

YAMANA GOLD INC  
Form 6-K  
June 28, 2005

**FORM 6-K**

UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION  
Washington, D.C. 20549

**Report of Foreign Issuer**

**Pursuant to Rule 13a-16 or 15d-16 of  
the Securities Exchange Act of 1934**

For the month of **June, 2005**

Commission File Number **001-31880**

**Yamana Gold Inc.**

(Translation of registrant's name into English)

**150 York Street, Suite 1902  
Toronto, Ontario M5H 3S5**

(Address of principal executive offices)

Indicate by check mark whether the registrant files or will file annual reports under cover Form 20-F or Form 40-F.

Form 20-F       Form 40-F

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(1):

**Note:** Regulation S-T Rule 101(b)(1) only permits the submission in paper of a Form 6-K if submitted solely to provide an attached annual report to security holders.

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(7):

**Note:** Regulation S-T Rule 101(b)(7) only permits the submission in paper of a Form 6-K if submitted to furnish a report or other document that the registrant foreign private issuer must furnish and make public under the laws of the jurisdiction in which the registrant is incorporated, domiciled or legally organized (the registrant's home country), or under the rules of the home country exchange on which the registrant's securities are traded, as long as the report or other document is not a press release, is not required to be and has not been distributed to the registrant's security holders, and, if discussing a material event, has already been the subject of a Form 6-K submission or other Commission filing on EDGAR.

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Indicate by check mark whether by furnishing the information contained in this Form, the registrant is also thereby furnishing the information to the Commission pursuant to rule 12g3-2(b) under the Securities Exchange Act of 1934.

Yes  No

If Yes is marked, indicate below the file number assigned to the registrant in connection with Rule 12g3-2(b) 82

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**SIGNATURE**

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

**YAMANA GOLD INC.**

/s/ Charles Main

Date: June 27, 2005

Name: Charles Main

Title: Vice President, Finance and Chief Financial Officer

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**SÃO VICENTE GOLD PROJECT  
MATO GRASSO STATE, BRAZIL**

**TECHNICAL REPORT**

**PURSUANT TO NATIONAL INSTRUMENT 43-101 OF  
THE CANADIAN SECURITIES ADMINISTRATORS**

**PREPARED FOR**

**YAMANA GOLD INC.**

June 2005

## 1.0 Summary

The São Vicente Project, located in Mato Grosso, Brazil, about 560 km west-northwest of the state capital of Cuiaba, is being evaluated as an open-pit heap leach gold operation in conjunction with a gravity concentration circuit.

Independent Mining Consultants, Inc. (IMC) were commissioned by Santa Elina Desenvolvimento Mineral S.A. (Santa Elina or SEDM), a wholly owned subsidiary of Yamana Gold Inc. (Yamana), to prepare a Technical Report for the São Vicente Project. The Technical Report has been prepared for filing pursuant to Canadian National Instrument 43-101 and provides information with respect to mineral resource and mineral reserve estimates, technical studies, and economic analysis which have been performed on the São Vicente property.

This Technical Report is a summary of the key findings of a feasibility study developed by Minerconsult Engenharia Ltda (Minerconsult) of Belo Horizonte, Brazil. The title of their report document is São Vicente Project Feasibility Study Update , and is dated April 2005. It is reported to be an update to a study done in 1997.

In addition to Minerconsult, several other groups also participated in the feasibility study, and subsequently are also key sources of the information incorporated into this report.

The São Vicente property is located in the extreme western portion of Mato Grosso State in west central Brazil, close to the Bolivian border. It is about 560 km west-northwest of the state capital of Cuiaba and is about 90 km north-northwest of the town of Pontes e Lacerda. Figure 4-1 shows the location of the property. Currently the São Vicente property consists of three contiguous mining permits held by SEDM. Figure 4-2 shows the location of the mining concessions. São Vicente is also about 58 km from Yamana's São Francisco Project area via a gravel road.

Gold was first discovered in the area in the 1700's by the Portuguese. The area became the first significant gold mining district in Brazil and the nearby settlement Vila Bela was at that time named the capital of Mato Grosso State. The district reportedly produced and shipped to Portugal some 60 to 70 tonnes of gold between 1720 and 1830, much of which came from the nearby São Francisco site. Remnants of this period of mining activity can still be seen on the São Francisco property.

In the mid-1970s, garimpeiro activity began in the area, and in 1977, Santa Elina began acquiring property in the Santa Elina Gold Belt and commenced dredging/placer mining in 1983. Approximately 76,000 oz of gold was produced by placer mining at São Vicente. Hard rock open pit mining at São Vicente produced an additional 110,810 oz of gold by flotation and gravity methods in the period 1995 to 1997.

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In 1996, Santa Elina was taken private and entered into a joint venture with Echo Bay. The joint venture carried out a number of exploration programs including more detailed diamond

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and reverse circulation ( RC ) drilling of both the São Francisco and São Vicente deposits. Mineral resource and reserve estimates and associated preliminary feasibility studies were subsequently carried out.

In 1998, the ongoing metallurgical tests for heap leach processing were completed and indicated the process to be viable. In 2002, Santa Elina re-examined the 1997 studies for each property. That resulted in the CAPEX estimates being significantly reduced for each deposit, in large part because of currency devaluation.

The São Vicente ore deposit is a shear hosted lode gold deposit which appears to be epigenetic and structurally controlled and composed of narrow, 1 cm to 5 cm wide, quartz (sericite) veins containing free gold. The veins and vein system/stockworks are both parallel to and crosscutting the bedding planes and appear to be separate or multiple, but closely related, mineralizing events.

The mineral reserve and mineral resources are based on an ore reserve block model developed by Geoexplore Consultoria e Servicos of Belo Horizonte, Brazil. The model was completed in early 2005. 226 drillholes representing about 31,000 m of drilling, almost all from core, were used to develop the model. Yamana retained GeoSystems International, Inc. (GSI) to review the mineral resource estimates. This review was conducted in January and February 2005.

Table 1-1 reports the mineral reserve of the São Vicente Project based on the production schedule developed by IMC during the 1<sup>st</sup> quarter of 2005. Ore planned to be mined and shipped directly to the plant amounts to 5,881 ktonnes at 1.066 g/t gold. The IMC mine plan also results in 123 ktonnes of low grade ore at 0.298 g/t gold that will be stockpiled and potentially processed at the end of the mine life. This results in a total mineral reserve of 6,004 ktonnes at 1.050 g/t gold for 202,700 contained ounces of gold. The total material movement is 21.3 million tonnes for an overall strip ratio of 2.55 to 1. The mine plan is based on processing 1,800 ktonnes of ore per year for a total commercial pit life of 3.3 years.

This mineral reserve is based on open pit mining only and does not include any potential underground mining. In particular, there is additional resource, namely the Deep South resource, which could be incorporated into an open pit, but appears to be more profitably

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mined as an underground mining project. Studies are in progress to evaluate underground mining potential of resources not included in the above mineral reserve.

The final pit design for the project is based on a floating cone analysis assuming a gold price of US\$ 350 per troy ounce.

At a 0.3 g/t gold cutoff grade, GCS has tabulated measured and indicated mineral resources for São Vicente at 12,459 ktonnes at 0.99 g/t gold for 396,000 contained ounces. Table 1-2 shows this resource by category. There is an additional 207 ktonnes of inferred resource at 0.53 g/t gold.

**Table 1-2: Mineral Resources at 0.3 g/t Gold Cutoff Grade**

| Resource Class       | Ore Ktonnes | Gold (g/t) | Gold (koz) |
|----------------------|-------------|------------|------------|
| Measured             | 6,431       | 1.03       | 213.0      |
| Indicated            | 6,028       | 0.95       | 183.0      |
| Measured + Indicated | 12,459      | 0.99       | 396.0      |
| Inferred             | 207         | 0.53       | 3.5        |

It is noted by IMC that this resource statement is simply a summation of model blocks above a 0.3 g/t cutoff grade. It is known to include some low grade material at depth that is unlikely to be extractable under current economic conditions. In addition, the mineral reserve of Table 1-1 uses lower cutoff grades than 0.3 g/t so the mineral reserve is not fully contained within the resource statement.

Previous hard rock mining activity at São Vicente Project was based on milling of the ores. The old facilities that treated the São Vicente gold ore consisted of crushing the run-of-mine to minus 9.5 – 12.7 mm (3/8 inches to 1/2 inches) and then grinding the crushed product to minus 2 mm in a rod mill. The ground ore was classified at 210 micrometer (65 mesh) in hydrocyclones with the underflow treated in a jigging circuit and the overflow in a froth flotation circuit. The coarse gold concentrate obtained in the jigging plant was sent directly to the gold shed for further treatment and the fine gold flotation concentrate was reground, thickened and treated in a CIL adsorption/ desorption/electrowinning circuit.

The process had a lot of operating and cost problems, including the following:

- Grinding costs were very high due to the high abrasiveness (more than 99.5% of quartz content).
- Inefficient hydrocyclone separation, which allowed a high amount of fine gold (chemical gold) to report to the cyclones underflow, there being lost in the jigging circuit tailings, thus reducing the overall recovery.
- Low available settling area for the flotation concentrate, which is a material that is difficult to settle. This led to high concentrate losses in the thickener overflow.

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Based on these facts, it was decided to investigate a more cost effective process suitable to treat the low grade São Vicente ores. Preliminary bottle rolls leaching tests were carried out with the fine fraction (-100 micrometer) of the ore showing that the ore was amenable to direct leaching by cyanide solution, with recoveries up to 90%.

Metallurgical test results obtained at Metago, by SEDM in house column tests, and also by Kappes, Cassidy & Associates indicated the possibility to increase overall plant recovery from the historic 67% to 81% if the introduction of a heap leach operation in the process was considered.

The adopted process method considers the following basic operations:

- ROM crushing in three stages until reaching 100% below 19mm.
- Wet screening of crushed ore on a 3mm mesh, with the fraction exceeding 3mm being directly sent to the leaching pile and the fraction smaller than 3mm being sent to jigging.
- Jigging of the fraction below 3mm in three successive stages, in existing jigs, until the concentrate is obtained for subsequent purification and smelting.
- Desliming of jigging tails at 57 microns, with the fraction exceeding 57 microns being dewatered and sent to the leaching pile, while the fraction below 57 microns is sent for thickening and subsequent leaching at the existing thickener and CIL unit.
- Ore exceeding 3mm, as well as deslimed and dewatered jigging tailings, are carried together by trucks to the leaching pile.
- CIC-type adsorption columns are used for recovery of gold from the leaching solution.
- Existing desorption, electrolysis, and smelting plants, after a few improvements have been introduced, are used in order to obtain gold ingots.

The plant design is sized to process 2,052 ktonnes per year of ore. This is based on open pit mine production of 1.8 million tonnes per year plus 252 ktonnes per year of existing tailings. Minerconsult estimates an overall metallurgical recovery of 81% of the gold feed grade based on their review of the testing data.

Capital and operating costs were developed by Minerconsult (process plant and infrastructure) and IMC (open pit mining) for financial modeling of the project. Initial capital costs for the São Vicente Project are summarized in Table 1-3.

**Table 1-3: Summary of Initial Capital Costs (US\$x1000)**

|                              |               |
|------------------------------|---------------|
| Mine Development             | 2,052         |
| Mine Equipment               | 4,821         |
| Process Plant/Infrastructure | 12,809        |
| Working Capital              | 500           |
| Owners Cost                  | 60            |
| <b>TOTAL</b>                 | <b>20,242</b> |

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In addition to these costs, additional plant capital of US\$ 692,000 in Year 1 and US\$ 59,000 in Year 2 has been allocated.

IMC and Minerconsult have estimated a salvage value of US\$ 2.5 million for mine and plant equipment at the end of the project to partially offset total life of project capital cost.

The capital cost estimate is in 1<sup>st</sup> quarter 2005 US dollars without escalation to the expected project start date. Items sourced in Brazil have been converted to US dollars at the rate of US\$ 1.00 = R\$ 3.00.

Table 1-4 summarizes the life of project operating costs for the São Vicente Project.

**Table 1-4: Summary of Life of Project Operating Costs (\$US)**

| Description                    | Total Cost<br>(US\$ x 1000) | Per Ore<br>Tonne | Per Gold<br>Ounce |
|--------------------------------|-----------------------------|------------------|-------------------|
| Mining                         | 12,004                      | 1.652            | 68.83             |
| Processing                     | 13,029                      | 1.794            | 74.71             |
| G&A/Reclamation                | 1,126                       | 0.155            | 6.46              |
| Refining, Transport, Insurance | 1,134                       | 0.156            | 6.50              |
| Royalty/CFEM Tax               | 654                         | 0.090            | 3.75              |
| <b>TOTAL</b>                   | <b>27,947</b>               | <b>3.847</b>     | <b>160.25</b>     |

Life of mine operating costs are US\$ 27.9 million or US\$ 3.85 per ore tonne. This amounts to US\$ 160.26 per troy ounce for the anticipated production of approximately 174,390 ounces.

Minerconsult performed a financial analysis of the São Vicente Project on an annual cashflow basis using a conventional pro-forma income statement format. A sensitivity analysis to key project parameters was also performed. The base case gold price used for the study was US\$ 375 per troy ounce. Recovered gold is estimated at 174,390 troy ounces for gross revenue of US\$ 65.4 million.

Table 1-5 shows the results of a before-tax cashflow analysis. The parameters shown are those normally of interest to the financial community.

**Table 1-5. Financial Results for Before-Tax Cashflow Analysis (US\$ 375/Oz Au)**

|  |                   |
|--|-------------------|
| Internal Rate of Return                | 41.9%             |
| Net Present Value at 5% Discount Rate  | US\$ 14.8 million |
| Net Present Value at 10% Discount Rate | US\$ 11.5 million |
| Payback Period                         | 1.5 years         |

The Minerconsult Feasibility Study Update demonstrates the technical feasibility of the São Vicente Project. Good recoveries of gold metal can be achieved and marketed. Previous mining activity has also demonstrated recoverable gold. The cost projections developed by this study, along with current gold prices, indicates a good possibility of financial success.

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A new exploration effort was commenced in early 2005 to 1) develop about 850 meters of underground drift to collect bulk samples from the Deep South orebody and also establish drill stations for 4500m of underground drilling, and 2) drill 4,000 meters of deep surface drilling to investigate potential gold mineralization in the contact between the metasediments and the volcano-sedimentary basement, below the pit and Deep South orebody. There appears to be good opportunities to expand the mineral reserve and mineral resource.

Yamana has also announced, in early May of 2005, that a formal construction decision on São Vicente has been deferred, pending further exploration results that are expected to be completed about July 2005.

It appears that the near term work to be done on the São Vicente Project is as follows:

- Complete the exploration work in progress.
- Update the resource block model.
- Develop an updated open pit production schedule and capital and operating costs.
- Perform a preliminary feasibility study on underground mining. This should include design of access and underground stopes, development of an underground mine production schedule, and estimation of capital and operating costs.

In addition, GSI recommends infill drilling in the higher grade zones prior to mining to improve the accuracy of short term mine plans.

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## **2.0 Introduction and Terms of Reference**

The São Vicente Project, located in Mato Grosso, Brazil, about 560 km west-northwest of the state capital of Cuiaba, is being evaluated as an open-pit heap leach gold operation in conjunction with a gravity concentration circuit.

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This Technical Report is a summary of the key findings of a feasibility study developed by Minerconsult Engenharia Ltda (Minerconsult) of Belo Horizonte, Brazil. The title of their report document is "São Vicente Project Feasibility Study Update", and is dated April 2005. It is reported to be an update to a study done in 1997. Minerconsult is responsible for metallurgical recovery estimates, process plant and infrastructure design and capital costs, and process and infrastructure operating costs.

In addition to Minerconsult, several other groups also participated in the feasibility study, and subsequently are also key sources of the information incorporated into this report.

Geoexplore Consultoria e Servicos (Geoexplore), also of Belo Horizonte, Brazil, was commissioned to develop the resource block model for the project. Their work is documented in the report "São Vicente Resources Estimate Update Report Revision 04", dated January 2005. An independent review of the resource model was provided by GeoSystems International, Inc (GSI). Based on this review, GSI is of the opinion that the resource model and the resource classification method used are in accordance with CIM guidelines and NI 43-101 standards. Their report is titled "São Vicente Gold Project Independent Review Report February 2005 Resource Model" and is dated March 2005.

In addition to this Technical Report, IMC was also commissioned to develop the mining portion of the project study. The IMC work included: 1) developing a mine plan and mine production schedule for the project, including the design of waste rock storage areas, 2) determining the mine equipment and labor requirements for the mine, and 3) estimating the mine capital and operating costs for the project. The details of this work are reported in the report "São Vicente Project, Brazil Mining Feasibility Study", dated March 2005.

Kappes, Cassidy & Associates (KCA) of Reno, Nevada performed much of the metallurgical testing that is used as the basis of this study. Their work is documented in the report "São Vicente Project Report of Metallurgical Tests", dated April 1998.

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Watts, Griffis and McOuatt Limited (WGM) developed a preliminary feasibility study of the project in 2003 for Santa Elina. This work is documented in "A Preliminary Feasibility Study of the Santa Elina Gold Project Composed of the São Francisco, São Vicente and Fazenda Nova/Lavrinha, Properties in Brazil for Santa Elina Mines Corporation", dated July 2003. WGM was not actively involved with this current study, but much of the background information for this current feasibility study, especially portions related to project history, exploration, geology, and nearby projects is drawn from the WGM report. In that report references to "Santa Elina" would not read "Yamana", given the acquisition of Santa Elina properties by Yamana in 2003.

Qualified Persons for this Technical Report include Michael Hester of IMC, and Ivan Machado of TechnoMine of Salt Lake City. Mr. Machado is fulfilling Qualified Person responsibilities for the Minerconsult portion of the study, including metallurgical recoveries and plant and infrastructure capital and operating costs. A site visit was conducted by M. Hester in November 2004. Mr. Machado conducted a site visit the week of June 13, 2005 to comply with NI 43-101 regulations. A site visit was also conducted by WGM senior personnel in March 2003.

The resource block model was developed by Porfirio Caballeiro of GCS. Mr. Cabaleiro is a 25-year experienced professional engineer, and although qualified by education and experience, he does not have the membership in a professional organization outside Brazil. Mr. Cabaleiro, along with Mario Conrado Reinhardt, a senior geologist from GCS, conducted a visit to the site in November 2004. Mario Rossi, Principal Geostatistician of GSI, and a Qualified Person under Canadian Securities regulations, reviewed the resource model prepared by Mr. Cabaleiro and concluded that it can be used for long-term mine planning and is adequate to support the Feasibility Study Update.

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IMC, as principal author of this Technical Report, accepts the resource block model developed by GCS based on the following:

1. Acceptance of the review conducted by GSI. This included the development of an alternative model, based on different geologic assumptions, that obtained essentially the same results as the GCS model.
2. Acceptance of the QA/QC work done by Ken Lovstrom and Echo Bay during 1997. IMC has worked with Mr. Lovstrom on other projects and accepts his work. Echo Bay staff involved with the project in 1997 included John Witner and Leah Mach. IMC did extensive work on other projects with these Echo Bay technical staff personnel during the mid-1990 s and accepts the work done by them.
3. Demonstration by GSI that the model results are not overly sensitive to various geologic assumptions and interpretations.
4. The additional review work done by WGM.

In this report the abbreviations Santa Elina, SEDM and Yamana are used interchangeably to refer to the sponsor company for this project. In particular, Minerconsult tended to use SEDM in their report and most other project participants used Yamana. Many of the historic

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reports used the Santa Elina abbreviation. IMC, referencing several report sources to prepare this document, generally maintained the references of the source document.

This report is in metric units of measurement. Ktonnes is an abbreviation for 1000 metric tonnes. Linear measurements are expressed in meters or kilometers and liquid volumes are in liters or kliters (liters x 1000). Gold grades are report in grams per metric tonne. Quantities of gold metal are often abbreviated as koz for 1000 troy ounces.

All currencies are in US dollars as of about the first quarter of 2005.

### **3.0 Disclaimer**

As discussed above, there has been participation from several different groups in the development of the São Vicente feasibility study. Each participant has carried out its work independently, and each directly for Yamana. They have not reviewed the work of the other participants and do not make any representation as to the accuracy of other s opinions or analyses.

IMC has exercised reasonable diligence in using data supplied by Yamana and the other project participants, and has no reason to believe that any data supplied are misleading or incorrect. However, IMC does not guarantee the accuracy of data supplied by others.

IMC also wishes to note the following items that were not specifically audited by any members of the current project participants:

The São Vicente sampling database is a historic database, developed fully by 1997. Neither Geoexplore, GSI, nor IMC have done any independent sampling or assaying or any other QA/QC reviews of the data. Instead, IMC has relied on an extensive QA/QC program conducted by Ken Lovstrom and Echo Bay in 1997, as well as some limited reviews done by WGM in 2003. There has

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not been any new sampling data added to the database since these audits were conducted.

The financial model includes the processing of a small amount of existing tailings material (1,260 ktonnes at 0.36 g/t gold) that is not included in the current mineral reserve or mineral resource statements. The quantity and grade of this material is estimated by Yamana and has not been audited.

The geologic model used to construct the resource block model was developed by Yamana personnel and has not been audited. However, GSI, in the course of their reviews developed a check block model, with different geologic assumptions, that got essentially the same results as the model based on Yamana geology.

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#### **4.0 Property Description and Location**

The São Vicente property is located in the extreme western portion of Mato Grosso State in west central Brazil, close to the Bolivian border. It is about 560 km west-northwest of the state capital of Cuiaba and is about 90 km north-northwest of the town of Pontes e Lacerda. Topographic coordinates of São Vicente are 14°32' S latitude and 59°17' W longitude. Figure 4-1 shows the location of the property.

Currently the São Vicente property consists of three contiguous mining permits held by Santa Elina Desenvolvimento, a Yamana Gold Company. The permits are registered with Departamento Nacional da Producao Mineral (DNPM) as process numbers 861.740/79, 861.810/79, and 861.809/79 and total 28,980 hectares. The mining permits are still in place from mining that was conducted at the site up until about 1996. Figure 4-2 shows the location of the mining concessions.

São Vicente is also about 58 km from Yamana's São Francisco Project area via a gravel road.

## 5.0 Accessibility, Climate, Local Resources, Infrastructure and Physiography

### 5.1 Access

Access to São Vicente is via the state capital of Cuiaba which has a population of more than 400,000. There are daily commercial jet flights to Cuiaba from São Paulo, Rio de Janeiro, and other major Brazilian cities.

There is good road access from Cuiaba to São Vicente. Pontes e Lacerda, the main city close to the site, is accessible by a 435 km paved highway from Cuiaba. The São Vicente property is 125 km from Pontes e Lacerda by road (90 km paved). Access is year round, and freight and other materials can be brought in relatively inexpensively.

### 5.2 Climate

The climate of the area is tropical to semi-topical with hot rainy summers, daily maximums in the range of 30°C to 35°C, and cooler dry winters with daily maximums in the range of 16°C to 20°C. The summer rainy period starts in December and continues through March.

The town of Pontes e Lacerda, with a population of 40,000, is the closest full service community. It has modern educational, medical, shopping, and banking facilities.

### 5.3 Local Resources

Other industries in the area include agriculture, cattle ranching, latex production for the rubber industry, tile and brick manufacturing, and small scale mining.

### 5.4 Infrastructure

National electrical service is not currently available at the project site. The closest national grid power source is at Pontes e Lacerda. Electrical power for previous mining at São Vicente was provided by diesel generators. For the implementation of the São Vicente Project, a 34.5 kV overhead line will be built from a new substation about 25 km from the project site.

Sixty homes, dormitories, a school and other basic facilities remain on site at São Vicente from the previous mining operation and are in serviceable condition but will be subject to certain rehabilitation work. A small number of care and maintenance personnel live at the site. It is proposed that the São Vicente mining facilities serve the combined São Francisco-São Vicente operation with daily travel to and from São Francisco.

Water is readily available at the project site both from streams and ground water. Santa Elina has permits in place for water use at São Vicente.

The property has an air strip for small planes.

Since the suspension of operations in 1997, some of the site production facilities have been removed to other projects. A small workforce is maintained at the townsite for care and maintenance of the remaining facilities as well as completion and support of the rehabilitation work that has been carried out since 1997.

There is some processing equipment still on the site from previous mining operations. This includes jigs, thickeners, and a carbon circuit from the milling operation. At the townsite, there are a maintenance garage, limited pilot test facilities and a laboratory, all of which will require upgrading to support future operations.

#### 5.5 Physiography

The physiography of the project is characterized by a mountain range, part of the Aguapei Mobile Belt and Mafic Arc, that follows the Brazil-Bolivia border. In the vicinity of the project, the range forms a prominent ridge some 800 m elevation that strikes approximately N30°W and is some 20 km wide. The ridge stands out from the plains (at approximately 200 m elevation) with a gentle slope on the western side towards Bolivia and a vertical, to near vertical, cliff like escarpment on the east side. The cliff like escarpment extends for more than 200 km along the mountain/Aguapei Mobile Belt. Streams drain the ridge both to the east and to the west with several of the eastern draining streams forming spectacular water falls. Both properties are partially covered with scrub.

Vegetation on the project area consists of mixed forest, savannah and open fields.

#### 6.0 History

Gold was first discovered in the area in the 1700 s by the Portuguese. The area became the first significant gold mining district in Brazil and the nearby settlement Vila Bela was at that time named the capital of Mato Grosso State. The district reportedly produced and shipped to Portugal some 60 to 70 tonnes of gold between 1720 and 1830, much of which came from the nearby São Francisco site. Remnants of this period of mining activity can be seen on the São Francisco property.

In the mid-1970s, garimpeiro activity began in the area, and in 1977, Santa Elina began acquiring property in the Santa Elina Gold Belt and commenced dredging/placer mining in 1983. Approximately 76,000 oz of gold was produced by placer mining at São Vicente. Hard rock mining at São Vicente produced an additional 110,810 oz of gold by flotation and gravity methods in the period 1995 to 1997.

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In 1998, the ongoing metallurgical tests for heap leach processing were completed and indicated the process to be viable. In 2002, Santa Elina re-examined the 1997 studies for each property. That resulted in the CAPEX estimates being significantly reduced for each deposit, in large part because of currency devaluation.

In 2003, Watts, Griffis, and McOaut (WGM) was commissioned to conduct a technical review of three properties held by Santa Elina and prepare a NI 43-101 Technical Report. However, per WGM, since this was the first public announcement of Mineral Reserves for the properties, a Preliminary Feasibility Study was required. The properties reviewed included São Vicente, São Francisco and Fazenda Nova. This study included the following for each property:

- An examination of each property;
- Data compilation;
- Review and audit of mineral resources and reserve estimates;
- A review of the proposed mining plan, metallurgical processes, environmental status, closure issues, logistics and infrastructure;
- Capital and operating costs review, with economic analyses.

The WGM Study was completed in 2003.

Most recently, Minerconsult Engenharia Ltda. (Minerconsult), from Belo Horizonte, was commissioned to prepare an updated feasibility study for the São Vicente Project. This study is reported to be an update to a study done by Minerconsult in 1997 and was completed in April 2005.

## 7.0 Geological Setting

### 7.1 Regional Geology

This description of regional geology is excerpted from the WGM report.

The regional geological setting for the São Vicente mine and numerous other gold occurrences that comprise the Santa Elina Gold Belt of central west Brazil and east central Bolivia is the Aguapei Mobile and Mafic Arc Belt. This belt, or break, is a major crustal scale shear zone that separates the Archean Amazon Craton on the east from the Proterozoic Paragua Craton on the west. The belt extends for more than 600 km in a north-northwest direction (Figure 7-1). The belt is characterized by a prominent mountain range composed of a 1,200 m thick sequence of Proterozoic clastic sediments known as the Aguapei Group (Figure 7-2). The Aguapei Group, the host rocks for the gold mineralization, is a sequence of texturally and mineralogically supermature sediments made up of braided river facies, aeolitic, aeolitic dune facies and shallow marine platform facies. Southward along the belt, the lower part of the Aguapei Group contains interbedded volcanic units and basic sills and dykes (that may be thrust from the east).

The Aguapei Group overlies the central part of the Amazon Craton (Brazilian Precambrian Shield) unconformably. This part of the shield, known as the Xingu Complex, contains lower Proterozoic volcano-sedimentary belts elongated in a northwest-southeast direction. The belts are surrounded by Archean gneissic to migmatitic batholiths. Prolonged erosion of the older rocks was accompanied by the development of basins into which the Aguapei sediments were deposited. The flat area surrounding the mountain range is believed to be mainly underlain by the Xingu Complex, however, most of the area is covered by eluvial-lateritic soils with few outcrops and the geology is not well known. Prolonged and deep erosion of this continental mass occurred during Proterozoic time, and was accompanied by the development of intracratonic basins in which were deposited the 1,200 m thick Aguapei Group of sediments. The sediments are represented by predominantly meta-arenites with lesser amounts of metapelites and even less common lenses of metaconglomerate. The Aguapei Group has been mapped over a 30 km strike length in Brazil and continues southward into Bolivia for more than 200 km, where it is known as the Sunas Group, before passing again into Brazil.

Structurally, the Aguapei Group rocks have been subjected to northwest-southeast compressional forces that folded the eastern edge into broad to tightly folded anticlinal-synclinal sequences paralleling the axis (azimuth 150°) of the mobile belt. Faulting, fracturing and shearing have also developed parallel to and across this fold axis.

The mountain range is bounded on both sides by faults. The fault on the east dips away from the mountain range at a shallow angle and separates the Archean basement on the east from the Proterozoic metasediments on the west and is thought by WGM to be a thrust fault in the vicinity of São Vicente to Pontes e Lacerda.

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A well-developed northeast-southwest fracture system crosscuts the regional trend. The linear occurrences of the most deformed parts of the Aguapei Group form ridges such as the São Vicente, de Borda, Patrimônio, Cagado, Caldeirão, Pau-a-Pique, Aguapei and Caramujo. The internal part of the Brazilian Aguapei or Bolivian Sunsas mobile belts contains the extensive Aguapei metasediment plateaus which show little or no deformation, for example, the ridges of Ricardo Franco/Santa Barbara in Brazil or Huanchaca in Bolivia.

The Sunsas orogenic cycle in Bolivia involved erosion of older rocks, deposition of the Sunsas and Vibosi Groups and their subsequent deformation and Vibosi metamorphism. The orogenic stage was accompanied by basic igneous and granitoid phases including the generation of pegmatites. The Susasa and Vibosi Groups cover the basement with a marked unconformity outcropping as internal metamorphosed synformal folds within the Sunsas orogenic belt or as relatively undisturbed layer sequences over the adjacent Paragua Craton (Bolivia), which remained unaltered during the orogeny.

The known bedrock gold deposits and occurrences in Mato Grosso state are separated into two districts – the São Vicente/Borda district and the Pontes e Lacerda district (to the south of São Francisco).

### 7.2 Local Geology

Knowledge of the geology of the São Vicente deposit is based on 30,135 m of drilling, in 217 drill holes, and exposure in the existing open pit. The drilling, which is mostly diamond drilling, includes 318 m of reverse circulation drilling.

Again, this description of local geology is excerpted from the WGM report.

Tight, steeply dipping, isoclinally folded meta-arenites of the Fortuna Formation comprise the local host rocks. The meta-arenites are composed predominantly of fine to grit sized quartz grains with a small percentage of interstitial recrystallized sericite, muscovite and locally minor chlorite, the alteration products of a former argillaceous matrix. Cross-bedding is commonly observed. Intercalated with the meta-arenites are metaconglomerates traceable up to several hundred meters along strike and up to 20 or 30 m thick, particularly where the conglomerates form the basal units of depositional cycles. The metaconglomerates are composed of poorly sorted, subangular to rounded quartz and quartzite pebbles in what was generally an argillaceous groundmass. Lenticular, thin (centimeter to decimeter thick) bodies of purplish-colored metapelites, of limited areal extent, are also interbedded in the meta-arenite units, particularly in the upper portion of the depositional cycles.

The basement of the Aguapei Group is comprised of a lower to mid Proterozoic sequence of fine grained metasediments (sericite schists), acidic metatuffs, banded iron formation ( BIF ), phyllites and quartzites, all intruded by granitoids and mafic rocks.

Both sequences were subject to three major deformational events that progressively resulted in folding, faulting and shearing, and finally fracturing of the rocks. These events were

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related to northeast-southwest compressional forces that shortened and buckled the rock masses along the Aguapei Tectonic Front. Deformation initially resulted in large anticline-synclinal folds with axial planes striking 150o and plunging to the northwest and southeast. Folds are symmetrical and can be followed for hundreds of meters. Axial plane foliation is prominent. Along the fold limbs, tight, meter-sized folds with sub-vertical axial planes exhibit a similar degree and orientation as the larger folds. Progressive compression resulted in rupturing of the flanks of the folds and formation of major shear-mylonitized zones up to 60 m thick, which can be traced for hundreds of meters in a northwest-southeast direction, parallel to the fold axes. The final episode was the formation of extensive flat to gently dipping fractures that allowed the emplacement of the higher-grade auriferous quartz veins/silicified zones.

During the orogeny, the rocks of the Fortuna Formation were subject to low grade metamorphism. The metamorphism is evident in the recrystallization of the quartz grains and in the alteration of the argillaceous matrix minerals into sericite-muscovite assemblages.

The gold bearing quartz veins display sericite and minor chlorite alteration. There have been no microscopic or other studies of alteration. Significant weathering, caused by the penetration of surface waters along major structures, is occasionally visible to a 200 m depth.

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### **8.0 Deposit Types**

This discussion of deposit type is from the WGM report.

São Vicente is a shear hosted lode gold deposit which appears to be epigenetic and structurally controlled and composed of narrow, 1 cm to 5 cm wide, quartz (sericite) veins containing free gold. The veins and vein system/stockworks are both parallel to and crosscutting the bedding planes

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and appear to be separate or multiple, but closely related, mineralizing events. While direct comparable examples of similar type deposits are not known to WGM, the deposits have some similarity to deposits in the Pontiac sediments of the Cadillac Break, Quebec, Canada and some similarity, at least lithologically, to the Witwatersrand gold deposits in South Africa.

## 9.0 Mineralization

The following discussion of mineralization is from the WGM report.

At São Vicente, gold mineralization occurs for more than 1,000 m in two parallel northwest trending zones along anticlinal flanks. These zones are located within a larger regional area of shearing 10 by 2 km wide and are characteristically proximal to the major regional shear zones.

Most of the gold occurs in millimeter to several centimeter-thick quartz veins which cut the host rocks in two prominent directions. One is sub-vertical in association with shear-mylonite zones sub-parallel to foliation in the meta-arenites. The other is flat to shallow dipping, crosscutting the foliation and bedding of the host rocks. The concentration of gold is directly related to the frequency of the two structures. Gold is intimately associated with quartz, to a lesser extent pyrite, and to a very small extent, arsenopyrite. Sericite and minor chlorite are common accessory minerals. Throughout the deposit, free gold is common and is visible as fine to coarse grains, some up to 10 mm in diameter. This gold is commonly described as gravimetric gold because of the historic gravimetric method used during the assaying for gold and for the mining method used to recover it. The fine gold that occurs in sericite, sulfides and silicates is collectively described as chemical gold. The contact between weathered (oxide-bearing) and unweathered (sulphide-bearing) rocks is highly irregular due to locally deep penetration of surface waters along major structural breaks.

In the south extension/east border area of the São Vicente pit there is potential for a higher gold grade underground resource coming from vertical dipping pods of quartz veins, rich in sulfides and sericite. This mineralized material occurs between elevation 240 m (top) and 50 m (bottom) covered by 120 m of barren rock. As defined by exploration drilling, the length is 300 m and it is open to the south. Geologic information indicates that the mineralization occurs as metric to decimetric lenticular pods paralleling foliation and up to 12 m thick. They plunge to the northwest following the fold axis of the host sediments. To date 21 core holes totaling 5,438 m have tested the area. Drillholes have cut 52 gold intersections at a

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grade over 1.0 g Au/t and 18 intersections over 4.0 g Au/t. Gold occurs largely as disseminated free coarse particles in the core samples.

## 10.0 Exploration

1990 to 1997: A considerable amount of diamond drilling was carried out during the period of mining operations at the site. The database used for geologic modeling contained 224 diamond drillholes totaling 30,672 m. Reserve circulation drilling totaled 2 holes and 318 m. There is no

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breakdown of drilling by year in the data supplied to WGM.

1994: During 1994 the gravity plant tailings area was tested by 100 by 25 m spaced drillholes.

1996 to 1997: Resource and reserve estimations were undertaken with the assistance of outside consultants and Echo Bay personnel. Concurrently, metallurgical testing (largely by KCA, with some by Santa Elina itself and some by METAGO) was carried out and a preliminary feasibility study produced. Echo Bay was involved in selecting consultants and provided certain in-house expertise for portions of the study. Minerconsult Engenharia Ltda. (Minerconsult), from Belo Horizonte, was also responsible for several aspects of the study.

1998: The KCA metallurgical testing was completed.

2005: A new exploration effort was commenced early in the year to 1) develop about 850 meters of underground drift to collect bulk samples from the Deep South orebody and also establish drill stations for 4500m of underground drilling, and 2) drill 4000 meters of deep surface drilling to investigate potential gold mineralization in the contact between the metasediments and the volcano-sedimentary basement, below the pit and Deep South orebody.

## 11.0 Drilling

Santa Elina drilled 30,996 m in 226 drillholes between 1990 and 1997. Part of this work was in support of ongoing production. 224 holes were diamond drillholes and the other two holes were drilled by reverse circulation, totaling 318 m. All the drilling was carried out on the deposit or the possible immediate extensions of it and was either NQ or HX size. Recoveries were above 95%. Drilling was carried out by Brazilian contractors.

Recovery and Rock Quality Determination ( RQD ) measurements were obtained from all drill core, with lithology, alteration and mineralization described prior to beginning the sampling process.

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## 12.0 Sampling

All the sampling information used to develop the São Vicente resource block model was from 226 drillholes discussed above. There was not any surface, trench, or channel samples from underground openings included.

The drill core was rigorously sampled on 2m intervals. For NQ core (47.6mm) the entire 2m core sample was used to provide approximately 9kg of material per sample. For HX core (76mm) half core was used, providing approximately 11kg per sample.

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Similar sampling procedures were carried out at São Vicente and at São Francisco.

### 13.0 Sample Preparation, Analyses and Security

The sample preparation and analyses procedures established by Santa Elina for both São Francisco and São Vicente are as follows:

Pre-1997: HX core was split and 11 kg samples were collected at 2 m intervals from one-half of the core. NQ core was also sampled at 2 m intervals but the whole core was used in order to provide an adequate sample size. This splitting procedure was also used in 1997.

The evident gold nugget effect led Santa Elina to develop specific protocols. On site, samples were crushed to quarter inch and pulverized to minus 2 mm in a hammer mill. A fraction (about one kilogram) was saved for ore characterization and the rest (seven to ten kilograms) was panned to remove the gravity gold (+150 mesh), which was amalgamated and assayed at the São Vicente mine facilities. The heavies which remained after amalgamation were assumed to contain no gold but were captured and saved. The entire pan tailings were collected, dried and split to a 1.8 kg sample and shipped to the NOMOS laboratory in Rio de Janeiro for gold analysis of a 50 g sample by fire assay with an AA finish. The value obtained from this assay was termed the fine, or chemical gold one. Therefore, each 2 m interval has two assays, gravity and chemical and the sum of them is the total gold grade.

1997: A QAQC audit by consultant Kenneth Lovstrom, while generally finding no fault with past procedures led to the introduction of a more industry standard protocol for the 1997 program. NOMOS set up a preparation and analytical lab on site and assaying was done on the entire samples using fire assay with an AA finish. In this sample stream there was no gravimetric gold assay. Almost two thousand 1997 samples were analyzed using both pre-1997 and 1997 protocols. It was concluded that results were comparable and that pre-1997 sampling data were reliable and by inference that the gravimetric step was not necessary. This subject is further discussed below.

Check assaying was carried out for Santa Elina by Bondar-Clegg in Vancouver and GeoLab in Brazil.

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Concerning sample security, the São Vicente sampling database was developed prior to 1997 and none of the reports available to IMC discuss any specific sample security procedures during sample preparation, analysis and/or transportation. There is a substantial amount of remaining drill core, sample pulps, and coarse rejects from both the São Vicente and São Francisco Projects stored under cover at the São Vicente Project site. There is opportunity to submit additional check samples if desired.

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#### 14.0 Data Verification

##### 14.1 Echo Bay Work

In mid-1996 Echo Bay purchased 43% of Santa Elina and became significantly involved in the evaluations of the São Francisco and São Vicente Project. In early 1997 Echo Bay retained Ken Lovstrom, a Tucson, Arizona, USA, geochemist, to conduct a detailed technical audit of the sampling and analytical procedures. This work included:

1. A review of sample preparation and analytical methods at the São Vicente preparation and analytical facilities. Recall from above that sample preparation and the assay of the coarse (gravimetric) fractions of the samples were done at São Vicente.
2. A review of the Nomos laboratory. They were doing the assays for the fine (chemical) fractions of the samples.

At this time a system of check sampling was introduced. It consisted of the introduction of blanks and standards (four of them prepared by Bondar-Clegg in a round robin process from material from Santa Elina's Fazenda Nova project) each 26 samples, duplicates each 10 samples and checks of 5% of the pulps at a second lab. The conclusion of Mr. Lovstrom in his January 1998 report was that the assay data were acceptable for use in resource estimates.

Also, as discussed above, 1995 samples were analyzed with both the amalgamation method and more convention fire assaying. Results compared well, giving confidence to the historic assaying method, and also demonstrating that more conventional methods should be acceptable.

##### 14.2 WGM Work

The WGM report discusses some limited data verification done by them. The following is extracted from their report.

Notwithstanding this study, WGM has recently received some data obtained after January 1998 regarding a 50-sample set of pulps which were subjected to a metallic sieve assaying method followed by fire assay and a AA finish at the NOMOS Laboratory. These results were compared

with the historic results using the pre-1997 Santa Elina procedures and the procedures introduced following the QAQC audit noted above. While the small sample population does not allow for definite conclusions there is a large discrepancy between the metallic results and the historic ones. The metallic grades are much higher. In addition the same data notes that the pre-1997 Santa Elina procedures included deducting 8% from the gravimetric Au assay to account for Ag amalgamated with the Au. This deduction is corroborated by historical losses in gold refining at the São Vicente mine. Both issues raised by this 50-sample set should be further investigated.

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WGM Senior Geologist, Velasquez Spring, and Senior Associate Metallurgical Engineer, Ross MacFarlane visited the project sited between March 1 and 3, 2003. During the visit the geology was reviewed, drill core and logs examined and selected drill core collected and sent for assay to Lakefield Laboratories in Belo Horizonte, Brazil, to confirm the presence of gold as reported (Table 14-1). WGM selected and sampled half of the already half-sawn drill core (quarter core) from two holes of each of the São Vicente and São Francisco deposits. The samples were carried in person by WGM to the airline freight offices and shipped to Lakefield Research Laboratories in Belo Horizonte for analysis. The samples were prepared and analyzed by metallic screen fire assay with final AA determination and the results are as follows:

Table 14-1  
ASSAY RESULTS

| Hole No. | Interval<br>(m) | WGM<br>(g Au/t) | Santa Elina<br>(g Au/t) |
|----------|-----------------|-----------------|-------------------------|
| SF-24    | 234-236         | 3.8             | 8.48                    |
| SF-46    | 274-276         | 10.8            | 0.40                    |
| SV-69    | 12-14           | 0.03            | 1.36                    |
| SV-90    | 62-64           | 0.5             | 0.62                    |

The samples all show various gold contents confirming the presence of gold in both deposits. WGM had selected the core from both high grade and low grade mineralization and although individual samples show considerable variance both the few numbers of samples collected and the probable cause of a nugget effect could explain the variance.

The site facilities, infrastructure and proposed open pit, heap leach pad areas were visited and the general environmental conditions examined at both properties.

14.3 IMC Comments

It should be noted that the duplicate assays and pulp check assays that were the basis of the Echo Bay QAQC evaluation were from São Francisco samples, not São Vicente samples, though the sampling and analytical procedures had been established based on São Vicente

experience. Reports made available to IMC do not indicate any QAQC work done specifically at São Vicente. Note that São Vicente had been an operating hard rock mine, with verifiable gold production, prior to 1997. This would lessen the emphasis for sample validation at São Vicente.

Due to the inherent difficulty in sampling coarse gold, there is some suggestion that gold grades are understated as the historic assay methods may not have captured all the nugget

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gold. Pitard in particular, in his 2004 report has indicated that this is likely. Unfortunately, short of large scale bulk samples, this is very difficult to confirm.

#### **15.0 Adjacent Properties**

This discussion of adjacent properties is excerpted from the WGM report.

Several companies/individuals hold mineral rights roughly on a northwest trending line to the immediate west and southwest of Santa Elina's extensive holdings (Figure 15-1). A Brazilian subsidiary of Inco is the largest mineral rights holder, followed by Geometrico de Granitos e Mineracao Ltda and subsidiaries of Rio Tinto. All these holdings are off of the main Santa Elina Gold Belt trend and in the case of Inco are targeting the more mafic terrain of the Aquapei Mobile and Mafic Arc Belt which defines the Proterozoic/Archean boundary. Inco is known to have encountered nickel mineralization in the area. Geometrico is in the dimension stone business.

The Aquapei Gold Province within the Aquapei Mobile Belt and Mafic Arc in Brazil is also known as the Santa Elina Gold Belt and contains a series of alluvial, eluvial and primary type deposits. Placer gold deposits rim the structural block of metasediments throughout the strike extent of the mountain range within Brazil. Some of the placer deposits drain folded metasedimentary terrain, some drain flat-lying metasediment terrain and some drain greenstone terrain, with the only common geological thread to these placer deposits being the structurally bounded mountain range of clastic metasediments.

These deposits are thus the result of the erosion of the primary gold sources within the Aquapei Group (Fortuna Formation) and/or within the contact zone with the volcano-sedimentary sequences.

Santa Elina hold numerous mineral concessions along more than 200 km of the belt (Figure 15-2). The known bedrock gold deposits have been separated into two districts: the São Vicente/Borda district and the Pontes e Lacerda district. In the São Vicente/Borda district which contains both São Vicente and São Francisco deposits, the gold mineralization occurs in shear zones that are filled with sericite and subordinate quartz along the bedding planes and in quartz veins filling fractures that cut the bedding planes. Free gold occurs from microscopic size nuggets of several millimeters in diameter. Gold also occurs as laminations along the shear planes and within limonitic boxworks after pyrite and arsenopyrite.

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Exploration by Santa Elina and/or associated companies has been concentrated along the São Vicente/Borda district. Geophysical aeromagnetic surveying, geochemical surveying and diamond drilling have been carried out but have not adequately explained the source of the associated placer deposits.

In the Lavrinha area of the Pontes e Lacerda district, the gold mineralization is often associated with low angle shear zones and also occurs in millimetric to centrimetric quartz veins within sulfide horizons within the meta-arenites.

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There are numerous deposits in Pontes e Lacerda district, all have been worked by garimpeiros and some explored by B.P. Mineracao (noe Rio Tinto) but all require further work.

The gold occurrence at the Lavrinha deposit (No. 18) is of particular interest as the gold occurs at the unconformity, at the base of the pile of metasediments, a different geological setting than the gold occurrences at São Vicente and São Francisco. Santa Elina holds several mineral exploration concessions surrounding the Lavrinha deposit.

The following is a brief description of some of the gold occurrences along the belt.

### 6° Braco

This prospect is located 10 km southeast of São Vicente at the headwaters of an area formerly dredged by Santa Elina. Exploration by panning material from the Braco creek led to the discovery of an area measuring 600 by 300 m covering two parallel mineralized metaconglomerate units. Former Portuguese workings cover an area of 300 by 100 m within the conglomerates.

Later mapping led to the discovery of numerous mineralized conglomerate boulders with gold values to 1.97 g Au/t and additional work is warranted. Santa Elina geologists have recommended trenching and drilling on this prospect.

### Carneiro

Situated 14 km northwest of Pontes e Lacerda and 3 km southeast of São Francisco, the Carneiro prospect has been working by garimpeiros. Gold mineralization is accompanied by pyrite and arsenopyrite in a shear zone in basement graphitic schists.

### Serra do Caldeirao

The Serra do Caldeirao properties are located 28 km south of Pontes e Lacerda in the Caldeirao Range. Basically, four areas of past and present garimpeiro activity occur here, two of which measure on the order of 1 km<sup>2</sup> of workings in colluvium and bedrock on the east slope of the ridge.

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Aquapei Group Fortuna Formation meta-arenites (locally exhibiting crossbedding), metapelites and metasedimentary breccias comprise the sedimentary package, which has been cut by two major fracture/shear orientations:

Striking 025°/60°SE  
Striking 100°-130°/50°SW

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Quartz veining, with associated pyrite, is best developed in these shears within the meta-arenites.

It is believed that mining activity has been concentrated in the colluvium coming off the Serra do Caldeirao which is located immediately to the west. However, two similar occurrences are located west and north of the present workings on the other side of the Serra do Caldeirao range, on the opposite flank of the anticlinal ridge, resulting in a potential bedrock source target in the order of 7 km along the ridge by 1 km in width.

Gold nuggets weighing as much as 120 g (about 4 oz) have been reported to have been recovered from the property.

The following properties, GP 3, 5, 6 and 7 are located 40 to 70 km south-southeast of Pontes e Lacerda and were initially discovered by B.P. Mineracao Ltda. (the Brazilian Company of BP Minerals) in the 1980s during an exploration program in the Archean greenstone belts for volcanic-hosted copper and gold deposits.

### GP 3

The GP 3 projects occur in a shear zone cutting sericite and epidote altered intrusive granites. Gold mineralization is developed in quartz veins related to shearing and also in a 2m thick laterite at surface. The quartz veins are oriented 160/70°SW and native gold is frequently encountered. An initial evaluation conducted in the early 1980s over a surface area of 200 by 100 m resulted in the following preliminary resource figure by BP Mineracao.

Laterite: 78,600 t at 1.2 g Au/t to a depth of 2 m  
Altered bedrock: 156,700 t at 1.9 g Au/t to a depth off 10 m

GP3 is considered a potential for several million tones of possibly greater than 1.0 g Au/t reserves.

### GP5

A gold occurrence in granites cut by shear-related quartz vein systems that strike 060° to 070°, with associated copper, lead, zinc, molybdenum, and bismuth geochemical anomalies.

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The largest gold geochemical anomaly here measures 1,300<sup>1</sup> to 100 m.

No detailed exploration was carried out at the time of discovery in the early 1980s, even though selected grab samples assayed up to 8.5 g Au/t.

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<sup>1</sup> Units are not specified in the WGM report.

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### GP 6

A similar occurrence to GP 5, gold is geochemically anomalous on surface over an area of 500 m by to 350 m, but no significant work was subsequently carried out.

### GP 7

The GP 7 property hosts a gold geochemical surface anomaly measuring 800 m by 150 m and is underlain by a 110° trending, shear-related quartz vein in altered granite. No significant follow up exploration has been done.

WGM concurs with Santa Elina that the various gold occurrences along the belt warrant exploration, in particular gold occurrences at the unconformity similar to that at Lavrinha, in the Pontes e Lacerda district.

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## 16.0 Mineral Processing and Metallurgical Testing

### 16.1 Historical Results

As discussed, there has been previous hard rock mining activity at the São Vicente Project based on milling of the ores. The old facilities that treated the low grade São Vicente gold ore consisted of crushing the run-of-mine to minus 9.5 12.7 mm (3/8 inches to 1/2 inches) and then grinding the crushed product to minus 2 mm in a rod mill. The ground ore was classified at 210 micrometer (65 mesh) in hydrocyclones with the underflow treated in a jigging circuit and the overflow in a froth flotation circuit. The coarse gold concentrate obtained in the jigging plant was sent directly to the gold shed for further treatment and the fine gold flotation concentrate was reground, thickened and treated in a CIL adsorption/ desorption/electrowinning circuit.

The above described process had a lot of operating and cost problems, including the following:

- Grinding costs were very high due to the high abrasiveness (more than 99.5% of quartz content).
- Inefficient hydrocyclone separation, which allowed a high amount of fine gold (chemical gold) to report to the cyclones underflow, there being lost in the jigging circuit tailings, thus reducing the overall recovery.
- Low available settling area for the flotation concentrate, which is a material that is difficult to settle. This lead to high concentrate losses in the thickener overflow.

Based on these facts, it was decided to investigate a more cost effective process suitable to treat the low grade São Vicente ores. Preliminary bottle rolls leaching tests were carried out with the fine fraction (-100 micrometer) of the ore showing that the ore was amenable to direct leaching by cyanide solution, with recoveries up to 90%.

### 16.2 Column Leach Tests

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Based on positive results in the bottle results it was decided to run column leach tests in order to verify the amenability of the ore to heap leaching processing. Initial testwork was conducted at Metago's laboratory (the former Mineral Research Center of the Goias State), and then by Santa Elina Desenvolvimento Mineral (SEDM) technical staff at the São Vicente Mine. Finally, Kappes, Cassidy & Associates (KCA of Reno, Nevada) performed complete tests (April 1998) that confirmed and validated the previous results.

The preliminary column leach tests carried out by Metago, from April to June 1996, utilized samples collected from the São Vicente mine plant feed. For these tests a circular 20 cm by 2.20 meter height PVC leaching column was used. Two size fractions were studied, i.e. the plant feed -13 mm, +2 mm (one column leach test) and the -2 mm fraction (three column leach tests). This last fraction was tested after the removal of the gravity gold, i.e. that

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coarse, free gold amenable to be recovered by panning. Three column leach tests were performed with this sample: one without further treatment, another including sample agglomeration, and another with 100 micron deslimed material. These tests with fine fractions showed that the recoveries were 84.9%, 90.2%, and 91.3% respectively. For the coarse fraction the recovery was about 66.5%.

Later on, São Vicente metallurgical staff performed column leach and bottle roll tests with the crushing final product samples in the existing crushing plant. This sample was a -1/2 inch (-1.27 cm) material and was prepared in order to simulate the proposed industrial circuit. Thus the sample was first classified at 3mm with the coarse fraction (-1/2 inch to +3mm) directly charged into a circular 12 inch by 10ft height column leach for testing. The -3 mm fraction was deslimed at 270 mesh (53 micron), and the +270 mesh fraction was panned to separate the gravity gold prior to its being charged into a circular 12 inch by 10 ft height column leach for testing. The -270 mesh material was tested in a bottle roll apparatus. A summary of the test results is presented in Table 16-1.

During February 1997, 13 drums of material, representing three bulk samples, were sent to KCA. Table 16-2 shows the samples description and weight. The three materials were composited in various ways to produce seven metallurgical samples for testing (Table 16-3). Table 16-4 summarizes the results of bottle roll and column testing on these samples. It is reported that the metallurgical bulk samples were collected in the industrial circuit of the Sao Vicente plant during the last months of the previous mine operations from different open pit areas and in such a way and extent that they may be considered representative of the ore body.

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**Table 16-2: Identification of KCA Original Samples**

| KCA Sample No. | Description  | Gold Grade (g/t) | Received Weight (kg) |
|----------------|--------------|------------------|----------------------|
| 25101          | Coarse Crush | 0.31             | 640                  |
| 25102          | Fine Crush   | 0.77             | 530                  |
| 25103          | Pit Clay     | 0.38             | 201                  |

**Table 16-3: Composition of Various KCA Metallurgical Composites**

| KCA Sample No. | Description/Composition   | Received Weights |
|----------------|---|------------------|
| 25101A         | 25101 Coarse Crush  | 100%             |
| 25151A         | 25101 Coarse Crush (+3.35 mm only)<br>25101 Coarse Crush (Tails from Wilfley Table) | ?<br>?           |
| 25102A         | 25102 Fine Crush  | 100%             |
| 25156A         | 25102 Fine Crush (+3.35 mm only)<br>25102 Fine Crush (Tails from Wilfley Table)     | ?<br>?           |
| 25103A         | 25103 Pit Clay  | 100%             |
| 25154A         | 25101 Coarse Crush<br>25103 Pit Clay  | 80%<br>20%       |
| 25155A         | 25102 Fine Crush<br>25103 Pit Clay  | 80%<br>20%       |

**Table 16-4.**  
**São Vicente Project**  
**Summary of Metallurgical Tests (From KCA)**

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### 16.3 Proposed Process Method

The proposed process method was selected by SEDM personnel. The selected gold processing unit operations are conventional and are supported by existing plant operation and metallurgical testwork results.

The results obtained at Metago, by SEDM in house column tests, and also by KCA's tests, indicated the possibility to increase overall plant recovery from the historic 67% to 81% if the introduction of a heap leach operation in the process was considered.

The adopted process method considers the following basic operations:

ROM crushing in three stages until reaching 100% below 19mm.

Wet screening of crushed ore on a 3mm mesh, with the fraction exceeding 3mm being directly sent to the leaching pile and the fraction smaller than 3mm being sent to jigging.

Jigging of the fraction below 3mm in three successive stages, in existing jigs, until the concentrate is obtained for subsequent purification and smelting.

Desliming of jigging tails at 57 microns, with the fraction exceeding 57 microns being dewatered and sent to the leaching pile, while the fraction below 57 microns is sent for thickening and subsequent leaching at the existing thickener and CIL unit.

Ore exceeding 3mm, as well as deslimed and dewatered jigging tailings, are carried together by trucks to the leaching pile.

CIC-type adsorption columns are used for recovery of gold from the leaching solution.

Existing desorption, electrolysis, and smelting plants, after a few improvements have been introduced, are used in order to obtain gold ingots.

In addition to mine ore, a small amount of old tailings from the operation of the PP2 dredge are reclaimed and carried by trucks to the leaching pile and are processed together with the ore. The plant design is sized to process 2,052 ktonnes per year of ore. This is based on mine production of 1.8 million tonnes per year plus 252 ktonnes per year of existing tailings.

Scalping at 3 mm is supported by former good industrial experience in the existing gravity plant, which was in operation when primary ore mining was started.

Desliming at 57 microns (270 mesh), of the jigging tailings, is considered to avoid the ore agglomeration before heap leaching and the high costs involved. This also allows the possibility to treat this fine material, after thickening, in the existing CIL circuit.

Figure 16-1 is a block diagram of the proposed process route.

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16.4 Tailings Management

The tailings (minus 53 micron) to be generated in the concentration plant will be discharged from the CIL operation at the following flowrates and concentrations:

**Table 16-5: Tailings Discharge Parameters**

| Parameter | Units | Description |
|-----------|-------|-------------|
| 9.0       | (t/h) | Solids      |
| 30.0      | (t/h) | Slurry      |

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|      |        |                  |
|------|--------|------------------|
| 3.4  | (m3/h) | Solids           |
| 21.0 | (m3/h) | Water            |
| 24.4 | (m3/h) | Slurry           |
| 30.0 | %      | Solids by weight |
| 1.23 | (none) | S.G. of slurry   |

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For a yearly operation schedule of 6,912 hours and considering 3.5 years for the project life, the total tailings tonnage can be calculated as

$$9.0 \text{ t/h} \times 3.5 \text{ yr} \times 6,912 \text{ hr/yr} = 217.7 \text{ ktonnes}$$

of tailings. Assuming the value of 1.5 t/m<sup>3</sup> for the dry density of the settled tailings, this tonnage represents 145,200 m<sup>3</sup> of dry tailings, which is a very small amount if compared with the available volume of tailing dams B5 or B7.

As those dams have been originally designed to accommodate 90 t/h of dry solids for six years, and the actual discharge rate will be only 9.0 t/h, i.e. less than 10% of the design number, it is clear that there will be no problem in terms of tailings containment.

The tailings will be conveyed to the tailing reservoirs by gravity, using a pipeline.

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## 17.0 Mineral Reserves and Mineral Resource Estimates

### 17.1 Mineral Reserve

It is the opinion of IMC that the mine production schedule defines the mineral reserve for a mining project. Table 17-1 reports the mineral reserve of the São Vicente Project based on the production schedule developed by IMC during the 1<sup>st</sup> quarter of 2005. Ore planned to be mined and shipped directly to the plant amounts to 5,881 ktonnes at 1.066 g/t gold. The IMC mine plan also results in 123 ktonnes of low grade ore at 0.298 g/t gold that will be stockpiled and potentially processed at the end of the mine life. This results in a total mineral reserve of 6,004 ktonnes at 1.050 g/t gold for 202,700 contained ounces of gold. The total material movement is 21.3 million tonnes for an overall strip ratio of 2.55 to 1. The mine plan is based on processing 1,800 ktonnes of ore per year for a total commercial pit life of 3.3 years.



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This mineral reserve is based on open pit mining only and does not include any potential underground mining. In particular, there is additional resource, namely the Deep South resource, which could be incorporated into an open pit, but appears to be more profitably mined as an underground mining project. Studies are in progress to evaluate underground mining potential of resources not included in the above mineral reserve.

The final pit design for the project is based on a floating cone analysis ran at a gold price of US\$ 350 per troy ounce. The floating cone analysis excluded potential Deep South underground ores. Table 17-2 shows the economic parameters used for the floating cone analysis and pit design. For comparison, it also shows the final parameters used in the financial analysis.

The mining cost estimate is based on a recent feasibility study done by IMC for another Yamana project in Brazil, the São Francisco Project, which utilized similar equipment. The São Francisco Project estimated average life of project mining cost was US\$ 0.52 per total tonne with peak production rates of 25.6 million tonnes per year. An analysis of the fixed costs such as salaried staff and the variable costs such as consumable items and hourly labor predicted a cost of about \$US 0.643 per total tonne for São Vicente. The other cost and recovery parameters were provided to IMC by Yamana personnel.

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**Table 17-2: Economic Parameters for Mine Design**

| Parameter  | Floating Cone/<br>Design (Note 1) | Final for<br>Financials |
|--|-----------------------------------|-------------------------|
| Mining Cost Per Total Tonne                        | \$ 0.643                          | \$ 0.615                |
| Processing and G&A Per Ore Tonne                   | \$ 2.11                           | \$ 1.966                |
| Process Recovery                                   | 81%                               | 81%                     |
| Gold Refining, Transport, Insurance Per Troy Ounce | \$ 6.50                           | \$ 6.50                 |
| Gold Royalty (% of Gross Revenue)                  | 1%                                | 1%                      |
| Gold Price Per Troy Ounce                          | \$ 350                            | \$ 350                  |
| Breakeven Cutoff Grade (\$350 Gold Price)          | 0.31 g/t                          | 0.29 g/t                |
| Internal Cutoff Grade (\$350 Gold Price)           | 0.24 g/t                          | 0.22 g/t                |

Note 1: It is essential to note that these parameters are estimates made at the beginning of the project for the purpose of starting the mine design process. They are based on previous studies and are not the final parameters used for financial analysis. Canadian Institute of Mining guidelines recommend the disclosure of these parameters because they pertain to cutoff grade calculations used in the study.

Figure 17-1 shows the final pit design. There is a main pit and two other small pit areas on the east side of the main pit. The main pit has two exits on the east side to allow access to the crusher and the waste dumps. Material above the haul roads will be hauled out of the pit on contour. The final pit is 1050 meters long in the northwest-southeast direction and 280 meters wide in the northeast-southwest direction. The pit bottom is at the 120 meter elevation. The highest wall is about 150 meters on the southeast wall of the north area of the pit. The total area disturbed by the pit is about 23 hectares.

A geotechnical study was performed by Figueiredo Ferraz in 1995, and served as the basis for the previous pit design and mining activity. This work recommended overall slope angles of 50°, 55°, or 60° depending on location in the pit and pit depth. Based on the projected pit depth, IMC used a base case overall slope angle of 55° for pit design.

IMC also designed a set of four mining phases for the São Vicente Project for mine production scheduling purposes. Phase 1 mines the northwest portion of the main pit to the final pit limits. The floating cone analysis showed this to be the most profitable area to commence mining. The phase one geometry was designed to provide about 2 years of ore in the highest grade, lowest strip ratio area of the mine.

Phase 2 mines the southeast portion of the main pit to the final wall position. Phase 3 and Phase 4 are the two small pits. Phase 3 is east of the Phase 2 pit, while Phase 4 is to the southeast.

A mine production schedule was developed to show the ore tonnes, metal grades, total material, and waste material by year throughout the life of the mine. The distribution of ore and waste contained in each of the mining phases was used to develop the schedule, assuring that criteria such as continuous ore exposure, mining accessibility, and consistent material movements were met.

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IMC used a dynamic programming scheduling algorithm, developed in-house, to evaluate several potential production schedules. Required annual ore tonnes and user specified annual total material movements are provided to the algorithm, which then calculates the annual cutoff grades for a maximum NPV schedule. The floating cone economics were used for the economic evaluation.

Tables 17-3 through 17-5 show the final schedule. Table 17-3 shows the mine production of ore for each mining year. The schedule is based on 1,800 ktonnes of ore per year. The table also shows that a small amount of low grade stockpile material is produced during preproduction and Year 1. This is the material between 0.28g/t gold and the operating ore cutoff grade for the year. The 0.28 g/t cutoff grade for the stockpile allows for some mining rehandle costs.

The table also shows the total material movement from the mine by year, which peaks at 5.5 million tonnes during Year 1 of commercial production. The preproduction period requires the mining of 3 million tonnes of total material to expose sufficient ore to make it a reliable ore source for the start of commercial production in Year 1. The preproduction period will require approximately 6 months. The ore mined during preproduction will be stockpiled near the crusher to make up part of Year 1 ore production.

Table 17-4 shows the processing of the low grade stockpile material during Year 4. The plant production schedule is shown on Table 17-5. It shows that Year 1 ore is made up of material mined during preproduction and Year 1.

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17.2 Mineral Resource

At a 0.3 g/t gold cutoff grade, GCS has tabulated measured and indicated mineral resources for São Vicente at 12,459 ktonnes at 0.99 g/t gold for 396,000 contained ounces. Table 17-6 shows this resource by category. There is an additional 207 ktonnes of inferred resource at 0.53 g/t gold.

**Table 17-6: Mineral Resources at 0.3 g/t Gold Cutoff Grade (by GCS)**

| Resource Class       | Ore Ktonnes | Gold (g/t) | Gold (koz) |
|----------------------|-------------|------------|------------|
| Measured             | 6,431       | 1.03       | 213.0      |
| Indicated            | 6,028       | 0.95       | 183.0      |
| Measured + Indicated | 12,459      | 0.99       | 396.0      |
| Inferred             | 207         | 0.53       | 3.5        |

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It is noted by IMC that this resource statement is simply a summation of model blocks above a 0.3 g/t cutoff grade. It is known to include some low grade material at depth that is unlikely to be extracted under current economic conditions. In addition, the mineral reserve of Section 17.1 uses lower cutoff grades than 0.3 g/t so the mineral reserve is not fully contained within the resource statement.

Table 17-7 contains a statement of mineral resources for the São Vicente Project, exclusive of the mineral reserve presented above, prepared by IMC to be more compliant with current regulations at current economic conditions.

Measured and Indicated Resources are tabulated by three categories:

**Lower Grade Resource in the Design Pit** At current gold prices, approximately US\$ 425 per ounce, there is additional measured and indicated resource in the design pit that could be processed. The table shows resource between 0.2 g/t gold and the operating cutoff grades for the mine plan. This amounts to 922 ktonnes at 0.237 g/t gold for about 7,000 contained ounces.

**Deep South Underground Resource** As discussed above the pit design excluded the Deep South Underground Resources. The table shows resource categorized as Deep South and above 1.5 g/t gold. This amounts to 340 ktonnes at 3.1 g/t gold for 33,600 contained ounces gold.

**Potential Large Pit Resource** If Deep South Ore is incorporated into a pit geometry a much larger open pit than used in this study can be developed. Using a floating cone at US\$ 425 per ounce and at a 0.2 g/t cutoff grade this amounts to 3,681 ktonnes at 0.810 g/t gold for 95,800 contained ounces. Note this does not double count the Deep South Underground Resource.

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Total measured and indicated resource, exclusive of the mineral reserve, is estimated by IMC at 4.9 million tonnes at 0.86 g/t gold for 136,400 contained ounces. This gives a total reserve/resource (excluding inferred resource) of 10.9 million tonnes at 0.964 g/t gold for 339,200 contained ounces gold.

One comment about the IMC resource statement is that if the underground mining option is chosen for the Deep South Ores, the Potential Large Open Pit Resources will probably no longer be a viable resource due to the low remaining grade and high strip ratio.

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### 17.3 Description of the Block Model

The mineral reserve and mineral resources stated in Sections 17.1 and 17.2 of this report are based on an ore reserve block model developed by Geoexplore Consultoria e Servicos of Belo Horizonte, Brazil. The model was completed in early 2005.

The key points of this model are as follows:

1. The model is generally based on regular blocks of size 10m by 10m by 5m high. However, these were locally sub-blocked to 5m by 5m by 2.5m high in some areas to fit local geology. The x-axis of the model was rotated 37 degrees counterclockwise to align the model blocks with the trend of the orebody.
2. The main ore controls for grade estimation are based on four interpreted domains named the 1) East High Grade Zone, 2) the West Horizontal High Grade Zone, 3) the Deep South High Grade Zone, and 4) the Low Grade Zone. The domain interpretation was done by Yamana personnel and provided to Geoexplore for use in modeling. It appears that the domains are based on grade and orientation of mineralization with the Low Grade Zone being a gross mineralized envelope and the other zones representing higher grade portions of the mineralization.
3. Three gold grades are available for each mineralized block. These include a total gold grade that is further characterized into fine (chemical) gold and coarse (gravimetric) gold. As discussed above, the gold assays were done by screen analysis to provide the specific information needed to do the fine and coarse gold distinctions.
4. The grade estimations consisted of an estimation of coarse and fine gold for each block, which were summed to obtain total gold. The gold grades were estimated by Multiple Indicator Kriging (MIK) and the domains discussed in Item 2 were used as hard boundaries for the estimations.
5. An elliptical search was used in all domains. The bearing of the major axis was N37°W for all domains. For the East High Grade Zone, the West Horizontal High Grade Zone, and the Low Grade Zone the major axis plunged 15° with no dip. For the Deep South Zone there was no plunge, but a 90° dip of the semi-major axis. In all cases the semi-major axis search radius was 67% of the major axis search radius and the minor axis search radius was 50% of the major axis search radius.
6. Estimations were done with four different maximum search radii, 40m, 60m, 100m, and 200m and the minimum radius required to estimate the block was adopted for each block. The 40m search used a minimum of six and a

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maximum of 10 samples, the 60m search used a minimum of four and a maximum of 12 samples, the 100m search used a minimum of four and a maximum of 16 samples, and the 200m search used a minimum of four and a maximum of 16 samples. The assay intervals (without compositing) were used for the grade estimation. These were generally 2m intervals and were not composited.

7. Measured resources are based on blocks estimated with the 40m search radius. Indicated resources are based on blocks estimated with 60m or 100m search radii. Blocks estimated with the 200m search radius were classified as inferred resource.
8. Gold grades were not capped or cut for grade estimation. MIK provides a natural grade capping mechanism by the assignment of the grade to apply to the highest grade indicator class.
9. A bulk density of 2.65 tonnes per cubic meter was applied to all material in the model.

The drillhole database also included lithologic codes for saprolite, meta-conglomerate, meta-arenite, hydrothermal alteration, mylonite, basement rocks, and quartz veins. IMC does not see any evidence that a lithologic model was done (it was not included in the model provided to IMC for mine planning).

#### 17.4 Independent Review of the Model

Yamana retained GeoSystems International, Inc. (GSI) to review the mineral resource estimates. This review was conducted in January and February 2005.

GSI's review included the development of an alternative MIK model, using different assumptions concerning geologic domains. Globally, the GSI model compared well with the Geoplore model at all cutoff grades.

The conclusions and recommendations from the GSI report are as follows:

1. The São Vicente resource model prepared by GCS (Revision 04, dated February 10, 2005) can be used for long-term mine planning and is adequate to support the Feasibility Study Update. This is because GSI believes that the overall tonnage, gold grades, and therefore metal content estimates of the deposit are sufficiently accurate ( $\pm 15\%$ ).
2. The resource model has been classified according to the Canadian Institute of Mining, Metallurgy, and Petroleum (CIM) guidelines, as adopted by National Instrument 43-101.

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3. There is risk of local variations that can impact production scheduling and expected cash flows in the first few years of operation. In general, it is expected that, locally, lower tonnage and higher grades may be found at the time of mining, compared to those predicted by the resource model. However, this is not considered a significant issue at this time, as the overall remaining gold metal content in the deposit is relatively small.

GSI also recommended further infill drilling prior to mining the highest-grade zones to improve short-term mining plans.

#### 17.5 Rock Density

Mineral reserves and mineral resources presented in this report are based on a rock density of 2.65 tonnes per cubic meter. Yamana personnel report that this is based on the following:

1. Measurements done in a drift excavated before the start up of open pit operations (1991-1992) that resulted in a 2.63 specific gravity for fresh rock at 40 meters depth.
2. Systematic measurements done during the open pit operation, which resulted in a 2.65 specific gravity for the last two years of mine operation.

It was also reported that measurements on core were done early in the project, but have been superceded by the above mining data.

### 18.0 Additional Requirements for Technical Reports on Development Properties

#### 18.1 Mining Operations

A mine plan was developed for the São Vicente Project to leach 1.8 million tonnes of crush/jig/leach ore per year with a peak total material rate of 5.5 million tonnes per year. The mine is scheduled to work six days per week or 313 days per year. Each day will consist of two 10-hour shifts. Two mining crews will cover the operation. Each person will be scheduled to work 60 hours per week. This is 16 hours more than the normal 44 hour work week, so substantial overtime pay will be included.

Six waste rock storage areas have also been designed for the São Vicente Project. The final configuration of these is shown in Figure 18-1. It can be seen that one of the waste storage areas represents a partial backfilling of the northwest end of the pit. The Northwest, West, East, and South facilities were designed by IMC. They will be end dumped (crest dumped) at the angle of repose of 37° (1.3H:1V). During mining Years 3 and 4 these storage facilities will be dozed down to an overall angle of 26° (2H:1V) to facilitate reclamation and long term stability.

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The North Waste Storage Facility was not designed by IMC, but was a design from a previous contractor provided to IMC by Yamana. IMC assumed 6,159 ktonnes of waste will be placed in this area. The designed storage area is partially filled due to previous mining activity. IMC was not provided with the current topography of this waste storage area and therefore cannot confirm the volume nor the exact truck haulage profiles to haul the waste to this destination. The North Waste Storage area is constructed in lifts at an angle suitable for reclamation.

The mine plan is based on a peak total material movement of 5.5 million tonnes in Year 1. The financial analysis of the project is based on owner operation of the mining fleet. IMC calculated the mine equipment requirements for preproduction and commercial. Table 18-1 shows the peak requirements. The study is based on operating the São Vicente mine with an excavator of 4.3 cubic meter capacity, a loader of 2.9 cubic meter capacity, and trucks of 30 metric tonne capacity. The equipment shown on Table 18-1 is adequate for preproduction activities including initial road construction, and commercial production activities of mining and transporting all ore and waste and maintaining the haul roads and waste storage areas. Topsoil will be mined separately and stored and ultimately used for reclamation activities.

**Table 18-1**  
**Peak Fleet Requirements for Preproduction and Commercial Production.**

| Equipment Type:                          | Preproduction | Commercial<br>Production |
|--|---------------|--------------------------|
| Ingersoll-Rand ECM 590 Rock Drill        | 3             | 3                        |
| Liebherr 964 Excavator (4.3 cu m)        | 1             | 1                        |
| Caterpillar 950G Wheel Loader (2.9 cu m) | 1             | 1                        |
| Randon RK 430B Truck (30mt)              | 5             | 6                        |
| Caterpillar D8R Track Dozer              | 1             | 1                        |
| Caterpillar D6R Track Dozer              | 1             | 1                        |
| Caterpillar 140H Grader                  | 1             | 1                        |
| Scania Water Truck (20 kliter)           | 1             | 1                        |
| Scania Fuel Truck                        | 1             | 1                        |

Yamana will staff mine operations, mine maintenance, mine engineering, and mine geology to perform all the necessary tasks associated with mine operations.

Mine ore grade control will be based on assaying production blast holes and also careful examination of geologic conditions at the mining face. Due to anticipated coarse gold at São Vicente, grade control based on blast hole assays only could be misleading.

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The mine plan developed by IMC does not include any special provisions for dilution. It is anticipated that slight grade smearing inherent in the resource block modeling accounts for the expected dilution.

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## 18.2 Recoverability

Metallurgical testing and the proposed process method were described in Section 16.0 of this report. Note that the overall recovery will be the combination of two terms: 1) the gravity recovery of the fine (less than 3mm) ore sent to the jigging plant, and 2) the heap leach recovery of the coarse ore plus jig tails. There is also the possibility of additional recovery from the slimes from the jigging plant.

An overall recovery of 81% of the ore feed grade was used for financial analysis. This is based on the following:

During December 1996, the São Vicente plant was running as described below:

The ore was crushed to minus ½ and then screened at 3 mm. The screen oversize was stored, while the undersize was pumped to the jigging circuit. One composite was made up daily, via an automatic sampler, for the jigging tailings. All material from the composite was panned. Therefore it was possible to estimate the gravity gold lost in the tailings, on a day-by-day basis. Since the gold produced, in that period was known, it was possible to estimate the gravity gold recovery: 81 %.

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The column leaching test work carried out by Metago, Kappes Cassidy Associates, and also by Echo Bay / Santa Elina metallurgical staff utilized composites from the jigging tailings plus the screen oversize (+ 3mm). All of them pointed to an average leaching recovery close to 76%.

The gold split, according to the gold assay/sizing showed that about 75% of the total gold fed to the plant goes straightway to the heap leach operation, while 25% feeds the jigging circuit.

Taking into account that the gravity circuit tailings (containing 4.75% of the total gold fed to the plant) are also conveyed to the heap leaching, the overall metallurgical recovery can be checked as follows:

Total recovery in gravity circuit = 25% of gold fed x 81% (recovery) = 20.25%.

Gold in the gravity circuit tailings: 25% (feed) - 20.25% (concentrate) = 4.75%.

Total recovery in the heap leaching = (75% direct feed to HL + 4.75% gravity circuit tailings to HL) = 79.75% of gold fed;

79.75% of gold fed x 76.18% (average recovery) = 60.75%.

TOTAL METALLURGICAL RECOVERY= (60.75% + 20.25%) = 81%.

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It is worth noting the fact that a thickener fines stream (minus 270 mesh) is envisioned to feed a small CIL circuit, whose loaded carbon will feed the CIC circuit Stripping Vessels. The gold so recovered has not been taken into account, since besides yielding a rather small additional portion of recovered gold, part of it would be achieved at the expense of the 4.75% fraction. The net result is a minor increase to the overall metallurgical recovery. It is important to keep in mind that the CIL Desorption EW Circuit recovery reaches at least 90%, i.e., a value greater than 76.18%.

### 18.3 Markets

Since the final product of the São Vicente Project will be gold ingots from an electrowinning and smelting process there should not be any significant marketing concerns.

### 18.4 Environmental Considerations

#### 18.4.1 Regulatory Requirements

The Brazilian licensing process can involve two levels: Federal or state. Whenever a Mining Concession is entirely located within a state of Brazil, the State Environmental Protection Agency (EPA) is responsible for issuing the licenses. When the Mining Concession covers more than one state, or if the mining projects has a major national or regional environmental impact, the Federal Environmental Agency (IBAMA) is responsible for issuing the licenses. In 1983, **Federal Decree N° 88.351** established that the National Licensing is conditional upon approval of the Environmental Impact Study (EIS).

Three types of licenses can be obtained:

***Preliminary License*** ( Licença Prévia LP)

A presentation of the EIS to the State Environmental Protection Agency (EPA), along with other documents such as the Declaration of Land Use of Municipal Authorities, along with at least an Application for Exploration to DNPM (National Mining Agency), a General Application Form duly fulfilled regarding the company and the project, copies of public notifications in Daily and Government Newspapers, and proof of EPA fees payment are required to obtain the license.

In this phase, a public meeting may be required before issuance of the Preliminary License by EPA. The meeting may be requested either by the EPA or a non-governmental organization (NGO) at least 45 days after the EIS submittal EPA.

Securing a Preliminary License indicates that the regulatory agency and community approved the Environmental Impact Study.

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***Implementation License*** ( Licença de Implantação LI)

The granting of this license depends on the presentation of Environmental Control Plans to the state EPA. The application comprises plans for environmental control and reclamation, among other documents, such as Deforestation Permits and Water Use Permits.

***Operation License*** ( Licença de Operação - LO)

This license is granted after the terms of the implementation for the project have been completed and found to be in compliance with the LI. This includes the implementation of the environmental control plans and the presentation of the Mining Rights awarded by the National Department of Mining Production (DNPM - National Mining Agency). This phase corresponds to the final implementation stage of the mining and milling facility..

Subsequently, additional laws were issued to regulate the preparation of environmental impact studies and reports for several activities, such as mining (**RESOLUÇÃO CONAMA 001/86**), as well as to establish the procedures for mining activities licensing (**RESOLUÇÃO CONAMA 009/90**), and to differentiate the licensing process according to the mineral class of the ore-bearing mineralization (**RESOLUÇÃO CONAMA 010/90**).

São Vicente Mining and Milling Facility has been awarded the ultimate environmental permit, i.e., the Operation License (LO N.º 793/2004), valid up to August 23, 2005, when it will be renewed.

#### 18.4.2 Other Permits

##### *Water Use Right Permit*

The Water Use Right Permit is regulated by **State Law N° 6945/97** and designates the FEMA (Mato Grosso-EPA) as the Official Water Resources Management Agency of Mato Grosso. However, the law has not yet been enacted and the Agency is not yet prepared to issue such licenses.

##### *Army and Federal Police Permit*

According to Federal Decree n.º 3.665/2000 chemical substances as Sodium Cyanide, Nitric Acid, Mercury Acid, etc, are controlled and inspected by the Ministry of Army. Other chemical substances as Chloride Acid, Sulphuric Acid, Hydrogenous Peroxide, Ammonium Hydroxide, Sodium Bicarbonate, etc, are controlled and inspected by the Federal Police as established by Federal Law n.º 10.357/2001 Permits application will be presented at the Ministry of Army and Federal Police in the third quarter of 2005.

##### *Deforestation Permit*

The Deforestation Permit is regulated by **State Law N° 38/95**, which establishes the licensing for the related activities, forest exploration projects, and agricultural and cattle raising projects (article 19, section IV). The application for licensing must done at the Forest Resources Department of Mato Grosso EPA. However, when deforestation activities are

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related to the mining projects, permit application must be submitted to the Mining Department of Mato Grosso-EPA. Permit application for the heap leach construction will be presented to the Agency in the third quarter of 2005.

### *Discharge Permit Law*

There is not a specific permit related to discharge of any liquid tailings or waste (effluents) into surface and groundwater. However the operation must meet the limits set forth by federal regulation as established in Articles 15 and 34 of **RESOLUÇÃO CONAMA Nº 357/2005** for surface water quality. This Act allows the discharge of effluents into the natural drainage when limits defined by the law are met. These limits for creeks and rivers cannot be exceeded by effluents discharge, so it is important to note that if of the natural drainage has insufficient flow to dilute the discharge, the effluent must be treated.

### *Archeological Recovery Permit*

**Federal Law Nº 230/2002 (Portaria 230/2002)** regulates the Archeological Recovery Permit. The application for the permit is presented at the IPHAN (Institute of National Historical and Artistic Heritage). Archeological studies have not been required by Mato Grosso-EPA for the São Vicente Project.

#### 18.4.3 Permitting Status

São Vicente mine started in 1985 as an alluvium operation. At that time, although there was an environmental legislation was in place, environmental licensing was not required. The licensing process started in 1988 with the Mine Reclamation Plan for alluvium mines submittal to the Environmental Protection Agency of Mato Grosso State (Mato Grosso-EPA). The plan was approved and the first Implementation License was awarded in September 1988. For obtaining an Operation License an Environmental Control Plan was presented to the Agency and a Provisional Operation License was issued in April 1990. Another provisional Operation License was issued in January 1991 and expired in April 1991. In May 1991 a definitive Operation License, valid for one year was issued.

The open pit operation started in 1992 and a Reclamation Plan was required and submitted to the Mato Grosso EPA for approval. The Operation License was issued and then renewed until 1995. This License was valid until December of 1997. From 1992 up to the end of 1994 São Vicente Facility operated with a gravity plant. From 1995 to February 1997 the operation encompassed open pit mining and mill plant (Gravity, Flotation, and CIP circuits). By the end of 1996 the project's owner informed the Agency about the new process Heap Leach & CIC-ADR plant to be implemented at the São Vicente facility. A short Environmental Impact Study was required and submitted to the Agency. The study was assessed and the Agency's technicians inspected the mine site. However, at that time the gold price declined and the owner decided to suspend the mining operations. The Mato Grosso-EPA was informed until 2003 when the company decided to apply again for the Operation License renewal. The Agency requested that some measures were implemented, such as: Heap Leach Pads Reclamation Plan, Surface and Ground Water Monitoring Plan, Heap Leach Drainage System Plan, and Air Quality Monitoring Plan. Implantation of the required measures was successfully accomplished and the current Operation License was issued on August 23, 2004,

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being valid for one year. The application for renewal will be presented at the Mato Grosso-EPA until August 23 2005.

#### 18.4.4 Environmental Management

The São Vicente mine lies in Mato Grosso state, Vila Bela da Santissima Trindade municipality, which can be found in the eastern slopes of the São Vicente ridge, in the Northeastern end along the São Vicente Creek. This ridge runs across the Chapada dos Parecis, in the Amazon basin.

The creeks that drain the mentioned area are irregular and intermittent, with a weak energetic power. The water flow follows the regional rain series and is characterized by presenting approximately 6 months of high pluviometric indexes with heavy downpour of high volumes in a short period. The precipitation occurs from October to April, concentrated in the quarter year December January February, raining in average 120 days per year.

Geologically, the area is based on Precambrian rocks, specifically on Basal Complex, related to two units: Xingu Complex (Lower Precambrian) and Aguapei Group (Upper Precambrian).

The climate is tropical with high temperatures through the year: averages in the range of 23° C to 25° C and maximums between 30° C to 32° C. During July the temperature varies between 16° C to 20° C.

The project area shows many kinds of vegetation like forests, savannas and fields. The riparian forest, that follows the Ariranha and São Vicente Creeks, occurs in rich and wet soils, with mosaic intersections of savannas and forests formations and joins itself to the other kind of forests in the bottom of the ridge.

Environmental testwork has been developed for the São Vicente Project since the beginning of its operation, involving basic revegetation of mined areas and water quality monitoring.

Also some studies have been conducted for both environmental and operational purposes, such as: vegetation surveys, wildlife studies, hydrological and pit slope stability studies. Planned test works, to be performed during 2005, include tailings pond effluent analysis, potentiality for acid rock drainage generation tests, surface and groundwater samplings (baseline), specific revegetation procedures for waste piles heap leach pads and tailings pond reclamation and rinsing tests for the heap leach pads.

Effluents that can reach the water courses come basically from four sources: waste piles, mine, plant (tailings and floor washing) and heap leach.

The water from the mine area, jig tailings and waste piles will flow along the São Vicente Creek and will reach a lagoon, which will help clarify the water. From the lagoon the water flows again to the São Vicente valley and reaches the Ariranha creek.

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The heap leach effluent will be treated with sodium hypochloride or hydrogenous peroxide to neutralize cyanide and will then be discharged into the tailings pond.

The heap leach water balance has been established considering the local annual rainfall and evaporation rates. The calculated total annual surplus will be 80,000 m<sup>3</sup>, reaching up to 17,000 m<sup>3</sup>/month.

In the area of tailings dams (Ariranha creek) the operational spillways have been designed for a 100 year return period flood. For the B1 dam, which is the most upstream dam, the effluent peak flow is 57.5 m<sup>3</sup>/s, the design effluent flowrate being the 30.0 m<sup>3</sup>/s. This stream will be routed into tailings dam B5, B6 and B8 reservoirs. From the B8 spillway the water is discharged to the natural drainage system.

Environmental impact mitigation for the São Vicente Project includes several actions in the mine and concentration areas, such as: to wet roads to avoid dusting using water trucks; to deposit waste rock by end dumping around the pit limits and close to the plant site; and to have industrial tailings stored in reservoirs (B5 and B7 dams). Furthermore, alluvial mined land has been reclaimed by regrading the site and revegetating it with grass and native species; for the heap leach operation a synthetic membrane will be installed at the base of the pad to collect the pregnant solution and to avoid groundwater contamination; the area will be surrounded by a fence and the solution ponds will be covered with a net to avoid avian wildlife mortalities.

The closure plan for the São Vicente Project includes reclamation of the following areas: waste dump, open pit, industrial area, heap leach, tailings ponds and alluvial mined areas, totaling 698.30 ha.

The preliminary estimated cost for reclamation and closure is US\$ 1,000,000.00.

#### 18.5 Taxes

Income taxes are 34% of taxable income. This is made up of two components, a 25% corporate tax rate and a 9% social contribution. For São Vicente, there is a reduction of 75% of the corporate tax rate, pursuant to legislation in force, as the investment is made in an area under governmental incentive (ADA), which will result in a corporate tax rate of 9%. Thus the sum of corporate taxes and social contribution is 15.25%.

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#### 18.6 Capital and Operating Costs

18.6.1 Capital Costs

18.6.1.1 General

Initial capital costs for the São Vicente Project are summarized in Table 18-2.

**Table 18-2: Summary of Initial Capital Costs (US\$x1000)**

|                              |               |
|------------------------------|---------------|
| Mine Development             | 2,052         |
| Mine Equipment               | 4,821         |
| Process Plant/Infrastructure | 12,809        |
| Working Capital              | 500           |
| Owners Cost                  | 60            |
| <b>TOTAL</b>                 | <b>20,242</b> |

In addition to these costs, additional plant capital of US\$ 692,000 in Year 1 and US\$ 59,000 in Year 2 has been allocated.

IMC and Minerconsult have estimated a salvage value of US\$ 2.5 million for mine and plant equipment at the end of the project to partially offset total life of project capital cost.

The capital cost estimate is in 1<sup>st</sup> quarter 2005 US dollars without escalation to the expected project start date. Items sourced in Brazil have been converted to US dollars at the rate of US\$ 1.00 = R\$ 3.00.

The following sections provide more specific details for the above estimates.

18.6.1.2 Mine Development and Equipment

The estimated mine capital cost includes the following items:

1. Mine major equipment.
2. Mine support equipment.
3. Shop tools.
4. Initial spare parts.
5. Engineering and geology equipment.
6. Mine preproduction development expense.

This estimate does not include the following mine physical structures:

1. Fuel and lubricant storage facilities.
2. Explosive storage facilities.

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It is anticipated that the vendors will provide storage for these items as part of their contract of work.

This estimate also does not include the mine shop and warehouse. This will be included in the facilities capital cost prepared by the general contractor for this study.

Table 18-3 summarizes the mine capital costs by category for initial capital. Due to the short duration for the project, there is not sustaining capital requirements.

Mine preproduction development of \$US 2.05 million is based on the mine plan developed by IMC and owner operation of the mining equipment during the preproduction period.

Mine equipment includes all the items on Table 18-3 except preproduction development. Mine equipment capital is \$US 4.82 million during Year 1.

An equipment salvage credit is also shown on Table 18-3. This amounts to US\$ 529,000 at the end of the mine life. The salvage value is approximately 10% for most equipment at the end of the useful life. Exceptions include the trucks. The manufacturer will allow about a 30% credit on trucks with usage up to 30,000 hours. The credit occurs in Year 5 of the project. This credit is applied to Year 4 of the financial analysis.

The following is noted:

1. Base equipment prices are shown in constant 1<sup>st</sup> quarter 2005 US dollars in the year in which the equipment is required. It is assumed that payment for the equipment is made at the time of delivery.
2. Except for the blast hole drills and the pumps, all of the equipment is available in Brazil, thus will not be subject to expensive transport and import costs.

3. The costs for the major equipment are based on quotes obtained by Yamana personnel for their São Francisco Project during the third quarter of 2004. IMC escalated them 1% to obtain 1<sup>st</sup> quarter 2005 costs.
4. The costs for minor equipment are based on IMC file quotes received over the last couple years and escalated to 1st quarter 2005 costs.

5. The capital costs shown include delivery to the site and assembly.
6. A contingency is not included in the mine capital cost.

18.6.1.3 Process Plant and Infrastructure

The estimated initial direct and indirect costs of the process plant and infrastructure has been estimated by Minerconsult as US\$ 12.8 million. Table 18-4 shows the details of this estimate in terms of major components.

Additional capital in the amounts US\$ 660,000 in Year 1 and US\$ 55,000 in Year 2 have also been included in the financial model.

The cost estimate is based on the following basic criteria:

Quantity Determination

Mass earthwork quantities for site preparation were developed from topographic maps and preliminary soils information provided by SEDM. It is considered that in a heap leach layout a reasonable level of flexibility is acceptable to adjust the layout to the site contours.

Structural earthwork quantities for roads and ponds were estimated from plot plans, contour maps and general arrangement drawings. Structural earthwork for various foundations was developed using engineering judgment.

Concrete, steel and architectural quantities were derived from plans, preliminary sketches as well as developed parametrically.

Mechanical equipment was defined on the equipment list. Mechanical bulk quantities for bins, chutes, liners and tanks were developed from the equipment list and preliminary sketches.

Yard piping quantities for Heap Leaching / Adsorption were estimated from the Basic Pipe Plan.

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Pricing

All prices are presented in US dollars, and the exchange rate used for items sourced in Brazil is US\$ 1.00 = R\$ 3.00. All Brazilian taxes, fees and duties are included in the estimate.

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Prices of mechanical and electrical equipment required by the beneficiation plant were obtained through quick consultations among traditional suppliers. For less relevant items the available Minerconsult Data Bank was used. The prices adopted, when quoted by Minerconsult, are average market values and haven't yet been formerly negotiated.

Prices of mechanical materials, steel structures and piping were obtained through quick consultations among traditional suppliers. For less relevant items, the available Minerconsult Data Bank was used.

Spare parts were treated as an allotment, defined at 2% of mechanical equipment supplies, but were not considered in the estimate shown on Table 18-4. They were incorporated into the working capital estimate as requested by SEDM.

### Infrastructure Works

The amounts to be spent in executing complementary services were treated as an allotment and determined by Minerconsult.

### Industrial Civil Works

Prices of services were estimated by Minerconsult on the basis of compositions of unit prices and specific applicable indexes, while for less relevant items the available Mineconsult Data Bank was used.

### Electromechanical Assembly

Prices of services were estimated by Minerconsult through quick consultation to a traditional supplier indicated by SEDM. For less relevant items, the available Minerconsult Data Bank was used.

### Taxes

Main taxes to be levied on supplies and services were highlighted on the basis of information provided by suppliers, inquired, as far as equipment and materials are concerned, or based on the ISS rate applied by the municipality where the works are to be implemented.

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Whenever informed by suppliers, the taxes levied on national and imported items are indicated in separate, and then as part of price make-up ICMS and IPI, in the case of national items, and II, ICMS, IPI, international freight, insurance and port expenses, in the case of imported items.

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With regards to the ISS, it was considered as included in the prices indicated, having been adopted as 3.0% applied over the total forecast services.

### Engineering and Management

An allowance of 4.0% on the Fixed Assets was used.

### Freight

Freight and insurance costs were estimated by considering a certain percentage (as informed by SEDM), which was applied to the price of the entire supply at the rate of 1.5%.

### Contingencies

Contingencies have been provided for so as to cover any expenses that may arise from emerging unpredictable events, or events beyond company control originating from market environmental variables.

Considering the type of supply involved, it is established as the amount of 10% applied over the forecast total direct investments.

### Engineering Risk Insurance

The equivalent to 0.5% over the undertaking's direct cost was adopted for expenses associated to engineering risk insurance a value based on the Minerconsult Data Bank.

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Working capital was estimated by Minerconsult based on criteria set by SEDM. The estimate included:

Initial fills of reagents, fuels, lubricants, and other consumables.

Spare parts, estimated as 2% over the planned initial investment, so as to supply from one year of operation until the end of mine operations.

Operating capital, intended to ensure the balance of accounts payable and receivable, until the project starts yielding a positive cash flow. This way, based on similar operations conducted by SEDM, it was established at 15 days (1/24<sup>th</sup> or 4.17%) of the projected first year operating cost.

Table 18-5 shows the details:

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**Table 18-5: Working Capital (US\$ x 1000)**

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|   |            |
|---|------------|
| Initial Fills                                   | 98         |
| Spare Parts                                     | 64         |
| Operational Capital (4.17% of US\$ 8.1 million) | 338        |
| <b>TOTAL</b>                                    | <b>500</b> |

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### 18.6.1.5 Owners Cost

An additional capital cost of US\$ 60,000 has been allocated for training.

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### 18.6.2 Operating Costs

#### 18.6.2.1 General

Table 18-6 summarizes the life of project operating costs for the São Vicente Project.

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**Table 18-6: Summary of Life of Project Operating Costs (\$US)**

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### Table 16-4. São Vicente Project Summary of Metallurgical Tests (From KCA)

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| Description                    | Total Cost<br>(US\$ x 1000) | Pre Ore<br>Tonne | Per Gold<br>Ounce |
|--------------------------------|-----------------------------|------------------|-------------------|
| Mining                         | 12,004                      | 1.652            | 68.83             |
| Processing                     | 13,029                      | 1.794            | 74.71             |
| G&A/Reclamation                | 1,126                       | 0.155            | 6.46              |
| Refining, Transport, Insurance | 1,134                       | 0.156            | 6.50              |
| Royalty/CFEM Tax               | 654                         | 0.090            | 3.75              |
| <b>TOTAL</b>                   | <b>27,947</b>               | <b>3.847</b>     | <b>160.25</b>     |

Life of mine operating costs are US\$ 27.9 million or US\$ 3.85 per ore tonne. This amounts to US\$ 160.26 per troy ounce for the anticipated production of approximately 174,390 ounces.

The operating cost estimate is in 1<sup>st</sup> quarter 2005 US dollars. Items sourced in Brazil have been converted to US dollars at the rate of US\$ 1.00 = R\$ 3.00.

The following sections provide a brief explanation of the various cost components.

#### 18.6.2.2 Mining

Mining costs were estimated by IMC based on owner operation of the mining equipment. Table 18-7 summarizes the total mine operating costs. The top part of the table shows total dollars by year by cost center and annual mining costs per tonne of total material. It is also important to note that the 'Total Material' column in this table shows the total tonnes used to calculate unit costs which includes ore that is handled twice by the mine.

The bottom part of Table 18-7 summarizes unit costs per total tonne and ore tonne by preproduction and commercial production. It should be noted that the costs per ore tonne are based on ore tonne mined, which is not necessarily the same as ore tonne processed due to stockpiled ore.

The Year 1 costs on Table 18-7 is the source for the mine development cost of \$US 2.05 million that is reported as preproduction development capital on Table 18-3. This amounts to \$US 0.684 per total tonne of material during this period.

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Total mine operating cost during commercial production is \$US 12.0 million. This amounts to \$US 0.615 per total tonne of material and \$2.149 per ore tonne (open pit only) during this period. The US\$ 1.652 per ore tonne presented in the previous section is based on prorating open pit mining costs over open pit plus tailings ore.

The following factors are considered for the operating cost calculations:

1. Local unit costs for consumable items such as diesel fuel and blasting agents.
2. Local hourly labor rates and fringe benefits were used.
3. Local costs for tires and spare parts were used.

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#### 18.6.2.3 Processing

The process cost estimate was developed by Minerconsult based on 2,052 ktonnes per year of production. This amounts to 1,800 ktonnes of open pit production and 252 ktonnes per year of existing tailings. Table 18-8 summarizes those costs by various unit operations. These costs amount to US\$ 3.7 million per year or \$1.81 per ore tonne.

**Table 18-8: Summary of Processing Costs**

| Description        | US\$ Per Year | US\$ Per<br>Ore Tonne | % of Total |
|--------------------|---------------|-----------------------|------------|
| Primary Crushing   | 177,338       | 0.086                 | 4.8%       |
| Secondary Crushing | 184,925       | 0.090                 | 5.0%       |
| Tertiary Crushing  | 459,268       | 0.224                 | 12.3%      |
| Jigging            | 115,328       | 0.056                 | 3.1%       |
| Heap Leaching      | 2,194,400     | 1.069                 | 59.0%      |
| Gold Shed          | 54,039        | 0.026                 | 1.5%       |

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|                      |                  |              |              |
|----------------------|------------------|--------------|--------------|
| CIL/Desorption       | 98,084           | 0.048        | 2.6%         |
| Reject/Water Reclaim | 162,679          | 0.079        | 4.4%         |
| Laboratory           | 38,167           | 0.019        | 1.0%         |
| Operational Support  | 234,431          | 0.114        | 6.3%         |
| <b>TOTAL</b>         | <b>3,718,659</b> | <b>1.811</b> | <b>100.0</b> |

The estimate is based on the following assumptions and parameters:

Operating Regime

Operating regimes were considered herein as indicated in the Process Design Criteria , namely:

**Table 18-9: Plant Operating Parameters**

|                                    | Unit    | Value |
|------------------------------------|---------|-------|
| <b>Crushing and Jigging Plants</b> |         |       |
| Operating days per year            | (days)  | 300   |
| Operating days per week            | (days)  | 6     |
| Hours per day                      | (hours) | 24    |
| Scheduled working hours per year   | (hours) | 7,200 |
| Effective working hours per year   | (hours) | 5,760 |
| Facility availability              | (%)     | 80    |
| <b>Hydrometallurgical Plant</b>    |         |       |
| Operating days per year            | (days)  | 360   |
| Operating days per week            | (days)  | 7     |
| Hours per day                      | (hours) | 24    |
| Scheduled working hours per year   | (hours) | 8,640 |
| Effective working hours per year   | (hours) | 6,912 |
| Facility availability              | (%)     | 80    |

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Wages



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Wages included in the operating costs estimate were defined and indicated by SEDM, and are based on a recent study conducted for their São Francisco Project.

### Staff

Staff comprising operation, maintenance and general services personnel was defined jointly with SEDM, by reference to the operating regimes considered, and is shown in detail in the operating costs estimate for each project area.

The following was in general considered:

- For areas under an operating regime of six days per week, three teams and three shifts a day;
- For areas under an operating regime of seven days per week, four teams and three shifts a day.

### Social Dues and Benefits

Amounts corresponding to social dues and benefits were established jointly with SEDM, having as a basis the values adopted for the São Francisco Project.

Thus the following were adopted:

- For social dues: 68% of salary value;
- For benefits: 21% of salary value.

### Electrical Energy

Electricity costs were estimated by reference to a demand study conducted by Minerconsult, on the basis of capacities defined in the list of mechanical equipment and of planned operating regime.

A unit cost of US\$ 0.041 per kWh, as proposed by CEMAT (local utility).

### Wear Materials

Costs corresponding to wear materials, basically meaning crusher jaws and coating, screens, and other minor items, were estimated by reference to the Minerconsult data base of similar projects.

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The amounts thus obtained are shown in detail in the operating cost estimate for each project area.

#### Replacement Parts

Costs corresponding to replacement parts were estimated by reference to similar projects, considering as an annual cost an allotment equal to 5% of the investment made in mechanical equipment.

#### Reagents

Costs corresponding to reagents, to be used in heap leaching operations, were estimated on the basis of unit consumption figures defined in the Process Design Criteria, applied to the ore mass fed to the pile, that is crushed ore and existing tailings.

Unit prices were provided by SEDM, having as a source the São Francisco Project study. When necessary, figures from Minerconsult's database were also used.

As for the operations involved which also require reagents, such as the gold shed, CIL/Desorption, water treatment, and the laboratory, the costs to be incurred in connection with reagents were estimated by updating the respective figures adopted in the 1997 study.

#### Building the Leaching Pile

For building the leaching pile, which involves the use of trucks for haulage and dozers for spreading the material, the solution adopted was the subcontracting of third-parties, at unit costs informed by SEDM, namely:

- US\$ 0.133 per tonne per kilometer for transportation to the pile;
- US\$ 0.10 per tonne for loading of existing tails material;
- US\$ 0.063 per tonne for spreading material at the pile.

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Table 18-10 shows general and administrative costs, including reclamation costs, that were incorporated into the financial model. These values were provided by SEDM.

**Table 18-10: General and Administrative Costs**

| Description  | US\$ Per Year  | US\$ Per<br>Ore Tonne | % of Total   |
|--------------|----------------|-----------------------|--------------|
| G&A          | 267,000        | 0.130                 | 83.9%        |
| Reclamation  | 51,000         | 0.025                 | 16.1%        |
| <b>TOTAL</b> | <b>318,000</b> | <b>0.155</b>          | <b>100.0</b> |

### 18.6.2.5 Gold Refining, Transportation and Insurance

The project capital includes electrowinning and smelting facilities to produce gold bullion on site. Refining, transportation and insurance of the bullion is at US\$ 6.50 per troy ounce. This cost was provided by SEDM.

### 18.6.2.6 Other Costs

A royalty (or CFEM tax), amounting to 1% of gross revenue, is included in the economic model.

## 18.7 Economic Analysis

Minerconsult performed a financial analysis of the São Vicente Project on an annual cashflow basis using a conventional pro-forma income statement format. A sensitivity analysis to key project parameters was also performed.

The base case gold price used for the study was US\$ 375 per troy ounce. Recovered gold is estimated at 174,390 troy ounces for gross revenue of US\$ 65.4 million.

Table 18-11 shows the results of a before-tax cashflow analysis. The parameters shown are those normally of interest to the financial community.

**Table 18-11. Financial Results for Before-Tax Cashflow Analysis (US\$ 375/Oz Au)**

|  |                   |
|--|-------------------|
| Internal Rate of Return                | 41.9%             |
| Net Present Value at 5% Discount Rate  | US\$ 14.8 million |
| Net Present Value at 10% Discount Rate | US\$ 11.5 million |
| Payback Period                         | 1.5 years         |

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In addition to the mineral reserve presented on Table 17-1, the financial model is based on processing an additional 1,260 ktonnes of ore at 0.36 g/t gold that represents some existing tailings at the project site. This is processed at the rate of 252 ktonnes per year for Years 1, 2, and 3 and 504 ktonnes in Year 4.

Figure 18-2 presents a sensitivity analysis of key parameters.

Appendix 1 of this report shows the cash flow model.

#### 18.8 Payback

According to the financial model prepared by Minerconsult the payback period for the São Vicente Project is 1.7 years on an after tax basis and 1.5 years on a pre-tax basis.

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#### 18.9 Mine Life

The open pit mining project represented in the feasibility study has a preproduction period of about six months followed by about 3.5 years of commercial production.

There appears to be opportunity to extend the life of the open pit some based on recent exploration results that have not been incorporated into this study.

There is also the likelihood of underground mining activity that has not been considered in this study. Given a fixed plant production rate this would probably extend the project life as it might be desirable to replace some open pit ore with underground ore and extend the life of the open pit.

Table 16-4. São Vicente Project Summary of Metallurgical Tests (From KCA)

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## 19.0 Other Relevant Data and Information

A new exploration effort was commenced in early 2005 to 1) develop about 850 meters of underground drift to collect bulk samples from the Deep South orebody and also establish drill stations for 4500m of underground drilling, and 2) drill 4000 meters of deep surface drilling to investigate potential gold mineralization in the contact between the metasediments and the volcano-sedimentary basement, below the pit and Deep South orebody. There appears to be good opportunities to expand the mineral reserve and mineral resource.

It should also be re-iterated that the Deep South potential underground ores have not been considered in this current study.

Yamana has also announced, in early May of 2005, that a formal construction decision on São Vicente has been deferred, pending further exploration results that are expected to be completed about July 2005.

## 20.0 Interpretation and Conclusions

The Minerconsult Feasibility Study Update demonstrates the technical feasibility of the São Vicente Project. Good recoveries of gold metal can be achieved and marketed. Previous mining activity has also demonstrated recoverable gold. The cost projections developed by this study, along with current gold prices, indicates a good possibility of financial success.

Though this study has presented São Vicente as a stand-alone project, and the study shows it to be economic on that basis, the close proximity to the São Francisco Project allows some synergies that should enhance the value of both projects. Infrastructure, management personnel, and supply ordering and inventorying are just some examples of items that can be shared.

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## 21.0 Recommendations

GSI recommended infill drilling in the higher grade zones prior to mining to improve the accuracy of short term mine plans.

It appears that the near term work to be done on the São Vicente Project is as follows:

- Complete the exploration work in progress.
- Update the resource block model.
- Develop an updated open pit production schedule and capital and operating costs.
- Perform a preliminary feasibility study on underground mining. This should include design of access and underground stopes, development of an underground mine production schedule, and estimation of capital and operating costs.

## 22.0 References

The following reports were used in the compilation of this Technical Report:

Geoexplore Consultoria e Servicos, January 2005, São Vicente Resource Estimate Update Report Revision 04.

GeoSystems International, Inc., March 2005, São Vicente Gold Project Independent Review Report February 2005 Resource Model.

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**INDEPENDENT  
MINING CONSULTANTS, INC.**

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## 23.0 Certificates

Following are the certificates of the qualified persons.

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Appendix 1 Cash Flow Model

