

**TERRAZAS ZINC-COPPER PROJECT  
CHIHUAHUA, MEXICO**

TECHNICAL REPORT

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

PREPARED FOR

CONSTELLATION COPPER CORPORATION

PREPARED BY

**INDEPENDENT**  
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## **1.0 Summary**

The Terrazas Zinc Copper Project, located near Chihuahua, Mexico, is being evaluated as an open pit heap leach operation.

Independent Mining Consultants, Inc. (IMC) was commissioned by Constellation Copper Corporation (Constellation) to prepare a Technical Report for the project. The Technical Report has been prepared for filing pursuant to Canadian National Instrument 43-101 and provides information with respect to mineral resources and other technical studies that have been performed on the Terrazas property. Constellation is the owner of Terrazas Project via their wholly owned Mexican subsidiary Minera Terrazas S.A. de C.V. that was formed to hold mining properties in Mexico.

The main purpose of this Technical Report is to report an updated mineral resource for the Terrazas Project. In addition to this Technical Report, IMC was also commissioned to review drilling and sampling data collected during 2004 and early 2005, develop an updated resource block model for the project, develop mining plans and schedules for the project, estimate mine equipment and capital and operating costs, and update the mineral reserve for the project. As of this writing, the sampling review, updated resource model, and updated mineral resource are completed, while the mining portions of the work, as well as the updated mineral reserve are in progress.

IMC's current scope of work is in support of a Feasibility Study of the project that is currently in progress and is being managed by M3 Engineering & Technology Corp. (M3) of Tucson, Arizona. The updated mineral reserve will require completion of that study. Several other groups are participants in the Feasibility Study.

The project site is located about 42 km north-northwest of the city of Chihuahua, the capital of the state of Chihuahua, in northern Mexico (Figure 4-1). It is located about 2 km east of the village of Terrazas.

The Terrazas zinc-copper deposit has been exploited since the late 1800's, but the main period of historical activity was from about 1904 to 1916. Operations during this time account for nearly all of the past production from the property, estimated at 250,000 tonnes grading about 2.5% copper. The property was developed by about 10 shafts, of about 75 to 100 meters depth. There are at least 2,500 meters of underground drifting, much of which is still accessible, and an undetermined amount of inaccessible production stopes. During this main production period, the mines supported two smelters located adjacent to the mines and connected by a small rail line. The smelters directly treated the oxidized copper ore, but did not attempt to recover zinc.

In the early 1970's about 100,000 tonnes of low grade copper ore were mined from several open cuts and processed in open vats with copper extracted by iron precipitation.

Modern exploration of the property was initiated in 1957 when ASARCO, Inc. performed mapping and sampling and drilled 28 core holes. They dropped the property in 1958, and it remained idle until 1976. Since then, Minas Frisco, Swannel Minerals, and Northcoast Silver Mines have drilled additional holes and performed various evaluations of the property.

Summo acquired an option on the property in early 2000 and drilled 34 reverse circulation holes as well as performed extensive investigations into the geology, mineralization, metallurgy and processing, and preliminary economics of a proposed copper-zinc operation. During 2001 Summo retained Jacobs Engineering to conduct a Prefeasibility Study of the project. The study was based on open pit mining and conventional heap leaching of crushed ore. The study, completed during February 2002, indicated the technical viability of the project, i.e. the ability to produce marketable copper and zinc. The study also indicated financial viability of the project at prices of \$0.90 per pound copper and \$0.45 per pound zinc. The project was shelved due to low prevailing commodity prices at that time.

Summo Minerals changed its name to Constellation Copper Corporation in 2003. In May 2004 Constellation initiated additional drilling activities at the Terrazas site. During 2004 and early 2005, 25 core holes totaling 4,541 meters, 119 reverse circulation holes totaling 17,960 meters, and 12 condemnation holes totaling 1,494 meters were drilled. Much of this additional drilling was in the newly discovered, high zinc, Cerro Verde extension of the deposit. Additional metallurgical work was also initiated in 2004 and continues into 2005.

The Terrazas area lies along the northwest trending zone that separates the Laramide-aged Mexican Thrust Belt to the east and the Tertiary volcanic plateau of the Sierra Madre Occidental to the west. More locally, the Terrazas deposit lies within the western margin of the Chihuahua Tectonic Belt, the north-northwest trending and northernmost portion of the Mexican Thrust Belt. Here, a thick section of evaporates, black limy shales and limestones accumulated in a subsiding trough during mostly Cretaceous time. Laramide-aged, compressional deformation affected the sediments in the trough and resulted in thin-skinned folding and thrust faulting of the sedimentary package. Tertiary volcanism in the Sierra Madre Occidental commenced towards the end of this deformational event.

Following the Laramide deformation event, the area was uplifted and subject to considerable erosion and related karst type dissolution along with the onset of local volcanic activity. Part of the eroded material, comprised of both limestone and volcanic fragments, accumulated in contemporaneously forming basins. Middle Tertiary igneous activity continued giving rise to numerous intrusive and extrusive features throughout the area to the east of the Sierra Madre Occidental, including Terrazas. Starting about 30 million years ago, the area was involved with northeast-southwest directed extension related to the formation of the Mexican portion of the Basin and Range Province. This extension may have resulted in the reactivation of some of the earlier compression-related low angle faults, and local volcanic-related features. The large El Sauz-Encinillas Basin just to the west of Terrazas is likely a fault-bounded feature related to Basin and Range extension.

Rock units exposed at Terrazas range in age from Cretaceous to Quaternary and with the exception of the Quaternary units, have been subject to variable degrees of structural

deformation, alteration and mineralization. The oldest rock units exposed at Terrazas are part of a Cretaceous sedimentary sequence that has been divided into three different formations. From oldest to youngest, they are the Finlay Limestone, the Benavides Shale and the Loma de Plata Limestone.

A depositional contact separates the underlying Cretaceous units from an overlying Tertiary age unit of conglomerate and sedimentary breccia, herein referred to as the Tinto Conglomerate. The Tinto Conglomerate is at least 75 meters thick in the Terrazas area and is an important host rock to mineralization and is often altered to skarn and marble. The conglomerate is widely exposed on the flanks of Cerro La Gloria and Cerro La Verde and to the north, and is generally similar to other conglomerate deposits in this part of Chihuahua.

Essentially all of the copper and zinc mineralization at Terrazas is hosted in skarn that is developed within the Finlay Limestone and the Tinto Conglomerate. The skarn has essentially totally replaced the minerals present in the precursor rock type with those characteristic of skarn (garnet, quartz, pyroxene) and generally obliterated the original texture.

Two areas of economically significant skarn alteration are present at Terrazas, one forming a semicircle to the south of Cerro La Gloria, referred to as the Main Zone deposit area, while a smaller area is centered on Cerro La Verde, which lies to the east of the Verde Fault. While the skarn development in the main deposit is cut-off at depth by the Terrazas Fault, the skarn development at Cerro La Verde is known by drilling to extend to a depth of more than 400 meters below surface, and appears in gross form as similar to a mushroom. The south side of this skarn body is a nearly vertical contact with marble, while the northern side is defined by the somewhat irregular contacts of intrusive rhyolite.

The drilling and sampling data available for resource modeling is 229 drillholes and 34,199m of drilling. Of this, 31,096m have been assayed for at least total copper. This total excludes Frisco holes, Swannel underground channel samples, as well as Constellation condemnation drilling. Reviews by IMC concluded the Frisco holes (rotary) and Swannel underground channel samples should not be used for resource determination. The database includes assay values for total copper, total zinc, acid soluble copper, acid soluble zinc, and acid consumption.

IMC, and others, conducted a significant amount of work to compare and verify the various drilling and sampling programs as part of this current study. IMC concludes that the Terrazas drillhole database is adequate for resource modeling for feasibility level studies.

Table 1-1 shows the mineral resource of the Terrazas Project by resource class. Measured and indicated resources are 85.6 million tonnes at 1.240% total zinc and 0.322% total copper. Acid soluble zinc and copper grades are estimated at 1.044% and 0.244% respectively. Inferred resources, amounting to 5.0 million tonnes at 3.541% total zinc and 0.357% total copper are also shown on the table.



| <b>Table 1-1. Mineral Resource Estimate for Terrazas Zinc-Copper Project</b>                          |                        |  |                               |                                 |                                 |                                   |
|---|------------------------|--|-------------------------------|---------------------------------|---------------------------------|-----------------------------------|
| <b>Chihuahua, Mexico</b>  |                        |  |                               |                                 |                                 |                                   |
| <b>Resource Class/Zone</b>  | <b>Ore<br/>Ktonnes</b> | <b>Net of<br/>Process<br/>(US\$/t)</b> | <b>Total<br/>Zinc<br/>(%)</b> | <b>Soluble<br/>Zinc<br/>(%)</b> | <b>Total<br/>Copper<br/>(%)</b> | <b>Soluble<br/>Copper<br/>(%)</b> |
| <b>Measured Mineral Resource</b>  |                        |  |                               |                                 |                                 |                                   |
| Main Zone   | 29,610                 | 5.56                                   | 0.524                         | 0.408                           | 0.358                           | 0.277                             |
| Cerro Verde   | 3,765                  | 22.06                                  | 3.082                         | 2.741                           | 0.288                           | 0.223                             |
| <b>Total Measured Mineral Resource</b>  | <b>33,375</b>          | <b>7.42</b>                            | <b>0.813</b>                  | <b>0.671</b>                    | <b>0.350</b>                    | <b>0.271</b>                      |
| <b>Indicated Mineral Resource</b>   |                        |  |                               |                                 |                                 |                                   |
| Main Zone   | 31,346                 | 5.35                                   | 0.558                         | 0.437                           | 0.323                           | 0.243                             |
| Cerro Verde   | 20,872                 | 19.69                                  | 2.948                         | 2.552                           | 0.277                           | 0.201                             |
| <b>Total Indicated Mineral Resource</b>   | <b>52,218</b>          | <b>11.08</b>                           | <b>1.513</b>                  | <b>1.282</b>                    | <b>0.305</b>                    | <b>0.226</b>                      |
| <b>Measured/Indicated Mineral Resource</b>  |                        |  |                               |                                 |                                 |                                   |
| Main Zone   | 60,956                 | 5.45                                   | 0.541                         | 0.423                           | 0.340                           | 0.260                             |
| Cerro Verde   | 24,637                 | 20.05                                  | 2.968                         | 2.581                           | 0.279                           | 0.204                             |
| <b>Total M+I Mineral Resource</b>   | <b>85,593</b>          | <b>9.65</b>                            | <b>1.240</b>                  | <b>1.044</b>                    | <b>0.322</b>                    | <b>0.244</b>                      |
| <b>Inferred Mineral Resource</b>  |                        |  |                               |                                 |                                 |                                   |
| Main Zone   | 1,567                  | 3.33                                   | 0.270                         | 0.200                           | 0.347                           | 0.277                             |
| Cerro Verde   | 3,480                  | 29.11                                  | 5.014                         | 3.660                           | 0.361                           | 0.199                             |
| <b>Total Inferred Mineral Resource</b>  | <b>5,047</b>           | <b>21.11</b>                           | <b>3.541</b>                  | <b>2.586</b>                    | <b>0.357</b>                    | <b>0.223</b>                      |
| Net of Process Value represents gross ore value per tonne less process, acid, G&A, and royalty costs. |                        |  |                               |                                 |                                 |                                   |

A “Net of Process” value was calculated for each block in the model to simplify economic calculations since the value of each mining block is dependent on the copper grade, the zinc grade, recoveries, and the net acid consumption. This value is the value per tonne of ore net of all processing and G&A costs (and also the royalty). Details of this calculation are shown in Section 17.1.

The mineral resource stated in Table 1-1 is based on an ore resource block model developed by IMC during July and August 2005. Sections 17.3 through 17.5 describe the model.

As discussed above, an updated mineral reserve for the Terrazas Project is pending, based on the completion of the Feasibility Study.

Mining operations at Terrazas will be conducted as in a typical, hard rock, open pit mine. The rock will be drilled, blasted, and loaded onto large haul trucks for transport to the crusher and waste dumps. A fleet of dozers, graders, and water trucks will also be used to maintain the mine in good working order. At this time it is anticipated that loaders with a bucket size of 16 to 18 cubic meters will load trucks with payload capacity of approximately 150 metric tonnes. Units typical to this size would be the Caterpillar 994D loader and Caterpillar 785C haul truck.

Also at this time an ore production rate of 5 million tonnes per year is contemplated. Mining will be conducted in the high zinc Cerro Verde and low zinc Main Zone through the mine life to keep zinc production fairly constant over the mine life. It will also be desired to schedule the mine to maintain acid consumption at a consistent rate.

The details of the mining production schedule, number of equipment units required, and mine capital and operating costs will be addressed in the Feasibility Study.

The metallurgical testing work done to date demonstrates that both the copper and zinc metal readily go into sulfuric acid solution, though, because of the skarn host rock, the amount of sulfuric acid consumed in the process is considerably higher than most leaching operations. The acid cost will be accounted for in the economic calculations.

Additional metallurgical studies in progress, as part of the ongoing Feasibility Study, will quantify the recovery of copper and zinc and acid consumption.

Current thought on processing for Terrazas is as follows. As the ore is mined, it is blended between the Main Zone pit and Cerro Verde pit sources to achieve relatively uniform zinc grade and acid consumption characteristics. A two-stage crushing plant reduces the blended ore to a nominal 19-millimeter (3/4-inch) top size, and a dry screening operation separates material that is finer than 3.36 millimeters (6 mesh).

A live stockpile accumulates the coarse -19/+3.36 millimeter material. Overland conveyors take this material through a cure drum to apply an initial wetting of concentrated sulfuric acid. A conveyor stacking system delivers the cured ore onto a large, rectangular lined leach pad that has been prepared with a drainage system. A network of drip irrigators delivers acidified raffinate from the copper and zinc solvent extraction circuits onto the leach pad ore. As this solution percolates through the ore, it extracts acid-soluble copper and zinc, along with impurities such as calcium, iron, manganese, aluminum and other elements. The resulting pregnant leach solution (PLS) drains from the heap through a drainage layer of coarse rock and perforated drainage piping to open lined trenches that extend along the downhill edge of the leach pad. These trenches deliver the PLS to two or more PLS ponds that feed to the copper solvent extraction plant.

If it is justified economically, an agitated leach circuit will treat the fine minus 3.36-millimeter material for metal recovery. A ball mill reduces the fines to less than about 300 microns (48 mesh). A series of agitated tanks leaches the milled pulp with acidified raffinate to extract the copper and zinc values, along with certain impurities. A counter-current thickening and dewatering system separates and washes the solids in the leached pulp from the liquor. The clarified liquor passes by gravity to the PLS ponds, while the washed solids are filtered and stacked with the residue from the heap leach operation.

The copper solvent extraction plant uses an oxime-type of organic reagent to extract the contained copper from the PLS, and to generate a strong and clean electrolyte for copper electrowinning. The electrowinning operation produces metallic copper in the form of cathodes, ready for commercial sale.

The copper raffinate from solvent extraction splits into advance and return streams; the return stream is recycled to the leaching operations. A solution purification operation treats the advance copper raffinate to:

- Remove traces of copper and other impurities such as nickel, cobalt and cadmium
- Reduce ferric iron to ferrous (or to remove it by precipitation as jarosite)
- Raise the solution pH to an acceptable range for feed to the zinc solvent extraction circuit.

The zinc solvent extraction circuit uses DEHPA to extract the zinc from solution and to generate a strong, clean zinc electrolyte for zinc electrowinning. The zinc electrowinning operation produces zinc as sheets of cathode zinc. These sheets are cast into ingots for commercial sale as special high grade (SHG) zinc.

A complete economic analysis will be performed with the Feasibility Study. This will include quantification of revenues, capital and operating costs, taxes, and financial measures such as net present value, rate of return, and payback period.

It is the opinion of IMC that the 2004/2005 drilling, which resulted in the delineation of the high zinc Cerro Verde area, has provided a much improved basis for the advancement of the Terrazas Project compared with the known resources incorporated into the 2002 Jacobs study.

The Feasibility Study should be continued to obtain definitive estimates of the technical and economic feasibility of the project. The current IMC resource block model is considered sufficiently accurate for Feasibility Study level work.

## 2.0 Introduction and Terms of Reference

The Terrazas Zinc Copper Project, located near Chihuahua, Mexico, is being evaluated as an open pit heap leach operation.

Independent Mining Consultants, Inc. (IMC) was commissioned by Constellation Copper Corporation (Constellation) to prepare a Technical Report for the project. The Technical Report has been prepared for filing pursuant to Canadian National Instrument 43-101 and provides information with respect to mineral resources and other technical studies that have been performed on the Terrazas property. Constellation is the owner of Terrazas Project via their wholly owned Mexican subsidiary Minera Terrazas S.A. de C.V. that was formed to hold mining properties in Mexico.

The main purpose of this Technical Report is to report an updated mineral resource for the Terrazas project. In addition to this Technical Report, IMC was also commissioned to review drilling and sampling data collected during 2004 and early 2005, develop an updated resource block model for the project, develop mining plans and schedules for the project, estimate mine equipment and capital and operating costs, and update the mineral reserve for the project. As of this writing, the sampling review, updated resource model, and updated mineral resource are completed, while the mining portions of the work, as well as the updated mineral reserve are in progress.

IMC's current scope of work is in support of a Feasibility Study of the project that is currently in progress and is being managed by M3 Engineering & Technology Corp. (M3) of Tucson, Arizona. The updated mineral reserve will require completion of that study.

Several other groups are participants in the current Feasibility Study as follows:

| <b>Table 2-1. Feasibility Study Participants</b> |   |
|--|---|
| Company  | Area of Responsibility  |
| M3 Engineering                                   | Feasibility study coordination, process facilities design, environmental surveys, and permitting. |
| Independent Mining Consultants, Inc.             | Resource model, sample verification, mine engineering and costing.                                |
| Metcon Research                                  | Metallurgical testing and process design.   |
| Vector Colorado, LLC                             | Geotechnical design of leach pads, ponds, ditches, retention structures and residue impoundment.  |
| Water Management Consultants                     | Subsurface hydrogeologic investigations and related environmental issues.                         |
| Electrowinning International Inc.                | Electrowinning technology for zinc recovery.  |
| Gustavson Associates                             | Management of contracts of Minera Terrazas with United States Trade Development Agency.           |
| Con-Sul, Inc.                                    | Sulfur market studies.  |

Since the main purpose of this document is to report an updated mineral resource, and many aspect of the new Feasibility Study are still in progress, much of the additional background information presented in this report is historic in nature. This is particularly true in the areas of metallurgical testing, flowsheet and plant design, and the environmental considerations. Note that since much of this information is historic, this report does not include Qualified Person Certification for these items.

The main sources for this historic information includes: 1) the report “Prefeasibility Study for the Terrazas Copper Zinc Project – Summo Minerals Corporation – Denver, Colorado” by Jacobs Engineering (Jacobs) and dated February 2002, and 2) the report “Technical Report for the Terrazas Copper Zinc Project – Chihuahua, Mexico” by Gary A. Parkison of Constellation and dated September 2005. Note that Summo Minerals Corporation (Summo) is the predecessor of Constellation. As of this writing, both of these reports are available on Sedar.

Jacobs was commissioned by Summo to conduct a Prefeasibility Study on the project in 2001. IMC was also a participant in that study, with approximately the same duties as the current study, the resource modeling and mine planning work.

Qualified Persons for this Technical Report include Michael G. Hester of IMC and Gary Parkison of Constellation. Mr. Hester was responsible for the review of the drilling and sampling data and for the development of the resource model and mineral resource. Mr. Parkison was responsible for the original collection of the drilling samples, for both Summo and Constellation, and also for the development of the geologic interpretation used in the updated resource model. He was also involved as project manager for the Jacobs study and is currently managing the Feasibility Study for Constellation. Mr. Hester visited the Terrazas site on March 22, 2005. Mr. Parkison has conducted numerous visits to the property.

The complete list of documents used to prepare this report is included in Section 22.0.

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), and sometimes in cubic meters. Copper and zinc grades are expressed in percent. Quantities of metal are expressed in US pounds (lbs) since commodity prices on world markets are often quoted in these terms. There are 2204.6 lbs per metric tonne.

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

### **3.0 Disclaimer**

As discussed above, there has been participation from several different groups in the development of the information presented in this report. Each participant has carried out its work independently, and each directly for Constellation. They have not reviewed the work of other participants and do not make any representation as the accuracy of other's opinions or analyses.

IMC has exercised reasonable diligence in using data supplied by Constellation 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 IMC:

1. IMC has not audited the ownership of surface and mineral rights on the subject lands, or the various contracts and agreements that Constellation has with the various property owners.
2. IMC has not audited the list of environmental permits that will be required to proceed with the development of the project, the status of those permits, or the adequacy of current operation and closure plans. IMC has relied on the work conducted for the Prefeasibility Study; this work will also be updated as part of the ongoing Feasibility Study.
3. IMC has not audited the metallurgical testing or process plant design work. Again, updates of this work are in progress. Also, for the purpose of stating mineral resources, and not mineral reserves, approximate ideas of the processing method, recoveries, and costs is deemed sufficient by IMC. The work done for the Prefeasibility Study is adequate for this requirement.

## 4.0 Property Description and Location

### 4.1 Property Location

The project site is located about 42 km north-northwest of the city of Chihuahua, the capital of the state of Chihuahua, in northern Mexico (Figure 4-1). It is located about 2 km east of the village of Terrazas.

### 4.2 Mineral Rights

Concerning land ownership, it is common in Mexico for surface rights and mineral rights to be severed. Mining rights are generally superior to surface rights, but the surface owner must be compensated for the disturbance or occupation of the land. This is generally accomplished through a negotiated surface occupation lease or an outright purchase of the land.

It should be noted that IMC has not audited the land ownership of the project. The following sections are excerpted from other reports and IMC has no reason to doubt their accuracy.

The following information on land status is from the report “Prefeasibility Study for Terrazas Copper Zinc Project – Summo Minerals Corporation – Denver, Colorado” by Jacobs Engineering and dated February 2002. Italics in the following paragraphs indicate updates made to the original text by IMC to reflect the current ownership.

“The Terrazas deposit is contained within the Unificacion Rio Tinto exploitation concession which covers an area of 167 hectares (Figure 4-2). An option to purchase agreement was executed with the owner of the Rio Tinto concessions, Sr. Mario Ayub, in April 2000. The basic terms of the agreement call for a seven year option period, with annual payments to maintain the option of \$125,000. *Constellation* or its assigns is also required to expend at least \$2,000,000 in exploration works during the term of the option. The option may be exercised at any time during the option period, but prior to commercial production, for a price of \$3,000,000. The underlying owner retains a 1.5 to 2.0% royalty based on net sales revenue, indexed to the prevailing copper price. Adjacent to the Unificacion Rio Tinto concession are two smaller exploration concessions, RT-9 and RT-10, which total an additional 170 hectares. These two concessions were filed after the option agreement was initiated, but per conditions in the agreement have been incorporated into it. The purchase option agreement is held by Minera Terrazas, S.A. de C.V., a Mexican company wholly owned by *Constellation*, and established to hold mineral properties in Mexico.”

The following is excerpted from the report “Technical Report for the Terrazas Copper Zinc Project – Chihuahua, Mexico” dated September 2005:

“During 2003 and 2004 two additional exploration concessions, RT-11 and RT-12, were added to the option to the existing purchase agreement via location on ground open for

location. There have been no changes to the terms of the purchase agreement. This brings the total area covered under the option to purchase agreement to approximately 1,200 hectares. The basic terms of the concession agreement calls for a purchase price of US \$3,000,000 to be paid in 2007 with production subject to a 1.5 to 2.0% royalty. Figure 4-2 shows the location of these two additional concessions and the other concessions held under the option to purchase agreement.”

#### 4.3 Surface Rights

The following is excerpted from the report “Technical Report for the Terrazas Copper Zinc Project – Chihuahua, Mexico” dated September 2005.

“Constellation also has entered into an option to purchase agreement with Armando Gutierrez regarding about 76 hectares of surface ownership covering a significant portion of the known mineralized area. This option to purchase expires in 2007 and can be exercised for the total payment of about US \$310,000.”

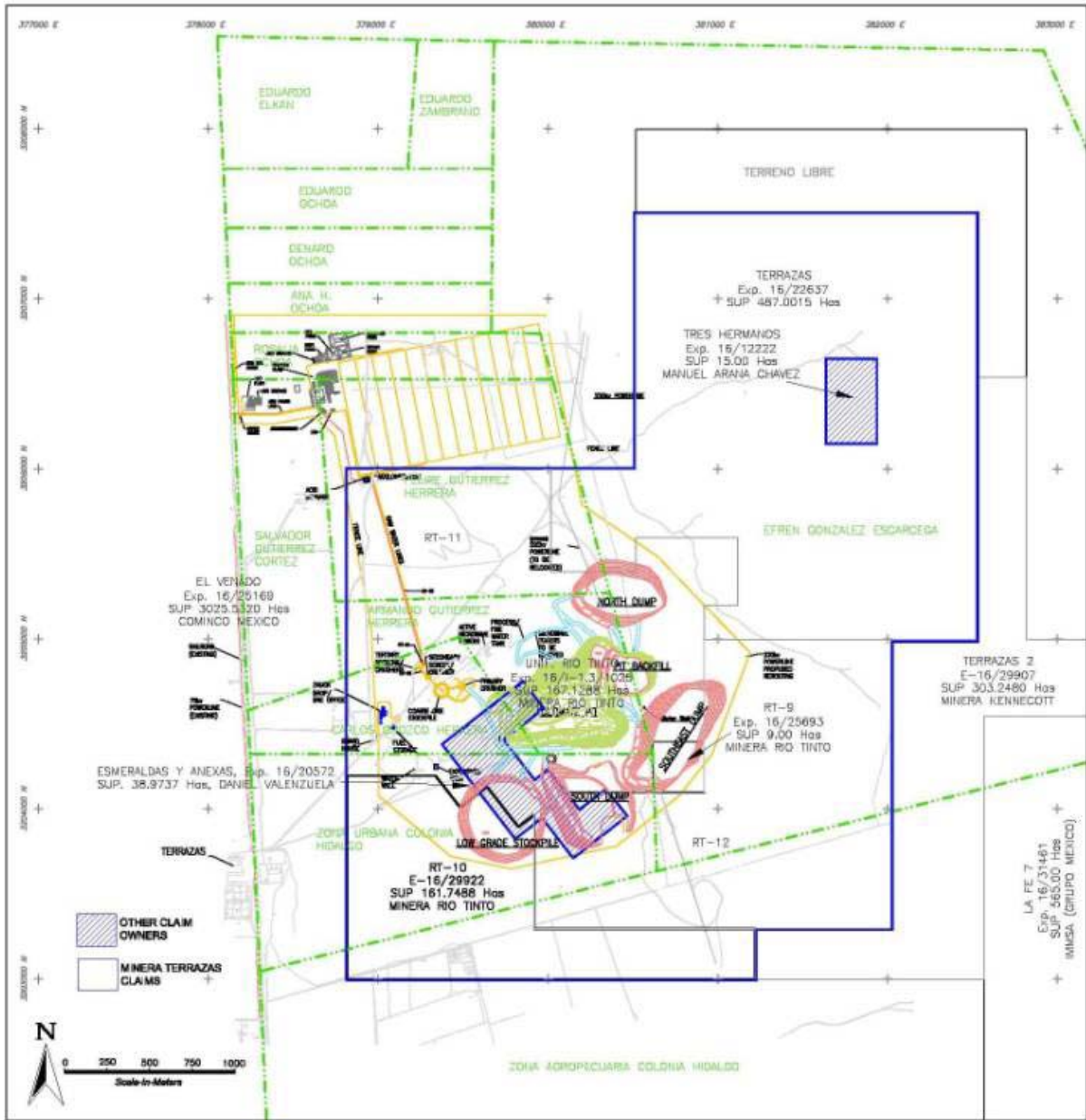
From Figure 4-2 it can be seen that it will be necessary to negotiate the surface use of several other land parcels for locating the plant, leach pad, mine waste storage areas, and also part of the Cerro Verde pit.



**Figure 4-1. Project Location Map**



Figure 4-2. Site Concession Map



## 4.4 Required Permits

### 4.4.1 General

The following information on required permits is from the report “Prefeasibility Study for Terrazas Copper Zinc Project – Summo Minerals Corporation – Denver, Colorado” by Jacobs Engineering and dated February 2002. Italics in the following paragraphs indicate updates made to the original text by IMC to reflect the current ownership situation. It was reported to IMC by Constellation personnel that this information is accurate. Gochnour and Associates, Inc. (G&A) assisted Summo with the preparation of the subject material for the 2002 study.

“Mexican environmental regulations require submittal of a Manifestation de Impacto Ambiental (MIA or Environmental Impact Evaluation) and, if necessary, based upon project size and impact, a Risk Assessment (RA) to SEMARNAP (the Lead Environmental Review Agency) as one of the initial steps in the mine permitting process. G&A anticipates that an RA would be required for this project due to its proximity to Chihuahua and potential visibility from Mexico Highway 45D. For the Terrazas Project, this document will be prepared after completion of this study and a positive decision to proceed with the project. When SEMARNAP's review is completed, the agency will provide a letter of authorization for construction activities, likely including a list of conditions for the project. The principal activity concluding the permitting process is obtaining the Operating License, which is performed concurrently with construction of the project. During the construction period, numerous other environmental authorizations are also required before operation of the project can begin. The following sections identify other major environmental plans and authorizations, and provide a summary of activities required to obtain each authorization.”

### 4.4.2 Air Operating License

“The Licencia de Funcionamiento (Operating License) acts as an air quality permit to operate and is issued by SEMARNAP. It appears that, unlike in the U.S., a demonstration of compliance with equipment emission limits and ambient air quality standards is not specifically required to obtain this license. However, an annual demonstration is required during operations and the Environmental Impact Statement (EIS) requires a listing of air pollution emitting sources with an estimate of their emission rates. If the emission rates exceed criteria for specific equipment identified in the Norms (e.g., stationary fuel combustion equipment), then a pollutant dispersion model is required to demonstrate compliance with the air quality standards (which apply outside of the facility boundaries). Based upon current understanding of the project, G&A anticipates that dispersion modeling will be necessary. Regardless, this information will be necessary/helpful to the design of adequate control/mitigation measures.

Once the final list of major emitting sources and control technologies has been developed, it can be used as a basis for providing information required in the Operating License

application identified below. To complete the air analysis and application for the Operating License, the following steps must be completed:

- Specify pollution emitting equipment following the application format
- Identify pollution control technologies used, costs, and percent control
- Quantify emission rates
- Compare controlled rates to the applicable Norms
- If emission rates exceed the Norms for any equipment, complete a pollutant dispersion model to demonstrate compliance with ambient air quality standards
- Compile this information into an Operating License application.”

#### 4.4.3 Land Use Change

“A change in land use from rangeland/agriculture to mining is required prior to construction of the Terrazas Project. The Land Use Change permit is applied for through the Natural Resources Secretaries of SEMARNAP. Their function is to encourage the protection and restoration of the environment. Once the application is submitted, it is expected that the Land Use Change permit will be issued following approval of the MIA. The only activity to be preformed to satisfy this permitting process is to provide a demonstration to SEMARNAP that property rights have been obtained.”

#### 4.4.4 Hazardous Waste

“Under the Mexico regulations, a hazardous waste determination must be made for all process wastes generated at the Terrazas Project. Specific wastes are listed as hazardous or, if not listed, can be declared hazardous by performing a test (CRETIB). Process wastes must be compared to the list and CRETIB tested if not listed. Although testing is not required until the wastes are generated, to the extent practical it is best to test prior to construction since hazardous characteristics will determine facility construction requirements. Large volume wastes (such as tailings and waste rock) should be tested prior to designing the facility since a significant cost will be associated with their disposal in the unlikely event that they do test as hazardous. If an on/off leach pad for processing becomes the preferred processing alternative, then it is recommended that material from leaching test(s) be collected and "neutralized" so that CRETIB analysis of this material can be performed.

Slag from historical smelting operations exists within the project boundaries. Inspection of the slag material did not show any visible impacts to the environment (dead vegetation zones or wildlife/avian mortalities) at the time of the site visit. While current plans do not anticipate use of this material, it is recommended that his material be evaluated/tested for CRETIB characteristics. If hazardous characteristics are noted, then a formal plan to address/mitigate this material should be developed.

In addition, approximately 50,000 tons of low-grade copper ore mined from several small open pits was crushed and processed in concrete vats. The remaining/residual material

should also be analyzed for CRETIB characteristics. If hazardous characteristics are noted, then a formal plan to address/mitigate this material should be developed.

Finally, there is an abandoned transformer located on the property that has and continues to leak oil. It is recommended that the oil material be analyzed for CRETIB characteristics and PCB content. Should *Constellation* proceed with project development, than an appropriate mitigation plan should be developed.

If any of the above-referenced testing reveals hazardous waste characteristics and there is the potential that proposed operations will impact any of these sites/facilities, then a permit will be necessary. To complete the permitting process, a Manifesto Para Empresas Generadoras de Residuos Peligrosos (Hazardous Waste Notification) for each potential waste stream must be filed with SEMARNAP.”

#### 4.4.5 Water Use

“All water concessions must be filed with the CNA (National Water Commission). The following additional applications must be filed with the CNA along with the water concession:

- Permit for execution of works (pumping system, pipeline, etc.)
- Authorization for the development and impact of a water course.”

#### 4.4.6 Waste Water Management

“It is not clear whether the Terrazas Project as proposed will require a waste water discharge permit. Due to the dry conditions, it is most likely that it will operate as a "zero discharge facility". Even so, a discharge permit may be necessary for closure activities. Regulations state that a permit is needed for the discharge of process water, but it is not clear if stormwater coming into contact with waste rock meets the definition of process water. A legal opinion should be obtained regarding whether this stormwater requires permitting. However, for planning purposes, it is assumed that a wastewater discharge permit is not required and best management practices will be required for all stormwater runoff associated with the Terrazas Project. It is likely that stormwater discharges to surface water will be scrutinized. There, stormwater from the waste rock dump must be characterized to determine if management strategies need to be developed. This may require constructing additional water diversions and sediment basins where appropriate. In order to adequately evaluate and design the various facilities, it is recommended that meteorological data (precipitation data, humidity, evaporation, etc.) be obtained/collected.

Once a final leach pad site is selected, an estimate of the 100-year storm event will be used as the hydrologic design criterion. In addition to the normal operating pond level(s), the volume

of runoff from up-gradient areas and volume of direct precipitation into the facilities will be determined.”

#### 4.4.7 Drinking Water

“Regulation of drinking water is the responsibility of the Secretariat of Health. It appears that a permit is not required to operate public and private drinking water systems. It is a requirement for the sanitary conditions of the drinking water system to be assessed by "the competent sanitary authority" following the recommended Program for Monitoring and Certification of the Quality of Water for Human Consumption of the Secretariat of Health. The most important consideration is the specific and stringent design requirements that must be met prior to operating the drinking water system. It has been assumed in this study that a drinking water system will not be constructed and that all drinking water will be bottled water brought to the site.”

#### 4.4.8 Explosives

“Application for the explosives permit is filed with the National Secretary of Defense. Two permits are needed:

- Storage
- Use

The Storage Permit is typically more difficult to obtain. The requirements include building the powder magazine to military specifications, passing a military inspection, and quantifying the amount of explosives that will be stored. The storage permit must be renewed annually, and if the storage quantities at the end of the year are more than the use, the permitted storage quantities will be reduced.

To receive the Use Permit, the Operating License must be issued and the yearly blasting requirements along with an emergency response plan must be provided. The Use Permit is renewed annually.”

#### 4.4.9 Local Agency Permits

“It is anticipated that permits and/or letter authorizations will be required from local agencies for certain Terrazas Project activities. Clarification of agency requirements and specific authorizations will be determined by scheduling a meeting with appropriate agency staff. It is currently anticipated that permits and/or authorizations will be required for the following project facilities, if constructed:

- Non-hazardous waste landfill
- Potable water system

- Septic systems
- Building permits for the process buildings and ancillary facilities
- Utility (Water) encasements/rights-of-way”

#### 4.5 Other Land Issues

The severing of surface and mineral rights means there is the potential for others to retain mineral rights on land that the project requires for surface facilities. Several condemnation holes drilled in 2004 and 2005 demonstrate the non-mineral character of the land where the proposed leach pad, plant and waste rock storage areas will be located.

IMC is not aware of any back-in-rights that any others might have on the property nor of any encumbrances to which the property is subject. IMC is also not aware of any existing environmental liabilities to which the property is subject.

## **5 Accessibility, Climate, Local Resources, Infrastructure and Physiography**

### 5.1 Accessibility

The project is readily accessible via a divided four lane highway (Federal Highway 45D). The site is 42 km north-northwest of the city of Chihuahua and 320 km south of Juarez City and El Paso, Texas. The site is connected to the main road via about 4 km of dirt road that also goes through the nearby village of Terrazas.

### 5.2 Climate

The climate is high desert, generally arid and not subject to freezing conditions with average annual rainfall of about 45 cm.

### 5.3 Local Resources

The population of Chihuahua, the capital of the state of Chihuahua, is about one million. This includes an abundance of available and qualified labor in the area. There is also an ample base of service providers in Chihuahua, Juarez, and El Paso to support heavy industry.

Northern Mexico in general has a well-established mining industry so there is an established network of vendors of heavy equipment, fuel, tires, explosives, etc.

#### 5.4 Infrastructure

In addition to the major road discussed above, there is an active existing rail line, owned by Ferrocarril Mexicana. It runs between Chihuahua and El Paso and is right next to the project site, running parallel to the highway.

There are also several existing power lines near the property. One of them will have to be relocated for the project.

Water is also abundant in the area. A significant water main, servicing Chihuahua, runs through the property. The source of the water for this system is limestone caverns located near the site. The karsted limestone geology in the project area generally makes for productive production of groundwater from wells.

Preliminary site layouts indicate that there is sufficient land in the vicinity available to support the required infrastructure such as the leach pad, plant, and mine waste storage areas. However, negotiations still have to be conducted with some surface owners to secure rights to these lands.

#### 5.5 Physiography

The Terrazas Project is located on the eastern flanks of a valley in an area with a local relief of about 200 meters or less, ranging from about 1,600 meters in the valley floor up to about 1,800 m at the top of the generally isolated hills and ranges. The vegetation in the area is quite sparse but consists of range grass along with scattered cacti and other shrubs with occasional Mesquite trees.



## 6 History

The following is excerpted from the report “Technical Report for the Terrazas Copper Zinc Project – Chihuahua, Mexico” dated September 2005:

“The Terrazas or Rio Tinto copper-zinc deposit has been exploited since the late 1800’s, but the main period of historical activity was from about 1904 to 1916. Operations during this time frame account for nearly all of the past production from the property, estimated at 250,000 tonnes grading about 2.5% copper. The property has been developed by about 10 shafts, of up to about 75 to 100 meters depth. There are at least 2,500 meters of underground drifting, much of which is still accessible, and an undetermined amount of inaccessible production stopes. During this main production period, the mines supported two smelters located adjacent to the mines and connected by a small rail line. The smelters directly treated the oxidized copper ore, but did not attempt to recover zinc.

In the early 1970’s about 100,000 tonnes of low grade copper ore were mined from several open cuts and processed in open vats with copper extracted by iron precipitation.

Modern exploration of the property was initiated in 1957 when ASARCO, Inc. performed mapping and sampling and drilled 28 core holes. They dropped the property in 1958, and it remained idle until 1976 when Minas Frisco drilled four rotary holes before they dropped their interest. Exploration did not resume on the property until Canadian junior Swannell Minerals optioned the property from the current owner in 1994 and performed an extensive amount of mapping and sampling, and drilled 16 reverse circulation holes. Swannell dropped the property in 1996, but another junior, Northcoast Silver Mines picked up the option, in 1997. Northcoast drilled 7 core holes in 1998, but dropped the property in 1999 due to low prevailing commodity prices.

Summo acquired an option on the property in early 2000 and drilled 34 reverse circulation holes as well as performing extensive investigations into the geology, mineralization, metallurgy and processing, and preliminary economics of a proposed copper-zinc operation.”

During 2001 Summo retained Jacobs Engineering to conduct a Prefeasibility Study of the project. The study was based on open pit mining and conventional heap leaching of crushed ore. Copper metal was to be extracted by solvent extraction and electrowinning. Zinc metal powder was to be extracted by direct electrowinning. The study, completed during February 2002, indicated the technical viability of the project, i.e. the ability to produce marketable copper and zinc. The study also indicated financial viability of the project at prices of \$0.90 per pound copper and \$0.45 per pound zinc. The project was shelved due to low prevailing commodity prices at that time.

Summo Minerals changed its name to Constellation Copper Corporation in 2003. In May 2004 Constellation initiated additional drilling activities at the Terrazas site. During 2004 and early 2005, 25 core holes totaling 4,541 meters, 119 reverse circulation holes totaling 17,960 meters, and 12 condemnation holes totaling 1,494 meters were drilled. Much of this

additional drilling was in the newly discovered, high zinc, Cerro Verde extension of the deposit. Additional metallurgical work was also initiated in 2004 and continues into 2005.

During early 2005, Constellation retained M3 Engineering to commence work on a feasibility study of the project. IMC was retained to develop the resource model and mine design in support of this study. As of this writing, the feasibility study is ongoing. A new resource model, the basis for the mineral resources stated in this report, was completed in August 2005.

## **7 Geological Setting**

### **7.1 Regional Geology**

The Terrazas area lies along the northwest trending zone that separates the Laramide-aged Mexican Thrust Belt to the east and the Tertiary volcanic plateau of the Sierra Madre Occidental to the west. More locally, the Terrazas deposit lies within the western margin of the Chihuahua Tectonic Belt, the north-northwest trending and northernmost portion of the Mexican Thrust Belt. Here, a thick section of evaporates, black limey shales and limestones accumulated in a subsiding trough during mostly Cretaceous time. Laramide-aged, compressional deformation affected the sediments in the trough and resulted in thin-skinned folding and thrust faulting of the sedimentary package. Tertiary volcanism in the Sierra Madre Occidental commenced towards the end of this deformational event.

Following the Laramide deformation event, the area was uplifted and subject to considerable erosion and related karst type dissolution along with the onset of local volcanic activity. Part of the eroded material, comprised of both limestone and volcanic fragments, accumulated in contemporaneously forming basins. Middle Tertiary igneous activity continued giving rise to numerous intrusive and extrusive features throughout the area to the east of the Sierra Madre Occidental, including Terrazas. Starting about 30 million years ago, the area was involved with northeast-southwest directed extension related to the formation of the Mexican portion of the Basin and Range Province. This extension may have resulted in the reactivation of some of the earlier compression-related low angle faults, and local volcanic-related features. The large El Sauz-Encinillas Basin just to the west of Terrazas is likely a fault-bounded feature related to Basin and Range extension.

### **7.2 Local Geology**

#### **7.2.1 Lithology**

Rock units exposed at Terrazas range in age from Cretaceous to Quaternary and with the exception of the Quaternary units, have been subject to variable degrees of structural deformation, alteration and mineralization. These features will be described in some detail in the following sections.

The oldest rock units exposed at Terrazas are part of a Cretaceous sedimentary sequence that has been divided into three different formations. From oldest to youngest, they are the Finlay Limestone, the Benavides Shale and the Loma de Plata Limestone.

The Finlay Limestone, unit Kf on the accompanying geologic map Figure 7-1, is the most widespread of the Cretaceous units in the Terrazas area. In this area, the Finlay is typically a gray, medium to thick bedded or massive micritic limestone with local accumulations of shell fragments. Black chert nodules are fairly common along with a few shaly layers that become more prominent towards the upper contact with the Benavides Shale. Through most of the area, the top of the Finlay has been eroded off, and the base of the unit is not exposed, but the exposed thickness of the unit is likely several hundred meters. It is the most widespread host rock to mineralization and is altered to skarn and marble in the deposit area.

The Benavides Shale, unit Kb, overlies the Finlay with a gradational contact with the contact normally defined at the base of the first thick shale layer. The upper contact with the overlying Loma de Plata Limestone is also gradational, as the predominant dark shale gives way to progressively more limestone. The upper and lower contacts of the unit have often localized low angle faults, but the preserved thickness in the Terrazas area is perhaps 50 meters. The Benavides is not known to host any significant mineralization.

The Loma de Plata Limestone, unit Kpl, consists of thin to medium bedded micritic and shaly limestone. It is typically gray, pink or orange in color and may be from 20 to 100 meters thick in the Terrazas area. The Loma de Plata is also not known to host any significant mineralization.

Uplift and erosion of the Cretaceous strata described above resulted in an uneven erosion surface developed on top of the limestone, with local relief on the contact to several tens of meters. Dissolution and karst related features, including laminated void infilling deposits, document this period of subaerial exposure.

A depositional contact separates the underlying Cretaceous units from an overlying Tertiary age unit of conglomerate and sedimentary breccia, herein referred to as the Tinto Conglomerate, unit Tc. The Tinto Conglomerate is at least 75 meters thick in the Terrazas area and is an important host rock to mineralization and is often altered to skarn and marble. The conglomerate is widely exposed on the flanks of Cerro La Gloria and Cerro La Verde and to the north, and is generally similar to other conglomerate deposits in this part of Chihuahua. The conglomerate is typically matrix supported, with about 50 percent clasts and 50 percent matrix on average. The matrix is typically sand sized while the subrounded to angular clasts are often in the range of two to five centimeters, but can be up to several meters in size. The conglomerate is generally massive to crudely bedded. Locally it is comprised mostly of sand sized particles which can be distinctly bedded and show cut and fill and cross-bedding textures. Clast compositions are predominantly limestone and igneous, mostly rhyolitic, in nature with a general decrease in the proportion of limestone clasts higher in the section. Where not converted to skarn, the limestone or marble clasts typically weather to a distinctive negative relief in exposures of conglomerate.

There are a large number of somewhat distinct igneous rock types present in and around the Terrazas area that are most likely Tertiary in age but can be both intrusive and extrusive in nature. For the sake of simplicity, a distinction will be made here between the monzonite, unit Tm, which both underlies the mineralized skarn and outcrops to the south at Cerro La Cruz, and all the other igneous rocks. The monzonite is typically in fault contact with the overlying skarn and does not appear to be genetically related to it. It is typically altered in close proximity to the fault, but is essentially unaltered elsewhere, and only locally on the hillside west of Cerro La Cruz does it show any endoskarn type of alteration. It is generally fine to medium grained with sparse phenocrysts and is white to gray in color. Three cross sections through the deposit are presented as Figures 7-2, 7-3, and 7-4 and show the relationship between the monzonite and the skarn.

The other igneous rocks have been lumped together as unit Tr (Tertiary Rhyolite), but are characterized by a wide variety of compositions and textures which probably represent several distinctly different periods of intrusive and extrusive activity, likely related to recurring activity along a major structural zone. Plutonic intrusions dominate in the northern part of the area, mostly north of Cerro La Gloria, where remnant conglomerate has largely been converted to garnet skarn but which is barren of metal values. These plutonic rocks could be related to the monzonite (unit Tm). Numerous high angle, generally east-west trending dikes are present in the south and east part of the area, where they intrude along pre-existing faults and are strongly porphyritic. Dikes closer to Cerro La Gloria and Cerro La Verde are generally rhyolitic as described below.

The rhyolitic rocks that underlie both Cerro La Gloria and Cerro La Verde, and outcrop extensively in the northern part of the deposit area, show a wide variety of textures, fabrics and alteration types. The rhyolitic rocks appear to be both intrusive and extrusive in nature and to encompass multiple phases that may be related. Most of the rhyolite in the area of Cerro La Verde appears to be part of a flow or flows, while the rhyolite closer to Cerro La Gloria seems to mostly be intrusive in nature. Flow-banding, flow breccias and intrusive breccias are all associated with most rhyolite outcrops, along with silicification, local clay alteration, and the introduction of fine grained pyrite. Along the south side of Cerro La Gloria, rhyolite appears to have intruded along a pre-existing fault and is in contact with earlier formed mineralized skarn. In this same area, rhyolite has intruded mineralized skarn as noted both in surface exposures and in drilling, suggesting that at least some of the rhyolite is younger than skarn formation. This is best shown on Figure 7-2. In the area of Cerro La Verde there are zones where the rhyolite has clearly intruded and engulfed what are relatively unaltered marble clasts. The age of the rhyolite units appears to bracket the age of the skarn formation and mineralization as there are unskarnified fragments of rhyolite in the Tinto Conglomerate, and it is clear that some rhyolite cuts mineralized skarn. Nevertheless, it is a phase or phases of the rhyolite which appears to be most closely related in time and space to the formation of the skarn and the copper and zinc mineralization.

Quaternary aged rock units include unconsolidated alluvium that is present in the intermittent stream drainages as well as local deposits of caliche-cemented coluvium on some of the hillsides. Rock units of recent age include dumps of waste rock generally associated with the

old underground and more recent open cut mine workings and the slag deposit associated with the old smelters at the site.

### 7.2.2 Structure

The Terrazas area is complexly faulted and contains both low angle and high angle faults. The low angle faults typically are found within or along the margins of the Cretaceous-age formations, with the contacts between the Loma de Plata, Benavides and Finlay Formations all being low angle normal faults. These faults typically have dips of from 10 to 40 degrees, and most often strike east-west. This group of faults also includes the fault contact between the skarnified Finlay and the underlying monzonite, hereafter referred to as the Terrazas Fault. This fault underlies and cuts off the mineralization in the main deposit at depth, but has not been noted to underlie the mineralization in the Cerro la Verde area. High angle faults generally trend north-northwest and west-southwest and appear to cut all of the Tertiary and older rock units. The Verde and Bronce Faults, both of which dip steeply to moderately to the east, typify the north trending faults. The Verde Fault has about 200 meters or so of down to the east displacement, while the Bronce has a down to the west displacement of maybe 10 meters or less. The east-west trending faults are often occupied by monzonite-type or rhyolitic dikes, including the fault which separates skarn and rhyolite to the west of Cerro La Gloria. Multiple periods of movement along these high angle faults are indicated by the localization of dikes along them, which themselves were later brecciated.

Folding of the Cretaceous units is locally significant but is often difficult to discern owing to the thick-bedded nature of the widespread Finlay Limestone and fact that much of the Finlay in the deposit area has been converted to skarn. Where folding can be discerned, the Finlay is generally broadly folded along generally north-south axes, while the thinner bedded and less competent rock units are sometimes isoclinally folded. Folding clearly appears to pre-date the skarn forming event.

At least four distinct periods of carbonate dissolution or karsting in the Terrazas area. The earliest was developed during surface exposure of the Cretaceous units prior to and during the deposition of the Tertiary Tinto Conglomerate. Next was a period that appears to be contemporaneous with the development of the skarn and the related introduction of the sulfide mineralization, which can be referred to as “hydrothermal karsting”. This period resulted in the development of both open voids as well as voids filled with karst-related collapse breccias. Many of the areas of breccia development have been thoroughly converted to skarn with relict breccia texture. During active oxidation of the deposit, many of the areas subject to “hydrothermal karsting” were further subjected to renewed dissolution, particularly in areas with extensive sulfide mineralization. More recent carbonate dissolution is noted underground where a large cavern has been developed along the Verde Fault, along with active cave formations.

### 7.2.3 Alteration

Alteration in the carbonate-bearing rocks is quite extensive and comprises both recrystallization and the formation of marble as well as the generation of skarn. The marble is generally peripheral to the areas of skarn development, and has affected the Finlay and Loma de Plata Formations, as well as the carbonate-rich portions of the Tinto Conglomerate. Marblization preceded, but was likely associated with, the formation of the skarn. The distribution of the altered areas is shown on Figures 7-1 through 7-4. Other less significant types of alteration common to skarn and carbonate replacement type deposits in northern Mexico and found in the Terrazas area include dolomitization, silicification, and local manganese oxide enrichment.

Essentially all of the copper and zinc mineralization at Terrazas is hosted in skarn that is developed within the Finlay Limestone and the Tinto Conglomerate. Significantly, skarn development has not been noted in any of the rhyolite units. The skarn has essentially totally replaced the minerals present in the precursor rock type with those characteristic of skarn (garnet, quartz, pyroxene) and generally obliterated the original texture so that it is hard to distinguish skarned Tinto Conglomerate from skarned Finlay Limestone. Most skarn is fine to medium grained, with the extremely fine-grained zones referred to as hornfels. The variations in sulfide content, grain size of the garnets and the development of hornfels appear to be related to specific beds in the original rock. Locally the skarn exhibits a brecciated texture that based on its cohesive nature appears to have been developed pre- or intra-skarn formation. Largely based on the mineralogy of the skarn, comprised of mostly andradite garnet (Ca,Fe) with some grossular garnet (Ca,Al) along with lesser quartz, calcite, iron oxides and clays, the skarn has undergone minor to moderate amounts of retrograde alteration. Some of the calcite is likely a retrograde product, while the iron oxides and clays likely developed from near surface oxidation.

Two areas of economically significant skarn alteration are present at Terrazas, one forming a semicircle to the south of Cerro La Gloria, referred to as the main deposit area, while a smaller area is centered on Cerro La Verde, which lies to the east of the Verde Fault. The two areas of skarn could merge at depth and be part of the same mineralizing system. Within the area shown as skarn on Figure 7-1, skarn development is generally more pervasive towards the interior of the zones. Towards the margins of the skarn there is generally a transition zone to marble alteration that in turn has a somewhat gradational contact into unaltered limestone. The contact zone between the skarn and the marble, often referred to as the “marble front”, is often quite erratic in detail with skarn alteration preferentially developed along certain beds or structures which sometimes give rise to “patchy” skarn developed in marble and remnant marble masses in skarn. The contact itself is generally quite sharp from skarn to marble or vice versa, with a transition zone ranging from a few centimeters to a few meters. While the skarn development in the main deposit is cut-off at depth by the Terrazas Fault, the skarn development at Cerro La Verde is known by drilling to extend to a depth of more than 400 meters below surface, and appears in gross form as similar to a mushroom. The south side of this skarn body is a nearly vertical contact with

marble, while the northern side is defined by the somewhat irregular contacts of intrusive rhyolite.

Alteration in the non-carbonate rocks is restricted to the monzonite and the various rhyolitic rocks. Argillic alteration with the development of clay has affected the monzonite, especially near the fault contact with the skarn. Some argillic alteration has also affected the rhyolitic rocks. Moderate to pervasive silicification with the introduction of fine-grained pyrite is common in the various rhyolite bodies in the area around Cerro La Gloria and Cerro La Verde. Much of the pyrite has been oxidized to iron oxides.

#### 7.2.4 Paragenesis

The deposition of the various carbonate sequences in the Terrazas area was followed by the development of low angle faults and subaerial erosion. This erosion was likely related to uplift which led to the deposition of the locally derived Tinto Conglomerate in adjacent basins. Skarn formation followed and was likely contemporaneous with the development of peripheral marble and recrystallized carbonate, with all features likely related to the sequence of rhyolitic intrusive and extrusive rocks exposed on Cerro La Gloria and Cerro La Verde. The prograde formation of the skarn included the introduction of silica and iron along with increased heat and temperature supplied by the rhyolite. The elongate northeast-trending development of the skarn bodies and the common occurrence of rhyolite intruding marble, and not skarn, in the area of Cerro La Gloria suggests that the actual heat source which gave rise to the skarn is likely not exposed and resides at depth. With the demise of the skarn-forming environment, retrograde alteration affected the area that was accompanied by brecciation, the formation of solution collapse features and the introduction of sulfide minerals.

Oxidation of the sulfide minerals resulted in limited redistribution of the copper and zinc grades and was likely accompanied by continued low angle faulting and rhyolitic volcanic activity. Contemporaneous with the onset of the regional Basin and Range tectonic regime, the Terrazas area was subjected to a final period of uplift, solution-related features and oxidation along with the development of several high angle, north-trending faults. It is likely that the skarn at Cerro La Verde is the down-faulted offset of skarn which was originally part of the main deposit area until cut by the Verde Fault. Most of the displacement along the Verde and Terrazas Faults likely occurred after much of the oxidation was already complete. There has locally been continued dissolution along these faults.

Based on the overall geologic setting and the information from a single drill hole in the central part of the deposit which penetrated through the monzonite “floor” of the deposit, there is the possibility of additional skarn-related sulfide mineralization at depths of 100 meters or more below the base of the known mineralization in the main deposit area. This suggests that the monzonite that underlies the Terrazas deposit may be a fault-bounded intrusive sill and/or tectonic “slice” which could have separated a larger, once contiguous skarn body into two parts, with the upper, exposed, part of the skarn being subjected to oxidation and possible future exploitation.



**Figure 7-1: Geology Map Showing Alteration**

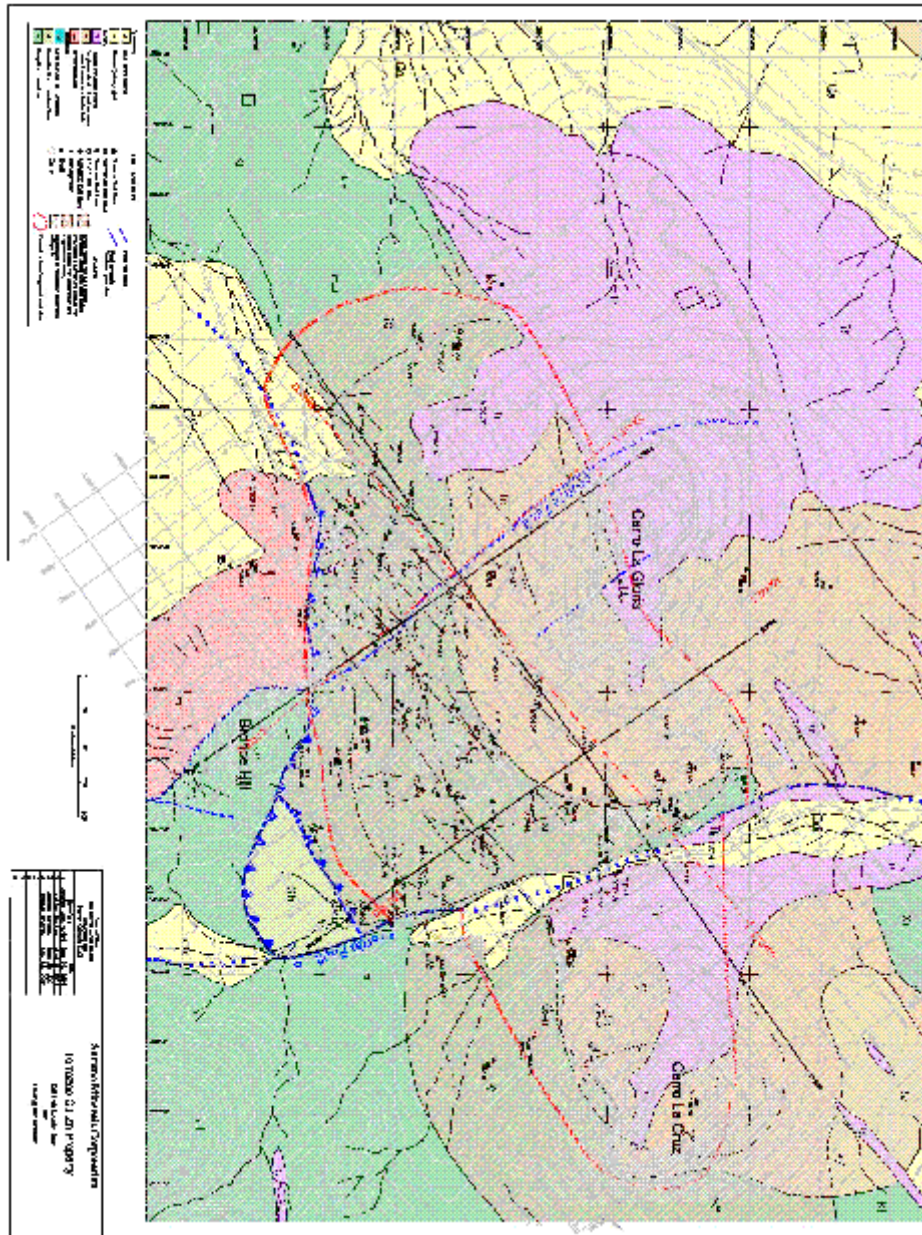




Figure 7-2. Geologic Cross Section 200NE

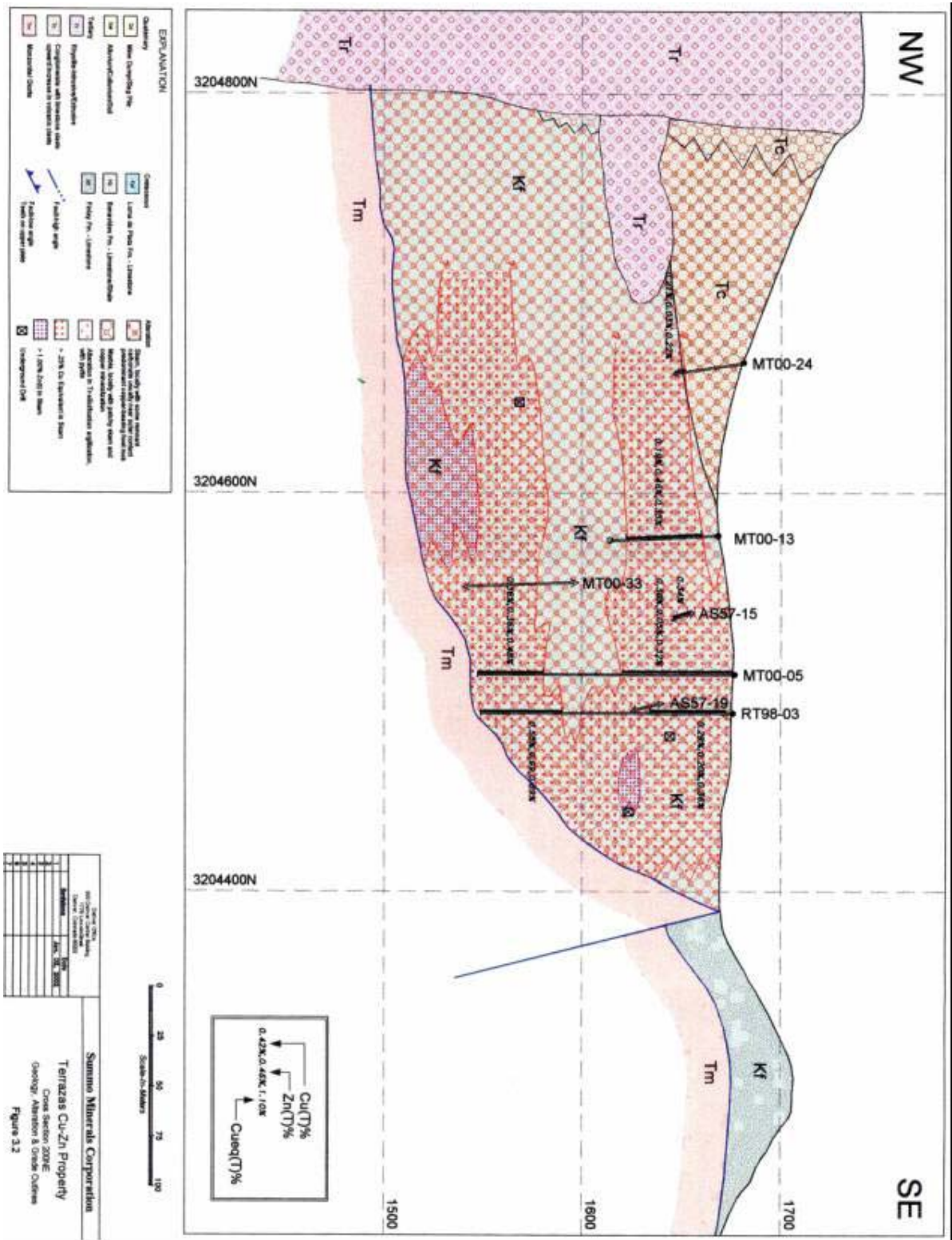


Figure 7-3. Geologic Cross Section 500NE

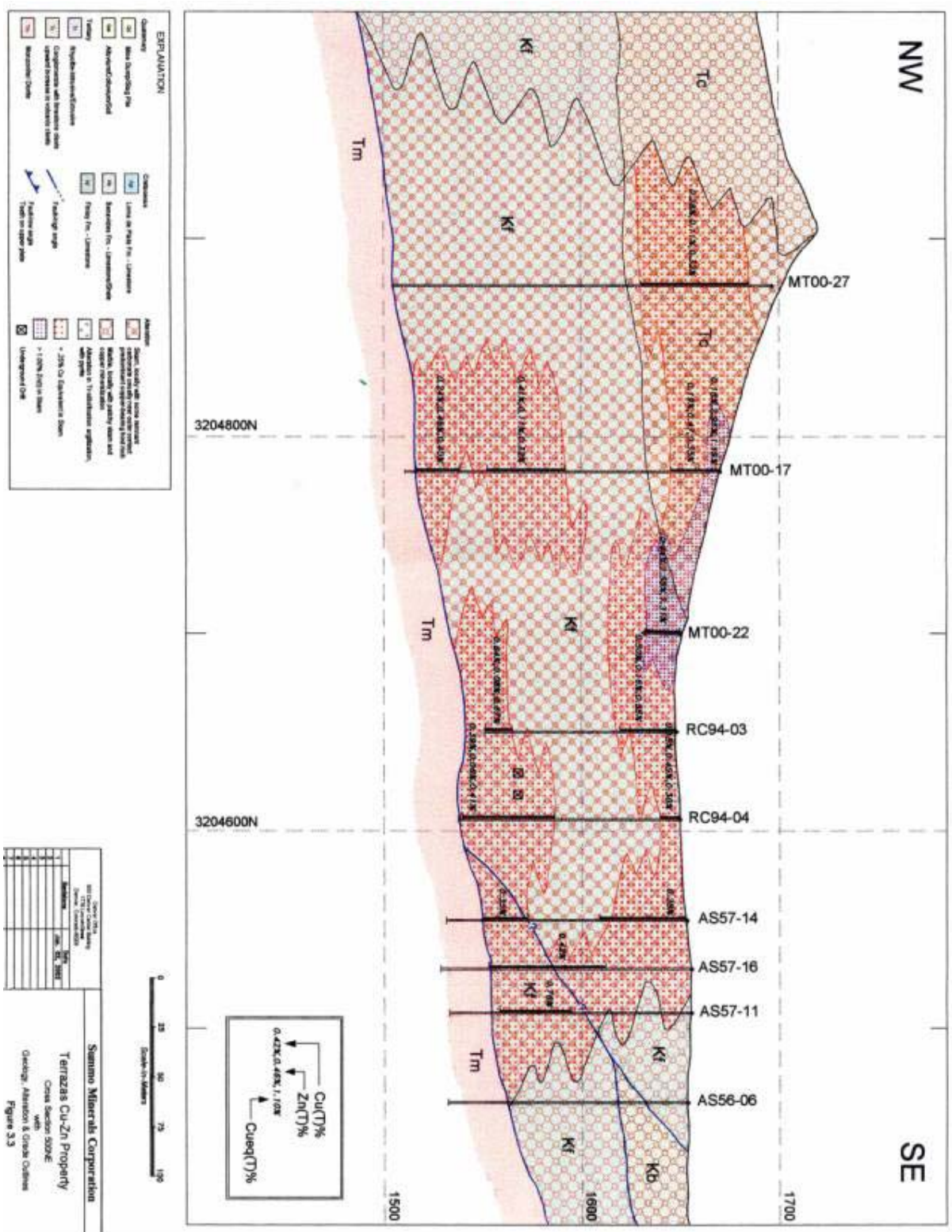
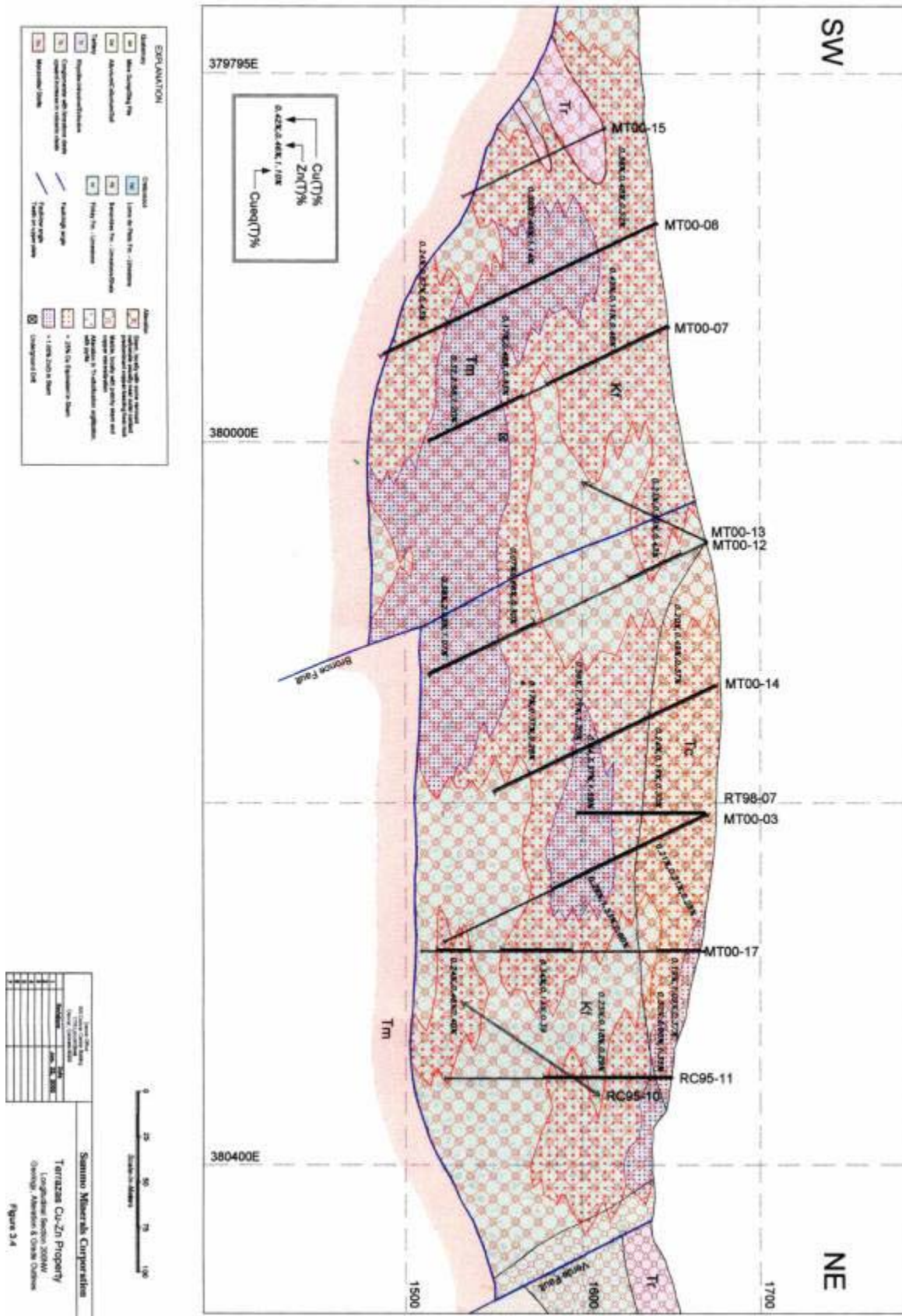
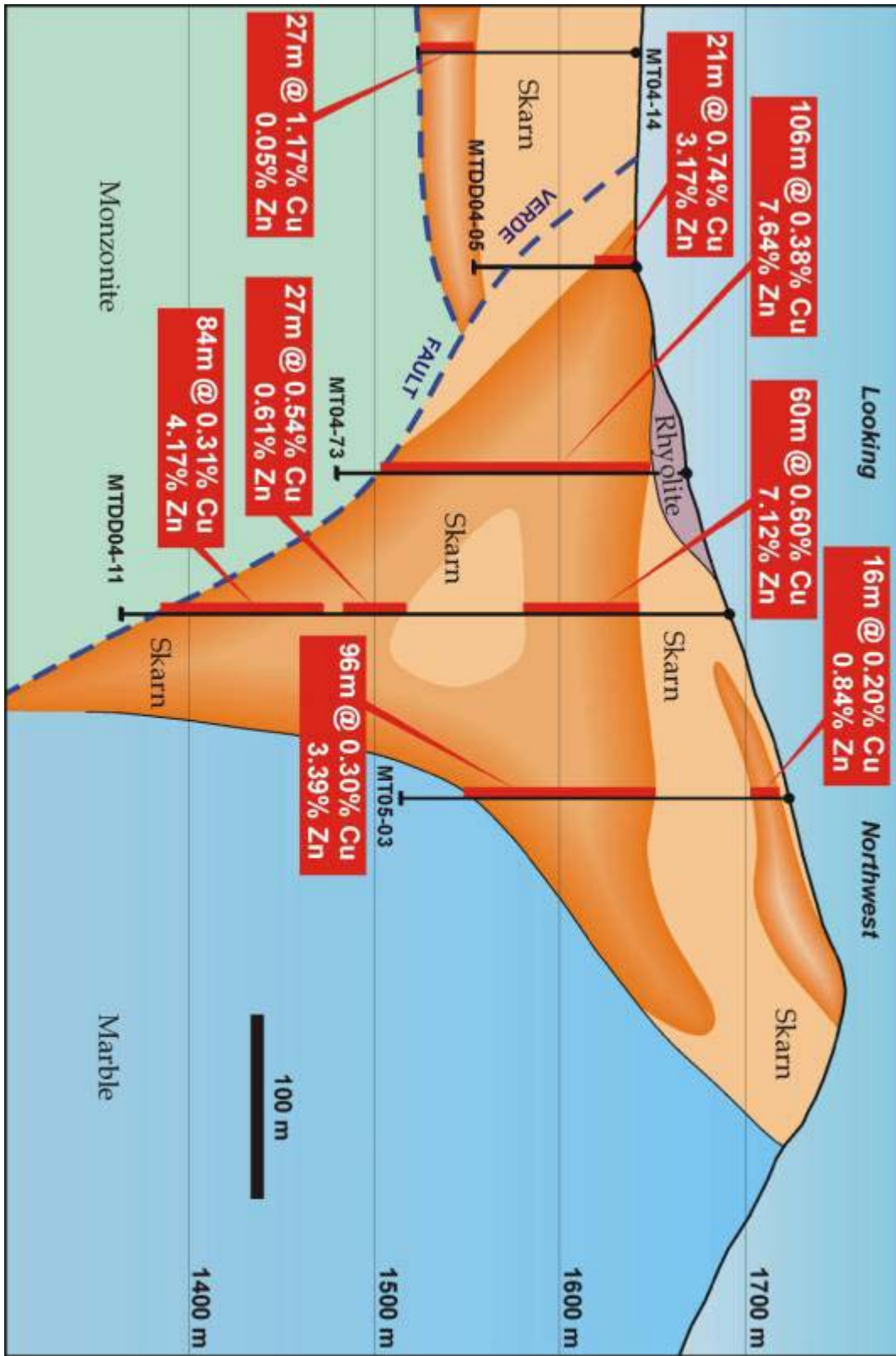




Figure 7-4. Geologic Cross Section 200 NW



**Figure 7-5. Drill Hole Section Through Cerro Verde Showing Mineralized Intercepts**



## 8 Deposit Types

The Terrazas (formerly Rio Tinto) deposit is one of a number of carbonate-hosted skarn or replacement Pb-Zn-Cu-Ag-Au deposits within the northern part of the Chihuahua Trough that share many common characteristics. Most of these deposits have some association with intrusive or subvolcanic stocks, dikes or sills and include the large deposits at Naica and Santa Eulalia to the south of Chihuahua City.

## 9 Mineralization

Copper and zinc mineralization at Terrazas took place over several episodes and comprises both the introduction of the original copper and zinc bearing sulfide minerals as well as a subsequent oxidation stage. The distribution of the mineralized zones and representative drill hole composite assays is shown in Figures 7-2, 7-3 and 7-4. Based on the study of thin sections, the introduction of the sulfide minerals appears to have followed the main period of skarn formation and be closely related to the formation of vugs and retrograde alteration. The sulfide minerals pyrite, chalcopyrite and sphalerite all appear to have been deposited broadly contemporaneously but not in equal proportions.

Discounting for the moment the remobilization of the copper and zinc during oxidation, the common non-coincidence of the grades for each of the metals suggests different source fluids, depositional controls and/or somewhat different timing over the deposition of the two metals. The sulfide minerals are often found in fractures and lining vugs as well as other features thought to be associated with brecciation and volume reduction related to the change from a carbonate rock to mostly skarn and/or retrograde related dissolution of remnant carbonate. Sulfides have also been noted replacing skarn-related minerals, primarily garnet. As is common for many mineralized skarns, the highest metal grades are often concentrated in close proximity to the transition from skarn to marble (the marble line or marble front). At Terrazas, this seems to be particularly true for copper, and hence was a locus for the past underground and surface production areas. Higher zinc grades are, for the most part, well inboard from the marble front. Associated with the marble front mineralization (oxide or sulfide) is often very coarse-grained, sparry-type yellow to black calcite that appears to be filling voids or vugs.

Thick, high-grade intercepts of zinc oxide mineralization (+150 meters grading greater than 5% zinc) have been noted in the Cerro La Verde area. These zinc grades are much higher than the average for the remainder of the deposit, but the mineralogy consists of the same zinc oxide species found elsewhere in the deposit. In contrast to the high zinc grades, the copper grades are somewhat less than the average for the deposit.

Oxidation has been quite pervasive at Terrazas with a large suite of copper and zinc oxide minerals recognized. Remnant sulfides are noted locally, generally associated with massive, fine-grained, "tight" skarn zones that have prevented the ingress of oxidizing conditions. These un-oxidized zones are minor in extent and dispersed through the deposit, do not appear

to be strictly depth-related and are often surrounded by well-oxidized areas. The most thoroughly oxidized zones are often associated with the occurrence of significant iron oxides and proximity to open dissolution type cavities and fault and breccia zones. For the main deposit, oxidation extends down to the Terrazas Fault, or to a depth of about 130 meters, slightly below the current water table. In contrast, thorough oxidation at Cerro La Verde extends to a depth of nearly 400 meters, some 200 meters or so below the current water table. There was likely not an extensive amount of re-mobilization of the copper and zinc during oxidation as the abundance of carbonate in the system would have prohibited the development of the low pH conditions necessary for extensive remobilization. There has only been very limited migration of copper, and lesser zinc, from the mineralized skarn into immediately adjacent rhyolite and monzonite.

Common copper oxide minerals noted are malachite, chrysocolla and tenorite as well as the secondary sulfide chalcocite. The copper oxides are commonly along fractures and rimming clasts and/or grains. Common zinc oxide minerals include hemimorphite, willemite, smithsonite, and zinc-bearing clay, with lesser aurichalcite and rosasite. In contrast to the quite discernable copper oxides, areas of even high-grade zinc oxide mineralization (>5 percent) are quite subtle and most commonly noted as areas with abundant to pervasive orange to brick red color iron oxides. Scanning Electron Microscope work conducted by DCM Science Lab of Denver has also demonstrated that much of the iron oxides contains from 1 to 5 percent copper and zinc.

Based on the underground exposures and drilling, there are numerous open voids within the skarn that have been filled with earthy iron oxides (limonite, goethite, and hematite) as well as others that have been filled by coarse calcite. These voids are thought to represent areas that had not been thoroughly replaced by skarn and where the remnant carbonate was later dissolved and/or recrystallized with the resultant voids localizing the deposition of mobile iron related to oxidation.

## **10 Exploration**

The following is excerpted from the report “Technical Report for the Terrazas Copper Zinc Project – Chihuahua, Mexico” dated September 2005:

“Following the closure of the active mines in about 1915, the property lay dormant for a number of years. Modern exploration of the property was initiated in the mid-1950’s.

As the property is well exposed and was previously defined by numerous drill holes, most exploration consisted of geologic mapping and reverse circulation percussion drilling. Essentially no geophysical or geochemical surveys have been performed in the immediate area of the project, and the results of these surveys were not particularly useful in establishing exploration or drilling targets. Most of the mapping was conducted by employees of Minera Cascabel, an independent contractor to Summo. The drilling was performed by Layne de Mexico, also an independent contractor to Summo. These mapping and drilling efforts were supervised by Gary A. Parkison, a Qualified Person. The

information developed through the mapping and drilling is deemed to be reliable and no more uncertain than that normally associated with such information.

Additional drilling was initiated in May 2004 and again was assisted by employees of Minera Cascabel under the direct supervision of Gary A. Parkison, a Qualified Person. Reverse circulation drilling was performed by Layne de Mexico, while core drilling was performed by Perforaciones Godbe de Mexico and Major Drilling de Mexico.”

## 11 Drilling

Table 11-1 summarizes the drilling and sampling programs completed to date for the Terrazas Project. It can be seen that the original database provided to IMC included 255 drillholes and 38,054 meters of drilling, of which 33,456m was assayed for at least total copper.

Table 11-1 shows that the Frisco sampling was by conventional rotary drilling and the average sample interval was 35m. It is suspected that this actually reflects a compositing of smaller sample intervals. Due to this large sampling interval, the Frisco data was not used for resource modeling.

Studies conducted during the 2002 Preliminary Study and re-confirmed in this present study indicate that the Swannel underground samples are biased high compared with nearby drilling data. The Swannel underground samples were also excluded from consideration for current resource modeling.

Table 11-2 summarizes the drilling and sampling data used for current resource modeling. Compared to Table 11-1, the Frisco, Swannel underground, and Constellation condemnation drilling is removed. This shows the data available for resource modeling to be 229 drillholes and 34,199m of drilling. Of this, 31,096m have been assayed for at least total copper.

The database includes assay values for total copper, total zinc, acid soluble copper, acid soluble zinc, and acid consumption. Table 11-3 summarizes the total meters assays for each assay by drilling campaign. Only the campaigns used in resource modeling are included. It can be seen that total copper and total zinc assaying was fairly complete at 90.9% and 83.7% of the total meters drilled respectively.

It can be seen that the soluble copper, soluble zinc, and acid consumption values are somewhat under-sampled in the database. Summo and Constellation assayed for soluble copper and soluble zinc when the total copper/zinc values were over about 0.1%.

It was reported to IMC that the acid soluble zinc and acid consumption assays for the Swannel RC drilling were done by Summo.

Figure 11-1 shows a hole location map, highlighted by drilling campaign, for the holes used in this study. The Asarco core holes (28 holes) include 25 vertical holes and three angle

holes. The database does not include detailed downhole survey information, so the presumed bearing and plunge of the angle holes are recorded in the database.

The Swannel RC holes (16 holes) include 13 vertical holes and three angle holes. Again, detailed downhole survey information is not available and the presumed orientations of the angle holes are recorded in the database.

The seven Newcastle core holes are all vertical holes. Again, downhole surveys are not available for these holes.

The 34 Summo RC holes include 17 vertical and 17 angle holes. The angle holes are all inclined at 60 degrees. Downhole surveys were not done for the Summo drilling.

For the 119 Constellation RC holes, 94 are vertical and 25 angle holes. One of these holes, MT05-02 has detailed downhole survey information; for the rest of the holes, presumed orientations of the holes are recorded in the database.

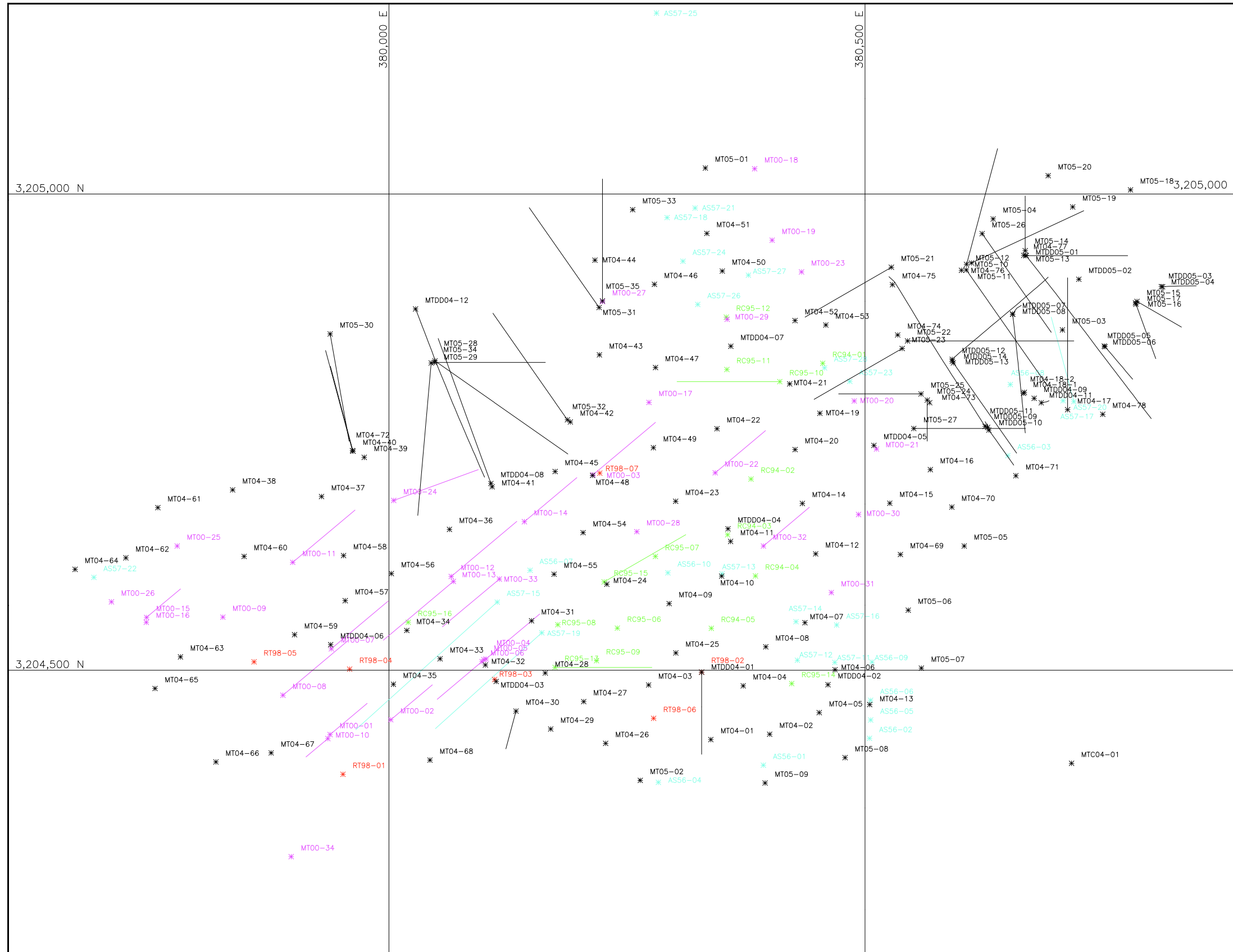
Of the 25 Constellation core holes, 11 are angle holes and 14 vertical. Downhole surveys were started for the late 2004 drilling and continued for the 2005 drilling, so about 14 of these holes have detailed downhole orientation surveys. Holes without detailed surveys include three of the angle holes. A review of the detailed downhole survey information indicates only very small deviations of no more than a couple degrees in bearing and plunge from initial orientation for the angle core holes.

It is the opinion of IMC that the available drilling and density of sampling is sufficient to support resource modeling at the level required for a Feasibility Study of the Terrazas Project.



| <b>Table 11-1: Summary of Drilling and Sampling Programs</b>                   |         |          |             |              |                  |               |                     |                   |                |                 |
|--|---------|----------|-------------|--------------|------------------|---------------|---------------------|-------------------|----------------|-----------------|
| Company  | Year    | Type     | Size        | No. of Holes | No. of Intervals | Meters        | Nom. Int. Lngth (m) | Intervals Assayed | Meters Assayed | Assayed For     |
| Asarco   | 1956-57 | Core     | NX,BX,AX    | 28           | 1,577            | 4,569         | 1.5, 3m             | 1,091             | 2,461          | tcu             |
| Frisco   | 1976    | Rotary   | ?           | 4            | 31               | 1,041         | avg 35m             | 30                | 1,040          | tcu             |
| Swannel  | 1994-95 | RC       | 13.3 cm     | 16           | 925              | 1,893         | 2m                  | 915               | 1,855          | tcu tzn scu szn |
| Swannel  | 1994-95 | UG chips | N.A.        | 10           | 264              | 1,320         | 5m                  | 264               | 1,320          | tcu tzn scu     |
| Newcoast   | 1998    | Core     | HQ,NQ,BTW   | 7            | 341              | 775           | 2m                  | 324               | 663            | tcu tzn scu     |
| Summo  | 2000    | RC       | 12.1 cm     | 34           | 1,488            | 4,461         | 3m                  | 1,467             | 4,352          | tcu tzn scu szn |
| Constellation  | 2004-05 | Core     | NC,NX       | 25           | 1,354            | 4,541         | 3m                  | 1,318             | 3,979          | tcu tzn scu szn |
| Constellation  | 2004-05 | RC       | 13.3,12.4cm | 119          | 5,921            | 17,960        | 3m                  | 5,889             | 17,786         | tcu tzn scu szn |
| Constellation  | 2005-05 | Condem   |             | 12           | 39               | 1,494         |                     | 0                 | 0              |                 |
| <b>TOTAL</b>   |         |          |             | <b>255</b>   | <b>11,940</b>    | <b>38,054</b> |                     | <b>11,298</b>     | <b>33,456</b>  |                 |
| tcu = total copper, tzn = total zinc, scu = soluble copper, szn = soluble zinc |         |          |             |              |                  |               |                     |                   |                |                 |

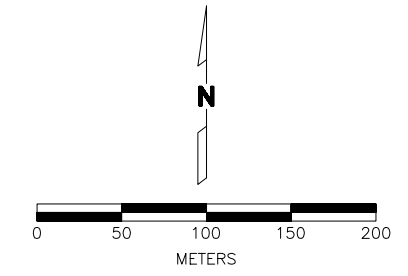
| <b>Table 11-2: Summary of Drilling and Sampling Data Used for Resource Modeling</b> |         |      |             |              |                  |               |                     |                   |                |                 |
|---|---------|------|-------------|--------------|------------------|---------------|---------------------|-------------------|----------------|-----------------|
| Company   | Year    | Type | Size        | No. of Holes | No. of Intervals | Meters        | Nom. Int. Lngth (m) | Intervals Assayed | Meters Assayed | Assayed For     |
| Asarco  | 1956-57 | Core | NX,BX,AX    | 28           | 1,577            | 4,569         | 1.5, 3m             | 1,091             | 2,461          | tcu             |
| Swannel   | 1994-95 | RC   | 13.3 cm     | 16           | 925              | 1,893         | 2m                  | 915               | 1,855          | tcu tzn scu szn |
| Newcoast  | 1998    | Core | HQ,NQ,BTW   | 7            | 341              | 775           | 2m                  | 324               | 663            | tcu tzn scu     |
| Summo   | 2000    | RC   | 12.1 cm     | 34           | 1,488            | 4,461         | 3m                  | 1,467             | 4,352          | tcu tzn scu szn |
| Constellation   | 2004-05 | Core | NC,NX       | 25           | 1,354            | 4,541         | 3m                  | 1,318             | 3,979          | tcu tzn scu szn |
| Constellation   | 2004-05 | RC   | 13.3,12.4cm | 119          | 5,921            | 17,960        | 3m                  | 5,889             | 17,786         | tcu tzn scu szn |
| <b>TOTAL</b>  |         |      |             | <b>229</b>   | <b>11,606</b>    | <b>34,199</b> |                     | <b>11,004</b>     | <b>31,096</b>  |                 |
| tcu = total copper, tzn = total zinc, scu = soluble copper, szn = soluble zinc      |         |      |             |              |                  |               |                     |                   |                |                 |



**Figure 11-1  
Hole Location Map**

**EXPLANATION OF HOLE MARKERS**

- \* Asarco Drilling
- \* Swannell Drilling
- \* Newcastle Drilling
- \* Summo Drilling
- \* Constellation Drilling



|   |  |
|---|--|
| <b>Constellation Copper Corp.</b><br>Terrazas Project - June 2005 |  |
| Date<br>Nov 2005  | <b>Hole Location Map</b><br>By Drilling Campaign |
| Drawing File<br>fig11-01.dwg                                      |  |
| <b>INDEPENDENT MINING CONSULTANTS, INC.</b><br>TUCSON, ARIZONA    |  |
| Reference Number<br>16602   |  |

| <b>Table 11-3: Assay Statistics by Sampling Campaign</b> |                      |                          |               |                |               |               |
|--|----------------------|--------------------------|---------------|----------------|---------------|---------------|
| Company/Type   | Total Meters Drilled | Assayed Length in Meters |               |                |               |               |
|  |                      | Total Copper             | Total Zinc    | Soluble Copper | Soluble Zinc  | Acid Consum.  |
| Asarco Core  | 4,569                | 2,461                    |               |                |               |               |
| Swannel RC   | 1,893                | 1,855                    | 1,855         | 1,853          | 846           | 1,627         |
| Newcoast Core  | 775                  | 663                      | 663           | 639            |               |               |
| Summo RC   | 4,461                | 4,352                    | 4,352         | 2,865          | 2,859         | 2,865         |
| Constellation Core                                       | 4,541                | 3,979                    | 3,979         | 2,582          | 2,403         | 2,602         |
| Constellation RC   | 17,960               | 17,786                   | 17,783        | 8,528          | 7,792         | 8,993         |
| <b>TOTAL</b>   | <b>34,199</b>        | <b>31,096</b>            | <b>28,632</b> | <b>16,467</b>  | <b>13,900</b> | <b>16,088</b> |
| % of Total   |                      | 90.9%                    | 83.7%         | 48.2%          | 40.6%         | 47.0%         |

## 12 Sampling

The Asarco core samples were small-diameter, dominantly 4.2 cm BX or 3.0 cm AX core. The sampling interval tended to be either 1.5m or 3m. The core recovery was not incorporated into the database provided to IMC, but inspection of the drill logs showed it to be quite variable and the reported average core recovery was 66.3%.

The Swannel RC drilling is reported to be from 13.3 cm diameter holes and was sampled on 2m intervals. A cyclone and a three-tiered Jones splitter were used to collect samples at the rig. Percent recoveries for the Swannell RC drilling are not recorded in the drill logs.

The Swannel underground chip samples were done on 5m sampling intervals. They were taken with a hammer over a 0.3m height on drift sidewalls. Recall from the previous section that they are not used for this present evaluation.

The Newcoast core generally utilized larger samples than the Asarco core, either 6.4 cm HQ, 4.8 cm NQ, or 4.1 cm NTW core. The sampling interval was two meters. Percent core recoveries were not recorded.

The Summo RC drilling was with a 12.1 cm hole and was sampled on 3m intervals. Summo used a center-return hammer for dry drilling and a conventional hammer for wet drilling (about 90% of the drilling was dry). A cyclone and a three-tiered Jones splitter was used for dry sampling and a rotary splitter for wet sampling. Sample recoveries were estimated visually during the Summo program (samples were not weighed). Recoveries in most intervals were estimated to have been better than 75% although some zones of low recovery were also recorded, particularly in the vicinity of old workings.

The Constellation RC holes were drilled by Layne de Mexico using a track mounted drill rig. Normally the hole diameter was from 13.3 and 12.4 cm, and in most cases a center return hammer was used. Exceptions were when abundant water was encountered in the hole and a tri-cone type bit was used. In rare cases a conventional hammer and interchange was used.

For RC holes drilled below about 225 meters an auxiliary air compressor and booster were utilized. The holes were generally drilled dry for as long as possible, typically about 100-125 meters depth or more. Of the approximately 20,000 meters of RC drilling performed during 2004-2005, about 13,500 meters were drilled dry. Once groundwater was encountered in the holes some water was injected into the hole to aid in drilling and to prevent the drill rods from sticking.

Dry samples were collected in a cyclone on the drill and then passed thru a vibrating three tiered Jones type splitter. The sample interval was typically three meters. A one eighth split of the sample was generally passed over a single splitter to provide a one-sixteenth split which was bagged and held for the assay lab. This sample generally weighed about 6 to 7 kgs, and represented a sample recovery of about 60 to 80% of the total interval drilled. The rods were evacuated or blown out before the drill rig advanced to the next sample interval.

The wet samples were collected in the cyclone and passed over a rotary wet splitter. The amount of covers on the splitter was varied to obtain one 5 gallon bucket full of cuttings and water for each three meter sample interval. Once the interval was complete most of the water in the sample was poured off and the sample passed through a single splitter to obtain a sample that generally weighed about 5 kgs after it dried out. Both dry and wet samples were placed in olefin polyester sample bags that were labeled with the drill hole and sample interval. For about one in twenty samples a duplicate sample was collected at the drill rig and submitted for assay.

Constellation core drilling was done mostly (+90%) with 6.4 cm NC core. When necessary, this was reduced to NX size (4.8 cm). The sample interval was 3m. Core recovery was recorded for the core holes and incorporated into the database. Overall core recovery was about 92%. The core samples were drilled by Perforaciones Godbe de Mexico and by Major Drilling de Mexico.

### **13 Sample Preparation, Analyses and Security**

There is not any specific information on sample preparation, analyses, or security measures available to IMC for the Asarco, Swannel, or Newcoast drilling, other than that the Asarco assays were done at the Asarco laboratory at Santa Eulalia. As will be discussed in Section 14 of this report, these data were validated by comparison with recent drilling data.

For the Summo RC samples, nominal 1/16 splits taken at the rig (5-8kg) were crushed to -10 mesh at the Chemex lab in Chihuahua and a 250g split of the -10 mesh material was then pulped to -150 mesh. This material was then split into two 125g pulps, one of which was retained in Chihuahua while the other was sent to the Chemex lab in Vancouver for assay.

Total copper and total zinc assays were run using a 4-acid digestion on 0.5g samples with the solution read for both total copper and total zinc using AA. Acid soluble copper and zinc assays were run by shaking a 0.25g sample in 10 mls of 5% sulfuric acid solution for 20

minutes at room temperature, and read for acid soluble copper and acid soluble zinc using AA. Acid soluble assays were run only on samples where the total copper or the total zinc assay exceeded 0.1%.

The Constellation samples were sent to BSi's prep lab facility in Durango, Mexico. The samples were dried in an oven at about 150 degrees F and then crushed to >80% -10 mesh by jaw crusher and/or roller mill. About 250-300 grams were then split out using a Jones splitter and pulverized to >90% -150 mesh using Labtech ring and puck pulverizers. Barren quartz sand is used between each sample. The 250 gram sample pulps were then split in half using a Jones splitter, with one half sent off to the assay lab, also a BSi lab either Reno or Lima, Peru. The other half of the sample was sent back to Constellation/Minera Terrazas in Chihuahua for storage, along with the remainder of the -10 mesh assay reject material.

For total copper and zinc, a 0.5 gm sample was obtained from the pulp, and is then subject to a 4-acid total digestion (HF, HNO<sub>3</sub>, HClO<sub>4</sub>, HCl). The solution was then read for total copper and total zinc using AA. For acid soluble copper and zinc, a 0.25 gm. sample was used. It was digested in 10ml of 5% sulfuric acid using a mechanical shaker table at room temp (20 degrees C) for 60 minutes. The solution was read for copper and zinc using AA. As with the Summo data, the soluble copper and zinc assays were generally only done if one either the total copper or total zinc assay exceeded 0.1%.

The acid consumption assays were done by the Cardwell method, as follows. Thirty grams of -150 mesh material are mixed with 50 milliliters of pH 1.5 sulfuric acid to form a slurry. The pH is measured and concentrated sulfuric acid is added to adjust and hold the pH to 1.5 while mixing for one hour. The amount of sulfuric acid used allows calculation of acid consumption. The acid consumption tests for the Constellation samples were by Prof. Sergio Trejo of the Metallurgy Department of the Chihuahua Institute of Technology. The tests done by Summo for the 2000 campaign were by the same method and were done by Cone Geochemical. Acid consumption determinations were generally only done for samples with either total copper or total zinc greater than 0.1%. Also the 2004-2005 samples were generally done on six meter pulp composites, rather than the three meter intervals. This was a cost saving measure, since the tests are quite labor intensive.

Concerning sample security, the RC samples were picked up at the drill rig at the end of each drill shift and taken to a secure warehouse for storage until they were picked up by the assay lab (BSi Inspectorate), who took the samples to their preparation facility in Durango, Mexico. For the core samples, the core was also stored in the secure facility in the village of Terrazas where it was photographed and logged for geology and geotechnical purposes. The core was then marked into three meter intervals, sawn using a diamond saw, and then placed into sample bags which were securely stored until picked up by BSi.

## 14 Data Verification

### 14.1 Collar Coordinates and Downhole Surveys

Collar monuments are still readily locatable in the field, at least for the recent drill hole locations. Constellation has recently re-surveyed and re-calculated hole collar locations to make sure they tie to the coordinate grid currently being used.

IMC did a careful comparison of hole collar locations with topography which resulted in further surveying and checking of a dozen or so holes. Hole collars in the database match topography well. Other than this check, IMC did not check surveying or the downhole orientation surveys.

### 14.2 IMC Database Audit

IMC randomly selected 18 holes from the database and compared assay certificates with the assay values currently in the database. The 18 holes included one Asarco hole, one Swannel hole, one Newcastle hole, three Summo holes, and 12 Constellation holes. The 18 holes also represent 8% of the accepted holes in the database. Note that accepted holes exclude the Frisco, Swannel underground, and Constellation condemnation drilling.

Table 14-1 summarizes the results of the check. It can be seen that assay certificate data was not available for the Asarco drilling, or for the Swannel drilling (other than the soluble zinc and acid consumption assays done by Summo).

There were no errors discovered between the database values and assay certificate values for either the Summo or Constellation drilling. The Summo checking included total copper, total zinc, soluble copper, soluble zinc, and acid consumption. The Constellation checking was mostly limited to the total and soluble copper and zinc assays. Limited assay certificate data for acid consumption assays was available as many of these assays were still pending when the IMC check was done.

One minor error was discovered in the Newcastle hole; a soluble copper assay of 0.64% on the assay certificate was entered into the database as 0.74% soluble copper. For the Swannel hole, there were two acid consumption assays on the assay certificate that were not incorporated into the database. It was also noted that there were two acid consumption assays at the upper detection limit, i.e. actual value would be higher than what is in the database.

Overall, results were excellent. There do not appear to be any errors of any significance in the database.

| Hole ID      | Company  | No. of Intervals | Errors   | Comments  |
|--------------|----------|------------------|----------|---|
| AS57-28      | Asarco   | 22               |          | No certificate data available                           |
| MT00-11      | Summo    | 57               | 0        |   |
| MT00-17      | Summo    | 53               | 0        |   |
| MT00-20      | Summo    | 32               | 0        |   |
| MT04-05      | Const.   | 38               | 0        |   |
| MT04-16      | Const.   | 61               | 0        |   |
| MT04-17      | Const.   | 90               | 0        |   |
| MT04-18-2    | Const.   | 40               | 0        |   |
| MT04-74      | Const.   | 57               | 0        |   |
| MT04-76      | Const.   | 95               | 0        |   |
| MT05-03      | Const.   | 67               | 0        |   |
| MT05-23      | Const.   | 49               | 0        |   |
| MTC04-02     | Const.   | 33               | 0        |   |
| MTDD04-11    | Const.   | 104              | 0        |   |
| MTDD05-09    | Const.   | 80               | 0        |   |
| MTDD05-12    | Const.   | 64               | 0        |   |
| RC95-09      | Swannel  | 65               | 2        |   |
| RT98-02      | Newcoast | 59               | 1        | a soluble copper assay, 0.64 certificate, 0.74 database |
| <b>TOTAL</b> |          | <b>1,066</b>     | <b>3</b> |   |

### 14.3 IMC Samples

As an independent check of sampling and assaying procedures and results, IMC designated 50 samples from recent Constellation drilling. Course rejects (not pulps) from these samples were sent to Chemex for sample preparation and assaying. The pulp prepared by Chemex was also sent to IPL for another analytical check. Course reject material was not available for one of the designated samples, leaving 49 samples.

The Chemex analytical procedure for total copper and zinc was done with a three acid digestion followed by ICP analysis. IPL used the same assay methods for total copper and zinc as Bsi, i.e. four acid digestion followed by AA analysis.

Table 14-2 summarizes the results. For total copper, Cases 1 and 2 show the Chemex assays to be 7.4% lower than the original Bsi assay and IPL to be 1.8% greater than the original Bsi assay. Expected precision is 7.9% and 8.6% respectively for these cases. This is interpreted as any one assay is expected to be within 7.9% and 8.6% respectively of the true value. Case 3 shows IPL to be about 9.9% greater than Chemex. It seems possible that the Chemex three acid digestion is not as aggressive as the four acid digestions used by the other labs; it might not be dissolving all the copper in the sample.

Review of xy plots (not shown) show four samples with a large difference between original Bsi values and new Chemex and IPL assays. This seems likely to be an error in sample

identification or labeling. With these samples removed (Cases 4 and 5) Chemex assays are about 5.5% less than the original Bsi assays and IPL assays are 3.5% greater than original Bsi assays. Precision estimates improve to 4.2% and 5.4% respectively.

For total zinc, Cases 9 and 10 (outliers removed) show Chemex assays to be 2.2% greater than the original Bsi assays and IPL to be 16.0% greater than original Bsi assays. The indicated precision is 4.3% and 8.0% respectively. Case 8 shows IPL greater than Chemex by 14.0% on the same pulp.

Cases 11 and 12 show results for Bsi versus IPL for acid soluble copper and zinc respectively. Chemex did not perform acid soluble assays for this data. Soluble copper assays compare well, with IPL 6.1% greater than the original Bsi results. For soluble zinc however, IPL is 22.2% greater than Bsi.

Overall, the results of this program demonstrated comparable amounts of copper and zinc in the coarse rejects samples as was reported in the original sampling program.

| Case | Assay | Original Lab | Check Lab | No. of Assays | Original Mean (%) | Check Mean (%) | % Difference | Precision (%) | Comments   |
|------|-------|--------------|-----------|---------------|-------------------|----------------|--------------|---------------|--|
| 1    | totcu | bsi          | chemex    | 49            | 0.569             | 0.527          | -7.4%        | 7.86%         | Four outlier samples removed<br>Four outlier samples removed |
| 2    | totcu | bsi          | ipl       | 49            | 0.569             | 0.579          | 1.8%         | 8.64%         |  |
| 3    | totcu | chemex       | ipl       | 49            | 0.527             | 0.579          | 9.9%         | 5.06%         |  |
| 4    | totcu | bsi          | chemex    | 45            | 0.548             | 0.518          | -5.5%        | 4.23%         |  |
| 5    | totcu | bsi          | ipl       | 45            | 0.548             | 0.567          | 3.5%         | 5.39%         |  |
| 6    | totzn | bsi          | chemex    | 49            | 2.702             | 2.325          | -14.0%       | 8.71%         | Four outlier samples removed<br>Four outlier samples removed |
| 7    | totzn | bsi          | ipl       | 49            | 2.702             | 2.651          | -1.9%        | 11.83%        |  |
| 8    | totzn | chemex       | ipl       | 49            | 2.325             | 2.651          | 14.0%        | 5.32%         |  |
| 9    | totzn | bsi          | chemex    | 45            | 1.858             | 1.899          | 2.2%         | 4.34%         |  |
| 10   | totzn | bsi          | ipl       | 45            | 1.858             | 2.156          | 16.0%        | 8.00%         |  |
| 11   | solcu | bsi          | ipl       | 45            | 0.476             | 0.505          | 6.1%         | 9.86%         |  |
| 12   | solzn | bsi          | ipl       | 44            | 2.117             | 2.586          | 22.2%        | 9.50%         |  |



#### 14.4 Summo QAQC Programs

Summo took duplicate 1/16<sup>th</sup> splits from 53 of the 1,488 samples it assayed (I.e. about one every 30<sup>th</sup> sample) and prepared two 125g pulps from these duplicate splits. One of these duplicate pulps was stored. The other was assayed at Chemex for total copper, acid soluble copper, total zinc, and acid soluble zinc using the Chemex procedures described in Section 13.0, and also total copper and total zinc using inductively coupled plasma (ICP). This pulp was then reassayed at Cone Geochemical for total copper, acid soluble copper, total zinc, and acid soluble zinc. Table 14-3 summarizes these various checks.

| Case | Assay  | Original Assay | Duplicate Assay | No. of Samples | Original Mean (%) | Check Mean (%) | Percent Difference |
|------|--------|----------------|-----------------|----------------|-------------------|----------------|--------------------|
| 1    | Tot Cu | Chemex         | Chemex          | 53             | 0.203             | 0.210          | 3.4%               |
| 2    | Tot Cu | Chemex         | Chem ICP        | 51             | 0.209             | 0.220          | 5.3%               |
| 3    | Tot Cu | Chemex         | Cone            | 53             | 0.203             | 0.209          | 3.0%               |
| 4    | Sol Cu | Chemex         | Chemex          | 34             | 0.179             | 0.175          | -2.2%              |
| 5    | Sol Cu | Chemex         | Cone            | 34             | 0.179             | 0.205          | 14.5%              |
| 6    | Tot Zn | Chemex         | Chemex          | 53             | 0.251             | 0.232          | -7.6%              |
| 7    | Tot Zn | Chemex         | Chem ICP        | 51             | 0.244             | 0.220          | -9.8%              |
| 8    | Tot Zn | Chemex         | Cone            | 53             | 0.251             | 0.241          | -4.0%              |
| 9    | Sol Zn | Chemex         | Chemex          | 34             | 0.256             | 0.255          | -0.4%              |
| 10   | Sol Zn | Chemex         | Cone            | 34             | 0.256             | 0.278          | 8.6%               |

Overall, the mean values of original and check assays are reasonably close. Total copper check assays tended to be slightly higher than original assays, from 3.0 to 5.3% higher, while total zinc checks tended to be 4.0 to 9.8% lower than original assays. Based on these comparisons, and comparisons of the various drilling campaigns, discussed below, the Summo data was accepted for the 2002 Prefeasibility Study.

The comparisons were shown on Table 14-3 were done by IMC as part of the 2002 study. IMC has no record of any blanks or standards assays being used in the Summo QAQC work. Note also that this work is predominantly a check of analytical procedures only because most of the check assays were done on the same pulp. Duplicate splits of original RC chips or core halves, or duplicate splits of coarse rejects, are required to check the entire sample preparation and analytical procedures.

#### 14.5 Constellation QAQC Programs

A comprehensive QAQC program was initiated for the Constellation 2004-2005 drilling program. A couple standards were submitted with the samples from each drillhole, bracketing the expected values in the hole. Duplicates were taken every 20<sup>th</sup> sample from sample splits collected at the site. Early in the project the standards used were developed from Carlota and San Manuel ores, which are copper oxide projects in Arizona. These standards did not contain zinc. Later standards were developed from Terrazas ore, from bulk samples acquired from underground openings.

Jeffrey A. Jaacks, a consulting geochemist, was retained by Constellation to analyze and report the results of the QAQC program. Results are presented in the report, "QA/QC Review of the Terrazas Project, Chihuahua, Mexico" dated October 14, 2005.

The main conclusions from the report are as follows:

1. Original studies indicated that the Lima facility of BSI has better accuracy and precision than the Reno facility. Later analyses on check samples indicated no reproducibility problems. It appears that there was an issue with the reproducibility of the early Carlota standards instead.
2. Overall accuracy and precision for the Terrazas Project are within acceptable limits for standards used later in the drilling program.
3. Duplicate analysis of the reverse circulation drilling program samples displayed acceptable reproducibility for copper and zinc analyses.
4. Check samples using the same pulp show acceptable reproducibility between ALS-Chemex, IPL, and BSI-Lima analyses with no or only slight bias existing between the check laboratories.

The report also included some recommendations:

1. Some batches of samples with outliers in either the standards or duplicates analyses were identified and it was recommended that assays in the batches be re-run.
2. The variance between IPL and BSI for acid soluble zinc on 44 check samples (Case 12 on Table 14-2) should be investigated.

To IMC's knowledge the recommendations have not yet been investigated. For item 2, it should be noted that the Bsi assays that the database is based on is the more conservative of the two assays. For item 1, IMC does not expect re-running a few selected batches of assays to make a significant difference in resource results.

There were additional suggestions pertaining to the future maintenance of the QAQC program that are not repeated here.

#### 14.6 Comparison of Recent and Historic Drilling Information

The Asarco, Newcastle, and Swannel data are historic data and little is known about the sampling and analytical methods used. Recent Constellation drilling effectively twinned several of these legacy holes. IMC has done a comparison of assay results in these various sets of twin holes.

Constellation drilling twinned four Asarco holes. Table 14-4 shows the holes and hole depths considered comparable. Recall that the Asarco holes were only assayed for total copper. The number of assay intervals is also not the same due to different interval lengths. The table shows a mean total copper grade of 0.317% for Asarco samples versus 0.332% for Constellation drilling. This is only about a 5% difference, indicating the Asarco holes can be accepted for resource evaluation.

Tables 14-5 and 14-6 compare Newcastle and Constellation total copper and total zinc for two twin holes. Table 14-5 shows a very close comparison between mean total copper grades at 0.293% for Newcastle versus 0.293% for Constellation. For total zinc (Table 14-6) Newcastle values are higher than Constellation at 0.589% versus 0.380% zinc.

Tables 14-7 and 14-8 compare Swannel RC drilling with Constellation drilling for total copper and total zinc for three sets of twin holes. For copper, Constellation is higher than Swannel at 0.375% versus 0.297%. For zinc, the converse is true, Swannel is higher than Constellation (0.505% zinc versus 0.409% zinc).

Tables 14-9 and 14-10 compare Constellation and Summo drilling for two twin holes. For total copper Summo values are higher than Constellation values, 0.382% copper versus 0.289% copper. For zinc, Constellation is slightly higher than Summo values, 0.489% zinc versus 0.446% zinc.

It appears to IMC that the sampling and assaying is reasonably consistent between the various sampling campaigns. IMC elected to use all the data from these sources for resource modeling. Recall that the Frisco data and Swannel underground samples were not used for resource modeling.

#### 14.7 Summary of Data Verification Programs

Based on the various QAQC and other data verification programs, conducted by IMC and others, IMC concludes that the Terrazas assay data base is adequate for resource modeling for feasibility study purposes.

| Asarco Hole ID | Const Hole ID | Depths (m) | Asarco Samples   |            |                 | Constellation Samples |            |                 |
|----------------|---------------|------------|------------------|------------|-----------------|-----------------------|------------|-----------------|
|                |               |            | No. of Intervals | Mean (%Cu) | Std. Dev. (%Cu) | No. of Intervals      | Mean (%Cu) | Std. Dev. (%Cu) |
| AS56-08        | MT04-18-1     | 0 - 223m   | 121              | 0.190      | 0.140           | 74                    | 0.277      | 0.257           |
| AS57-11        | MT04-06       | 55 - 97m   | 22               | 0.812      | 0.698           | 14                    | 0.700      | 0.700           |
| AS57-14        | MT04-07       | 0 - 100m   | 40               | 0.263      | 0.307           | 32                    | 0.241      | 0.270           |
| AS57-13        | MT04-10       | 0 - 115m   | 45               | 0.462      | 0.581           | 39                    | 0.379      | 0.488           |
| TOTAL          |               |            | 228              | 0.317      | 0.417           | 159                   | 0.332      | 0.398           |

| Newcoast Hole ID | Const Hole ID | Depths (m) | Newcoast Samples |            |                 | Constellation Samples |            |                 |
|------------------|---------------|------------|------------------|------------|-----------------|-----------------------|------------|-----------------|
|                  |               |            | No. of Intervals | Mean (%Cu) | Std. Dev. (%Cu) | No. of Intervals      | Mean (%Cu) | Std. Dev. (%Cu) |
| RT98-03          | MTDD04-03     | 0 - 125m   | 56               | 0.303      | 0.290           | 40                    | 0.292      | 0.198           |
| RT98-07          | MT04-48       | 0 - 68m    | 32               | 0.290      | 0.189           | 24                    | 0.296      | 0.208           |
| TOTAL            |               |            | 88               | 0.298      | 0.256           | 64                    | 0.293      | 0.200           |

| Newcoast Hole ID | Const Hole ID | Depths (m) | Newcoast Samples |            |                 | Constellation Samples |            |                 |
|------------------|---------------|------------|------------------|------------|-----------------|-----------------------|------------|-----------------|
|                  |               |            | No. of Intervals | Mean (%Zn) | Std. Dev. (%Zn) | No. of Intervals      | Mean (%Zn) | Std. Dev. (%Zn) |
| RT98-03          | MTDD04-03     | 0 - 125m   | 56               | 0.313      | 0.764           | 40                    | 0.175      | 0.371           |
| RT98-07          | MT04-48       | 0 - 68m    | 32               | 1.073      | 1.868           | 24                    | 0.725      | 1.566           |
| TOTAL            |               |            | 88               | 0.589      | 1.322           | 64                    | 0.380      | 1.026           |

| Swannel Hole ID | Const Hole ID | Depths (m) | Swannel Samples  |            |                 | Constellation Samples |            |                 |
|-----------------|---------------|------------|------------------|------------|-----------------|-----------------------|------------|-----------------|
|                 |               |            | No. of Intervals | Mean (%Cu) | Std. Dev. (%Cu) | No. of Intervals      | Mean (%Cu) | Std. Dev. (%Cu) |
| RC94-03         | MTDD04-04     | 0 - 98m    | 48               | 0.278      | 0.276           | 32                    | 0.262      | 0.368           |
| RC95-12         | MT00-29       | 0 - 75m    | 36               | 0.497      | 0.421           | 25                    | 0.681      | 0.597           |
| RC95-16         | MT04-34       | 0 - 124m   | 60               | 0.193      | 0.135           | 41                    | 0.276      | 0.380           |
| TOTAL           |               |            | 144              | 0.297      | 0.301           | 98                    | 0.375      | 0.473           |

| Swannel Hole ID | Const Hole ID | Depths (m) | Swannel Samples  |            |                 | Constellation Samples |            |                 |
|-----------------|---------------|------------|------------------|------------|-----------------|-----------------------|------------|-----------------|
|                 |               |            | No. of Intervals | Mean (%Zn) | Std. Dev. (%Zn) | No. of Intervals      | Mean (%Zn) | Std. Dev. (%Zn) |
| RC94-03         | MTDD04-04     | 0 - 98m    | 48               | 0.087      | 0.075           | 32                    | 0.096      | 0.143           |
| RC95-12         | MT00-29       | 0 - 75m    | 36               | 0.872      | 2.320           | 25                    | 0.316      | 0.450           |
| RC95-16         | MT04-34       | 0 - 124m   | 60               | 0.620      | 1.021           | 41                    | 0.710      | 0.823           |
| TOTAL           |               |            | 144              | 0.505      | 0.136           | 98                    | 0.409      | 0.639           |

| Summo Hole ID | Const Hole ID | Depths (m) | Summo Samples    |            |                 | Constellation Samples |            |                 |
|---------------|---------------|------------|------------------|------------|-----------------|-----------------------|------------|-----------------|
|               |               |            | No. of Intervals | Mean (%Cu) | Std. Dev. (%Cu) | No. of Intervals      | Mean (%Cu) | Std. Dev. (%Cu) |
| MT00-05       | MT04-32       | 0 - 118m   | 39               | 0.225      | 0.245           | 39                    | 0.302      | 0.275           |
| MT00-21       | MTDD04-05     | 0 - 90m    | 29               | 0.594      | 1.309           | 29                    | 0.273      | 0.578           |
| TOTAL         |               |            | 68               | 0.382      | 0.885           | 68                    | 0.289      | 0.428           |

| Summo Hole ID | Const Hole ID | Depths (m) | Summo Samples    |            |                 | Constellation Samples |            |                 |
|---------------|---------------|------------|------------------|------------|-----------------|-----------------------|------------|-----------------|
|               |               |            | No. of Intervals | Mean (%Zn) | Std. Dev. (%Zn) | No. of Intervals      | Mean (%Zn) | Std. Dev. (%Zn) |
| MT00-05       | MT04-32       | 0 - 118m   | 39               | 0.086      | 0.188           | 39                    | 0.258      | 0.741           |
| MT00-21       | MTDD04-05     | 0 - 90m    | 29               | 0.931      | 1.783           | 29                    | 0.801      | 2.317           |
| TOTAL         |               |            | 68               | 0.446      | 1.235           | 68                    | 0.489      | 1.621           |

## 15 Adjacent Properties

There are no known adjacent properties to that of the Terrazas Project that have any known or implied mineral resources that would impact on the future exploration or development of the property.

## 16 Mineral Processing and Metallurgical Testing

### 16.1 Mineral Processing

As the Terrazas ore is mined, it is blended between main pit and Verde pit sources to achieve a relatively uniform total assay acid consumption characteristic. A two-stage crushing plant reduces the blended ore to a nominal 19-millimeter (3/4-inch) top size, and a dry screening operation separates material that is finer than 3.36 millimeters (6 mesh).

A live stockpile accumulates the coarse -19/+3.36 millimeter material. Overland conveyors take this material through a cure drum to apply an initial wetting of concentrated sulfuric acid. A conveyor stacking systems delivers the cured ore onto a large, rectangular lined leach pad that has been prepared with a drainage system. A network of drip irrigators delivers acidified raffinate from the copper and zinc solvent extraction circuits onto the leach pad ore. As this solution percolates through the ore, it extracts acid-soluble copper and zinc, along with impurities such as calcium, iron, manganese, aluminum and other elements. The resulting pregnant leach solution (PLS) drains from the heap through a drainage layer of coarse rock and perforated drainage piping to open lined trenches that extend along the downhill edge of the leach pad. These trenches deliver the PLS to two or more PLS ponds that feed to the copper solvent extraction plant.

If it is justified economically, an agitated leach circuit will treat the fine minus 3.36-millimeter material for metal recovery. A ball mill reduces the fines to less than about 300 microns (48 mesh). A series of agitated tanks leaches the milled pulp with acidified raffinate to extract the copper and zinc values, along with certain impurities. A counter-current thickening and dewatering system separates and washes the solids in the leached pulp from the liquor. The clarified liquor passes by gravity to the PLS ponds, while the washed solids are filtered and stacked with the residue from the heap leach operation.

The copper solvent extraction plant uses an oxime-type of organic reagent to extract the contained copper from the PLS, and to generate a strong and clean electrolyte for copper electrowinning. The electrowinning operation produces metallic copper in the form of cathodes, ready for commercial sale.

The copper raffinate from solvent extraction splits into advance and return streams; the return stream is recycled to the leaching operations. A solution purification operation treats the advance copper raffinate to:

- Remove traces of copper and other impurities such as nickel, cobalt and cadmium
- Reduce ferric iron to ferrous (or to remove it by precipitation as jarosite)
- Raise the solution pH to an acceptable range for feed to the zinc solvent extraction circuit.

The zinc solvent extraction circuit uses DEHPA to extract the zinc from solution and to generate a strong, clean zinc electrolyte for zinc electrowinning. The zinc electrowinning operation produces zinc as sheets of cathode zinc. These sheets are cast into ingots for commercial sale as special high grade (SHG) zinc.

The zinc raffinate returns to the leaching operations to make use of the acid that has been generated as a byproduct of the electrowinning operation.

## 16.2 Historic Metallurgical Testing

### 16.2.1 Test Program Participants and Sampling

Several organizations participated in the initial metallurgical investigations that were associated with the 2002 prefeasibility study. The main contributors were:

**Table 16-1**  
**Terrazas Prefeasibility Study**  
**Test Program Participants**

| Organization                      | Location              | Primary Responsibility |
|-----------------------------------|-----------------------|------------------------|
| METCON Research, Inc.             | Tucson, Arizona       | Leaching parameters    |
| Resource Development Inc.         | Wheat Ridge, Colorado | Leaching parameters    |
| Hazen Research, Inc.              | Golden, Colorado      | Zinc recovery process  |
| Electrowinning International Inc. | North Vancouver, BC   | Zinc electrowinning    |

All of the test work was based on samples that were defined and collected at the site by the Owner. Eight sample composites, selected in an attempt to represent the mineralogical and spatial variability of the deposit, were comprised of the minus 10 mesh assay rejects from reverse circulation drill hole cuttings. Another 12 samples were taken from existing underground workings for use in column testing at METCON, as well as for bottle roll agitation leach tests. Sixteen other underground samples were obtained in support of the acid consumption test work performed at RDi.

### 16.2.2 METCON

METCON conducted the majority of the leaching test program. The main components of their test program included:

- Sample receiving, logging and characterization
- Preliminary and repeat agitation leach tests
- Preliminary and optimization static leach tests
- Open cycle 76 mm diameter column leach tests

- Locked cycle 76 mm diameter column leach tests
- Open cycle 76 mm diameter column leach tests on prepared high acid consuming samples
- A check on the effect of acid cure dosage on overall acid consumption
- A check on the effect of crush size on overall metal extraction rate and acid consumption

Most of the column tests had about 100 days or more of irrigation. The main conclusions are:

- The samples from the Terrazas Project are amenable to sulfuric acid leaching of copper and zinc by a heap leach technique.
- These materials are characterized by high sulfuric acid consumption.
- The total copper grade in these samples ranged from 0.15 to 1.23 percent. On average, the acid soluble portion of this copper is approximately 85 percent.
- The total zinc grade in these samples ranged from 0.12 to 4.09 percent. The acid soluble portion of the total contained zinc also averaged 85 percent.

There may be an advantage to leaching at coarser crush sizes to reduce acid consumption and to aid percolation.

### 16.2.3 Resource Development Inc.

RD*i* conducted four test programs on Terrazas samples to generate reports for this study:

1. A determination of acid consumption versus particle size.
2. An examination of the relationship between actual and ultimate acid consumption.
3. A demonstration of the principle of zinc recovery from solution by sulfidization.
4. A determination of attainable leach solution copper and zinc tenors, as well as an investigation of the build-up of iron.

The major conclusions from these tests are:

- The acid consumption increased as the particle size became finer, ranging from 31.9 kg/t for plus 1.5-inch material to 378 kg/t for minus 150-mesh material.
- Coarser fractions demonstrated size degradation.
- The actual consumptions were 20 percent to 38 percent of the ultimate acid consumption. RD*i* developed a regression equation to relate actual and ultimate acid consumption.
- Sulfidization by either NaHS or H<sub>2</sub>S does work in acid solutions to produce a synthetic concentrate of zinc sulfide.



- In the sequential leach tests, the zinc tenor reached about 76 g/L, and the copper tenor reached about 27 g/L.
- Iron concentrations in solution stayed fairly low, at less than 2.5 g/L.

Copper, zinc and iron extractions tended to decrease when the total dissolved solids (TDS) increased to over 200 g/L in the leachate.

#### 16.2.4 Hazen Research, Inc.

Hazen conducted three test programs for the 2002 study:

1. Purification of zinc feed solution by neutralization with limestone, filtration, and precipitation of remaining impurities by cementation with zinc dust.
2. Shake-out tests with DEHPA on purified zinc solution to generate McCabe-Thiele diagrams, which provided an outline of the zinc solvent extraction circuit configuration.
3. Reduction of ferric iron to ferrous iron, as well as copper removal, by zinc dust addition alone, followed by solvent extraction of zinc from this purified, reduced solution with Cyanex 302.

The major conclusions were:

- Limestone effectively removes most of the iron, aluminum and silicon from solution at pH 4.5 to 5.5. Copper is effectively removed at final pH over 5.
- Zinc precipitation can effectively remove copper, but at three to six times the stoichiometric ratio. Acid consumes some of this zinc.
- Cadmium and cobalt did not precipitate with this procedure. Antimony or another precipitant may be more effective for these metals.
- A zinc solvent extraction plant based on DEHPA can work with a single stage of extraction and a single stage of stripping. Scrub and wash stages are recommended to prevent calcium migration to the electrolyte.

Ferric iron can be effectively reduced to ferrous by rapid addition of zinc dust. Copper does not begin to precipitate until the iron reduction is complete. Hydrogen evolution (from acid consumption of zinc) is a strong competing reaction.

#### 16.2.5 Electrowinning International Inc.

EWII conducted six bench scale scoping tests of copper and zinc recovery by EMEW<sup>®</sup> cells on two different solutions, examining both copper and zinc production. The first solution

was a copper raffinate from METCON static leach tests, and the second was a purified zinc SX feed solution that was prepared by Hazen.

EWII was successful in recovering copper from raffinate, and in recovering zinc from purified zinc electrolyte. However, electrowinning of zinc from unpurified zinc electrolyte was not successful due to the high levels of impurities, particularly ferric iron.

Additional tests were conducted to demonstrate the impact of reduced iron and other impurities. These tests used copper raffinate from METCON, “spiked” with zinc, and zinc powder reduced to convert all ferric to ferrous. All runs were successful in recovering zinc metal, with grades as high as 99.65 percent zinc.

### 16.3 Current Testing Program

The current testing program is based at METCON Research, and is centered on the development of heap leach parameters for the Terrazas ore. The high acid consumption of this material remains a focus of attention. The particle size distribution of the ore feed to leach is an emerging area of interest as well. Recent results indicate that partial or complete removal of fines will improve heap leach reliability.

Bottle roll tests, open cycle column leaches and other procedures have been completed to characterize leaching behavior for three bulk samples taken from the railroad tunnel in the main pit area.

Current open cycle column tests are being conducted on four blends of these bulk samples with two new bulk samples taken from high grade zones. This corresponds with the anticipated practice of blending main pit and Cerro Verde ores, to maintain a relatively uniform acid consumption characteristic for leach pad ore feed. The columns now being readied for test are to investigate the leaching behavior of these four blends with respect to fines content, lixiviant strength and column depth.

In upcoming work, a series of agitation leach tests will define the extraction behavior of the minus 6-mesh (3.36 mm) fines material. Following the current series of columns, a group of closed-cycle column leach tests will investigate the impurities build-up in the leachate and raffinate. The test program will culminate with a pilot plant to demonstrate leaching, purification and zinc solvent extraction operations.

## 17 Mineral Resources and Mineral Reserves Estimates

### 17.1 Mineral Resources

Table 17-1 shows the mineral resource of the Terrazas Project by resource class. Measured and indicated resources are 85.6 million tonnes at 1.240% total zinc and 0.322% total copper. Acid soluble zinc and copper grades are estimated at 1.044% and 0.244% respectively. Inferred resources, amounting to 5.0 million tonnes at 3.541% total zinc and 0.357% total copper are also shown on the table.

| Resource Class/Zone                        | Ore<br>Ktonnes | Net of<br>Process<br>(US\$/t) | Total<br>Zinc<br>(%) | Soluble<br>Zinc<br>(%) | Total<br>Copper<br>(%) | Soluble<br>Copper<br>(%) |
|--|----------------|-------------------------------|----------------------|------------------------|------------------------|--------------------------|
| <b>Measured Mineral Resource</b>           |                |                               |                      |                        |                        |                          |
| Main Zone                                  | 29,610         | 5.56                          | 0.524                | 0.408                  | 0.358                  | 0.277                    |
| Cerro Verde                                | 3,765          | 22.06                         | 3.082                | 2.741                  | 0.288                  | 0.223                    |
| <b>Total Measured Mineral Resource</b>     | <b>33,375</b>  | <b>7.42</b>                   | <b>0.813</b>         | <b>0.671</b>           | <b>0.350</b>           | <b>0.271</b>             |
| <b>Indicated Mineral Resource</b>          |                |                               |                      |                        |                        |                          |
| Main Zone                                  | 31,346         | 5.35                          | 0.558                | 0.437                  | 0.323                  | 0.243                    |
| Cerro Verde                                | 20,872         | 19.69                         | 2.948                | 2.552                  | 0.277                  | 0.201                    |
| <b>Total Indicated Mineral Resource</b>    | <b>52,218</b>  | <b>11.08</b>                  | <b>1.513</b>         | <b>1.282</b>           | <b>0.305</b>           | <b>0.226</b>             |
| <b>Measured/Indicated Mineral Resource</b> |                |                               |                      |                        |                        |                          |
| Main Zone                                  | 60,956         | 5.45                          | 0.541                | 0.423                  | 0.340                  | 0.260                    |
| Cerro Verde                                | 24,637         | 20.05                         | 2.968                | 2.581                  | 0.279                  | 0.204                    |
| <b>Total M+I Mineral Resource</b>          | <b>85,593</b>  | <b>9.65</b>                   | <b>1.240</b>         | <b>1.044</b>           | <b>0.322</b>           | <b>0.244</b>             |
| <b>Inferred Mineral Resource</b>           |                |                               |                      |                        |                        |                          |
| Main Zone                                  | 1,567          | 3.33                          | 0.270                | 0.200                  | 0.347                  | 0.277                    |
| Cerro Verde                                | 3,480          | 29.11                         | 5.014                | 3.660                  | 0.361                  | 0.199                    |
| <b>Total Inferred Mineral Resource</b>     | <b>5,047</b>   | <b>21.11</b>                  | <b>3.541</b>         | <b>2.586</b>           | <b>0.357</b>           | <b>0.223</b>             |

Net of Process Value represents gross ore value per tonne less process, acid, G&A, and royalty costs.

To comply with the stipulation of NI 43-101 that stated resources have “reasonable prospect for economic extraction” the above resources are contained within a floating cone geometry. This gives resources contained in a potential open pit mining geometry. Table 17-2 shows the price and economic parameters used for the floating cone evaluation.

The crushing, leaching, G&A, and refining costs were provided to IMC by Constellation personnel. They are based on the 2002 Prefeasibility Study results escalated to 4<sup>th</sup> quarter 2005 costs. The recovery estimates were also provided by Constellation. The mining cost is also based on the 2002 study, escalated by IMC to 4<sup>th</sup> quarter 2005 costs. The commodity prices, including acid, were provided by Constellation.

| <b>Table 17-2: Economic Parameters for Floating Cone Evaluations (US\$)</b> |         |
|---|---------|
| Mining Cost Per Total Tonne   | \$0.80  |
| Crushing Cost Per Ore Tonne   | \$0.25  |
| Leaching Cost Per Ore Tonne   | \$0.50  |
| G&A Cost Per Ore Tonne  | \$0.50  |
| Copper SXEW/Marketing Per Pound   | \$0.15  |
| Zinc SXEW/Marketing Per Pound   | \$0.22  |
| Copper Recovery (100% of Soluble Copper, Maximum of 95% of Total Copper)    |         |
| Zinc Recovery (100% of Soluble Zinc, Maximum of 95% of Total Zinc)          |         |
| Royalty (% of Gross Revenue)  | 1.5%    |
| Acid Price Per Kg   | \$0.040 |
| Copper Price (Base Case) Per Pound  | \$1.20  |
| Zinc Price (Base Case) Per Pound  | \$0.60  |
| Net of Process Breakeven Cutoff (Mining Cost)                               | \$0.80  |
| Net of Process Internal Cutoff  | \$0.01  |

A “Net of Process” value was calculated for each block in the model to simplify economic calculations since the value of each mining block is dependent on the soluble copper grade, the soluble zinc grade, and the net acid consumption. This value is the value per tonne of ore net of all processing and G&A costs (and also the royalty). An example of this calculation for a block with an acid soluble copper grade of 0.274%, a zinc soluble grade of 0.413%, and a net acid consumption of 50.0 kg per tonne is as follows:

|                          |                                     |                |
|--------------------------|-------------------------------------|----------------|
| Copper Revenue           | $\$1.20 \times 0.274 \times 22.046$ | \$7.249        |
| +Zinc Revenue            | $\$0.60 \times 0.413 \times 22.046$ | \$5.463        |
| -Copper SXEW/Marketing   | $\$0.15 \times 0.274 \times 22.046$ | \$0.906        |
| -Zinc SXEW/Marketing     | $\$0.22 \times 0.413 \times 22.046$ | \$2.003        |
| -Royalty                 | $0.015 \times (7.249 + 5.463)$      | \$0.191        |
| -Acid Consumption        | $0.040 \times 50.0$                 | \$2.000        |
| -Crushing, Leaching, G&A | $0.25 + 0.50 + 0.50$                | <u>\$1.250</u> |
| Net of Processing/tonne  |                                     | \$6.362        |

Measured, indicated, and inferred skarn resources were allowed to contribute to the economics for the floating cone. The non-skarn resources (all inferred) were not allowed to contribute to the cone economics. However, the non-skarn resource contained in the floating

cone geometry is included on Table 17-1. The skarn versus non-skarn inferred resources are about 3.5 million and 1.5 million tonnes respectively.

The slope angle used for the floating cone was 50°. This is based on a 55° interramp angle with allowance for haul roads.

The block net acid consumption was estimated at 33% of the block kriged values based on the assay data. This estimate was provided to IMC by Constellation. The acid consumption values in the model are based on measurements on pulverized sample; actual heap leaching results are expected to be considerably less. Column testing in progress will better define this parameter.

The resources on Table 17-1 are tabulated at a net of process cutoff grade of \$0.01, i.e. internal cutoff grade. The block only has to pay for processing, G&A and royalties. This assumes mining is a sunk cost for blocks that have to be mined.

Figure 17-1 shows the floating cone geometry used for the mineral resource tabulation.

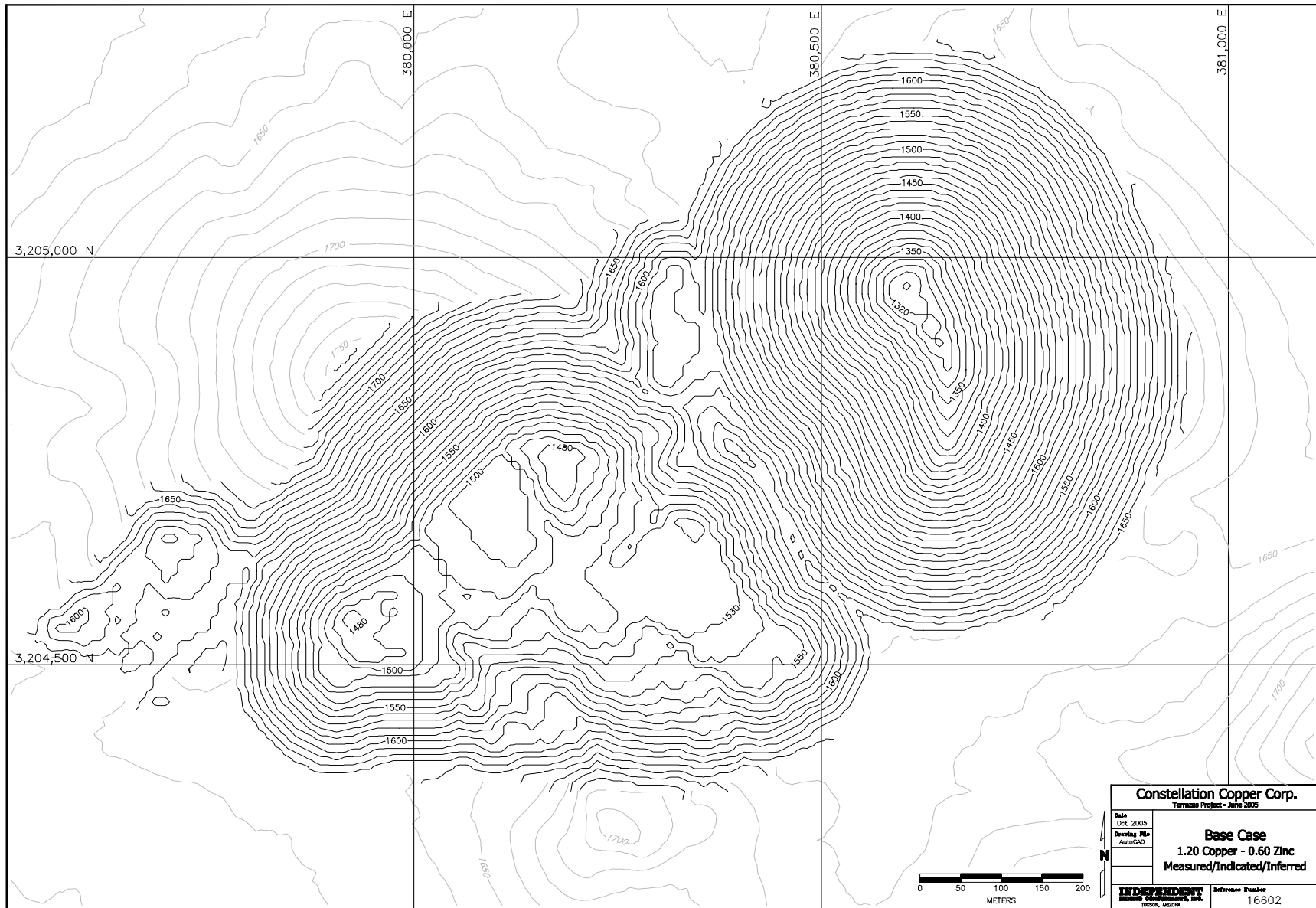


Figure 17-1. Floating Cone for Mineral Resource

## 17.2 Mineral Reserve

It is not the intent of this Technical Report to report an updated mineral reserve for the Terrazas Project. It is necessary to complete the Feasibility Study that is currently in progress before an updated mineral reserve can be determined.

The most current mineral reserve is based on the 2002 Prefeasibility Study and is:

**Table 17-3**  
**Mineral Reserve Based on 2002 Prefeasibility Study**

| <u>Classification</u> | <u>Tonnes(000's)</u> | <u>Cu (Tot)%</u> | <u>Zn(Tot)%</u> |
|-----------------------|----------------------|------------------|-----------------|
| Proven                | 27,500               | 0.37             | 0.53            |
| Probable              | 25,500               | 0.33             | 0.64            |
| Total Proven+Probable | 52,500               | 0.35             | 0.58            |

This mineral reserve, however, does not include the new, high zinc, Cerro Verde area.

## 17.3 Description of the Block Model

The mineral resource stated in Section 17.1 of this report is based on an ore resource block model developed by IMC during July and August 2005. The key points of the model are summarized as follows:

1. The model is based on regular blocks of size 10m by 10m by 5m high. The model is not rotated.
2. A geologic interpretation of the skarn, marble, monzonite, and rhyolite rock types was done and incorporated into the model. Constellation personnel did the rock type interpretation on cross sections. IMC reconciled the sections into an interpretation on level maps that was digitized and used to assign model blocks.
3. Three faults were also interpreted and put in the model. The most important is the Cerro Verde Fault that separates the Cerro Verde and Main Zone orebodies. The Bronze Fault separates the Main Zone orebody into east and west portions, but does not appear to be very significant from grade modeling perspective.
4. Block grade estimations were based on regular 5m bench composites. Assays were length weighted for each composite. Lithology was first assigned based on the majority rock type in each composite. Lithology and fault zone codes

were reviewed against model rock types and final values were set to be consistent with the model interpretation.

5. Main Zone skarn copper composites were capped at 3.0% copper. This affected seven composites of 4.55%, 4.39%, 4.02%, 3.88%, 3.82%, 3.47%, and 3.32%. Main Zone skarn zinc composites were capped at 8.5%, affecting two composites of 20.0% and 10.3%. Main Zone non-skarn zinc composites were capped at 2.5% zinc, affecting two composites of 8.44% and 6.25%.
6. Cerro Verde skarn copper composites were capped at 2.5% copper, affecting one composite of 4.88% copper. Cerro Verde skarn zinc composites were capped at 20.0%, affecting one composite of 30.17%. IMC capped composites, instead of assays because there were considerable differences in sample intervals for the various drilling campaigns.
7. Rock type boundaries were respected for all grade estimations. Skarn blocks were only estimated with skarn composites, marble blocks were only estimated with marble composites, etc. The Cerro Verde Fault was also a hard boundary for grade estimation purposes.
8. Additional grade zones were established in the skarn by indicator kriging to segregate blocks into higher and lower grade populations. For Main Zone and Cerro Verde total copper a discriminator of 0.1% copper was used. Composites above 0.1% copper were assigned a value of 1 and composites below 0.1% were assigned a value of 0. The ones and zeros were kriged to obtain a value between 0 and 1 for each block that may be interpreted as the probability that the block is above 0.1% copper. Blocks with a probability of 0.5 or more were assigned to a higher-grade population and blocks below 0.5 to the lower-grade population. Composites were also assigned a high-grade/low-grade population code based on the code of the block in which they were located. The grade boundaries were also hard boundaries for grade estimation. A discriminator of 0.1% zinc was also used for the Main Zone to establish a zinc grade boundary. For Cerro Verde zinc, discriminators of 0.15% zinc and 3.0% zinc were used to develop a low-grade, medium-grade, and high-grade zinc grade zone.
9. Variograms were developed for total copper and total zinc in Main Zone and Cerro Verde and block grades were estimated by ordinary kriging. Table 17-4 shows all the estimation parameters. Note for all non-skarn rock types a search radius of 50m by 50m by 15m vertical was used. This was to limit grade extrapolation in these sparsely drilled areas outside the skarn.
10. To estimate the acid soluble copper and zinc grades the ratio of soluble to total copper (and zinc) were calculated for each composite and used to kriging ratios for the blocks. Estimation parameters were the same as used for total copper and zinc. The block ratios were then multiplied by the total copper (zinc) to



calculate the block soluble values. This approach was necessary because soluble copper and zinc assays were not done for assay intervals with total copper and zinc less than 0.1%.

11. Block acid consumption values were also estimated by ordinary kriging. Rock type boundaries were respected, but the grade boundaries were not since acid consumption is related more to gangue mineralogy than metal grades. A review by IMC showed poor correlation between acid consumption and metal grades. Blocks with missing acid consumption values due to sparse data were set to the mean value of the composites on a rock type basis.
12. A resource classification code (measured, indicated, and inferred resources) was also assigned to the model by IMC. Section 17.5 provides the details of this assignment. All non-skarn blocks with grade estimates were assigned as inferred resource; they were not allowed to be measured or indicated resource.
13. Block bulk densities were also assigned to the model based on rock type, zone (Main Zone versus Cerro Verde), and also based on grade. More details on the specific gravity data and bulk density assignments are in Section 17.4.

**Table 17-4. Block Grade Estimation Parameters**

| Item | Area | Assay    | Rock Type | Description                                 | Theta (deg) | Phi (deg) | Psi (deg) | R1 (m) | R2 (m) | R3 (m) | Spherical Variogram Parameters |        |        | S1 (m) | S2 (m) | S3 (m) | Min. Comps | Max. Comps | Max Per Hole |
|------|------|----------|-----------|---|-------------|-----------|-----------|--------|--------|--------|--------------------------------|--------|--------|--------|--------|--------|------------|------------|--------------|
|      |      |          |           |   |             |           |           |        |        |        | Nugget                         | C      | Sill   |        |        |        |            |            |              |
| 1    | CV   | Tot Zn   | Skarn     | 0.15% and 3.0% Discriminator                | 225         | -22.5     | 67        | 150    | 112    | 38     | 0.085                          | 0.142  | 0.227  | 150    | 112    | 38     | 1          | 15         | n.a.         |
| 2    | CV   | Tot Zn   | Skarn     | Total Zinc Grade, Also aszn/tzn ratio       | 225         | -22.5     | 67        | 88     | 66     | 25     | 4.25                           | 3.77   |        | 150    | 112    | 38     | 1          | 15         | n.a.         |
|      |      |          |           |   |             |           |           | 200    | 150    | 50     |                                | 3.68   | 11.7   |        |        |        |            |            |              |
| 3    | CV   | Tot Zn   | Non-skarn | Total Zinc, Also aszn/tzn ratio             | 0           | 0         | 0         | 88     | 88     | 25     | 4.25                           | 3.77   |        | 50     | 50     | 15     | 1          | 15         | n.a.         |
|      |      |          |           |   |             |           |           | 200    | 200    | 50     |                                | 3.68   | 11.7   |        |        |        |            |            |              |
| 4    | CV   | Tot Cu   | Skarn     | 0.1% Discriminator                          | 225         | -22.5     | 67        | 90     | 90     | 35     | 0.06                           | 0.161  | 0.221  | 125    | 125    | 40     | 1          | 15         | n.a.         |
| 5    | CV   | Tot Cu   | Skarn     | Total Copper Grade, Also ascu/tcu ratio     | 225         | -22.5     | 67        | 75     | 75     | 25     | 0.0463                         | 0.0463 | 0.0926 | 125    | 125    | 40     | 1          | 15         | n.a.         |
| 6    | CV   | Tot Cu   | Non-skarn | Total Coper, Also ascu/tcu ratio            | 0           | 0         | 0         | 75     | 75     | 25     | 0.0463                         | 0.0463 | 0.0926 | 50     | 50     | 15     | 1          | 15         | n.a.         |
| 7    | CV   | Acid Con | Skarn     | Skarn acid consumption (kg/t)               | 0           | -67.5     | 0         | 150    | 60     | 60     | 0                              | 30,600 | 30,600 | 150    | 60     | 40     | 1          | 15         | n.a.         |
| 8    | CV   | Acid Con | Non-skarn | Non-skarn acid consumption (kg/t)           | 0           | 0         | 0         | 150    | 60     | 60     | 0                              | 30,600 | 30,600 | 50     | 50     | 15     | 1          | 15         | n.a.         |
| 9    | CV   | Tot Zn   | Skarn     | Special kriging for resource classification | 225         | -22.5     | 67        | 88     | 66     | 25     | 0.25                           | 0.375  |        | 134    | 100    | 34     | 1          | 15         | 1            |
|      |      |          |           |   |             |           |           | 200    | 150    | 50     |                                | 0.375  | 1.000  |        |        |        |            |            |              |
| 10   | MZ   | Tot Zn   | Skarn     | 0.1% Discriminator                          | -67.5       | -22.5     | 0         | 150    | 200    | 75     | 0.117                          | 0.117  | 0.234  | 158    | 122    | 25     | 1          | 15         | n.a.         |
| 11   | MZ   | Tot Zn   | Skarn     | Total Zinc Grade, Also aszn/tzn ratio       | -67.5       | -22.5     | 0         | 130    | 100    | 50     | 0.270                          | 0.383  | 0.653  | 158    | 122    | 25     | 1          | 15         | n.a.         |
| 12   | MZ   | Tot Zn   | Non-skarn | Total Zinc, Also aszn/tzn ratio             | 0           | 0         | 0         | 130    | 130    | 50     | 0.270                          | 0.383  | 0.653  | 50     | 50     | 15     | 1          | 15         | n.a.         |
| 13   | MZ   | Tot Cu   | Skarn     | 0.1% Discriminator                          | -67.5       | -22.5     | 0         | 200    | 160    | 75     | 0.10                           | 0.13   | 0.23   | 175    | 110    | 25     | 1          | 15         | n.a.         |
| 14   | MZ   | Tot Cu   | Skarn     | Total Copper Grade, Also ascu/tcu ratio     | -67.5       | -22.5     | 0         | 175    | 110    | 50     | 0.0400                         | 0.0246 | 0.0646 | 175    | 110    | 25     | 1          | 15         | n.a.         |
| 15   | MZ   | Tot Cu   | Non-skarn | Total Coper, Also ascu/tcu ratio            | 0           | 0         | 0         | 175    | 175    | 50     | 0.0400                         | 0.0246 | 0.0646 | 50     | 50     | 15     | 1          | 15         | n.a.         |
| 16   | MZ   | Acid Con | Skarn     | Skarn acid consumption (kg/t)               | 45          | -22.5     | 0         | 175    | 120    | 90     | 6,500                          | 8,100  | 14,600 | 175    | 120    | 25     | 1          | 15         | n.a.         |
| 17   | MZ   | Acid Con | Non-skarn | Non-skarn acid consumption (kg/t)           | 0           | 0         | 0         | 175    | 120    | 90     | 6,500                          | 8,100  | 14,600 | 50     | 50     | 15     | 1          | 15         | n.a.         |
| 18   | MZ   | Tot Cu   | Skarn     | Special kriging for resource classification | -67.5       | -22.5     | 0         | 175    | 110    | 50     | 0.25                           | 0.75   | 1.00   | 117    | 74     | 17     | 1          | 15         | 1            |

Description of Parameters:

- theta            Rotation of Y (north) axis clockwise to principal direction in horizontal plane.
  - phi              Dip of principal axis, negative is down
  - psi              Rotation around principal axis, clockwise is negative (from perspective of looking down axis back toward origin).
  - R1,R2,R3      Variogram ranges in primary, secondary, and tertiary directions respectively. Additional lines are for nested variogram models.
  - S1,S2,S3      Search radii in primary, secondary, and tertiary directions respectively.
- Spherical Variogram Parameter units are assay units squared, i.e. (%)\*2, (kg/t)\*2, discriminators for indicator kriging are dimensionless.

## 17.4 Specific Gravity Determinations

Three sets of specific gravity measurements were available for this study.

As part of their 2000 study, Summo selected 16 samples from available Newcoast core and sent them to Resource Development Inc.'s (RDI) laboratory in Wheat Ridge Colorado. The 16 samples by rock type included two intrusive rocks (monzonite), one limestone, one marble, one hornfel, and 11 garnet skarns (three relatively unmineralized and eight mineralized). Seventeen measurements were actually done since one sample was large enough to make two sub-samples. The tests were by standard water immersion. The tests were first run on un-waxed samples, and then the samples were coated in wax and the tests done again. IMC received the raw data for these tests and they appear to have been correctly done, including adjusting for the wax as a tare for the waxed samples. Samples were oven dried before testing. The tests were done in November 2000.

At the request of IMC, Constellation pulled 24 core samples from their recent core drilling to be used for unconfined uniaxial compressive strength testing. Twenty three of the samples survived shipping and were sent to Call & Nicholas, Inc.'s (CNI) lab in Tucson. The cylinders prepared for the testing were carefully measured for diameter and length by micrometer and also weighed, so a weight and volume, and resultant specific gravity could be calculated from this data. The samples were not oven dried, but moisture content was very low. By rock type this data represented five limestone/marble samples, six rhyolite samples, six mineralized skarn samples and six unmineralized skarn samples. These tests were completed in May 2005.

During May 2005, IMC specified 146 samples by hole id and depth to be pulled from Constellation 2004 and 2005 core for additional specific gravity measurements. By rock type these were 13 rhyolite samples, 11 monzonite samples, 24 limestone/marble samples, and 98 garnet skarn samples. On a rock type basis IMC calculated an approximate sampling interval to evenly distribute the samples through the available core. The target of about a dozen rhyolite and monzonite samples was based on these rock types are generally unmineralized and represent only a modest amount of total expected pit tonnage. Twenty four limestone/marble samples was because this rock type represents a much larger tonnage and also represents rocks in various states of alteration. The garnet skarn was considered to be quite variable with respect to specific gravity so a considerably larger sample base was specified. This also gives enough samples to look for any sub-populations of the skarn that might be present.

Constellation personnel augmented IMC's list so the number of samples pulled amounted to 174 samples. By rock types the actual samples delivered to the lab were 10 rhyolite samples, 12 monzonite samples, 24 limestone/marble samples, and 128 garnet skarn samples. In particular, since recent core holes were mostly in the Cerro Verde area, Constellation personnel pulled additional samples to provide more coverage in the main zone.

The samples were sent to Metcon lab in Tucson, Arizona. Tests were done by standard water immersion of waxed samples. The raw measurement data was provided to IMC for processing. The tests were completed in July 2005.

Table 17-5 summarizes the results by rock type for the accepted measurements. The table also shows bulk density values used for resource calculation. In particular, note that skarn densities were reduced 3% to adjust for voids in the rock mass. This value is an estimate by IMC based on observing the rock mass in underground openings at the site.

| <b>Table 17-5: Summary of Specific Gravity Data and Block Bulk Density Parameters</b> |                   |       |           |                        |              |               |
|---|-------------------|-------|-----------|------------------------|--------------|---------------|
| Population Description  | Sample Statistics |       |           | Block Model Parameters |              |               |
|   | No. of Samples    | Mean  | Std. Dev. | Bulk Factor            | Bulk Density | Ktonnes/Block |
| High Density Limestone/Marble   | 21                | 2.696 | 0.008     | 1.00                   | 2.70         | 1.348         |
| Low Density Limestone/Marble  | 9                 | 2.606 | 0.031     | 1.00                   | 2.61         | 1.303         |
| Rhyolite  | 15                | 2.506 | 0.087     | 1.00                   | 2.51         | 1.253         |
| Monzonite   | 13                | 2.496 | 0.115     | 1.00                   | 2.50         | 1.248         |
| Mineralized Skarn (> 0.12% copper)  |                   |       |           |                        |              |               |
| Cerro Verde Mineralized Skarn   | 38                | 2.787 | 0.285     | 0.97                   | 2.70         | 1.350         |
| Main Zone Mineralized Skarn   | 46                | 2.932 | 0.321     | 0.97                   | 2.84         | 1.422         |
| Unmineralized Skarn (<= 0.12% copper)   |                   |       |           |                        |              |               |
| Cerro Verde Unmineralized Skarn   | 31                | 2.990 | 0.265     | 0.97                   | 2.90         | 1.450         |
| Main Zone Unmineralized Skarn   | 35                | 3.093 | 0.300     | 0.97                   | 3.00         | 1.500         |

Note: Ktonnes Per Block is Based on 10m x 10m x 5m high blocks

## 17.5 Resource Classification

The resource classification was done as follows for the Terrazas Project. A special grade kriging was done, specifically for the purpose of resource classification. Note that the grades from this kriging were not used, but the number of samples and kriging standard deviation from it were used for the resource classification. A zinc grade kriging was used for resource classification in Cerro Verde and a copper grade kriging in Main Zone.

1. The special krigings (total zinc in Cerro Verde and copper in Main Zone) were done as follows. The maximum search radii for the kriging were set to 67% (2/3rds) of the variogram range. The variogram model was also normalized to a sill value of 1.0 and a nugget of 0.25. A maximum of one composite per drill hole was allowed in the kriging and population boundaries were ignored. This procedure basically counts the number of holes within 2/3 of the variogram range and also calculates a kriging standard deviation with this data. These values (number of holes and kriging standard deviation) are stored in the model.
2. Probability plots of block kriging standard deviations by number of holes are plotted. See Figure 17-1 for Cerro Verde.

3. First, all blocks with kriged grades are set to a default of inferred resource. Note that for blocks with the closest hole more than  $2/3^{\text{rd}}$  of the variogram range that is their final classification. They will not be examined in the special kriging.
4. The plots of kriging standard deviations indicate that blocks estimated with four or more holes generally have standard deviations less than 1.0. Blocks kriged with four or more holes within  $2/3^{\text{rds}}$  of the variogram range are classified as indicated resource.
5. Blocks kriged with three holes and with a kriging standard deviation less than 1.0 are classified as indicated resource. This is about 83% of the blocks kriged with three holes. Blocks kriged with two holes and with a kriging standard deviation less than 0.9 are also classified as indicated resource. This is about 40% of the blocks kriged with only two holes. Blocks kriged with one hole and with a kriging standard deviation less than 0.7 (1.2% of these blocks) are also classified as indicated resource.
6. Blocks with a kriging standard deviation less than 0.5 are then re-classified as measured resource. Note from the graph that one hole cannot develop measured resource and blocks kriged with two and three holes will develop only minimal quantities of measured resource.

Visually the described method appears to give good results. Indicated resources are not extrapolated far outside of the drilling data and measured resources are developed only in well-drilled areas. Blocks kriged with one and two holes can generate indicated resources only very close to the holes.

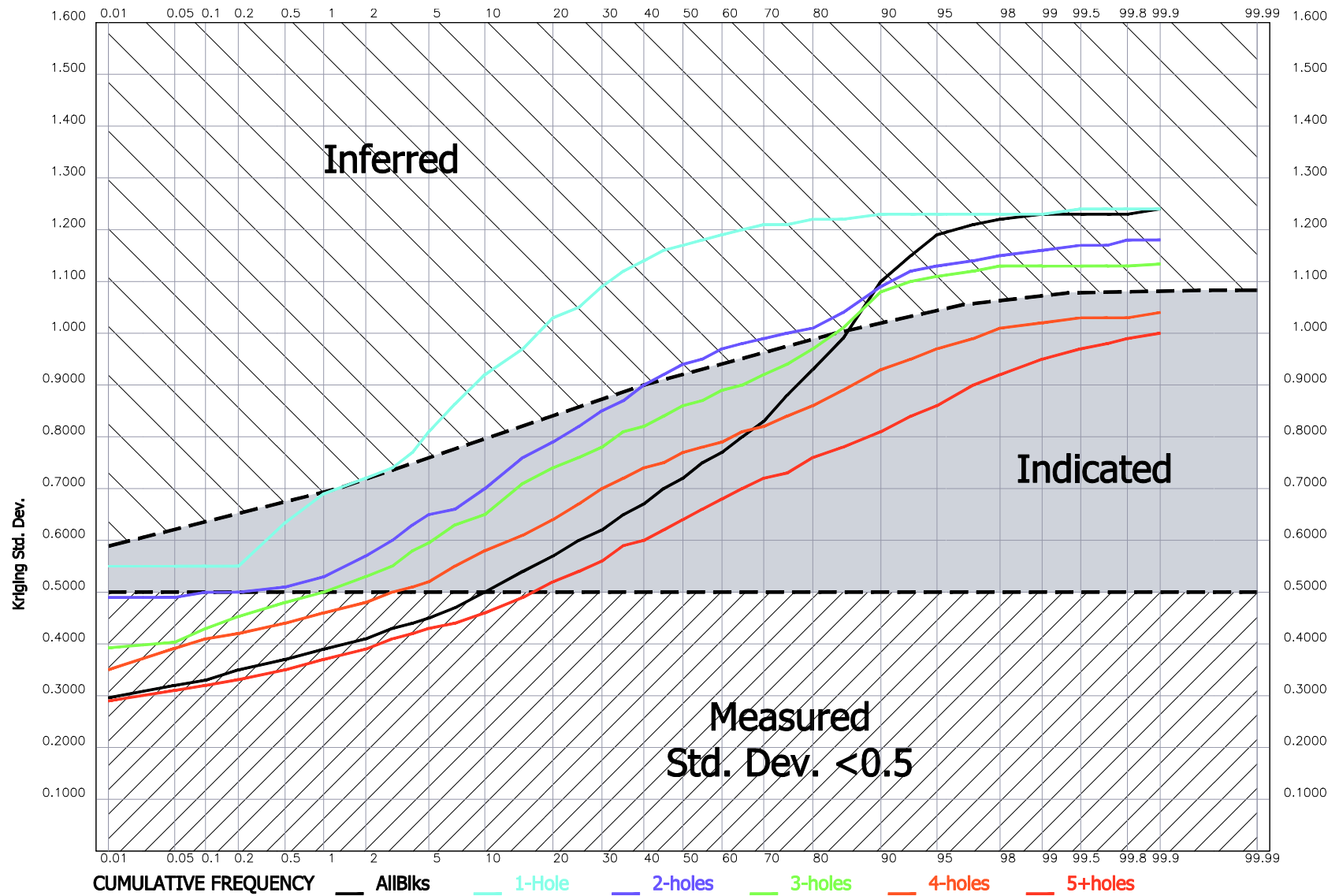


Figure 17-2: Probability Plot of Kriging Standard Deviation by No. of Holes, Showing Resource Classification for Cerro Verde.

## 17.6 Sensitivity Analysis of Resource

Several floating cones were run to test the sensitivity of the resources to the economic parameters shown on Table 17-2. Table 17-6a shows results for floating cones that were done with measured, indicated, and inferred skarn resources allowed to contribute to the cone economics. Case 1 on this table is the basis of the mineral resource statement shown on Table 17-1. Table 17-6b shows percent changes for each cone from the base case. It can be seen that the resource tonnes are not very sensitive to zinc price, slope angles, mining costs, processing costs, SXEW costs, or acid costs. Main Zone resources are, however, somewhat sensitive to copper price.

Tables 17-7a and 17-7b show results for floating cones that were done with only measured, and indicated resources allowed to contribute to the cone economics. The base case cone on Table 17-7a would be a likely geometry to use for mine design for eventual determination of measured and indicated mineral reserves. It can be seen that this geometry contains 84.4 million ore tonnes at 0.324% copper and 1.237% zinc. Total material in the cone geometry is 198.0 million tonnes.

Again, it can be seen that about the only parameter the floating cone ore tonnage and grade results are sensitive to is copper price in the Main Zone. Note that the sensitivity analysis does not include process recoveries. The sensitivity to metal recovery would be about the same as the sensitivity to commodity prices.

**Table 17-6a: Floating Cone Sensitivity Analysis - Measured, Indicated, and Inferred Resource**

| Case | Description                  | Main Zone   |                         |                  |                |               | Cerro Verde |                         |                  |                |               | Total - Main Zone and Cerro Verde |                         |                  |                |               | Contained Copper (tonnes) | Contained Zinc (tonnes) | Total Strip Ratio |
|------|------------------------------|-------------|-------------------------|------------------|----------------|---------------|-------------|-------------------------|------------------|----------------|---------------|-----------------------------------|-------------------------|------------------|----------------|---------------|---------------------------|-------------------------|-------------------|
|      |                              | Ore Ktonnes | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes | Ore Ktonnes | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes | Ore Ktonnes                       | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes |                           |                         |                   |
| 1    | Base Case                    | 62,523      | 5.40                    | 0.340            | 0.534          | 114,502       | 28,117      | 21.17                   | 0.289            | 3.222          | 124,662       | 90,640                            | 10.29                   | 0.324            | 1.368          | 239,164       | 293,836                   | 1,239,803               | 1.64              |
| 2    | Cu and Zn Prices +10%        | 70,828      | 6.03                    | 0.335            | 0.488          | 125,460       | 29,774      | 23.97                   | 0.282            | 3.090          | 128,185       | 100,602                           | 11.34                   | 0.319            | 1.258          | 253,645       | 321,236                   | 1,265,657               | 1.52              |
| 3    | Cu and Zn Prices -10%        | 54,504      | 4.68                    | 0.352            | 0.574          | 104,108       | 26,507      | 18.08                   | 0.297            | 3.356          | 121,234       | 81,011                            | 9.06                    | 0.334            | 1.484          | 225,342       | 270,580                   | 1,202,428               | 1.78              |
| 4    | Copper Price +10%            | 69,408      | 5.63                    | 0.337            | 0.491          | 122,912       | 28,750      | 21.25                   | 0.288            | 3.161          | 125,252       | 98,158                            | 10.21                   | 0.323            | 1.273          | 248,164       | 316,705                   | 1,249,581               | 1.53              |
| 5    | Copper Price -10%            | 56,559      | 5.13                    | 0.347            | 0.570          | 107,170       | 27,471      | 21.10                   | 0.292            | 3.285          | 123,861       | 84,030                            | 10.35                   | 0.329            | 1.458          | 231,031       | 276,475                   | 1,224,809               | 1.75              |
| 6    | Zinc Price +10%              | 64,225      | 5.82                    | 0.337            | 0.528          | 117,201       | 28,871      | 24.09                   | 0.285            | 3.160          | 125,688       | 93,096                            | 11.49                   | 0.321            | 1.344          | 242,889       | 298,721                   | 1,251,432               | 1.61              |
| 7    | Zinc Price -10%              | 60,401      | 4.97                    | 0.345            | 0.536          | 110,390       | 27,002      | 18.30                   | 0.295            | 3.303          | 121,445       | 87,403                            | 9.09                    | 0.330            | 1.391          | 231,835       | 288,039                   | 1,215,625               | 1.65              |
| 8    | Slope Angle +10% (55 Deg)    | 62,376      | 5.44                    | 0.340            | 0.538          | 107,648       | 28,410      | 21.09                   | 0.290            | 3.224          | 109,882       | 90,786                            | 10.34                   | 0.324            | 1.379          | 217,530       | 294,467                   | 1,251,521               | 1.40              |
| 9    | Slope Angle -10% (45 Deg)    | 64,830      | 5.26                    | 0.343            | 0.513          | 128,609       | 27,857      | 21.23                   | 0.289            | 3.217          | 141,785       | 92,687                            | 10.06                   | 0.327            | 1.326          | 270,394       | 302,874                   | 1,228,738               | 1.92              |
| 10   | Mining Cost +10% (0.88/t)    | 61,735      | 5.42                    | 0.341            | 0.535          | 111,455       | 28,063      | 21.18                   | 0.289            | 3.220          | 123,375       | 89,798                            | 10.35                   | 0.325            | 1.374          | 234,830       | 291,618                   | 1,233,911               | 1.62              |
| 11   | Mining Cost -10% (0.72/t)    | 64,493      | 5.31                    | 0.342            | 0.522          | 120,217       | 28,180      | 21.14                   | 0.289            | 3.218          | 125,017       | 92,673                            | 10.12                   | 0.326            | 1.342          | 245,234       | 302,006                   | 1,243,486               | 1.65              |
| 12   | Process/GA Cost +10% (1.375) | 61,020      | 5.38                    | 0.343            | 0.542          | 112,930       | 27,869      | 21.23                   | 0.291            | 3.247          | 124,661       | 88,889                            | 10.35                   | 0.327            | 1.390          | 237,591       | 290,397                   | 1,235,635               | 1.67              |
| 13   | Process/GA Cost -10% (1.125) | 64,171      | 5.40                    | 0.338            | 0.524          | 116,101       | 28,343      | 21.13                   | 0.288            | 3.200          | 124,717       | 92,514                            | 10.22                   | 0.323            | 1.344          | 240,818       | 298,526                   | 1,243,232               | 1.60              |
| 14   | Cu and Zn SXEW Costs +10%    | 61,337      | 5.20                    | 0.342            | 0.540          | 113,551       | 27,737      | 20.05                   | 0.291            | 3.255          | 124,084       | 89,074                            | 9.82                    | 0.326            | 1.385          | 237,635       | 290,487                   | 1,234,059               | 1.67              |
| 15   | Cu and Zn SXEW Costs -10%    | 63,914      | 5.59                    | 0.339            | 0.526          | 116,312       | 28,498      | 22.27                   | 0.287            | 3.190          | 125,141       | 92,412                            | 10.73                   | 0.323            | 1.348          | 241,453       | 298,458                   | 1,245,274               | 1.61              |
| 16   | Copper SXEW Cost +10%        | 61,718      | 5.36                    | 0.341            | 0.538          | 113,258       | 28,050      | 21.15                   | 0.289            | 3.229          | 124,662       | 89,768                            | 10.29                   | 0.325            | 1.379          | 237,920       | 291,523                   | 1,237,777               | 1.65              |
| 17   | Copper SXEW Cost -10%        | 63,240      | 5.43                    | 0.339            | 0.529          | 115,048       | 28,167      | 21.20                   | 0.289            | 3.217          | 124,680       | 91,407                            | 10.29                   | 0.324            | 1.357          | 239,728       | 295,786                   | 1,240,672               | 1.62              |
| 18   | Zinc SXEW Cost +10%          | 61,946      | 5.24                    | 0.341            | 0.536          | 113,876       | 27,801      | 20.08                   | 0.291            | 3.248          | 124,085       | 89,747                            | 9.84                    | 0.326            | 1.376          | 237,961       | 292,137                   | 1,235,007               | 1.65              |
| 19   | Zinc SXEW Cost -10%          | 63,029      | 5.56                    | 0.339            | 0.533          | 115,138       | 28,374      | 22.29                   | 0.288            | 3.199          | 124,706       | 91,403                            | 10.75                   | 0.323            | 1.361          | 239,844       | 295,385                   | 1,243,629               | 1.62              |
| 20   | Acid Cost +10% (0.044/kg)    | 59,363      | 5.39                    | 0.344            | 0.553          | 112,967       | 27,398      | 21.26                   | 0.293            | 3.288          | 123,864       | 86,761                            | 10.40                   | 0.328            | 1.417          | 236,831       | 284,485                   | 1,229,124               | 1.73              |
| 21   | Acid Cost -10% (0.036/kg)    | 66,028      | 5.40                    | 0.336            | 0.513          | 116,619       | 28,746      | 21.13                   | 0.286            | 3.162          | 124,542       | 94,774                            | 10.17                   | 0.321            | 1.316          | 241,161       | 304,068                   | 1,247,672               | 1.54              |

**Table 17-6b: Floating Cone Sensitivity Analysis - Measured, Indicated, and Inferred Resource - Percent Change From Base Case**

| Case | Description                  | Main Zone   |                         |                  |                |               | Cerro Verde |                         |                  |                |               | Total - Main Zone and Cerro Verde |                         |                  |                |               | Contained Copper (tonnes) | Contained Zinc (tonnes) | Total Strip Ratio |
|------|------------------------------|-------------|-------------------------|------------------|----------------|---------------|-------------|-------------------------|------------------|----------------|---------------|-----------------------------------|-------------------------|------------------|----------------|---------------|---------------------------|-------------------------|-------------------|
|      |                              | Ore Ktonnes | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes | Ore Ktonnes | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes | Ore Ktonnes                       | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes |                           |                         |                   |
| 1    | Base Case                    | ----        | ----                    | ----             | ----           | ----          | ----        | ----                    | ----             | ----           | ----          | ----                              | ----                    | ----             | ----           | ----          | ----                      | ----                    | ----              |
| 2    | Cu and Zn Prices +10%        | 13.3%       | 11.7%                   | -1.5%            | -8.6%          | 9.6%          | 5.9%        | 13.2%                   | -2.4%            | -4.1%          | 2.8%          | 11.0%                             | 10.2%                   | -1.5%            | -8.0%          | 6.1%          | 9.3%                      | 2.1%                    | -7.2%             |
| 3    | Cu and Zn Prices -10%        | -12.8%      | -13.3%                  | 3.5%             | 7.5%           | -9.1%         | -5.7%       | -14.6%                  | 2.8%             | 4.2%           | -2.7%         | -10.6%                            | -11.9%                  | 3.0%             | 8.5%           | -5.8%         | -7.9%                     | -3.0%                   | 8.7%              |
| 4    | Copper Price +10%            | 11.0%       | 4.3%                    | -0.9%            | -8.1%          | 7.3%          | 2.3%        | 0.4%                    | -0.3%            | -1.9%          | 0.5%          | 8.3%                              | -0.8%                   | -0.5%            | -6.9%          | 3.8%          | 7.8%                      | 0.8%                    | -6.7%             |
| 5    | Copper Price -10%            | -9.5%       | -5.0%                   | 2.1%             | 6.7%           | -6.4%         | -2.3%       | -0.3%                   | 1.0%             | 2.0%           | -0.6%         | -7.3%                             | 0.6%                    | 1.5%             | 6.6%           | -3.4%         | -5.9%                     | -1.2%                   | 6.8%              |
| 6    | Zinc Price +10%              | 2.7%        | 7.8%                    | -0.9%            | -1.1%          | 2.4%          | 2.7%        | 13.8%                   | -1.4%            | -1.9%          | 0.8%          | 2.7%                              | 11.6%                   | -1.0%            | -1.7%          | 1.6%          | 1.7%                      | 0.9%                    | -1.8%             |
| 7    | Zinc Price -10%              | -3.4%       | -8.0%                   | 1.5%             | 0.4%           | -3.6%         | -4.0%       | -13.6%                  | 2.1%             | 2.5%           | -2.6%         | -3.6%                             | -11.7%                  | 1.7%             | 1.7%           | -3.1%         | -2.0%                     | -2.0%                   | 0.8%              |
| 8    | Slope Angle +10% (55 Deg)    | -0.2%       | 0.7%                    | 0.0%             | 0.7%           | -6.0%         | 1.0%        | -0.4%                   | 0.3%             | 0.1%           | -11.9%        | 0.2%                              | 0.4%                    | 0.1%             | 0.8%           | -9.0%         | 0.2%                      | 0.9%                    | -14.8%            |
| 9    | Slope Angle -10% (45 Deg)    | 3.7%        | -2.6%                   | 0.9%             | -3.9%          | 12.3%         | -0.9%       | 0.3%                    | 0.0%             | -0.2%          | 13.7%         | 2.3%                              | -2.3%                   | 0.8%             | -3.1%          | 13.1%         | 3.1%                      | -0.9%                   | 17.0%             |
| 10   | Mining Cost +10% (0.88/t)    | -1.3%       | 0.4%                    | 0.3%             | 0.2%           | -2.7%         | -0.2%       | 0.0%                    | 0.0%             | -0.1%          | -1.0%         | -0.9%                             | 0.5%                    | 0.2%             | 0.5%           | -1.8%         | -0.8%                     | -0.5%                   | -1.4%             |
| 11   | Mining Cost -10% (0.72/t)    | 3.2%        | -1.7%                   | 0.6%             | -2.2%          | 5.0%          | 0.2%        | -0.1%                   | 0.0%             | -0.1%          | 0.3%          | 2.2%                              | -1.6%                   | 0.5%             | -1.9%          | 2.5%          | 2.8%                      | 0.3%                    | 0.5%              |
| 12   | Process/GA Cost +10% (1.375) | -2.4%       | -0.4%                   | 0.9%             | 1.5%           | -1.4%         | -0.9%       | 0.3%                    | 0.7%             | 0.8%           | 0.0%          | -1.9%                             | 0.6%                    | 0.8%             | 1.6%           | -0.7%         | -1.2%                     | -0.3%                   | 2.1%              |
| 13   | Process/GA Cost -10% (1.125) | 2.6%        | 0.0%                    | -0.6%            | -1.9%          | 1.4%          | 0.8%        | -0.2%                   | -0.3%            | -0.7%          | 0.0%          | 2.1%                              | -0.7%                   | -0.5%            | -1.8%          | 0.7%          | 1.6%                      | 0.3%                    | -2.2%             |
| 14   | Cu and Zn SXEW Costs +10%    | -1.9%       | -3.7%                   | 0.6%             | 1.1%           | -0.8%         | -1.4%       | -5.3%                   | 0.7%             | 1.0%           | -0.5%         | -1.7%                             | -4.5%                   | 0.6%             | 1.3%           | -0.6%         | -1.1%                     | -0.5%                   | 1.8%              |
| 15   | Cu and Zn SXEW Costs -10%    | 2.2%        | 3.5%                    | -0.3%            | -1.5%          | 1.6%          | 1.4%        | 5.2%                    | -0.7%            | -1.0%          | 0.4%          | 2.0%                              | 4.3%                    | -0.4%            | -1.5%          | 1.0%          | 1.6%                      | 0.4%                    | -1.6%             |
| 16   | Copper SXEW Cost +10%        | -1.3%       | -0.7%                   | 0.3%             | 0.7%           | -1.1%         | -0.2%       | -0.1%                   | 0.0%             | 0.2%           | 0.0%          | -1.0%                             | 0.0%                    | 0.2%             | 0.8%           | -0.5%         | -0.8%                     | -0.2%                   | 0.7%              |
| 17   | Copper SXEW Cost -10%        | 1.1%        | 0.6%                    | -0.3%            | -0.9%          | 0.5%          | 0.2%        | 0.1%                    | 0.0%             | -0.2%          | 0.0%          | 0.8%                              | 0.0%                    | -0.2%            | -0.8%          | 0.2%          | 0.7%                      | 0.1%                    | -1.0%             |
| 18   | Zinc SXEW Cost +10%          | -0.9%       | -3.0%                   | 0.3%             | 0.4%           | -0.5%         | -1.1%       | -5.1%                   | 0.7%             | 0.8%           | -0.5%         | -1.0%                             | -4.4%                   | 0.4%             | 0.6%           | -0.5%         | -0.6%                     | -0.4%                   | 0.8%              |
| 19   | Zinc SXEW Cost -10%          | 0.8%        | 3.0%                    | -0.3%            | -0.2%          | 0.6%          | 0.9%        | 5.3%                    | -0.3%            | -0.7%          | 0.0%          | 0.8%                              | 4.5%                    | -0.3%            | -0.5%          | 0.3%          | 0.5%                      | 0.3%                    | -0.9%             |
| 20   | Acid Cost +10% (0.044/kg)    | -5.1%       | -0.2%                   | 1.2%             | 3.6%           | -1.3%         | -2.6%       | 0.4%                    | 1.4%             | 2.0%           | -0.6%         | -4.3%                             | 1.1%                    | 1.1%             | 3.6%           | -1.0%         | -3.2%                     | -0.9%                   | 5.6%              |
| 21   | Acid Cost -10% (0.036/kg)    | 5.6%        | 0.0%                    | -1.2%            | -3.9%          | 1.8%          | 2.2%        | -0.2%                   | -1.0%            | -1.9%          | -0.1%         | 4.6%                              | -1.2%                   | -1.0%            | -3.8%          | 0.8%          | 3.5%                      | 0.6%                    | -5.7%             |



**Table 17-7a: Floating Cone Sensitivity Analysis - Measured and Indicated Resource Only**

| Case | Description                  | Main Zone   |                         |                  |                |               | Cerro Verde |                         |                  |                |               | Total - Main Zone and Cerro Verde |                         |                  |                |               | Contained Copper (tonnes) | Contained Zinc (tonnes) | Total Strip Ratio |
|------|------------------------------|-------------|-------------------------|------------------|----------------|---------------|-------------|-------------------------|------------------|----------------|---------------|-----------------------------------|-------------------------|------------------|----------------|---------------|---------------------------|-------------------------|-------------------|
|      |                              | Ore Ktonnes | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes | Ore Ktonnes | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes | Ore Ktonnes                       | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes |                           |                         |                   |
| 1    | Base Case                    | 60,343      | 5.47                    | 0.341            | 0.541          | 107,498       | 24,050      | 20.28                   | 0.280            | 2.982          | 90,550        | 84,393                            | 9.69                    | 0.324            | 1.237          | 198,048       | 273,110                   | 1,043,627               | 1.35              |
| 2    | Cu and Zn Prices +10%        | 68,463      | 6.11                    | 0.336            | 0.494          | 119,474       | 25,068      | 23.33                   | 0.275            | 2.896          | 92,965        | 93,531                            | 10.73                   | 0.320            | 1.138          | 212,439       | 298,973                   | 1,064,177               | 1.27              |
| 3    | Cu and Zn Prices -10%        | 53,141      | 4.73                    | 0.351            | 0.583          | 98,926        | 22,452      | 17.37                   | 0.288            | 3.115          | 85,897        | 75,593                            | 8.48                    | 0.332            | 1.335          | 184,823       | 251,187                   | 1,009,192               | 1.44              |
| 4    | Copper Price +10%            | 67,330      | 5.69                    | 0.338            | 0.498          | 117,935       | 24,450      | 20.50                   | 0.278            | 2.942          | 91,064        | 91,780                            | 9.64                    | 0.322            | 1.149          | 208,999       | 295,546                   | 1,054,622               | 1.28              |
| 5    | Copper Price -10%            | 55,090      | 5.19                    | 0.347            | 0.577          | 102,227       | 23,541      | 20.13                   | 0.281            | 3.031          | 89,480        | 78,631                            | 9.66                    | 0.327            | 1.312          | 191,707       | 257,313                   | 1,031,397               | 1.44              |
| 6    | Zinc Price +10%              | 62,181      | 5.91                    | 0.338            | 0.535          | 111,676       | 24,695      | 23.13                   | 0.276            | 2.933          | 92,592        | 86,876                            | 10.80                   | 0.320            | 1.217          | 204,268       | 278,330                   | 1,056,973               | 1.35              |
| 7    | Zinc Price -10%              | 58,644      | 5.03                    | 0.345            | 0.545          | 104,655       | 22,954      | 17.57                   | 0.286            | 3.063          | 86,694        | 81,598                            | 8.56                    | 0.328            | 1.253          | 191,349       | 267,970                   | 1,022,691               | 1.35              |
| 8    | Slope Angle +10% (55 Deg)    | 60,701      | 5.50                    | 0.340            | 0.544          | 103,901       | 24,133      | 20.29                   | 0.280            | 2.990          | 80,283        | 84,834                            | 9.71                    | 0.323            | 1.240          | 184,184       | 273,956                   | 1,051,790               | 1.17              |
| 9    | Slope Angle -10% (45 Deg)    | 62,662      | 5.34                    | 0.344            | 0.522          | 119,780       | 23,716      | 20.41                   | 0.281            | 2.990          | 101,994       | 86,378                            | 9.48                    | 0.327            | 1.200          | 221,774       | 282,199                   | 1,036,204               | 1.57              |
| 10   | Mining Cost +10% (0.88/t)    | 59,788      | 5.49                    | 0.342            | 0.543          | 105,633       | 24,038      | 20.29                   | 0.280            | 2.983          | 90,551        | 83,826                            | 9.73                    | 0.324            | 1.243          | 196,184       | 271,781                   | 1,041,702               | 1.34              |
| 11   | Mining Cost -10% (0.72/t)    | 61,898      | 5.41                    | 0.340            | 0.534          | 113,059       | 24,140      | 20.25                   | 0.280            | 2.980          | 91,580        | 86,038                            | 9.57                    | 0.323            | 1.220          | 204,639       | 278,045                   | 1,049,907               | 1.38              |
| 12   | Process/GA Cost +10% (1.375) | 59,188      | 5.45                    | 0.343            | 0.549          | 107,281       | 23,760      | 20.36                   | 0.281            | 3.006          | 89,619        | 82,948                            | 9.72                    | 0.325            | 1.253          | 196,900       | 269,780                   | 1,039,168               | 1.37              |
| 13   | Process/GA Cost -10% (1.125) | 62,207      | 5.47                    | 0.339            | 0.531          | 110,756       | 24,156      | 20.29                   | 0.279            | 2.966          | 89,926        | 86,363                            | 9.62                    | 0.322            | 1.212          | 200,682       | 278,277                   | 1,046,786               | 1.32              |
| 14   | Cu and Zn SXEW Costs +10%    | 59,187      | 5.26                    | 0.343            | 0.546          | 106,386       | 23,568      | 19.29                   | 0.282            | 3.021          | 89,283        | 82,755                            | 9.26                    | 0.326            | 1.251          | 195,669       | 269,473                   | 1,035,150               | 1.36              |
| 15   | Cu and Zn SXEW Costs -10%    | 61,932      | 5.66                    | 0.339            | 0.534          | 110,736       | 24,360      | 21.37                   | 0.278            | 2.957          | 91,395        | 86,292                            | 10.09                   | 0.322            | 1.218          | 202,131       | 277,670                   | 1,051,042               | 1.34              |
| 16   | Copper SXEW Cost +10%        | 60,300      | 5.42                    | 0.341            | 0.545          | 109,395       | 23,997      | 20.26                   | 0.280            | 2.988          | 90,550        | 84,297                            | 9.64                    | 0.324            | 1.240          | 199,945       | 272,815                   | 1,045,665               | 1.37              |
| 17   | Copper SXEW Cost -10%        | 61,352      | 5.50                    | 0.340            | 0.537          | 109,763       | 24,138      | 20.29                   | 0.279            | 2.975          | 90,857        | 85,490                            | 9.68                    | 0.323            | 1.225          | 200,620       | 275,942                   | 1,047,566               | 1.35              |
| 18   | Zinc SXEW Cost +10%          | 59,971      | 5.30                    | 0.342            | 0.542          | 107,629       | 23,612      | 19.32                   | 0.282            | 3.016          | 89,283        | 83,583                            | 9.26                    | 0.325            | 1.241          | 196,912       | 271,687                   | 1,037,181               | 1.36              |
| 19   | Zinc SXEW Cost -10%          | 61,084      | 5.64                    | 0.339            | 0.540          | 109,668       | 24,319      | 21.34                   | 0.278            | 2.962          | 91,395        | 85,403                            | 10.11                   | 0.322            | 1.230          | 201,063       | 274,682                   | 1,050,182               | 1.35              |
| 20   | Acid Cost +10% (0.044/kg)    | 57,444      | 5.46                    | 0.344            | 0.561          | 106,574       | 23,530      | 20.27                   | 0.282            | 3.032          | 90,023        | 80,974                            | 9.76                    | 0.326            | 1.279          | 196,597       | 263,962                   | 1,035,690               | 1.43              |
| 21   | Acid Cost -10% (0.036/kg)    | 63,979      | 5.47                    | 0.337            | 0.520          | 111,381       | 24,615      | 20.26                   | 0.277            | 2.929          | 90,886        | 88,594                            | 9.58                    | 0.320            | 1.189          | 202,267       | 283,793                   | 1,053,664               | 1.28              |

**Table 17-7b: Floating Cone Sensitivity Analysis - Measured and Indicated Resource Only - Percent Change From Base Case**

| Case | Description                  | Main Zone   |                         |                  |                |               | Cerro Verde |                         |                  |                |               | Total - Main Zone and Cerro Verde |                         |                  |                |               | Contained Copper (tonnes) | Contained Zinc (tonnes) | Total Strip Ratio |
|------|------------------------------|-------------|-------------------------|------------------|----------------|---------------|-------------|-------------------------|------------------|----------------|---------------|-----------------------------------|-------------------------|------------------|----------------|---------------|---------------------------|-------------------------|-------------------|
|      |                              | Ore Ktonnes | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes | Ore Ktonnes | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes | Ore Ktonnes                       | Net of Process (US\$/t) | Total Copper (%) | Total Zinc (%) | Total Ktonnes |                           |                         |                   |
| 1    | Base Case                    | ----        | ----                    | ----             | ----           | ----          | ----        | ----                    | ----             | ----           | ----          | ----                              | ----                    | ----             | ----           | ----          | ----                      | ----                    | ----              |
| 2    | Cu and Zn Prices +10%        | 13.5%       | 11.7%                   | -1.5%            | -8.7%          | 11.1%         | 4.2%        | 15.0%                   | -1.8%            | -2.9%          | 2.7%          | 10.8%                             | 10.7%                   | -1.2%            | -8.0%          | 7.3%          | 9.5%                      | 2.0%                    | -5.6%             |
| 3    | Cu and Zn Prices -10%        | -11.9%      | -13.5%                  | 2.9%             | 7.8%           | -8.0%         | -6.6%       | -14.3%                  | 2.9%             | 4.5%           | -5.1%         | -10.4%                            | -12.4%                  | 2.7%             | 8.0%           | -6.7%         | -8.0%                     | -3.3%                   | 7.3%              |
| 4    | Copper Price +10%            | 11.6%       | 4.0%                    | -0.9%            | -7.9%          | 9.7%          | 1.7%        | 1.1%                    | -0.7%            | -1.3%          | 0.6%          | 8.8%                              | -0.6%                   | -0.5%            | -7.1%          | 5.5%          | 8.2%                      | 1.1%                    | -5.2%             |
| 5    | Copper Price -10%            | -8.7%       | -5.1%                   | 1.8%             | 6.7%           | -4.9%         | -2.1%       | -0.7%                   | 0.4%             | 1.6%           | -1.2%         | -6.8%                             | -0.3%                   | 1.1%             | 6.1%           | -3.2%         | -5.8%                     | -1.2%                   | 6.8%              |
| 6    | Zinc Price +10%              | 3.0%        | 8.0%                    | -0.9%            | -1.1%          | 3.9%          | 2.7%        | 14.1%                   | -1.4%            | -1.6%          | 2.3%          | 2.9%                              | 11.5%                   | -1.0%            | -1.6%          | 3.1%          | 1.9%                      | 1.3%                    | 0.3%              |
| 7    | Zinc Price -10%              | -2.8%       | -8.0%                   | 1.2%             | 0.7%           | -2.6%         | -4.6%       | -13.4%                  | 2.1%             | 2.7%           | -4.3%         | -3.3%                             | -11.7%                  | 1.5%             | 1.4%           | -3.4%         | -1.9%                     | -2.0%                   | -0.1%             |
| 8    | Slope Angle +10% (55 Deg)    | 0.6%        | 0.5%                    | -0.3%            | 0.6%           | -3.3%         | 0.3%        | 0.0%                    | 0.0%             | 0.3%           | -11.3%        | 0.5%                              | 0.2%                    | -0.2%            | 0.3%           | -7.0%         | 0.3%                      | 0.8%                    | -13.0%            |
| 9    | Slope Angle -10% (45 Deg)    | 3.8%        | -2.4%                   | 0.9%             | -3.5%          | 11.4%         | -1.4%       | 0.6%                    | 0.4%             | 0.3%           | 12.6%         | 2.4%                              | -2.2%                   | 1.0%             | -3.0%          | 12.0%         | 3.3%                      | -0.7%                   | 16.4%             |
| 10   | Mining Cost +10% (0.88/t)    | -0.9%       | 0.4%                    | 0.3%             | 0.4%           | -1.7%         | 0.0%        | 0.0%                    | 0.0%             | 0.0%           | 0.0%          | -0.7%                             | 0.4%                    | 0.2%             | 0.5%           | -0.9%         | -0.5%                     | -0.2%                   | -0.5%             |
| 11   | Mining Cost -10% (0.72/t)    | 2.6%        | -1.1%                   | -0.3%            | -1.3%          | 5.2%          | 0.4%        | -0.1%                   | 0.0%             | -0.1%          | 1.1%          | 1.9%                              | -1.2%                   | -0.1%            | -1.3%          | 3.3%          | 1.8%                      | 0.6%                    | 2.4%              |
| 12   | Process/GA Cost +10% (1.375) | -1.9%       | -0.4%                   | 0.6%             | 1.5%           | -0.2%         | -1.2%       | 0.4%                    | 0.4%             | 0.8%           | -1.0%         | -1.7%                             | 0.3%                    | 0.5%             | 1.3%           | -0.6%         | -1.2%                     | -0.4%                   | 2.0%              |
| 13   | Process/GA Cost -10% (1.125) | 3.1%        | 0.0%                    | -0.6%            | -1.8%          | 3.0%          | 0.4%        | 0.0%                    | -0.4%            | -0.5%          | -0.7%         | 2.3%                              | -0.8%                   | -0.4%            | -2.0%          | 1.3%          | 1.9%                      | 0.3%                    | -1.7%             |
| 14   | Cu and Zn SXEW Costs +10%    | -1.9%       | -3.8%                   | 0.6%             | 0.9%           | -1.0%         | -2.0%       | -4.9%                   | 0.7%             | 1.3%           | -1.4%         | -1.9%                             | -4.5%                   | 0.6%             | 1.2%           | -1.2%         | -1.3%                     | -0.8%                   | 1.3%              |
| 15   | Cu and Zn SXEW Costs -10%    | 2.6%        | 3.5%                    | -0.6%            | -1.3%          | 3.0%          | 1.3%        | 5.4%                    | -0.7%            | -0.8%          | 0.9%          | 2.3%                              | 4.2%                    | -0.6%            | -1.5%          | 2.1%          | 1.7%                      | 0.7%                    | -0.3%             |
| 16   | Copper SXEW Cost +10%        | -0.1%       | -0.9%                   | 0.0%             | 0.7%           | 1.8%          | -0.2%       | -0.1%                   | 0.0%             | 0.2%           | 0.0%          | -0.1%                             | -0.5%                   | 0.0%             | 0.3%           | 1.0%          | -0.1%                     | 0.2%                    | 1.9%              |
| 17   | Copper SXEW Cost -10%        | 1.7%        | 0.5%                    | -0.3%            | -0.7%          | 2.1%          | 0.4%        | 0.0%                    | -0.4%            | -0.2%          | 0.3%          | 1.3%                              | -0.2%                   | -0.3%            | -0.9%          | 1.3%          | 1.0%                      | 0.4%                    | 0.0%              |
| 18   | Zinc SXEW Cost +10%          | -0.6%       | -3.1%                   | 0.3%             | 0.2%           | 0.1%          | -1.8%       | -4.7%                   | 0.7%             | 1.1%           | -1.4%         | -1.0%                             | -4.4%                   | 0.4%             | 0.3%           | -0.6%         | -0.5%                     | -0.6%                   | 0.7%              |
| 19   | Zinc SXEW Cost -10%          | 1.2%        | 3.1%                    | -0.6%            | -0.2%          | 2.0%          | 1.1%        | 5.2%                    | -0.7%            | -0.7%          | 0.9%          | 1.2%                              | 4.3%                    | -0.6%            | -0.6%          | 1.5%          | 0.6%                      | 0.6%                    | 0.6%              |
| 20   | Acid Cost +10% (0.044/kg)    | -4.8%       | -0.2%                   | 0.9%             | 3.7%           | -0.9%         | -2.2%       | 0.0%                    | 0.7%             | 1.7%           | -0.6%         | -4.1%                             | 0.8%                    | 0.7%             | 3.4%           | -0.7%         | -3.3%                     | -0.8%                   | 6.0%              |
| 21   | Acid Cost -10% (0.036/kg)    | 6.0%        | 0.0%                    | -1.2%            | -3.9%          | 3.6%          | 2.3%        | -0.1%                   | -1.1%            | -1.8%          | 0.4%          | 5.0%                              | -1.1%                   | -1.0%            | -3.8%          | 2.1%          | 3.9%                      | 1.0%                    | -4.7%             |

## **18 Additional Requirements for Technical Reports on Development Properties**

### **18.1 Mining Operations**

Mining operations at Terrazas will be conducted as in a typical, hard rock, open pit mine. The rock will be drilled, blasted, and loaded onto large haul trucks for transport to the crusher and waste dumps. A fleet of dozers, graders, and water trucks will also be used to maintain the mine in good working order. At this time it is anticipated that loaders with a bucket size of 16 to 18 cubic meters will load trucks with payload capacity of approximately 150 metric tonnes. Units typical to this size would be the Caterpillar 994D loader and Caterpillar 785C haul truck.

Also at this time an ore production rate of 5 million tonnes per year is contemplated. Mining will be conducted in the high zinc Cerro Verde and low zinc Main Zone through the mine life to keep zinc production fairly constant over the mine life. It will also be desired to schedule the mine to maintain acid consumption at a consistent rate.

The details of the mining production schedule, number of equipment units required, and mine capital and operating costs are pending in the Feasibility Study currently in progress.

### **18.2 Recoverability**

The metallurgical testing work done to date demonstrates that both the copper and zinc metal readily go into sulfuric acid solution, though, because of the skarn host rock, the amount of sulfuric acid consumed in the process is considerably higher than most leaching operations. The acid cost will be accounted for in the economic calculations.

Additional metallurgical studies in progress, as part of the ongoing Feasibility Study, will quantify the recovery of copper and zinc and acid consumption.

### **18.3 Markets**

The copper SXEW plant will produce cathode copper. Assuming relatively good purities can be maintained, this will be readily marketable.

The zinc SXEW plant will produce cathode zinc. This will be cast into ingots, and again, assuming good purity is maintained, can be marketed as special high grade (SHG) zinc.

There are active commodities markets for both metals such as Comex and the London Metal Exchange.

## 18.4 Environmental Considerations

### 18.4.1 Key Permits Required and Estimated Approval Time

Federal laws primarily regulate mining in Mexico, however there are several permit programs subject to state and local jurisdiction. The key permits required are shown in Table 18-1. The chart shows the government agencies involved as well as the status and the estimated approval time for each permit. The Secretary of Environment and Natural Resources (SEMARNAT) is the chief agency regulating environmental matters in Mexico. The CNA has authority over all matters concerning water rights and activities that affect ground and surface water supplies, including activities in the floodplains.

The SEMARNAT permit programs that are mandatory for the construction stage are the Environmental Impact Manifest (MIA), Risk Analysis Study (RA) and the Land Use Change Study (CUS). An endorsement must also be obtained at the municipal level to start the mine construction. A release letter from National Institute of Anthropology and History (INAH) will be obtained prior to any actions that could disturb the identified cultural resources at the site.

The MIA document is typical of environmental assessment exercises. Baseline conditions are established, impacts are predicted with application of mitigation measures. Reclamation procedures and specifications are set forth along with monitoring plans for operation and post-operation periods.

The RA is a companion to the MIA. The RA is required for projects that use certain amounts of certain chemicals or are otherwise perceived as posing elevated risk to the local community or the environment. Mining projects always require an RA. Elements of the RA focus on the presence of chemicals. Risks are evaluated using a variety of models and calculations.

The purpose of the CUS is to quantify the loss of soil and vegetation resources. Final approval of the CUS requires demonstration of a secure land position and payment of a substantial "reforestation" fee. The fee for recently approved operations ranged from about US\$ 500 to over US\$ 1000 per hectare. The fee amount is negotiable, but the negotiations require a good deal of time.

If a new power line or road is necessary, either must undergo a separate MIA/CUS process, though no RA would be required for either.

The explosives use permit must be secured before any explosives can be brought into the storage area. The National Secretary of Defense (SEDENA) has authority over all explosives permits.

**Table 18-1**  
**Key Permits and Estimated Response Time**

| <b>REQUIRED PERMIT</b>                           | <b>MINING STAGE</b>                        | <b>AGENCY</b>   | <b>ESTIMATED RESPONSE TIME</b>   |
|--|--|---|--|
| Environmental Impact Manifest (MIA) <sup>1</sup> | Construction/<br>operation/<br>abandonment | SEMARNA<br>T-State<br>offices   | 3 to 6 months  |
| Land use change study (CUS) <sup>1</sup>         | Construction/<br>Operation                 | SEMARNA<br>T-DGGFS <sup>2</sup> -<br>State offices.                       | 3 to 6 months (not counting fee negotiation time)  |
| Risk analysis study (RA) <sup>1</sup>            | Construction/<br>Operation                 | SEMARNA<br>T-(Mexico<br>City office)                                      | 3 to 6 months  |
| Land use license <sup>1</sup>                    | Construction                               | Chihuahua<br>municipality   | 2 months   |
| Explosive handling and storage permits           | Construction/-<br>Operation                | SEDENA <sup>3</sup><br>(Also<br>requires state<br>and local<br>approvals) | 2 to 3 months<br>following<br>inspection and<br>approval of a<br>constructed powder<br>magazine. |
| Archaeological release letter <sup>1</sup>       | Construction                               | INAH <sup>4</sup> (State<br>offices)                                      | 3 to 4 months  |
| Water use concession title                       | Construction/<br>Operation                 | CNA <sup>5</sup> (State<br>offices)                                       | 2 to 5 months  |
| Water discharge permit                           | Operation                                  | CNA (State<br>offices)  | 2 to 5 months  |
| Unique license                                   | Operation                                  | SEMARNA<br>T-State<br>offices   | 3 to 12 months   |
| Accident prevention plan                         | Operation                                  | SEMARNA<br>T-State<br>offices   | Not defined  |

<sup>1</sup>Mandatory to start construction activities.

<sup>2</sup>DGGFS (General Department of Permitting for Forestry and Soils)

<sup>3</sup>SEDENA (National Secretary of Defense)

<sup>4</sup>INAH (National Institute of Anthropology and History)

<sup>5</sup>CNA (National Water Commission)

#### 18.4.2 Current Status

Baseline environmental studies for flora and fauna, and archaeology are substantially complete. Baseline ground water quality is being studied as part of an overall geohydrologic study to begin late in 2005. Socio-economics, soils, other disciplines are not yet underway.

The majority of the environmental permit applications for the project will be conducted through the Chihuahua offices of SEMARNAT, which facilitates a closer follow up of the permitting process.

#### 18.5 Economic Analysis

A complete economic analysis will be performed with the Feasibility Study that is currently in progress. This will include quantification of revenues, capital and operating costs, taxes, and financial measures such as net present value, rate of return, and payback period.

#### 18.6 Mine Life

Assuming an ore production rate of 5 million tonnes per year and a potential mineral reserve of about 84 million tonnes, as indicated by the base case floating cone geometry on Table 17-7a, a commercial production life of the Terrazas of about 17 years is indicated.

There is the potential for some additional resources being discovered on the property and converted to mineral reserve that could extend the project life.

It should also be noted that project economics will be sensitive to commodity prices. An extended period of low copper and/or zinc prices would likely result in premature closure of the project.

## **19 Other Relevant Data and Information**

IMC has nothing to report in this section.

## **20 Interpretation and Conclusions**

It is the opinion of IMC that the 2004/2005 drilling, which resulted in the delineation of the high zinc Cerro Verde area, has provided a much improved basis for the advancement of the Terrazas project compared with the known resources incorporated into the 2002 Jacobs study.

The Feasibility Study, currently in progress, should be continued to obtain definitive estimates of the technical and economic feasibility of the project. The current IMC resource block model is considered sufficiently accurate for Feasibility Study level work.

## **21 Recommendations**

Since the primary emphasis of this Technical Report is updated mineral resources, IMC's recommendations will be limited to this subject. The other important issues are currently being evaluated in the context of the Feasibility Study currently in progress.

There are known voids in the Terrazas ore bodies due to previous small scale mining activity. All accessible underground openings need to be surveyed. The volume of these is not expected to have a significant effect on resources. The scale of previous mining was too small to be of much concern. Of greater concern would be personnel safety and protection of mining equipment operating in areas of previous mining.

It is likely that additional drilling can convert a significant portion of the inferred mineral resource to indicated resource, particularly in Cerro Verde. However, much of this resource is at such a depth that it will occur fairly late in the mining plan. There is considerable latitude in the timing of much of this additional drilling.

## **22 References**

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

Independent Mining Consultants, Inc., January 2002, “Terrazas Project, Mexico – Preliminary Mining Feasibility Study.”

Jaacks, Jeff, October 2005, memo report “QA/QC Review of the Terrazas Project, Chihuahua, Mexico.”

Jacobs Engineering Group Inc., February 2002, “Prefeasibility Study for Terrazas Copper Zinc Project – Summo Minerals Corporation – Denver Colorado.”

Parkison, Gary A., Constellation Copper Corporation, September 2005, “Technical Report for the Terrazas Copper Zinc Project – Chihuahua, Mexico.”

## **23 Certificates**

Following are the certificates of the Qualified Persons.

## CERTIFICATE OF QUALIFIED PERSON

I, Michael G. Hester, do hereby certify that:

- I am employed by the consulting firm of Independent Mining Consultants, Inc. in the capacity of Vice President and Principal Mining Engineer. The office of Independent Mining Consultants, Inc. is located at 2700 E. Executive Drive, Suite 140, Tucson, Arizona, 85706, USA.
- I am a graduate of the University of Arizona with a M.S. degree in Mining Engineering, 1982, and a B.S. degree in Mining Engineering, 1979.
- I am a Fellow of The Australasian Institute of Mining and Metallurgy (AusIIM), a professional society as defined by NI 43-101. I am also a member of the Society of Mining, Metallurgy and Exploration (SME), and the Canadian Institute of Mining, Metallurgy and Petroleum (CIM).
- I have practiced my profession as a mining engineer continually since my graduation in 1979, about 26 years. I have worked for Pincock, Allen & Holt, Inc. (1979 – 1983) and Independent Mining Consultants, Inc. (1983 to present) of which I am one of the founding partners. I also worked in the Department of Mining and Geological Engineering of the University of Arizona as an Adjunct Lecturer during 1997 and 1998, where I taught classes in mine planning and mine evaluation.
- I visited the Terrazas property on March 22, 2005.
- I have been involved with the development of the ore resource model and the updated mineral resource estimate for the Technical Report. I am also the principal author of the report.
- I am not aware of any material fact or material change with respect to the subject matter of the technical report which is not reflected in the technical report, or the omission to disclose said material which makes the technical report misleading.
- I am an independent qualified person based on the tests set out in Section 1.5 of Form 43-101.

\_\_\_\_\_"Michael G. Hester"\_\_\_\_\_  
Michael G. Hester  
Vice President and Principal Mining Engineer  
Independent Mining Consultants, Inc.

November 17, 2005



Certificate of Author

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Gary A. Parkison  
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Larkspur, Colorado 80118  
Tel & Fax (303)681-2233  
gaparkison@aol.com

I, Gary A. Parkison, Certified Professional Geologist, CPG-07299, do hereby certify that:

1. I am currently employed by Constellation Copper Corporation with the position of Vice President Exploration & Development, whose address is 3900 S. Wadsworth Blvd., Suite 495, Lakewood, Colorado, USA, 80118
2. I graduated from the University of California, Los Angeles with a Bachelor of Science degree in Geology in 1973 and subsequently obtained a Master of Science degree in Geology from the University of California, Berkeley in 1976.
3. I am a member in good standing of the American Institute of Professional Geologists, the Society for Mining, Metallurgy and Exploration and the Society of Economic Geology.
4. I have practiced my profession continuously since 1976 and have been involved in mineral exploration, evaluation, acquisition, development and mining activities since that time for a number of commodities including base and precious metals and industrial minerals, mostly in the United States and Mexico.
5. I have read the definition of “qualified person” set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.
6. This Technical Report titled Terrazas Copper Zinc Project, Chihuahua, Mexico was prepared by the author and Qualified Person, Gary A. Parkison, for the purposes of complying with National Instrument 43-101 at the request of Constellation Copper Corporation, formerly Summo Minerals Corporation. The author has visited the Terrazas Project site on at least fifteen separate occasions during the period July 2000 to the present, with the most recent visit taking place from February 14 to February 19, 2005.
7. I have had prior involvement with the property that is the subject of the Technical Report. The nature of my prior involvement was as an independent consultant to Summo Minerals Corporation, which subsequently changed its name to Constellation Copper Corporation.
8. I am not aware of any material fact or material change with respect to the subject matter of this technical report that is not reflected in this report and that the omission to disclose would make this report misleading.
9. I am not independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101, as I am currently an employee of the issuer, Constellation Copper Corporation
10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Dated this 17th day of November 2005.

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Signature of Qualified Person

Gary A. Parkison