

# **Technical Report and Resource Estimate**

for the

# **Superior Project**

Plumas County, California

Prepared for

# **Crown Gold Corporation**

Prepared by

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## SUMMARY

This report provides a description of, and an independent resource estimate for the Engels and Superior copper deposits, two of the three identified deposits (Engels, Superior, and Sulfide Ridge), known as the Superior Project located in Plumas County California and held by Crown Gold Corporation.

### Property Description

Crown Gold acquired 132 unpatented lode claims and a lease with an option to purchase 36 patented lode claims which together make up the Superior Project from Nevoro Copper Inc., a subsidiary of Starfield Resources in June, 2013.

This report serves as the basis supporting an initial release of the mineral resources presented in the news release dated October 2, 2013. This report is prepared under the terms defined by NI 43-101. The effective date for this report is November 15, 2013.

The Superior Project is located approximately 16 kilometers northeast of Greenville, California, and about 160 kilometers northwest of Reno, Nevada. The property consists of 132 unpatented contiguous optioned unsurveyed mining lode claims, 36 patented lode claims and 65.6 hectares covering an area of approximately 1,297 hectares when adjusted for claim overlap.

The project is situated in the Sierra Nevada province of California. The claims vary in elevation from approximately 1,680 meters to approximately 1,957 meters. The climate is defined by hot summers to a maximum of 38° C and cold, windy winters with lows to -23° C. Precipitation is moderate with average rainfall of 76cm and average snowfall of approximately 3.5m.

The property has sufficient surface rights for future exploration or mining operations although there is likely to be a requirement to lease nearby flat land available within a ten kilometer radius for including potential waste disposal areas, heap leach pads areas and processing plant sites.

### History and Ownership

Henry A. Engels and his sons acquired the Superior Mine in 1880 and discovered the Engels Mine in 1883. Operations began in 1880 and continued to 1930.

The total reported production from the Engels and Superior mines was approximately 160 million pounds of copper, 23,000 ounces of gold and 1.9 million ounces of silver recovered from 4.7 million short tons of ore between 1914 and 1930. Mill recovery averaged about 80% during this period of operation, indicating a feed grade of about

2.2% copper and 0.5opt Ag and 0.005 opt Au. Since 1930 activity in the Lights Creek District has largely been limited to exploration.

From 1961 through 1981 Placer Amex conducted exploration of the Lights Creek District. Reconnaissance surveys were made in 1962-63 and stream sediment and soil sampling surveys were conducted in 1964-65. The Superior, Sulfide Ridge, and Engels Mine sites all showed plus 1000 ppm Cu anomalies in soils.

Amex completed 96 diamond drill holes totaling approximately 16,470 meters at the Superior deposit between 1964 and 1967. Drilling at Sulfide Ridge began in 1964. Drilling at the Engels Mine occurred in 1965. Between 1965 and 1967 Placer Amex drilled a total of 47,289 meters of core and 1,165 meters of rotary drilling in the Lights Creek district.

Errors were discovered in the drill core assays conducted by the Amex lab at the Golden Sunlight project in Montana and of the pulps were re-assayed at Union Assay in Salt Lake City between 1967 and 1968. It is unclear whether this re-assay included the Placer Amex drilling at Engels.

Sheffield Resources Inc. staked an additional 410 unpatented lode claims in the district between November 2004 and October 2008. In April 2006 Sheffield optioned the California-Engels land consisting of about 894 acres of deeded land covering the historic Engels and Superior Mines. Sheffield completed 504 meters of core drilling at Engels in May and June of 2008.

Sheffield Resources was acquired by Nevoro Copper in July 2008. Nevoro completed 737 meters of core drilling at Engels from August to November 2008. Additional unpatented lode claims were staked by Nevoro in 2007 (33 total), 2008 (23 total) and 2011 (12 total).

In 2009 Starfield Resources Inc. acquired Nevoro Inc. the parent company of Nevoro Copper Inc., and conducted a limited drilling program at Engels in 2009 and 2010. They also contracted a property-wide airborne geophysical survey conducted by Fugro Airborne Surveys. Starfield dropped the unpatented claims encompassing the Moonlight deposit in 2012.

Crown Gold acquired the property June 27<sup>th</sup> 2013 from Starfield's subsidiary Nevoro including the complete database held by Nevoro which comprehensively documents all known exploration activity on the property from 1960 to the present time.

## **Geology and Mineralization**

The Superior Project area is part of the larger Lights Creek District located at the northern end of the Sierra Nevada physiographic province at the juncture with the late-Tertiary-to-Recent Cascade volcanic province to the north and the Basin and Range province immediately to the east.

The Lights Creek District lies at the northern end of the 40km-long, 8km-wide, N20W trending Plumas Copper Belt interpreted to represent an extension of the NNW trending Walker Lane structural lineament. The Walker Lane has hosted some of the largest precious and base metal mines in the western US including the Yerington District approximately 160km southeast of Lights Creek.

Greenschist facies Mesozoic metavolcanic rocks have been intruded by the late Jurassic to Early Eocene Lights Creek Stock in the District. The Lights Creek stock is a roughly circular fine to medium grained quartz monzonite to granodioritic tourmaline-rich intrusive, approximately 18 square kilometers in area.

Structural preparation has been important in localizing mineralization in the Lights Creek District. Mineralization is preferentially located in stockwork zones with fractures of multiple orientations or at the intersection of structures and lithologic contacts.

A significant portion of the copper mineralization is also truly disseminated and not associated with fractures or veinlets.

Mineralization in the Lights Creek District area has been characterized as of the porphyry copper type.

The Engels deposit lies outside the Lights Creek Stock, immediately adjacent to its eastern margin in an area of represented by both gabbroic-phase intrusives and roof-pendant metavolcanics.

Mineralization in the Engels Mine area occurs in a 390m by 200m pipe like zone. Mineralization is associated with brecciated zones that exhibit features of both an intrusion breccia and a hydrothermal breccia. The relationship of mineralization to zones of breccia and contacts between the quartz diorite and metavolcanic is evident. The disseminated copper minerals are often very abundant and locally coalesce. Copper grades exceeding 15% Cu have been encountered in several 2m core intercepts.

Copper mineralization at Engels is strongly oxidized to depths of 70 meters. Assay analysis for sulfuric acid soluble copper in a portion of samples from the post 2004 drilling indicates copper oxides representing 90% of total copper within these depths. Copper oxide minerals consist primarily as malachite with lesser chrysocolla and azurite. The principal sulfide minerals consist of bornite and chalcopyrite.

The Superior deposit lies within the Lights Creek Stock near the south-eastern margin and south of Engels. The deposit is hosted within the quartz monzonite. Disseminated copper mineralization at Superior, lies within a roughly circular area about 610 meters in diameter. Disseminated mineralization consists of fine chalcopyrite and lesser bornite with typical grades of between 0.1%-0.3% copper.

Within this disseminated mineralization are tabular brecciated structures that were historically mined up to 244 meters along strike, 183 meters down dip and 3-7 meters wide. Mineralization in the breccia-veins consists of magnetite-actinolite-minor quartz-siderite-bornite-chalcopyrite.

The geology and mineralization at Sulfide Ridge appears to be most similar to Superior and was characterized by Placer Amex geologists as a porphyry system. The wide-spaced (100-200m) drilling indicates disseminated copper mineralization similar to that found at Superior, however no occurrences of the high-grade breccia-veins mined at Superior has been encountered in the drill holes. That said, the drilling that has been done defines significant copper mineralization with copper grades in 5 meter composites exceeding 0.3% Cu over 1500 meters north-to south and 500m east to west.

### **Drilling, sampling, and data verification**

All drill holes used in the resource estimate are diamond drill core. Historic drilling for Placer Amex was done by Boyles Brothers. NX (54.7mm) core was recovered to a depth of 30-60 meters and then the hole was completed using BX (42mm) core. Placer's BX drilling typically showed 95% recovery overall with lower recoveries in softer copper bearing zones.

Core drilling at Engels was conducted by Ruen Drilling Incorporated, a California licensed company, based in Clark Fork, Idaho. HQ (63.5mm) core was recovered from the collar of virtually all the core holes. Core recovery was reported as greater than 95% at Engels. Core recovery was compromised when the holes intersected old stopes and caved areas. Total copper was the only element consistently assayed for.

Engels drilling is tightly confined to the immediate vicinity of the historically mined volume, and does not test the along-strike, or down dip extent of mineralization.

The drilling for the Superior Project consists of historic drilling done by Placer Amex from 1962 to 1972. Of the three deposits having some drill holes, Engels is the only deposit recently drilled with 44 of the total of 61 drill holes being drilled by Sheffield/Nevo/Starfield from 2005 through 2010.

Superior drilling appears to better define the limits of known mineralization, however the orientations are more random than ideal and additional drilling should investigate the possible existence of other high-grade structurally-controlled segregations of high-grade to the northeast and at depth.

Sulfide Ridge drilling is very widely spaced with intervals of between 100m and 200m, relatively shallow for the lateral extent of mineralization observed. All drill holes are vertical.

Most of the drill hole samples documented in this report and upon which the Superior resource estimate is based were collected from 1962-1972. The actual details of the

sampling methods and recovery factors as well as the approach the individual companies selected to complete the various sampling programs are not available. This lack of documentation was a major consideration in classifying the resource estimate. That notwithstanding, the sampling done prior to 2005 was completed by geologic employees of a large, professional international mining company: Placer Dome or its predecessor companies or wholly owned US subsidiaries. The Author is prepared to assume that professional sampling techniques were used.

The 2005-2010 Engels core samples were submitted to the ALS-Chemex laboratory, now ALS USA. ALS USA is accredited by the Standards Council of Canada as conforming with requirements of CAN-P-1579, CAN-P-4E (ISO/IEC 17025:2005). ALS analyzed for total copper using a four acid digestion by HF, HNO<sub>3</sub>, HClO<sub>4</sub> and HCl with copper content determined either by ICP or by AA.

A total of 366 assay intervals for the Engels drilling done by Sheffield representing 19% of the total modern Engels database was checked against the assay certificates for data entry errors in copper (3 methods), silver, gold, iron, and arsenic. A total of 51 errors were found, all confined to the iron assays corresponding to an overall 1.99% error rate. The Author considers this error rate acceptable for a database not previously subject to rigorous scrutiny.

Of the three deposits considered within the Superior Project: Engels, Superior and Sulfide Ridge, only Engels was drilled by Sheffield. Consequently Engels is the only deposit for which contemporary standards of QA/QC have been applied. A total of 24 pulp duplicates were run on Engels drill hole samples. The results for total copper were indicative of good precision with a correlation coefficient of 0.9988 and no demonstrated bias. Only six field duplicates were completed for the Engels drilling. The results clearly indicated a mislabeling or miss-selection of the samples and were discarded.

A total of 91 reference standards were submitted with the Engels drill samples. A total of 8 fell outside two standard deviations from the accepted values for the standards. Overall the results were acceptable to the Author.

A total of 42 blanks were submitted as well. The results indicate the presence of low-level contamination, but the source has not been identified. The level of contamination is well below potentially economic copper grades and does not appear significant enough to materially affect the assay results. The pulp duplicate and reference standards analyses demonstrate an acceptable level of reliability and reproducibility. The coarse rejects analyses show inattention to sample organization or labeling. The blank reference material analyses suggest the presence of low-level contamination, but not of a magnitude likely to materially affect the results of the estimates. The Author concludes that the QA/QC analysis conducted by Sheffield in drilling at Engels demonstrates an adequate level reliability in the drill hole database.

Sheffield was able to recover a small portion of the original Superior core which had been stored underground on the 1 level. Sheffield resubmitted the entire half-splits to

ALS Chemex. In addition, in re-sampling the ribs of the Level 1 workings, Sheffield attempted to sample as closely to Placer Amex sample locations as possible to permit comparison with their results. The composited results of these efforts compare very well with the original Placer Amex results. The Author considers the results of the above duplicate analysis program to offer a small but significant measure of confirmation of the Placer Amex assay values for Superior.

### **Resource Estimation**

Resources have been estimated for the Engels and Superior deposits and are presented in the technical report. Both deposits possess sufficient drill hole data density to support the effort.

Total copper (copper oxides plus copper sulfides) was the only metal evaluated, as the the number of assays for silver and gold were insufficient at Engels for estimation purposes and wholly absent at Superior.

The estimation process employed for the Engels and Superior deposits was the Probability Assigned-Constrained Kriging (“PACK”) approach which develops a constraining probabilistic envelope using binary (0’s and 1’s) indicators. These envelopes are then used to constrain both data available to inform blocks; and the blocks eligible to receive an estimate.

The application of the probabilistic envelope is precisely analogous to the application of a deterministic, “wire-frame”, envelope. In the case of both Engels and Superior the threshold grade selected was 0.200% total copper.

Upon verification of the indicator value selection and any secondary restrictions applied, the composites thus selected were characterized through exploratory data analysis and estimating parameters developed for estimation of total copper %.

Block models were constructed of sufficient dimension to accommodate conceptual-level open pit analysis deemed by the Author to be necessary for demonstrating potential economic recoverability of the resource being reported.

The results of the indicator estimates used to create the probabilistic envelopes were examined on bench plans with nearby composites posted for comparison against the shape. This was necessary as the irregular drilling pattern precluded examination in section. The examination confirmed the validity of the constraining envelope.

The results of the total copper estimates were examined in the same way and the results were also found to be valid and appropriate.

Bulk density was applied as a single value of 2.75 for all material, mineralized and unmineralized. This figure is based on cursory and limited specific gravity testing with

consideration of the relatively high magnetite content of the rock and the inferred relationship between density and the degree of copper mineralization.

The need for grade capping was analyzed by the Author by undertaking both capped and uncapped estimates and comparing the metal contribution from the component of copper removed by capping. Capping was deemed unnecessary based on the following results: In the case of Engels, the component of grade above the capped value contributed only 2.04% of metal from 2.8% of all composites capped. For Superior the component of grade above the capped value contributed 2.6% of metal from 2.0% of all composites capped.

The resource was classified entirely as Inferred by the Author due primarily for the following reasons: In the case of Engels, to the lack of sequential copper assay analysis demonstrating the proportion of copper that would be recovered by a heap-leach, SX-EW process, the most likely process route for the upper portion of Engels.; In the case of Superior, the lack of documentation on sampling, security, and QA/QC for the Placer Amex assays.

## Resource Statement

The resource estimate developed by this study is:

<b>Engels:</b>	<b>Inferred</b>	<b>2.5Mt @1.05% total copper</b>
<b>Superior:</b>	<b>Inferred</b>	<b>54Mt @0.41% total copper</b>
<b>Total:</b>	<b>Inferred</b>	<b>57Mt @0.43% total copper</b>

These resources are constrained within raw pit shells in order to demonstrate the potential economic recoverability of the resources presented. These pit shell were developed using a Floating Cone program with cost parameters taken from InfoMine's Cost Mine Service.

Engels tonnage above cutoff was further adjusted by removal of an estimate of historic mining by bench within the pit shell volume. The total mined tonnage within the Engels pit shell removed by-bench was 700,000 tonnes taken at the average grade of the block estimates above the calculated cutoff grade.

Superior has no adjustment for the historic mining, as the total tonnage mined is less than 2% of the estimate.

## Conclusions and Recommendations

The Author concludes that the Superior Project demonstrates the presence of a significant resource with considerable upside potential for expansion through focused exploration.

Superior is the best drilled of the deposits and mineralization is largely closed off by drilling, although some potential exists to the east and south as well as at depth.

Engels possesses only a small but relatively high-grade resource, but is clearly open along strike in both directions for increasing the shallow mineralization amenable to open pit mining. The potential for additional underground material is clearly present, although exploration for such will require significant expenditure to re-open old underground workings to permit drilling.

Sulfide Ridge likely presents the greatest opportunity for significant expansion of the resource as the extent of mineralization demonstrated in the few widely spaced holes, while of lower grade than either Engels or Superior extends over 1500m north to south and 500m east to west.

The Author recommends that Crown Gold undertake a phased approach to advancing all three deposits with first priorities to include drilling to expand the shallow mineralization at Engels, drilling at Superior to offer greater confirmation of the Placer Amex drilling and supplement the lack of QA/QC documentation that hampers the confidence that can be placed in the estimate, and drilling at Sulfide Ridge to better understand the structural controls on mineralization so that a comprehensive in-fill drilling program can be designed.

The Author also recommends that less expensive, but important issues be addressed as well including:

- obtain high resolution topography and link to past drill collar coordinates;
- conduct a more focused and organized SG test program using an independent laboratory;
- re-submit the Engels pulps for sequential copper analysis to permit accurate assessment of the potential for heap leach SX-EW treatment.

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## **Introduction and Terms of Reference**

This report provides a description of and an independent resource estimate for the Engels and Superior copper deposits, two of the three identified deposits (Engels, Superior, and Sulfide Ridge) known as the Superior Project (the “project”) located in Plumas County California and held by Crown Gold Corporation (“Crown Gold” or “the company”). Crown Gold acquired 132 unpatented lode claims and a lease with an option to purchase 36 patented lode claims which together make up the Superior Project from Nevoro Copper Inc., a subsidiary of Starfield Resources in June, 2013. In addition, the exploration potential of the three deposits is discussed and recommendations for further work are presented.

This report serves as the basis supporting an initial release of the mineral resources presented in the news release dated October 2, 2013. This report is prepared under the terms defined by NI 43-101. The effective date for this report is November 15, 2013. This report is based on:

- Reports and maps accumulated from the initial historic production at both Engels and Superior;
- Reports, maps and data generated by exploration and evaluation activities of American Exploration and Mining Company (Placer-AMEX) a subsidiary of Placer Development Ltd (later Placer Dome), in the 1960’s and 1970’s; and
- Reports, maps and data generated by recent exploration activity from 2004 to 2010 by Sheffield Resources Ltd (Sheffield), Nevoro Copper Inc. (Nevoro), and Starfield Resources Inc. (Starfield).

No restrictions of data, information or access were placed on the Author in the preparation of this report.

At the request of Crown Gold, the Author visited the site on August 18<sup>th</sup> and 19<sup>th</sup> 2013 in company with the CEO of Crown Gold, Stephen Dunn, and the former project geologist for Nevoro and Starfield, John Schaff.

## **Reliance on Other Experts**

The author has prepared this report based upon information believed to be accurate at the time of completion, but which is not guaranteed. The author has principally relied on information provided by Crown Gold obtained in turn by them from Starfield and their agents, and from private historic files held by the California-Engels Mining Company, the owner of the patented claims subject to lease.

Title to the California-Engels claims has been reviewed by management of Crown Gold who takes responsibility for the claims and any liabilities, encumbrances or lien's on those claims. The Author has a copy of the receipt from the United States Department of the Interior; Bureau of Land Management Sacramento, California (the "BLM) dated August 27, 2013 acknowledging payment by Crown Gold of the required fees for the claims. This receipt including a list of the claims and their location is included in Appendix A of this report.

The opinions, conclusions and recommendations presented in this report are conditional upon the accuracy and completeness of the information supplied by both parties. The Author reserves the right, but will not be obligated, to revise this report if additional information becomes known to the Author subsequent to the date of this report. The Author assumes no responsibility for the actions of Crown Gold respecting the distribution of this report.

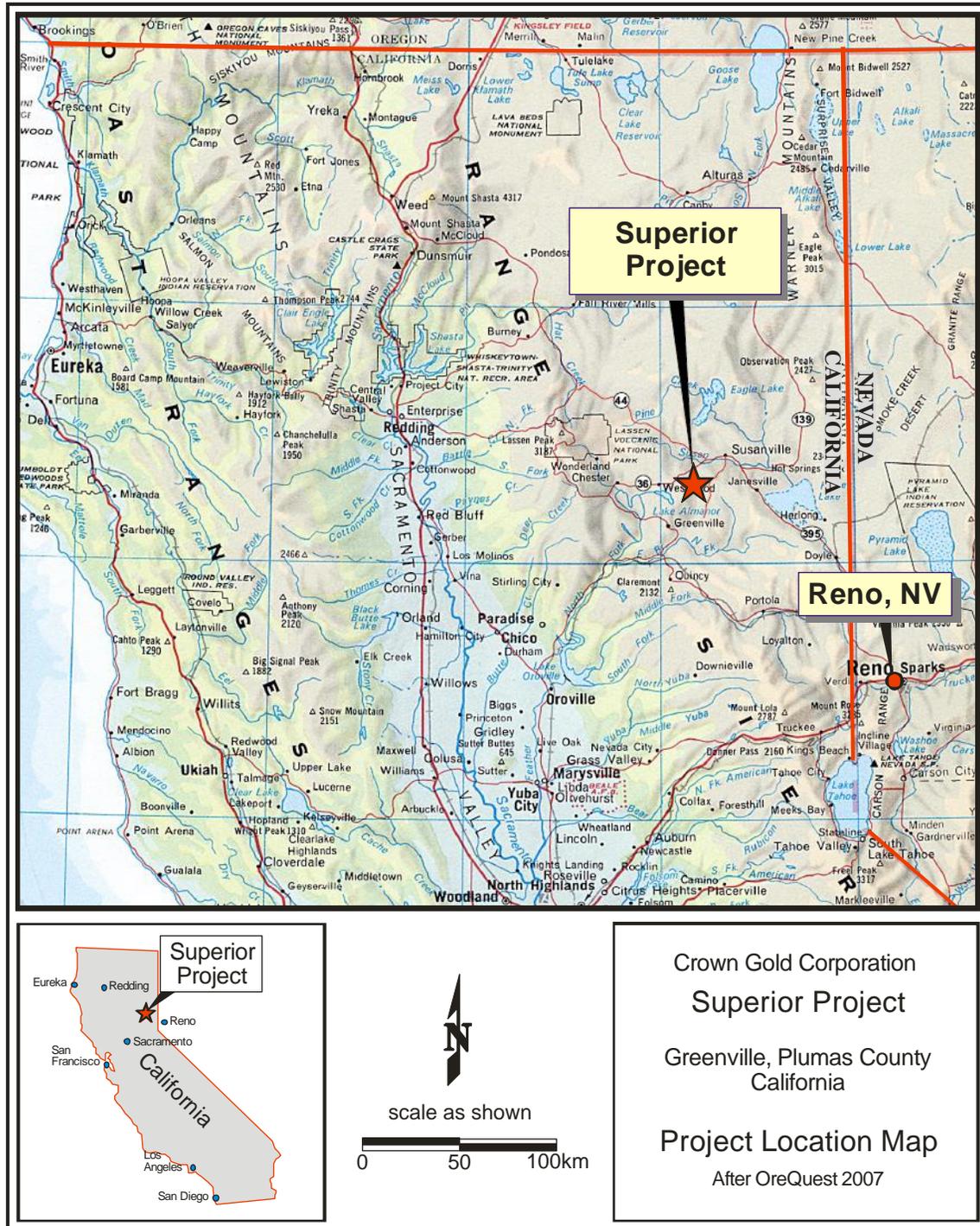
## **Property Description and Location**

The bulk of the following property description was taken from the 2007 NI 43-101 report prepared by OreQuest Consultants for Sheffield Resources. Modifications consist of removal of reference to deposits outside Crown Gold's property boundary and updates to reflect additional work done within the property boundary between 2007 and 2011.

The Superior Project is located approximately 16 kilometers northeast of Greenville, California, and about 160 kilometers northwest of Reno, Nevada. The project location is shown on the Moonlight Peak and Kettle Rock 7.5' USGS topographic maps. The Latitude at the approximate center of Moonlight property is 40°13'36"N and the Longitude is 120° 48' 11" W or UTM coordinates of 686,855E, 4,455,250N (NAD 27 CONUS). The property lies within Sections 1, 2, 11 12, 13,14& 24 T27N R10E, Sections 4,5,6 7 ,8,9,17&18 T27N, R11E, Sections 35 & 36 T28N, R10E and Section 31&32 T28N, R11E in Plumas County, California (Figure 1).

The property consists of 132 unpatented contiguous optioned unsurveyed mining lode claims, 36 patented lode claims and 65.61 hectares covering an area of approximately 1,297.6 hectares when adjusted for claim overlap. The claims are shown on Figure 2, summarized in Table 1, and the detailed claim information is listed in Appendix A.

In acquiring the property from Starfield, Crown Gold assumed the original terms of the lease agreement for the 36 patented lode and 65.61 hectares of fee lands claims made between Sheffield and the California-Engels Mining Company signed April 24, 2006. Those terms are presented below.



**Figure 1: Superior Project Property Location**

Sheffield Inc. (ASI) entered into an “Exploration Permit with option to Lease and Purchase” (the “Agreement”) with California-Engels Mining Company (California – Engels). The optioned block consists of 6 fee property claims (162.12 acres) and 36 patented lode mineral claims (735.98 acres), full details are shown in Appendix A. The

terms of the agreement are as follows have been provided to the Author by the management of Sheffield:

*“Exploration Permit: Sheffield must pay US\$20,000 on signing of the Agreement to initiate the Exploration Lease which has a term of 120 days for completion of due diligence studies and selection of lands to be included in the Mining Lease. The Exploration Permit terminate when Sheffield notified California-Engels of its decision as to include all optioned lands in a Mining Lease.*

*Mining Lease: Sheffield paid US\$1000 to initiate the Mining Lease and upon acceptance by the TSX-Venture Exchange American Sheffield issued 50,000 Sheffield common shares to California-Engels. (money has been paid and shares were issued) On each anniversary of the acceptance during the currency of the Mining Lease Sheffield will pay California-Engels US\$20,000 and will on each of the first two anniversaries issue to that company 100,000 Sheffield common shares. (all monies owing to November, 2013 have been paid and all shares owed have been issued).*

*In the event Sheffield completes a bankable feasibility study on the California-Engels properties or begins construction of a mill for commercial production of mineral products from the property, Sheffield will in the first instance of each event issue to California-Engels 200,000 Sheffield common shares.*

*Sheffield will during the currency of the Mining Lease perform a minimum of US\$25,000 or work on the property and will pay any land taxes assessed against the property.*

*Purchase of Property: Sheffield may, at a time of its selection and before commencement of commercial mining on the properties, purchase the California-Engels properties that are subject to this agreement by paying to California-Engels at Sheffield's election either US\$10 million or issuing one million shares of Sheffield common shares. Sheffield has the right to make payment in cash or shares at its sole discretion.*

*California-Engels reserves for itself the rights to timber on the property and the right to manage said timber as a tree farm. Said timber management activities may not interfere with Sheffield's exploration or mining activities. In the event Sheffield notifies California-Engels that the timber must be removed to make room for Sheffield's activity, California-Engels must remove the timber or Sheffield may harvest the timber on behalf of California-Engels and recover Sheffield's costs by deducting them from the proceeds of the sale of the timber.*

*California-Engels also reserves for itself the rights to specified dumps of broken rock which may be sold to third parties or used in maintaining the roads on the property.*

*California-Engels further reserves for itself a 2% Net Smelter Return Royalty capped at US\$25,000,000.*

*On purchase of the property the annual payments increase to US\$60,000 and are deductible from future royalty payments”*

In summary, the total area of the Crown Gold claim block, minus the area covered by the overlapping claims, is approximately 1,232 hectares and is summarized in Table 1.

#### **MINERAL CLAIMS SUMMARY**

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	number of claims	acres	hectares
Unpatented claims (22.06 acre basis):	132	2,727	1,104
Patented claims:	36	736	298
Fee lands		162	65
Subtotal patented and unpatented:	168	3,625	1,466
Approximate overlap with patented claims:	28	-219	-89
Approximate overlap with unpatented claims:	12	-201	-81
<b>totals:</b>	<b>168</b>	<b>3,205</b>	<b>1,298</b>

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*Table 1: Superior Project Mineral Claims Summary*

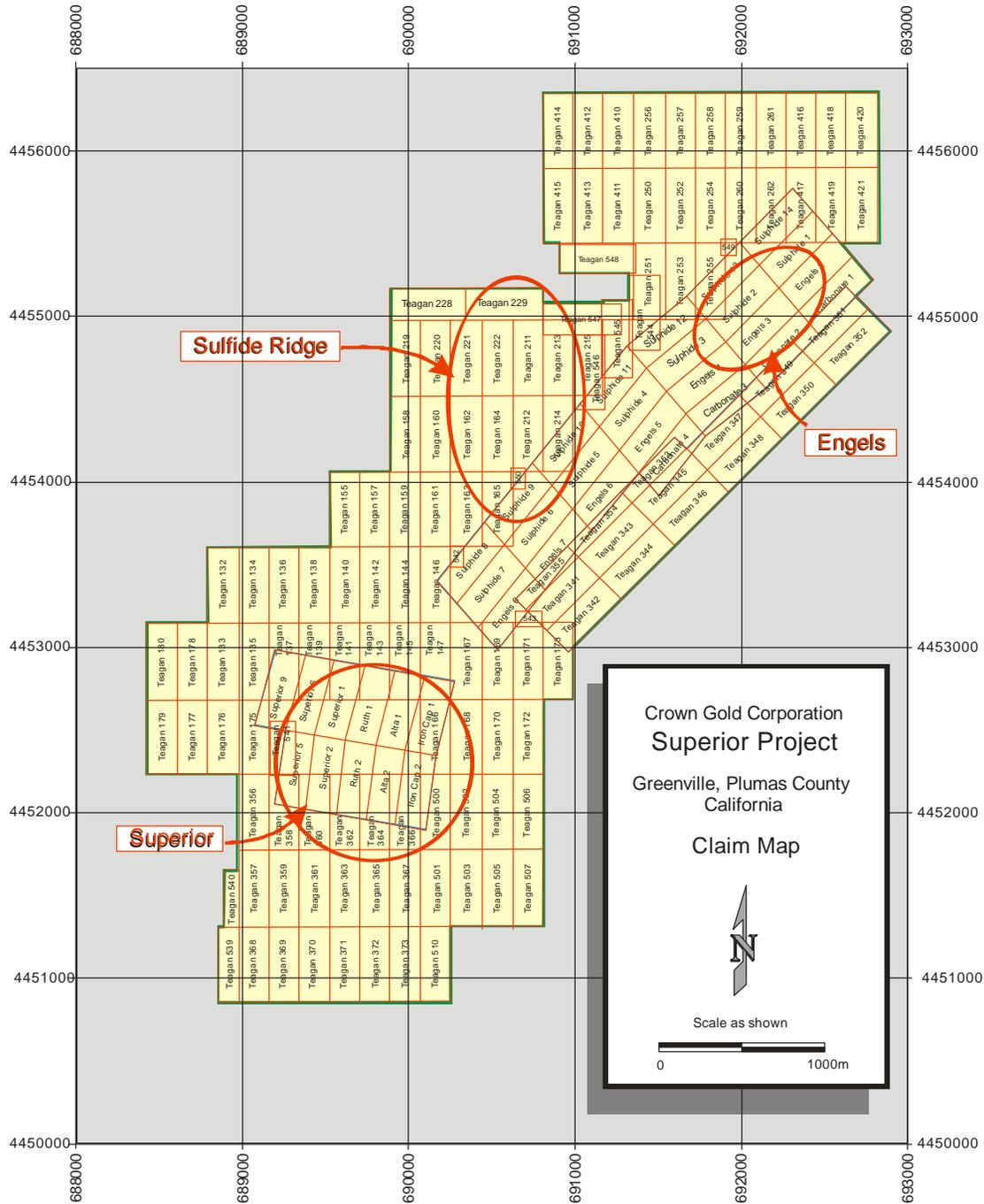


Figure 2: Superior Project Property Map

Exploration on Federal lands requires a permit to conduct exploration except for sampling of rocks and soils by hand and activities that create no land disturbance. The three levels of permits reflect increasing disturbance:

- No permitting is necessary for surface exploration on the patented mining claims on the Superior Project.

- Sampling of rocks and soils by hand would require no permit. Activities that create no land disturbance would also be permitted.
- The lowest level is Categorical Exclusion (CE). This is the least intense disturbance and requires some public notification. Track mounted auger drilling and no new road clearing would fit in this category according to USFS personnel. A lead time of 3-4 months would be required to grant this level of permit.
- Environmental assessment (EA) requires an in depth study with 30 days for public comment, plus additional time for appeal. Drilling with an RC rig using water, new road construction, etc., would require this level of permit. USFS personnel suggest that one year may be required to receive a permit. Studies on archaeology and sensitive plant species would be required prior to disturbance.
- Environmental Impact (EI) is the highest permit level and would be required for mine development. Several aspects should be factored into timing of exploration plans.
- The time needed to issue permits is governed by available USFS personnel resources or for the company to hire an outside approved consultant to complete the work.

During the dry season, the threat of forest fires may limit access to the area. Exploration and mining can be conducted year-round, due to the established road and its proximity to infrastructure. The property is large enough to support all future exploration or mining operations including facilities and potential waste disposal areas. Potential processing plant sites may have to be located closer to water. Controlling the mineral rights under valid lode claims will not fully entitle the company to develop a mine. Permitting will need to be carefully planned and executed to be sustainable in the community and this area of California.

California is often perceived as having a restrictive regulatory environment in regards to mining operations. Historically mining operations have been permitted even when there were legitimate social or environmental concerns. Specific examples of successful permitting in California include:

- The open pit mines at Carson Hill and Jamestown were permitted and operated to their economic limit in very close proximity to residential and commercial development.
- Approval was required by three separate counties and the federal government for the open pit McLaughlin Mine. It was permitted and operated until reserves were exhausted in a geologic environment with high levels of toxic metals.

- The Sutter Creek and Washington-Niagara Mines have recently received permits to conduct mining and milling operations. Underground development is proceeding at both operations.

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

The bulk of the following property description was taken from the April 2007 NI 43-101 report of the Moonlight Project prepared by OreQuest Consultants for Sheffield Resources. Modifications consist primarily of removal of reference to deposits outside Crown Gold’s property boundary and updates to reflect additional work done within the property boundary between 2007 and 2011.

The property can be accessed from the Reno Nevada International airport by US Interstate 395 northwest for approximately 137 kilometers to the town of Susanville California, then by State Highway 36 towards the town of Westwood for approximately 30 kilometers to a secondary road heading south (approximately 3.5 kilometers east of Westwood). Figure 3 presents the access and cultural features surrounding the Superior Project property.

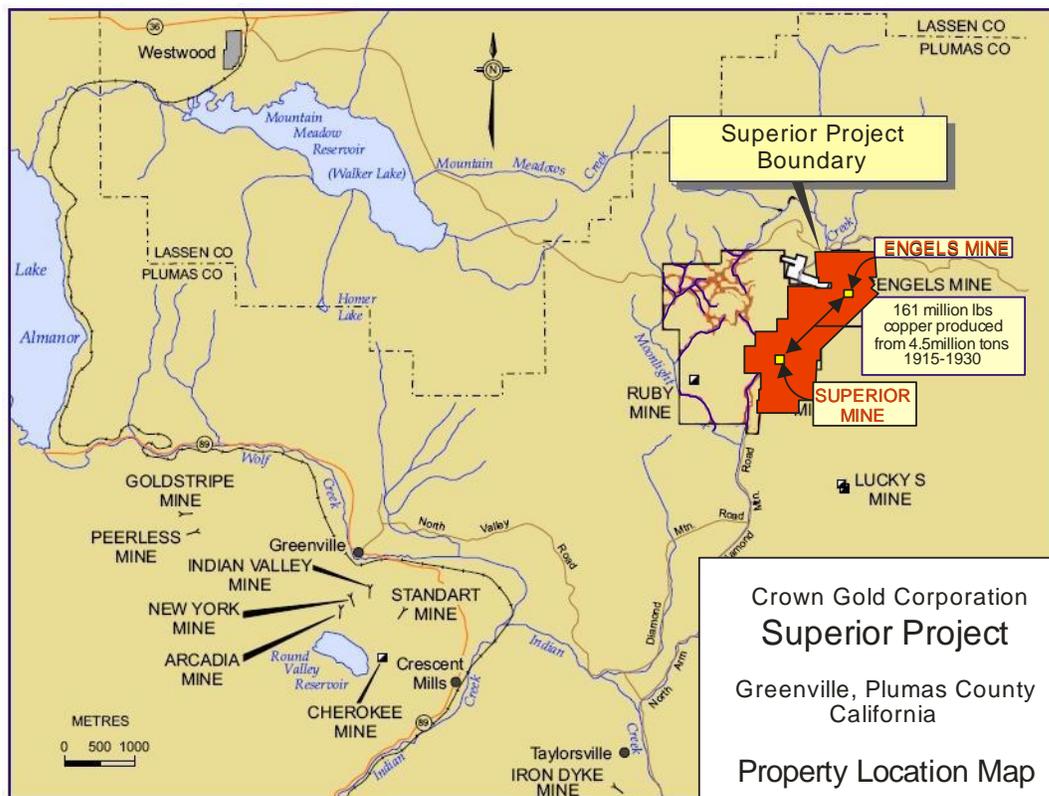


Figure 3: Superior Project Property Map

The western most edge of the claim blocks is approximately 23 kilometers from the turnoff of Highway 36 via a series of gravel roads, many of which are actively used by logging companies operating east of the company's claim block. The access is fair across the current project ground utilizing active forestry roads and drill access roads completed by Placer in the 1960-70's.

The project is situated in the Sierra Nevada province of California, characterized by north-northwest trending mountain ranges separated by alluvial filled valleys. The claims vary in elevation from a low of approximately 1,682 meters to a high of approximately 1,957 meters.

There are a few bedrock exposures on the property. No homes are located on the property. The nearest ranch and home is located approximately 5 kilometers west-southwest on the secondary access road off Highway 36.

The climate is defined by hot summers to a maximum of 38° C and cold, windy winters with lows to -23° C. Precipitation is moderately light with average rainfall of 76cm and average snowfall of approximately 3.5m. The vegetation varies depending on elevation and moisture. Cedar, lodgepole pine, mountain mahogany, and juniper grow on the slopes of the project ground. The project area is fairly dry with numerous small dry drainages scattered throughout the claim block, water will need to be trucked during drilling phases. The Mountain Meadows Reservoir is located approximately six miles to the west-northwest of the property which could supply water for all advanced exploration activities on the property.

The area is serviced by Pacific Gas & Electric Company (PG&E) and significant high tension power lines lie close to the project ground and parallel Highway 36.

The nearest rail line is the Western Pacific that runs through the town of Westwood, approximately 24 road km to the west of the property. International air services are located in Reno, approximately 127 km southeast of Susanville. The closest deep water port is Sacramento which is located approximately 241 km to the southwest.

There is a very large, highly trained mining-industrial workforce available in Northern Nevada. Supplies and services for mining companies to conduct full exploration and mining development projects are available at Carlin, Elko Winnemucca, and Reno. There are also additional workforce resources in the nearby towns of Quincy and Greenville.

Exploration and mining could be conducted year-round, due to the established roads and the projects proximity to the nearby towns. Exploration in winter will incur additional costs for regular snow removal.

The property has sufficient surface rights for future exploration or mining operations although there is likely to be a requirement to lease nearby flat land available within a ten kilometer radius for including potential waste disposal areas, heap leach pads areas and processing plant sites.

## History

This property history is taken and modified from “Report on Exploration at the Moonlight Project 2005-2008 Plumas Co. California” by Robert G. Wetzel, 31 January 2009

Henry A. Engels and his sons acquired the Superior Mine in 1880 and discovered the Engels Mine in 1883. Operations began in 1880 and continued to 1930. The main period of operation was between 1915 and 1930. Operations were suspended in 1930 due to a significant fall in the copper price in response to the Great Depression.

The total reported production from the Engels and Superior Mines was approximately 160 million pounds of copper, 23,000 ounces of gold and 1.9 million ounces of silver recovered from 4.7 million short tons of ore between 1914 and 1930. (Lamb, 2006) Mill recovery averaged about 80% during this period of operation, indicating a feed grade of about 2.2% copper and 0.5opt Ag and 0.005 opt Au.

Since 1930 activity in the Lights Creek District has largely been limited to exploration. Newmont Mining explored the area in 1953-54 and completed a preliminary aerial geologic map of the Lights Creek area. Phelps Dodge conducted some investigations in the early 1960s. Lessees mined a few thousand tons of ore from the Superior in the early 1960s. This ore was shipped directly to the smelter and it was reported often ran more than 10 % Cu and 4 opt Ag.

In 1961 Amex (predecessor to Placer Amex, Placer Dome, Barrick) decided to pursue a general investigation of the Lights Creek District. Reconnaissance surveys were made in 1962-63 and extensive stream sediment and soil sampling surveys were conducted in 1964-65. The Superior, Moonlight Valley, Sulfide Ridge, Engels Mine, Warren Creek and Blue Copper areas all showed plus 1000 ppm Cu anomalies in soils.

Amex signed a sublease on the California-Engels property in July 1964 and began drilling at the Superior in September 1964. Drilling at Superior was completed in January 1967 and the results indicated a considerable tonnage of low-grade disseminated copper. The first hole in the Sulfide Ridge soil geochemical anomaly was drilled in December 1964 and the first claims in Moonlight Valley were staked in December 1964. The first holes in the Engels Mine and Warren Creek anomalies were drilled in September and October 1965. A total of 47,289 meters of core and 1,165 meters of rotary drilling had been completed in the Lights Creek district by the end of 1967. In total Placer Amex drilled approximately 96 drill holes or approximately 16,470 meters of diamond drilling (including 1,165 meters of rotary drilling) at Superior from 1964-1968.

Extensive errors were discovered in the drill core assays conducted by the Amex lab at the Golden Sunlight project in Montana and the process of re-assaying all the pulps at Union Assay in Salt Lake was begun in October 1967. This re-assaying was completed

in April 1968 and included third party QC assays by Hawley and Hayley and the Amex lab in Vancouver.

Drilling continued in 1968, 1969 and 1970. Preliminary metallurgical investigations were begun and the first of many deposit modeling and economic evaluations was begun in 1968. Computer models, a resource estimate, economic evaluation and a summary report were completed in February 1972.

Expenditures on the property were reduced and work was largely limited to that necessary to hold the claims through assessment work after 1972. After Placer merged with Dome Mines in 1987 the company began to focus its exploration efforts almost strictly on gold.

Sheffield/Nevero staked an additional 410 unpatented lode claims in the district between November 2004 and October 2008. In April 2006 Sheffield optioned the California-Engels land consisting of about 894 acres of deeded land covering the historic Engels and Superior Mines.

Sheffield began drilling to confirm and enhance the previously indicated historical resource at Moonlight Valley in December 2005. In 2005, 560 meters of HQ core drilling were completed in 2005. A total of 2,834 meters of core drilling were completed in 2006 with 2,322 meters completed at Engels. Sheffield completed 504 meters of core drilling at Engels in May and June of 2008.

Sheffield Resources was acquired by Nevero Copper in July 2008. Nevero completed 737 meters of core drilling at Engels from August to November 2008. Additional unpatented lode claims were staked by Nevero in 2007 (33 total), 2008 (23 total) and 2011 (12 total). The 2011 staking program was designed to cover any un-staked corners and fractions present between the patented and unpatented lode claims at Engels and Superior.

In 2009 Starfield Resources Inc. acquired Nevero Inc. the parent company of Nevero Copper Inc., and conducted a limited drilling program at Engels in 2009 and 2010. They also contracted a property-wide airborne geophysical survey conducted by Fugro Airborne Surveys. Starfield dropped the unpatented claims encompassing the Moonlight deposit in 2012.

Crown Gold acquired the property June 27<sup>th</sup> 2013 from Starfield's subsidiary Nevero including a minor amount of exploration and office equipment and supplies, the stored core and the complete database held by Nevero which comprehensively documents all known exploration activity on the property from 1960 to the present time.

## Historical Resource Estimates

Historic resource estimates were compiled for the Engels, Superior and Sulfide Ridge areas by Placer Amex in the early 1970's. These estimates predate NI 43-101 guidelines and none of the following are regarded by the Author as compliant with current National Instrument 43-101 standards for reporting of resources and reserves. The Author here stresses that any reporting of Resource or Reserve categories referred to by Placer Amex cannot be regarded as corresponding to current CIM definitions. Furthermore Crown Gold is not treating these historic estimates as current mineral resources or mineral reserves.

### Historic Resource Estimates for Engels:

- Placer Amex determined in the 1970's that there may still be a small open pit potential of approximately 2 million tons grading 0.65% Cu remaining in the pillars and immediate area along strike.
- Additional indicated and inferred resources of 19 million tons averaging 0.63% Cu were reported by Placer Amex that were not considered amenable to open pit mining methods at the time of the work.
- Placer Amex also reported a small tonnage, 68,000 tons of 2% Cu (not to NI43-101) remaining in the shaft level sill pillar.

### Historic Resource Estimates for Superior:

- Preliminary "potential ore reserves" for Superior were estimated by Placer Amex in 1967 ("*Preliminary Evaluation of Superior Pit, Lights Creek*", W.D. Baker, April 1967) of 54 million tons grading 0.60% Cu at an unspecified Cu cutoff.
- Preliminary computerized "ore reserves" for Superior were estimated by Placer Amex of 43 million tons grading 0.559% Cu with a 0.3% Cu cutoff.
- In 1971-72 Placer Amex completed further computer designed resource estimates using a 0.25% cutoff and reported "minable reserves within a smoothed ultimate pit" using the inverse distance to the 5th power as a block estimator, of 39 million tons grading 0.41% Cu with a strip ratio of 1.2:1 (Rivera 1972).

### Historic Resource Estimates for Sulfide Ridge:

- Preliminary "potential ore reserves" for Sulfide Ridge were estimated by Placer Amex in 1967 (W. D. Baker) of 100 million tons grading 0.45% Cu at an unspecified Cu cutoff.

## **Geological Setting and Mineralization**

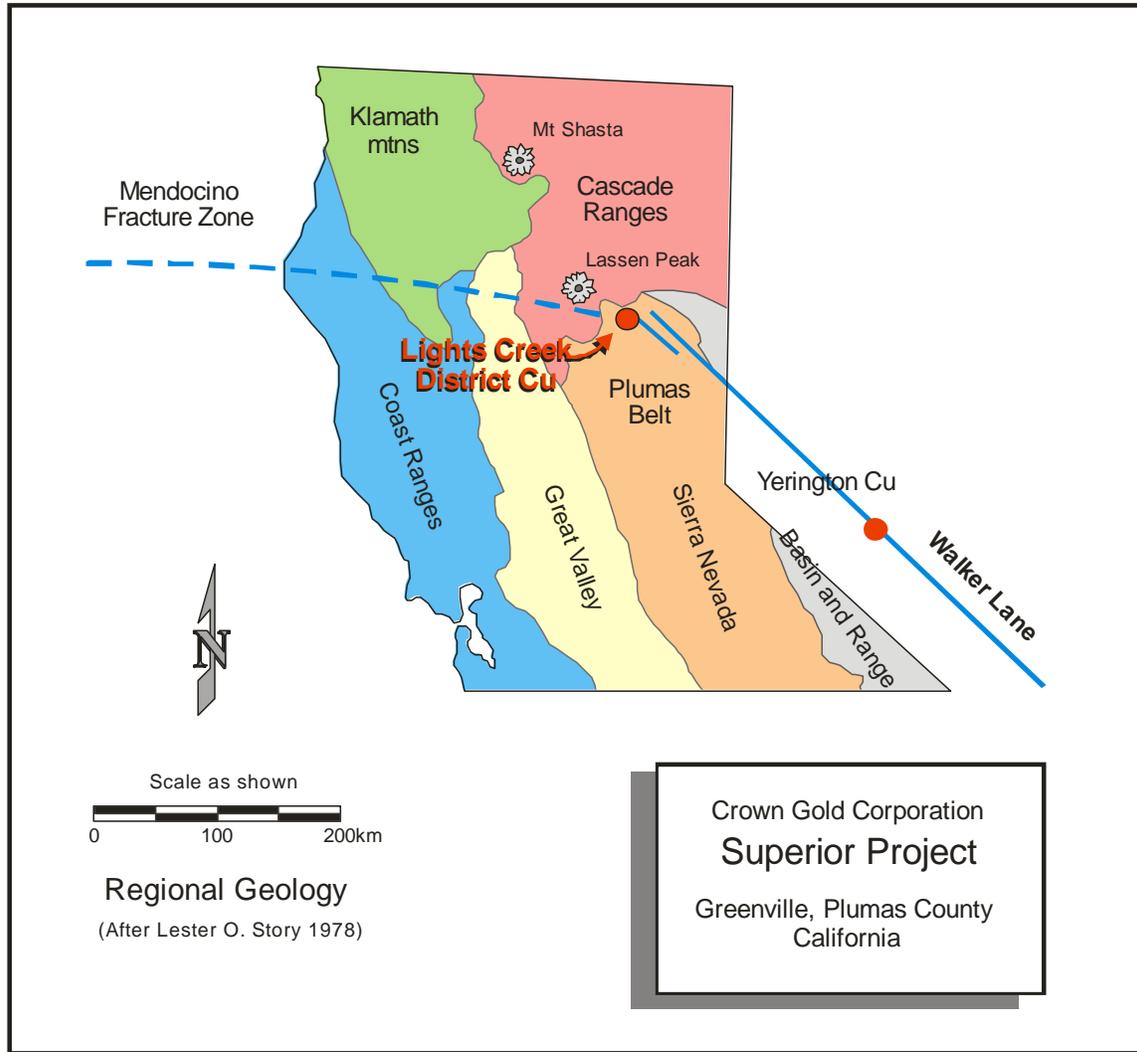
### **Regional Geology**

The Superior Project area is part of the larger Lights Creek District. The Lights Creek District is located at the northern end of the Sierra Nevada physiographic province at the juncture with the late-Tertiary-to-Recent Cascade volcanic province to the north and the Basin and Range province immediately to the east.

The Lights Creek District lies at the northern end of the 40km-long, 8km-wide, N20W trending Plumas Copper Belt interpreted to represent an extension of the NNW trending Walker Lane structural lineament. Other structural orientations observed in the district suggest a possible influence from an eastward extension of the Mendocino fracture zone.

The Walker Lane has hosted some of the largest precious and base metal mines in the western US including the Yerington District about 160km southeast of Lights Creek, estimated to host the potential for a 20 billion pound copper resource. (Pumpkin Hollow Technical Report)

Greenschist facies Mesozoic metavolcanic rocks with a general NNW strike and southwest dip have been intruded by the late Jurassic to Early Eocene Lights Creek Stock in the Lights Creek District. Figure 4 below presents the regional geologic features.



*Figure 4: Map of the regional geology for the Superior Project.*

## Local Geology

A section of Jurassic weakly metamorphosed dacites, andesites and basalts and associated volcanics are exposed in Superior Project area. These metavolcanics are part of a 9 km thick section of early Mesozoic metavolcanic rocks that are exposed in a northwest trending belt about 80km long. The metavolcanics in the project area have a fairly uniform regional northwest strike and moderate southwest dip. The sequence above the Lights Creek Stock intrusive contact in the Moonlight Valley area is dominantly made up of a complex of andesitic flows that have been characterized as keratophyres.

The metavolcanics are intruded by Jurassic-to-Cretaceous plutonic rocks of varying composition in and around the Plumas Copper Belt.

Work by Anderson (1931) and Storey (1978) suggest there are five distinct batholithic differentiates in the Lights Creek area. According to Storey (1978) “These are from oldest to youngest:

1. Engels Mine gabbro (main host to high-temperature mine copper deposit)
2. Quartz diorite (also host to Engels Mine ore).
3. Granodiorite (main batholith, non-mineralized)
4. Quartz monzonite (host to porphyry-type copper occurrence of intermediate temperature).
5. Coarse-grained granite (non-copper bearing with rare molybdenum occurrences).

The quartz monzonite is the most heterogeneous in overall make-up of any of the segregated intrusive bodies.”

The Lights Creek Stock refers to the quartz monzonite listed above, which is the ore host at the Moonlight and Superior deposits (Figure 5). Surface exposures and drill intersections indicate the stock is dome shaped with gently dipping flanks and probably underlies a much larger area than the outcrop at shallow depths. The stock appears to have domed the overlying metavolcanics with steeper dips on the flanks and flatter dips over the top of the intrusive.

The Lights Creek Stock varies considerably in texture and composition and both Sheffield and Placer have noted that the quartz monzonite tends to be finer grained with a more porphyritic texture near the contact with metavolcanics and less potassium feldspar-rich and more equigranular with depth and towards the center of the quartz monzonite stock.

The Lights Creek stock is a roughly circular fine to medium grained quartz monzonite to granodioritic tourmaline-rich intrusive, approximately 18 square kilometers in area, believed to represent a differentiated satellite of the Sierra Nevada batholith. Coarse-grained granodioritic Sierra Nevada batholithic rocks are exposed a few kilometers to the east of Moonlight.

Structural preparation has been important in localizing mineralization in the Lights Creek District, however, structures which host mineralization typically show little apparent displacement and individual structures can typically be traced for less than 15m and rarely up to 200m either along strike or dip. Mineralization is preferentially located in stockwork zones with fractures of multiple orientations or at the intersection of structures and lithologic contacts.

The structures which host the mineralization at the Ruby Mine in the Lights Creek District and the Walker Mine 15 miles (25 km) to the southeast, strike about N20W and dip steeply to the northeast. These mineralized zones parallel the trend of the Plumas copper belt and the Walker Lane.

N10E steep to moderately east dipping structures host significant portions of the mineralization mined in the past at the Superior Mine. Similar trending fracture zones are observed to host copper mineralization throughout the district including the Moonlight and Engels areas.

Northwest striking gently southwest dipping fracture zones are observed to host significant copper mineralization throughout the district as well.

A very significant portion of the copper mineralization is also truly disseminated and not associated with fractures or veinlets. This disseminated mineralization is typically associated with 2-10mm blebs of tourmaline.

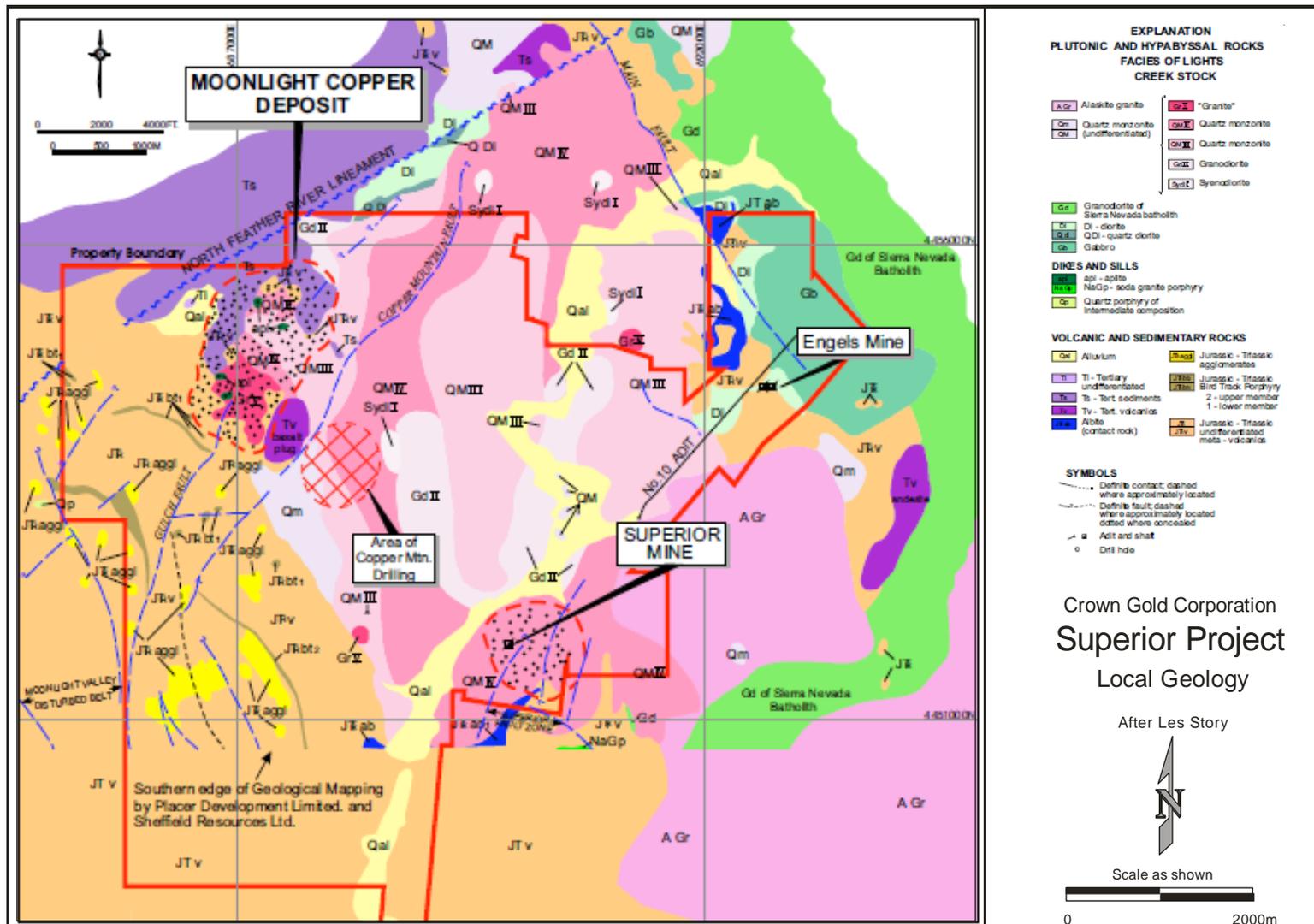


Figure 5: Local geology of the Lights Creek District

## Deposit Geology

Most of the mineralization in the Lights Creek District appears to be related to the tourmaline-rich Lights Creek Stock or related dikes. While the Engels deposit lies just outside the stock, in the surrounding gabbroic-phase intrusive and metavolcanics, narrow dikes of granitic composition with abundant tourmaline have been noted. These dikes are interpreted to be late stage differentiates of the Lights Creek Stock and often display pegmatitic textures.

Mineralization in the Lights Creek District area has been characterized as of the porphyry copper type. Placer however recognized that the deposits had characteristics which were not typical of porphyry copper deposits and lacked many of the typical features. Storey (1978) noted, "*Typical porphyry copper-type alteration zonation as illustrated by Lowell and Guilbert is nonexistent.*" Some of the early disseminated mineralization at Moonlight and Superior show some similarity to the diorite model porphyries common in British Columbia.

Many copper deposits which had previously been classified as porphyry copper type have now been re-characterized as belonging to the iron oxide copper type. There is evidence that the Superior Project deposits could be included in this group.

A number of deposits have been classified as belonging to the iron oxide copper type. These deposits range in age from Precambrian to Tertiary and include Olympic Dam in Australia, Candelaria and Mantos Blancos in Chile, Luz del Cobre in Mexico, Marcona in Peru and Minto in the Yukon. All of these deposits show significant tonnages of plus 2% copper mineralization.

### Engels

The Engels deposit lies outside the Lights Creek Stock, immediately adjacent to its eastern margin in an area of represented by both gabbroic-phase intrusives and roof-pendant metavolcanics.

Engels is a structurally-controlled tabular shear-zone hosted deposit striking north-east and dipping steeply to the south east. Mineralized widths range from 5m to over 20m. The historically mined total strike length for the main ore shoot ranges from 100m to 250m, while a narrower ore shoot to the south along strike was mined at lengths from 20m up to 60m. The vertical extent mined is approximately 580m.

Mineralization in the Engels Mine area occurs in a 390m by 200m pipe like zone. Mineralization is associated with brecciated zones that exhibit features of both an intrusion breccia and a hydrothermal breccia.

A diorite or quartz diorite has intruded a pendant of plagioclase phenocryst-rich metavolcanic in a complex mass of dikes and dikelets. The fine grained matrix of the

metavolcanic has often been altered to biotite in the mine area. Primary mineralization consists of zones of silica+magnetite+biotite hornfels alteration with varying amounts of disseminated bornite and chalcopyrite. This mineralization exhibits metasomatic textures and is most intense at or near the numerous contacts of the quartz diorite and metavolcanic.

The disseminated copper minerals are often very abundant and locally coalesce. Copper grades exceeding 15% Cu have been encountered in several 2m core intercepts. The relationship of mineralization to zones of breccia and contacts between the quartz diorite and metavolcanic is evident in surface exposures.

Calc-silicate minerals especially epidote and locally garnet are also present. The specific gravity varies widely. Magnetite or sulfide-rich rock often has a specific gravity of more than 2.8.

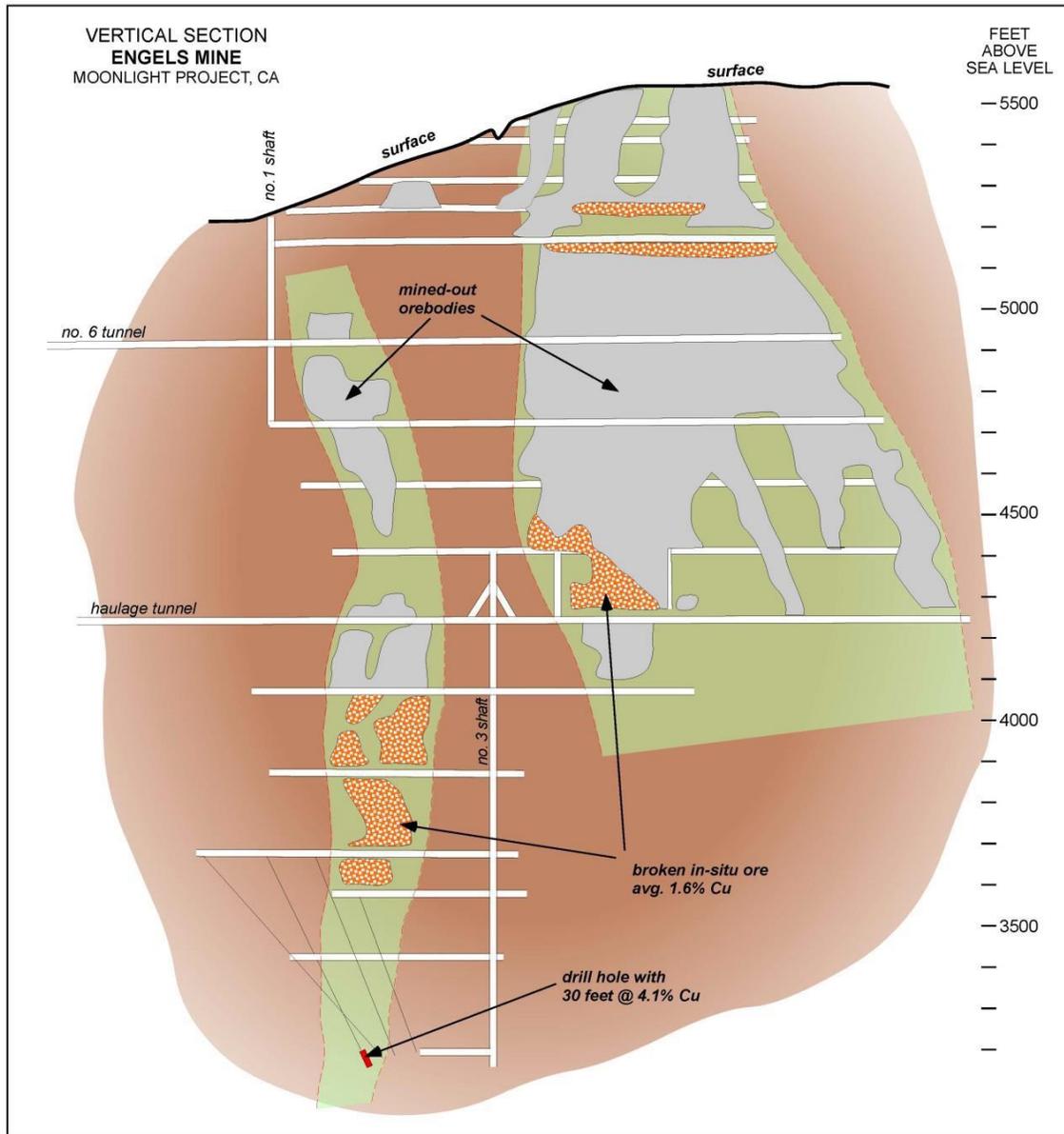
Much of the copper mineralization at Engels is strongly oxidized to a depth of 70 meters. Assay analysis for sulfuric acid soluble copper in a portion of samples from the modern (post 2004) drilling indicates copper oxides representing 90% of total copper within these depths.

Copper oxide minerals consist primarily as malachite with lesser chrysocolla and azurite and in copper bearing limonites and clays. Electron microprobe work indicates some copper occurs as replacement of potassium in biotite. Typical oxidized copper bearing silica hornfels shows a specific gravity of 2.5. Very strongly weathered metavolcanic and diorite typically show a specific gravity of 2.3.

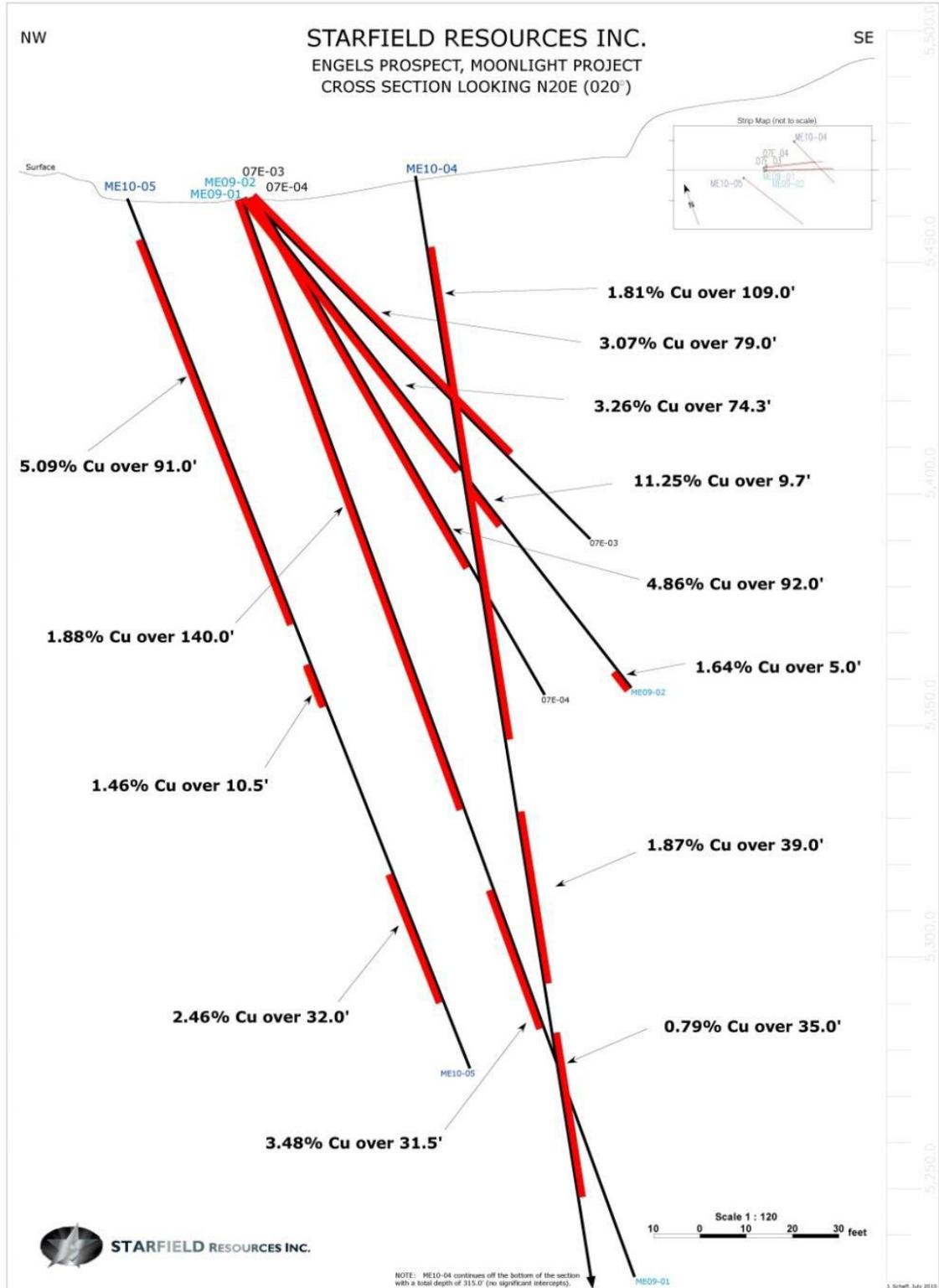
The principal sulfide minerals consist of bornite and chalcopyrite hosted in a hornblende gabbro body. Younger quartz diorite and quartz monzonite bodies are associated with the gabbro and are considered to have played an important role in the placement of the copper mineralization.

Very preliminary metallurgical results are discussed in the metallurgy section.

The deposit appears to splay to the northwest in the upper 200m with widths increasing upward. Figure 6 presents a long section of the Engels deposit as it was mined. Figure 7 presents a cross section through Engels showing the composited drill hole intercepts from the Starfield drilling in 2009 and 2010. These intercepts indicate that significant material of the tenor historically mined underground remains within 100 meters of the surface. These drill holes are included in the resource estimate prepared for this report and inform the estimate for Engels.



**Figure 6: Long section of Engels showing the historic mining.**



**Figure 7: Engels northwest-southeast drill hole cross section presenting summarized results of 2009-2010 drilling.**

## Superior

The Superior deposit lies within the Lights Creek Stock near the south-eastern margin and south of Engels. The deposit is hosted within the quartz monzonite, however exposures of more mafic units interpreted to be rafted xenoliths from the intruded host rock have been observed near the southern extent of exposure.

The mineralization at Superior is hosted in the Lights Creek Quartz Monzonite and minor generally flat-lying diabase dikes. The quartz monzonite is generally more equigranular and less potassium feldspar-rich than that observed at Moonlight.

Alteration at Superior includes both silicification and potassic alteration. As at Engels magnetite appears to be a significant alteration mineral as well. Also in common with Engels there is very little pyrite observed at Superior.

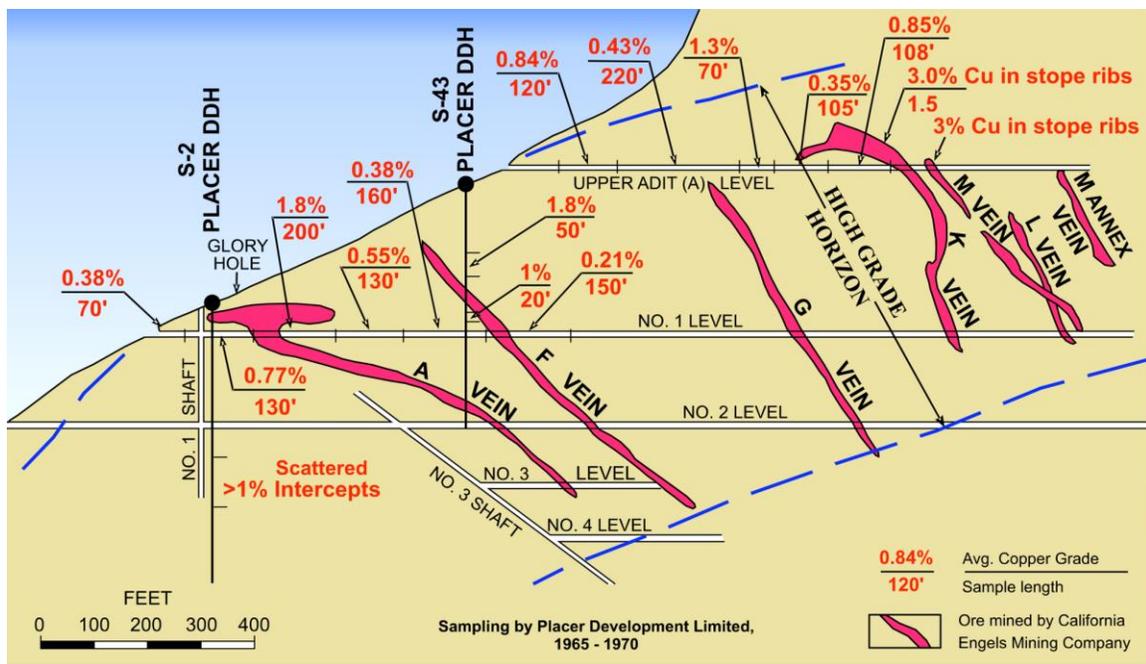
There are significant copper oxides deposited on the exposed surfaces of the underground workings at Superior. These appear to the Author to be the result of oxidation and re-deposition from weathering dating from the period of active mining. Sequential copper assaying has not been done, however Superior appears to be largely un-oxidized.

Disseminated copper mineralization at Superior, revealed by drilling and exposure in underground workings, lies within a roughly circular area about 610 meters in diameter. This mineralization consists of finely disseminated chalcopyrite and lesser bornite. This disseminated mineralization typically runs 0.1-0.3% copper and copper minerals are typically associated with tourmaline. Within this disseminated mineralization are more than ten tabular brecciated structures (veins) that were mined up to 244 meters along strike, 183 meters down dip and 3-7 meters wide.

There are two predominate trends to the breccia-veins. Veins trend N-S and dip to the east and there are a number of essentially flat lying veins. Mineralization in the breccia-veins consists of magnetite-actinolite-minor quartz-siderite-bornite-chalcopyrite. The historic mill feed from these stopes averaged about 2.2% copper. These veins and the stockworks between them define a high grade core to the Superior deposit.

Historic mining at Superior focused on the chalcopyrite rich breccia veins. The surrounding body of disseminated copper mineralization, ignored as uneconomic in the past was subsequently defined from work completed by Placer Amex. They drilled approximately 96 drill holes representing approximately 16,500 meters of diamond drilling (including 1,165 meters of rotary drilling) from 1964-1968.

Figure 8 below presents a schematic cross section through Superior showing the distribution of the breccia veins as indicated by the stopes (magenta) as well as selected underground sampling results.



**Figure 8: Schematic east-west cross section through Superior showing the distribution of breccia veins within the mass of disseminated mineralization.**

### Sulfide Ridge

There is very little documentation regarding the geology of the Sulfide Ridge deposit. There is little outcrop visible. What can be interpreted comes largely from the very widely-spaced 28 drill holes completed by Placer Amex. A geological map of the Sulfide Ridge, Engels area prepared in 1965 by Placer Amex shows Sulfide Ridge to be hosted within the quartz monzonite of the Lights Creek Stock on the basis of small scattered outcrops. Small prospect shafts and pits dating from the early 20<sup>th</sup> century provide additional scattered points of reference.

The geology and mineralization at Sulfide Ridge appears to be most similar to Superior and was characterized by Placer Amex geologists as a porphyry system. The wide-spaced (100-200m) drilling indicates disseminated copper mineralization similar to that found at Superior, however no occurrences of the high-grade breccia-veins mined at Superior has been encountered in the drill holes. That said, the drilling that has been done defines significant copper mineralization with copper grades in 5 meter composites exceeding 0.3% Cu over 1500 meters north-to south and 500m east to west.

## Deposit Types

The Engels deposit is characterized as a shear zone-hosted, structurally-controlled, tabular breccia body(s) hosted within mafic units of the Lights Creek Stock as well as the metavolcanic rock into which the stock was intruded. Copper and silver mineralization at Engels appears to be associated with late-stage differentiates of the more felsic units of the Lights Creek Stock.

The Superior and Sulfide Ridge deposits are classified in this report porphyry copper deposits with associated silver and, to a lesser extent gold. Porphyry copper deposits provide more than 50% of the world's copper from over 100 producing mines.

The accepted geological model described for copper porphyry deposits is based largely on occurrences in Arizona and Chile. This model describes porphyry copper deposits as cylindrical, stock-like composite bodies having elongate outcrops 1.5km x 2 km in diameter and containing an outer shell of medium to coarse-grained equigranular rock with a porphyritic core of similar composition.

The most common ore hosts are quartz monzonite to granodiorite felsic plutonic rocks. In addition, a second population of deposits occurs in more mafic intrusive rocks of syenitic to dioritic composition.

The model also describes a zonal pattern to alteration first documented by Lowell and Guilbert in 1970, who suggested that four alteration halos were often present roughly centered on the porphyry stock:

- Potassic Zone – this zone was always present and characterized by secondary potassium feldspar (K-spar), biotite and/or chlorite replacing primary K-spar, plagioclase and mafics. Minor sericite may be present.
- Phyllic Zone - not always present a characterized by vein quartz, sericite and pyrite with minor chlorite, illite and rutile replacing the K-spar and biotite.
- Argillic Zone – was not always present. It is identified by the clay minerals kaolinite and montmorillonite with minor disseminated pyrite. Plagioclase is strongly altered, K-spar unaffected and biotite is chloritized.
- Propylitic Zone –always present and contains chlorite, calcite and minor epidote. The mafic minerals are highly altered while the plagioclase is less altered.

At depth all zones are thought to coalesce into a single, large K-spar-quartz- chlorite-sericite unit.

Placer Amex recognized that the deposits of the Lights Creek district had many characteristics which were not typical of porphyry copper deposits and lacked many of

the typical features. Storey (1978) noted, "Typical porphyry copper-type alteration zonation as illustrated by Lowell and Guilbert is nonexistent."

Many copper deposits which had previously been classified as porphyry copper-type have now been re-characterized as belonging to the iron oxide copper-type (IOCG). There is considerable evidence that the porphyry-like Lights Creek deposits could be included in this group.

The IOCG group represents a very wide distribution of deposits in terms of age, size, mineralogy and metals present, however the characteristics listed below are consistently used to classify these types of deposits.

- Abundant magnetite and/or hematite which is often specular. If both are present, hematite is more common higher in the system;
- Low pyrite content with increased pyrite often located beneath and adjacent to the ore zone;
- Typically tabular shaped orebody rather than cylindrical or deep sided cupola-shaped like porphyry copper deposits;
- Abundant bornite and/or hypogene chalcocite often as a late fracture filling phase of mineralization; and
- Anomalous Au, Ag, U, and rare earth elements

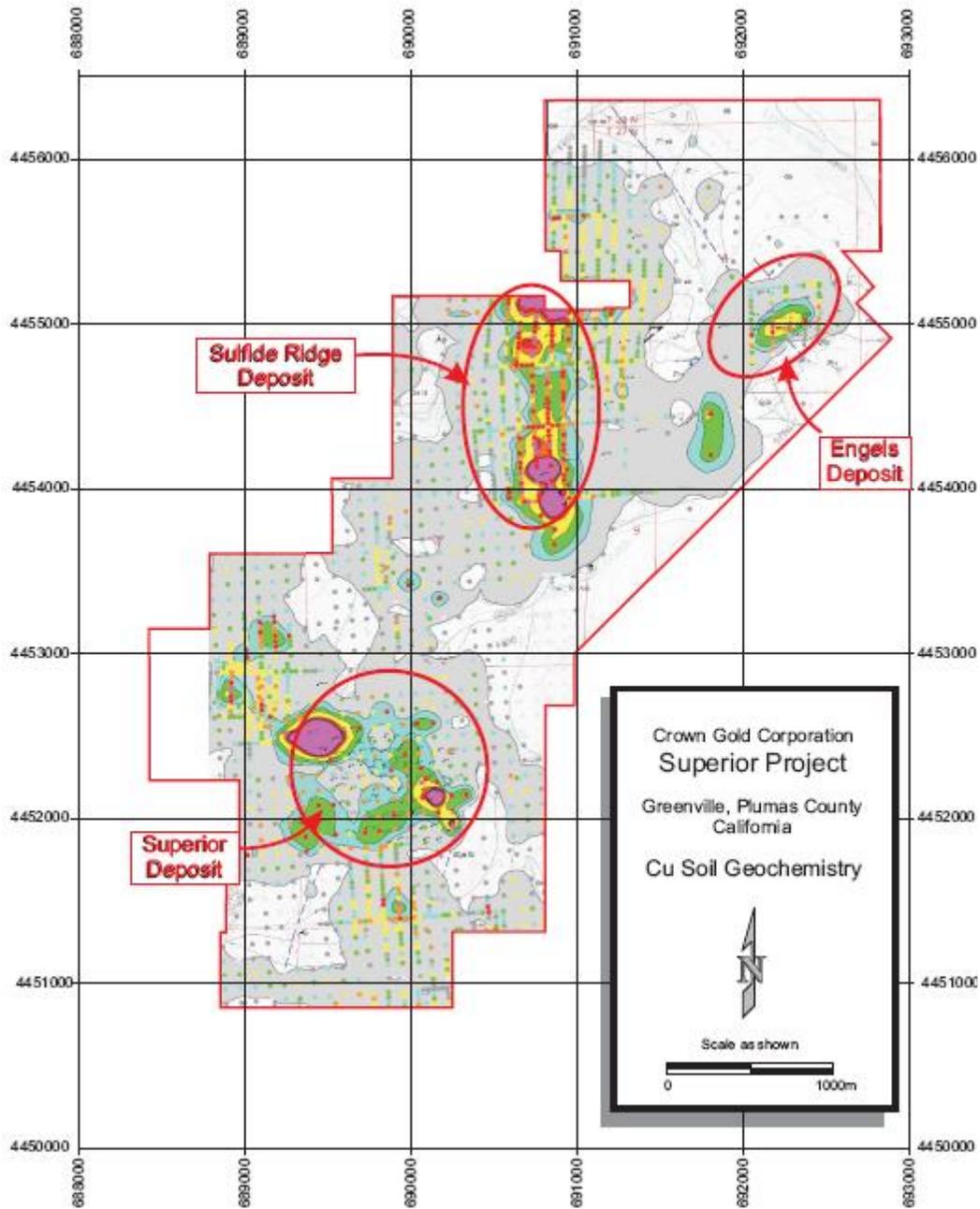
The Lights Creek deposits show all of these characteristics. A number of deposits have been classified by various authors as belonging to the iron oxide copper type including Olympic Dam in Australia, Candelaria and Mantos Blancos in Chile, Luz del Cobre in Mexico, Marcona in Peru and Minto in the Yukon. All of these deposits show significant tonnages of plus 2% copper mineralization and there is potential to discover additional plus 2% copper mineralization in the Lights Creek district.

The Author has had significant experience with deposits classified as of the porphyry copper type and the number which lack the zoned alteration pattern described by Lowell and Guilbert is striking. In general, the dimensions and geometry of the porphyritic intrusive(s) associated with copper mineralization appears to play some role in the pattern of alteration observed. In addition the presence of iron as an alteration mineral is not uncommon in porphyry copper systems, particularly when more mafic rocks host the intrusive.

## Exploration

Placer Amex conducted a series of soil and rock geochemical surveys for copper beginning in 1963. Initially done at 98m centers, the program was followed up with

sampling on 34m by 68m foot centers in areas indicated as anomalous in copper. This work identified most of the exploration targets in the district and informed the exploration activities of Placer Amex. Figure 9 below presents the soil geochemistry contours.

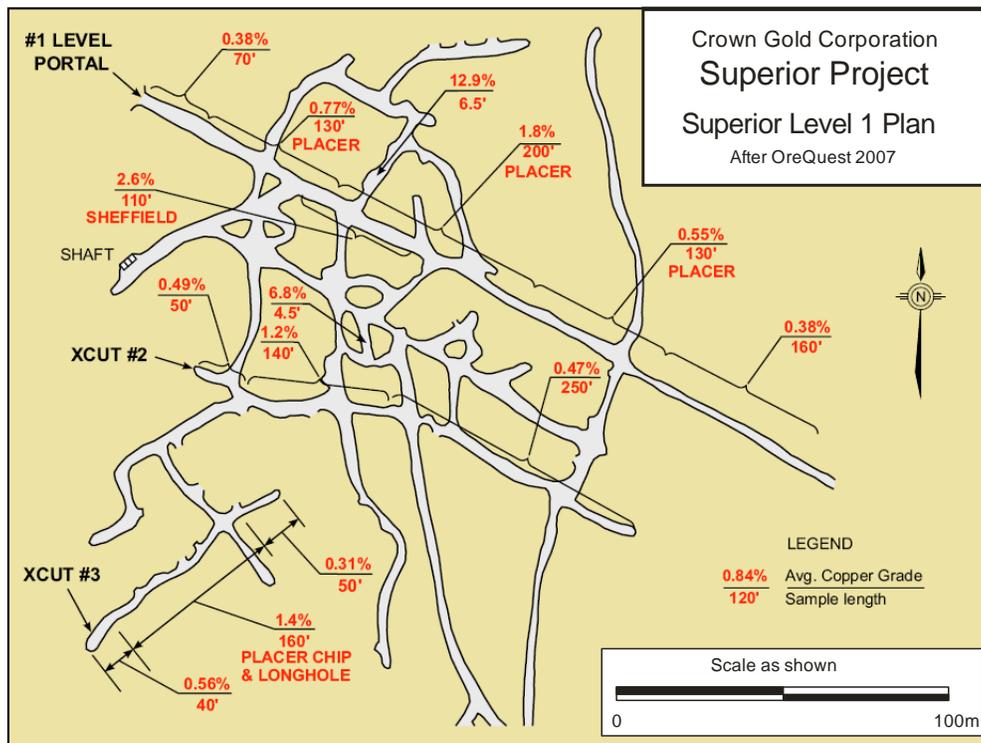


**Figure 9: Soil geochemistry contour map within the Superior Project property boundary.**

In 1966 Placer Amex initiated a ground-based Induced Polarization (IP) survey over the property area. The survey was conducted by Heinrichs Geoexploration Company of Tucson, AZ. Their conclusions recommended follow-up drilling at several targets including Moonlight Valley, Blue Copper, and Warren Creek. Warren Creek lies within Crown Gold's property boundary.

In 1969 Placer Amex initiated an aero-magnetic and gamma ray survey conducted by Geophoto Services Inc., a subsidiary of Texas Instruments Co., over the property area. The results of the study were regarded as inconclusive by Placer.

Placer Amex undertook extensive chip-channel sampling of the 1 Level workings at Superior. The composited results of this work are shown in Figure 10 below:



**Figure 10: Superior Level 1 Plan showing composited Placer Amex chip/channel sampling.**

From 2005 through 2007, Sheffield completed a program of underground sampling in the old Superior mine (Figure 7 and Figure 8). A total of 151 chip-channel or select grab samples were collected in addition to 32 samples of splits from the old Placer Amex underground drill core. The chip-channel sampling of the 1 Level at Superior generally confirmed the results of Placer Amex sampling of the same level which defined the broad-scale disseminated copper mineralization between and beyond the higher-grade breccia veins historically mined.

SUMMARY 2006 SUPERIOR MINE UNDERGROUND SAMPLING

No of Samples	Mine area	Average width (m)	Avg. Cu %	Avg. Au g/t	Avg. Ag g/t
32	Underground drill core re-samples	n/a	0.59	0.026	5.48
38	A Level underground samples	2.69	0.20	0.042	8.9
113	1 Level underground samples	2.88	2.43	0.028	39.8

*Table 2: Summary of Sheffield underground sampling at Superior.*

In 2010, Starfield commissioned Fugro Airborne Services to conduct an airborne magnetic and EM geophysical survey of the property. The purpose of the survey was to collect magnetic and EM data to be used to enhance the understanding of the geology of the area and possibly to locate new mineral deposits.

The survey provided a great deal of geophysical data that can be used to improve the geological mapping in the area. The magnetic data from the survey clearly shows major structures on the property and permits distinction of lithological/alteration differences within the Lights Creek intrusive complex.

## Drilling

All drill holes used in the resource estimate are diamond drill core. Historic drilling for Placer Amex was done by Boyles Brothers, a respected drilling contractor acquired by Layne Christiansen. Boyles typically drilled 2-12 meters at the collar of the hole with a rock bit and then set casing. NX (54.7mm) core was recovered to a depth of 30-60 meters and then the hole was completed using BX (42mm) core. Placer's BX drilling typically showed 95% recovery overall and lower recoveries in softer copper bearing zones.

Core drilling at Engels was conducted by Ruen Drilling Incorporated, a California licensed company, based in Clark Fork, Idaho. HQ (63.5mm) core was recovered from the collar of virtually all the core holes. Core recovery was reported as greater than 95% at Engels. Core recovery was compromised when the holes intersected old stopes and caved areas. Total copper was the only element consistently assayed for.

The drilling for the Superior Project consists of historic drilling done by Placer Amex from 1962 to 1972. Of the three deposits having some drill holes, Engels is the only deposit recently drilled with 44 of the total of 61 drill holes being drilled by Sheffield/Nevoro/Starfield from 2005 through 2010.

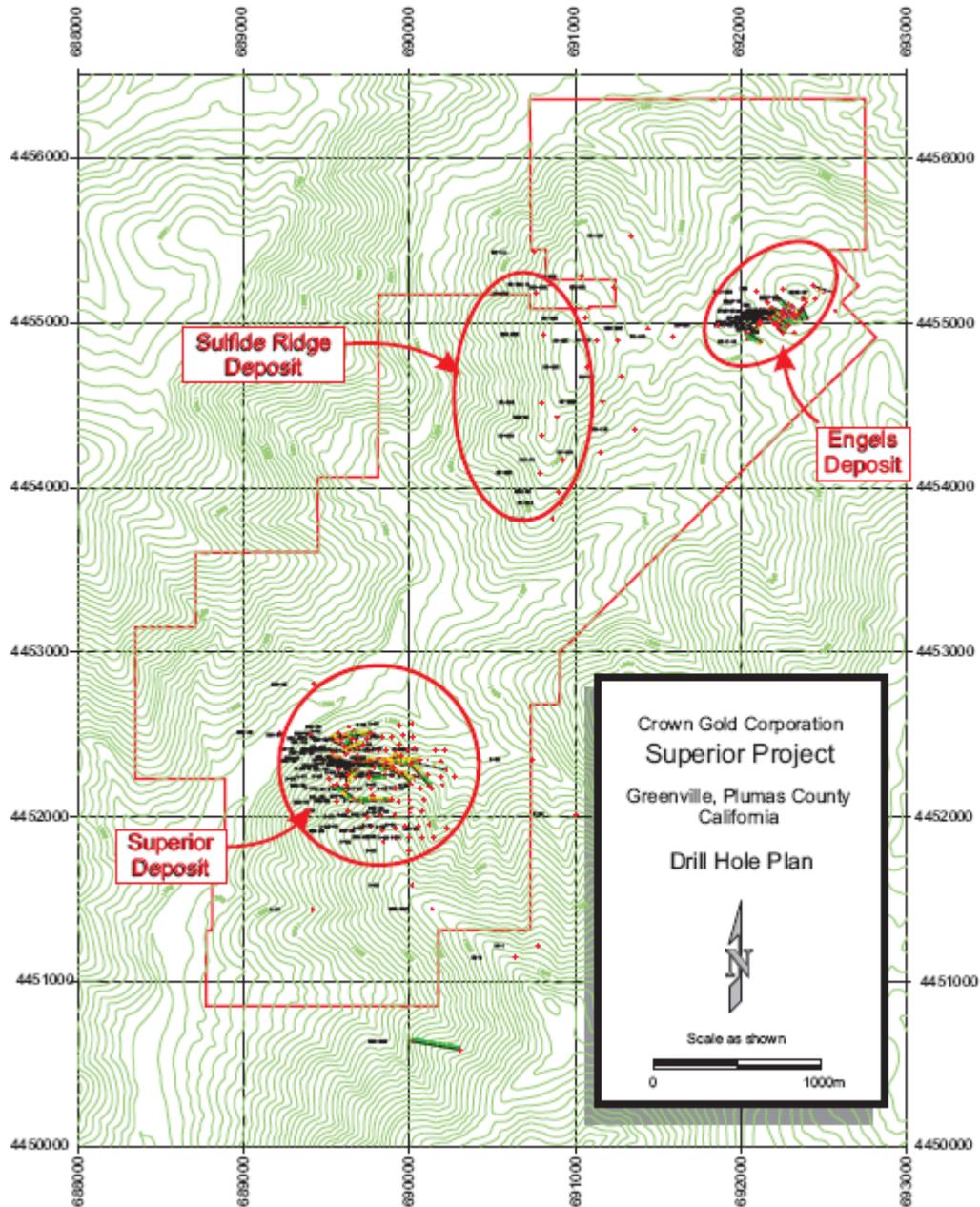
Table 3 below presents the drilling statistics by deposit.

**Summary of Superior Project Drilling**

<b>deposit</b>		<b>total number</b>	<b>core size</b>	<b>avg. depth (m)</b>	<b>total (m)</b>
<b>Engels</b>					
	Historic	17	BX or BQ	122.7	2,086.7
	Recent	44	HQ	81.0	3,563.1
	<b>Total</b>	<b>61</b>		<b>92.6</b>	<b>5,649.7</b>
<b>Superior</b>					
	Historic	128	BX or BQ	150.0	19,194.1
	Recent	0			
	<b>Total</b>	<b>128</b>		<b>150.0</b>	<b>19,194.1</b>
<b>Sulfide Ridge</b>					
	Historic	28	BX or BQ	137.4	3,846.8
	Recent	0			
	<b>Total</b>	<b>28</b>	<b>BX or BQ</b>	<b>137.4</b>	<b>3,846.8</b>
<b>Total Superior Project Drilling:</b>		<b>217</b>		<b>132.2</b>	<b>28,690.5</b>

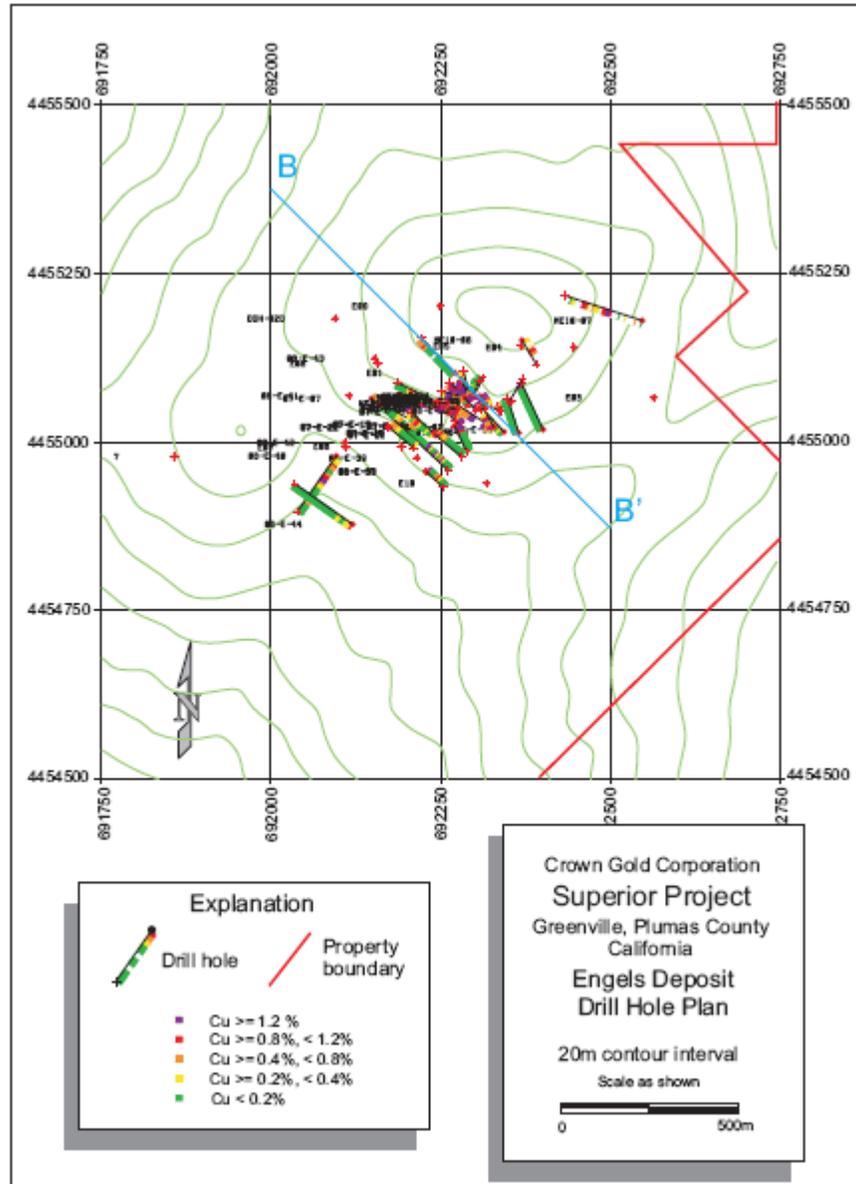
*Table 3: Summary of Superior Project Drilling by Deposit and Age.*

The location and orientation of the existing drill holes is controlled to some extent by topography and access for surface drilling and the extent and availability of underground workings for underground drilling and, do not appear to be ideally oriented for the current understanding of the fabric of mineralization, particularly Engels and Superior. Sulfide Ridge is an exception, largely because drilling is too sparse to have identified any fabric of mineralization. Figure 11 below presents all of the drilling within the Superior Project property boundary.

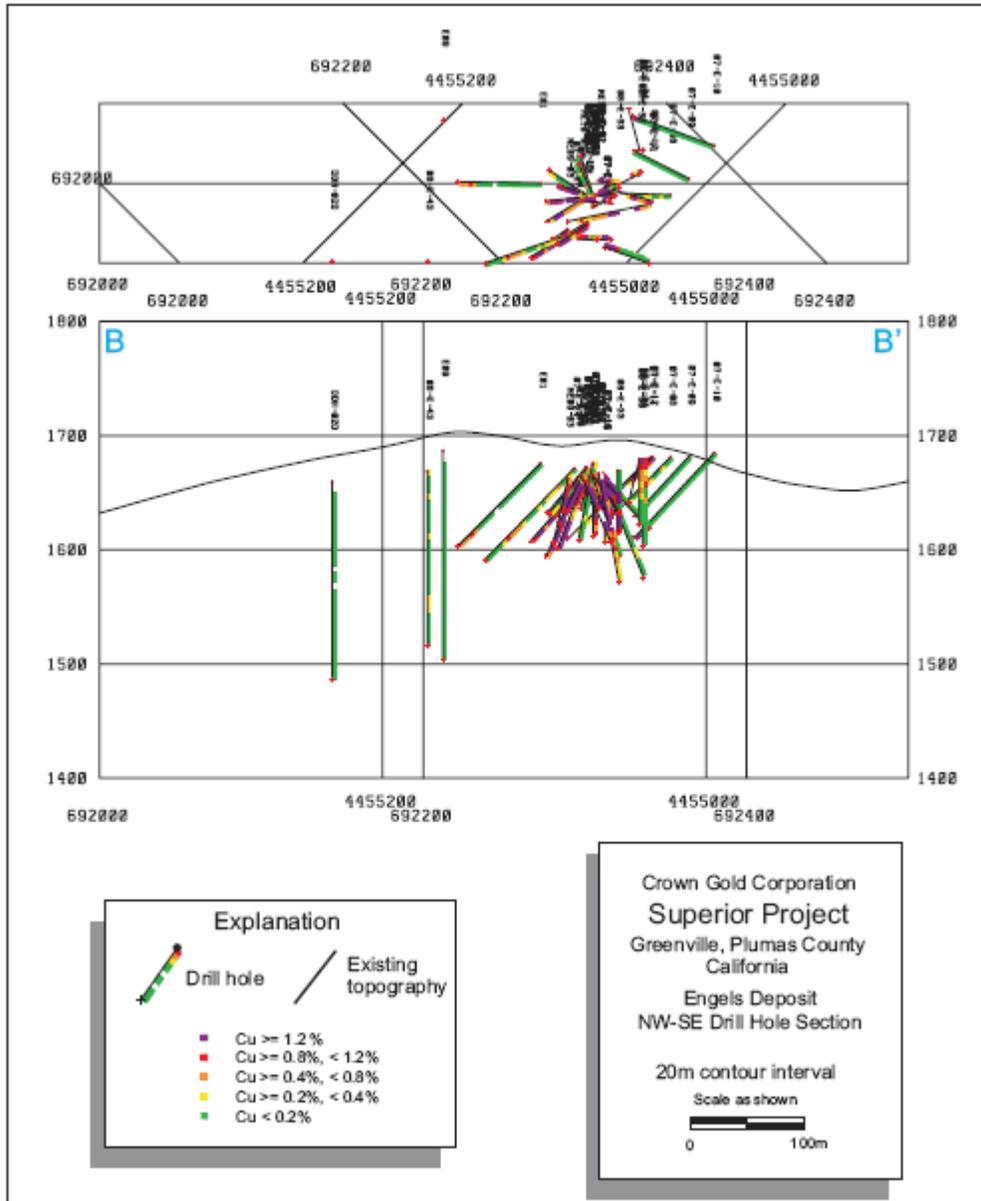


**Figure 11: Plan projection of all drilling within the Superior Project boundary.**

Engels drilling is tightly confined to the immediate vicinity of the historically mined volume, and does not test the along-strike, or down dip extent of mineralization. Figure 12a presents a plan projection of the Engels drilling and Figure 12b presents a NW-SE cross section through the center.

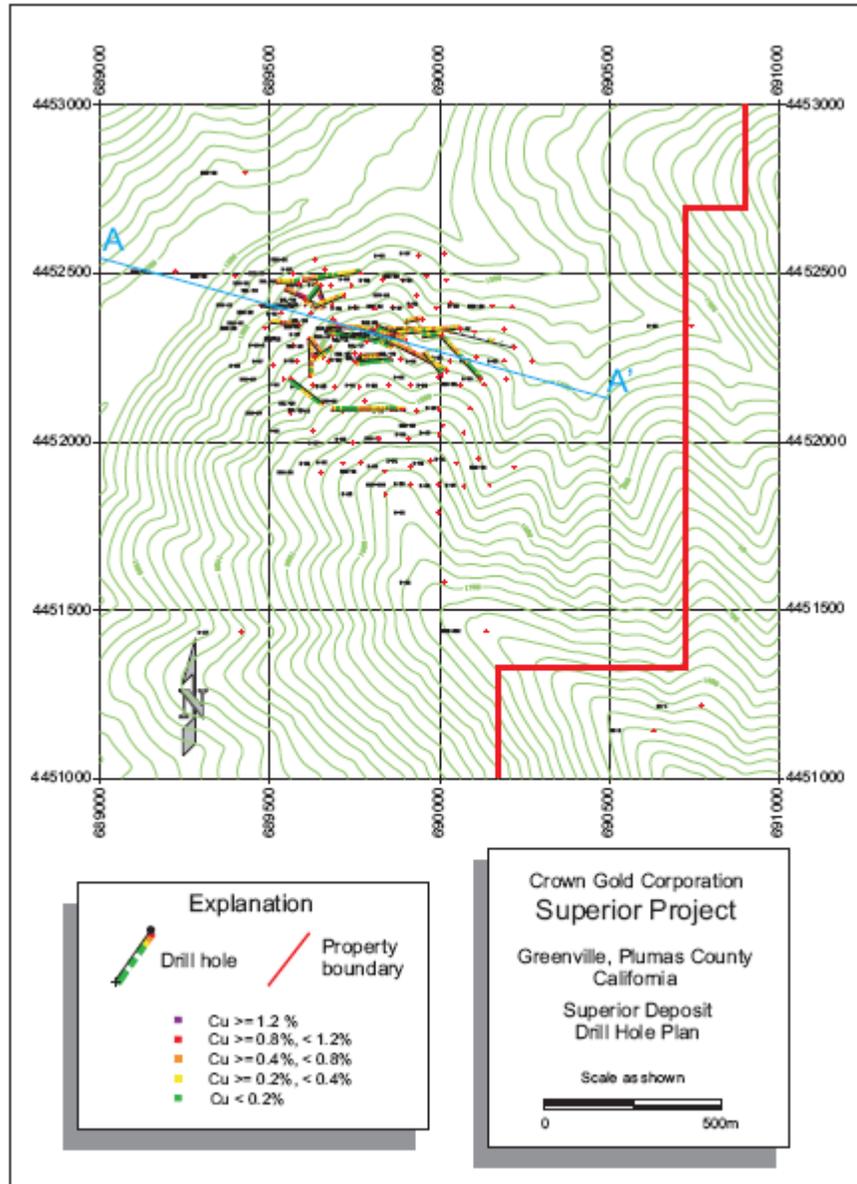


*Figure 12a: Plan projection of Engels drill holes.*



*Figure 12b: Cross section of Engels drill holes.*

Superior drilling appears to better define the limits of known mineralization, however the orientations are more random than ideal and additional drilling should investigate the possible existence of other high-grade structurally-controlled segregations of high-grade to the northeast and at depth. Figure 13a presents the plan projection to surface of the Superior drill holes. Figure 13b presents a NW-SE cross section through the center of the Superior drilling.



*Figure 13a: Plan projection of Superior drill holes.*

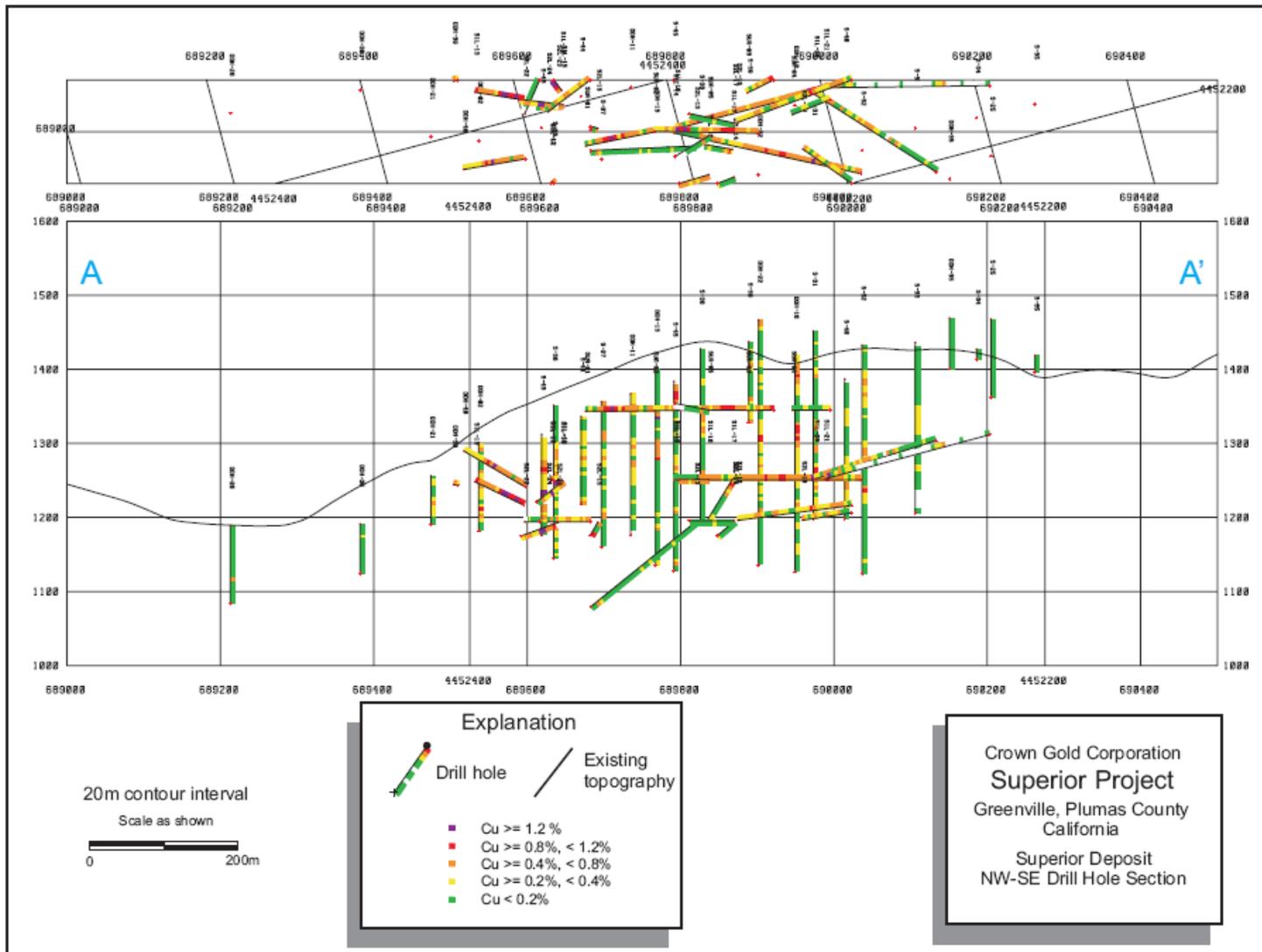
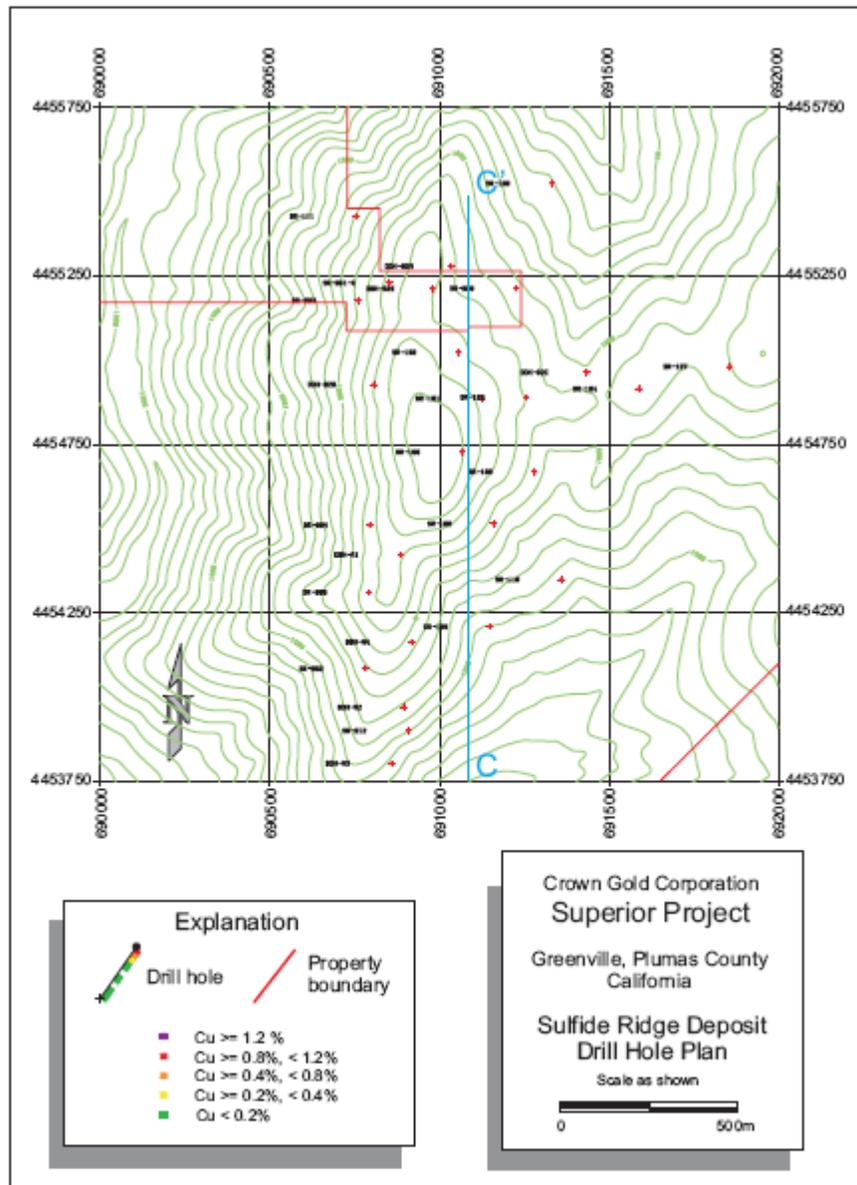


Figure 13b: N105E Drill hole cross section through Superior.

Sulfide Ridge drilling is very widely spaced with intervals of between 100m and 200m, relatively shallow for the lateral extent of mineralization observed. All drill holes are vertical. The grades present in the 28 drill holes was not of interest to Placer Amex at the time of drilling and, while generally lower than those present at both Engels and Superior, indicate copper mineralization within the range of contemporary economic interest. Sulfide Ridge should be tested further with angled core holes in at least two orientations and extending to greater depth than previous drilling. The extent of copper mineralization at Sulfide Ridge is untested in any direction. Figure 14a presents the plan projection to surface of the Sulfide Ridge drill holes. Figure 14b presents a north-south cross section through the center of the Sulfide Ridge drilling.



**Figure 14a: Plan projection of Sulfide Ridge drill holes.**



Specific gravity determinations were made at varying depths and in variably mineralized rock on the holes drilled in 2006. Copper-poor rock typically showed lower specific gravity than copper-rich rock and rock in the oxidized zone typically showed a lower specific gravity than un-oxidized rock. Rock containing more than 0.15% Cu appears to have an average specific gravity of 2.67 in the oxidized zone and 2.72 in the un-oxidized zone. Sheffield's inspection of Placer's reports indicates that they used a specific gravity of 2.7 in all their resource calculations.

## **Sampling Method and Approach**

The sampling done prior to 2005 was completed by geologic employees of a large, professional international mining company: Placer Dome or its predecessor companies or wholly owned US subsidiaries. The Author is prepared to assume that professional sampling techniques were used. No reports or data detailing the sampling methods, analyses, quality control measures or security procedures used by Placer Dome were available to the author for review and verification during the time of preparing this report.

Most of the samples documented in this report were collected from 1962-1972. The actual details of the sampling methods and recovery factors as well as the approach the individual companies selected to complete the various sampling programs are not available to the author. Such details are generally not recorded in internal company reports and this is not uncommon for large companies.

Often internal company reports contain just the highlights or best results, complete lists of samples are commonly not supplied in the reports.

Drilling from 2007-2010 was completed by Ruen Drilling Incorporated, the drill contractor, which operated on a one shift basis. The holes were surveyed by means of a Tropari survey instrument. Drill collars were located in the field with a Garmin GPS and a permanent marker was placed in the approximate collar location after reclamation of the drill sites. All field phases of the program were conducted under the supervision of Sheffield's or Starfields's Professional Geologist.

Core was placed in labeled wooden or cardboard boxes at the drill site by the drill contractor's staff. Footage blocks as appropriate were placed by the contractor. The core was transported from the work site to the fenced and locked logging facility in Crescent Mills by either the contractor's staff at end of shift or by Sheffield's geologist. The core was photographed and the rock quality logged. The core was then split by sawing it in half lengthwise with a diamond saw after which the geology was logged and samples were taken. The samples were placed in bags with a preprinted uniquely numbered sample tag, sealed and stored in rice bags.

Standard samples acquired from CDN laboratories in Surrey, British Columbia or created by CDN from material collected by Sheffield from various sources and blank samples collected in bulk from unmineralized quartz monzonite were inserted at intervals in the

sample stream. Approximately 20 percent of samples shipped were Quality Assurance/Quality Control samples.

An ALS-Chemex truck came to the logging site periodically to take custody of the samples and transport them to the ALS laboratory in Reno, Nevada for processing. The degree of security exercised in regards to the core and samples is considered adequate given the nature of the mineralization.

## **Sample Preparation, Analysis and Security**

Sample preparation and analyses completed for the historic drilling were done by a large, professional international mining company, Placer Dome or its predecessor companies or as its wholly owned US subsidiaries Placer Dome/Amex. The Author assumes that professional sampling and assaying techniques were employed.

The original core analyses for the Lights Creek District drilling were assayed at Placer's Golden Sunlight gold project in Montana. This lab was set up to treat the gold ores from the deposit so the company's analytical techniques were well developed for precious metals procedures. During the late summer-to-early-fall of 1967, Placer Amex determined that there was a problem with the soluble copper analyses being completed at their Golden Sunlight gold mine. Consequently, they began a program of re-assaying the entire core at an independent lab, Union Assay in Salt Lake City. The re-assaying, using chemical analyses, was completed by the spring of 1968. There are no records to indicate why Placer determined that the original analyses were incorrect, most of the results from the Golden Sunlight assayers no longer exist. Results used for grade determination did not include any of the original analyses, only the copper assays produced at Union Assay.

No reports or data detailing the methods of sample preparation, full analytical methods used, or quality control measures utilized by Placer Dome/Amex were available to the writer for review and verification. It is encouraging to note that Placer Amex must have had some system in place to determine that there was a problem with the original analyses completed at the Golden Sunlight mine to justify the re-assay of thousands of core samples. Full details of sample security of samples as required in NI 43-101 were not commonly provided in the internal company documents discussing the previous work. There is no reason to suspect any irregularities or question the results of the old sampling as the results contained in this report were collected by a reputable major mining company.

The 2005-2010 core samples were submitted to the ALS-Chemex laboratory, now ALS USA Inc., ALS MINERALS 4977 Energy Way Reno, NV 89502. ALS USA is accredited by the Standards Council of Canada as conforming with requirements of CAN-P-1579, CAN-P-4E (ISO/IEC 17025:2005). At the ALS laboratory the core samples were sorted, dried, crushed and pulverized to 85% minus 75 microns using methodology WEI-21.

Total copper was assayed by ALS methods Cu OG62 and CU AA62. These methods use a four acid digestion by HF, HNO<sub>3</sub>, HClO<sub>4</sub> and HCl of the sample and the copper content is determined either by ICP (Cu OG62) or by AA (Cu AA62).

Sulfuric acid soluble copper was assayed by ALS method Cu-AA05. In the Cu-AA05 procedure the sample is leached at room temperature with 5% sulfuric acid and then agitated for an hour. The solution is analyzed by atomic absorption spectroscopy to determine the acid soluble copper concentration of the sample.

Gold was assayed by ALS method Au-AA23 which is a fire assay fusion of a 30 gram aliquot with an AA finish. The other elements were determined using ALS method ME-ICP- 61 in which the sample is digested in a four acid leach and the elemental concentrations are determined by ICP-AES. Once the results of the assays were received, they were posted on the digital drill logs.

In, 2006 underground sampling was completed in the old Superior underground workings. Select samples are taken to characterize a certain type or mineralogy, often high grade. Grabs are numerous pieces of material of collected at random but not necessarily representative of grade in place. If meterage is shown, then the samples are chip-channels that should give a good representation of grade across the stated thickness. Only chip-channel samples were used in the averages shown in Figure 7 and Figure 8 and were 3.1m chip-channel samples that typically weighed 6-8kg.

The Superior underground workings contained some of the old 1966-72 Placer drill core stored in cardboard boxes. Although the boxes were in poor condition, labels and intervals were sufficiently preserved to allow for a re-sampling of a number of intervals and therefore a comparison of Placer sampling and Sheffield sampling. In the 2006 Sheffield sampling of the old core, the remaining 1/2 split of core from Placer was sawed into two 1/4 pieces and one of the 1/4 pieces was sent to the lab.

Thirty samples of Placer core were collected in this manner. Two of the Placer core intervals sampled contained less core so the entire remaining 1/2 split was bagged and sent to the lab for analysis. The Table 6 provides a comparison of the results from the 1960-70's Placer sampling and Sheffield sampling. Although there are some differences in the individual sample intervals of the core analyses, the overall core average was nearly identical at 0.37% Cu.

The Author considers the sample preparation, analyses and security appropriate for the recent drilling commissioned by Sheffield. One minor exception is in the Cu AA05 approach to determining the acid soluble component of total copper. The Author recommends employing the sequential acid analysis to generate a value more representative of copper recovered by heap-leach SX-EW methods. Use of the Cu AA05 method alone may understate true recovery as certain secondary sulfide copper minerals, such as chalcocite, are not fully soluble in sulfuric acid alone, but can be recovered by heap leaching.

The Author cannot evaluate the sample preparation, analyses and security procedures for the Placer Amex drilling, however given the prominence of the company involved, and the reputation of the drilling company used, are prepared to accept the assay values produced with some limitations.

## Data Verification

In as much as this study represents the first attempt to produce a National Instrument 43-101 compliant resource estimate for the deposits of the Superior Project, this effort represents the first time the drill hole database has been rigorously checked for errors. Many of the issues found in the database are not errors per se but rather conditions that might lead to errors in data manipulation, analysis and grade-tonnage estimation. The following is a summary description of the checks made on, and corrections or adjustments made to the drill hole database. A detailed list was provided to Crown Gold.

- 1) All of the drill hole identifiers used blank spaces. These were changed replacing the blanks with dashes to create names that are continuous with no gaps. For example: Drill hole “07 E 01” was changed to “07-E-01”. Using continuous names prevents value displacement when loading files into various programs.
- 2) A total of 13 drill holes were missing collar coordinate and orientation information. These were removed from the database pending further research and correction.
- 3) A total of 26 drill holes had discrepancies between total depth drilled and final “to” values arising from the use of a conversion factor from meters to feet in the spreadsheet without rounding with the “ROUND” excel function. This was corrected.
- 4) A total of 9 drill holes had the final assay “to” value greater than the stated total depth of the drill hole. The total depth values in the collar file were adjusted to match the final “to” value in the assay file.
- 5) A total of 57 drill holes were missing the top-most interval when no sample was taken. The missing collar intervals were inserted with “-9” inserted to designate missing values.
- 6) The following 3 files had unit labeling errors:
  - The file [ME10-05 Geochem w descriptions & all assays.xls] lists Cu assay (ME-ICP61 Cu) as ppm but should be percent. The label is correct in the .csv file provided by the laboratory

- The file [ME10-05 Geochem w descriptions & all assays.xls] lists Ag assay (ME-ICP61 Ag) as percent but should be ppm. The label is correct in the .csv file provided by the laboratory
  - The file [ME10-05 Geochem w descriptions & all assays.xls] lists As assay (ME-ICP61 As) as percent but should be ppm. The label is correct in the .csv file provided by the laboratory
- 7) A total of 6 assay intervals required correction due to mistyping in data entry.
- 8) A total of 32 missing intervals were inserted with “-9” designating missing data.
- 9) A total of 197 assay intervals were logged by the geologist as stope fill but were not clearly flagged in the assay database. The all intervals were checked in the geologic logs and clearly flagged to prevent inclusion in subsequent data analysis and grade estimation.
- 10) A total of 15 QA/QC standards had the assay values displaced with Cu AA05 values in the Cu OG62 column.

In addition to the above, a total of 366 assay intervals for the Engels drilling done by Sheffield representing 19% of the total modern Engels database, was checked against the assay certificates for data entry errors in copper (3 methods), silver, gold, iron, and arsenic. A total of 51 errors were found, all confined to the iron assays. No other errors were found for the other elements. The erroneous iron values were determined to arise from the spreadsheet supplied by the laboratory which was directly loaded into the database without checking. The correct values were present on the write-protected assay certificates provided in .PDF format.

On the whole the error rate discovered in the above comparisons corresponds to a 1.99% error rate. The Author considers this error rate acceptable for a database not previously subject to rigorous scrutiny.

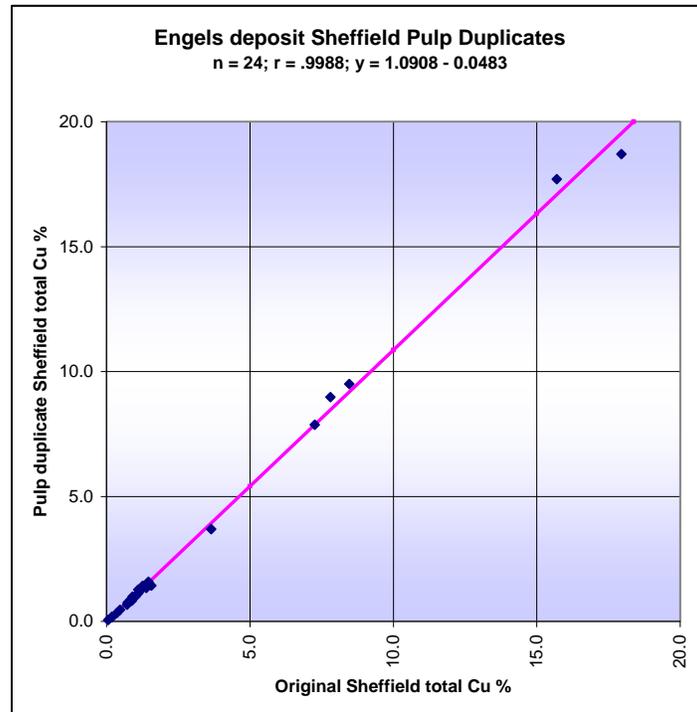
As a final adjustment, all assay values designated as below the detection limit for the assay method employed was set at ½ of the detection limit.

## **QA/QC Protocols**

Of the three deposits considered within the Superior Project: Engels, Superior and Sulfide Ridge, only Engels was drilled by Sheffield and Starfield. Consequently Engels is the only deposit for which contemporary standards of QA/QC have been applied. The Engels QA/QC program was part of a much larger program encompassing the Moonlight Valley deposit, which was the primary focus of Sheffield, as well. Several elements were analyzed; primarily copper, gold, and silver; however only total copper, being the only element estimated, is discussed here.

### Pulp Duplicates

A total of 24 pulp duplicates were run on Engels drill hole samples. The results for total copper were indicative of good precision with a correlation coefficient of 0.9988 and no demonstrated bias. Figure 15 below presents the results:



***Figure 15: Scatter plot of pulp duplicate assay results vs. original assay results for total copper percent.***

### Field Duplicates

Only six field duplicates were completed for the Engels drilling. The results clearly indicate a mislabeling or miss-selection of the samples and must be discarded. Table 4 below presents the results for the original total copper (Cu OG62) results against the re-sampled results. No meaningful analysis of the field duplicate program for Engels can be completed.

**Engels Field Duplicates**

dh_id	from (m)	to (m)	sample number	original assay certificate	total Cu % Cu OG62	re-submitted assay certificate Cu OG62	total Cu % Cu OG62	re-submitted assay certificate ICP	ICP ppm Cu
07-E-09	2	4	ESH-0310	RE07094080	0.083	RE08003643	0.242	RE08009593	2520
07-E-09	4	6	ESH-0311	RE07094080	0.041	RE08003643	0.189	RE08009593	2000
07-E-09	6	8	ESH-0312	RE07094080	0.075	RE08003643	0.293	RE08009593	2970
07-E-09	8	10	ESH-0313	RE07094080	0.099	RE08003643	0.372	RE08009593	3860
07-E-09	10	12	ESH-0314	RE07094080	0.071	RE08003643	0.373	RE08009593	3880
07-E-09	12	14	ESH-0315	RE07094080	0.056	RE08003643	0.655	RE08009593	6500

**Table 4: Field duplicates for Sheffield drilling at Engels indicating mislabeling or incorrect sample selection.**

Standards

Sheffield used seven different standard reference samples, five commercially prepared from Canadian base metal mines, and two from composites made from deposits and mill tails from the Lights Creek District. Sheffield also included four blanks in its QA/QC program. Sample preparation of the standards was done by CDN Resource Laboratories, Ltd. (CDN) of Delta, BC. CDN also organized the round robin testing. The standards were characterized from 10 samples submitted in round-robin to a variety of accredited North American laboratories. The vast majority of standards used at Engels were the two derived from local material. The standards and their accepted assay values are listed in Table 5 below.

**Sheffield Drilling Program Standard Reference Materials**

Standard name	accepted value total Cu%	2X std. dev. total Cu%	number of samples	number of labs	source
CDN HG HLHC	5.070	±0.27	10	12	High Lake west zone
CDN CGS-1	0.596	±0.029	10	9	Red Chris
CDN CGS-4	1.947	±0.062	10	9	Red Chris
CDN CGS-5	0.155	±0.006	10	8	Red Chris
CDN CGS-7	1.010	±0.07	10	11	Red Chris
SH LG	0.501	±0.026	10	5	Various sources at Moonlight
SH HG	1.038	±0.042	10	5	Various sources at Moonlight

Notes: High Lake is a Volcanogenic Massive Sulphide deposit in the Slave Structural Province of Canada. Red Chris is a Porphyry Copper/Gold deposit in BC, Canada. The various sources at Moonlight include drill hole composites, dump material, process tails, and outcrop and road cut material.

**Table 5: Characterization of Standard Reference Material used by Sheffield in drilling at Engels.**

Only a limited number of standards and blanks were analyzed with the limited Engels drilling program, too few to justify a rigorous statistical analysis.

A total of 43 submissions of standard SH HG were analyzed. The mean value for the 43 was 1.037% Cu against an accepted value of 1.038% Cu. Of the 43 standards SH HG, a total of five received values at or beyond two standard deviations from the accepted value, two above at 1.105% Cu and three at or below at 0.996%, 0.992% and 0.990 % Cu.

A total of 48 submissions of standard SH LG were analyzed. The mean value for the 48 was 0.505% Cu against an accepted value of 0.501% Cu. Of the 48 standards SH LG, a total of three received values above the accepted value plus two standard deviations. These values were 0.551%, 0.532%, and 0.527% Cu. No standards fell below the accepted value minus two standard deviations.

In addition to the above a total eight standards were submitted including five submissions of CDN HG HLHC (mean value of 5.024% Cu against the accepted value of 5.05% Cu, all within one standard deviation of the accepted value) , and one each of CDN CGS-1 (0.596% Cu against accepted value of 0.596% Cu) , CDN CGS-4 (1.940% Cu against accepted value of 1.946% Cu), and CDN CGS-5 (0.154% Cu against accepted value of 0.155% Cu).

A total of 42 blanks created from unmineralized quartz monzonite were submitted with the Engels drill hole samples. On the whole the blanks suggest to the Author the presence of a slight contamination problem, either at the ALS laboratory or in the on-site storage of blank reference materials. Other possibilities include sample mislabeling or blank material that was not truly barren. Given the wide-spread extent of low-grade mineralization within the Lights Creek Stock, the Author recommends creation of a new set of blank reference materials with round-robin certification of grade.

Of the 42 blanks a total of 11 returned anomalous values averaging 0.0165% Cu (0.007% Cu for the total data set) with the three highest values being 0.035%, 0.027%, and 0.017% Cu. While these values lie below the realistic range of economic copper values, their occurrence should have been investigated. The remaining 31 blanks were within a more acceptable range of the reported detection limit for copper.

The pulp duplicate and reference standards analyses demonstrate an acceptable level of reliability and reproducibility. The coarse rejects analyses show inattention to sample organization or labeling. The blank reference material analyses suggest the presence of low-level contamination, but not of a magnitude likely to materially affect the results of the estimates. The Author concludes that the QA/QC analysis conducted by Sheffield and Starfield in drilling at Engels demonstrates an adequate level reliability in the drill hole database but that greater attention to QA/QC protocols and timely examination of results as received by the laboratory should be paid going forward. The QA/QC protocols employed by Placer Amex are not described but are unlikely to conform to current standards.

Placer Amex realized in 1967 that the assays performed at their Golden Sunlight mine facility were unreliable. The discovery of the assaying problems at the Golden Sunlight Mine in 1967 was sufficient to initiate a nearly complete re-assay of the entire Superior core using an independent laboratory. These values were used in all instances replacing the original assay values. Of the total of 3,215 assay interval, the Author was provided with 2,998 (93% of the original total) re-assayed intervals.

Most of the old pulps were re-assayed at Union Laboratory in Salt Lake City and quality control checks were done at Hawley and Haley and the Amex lab in Vancouver. There is documentation that virtually all the core from Superior and Moonlight was re-assayed at Union with quality control, although descriptive documentation of protocols is absent. It is unclear whether pulps from the Engels drilling were re-analyzed, calling into greater question the historic drilling data at Engels.

Sheffield was able to recover a small portion of the original Superior core which had been stored underground on the 1 level. Most of the cardboard core boxes had deteriorated and matching the drill hole and intervals with specific core lengths difficult. From the portion that could be confidently identified, Sheffield resubmitted the entire half-splits to ALS Chemex. Table 6 below presents the comparison between the composited core intervals and the original Placer Amex assay results.

In addition, in re-sampling the ribs of the Level 1 workings, Sheffield attempted to sample as closely to Placer Amex sample locations as possible to permit comparison with their results. These composited results are included in Table 6 below.

**Composited Placer/Amex Sampling vs Sheffield sampling**

Sample Location	From (feet)	To (feet)	Width (feet)	Placer Cu%	Sheffield Cu%
#1 X cut Superior	160	270	110	2.59	2.49
#1 X cut Superior	310	450	140	0.86	1.01
S-44 Placer Core	70	100	30	0.36	0.39
S-44 Placer Core	160	170	10	0.47	0.37
S-44 Placer Core	180	200	20	0.39	0.52
S-44 Placer Core	320	330	10	0.31	0.39
S-44 Placer Core	380	388	8	0.64	0.59
S-40 Placer Core	460	470	10	0.41	0.38
S-40 Placer Core	480	520	40	0.29	0.29
S-40 Placer Core	520	580	60	0.23	0.25
S-36 Placer Core	400	490	90	0.21	0.17
Core Sample Averages				0.37	0.37

*Table 6: comparison between Placer Amex assays and Sheffield re-assays*

The Author considers the results of the above duplicate analysis program to offer a small but significant measure of confirmation of the Placer Amex assay values for Superior. The lack of clarity regarding the re-assay of Engels pulps in the Placer Amex drilling is of concern; however comfort is taken from the fact that the recent drilling by Sheffield and Starfield comprises 63% of the total length drilled in the Engels database.

## **Mineral Processing and Metallurgical Testing**

Placer Amex completed metallurgical testing on five bulk composite samples of core from the Moonlight Valley deposit to the west of the Superior Project in 1989 to evaluate the potential for leaching the material. The composite core samples were collected by Placer Amex and sent to the Kappes, Cassidy & Associates (KCA) laboratory in Sparks, Nevada. Three of the samples contained oxide material; the other two samples were of sulphide material.

The Author recommends that pulps from Engels drilling be re-submitted to a certified laboratory with the capabilities to undertake the Sequential Copper Analysis Method described by G. A. Parkison and R. B. Bhappu in 1995, to permit better quantification of potential for copper recovery of upper Engels material by heap-leach SX-EW methods.

The Author recommends that the same analysis be undertaken on any subsequent drilling performed on both Superior and Sulfide Ridge to determine the depth and extent of oxidation of copper sulfides to better demonstrate copper recovery by flotation.

Preliminary grind and flotation tests on sulfide material should be initiated for Superior, Sulfide Ridge and lower Engels material to determine preliminary grind requirements, expected recoveries and achievable concentrate grades.

## **Mineral Resource Estimates**

### **Introduction**

Resources have been estimated for the Engels and Superior deposits. Both possess significant drill hole data density to support the effort.

Total copper (copper oxides plus copper sulfides) was the only metal evaluated in the resource estimates presented here. Engels possessed some sulfuric acid-soluble copper grade assays, but in insufficient numbers to permit development of valid estimating parameters. Similarly other elements of interest including silver, gold, iron and arsenic were either wholly absent, as at Superior, or present only in a portion of the recent Sheffield drilling.

The estimation process employed for the Engels and Superior deposits was the Probability Assigned-Constrained Kriging (“PACK”) approach which develops a constraining probabilistic envelope using binary (0’s and 1’s) indicators. These envelopes are then used to constrain both data available to inform blocks; and the blocks eligible to receive an estimate. The application of the probabilistic envelope is precisely analogous to the application of a deterministic, “wire-frame”, envelope. The approach is described in greater detail below in subsection “Description of the PACK estimation approach”.

## Data Available

The drill hole database available consisted of the following:

**Simplified summary of Moonlight drilling by deposit**

Deposit	number of drillholes	total length (m)	Drill core type and era
Engels	61	5649.7	(3563.1m post 2005 NQ, 2,086.6m historic BX or BQ)
Superior	128	19194.1	historic BX or BQ
Sulfide Ridge	28	3846.8	historic BX or BQ

**Table 7: Simplified description of the Superior Project drill hole database**

All drill holes are diamond drill core. Historic drilling consists of a combination of BX (42mm) or BQ (36.4mm). Post 2004 drilling, present only at Engels, was HQ (63.5mm). Total copper was the only element consistently assayed for.

The location and orientation of the existing drill holes is controlled to some extent by topography and access for surface drilling and the extent and availability of underground workings for underground drilling and, except for Sulfide Ridge do not appear to be ideal for current understandings of the fabric of mineralization, particularly Engels and Superior.

Engels drilling is tightly confined to the upper portion of and in the immediate vicinity of the historically mined volume, and does not test the along-strike, or down dip extent of mineralization. A total of 197 assay intervals in the Engels drilling were logged as fill from collapsed stopes. These intervals were flagged in the assay table and were not included in compositing, data analysis or estimation. The average total copper grade of the stope fill material is 1.55%.

Superior drilling appears to better define the limits of known mineralization, however the orientations are more random than ideal and additional drilling should investigate the possible existence of other high-grade structurally-controlled segregations of high-grade to the northeast and at depth.

Sulfide Ridge drilling is very widely spaced with spacings of between 100m and 200m, relatively shallow for the lateral extent of mineralization observed and entirely vertical. The grades present in the 28 drill holes was not of interest to Placer-Amex at the time of drilling and, while generally lower than those present at both Engels and Superior, indicate copper mineralization within the range of contemporary economic interest. Sulfide Ridge should be tested further with angled core holes at at-least two orientations extending to greater depth. The extent of copper mineralization at Sulfide Ridge is untested in any direction.

The drill hole data was length composited to uniform down-hole 5m lengths.

## **Exploratory Data Analysis**

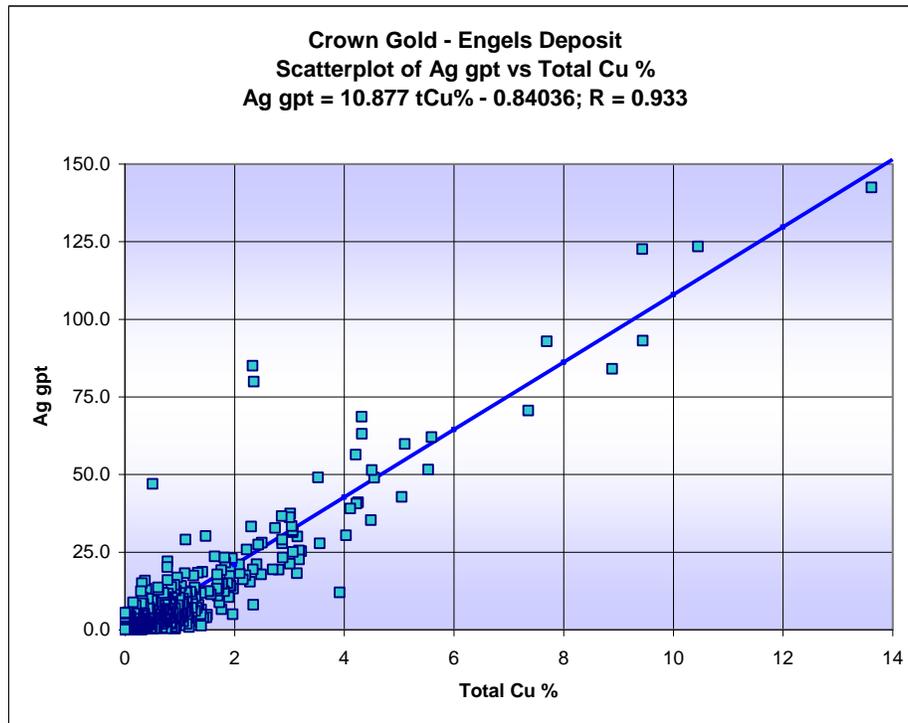
The exploratory data analysis consisted of:

- bivariate statistics for Engels only comparing the possible relationships between total copper and other potentially important metals for the limited data set;
- simple analysis of composites for both Engels and Superior at a range of threshold cutoff grades for total copper to select an appropriate threshold copper grade for the indicators;
- variography of the binary indicators for both Engels and Superior to establish the orientation and dimensions of a search and weighting ellipsoid;
- estimation of the indicators to the block models;
- selection of the optimal indicator value to constrain composites eligible to inform the estimate and blocks eligible to receive an estimate.
- univariate statistics for total copper in the selected composites for both Engels and Superior to characterize the behavior in the 5m composites; and
- variography of the selected composites for both deposits to establish estimating parameters for total copper.

### **Bivariate Statistics**

The bivariate statistics were generated on the entire set of composites for which the two metals being compared existed. The data were not constrained by any probabilistic shell. The metals compared against copper were: gold, silver, iron, and arsenic. The only metal to show any material relationship with copper was silver. That relationship is very strong and suggests co-deposition in the same mineralizing event. Figure 16 below presents the

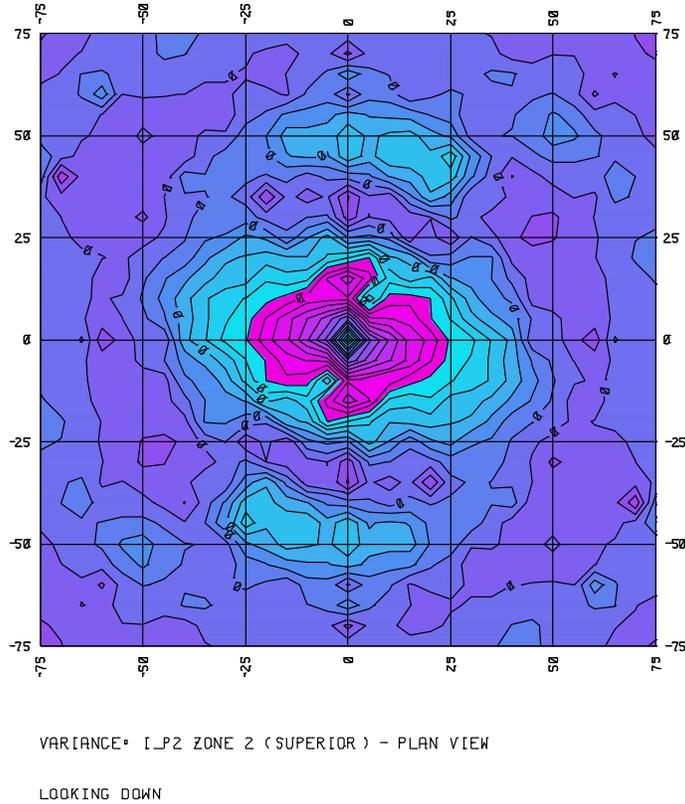
scatter plot of silver vs. total copper. The complete set of scatter plots is presented in Appendix C.



*Figure 16: scatterplot of silver gpt vs. total copper % in 5m composites.*

## Indicator Variography

Global semi-variograms were generated for both deposits for the indicators to establish the nugget effect. Directional variograms were then generated in plan in 30 degree increments and the variance values were contoured to establish the direction and relative degree of any anisotropy present. Figure 17 below presents the variance contour map for Superior indicators to illustrate. The complete set of variance maps for superior and Engels are presented in Appendix C: Exploratory Data Analysis.



**Figure 17: Example of indicator variance contour map, Superior deposit.**

The anisotropy established in plan was then used as a guide to generate similar variance contour maps in the two orthogonal vertical planes, along strike and perpendicular to strike. From the three contour maps the orientation of the three orthogonal axes was established and the directional semi-variograms corresponding to those directions generated and modeled.

The global variograms for both deposits were very well structured, providing reliable values for the nugget effect in each case. The directional variograms for Engels were moderately well structured, structural quality was compromised primarily by the very limited extent of drilling. The directional variograms for Superior were well structured. Overall, the variography for the indicator estimation was of sufficient quality to ensure generation of a constraining volume consistent with the supporting drill hole composites. Table 8 below presents the variogram parameters used in the indicator estimation. Note all variograms were normalized to a total sill of “1” to permit calculation of quality of estimate parameters including the slope of the regression.

**Crown Gold Corp - Superior Project**  
**0.20 % tCu Indicator Variogram parameters**

**Engels (Zone 1) 0.2% tCu indicator Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.229						
SPH	0.371	15	25	25	+15o (down)	0o (horiz.)	n135e
SPH	0.400	30	50	50	+15o (down)	0o (horiz.)	n135e

**Superior (Zone 2) 0.2% Cu Indicator Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.287						
SPH	0.287	40	35	12	+0o (horiz.)	-0o (horiz.)	n105e
SPH	0.426	70	60	55	+0o (horiz.)	-0o (horiz.)	n105e

Note: Techbase "dip" convention is positive down, negative up  
 Techbase "j" azimuth direction is by definition "i" direction minus 90°  
 Techbase "k" direction is by definition mutually orthogonal to I & j

*Table 8: Variogram parameters used in estimating the 0.20% total copper indicators.*

Additional estimating parameters employed were:

maximum samples = 15;  
 minimum samples = 3; search ellipsoid equals variogram ellipsoid;  
 block discretization is 4 by 4 by 2.

## Description of the PACK estimation approach

The estimation process employed for the Engels and Superior deposits was the Probability Assigned-Constrained Kriging (“PACK”) approach which develops a constraining probabilistic envelope using binary indicators (0’s and 1’s). These envelopes are then used to constrain both data available to inform blocks; and the blocks eligible to receive an estimate. The application of the probabilistic envelope is precisely analogous to the application of a deterministic or “wire-frame” envelope.

In the case of both Engels and Superior the threshold grade selected was 0.200% total copper. Typically, the threshold value selected lies near the anticipated cutoff grade, although analysis of observable grade “breaks”, i.e. boundaries of marked contrast, must also be considered. For these estimates a naïve (non-spatial) analysis was done comparing total tonnes and total metal implied in the composite set at a range of cutoff grades. The goal was to maximize total metal while minimizing total tonnes. Tables 9a and 9b present these comparisons for each deposit.

**Engels composite cutoff value analysis**

cutoff	avg grade	# of comps (tonnes)	metal	% grade	% tonnes	% metal	change in grade	change in tonnes	change in metal
0.050	0.852	633	539	100%	100%	100%			
0.100	1.014	524	532	119%	83%	99%	0.162	109	8
0.150	1.117	470	525	131%	74%	97%	0.103	54	7
<b>0.200</b>	<b>1.210</b>	<b>428</b>	<b>518</b>	<b>142%</b>	<b>68%</b>	<b>96%</b>	<b>0.093</b>	<b>42</b>	<b>7</b>
0.250	1.298	393	510	152%	62%	95%	0.088	35	8

*Table 9a: Cutoff analysis for selection of the total copper indicator threshold grade for Engels.*

From Table 9a it can be seen that at the 0.200% total copper threshold 32% of tonnes are excluded, approximated by number of composites, while 96% of metal is retained, approximated by the average grade of the composites times the number of composites.

**Superior composite cutoff value analysis**

cutoff	avg grade	# of comps (tonnes)	metal	% grade	% tonnes	% metal	change in grade	change in tonnes	change in metal
0.050	0.218	2988	651	100%	100%	100%			
0.100	0.218	2988	651	100%	100%	100%	0.000	0	0
0.150	0.266	2380	632	122%	80%	97%	0.048	608	18
<b>0.200</b>	<b>0.317</b>	<b>1846</b>	<b>584</b>	<b>145%</b>	<b>62%</b>	<b>90%</b>	<b>0.051</b>	<b>534</b>	<b>48</b>
0.250	0.358	1427	511	164%	48%	79%	0.041	419	74

*Table 9b: Cutoff analysis for selection of the total copper indicator threshold grade for Superior.*

From Table 9b it can be seen that at the 0.200% total copper threshold 38% of tonnes are excluded, approximated by number of composites, while only 90% of metal is retained, approximated by the average grade of the composites times the number of composites.

The binary indicators are evaluated geostatistically and estimation parameters developed. On the basis of the estimating parameters developed, the 1's and 0's are estimated to the block models using an appropriate estimation method. In this case the values were estimated using Ordinary Kriging.

The PACK approach produces block estimates for the indicators that consist of numbers between 0 and 1 that are analogous to the decimal probability that the block is above or below the selected threshold grade upon which the indicator assignments are based. Selection of the appropriate indicator estimate value to use to constrain the estimate varies, but is most commonly based on examination of the results against the original drill hole data in section. In the case of both Superior and Engels the highly variable orientation of drill holes precludes accurate assessment of the appropriate value visually and an alternative approach was used.

The block indicator estimates were back-estimated to the composites using a nearest neighbor assignment with the identical anisotropic search used in the original indicator estimate. This assigns the nearest (in anisotropic space) block indicator value to the composites. The composite table is then brought into a spreadsheet for analysis.

The analysis consists of comparing the original “1”s and 0’s” assigned on the basis of the threshold selection to the indicator estimates and testing which value for the estimates most closely balances the errors of below-threshold composites included against errors of above-threshold composites excluded. The resulting number is then selected as the value that best defines both the volume to receive the estimate and the data to inform the estimate. Table 10a below presents an example summary for the Engels deposit and Table 10b that for the Superior deposit.

Indicator Error Summary  Engels: tCu %	0.2% tCu	0.2 % tCu percent error	avg grade of errors % tCu	avg grade selected % tCu
	<b>Selected Indicator Value:</b>	<b>0.5240</b>		
<b>Total positive errors:</b>	51	4.5%	0.078	
<b>Total negative Errors:</b>	50	4.5%	0.514	
<b>Total Net Error:</b>	-1	-0.1%		

*Table 10a: Indicator Selection Summary for Engels*

From the table above it can be seen that the indicator estimate value to use for Engels is 0.524. Selection of that value gives an average grade of composites within the envelope of 1.156% total copper. A total 51 composites (4.5% of the total) are included in that envelope that are below the threshold and have an average grade of 0.078% total copper. A total 50 composites above the threshold are excluded from the enveloped and have an average grade of 0.514% total copper.

Indicator Error Summary  Superior: tCu %	0.2% tCu	0.2 % tCu percent error	avg grade of errors % tCu	avg grade selected % tCu
	<b>Selected Indicator Value:</b>	<b>0.4664</b>		
<b>Total positive errors:</b>	215	5.7%	0.140	
<b>Total negative Errors:</b>	214	5.7%	0.311	
<b>Total Net Error:</b>	-1	0.0%		

*Table 10b: Indicator Selection Summary for Superior*

From Table 10b above it can be seen that the indicator estimate value to use for Superior is 0.4664. Selection of that value gives an average grade of composites within the envelope of 0.391% total copper. A total 215 composites (5.7% of the total) are included in that envelope that are below the threshold and have an average grade of 0.14% total copper. A total 214 composites above the threshold are excluded from the envelope and have an average grade of 0.311% total copper. Figure 2 below presents a portion of the 1255 level bench plan for Superior including composites within 10m above and below with the blocks color coded to indicate inclusion within or exclusion from the envelope.

Note that a “positive error” is one where a composite is included in the data set that is actually below the threshold value, and a “negative error” is one where a composite above the threshold is excluded. This is exactly analogous to what occurs in developing a deterministic (i.e. physical wireframe) envelope. Isolated occurrences of mineralization surrounded by barren material will be excluded from the wireframe and isolated barren intervals will be included.

In addition to the indicator selection value used, and largely on the basis of visual examination of the indicator estimator results, additional restrictions may be placed on the envelope in order to improve the overall shape. In particular, these secondary restrictions are used to limit extrapolation beyond data. In the case of both Engels and Superior these restrictions were applied and were based on a quality-of-estimate measure termed the “Slope of the Regression”. For Superior the value selected was 0.2, and for Engels the value was 0.25.

Upon verification of the indicator value selection and any secondary restrictions applied, the composites thus selected are characterized through exploratory data analysis and estimating parameters developed for estimation of total copper. Appendix D: Representative Block Model Bench Plans presents three example bench plans for each deposit showing the blocks that received an indicator estimate and those that met the combined criteria of the selected indicator estimate value and chosen slope-of-the-regression value.

## **Univariate statistics for total copper in the selected composites**

Table 11 below summarizes the univariate statistics for the selected composites. The complete output is presented in Appendix C.

**Superior Project 5m composites**

**October 2013**

Zone	ip_jk	max	min	mean	std. dev.	CoV	Capping Grade	% of comps Capped	count
Uncapped 1 - Engels	0.5240	13.62	0.005	1.16	1.63	1.407			429
Capped 1 - Engels	0.5240	5.86	0.005	1.07	1.19	1.108	5% tCu	2.80%	429
Uncapped 2 - Superior	0.4664	3.01	0.001	0.39	0.29	0.738			1430
Capped 2 - Superior	0.4664	1.38	0.001	0.38	0.24	0.618	1.2% tCu	1.96%	1430

*Table 11: Summary univariate statistics for 5m composites within the probabilistic shell.*

Please note that both capped and uncapped values for total copper are presented in Table 11. A detailed description of grade capping as applied to this study and the conclusions drawn regarding the need for grade capping is presented below in the sub-section: Grade Capping.

## Variography for total copper in the selected composites

Global semi-variograms for capped and uncapped total copper were generated for both deposits. These were well structured permitting confident establishment of the nugget and sills for both deposits.

Directional variograms were generated as well along the axes determined from the indicator variograms. These were poorly structured, in part due to the presence of high-grade values in the composite set and in part, for Engels, due to the restricted volume drilled. As a general rule, as the lag distance of the semi-variogram reaches 1/3 of the total dimension of data, pair number decline and structure decays as a consequence. The directional variograms are presented in Appendix C.

The variogram models developed were therefore based upon a composite of sources: the nugget and sills were taken from the global semi-variograms, the ranges were taken from the well structured indicator variograms.

## Estimation Parameters

Tables 4a and 4b below summarizes the estimating parameters developed for both capped and uncapped composites. Table 12a below presents the final variogram parameters used in estimation of uncapped total copper. Table 12b presents the final variogram parameters used in estimation of capped total copper. As with the indicator variograms, the total sills are normalized to “1”.

**Crown Gold Corp - Moonlight Project**  
 Uncapped tCu % Variogram parameters

**Engels (Zone 1) Uncapped tCu Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.077	0					
SPH	0.423	15.0	25.0	25.0	+15o (down)	0o (horiz.)	n135e
SPH	0.500	30.0	50.0	50.0	+15o (down)	0o (horiz.)	n135e

**Superior (Zone 2) Uncapped tCu Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.125	0.0					
SPH	0.500	40.0	35.0	12.0	+0o (horiz.)	-0o (horiz.)	n105e
SPH	0.375	70.0	60.0	55.0	+0o (horiz.)	-0o (horiz.)	n105e

*Table 12a: Variogram parameters used in estimating uncapped total copper.*

**Crown Gold Corp - Superior Project**  
 Capped tCu % Variogram parameters

**Engels (Zone 1) Capped tCu Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.114	0					
SPH	0.571	15.0	25.0	25.0	+15o (down)	0o (horiz.)	n135e
SPH	0.314	30.0	50.0	50.0	+15o (down)	0o (horiz.)	n135e

**Superior (Zone 2) Capped tCu Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.200	0.0					
SPH	0.400	40.0	35.0	12	+0o (horiz.)	-0o (horiz.)	n105e
SPH	0.400	70.0	60.0	55.0	+0o (horiz.)	-0o (horiz.)	n105e

*Table 12b: Variogram parameters used in estimating capped total copper.*

Notes: Techbase "dip" convention is positive down, negative up  
 Techbase "j" direction is by definition "i" direction minus 90°  
 Techbase "k" direction is by definition mutually orthogonal to I & j

variogram sills taken from global variograms of capped metal

variogram ranges established from global variograms as "l" ranges with multipliers based on relative anisotropies from the indicator variograms applied to calculate "j" and "k"

Additional estimating parameters include:

- maximum samples = 24;

- minimum samples = 4;
- search ellipsoid equals variogram ellipsoid;
- block discretization is 4 by 4 by 2.

## Block Model Definition

Block models were created in Techbase software. Separate block models were created for each deposit. For Engels the block model definition was:

### Engels

---

Lower-left X centroid coordinate:	691,505	Column size:	10m	Number:	151
Lower-left centroid Y coordinate:	4,454,505	Row size:	10m	Number:	101
top centroid Z coordinate:	1,775	Level size:	10m	Number:	60
Baseline azimuth:	90				

---

*Table 13a: Block model parameters for the Engels block model*

For Superior the block model definition was:

### Superior

---

Lower-left X centroid coordinate:	689,010	Column size:	20m	Number:	75
Lower-left centroid Y coordinate:	4,451,510	Row size:	20m	Number:	75
top centroid Z coordinate:	1,745	Level size:	10m	Number:	70
Baseline azimuth:	90				

---

*Table 13b: Block model parameters for the Engels block model*

## Grade Interpolation

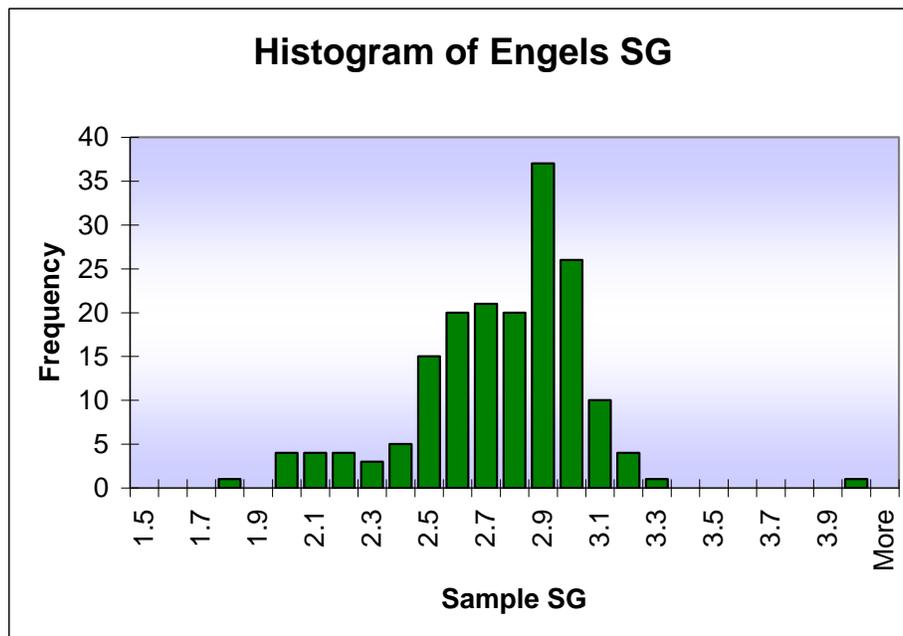
Total copper grades both capped and uncapped were interpolated by ordinary kriging using the estimating parameters described above.

## Bulk Density

Bulk density used in this resource estimate is 2.75 based on the geometric mean SG of 2.77 for 176 SG measurements taken of Engels core. A total of 180 samples were collected and measured, however four were logged as fragments of stope fill material according to the drill logs. This value was used for both Engels and Superior. There is no documentation for SG testing of Superior core.

Figure 18 presents the histogram of the measurement results. The rationale for selecting the geometric mean (2.77) rather than the arithmetic mean (2.70) is:

- that there is likely to be some correlation between SG and the degree of copper mineralization;
- Engels is largely oxidized, particularly within the elevations drilled by Sheffield from which the samples were drawn, whereas Superior is much less so.



*Figure 18: histogram of Engels SG*

There was no documentation provided to the Author describing the method of determination, or the individuals or laboratories responsible. The SG measurement values were listed in text fields in the drill logs with descriptive text included in the same field making extraction difficult.

The Author recommends that in future:

- A more rigorous program of SG determination be undertaken with effort made to measure reasonable populations of key lithologies and degrees of mineralization.
- The method of SG determination be described and documented
- The individuals or laboratories taking the measurements be documented

- The SG data be stored as numeric data in a dedicated field in the assay table to facilitate numerical analysis

## Grade Capping:

Capping values were selected to permit comparison between capped and uncapped estimate results and a determination of the need for capping.

Grade capping is most properly considered a risk management tool. The Author's approach is to evaluate the need for capping on the basis of a certain percentage of total metal contributed from a certain percentage of the highest grade composites. A typical threshold of concern might be  $\geq 10\%$  of metal deriving from  $\leq 1\%$  of composites.

The purely numerical approaches often employed in grade capping analysis appear to be more quantitative and precise than is usually the case. Numerically identical sample populations can have very different requirements for capping depending on the spatial distribution of apparent "outliers". Where "outliers" are clustered together they provide mutual support giving confidence to the existence of actual high grade zones. Where "outliers" are randomly scattered, then that validity is much more questionable. In addition, where "outliers" are clustered, the total volume affected in estimation is much less as their volumes of influence overlap. Where widely scattered, the impact is much greater as the total volume affected is maximized. Consequently a purely numerical approach to grade capping analysis is regarded by the Author as naïve.

On the basis of this approach, a single set of capped estimates were developed for both Superior and Engels to evaluate the influence of potential outliers. Engels composites were capped at 5% total copper affecting 2.8% of the total composites selected as eligible to inform the estimate. For Superior the capping value was 1.2% total copper affecting 2.0% of the total composites selected.

The capping was done according to a formula which reduced the component of grade value above the selected cap by a factor of ten. For example for a Superior composite of 7.0% total copper the capped value would be:

$$((7.0\% - 1.2\%)/10) + 1.2\% = 1.78\%$$

The capped composites are separately analyzed to establish estimating parameters and both capped and uncapped estimates generated. The difference between the two, in total metal content in the block model is then compared to evaluate the need for capping.

In the case of Engels, the component of grade above the capped value contributed only 2.04% of metal from 2.8% of composites capped. For Superior the component of grade above the capped value contributed 2.6% of metal from 2.0% of composites capped.

On the basis of these results it was concluded that capping was not necessary in either case.

## **Topographic Data:**

Pre-2005 drilling coordinates were converted from the original local grid coordinates, through California State Plane coordinates to NAD 27 coordinates. Relatively low-resolution surface topography was purchased online from Mapmart in WGS 84 format and converted to NAD 27 by the Author using the conversion utility available at ([tagis.dep.wv.gov/convert/llutm\\_conus.php](http://tagis.dep.wv.gov/convert/llutm_conus.php)) and then confirmed by checking against the conversion utility available from Cibola Search and Rescue.

It is important to note that different conversion programs available online and used in GPS equipment may produce different results for the same system-to-system conversions with relative displacements between results of several meters.

It is the Author's opinion that higher resolution topography should be established by LIDAR or photogrammetric methods in WGS 84 format and that a sufficient number and distribution of the original surface drill hole collars be located, also in WGS 84 format, to establish appropriate translation and rotation factors from the original local grid system to tie all the data together with a minimum of intermediate steps.

## **Classification**

Based on the study herein reported, delineated mineralization of the Superior Project is classified as a resource according to the following definition from National Instrument 43-101.

*"In this Instrument, the terms "mineral resource", "inferred mineral resource", "indicated mineral resource" and "measured mineral resource" have the meanings ascribed to those terms by the Canadian Institute of Mining, Metallurgy and Petroleum, as the CIM Standards on Mineral Resources and Reserves Definitions and Guidelines adopted by CIM Council on August 20, 2000, as those definitions may be amended from time to time by the Canadian Institute of Mining, Metallurgy, and Petroleum."*

*"A Mineral Resource is a concentration or occurrence of natural, solid, inorganic or fossilized organic material in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge."*

*The terms Measured, Indicated and Inferred are defined in NI 43-101 as follows:*

*“A 'Measured Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity.”*

*“An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics, can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed.”*

*“An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.”*

The reportable resources for Engels and Superior are regarded by the Author as being only of the Inferred category according to current NI 43-101 standards. In both deposits, the data density appears to be sufficient to support a higher classification however:

- For Superior the principal reason for the Inferred classification is the lack of adequate documentation relating sampling methods and protocols, assay analysis and quality assurance and quality control.
- For Engels the principal reason for this classification is the lack of appropriate sequential assay analysis sufficient for determination of the proportion of total copper that could be recovered by heap leach solvent extraction electro-winning (“SXEW”) methods.

In addition, the following conditions also limit the confidence that can be placed in the estimates:

- Historic underground mining constitutes a very significant proportion of the Engels deposit as modeled (3,360,000 short tons). The specific location and form of the stoped volume has not been modeled to the extent that permits removal of that specific portion of the block model, and the volume of material removed was based on by-bench estimates of the void volume developed from production

records and three widely-spaced stope outlines in plan. The proportion of mined volume within the raw pit shell was estimated to be 700,000 metric tonnes.

- Superior likewise had significant underground production estimated to be 1,300,000 short tons. No adjustment has been made to Superior however as this tonnage represents less than 2% of the total volume modeled for Superior and 2.4% of the mineralized volume within the constraining pit shell. The Author strongly recommends that solids capturing the stoped volume be developed from underground production level plans if possible, or by laser survey if not.

## Constraining Pits

NI 43-101 guidance does not require that resource estimates be constrained by a pit shell. Obviously for resources most likely to be exploited by underground mining methods this is appropriate. However, where the grade, geometry and proximity to surface of the grade tonnage estimates indicate that open pit mining is the most likely exploitation route, then constraining the grade tonnage estimate with a pit shell is the most reasonable method of meeting the NI 43-101 requirement that the resources demonstrate potential economic and technical recoverability. Consequently both deposits were subject to open pit analysis by Floating Cone methods.

These resources are constrained within raw pit shells in order to demonstrate the potential economic recoverability of the resources presented. These pit shell were developed using a Floating Cone program with cost parameters taken from InfoMine's Cost Mine Service. The parameters used for each pit were:

### Superior:

- mining cost: \$2.80/tonne of material mined (20ktpd processed)
- process cost: \$8.00/tonne of material processed (20ktpd flotation)
- G&A cost: \$2.00/tonne of material processed
- Metallurgical recovery: 90% of total copper
- Copper price: \$3.00/lb
- Mining recovery: 100%
- Dilution: 0%
- Overall Pit slope: 45°

### Engels:

- mining cost: \$2.80/tonne of material mined;
- process cost: \$1.35/lb Cu (10ktpd SXEW)
- G&A cost: \$2.00/tonne of material processed

- Metallurgical recovery: 80% of total copper
- Copper price: \$3.00/lb
- Mining recovery: 100%
- Dilution: 0%
- Overall Pit slope: 45°

The premise for the productivity rates upon which the operating costs are based is that the total quantum of material likely to be mined would support a mining rate of at least 20ktpd. The Engels deposit oxide material is envisioned to be campaign mined at 10ktpd within a short period and processed by heap-leach SX-EW methods providing early cash-flow to the project. The Superior deposit is envisioned to be mined at a steady-state 20ktpd through exhaustion.

The raw pit shells resulting from the above analysis are presented in Appendix D.

## **Estimation of the volume of material historically mined at Engels**

In order to account for the historically mined material at Engels in the absence of sufficient data to develop a 3D model of the void, the following was done:

The along-strike lengths of the stoped areas was taken from the long section compiled in 1980 on generally 20m vertical spacing and interpolated between to arrive at total lengths on 10m spacing corresponding to the 10m bench height in the Engels block model.

The stope width was taken from the three stope level plans available and interpolated or extrapolated between and above and below according to the judgment of the Author. The volume for each bench was then estimated assuming that the stope outlines in plan are rectangular. The total volumes were then summed and compared against the production records for total tons processed from Engels. The volume and tonnage was within 7% of the historic reported production.

## **Resource Statement**

The resource estimate developed by this study is:

<b>Engels:</b>	<b>Inferred</b>	<b>2.5Mt @1.05% total copper</b>
<b>Superior:</b>	<b>Inferred</b>	<b>54Mt @0.41% total copper</b>
<b>Total:</b>	<b>Inferred</b>	<b>57Mt @0.43% total copper</b>

These resources are constrained within raw pit shells in order to demonstrate the potential economic recoverability of the resources presented. These pit shells were developed using a Floating Cone program with cost parameters taken from InfoMine's Cost Mine Service and assumed recovery factors of 90% for flotation (Superior) and 80% for SXEW (Engels).

Engels tonnage above cutoff was further adjusted by removal of an estimate of historic mining by bench within the pit shell volume. Superior has no adjustment for the historic mining.

## **Mineral Reserve Estimates**

N/A. No Mineral Reserves are reported herein.

## **Mining Methods**

N/A. No evaluation of mining methods has been done herein except for the purposes of constraining the grade-tonnage estimates to a raw (no access design) pit shell using operating cost factors derived from cost manuals.

## **Recovery Methods**

N/A. No evaluation of metallurgical process and metal recovery has been done herein except for the purposes of constraining the grade-tonnage estimates to a raw (no access design) pit shell using operating cost factors derived from cost manuals.

Engels, being significantly oxidized, was envisioned to be treated by heap-leach SX-EW methods at 10,000 metric tonnes per day, and Superior, being much less oxidized, was envisioned to be treated by conventional flotation methods at 20,000 metric tonnes per day.

## **Project Infrastructure**

N/A. No evaluation has been done of project Infrastructure.

## **Market Studies and Contracts**

N/A. No market studies have been done or contracts made.

## **Environmental Studies, Permitting and Social or Community Impact**

Sheffield recognized from their first involvement the importance of environmental and social considerations in advancing the project.

The Forest Service reviewed Sheffield's drilling operations and reclamation work and was complimentary of the company's effort to minimize environmental impact and complete reclamation.

Sheffield has undertaken surveys to determine baseline water quality in the watersheds draining the Moonlight area from the beginning of exploration with particular attention paid to the possible impact historical mining operations in the district have had on water quality.

Water samples were taken from the only two areas with past or anticipated future mining activity. These samples were analyzed for a full suite of metals. These samples were gathered by Sheffield personnel and an independent environmental consultant.

In spite of very wide spread copper mineralization at the surface and the historical mining and milling of approximately 4 million tons of copper ore in the Lights Creek District, no copper was detected in the water sampled from various locations on Lights and Moonlight Creeks. Copper in concentrations below those deemed toxic by the State of California was detected in the water discharging from the portals at the Engels and Superior mines. In addition, the mine water showed very slightly alkaline pH from 7 to 8, which is the same as that found in Moonlight and Lights Creek.

Copper concentrations in the water being discharged from the #2 portal of the Superior Mine were observed to be higher during period periods of heavy runoff. Any copper in the water would be even more strongly diluted in Lights Creek at this time and as previously noted no copper was detected in Lights Creek at several locations downstream of the Superior Mine. Copper content at the #2 portal were determined to be higher from January to July due to rain water percolating down through the open stopes and dissolving the oxidized copper minerals. The natural groundwater coming from the #2 portal is suspected to be very low in copper.

A part of the 2006 program included an acid base accounting and water sample collection from areas down stream of the old Superior-Engels workings as well as downstream of the Moonlight deposit. This sampling was done to determine if the old workings or dumps were producing acid mine drainage. The following is a summary of the procedures for acid base accounting program as provided by R. Wetzel:

*“Acid Base Accounting (ABA) analyses were performed by ALS Chemex in Vancouver. The most important parameter determined by ABA analysis is the net neutralizing potential (NNP) which theoretically indicates whether the material will generate acid over time. NNP is determined by subtracting maximum potential acidity (MPA) from neutralizing potential (NP). Neutralizing potential is determined by treating a 2.0 g sample with a known excess volume and normality of HCl. After heating, the solution generated is titrated to pH 7 with sodium hydroxide to determine the amount of acid neutralized by the test material. This neutralizing potential is expressed as tonnes equivalent CaCO<sub>3</sub> per 1000 tonnes material.*

*Maximum potential acidity is determined by multiplying the percent total sulfur determined on a Leco Sulfur Analyzer by 31.25. MPA is also expressed as tonnes equivalent CaCO<sub>3</sub> per 1000 tonnes material.”*

The following is a summary of the procedures for acid base accounting program as provided by R. Wetzel:

*“Water Quality Samples were analyzed at State certified Sierra Foothill Laboratory in Jackson, California. Sierra Foothill Labs certifies that tests results meet all applicable NELAC requirements. Samples were taken in one liter plastic bottles provided by the lab and delivered to the Lab within 24-48 hours after being taken. They were prepared for analyses according to method EPA200.2. Copper was analyzed by FAA, arsenic by FAA and mercury by CVAA. Most other metals were analyzed by ICP.”*

Crown Gold will need to secure the professional services of environmental consultants in order to identify the number and sequence of permits that they will require in advancing the Superior Project. This process should be part of and inform the strategies for additional drilling of the deposits. The following statements can be made for exploration permitting.

#### Patented Mining Claims

No permitting is necessary for surface exploration on the patented mining claims on the Superior Project.

#### Unpatented Mining Claims

A Plan Of Operations using the Plan Of Operations For Mining Activities On National Forest System Lands form is submitted for exploration on the unpatented claims on the Superior Project. Since 2005, the exploration activities on the project have been carried out under a Categorical Exclusion. The District Ranger for Plumas National Forest granted this Categorical Exclusion stating:

*“I have determined that action is categorically excluded from documentation in an environmental impact statement or environmental assessment because it involves a short-term mineral investigation and incidental support activities (FSH 1090.15, 31.2 #8). The project does not*

*involve any extraordinary circumstances related to resource conditions (FSH 1909.15, 30.3)."*

Permitting time under a Categorical Exclusion significantly shortens permitting time to a period of approximately four to six months from the typical time of 12 to 24 months.

A new Plan Of Operations application will need to be submitted and it is anticipated that a Categorical Exclusion will be granted for future exploration.

## Capital and Operating Costs

N/A. No capital or operating cost calculations have been done for this study.

## Economic Analysis

N/A. No economic analysis has been done for this study.

## Adjacent Properties

The Moonlight Valley deposit lies within the Lights Creek Stock near its western margin approximately 4km to the west of the Superior Project area. This deposit was held by Sheffield/Nevoro and an NI 43-101 technical report and resource estimate prepared by OreQuest was completed in 2007. Moonlight Valley shares many similarities with the deposits at Superior and Sulfide Ridge, including disseminated copper mineralization and elevated iron, as well as a few differences, including iron mineralization as specular hematite rather than the magnetite present at the Superior Project deposits.

The resource estimate prepared by OreQuest at a cutoff grade of 0.2% Cu totaled:

### Indicated Resource:

**161,570,000 tons at 0.324% Cu 0.003 opt Au, 0.099 opt Ag**

### Inferred Resource:

**88,350,000 tons at 0.282% Cu, 0.003 opt Au, 0.089 opt Ag**

The Walker Mine is located at the southeast end of the Plumas Copper Belt and there are numerous small mines and copper showings between the Walker Mine and the Lights Creek District. The Walker Mine, located approximately 20 km southeast of the Moonlight property, is reported to have produced about 168 million pounds of copper, 180,000 ounces of gold and 3.6 million ounces of silver from 5.3 million tons of ore from 1916-1941. Assuming 80% recovery, the feed grade would have been 1.98% Cu, 0.85 opt

Ag, 0.041 opt Au. The copper mineralization at the Walker Mine is contained in N20W steeply northeast dipping zones of quartz, chlorite, magnetite and pyrite. Chalcopyrite is the predominant copper mineral but bornite is also abundant.

## **Other Relevant Data and Information**

The Author is not aware of other additional data or information.

## **Interpretation and Conclusions**

The geology and mineralization at Superior and Sulfide Ridge, both hosted within the quartz monzonite porphyry Lights Creek Stock, are described as copper porphyries with significant volumes of disseminated copper mineralization existing primarily on stockwork related fracture surfaces.

The mass of rock containing disseminated mineralization at Superior also contains a series of sub-parallel, tabular structures of significantly higher grade copper mineralization which were the focus of the historic underground mining. These structures have been interpreted as being truncated by low-angle faults both top and bottom. Very few drill holes test the volume below the lower inferred structure.

Mineralization at Superior appears to be predominantly sulfide (chalcopyrite and bornite) and the visually impressive copper oxides observed in the underground appear to be transported from near surface and deposited on the exposed surfaces post mining.

Mineralization at Sulfide Ridge is assumed to be predominantly sulfide (chalcopyrite and bornite).

The Engels deposit is hosted by the more mafic intrusives and metavolcanic country rock into which the Lights Creek Stock was intruded and appears to be much more structurally controlled with disseminated mineralization much more restricted than in the other two deposits and often associated with small-scale pegmatitic and metasomatic replacement textures.

Mineralization at Engels appears to be predominantly oxidized, at least within the vertical extent likely to be amenable to open pit exploitation.

The location and orientation of the existing drill holes is controlled to some extent by topography and access for surface drilling and the extent and availability of underground workings for underground drilling and, except for Sulfide Ridge do not appear to be ideal for current understanding of the fabric of mineralization, particularly Engels and Superior.

Engels drilling is tightly confined to the immediate vicinity of the historically mined volume, and does not test the along-strike, or down dip extent of mineralization.

Superior drilling appears to better define the limits of known mineralization, however the orientations are more random than ideal and additional drilling should investigate the possible existence of other high-grade structurally-controlled segregations of high-grade to the northeast and at depth.

Sulfide Ridge drilling is very widely spaced with intervals of between 100m and 200m, relatively shallow for the lateral extent of mineralization observed and entirely vertical. The grades present in the 28 drill holes were not of interest to Placer-Amex at the time of drilling and, while generally lower than those present at both Engels and Superior, indicate copper mineralization within the range of contemporary economic interest. Sulfide Ridge should be tested further with angled core holes in at least two orientations and extending to greater depth than previous drilling. The extent of copper mineralization at Sulfide Ridge is untested in any direction.

It is the Author's opinion that Sulfide Ridge presents the greatest opportunity for significant increase in the resource base within Crown Gold's land position.

Silver assays exist for the recent, (post 2004) drilling for Engels and support the reported silver recovered in the historic mining records. The total proportion of silver grades was insufficient to support independent estimation of silver as a variable. Silver assays were not available for either Superior or Sulfide Ridge. From historic production records it is likely that silver could be a significant economic contributor to the deposit with recovery in the copper concentrate from flotation. This may also be true for Sulfide Ridge.

Similarly sulfuric acid soluble copper was also analyzed for the recent drilling and demonstrates the significant degree of oxidation present at Engels. As with silver, the number of assays for acid soluble copper was deemed insufficient for independent estimation of sulfuric acid soluble copper. In addition, evaluation of the Engels deposit for SXEW vs sulfide flotation requires at least CN soluble analysis for copper in order to arrive at an accurate balance of the proportion of total copper recoverable by either method.

Sampling, sample preparation, assay analysis and QA/QC protocols are demonstrated to be consistent with current NI 43-101 standards only for the post 2004 drilling done at Engels. For all historic drilling the documentation was not available in the information supplied and the QA/QC protocols described are limited to extensive re-analysis of pulps and more limited re-analysis of split core. A small number of re-assays from original core was undertaken by Sheffield, however the sample intervals are often different from the original making comparison with the original results only possible with composites.

It is the Author's opinion that higher resolution topography should be established by LIDAR or photogrammetric methods in WGS 84 format and that a sufficient number and

distribution of the original surface drill hole collars be located, also in WGS 84 format, to establish appropriate translation and rotation factors from the original local grid system to tie all the data together with a minimum of intermediate steps.

A total of three deposits: Engels, Superior, and Sulfide Ridge were evaluated with grade-tonnage models produced for each. Of the three, only two possessed sufficient drill hole data densities to support reportable resource estimates for total copper: Engels and Superior.

The estimation process employed for all three deposits was the Probability Assigned-Constrained Kriging (PACK) approach which develops a constraining envelope using binary (0 and 1) indicators. These envelopes are then used to constrain both data available to inform blocks; and the blocks eligible to receive an estimate.

The Author concludes that the Superior Project demonstrates the presence of a significant resource with considerable upside potential for expansion through focused exploration.

Superior is the best drilled of the deposits and mineralization is largely closed off by drilling, although some potential exists to the east and south as well as at depth.

Engels possesses only a small but relatively high-grade resource, but is clearly open along strike in both directions for increasing the shallow mineralization amenable to open pit mining. The potential for additional underground material is clearly present, although exploration for such will require significant expenditure to re-open old underground workings to permit drilling.

Sulfide Ridge likely presents the greatest opportunity for significant expansion of the resource as the extent of mineralization demonstrated in the few widely spaced holes, while of lower grade than either Engels or Superior extends over 1500m north to south and 500m east to west.

Superior and Engels lie primarily on patented claims. The southern geochemical anomaly at Sulfide Ridge also lies on patented claims. These areas may be drilled without requiring Crown Gold to obtain additional permits.

The Author recommends that Crown Gold undertake a phased approach to advancing all three deposits with first priorities to include drilling to expand the shallow mineralization at Engels, drilling at Superior to offer greater confirmation of the Placer Amex drilling and supplement the lack of QA/QC documentation that hampers the confidence that can be placed in the estimate, and drilling at Sulfide Ridge to better understand the structural controls on mineralization so that a comprehensive in-fill drilling program can be designed.

The Author also recommends that less expensive, but important issues be addressed as well including:

- obtain high resolution topography and link to past drill collar coordinates;
- conduct a more focused and organized SG test program using an independent laboratory;
- re-submit the Engels pulps for sequential copper analysis to permit accurate assessment of the potential for heap leach SX-EW treatment.

## Recommendations

### EXPLORATION PERMITTING

#### Patented Mining Claims

No permitting is necessary for surface exploration on the patented mining claims on the Superior Project.

#### Unpatented Mining Claims

A Plan Of Operations using the Plan Of Operations For Mining Activities On National Forest System Lands form is submitted for exploration on the unpatented claims on the Superior Project. Since 2005, the exploration activities on the project have been carried out under a Categorical Exclusion. The District Ranger for Plumas National Forest granted this Categorical Exclusion stating:

*“I have determined that action is categorically excluded from documentation in an environmental impact statement or environmental assessment because it involves a short-term mineral investigation and incidental support activities (FSH 1090.15, 31.2 #8). The project does not involve any extraordinary circumstances related to resource conditions (FSH 1909.15, 30.3).”*

Permitting time under a Categorical Exclusion significantly shortens permitting time to a period of approximately four to six months from the typical time of 12 to 24 months.

A new Plan Of Operations application will need to be submitted and it is anticipated that a Categorical Exclusion will be granted for future exploration.

Work recommended for the Superior Project includes:

- Drilling at Engels to confirm and expand the resource,
- Drilling at Superior to confirm and expand the resource, and
- Drilling at Sulfide Ridge to understand controls on mineralization.

Work and budgetary recommendations for the remainder of 2013 and 2014 are divided into three (3) phases. A total budget of \$1,720,637 is recommended.

## Phase 1

Expenditure will total \$83,287 for data review, data compilation, geophysical data review, permitting, aerial photography/topo map production, pulp re-analyses, specific gravity analyses, drill targeting and other activities prior to initial drilling in Phase 2.

CATEGORY	UNIT	UNIT COST	# OF UNITS	SUBTOTAL
Data Review	Daily Rate	\$650	5	\$3,250
Data Compilation	Daily Rate	\$650	17	\$11,050
Geophysical Data Review	Report	\$5,000	1	\$5,000
Permitting	Report	\$10,000	1	\$10,000
Aerial Photography/Topo Map	Photos/Map	\$15,000	1	\$15,000
Pulp Re-Analysis	Pulp	\$40	500	\$20,000
Specific Gravity Analyses	Sample	\$15	200	\$3,000
Drill Targeting	Daily Rate	\$650	10	\$6,500
	Nightly			
Lodging	Rate	\$95	5	\$475
Meals	Daily Total	\$60	5	\$300
Vehicle Mileage	Mile	\$1	400	\$340
Scanning/Copying	Document	\$500	1	\$500
Miscellaneous		\$300	1	\$300
			<b>Subtotal</b>	<b>\$75,715</b>
			Contingency	\$7,572
			<b>Total</b>	<b><u>\$83,287</u></b>

*Table 14: Phase 1 recommendations and budget*

## Phase 2

Expenditure will total \$463,925 for the drilling of 1,200 meters to test the strike extensions of mineralization at Engels.

CATEGORY	UNIT	UNIT COST	# OF UNITS	SUBTOTAL
Project Manager	Daily Rate	\$650	30	\$19,500
Geologist	Daily Rate	\$500	30	\$15,000
Geotech (Core Cutting, Sampling)	Daily Rate	\$250	30	\$7,500
Drill Site Construction	Hour	\$140	15	\$2,100
Core Drilling (All Direct Costs)	Meter	\$275	1,200	\$330,000

Assays	Sample Nightly	\$30	1,000	\$30,000
Lodging	Rate	\$95	90	\$8,550
Meals	Daily Total	\$60	90	\$5,400
Vehicle Mileage	Mile	\$1	2,000	\$1,700
Miscellaneous		\$2,000	1	\$2,000
			<b>Subtotal</b>	<b>\$421,750</b>
			Contingency	\$42,175
			<b>Total</b>	<b><u>\$463,925</u></b>

*Table 15: Phase 2 recommendations and budget*

### Phase 3

Expenditure will total \$1,169,685 for the drilling of 3,000 meters at Engels, Sulfide Ridge and Superior.

CATEGORY	UNIT	UNIT COST	# OF UNITS	SUBTOTAL
Project Manager	Daily Rate	\$650	90	\$58,500
Geologist	Daily Rate	\$500	90	\$45,000
Geotech (Core Cutting, Sampling)	Daily Rate	\$250	90	\$22,500
Drill Site Construction	Hour	\$140	30	\$4,200
Core Drilling (All Direct Costs)	Meter	\$275	3,000	\$825,000
Assays	Sample Nightly	\$30	2,500	\$75,000
Lodging	Rate	\$95	90	\$8,550
Meals	Daily Total	\$60	270	\$16,200
Vehicle Mileage	Mile	\$1	4,000	\$3,400
Miscellaneous		\$5,000	1	\$5,000
			<b>Subtotal</b>	<b>\$1,063,350</b>
			Contingency	\$106,335
			<b>Total</b>	<b><u>\$1,169,685</u></b>

*Table 16: Phase 3 recommendations and budget*

### Fixed Costs

The fixed costs totaling \$56,540 are detailed in the following table.

<b>CATEGORY</b>	<b>UNIT</b>	<b>UNIT COST</b>	<b># OF UNITS</b>	<b>SUBTOTAL</b>
Core Shack Rental	Monthly Rate	\$700	12	\$8,400
Property Payment	Annual Payment	\$20,000	1	\$20,000
Claim Holding Costs	Annual Payment	\$18,000	1	\$18,000
Miscellaneous		\$5,000	1	\$5,000
			<b>Subtotal</b>	<b>\$51,400</b>
			Contingency	\$5,140
			<b>Total</b>	<b><u>\$56,540</u></b>

*Table 17: Fixed costs associated with the recommended activities*

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### **CERTIFICATE OF AUTHOR**

I, William F. Tanaka, do hereby certify that:

1. I am a consulting geological engineer with an office at 11675 W. 35<sup>th</sup> Avenue, Wheat Ridge, Colorado, USA.
2. I am a 1984 graduate of the Colorado School of Mines with a B.Sc. in Geological Engineering.
3. I am a Fellow in good standing of the Australasian Institute of Mining and Metallurgy and a Member in good standing of the Society for Mining, Metallurgy and Exploration.
4. I have practiced my profession continuously since 1984. I have completed resource estimation and mining studies for over 28 years on a wide variety of base and precious metal deposits. I have worked on porphyry copper deposits in North, Central and South America and Australia, as well as sedimentary and IOCG copper deposits in North and South America and Africa.
5. I have read the definition of “qualified person” set out in National Instrument 43-101 and certify that by reason of education, experience, independence and affiliation with a professional association, I meet the requirements of an Independent Qualified Person as defined in National Policy 43-101.
6. I am the primary Author of this report titled “Technical Report and Resource Estimate for the Superior Project Plumas County, California” prepared for Crown Gold Corporation; dated November 15, 2013, and refiled on November 7, 2014 and am responsible for all sections of this technical report. This technical report is based on a personal site visit on August 18<sup>th</sup> and 19<sup>th</sup> 2013 and study of data and literature on the Superior and Engels copper deposits.
7. I have not previously worked on this property.
8. I am independent of Crown Gold Corporation applying all the tests in Section 1.5 of NI 43-101.
9. To the best of my knowledge, information and belief, this technical report contains all of the scientific and technical information that is required to be disclosed to make this technical report not misleading.
10. I have read NI 43-101 and NI 43-101F1 and the technical report has been prepared in compliance with that instrument and form.

Dated this 7th day of November 2014.



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William F. Tanaka; FAusIMM; Independent Mineral Consultant

## **Appendix A: Claim Information**



<b>Claim Name</b>	<b>Claim No.</b>	<b>CAMC</b>	<b>Area (acres)</b>	<b>Area (hectares)</b>	<b>Book</b>	<b>Recording Date</b>	<b>Expiry Date</b>
Teagan	132	286058	20.66	8.36	2006	3-Aug-06	31-Aug-14
Teagan	133	286059	20.66	8.36	2006	4-Aug-06	31-Aug-14
Teagan	134	285666	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	135	285667	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	136	285668	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	137	285669	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	138	285670	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	139	285671	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	140	285672	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	141	285673	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	142	285674	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	143	285675	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	144	285676	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	145	285677	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	146	285678	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	147	285679	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	155	285687	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	157	285689	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	158	285690	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	159	285691	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	160	285692	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	161	285693	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	162	285694	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	163	285695	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	164	285696	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	165	285697	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	166	285698	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	167	285699	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	168	285700	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	169	285701	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	170	285702	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	171	285703	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	172	285704	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	173	285705	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	175	285707	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	176	285708	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	177	285709	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	178	285710	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	179	285711	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	180	285711	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	185	285717	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	186	285718	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	211	285731	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	212	285732	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	213	285733	20.66	8.36	2006	15-Jun-06	31-Aug-14

Teagan	214	285734	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	215	285735	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	219	286549	20.66	8.36	2006	19-Oct-06	31-Aug-14
Teagan	220	286550	20.66	8.36	2006	19-Oct-06	31-Aug-14
Teagan	221	285736	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	222	285737	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	228	285738	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	229	285739	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	250	285740	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	251	285741	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	252	285742	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	253	285743	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	254	285744	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	255	285745	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	256	285746	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	257	285747	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	258	285748	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	259	285749	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	260	285750	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	261	285751	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	262	285752	20.66	8.36	2006	15-Jun-06	31-Aug-14
Teagan	341	289223	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	342	289224	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	343	289225	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	344	289226	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	345	289227	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	346	289228	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	347	289229	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	348	289230	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	349	289231	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	350	289232	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	351	289233	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	352	289234	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	353	289240	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	354	289241	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	355	289242	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	356	289243	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	357	289244	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	358	289245	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	359	289246	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	360	289247	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	361	289248	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	362	289249	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	363	289250	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	364	289251	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	365	289252	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	366	289253	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	367	289254	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	368	289255	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	369	289256	20.66	8.36	2007	5-Jun-07	31-Aug-14

Teagan	370	289257	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	371	289258	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	372	289259	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	373	289260	20.66	8.36	2007	5-Jun-07	31-Aug-14
Teagan	410	293334	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	411	293335	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	412	293336	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	413	293337	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	414	293338	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	415	293339	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	416	293340	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	417	293341	20.66	8.36	2008	8-Oct-08	31-Aug-14
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Teagan	501	293347	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	502	293348	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	503	293349	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	504	293350	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	505	293351	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	506	293352	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	507	293353	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	510	293354	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	539	293385	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	540	293386	20.66	8.36	2008	8-Oct-08	31-Aug-14
Teagan	541	293733	20.66	8.36	2011	15-Aug-11	31-Aug-14
Teagan	542	293734	20.66	8.36	2011	15-Aug-11	31-Aug-14
Teagan	543	293735	20.66	8.36	2011	15-Aug-11	31-Aug-14
Teagan	544	293736	20.66	8.36	2011	15-Aug-11	31-Aug-14
Teagan	545	293737	20.66	8.36	2011	15-Aug-11	31-Aug-14
Teagan	546	293738	20.66	8.36	2011	15-Aug-11	31-Aug-14
Teagan	547	293739	20.66	8.36	2011	15-Aug-11	31-Aug-14
Teagan	548	293740	20.66	8.36	2011	15-Aug-11	31-Aug-14
Teagan	549	293741	20.66	8.36	2011	15-Aug-11	31-Aug-14
Teagan	550	293742	20.66	8.36	2011	15-Aug-11	31-Aug-14

## **Appendix B: Listing of Drill Holes Used in Resource Estimates**

original dh_id	renamed dh_id	UTM NAD27 x	UTM NAD27 y	z	td (m)
07 E 01	07-E-01	692302.79	4455058.94	5466.74	58.00
07 E 02	07-E-02	692301.85	4455059.02	5466.47	44.81
07 E 03	07-E-03	692289.99	4455055.13	5463.45	31.70
07 E 04	07-E-04	692290.64	4455055.19	5463.71	37.80
07 E 05	07-E-05	692262.12	4455044.39	5455.18	41.79
07 E 06	07-E-06	692261.41	4455044.95	5455.31	35.69
07 E 07	07-E-07	692148.66	4455064.32	5405.61	243.60
07 E 08	07-E-08	692345.68	4455014.83	5514.71	73.76
07 E 09	07-E-09	692367.20	4455013.31	5517.32	74.40
07 E 10	07-E-10	692403.29	4455018.30	5527.36	106.41
07 E 11	07-E-11	692327.92	4455021.61	5514.92	102.41
07 E 12	07-E-12	692330.67	4455022.21	5515.74	58.49
07 E 13	07-E-13	692277.62	4455049.49	5459.46	81.59
07 E 14	07-E-14	692272.78	4455023.14	5446.23	54.01
07 E 15	07-E-15	692272.78	4455023.14	5446.23	91.50
07 E 16	07-E-16	692272.78	4455023.14	5446.23	57.61
07 E 17	07-E-17	692220.59	4455024.99	5413.03	91.81
07 E 18	07-E-18	692223.13	4455026.37	5412.80	78.39
07 E 19	07-E-19	692242.04	4455013.44	5416.70	65.20
07 E 20	07-E-20	692243.34	4455012.05	5417.37	89.31
07 E 21	07-E-21	692244.65	4455009.74	5417.55	71.02
07 E 22	07-E-22	692175.40	4455021.49	5381.40	67.70
07 E 23	07-E-23	692173.86	4455021.93	5381.17	31.09
07 E 24	07-E-24	692263.00	4455051.00	5483.00	117.10
07 E 25	07-E-25	692293.00	4455058.00	5499.00	64.92
07 E 26	07-E-26	692292.00	4455066.00	5485.00	85.10
07 E 27	07-E-27	692292.00	4455066.00	5485.00	56.08
07 E 28	07-E-28	692275.00	4455048.00	5465.00	71.63
07 E 29	07-E-29	692294.00	4455067.00	5485.00	56.69
07 E 30	07-E-30	692294.00	4455067.00	5485.00	54.89
07 E 31	07-E-31	692298.00	4455063.00	5495.00	53.04
07 E 32	07-E-32	692298.00	4455063.00	5495.00	73.18
08 E 33	08-E-33	692321.71	4455055.84	5477.15	55.50
08 E 34	08-E-34	692355.87	4455059.38	5509.28	76.81
08 E 35	08-E-35	692354.34	4455061.43	5509.21	52.70
08 E 36	08-E-36	692339.20	4455046.46	5508.30	57.30
08 E 37	08-E-37	692230.11	4454956.13	5382.66	147.37
08 E 38	08-E-38	692231.13	4454955.37	5382.92	47.30
08 E 39	08-E-39	692216.49	4454976.15	5382.44	66.81
08 E 40	08-E-40	692096.92	4454979.05	5400.53	153.92
08 E 41	08-E-41	692116.25	4455068.35	5409.45	153.31
08 E 42	08-E-42	692110.00	4454999.00	5421.00	131.06
08 E 43	08-E-43	692154.00	4455124.00	5475.00	152.40
08 E 44	08-E-44	692121.00	4454878.00	5381.00	147.83
DDH 01	DDH-01	689567.05	4452500.93	4139.84	61.48
DDH 01A	DDH-01A	690012.67	4450632.97	5074.00	461.77
DDH 01C	DDH-01C	690137.29	4451436.90	5619.52	102.41
DDH 01D	DDH-01D	689914.87	4451871.87	5328.32	98.15
DDH 02	DDH-02	689533.62	4452384.87	4259.21	116.43
DDH 02A	DDH-02A	691036.24	4455275.65	5480.00	110.34

DDH 02B	DDH-02B	690807.88	4454925.00	5270.00	102.41
DDH 02C	DDH-02C	691435.66	4454961.33	5300.00	105.46
DDH 02D	DDH-02D	692095.33	4455183.01	5445.39	173.74
DDH 02E	DDH-02E	690981.09	4455209.16	5450.00	106.38
DDH 04	DDH-04	689634.14	4452541.81	4117.87	45.72
DDH 07	DDH-07	689541.52	4452185.96	4473.00	153.16
DDH 08	DDH-08	689678.24	4452464.82	4305.00	103.63
DDH 11	DDH-11	689750.49	4452401.62	4485.00	190.80
DDH 13	DDH-13	689761.37	4452312.29	4595.05	265.79
DDH 16	DDH-16	689916.06	4452402.45	4564.00	139.29
DDH 18	DDH-18	689958.31	4452321.78	4653.10	291.69
DDH 19	DDH-19	689934.74	4452436.27	4520.12	196.60
DDH 20	DDH-20	689484.97	4452337.59	4190.08	69.49
DDH 21	DDH-21	689472.85	4452406.63	4121.00	66.14
DDH 22	DDH-22	689886.82	4452243.74	4811.42	330.71
DDH 23	DDH-23	689963.65	4452491.95	4454.08	115.21
DDH 25	DDH-25	689780.25	4452120.64	4834.14	276.15
DDH 28	DDH-28	689219.52	4452507.40	3898.94	105.16
DDH 29	DDH-29	689651.65	4451908.67	4996.43	71.32
DDH 30	DDH-30	689396.83	4452492.05	3908.00	67.67
DDH 31	DDH-31	689839.02	4451911.89	5214.78	209.09
DDH 32	DDH-32	689426.53	4452799.41	4012.82	58.22
DDH 33	DDH-33	690214.96	4452402.34	4383.92	68.28
DDH 34	DDH-34	690221.05	4451923.42	4968.20	65.53
DDH 35	DDH-35	690134.13	4452171.04	4820.54	68.58
DDH 36	DDH-36	690011.57	4452048.21	5080.47	138.99
DDH 37	DDH-37	689559.28	4452085.49	4675.79	53.04
DDH 38	DDH-38	689909.56	4452009.69	5158.27	187.15
DDH 39	DDH-39	689521.92	4452471.53	4082.00	63.70
DDH 40	DDH-40	689504.41	4452352.79	4231.00	96.93
DDH A1	DDH-A1	690886.68	4454421.12	5312.32	61.75
DDH A2	DDH-A2	690896.10	4453969.34	5084.37	111.56
DDH A3	DDH-A3	690860.71	4453803.17	4895.44	107.59
DDH A4	DDH-A4	690919.27	4454162.78	5280.94	202.39
E01	E01	692272.61	4455102.35	5497.18	101.80
E02	E02	692300.47	4455058.65	5468.49	37.49
E03	E03	692567.34	4455065.78	5497.62	120.40
E04	E04	692449.07	4455140.04	5628.53	147.07
E05	E05	692371.64	4455142.32	5608.86	131.06
E06	E06	692193.78	4454993.38	5335.45	183.79
E07	E07	692111.00	4454992.00	5399.87	184.10
E08	E08	692158.62	4455116.03	5433.33	183.79
E09	E09	692250.73	4455201.31	5533.10	182.88
E10	E10	692320.05	4454938.51	5419.45	182.88
ME09-01	ME09-01	692294.00	4455060.00	5463.50	76.20
ME09-02	ME09-02	692295.00	4455060.00	5463.50	40.84
ME09-03	ME09-03	692261.00	4455057.00	5453.00	57.91
ME10-04	ME10-04	692310.00	4455068.00	5465.00	96.01
ME10-05	ME10-05	692287.00	4455066.00	5460.00	62.64
ME10-06	ME10-06	692372.00	4455151.00	5600.00	106.68
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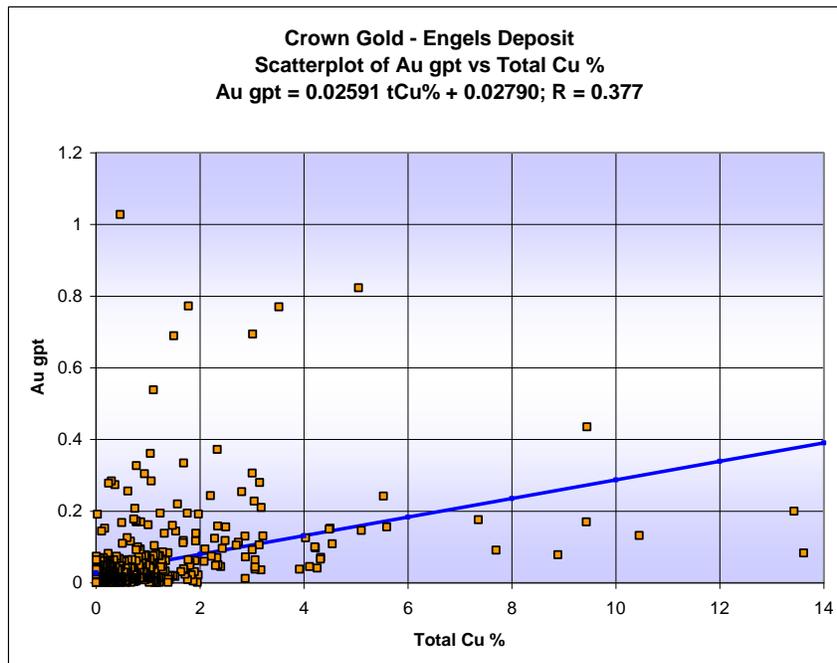
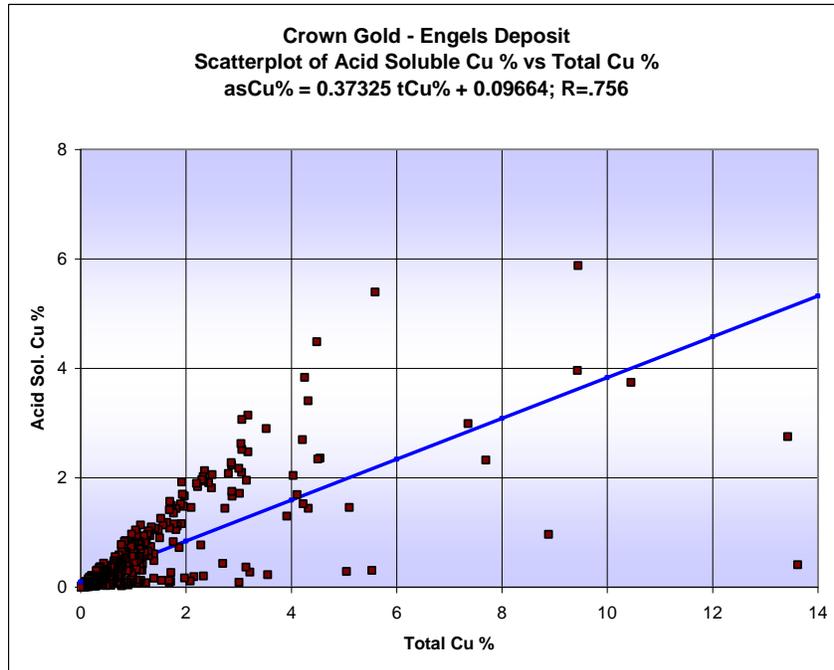
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S 07	S-07	689742.89	4451996.33	4990.65	123.14
S 08	S-08	689822.37	4452007.34	5057.28	266.70
S 09	S-09	689999.81	4452021.22	5127.27	30.48
S 10	S-10	690071.21	4452026.93	5135.62	207.57
S 12	S-12	689716.36	4452091.81	4804.81	115.21
S 13	S-13	689860.62	4452094.75	4990.63	316.08
S 14	S-14	689933.64	4452091.61	5045.54	284.38
S 15	S-15	689999.86	4452095.78	4979.20	243.54
S 16	S-16	690090.20	4452100.49	5017.39	200.56
S 18	S-18	689625.65	4452169.64	4568.53	106.68
S 19	S-19	689690.41	4452163.46	4688.28	266.40
S1L 10	S1L-10	689795.42	4452331.93	4102.81	240.79
S1L 11	S1L-11	689613.49	4452304.95	4101.06	109.73
S1L 12	S1L-12	689614.67	4452305.53	4101.06	70.10
S1L 13	S1L-13	689546.11	4452449.71	4094.76	73.15
S1L 14	S1L-14	689791.30	4452327.12	4102.76	257.56
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S1L 19	S1L-19	689599.39	4452477.29	4099.48	168.86
S1L 20	S1L-20	689988.68	4452328.04	4107.78	199.95
S1L 21	S1L-21	690003.70	4452333.87	4108.03	230.43
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S 21	S-21	689852.03	4452167.80	4870.74	326.44
S 22	S-22	689915.26	4452167.20	4924.20	343.51
S 23	S-23	689994.79	4452191.41	4805.83	269.44
S 24	S-24	690063.07	4452167.57	4877.98	278.59
S 25	S-25	690196.51	4452187.22	4814.87	105.77
S 26	S-26	689510.50	4452226.24	4372.16	131.06
S 27	S-27	689578.24	4452239.13	4416.64	158.50
S 28	S-28	689671.79	4452240.55	4573.96	180.14
S 29	S-29	689749.59	4452263.35	4597.58	232.26
S2L 13	S2L-13	689814.86	4452302.74	3917.55	182.18
S2L 14	S2L-14	689854.14	4452248.95	3918.80	131.92
S2L 15	S2L-15	689693.32	4452359.97	3915.32	19.96
S2L 16	S2L-16	689878.35	4452319.01	3923.95	185.32
S2L 17	S2L-17	689872.78	4452319.44	3922.42	61.87
S2L 18	S2L-18	689953.38	4452261.49	3924.85	83.82
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S2L 20	S2L-20	689656.53	4452114.27	3919.62	121.92
S2L 21	S2L-21	689683.11	4452093.65	3924.90	213.66
S2L 22	S2L-22	689603.19	4452404.26	3917.15	77.11
S2L 23	S2L-23	689650.07	4452405.73	3914.55	53.64
S2L 24	S2L-24	689634.12	4452398.86	3917.67	91.44
S 30	S-30	689809.03	4452243.12	4724.26	125.58
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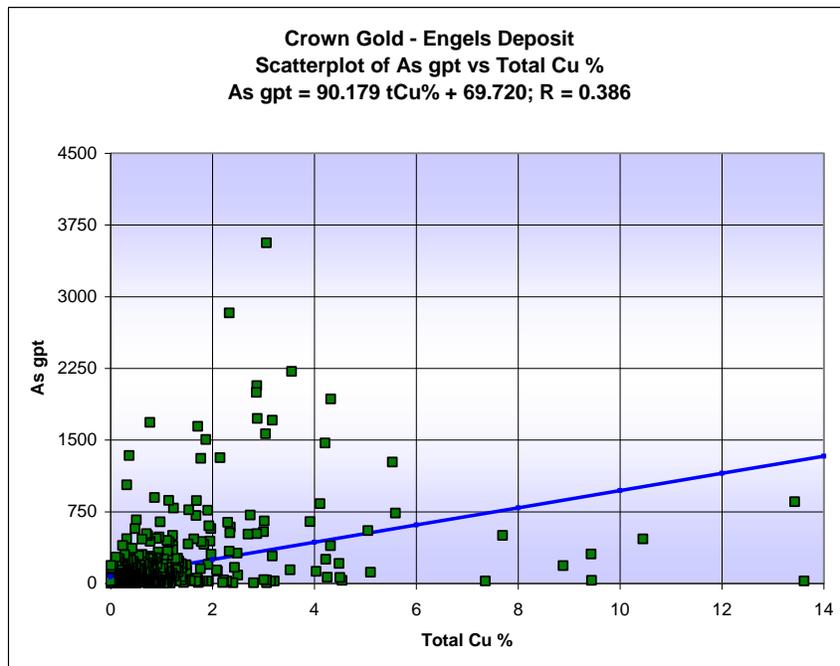
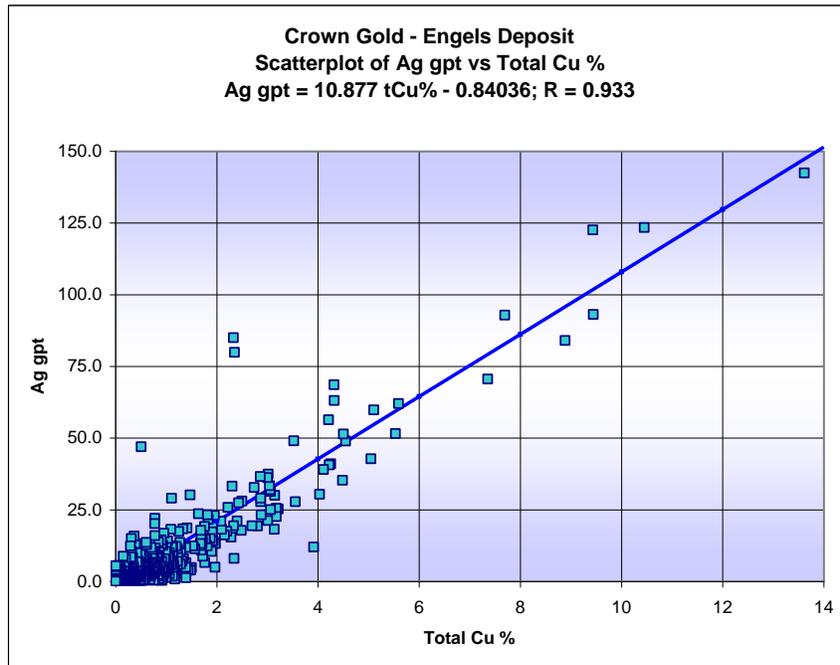
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S 35	S-35	690271.99	4452239.63	4654.38	22.86
S 36	S-36	689617.53	4452307.13	4433.39	207.26
S 36 A	S-36-A	689567.23	4452286.76	4371.59	196.60
S 37	S-37	689687.50	4452318.68	4449.46	196.90
S 38	S-38	689825.25	4452316.77	4683.69	235.92
S 39	S-39	689893.73	4452321.19	4714.93	108.81
S 40	S-40	690029.91	4452328.54	4550.00	188.37
S 41	S-41	690104.17	4452326.50	4576.44	156.06
S 42	S-42	690190.06	4452335.98	4519.19	148.44
S 43	S-43	689620.41	4452380.33	4303.88	135.64
S 44	S-44	689682.77	4452407.51	4383.76	118.26
S 45	S-45	689809.31	4452395.95	4539.60	256.03
S 46	S-46	689861.04	4452398.75	4553.16	202.69
S 47	S-47	689989.26	4452397.58	4538.72	226.77
S 48	S-48	690034.09	4452410.16	4424.89	130.45
S 49	S-49	690155.70	4452403.29	4423.26	35.05
S 50	S-50	689663.74	4452512.44	4215.94	30.18
S 51	S-51	689741.46	4452466.10	4357.65	102.72
S 52	S-52	689833.72	4452483.69	4385.53	124.97
S 53	S-53	689892.80	4452479.67	4420.70	144.17
S 54	S-54	690018.92	4452479.76	4401.55	123.44
S 55	S-55	689937.45	4452552.93	4335.79	138.07
S 57	S-57	690013.09	4452560.32	4345.75	146.91
S 59	S-59	690051.70	4451935.70	5263.13	185.93
S 60	S-60	689996.43	4451874.47	5396.91	98.15
S 61	S-61	690115.97	4451947.87	5152.21	96.01
S 62	S-62	689841.23	4451844.50	5228.16	165.51
S 63	S-63	690071.02	4451868.84	5286.86	152.40
S 64	S-64	690147.92	4451870.50	5144.64	152.40
S 65	S-65	689996.75	4451788.95	5442.98	158.50
S 66	S-66	690013.34	4451581.30	5539.25	295.66
S 67	S-67	689416.93	4451432.87	4460.00	223.11
S 68	S-68	690743.58	4452344.14	4460.00	131.98
S 69	S-69	691006.38	4452011.72	4870.00	169.47
SR 001 A	SR-001-A	690852.96	4455226.13	5230.00	156.06
SR 002	SR-002	690782.45	4454084.18	4958.63	56.08
SR 003	SR-003	690761.14	4455173.84	5030.00	44.20
SR 004	SR-004	690795.76	4454509.14	5130.00	135.64
SR 005	SR-005	690793.54	4454309.99	5223.14	107.90
SR 009	SR-009	691227.32	4455210.07	5360.00	45.72
SR 012	SR-012	690909.81	4453899.97	4976.53	50.29
SR 100	SR-100	691333.26	4455521.11	5060.00	152.40
SR 101	SR-101	691126.21	4454883.81	5540.00	245.67
SR 102	SR-102	691057.07	4455020.99	5500.00	152.40
SR 103	SR-103	691258.13	4454887.43	5450.00	188.06
SR 104	SR-104	691590.38	4454912.07	5310.00	173.74
SR 105	SR-105	691067.72	4454725.55	5640.00	254.81
SR 106	SR-106	691161.54	4454513.20	5420.00	177.39
SR 107	SR-107	691857.53	4454978.20	5320.00	146.61
SR 108	SR-108	691281.77	4454666.96	5400.00	242.93

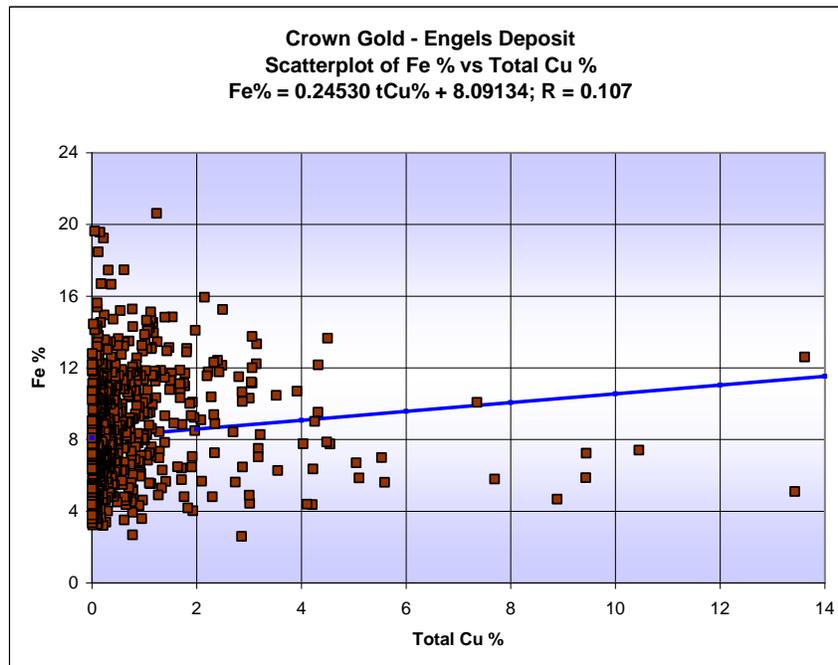
SR 109	SR-109	691149.68	4454208.22	5000.00	164.59
SR 110	SR-110	691361.53	4454347.75	5030.00	126.19
SR 111	SR-111	690755.13	4455423.24	4950.00	144.48
SUA 01	SUA-01	689671.62	4452341.01	4407.50	94.49
SUA 02	SUA-02	689766.01	4452336.38	4410.60	140.21
SUA 03	SUA-03	689900.61	4452354.09	4411.25	51.82
SUA 04	SUA-04	689951.88	4452310.12	4412.10	54.86
SUA 05	SUA-05	689835.94	4452311.65	4412.57	54.86
US 1	US-1	690771.87	4451213.79	6012.95	41.91
US 1 A	US-1A	690771.87	4451213.79	6012.95	38.10
US 2	US-2	690634.04	4451141.00	6156.10	153.31

## **Appendix C: Exploratory Data Analysis**

## Bivariate Statistics: Engels Composites







## Indicator Threshold Grade Selection Analysis

### Engels composite cutoff value analysis

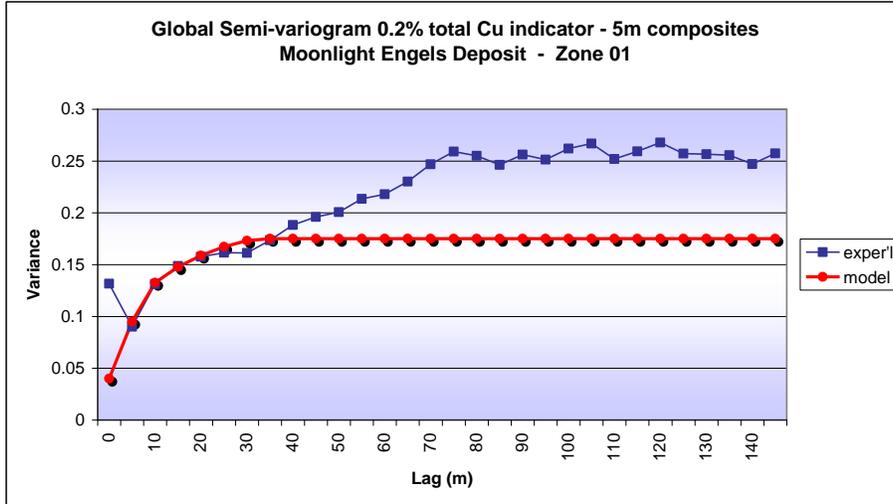
cutoff	avg grade	# of comps (tonnes)	% metal	% grade	% tonnes	% metal	change in grade	change in tonnes	change in metal
0.050	0.852	633	539	100%	100%	100%			
0.100	1.014	524	532	119%	83%	99%	0.162	109	8
0.150	1.117	470	525	131%	74%	97%	0.103	54	7
<b>0.200</b>	<b>1.210</b>	<b>428</b>	<b>518</b>	<b>142%</b>	<b>68%</b>	<b>96%</b>	<b>0.093</b>	<b>42</b>	<b>7</b>
0.250	1.298	393	510	152%	62%	95%	0.088	35	8

### Superior composite cutoff value analysis

cutoff	avg grade	# of comps (tonnes)	% metal	% grade	% tonnes	% metal	change in grade	change in tonnes	change in metal
0.050	0.218	2988	651	100%	100%	100%			
0.100	0.218	2988	651	100%	100%	100%	0.000	0	0
0.150	0.266	2380	632	122%	80%	97%	0.048	608	18
<b>0.200</b>	<b>0.317</b>	<b>1846</b>	<b>584</b>	<b>145%</b>	<b>62%</b>	<b>90%</b>	<b>0.051</b>	<b>534</b>	<b>48</b>
0.250	0.358	1427	511	164%	48%	79%	0.041	419	74

# Indicator Variography

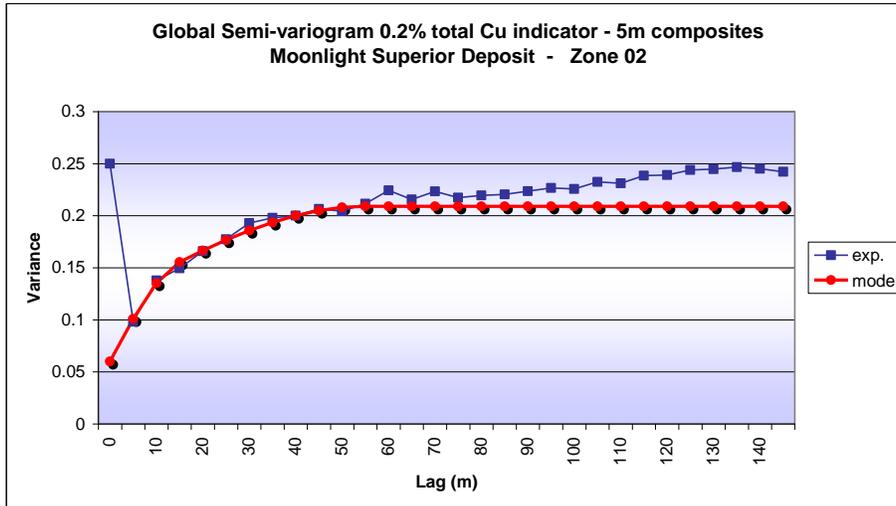
## Global Indicator Variograms



	Sill	Range
C0	0.229	0.0
C1	0.371	12.0
C2	0.400	35.0

i\_p20t

1

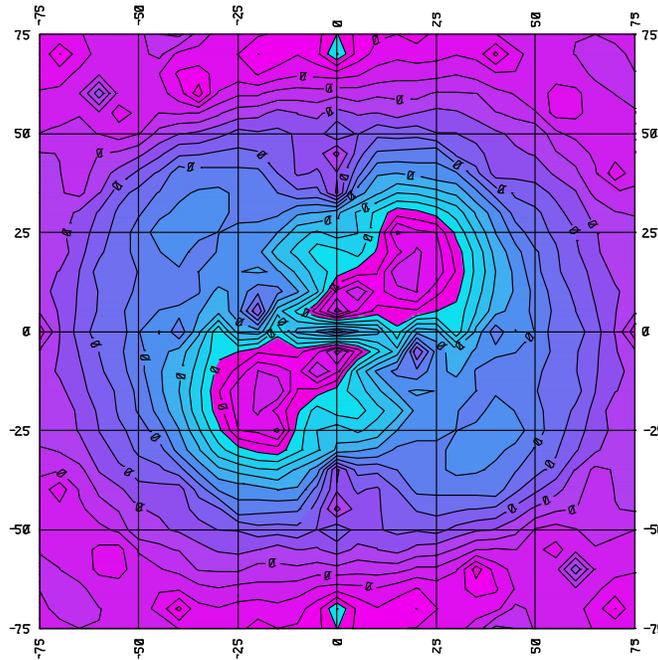


	Sill	Range
C0	0.287	0.0
C1	0.287	15.0
C2	0.426	55.0

i\_p20t

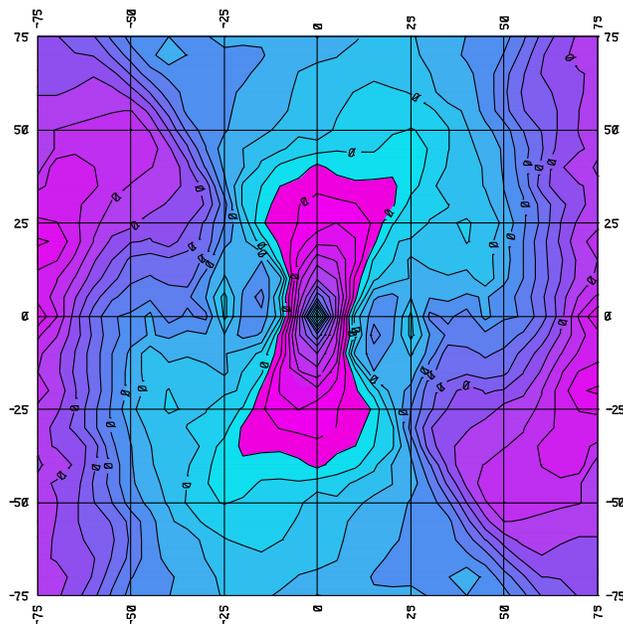
2

**Engels Variance Contour Maps:**



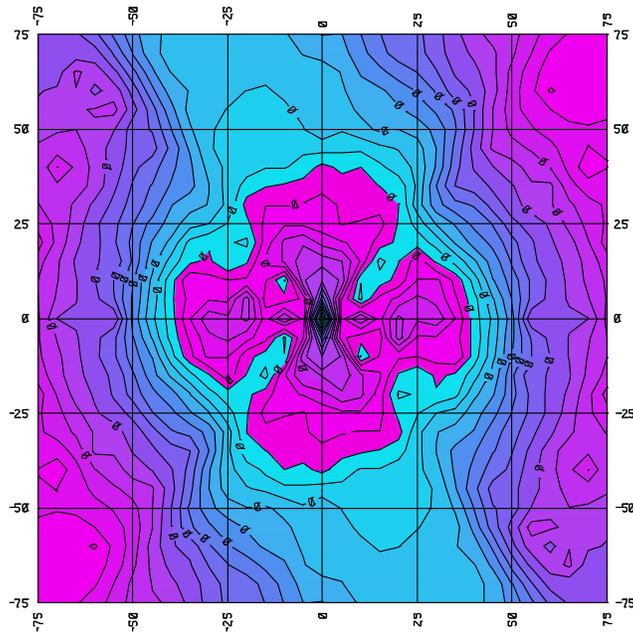
VARIANCE\* [ \_P2 ZONE 1 (ENGELS) ] - PLAN VIEW

LOOKING DOWN



VARIANCE\* [ \_P2 ZONE 1 (ENGELS) ] - XS VIEW

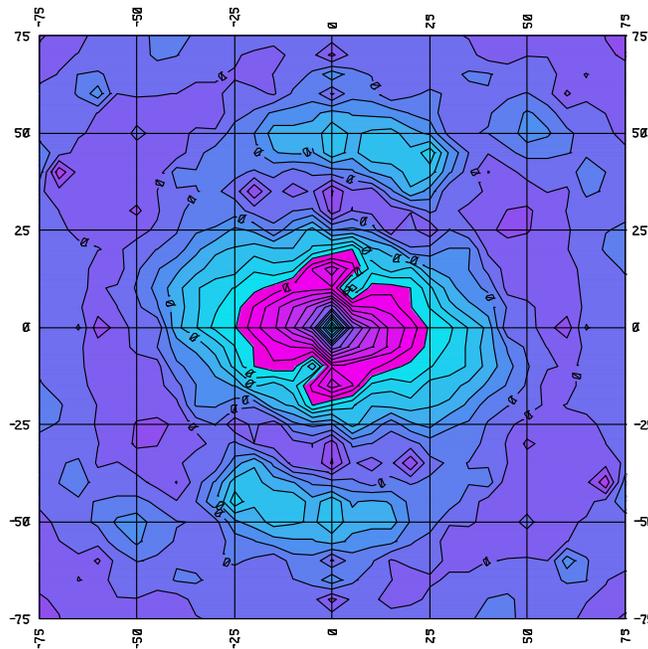
LOOKING N45E



VARIANCE\* [ \_P2 ZONE 1 (ENGELS) - LS VIEW

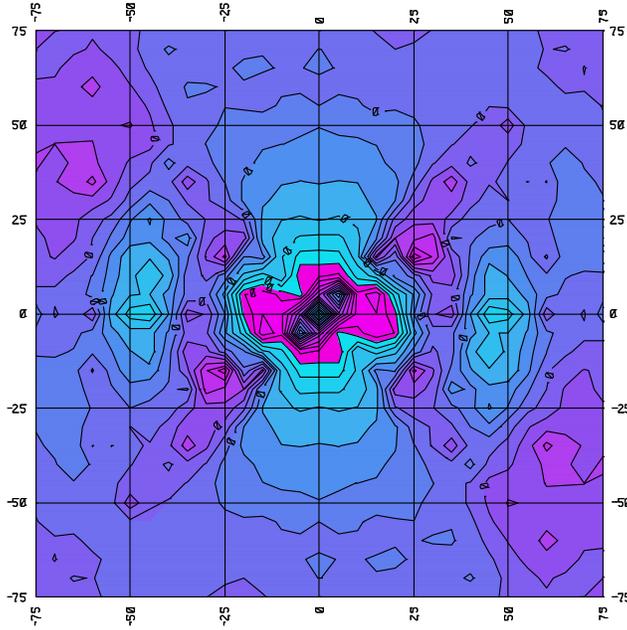
LOOKING N45W

### Superior Variance Contour Maps



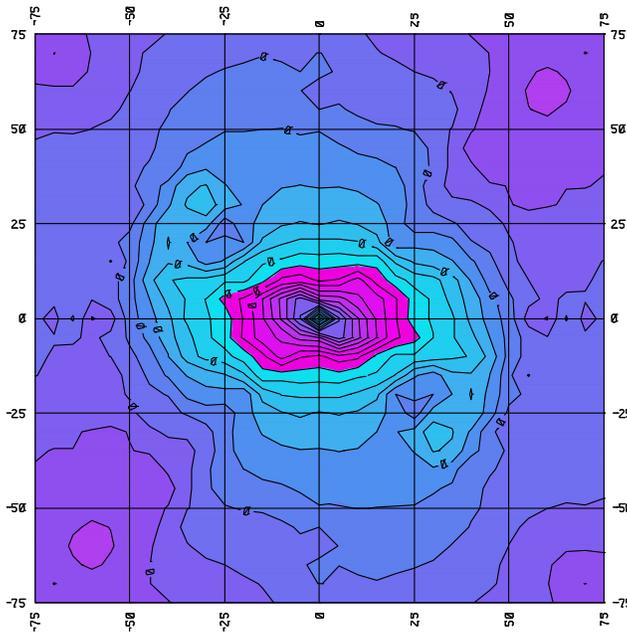
VARIANCE\* [ \_P2 ZONE 2 (SUPERIOR) - PLAN VIEW

LOOKING DOWN



VARIANCE\* I\_P2 ZONE 2 (SUPERIOR) - XS VIEW

LOOKING N75W

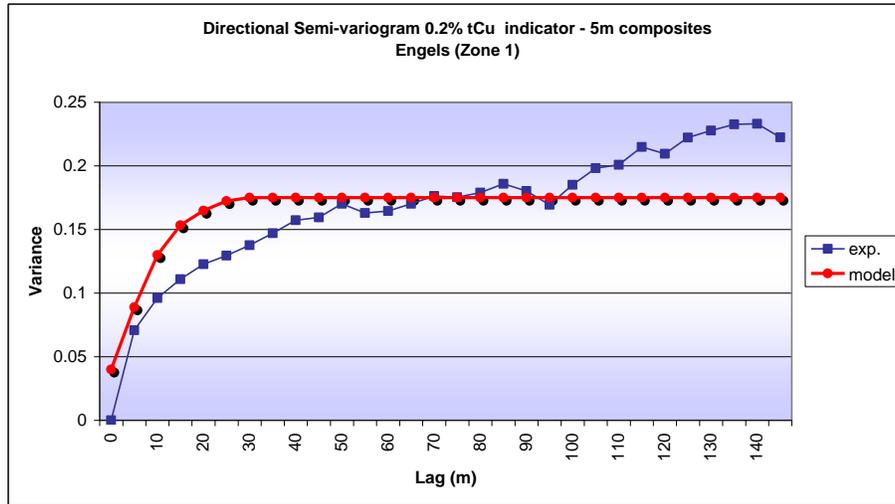


VARIANCE\* I\_P2 ZONE 2 (SUPERIOR) - LS VIEW

LOOKING N15E

## Indicator Directional Variograms

Engels:



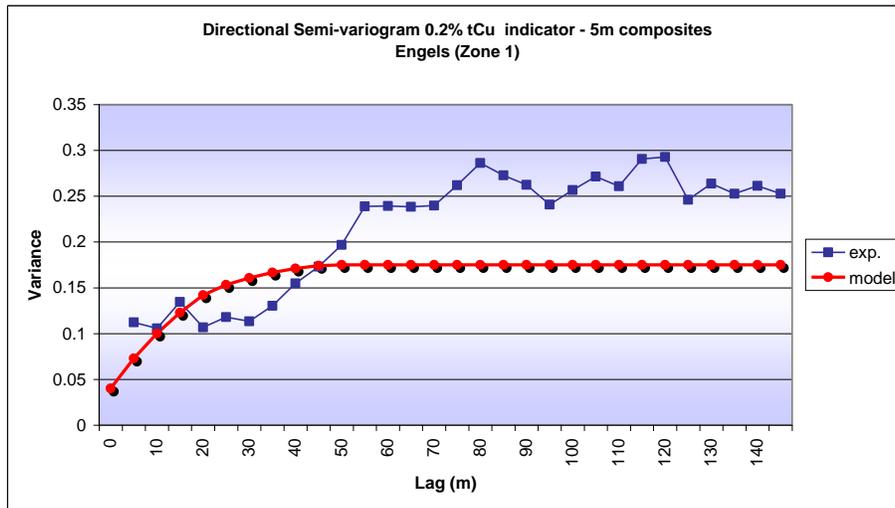
	Sill	Range
C0	0.229	0
C1	0.371	15
C2	0.400	30

azimuth: n135e  
 plunge: +15° (down)

i\_p20t

0.2% tCu Indicator

1



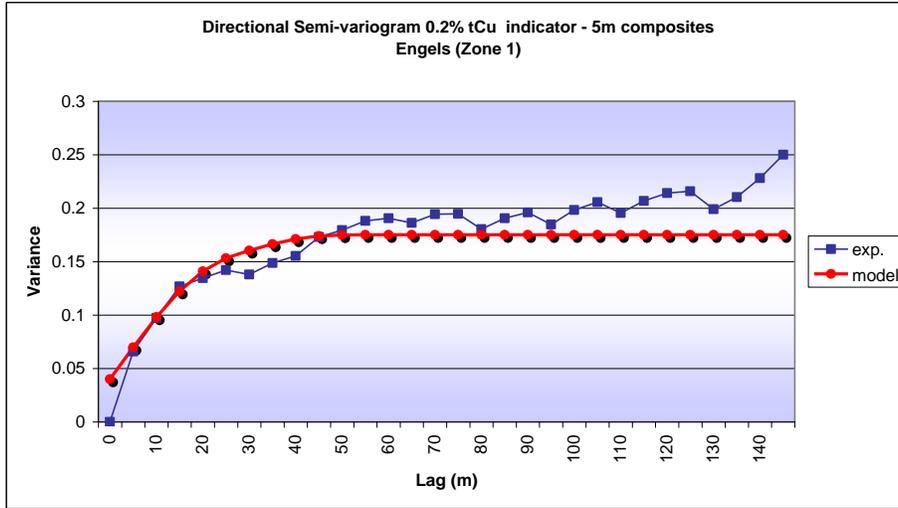
	Sill	Range
C0	0.229	0
C1	0.371	25
C2	0.400	50

azimuth: n45e  
 plunge: 0° (horiz.)

i\_p20t

0.2% tCu Indicator

2



	Sill	Range
C0	0.229	0
C1	0.371	25
C2	0.400	50

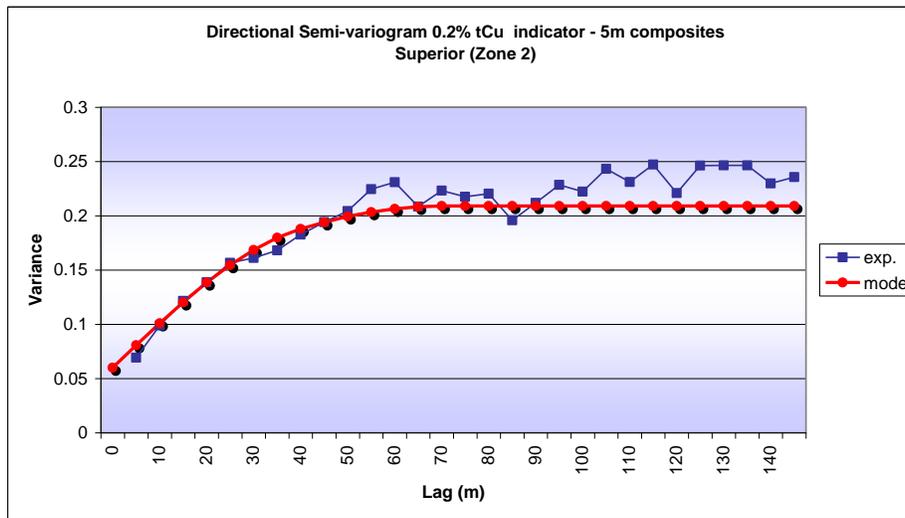
azimuth: n45e  
 plunge: -75° (up)

i\_p20t

0.2% tCu Indicator

3

**Superior:**



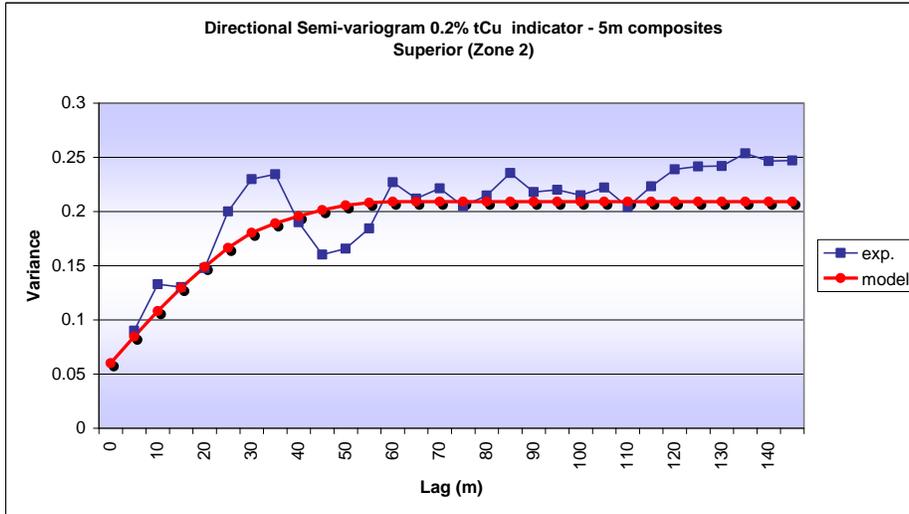
	Sill	Range
C0	0.287	0
C1	0.287	40
C2	0.426	70

azimuth: n105e  
 plunge: +0° (horiz.)

i\_p20t

0.2% tCu Indicator

1



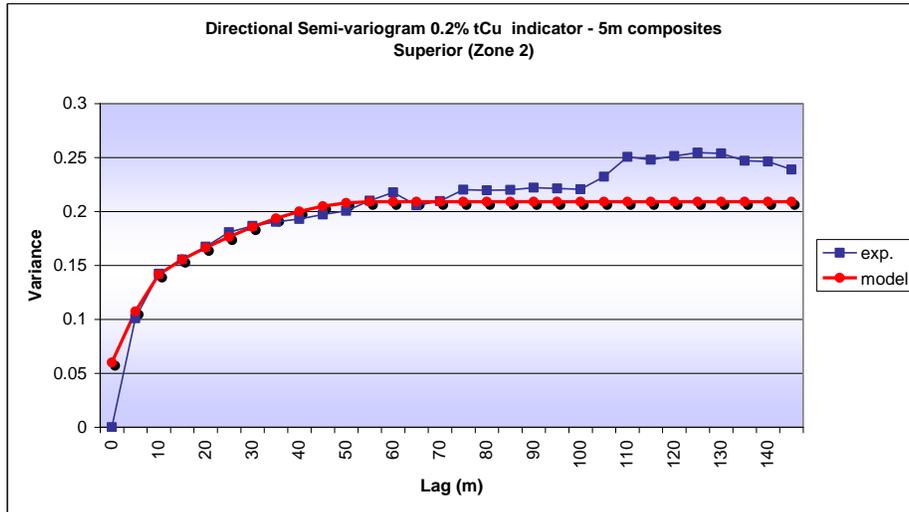
	Sill	Range
C0	0.287	0
C1	0.287	35
C2	0.426	60

azimuth: n15e  
 plunge: -0° (horiz.)

i\_p20t

0.2% tCu Indicator

2



	Sill	Range
C0	0.287	0
C1	0.287	12
C2	0.426	55

azimuth: n105e  
 plunge: +90° (vert.)

i\_p20t

0.2% tCu Indicator

3

**Indicator Variogram Estimating Parameters**

**Crown Gold Corp - Superior Project**  
**0.20 % tCu Indicator Variogram parameters**

**Engels (Zone 1) 0.2% tCu indicator Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.229						
SPH	0.371	15	25	25	+15o (down)	0o (horiz.)	n135e
SPH	0.400	30	50	50	+15o (down)	0o (horiz.)	n135e

**Superior (Zone 2) 0.2% Cu Indicator Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.287						
SPH	0.287	40	35	12	+0o (horiz.)	-0o (horiz.)	n105e
SPH	0.426	70	60	55	+0o (horiz.)	-0o (horiz.)	n105e

Note: Techbase "dip" convention is positive down, negative up  
 Techbase "j" azimuth direction is by definition "i" direction minus 90°  
 Techbase "k" direction is by definition mutually orthogonal to I & j

**Indicator Estimate Value Selection Summary**

Engels:

**5m Composites**

**Indicator Error Summary**

Engels: tCu %	0.2% tCu	0.2 % tCu percent error	avg grade of errors % tCu	avg grade selected % tCu
	<b>Selected Indicator Value:</b>	<b>0.5240</b>		
<b>Total positive errors:</b>	51	4.5%	0.078	
<b>Total negative Errors:</b>	50	4.5%	0.514	
<b>Total Net Error:</b>	-1	-0.1%		

**Superior**

**5m Composites**

Indicator Error Summary  Superior: tCu %	0.2% tCu	0.2 % tCu percent error	avg grade of errors % tCu	avg grade selected % tCu
	<b>Selected Indicator Value:</b>	<b>0.4664</b>		
<b>Total positive errors:</b>	215	5.7%	0.140	
<b>Total negative Errors:</b>	214	5.7%	0.311	
<b>Total Net Error:</b>	-1	0.0%		

**Univariate Statistics – total copper**

Superior Project 5m composites

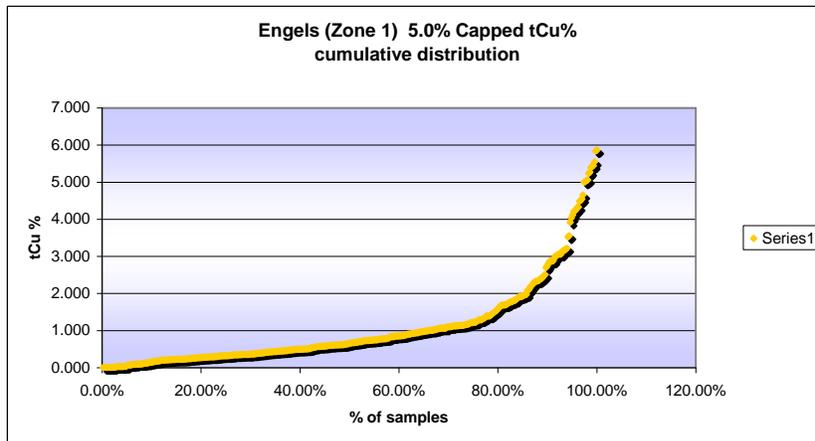
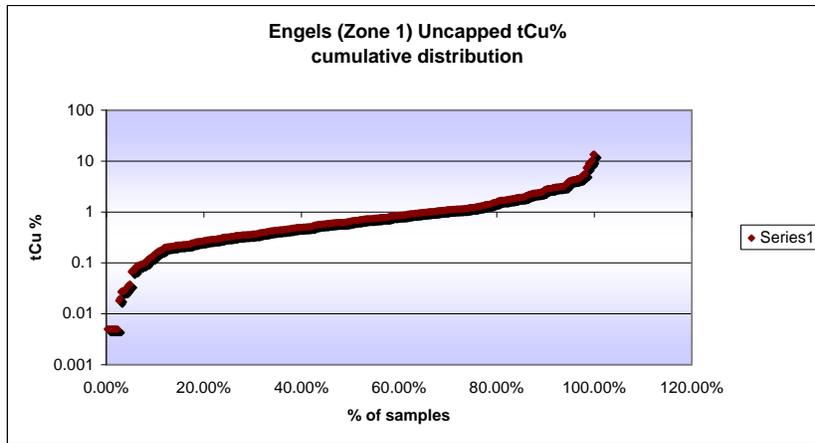
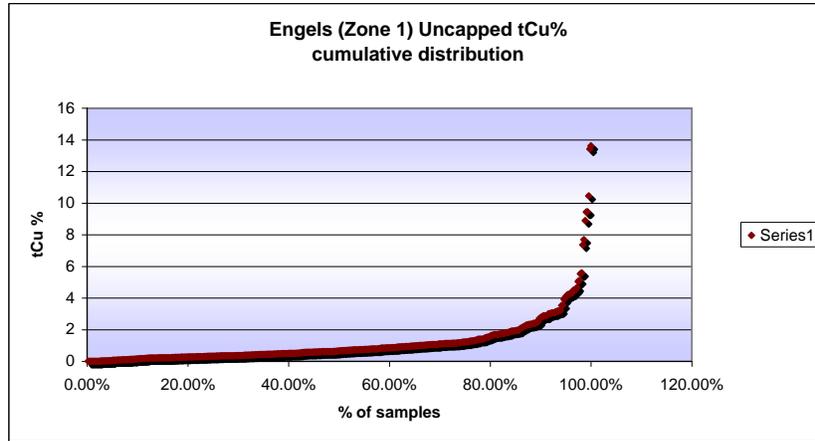
October 2013

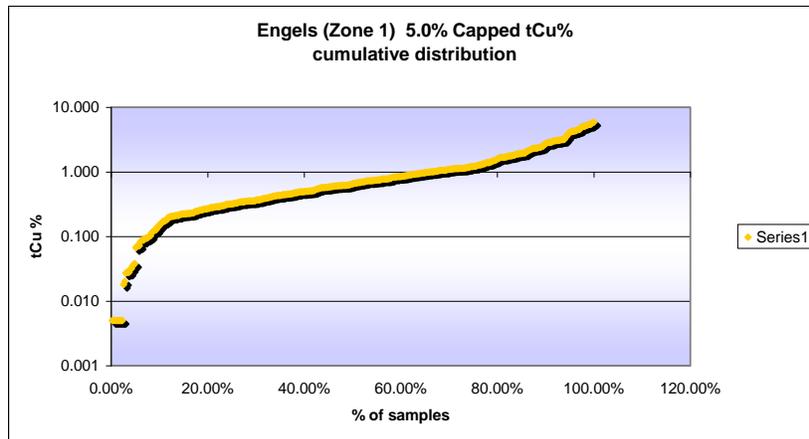
Zone	ip_jk	max	min	mean	std. dev.	CoV	Capping Grade	% of comps Capped	count
Uncapped 1 - Engels	0.5240	13.62	0.005	1.16	1.63	1.407			429
Capped 1 - Engels	0.5240	5.86	0.005	1.07	1.19	1.108	5% tCu	2.80%	429
Uncapped 2 - Superior	0.4664	3.01	0.001	0.39	0.29	0.738			1430
Capped 2 - Superior	0.4664	1.38	0.001	0.38	0.24	0.618	1.2% tCu	1.96%	1430

*Summary table of univariate statistics, 5m composites*

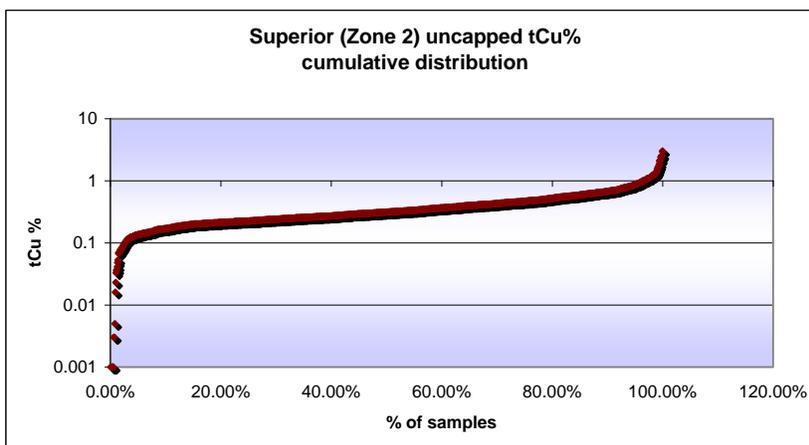
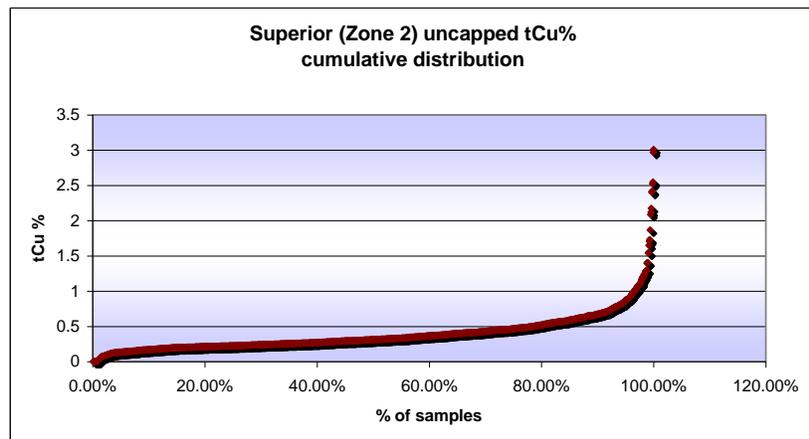
### Cumulative distribution plots Capped and Uncapped total copper

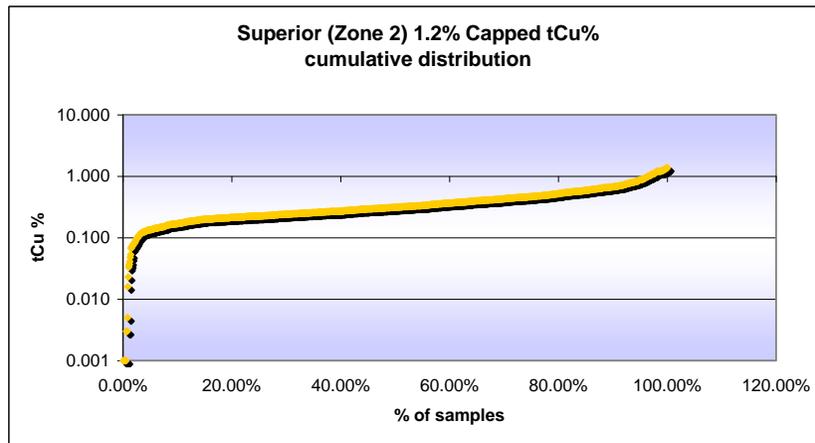
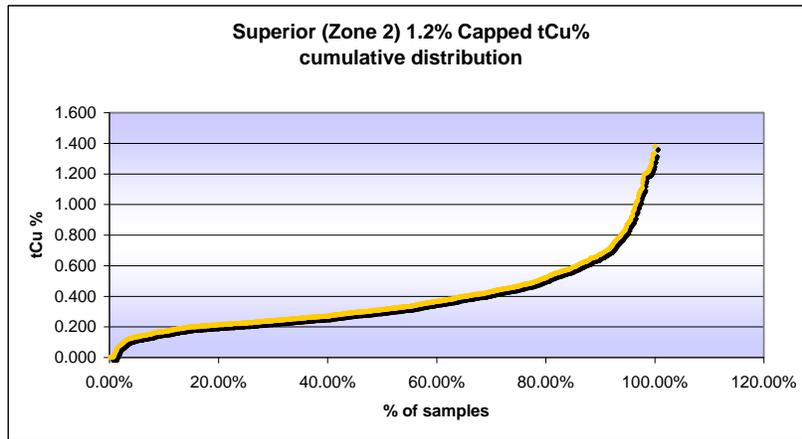
Engels:



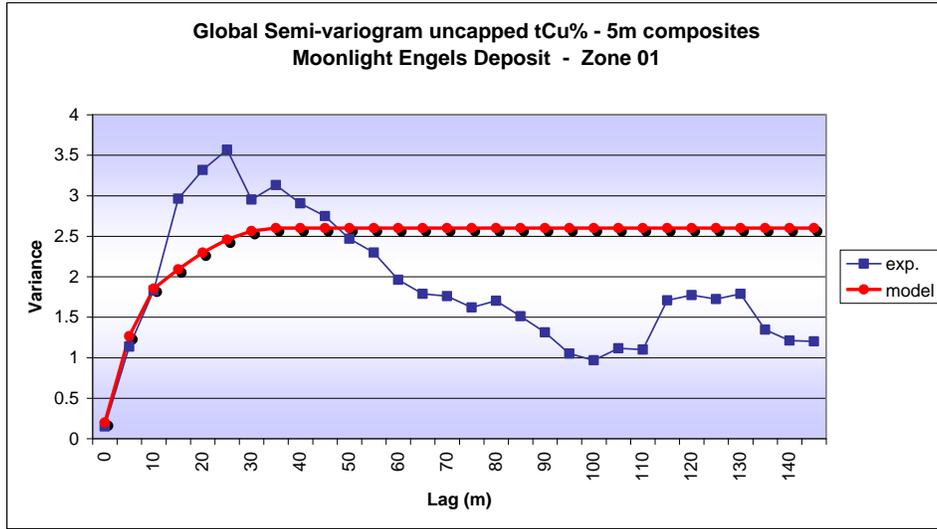


**Superior**



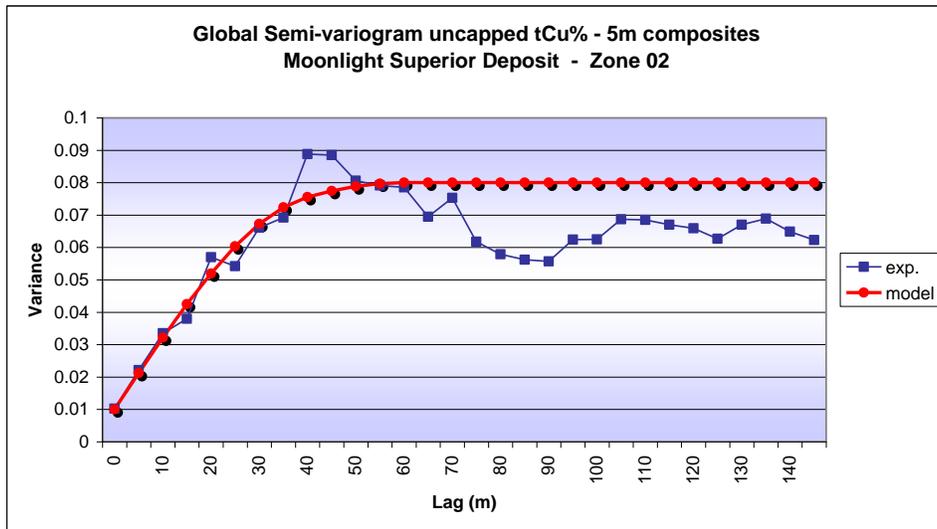


**Global Variograms total copper**



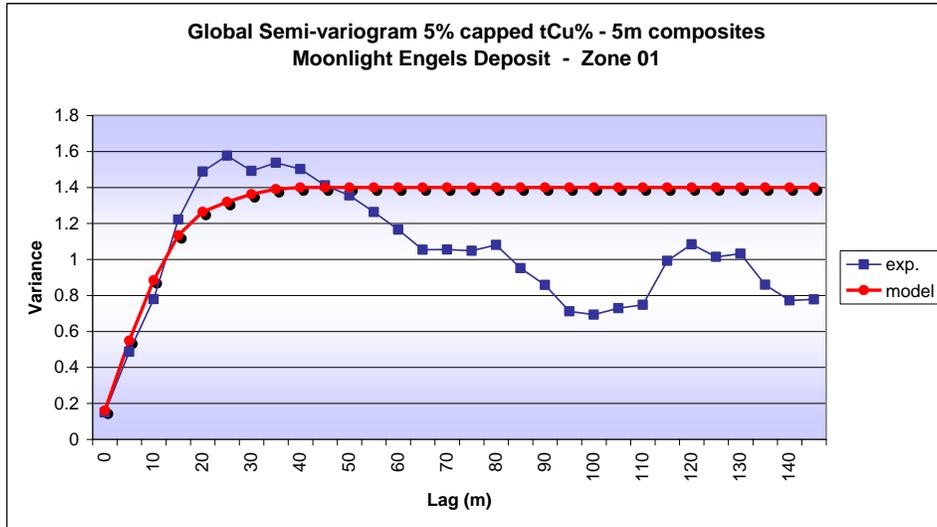
	Sill	Range
C0	0.077	0.0
C1	0.423	10.0
C2	0.500	35.0

tCu\_c



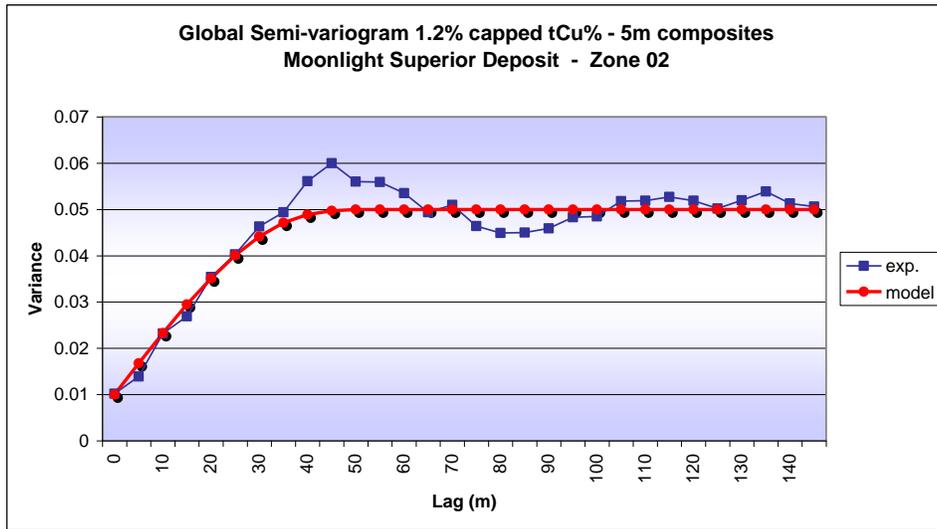
	Sill	Range
C0	0.125	0.0
C1	0.500	40.0
C2	0.375	60.0

tCu\_c



	Sill	Range
C0	0.114	0.0
C1	0.571	20.0
C2	0.314	40.0

tCu\_c

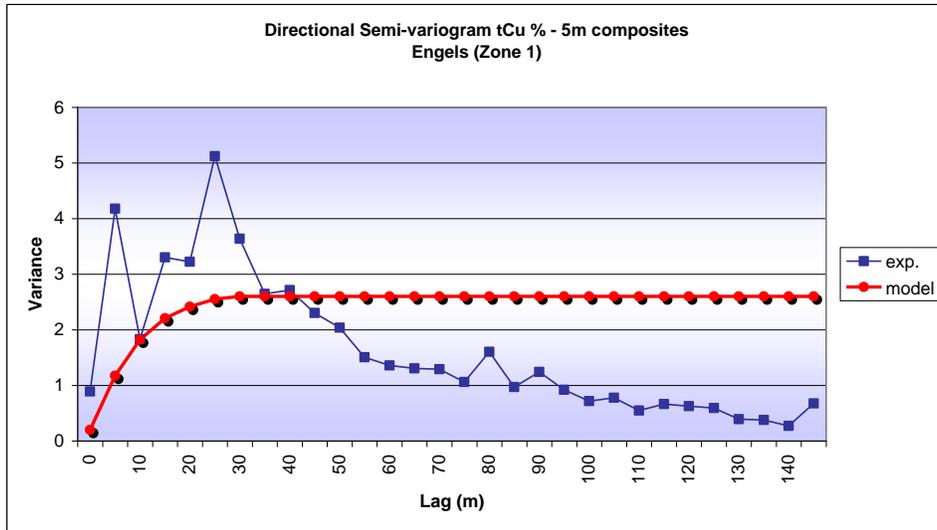


	Sill	Range
C0	0.200	0.0
C1	0.400	40.0
C2	0.400	50.0

tCu\_c

## Directional Variograms total copper

### Engels

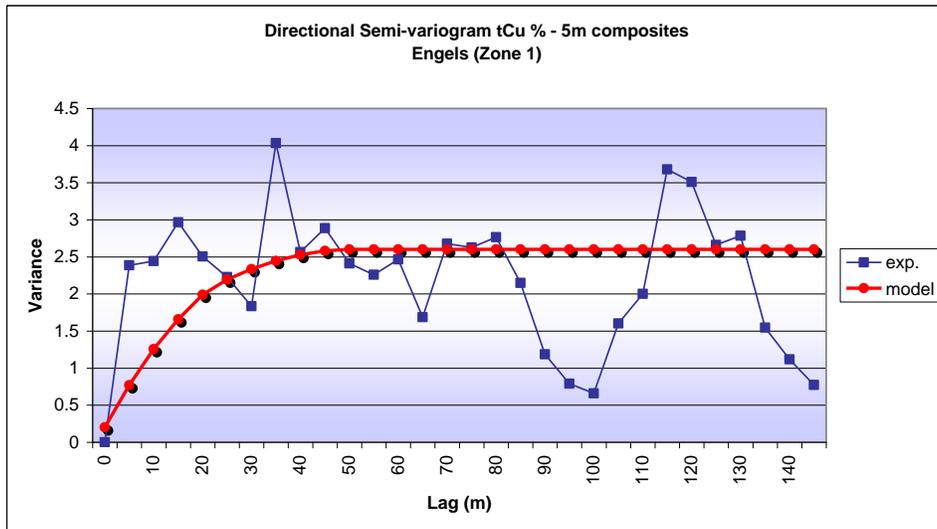


	Sill	Range
C0	0.077	0
C1	0.423	15
C2	0.500	30

azimuth: n135e  
 plunge: +15° (down)

tCu\_c

1



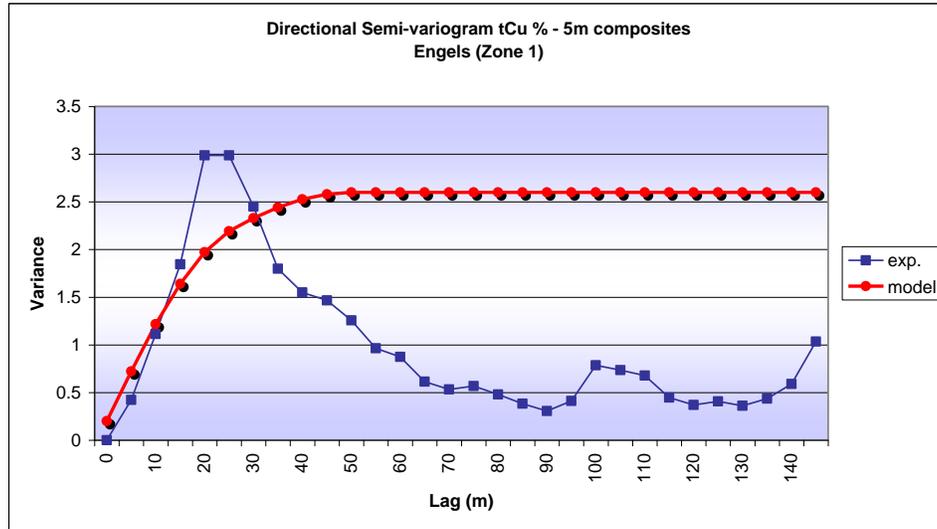
	Sill	Range
C0	0.077	0
C1	0.423	25
C2	0.500	50

azimuth: n45e  
 plunge: -0° (horiz)

tCu\_c

0

2



	Sill	Range
C0	0.077	0
C1	0.423	25
C2	0.500	50

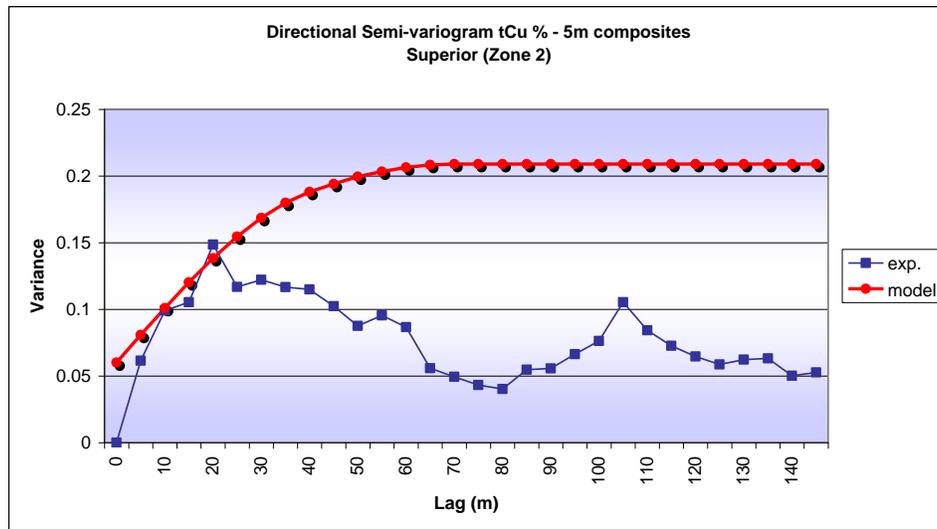
azimuth: n45e  
 plunge: -75°(up)

tCu\_c

0

3

**Superior**

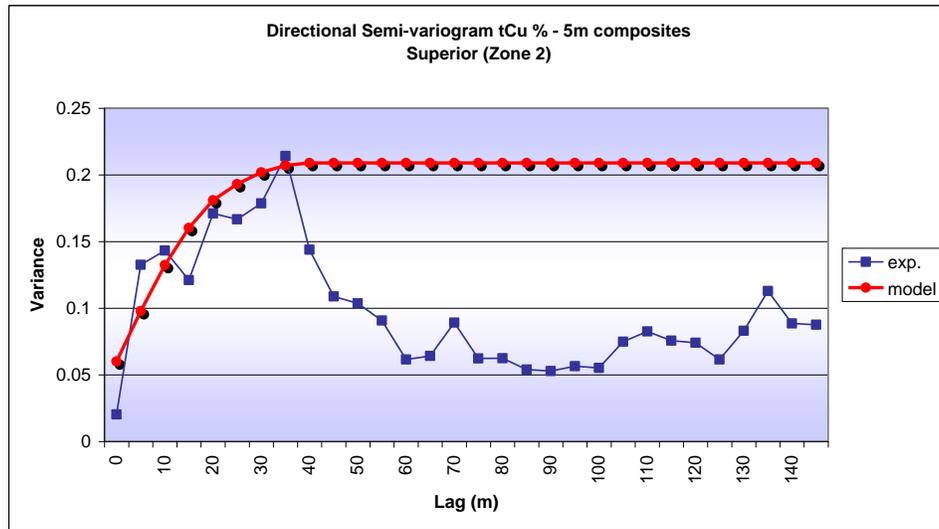


	Sill	Range
C0	0.287	0
C1	0.287	40
C2	0.426	70

azimuth: n105e  
 plunge: +00°

tCu\_c

1

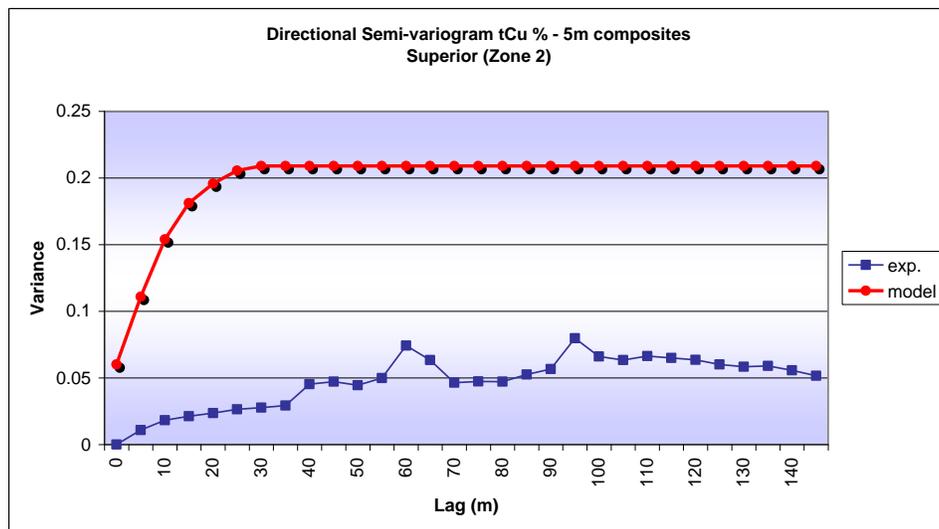


	Sill	Range
C0	0.287	0
C1	0.287	22
C2	0.426	40

azimuth: n15e  
 plunge: 0° (horiz)

tCu\_c

2



	Sill	Range
C0	0.287	0
C1	0.287	15
C2	0.426	30

azimuth: n105e  
 plunge: 90° (vert)

tCu\_c

3

**Crown Gold Corp - Superior Project**  
**Capped tCu % Variogram parameters**

**Engels (Zone 1) Capped tCu Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.114	0					
SPH	0.571	15.0	25.0	25.0	+15o (down)	0o (horiz.)	n135e
SPH	0.314	30.0	50.0	50.0	+15o (down)	0o (horiz.)	n135e

**Superior (Zone 2) Capped tCu Variogram Parameters**

Variogram	Sill	range i m	range j m	range k m	dip i deg.	dip j deg.	azim i deg.
NUG	0.200	0.0					
SPH	0.400	40.0	35.0	12	+0o (horiz.)	-0o (horiz.)	n105e
SPH	0.400	70.0	60.0	55.0	+0o (horiz.)	-0o (horiz.)	n105e

## **Appendix D: Selected Bench Plans for Engels and Superior**

