# INDUSTRIAS INFINITO S.A.

and

# VANNESSA VENTURES LTD

# LAS CRUCITAS GOLD PROJECT

## NI 43-101 TECHNICAL REPORT SUMMARY OF THE BANKABLE FEASIBILITY STUDY AND ADDENDUM REPORT


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# 1.0 SUMMARY

## 1.1 GENERAL

On November 15, 2005 Vannessa Ventures Ltd, (Vannessa) through their wholly owned subsidiary Industrias Infinito S.A., contracted with Micon International Limited to conduct a bankable feasibility study for the Crucitas Gold Project. Portions of the study were contracted directly by Vannessa to Golder Associates and to System Geostat International Inc (Geostat). In the study, all mining activities were considered, and costed, on the basis of using owner's personnel and equipment. Micon completed and issued the study report to Vannessa in July 2006.

Subsequently, Vannessa has discussed the possibility of contract mining with potential contractors and received an attractive proposal from an experienced mining contractor in mid-August 2006. The contractor has wide experience in Central and South America. An operation run by the contractor has been visited several times by Vannessa personnel and direct observation, together with the opinion of the mine management, indicates that the mining contractor is very competent. The contractor is familiar with the Crucitas project after visiting the area on three occasions and having studied in detail the mine plans and tailing dam design. An Addendum report summarizing the project description, operating and capital costs, and the resulting financial evaluation, based on all mining activities conducted by a Contractor, was presented to Vannessa in October 2006. Minor refinements to the G &A operating cost, subsequent to the feasibility study, were also employed in the Addendum.

The feasibility study provides a description of the geology, mining and milling operations, tailings facilities, services and other facilities, together with the associated capital and operating costs, required to develop the Crucitas Project. The study includes description of the mining plan and mine operations, processing requirements, the tailings and water management systems, the necessary site infrastructure and presents the environmental, permitting and socio-economic considerations in undertaking the project.

This report summarizes the feasibility study and subsequent addendum. A complete copy of the full feasibility study and addendum are located in the Vannessa offices in Calgary, AB. Canada.

Vannessa has an Exploitation Permit to mine all of the mineralized material at Crucitas and in late 2005 obtained an environmental operating permit for mining the overlying saprolite material. It is important to note that the majority of the mineralization subject to mining is hard rock, which is not currently permitted, but Vannessa believes that the environmental operating permit can be modified in the near future and has plans to apply for a modification of this permit, to cover the mining of saprolite plus the underlying hard rock material. This feasibility study is based on mining both materials. A sensitivity analysis of mining saprolite only is presented in the report. In the event that future in-fill drilling identifies additional saprolite reserves in the areas adjacent to the two proposed open pits the mining plan can be modified to recover this material without a negative impact on the anticipated future mining of the underlying hard rock reserves.

All costs are estimated in United States dollars as of the first quarter of 2006. No allowance has been made for cost escalation. The exchange rate used in the conversion of the local, Costa Rican currency is 1 US dollar = 480 Colones (¢). A gold price of $US 550 per ounce is assumed.

The marketing aspects of the gold and silver products are also presented. Construction and expenditure schedules are presented. Capital and operating costs are estimated to be within an accuracy of ±15%. Financial and sensitivity analyses are also presented.

## 1.2 BACKGROUND

The Crucitas gold deposit is located in north central Costa Rica, in Alajuela province. The project lies 105 km north of the capital of San José, and 16 km north east of the small town of Coopevega, see Figures 1.1 and 1.2.

**Figure 1.1**
**Site Location Map**

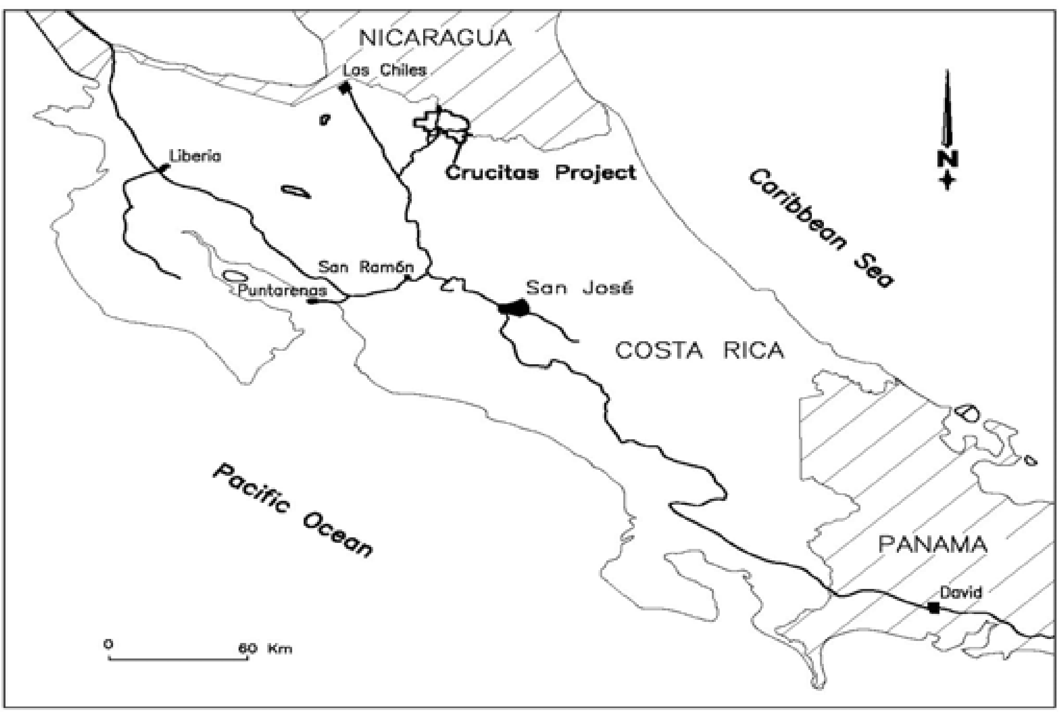


**Figure 1.2**
**View of the Crucitas Project**

Placer Dome de Costa Rica (PDCR), a wholly owned subsidiary of Placer Dome Inc (PDI) continuously explored this property throughout 1992-1998. In 1998, Lyon Lake Mines Ltd. (LLL) acquired the property from PDCR. Following the acquisition, the corporate name of PDCR was officially changed to Industrias Infinito, S.A. (Infinito), a subsidiary of Lyon Lake Mines Ltd.

Vannessa Ventures signed an agreement with Lyon Lake Mines Ltd. in May 2000 to acquire a 100% interest in the project. Originally staked in 1992, over US$34 million has been spent on the property to date. Accordingly, Infinito is 100% controlled by Vannessa.

## 1.3 GENERAL AND RESOURCES

In June of 2005, Vannessa awarded System Geostat International Inc (Geostat) a mandate to update its Crucitas mineral resource model and to prepare a Technical Report according to the National Policy 43-101 in Canada. The object of this report was to provide Vannessa Ventures Ltd. and its wholly owned subsidiary in Costa Rica, Industrias Infinito S.A., an independent opinion of the estimation of the resources of the Crucitas Gold Mining Project in Costa Rica. The full Geostat Report, dated February 28th, 2006, is included in Appendix 3A of the feasibility study.

In the preparation of the report, Geostat relied on various technical reports, maps, drawings and mine plans, as well as historic documents, as specified in the list of references, as well as on its experience in this area. The original data files come from a backup prepared by Cambior and IMC in a 1999 study or by the former owner, Placer Dome Inc (PDI), prior to 1999. These files include a mine plan designed by Cambior in 1999, prior to the adoption of the National Instrument 43-101 in February, 2001.

Geostat visited the Crucitas project site in Costa Rica in October, 2005 and Geostat had access to original documents such as Assay Certificates. In Costa Rica, the staff working at Industrias Infinito, a subsidiary of Vannessa, is basically the same group that previously worked for Placer Dome Inc. (PDI) as far back as 1993. They were readily available to assist Geostat in its review assessment.

The Resources in and outside the structures basically split in two categories: Indicated and Inferred. Geostat is of the opinion that there is no Measured Resources in the Crucitas project at the moment based on the CIM definition recommended by the NI 43-101.

The total Indicated Resources above the 0.5 g Au/t cut-off grade are estimated to contain 25.1 millions tonnes at 1.22 g Au/t (985 thousand gold ounces) and at 3.17 g Ag/t (2.56 million silver ounces) in both Fortuna and Botija in and out of the structures, as shown in Table 1.1.

**Table 1.1**
**Estimated Indicated Mineral Resources at Crucitas**

| Material/Zone | Tonnes | Gold (g/t) | Silver (g/t) | Gold oz | Silver oz |
|---|---|---|---|---|---|
| **Saprolite** | | | | | |
| Total Structure | 3,528,630 | 1.6 | 1.91 | 181,22 | 217,052 |
| Total Outvein | 638,472 | 0.64 | 1.00 | 13,224 | 20,443 |
| Total Saprolite | 4,167,102 | 1.45 | 1.77 | 194,646 | 237,495 |
| **Rock** | | | | | |
| Total Structure | 16,540,075 | 1.32 | 3.51 | 700,919 | 1,863,994 |
| Total Outvein | 4,378,546 | 0.63 | 3.25 | 89,376 | 457,617 |
| Total Rock | 20,918,621 | 1.18 | 3.45 | 790,295 | 2,321,611 |
| **Total** | **25,085,723** | **1.22** | **3.17** | **984,941** | **2,559,105** |

The total Inferred Resources above the 0.5 g Au/t cut-off grade are estimated to contain 12.6 millions tonnes at 1.23 g Au/t (496 thousand gold ounces) and at 3.14 g Ag/t (1.27 million silver ounces) in the Inferred category for Fortuna, Botija and Fuentes in and out of the structures, as shown in Table 1.2.

**Table 1.2**
**Estimated Inferred Resources**

| Material/Zone | Tonnes | Gold (g/t) | Silver (g/t) | Gold oz | Silver oz |
|---|---|---|---|---|---|
| **Saprolite** | | | | | |
| Total Structure | 2,261,899 | 1.48 | 2.75 | 107,707 | 199,698 |
| Total Outvein | 721,185 | 0.69 | 1.02 | 16,065 | 23,566 |
| Total Saprolite | 2,983,084 | 1.29 | 2.33 | 123,772 | 223,265 |
| **Rock** | | | | | |
| Total Structure | 7,081,264 | 1.42 | 3.52 | 322,579 | 801,190 |
| Total Outvein | 2,502,871 | 0.62 | 3.02 | 49,721 | 243,025 |
| Total Rock | 9,584,135 | 1.21 | 3.39 | 372,300 | 1,044,215 |
| **Total** | **12,567,219** | **1.23** | **3.14** | **496,072** | **1,267,479** |

## 1.4 MINING

Mining will be by the open pit method with conventional shovel and truck operations. The open-pit optimization for the Los Crucitas project was carried out using the Geostat mineral resource block model and Surpac Lerchs-Grossman pit optimization software. Economic parameters as shown in Table 1.3 were applied to the mineral resource block model to create an economic optimized pit shell.

**Table 1.3**
**Economic Parameters used in Open-Pit Optimization**

| Criteria | Material Type | Value |
|---|---|---|
| Mining Operating Costs | Saprolite | 1.30 $/tonne |
| | Hard Rock | 1.47 $/tonne |
| Processing Costs | Saprolite | 5.65 $/tonne ore |
| | Hard Rock | 7.57 $/tonne ore |
| G & A Costs | Saprolite | 1.73 $/tonne ore |
| | Hard Rock | 2.50 $/tonne ore |
| Processing Recovery | Saprolite | 96 % |
| | Hard Rock | 91.5 % |
| Mine Call Factor | - | 96 % |

Recommendations for pit wall inclinations and bench configurations were provided by Golder Associates Limited, based upon slope design investigations performed on the Fortuna and Botija deposits of the Crucitas project.

The mineable reserve estimate as of March 2006, based upon owner mining and a gold price of $550 per oz, is presented in Table 1.4.

**Table 1.4**
**Mineable Reserve for Los Crucitas Fortuna and Botija Open Pits**

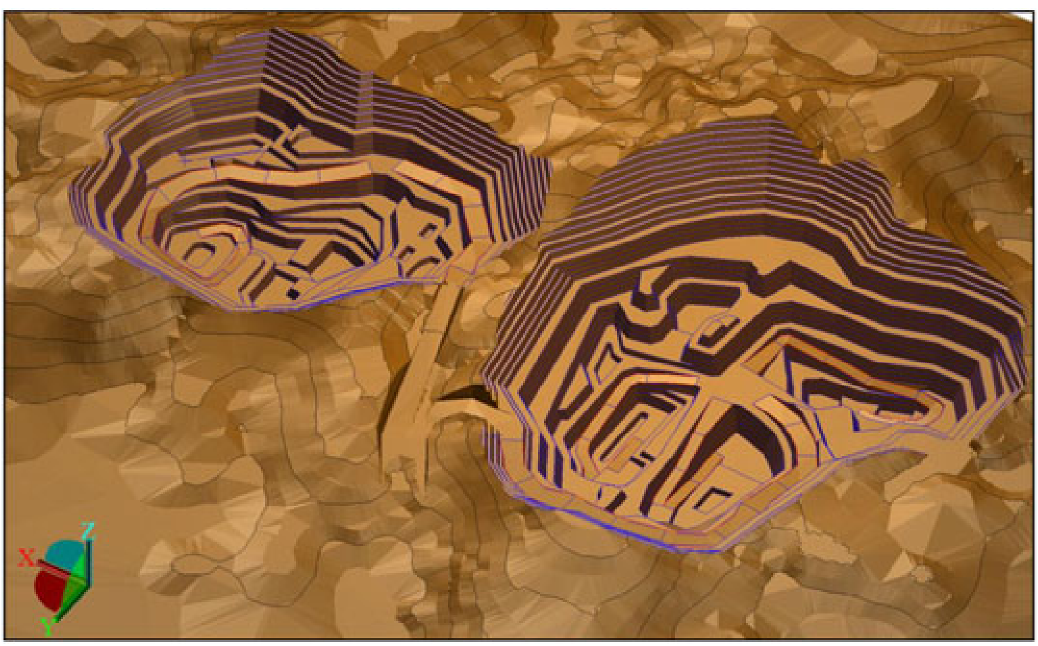
| | Ore Tonnes (Kt) | Gold Grade (g/t) | Gold (000's oz) | Silver Grade (g/t) | Waste (Kt) | Strip Ratio | Total Tonnes (Kt) |
|---|---|---|---|---|---|---|---|
| **Fortuna** | | | | | | | |
| Saprolite | 2,270.4 | 1.46 | 106.8 | 1,76 | 3,001.7 | 1.6 | 5,802.4 |
| Hard Rock | 7,681.6 | 1.43 | 352.7 | 3.58 | 9,307.9 | 1.2 | 17,098.4 |
| Total | 9,951.9 | 1.44 | 459.6 | 3.20 | 12,309.6 | 1.3 | 22,900.8 |
| **Botija** | | | | | | | |
| Saprolite | 1,316.1 | 1.51 | 63.9 | 1.93 | 1,669.9 | 1.5 | 3,258.1 |
| Hard Rock | 3,645.9 | 1.40 | 163.8 | 3.85 | 6,137.2 | 1.7 | 9,883.0 |
| Total | 4,962.0 | 1.43 | 227.7 | 3.36 | 7,807.1 | 1.6 | 13,141.1 |
| **Total** | | | | | | | |
| **Total** | 14,914.0 | 1.43 | 687.2 | 3.25 | 20,116.7 | 1.4 | 36,042.0 |

Notes on Reserves:

1) Mineable reserves were calculated by applying 5% dilution to ore tonnes of waste tonnes at the average waste gold grade, and subtracting 4.76% of diluted ore tonnes as ore losses. This equates to a factor of 96% on the grade of the ore but has no effect on tonnage.
2) Some 1.01 Mt of Inferred Resource at a grade of 1.23 g/t lies within the boundaries of the final pit shell, are included in the total tonnes shown, and will be extracted during mining. This material should be stockpiled at the plant and sampled.
3) The strip ratio is calculated as total ore tonnes divided by waste plus inferred ore tonnes. The total of inferred resource within the final design amounts to 7% of the total indicated reserves.

The designed final pits for the Fortuna and Botija deposits are presented in Figure 1.2

**Figure 1.2**
**Final Open-Pit Design – 3D NW Isometric View**



A mining production schedule was prepared for the estimated mineable reserves with the use of MineSched scheduling software. The mining production schedule was designed to deliver a nominal feed rate of ore to the processing plant daily while maintaining a balanced strip-ratio of ore and waste production from the mine.

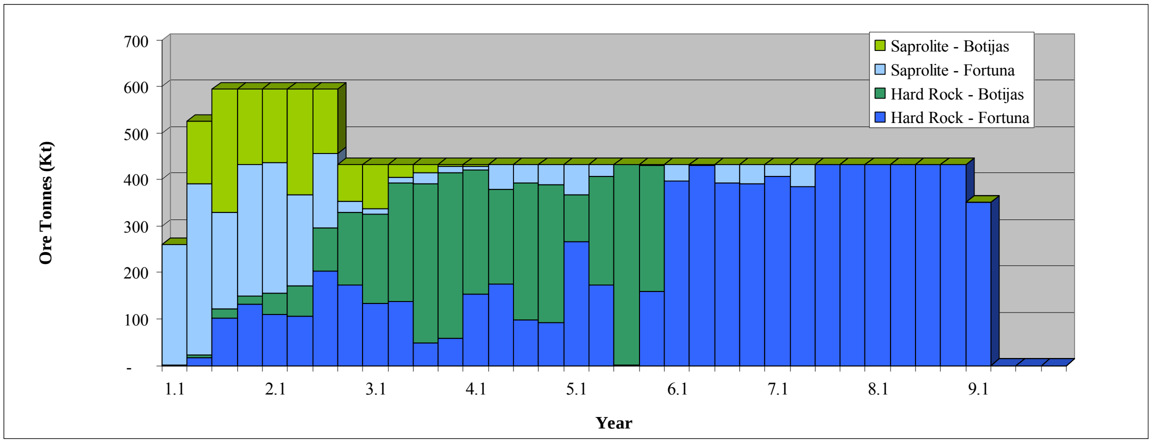
The mining will be conducted on 5 metre benches, with a pre-strip totalling 440,000 cubic metres, planned to gain barren saprolite waste to be used in construction of the tailings dam. After ramping up to plant capacity, a nominal plant feed consisting of a blend of 75% saprolite and 25% hard rock, is planned to continue until the completion of the saprolite reserves. The plant capacity is designed for 7,500 ore tonnes per day (2.50 Mtpa) within saprolite, whereas within hard rock the plant capacity is 5,000 tonnes per day (1.82 Mtpa). Therefore an initial ore production rate from the mine of 6,875 tonnes per day was scheduled in order to provide the nominal feed of 75% saprolite and 25% hard rock. On completion of the saprolite reserves the plant feed rate will be reduced and so the ore production rate is dropped to 5,000 tonnes per day.

There is capacity for the stockpiling of 50,000 tonnes of hard rock ore, which can be stored on a pad adjacent to the plant. The planned strip ratio during mine production was 1.35, and is maintained as closely as possible throughout the mine life. At the earliest date possible, waste is planned to be back-filled into completed sections of the mine.

The production schedule is planned around a work regime of 350 days per annum and 20 hours per day. In order to minimise dilution and mining losses, ore excavations are scheduled for the day shifts.

The proposed production schedule is shown on Figure 1.3

**Figure 1.3**
**Ore Production Graph**



### Mining Equipment Fleet

The mining and ancillary fleet requirement, for the owner mining case presented in the Feasibility Study, were based on consideration of the required processing plant feed rates, average haul distances, shift roster, local conditions and assumptions on the equipment availability and utilization. The contractor may elect to modify the fleet supplied, but has proposed to utilize articulated vehicles, as assumed for the owner mining base case. The following major equipment or equivalent would most probably be selected by the contractor.

Loading will be carried out by a Cat 365 backhoe excavator with a 4.4 $m^3$ bucket capacity. Cat D400 35t capacity articulated trucks are proposed due to the expected working conditions and local climate. Three track dozers, Cat D8's, are proposed for the bench cleaning, road building, waste dump and stockpile levelling and other earthmoving operations. Additional support equipment comprises one 140H grader and one water truck. Drilling equipment will be two Atlas Copco ROC F9 rigs.

Grade control for the saprolite material will require drilling or trenching by the contractor. The sampling and assaying cost is included in the Vannessa payroll and supplies cost. For the hard rock materials, blast hole samples will be utilized for grade control.

Vannessa will supervise the contract mining and provide technical control through the technical services group under the direction of the Mine Manager. A group of ten persons is proposed including a geologist, surveyors and samplers for grade control. In addition, workers for reclamation of the pits are included.

## 1.5 MINERAL PROCESSING

The majority of metallurgical testing on Las Crucitas samples was conducted in four phases by Placer Dome International (PDI) during development of the previous feasibility study completed by Cambior in 1999. In 2005, additional testing by Process Research Associates was commissioned to confirm leaching characteristics and test the use of oxygen. CyPlus also carried out further work to determine cyanide destruction parameters, and a further review of all testing was conducted

The gold extraction testwork confirmed that the ore is readily amenable to agitated cyanidation, at an optimum grind size of 150 microns. The low levels of silver and its limited recovery through cyanidation, the absence of deleterious elements consuming cyanide, and robbing the pregnant solution of the dissolved gold favour a treatment scheme with a CIP process. Whole ore cyanidation provides comparable results to the optimum results obtained with a more complex gravity plus cyanidation process, and without requiring significantly more leaching residence time.

The competent rock types are found to exhibit similar reagent consumption while the saprolite is distinct. The former requires about 2.5 kg CaO/tonne while the saprolite needs up to 3.9 kg/tonne. A short program of testing was initiated during the course of the study to examine the effect of oxygen addition in leaching and to develop cyanide destruction parameters. Leaching kinetics with oxygen were tested, and the ultimate extractions after 48 hours leaching, and the rate of dissolution was significantly improved with the oxygen addition. Final gold dissolution was 98.3% with oxygen compared with 91.3% with air.

Cyanide destruction was examined by the supplier company Cyplus in a program comparing the SO2/Air method with the CombinOx method. These reagents were added after standard leaching tests with Crucitas samples containing 125 mg/L cyanide as WAD form. Both reagent schemes were effective in reducing the cyanide content to below 1mg/L $CN_{WAD}$

A capital and operating cost comparison conducted by Cyplus indicated that the operating cost with CombinOx would be about 15% lower than with SO2/air, and capital costs would be significantly reduced. The CombinOx method was recommended.

A plant capable of processing 5,000 t/d of competent rock was selected for the basis of the design criteria. A mineral sizer will be used for initial crushing with the predominantly saprolite ore. The grinding circuit incorporates a SAG mill and a ball mill in series. Any saprolite mixture with the competent ore allows for an increase in the actual throughput capability. The leach and CIP circuits are designed to handle a maximum of 7,500 t/d during periods when almost 100% Saprolite is being treated.

The expected average recovery is 92.6% for gold and 50.0% for silver over the mine life. Saprolite yields the highest gold recovery at 96.0% compared with hard rock at 91.5%.

The CIP circuit tailings will be diluted to 25% solids and subjected to a cyanide destruction system utilising the CyPlus CombinOx process. The dilution is necessary to ensure process efficiency and minimise reagent consumption. The benign tailings will then be transferred to the tailings dam.

Water will be pumped from the tailings pond to the plant process water pond. Since the water reticulation system will have an annual net gain it will be necessary to periodically discharge excess water to the environment. Potable water and that required for cooling and pump gland seals will be obtained from well water.

## 1.6 TAILINGS AND WATER MANAGEMENT

The area of the proposed tailings facility is partially covered with jungle vegetation and is characterized by a series of hills surrounding the basin. Pond development involves joining these hills, which extend up to 95 m above the basin bottom, with a series of earthfill dams. The embankment fills extend up to 36 m above the valley that drains the area. The surface area covered by the tailings pond within the pond perimeter is approximately 165 ha and the storage capacity of the pond thus formed is about 14 Mt of tailings and some 12 Mt of waste rock produced during 9.25 years of production.

The site of the proposed tailings facility is located in the watershed of the Rio Infiernillo which drains into the Rio San Juan. Cofferdams will be required during the initial stage of construction to block the flow of the creeks across the basin.

The mean annual precipitation used in design was 3,108 mm while mean annual evaporation was estimated to be 1,000 mm. An evaluation of extreme rainfall events indicated a Probable Maximum Precipitation (PMP) daily event for a 24-hour duration of 425 mm.

The basic dam design incorporates a homogeneous saprolite fill section with internal chimney, finger and toe drains to intercept seepage and control pore pressures. The main dam crests will ultimately be constructed to typically elevation 80 m and will be some 18 m wide. The upstream slopes are provided with a 1 m thick blanket of waste rock for erosion protection. The downstream slopes are provided with rock fill and a robust geotextile for erosion protection

The deposition plan was developed to force the supernatant water away from the main dam. In order to maintain the excess storage capacity of 3.0 $Mm^3$, it will be necessary to raise the dam crest(s) on an ongoing basis.

At the end of mining operations, the pond water will continue to be completely contained within the basin and excess pond water will continue to be treated prior to release to the environment until such time as the water quality has improved and treatment is no longer required. Once the basin pond water meets applicable water quality standards; the tailings will be flooded with a minimum 1.0 m water cover and all runoff from the facility will discharge through the permanent spillway. Discharges from the facility on closure will ultimately report to the Rio Infiernillo, which in turn discharges some 10 km downstream to the Rio San Juan, along the border of Costa Rica and Nicaragua.

Staged construction of the main dam is proposed, with mine waste delivered by the mining contractor. The smaller saddle dams and containment berms may be built in a single operation or staged, if scheduling requires. It is anticipated that the initial stage of construction of the main dam would consist of a starter dam raised to elevation 60 msl in the upstream core zone of the higher dam. Cofferdams in the creek valleys will be required upstream of the dams for surface water control during the Stage 1 construction. The starter dam would provide storage for approximately 1.5 $Mm^3$ of tailings or about one year at the design mill production rates. Ongoing embankment construction would be required.

When the crests are raised to the final elevation of 80 m a storage capacity of 17 $Mm^3$ of tailings and 8 $Mm^3$ of potentially acid generating waste rock is provided.

This region of Costa Rica is seismically active and consideration of the seismic stability is therefore required. The results of the site specific seismic hazard evaluation performed by Insuma S.A., presented in a report completed in 2006, provided the recommended seismic design criteria for the dam.

The total catchment area draining to the tailings pond is 310 hectares and includes a portion of the area encompassed by the Fortuna Pit. A simple rainfall-runoff model was constructed for long duration precipitation "events" having return periods of 100 years, 1,000 years and 10,000 years. The model assumes a runoff coefficient of 0.8 for these extreme events which should provide conservatively high runoff estimates given the density of vegetation in the basin and the evaporation estimates for the area.

The tailings facility has been designed to maintain a minimum pond of supernatant water for reclaim to the mill while providing a minimum 3.0 $Mm^3$ of emergency storage capacity above the maximum operating water level. Additionally, a minimum pond volume in the order of 2 $Mm^3$ should be maintained at all times in order to provide a reliable source of reclaim water to the mill.

In order to maintain the pond at an appropriate level and also maintain the freeboard requirements, the excess water will be removed from the storage area via a barge mounted pumping system, at a closely regulated rate to ensure these operating criteria are met.

For the purposes of this report, it has been assumed that the tailings and waste rock will be acid generating, and the tailings deposition and closure plans have been designed accordingly. The tailings and waste rock will be flooded to the maximum extent practicable during the operating mine life and on closure will be flooded beneath a minimum 1.0 m water cover.

### ARD and Water Quality

In October of 2005, Vannessa awarded Golder Associates Ltd. (Golder) a mandate to review and update if necessary ARD geochemistry and water quality aspects in advancing the Crucitas project to bankable feasibility level. Review of available data was conducted and data gaps were identified. Two reports were prepared and submitted to Vanessa. The object of these reports was to provide Vannessa, and its wholly owned subsidiary in Costa Rica, Industrias Infinito S.A., data and information necessary to complete a bankable feasibility study, and to identify any potential data gaps or data requirements.

In the preparation of these reports, Golder relied on various technical reports, maps, drawings and mine plans, as well as historic documents, as specified in the list of references, as well as on its experience in this area. The original data files come from a backup prepared by Cambior and IMC in a 1999 study or by the former owner, Placer Dome Inc (PDI), prior to 1999. These files include a mine plan designed by Cambior in 1999, environmental geochemistry data by PDI in 1996 and 1997, and a previous feasibility study from Cambior in 1999 prior to the adoption of the National Instrument 43-101 in February, 2001.

A hydrogeochemist from Golder visited the Crucitas project site in Costa Rica in November, 2005 and Golder had access to drill core and drill logs available on site. The ARD reports, Acid Base Accounting (ABA) testing and humidity cell (kinetic) tests have been carried out as part of previous PDI studies and were reviewed for completeness by Golder. Testing results indicate that the saprolite is non-acid generating while the hard rock from below the saprolite has been characterized as potentially acid generating. Kinetic testing of simulated plant tailings, after cyanide destruction, is in progress and results will be used in the detailed engineering phase for final design of the effluent water treatment system. It is also recommended that additional short term leach data on waste rock be completed to supplement existing data.

A water quality model was prepared based on data as provided in previous feasibility studies and adjusted based on the proposed mine plan as of August, 2006. Baseline and process water data used in the predictive water quality modeling were data collected and reported during the initial feasibility studies. It is recommended that the baseline water quality data and process water data be updated to provide a complete suite of geochemical parameters for each of the geochemical inputs. The water quality model should be updated when these data are available to increase the predictive capabilities of the water quality model. If the conclusions significantly change, an addendum to the feasibility study should be prepared and submitted based on the updated results.

Existing geochemical data suggests that acid rock drainage and metal leaching will occur within the pit walls, and geochemical modeling suggests water in the pit sumps will significantly impact the water quality of the WSFP. Because the water in the open pit will likely be characterized by low-pH, sulphate-and metal-rich water, water collected in the open pit sump may need to be treated before being discharged into the WSFP.

At closure, the water in the pit sumps should initially be treated to prevent the accumulation of large volume of water with poor water quality. This treatment should be continued during the flooding of the pit depending on the rock types (i.e., sulfide-bearing rock) that are exposed to the atmosphere as the water level rises in the pit. Once the pit is flooded there should not be any water quality issues related to the pits assuming the water was adequately treated and that the portion of the pit walls containing sulphide minerals are no longer be exposed to atmospheric conditions.

Results of model simulations indicate that several elements may potentially exceed Costa Rican drinking water guidelines within the WSFP, including Al, As, Cu, Mn, Ni and SO4. Concentrations of Al, As, CN, and Cu also exceed Costa Rican industrial effluent guidelines. These results are consistent with the previous feasibility study that suggested that the concentrations of metals within the WFSP are elevated during the operation period and will likely require treatment. Given that many of the model inputs were the same as those used by the previous study; it is not surprising that the predictions of the final water quality of the WSFP are similar. Furthermore, the model simulations indicate that the concentrations of metals are higher during active mine operations as compared to the post closure times.

Because elevated concentrations of sulphate and metals are expected to occur in the WSFP and will likely impact downstream receivers if discharged to the environment, a treatment system is required, and as a minimum will need to achieve concentrations of metals that comply with Costa Rican industrial guidelines.

Although standard treatment systems can reduce concentrations to below industrial guidelines, discharges after treatment often exceed the more strict water quality guidelines of downstream receivers. In such cases, a permit is usually required to discharge effluents that will impact the water quality of receivers off-site. Often times supplemental ecological and aquatic assessments on the receiving water courses are required as part of environmental assessment studies. The environmental assessment should be reviewed to ensure that due consideration has been given to potential changes in the receiving water quality, and appropriate changes to the water treatment system will be required if necessary.

**Water Treatment**

A treatment system for the surplus water discharged from the pond is included, to ensure that discharge criteria for the receiving stream are attained. Since the metal content of this water will essentially be due to open pit drainage water, lime will be added in the open pit sumps to enhance metal precipitation in the tailings pond. Treatment of the surplus discharged water will consist of additional lime addition and pH correction. A wetland will be constructed in the receiving water course to achieve reduction of suspended solids and ammonia content of the discharged surplus water. The effectiveness of the treatment system and implications of discharge on downstream water quality will be assessed during final design.

## 1.7 POWER SUPPLY AND COMMUNICATIONS

A 14 kV mono-phase power line presently ends some 7 km from Crucitas. This line will be extended in the next few months to the small settlement of Crucitas and will be useful as a power source during construction.

It has been determined that the normally used supply voltage of 25 kV will not be adequate for the load (estimated at 5.4 MW) and it is planned to build a new 69 kV line from the Muelle substation to Crucitas, a distance of approximately 80 km. The first 30 km would follow the paved highway (number 35) then from Buenos Aires to Crucitas it would follow the present road via Coopevega.

An agreement has been negotiated with Coopelesca which will require that IISA supplies all the materials for the line (poles, insulators, cable, hardware) and Coopelesca will be responsible for arranging the right of way and the installation of the line. The feeder line from the main substation at Penas Blancas (15 km away) will be the responsibility of Coopelesca.

The main electrical substation will be located near the plant and will transform the 69 kV supply to 4160 V for supplying the SAG and ball mills and will be further transformed to lower voltages for motors and lighting.

A microwave link with the San José office will be re-established with the installation of a new tower and transmission equipment. Sufficient band width will be available for multi-line telephone and internet use. Cellular telephone communication already operates on site. The new communication system will be installed during the first months of construction.

## 1.8 INFRASTRUCTURE

The Coopevega road will be the main access to the Crucitas Project and the upgrading of this road is one of the responsibilities of the company set out in the environmental operating permit. An alternative route via Concho and Llano Verde has been upgraded by the government, and this will offer an alternative route if required. This may be especially important while the Coopevega road is being upgraded. Less than 7 km will need some upgrading to allow heavy loads to reach site from Llano Verde. The 10 km section of road from Chamorro to Crucitas is being upgraded to an adequate standard by the municipality, with financial help from IISA.
The Crucitas Project has the possibility of using an existing airstrip, which is 8 km from the mill site along the road to Concho, but no plans have been made to upgrade this. Ground transport will be used for shipping gold (insurance will be provided by the shipper). With an upgraded road, travel by car to the mine will be facilitated and is not unreasonably long

Service buildings will erected at the site but will include some of the existing buildings, which will be upgraded or expanded to suit the project demand. They include:

- Change Rooms and First Aid Building.
- Administration Building.
- Truck Shop and Warehouse building.
- Fuel Handling & Storage.
- Assay Laboratory.
- Dining Room expanded.
- Accommodation buildings.
- Reagent storage, explosive storage, etc.

## 1.9 ENVIRONMENTAL MANAGEMENT

A number of socio-economic studies have been completed for the proposed project area. These include land use, landscape characterization, socio-economic characterization, social profiles, and public opinion studies. Although most of these studies were conducted in 1996 they have proved to be sufficient to define the baseline socio-economic environment and provide supporting information for an Environmental Impact Study (EIS). In the preparation of the EIS and its approval process, various commitments have been made by Vannessa to help the local community infrastructure and develop sustainable economic activity. These commitments have been formalized in annexes to the EIS and are set out in the Environmental Operating Permit.

The Environmental Management Plan (EMP) was one of the most important sections of the EIS. The Crucitas EMP contains individual proactive management plans. It includes forestry, wildlife habitat, wastewater treatment, acid rock drainage prevention and control, surface water management, erosion control, environmental monitoring and reclamation/closure plan. In addition to an environmental manager, three graduates will also be employed by Vannessa to ensure full compliance with all regulations and responsibilities set out in the EMP. An environmental auditor will also be contracted to carry out periodic surveys of all aspects of the project.

The reclamation process will be consistent with local land use objectives and Equator Principles. The goals are to mitigate the effects of land disturbances by minimizing potential adverse effects to water resources, minimizing or eliminating public safety hazards, providing long term stable landform configurations and reclaiming surface disturbances for beneficial use consistent with local land use practice. It is anticipated that the site will be returned to productive land uses to include managed forestry and wildlife habitat.

### 1.10 SOCIO-ECONOMIC

A number of socioeconomic studies have been completed for the proposed project area. These include land use, landscape characterization, socioeconomic characterization, social profiles, and public opinion studies. Although most of these studies were conducted in 1996, changes have not been great in the socioeconomic status of the towns and villages in northern Costa Rica. Some minor additional work has been carried out more recently and with these, sufficient supporting information for an Environmental Impact Study (EIS) was available. On going studies form a part of the responsibilities of the company during construction and operation.

A public meeting held in 2004, attended by approximately 1200 people, found broad local support for the project. A substantial public relations effort using the press, radio and television is being maintained by the company to ensure that the local population is fully informed of development of the project and this will be maintained throughout the operation of the project.

Potential socioeconomic benefits include the creation of direct and indirect jobs, and revenues developed from property, sales, and income taxes; improvements of roads; development of trade; employee training; training of the youth; and support of schools and rural organizations by the company and its employees. These responsibilities are set out in the environmental operation permit and include the supply of an ambulance and upgrading of rural clinics and schools.

During the past 5 years a great deal of work has been carried out by the company to lay the groundwork for on-going socioeconomic development of the region and training programs, in organic farming, cheese production, clothing manufacture and computer technology, are already being run by the company. Further courses are planned, some to prepare local people for work with the mine, others to prepare them for other economic activity. A dedicated training centre will be built by Vannessa in Coopevega for on-going training.

A feasibility study, for setting up a cooperative in the area, is being prepared by the Canadian Cooperative Association and the company is funding this study. Some of the areas of activity which are being considered are organic agriculture, forestry products, textiles and furniture manufacture. Where possible the proposed cooperative will be involved in activities associated with the construction and operation of the mine. Funding of the socioeconomic development directly from the company will be through payment into a trust fund based on the tonnage of ore treated and grants from international organizations will be also be pursued. A dedicated manager with support staff will be employed to ensure the smooth running of the programs.

Where feasible, Vannessa will support the Cost Rican economy by purchasing locally. During construction, concrete and most materials necessary to construct auxiliary buildings will be purchased in-country. During operations, most food, fuel and lubricants will be purchased from local suppliers.

## 1.11 PROJECT CAPITAL COST

The project initial capital cost is summarized in Table 1.5. These costs include all direct and indirect costs plus a contingency allowance. Mining capital costs include mobilization of the contractor and materials for technical control of the contracted mining.

**Table 1.5**
**Summary of Estimated Capital Costs**

| Item | Estimated Capital Cost ($US) |
|---|---|
| **Direct Costs** | |
| Mining | 400,000 |
| Process Plant | 21,958,173 |
| Tailings Management Facilities (preproduction) | 3,340,000 |
| Power Transmission Line | 2,570,000 |
| Sub-Station | 1,439,335 |
| Infrastructure | 4,051,492 |
| Effluent Treatment | 500,000 |
| **Sub-Total Direct Costs** | **34,259,000** |
| **Indirect Costs** | |
| Owner's Costs | 1,905,312 |
| Insurance | 445,000 |
| EPCM | 3,404,464 |
| Field Indirects | 177,500 |
| Reagents and Wear Parts Stock | 851,000 |
| First Fills | 277,633 |
| Spare Parts | 770,000 |
| Vendor Assistance | 50,000 |
| Wet Commissioning | 377,523 |
| Sales Tax on buildings and materials | 260,000 |
| Contingency | 4,254,000 |
| **Sub-Total Indirect Costs** | **12,772,432** |
| **TOTAL ESTIMATED CAPITAL COSTS** | **47,031,432** |

The direct construction costs presented in this table include all areas of the project requiring initial capital expenditures. All costs include equipment, material and labour. Equipment items purchased in Costa Rica are costed exclusive of sales tax, for which Vannessa expects to be exonerated. Sales tax at 13% is applied to approximately $2 million of purchases representing the cost of materials for the camp and related buildings.

The indirect costs include all construction related items such as engineering, procurement, construction management, construction equipment, personnel transportation, room & board, freight, first reagents fill, capital spares, etc.

Sustaining capital is estimated over the mine life for tailings dam raising and infrastructure items replacement. Allowances for project closure at $3 million, and a probable salvage value of $1.5 million, are included.

## 1.12 PROJECT OPERATING COSTS

The project operating costs have been developed on an annual basis recognizing the variation in the processed ore tonnes and saprolite: hard rock ratio. Averaged over the mine life, the operating costs are as shown in Table 1.6.

**Table 1.6**
**Summary of Operating Costs**

| Item | Saprolite ($/t) | Hard Rock ($/t) | Total $/t |
|---|---|---|---|
| Mining, per tonne rock | 2.18 | 1.66 | 1.78 |
| Processing | 4.86 | 6.61 | 6.19 |
| G&A | 2.29 | 2.79 | 2.67 |
| **Total, per ore tonne** | | | **13.15** |

Apart from mining and earthmoving costs quoted by a contractor, the operating costs have been developed from first principles, as detailed in the Feasibility Study. Subsequent to the Feasibility Study, G&A operating costs are refined slightly by reducing the personnel force by 6 persons, deemed superfluous in the contact mining situation, and associated vehicle costs.

## 1.13 ECONOMIC AND FINANCIAL ANALYSIS

### Economic Evaluation

A discounted cash flow analysis has been prepared on the basis of the project production and costs developed in the foregoing sections. Vannessa has supplied the tax calculation basis after recent meetings with consultants in Costa Rica. Tax calculations include:

- Corporate tax rate of 30%, plus minor municipal and local land taxes.

- Exoneration from the 13% sales tax except on materials (approximately $2 million cost) for office and similar buildings.

- Previous exploration expenses of $24.5 million may be used to reduce the taxable profit in proportion to gold sales, based on a previously licensed gold total production of 1,007,210 ounces, or $24.32 per ounce. Since the amount is calculated in Colones, the dollar value is devalued in each subsequent year by 10%.

- Depreciation of total project capital cost to zero during life of mine period.

The summary results of this analysis are presented in Table 1.7, for contractor mining. The base case assumes mining of the saprolite ore plus the economic hard rock ore, with the alternative case of saprolite-only production. The cash cost of gold production includes the credit for silver sales applied as a deduction from the total operating cost, with the result expressed as net operating cost per ounce of gold sold.

**Table 1.7**
**Economic Evaluation**

| | Contract Mining | |
|---|---|---|
| | **Total ore** | **Saprolite only** |
| Life of mine operating cost, $/t ore | 13.15 | 12.05 |
| Pre-production capital cost, $ | 47,031,000 | 47,031,000 |
| Total Gold Produced, oz | 636,530 | 165,340 |
| Cash Cost (LOM Average) $/oz Au with Ag credit | 299.48 | 254.18 |
| Ore Mined tonnes | 14,914,000 | 3,586,000 |
| Average Grade g/t | 1.43 | 1.49 |
| Stripping Ratio (Mine Life) | 1.42 | 0.82 |
| Gold Price $/oz | 550 | 550 |
| Cashflow pre-tax $ | 84,935,000 | -3,247,000 |
| Cashflow after tax $ | 61,179,000 | -5,842,000 |
| IRR , after tax | 26.0 | -6.8 |
| NPV 10%, after tax | 24,528,000 | -11,132,000 |
| Payback period years | 3.0 | NA |

### Sensitivity Analysis

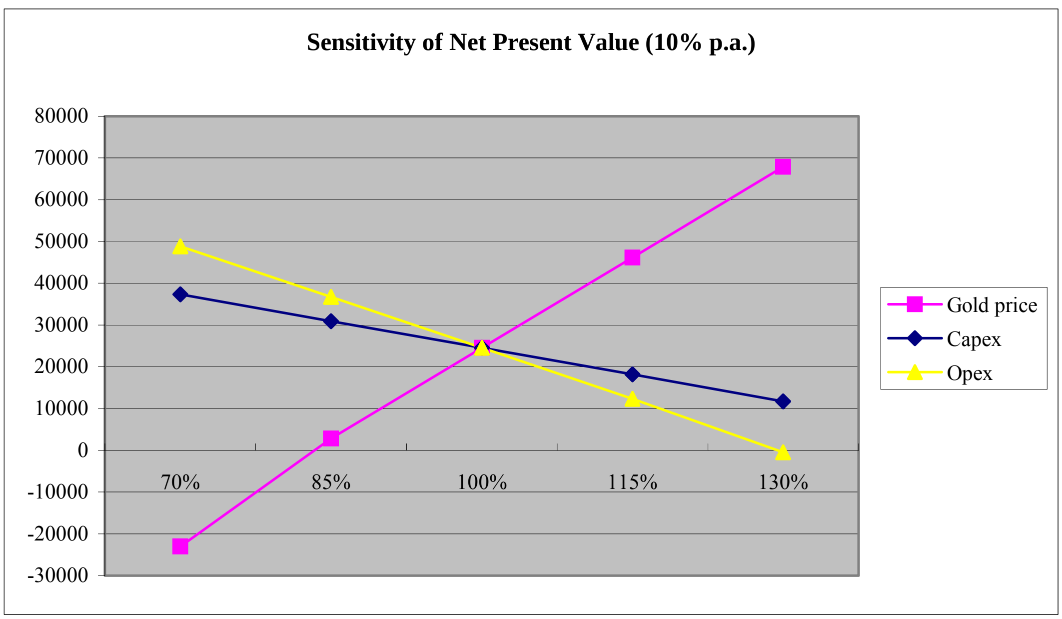
Sensitivity analysis on the whole ore base case, indicates the following in Table 1.8.

The sensitivity analysis reveals that the project is most sensitive to gold price, followed by operating costs and finally to capital costs. This is illustrated in Figure 1.4.

**Table 1.8**
**Sensitivity Analyses, Whole ore, Contract Mining**

| Description | Favourable Change | | Base Case | Unfavourable Change | |
|---|---|---|---|---|---|
| Gold Prices | +15% | 633 | 550 | -15% | 468 |
| IRR | | 38.43 | 25.99 | | 12.01 |
| Cash Flow | | 97,128,000 | 61,179,000 | | 25,070,000 |
| NPV10% | | 46,210,000 | 24,528,000 | | 2,794,000 |
| | | | | | |
| Capital Costs, life of mine | -15% | 50,285,000 | 59,159,000 | +15% | 68,033,000 |
| IRR | | 33.42 | 25.99 | | 20.41 |
| Cash Flow | | 68,016,000 | 61,179,000 | | 54,342,000 |
| NPV10% | | 30,920,000 | 24,528,000 | | 18,135,000 |
| | | | | | |
| Operating Expenses $/t | -15% | 10.88 | 13.15 | +15% | 14.72 |
| IRR (before depreciation) | | 32.68 | 25.99 | | 18.63 |
| Cash Flow | | 82,002,000 | 61,179,000 | | 40,356,000 |
| NPV10% | | 36,703,000 | 24,528,000 | | 12,352,000 |

**Figure 1.4**
**Sensitivity of Net Present Value**




## 1.14 PROJECT EXECUTION PLAN

The project construction period is expected to be 16 months. During construction the labour force on-site is expected to peak at 270 workers.

Much work has already been done to identify contractors for the project, not only for construction but also for engineering. Unit costs quoted for design and construction have been supplied by these potential contactors and have been used in this feasibility study. All concerned are familiar with the project and this process will continue through the summer of 2006. Vannessa plans to carry out the EPCM activities with its own forces, rather than hiring a large specialized company. With this approach, it is expected that considerable time will be saved. The methodology for managing the project and the schedule are based on experience gained in a very similar project in another Latin American country and from detailed discussions with contractors and suppliers.

## 1.15 ORGANIZATIONAL STRUCTURE AND OPERATING POLICIES

The structures for operating the mine and plant have been detailed and are considered normal for this type of operation. The environmental management, public relations and corporate social responsibility departments are larger and more specifically defined than for most operations of this size and reflect the seriousness of Vannessa and the Costa Rican government in dealing with these matters.

Staffing will include very few expatriates as Costa Rica possesses an excellent education system. Only key positions in mine and plant operation will be require foreign specialists and these will be substituted by local graduates when trained. It is a condition of the environmental operating permit that the company will try to employ up to 75% of the workforce from the local communities and the training programs already started are part of Vannessa’s effort to achieve this objective. In addition to normal employment policies such as no sexual discrimination, great care will be taken to only employ Costa Rican citizens or foreigners with full working privileges. This is important as the Nicaraguan border is nearby and many illegal immigrants are present in the region.

## 1.16 RECOMMENDATIONS AND CONCLUSIONS

The project is viable based on the total resource, at the base case gold price used ($550/oz.).

The project may be viable for saprolite mining alone if the gold price is higher and / or inferred resources are converted to the indicated category by further drilling.

Industrias Infinito should prepare the application for the environmental permit for mining hard rock resources, as additional impacts are limited and the feasibility study has identified changes to the original project plan that reduce some impacts. Significantly reduced disturbed areas, and the availability of land recently purchased by Industrias Infinito, provide an opportunity to reduce and mitigate any environmental impact of the development versus the original concept in the previous studies of the project.

Social programs are already well developed and should continue.

Considerable geological exploration potential exists in the immediate vicinity of the Crucitas resource, both to convert inferred resources to the indicated category and to develop new resources. Further exploration is recommended to ensure that all economically recoverable resources are developed in a logical and environmentally sensitive manner.

The exploration potential on a more regional level in the 196 square km of exploration concessions owned by Industrias Infinito is considerable and further exploration is recommended.

# 2.0 INTRODUCTION

On November 15, 2005 Vannessa Ventures Ltd, (Vannessa) through their wholly owned subsidiary Industrias Infinito S.A., contracted with Micon International Limited to conduct a bankable feasibility study for the Crucitas Gold Project. Portions of the study were contracted directly by Vannessa to Golder Associates and to System Geostat International Inc (Geostat). In the study, all mining activities were considered, and costed, on the basis of using owner's personnel and equipment. Micon completed and issued the study report in July 2006.

Subsequently, Vannessa has discussed the possibility of contract mining with potential contractors and received an attractive proposal from an experienced mining contractor in mid-August 2006. The contractor has wide experience in Central and South America. An operation run by the contractor has been visited several times by Vannessa personnel and direct observation, together with the opinion of the mine management, indicates that the mining contractor is very competent. The contractor is familiar with the Crucitas project after visiting the area on three occasions and having studied in detail the mine plans and tailing dam design. As a result of the discussions between Vannessa and the contractor an addendum report was undertaken, based on all mining activities conducted by a Contractor. Minor refinements to the G &A operating cost, subsequent to the feasibility study, are also employed in this Addendum.

The feasibility study provides a description of the geology, mining and milling operations, tailings facilities, services and other facilities, together with the associated capital and operating costs, required to develop the Crucitas Project. The study includes description of the mining plan and mine operations, processing requirements, the tailings and water management systems, the necessary site infrastructure and presents the environmental, permitting and socio-economic considerations in undertaking the project.

This report summarizes the feasibility study and subsequent addendum and a complete copy of the full feasibility study and addendum are located in the Vannessa offices in Calgary, AB. Canada.

The geological setting of the property, mineralization style and occurrences, and exploration history were described in a report that was prepared by Lafleur (2006) and in various government and other publications listed in Section 21 "References". The relevant sections of those reports are reproduced herein.

Micon conducted this study in conjunction with a number of other consultants responsible for specific technical areas, as shown in Table 2.1.

A number of the authors conducted personal inspections of the Crucitas property during their site visits, as noted in the attached authors'certificates.

**Table 2.1**
**Feasibility Study Team**

| | |
|---|---|
| Mineral resource estimate | Geostat International Ltd |
| Mineral reserve estimate, mine plan, mine equipment and mine facilities. | Micon International Limited |
| Open pit geotechnical (slope) studies | Golder Associates Ltd. |
| Process engineering | Micon International Limited and Met-Chem |
| Mine rock and tailings disposal | Golder Associates Ltd. |
| Environmental baseline studies | Golder Associates Ltd. |
| Environmental management plan and permitting | Golder Associates Ltd. |
| Infrastructure and plant design, capital expenditures and operating costs | Micon International Limited and Met-Chem |
| Economic evaluation | Micon International Limited |

All costs are estimated in United States (US) dollars as of the first quarter of 2006. The exchange rate used in the conversion of the local Costa Rican currency is 1 US dollar = 480 Colones (¢). Quantities are generally stated in SI units, the Canadian and international practice, including metric tons (tonnes, t) and kilograms (kg) for weight, kilometres (km) or metres (m) for distance, hectares (ha) for area, grams (g) and grams per metric tonne (g/t) for gold grades (g/t Au).

Precious metal grades may be expressed in parts per billion (ppb) or grams per metric tonne (g/t) and quantities may also be reported in troy ounces (ounces, oz), a common practice in the mining industry. Early exploration work on the property was conducted using the imperial system of measurement and the exploration grid and certain early exploration results may be expressed in feet (ft) although these were converted to metric measurements for resource estimation. Table 2.2 summarizes a list of the various abbreviations used throughout this report.

**Table 2.2**
**List of Abbreviations**

| | |
|---|---|
| Acid base accounting | ABA |
| Acid rock drainage | ARD |
| Centimetre(s) | Cm |
| Ammonium Nitrate – Fuel Oil | ANFO |
| Centimetres per second | cm/s |
| Co-disposal area | CDA |
| Cubic metre(s) | $m^3$ |
| Cubic metres per day | $m^3$/d |
| Cubic metres per second | $m^3$/s |
| Cubic metres per year | $m^3$/y |
| Day(s) | D |
| Days per week | d/w |
| Degree(s) | $^o$ |
| Degrees Celsius | $^o$C |
| Dollar(s), Canadian and US | $, Cdn$ and US$ |
| Engineering, procurement and construction management | EPCM |
| Environmental design flood | EDF |

| | |
|---|---|
| Environmental Protection Agency (US Federal) | EPA |
| Foot(feet) | Ft |
| Geostat International Inc. | Geostat |
| Golder Associates | Golder |
| Hectare(s) | Ha |
| Hertz | Hz |
| Horse power | HP |
| Hour(s) | H |
| Hydraulic conductivity | K |
| Inductively coupled plasma-optical emission spectrometry/mass spectrometry | ICP-OES/MS |
| Inch(es) | In |
| Industrias Infinito S.A. | Industrias Infinito |
| Litre(s) | L |
| Kilogram(s) | Kg |
| Kilograms per day | kg/d |
| Kilometre(s) | Km |
| Kilovolt(s) | kV |
| Kilowatthours per tonne | kWh/t |
| KiloNewton per cubic metre | $kN/m^3$ |
| Megapascal(s) | MPa |
| Megavoltampere(s) | MVA |
| Metal Mining Effluent Regulations (Federal) | MMER |
| Metre(s) | M |
| Micron(s) | Mm |
| Million years | Ma |
| Milligram(s) | Mg |
| Millimetre(s) | Mm |
| Minute(s) | Min |
| Net acid generating | NAG |
| Net present value | NPV |
| Net smelter return | NSR |
| Not available/applicable | n.a. |
| Peak ground acceleration (acceleration due to gravity) | G |
| Percent(age) | % |
| Platinum group metals | PGM |
| Placer Dome de Costa Rica | PDCR |
| Probable maximum precipitation | PMP |
| Rock Mass Quality | RMQ |
| Rock Quality Designation | RQD |
| Second | S |
| Specific gravity | SG |
| Uniaxial compressive strength | UCS |
| US gallons per minute | USgpm |
| Volt(s) | V |
| Weight percent | wt% |
| x-ray diffraction | XRD |
| Years(s) | Y |
| SGS Lakefield Research Limited | SGS |
| Vannessa Ventures Ltd | Vanessa |

## 3.0 RELIANCE ON OTHER EXPERTS

Micon has reviewed and analyzed data provided by Vanessa, Industrias Infinito S.A., its consultants and previous operators of the property, and has drawn its own conclusions therefrom. Micon has not carried out any independent exploration work, drilled any holes or carried out any sampling and assaying.

While exercising all reasonable diligence in checking, confirming and testing it, Micon has relied upon the data presented by Vanessa, Industrias Infinito, the previous operators and the feasibility technical team listed in Table 2.1 in formulating its opinion. Micon accepts in good faith that Vanessa, Industrias Infinito, previous operators and the members of the feasibility technical team, not working under Micon’s direct supervision, disclosed all relevant data during the development and preparation of the feasibility study.

The various agreements under which Vanessa and Industrias Infinito holds title to the mineral lands for this project have not been investigated or confirmed by Micon and Micon offers no opinion as to the validity of the mineral title claimed. A reference to a description of the property, ownership thereof, lease payments, royalties, etc. as set out in this report and a previous Technical Report, is provided for general information purposes only.

The geological, mineralization and exploration descriptions used in this report are taken from reports prepared by Vanessa, Industrias Infinito, or their contracted consultants.

Micon and the members of the feasibility technical team are pleased to acknowledge the helpful cooperation of Vanessa and Industrias Infinito management and field staff, all of whom made any and all data requested available and responded openly and helpfully to all questions, queries and requests for material.

## 4.0 PROPERTY DESCRIPTION AND LOCATION

The property description and location for the Crucitas project were originally set out in a Technical Report entitled "Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary", a report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since the technical report was filed on SEDAR in April, 2006 there has not been any material change in this information and the information contained in the April report remains valid.

## 5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

The accessibility, climate, local resources, infrastructure and physiography descriptions for the Crucitas project are set out in a Technical Report entitled "Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary", a report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since the technical report was filed on SEDAR in April, 2006 there has not been any material change in this information and the information contained in the April report remains valid.

## 6.0 HISTORY

The history of the Crucitas project is described in a Technical Report entitled "Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary", a report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since the technical report was filed on SEDAR in April, 2006 there has not been any material change in this information and the information contained in the April report remains valid.

## 7.0 GEOLOGICAL SETTING

The geological setting for the Crucitas project is described in a Technical Report entitled "Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary", a report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since the technical report was filed on SEDAR in April, 2006 there has not been any material change in this information and the information contained in the April report remains valid.

## 8.0 DEPOSIT TYPES

The deposit type descriptions for the Crucitas project are set out in a Technical Report entitled "Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary", a report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since the technical report was filed on SEDAR in April, 2006 there has not been any material change in this information and the information contained in the April report remains valid.

## 9.0 MINERALIZATION

The mineralization styles seen at the Crucitas project are described in a Technical Report entitled "Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary", a report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since the technical report was filed on SEDAR in April, 2006 there has not been any material change in this information and the information contained in the April report remains valid.

# 10.0 EXPLORATION

The results of previous surface exploration at the Crucitas project are described in a Technical Report entitled "Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary", a report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. This technical report is included as Appendix 3A of the feasibility study and since the report was filed on SEDAR in April, 2006 there has not been any material change in this information and it remains valid. The information contained in the April, 2006 report is quoted below.

## 10.1 PROSPECTING AND DISCOVERY BY PDI

"The Crucitas project was initially explored in 1992 by Tim Coates and Associates (TC & A), a small geological consulting firm that carried out initial prospecting work in the district and made the discovery after taking stream sediment, rock chips and soil samples in the Crucitas area. Silicified and pyritized boulders were first discovered in several streambeds. The boulders were sampled along with the stream sediments. Although none of the rock chip samples returned encouraging gold assay results, a stream sediment collected from the creek now known as Discovery Creek assayed > 10 parts per million (ppm) gold. Follow-up stream sediment sampling and prospecting outlined a large gold anomaly, with many of the drainages over an area > 5 km2 yielding anomalous values. Chip samples from silicified tuffs and hydrothermal breccias in the creek beds returned assay values ranging from 0.2 to 10 ppm gold."

"A total of sixty, stream sediment, rock chip, and soil samples were collected in the Crucitas area. The technique used consisted in collecting 5 kg of silt in the active bed of the creek by using a minus 10 mesh sieve. Panning was also carried out to determine the presence of visible gold. The rock samples were collected by chip sampling mineralized boulders, while soil sampling consisted of collecting 5 kg of C horizon material with a hoe pick."

## 10.2 SOIL SURVEY

"In late 1992, TC & A optioned the property to PDI that established a local subsidiary company, Placer Dome Costa Rica (PDCR) and undertook systematic exploration work on the property and neighbouring concessions. A soil survey grid was established over the gold anomalies' areas. It covered an area of 3 km2, from which over 2,500 soil samples were collected. Twenty-five grid lines were cut with the use of a compass and hip chain. They totaled 68.5 km, spaced every 100 m, and on average were 1.5 km long in an east-west direction. Soil samples were taken at 50 m intervals along the grid lines by using a hand auger. Two samples were collected at each site: an upper profile sample from 0.7 to 1.0 m in depth, and a lower profile sample from 1.7 to 2.0 m in depth below the surface. Each sample consisted of approximately 500 grams (g) of material. A brief description was made for each of the samples, which included color, oxide mineralogy, and quartz vein content."

"The results of the soil survey outlined an extensive area of anomalous gold greater than 500 ppb. There was no significant difference between the gold results in the upper and lower profile samples. The gold anomalies outlined by the soil survey were further tested by diamond drilling."

## 10.3 PETROGRAPHY

"Three independent petrographers conducted separate studies on a total of 70 samples collected from predominantly core samples of the Fortuna and Botija deposits. The samples came from volcanic flows, fragmental pyroclastics, and hydrothermal breccias."

"Glass shards and devitrification textures were commonly observed in the PCT samples, indicating a volcanic ash matrix. Primary sanidine-orthoclase and secondary adularia were the most common types of K-feldspar observed in the volcanic flows. The petrography of the intensely altered samples points to a complex relationship between the quartz-adularia-pyrite alteration and the intense silicification events."

"Three samples exhibiting visible gold in sulphide-rich veins were also examined. The petrography indicated that native gold occurs in two principal modes:"

- "The common mode is Au angular to irregular grains, 20 to 500 microns in size, interstitial to the quartz grains, and unassociated with the sulphides."
- "The other occurrence is Au associated, with pyrite grains at the edge of quartz veins in contact with the wallrock."

"A mineralogical study conducted by Stephen Kessler at the University of Michigan was performed on eight gold bearing vein samples of the Fortuna deposit using microscopy and SEM microbeam examinations. The study confirmed that the gold occurs as Ag-bearing native gold, either as free grains up to 1 mm in size, or as inclusions in pyrite and goethite. All the gold is closely associated with veining either in or at the edge of veins. It was impossible to determine whether gold was present as inclusions or solid solution in the disseminated pyrite present in the altered wallrock."

"The ore mineralogy includes native gold, pyrite, goethite, argentite, Ag-bearing tetrahedrite, chalcopyrite, and covellite. The shape of the native gold varies as a function of the mineral assemblage: Gold occurs as inclusions in goethite or pyrite and is usually rounded, while angular shapes are more common in quartz-adularia veins. There is no significant difference in the fineness between the goethite or pyrite inclusions, or the native grains in veins. This suggests that gold has not relocated during oxidation."

"Pyrite is widespread and occurs in grain sizes that vary from a few microns to 2 cm. At least two generations of pyrite are present:"

- “A first generation consists of relatively coarse-grained euhedral crystals disseminated throughout the rock. No gold inclusions were detected in any of those pyrite grains.”

- “The second generation of pyrite is found in veins and is associated with free gold and local argentite.”

“Goethite occurs in the weathered samples, replacing Fe-bearing sulphides of mainly pyrite and chalcopyrite. It is found both in veins and in wallrock, and in some case, as much as 10 cm away from the veins. Chalcopyrite occurs in minor amounts and is associated with Ag-bearing tetrahedrite in the pyrite-rich veins. There is no evidence that the goethite is hypogene.”

“The mineralogy of the ore-related hydrothermal alteration in these samples is mainly adularia and secondary quartz. The adularia occurs as vein mineral and also as replacement mineral in the wallrock. The secondary quartz is also common as vein and wallrock mineral. Sericite and kaolinite are found locally, but do not appear to be major components of the alteration assemblage. Instead, these minerals are more likely associated with late-stage retrograde metamorphism. The mineralogy has confirmed that the host rocks are quartz poor and K-feldspar rich. The volcanics were described as trachytes.”

## 11.0 DRILLING

The information contained in this portion of the report was extracted from Appendix 3A of the feasibility study. Appendix 3A of the feasibility study is a Technical Report entitled "Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary", which is a Geostat report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since this report was filed on SEDAR in April, 2006 there has not been any material change in this information and it remains valid. The information contained in the April, 2006 report is quoted below.

"A total of 251 exploration or in-fill diamond drill holes have been completed to date. As well, an additional 27 geotechnical, or water well holes, and 90 Trado (mechanical auger) holes are shown on Table 11.1, List of Drill Holes by Sector.

Most of the holes drilled are located within the Fortuna, Botija, and Fuentes zones. The depth of the holes ranges from 1.0 to 236.2 m."

**Table 11.1**
**List of Drill Holes by Sector**

| Zone | Number of holes | Drill spacing | Zone dimension | Meterage |
|---|---|---|---|---|
| **Fortuna** | 137 | 50 m x 25 m | 1.3 km x 0.5 km | 20 359 |
| **Botija** | 61 | 50 m x 25 m | 0.5 km x 0.5 km | 7 662 |
| **Fuentes** | 26 | 100 m x 50 m | 0.5 km x 0.5 km | 3 170 |
| **Exploration** | 27 | - | - | 3188 |
| **Geotechnical** | 27 | - | - | 831 |
| **Trado (auger)** | 90 | 100 m x 100 m | 2.5 km x 2.0 km | 894 |
| **Total** | **368** | - | - | **36,104** |

"Three drill contractors were involved with the drilling at Crucitas. A local drilling contractor, Cimco S.A., drilled the initial holes using a Longyear 38. The holes drilled were HQ and NQ size. A second drilling contractor, Geotech Boyles Bros. S.A. (Boytec), drilled from hole DH94-15 onward with a similar machine. Two drill rigs completed the first drilling campaign with hole DH94-24 in May 1994. A second drilling program was contracted to Geotech Boyles in late 1994 to define the two best targets, now known as Fortuna and Botija. J.T. Thomas Ltd was also contracted from hole DH95-52 onward using Longyear 38 machines and HQ size holes. The initial 100 m x 100 m drilling pattern was later in-filled using a 25 m x 50 m pattern to test the continuity of the high grade gold mineralization. In 1999, four condemnations and eleven geotechnical holes, HQ size, were drilled by IMNSA using one Longyear 34 and one Longyear 38."

"Technical problems encountered with drilling were mostly associated with poor saprolite recovery. Slow and careful drilling, with low water pressure and the use of special bits, usually obtained the best results."

"Core orientation measurement procedures were implemented starting with hole DH94-27. The device used consisted of a long narrow rod with a red crayon attached at the end which was lowered slowly through the drill bit to mark the lower edge of the core. By using additional orientation equipment, the structures were rotated in their proper position and tabulated in the drill hole logs. The majority of the drill holes were directed to the west at an inclination that ranged between 45 to 60o from the horizontal. This was determined to be the most appropriate direction of drilling based on the structural study of the oriented core."

"A saprolite auger program was established in the area north of the Botija zone, in the Coyote zone area and northwest of the Fortuna zone. A total of 90 Trado Holes were completed on a 100 m grid to test extensive (> 1.0 g Au/t) geochemical anomaly and high resistivity values. The depth of the auger holes ranged from 5 to 20 m, depending on the ground conditions and defined anomalous zones, down to an average depth of 10 m. A quality control program was implemented to handle the auger samples. A sample was consistently collected every meter. To avoid any bias, the entire sample was collected and then dried. The sample was put through a cone crusher and then split repeatedly to approximately 300 g. Every 5$^{th}$ sample was a hidden standard or blank, and every 10$^{th}$ sample was a duplicate."

"A total of twenty five geotechnical holes were drilled. These holes were located in the area of potential mine tailings and waste dump areas. The depth of the HQ size drill holes ranged from 15.3 to 50.0 m. Bedrock was not encountered in any of these holes. The saprolite and saprock horizons were sampled to determine any gold potential. Only one geotechnical hole returned anomalous gold values. This hole, GT96-6, is located near the northwest Fortuna trend at the northeastern edge of the proposed tailings site Additional ground exploration work is warranted in this area."

"Bruce Geotechnical Consultants Inc. installed 50 mm diameter PVC standpipe piezometer tubes down the holes, and completed the study on the hydraulic conductivity of the saprolite and saprock."

Pictures of the drill core are seen in Figure 11.1.

**Figure 11.1**
**Pictures of the Drill Core**



# 12.0 SAMPLING METHOD AND APPROACH

The information contained in this portion of the report was extracted from Appendix 3A of the feasibility study. Appendix 3A of the feasibility study is a Technical Report entitled "Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary", which is a Geostat report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since this report was filed on SEDAR in April, 2006 there has not been any material change in this information and it remains valid. The information contained in the April, 2006 report is quoted below.

## 12.1 DRILLING DESCRIPTION

"Drilling was core drilling for the most part using a variety of Longyear 34 and 38 pieces of equipment. As shown on the figure below (Figure 12.1), drilling was conducted on a 25 x 50 m regular grid in the center of Fortuna and Botija and on a less regular spacing in the direction of extensions of the deposits. Early on, drilling was oriented west to intersect the gold bearing structures with a better angle. This worked better for Fortuna. Drill orientation was not optimized for Botija. Core recovery was measured and core samples were taken by sawing in 2 the core using a diamond saw."

"Trado or Auger holes were dug by hand in shallow holes up to 20 m depth or more using extension rods. They stopped when rock resistance was encountered or before after hitting the water table."

"The description of drilling is more detailed in the previous section."

## 12.2 CHANNELLING AND TRENCHING

"No channel samples were taken. There is no outcrop on the property. Some trenches were dug far north of the Fortuna Zone."

## 12.3 MEASURE OF SPECIFIC GRAVITY

"The equipment used on-site to measure the specific gravity of saprolite consisted of an electronic balance accurate to 0.01 g, a large bucket of water, thin plastic to wrap clay-rich samples water-tight, and a thin nylon line which held the sample immersed in water."

"The saprolite samples were measured immediately after being collected from the field to determine in-situ wet specific gravity. The samples had to be intact and longer than 10 cm. To determine dry specific gravity, the saprolite samples were placed in an electric oven for more than 24 hours at 90$^{o}$ C. Fresh rock samples were typically dried in less than 3 hours."

"Additional data were collected, including sample location, length, rock type, and a brief description of the clay content and of any significant mineralization."

**Figure 12.1**
**Plan View Showing Drill Holes from Elevation 50 m to 100m asl.**


### 12.3.1 Saprolite SG Measurements

The specific gravity of saprolite was determined with the sample wrapped in thin plastic, weighted in air ($W_{air}$), and then carefully immersed in water and weighted again ($W_w$). The specific gravity would then be calculated using the following equation:

$$SG_{sap} = \frac{Mass}{Vol.} = \frac{W_{air}}{(W_{air} - W_w)}$$

The buoyancy method uses the weights of the in-situ wet material in air and in water, and the dry weight of the same material in air. The specific gravity is then calculated using the following equation:

$$SG_{sap-bm} = \frac{W_{air-dry}}{(W_{air-wet} - W_{w-wet})}$$

"The specific gravity (SG) data includes measurements of 607 saprolite samples, and 179 saprock samples by the buoyancy method. Saprolite and saprock samples were collected every 3 to 5 m for each hole between holes DH95-96 to DH96-237."

"The lower and upper limits of the SG data for saprolite are 1.15 and 1.85; the mean is 1.35 and the median is 1.31. The lower and upper limits for saprock are 1.40 and 2.19, whereas its mean is 1.65 and its median 1.63. The results are presented in Table 12.1. Mean buoyancy specific gravity values were used for the modeling."

**Table 12.1**
**Saprolite and Saprock Specific Gravity Statistics**

| Type | Saprolite | | | Saprock | | |
|---|---|---|---|---|---|---|
| **S.G type** | **Buoyancy** | **Dry** | **In-situ** | **Buoyancy** | **Dry** | **In-situ** |
| **Number** | 607 | 414 | 616 | 179 | 118 | 179 |
| **Mean** | **1.35** | **1.48** | **1.77** | **1.65** | **1.70** | **1.96** |
| **Median** | 1.31 | 1.45 | 1.76 | 1.63 | 1.70 | 1.95 |
| **Min.** | 1.15 | 1.10 | 1.25 | 1.40 | 1.24 | 1.66 |
| **Max.** | 1.85 | 2.01 | 2.15 | 2.19 | 2.15 | 2.72 |
| **Std dev.** | 0.15 | 0.17 | 0.11 | 0.18 | 0.17 | 0.14 |

### 12.3.2 Rock SG Measurements

"The moisture content in bedrock is low, and only dry specific gravity measurements were required for the different rock types. Rock samples were selected by a geologist at approximately every 5 m for all holes to DH96-237. Half-split and cut core segments were measured preceding hole DH95-86. Rock classification is based on those corresponding domains in the geology model. Table 12.2 presents the same statistics as previously for the saprolite and saprock samples. Some outlier data were trimmed from the database, and the more robust median statistic was used for the modelling purposes. The average used in resource calculation is 2.37."

**Table 12.2**
**Rock Specific Gravity Statistics**

| Type | PCT | FDC1 | FDC2 | RBX | FINT | VOL | BVOL | DIAB |
|---|---|---|---|---|---|---|---|---|
| **Number** | 1355 | 522 | 361 | 227 | 14 | 134 | 102 | 12 |
| **Mean** | 2.34 | 2.38 | 2.38 | 2.35 | 2.44 | 2.41 | 2.24 | 2.62 |
| **Median** | **2.37** | **2.41** | **2.41** | **2.38** | **2.48** | **2.42** | **2.24** | **2.65** |
| **Min.** | 1.52 | 1.71 | 1.60 | 1.83 | 2.14 | 1.92 | 1.88 | 2.30 |
| **Max.** | 2.94 | 2.76 | 2.76 | 2.76 | 2.57 | 2.81 | 2.63 | 2.81 |
| **Std dev.** | 0.16 | 0.16 | 0.16 | 0.17 | 0.11 | 0.19 | 0.16 | 0.15 |
| **Trimmed** | 52 | 13 | 10 | 5 | 0 | 1 | 1 | 0 |

## 12.4 COMPOSITING

"Compositing is the method by which the original samples are divided, split and grouped to obtain regular size samples to avoid sampling biases. The choice of the compositing method is a function of the nature of the geology and/or to adapt it to the mining method used."

### 12.4.1 One Metre Composites Down the Hole

"Geostat has chosen to make 1m down the drill hole axis composites. The majority of samples were originally about 1m in length. Placer Dome used very detailed sampling of irregular length the first two years of the project to study the geology and to learn what mechanism controlled the gold mineralization. (See Figures 12.2 and 12.3)."

"While smaller samples or composites tend to display a greater sampling variance and accentuate the effect of coarse grains of gold (nugget effect) present in occasional samples, since the ore deposit is broken down into a multitude of smaller structures in this case, using smaller composite presents several advantages and some disadvantages as follow:"

1. "The data composited has similar characteristic to the original geological data – geology is more likely to be taken into consideration as in the structure outlines themselves;"

2. "The number of resulting composites is larger than with longer composites – making more point available to compute the local grade but sampling variations increases – computing time is not increased because computing is limited to one structure at a time;"

3. "Average grade do not differ on the whole depending on the selection criteria. Detailed grade variation modelling may be unreliable and mining selectivity may be hard to achieve. The opposite is also true. Too much smoothing may dilute grade in excess."

**Figure 12.2**
**PDI Sample Length Statistivs**

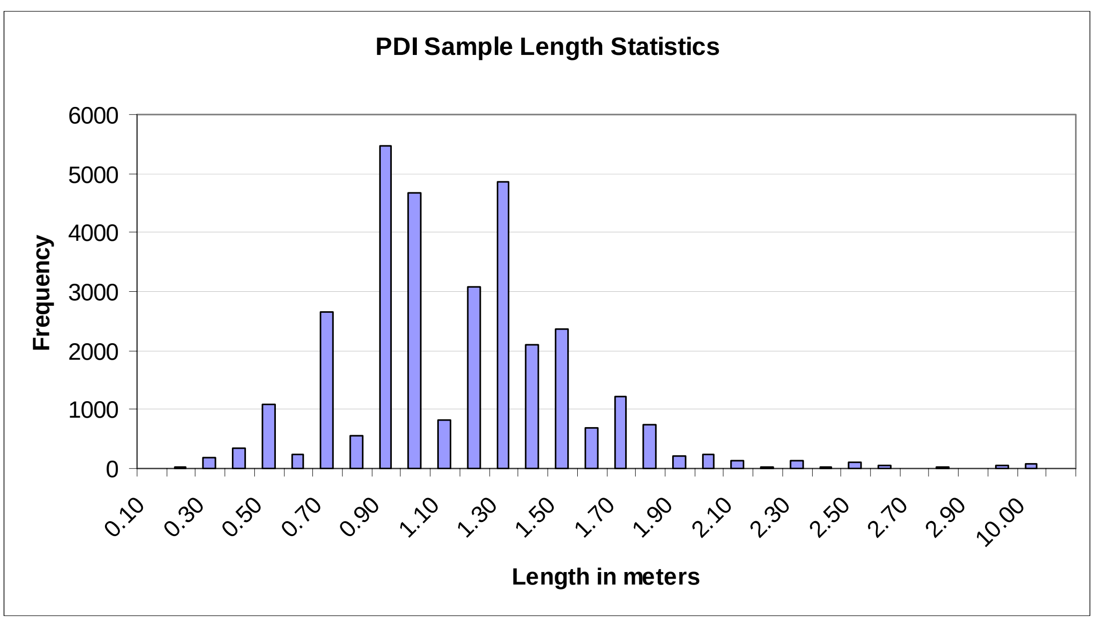
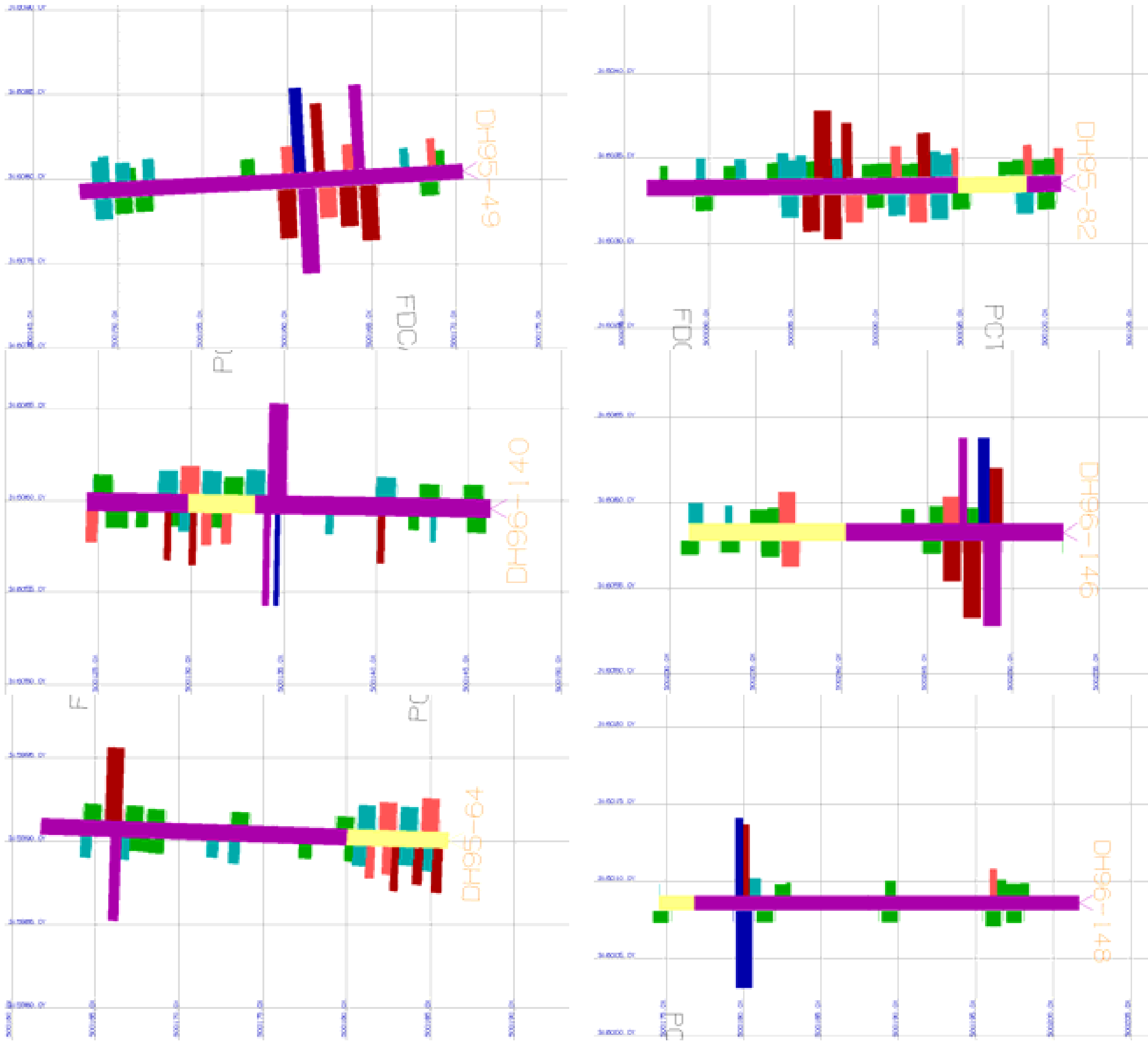


**Figure 12.3**
**Examples of the Effect of 2 m Compositing on Original Assays (with Lithology)**




"The following tables show the average grade of gold, the number of 1m composites and rock codes for the structures and the lithology."

**Table 12.3**
**Fortuna 1 m Composite Statistics**

## Fortuna 1m Composites in Steep Dipping Structures (Azimuth 340º)

Nb — Structure Code

| | F01 | F02 | F04 | F06 | F08 | F09 | F10 | F105 | F11 | F12 | F14 | F16 | F17 | F18 | F20 | F22 | F23 | F24 | F26 | F27 | F28 | F30 | F31 | F33 | F34 | F36 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LITHO** | **201** | **202** | **204** | **206** | **208** | **209** | **210** | **2105** | **211** | **212** | **214** | **216** | **217** | **218** | **220** | **222** | **223** | **224** | **226** | **227** | **228** | **230** | **231** | **233** | **234** | **236** | |
| ABT | | | | | | | | | | 14 | 8 | 3 | | 4 | | | 2 | | | | | | | | | | 31 |
| AND | | | | | | | | | | | | 1 | | | | | 4 | | 6 | | | | | | | | 11 |
| ASH | | | | | | | 1 | | 1 | 1 | | 27 | | | 1 | 7 | 3 | 1 | | 5 | | 6 | | 2 | | | 55 |
| BAS | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | 1 |
| CON | | 3 | | | | | | | | | | | | | | | | | | | | | 1 | 1 | | | 5 |
| DAC | 11 | 19 | 6 | 16 | 22 | 11 | 9 | 5 | 28 | 59 | 28 | 47 | | 33 | 32 | 43 | 90 | 49 | 56 | | | 17 | | 6 | | | 587 |
| DIAB | | | | | | | | | | 1 | | | | | 5 | 1 | 8 | | 4 | | | | | 4 | | | 23 |
| FBX | | 10 | 9 | | 17 | 24 | 100 | 45 | 85 | 126 | 73 | 34 | | 82 | 110 | 149 | 146 | 80 | 110 | 53 | 16 | 4 | 9 | 7 | | | 1289 |
| GOU | | | | | 16 | | 3 | | 6 | 8 | 6 | | | 3 | 1 | 6 | 2 | 6 | 2 | | | | | 2 | | | 61 |
| LAP | | 56 | 7 | 2 | 35 | 42 | 13 | 30 | 34 | 30 | 95 | 88 | 5 | 115 | 119 | 99 | 57 | 17 | 73 | 141 | 46 | 37 | 14 | 3 | | | 1158 |
| LAT | | 2 | 12 | 2 | 128 | 38 | 11 | 6 | 39 | 33 | 140 | 65 | | 134 | 139 | 107 | 155 | 33 | 119 | 114 | 51 | 120 | 38 | 17 | 27 | 8 | 1538 |
| LBT | | | 5 | | 54 | 30 | 39 | 21 | 21 | 69 | 25 | 23 | | 84 | 51 | 99 | 79 | 75 | 110 | 19 | 17 | 2 | | 18 | 7 | | 848 |
| NR | | | | | | | | | | 5 | | | | | 1 | | | 1 | | | | | 1 | | | | 8 |
| OVB | | | | | 9 | | 3 | | 1 | 9 | 18 | 12 | | 10 | 23 | 19 | 10 | 10 | 7 | 9 | 12 | 12 | 1 | | | 9 | 174 |
| QVN | | | | | 2 | 1 | 1 | | 2 | 2 | 3 | 6 | | 3 | 6 | 5 | 3 | 1 | 1 | 1 | | 3 | | | | 2 | 42 |
| RHY | | | | | 9 | | | | | 18 | 27 | 17 | | 41 | 16 | 33 | 9 | 9 | 29 | 8 | | | | 2 | | | 218 |
| SAP | 2 | 11 | 30 | 36 | 52 | 19 | 59 | 34 | 37 | 37 | 83 | 56 | 12 | 96 | 128 | 194 | 75 | 105 | 147 | 122 | 44 | 18 | 27 | 17 | | 36 | 1477 |
| SPK | | | | | | | 18 | | | 15 | | | | 12 | 3 | | | 10 | | | 8 | | | | | | 66 |
| VBX | | | | | | | | | | | | | | | | | | | 4 | | | | | | | | 4 |
| **Total** | **13** | **101** | **69** | **56** | **344** | **165** | **257** | **141** | **254** | **427** | **506** | **380** | **17** | **617** | **635** | **762** | **643** | **397** | **668** | **472** | **194** | **219** | **91** | **79** | **34** | **55** | **7596** |

Auc — Structure Code

| | F01 | F02 | F04 | F06 | F08 | F09 | F10 | F105 | F11 | F12 | F14 | F16 | F17 | F18 | F20 | F22 | F23 | F24 | F26 | F27 | F28 | F30 | F31 | F33 | F34 | F36 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LITHO** | **201** | **202** | **204** | **206** | **208** | **209** | **210** | **2105** | **211** | **212** | **214** | **216** | **217** | **218** | **220** | **222** | **223** | **224** | **226** | **227** | **228** | **230** | **231** | **233** | **234** | **236** | |
| ABT | | | | | | | | | | 0.84 | 2.07 | 0.88 | | 0.77 | | | 1.21 | | | | | | | | | | 1.18 |
| AND | | | | | | | | | | | | 10.11 | | | | | 1.51 | | 1.10 | | | | | | | | 2.07 |
| ASH | | | | | | | 7.93 | | 0.32 | 1.64 | | 0.64 | | | 1.02 | 2.36 | 0.59 | 1.75 | | 0.96 | | 1.71 | | 0.32 | | | 1.16 |
| BAS | | | | | | | | | | | | 0.44 | | | | | | | | | | | | | | | 0.44 |
| CON | | 0.74 | | | | | | | | | | | | | | | | | | | | | 0.31 | 5.44 | | | 1.60 |
| DAC | 3.78 | 1.97 | 0.93 | 1.25 | 1.27 | 1.84 | 1.26 | 0.88 | 0.68 | 1.38 | 1.22 | 1.39 | | 1.56 | 1.50 | 1.70 | 1.15 | 1.88 | 1.41 | | | 1.21 | | 1.60 | | | 1.44 |
| DIAB | | | | | | | | | | 0.34 | | | | | 0.01 | 4.07 | 0.02 | | 0.02 | | | | | 0.89 | | | 0.36 |
| FBX | | 3.29 | 2.84 | | 2.05 | 3.15 | 1.43 | 1.31 | 1.02 | 1.83 | 0.95 | 1.49 | | 1.11 | 1.57 | 1.82 | 1.39 | 1.82 | 1.99 | 2.13 | 2.35 | 0.51 | 1.13 | 0.72 | | | 1.61 |
| GOU | | | | | 1.09 | | 0.25 | | 0.98 | 0.68 | 1.23 | | | 1.20 | 0.98 | 1.68 | 0.78 | 12.73 | 1.03 | | | | | 3.34 | | | 2.27 |
| LAP | | 1.27 | 2.92 | 0.79 | 0.69 | 1.63 | 1.48 | 0.88 | 0.54 | 1.36 | 1.53 | 1.36 | 6.80 | 1.29 | 1.60 | 2.15 | 1.23 | 1.77 | 1.54 | 1.52 | 1.20 | 1.60 | 1.68 | 0.43 | | | 1.47 |
| LAT | | 3.03 | 2.18 | 0.85 | 1.87 | 0.89 | 0.99 | 0.94 | 1.33 | 1.64 | 1.90 | 1.00 | | 1.81 | 1.94 | 1.32 | 2.42 | 2.80 | 1.11 | 0.94 | 1.70 | 1.68 | 1.06 | 0.90 | 1.16 | 1.14 | 1.63 |
| LBT | | | 1.40 | | 0.99 | 0.97 | 1.19 | 1.00 | 3.07 | 0.90 | 1.62 | 1.15 | | 1.58 | 1.37 | 1.60 | 1.02 | 1.51 | 1.15 | 1.10 | 1.21 | 3.05 | | 0.83 | 4.55 | | 1.33 |
| NR | | | | | | | | | | 1.95 | | | | | 0.83 | | | 0.00 | | | | | 2.63 | | | | 1.65 |
| OVB | | | | | 0.59 | | 1.20 | | 1.07 | 1.04 | 1.84 | 0.90 | | 2.25 | 2.58 | 2.36 | 1.41 | 2.14 | 1.17 | 0.46 | 0.90 | 1.43 | 0.66 | | | 3.12 | 1.69 |
| QVN | | | | | 4.46 | 3.85 | 3.07 | | 5.42 | 11.68 | 3.57 | 10.43 | | 2.34 | 8.07 | 12.78 | 6.27 | 5.87 | 0.61 | 8.82 | | 19.29 | | | | 4.24 | 8.17 |
| RHY | | | | | 0.84 | | | | | 2.36 | 1.41 | 0.66 | | 0.75 | 0.93 | 1.64 | 3.29 | 0.63 | 3.39 | 3.91 | | | | 0.98 | | | 1.68 |
| SAP | 1.22 | 2.66 | 3.63 | 1.42 | 1.42 | 1.51 | 1.52 | 2.59 | 1.00 | 2.98 | 1.04 | 1.59 | 1.05 | 2.77 | 2.70 | 1.74 | 1.70 | 1.56 | 1.17 | 2.01 | 2.45 | 1.96 | 1.08 | 2.47 | | 1.12 | 1.84 |
| SPK | | | | | | | 1.02 | | | 1.08 | | | | 3.90 | 3.33 | | | 1.69 | | | 1.36 | | | | | | 1.80 |
| VBX | | | | | | | | | | | | | | | | | | | 0.04 | | | | | | | | 0.04 |
| **Total** | **3.38** | **1.77** | **2.81** | **1.33** | **1.43** | **1.57** | **1.38** | **1.45** | **1.16** | **1.64** | **1.47** | **1.40** | **2.74** | **1.70** | **1.94** | **1.82** | **1.61** | **1.93** | **1.43** | **1.59** | **1.70** | **1.87** | **1.17** | **1.35** | **1.86** | **1.56** | **1.63** |

7

**Table 12.4**
**Botija 1 m Composite Statistics**

## Botija 1m Composites in Steep Dipping Structures (Azimuth 70º)

| cmp | Structure Code | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B01 | B02 | B03 | B04 | B05 | B06 | B07 | B08 | B09 | B12 | B13 | B14 | B15 | B16 | B18 | Total |
| **LITHO** | **101** | **102** | **165** | **104** | **105** | **106** | **107** | **108** | **109** | **112** | **113** | **114** | **115** | **116** | **118** | |
| ABT | | | | | 2 | | | | | | | | | | | 2 |
| AND | | | | | 2 | | | | | | 1 | | | | | 3 |
| ASH | 2 | 4 | | 5 | | | | 1 | | | 2 | | 20 | 20 | 15 | 69 |
| DAC | 1 | 4 | 5 | 2 | 3 | 21 | 6 | 30 | 42 | 13 | 34 | 10 | 15 | 17 | 4 | 207 |
| DIAB | | | | | | | | | 1 | | | | | | | 1 |
| FBX | | | 16 | 23 | 11 | 24 | | | 20 | | | | 4 | | | 98 |
| GOU | | | 4 | | 3 | 3 | 1 | 1 | | | 1 | | | | | 13 |
| LAP | 15 | 23 | 80 | 110 | 74 | 102 | 43 | 146 | 116 | 88 | 72 | 8 | 22 | 31 | 17 | 947 |
| LAT | 23 | 17 | 72 | 70 | 57 | 68 | 5 | 19 | 8 | 18 | 13 | 14 | 18 | 7 | 38 | 447 |
| LBT | 3 | 4 | 20 | 35 | 18 | 4 | 6 | 17 | 12 | 18 | 45 | 4 | 11 | 5 | | 202 |
| NR | | | | | | 2 | | | | | | | | | | 2 |
| OVB | | 3 | 6 | 4 | 9 | 10 | 6 | 8 | 29 | 4 | 15 | 7 | 7 | 3 | 5 | 116 |
| QVN | | | 1 | | | | | | | | | 1 | | | | 2 |
| RHY | | | | | 4 | 14 | 3 | 9 | 32 | 15 | 11 | | | 8 | 4 | 100 |
| SAP | 27 | 15 | 61 | 32 | 46 | 56 | 26 | 78 | 97 | 79 | 55 | 37 | 19 | 21 | 11 | 660 |
| VBX | | | | | | | 5 | | | | | | | | | 5 |
| **Total** | **71** | **70** | **265** | **281** | **229** | **304** | **101** | **309** | **357** | **235** | **249** | **81** | **116** | **112** | **94** | **2874** |

| AUc | Structure Code | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B01 | B02 | B03 | B04 | B05 | B06 | B07 | B08 | B09 | B12 | B13 | B14 | B15 | B16 | B18 | Total |
| **LITHO** | **101** | **102** | **165** | **104** | **105** | **106** | **107** | **108** | **109** | **112** | **113** | **114** | **115** | **116** | **118** | |
| ABT | | | | | 0.39 | | | | | | | | | | | 0.39 |
| AND | | | | | 0.06 | | | | | | 0.24 | | | | | 0.12 |
| ASH | 0.87 | 1.01 | | 1.09 | | | | 0.94 | | | 1.61 | | 1.67 | 1.46 | 1.87 | 1.53 |
| DAC | 0.36 | 2.16 | 0.02 | 0.45 | 0.38 | 1.41 | 0.84 | 1.26 | 1.20 | 2.31 | 1.33 | 1.22 | 1.37 | 1.97 | 1.07 | 1.35 |
| DIAB | | | | | | | | | 0.01 | | | | | | | 0.01 |
| FBX | | | 2.30 | 0.84 | 1.44 | 1.37 | | | 0.88 | | | | 1.20 | | | 1.30 |
| GOU | | | 1.13 | | 0.57 | 0.29 | 0.14 | 5.22 | | | 0.53 | | | | | 1.00 |
| LAP | 1.25 | 1.82 | 1.46 | 1.34 | 1.34 | 1.22 | 1.09 | 1.55 | 1.44 | 1.45 | 0.80 | 1.05 | 1.26 | 1.35 | 0.66 | 1.33 |
| LAT | 0.82 | 0.78 | 1.27 | 1.58 | 1.37 | 1.39 | 0.84 | 1.20 | 1.06 | 1.28 | 1.14 | 0.38 | 0.36 | 0.67 | 0.56 | 1.16 |
| LBT | 1.31 | 1.22 | 2.03 | 0.90 | 0.30 | 1.06 | 0.39 | 1.67 | 0.95 | 0.90 | 0.83 | 1.31 | 0.89 | 1.02 | | 1.02 |
| NR | | | | | | 1.07 | | | | | | | | | | 1.07 |
| OVB | | 1.70 | 1.32 | 1.00 | 2.18 | 2.32 | 1.93 | 5.65 | 6.84 | 2.89 | 1.41 | 1.67 | 1.49 | 0.85 | 1.38 | 3.27 |
| QVN | | | 2.03 | | | | | | | | | 2.57 | | | | 2.30 |
| RHY | | | | | 0.38 | 0.56 | 0.78 | 2.96 | 0.87 | 0.94 | 0.79 | | | 0.55 | 0.39 | 0.95 |
| SAP | 0.53 | 0.95 | 1.82 | 1.36 | 2.28 | 1.93 | 2.38 | 3.04 | 2.41 | 2.80 | 1.39 | 3.76 | 1.79 | 1.40 | 1.54 | 2.19 |
| VBX | | | | | | | 0.78 | | | | | | | | | 0.78 |
| **Total** | **0.82** | **1.31** | **1.55** | **1.29** | **1.43** | **1.41** | **1.37** | **2.04** | **2.00** | **1.89** | **1.07** | **2.28** | **1.27** | **1.35** | **0.96** | **1.55** |

**Table 12.5**
**Other 1 m Composites outside Structures Statistic**

## Other 1m Composites outside the Steep Dipping Structures

| LITHO | Auc | Nb |
|---|---|---|
| ABT | 0.31 | 179 |
| AND | 0.03 | 699 |
| ASH | 0.21 | 395 |
| BAS | 0.04 | 50 |
| BT | 0.16 | 5 |
| CON | 0.36 | 9 |
| DAC | 0.40 | 3637 |
| DIAB | 0.03 | 319 |
| FBX | 0.37 | 1565 |
| GOU | 0.17 | 296 |
| LAP | 0.26 | 6018 |
| LAT | 0.29 | 4961 |
| LBT | 0.27 | 2372 |
| NR | 0.47 | 6 |
| OVB | 0.67 | 434 |
| QFP | 0.01 | 398 |
| QVN | 3.49 | 22 |
| RHY | 0.28 | 536 |
| SAP | 0.35 | 3249 |
| SPK | 0.74 | 87 |
| VBX | 0.09 | 227 |
| **Total** | **0.30** | **25464** |

### 12.4.2 Five Metre Composites by Bench

"To facilite comparison with previous resources estimates, Geostat also did a 3D block model based on 5m bench composites without the structured ore outline to confine compositing. This procedure is similar to IMC model which used 6m bench composites. Such approach is found to decrease noticeably the nugget effect. On the other hand, as the next sub-section will show, the grade continuity did not changed much. The ranges established through variography analyses were longer but not much longer than 25 m. The continuity remained unidirectional also. Geostat had hoped the variography of the 5m bench composites would display a preferential orientation for gold grade continuity along the reported structures. It was not the case. We feel it is unlikely these characteristics will change, no matter how much sampling is done. These results are consistent with what we observed in the field. It is typical of epithermal gold deposits to display high nugget effects and short ranges. The gold hydrothermal solutions came up through fissures in volcanic rock along brecciated material. Only small veinlets were able to develop at best most of the time. In other words and without going into detail of the petrographic study, there are no particular features bearing gold that has opened wide and long enough to display some sort of anisotropy. The following sub-section will elaborate more on this matter."

## 12.5 GEOSTATISTICAL ANALYSIS

"This sub-section presents the variography of the Crucitas project. The variography characterize the grade continuity of gold and silver in the deposit. It sets the parameters used to project the sample grades in space to estimate the grade of the deposit."

"The grade of the geological units and the grade of production are distinct. The geostatistical analysis may put the emphasis more on geology if it uses shorter composites and on production if it uses longer bench composites. This is just one step in the process of modelling the resource. Consistency is required to obtain a correct grade model and resource estimation report to be converted to mining reserves using the corresponding mine factors (dilution and recovery)."

"The following figures show the Statistics of 2m composites tested by Geostat. They are the same composites used by CPC in its 1999 Feasibility Study. This analysis is based on composites grouped by rock type based on lithology, not structures. The Correlogram (standardized variogram developed by Geostat) allows us to see that the data characteristics are about the same in all rock types."

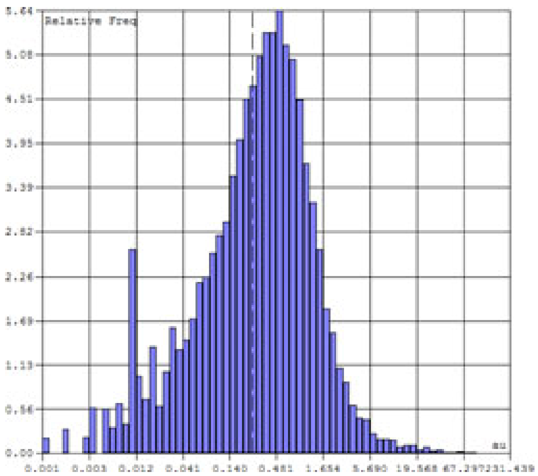
"Geostat tested 5m bench composites to compare with IMC composites set with a 6m bench interval. That exercise, and other comparison between the 2m and the 5m composites analysis, and the results from the 1m composites are also discussed at the end of this sub-section."

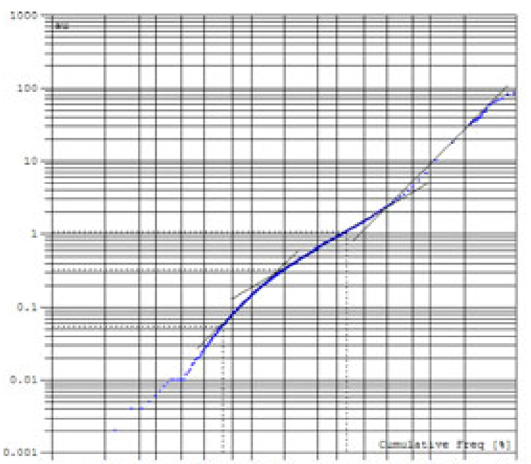
"The breaks or points of inflexion in all probability curves are always at the same values: 0.2 and 2.0 g Au/t. They could represent a laboratory artefact wrapped around the average grade which is around 1.0 and 2.0 g Au/t and 0.2 g Au/t could have been set as the effective detection limit. But PDI sampling procedures at the laboratory were standard to detect gold between 0.1 and 30 g Au/t. PDI report 2 events that inserted gold in the host rocks: one broad low grade event and one higher grade probably confined to the steep dipping structures often marked by breccias. Bench composites (>5m) tend to straighten the cumulative frequency probability line, therefore masking this geological feature, if that is what it is."

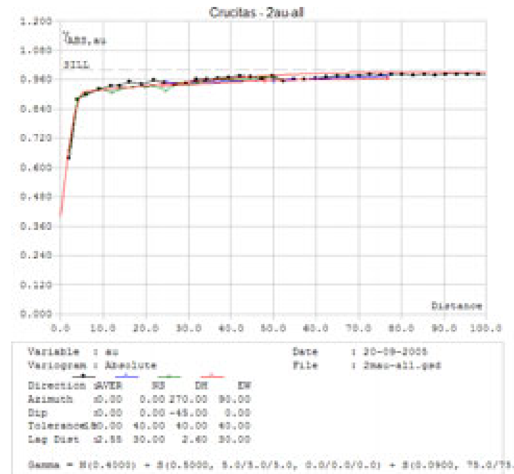
"The continuity of grade is equal in all direction most of the time. Based on a study of indicators, the high grade (2.0) is highly nuggety (made of coarse grains of gold erratically distributed), while the low grade (0.2) is more continuous (made of fine grains of gold more evenly distributed). Here again, some of this may be induced by changes in sample preparation procedure to break down the expected coarse grain of gold into a fine powder to render the sample material homogeneous. This is a standard procedure so that the laboratory can repeat their results while the samples are actually hampered by their natural condition of containing an unpredictable number of coarse grains of gold from time to time."

"It may be noticed that the quality of the Correlogram will appear to decrease when a subset of the whole database is used. That is due to using less data, not necessarily data of a lesser quality. It should be looked at as a sort of fuzziness in the picture and not read as a variation in the data characteristic, unless justified and meaningful changes occur."

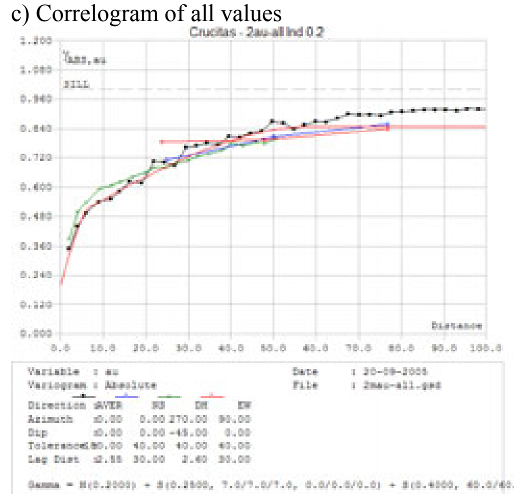
**Figure 12.4**
**Statistics for 2m Composites Gold Assays for all rock types**


a) Histogram


b) Probability Curve



c) Correlogram of all values



d) Correlogram of Indicators 0.2 above 2.0 below

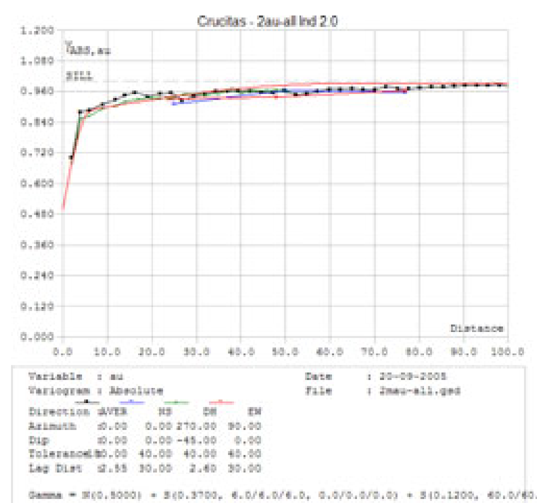
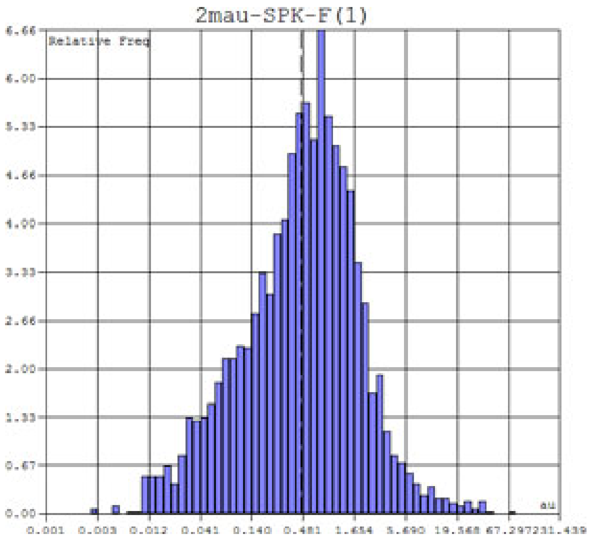
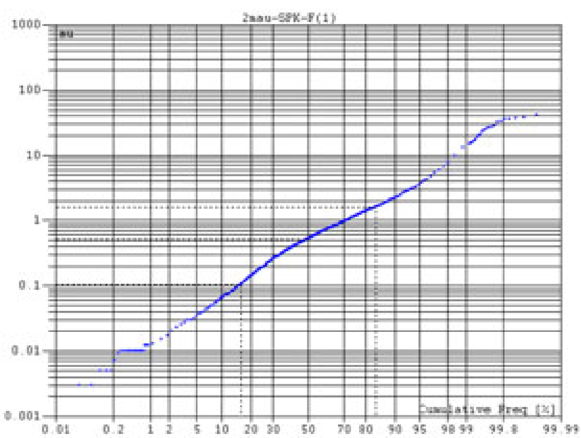


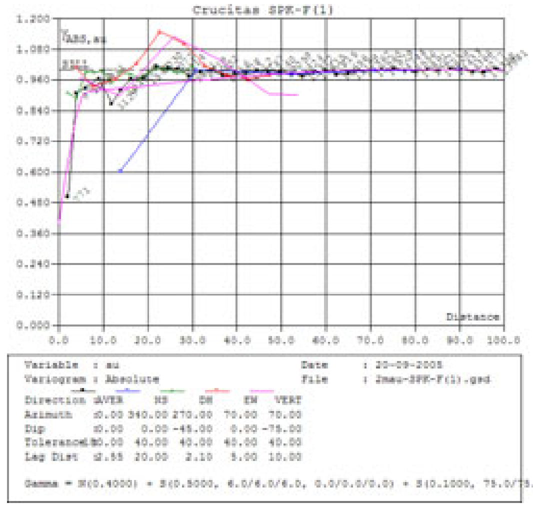
**Figure 12.5**
**Statistics for 2m Composites Gold Assays in SPK for Fortuna**



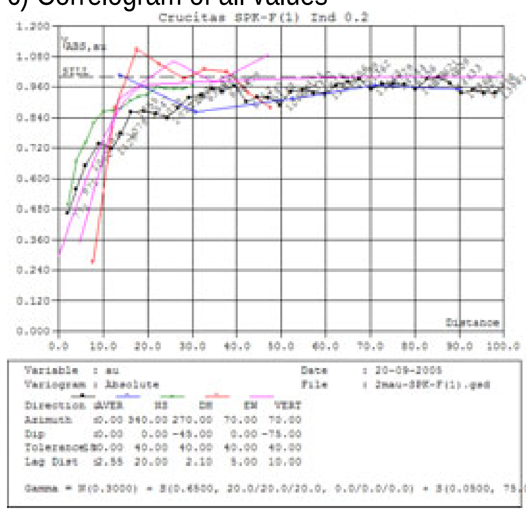

a) Histogram




b) Probability Curve




c) Correlogram of all values




d) Correlogram of Indicators 0.2 above 2.0 below

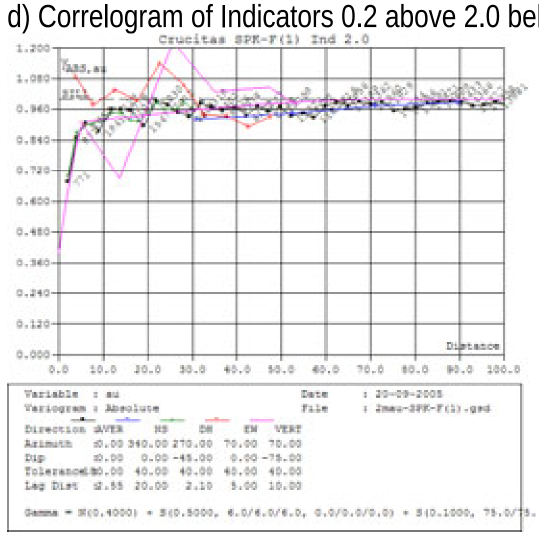
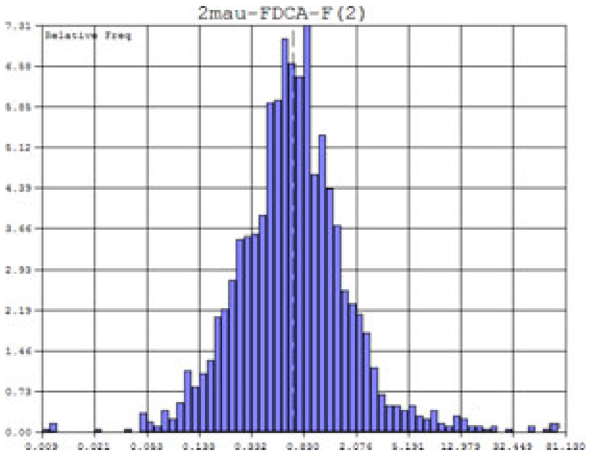
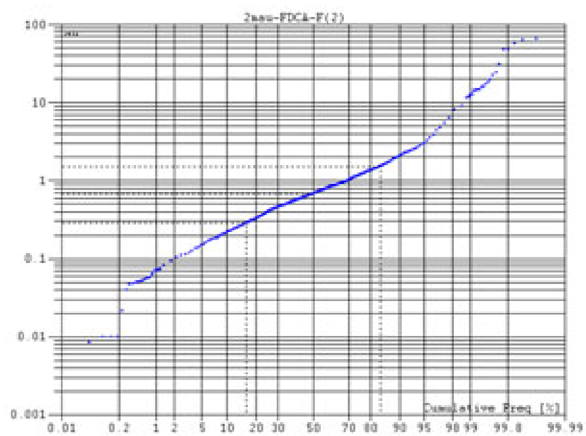


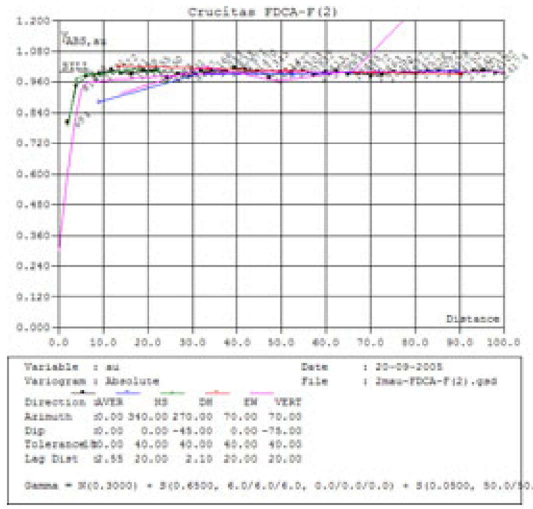
**Figure 12.6**
**Statistics for 2m Composites Gold Assays in FDCA for Fortuna**



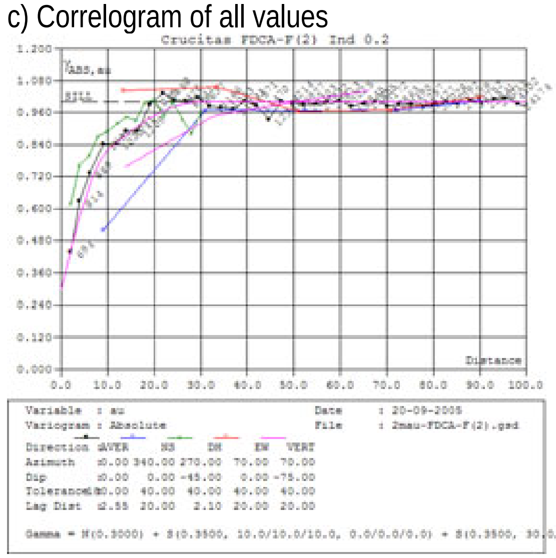
a) Histogram



b) Probability Curve



c) Correlogram of all values



d) Correlogram of Indicators 0.2 above 2.0 below

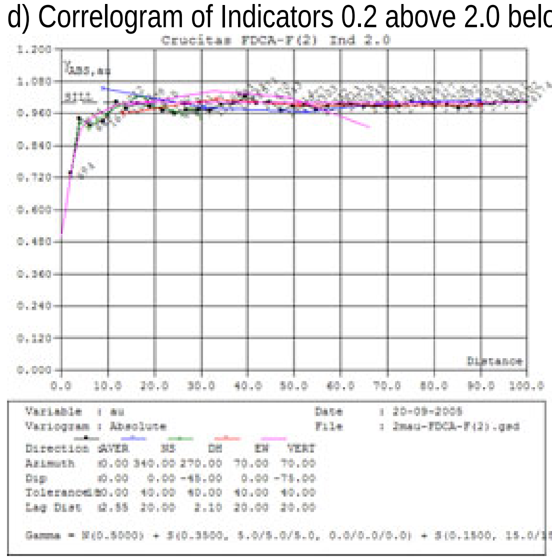
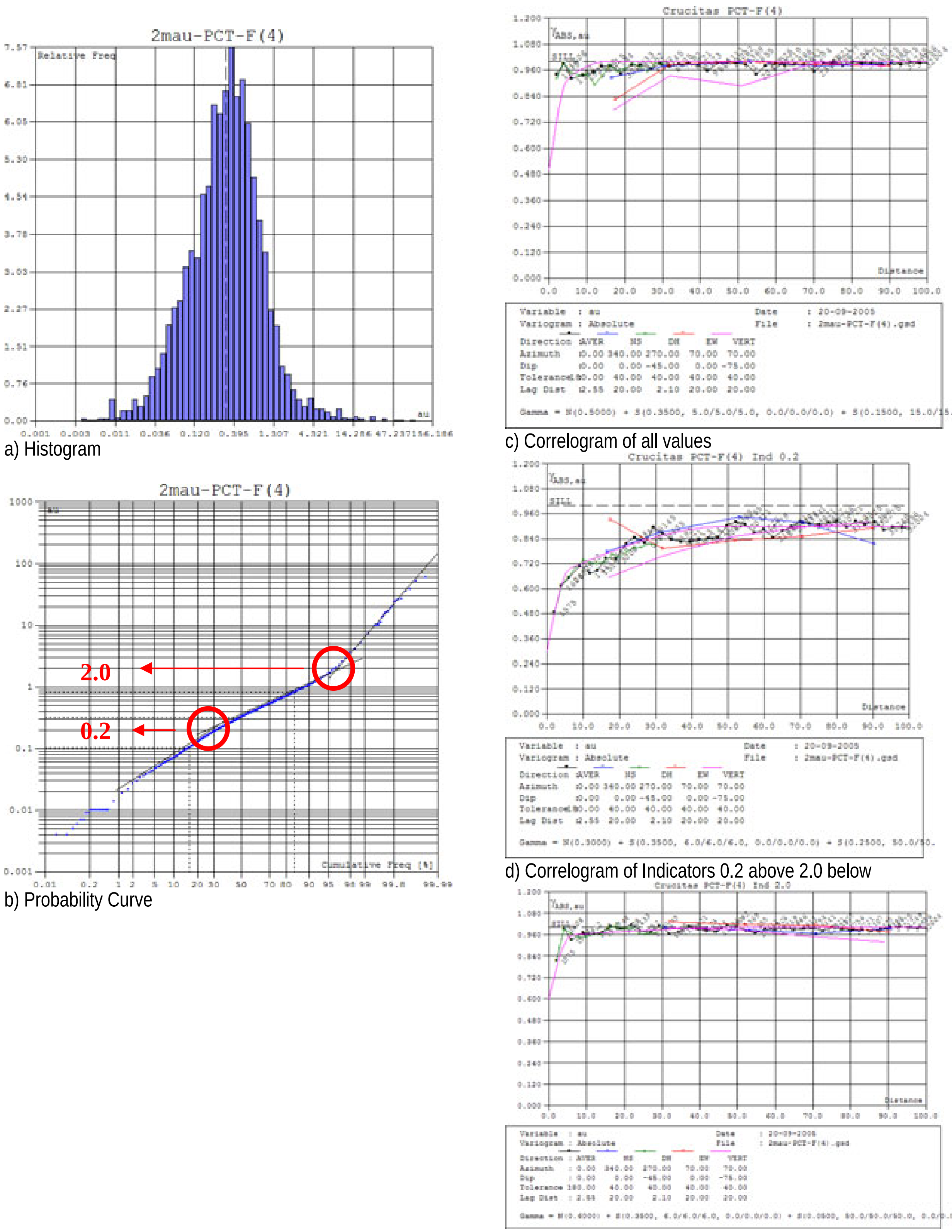


**Figure 12.7**
**Statistics for 2m Composites Gold Assays in PCT for Fortuna**



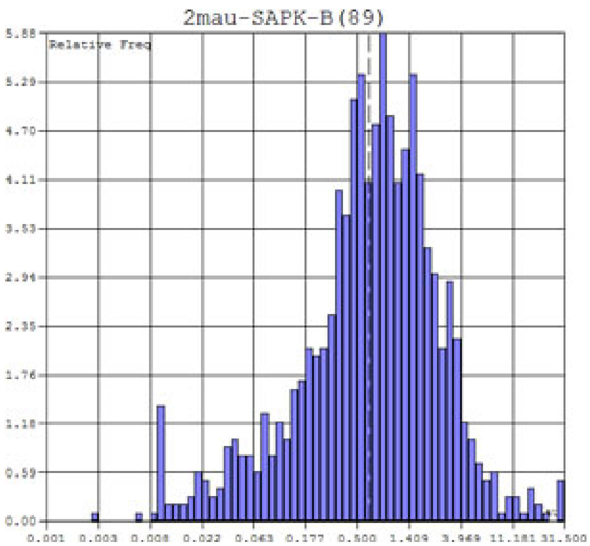

a) Histogram

b) Probability Curve

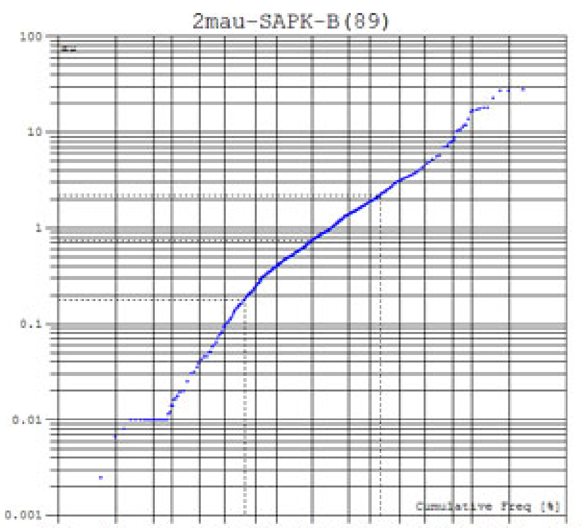
c) Correlogram of all values

d) Correlogram of Indicators 0.2 above 2.0 below

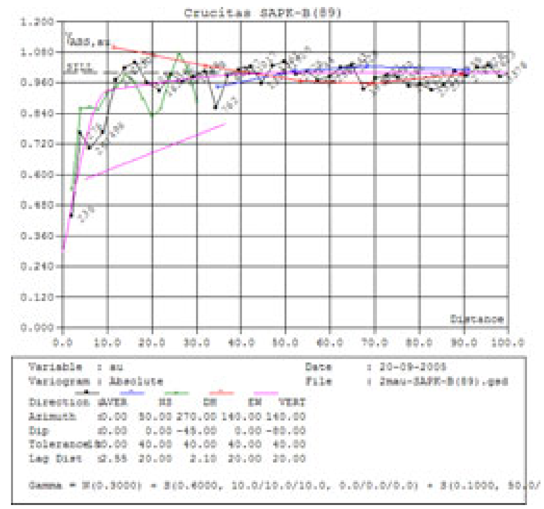
**Figure 12.8**
**Statistics for 2m Composites Gold Assays in SAPK for Botija**



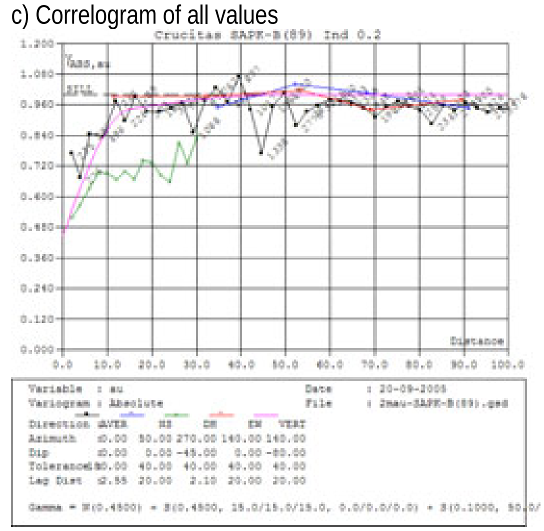

a) Histogram




b) Probability Curve




c) Correlogram of all values




d) Correlogram of Indicators 0.2 above 2.0 below

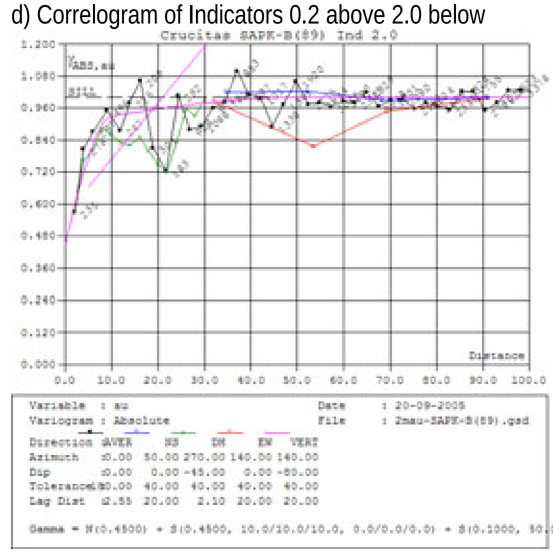
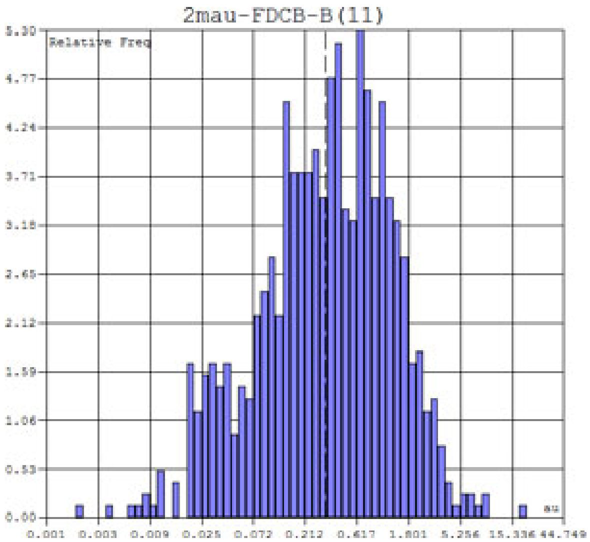
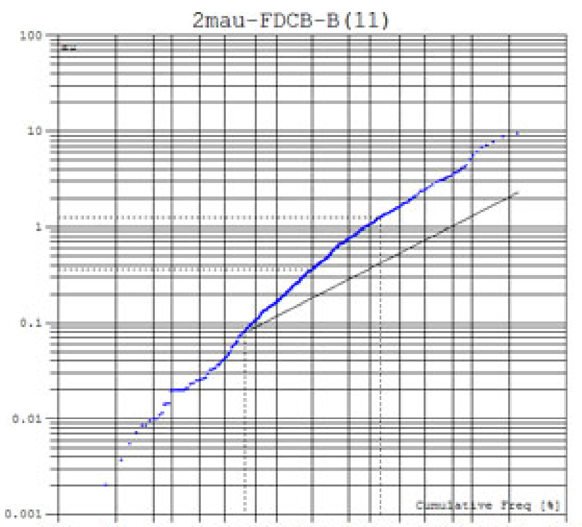


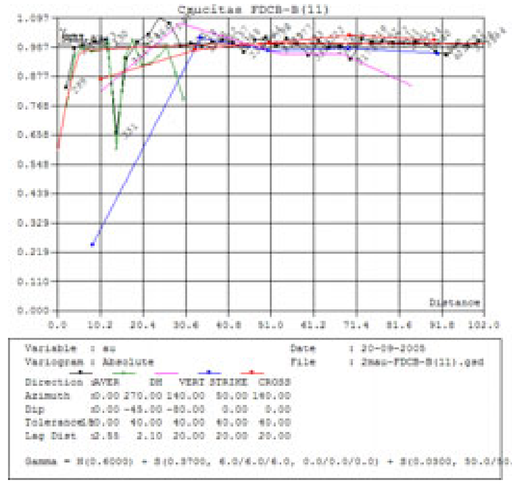
**Figure 12.9**
**Statistics for 2m Composites Gold assays in FDCB for Botija**



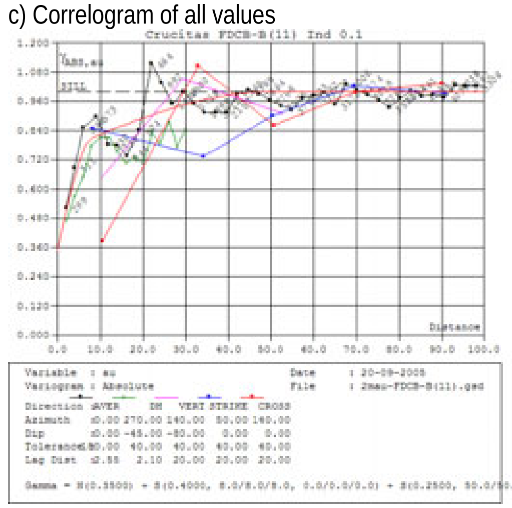

a) Histogram




b) Probability Curve




c) Correlogram of all values




d) Correlogram of Indicators 0.2 above 1.0 below

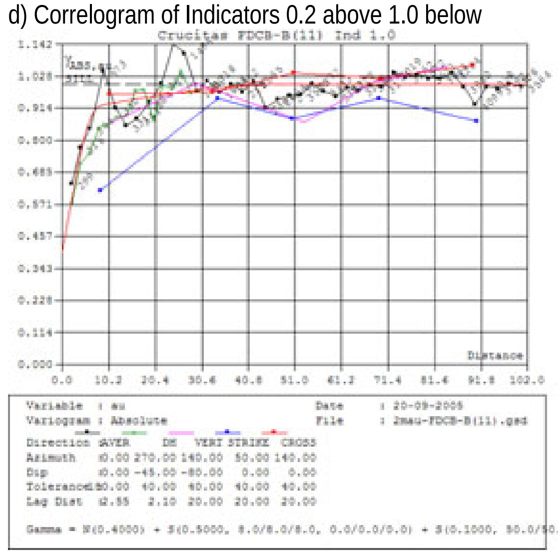
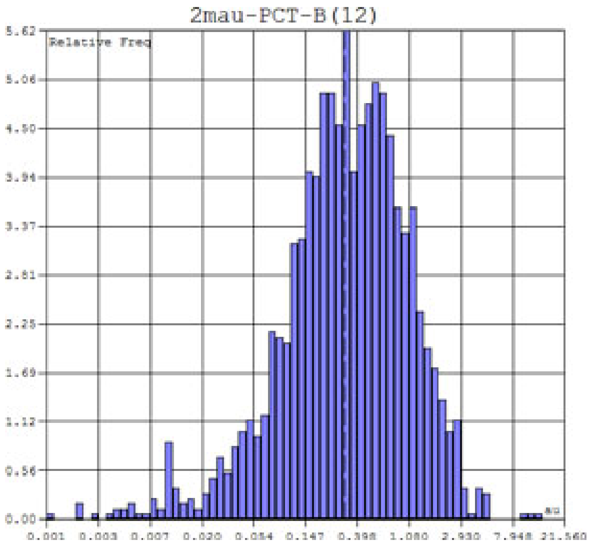
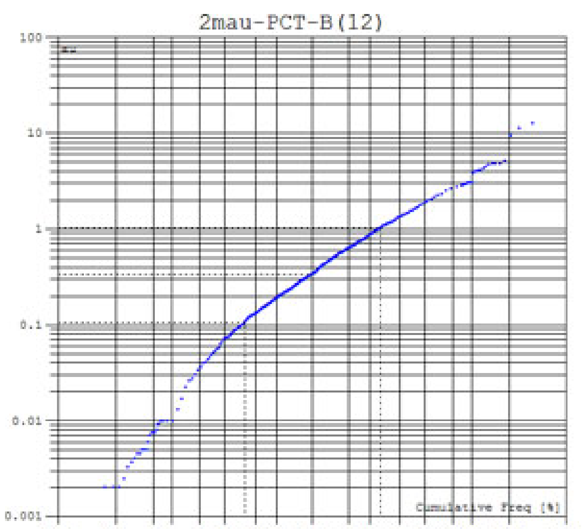


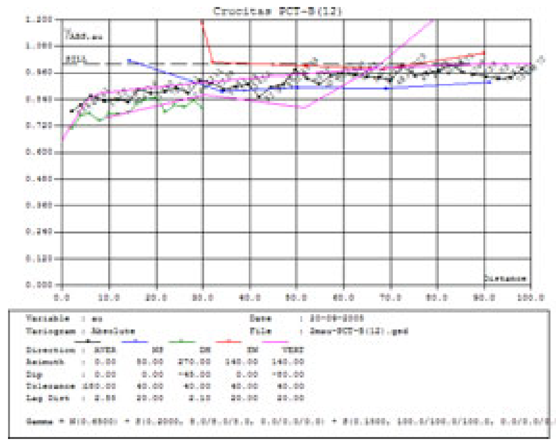
**Figure 12.10**
**Statistics for 2m Composites Gold assays in PCT for Botija**



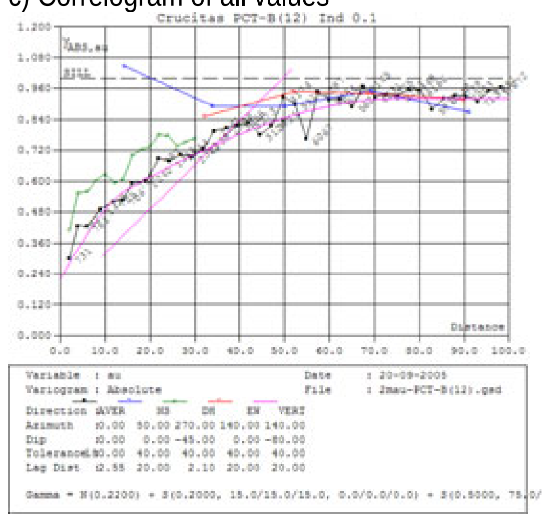

a) Histogram




b) Probability Curve



c) Correlogram of all values




d) Correlogram of Indicators 0.2 above 1.0 below

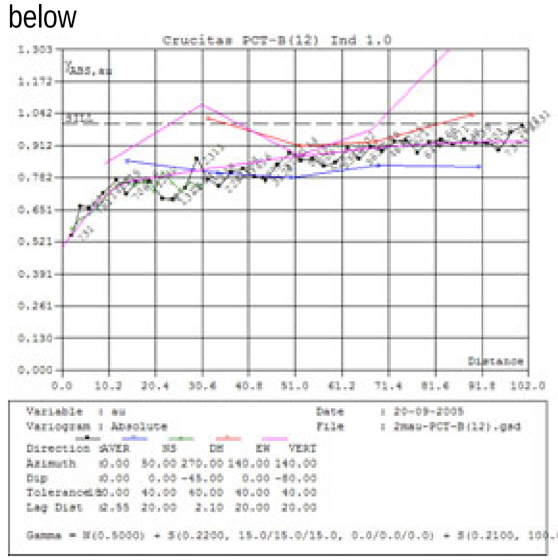
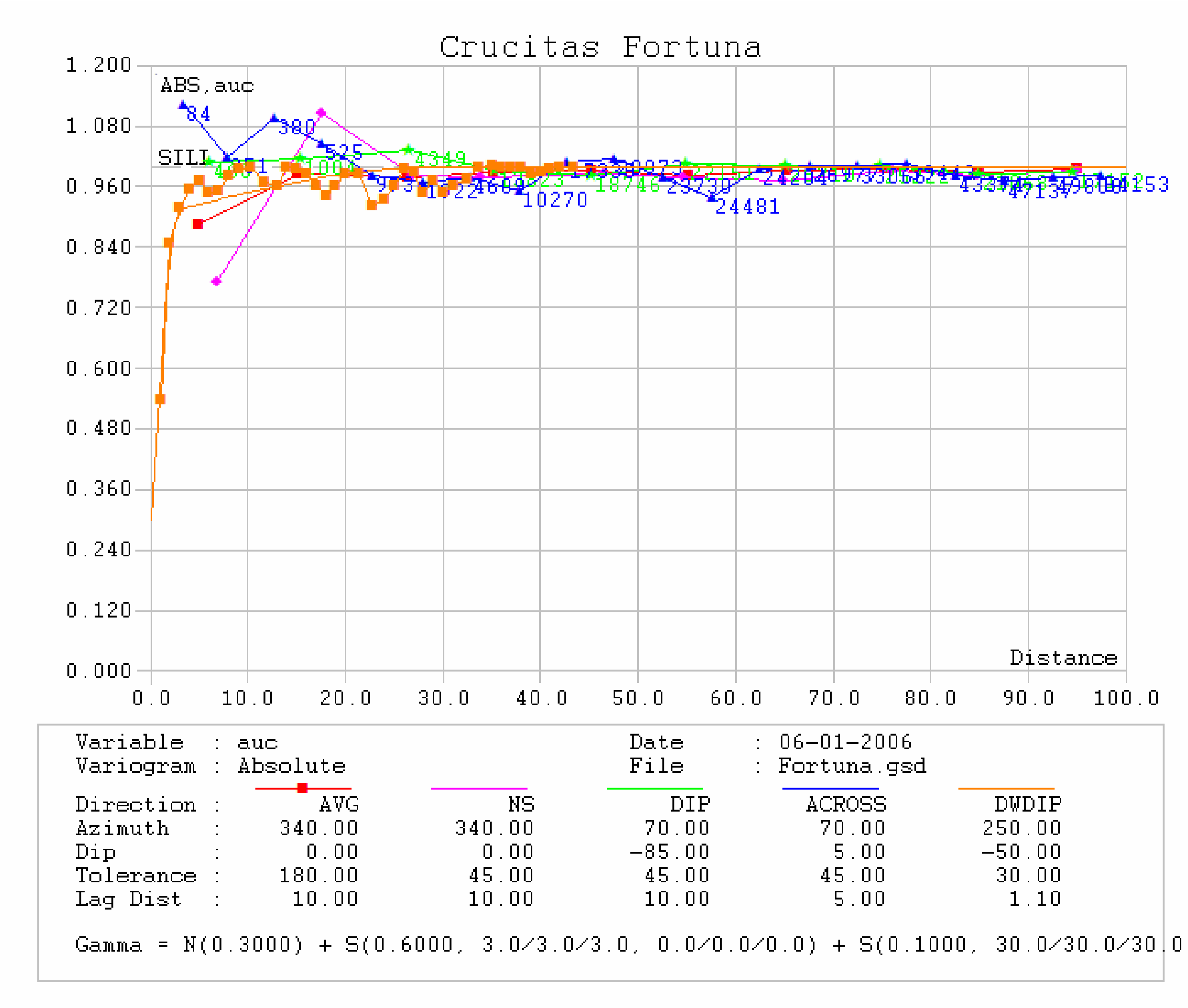
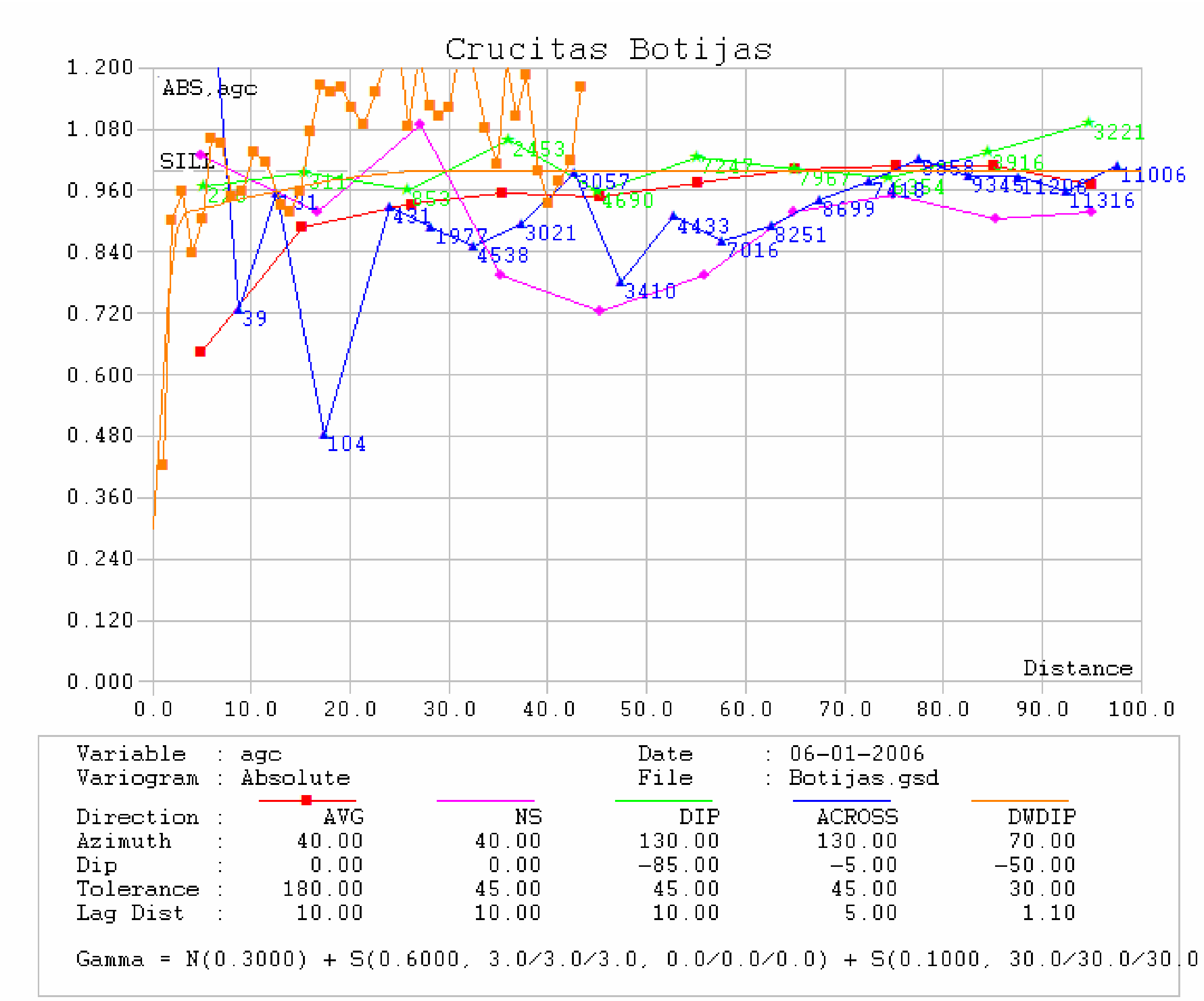


**Figure 12.11**
**Correlogram of Fortuns 1 m Composites in all Structures (7,596 composites)**




"On this enlarged graphic of the Fortuna data, it is clear that there is no significant difference in grade continuity between directions and that the grade continuity has a very short range (mostly less than 10m). However, the data set comprised only the 1m composites (7,596) located inside the envelopes of the steep dipping structures. Since this does include most of the high grade samples (avg 1.63 g Au/t), it does not "see" the suspected more even low grade material (0.30 g Au/t) located outside those envelopes. Therefore, this analysis would only highlight the grade behaviour inside the structures, not the difference between the samples in and out of the structures to help locate and outline those structures. This analysis shows the grade continuity inside the structures to be nuggety, very short range and unidirectional. This is about the same behaviour that we observe in the 2m composite with a high grade indicator (without the structures for sample tagging). In fact, the statistics and logic indicate that we are looking at the same data and we are getting the same results in the grade continuity study using Correlograms."

**Figure 12.12**
**Correlogram of Botija 1 m Composites in all Structures (2,874 composites)**




"The graphic above indicates that the Botija data is more variable than Fortuna when compared to the previous graphics. We already know that Botija is smaller, that it has less data and that drilling orientation was not optimized as for Fortuna. Therefore, if we discount the lower quality of the variography based on the difference of the quality of the data, it is likely that the grade characteristics are very similar, if not identical for Botija and Fortuna. In other words, the difference between the Botija and the Fortuna data set are not significant from a geostatistical point of view. Since the grade variation is unidirectional and it as the same characteristic in both Botija and Fortuna, a single variogram equation is required to compute grades in both. See examples of equation resolution at the bottom of the graphics in the form of:"

$$Gamma = N\ (0.xx) + S_1\ (0.xx, dx/dy/dz) + S_2\ (0.xx, dx/dy/dz)$$

"Where N is the nugget effect and S the speric (or else) model parameters. In the Correlogram, Gamma is divided by the sampling variance and the sum of all gammas is equal to 1"

**Figure 12.13**
**TestingDrill Hole with Azimuth270° Only for Fortuna 1m Composites**

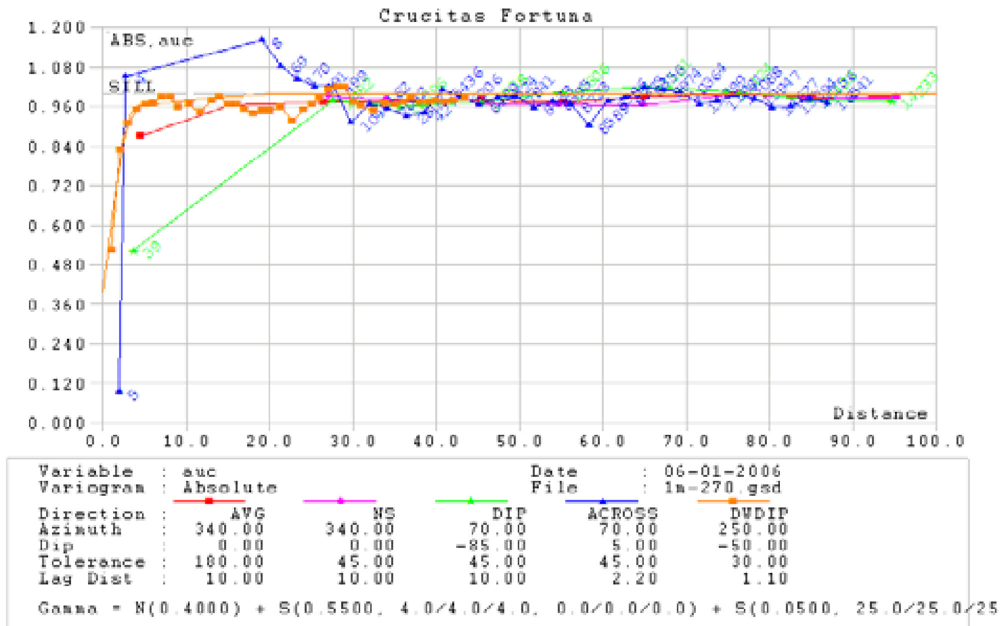



**Figure 12.14**
**Botija FDCD (11) – Indicator 1.0 g/t Gold**

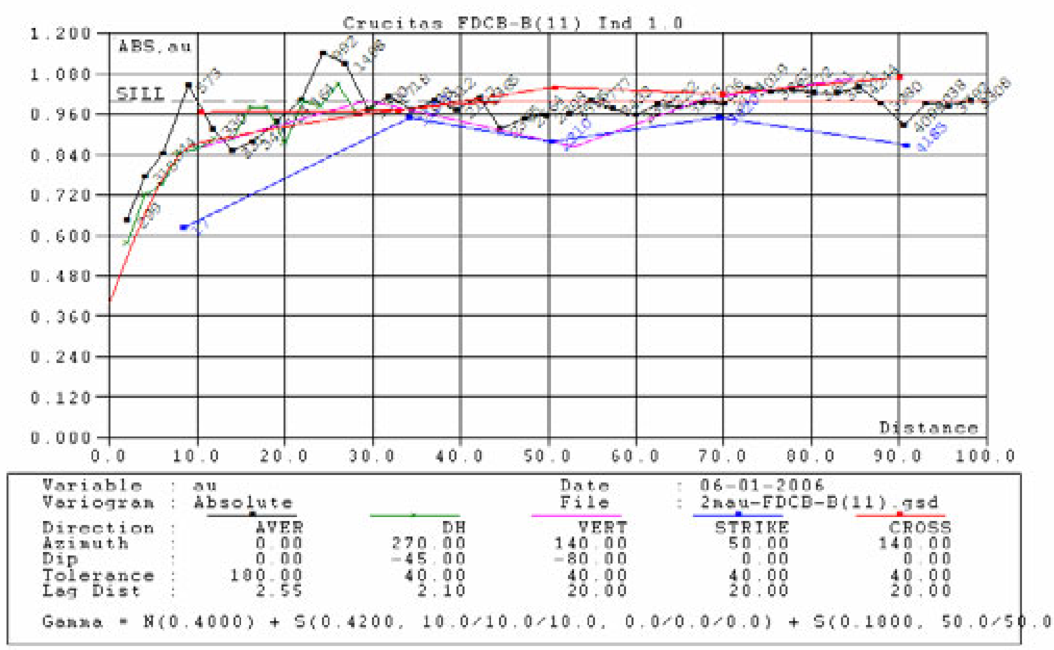
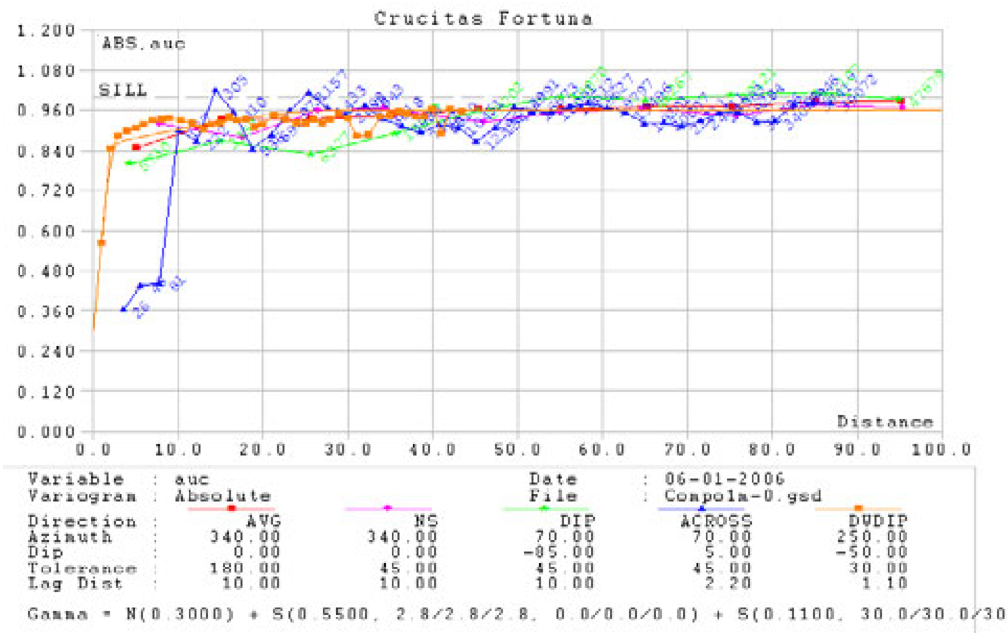


**Figure 12.15**
**Cooelogram of Other 1 m Composites Outside the Structures (25,646 composites)**




“The 3 figures above help us draw the following conclusions:”

- “The 1 m composites geostatistical behaviour does not differ much from the 2m composites.”
- “Making a special case for the samples coming from the oriented drill holes with a 270º azimuth does not make a significant difference either.”
- “Using indicators shows that the range of continuity for very low grade is very good and can reach 50m or more, but such low grade material has no economic bearing. The range of high grade composites, which is what matters in this case, does not change significantly. An indicator of 2 g Au/t already displays behaviour similar to the variogram without the indicator. This fact limits the benefits of using Indicator Kriging.”
- “Using the structures envelops to analyze the data adds little to the understanding of the grade continuity.”

“In addition to making a statistical analysis of the data using the structured model to segregate the samples, Geostat has tested a model using a methodology similar to IMC in 1999. For this purpose, 5m composites were generated by bench. The results of this analysis, which does not take into account the structures to segregate the samples, follow. If the structures exist, Geostat made the assumption that such an analysis was more likely to see their effect on grade variations in space.”

**Figure 12.16**
**Correlogram of 5 m Bench Composites**

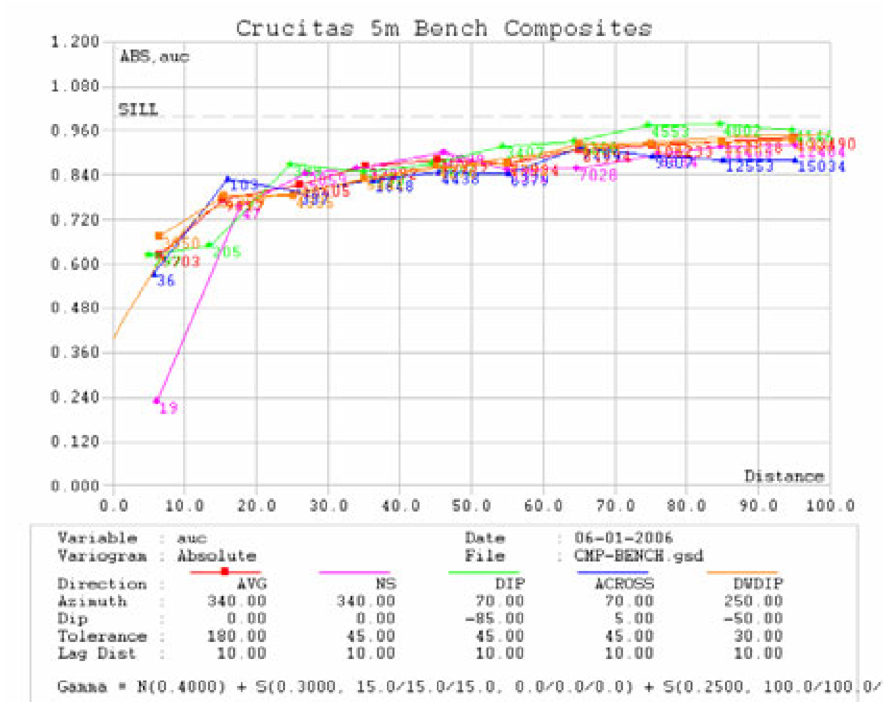
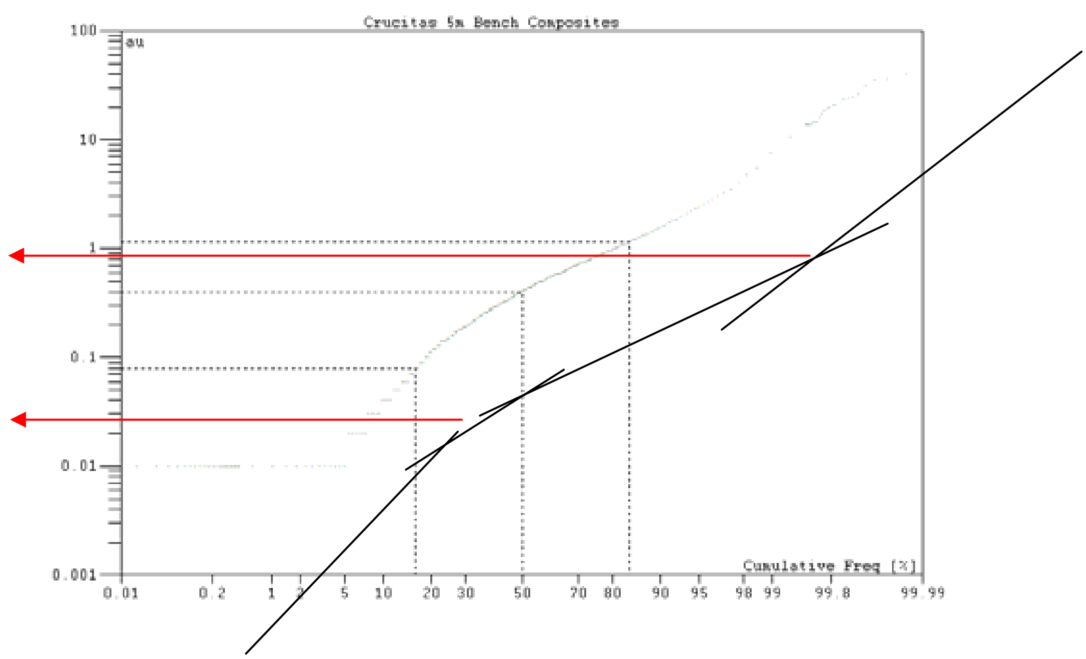
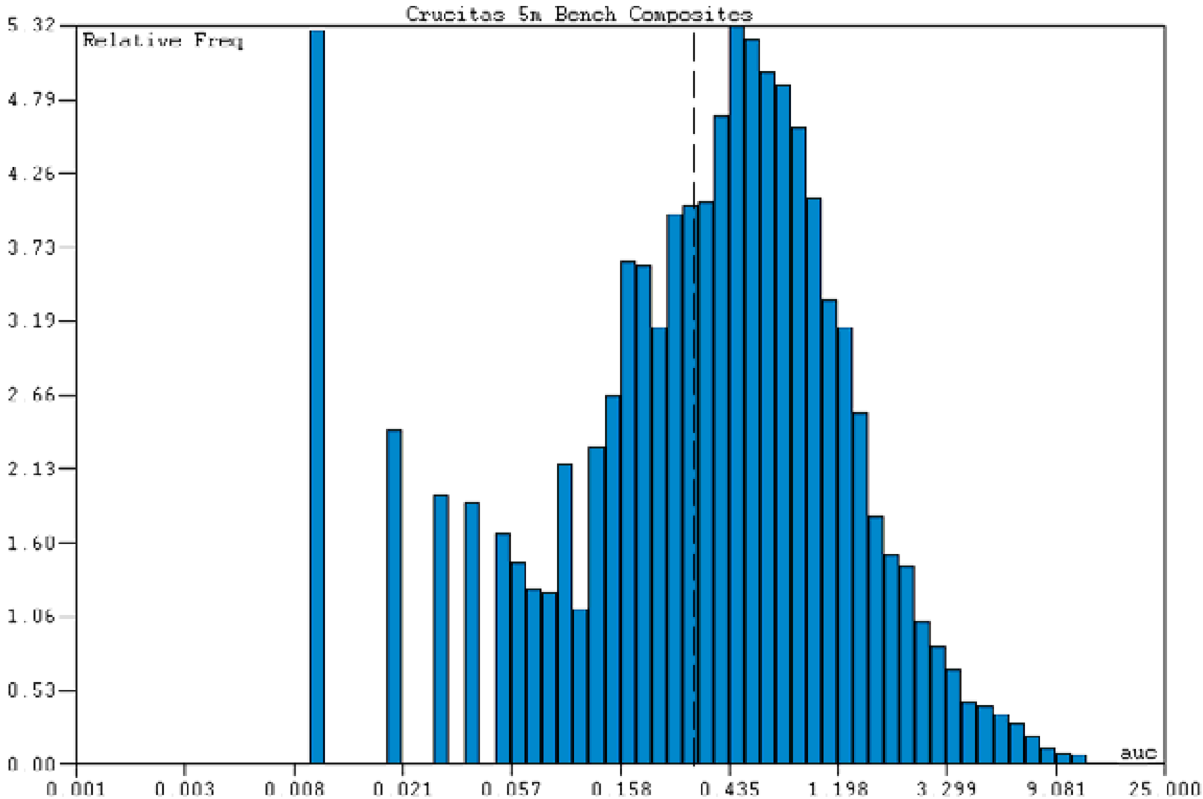


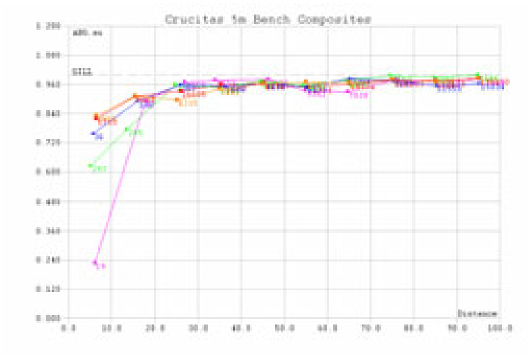

**Figure 12.17**
**Statistics for Gold of the 5 M Composites by Bench**



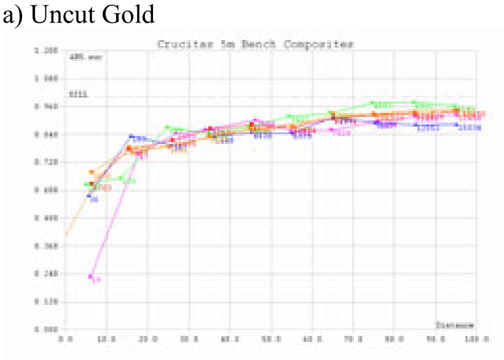


Crucitas 5m Bench Composites
Relative Freq
5.32
4.79
4.26
3.73
3.19
2.66
2.13
1.60
1.06
0.53
0.00
0.001
0.003
0.008
0.021
0.057
0.158
0.435
1.198
3.299
9.081
25.000
auc

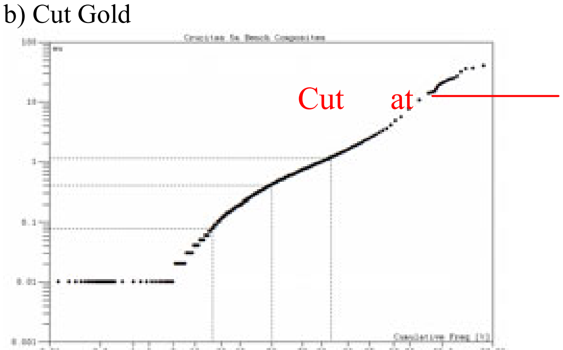
**Figure 12.18**
**Statistics and Correlogram of Gold and Silver 5 m Bench Composites**



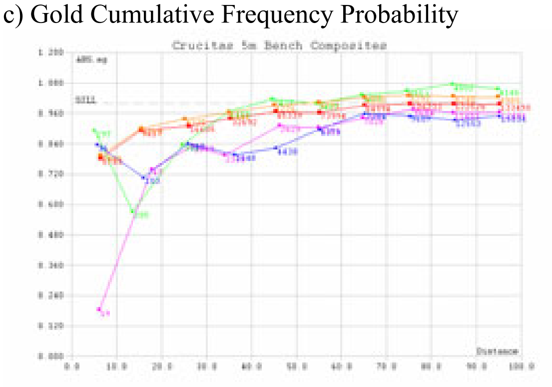

a) Uncut Gold



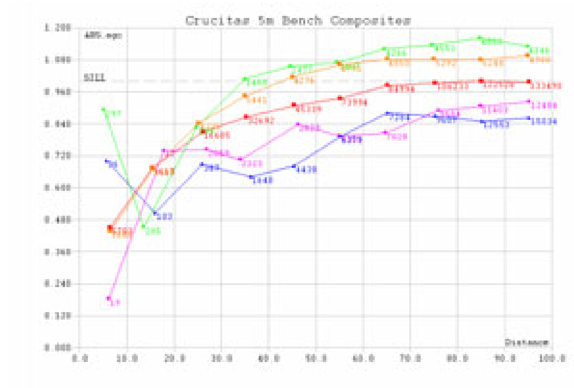

b) Cut Gold



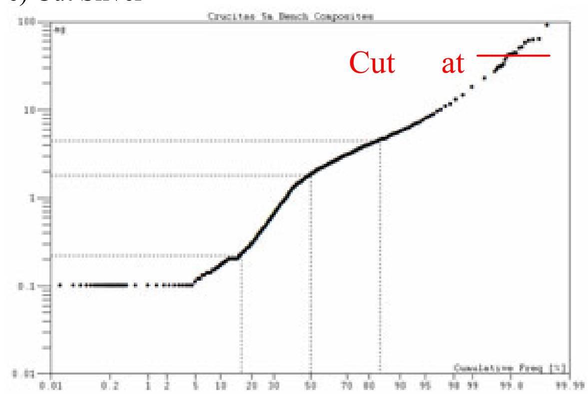

c) Gold Cumulative Frequency Probability




d) Uncut Silver




e) Cut Silver




f) Silver Cumulative Frequency Probability

"The variography of the 5m bench composites should be very comparable to the analysis of IMC 6m bench composites or it should be, but Geostat came to different conclusions than IMC regarding the range of continuity and the anisotropy. See Appendix 6. As the graphic above shows, the curves are much smoother than when using the 2m or 1m composites. That is because the variance of grades is reduced automatically when making larger composites. Longer composites eliminate the noise in the data set. This is acceptable if the 'noise' is not legitimate and useful geologically speaking. It also contributes to lower the nugget effect although it is not reduced significantly in this case when compared to shorter composites. Longer composites also increase the range of continuity but again not significantly considering that 70% of the grade variance is explained by components at shorter range than 15m."

"The better condition of the variogram made with 5m bench composites is due to the growing influence of the low grade samples which offer a better continuity as shown in previous graphics. The low grade samples outnumber the high grade ones by more than 2 to 1. See Appendix 5 of the April, 2006 Technical Resport by Geostats."

### 12.5.1 Conclusion of the Geostatistical Analysis

"It may be noticed that the impact of cutting grades increases the apparent range of grade continuity both for gold and silver. This is logical. In addition, silver displays an anisotropy when cut. Geostat has no explanation for this unusual response of the data at the moment. Since silver does not carry any significant economic weigh, it does not necessitate more study in our opinion for the time being."

"The impact of using larger composites on the resources is a much lower grade but much larger tonnage. If low grade and high grade material cannot be separated on a mining scale, it is deemed appropriate to use such a model. The positive impact of using longer composites and larger SMU is to reduce the margin of error of estimation. But the smoothing effect which increases the "dilution" induced by the model may also have a negative economic impact. The resource model, including sample size, should fit the optimal mining plan, but that is unknown at the exploration stage."

"On the other hand, a model using more discrete values may be compared to a simulation exercise where geology has a stronger say or, as in this case, a model fully constrained by geology (vertical structures multiple envelops and short 1m composites). It is always possible to group small samples into large composites but not the other way around. From a statistical point of view, a large block with a low margin of error or many smaller blocks with a higher margin of error are equivalent if the smaller blocks are considered as a group that occupies a similar volume to the large SMU. As a group of small blocks, their margins of error tend to cancel each other out. Individually, they may be more unreliable, but the more discrete model offers the unique opportunity of considering selective mining as a possibility. Vannessa is the first operator to consider that possibility by attempting to outline the steep dipping structures making the conduit of gold hydrothermal solutions."

"In the case of Crucitas, the geostatistical analysis does not contribute much to support the narrowly structured geological model nor does it negate its existence. The anisotropy it could artificially induce by having gold concentrated in the elongated, narrow and steep structures is not measurable in the final geostatistical analysis, whether using short or long composites or whether constrained by structures, lithology and/or benches or not. It does not mean that the structures do not exist; but they cannot be seen with the existing data in the Correlogram. It is likely that it will never be seen. The variography is not a condition of the data quality, rather it is an aid to the understanding of the geological character of the deposit. Whatever goes on at a very small scale is unlikely to matter for mining production or geological interpretation. More data will eventually be gathered but the amount of details it will procure might not change the definition describe here."

"Geostat has also tested the block models made with and without indicators as well as with and without the structures. As long as the fact that grade continuity limited in range is respected and the data is processed consistently, the global results are similar when measured in total ounces of gold. Since the structures do exist, we favoured using them in our final resource model. Furthermore, while the outline provided by Vannessa is not well supported by the geostatistical analysis, it does match sampling statistics, in particular the 42 samples described as Quartz Veins (QVN) grading more than 8 g Au/t in Fortuna. Geostat notes that loosely drawing structures by joining the high grade intercepts in drill holes does not prove their existence. It is the oriented core measurement of the structures (Section 11) and the few outcrops proving there existence that justify taking them into consideration. It is deemed the most likely geological model suitable to support the resource model."

"On a larger scale, the question is whether or not selective mining will be required. Given the geostatistical analysis that Geostat has done and the block model generated to outline the mineral resources of the Crucitas project, it remains difficult to say if the structured geological model offers an opportunity to improve production scheduling. The differences observed between the grades and tonnages estimated by the previous operators are significant, but it reflects the opportunity and uncertainty of mining selectively or over-diluting the existing material."

"The final equations for Kriging retained are:"

"For Fortuna:"

"$Gamma = N\,(0.40) + S_1\,(0.35, 7m/7m/7m) + S_2\,(0.10, 30m/30m/30m) + S_3\,(0.15, 200m/200m/200m)$"

"For Botija:"

"$Gamma = N\,(0.40) + S_1\,(0.15, 7m/7m/7m) + S_2\,(0.25, 50m/50m/50m) + S_3\,(0.20, 200m/200m/200m)$"

"For all other case:"

$Gamma = N\,(0.30) + S_1\,(0.60, 3m/3m/3m) + S_2\,(0.10, 30m/30m/30m)$

## 13.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

The information contained in this portion of the report was extracted from Appendix 3A of the feasibility study. Appendix 3A of the feasibility study is a Technical Report entitled "“Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary”, which is a Geostat report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since this report was filed on SEDAR in April, 2006 there has not been any material change in this information and it remains valid. The information contained in the April, 2006 report is quoted below.

### 13.1 SAMPLE PREPARATION

“Meterage of the drill core was verified by the logging geologist prior to sample selection. Sample intervals were chosen and marked within the geological intervals. No samples crossed lithological contacts. Sample lengths varied depending on the geology, and did not usually exceed 1.5 m. Any veins larger than 10 cm, or geological intervals with dense veining, were separated out as samples. Sample numbers were assigned to the sample intervals and were labelled on the core boxes. The “from-to” sample intervals were written in the corresponding sample booklet. The core was then photographed to document the logging and sampling intervals.”

“The samples consisted of half-core. Samples for holes DH93-1 to DH-95-50 were split on-site using a core-splitter, and were then sent to a Vancouver laboratory for further preparation and analysis.”

- “Samples from holes DH93-1 to DH94-24 were prepared and analyzed at Bondar-Clegg in Vancouver.”
- “Samples of holes DH94-25 to DH95-50 were prepared at CDN Resource Laboratories and analyzed at Placer-Dome Research Center (PDI) in Vancouver.”
- “Samples of holes DH95-51 to DH96-237 were prepared on-site down to 350 g coarse rejects and were then sent to PDI Research Center for pulverization and analysis. The rejects are kept on-site for storage.”
- “Samples of holes DH-99-290 to DH 99-292 were prepared and assayed on site.”
- “Samples from DH-99-293 were prepared on site and sent to Laguna Gold laboratory for assaying.”

### 13.2 ANALYSES

“Bondar-Clegg analyzed the core samples for holes DH93-1 to DH94-24 and all rock, soil, and silt samples. The analytical method for Au was by fire assay of a 30 g aliquot with AA finish. Assay results that exceeded 10 ppm were re-analyzed by fire assay with gravimetric finish. Eight elements, including Ag, Cu, Pb, Zn, Mo, As, Sb, and Bi, were determined by Inductively Coupled Plasma (ICP). Hg was also analyzed by cold vapor AA finish. The high (>10 ppm) Ag values were re-analyzed using gravimetric finish."

"The PDI Research Center analyzed the samples for holes DH94-25 to DH96-237. Au analysis was by fire assay, with AA finish initially on 25 g aliquots (DH94-25 to DH95-33) later increased to 50 g aliquots. All samples were also analyzed for 27 other elements using ICP. The high assay values for Ag (>10 ppm), Cu (>4000 ppm), and Mo (>1000 ppm) were re-analyzed. Samples from the 1999 drilling program were assayed on site (DH 99-290 to DH 99-292) (10 grs. AR/AA ). Hole DH 99-293 was assayed using 50 grs (F.A./AA)."

### 13.3 SECURITY

"As far as Geostat knows, there were no specific measures taken by PDI for security other than having an efficient system to log drill core and prepare samples on site quickly and efficiently. That system was set-up progressively between 1993 and 1994. The PDI laboratory rock standard probably stands above industry standard average. Geostat used the equipment installed by Placer Dome on location to prepare its own samples and was able to notice hands-on that the staff hired and trained by PDI was still available and performed well their duties."

"In addition, the geologist had their office on site, leaving no gaps in supervision at the time of drilling between 1993 and 1999. See Figure 11, page 34. The only exception was the first campaign before the office construction on site which used the office in Coopvega for core logging. In addition, standard check samples were used systematically as well as internal and independent duplicates. That procedure is explained in more detail in the following section. The original core was sawed in 2 halves to keep a witness on site which was tested at least by IMC in 1999 and Geostat in 2005."

**Figure 13.1**
**Pictures of the Sample Preparation Facilities on Site (2005)**

## 14.0 DATA VERIFICATION

The information contained in this portion of the report was extracted from Appendix 3A of the feasibility study. Appendix 3A of the feasibility study is a Technical Report entitled "“Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary”, which is a Geostat report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since this report was filed on SEDAR in April, 2006 there has not been any material change in this information and it remains valid. The information contained in the April, 2006 report is quoted below.

### 14.1 INTRODUCTION

"In 2005, Geostat received the data base for the Crucitas project as a Gemcom Project files set that had already been modified by Vannessa. The original Gemcom project directory bore the name Cambior_1999 and it included the drill hole database which did not change since 1999 as well as the block models produced both by Cambior and IMC in 1999. Vannessa started working on upgrading the geological model by adding the gold bearing steep dipping structures. Vannessa also verified the topography and other aspect of the model to insure the integrity of the information in this project file set."

"Cambior reported in its Feasibility Study commissioned by Lyon Lake in 1999 that the database consists of a series of drill logs in GEOLOG format, and tabular summaries on ASCII flat files with all the relevant information (collar locations, survey data, lithological abbreviations, and gold and silver assays). The former series were imported into GEMCOM for Windows software, and a dozen holes were checked against the actual drill logs for importation accuracy."

"There are 32,175 gold and silver assays ranging from 0 to 542g Au/t for gold, and 0 to 550g Ag/t for silver. Approximately 300 assays, or slightly less than 1% of the assay database, were examined against the Bondar-Clegg assay certificates for errors in data entry. No meaningful errors were found, except for five rounding errors from the conversion of parts per billion (ppb) results into g/t in the drill logs."

"Examination of the survey data reveals that no collars were resurveyed for their final orientation and dip, and that all that was left were initial survey measurement and strings of Sperry Sun down-hole survey shots, which have been known to be plagued with problems and cannot be used to read a hole orientation near the casing. This introduces a small amount of uncertainty in the final location of the drill targets."

"When available, core recovery values were read from the drill logs and incorporated into the database. The range of recoveries varies from 0% to 273%, though the upper values (>100%) may be typographical errors. Out of 32,175 recovery values ranging from 0 to 100%, less than 5% (748 values) fall below 50%, and the mean recovery is 87.5%."

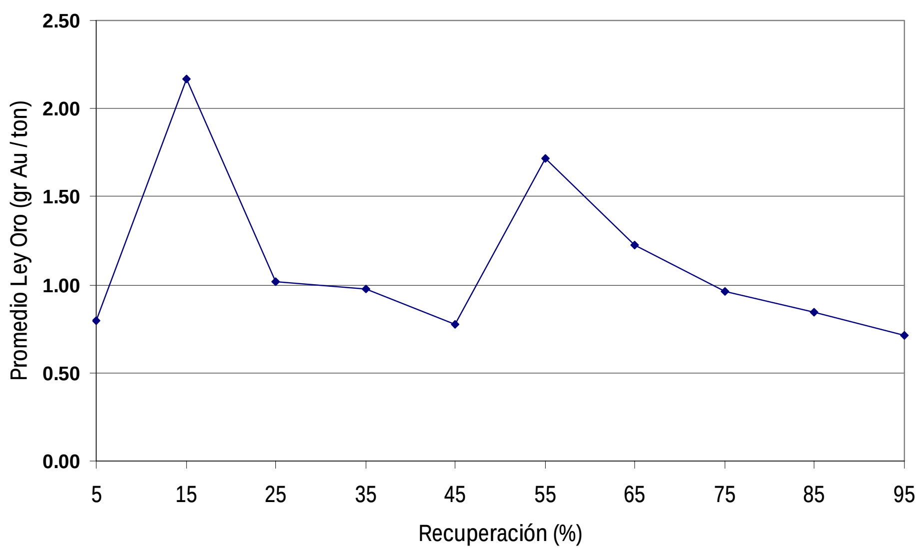
"Figure 14.1 below illustrates the behaviour of the average gold grade with variable core recoveries. It reveals no systematic trends either of increasing or decreasing gold grades with lower recoveries, and the fluctuation is well within a confidence interval of one standard deviation (±3.3 g/t)."

## 14.2 VERIFICATION OF PLACER DOME BLANKS AND STANDARDS

"In 1999, the services of Independent Mining Consultants (IMC) were retained by Lyon Lake Mines Ltd. (LLL) to build a mineable reserve and mine model, and to run any checks it deemed necessary, during the course of the study, to validate the data. Placer Dome Inc (PDI) instituted a program to analyze blanks, checks, and standards during their exploration program. The PDI report, entitled Cerro Crucitas Project, Pre-Feasibility Study, Volume 1 Geology, summarizes the procedures adopted by Placer Dome procedures that were utilized. IMC could not specifically verify the application of the procedures, because they had been completed prior to the involvement of Lyon Lake or Cambior's Project & Construction

Group (CPC) on the project. IMC did not, however, discover any evidence that would cast doubt on PDI description of procedures to collect and analyze checks, blanks, and standards. As an independent verificator, IMC collected samples while on site, and had them assayed by a third party laboratory under the direction of IMC personnel. The results of that work are summarized in the next sub-section. In 2005, Geostat did review this work and took 21check samples of its own in October 2005. Geostat findings are discussed at the end of this section (13.5) of the present report."

**Figure 14.1**
**Gold Grade (left – Y axis) and Core Recovery (below –Xaxis)**




"In 1999, IMC did obtain a copy of the PDI database containing checks, blanks, and standards during the site visit and was able to confirm PDI resulting statistical analysis based on the same information. The following description of PDI quality assurance and quality control (QA-QC) program is summarized from the PDI report. This discussion focuses on QA-QC for gold, since that is the only significant economic metal at Crucitas. Geostat reproduced and verified those results in its report to demonstrate that the data they used are valid, but neither Geostat nor IMC, were involved in the project when the data was being produced by PDI from 1993 to 1999. Core from drill holes DH93-1 through DH94-24 was split on site and sent to Bondar Clegg in Vancouver for preparation and assay. A Bondar-Clegg internal QA-QC program was implemented on the samples from drill holes DH93-1 through DH94-24 with "several standards and blanks randomly inserted into each work order". Assay techniques for gold utilized a 30 g aliquot. Duplicates of samples with values higher than 0.50 g Au/t showed a high variance due to an apparent nugget effect."

"Drill Holes DH94-25 to DH95-50 were split on site, prepared at CDN Resource Laboratories, and assayed at the PDI Research Center laboratory. From Drill Hole DH94-25 to DH95-33, a 25 g aliquot was used for assay. From DH95-34 through DH96-237, a 50g aliquot was utilized. Beginning with drill holes DH95-25 through DH96-236, a field program of blind checks, blanks, and standards was implemented by PDI. For every set of 20 samples, a standard, a blank, and two duplicates were inserted. IMC has found a number of

PDI reports that present the statistical analysis of the check, blank, and standard data. Those reports indicate acceptable statistical results. Geostat reviewed the blanks and standard results produced by PDI and basically agrees with their findings of IMC. **Geostat does not have the results of the duplicates."**

"In 1999, IMC reports that "the duplicates consisted of two sets. The first set of data was a '*blind original*' sample inserted in the sample shipment. PDI text describes this as a second split of the preceding drill sample. This set is referred to as the '*Blind Original versus Blind Duplicate (Borg vs Bdup)*'. It is understood that this '*blind original*' was a second split of crushed material (about 350 g), since pulverizing was not performed on site." **Geostat did notice the presence of 'puck' type pulverizers on site. This is consistent with the fact that the standard samples inserted in batch of prepared samples destined to external assay laboratory came as pulverized material. See next sub-section 14.3 for more details."**

"The PDI laboratory submitted a second group of duplicates to an outside laboratory for testing. This set was labeled "Internal Original versus Internal Duplicate (Iorg vis Idup). The Internal Duplicate sub-samples were submitted to an outside laboratory as a check on the PDI laboratory and consisted of a duplicate assay pulp. The International Plasma Laboratory (IPL) was used for the outside lab running the Idup samples. A series of roughly 1,088 samples were assayed by both AA finish and gravimetric finish as a check on the AA procedure. To verify the results, IMC utilized the data file obtained from the site, and checked the overall results from all data generated by PDI by combining and comparing all check, blank, and standard data issued from PDI QA-QC program into a common data file for evaluation, regardless of the drill sequence number. It turns out that IMC combined assay lots of different aliquots size into one set of data files for analysis, but this is believed to have little consequence on the overall validity of their analysis."

"Figure 14.2 a) summarizes the response of 1,675 blanks that were inserted into the assay stream for analysis. All but three of the samples reported a waste or trace value from the assay procedures. The three values that reported grades greater than 1.2 g Au/t could have been mislabeled, or might reflect some cross contamination from other samples. This rate is less than 0.20% of the blank samples, and does not indicate a significant problem in reporting blank values."

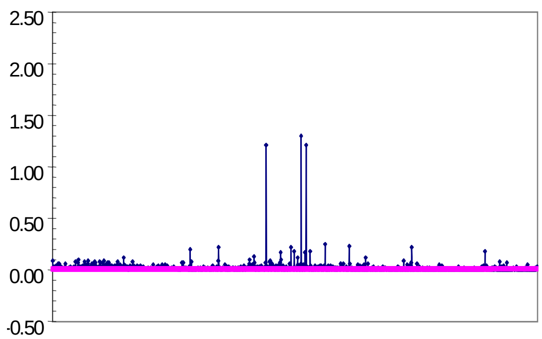
"Figure 14.2 (b) to (g) illustrates the results of all of the standard values reported by PDI. The observed trend is that the PDI assays were roughly 2 to 5 % lower than the standard values. The variance about the expected value is generally small for the check results. Higher-grade samples illustrate higher variance normally expected."

"The minor bias, indicated by the standards results, implies that the PDI values are conservatively low compared with the standards values, and can consequently be used for the determination of reserves."

**Figure 14.2**
**Blanks and Standards Assays**

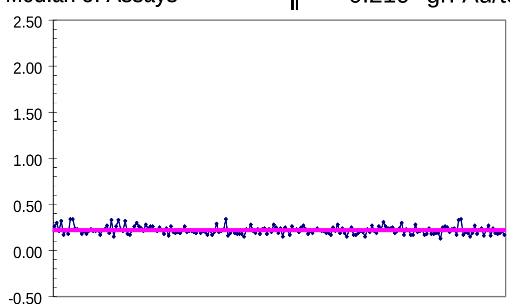
## a) Blanks

| | |
|---|---|
| Standard Nominal Value | **0.000 gr. Au/ton.** |
| Number of Assays | **1 675** |
| Median of Assays | **0.017 gr. Au/ton.** |

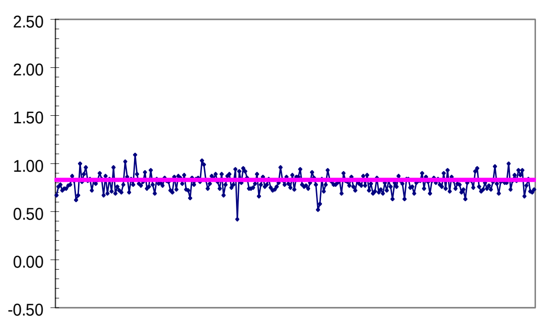



## b) Standard 2

| | |
|---|---|
| Standard Nominal Value | 0.220 gr. Au/ton |
| Number of Assays | 198 |
| Median of Assays | 0.219 gr. Au/ton |



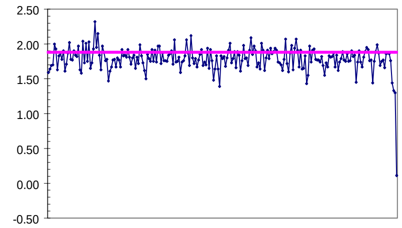

## c) Standard 3




| | |
|---|---|
| Standard Nominal Value | 0.830 gr. Au/ton. |
| Number of Assays | 244 |
| Median of Assays | 0.797 gr. Au/ton. |

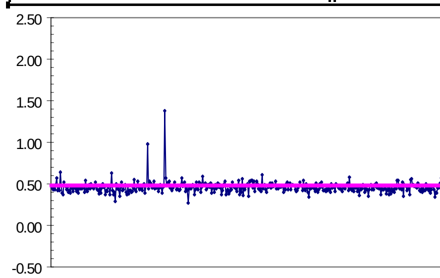
## d) Standard 4

| | |
|---|---|
| Standard Nominal Value | 1.880 gr. Au/ton |
| Number of Assays | 233 |
| Median of Assays | 1.783 gr. Au/ton |



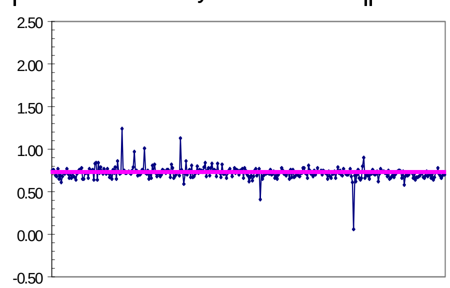

## e) Standard 5

| | |
|---|---|
| Standard Nominal Value | 0.480 gr. Au/ton |
| Number of Assays | 435 |
| Median of Assays | 0.458 gr. Au/ton |



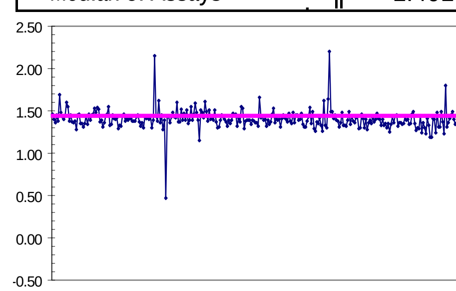

## f) Standard 6

| | |
|---|---|
| Standard Nominal Value | 0.730 gr. Au/ton |
| Number of Assays | 350 |
| Median of Assays | 0.720 gr. Au/ton |




## g) Standard 7

| | |
|---|---|
| Standard Nominal Value | 1.440 gr. Au/ton. |
| Number of Assays | 291 |
| Median of Assays | 1.401 gr. Au/ton. |



## 14.3 PLACER DOME VERIFIED DUPLICATE ASSAYS

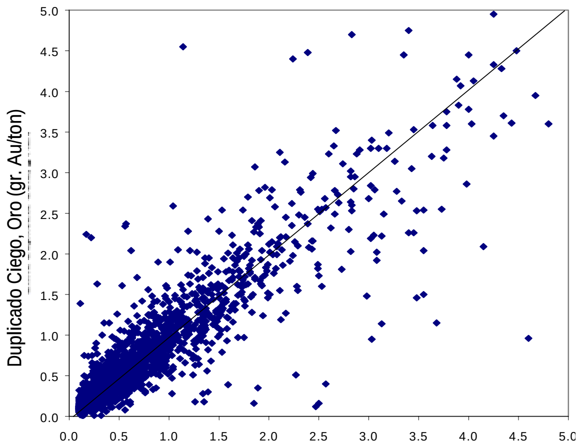
"In 1999, the duplicate analysis completed by PDI was reviewed by IMC by tabulating XY scatter plots and QQ population plots for both the blind duplicates and the internal duplicates. Figure 14.3 summarizes the results of the blind duplicates, and Figure 14.4 illustrates the results of the internal duplicates. **Geostat did not have this data at the time of writing this report, but it reproduces the findings of IMC here since the reproducibility of sample results is important to demonstrate."**

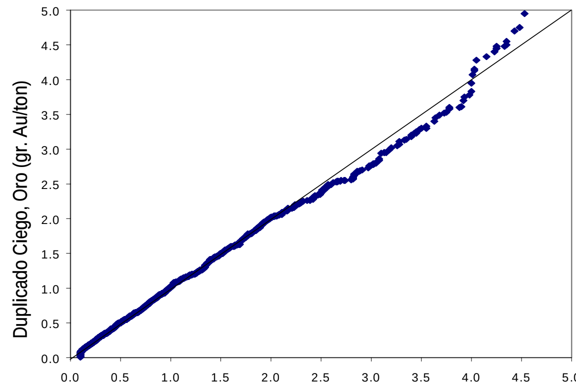
"The data range within the blind duplicate check (crushed material to the same lab) ranges from 0.01 to values over 100 g Au/t. In order to focus on the meaningful range of data, the mean value was calculated above 0.10 g Au/t, and the values were plotted from 0.10 to 5.0 g Au/t. The XY scatter plot illustrates the high degree of variance in preparation of a data split. There is, however, no evidence of bias between the two sample sets. The QQ plot of the ranked (not paired) data illustrates a general 1 to 1 correlation between the two data sets."

"Figure 14.4 summarizes the results of the internal checks submitted to an external lab. IMC holds the opinion that these are likely duplicate pulp samples rather than crushed material as in the previous data set. As should be expected, the variation of the sample pairs is substantially less than in the blind samples. There are a few "outlier" samples that may be explained by "coarse gold" or simple mislabeling of samples. Comparison of means, and review of the QQ plot indicates that the original assay is, on the average, about 1% less than the outside duplicate. This level of bias is too small to quantify with this database. In summary, there is no apparent bias between the internal original and internal duplicate samples."

"All of the project data and all of the QA-QC evaluation of the data were from the single source of PDI. Although all information reviewed by IMC indicates that the data set is reliable, an independent confirmation of the presence of gold mineralization at Crucitas was completed by IMC in 1999 and by Geostat in 2005 with independent assays. These exercises are discussed in the next two sub-sections."

**Figure 14.3**
**Placer Dome Blind Duplicate Assay Results (from crushed material)**

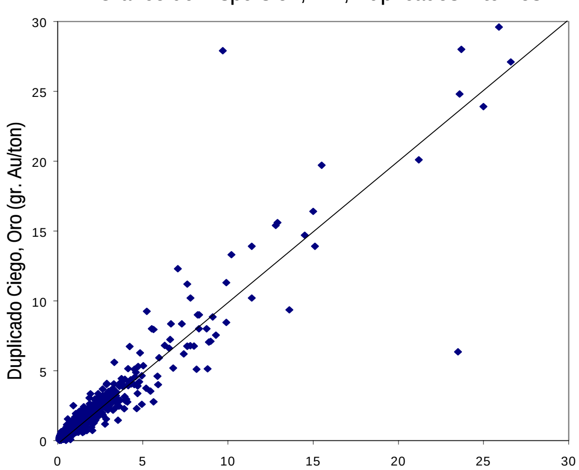


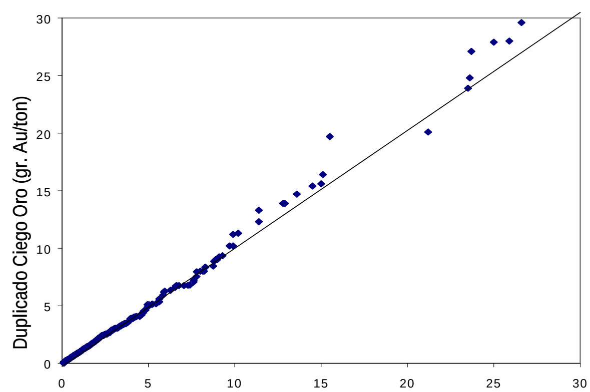




| Estadísticas Básicas para Todos los Pares | | |
|---|---|---|
| | *Original Oro gr. Au/ton* | *Duplicado Oro gr. Au/ton* |
| Número | 3 427 | 3 427 |
| Media gr. Au/ton | 0.692 | 0.724 |
| Desviación Estándar | 1.890 | 2.616 |
| Max gr. Au/ton | 44.40 | 100.00 |
| Min gr. Au/ton | 0.01 | 0.01 |

| Estadísticas Básicas - Original > 0.10 gr. Au/ton | | |
|---|---|---|
| | *Original Oro gr. Au/ton* | *Duplicado Oro gr. Au/ton* |
| Número | 2 558 | 2 558 |
| Media gr. Au/ton | 0.913 | 0.914 |
| Desviación Estándar | 2.143 | 2.263 |
| Max gr. Au/ton | 44.40 | 41.20 |
| Min gr. Au/ton | 0.10 | 0.01 |

**Figure 14.4**
**Placer Dome Internal Duplicate Assay Results (from pulverized material)**




| Estadísticas Básicas para todos los Pares | | |
|---|---|---|
| | *Original Oro gr. Au/ton* | *Duplicado Oro gr. Au/ton* |
| Numero | 2 024 | 2 024 |
| Media gr. Au/ton | 1.275 | 1.291 |
| Desviación Estándar | 7.536 | 7.829 |
| Max gr. Au/ton | 217.00 | 249.00 |
| Min gr. Au/ton | 0.01 | 0.01 |

| Estadísticas Básicas - Original > 0.10 gr. Au/ton | | |
|---|---|---|
| | *Original Oro gr. Au/ton* | *Duplicado Oro gr. Au/ton* |
| Numero | 1 538 | 1 538 |
| Media gr. Au/ton | 1.667 | 1.688 |
| Desviación Estándar | 8.608 | 8.946 |
| Max gr. Au/tor | 217.00 | 249.00 |
| Min gr. Au/tor | 0.10 | 0.01 |

## 14.4 INDEPENDENT VERIFICATION OF GOLD OCCURRENCE BY IMC (1999)

"IMC completed an independent verification of the presence of gold mineralization at the Crucitas Project by collecting samples from core and coarse rejects stored on site. This test was not designed to validate the resource or average deposit grade. Neither was it designed to validate the sampling and assaying procedures utilized by PDI. Its objective was to confirm the presence of gold only, and to identify any significant differences within the test intervals between PDI's and IMC's independent results."

"IMC collected 30 samples from the existing split drill core or diamond drill coarse rejects stored on site at Crucitas. The list of samples was generated by IMC while on site; hence, there was no opportunity for sample modification prior to their collection. IMC personnel accompanied LLL sample handlers as the samples were pulled from core trays or from coarse reject storage. IMC personnel observed and assisted in the sample preparation and handling. Sample numbering, recording, bagging, and preparation for shipment was prepared by IMC engineers. The samples were checked as baggage on the same flights as the IMC site visit personnel, and were under IMC control until delivered to the sample preparation laboratory."

"IMC selected the samples to be representative of the range of deposit gold grades. More emphasis was placed on sampling of "ore grade" mineralization as opposed to waste, because of the obvious economic impacts. Waste samples were included, however, to obtain some understanding of the original assay ability to categorize ore and waste."

"Hard rock and saprolite samples are represented on the list. Five of the saprolite samples had been crushed completely by PDI, and stored as coarse rejects. They have been coded with an "R" on Table 3.5. The coarse rejects were poured through a Jones splitter a number of times until roughly 1 kg of sample was bagged for the IMC sample."

"Hard rock or saprock samples were obtained by sawing the existing half core with a diamond saw to obtain a ¼ core sample, leaving ¼ in the core tray. If the core sample was not intact, it was split by hand, by dividing the loose material in half longitudinally with a spoon half placed in a sample bag. Samples that were sawn were dried on site at $100^{o}$ C for roughly 1 to 2 hours."

"The samples were delivered by IMC to Metcon Research, Inc. of Tucson, Arizona for sample preparation. All samples were crushed to 10 mesh, and split to obtain roughly 1 kg. The entire 1 kg was pulverized by a ring and puck pulverizer. The pulp was rolled, and about 150 g was sent to Skyline Laboratories, of Tucson, Arizona for Fire Assay. Skyline fire assayed a 50g aliquot with a gravimetric finish. The 50 g aliquot is the same size as recorded in the later PDI assay procedure descriptions. The original sample value was not provided to Metcon or Skyline. IMC did provide Metcon with a broad range of expected assay result to assure proper selection of assay finish."

"In summary, the IMC check assay procedure does validate the presence of gold in the 30 samples tested. In addition, a statistical analysis of the results indicates that the mean grade of the 29 samples in the original data base, and the mean grade of the 29 test results are not sufficiently different to be rejected as different values. One sample was removed from the test because it was a high outlier value in the check assay results."

"Results of the assay checks are presented on Table 14.1. The original value from the assay database is shown adjacent to the check assay result. Sample IMC-1 was reported in the database at a value of 1.90 g Au/t. The check result was 28 g Au/t, which implies some degree of "nugget effect", may exist in the deposit. This very high value outlier was removed from any further statistical calculations by IMC."

"The mean, variance, and standard deviation of the original and check values are shown on the bottom of the table. The mean gold value for the 29 samples utilized were 1.65 g/t for the original set and, 1.48 g/t for the check data set: a difference of 9.8%."

"IMC prepared two statistical tests of the means of the two sample sets being tested:"

"A Paired "t" statistic;
The "Smith-Satterthwaite Statistic" (SWT)."

"The results of both tests are distributed according to the Students "t" distribution, with 28 degrees of freedom and 55 degrees of freedom respectively. In summary, the Paired "t" and the SWT would have to be greater than about 2.0 to prove that the mean of the two data sets are different (with a 90% confidence). Since both of the statistics are less than 2.0 for both gold and silver, the test indicates that the means are sufficiently close to be acceptable."

## 14.5 INDEPENDENT VERIFICATION OF GOLD OCCURRENCE BY GEOSTAT (2005)

"Like IMC, Geostat completed an independent verification of the presence of gold mineralization at the Crucitas Project by collecting samples from core stored on site. This test was not designed to validate the resource or average deposit grade. Neither was it designed to validate the sampling and assaying procedures utilized by PDI. Its objective was to confirm the presence of gold only, and to identify any significant differences within the test intervals between PDI's and Geostat's independent results."

"Geostat collected 21 samples: 18 from the existing split drill core and 3 standard samples stored on site at Crucitas. The list of samples was generated by Geostat while on site; hence, there was no opportunity for sample tempering prior to their collection. Geostat personnel accompanied Vannessa sample handlers as the samples were pulled from core trays storage. Geostat's personnel observed and assisted in the sample preparation and handling. Sample numbering, recording, bagging, and preparation for shipment was prepared by Geostat engineer. The samples were checked as baggage on the same flights as the Geostat site visit personnel, and remained under Geostat control until delivered to the sample preparation and assay laboratory back in Canada."

**Table 14.1**
**Results of Independent Assay Check for Gold and Silver - IMC 1999**

**Results of Independent Assay Check for Gold and Silver**
**Core Samples Collected by IMC on 25 March 1999**

| IMC Number | DH Number | From Meters | To Meters | C=Core R=Coarse Reject | Original Sample No. | Tag Sample No. for Preparation | Original Data Base Au Grade g/tonne | Metcon Prep Skyline Assay Fire Assay g/tonne | Original Data Base Ag Grade g/tonne | Metcon Prep Skyline Assay Fire Assay g/tonne |
|---|---|---|---|---|---|---|---|---|---|---|
| IMC 1 | DH-55 | 16.80 | 18.10 | C | 27224 | 89651 | 1.90 | 28.00 | 0.20 | 27.00 |
| | ***Outlier Response of Above Sample Eliminated from Calculation of Mean and Variance*** | | | | | | | | | |
| IMC 2 | DH-55 | 27.15 | 28.10 | C | 27236 | 89652 | 1.22 | 0.60 | 2.60 | 2.00 |
| IMC 3 | DH-55 | 36.75 | 38.15 | C | 27247 | 89666 | 7.56 | 9.50 | 8.00 | 8.00 |
| IMC 4 | DH-55 | 46.90 | 47.90 | C | 27258 | 89664 | 1.17 | 1.15 | 15.00 | 10.00 |
| IMC 5 | DH-149 | 66.95 | 67.75 | C | 41816 | 89655 | 1.09 | 1.65 | 3.50 | 4.00 |
| IMC 6 | DH-149 | 88.90 | 89.90 | C | 41846 | 89654 | 1.07 | 0.60 | 2.10 | 2.00 |
| IMC 7 | DH-149 | 111.30 | 112.70 | C | 41877 | 89653 | 0.61 | 0.50 | 2.10 | 0.50 |
| IMC 8 | DH-149 | 133.10 | 134.75 | C | 41907 | 89657 | 1.05 | 0.40 | 1.10 | 1.00 |
| IMC 9 | DH-149 | 155.70 | 156.70 | C | 41937 | 89656 | 4.22 | 2.35 | 5.40 | 7.00 |
| IMC 31 | DH-149 | 98.40 | 99.40 | C | 41859 | 89665 | 1.48 | 2.35 | 1.70 | 2.00 |
| IMC 32 | DH-149 | 121.20 | 122.00 | C | 41891 | 89667 | 0.22 | 0.20 | 0.90 | 1.00 |
| IMC 10 | DH-24 | 23.60 | 25.50 | C | 2603 | 89659 | 1.76 | 2.05 | 4.70 | 3.00 |
| IMC 11 | DH-24 | 47.45 | 48.90 | C | 2618 | 89658 | 4.47 | 2.00 | 6.30 | 4.00 |
| IMC 12 | DH-24 | 79.19 | 80.69 | C | 2640 | 89661 | 0.38 | 0.35 | 4.00 | 2.00 |
| IMC 13 | DH-50 | 18.60 | 19.70 | C | 26577 | 89660 | 4.12 | 1.80 | 8.00 | 4.00 |
| IMC 14 | DH-50 | 36.90 | 37.95 | C | 26598 | 89662 | 0.83 | 0.85 | 0.20 | 0.50 |
| IMC 15 | DH-134 | 35.40 | 36.30 | R | 38571 | 99431 | 0.24 | 0.25 | 0.40 | 0.50 |
| IMC 16 | DH-134 | 57.60 | 58.25 | C | 38604 | 89668 | 3.90 | 2.65 | 3.60 | 3.00 |
| IMC 17 | DH-134 | 84.80 | 85.80 | C | 38638 | 89669 | 0.45 | 1.00 | 2.70 | 3.00 |
| IMC 18 | DH-134 | 111.60 | 112.40 | C | 38672 | 89670 | 0.93 | 1.20 | 3.20 | 3.00 |
| IMC 19 | DH-48 | 11.55 | 12.75 | C | 26168 | 89673 | 2.19 | 2.65 | 0.20 | 0.50 |
| IMC 20 | DH-48 | 27.20 | 27.90 | C | 26189 | 89674 | 0.60 | 0.55 | 0.10 | 0.50 |
| IMC 23 | DH-2 | 29.42 | 30.92 | C | 1092 | 89671 | 1.27 | 2.20 | 3.20 | 7.00 |
| IMC 24 | DH-2 | 59.95 | 61.42 | C | 1112 | 89672 | 0.44 | 0.20 | 5.40 | 3.00 |
| IMC 25 | DH-2 | 72.10 | 73.12 | C | 1120 | 89675 | 0.26 | 0.50 | 2.60 | 0.50 |
| IMC 26 | DH-2 | 117.80 | 119.27 | C | 1152 | 99426 | 0.38 | 0.55 | 2.50 | 1.00 |
| IMC 27 | DH-175 | 12.20 | 13.70 | R | 52754 | 99428 | 1.96 | 1.20 | 0.20 | 0.50 |
| IMC 28 | DH-175 | 27.40 | 28.70 | R | 52774 | 99430 | 0.03 | 0.03 | 0.60 | 0.50 |
| IMC 29 | DH-175 | 47.20 | 48.80 | R | 52794 | 99429 | 2.34 | 1.90 | 1.30 | 2.00 |
| IMC 30 | DH-175 | 68.30 | 69.60 | R | 52814 | 99427 | 1.20 | 1.55 | 6.00 | 6.00 |
| | | | | | | Number | 29.00 | 29.00 | 29.00 | 29.00 |
| | | | | | | Mean | 1.64 | 1.48 | 3.37 | 2.83 |
| | | | | | | Variance | 2.91 | 3.05 | 10.19 | 6.58 |
| | | | | | | Std Dev | 1.71 | 1.75 | 3.19 | 2.56 |
| | | | | | | Hypothesis Test Parameters for 29 Sample Pairs | Original Versus Check Gold | | Original Versus Check Silver | |
| | | | | | | Paired "t" | 0.931 | | 1.725 | |
| | | | | | | Smith-Satterthwaite | 0.355 | | 0.707 | |

"Geostat selected the samples to be representative of the range of deposit gold grades. More emphasis was placed on sampling of "ore grade" mineralization as opposed to waste, because of the obvious economic impacts. Waste samples were not included. Three samples using PDI Laboratory Standards were taken on site to verify the reliability of grade reproduction of samples."

"Hard rock and saprolite samples are represented on the list. Saprolite is more difficult to find in the core boxes today because it has been the object of repetitive sampling from third party interest and for metallurgical testing. Because saprolite is often loose material, some of those samples were bagged like the auger samples which make them more difficult to retrieve as they were piled between core racks, under the same roof. After some 10 years of storage, some bags are prone to tear. After multiple unsuccessful attempts to get samples of saprolite near surface in the core boxes, the shallowest samples of saprolite were taken at some 47 m down the hole. Therefore, the samples taken of the saprolite probably represent more saprock than laterite at that depth. The Litho field in Table 14.2 gives the type of material sampled according to the drill log."

"Hard rock or saprock samples were obtained by splitting the existing sawed half core with a core splitter instead of a diamond saw, which was out of commission, to obtain a ¼ core sample, leaving ¼ in the core tray. If a half-core sample appeared crushed, it was split by hand, by dividing the loose material in half longitudinally with a spoon half placed in a sample bag. Samples were dry enough to be crushed directly in the jaw crusher followed by a cone crusher to be reduced to sand. All samples were then poured through a Jones splitter until roughly 300 g of sample was obtained and bagged for the Geostat sample (using a scale). The rejects were kept in storage at the mine for later verification, if required, and to provide an eventual backup. The 3 standard samples (# 3, 14 and 18) were already pulverized, but the 18 other samples were not when delivered by Geostat to the laboratory."

"The samples were delivered by Geostat to ALS Chemex Laboratories in Val d'Or (Quebec, Canada) for sample preparation and assaying using a 50 g aliquot. A 100 g portion of the 300 g sent to the ASL laboratory was sent after preparation (pulverization for homogenization) to the Boulamaque Laboratory in Val d'Or for assaying of 2 portions of 1 assay-ton (30 g). All samples were analysed using fire assay and finished by gravimetry - for gold and AA for silver - at both laboratories. Geostat did provide both laboratories with a broad range of expected assay result to assure proper selection of assay finish."

"In summary, the Geostat check assay procedure does validate the presence of gold in 20 samples and no gold in the blank standard sample (#3) tested. In addition, a statistical analysis of the results using the Student Test indicates that the mean grade of the 18 samples in the original data base, and the mean grade of the 18 test results for the 2 laboratories used by Geostat are not sufficiently different to be rejected as different values. The majority of check samples gave results similar to the original values both for gold and silver and each individual paires. However, the duplicate assays from both laboratories chosen by Geostat, ALS Chemex and Bourlamaque Laboratories, presented much less difference than compared with the original assays. The later indicate that the nature of the ore at Crucitas, while "nuggety", allow assay results to be repeated relatively easily for a gold ore."

"The strongest differences in gold grade assayed (check samples # 2, 8, 10, 11, 17 and 21) are induced by the difference in the method of sampling and the coarse grain nature of gold found in the samples. Gold grain size variations are not usually measured directly in individual samples but indirectly using semi-variograms. While the sampling variance is increased significantly by taking ¼ of the core instead of ½ of the core in the original samples, as well as by splitting the core instead of sawing it in two, the results from Geostat samples are deemed comparable to the original PDI assays. Check samples verify well the data 12 times out of 18 assays for both gold and silver."

"Results of the assay checks are presented on Table 14.2. The original value from the assay database is shown adjacent (left) to the check assay result. In fact, the assay results obtained for the same check samples by two independent laboratories, ALS and Bourlamaque, match very well for an epithermal gold deposit of relatively low grade. In addition, the Bourlamaque double assays using 30g aliquot also demonstrate a relatively high efficiency to determine gold grade of the Crucitas ore type with a single standard fire assay using a 30 g aliquot. See Table 14.3. These results of the check samples program are sufficient to say the assays in Vannessa database are reliable based on a limited verification exercise, according to the mining industry standard and practice."

"While the data is likely to have been correctly sampled and assayed, our limited check sample program shows that 1 time in every 3 assays, the assays are likely to differ by more than double, even triple the value of gold when comparing results from the same location in the same core and at the same depth in the drill holes. This illustrates the 'nugget effect' resulting from having very few but relatively coarse grains of gold and silver in the samples. These results and their variance are what we would expect for this type of mineralization."

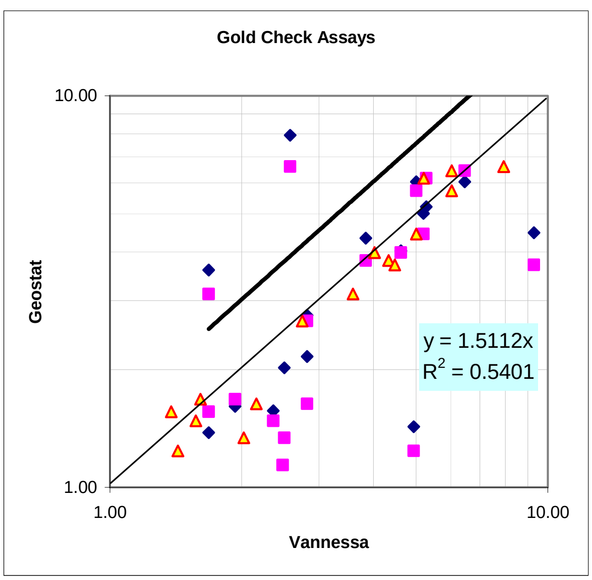
"The lack of repeatability in gold sample assays, if acceptable by standard industry practice, does imply that any grade distribution model derived from these samples will inherit some inaccuracy which cannot be resolved with the existing data, no matter how sophisticated the modelling method. Only sampling method apparent to mining production could improve our knowledge of the quality of existing data results. A mineralogical study can characterize the distribution of gold grain size at the microscopic scale with or without metallurgical testing to support it. Alternatively, systematic sampling on a small but tight grid (10m by 10m) like a blast hole pattern - ideally inclined so to cut across the structural fabric of the mineralization - can verify the accuracy of grade interpolation using the current samples. Geostat will discuss mineralogy in Section 15 and sampling in Section 18 and 19."

**Table 14.2**
**Results of Independent Assay Check for Gold and Silver – Geostat 2005**

**Check Samples Program** **October 2005**
**By Geostat** **for Vannessa Ventures Ltd** **Crucitas project**

| | | | | | | | | PDI original | | ALS Chemex | | Bourlamaque | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Rec** | **Section** | **Area** | **Hole-ID** | **From** | **To** | **Sample no** | **Litho** | **Au** | **Ag** | **Au** | **Ag** | **Au** | **Ag** |
| 3 | | Fortuna | STD1 | | | 3 | | 0.02 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 |
| 14 | | Fortuna | STD8A (5) | | | 14 | | 0.57 | 3.4 | 0.57 | 3.4 | 0.52 | 4.0 |
| 18 | | Botijas | STD10 (7) | | | 18 | | 1.42 | 2.8 | 1.42 | 2.8 | 1.77 | 3.0 |
| 1 | 316000 | Fortuna | DH96-160 | 121.20 | 122.30 | 1 | FELD | 1.68 | 26.0 | 1.38 | 17.4 | 1.56 | 18.0 |
| 2 | | Fortuna | DH96-150 | 86.00 | 87.50 | 2 | FELD | 1.68 | 12.0 | 3.59 | 6.6 | 3.12 | 5.0 |
| 4 | | Fortuna | DH96-219 | 53.30 | 54.60 | 4 | FELD | 1.93 | 6.0 | 1.61 | 4.3 | 1.68 | 4.0 |
| 5 | | Fortuna | DH96-219 | 49.20 | 50.65 | 5 | FELD | 5.20 | 15.0 | 5.01 | 13.9 | 4.44 | 17.0 |
| 6 | | Fortuna | DH96-219 | 138.40 | 139.40 | 6 | PCT | 2.36 | 4.4 | 1.57 | 4.1 | 1.48 | 4.0 |
| 7 | | Fortuna | DH96-219 | 139.40 | 140.60 | 7 | PCT | 2.82 | 5.1 | 2.75 | 4.6 | 2.66 | 5.0 |
| 8 | | Fortuna | DH96-166 | 47.20 | 48.20 | 8 | FELD | 2.58 | 1.6 | 7.93 | 3.4 | 6.60 | 4.0 |
| 9 | 315900 | Fortuna | DH96-154 | 47.20 | 48.60 | 9 | FELD | 4.62 | 14.0 | 4.02 | 15.8 | 3.98 | 17.0 |
| 10 | | Fortuna | DH96-154 | 60.60 | 61.40 | 10 | FELD | 4.94 | 14.0 | 1.43 | 10.5 | 1.24 | 11.0 |
| 11 | | Fortuna | DH96-153 | 67.30 | 68.00 | 11 | FELD | 12.90 | 29.0 | 36.40 | 75.0 | 40.04 | 49.0 |
| 12 | | Fortuna | DH96-156 | 30.00 | 31.00 | 12 | SPAK | 5.28 | 5.5 | 5.21 | 3.3 | 6.17 | 8.0 |
| 13 | | Fortuna | DH96-218 | 109.20 | 110.30 | 13 | DAC | 2.82 | 5.4 | 2.16 | 4.5 | 1.64 | 5.0 |
| 15 | | Fortuna | DH96-136 | 99.40 | 101.70 | 15 | DAC | 6.46 | 15.0 | 6.03 | 6.7 | 6.44 | 7.0 |
| 16 | | Botijas | DH96-177 | 97.20 | 98.50 | 16 | LBT | 3.84 | 10.0 | 4.33 | 12.7 | 3.80 | 12.0 |
| 17 | | Botijas | DH96-177 | 98.50 | 99.40 | 17 | LAP | 2.50 | 24.0 | 2.02 | 26.4 | 1.34 | 27.0 |
| 19 | | Botijas | DH93-1 | 87.25 | 88.76 | 19 | LAT | 5.01 | 9.1 | 6.03 | 3.6 | 5.72 | 5.0 |
| 20 | | Botijas | DH95-126 | 104.60 | 105.80 | 20 | DAC | 2.48 | 10.0 | 0.95 | 1.4 | 1.14 | 2.0 |
| 21 | | Botijas | DH95-63 | 80.90 | 81.90 | 21 | LAT | 9.30 | 24.0 | 4.47 | 25.5 | 3.70 | 27.0 |
| **Student Test** : au/au and ag/ag (Greater than 2 mean significant difference) | | | | | | | | 0.61 | 0.91 | 1.00 | 0.89 | 0.65 | 0.96 |

5.32 strong individual difference in triplet
2.48 high individual difference in triplet



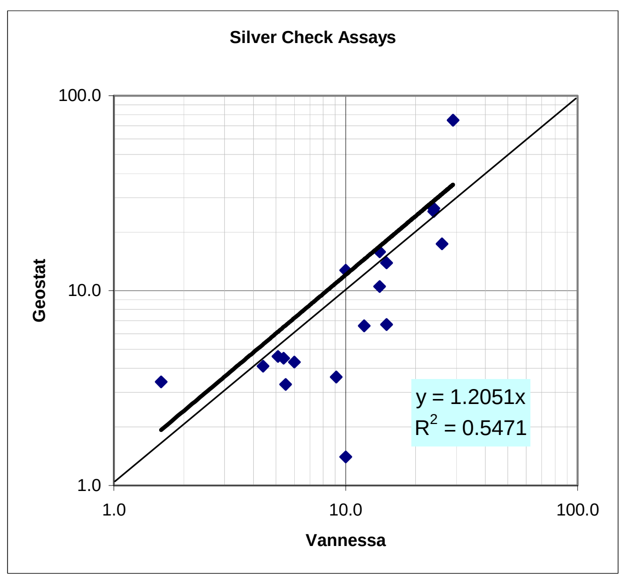
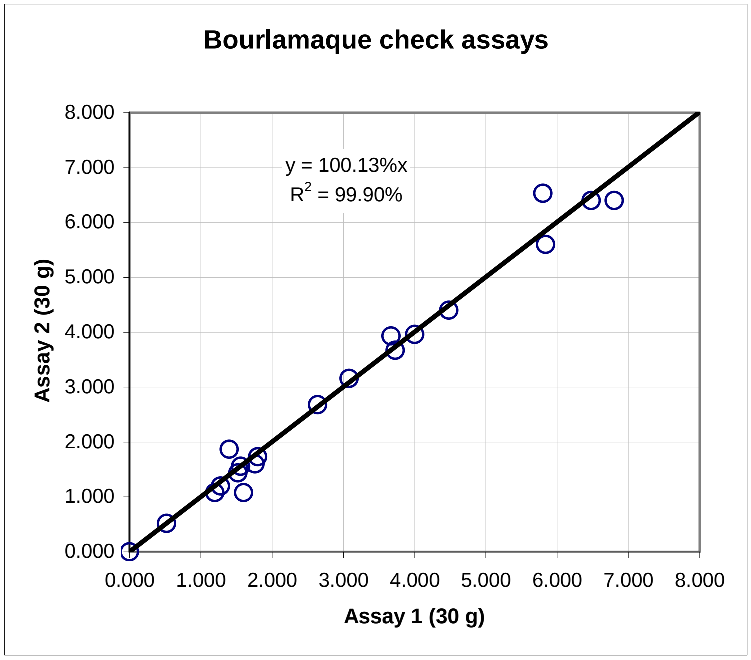



**Table 14.3**
**Bourlamaque Comparative Results**

**Bourlamaque (double 30g aliquot)**

| Sample | Au g/t | Au2 | au_avg | Ag g/t |
|---|---|---|---|---|
| CV-01 | 1.560 | 1.560 | 1.560 | 18 |
| CV-02 | 3.080 | 3.160 | 3.120 | 5 |
| CV-03 | 0.000 | 0.000 | 0.000 | 0 |
| CV-04 | 1.760 | 1.600 | 1.680 | 4 |
| CV-05 | 4.480 | 4.400 | 4.440 | 17 |
| CV-06 | 1.520 | 1.440 | 1.480 | 4 |
| CV-07 | 2.640 | 2.680 | 2.660 | 5 |
| CV-08 | 6.800 | 6.400 | 6.600 | 4 |
| CV-09 | 4.000 | 3.960 | 3.980 | 17 |
| CV-10 | 1.280 | 1.200 | 1.240 | 11 |
| CV-11 | 40.000 | 40.080 | 40.040 | 49 |
| CV-12 | 5.800 | 6.530 | 6.165 | 8 |
| CV-13 | 1.400 | 1.870 | 1.635 | 5 |
| CV-14 | 0.520 | 0.520 | 0.520 | 4 |
| CV-15 | 6.480 | 6.400 | 6.440 | 7 |
| CV-16 | 3.670 | 3.930 | 3.800 | 12 |
| CV-17 | 1.600 | 1.080 | 1.340 | 27 |
| CV-18 | 1.800 | 1.730 | 1.765 | 3 |
| CV-19 | 5.840 | 5.600 | 5.720 | 5 |
| CV-20 | 1.200 | 1.080 | 1.140 | 2 |
| CV-21 | 3.730 | 3.670 | 3.700 | 27 |




## 14.6 DIAMOND DRILLING VERSUS AUGER DRILLING

"PDI drilled a series of Auger drill holes in saprolite zones of the deposit. These were labelled the "SP" series holes and they surround the diamond-drilled area of the deposit; however, the majority of these SP holes are north of the main zones of Fortuna and Botija, which indicates the presence of ore grade mineralization in the saprolite. In 1999, IMC completed a brief test of the SP hole data by comparing them with the nearest diamond drill result within the same saprolite unit."

"The procedure was as follows: For each SP Hole assay, the nearest diamond drill hole (DDH) assay was found, maximum search parameters were set in increasing increments from 10 to 100 m spacing between the two data types, basic statistics of the SP and DDH holes were compared; and "t" statistic comparisons of mean values were completed. The comparison was then repeated with 6 m composites."

"The test results found only 16 pairs of assay spaced closer than 30 m apart. There were 54 pairs at 40 m spacing, and 107 pairs at 50 m spacing. Table 14.4 summarizes the results at those two maximum spacings, since there are too few pairs for statistical comparison at closer spacings."

**Table 14.4**
**Nearest Neighbor Comparison Auger SSP Holes to Diamond DDH Holes**

| Maximum Separation Meters | Number of Pairs | SP Assays | | DDH Assays | | "t" Statistic | "t" Degrees of Freedom | Paired "t" Statistic | "t" Degrees of Freedom |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean g Au/t | Variance | Mean g Au/t | Variance | | | | |
| Assays | | | | | | | | | |
| 40 | 54 | 0.856 | 1.543 | 0.855 | 2.503 | 0.006 | 100.3 | 000.3 | 53 |
| 50 | 107 | 0.678 | 1.375 | 0.722 | 1.602 | 0.268 | 210.8 | 0.182 | 106 |
| Composites | | | | | | | | | |
| 40 | 8 | 0.803 | 0.273 | 0.731 | 0.356 | 0.255 | 13.8 | 0.474 | 7 |
| 50 | 107 | 0.652 | 0.476 | 0.674 | 0.341 | 0.103 | 33.1 | 0.146 | 17 |

"The results of the hypothesis test are unclear, considering the few samples and the high variance of the small sample set. IMC expressed the opinion they had the impression that the Auger "SP" holes were possibly losing gold compared with the diamond drill holes, possibly because it is difficult to recover Qtz vein fragments with the auger."

"IMC's review of PDI's documentation was unclear regarding the sample protocols for the Auger holes. The Auger holes are also generally spaced 100 m apart (wider than the statistical range in the NS direction). These two factors along with the uncertain statistical comparison have led IMC to form the opinion that the SP holes should not be included within the calculations of measured and indicated resources or reserves."

"The Auger "SP" holes will be used to make an estimate of potential saprolite resources at the "inferred" level of confidence, but the measured and indicated resources and potential reserves will be based on the diamond drilling information only."

"Geostat finds the spacing between Auger holes much too large to draw any conclusion at this stage. Furthermore, the existing Auger data does not support well the geological model that implies gold spread through lithology assuming continuity nearing 100 meters. See Section 14."

## 14.7 ROCK CODES

"Geostat has verified the rock codes used in the current block model. PDI reportedly used 21 rock codes to represent the lithology in core logging. We found several set of rock codes and rock names in the tables for assays and composites, including one by IMC with 7 rock codes."

"The current block model uses only 14 rock codes to represent the lithology. Geostat has compared the rock codes with the lithology on sections and plan views and found the rock codes to match the lithology. This is not a valid test since the current lithology was drawn from the rock codes in the block model, but the lithology does match that in the documents and previous reports produced by PDI and IMC, as well as the drill logs in the Gemcom database within the accuracy of the block model (5 x 5 x 5m). The following Table shows the basic rock codes with respect to lithology only and some statistics based on the 2m composites. It excludes the presence of the cross cutting structures which is documented in Table 12.3, Table 12.4 and Table 12.5 using 1m composites."

**Table 14.5**
**List of Rock Names and Rock Codes**

| File Name | Rock Name | Rock Code | Type Cmp | Number Of Composites | Med Au (g/t) | Avrg Au (g/t) |
|---|---|---|---|---|---|---|
| **Fortuna SAPK** | Saprolite And Rock | 1 | 2m | 2,720 | **0.52** | **1.28** |
| **Fortuna FDCA** | Felsic Dome A | 2 | 2m | 2,078 | **0.68** | **1.32** |
| **Fortuna FDCB** | Felsic Dome B | 3 | 2m | 863 | **0.36** | **0.72** |
| **Fortuna PCT** | Pyroclastics | 4 | 2m | 4,157 | **0.32** | **0.70** |
| **Fortuna BVOL** | Basic Volcanics | 5 | 2m | 715 | 0.02 | 0.14 |
| **Fortuna DIAB** | Diabase Intrusive Dyke | 6 | 2m | 177 | 0.01 | 0.07 |
| **Fuentes VOL** | Volcanics (Fuentes) | 7 | 2m | 1,422 | **0.25** | 0.57 |
| ***All Fortuna+Fu*** | | *1-7* | *2m* | *12,132* | | 0.88 |
| **Botijas SAP** | Saprolite | 8 | 2m | 749 | **0.83** | **1.60** |
| **Botijas SPK** | Saprolite And Rock | 9 | 2m | 258 | **0.50** | **1.09** |
| **Botijas FDCA** | Felsic Dome A | 10 | 2m | 199 | **0.32** | **0.59** |
| **Botijas FDCB** | Felsic Dome B | 11 | 2m | 778 | **0.36** | **0.77** |
| **Botijas PCT** | Pyroclastics | 12 | 2m | 1700 | **0.33** | **0.59** |
| **Botijas BVOL** | Basic Volcanics | 13 | 2m | 822 | 0.03 | 0.11 |
| ***All Botijas*** | | 8-13 | 2m | 4506 | | 0.73 |
| **Undefined** | | 14 | 2m | 1138 | 0.01 | 0.10 |
| **Air** | | 500 | 2m | 251 | 0.01 | 0.11 |
| **2mau_All.Cmp** | | **1-14 +500** | **2m** | **18,027** | 0.31 | **0.78** |

## 15.0 ADJACENT PROPERTIES

The information contained in this portion of the report was extracted from Appendix 3A of the feasibility study. Appendix 3A of the feasibility study is a Technical Report entitled "“Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary”, which is a Geostat report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. Since this report was filed on SEDAR in April, 2006 there has not been any material change in this information and it remains valid. The information contained in the April, 2006 report is quoted below.

“Costa Rica does not have a well developed mining industry, but modern exploration for gold has increased in the last 20 years. Among the projects of interest, there are the usual small scale gold miners and some other relatively small projects as described below.”

### 15.1 SOUTH PACIFIC COAST SMALL SCALE MINERS

“Small scale gold mining such as gold panning in rivers is reported in various areas in Costa Rica. The main area known to have more continuous activity of this kind is the South Pacific Coast, near Panama. There is tunnelling gold mining in the area of Abangares also.”

On the Pacific coast, the following Canadian mining companies were present in the last 20 years:

1) Las Lilas Mining Project in Quebrada Grande de Liberia, owner of the subsidiary Tierra Colorada S.A of Barrick Gold, a Canadian company.

2) Mining Rio Chiquito de Tilaran, owned by Corporation Minerals Mallon S.A, a subsidiary of the Canadian Mallon Minerals. Newmont Mining was also involved in exploring the property (Mining Magazine, March 1992:179).

3) Mining La Union, in La Union of Montes de Oro, owned by Minerales La Union S.A, a Canadian subsidiary.

4) Mining Beta Vargas in La Pita de Chomes, Puntareanas and San Juan of Abangares-Guanacaste, owned by the subsidary Novontar S.A of Lyon Lake Mines of Canada.

5) Ariel Resources Ltd, in La Junta de Abangares, the oldest Canadian mining in Costa Rica, extracts gold through three subsidiaries:

    a. Mining Tres Hermanos, operated by el Valiente Ascari.
    b. Mining San Martin, operated by Mining of Sierra Alta S.A.
    c. Mining El Recio, operated by Minera Silencio S.A.

## 15.2 BETA VARGAS

Beta Vargas is a small gold mine located La Pita de Chomes, Puntareanas and San Juan of Abangares-Guanacaste that was developed and put into production by Lyon Lake Ltd in the 1990's. This mine reportedly extracted 60,000 ounces of gold. Lyon Lake acquired the Crucitas project from PDI in 1999 and passed it along to Vannessa in May 2000.

**Figure 15.1**
**Beta Vargas Gold Mine**

## 16.0 MINERAL PROCESSING AND METALLURGICAL TESTING

The information contained in this portion of the report was summarized from the Micon feasibility study conducted and issued in July, 2006 to Vannessa as well as from the addendum report summary issued in October, 2006. A detailed description of the mineral processing and metallurgical testing was also contained in a Technical Report entitled "“Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary”, which is a Geostat report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006.

The majority of metallurgical testing on Las Crucitas samples was conducted in four phases by Placer Dome International (PDI) during development of the previous feasibility study completed by Cambior in 1999. In 2005, additional testing by Process Research Associates was commissioned to confirm leaching characteristics and test the use of oxygen. CyPlus also carried out further work to determine cyanide destruction parameters, and a further review of all testing was conducted

Geographical distinction was used for the nomenclature of the selected sample composites to distinguish the materials gathered. A split between saprolitic material and rock samples of a pyroclastic or felsic nature was made to recognize the different metallurgical responses of these two types.

Grinding characteristics were determined during Phase III testing as shown in Table 16.1.

**Table 16.1**
**Grinding Parameter Determinations**

| Parameter | Fortuna Zone Pyroclastic | Fortuna Zone Felsic Dome | Botija Zone Pyroclastic |
|---|---|---|---|
| Correlated Autogenous WI (kWh/t) | 16.5 | 14.8 | 14.8 |
| Bond Rod Mill WI (kWh/t) | 15.0 | 12.0 | 13.8 |
| Bond Ball Mill WI (kWh/t) | 16.5 | 14.1 | 16.0 |
| Bond Abrasion Index (g) | 0.3116 | 0.1813 | 0.2601 |

The gold extraction testwork confirmed that the ore is readily amenable to agitated cyanidation, at an optimum grind size of 150 microns. The low levels of silver and its limited recovery through cyanidation, the absence of deleterious elements consuming cyanide, and robbing the pregnant solution of the dissolved gold favour a treatment scheme with a CIP process. Whole ore cyanidation provides comparable results to the optimum results obtained with a more complex gravity plus cyanidation process, and without requiring significantly more leaching residence time.

The overall recovery figures are considered representative of the test results for the grind size and leach retention time targeted (20 hours for the saprolites and felsic domes, and 36 hours for the pyroclastics). Recovery values selected are shown in Table 16.2.

**Table 16.2**
**Expected Overall Gold Recovery (%)**

| Rock Type | Au Recovery | Ag Recovery |
|---|---|---|
| Fortuna Saprolite | 93.0 | 35.0 |
| Botija Saprolite | 94.5 | 35.0 |
| Fortuna Pyroclastic | 88.0 | 60.0 |
| Botija Pyroclastic | 95.0 | 60.0 |
| Fortuna Felsic Dome | 92.5 | 60.0 |
| Botija Felsic Dome | 88.5 | 60.0 |

Recovery figures for silver are approximate, based on a limited number of determinations.

The competent rock types are found to exhibit similar reagent consumption while the saprolite is distinct. As discovered in the third testwork phase, the former requires about 2.5 kg CaO/tonne while the saprolite needs up to 3.9 kg/tonne (all based on 95% available CaO). A short program of testing was initiated during the course of this current study to examine the effect of oxygen addition in leaching and to develop cyanide destruction parameters. Leaching kinetics with oxygen were tested, and the ultimate extractions after 48 hours leaching, and the rate of dissolution was significantly improved with the oxygen addition. Final gold dissolution was 98.3% with oxygen compared with 91.3% with air.

Cyanide destruction was examined by the supplier company Cyplus in a program comparing the SO2/Air method with the CombinOx method. These reagents were added after standard leaching tests with Crucitas samples containing 125 mg/L cyanide as WAD form. Both reagent schemes were effective in reducing the cyanide content to below 1mg/L $CN_{WAD}$

A capital and operating cost comparison conducted by Cyplus indicated that the operating cost with CombinOx would be about 15% lower than with SO2/air, and capital costs would be significantly reduced. The CombinOx method was recommended.

A plant capable of processing 5,000 t/d of competent rock, as described in Section 18.2, was selected for the basis of the design criteria. Any saprolite mixture with the competent ore allows for an increase in the actual throughput capability. The leach and CIP circuits are designed to handle a maximum of 7,500 t/d during periods when almost 100% Saprolite is being treated.

The expected average recovery is 92.6% for gold and 50.0% for silver over the mine life. Saprolite yields the highest gold recovery at 96.0% compared with hard rock at 91.5%, based on the improved extraction obtained with oxygen addition.

## 17.0 MINERAL RESOURCE AND MINERAL RESERVES

The information regarding the mineral resources contained in this portion of the report was extracted and summarized from Appendix 3A of the feasibility study. Appendix 3A of the feasibility study is a Technical Report entitled "“Technical Report for the Crucitas Project of Vannessa Ventures Ltd., Calgary”, which is a Geostat report authored by Pierre-Jean Lafleur, P.Eng., dated February 28, 2006 and filed with SEDAR on April 10, 2006. The information regarding the mineral reserves has been summarized from the Micon feasibility study conducted and issued in July, 2006 to Vannessa as well as from the addendum report summary issued in October, 2006.

### 17.1 GEOLOGY AND RESOURCES

In June, 2005, Vannessa awarded System Geostat International Inc (Geostat) a mandate to update its Crucitas mineral resource model and to prepare a Technical Report according to the National Policy 43-101 in Canada. The object of this report was to provide Vannessa Ventures Ltd. and its wholly owned subsidiary in Costa Rica, Industrias Infinito S.A., an independent opinion of the estimation of the resources of the Crucitas Gold Mining Project in Costa Rica. The full Geostat Report, dated February 26$^{th}$, 2006, is included in Appendix 3A of the feasibility study.

In the preparation of the report, Geostat relied on various technical reports, maps, drawings and mine plans, as well as historic documents, as specified in the list of references, as well as on its experience in this area. The original data files come from a backup prepared by Cambior and IMC in a 1999 study or by the former owner, Placer Dome Inc (PDI), prior to 1999. These files include a mine plan designed by Cambior in 1999, prior to the adoption of the National Instrument 43-101 in February 2001.

Geostat visited the Crucitas project site in Costa Rica in October 2005 and Geostat had access to original documents such as Assay Certificates. In Costa Rica, the staff working at Industrias Infinito, a subsidiary of Vannessa, is basically the same group that previously worked for Placer Dome Inc. (PDI) as far back as 1993. They were readily available to assist Geostat in its review assessment.

The Resources in and outside the structures basically split in two categories: Indicated and Inferred. Geostat is of the opinion that there is no Measured Resources in the Crucitas project at the moment based on the CIM definition recommended by the NI 43-101.

The total Indicated Resources above the 0.5 g Au/t cut-off grade are estimated to contain 25.1 millions tonnes at 1.22 g Au/t (985 thousand gold ounces) and at 3.17 g Ag/t (2.56 million silver ounces) in both Fortuna and Botija in and out of the structures, as shown in Table 17.1.

**Table 17.1**
**Estimated Indicated Mineral Resources at Crucitas**

| Material/Zone | Tonnes | Gold (g/t) | Silver (g/t) | Gold oz | Silver oz |
|---|---|---|---|---|---|
| **Saprolite** | | | | | |
| Total Structure | 3,528,630 | 1.6 | 1.91 | 181,22 | 217,052 |
| Total Outvein | 638,472 | 0.64 | 1.00 | 13,224 | 20,443 |
| Total Saprolite | 4,167,102 | 1.45 | 1.77 | 194,646 | 237,495 |
| **Rock** | | | | | |
| Total Structure | 16,540,075 | 1.32 | 3.51 | 700,919 | 1,863,994 |
| Total Outvein | 4,378,546 | 0.63 | 3.25 | 89,376 | 457,617 |
| Total Rock | 20,918,621 | 1.18 | 3.45 | 790,295 | 2,321,611 |
| **Total** | **25,085,723** | **1.22** | **3.17** | **984,941** | **2,559,105** |

The total Inferred Resources above the 0.5 g Au/t cut-off grade are estimated to contain 12.6 millions tonnes at 1.23 g Au/t (496 thousand gold ounces) and at 3.14 g Ag/t (1.27 million silver ounces) in the Inferred category for Fortuna, Botija and Fuentes in and out of the structures, as shown in Table 17.2.

**Table 17.2**
**Estimated Inferred Resources at Crucitas**

| Material/Zone | Tonnes | Gold (g/t) | Silver (g/t) | Gold oz | Silver oz |
|---|---|---|---|---|---|
| Saprolite | | | | | |
| Total Structure | 2,261,899 | 1.48 | 2.75 | 107,707 | 199,698 |
| Total Outvein | 721,185 | 0.69 | 1.02 | 16,065 | 23,566 |
| Total Saprolite | 2,983,084 | 1.29 | 2.33 | 123,772 | 223,265 |
| Rock | | | | | |
| Total Structure | 7,081,264 | 1.42 | 3.52 | 322,579 | 801,190 |
| Total Outvein | 2,502,871 | 0.62 | 3.02 | 49,721 | 243,025 |
| Total Rock | 9,584,135 | 1.21 | 3.39 | 372,300 | 1,044,215 |
| **Total** | **12,567,219** | **1.23** | **3.14** | **496,072** | **1,267,479** |

## 17.2 MINING AND MINERAL RESERVES

Mining will be by the open pit method with conventional shovel and truck operations. The open-pit optimization for the Los Crucitas project was carried out using the Geostat mineral resource block model and Surpac Lerchs-Grossman pit optimization software. Economic parameters as shown in Table 17.3 were applied to the mineral resource block model to create an economic optimized pit shell.

Recommendations for pit wall inclinations and bench configurations were provided by Golder Associates Limited, based upon slope design investigations performed on the Fortuna and Botija deposits of the Crucitas project.

The ore reserve estimate as of March 2006, based upon owner mining and a gold price of $550 per oz, is presented in Table 17.4.

**Table 17.3**
**Economic Parameters used in Open-Pit Optimization**

| Criteria | Material Type | Value |
|---|---|---|
| Mining Operating Costs | Saprolite | 1.30 $/tonne |
| | Hard Rock | 1.47 $/tonne |
| Processing Costs | Saprolite | 5.65 $/tonne ore |
| | Hard Rock | 7.57 $/tonne ore |
| G & A Costs | Saprolite | 1.73 $/tonne ore |
| | Hard Rock | 2.50 $/tonne ore |
| Processing Recovery | Saprolite | 96 % |
| | Hard Rock | 91.5 % |
| Mine Call Factor | - | 96 % |

**Table 17.4**
**Mineable Reserve for Los Crucitas Fortuna and Botija Open Pits**

| | Ore Tonnes (Kt) | Gold Grade (g/t) | Gold (000's oz) | Silver Grade (g/t) | Waste (Kt) | Strip Ratio | Total Tonnes (Kt) |
|---|---|---|---|---|---|---|---|
| **Fortuna** | | | | | | | |
| Saprolite | 2,270.4 | 1.46 | 106.8 | 1,76 | 3,001.7 | 1.6 | 5,802.4 |
| Hard Rock | 7,681.6 | 1.43 | 352.7 | 3.58 | 9,307.9 | 1.2 | 17,098.4 |
| Total | 9,951.9 | 1.44 | 459.6 | 3.20 | 12,309.6 | 1.3 | 22,900.8 |
| **Botija** | | | | | | | |
| Saprolite | 1,316.1 | 1.51 | 63.9 | 1.93 | 1,669.9 | 1.5 | 3,258.1 |
| Hard Rock | 3,645.9 | 1.40 | 163.8 | 3.85 | 6,137.2 | 1.7 | 9,883.0 |
| Total | 4,962.0 | 1.43 | 227.7 | 3.36 | 7,807.1 | 1.6 | 13,141.1 |
| **Total** | | | | | | | |
| **Total** | 14,914.0 | 1.43 | 687.2 | 3.25 | 20,116.7 | 1.4 | 36,042.0 |

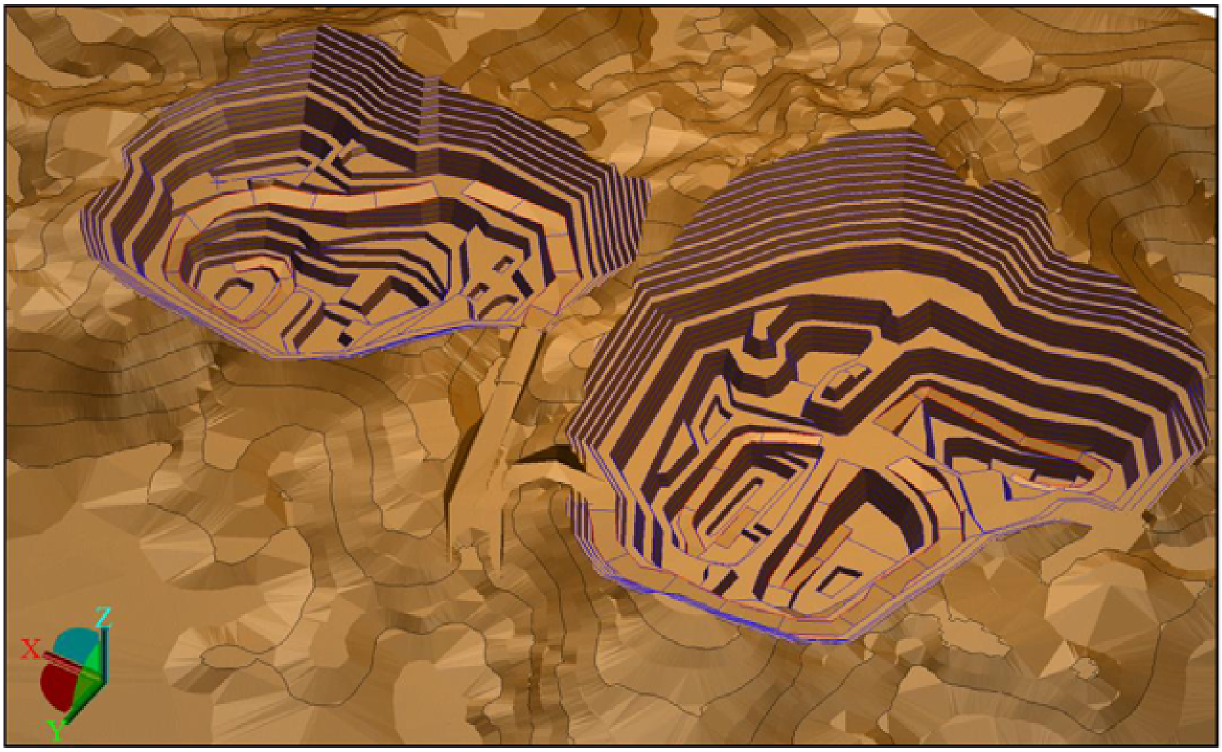
Notes on Reserves:
1) Mineable reserves were calculated by applying 5% dilution to ore tonnes of waste tonnes at the average waste gold grade, and subtracting 4.76% of diluted ore tonnes as ore losses. This equates to a factor of 96% on the grade of the ore but has no effect on tonnage.
2) Some 1.01 Mt of Inferred Resource at a grade of 1.23 g/t lies within the boundaries of the final pit shell, are included in the total tonnes shown, and will be extracted during mining. This material should be stockpiled at the plant and sampled.
3) The strip ratio is calculated as total ore tonnes divided by waste plus inferred ore tonnes. The total of inferred resource within the final design amounts to 7% of the total indicated reserves.

The designed final pits for the Fortuna and Botija deposits are presented in Figure 17.1

A mining production schedule, presented in Figure 18.1, was prepared for the estimated mineable reserves with the use of MineSched scheduling software. The mining production schedule was designed to deliver a nominal feed rate of ore to the processing plant daily while maintaining a balanced strip-ratio of ore and waste production from the mine.

The mining will be conducted on 5 metre benches, with a pre-strip totalling 440,000 cubic metres, planned to gain barren saprolite waste to be used in construction of the tailings dam. After ramping up to plant capacity, a nominal plant feed consisting of a blend of 75% saprolite and 25% hard rock, is planned to continue until the completion of the saprolite reserves. The plant capacity is designed for 7,500 ore tonnes per day (2.50 Mtpa) within saprolite, whereas within hard rock the plant capacity is 5,000 tonnes per day (1.82 Mtpa). Therefore an initial ore production rate from the mine of 6,875 tonnes per day was scheduled in order to provide the nominal feed of 75% saprolite and 25% hard rock. On completion of the saprolite reserves the plant feed rate will be reduced and so the ore production rate is dropped to 5,000 tonnes per day.

**Figure 17.1**
**Final Open-Pit Design – 3D NW Isometric View**




There is capacity for the stockpiling of 50,000 tonnes of hard rock ore, which can be stored on a pad adjacent to the plant. The planned strip ratio during mine production was 1.35, and is maintained as closely as possible throughout the mine life. At the earliest date possible, waste is planned to be back-filled into completed sections of the mine.

# 18.0 OTHER RELEVANT DATA AND INFORMATION

The information in this portion of the report was extracted and summarized from the Micon feasibility study conducted and issued in July, 2006 to Vannessa as well as from the addendum report summary issued in October, 2006. This section contains the information required for items 20 and 25 as specified in Form 43-101 Technical Report and may contain some information which has been covered in other portions of this report for sake of clarity in the discussion which follows.

## 18.1 MINING

Mining will be by the open pit method with conventional shovel and truck operations. The open-pit optimization for the Los Crucitas project was carried out using the Geostat mineral resource block model and Surpac Lerchs-Grossman pit optimization software.

The ore reserve estimate as of March 2006, based upon owner mining and a gold price of $550 per oz, is presented in Table 17.4 above. The designed final pits for the Fortuna and Botija deposits are presented in Figure 17.1.

A mining production schedule was prepared for the estimated mineable reserves with the use of MineSched scheduling software. The mining production schedule was designed to deliver a nominal feed rate of ore to the processing plant daily while maintaining a balanced strip-ratio of ore and waste production from the mine.

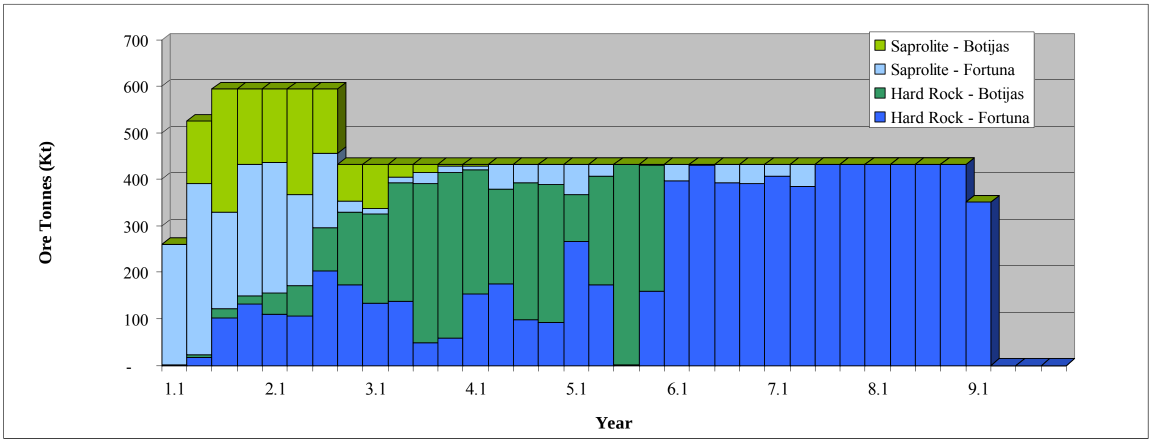
The mining will be conducted on 5 metre benches, with a pre-strip totalling 440,000 cubic metres, planned to gain barren saprolite waste to be used in construction of the tailings dam. After ramping up to plant capacity, a nominal plant feed consisting of a blend of 75% saprolite and 25% hard rock, is planned to continue until the completion of the saprolite reserves. The plant capacity is designed for 7,500 ore tonnes per day (2.50 Mtpa) within saprolite, whereas within hard rock the plant capacity is 5,000 tonnes per day (1.82 Mtpa). Therefore an initial ore production rate from the mine of 6,875 tonnes per day was scheduled in order to provide the nominal feed of 75% saprolite and 25% hard rock. On completion of the saprolite reserves the plant feed rate will be reduced and so the ore production rate is dropped to 5,000 tonnes per day.

There is capacity for the stockpiling of 50,000 tonnes of hard rock ore, which can be stored on a pad adjacent to the plant. The planned strip ratio during mine production was 1.35, and is maintained as closely as possible throughout the mine life. At the earliest date possible, waste is planned to be back-filled into completed sections of the mine.

The production schedule is planned around a work regime of 350 days per annum and 20 hours per day. In order to minimise dilution and mining losses, ore excavations are scheduled for the day shifts.

The proposed production schedule is shown on Figure 18.1

**Figure 18.1**
**Ore Production Graph**




### 18.1.1 Mining Equipment Fleet

The mining and ancillary fleet requirement, for the owner mining case presented in the Feasibility Study, were based on consideration of the required processing plant feed rates, average haul distances, shift roster, local conditions and assumptions on the equipment availability and utilization. The contractor may elect to modify the fleet supplied, but has proposed to utilize articulated vehicles, as assumed for the owner mining base case. The following describes the fleet, which most probably would be selected by the contractor.

Loading will be carried out by a Cat 365 backhoe excavator with a 4.4 $m^3$ bucket capacity. Based on the loading fleet estimates, three excavators will be required in the first two year of the mining operation and in Year 5.

Cat D400 35t capacity articulated trucks are proposed due to the expected working conditions and local climate. Haul profiles for each scheduling period were prepared and the average truck speed was applied for each road sector accordingly. On an annual basis, seven trucks will be required in the first two years and Year 4. The truck requirement for the remaining periods is estimated to be a total of six units per year.

Three track dozers, Cat D8's, are proposed for the bench cleaning, road building, waste dump and stockpile levelling and other earthmoving operations. This is based upon a minimum requirement of one dozer per pit and one spare during simultaneous mining of both pits. Additional support equipment comprises one 140H grader and one water truck. The grader and water truck will be utilized in haul road maintenance to increase the tire life of the mobile equipment.

Drilling equipment will be two Atlas Copco ROC F9 rigs. It is anticipated that drilling will be 5" (125mm) diameter holes at the rate of 30 m per hour on a nominal 3 m x 3.5 m pattern. Drilling and blasting costs are applicable to hard rock and 15-20% of saprolite material. An allowance of 5% was made for re-drilling. Drilling is expected to be 9,600 hr/a with a bit life of 500m.

For hard rock, a powder factor of 280 g/t is estimated using ANFO explosives and for the saprolite the powder factor is 180 g/t. Gelac will be used in the presence of water in blast-holes. Dual delay detonators will be used to help control noise and vibration during the blasting process. Five percent secondary blasting was considered in the estimation. Also, it is assumed that 15% wet blasting will be required.

Grade control for the saprolite material will require drilling or trenching by the contractor. The sampling and assaying cost is included in the Vannessa payroll and supplies cost. For the hard rock materials, blast hole samples will be utilized for grade control.

Vannessa will supervise the contract mining and provide technical control through the technical services group under the direction of the Mine Manager. A group of ten persons is proposed including a geologist, surveyors and samplers for grade control. In addition, workers for reclamation of the pits are included.

## 18.2 MINERAL PROCESSING

A plant capable of processing 5,000 t/d of competent rock was selected for the basis of the design criteria. Any saprolite mixture with the competent ore allows for an increase in the actual throughput capability. The leach and CIP circuits are designed to handle a maximum of 7,500 t/d during periods when almost 100% Saprolite is being treated.

The proposed flowsheet incorporates a Mineral Sizer, as it is anticipated that predominantly saprolite ore will be treated for the first few years and this equipment is better able than a jaw crusher to handle the clay material.

The grinding circuit incorporates a SAG mill and a ball mill in series. As a result of the wide tonnage fluctuations expected from the mixture of saprolite and competent rock, the grinding mill pumps and the apron feeders delivering ore to the primary mill will be equipped with variable speed drives. The ability to include a pebble crushing circuit, if required at a later date, is considered in the layout of the grinding circuit.

The SAG mill will operate in a closed circuit with a vibrating screen. The screen oversize will be recycled to the SAG mill whilst the undersize will join the ball mill discharge and be fed to cyclones above the mill. The ball mill will operate in closed circuit.

The ball mill cyclone overflow, at 35% solids, will gravity flow to a trash screen and then to the leach circuit. A thickener has intentionally not been incorporated ahead of the leach circuit as the saprolite is extremely difficult to settle and would require large quantities of flocculent. Gold and silver leaching will be initiated in the grinding circuit with the addition of cyanide and slaked lime solutions to the SAG mill feed chute.

The agitated leaching is followed by contacting the leach solution with activated carbon in a CIP circuit. The loaded carbon is stripped and the pregnant solution containing the gold and silver pumped through electrowinning cells where the metals are plated onto cathodes. Periodically, the deposit will be pressure washed off the cathodes and will be pumped into sock filters, which will then be refined in a propane fired furnace to produce dore bars.

The CIP circuit tailings will be diluted to 25% solids and subjected to a cyanide destruction system utilising the CyPlus CombinOx process. The dilution is necessary to ensure process efficiency and minimise reagent consumption. The benign tailings will then be transferred to the tailings dam.

Water will be pumped from the tailings pond to the plant process water pond. Since the water reticulation system will have an annual net gain it will be necessary to periodically discharge excess water to the environment. Potable water and that required for cooling and pump gland seals will be obtained from well water.

## 18.3 TAILINGS AND WATER MANAGEMENT

The area of the proposed tailings facility is partially covered with jungle vegetation and is characterized by a series of hills surrounding the basin. Pond development involves joining these hills, which extend up to 95 m above the basin bottom, with a series of earthfill dams. The embankment fills extend up to 36 m above the valley that drains the area. The surface area covered by the tailings pond within the pond perimeter is approximately 165 ha and the storage capacity of the pond thus formed is about 14 Mt of tailings and some 12 Mt of waste rock produced during 9.25 years of production.

The site of the proposed tailings facility is located in the watershed of the Rio Infiernillo which drains into the Rio San Juan. Cofferdams will be required during the initial stage of construction to block the flow of the creeks across the basin.

Geotechnical and hydrogeologic conditions at the dam locations and within the pond area were investigated in a series of sampled boreholes and test pits to supplement previous site investigations. The investigations indicated that the area of the proposed tailings facility is covered by residual saprolite soil deposits with unit thickness typically in the range of 1.4 m to 17.2 m. The residual saprolite soils form a relatively low hydraulic conductivity lining over the whole of the basin.

The mean annual precipitation used in design was 3,108 mm while mean annual evaporation was estimated to be 1,000 mm. An evaluation of extreme rainfall events indicated a Probable Maximum Precipitation (PMP) daily event for a 24-hour duration of 425 mm.

The basic dam design incorporates a homogeneous saprolite fill section with internal chimney, finger and toe drains to intercept seepage and control pore pressures. The main dam crests will ultimately be constructed to typically elevation 80 m and will be some 18 m wide. The upstream slopes are provided with a 1 m thick blanket of waste rock for erosion protection. The downstream slopes are provided with rock fill and a robust geotextile for erosion protection

The following criteria were used in developing the tailings deposition plan:

- Average mill production rate: 1.89 Mt/year.
- Ultimate Facility Capacity: 14.9 Mt.
- Tailings in situ dry density: 1.1 t/$m^3$.
- Tailings beach slope: 1 per cent.
- Minimum storage capacity above pond surface: 3.0 $Mm^3$.
- Average waste rock production: 1.69 Mt/year.

In addition to the above criteria, the deposition plan was developed to force the supernatant water away from the main dam. In order to maintain the excess storage capacity of 3.0 $Mm^3$, it will be necessary to raise the dam crest(s) on an ongoing basis.

At the end of mining operations, the pond water will continue to be completely contained within the basin and excess pond water will continue to be treated prior to release to the environment until such time as the water quality has improved and treatment is no longer required. Once the basin pond water meets applicable water quality standards; the tailings will be flooded with a minimum 1.0 m water cover and all runoff from the facility will discharge through the permanent spillway. Discharges from the facility on closure will ultimately report to the Rio Infiernillo, which in turn discharges some 10 km downstream to the Rio San Juan, along the border of Costa Rica and Nicaragua.

Staged construction of the main dam is proposed, with mine waste delivered by the mining contractor. The smaller saddle dams and containment berms may be built in a single operation or staged, if scheduling requires. It is anticipated that the initial stage of construction of the main dam would consist of a starter dam raised to elevation 60 msl in the upstream core zone of the higher dam. Cofferdams in the creek valleys will be required upstream of the dams for surface water control during the Stage 1 construction. The starter dam would provide storage for approximately 1.5 $Mm^3$ of tailings or about one year at the design mill production rates. Ongoing embankment construction would be required.

When the crests are raised to the final elevation of 80 m a storage capacity of 17 $Mm^3$ of tailings and 8 $Mm^3$ of potentially acid generating waste rock is provided.

Details of the estimated volumes for construction to the final crest elevation are given in Table 18.1, the Zone 1 saprolite fill volume includes backfill for stripped areas and key trenches up to the original ground level as well as allowances for settlements and shrinkage. These quantities should be considered approximate only since additional topographic survey is required to fully define the dam footprints.

**Table 18.1**
**Preliminary Dam Fill Volume EstimatesCrucitas Project**

| Item | Quantity |
|---|---|
| Zone 1 saprolite fill | 2,500,000 $m^3$ |
| Zone 2 rock fill | 85,000 $m^3$ |
| Zone 2a rock fill (non acid generating) | 200,000 $m^3$ |
| Zone 3 sand | 35,000 $m^3$ |
| Zone 4 crushed rock | 72,000 $m^3$ |
| Geotextile | 175,000 $m^2$ |
| Stripping and key excavation | 200,000 $m^3$ |

This region of Costa Rica is seismically active and consideration of the seismic stability is therefore required. The results of the site specific seismic hazard evaluation performed by Insuma S.A., presented in a report completed in 2006, provided the recommended seismic design criteria for the dam. A three-level seismic design approach was recommended for seismic analysis and design. This is accomplished by considering three separate design earthquake events at the facility, the Operating Basis Earthquake (OBE), Maximum Design Earthquake (MDE), and a Controlling Maximum Credible Earthquake (CMCE). The OBE represents the earthquake that is likely to occur during the design life of the tailings dam. This earthquake event has a relatively high probability of occurrence during the structure's design life. The structure is to be designed such that no damage will occur during the OBE event. The MDE represents a major seismic event with higher magnitude, but lower probability of occurrence during the structure's design life. The structure must be designed such that, during the MDE event, there will be only minor damage that is readily repairable, and the system is to be in service shortly after the earthquake. The Maximum Credible Earthquake (MCE) represents the largest earthquake that can affect the site under the currently known tectonic framework. The CMCE earthquake represents the MCE that can generate the largest ground shaking at the site. The MCE and CMCE were described deterministically and probabilistically (in terms of ground motions) by Insuma S.A.

Slope stability analyses were performed for the dam using the effective stress material properties and groundwater table elevation. Liquefaction of the existing tailings is expected to occur during the CMCE. Static slope stability analyses for the main dam were performed assuming that the tailings have liquefied. The computer program SLIDE (Rocscience, 2001) was used to calculate the factors-of-safety against sliding along potential slip surfaces for the selected embankment sections.

Based on the Golder analyses, the static Factor of Safety of a trial failure surface extending from the crest to the downstream toe is about 1.8 and the infinite slope Factor of Safety for a surficial sloughing type failure is about 1.6. The downstream slope therefore has acceptable static factors of safety.

The simplified dynamic deformation analysis performed for the final dam configuration during the CMCE event indicated that the expected seismically induced permanent deformation during the CMCE event will be approximately 60 mm or less. Thus, the final dam configuration will be stable during the CMCE event.

The total catchment area draining to the tailings pond is 310 hectares and includes a portion of the area encompassed by the Fortuna Pit. A simple rainfall-runoff model was constructed for long duration precipitation "events" having return periods of 100 years, 1,000 years and 10,000 years. The model assumes a runoff coefficient of 0.8 for these extreme events which should provide conservatively high runoff estimates given the density of vegetation in the basin and the evaporation estimates for the area.

Based on the results of this rainfall-runoff model, the emergency excess storage requirements for tailings basin operation were developed. The tailings basin will be required to maintain sufficient excess storage capacity above the operating tailings pond level to contain the 1 in 10,000 year one month duration precipitation event with no allowance for pumping. This event amounts to 1,457 mm of precipitation falling in one month and translates to an excess storage capacity requirement of 3.0 $Mm^3$.

The tailings facility has been designed to maintain a minimum pond of supernatant water for reclaim to the mill while providing a minimum 3.0 $Mm^3$ of emergency storage capacity above the maximum operating water level. Additionally, a minimum pond volume in the order of 2 $Mm^3$ should be maintained at all times in order to provide a reliable source of reclaim water to the mill.

In order to maintain the pond at an appropriate level and also maintain the freeboard requirements, the excess water will be removed from the storage area via a barge mounted pumping system, at a closely regulated rate to ensure these operating criteria are met.

Acid Base Accounting (ABA) testing and humidity cell (kinetic) tests have been carried out on numerous samples of ore and waste materials from various ore zones of the Crucitas project. Testing results indicate that the saprolite is non-acid generating while the rock has been characterized as potentially acid generating. Kinetic testing of simulated plant tailings, after cyanide destruction, is in progress and results will be used in the detailed engineering phase for final design of the effluent water treatment system.

For the purposes of this report, it has been assumed that the tailings and waste rock will be acid generating, and the tailings deposition and closure plans have been designed accordingly. The tailings and waste rock will be flooded to the maximum extent practicable during the operating mine life and on closure will be flooded beneath a minimum 1.0 m water cover.

### 18.3.1 ARD and Water Quality

In October of 2005, Vannessa awarded Golder Associates Ltd. (Golder) a mandate to review and update if necessary ARD geochemistry and water quality aspects in advancing the Crucitas project to bankable feasibility level. Review of available data was conducted and data gaps were identified. Two reports were prepared and submitted to Vanessa The object of these reports was to provide Vannessa, and its wholly owned subsidiary in Costa Rica, Industrias Infinito S.A., data and information necessary to complete a bankable feasibility study, and to identify any potential data gaps or data requirements.

In the preparation of these reports, Golder relied on various technical reports, maps, drawings and mine plans, as well as historic documents, as specified in the list of references, as well as on its experience in this area. The original data files come from a backup prepared by Cambior and IMC in a 1999 study or by the former owner, Placer Dome Inc (PDI), prior to 1999. These files include a mine plan designed by Cambior in 1999, environmental geochemistry data by PDI in 1996 and 1997, and a previous feasibility study from Cambior in 1999 prior to the adoption of the National Instrument 43-101 in February, 2001.

A hydrogeochemist from Golder visited the Crucitas project site in Costa Rica in November, 2005 and Golder had access to drill core and drill logs available on site. The ARD reports, Acid Base Accounting (ABA) testing and humidity cell (kinetic) tests have been carried out as part of previous PDI studies and were reviewed for completeness by Golder. Testing results indicate that the saprolite is non-acid generating while the hard rock from below the saprolite has been characterized as potentially acid generating. Kinetic testing of simulated plant tailings, after cyanide destruction, is in progress and results will be used in the detailed engineering phase for final design of the effluent water treatment system. It is also recommended that additional short term leach data on waste rock be completed to supplement existing data.

A water quality model was prepared based on data as provided in previous feasibility studies and adjusted based on the proposed mine plan as of August, 2006. Baseline and process water data used in the predictive water quality modeling were data collected and reported during the initial feasibility studies. It is recommended that the baseline water quality data and process water data be updated to provide a complete suite of geochemical parameters for each of the geochemical inputs. The water quality model should be updated when these data are available to increase the predictive capabilities of the water quality model. If the conclusions significantly change, an addendum to the feasibility study should be prepared and submitted based on the updated results.

Existing geochemical data suggests that acid rock drainage and metal leaching will occur within the pit walls, and geochemical modeling suggests water in the pit sumps will significantly impact the water quality of the WSFP. Because the water in the open pit will likely be characterized by low-pH, sulphate-and metal-rich water, water collected in the open pit sump may need to be treated before being discharged into the WSFP.

At closure, the water in the pit sumps should initially be treated to prevent the accumulation of large volume of water with poor water quality. This treatment should be continued during the flooding of the pit depending on the rock types (i.e., sulfide-bearing rock) that are exposed to the atmosphere as the water level rises in the pit. Once the pit is flooded there should not be any water quality issues related to the pits assuming the water was adequately treated and that the portion of the pit walls containing sulphide minerals are no longer be exposed to atmospheric conditions.

Results of model simulations indicate that several elements may potentially exceed Costa Rican drinking water guidelines within the WSFP, including Al, As, Cu, Mn, Ni and SO4. Concentrations of Al, As, CN, and Cu also exceed Costa Rican industrial effluent guidelines. These results are consistent with the previous feasibility study that suggested that the concentrations of metals within the WFSP are elevated during the operation period and will likely require treatment. Given that many of the model inputs were the same as those used by the previous study; it is not surprising that the predictions of the final water quality of the WSFP are similar. Furthermore, the model simulations indicate that the concentrations of metals are higher during active mine operations as compared to the post closure times.

Because elevated concentrations of sulphate and metals are expected to occur in the WSFP and will likely impact downstream receivers if discharged to the environment, a treatment system is required, and as a minimum will need to achieve concentrations of metals that comply with Costa Rican industrial guidelines.

Although standard treatment systems can reduce concentrations to below industrial guidelines, discharges after treatment often exceed the more strict water quality guidelines of downstream receivers. In such cases, a permit is usually required to discharge effluents that will impact the water quality of receivers off-site. Often times supplemental ecological and aquatic assessments on the receiving water courses are required as part of environmental assessment studies. The environmental assessment should be reviewed to ensure that due consideration has been given to potential changes in the receiving water quality, and appropriate changes to the water treatment system will be required if necessary.

### 18.3.2 Water Treatment

A treatment system for the surplus water discharged from the pond is included, to ensure that discharge criteria for the receiving stream are attained. Since the metal content of this water will essentially be due to open pit drainage water, lime will be added in the open pit sumps to enhance metal precipitation in the tailings pond. Treatment of the surplus discharged water will consist of additional lime addition and pH correction. A wetland will be constructed in the receiving water course to achieve reduction of suspended solids and ammonia content of the discharged surplus water.

## 18.4 POWER SUPPLY AND COMMUNICATIONS

A 14 kV mono-phase power line presently ends some 7 km from Crucitas. This line will be extended in the next few months to the small settlement of Crucitas and will be useful as a power source during construction.

It has been determined that the normally used supply voltage of 25 kV will not be adequate for the load (estimated at 5.4 MW) and it is planned to build a new 69 kV line from the Muelle substation to Crucitas, a distance of approximately 80 km. The first 30 km would follow the paved highway (number 35) then from Buenos Aires to Crucitas it would follow the present road via Coopevega.

An agreement has been negotiated with Coopelesca which will require that IISA supplies all the materials for the line (poles, insulators, cable, hardware) and Coopelesca will be responsible for arranging the right of way and the installation of the line. The feeder line from the main substation at Penas Blancas (15 km away) will be the responsibility of Coopelesca.

A line with 17 metre concrete poles is planned, with an average distance between poles of 75 metres. Coopelesca is preparing the engineering for this line, but for the purpose of the feasibility study a conceptual design has been prepared by BSC Engineered Systems of Spokane, Washington. Current US costs were used for the cost estimate.

The main electrical substation will be located near the plant and will transform the 69 kV supply to 4160 V for supplying the SAG and ball mills and will be further transformed to lower voltages for motors and lighting.

A microwave link with the San José office will be re-established with the installation of a new tower and transmission equipment. Sufficient band width will be available for multi-line telephone and internet use. Cellular telephone communication already operates on site.  The new communication system will be installed during the first months of construction.

## 18.5 INFRASTRUCTURE

The Coopevega road will be the main access to the Crucitas Project and the upgrading of this road is one of the responsibilities of the company set out in the environmental operating permit. An alternative route via Concho and Llano Verde has been upgraded by the government, and this will offer an alternative route if required. This may be especially important while the Coopevega road is being upgraded. Less than 7 km will need some upgrading to allow heavy loads to reach site from Llano Verde. The 10 km section of road from Chamorro to Crucitas is being upgraded to an adequate standard by the municipality, with financial help from IISA. This work will start in July 2006 and will be finished before the official start of the project (September 1$^{st}$.) The cost of the road upgrading to be included in the capital cost is thus for the section Coopevega to Chamorro (15 km) plus the cost of the 7 km from Llano Verde.

The Crucitas Project has the possibility of using an existing airstrip, which is 8 km from the mill site along the road to Concho, but no plans have been made to upgrade this.  Ground transport will be used for shipping gold (insurance will be provided by the shipper).  With an upgraded road, travel by car to the mine will be facilitated and is not unreasonably long

Service buildings will erected at the site but will include some of the existing buildings, which will be upgraded or expanded to suit the project demand. They include:

- Change Rooms and First Aid Building.
- Administration Building.
- Truck Shop and Warehouse building.
- Fuel Handling & Storage.
- Assay Laboratory.
- Dining Room expanded.
- Accommodation buildings.
- Reagent storage, explosive storage, etc.

## 18.6 ENVIRONMENTAL MANAGEMENT

A number of socio-economic studies have been completed for the proposed project area. These include land use, landscape characterization, socio-economic characterization, social profiles, and public opinion studies. Although most of these studies were conducted in 1996 they have proved to be sufficient to define the baseline socio-economic environment and provide supporting information for an Environmental Impact Study (EIS). In the preparation of the EIS and its approval process, various commitments have been made by Vannessa to help the local community infrastructure and develop sustainable economic activity. These commitments have been formalized in annexes to the EIS and are set out in the Environmental Operating Permit.

The Environmental Management Plan (EMP) was one of the most important sections of the EIS. The Crucitas EMP contains individual proactive management plans. It includes forestry, wildlife habitat, wastewater treatment, acid rock drainage prevention and control, surface water management, erosion control, environmental monitoring and reclamation/closure plan. In addition to an environmental manager, three graduates will also be employed by Vannessa to ensure full compliance with all regulations and responsibilities set out in the EMP. An environmental auditor will also be contracted to carry out periodic surveys of all aspects of the project.

The reclamation process will be consistent with local land use objectives and Equator Principles. The goals are to mitigate the effects of land disturbances by minimizing potential adverse effects to water resources, minimizing or eliminating public safety hazards, providing long term stable landform configurations and reclaiming surface disturbances for beneficial use consistent with local land use practice. It is anticipated that the site will be returned to productive land uses to include managed forestry and wildlife habitat.

## 18.7 SOCIO-ECONOMIC

A number of socioeconomic studies have been completed for the proposed project area. These include land use, landscape characterization, socioeconomic characterization, social profiles, and public opinion studies. Although most of these studies were conducted in 1996, changes have not been great in the socioeconomic status of the towns and villages in northern Costa Rica. Some minor additional work has been carried out more recently and with these, sufficient supporting information for an Environmental Impact Study (EIS) was available. On going studies form a part of the responsibilities of the company during construction and operation.

A public meeting held in 2004, attended by approximately 1200 people, found broad local support for the project. A substantial public relations effort using the press, radio and television is being maintained by the company to ensure that the local population is fully informed of development of the project and this will be maintained throughout the operation of the project.

Potential socioeconomic benefits include the creation of direct and indirect jobs, and revenues developed from property, sales, and income taxes; improvements of roads; development of trade; employee training; training of the youth; and support of schools and rural organizations by the company and its employees. These responsibilities are set out in the environmental operation permit and include the supply of an ambulance and upgrading of rural clinics and schools.

During the past 5 years a great deal of work has been carried out by the company to lay the groundwork for on-going socioeconomic development of the region and training programs, in organic farming, cheese production, clothing manufacture and computer technology, are already being run by the company. Further courses are planned, some to prepare local people for work with the mine, others to prepare them for other economic activity. A dedicated training centre will be built by Vannessa in Coopevega for on-going training.

A feasibility study, for setting up a cooperative in the area, is being prepared by the Canadian Cooperative Association and the company is funding this study. Some of the areas of activity which are being considered are organic agriculture, forestry products, textiles and furniture manufacture. Where possible the proposed cooperative will be involved in activities associated with the construction and operation of the mine. Funding of the socioeconomic development directly from the company will be through payment into a trust fund based on the tonnage of ore treated and grants from international organizations will be also be pursued. A dedicated manager with support staff will be employed to ensure the smooth running of the programs.

Where feasible, Vannessa will support the Cost Rican economy by purchasing locally. During construction, concrete and most materials necessary to construct auxiliary buildings will be purchased in-country.  During operations, most food, fuel and lubricants will be purchased from local suppliers.

## 18.8 PROJECT CAPITAL COST

The project initial capital cost is summarized in Table 18.2. These costs include all direct and indirect costs plus a contingency allowance. Mining capital costs include mobilization of the contractor and materials for technical control of the contracted mining.

**Table 18.2**
**Summary of Estimated Capital Costs**

| Item | Estimated Capital Cost ($US) |
|---|---|
| **Direct Costs** | |
| Mining | 400,000 |
| Process Plant | 21,958,173 |
| Tailings Management Facilities (preproduction) | 3,340,000 |
| Power Transmission Line | 2,570,000 |
| Sub-Station | 1,439,335 |
| Infrastructure | 4,051,492 |
| Effluent Treatment | 500,000 |
| **Sub-Total Direct Costs** | **34,259,000** |
| **Indirect Costs** | |
| Owner's Costs | 1,905,312 |
| Insurance | 445,000 |
| EPCM | 3,404,464 |
| Field Indirects | 177,500 |
| Reagents and Wear Parts Stock | 851,000 |
| First Fills | 277,633 |
| Spare Parts | 770,000 |
| Vendor Assistance | 50,000 |
| Wet Commissioning | 377,523 |
| Sales Tax on buildings and materials | 260,000 |
| Contingency | 4,254,000 |
| **Sub-Total Indirect Costs** | **12,772,432** |
| **TOTAL ESTIMATED CAPITAL COSTS** | **47,031,432** |

The direct construction costs presented in this table include all areas of the project requiring initial capital expenditures. All costs include equipment, material and labour. Equipment items purchased in Costa Rica are costed exclusive of sales tax, for which Vannessa expects to be exonerated. Sales tax at 13% is applied to approximately $2 million of purchases representing the cost of materials for the camp and related buildings.

The indirect costs include all construction related items such as engineering, procurement, construction management, construction equipment, personnel transportation, room & board, freight, first reagents fill, capital spares, etc.

Sustaining capital is estimated over the mine life for tailings dam raising and infrastructure items replacement. Allowances for project closure at $3 million, and a probable salvage value of $1.5 million, are included.

## 18.9 PROJECT OPERATING COST

The project operating costs have been developed on an annual basis recognizing the variation in the processed ore tonnes and saprolite: hard rock ratio. Averaged over the mine life, the operating costs are as shown in Table 18.3.

**Table 18.3**
**Summary of Operating Costs**

| Item | Saprolite ($/t) | Hard Rock ($/t) | Total $/t |
|---|---|---|---|
| Mining, per tonne rock | 2.18 | 1.66 | 1.78 |
| Processing | 4.86 | 6.61 | 6.19 |
| G&A | 2.29 | 2.79 | 2.67 |
| **Total, per ore tonne** | | | **13.15** |

Mining and tailings dam construction costs have been quoted by Sococo, with different rates for the two pits. For mining the following unit rates are suggested:

| | Unit | La Fortuna | Botija |
|---|---|---|---|
| Mining Saprolite ore | $/BCM | $2.99 | $2.99 |
| Mining Saprolite waste | $/BCM | $2.52 | $2.69 |
| Mining Rock ore | $/BCM | $3.94 | $3.99 |
| Mining Rock waste | $/BCM | $3.52 | $3.69 |

Sample drilling in saprolite is extra based on $5 per metre. Costs include for all mining with drilling, blasting and haulage to the crusher or waste dump, and pumping water and road construction within the pits. Rates assume haulage less than 1 km.

Tailings dam construction costs are also supplied by Sococo, at $2.75/BCM for stripping, and $2.00/BCM for placing clay or rock (in addition to mining costs) from the pits.

All other operating costs have been developed from first principles, as detailed in the Feasibility Study. Subsequent to the Feasibility Study, G&A operating costs are refined slightly by reducing the personnel force by 6 persons, deemed superfluous in the contact mining situation, and associated vehicle costs.

## 18.10 ECONOMIC AND FINANCIAL ANALYSIS

### 18.10.1 Economic Evaluation

A discounted cash flow analysis has been prepared on the basis of the project production and costs developed in the foregoing sections. Vannessa has supplied the tax calculation basis after recent meetings with consultants in Costa Rica. Tax calculations include:

- Corporate tax rate of 30%, plus minor municipal and local land taxes.
- Exoneration from the 13% sales tax except on materials (approximately $2 million cost) for office and similar buildings.
- Previous exploration expenses of $24.5 million may be used to reduce the taxable profit in proportion to gold sales, based on a previously licensed gold total

production of 1,007,210 ounces, or $24.32 per ounce. Since the amount is calculated in Colones, the dollar value is devalued in each subsequent year by 10%.

- Depreciation of total project capital cost to zero during life of mine period.

The summary results of this analysis are presented in Table 18.4, for contractor mining. The base case assumes mining of the saprolite ore plus the economic hard rock ore, with the alternative case of saprolite-only production. The cash cost of gold production includes the credit for silver sales applied as a deduction from the total operating cost, with the result expressed as net operating cost per ounce of gold sold.

**Table 18.4**
**Economic Evaluation**

| | Contract Mining | |
|---|---|---|
| | **Total ore** | **Saprolite only** |
| Life of mine operating cost, $/t ore | 13.15 | 12.05 |
| Pre-production capital cost, $ | 47,031,000 | 47,031,000 |
| Total Gold Produced, oz | 636,530 | 165,340 |
| Cash Cost (LOM Average) $/oz Au with Ag credit | 299.48 | 254.18 |
| Ore Mined tonnes | 14,914,000 | 3,586,000 |
| Average Grade g/t | 1.43 | 1.49 |
| Stripping Ratio (Mine Life) | 1.42 | 0.82 |
| Gold Price $/oz | 550 | 550 |
| Cashflow pre-tax $ | 84,935,000 | -3,247,000 |
| Cashflow after tax $ | 61,179,000 | -5,842,000 |
| IRR , after tax | 26.0 | -6.8 |
| NPV 10%, after tax | 24,528,000 | -11,132,000 |
| Payback period years | 3.0 | NA |

### 18.10.2 Sensitivity Analysis

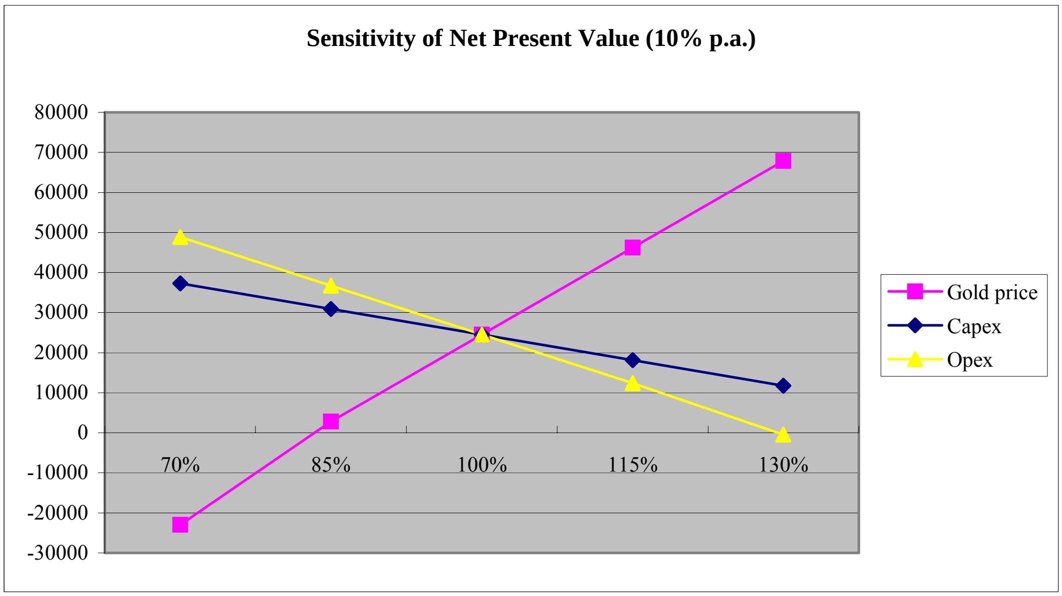
Sensitivity analysis on the whole ore base case, indicates the following in Table 18.5.

**Table 18.5**
**Sensitivity Analyses, Whole Ore, Contract Mining**

| Description | Favourable Change | | Base Case | Unfavourable Change | |
|---|---|---|---|---|---|
| Gold Prices | +15% | 633 | 550 | -15% | 468 |
| IRR | | 38.43 | 25.99 | | 12.01 |
| Cash Flow | | 97,128,000 | 61,179,000 | | 25,070,000 |
| NPV10% | | 46,210,000 | 24,528,000 | | 2,794,000 |
| | | | | | |
| Capital Costs, life of mine | -15% | 50,285,000 | 59,159,000 | +15% | 68,033,000 |
| IRR | | 33.42 | 25.99 | | 20.41 |
| Cash Flow | | 68,016,000 | 61,179,000 | | 54,342,000 |
| NPV10% | | 30,920,000 | 24,528,000 | | 18,135,000 |
| | | | | | |
| Operating Expenses $/t | -15% | 10.88 | 13.15 | +15% | 14.72 |
| IRR (before depreciation) | | 32.68 | 25.99 | | 18.63 |
| Cash Flow | | 82,002,000 | 61,179,000 | | 40,356,000 |
| NPV10% | | 36,703,000 | 24,528,000 | | 12,352,000 |

The sensitivity analysis reveals that the project is most sensitive to gold price, followed by operating costs and finally to capital costs. This is illustrated in Figure 18.1.

**Figure 18.1**
**Sensitivity of Net Present Value**




## 18.11 PROJECT EXECUTION PLAN

The project construction period is expected to be 16 months. During construction the labour force on-site is expected to peak at 270 workers.

Much work has already been done to identify contractors for the project, not only for construction but also for engineering. Unit costs quoted for design and construction have been supplied by these potential contactors and have been used in this feasibility study. All concerned are familiar with the project and this process will continue through the summer of 2006. Vannessa plans to carry out the EPCM activities with its own forces, rather than hiring a large specialized company. With this approach, it is expected that considerable time will be saved. The methodology for managing the project and the schedule are based on experience gained in a very similar project in another Latin American country and from detailed discussions with contractors and suppliers.

## 18.12 GOLD SALES

Gold cathode production, including the small amount of contained silver, will be smelted on a weekly basis, varying the day of the week as much as possible for security reasons. Transport of the bullion from the mine to San José (by Securicor) will be carried out by armoured car.

Refining will be carried out by Johnson Matthey, Canada.

## 18.13 ORGANIZATIONAL STRUCTURE AND OPERATING POLICIES

The structures for operating the mine and plant have been detailed and are considered normal for this type of operation. The environmental management, public relations and corporate social responsibility departments are larger and more specifically defined than for most operations of this size and reflect the seriousness of Vannessa and the Costa Rican government in dealing with these matters.

Staffing will include very few expatriates as Costa Rica possesses an excellent education system. Only key positions in mine and plant operation will be require foreign specialists and these will be substituted by local graduates when trained. It is a condition of the environmental operating permit that the company will try to employ up to 75% of the workforce from the local communities and the training programs already started are part of Vannessa's effort to achieve this objective. In addition to normal employment policies such as no sexual discrimination, great care will be taken to only employ Costa Rican citizens or foreigners with full working privileges. This is important as the Nicaraguan border is nearby and many illegal immigrants are present in the region.

Wage rates in this study have been obtained from a recent Price Waterhouse survey and a 10% premium has been added to each category to ensure jobs are attractive to qualified candidates.

## 19.0 INTERPRETATION AND CONCLUSIONS

The economic analysis shows that the project is viable based on mining of the total resource, at the base case gold price used ($550/oz.).

The project may be viable for saprolite mining alone if the gold price is higher and / or inferred resources are converted to the indicated category by further drilling.

## 20.0 RECOMMENDATIONS

Industrias Infinito should prepare the application for the environmental permit for mining hard rock resources, as additional impacts are limited and the feasibility study has identified changes to the original project plan that reduce some impacts. Significantly reduced disturbed areas, and the availability of land recently purchased by Industrias Infinito, provide an opportunity to reduce and mitigate any environmental impact of the development versus the original concept in the previous studies of the project.

Social programs are already well developed and should continue.

Considerable geological exploration potential exists in the immediate vicinity of the Crucitas resource, both to convert inferred resources to the indicated category and to develop new resources. Further exploration is recommended to ensure that all economically recoverable resources are developed in a logical and environmentally sensitive manner.

The exploration potential on a more regional level in the 196 square km of exploration concessions owned by Industrias Infinito is considerable and further exploration is recommended.

**MICON INTERNATIONAL LIMITED**

*"Ian R. Ward, P.Eng."*

Ian R. Ward, P.Eng.
President, Micon International Ltd.
February 21, 2007

## 21.0 REFERENCES

Canadian Institute of Mining, Metallurgy, and Petroleum, (2001), Guide pour l'estimation des Ressources et des Réserves, 10 p.

http://centralamerica.com/cr/info/, (2006), Costa Rica Information on the Internet.

http://costa-rica-guide.com/fr_maps.htm, (2006), Costa Rica Maps on the Internet.

Iturralde-Vinent, M. et al., (Date not recorded), IGCP Project 433: Caribbean Plate Tectonics; Scientific Report of Field Workshop to the "Nicoya Complex" in Costa Rica.

Lafleur, J.P., (2006), Technical Report for The Crucitas Project of Vannessa Ventures Ltd, Calgary, 170 p.

Ontario Securities Commission, (2001), NI 43-101 Final Rule.

Rogers, D.S., (1981), CIM Report on Diamond Drilling as an aid in ore definition at the Dome Mine for presentation at the 83rd Annual General Meeting of the C.I.M.M., Calgary.

# 22.0 CERTIFICATES

**IAN R. WARD, P.ENG**

As an author of this report, I, Ian R. Ward do hereby certify that:

1. I am employed as the President and Principal Metallurgist by, and carried out this assignment for; Micon International Limited, Suite 900, 390 Bay Street, Toronto, Ontario M5H 2Y2, tel (416) 362-5135 fax (416)362-5763.

2. This certificate applies to the technical report titled **"**Las Crucitas Gold Project, NI 43-101 Technical Report Summary of the Bankable Feasibility Study and Addendum Report " dated February 2007, prepared for Industrias Infinito S.A. and Vannessa Ventures Ltd.

3. I hold the following academic qualifications:
   B.Sc. (Hons) Minerals Engineering, The University of Birmingham, U.K. 1968

4. I am a registered Professional Engineer of Ontario (membership number 48869010); as well, I am a member in good standing of the Canadian Institute of Mining, Metallurgy and Petroleum;

5. I have worked as a metallurgist in the minerals industry and in consulting engineering companies for the last 39 years. My work experience includes the management of technical and feasibility studies, management of metallurgical testwork programs and the design of numerous mineral processing plants;

6. I am familiar with NI 43-101 and, by reason of education, experience and professional registration; I fulfill the requirements of a Qualified Person as defined in NI 43-101.

7. I have not visited the property which is the subject of this report;

8. I managed the preparation by Micon of the detailed Feasibility Study of the project and the subsequent Addendum Study, and I am responsible for Sections 16, 18.2, 18.8, 18.9, 18.10, 18.11, 18.12 and portions of Section 1 of the report. I am also responsible for Sections 18.4, 18.7 and 18.13 of the report, which incorporate information collected by Vannessa Ventures Ltd. personnel, which I have reviewed and accept;

9. I am independent of the parties involved in the transaction for which this report is required, other than providing consulting services;

10. I have no prior involvement with the property or the issuer.

11. I have read NI-43-101 and I consider that this report has been prepared in compliance with the instrument.

12. As of the date of this certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

13. I consent to the filing of the report with any Canadian stock exchange or securities regulatory authority, and any publication by them of the report.

Dated February 21, 2007

"*Ian R. Ward*"

Ian R. Ward P.Eng.

**MANI VERMA, P.ENG**

As the co-supervisory of this report entitled “Las Crucitas Gold Project Ni 43-101”, I, Mani Verma do hereby certify that:

1. I am an associate of Micon International Limited, Suite 900, 390 Bay Street, Toronto, Ontario M5H 2Y2, Tel: 416-362-5135, Fax: 416-362-5763, e-mail mverma@micon-international.com;

2. I hold the following academic qualifications;

| | |
|---|---|
| B.Eng. (Mining) | Sheffield University, UK 1963 |
| M. Eng. (Mineral Economics) | McGill University 1981 |

3. I am a registered Professional Engineer with the Professional Engineers of Ontario; as well, I am a member in good standing of other technical associations and societies, including;

   The Canadian Institute of Mining and Metallurgy (Toronto Branch);

4. I have worked as a mining engineer in the minerals industry for over 25 years;

5. I have read NI 43-101 and Form 43-101 FI and, by reason of education, experience and professional registration, I fulfill the requirements of a Qualified Person as defined in NI 43-101;

6. This report has been prepared in compliance with the criteria set forth in NI 43-101 and Form 43-101 FI:

7. I supervised the work performed by other Micon staff in developing Sections 17.2 and 18.1 of the report, plus the development of mine operating costs in Section 18.9, and am responsible for these sections of the report.

8. I have not visited the property which is the subject of this Technical Report;

9. I have had no prior involvement with the property that is the subject of this Technical Report;

10. I am not aware of any material fact, or change in reported information, in connection with the subject property, not reported or considered by me, the omission of which makes this report misleading;

11. I am independent of the parties involved in the transaction for which this report is required, other than providing consulting services;

12. I consent to the filing of the report with any Canadian stock exchange of securities regulatory authority, and any publication by them of the report.

Dated this 21st day of February, 2007

*“Mani M. Verma*

Mani M. Verma, P.Eng.

**Certificate of Qualification**
**Pierre Jean Lafleur, ing.**

I, Pierre Jean Lafleur, certify that:

1) At the time of this report I am a resident at 933 Carre Valois, Ste-Thérèse, Québec, Canada, J7E 4L8.

2) I am a registered Professional Geoscientist with the Association of Professional Geoscientists in the Province of Quebec (membership OIQ #39862.

3) I hold the following academic qualifications:

- I am a member of the Canadian Institute of Mines and Metallurgy.
- I am graduate from Ĕcole Polytechnique of Montreal (B. ENG.).

4) I have practised my profession in exploration, geology and mining for more than 25 years, with extensive experience in gold, base metals and industrial minerals as well.

5) I have visited the Crucitas Project site on a trip to Costa Rica from October 11th to 21st 2005 and took my own samples from the old drill core in storage on site.

6) I wrote the original report for the Crucitas Project, Entitled "Technical report for the Crucitas Project of Vannessa Ventures Ltd. Calgary " Dated February, 2006 for Geostat.

7) The reader should be aware that PJ Lafleur, prior to working with Geostat and writing the February 2006 report, had been called by Lyon Lake in February 1999 to review the CPC and IMC findings as an Independent Consultant.

8) This certificate applies to the technical report Entitled "Las Crucitas Gold Project NI43101 Summary of the Bankable Feasibility Study and Addendum" Dated February 2007.

9) I am a Qualified Person according to the National Policy 43-101. I have read the norm and I understand the terms and implications.

10) I have not received, nor do I expect to receive directly or indirectly any interest in any form for the Crucitas project from Vannessa Ventures Ltd.

11) I am responsible for section 10, 11, 12, 13, 14, 15 and portions of section 17 related to the resource estimate.

12) That, as of this date of this certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed not make this technical report not misleading.

13) I consent to the filing of this report with any Canadian stock exchange or securities regulatory authority, and any publication by them of the report.

Dated February 21, 2007

*"Pierre J. Lafleur"*

Pierre Jean Lafleur, P.Eng.,

# PHILIP R. BEDELL

## CERTIFICATE

As an author of a portion of this report, I, Philip R. Bedell do hereby certify that:

1. I am employed as the Senior Principal Geotechnical Engineer by, and carried out this assignment for; Golder Associates Ltd, 309 Exeter Road, Unit 1, London, Ontario, N6L 1C1, tel (519) 652-0099 fax (519) 652-6299.

2. This certificate applies to Section 1.6, Tailings and Water Management, of the technical report titled **"**Las Crucitas Gold Project, NI 43-101 Technical Report Summary of the Bankable Feasibility Study and Addendum Report" dated February 2007, prepared for Industrias Infinito S.A. and Vannessa Ventures Ltd.

3. I hold the following academic qualifications:
   B.E.Sc., Civil Engineering, The University of Western Ontario, 1966
   M.E.Sc., Soil Mechanics and Foundation Engineering, The University of Western Ontario, 1967.

4. I am a registered Professional Engineer of Ontario (membership number 03046018); as well, I am a Designated Consulting Engineer in Ontario (No. 1452);

5. I have worked as a geotechnical engineer and consultant for the last 40 years. My work experience includes being Senior Project Director, Manager and Design Engineer responsible for major civil engineering works including the design and construction of mining, transportation and municipal infrastructure projects. The mining projects have included the geotechnical investigation, design and construction monitoring for open pit mines and related tailings facilities and infrastructure, as well as responsibility for the review and report preparation for a forensic investigation of a tailings dam failure in South America;

6. I am familiar with NI 43-101 and, by reason of education experience and professional registration, I fulfill the requirements of a qualified person as defined in NI 43-101.

7. I have visited the property which is the subject of this report in 1999;

8. I managed the preparation by Golder Associates Ltd. of the reports titled "Volume I, Study for Tailings and Waste Rock Facility, Crucitas Project, Costa Rica" (Report No. 991-3051US (1001), dated August 10, 2006); Volume II, Appendices A and B, "Geotechnical Investigation, Tailings Facility, Crucitas Project, Costa Rica" (Report No. 991-3051, dated August 10, 2006), and Volume III, Appendix C, "Geotechnical Investigation, Tailings Facility, Crucitas Project, Costa Rica" (Report No. 991-3051US (1001), dated August 2006). The relevant portions of these reports have been incorporated in Micon's Bankable Feasibility Study and summarized in NI 43- 101 Technical Report Summary of the Bankable Feasibility Study and Addendum Report.

9. I am independent of the parties involved in the transaction for which this report is required, other than providing consulting services;

10. I was previously involved with the property as Geotechnical Consultant to Lyon Lake Mines in 1999.

11. I am familiar with NI43-1 01 and I consider that the portions of the report pertaining to the tailings and waste rock management have been prepared in compliance with the instrument.

12. As of the date of this certificate, to the best of my knowledge, information and belief, the portions of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed so as to make the technical report not misleading.

13. I consent to the filing of the report with any Canadian stock exchange or securities regulatory authority, and any publication by them of the report.

Dated February 22, 2007

*"Philip R. Bedell"*

Philip R. Bedell, P.Eng.

**KENNETH J. DE VOS**

**CERTIFICATE**

As an author of an appendix within this report, I, Kenneth J. DeVos do hereby certify that:

1. I am employed as a Hydrogeochemist by, and carried out this assignment for; Golder Associates Limited, 2390 Argentia Road, Mississauga, Ontario L5N 5Z7, tel (905) 567-4444 fax (905)567-6561.

2. This certificate applies to the report titled "Water Quality Modeling of the Waste Storage Facility Pond", referred to as Appendix 6B titled "water quality" of the Bankable Feasibility Study prepared for Industrias Infinito S.A. and Vannessa Ventures Ltd.

3. I hold the following academic qualifications:
B.Sc. (Hons) Applied Earth Science, University of Waterloo, Waterloo, ON. 1992.
M.Sc. Applied Earth Science, University of Waterloo, Waterloo, ON., 1995.

4. I am a registered Professional Geoscientist of Ontario (membership number 0908); as well, I am a registered Professional Geologist in Alberta (membership number M72089) and a registered Professional Geologist licensee in Northwest Territories.

5. I have worked as a geochemist specializing in assessment of environmental assessment and geochemistry of mining properties in consulting engineering companies for the last 14 years. My work experience includes the management of environmental aspects of feasibility studies, management of geochemical and water quality testwork programs and the development of environmental implications and specifications for waste rock and tailings management options;

6. I am familiar with NI 43-101 and, by reason of education, experience and professional registration; I fulfill the requirements of a Qualified Person under Section 1.1 part b) of the definition of "qualified person" in NI 43-101 for the subject matter as provided in Appendix 6B.

7. I have visited the property which is the subject of the report in November of 2005;

8. I managed the preparation by Golder Associates Limited of the report titled "Water Quality Modeling of the Waste Storage Facility Pond". The report incorporates information provided by Vannessa Ventures Ltd. personnel, which I have reviewed and provided recommendations on potential data gaps as outlined in the report. Appendix 6B of the Bankable Feasibility Study titled "water quality" has referred to this report in its entirety. Relevant portions of the report have been reproduced in "Section 1.6.1 ARD and Water Quality" and "Section 18.3.1 ARD and Water Quality" of NI 43-101 Technical Report Summary of the Bankable Feasibility Study and Addendum Report.

9. I am independent of the parties involved in the transaction for which this report is required, other than providing consulting services;

10. I have no prior involvement with the property or the issuer.

11. I have read NI-43-101 and I consider that the specific calculations as reported in the report titled "Water Quality Modeling of the Waste Storage Facility Pond", for which I am responsible have been prepared in compliance with the instrument, however in completing these calculations reliance was placed on baseline water quality data as provided by Vanessa Ventures Ltd. and recommendations regarding data gaps have been provided in the report. Due to the historical nature of the data provided by Vanessa Ventures it was not possible to review the details and QA/QC program for the water quality baseline data.

12. As of the date of this certificate, to the best of my knowledge, information and belief, the calculations completed for which I am responsible contain the scientific and technical information that is required

to be disclosed to make the methodology of the calculations not misleading. The resulting calculated water quality heavily relies on baseline water quality data and process water quality data and groundwater quality data as provided by Vanessa Ventures Limited and was not verified. Although the methodology and calculations are not misleading the accuracy of the end result may vary and is dependant on the quality of the data provided by Vanessa Ventures Limited.

13. I consent to the filing of the report with any Canadian stock exchange or securities regulatory authority, and any publication by them of the report.

Dated February 21, 2007

"*Kenneth J. DeVos*"

Kenneth J. DeVos P.Geo.