	Volume (liter)	Percent Solids	Leach Period(hr)	pH Initial	pH Final	NaCN (g)	CaO (g)		NaCN (g/l)	CaO (g/l)	pH	
Conditioning	0.410	20	0	8.18	11.13	0.400	0.100					
Pregnant Solution (1)	0.410	20	4	10.82	11.14	0.000	0.030		0.88	0.04	10.78	
Pregnant Solution (1)	0.410	20	24	11.14	11.55	0.170	0.160		0.56	0.08	11.13	
Pregnant Solution	0.370		48		10.87				0.77	0.06	10.95	
Wash Solution (2)	0.280								0.10	0.09	10.53	
Cyanide and Lime Consumption (kg/tonne)						1.997	2.380					

REMARKS: (1) 40 ml Aliquot sample was removed after 4 and 24 hours of leaching
(2) Three stage water wash (3 x 100 ml)

METALLURGICAL RESULTS

PRODUCT	VOLUME (ml)	WEIGHT (g)	ASSAYS (ppm-g/t)			CUMULATIVE CONTENT			CUMULATIVE EXTRACTION (3)		
			Au			Au (mg)			Au (%)		Au (g/t)
4 hr. Pregnant Leach	410		0.009			0.004			1.82		0.04
24 hr. Pregnant Leach	410		0.009			0.004			1.99		0.04
48 hr. Pregnant Leach	370		0.009			0.004			1.99		0.04
Wash Solution	280		0.001			0.004			2.13		0.04
Loaded Carbon		5.69	34.08			0.198			97.56		1.99
Leach Residue		99.28	0.05			0.005			2.44		
Calc. Head			2.03			0.203			100.00		
Assay Head (4)		99.91	2.48			0.248					

REMARKS: (3) Percent extraction based on calculated head (solutions plus loaded carbon plus leach residue contents)
(4) Composite assay head

METCON RESEARCH, INC.

Bottle Roll Leach Test Data Log

OBJECTIVE : Preliminary 1st. Cleaner Concentrate from Flotation Cyanide Leach, at different grind size.
With 5 g activated carbon

CLIENT : Jinshan Gold Mines
SAMPLE I.D.: Sulfide 1st. Cl. Concentrate, grind size P80 200 mesh
FEED WEIGHT: 99.84 grams
FEED SIZE : Grind size 80 Percent Passing 200 mesh

PROJECT NO. : M-667-02
DATE BEGIN : 07/15/05
DATE END : 07/17/05
TEST No. : FS1-S-AL04

CONDITION AND REAGENTS

OPERATION	SLURRY CONDITIONS				REAGENT ADDITION				PREGNANT SOLUTION ASSAY			
	Volume (liter)	Percent Solids	Leach Period(hr)	pH Initial	pH Final	NaCN (g)	CaO (g)		NaCN (g/l)	CaO (g/l)	pH	
Conditioning	0.410	20	0	8.10	11.04		0.410	0.090				
Pregnant Solution (1)	0.410	20	4	10.96	11.22	0.000	0.030		0.89	0.05	10.94	
Pregnant Solution (1)	0.410	20	24	11.18	11.41	0.150	0.090		0.62	0.09	11.16	
Pregnant Solution	0.400		48		10.96				0.76	0.04	10.94	
Wash Solution (2)	0.280								0.12	0.04	10.64	
Cyanide and Lime Consumption (kg/tonne)							1.623	1.775				

REMARKS: (1) 40 ml Aliquot sample was removed after 4 and 24 hours of leaching
(2) Three stage water wash (3 x 100 ml)

METALLURGICAL RESULTS

PRODUCT	VOLUME (ml)	WEIGHT (g)	ASSAYS (ppm-g/t)			CUMULATIVE CONTENT				CUMULATIVE EXTRACTION (3)		
			Au			Au (mg)				Au (%)		Au (g/t)
4 hr. Pregnant Leach	410		0.010			0.004				2.26		0.04
24 hr. Pregnant Leach	410		0.009			0.004				2.25		0.04
48 hr. Pregnant Leach	400		0.009			0.004				2.40		0.04
Wash Solution	280		0.001			0.005				2.56		0.05
Loaded Carbon		5.76	29.49			0.175				96.17		1.75
Leach Residue		99.36	0.07			0.007				3.83		
Calc. Head			1.82			0.182				100.00		
Assay Head (4)		99.84	2.08			0.208						

REMARKS: (3) Percent extraction based on calculated head (solutions plus loaded carbon plus leach residue contents)
(4) Composite assay head

SUMMARY OF METALLURGICAL RESULTS
Preliminary Cyanide Leach Study
Ambient 48 hr. Bottle Roll Leach Tests on Column Feed
Oxide Ore - "Chang Shan Hao" Project
METCON Project No. M-667-02

Test Number	Sample ID	Grind Size	Head		Leach Residue Assay (g/t)	Reagent Consumption		Leach Time (h)	Extraction	
			Calculated Au (g/t)	Assayed Au (g/t)		NaCN (kg/t)	CaO (kg/t)		Au (%)	Au (g/t)
BR-Ox-05	Oxide Column Leach Test Feed Standard test at 400 mesh grind size	P ₈₀ 400 mesh	1.04	0.91	0.05	0.207	2.544	48	95.18	0.99
BR-Ox-06	Oxide Column Leach Test Feed Standard test at 400 mesh grind size with activated carbon	P ₈₀ 400 mesh	0.66	0.91	0.01	0.394	2.678	48	98.50	0.65

Remarks:

METCON RESEARCH

Bottle Roll Leach Test Data Log

OBJECTIVE : Preliminary Cyanide Leach, at different conditions.
Standard test at 400 mesh grind size

CLIENT : Jinshan Gold Mines
SAMPLE ID: Oxide Column Leach Test Feed
FEED WEIGHT: 999.06 grams
FEED SIZE : Grind Size 80 Percent Passing 400 mesh

PROJECT NO : M-667-02
DATE BEGIN : 07/13/05
DATE END : 07/15/05
TEST No. : BR-Ox-05

OPERATION	SLURRY CONDITIONS				REAGENT ADDITION				PREGNANT SOLUTION ASSAY			
	Volume (liter)	Percent Solids	Leach Period(hr)	pH Initial	pH Final	NaCN (g)	CaO (g)	NaCN (g/l)	CaO (g/l)	pH		
Conditioning	2.001	33	0	8.00	10.96	2.000	1.790					
Pregnant Solution (1)	2.007	33	4	11.25		0.000	0.410	0.93	0.07	11.24		
Pregnant Solution (1)	1.999	33	24	11.08	11.37	0.000	0.500	0.95	0.13	11.42		
Pregnant Solution	1.640		48		11.15			0.89	0.07	11.05		
Wash Solution (2)	0.600							0.43	0.06	10.98		
Cyanide and Lime Consumption (kg/tonne)						0.207	2.544					

REMARKS: (1) 40 ml Aliquot sample was removed after 4 and 24 hours of leaching
(2) Three stage water wash (3 x 200 ml)

METALLURGICAL RESULTS															
PRODUCT	VOLUME (ml)	WEIGHT (g)	ASSAYS (ppm-g/t)				CUMULATIVE CONTENT				CUMULATIVE EXTRACTION (3)				
			Au				Au (mg)				Au (%)			Au (g/t)	
4 hr. Pregnant Leach 24 hr. Pregnant Leach 48 hr. Pregnant Leach Wash Solution	2007		0.26												
	1999		0.49												
	1640		0.50												
	600		0.23												
Leach Residue (5)		1000.32	0.05							0.050				4.82	
Calc. Head			1.04							1.038				100.00	
Assay Head (4) (6)		999.06	0.91							0.909					

REMARKS: (3) Percent extraction based on calculated head (solutions plus leach residue contents)
(4) Composite assay head
(5) Leach residue Au Metallic result, Total sample Wt=488.93 g, +150 mesh Wt=0.63 g, -150 mesh Wt=488.30 g, +150 mesh Au=0.06 g/t, -150 mesh Au=0.05 g/t
(6) Head Au Metallic result, Total sample Wt=498.16 g, +150 mesh Wt=2.48 g, -150 mesh Wt=495.68 g, +150 mesh Au=37.89 g/t, -150 mesh Au=0.73 g/t

METCON RESEARCH

Bottle Roll Leach Test Data Log

OBJECTIVE : Preliminary Cyanide Leach, at different conditions.
Standard test at 400 mesh grind size with activated carbon

CLIENT : Jinshan Gold Mines
SAMPLE I.D: Oxide Column Leach Test Feed
FEED WEIGHT: 998.68 grams
FEED SIZE : Grind Size 80 Percent Passing 400 mesh

PROJECT NO : M-667-02
DATE BEGIN : 07/15/05
DATE END : 07/17/05
TEST No. : BR-Ox-06

OPERATION	SLURRY CONDITIONS					REAGENT ADDITION					PREGNANT SOLUTION ASSAY				
	Volume (liter)	Percent Solids	Leach Period(hr)	pH Initial	pH Final	NaCN (g)	CaO (g)	NaCN (g/l)	CaO (g/l)	pH	NaCN (g/l)	CaO (g/l)			
Conditioning	2.001	33	0	7.92	10.90	2.000	1.840								
Pregnant Solution (1)	2.005	33	4	11.13	11.26	0.000	0.470	0.95	0.06	11.22					
Pregnant Solution (1)	2.009	33	24	11.55	11.50	0.000	0.500	0.93	0.14	11.51					
Pregnant Solution	1.480		48		11.16			0.84	0.06	10.93					
Wash Solution (2)	0.640							0.45	0.06	11.01					
Cyanide and Lime Consumption (kg/tonne)						0.394	2.678								

REMARKS: (1) 40 ml Aliquot sample was removed after 4 and 24 hours of leaching
(2) Three stage water wash (3 x 200 ml)

PRODUCT	VOLUME (ml)	WEIGHT (g)	ASSAYS (ppm-g/t)			CUMULATIVE CONTENT			CUMULATIVE EXTRACTION (3)		
			Au			Au (mg)			Au (%)		Au (g/t)
4 hr. Pregnant Leach	2005		0.060			0.120			18.14		0.12
24 hr. Pregnant Leach	2009		0.050			0.103			15.51		0.10
48 hr. Pregnant Leach	1480		0.010			0.019			2.89		0.02
Wash Solution	640		0.010			0.026			3.86		0.03
Loaded Carbon		5.64	111.29			0.653			98.50		0.65
Leach Residue (5)		998.17	0.01			0.010			1.50		
Calc. Head			0.56			0.663			100.00		
Assay Head (4) (6)		998.68	0.91			0.909					

REMARKS: (3) Percent extraction based on calculated head (solutions plus loaded carbon plus leach residue contents)
(4) Composite assay head
(5) Leach residue Au Metallic result, Total sample Wt=500.22 g, +150 mesh Wt.=4.35 g, -150 mesh Wt.=495.87 g, +150 mesh Au=0.01 g/t, -150 mesh Au=0.01 g/t
(6) Head Au Metallic result, Total sample Wt=498.16 g, +150 mesh Wt.=2.48 g, -150 mesh Wt.=495.68 g, +150 mesh Au=37.89 g/t, -150 mesh Au=0.73 g/t

SUMMARY OF METALLURGICAL RESULTS
Preliminary Cyanide Leach Study
Ambient 48 hr. Bottle Roll Leach Tests on Column Feed
Sulfide Ore - "Chang Shan Hao" Project
METCON Project No. M-667-02

Test Number	Sample ID	Grind Size	Head		Leach Residue Assay (g/t)	Reagent Consumption		Leach Time (h)	Extraction	
			Calculated Au (g/t)	Assayed Au (g/t)		NaCN (kg/t)	CaO (kg/t)		Au (%)	Au (g/t)
BR-S-05	Sulfide Column Leach Test Feed Standard test at 400 mesh grind size	P ₈₀ 400 mesh	0.66	0.51	0.03	0.384	2.134	48	95.41	0.63
BR-S-06	Sulfide Column Leach Test Feed Standard test at 400 mesh grind size with activated carbon	P ₈₀ 400 mesh	0.53	0.51	0.01	0.543	2.175	48	98.10	0.52

Remarks:

METCON RESEARCH

Bottle Roll Leach Test Data Log

OBJECTIVE : Preliminary Cyanide Leach, at different conditions.
Standard test at 400 mesh grind size

CLIENT : Jinshan Gold Mines
SAMPLE ID: Sulfide Column Leach Test Feed
FEED WEIGHT: 999.21 grams
FEED SIZE : Grind Size 80 Percent Passing 400 mesh

PROJECT NO : M-667-02
DATE BEGIN : 07/13/05
DATE END : 07/15/05
TEST No. : BR-S-05

CONDITION AND REAGENTS

OPERATION	SLURRY CONDITIONS				REAGENT ADDITION				PREGNANT SOLUTION ASSAY			
	Volume (liter)	Percent Solids	Leach Period(hr)	pH initial	pH Final	NaCN (g)	CaO (g)	NaCN (g/l)	CaO (g/l)	pH		
Conditioning	2.001	33	0	8.25	11.36	2.000	1.640					
Pregnant Solution (1)	2.007	33	4	11.25	11.10	0.000	0.130	0.95	0.08	11.28		
Pregnant Solution (1)	1.999	33	24	10.96	11.60	0.000	0.510	0.96	0.14	11.57		
Pregnant Solution	1.640		48		11.19			0.80	0.07	11.07		
Wash Solution (2)	0.600							0.38	0.04	10.80		
Cyanide and Lime Consumption (kg/tonne)						0.384	2.134					

REMARKS: (1) 40 ml Aliquot sample was removed after 4 and 24 hours of leaching
(2) Three stage water wash (3 x 200 ml)

METALLURGICAL RESULTS

PRODUCT	VOLUME (ml)	WEIGHT (g)	ASSAYS (ppm-g/t)		CUMULATIVE CONTENT		CUMULATIVE EXTRACTION (3)		
			Au		Au (mg)		Au (%)		Au (g/t)
4 hr. Pregnant Leach	2007		0.20		0.401		61.01		0.40
24 hr. Pregnant Leach	1999		0.27		0.548		83.26		0.55
48 hr. Pregnant Leach	1640		0.32		0.628		95.41		0.63
Wash Solution	600		0.14						
Leach Residue (5)		1007.15	0.03		0.030		4.59		
Calc. Head			0.66		0.658		100.00		
Assay Head (4) (6)		999.21	0.51		0.510				

REMARKS: (3) Percent extraction based on calculated head (solutions plus leach residue contents)
(4) Composite assay head
(5) Leach residue Au Metallic result, Total sample Wt=495.56 g, +150 mesh Wt=3.13 g, -150 mesh Wt=492.43 g, +150 mesh Au=0.04 g/t, -150 mesh Au=0.03 g/t
(6) Head Au Metallic result, Total sample Wt=499.71 g, +150 mesh Wt=8.34 g, -150 mesh Wt=491.37 g, +150 mesh Au=5.95 g/t, -150 mesh Au=0.42 g/t

METCON RESEARCH

Bottle Roll Leach Test Data Log

OBJECTIVE : Preliminary Cyanide Leach, at different conditions.
Standard test at 400 mesh grind size with activated carbon

CLIENT : Jinshan Gold Mines
SAMPLE I.D: Sulfide Column Leach Test Feed
FEED WEIGHT: 999.31 grams
FEED SIZE : Grind Size 80 Percent Passing 400 mesh

PROJECT NO : M-667-02
DATE BEGIN : 07/15/05
DATE END : 07/17/05
TEST No. : BR-S-06

OPERATION	SLURRY CONDITIONS					REAGENT ADDITION					PREGNANT SOLUTION ASSAY				
	Volume (liter)	Percent Solids	Leach Period(hr)	pH Initial	pH Final	NaCN (g)	CaO (g)	NaCN (g/l)	CaO (g/l)	pH	NaCN (g/l)	CaO (g/l)			
Conditioning	2.001	33	0	8.22	11.40	2.000	1.660								
Pregnant Solution (1)	2.005	33	4	11.09		0.000	0.150	0.94	0.08	11.32					
Pregnant Solution (1)	2.009	33	24	10.97	11.63	0.000	0.500	0.86	0.13	11.61					
Pregnant Solution	1.520		48		11.22			0.74	0.06	10.94					
Wash Solution (2)	0.620							0.42	0.06	11.01					
Cyanide and Lime Consumption (kg/tonne)						0.543	2.175								

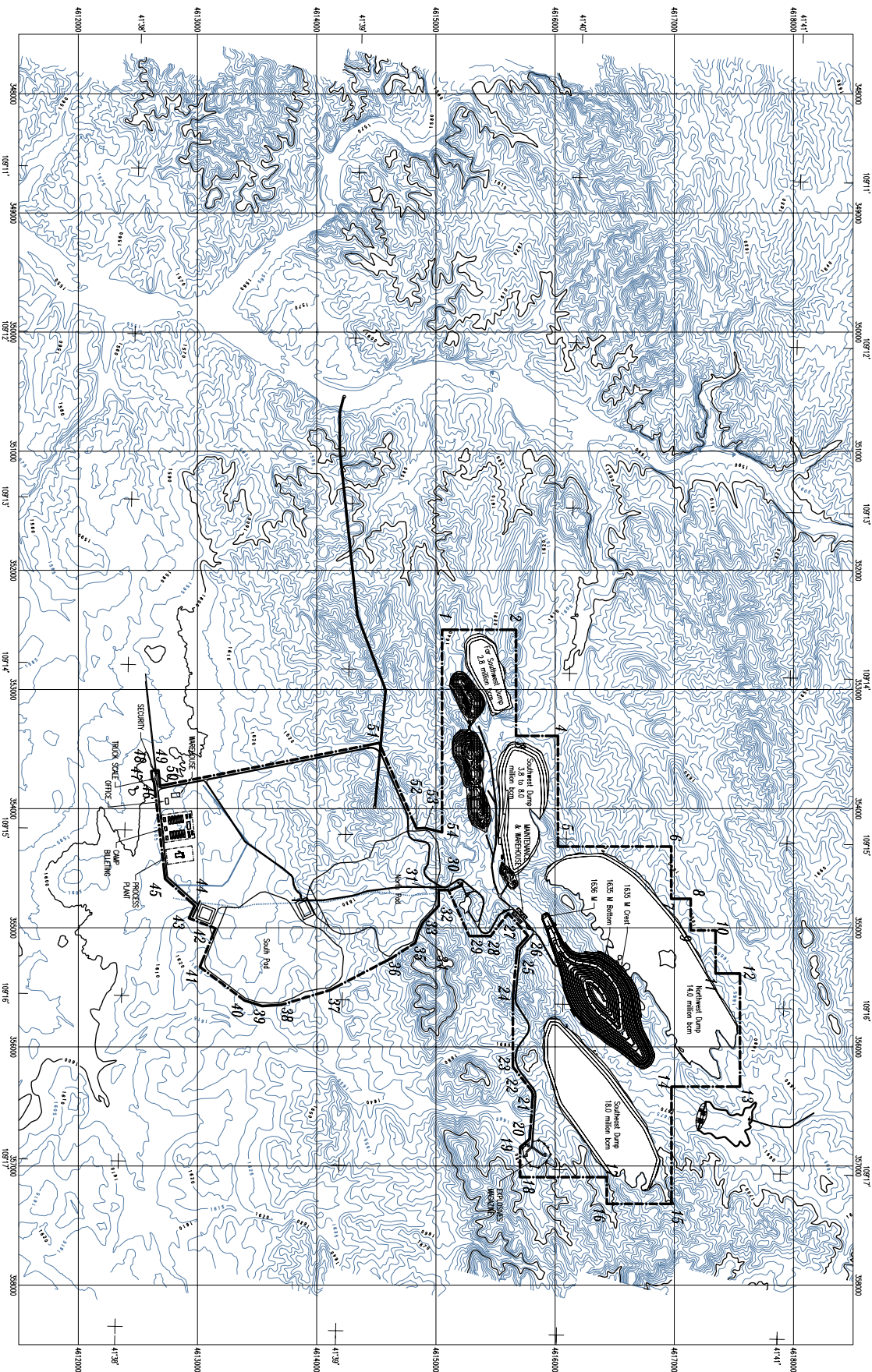
REMARKS: (1) 40 ml Aliquot sample was removed after 4 and 24 hours of leaching
(2) Three stage water wash (3 x 200 ml)

PRODUCT	VOLUME (ml)	WEIGHT (g)	ASSAYS (ppm-g/t)			CUMULATIVE CONTENT			CUMULATIVE EXTRACTION (3)		
			Au			Au (mg)			Au (%)		Au (g/t)
4 hr. Pregnant Leach	2005		0.050			0.100			18.92		0.10
24 hr. Pregnant Leach	2009		0.020			0.042			7.96		0.04
48 hr. Pregnant Leach	1520		0.010			0.018			3.40		0.02
Wash Solution	620		0.010			0.024			4.57		0.02
Loaded Carbon		5.65	87.79			0.520			98.10		0.52
Leach Residue (5)		1007.32	0.01			0.010			1.90		
Calc. Head			0.53			0.530			100.00		
Assay Head (4) (6)		999.31	0.51			0.510					

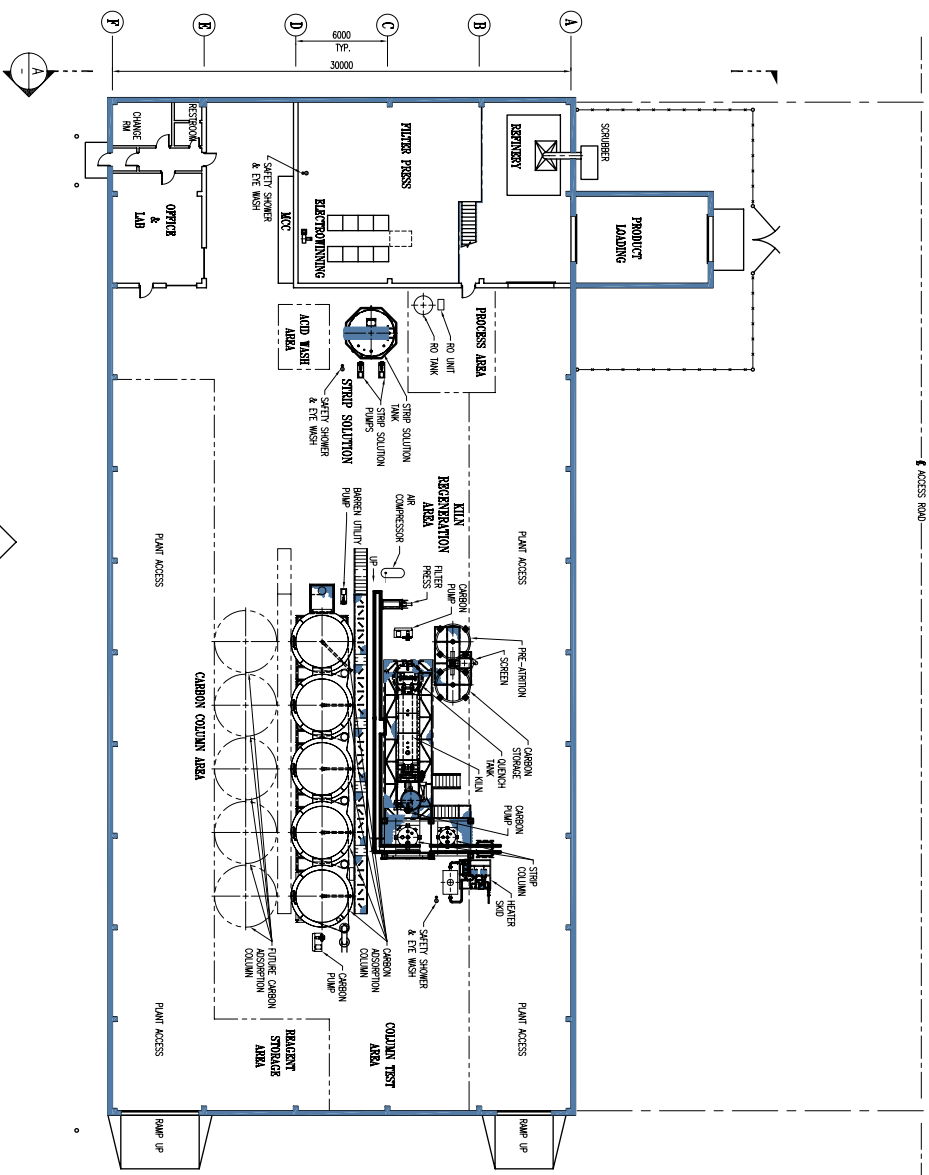
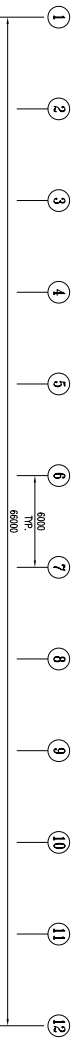
REMARKS: (3) Percent extraction based on calculated head (solutions plus loaded carbon plus leach residue contents)
(4) Composite assay head
(5) Leach residue Au Metallic result, Total sample Wt=501.30 g, +150 mesh Wt.=2.74 g, -150 mesh Wt.=498.56 g, +150 mesh Au=0.01 g/t, -150 mesh Au=0.01 g/t
(6) Head Au Metallic result, Total sample Wt=499.71 g, +150 mesh Wt.=8.34 g, -150 mesh Wt.=491.37 g, +150 mesh Au=5.95 g/t, -150 mesh Au=0.42 g/t

APPENDIX 5

PLOT PLAN AND PROCESS FLOW SHEETS

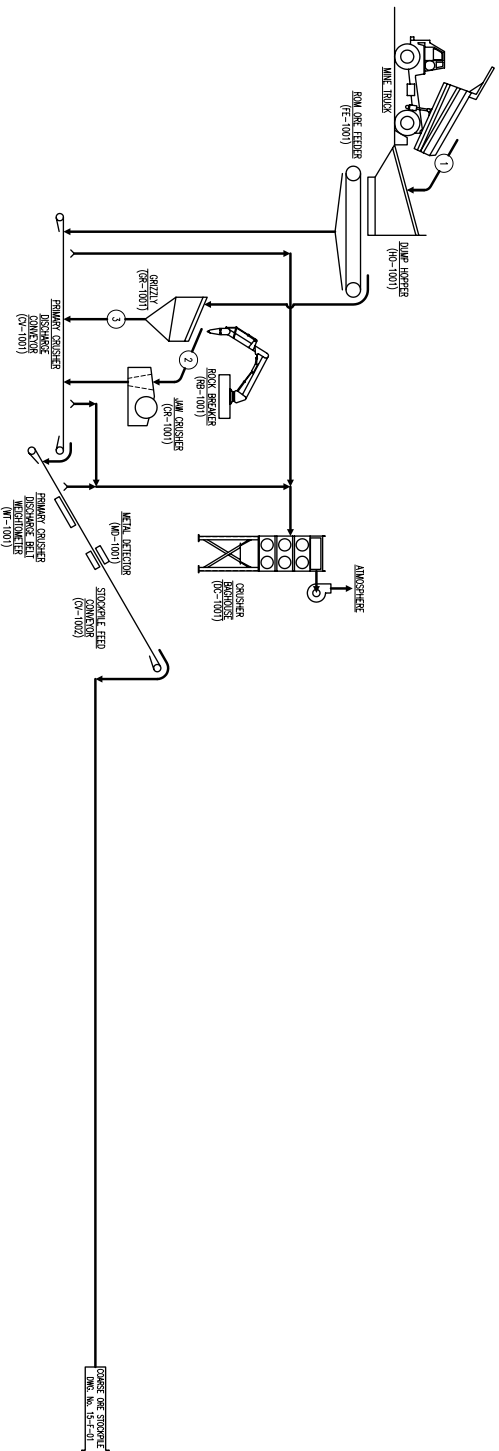


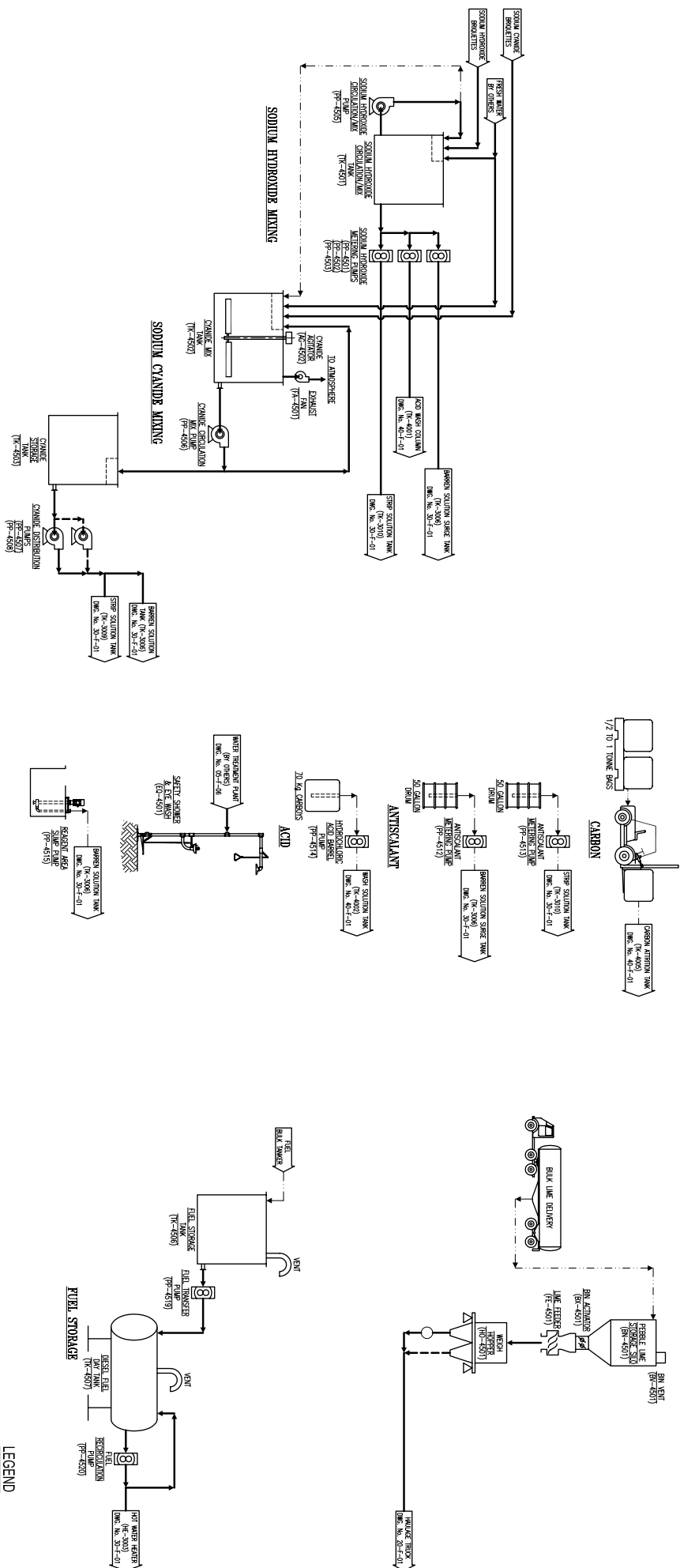
DRAWING TITLE									
JINSHAN GOLD MINES INC. SITE PLAN MINE & PROCESS FACILITIES PRELIMINARY ENGINEERING DESIGN									
DRAWING NO. 05-L-01									
PROJECT NO. 302-02									
SCALE 1 : 15000									
PROJECTED BY DATE									
CHECKED BY DATE									
APPROVED BY DATE									
REVISIONS									
REFERENCE									
DRAWING NO.									



PRELIMINARY
NOT FOR CONSTRUCTION

[illegible]

[illegible]



DRAWING TITLE										DRAWING NO.									
JINSHAN GOLD										45-F-01									
MINES INC.										PROJECT NO.									
CHANG SHAN HAO GOLD										SHEET NO.									
PROJECT										DATE									
PRELIMINARY ENGINEERING DESIGN										SCALE									
CLIENT										PROJECT NO.									
F. F. F. (Design)										SHEET NO.									
SHEET										DATE									
DESIGN										PROJECT NO.									
CHECKED										SHEET NO.									
DESIGN										DATE									
REVISIONS										PROJECT NO.									
NO. BY/DATE										SHEET NO.									
P2 01-23-05										DATE									
REFERENCE										PROJECT NO.									
DRAWING NO.										SHEET NO.									

APPENDIX 6

PROCESS DESIGN CRITERIA

Nominal

Design

Source Code

1.0

INTRODUCTION

The following criteria are developed to process ore for Jinshan Gold Mines Inc. at 217 gold mine in Wulate County, Inner Mongolia China. A run of mine (ROM) heap leach facility processing 20,000 metric tonnes per day of oxide ore is planned for the first two years of operation. During the first two years of operation, a three stage crushing plant capable of crushing 20,000 metric tonnes per day to a p80 of 10 mm will be designed and constructed. New facilities include a permanent leach pad and associated internal pond. A new five stage CIG adsorption unit, two elution vessels as well as other carbon handling facilities will also be installed.

2.0

INFORMATION SOURCE CODE

Code Source

A Assumptions For Study
 B Calculated
 C Client Information
 I Industry Standard Practice
 K KDE
 O Information Provided by Others
 P Published Information / Criteria
 T Engineering, Testwork or Reports
 V Vendor Data

3.0

PROCESS DESIGN CRITERIA

3.1 SITE DATA

Location	Xin-hu-re township in Wulate, Inner Mongolia, which is at east longitude 109°11'00" to 109°17' 00" and north latitude 41°38' 00" to 41°41' 00"	C
Altitude, Meters Above Sea Level	1550 to 1750 meters	T
Ambient Air Pressure, mm Hg	860-890	A
Ambient Air Temperature		
Maximum	37	T
Minimum	-34	T
Building Design Temp. °C	0 to 50	A
Precipitation, mm (Max 24 Hr)	25	A
Precipitation, mm (Annual Average)	233.7	T
Wet Season > 50 mm per month	July and August	T
Dry Season < 50 mm per month	September to June	T
Evaporation, mm (Annual Average)	2646.2	T
Wind Direction, Prevailing	NW	T
Design Wind Load	150 kph	A
Seismic Zone	UBC Zone 0	A

3.2 GENERAL

ROM Tonnes,		14,200,000	C
Crush Leach Tonnes, Total		<u>38,077,673</u>	C
Total		52,277,673	B
Daily Ore Feed Rate, Tonnes per Day	20,000	23,000	C
Mining Days per Year	355	355	C
Annual Ore Feed Rate	7,100,000	7,100,000	B
Nominal Mine Life, years		7.4	B
Average Ore Grade, grams per tonne			
Gold			
ROM Ore		0.730	C
Crush Leach Ore		<u>0.769</u>	C
Resource Total		0.758	B
Silver			
ROM Ore		1.30	A
Crush Leach Ore		1.80	A
Resource Total		1.66	C
Average ROM Gold Recovery, Percent			
ROM Oxide		80	T
ROM Sulfide		50	T
Average Crushed Ore Gold Recovery, Percent			
Oxide		90	T
Sulfide		70	T

	<u>Nominal</u>	<u>Design</u>	<u>Source Code</u>
Average Silver Recovery, Percent			
ROM Oxide		5	A
Sulfide		5	A
Total Recoverable Gold			
ROM Ore		266,778	B
Crushed Leach Ore		<u>665,925</u>	B
Total		932,703	B
Initial Average Annual Production Rate from ROM Ore			
Gold		133,389	B
Silver		14,839	B
Overall Average Annual Production Rate, Ounces			
Gold		126,673	B
Silver		18,996	B

3.3 ORE CHARACTERISTICS

Specific Gravity	2.6 - 3.0	2.6 - 3.0	T
Average	2.7	2.7	T
Run of Mine Ore Size, mm			
Percent Passing			
1000		80	A
150		50	A
50		20	A
Run of Mine Ore Moisture			
Normal, Percent	3	3	A
Retained Moisture, Percent	11	11	T
Saturation Moisture, Percent	18	18	T
Angle of Repose, Degrees	38	38	A
Draw Down Angle, Degrees	45	45	A
Bulk Density Tonnes per Cubic Meter	1.5 - 1.7	1.5 - 1.7	A
For Volume Calculations	1.70	1.70	T
For Structural Calculations	2.00	2.00	A
Bond Mill Work Index, kWh/Tonne			
Oxide	5.6 - 14.7	14.70	T
Sulfide	9.5 - 17.6	17.60	T
Bond Abrasion Index			
Oxide	0.048 - 0.0794	0.0794	T
Sulfide	0.0927 - 0.209	0.2090	T

3.4 OPERATING TIMES

Crushing Schedule			
Days per Year		355	C
Shifts per Day		3	C
Hours per Shift		8	C
Availability		83%	A
ROM Stacking Schedule			
Days per Year		355	C
Shifts per Day		3	C
Hours per Shift		8	C
Leaching and Adsorption			
Days per Year		365	C
Shifts per Day		3	C
Hours per Shift		8	C
Availability		98%	
Carbon Stripping and Electrowinning			
Days per Week		7	C
Hours per Day		24	C
		98%	
Carbon Reactivation			
Days per Week		7	C
Hours per Day		24	C
		98%	
Refining			
Days per Week (1 Day Melting)		5	C
Hours per Day		8	C

	<u>Nominal</u>	<u>Design</u>	Source Code
CRUSHING			
Design, Dry Tonnes per Hour		1150	B
Truck Size		16 to 90 Tonne	C
Dump Pocket Size, tonnes		180	A
Crusher Operating Time, hrs. / Day at Design Throughput		20.0	B
Primary Crusher			
Type		Jaw	I
Feed Method		Direct Dump from Mine or by Loader	I
Pocket Discharge Method		Apron Feeder	I
Primary Crusher Feed			
100 Percent Passing Size, mm		1000	A
80 Percent Passing Size, mm		600	A
Throughput Rate, Tonnes / Hr		1150	B
Primary Crusher Discharge			
80 Percent Passing Size, mm		200	A
Secondary Crusher:			
Type		HP Standard Cone	I
Bowl Type		Coarse	I
Feed Method		Screen Oversize	I
Tertiary			
Type		HP Shorthead Cone	I
Bowl Type		Medium	I
Feed Method		Screen Oversize	I
Crushing Plant Final Product			
100 Percent Passing Size, mm		12	K
80 Percent Passing Size, mm		10	K
Surge Bin Total Capacity, Tonnes		2,300	A
Fine Ore Angle of Repose, Degrees		37	A
Drawdown Angle, Degrees		45	A
Storage Requirements, Hours		2	I
Ore Reclaim Feed Method		Belt Feeders	I
Reclaim Rate per Feeder (Two Feeders Installed), Tonnes per Hour		2000	A

	Nominal	Design	Source Code
3.5 ROM ORE STACKING			
Stacking Rate, tonnes per day	20,000	23,000	C
Bulk Density of ROM Ore, tonnes per cubic meter		1.7 tonne per m3 (dry basis)	I
Stacking Method		Truck Dump from Prepared Access Corridors; Dozer Spreading of Ore; Dozer Ripping before Leaching	
Lime Addition Method		Lime Addition Silo with Rotary Valve to Trucks	C
Lime Addition Rate, kg per tonne	2	3	K
Dosing System		Sized to Dose One Truck in Less Than 30 Seconds	T
			A
3.6 LEACH PADS			
Type		Multiple Lift, Single-Use Pad	C
Construction Phasing			
Phase 1	Construct in Year 0		
Lined Area		360,000 m ²	O
Phase 2	Construct in Year 3		
Lined Area		385,000 m ²	O
3.7 HEAP CONSTRUCTION			
Method of Construction		Trucks (ROM ore)	C
Nominal Heap Lift Height, meters		10	A
Number of Lifts		7	A
Maximum Heap Height		70 meters	O
Ore Natural Angle of Repose		1.3:1 (H:V)	O
Downstream Face Heap Side Slope		2.5:1 (H:V)	O
Number of Modules			
3.8 HEAP OPERATION			
Solution Application Rate, liters per hour per square meter	6	6	K
Primary Leaching Cycle, days		90	A
Number of Leach Cycles		1	A
Solution Application Method		Drip Emitters	C
Solution Pumping Availability, percent		98	A
Solution Pumping Rate, cubic meters per hour	635	858	B
Area Irrigated, square meters	105,882	142,941	B
Solution Evaporation Rate, liters per hour per square meter		0.36	A
Solution Filters			
Type		Self-cleaning	I
Screen Aperture		0.25 mm (60 mesh)	I
Leached Ore Retained Moisture, percent		11	T
Draindown, Average		23 liters/tonne	A
3.9 SOLUTION PONDS AND TANKS (WITH GOLDR)			
Number of Solution Ponds			
Pregnant (Internal to Pad)		1	C
Excess Solution		1	O
Number of Solution Tanks			
Barren Solution		1	K
Basis for Sizing of Barren Tank		30 minutes of total barren solution flow to the tank	K
Barren Tank Size, cubic meters		429	B
Nominal Tank Size,			
Diameter		8.2	B
Height		9.2	B

	Nominal	Design	Source Code
3.10 RECOVERY PLANT			
Mechanical Availability, percent		98	I
Solution Processing			
Method		Carbon Adsorption	I
Number of Trains		1	K
Number of Columns/Train		5	K
Type		Cascade	I
Nominal Column Dimensions, meters			
Diameter		3.8	B
Height		4.2	B
Pregnant Solution Flow Rate	635	858	B
Specific Flowrate, m3 / hr / m2	60	75	I
Tonnes Carbon per Adsorption Column	2	2	A
Design Metal Loading Kg (Au + Ag) per Tonne Carbon	4.0	1.8	I
Tenor of Pregnant Solution (nominal), grams Au per tonne solution		0.71	B
3.11 CARBON DESORPTION			
Carbon Desorption Method		Pressure Zadra	I
Elution Temperature		135°C	I
Boiler			
Type		Hot Water, Vertical	K
Fuel		DIESEL	K
Heat Exchangers			
Type		Plate	I
Number		3	I
Elution Column Carbon Capacity, tonnes		2	K
Number of Columns		2	K
Height:Diameter Ratio		4 to 1	I
Desorption Flowrate, Bed Volumes per Hour		2	I
Bed Volumes Required	24.5	24.5	I
Stripping Schedule			
Weeks per Year		50	C
Number of Elution Cycles per Week		11.4	B
Solution Heater Exchange System			
Inlet Design, °C	65	65	I
Outlet, °C	135°C	135°C	I
Solution Specific Gravity	1.02	1.02	A
Specific Heat of Solutions, Cal/(Kg °C)	1.13	1.13	A
3.12 ELECTROWINNING			
Number of cells, operating in series	1.0	1.0	I
Electrowinning Temperature		85°C	I
Gold Recovery		± 70% per Pass Through Cells	K
Mechanical Availability		98% +	A
Plating current, Amps			
Total	638	1,070	B
Eluate flow, m3/hr	8.0	8.0	I
Cathodes required per cell	7	12	B
Number of rectifiers	1	1	I
Rectifier voltage	6	6	I
Cathodes	Steel Wool	Steel Wool	I
Anodes	Stainless Steel	Stainless Steel	I
Overall Recovery	95+	95+	A
Voltage, Maximum	12	12	I
Rectifier Amperage, Maximum	1000	1000	B
3.13 ACID WASH			
Type		Hydrochloric Acid	I
Containers		1 m ³ Tote Bins	C
Schedule		Every Elution Cycle	I
Carbon Capacity		Same as Elution Column	I
Bed Volumes Required		2	I
Wash Time		4 to 6 Hours	I
Wash Temperature		Ambient	I
Mechanical Availability		98% +	A

	Nominal	Design	Source Code
3.14 CARBON REACTIVATION			
Carbon Reactivation Kiln			
Feed Hopper Capacity, Tonnes		2	I
Number		1	I
Type		Horizontal	I
Retention Time, Minutes		10 at temperature	I
Heating Method		Indirect Electric	K
Carbon, Average oC		600	I
Carbon, Design oC		850	I
Steam Requirement, Kg/Kg Carbon			
Quench Tank Capacity, Tonne		2	K
Carbon Properties			
Size, Process	6 by 24 Mesh	6 by 24 Mesh	A
Size, New	6 by 12 Mesh	6 by 12 Mesh	I
Void Fraction, Percent			
(Wet Settled Bed)	40	40	A
Specific Gravity of Dry Carbon	2.23	2.23	T
Bulk Density of Settled Carbon, Kilograms per cubic Meter			
Attritted Circuit Carbon	600	600	A
Virgin Carbon	450	450	V
3.15 GOLD SMELTING			
Mercury Removal			
Retort Furnace		Electric	I
Number Required		1	I
Operation Time, Hours		22	I
Total Volume, ft3		5	I
m3		0.14	B
Condenser		Water Bath	I
Smelting Furnace			
Type		Induction	K
Number Required		1	I
Smelting Batches per Week, Avg.		1	B
Smelting Temperature, °C		1250	I
Meltdown Time, Hours		1.5 to 2.0	I
Flux Consumption			
Borax, Kg/oz Gold		0.05	A
Sodium Nitrate, Kg/oz Gold		0.04	A
Silica, Kg/oz Gold		0.04	A
Sodium Carbonate, Kg/oz Gold		0.005	A
Fluorspar, Kg/oz Gold		0.002	A
Slag Handling			
Crushing		Jaw & Hammermill	K
Gravity Concentration		Gemini Table	K
Feed Size to Gravity Circuit		1.70 mm (10 mesh)	K
Feed Rate to Gravity Circuit		30 kg per hour	K
Slag Produced		100 kg per week	A
Concentrate Produced		10 to 20 kg per week	A

3.16 REAGENTS

	Nominal	Design	Source Code
Activated Carbon			
Type		Coconut	I
Consumption, Kg per Tonne Ore		0.1	I
Shipping Container		Bags or Boxes	I
Storage Capacity, Months		3	A
Acid			
Type		Hydrochloric	I
Consumption, Kg per Tonne Ore		0.1 - 0.3	I
Delivered Concentration, Pct by Wt		35	A
Usage Concentration, Pct by Wt		3 - 5	I
Storage Capacity, Days		60	A
Sodium Hydroxide			
Consumption, Kg per Tonne Ore		0.15 - 0.35	I
Delivered Concentration, Pct by Wt		100 (prills)	A
Storage Concentration, Pct by Wt		25	I
Container Size, kg		50	A
Quantity per Batch, kg		400	A
Usage Concentration, Pct by Wt		1 - 2	I
Storage Tank Size,		Two Batches	A
Sodium Cyanide			
Consumption, Kg per Tonne Ore		0.3	T
Container Size, kg		22 kg drums	A
Delivered Concentration, Pct by Wt		100 (flake)	I
Storage Concentration, Pct by Wt		20	A
Usage Concentration, Pct by Wt		20	A
Dry Storage Capacity, Months		3	A
Mix Tank, Tonnes/Batch		2.7	A
Storage Tank		Two Batches	A
Antiscalant			
Container		200 liter drums	A
Average Addition Rate		6 ppm	A
Lime			
Consumption, Kg per Tonne Ore			
Oxide	1.5	2	T
Sulfide	2	2.5	
Daily Consumption, Tonnes	46	57.5	
Delivered Concentration, Pct CaO		90 % CaO	A
Size		Pebble (-25 mm / + 6 mm)	
Shipping Container		2 Tonne Bag	C
Storage Capacity, Days		2	A
Storage Tank Capacity, Tonnes		115	B

APPENDIX 7

MAJOR PROCESS EQUIPMENT LIST

PRELIMINARY EQUIPMENT LIST

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Operating Power kW
Area 10 Primary Crushing							
BN - 1001	1	1	Dump Hopper, 180 tonne				
CM - 1001	1	1	Air Compressor		22	22	16.5
CR - 1001	1	1	Primary Jaw Crusher 48" x 60"		224	224	168.0
	1	1	Including Lube System		1.5	1.5	1.1
CV - 1001	1	1	Primary Crusher Discharge Conveyor, 48" x 120'		30	30	22.5
CV - 1002	1	1	Stockpile Feed Conveyor, 48" x 150'		37.3	37.3	28.0
DC - 1001	1	1	Baghouse		22	22	16.5
FE - 1001	1	1	ROM Ore Apron Feeder 60" x 25'		44.8	44.8	33.6
RB - 1001	1	1	Rock Breaker		22	22	16.5
GR - 1001	1	1	Grizzly Screen				
WT - 1001	1	1	Primary Crusher Disch Belt Weightometer		0.1	0.1	0.1
Subtotal Area 10 Primary Crushing						403.7	302.8
Area 15 Fine Crushing							
BA - 1501	1	1	Lime Bin Activator		1.1	2.2	1.7
BN - 1501	1	1	Surge Bin, 1000 tonne				
BN - 1502	1	1	Product Bin, 2000 tonne				
BN - 1503	1	1	Lime Bin, 100 tonne				
CN - 1501	1	1	Crane		10	10	7.5
CR - 1501	1	1	Secondary Crusher, 7'		596.8	596.8	447.6
	1	1	Including Oil Cooling Fan		3.7	3.73	2.8
	1	1	Including Lube Oil Pump		3.7	3.73	2.8
	1	1	Including Hydraulic Adjustment Pump		1.5	1.492	1.1
	1	1	Including Lube Oil Heater		10.0	10	7.5
CR - 1502	1	1	Tertiary Crusher, 7'		596.8	596.8	447.6
	1	1	Including Oil Cooling Fan		3.7	3.73	2.8
	1	1	Including Lube Oil Pump		3.7	3.73	2.8
	1	1	Including Hydraulic Adjustment Pump		1.5	1.492	1.1
	1	1	Including Lube Oil Heater		10.0	10	7.5
CR - 1503	1	1	Tertiary Crusher, 7'		596.8	596.8	447.6
	1	1	Including Oil Cooling Fan		3.7	3.73	2.8
	1	1	Including Lube Oil Pump		3.7	3.73	2.8
	1	1	Including Hydraulic Adjustment Pump		1.5	1.492	1.1
	1	1	Including Lube Oil Heater		10.0	10	7.5
CV - 1501	1	1	Secondary Feed Conveyor		37	37	27.8
CV - 1502	1	1	Crusher Discharge Conveyor 48" x 150'		75	75	56.3
CV - 1503	1	1	Transfer Conveyor, 48" x 130'		75	75	56.3
CV - 1504	1	1	Splitter Conveyor, 48" x 20'		37	37	27.8
CV - 1505	1	1	Tertiary Crusher A Feed Conveyor, 36" x 20'		37	37	27.8
CV - 1506	1	1	Tertiary Crusher B Feed Conveyor, 36" x 20'		37	37	27.8
CV - 1507	1	1	Final Product Discharge Conveyor		75	75	56.3
DC - 1501	1	1	Secondary Crusher Baghouse		22	22	16.5
DC - 1502	1	1	Tertiary Crusher Baghouse		22	22	16.5
DC - 1503	1	1	Tertiary Crusher Baghouse		22	22	16.5
DC - 1504	1	1	Lime Bin Dust Collector		1.85	1.85	1.4
FE - 1501	2	1	Coarse Ore Apron Feeder		15	30	11.3
FE - 1502			Coarse Ore Apron Feeder				
FE - 1503	1	1	Lime Variable Speed Screw Feeder		0.75	0.75	0.6
FE - 1504	2	1	Crushed Ore Feeder, belt feeder, 2000 tph, variable speed		15	30	11.3
FE - 1505			Crushed Ore Feeder, belt feeder, 2000 tph, variable speed				
MG - 1501	1	1	Tramp Magnet - electromagnet		7.5	7.5	5.6
MG - 1502	1	1	Tramp Magnet - electromagnet		7.5	7.5	5.6
SC - 1501	1	1	Secondary Feed Screen		22	22	16.5
SC - 1502	2	2	Vibrating Screen 8 x 20		37.3	74.6	56.0
SC - 1503			Vibrating Screen 8 x 20				
TR - 1501	1	1	Magnet Trolley System		0.3	0.3	0.2
TR - 1502	1	1	Magnet Trolley System		0.3	0.3	0.2
WT - 1501	1	1	Belt Weightometer		0.3	0.3	0.2
WT - 1502	1	1	Belt Weightometer		0.3	0.3	0.2
Subtotal Area 15 Fine Crushing						2473.9	1,832.9

PRELIMINARY EQUIPMENT LIST

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Operating Power kW
Area 20 Leaching							
PD - 2001	1	1	Pregnant Solution Pond				
PD - 2002	1	1	Excess Solution Pond				
PP - 2001	3	2	Pregnant Solution Pumps	U. S.	56	168	84.0
PP - 2002							
PP - 2003							
PP - 2004	2	1	Excess Solution Pumps	U. S.	45	90	33.8
PP - 2005							
Subtotal Area 20 Leaching						258	117.8
Area 30 CIC and Carbon Stripping							
DR - 3001	1	1	Retort, Electric, 2 cuft, w/Hg Trap and Chiller	U. S.	5	5	3.8
EQ - 3000	1	1	Miscellaneous Equipment, vault door GSA Class 5, Electronic Lock, Includes Day Gate & Wall Flange	U. S.			
EW - 3001	2	1	Electrowinning cell 75 cubic ft complete with 21 anodes, 20 SS cathodes and buss bar	U. S.			
EW - 3002				U. S.			
FA - 3001	1	1	Exhaust Fan, electrowinning area, 57 cubic meters per minute including ductwork	U. S.	0.75	0.75	0.6
FL - 3001	1	1	Electrowinning sludge filter, plate and frame	U. S.			
HE - 3001	1	1	Strip solution recovery heat exchanger	U. S.			
HE - 3002	1	1	Strip solution primary heat exchanger	U. S.			
HE - 3003	1	1	Strip solution heater, 1.54/1.23 MBtu/hr, Diesel (No 2 Fuel Oil) Valves & Instruments, Expansion Tank, Air Separator	U. S.			
HE - 3004	1	1	Strip solution cooling heat exchanger	U. S.			
PP - 3001	3	2	Barren Solution Pump 854 m3 per hour design total flow	U. S.	186	558	279.0
PP - 3002							
PP - 3003							
PP - 3004	1	1	CIC Carbon transfer pump, 76 to 50 mm, horizontal screw impeller, Hidrostral Type	U. S.	2.2	2.2	1.7
PP - 3005	1	1	Stripped carbon transfer pump, 75 to 50 mm, horizontal screw impeller, Hidrostral Type	U. S.	2.2	2.2	1.7
PP - 3006	1	1	CIC area sump pump, vertical rubber covered, 50 by 1200 mm vertical	U. S.	3.7	3.7	2.8
PP - 3007	1	1	Carbon area sump pump, vertical rubber covered, 50 by 1200 mm vertical	U. S.	3.7	3.7	2.8
PP - 3008	2	1	Strip solution pump, horizontal 70 gpm	U. S.	3.7	7.5	2.8
PP - 3009				U. S.			
PP - 3010	2	1	Hot Water Circulation Pump	U. S.	3.7	7.5	2.8
PP - 3011				U. S.			
PP - 3012	1	1	Electrowinning sludge pump, 40 gpm	U. S.	3.7	3.7	2.8
PP - 3013	2	1	Process Water Pump, 200 gpm	U. S.	20.0	40.0	
PP - 3014							
RF - 3001	2	1	DC Rectifier, SCR, 0-1500 A, 0-6 V	U. S.	15.0	30.0	11.3
RF - 3002							
SA - 3001	1	1	Pregnant solution sampler	China			
SA - 3002	1	1	Barren solution sampler	China			
SC - 3001	1	1	Trash screen, 4 Mesh	China			
SC - 3002	1	1	Carbon safety screen, 35 Mesh sieve bend	China			
TK - 3001	1	1	Carbon Adsorption Column No 1, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm Includes 10" Magmeter	China			
TK - 3002	1	1	Carbon Adsorption Column No 2, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China			
TK - 3003	1	1	Carbon Adsorption Column No 3, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China			
TK - 3004	1	1	Carbon Adsorption Column No 4, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China			
TK - 3005	1	1	Carbon Adsorption Column No 5, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China			
TK - 3006	1	1	Barren Solution Surge Tank, Insulated, 8.2 M Dia x 9.2 M High	China			
TK - 3007	1	1	Barren Solution Sump				
TK - 3008	2	2	Carbon Strip Column, 2 tonne capacity CS, 100 psi-300 F ASME VIII, In/Out Manifolds	U. S.			
TK - 3009							
TK - 3010	1	1	Strip solution tank, CS, w/Sight Glass	China			
TK - 3011	1	1	Cathode wash tank, FRP, 1 meter diameter x 1 meter high	U. S.			
Subtotal Area 30 CIC and Carbon Stripping						664	327

PRELIMINARY EQUIPMENT LIST

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Operating Power kW
Area 35 Refining							
BM - 3501	1	1	Batch ball mill	U. S.	2.2	2.2	1.7
FA - 3501	1	1	Exhaust fan, furnace and retort area	U. S.	3.7	3.7	2.8
FR - 3501	1	1	Induction furnace, Induction, 75 kW/0.7 cuft, w/Hydraulics & Chiller	U. S.	75	75	56.3
GR - 3501	1	1	Gravity Concentrator	U. S.			
SC - 3501	1	1	Vibrating slag screen	U. S.	0.7	0.7	0.6
ZM - 3501	1	1	Smelting furnace equipment (Includes cascade mold stand, 1000 oz molds (5), and slag pot (2), 25 cuft, Cement Mixer, PE Drum	U. S.			
Subtotal Area 35 Refining						81.714	61.3
Area 40 Carbon Handling							
AG - 4001	1	1	Attrition Tank Agitator	U. S.	0.7	0.7	0.6
EQ - 4001	1		Safety shower and eye wash				
DV - 4001	1	1	Flop Gate				
FA - 4001	1	1	Exhaust fan, carbon wash area	U. S.	0.7	0.7	0.6
FA - 4002	1	1	Kiln exhaust fan	U. S.	0.7	0.7	0.6
FL - 4001	1	1	Carbon Fines Filter	U. S.			
HO - 4001	1	1	Kiln feed hopper, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	U. S.			
KN - 4001	1	1	Regeneration kiln package, Horizontal, Electric 120 kW or Diesel (No 2 Fuel Oil)	U. S.	120	120	90.0
PP - 4001	1	1	Carbon wash pump, 34 gpm	U. S.	3.7	3.7	2.8
PP - 4004	1	1	Carbon transfer pump, 75 by 50 mm, screw impeller hidrostal type	U. S.	3.7	3.7	2.8
PP - 4006	1	1	Sump pump, carbon wash area 20 gpm	U. S.	3.7	3.7	2.8
PP - 4007	2	1	Carbon Fines Pump, 70 gpm	U. S.	3.7	7.5	2.8
PP - 4008					3.7		
SC - 4001	1	1	Dewatering screen, SS Wedgewire panel	U. S.			
SC - 4002	1	1	Carbon Sizing screen, 36" Midwestern, flop gate high speed vibrating	U. S.	1	1	0.8
SJ - 4001	1	1	Kiln feed screw conveyor SS Screw	U. S.	1	1	0.8
TK - 4001	1	1	Acid wash column, FRP, 2.0 Ton, Includes Inlet/Outlet Manifolds	U. S.			
TK - 4002	1	1	Wash solution tank, FRP	U. S.			
TK - 4003	1	1	Quench tank, Carbon Steel, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China			
TK - 4004	1	1	Carbon Storage Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China			
TK - 4005	1	1	Carbon Attrition Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China			
TK - 4007	1	1	Carbon Fines Storage Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China			
Subtotal Area 40 Carbon Handling						142.1	103.8
Area 45 Reagents							
AG - 4502	1	1	Agitator for cyanide mix tank	U. S.	3.7	3.7	2.8
BN - 4501	1	1	Pebble lime storage silo, 100 tonne capacity with bag house	China			
BV - 4501	1	1	Bin Vent	China	0.7	0.7	0.5
BX - 4501	1	1	Bin Activator	China	0.7	0.7	0.5
EQ - 4501	1	1	Safety shower and eye wash station	U. S.			
FA - 4501	1	1	Exhaust fan cyanide mixing		0.7	0.7	0.5
FE - 4501	1	1	Lime feeder	U. S.	0.7	0.7	0.5
HO - 4501	1	1	Lime Feed Hopper	U. S.			
PP - 4501	3	3	Sodium hydroxide metering pumps	China	0.7	2.1	1.6
PP - 4502				China			
PP - 4503				China			
PP - 4505	1	1	Sodium hydroxide mixing/circulating pumps 4.5 m3/hr, 7.6 m tdh	U. S.	1.5	1.5	1.1
PP - 4506	1	1	Cyanide Transfer pump, 17 m3/hr, 10.7 m tdh	U. S.	1.5	1.5	1.1
PP - 4507	2	1	Cyanide Distribution pump, 9.1 m3/hr, 30.5 m tdh	U. S.	1.5	3	1.1
PP - 4508							
PP - 4512	2	1	Antiscaling - metering type	China			
PP - 4513							
PP - 4514	1	1	Hydrochloric acid pump - barrel type, 20gpm	U. S.	0.7	0.7	0.5
PP - 4515	1	1	Sump pump, reagent area, 50 by 1200mm vertical	U. S.	3.7	3.7	2.8
PP - 4519	1	1	Fuel pump - transfer, 1.1 m3/hr, 30.5 m tdh	U. S.	0.7	0.7	0.5
PP - 4520	1	1	Fuel pump - recirculation 1.1 m3/hr, 30.5 m tdh	U. S.	0.7	0.7	0.5
TK - 4501	1	1	Caustic mix tank, CS, 1.8 Ø x 1.8 m, w/20 kG Bag Breaker	China			
TK - 4502	1	1	Cyanide mix tank, CS, 2.4 Ø x 2.4 m, w/SuperSack Bag Breaker & Hoist	China			
TK - 4503	1	1	Cyanide storage tank, CS, 4.3 Ø x 4.9 m	China			
TK - 4506	1	1	Fuel storage tank	China			
TK - 4507	1	1	Fuel day tank	China			
Subtotal Area 45 Reagents						20.5	14.2
TOTAL ATTACHED KW						4,044	2,760

APPENDIX 9

PROCESS OPERATING COST SPREADSHEETS

Jinshan Project Staffing Levels & Salary Schedules
Process & Laboratory - Crushed Heap Leach

Area	Job Title	Number	Annual Base Pay		Burdens	Total	Total Annual Cost, RMB
			Salary	Hourly			
PROCESS							
Supervision							
	Process Manager	1	60,000		25,800	85,800	85,800
	Maintenance Superintendent	1	45,000		19,350	64,350	64,350
	Administrative Technician	2	36,000		15,480	51,480	102,960
	Mill General Foreman	4	36,000		15,480	51,480	205,920
	Shift Foreman	8	36,000		15,480	51,480	411,840
	Process Maintenance Foreman	8	36,000		15,480	51,480	411,840
Crushing							
	Primary Crusher Operator	4		18,000	7,740	25,740	102,960
	Secondary/Tertiary Crusher Operator	8		18,000	7,740	25,740	205,920
	Crusher Helper	16		18,000	7,740	25,740	411,840
Heap/ROM Leach							
	Heap Leach Operator	4		18,000	7,740	25,740	102,960
	Reagent Operator - Heap Leach	4		18,000	7,740	25,740	102,960
	Reagent Operator - ROM	0		18,000	7,740	25,740	-
	Dozer Operator - ROM & Heap Leach	4		18,000	7,740	25,740	102,960
	Piping Crew - Heap Leach	8		18,000	7,740	25,740	205,920
	Piping Crew - ROM Leach	0		18,000	7,740	25,740	-
	Day Laborers	16		18,000	7,740	25,740	411,840
Recovery Plant							
	Recovery Plant Operator	8		18,000	7,740	25,740	205,920
	Refining Operator	2		18,000	7,740	25,740	51,480
	Shift Laborer	8		18,000	7,740	25,740	205,920
Process Maintenance							
	Mechanic	8	18,000		7,740	25,740	205,920
	Mechanic Helper	8		18,000	7,740	25,740	205,920
	Electrician	8	18,000		7,740	25,740	205,920
	Electrician Helper	8		15,000	6,450	21,450	171,600
	Instrumentation Technician	8	36,000		15,480	51,480	411,840
	SUBTOTAL PROCESS	146					4,594,590
LABORATORY							
	Chief Metallurgist	1	45,000		19,350	64,350	64,350
	Chemist	6	36,000		15,480	51,480	308,880
	Lab Technician	8	36,000		15,480	51,480	411,840
	Metallurgical Testing Helper	8		18,000	7,740	25,740	205,920
	Shift Sample Buckers	8		18,000	7,740	25,740	205,920
	SUBTOTAL LABORATORY	31					1,196,910
	TOTAL	177					5,791,500
	TOTAL, RMB / tonne						0.82

PRELIMINARY EQUIPMENT LIST
CRUSH LEACH OPTION

Preliminary Major Equipment List														
Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %		Operating Power kW	Hours/Day	kwh/year		kwh/t	
							Oxide	Sulfide	ROM		Oxide	Sulfide	ROM	
Area 10 Primary Crushing														
BN - 1001	1	1	Dump Hopper, 180 tonne											
CM - 1001	1	1	Air Compressor		22	22				16.5		117,150		0.02
GR - 1001	1	1	Primary Jaw Crusher 48" x 60"		224	224		75%		20.0		1,192,800		0.17
	1	1	Including Lube System		1.5	1.5		75%		1.1		9,393		0.00
CV - 1001	1	1	Primary Crusher Discharge Conveyor, 48" x 120'		30	30		75%		22.5		159,750		0.02
CV - 1002	1	1	Stockpile Feed Conveyor, 48" x 150'		37.3	37.3		75%		28.0		198,623		0.03
DC - 1001	1	1	Baghouse		22	22		75%		22		137,768		0.02
FE - 1001	1	1	ROM Ore Apron Feeder 60" x 25'		44.8	44.8		75%		33.6		238,560		0.03
RB - 1001	1	1	Rock Breaker		22	22		75%		16.5		137,768		0.02
SC - 1001	1	1	Grizzly Screen											
WT - 1001	1	1	Primary Crusher Disch Belt Weighometer		0.1	0.1		75%		0.1		533		0.00
Subtotal Area 10 Primary Crushing						403.7				302.8		2,192,345.1		0.31

PRELIMINARY EQUIPMENT LIST
CRUSH LEACH OPTION

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %		Operating Power kW	Hours/Day	kwh/year		kwh/t			
							Oxide	Sulfide	ROM		Oxide	Sulfide	ROM	Oxide	Sulfide	ROM
Area 15 Fine Crushing																
BA - 1501	2	2	Lime Bin Activator		1.1	2.2		75%		1.7	20.0	11,715			0.00	
BN - 1501	1	1	Surge Bin, 1000 tonne													
BN - 1502	1	1	Product Bin, 2000 tonne													
BN - 1503	1	1	Lime Bin, 100 tonne													
CN - 1501	1	1	Crane		10	10		75%		7.5	8.0	21,300			0.00	
CR - 1501	1	1	Secondary Crusher, 7'		596.8	596.8		75%		447.6	20.0	3,177,960			0.45	
	1	1	Including Oil Cooling Fan		3.7	3.73		75%		2.8	23.5	23,358			0.00	
	1	1	Including Lube Oil Pump		3.7	3.73		75%		2.8	23.5	23,358			0.00	
	1	1	Including Hydraulic Adjustment Pump		1.5	1.492		75%		1.1	23.5	9,343			0.00	
	1	1	Including Lube Oil Heater		10.0	10		75%		7.5	23.5	62,622			0.01	
CR - 1502	1	1	Tertiary Crusher, 7'		596.8	596.8		75%		447.6	20.0	3,177,960			0.45	
	1	1	Including Oil Cooling Fan		3.7	3.73		75%		2.8	23.5	23,358			0.00	
	1	1	Including Lube Oil Pump		3.7	3.73		75%		2.8	23.5	23,358			0.00	
	1	1	Including Hydraulic Adjustment Pump		1.5	1.492		75%		1.1	23.5	9,343			0.00	
	1	1	Including Lube Oil Heater		10.0	10		75%		7.5	23.5	62,622			0.01	
CV - 1501	1	1	Secondary Feed Conveyor		37	37		75%		27.8	20.0	197,025			0.03	
CV - 1502	1	1	Crusher Discharge Conveyor 48" x 150'		75	75		75%		56.3	20.0	399,375			0.06	
CV - 1503	1	1	Transfer Conveyor, 48" x 130'		75	75		75%		56.3	20.0	399,375			0.06	
CV - 1504	1	1	Splitter Conveyor, 48" x 20'		37	37		75%		27.8	20.0	197,025			0.03	
CV - 1505	1	1	Tertiary Crusher A Feed Conveyor, 36" x 20'		37	37		75%		27.8	20.0	197,025			0.03	
CV - 1506	1	1	Tertiary Crusher B Feed Conveyor, 36" x 20'		37	37		75%		27.8	20.0	197,025			0.03	
CV - 1507	1	1	Final Product Discharge Conveyor		75	75		75%		56.3	20.0	399,375			0.06	
DC - 1501	1	1	Secondary Crusher Baghouse		22	22		75%		16.5	20.0	117,150			0.02	
DC - 1502	1	1	Tertiary Crusher Baghouse		22	22		75%		16.5	20.0	117,150			0.02	
DC - 1503	1	1	Tertiary Crusher Baghouse		22	22		75%		16.5	20.0	117,150			0.02	
DC - 1504	1	1	Lime Bin Dust Collector		1.85	1.85		75%		1.4	4.0	1,970			0.00	
FE - 1501	2	1	Coarse Ore Apron Feeder		15	30		75%		11.3	20.0	79,875			0.01	
FE - 1502			Coarse Ore Apron Feeder													
FE - 1503	1	1	Lime Variable Speed Screw Feeder		0.75	0.75		75%		0.6	20.0	3,994			0.00	
FE - 1504	2	1	Crushed Ore Feeder, belt feeder, 2000 tph, variable speed		15	30		75%		11.3	20.0	79,875			0.01	
FE - 1505			Crushed Ore Feeder, belt feeder, 2000 tph, variable speed													
MG - 1501	1	1	Tramp Magnet - electromagnet		7.5	7.5		75%		5.6	20.0	39,938			0.01	
MG - 1502	1	1	Tramp Magnet - electromagnet		7.5	7.5		75%		5.6	20.0	39,938			0.01	
SC - 1501	1	1	Secondary Feed Screen		22	22		75%		16.5	20.0	117,150			0.02	
SC - 1502	2	2	Vibrating Screen 8 x 20		37.3	74.6		75%		56.0	20.0	397,245			0.06	
SC - 1503			Vibrating Screen 8 x 20													
TR - 1501	1	1	Magnet Trolley System		0.3	0.3		75%		0.2	23.5	1,879			0.00	
TR - 1502	1	1	Magnet Trolley System		0.3	0.3		75%		0.2	23.5	1,879			0.00	
WT - 1501	1	1	Belt Weightometer		0.3	0.3		75%		0.2	23.5	1,879			0.00	
WT - 1502	1	1	Belt Weightometer		0.3	0.3		75%		0.2	23.5	1,879			0.00	
Subtotal Area 15 Fine Crushing									1,832.9			13,028,112			1.83	

PRELIMINARY EQUIPMENT LIST

CRUSH LEACH OPTION

[illegible]

PRELIMINARY EQUIPMENT LIST
CRUSH LEACH OPTION

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %		Operating Power kW	Hours/Day	kwh/year		kwh/t		
							Oxide	Sulfide	ROM		Oxide	Sulfide	Oxide	Sulfide	ROM
Area 30 CIC and Carbon Stripping															
DR - 3001	1	1	Retort, Electric, 2 cuft, w/Hg Trap and Chiller	U. S.	5	5		75%		23.5		32,193		0.005	
EQ - 3000	1	1	Miscellaneous Equipment, vault door GSA Class 5, Electronic Lock, Includes Day Gate & Wall Flange	U. S.											
EW - 3001	2	1	Electrowinning cell 75 cubic ft complete with 21 anodes, 20 SS cathodes and buss bar	U. S.											
EW - 3002				U. S.											
FA - 3001	1	1	Exhaust Fan, electrowinning area, 57 cubic meters per minute including ductwork	U. S.	0.75	0.75		75%	0.6	23.5		4,829		0.00	
FL - 3001	1	1	Electrowinning sludge filter, plate and frame	U. S.											
HE - 3001	1	1	Strip solution recovery heat exchanger	U. S.											
HE - 3002	1	1	Strip solution primary heat exchanger	U. S.											
HE - 3003	1	1	Strip solution heater, 1.54/1.23 MBtu/hr, Diesel (No 2 Fuel Oil) Valves & Instruments, Expansion Tank, Air Separator	U. S.											
HE - 3004	1	1	Strip solution cooling heat exchanger	U. S.											
PP - 3001	3	2	Barren Solution Pump 854 m3 per hour design total flow	U. S.	186	558		75%	279.0	23.5		2,395,159		0.34	
PP - 3002				U. S.											
PP - 3003															
PP - 3004	1	1	CIC Carbon transfer pump, 76 to 50 mm, horizontal screw impeller, Hydrostal Type	U. S.	2.2	2.2		75%	1.7	23.5		14,410		0.00	
PP - 3005	1	1	Striped carbon transfer pump, 75 to 50 mm, horizontal screw impeller, Hydrostal Type	U. S.	2.2	2.2		75%	1.7	23.5		14,410		0.00	
PP - 3006	1	1	CIC area sump pump, vertical rubber covered, 50 by 1200 mm vertical	U. S.	3.7	3.7		75%	2.8	23.5		24,016		0.00	
PP - 3007	1	1	Carbon area sump pump, vertical rubber covered, 50 by 1200 mm vertical	U. S.	3.7	3.7		75%	2.8	23.5		24,016		0.003	
PP - 3008	2	1	Strip solution pump, horizontal 70 gpm	U. S.	3.7	7.5		75%	2.8	23.5		24,016		0.00	
PP - 3009				U. S.											
PP - 3010	2	1	Hot Water Circulation Pump	U. S.	3.7	7.5		75%	2.8	23.5		24,016		0.00	
PP - 3011				U. S.											
PP - 3012	1	1	Electrowinning sludge pump, 40 gpm	U. S.	3.7	3.7		75%	2.8	23.5		24,016		0.00	
PP - 3013	2	1	Process Water Pump, 200 gpm	U. S.	20.0	40.0		75%	15.0	23.5		128,772		0.02	
PP - 3014															
RF - 3001	2	1	DC Rectifier, SCR, 0-1500 A, 0-6 V	U. S.	15.0	30.0		75%	11.3	23.5		96,579		0.01	
RF - 3002															
SA - 3001	1	1	Pregnant solution sampler	China											
SA - 3002	1	1	Barren solution sampler	China											
SC - 3001	1	1	Trash screen, 4 Mesh	China											
SC - 3002	1	1	Carbon safety screen, 35 Mesh sieve bend	China											
TK - 3001	1	1	Carbon Adsorption Column No 1, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm Includes 10" Magmeter	China											
TK - 3002	1	1	Carbon Adsorption Column No 2, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China											
TK - 3003	1	1	Carbon Adsorption Column No 3, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China											
TK - 3004	1	1	Carbon Adsorption Column No 4, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China											
TK - 3005	1	1	Carbon Adsorption Column No 5, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China											
TK - 3006	1	1	Barren Solution Surge Tank, Insulated, 8.2 M Dia x 9.2 M High	China											
TK - 3007	1	1	Barren Solution Sump												
TK - 3008	2	2	Carbon Strip Column, 2 tonne capacity CS, 100 psi-300 F ASME VIII, In/Out Manifolds	U. S.											
TK - 3009															
TK - 3010	1	1	Strip solution tank, CS, w/Sight Glass	China											
TK - 3011	1	1	Cathode wash tank, FRP, 1 meter diameter x 1 meter high	U. S.		664			327			2,806,431.21		0.40	
Subtotal Area 30 CIC and Carbon Stripping															

PRELIMINARY EQUIPMENT LIST
CRUSH LEACH OPTION

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %		Operating Power kW	Hours/Day	kwh/year			kwh/t		
							Oxide	Sulfide	ROM		Oxide	Sulfide	ROM	Oxide	Sulfide	ROM
Area 35 Refining																
BM - 3501	1	1	Batch ball mill	U. S.	2.2	2.2		75%		1.7	23.5					
FA - 3501	1	1	Exhaust fan, furnace and rehot area	U. S.	3.7	3.7		75%		2.8	23.5		14,410		0.00	
FR - 3501	1	1	Induction furnace, Induction, 75 kW/0.7 cuft. w/Hydraulics & Chiller	U. S.	75	75		75%		56.3	23.5		24,016		0.00	
GR - 3501	1	1	Gravity Concentrator	U. S.				75%			23.5		482,895		0.07	
SC - 3501	1	1	Vibrating slag screen	U. S.	0.7	0.7		75%		0.6	23.5				0.00	
ZM - 3501	1	1	Smelting furnace equipment (Includes cascade mold stand, 1000 oz molds (5), and slag pot (2), 25 cuft. Cement Mixer, PE Drum	U. S.									4,803			
Subtotal Area 35 Refining						81.7				61.3			526,123.76		0.07	

PRELIMINARY EQUIPMENT LIST
CRUSH LEACH OPTION

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %		Operating Power kW	Hours/Day	kwh/year		kwh/t		
							Oxide	Sulfide	ROM		Oxide	Sulfide	Oxide	Sulfide	ROM
Area 40 Carbon Handling															
AG - 4001	1	1	Attrition Tank Agitator	U. S.	0.7	0.7		75%		0.6	1.0	204		0.00	
EQ - 4001	1		Safety shower and eye wash												
DV - 4001	1	1	Flop Gate												
FA - 4001	1	1	Exhaust fan, carbon wash area	U. S.	0.7	0.7		75%		0.6	23.5	4,803		0.00	
FA - 4002	1	1	Klin exhaust fan	U. S.	0.7	0.7		75%		0.6	23.5	4,803		0.00	
FL - 4001	1	1	Carbon Fines Filler	U. S.											
HO - 4001	1	1	Klin feed hopper, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	U. S.											
KN - 4001	1	1	Regeneration klin package, Horizontal, Electric 120 kW or Diesel (No 2 Fuel Oil)	U. S.	120	120		75%		90.0	23.5	772,632		0.11	
PP - 4001	1	1	Carbon wash pump, 34 gpm	U. S.	3.7	3.7		75%		2.8	23.5	24,016		0.00	
PP - 4004	1	1	Carbon transfer pump, 75 by 50 mm, screw impeller hidrostatic type	U. S.	3.7	3.7		75%		2.8	23.5	24,016		0.00	
PP - 4006	1	1	Sump pump, carbon wash area 20 gpm	U. S.	3.7	3.7		75%		2.8	23.5	24,016		0.00	
PP - 4007	2	1	Carbon Fines Pump, 70 gpm	U. S.	3.7	7.5		75%		2.8	23.5	24,016		0.00	
PP - 4008					3.7										
SC - 4001	1	1	Dewatering screen, SS Wedgewire panel	U. S.				75%			23.5				
SC - 4002	1	1	Carbon Sizing screen, 36" Midwestern, flop gate high speed vibrating	U. S.	1	1		75%		0.8	23.5	6,439		0.00	
SJ - 4001	1	1	Klin feed screw conveyor SS Screw	U. S.	1	1		75%		0.8	23.5	6,439		0.00	
TK - 4001	1	1	Add wash column, FRP, 2.0 Ton, Includes Inlet/Outlet Manifolds	U. S.											
TK - 4002	1	1	Wash solution tank, FRP	U. S.											
TK - 4003	1	1	Quench tank, Carbon Steel, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China											
TK - 4004	1	1	Carbon Storage Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China											
TK - 4005	1	1	Carbon Attrition Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China											
TK - 4007	1	1	Carbon Fines Storage Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China											
	Subtotal Area 40 Carbon Handling					142.1			103.8			891,383.72		0.13	

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %		Operating Power kW	Hours/Day	kwh/year		kwh/t	
							Oxide	Sulfide	ROM		Oxide	Sulfide	Oxide	ROM
Area 45 Reagents														
	1	1	Agitator for cyanide mix tank	U. S.	3.7	3.7				2.8	23.5			
AG - 4502				China								24,016		
BN - 4501	1	1	Pebble lime storage silo, 100 tonne capacity with bag house	China	0.7	0.7		75%						0.00
BV - 4501	1	1	Bin Vent	China	0.7	0.7		75%		0.5	23.5	4,507		
BX - 4501	1	1	Bin Activator	China	0.7	0.7		75%		0.5	23.5	4,507		
EQ - 4501	1	1	Safety shower and eye wash station	U. S.									0.00	
FA - 4501	1	1	Exhaust fan cyanide mixing	U. S.	0.7	0.7		75%		0.5	23.5	4,507		
FE - 4501	1	1	Lime feeder	U. S.	0.7	0.7		75%		0.5	23.5	4,507		
HO - 4501	1	1	Lime Feed Hopper	U. S.										
PP - 4501	3	3	Sodium hydroxide metering pumps	China	0.7	2.1		75%		1.6	23.5	13,521		0.00
PP - 4502				China										
PP - 4503				China										
PP - 4506	1	1	Sodium hydroxide mixing/circulating pumps, 4.5 m3/hr, 7.6 m t/dh	U. S.	1.5	1.5		75%		1.1	23.5			
PP - 4506	1	1	Cyanide transfer pump, 17 m3/hr, 10.7 m t/dh	U. S.	1.5	1.5		75%		1.1	23.5	9,658		0.00
PP - 4507	2	1	Cyanide Distribution pump, 9.1 m3/hr, 30.5 m t/dh	U. S.	1.5	3		75%		1.1	23.5	9,658		0.00
PP - 4508														
PP - 4512	2	1	Antiscaling - metering type	China				75%			23.5			
PP - 4513								75%			23.5			
PP - 4514	1	1	Hydrochloric acid pump - barrel type, 20gpm	U. S.	0.7	0.7		75%		0.5	23.5	4,507		0.00
PP - 4515	1	1	Sump pump, reagent area, 50 by 1200mm vertical	U. S.	3.7	3.7		75%		2.8	23.5	24,016		0.00
PP - 4519	1	1	Fuel pump - transfer, 1.1 m3/hr, 30.5 m t/dh	U. S.	0.7	0.7		75%		0.5	23.5	4,507		0.00
PP - 4520	1	1	Fuel pump - recirculation 1.1 m3/hr, 30.5 m t/dh	U. S.	0.7	0.7		75%		0.5	23.5	4,507		0.00
TK - 4501	1	1	Causalic mix tank, CS, 1.8 Ø x 1.8 m, w/20 KG Bag Breaker	China										
TK - 4502	1	1	Cyanide mix tank, CS, 2.4 Ø x 2.4 m, w/20 KG Bag Breaker	China										
TK - 4503	1	1	Cyanide storage tank, CS, 4.3 Ø x 4.9 m	China										
TK - 4506	1	1	Fuel storage tank	China										
TK - 4507	1	1	Fuel day tank	China										
Subtotal Area 45 Reagents				TOTAL ATTACHED KW	20.46					14.2		122,076		0.02
				TOTAL OPERATING KW	4,044					2,760		20,577,332		2.90

Jinshan Gold Mines Preliminary Operating Costs - Crushed Heap Leach

Area		Item	Units	Quantity			Unit	RMB/Tonne		
				Oxide	Sulfide	ROM	Costs, RMB	Oxide	Sulfide	ROM
Labour										
	Process	lot		146			4,594,590		0.647	
	Laboratory	lot		31			1,196,910		0.169	
	SUBTOTAL			177			5,791,500		0.816	
Area 10 Primary Crushing										
	Power	kWh/t		0.309			0.30		0.093	
	Crusher Liner	kg/t		0.002			92.1		0.191	
	Maintenance Supplies	lot							0.327	
	SUBTOTAL								0.611	
Area 15 Fine Crushing										
	Power	kWh/t		1.83			0.30		0.550	
	Crusher Liner	kg/t		0.02			54.0		0.896	
	Dozer (At Stockpile)	hrs/day		0.50			260		0.007	
	Maintenance Supplies	lot							0.982	
	SUBTOTAL								2.435	
Stacking										
	Power	kWh/t								
	Position Conveyors	hrs/day								
	Dozer (Crushed Ore)	hrs/day		8			260		0.104	
	Dozer (ROM Ore)	hrs/day								
	Maintenance Supplies	lot								
	SUBTOTAL								0.104	
Area 20 Leaching										
	Power	kWh/t		0.14			0.30		0.043	
	Piping	lot							0.243	
	Maintenance Supplies	lot							0.033	
	SUBTOTAL								0.318	
Area 30 CIC and Carbon Stripping										
	Power	kWh/t		0.40			0.30		0.119	
	Diesel-Boiler	kg / strip		504			4.0		0.198	
	Carbon	kg / tonne Carbon		30.0			10.0		0.059	
	Misc. Operating Supplies	lot							0.114	
	Maintenance Supplies	lot							0.068	
	SUBTOTAL								0.557	
Area 35 Refining										
	Power	kWh/t		0.07			0.30		0.022	
	Misc. Operating Supplies	lot							0.034	
	Maintenance Supplies	lot							0.037	
	SUBTOTAL								0.094	
Area 40 Carbon Handling										
	Power	kWh/t		0.13			0.30		0.038	
	Misc. Operating Supplies	lot							0.020	
	Maintenance Supplies	lot							0.065	
	SUBTOTAL								0.123	

Jinshan Gold Mines Preliminary Operating Costs - Crushed Heap Leach

Area		Item	Units	Quantity			Unit	RMB/Tonne		
				Oxide	Sulfide	ROM	Costs, RMB	Oxide	Sulfide	ROM
Area 45 Reagents										
	Power	kWh/t		0.02			0.3		0.005	
	Cyanide	kg/t		0.40			10.0		4.000	
	Lime - ROM	kg/t		2.00			0.25		0.500	
	Cement	kg/t					0			
	Hydrochloric Acid	L/batch		800			0.8		0.063	
	Sodium Hydroxide	kg/batch		70			0.2		0.002	
	Anti-scalent	ppm		6			15		0.072	
	Fluxes	kg/oz		0.15			3		0.011	
	Maintenance Supplies	lot							0.016	
	SUBTOTAL								4.669	
Area 90 Laboratory										
	Fire Assays	Assays / Day		200			20.0		0.200	
	Solution Assays	Assays / Day		133			5.0		0.033	
	Miscellaneous Supplies	lot							0.100	
	Power	kWh/t		0.10			0.30		0.030	
	SUBTOTAL								0.363	
Area 100 Support Services										
	Buildings - Power	kWh/t		0.100			0.30		0.030	
	Light Vehicles	km/day		400			1.2		0.025	
	Maintenance Trucks	km/day		200			1.5		0.015	
	Bobcat Loader	hrs/day		8			40		0.016	
	Forklift	hrs/day		4			32		0.007	
	Backhoe	hrs/day		4			35		0.007	
	Mobile Crane	hrs/day		8			250		0.103	
	Truck	hrs/day		8			70		0.029	
	SUBTOTAL								0.232	
	TOTAL								10.322	
								Original	9.284	

Jinshan Project Staffing Levels & Salary Schedules
Process & Laboratory - Heap Leach w ROM Only

Area	Job Title	Number	Annual Base Pay		Burdens	Total	Total Annual Cost, RMB
			Salary	Hourly			
PROCESS							
Supervision							
	Process Manager	1	60,000		25,800	85,800	85,800
	Maintenance Superintendent	1	45,000		19,350	64,350	64,350
	Administrative Technician	2	36,000		15,480	51,480	102,960
	Mill General Foreman	4	36,000		15,480	51,480	205,920
	Shift Foreman	8	36,000		15,480	51,480	411,840
	Process Maintenance Foreman	8	36,000		15,480	51,480	411,840
Crushing							
	Primary Crusher Operator			18,000	7,740	25,740	-
	Secondary/Tertiary Crusher Operator			18,000	7,740	25,740	-
	Crusher Helper			18,000	7,740	25,740	-
Heap/ROM Leach							
	Heap Leach Operator	4		18,000	7,740	25,740	102,960
	Reagent Operator - Heap Leach			18,000	7,740	25,740	-
	Reagent Operator - ROM	4		18,000	7,740	25,740	102,960
	Dozer Operator - ROM & Heap Leach	4		18,000	7,740	25,740	102,960
	Piping Crew - Heap Leach			18,000	7,740	25,740	-
	Piping Crew - ROM Leach	8		18,000	7,740	25,740	205,920
	Day Laborers	16		18,000	7,740	25,740	411,840
Recovery Plant							
	Recovery Plant Operator	8		18,000	7,740	25,740	205,920
	Refining Operator	2		18,000	7,740	25,740	51,480
	Shift Laborer	8		18,000	7,740	25,740	205,920
Process Maintenance							
	Mechanic	8	18,000		7,740	25,740	205,920
	Mechanic Helper	8		18,000	7,740	25,740	205,920
	Electrician	8	18,000		7,740	25,740	205,920
	Electrician Helper	8		15,000	6,450	21,450	171,600
	Instrumentation Technician	8	36,000		15,480	51,480	411,840
	SUBTOTAL PROCESS	118					3,873,870
LABORATORY							
	Chief Metallurgist	1	45,000		19,350	64,350	64,350
	Chemist	6	36,000		15,480	51,480	308,880
	Lab Technician	8	36,000		15,480	51,480	411,840
	Metallurgical Testing Helper	8		18,000	7,740	25,740	205,920
	Shift Sample Buckers	8		18,000	7,740	25,740	205,920
	SUBTOTAL LABORATORY	31					1,196,910
	TOTAL	149					5,070,780
	TOTAL, RMB / T						0.71

PRELIMINARY EQUIPMENT LIST
ROM ONLY OPERATION

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %		Operating Power kW	Hours/Day	kwh/year		kwh/t	
							Oxide	Sulfide	ROM		Oxide	Sulfide	Oxide	ROM
Area 20 Leaching														
PD - 2001	1	1	Pregnant Solution Pond											
PD - 2002	1	1	Excess Solution Pond											
PP - 2001	3	2	Pregnant Solution Pumps	U. S.	56	168			84.0	23.5				721,123
PP - 2002														0.102
PP - 2003														
PP - 2004	2	1	Excess Solution Pumps	U. S.	45	90			33.8	23.5				289,737
PP - 2005														0.041
PP - 2010	1	1	Sampling Pump	China	0.12	0.12			0.1	23.5				773
PP - 2011	1	1	Sampling Pump											0.000
	Subtotal Area 20 Leaching					258.12			117.84					0.142

PRELIMINARY EQUIPMENT LIST
ROM ONLY OPERATION

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power KW	Attached Power KW	Load Factor, %			Operating Power KW	Hours/Day	kwh/year			kw/t		
							Oxide	Sulfide	ROM			Oxide	Sulfide	ROM	Oxide	Sulfide	ROM
Area 30 CIC and Carbon Stripping																	
DR - 3001	1	1	Retort, Electric, 2 cuft, w/Hg Trap and Chiller	U. S.	5	5			75%	3.8	23.5			32,193			0.005
EQ - 3000	1	1	Miscellaneous Equipment, vault door GSA Class 5, Electronic Lock, Includes Day Gate & Wall Flange	U. S.													
EW - 3001	2	1	Electrowinning cell 75 cubic ft complete with 21 anodes, 20 SS cathodes and buss bar	U. S.													
EW - 3002				U. S.													
FA - 3001	1	1	Exhaust Fan, electrowinning area, 57 cubic meters per minute including ductwork	U. S.	0.75	0.75			75%	0.6	23.5			4,829			0.001
FL - 3001	1	1	Electrowinning sludge filter, plate and frame	U. S.													
HE - 3001	1	1	Strip solution heat exchanger	U. S.													
HE - 3002	1	1	Strip solution heat exchanger	U. S.													
HE - 3003	1	1	Strip solution heater, 1.54/1.23 MBtu/hr, Diesel (No 2 Fuel Oil) Valves & Instruments, Expansion Tank, Air Separator	U. S.													
PP - 3001	3	2	Barren Solution Pump 854 m3 per hour design total flow	U. S.	186	558			75%	279.0	23.5			2,395,159			0.337
PP - 3002																	
PP - 3003																	
PP - 3004	1	1	Carbon transfer pump to stripping, 76 to 50 mm, horizontal screw impeller, Hydroetal Type	U. S.	2.2	2.2			75%	1.7	23.5			14,410			0.002
PP - 3005	1	1	Stripped carbon transfer pump, 75 to 50 mm, horizontal screw impeller, Hydroetal Type	U. S.	2.2	2.2			75%	1.7	23.5			14,410			0.002
PP - 3006	1	1	CIC area sump pump, vertical rubber covered, 50 by 1200 mm vertical	U. S.	3.7	3.7			75%	2.8	23.5			24,016			0.003
PP - 3007	1	1	Carbon area sump pump, vertical rubber covered, 50 by 1200 mm vertical	U. S.	3.7	3.7			75%	2.8	23.5			24,016			0.003
PP - 3008	2	1	Strip solution pump, horizontal 70 gpm	U. S.	3.7	7.5			75%	2.8	23.5			24,016			0.003
PP - 3009				U. S.													
PP - 3010	2	1	Hot Water Circulation Pump	U. S.	3.7	7.5			75%	2.8	23.5			24,016			0.003
PP - 3011				U. S.													
PP - 3012	1	1	Electrowinning sludge pump, 40 gpm	U. S.	3.7	3.7			75%	2.8	23.5			24,016			0.003
PP - 3013	2	1	Process Water Pump, 200 gpm	U. S.	20.0	40.0			75%	15.0	23.5			128,772			0.018
PP - 3014																	
RF - 3001	2	1	DC Rectifier, SCR, 0-1500 A, 0-6 V	U. S.	15.0	30.0			75%	11.3	23.5			96,579			0.014
RF - 3002																	
SA - 3001	1	1	Pregnant solution sampler	China													
SA - 3002	1	1	Barren solution sampler	China													
SC - 3001	1	1	Trash screen, 4 Mesh	China													
SC - 3002	1	1	Carbon safety screen, 35 Mesh sieve bend	China													
TK - 3001	1	1	Carbon Adsorption Column No 1, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm Includes 10" Magmeter	China													
TK - 3002	1	1	Carbon Adsorption Column No 2, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China													
TK - 3003	1	1	Carbon Adsorption Column No 3, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China													
TK - 3004	1	1	Carbon Adsorption Column No 4, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China													
TK - 3005	1	1	Carbon Adsorption Column No 5, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	China													
TK - 3006	1	1	Barren Solution Surge Tank, Insulated, 8.2 M Dia x 9.2 M High	China													
TK - 3007	1	1	Barren Solution Sump														
TK - 3008	1	1	Carbon Strip Column, 2 tonne capacity CS, 100 psi-300 F ASME VIII, In/Out Manifolds	U. S.													
TK - 3009	1	1	Strip solution tank, CS, w/Sight Glass	China													
															</		

PRELIMINARY EQUIPMENT LIST
ROM ONLY OPERATION

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %			Operating Power kW	Hours/Day	kwh/year			kwh/t		
							Oxide	Sulfide	ROM			Oxide	Sulfide	ROM			
Area 35 Refining																	
BM - 3501	1	1	Batch ball mill	U. S.	2.2	2.2			75%	1.7	23.5			14,410		0.002	
FA - 3501	1	1	Exhaust fan, furnace and retort area	U. S.	3.7	3.7			75%	2.8	23.5			24,016		0.003	
FR - 3501	1	1	Induction furnace, Induction, 75 kW/0.7 cuft, w/Hydraulics & Chiller	U. S.	75	75			75%	56.3	23.5			482,895		0.068	
GR - 3501	1	1	Gravity Concentrator	U. S.		0.0			75%	0.0	23.5			0		-	
SC - 3501	1	1	Vibrating slag screen	U. S.	0.7	0.7			75%	0.6	23.5			4,803		0.001	
ZM - 3501	1	1	Smelting furnace equipment (Includes cascade mold stand, 1000 oz molds (5), and slag pot (2), 25 cuft, Cement Mixer, PE Drum	U. S.													
Subtotal Area 35 Refining						81.7				61.3						0.074	

PRELIMINARY EQUIPMENT LIST
ROM ONLY OPERATION

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %		Operating Power kW	Hours/Day	kwh/year			kwh/t		
							Oxide	Sulfide	ROM		Oxide	Sulfide	ROM	Oxide	Sulfide	ROM
Area 40 Carbon Handling																
AG - 4001	1	1	Attrition Tank Agitator	U. S.	0.7	0.7			75%	23.5			4,803			0.001
EQ - 4001	1	1	Safety shower and eye wash													
DV - 4001	1	1	Flop Gate													
FA - 4001	1	1	Exhaust fan, carbon wash area	U. S.	0.7	0.7			75%	23.5			4,803			0.001
FA - 4002	1	1	Klin exhaust fan, carbon wash and reactivation area	U. S.	0.7	0.7			75%	23.5			4,803			0.001
FL - 4001	1	1	Carbon Fires Filter	U. S.												
HO - 4001	1	1	Klin feed hopper, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	U. S.												
KN - 4001	1	1	Regeneration klin package, Horizontal, Electric 120 kW or Diesel (No 2 Fuel Oil)	U. S.	120	120			75%	23.5			772,632			0.109
PP - 4001	1	1	Carbon wash pump, 34 gpm	U. S.	3.7	3.7			75%	23.5			24,016			0.003
PP - 4004	1	1	Carbon transfer pump, 75 by 50 mm, screw impeller hidrostal type	U. S.	3.7	3.7			75%	23.5			24,016			0.003
PP - 4006	1	1	Sump pump, carbon wash area 20 gpm	U. S.	3.7	3.7			75%	23.5			24,016			0.003
PP - 4007	2	1	Carbon Fires Pump, 70 gpm	U. S.	3.7	7.5			75%	23.5			24,016			0.003
PP - 4008					3.7											
SC - 4001	1	1	Dewatering screen, SS Wedgewire panel	U. S.												
SC - 4002	1	1	Carbon Sizing screen, 36" Midwestern, flop gate high speed vibrating	U. S.	1	1			75%	23.5			6,439			0.001
SJ - 4001	1	1	Klin feed screw conveyor SS Screw	U. S.	1	1			75%	23.5			6,439			0.001
TK - 4001	1	1	Acid wash column, FRP, 2.0 Ton, Includes Inlet/Outlet Manifolds	U. S.												
TK - 4002	1	1	Wash solution tank, FRP	U. S.												
TK - 4003	1	1	Quench tank, Carbon Steel, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China												
TK - 4004	1	1	Carbon Storage Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China												
TK - 4005	1	1	Carbon Attrition Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China												
TK - 4007	1	1	Carbon Fires Storage Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	China												
			Subtotal Area 40 Carbon Handling			142,142			103,809							0.126

PRELIMINARY EQUIPMENT LIST ROM ONLY OPERATION

Equipment Number	Number Installed	Number Operating	Description	Vendor	Motor Power kW	Attached Power kW	Load Factor, %			Hours/Day	kwh/year			kw/t		
							Oxide	Sulfide	ROM		Oxide	Sulfide	ROM	Oxide	Sulfide	ROM
Area 45 Reagents																
AG - 4502	1	1	Agitator for cyanide mix tank	U. S.	3.7	3.7			75%	23.5			24.016			0.003
BN - 4501	1	1	Pebble lime storage silo, 3-m diameter by 14-m high with bag house	China												
BN - 4501	1	1	Bin Vent	China	0.7	0.7			75%	23.5			4.507			0.001
BX - 4501	1	1	Bin Activator	China	0.7	0.7			75%	23.5			4.507			0.001
EO - 4501	1	1	Safety shower and eye wash station	U. S.												
FA - 4501	1	1	Exhaust fan cyanide mixing	U. S.	0.7	0.7			75%	23.5			4.507			0.001
FE - 4501	1	1	Lime feeder	U. S.	0.7	0.7			75%	23.5			4.507			0.001
HO - 4501	1	1	Lime Feed Hopper	U. S.												
PP - 4501	1	1	Sodium hydroxide metering pumps	China	0.7	2.1			75%	23.5			13.521			0.002
PP - 4502	3	3		China					75%	23.5			0			-
PP - 4503				China					75%	23.5			0			-
PP - 4505	1	1	Sodium hydroxide mixing/circulating pumps 4.5 m3/hr, 7.6 m tdh	U. S.	1.5	1.5			75%	23.5			9.658			0.001
PP - 4506	1	1	Cyanide Transfer pump, 17 m3/hr, 10.7 m tdh	U. S.	1.5	1.5	1.5		75%	23.5			9.658			0.001
PP - 4507	2	1	Cyanide Distribution pump, 9.1 m3/hr, 30.5 m tdh	U. S.	1.5	3			75%	23.5			9.658			0.001
PP - 4508																
PP - 4512	2	1	Antiscaling - metering type	China					75%	23.5			0			-
PP - 4513																
PP - 4514	1	1	Hydrochloric acid pump - barrel type, 20gpm	U. S.	0.7	0.7			75%	23.5			0			-
PP - 4515	1	1	Sump pump, reagent area, 50 by 1200mm vertical	U. S.	3.7	3.7			75%	23.5			4.507			0.001
PP - 4519	1	1	Fuel pump - transfer, 1.1 m3/hr, 30.5 m tdh	U. S.	0.7	0.7			75%	23.5			24.016			0.003
PP - 4520	1	1	Fuel pump - recirculation 1.1 m3/hr, 30.5 m tdh	U. S.	0.7	0.7			75%	23.5			4.507			0.001
TK - 4501	1	1	Claustic mix tank, CS, 1.8 Ø x 1.8 m, w/20 KG Bag Breaker	China					75%	23.5			4.507			0.001
TK - 4502	1	1	Cyanide mix tank, CS, 2.4 Ø x 2.4 m, w/SuperSack Bag Breaker & Hoist	China												
TK - 4506	1	1	Fuel storage tank	China												
TK - 4507	1	1	Fuel day tank	China												
Subtotal Area 45 Reagents						20.46				14.22						0.017
						1,166.8				624.1						0.755
						TOTAL OPERATING KW										

Jinshan Gold Mines Preliminary Operating Costs - Heap Leach w ROM Only

Area		Item	Units	Quantity			Unit	RMB/Tonne		
				Oxide	Sulfide	ROM	Costs, RMB	Oxide	Sulfide	ROM
Labour										
	Process	lot			118	3,873,870			0.546	
	Laboratory	lot			31	1,196,910			0.169	
	SUBTOTAL				149	5,070,780			0.714	
Stacking										
	Power	kWh/t								
	Position Conveyors	hrs/day								
	Dozer (Crushed Ore)	hrs/day								
	Dozer (ROM Ore)	hrs/day			8	260			0.104	
	Maintenance Supplies	lot								
	SUBTOTAL								0.104	
Area 20 Leaching										
	Power	kWh/t			0.1	0.30			0.043	
	Piping	lot							0.243	
	Maintenance Supplies	lot							0.033	
	SUBTOTAL								0.318	
Area 30 CIC and Carbon Stripping										
	Power	kWh/t			0.40	0.30			0.119	
	Diesel-Boiler	kg / strip			504	4.0			0.217	
	Carbon	g / tonne Carbon			30	10.0			0.065	
	Misc. Operating Supplies	lot							0.114	
	Maintenance Supplies	lot							0.068	
	SUBTOTAL								0.582	
Area 35 Refining										
	Power	kWh/t			0.07	0.30			0.022	
	Misc. Operating Supplies	lot							0.034	
	Maintenance Supplies	lot							0.037	
	SUBTOTAL								0.094	
Area 40 Carbon Handling										
	Power	kWh/t			0.13	0.30			0.038	
	Misc. Operating Supplies	lot							0.022	
	Maintenance Supplies	lot							0.065	
	SUBTOTAL								0.125	
Area 45 Reagents										
	Power	kWh/t			0.02	0.3			0.005	
	Cyanide	kg/t			0.30	10.0			3.000	
	Lime - ROM	kg/t			2	0.25			0.500	
	Cement	kg/t				0				
	Hydrochloric Acid	L/batch			800	0.8			0.069	
	Sodium Hydroxide	kg/batch			70	0.2			0.002	
	Anti-scalent	ppm			6	15			0.071	
	Fluxes	kg/oz			0.15	3			0.012	
	Maintenance Supplies	lot							0.016	
	SUBTOTAL								3.676	

Jinshan Gold Mines Preliminary Operating Costs - Heap Leach w ROM Only

Area		Units	Quantity			Unit	RMB/Tonne		
Item			Oxide	Sulfide	ROM	Costs, RMB	Oxide	Sulfide	ROM
Area 90 Laboratory									
	Fire Assays	Assays / Day			200	20.0			0.200
	Solution Assays	Assays / Day			133	5.0			0.033
	Miscellaneous Supplies	lot							0.100
	Power	kWh/t			0.10	0.3			0.030
	SUBTOTAL								0.363
Area 100 Support Services									
	Buildings - Power	kWh/t			0.100	0.30			0.030
	Light Vehicles	km/day			400	1.2			0.025
	Maintenance Trucks	km/day			200	1.5			0.015
	Bobcat Loader	hrs/day			8	40			0.016
	Forklift	hrs/day			4	32			0.007
	Backhoe	hrs/day			4	35			0.007
	Mobile Crane	hrs/day			8	250			0.103
	Truck	hrs/day			8	70			0.029
	SUBTOTAL								0.232
	TOTAL								6.208
								Original	5.140

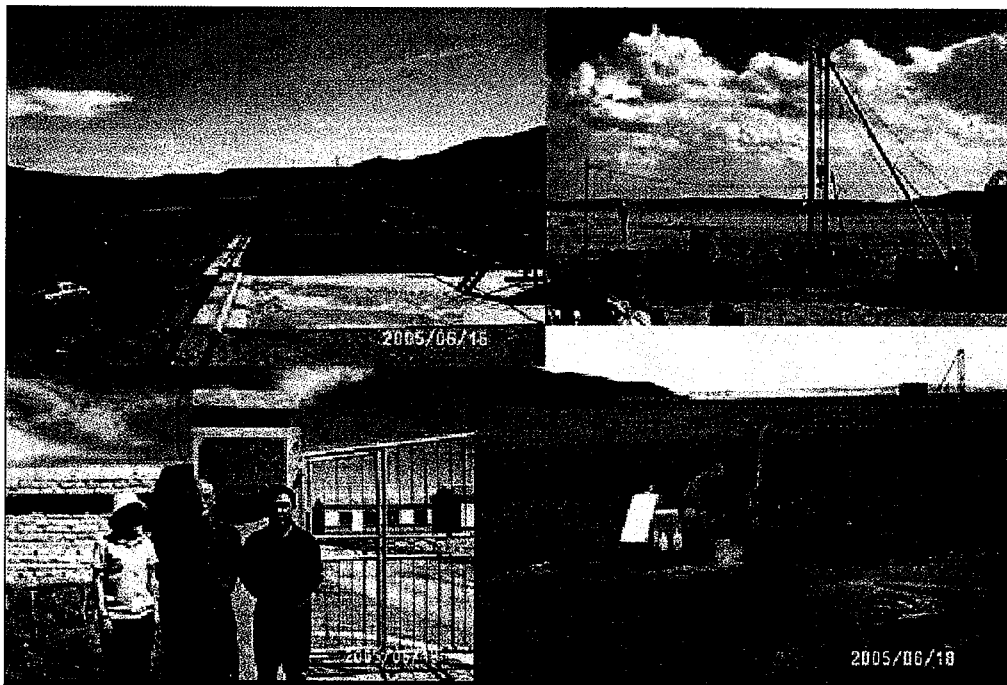
APPENDIX 10

HYDROGEOLOGICAL REVIEW



DRAFT REPORT

**HYDROGEOLOGICAL REVIEW FOR
CHANG SHAN HAO GOLD PROJECT,
INNER MONGOLIA, CHINA**



Submitted to:

**KD Engineering Co Inc
7701 N Business Park Drive
Tucson Arizona 85743
USA**

July 2005

05-1340-004

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1. INTRODUCTION	1
2. SCOPE OF GOLDER'S REVIEW	2
3. INFORMATION PROVIDED FOR GOLDER'S REVIEW	3
4. SCOPE OF HYDROGEOLOGICAL INVESTIGATIONS	6
5. REVIEW SUMMARY	7
6. SITE VISIT	8
7. REVIEW OF HYDROGEOLOGICAL INVESTIGATIONS CONDUCTED BY BAOGANG INSTITUTE	11
7.1 Review of Work Plan Section 2 Mine Site (ChangShanHao Gold Mine Hydrogeological Investigation)	11
7.2 Review of Workplan Section 3 Well Field (Hydrogeological Investigations for Water Supply)	16
7.3 Review of Workplan Section 6 (Work Progress and Organization Plan) and Workplan Item 8 (In-house Analysis, Documentation, and Reporting)	21
8. CONCLUSIONS AND RECOMMENDATIONS	23
9. CLOSURE	26

1. INTRODUCTION

Golder Associates (Golder) has been retained by KD Engineering to conduct a review of the hydrogeological investigations currently being carried out by BaoGang Exploration, Survey and Mapping Research Institute (BaoGang Institute) at the Chang Shan Hao gold mine project located in ChangShanHao, Wulate, Bamen, Inner Mongolia, China. The Chang Shan Hao gold mine is at an early stage of development by JinShan Gold Mine Ltd. (JGM). In February, 2005 JGM contracted BaoGang Institute to conduct hydrogeological investigations for the project as part of an application for the mining permit and water use permit to meet Chinese regulatory requirements.

The hydrogeological field investigations started on 1 March 2005, with focus on the mine area and the proposed well field area. BaoGang Institute plans to complete all of the work and submit the final report to JGM by the end of December, 2005.

As part of the review work Dr. Zengshan Duan of Golder visited the project site and BaoGang Institute's head office in BaoTou. The site visit was conducted over a period of June 16 to June 22, 2005. This report provides a summary of Dr. Duan's site visit, and results of our review of BaoGang Institute's work completed prior to June 22, 2005.

2. SCOPE OF GOLDER'S REVIEW

Based on the requests from JGM, Golder's review focused on assessing if the work carried out by BaoGang Institute meets the following requirements:

- compliance with the relevant Chinese regulations, guidelines or codes;
- compliance with the scope of work in the contract between JGM and BaoGang Institute (GF-2000-0203); and
- the estimated water requirements of 1,000,000 m³/year, (2,740 m³/day or 114 m³/hour) for the mine operations can be obtained from the groundwater sources.

3. INFORMATION PROVIDED FOR GOLDER'S REVIEW

The following documents were provided by JGM and BaoGang Institute for review:

Information Directly Related to BaoGang Institute's Work

- The contract document GF-2000-0203 "Investigation Contract of Construction engineering, Hydrogeology Investigation of ChangShanHao Gold Project in Wulate County, Bamen, Inner Mongolia, China" (translated to English by JGM as "Investigation Contract of Construction Engineering" in document CSH0281 Baogang Revised contract English Translation Comments.doc), with the following appendices:
 - Appendix I – Implementation workplan design of Hydrogeological exploration for ChangShanHao gold mine by BaoGang Exploration, Survey, and Mapping Research Institute and dated February, 2005, which was translated to English by JGM as "Proposal for Hydrogeology Investigation of Changshan hao Gold Mine in Wulate county, Bamen city, Inner Mongolia" (CSH0278 Revised Baogang Proposal for Hydrogeology.doc);
 - Appendix II - Detailed Water Resource Investigation Study Technical Guidelines (CSH0247 Detailed Water Resource Investigation Study Technical Approach.doc); and
 - Appendix III - Comments on Revised Detailed Hydrogeological Study by Baogang Survey Institute (Baotou) (CSH0279 Comments on Revised Detailed Hydrogeological Study by Baogang Survey Institute.doc).
- Appendix outlining the requirements for BaoGang Institute to provide an interim report in March, 2005. This appendix was not provided for Golder's review.
- Preliminary Survey Report on Regional Hydrogeology (Scale - 1:200,000) (in Chinese) for the BaiYunEr Area, 114 Hydrogeology and Engineering Geology Team, Inner Mongolia, 1980;

-
- Wulate 217 Gold Mine Area Geological Map – 217 Gold Project (Scale - 1:4,000) (in Chinese) , April, 2005, BaoGang Exploration, Survey, and Mapping Research Institute;
 - Wulate 217 Gold Mine Area Topographic Map (Scale - 1:10,000) (in Chinese), March, 2005, BaoGang Exploration, Survey, and Mapping Research Institute;
 - Raw Log of Borehole Drilling Record with Borehole Geological Column Map (Scale - 1:200) for Boreholes DDH103, DDH105, DDH106, SJ1,SJ3,SJ5 in the Mining Area (in Chinese), April, 2005, BaoGang Exploration, Survey, and Mapping Research Institute;
 - Borehole Geological Column Map (Scale - 1:200) for Boreholes DDH05-102 and DDH05-104 in the Mining Area (in Chinese) , April, 2005, BaoGang Exploration, Survey, and Mapping Research Institute;
 - Wulate 217 Gold Mine Water Supply Well Field Topographic Map (Scale - 1:10,000) (in Chinese), March, 2005, BaoGang Exploration, Survey, and Mapping Research Institute;
 - Summery table of pumping test results for the well field hydrogeological investigation (a hard copy of draft table was provided; incomplete, 3 of 5 tests have been conducted to date); and
 - Summery table of borehole exploration results for the well field hydrogeological investigation (46 boreholes drilled to date; see details in Appendix I).

Other Background Information

JGM provided the following documents for the review:

- Documents provided by Steven R. McMullan (SRM) through JinShan's FTP site;
- Preliminary Assessment of the ChangShanHao 217 Gold Project, Nei Mongol, People's Republic of China, JGM, April 15, 2005;
- Preliminary Hydrogeology Investigation and Water Resource Evaluation – ChangShaHao 217 Gold Project, Inner Mongolia, China, Technical Report, ERM December, 2004

- Environmental and Social Impact Assessments, Scoping Study Report, ChangShanHao 217 Gold Project Nei Mongol, P.R. China, December, 2004
- Environmental Contaminant Monitoring Groundwater Component – Pilot Leach Plant, SRM, May 24, 2005

4. SCOPE OF HYDROGEOLOGICAL INVESTIGATIONS

It is our understanding that the objective of the hydrogeological investigations by the BaoGang Institute is to:

- characterize the hydrogeological condition of the mine area to provide estimates of potential groundwater inflows into the open pit in support of the pit dewatering design; and
- characterize the hydrogeological conditions of the proposed well field to evaluate the aquifer yields in support of the mine water supply requirements.

5. REVIEW SUMMARY

The methodology used by Golder in this review is described below:

- The signed contract between JGM and BaoGang Institute was reviewed. This contract contains three appendices. The main contract defines the amount of required field exploration/survey work (Item 1.7), the start time of the field exploration (Item 4.1.1), weekly progress reporting (Item 4.1.3), and the deadline for completing the exploration work and submitting the final report (Item 4.1.1). The contract also defines the requirement for the review of the contractor's work in Item 8. It states that *"due to the special requirements from the client (JGM) on the amount of work and the progress, the contractor will execute the contract based on the exploration implementation work plan approved by JGM and defined in Appendix 1, on which the future review of contractor's work should be based"*. Golder's review was based on this approved exploration implementation work plan. The work progress and the amount of work conducted by BaoGang Institute to date were checked against the contract.
- The quality of BaoGang Institute's work was checked against Chinese technical codes for mine development/design and water supply for mine operation, and relevant international professional services standards.
- The review process involved a review of the information provided, discussions with BaoGang Institute's project team, and a site visit for verifying the work completed to date and for inspecting the work practice for those works currently in process.

6. SITE VISIT

As part of the review assessment Dr. Duan visited the project between June 15 to 22, 2005. The main activities conducted during the site visit are described below.

Day 1 - June 15, 2005 Beijing

Meeting with representatives of various regulatory agencies in Beijing to confirm the current Chinese regulations for hydrogeological investigations for mining and water supply. The agencies included the State Geological Survey Bureau of the Chinese Ministry of Land Resources who are responsible for developing the Chinese national technical codes for hydrogeological investigations, and the Chinese Ministry of Water Resources who are responsible for developing policy and regulation for water supply permits for construction projects. The information collected at these meetings included the current technical codes/guidelines, laws, regulations, and policy documents.

Day 2 - June 16, 2005 ChangShanHao Mine Site

Dr. Duan arrived at the ChangShanHao mine site and met with JGM project manager Steven McMullan. The meeting confirmed the scope of Golder's review work and provided Dr. Duan with background information related to the site hydrogeology and water supply investigations, including some documentation.

Day 3 - June 17, 2005 ChangShanHao Mine Site

Visit of the mine site arranged by JGM. The areas visited included the mine site and the pumping test sites in the mine area. Two pumping test sites were visited. One of the tests had just stopped during the visit and an inspection of the discharge point of the pumped water was conducted.

Day 4 - June 18, 2000 ChangShanHao Mine Site

There was very little information available from JGM on the hydrogeological work completed by BaoGang Institute to date. A meeting was held among Dr. Duan (Golder), Steven McMullan (JGM), and Mr. Li WenZhi (BaoGang Institute's on-site project manager). Mr. Li provided

update on BaoGang Institute's work completed to date, future work planned, the work in progress, the methods used, the results and findings, and any technical problems that they encountered in their work. It was estimated that about 70% to 80% of the planned field work has been completed to date. At the time of the site visit none of the work conducted by BaoGang has been documented in a form of a report.

After the meeting, Dr. Duan visited the well field. Mr Li. and Mr. McMullen guided the visit. This field tour covered the proposed well field area including all of the five pumping test well sites, some of the observation boreholes, and the river, springs and the wetlands near the well sites. One pumping test had been completed and two were under way at the time of the visit. Two additional pumping tests were scheduled to be completed within three to five days after the visit. Dr. Duan inspected the field records of the pumping data, the equipment, the facilities, and the method used for the pumping tests.

Day 5 - June 19, 2005 ChangShanHao Mine Site

Meeting with the BaoGang Institute's on site staff to obtain further information for the review.

Additional documents and information obtained for the review included: geological map 1:4,000 and a topography map of the mine area in 1:10,000 scale, eight geological borehole logs, including three hydrogeological boreholes with depths around 150 m (DDH103, DDH105, DDH106), three boreholes for water quality monitoring with depth of about 50 m (SJ1, SJ3, SJ5), and two geological boreholes (DDH05-102 and DDH05-104). All the documents were provided in digital format in Chinese (not readable by the English software). Groundwater samples were collected from seven boreholes but results of the chemical analyses were not available at the time of the site visit.

Topographical contour map (scale - 1:10,000) was provided for the well field investigation. To date, 51 boreholes have been drilled in the well field area. Five of them were drilled as part of the hydrogeological investigations. The other 46 boreholes were drilled as part of the exploration program but were completed as observation boreholes for pumping tests and for long-term groundwater monitoring. It is expected that more pumping wells will be drilled and tested as part of the current investigations.

Day 6 - June 20, 2005 ChangShanHao Mine Site

On June 20, 2005, BaoGang Institute provided Chinese AutoCAD software for reading the borehole logs, but the software failed to open the files. BaoGang Institute agreed to provide hard copies of the logs during the visit to BaoGang Institute's head office in BaoTou.

Discussions with Mr. Li Wenzhi and other senior technical staff from BaoGang Institute on site continued on June 20, 2005. The discussions focused on the methods used for hydrogeological investigations and characterization of the hydrogeological conditions in the mine area and the well field.

Day 7 - June 21, 2005 BaoTou

Travel to BaoTou. Meetings at BaoGang Institute's head office with senior staff. As requested by JGM, Dr. Duan provided some comments on the current work at the site and made some suggestions for the future work based on his observations during the visit of the mine site (Dr. Duan's comments are provided in Section 8 of this report).

Day 8 - June 22, 2005 BaoTou

On June 22, 2005, BaoGang Institute provided Dr. Duan with a hard copy of the geological borehole logs for boreholes DDH05-102 and DDH05-104, report on regional hydrogeological study, and the original field drilling records of six boreholes in the mine area (DDH103, DDH105, DDH106, SJ1, SJ3, SJ5). Further meeting and discussion were held with Mr. Li to clarify the specific amount of work that the Institute had completed. Travel to Beijing.

7. REVIEW OF HYDROGEOLOGICAL INVESTIGATIONS CONDUCTED BY BAOGANG INSTITUTE

The review followed the proposed work plan of BaoGang Institute approved by JGM and the review methodology described in Section 4 of this report. The review covered the work completed by BaoGang Institute up to June 22, 2005.

The following presents the scope of the approved work plan:

Section 1	Introduction
Section 2	ChangShanHao Gold Mine Hydrogeological Investigations
Section 3	Hydrogeological Investigations for Water Supply
Section 4	Guarantee of Work Quality
Section 5	Work Safety Consideration and Measurements
Section 6	Work Progress and Organization Plan
Section 7	Materials and Equipments Requirements
Section 8	In-house Analysis, Documentation and Reporting

Golder's review focused on the technical contents of the work plan covered in the Sections 2, 3, 6 and 8. Golder's comments on these sections are provided below.

7.1 Review of Work Plan Section 2 Mine Site (ChangShanHao Gold Mine Hydrogeological Investigation)

The purpose of these investigations is to characterize the groundwater regime in the mine area, and to estimate the groundwater inflows to the open pit in support of the dewatering design.

The Chinese national technical code relevant to this investigation is entitled "Exploration Specification of Hydrogeology and Engineering Geology in Mining Areas" (GB12719-91).

Section 2.1 Hydrogeological Mapping

According to Mr. Li Wenzhi, the total detailed hydrogeological mapping in 1:10,000 scale completed by BaoGang Institute to date covers an area of 3.4 km² for the mine, and 18 km² for the well field. The hydrogeological map was not yet available.

Section 2.1.1 Data collection

The data collected by BaoGang to date are listed below, but most of the data were not available for this review.

- Topographic map generated from Aerial Survey (scale - 1:50,000);
- Regional hydrogeological map (scale - 1:200,000);
- Data from regional hydrogeological investigations (scale - 1:200,000);
- Regional hydrogeological investigation report (a hard copy in Chinese was provided for this review);
- Geological borehole logs from the mine area (information collected for geological exploration, and no information recorded for hydrogeological investigation including groundwater level, drilling fluid losses, fracture frequency, etc.);
- Geological map for the mine area (scale - 1:4,000 (hard copy was provided for this review);
- Daily record of dewatering pumping rates since 1975 for the open pit of BaiYunErFu Iron Mine;
- Report on TaiLinGong water supply hydrogeological investigation for BaiYunErFu Iron Mine; and,
- The survey points (coordinates and elevations) used for the 1:10,000 scale topographic mapping by Inner Mongolia Survey Bureau.

Section 2.1.2

The total area covered by regional hydrogeological mapping in 1:50,000 scale to date is about 15 km² of the mine area, and 35 km² for the well field area.

Section 2.1.2 – 2.1.6

This section cannot be properly assessed until all the field investigations are completed.

Section 2.1.7

The survey of wells, spring, and other groundwater monitoring points have been completed for all of the mine area, and for about 70% to 80% of the well field area.

Section 2.1.8

Water level contour map was not provided for this review. Based on the information by BaoGang, the groundwater monitoring program was initiated around the end of April, 2005, with measurements collected every five days (more frequently in the rainy season). The frequency of the water level measurements complies with the technical code. A problem related to the survey (according to BaoGang Institute) is being caused by the currently operating pumping wells at the site (e.g. 217 mining dewatering, and 208 mine water supply pumping). The groundwater levels monitored in the area of these wells do not represent the background groundwater conditions. These effects need to be considered during the interpretation of the results.

Section 2.1.9

BaoGang Institute has not started the work on data analyses and reporting for the mine area. This work item still needs to be undertaken.

Section 2.1.10

Pumping tests were completed for the wells currently in use at the mine site, although no results were provided for this review. Additional tests were recently conducted in two new 150 m deep boreholes. The tests were not completed due to problems with the pumps that are currently being repaired. BaoGang Institute was planning to resume the pumping tests for the additional wells soon.

Section 2.2 Geophysical Survey

BaoGang Institute stated that they would not conduct the ground geophysical survey for the mine area since they had prepared a geological map (scale - 1:4000) of acceptable accuracy based on interpretation of geological borehole logs conducted by 217 Team. However, the institute is

planning to conduct a downhole geophysical survey of the exploration boreholes in the mine area. This change in the work scope is considered acceptable.

Section 2.3 Hydrogeological Investigation in the Mine Area

Only limited groundwater information are available for the area outside of the proposed open pit. This was discussed with Mr. Li of BaoGang Institute and Mr. Li agreed to expend the hydrogeological investigations to cover the area immediately around the proposed mining operations .

Section 2.3.1

Selection of the locations for hydrogeological boreholes was mainly based on the geological structures identified during the previous geological exploration conducted by 217 Team. The structural lineaments are usually targeted by hydrogeological investigations because under certain conditions they can act as conduits for groundwater flow. The work by 217 Team however was focused on geological exploration and not hydrogeology. Additional groundwater information should be considered in support of this plan for selecting the new borehole locations.

Section 2.3.2

All of the seven hydrogeological boreholes proposed for the mine site have been completed as proposed. Two of the boreholes were used as test pumping wells and the other five boreholes were used as observation wells.

Section 2.3.3

See comments on section 2.3.1.

Section 2.3.4

The two boreholes used for the pumping tests were completed in 220mm diameter, larger than originally proposed. No borehole log was provided for these two wells for review.

Section 2.3.5

All the observation boreholes were drilled in 75 mm diameter, smaller than proposed, because a larger drill rig was not available for the drilling program. This change is not considered critical for the purpose of water level observation.

Section 2.3.6

BaoGang Institute provided a hard copy of the two geological borehole logs DDH05-102 and DDH05-104, and the original field drilling record of 6 boreholes in the mine area (DDH103, DDH105, DDH106, SJ1, SJ3, SJ5). The logs provided information on the drilling conditions and the geology. No records of lost circulation were recorded on any of the documents.

Section 2.3.7

According to BaoGang, all the boreholes were cored with core recovery over 90%. These numbers indicate massive rock with only a limited fracturing..

Section 2.4 Pumping Test***Section 2.4.1***

Two pumping tests were conducted in the mine area, but were suspended prior to their completions because of problems with the pumps. Based on the information collected during the site visit, the tests were conducted as variable-head tests, as outlined in the work plan. Dr. Duan proposed changes to the current methodology by first conducting a step-drawdown test, followed by a long-term constant head test if the local condition permits. Mr. Li from BaoGang Institute accepted this suggestion. It was expected that the pumping tests at the mine site would be resumed within 15 days.

Section 2.4.2

Two methods were used to measure the flows during the pumping tests for QA/QC. One method was to record the time required to fill up a container of known volume, and the other method was to use a flowmeter. The water levels were measured using tape through the observation pipe.

These methods are considered acceptable, even though the flow measurement methods do not follow the work plan, which proposed use of a weir instead of a flowmeter.

Section 2.5 Well-Logging

According to Mr. Li, induced polarization and resistivity logging was conducted in three test boreholes. Acoustic logging was carried out in other two boreholes. The acoustic logging will be also carried out in the two pumping wells after the pumping tests.

Section 2.6 Water Quality Analysis

Four groundwater samples were collected during the dry season and submitted to laboratory for analyses. (two samples for total chemical analysis and two for bacteriological analysis). The plan is to analyze 15 additional samples (more if necessary). According to Bao Gang, the result of the analysis indicate that the groundwater at the mine site is not suitable for drinking water supply, but can be used for industrial purposes.

Section 2.7 Survey

Mr. Li stated that about 50 locations were surveyed at the project site to-date. About 20 of these points are part of the hydrologic and hydrogeological investigations. No documented information was provided for this review.

7.2 Review of Workplan Section 3 Well Field (Hydrogeological Investigations for Water Supply)

The proposed well field location is about 7 km away from the mine site. The well field is located within a dry river bed and covers an area about 8 km long and 300 m to 800 m wide. The aquifer thickness underneath this site is estimated to be between 2 m to 11m. The Chinese national technical code relevant to this review is entitled "Standard for Hydrogeological Investigation of Water Supply" (GB50027-2001).

Section 3.1 Hydrogeological Mapping

BaoGang Institute completed a topographical mapping (scale - 1:10,000) for the well field, but a hydrogeological map for this area was not available. The mapping for the surrounding areas was in progress. The regional hydrogeological investigations covers approximately 100 km², while the detailed investigations for the well field cover an area of about 18 km².

Section 3.1.1

According to Mr. Li, regional hydrologic and meteorological data have been collected for the project site. These include data obtained from the HaiLiuTu meteorological station for the period from 1997 to 2004, and the BaiYunErBo meteorological station for the period from 1954 to 1990. These stations recorded data such as air temperature, rainfall and evaporation. The closet meteorological station to the mine site has recorded hydrological data for the period from 1981 to 2004 and meteorological data for the period from 1971 to 2004.

Section 3.1.2

A topographical map for the well field was provided for this review, but no documentation or map on the regional topography, geomorphology and geology was provided for this review.

Section 3.1.3

The field part of the mapping task was completed. The pumping tests were in process. The characterization of the groundwater conditions in the well field area was not completed. Discussions with Mr. Li and his team indicated that more work will be done for characterization of the groundwater system.

Section 3.1.4

According to Mr. Li, the survey of wells, spring, and surface water features within the study area was in progress. Information such as location, elevation, and flow rate will be measured for each point.

Section 3.1.5

Based on the available data, the relationship between groundwater and surface water, and the hydraulic connection between the different hydrostratigraphic units cannot be clearly defined. It is

understood that more work is proposed for both the mine and the wellfield area, to further define these relationships.

Section 3.1.6

More information on the current and future water uses within the study area are still needed.

Section 3.1.7

According to Mr. Li, the long-term groundwater monitoring program was initiated on March 20, 2005. The water level data are collected every five days during the dry season and in shorter intervals during the wet season. No map showing locations of the observation wells was provided. BaoGang Institute stated that no response was recorded in any of the monitoring wells during the pumping tests except for one well downstream from the pumping well.

Section 3.1.8

According to Mr. Li, the hydrologic data for the ErNiuWan reservoir including the flood levels would soon be collected.

Dr. Duan suggested to measure the surface flow rates at the failed dam site at the river. The dam site controls the surface water flow from the catchment upstream of the well field. Surface flow measurements are important part of the groundwater assessment.

Section 3.1.9

According to Mr. Li, the hydrogeological conditions of the well field area are relative simple. The alluvial aquifer is directly connected with the underlying fractured rock aquifer. Pumping well 2 was completed across both aquifers. Pumping records for this test were provided for this review.

Section 3.1.9

According to Mr. Li, the field work for the hydrogeological mapping (scale – 1:10,000) was completed, although the hydrogeological map was not available yet. The long-term groundwater monitoring network consists of five observation wells. The monitoring commenced on March 20, 2005. The frequency of data collection (every 5 days) meets the requirements of the technical

code (observations every 5-10 days under normal conditions). No document for the monitoring program was provided for this review.

Section 3.2 Geophysical Investigations

The size of the area covered by the ground geophysical survey in the well field area to date is about 3 km². Resistivity and induced polarization log was obtained for a total of 60 locations. Mr. Li stated that the institute would not carry out any more downhole geophysical logging in the well field area because the data collected to date are sufficient for characterizing the relatively simple hydrogeological conditions. However, if additional data will be required the institute will drill more boreholes for geophysical interpretation.

Section 3.3 Hydrogeological Investigations

A map showing five groundwater investigation transects across the study area was provided for the review. The transects were equally distributed over the area, and Dr. Duan suggested to Mr. Li, that a higher density coverage should be considered in the area downstream from the site where the local topographical, geomorphological and geological conditions indicated possible presence of more favorable groundwater conditions.

According to Mr. Li, BaoGang Institute has completed 51 boreholes along five transects, (3 more than the workplan requirement). Forty three of those boreholes were completed as part of a combined geological and hydrogeological investigations, 3 for long-term groundwater observation, and 5 for hydrogeological testing. The number of the observation boreholes meets the requirements of the workplan and the technical code. However, more investigation is likely required to characterize the groundwater conditions immediately outside of the proposed well field. Mr. Li stated that the institute might add another nine boreholes in their workplan as required. No logs or detail records for these boreholes were provided for this review.

Section 3.4 Pumping Tests

See comments on workplan item 3.2.

Section 3.4.1

According to Mr. Li, single-well pumping tests were conducted in three wells. The work plan proposed eight tests, but some of the existing wells were dry.

Section 3.4.2

It is our understanding that five pumping tests using a monitoring well network were planned as part of the work plan. Three of these tests were completed and the two remaining tests were in process at the time of the site visit. The pumping tests were conducted as two-step drawdown tests, followed by a constant rate pumping test. Dr. Duan suggested using three-step drawdown tests if possible, to obtain better data for selecting the rate for the long-term constant rate test.

Dr. Duan conducted a field inspection of a pumping test being conducted at the time of the visit. He checked the records of the pumping test data including the water flow measurement, the equipment used for the test, and the discharge location of the pumped water. The testing method and the testing equipment were found to be adequate for the job. The test procedure followed the technical codes.

No data or analysis of the pumping test were available for this review.

Section 3.4.3

Three pumping tests were completed and two remaining tests were in progress. Results of these pumping tests can be treated as dry season data. No record of the pumping tests was provided for this review.

Section 3.4.4

One multi-well interference pumping test was planned for the final stage of the pumping tests at the location where high yields were expected. The wet season is soon approaching, and this test should commence as soon as possible.

Section 3.4.5-3.4.6

No schedule was provided for this review. Mr. Li stated that the pumping tests would be completed by the end of July, 2005.

Section 3.5 Geophysical Well Logging

BaoGang Institute will not carry out geophysical logging of the boreholes located in the well field area because it is assumed that sufficient information are available to support the geological characterization of the area.

Section 3.6 Sample Analysis***Section 3.6.1***

At the time of this review, 32 of the proposed 60 samples were collected and submitted to laboratory for analyses. Groundwater sampling program was in progress.

Section 3.6.2

At the time of this review, 7 of the proposed 8 bacteriological analyses and 5 of the proposed 32 total chemical analyses were completed. The remaining samples were still being analyzed.

Section 3.7 Survey

Topographical mapping (scale - 1:10,000) was completed for 18 km² area. A total of 80 locations were surveyed. These included surface water bodies, wells and springs.

Section 3.8 Work Schedule

The field work appears to proceed in accordance with the proposed work plan. According to BaoGang Institute, most of the field investigations and survey work is expected to be complete by the end of August, 2005, except for the long-term groundwater observations and the flood measurement.

**7.3 Review of Workplan Section 6 (Work Progress and Organization Plan) and
Workplan Item 8 (In-house Analysis, Documentation, and Reporting)**

Based on the information obtained during the site visit, the work progress to date is in general agreement with the proposed schedule in the Work Plan., except of the in-house analysis and interim reporting. Dr. Duan suggested to BaoGang Institute and JGM that interim reports should

be issued on regular bases providing an update of the field program. The progressive analysis and reporting activities have the following merits:

- to help identify and address any potential problem in the field work in a timely fashion;
- to simplify preparation of the final report; and
- to allow for external review of the ongoing work.

Based on the information provided for this review, to date BaoGang Institute has completed 70% to 80% of the required field work defined in the work plan, except for the in-house analysis and documentation. The hydrogeological investigations are generally on or ahead of the proposed schedule. Some of the work conducted exceeded the requirements indicated in the work plan.

It is expected that most of the field work should be completed by the end of August 2005.

8. CONCLUSIONS AND RECOMMENDATIONS

Based on the information obtained during the site visit it is our opinion that BaoGang Institute's investigations follow the approved work plan, and are being conducted according to the Chinese national technical codes and guidelines. The information collected to date however is not sufficient to determine if the groundwater obtained from pit dewatering and the proposed well field can meet the water requirements of the proposed mining operations. The estimates can not be made before completion of the field investigations.

Hydrogeological Mapping

- The hydrogeological mapping conducted as part of the current investigations focused on two specific areas, the proposed open pit and the well field. It would be beneficial to extend the hydrogeological survey past these two areas to identify other potential sources of groundwater supply should the two areas currently being investigated proved inadequate
- In addition to the seven recently drilled boreholes, there is only limited information available on groundwater conditions from the exploration boreholes that could be used for characterization of the hydrogeological regime in the mine site area.
- The digital files provided by BaoGang Institute for this review are in Chinese GIS and CAD software format that is not recognized by any international standard software. It is recommended that all the maps and drawings prepared for this project are converted into a format that is compatible with most commonly used international standard software for both domestic and international users.
- Based on the work carried out to date, it appears that additional information might be needed to evaluate the connection between the proposed well field aquifer, the river, and the wetlands where the springs are located.
- Further characterization of the structural model and the hydrogeological behavior of the individual structures is recommended to provide additional information in support of the pit dewatering design.

Pumping Tests

- In order to determine the most suitable pumping rate for the long-term constant rate tests we recommend using three-step drawdown test instead of the two-step method currently being used..
- The observation interval of the pumping tests should follow the Chinese national codes and guidelines. Draft drawdown curves and simple analysis should be performed on site to evaluate the collected information in a timely manner.

Groundwater Resources Assessment

- The available data from the pumping tests conducted in the well field area indicate that the aquifer targeted by the investigations is not uniform. The pumping test in Well 3 was conducted at a rate of 70 m³/hour, while the other four wells were tested at rates between 20 to 30 m³/hour. Because of the irregular yields obtained from the pumping wells the test results have to be analyzed in detail in order to determine the long-term sustainability of the aquifer..
- A site-wide water balance study will be critical to the project to assess the availability of water required for the proposed mining activities.
- Detailed investigations should be carried out in the area of the upper springs as this wetland area is one of the important recharge sources for the groundwater in the well field.
- The water levels in the river and the flow rates should be surveyed at several locations upstream and downstream from the site to evaluate the relationship between the surface water and the groundwater in the well field area.
- Further investigation is required to assess the current water use and future water demands in the study area.
- Numerical hydrogeological model should be developed to evaluate the potential impact of the mining operations on the existing groundwater conditions over the period of mine life (12 years). The model could be also used to assist with the well-field development strategy.

Water Permit Application

Water permitting in China is regulated by the Chinese Ministry of Water Resources or local governmental water resource bureaus depending on the water amount, the importance of the project, and the location of the site for water extraction. It is our understanding that JGM would like to limit its water use to 1,000,000 m³/year (2,740 m³/day or 114 m³/hour), the amount for which the water extraction permit can be issued by the local government

Based on the information obtained during the site visit it is our opinion that the hydrogeological investigations currently being conducted by the BaoGang Institute meet the technical guidelines set by the State Geological Survey Bureau of the Ministry of Land Resources for groundwater exploration, but is not sufficient to support an application for the water extraction permit. Further work in support of an application to the Ministry of Water Resources will be required.

Next Phase of Review

The scope of our work was limited by the amount of information that was available for review at the time of the site visit. Additional review program will be required in order to complete the project according to the originally proposed scope of work. It is expected that Bao Gang Institute will complete the field program by the end of August 2005, and the next phase of review should be scheduled accordingly.

9. CLOSURE

We trust the above meets your present requirements. If you have any questions or require additional details, please contact the undersigned.

Yours faithfully

GOLDER ASSOCIATES LTD.

Zengshan Duan, Ph.D., M.Sc., B.Eng.
Senior Project Hydrogeologist

Mike Dobr, RNDr., P.Geo.
Associate, Senior Hydrogeologist

APPENDIX 11

CAPITAL COST SPREADSHEETS

Chang Shan Hao Gold Project - China

Development Study
August 2005

Capital Cost Estimate Summary

Item	Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
Initial Direct Costs				
Land Acquisition	-	459,000	-	459,000
Infrastructure	921,000	4,841,100	-	5,762,100
Mining	-	1,920,300	-	1,920,300
Heap Leach Pad & Ponds	31,500	7,941,800	-	7,973,300
Processing Plant	4,152,800	1,169,200	-	5,322,000
INITIAL DIRECT COST	5,105,300	16,331,400	-	21,436,700
Initial Indirect Costs				
Feasibility & Detail Engineering	-	1,987,500	-	1,987,500
Procurement	-	160,000	-	160,000
Construction Management	-	1,097,800	-	1,097,800
Field Office Expense & Construction Support	-	226,956	-	226,956
Commissioning & Training	-	186,200	-	186,200
Initial Fill (1.5% of Direct Costs)	-	321,600	-	321,600
Startup	-	55,000	-	55,000
Mobile Equipment	-	338,000	-	338,000
Spare Parts (5% of Equipment Cost)	-	255,300	-	255,300
Owners Cost (5 % of Direct Cost)	-	1,071,800	-	1,071,800
INITIAL INDIRECT COST	-	5,700,156	-	5,700,156
INITIAL DIRECT & INDIRECT COSTS	5,105,300	22,031,556	-	27,136,856
Contingency 17%	867,901	3,745,365	-	4,613,266
TOTAL INITIAL PROJECT COST	5,973,201	25,776,921	-	31,750,122
FUTURE SUSTAINING DIRECT COSTS				
Infrastructure	-	-	-	-
Mining	56,500	63,500	-	120,000
Heap Leach Pad & Ponds	31,500	5,078,300	-	5,109,800
Crushing Plant	6,455,000	3,480,200	-	9,935,200
SUSTAINING DIRECT COST	6,543,000	8,622,000	-	15,165,000
FUTURE SUSTAINING INDIRECT COSTS				
Feasibility & Detail Engineering	-	973,500	-	973,500
Procurement	-	85,600	-	85,600
Construction Management	-	900,800	-	900,800

Chang Shan Hao Gold Project - China

Development Study
August 2005

Capital Cost Estimate Summary

Item	Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
Field Office Expense & Construction Support	-	178,016	-	178,016
Commissioning & Training	-	144,500	-	144,500
Initial Fill (1.5% of Direct Costs)	-	227,500	-	227,500
Startup	-	157,100	-	157,100
Mobile Equipment	-	139,000	-	139,000
Spare Parts (5% of Equipment Cost)	-	298,700	-	298,700
Owners Cost (3 % of Direct Cost)	-	455,000	-	455,000
SUSTAINING INDIRECT COST	-	3,559,716	-	3,559,716
TOTAL SUSTAINING DIRECT & INDIRECT COSTS	6,543,000	12,181,716	-	18,724,716
Contingency 17%	1,112,310	2,070,892	-	3,183,202
TOTAL SUSTAINING PROJECT COST	7,655,310	14,252,608	-	21,907,918

TOTAL INITIAL AND FUTURE SUSTAINING PROJECT COST 53,658,039

NOTES:

1. The average construction built-up labor rate was calculated to be \$3.00 / Hr. This rate includes payroll taxes and insurance, travel to and from site, small tools, per diem expenses, and home office support and field construction supervision. This rate excludes contractor equipment rental.
2. The productivity for this project was assumed to be US manhours X 3. This was based on the assumption that there will be more manpower and less construction equipment on the job.
3. Exclusions to Scope of Work
 - Permits, royalties and licenses
 - Environmental costs, testing & monitoring
 - Metallurgical testing
 - Development of a natural gas source
 - Electrical Power Backup except for partial process plant and emergency pumping
 - Escalation
 - Taxes, duty & import fees
 - Mine Sustaining Costs after 2 years
 - Reclamation

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate

Development Study
January 2005

Direct Costs

Item	Quantity	U/M	Unit	Manhours Code	Total	Plant Equip	Unit Costs Contracts	Bulk Mat	Owner	Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
Land Acquisition Cost (Provided by Jinshan)	1	Lot		0 GC	-	-	459,000	-	-	-	459,000	-	459,000
Subtotal					-	-	459,000	-	-	-	459,000	-	459,000

INITIAL COSTS Land Acquisition

Infrastructure

Site & Earthwork

Offsite Road (from BGRIMM Report)	1	Lot		0 GC	-	-	105,700	-	-	-	105,700	-	105,700
Forestation (from BGRIMM Report)	1	Lot		0 GC	-	-	120,500	-	-	-	120,500	-	120,500
Geotechnical support Allowance	1	Lot		0 GC	-	-	30,000	-	-	-	30,000	-	30,000

Ancillary Buildings & Structures

Dormitory (from BGRIMM Report)	1	Lot		0 GC	-	-	733,000	-	-	-	733,000	-	733,000
Warehouse (from BGRIMM Report)	1	Lot		0 GC	-	-	344,200	-	-	-	344,200	-	344,200
Canteen (from BGRIMM Report)	1	Lot		0 GC	-	-	146,600	-	-	-	146,600	-	146,600
Hostel (from BGRIMM Report)	1	Lot		0 GC	-	-	82,500	-	-	-	82,500	-	82,500
Club (from BGRIMM Report)	1	Lot		0 GC	-	-	13,747	-	-	-	13,700	-	13,700
Independent Clinic (from BGRIMM Report)	1	Lot		0 GC	-	-	24,434	-	-	-	24,400	-	24,400
Gatehouse (20 x 20 x 10' Tall)	400	Sq Ft		0.5 GC	200	200	-	-	10	-	4,600	-	4,600
Lab Chemical Storage Building (30 x 10' x 10' Tall)	300	Sq Ft		0.5 GC	150	150	-	-	10	-	3,500	-	3,500
Sewage Facility & Building (20 x 30' x 16' Tall)	600	Sq Ft		0.5 GC	300	300	-	-	10	-	6,900	-	6,900
Fire Water Pump House / Emergency Gen Bldg (30' x 60' x 12' Tall)	1800	Sq Ft		0.5 GC	900	900	-	-	10	-	20,700	-	20,700
Fire Water Tank, 50,000 gallons, 30' x 20'	55000	lbs		0.03 GC	1,650	1,650	-	-	1	-	73,700	-	73,700
Change House (100 x 50' x 14' Tall)	5000	Sq Ft		0.6 GC	3,000	3,000	-	-	12	-	69,000	-	69,000

Equipment

Communications Allowance	1	Lot		400 GC	400	400	20,000	5,000	-	20,000	6,200	-	26,200
Safety equipment	1	Lot		600 GC	600	600	60,000	25,000	-	-	26,800	-	26,800
Laboratory Equipment	1	Lot		400 GC	400	400	100,000	50,000	-	100,000	51,200	-	151,200
Sanitation Equipment	1	Lot		600 GC	600	600	75,000	50,000	-	75,000	51,800	-	126,800
Air Compressor Allowance	1	Lot		240 GC	240	240	30,000	5,000	-	30,000	5,700	-	35,700
Telecommunication Allowance	1	Lot		0 GC	-	-	100,000	-	-	-	100,000	-	100,000
Water Supply from Wells to Distribution Tank (from BGRIMM Report)	1	Lot		0 GC	-	-	570,400	-	-	-	570,400	-	570,400
Water Supply from Distribution Tank to Mine and Plant (from BGRIMM Report)	1	Lot		0 GC	-	-	344,200	-	-	-	344,200	-	344,200
Boiler for Smeltery and Living Quarters (from BGRIMM Report)	1	Lot		0 GC	-	-	236,900	-	-	-	236,900	-	236,900
Auxiliary facilities for concentrator and smeltry (from BGRIMM Report)	1	Lot		0 GC	-	-	141,000	-	-	-	141,000	-	141,000
Cost of tools, apparatus & Production furniture (from BGRIMM Report)	1	Lot		0 GC	-	-	70,100	-	-	-	70,100	-	70,100

Piping & Ducting

Allowance for Utility Pipe, Fittings & Valves	1	Lot		2000 GC	2,000	2,000	-	50,000	-	-	56,000	-	56,000
Allowance for Fire Water Piping & Sprinklers	1	Lot		2000 GC	2,000	2,000	70,000	25,000	-	50,000	31,000	-	81,000

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate Direct Costs

Development Study
January 2005

Item	Quantity	U/M	Unit	Manhours Code	Total	Plant Equip	Unit Costs Contracts	Bulk Mat	Owner	Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
Electrical													
Offsite Power Supply (from BGRIMM Report)	1	Lot	0 GC		-		843,400			-	843,400	-	843,400
Main Substation 35 KV - 6 KV	1	Lot	500 GC		500	268,000		26,000		268,000	27,500	-	295,500
Camp Area													
Emergency Generator	1	Lot	120 GC		120	85,000		6,000		85,000	6,400	-	91,400
Water System Area													
Distribution Line	1	Lot	800 GC		800	-		100,000		-	102,400	-	102,400
Substation	1	Lot	120 GC		120	65,000		26,000		65,000	26,400	-	91,400
Electrical Installation	1	Lot	180 GC		180	160,000		39,000		160,000	39,500	-	199,500
Instrumentation and PLC	1	Lot	200 GC		200	68,000		12,000		68,000	12,600	-	80,600
Construction Consumables (13.5% of Labor Cost)													
	1	Lot	GC				17,447			-	17,400	-	17,400
Large Crane Rental Costs													
Crane Mob & Demob	1	Lot	0 GC		-		3,000	0		-	3,000	-	3,000
Crane Usage Cost	3	Mo	0 GC		-		45,000	0		-	135,000	-	135,000
Freight Allowance 5% of Equipment & Materials													
	1	Lot	0 GC		-	0	71,003	0		-	71,000	-	71,000
Additional cost required for Labor Productivity													
Subtotal	1	Lot	28,720 GC		28,720	0		0		-	86,200	-	86,200
					43,080	1,001,000	4,043,131	419,053	-	921,000	4,841,100	-	5,762,100

Mining

Site & Earthwork

Pre-Production Shipping (from John Nilsson)	1	Lot	0 GC		-		514,800	0		-	514,800	-	514,800
Mine Haul Roads (from John Nilsson)	1	Lot	0 GC		-		238,800	0		-	238,800	-	238,800
Diversion Ditches (from John Nilsson)	1	Lot	0 GC		-		368,000	0		-	368,000	-	368,000

Structures

General Mine Administration office (from John Nilsson)	1	Lot	0 GC		-		137,500	0		-	137,500	-	137,500
Explosive Storage (from John Nilsson)	1	Lot	0 GC		-		129,000	0		-	129,000	-	129,000

Equipment

Mine Equipment (from John Nilsson)	1	Lot	0 GC		-		-	0		-	-	-	-
Light Vehicles (from John Nilsson)	1	Lot	0 GC		-		120,000	0		-	120,000	-	120,000
Engineering Systems (from John Nilsson)	1	Lot	0 GC		-		289,600	0		-	289,600	-	289,600
Pit Dewatering (from John Nilsson)	1	Lot	0 GC		-		122,600	0		-	122,600	-	122,600

Electrical & Instrumentation

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate Direct Costs

Development Study
January 2005

Item	Quantity	U/M	Unit	Manhours Code	Total	Plant Equip	Unit Costs Contracts	Bulk Mat	Owner	Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
Additional cost required for Labor Productivity	1	Lot	-	GC	-	0	0	-	-	-	-	-	-
Subtotal					-	-	1,920,300	-	-	-	1,920,300	-	1,920,300
Heap Leach Pad & Ponds													
Site & Earthwork													
Site Preparation	1	Lot		GC	-		60,000			-	60,000	-	60,000
Heap Leach Pad Earthworks	1	Lot		GC	-		3,172,450			-	3,172,500	-	3,172,500
Pond Earthworks	1	Lot		GC	-		1,096,220			-	1,096,200	-	1,096,200
Water Diversion Earthworks	1	Lot		GC	-		21,125			-	21,100	-	21,100
Geosynthetics, Leach Pad and Ponds	1	Lot		GC	-		2,424,900			-	2,424,900	-	2,424,900
Fence around perimeter of Leach Pads and Process Plant	6600	Ft		0.25 GC	1,650				20	-	137,000	-	137,000
Structures													
Concrete Culvert / Pump Support Allowance	1	Lot		GC	-		70,000			-	70,000	-	70,000
Piping & Valves													
Drainage / Collection Piping Allowance	1	Lot		GC	-		487,390			-	487,400	-	487,400
Distribution Piping Allowance	1	Lot		GC	-		400,000			-	400,000	-	400,000
Electrical													
Distribution Line	1	Lot		200 GC	200			32,000		-	32,600	-	32,600
Distribution Transformer	1	Lot		120 GC	120		8,500	6,000		8,500	6,400	-	14,900
Motor Controller	1	Lot		180 GC	180		9,000	5,500		9,000	6,000	-	15,000
Instrumentation and PLC	1	Lot		200 GC	200		14,000	13,000		14,000	13,600	-	27,600
Additional cost required for Labor Productivity	1	Lot		4,700 GC	4,700		0	0		-	14,100	-	14,100
Subtotal					7,050	31,500	7,732,085	56,520	-	31,500	7,941,800	-	7,973,300
Processing Plant													
Site & Earthwork													
Structural Excavation for Process Building	575	Cu M		0.75 GC	431					-	1,300	-	1,300
Structural Excavation for Misc Equipment	185	Cu M		0.75 GC	139					-	400	-	400
Structural Backfill	350	Cu M		1 GC	350			15		-	6,300	-	6,300
Geotechnical support	1	Lot		0 GC	-		8,000	-		-	8,000	-	8,000
Structures													
Process Building (200' x 100' x 40')	20000	Sq Ft		0.2 GC	4,000			15		-	312,000	-	312,000
Equipment Access Stairways	9500	lbs		0.08 GC	760			0.26		-	4,800	-	4,800
Misc Pipe, Ducting, Cable tray Supports	4500	lbs		0.08 GC	360			0.26		-	2,300	-	2,300
Misc support steel	5000	lbs		0.08 GC	400			0.26		-	2,500	-	2,500

Processing Plant

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate Direct Costs

Development Study
January 2005

	Item	Quantity	U/M	Unit	Manhours Code	Total	Plant Equip	Unit Costs Contracts	Bulk Mat	Owner	Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
	Concrete Foundation & Piers for Equipment	270	Cu M	16 GC		4,320			90		-	37,300	-	37,300
	Concrete Foundation & Piers for Process Building	75	Cu M	16 GC		1,200			90		-	10,400	-	10,400
	Concrete Slab in Process Building	270	Cu M	12 GC		3,240			90		-	34,000	-	34,000
	Barren Tank / Pump house Slab & Foundations	75	Cu M	12 GC		900			90		-	9,500	-	9,500
	Product Loading Area Concrete and Wall	30	Cu M	12 GC		360			90		-	3,800	-	3,800
	Equipment													
	Area 20 Leaching													
PP - 2001	Pregnant Solution Pump	1	Ea	160 GC		160	60000		0		60,000	500	-	60,500
PP - 2002	Pregnant Solution Pump	1	Ea	160 GC		160	60000		0		60,000	500	-	60,500
PP - 2003	Pregnant Solution Pump	1	Ea	160 GC		160	60000		0		60,000	500	-	60,500
PP - 2004	Excess Solution Pumps	1	Ea	80 GC		80	50000		0		50,000	200	-	50,200
PP - 2005	Excess Solution Pumps	1	Ea	80 GC		80	50000		0		50,000	200	-	50,200
PP - 2010	Sampling Pump	1	Ea	40 GC		40	3500		0		3,500	100	-	3,600
PP - 2011	Sampling Pump	1	Ea	40 GC		40	3500		0		3,500	100	-	3,600
	Process Equipment from US (Summit Valley quote)													
	Area 30 CIC and Carbon Stripping													
EQ - 3000	Retort, Electric, 2 cuft, w/Hg Trap and Chiller	1	Ea	120 GC		120	0		0		-	400	-	400
	Miscellaneous Equipment, vault door GSA Class 5, Electronic Lock, Includes Day Gate & Wall Flange	1	Ea	240 GC		240	0		0		-	700	-	700
EW - 3001	Electrowinning cell 75 cubic ft complete with 21 anodes, 20 SS cathodes and buss bar	1	Ea	60 GC		60	0		0		-	200	-	200
EW - 3002	Electrowinning cell 75 cubic ft complete with 21 anodes, 20 SS cathodes and buss bar	1	Ea	60 GC		60	0		0		-	200	-	200
FA - 3001	Exhaust Fan, electrowinning area, 57 cubic meters per minute including ductwork	1	Ea	40 GC		40	0		0		-	100	-	100
FL - 3001	Electrowinning sludge filter, plate and frame	1	Ea	40 GC		40	0		0		-	100	-	100
HE - 3001	Strip solution heat exchanger	1	Ea	40 GC		40	0		0		-	100	-	100
HE - 3002	Strip solution heat exchanger	1	Ea	40 GC		40	0		0		-	100	-	100
HE - 3003	Strip solution heater, 1,547.123 MBtu/hr, Diesel (No 2 Fuel Oil) Valves & Instruments, Expansion Tank, Air Separator	1	Ea	160 GC		160	0		0		-	500	-	500
PP - 3001	Barren Solution Pump	1	Ea	60 GC		80	80000		0		80,000	200	-	80,200
PP - 3002	Barren Solution Pump	1	Ea	60 GC		80	80000		0		80,000	200	-	80,200
PP - 3003	Barren Solution Pump	1	Ea	60 GC		80	80000		0		80,000	200	-	80,200
PP - 3004	Carbon transfer pump to stripping, 76 to 50 mm, horizontal screw impeller, Hidrostral Type	1	Ea	60 GC		60	0		0		-	200	-	200
PP - 3005	Stripped carbon transfer pump, 75 to 50 mm, horizontal screw impeller, Hidrostral Type	1	Ea	60 GC		60	0		0		-	200	-	200
PP - 3006	Carbon area sump pump, vertical rubber covered, 50 by 1200 mm vertical	1	Ea	40 GC		40	0		0		-	100	-	100
PP - 3008	Strip solution pump, horizontal 70 gpm	1	Ea	40 GC		40	0		0		-	100	-	100
PP - 3009	Strip solution pump, horizontal 70 gpm	1	Ea	40 GC		40	0		0		-	100	-	100
PP - 3010	Hot Water Circulation Pump	1	Ea	32 GC		32	0		0		-	100	-	100
PP - 3011	Hot Water Circulation Pump	1	Ea	32 GC		32	0		0		-	100	-	100
PP - 3012	Electrowinning sludge pump, 40 gpm	1	Ea	32 GC		32	0		0		-	100	-	100
RF - 3001	DC Rectifier, SCR, 0-1500 A, 0-6 V	1	Ea	32 GC		32	0		0		-	100	-	100
RF - 3002	DC Rectifier, SCR, 0-1500 A, 0-6 V	1	Ea	32 GC		32	0		0		-	100	-	100
SA - 3001	Pregnant solution sampler	1	Ea	40 GC		40	0		0		-	100	-	100
SA - 3002	Barren solution sampler	1	Ea	40 GC		40	0		0		-	100	-	100
SC - 3001	Trash screen, 4 Mesh	1	Ea	16 GC		16	0		0		-	100	-	100
SC - 3002	Carbon safety screen, 35 Mesh sieve bend	1	Ea	24 GC		24	0		0		-	100	-	100

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate Direct Costs

Development Study
January 2005

	Item	Quantity	U/M	Unit	Manhours Code	Total	Plant Equip	Unit Costs Contracts	Bulk Mat	Owner	Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
TK - 3001	Carbon Adsorption Column No 1, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm Includes 10" Magmeter	1	Ea	60 GC		80		0		0	-	200	-	200
TK - 3002	Carbon Adsorption Column No 2, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	1	Ea	60 GC		80		0		0	-	200	-	200
TK - 3003	Carbon Adsorption Column No 3, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	1	Ea	60 GC		80		0		0	-	200	-	200
TK - 3004	Carbon Adsorption Column No 4, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	1	Ea	60 GC		80		0		0	-	200	-	200
TK - 3005	Carbon Adsorption Column No 5, Two Ton/3500 gpm, CS, Tanks w/304SS Diaphragm	1	Ea	60 GC		80		0		0	-	200	-	200
TK - 3006	Barren Solution Surge Tank, Insulated, 8.2 M Dia x 9.2 M High	30000	lbs	0.08 GC		2,400			0.6		-	25,200	-	25,200
TK - 3007	Barren Solution Sump	1	Ea	32 GC		32		0		0	-	100	-	100
TK - 3008	Carbon Strip Column, 2 tonne capacity CS, 100 psi-300 F ASME VIII, In/Out Manifolds	1	Ea	60 GC		60		0		0	-	200	-	200
TK - 3009	Strip solution tank, CS, w/Sight Glass	1	Ea	16 GC		16		0		0	-	-	-	-
TK - 3010	Cathode wash tank, FRP, 1 meter diameter x 1 meter high	1	Ea	8 GC		8		0		0	-	-	-	-
Area 35 Refining														
BM - 3501	Batch ball mill	1	Ea	80 GC		80		0		0	-	200	-	200
FA - 3501	Exhaust fan, furnace and retort area	1	Ea	40 GC		40		0		0	-	100	-	100
FR - 3501	Induction furnace, Induction, 75 kW/0.7 cuft, w/Hydraulics & Chiller	1	Ea	60 GC		60		0		0	-	200	-	200
GR - 3501	Gravity Concentrator	1	Ea	60 GC		60		0		0	-	200	-	200
SC - 3501	Vibrating slag screen	1	Ea	40 GC		40		0		0	-	100	-	100
ZM - 3501	Smelting furnace equipment (Includes cascade mold stand, 1000 oz molds (5), and slag pot (2), 25 cuft, Cement Mixer, PE Drum	1	Ea	24 GC		24		0		0	-	100	-	100
Area 40 Carbon Handling														
EQ - 4001	Safety shower and eye wash	1	Lot	GC		-		0		0	-	-	-	-
FA - 4002	Klin exhaust fan, carbon wash and reactivation area	1	Ea	16 GC		16		800		0	800	-	-	800
FL - 4001	Carbon Fines Filter	1	Ea	60 GC		60		0		0	-	200	-	200
HO - 4001	Klin feed hopper, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	1	Ea	12 GC		12		0		0	-	-	-	-
KN - 4001	Regeneration klin package, Horizontal, Electric 120 kW or Diesel (No 2 Fuel Oil)	1	Ea	800 GC		800		0		0	-	2,400	-	2,400
PP - 4001	Carbon wash pump, 34 gpm	1	Ea	24 GC		24		0		0	-	100	-	100
PP - 4003	Washed carbon transfer pump, 75 by 50 mm, screw impeller hidrostral type	1	Ea	60 GC		60		0		0	-	200	-	200
PP - 4004	Carbon transfer pump, 75 by 50 mm, screw impeller hidrostral type	1	Ea	60 GC		60		0		0	-	200	-	200
PP - 4006	Sump pump, carbon wash area 20 gpm	1	Ea	24 GC		24		0		0	-	100	-	100
PP - 4007	Carbon Fines Pump, 70 gpm	1	Ea	40 GC		40		0		0	-	100	-	100
PP - 4008	Carbon Fines Pump, 70 gpm	1	Ea	40 GC		40		0		0	-	100	-	100
SC - 4001	Sizing and dewatering screen, 36" Midwestern, flop gate high speed vibrating	1	Ea	32 GC		-		0		0	-	-	-	-
SJ - 4001	Klin feed screw conveyor SS Screw	1	Ea	24 GC		24		0		0	-	100	-	100
TK - 4001	Acid wash column, FRP, 2.0 Ton, Includes Inlet/Outlet Manifolds	1	Ea	60 GC		60		0		0	-	200	-	200
TK - 4002	Wash solution tank, FRP	1	Ea	24 GC		24		0		0	-	100	-	100
TK - 4003	Quench tank, Carbon Steel, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	1	Ea	24 GC		24		0		0	-	100	-	100
TK - 4004	Carbon Storage Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	1	Ea	24 GC		24		0		0	-	100	-	100
TK - 4007	Carbon Fines Storage Tank, 2 meters diameter by 2 meters vertical side, 60 degree cone bottom	1	Ea	24 GC		24		0		0	-	100	-	100
Area 45 Reagents														
AG - 4501	Agitator for caustic mix tank	1	Lot											
AG - 4502	Agitator for cyanide mix tank	1	Ea	16 GC		16		3500		0	3,500	-	-	3,500
		1	Ea	16 GC		16		3500		0	3,500	-	-	3,500

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate

Direct Costs

Development Study
January 2005

Unit Costs													
Item	Quantity	U/M	Unit	Code	Total	Plant Equip	Unit Costs			Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
							Contracts	Bulk Mail	Owner				
BN - 4501	15000	lbs	0.08 GC		1,200					-	7,500	-	7,500
BV - 4501	1	Ea	16 GC		16	2500			2,500		-	-	2,500
BX - 4501	1	Ea	60 GC		60	3500			3,500		200	-	3,700
EQ - 4501	1	Ea	32 GC		32	800			800		100	-	900
FA - 4501	1	Ea	32 GC		32	500			500		100	-	600
FE - 4501	1	Ea	32 GC		32	1500			1,500		100	-	1,600
HO - 4501	1	Ea	40 GC		40	4000			4,000		100	-	4,100
PP - 4501-4	4	Ea	24 GC		96	500			2,000		300	-	2,300
PP - 4505	1	Ea	40 GC		40	4500			4,500		100	-	4,600
PP - 4506-7	2	Ea	60 GC		120	4500			9,000		400	-	9,400
PP - 4512-13	2	Ea	24 GC		48	1500			3,000		100	-	3,100
PP - 4514	1	Ea	16 GC		16	4500			4,500		-	-	4,500
PP - 4519	1	Ea	60 GC		60	4500			4,500		200	-	4,700
PP - 4515	1	Ea	80 GC		80	7500			7,500		200	-	7,700
PP - 4520	1	Ea	40 GC		40	4500			4,500		100	-	4,600
TK - 4501	1	Ea	60 GC		60	1200			1,200		200	-	1,400
TK - 4502	1	Ea	60 GC		60	22000			22,000		200	-	22,200
TK - 4506	1	Ea	32 GC		32	6000			6,000		100	-	6,100
TK - 4507	1	Ea	16 GC		16	1500			1,500		-	-	1,500
Piping & Ducting													
Piping Allowance, Fittings Valves Etc.													
	1	Lot	400 GC		400	75,000		45,000		75,000	46,200	-	121,200
Electrical & Instrumentation													
Distribution Line	1	Lot	160 GC		160	-		16,000		-	16,500	-	16,500
Substation	1	Lot	360 GC		360	92,000		24,000		92,000	25,100	-	117,100
Electrical Installation	1	Lot	4200 GC		4,200	186,000		142,000		186,000	154,600	-	340,600
Instrumentation & PLC	1	Lot	800 GC		800	232,000		46,000		232,000	48,400	-	280,400
Emergency Generator	1	Lot	160 GC		160	100,000		5,000		100,000	5,500	-	105,500
Construction Consumables (13.5% of Labor Cost)													
	1	Lot	GC				38,253			-	38,300	-	38,300
Large Crane Rental Costs													
Crane Mob & Demob	1	Lot	0 GC		-		20,000	0		-	20,000	-	20,000
Crane Usage Cost	2	Mo	0 GC		-		60,000	0		-	120,000	-	120,000
Freight Allowance of Equipment (incl in Equipment cost)													
	0	Lot	0 GC		-	0	-	0		-	-	-	-
Freight Allowance of Bulk Materials (Allowance)													
	1	Lot	0 GC		-	0	-	25000		-	25,000	-	25,000
Additional cost required for Labor Productivity													
	1	Lot	62,968 GC		62,968	0		0		-	188,900	-	188,900
Subtotal					94,452	4,145,300	126,253	303,482	-	4,152,800	1,169,200	-	5,322,000
Total Initial Direct Cost					144,582	5,177,800	14,280,769	779,055	-	5,105,300	16,331,400	-	21,436,700

FUTURE SUSTAINING DIRECT COSTS

Infrastructure

Construction Consumables (13.5% of Labor Cost)

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate Direct Costs

Development Study
January 2005

Item	Quantity	U/M	Unit	Manhours Code	Total	Plant Equip	Unit Costs Contracts	Bulk Mat	Owner	Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
Large Crane Rental Costs													
Crane Mob & Demob	0	Lot		0 GC	-		-		0	-	-	-	-
Crane Usage Cost	0	Mo		0 GC	-		-		0	-	-	-	-
Freight Allowance 5% of Equipment & Materials													
	1	Lot		0 GC	-		-		0	-	-	-	-
Additional cost required for Labor Productivity													
Subtotal	1	Lot	-	GC	-		0		0	-	-	-	-
							-		-	-	-	-	-

Mining

Site & Earthwork													
Structures													
Equipment													
Mine Equipment	1	Lot		0 GC	-		-		0	-	-	-	-
Electrical & Instrumentation													
Mine Shop													
Distribution Line	1	Lot		200 GC	200	32,000		28,000		32,000	28,600	-	60,600
Distribution Transformer	1	Lot		120 GC	120	8,500		6,000		8,500	6,400	-	14,900
Distribution Switchgear	1	Lot		150 GC	150	16,000		28,000		16,000	28,500	-	44,500
Additional cost required for Labor Productivity													
Subtotal	1	Lot	-	GC	470	56,500	-	62,000	-	56,500	63,500	-	120,000

Heap Leach Pad & Ponds

Site & Earthwork													
Site Preparation	1	Lot		GC	-		60,000			-	60,000	-	60,000
Heap Leach Pad Earthworks	1	Lot		GC	-		2,552,350			-	2,552,400	-	2,552,400
Pond Earthworks	1	Lot		GC	-		-			-	-	-	-
Water Diversion Earthworks	1	Lot		GC	-		17,770			-	17,800	-	17,800
Geosynthetics, Leach Pad and Ponds	1	Lot		GC	-		1,837,500			-	1,837,500	-	1,837,500
Fence around perimeter of Leach Pads and Process Plant	6600	Ft		0.25 GC	1,650			20		-	137,000	-	137,000
Structures													
Concrete Culvert / Pump Support Allowance	1	Lot		GC	-		-			-	-	-	-

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate
Direct Costs

Development Study
January 2005

Item		Quantity	U/M	Unit	Manhours Code	Total	Plant Equip	Unit Costs Contracts	Bulk Mat	Owner	Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
Piping & Valves														
Drainage / Collection Piping Allowance		1	Lot		GC	-		215,028			-	215,000	-	215,000
Distribution Piping Allowance		1	Lot		GC	-		200,000			-	200,000	-	200,000
Electrical														
Distribution Line		1	Lot	200	GC	200	-		32,000		-	32,600	-	32,600
Distribution Transformer		1	Lot	120	GC	120	8,500		6,000		8,500	6,400	-	14,900
Motor Controller		1	Lot	180	GC	180	9,000		5,500		9,000	6,000	-	15,000
Instrumentation and PLC		1	Lot	200	GC	200	14,000		13,000		14,000	13,600	-	27,600
Additional cost required for Labor Productivity		1	Lot	-	GC	-	0	0			-	-	-	-
Subtotal						2,350	31,500	4,882,648	56,520	-	31,500	5,078,300	-	5,109,800
Crushing Plant														
Site & Earthwork														
Structural Excavation for Foundations		1000	Cu M	0.75	GC	750					-	2,300	-	2,300
Structural Excavation for Crusher Building		750	Cu M	0.75	GC	563					-	1,700	-	1,700
Structural Excavation for Misc Equipment		550	Cu M	0.75	GC	413					-	1,200	-	1,200
Structural Backfill		1200	Cu M	0.75	GC	900			15		-	20,700	-	20,700
Geotechnical support		1	Lot	0	GC	-		50,000	-		-	50,000	-	50,000
Structures														
Crushing Plant Building (200' x 200' x 45')		40000	Sq Ft	0.3	GC	12,000			14		-	596,000	-	596,000
Magnet Support Steel		6500	lbs	0.08	GC	520			0.26		-	3,300	-	3,300
Crusher Area Access Platforms		40000	lbs	0.08	GC	3,200			0.26		-	20,000	-	20,000
Access Stairways		30000	lbs	0.08	GC	2,400			0.26		-	15,000	-	15,000
Misc Pipe, Ducting, Cable tray Supports		25000	lbs	0.08	GC	2,000			0.26		-	12,500	-	12,500
Bin support steel		20000	lbs	0.08	GC	1,600			0.26		-	10,000	-	10,000
Bin Access Platforms & Stairways		10000	lbs	0.08	GC	800			0.26		-	5,000	-	5,000
Baghouse Support steel, Access Platforms & Stairs		35000	lbs	0.08	GC	2,800			0.26		-	17,500	-	17,500
Concrete Foundation for Crushers		1000	Cu M	12	GC	12,000			120		-	156,000	-	156,000
Concrete Foundation & Piers for Remaining Equipment		650	Cu M	12	GC	7,800			120		-	101,400	-	101,400
Concrete Foundation & Piers for Building		350	Cu M	12	GC	4,200			120		-	54,600	-	54,600
Concrete Slab in Building		550	Cu M	10	GC	5,500			120		-	82,500	-	82,500
Concrete, Foundation for Misc Support Columns		50	Cu M	12	GC	600			120		-	7,800	-	7,800
Misc, Concrete Slabs		45	Cu M	10	GC	450			120		-	6,800	-	6,800
Equipment														
Area 10 Primary Crushing														
Dump Bin, 250 tonne		275000	lbs	0.02	GC	5,500			0.4		-	126,500	-	126,500
Air Compressor		1	Ea	60	GC	60	28,000				28,000	200	-	28,200

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate Direct Costs

Development Study
January 2005

	Item	Quantity	U/M	Unit	Manhours Code	Total	Plant Equip	Unit Costs Contracts	Bulk Mat	Owner	Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
CR - 1001	Primary Jaw Crusher 48" x 60"	1	Ea	1800 GC		1,800	420,000				420,000	5,400	-	425,400
	Including Lube System	1	Ea	80 GC		80					-	200	-	200
CV - 1001	Primary Crusher Discharge Conveyor, 48" x 120'	1	Ea	240 GC		240	150,000				150,000	700	-	150,700
CV - 1002	Stockpile Feed Conveyor, 48" x 150'	1	Ea	300 GC		300	162,000				162,000	900	-	162,900
	Coarse Ore Stockpile, 20,000 ton live capacity	1	Ea	240 GC		240	120,000				120,000	700	-	120,700
DC - 1001	Baghouse	1	Ea	80 GC		80	40,000				40,000	200	-	40,200
FE - 1001	Apron Feeder 60" x 25'	1	Ea	240 GC		240	120,000				120,000	700	-	120,700
RB - 1001	Rock Breaker	1	Ea	240 GC		240	95,000				95,000	700	-	95,700
SC - 1001	Grizzly Screen	1	Ea	24 GC		24	47,000				47,000	100	-	47,100
WT - 1001	Primary Crusher Disch Belt Weightometer	1	Ea	32 GC		32	14,000				14,000	100	-	14,100
Area 15 Fine Crushing														
BA - 1501	Lime Bin Activator	1		GC		-	12,000				12,000	-	-	12,000
BN - 1501	Surge Bin, 1000 tonne	400000	lbs	0.02 GC		8,000			0.4		-	184,000	-	184,000
BN - 1502	Product Bin, 2000 tonne	680000	lbs	0.02 GC		13,600			0.4		-	312,800	-	312,800
BN - 1503	Lime Bin, 100 Tonne	50000	lbs	0.04 GC		2,000			0.4		-	26,000	-	26,000
CR - 1501	Secondary Crusher, 7' Heavy Duty	1	Ea	1200 GC		1,200	1,100,000				1,100,000	3,600	-	1,103,600
	Including Oil Cooling Fan	1	Ea	24 GC		24					-	100	-	100
	Including Lube Oil Pump	1	Ea	40 GC		40					-	100	-	100
	Including Hydraulic Adjustment Pump	1	Ea	40 GC		40					-	100	-	100
	Including Lube Oil Heater	1	Ea	8 GC		8					-	100	-	100
CR - 1502	Tertiary Crusher, 7' Heavy Duty	1	Ea	1200 GC		1,200	1,100,000				1,100,000	3,600	-	1,103,600
	Including Oil Cooling Fan	1	Ea	24 GC		24					-	100	-	100
	Including Lube Oil Pump	1	Ea	40 GC		40					-	100	-	100
	Including Hydraulic Adjustment Pump	1	Ea	40 GC		40					-	100	-	100
	Including Lube Oil Heater	1	Ea	8 GC		8					-	100	-	100
CR - 1503	Tertiary Crusher, 7' Heavy Duty	1	Ea	1200 GC		1,200	1,100,000				1,100,000	3,600	-	1,103,600
	Including Oil Cooling Fan	1	Ea	24 GC		24					-	100	-	100
	Including Lube Oil Pump	1	Ea	40 GC		40					-	100	-	100
	Including Hydraulic Adjustment Pump	1	Ea	40 GC		40					-	100	-	100
	Including Lube Oil Heater	1	Ea	8 GC		8					-	100	-	100
CV - 1501	Secondary Crusher Feed Conveyor	1	Ea	80 GC		80	160,000				160,000	200	-	160,200
CV - 1502	Secondary Crusher Discharge Conveyor 48" x 150'	1	Ea	600 GC		600	160,000				160,000	1,800	-	161,800
CV - 1503	Transfer Conveyor, 48" x 130'	1	Ea	500 GC		500	126,000				126,000	1,500	-	127,500
CV - 1504	Splitter Conveyor, 48" x 20'	1	Ea	100 GC		100	35,000				35,000	300	-	35,300
CV - 1505	Tertiary Crusher A Feed Conveyor, 36" x 20'	1	Ea	120 GC		120	35,000				35,000	400	-	35,400
CV - 1506	Tertiary Crusher B Feed Conveyor, 36" x 20'	1	Ea	120 GC		120	35,000				35,000	400	-	35,400
CV - 1507	Final Product Discharge Conveyor	1	Ea	100 GC		100	60,000				60,000	300	-	60,300
DC - 1501	Secondary Crusher Baghouse	1	Ea	400 GC		400	40,000				40,000	1,200	-	41,200
DC - 1502	Tertiary Crusher Baghouse	1	Ea	400 GC		400	40,000				40,000	1,200	-	41,200
DC - 1503	Tertiary Crusher Baghouse	1	Ea	400 GC		400	40,000				40,000	1,200	-	41,200
DC - 1504	Lime Bin Dust Collector	1	Ea	120 GC		120	25,000				25,000	400	-	25,400
FE - 1501	Apron Feeder	1	Ea	140 GC		140	75,000				75,000	400	-	75,400
FE - 1502	Apron Feeder	1	Ea	140 GC		140	75,000				75,000	400	-	75,400
FE - 1503	Lime Variable Speed Screw Feeder	1	Ea	60 GC		60	18,000				18,000	200	-	18,200
FE - 1504	Crushed Ore Feeder, belt feeder, 2000 TPH variable speed	1	Ea	120 GC		120	40,000				40,000	400	-	40,400
FE - 1505	Crushed Ore Feeder, belt feeder, 2000 TPH variable speed	1	Ea	120 GC		120	40,000				40,000	400	-	40,400
MG - 1501	Tramp Magnet - electromagnet	1	Ea	200 GC		200	45,000				45,000	600	-	45,600
SC - 1501	Secondary Feed Screen	1	Ea	400 GC		400	45,000				45,000	1,200	-	46,200
SC - 1502	Vibrating Screen 8 x 20	1	Ea	400 GC		400	65,000				65,000	1,200	-	66,200
SC - 1503	Vibrating Screen 8 x 20	1	Ea	400 GC		400	65,000				65,000	1,200	-	66,200
WT - 1501	Belt Weightometer	1	Ea	60 GC		60	14,000				14,000	200	-	14,200
WT - 1502	Belt Weightometer	1	Ea	60 GC		60	14,000				14,000	200	-	14,200
Piping & Ducting														
	Ducting Allowance, Expansion Joints, Fittings & Dampers	1	Lot	400 GC		400	80,000		85,000		80,000	86,200	-	166,200
	Piping Allowance, Fittings Valves Etc.	1	Lot	100 GC		100	25,000		15,000		25,000	15,300	-	40,300

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate
Direct Costs

Development Study
January 2005

Item	Quantity	U/M	Unit	Manhours Code	Total	Plant Equip	Unit Costs Contracts	Bulk Mat	Owner	Plant Equipment	Contracts & Material	Owners Labor & Exp.	TOTAL
Electrical & Instrumentation													
Distribution Line 6KV	1	Lot	300 GC		300		-	30,000		-	30,900	-	30,900
Substation	1	Lot	260 GC		260	102,000		25,000		102,000	25,800	-	127,800
Switchgear and High Voltage Motor Controllers	1	Lot	260 GC		260	260,000		30,000		260,000	30,800	-	290,800
Electrical Installation	1	Lot	2800 GC		2,800	132,000		96,000		132,000	104,400	-	236,400
Instrumentation & PLC	1	Lot	640 GC		640	96,000		18,000		96,000	19,900	-	115,900
Construction Consumables (13.5% of Labor Cost)													
	1	Lot	GC				127,172			-	127,200	-	127,200
Large Crane Rental Costs													
Crane Mob & Demob	1	Lot	0 GC		-		23,700	0		-	23,700	-	23,700
Crane Usage Cost	2	Mo	0 GC		-		100,000	0		-	200,000	-	200,000
Freight Allowance 5% of Equipment & Materials													
	1	Lot	0 GC		-	0	337,738	0		-	337,700	-	337,700
Additional cost required for Labor Productivity													
	1	Lot	209,336 GC		209,336	0	0	0		-	628,000	-	628,000
Subtotal					314,004	6,455,000	638,609	299,752	-	6,455,000	3,480,200	-	9,935,200
Total Sustaining Direct Cost													
					316,824	6,543,000	5,521,257	418,272	-	6,543,000	8,622,000	-	15,165,000

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate

Development Study
January 2005**Indirect Costs**

Item	Quantity	U/M	Unit	Manhours		Total	Plant Equip	Unit Costs		Bulk Matl	Owner	Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
				Code				Contracts							
Initial Indirect Costs															
Feasibility & Detail Engineering															
Meetings / Schedules / Misc	400 Hr		1 E3			400		125				-	50,000	-	50,000
Allowance for Feasibility Study	1 Lot		1 E3			1		150,000				-	150,000	-	150,000
Allowance for Basic Engineering	1 Lot		1 E3			1		100,000				-	100,000	-	100,000
Allowance to Convert to Chinese	1 Lot		1 E3			1		35,000				-	35,000	-	35,000
Allowance for Chinese Institute (BGRIMM) Including	1 Lot					-		100,000				-	100,000	-	100,000

Environment Assessment

Production Assessment

Occupation Hazard Assessment

Preliminary Design Package

Detail Engineering Dwg's

US Engineering (KDE)	8000 hrs		1 E3			8,000		95				-	760,000	-	760,000
Flowsheets	5 Dwg					-						-	-	-	-
Civil / Concrete	10 Dwg					-						-	-	-	-
General Arrangements / Sections	5 Dwg					-						-	-	-	-
Geotechnical	12 Dwg					-						-	-	-	-
Architectural	4 Dwg					-						-	-	-	-
Piping & Instrument Diagrams	8 Dwg					-						-	-	-	-
Mechanical Details	16 Dwg					-						-	-	-	-
Structural Details	8 Dwg					-						-	-	-	-
Electrical / Instrumentation	65 Dwg					-						-	-	-	-
Piping / Ducting	10 Dwg					-						-	-	-	-
US Engineering (Golder)	1 Lot		1 E3			-		30,000				-	30,000	-	30,000
Chinese Basic Engineering	1 Lot		1 E3			1		174,000				-	174,000	-	174,000
Chinese Detail Engineering	1 Lot		1 E3			1		443,000				-	443,000	-	443,000
Flowsheets	10 Dwg					-						-	-	-	-
Civil / Concrete	40 Dwg					-						-	-	-	-
General Arrangements / Sections	25 Dwg					-						-	-	-	-
Geotechnical	35 Dwg					-						-	-	-	-

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate

Development Study
January 2005**Indirect Costs**

Item	Quantity	U/M	Unit	Manhours		Total	Plant Equip	Unit Costs		Bulk Matl	Owner	Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
				Code				Contracts							
Architectural	35	Dwg				-						-	-	-	-
Piping & Instrument Diagrams	40	Dwg				-						-	-	-	-
Mechanical Details	40	Dwg				-						-	-	-	-
Structural Details	30	Dwg				-						-	-	-	-
Electrical / Instrumentation	125	Dwg				-						-	-	-	-
Piping / Ducting	40	Dwg				-						-	-	-	-
X-Pat Supervision (1 Person 16 Weeks)	16	Wk		1 E3		16			6,750			-	108,000	-	108,000
Jinshan Engineering Supervision (1 person 10 week	10	Wk		1 E3		10			3,750			-	37,500	-	37,500
Subtotal						-						-	1,987,500	-	1,987,500
Procurement															
US Procurement															
Prepare Contractor Bid Package	3	Wk				-			4,800			-	14,400	-	14,400
Compile Bidders List	60	Hr				-			110			-	6,600	-	6,600
Perform Bid Analysis	40	Hr				-			110			-	4,400	-	4,400
Expedite	200	Hr				-			110			-	22,000	-	22,000
Import / Export Doc. Prep.	300	Hr				-			110			-	33,000	-	33,000
Factory Equipment Inspection	60	Hr				-			110			-	6,600	-	6,600
Procurement Personnel, 1 req'd	6	Wk				-			3,000			-	18,000	-	18,000
Chinese Procurement															
Prepare Contractor Bid Package	1	Lot		1 E3		-			55,000			-	55,000	-	55,000
Compile Bidders List	20	Wk				-			-			-	-	-	-
Perform Bid Analysis	400	Hr				-			-			-	-	-	-
Expedite	400	Hr				-			-			-	-	-	-
Factory Equipment Inspection	300	Hr				-			-			-	-	-	-
Procurement Personnel, by Owner, 2 req'd	36	Wk				-			-			-	-	-	-
Subtotal						-						-	160,000	-	160,000

Chang Shan Hao Gold Project - ChinaPreliminary Capital Cost Estimate
Indirect CostsDevelopment Study
January 2005

Item	Quantity	U/M	Unit	Manhours		Total	Plant Equip	Unit Costs		Bulk Matl	Owner	Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
				Code				Contracts							
Construction Management															
X- PAT Construction Manager (5 Months)	24 wk		60			1,440		8,100				-	194,400	-	194,400
X- PAT Construction Supt. (5 Months)	24 wk		60			1,440		7,500				-	180,000	-	180,000
X-PAT Construction Coordinator (5 Months)	24 wk		60			1,440		3,600				-	86,400	-	86,400
Geotechnical Construction Quality Assurance	1 Lot		0			-		250,000				-	250,000	-	250,000
Chinese Project / Construction Management	1 Lot		0			-		387,000				-	387,000	-	387,000
Project Engineer as Required	35 wk		60			2,100						-	-	-	-
Field Engineer as Required	35 wk		60			2,100						-	-	-	-
Safety Engineer	35 wk		40			1,400						-	-	-	-
Cost/Scheduling Engineer	35 wk		40			1,400						-	-	-	-
Construction Clerk	35 wk		40			1,400						-	-	-	-
Bookkeeper / Timekeeper	35 wk		40			1,400						-	-	-	-
Warehouse / Receiving	35 wk		40			1,400						-	-	-	-
Field office expenses	35 wk		40			1,400						-	-	-	-
QA/QC consultant	35 wk		40			1,400						-	-	-	-
Engineer Per Diem Expenses	200 wk					-						-	-	-	-
Construction Management Travel	20 Trips					-						-	-	-	-
Subtotal												-	1,097,800	-	1,097,800

Field Office Expense & Construction Support

Approval Process for Construction (2% of CM Cost)															
Field Office Expense	1 Lot					-		40,000				-	21,956	-	21,956
Surveying	1 Lot					-		20,000				-	20,000	-	20,000
Geotechnical Testing & Reports	1 Lot					-		35,000				-	35,000	-	35,000
Temporary power	2 mo					-		15,000				-	30,000	-	30,000
Computers & software	1 Lot					-		20,000				-	20,000	-	20,000
Mobilize / Demobilize	1 Lot					-		30,000				-	30,000	-	30,000
Insurance on Rental Equipment	1 Lot					-		30,000				-	30,000	-	30,000
Subtotal								190,000				-	226,956	-	226,956

Chang Shan Hao Gold Project - ChinaPreliminary Capital Cost Estimate
Indirect CostsDevelopment Study
January 2005

Item	Quantity	U/M	Unit	Manhours		Plant Equip	Unit Costs			Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
				Code	Total		Contracts	Bulk Matl	Owner				
Commissioning & Training													
Process Engineer, 1 Req'd	4	Wk			-		9,000			-	36,000	-	36,000
Training Engineer, 2 Req'd	8	Wk			-		8,100			-	64,800	-	64,800
Training manuals / CD's (English / Chinese)	1	Lot			-		60,000			-	60,000	-	60,000
Mfg. Equipment Erection	2	wk			-		7,000			-	14,000	-	14,000
Mfg. Travel Expenses	4	Trip			-		2,500			-	10,000	-	10,000
Per Diem Expenses	14	wk			-		100			-	1,400	-	1,400
Subtotal							86,700			-	186,200	-	186,200

Initial Fill (1.5% of Direct Costs)

Initial Fill Allowance (1.5% of Direct Cost)	1	Lot			-		321,551			-	321,600	-	321,600
Subtotal										-	321,600	-	321,600

Startup

Process Engineer, 1 Req'd	4	Wk			-		9,000			-	36,000	-	36,000
Travel Expenses	2	Trip			-		8,500			-	17,000	-	17,000
Per Diem Expenses	4	wk			-		500			-	2,000	-	2,000
Subtotal										-	55,000	-	55,000

Mobile Equipment

Forklifts (Feed & Product & Warehouse)	3	Ea			-		30,000			-	90,000	-	90,000
Forklift, Heavy Duty	1	Ea			-		60,000			-	60,000	-	60,000
8 Ton Crane	1	Ea			-		75,000			-	75,000	-	75,000
3-Ton Flatbed	1	Ea			-		30,000			-	30,000	-	30,000
Trailer mounted electric welders	2	Ea			-		4,000			-	8,000	-	8,000
Pickup Trucks	2	Ea			-		20,000			-	40,000	-	40,000
Bobcats	1	Ea			-		35,000			-	35,000	-	35,000
Subtotal										-	338,000	-	338,000

Spare Parts (5% of Equipment Cost)

Spare Part Allowance (5% of Equipment Cost)	1	Lot			-		255,265			-	255,300	-	255,300
--	---	-----	--	--	---	--	---------	--	--	---	---------	---	---------

Chang Shan Hao Gold Project - ChinaPreliminary Capital Cost Estimate
Indirect CostsDevelopment Study
January 2005

Item	Quantity	U/M	Unit	Manhours		Total	Plant Equip	Unit Costs		Owner	Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
				Code				Contracts	Bulk Matl					
Subtotal								255,265	-	-	-	255,300	-	255,300
Owners Cost (5 % of Direct Cost)														
Owners Costs are for the items listed below:														
Plant Staff Personnel Allowance	1	Lot				-		1,071,835		0	-	1,071,800	-	1,071,800
Operating Personnel						-					-	-	-	incl above
Maintenance Personnel						-					-	-	-	incl above
						-					-	-	-	incl above
Review Engineering & Testing														
Review Detail Engineering Dwgs						-					-	-	-	incl above
Project Manager On Site for Start-Up						-					-	-	-	incl above
Project Manager at Engineering Office						-					-	-	-	incl above
Drill and case exploratory water wells						-					-	-	-	incl above
Hydrologist						-					-	-	-	incl above
Geotechnical consultant						-					-	-	-	incl above
Followup metallurgical testing						-					-	-	-	incl above
Travel to Plant Site						-					-	-	-	incl above
Travel to Engineering Office						-					-	-	-	incl above
Permitting														
Acquire water rights - allowance						-					-	-	-	incl above
Acquire surface rights - allowance						-					-	-	-	incl above
Consultant - assemble/submit permit						-					-	-	-	incl above
Explosives & misc. permits - allowance						-					-	-	-	incl above
Subtotal						-					-	1,071,800	-	1,071,800
Total Initial Indirect Cost						13,376					-	5,700,156	-	5,700,156

FUTURE SUSTAINING INDIRECT COSTS

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate

Development Study
January 2005**Indirect Costs**

Item	Quantity	U/M	Unit	Manhours		Total	Plant Equip		Unit Costs		Owner	Plant Equipment		Contracts & Material	Owner Labor & Exp.	TOTAL
				Code	Code		Code	Code	Code	Code		Code	Code			
Item	Quantity	U/M	Unit	Manhours		Total	Plant Equip		Unit Costs		Owner	Plant Equipment		Contracts & Material	Owner Labor & Exp.	TOTAL

Indirect Costs**Feasibility & Detail Engineering**

Meetings / Schedules / Misc	100	Hr	1 E3	100					125					12,500	-	12,500
Allowance for Feasibility Study	1	Lot	1 E3	1					100,000					100,000	-	100,000
Allowance for Basic Engineering	1	Lot	1 E3	1					75,000					75,000	-	75,000
Allowance to Convert to Chinese	1	Lot	1 E3	1					10,000					10,000	-	10,000
Allowance for Chinese Institute (BGRIMM) Including Environment Assessment	1	Lot		-					100,000					100,000	-	100,000

Environment Assessment

Production Assessment

Occupation Hazard Assessment

Preliminary Design Package

US Engineering (Golder)	1	Lot	1 E3	-					30,000					30,000	-	30,000
-------------------------	---	-----	------	---	--	--	--	--	--------	--	--	--	--	--------	---	--------

Detail Engineering Dwg's

US Basic Engineering (KDE)	3000	hrs	1 E3	3,000					95					285,000	-	285,000
Flowsheets	0	Dwg		-										-	-	-
Civil / Concrete	0	Dwg		-										-	-	-
General Arrangements / Sections	0	Dwg		-										-	-	-
Geotechnical	0	Dwg		-										-	-	-
Architectural	0	Dwg		-										-	-	-
Piping & Instrument Diagrams	0	Dwg		-										-	-	-
Mechanical Details	0	Dwg		-										-	-	-
Structural Details	0	Dwg		-										-	-	-
Electrical / Instrumentation	0	Dwg		-										-	-	-
Piping / Ducting	0	Dwg		-										-	-	-

Chinese Detail Engineering Company	1	Lot	1 E3	1					235,000					235,000	-	235,000
Flowsheets	3	Dwg		-										-	-	-
Civil / Concrete	30	Dwg		-										-	-	-
General Arrangements / Sections	18	Dwg		-										-	-	-

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate

Development Study
January 2005

Indirect Costs

Item	Quantity	U/M	Unit	Manhours		Total	Plant Equip	Unit Costs		Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
				Code				Contracts	Bulk Matl				
Geotechnical	8	Dwg				-				-	-	-	-
Architectural	12	Dwg				-				-	-	-	-
Piping & Instrument Diagrams	15	Dwg				-				-	-	-	-
Mechanical Details	30	Dwg				-				-	-	-	-
Structural Details	20	Dwg				-				-	-	-	-
Electrical / Instrumentation	70	Dwg				-				-	-	-	-
Piping / Ducting	30	Dwg				-				-	-	-	-
X-Pat Supervision (1 Person 20 Weeks)	12	Wk		1 E3		12		6,750		-	81,000	-	81,000
Jinshan Engineering Supervision (1 person 20 week	12	Wk		1 E3		12		3,750		-	45,000	-	45,000
Subtotal						-				-	973,500	-	973,500

Procurement

US Procurement													
Prepare Contractor Bid Package	3	Wk				-		4,800		-	14,400	-	14,400
Compile Bidders List	40	Hr				-		110		-	4,400	-	4,400
Perform Bid Analysis	40	Hr				-		110		-	4,400	-	4,400
Expedite	40	Hr				-		110		-	4,400	-	4,400
Import / Export Doc. Prep.	60	Hr				-		110		-	6,600	-	6,600
Factory Equipment Inspection	40	Hr				-		110		-	4,400	-	4,400
Procurement Personnel, 1 req'd	4	Wk				-		3,000		-	12,000	-	12,000
Chinese Procurement													
Prepare Contractor Bid Package	1	Lot				-		35,000		-	35,000	-	35,000
Compile Bidders List	300	Hr				-		-		-	-	-	-
Perform Bid Analysis	300	Hr				-		-		-	-	-	-
Expedite	400	Hr				-		-		-	-	-	-
Factory Equipment Inspection	300	Hr				-		-		-	-	-	-

Chang Shan Hao Gold Project - ChinaPreliminary Capital Cost Estimate
Indirect CostsDevelopment Study
January 2005

Item	Quantity	U/M	Unit	Manhours		Total	Plant Equip	Unit Costs		Owner	Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
				Code				Contracts	Bulk Matl					
Procurement Personnel, by Owner, 2 req'd	36 Wk					-		-			-	-		-
Subtotal											-	85,600	-	85,600
Construction Management														
X- PAT Construction Manager (6 Months)	24 wk		60			1,440		8,100			-	194,400	-	194,400
X- PAT Construction Supt. (6 Months)	24 wk		60			1,440		6,600			-	158,400	-	158,400
X-PAT Construction Coordinator (6 Months)	24 wk		60			1,440		4,500			-	108,000	-	108,000
Geotechnical Construction Quality Assurance	1 Lot		0			-		250,000			-	250,000	-	250,000
Chinese Project and Construction Management														
Project Engineer as Required	1 Lot		0			-		190,000			-	190,000	-	190,000
Field Engineer as Required	30 wk		60			1,800		-			-	-	-	-
Safety Engineer	30 wk		60			1,800		-			-	-	-	-
Cost/Scheduling Engineer	30 wk		40			1,200		-			-	-	-	-
Construction Clerk	30 wk		40			1,200		-			-	-	-	-
Bookkeeper / Timekeeper	30 wk		40			1,200		-			-	-	-	-
Warehouse / Receiving	30 wk		40			1,200		-			-	-	-	-
Field office expenses	30 wk		40			1,200		-			-	-	-	-
QA/QC consultant	20 wk		40			800		-			-	-	-	-
Engineer Per Diem Expenses	72 wk					-		-			-	-	-	-
Construction Management Travel	12 Trips					-		-			-	-	-	-
Subtotal											-	900,800	-	900,800

Field Office Expense & Construction Support

Approval Process for Construction (2% of CM Cost)														
Field Office Expense	1 Lot					-		40,000			-	18,016	-	18,016
Surveying	1 Lot					-		30,000			-	30,000	-	30,000
Geotechnical Testing & Reports	1 Lot					-		15,000			-	15,000	-	15,000
Temporary power	0 mo					-		-			-	-	-	-
Computers & software	1 Lot					-		5,000			-	5,000	-	5,000
Mobilize / Demobilize	1 Lot					-		40,000			-	40,000	-	40,000

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate

Development Study
January 2005**Indirect Costs**

Item	Quantity	U/M	Unit	Manhours		Plant Equip	Unit Costs		Owner	Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
				Code	Total		Contracts	Bulk Matl					
Insurance on Rental Equipment	1	Lot			-		30,000			-	30,000	-	30,000
Subtotal							160,000			-	178,016	-	178,016
Commissioning & Training													
Process Engineer, 2 Req'd	4	Wk			-					-	-	-	-
Training Engineer, 2 Req'd	4	Wk			-		18,000			-	72,000	-	72,000
Training manuals / CD's (English / Chinese)	1	Lot			-		50,000			-	50,000	-	50,000
Mfg. Equipment Erection	2	wk			-		7,000			-	14,000	-	14,000
Mfg. Travel Expenses	3	Trip			-		2,500			-	7,500	-	7,500
Per Diem Expenses	10	wk			-		100			-	1,000	-	1,000
Subtotal							77,600			-	144,500	-	144,500

Initial Fill (1.5% of Direct Costs)

Initial Fill Allowance (1.5% of Direct Cost)	1	Lot			-		227,475			-	227,500	-	227,500
Subtotal										-	227,500	-	227,500

Startup

Process Engineer, 2 Req'd	1	Mo			-		129,600			-	129,600	-	129,600
Travel Expenses	3	Trip			-		8,500			-	25,500	-	25,500
Per Diem Expenses	4	wk			-		500			-	2,000	-	2,000
Subtotal										-	157,100	-	157,100

Mobile Equipment

Forklifts (Feed & Product & Warehouse)	0	Ea			-		30,000			-	-	-	-
Forklift, Heavy Duty	1	Ea			-		80,000			-	80,000	-	80,000
8 Ton Crane	0	Ea			-		75,000			-	-	-	-
3-Ton Flatbed	0	Ea			-		30,000			-	-	-	-
Trailer mounted electric welders	1	Ea			-		4,000			-	4,000	-	4,000
Pickup Trucks	1	Ea			-		20,000			-	20,000	-	20,000
Bobcats	1	Ea			-		35,000			-	35,000	-	35,000
Subtotal										-	139,000	-	139,000

Chang Shan Hao Gold Project - China

Preliminary Capital Cost Estimate

Development Study
January 2005**Indirect Costs**

Item	Quantity	U/M	Unit	Manhours		Plant Equip	Unit Costs		Owner	Plant Equipment	Contracts & Material	Owner Labor & Exp.	TOTAL
				Code	Total		Contracts	Bulk Matl					
Spare Parts (5% of Equipment Cost)													
Spare Part Allowance (5% of Equipment Cost)	1	Lot			-		298,660			-	298,700	-	298,700
Subtotal													
Owners Cost (3 % of Direct Cost)													
Owners Costs are for the items listed below:													
Plant Staff Personnel Allowance			1 Lot		-		454,950			-	455,000	-	455,000
Operating Personnel					-					-	-	-	incl above
Maintenance Personnel					-					-	-	-	incl above
					-					-	-	-	incl above
Review Engineering & Testing													
Review Detail Engineering Dwgs					-					-	-	-	incl above
Project Manager On Site for Start-Up					-					-	-	-	incl above
Project Manager at Engineering Office					-					-	-	-	incl above
Drill and case exploratory water wells					-					-	-	-	incl above
Hydrologist					-					-	-	-	incl above
Geotechnical consultant					-					-	-	-	incl above
Followup metallurgical testing					-					-	-	-	incl above
Travel to Plant Site					-					-	-	-	incl above
Travel to Engineering Office					-					-	-	-	incl above
Permitting													
Acquire water rights - allowance					-					-	-	-	incl above
Acquire surface rights - allowance					-					-	-	-	incl above
Consultant - assemble/submit permit					-					-	-	-	incl above
Explosives & misc. permits - allowance					-					-	-	-	incl above
Subtotal													
Total Sustaining Indirect Cost													

AVERAGE BUILT-UP LABOR RATE FOR A COMPOSITE CREW				
Job Description	Cost/Hr	No. of People	Weighted Average	Cost
Superintendent	5	1	0.08	0.38
Foreman	4	2	0.15	0.62
Journeyman	2.5	3	0.23	0.58
Journeyman Assistant	2	3	0.23	0.46
Helper	1.5	2	0.15	0.23
General Labor, unskilled	1	2	0.15	0.15
Camp & Food Allowance				0.75
Built Up Labor Rate		13		3.17

NOTES:

1. Use US\$3.00 / hr for cost estimate.
2. Above Labor Rates include Payroll taxes and Insurance, Travel to and from site, Overtime, small tools, consumables, per diem allowance, and home office support and field construction supervision.
3. This rate does not include contractor rental equipment such as cranes, forklift trucks etc.
4. The productivity for this project was US manhours x 3. This was based on the assumption that there will be more manpower and less construction equipment on the job.

CONTINGENCY ASSUMPTIONS

Description	Accuracy	% of total cost	weighted contingency
Civil / Earthwork	20%	35.94%	7.2%
Concrete /Structural	20%	9.33%	1.9%
Equipment	12%	34.05%	4.1%
Piping / Ducting	20%	4.89%	1.0%
Electrical / Instrumentation	15%	10.15%	1.5%
Remaining Items	20%	5.63%	1.1%
Average Contingency		100.00%	16.8%
Weather & Storm Conditions			0.5%
Built-Up Contingency			17.3%

Use 17% for the estimate

INITIAL CONSTRUCTION COSTS BY COMMODITY

AREA DESCRIPTION	Man Hours	Site Work Civil	Buildings Steel	Concrete	Equipment	Pipe Ducting	Elect Instrument	Contractor Rental Equipment	Const Consummables	Freight	Productivity	TOTAL
Land Acquisition	-	-	-	-	-	-	-	-	-	-	-	459,000
Infrastructure	43,080	256,200	1,522,800	-	1,829,300	137,000	1,704,200	138,000	17,400	71,000	86,200	5,762,100
Mining	-	1,121,600	266,500	-	532,200	-	-	-	-	-	-	1,920,300
Heap Leach Pad & Ponds	7,050	6,911,700	-	70,000	-	887,400	90,100	-	-	-	14,100	7,973,300
Processing Plant	94,452	16,000	329,100	95,000	3,508,400	121,200	860,100	140,000	38,300	25,000	188,900	5,322,000
TOTAL	144,582	8,305,500	2,118,400	165,000	5,869,900	1,145,600	2,654,400	278,000	55,700	96,000	289,200	21,436,700

% Not including Land 1% 40% 10% 1% 28% 5% 13% 1% 0% 0% 1% 100%

FUTURE SUSTAINING CONSTRUCTION COSTS BY COMMODITY

AREA DESCRIPTION	Man Hours	Site Work Civil	Buildings Steel	Concrete	Equipment	Pipe Ducting	Elect Instrument	Contractor Rental Equipment	Const Consummables	Freight	Productivity	TOTAL
Infrastructure	-	-	-	-	-	-	-	-	-	-	-	-
Mining	470	-	-	-	-	-	120,000	-	-	-	-	120,000
Heap Leach Pad & Ponds	2,350	4,604,700	-	-	-	415,000	90,100	-	-	-	-	5,109,800
Crushing Plant	314,004	75,900	679,300	409,100	6,432,000	206,500	801,800	350,900	-	337,700	628,000	9,921,200
TOTAL	316,824	4,680,600	679,300	409,100	6,432,000	621,500	1,011,900	350,900	-	337,700	628,000	15,151,000

461,406 12,986,100 2,797,700 574,100 12,301,900 1,767,100 3,666,300 628,900 55,700 433,700 917,200 36,128,700

Percent of Project not including land 35.94% 7.74% 1.59% 34.05% 4.89% 10.15% 1.74% 0.15% 1.20% 2.54% 100.00%

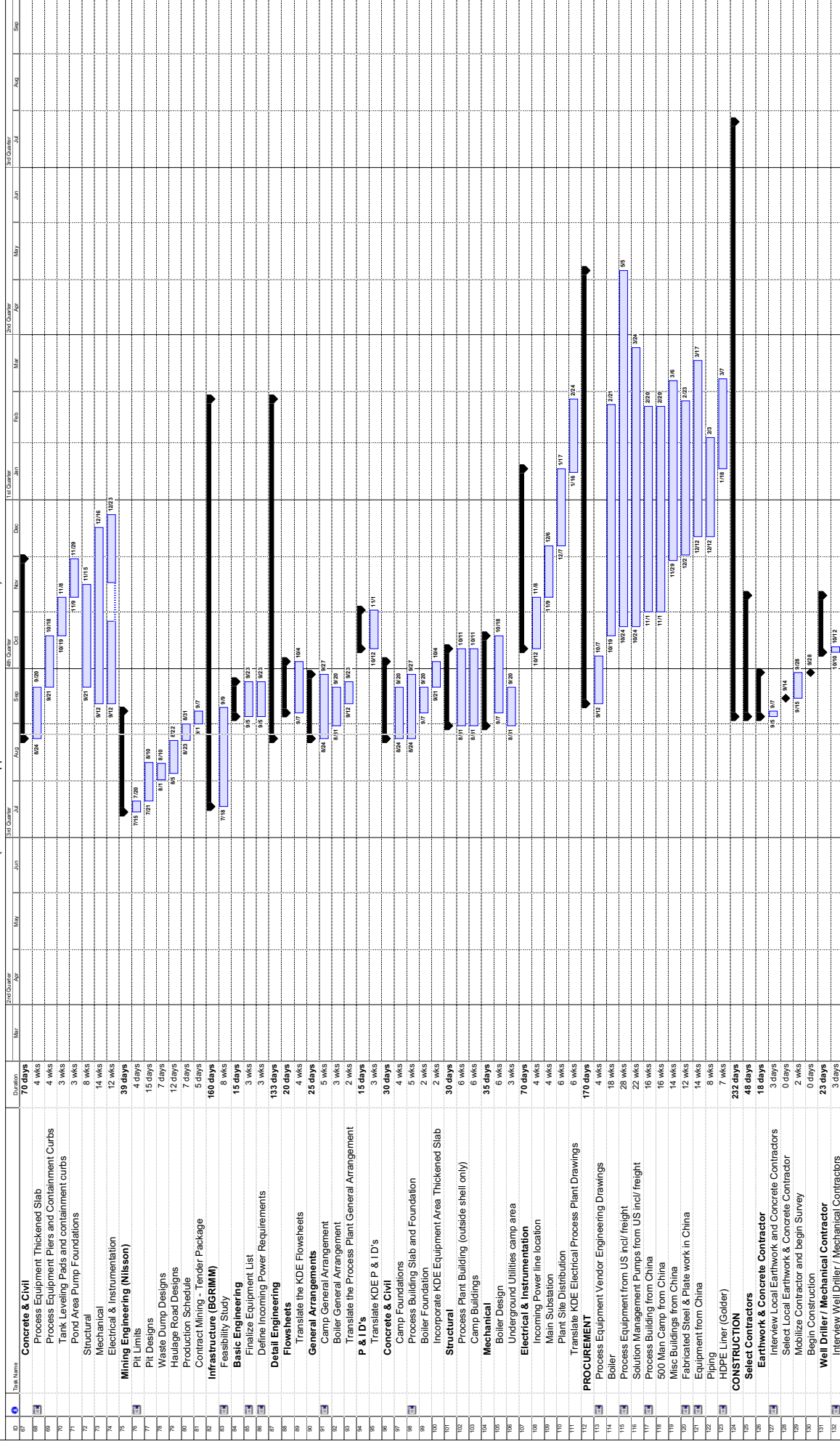
APPENDIX 12

PROJECT SCHEDULE

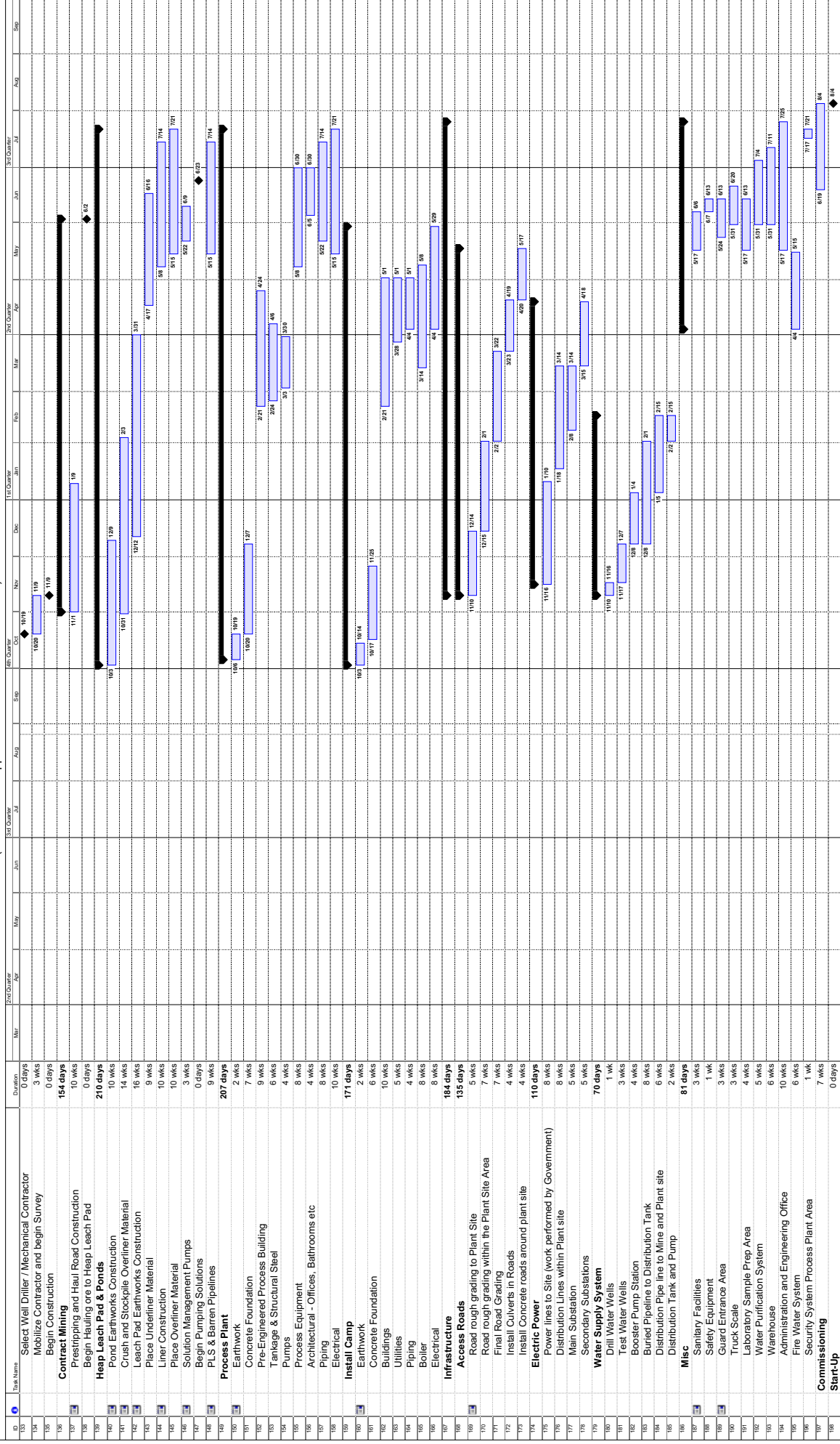
(Government Approval Time was not considered)

ID	Task Name	Duration	Start Date	End Date	Progress	Dependencies	Resources	Notes
1	Milestones	222 days						
2	Begin Earthwork and Concrete Construction (2005)	0 days						
3	Begin Stockpiling Underliner Material	0 days						
4	Issue PO for Process Plant	0 days						
5	Begin Contract Mining	0 days						
6	Process Plant Equipment Arrive on Site	0 days						
7	Begin Pond and Pad Liner Installation	0 days						
8	Begin Hauling Ore to Heap Leach Pad	0 days						
9	Begin Circulating Solutions to Heap	0 days						
10	Plant Startup	0 days						
11	Metallurgical Test work	89 days						
12	Complete Metallurgical Testing	0 days						
13	Sample Prep and Assay	4 wks						
14	Preliminary Flotation Testing Results	0 days						
15	Preliminary "Indicated" Recovery Report	0 days						
16	Final Metallurgical Report	0 days						
17	ENGINEERING	219 days						
18	Development Study	90 days						
19	Geotechnical Work (Goldier)	30 days						
20	Field Investigation	2 wks						
21	Prelim Geographic Mapping & Geophysics	1 wk						
22	Confirm Leach Pad Site	4 wks						
23	Drilling & Test Pits	4 wks						
24	Geotechnical Laboratory Testing	5 days						
25	Leach Pad Layout	1 wk						
26	Prelim based on Current Topography	65 days						
27	Final Layout based on Survey	2 wks						
28	Seismic Risk Review/ Slope Stability	2 wks						
29	Operational Water Balance	2 wks						
30	Hydrology & Diversion Channel Design	11 wks						
31	Plant Foundation Support	9 wks						
32	Detail Pad & Pond Construction Drawings	9 wks						
33	Construction Specifications	3 wks						
34	Design Report	155 days						
35	Construction Quantities & Material Ordering List	8 wks						
36	Process Plant (KDE)	8 days						
37	Design Criteria	12 wks						
38	Mass Balance	2 wks						
39	Equipment List	2 wks						
40	Hydraulic Calculations	2 wks						
41	Electrical Load Study	3 wks						
42	Capital Cost	6 days						
43	Operating Cost	120 days						
44	Detail Engineering Drawings	80 days						
45	Flowsheets	6 wks						
46	Heap Leach Area	5 wks						
47	Adsorption, Carbon Stripping & Refining	5 wks						
48	Carbon Reactivation	4 wks						
49	Utilities & Reagents	4 wks						
50	Primary Crushing	4 wks						
51	Secondary Crushing	15 days						
52	General Arrangements	3 wks						
53	Process Plant Building - Architectural Dwg	3 wks						
54	Process Plant General Arrangement	3 wks						
55	Site Plan	120 days						
56	P & ID's	1 wk						
57	Symbols Index	3 wks						
58	Heap Leach Solution Management	3 wks						
59	Carbon Adsorption & Stripping	3 wks						
60	Bullion Production	3 wks						
61	Carbon Reactivation	3 wks						
62	Utilities & Reagents	3 wks						
63	Water System	3 wks						
64	Leach Pad Distribution System	3 wks						
65	Primary Crushing	3 wks						
66	Secondary Crushing	3 wks						

PRELIMINARY JINSHAN EPCM SCHEDULE
(Government Approval Time was not considered)



PRELIMINARY JINSHAN EPCM SCHEDULE
(Government Approval Time was not considered)



APPENDIX 13

GOLDER ASSOCIATES PHASE 1 (PRE-FEASIBILITY) PIT SLOPE STUDY

Golder Associates Inc.
6165 Ridgeview Court, Suite F
Reno, NV USA 89509
Telephone: (775) 828-9604
Fax: (775) 828-9645



REPORT ON

PHASE 1 (PRE-FEASIBILITY) PIT SLOPE STUDY

CHANG SHAN HAO 217 GOLD PROJECT

INNER MONGOLIA, CHINA

Submitted to:

Jinshan Gold Mines Inc.

Submitted by:

*Golder Associates Inc.
6165 Ridgeview Court #F
Reno, NV 89509*

Graeme Major
Principal Geotechnical Engineer

Distribution:

1 Copy - Jinshan Gold Mines Inc. (ftp)
3 Copies - Jinshan Gold Mines Inc., Vancouver
1 Copy - Golder Associates, Reno

August, 2005

053-2515.030

05127.doc

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	General.....	1
1.2	Purpose and Scope.....	2
1.3	Project Description	2
2.0	SITE CONDITIONS AND PLANNED PIT DEVELOPMENT	6
2.1	Topography	6
2.2	Regional Geologic Setting	6
2.3	Stratigraphy.....	7
2.4	Structure.....	8
2.5	Alteration	10
2.6	Hydrogeology	10
2.7	Planned Pit Development.....	10
3.0	GEOLOGICAL AND GEOTECHNICAL DATA	12
3.1	Geological Database	13
3.1.1	Surface Mapping.....	13
3.1.2	Core Logging.....	13
3.1.3	Drift Mapping and Performance	13
3.1.4	Geologic Sections	13
3.2	Geotechnical Database.....	14
3.2.1	Fracture Data.....	14
3.2.2	Oriented Core Data	15
3.2.3	Exploration and Bulk Sampling Drift Mapping Data	16
3.2.4	Strength Testing.....	16
3.2.5	General Evaluation of Geotechnical Data.....	17
4.0	GEOTECHNICAL MODEL AND STABILITY EVALUATION	18
4.1	Preliminary Geotechnical Model.....	18
4.1.1	Geotechnical Units.....	18
4.1.2	Rock Quality Evaluation.....	19
4.1.3	Structural Evaluation	20
4.1.3.1	Oriented Core Data	20
4.1.3.2	Drift Mapping Data.....	21
4.2	Stability of Existing Pit Slopes	21
4.3	Predicted Bench Stability in Future Pits	22
4.4	Large-Scale Slope Stability.....	23
4.5	Conclusions Related to Slope Stability.....	23
5.0	PRELIMINARY SLOPE DESIGN RECOMMENDATIONS.....	25
5.1	Geological Assumptions	25
5.2	Operating Assumptions.....	26
5.2.1	Standard of Care	26

5.2.2	Operating Bench Heights and Slope Design Criteria.....	26
5.2.3	Perimeter Blasting.....	26
5.3	Slopes in Alluvium	28
5.4	First Bench in Oxide Bedrock.....	28
5.5	Footwall Slopes.....	28
5.6	Hanging Wall Slopes	29
5.7	End Wall Slopes.....	29
5.8	Summary of Preliminary Pit Slope Design Recommendations	30
5.9	Risks and Opportunities for Pit Slopes	31
5.9.1	Risks	31
5.9.2	Opportunities	32
6.0	RECOMMENDATIONS FOR GEOTECHNICAL PROGRAM TO SUPPORT FEASIBILITY-LEVEL PIT SLOPE DESIGNS	34
6.1	Completion of Transformation of Coordinate System.....	34
6.2	Distribution and Character of Geotechnical Units in Ultimate Pit Slopes.....	34
6.3	Surface Mapping.....	34
6.4	Core Drilling	35
6.5	Investigation and Characterization of Alluvium.....	35
6.6	Laboratory Testing.....	35
6.7	Geotechnical Structural and Rock Quality Evaluation	35
6.8	Engineering Analyses and Design	36
6.9	Perimeter Blasting Recommendations.....	36
6.10	Pit Hydrogeological Evaluation.....	36
7.0	REFERENCES	37

LIST OF TABLES

Table 1	Weighted Average RQD by Corehole
Table 2	ISRM Strength Classifications and RQD Descriptions
Table 3	Laboratory Test Data

LIST OF PHOTOGRAPHS

Photograph 1	Unauthorized Test Pitting East of Trial Pit and 1994 Brigade 217 Heap Leach of Underground Crosscut Development Rock
Photograph 2	Brigade 208 Pit, SW Pit Footwall Slope Developed Along Foliation
Photograph 3	Panorama of Trial Pit
Photograph 4	Jinshan Test Leach Pad for Trial Pit Ore
Photograph 5	Decline Portal Inclined at 18°
Photograph 6	Terrain at Northeast Zone Around Trial Pit
Photograph 7	F1 Fault Strand in North Slope of B28 West Pit
Photograph 8	F2 Fault in Northeast Corner of Trial Pit. Fault Cuts Foliation and is Wavy, with Fault Gouge Approx. 1 m to 2 m Thick

- Photograph 9 F2 Fault in North Slope of Trial Pit is Wavy, with Orientations Varying from 158/50 to 158/70
- Photograph 10 Graphitic Surface of F2 Fault
- Photograph 11 Trial Pit, West Slope. Foliation Dips are Commonly Flattened by Downslope Creep Near Surface
- Photograph 12 Typical Oxide Core
- Photograph 13 Typical Unfractured Sulphide Core
- Photograph 14 Saw-Cut Samples from Exploration and Bulk Sampling Drift
- Photograph 15 North Slope on Top Bench at West End of Trial Pit Approx. 30 m North of F2 is in Oxidized Strong Slate that Reflects General Improvement in Rock Quality North of F2
- Photograph 16 Brigade 208 Pit, Benches 20-25 m High Developed Along Foliation Oriented 80/170 at Bottom to 60/170 at Top; Roll in Dip is Apparently Surface Phenomenon
- Photograph 17 Brigade 208 Pits, Showing Typical Differences in Stability Between Estimated 25 m Footwall and Hanging Wall Sections
- Photograph 18 Brigade 208 Pit, West End Hanging Wall in Phyllite; Poor Hanging Wall Stability Conditions Mitigated by Bench Development Resulting in Flat Slope Angle
- Photograph 19 Brigade 208 Pit, East End Hanging Wall in Sandstone; Stability Conditions Very Hazardous with an Estimated 40 m of Severe Rockfall Hazard – Does Not Meet North American Standards
- Photograph 20 B28 West Pit Looking West. Hanging Wall (South) Slope is in Better Conditions than Other Hanging Wall Slopes Because the Foliation is Approximately Vertical

LIST OF FIGURES

- Figure 1 Project Location and Proposed Facilities Layout
- Figure 2 Geologic Map of 217 Gold Property
- Figure 3 Geological Detail Map of 217 Gold Property with Drillhole Locations
- Figure 4 Schematic Relationship of F1 and F2 Faults
- Figure 5 Preliminary Pit Layouts
- Figure 6 Stereoplot of All Structural Data from Northeast Zone
- Figure 7 Stereoplot of All Structural Data from Southwest Zone
- Figure 8 Stereoplot of All Structural Data from Bulk Sampling and Exploration Drift
- Figure 9 Bench Design Criteria
- Figure 10 Design Footwall Bench Configurations
- Figure 11 Design Hanging Wall Bench Configurations for Oxide and Fresh Rock

LIST OF APPENDICES

- Appendix A Corehole Location and Downhole Survey Data
- Appendix A-1 Corehole Collar Location, Lengths, and Orientations
- Appendix A-2 Corehole Downhole Surveys
- Appendix B Oriented Core Data

Appendix B-1 Plots of Oriented Core Data
Appendix B-2 Oriented Core Data

Appendix C Geologic Sections

Appendix C-1 Geological Sections
Appendix C-2 Geotechnical Sections

1.0 INTRODUCTION

1.1 General

The Chang Shan Hao 217 (“CSH217” or “217”) gold project is a large tonnage low grade deposit located at Xin-hu-re township in Wulate, Inner Mongolia, the People’s Republic of China. The site is located at approximately east longitude 109° 14’ and north latitude 41° 39’, some 210 km by road from Bautou, a major industrial city with a population of approximately 1.5 million in Inner Mongolia (Figure 1).

The deposit was initially identified in the early 1990’s based on a geophysical anomaly. It was investigated by Brigade 217, Northwest Geological Exploration Bureau, China National Nuclear Corporation (“Brigade 217”), from the early 1990’s, at times in combination with other Joint Venture partners. Jinshan Gold Mines Inc. (“Jinshan”), a publicly traded corporation listed on the Toronto stock exchange that changed its name from Pacific Minerals Inc. in March, 2004, entered into a Joint Venture arrangement with Brigade 217 under which Jinshan acquired a 96.5% interest in the project and Brigade 217 retained a 3.5% interest. Jinshan is currently coordinating development of a bankable feasibility study to evaluate the feasibility of mining the CSH217 deposit by open pit mining methods and processing the ore by means of heap leaching. A “Western Feasibility Study” is currently being completed in support of this evaluation, while Chinese agencies are completing a separate feasibility-level study to Chinese standards to complete Chinese regulatory requirements. KD Engineering (KDE) of Tucson, Arizona, is the Project Coordinator, coordinating the roles of Golder Associates (heap leach facility design engineer and pit slope design recommendations); John Nilsson (open pit designs); and BGRIMM (Chinese design institute preparing designs of project infrastructure). KDE is also the design engineer for the process facilities, is conducting laboratory column testing of ore samples, and is leading the Western Feasibility Study.

The feasibility study requires pit designs based on estimates of achievable slope angles that are supported by an engineering evaluation of site conditions. Jinshan requested Golder Associates to undertake this initial (Phase 1 or pre-feasibility level) pit slope stability evaluation through a subcontract with KDE.

1.2 Purpose and Scope

The purpose and scope of this study were defined in a Scope and Cost Estimate from Golder Associates to KD Engineering dated June 1, 2005.

The purpose of this study is to develop preliminary pre-feasibility pit slope design recommendations based on currently available information, and to recommend a program of site investigation and engineering analyses suitable for support of feasibility-level pit slope designs.

The scope of work comprised completion of a "Phase 1" or "Scoping" study for support of design of pit slopes. This included a site reconnaissance of approximately one week's duration to review site conditions and collect available information, preliminary evaluation of available data, and preparation of this Phase 1 report to:

- Document current conditions
- Present a preliminary geotechnical model
- Provide preliminary slope design recommendations based on available information
- List assumptions and risks associated with the Phase 1 study
- Provide a detailed scope of work for a feasibility-level pit slope design study

Weisheng Zang, site geologist for Jinshan, assisted on site by collecting the pertinent geological/geotechnical information and helping to develop a realistic geotechnical model.

1.3 Project Description

Details of the project history and general site conditions are provided as background for completeness and understanding of this report. A pre-feasibility study for the project prepared by Nanchang Engineering & Research Institute of Nonferrous Metals (NERIN, 2003) provides some of the historical and factual information, including the basic geologic setting and interpretation, detailed in this current report. A preliminary assessment of the project by Rossi and others (2005) also provides historical and technical information.

The project site has seen some small-scale gold production from alluvial deposits, but is not an area of historic bedrock gold production by surface or underground means. Historic placer workings and geochemical anomalies led to systematic geologic mapping and sampling by Brigade 217 beginning in 1992. Exploration was initially by surface trenching and pitting, followed by development of an exploration and bulk sampling cross cut. Brigade 217 did not complete any core drilling.

A variety of mining activities that have recently been undertaken within the project area include the following:

- In 1994, Brigade 217 developed a 130 m long underground exploration and bulk sampling crosscut in the north area of the deposit, and processed the ore by heap leaching (Photograph 1).
- Dredging of the alluvial deposits of Chang Shan Hao Creek, which drains the Chang Shan Hao valley from west to east, and that overlie portions of the mineralization, was apparently conducted on multiple occasions from the early 1990's.
- Extensive shallow surface workings were developed by unauthorized miners from the 1990's (Photograph 1), but these working are not currently active.
- In 2004, surface mining of portions of oxide mineralization in the Southwest area, and ore processing by heap leaching, was undertaken by Brigade 208, who has excavated pits in excess of 40 m deep in the Southwest area (Photograph 2). Brigade 208 has apparently conducted officially unauthorized surface mining of oxides in the Southwest zone intermittently since 1997. Leaching of the ore continues to the present time.
- In 2004, Jinshan authorized excavation of a bulk sampling and exploration Trial Pit in the Northeast area. Material excavated from this pit (Photograph 3) has been used for test leaching (Photograph 4). Excavation has provided good exposures of some important geological features.
- An exploration and bulk sampling decline developed at a gradient of 18° from August, 2004 through March, 2005 (Photograph 5) provided exposures and information on underground

support requirements for important geological units. The decline was developed to the 1575 m level at Section 10,200, at which level a 100 m crosscut was developed. The decline and cross cut provided bulk samples that are currently undergoing test leaching. The decline and cross cut are not currently accessible because ventilation and support is not being maintained, but it is providing the water supply for the test leaching.

Exploration has identified two major mineralized zones termed the Northeast and Southwest zones. Exploration at the CSH217 site by Jinshan has included diamond core drilling and surface sampling. To date, approximately 100 HQ-size coreholes have been drilled for a total of approximately 20,000 m of core. There has been no reverse circulation drilling. With the exception of condemnation and hydrogeological testing, exploration coreholes are generally inclined at approximately 45° to 60° to intersect the sub-vertical mineralization. Drilling is generally to the south because mineralization is interpreted to dip steeply to the north in the larger Northeast mineralized zone; only DDH 33, at the extreme southwest end of the Southwest zone, has been drilled to the north.

The mine grid system is aligned along the trend of the mineralization, with Mine North at 335°. Exploration coreholes are generally drilled at an azimuth of 155° in both the Northeast and Southwest mineralized zones. Magnetic declination at the site is approximately 2° East.

Of 101 numbered coreholes at the site, data from 90 coreholes are available after data from ten initial coreholes drilled by Southwest Pacific and of unknown reliability is excluded. One numbered corehole (Corehole 46) was not drilled. Details of available coreholes are provided in the chapter on Geological and Geotechnical Data.

NERIN (2003) used Minesight software to estimate a total resource for their design Northeast Pit of approximately 30 million tonnes (11.5 million tonnes of oxide and 18.6 million tonnes of sulfide) at a stripping ratio of 1.97:1 and containing a total of 26 tonnes of gold. They did not estimate a resource for the Southwest zone due to a lack of data.

Current published reserves stand at 83 millions tonnes at an average grade of 0.82 g/t of Indicated resource using a cutoff of 0.5 g/t, for a total of 2.2 million ounces, and an additional 1 million ounces of Inferred mineralization from 37 million tonnes at 0.89 g/t.

Preliminary pit designs prepared by John Nilsson of Nilsson Mine Services Ltd. have been used as a basis for developing preliminary pit slope design recommendations for this report, and for developing recommendations for additional geotechnical work.

2.0 SITE CONDITIONS AND PLANNED PIT DEVELOPMENT

Much of the following information is taken from Rossi and others (2005).

2.1 Topography

The site is located on the Inner Mongolia Plateau, a region characterized by sparsely vegetated, gently undulating terrain (Photograph 6) at elevations ranging from approximately 1550 m to 1750 m above sea level. The site elevation varies between approximately 1600 m and 1700 m.

Mineralization is located toward the bottom of the gently-sloped Chang Shan Hao valley that trends ENE in the vicinity of the Northeast mineralized zone, and approximately East-West in the vicinity of the Southwest mineralized zone. Bedrock is exposed at surface over much of the site. Alluvial deposits along the valley bottom do not exceed 4 m to 7 m in thickness (Blair, 2005).

2.2 Regional Geologic Setting

The CSH217 deposit is located within the North China Gold Belt in the central area of the Bayan Obo Depression near the northern margin of the North China Craton. Archean and Early Proterozoic gneisses, schists, and amphibolites that were deformed and metamorphosed around 1.8 Ga form basement rocks that crop out over about one third of the craton. Low grade metamorphosed Proterozoic quartzites, shales, and limestones plus unmetamorphosed Paleozoic rocks occur as accretionary complexes surrounding the basement rocks. Continental basinal coal-bearing Permian through Cretaceous sediments and subaerial volcanic rocks unconformably overlie the Proterozoic sequences in valleys adjacent to the uplifted Precambrian basement.

Gold mineralization at the CSH217 site is hosted by Middle to Upper Proterozoic metasedimentary rocks of the Bayan Obo Group, which is comprised predominantly of clastic sedimentary formations intercalated with carbonate-rich rocks, and includes sandstones, greywackes, and slates with dolomite and limestone.

2.3 Stratigraphy

Proterozoic carbonaceous metasedimentary rocks host the CSH217 gold mineralization in the south limb of the CSH syncline, which is one of the most prominent structural features in a major east-west trending belt of complex folding. Granitoid batholiths occur to the north and south of the property.

A geologic map of the 217 Gold Project site is included as Figure 2. Strata that crop out in the area of the site are the middle portion of the Bayan Obo Group. From the bottom up they are:

Jinshan Formation (Pt₂by^j) – black, carbonaceous slate, silty slate, andalusite hornfels, meta-siltstone, and arkose, with a small number of high-grade, gold-bearing quartz veinlets. Crops out in the west, north, and south of the site. The contact with overlying calcareous clastic rocks of the Halahougete Formation is gradational.

Halahougete Formation (Pt₂by^h) – thin- to medium-bedded dolomitic limestone, interbedded with chert, slate, silicified bands, and calcareous clastic rocks. Unmineralized. Sharp contact with overlying Birute Formation. Widely distributed at surface at site.

Birute Formation (Pt₂by^b) – carbonaceous meta-siltstone, carbonaceous phyllite, phyllite, and meta-sandstone. Crops out in the central portion of the site. Is divided into the following subunits from the oldest to the youngest:

b₁ – carbonaceous metasandstone

b₂ – carbonaceous phyllite, phyllite, and andalusite-staurolite-garnet schist, with inter-bedded meta-siltstone, meta-sandstone, and meta-basalt

b₃ – meta-siltstones, meta-sandstones, conglomerate, and sedimentary breccia

b₄ – calcareous and carbonaceous black phyllite and schist

Gold mineralization occurs predominantly in veinlets within the b₂ subunit of the Birute Formation. While no distinctive marker horizons have been identified in this unit, an Andalusite Schist horizon encountered in most coreholes has generally been taken as the base of ore-grade mineralization. Foliation that crosses bedding at a low angle is strongly developed within the phyllites of this unit. The foliation dips steeply, generally to the northwest in the Northeast zone and to the southeast in the

Southwest zone. A geological detail map of the project area showing major structures and drillhole locations is included as Figure 3.

Granitoid batholiths that crop out to the north and south of the metasediments were emplaced during the period 413 Ma to 205 Ma. Barren ultramafic to felsic dikes of diabase, lamprophyre, diorite, aplite, and pegmatite composition are present within the metasedimentary sequence. Pegmatite and some diorite bodies cut the bedding, while all lamprophyre and some diorite bodies are concordant with bedding. In the Northeast zone, an abundance of lamprophyre dikes in the hanging wall rocks above the mineralized zone decreases down the section to become sparse in the mineralized zones. Dike contacts are generally sharp with no evident alteration of the metasediments; texture varies from massive to foliated. Continuity is evident for up to hundreds of meters on surface, but can not generally be traced reliably down-dip from available core drilling. The concordant character of the lamprophyres suggests that they may be discontinuous flows and tuffs emplaced during deposition of the sediments.

2.4 Structure

Gold mineralization is hosted within a major southwesterly-trending ductile-brittle shear zone within the Proterozoic sediments. Whether the shear zone controlled original emplacement, or developed subsequently as a result of folding with movement taking place within the more fissile strata containing the gold mineralization, is uncertain. Current interpretation is that a ductile-brittle shear zone that cross-cuts the original bedding at about 10° controlled mineralization.

Important structures have been identified in association with the limits of mineralization. The origin and details of the character of these structures are still being evaluated, but the following description is based on a simplification of the currently favored interpretation that highlights implications for slope stability.

A major fault designated F1 is developed within the southwesterly-trending ductile-brittle shear zone. The F1 fault consists of three or four discrete fracture zones that are parallel to the mineralization in the Southwest mineralized zone (Photograph 7). In the Northeast mineralized zone the F1 fault includes a single primary shear zone that lies within the 0.2 g/t Au envelope, approximately bounds the southern (footwall) limit of the mineralized zone, and is generally traceable from section to

section and down-section in most coreholes. The F1 fault also includes two or three smaller brittle shears that do not appear to be continuous based on available core information. The F1 fault zone is thought to be contemporaneous with mineralization, and has no obvious displacement. F1 fault fracture zones are conspicuous in core due to their low RQD (Rock Quality Designation – a modified core recovery index in which only sound core recovered in lengths of 10 cm or greater is counted as recovery). There is no graphite in the F1 fault in the Southwest mineralized zone, and little if any in the Northeast mineralized zone.

A second recently-identified shear zone designated F2 that trends west-southwest and dips steeply to the southeast approximately bounds the northern (hanging wall) limit of mineralization in the Northeast mineralized zone. In the vicinity of the Northeast Pit, the fault is approximately 1 m to 2 m wide and cuts foliation where it is exposed at surface (Photograph 8); it is interpreted to dip at an average of about 75° to the southeast, but is somewhat irregular and wavy, with dips varying between 50° and 70° where it is exposed in the Trial Pit (Photograph 9). This is interpreted to be a post-mineralization strike-slip sinistral fault that offsets earlier structures and may have caused the separation of the Northeast and Southwest mineralized zones, as illustrated schematically in Figure 4. This interpretation suggests a horizontal displacement of approximately 300 m. The F2 fault lies to the south of the Southwest mineralized zone, and although its location is not known, it is not expected to be encountered in the Southwest Pit.

The major shear zones that bound mineralization have been designated graphitic in the Northeast mineralized zone, but are not graphitic in the Southwest mineralized zone. While graphite is apparently present throughout much of the carbonaceous phyllites, and is certainly present within the graphitic shear zones, the intensity of graphite in the surface exposures (Photograph 10) and core of the graphitic shear zones that we inspected was generally low, and much less than we have observed in graphitic shear zones at some other properties.

Foliation is strongly developed within the phyllites and schists in the mineralized zones that lie between the bounding F1 and F2 faults in the Northeast mineralized zone. Foliation dips steeply to the north in the Northeast Zone, and steeply to the south in the Southwest Zone. In surface exposures and core of oxidized rock the phyllites and schist are highly fissile along the foliation, with fractures developed every few cm to tens of cm. Near-surface foliation is commonly deformed by gravity-driven downslope deformations (Photograph 11) resulting in flatter dips. A strongly-developed

fracture system along the foliation is expected throughout the oxidized zone. The fresh phyllites and schists appear to be more massive based on observations of the core and in the exploration cross-cut. Foliation is present throughout these units, and the core splits preferentially along the foliation, but the frequency of natural fractures developed along the foliation is much lower than in the oxidized rock.

Gold mineralization occurs in thin veinlets and stringers of sulfide and quartz-sulfide that are concordant with bedding and foliation and trend along the shear zone, and therefore is steeply dipping. Mapping and drilling has documented the mineralized stratigraphy over a continuous strike length of 4.6 km. Mineralized zones reach a maximum thickness of 150 m in the Northeast zone, and have been drilled to a maximum depth of 260 m. Mineralization is open at depth.

2.5 Alteration

Hydrothermal alteration of the host rocks is weak, with only chlorite and silica alteration recorded on drill logs. The host sediments are moderately to strongly sericitized and andalusite crystals are prominently developed in the footwall Andalusite Schist, which is locally weakly mineralized. Vein contacts are sharp with no alteration selvage in the host rocks. There is no significant clay alteration.

Oxidation depths are variable. A typical oxidation depth is about 40 m, although locally the depth of oxidation may be less than 25 m or greater than 60 m.

2.6 Hydrogeology

Little is known about the hydrogeology in the immediate areas of the pits. Current groundwater levels and hydraulic conductivities of bedrock units in the pit areas have not been documented or investigated.

2.7 Planned Pit Development

Preliminary pit designs have been developed by John Nilsson to support pre-feasibility level design studies. Various pit designs have been developed for mining alternatives such as oxide pits and run-of-mine pits, but the pit designs used for this current study correspond to a three-stage crushing and

leaching operation of oxide and primary ore for the Northeast mineralization (“843” Design), since this alternative maximizes the reserves and the pit depths, and run-of-mine pits (“841” Design) for the Southwest mineralization. These pits, as shown in Figure 5, represent the current best information for estimating pit limits and depths. They have been used in conjunction with the geologic model to estimate the distribution of geologic units and the extent of exploration core drilling in the pit walls.

The Northeast mineralized zone would be mined by a single Northeast Pit. The Southwest mineralized zone could be mined by as many three smaller, shallower pits (“West 1”, “West 2” and “Far West”) that are close together and may merge into a single pit depending on operation economics. The pits are aligned along the sub-vertical mineralization, and are relatively long and narrow. They have been designed assuming 48° inter-ramp angles for the north slopes, and 46° inter-ramp angles for the south slopes. The Northeast “843” Pit is approximately 1,500 m long, a maximum of over 500 m wide, and has a maximum depth of approximately 200 m. The Southwest “841” Pits do not exceed approximately 500 m in length and 250 m in width, with a maximum indicated depth of 65 m. Because the mineralization dips steeply, we expect that pit economics will be sensitive to the design pit slope angles, particularly for the deeper Northeast Pit.

3.0 GEOLOGICAL AND GEOTECHNICAL DATA

In general, the quantity and quality of geotechnical data available to support this pre-feasibility study are excellent, and in our experience are superior to the amount of geotechnical information that is commonly collected on mining projects at this stage of development.

Exploration core drilling performed on the site to date is summarized in the following table.

EXPLORATION CORE DRILLING SUMMARY				
Corehole Numbers	Drilled By	Year Drilled	Length (m)	Comments
1-10	Southwestern/ Global Pacific JV	1999	2797	Widely-spaced coreholes; data not used by Jinshan or for geotechnical evaluation because reliability unknown
11-33	Pacific Minerals Inc.	2002	4997	Core drilling by predecessor of Jinshan
34-66	Pacific Minerals Inc.	2003	6056	Corehole 46 not drilled. All Core Consumed from Metallurgical Corehole 57.
67-101	Jinshan G M Inc.	2004	6598	

Of 101 numbered coreholes, data from 90 coreholes are available. Data from 10 coreholes of unknown reliability (Coreholes 1-10) were excluded. Corehole 46 was not drilled. Metallurgical Corehole 57 is excluded from the geotechnical database because details of the drillhole location could not be found. Corehole collar coordinates, lengths, and orientations are listed in Appendix A-1. Downhole survey results are listed in Appendix A-2.

Multiple coordinate systems that are not transformable by linear transforms have been used at the project. This has complicated the precise transformation of some older data into the current coordinate system. For this reason, some of the location data incorporated into this report may not be exact. For example, pit plans and sections developed using the current coordinate system have been transposed approximately onto geological plans and sections developed using an older coordinate system. However, accuracy of these approximate transpositions is considered adequate for the current purpose of a pre-feasibility evaluation.

3.1 Geological Database

3.1.1 Surface Mapping

Surface mapping of lithology and major structures by Jinshan personnel has supplemented Brigade 217 mapping to produce the detailed geologic map attached as Figure 3. Surface mapping has not included detailed evaluation of variations in foliation orientations, although the general orientations of the foliation at surface is interpreted to be steeply dipping to the northwest in the Northeast zone, and generally steeply dipping to the southeast in the Southwest zone.

3.1.2 Core Logging

The geologic database includes detailed lithologies and geotechnical logs for coreholes 11 through 101. Core photographs available for Corehole 11 and for Coreholes 34 through 101 enable verification of the fracture index in the geologic logs. Core is cut with a diamond saw to provide samples for assaying. The half core retained on site enables a general assessment of rock quality to supplement core logs.

3.1.3 Drift Mapping and Performance

Mapping data of the exploration and bulk sampling crosscut include lithologies and structural orientations. We understand that the decline and crosscut did not require systematic support except through fault zones, where the ground was broken and weak and groundwater inflows were encountered.

3.1.4 Geologic Sections

Geologic sections developed by Jinshan personnel on 50 m centers showing lithologies along corehole traces, interpreted mineralized envelopes, and locations of major shear zones are included in Appendix C-1. Geotechnical sections developed from the geologic sections by Jinshan personnel that show the RQD plotted along the corehole traces and the locations of the pit shells are included in Appendix C-2.

3.2 Geotechnical Database

3.2.1 Fracture Data

Geotechnical logging includes for each core run measurements of core recovery, RQD, the longest piece of core, and the number of pieces of core. These measurements are available for Coreholes DDH-11 through DDH-101 and comprise a valuable database for evaluating the absolute and relative degrees of fracturing. In general, the database appears reasonable, after cleanup of a few apparent errors and duplications.

The RQD database was used to develop a estimate of rock quality for oxide and sulfide zones. The base of the oxide zone was taken as the bottom of reasonably continuous oxidation, usually corresponding with the start of reasonably continuous sulfides, on the “simple logs” spreadsheet. This may not correspond to the lowest level of oxidation, since oxidation may be carried deeper down structures, but is considered to provide a reasonable estimate of the extent of the major effects of oxidation on the general mechanical characteristics of the rock.

Weighted average RQD's calculated for the oxide and sulphide zones of each corehole are listed in Table 1. Weighted average RQD's for the entire property and for each zone of the deposit are as follows:

WEIGHTED AVERAGE RQD'S		
Region	Oxide	Sulphide
Entire Deposit	31.9	64.3
Northeast Zone	36.1	65.4
Southwest Zone	21.4	61.9

Photographs of typical oxide core and sulphide core are included as Photographs 12 and 13, respectively.

3.2.2 Oriented Core Data

Core orientation by the Spear method has been used to measure true orientations of core fractures and structures in most coreholes since DDH-11. Core was set in a goniometer to the nominal drillhole orientation and orientations measured with a compass. We understand that orientation measurements were corrected for drillhole deviations as measured by downhole surveys by aligning the goniometer with the drillhole orientation measured by the nearest downhole survey. The database includes 1920 measurements of structural orientations from 76 coreholes.

Structures measured include the following, where the boundary between the Northeast mineralization and the Southwest mineralization has been taken at Section 354,700E:

NUMBER OF STRUCTURES MEASURED IN ORIENTED CORE				
STRUCTURE	SYMBOL	NORTHEAST	SOUTHWEST	TOTAL
Bedding	S0	322	117	439
Foliation	S1	838	178	1,016
Quartz Veinlet	Q	313	30	343
Pyrite Veinlet	F	60	24	84
Dike Contact	C	29	9	38
TOTAL		1,562	358	1,920

Stereoplots of structural measurements for each structure type in the Northeast and Southwest zones are included in Appendix B-1. The structural database is included in Appendix B-2. Fractures other than bedding and foliation fractures were not always recorded, so these data may not be an accurate statistical representation of all fracture systems present.

Stereoplots of the combined structural orientation data from oriented core for the Northeast zone is shown as Figure 6, and for the Southwest zone as Figure 7. The dominance of steeply-dipping foliation, and the general similarity of structural conditions in these two zones, is evident from these plots.

3.2.3 Exploration and Bulk Sampling Drift Mapping Data

A total of 67 structural orientation measurements were recorded from the sidewalls of the bulk sampling and exploration crosscut, which was excavated in the Northeast mineralized zone. No information beyond the location and orientation of the structures was included on the maps. Stereoplots of structural mapping are plotted as Figure 8. The dominance of steeply-dipping foliation-parallel structures, and the general similarity with the stereoplots of oriented core data, is evident from this plot.

3.2.4 Strength Testing

Strength testing performed by Baogang Institute Laboratory on 33 samples of fresh and oxidized ore and waste is summarized in Table 3. Compressive strength tests are particularly important for slope stability. Average compressive strengths and International Society for Rock Mechanics (ISRM) strength classifications (Table 2) for important geotechnical units are as follows:

SUMMARY OF COMPRESSIVE STRENGTH TEST RESULTS				
Rock Type	Sample Type	Mean Compressive Strength (MPa)	Std. Dev. Compressive Strength (MPa)	ISRM Strength Classification
Diorite	Weathered Waste	38.6	11.6	R3
Lamprophyre	Weathered Waste	106.0	32.4	R5
Meta-sandstone	Weathered Waste	67.8	19.4	R4
Slate	Weathered Ore	36.2	4.6	R3
Phyllite	Weathered Ore	30.2	1.6	R3
Mica Schist	Fresh Waste	40.5	3.7	R3
Meta-sandstone	Fresh Waste	82.6	44.8	R4
Lamprophyre	Fresh Waste	66.2	16.7	R4
Slate	Fresh Ore	94.8	21.4	R4
Andalusite Schist	Fresh Ore	63.2	17.3	R4
Phyllite	Fresh Ore	47.1	13.6	R3

Laboratory testing indicates that Fresh rock is generally Strong (R4) to Medium Strong (R3), while the Weathered rock is generally Medium Strong (R3) to Strong (R4).

3.2.5 General Evaluation of Geotechnical Data

Our review of representative core suggests that there is little difference between the mechanical characteristics of the Phyllite and the Andalusite Schist; the distinction between these units appears based primarily on the presence of andalusite crystals, and not on any marked difference in strength or structural characteristics. The units do not appear to differ significantly geotechnically.

The F1 Fault Zone and the F2 Fault are major, continuous structures characterized by fracturing and shearing. They generally dip steeply. No significant low-angle structures have been identified.

Foliation is well-developed and dips steeply throughout the mineralized zones. Foliation generally dips steeply northwest in the Northeast zone, and steeply southeast in the Southwest zone, but appears to be vertical locally. Limited drill core and surface observations northwest of the Northeast zone indicates that foliation development is present to the expected limits of the pit; rock quality is thought to improve to the north of F2, but this has not been supported by detailed documentation. Little is known about the lithologies or structure that will be present in the footwall (southeast) slope of the Northeast Pit to the south of the Andalusite Schist.

The oxide zone is characterized by reduced compressive strengths and increased fracture intensity relative to the sulphide zone. Structural orientations appear similar in both these zones.

4.0 GEOTECHNICAL MODEL AND STABILITY EVALUATION

4.1 Preliminary Geotechnical Model

4.1.1 Geotechnical Units

The oxidation zone is well defined in the geologic model. It is evident from surface observations and core that the phyllite is highly fissile along the foliation in the zone of oxidation. The degree to which the fresh phyllite is fissile is less well defined. The foliation still clearly represents the major systematic plane of weakness in the fresh phyllite, as evidenced by the strong tendency for core of fresh phyllite to split along the foliation when the core is split by diamond sawing. However, block samples sawn from the walls of the exploration and bulk sampling crosscut appear massive and high strength with little evidence that they are fissile (Photograph 14), although these samples are undoubtedly biased towards the more massive samples that can withstand sampling and still maintain their integrity. Photographs of un-split (Photograph 13) core suggest that while the fresh rock is fissile along foliation, it is generally competent and relatively massive with a low natural fracture frequency beyond fracture and fault zones.

Current information indicates that there is little difference in the mechanical characteristics of the rock in the mineralized package based on lithology. Intensity of oxidation is the primary factor in determining the degree of fracturing, fissility, and strength of the geologic units. Little information is available on the character of the footwall (southeast wall) rocks in the Northeast zone because drilling is generally to the Southeast and is terminated within the Andalusite Schist inside the pit limits. More information is available from the Hanging wall (northwest wall) rocks, where the coreholes are drilled parallel to the slope, although most drillholes near the highest slopes are within the pit limit.

For current purposes, the rocks can be divided into the following geotechnical units:

- Oxide Foliated Rock
- Fresh Foliated Rocks
- Faults and Fractured Zones

Drilling and surface mapping has not characterized any non-foliated rocks (such as sandstones or limestones) that will be present in the pit slopes, although this may simply reflect the limited surface exposures and drilling information from the vicinity of the southeast slope of the Northeast Pit. However, for current purposes, all rocks that will be exposed in the pit slopes will be assumed to be foliated along the structural trends defined by oriented core drilling and drift mapping.

4.1.2 Rock Quality Evaluation

Oxide zones have typical RQD's in the range of 20 to 35, which corresponds to Very Poor to Poor rock quality (Table 2), while RQD's are typically in the mid 60's for the sulphide zones, corresponding to Fair quality rock.

Inspection of selected core on site and selected core photographs (Photographs 12 and 13) support this interpretation. Sulphide zone rock is commonly very good quality rock between intermittent zones of fracturing and faulting of limited thickness where the RQD is low.

To the north of the F2 fault, rock quality is thought to generally improve in the oxidized zone with distance from the strongly foliated mineralized zone. The slate exposed some 30 m north and west of the main Trial Pit excavation was moderately strong and competent (Photograph 15). The north pit limit is expected to be approximately 150 m north of the F2 Fault.

In the Northeast zone, geological interpretations at the time of the exploration drilling did not anticipate significant mineralization in the footwall of the Andalusite Schist, and consequently drilling was generally stopped prior to penetrating the footwall rocks below the Andalusite Schist. However, much of the footwall pit slope will be developed below the footwall of the Andalusite Schist, and may encounter Sandstone and Limestone that have not currently been characterized. Surface exposures of these units are poor due to alluvial cover and surficial weathering between dikes. There is therefore little information on the character of the rock in which the footwall slope will be developed.

4.1.3 Structural Evaluation

4.1.3.1 *Oriented Core Data*

Data from oriented coreholes are generally consistent with the structural interpretation developed from surface mapping. Structural data from mapping of the exploration and bulk sampling crosscut is also consistent with the oriented coring structural data. The consistency of the oriented core data, and its compatibility with the site structural model and the drift mapping data, indicates that the oriented coring program has produced reliable data.

Because the structural model includes a small change in foliation orientation between the Northeast and Southwest mineralized zones, oriented core structural data have been separated into data east and west of Section 354,700E.

The most prominent discontinuities logged in all core data are foliation (S1), followed by bedding (S0). Contoured stereoplots of orientations of each type of structure documented are presented in Appendix B-1; mean orientations of each of these structural sets measured as the peak of Fisher distributions fitted to the data are summarized in the following table:

MEAN ORIENTATIONS OF STRUCTURES MEASURED IN ORIENTED CORE									
STRUCTURE	SYMBOL	NORTHEAST				SOUTHWEST			
		No. Of Poles	Peak Conc. (%)	Mean Dip (°)	Mean Dip Dirn. (°)	No. Of Poles	Peak Conc. (%)	Mean Dip (°)	Mean Dip Dirn. (°)
Bedding	S0	322	23.4	89	334	117	41.3	87	157
Foliation	S1	838	23.9	84	330	178	35.1	87	157
Quartz Veinlet	Q	313	25.3	83	333	30	62.0	89	341
Pyrite Veinlet	F	60	21.4	77	329	24	47.3	88	166
Dike Contact	C	29	32.2	85	163	9	42.5	89	146

All structures are closely aligned to the foliation, and no significant secondary structural orientations are apparent in any of the data sets. Although some secondary structures will be encountered at other orientations, the oriented core data provide strong evidence of the pervasive and prominent effects of the foliation structures throughout the cored zones.

Figures 6 and 7 are stereoplots of the structural data measured from oriented coreholes in the Northeast and Southwest zones, respectively. All structures are steeply-dipping, with the structures in the Northeast zone generally dipping steeply to the northwest, while structures in the Southwest zone generally dip steeply to the southeast.

4.1.3.2 Drift Mapping Data

The contoured stereoplot of the drift mapping data (Figure 8) shows a maximum concentration of contoured poles of 51.2 % with a dip/dip direction of 86/328. This corresponds closely to the foliation/bedding orientation documented from oriented core in the Northeast mineralized zone where the drift was developed.

No secondary concentrations are evident on the contour plot, in part because the very high concentration of orientations results in a high minimum contour interval of 5.5%, which would require at least three poles to fall within a 1% area of the net to meet minimum contouring requirements. Inspection of the pole plot (Figure 8) indicates a weak secondary structural set dipping at moderate to steep angles of 50° to 70° to the southeast, possibly associated with the F2 fault.

4.2 Stability of Existing Pit Slopes

Slopes developed in the existing Brigade 208 Pits in the Southwest mineralized zones show consistent patterns. These oxide pits illustrate the importance of structural control and operating practices on bench-scale stability. Footwall (north) slopes are generally developed at steep angles along foliation without benching for heights of up to an estimated 30 m (Photograph 2). These footwall slopes generally appear to be relatively stable, with no indication of large-scale instability, and little indication of rockfall hazard (Photograph 16 and 17).

Hanging wall (south) slopes are generally developed at flatter angles in benched configurations. While the slope appears to be stable overall, bench-scale stability conditions are almost universally poor due to unstable bench conditions that result from a combination of the structural conditions and blasting and excavation practices. Where catch benches have been left to mitigate rockfall hazards to an acceptable degree, the resulting overall slope angles are relatively flat (Photograph 18). Where catch benches have not been developed (Photograph 19), rockfall hazards are severe and are unacceptable by North American standards. Hanging wall stability only improves at the westernmost (B28) of the Brigade 208 Pits, where the foliation appears to be vertical (Photograph 20) rather than dipping steeply into the south slopes, as it is elsewhere in these pits.

With the exception of the westernmost (B28) pit, where the foliation appears to dip vertically, the performance of the hanging wall (south) is generally consistently poor, while the performance of the footwall (north) slopes of the Brigade 208 Pits is consistently good. However, there are several unresolved issues regarding slope performance. First, the foliation dip in the footwall slopes is generally flatter than the dip indicated from oriented core drilling. Second, pit mapping is not detailed, so it is uncertain to what extent other factors beyond fracture development associated with foliation may be affecting the performance of the hanging wall slopes. For example, it is uncertain to what degree the slopes may be developed within siltstone, sandstone, quartzite, or limestone of the Halahougete Formation that may have been affected by the intrusive body to the south. Regardless of the origin of the poor stability conditions of these south slopes, it is evident that unfavorable geotechnical conditions are to be expected, and that a better understanding of the cause and extent of these unfavorable conditions should be developed to support feasibility-level pit slope designs.

4.3 Predicted Bench Stability in Future Pits

We expect that the phyllite will be highly fissile in the oxide zone, where it will be highly susceptible to blast damage opening fractures and loosening the rock mass to create unstable bench faces. It will be difficult to develop clean, stable bench faces at the blasting trim line due to the open fractures along foliation. It will likely be relatively easy to scale footwall bench faces back to continuous foliation surfaces even behind the perimeter blasting line, and care will be necessary to avoid over-excavating and undercutting the bench face, but with light blasting and careful scaling it should be possible to develop stable bench faces along the foliation. Developing stable bench faces in the oxide

hanging wall slopes will be difficult, and stability will be extremely sensitive to over-blasting. Careful trim blasting with thorough but careful scaling will be required to maximize stable bench face angles.

Although existing exposures are limited, hanging wall conditions are indicated to be variable. Rock quality of the hanging wall (south) slopes in the Brigade 208 Pits in the Southwest area generally appears to be less favorable than the conditions exposed in the hanging wall (north) slope of the Trial Pit in the Northeast area.

On balance, we expect that fresh phyllite and other foliated fresh rocks will also tend to split along foliation, but because they will have fewer open fractures and generally be less fissile than the oxide rock, there will be better potential to develop and define the bench faces with the perimeter blasting. The indicated high rock quality suggests that pre-split blasting should be effective in the relatively massive fresh rock. Pre-split holes drilled parallel to the foliation on the footwall should produce a clean face along foliation. Pre-split holes drilled vertically on the hanging wall will minimize the damage and the development of fractures along foliation, which will minimize the development of toppling and rockfall.

4.4 Large-Scale Slope Stability

The high rock strengths and moderate to low degree of fracturing should preclude development of rock mass failures for the slope heights planned at the CSH217 project. The potential for large-scale rock slope failures would be limited to failures controlled by large structures. Known structures are steeply-dipping and would not undercut or control the stability of large slopes. The risk of large-scale slope failures appears low based on current information.

4.5 Conclusions Related to Slope Stability

Our important conclusions related to pit slope stability include the following:

- Well-developed foliation is the predominant structural that will control bench stability
- Expected bench-scale failure mechanisms are planar sliding in the footwall slopes, and toppling in the hanging wall slopes

- Both potential planar slab failures in the footwall and potential toppling failures in the hanging wall will be sensitive to the presence of groundwater pressures and the effects of blast damage, particularly in the oxide zone
- Since bench stability will be sensitive to blasting and excavation practices, careful controlled blasting and bench scaling at the pit limit will be essential for maximizing stable bench face angles and inter-ramp slopes
- Major faults that limit mineralization and that will be exposed in the pit slopes dip steeply and therefore should not control overall slope stability, although they could control bench stability and potentially stability of multiple benches locally
- Risks of large-scale slope failures appear to be low

5.0 PRELIMINARY SLOPE DESIGN RECOMMENDATIONS

5.1 Geological Assumptions

Our pre-feasibility level pit slope design recommendations have been developed based on the geotechnical model and stability evaluation described in the preceding chapter. Important elements of that model for slope design and performance include:

- There are no known major structures that will control large-scale (multi-bench) stability of the pit slopes – known faults are of limited width and generally dip steeply so that their influence on stability will be limited to one or two benches where the slope is aligned with the fault, else to a few meters of bench width where the fault strikes into the slope
- The rock is moderate to high strength and is lightly fractured (sulphide rock) to moderately fractured (oxide rock) except for intermittent and generally widely-spaced fault and fracture zones; there are no extensive or continuous zones of weak rock that could affect large-scale slope stability
- Foliation is pervasive within the mineralized zones and is the only systematic structure identified that will control bench stability throughout the pits
- Foliation generally dips steeply to the northwest in the Northeast zone, and steeply to the southeast in the Southwest zone
- Geological data from beyond the mineralized zones is sparse, but since surface observations suggest that the general structural trends continue beyond the mineralized zones, for purposes of this evaluation, it will be assumed that the structural conditions defined by oriented core drilling and underground drift mapping extend to the vicinity of the ultimate pit slopes
- Groundwater pressures will be controlled as necessary to ensure the stability of benches

5.2 Operating Assumptions

5.2.1 Standard of Care

We assume that the pits will be designed and operated to North American standards of safety. This requires development of stable bench faces where any operations are to be performed below the benches, and development of effective catch benches above the production levels. Some North American jurisdictions do not specify maximum distances between effective catch benches, while jurisdictions that do specify maximum distances are frequently prepared to increase the nominal maximum provided that the increased distances can be shown to meet an acceptable level of stability based on geological conditions and operating practices.

5.2.2 Operating Bench Heights and Slope Design Criteria

We initially assumed that the production bench height in waste rock would be 12 m in accordance with customary Chinese practices, even if grade control requirements dictate use of 6 m benches in ore. Subsequently, it was decided that a 6 m production bench height would probably be used in both ore and waste rock. Slope design recommendations are provided for both production bench heights. Design slope angles will be defined by the design catch bench (“berm”) width, the distance between catch benches, and the design bench face angle or “batter” (Figure 9).

5.2.3 Perimeter Blasting

Development of steep, stable bench faces in the footwall slopes, and therefore the potential for maximizing pit slope angles, will require effective perimeter blasting. At a minimum, effective trim blasting should be expected for all pit slopes. However, we expect that pre-split blasting may be effective for all footwall slopes where bench faces are developed along the foliation, and for hanging wall and end wall slopes if the fresh phyllites are relatively massive when fresh. We do not expect that pre-split blasting would be effective in the hanging wall or end wall rocks in the oxidized zones that are characterized by closely-spaced open fractures along the foliation.

Where foliation dips are more than a few degrees from vertical, we expect that the best results from perimeter blasting for the footwall slopes will be achieved by inclining the perimeter blastholes along

the foliation. Therefore, if Jinshan wishes to maintain the potential to optimize slopes by implementing superior blasting practices that maximize stable bench face angles, production drills that can drill blastholes along the dip of the foliation (flattest inclination estimated to be approximately 70°) should be specified for perimeter blasthole drilling. These drills should be configured so that they can drill underneath themselves so that blastholes can be collared immediately at the toe of the overlying bench.

If it is practical, perimeter blasthole drills should be capable of drilling to a double bench height (12 m or 24 m) to facilitate implementation of a double bench pre-split of the footwall benches. This could only be implemented for the 12 m production bench height if the geological conditions are uniform and favorable, and the quality of drilling and blasting practices is superior, but should be readily achievable for the 6 m production bench height. Having the capability to implement this approach would ensure that the slope design can be optimized using this approach if conditions warrant.

The benefits of a double height footwall pre-split with 12 m production bench heights is likely to be relatively small compared to the results that can be achieved with drilling single bench heights, provided the second bench can be collared close to the toe of the first bench. However, for 6 m production bench heights, a double height (12 m) pre-split could substantially facilitate the safe development of steep slopes. A 12 m pre-split of the upper two benches would eliminate the ledge that commonly develops between lifts and that can increase the risks of rockfall during drilling and loading operations on lower benches. Every effort should be made to implement a double height pre-split if a 6 m production bench height is used.

Effective perimeter blasting results in increased drilling and blasting costs (due to the additional drilling and explosives required) and additional capital cost (due to the additional blasthole drilling capacity required). The benefits achieved from these increased costs include steeper stable slopes and safer working conditions. Preliminary perimeter blasting designs developed in support of the final feasibility study, together with estimates of the potential increase in safe slope angles that will result from the perimeter blasting, should be used as a basis for estimating drilling capacity requirements, and for an initial pit economic analyses.

5.3 Slopes in Alluvium

We understand that alluvium at the pit crest will not exceed approximately 7 m in thickness. Alluvium slopes should be excavated at 2(H):1(V), and a 6 m wide catch bench should be developed at the base of the alluvium. This will prevent any raveling or slumping or other failure of the alluvium from impacting operations, and will provide access for cleanup of any failures. Development of groundwater pressures or flows within the excavated alluvium at the pit crest should be prevented, else the alluvium should be stabilized by other means such as buttressing.

5.4 First Bench in Oxide Bedrock

Because of the effects of weathering and the rolling in the foliation caused by near-surface down-slope gravity movements, we recommend limiting the height of the first bench in oxide bedrock to 12 m, and constructing a 7 m wide catch bench at the toe of the first bench at all locations.

5.5 Footwall Slopes

Footwall slopes in foliated rocks below the first bench should be designed with bench face angles (batters) developed along the foliation using a double bench configuration (24 m between catch benches or “berms”) for 12 m production benches, or a triple bench configuration (18 m between catch benches) for 6 m production bench heights.

The ability to develop stable bench face angles that correspond with the foliation dip will depend on equipment and operating practices. Back-break due to over-blasting, or development of mid-bench ledges as a result of a step-out for drill setup, or failure to break a clean toe, will reduce the effective bench face angle. In view of these uncertainties, and the range of foliation dips evident in the available data, we recommend assuming a design bench face angle of 75° for current purposes. This implies good blasting and excavation practices, but should be achievable by competent and experienced contractors or miners with careful perimeter blasting.

Standard design catch bench widths of 9.4 m for 24 m bench heights would result in design inter-ramp slope angles in excess of 55°; we recommend assuming a 55° inter-ramp slope angle for pre-feasibility purposes, with a design catch bench width of 10.3 m. This design bench configuration

(Figure 10) will provide some flexibility for variable geological conditions or for unanticipated problems with operating practices. A design catch bench width of 8.0 m (slightly less than the standard design catch bench width of 8.2 m) for a 6 m triple bench (18 m between catch benches) results in a design inter-ramp slope angle of approximately 55° (Figure 10); we recommend assuming this design configuration if for 6 m production benches.

5.6 Hanging Wall Slopes

Hanging wall slopes should be single benched for 12 m production benches, or double benched for 6 m production benches, using perimeter blasting techniques comprising vertical trim blasting in the oxide and a vertical pre-split in the fresh rock. Because of the effects of fracturing and foliation, we do not expect that this will result in vertical bench faces. For preliminary planning purposes, we assume that this will enable development of stable bench faces with bench face angles of approximately 65° in the oxide rock, and approximately 70° in the fresh rock. Standard catch bench widths of 7.0 m will result in design inter-ramp slope angles of 44° in the oxide and 47° in fresh rock (Figure 11).

Indicated geological variability between hanging wall slope conditions in oxide rock in the Northeast and Southwest areas indicates that there is likely to be a relatively high degree of variability in hanging wall slope performance. Additional evaluations and analyses in support of feasibility-level slope designs should enable some refinement in predicted slope performance. Substantially better geotechnical conditions than are currently indicated would be required to justify significantly steeper hanging wall slope designs in oxide rock.

5.7 End Wall Slopes

End wall slopes in oxide rock should initially be designed at the same configuration as the hanging wall slopes in oxide rock. In fresh rock, we expect that double bench configurations for 12 m production benches, or triple bench configurations for 6 m production bench heights, should be feasible if suitable blasting and excavation practices are implemented. We recommend assuming a 55 degree inter-ramp slope angle in fresh rock, similar to the footwall design, for pre-feasibility purposes.

5.8 Summary of Preliminary Pit Slope Design Recommendations

Recommended pre-feasibility level slope designs are as follows:

SUMMARY OF SLOPE DESIGN RECOMMENDATIONS			
Unit	Location	Blasting and Excavation Practices	Design Inter-Ramp Slope Angle (°)
Alluvium	Pit Crest	▪ Free dig ▪ Height not to exceed 10m ▪ Construct Catch Bench on Top of Bedrock	2(H):1(V)
Oxide Rock	First Bench, All Slopes	▪ Pre-split Footwall; Trim Blast Other Slopes ▪ 12 m Single Bench; or ▪ 2 x 6m (12 m) Double Bench ▪ 7 m Catch Bench	
Oxide Rock	Footwall	▪ Inclined Pre-split ▪ 24 m (2 x 12 m) Double Bench; or ▪ 18 m (3 x 6 m) Triple Bench	55
Oxide Rock	Hanging Wall	▪ Vertical Trim Blast ▪ 12 m Single Bench; or ▪ 2 x 6 m (12 m) Double Bench	44
Oxide Rock	End Walls	▪ Vertical Trim Blast ▪ 12 m Single Bench; or ▪ 2 x 6 m (12 m) Double Bench	44
Sulphide Rock	Footwall	▪ Inclined Pre-split	55
Sulphide Rock	Hanging Wall	▪ Vertical Pre-split	47
Sulphide Rock	End Walls	▪ Vertical Pre-split	55

Recommended pre-feasibility level pit slope design configurations are as follows:

SUMMARY OF RECOMMENDED DESIGN BENCH CONFIGURATIONS IN BEDROCK						
Unit	Blasting Practices	Bench Face ("Batter") Angle (BFA - °)	Bench Confign.	Bench Height (m)	Catch Bench ("Berm") Width (m)	Inter-Ramp Angle (IRA - °)
Oxidized Footwall	Inclined Pre-Split	75	Double 12 m	24	10.3	55
			Or Triple 6 m	18	8.0	55
Oxidized Hanging Wall and End Walls	Vertical Trim Blast	65	Single 12 m	12	7.0	44
			Or Double 6 m	12	7.0	44
Fresh Footwall	Inclined Pre-Split	75	Double 12 m	24	10.3	55
			Or Triple 6 m	18	8.0	55
Fresh End Walls	Vertical Pre-Split	75	Double 12 m	24	10.3	55
			Or Triple 6 m	18	8.0	55
Fresh Hanging Wall	Vertical Pre-Split	70	Single 12 m	12	7.0	47
			Or Double 6 m	12	7.0	47

5.9 Risks and Opportunities for Pit Slopes

5.9.1 Risks

The primary risks to being able to achieve the recommended pit slope design configurations are geological uncertainty, and poor blasting and excavation practices.

Geologic risks primarily relate to the character of the footwall units below the Andalusite Schist, and the variability in the foliation dips. These uncertainties can be reduced by additional investigation and characterization of the footwall conditions, and detailed evaluation of the existing structural database on foliation orientation.

Hanging wall and end wall performance will be particularly sensitive to poor blasting and exploration practices, although even the favorable stability conditions expected in the footwall slopes could be compromised by poor blasting and excavation practices. Triple benching is more difficult to implement safely than double benching, and care will be necessary to ensure safe working conditions

while drilling and loading the third lift. A double height (12 m) pre-split should be implemented to mitigate this potential hazard.

The F2 fault, and potentially associated structures, is interpreted to dip steeply at an average of about 75°. Yet where it is exposed in the Trial Pit, the dip is flatter, between about 50° and 70°. If this flatter dip is in fact characteristic of the fault at depth, it could control stability of portions of the Hanging wall slope of the Northeast Pit.

The presence of significant groundwater pressures in the immediate vicinity of the pit slopes would substantially increase the risk of bench-scale failure that could progress to larger failures. The presence of groundwater in the alluvium at the pit crest would result in a high risk of instability of the alluvium.

5.9.2 Opportunities

Opportunities to steepen pit slopes will depend largely on confirming the favorable conditions assumed for this stability evaluation, and implementing superior operating practices that will enable steepening of bench face angles and/or reducing catch bench widths.

Surface observations suggest that geological conditions of the oxide zone Hanging wall (north) slope of the Northeast Pit may be more favorable than conditions observed in the existing Brigade 208 Pits. If this can be demonstrated by mapping and detailed core evaluations, it may be feasible to increase the design slope angle for that slope.

There is some potential to increase the hanging wall slope in fresh rock by double or triple benching, but only if the fresh rock is so massive and the perimeter pre-split blasting and scaling practices are so superior that opening of foliation fractures is prevented. Alternatively, if the foliation dip becomes vertical, as it does at the west end of the Brigade 208 B28 West Pit (Photograph 20), then the structural conditions will be similar on both the footwall and hanging wall sides of the pit, and similar steep slope designs could be implemented.

Inter-ramp slope angles in excess of 55° may be feasible if highly favorable geotechnical conditions are encountered and documented (such a vertical foliation), and excellent operating practices are

implemented to produce superior pre-split blasting results. However, it is not generally appropriate to incorporate such optimistic assumptions into pre-feasibility or feasibility-level studies or slope designs until they can be demonstrated as viable based on field performance.

6.0 RECOMMENDATIONS FOR GEOTECHNICAL PROGRAM TO SUPPORT FEASIBILITY-LEVEL PIT SLOPE DESIGNS

The geotechnical program to support feasibility-level pit slope designs should focus on the Northeast Pit, since slope heights in this pit are substantially greater than slope heights in the Southwest Pits.

6.1 Completion of Transformation of Coordinate System

All data should be converted into a uniform coordinate system to ensure the reliable, consistent, and accurate preparation of all plans and sections.

6.2 Distribution and Character of Geotechnical Units in Ultimate Pit Slopes

The distribution of geological and geotechnical units in the vicinity of the pit slopes should be defined based on surface mapping and core drilling. Because of better surface exposures and more coreholes that are in the vicinity of the Hanging wall (northwest) pit slope, core drilling should concentrate on identifying and characterizing the geotechnical units and structure in the Footwall (southeast) slope of the Northeast Pit.

6.3 Surface Mapping

Confirmatory surface structural mapping should be completed to support development of slope design recommendations. This should comprise a limited program of documentation of spatial variation of foliation orientations in existing pits, documentation of orientations of other fracture sets exposed in existing excavations to confirm that there are not widespread secondary structural sets with orientations unfavorable for slope stability, and documentation of orientations, locations, and character of major fault zones. In addition, additional surface mapping and geological interpretation of the Hanging wall between the mineralized zones and the pit limit in the Northeast Pit should be used in combination with detailed evaluation of oriented and geotechnical core data to enhance the reliability of the geological and geotechnical models in this important area. We do not recommend an extensive program of mapping foliation orientations in shallow surface exposures because of the evident effect of downslope creep on some near-surface rock (Photograph 11); we expect that a more

reliable interpretation of the distribution of foliation orientations will be obtained from subsurface (oriented core and drift mapping) data.

6.4 Core Drilling

Core drilling should be used to investigate geological and geotechnical conditions in the Footwall (southeast) slope of the Northeast Pit below (southeast of) the Andalusite Schist. This should be done by extending exploration coreholes. In general terms, several coreholes that intersect the design pit at approximately one half to two thirds the way from the crest to the toe of the slope should be extended to the pit bottom elevation. Core should be logged geotechnically and oriented.

In view of the large geotechnical and structural database currently available from within the central mineralized zones, we do not consider it necessary to collect additional geotechnical or structural data from these areas. The costs and effort of coring, orienting core, and geotechnical core logging should be focused in the vicinity of the pit slopes where data are currently lacking.

6.5 Investigation and Characterization of Alluvium

Provided the alluvium does not exceed 10 m in thickness, and that significant groundwater pressures or flows are not permitted to develop in the vicinity of cut slopes in the alluvium, there should be no need to conduct additional investigation or characterization of the alluvium.

6.6 Laboratory Testing

Available rock testing data confirms the expected high strengths of the mineralized zone rocks. Little additional testing of these materials should be required for geotechnical purposes. Additional rock testing should characterize the strengths of Footwall rocks that have not been tested to date, and index properties and shear strength characteristics of the F1 and F2 fault zone materials.

6.7 Geotechnical Structural and Rock Quality Evaluation

A detailed evaluation of rock structure and quality in the vicinity of the design pit slopes should be completed using the available database and the additional data collected from the proposed core drilling program to supplement the general characterization performed for this Phase 1 (pre-

feasibility) study. This should include development of predicted distributions of rock quality and structure in the immediate vicinity of pit slopes, including the predicted locations of the F2 fault and the F1 fault zones.

6.8 Engineering Analyses and Design

Engineering analyses based on the revised geotechnical and structural model should be used as a basis for developing feasibility-level pit slope design recommendations.

6.9 Perimeter Blasting Recommendations

Preliminary perimeter blasting designs for trim blasting and pre-split blasting should be developed to support equipment selection and operating cost estimates. Estimates of the potential increases in stable bench face angles and inter-ramp slope angles that alternative controlled blasting methods could produce should be developed in support of equipment selection, operating cost estimates, and pit optimization.

6.10 Pit Hydrogeological Evaluation

The slope design recommendations of this report assume that pit drainage can prevent the development of excessive pore pressures in the immediate vicinity of the pit slopes during pit development. Groundwater levels are indicated to be relatively high, yet there is currently no basis for supporting this assumption or for estimating the methods or costs of drainage measures required to achieve these conditions. Feasibility-level pit slope design recommendations will have to be supported by pit hydrogeological studies to demonstrate the viability and estimate the methods and costs of effective depressurization in the immediate vicinity of the pit slopes.

7.0 REFERENCES

Blair, P., 2005. Personal communication.

NERIN (Nanchang Engineering & Research Institute of Nonferrous Metals), 2003. 217 Gold Mine Project, Wulatezhongqi, Inner Mongolia (10,000t/d), Prefeasibility Study Report, Draft, dated November, 2003.

Rossi, Mario E, David A. Tutton, and John W. Nilsson, 2005. Preliminary Assessment of the Chang Shan Hao 217 Gold Project, Nei Mongol, People's Republic of China. Report prepared on behalf of Jinshan Gold Mines, Inc., dated April 15, 2005.

APPENDIX 14

RESULTS FROM 1999 TRENCH AND DRILL HOLE PROGRAM

**Summary Report
CSH Gold Prospect
Inner Mongolia, China**

Pre 1999 Nuclear 217's Assay Data

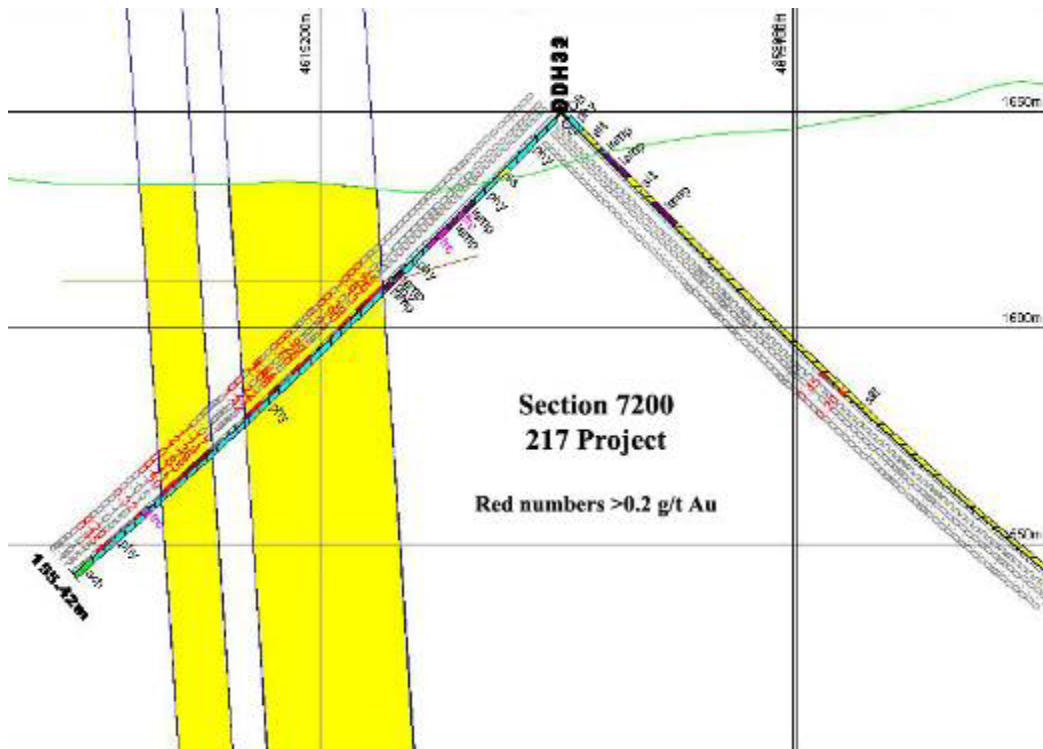


Figure C.1: Interpreted Section 7200 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

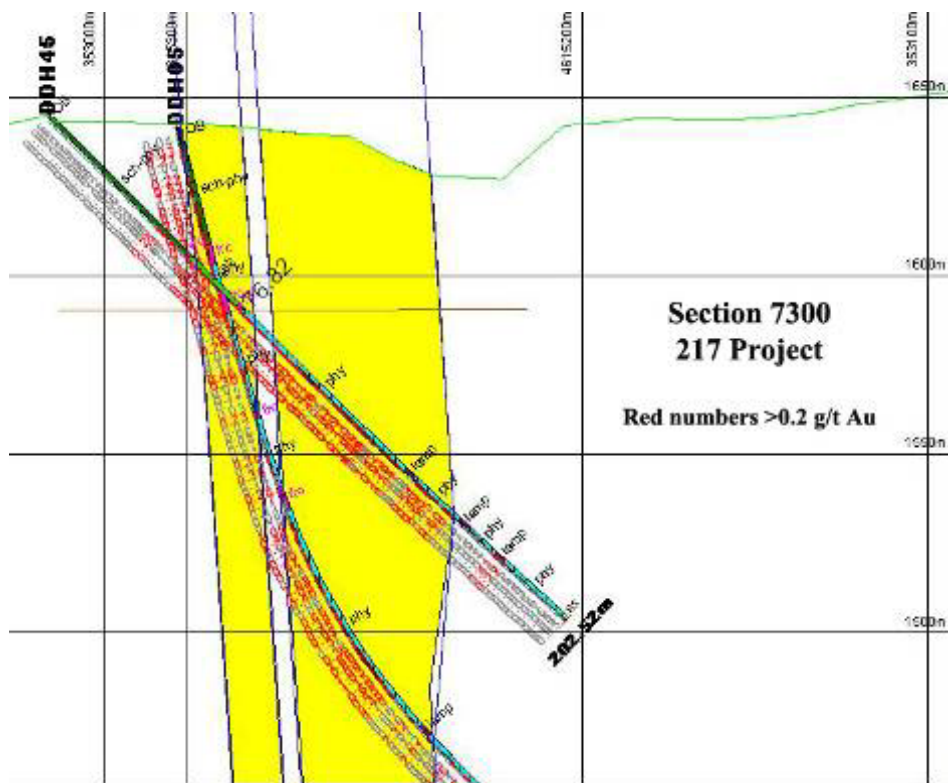


Figure C.2: Interpreted Section 7300 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

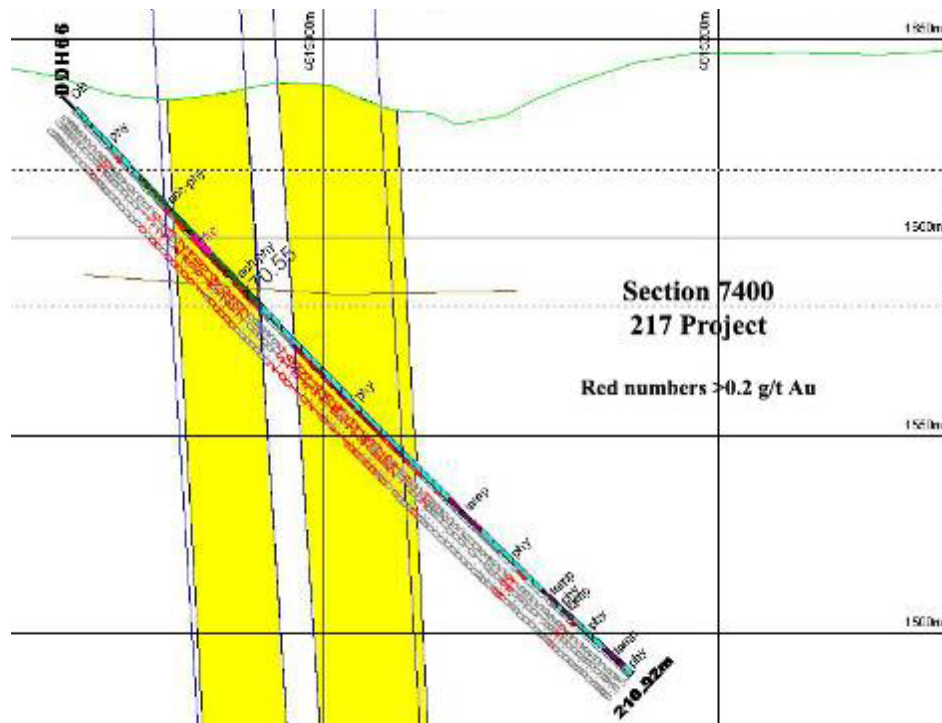


Figure C.3: Interpreted Section 7400 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

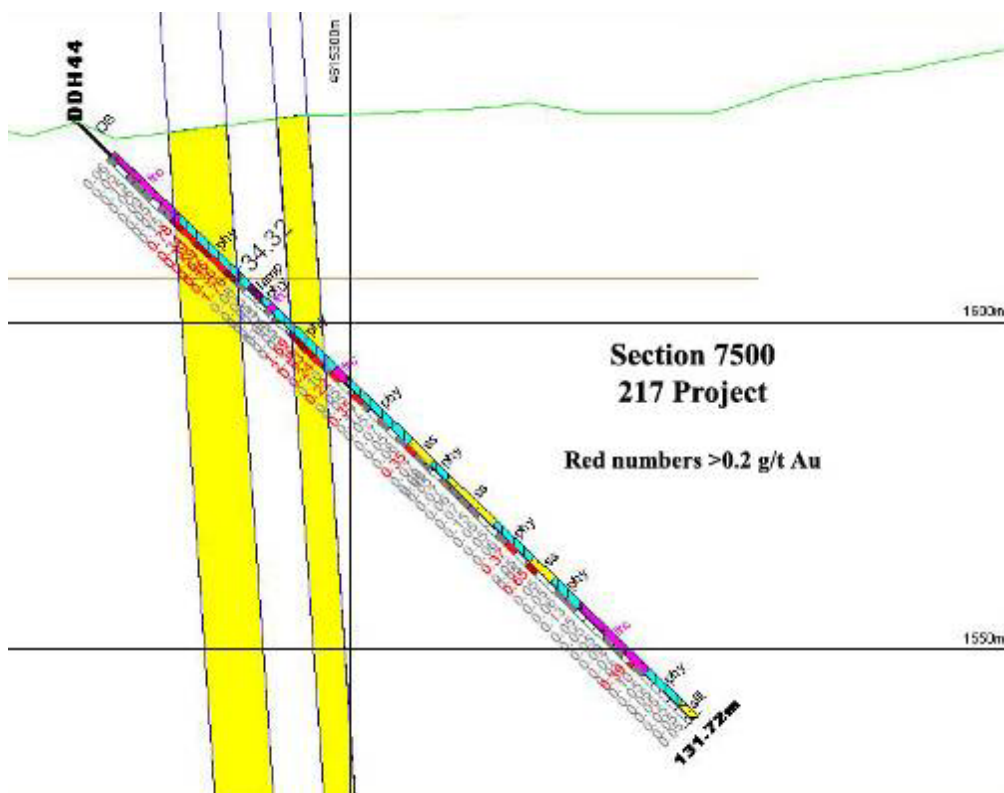


Figure C.4: Interpreted Section 7500 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

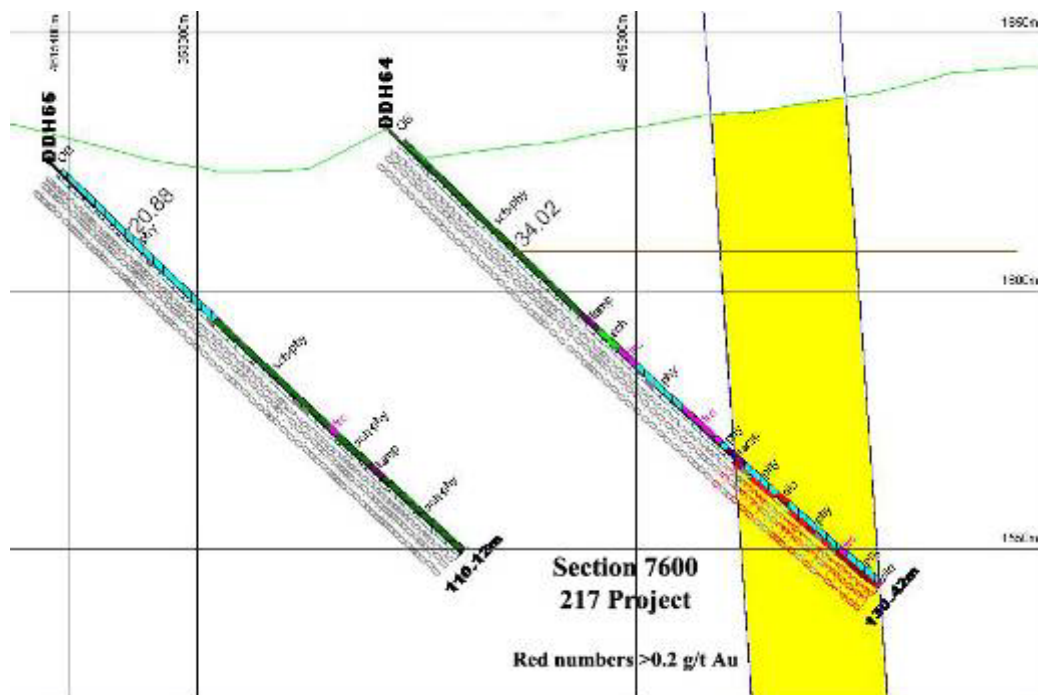


Figure C.5: Interpreted Section 7600 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.



Figure C.6: Interpreted Section 7700 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

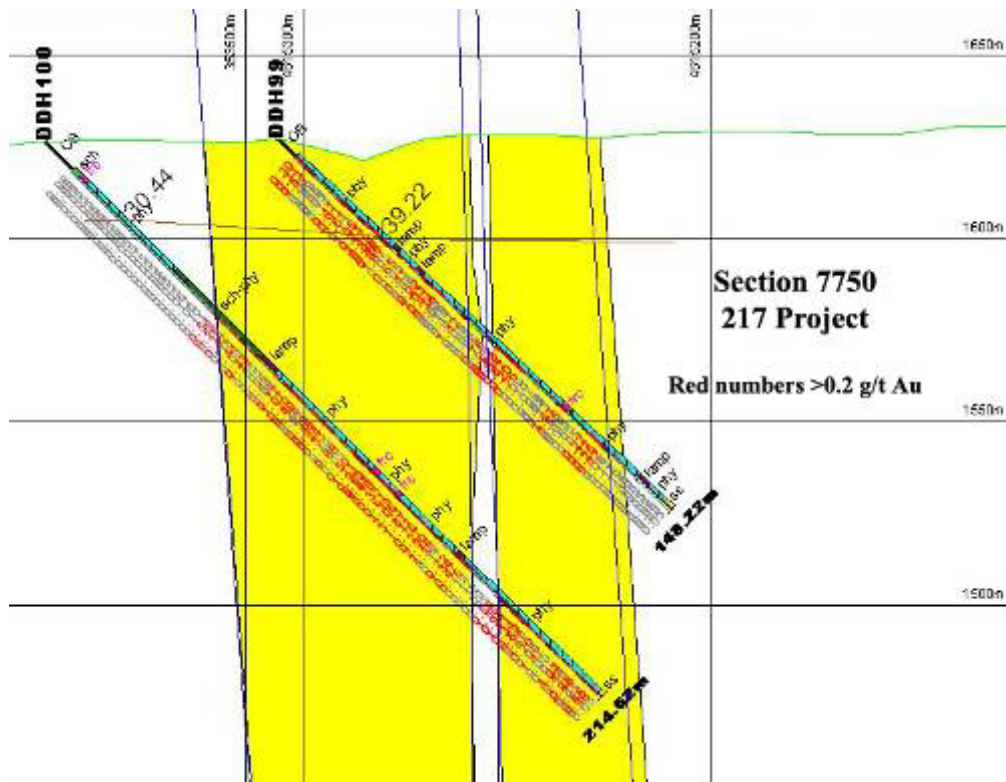


Figure C.7: Interpreted Section 7750 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.



Figure C.8: Interpreted Section 7800 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

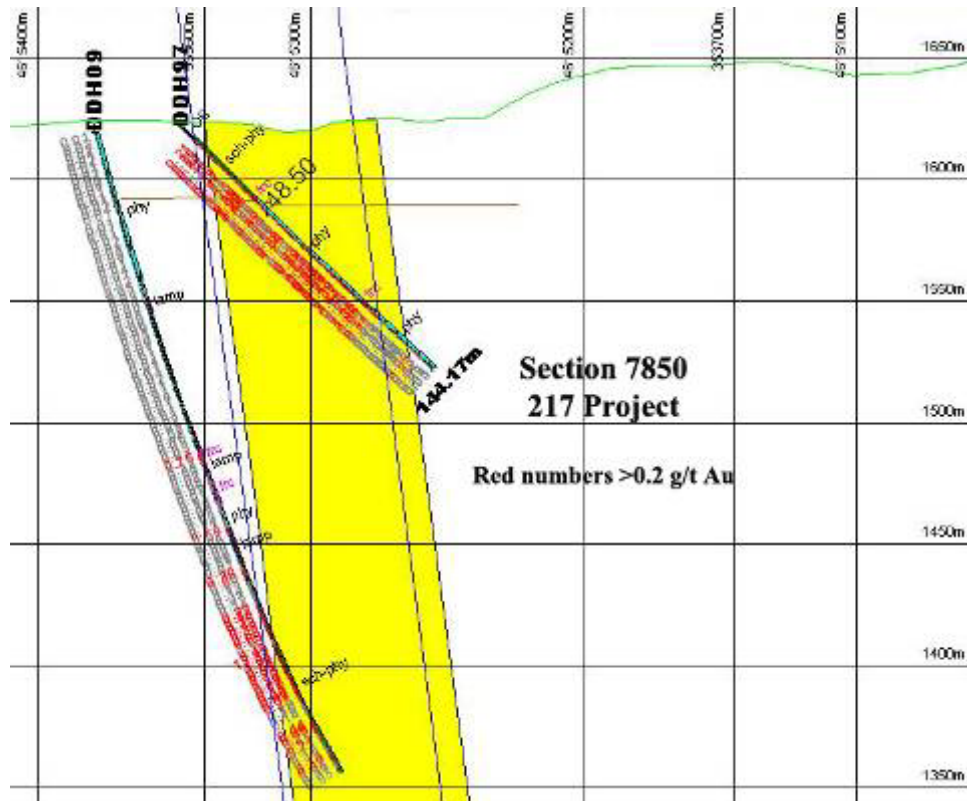


Figure C.9: Interpreted Section 7850 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

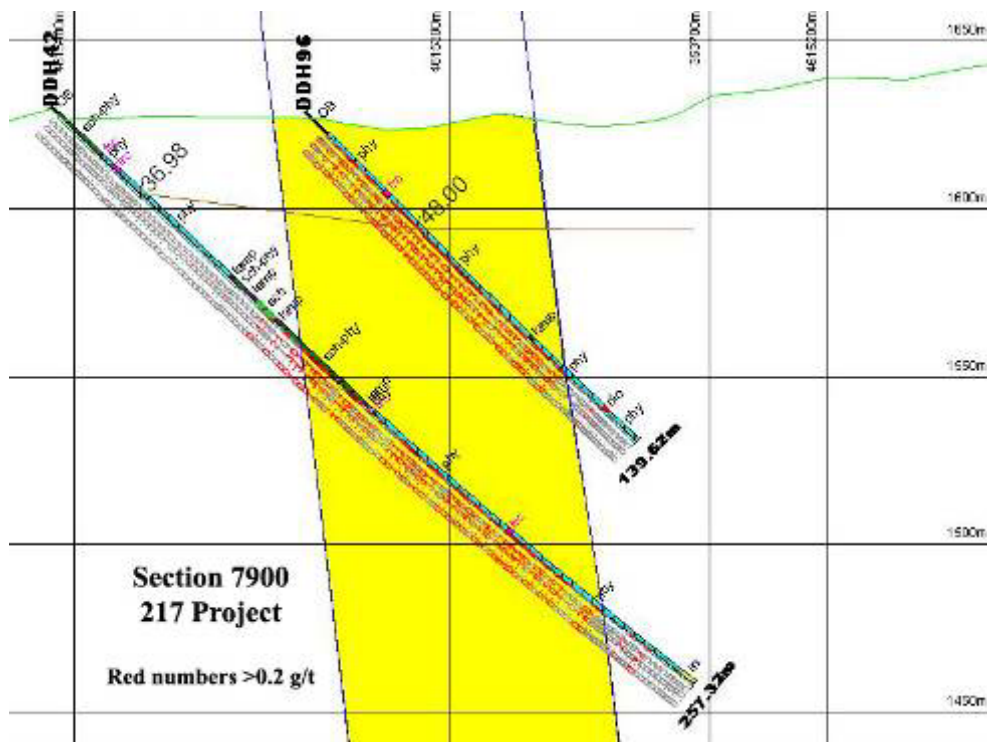
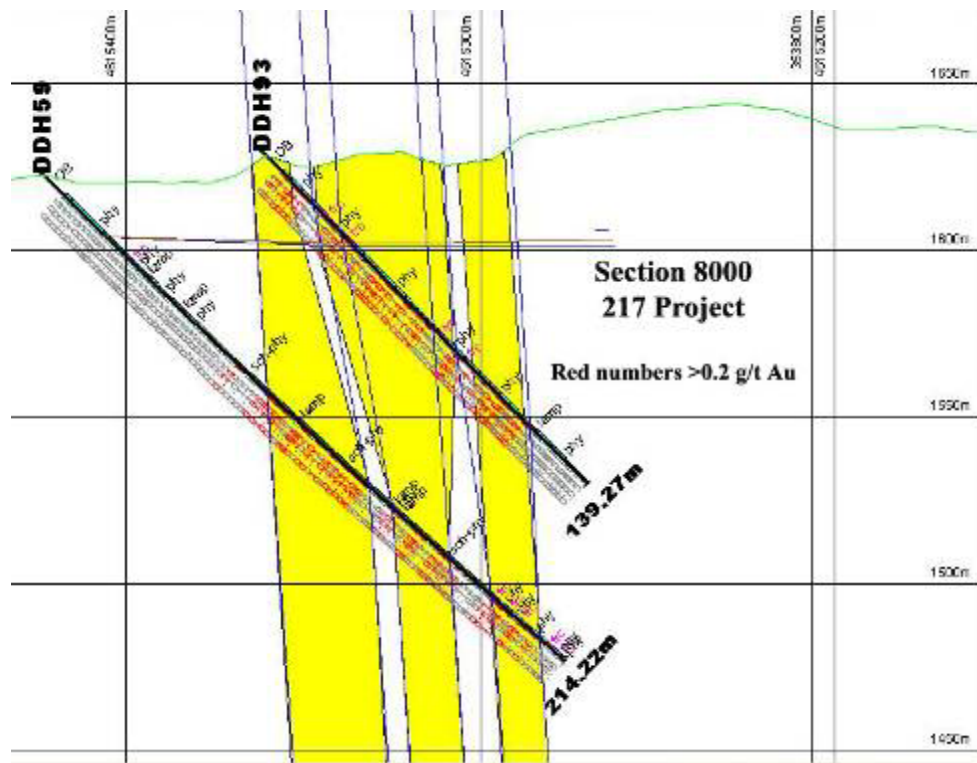
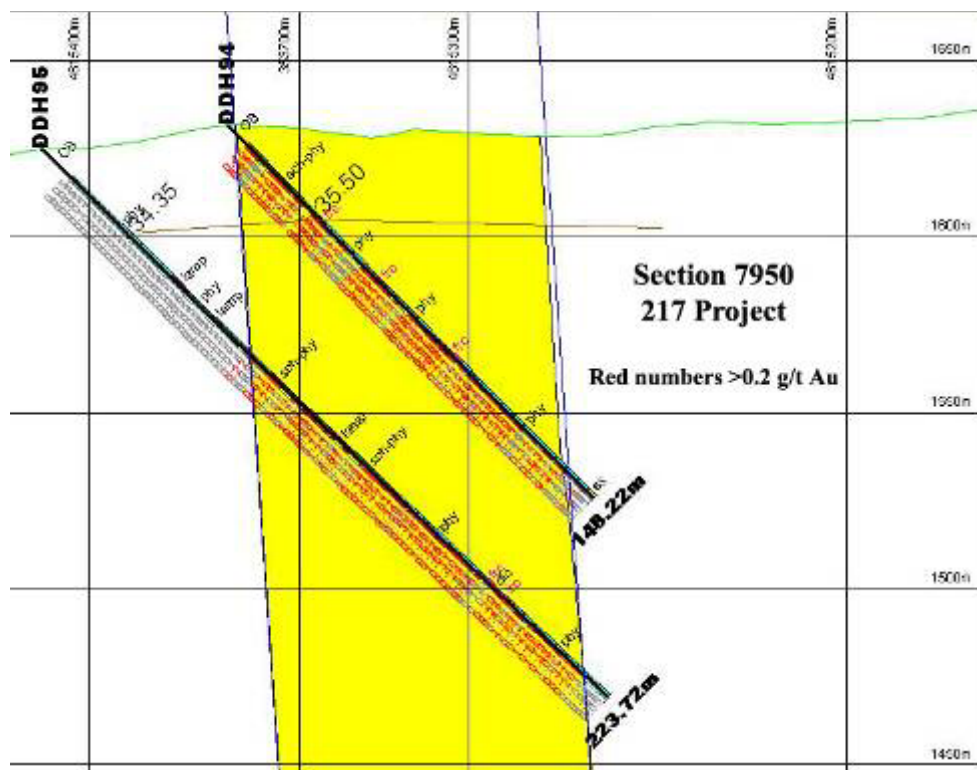


Figure C.10: Interpreted Section 7900 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.



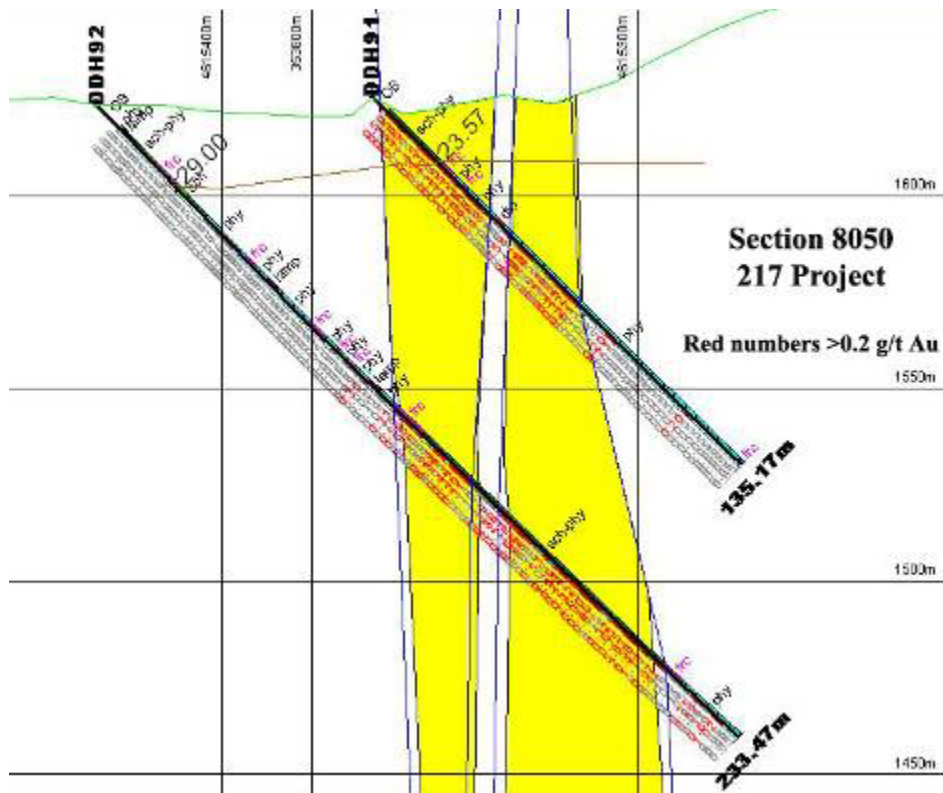


Figure C.13: Interpreted Section 8050 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

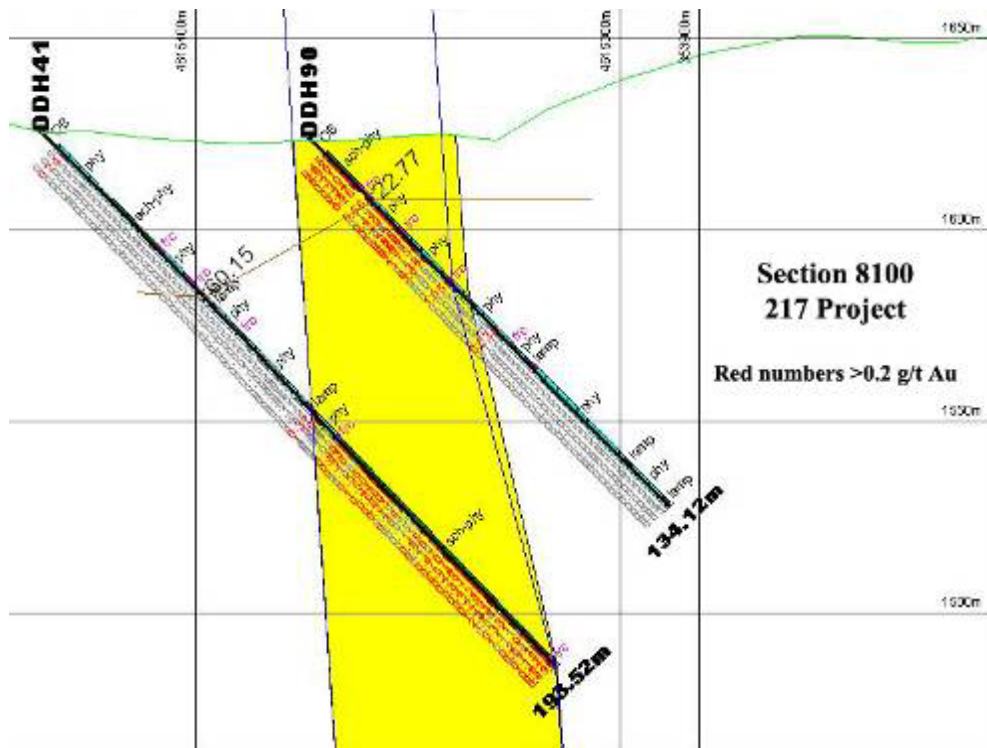


Figure C.14: Interpreted Section 8100 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

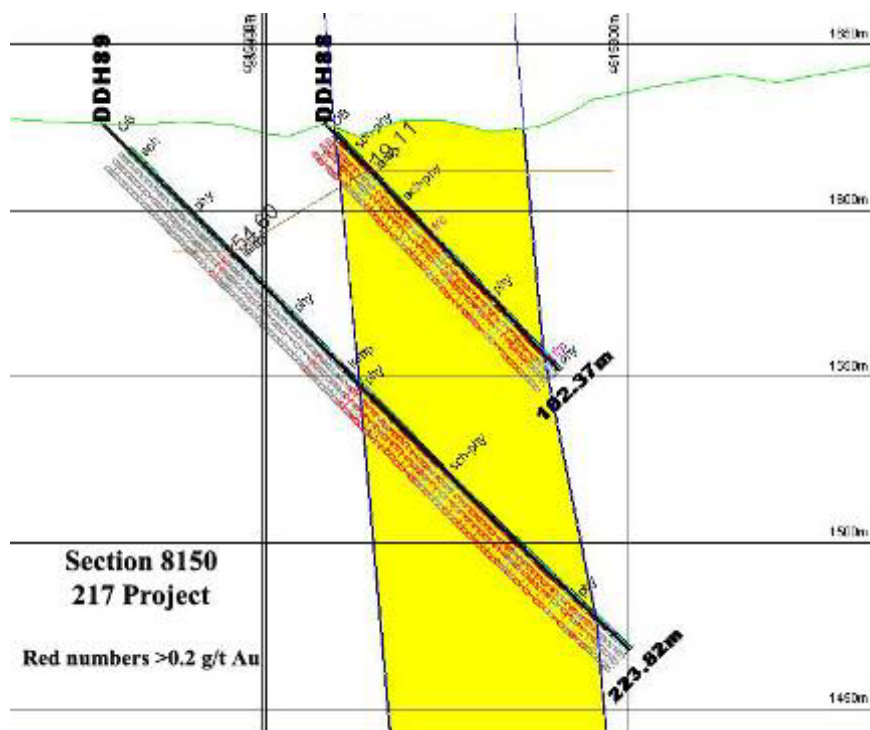


Figure C.15: Interpreted Section 8150 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

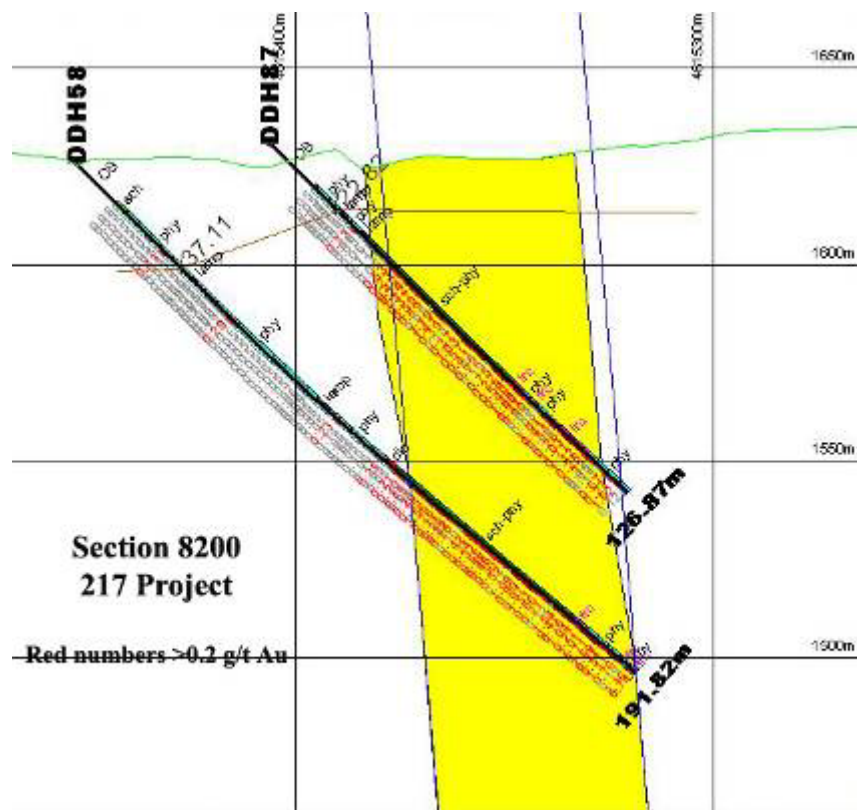


Figure C.16: Interpreted Section 8200 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

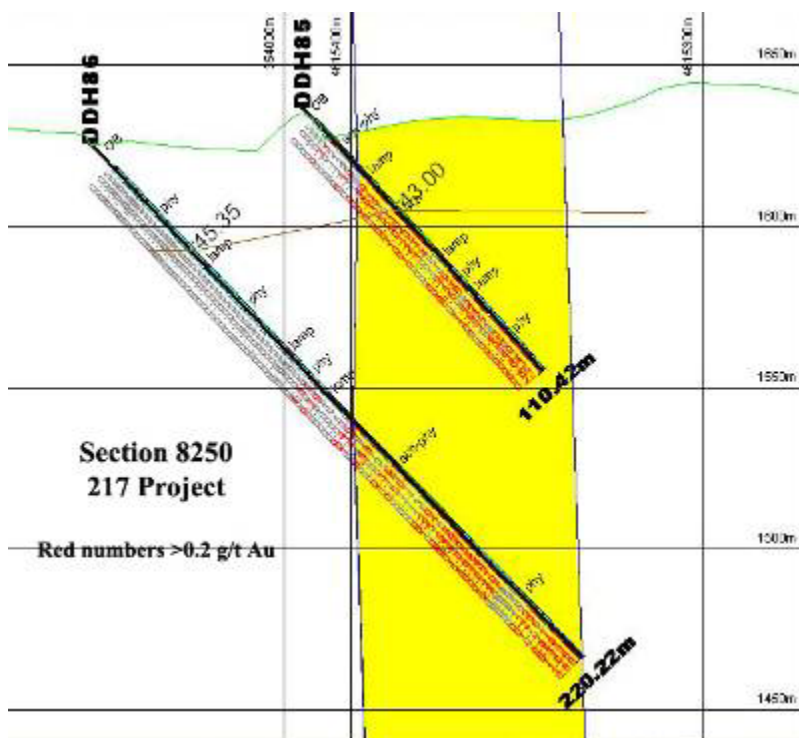


Figure C.17: Interpreted Section 8250 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

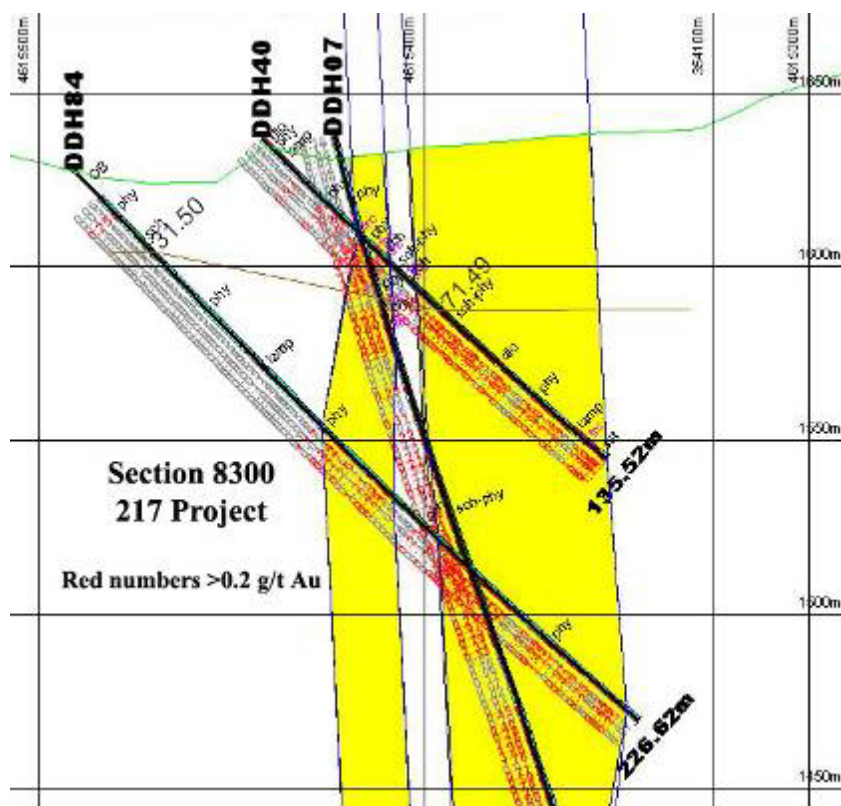


Figure C.18: Interpreted Section 8300 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

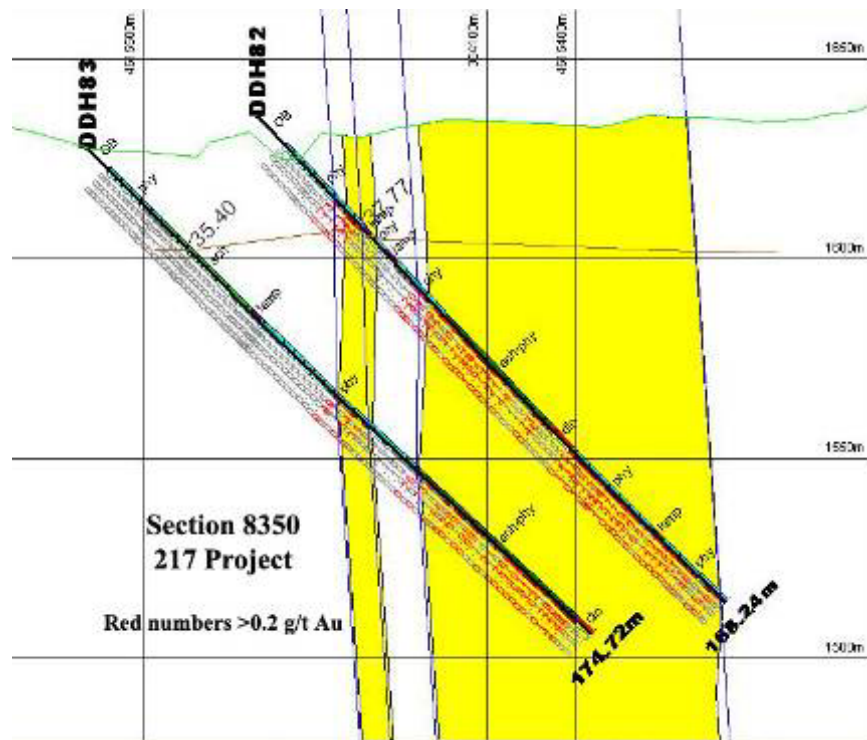


Figure C.19: Interpreted Section 8350 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

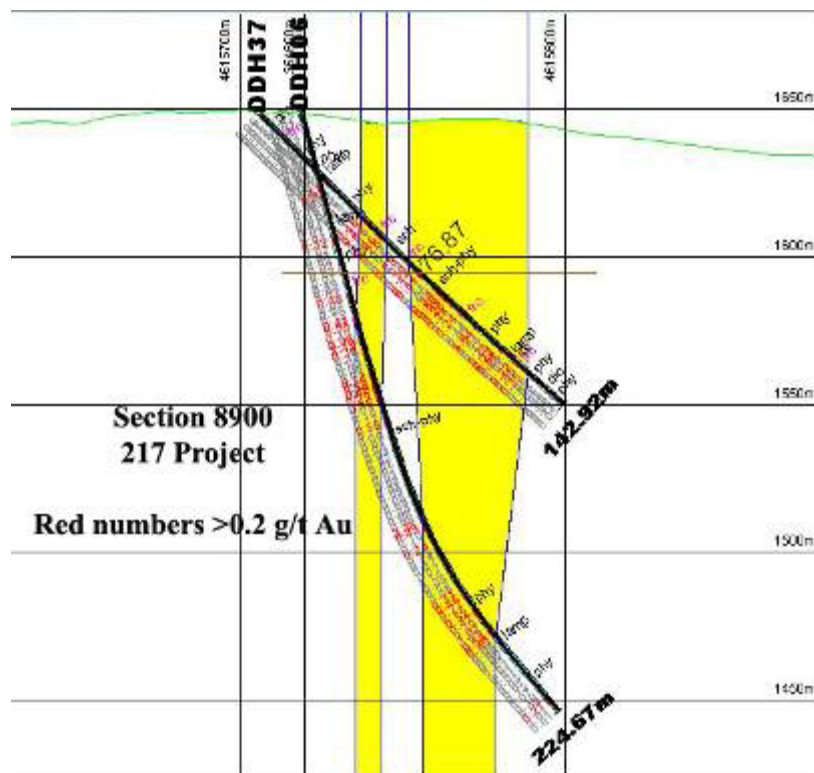


Figure C.20: Interpreted Section 8900 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

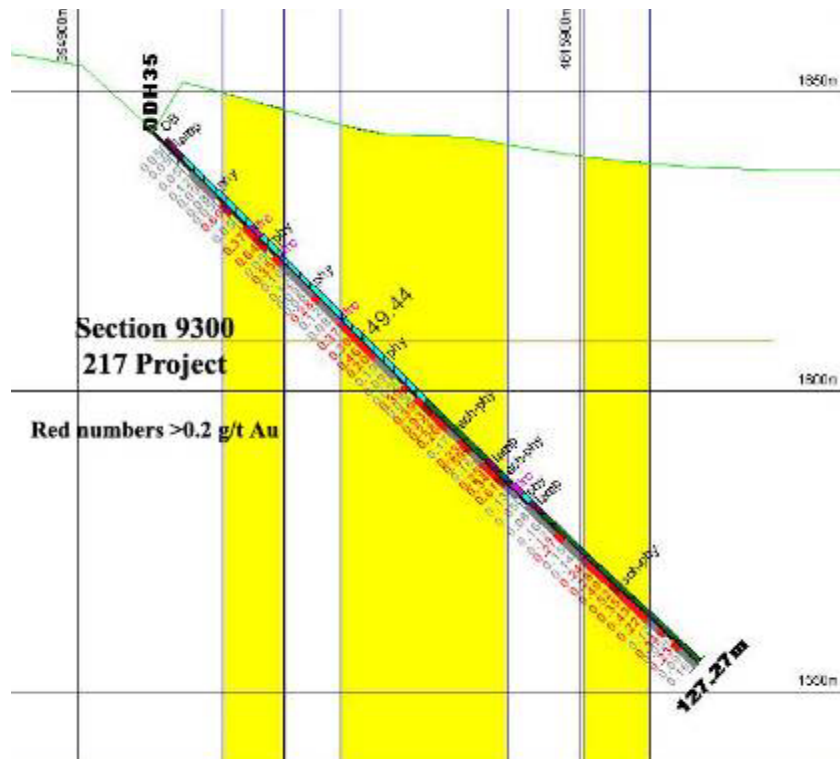


Figure C.21: Interpreted Section 9300 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

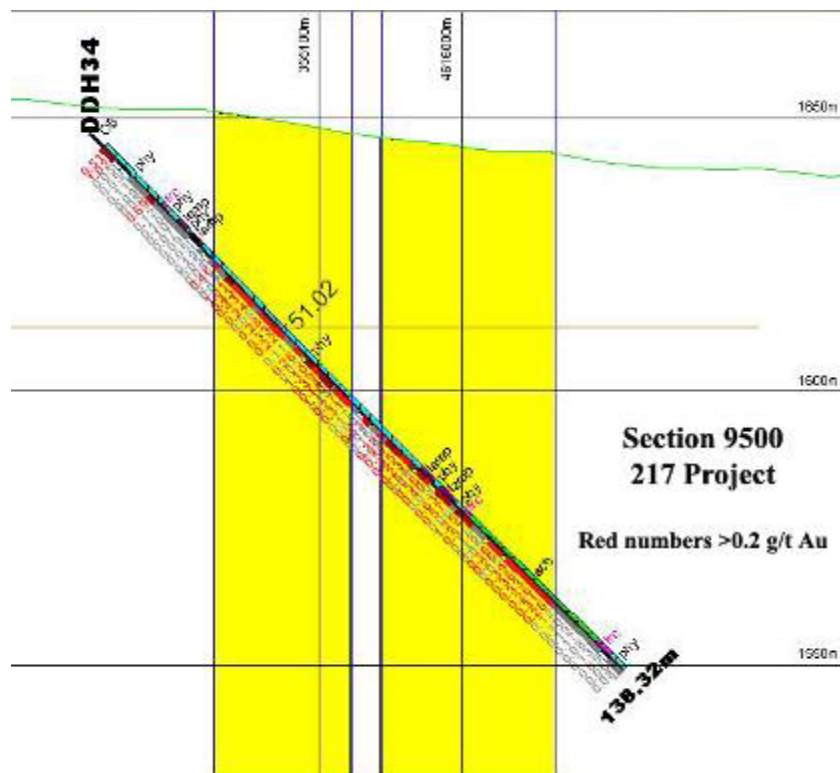


Figure C.22: Interpreted Section 9500 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

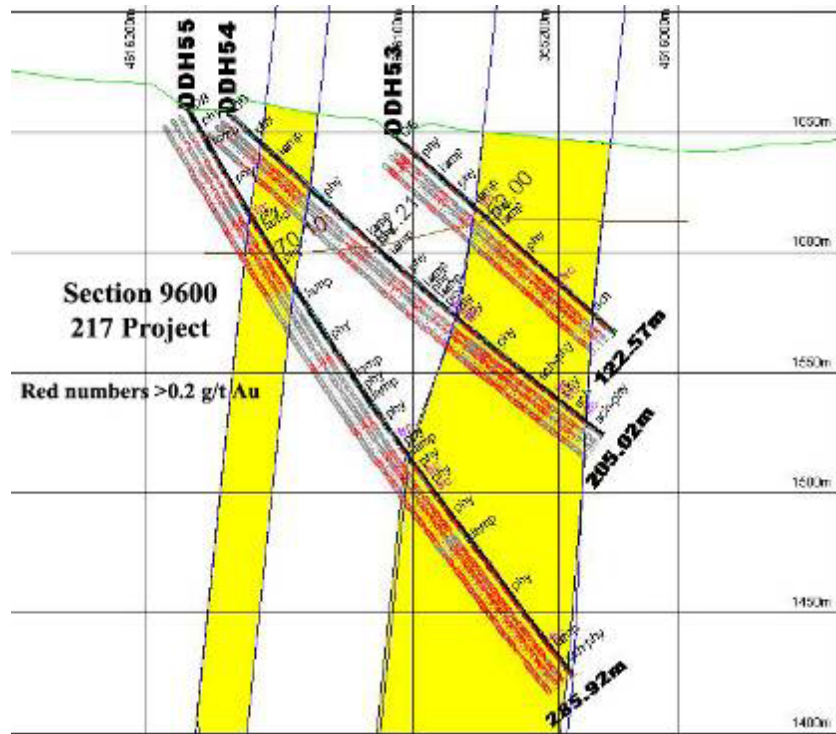


Figure C.23: Interpreted Section 9600 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

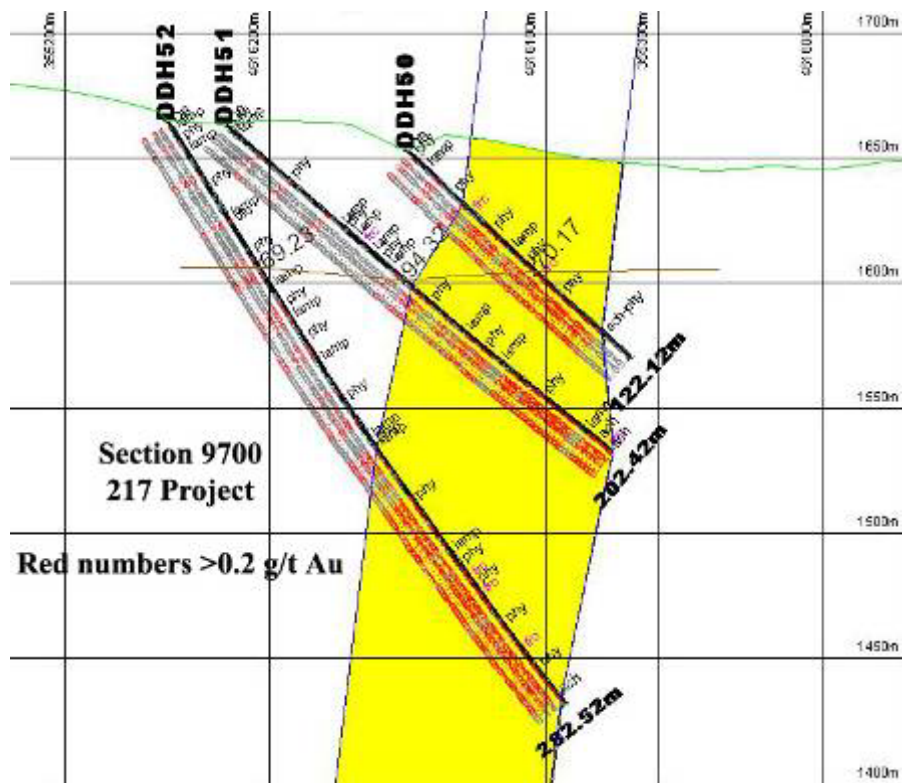


Figure C.24: Interpreted Section 9700 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

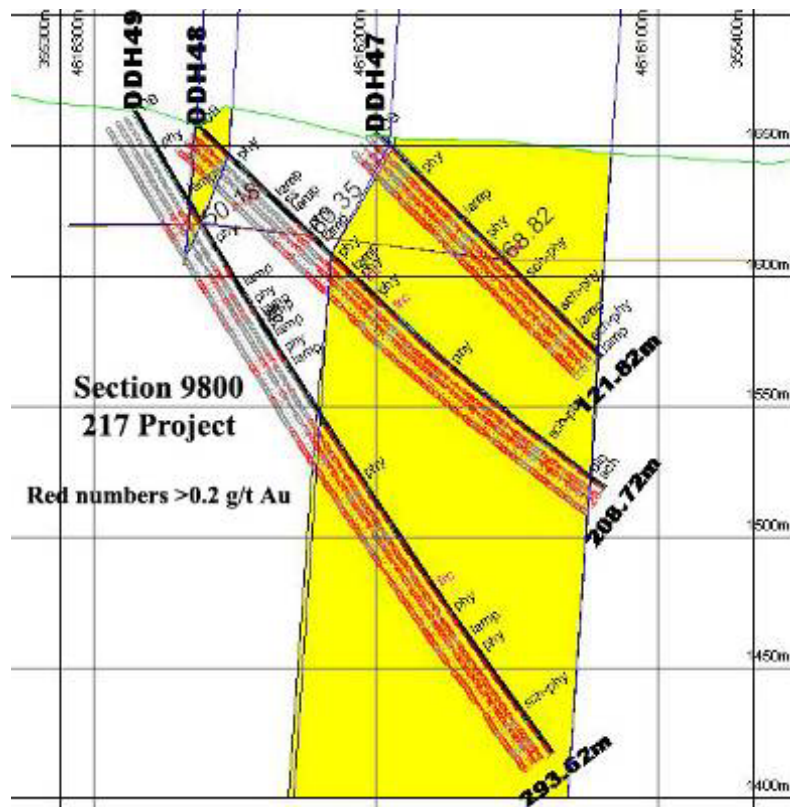


Figure C.25: Interpreted Section 9800 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

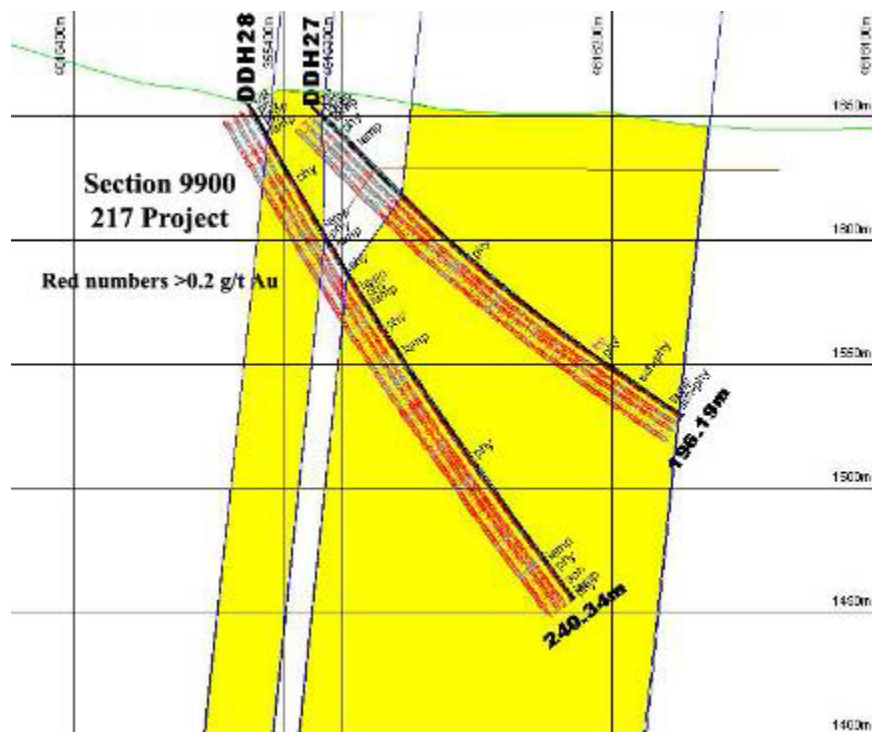


Figure C.26: Interpreted Section 9900 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

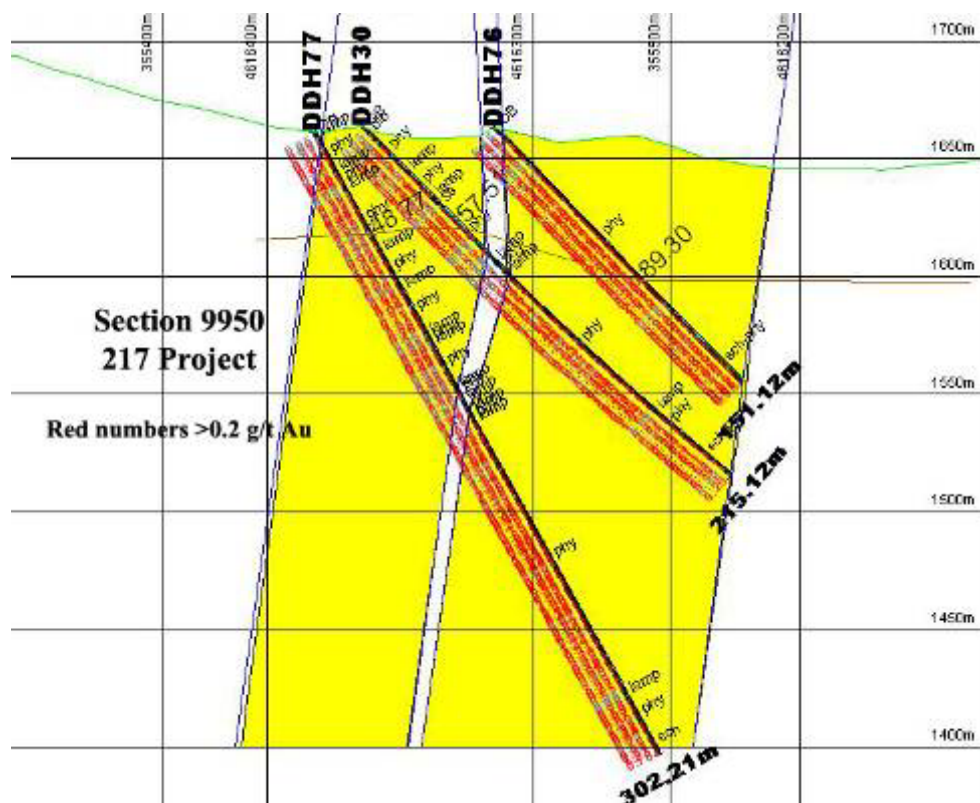


Figure C.27: Interpreted Section 9950 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

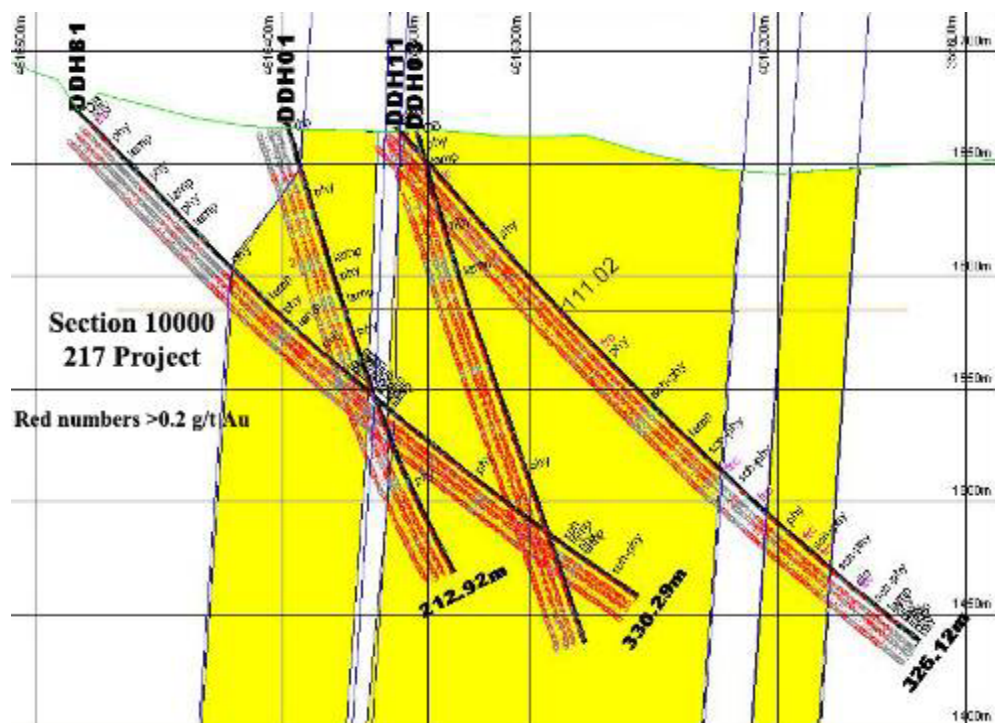


Figure C.28: Interpreted Section 10000 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

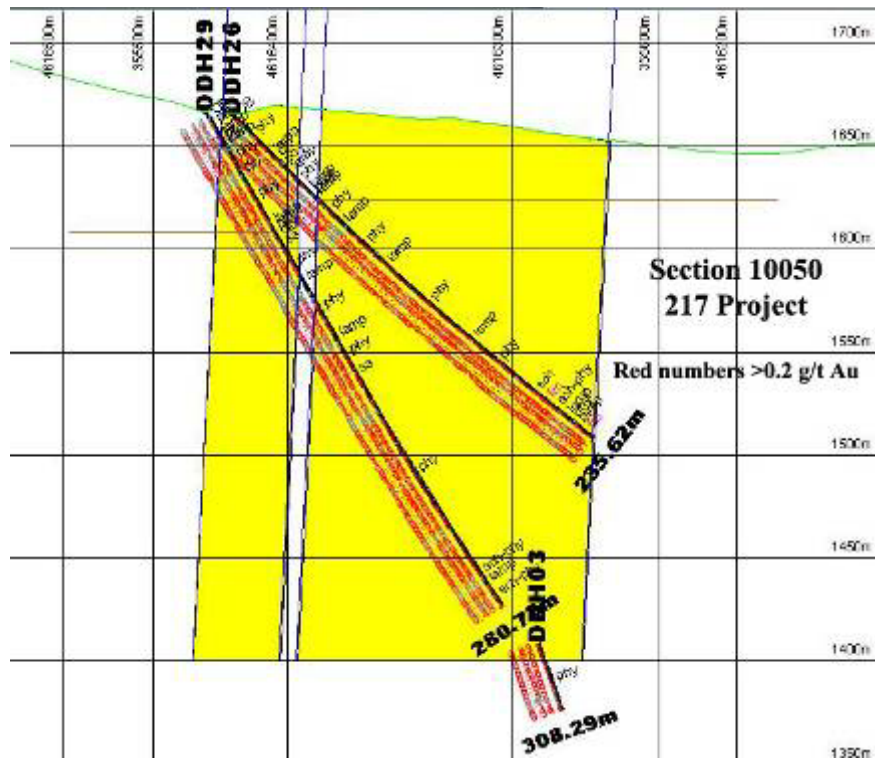


Figure C.29: Interpreted Section 10050 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

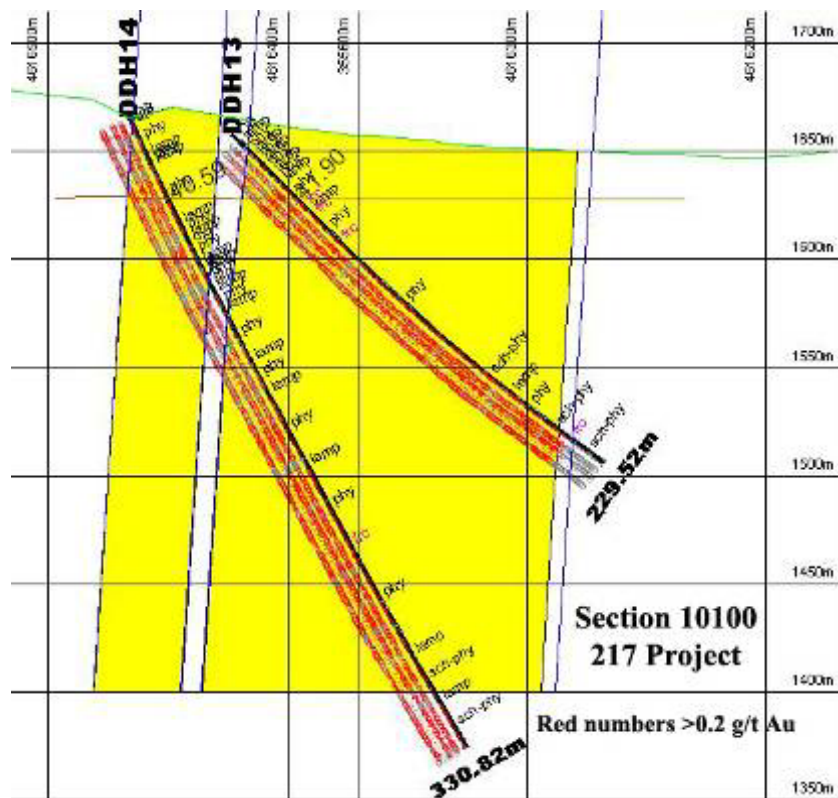


Figure C.30: Interpreted Section 10100 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

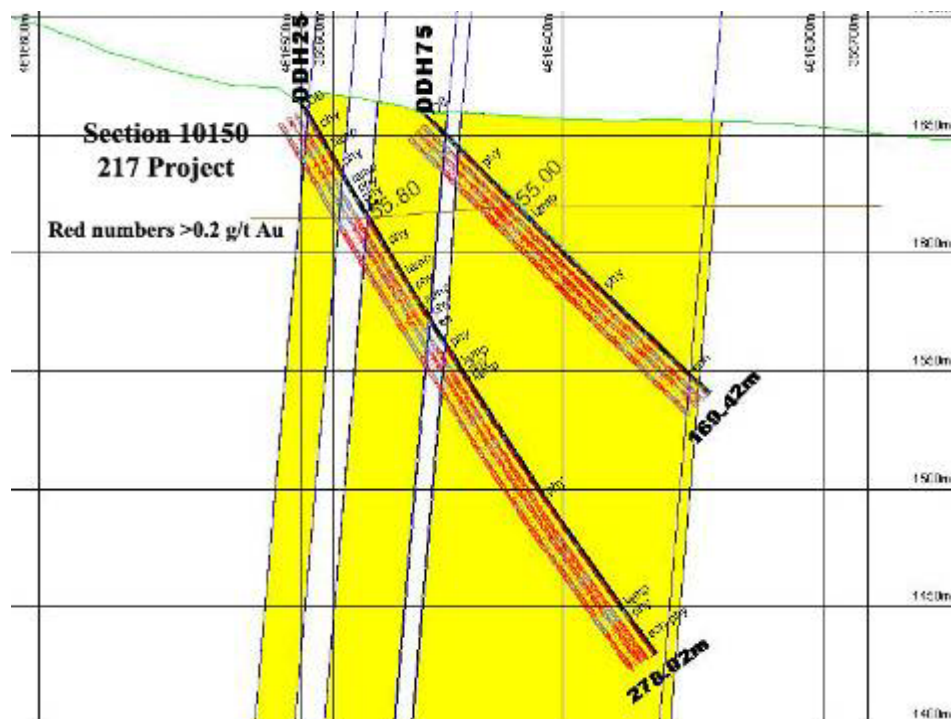


Figure C.31: Interpreted Section 10150 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

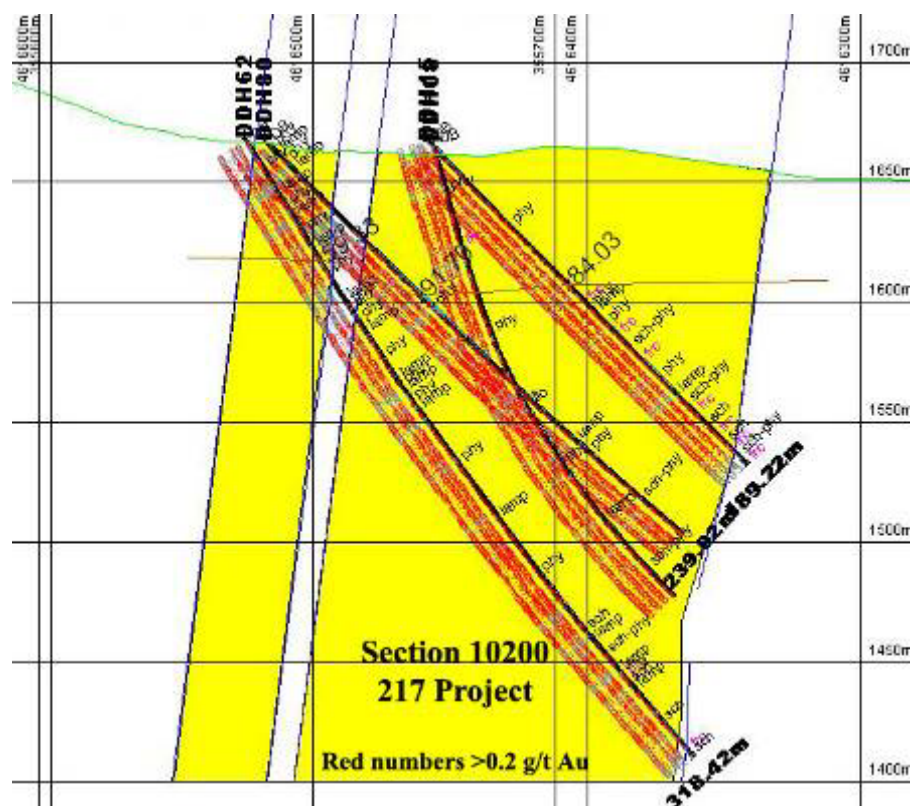


Figure C.32: Interpreted Section 10200 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

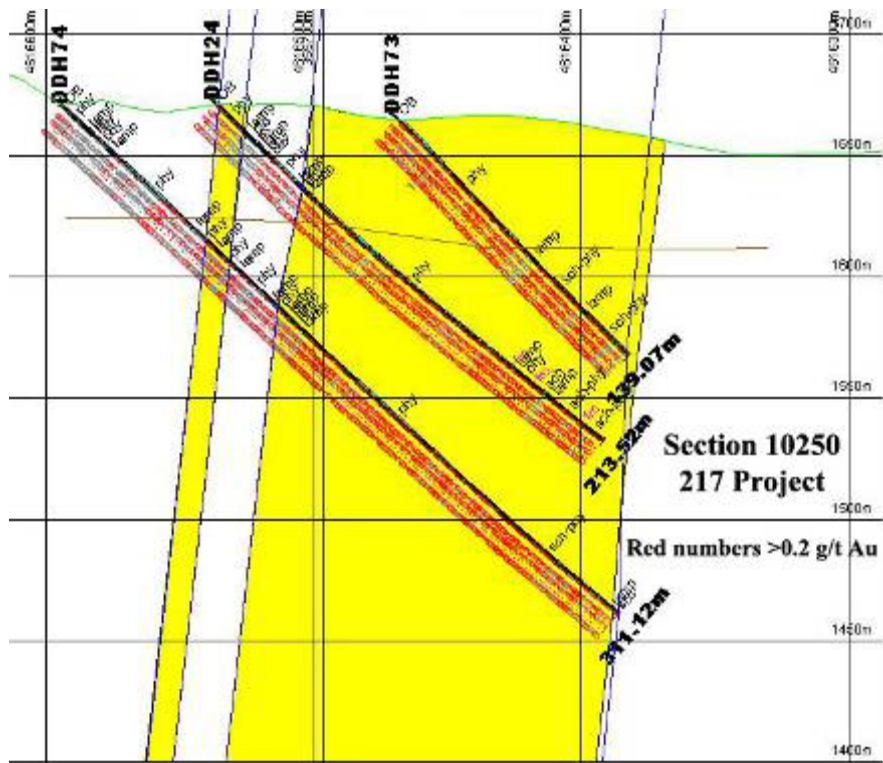


Figure C.33: Interpreted Section 10250 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

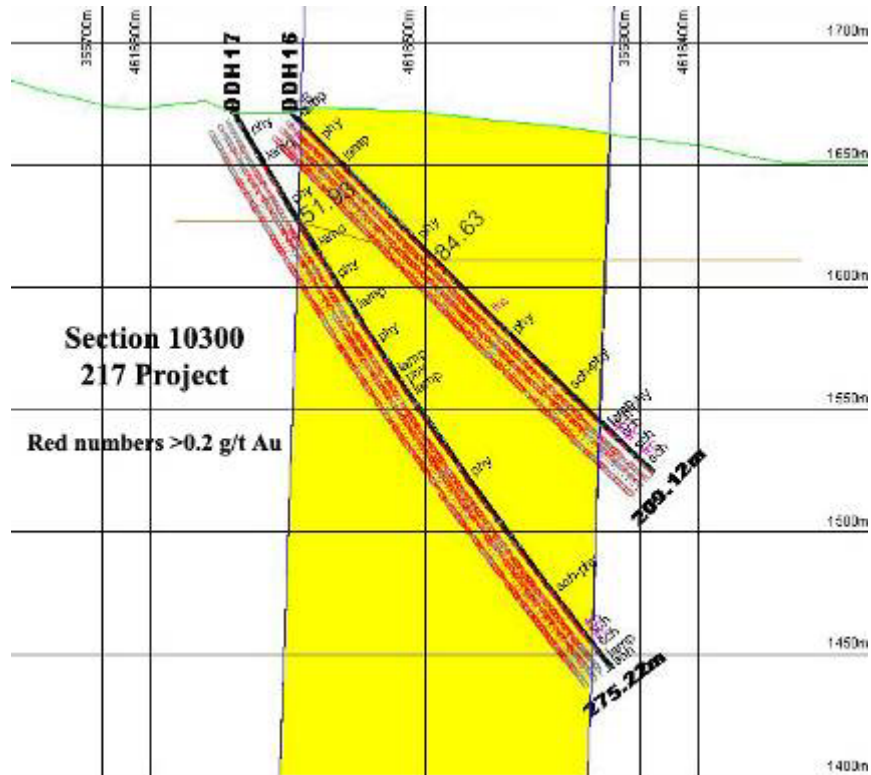


Figure C.34: Interpreted Section 10300 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

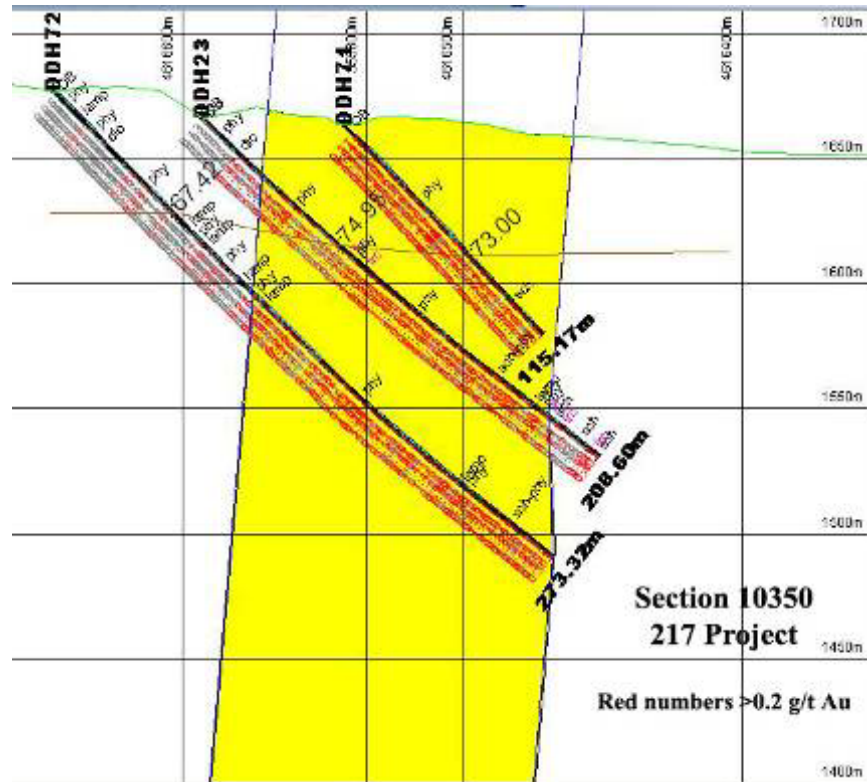


Figure C.35: Interpreted Section 10350 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

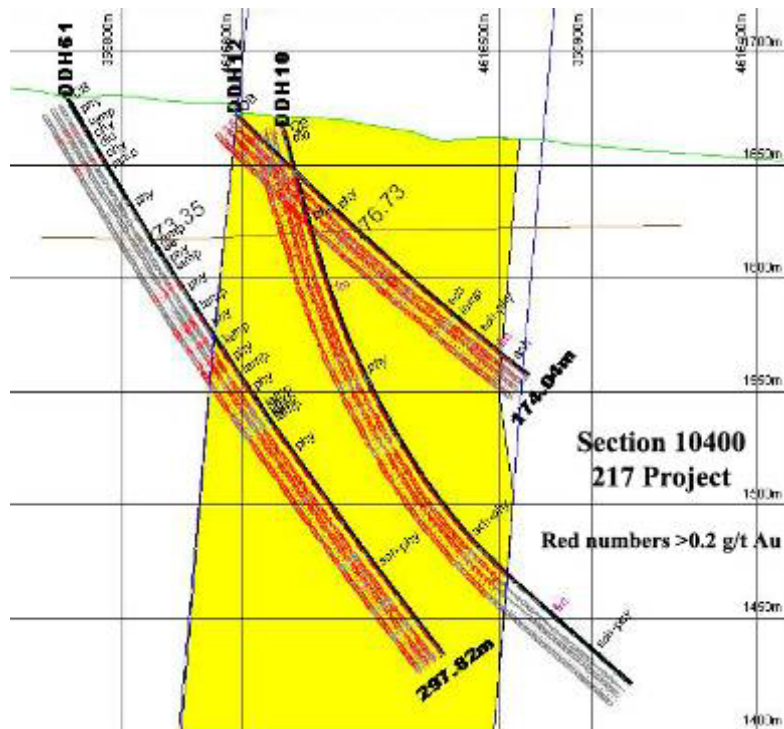


Figure C.36: Interpreted Section 10400 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.



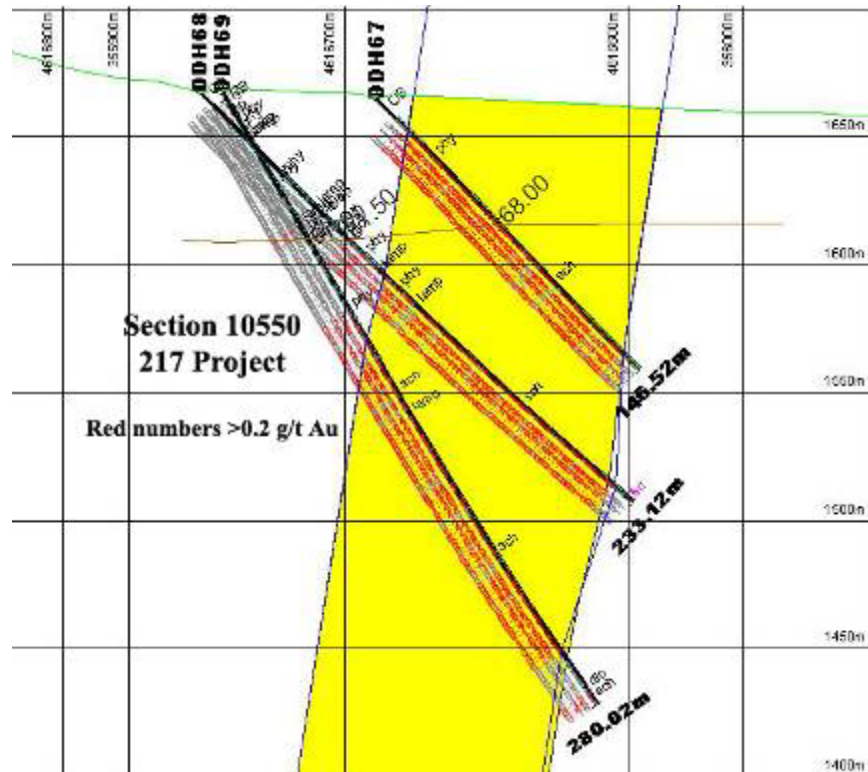


Figure C.39: Interpreted Section 10550 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

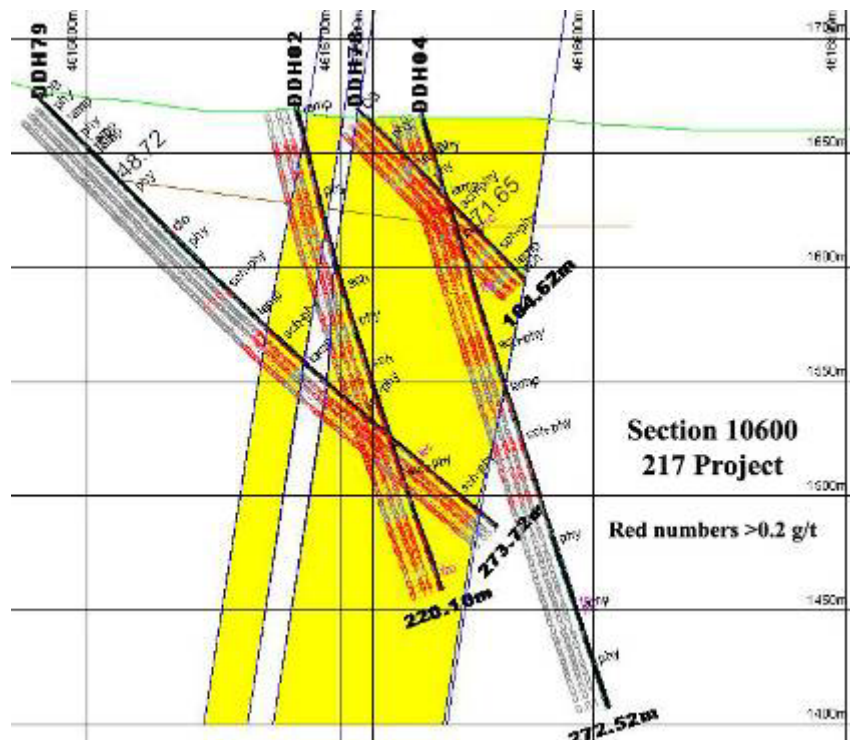


Figure C.40: Interpreted Section 10600 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

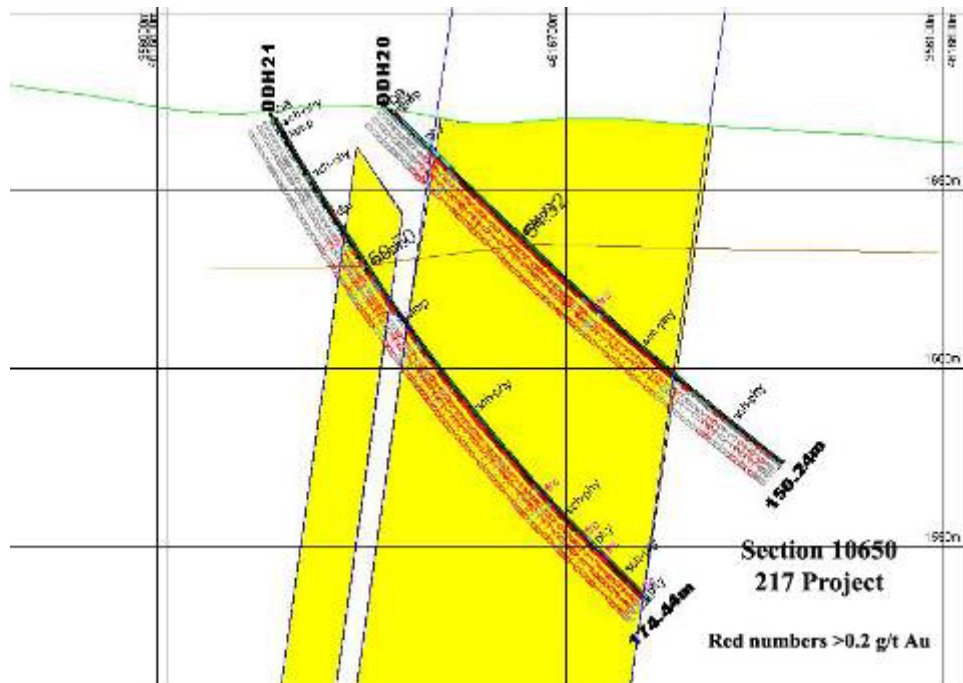


Figure C.41: Interpreted Section 10650 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

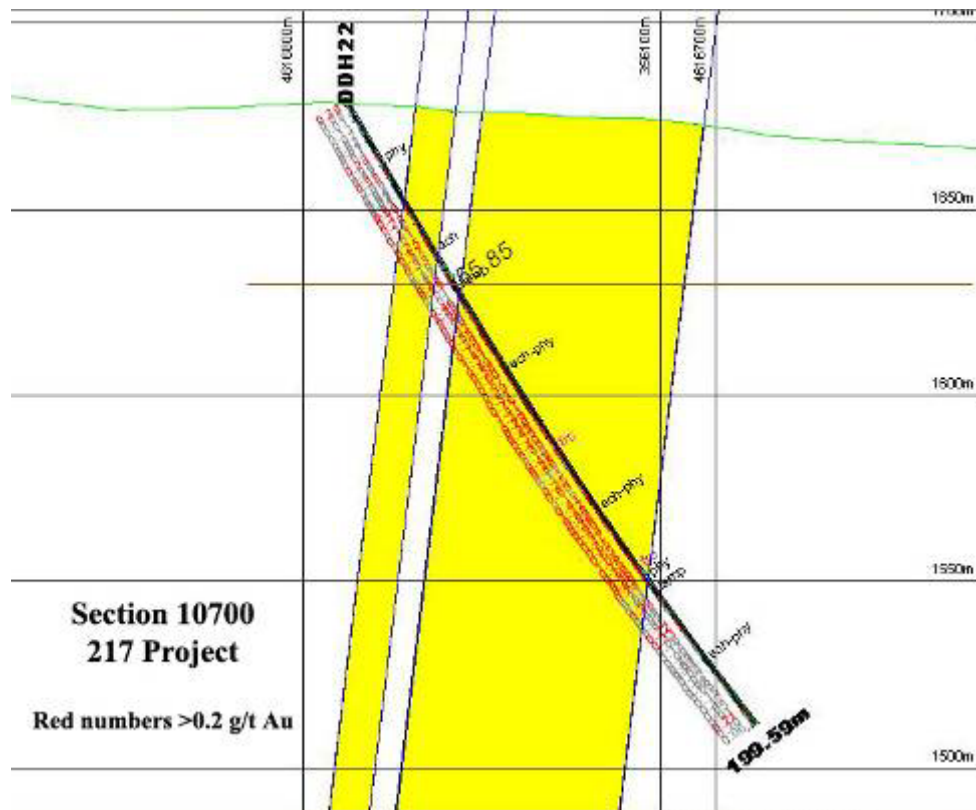


Figure C.42: Interpreted Section 10700 showing drill hole data, interpreted 0.20g/t zone, oxide/sulphide interface, and topography.

APPENDIX D

SUMMARY CORRELOGRAMS

AND INDICATOR VARIOGRAM MODELS

AS REQUIRED BY THE IMOK MODEL, 2m COMPOSITES

Calculate Sample Variograms

GSLIB Rotation Conventions

Nugget ==> 0.020

C1 ==> 0.704

C2 ==> 0.276

First Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> -56

RH Rotation about the X' axis ==> -13

RH Rotation about the Y' axis ==> 8

Range along the Z' axis ==> 7.7 Azimuth ==> 337 Dip ==> 75

Range along the Y' axis ==> 42.0 Azimuth ==> 304 Dip ==> -13

Range along the X' axis ==> 34.4 Azimuth ==> 35 Dip ==> -8

Second Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> 72

RH Rotation about the X' axis ==> -51

RH Rotation about the Y' axis ==> 9

Range along the Z axis ==> 696.1 Azimuth ==> 83 Dip ==> 39

Range along the X' axis ==> 65.6 Azimuth ==> 169 Dip ==> -5

Range along the Y' axis ==> 284.2 Azimuth ==> 72 Dip ==> -51

Modeling Criteria

Minimum number pairs req'd ==> 100

Sample variogram points weighted by # pairs

Figure D.1: Summary description of the overall Au correlogram model.

Indicator Variogram, Au>0.2, NE

GSLIB Rotation Conventions

Nugget ==> 0.222

C1 ==> 0.164

C2 ==> 0.614

First Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> -71

RH Rotation about the X' axis ==> 24

RH Rotation about the Y' axis ==> -10

Range along the Z' axis ==> 84.7 Azimuth ==> 132 Dip ==> 65

Range along the Y' axis ==> 19.0 Azimuth ==> 289 Dip ==> 24

Range along the X' axis ==> 175.7 Azimuth ==> 22 Dip ==> 9

Second Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> -37

RH Rotation about the X' axis ==> 9

RH Rotation about the Y' axis ==> -44

Range along the Z axis ==> 1107.3 Azimuth ==> 224 Dip ==> 45

Range along the X' axis ==> 1384.8 Azimuth ==> 61 Dip ==> 43

Range along the Y' axis ==> 85.0 Azimuth ==> 323 Dip ==> 9

Modeling Criteria

Minimum number pairs req'd ==> 350

Sample variogram points weighted by # pairs

Figure D.2: Summary description of the relative indicator variogram model, 0.20g/t, NE zone.

Indicator Variogram, Au>0.2, SW

GSLIB Rotation Conventions

Nugget ==> 0.400

C1 ==> 0.244

C2 ==> 0.356

First Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> -26

RH Rotation about the X' axis ==> -10

RH Rotation about the Y' axis ==> -16

Range along the Z' axis ==> 104.7 Azimuth ==> 276 Dip ==> 71

Range along the Y' axis ==> 29.7 Azimuth ==> 334 Dip ==> -10

Range along the X' axis ==> 193.3 Azimuth ==> 61 Dip ==> 16

Second Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> -4

RH Rotation about the X' axis ==> -5

RH Rotation about the Y' axis ==> -20

Range along the Z axis ==> 181.7 Azimuth ==> 280 Dip ==> 69

Range along the X' axis ==> 483.2 Azimuth ==> 85 Dip ==> 20

Range along the Y' axis ==> 36.2 Azimuth ==> 356 Dip ==> -5

Modeling Criteria

Minimum number pairs req'd ==> 200

Sample variogram points weighted by # pairs

Figure D.3: Summary description of the relative indicator variogram model, 0.20g/t, SW zone.

Correlogram, Au>0.2, NE

GSLIB Rotation Conventions

Nugget ==> 0.500

C1 ==> 0.434

C2 ==> 0.066

First Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> 21

RH Rotation about the X' axis ==> -1

RH Rotation about the Y' axis ==> 107

Range along the Z' axis ==> 24.8 Azimuth ==> 112 Dip ==> -17

Range along the Y' axis ==> 29.6 Azimuth ==> 21 Dip ==> -1

Range along the X' axis ==> 6.0 Azimuth ==> 290 Dip ==> -73

Second Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> 68

RH Rotation about the X' axis ==> 67

RH Rotation about the Y' axis ==> 15

Range along the Z axis ==> 656.6 Azimuth ==> 232 Dip ==> 22

Range along the X' axis ==> 40.9 Azimuth ==> 144 Dip ==> -6

Range along the Y' axis ==> 741.7 Azimuth ==> 68 Dip ==> 67

Modeling Criteria

Minimum number pairs req'd ==> 100

Sample variogram points weighted by # pairs

Figure D.4: Summary description of the correlogram model, Au $\geq$ 0.20g/t, NE zone.

Correlogram Au>0.2, SW

GSLIB Rotation Conventions

Nugget ==> 0.750

C1 ==> 0.212

C2 ==> 0.038

First Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> -33

RH Rotation about the X' axis ==> 29

RH Rotation about the Y' axis ==> 38

Range along the Z' axis ==> 3.4 Azimuth ==> 89 Dip ==> 44

Range along the Y' axis ==> 29.5 Azimuth ==> 327 Dip ==> 29

Range along the X' axis ==> 29.3 Azimuth ==> 36 Dip ==> -32

Second Structure -- Exponential with Practical Range

LH Rotation about the Z axis ==> 15

RH Rotation about the X' axis ==> 90

RH Rotation about the Y' axis ==> 20

Range along the Z axis ==> 198.3 Azimuth ==> 175 Dip ==> -0

Range along the X' axis ==> 19.4 Azimuth ==> 85 Dip ==> 0

Range along the Y' axis ==> 1025.4 Azimuth ==> 196 Dip ==> 90

Modeling Criteria

Minimum number pairs req'd ==> 75

Sample variogram points weighted by # pairs

Figure D.5: Summary description of the correlogram model, Au $\geq$ 0.20g/t, SW zone.

APPENDIX E

ADDITIONAL PLAN AND CROSS SECTIONAL VIEWS

2005 RESOURCE MODEL

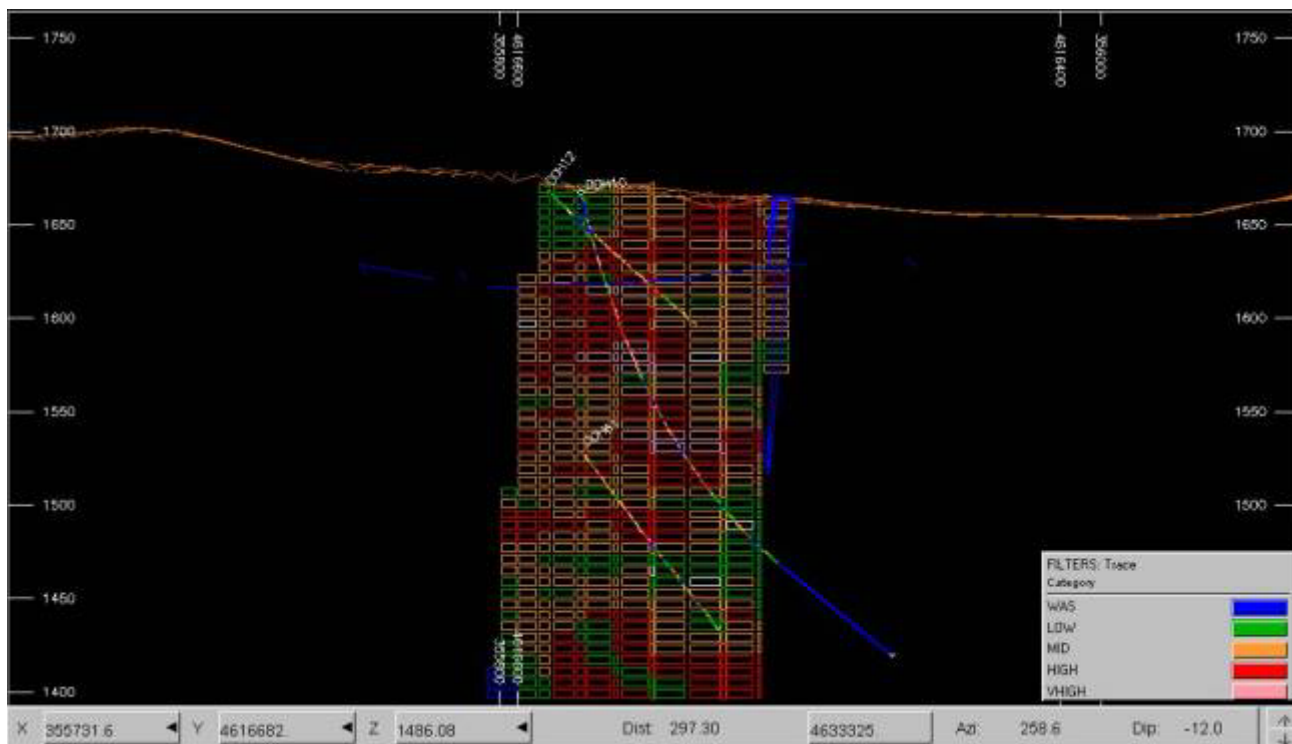


Figure E.1: Cross-section, Au estimated grades, NE zone. Orange, red, and magenta represent $\text{Au} \geq 0.50\text{g/t}$. Blocks are $12.5 \times 12.5 \times 6\text{m}$, and can be used for scale.

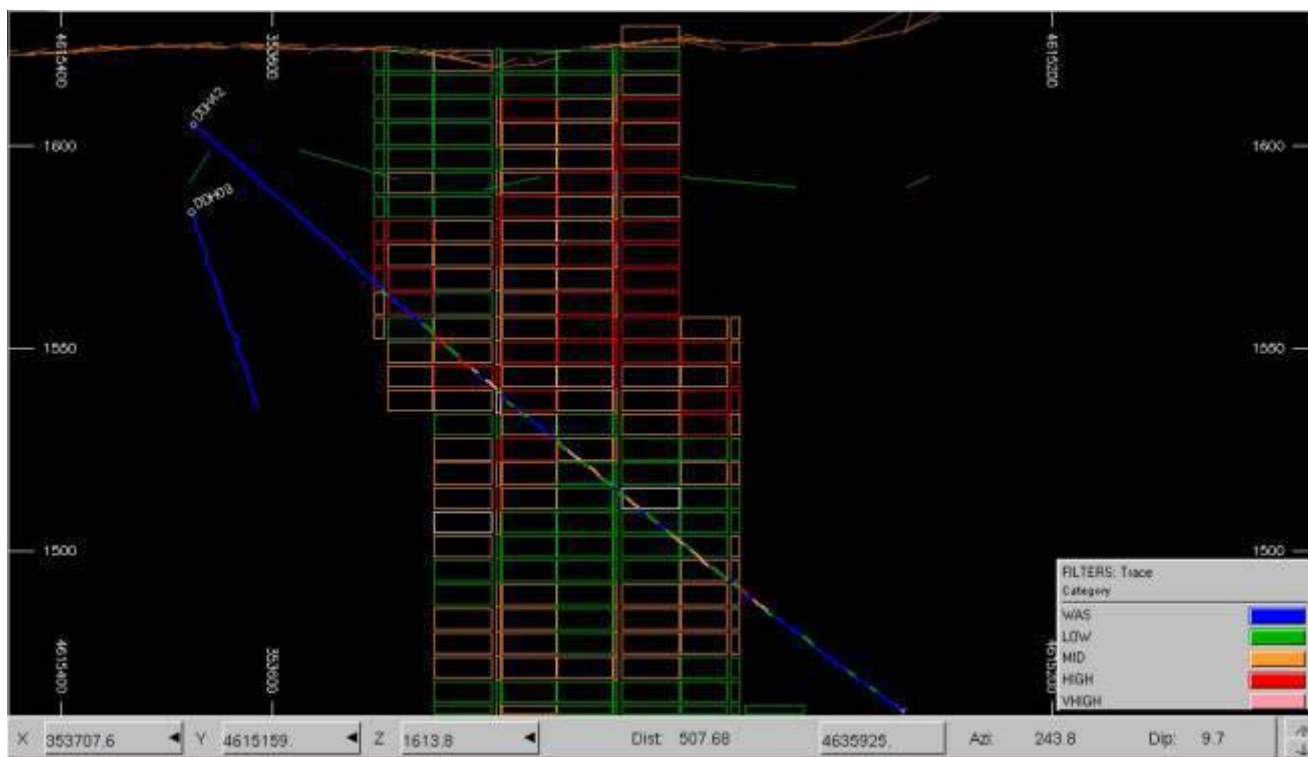
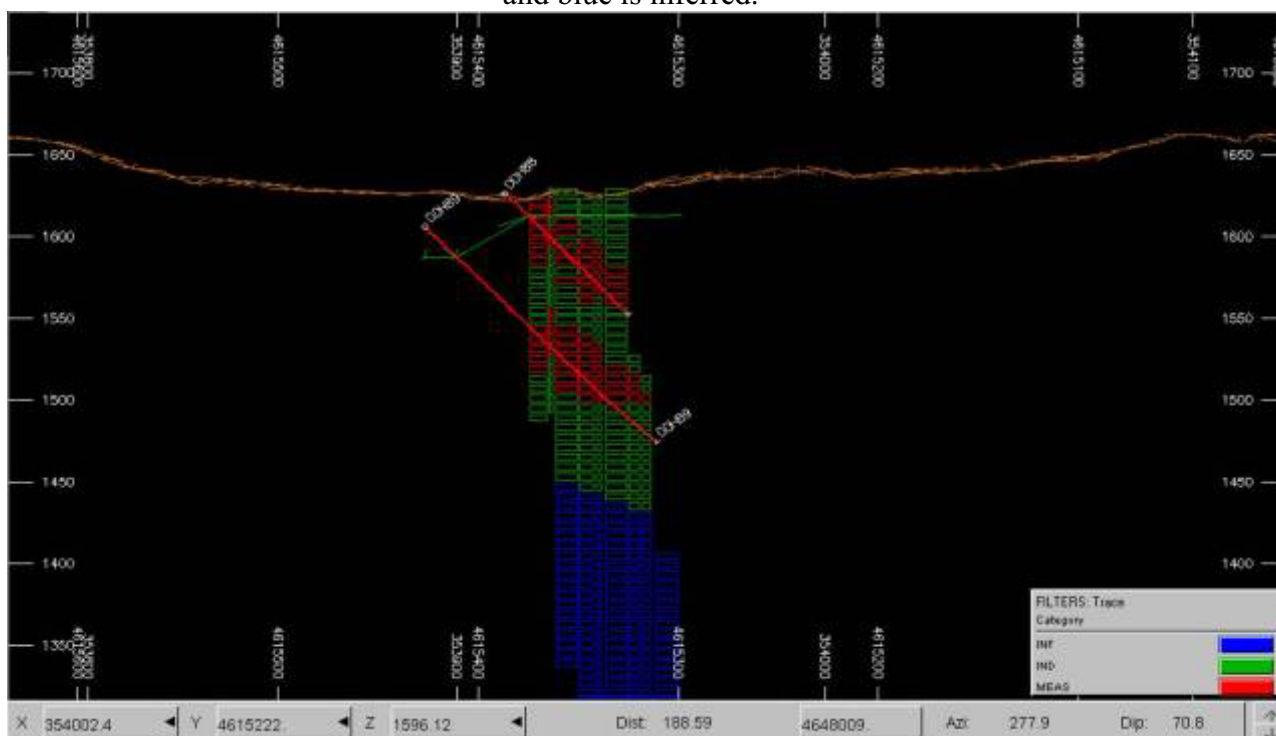
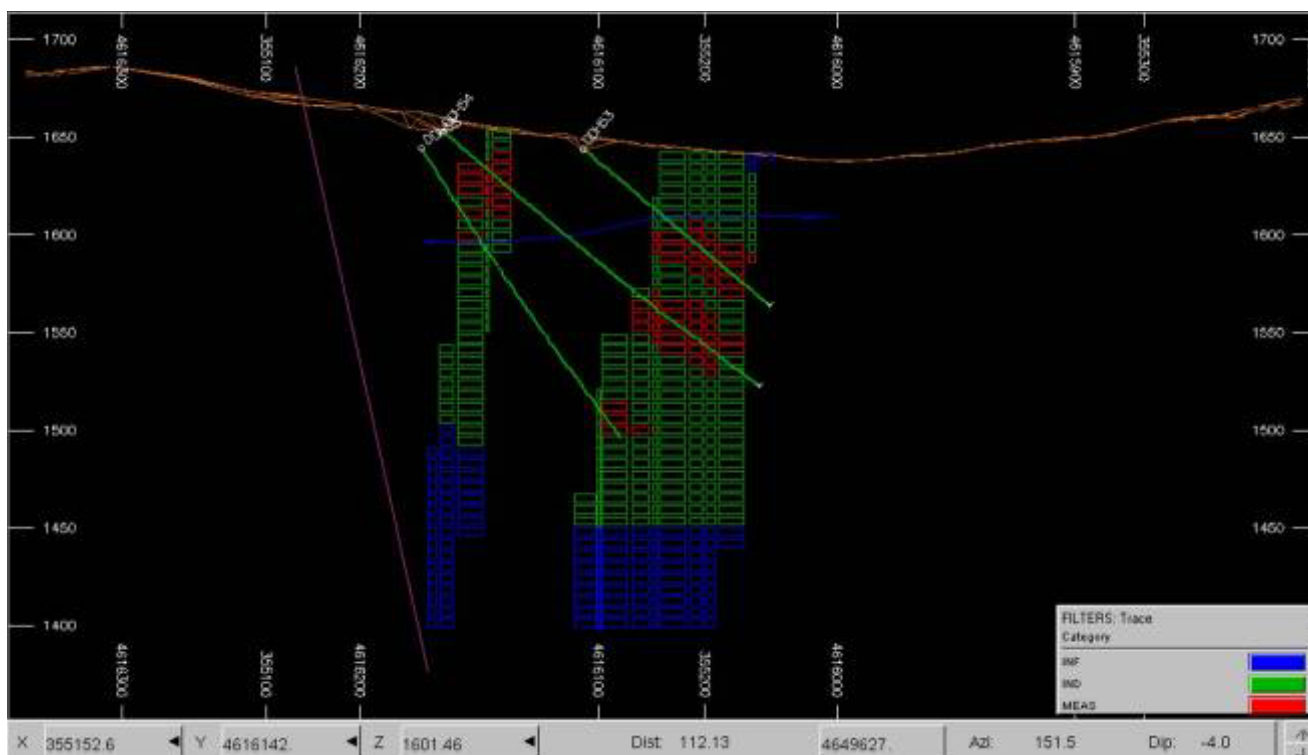


Figure E.2: Cross-section, Au estimated grades, SW zone. Orange, red, and magenta represent $\text{Au} \geq 0.50\text{g/t}$. Blocks are $12.5 \times 12.5 \times 6\text{m}$, and can be used for scale.



APPENDIX F

VALIDATION STATISTICS

2005 RESOURCE MODEL

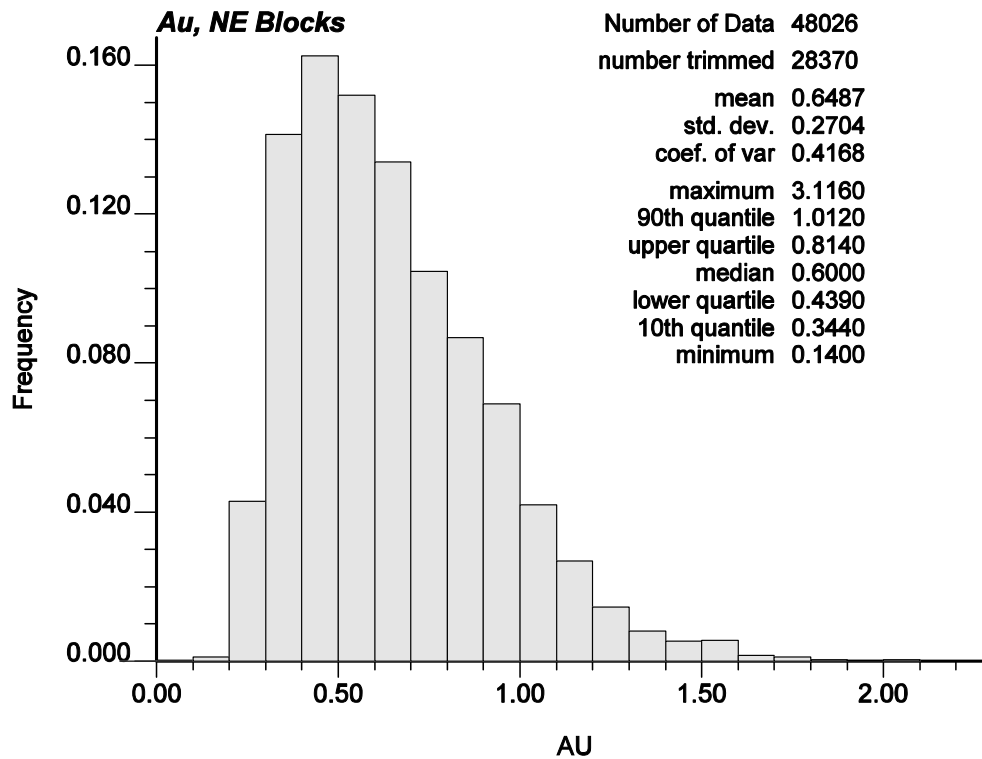


Figure F.1: Histogram and Basic Statistics, NE resource model. Au grades shown correspond to mineralized proportion of the block, not fully diluted block Au grade.

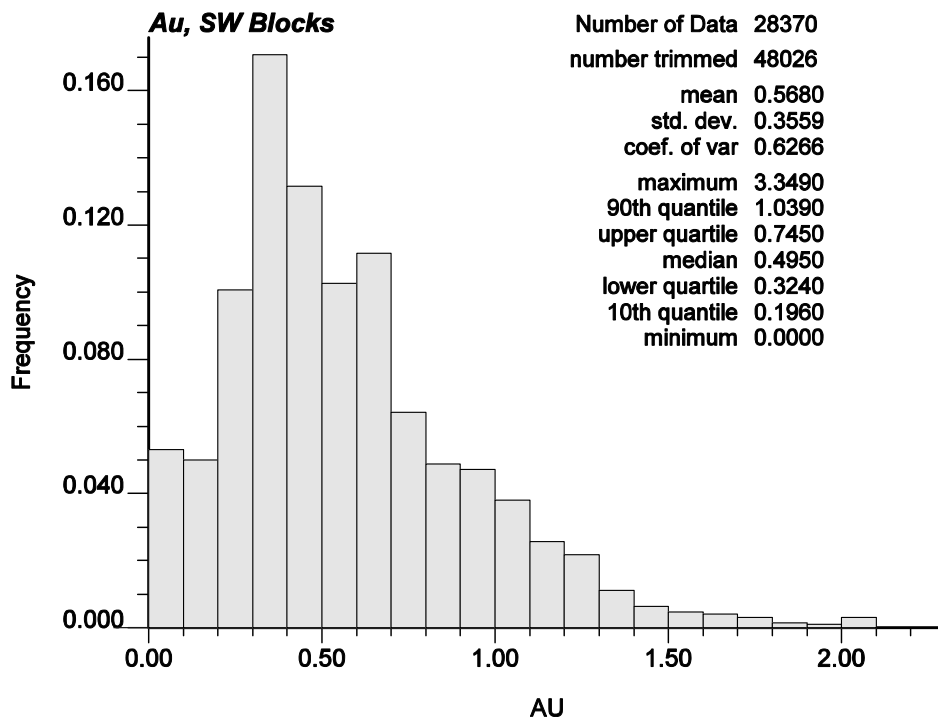


Figure F.2: Histogram and Basic Statistics, SW resource model. Au grades shown correspond to mineralized proportion of the block, not fully diluted block Au grade.

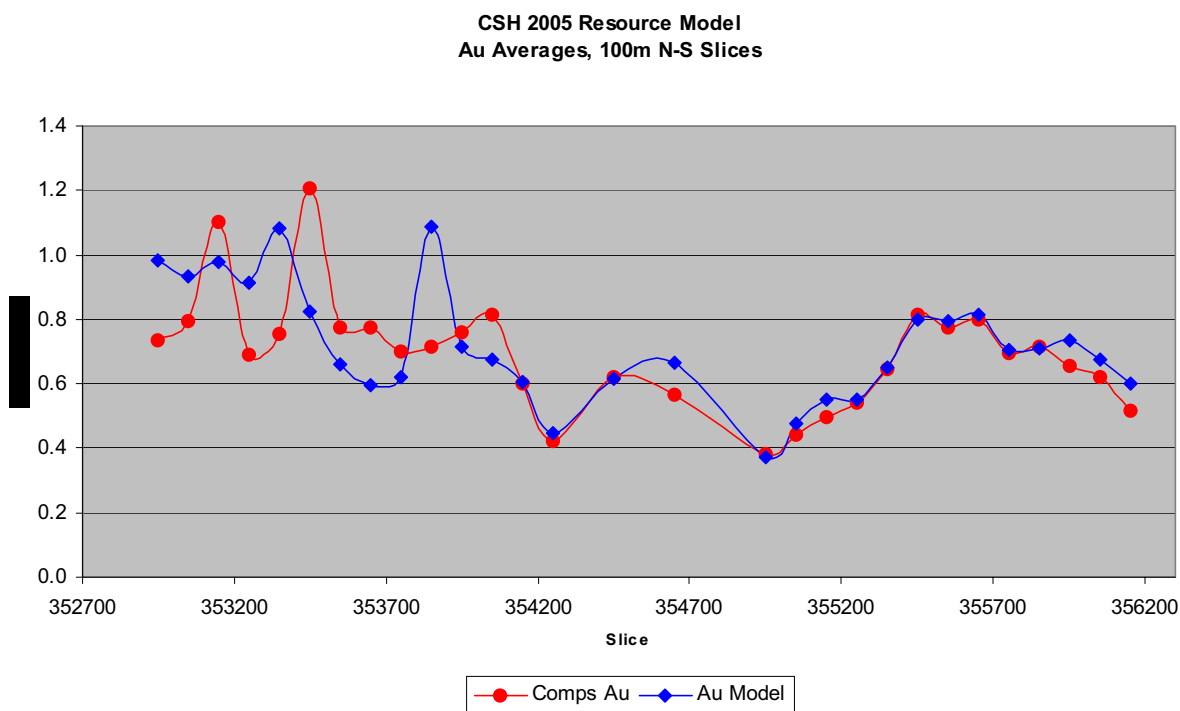


Figure F.3: Drift analysis in the Easting direction, 100m N-S slices, CSH 217 2005 resource model.

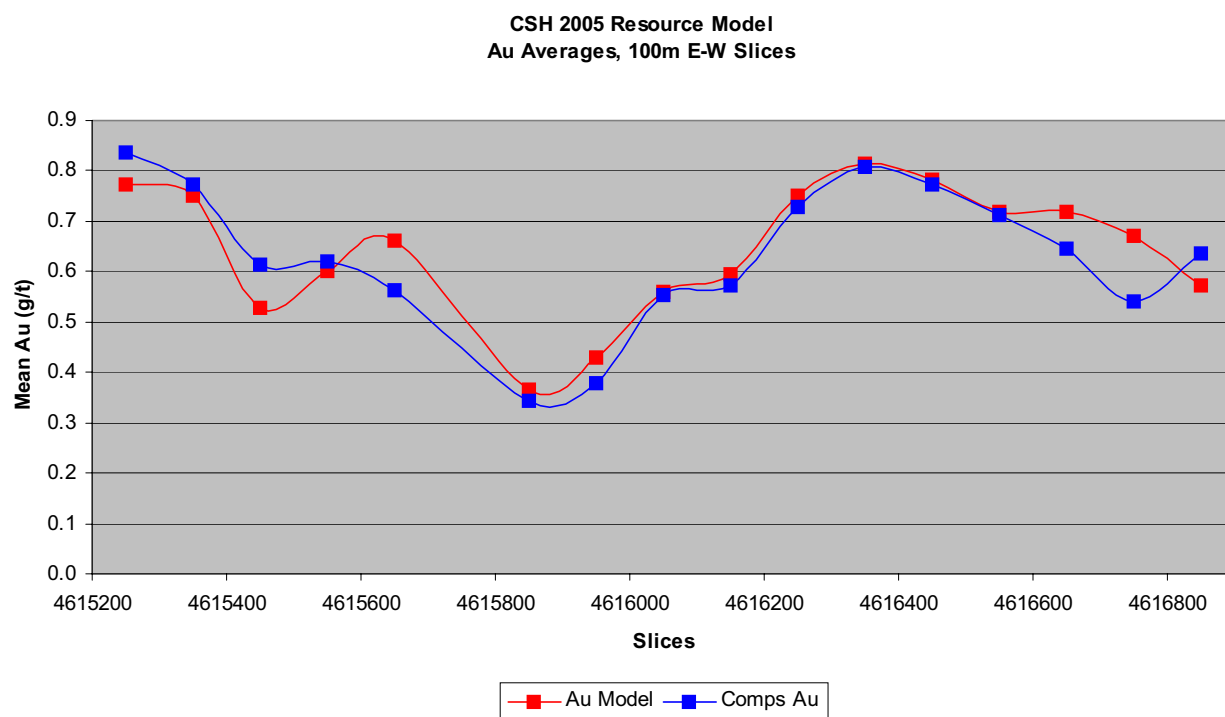


Figure F.4: Drift analysis in the Northing direction, 100m E-W slices, CSH 217 2005 resource model.

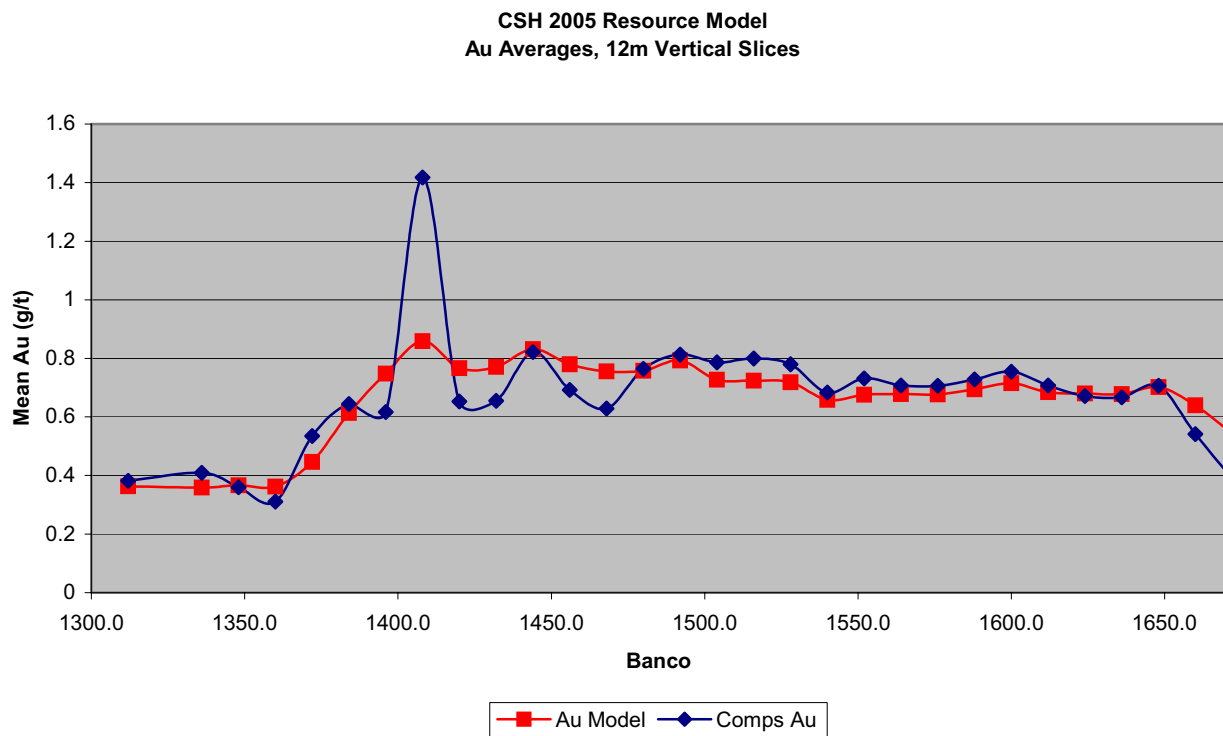


Figure F.5: Drift analysis in the vertical direction, 12m slices, CSH 2005 217 resource model.

APPENDIX 15

HAZEN RESEARCH WORK INDEX REPORT



Hazen Research, Inc.
4601 Indiana St.
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

September 2, 2005

E-mail and Mail Delivery

Mr. Francisco Garcia
METCON Research, Inc.
7701 N. Business Park Drive
Tucson, AZ 85743

Subject: Revised Comminution Results of Chang Shan Hao Samples
Hazen Project 10280, Revision 1

Dear Mr. Garcia:

As you requested, the Chang Shan Hao Project samples that were received at Hazen Research, Inc. in July 2005 were subjected to Bond ball mill (BW_i), crusher (CW_i), and abrasion index (A_i) testing. Hazen's September 1, 2005, report did not include the CW_i results. Upon receipt, the samples were assigned Hazen numbers for internal identification and future reference, as shown in Table 1.

Table 1. Sample Identification

HRI	Client Identification	Approximate Weight, kg
51041-1	Oxide Waste	30
51041-2	Oxide Ore	30
51041-3	Sulphide Waste	30
51041-4	Sulphide Ore	30
51041-5	Oxide--Column Feed	20
51041-6	Sulphide--Column Feed	20

Test results are summarized in Table 2; complete results are reported in Appendices A, B, and C.

Table 2. Summary of BW_i, CW_i, and A_i Evaluations

HRI	Client Identification	BW _i , kWhr/mt	CW _i , kWhr/mt	A _i , g
51041-1	Oxide Waste	7.2	10.0	0.072
51041-2	Oxide Ore	8.5	14.7	0.048
51041-3	Sulphide Waste	9.9	15.8	0.138
51041-4	Sulphide Ore	13.1	17.6	0.209
51041-5	Oxide--Column Feed	9.6	--	--
51041-6	Sulphide--Column Feed	13.6	--	--

Ball mill and crusher results are reported in metric ton units. Crusher and abrasion tests were not requested on the column feeds.

The oxide materials and the sulphide waste appear to be softer than the sulphide ore and the sulphide column feed.

This letter report completes the work authorized for these samples. Hazen looks forward to continuing to assist you with comminution testing. Please contact me if you have questions concerning this project.

Regards,



Dennis M. Johnson
Project Manager

DMJ/aw

Enclosures

xc: Jerry Downey, Hazen Research, Inc.

APPENDIX A
Bond Ball Mill Index Data Sheets

Standard Bond Ball Mill Grindability Test

Date:

Aug-05

Project No:

10280

Test No:

2216

Purpose: To determine the ball mill grindability of the test sample in terms of a Bond work index number, BW_i .

Procedure: The equipment and procedure duplicate the Bond method for determining ball mill work indices. The sample was stage crushed to minus 6 mesh. This material was used as feed for the grindability test.

Sample: Client Identified: Oxide Waste
Sample No: 51041-1

Results: P_1 = 100% passing size of product 149 μm
 P_{80} = 80% passing size of product 100 μm
 F_{80} = 80% passing size of feed 1,455 μm
Gpr = Grams per revolution 3.70 g

Calculation of a Bond Ball Mill Work Index:

$$BW_i = \frac{44.5}{P_1^{0.23} \times Gpr^{0.82} \times \left(\frac{10}{\sqrt{P_{80}}} - \frac{10}{\sqrt{F_{80}}} \right)}$$

$$BW_i = 6.5 \text{ kWhr/st}$$

$$BW_i = 7.2 \text{ kWhr/mt}$$

Standard Bond Ball Mill Grindability Test

Date: Aug-05
Project No: 10280
Test No: 2216

Test Conditions and Notes

100% passing size of product: 100 mesh
Test feed weight (700 cm³): 1.285.5 g
Percent minus 100 mesh in feed: 34.7 %
Target product weights: + 100 mesh 918.2 g
- 100 mesh 367.3 g

Test Ball Charge

Ball Size in	Number of Balls	Weight g
1.45	43	8,806
1.17	67	7,209
1.00	10	672
0.75	71	2,009
0.61	94	1,428
Totals:	285	20,125

Stage No.	Revolutions	New Feed g	Undersize		U'Size In Product g	Undersize Product		Circ. Load %
			In Feed g	To Be Ground g		Total g	Per Mill Revolutions g	
1	0	1,285.5	446.7	-79.4	446.1	-0.6	#DIV/0!	188.2
2	100	446.1	155.0	212.3	521.5	366.5	3.66	146.5
3	51	521.5	181.2	186.1	372.5	191.3	3.75	245.1
4	63	372.5	129.4	237.8	370.1	240.7	3.82	247.3
5	63	370.1	128.6	238.7	354.1	225.5	3.58	263.0
6	68	354.1	123.0	244.2	374.5	251.5	3.70	243.3
7	64	374.5	130.1	237.2	365.3	235.2	3.67	251.9
8	65	365.3	126.9	240.3	370.1	243.2	3.74	247.3

Average of Last Three Stages: 3.70 247.5

Standard Bond Ball Mill Grindability Test

Date: Aug-05
Project No: 10280
Test No: 2216

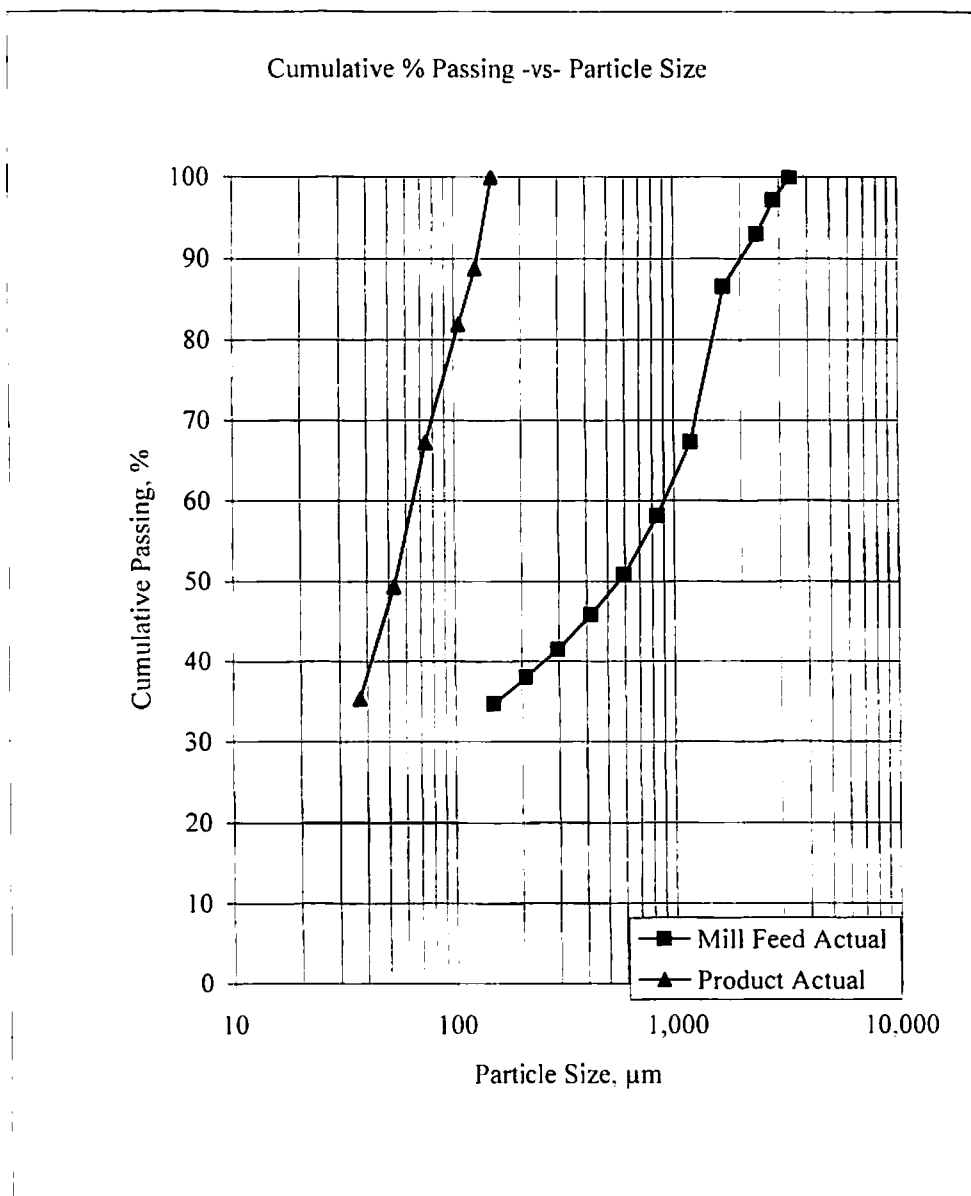
Detailed Particle Analyses

Screen Size (Retained)		Mill Feed. -6 mesh				Circ. Load. +100 mesh			Test Product, -100 mesh			
Tyler Mesh	µm	g	Wt. %	Cum. Wt. %		g	Wt. %	Pass	g	Wt. %	Cum. Wt. %	
				Pass	Retain						Pass	Retain
6	3,360	0.0	0.0	100.0	0.0	0.0	0.0	100.0				
7	2,830	36.0	2.8	97.2	2.8	30.5	3.3	96.7				
8	2,380	53.4	4.2	93.0	7.0	32.0	3.5	93.2				
10	1,680	82.5	6.4	86.6	13.4	40.7	4.5	88.7				
14	1,190	248.6	19.3	67.3	32.7	117.2	12.8	75.9				
20	841	117.3	9.1	58.2	41.8	66.8	7.3	68.6				
28	595	94.9	7.4	50.8	49.2	84.0	9.2	59.4				
35	420	63.3	4.9	45.9	54.1	89.9	9.8	49.5				
48	297	56.0	4.4	41.5	58.5	135.4	14.8	34.7				
65	210	44.6	3.5	38.0	62.0	170.7	18.7	16.0				
100	149	42.2	3.3	34.7	65.3	146.4	16.0	0.0				
-100	-149	446.7	34.7	0.0	100.0	0.0	0.0	0.0				
Totals:		1,285.5	100.0			913.6	100.0					
100	149								0.0	0.0	100.0	0.0
115	125								28.1	11.2	88.8	11.2
150	105								17.1	6.8	81.9	18.1
200	74								36.8	14.7	67.3	32.7
270	53								44.9	17.9	49.3	50.7
400	37								35.0	14.0	35.3	64.7
-400	-37								88.5	35.3	0.0	100.0
Totals:									250.4	100.0		

Standard Bond Ball Mill Grindability Test

Date:
Project No:
Test No:

Aug-05
10280
2216



Standard Bond Ball Mill Grindability Test

Date: Aug-05
Project No: 10280
Test No: 2218

Purpose: To determine the ball mill grindability of the test sample in terms of a Bond work index number, BW_i .

Procedure: The equipment and procedure duplicate the Bond method for determining ball mill work indices. The sample was stage crushed to minus 6 mesh. This material was used as feed for the grindability test.

Sample: Client Identified: Oxide Ore
Sample No: 51041-2

Results: P_1 = 100% passing size of product 149 μm
 P_{80} = 80% passing size of product 84 μm
 F_{80} = 80% passing size of feed 1,892 μm
Gpr = Grams per revolution 2.48 g

Calculation of a Bond Ball Mill Work Index:

$$BW_i = \frac{44.5}{P_1^{0.23} \times Gpr^{0.82} \times \left(\frac{10}{\sqrt{P_{80}}} - \frac{10}{\sqrt{F_{80}}} \right)}$$

$$BW_i = 7.8 \text{ kWhr/st}$$

$$BW_i = 8.5 \text{ kWhr/mt}$$

Standard Bond Ball Mill Grindability Test

Date: Aug-05
Project No: 10280
Test No: 2218

Test Conditions and Notes

100% passing size of product: 100 mesh
 Test feed weight (700 cm³): 1,287.6 g
 Percent minus 100 mesh in feed: 27.1 %
 Target product weights: + 100 mesh 919.7 g
 - 100 mesh 367.9 g

Test Ball Charge

Ball Size in	Number of Balls	Weight g
1.45	43	8,806
1.17	67	7,209
1.00	10	672
0.75	71	2,009
0.61	94	1,428
Totals:	285	20,125

Stage No.	Revolutions	New Feed g	Undersize		U'Size In Product g	Undersize Product		Circ. Load %
			In Feed g	To Be Ground g		Total g	Per Mill Revolutions g	
1	100	1,287.6	348.7	19.2	577.8	229.1	2.29	122.8
2	92	577.8	156.5	211.4	363.2	206.7	2.25	254.5
3	120	363.2	98.4	269.5	353.6	255.2	2.13	264.1
4	128	353.6	95.8	272.1	385.0	289.2	2.26	234.4
5	117	385.0	104.3	263.6	368.3	264.0	2.26	249.6
6	119	368.3	99.7	268.1	356.5	256.8	2.16	261.2
7	126	356.5	96.5	271.3	379.6	283.1	2.25	239.2
8	118	379.6	102.8	265.1	370.0	267.2	2.26	248.0
9	118	370.0	100.2	267.7	389.1	288.9	2.45	230.9
10	107	389.1	105.4	262.5	372.5	267.1	2.50	245.7
11	107	372.5	100.9	267.0	367.9	267.0	2.50	250.0

Average of Last Three Stages: 2.48 242.2

Standard Bond Ball Mill Grindability Test

Date: Aug-05
Project No: 10280
Test No: 2218

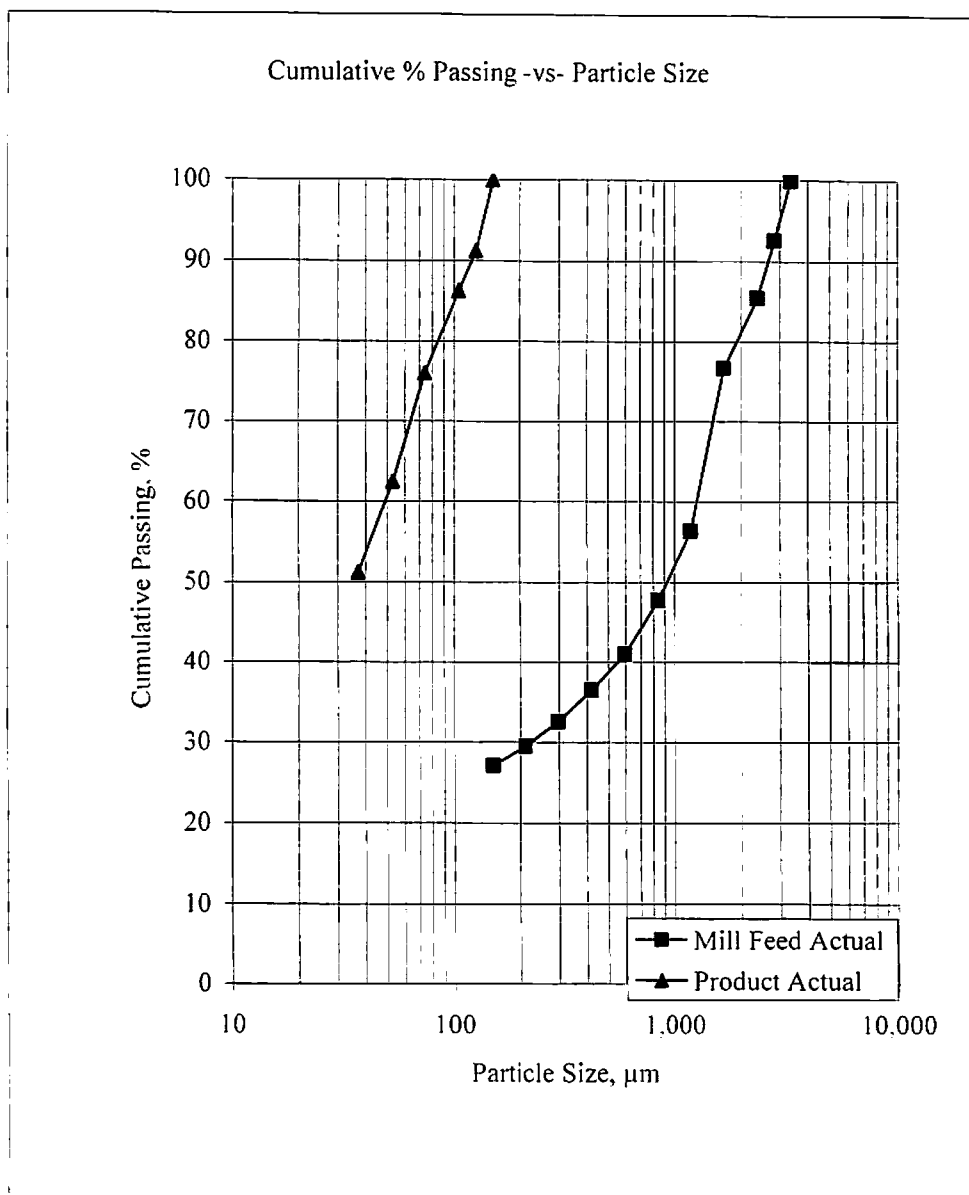
Detailed Particle Analyses

Screen Size (Retained)		Mill Feed. -6 mesh				Circ. Load. +100 mesh			Test Product. -100 mesh			
Tyler Mesh	µm	g	Wt. %	Cum. Wt. %		g	Wt. %	Pass	g	Wt. %	Cum. Wt. %	
				Pass	Retain						Pass	Retain
6	3,360	0.0	0.0	100.0	0.0	0.0	0.0	100.0				
7	2,830	95.6	7.4	92.6	7.4	82.8	9.0	91.0				
8	2,380	91.0	7.1	85.5	14.5	56.9	6.2	84.8				
10	1,680	113.5	8.8	76.7	23.3	65.1	7.1	77.7				
14	1,190	261.6	20.3	56.4	43.6	164.2	17.9	59.8				
20	841	110.9	8.6	47.8	52.2	82.8	9.0	50.8				
28	595	86.6	6.7	41.0	59.0	80.4	8.7	42.1				
35	420	58.3	4.5	36.5	63.5	74.2	8.1	34.0				
48	297	50.9	4.0	32.6	67.4	96.4	10.5	23.5				
65	210	39.3	3.1	29.5	70.5	111.4	12.1	11.4				
100	149	31.2	2.4	27.1	72.9	104.7	11.4	0.0				
-100	-149	348.7	27.1	0.0	100.0	0.0	0.0	0.0				
Totals:		1,287.6	100.0			918.9	100.0					
100	149								0.0	0.0	100.0	0.0
115	125								21.9	8.8	91.2	8.8
150	105								12.4	5.0	86.3	13.7
200	74								25.7	10.3	76.0	24.0
270	53								33.9	13.5	62.5	37.5
400	37								28.3	11.3	51.2	48.8
-400	-37								128.0	51.2	0.0	100.0
Totals:									250.2	100.0		

Standard Bond Ball Mill Grindability Test

Date:
Project No:
Test No:

Aug-05
10280
2218



Standard Bond Ball Mill Grindability Test

Date: Aug-05
Project No: 10280
Test No: 2217

Purpose: To determine the ball mill grindability of the test sample in terms of a Bond work index number, BW_i .

Procedure: The equipment and procedure duplicate the Bond method for determining ball mill work indices. The sample was stage crushed to minus 6 mesh. This material was used as feed for the grindability test.

Sample: Client Identified: Sulphide Waste
Sample No: 51041-3

Results: P_1 = 100% passing size of product 149 μm
 P_{80} = 80% passing size of product 104 μm
 F_{80} = 80% passing size of feed 2.215 μm
 G_{pr} = Grams per revolution 2.40 g

Calculation of a Bond Ball Mill Work Index:

$$BW_i = \frac{44.5}{P_1^{0.23} \times G_{pr}^{0.82} \times \left(\frac{10}{\sqrt{P_{80}}} - \frac{10}{\sqrt{F_{80}}} \right)}$$

$$BW_i = 8.9 \text{ kWhr/st}$$

$$BW_i = 9.9 \text{ kWhr/mt}$$

Standard Bond Ball Mill Grindability Test

Date: Aug-05
 Project No: 10280
 Test No: 2217

Test Conditions and Notes

100% passing size of product: 100 mesh
 Test feed weight (700 cm³): 1.309.8 g
 Amount of minus 100 mesh in feed: 23.1 %
 Target product weights: + 100 mesh 935.6 g
 - 100 mesh 374.2 g

Test Ball Charge

Ball Size inch	Number of Balls	Weight g
1.45	43	8,806
1.17	67	7,209
1.00	10	672
0.75	71	2,009
0.61	94	1,428
Total:	285	20,125

Stage No.	Revolutions	New Feed g	Undersize		U'Size In Product g	Undersize Product		Circ. Load %
			In Feed g	To Be Ground g		Total g	Per Mill Revolutions g	
1	100	1.309.8	303.0	71.2	489.6	186.6	1.87	167.5
2	140	489.6	113.3	261.0	385.5	272.2	1.94	239.8
3	147	385.5	89.2	285.0	386.3	297.1	2.02	239.1
4	141	386.3	89.4	284.9	389.9	300.5	2.13	235.9
5	133	389.9	90.2	284.0	386.8	296.6	2.23	238.6
6	128	386.8	89.5	284.7	346.9	257.4	2.01	277.6
7	146	346.9	80.2	294.0	368.1	287.9	1.97	255.8
8	147	368.1	85.2	289.1	385.6	300.4	2.04	239.7
9	139	385.6	89.2	285.0	394.7	305.5	2.20	231.8
10	129	394.7	91.3	282.9	388.1	296.8	2.30	237.5
11	124	388.1	89.8	284.4	385.0	295.2	2.38	240.2
12	120	385.0	89.1	285.2	379.0	289.9	2.42	245.6
13	119	379.0	87.7	286.6	374.8	287.1	2.41	249.5

Average of Last Three Stages: 2.40 245.1

Standard Bond Ball Mill Grindability Test

Date: Aug-05
Project No: 10280
Test No: 2217

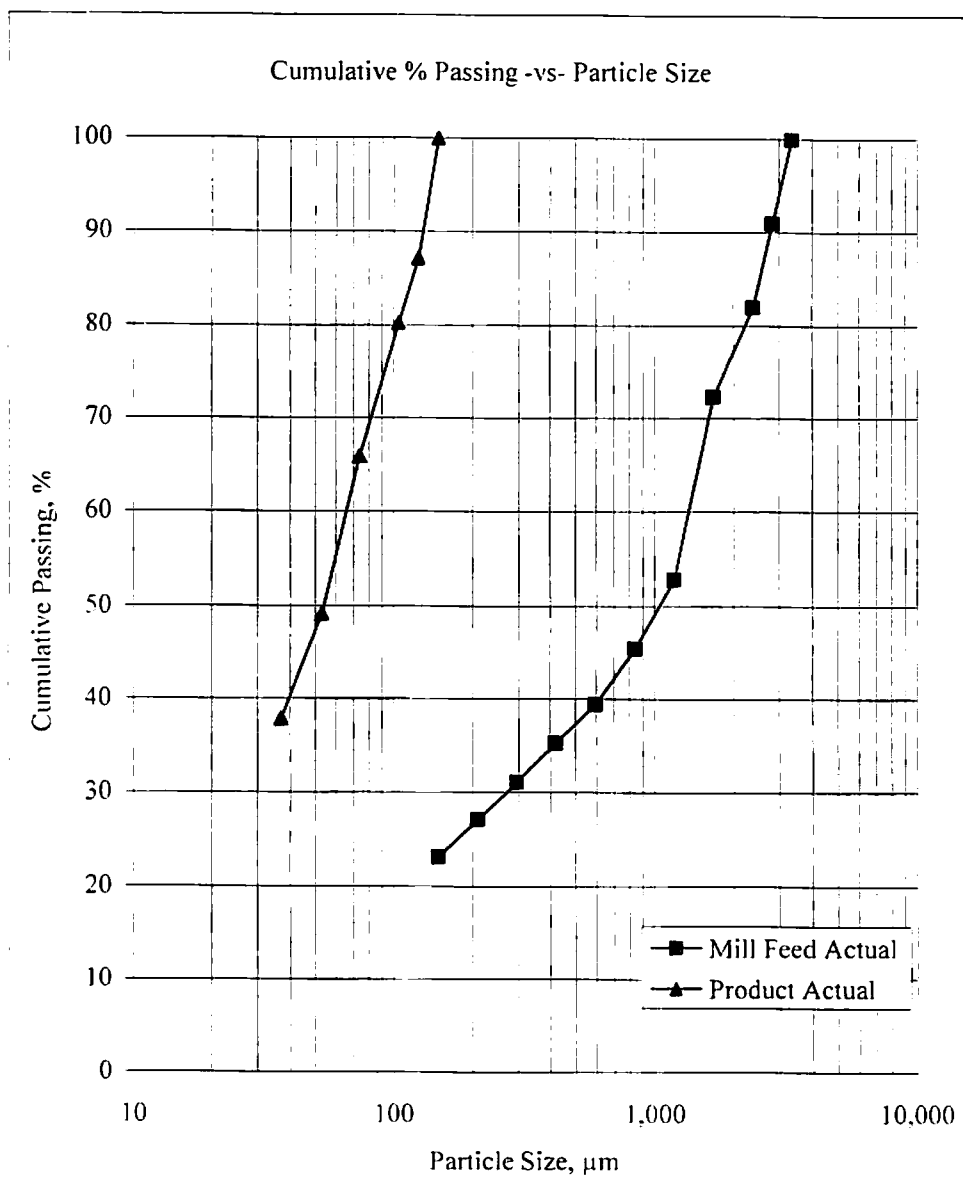
Detailed Particle Analyses

Screen Size (Retained)		Mill Feed. -6 mesh				Circ. Load. +100 mesh			Test Product. -100 mesh			
Tyler Mesh	µm	Weight g %		Cum. Wt. % Pass Retain		Weight g %		% Pass	Weight g %		Cum. Wt. % Pass Retain	
6	3,360	0.0	0.0	100.0	0.0	0.0	0.0	100.0				
7	2,830	118.4	9.0	91.0	9.0	77.8	8.3	91.7				
8	2,380	117.2	8.9	82.0	18.0	54.6	5.9	85.8				
10	1,680	126.7	9.7	72.3	27.7	60.7	6.5	79.3				
14	1,190	255.1	19.5	52.9	47.1	139.4	15.0	64.3				
20	841	97.2	7.4	45.4	54.6	68.6	7.4	57.0				
28	595	78.7	6.0	39.4	60.6	69.4	7.4	49.5				
35	420	54.8	4.2	35.2	64.8	66.4	7.1	42.4				
48	297	54.7	4.2	31.1	68.9	97.9	10.5	31.9				
65	210	52.3	4.0	27.1	72.9	138.3	14.8	17.0				
100	149	51.7	3.9	23.1	76.9	158.8	17.0	0.0				
-100	-149	303.0	23.1	0.0	100.0	0.0	0.0	0.0				
Total:		1,309.8	100.0			931.9	100.0					
100	149								0.0	0.0	100.0	0.0
115	125								32.1	12.8	87.2	12.8
150	105								17.3	6.9	80.2	19.8
200	74								35.9	14.4	65.9	34.1
270	53								41.8	16.7	49.2	50.8
400	37								28.4	11.4	37.8	62.2
-400	-37								94.6	37.8	0.0	100.0
Total:									250.1	100.0		

Standard Bond Ball Mill Grindability Test

Date:
Project No:
Test No:

Aug-05
10280
2217



Standard Bond Ball Mill Grindability Test

Date:

Aug-05

Project No:

10280

Test No:

2219

Purpose: To determine the ball mill grindability of the test sample in terms of a Bond work index number, BW_i .

Procedure: The equipment and procedure duplicate the Bond method for determining ball mill work indices. The sample was stage crushed to minus 6 mesh. This material was used as feed for the grindability test.

Sample: Client Identified: Sulphide Ore
Sample No: 51041-4

Results: P_1 = 100% passing size of product 149 μm
 P_{80} = 80% passing size of product 96 μm
 F_{80} = 80% passing size of feed 1.887 μm
 G_{pr} = Grams per revolution 1.63 g

Calculation of a Bond Ball Mill Work Index:

$$BW_i = \frac{44.5}{P_1^{0.23} \times G_{pr}^{0.82} \times \left(\frac{10}{\sqrt{P_{80}}} - \frac{10}{\sqrt{F_{80}}} \right)}$$

$$BW_i = 11.9 \text{ kWhr/st}$$

$$BW_i = 13.1 \text{ kWhr/mt}$$

Standard Bond Ball Mill Grindability Test

Date: Aug-05
Project No: 10280
Test No: 2219

Test Conditions and Notes

100% passing size of product: 100 mesh
Test feed weight (700 cm³): 1,194.6 g
Percent minus 100 mesh in feed: 27.6 %
Target product weights: + 100 mesh 853.3 g
- 100 mesh 341.3 g

Test Ball Charge

Ball Size in	Number of Balls	Weight g
1.45	43	8,806
1.17	67	7,209
1.00	10	672
0.75	71	2,009
0.61	94	1,428
Totals:	285	20,125

Stage No.	Revolutions	New Feed g	Undersize		U'Size In Product g	Undersize Product		Circ. Load %
			In Feed g	To Be Ground g		Total g	Per Mill Revolutions g	
1	100	1,194.6	329.4	11.9	501.4	172.0	1.72	138.3
2	118	501.4	138.3	203.1	339.3	201.0	1.70	252.1
3	145	339.3	93.6	247.8	322.4	228.8	1.58	270.5
4	160	322.4	88.9	252.4	350.6	261.7	1.64	240.7
5	150	350.6	96.7	244.6	334.5	237.8	1.59	257.1
6	157	334.5	92.2	249.1	346.2	254.0	1.62	245.1
7	152	346.2	95.5	245.9	346.3	250.8	1.65	245.0
8	149	346.3	95.5	245.8	336.8	241.3	1.62	254.7

Average of Last Three Stages: 1.63 248.2

Standard Bond Ball Mill Grindability Test

Date: Aug-05
Project No: 10280
Test No: 2219

Detailed Particle Analyses

Screen Size (Retained)		Mill Feed, -6 mesh				Circ. Load, +100 mesh			Test Product, -100 mesh			
Tyler Mesh	µm	g	Wt. %	Cum. Wt. %		g	Wt. %	Pass	g	Wt. %	Cum. Wt. %	
				Pass	Retain						Pass	Retain
6	3,360	0.0	0.0	100.0	0.0	0.0	0.0	100.0				
7	2,830	101.1	8.5	91.5	8.5	103.8	12.1	87.9				
8	2,380	81.1	6.8	84.7	15.3	59.3	6.9	81.0				
10	1,680	88.8	7.4	77.3	22.7	67.1	7.8	73.1				
14	1,190	203.7	17.1	60.3	39.7	147.4	17.2	55.9				
20	841	94.8	7.9	52.3	47.7	67.4	7.9	48.1				
28	595	83.6	7.0	45.3	54.7	63.7	7.4	40.6				
35	420	63.2	5.3	40.0	60.0	59.1	6.9	33.7				
48	297	59.2	5.0	35.1	64.9	80.2	9.4	24.4				
65	210	49.8	4.2	30.9	69.1	102.6	12.0	12.4				
100	149	39.9	3.3	27.6	72.4	106.4	12.4	0.0				
-100	-149	329.4	27.6	0.0	100.0	0.0	0.0	0.0				
Totals:		1,194.6	100.0			857.0	100.0					
100	149								0.0	0.0	100.0	0.0
115	125								28.2	11.2	88.8	11.2
150	105								15.0	5.9	82.9	17.1
200	74								27.8	11.0	71.9	28.1
270	53								32.3	12.8	59.1	40.9
400	37								27.5	10.9	48.2	51.8
-400	-37								121.8	48.2	0.0	100.0
Totals:									252.6	100.0		

Standard Bond Ball Mill Grindability Test

Date:

Aug-05

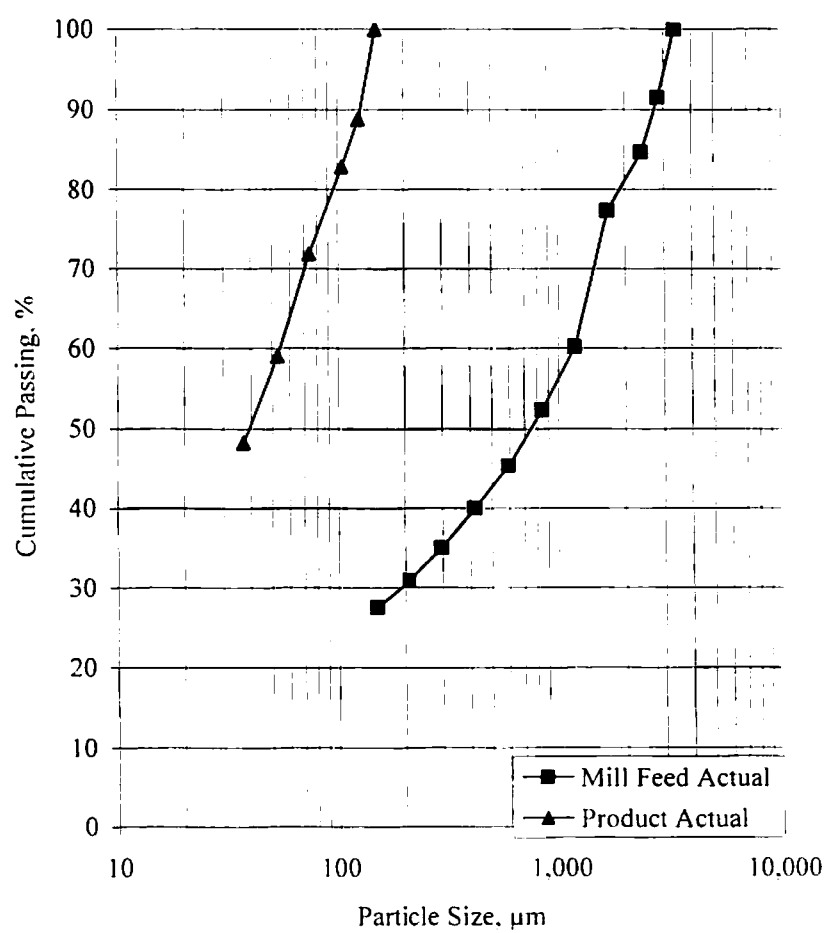
Project No:

10280

Test No:

2219

Cumulative % Passing -vs- Particle Size



Standard Bond Ball Mill Grindability Test

Date:
Project No:
Test No:

Aug-05
10280
2214

Purpose: To determine the ball mill grindability of the test sample in terms of a Bond work index number, BW_i .

Procedure: The equipment and procedure duplicate the Bond method for determining ball mill work indices. The sample was stage crushed to minus 6 mesh. This material was used as feed for the grindability test.

Sample: Client Identified: Oxide Column Feed
Sample No: 51041-5

Results: P_1 = 100% passing size of product 149 μm
 P_{80} = 80% passing size of product 109 μm
 F_{80} = 80% passing size of feed 1,363 μm
Gpr = Grams per revolution 2.83 g

Calculation of a Bond Ball Mill Work Index:

$$BW_i = \frac{44.5}{P_1^{0.23} \times Gpr^{0.82} \times \left(\frac{10}{\sqrt{P_{80}}} - \frac{10}{\sqrt{F_{80}}} \right)}$$

$$BW_i = 8.7 \text{ kWhr/st}$$

$$BW_i = 9.6 \text{ kWhr/mt}$$

Standard Bond Ball Mill Grindability Test

Date: Aug-05
 Project No: 10280
 Test No: 2214

Test Conditions and Notes

100% passing size of product: 100 mesh
 Test feed weight (700 cm³): 1.179.9 g
 Percent minus 100 mesh in feed: 33.9 %
 Target product weights: + 100 mesh 842.8 g
 - 100 mesh 337.1 g

Test Ball Charge

Ball Size in	Number of Balls	Weight g
1.45	43	8,806
1.17	67	7,209
1.00	10	672
0.75	71	2,009
0.61	94	1,428
Totals:	285	20,125

Stage No.	Revolutions	New Feed g	Undersize		U'Size In Product g	Undersize Product		Circ. Load %
			In Feed g	To Be Ground g		Total g	Per Mill Revolutions g	
1	0	1.179.9	400.3	-63.2	400.3	0.0	#DIV/0!	194.8
2	100	400.3	135.8	201.3	649.8	514.0	5.14	81.6
3	23	649.8	220.5	116.7	299.2	78.7	3.42	294.4
4	69	299.2	101.5	235.6	319.4	217.9	3.16	269.4
5	72	319.4	108.4	228.7	306.3	197.9	2.75	285.2
6	85	306.3	103.9	233.2	350.7	246.8	2.90	236.4
7	75	350.7	119.0	218.1	325.6	206.6	2.75	262.4
8	82	325.6	110.5	226.6	337.2	226.7	2.77	249.9
9	81	337.2	114.4	222.7	341.1	226.7	2.80	245.9
10	79	341.1	115.7	221.4	342.2	226.5	2.87	244.8
11	77	342.2	116.1	221.0	334.2	218.1	2.83	253.1

Average of Last Three Stages: 2.83 247.9

Standard Bond Ball Mill Grindability Test

Date: Aug-05
 Project No: 10280
 Test No: 2214

Detailed Particle Analyses

Screen Size (Retained)		Mill Feed, -6 mesh				Circ. Load, +100 mesh			Test Product, -100 mesh			
Tyler Mesh	µm	g	Wt. %	Cum. Wt. %		g	Wt. %	Pass	g	Wt. %	Cum. Wt. %	
				Pass	Retain						Pass	Retain
6	3.360	0.0	0.0	100.0	0.0	0.0	0.0	100.0				
7	2.830	15.2	1.3	98.7	1.3	9.5	1.1	98.9				
8	2.380	47.4	4.0	94.7	5.3	31.8	3.8	95.1				
10	1.680	59.6	5.1	89.6	10.4	43.7	5.2	89.9				
14	1.190	185.3	15.7	73.9	26.1	121.5	14.4	75.6				
20	841	98.8	8.4	65.6	34.4	63.8	7.5	68.0				
28	595	84.5	7.2	58.4	41.6	70.9	8.4	59.6				
35	420	63.3	5.4	53.0	47.0	74.0	8.8	50.9				
48	297	67.2	5.7	47.3	52.7	110.6	13.1	37.8				
65	210	67.8	5.7	41.6	58.4	154.0	18.2	19.6				
100	149	90.5	7.7	33.9	66.1	165.4	19.6	0.0				
-100	-149	400.3	33.9	0.0	100.0	0.0	0.0	0.0				
Totals:		1.179.9	100.0			845.2	100.0					
100	149								0.0	0.0	100.0	0.0
115	125								37.8	15.0	85.0	15.0
150	105								16.1	6.4	78.7	21.3
200	74								29.9	11.8	66.8	33.2
270	53								34.2	13.5	53.3	46.7
400	37								29.9	11.8	41.4	58.6
-400	-37								104.7	41.4	0.0	100.0
Totals:									252.6	100.0		

Standard Bond Ball Mill Grindability Test

Date:

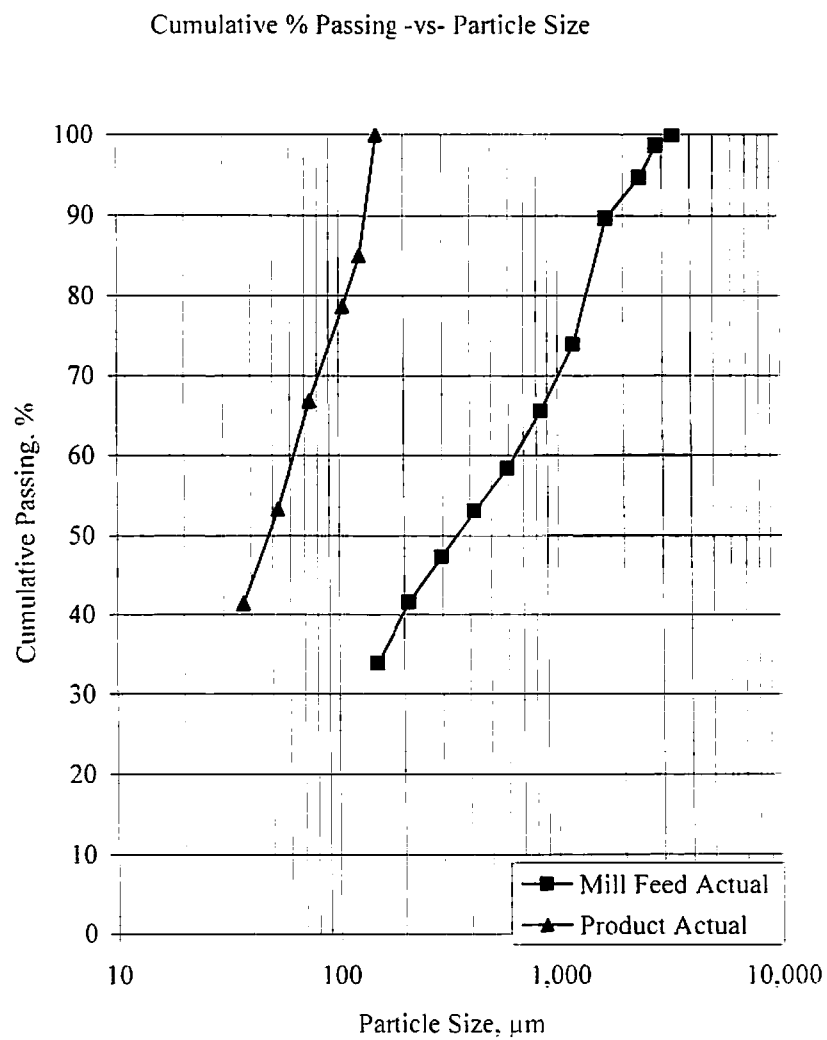
Aug-05

Project No:

10280

Test No:

2214



Standard Bond Ball Mill Grindability Test

Date:

Aug-05

Project No:

10280

Test No:

2215

Purpose: To determine the ball mill grindability of the test sample in terms of a Bond work index number, BW_i .

Procedure: The equipment and procedure duplicate the Bond method for determining ball mill work indices. The sample was stage crushed to minus 6 mesh. This material was used as feed for the grindability test.

Sample: Client Identified: Sulphide Column Feed
Sample No: 51041-6

Results: P_1 = 100% passing size of product 149 μm
 P_{80} = 80% passing size of product 100 μm
 F_{80} = 80% passing size of feed 1,911 μm
 Gpr = Grams per revolution 1.62 g

Calculation of a Bond Ball Mill Work Index:

$$BW_i = \frac{44.5}{P_1^{0.23} \times Gpr^{0.82} \times \left(\frac{10}{\sqrt{P_{80}}} - \frac{10}{\sqrt{F_{80}}} \right)}$$

$$BW_i = 12.3 \text{ kWhr/st}$$

$$BW_i = 13.6 \text{ kWhr/mt}$$

Standard Bond Ball Mill Grindability Test

Date: Aug-05
 Project No: 10280
 Test No: 2215

Test Conditions and Notes

100% passing size of product: 100 mesh
 Test feed weight (700 cm³): 1,257.0 g
 Percent minus 100 mesh in feed: 18.8 %
 Target product weights: + 100 mesh 897.9 g
 - 100 mesh 359.1 g

Test Ball Charge

Ball Size in	Number of Balls	Weight g
1.45	43	8,806
1.17	67	7,209
1.00	10	672
0.75	71	2,009
0.61	94	1,428
Totals:	285	20,125

Stage No.	Revolutions	New Feed g	Undersize		U'Size In Product g	Undersize Product		Circ. Load %
			In Feed g	To Be Ground g		Total g	Per Mill Revolutions g	
1	100	1,257.0	235.9	123.2	419.5	183.6	1.84	199.6
2	153	419.5	78.7	280.4	335.4	256.7	1.68	274.8
3	177	335.4	62.9	296.2	360.6	297.7	1.68	248.6
4	173	360.6	67.7	291.5	371.4	303.7	1.76	238.4
5	165	371.4	69.7	289.4	367.7	298.0	1.81	241.9
6	161	367.7	69.0	290.1	327.0	258.0	1.60	284.4
7	186	327.0	61.4	297.8	376.1	314.7	1.69	234.2
8	171	376.1	70.6	288.6	348.4	277.8	1.62	260.8
9	181	348.4	65.4	293.8	357.2	291.8	1.61	251.9
10	181	357.2	67.0	292.1	360.2	293.2	1.62	249.0

Average of Last Three Stages: 1.62 253.9

Standard Bond Ball Mill Grindability Test

Date: Aug-05
 Project No: 10280
 Test No: 2215

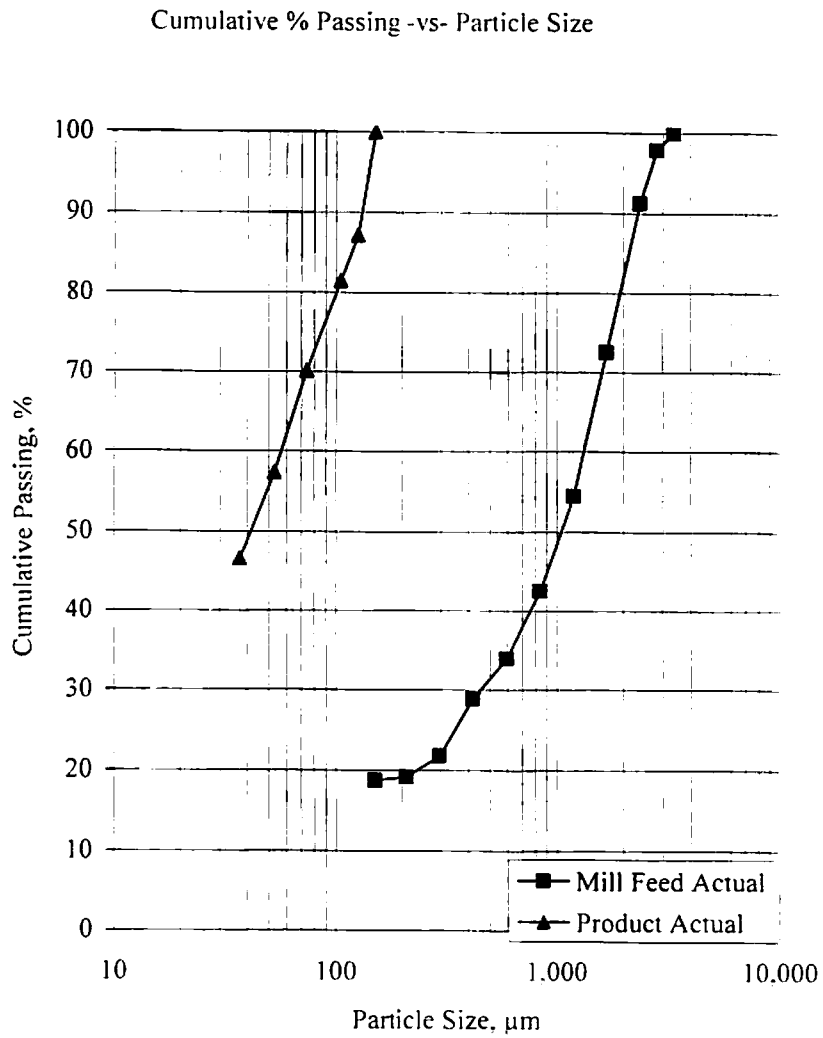
Detailed Particle Analyses

Screen Size (Retained)		Mill Feed, -6 mesh				Circ. Load, +100 mesh			Test Product, -100 mesh			
Tyler Mesh	µm	g	Wt. %	Cum. Wt. %		g	Wt. %	Pass	g	Wt. %	Cum. Wt. %	
				Pass	Retain						Pass	Retain
6	3.360	0.0	0.0	100.0	0.0	0.0	0.0	100.0				
7	2.830	26.6	2.1	97.9	2.1	14.0	1.6	98.4				
8	2.380	83.1	6.6	91.3	8.7	43.4	4.9	93.6				
10	1.680	235.0	18.7	72.6	27.4	61.1	6.9	86.7				
14	1.190	227.4	18.1	54.5	45.5	174.6	19.6	67.1				
20	841	150.1	11.9	42.5	57.5	91.6	10.3	56.8				
28	595	107.7	8.6	34.0	66.0	91.2	10.2	46.6				
35	420	63.8	5.1	28.9	71.1	83.3	9.4	37.2				
48	297	89.0	7.1	21.8	78.2	103.1	11.6	25.6				
65	210	32.5	2.6	19.2	80.8	112.9	12.7	13.0				
100	149	5.9	0.5	18.8	81.2	115.5	13.0	0.0				
-100	-149	235.9	18.8	0.0	100.0	0.0	0.0	0.0				
Totals:		1,257.0	100.0			890.7	100.0					
100	149								0.0	0.0	100.0	0.0
115	125								35.1	12.8	87.2	12.8
150	105								15.7	5.7	81.5	18.5
200	74								31.1	11.3	70.1	29.9
270	53								35.0	12.8	57.4	42.6
400	37								29.5	10.8	46.6	53.4
-400	-37								127.7	46.6	0.0	100.0
Totals:									274.1	100.0		

Standard Bond Ball Mill Grindability Test

Date:
Project No:
Test No:

Aug-05
10280
2215



APPENDIX B

Bond Crusher Index Data Sheets

PHILLIPS ENTERPRISES LLC**BOND IMPACT TEST**Test # 1Project No. 053010Date: July 29, 05

Purpose:	To determine the low-energy Work Index for crushing (kW-hr/m.ton) as a basis for determining crushing power requirements.
Sample:	20 pieces of sample Hazen No. 51041-1 CSH-13, Oxide Waste
Procedure:	Modified Bond procedure for determining work index with impact testing machine, using natural 75 x 50 mm pieces.

Piece	Sample Thickness			Impact Energy for Breakage		
	64 th s of inch	Inches	Millimeters	Ft-lb	Joules	Joules/mm
1	158	2.47	62.71	28	37.9638	0.605
2	155	2.42	61.52	20	27.117	0.441
3	156	2.44	61.91	24	32.5404	0.526
4	262	4.09	103.98	16	21.6936	0.209
5	145	2.27	57.55	24	32.5404	0.565
6	176	2.75	69.85	28	37.9638	0.544
7	139	2.17	55.17	28	37.9638	0.688
8	130	2.03	51.59	44	59.6574	1.156
9	138	2.16	54.77	12	16.2702	0.297
10	150	2.34	59.53	24	32.5404	0.547
11	138	2.16	54.77	24	32.5404	0.594
12	128	2.00	50.80	28	37.9638	0.747
13	146	2.28	57.94	8	10.8468	0.187
14	124	1.94	49.21	20	27.117	0.551
15	138	2.16	54.77	12	16.2702	0.297
16	198	3.09	78.58	20	27.117	0.345
17	115	1.80	45.64	12	16.2702	0.356
18	214	3.34	84.93	12	16.2702	0.192
19	128	2.00	50.80	8	10.8468	0.214
20	128	2.00	50.80	28	37.9638	0.747
Average:						0.490
Specific Gravity:						2.62
Work Index ⁽¹⁾ , kW-hr/m.ton:						10.00
Work Index, kW-hr/short ton:						9.07

⁽¹⁾ Formula =
$$\frac{53.49 \times \text{Joules/mm}}{\text{Specific Gravity}}$$

PHILLIPS ENTERPRISES LLC**BOND IMPACT TEST**Test # 2Project No. 053010Date: August 1, 05

Purpose:	To determine the low-energy Work Index for crushing (kW-hr/m.ton) as a basis for determining crushing power requirements.
Sample:	20 pieces of sample Hazen No. 51041-2 CSH-14, Oxide Ore
Procedure:	Modified Bond procedure for determining work index with impact testing machine, using natural 75 x 50 mm pieces.

Piece	Sample Thickness			Impact Energy for Breakage		
	64 th s of inch	Inches	Millimeters	Ft-lb	Joules	Joules/mm
1	114	1.78	45.24	32	43.3872	0.959
2	112	1.75	44.45	24	32.5404	0.732
3	151	2.36	59.93	16	21.6936	0.362
4	120	1.88	47.63	44	59.6574	1.253
5	149	2.33	59.13	28	37.9638	0.642
6	150	2.34	59.53	20	27.117	0.456
7	143	2.23	56.75	12	16.2702	0.287
8	118	1.84	46.83	20	27.117	0.579
9	136	2.13	53.98	48	65.0808	1.206
10	124	1.94	49.21	24	32.5404	0.661
11	182	2.84	72.23	16	21.6936	0.300
12	129	2.02	51.20	32	43.3872	0.847
13	132	2.06	52.39	24	32.5404	0.621
14	127	1.98	50.40	36	48.8106	0.968
15	122	1.91	48.42	40	54.234	1.120
16	158	2.47	62.71	20	27.117	0.432
17	130	2.03	51.59	16	21.6936	0.420
18	117	1.83	46.43	20	27.117	0.584
19	112	1.75	44.45	36	48.8106	1.098
20	112	1.75	44.45	32	43.3872	0.976
Average:						0.725
Specific Gravity:						2.64
Work Index ⁽¹⁾ , kW-hr/m.ton:						14.69
Work Index, kW-hr/short ton:						13.32

⁽¹⁾ Formula =
$$\frac{53.49 \times \text{Joules/mm}}{\text{Specific Gravity}}$$

PHILLIPS ENTERPRISES LLC**BOND IMPACT TEST**Test # 3Project No. 053010Date: 2-Aug-05

Purpose:	To determine the low-energy Work Index for crushing (kW-hr/m.ton) as a basis for determining crushing power requirements.
Sample:	20 pieces of sample Hazen No. 51041-3 CSH-15, Sulfide Waste
Procedure:	Modified Bond procedure for determining work index with impact testing machine, using natural 75 x 50 mm pieces.

Piece	Sample Thickness			Impact Energy for Breakage		
	64 th s of inch	Inches	Millimeters	Ft-lb	Joules	Joules/mm
1	166	2.59	65.88	44	59.6574	0.906
2	142	2.22	56.36	36	48.8106	0.866
3	131	2.05	51.99	28	37.9638	0.730
4	174	2.72	69.06	28	37.9638	0.550
5	154	2.41	61.12	36	48.8106	0.799
6	132	2.06	52.39	60	81.351	1.553
7	162	2.53	64.29	48	65.0808	1.012
8	154	2.41	61.12	20	27.117	0.444
9	172	2.69	68.26	16	21.6936	0.318
10	136	2.13	53.98	28	37.9638	0.703
11	186	2.91	73.82	28	37.9638	0.514
12	136	2.13	53.98	56	75.9276	1.407
13	160	2.50	63.50	20	27.117	0.427
14	144	2.25	57.15	40	54.234	0.949
15	144	2.25	57.15	56	75.9276	1.329
16	132	2.06	52.39	28	37.9638	0.725
17	139	2.17	55.17	28	37.9638	0.688
18	142	2.22	56.36	48	65.0808	1.155
19	164	2.56	65.09	28	37.9638	0.583
20	143	2.23	56.75	36	48.8106	0.860
Average:						0.826
Specific Gravity:						2.80
Work Index ⁽¹⁾ , kW-hr/m.ton:						15.78
Work Index, kW-hr/short ton:						14.31

⁽¹⁾ Formula =
$$\frac{53.49 \times \text{Joules/mm}}{\text{Specific Gravity}}$$

PHILLIPS ENTERPRISES LLC**BOND IMPACT TEST**Test # 4Project No. 053010Date: 3-Aug-05

Purpose:	To determine the low-energy Work Index for crushing (kW-hr/m.ton) as a basis for determining crushing power requirements.
Sample:	20 pieces of sample Hazen No. 51041-4 CSH-16, Sulfide Ore
Procedure:	Modified Bond procedure for determining work index with impact testing machine, using natural 75 x 50 mm pieces.

Piece	Sample Thickness			Impact Energy for Breakage		
	64 th s of inch	Inches	Millimeters	Ft-lb	Joules	Joules/mm
1	139	2.17	55.17	56	75.9276	1.376
2	124	1.94	49.21	48	65.0808	1.322
3	126	1.97	50.01	40	54.234	1.085
4	147	2.30	58.34	44	59.6574	1.023
5	124	1.94	49.21	28	37.9638	0.771
6	150	2.34	59.53	24	32.5404	0.547
7	128	2.00	50.80	56	75.9276	1.495
8	122	1.91	48.42	32	43.3872	0.896
9	127	1.98	50.40	32	43.3872	0.861
10	131	2.05	51.99	40	54.234	1.043
11	154	2.41	61.12	60	81.351	1.331
12	130	2.03	51.59	20	27.117	0.526
13	163	2.55	64.69	24	32.5404	0.503
14	174	2.72	69.06	40	54.234	0.785
15	130	2.03	51.59	40	54.234	1.051
16	144	2.25	57.15	28	37.9638	0.664
17	120	1.88	47.63	20	27.117	0.569
18	122	1.91	48.42	28	37.9638	0.784
19	128	2.00	50.80	32	43.3872	0.854
20	134	2.09	53.18	44	59.6574	1.122
Average:						0.930
Specific Gravity:						2.82
Work Index ⁽¹⁾ , kW-hr/m.ton:						17.64
Work Index, kW-hr/short ton:						16.00

⁽¹⁾ Formula =
$$\frac{53.49 \times \text{Joules/mm}}{\text{Specific Gravity}}$$

APPENDIX C

Bond Abrasion Index Data Sheets

Abrasion Test

Date: Jul-05
Project No: 10280
Test No: 05185

Purpose: To determine the abrasion index which can be used to determine steel media and liner wear in crushers, rod mills, and ball mills.

Procedure: The equipment and procedure duplicate the Pennsylvania Crusher method for determining an abrasion index.

Sample: Client Identified: Oxide Waste
Sample Number: 51041-1

Results:

Original Coupon Weight	=	94.3153 g
Final Coupon Weight	=	94.2434 g
Abrasion Index (A_i)	=	0.0719 g

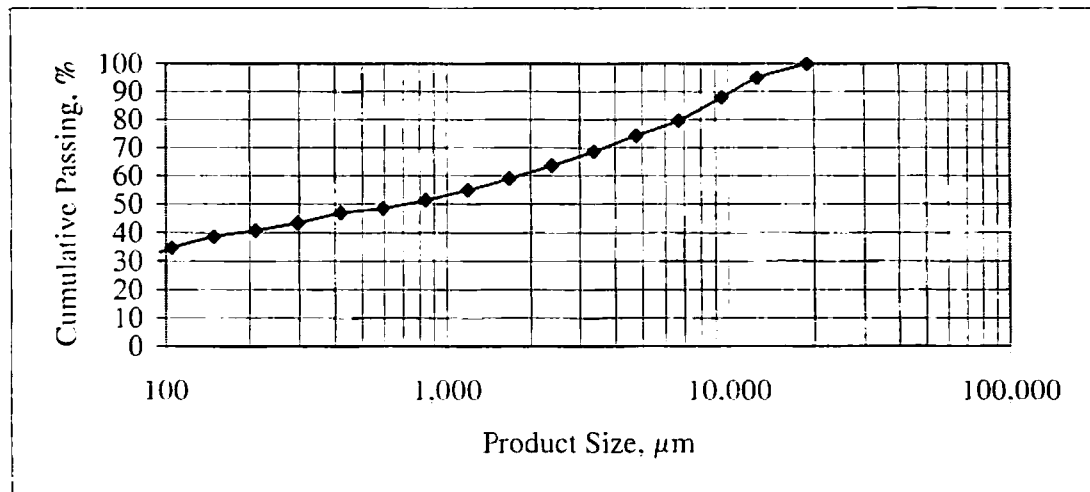
Equipment		Equations ¹ ($A_i > 0.021$)	Wear Rate (lb/kWh)
Wet Rod Mill	Rods =	$0.35(A_i - 0.020)^{0.2}$	= 0.1937
	Liner =	$0.035(A_i - 0.015)^{0.3}$	= 0.0148
Wet Ball Mill (overflow and grate discharge)	Balls =	$0.35(A_i - 0.015)^{0.33}$	= 0.1359
	Liner =	$0.026(A_i - 0.015)^{0.3}$	= 0.0110
Dry Ball Mill (grate discharge, $A_i < 0.22$)	Balls =	$0.05A_i^{0.5}$	= 0.0134
	Liner =	$0.005A_i^{0.5}$	= 0.0013
Crushers (gyratory, jaw, and cone)	Liner =	$(A_i + 0.22)/11$	= 0.0265
Roller Crushers	Roll Shell =	$(0.1A_i)^{0.67}$	= 0.0372

¹ Bond, FC, "Metal Wear in Crushing and Grinding," Allis-Chalmers Publication 07P1701, Dec. 1963.

Abrasion Test

Date: Jul-05
 Project No: 10280
 Test No: 05185

Tyler Mesh		Direct Wt.		Cumulative %	
inch or mesh	μm	g	%	Passing	Retained
3/4 inch	19,000	0.0	0.0	100.0	0.0
1/2	12,700	81.3	5.1	94.9	5.1
3/8	9,510	111.4	6.9	88.0	12.0
3 mesh	6,700	133.2	8.3	79.7	20.3
4	4,760	85.5	5.3	74.4	25.6
6	3,360	91.7	5.7	68.6	31.4
8	2,380	80.0	5.0	63.7	36.3
10	1,680	74.9	4.7	59.0	41.0
14	1,190	64.4	4.0	55.0	45.0
20	841	57.0	3.6	51.4	48.6
28	595	47.6	3.0	48.5	51.5
35	420	26.0	1.6	46.8	53.2
48	297	55.8	3.5	43.4	56.6
65	210	41.5	2.6	40.8	59.2
100	149	36.7	2.3	38.5	61.5
150	105	63.1	3.9	34.6	65.4
200	74	94.8	5.9	28.7	71.3
-200	-74	459.9	28.7	0.0	100.0
Total		1,604.7	100.0		



Abrasion Test

Date: Jul-05
Project No: 10280
Test No: 05186

Purpose: To determine the abrasion index which can be used to determine steel media and liner wear in crushers, rod mills, and ball mills.

Procedure: The equipment and procedure duplicate the Pennsylvania Crusher method for determining an abrasion index.

Sample: Client Identified: Oxide Ore
Sample Number: 51041-2

Results:

Original Coupon Weight	=	94.2328 g
Final Coupon Weight	=	94.1844 g
Abrasion Index (A_i)	=	0.0484 g

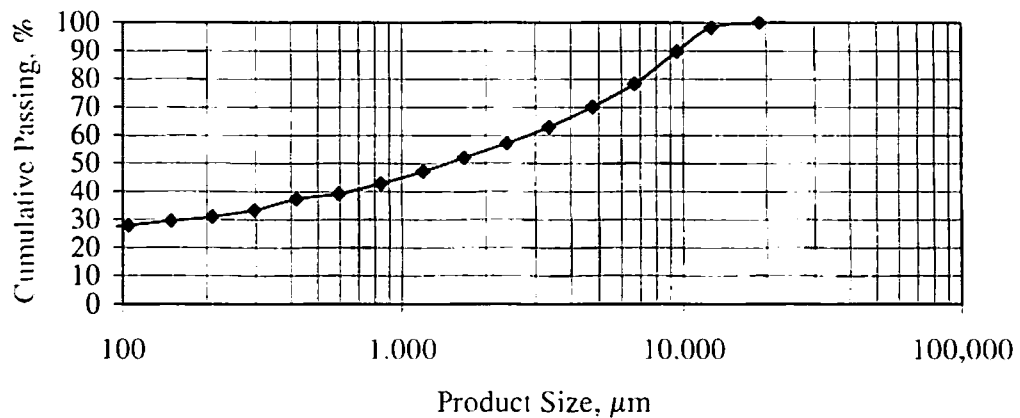
Equipment		Equations ¹ ($A_i > 0.021$)	Wear Rate (lb/kWh)
Wet Rod Mill	Rods =	$0.35(A_i - 0.020)^{0.2}$	= 0.1717
	Liner =	$0.035(A_i - 0.015)^{0.3}$	= 0.0126
Wet Ball Mill (overflow and grate discharge)	Balls =	$0.35(A_i - 0.015)^{0.33}$	= 0.1140
	Liner =	$0.026(A_i - 0.015)^{0.3}$	= 0.0094
Dry Ball Mill (grate discharge, $A_i < 0.22$)	Balls =	$0.05A_i^{0.5}$	= 0.0110
	Liner =	$0.005A_i^{0.5}$	= 0.0011
Crushers (gyratory, jaw, and cone)	Liner =	$(A_i + 0.22)/11$	= 0.0244
Roller Crushers	Roll Shell =	$(0.1A_i)^{0.67}$	= 0.0286

¹ Bond, F.C. "Metal Wear in Crushing and Grinding," Allis-Chalmers Publication 07P1701, Dec. 1963.

Abrasion Test

Date: Jul-05
Project No: 10280
Test No: 05186

Tyler Mesh		Direct Wt.		Cumulative %	
inch or mesh	μm	g	%	Passing	Retained
3/4 inch	19,000	0.0	0.0	100.0	0.0
1/2	12,700	28.6	1.8	98.2	1.8
3/8	9,510	134.3	8.5	89.8	10.2
3 mesh	6,700	181.9	11.5	78.3	21.7
4	4,760	129.7	8.2	70.1	29.9
6	3,360	112.8	7.1	63.0	37.0
8	2,380	93.2	5.9	57.2	42.8
10	1,680	82.1	5.2	52.0	48.0
14	1,190	77.2	4.9	47.1	52.9
20	841	68.7	4.3	42.8	57.2
28	595	58.0	3.7	39.2	60.8
35	420	31.5	2.0	37.2	62.8
48	297	61.6	3.9	33.3	66.7
65	210	36.7	2.3	31.0	69.0
100	149	23.9	1.5	29.5	70.5
150	105	25.9	1.6	27.9	72.1
200	74	27.6	1.7	26.1	73.9
-200	-74	415.0	26.1	0.0	100.0
Total		1,588.6	100.0		



Abrasion Test

Date: Jul-05
Project No: 10280
Test No: 05187

Purpose: To determine the abrasion index which can be used to determine steel media and liner wear in crushers, rod mills, and ball mills.

Procedure: The equipment and procedure duplicate the Pennsylvania Crusher method for determining an abrasion index.

Sample: Client Identified: Sulphide Waste
Sample Number: 51041-3

Results:

Original Coupon Weight	=	93.4092 g
Final Coupon Weight	=	93.2708 g
Abrasion Index (A_i)	=	0.1384 g

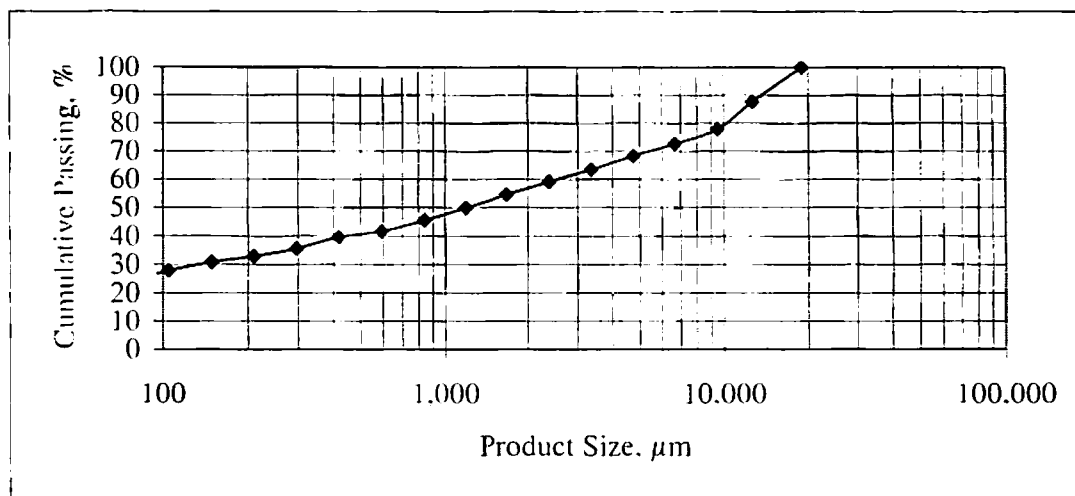
Equipment		Equations ¹ ($A_i > 0.021$)	Wear Rate (lb/kWh)
Wet Rod Mill	Rods =	$0.35(A_i - 0.020)^{0.2}$	= 0.2284
	Liner =	$0.035(A_i - 0.015)^{0.3}$	= 0.0187
Wet Ball Mill (overflow and grate discharge)	Balls =	$0.35(A_i - 0.015)^{0.33}$	= 0.1755
	Liner =	$0.026(A_i - 0.015)^{0.3}$	= 0.0139
Dry Ball Mill (grate discharge, $A_i < 0.22$)	Balls =	$0.05A_i^{0.5}$	= 0.0186
	Liner =	$0.005A_i^{0.5}$	= 0.0019
Crushers (gyratory, jaw, and cone)	Liner =	$(A_i + 0.22)/11$	= 0.0326
Roller Crushers	Roll Shell =	$(0.1A_i)^{0.67}$	= 0.0576

¹ Bond, FC, "Metal Wear in Crushing and Grinding," Allis-Chalmers Publication 07P1701, Dec. 1963.

Abrasion Test

Date: Jul-05
Project No: 10280
Test No: 05187

Tyler Mesh		Direct Wt.		Cumulative %	
inch or mesh	μm	g	%	Passing	Retained
3/4 inch	19,000	0.0	0.0	100.0	0.0
1/2	12,700	197.5	12.4	87.6	12.4
3/8	9,510	156.3	9.8	77.9	22.1
3 mesh	6,700	82.3	5.2	72.7	27.3
4	4,760	69.0	4.3	68.4	31.6
6	3,360	77.6	4.9	63.5	36.5
8	2,380	70.1	4.4	59.1	40.9
10	1,680	73.0	4.6	54.6	45.4
14	1,190	74.2	4.6	49.9	50.1
20	841	70.6	4.4	45.5	54.5
28	595	60.9	3.8	41.7	58.3
35	420	32.7	2.0	39.6	60.4
48	297	66.0	4.1	35.5	64.5
65	210	42.8	2.7	32.8	67.2
100	149	32.6	2.0	30.8	69.2
150	105	47.5	3.0	27.8	72.2
200	74	58.9	3.7	24.1	75.9
-200	-74	385.2	24.1	0.0	100.0
Total		1,597.0	100.0		



Abrasion Test

Date: Jul-05
Project No: 10280
Test No: 05186

Purpose: To determine the abrasion index which can be used to determine steel media and liner wear in crushers, rod mills, and ball mills.

Procedure: The equipment and procedure duplicate the Pennsylvania Crusher method for determining an abrasion index.

Sample: Client Identified: Sulphide Ore
Sample Number: 51041-4

Results:

Original Coupon Weight	=	94.1844 g
Final Coupon Weight	=	93.9755 g
Abrasion Index (A_i)	=	0.2089 g

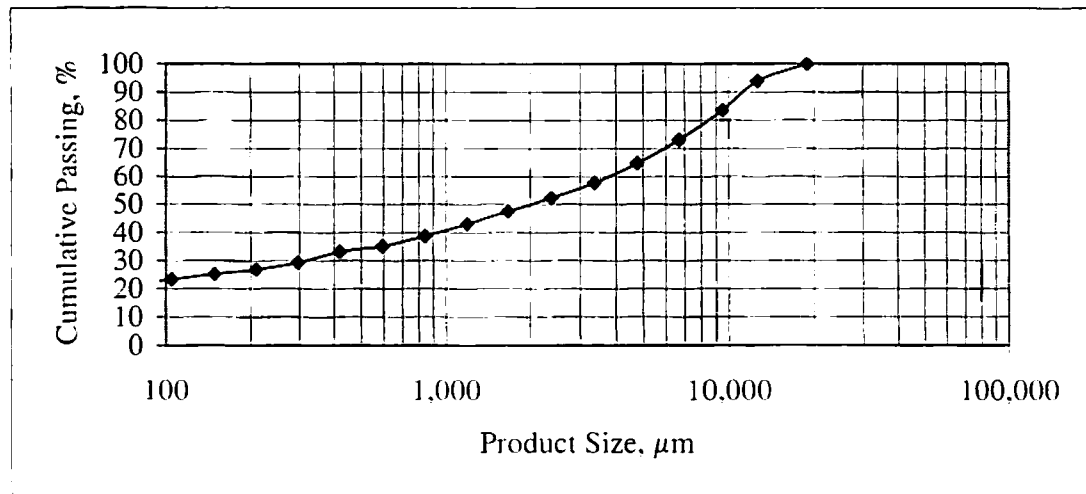
Equipment		Equations ¹ ($A_i > 0.021$)	Wear Rate (lb/kWh)
Wet Rod Mill	Rods =	$0.35(A_i - 0.020)^{0.2}$	= 0.2508
	Liner =	$0.035(A_i - 0.015)^{0.3}$	= 0.0214
Wet Ball Mill (overflow and grate discharge)	Balls =	$0.35(A_i - 0.015)^{0.32}$	= 0.2037
	Liner =	$0.026(A_i - 0.015)^{0.3}$	= 0.0159
Dry Ball Mill (grate discharge, $A_i < 0.22$)	Balls =	$0.05A_i^{0.5}$	= 0.0229
	Liner =	$0.005A_i^{0.5}$	= 0.0023
Crushers (gyratory, jaw, and cone)	Liner =	$(A_i + 0.22)/11$	= 0.0390
Roller Crushers	Roll Shell =	$(0.1A_i)^{0.67}$	= 0.0758

¹ Bond, FC, "Metal Wear in Crushing and Grinding." Allis-Chalmers Publication 07P1701, Dec. 1963.

Abrasion Test

Date: Jul-05
Project No: 10280
Test No: 05186

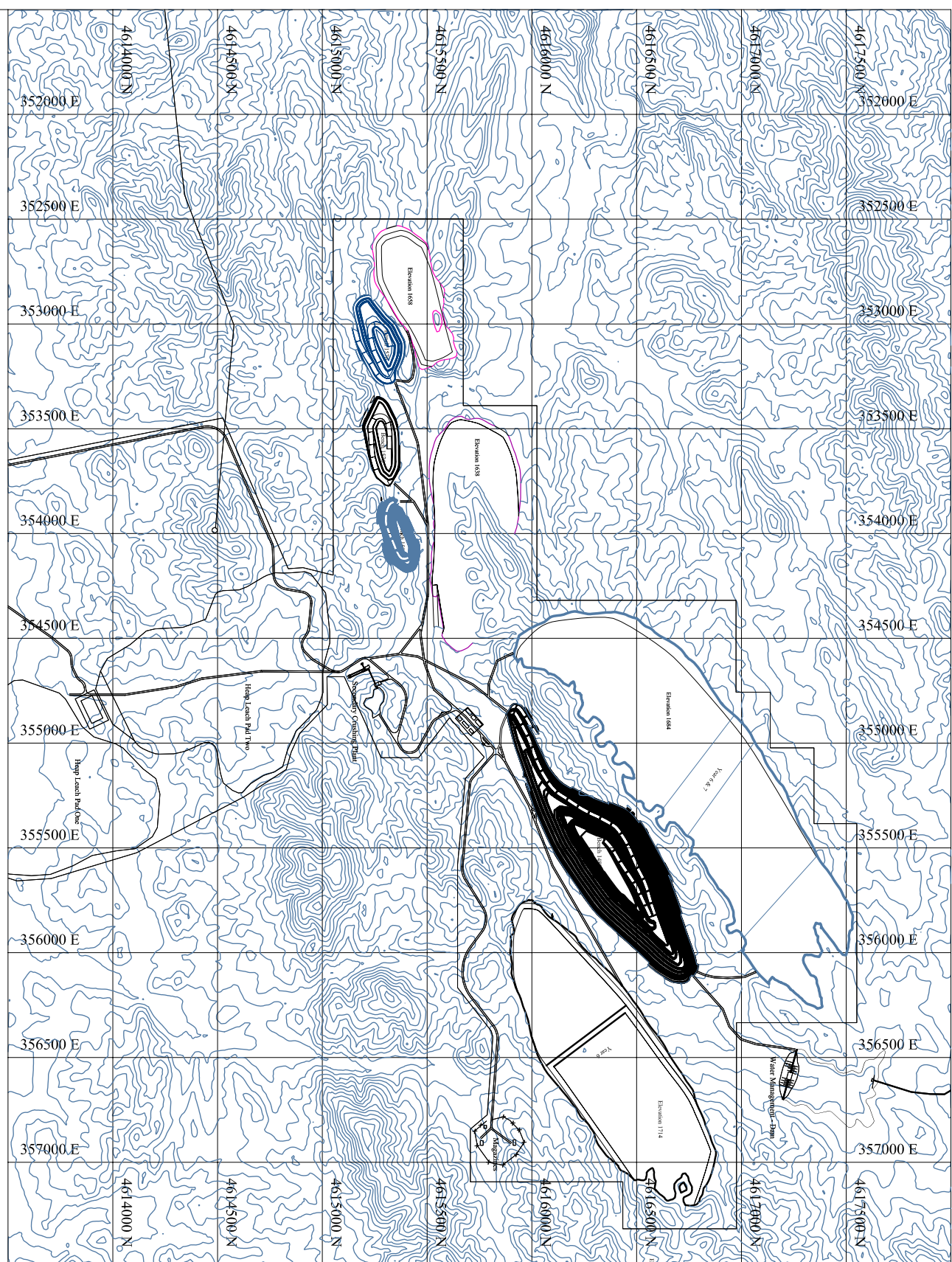
Tyler Mesh		Direct Wt.		Cumulative %	
inch or mesh	μm	g	%	Passing	Retained
3/4 inch	19,000	0.0	0.0	100.0	0.0
1/2	12,700	98.6	6.2	93.8	6.2
3/8	9,510	163.7	10.3	83.6	16.4
3 mesh	6,700	167.6	10.5	73.1	26.9
4	4,760	131.9	8.3	64.8	35.2
6	3,360	112.8	7.1	57.7	42.3
8	2,380	85.4	5.4	52.4	47.6
10	1,680	77.4	4.8	47.5	52.5
14	1,190	72.4	4.5	43.0	57.0
20	841	67.9	4.3	38.7	61.3
28	595	58.1	3.6	35.1	64.9
35	420	31.8	2.0	33.1	66.9
48	297	61.6	3.9	29.2	70.8
65	210	38.6	2.4	26.8	73.2
100	149	26.2	1.6	25.2	74.8
150	105	30.0	1.9	23.3	76.7
200	74	29.3	1.8	21.5	78.5
-200	-74	342.5	21.5	0.0	100.0
Total		1,595.7	100.0		



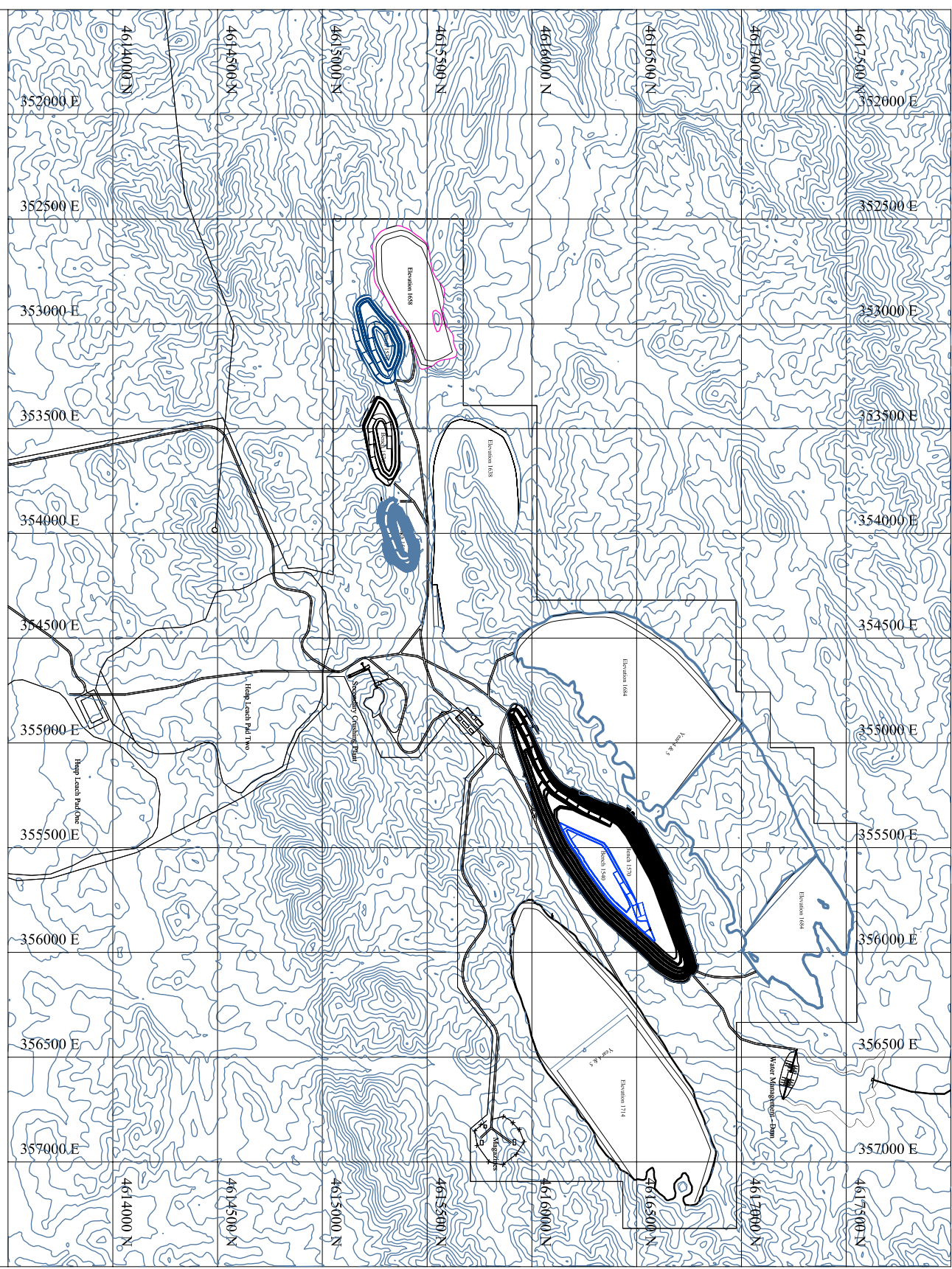
APPENDIX 16

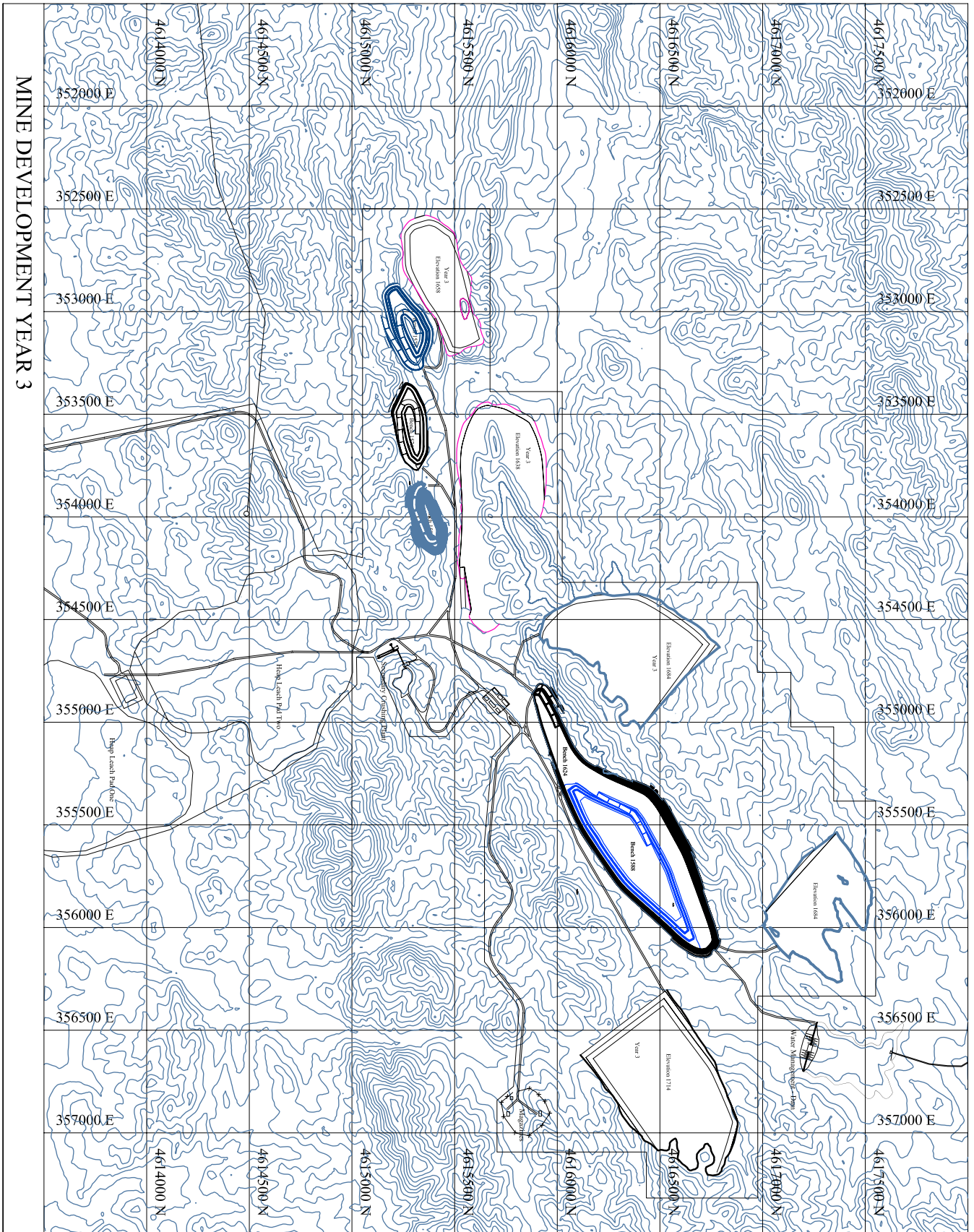
MINE PLAN DRAWINGS
YEARS 1 THROUGH 8

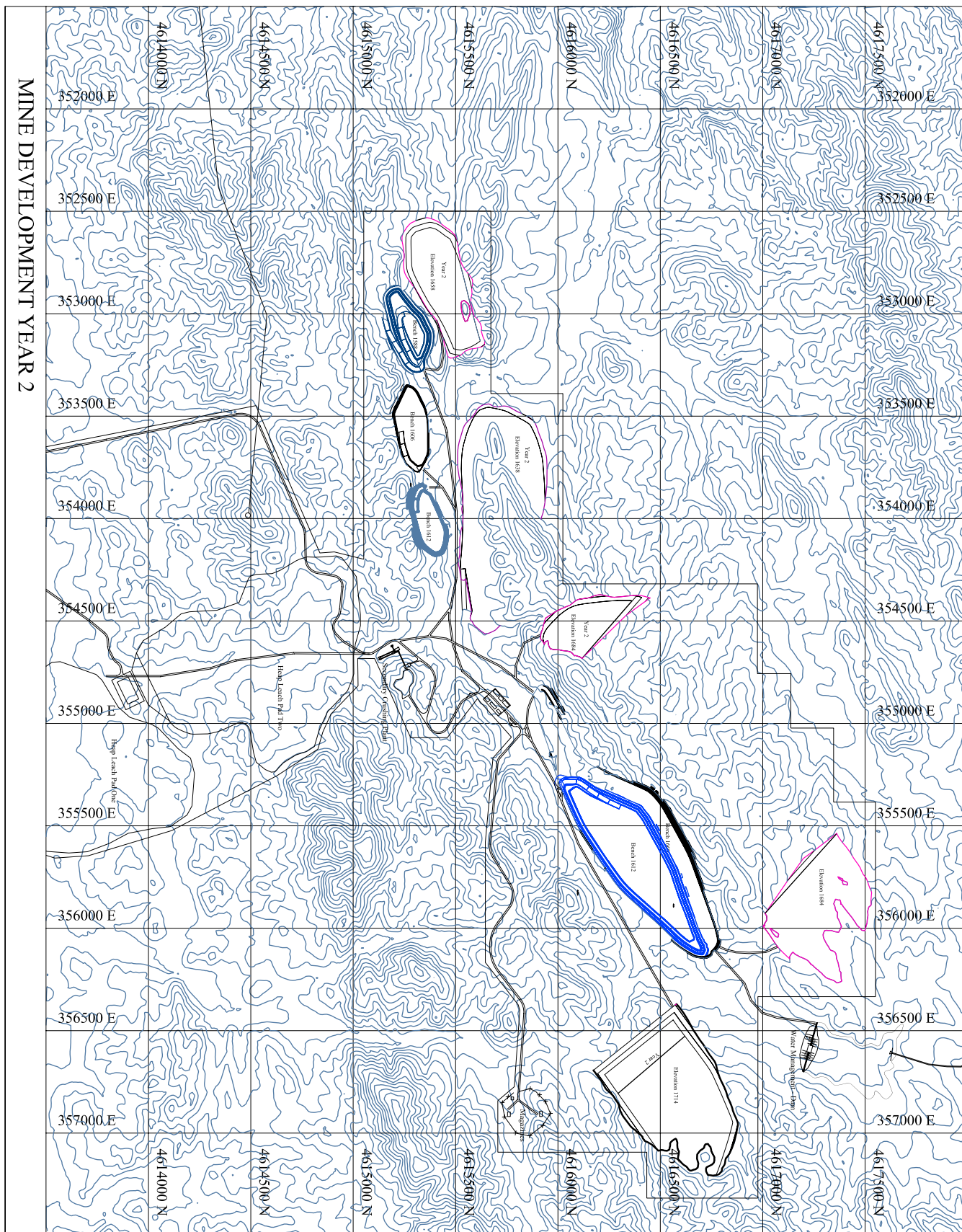
MINE DEVELOPMENT YEAR 7

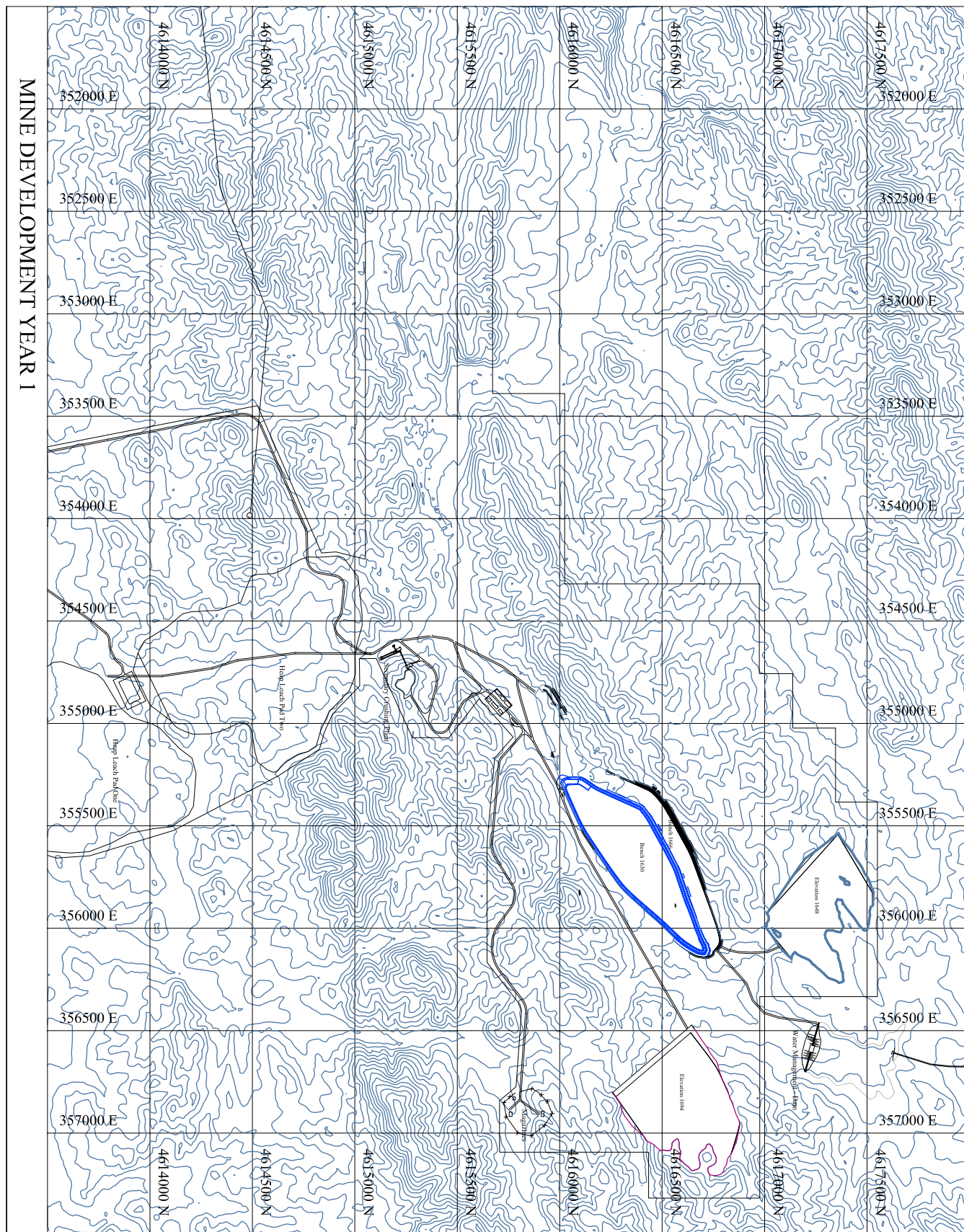


MINE DEVELOPMENT YEAR 5

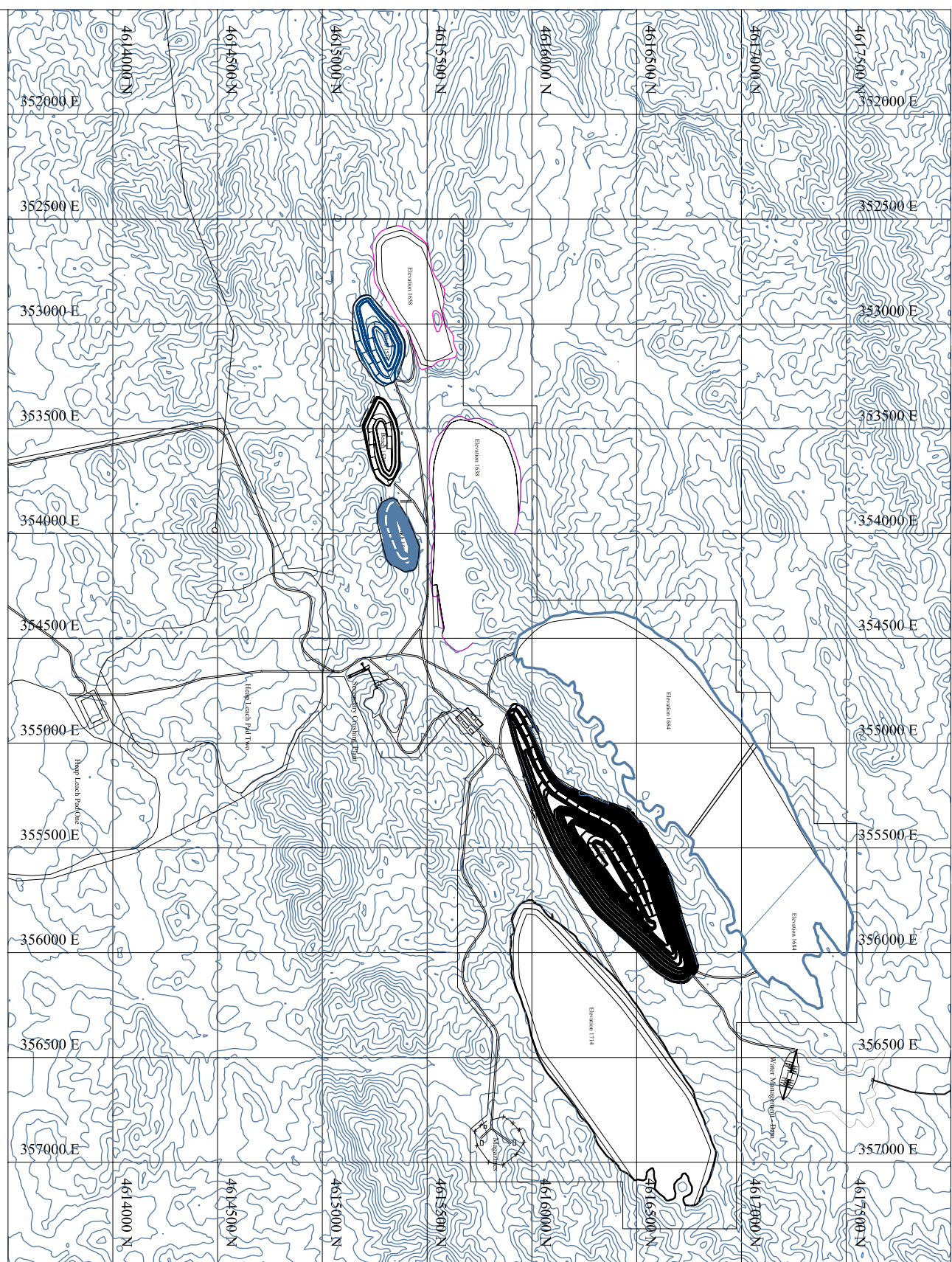








MINE DEVELOPMENT YEAR 8



APPENDIX 17

MINE BOUNDARY COORDINATES

MINE BOUNDARY POINTS

Point	East(x, meter)	North (y, meter)
1	352498.8221	4615051.5886
2	352498.8221	4615672.3337
3	353389.6693	4615672.3337
4	353389.6693	4616024.1431
5	354318.7736	4616024.1431
6	354318.7736	4616974.0984
7	354757.0598	4616974.0984
8	354757.0598	4617137.5102
9	355022.6826	4617137.5102
10	355022.6826	4617346.3606
11	355383.9739	4617346.3606
12	355383.9739	4617550.6708
13	356333.7836	4617550.6708
14	356333.7836	4616976.3321
15	357317.3933	4616976.3321
16	357317.3933	4616433.8404
17	357093.1666	4616433.8404
18	357093.1666	4615706.3729
19	356841.7878	4615706.3729
20	356773.8523	4615786.8373
21	356400.4700	4615813.9265
22	356373.3395	4615805.7131
23	356167.1173	4615645.5457
24	355578.8427	4615645.5457
25	355168.9017	4615682.7893
26	355066.8789	4615772.6095
27	354879.4312	4615606.6314
28	355069.6710	4615459.6037
29	355069.6710	4615280.6560
30	354683.5153	4615104.8391
31	354682.8792	4615022.1266
32	354816.4288	4615023.6989
33	354954.4912	4614891.1623
34	355042.1770	4614851.6412
35	355125.8292	4614827.5506
36	355255.5499	4614627.4155
37	355513.1055	4614132.7632
38	355679.9170	4614098.3969
39	355679.9170	4613891.4999
40	355741.8512	4613795.6054
41	355687.1164	4613613.1828
42	355579.9850	4613361.9220
43	355295.6590	4613049.8168
44	355020.1500	4613156.8510
45	354929.9075	4612924.5643
46	354814.2757	4612977.0806
47	354589.7489	4612728.3427
48	353777.0969	4612635.8553
49	353749.9952	4612619.9677
50	353685.2320	4612612.4114
51	353678.0982	4612672.2716
52	353808.9828	4612686.6123
53	353448.7923	4614524.7631
54	354167.8821	4614837.1728
55	354162.7061	4614907.7587
56	354198.4742	4615051.5886