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# TECHNICAL REPORT AND PRELIMINARY ECONOMIC ASSESSMENT ON THE SOUTH CROFTY TIN PROJECT, CORNWALL, UNITED KINGDOM

**FOR**

**STRONGBOW EXPLORATION INC.**

**LATITUDE 50° 13’ 21” N LONGITUDE 5° 16’ 32” W**
**30U 337,679 mE 5,565,836 mN**

**NI 43-101 & 43-101F1**
**Technical Report No. 320**

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**Effective Date: February 16, 2017**
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# 1.0 SUMMARY

## 1.1 INTRODUCTION

This Technical Report and Preliminary Economic Assessment, with an effective date of February 16, 2017, was prepared by P&E Mining Consultants Inc. ("P&E") at the request of Mr. Richard Williams, P.Geo, President and CEO of Strongbow Exploration Inc ("Strongbow" or the "Company"). Strongbow is a TSX Venture Exchange listed Canadian-based company with its head office located in Vancouver, B.C., Canada. This report was prepared to provide an independent Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project ("South Crofty Project", the "Project" or the "Property") located in Cornwall, United Kingdom. In 2016, Strongbow purchased 100% interests in Western United Mines Limited ("WUM") and Cornish Minerals Limited (Bermuda) ("CMLB"), which own the surface and underground mining rights to the South Crofty Project.

The South Crofty Project is a past-producing underground tin mine located in the town of Pool in the historic Cornwall tin mining district of southwest England. The Project is located 390 km west-southwest of London, England and is approximately 4.5 km south of the Celtic Sea coast.

The Project's extensive 1,490 ha underground permissions extend over 26 historic mining operations, including two of the most significant mines in the Cornish tin mining district, being the South Crofty Mine to the east and the Dolcoath Mine to the west. The Project's underground permissions area includes five Mineral Rights, which are registered with the Land Registry as well as areas of Mineral Rights that are leased or unregistered.

The Project is currently on care and maintenance, and operates under permissions that were granted in 1952 and updated in 2006 with environmental conditions imposed. Replacement planning applications for surface and underground developments were approved by Cornwall Council in 2011 and 2013 which has increased the Project area to 1,490 ha with a working depth of 1,500 m below surface. The underground mining permission is valid until 2071. WUM also has approximately 7.65 ha (18.9 acres) of surface ownership.

The Project site is located within an industrial area with highly developed power supply and regional distribution, has two 33 kV overhead power lines which traverse the Property, and a dedicated 11 kV power supply to the New Cook's Kitchen shaft. The Project also has ready access to fresh water supplied by the local South West Water utility. Site infrastructure from prior mining and development operations includes office and warehouse buildings, and the partially refurbished New Cook's Kitchen shaft. A modern decline extends to a vertical depth from surface of 120 m at an average gradient of -16%, with a west branch that provides access to the Upper Mine Dolcoath mineralization while an east branch, mined in the 1980s, was being developed to provide rubber tired vehicle access/secondary egress into the South Crofty Mine. Process plant facilities from prior operations have been dismantled and removed.

Cornwall has a strong history of mining, and historically has exported mine workers around the globe. Although mining has experienced a considerable decline in the region, mining capability and knowledge is still present in the local workforce. With a local urban population of over 59,000 inhabitants in the Redruth, Pool, and Camborne area, there are sufficient local human resources to staff many unskilled or partially skilled jobs at a mine.

The South Crofty Project is located in the highly mineralized Central Mining District of Cornwall. Mining is reported to have been undertaken in the region prior to 2000 BC during the Bronze Age of Western Europe. The modern ownership history may be considered as commencing in 1967 when South Crofty Ltd. became a wholly owned subsidiary of Siamese Tin Syndicate Ltd and Siamese Tin's subsidiary, St. Piran Ltd. In mid-1982, the company was acquired from St. Piran by Charter Consolidated, which subsequently disposed of 40% of its holdings to Rio Tinto Zinc ("RTZ"). In 1984, RTZ acquired Charter's 60% interest and South Crofty became part of Carnon Consolidated Ltd.

In October 1985, the price of tin dropped dramatically on the world markets following the collapse of the International Tin Agreement. Carnon became privately owned in June 1988 when the business and assets of the group were purchased from RTZ through a management buy-out. In 1994 South Crofty was purchased by Crew Natural Resources ("Crew") of Canada. After several years of depressed tin prices, South Crofty was closed in March 1998 and the mine was allowed to flood. At the time of its closure in 1998, South Crofty was the last remaining working tin mine in Cornwall.

The South Crofty Project was acquired by Baseresult Holdings Limited ("Baseresult") in 2001. In November 2007, Baseresult formed a 50-50 joint venture with Galena Special Situations Fund ("GSSF") and formed Western United Mines Limited ("WUM"). Cornish Minerals Limited (Bermuda) ("CMLB"), a sister company to Baseresult, owned the mineral rights in the South Crofty Project as well as others elsewhere in Cornwall. Cornish Minerals Limited, a UK registered company, was created as a holding company over both WUM and CMLB with GSSF and Baseresult as 50-50 shareholders. Ownership of the Project was transferred to WUM.

In 2011, Celeste Copper, a Canadian publicly listed company, entered into a joint venture agreement with WUM on the South Crofty Project. In 2013, due to poor market conditions, Celeste failed to meet its commitments under the terms of the joint venture, consequently WUM and CML were placed into administration to protect the assets, however, CMLB was not put into administration.

GSSF was the only secured creditor under administration. In 2014, GSSF reached an agreement with a Vancouver based private company, Tin Shield Production Inc ("Tin Shield"), whereby Tin Shield had the right to acquire a 100% interest in WUM / CML and CMLB. Tin Shield funded ongoing operational costs under the administration process in order to maintain the underground mining permissions in good standing and funded CMLB to ensure it also remained in good standing.

In March 2016, Strongbow announced that it had reached agreement with GSSF and Tin Shield to acquire a 100% interest in WUM and CMLB (collectively the "Companies") by funding WUM's exit from administration.

Strongbow acquired from administration a 100% interest in WUM and acquired a 100% interest in CMLB on July 11, 2016.

The material terms of the agreement are as follows, all references to currency being in Canadian dollars unless otherwise specified:

- Strongbow entered into a purchase and sale agreement with the administrator managing the affairs of WUM and Cornish Minerals Limited (UK), the sole shareholder of the Companies (also in administration) to acquire the shares of the Companies and to fund the exit of WUM from administration by reaching a settlement of the claims owed to unsecured creditors. The unsecured creditors approved the proposal on June 10, 2016. Strongbow paid £143,000 (CDN$249,000) for the exit from administration.
- GSSF, the only secured creditor, converted all debt owed to it into common shares of WUM and Strongbow acquired these shares, in return for future milestone payments, thereby completing the acquisition of 100% of the shares of the Companies.
- The UK holding company Cornish Minerals Limited (in administration) released the intra group indebtedness owed to it by WUM, amounting to £11,525,758.
- Upon closing of the acquisition, Strongbow reimbursed Tin Shield CDN$318,000 for operating costs incurred for the Project from November 1, 2015 to February 29, 2016; Strongbow assumed responsibility for the monthly Project operating costs as of March, 2016. Also upon closing, Strongbow made a payment of US$80,000 to Tin Shield to refund a shareholder loan made to Tin Shield.
- On July 11, 2016, Strongbow issued 2,000,000 common shares with a value of CDN$400,000 for the acquisition. A total of 1,050,000 common shares were issued to GSSF and 950,000 common shares were issued to Tin Shield. The common shares were subject to a hold period that expired November 12, 2016.

In addition to the reimbursement, loan repayment and shares issued on July 11, 2016, Strongbow agreed to the following additional payments and share issuances as part of the purchase and sale agreement with GSSF and Tin Shield, whereby GSSF and Tin Shield would split the payments 52.5% to GSSF and 47.5% to Tin Shield:

- Strongbow will issue 1,000,000 common shares to GSSF / Tin Shield upon receipt of a permit to increase water discharge from the old mine workings from 10,000 $m^3$ per day to 25,000 $m^3$ per day.
- Strongbow will make a payment to GSSF / Tin Shield totaling CDN$2,000,000 (cash and / or common shares at Strongbow's election) on the second anniversary of the approval vote by creditors for WUM's exit from administration (date set at June 10, 2018).
- Strongbow will issue 2,000,000 common shares to GSSF / Tin Shield on delivery of a positive Feasibility Study or commencement of commercial production, whichever occurs first.
- Strongbow will make a cash and / or common share payment to GSSF / Tin Shield equal to 25% of the Net Present Value ("NPV") of the Project upon making a decision to go into production. In the event that Strongbow's market capitalization is less than the NPV of the Project when a production decision is made, Strongbow will pay the equivalent of 25% of its market value to GSSF / Tin Shield and the balance (between the 25% of market value and 25% of the NPV of the Project) will be paid out as a 5% Net Profits Interest from production.
- In the event that Strongbow transfers any assets, rights, or entitlements to certain mineral rights which are not part of the core mineral rights (the "Other Mineral

Rights”) to a third party before the agreed consideration has been paid to GSSF / Tin Shield, then GSSF / Tin Shield will be entitled to receive a payment equal to 10% of any consideration received for the Other Mineral Rights, to a maximum of CDN$1,000,000.

On September 16, 2016 the TSX Venture Exchange Inc. confirmed it accepted for filing the purchase and sale agreement entered into by Strongbow with the administrator managing the affairs of WUM and Cornish Minerals Limited (UK).

## 1.2 RELIANCE ON OTHER EXPERTS

P&E has relied on a legal opinion dated February 26, 2016 from Stephens Scown LLP, UK solicitors to Strongbow, to confirm that Strongbow will have title to the underground mine permission area and certain surface rights when the South Crofty Project exits from administration (now accomplished). P&E has relied on a letter dated February 27, 2017 from Owen Mihalop, Director, WUM, to confirm that there has been no material change to the Property, other than the commencement of water treatment and pumping trials from New Cook’s Kitchen Shaft, since the P&E Independent Qualified Person site visit in November, 2014.

## 1.3 HISTORY

Average annual production in the period 1984 to 1998 at the South Crofty Mine was 191,200 tons at an average grade of 1.31% Sn. A total of 9,976,171 tons at an average grade of 1.00% Sn were mined between 1906 and 1998. In addition to the South Crofty Mine production, the Dolcoath Mine operated as an independent mine from 1895 to 1921. During this period 2,135,470 tons were processed at a grade of approximately 2% Sn.

The South Crofty Project has a very large historic database with an estimated 3,000 drill holes (87,000 m) and 45,000 underground channel samples that have been compiled by WUM. A closure estimate was completed for the South Crofty Property by Owen and LeBoutillier for Crew in 1998. This estimate included Proven and Probable “reserves” of 730,750 tonnes at 1.48% Sn plus Inferred resources of 2,172,850 tonnes at 1.48% Sn. The estimate was based on longitudinal section calculations using a 1% Sn cut-off and minimum 1.0 m mining width.

*The historical estimate was prepared according to the mine’s operational policy at the time of closure in 1998. The estimate predates the introduction of National Instrument 43-101 (NI43-101). A Qualified Person (QP) has not carried out sufficient work to verify these historical estimates as current Mineral Resources and therefore, the company is treating the numbers as historical and indicative only, and as such the estimates cannot be relied upon.*

Recent drilling from 2008 to 2013 at Dolcoath, and the increase in Mineral Resources there, has rendered the 1998 Mineral Resource Estimate out of date. In addition, the current Mineral Resource Estimate reported in this study was prepared using different parameters such as tin cut-off grade and metal pricing and used block model grade estimation methodology.

Micromine Limited (“Micromine”), UK, was engaged by Celeste to produce NI 43-101 Mineral Resource Estimates and Technical Reports in 2011 and 2012. These estimates incorporated results of drilling by WUM and focussed on the Upper Dolcoath lodes, west of the Great Crosscourse fault and above approximately 400 m depth from surface. The Micromine results are superseded by the present Mineral Resource Estimate in this technical report.

## 1.4 GEOLOGICAL SETTING AND MINERALIZATION

The geology of Cornwall is dominated by granitic intrusions that are part of Permian Cornubian batholith and Devonian metasedimentary and metavolcanics, known locally as "killas", that form the metamorphic aureole and host rocks of the intrusions. This assemblage was formed in the Variscan orogenic event. Crustal thickening resulting from deformation of Devonian flysch-type sediments and associated volcanics during the initial phases of the Variscan orogeny in the Devonian and Carboniferous periods was followed by lithospheric extension, crustal subsidence and anatexis of metasediments to form Cornubian granitoid magmas in the Permian.

The South Crofty Project area lies on the north side of the Permian Carn Brea Granite that is thought to be connected with the Cornubian batholith at depth. The South Crofty Project area is underlain by rocks locally known as "killas", a series of metasedimentary and metavolcanic rocks and associated hornfels and skarns, that occur in close proximity to the granite contact. At depth, the granite underlies the whole Project area. Mineralization occurs in "lodes" or vein-type structures that generally strike east-northeast and parallel the strike of the granite/killas contact. The lodes occur in both the granite and the overlying killas and the character of the lodes changes depending on the host rocks. Within the granite, the principal mineral of economic significance is cassiterite, whereas above the granite contact, copper and zinc sulfide mineralization is developed. The Great Crosscourse is a late fault that bisects the South Crofty Project area and is associated with an approximately 100 m strike slip movement. The Great Crosscourse had a significant influence on the historical mine development of the South Crofty Project since the South Crofty Mine was developed on the east side of the fault and the Dolcoath Mine on the west side and the two mines were not hydraulically connected.

## 1.5 DEPOSIT TYPES

The South Crofty Tin Deposit is an intrusion related, structurally controlled, vein-hosted mineralization type.

## 1.6 EXPLORATION

WUM re-established the decline at the Project site and since 2008 has extended the existing decline a further 380 m to a total vertical depth of 120 m below surface at an average gradient of 16%. At a depth of 120 m, a spine drive was commenced and progressively developed to a length of 130 m. The decline extends in a south-westerly direction through the Great Crosscourse above the historic Dolcoath workings and provides exploration access to the Upper Dolcoath area lodes. The decline and spine drive have served as an access point for the 31,000 m underground drill program conducted by WUM.

Tin Shield's exploration was limited to assaying of approximately 720 samples from drill core intersecting the Upper Dolcoath area lodes. These assays are from holes drilled by WUM in late 2012 and 2013, and have been incorporated into the assay database.

Strongbow has not carried out any exploration at the Project to date.

## 1.7 DRILLING

The ability to drill from surface is limited by the urban development of the surface overlying a significant part of the Project Mineral Rights. Furthermore, historically there has been very limited surface exploration drilling. WUM's approach was to use the decline and spine drive for all of its modern exploration drilling. The decline and spine drive have served as an access point for the underground drill program conducted by WUM between 2008 and 2013. A total of 157 holes for 31,000 m were drilled. Drill holes ranged in length from 4.2 m to 450 m with an average of 197 m. A total of 6,591 m was sampled and assayed.

## 1.8 SAMPLE PREPARATION, ANALYSIS, SECURITY AND DATA VERIFICATION

P&E considers that the sample preparation, security and analytical procedures for the South Crofty Project are adequate for the purposes of this Mineral Resource Estimate.

P&E carried out assay data verification for the recent drilling in March-April 2015. The assay certificates in spreadsheet format were independently obtained directly from AGAT, SGS and WAI laboratories. A total of 5,597 records for tin, copper, zinc and lead assays contained in the Mineral Resource wireframes were extracted for verification against laboratory assay records. Approximately 1,798 assays were located and checked. A number of discrepancies were noted and the database was corrected and updated.

WUM implemented a comprehensive QA/QC program for the final stages of drilling at the South Crofty Project. Based upon the evaluation of the QA/QC program undertaken by the Company, as well as P&E's due diligence sampling, it is P&E's opinion that the results are suitable for use in the current Mineral Resource Estimate.

## 1.9 MINERAL PROCESSING AND METALLURGICAL TESTING

No metallurgical testwork has been conducted as yet on material from the current Mineral Resource. However, the long history of past production from the Property leaves little doubt that a viable process with acceptable recoveries can be developed.

The South Crofty process plant operated until 1988 when processing was transferred to the Wheal Jane process plant and continued until the South Crofty Mine was shut down.

The South Crofty process plant produced two gravity concentrates; a low grade concentrate typically assaying 26% Sn and a high grade concentrate assaying about 47% Sn from a head grade of 0.84% Sn. Overall tin recovery was reportedly approximately 73%.

Better performance was achieved at the Wheal Jane process plant. For the year 1997, average Sn recovery was reportedly 88.5% from a head grade of 1.40% Sn. Both gravity and flotation concentrates were produced, with a combined grade of 58% Sn. The improved performance at Wheal Jane relative to South Crofty is due to the incorporation of tin flotation in the process coupled with significant metallurgical improvements that were achieved.

## 1.10 MINERAL RESOURCE ESTIMATE

The Mineral Resource for the South Crofty Project was estimated by conventional 3D computer block modelling methods employing Dassault Systemes GEMS mining software V6.4 and V6.6 ("GEMS").

The Sn, Cu, Zn, Pb, and W mineralization occurs in various narrow, structurally controlled hypothermal to epithermal fissure veins or lodes hosted in killas metsedimentary rocks and Carn Brea batholith granites. Polymetallic-low-grade tin mineralization is characteristic of the killas whereas the granite is tin-rich and base metals poor. Mineral Resources were estimated for 24 lodes located within an area of 3.3 km by 1 km and extending from near surface at Dolcoath to 835 m depth from surface for the deep lodes such as at Roskear and No. 8 area. The granite-hosted deep lodes have witnessed past mining with resources having been accordingly depleted for stopes, draw points and raises but not for levels and drifts since the latter are volumetrically small. The narrow widths of the lodes and presence of local town infrastructure on surface precludes open pit mining leaving the lodes being only amenable to underground mining.

For the purpose of Mineral Resource estimation and reporting, the lodes have been grouped into the "Lower Mine" which includes the deep, granite-hosted lodes for which only tin analyses are available, and the "Upper Mine" in which lodes straddling or lying above the granite-killas contact, have been tested by recent drilling and have multi-element analyses available. The recent drilling and assaying has been subjected to current industry standard QA/QC work, however, the historic core drilling and assaying would have been supported by mine quality control practices in force at those times and would not have been as rigorous as required by today's CIM standards.

Indicated and Inferred Mineral Resources have been estimated for tin in the Lower Mine and tin, copper and zinc in the Upper Mine. This Mineral Resource Estimate is based on diamond drilling, core sampling and assaying as well as underground back and face channel sampling and chip sample assaying. Sampling during past mine operations in the Lower Mine was predominantly historic channel sampling and short hole wall drilling in drives with historic exploration drilling on strike and down dip of the workings. Recent drilling from 2008 to 2013 has tested the Upper Mine Dolcoath lodes.

The exploration drill hole database for the South Crofty Project contains 157 recent diamond drill holes totalling 30,931.82 m, 3,362 historic diamond drill holes for 90,732.81 m and 14,893 historic channels over 29,439.75 m.

Metal prices used for the Mineral Resource Estimate were US$8.50/lb Sn, US$2.75/lb Cu and US$0.90/lb Zn based on LME approximate two-year trailing averages at March 31, 2016. Process recovery assumptions are 88.5% for Sn, 85% for Cu and 70% for Zn. Given the polymetallic nature of the lodes, mineral wireframe modelling and Mineral Resource reporting is based on tin equivalent ("SnEq") grade. The SnEq calculation includes metal price and recovery: SnEq% = Sn% + (0.311 x Cu%) + (0.084 x Zn%). For the deep lodes, only tin analyses are available, therefore SnEq% is essentially Sn%.

Fifty-nine (59) mineral wireframes for twenty-four (24) lodes were constructed from mineralization intercepts in channels and drill holes at a cut-off grade of 0.5% SnEq over a minimum true width of 1.2 m. The Lower Mine lodes were modelled mostly on level plan views using varying horizontal widths depending on lode dip. Minimum length of tin mineralization along strike on the levels for inclusion in Mineral Resources was 15 m. Lode widths commonly are narrower than minimum mining width and were "bulked out" to at least minimum width using adjacent assays when available and practical or to minimum width at zero Sn grade where only the lode was sampled. In the latter case, preference was given to bulking out on the lode footwall in keeping with past mining convention at South Crofty. Upper Mine lodes, estimated predominantly from recent drilling, were modeled on vertical cross-sections.

Assay grades were capped at 6% for Sn, 4% for Cu and 20% for Zn for the Upper Mine and 20% Sn for the Lower Mine. Assay composites were generated for the vein intercepts from the assays captured by GEMS software in the mineral wireframes. Channel samples from predominantly the Lower Mine, were composited at a length of 1.2 m dynamically adjusted in order that all composites in the intercept have the same length. This method ensures that the grade weighting is correctly applied for bulked out lode widths but results in variable composite lengths. Compositing for drill holes was done down hole at 1.5 m consistent lengths with review of discarded residual fragments for bias.

Four block models and several partial block models were created to encompass the various lode areas: Dolcoath, Roskear, No.4-No.8-No.2-Providence; and Pryces-Tincroft. The Mineral Resource block models' X axes are rotated to 60° azimuth. Block sizes are 5m x 5m x 2m vertical. Inverse distance cubed ("$ID^3$") interpolation was carried out using multiple search distances and search ellipses oriented to lode strikes and dips.

Historic bulk density for mining granite-hosted lodes was 2.77 $t/m^3$ (Owen et al. 1998). Water immersion bulk density testing was carried out on-site for 119 core samples from 2009 to 2012 drill holes. Samples were obtained from the Dolcoath lodes and averaged 3.09 $t/m^3$. To convert block model volumes to tonnes, P&E used a 2.77 $t/m^3$ bulk density for the deep, granite-hosted lodes and 3.0 $t/m^3$ for the killas-hosted Sn-Cu-Zn bearing lodes at Dolcoath.

Mineral Resources were classified as Indicated and Inferred based on completeness of channel sampling (levels above/below, raises), the drill hole spacing, confidence in the assaying for drilling, and geologic confidence in grade continuity. The Indicated and Inferred Mineral Resource Estimate for the Lower Mine includes pillars and sills, some of which may not be recoverable pending an advanced engineering study and inspection underground once the workings are accessible. The South Crofty Project Mineral Resource Estimate is presented in Table 1.1. The Indicated Mineral Resource Estimate at a 0.6% SnEq block cut-off grade is 1.92 million tonnes averaging 1.70% SnEq. The Inferred Mineral Resource Estimate at a 0.6% SnEq block cut-off grade is 1.20 million tonnes averaging 1.52% SnEq.

**TABLE 1.1**
**SOUTH CROFTY MINERAL RESOURCE ESTIMATE AT 0.6% SNEQ CUT-OFF(1-11)**

| Lode/Mine | Indicated | | Inferred | |
|---|---|---|---|---|
| | Tonnes (k) | SnEq % | Tonnes (k) | SnEq % |
| **Lower Mine Lodes Sn%** | | | | |
| No. 4 | 452 | 2.04 | 225 | 2.19 |
| No. 2 | 180 | 1.63 | 13 | 1.12 |
| No. 8 | 127 | 1.72 | 34 | 2.33 |
| No.2-NCK | 53 | 2.18 | - | - |
| Providence | - | - | 28 | 2.37 |
| Roskear A | 28 | 2.15 | 50 | 2.15 |
| Roskear B | 90 | 1.93 | 70 | 1.85 |
| Roskear BHW | 24 | 1.77 | - | - |
| Pryces/Tincroft | 298 | 1.67 | 74 | 2.24 |
| Dolcoath South | 226 | 1.67 | 108 | 1.50 |
| Dolcoath South Branch | 38 | 1.56 | 5 | 2.07 |

| Table 1.1<br>South Crofty Mineral Resource Estimate at 0.6% SnEq Cut-Off[1-11] | | | | |
|---|---|---|---|---|
| **Lode/Mine** | **Indicated** | | **Inferred** | |
| | **Tonnes (k)** | **SnEq %** | **Tonnes (k)** | **SnEq %** |
| Dolcoath North | 144 | 1.55 | 47 | 1.57 |
| Dolcoath North HW | - | - | 14 | 0.88 |
| Dolcoath North FW | - | - | 70 | 1.36 |
| **Subtotal Lower Mine** | **1,660** | **1.81** | **738** | **1.91** |
| | | | | |
| **Upper Mine Lodes SnEq%** | | | | |
| Dolcoath Middle | 89 | 1.01 | 22 | 0.77 |
| Dolcoath Middle Branch (ID4) | 36 | 1.00 | - | - |
| Dolcoath Upper Main | - | - | 274 | 0.81 |
| Dolcoath Upper South South Branch | - | - | 86 | .86 |
| Dolcoath NVC | - | - | 35 | 1.11 |
| Dolcoath Little NW | 11 | 0.82 | - | - |
| Dolcoath Little NW FW | - | - | 1 | 0.86 |
| Dolcoath Little NE (ID4) | - | - | 46 | 1.44 |
| Dolcoath S. Entral (ID4) | 121 | 0.98 | - | - |
| | | | | |
| **Subtotal Upper Mine** | **257** | **0.99** | **464** | **0.91** |
| **Grand Total Lower and Upper Mine** | **1,917** | **1.70** | **1,202** | **1.52** |

*(1) CIM definitions were followed for the Mineral Resource Estimate.*

*(2) The Qualified Persons for this Mineral Resource Estimate are: Richard Routledge, M.Sc. (Applied), P.Geo. and Eugene Puritch, P.Eng. of P&E Mining Consultants Inc.*

*(3) Mineral Resources are estimated by conventional 3D block modelling based on wireframing at a 0.5% SnEq cut-off grade and inverse distance to the power of 3 grade interpolation. The 0.5% SnEq cut off for wireframing vs 0.6% SnEq for resource reporting is due to a shift to lower Sn prices between the commencement and finalization of this report.*

*(4) SnEq is calculated using the formula: SnEq% = Sn% + (Cu% x 0.311) + (Zn% x 0.084).*

*(5) For the purpose of this Mineral Resource Estimate, assays were capped at 20% Sn for the Lower Mine and 6% for Sn, 4% for Cu and 20% for Zn for the Upper Mine.*

*(6) The 0.6% SnEq Mineral Resource cut-off grade was derived from the approximate March 31, 2016 LME two year trailing average Sn price of US$8.50/lb, Cu price of US$2.75/lb, and Zn price of US$0.90/lb, 88.5%, 85% and 70% respective process recoveries, smelter payable of 95% and Sn refining charges of US$0.25.lb. Operating costs used were US$55/t mining, US$27/t processing and US$9/t G&A.*

*(7) Bulk densities of 2.77 tonnes/$m^3$ and 3.00 tonnes/$m^3$ have been applied for volume to tonnes conversion for the Lower and Upper Mine, respectively.*

*(8) Mineral Resources are estimated from near surface to a depth of approximately 869 m.*

*(9) Mineral Resources are classified as Indicated and Inferred based on drill hole and channel sample distribution and density, interpreted geologic continuity and quality of data.*

*(10) The Mineral Resources have been depleted for past mining, however, they contain portions that may not be recoverable pending engineering study.*

*(11) Mineral Resources which are not Mineral Reserves do not have demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues. There is no certainty that all or any part of the Inferred Mineral Resource Estimate will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration.*

Validation of the grade interpolation and the block model was carried out by on-screen review of grades and other block model estimation parameters versus drill hole composites, by comparison of assay, composites, zone intercepts and block grades, comparison to alternate nearest neighbour ("NN") interpolations, and review of the volumes of wireframes versus reported resources.

Although there are number of uncertainties in the historic data, appropriate due diligence has been exercised to compile and verify data from mine records and in P&E's opinion, the Mineral Resource Estimate has no fatal flaws, is reasonable and has been undertaken according to industry standard practice.

There are many opportunities to increase the Mineral Resources and to raise the confidence category of those resources by additional drilling and development.

Similarly, there are additional historic but unconnected mines within the mineral permission area that represent additional exploration or development potential to the Project.

The potential for Mineral Resources at the Roskear D and North Pool lodes was not addressed as part of this report and should be considered in future work programs.

## 1.11 MINING METHODS

The underground mine has been scheduled at a steady-state production rate of 1,000 tpd on a seven day per week work schedule. The mine design layout and the mining method selection have been done at a PEA level and it is assumed that sublevel longhole stopes spaced at 30 m vertical level intervals is appropriate. The New Cook's Kitchen Shaft ("NCK") hoisting facility will have the capacity to handle the scheduled amount of production.

All water removed from the mine workings by mechanical pumping will pass through an onsite water treatment plant before being discharged to the Red River and subsequently to the sea. An application is planned in 2017 in order that the current permit to discharge water at a rate of 10,000 $m^3$/day from the mine workings can be increased to 25,000 $m^3$/day. Once the mine is dewatered, which is estimated to take place over a two-year period, steady-state dewatering is estimated to be between 5,500 $m^3$/day and 6,500 $m^3$/day.

All mine and stope development will be undertaken by Company workforce except where specialized skills are required such as shaft rehabilitation and dewatering, exploration diamond drilling and other specialized jobs that will be contracted. Shaft operating, rock handling, hauling and all underground mechanical and electrical work will be by the Company workforce. The Company will also provide overall mine management, supervision, and technical services support, such as mine planning, grade control, geotechnical, ventilation, pumping, geological, and surveying services.

Mine development will be carried out using trackless rubber tire equipment using ramps and horizontal accesses from the NCK shaft. Single boom drill jumbos, 3 t LHD's, 20 t trucks, rock bolters and pneumatic longhole drills will be used, along with a fleet of ancillary equipment. The New Roskear and Taylor's shafts will be accessed by the development and will be used for ventilation and manways. The NCK shaft will be the main production shaft after refurbishment once new hoist components and conveyances are installed and commissioned.

It is envisioned that a new rock handling system will established by including a primary crusher and mineralized material-pass bin and grizzly at the truck/conveyor dump near the bottom of the NCK shaft. The old loading pocket area will be refurbished and reintroduced into the rock transfer circuit. This will require the installation of two new measuring pockets, new loadout conveyor and short transfer conveyor below the primary crusher, vibratory feeder, primary crusher, mineralized material bin feeder, new mineralized material bin (approximate capacity for four hours of hoisting), and rock grizzly at the top of the mineralized material bin.

The rock transfer below the loading pocket level will be done via an inclined conveyor drift which will be refurbished and a new conveyor installed. Any mineralized or waste rock material produced and required to be transferred to the NCK shaft or below the conveyor bottom will be hauled using 20 t mining trucks and electric LHD units.

Material transfer from the NCK shaft to the South Crofty process plant will be achieved via the 2,060 m level (40 fathom level) discharge station and Tuckingmill conveyor. At the 2,060 m level it is envisioned that the following will be installed and constructed; skip dump arrangement, rock storage, bottom feeder to discharge onto conveyor, and a conveyor approximately 590 m in length.

An isometric view of the proposed Dolcoath Section underground mine layout is presented in Figure 1.1. A longitudinal section of the Dolcoath Section is presented in Figure 1.2. The two figures contain existing development (some of which will be rehabilitated), new development, new ramps between levels, and stoping blocks that are included in the mine production schedule.

### Figure 1.1 Isometric View of the Dolcoath Section Underground Mine Layout

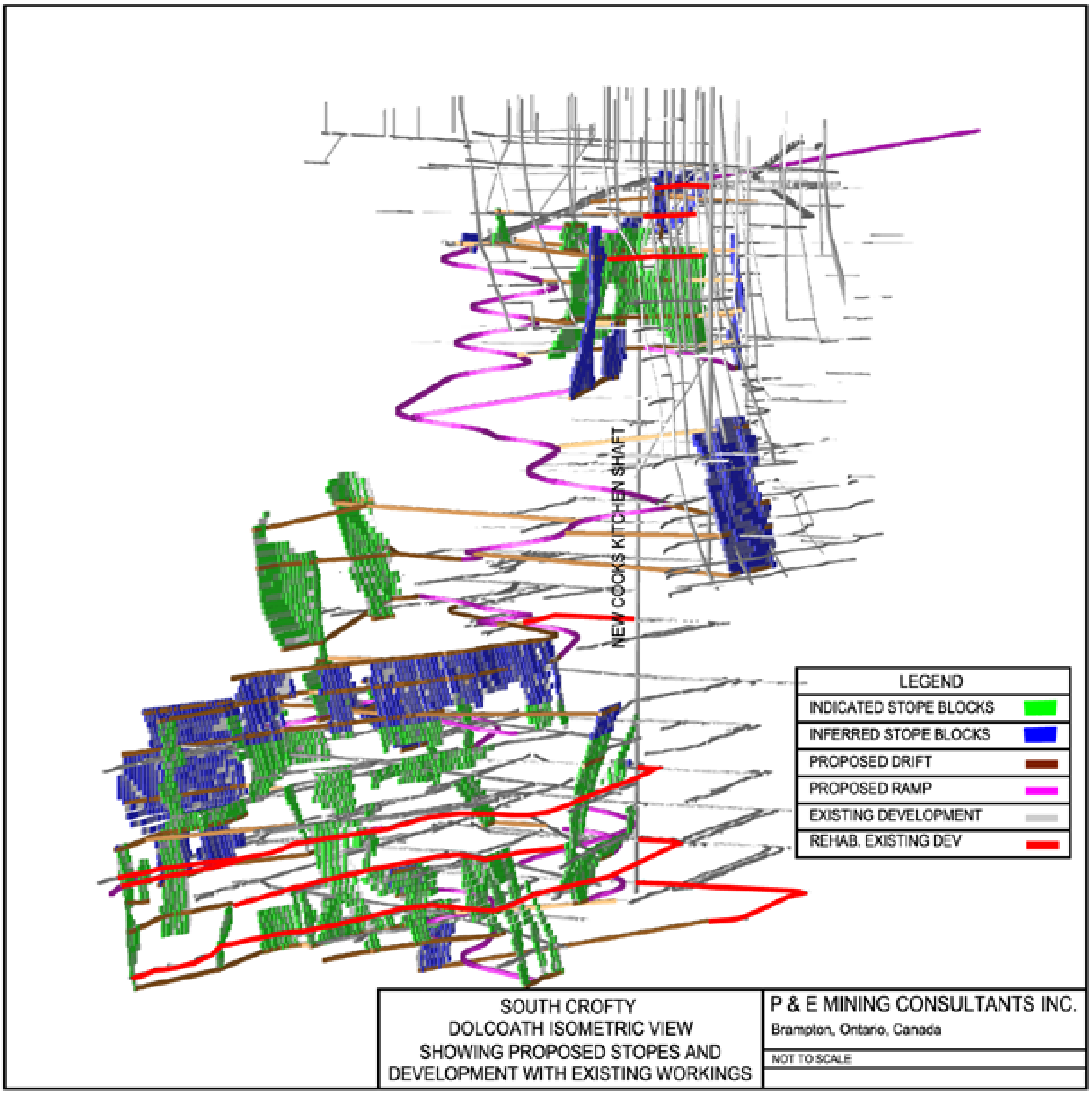
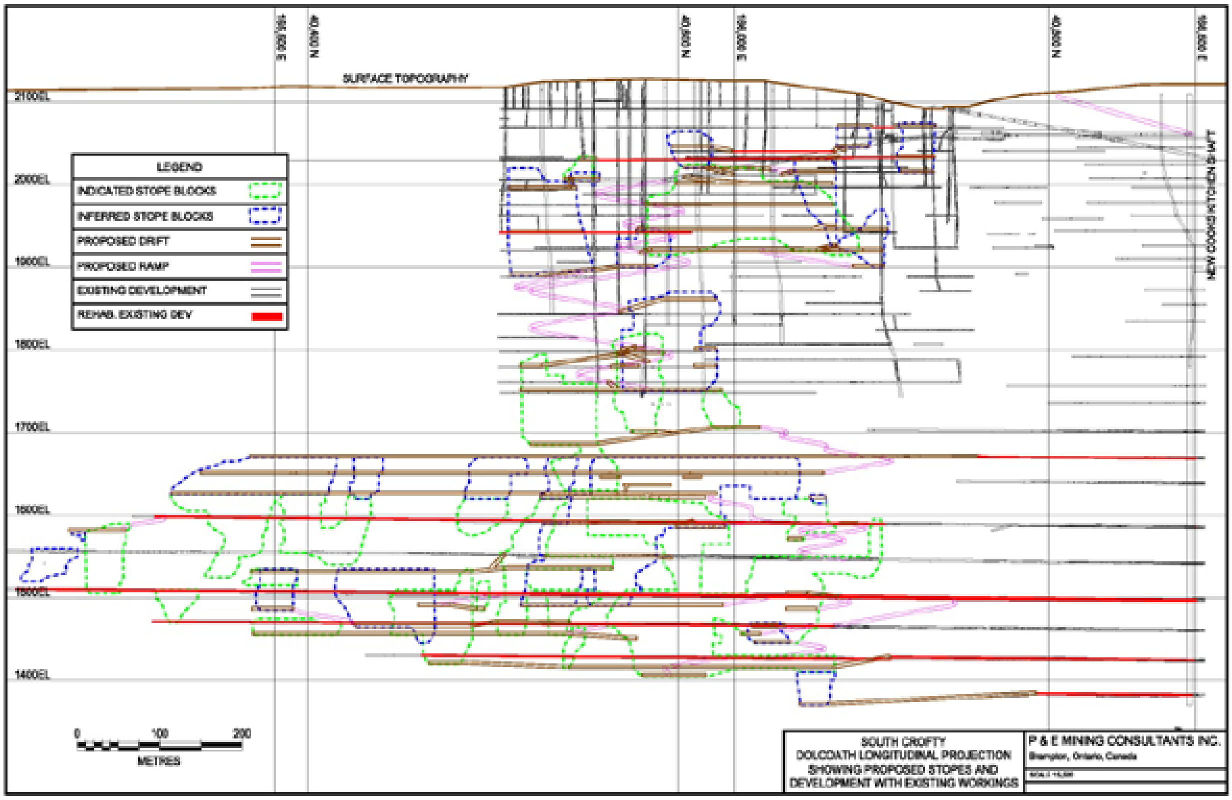


**Figure 1.2 Longitudinal View of the Dolcoath Section Underground Mine Layout**




17.3 km of new level and decline development will be driven over the life-of-mine ("LOM"). 35.2 km of existing drifts will be enlarged and rehabilitated over the LOM. 5.9 km of raising will be carried out over the LOM.

According to historic operations records, the hangingwall and footwall at South Crofty are competent and stopes may not require any backfill after extraction. Backfill will provide a competent work floor in the stopes. In order to meet surface permissions that stipulate no tailings facility, all tailings will be pumped underground. P&E recommends thickened tailings as the preferred and most cost effective type of backfill. It may be possible to reduce the cement content by separating the coarse fraction, to be pumped into the active stoping areas, and the fine fraction that will be disposed into old mining voids.

At a cut-off value of 0.70% SnEq the mineralized material mined is estimated at 2.575 Mt at an average grade of 1.55% SnEq. Approximately 60,000 t of mineralized material was considered not mineable due to proximity to historic workings, remnant mineralization, or in unrecoverable sill pillars. However, this material will require physical inspection underground once the workings are dewatered and accessible, to confirm if it can be mined. Mining dilution was estimated by calculating the tonnes and grades within a 'skin' around the outside of each of the planned stope shapes using Gemcom software. This 'skin' was created on the footwall and hangingwall of each mining block. Mining dilution was estimated by calculating the over-break in the hangingwall and footwall of each stope shape, and for this study P&E used external mining dilution of 15%. A diluting grade was applied to every mining block at 0.45% SnEq grade. Additionally, the mining recovery was assumed to be 95% for all stopes and sill tonnes. The LOM schedule by mine area is presented in Table 1.2.

| **TABLE 1.2<br>SOUTH CROFTY UNDERGROUND LOM PLAN BY AREA** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Mine Section** | **Y1** | **Y2** | **Y3** | **Y4** | **Y5** | **Y6** | **Y7** | **Y8** | **Total LOM** |
| Dolcoath (t) | 4,900 | 48,100 | 133,800 | 149,400 | 139,400 | 136,100 | 207,700 | 334,700 | 1,154,100 |
| Dolcoath Grade (SnEq%) | 1.85 | 1.42 | 1.45 | 1.56 | 1.24 | 1.25 | 0.96 | 0.95 | 1.18 |
| Lodes 2, 4 & 8 (t) | 183,200 | 183,000 | 151,300 | 139,400 | 122,500 | 119,400 | 80,700 | - | 979,500 |
| Lodes 2, 4 & 8 Grade (SnEq%) | 2.03 | 1.97 | 1.39 | 1.71 | 1.64 | 1.68 | 2.27 | | 1.80 |
| Roskear (t) | 20,600 | 26,300 | 12,900 | 23,900 | 27,000 | 23,500 | 16,200 | - | 150,400 |
| Roskear Grade (SnEq%) | 1.66 | 1.66 | 1.83 | 2.02 | 1.86 | 1.78 | 1.78 | | 1.80 |
| Pryces-Tincroft (t) | 1,300 | 22,600 | 52,000 | 37,300 | 61,100 | 71,000 | 45,400 | - | 290,700 |
| Pryces-Tincroft Grade (SnEq%) | 1.59 | 1.98 | 2.40 | 2.50 | 2.44 | 1.85 | 1.15 | | 2.05 |
| | | | | | | | | | |
| **Total Tonnes Mined** | **210,000** | **280,000** | **350,000** | **350,000** | **350,000** | **350,000** | **350,000** | **334,700** | **2,574,700** |
| **Grade (SnEq%)** | **1.99** | **1.85** | **1.58** | **1.75** | **1.64** | **1.56** | **1.33** | **0.95** | **1.55** |

## 1.12 RECOVERY METHODS

Initial crushing will be conducted underground using a jaw crusher and underground surge bin. After hoisting, material will be subsequently delivered by conveyor to secondary and tertiary cone crushers operating in closed circuit with screens to produce a suitable feed to the grinding circuit. South Crofty mineralized material feed is characterized as "slimey" and washing of coarse feed using a trommel screen is included. Heavy media separation is potentially applicable.

Crushed mineralized material will be fed to a conventional rod mill - ball mill combination with the ball mill in closed circuit with screens. Rod mill discharge will be fed to a primary gravity circuit using spirals for concentration. Spiral concentrate is cleaned in two stages and fines are directed to the tin flotation circuit. The remainder of the solids reports to a ball mill - classification circuit and secondary spirals. Potentially, a finished concentrate may be generated within this circuit.

Historically, classification was accomplished using spiral classifiers and hydroseparators for size separation prior to gravity concentration. Hydrocyclones may be employed in any future circuit. The classified product is fed to clusters of spiral concentrators to potentially produce a finished concentrate and a middlings product. The middlings are directed to the tin flotation circuit.

A conventional flotation circuit recovers fine tin not recovered by gravity concentration. De-sliming of the flotation feed via cyclones may be required. The flotation circuit is comprised of a rougher-scavenger stage followed by two stages of cleaning to produce a finished tin flotation concentrate.

Towards the end of mine life, copper and zinc values in the feed will increase and it is planned to install conventional flotation circuits comprising rougher and multiple cleaner stages for the separate recovery of copper and zinc concentrates.

## 1.13 PROJECT INFRASTRUCTURE

The Property is readily accessible by a network of existing all-weather paved highways and local roads. The Project site is located within an industrial area with a highly developed power supply and regional distribution and has two 33 kV overhead power lines which traverse the Property. A 5MW dedicated electrical power supply is presently available from the national power grid through the existing 3.5MW substation at New Cook's Kitchen Shaft and it is estimated that 10-12MW can be accessed in the future with proper infrastructure including a new substation.

A 25,000 $m^3$/day water treatment will be installed in order that the mine can be dewatered over an 18 – 24 month period. During production, a steady-state dewatering program of 5,500 to 6,500 $m^3$/day will be maintained subject to annual precipitation variations.

The Project will be developed and constructed in accordance with the current permitted site layout, which received full conditional planning permission on November 3, 2011, and was confirmed to be extant by Cornwall Council on January 30, 2017. The site will accommodate a process plant, tailings treatment and pumping plant, sewage treatment, underground mine accesses (shafts and decline ramp), core storage area, two-story mine and administration building/office, access site gate house, and supply infrastructure such as power plant, electric substation, emergency power generation, miners dry/change building, maintenance shop (electrical and mechanical), fuel storage tanks, warehouse and stores, weighbridge, explosives storage and compressor house.

## 1.14 MARKET STUDIES AND CONTRACTS

There are no material contracts pertaining to the South Crofty Project. The Project is open to the spot tin price market, along with copper and zinc, and there are no streaming or forward sales contracts in place.

A tin price of US$10/lb has been based on a five year forecast to 2020 by BMI Research in their report titled "BMI Tin Report Q1 2017" dated October, 2016. The report states that "(Tin) p*rices will increase gradually to USD22,000/tonne by 2020…as the global tin market posts sustained market deficits and inventories dwindle.*"

A copper price of US$2.65/lb and a zinc price of US$0.90/lb have been based on LME approximate two-year trailing averages at March 31, 2016, which were current prices when P&E compiled the Mineral Resource Estimate.

## 1.15 ENVIRONMENTAL

The historic South Crofty Mine is situated in the town of Pool between Camborne and Redruth in Cornwall, England. It is part of the Cornwall and West Devon Mining Landscape, and is part of a United Nations Educational, Scientific and Cultural Organization ("UNESCO") designated World Heritage Site comprised of mining landscapes in Cornwall and West Devon.

Atkins Engineering Limited completed two environmental statements for the below-ground and above-ground works at the South Crofty Mine in support of WUM's applications for permissions. Conditional permissions were granted for the above-ground (surface) and below-ground (underground) activities at the South Crofty mine in 2011 and 2013, respectively, based on a proposal that had been prepared and submitted by WUM. Agreement on the surface permissions was reached between WUM, Historic England and Cornwall Council, and the conditional planning was duly granted on November 3, 2011 and subsequently declared to be lawfully implemented and extant on 30th January, 2017. The scope of works described in the existing surface and underground conditional permissions are likely adequate for the future development of the Project. These two permissions permit mining and processing operations to 2071.

The Environment Agency has agreed with WUM that the standard for the interim water discharge quality that will apply while dewatering will be set at the conclusion of dewatering trials that have just been completed. The next permit that WUM will apply for is the Mine Waste Permit with Water Discharge Consent. Once this permit is granted, then WUM will be able to commence dewatering activities and discharge treated mine water into the Red River via the consented discharge points.

This PEA assumes that waste rock and thickened tailings would be used to backfill mined-out workings. The underground permission requires tailings leach testing and Local Planning Authority ("LPA") approval before tailings can be used for underground backfilling. The permissions also require other LPA approvals as the Project is advanced and the PEA assumes that such approvals would be obtained.

The mine would be closed in an orderly manner based on a closure plan that would be regularly updated and refined over the life of the Project. As defined in the surface permission, a surface restoration scheme would be required to be submitted for approval at least two years prior to the expiration of the date in the permission or within two years of the permanent cessation of mineral working whichever is the sooner. A restoration scheme for the surface features and shafts needs to be submitted for approval by the LPA at least two years prior to the expiration of the permission or within two years of the permanent cessation of mining activity.

## 1.16 CAPITAL AND OPERATING COSTS

### 1.16.1 Capital Costs

The initial dewatering, surface and underground infrastructure capital for the South Crofty Project is estimated at US$118.7M. The estimate was assembled using historical data from similar projects, scoping level input from various vendors and owner supplied costs which are considered to be reasonable within the current estimate requirements for this report.

The pre-production capital cost estimate is presented in Table 1.3.

| TABLE 1.3<br>PRE-PRODUCTION CAPITAL COST ESTIMATE | | | |
|---|---|---|---|
| **Capital Cost Area** | **Y-2** | **Y-1** | **Total US$M** |
| Pumping, Shaft Refurb and Water Treatment | 25.2 | 8.8 | 34.0 |
| Mining Equipment and Ventilation | - | 3.6 | 3.6 |
| Mine Development | - | 4.2 | 4.2 |
| Sub-surface Material Transfer and Conveyor to Mill | 2.5 | 3.5 | 6.0 |
| Level Development Rehab | - | 2.8 | 2.8 |
| Surface Processing Plant | 22.6 | 15.1 | 37.7 |
| Thickened Tailings Fill Plant | 3.5 | 7.5 | 11.0 |
| Site Infrastructure | 7.5 | - | 7.5 |
| Owners Costs | 0.6 | 0.7 | 1.3 |
| Contingency @ 15%* | 5.9 | 4.7 | 10.6 |
| | | | |
| **Total Pre-production Capital Cost** | **67.8** | **50.9** | **118.7** |

***Note:** The process plant contingency is 35% and is not included in the overall 15% contingency.*

The sustaining capital cost to develop or refurbish all required mining levels at South Crofty has been estimated at US$83.8M which includes underground development, equipment sustaining capital, all associated labour, stope definition diamond drilling, and other surface and underground infrastructure to support the Project for the duration of the mine life. Sustaining capital also includes US$3.7M in Production Year 7 for the installation of a Cu/Zn recovery circuit in order that the Upper Mine zones can be processed at the end of the mine life. All sustaining capital includes a 15% contingency.

Total capital costs over the LOM are estimated to total US$202.6M including pre-production and sustaining capital costs.

### 1.16.2 Operating Costs

Table 1.4 presents mine production unit operating costs per tonne mined.

| **TABLE 1.4<br>UNDERGROUND MINE OPERATING COSTS** | |
|---|---|
| **Cost Item** | **US$/t** |
| Mineralized Material Development | 4.40 |
| Stoping | 13.97 |
| Backfill (Thickened Tailings) | 5.52 |
| Crushing | 3.50 |
| Hoisting | 5.23 |
| Rock Transport UG Truck Haulage | 2.91 |
| Rock Transport Surface Conveyor | 1.50 |
| Tailings Disposal UG | 2.08 |
| DD Definition Drilling | 3.72 |
| UG Mine Indirect Cost | 11.60 |
| UG Mine Services | 9.20 |
| UG Mine Fixed Equipment Maintenance | 3.01 |
| | |
| **Total** | **66.65** |

Process plant operating cost estimates are presented in Table 1.5 for steady-state production of 350,000 tpy or 1,000 tpd. Almost half of the cost is labour. The process is primarily grinding and gravity, hence the reagent cost is low compared to many base metal process plants.

| **TABLE 1.5<br>PROCESS PLANT OPERATING COSTS AT 1,000 TPD** | | |
|---|---|---|
| **Item** | **US$M/yr** | **US$/t** |
| Operating Labour | 4.0 | 11.41 |
| Power | 1.8 | 5.17 |
| Reagents | 0.3 | 0.94 |
| Operating Supplies | 2.0 | 5.66 |
| | | |
| **Total** | **8.1** | **23.18** |

At throughput rates in the first two years of production of 210,000 tpy and 280,000 tpy, the process plant operating costs are estimated to increase to US$31.83/t and US$26.42/t, respectively. Once the Cu/Zn recovery circuit is installed during production year seven, the plant operating cost is estimated to increase from steady-state of US$23.18/t to US$23.69/t. The average processing cost over the LOM is estimated at US$24.30/t.

For this Project the power cost per kilowatt-hour is US$0.1074 and is a blended cost based on peak and off-peak rates.

A fixed global G&A cost which includes all related labour, consumables, and services that are used by the site has been estimated at US$7.33/tonne processed.

Closure costs for the Project are estimated at US$10M. To achieve that target by the end of LOM, an operating cost fund will be established at a cost of US$3.06/t processed. This fund will accrue at 5% interest from the start of production. By the end of production the fund will be at a principle amount of US$7.9M plus US$2.1 interest, equal in total to US$10M.

Manpower has been estimated at 112 people during the second year of pre-production, increasing to a peak of 277 people during steady-state production.

Total operating costs for the South Crofty Mine have been estimated to average US$101.35/t processed over the LOM, and are presented in Table 1.6.

**TABLE 1.6**
**TOTAL OPERATING COSTS**

| Item | Cost US$/t Processed |
|---|---|
| Mining | 66.65 |
| Processing | 24.30 |
| G&A | 7.33 |
| Closure Fund | 3.06 |
| | |
| **Total** | **101.35** |

## 1.17 ECONOMIC ANALYSIS

The economic analysis is based on the 2017 South Crofty underground Project LOM plan comprised of mining the South Crofty, Upper and Lower Dolcoath, Lodes 2, 4 and 8, Roskear and Pryces-Tincroft deposits including updated production plans, underground development design, stoping, vertical raising, conveyor installation, refurbishing of all required access including New Cook's Kitchen Shaft and Roskear Shaft, underground and surface infrastructure, required manpower to operate the mine and all operating costs. The LOM plan covers a ten year period, comprised of two years of pre-production, and eight years of production.

The LOM plan and economic analysis is based on the Company obtaining the necessary permit to commence dewatering of South Crofty underground voids and recommence mining operations approximately two years later once the water level is at the bottom of the New Cook's Kitchen Shaft. Operational costs are based on first principle estimates for development, process plant, underground mining and G&A including all mining consumables, labour, maintenance, overheads, and mine services based on the Project mine schedule.

Capital work consists of dewatering, shaft and level rehabilitation, new declines and level drifts, and undergoing infrastructure such as main ventilation fans, shaft loading system, mineralized material-pass/waste-pass system, new Tuckingmill Decline including conveyor installation, discharge system below surface, new intermediate pumping stations, bottom shaft pumping station, mine bottom pumping station and underground primary crusher chamber excavation, construction and installation.

All costs are in Q4 2016 US dollar nominal terms and inflation has not been considered in the cash flow analysis. A 1.25 (USD:GBP) exchange rate has been used in calculations in the financial model unless otherwise noted.

### 1.17.1 Revenue

- The Project averages 0.25 Mtpa mined during the first two years of production and approximately 0.35 Mtpa thereafter to the end of mine life.
- Average Sn production of 9.71M lb/year over the eight year LOM.
- All mineralized material feed will be supplied directly to the process plant via the New Cook's Kitchen Shaft and Tuckingmill conveyor and processed with no substantial build-up of stockpiled material.
- Average diluted grade mined is estimated at 1.55 % SnEq.
- Average process recoveries of 88% for Sn, 85% for Cu, and 70% for Zn.
- 59% Sn grade in concentrate is planned.
- For the LOM, the Sn price is US$10.00/lb produced at 100% payable metal during smelting and refining.
- Cu and Zn metal have been converted to SnEq using metal prices of $2.65/lb Cu and $0.90/lb Zn.
- Sales costs (concentrate transportation, smelting and refining charges) are estimated at US$0.60/lb-recovered-Sn.
- Royalty varies by zone and Sn price from 0.42% for Sn prices less than US$22,000/t to 0.63% for Sn prices over US$25,000/t. The average royalty is 0.52% over the LOM. There are no other applicable royalties.
- For the purposes of simple financial modeling, revenue is recognised at the time Sn concentrate shipments leave the Port of Plymouth.

### 1.17.2 Costs

- Two year pre-production period, followed by eight years of production.
- Initial capital cost of US$118.7M including 15% contingency on all items, except 35% contingency on the process plant.
- LOM sustaining capital costs of US$83.8M including 15% contingency for capital development, underground equipment, construction of Cu/Zn flotation circuit, ventilation, site infrastructure, and resource upgrade diamond drilling.
- Average operating cost over LOM of US$101.35 per tonne processed.
- Average cash cost per lb of SnEq of US$3.36/lb over LOM and an all-in sustaining cash cost ("AISC") of US$4.44/lb SnEq.
- Freight and refining costs for tin concentrate has been based on historical costs and data from other tin projects and are subject to market adjustment. Concentrate transportation, smelting and refining of Sn, Cu and Zn product costs are estimated at US$0.60 per recovered pound (lb) of tin. South Crofty tin concentrate has historically sustained low deleterious element penalties, and none were considered in this estimate.
- Corporate tax rate of 17% based on new UK legislation effective as of 2020.

### 1.17.3 Net Present Value

The after-tax Net Present Value ("NPV") at a 5% discount rate from pre-production through to completion of LOM for the base case is estimated at US$130.5M and the Internal Rate of Return ("IRR") is estimated at 23%, with a payback of 3.8 years, at assumed metal prices of US$10.00/lb Sn, US$2.65/lb Cu and US$0.90/lb Zn. Project economics are summarized in Table 1.7.

| Table 1.7<br>After-Tax Project Economic Summary | |
|---|---|
| **Operating Statistics** | **LOM** |
| Tonnes Mined (000s) | 2,575 |
| SnEq grade (%) | 1.55 |
| Process Plant Recovery (%) | 88 |
| Concentrate Grade (% SnEq) | 59 |
| Concentrate Produced (t) | 59,699 |
| Metal Contained in Concentrate (M lb SnEq) | 77.65 |
| Cash Cost (US$/lb SnEq) | 3.36 |
| All-in Sustaining Cost (US$/lb SnEq) | 4.44 |
| | |
| **Estimated Cash Flow** | **(US$ M)** |
| SnEq Revenue | 776.5 |
| Concentrate Transport & Refining | (46.6) |
| Royalties | (3.8) |
| Net Smelter Return (NSR) | 726.1 |
| | |
| **Cost Summary** | **(US$ M)** |
| Mining Cost | (171.6) |
| Processing Cost | (62.6) |
| G&A Cost | (18.9) |
| Closure Cost | (7.9) |
| Pre-Tax Cash Earnings | 465.1 |
| Depreciation | (176.7) |
| EBITDA | 288.4 |
| Losses Carried Forward | (25.9) |
| Taxable Income | 262.5 |
| Corporate Tax | (48.2) |
| VAT Payable | (40.5) |
| VAT Rebate | 40.5 |
| Capital and Sustaining Capital Cost | 202.6 |
| After-Tax Cash Flow | 214.4 |
| | |
| NPV @ 5% | 130.5 |
| IRR (%) | 23 |
| Payback Period (years from start of production) | 3.8 |

### 1.17.4 Sensitivity Analysis

The sensitivities and the impact on cash flows have been calculated for -20% to +20 % variations in tin price, operating cost and capital cost against the base case as presented in Table 1.8.

| Table 1.8<br>South Crofty Sensitivity Analysis | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sn Price Sensitivity (After-Tax US$M)** | | | | | | | | | |
| **US$/lb** | **9.00** | **9.25** | **9.50** | **9.75** | **10.00*** | **10.25** | **10.50** | **10.75** | **11.00** |
| NPV | 73.7 | 88.0 | 102.3 | 116.6 | **130.5** | 145.2 | 159.5 | 173.8 | 188.1 |
| CF | 137.3 | 156.7 | 176.1 | 195.5 | **214.4** | 234.4 | 253.8 | 273.2 | 292.6 |
| IRR(%) | 16 | 18 | 20 | 22 | **23** | 25 | 27 | 28 | 30 |
| **NPV (After-Tax US$M)** | | | | | | | | | |
| **%** | **-20%** | **-15%** | **-10%** | **-5%** | **Base Case** | **5%** | **10%** | **15%** | **20%** |
| Capex | 166.5 | 157.6 | 148.7 | 139.8 | **130.5** | 122.0 | 113.1 | 104.2 | 95.3 |
| Opex | 169.1 | 159.5 | 150.0 | 140.4 | **130.5** | 121.3 | 111.8 | 102.2 | 92.7 |
| **Cash Flow (After-Tax US$M)** | | | | | | | | | |
| **%** | **-20%** | **-15%** | **-10%** | **-5%** | **Base Case** | **5%** | **10%** | **15%** | **20%** |
| Capex | 255.5 | 245.3 | 235.2 | 225.1 | **214.4** | 204.8 | 194.7 | 184.6 | 174.4 |
| Opex | 267.1 | 254.1 | 241.0 | 228.0 | **214.4** | 201.9 | 188.9 | 175.8 | 162.8 |
| **IRR (After-Tax %)** | | | | | | | | | |
| **%** | **-20%** | **-15%** | **-10%** | **-5%** | **Base Case** | **5%** | **10%** | **15%** | **20%** |
| Capex | 32 | 30 | 27 | 25 | **23** | 22 | 20 | 18 | 17 |
| Opex | 28 | 27 | 26 | 25 | **23** | 22 | 21 | 20 | 19 |

***Note:*** ** represents Base Case scenario*

## 1.18 ADJACENT PROPERTIES

Cornish Minerals Limited (Bermuda), the sister company of WUM, holds a number of mineral rights in Cornwall that cover a total area of approximately 150 $km^2$. There are many historical and past-producing mines throughout Cornwall and some of them proximal to South Crofty. A Qualified Person has been unable to verify the information on the adjacent properties held by Cornish Minerals Limited (Bermuda).

Wolf Minerals Ltd., an Australian and London AIM listed specialty metal’s company, has developed the Drakelands open pit tungsten-tin project in the neighbouring county of Devon and started production in 2015.

## 1.19 INTERPRETATION AND CONCLUSIONS

P&E concludes that the South Crofty Project has economic potential as an underground mining operation, utilizing a new processing plant to produce tin, copper and zinc concentrates. The PEA outlines 2.575 Mt of mill feed (inclusive of mining dilution and loss factors) averaging 1.55% SnEq from four main underground areas. The mineralized material from the Mineral Resource Estimate supporting this tonnage contains both Indicated and Inferred Mineral Resources. The Project has an estimated pre-production capital cost at US$118.7 million and robust economics with an after-tax NPV of C$130.5M, an after-tax IRR of 23%, and a 3.8 year payback period using base case metal prices of US$10.00/lb Sn, US$2.65/lb Cu and US$0.90/lb Zn.

P&E recommends that Strongbow advance the South Crofty Project with extended and advanced technical studies, including a drill program, with the intention of advancing the Project to a production decision.

The following list itemizes the conclusions that can be drawn from the information provided in this PEA:

- The South Crofty Project is an advanced Property with extensive underground development and permits in place.
- Although the structural controls are locally complex, the mineralized lodes overall present a relatively simple geometry with lode formation controlled by conjugate fracture sets that producing branching lodes, which are generally steeply dipping either to the south or the north at 60° to 80° to depths over 1,000 m from surface.
- The South Crofty Project benefits from an extensive historical Mineral Resource database for deep lodes with over 55,000 m of channel sampling combined with 31,000 m of modern drilling, which has enabled an NI 43-101 Mineral Resource Estimate to be reported for the Property.
- In P&E's opinion the drill hole and assay/analytical databases were suitable for the estimation of Mineral Resources and future Mineral Reserves. In addition to data verification, P&E reviewed the QA/QC for the South Crofty Project analyses from the recent drilling and concludes that the analyses are acceptable for Mineral Resource estimation.
- The South Crofty Project Indicated Mineral Resource Estimate at a 0.6% SnEq block cut-off grade is 1.92 million tonnes averaging 1.70% SnEq. The Inferred Resource Estimate at a 0.6% SnEq block cut-off grade is 1.20 million tonnes averaging 1.52% SnEq.
- Although there are number of uncertainties in the historic data, appropriate due diligence has been exercised to compile and verify data from mine records and in P&E's opinion, the Mineral Resource Estimate has no fatal flaws, is reasonable and has been undertaken according to industry standard practice.
- There are many opportunities to increase these Mineral Resources and to raise the confidence category of those resources by additional drilling and development. Similarly, there are additional historic but unconnected mines within the mineral rights area that represent additional exploration or development potential to the Project.
- The wealth of information available enhances the Project understanding, and significantly de-risks the interpretation of the geology and distribution of mineralized lodes and contained metal as well as the extent of underground workings and previously mined areas. However, it is clear that some parts of the historic data set are lost or otherwise incomplete, and that this represents some risk to the Project.
- The Property is readily accessible by a network of existing all-weather paved highways and local roads. The required site infrastructure can be built within the current industrial area available. Adequate electrical power is readily available and accessible from the national grid.
- Conditional permissions were granted for the above-ground (surface) and below-ground (underground) activities at the South Crofty mine in 2011 and 2013, respectively, based on a proposal that had been prepared and submitted by WUM.
- A water treatment system has been trial tested and is expected to provide a viable method of treating the large amount of water that needs to be pumped out of the existing underground workings. The Environment Agency has agreed with WUM that the standard for the interim water discharge quality that will apply while dewatering will be set at the conclusion of dewatering trials that have just been

completed (Q1 2017). It is anticipated that the Company will apply for a Mine Waste Permit with Water Discharge Consent during 2017.

- All water removed from the mine workings by mechanical pumping will pass through an onsite water treatment plant before being discharged to the Red River and out to the sea. Application is planned in 2017 in order that the current permit to discharge water at a rate of 10,000 $m^3$/day from the mine workings can be increased to 25,000 $m^3$/day. Once the mine is dewatered, which is estimated to take place over a two year period, steady-state dewatering is estimated to be between 5,500 $m^3$/day and 6,500 $m^3$/day, subject to annual precipitation variations.
- The long history of past production from the Property leaves little doubt that a viable metallurgical process with acceptable recoveries can be developed. It is probable that a new process plant would incorporate gravity and flotation recovery of tin, generally as practiced at Wheal Jane. South Crofty successfully employed heavy media separation and this unit operation could be adopted in a new process plant if economics warrant. Saleable concentrates for tin, copper and zinc are expected to be produced at reasonable recoveries.
- The underground mine has been scheduled at a steady-state production rate of 1,000 tpd on a seven day per week work schedule. The mine design layout and the mining method selection have been done at a PEA level and it is assumed that sublevel longhole stopes spaced at 30 m vertical level intervals is appropriate. The NCK shaft hoisting facility will have the capacity to handle the amount of production.
- The New Roskear and Taylor's shafts will be accessed by the development and will be used for ventilation and manways. The NCK shaft will be the main production shaft after refurbishment once new hoist components and conveyances are installed and commissioned.
- In order to meet surface permit permissions that stipulate no tailings facility, all tailings will be pumped underground. Thickened tails is the preferred and most cost effective type of backfill.
- For this study a 350,000 tpy production rate has been targeted and scheduled after two years of ramp-up, with one final year of wind down. At a cut-off value of 0.70% SnEq the mineralized material mined is estimated at 2.575 Mt at an average grade of 1.55% SnEq.
- It was assumed that historical mine costs will not be relevant for the current exercise, therefore first principle and equipment quotes from similar projects have been considered when estimating the operating and capital costs.
- Capital cost estimates have an accuracy level of ±35% for all items and include a 15% contingency on all capital items except for the process plant for which a 35% contingency has been applied. The initial dewatering, surface and underground infrastructure capital for the South Crofty Project is estimated at US$118.7M.
- The sustaining capital cost to develop or refurbish all required mining levels at South Crofty has been estimated at US$83.8M which includes underground development, equipment sustaining capital, all associated labour, stope definition diamond drilling, and other surface and underground infrastructure to support the Project for the duration of the mine life.
- Total capital costs over the LOM are estimated at US$202.6M including pre-production and sustaining capital costs.
- The underground mine production unit operating costs are estimated at US$66.65/tonne mined. The average processing cost over the LOM is estimated

at US$24.30/t processed. Fixed global G&A costs, which include all related labour, consumables, and services that are used by the site, are estimated at US$7.33/t processed. Total operating costs for the South Crofty Project have been estimated to average US$101.35/t processed over the LOM.

- Total manpower to be employed at the Project during steady-state production is estimated at 277 people.
- Closure costs for the Project are estimated at US$10M. To achieve that target by the end of LOM, an operating cost fund will be established at a cost of US$3.06/t processed. This cost is included in the underground mining operating cost. The mine would be closed in an orderly manner based on a closure plan that would be regularly updated and refined over the life of the Project.

## 1.20 RECOMMENDATIONS

P&E recommends in-fill drilling to upgrade a portion of the Lower Mine Inferred Mineral Resources to Indicated Mineral Resources as a basis for Pre-Feasibility Study and estimation of Mineral Reserves. A preliminary diamond drilling campaign of 26,500 m is proposed to upgrade approximately 800,000 tonnes of Mineral Resources in No. 2 and Dolcoath South lodes in the Lower Mine, and to test areas adjacent to the Dolcoath and Roskear lodes where there is potential for a material increase in the Mineral Resource Estimate. The campaign assumes access from surface or upper level workings and controlled drilling of wedged holes off pilot holes. P&E estimates preliminary costs for the drill program at $5.3 million.

Once the in-fill drilling program is completed and the Mineral Resource Estimate is updated, and assuming that sufficient Mineral Resources are upgraded to the Indicated Mineral Resource category, P&E recommends that Strongbow proceed to the next stage of engineering, which would be a Pre-Feasibility Study.

The next permit that WUM should acquire is the Mine Waste Permit with Water Discharge Consent. Once this permit is granted WUM will be able to commence dewatering activities and discharge treated mine water into the Red River via the consented discharge points.

To improve the Mineral Resource Estimate QA/QC protocol, P&E recommends Strongbow locate a non-mineralized blank to replace the one currently being used.

The potential for Mineral Resources at the Roskear D and North Pool lodes was not addressed as part of this report and should be considered in future work programs.

Metallurgical testwork on representative samples from the current Mineral Resource Estimate and a detailed review of past metallurgical work will be required to develop and optimize the process plant flowsheet.

P&E recommends thickened tailings as the preferred and most cost effective type of backfill. Testwork is recommended on tailings and backfill material to determine rheology and strength at various cement contents, and to determine if less expensive thickened tailings could be used for deposition underground instead of paste tailings.

P&E recommends the following related to future underground mining:

- During the pre-production period a long-term ventilation management plan should be developed by the mine ventilation engineer.
- The Company should develop a waste rock/aggregate strategy through an engineering study at a later stage.
- Permanent dewatering pumps should be multistage Sulzer type pumps with one on duty and one on standby for maintenance flexibility. When in production, to take advantage of lower power rates, P&E recommends that pumping from the shaft bottom to the 1,750 m level and the 2,060 m level pump stations should occur during night hours.

A comprehensive closure plan is recommended as part of a Pre-Feasibility Study.

# 2.0 INTRODUCTION AND TERMS OF REFERENCE

## 2.1 TERMS OF REFERENCE

The following report was prepared to provide a Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project ("South Crofty Project", the "Project" or the "Property") located in Cornwall, United Kingdom. On July 11, 2016, Strongbow acquired, from administration, a 100% interest in Western United Mines Limited ("WUM") and Cornish Minerals Limited (Bermuda) ("CMLB") which own the surface and underground mining rights to the South Crofty Project.

This report was prepared by P&E Mining Consultants Inc. ("P&E") at the request of Mr. Richard Williams, P.Geo., President & CEO of Strongbow Exploration Inc ("Strongbow" or the "Company"). Strongbow is a publicly listed company (TSX-Venture exchange; trading symbol SBW) with its head office located at:

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Mr. Richard Routledge, P.Geo., of P&E, a qualified person under the regulations of NI 43-101, conducted a site visit to the Property on November 17 to 21, 2014, particularly to review items pertaining to the Mineral Resource. Mr. Andrew Bradfield, P.Eng., of P&E, a qualified person under the regulations of NI 43-101, conducted a site visit to the Property on June 17-18, 2014, for a technical review. There has been no material change to the scientific and technical information about the Property since the November 2014 site visits, other than the commencement of water treatment and pumping trials from New Cook's Kitchen Shaft, as indicated in a letter from Owen Mihalop, Director, Western Union Mines Limited, on February 27, 2017.

## 2.2 SOURCES OF INFORMATION

In addition to the site visits, P&E held discussions with technical personnel from WUM regarding all pertinent aspects of the Project and carried out a review of available literature and documented results concerning the Property. The reader is referred to those data sources, which are outlined in the References section of this report, for further detail.

Table 2.1 presents the authors and co-authors of each section of this report who, acting as a QP as defined by NI 43-101, take responsibility for those sections of the report as outlined in the Certificates of Qualified Person included in Section 28 of this report.

| **TABLE 2.1<br>REPORT AUTHORS AND CO-AUTHORS** | | |
|---|---|---|
| **Qualified Person** | **Employer** | **Sections of Technical Report** |
| Mr. Andrew Bradfield, P.Eng. | P&E Mining Consultants | 2, 3, 15, 18, 19, 20, 22, 24 and Co-author 1, 16, 21, 25, 26 |
| Ms. Jarita Barry, P.Geo. | P&E Mining Consultants | Co-author 1, 11, 12, 25, 26 |
| Mr. David Burga, P.Geo. | P&E Mining Consultants | 4, 5, 6, 7, 8, 9, 10, 23 and Co-author 1, 25, 26 |
| Mr. Ernest Burga, P.Eng. | Andeburg Consulting Services Inc. | Co-author 1, 21, 25, 26 |
| Mr. Alfred Hayden, P.Eng. | EHA Engineering Ltd. | 13, 17 and Co-author 1, 25, 26 |
| Mr. Eugene Puritch, P.Eng., FEC | P&E Mining Consultants | Co-author 1, 14, 25, 26 |
| Mr. Richard Routledge, P.Geo. | P&E Mining Consultants | Co-author 1, 11, 12, 14, 25, 26 |
| Mr. Alexandru Veresezan, P.Eng. | P&E Mining Consultants | Co-author 1, 16, 21, 25, 26 |
| Mr. Yungang Wu, P.Geo. | P&E Mining Consultants | Co-author 1, 14, 25, 26 |

The Mineral Resource Estimate is prepared in compliance with the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM"), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions that were in force as of the effective date of this report.

## 2.3 UNITS AND CURRENCY

Unless otherwise stated all units used in this report are metric. Tin (Sn), copper (Cu) and zinc (Zn) assay values are reported in percentage (%) of metal. The US$ is used throughout this report unless specifically stated otherwise.

The following list shows the meaning of the abbreviations for technical terms used throughout the text of this report.

| **Abbreviation** | **Meaning** |
|---|---|
| "Ag" | silver |
| "As" | arsenic |
| "Au" | gold |
| "cm" | centimetre(s) |
| "CML" | Cornish Minerals Ltd. |
| "CDN$" | Canadian dollar |
| "Companies" | WUM and CML (Bermuda) |
| "Co" | cobalt |
| "Cu" | copper |
| "DDH" | diamond drill hole |
| "DIT" | Department of Industry and Trade |
| "ft" | foot |
| "g/t" | grams per tonne |
| "GSSF" | Galena Special Situations Fund |
| "GSSMF" | Galena Special Situations Master Fund |
| "ha" | hectare(s) |
| "HHP" | High heat production |
| "km" | kilometre(s) |
| "lb" | pound(s) |
| "m" | metre(s) |

| | |
|---|---|
| “mm” | millimetre(s) |
| “M” | millions |
| “Ma” | millions of years |
| “MW” | megawatts |
| “P&E” | P&E Mining Consultants Inc. |
| “PEA” | Preliminary Economic Assessment |
| “Sn” | tin |
| “Strongbow” | Strongbow Exploration Inc. |
| “T” | imperial ton(s) |
| “t” | metric tonne(s) |
| “tpy” | tonnes per year |
| “US$” | United States of America dollar |
| “W” | tungsten |
| “WUM” | Western United Mines Limited |
| “Zn” | zinc |

## 3.0 RELIANCE ON OTHER EXPERTS

P&E has assumed that all of the information and technical documents listed in the References section of this report are accurate and complete in all material aspects. While we have carefully reviewed all of the available information presented to us, we cannot guarantee its accuracy and completeness. We reserve the right, but will not be obligated to revise our report and conclusions if additional information becomes known to us subsequent to the date of this report.

P&E has relied on a legal opinion dated February 26, 2016 from Stephens Scown LLP, UK solicitors to Strongbow, to confirm that Strongbow will have title to the underground mine permission area and certain surface rights when the South Crofty Project exits from administration (now accomplished). P&E has relied on a letter dated February 27, 2017 from Owen Mihalop, Director, WUM, to confirm that there has been no material change to the Property, other than the commencement of water treatment and pumping trials from New Cook's Kitchen Shaft, since the P&E Independent Qualified Person site visit in November, 2014.

P&E has not verified the legality of any underlying agreement(s) that may exist concerning the licenses or other agreement(s) between third parties and has relied on Strongbow to have conducted the proper legal due diligence.

A draft copy of the report has been reviewed for factual errors by Strongbow. Any changes made as a result of these reviews did not involve any alteration to the conclusions made. Hence, the statement and opinions expressed in this document are given in good faith and in the belief that such statements and opinions are not false and misleading at the effective date of this report.

## 4.0 PROPERTY DESCRIPTION AND LOCATION

### 4.1 PROPERTY LOCATION

The South Crofty Project, located in the town of Pool, between the towns of Redruth and Camborne, is a past-producing underground tin mine located in the historic Cornwall tin mining district of southwest England. The Project is located at latitude 50° 13’ 21” N longitude 5° 16’ 32” W (UTM Coordinates WGS84 30U 337,679 mE 5,565,836 mN). The population of the Camborne-Pool-Redruth urban area is 59,112 (2011 census). The Project is located 390 km west-southwest of London, England. The Property is approximately 4.5 km south of the north coast of Cornwall and the Celtic Sea (Figure 4.1).

The Project is accessed from the fully-permitted site located within the town of Pool. Underground workings extend beneath Pool and the neighbouring towns. The South Crofty Project and past-producing mines extend 3.3 km east-west along strike from Camborne toward Redruth in the east and 800 m north-south from highway A30 to the railway in the south. It is the largest past-producing mine, in terms of area, in Cornwall and workings extend to a depth of 873 m below surface (Hogg, 2011).

**Figure 4.1 Property Location Map**


***Source:*** *Google Earth 2014*

### 4.2 PROPERTY DESCRIPTION AND TENURE

The South Crofty Project was acquired by Baseresult Holdings Limited (“Baseresult”) in 2001. In November 2007, Baseresult formed a 50-50 joint venture with Galena Special Situations Fund (“GSSF”) and formed Western United Mines Limited (“WUM”). Cornish Minerals Limited

(Bermuda) ("CMLB"), a sister company to Baseresult owned the mineral rights in the South Crofty Project as well as others elsewhere in Cornwall. Cornish Minerals Limited, a UK registered company, was created as a holding company over both WUM and CMLB with GSSF and Baseresult as 50-50 shareholders. Ownership of the Project was transferred to WUM.

In 2011, Celeste Copper, a Canadian publicly listed company, entered into a joint venture agreement with WUM on the South Crofty Project. In 2013, due to poor market conditions, Celeste failed to meet its commitments under the terms of the joint venture, consequently GSSF placed WUM and CML into administration to protect the Project assets. However, CLMB was not put into administration.

GSSF was the only secured creditor under administration. In 2014, GSSF reached an agreement with a Vancouver based private company, Tin Shield Production Inc ("Tin Shield"), whereby Tin Shield had the right to acquire a 100% interest in WUM / CML and CMLB. Tin Shield funded ongoing operational costs under the administration process in order to maintain the underground mining permissions in good standing and funded CMLB to ensure it also remained in good standing.

In March 2016, Strongbow announced that it had reached agreement with GSSF and Tin Shield to acquire a 100% interest in WUM and CMLB (collectively the "Companies") by funding WUM's exit from administration.

Strongbow acquired from administration a 100% interest in WUM and acquired a 100% interest in CMLB on July 11, 2016.

The material terms of the agreement are as follows, all references to currency being in Canadian dollars unless otherwise specified:

- Strongbow entered into a purchase and sale agreement with the administrator managing the affairs of WUM and Cornish Minerals Limited (UK), the sole shareholder of the Companies (also in administration) to acquire the shares of the Companies and to fund the exit of WUM from administration by reaching a settlement of the claims owed to unsecured creditors. The unsecured creditors approved the proposal on June 10, 2016. Strongbow paid £143,000 (CDN$249,000) for the exit from administration.
- GSSF, the only secured creditor, converted all debt owed to it into common shares of WUM and Strongbow acquired these shares, in return for future milestone payments, thereby completing the acquisition of 100% of the shares of the Companies.
- The UK holding company Cornish Minerals Limited (in administration) released the intra group indebtedness owed to it by WUM, amounting to £11,525,758.
- Upon closing of the acquisition, Strongbow reimbursed Tin Shield CDN$318,000 for operating costs incurred for the Project from November 1, 2015 to February 29, 2016; Strongbow assumed responsibility for the monthly Project operating costs as of March 2016. Also upon closing, Strongbow made a payment of US$80,000 to Tin Shield to refund a shareholder loan made to Tin Shield.
- On July 11, 2016, Strongbow issued 2,000,000 common shares with a value of CDN$400,000 for the acquisition. A total of 1,050,000 common shares were issued to GSSF and 950,000 common shares were issued to Tin Shield. The common shares were subject to a hold period that expired November 12, 2016.

In addition to the reimbursement, loan repayment and shares issued on July 11, 2016, Strongbow agreed to the following additional payments and share issuances as part of the purchase and sale agreement with GSSF and Tin Shield, whereby GSSF and Tin Shield would split the payments 52.5% to GSSF and 47.5% to Tin Shield:

- Strongbow will issue 1,000,000 common shares to GSSF / Tin Shield upon receipt of a permit to increase water discharge from the old mine workings from 10,000 $m^3$ per day to 25,000 $m^3$ per day.
- Strongbow will make a payment to GSSF / Tin Shield totaling CDN$2,000,000 (cash and / or common shares at Strongbow's election) on the second anniversary of the approval vote by creditors for WUM's exit from administration (date set at June 10, 2018).
- Strongbow will issue 2,000,000 common shares to GSSF / Tin Shield on delivery of a positive Feasibility Study or commencement of commercial production, whichever occurs first.
- Strongbow will make a cash and / or common share payment to GSSF / Tin Shield equal to 25% of the Net Present Value ("NPV") of the Project upon making a decision to go into production. In the event that Strongbow's market capitalization is less than the NPV of the Project when a production decision is made, Strongbow will pay the equivalent of 25% of its market value to GSSF / Tin Shield and the balance (between the 25% of market value and 25% of the NPV of the Project) will be paid out as a 5% Net Profits Interest from production.
- In the event that Strongbow transfers any assets, rights, or entitlements to certain mineral rights which are not part of the core mineral rights (the "Other Mineral Rights") to a third party before the agreed consideration has been paid to GSSF / Tin Shield, then GSSF / Tin Shield will be entitled to receive a payment equal to 10% of any consideration received for the Other Mineral Rights, to a maximum of CDN$1,000,000.

On September 16, 2016 the TSX Venture Exchange Inc. confirmed it accepted for filing the purchase and sale agreement entered into by Strongbow with the administrator managing the affairs of WUM and Cornish Minerals Limited (UK).

CMLB holds the title to the underground mineral rights and WUM holds certain surface rights that form the South Crofty Project. The Project's extensive 1,490 ha underground permissions extend over two key historic mining operations being the South Crofty mine to the east and the Dolcoath mine to the west. The mining operations were historically separated by the Great Crosscourse fault, which follows the course of the Red River as its surface feature.

Figure 4.2 shows the underground permissions area and the geographical context of the Project site in relation to the historic mine workings. The Project underground permissions area includes five Mineral Rights which are registered with the Land Registry as well as areas of Mineral Rights that are unregistered (areas coloured pink in Figure 4.2). The registered Mineral Rights have the following title numbers:

- CL169822
- CL169823
- CL188226
- CL188227
- CL188228

The landholdings are detailed in Appendix 1 of the report by Hogg (2011). Permit extents and co-ordinates are surveyed by use of Leica total station device. Confirmation survey was carried out by the mine surveyors in 2003 following the property's initial registration at the Land Registry. The unregistered mineral holdings have not been surveyed, although the relevant plans are held by WUM.

In the UK mineral ownership extends to the centre of the earth. The Project operates under permissions that were granted in 1952 and updated in 2006 with environmental conditions imposed. Replacement planning applications (one for surface and one for underground) were approved by Cornwall Council in 2011 and 2013 which in effect has increased the Project area to 1,490 ha with a working depth of 1,500 m below ground level. WUM has approximately 7.65 ha (18.9 acres) of surface ownership.

On March 2, 2017, P&E independently verified through a UK government website that the five Mineral Rights are registered with Cornish Minerals Limited (UK). The reader is cautioned that P&E has relied on the other tenure information provided by an independent legal opinion dated February 26, 2016 conducted by Stephens Scown, a law firm specialising in UK mineral law and solicitors to Strongbow. P&E has not verified the legality of any underlying agreement(s) that may exist concerning the licenses or other agreement(s) between third parties but has relied on Strongbow to have conducted the proper legal due diligence.

## 4.3 PERMITS

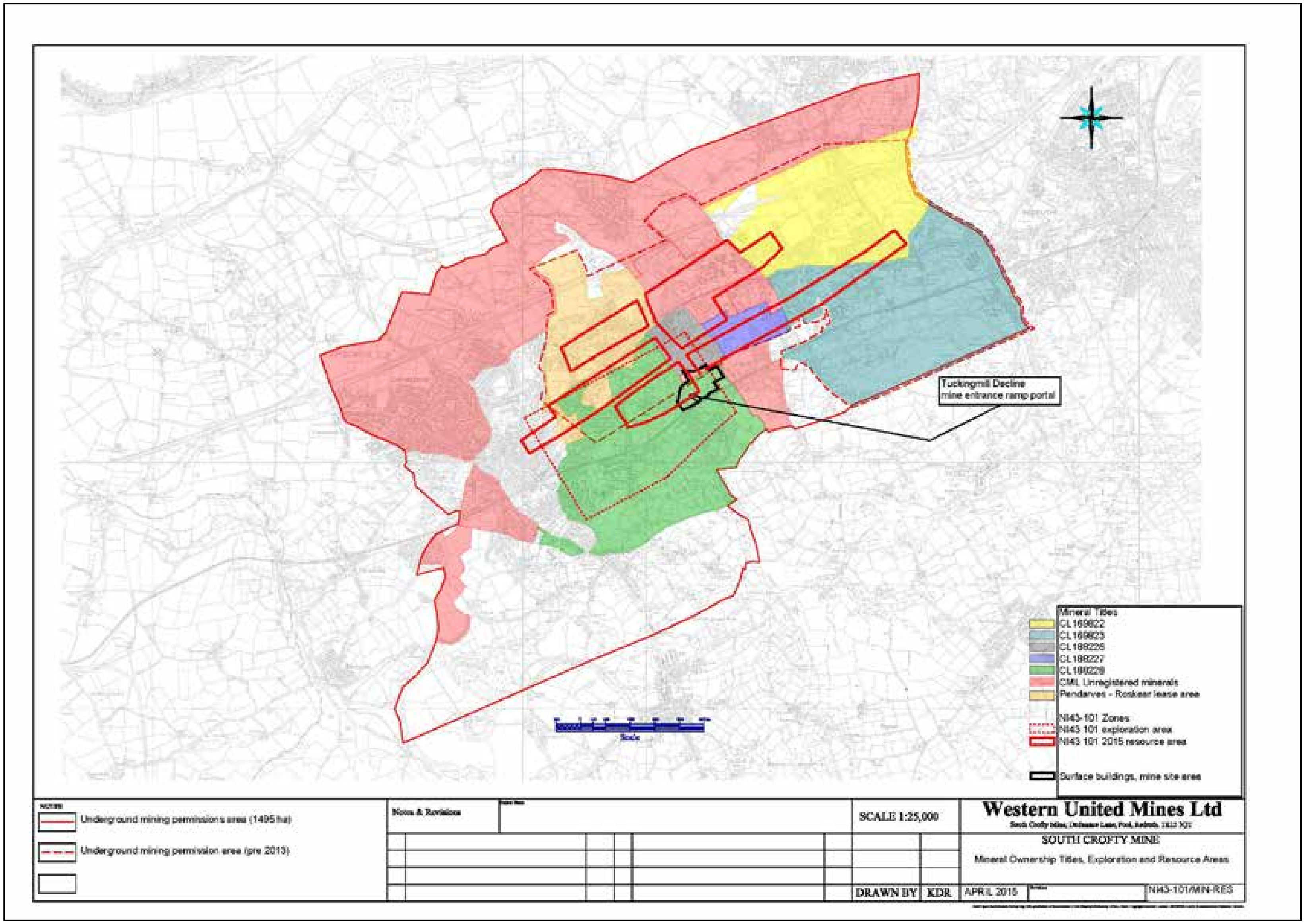
P&E understands that all titles and leases relating to the Project including permits required for exploration are current and valid until at least 2020. P&E has not reviewed requirements for the retention of these titles, or the terms of any royalties, back-in rights, payments, or other agreements and encumbrances to which the Property may be subject.

Cornwall Council, the Local Planning Authority ("LPA"), issued a Grant of Conditional Planning Permission ("permission") for Project-related surface activities in 2011 and another for Project-related underground activities in 2013 based on the scope described in the applications submitted by WUM. These two permissions permit mining and milling operations to 2071. Under the Town and Country Act 1990, Schedule 5, Part 1, s.1(2) the winning and working of minerals or the deposit of mine waste must cease not later than 60 years after the date of the permission.

Under the terms of the surface permission, the permitted surface development was to be commenced by November 3, 2016. In September and October, 2016, eight key surface conditions (numbers 6, 7, 8, 9, 10, 11, 12 and 32) were discharged by Cornwall Council which allowed construction work to commence. A 5 m section of concrete kerb was then installed along the main road into the Project site and a Certificate of Lawfulness for Proposed Use or Development was issued by Cornwall Council dated January 30, 2017, effective November 18, 2016. The Certificate of Lawfulness states that development has materially commenced in connection with PA10/04564 and that permission is therefore considered to be extant. The Grant of Conditional Planning Permission extends to June 30, 2071.

The next permit that WUM will apply for is the Mine Waste Permit with Water Discharge Consent. Once this permit is granted, then WUM will be able to commence dewatering activities and discharge treated mine water into the Red River via the consented discharge points.

**Figure 4.2 Mineral Licences Forming the South Crofty Project**



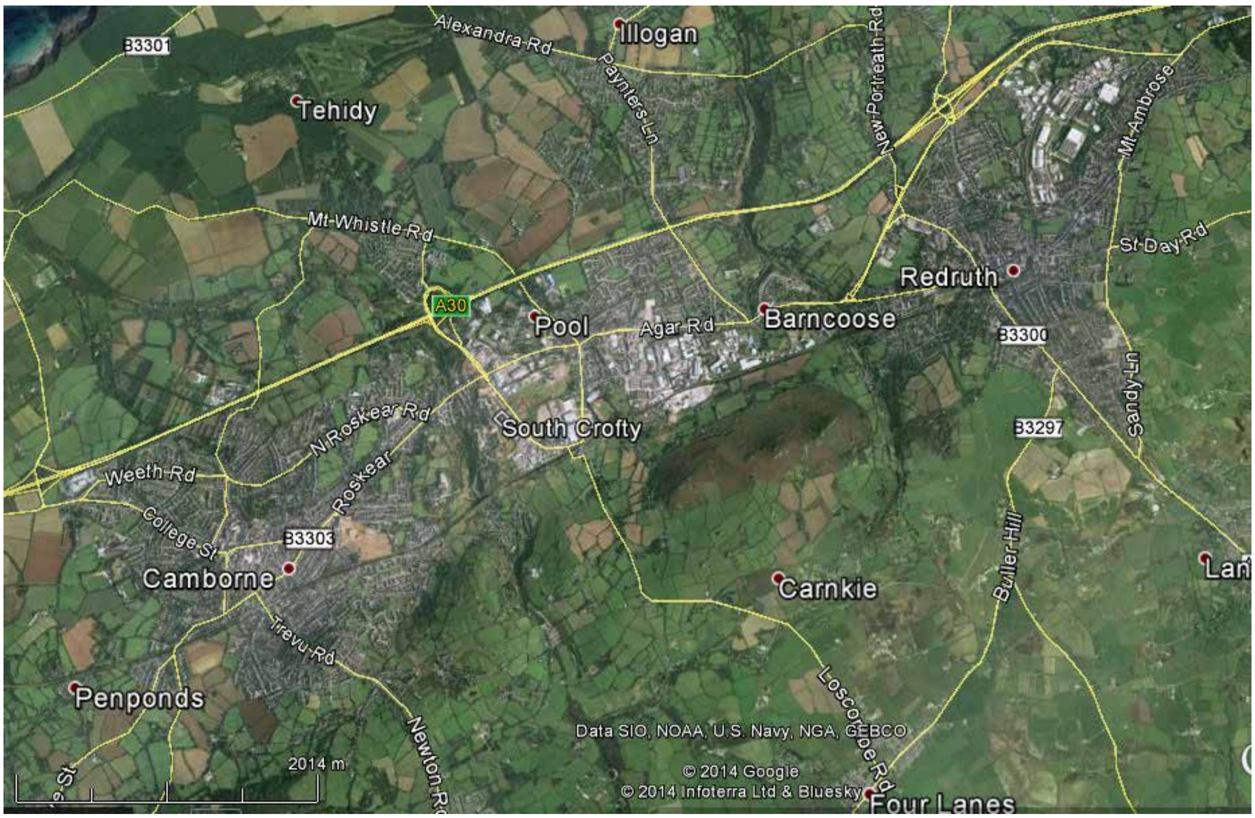

***Source:*** *Western United Mines Ltd. 2013.*

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

## 5.1 ACCESS

The South Crofty Property and the underground workings are largely within and underneath the town of Pool between the towns of Redruth and Camborne. The Project is located in an urban and semi-urban area and, as a consequence, existing transport infrastructure is well-developed (Figure 5.1). The Property is 1 km south of the A30 trunk road from London to Land's End, Cornwall. Redruth, Camborne, and Pool are all accessed from the A30 road. Air services are available via flights from London Gatwick Airport to Newquay Cornwall Airport, located 30 km northeast of South Crofty. In addition, train services on the First Great Western line extend to Redruth and Camborne from London.

**Figure 5.1 Regional Location Map**




***Source:*** *Google Earth 2014*

## 5.2 CLIMATE

Cornwall has a temperate oceanic climate with average annual temperatures of approximately 10°C. Climate data for Truro, Cornwall, located 16 km east of South Crofty (Table 5.1) indicate that July and August are the warmest months with average high temperatures of 19°C and February is the coldest month with average lows of 4°C. October and November are the wettest months with an average of 87 mm of precipitation.

| TABLE 5.1 CLIMATE DATA FOR TRURO, CORNWALL | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Month** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** | **Year** |
| Average high °C (°F) | 8 (46) | 8 (46) | 10 (50) | 12 (54) | 15 (59) | 17 (63) | 19 (66) | 19 (66) | 17 (63) | 14 (57) | 11 (52) | 9 (48) | 13.3 (55.8) |
| Average low °C (°F) | 5 (41) | 4 (39) | 5 (41) | 6 (43) | 8 (46) | 11 (52) | 13 (55) | 14 (57) | 12 (54) | 10 (50) | 7 (45) | 6 (43) | 8.4 (47.2) |
| Precipitation mm (inches) | 81 (3.19) | 63 (2.48) | 49 (1.93) | 54 (2.13) | 40 (1.57) | 47 (1.85) | 48 (1.89) | 51 (2.01) | 57 (2.24) | 87 (3.43) | 87 (3.43) | 78 (3.07) | 742 (29.22) |

***Source:*** *"Weather Averages - Truro, England". Foreca. Retrieved 2008-05-20.*

## 5.3 LOCAL RESOURCES

Cornwall has a strong history of mining, and historically has exported mine workers around the globe. Although mining has experienced a considerable decline in the region, mining capability and knowledge is still present in the local workforce. With a local urban population of over 59,100 in the Redruth, Pool, and Camborne area, there are sufficient local human resources to staff many unskilled or partially skilled jobs at a mine. The Camborne School of Mines, part of the University of Exeter, is a major centre of higher learning for geology and mining engineering. Mining equipment supply, service support, and other logistical requirements should be available as there are existing china clay open pit mining operations in Cornwall, as well as the Drakelands tungsten-tin mine in the neighbouring county of Devon, owned by Wolf Minerals Ltd., which started production in 2015.

## 5.4 INFRASTRUCTURE

The site has excellent transportation infrastructure including the A30 trunk road located 1 km north of the property and the First Great Western railway line that borders the property to the south.

The Project is located within an industrial area with highly developed power supply and regional distribution. The Project site has two 33kV overhead power lines which cross the Property. Capacity is sufficient for future mining operations. The Project also has ready access to fresh water supplied by the South West Water utility, with a six-inch main water line crossing the site location.

Site infrastructure from prior mining and development operations includes office and warehouse buildings, and the partially refurbished New Cook's Kitchen shaft. A modern decline extends to a depth of 120 m at an average gradient of -16% (Figure 5.2). The decline extends in a south westerly direction through the Great Crosscourse fault above the historic Dolcoath mine workings and provides access to the upper Dolcoath mineralization.

Processing facilities from prior operations have been dismantled and removed.

**Figure 5.2 South Crofty Project Site***

**Showing portal at entrance to decline, headframe at New Cook's Kitchen shaft, portal road access and 33 kV powerlines.*

***Source:*** *Western United Mines Ltd. 2013*

Although the Property is bordered by urban residential and industrial areas to the north, east and west, the mining operation is entirely underground. The opportunity to develop surface infrastructure is limited by the available space. To the south, land use is semi-rural dominantly grazing and rough pasture.

## 5.5 PHYSIOGRAPHY

The topography of the site consists of a plateau at an elevation of 102 to 116 m asl that slopes gently north toward the coast of Cornwall (Figure 5.3). The plateau is cut by north northwest trending valleys with 5 to 10 m of local relief that are drained by north flowing streams, including the Red River valley that borders the site to the immediate west. To the south of the property, the Carn Brea Granite outcrops as an east northeast trending hill which rises to a height of 228 m.

**Figure 5.3 Overview of the Town of Pool and South Crofty Project Area**

**Looking northwest from Carn Brea hill. Celtic Sea is visible in background.*
***Photo:*** *Tin Shield Production Inc. 2014*

The topography in the immediate area of the site has been modified by dumping of mine waste rock over many years and by urbanization. The vegetation which develops on the modified sites is generally typical of the surrounding area, and is composed of gorse scrub, willow, acid grassland, heathland, bare ground, and wetlands. In Cornwall, gorse and willow scrub typically take the place of woodland.

## 6.0 HISTORY

## 6.1 SOUTH CROFTY MINE HISTORY

The following history of the South Crofty Project from its beginnings in the 16th Century up to the closure of the mine in 1998 is largely summarized from Hogg (2012).

### 6.1.1 Early History

The South Crofty Project is located in the central mining district of Cornwall, in one of the most highly mineralized regions in the world. Mining is reported to have been undertaken in the Cornwall region from before 2000 BC during the Bronze Age of Western Europe when much of the tin for the bronze copper-tin alloys was obtained from placer deposits in Cornwall and Devon.

In 1580, Ulrich Frosse was charged with exploring the possibility of mining for copper in Cornwall, working initially at Perranporth and Illogan, however, the venture was not a success. Subsequently, John Coster, a metallurgist and engineer, developed the first true copper mine in Cornwall, at Chacewater in the early 1700s.

In the 1700s, national demand for copper rose rapidly and Cornwall proved rich in ore, particularly to the north of Carn Brea in the vicinity of the present South Crofty Property. By the 1720s Cornwall was producing 6,000 tons per annum of copper ore rising to 30,000 tons per annum copper ore by 1770. The underground operations at the Cornish mines were challenged by open pit operations in Anglesey from 1768. The Cornish mines responded to this by improving pumping efficiencies and by the end of the century the region was booming with the Anglesey mines ceasing to be a threat, copper prices rising, and new technologies enhancing operating efficiencies. During this period new foundries and engineering works were established at sites such as Perranarworthal and Hayle. New ports were being constructed to ship ore, coal and timber and tramways were being laid down to serve the mining fields inland. The Redruth and Chacewater Railway opened in 1825 and carried 50,000 tons of ore in its first year from mines to the Fal estuary.

In 1836, the Caradon mines were discovered and in 1844, the rich Wheal Maria and Devon Great Consols mines were established. In the 1830s Cornwall dominated world copper production; however, by 1850 Chile's production far exceeded Cornwall's output, the North American Lake Superior mines and mines in South Australia were also developing quickly. Cornwall and Devon's peak year for copper production was 1855 to 1856, when 209,000 tons of ore were mined.

By 1860, tin was replacing copper as the most important mineral, particularly in the western mines and in 1866 the crash in the copper market led to substantial closures in the Cornish copper mining industry. Through increasing mechanisation and the adoption of efficient ore dressing technologies, mines with a significant tin content were able to continue working. Tin became increasingly important from the 1860s onwards as tin prices improved, although copper was still an important product up to the end of the nineteenth century when it was replaced by arsenic and later tungsten as the chief by-product of tin mining.

During the latter part of the twentieth century the Cornwall mining industry faced increasing challenges due to competition from abroad and fluctuations in metals prices.

### 6.1.2 South Crofty Mine History 19th Century to Closure in 1998

The following section is summarized from Hogg (2012). Metal mining in the district centred on South Crofty probably began as much as 400 years ago. At various times tin, copper and arsenic have been the principal products. The operation known as South Crofty was one of many small operations in the 19th century and South Crofty became a consolidator as adjoining mines failed to cope with variable metal prices and the challenges of increasing depth. A number of mines are contiguous at depth and are both flooded and hydraulically connected leading to a large volume of interconnected voids.

The neighbouring mine of Dolcoath, closed in 1922, and acquired by the South Crofty operators in 1936, is separated from South Crofty mine by a major fault known as the Great Crosscourse. In its latter years of operation, South Crofty entered and produced from lodes within the Dolcoath area north of the Main Lode and below previous workings.

The modern ownership history may be considered as starting in 1967 when South Crofty Ltd. became a wholly owned subsidiary of Siamese Tin Syndicate Ltd and Siamese Tin's subsidiary, St. Piran Ltd. This change of ownership was the start, in 1969, of a £1 million programme to increase ore hoisting capacity and to make substantial improvements to the mill. By 1975 the process plant was processing more than 200,000 tons of ore annually (including some from Pendarves mine) to yield around 1,500 tons of tin concentrate annually.

In mid-1982, the company was acquired from St. Piran by Charter Consolidated, which subsequently disposed of 40% of its holdings to Rio Tinto Zinc ("RTZ"). These holdings were vested in a new holding company, Wheal Crofty Holdings Ltd, with the same proportion of ownership. Then in 1984 RTZ acquired Charter's 60% interest and South Crofty became part of Carnon Consolidated Ltd.

In October 1985, the price of tin dropped dramatically on the world markets following the collapse of the International Tin Agreement. Carnon rationalized the operations, involving closure of the nearby Pendarves mine which had supplied ore to the South Crofty process plant. With a diminishing ore supply, this process plant was progressively shut and by 1988 all South Crofty ore was trucked for processing at Wheal Jane.

As well as a reduction in manpower, the mines were rationalized and a programme of modernization, started by RTZ before the price crash, was stepped up. This was made possible by the co-operation and financial support of the Department of Trade and Industry ("DTI") in the form of loans for capital improvement. The majority of this capital was put into the South Crofty mine. In addition, RTZ also provided a loan to fund the operating losses.

Carnon became privately owned in June 1988 when the business and assets of the group were purchased from RTZ through a management buy-out. A trust was established for the benefit of the employees who received twenty percent of the equity. Carnon Holdings Limited was incorporated at this time.

In February 1991, the DTI stopped all further support of capital projects. The company substantially reduced labour costs which, coupled with a small rise in the tin price, allowed the mine to continue operating at a small loss. The losses were funded through the sale of surplus land and redundant assets. In 1994 South Crofty was purchased by Crew Natural Resources of

Canada, and the New Roskear shaft took over from the Robinson Shaft as the secondary egress shaft.

During the time of RTZ’s control, efforts were made to introduce trackless mining and a decline was commenced from the Tuckingmill valley east toward the main South Crofty workings with the intention of providing trackless access/secondary egress to the deeper operational areas and examining the upper levels of the mine. After about a kilometre this was abandoned but the decline is a significant point of entry for the modern workings and was subsequently extended in a south westerly direction by WUM.

During the last years of operation, the mine effectively became trackless with two declines driven below the bottom of the main vertical shaft (New Cook’s Kitchen) to the north and west to access lodes within Dolcoath and to the north of the older Dolcoath workings. These lodes are known as the Roskear 1 to 6 lodes, and the Dolcoath South Middle and North lodes. The focus of operations thus became deeper and further removed from the main South Crofty workings.

After several years of depressed tin prices, South Crofty Ltd announced in August 1997 that closure was imminent, and closure was completed by March 1998 and the mine was allowed to flood. At the time of its closure in 1998, South Crofty was the last remaining working mine in Cornwall.

#### 6.1.3 South Crofty Mine History and Ownership after 1998 Mine Closure

The following section is compiled from Hogg (2012), information in the public domain, and material provided by WUM.

The South Crofty Project was acquired by Baseresult Holdings Limited (“Baseresult”) in 2001. Baseresult was a private company formed by a group of investors to develop the Project.

Subsequent to the acquisition by Baseresult, the South West Regional Development Agency, (“SWRDA”) established by the UK Government, came to the conclusion that the region should no longer be investing in mining. Several years of negotiation followed, with the regulatory authorities favouring complete cessation of mining activity at South Crofty and redevelopment of the site. In 2007, this concept was overturned and the mining permits effectively reconfirmed. The SWRDA was disbanded. The surface area for the construction of the process facility was approved in 2011 and the Mining Permit was approved in 2013. This is not a current issue. The SWRDA was an unelected "quasi-autonomous non-government organisation" or "quango" that unilaterally decided that the South West of England no longer needed mining. It attempted for many years to compulsorily purchase the surface land from WUM in order to redevelop the land. WUM fought every legal challenge put in its way by SWRDA, which culminated in a Public Enquiry in 2007, and SWRDA lost. Following the Public Enquiry, WUM was finally able to negotiate a mutually beneficial redevelopment plan with the local authorities that allowed both mining and the re-generation of the Camborne-Pool area to co-exist. SWRDA was finally disbanded in 2010, the conditional surface planning permission was granted by Cornwall Council in 2011 and the underground permission granted in 2013. The situation today is that the Council remains supportive of mining in the area and the Mineral Planning Authority is actively working with WUM to implement the surface consents.

In November 2007, Baseresult formed a 50:50 joint venture with Galena Special Situations Fund ("GSSF") with GSSF providing financing through Cassiterite Ltd. ("Cassiterite"), a special purpose company. Ownership of the Project was transferred to WUM, owned by Cassiterite and Baseresult.

In May 2011, Baseresult and Cassiterite entered into an earn-in agreement with Celeste Mining Corporation ("Celeste"), a Canadian Company listed on the TSXV and trading under the symbol "C". The earn-in was into WUM's parent company, Cornish Minerals Limited (UK), which held 100% of WUM and was to be funded by staged investments by Celeste. In September 2011, Celeste completed the payment for an initial 25% interest in CML and in June 2012, Celeste provided notice that it was exercising an option to increase its ownership to 60% of the Project. However, Celeste did not provide the associated funding to increase its interest and on June 5, 2013, Celeste was served with a notice of default under the earn-in agreement. Subsequently, the directors of WUM took the decision to place WUM into administration.

GSSF was the only secured creditor under administration. In 2014, GSSF reached an agreement with a Vancouver based private company, Tin Shield Production Inc ("Tin Shield"), whereby Tin Shield had the right to acquire a 100% interest in WUM / CML and CMLB. Tin Shield funded ongoing operational costs under the administration process in order to maintain the underground mining permissions in good standing.

In March 2016, Strongbow announced that it had reached agreement with GSSF and Tin Shield to acquire a 100% interest in WUM and CMLB by funding WUM's exit from administration.

Strongbow acquired from administration a 100% interest in WUM and simultaneously a 100% interest in CMLB on July 11, 2016.

## 6.2 HISTORIC EXPLORATION

As observed by Kneebone (2008) and Hogg (2012) up to the mid-1980s, there was limited geological mapping or exploration management input at South Crofty Mine. Lodes were followed and mined as they were intersected in underground workings and little effort was made to quantify mineralization. Until the collapse of tin prices in the mid-1980s there was little incentive to improve technical services, mining methods, working practices or to carry out systematic exploration and evaluation of areas beyond the operating mine because South Crofty Mine had operated profitably and was deemed to have adequate "reserves".

There has been very limited surface drilling at the South Crofty Project. Hogg (2012) notes that much of the underground drilling in the twentieth century was essentially horizontal or at a slight downward inclination from workings that were already deep. This tended to encourage horizontal development of the mine and increase in depth. It is of note that the lodes last worked by South Crofty in the western part of the mine were all discovered by essentially horizontal drilling and had not been explored at higher levels. The Dolcoath South, Middle and North lodes are now known to be capped by an elvan intrusion several hundred metres above where they were last mined, while the Roskear lodes, of which there are at least 6, were developed at depth by South Crofty and in the 19$^{th}$ century near surface as the Roskear mine. Between the near surface and deep lodes, there are several hundred metres of lode that have never been explored.

The historic database for the South Crofty Project is very large. An estimated 3,000 drill holes (87,000 m) and 45,000 underground channel samples have been compiled by WUM.

Exploration and drilling by WUM from 2008 to 2013 is reported in Section 9 and 10 of this report.

## 6.3 HISTORIC PRODUCTION

Production from the South Crofty Mine between 1906 to its closure in 1998 is summarised in Tables 6.1 and 6.2 from Kneebone (2008). Kneebone's data shows that average annual production in the period 1984 to 1998 was 191,200 tons at an average grade of 1.31% Sn and that a total of 9,976,171 tons at an average grade of 1.0% Sn were mined between 1906 and 1998.

**TABLE 6.1**
**PRODUCTION FROM THE SOUTH CROFTY MINE BETWEEN 1906 AND 1998**

| Period | No. of Years | Ore (tons) | Annualised Production (tons /annum - average) | Sn % |
|---|---|---|---|---|
| 1984 to 1998 | 14 | 2,676,864 | 191,200 | 1.31 |
| 1934 to 1984 | 50 | 4,956,067 | 99,100 | 0.90 |
| 1906 to 1934 | 28 | 2,343,240 | 83,700 | 0.77 |
| | | | | |
| **Total** | **92** | **9,976,171** | **108,400** | **1.00** |

***Source:*** *Kneebone 2008*

**TABLE 6.2**
**PRODUCTION OVER THE LAST 14 YEARS AT SOUTH CROFTY MINE**

| Year | Ore (tons) | Sn % |
|---|---|---|
| 1984 | 247,260 | 0.88 |
| 1985 | 198,120 | 0.90 |
| 1986 | 238,320 | 1.18 |
| 1987 | 214,692 | 1.27 |
| 1988 | 159,420 | 1.33 |
| 1989 | 199,356 | 1.48 |
| 1990 | 204,696 | 1.54 |
| 1991 | 153,423 | 1.61 |
| 1992 | 169,908 | 1.49 |
| 1993 | 175,356 | 1.46 |
| 1994 | 179,592 | 1.25 |
| 1995 | 180,192 | 1.27 |
| 1996 | 175,200 | 1.48 |
| 1997 | 181,320 | 1.42 |
| | | |
| **Total** | **2,676,864** | **1.31** |

In addition to the South Crofty mine production, the Dolcoath Mine operated as an independent mine from 1895 to 1921. During this period 2,135,470 tons of ore were crushed at a grade of approximately 2% Sn.

## 6.4 HISTORICAL ESTIMATES

### 6.4.1 Owen and Leboutillier (1998) Closure Estimate

In March 1998, M. Owen, Chief Geologist and N. LeBoutillier, Senior Mine Geologist, completed a closure estimate for the South Crofty Mine (Owen and LeBoutillier, 1998). The estimate was prepared according to the mines operational policy at the time of closure in 1998. The estimate predates the introduction of National Instrument 43-101 ("NI 43-101"). A Qualified Person ("QP") has not carried out sufficient work to verify these historical estimates as current mineral resources and therefore, the Company is treating the numbers as historical and indicative only, and as such the estimates cannot be relied upon.

The historical estimate is based on a variety of sampling methods including drilling, chip, and channel sampling from within drives, crosscuts, raises, and other areas surrounding stopes planned for mining. The estimate also contains old pillars and other remnants in the totals. The tonnage, average metal grades and thickness for all discrete mineralized zones or subzones were estimated based on a longitudinal sectional resource calculation method then summarised into a tabular format for the final reporting of the estimated reserves. P&E has reviewed the longsection drawings and summary tables that are the basis of the estimates.

Underground production at South Crofty ceased on Friday, March 6, 1998 at the end of the night shift and the closure estimate summarized in Table 6.3 is based on "reserves" and resources at the time of closure.

**TABLE 6.3**
**HISTORICAL ESTIMATE AT SOUTH CROFTY – OWEN/LEBOUTILLIER**

| Category | Tonnes (t) | Sn% |
|---|---|---|
| Proven Reserve | 93,800 | 1.66 |
| Probable Reserve | 636,950 | 1.45 |
| Reserve (Prov + Prob) | 730,750 | 1.48 |
| Inferred Resource | 2,172,850 | 1.48 |

The Owen and LeBoutillier (1998) estimate includes detailed tables of tonnage and grade for individual resource blocks that are identified on longsections for each of the mineralized lodes. The estimate utilizes definitions outlined in US Geological Survey circular No. 831 as a basis of classification. Measured reserve blocks are fully developed for evaluation and fully sampled. Owen and LeBoutillier (1998) define Indicated reserve blocks as being partially developed and partially sampled and note that Indicated blocks may extend above and rarely below the lode drive. Inferred blocks have no development or incomplete development and are based on available lode intersections and assumed continuity based on geological evidence.

The Owen and LeBoutillier (1998) estimate was prepared based on a cut-off grade of 1.00% Sn and a minimum mining width of 1.0 m true width. Where lode widths were less than 1 m, wall rock grade was applied to achieve minimum mining width. High grade assay cutting was used on a lode by lode basis and ranged from a low of 4.0% Sn to a maximum of 10.0% Sn. A bulk density of 2.77 $t/m^3$ was used for granite hosted lodes and a bulk density of 2.85 $t/m^3$ was used for killas (metasedimentary) hosted lodes.

Recent drilling from 2008 to 2013 at Dolcoath, and the increase in mineral resources there, has rendered the 1998 estimate out of date. In addition, the current Resource Estimate reported in this study was prepared using different parameters such as cut-off and metal pricing and used a block model estimation methodology.

### 6.4.2 Additional Historic Estimates

A number of known historical mine workings in addition to South Crofty and Dolcoath are included in, or adjacent to, the area of the WUM operating permissions. These past-producing mines include the Highburrow, Carn Brea, and Barncoose mines that are not directly connected to the workings of Dolcoath and South Crofty but could at a later stage be accessed from them.

The Micromine (2011) report references a 1988 study by A. Lewis, Chief Geologist and Technical Services Superintendent of Carnon Consolidated Tin Mines, a wholly owned subsidiary of RTZ. As documented by Micromine (2011), Lewis described historic estimates at Highburrow, Carn Brea and Barncoose as defined by United States Geological Survey Circular No. 831. These historic estimates represent additional exploration targets on the Property.

P&E understands that the past-producing Highburrow, Carn Brea and Barncoose mines are within the South Crofty Property but has not verified the location of these past producing mines. P&E has not reviewed any of the data including sections or plans from which the additional historic estimates for the past producing mines and considers the historic estimates in this section of the report to be exploration targets.

As documented in the Micromine (2011) report, the Highburrow Lode system is the easterly extension of the Dolcoath Main Lode and covers a strike distance of 2 km from the Tuckingmill Valley in the west to a point just east of the old Portreath railway (South Crofty grid 700W to 1,300E). Micromine (2012) reported that the Highburrow Mine has historic estimates ranging from a minimum tonnage of 970,384 to a maximum of 2,698,631 at a range of 1.0 to 1.4% Sn. It is not clear if these are metric tonnes or imperial tons. A Qualified Person ("QP") has not carried out sufficient work to verify these historical estimates as current mineral resources and therefore, the Company is treating the numbers as historical and indicative only, and as such the estimates cannot be relied upon.

Mineralization at the past-producing Barncoose mine has been estimated for 1,100E to 1,900E from surface to a depth of 450 m. Micromine (2012) reported that the Barncoose Mine has a historical estimate ranging from a minimum tonnage of 20,110 to a maximum of 172,368 at a range of 1.0 to 1.15% Sn. A Qualified Person ("QP") has not carried out sufficient work to verify these historical estimates as current mineral resources and therefore, the Company is treating the numbers as historical and indicative only, and as such the estimates cannot be relied upon.

On the immediate northern flank of the Carn Brea Granite a series of lodes have been mined for tin. Micromine (2012) reported that the Carn Brea Mine has a historical estimate ranging from a minimum tonnage of 24,930 to a maximum of 209,412 at a range of 1.0 to 1.15% Sn. A Qualified Person ("QP") has not carried out sufficient work to verify these historical estimates as current mineral resources and therefore, the Company is treating the numbers as historical and indicative only, and as such the estimates cannot be relied upon.

## 6.5 PREVIOUS NI 43-101 RESOURCE ESTIMATES

Micromine Limited ("Micromine") in London, UK, was engaged by Celeste to produce NI 43-101 Mineral Resource Estimates and Technical Reports in 2011 and 2012. These estimates incorporated results of drilling by WUM and focussed on the Upper Dolcoath lodes, west of the Great Crosscourse fault and above approximately 400 m depth from surface. These Dolcoath "Upper Lodes" were the focus of exploration for WUM, and WUM considered they offered the most immediate potential to advance. It is important to note that the Micromine 2011 report (Hogg, 201l) and Micromine 2012 report (Hogg, 2012) considered only the Upper Dolcoath Lodes and therefore are only a subset of the mineralization considered in the historical Owen and Leboutillier (1998) closure "reserve". Furthermore, the Micromine (2011) and Micrmine (2012) resource estimates used 0.3% SnEq and 0.2% SnEq cut-off grades, respectively. These cut-off grades are considerably below the historical 1% Sn cut-off used in historical estimates. The 2011 Micromine Report estimated the Upper Dolcoath resource at 1,331,000 tonnes of 0.44% Sn, 1.08% Cu and 0.66% Zn, or 0.88% SnEq in the Inferred Category at a 0.30% SnEq cut-off grade (Table 6.4).

**TABLE 6.4**
**MICROMINE DOLCOATH RESOURCE ESTIMATE – MARCH 2011**

| Category | Cut-off SnEq% | Tonnes | Bulk Density | SnEq % | Sn % | Cu % | Zn % |
|---|---|---|---|---|---|---|---|
| Inferred | 0.3 | 1,330,982 | 3.06 | 0.88 | 0.44 | 1.08 | 0.66 |

The Sn equivalent ("SnEq") calculation for the Micromine (2011) was based on commodity prices and assumed equivalent metal recovery for Sn, Cu and Zn:

$$\%SnEq = Sn\ grade + (Cu\ grade*0.354) + (Zn\ grade*0.091)$$

In 2012, Celeste engaged Micromine for an updated Dolcoath resource estimate and technical report. The 2012 estimate included the results of 121 diamond drill holes for 23,067 m, and two underground channels cut for 53 m. The 2012 Micromine resource (Table 6.5) updated the initial June 2011 resource estimate and utilized the data from 59 additional drill holes.

**TABLE 6.5**
**MICROMINE DOLCOATH RESOURCE ESTIMATE – MARCH 2012**

| Category | Cut-off SnEq% | Tonnes | Bulk Density | SnEq % | Sn % | Cu % | Zn % |
|---|---|---|---|---|---|---|---|
| Inferred | 0.2 | 2,469,000 | 3.03 | 0.68 | 0.46 | 0.54 | 0.23 |

The SnEq for the Micromine 2012 report was based on spot commodity prices and also assumed equivalent metal recovery for Sn, Cu and Zn.

$$SnEq\% = Sn\% + (Cu\%*0.364) + (Zn\%*0.097)$$

For the 2012 estimate, Micromine used a 0.2% SnEq cut-off grade. A total of seven areas were modelled for tin (Dolcoath Middle, Dolcoath South, Dolcoath South-South Branch, Dolcoath 'Flat', Dolcoath North Entral, Dolcoath South Entral and Dolcoath Main). Eight areas were modelled for Cu and Zn (Dolcoath North, Dolcoath Middle, Dolcoath South, Dolcoath South-

South Branch, Dolcoath 'Flat', Dolcoath North Entral, Dolcoath South Entral and Dolcoath Main).

Grade domain modelling was completed for Sn, Cu and Zn, with a minimum width of approximately 1.0 m. Where appropriate, geology was used in combination with grade values to assist in lode interpretation.

Potentially economic mineral resources were reported for a marginal cut-off grade of 0.2% SnEq based on the cost of mining and processing the mineralization and the selling price of the final product. Metal prices were based on LME 3-year trailing averages as of July 16, 2012. The cut-off grade for reporting of resources at Dolcoath was established using Sn equivalent grade ("SnEq%"), and block revenue factors including metal recovery adhering to best practices and NI 43-101 reporting requirements in order to satisfy the criterion of "potential commercial extractability".

Classification of interpolated blocks was undertaken using the following criteria:

- Interpolation criteria based on sample density, search and interpolation parameters
- Assessment of the reliability of geological, sample, survey and bulk density data
- Robustness of the geological model
- Deposit type
- Drilling and sample density
- Understanding of grade continuity.

From the above factors, Hogg (2012) was of the opinion that the Inferred category was an appropriate resource classification at that time. There were a number of minor issues relating to data verification and QA/QC which needed to be addressed to increase confidence of input data, particularly Zn and to a lesser degree Sn prior to increased resource classification. Sample spacing and drill hole density within domains was considered wide and the total number of assays in a number of domains was low. Grade continuity remains poorly understood due to the wide spacing and low number of samples per mineralized domain, rendering variography and determination of grade continuity impossible at that time. The current Mineral Resource Estimate for the Dolcoath Main lodes produced by P&E, and detailed in this report, supersedes the Micromine (2011) and Micromine (2012) estimates.

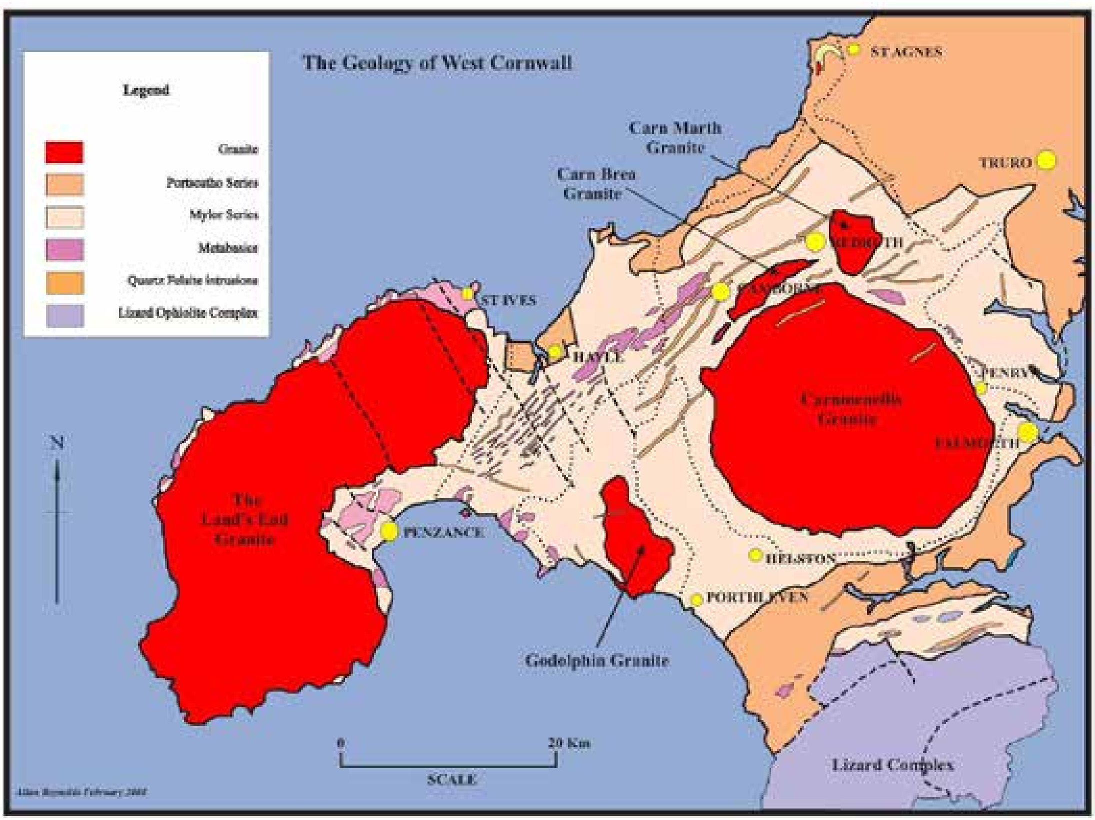
## 7.0 GEOLOGICAL SETTING AND MINERALIZATION

## 7.1 REGIONAL GEOLOGY

The geology of Cornwall is dominated by Paleozoic granitic intrusions that are part of Cornubian batholith and the metasedimentary and metavolcanic rocks, known locally as "killas", that form the metamorphic aureole and host rocks of the intrusions. This assemblage was formed in the Variscan (also known as Hercynian) orogenic event. Crustal thickening resulting from deformation of the Devonian flysch-type sediments and associated volcanics during the initial phases of the Variscan orogeny in the Devonian and Carboniferous periods, was followed by lithospheric extension, crustal subsidence and anatexis of metasediments to form Cornubian granitoid magmas in the Permian (Shail and Moon, 2014). The age of the Cornubian batholith is well constrained from both stratigraphic relationships and radiometric dating at 300 to 275 Ma and corresponds with the late stages of the Variscan orogeny in the early Permian period (Chesley et al., 1993).

On a basis of geophysics, the Cornubian granite is interpreted to extend for greater than 200 km from the Dartmoor area, Devon in the east to the Isles of Scilly off the Cornish coast in the west. The surface geology (Figure 7.1) defines a series of granite plutons and stocks separated by "killas" (metasedimentary rocks). In the sub-surface, it is thought that many of granitic plutons are joined at depth with the killas having granitic rocks beneath them at depth (Shail and Moon, 2014). Overall, the granitic intrusive body has a northeast trending long axis.

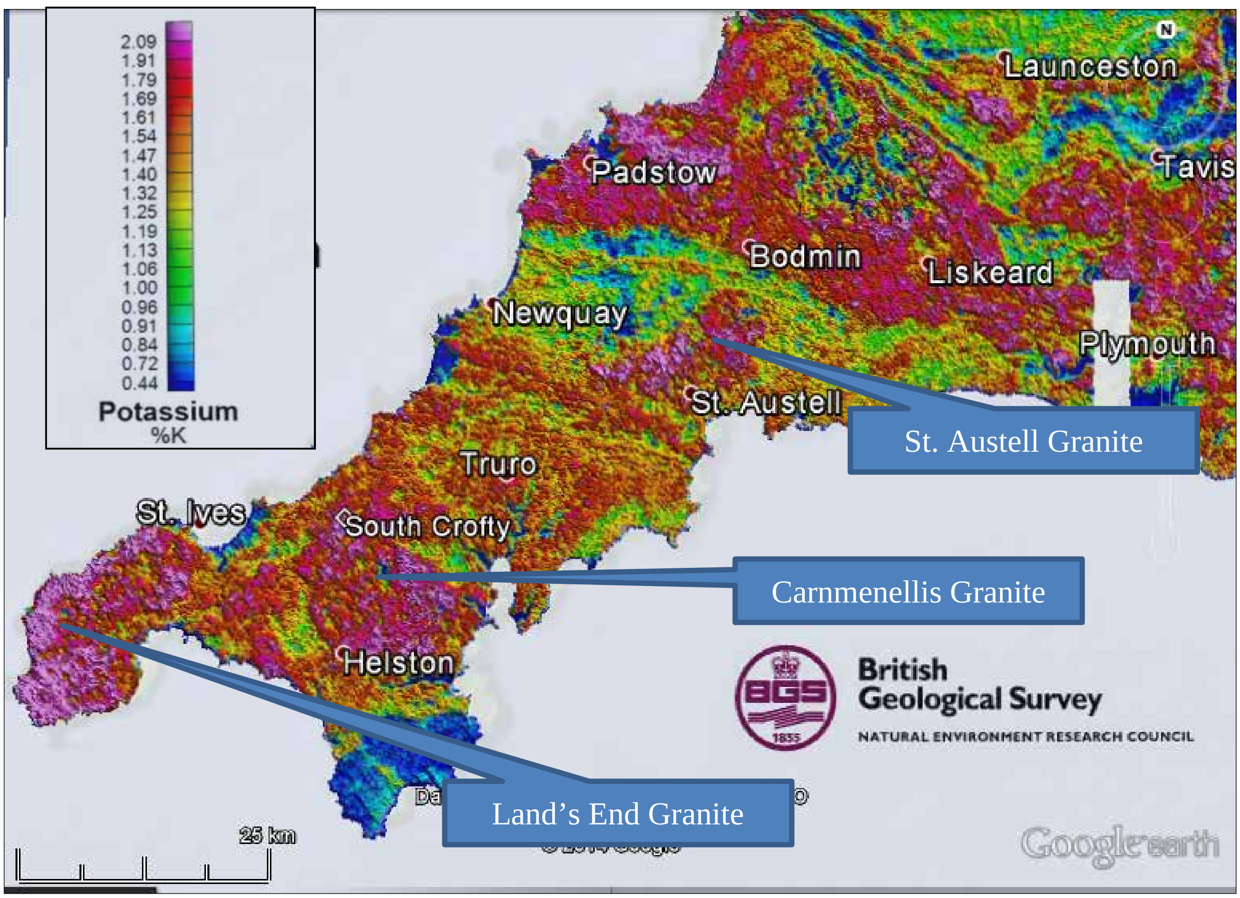
**Figure 7.1 Regional Geology**




***Source:*** *WUM 2014*

The Cornubian granite is coarse grained and enriched in a variety of elements including potassium, lithium, uranium, thorium, tin, tungsten, copper, chlorine, fluorine, and rare earth elements. The enrichment in radiogenic elements such as potassium, uranium and thorium and strong thermal activity has resulted in it being classified as a high-heat producing ("HHP") granite. The British Geological Survey has recently completed airborne radiometric and total field magnetic surveys of southwest England as part of the TELUS SW program. Products of the survey include airborne radiometric maps that show distribution of various radioactive elements including potassium shown in Figure 7.2 that effectively map the surface exposure of granitic intrusions.

**Figure 7.2 Airborne Radiometric Map of Southwest England Showing Potassium (K) Distribution**




*Source:* *British Geological Survey "TELUS SW Project" overlain on Google Earth 2014.*

The enriched radiogenic element content of the Cornubian Granite combined with its metal content are key factors in the development of the Cornwall mineral deposits. The radiogenic element enrichment and HHP characteristics resulted in a slow crystallization process and possibly internal reheating allowing for efficient fractionation of the contained metals into the residual late magmatic phases and fluids.

## 7.2 LOCAL GEOLOGY

The following description of the local geology of the South Crofty Project area is primarily summarized from Hogg (2012).

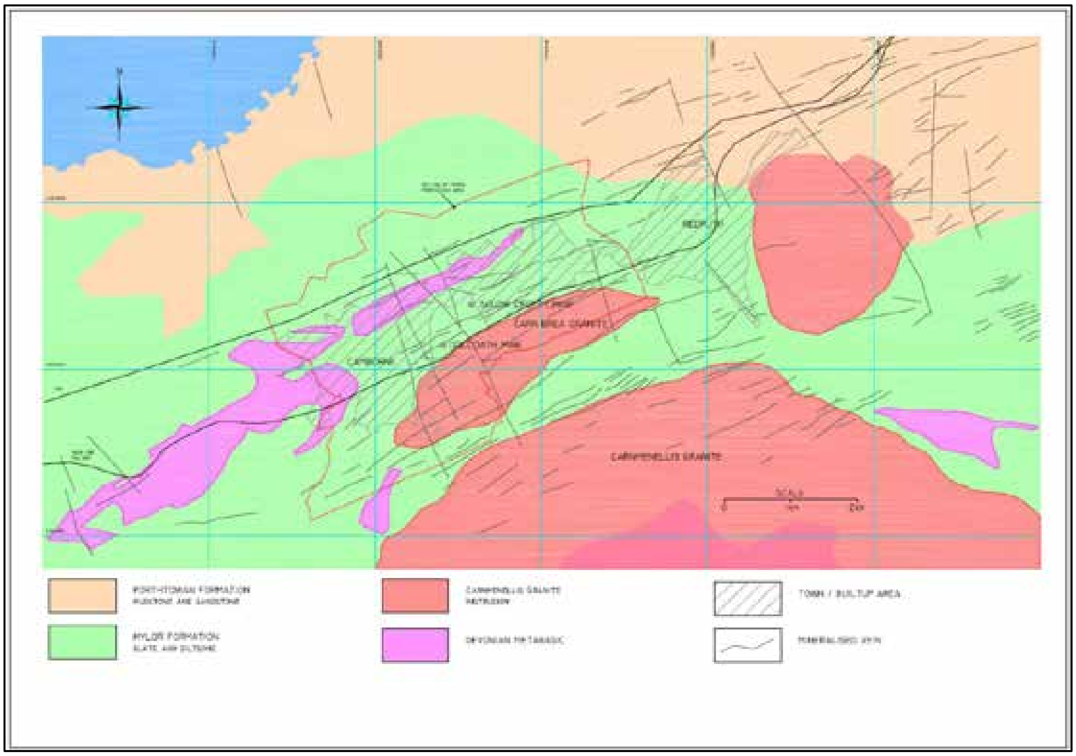
The Paleozoic geology of the South Crofty Project area consists of killas (metasedimentary and minor metavolcanic rocks) and granite of the Cornubian batholith (Figure 7.3). The Project area lies on the north side of the Permian Carn Brea Granite that outcrops on the Carn Brea hill and is thought to be connected with the Carnmenellis Granite and the larger Cornubian batholith at depth. Locally, the killas are considered to be part of the Devonian Mylor Formation that consists primarily of slate and siltstone and is intruded by Devonian metamorphosed mafic rocks.

The surface of the South Crofty Project area is situated on "killas", the series of metasedimentary and metavolcanic rocks and associated hornfels and skarns, that occur in close proximity to the granite contact. At depth, the granite underlies the whole Project area. The depth to the contact with the granite increases to the north, with the contact surface striking east-northeast and dipping to the NNW at $30^{o}$ to $40^{o}$. Rolls and ridges along the granite contact are thought to have influence on the location of mineralization.

The lodes of the South Crofty deposit and numerous nearby mines generally strike east-northeast and parallel the strike of the granite/killas contact. The lodes occur in both the granite and the overlying killas and the character of the lodes changes depending on the host rocks. Within the granite, the principal mineral of economic significance is cassiterite, whereas above the granite contact, copper and zinc sulfide mineralization is developed.

A series of northwest trending faults with associated mineralization, locally known as "Crosscourses" are considered to be related to Triassic rift basin development at 240 to 220 Ma. The Great Crosscourse is a late fault that bisects the South Crofty Project area and is associated with an approximately 100 m strike slip movement. The Great Crosscourse had a significant influence of the historical mine development of the South Crofty Project since the South Crofty Mine was developed on the east side of the fault and the Dolcoath Mine on the west side and the two mines were not hydraulically connected.

**Figure 7.3 Geology of the South Crofty Project area**



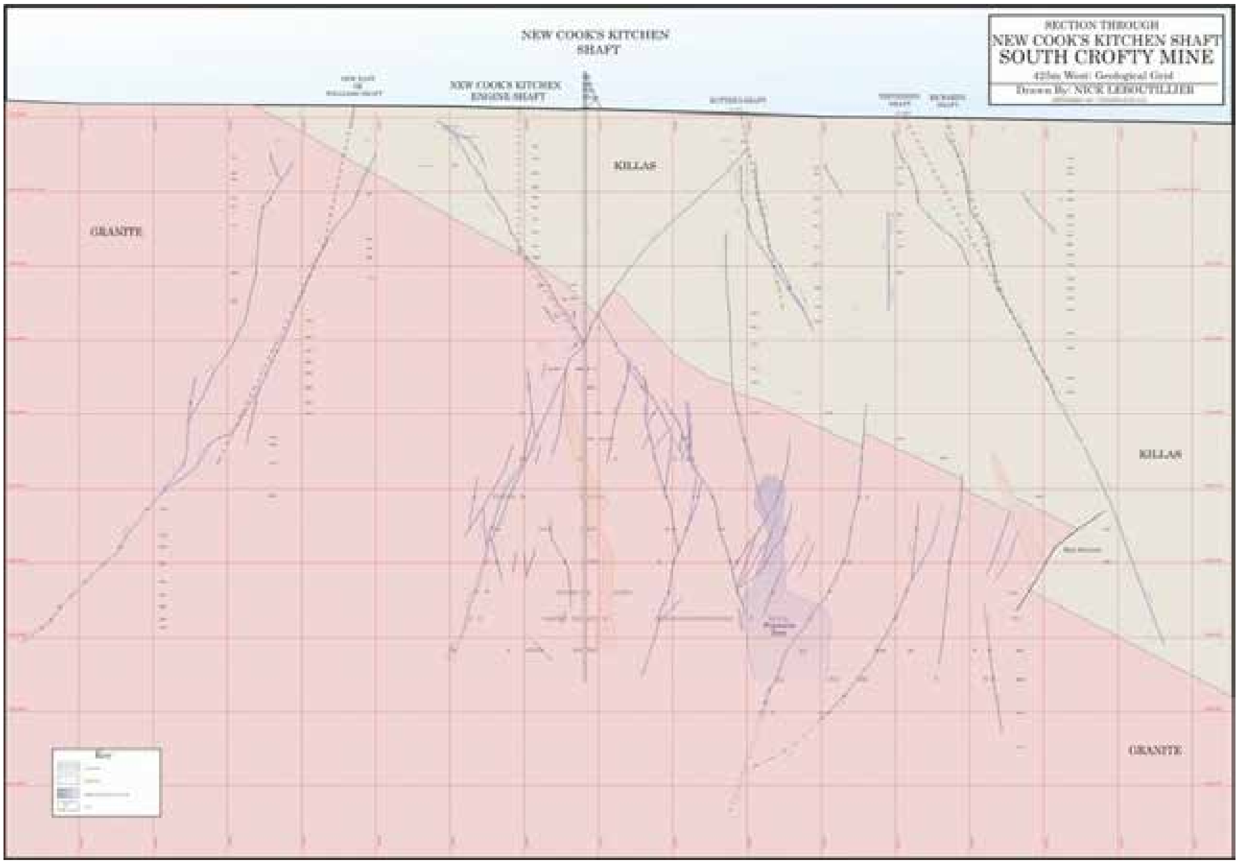

***Source:*** *WUM 2014*

## 7.3 DEPOSIT GEOLOGY

The following description of the South Crofty Deposit is primarily from Kneebone (2008).

Mineralization at South Crofty is primarily in the form of "lodes" consisting of dominantly east-northeast striking fissure veins and associated mineralization that typically occupy steeply dipping normal and reverse fractures or faults. Lodes may persist for 1 to 2 km in strike length with 600 to 1,000 m dip extents. The section through the New Cook's Kitchen Shaft (Figure 7.4) shows the complexity of the lode fissure relationships with both north and south dipping structures that are joined by bridging veins. There is a general reduction in the number of structures with depth. The deep fractures, tend to branch and "horsetail" upon entering the shallower horizons. Many of the lodes display curved surfaces in section and may change dip directions in the granite and killas.

**Figure 7.4 Section Through the South Crofty Mine at the New Cook's Kitchen Shaft**




***Source:*** *N. Leboutillier, 1998*

## 7.4 MINERALIZATION

Within the mine workings, Kneebone (2008) identified five main phases of mineralization, that in order from oldest to youngest are:

i. An early black tourmaline (schorl) phase, with thin, tin-bearing stringers of schorl emplaced throughout the fracture zones. The tungsten bearing (greisen type mineralization) quartz floors and pegmatites of Pegmatite Lode and the North Pool Zone are of similar age.

ii. Tourmaline to Chlorite phase consisting of:
   a. A blue tourmaline phase that carries the majority of the tin mineralization in the form of fine-grained cassiterite, which may be in discrete seams, veinlets or disseminated grains. This phase shows evidence of very rapid crystallisation and often displays brecciation textures related to explosive decompression; and
   b. A chlorite phase. In this phase (which often overprints the 2a phase), dark green crystalline chlorite is the dominant gangue mineral. It often carries coarsely crystalline cassiterite, as disseminations and seams.

iii. A tin barren fluorite phase that occupies sections of the lodes with 'caunter orientation', where the lodes have been faulted by later tensional wrench faults. These intralode segments (having the same strike as east-west trending caunter lodes) have been infilled with a fluorite/haematite/earthy chlorite/quartz paragenesis, in substitution for absent earlier tin rich phases of mineralization.

iv. A caunter lode phase that represent later mesothermal/epithermal mineralization emplaced in east-west trending fractures. These lodes are typically poor in cassiterite, carrying a gangue of early amorphous chlorite/haematite/ fluorite/quartz, with copper/lead/zinc/bismuth base metal mineralization. Where they cross the earlier lodes they fault them, often with considerable displacement.
v. A late crosscourse phase with displacement and mineralization that post-dates phases 1 to 4. Crosscourses have a rough northwest orientation and carry an epithermal paragenesis of chalcedonic silica with earthy chlorite, haematite and minor amounts of marcasite and occasional copper and bismuth sulphides.

Kneebone (2008) subdivided South Crofty lode types as follows:

i) Type I Lodes - These are lodes predominantly showing phase 2a mineralization. They are typified by certain sections of Dolcoath South Lode, North Lode and Roskear A Lode.
ii) Type II Lodes - These lodes show a higher proportion of haematite /chlorite / fluorite enrichment as well as having mineralization phases 2a and 2b present. They show areas consisting largely of phase 3 type mineralization. They are typified by certain sections of Providence Lode, Dolcoath North Lode, Roskear B Lode, Roskear D Lode and Roskear South Lode.
iii) Type III Lodes - “Caunter” or “Guide” lodes which carry an assemblage of chlorite / hematite /fluorite with minor cassiterite and variable copper, lead, zinc and bismuth phases. These structures were sometimes worked for copper in the shallower old workings. A typical example is the Reeve’s Lode.
iv) Type IV Lode Zones - Lode zones that resemble stockwork veins and are characterised by quartz /cassiterite / tourmaline assemblages. The wallrocks are pervasively altered and often carry significant mineralization. They are typified by certain sections of No.2 Complex, 3ABC Complex, 3B Pegmatite Lode and North Pool Zones.

Kneebone (2008) reports that wallrock mineralization is widespread, although not ubiquitous. Wallrock alteration is encountered in the form of:

i) tourmalinisation (both pervasive replacement and veining);
ii) chloritisation (usually involving predominantly micas and to a lesser extent felspars);
iii) hematisation (often as hematisation of chlorite, micas and felspars or as later hematisation of earlier pervasive chloritisation).

Pervasive albitisation has also been noted in association with zones of interaction of certain of the Lode / Quartz “Floors” / “Pegmatite Zones”. Cassiterite (tin) mineralization is often, though not always, present in these wallrock alteration zones. The cassiterite is present variously as veinlets, and disseminations. These incidences of mineralization are usually seen to be associated with reactivation of lode fissures and/or later mineralization phases within the lode fissures. Mineralized wallrock can, in many locations, constitute a major component (or indeed the major component) of the mineralized structure. In some instances, the greater part of the tin mineralization present is located in the mineralized wallrock, rather than in the lode fissure material.

Kneebone (2008) stresses that the lodes of the district tend not to fit within any one single "classification" as above. Being multiphase structures, they more often than not exhibit domains of more than one type over their spatial extent. The subdivisions as above are therefore best considered as a method of quickly and conveniently describing the mineralization domain(s) at a particular location within the extent of a lode.

## 8.0 DEPOSIT TYPES

The South Crofty Tin Deposit is an intrusion related, structurally controlled, vein-hosted mineralization type.

The geological model for the deposit type is described by Kneebone (2008) (Figure 8.1). The protracted cooling of the batholith and thermal energy from radioactive decay are significant factors in the scale and diversity of the Cornwall mineralization. The main phase of mineralization lasted well over 20 million years and hot brines can still be encountered at depth within the granite, as experienced by miners on the 380 fathom level of the former South Crofty Mine.

An early pegmatite phase of mineralization (ca. 285 Ma) carried quartz and feldspar together with wolframite, arsenopyrite, löllingite, native bismuth and molybdenite. At this time metasomatic fluids and vapours escaping from the granite led to the development of skarn rocks on the granite margins. Still in the early stage of mineralization, the pegmatites were followed by a phase of greisen-style mineralization. Hydraulic fracturing in some of the cusp areas led to the development of sheeted greisen veins (both endogranitic and exogranitic) in many of the granite cupolas. The quartz floors of South Crofty and the replacement zones of North Pool Zones and the 3ABC pegmatite complexes are related to this phase and show a similar primary mineralogy. Larger vein structures such as South Crofty's Roskear Complex, North Pool Quartz lode and parts of North Pool B2 vein system are also of this type.

The principal mineralization phase was coeval with the second magmatic event around 270 Ma. This phase was more diverse than the first phase and gave rise to the extensive hydrothermal vein system of the Cornish mineralization. The mixing of magmatic, meteoric and connate fluids via convection cells brought in a great volume of metals, together with boron, and sulphur leached from the killas. The increase of fluid pressure resulted in the fracturing of the granite carapace and the rapid movement of mineral-depositing vapours and fluids along these fissure systems.

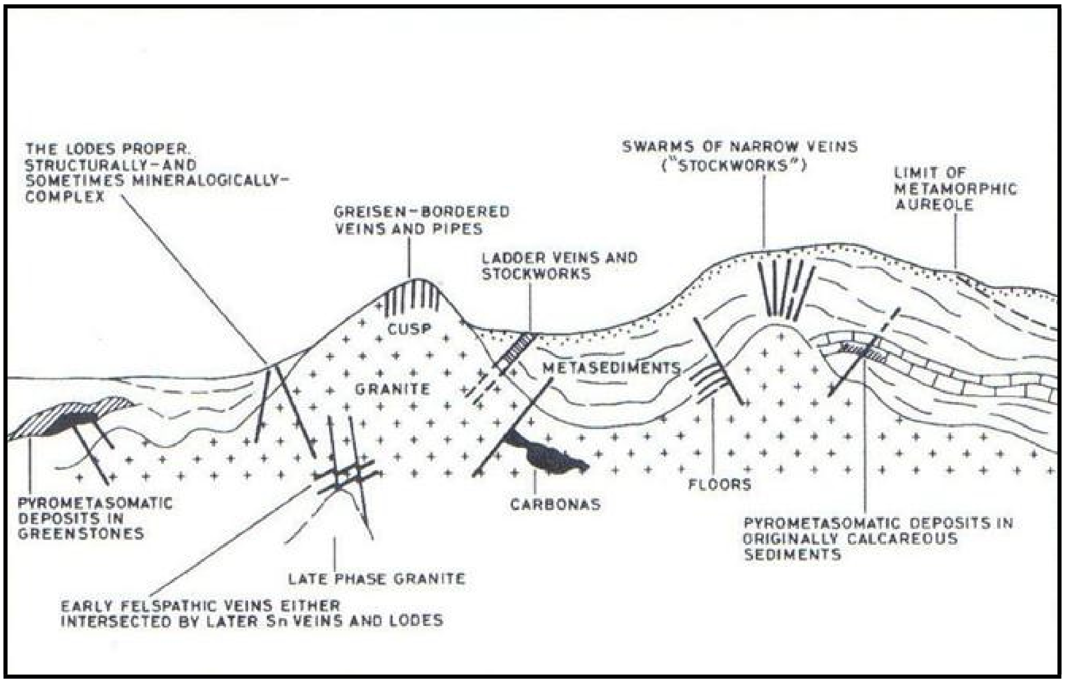
With the deposition of minerals, the fracture became sealed until the fluid pressure reached a high enough level to cause failure along the plane again. This series of conditions "crack sealing" and hydraulic failure were repeated many times and also gave rise to highly brecciated lode textures displaying characteristics of multiphase deposition. The early high temperature minerals deposited in the lodes within and adjacent to the granite/killas contact were found in the pegmatite style of mineralization, chiefly quartz, feldspar, wolframite, arsenopyrite/löllingite, cassiterite and tourmaline.

Deposition was accompanied by pervasive tourmalinisation of the wallrocks. At higher levels, copper mineralization becomes important with the deposition of a mesothermal assemblage including chalcopyrite, chalcocite, chlorite, fluorite and sphalerite and at higher levels again, there is a gradual change to an epithermal suite with the deposition of galena, stibnite, haematite and siderite.

A change in stress conditions in the Lower Permian resulted in the development of a second fracture system trending northwest-southeast. These are the "caunter lodes" that displace earlier vein systems and are dominantly mesothermal in character.

Late extensional Crosscourse faults locally offset many of the lodes. These faults may be infilled with clay or chalcedony, quartz, haematite and chlorite. Some Crosscourse are mineralized, carrying a mesothermal to epithermal suite of minerals including galena, chalcopyrite, marcasite, barite and fluorite.

**Figure 8.1 Styles of Primary Tin Mineralization in Cornwall**




***Source:*** *Kneebone 2008, after Hosking 1969*

## 9.0 EXPLORATION

Strongbow has not carried out any exploration to date.

### 9.1 WUM PROGRAM 2008-2013

WUM re-established the decline at the Project site and since 2008 has extended the existing decline a further 380 m to a total depth of 120 m below surface at an average gradient of 1 in 6. At a depth of 120 m, a spine drive was commenced and progressively developed to a length of 130 m. The decline extends in a south-westerly direction through the Great Crosscourse above the historic Dolcoath workings and provides exploration access to the upper Dolcoath area lodes. The decline and spine drive has served as an access point for the 31,000 m underground drill program conducted by WUM.

### 9.2 TIN SHIELD PROGRAM

Tin Shield's exploration was limited to assaying of approximately 720 samples from drill core intersecting the Upper Dolcoath area lodes. These assays are from holes drilled by WUM in late 2012 and 2013, and have been incorporated into the assay database. Sample preparation, analyses, security and QA/QC are discussed in Sections 11 and 12 of this report.

## 10.0 DRILLING

This section reports on 31,000 m drilling conducted by WUM between 2008 and 2013. Tin Shield did not conduct any drilling on the South Crofty Project.

The ability to drill from surface is limited by the urban development of the surface overlying a significant part of the Project Mineral Rights. Furthermore, historically there has been extremely limited surface exploration drilling. WUM's approach was to use the decline and spine drive for all of its modern exploration drilling. The decline is located in un-mineralized ground with the target mineralized lodes located to the north and south of the decline. Opportunity exists to site further exploration drilling at surface within the licence area, or with permission from local landowners.

The core recovered from the holes ranged from sizes PQ (85 mm core) to NQ (48 mm core) but was typically HQ (64 mm core). The drill holes were collared at 10 underground locations along the decline over a strike length of approximately 750 m.

A total of 157 holes for 31,000 m were drilled. Drill holes ranged in length from 4.2 m to 450 m with an average of 197 m. Standpipes were used to limit water ingress as the drilling crossed wet and/or flooded areas of the mine and old workings. The standpipes also limit the passage of noxious gases which can accumulate in the drill cuts. Recovery for the drilling was generally excellent, in excess of 95% recovered core except, however, in those areas which intersected void, or old workings which had been filled. Evidence of fill was recovered as the material was homogenised to a standard size with a high degree of roundness. A number of holes were lost or stopped short of target due to drilling difficulties associated with broken ground conditions surrounding old workings.

Hole surveys were taken approximately every 6 m for many of the holes; however, some holes were only surveyed at the end of hole. The inclination of holes ranged from +24.6° and -78.9°. The bulk of the holes were targeted either north of the decline with azimuths between 300° and 360° or between 130° and 204°.

A total of 6,591 m was sampled and assayed. Typically, only visibly mineralized intersections were assayed. Samples were collected on a nominal one metre basis in those areas that were mineralized. Samples were broken on lithological boundaries with a minimum length of 10 cm where appropriate so that samples did not cross geological constraints and remained representative.

The drilling was designed to provide further samples and information on previously interpreted lodes, and the angles of intercept were designed to be normal to these lodes. The interpreted lodes conform to the established mineralized structures in the area, typically dipping north at 60 to 80°, occasionally dipping south at 60° to 80° with conjugate structures at flatter dips. There are some shallow (30°) dipping lodes in this area. With the mineralization style, and the drilling angles, several intersections were drilled along the structures and in these cases apparent thicknesses are in excess of the known true thickness from other historically worked lodes in the system.

Significant intercepts from the WUM drilling program that were reported by Celeste in press releases dated December 18, 2012 and January 31, 2013 are presented in Table 10.1. This table has selected intersections with generally greater than 1 m length and greater than 0.5% SnEq.

Table 10.1 illustrates that in the Upper Dolcoath area, the lodes have highly variable Sn/Cu/Zn ratios and that drill holes typically intersected several lodes. A number of the holes in Table 10.1 had core loss due to old workings. The holes reported by Celeste were all drilled south of the decline and intersected the South Entral, Dolcoath Main, Dolcoath South-South, and Interstitial Lodes.

**TABLE 10.1**
**SIGNIFICANT(1) DRILL INTERCEPTS FROM THE WUM UNDERGROUND DRILLING PROGRAM REPORTED IN 2012 AND 2013**

| Hole | Az./Incl. | From (m) | To (m) | Width (m) | Sn (%) | Cu (%) | Zn (%) | SnEq(2) (%) | Lode Interpretation(3) |
|---|---|---|---|---|---|---|---|---|---|
| 0908 | 174/-14 | 165.30 | 166.35 | 1.05 | 0.10 | 1.05 | 0.12 | 0.50 | Dolcoath Main |
| 0909 | 174/-26 | 105.56 | 108.56 | 3.00 | 2.13 | 1.02 | 0.02 | 2.50 | South Entral |
| 1210 | 158/-30 | 103.81 | 112.81 | 9.00 | 0.37 | 0.97 | 0.05 | 0.72 | South Entral |
| 1211 | 158/-45 | 121.97 | 124.97 | 3.00 | 0.55 | 0.75 | 0.03 | 0.82 | South Entral |
| 1211 | | 165.97 | 167.97 | 2.00 | 0.49 | 0.05 | <0.01 | 0.51 | South Entral |
| 1211 | | 171.97 | 176.97 | 5.00 | 0.21 | 0.78 | 0.02 | 0.50 | South Entral |
| 1211 | | 281.93 | 283.93 | 2.00 | 0.57 | 0.93 | 0.02 | 0.91 | Main Lode |
| 1213 | 196/-25 | 113.44 | 118.44 | 5.00 | 0.32 | 1.20 | 0.02 | 0.75 | South Entral |
| 1213 | | 286.51 | 290.11 | 6.50 | 0.18 | 0.95 | 0.87 | 0.61 | Main Lode |
| 1214 | 173/-35 | 103.25 | 106.25 | 3.00 | 0.18 | 1.40 | 0.83 | 0.77 | South Entral |
| | | 131.83 | 133.83 | 2.00 | 0.30 | 2.10 | 0.01 | 1.06 | South Entral |
| 1215 | 171/-44 | 116.23 | 118.23 | 2.0 | 0.71 | 0.59 | 0.10 | 0.93 | South Entral |
| 1215 | 171/-44 | 246.0 | 247.0 | 1.0 | 0.22 | 2.64 | 0.08 | 1.18 | Dolcoath South South |
| 1215 | 171/-44 | 306.64 | 307.43 | 0.79 | 1.52 | 0.44 | 0.03 | 1.68 | Main Lode |
| 1216 | 191/0 | 144.09 | 150.00 | 5.91 | 0.57 | 0.11 | 0.22 | 0.63 | Interstitial Lode |
| 1216 | 191/0 | 182.37 | 184.12 | 1.75 | 0.44 | 0.11 | 3.00 | 0.76 | Dolcoath South South |
| 1217 | 190/-14 | 90.22 | 93.72 | 3.70 | 0.11 | 1.12 | 5.30 | 1.09 | South Entral |

*(1) Intersections are selected from Celeste press releases dated December 18, 2012 and January 18, 2013 with minimum 1.0 m and 0.5% SnEq;*
*(2) SnEq% = Sn% + (Cu% x 0.359) + (Zn% x 0.0927);*
*(3) Lode interpretations by WUM/Celeste as reported in Celeste releases.*

## 11.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

### 11.1 SAMPLE PREPARATION AND SECURITY

The following summary regarding sample preparation of the 2008 to 2014 drilling carried out at the Property was largely taken from Hirst, et al., (2014) and Hogg (2012).

The preparation of samples for analysis begins on site with mark-up of the core and recording of core recovery. During drilling, boxes are marked up by the geologist as the core is recovered for the following:

- Sample From and To;
- Lithological Breaks;
- Natural Fractures;
- Handling Breaks; and
- Losses.

Care is taken to ensure that the core is inserted the correct way round and all the pieces fit together. The box is marked with depth from and depth to, as well as with a direction of drilling. Wooden blocks are inserted to mark the end of each core run as well as mark any areas of loss, with the estimated loss recorded in these cases. Drill core runs prior to the beginning of 2011 however, were not marked at all. The lithology and mineralization of the core is described. Rock Quality Designation ("RQD") and fracture count are recorded in the logs. Logging is entered using a Compaq iPaq directly into excel spreadsheets by the geologist. No paper logs or field books are used.

Core boxes are then brought to surface in batches of eight to ten and delivered under supervision by the geologist to the core shed. Once in the core shed the box marking is checked. The axis of mineralization is marked on the core ready for sawing. Care is taken to halve the core along the axis of mineralization, to ensure the mineralization in the sample for analysis is representative of the whole.

The core is sawn in half in batches by the geologist, or by a geological technician under the geologist's supervision. The boxes are then marked with the sample identification for the half core to be analyzed, so the samples can be traced to their exact location in the boxes.

The saw used is a Vancon Core Saw. It is water lubricated during sawing, and washed down before and after use. It is not washed down between samples of the same type. It is washed down thoroughly between samples of different lithology, or different levels of mineralization, to minimize potential cross contamination. There is no compressed air or ventilation to manage dust, but the area is washed down and swept regularly.

Half core is retained in the boxes. The half core for analysis is broken to fit in heavy duty polythene sample bags. The polythene bags are marked with the sample ID, but no other identifying marks. Reconciliation between the sample ID and true information is kept by the geologist so the exact sample location and details can be recalled from the sample ID. The openings in the bags are twisted, taped, folded then zip tied over to ensure no spillage during handling or transit.

Blank samples are entered into the batches. The blank material is local granite, once thought to be barren but now known to be part of the mineralized system.

Over the various phases of drilling, quality assurance/quality control ("QA/QC") protocol has evolved and is summarized below:

- SD01-28: WAI inserted one blank and one pulp duplicate sample into sample stream of each batch.
- SD29-104: WUM inserted two blanks, one CRM and one field, coarse reject and pulp duplicate into sample stream of each batch.
- SD105-135: WUM inserted two blanks, two CRMs and one field, coarse reject and pulp duplicate into sample stream of each batch.

The samples are then delivered in batches to an independent lab for analysis.

Three laboratories have been used for the preparation of samples. Initial holes (batches SD01 to 47) were prepared at Wardell Armstrong International Laboratories ("WAI"), a then unaccredited laboratory (however now accredited) facility in Cornwall, United Kingdom; from January 2012 (SD48 to 104) samples were prepared at AGAT laboratory ("AGAT"), an accredited laboratory facility in Mississauga, Ontario, Canada, and the remaining 720 samples (SD105 to 135) were prepared at SGS Cornwall ("SGS") and analysed by SGS in either Toronto or Vancouver.

The core shed is generally kept locked, with access from a standard door and a large sliding vehicle door. Both doors have padlocks. The keys are held by the geologist, the site manager, and the site maintenance manager. The building is in good condition and reasonably secure. The building is unheated but dry. Core is boxed on pallets, rather than on shelving, which makes access to some of the core time consuming, but the facilities are adequate for the storage and security of the core.

Before being stored, the core is photographed wet and dry on a photo board.

Once samples have been prepared, the coarse rejects and pulps are returned for storage in the core shed. Bags are marked up and stacked.

P&E considers that the sample preparation, security and analytical procedures for the South Crofty Project are adequate for the purposes of this Mineral Resource Estimate.

## 11.2 ANALYSES

### 11.2.1 WAI Laboratory/ X-Ray Minerals Laboratory

The sample preparation procedure followed by WAI included oven-drying and weighing the sample, as well as allocating a unique WAI log-in number to each sample. The sample was then jaw-crushed to pass 10 mm - 12 mm, then crushed to passing -1.0 mm by a balanced roll crusher, and riffle-split to obtain a subsample of around 150 g. The 150 g split sub-sample was then pulverized to 100% passing 100 µm, with half of this sample dispatched for XRF analyses and the remaining half stored as a reference sample.

The prepared samples were then sent to X-Ray Minerals Laboratory, of Colwyn Bay, Wales, United Kingdom for X-ray Fluorescence ("XRF") analysis using a Spectro X-Lab Energy Dispersive Polarised X-ray Fluorescence ("EDPXRF") Analyzer. The XRF device was fully calibrated using International Rock, Soil, Ore, Sediment, Ash, Oil, Plastic, Organic and Water standards to ensure repeatable and accurate analysis.

Samples were oven-dried if required in an oven at 80°C and around 20 g of the sample was milled with an agate ball mill at 500 rpm for five minutes in order to produce two pellets for quality control purposes. Milled samples were then weighed out to 10 g (+/- 0.2 g) and then combined in a plastic beaker with a polyvinyl alcohol (1% Moviol) or wax binder before being pressed at 15 tons for two minutes using polished stainless steel platens to produce a 32 mm pellet. The pelleted samples were oven dried at 80°C for at least two hours before being analyzed for a multi-element array including Sn, Cu and Zn.

Batches with ten or more samples had one randomly chosen sample duplicated in every ten samples from residual milled powder to check for precision.

A calibration verification check sample was also used to check the accuracy of the instrument and to assess the stability and consistency of analysis. A certified reference material ("CRM") was analyzed at the beginning of each working day, during active sample analyses, and at the end of each working day.

The measured value for each target analyte should be within +/-5 percent of the true value for the calibration verification check to be acceptable. If a measured value falls outside this range, then the CRM is re-analyzed. If the value continues to fall outside the acceptance range, the instrument's multi-channel analyzer ("MCA") is then re-calibrated, and the batch of samples analyzed before the unacceptable calibration verification is re-analyzed.

### 11.2.2 AGAT Laboratory

From January 2012 (batch SD48 onwards) sample preparation and analyses were carried out by AGAT. Sample preparation procedures followed by AGAT included:

Samples were delivered via courier, client drop-off or picked up by AGAT personnel or a representative of the lab. Samples received by AGAT were logged into the lab's LIMS system and discrepancies observed were noted internally, as well as reporting to the client immediately. Samples were then dried to 60°C, crushed to 75 per cent passing 10 mesh (2 mm) and split to 250 g using a Jones riffle splitter or rotary split. Samples were pulverized to 85% passing 200 mesh (75 µm), dried and then shaken on an 80 mesh sieve with the plus fraction stored and the minus fraction sent for analysis.

All equipment was cleaned using quartz and air from a compressed air source. Blanks, sample replicates, duplicates, and internal reference materials (both aqueous and geochemical standards) are routinely used as part of AGAT's quality assurance program.

Analysis at AGAT was performed by peroxide fusion followed by an Inductively Coupled Plasma - Optical Emission Spectroscopy ("ICP- OES") finish for Sn, and four acid digest followed by Inductively Coupled Plasma – Mass Spectroscopy ("ICP/ICP-MS") finish for multi-elements including Cu and Zn.

Prepared samples were digested with perchloric acid ($HClO_4$), hydrofluoric acid (HF), and nitric acid ($HNO_3$), dried, heated with hydrochloric acid (HCl) and diluted to 50mL with de-ionized water.

AGAT uses its own internal QA/QC checks, routinely inserting blanks, reference materials (both aqueous and geochemical standards), replicates and duplicates.

PerkinElmer 7300DV and 8300DV ICP-OES and PerkinElmer Elan9000 and NexION ICP-MS instruments are used in the analysis. Inter-Element Correction ("IEC") techniques are used to correct for any spectral interferences.

AGAT is an independent lab that has developed and implemented at each of its locations a Quality Management System ("QMS") designed to ensure the production of consistently reliable data. The system covers all laboratory activities and takes into consideration the requirements of ISO standards.

AGAT maintains ISO registrations and accreditations, which provide independent verification that a QMS is in operation at the location in question. Most AGAT laboratories are registered or are pending registration to ISO 9001:2000.

### 11.2.3 SGS Laboratory

From August 2012 (batch SD105 onwards), sample preparation and analyses were carried out by SGS laboratories. Sample preparation was undertaken at SGS Cornwall and analysis at SGS Vancouver or Toronto. Procedures followed by SGS included the following:

Samples were delivered via courier, to SGS Cornwall for preparation, where they were received by SGS personnel and samples were then logged into the lab's LIMS system. Samples were crushed, ground and dried. As a routine practice with core, the entire sample is crushed to a nominal minus 10 mesh (2 mm), mechanically split via a riffle splitter in order to divide the sample into a 250 g sub-sample for analysis and the remainder is stored as a reject. Samples are pulverized to 85% passing 75 micron (200 mesh) or otherwise specified by client.

Samples were then analyzed by sodium peroxide fusion and a combination of Inductively Coupled Plasma Atomic Emission Spectrometry ("ICP-AES"), and Inductively Coupled Plasma Mass Spectrometry ("ICP-MS").

Samples are fused by sodium peroxide in graphite crucibles and dissolved using diluted $HNO_3$. During digestion the sample is split into two, and half is given to ICP-AES and the other half is given to ICP-MS. The digested sample solution is analyzed by ICP-AES and ICP-MS. Samples are analyzed against known calibration materials to provide quantitative analysis of the original sample.

SGS operates 1,350 offices and labs throughout the world. Sample processing services at SGS are ISO 17025 accredited by the Standards Council of Canada. Quality Assurance procedures include standard operating procedures for all aspects of the processing and also include protocols for training and monitoring of staff. ONLINE LIMS is used for detailed worksheets, batch and sample tracking including weights and labeling for all the products from each sample.

## 12.0 DATA VERIFICATION

### 12.1 SITE VISIT AND INDEPENDENT SAMPLING

Mr. Richard Routledge, P.Geo., of P&E, a Qualified Person ("QP") as defined by Canadian National Instrument NI 43-101 standards of disclosure for mineral projects, visited the South Crofty Project from November 17 to November 21, 2014, for the purposes of completing a site visit and due diligence sampling. Mr. Routledge held discussions with WUM staff, including general data acquisition procedures, core logging procedures and quality assurance/quality control ("QA/QC"). He also examined drill core, viewed drill hole collars in the decline for various recent drilling (not flooded), visited the Tincroft North section underground, collected core samples for independent analysis and collected digital data during the visit. There has been no material change to the scientific and technical information about the property, other than the commencement of water treatment and pumping trials from New Cook's Kitchen Shaft, since the November 2014 site visit as indicated in a letter from Mr. Owen Mihalop, WUM, Director, dated February 27, 2017.

Mr. Routledge collected seven samples from six drill holes during the site visit. A range of high, medium and low-grade samples were selected from the stored core samples. Samples were collected by taking a 1⁄4 split of the half core remaining in the core box. Once the samples were 1⁄4 sawn they were placed in a large polyurethane bag. The samples were delivered by Mr. Routledge to the SGS laboratory at the former Wheal Jane mine site where sample preparation was carried out. Sample pulps were shipped by SGS UK to the SGS laboratory in Lakefield, Ontario, Canada, for analysis.

Samples at SGS were analyzed for As, Sn, Cu, Zn, $WO_3$ and Pb by whole rock analysis using XRF.

Results of the site visit due diligence samples (for Sn, Cu and Zn only) are presented in Figures 12.1, 12.2 and 12.3.

**Figure 12.1 South Crofty Project Site Visit Sample Results for Sn**

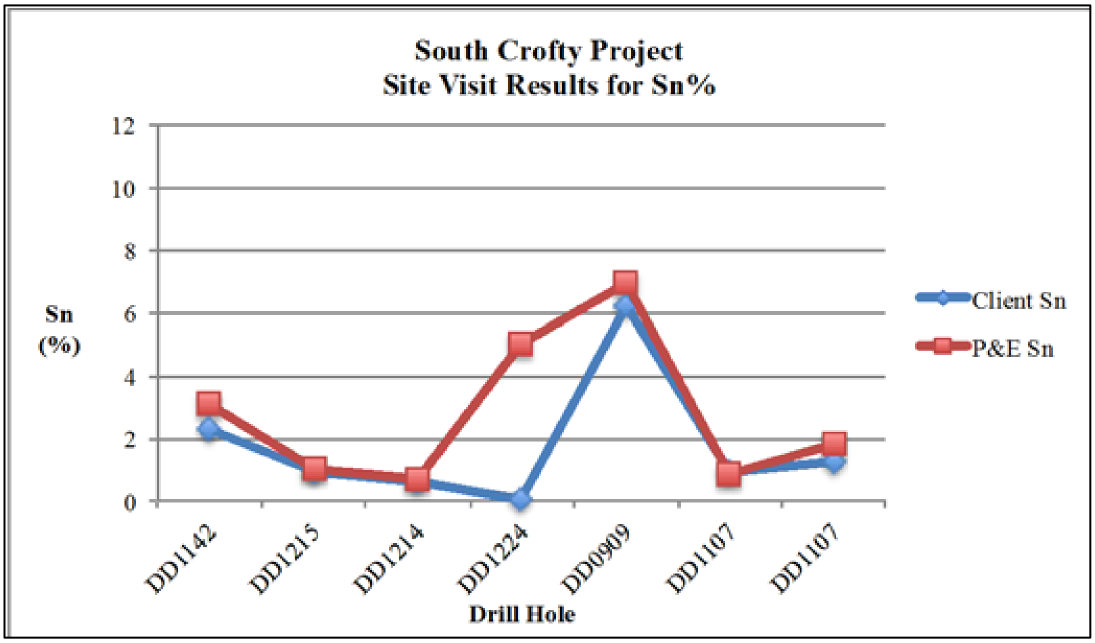



**Figure 12.2 South Crofty Project Site Visit Sample Results for Cu**

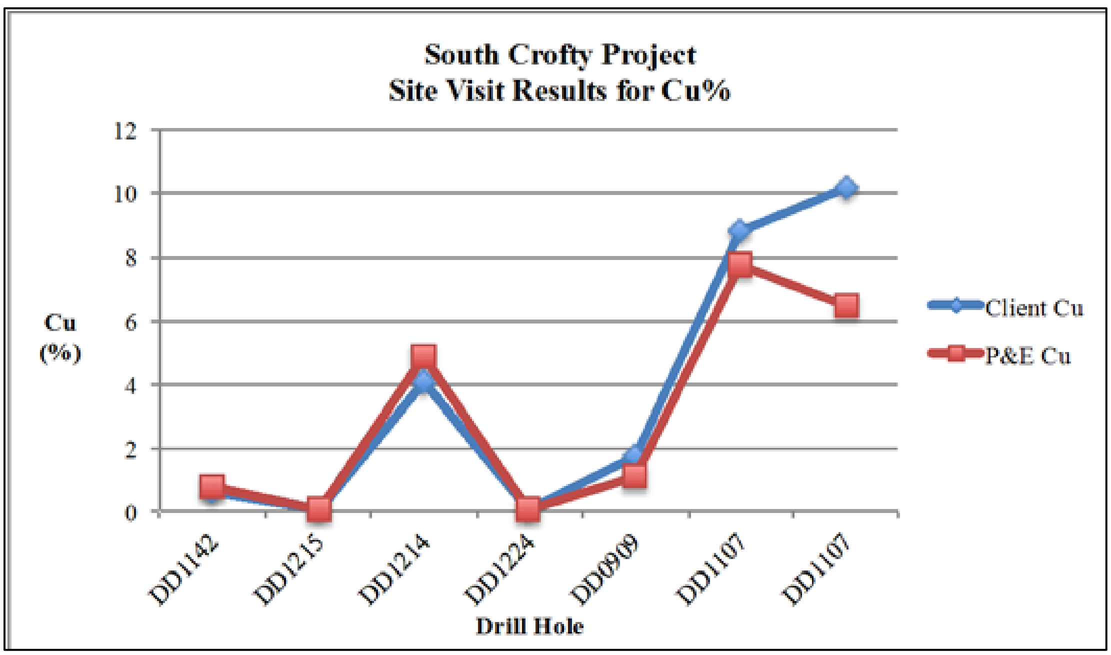
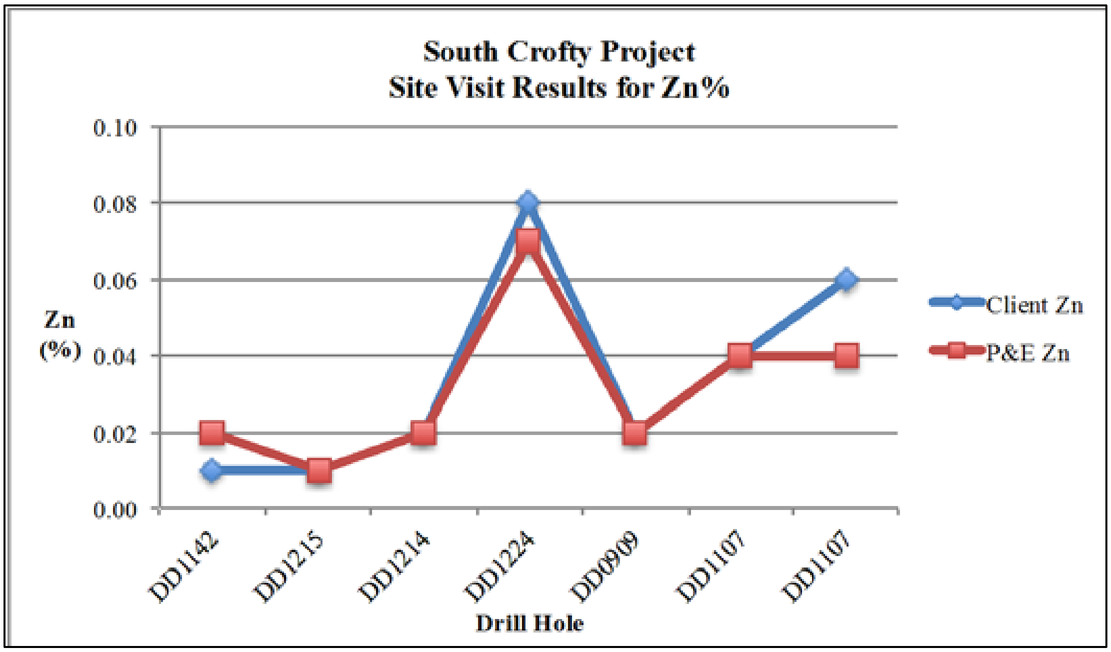


**Figure 12.3 South Crofty Project Site Visit Sample Results for Zn**




## 12.2 QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

QA/QC protocol evolved at the Project over time and only the more recent drilling has been monitored with the insertion of QA/QC samples. The following sections describe the QA/QC data since 2010, when QA/QC monitoring commenced at batch SD01.

### 12.2.1 2010 – 2011 (Batches SD01-47): WAI Prep / X-Ray Minerals Analysis

Performance of Certified Reference Materials

WUM commenced inserting its own CRMs (standards) into the sample stream from batch SD29 on. Prior to this, the preparation laboratory (WAI) was inserting standards into the sample stream. Data prior to batch SD29 has not been examined.

Two CRMs were sourced by WUM from Ore Research and Exploration Pty. Ltd. ("ORE"), of Bayswater North, Australia, being the OREAS 140 and 141 standards. Both standards are certified for Sn, Cu and Zn. The pressed pellet X-ray fluorescence performance gates were used for the Sn data.

There were five data points for OREAS 140 and all samples passed for Sn, Cu and Zn, with Cu displaying a slightly high bias and Zn a slightly low bias.

There were 14 data points for OREAS 141 and all samples passed for Sn and Cu, with Sn displaying a slightly low bias and Cu a slightly high bias. All samples failed low for Zn, however this will have no significant impact on the mineral resource with assays being underestimated rather than overestimated.

Performance of Blank Material

WUM inserted its own locally sourced blank material from local granite. The granite is part of the mineralized system and does demonstrate very low grades of mineralization for the elements in question. The grades are so low however that, for all intents and purposes, the material has been considered blank.

The blank results were assessed for each element, using the average grade of a total of 88 data points as a guide. The average grades are as follows:

- Sn = 25 ppm
- Cu = 27 ppm
- Zn = 60 ppm

Data for each of the elements were plotted against the corresponding average value. The majority of results fell below or close to the average grades given above, with maximum values for Sn, Cu and Zn being 117.7 ppm, 379.6 ppm and 360 ppm, respectively. P&E considers all of the blank data to be within acceptable limits, with none of the results significantly impacting the mineral resource.

Performance of Duplicates

WUM inserted a total of 19 field, coarse reject and pulp duplicates into the sample stream for batches SD29 through SD47. There were also 60 laboratory pulp duplicates available for examination.

Data points were charted on scatter plots and precision for all elements appear acceptable, with precision increasing with the fining of duplicate grain size.

### 12.2.2 2012 (Pre-August) (Batches SD48-104): AGAT Lab

Performance of Certified Reference Materials

WUM continued to use the OREAS 140 and 141 CRMs sourced from ORE of Australia. The performance gates calculated from fusion method were used for the Sn data.

There were 27 data points for OREAS 140 and all samples passed for Cu and Zn. Three samples failed low for Sn and this is considered to be of no impact to the database. Zn was noted to have a slightly low bias.

There were 29 data points for OREAS 141, with one failure each for Sn and Cu and four failures for Zn. A low bias was noted for Zn. P&E does not consider any of the failures to impact the database as all were -3 standard deviations below the certified mean value.

Performance of Blank Material

The same granitic blank material was used in 2012 and the blank results have been assessed in the same manner as the previous years.

The blank results were assessed for each element, using the average grade of a total of 102 data points as a guide. The average grades are as follows:

- Sn = 185 ppm
- Cu = 11 ppm
- Zn = 41 ppm

The majority of results fell close to the average grades given above, with maximum values for Sn, Cu and Zn given at 420 ppm, 67 ppm and 181 ppm, respectively. P&E considers all of the blank data to be within acceptable limits, with none of the results significantly impacting the resource.

Performance of Duplicates

WUM inserted a total of 51 field, coarse reject and pulp duplicates into the sample stream for batches SD48 through SD104.

Data points were charted on scatter plots and precision for all elements appear acceptable, with precision increasing with the fining of duplicate grain size.

### 12.2.3 2012 (Post-August) (Batches SD105-135): SGS Lab

Performance of Certified Reference Materials

Tin Shield sent a total of 720 previously unanalyzed drill hole samples to SGS. A variety of ORE CRMs were utilized, that included OREAS 36 (certified for Cu, and Zn), 111 (Cu and Zn), 140 (Sn, Cu and Zn), 141 (Sn, Cu and Zn) and 142 (Sn, Cu and Zn).

There were 13 data points for OREAS 36 for Cu and Zn. There were no failures for Cu and two low failures for Zn. A slight low bias for Zn was noted. P&E does not consider any of the failures to impact the database as all were -3 standard deviations below the certified mean value.

There were 19 data points for the OREAS 111 standard for Cu and Zn. All samples passed for Cu and Zn and a high bias was noted for both elements.

Sn, Cu and Zn all performed well for the OREAS 140 CRM, with no failures out of the 12 samples reviewed. A low bias was indicated for both Sn and Zn.

All 20 samples passed for the OREAS 141 CRM for Sn, Cu and Zn, and a low bias was indicated for all of these three elements.

There were 7 data points for the OREAS 142 standard for Sn, Cu and Zn. All samples passed for all three elements and a low bias was noted for Zn.

Performance of Blank Material

The same granitic blank material was used as in previous years. The blank results have also been assessed in the same manner as before.

The blank results were assessed for each element as with the previous phases, using the average grade of a total of 102 data points as a guide. The average grades are as follows:

- Sn = 46 ppm
- Cu = 55 ppm
- Zn = 123 ppm

Data for each of the elements were plotted against the corresponding average value and, once again, the majority of results fell close to the average grades given above. There were four relatively high-grade blank samples that were assessed:

- Cu sample C1215105 from batch SD118, at 830 ppm, which was located in a relatively low-grade interval and there were also nine other non-problematic blanks in this batch and no follow-up was considered necessary.
- Sn sample C1222009 from batch SD126, at 4,210 ppm, which followed a very high-grade sample and indeed showed high contamination. No follow-up was considered necessary.
- Zn samples C1304162 and C1304174 from batch SD134, at 2,980 and 2,530 ppm respectively, were positioned in relatively low-grade intervals and there were also four other non-problematic blanks in this batch. No follow-up action was considered necessary.

P&E considers all of the blank data to be within acceptable limits, with none of the results significantly impacting the mineral resource.

Performance of Duplicates

WUM inserted field, coarse reject and pulp duplicates into the sample stream in batches SD105 through SD135. A total of 47 field, 39 coarse reject and 171 pulp duplicates were examined, together with 90 laboratory coarse duplicates and 43 laboratory pulp duplicates.

Data points were charted on scatter plots and precision for all elements appear acceptable, with precision increasing with the fining of duplicate grain size.

## 12.3 CHECK ASSAYS

Various check analyses were carried out at assorted secondary laboratories to evaluate the accuracy of the primary laboratories.

In May of 2012, random WAI drill hole samples were selected for comparison to check assays carried out at Activation Laboratories for Sn, Cu and Zn. A total of 142 samples were analysed, from batches SD01 to SD47, and comparison between the original WAI results and Activation Laboratory's check analyses is excellent.

In September of 2012, check assays were also carried out on a total of 204 WUM drill hole samples. Check assaying was undertaken at AGAT laboratories for Sn, Cu and Zn on samples from drill holes WUM-1200 to WUM-1212 and comparison of original and check results are also excellent.

Check analyses of randomly selected XRM laboratory samples for Sn, Cu and Zn were also undertaken at OMAC laboratory in 2012. A total of 40 samples were sent for analysis and, aside from one Sn result, that was concluded to be a sample mismatch, comparison of the original samples to the check assays was also excellent for all three previously stated elements.

## 12.4 DATA VERIFICATION RECOMMENDATIONS AND CONCLUSIONS

WUM implemented a comprehensive QA/QC program for the final stages of drilling at the South Crofty Project. The only recommendation made to improve the QA/QC protocol is to locate a non-mineralized blank to replace the one currently being used.

Based upon the evaluation of the QA/QC program undertaken by the Company, as well as P&E's due diligence sampling, it is P&E's opinion that the results are suitable for use in the current Mineral Resource Estimate.

## 13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

No metallurgical testwork has been conducted as yet on material from the current mineral resource. However, the long history of past production from the Property leaves little doubt that a viable process with acceptable recoveries can be developed.

The South Crofty process plant operated until 1988 when processing was transferred to the Wheal Jane process plant and continued until the South Crofty Mine was shut down.

The South Crofty process plant produced two gravity concentrates; a low grade concentrate typically assaying 26% Sn and a high grade concentrate assaying about 47% Sn from a head grade of 0.84% Sn. Tin recovery overall was reportedly about 73%.

Better performance was achieved at the Wheal Jane process plant. For the year 1997, average recovery was reportedly 88.5% from a head grade of 1.40% Sn. Both gravity and flotation concentrates were produced, with a combined grade of 58% Sn. The improved performance at Wheal Jane relative to South Crofty is due to the incorporation of tin flotation in the process coupled with significant metallurgical improvements that were achieved.

Features of the South Crofty process plant and that of Wheal Jane (which successfully processed South Crofty mineralized material for 10 years) are expected to be included in the proposed new mill. It is probable that a new process plant would incorporate gravity and flotation recovery of tin, generally as practiced at Wheal Jane. South Crofty successfully employed heavy media separation (“HMS”) and this unit operation could be adopted in a new process plant if economics warrant. A portion of the current mineral resource contains potentially recoverable copper and zinc, which, if economic, would require additional flotation equipment later in the Project life.

## 14.0 RESOURCE ESTIMATE

### 14.1 SUMMARY

The Mineral Resource Estimate for the South Crofty Project was done by conventional 3D computer block modelling methods employing Dassault Systemes GEMS mining software V6.4 and V6.6 ("GEMS").

The Sn, Cu, Zn, Pb, W mineralization occurs in various narrow, structurally controlled hypothermal to epithermal fissure veins or lodes hosted in killas metsedimentary rocks and Carn Brae batholith granites. Polymetallic-low grade tin mineralization is characteristic of the killas whereas the granite is tin-rich and base metals poor. The Mineral Resource Estimate included 24 lodes located within an area of 3.3 km by 1 km and extending from near surface at Dolcoath to 835 m depth for the deep lodes such as at Roskear and No. 8 area. The granite-hosted deep lodes have witnessed past mining with resources having been accordingly depleted for stopes, draw points and raises but not for levels and drifts since the latter are volumetrically small. The narrow widths of the lodes and presence of town infrastructure on surface precludes open cast mining leaving the lodes being only amenable to underground mining.

For the purpose of Mineral Resource estimation and reporting, the lodes have been grouped into the "Lower Mine" which includes the deep, granite-hosted lodes for which only tin analyses are available, and the "Upper Mine" in which lodes straddling or lying above the granite-killas contact, have been tested by recent drilling and have multi-element analyses available. The recent drilling and assaying has been subjected to current industry standard QA/QC work, however, the historic core drilling and assaying would have been supported by mine quality control practices in force at those times and would not have been as rigorous as required by today's CIM standards.

Indicated and Inferred Mineral Resources have been estimated for tin in the Lower Mine, and tin, copper and zinc in the Upper Mine. This Mineral Resource Estimate is based on diamond drilling, core sampling and assaying as well as underground back and face channel sampling and chip sample assaying. Sampling during past mine operations in the Lower Mine was predominantly historic channel sampling and short hole wall drilling in drives with historic exploration drilling on strike and down dip of the workings. Recent drilling from 2008 to 2013 has tested the Upper Mine Dolcoath lodes.

The exploration drill hole database for the South Crofty Project contains 157 recent diamond drill holes totalling 30,931.82 m, 3,362 historic diamond drill holes for 90,732.81 m and 14,893 historic channels over 29,439.75 m.

Metal prices used for the Mineral Resource Estimate are US$8.50/lb Sn, US$2.75/lb Cu and US$0.90/lb Zn based on approximate LME two-year trailing averages at March 31, 2016. Process recovery assumptions are 88.5% for Sn, 85% for Cu and 70% for Zn. Given the polymetallic nature of the lodes, mineral wireframe modelling and resource reporting is based on tin equivalent ("SnEq") grade. The SnEq calculation includes metal price and recovery: SnEq% = Sn% + (0.311 x Cu%) + (0.084 x Zn%). For the deep lodes, only tin analyses are available, therefore SnEq% is essentially Sn%.

Fifty-nine (59) mineral wireframes for twenty-four (24) lodes were constructed from mineralization intercepts in channels and drill holes at a cut-off grade of 0.5% SnEq over a minimum true width of 1.2 m. The Lower Mine lodes were modelled mostly on level plans using varying horizontal widths depending on lode dip. Minimum length of Sn mineralization along strike on the levels for inclusion in resources was 15 m. Lode widths commonly are narrower than minimum mining width and were "bulked out" to at least minimum width using adjacent assays when available and practical or to minimum width at zero grade where only the lode was sampled. In the latter case, preference was given to bulking out on the lode footwall in keeping with past mining convention at South Crofty. Upper Mine lodes, estimated predominantly from recent drilling, were modelled on vertical cross-sections.

Assay grades were capped at 6% for Sn, 4% for Cu and 20% for Zn for the Upper Mine and 20% Sn for the Lower Mine. Assay composites were generated for the vein intercepts from the assays captured by GEMS software in the mineral wireframes. Channel samples, from predominantly the Lower Mine, were composited at a length of 1.2 m dynamically adjusted in order that all composites in the intercept have the same length. This method ensures that the grade weighting is correctly applied for bulked out lode widths but results in variable composite lengths. Compositing for drill holes was done down hole at 1.5 m consistent lengths with review of discarded residual fragments for bias.

Four block models and several partial models were created to encompass the various lode areas: Dolcoath, Roskear, No.4-No.8-No.2-Providence; and Pryces-Tincroft. The Mineral Resource block models' X axes are rotated to 60° azimuth. Block sizes are 5m x 5m x 2m vertical. Inverse distance cubed ("$ID^3$") interpolation was carried out using multiple search distances and search ellipses oriented to lode strikes and dips.

Historic bulk density for mining granite-hosted lodes was 2.77 t/$m^3$ (Owen et al. 1998). Water immersion bulk density testing was carried out on-site for 119 core samples from 2009 to 2012 drill holes. Samples were obtained from the Dolcoath lodes and averaged 3.09 t/$m^3$. To convert block model volumes to tonnes, P&E used a 2.77 t/$m^3$ bulk density for the deep, granite-hosted lodes and 3.0 t/$m^3$ for the killas-hosted Sn-Cu-Zn bearing lodes at Dolcoath.

Mineral Resources were classified as Indicated and Inferred based on completeness of channel sampling (levels above/below, raises), the drill hole spacing, confidence in the assaying for drilling, and geologic confidence in grade continuity. The Indicated and Inferred Mineral Resource Estimates for the Lower Mine include pillars and sills, some of which may not be recoverable pending an advanced engineering study and inspection underground once the workings are accessible.

The Indicated Mineral Resource Estimate at a 0.6% SnEq block cut-off grade is 1.92 million tonnes averaging 1.70% SnEq. The Inferred Mineral Resource Estimate at a 0.6% SnEq block cut-off grade is 1.20 million tonnes averaging 1.52% SnEq.

Validation of the grade interpolation and the block model was carried out by on-screen review of grades and other block model estimation parameters versus drill hole composites, by comparison of assay, composites, zone intercepts and block grades, comparison to alternate nearest neighbour ("NN") interpolations, and review of the volumes of wireframes versus reported mineral resources.

Although there are a number of uncertainties in the historic data, appropriate due diligence has been exercised to compile and verify data from mine records, and in P&E's opinion, the Mineral

Resource Estimate has no fatal flaws, is reasonable and has been undertaken according to industry standard practice.

## 14.2 SOURCE OF DATA

Drill hole and channel sampling databases in digital format (Access and Excel) were provided by WUM personnel Dr. Keith Russ PhD, Technical Services Engineer and Ms. Samantha Rae B.Sc., Chief Mine Geologist, during the P&E 5-day site visit (Nov 17 to 22, 2014). Two databases were provided, one with recent drilling, historic exploration diamond drill holes and some channel samples, and the other largely historic channel samples with some historic drilling data. Initial importing of historic channels and historic drilling data disclosed duplication of drill holes and channels between the databases as well as duplicated data and partially duplicated data within the databases. The duplicated channel sampling data consisted of resampled channels that included wall sampling in contrast to earlier lode sampling only. P&E retained the most appropriate data and other data were removed from the database and stored. The data were extensively cleaned up during the wireframing/modelling process, and additional data was retrieved from mine records where necessary, as gaps in the sampling were noted as wireframing work progressed. Once data acquisition and verification were completed, the databases were segregated into a drill hole database and a channel sample database for the purpose of domain interpretation and mineral resource estimation.

Discussions were held with WUM personal during the 5-day site visit and on an ongoing basis during the data verification and modeling phases of the resource estimate. At a P&E request, Mr. Allan Reynolds, Technical Services Manager of WUM, extracted and compiled historic resource estimates and production data for Roskear and No. 8 lodes and carried out a reconciliation of the mine's historic resource estimates versus mining.

Publically available reports on SEDAR were accessed and reviewed as well as non-public reports at the mine and others commissioned by WUM and Tin Shield.

## 14.3 DATA VALIDATION

P&E uses GEMS to validate the drill hole database using software routines that trap errors and potential problems such as:

- Intervals exceeding the hole length (from-to problem).
- Negative or zero length intervals (from-to problem).
- Inconsistent down hole survey records or lack of zero depth entry at collar as needed by GEMS.
- Duplicate samples or out of sequence and overlapping intervals (from-to problem; additional sampling/check sampling included in table).
- No interval defined within analyzed sequences (not sampled or implicit missing samples/results).

Validation of data also includes checks for:

- Inconsistent naming conventions and analytical units.
- Transposed assay table columns.
- Implausible drill hole collar locations.
- Implausible drill hole traces on screen in 3D.
- Drill hole deviation checks by software or Excel graphs.

The drill hole data received from WUM required extensive verification and validation work to prepare for Mineral Resource estimation and allow for acceptance for resource classification at a higher level than Inferred.

The recent drilling verification, after checks for laboratory batch reruns, was resolved to 53 discrepancies between laboratory certificates and the assay database. Most of these were found to be incorrectly entered QA/QC results.

Approximately 40,000 historic channel samples were digitized from mine plans by WUM using contract personnel over a period of 18 months. During import of CSV files to GEMS and subsequent wireframing work, P&E found inconsistencies such as coordinate errors, excessive lengths, duplicates (resampling), near duplicates (geology grid versus mine grid), and implausible orientations with respect to drift walls. WUM was apprised of these issues and checks against original records were performed. The channels were also subjected to GEMS validation routines.

P&E used proprietary software to examine the down hole surveys for excessive deviation readings that would bear confirming or removal. Much of the historic drilling in the Lower Mine has limited or no down hole surveys since many holes were short bazooka holes into drift walls. Historic exploration holes testing lower mined lodes are primarily on the fringes of the deposits where Inferred Resources are outlined. Results of the deviation examination are in point form as follows (refer to Table 14.1):

<u>All Holes: Down Hole Survey Verification</u>

- Number of holes in survey file: 3,515
- Number of records: 7,981
- Total length drilled: 121,591.73 m
- Number of unsurveyed holes: 3,270
- Total length of unsurveyed holes: 90,410.19 m
- Percent of unsurveyed holes: 93.03%
- Percent by length of unsurveyed holes: 74.36%

<u>Down Hole Deviation Analysis for Recent Drilling</u>

- Threshold deviation: 10°/ 30 m
- Number of excessive azimuth deviations/m: 44
- Number of excessive dip deviations/m: 2
- Number of holes with no azimuth change: 1
- Number of holes with no dip change: 113

| **TABLE 14.1<br>DRILL HOLE DEVIATION ANALYSIS** | | |
|---|---|---|
| **Hole ID** | **Distance(m)** | **Az/Dip** |
| DD0921 | 42 | Az |
| DD0923 | 15 | Az |
| DD0923 | 21 | Az |
| DD0925 | 12 | Az |
| DD0925 | 18 | Az |
| DD0925 | 162 | Az |
| DD0931 | 11 | Az |
| DD1004 | 163 | Az |
| DD1004 | 163 | Dip |
| DD1005 | 137 | Az |
| DD1008 | 12 | Az |
| DD1014 | 13 | Az |
| DD1014 | 19 | Az |
| DD1015 | 12 | Az |
| DD1015 | 18 | Az |
| DD1020 | 8 | Az |
| DD1021 | 251 | Az |
| DD1021 | 257 | Az |
| DD1024 | 14 | Az |
| DD1025 | 14 | Az |
| DD1025 | 56 | Az |
| DD1025 | 62 | Az |
| DD1026 | 89 | Az |
| DD1026 | 95 | Az |
| DD1031 | 87 | Az |
| DD1031 | 99 | Az |
| DD1103 | 265 | Az |
| DD1125 | 13 | Az |
| DD1125 | 19 | Az |
| DD1130 | 108 | Az |
| DD1138 | 32 | Az |
| DD1139 | 158 | Az |
| DD1212 | 6 | Dip First reading |
| DD1213 | 72 | Az |
| DD1213 | 78 | Az |
| DD1227 | 25 | Az |
| DD1227 | 31 | Az |
| DD1304 | 214 | Az |
| DD1304 | 242 | Az |
| DD1305 | 141 | Az |
| DD1305 | 153 | Az |
| DD1305 | 300 | Az |
| DD1305 | 306 | Az |
| DD1305 | 352 | Az |
| DD1305 | 355 | Az |
| DD1305 | 391 | Az |
| **Total holes 25** | | |

The deviation of 10° per 30 m for the deviation test above is a high threshold for the PQ to BQTW sized drill rods used in the recent drilling. Readings for azimuth appear to have been a problem for the Reflex Instruments EZ-TRAC equipment, possibly at the reconciliation with the local magnetic field or with magnetic sources down hole.

Holes with excessive deviation were checked against available survey records. Implausible readings were discarded where practicable.

## 14.4 SOUTH CROFTY SAMPLING DATABASE

The digital drill hole and channel databases contain data for surface and underground diamond drill holes and channel samples. The data were acquired from 1917 to 2013. P&E divided drill hole data and channel data into two databases. The drill hole database contains 3,519 holes totalling 123,130.90 m of which the recent drilling from 2008 to 2013 comprises 157 holes for 30,931.82 m. The historic channel database contains 14,893 channels over 29,439.35 m.

The drilling and channel sampling spans 4.08 km along the 60° strike of the mineralized lodes and extends to a depth up to 877 m. Other than bazooka wall drilling, drill holes are fanned or irregularly spaced with variable hole density. The databases are summarized in Table 14.2.

**TABLE 14.2**
**SUMMARY OF DIAMOND DRILL HOLES AND CHANNELS DATABASES**

| | Count | Length (m) | Minimum (m) | Maximum (m) | Average (m) |
|---|---|---|---|---|---|
| Drill holes | 3,519 | 123,664.20 | 0.50 | 450.65 | 35.14 |
| Channels | 14,893 | 29,439.75 | 0.02 | 10.96 | 1.98 |
| Drill Holes in Resource Estimate | 1,036 | 38,252.28 | 2.04 | 437.32 | 36.92 |
| Channels in Resource Estimate | 13,536 | 12,056.41 | 0.02 | 7.92 | 0.89 |

A plan of drill hole locations for the South Crofty Project area is shown in Figure 14.1 and a 3D perspective view is shown in Figure 14.2.

### 14.4.1 Drill Hole Collar Surveys

Collars for the recent drill holes in the decline and spine drive were located by WUM surveyors using conventional underground survey methods.

### 14.4.2 Down Hole Surveys

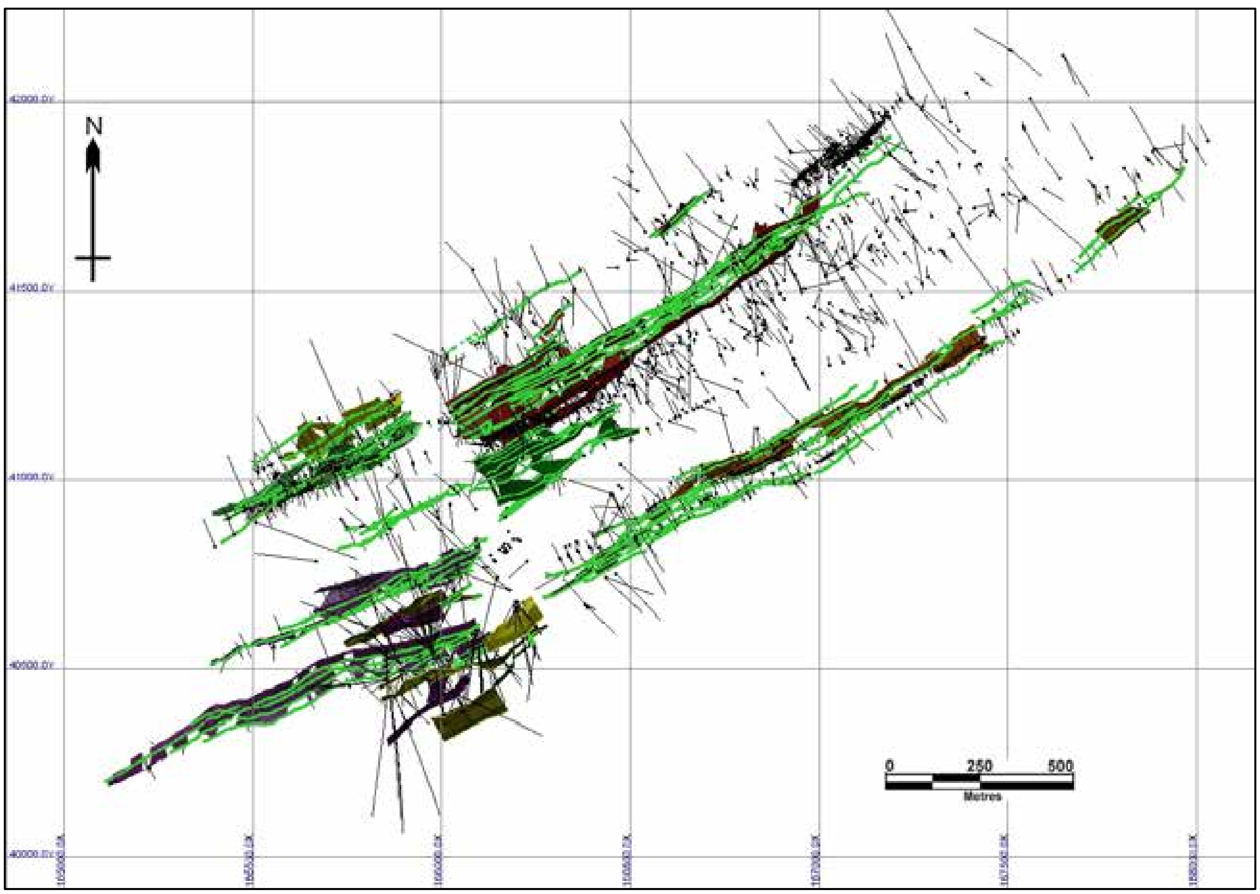
Down hole surveys for recent drilling were carried out by WUM personnel using Reflex EZ-Trac tooling which is equipped with a built-in compass that is not suitable for in-casing readings and is affected by magnetic rocks. The Reflex EZ-Trac is an electronic device providing digital processing and read-out by EZ-COM software and can be operated in single or multi-shot mode. The probe length is 1.03 m. The accuracy of the Reflex instrument is ±0.25° for inclination measurements and ±0.35° for azimuth measurements.

Surveying with the Reflex EZ-Trac began with hole DD0918 but included holes DD0908 and DD0909 which were redrilled in 2012. Recent holes DD0901 to DD0909, DD0912 and DD0917 were not surveyed down hole. Readings were taken in multi-shot mode from the hole toe to surface at nominal 6 m intervals. The azimuths were corrected for magnetic declination and drift, and subsequently the corrected data were entered into the digital drill hole database.

### 14.4.3 Channel Sample Surveys

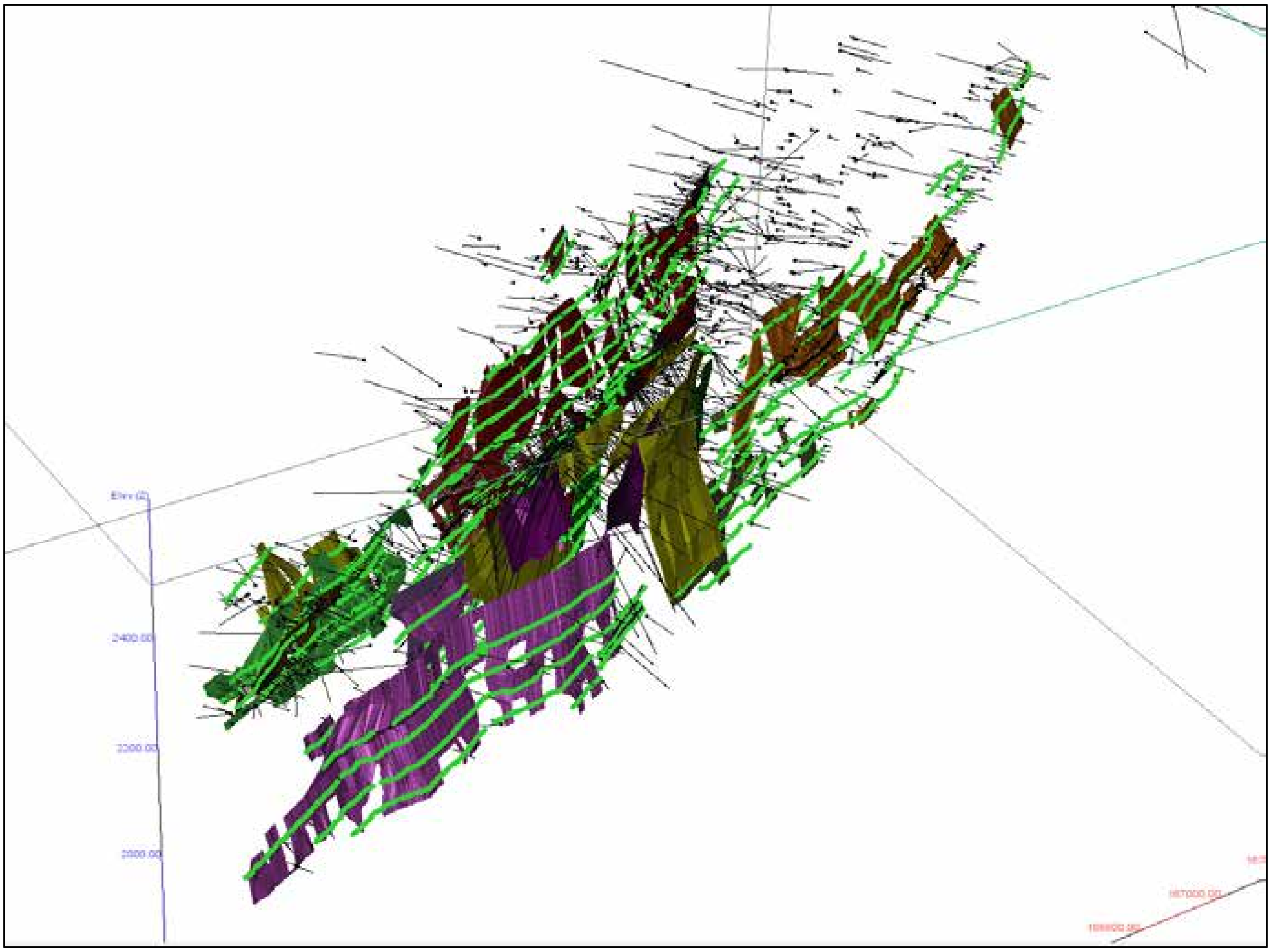
WUM has compiled channel sampling digital data from mine hardcopy sample logs. Channels were entered in the database as pseudo drill holes. The records for later or check channels with multiple assays contain coordinates that locate the samples with reasonable accuracy within the levels. The coordinates have been located digitally by cursor on scanned mine plans with elevation of these channels taken as 1.5 m above the drive floor. For channels lacking survey plans or those that were incompletely sampled wall to wall, the starting points have been taken from the log's distances from survey plugs or identifiable workings features, such as crosscuts, and the origin was set at the drive south wall. Although face samples are included in the database, the majority were back channels. As such there is a minor spatial displacement of the channels with respect to their actual locations. However, this small error is well within overall resource estimation variability.

**Figure 14.1 Drill Hole and Channel Sample Location Plan and Surface Projection of the South Crofty Lode Wireframes (Non-Depleted)**




Legend: ------ Channels |-----o Drill Hole (Workings not shown)

**Figure 14.2 3D Isometric View of Drill holes, Channel Sampling and Lode Wireframes (Non-Depleted) (Looking NNE)**



Legend: ------ Channels |-----o Drill Hole (Workings not shown)

### 14.4.4 Assay/Analytical Database

The drill hole assay database contains 28,030 samples covering 38,386.42 m of coring, whereas the channel assay database contains 35,556 samples covering 29,144.82 m of chip sampling. Tables 14.3 and 14.4 summarize basic statistics for the channel sample and drill core databases and the various Mineral Resource areas in the lodes that P&E modelled for its Mineral Resource Estimate.

Historic back channels in the Lower Mine were taken at 3.0 m intervals and locally at 1.0 m. Chip samples in the channels were cut generally at minimum of 0.3 m (1 ft) and up to ±7.0 m with the bulk of the samples taken over 0.6 m (2 ft). Sample widths for channels and bazooka wall drilling are irregular and where the lode walls (waste) are sampled, lengths tend to be substantially longer than for the lodes making dilution to minimum mining width using hanging wall and footwall assays problematic.

Tin content in a portion of the channel samples was determined by "vanning assay". Such assays are from channels with only one sample, which account for up to 30% of the channel samples used in the Mineral Resource Estimate or up to 52% by length. Vanning is a washing/panning type method that was most widely used to determine the tin content of Cornish ores and process plant products. It involved washing and separating a weighed portion of the material to be tested on a specially shaped "vanning" shovel. Here the heavy cassiterite was collected whilst the lighter waste washed away. Repeated washing and subsequent roasting of the cassiterite concentrate to remove arsenic produced a clean concentrate of "black tin". After removing any iron minerals present with a magnet, the concentrate was weighed and the amount of cassiterite in the original sample calculated and reported as lbs of black tin per long ton. Because the vanning assay emulated the milling processes it was particularly useful to determine recoverable tin, and in the hands of a skilled operator was quick and relatively accurate to tin contents as low as 0.1% Sn. The vanning method continued to be used underground until the end of 20th century even though reliable wet chemical methods were in use at mine laboratories from the late 19th century. At South Crofty, vanning assays have been converted to total Sn% by a formula developed at the mines that is based on a comparison of vanning results to wet chemical or XRF analytical results. Sn% = vanning assay (lbs/long ton) x 1.1/22.4 (or 0.049) where 22.4 is the conversion from long tons to percent and 1.1 is the factor converting recoverable tin to total tin content.

P&E examined 65 original vanning sampling records where black tin lbs/long ton had been converted to recoverable Sn%. Only one error was found, however, since the original vanning results would have been converted to total Sn%, the error is immaterial in terms of the channel sampling database.

There are 26 of the 157 recent drill holes and 504 historic holes that have no assays. Where assays were not available for the drill holes, there was uncertainty in location or that assays were questionable vis a vie surrounding sampling, the respective holes were eliminated for the purpose of mineral resource estimation. Similarly, for channel samples, where assays were lacking or location or orientation was suspect, these were discarded or not wireframed.

**TABLE 14.3**
**SUMMARY STATISTICS FOR THE CHANNEL ASSAYS DATABASE**

| Domain | Name | Count | Length (m) | Minimum | Maximum | Average Sn% | Weighted Sn% | Std. Dev. | Coef. Var. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | Waste | 21,838 | 16,962.54 | 0.0000 | 48.96 | 0.28 | 0.23 | 1.23 | 4.31 |
| 1 | Pryces | 914 | 673.34 | 0.0001 | 43.60 | 2.47 | 2.17 | 4.65 | 1.88 |
| 2 | Pryces | 95 | 58.60 | 0.0010 | 57.00 | 2.33 | 2.57 | 6.46 | 2.77 |
| 3 | Pryces | 156 | 128.15 | 0.0010 | 9.00 | 0.66 | 0.84 | 1.18 | 1.78 |
| 4 | Pryces | 389 | 275.57 | 0.0000 | 36.73 | 1.77 | 1.67 | 3.29 | 1.86 |
| 5 | Pryces | 60 | 93.65 | 0.2900 | 4.03 | 1.04 | 1.07 | 0.70 | 0.67 |
| 6 | Pryces | 49 | 93.41 | 0.0001 | 8.30 | 1.19 | 0.99 | 1.54 | 1.30 |
| 7 | Pryces | 20 | 12.50 | 0.0010 | 41.01 | 3.28 | 2.88 | 8.85 | 2.70 |
| 8 | Pryces | 46 | 29.60 | 0.0010 | 9.25 | 1.68 | 1.68 | 2.39 | 1.43 |
| 9 | Pryces | 39 | 23.10 | 0.0010 | 9.05 | 1.81 | 1.77 | 2.28 | 1.26 |
| 10 | Pryces | 38 | 21.70 | 0.0010 | 18.00 | 1.42 | 1.16 | 2.99 | 2.12 |
| 11 | Pryces | 31 | 20.85 | 0.0010 | 7.40 | 0.73 | 0.79 | 1.40 | 1.91 |
| 12 | Pryces | 7 | 5.80 | 0.2200 | 3.95 | 1.44 | 1.54 | 1.11 | 0.77 |
| 13 | Pryces | 12 | 7.28 | 0.2200 | 5.70 | 2.00 | 2.01 | 1.54 | 0.77 |
| 14 | Pryces | 4 | 2.20 | 0.1200 | 10.20 | 2.98 | 2.74 | 4.18 | 1.40 |
| 15 | Pryces | 14 | 7.90 | 0.6000 | 8.80 | 2.95 | 3.03 | 2.49 | 0.84 |
| 17 | Pryces | 16 | 8.40 | 0.1000 | 2.40 | 0.73 | 0.78 | 0.67 | 0.92 |
| 18 | Pryces | 13 | 8.30 | 0.0010 | 16.55 | 2.52 | 2.82 | 4.27 | 1.69 |
| 19 | Pryces | 22 | 11.80 | 0.1000 | 9.57 | 1.09 | 0.73 | 1.99 | 1.83 |
| 20 | Pryces | 21 | 13.90 | 0.0010 | 20.95 | 3.54 | 3.95 | 5.58 | 1.58 |
| 30 | Tincroft | 17 | 11.34 | 0.0001 | 7.66 | 1.53 | 1.26 | 2.12 | 1.38 |
| 31 | Tincroft | 87 | 59.80 | 0.0010 | 18.61 | 1.32 | 1.35 | 2.64 | 2.00 |

| **TABLE 14.3<br>SUMMARY STATISTICS FOR THE CHANNEL ASSAYS DATABASE** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Domain** | **Name** | **Count** | **Length (m)** | **Minimum** | **Maximum** | **Average Sn%** | **Weighted Sn%** | **Std. Dev.** | **Coef. Var.** |
| 32 | Tincroft | 478 | 425.63 | 0.0001 | 25.24 | 2.20 | 2.03 | 3.81 | 1.73 |
| 33 | Tincroft | 72 | 68.39 | 0.0001 | 13.06 | 2.21 | 2.33 | 2.59 | 1.17 |
| 34 | Tincroft | 29 | 52.29 | 0.0982 | 3.63 | 0.96 | 0.93 | 1.04 | 1.08 |
| 35 | Tincroft | 36 | 21.00 | 0.0100 | 5.63 | 1.14 | 1.15 | 1.40 | 1.22 |
| 36 | Tincroft | 25 | 19.50 | 0.0210 | 10.92 | 2.36 | 2.39 | 2.91 | 1.23 |
| 37 | Tincroft | 22 | 17.73 | 0.0000 | 2.95 | 0.71 | 0.69 | 0.89 | 1.25 |
| 38 | Tincroft | 30 | 22.51 | 0.0000 | 6.77 | 2.10 | 2.05 | 1.86 | 0.88 |
| 39 | Tincroft | 16 | 6.24 | 0.0491 | 13.85 | 2.85 | 2.30 | 3.47 | 1.22 |
| 40 | RoskearA | 396 | 382.86 | 0.0000 | 18.24 | 2.53 | 2.34 | 2.87 | 1.13 |
| 41 | RoskearB | 813 | 1,025.17 | 0.0000 | 18.93 | 2.16 | 1.80 | 2.85 | 1.32 |
| 42 | RoskearBHW | 234 | 206.65 | 0.0000 | 19.68 | 2.05 | 1.80 | 2.46 | 1.20 |
| 51 | Providence | 65 | 47.85 | 0.0000 | 13.80 | 2.43 | 2.31 | 3.43 | 1.41 |
| 52 | Providence | 30 | 22.10 | 0.0000 | 10.39 | 1.05 | 1.04 | 1.91 | 1.81 |
| 53 | Providence | 25 | 15.40 | 0.0000 | 36.39 | 4.57 | 4.36 | 8.34 | 1.82 |
| 54 | Providence | 4 | 6.90 | 2.9800 | 13.20 | 7.35 | 6.76 | 3.70 | 0.50 |
| 60 | North FW | 114 | 72.30 | 0.0000 | 9.19 | 1.18 | 1.13 | 1.84 | 1.57 |
| 61 | South Branch | 183 | 107.35 | 0.0000 | 36.74 | 1.82 | 1.51 | 3.75 | 2.06 |
| 62 | Middle | 184 | 94.71 | 0.0000 | 9.24 | 0.85 | 0.75 | 1.68 | 1.96 |
| 63 | North | 1,358 | 827.07 | 0.0000 | 52.00 | 1.39 | 1.35 | 3.02 | 2.18 |
| 65 | South | 2,155 | 1,252.13 | 0.0000 | 35.00 | 1.63 | 1.63 | 2.80 | 1.71 |
| 81 | No. 8-1 | 884 | 694.52 | 0.0000 | 33.34 | 2.55 | 2.46 | 3.83 | 1.50 |
| 82 | No. 8-2 | 108 | 60.99 | 0.0001 | 47.44 | 2.34 | 2.29 | 5.00 | 2.13 |
| 100 | No. 4 | 2,512 | 2,995.97 | 0.0000 | 48.11 | 2.29 | 2.08 | 3.38 | 1.47 |
| 201 | No. 2-1 | 1,138 | 1,534.22 | 0.0001 | 33.52 | 1.99 | 1.64 | 2.94 | 1.47 |
| 202 | No. 2-2 | 44 | 45.80 | 0.4420 | 3.73 | 1.29 | 1.30 | 0.64 | 0.50 |
| 203 | No. 2-NCK | 531 | 463.95 | 0.0001 | 28.50 | 2.20 | 2.09 | 3.63 | 1.64 |
| | | | | | | | | | |
| | **Totals** | **35,374** | **29,018.96** | | | | | | |

| **TABLE 14.4<br>SUMMARY STATISTICS FOR THE DRILL CORE ASSAYS DATABASE** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Domain** | **Name** | **Count** | **Length (m)** | **Min Sn%** | **Max Sn%** | **Average Grade Sn%** | **Weighted Grade Sn%** | **Std. Dev.** | **Coef. Var.** |
| 0 | Waste | 23,231 | 17,346.76 | 0.0000 | 41.10 | 0.61 | 0.43 | 1.87 | 3.09 |
| 1 | Pryces | 298 | 228.12 | 0.0000 | 16.29 | 1.87 | 1.92 | 2.73 | 1.46 |
| 2 | Pryces | 149 | 104.69 | 0.0000 | 25.88 | 1.39 | 1.52 | 2.83 | 2.04 |
| 3 | Pryces | 2 | 2.85 | 0.1900 | 2.15 | 1.17 | 1.08 | 0.98 | 0.84 |
| 4 | Pryces | 40 | 23.57 | 0.0000 | 28.14 | 2.24 | 1.81 | 4.97 | 2.22 |
| 5 | Pryces | 6 | 6.70 | 0.1600 | 3.04 | 1.66 | 1.49 | 0.86 | 0.52 |
| 6 | Pryces | 10 | 5.50 | 0.0400 | 2.50 | 0.99 | 0.99 | 0.72 | 0.72 |
| 7 | Pryces | 47 | 31.26 | 0.0100 | 6.03 | 1.43 | 1.39 | 1.26 | 0.88 |
| 9 | Pryces | 1 | 2.45 | 0.1000 | 0.10 | 0.10 | 0.10 | 0.00 | 0.00 |
| 14 | Pryces | 17 | 13.60 | 0.0300 | 21.65 | 3.45 | 2.38 | 5.49 | 1.59 |
| 15 | Pryces | 2 | 2.10 | 0.6700 | 1.75 | 1.21 | 1.13 | 0.54 | 0.45 |
| 16 | Pryces | 70 | 53.29 | 0.0300 | 16.97 | 3.13 | 2.99 | 3.31 | 1.06 |
| 17 | Pryces | 1 | 0.74 | 0.6200 | 0.62 | 0.62 | 0.62 | 0.00 | 0.00 |
| 19 | Pryces | 1 | 0.50 | 0.0100 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 |
| 20 | Pryces | 2 | 1.00 | 0.0100 | 0.16 | 0.09 | 0.09 | 0.08 | 0.88 |
| 21 | Pryces | 88 | 79.80 | 0.0100 | 20.37 | 2.13 | 1.89 | 3.96 | 1.86 |
| 32 | Tincroft | 1 | 1.75 | 2.5600 | 2.56 | 2.56 | 2.56 | 0.00 | 0.00 |
| 39 | Tincroft | 1 | 0.61 | 4.2200 | 4.22 | 4.22 | 4.22 | 0.00 | 0.00 |
| 40 | RoskearA | 59 | 53.79 | 0.1300 | 26.78 | 2.83 | 2.52 | 4.65 | 1.65 |
| 41 | RoskearB | 704 | 520.58 | 0.0000 | 32.00 | 2.40 | 2.11 | 3.55 | 1.48 |
| 42 | RoskearBHW | 178 | 122.22 | 0.0000 | 20.75 | 2.50 | 2.19 | 3.75 | 1.50 |
| 54 | Providence | 3 | 1.50 | 0.1600 | 6.12 | 2.52 | 2.62 | 2.59 | 1.03 |
| 55 | Providence | 14 | 7.95 | 0.1200 | 7.98 | 2.04 | 2.06 | 2.37 | 1.16 |

| Table 14.4<br>Summary Statistics for the Drill Core Assays Database | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Domain** | **Name** | **Count** | **Length (m)** | **Min Sn%** | **Max Sn%** | **Average Grade Sn%** | **Weighted Grade Sn%** | **Std. Dev.** | **Coef. Var.** |
| 60 | North FW | 17 | 8.85 | 0.0100 | 4.00 | 1.11 | 1.07 | 1.22 | 1.10 |
| 61 | South Branch | 3 | 1.77 | 0.6500 | 6.39 | 2.91 | 2.82 | 2.50 | 0.86 |
| 62 | Middle | 86 | 77.54 | 0.0010 | 6.45 | 0.56 | 0.51 | 0.99 | 1.78 |
| 63 | North | 130 | 81.45 | 0.0000 | 12.73 | 1.57 | 1.66 | 2.05 | 1.30 |
| 64 | North HW | 16 | 7.30 | 0.0500 | 9.28 | 1.71 | 1.44 | 2.24 | 1.31 |
| 65 | South | 13 | 9.83 | 0.0500 | 6.24 | 1.54 | 1.32 | 1.84 | 1.20 |
| 66 | Upper SSB | 39 | 34.34 | 0.0100 | 2.11 | 0.41 | 0.35 | 0.46 | 1.14 |
| 70 | Upper Main | 124 | 94.24 | 0.0000 | 3.48 | 0.41 | 0.43 | 0.59 | 1.45 |
| 71 | S. Entral | 129 | 94.28 | 0.0010 | 6.20 | 0.52 | 0.54 | 0.84 | 1.62 |
| 72 | NVC | 52 | 45.02 | 0.0000 | 5.27 | 0.55 | 0.39 | 1.09 | 1.98 |
| 73 | Middle Branch | 37 | 30.12 | 0.0100 | 3.99 | 0.67 | 0.57 | 0.96 | 1.43 |
| 74 | Little NE | 57 | 36.88 | 0.0000 | 14.00 | 1.06 | 1.22 | 2.59 | 2.45 |
| 75 | Little NW | 41 | 34.74 | 0.0200 | 2.37 | 0.28 | 0.31 | 0.48 | 1.70 |
| 76 | Little NW FW | 10 | 9.69 | 0.0100 | 6.61 | 1.05 | 0.91 | 2.04 | 1.95 |
| 81 | No. 8-1 | 614 | 423.46 | 0.0000 | 47.00 | 1.86 | 1.71 | 3.43 | 1.85 |
| 82 | No. 8-2 | 2 | 5.90 | 0.5700 | 1.64 | 1.11 | 1.23 | 0.54 | 0.48 |
| 100 | No. 4 | 351 | 311.16 | 0.0100 | 37.50 | 3.17 | 2.62 | 5.21 | 1.64 |
| 201 | No.2-1 | 12 | 5.65 | 0.0500 | 5.36 | 2.01 | 1.91 | 1.82 | 0.91 |
| 202 | No.2-2 | 6 | 1.88 | 0.1000 | 4.67 | 1.02 | 1.02 | 1.64 | 1.62 |
| 203 | No.2-NCK | 2 | 1.09 | 0.69 | 8.30 | 4.50 | 1.88 | 3.81 | 0.85 |
| | | | | | | | | | |
| | **Totals** | **26,666** | **19,926.92** | | | | | | |

WUM submitted the recent drill core samples for multi-element ICP analysis including Sn, Cu, Pb and Zn at the AGAT, SGS and WAI (Wardell Armstrong) laboratories in Cornwall for sample preparation from 2008 to 2013, with AGAT and SGS chemical analyses being performed in Canada. Analyses for historic drill core and channel chip samples were performed at various laboratories including the Wheal Jane mine laboratory and the South Crofty mine laboratory. Limited umpire assaying at outside laboratories was also undertaken.

P&E carried out assay data verification for the recent drilling in March-April 2015. The assay certificates in spreadsheet format were obtained directly from AGAT, SGS and WAI laboratories. A total of 5,597 records for tin, copper, zinc and lead assays contained in the mineral resource wireframes were extracted for verification against laboratory assay records. Approximately 1,798 assays were located and checked. A number of discrepancies were noted and the database was corrected and updated.

In addition to the data verification reported above, P&E reviewed the QA/QC for the South Crofty Project analyses from the recent drilling and concludes that the analyses are acceptable for Mineral Resource estimation.

P&E's site visit confirmed that core recovery was generally good, the lodes were reasonably competent and recovery was over 90% for core examined.

In P&E's opinion the drill hole and assay/analytical databases was suitable for the estimation of Mineral Resources and Mineral Reserves.

## 14.5 CUT-OFF GRADES AND WIREFRAMES

P&E examined metal prices, preliminary operating costs and metal recoveries with respect to the 0.6% SnEq Mineral Resource cut-off grade and wireframe cut-off grade (Table 14.5). Mining costs assume longhole mining.

| TABLE 14.5<br>MINERAL RESOURCE ESTIMATE CUT-OFF GRADE PARAMETERS | |
|---|---|
| Metal Price: Sn US$/lb | 8.50 |
| Concentrate Recovery Sn | 85.5% |
| Smelter Payable Sn | 95% |
| Mining Cost US$/t | 55 |
| Process Cost US$/t | 27 |
| G&A Cost US$/t | 9 |
| Smelting, Refining, Freight Cost US$/t | 600 |
| | |
| **Total Operating Cost US$/t** | **91** |
| **Mine Cut-off SnEq%** | **0.6%** |

The breakeven cut-off grade is in the order of 0.6% SnEq. Wireframing by others in the past has employed 0.2% Sn to 0.3% Sn to preserve grade continuity. P&E extracted assays for wireframes used in past Mineral Resource estimates for Lower Mine lodes and examined tin grade distributions. P&E concluded that a slightly lower 0.5% SnEq cut-off was appropriate for wireframing and that its use would reduce dilution expected from the use of 0.2% Sn to 0.3% Sn cut-offs and optimize the grade of Mineral Resources, thus offering higher potential for economic mining.

Fifty-nine (59) mineral wireframes for twenty-four (24) lodes were constructed from mineralization intercepts in channels and drill holes at a cut-off grade of 0.5% SnEq over a minimum true width of 1.2 m. Wireframes were constructed by conventional polylining and snapping to assay limits in 3D space. Wireframing was carried out by P&E geologists Richard Routledge, M.Sc. (Applied), P.Geo., Antoine Yassa, P.Geo., and Yungang Wu, M.Sc., P.Geo., all Qualified Persons under CIM definitions.

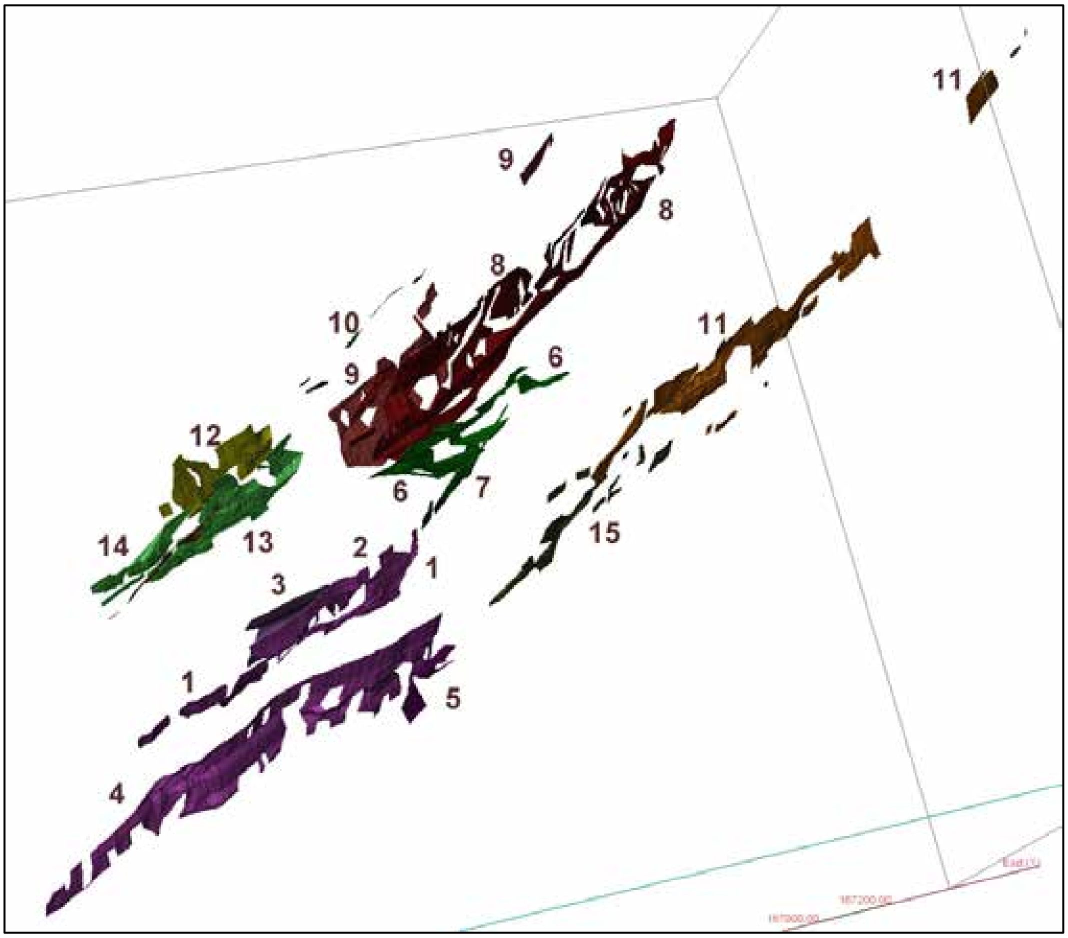
Upper Mine interpretation and wireframing, primarily from recent drill holes, was done on vertical cross-sections.

The Lower Mine lodes that are dominated by horizontal channel and bazooka drilling were modelled mostly on level plans generated at the elevations of the workings. Minimum horizontal widths varied depending on lode dip. Interpretation of zones within the lodes was made on inclined longitudinal sections. Minimum length of Sn mineralization along strike on the levels for inclusion in mineral resources was 15 m. Wireframes were projected up to 25 m beyond the limits of sampling for drill holes and channel samples on the periphery of the lodes or half the distance between levels in the plane of the lode for areas of channel sampling.

Lode widths commonly are narrower than minimum mining width and were “bulked out” to at least minimum width using adjacent assays when available and practical or to minimum width at zero grade where only the lode was sampled. In the latter case, preference was given to bulking out on the lode footwall in keeping with past mining convention at South Crofty. Judgment was exercised in the interpretation of the lodes continuity and incorporation of waste with respect to mineability to avoid unrealistic "kinks" in the lode outlines.

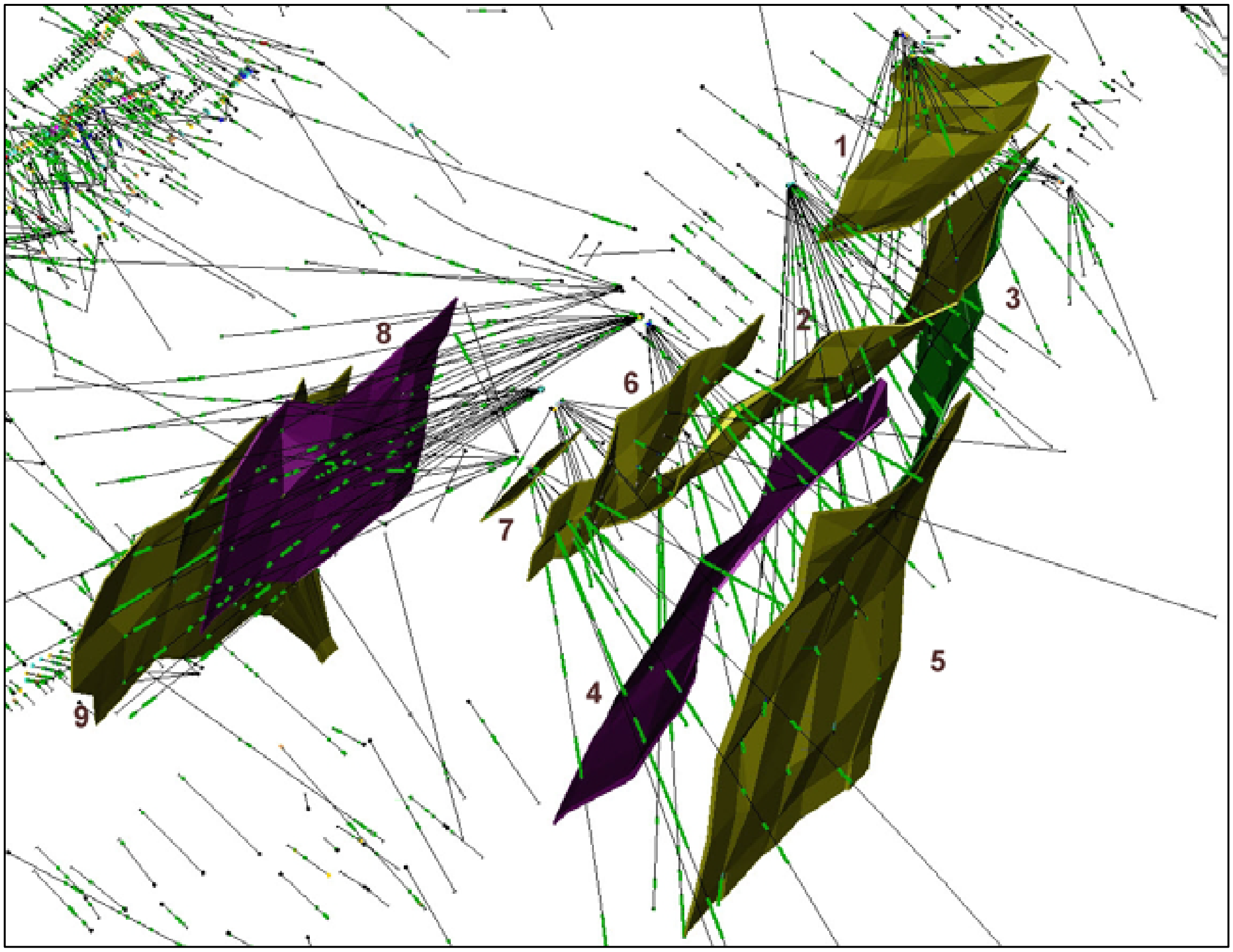
Isometric views in Figures 14.3 and 14.4 show the relative locations of the Lower Mine and Upper Mine lodes, respectively. Tables 14.6 and 14.7 provide keys to the Figures.

**Figure 14.3 Isometric View and Relative Locations of Lower Mine Depleted Lodes (Looking NNE and Down)**



| Table 14.6<br>Lower Mine Lodes | |
|---|---|
| **Figure 14.3 Key** | **Lode Name (Wireframes)** |
| 1 | Dolcoath North |
| 2 | Dolcoath North Hanging Wall |
| 3 | Dolcoath North Footwall |
| 4 | Dolcoath South |
| 5 | Dolcoath South Branch |
| 6 | No. 2 (2) |
| 7 | No. 2-NCK |
| 8 | No. 4 |
| 9 | No. 8 (2) |
| 10 | Providence (5) |
| 11 | Pryces (21) |
| 12 | Roskear A |
| 13 | Roskear B |
| 14 | Roskear B Hanging Wall |
| 15 | Tincroft (10) |

**Figure 14.4 Isometric View and Relative Locations of Upper Mine Lodes (Looking NNE)**



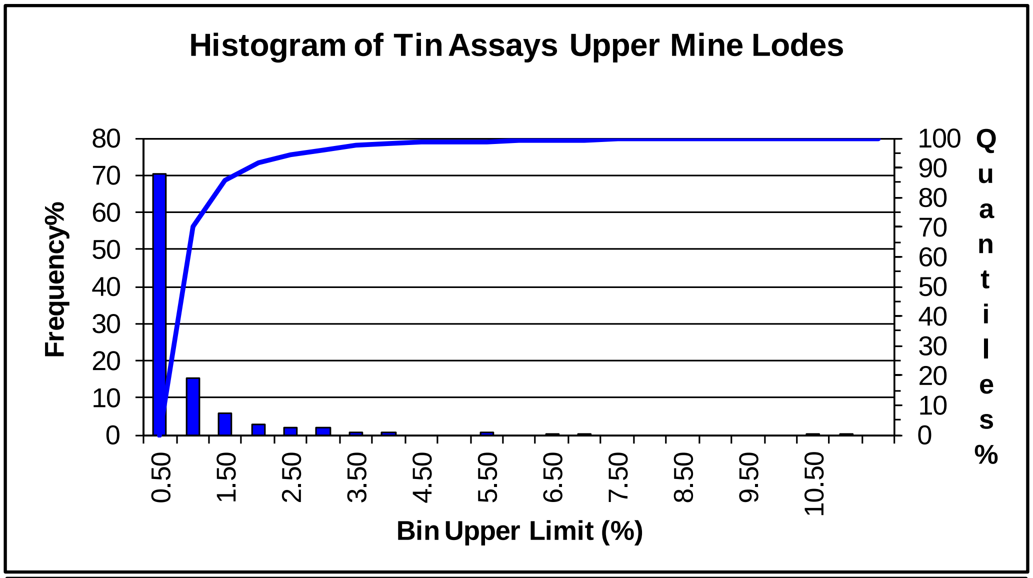
| **TABLE 14.7**<br>**UPPER MINE LODES** | |
|---|---|
| **Figure 14.4 Key** | **Lode Name** |
| 1 | Dolcoath Little North East |
| 2 | Dolcoath South Entral |
| 3 | Dolcoath North Valley Caunter (NVC) |
| 4 | Dolcoath Upper South-South Branch |
| 5 | Dolcoath Main |
| 6 | Dolcoath Little North West |
| 7 | Dolcoath Little Northwest Footwall |
| 8 | Dolcoath Middle |
| 9 | Dolcoath Middle Branch |

## 14.6 ASSAY GRADE DISTRIBUTIONS AND GRADE CAPPING

P&E examined basic statistics for Lower Mine Sn assays and Upper Mine Sn, Cu and Zn assays. Grade distribution for the Sn assays are positively skewed and somewhat bimoldal (Figures 14.5 and 14.6). P&E's review of the spatial distribution of higher grades disclosed no significant clustering that would warrant modeling discrete high-grade zones. Accordingly, P&E elected to cap high assays within the wireframes in order to limit the influence of high outlier assays. P&E examined lognormal probability cumulative frequency plots of the assays and the capping value was based on the cumulative probability of approximately 97.5% to 99.5% (Figures 14.7 to 14.11). Grade capping was carried out on individual resource assays (Table 14.8).

| **TABLE 14.8**<br>**GRADE CAPPING STATISTICS** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Count** | **Max. Value** | **Raw Average** | **Raw CV** | **Cap** | **No. Values Capped** | **% Capped** | **Capped Average** | **Capped CV** |
| UM Sn% | 466 | 10.56 | 0.55 | 1.92 | 6 | 4 | 0.7% | 0.53 | 0.89 |
| UM Cu% | 459 | 11.17 | 0.77 | 1.78 | 4 | 12 | 2.5% | 0.69 | 1.41 |
| UM Zn% | 459 | 32.40 | 0.97 | 3.24 | 20 | 4 | 0.8% | 0.92 | 2.97 |
| LM Sn% | 16,551 | 57.00 | 2.01 | 1.69 | 20 | 83 | 0.5% | 1.97 | 1.55 |

**Figure 14.5 Histograms of Sn Assays in Upper Mine Resource Wireframes**



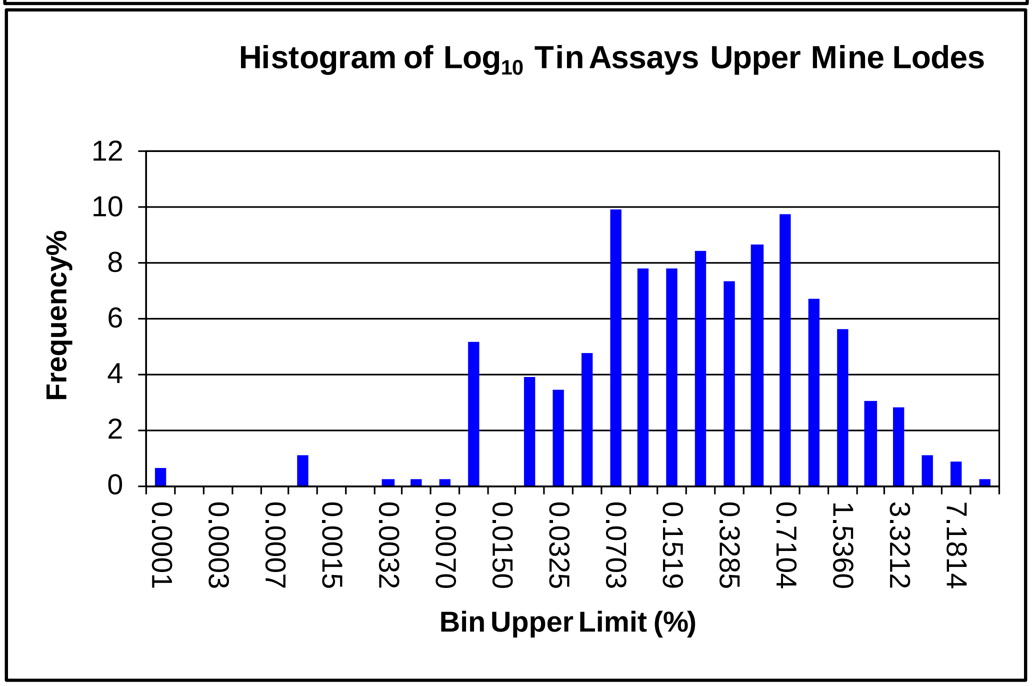
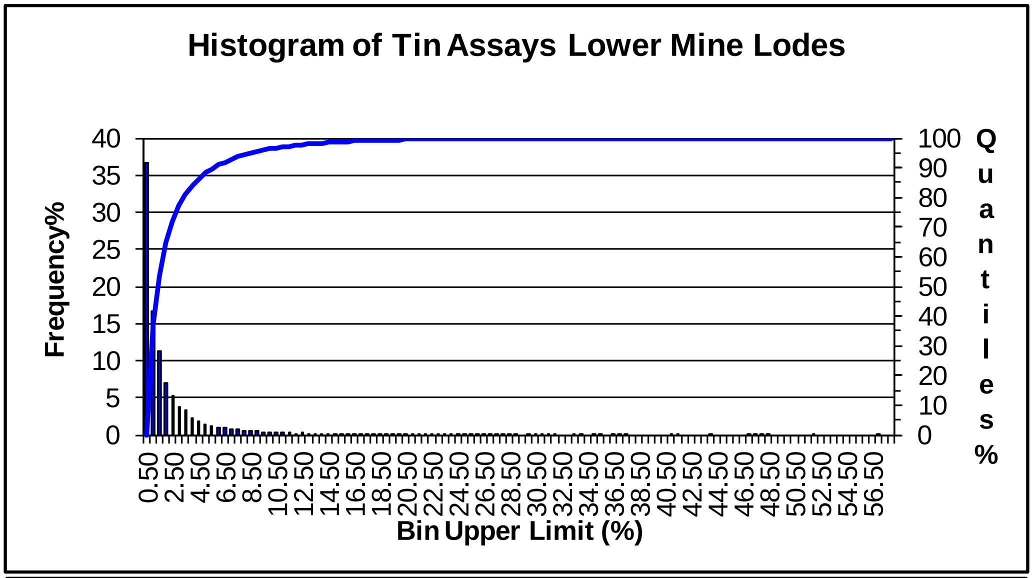



**Figure 14.6 Histograms of Sn Assays in Lower Mine Resource Wireframes**



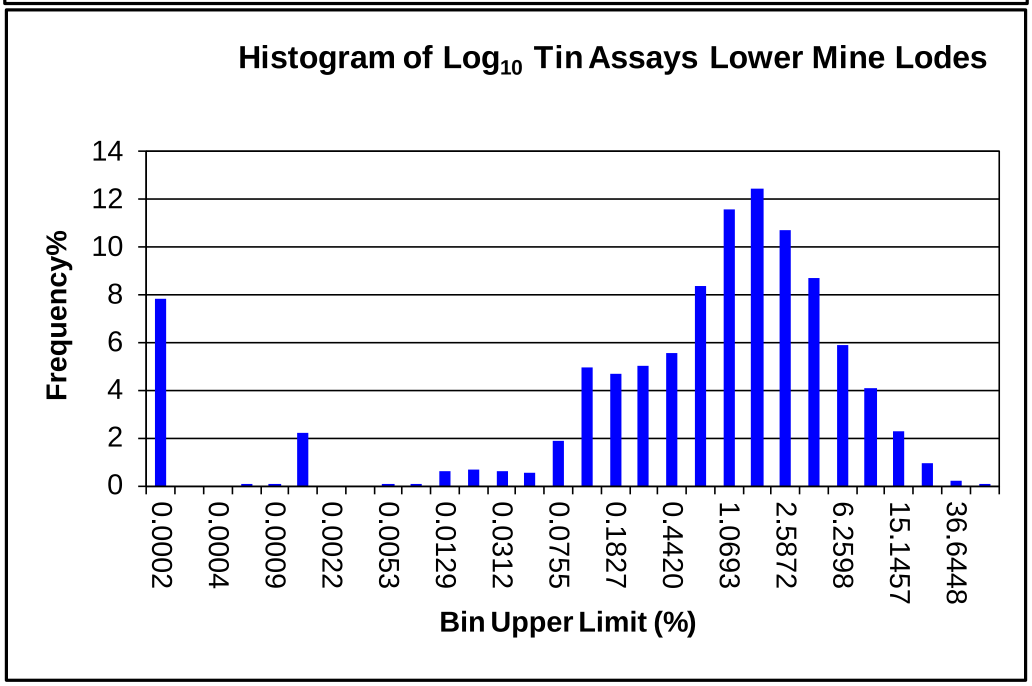



**Figure 14.7 Log-Probability Plot for All Sn Assays in Lower Mine Wireframes**

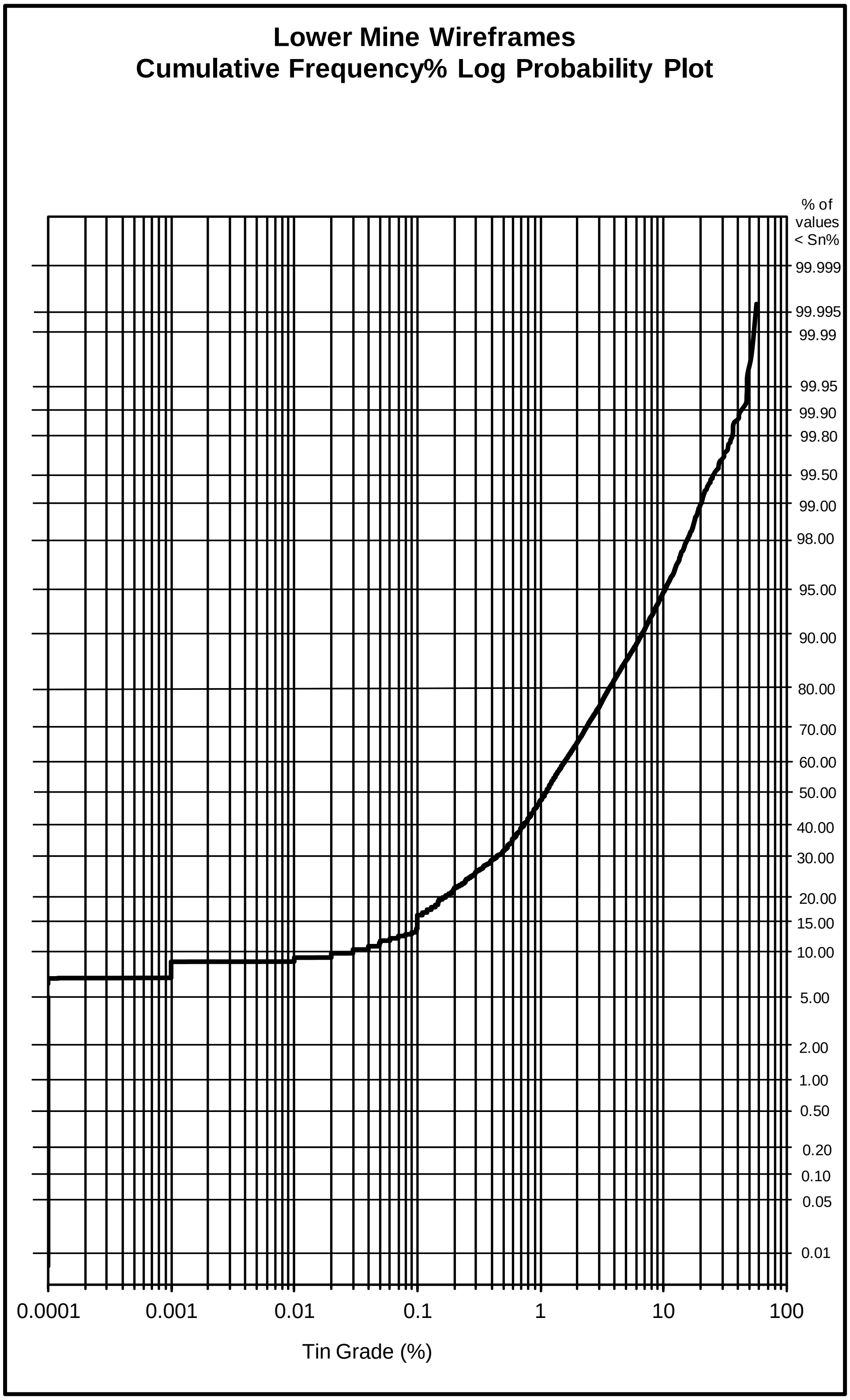


**Figure 14.8 Log-Probability Plot for All Sn Assays in Upper Mine Wireframes**

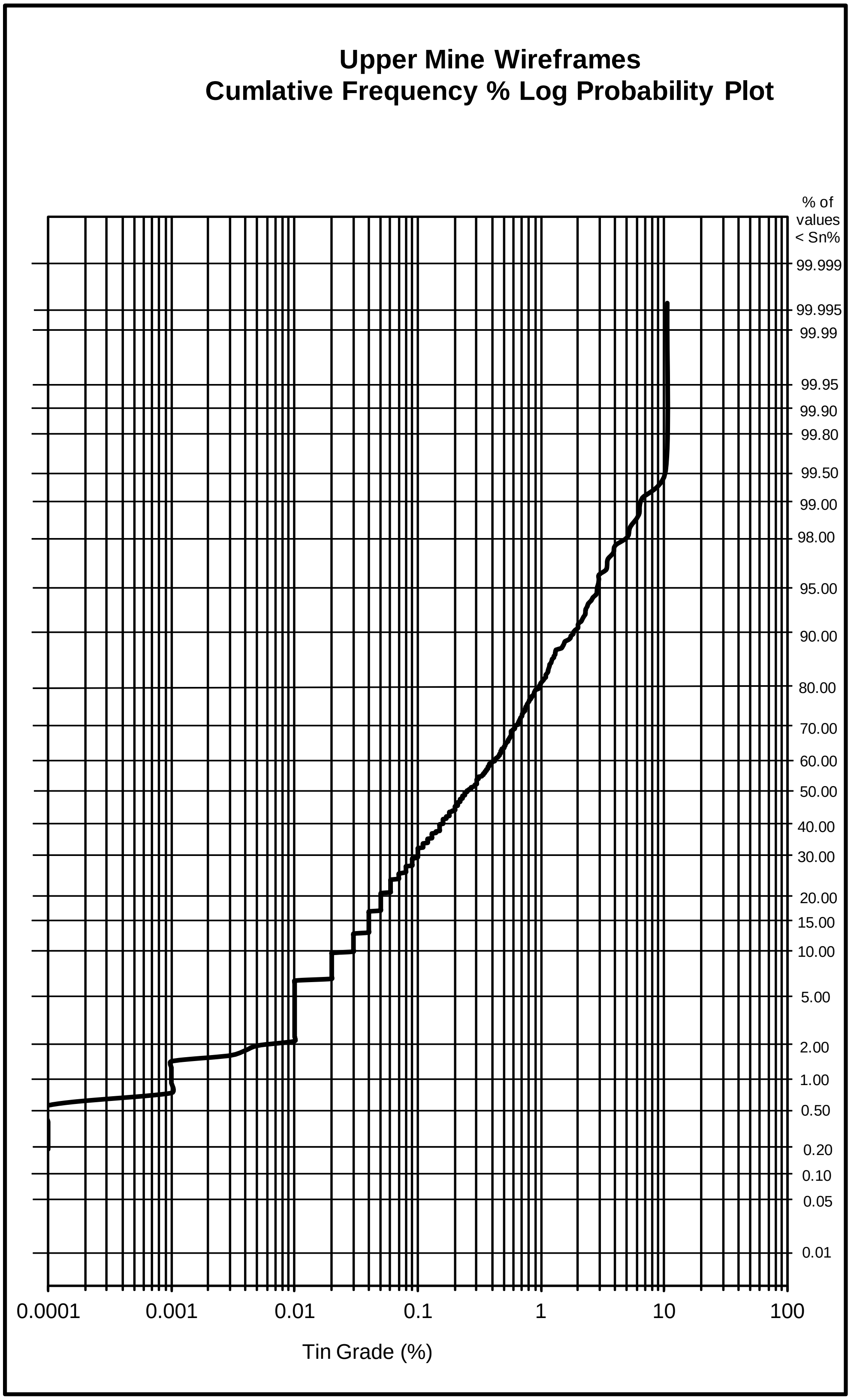


**Figure 14.9 Log-Probability Plot for All Cu Assays in Upper Mine Wireframes**

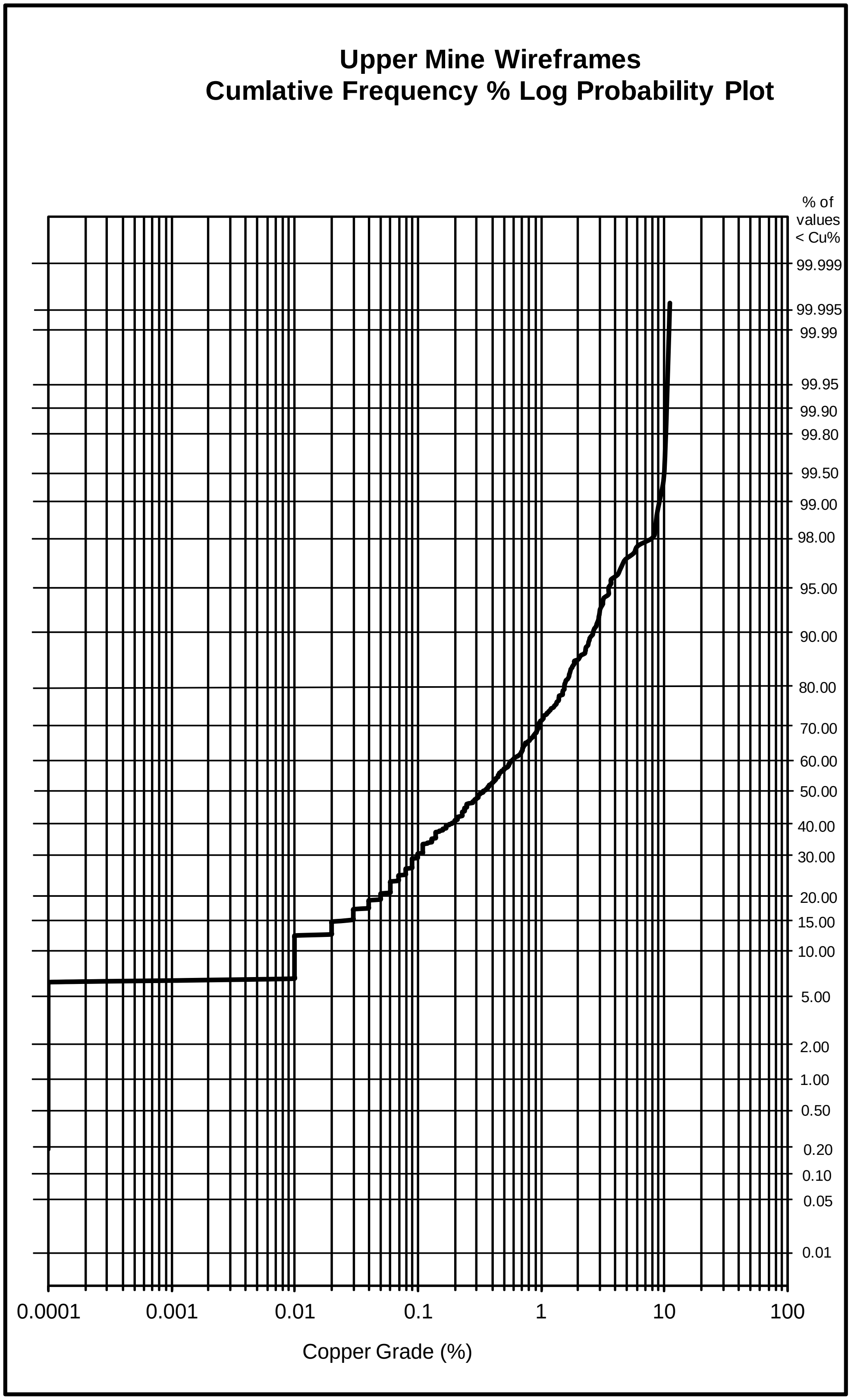


**Figure 14.10 Log-Probability Plot for All Zn Assays in Upper Mine Wireframes**

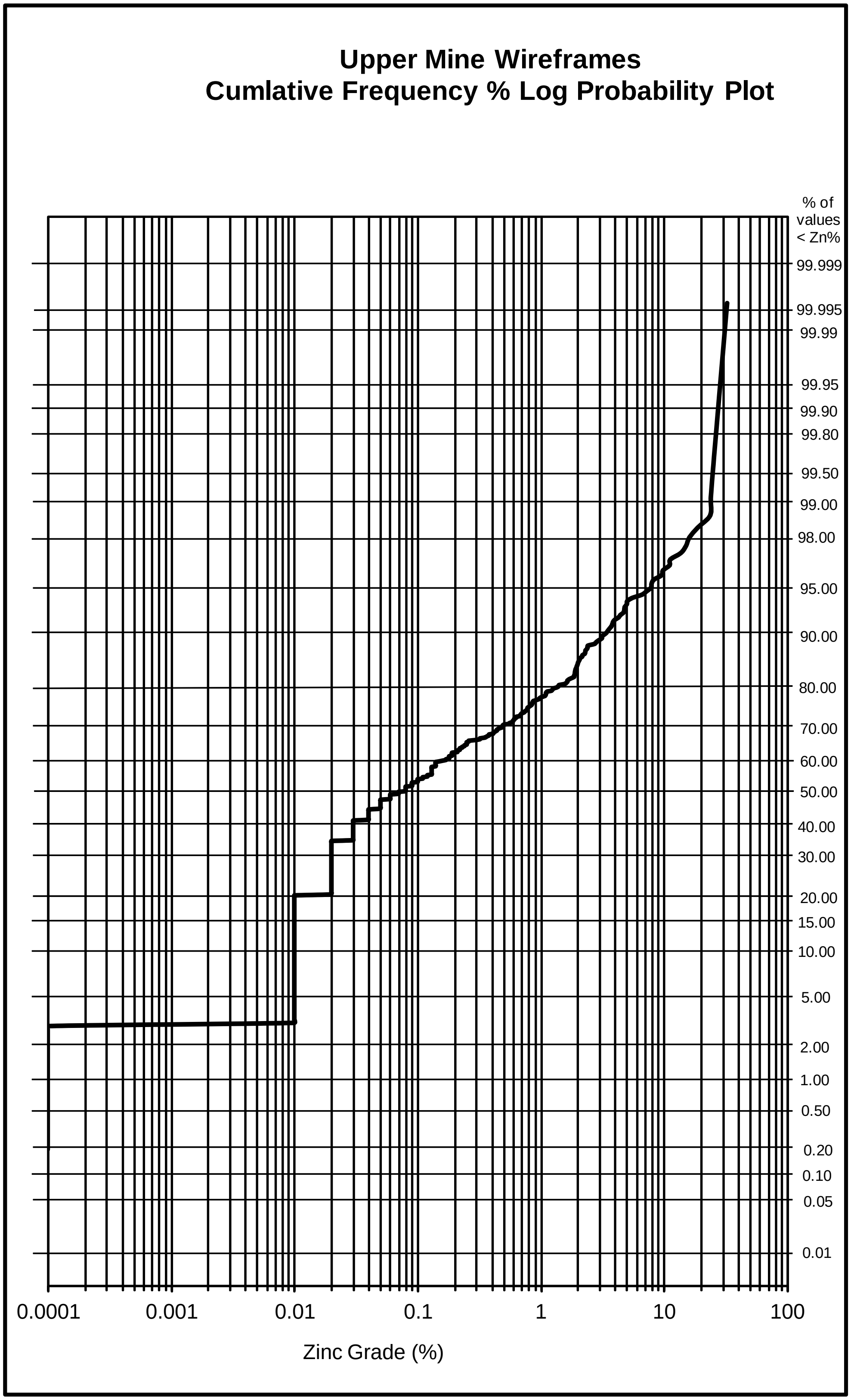
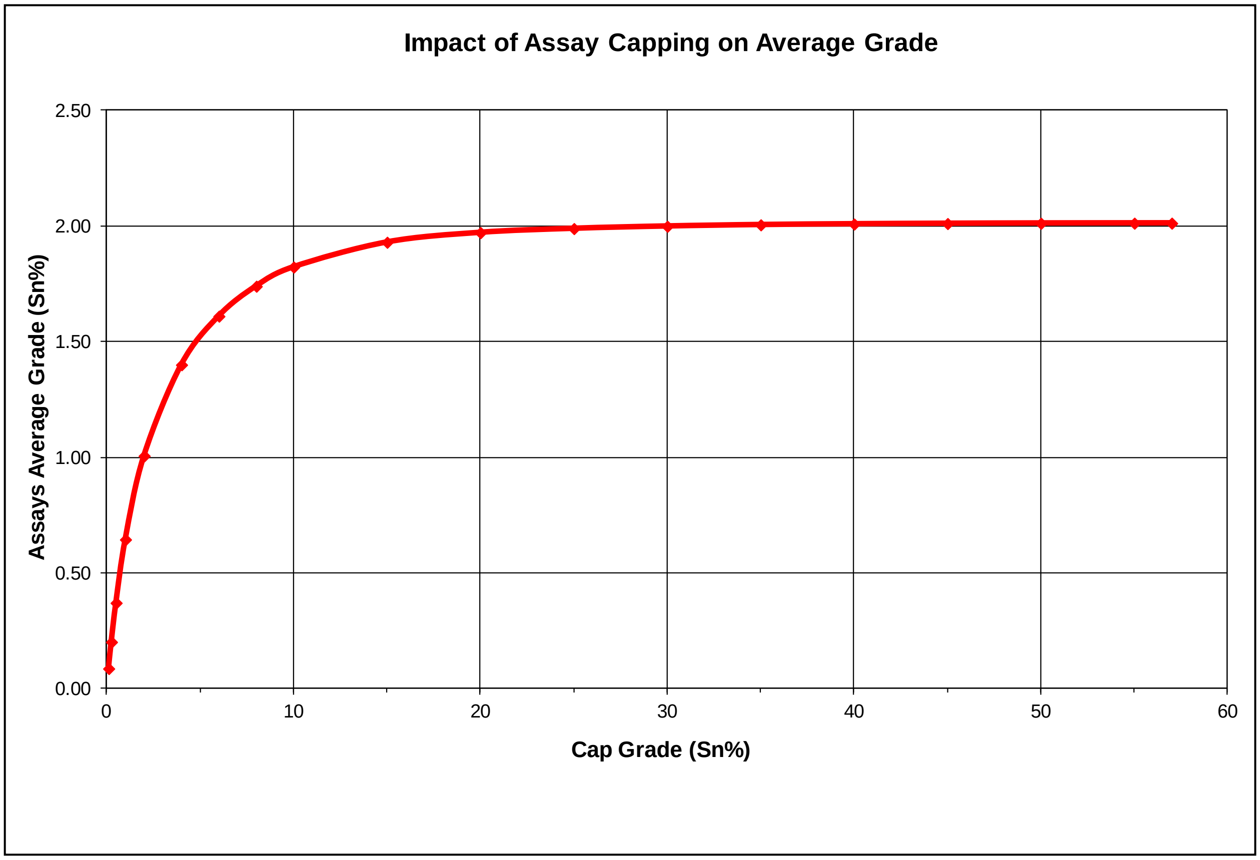


**Figure 14.11 Capping Lower Mine Wireframe Sn Assays**




## 14.7 ASSAY COMPOSITING

Assay composites were generated for the lode intercepts from the assays captured by GEMS software inside the mineralized wireframes. Channel samples located predominantly in the Lower Mine had composite length of 1.2 m dynamically adjusted in order that all composites in the intercept have the same length. This method ensured that the grade weighting was correctly applied for bulked out lode widths but results in variable composite lengths.

Compositing for drill holes was done down hole at 1.5 m consistent lengths. After a review for any grade bias, fragments of composites (tails) with lengths less than 0.3 m were discarded as representing mostly artifacts of wireframe intersection by GEMS.

## 14.8 BULK DENSITY

Historic bulk density for mining granite-hosted lodes was 2.77 t/m$^3$ (Owen et al. 1998). Water immersion bulk density testing was carried out on-site for 119 core samples. Two displacement methods for the determination of average rock bulk density and apparent relative bulk density were used with the average of the two recorded as input to estimations (Hogg, 2012). 24 NQ half core samples were taken from 2010 and 2011 drill holes and the balance of 95 core samples were taken from 2011-2012 holes. A varied number of samples were obtained from the Dolcoath South-South Branch, Dolcoath Flat, Dolcoath Middle, Dolcoath Main, Dolcoath South and Dolcoath South Entral lodes. Bulk density results ranged from 2.60 t/m$^3$ to 4.57 t/m$^3$ and averaged 3.09 t/m$^3$ indicating a higher bulk density for the killas hosted mineralization at Dolcoath. To convert block model volumes to tonnes, P&E used a 2.77 t/m$^3$ bulk density for the deep, granite-hosted lodes and 3.0 $t/m^3$ for the killas-hosted Sn-Cu-Zn bearing lodes at Dolcoath. The granite-killas contact was modelled from recent drilling and used to build the bulk density block model.

## 14.9 VARIOGRAPHY AND GRADE INTERPOLATION SEARCH STRATEGY

P&E prepared variance normalized semi-variograms for assay composites prepared from assays within the mineral resource wireframes. Linear down hole variography shows a low nugget effect for Sn, Cu and Zn and supports the use of $ID^3$ interpolation.

3D variography to guide search ellipse strategy utilized omni and tighter vector variograms for all or selected lodes with sufficient samples to support semi-variograms. In the Upper Mine, 3D copper variography indicated strike (X) ranges of 27 m to 43 m and dip (Y) ranges of 7 m to 41 m. Zinc variograms indicated strike ranges of 9 m to 48 m but dip variograms were not robust. Tin variography indicated strike ranges of 4 m to 26 m and dip ranges of 7 m to 55 m. Examination of the drill intercept spacings in the Upper Mine lodes indicated that these ranges were exceeded in a number of lodes, and in order to capture samples, the initial search ellipse had to be expanded to X= 55 m and Y= 65 m.

Variography for the Lower Mine was based on the No. 4 and Roskear A lodes channel/bazooka composites and was robust for strike with ranges of 5 m to 21 m and dips at 8 m to 38 m. A steep plunge to the SW was noted from the wireframe trends on inclined plane and the search ellipse axis on dip was rotated 12° off vertical to match this trend. This latter rotation was not applied to lodes without evidence of plunge. The initial search ellipse axes for the Lower Mine were standardized at X=21 m and Y =38 m. The Y distance ensured the capture of channel samples from up to three levels.

Whilst generalized interpolation search distances were applied to all lodes in each of the Upper or Lower Mines, the orientation of the searches were matched to that of each lode.

## 14.10 BLOCK MODEL

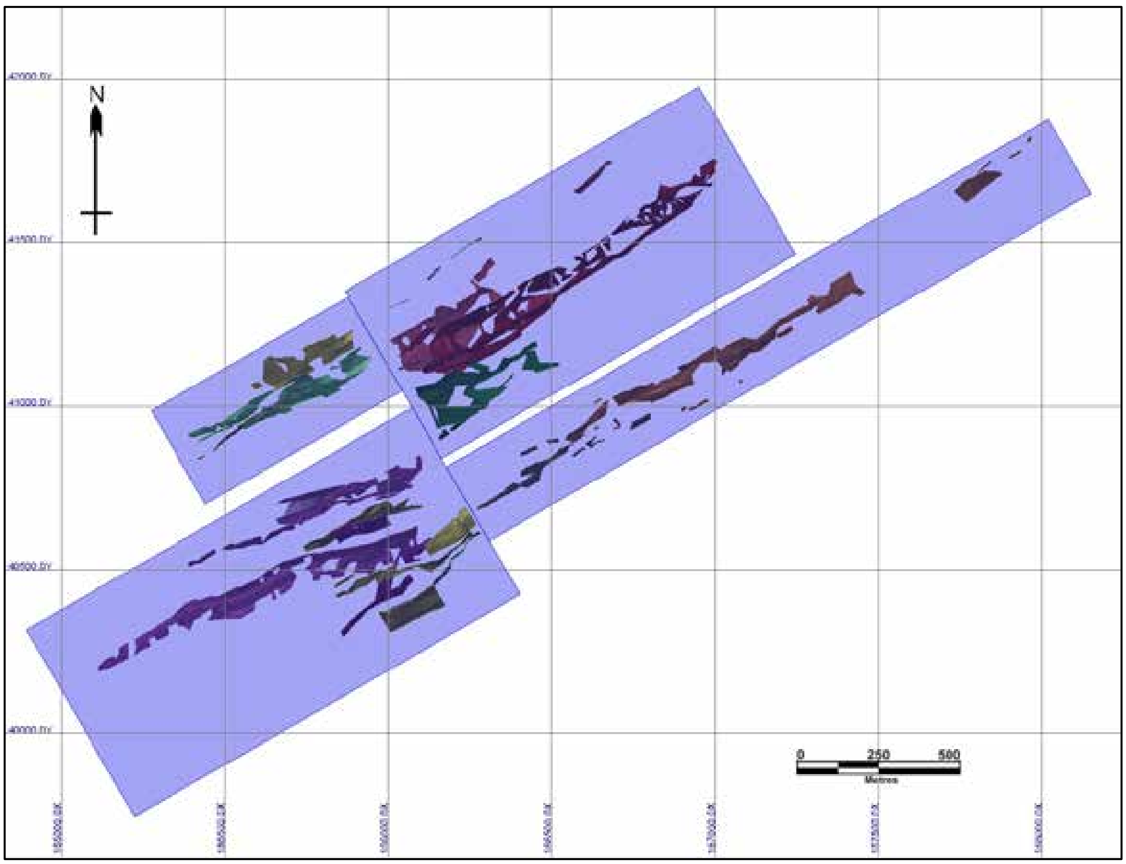
Four block models were created to encompass the various lode areas: Dolcoath, Roskear, No.4-No.8-No.2-Providence; and Pryces-Tincroft. Partial block models or folders were created for Dolcoath, Roskear and Pryces-Tincroft block models because lode wireframes all have unique rock codes and the proximity of some of the lode wireframes results in a sharing of common blocks. The Mineral Resource block models' X axes are rotated to 60° azimuth (30° in GEMS convention). Block sizes are 5 m x 15 m x 5 m vertical. Block model origins were set in order that block centroids maintain a continuum in coordinates from block model to block model which will facilitate merging the models in the future.

The origins of the block models are listed in Table 14.9 and the plan view of the block model areas is shown in Figure 14.12.

**TABLE 14.9**
**BLOCK MODEL ORIGINS**

| | Dolcoath Model | Roskear Model | No.2-No.4-No.8-Providence | Pryces-Tincroft |
|---|---|---|---|---|
| X (Column) | 165,225 | 165,440.907 | 166,162.795 | 166,308.295 |
| Y (Row) | 39,744 | 40,700.038 | 40,839.692 | 40,587.679 |
| Z (Level) | 2,100 | 1,525 | 1,800 | 1,800 |
| X No. Blocks | 272 | 139 | 250 | 425 |
| Y No. Blocks | 440 | 220 | 394 | 174 |
| Z No. Blocks | 170 | 52 | 120 | 94 |

**Figure 14.12 Plan View of Block Models**

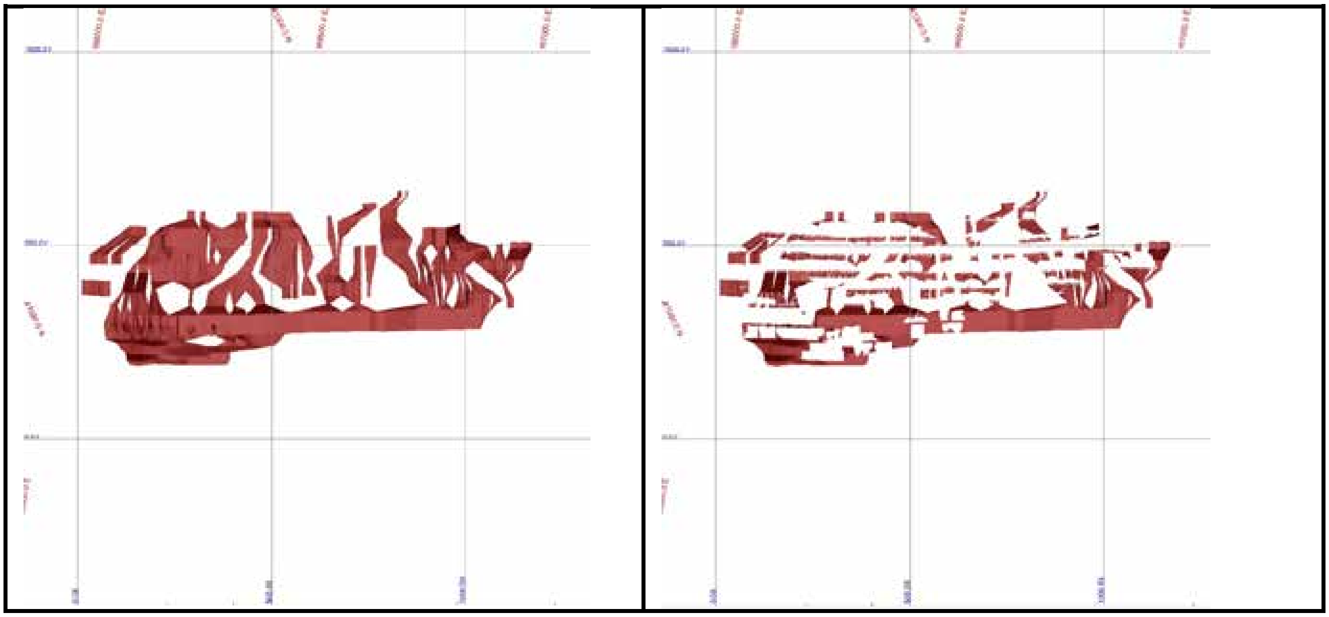



## 14.11 BLOCK MODEL GRADE INTERPOLATION

### 14.11.1 Depletion Models

Portions of the mineral wireframes developed by P&E at a 0.5% SnEq cut-off grade in the Lower Mine have been depleted by previous mining operations and were removed from the Mineral Resource Estimate block model. WUM provided 2D surfaces of the mined-out stopes and raises for each mined lode. The workings were digitized from mine records in SURPAC. P&E used, adapted, or re-digitized the WUM surfaces where necessary for validation in GEMS. The lode wireframes were clipped to produce post-mining wireframes for the Mineral Resource Estimate. The clipped wireframes were used for interpolation, volumetrics and reporting. An example of pre- and post depletion wireframes is presented in Figure14.13.

**Figure 14.13 Pre- and Post Depletion Wireframes at 0.5% Sn Cut-Off**



### 14.11.2 Search Strategy and Grade Interpolation

The composites intended for grade interpolation were extracted from the non-depleted (clipped) wireframes coded for the interpolation profiles in GEMS. Inverse distance grade interpolation was carried out using multiple expanding search distances in search ellipses oriented to lode strikes and dips. The Lower Mine was interpolated for Sn, whereas the Upper Mine was interpolated for Sn, Cu and Zn. The interpolation ellipse orientations were set in GEMS format ZXZ which is with respect to the block model axes and facilitated optimizing the search orientations for the 59 wireframes. $ID^3$ was utilized for all wireframes except for the Upper Mine Dolcoath lodes Middle Branch, Little North East and South Entral where $ID^4$ was used to control over-smoothing because of the irregular or tight drill intercept spacing.

Table 14.10 illustrates the search and grade interpolation strategy.

| TABLE 14.10<br>GRADE INTERPOLATION SEARCH CRITERIA | | | |
|---|---|---|---|
| **Search Axis** | **Pass 1** | **Pass 2** | **Pass 3** |
| **Upper Mine** | | | |
| X (m) | 55 | 110 | 156 |
| Y (m) | 65 | 130 | 195 |
| Z (m) | 10 | 20 | 30 |
| **Lower Mine** | | | |
| X (m) | 20 | 40 | 100 |
| Y (m) | 75 | 140 | 200 |
| Z (m) | 10 | 20 | 30 |

For interpolation Passes 1 and 2, the minimum/maximum number of composites used for interpolation were 2/12, whereas 1/12 was used for Pass 3 which was designed to populate grades in all remaining blocks in the wireframes.

Interpolated grades were saved in their respective grade attribute models together with estimation criteria such as number of composites and holes used for the estimate, minimum distance from the composites to the block centroid, and interpolation pass number.

SnEq% in the block model is converted from interpolated block Sn, Cu and Zn grades where SnEq% = Sn% + (Cu% x 0.311) + (Zn% x 0.084) as discussed previously. The partial block models were merged by weighting based on block percentages and bulk density into standard block models for mineral resource reporting by SnEq% cut-off.

## 14.12 MINERAL RESOURCE CLASSIFICATION

In P&E's opinion, the level of recent sampling, assaying and exploration work completed and historic mining, exploration and sampling to 1998 is sufficient to indicate that the South Crofty Project Sn, Cu, Zn deposits have the size and grades to indicate reasonable potential for economic extraction and thus qualify the estimated resources as Mineral Resources under CIM definition standards.

International regulator's codes including the Canadian National Instrument 43-101/CIM (Canada) and the JORC (Australia) require that the following aspects be considered when developing a classification scheme:

- Continuity of geological features (lithology, structure, alteration, etc)
- Continuity of the mineralization and grades
- Variogram models and their related ranges
- Statistics of the grade population
- Tonnage factor
- Distance between sample points (drilling density)
- Sampling and data quantity and quality/and integrity (QA/QC)
- Economic, legal, environmental and technical perspectives of extraction
- Type and scale of an appropriate mining operation
- Recovery and other metallurgical considerations
- Cut-off grade analysis
- Mining rights and permitting.

Mineral Resources were classified as Indicated and Inferred based on completeness of channel sampling (levels above/below, raises), the drill hole spacing, confidence in the assaying for drilling, and geologic confidence in grade continuity. The Indicated and Inferred Mineral Resource Estimate for the Lower Mine includes pillars and sills, some of which may not be recoverable pending a future engineering study.

The Mineral Resource Estimates were categorized as follows:

**Lower Mine**

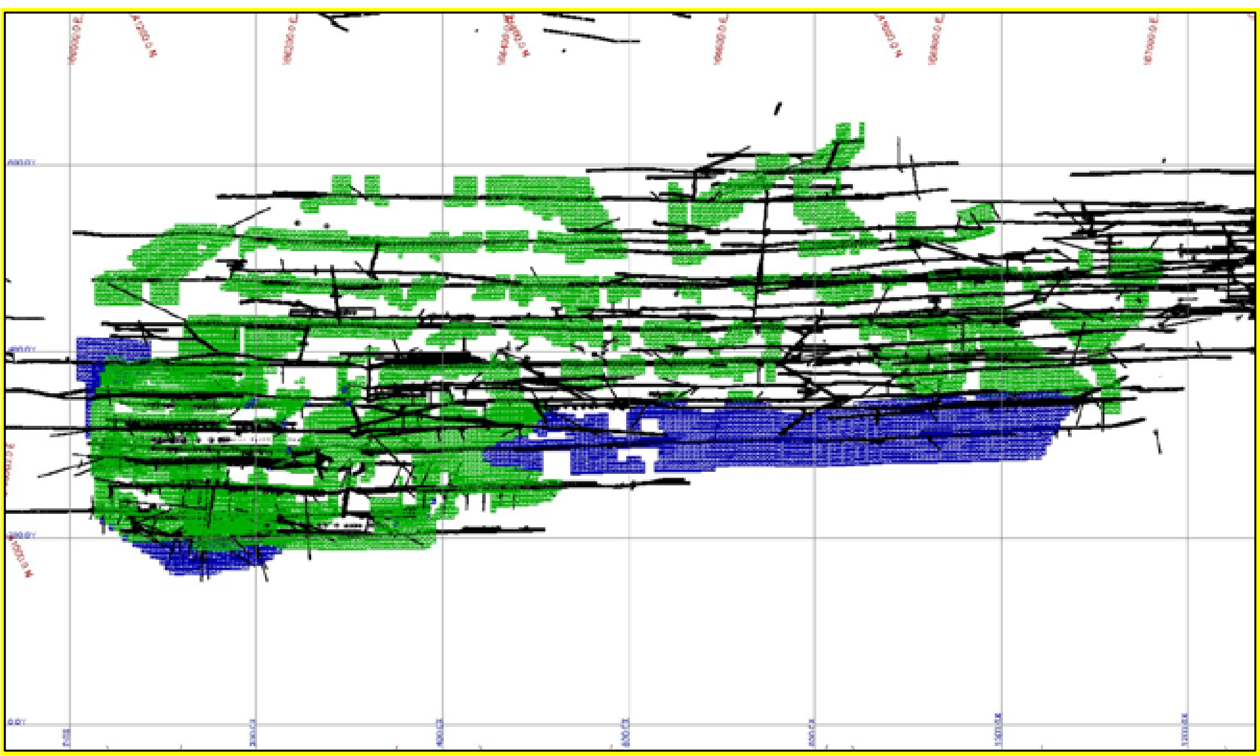
- **Indicated Mineral Resources:** Resource blocks which lie in the underground developed areas supported by channel sampling and wall drilling on two levels and within 25 m of the levels.
- **Inferred Mineral Resources:** Resource blocks which lie in the underground developed areas supported by channel sampling and wall drilling on one level and within 25 m of the level. Resource blocks interpolated primarily from exploration drill holes which for the most part are widely or irregularly spaced and for which down hole surveys are generally lacking.

**Upper Mine**

- **Indicated Mineral Resources:** Resources based on a regular drill hole spacing of 30 m to 40 m.
- **Inferred Mineral Resources:** Resources drilled at wider spacing than Indicated and intersected by a least three holes.

The distribution of Indicated and Inferred Mineral Resource blocks is illustrated for No. 4 lode in Figure 14.14.

**Figure 14.14 Distribution of Indicated and Inferred Resources for No. 4 Lode**



Colour Key: Indicated Resource (green) Inferred Resource (blue)

## 14.13 MINERAL RESOURCE REPORTING

Table 14.11 summarizes the South Crofty Project Indicated and Inferred Mineral Resource Estimates at a cut-off grade of 0.6% SnEq.

The Indicated Mineral Resource Estimate at a 0.6% SnEq block cut-off grade is 1.92 million tonnes averaging 1.70% SnEq. The Inferred Mineral Resource Estimate at a 0.6% SnEq block cut-off grade is 1.20 million tonnes averaging 1.52% SnEq.

**TABLE 14.11**
**SOUTH CROFTY MINERAL RESOURCE ESTIMATE AT 0.6% SNEQ CUT-OFF(1-12)**

| Lode/Mine | Indicated | | Inferred | |
|---|---|---|---|---|
| | Tonnes (k) | SnEq % | Tonnes (k) | SnEq % |
| **Lower Mine Lodes Sn%** | | | | |
| No. 4 | 452 | 2.04 | 225 | 2.19 |
| No. 2 | 180 | 1.63 | 13 | 1.12 |
| No. 8 | 127 | 1.72 | 34 | 2.33 |
| No.2-NCK | 53 | 2.18 | - | - |
| Providence | - | - | 28 | 2.37 |
| Roskear A | 28 | 2.15 | 50 | 2.15 |
| Roskear B | 90 | 1.93 | 70 | 1.85 |
| Roskear BHW | 24 | 1.77 | - | - |
| Pryces/Tincroft | 298 | 1.67 | 74 | 2.24 |
| Dolcoath South | 226 | 1.67 | 108 | 1.50 |
| Dolcoath South Branch | 38 | 1.56 | 5 | 2.07 |
| Dolcoath North | 144 | 1.55 | 47 | 1.57 |
| Dolcoath North HW | - | - | 14 | 0.88 |
| Dolcoath North FW | - | - | 70 | 1.36 |
| **Subtotal Lower Mine** | **1,660** | **1.81** | **738** | **1.91** |
| **Upper Mine Lodes SnEq%** | | | | |
| Dolcoath Middle | 89 | 1.01 | 22 | 0.77 |
| Dolcoath Middle Branch (ID4) | 36 | 1.00 | - | - |
| Dolcoath Upper Main | - | - | 274 | 0.81 |
| Dolcoath Upper South South Branch | - | - | 86 | .86 |
| Dolcoath NVC | - | - | 35 | 1.11 |
| Dolcoath Little NW | 11 | 0.82 | - | - |
| Dolcoath Little NW FW | - | - | 1 | 0.86 |
| Dolcoath Little NE (ID4) | - | - | 46 | 1.44 |
| Dolcoath S. Entral (ID4) | 121 | 0.98 | - | - |
| **Subtotal Lower and Upper Mine** | **257** | **0.99** | **464** | **0.91** |
| **Grand Total Lower and Upper Mine** | **1,917** | **1.70** | **1,202** | **1.52** |

*(1) CIM definitions were followed for the Mineral Resource Estimate.*
*(2) The Qualified Persons for this Mineral Resource Estimate are: Richard Routledge, M.Sc. (Applied), P.Geo. and Eugene Puritch, P.Eng. of P&E Mining Consultants Inc.*
*(3) Mineral Resources are estimated by conventional 3D block modelling based on wireframing at a 0.50% SnEq cut-off grade and inverse distance to the power of 3 grade interpolation. The 0.5% SnEq cut-off for wireframing vs 0.6% SnEq cut-off for resource reporting is due to a shift to lower Sn prices between the commencement and finalization of this report.*
*(4) SnEq is calculated using the formula: %SnEq = Sn% + (Cu% x 0.311) + (Zn% x 0.084).*
*(5) For the purpose of this Mineral Resource Estimate, assays were capped at 20% Sn for the Lower Mine and 6% for Sn, 4% for Cu and 20% for Zn for the Upper Mine.*
*(6) The 0.6% SnEq resource cut-off grade was derived from the approximate March 31, 2016 two year LME trailing average Sn price of US$8.50/lb, Cu price of US$2.75/lb, and Zn price of US$0.90/lb, 88.5%, 85% and 70% respective process recoveries, smelter payable of 95% and Sn refining charges of US$0.25.lb. Operating costs used were US$55/t mining, US$27/t processing and US$9/t G&A.*

(7) *Bulk densities of 2.77 t/m³ and 3.00 t/m³ have been applied for volume to tonnes conversion for the Lower and Upper Mine, respectively.*
(8) *Mineral Resources are estimated from near surface to a depth of approximately 869 m.*
(9) *Mineral Resources are classified as Indicated and Inferred based on drill hole and channel sample distribution and density, interpreted geologic continuity and quality of data.*
(10) *The Mineral Resources have been depleted for past mining, however, they contain portions that may not be recoverable pending a future engineering study.*
(11) *Mineral Resources which are not Mineral Reserves do not have demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues. There is no certainty that all or any part of the Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration.*
(12) *Figures in table are rounded and may not sum exactly.*

Table 14.12 summarizes the Indicated and Inferred Mineral Resource Estimates for the three metals estimated in the Upper Mine at a cut-off grade of 0.6% SnEq.

**TABLE 14.12**
**UPPER MINE MINERAL RESOURCE ESTIMATE AT 0.6% SNEQ CUT-OFF(1-12)**

| **Indicated** | | | | | |
|---|---|---|---|---|---|
| **Lode** | **Tonnes (k)** | **Sn %** | **Cu %** | **Zn %** | **SnEq %** |
| Dolcoath Middle | 89 | 0.72 | 0.88 | 0.15 | 1.01 |
| Dolcoath Middle Branch | 36 | 0.90 | 0.33 | 0.02 | 1.00 |
| Dolcoath Little NW | 11 | 0.71 | 0.16 | 0.82 | 0.83 |
| Dolcoath S. Entral | 121 | 0.62 | 0.92 | 1.04 | 0.99 |
| | | | | | |
| **Total Indicated** | **257** | **0.70** | **0.79** | **0.58** | **0.99** |
| **Inferred** | | | | | |
| **Lode** | **Tonnes (k)** | **Sn %** | **Cu %** | **Zn %** | **SnEq %** |
| Dolcoath Middle | 22 | 0.75 | 0.05 | 0.01 | 0.77 |
| Dolcoath Upper Main | 274 | 0.61 | 0.59 | 0.22 | 0.82 |
| Dolcoath Upper S. Branch | 86 | 0.50 | 0.73 | 1.84 | 0.88 |
| Dolcoath NVC | 35 | 0.76 | 1.09 | 0.14 | 1.11 |
| Dolcoath Little NW FW | 1 | 0.84 | 0.03 | 0.25 | 0.87 |
| Dolcoath Little NE | 46 | 1.17 | 0.55 | 1.41 | 1.46 |
| | | | | | |
| **Total Inferred** | **464** | **0.67** | **0.62** | **0.63** | **0.91** |

(1) *CIM definitions were followed for the Mineral Resource Estimate.*
(2) *The Qualified Persons for this Mineral Resource Estimate are: Richard Routledge, M.Sc. (Applied), P.Geo. and Eugene Puritch, P.Eng. of P&E Mining Consultants Inc.*
(3) *Mineral Resources are estimated by conventional 3D block modelling based on wireframing at a 0.50% SnEq cut-off grade and inverse distance to the power of 3 grade interpolation. The 0.5% SnEq cut-off for wireframing vs 0.6% SnEq cut-off for resource reporting is due to a shift to lower Sn prices between the commencement and finalization of this report.*
(4) *SnEq is calculated using the formula: %SnEq = Sn% + (Cu% x 0.311) + (Zn% x 0.084).*
(5) *For the purpose of this Mineral Resource Estimate, assays were capped at 20% Sn for the Lower Mine and 6% for Sn, 4% for Cu and 20% for Zn for the Upper Mine.*
(6) *The 0.6% SnEq Mineral Resource cut-off grade was derived from the approximate March 31, 2016 two year LME trailing average Sn price of US$8.50/lb, Cu price of US$2.75/lb, and Zn price of US$0.90/lb, 88.5%, 85% and 70% respective process recoveries, smelter payable of 95% and Sn refining charges of US$0.25.lb. Operating costs used were US$55/t mining, US$27/t processing and US$9/t G&A.*
(7) *Bulk densities of 2.77 tonnes/m³ and 3.00 tonnes/m³ have been applied for volume to tonnes conversion for the Lower and Upper Mine, respectively.*
(8) *Mineral Resources are estimated from near surface to a depth of approximately 869 m.*

*(9) Mineral Resources are classified as Indicated and Inferred based on drill hole and channel sample distribution and density, interpreted geologic continuity and quality of data.*
*(10) The Mineral Resources have been depleted for past mining, however, they contain portions that may not be recoverable pending a future engineering study.*
*(11) Mineral Resources which are not Mineral Reserves do not have demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues. There is no certainty that all or any part of the Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration.*
*(12) Figures in table are rounded and may not sum exactly.*

Table 14.13 summarizes the Indicated and Inferred Mineral Resource Estimate sensitivity for SnEq in the Upper Mine and Lower Mine above and below a cut-off grade of 0.6% SnEq.

**TABLE 14.13**
**MINERAL RESOURCE ESTIMATE SENSITIVITY TO SNEQ CUT-OFF**

| Lower Mine Sn Cut-Off | Indicated Tonnes (k) | Sn% | Inferred Tonnes (k) | Sn% |
|---|---|---|---|---|
| 0.70% | 1,545 | 1.89 | 699 | 1.98 |
| 0.65% | 1,601 | 1.85 | 719 | 1.94 |
| **0.60%** | **1,660** | **1.81** | **738** | **1.91** |
| 0.55% | 1,714 | 1.77 | 759 | 1.87 |
| 0.50% | 1,763 | 1.73 | 778 | 1.84 |
| | | | | |
| **Upper Mine SnEq Cut-Off** | **Indicated Tonnes (k)** | **SnEq%** | **Inferred Tonnes (k)** | **SnEq%** |
| 0.70% | 200 | 1.09 | 341 | 1.01 |
| 0.65% | 227 | 1.04 | 396 | 0.96 |
| **0.60%** | **257** | **0.99** | **464** | **0.91** |
| 0.55% | 293 | 0.94 | 536 | 0.87 |
| 0.50% | 328 | 0.90 | 631 | 0.82 |

## 14.14 BLOCK MODEL VALIDATION

### 14.14.1 Reconciliation

WUM informed P&E that historically, there were no annual mine reconciliations for resource/reserves models, mining and processing. WUM compiled past mine production data from monthly reports from 1998 to 1999 and annual Measured and Indicated resource statements over the same period for No. 8 lode and Roskear A, B, BHW lodes. Results are compared in Table 14.14.

| TABLE 14.14<br>RECONCILIATION | | | |
|---|---|---|---|
| **Lode** | **Tonnes** | **Sn%** | **Tonnes Contained Sn** |
| No. 8 Resources (1983-1998) | 140,615 | 2.29 | 3,222 |
| No. 8 Trammed (1989-1998) | 230,186 | 1.69 | 3,890 |
| Variance | 89,571 | -0.60 | 668 |
| Variance% | 64% | -60% | 21% |
| | | | |
| Roskear A Resources (1989-1998) | 64,775 | 2.29 | 1,485 |
| Trammed (1989-1998) | 140,850 | 1.80 | 2,530 |
| Variance | 76,075 | -0.49 | 1,045 |
| Variance% | 117% | -21% | 70% |
| | | | |
| Roskear B, BHW, D Resources (1989-1998) | 258,708 | 1.78 | 4,606 |
| Trammed (1989-1998) | 462,678 | 1.58 | 7,291 |
| Variance | 203,970 | -0.20 | 2,685 |
| Variance% | 79% | -11% | 58% |

***Source:*** *Reynolds (2015)*

From Table 14.14 it is apparent that the Roskear and No. 8 operations were producing more tonnes by 64% to 117% and metal by 21% to 70% than estimated in the undiluted resources but at a lower grade of -21% to -60% versus resources. The loss in grade, if from dilution only, indicates only 13% to 36% dilution which would be expected for narrow lode shrinkage to longhole mining, but this small grade dilution does not account for the higher production in tonnes. Clearly resource estimation in terms of grade has performed reasonably well in the historic operations and the supporting assay data must have been reasonably reliable despite the lack of CIM post-1998-implementated rigorous QA/QC programs for exploration.

### 14.14.2 Block Model

The block model was validated using a number of industry standard methods including visual and statistical methods, and internal peer review.

Visual examinations of composite and block grades were made on plans and sections on-screen and review of the reasonableness of estimation parameters, including:

- Number of composites used for estimation
- Number of holes/channels used for estimation
- Distance to the nearest composite
- Number of passes used to estimate grade.

Verification of GEMS-reported mineral resource volumes was achieved by comparison to wireframe volumes. GEMS reports resources using the percent models or solids models. As part of the validation, the global estimates for several percent models and solids models were compared and found to differ by less than 1%.

Comparisons of the $ID^3$ model to the NN model were made for tin on a global basis for each lode or grouped lode in the case Pryces and Tincroft. The estimate generally agreed to within 10%, which is acceptable. Where outside this range for NN, good agreement was found with composites or averaged intercepts.

## 14.15 RESOURCE ESTIMATION CONCLUSIONS

Although there are minor uncertainties in the historic channel sampling and drilling, and a lack of QA/QC done to current standards, it is P&E's opinion that based on the high sampling density, availability of historic records to check, the evidence of check sampling done in the past and the due diligence in verifying the sampling data by WUM and P&E, that a portion of the Lower Mine resources may be categorized as Indicated Resource.

P&E believes that this Mineral Resource Estimate has no fatal flaws, is reasonable and has been carried out according to industry standard practice.

## 14.16 RECOMMENDATIONS

P&E recommends fill-in drilling to upgrade a portion of the Inferred Resources to Indicated Resources as a basis for Prefeasibility or Feasibility Study and Mineral Reserve estimation. A preliminary diamond drilling campaign of 26,500 m is proposed to upgrade approximately 800,000 tonnes of mineral resources in No. 2 and Dolcoath South lodes in the Lower Mine and Dolcoath Upper Main and Upper South South Branch lodes in the Upper Mine. These resources represent more than half of the Inferred Resources. The campaign assumes access from surface or upper level workings and controlled drilling of wedged holes off pilot holes. P&E estimates preliminary costs for the drill program at US$5.3 million.

## 15.0 MINERAL RESERVE ESTIMATES

This section is not applicable to this report.

## 16.0 MINING METHODS

### 16.1 INTRODUCTION

Mine development will be carried out using trackless rubber tired equipment utilizing ramps and horizontal accesses from the New Cook's Kitchen Shaft ("NCK shaft"). Existing shafts in the South Crofty Mine will be accessed by the development and will be deepened where necessary for ventilation and manways. The NCK shaft will be the main production shaft after refurbishment once new winder (hoist) components and conveyances are installed and commissioned.

It is envisioned that a new rock handling system will be established by including a primary crusher, mineralized material-pass bin and grizzly at the truck/conveyor dump. The old loading area will be refurbished and re-introduced into the rock transfer circuit. This will require the installation of two new measuring pockets, new loadout conveyor, short transfer conveyor below the primary crusher, vibratory feeder, primary crusher, mineralized material bin evacuation feeder, new mineralized material bin (approximate capacity for four hours of hoisting), and rock grizzly at the top of the mineralized material bin.

Rock transfer below the loading pocket level will be done via an inclined refurbished conveyor drift with a new conveyor system installed. Any mined material produced and required to be transferred to the NCK shaft or below the conveyor bottom will be hauled using 20 t mining trucks and electric load-haul-dump ("LHD") units.

Mine material transfer from NCK shaft to the South Crofty process plant will be done via the 2,060 m level (40 fathom level) discharge station and Tuckingmill conveyor. At the 2,060 m level it is envisioned that the following must be installed and constructed; skip dump arrangement, rock storage bin, bottom feeder to discharge onto conveyor, and a conveyor approximately 590 m in length.

An isometric view of the proposed Dolcoath Mine Section underground layout is presented in Figure 16.1. The figure contains existing development (some of which must be rehabilitated), new development, new ramps between levels, and stoping blocks that are included in the mine production schedule.

A longitudinal view of the proposed Dolcoath Mine Section underground layout is presented in Figure 16.2.

## Figure 16.1 Isometric View of the Dolcoath Mine Section Underground Layout

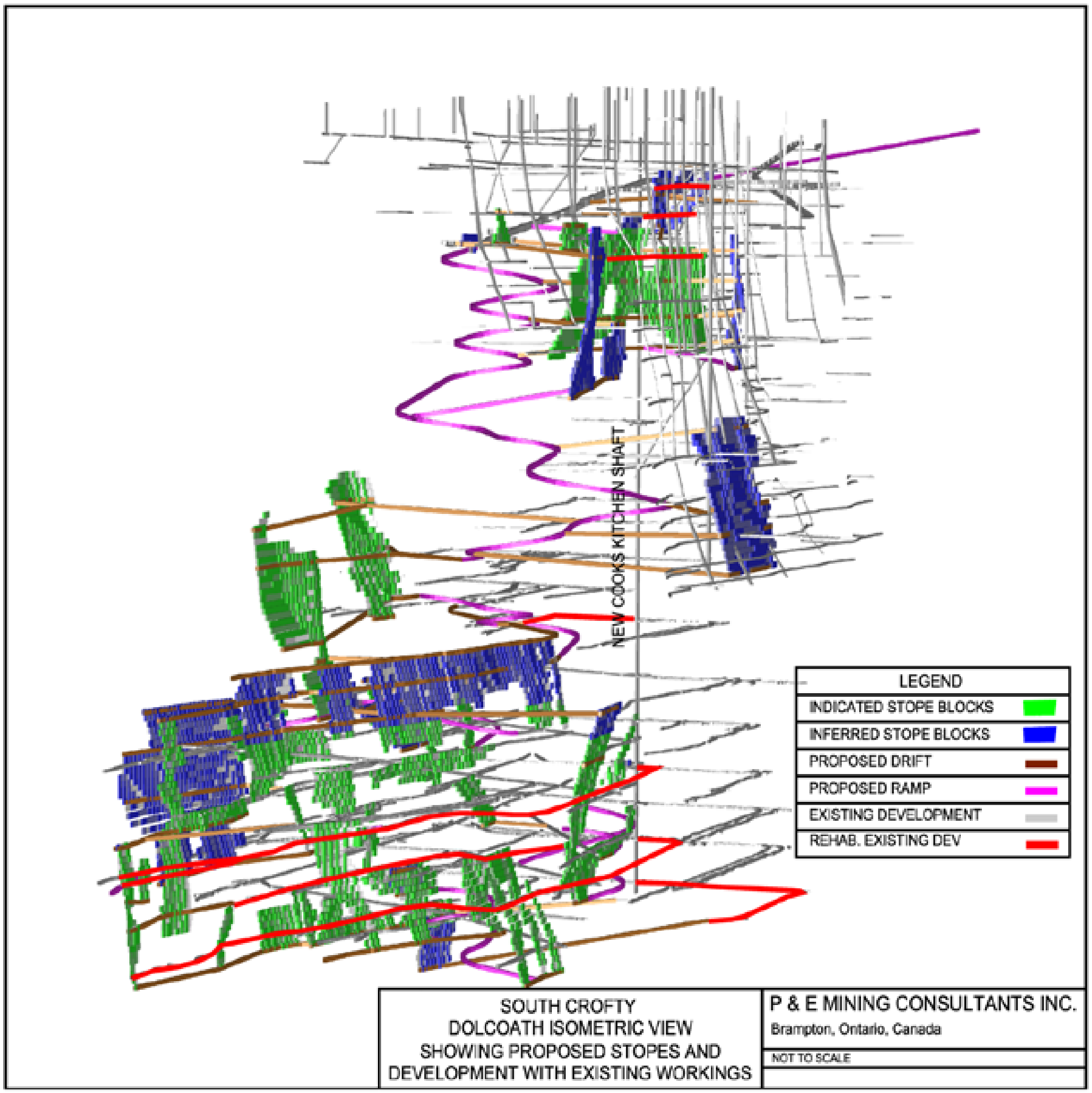
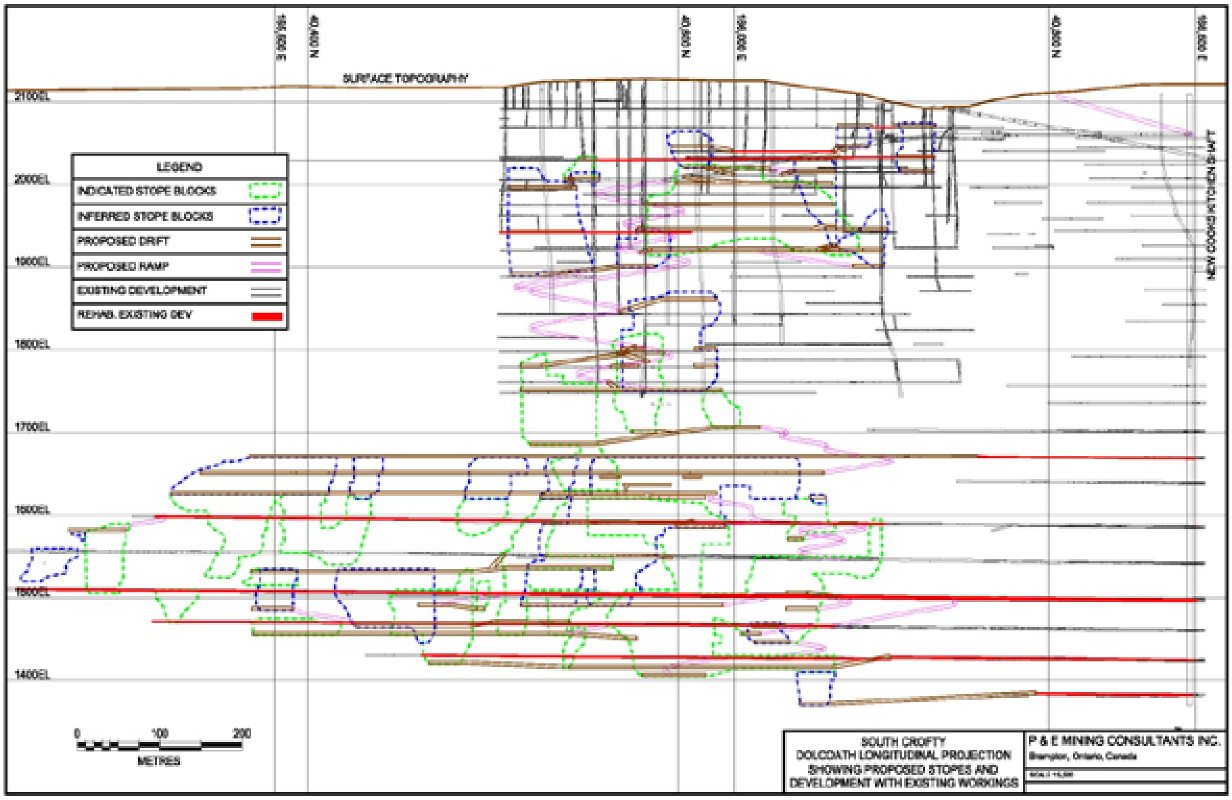


**Figure 16.2 Longitudinal View of the Dolcoath Mine Section Underground Layout**




The underground mine production has been scheduled at a steady-state rate of 1,000 tpd on a 7 day work schedule but could be scheduled at 1,200 tpd on a 6 day schedule. The NCK shaft hoisting facility will have the capacity to handle either level of production. The mine design layout and the mining method selection have been done at a PEA level and it is assumed that sublevel longhole stopes spaced at 30 m vertical level intervals is appropriate.

All mine and stope development will be undertaken by the Company workforce except where specialized skills are required such as shaft rehabilitation and dewatering, exploration diamond drilling and other specialized tasks that will be contracted out. Shaft operating, rock handling, hauling and all underground mechanical and electrical work will be by the Company. The Company will also provide overall mine management, supervision, and technical services support, such as mine planning, grade control, geotechnical, ventilation, pumping, geology, and surveying services.

## 16.2 DEWATERING

All water removed from the mine workings by mechanical pumping will pass through an onsite water treatment plant before being discharged to the Red River and out to the sea. An application for this discharge is planned in 2017 in order that the current permit to discharge water at a rate of 10,000 $m^3$/day from the mine workings can be increased to 25,000 $m^3$/day.

If during initial dewatering the Company performs any exploration diamond drilling activities, mine water used at the working face for diamond drilling and environmental control may flow or be pumped from that location and the water returned locally into the general mine water supply, subject to it causing no contamination to controlled water. The location where the face water enters the mine water acts as a settlement system which will likely be one of a series before being discharged to controlled water, whereby settlement occurs within the local mine workings and the water decants at a higher horizon.

Once dewatering of the flooded workings commences, via two 10 inch pipes installed in the NCK shaft, the water will be pumped to surface to a water treatment plant. The initial pumping route is through 10" pipes to be installed in the existing decline which will pass through the adit connection to the NCK shaft. The water treatment plant will be positioned adjacent to the portal entrance into the decline. Monitoring of water flow will occur at the headframe level at NCK shaft. Monitoring of suspended particles, heavy metals and chemical content will be done at the water treatment plant.

A permanent pumping station is to be located at the 1,750 m level, which coincides with the 195 fathom level of the South Crofty Mine. Below the 1,380 m level (400 fathom level) the dewatering continues via two existing declines to the 1,225 m level (470 fathom level), which is the lowest level in the mine. Four sumps will be installed into the existing shaft stations which will provide the capability of pumping the water from the South Crofty Mine workings into the NCK shaft pipelines. All costs associated with refurbishing the NCK shaft and establishing new pump stations while dewatering have been included in the initial Project capital cost estimates. This includes high rate pumps, shaft refurbishing, new sump establishment and equipping, headframe refurbishing, and new conveyances and cables.

Ultimately, once the dewatering of all mine workings has been completed, a new sump will be established at the bottom of the mine which will collect all water for pumping via access declines to the NCK shaft pumping station and from there to surface. During the last year of operation in 1998 pumping records indicated the mine pumped approximately 6,000 $m^3$/day of water to surface. Costs associated with pumping during operations have been included in mine services operational costs.

Used underground service water entering the dewatering system will be settled before being pumped back to the surface mine water treatment plant. Some of the water will then be recycled back into the mine and process plant and the surplus water will be discharged into the Red River.

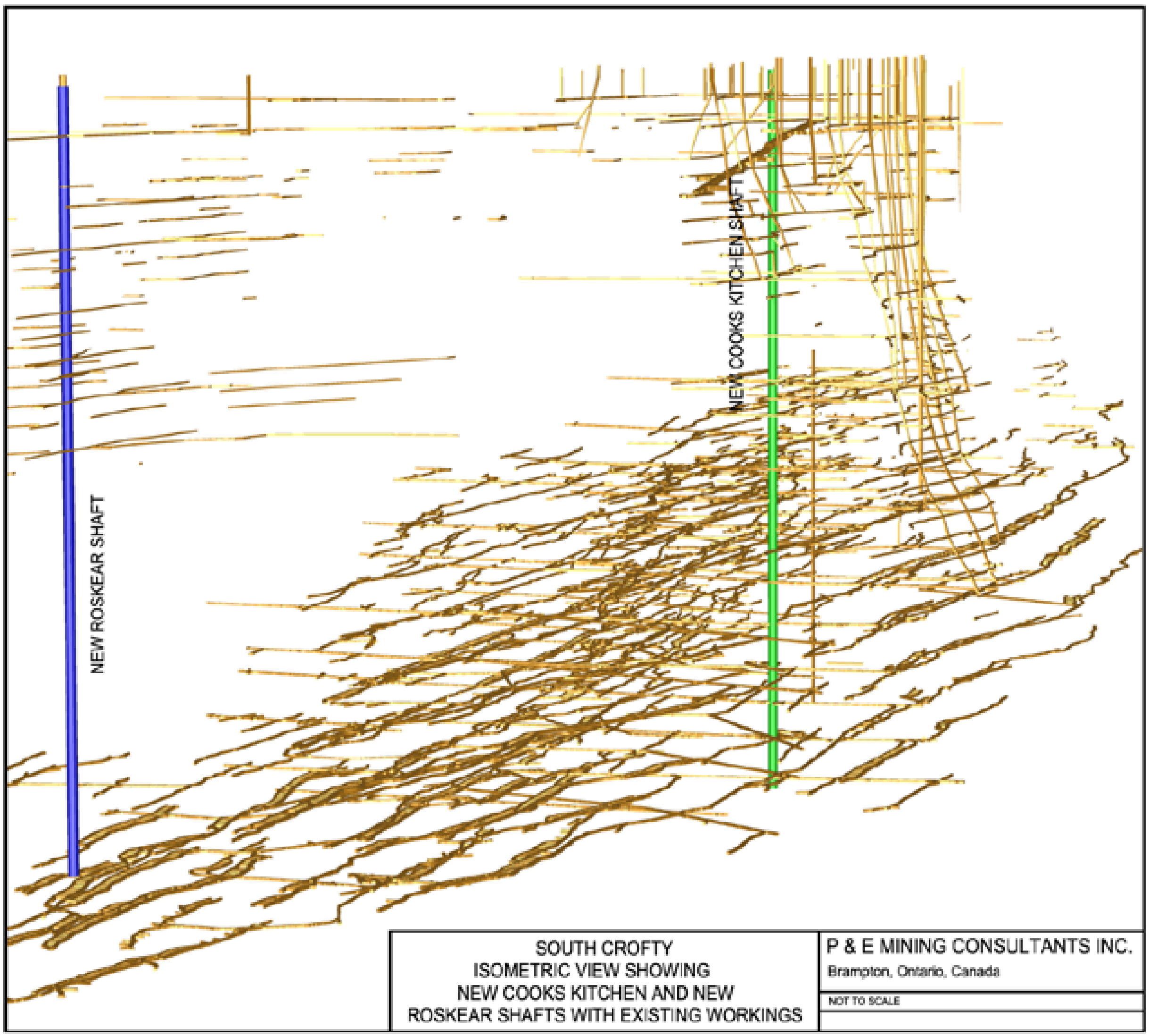
## 16.3 MINE ACCESS

Access to the mine will be via the four compartment NCK shaft, with the New Roskear shaft used for ventilation and as a second egress from the mine (Figure 16.3). The NCK is a production and personnel shaft 740 m deep with four compartments in line, and services running along the production compartments. Services will consist of 2 x 10 inch dewatering lines, 1 x 8 inch tailings disposal line, water line, central blasting cable, power cable for pumping and rock handling system, and a communications line.

The New Roskear shaft is envisioned to be used as a second egress for the entire mine and a main ventilation exhaust. Within the current estimates to refurbish the New Roskear headframe, a Maryann hoist and 50% of the entire shaft sets will be replaced. Once completed, the New Roskear shaft will serve as an evacuation route for mine workers in case of an emergency, as well as a main ventilation exhaust for the mine with two fans installed at the bottom of the shaft. To accommodate the two main fans, a connecting level between the two shafts will be excavated to ensure enough room is available for fan foundations, mechanical and electrical equipment installation.

Mine access levels will be accessed via the NCK shaft existing stations and enlarged to 3.5 m x 3.5 m from their original size, and will be fully supported to enable personnel travel during production. Rehabilitation of existing levels has been optimized to reduce the amount of effort required, and where possible new decline accesses were designed to shorten the development schedule and minimize costs.

**Figure 16.3 Isometric View of South Crofty Underground Mine Main Accesses**




## 16.4 VENTILATION

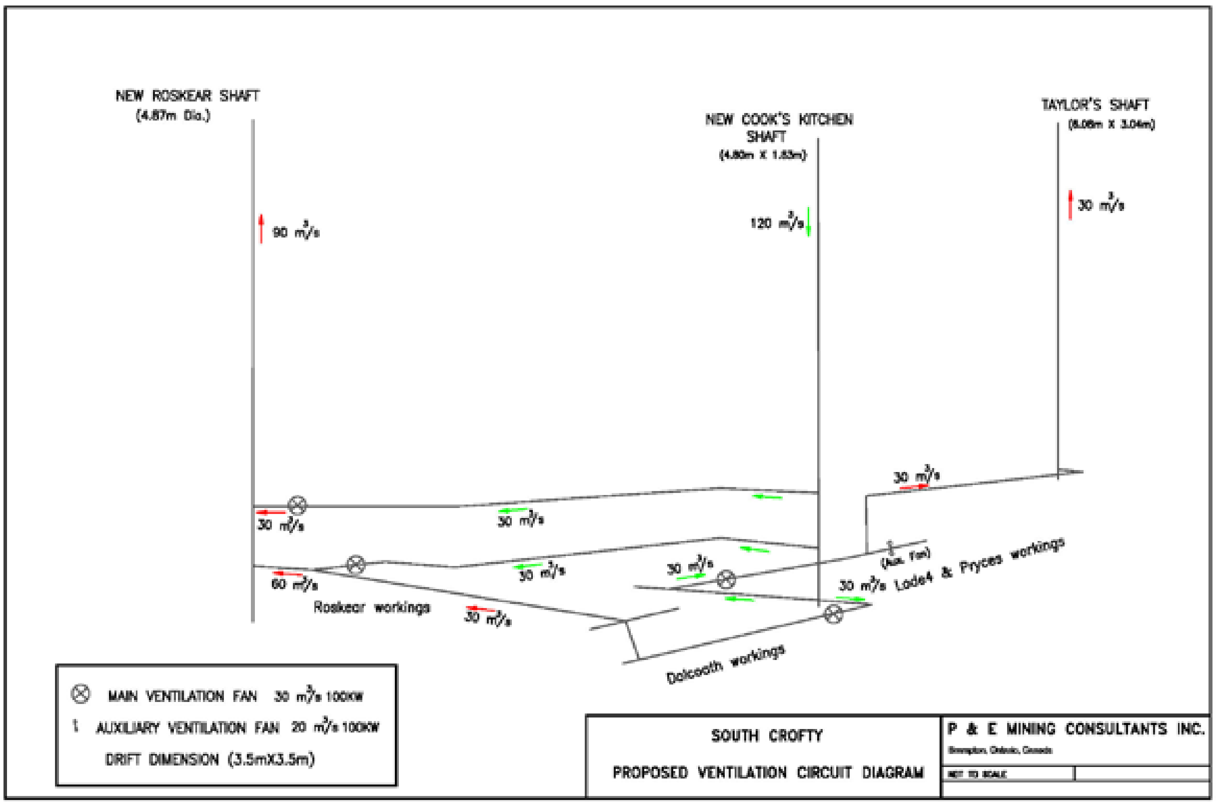
Downcast ventilation will be through the refurbished NCK shaft which will be augmented by upcast ventilation through the New Roskear and Taylor's shafts. Due to the high number of level accesses between the NCK and New Roskear shafts it is not known with certainty at this stage how many levels must be barricaded in order to direct the fresh air where it is required. It has been assumed that extensive ventilation work will need to be performed, such as construction of bulkheads and vent regulators in order to ensure adequate ventilation to all working areas once the South Crofty Mine is operational.

According to old records and reports, there is no need for cooling or heating of the mine air during summer or winter periods, and for that reason no capital allowance or maintenance costs have been considered for these activities within this study.

### 16.4.1 Primary Ventilation

Figure 16.4 presents a 3D view of the final ventilation schematic. The primary ventilation circuit has been highlighted and reflects the planned ventilation network when the mine is in operation. Numeric values modelled are typically airflow volumes in cubic metres per second. A VentSim Visual model of the final mine layout was updated by P&E to reflect the planned changes and to produce an optimal underground ventilation flow diagram.

**Figure 16.4 South Crofty Ventilation Diagram**




The key components of the ventilation design are:

- NCK shaft as a primary fresh air intake raise ("FAR") for the entire mine, especially the lower levels.
- New Roskear and Taylor's shafts as a dedicated return air raises ("RAR") for the mine.
- The airflow requirement estimates have a peak of approximately 120 $m^3/s$, which is for a single ventilation milestone that represents the worst case scenario for the lowest production level when the mine is in full production. Four primary ventilation fans have been planned to be installed underground, with two near the New Roskear shaft on lower levels, and two near the NCK shaft on lower levels, with fan sizes to be a minimum of 100 kW.

- There will be greater air flow rates required in the mine depending on which levels are active. This is due to the reduced pressure of running upper levels as opposed to lower levels. The proposed ventilation system should be more than sufficient to support the LOM requirements.

### 16.4.2 Mine Ventilation – Operational Phase

The proposed ventilation model draws fresh air into the mine via the NCK shaft (approximately 120 $m^3$/s). From that location ventilation is forced through flexible ventilation ducting to working areas. It is recommended that where necessary the current flexible vent ducting be replaced with smooth surface ducting of similar size (metal or fiberglass) to reduce air resistance. At intersections, specialty units such as Tee's, Wye's and angles can be purchased through the vent supplier and installed if required. If noise becomes an issue when operating, then fan silencers should be installed to address this health concern for the mine workers.

When developing the main decline, the ventilation demand will require additional in-line or parallel line fans to be installed in order to maintain proper air flow at the working faces. Ventilation along the strike vein drifts as well as footwall accesses will require smaller size fans and vent ducting. Within the current model, P&E has calculated that 50 kW or smaller fans with 600 to 900 mm vent ducting will provide sufficient air for development and stoping activities.

P&E also recommends that during the pre-production period, a long-term ventilation management plan should be developed by the mine ventilation engineer. This management plan although complex, should essentially include detailed specifications of the dust, DPM, gases, and other air pollutant admissible limits for underground as well as frequency for those readings to be taken. Within the plan, special attention should be given to ventilation plan updates, evacuation routes, and refuge areas in case of emergency.

Additionally, constant monitoring of underground air quality should be implemented to ensure the well-being of the mining workforce at any time and to comply with UK regulations for mine ventilation. Any underground mine will have multiple sources of contamination from blasting of development headings or stopes, diesel exhaust from mining equipment, in-situ presence of radon and hydrogen sulfide gases, and other activities. An assessment of all pollutants should be recorded and sufficient ventilation modeled to reduce the contaminants by individual mining panel if necessary.

To constantly monitor the underground air quality, it is recommended that multi-gas detectors be used by mine supervisors in working headings.

## 16.5 MINE DEVELOPMENT

Broken material from existing access level rehabilitation/enlargement, new waste level development and development into mineralized rock will be loaded on each level directly into underground haulage trucks at purpose-built loading areas to accommodate the height requirement. Haulage from the levels to the mineralized material-pass/waste-pass system and to surface process plant bins will be by 20 t capacity underground haulage trucks. Development waste and access level rehabilitation/enlargement will initially be used to fill old workings but as the cemented thickened tails comes online it will be used as waste-fill material for empty secondary stopes as well as to produce aggregate for roads, concrete and shotcrete for underground construction work.

Development face drilling will be done by single boom electric hydraulic jumbos, drilling 4.1 m length rounds. All headings will be supported with split-set bolts and welded wire mesh. Additional ground support will be applied if ground conditions dictate, usually for intersections or larger excavation areas such as main fan chambers, sumps, the crusher station, mineralized material bin, Tuckingmill conveyor loadout, etc. Extra ground support would consist of 4.0-6.0 m long grouted cable bolts as well as longer split-set or mechanical bolts. Development face explosives will be loaded using a scissorlift charge-up wagon, utilizing pneumatically-loaded ANFO, with blasting performed via a central blasting network.

The annual amounts of rehabilitation, access development and raise development metres over the life-of-mine ("LOM") are presented in Figures 16.5 to 16.7.

**Figure 16.5 South Crofty Annual Rehabilitation Metres**

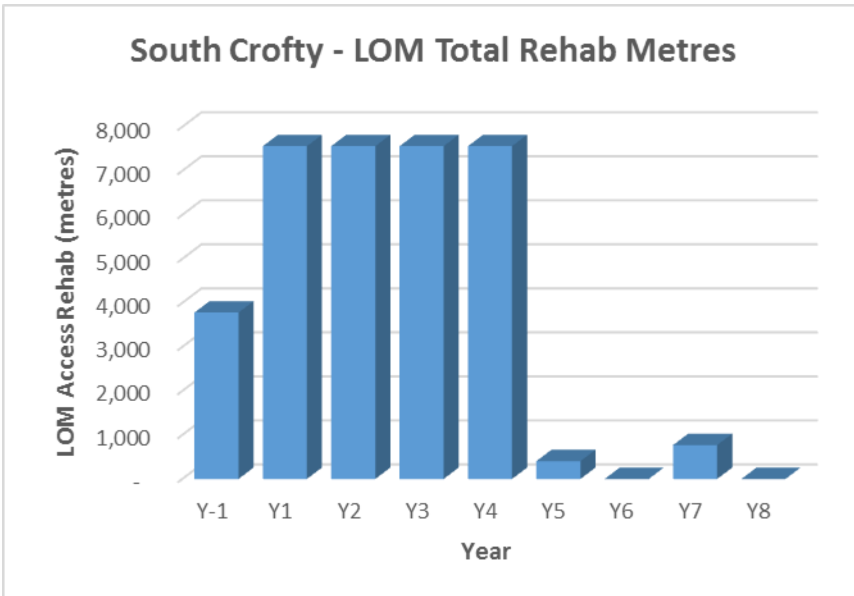


**Figure 16.6 South Crofty Annual Access Development Metres**

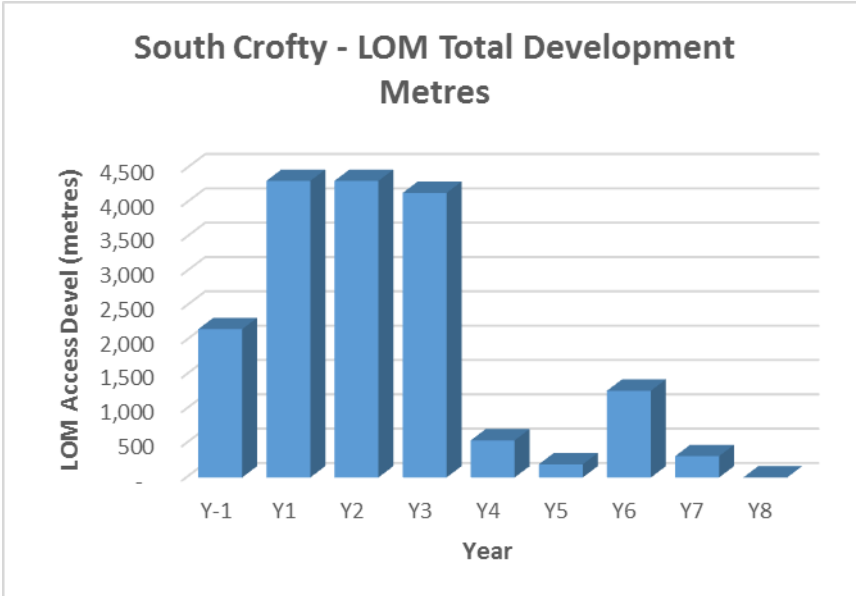
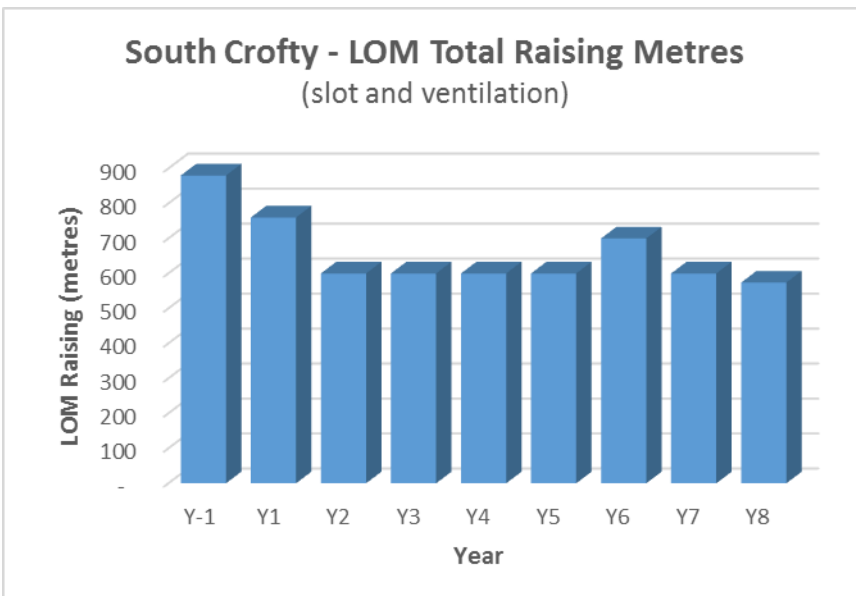



**Figure 16.7 South Crofty Annual Raise Development Metres**




## 16.6 MINE PRODUCTION

The mining method selected is sublevel longhole stoping with cemented thickened tailings for backfill. Stopes will be extracted in an inverted triangle pattern with sublevel intervals of 30 m floor to floor and approximately 300 m on strike. Within a mining panel, stopes will be extracted in sequence from the bottom level upwards and from panel extremities will be retrieved towards the center.

Where applicable, stopes will be mined out entirely without any backfill, especially stopes at the top of the mine panel and remnant or isolated stopes. Since the underground ground conditions are expected to be good, and the mine has been operated in the past with minimal backfill, it is expected that stope backfill can either be delayed after a stope is mined or many stopes will not require backfill for ground support.

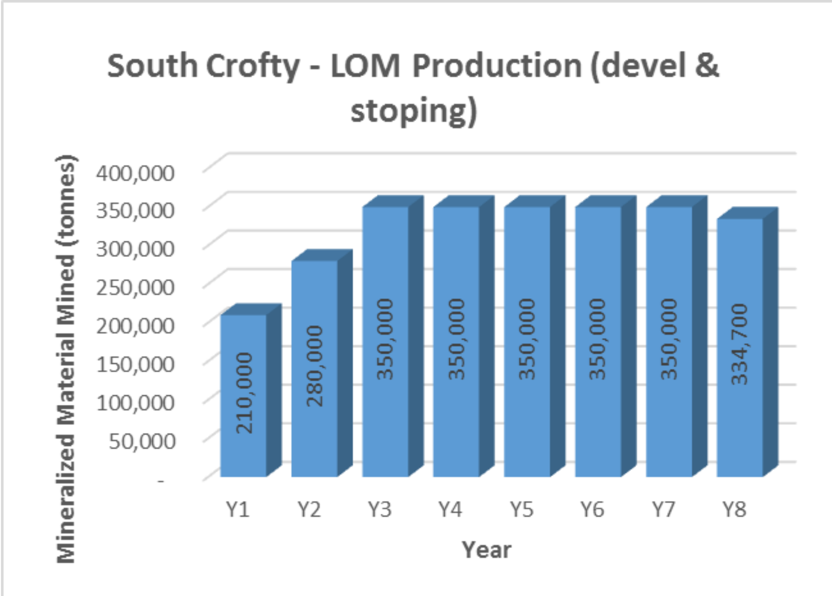
### 16.6.1 Mining Method and Backfill Selection

The South Crofty LOM plan includes the Lower Dolcoath Section, Upper Dolcoath Section, Lodes 2, 4, and 8, Roskear Section, and the Pryces - Tincroft Section, and contains 2.58 Mt based on a sublevel longhole stope mining method with a process plant feed grade of 1.55% SnEq including 15% mining dilution and 95% mining recovery. This equates to a mine life of eight years based on a maximum mining extraction rate of 350,000 tpy.

To maximise the extraction tonnage, stopes will be backfilled as required with thickened tails with cement added. Several different backfill systems were studied including cement aggregate-fill, cemented rock-fill and cemented tailings-fill (thickened fill and paste fill). Ultimately the cemented thickened tails option was selected as the most economic and lowest risk for the mine as well as to maximize use of the existing piping network to dispose excess tails into old mine voids. Cemented thickened tails will allow for 100% of the process tailings to be disposed of underground and eliminates the need for a surface tailings storage facility. The surface permit permissions do not allow for a surface tailings facility, and there is very limited space at surface since the mine is located within an industrial area. The other type of backfill that was strongly considered was cemented paste fill, however it would require a higher capital cost to build a paste fill plant and operating costs were estimated to be slightly higher than thickened tails.

Longhole open stopes can leave voids of over 3,000 $m^3$. These stopes were designed to have the drill drift and extraction drift longitudinal into the mineralized rock and can vary in shape according to the economics of the mineralized material. Stoping lifts will be nominally 30 m high, with one drill level and one extraction level. Double-lifts can be taken where stope geometry and geotechnical conditions permit. Drilling will be completed using up and down holes, up to 30 m in length. Mineralization is extracted with conventional and tele-remote extraction techniques. Once a stope is complete, it will be filled with either cemented thickened tails and/or unconsolidated waste rock from development. The extraction sequence allows for high recovery of the mineralized material with no pillars left behind. Annual tonnages to be mined according to the LOM plan are presented in Figure 16.8.

**Figure 16.8 South Crofty Annual Production Tonnes**




### 16.6.2 Production Drilling

Production drilling at South Crofty will be carried out predominately by a pneumatic "Stope Master" or "Stope Mate" type using a top hammer ("TH") longhole rig, utilizing 1.22 – 1.52 m long rods. The pneumatic drill rigs can drill upper holes of up to 20-25 m in length and 30-35 m downhole, and can drill several hundred metres of production holes per day. The hole diameter used is dependent on the direction of holes (down holes or up holes), however, drilling accuracy is important with bit diameters ranging from 51 mm to 106 mm. The small dimensions of these drills allow them for use in narrow vein mining. The drill drift can be as small as 2.2 m x 3.5 m which will be well suited for the South Crofty Mine stope extraction requirements.

All production drilling at South Crofty will be undertaken with TH production drill rigs, drilling 64 mm holes from a single drill drift placed along the mineralized vein (longitudinal stopes). Upholes are planned to be drilled with the same drill rigs, especially in isolated or remnant stope areas. The TH pneumatic drill rigs can also be used for cable bolting and miscellaneous drilling work such as drain holes, drop raising, service holes etc. Two production pneumatic drill rigs will be required to achieve the production levels and miscellaneous drill work at South Crofty.

It is appropriate to mention that P&E has selected these drill rigs due to their versatility for narrow vein mining, reduced vibration for operators, and low maintenance costs. According to manufacturers these drills have very few parts, fit into very small drifts, and typically cost a fraction to run compared to electric - hydraulic drills.

### 16.6.3 Blasting

Special attention is required to blast planning due the narrow mineralized zones. The Company underground mining workforce will use explosives and consumables supplied by UK manufacturers. The Company will have the licence to store, deliver underground, load and blast the holes. Explosives will be stored on site in a secured explosives magazine in accordance with UK regulations.

The primary blasting agent envisioned to be used at South Crofty will be ANFO, although emulsion is a preferred alternative where water persists into the development faces as well as production holes. The explosive will be pneumatically loaded into the drilled blast holes using a scissorlift charge-up wagon to achieve a loaded density of 0.95 kg/m² for development faces. A 2 t bulk carrier is recommended to be used for loading stope blast holes which will be mounted onto a flat bed or underground carrier. Cartridge boosters, Nonel and electric detonators will be used to initiate the blasts.

The blasts will be fired remotely from surface via a central blasting system. The connecting bell wire will be attached to the central blasting system and all personnel will then evacuate the mine, allowing the shift boss or mine captain to fire the blast from surface. It is recommended that blasting be conducted at the end of each shift as this eliminates the need for anyone to be underground during blasting as well as allowing working areas to be ventilated between the shifts with no mining personnel exposed to blasting fumes. These systems are the safest installations because they permit tight control of the workforce accessing the underground and entire evacuation before blasting occurs.

### 16.6.4 Loading and Broken Material Handling

Daily production at South Crofty is projected at 1,000 tpd with an initial 24 month ramp-up. Production levels will initially be around 600 tpd in the first year and increase to 800 tpd during the second year of the ramp-up. This requires approximately 2-3 active stopes in the first year, 5-6 active stopes in the second year, and ultimately 8-9 active stopes to maintain production levels, in addition to development in mineralized material. All extraction and loading underground will be done using 3 t electric LHD loaders. Rock will be loaded into 20 t haul trucks (fleet of 2 required) and then hauled to the conveyor transfer point via level access or declines.

The broken mineralized material will be moved by a remote-controlled LHD and placed in stockpiles, reloaded into trucks, and hauled to transfer points, whereas the development in mineralized material faces will be conventionally extracted and hauled into temporary stockpiles and from there to the transfer points.

Due to noise issues, dust and surface facility location, South Crofty will have its primary crushing placed underground and integrated within the NCK shaft rock handling and hoisting system. Before the mineralized material is transferred into the underground primary storage bin, it will go through a grizzly to reduce the rock size to < 600 mm. From a storage bin the rock will be delivered on a pan feeder into the primary jaw crusher which will further reduce the size to < 150 mm in order to be conveyed and transported to surface via the NCK shaft and to the process plant via the Tuckingmill underground conveyor drift.

Mineralized material will be transported from an underground primary crusher through a series of vibratory feeders and loadout conveyors, and subsequently loaded into two measuring pockets which will ultimately discharge into the NCK shaft 6.5 t skips. The measuring pockets will be automated and controlled via PLC programming using level and weight sensors. The measuring pockets will then bottom discharge into the skips and the material will be hoisted to the 2,060 m level (40 fathom level) and discharged into a temporary storage bin. From there the material will be transferred to the process plant fine mineralized material storage bins via the 590 m Tuckingmill conveyor.

No significant stockpile will be stored underground or on surface. Therefore, the mineralized material haulage requirements will move in parallel to the tonnages produced with continuous haulage and hoisting. On average, throughout the LOM, each tonne of mineralized material will be hauled approximately 1.5 km from its source to the surface plant.

### 16.6.5 Backfill

According to historic operations records, the hangingwall and footwall at South Crofty are competent and stopes may not require any backfill after extraction. Backfill would provide a competent work floor in the stopes. In order to meet surface permit permissions that stipulate no tailings facility, all tailings will be pumped underground. P&E recommends cemented thickened tails as the preferred and most cost effective type of backfill. It may be possible to reduce the cement content by separating the coarse fraction, to be pumped into the active stoping areas, and the fine fraction that will be disposed into old mining voids.

The thickened tailings system requires a small plant to be built on surface mainly to prepare the tailings for pumping. Additionally, to ensure good fluidity and to eliminate the potential of underground water contamination by diffusion with processing reagents and chemicals contained by the disposed tails, P&E suggests that a low binder cement content must be added for solidification. The backfill plant will reduce the water content and the thickened tails and will be mixed with 1.5-2% cement in a slurry.

P&E envisions that nearly all newly mined stopes will be filled with either cemented thickened tails or unconsolidated waste rock. The cemented thickened tails will be mixed on surface and piped underground via the NCK shaft eight inch lines to working areas. An underground crew will be responsible for installing the underground pipe reticulation system through which the cemented thickened tails will travel, utilizing mainly gravity to reach the backfilling locations.

The fine fraction of the process tails will follow more or less the same route/process and be pumped underground into old mining voids. These voids must be identified and properly sealed prior to tailings disposal. It is also recommended that they should be within the proximity of planned working areas for easy access and reduced cost of piping and rehab work required. The entire quantity of mine tailings produced will be disposed underground.

Unconsolidated waste rock generated from development will also be utilised to help fill stope voids. This provides short cycle times and production efficiencies by reducing the amount of waste removal from underground. Minimal waste will be hauled/hoisted to surface. Some waste may be hauled to the crusher to be used as shotcrete/concrete aggregate, road bed material or fill for surface construction pads.

The backfill plant will consist of tailings holding tanks, mixing plant and 200 t cement storage silos and metering system, a thickened tails delivery hopper connected to the main pump, and boreholes from surface to underground. Ancillary equipment included with the plant are a separate Motor Control Center ("MCC") building with a control room and QA/QC lab, 5 $m^3$ plant air receiver, instrument air dryer and receiver, wet type dust collector, wash down water pump and piping, control valve and piping, high pressure water cleaner and piping and a mixture metering pump and delivery piping.

Tailings will be pumped from the tailings thickener into the first holding tank into a smaller second tank/delivery hopper and subsequently cement slurry will be added at the tailings pump.

Cement slurry is added to the mixture via a PLC controlled circuit from silos and mine reticulation water to ensure that the thicken tails have the required viscosity and binder content. A more precise binder content for thickened tails will be determined during a later engineering study stage (Feasibility Study). At that stage, and after consulting with a backfill consulting firm, P&E has evaluated two binder contents, 1.5% for tails disposal and 2% for cemented thickened tails placed into active stopes. Higher binder content will be located usually in the pour above sill pillars, as well as when encountering adverse geotechnical conditions within a mining panel.

Figure 6.9 presents the annual tonnages of tailings produced and transferred underground. Figure 16.10 shows the annual tonnages of cemented thickened tails planned to be placed in stopes mined during the PEA mine plan. Figure 16.11 presents the annual tonnages of thickened tails that can be placed in voids instead of mine plan stopes.

**Figure 16.9 South Crofty Annual Tailings Tonnes**

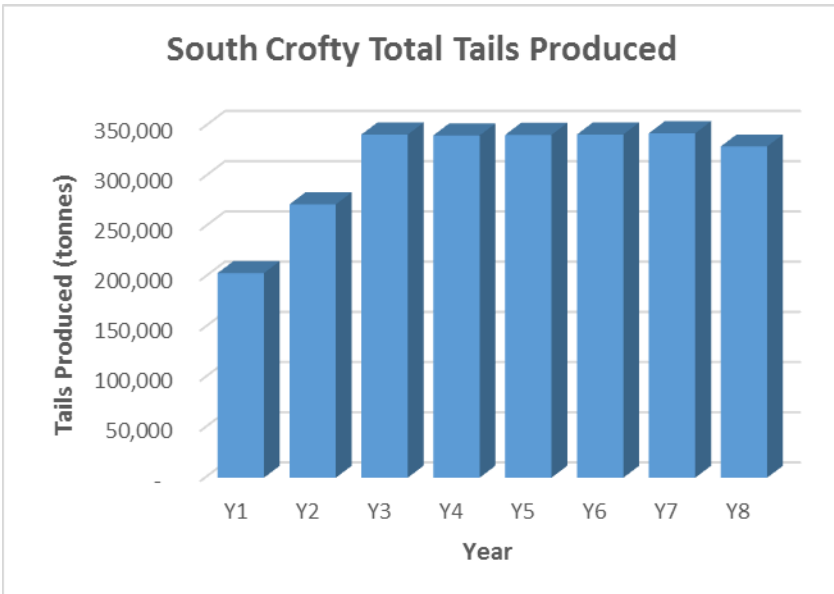


**Figure 16.10 Annual Cemented Thickened Tails Required For Stopes**

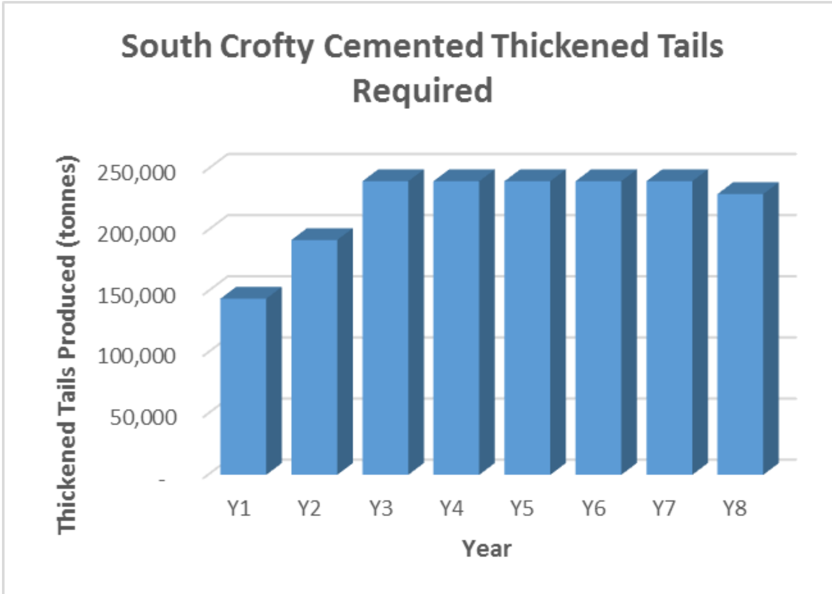
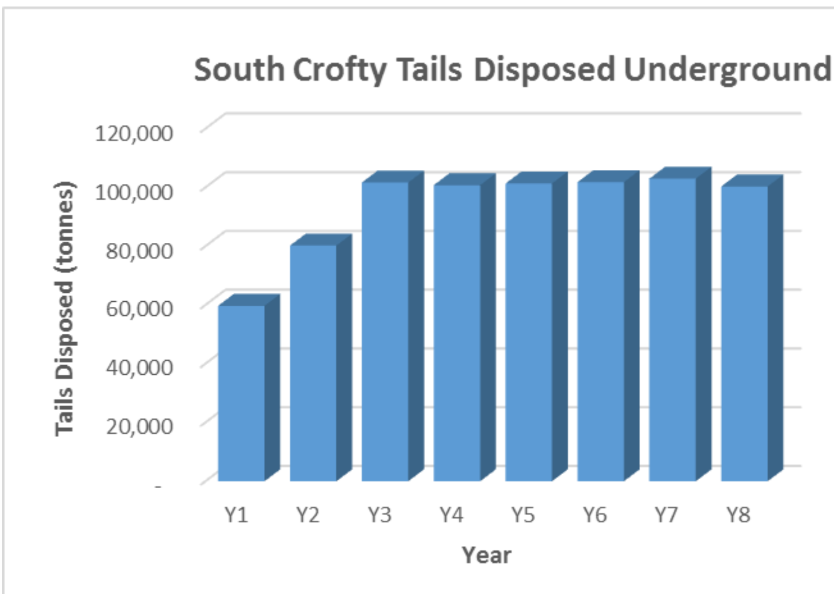



**Figure 16.11 Annual Tails Disposed Underground in Voids**

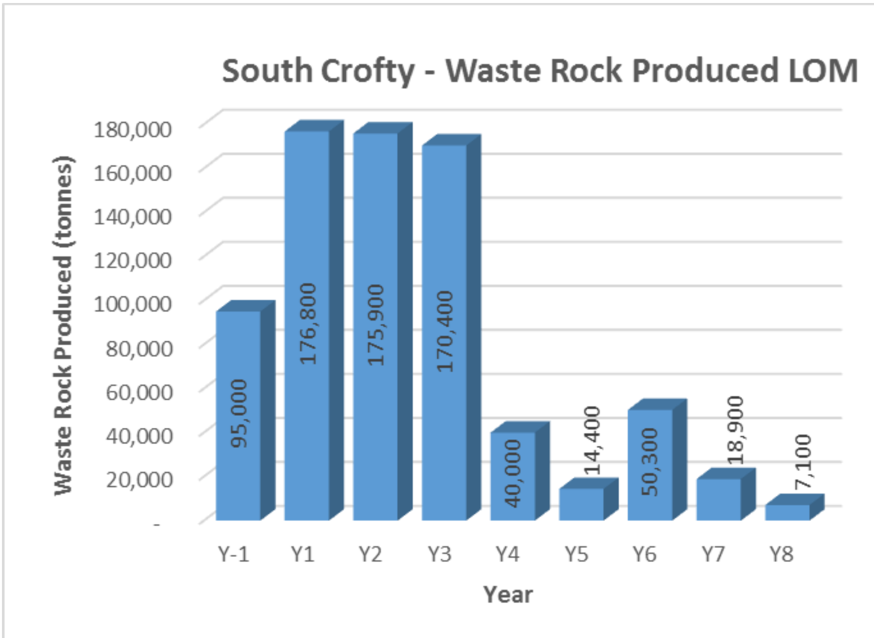



### 16.6.6 Waste Rock Disposal

Waste rock that is generated from development mining will need to be managed. P&E understands that there is provision to store aggregate material on surface as a supply to a secondary market. While this arrangement could be feasible over the LOM, P&E recommends that a formal contract be drawn up with a contractor to identify and disclose details of any continued operation. P&E further recommends that the Company develop a waste rock strategy through an engineering study at a later stage. Such a study would determine quantities to facilitate handling requirements and long term storage needs.

Within the current evaluation, P&E has assumed that all waste rock resulting from underground development or other excavations will remain underground and will ultimately be disposed into newly created or historic mined voids. A limited waste rock quantity will be hoisted to surface for aggregate production and sent back underground for various usages such as road bed material and aggregate for shotcrete and concrete work. Figure 16.12 presents the annual waste rock tonnages planned over the LOM.

**Figure 16.12 Annual Waste Rock Mined Underground**




### 16.6.7 Ground Support

Ground support will be a high priority, not just in terms of safety, but also to assure continuity of operations over the LOM. A site-wide ground control regime must be set up by site geotechnical engineers/technicians. This regime will classify all headings and drives in terms of their mining rock mass rating, blast damage, stress change, life of excavation, usage frequency and excavation size.

P&E recommends that the ground support included in all development excavations at South Crofty be based on split-sets or resin bolts for roof support, together with welded wire mesh.

Typical long term development drifts such as declines or mining panel level accesses will be reinforced by split set bolts (1.8 m long) with a pattern of 1.5 m by 1.5 m. For short term development such as mineralized material drives, 1.8 m long split sets will be used with a pattern of 1.5 m by 1.5 m. When poor ground conditions are encountered shotcrete will be applied and the thickness will be dictated by the adversity of the ground conditions to ensure drift stability.

Static cable bolts are also recommended to provide ground support where large unstable wedges are formed or for large excavations such as a crusher chamber, main fans chamber or storage bin. Generally, all intersections will require cable bolts reinforcement. However, when stope backs are accessible and back failure is predicted, cable bolts must be installed immediately to reduce dilution and improve stability of stopes.

Dynamic cable bolts should be considered in the future in areas of expected seismicity. Holes for both cable bolt types can be drilled by a production longhole drill rig, and the cables installed and grouted by a service crew.

#### 16.6.8 Water Pumping – LOM

The water pumped from the mine will come from the following main sources:

- Ground water inflow;
- Service water (mainly drilling equipment);
- Water drainage from backfill placement; and
- Water drainage from fine fraction tailings disposal.

##### 16.6.8.1 Dewatering Program

Initial mine dewatering will take place as previously explained in the pre-production dewatering section of this report. The dewatering will be via the NCK shaft using high rating vertical turbine pumps installed onto a specially designed and constructed dewatering stage in the shaft. The dewatering stage will be hung under one of the conveyances with access though the conveyance floor safety door. The pump will be connected via a high-pressure flexible hose to the newly installed 10 inch shaft main dewatering pipelines.

Concurrently, a specialized shaft contractor crew will install all required services into the designated compartment for future use when the mine is in operation such as second main pipeline, tails disposal pipeline, underground water line, compressed air line, electrical cables, communication cables, and central blasting line. When initial dewatering has been completed, water will flow into a retaining sump where a submersible pump will be positioned and programmed to pump water in a 10" main pipeline up the shaft to the upper level sumps and to the Tuckingmill Decline lower section at the shaft station level.

At the Tuckingmill Decline horizon, a separate pump will be located for pumping water up the NCK shaft for treatment and discharge to the Red River. In the future when the processing plant is operating this water will be pumped for use in the plant, which is a vertical height of 60 m above the adit bottom.

At the 300 m level the main pump station will be established, approximately 370 m vertically below the ramp portal. Sulzer MBN multistage pumps will be installed in the pump station. Standard water storage sumps will be constructed using old level drift voids as part of the pumping system. Any grit will permanently remain in the sump. The water will pass through a stainless steel sieve to remove any grit prior to entering the pump.

#### 16.6.8.2 Pump Station Requirements – Operational Phase

The following levels will be utilized for establishing the initial dewatering and steady-state pump stations:

- 2,060 m level (40 fathom) - 25,000 m³/day then steady-state 5,500 $m^3$/day to 6,500 m³/day once in production.
- 1,750 m level (195 fathom) - 25,000 m³/day then steady-state 2,500 m³/day.
- 1,380 m level NCK shaft bottom (400 fathom) – 2,500 m³/day.
- 1,220 m level Mine Bottom (470 fathom) – 1,500 m³/day.

P&E recommends that permanent pumps should be multistage Sulzer type pumps with one on duty and one on standby for maintenance flexibility. These pumps are high rate – high head capable of maintaining control of the mine water.

#### 16.6.8.3 Dewatering Pipeline and Redundancy

During dewatering, if practical, the vertical section of the NCK shaft will be used for ventilation and as a services shaft. Below the loading area section of the shaft, the dewatering pipeline will run along the conveyor drift and the access ramp below the conveyor drift bottom. Once the lowest point in the mine has been reached a series of service holes can be drilled and reamed to the appropriate diameter to enable the installation of the main vertical pipeline. When in production a second pipeline will be installed into the NCK shaft from surface to the shaft bottom pumping station with connections at every pumping station level and act as a standby pipeline to replace the primary pipeline in case of emergency or when maintenance must be performed on the first line.

When in production, to take advantage of lower power rates, P&E recommends that pumping from the shaft bottom to the 1,750 m level and 2,060 m level pump stations should occur during the night. From these locations, the water will be pumped to the adit horizon and stored. Adit sump pumps will take the water to surface for use in the processing plant after which it will pass through the water treatment plant to be processed to ensure compliance with the terms of the discharge permit.

### 16.6.9 Mine Power

The UK national power grid crosses the South Crofty Property, and the operation is currently connected to it and the connection will be upgraded in the future to meet power demands. The concept is described below in more detail including surface substation and distribution and interconnection with the underground operations.

#### 16.6.9.1 Surface Main Power Supply and Substation

The main power distribution will be at 11,000 volts 3 phase 50 cycles using SF6 circuit breakers. A main substation will be established on surface near the processing plant on its north side and close to the Tuckingmill Decline during pre-production development. Power from the UK national grid will be received at 33,000 volts via two incoming breakers, transformed down to 11,000 volts and connected by two circuit breakers to the main substation bus bar system.

Power may also be fed onto the bus bars by two generator sets through synchronising switches and circuit breakers. The generator sets will provide secondary power back-up, top up power and alternative power prior to the electricity company's power upgrade. Distribution switches on the main substation bus bars will feed the mill, the mine general distribution, the main mine pump stations and surface distribution. Provision will be made for two circuit breakers that can be added to the system for future expansion.

#### 16.6.9.2 Underground Electrical Distribution

The main distribution at 11,000 volts will be used to power drill rigs, mobile equipment and local services via 1,100 volt/415 volt transformers. Switching for all electrical powered mobile (un-pluggable) equipment will be by gate end box and incorporate pilot earth protection.

Local service distribution will be at 415 volts transformed down where necessary to supply 240 and 110 volt single phase circuits for lighting, small power tools and pumps. Pump motors, capacitors and switchgear for the two larger pump stations will be designed at 3,300 volts. The initial cables will be routed into the Tuckingmill Decline. Later, when the mine is in operation a main underground substation will be located on the 1,750 m level at NCK shaft to service the main pump station.

The permanent main pump station power supply feed will be kept separate from the mine production distribution system.

#### 16.6.9.3 Phasing of Power Supply

Prior to production, the power supply route will enter the mine using the Tuckingmill Decline where it will be directed to the NCK shaft at the 2,060 m level station. From the shaft services compartment the feed will continue down to the next pumping level station located at 1,750 m level. From there the feed will continue to the 1,460 m level and 1,380 m level pump stations at the shaft bottom and finally to 1,225 m level sump (mine bottom). Should it be considered necessary, the NCK shaft may have feed lines installed in the shaft for each main pump station including one below the current bottom level to serve the mining activities and lowest level sump.

The intermediate stage pumping arrangements will be fed from the mine distribution system as will the initial powering of the main pump station on 1,750 m level.

100% redundancy has been envisaged for electrical circuit breakers, transformers and feeders supplying the main pump stations. For temporary feed lines and for the stage pumping arrangements there is no requirement for this level of security and this has not been included in the cost estimate and evaluation. The water feed to the initial dewatering pumps will be controllable via stand-alone valves located at the end of the shaft pipelines. In case of emergency the water pipeline will be turned off reducing the risk of equipment loss.

#### 16.6.9.4 NCK Shaft Main Substation

The existing power supply at the NCK shaft will be upgraded to carry the requirements for underground operations, with the main substation located adjacent to the shaft. This is to avoid any flooding potential and loss of production.

A bus section switch is included as part of the main substation as well as all of the dual supply lines that run from it. The system will normally run with the bus section circuit breakers open, however in the case of faults occurring or for planned maintenance and other works on the system the bus section switches may be closed under strict control to provide appropriate feeds. The switching setup must take into account the cable sizes so as to avoid back feeding through inappropriately sized feeders. Similarly, any switching must take account of the status of transformer circuit breakers and the isolation as necessary of voltage transformers.

#### 16.6.9.5 Production/Development Substations

For the production phase each substation will consist of an 11,000 volt circuit breaker feeding a 500 kVA transformer. Link switches will be mounted on either side of the 11kV circuit breaker to facilitate circuit isolations. Where appropriate the 11,000 volt distribution system will be ringed out. The addition of a second circuit breaker to act as a bus section switch will be required at some substations to facilitate this.

The 500 kVA transformer will feed a distribution board supplying local district gate end boxes at 1,100 volts. The distribution board will also feed a local transformer for 415 volt local services. 1,100/415 transformers will normally be of 125 or 200 kVA capacity. 415 volt transformers could also be fed via district gate end boxes where this becomes convenient.

#### 16.6.9.6 Cable Sizes and Cable Terminations

The main 11,000 volt cable that feeds to the mill, mine distribution and pump stations will be appropriately sized to enable the normal load to be run through one feeder and at the same time limit the voltage drop to 2.5%. The 3,300 volt cable to the pump stations on 2,060 m and 1,750 m levels, the cable for the main ventilation fans located near the New Roskear shaft bottom, and second supply line for the mine, will all be sized in a similar mode. For cable terminations, P&E recommends that appropriate termination kits shall be used to avoid any fire and power disruptions to underground workings. It is common for extensive power networks to find that the use of inappropriate kits can cause lengthy and costly disruptions.

## 16.7 MINE PLAN AND SCHEDULE

### 16.7.1 LOM Schedule Highlights

- Highlights of the South Crofty PEA mine plan include:
- Eight year mine life;
- Two years of initial dewatering of old mine workings;
- Underground mining from several independent areas;
- Lower production rates during the two year ramp-up stage from development and stoping;
- Cemented thickened tails used for backfill;
- Balance of process tailings to be disposed underground;
- NCK shaft hoisting capacity exceeds planned production levels;
- 40,000 m of definition drilling included over the LOM; and
- All waste rock produced to be disposed underground.

The LOM schedule (Table 16.1) is based on limited historical performance, meeting established strategic base conditions, and the potential to realise mining efficiency opportunities. At a cut-off value of 0.70% SnEq the mineralized material mined is estimated at 2,575,000 tonnes at an average grade of 1.55% SnEq. Approximately 60,000 t of mineralized material was considered not mineable due to proximity to historic workings, remnant mineralization, or in unrecoverable sill pillars. However, this material will require physical inspection underground once the workings are dewatered and accessible, to confirm if it can be mined. Mining dilution was estimated by calculating the tonnes and grades within a ‘skin’ around the outside of each of the planned stope shapes using Gemcom software. This ‘skin’ was created on the footwall and hangingwall of each mining block. Mining dilution was estimated by calculating the over-break in the hangingwall and footwall of each stope shape, and for this study P&E used a mining dilution of 15% in total. This was applied to every mining block at a 0.45% SnEq grade. Additionally, the mining recovery was assumed to be 95% for all stopes and sill tonnes. Table 16.2 presents the LOM plan by elevation.

**TABLE 16.1**
**SOUTH CROFTY UNDERGROUND LOM PLAN BY AREA**

| Mine Section | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Total LOM |
|---|---|---|---|---|---|---|---|---|---|
| Dolcoath (t) | 4,900 | 48,100 | 133,800 | 149,400 | 139,400 | 136,100 | 207,700 | 334,700 | 1,154,100 |
| Dolcoath Grade (SnEq%) | 1.85 | 1.42 | 1.45 | 1.56 | 1.24 | 1.25 | 0.96 | 0.95 | 1.18 |
| Lodes 2, 4 & 8 (t) | 183,200 | 183,000 | 151,300 | 139,400 | 122,500 | 119,400 | 80,700 | - | 979,500 |
| Lodes 2, 4, & 8 Grade (SnEq%) | 2.03 | 1.97 | 1.39 | 1.71 | 1.64 | 1.68 | 2.27 | | 1.80 |
| Roskear (t) | 20,600 | 26,300 | 12,900 | 23,900 | 27,000 | 23,500 | 16,200 | - | 150,400 |
| Roskear Grade (SnEq%) | 1.66 | 1.66 | 1.83 | 2.02 | 1.86 | 1.78 | 1.78 | | 1.80 |
| Pryces-Tincroft (t) | 1,300 | 22,600 | 52,000 | 37,300 | 61,100 | 71,000 | 45,400 | - | 290,700 |
| Pryces-Tincroft Grade (SnEq%) | 1.59 | 1.98 | 2.40 | 2.50 | 2.44 | 1.85 | 1.15 | | 2.05 |
| | | | | | | | | | |
| **Total Tonnes Mined** | **210,000** | **280,000** | **350,000** | **350,000** | **350,000** | **350,000** | **350,000** | **334,700** | **2,574,700** |
| **Grade (SnEq%)** | **1.99** | **1.85** | **1.58** | **1.75** | **1.64** | **1.56** | **1.33** | **0.95** | **1.55** |

**TABLE 16.2**
**SOUTH CROFTY UNDERGROUND LOM PLAN BY LEVEL**

| Level (m) | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Tonnes | %SnEq |
|---|---|---|---|---|---|---|---|---|---|---|
| 2050EL | - | - | - | - | - | - | - | 18,500 | 18,500 | 1.01 |
| 2000EL | - | - | - | - | - | - | - | 66,400 | 66,400 | 1.09 |
| 1950EL | - | - | - | - | - | - | - | 123,200 | 123,200 | 0.90 |
| 1900EL | - | - | - | - | - | - | - | 87,700 | 87,700 | 0.93 |
| 1850EL | - | - | - | - | - | - | - | 24,100 | 24,100 | 0.91 |
| 1800EL | - | - | - | - | - | - | 50,600 | 14,800 | 65,400 | 0.90 |
| 1750EL | - | - | - | - | - | - | 69,300 | - | 69,300 | 0.89 |
| 1700EL | - | - | - | 32,800 | 46,200 | - | - | - | 79,000 | 1.07 |
| 1650EL | - | - | 143,500 | 31,200 | - | - | - | - | 174,700 | 1.11 |
| 1600EL | - | - | - | - | - | 110,900 | 177,600 | - | 288,500 | 1.44 |
| 1550EL | - | - | - | - | 99,900 | 163,100 | - | - | 263,000 | 1.46 |
| 1500EL | - | - | - | 117,500 | 113,000 | - | - | - | 230,500 | 1.92 |

**TABLE 16.2**
**SOUTH CROFTY UNDERGROUND LOM PLAN BY LEVEL**

| Level (m) | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Tonnes | %SnEq |
|---|---|---|---|---|---|---|---|---|---|---|
| 1450EL | - | - | 145,000 | 106,000 | - | - | - | - | 251,000 | 1.95 |
| 1400EL | - | 216,700 | 61,500 | - | - | - | - | - | 278,200 | 1.81 |
| 1350EL | 210,000 | 63,300 | - | - | - | - | - | - | 273,300 | 1.99 |
| 1300EL | - | - | - | - | - | 76,000 | 52,500 | - | 128,500 | 1.92 |
| 1250EL | - | - | - | 62,500 | 90,900 | - | - | - | 153,400 | 1.77 |
| | | | | | | | | | | |
| **TOTAL** | **210,000** | **280,000** | **350,000** | **350,000** | **350,000** | **350,000** | **350,000** | **334,700** | **2,574,700** | **1.55** |

Figures 16.13 to 16.20 present isometric views and longitudinal sections depicting the distribution of mineralized material in the mine plan within the Upper and Lower Dolcoath Section, the Lodes 2, 4 and 8 Section, the Pryces - Tincroft Section, and the Roskear Section.

**Figure 16.13 Isometric View of Dolcoath Upper and Lower Level Mineralized Material Mined**

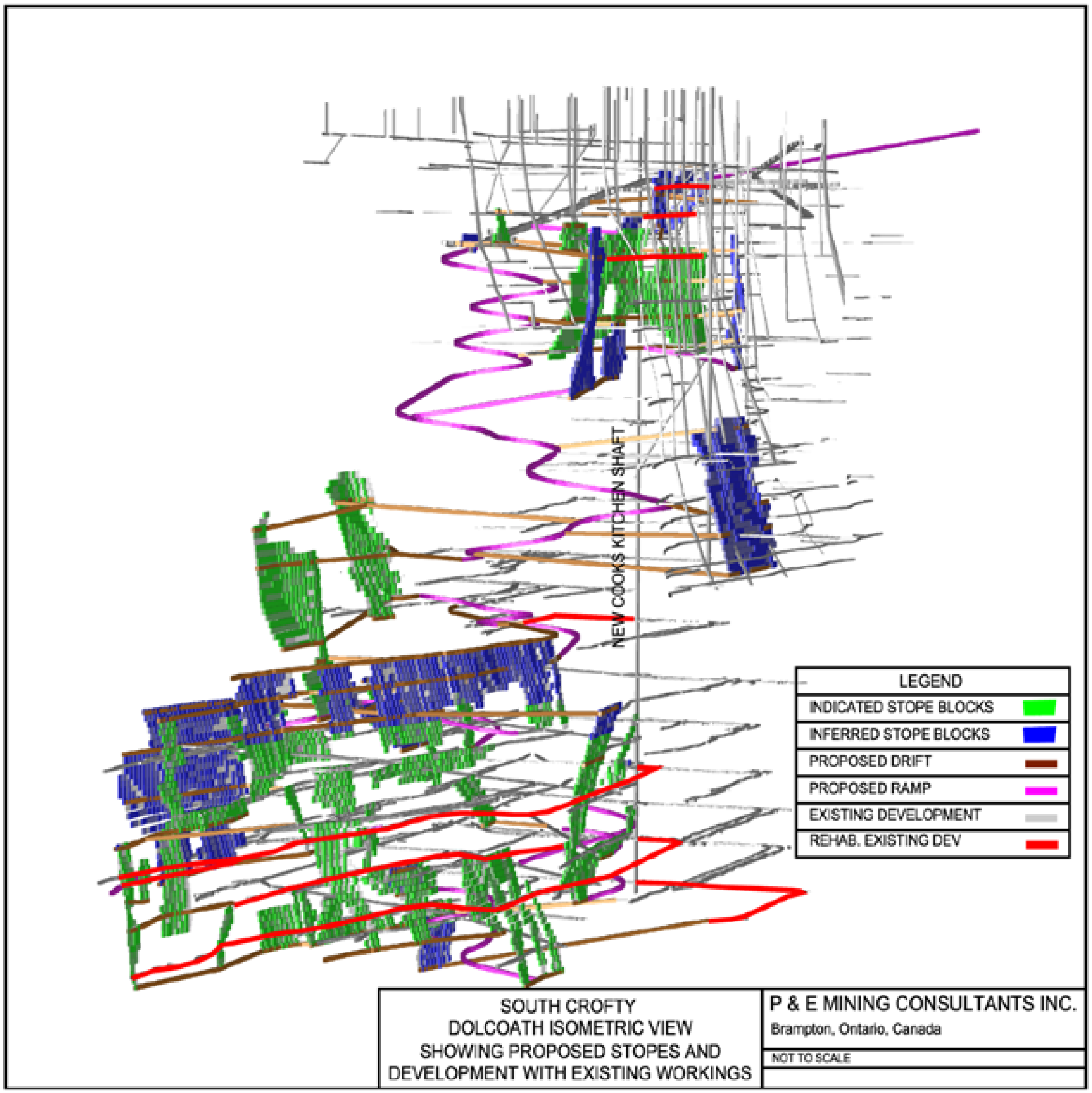


**Figure 16.14 Longitudinal Section of Dolcoath Upper and Lower Level Mineralized Material Mined**

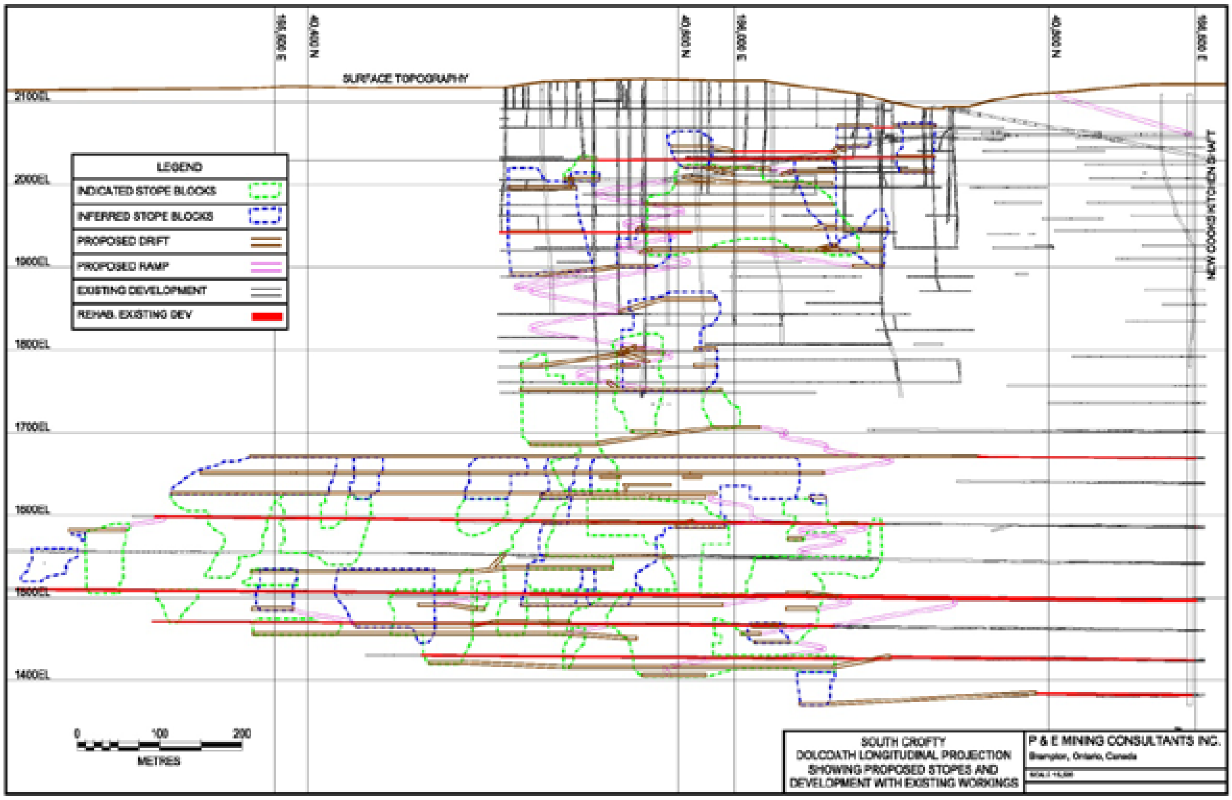
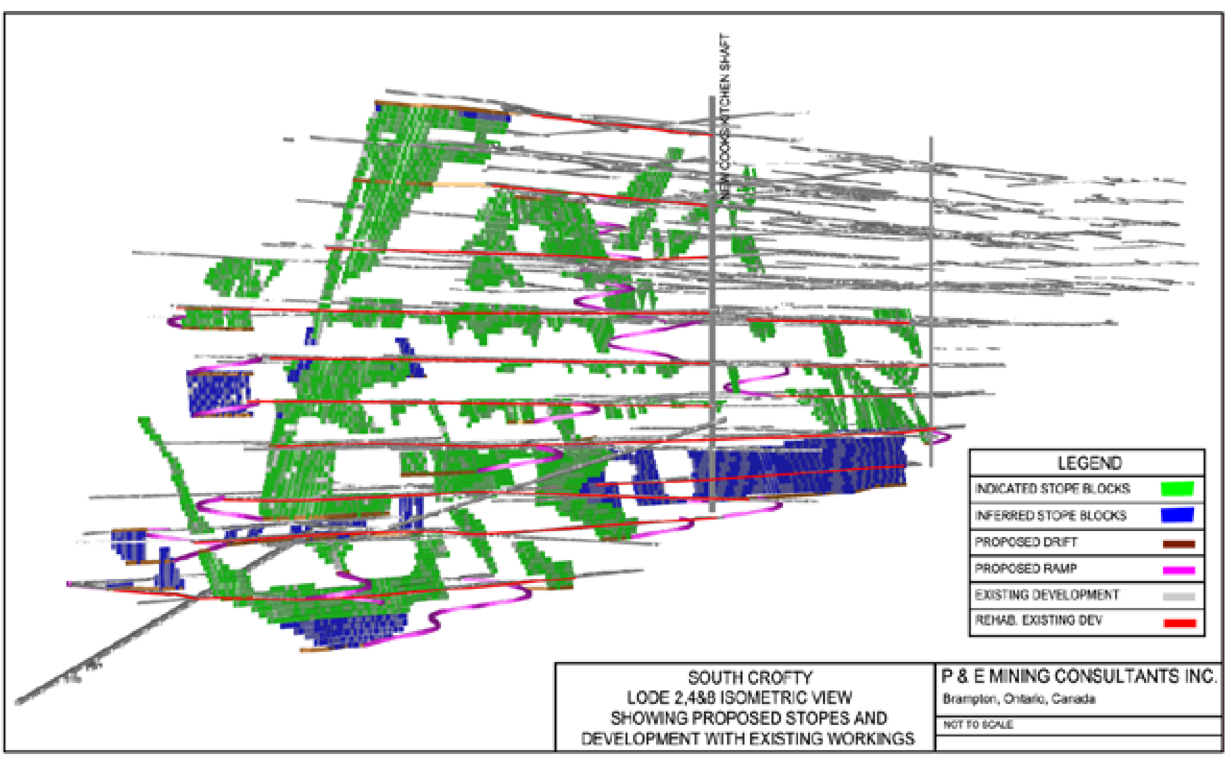
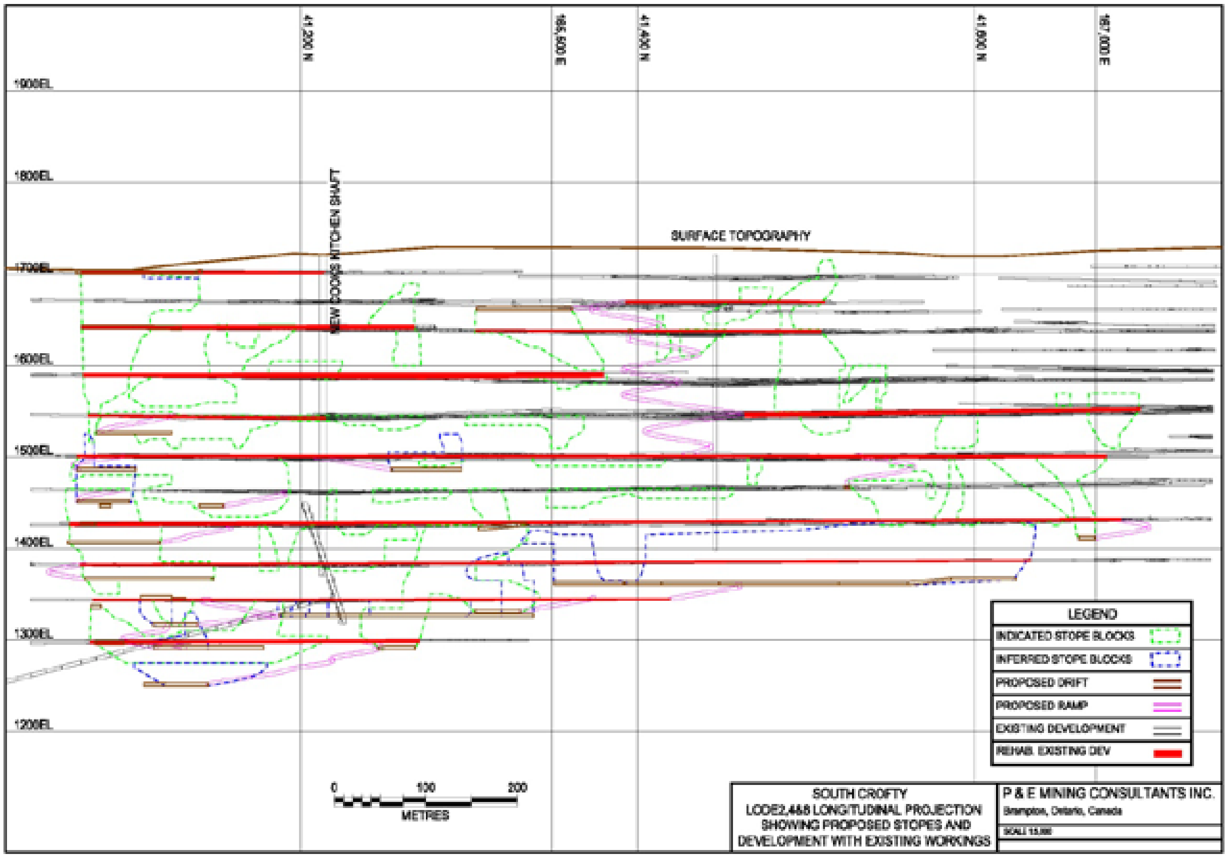


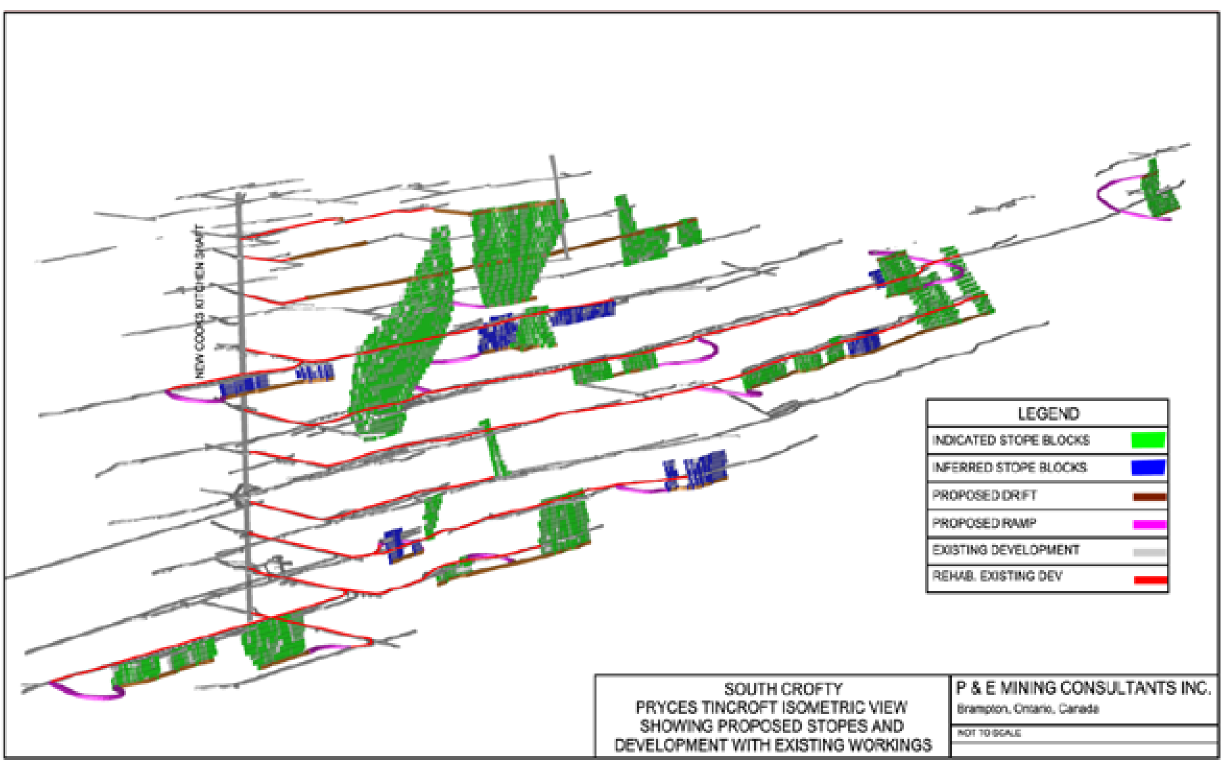

**Figure 16.15 Isometric View of Lode 2, 4 & 8 Mineralized Material Mined**



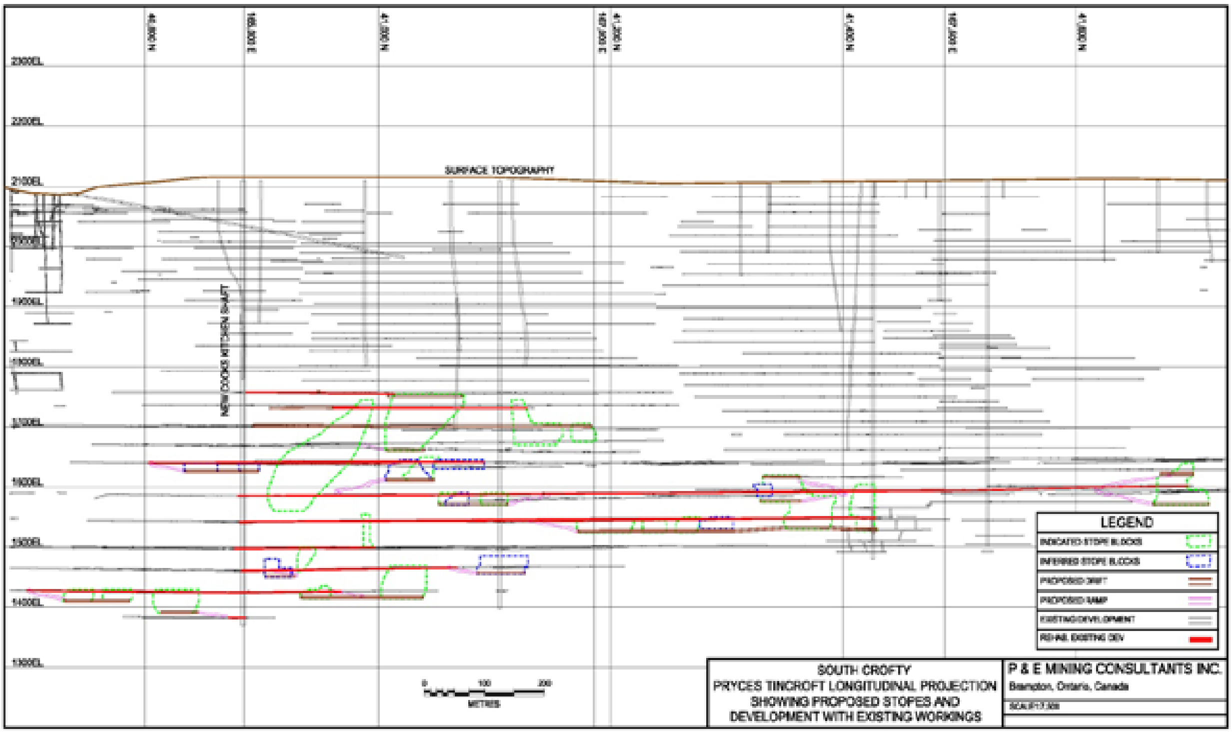
## Figure 16.16 Longitudinal Section of Lode 2, 4 & 8 Mineralized Material Mined




## Figure 16.17 Isometric View of Pryces-Tincroft Mineralized Material Mined



## Figure 16.18 Longitudinal Section of Pryces-Tincroft Mineralized Material Mined




## Figure 16.19 Isometric View of Roskear Mineralized Material Mined

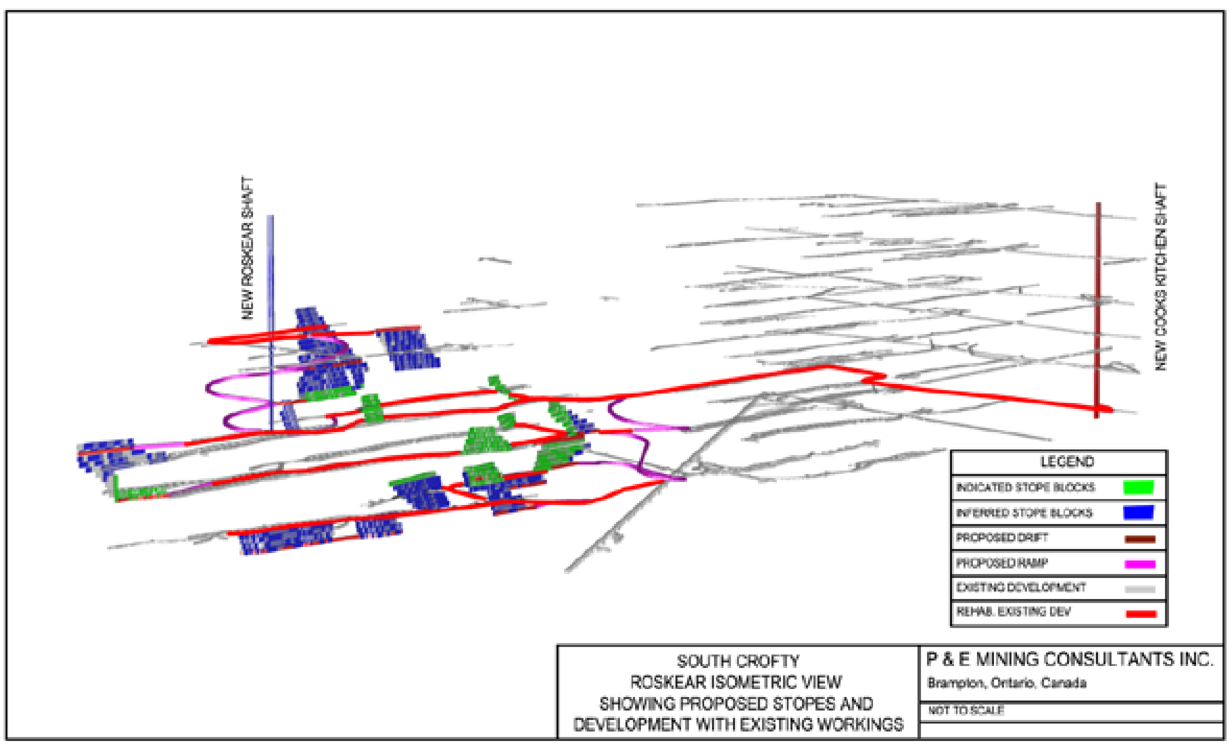
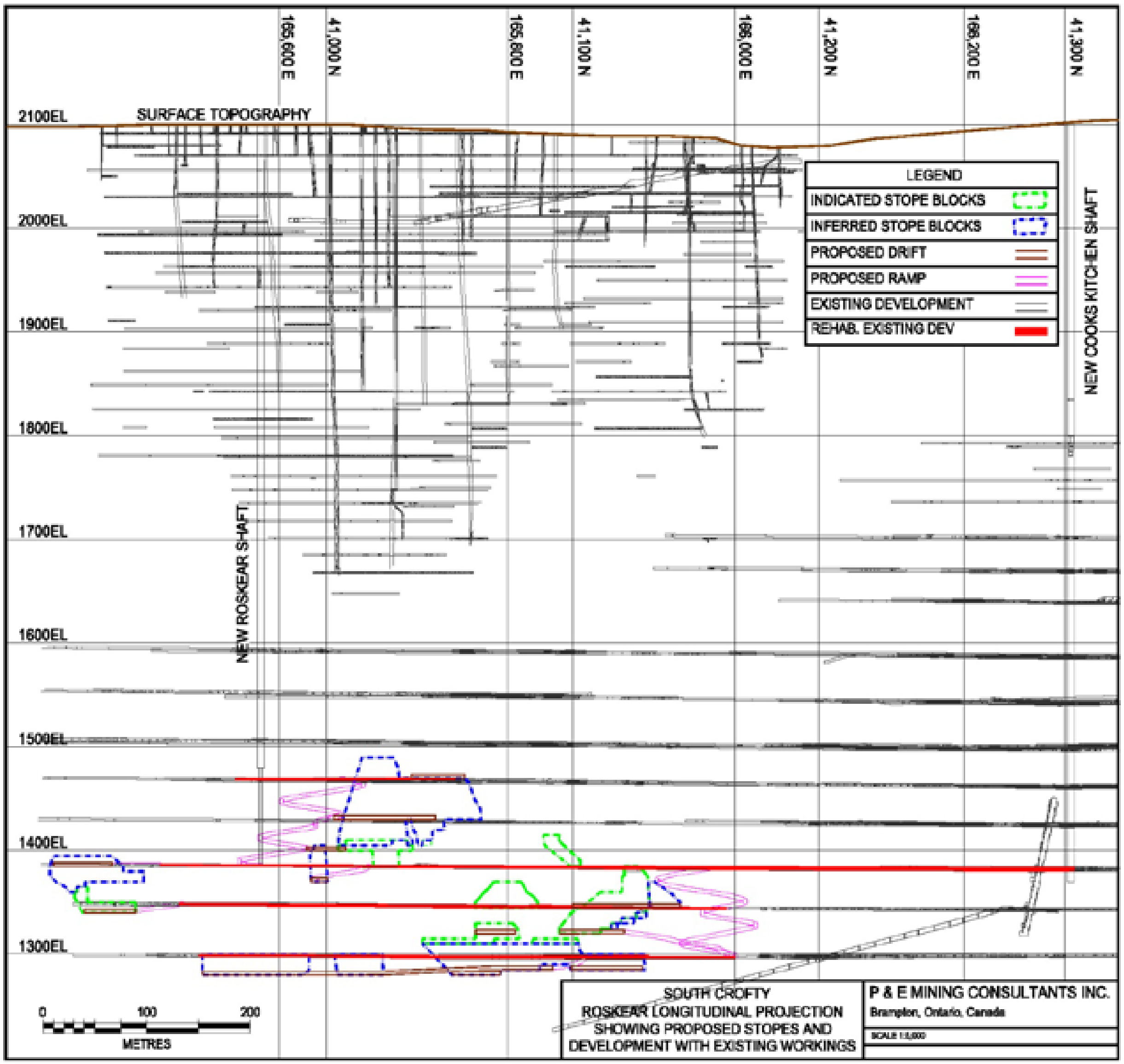


**Figure 16.20 Longitudinal Section of Roskear Mineralized Material Mined**




## 16.8 DEVELOPMENT AND REHABILITATION PLAN

The bulk of the new development and rehabilitation of existing accesses are located within the Dolcoath Upper and Lower Sections. In Figures 16.13 to 16.20 the orange coloured levels are existing development that will be enlarged and ground supported. The grey coloured levels are existing development that will not be rehabilitated. The magenta and brown coloured drifts, decline, or raises are new development.

All new development and rehabilitation of old access/levels will be accomplished with a fleet of new trackless equipment including but not limited to jumbo drills, LHDs, trucks, rock bolters, and other mining support equipment.

The development plan over the first 3-4 years will focus on developing the lower levels, level rehabilitation and access declines to open new stoping horizons. Level development will be focused on the scheduled mining sequence to ensure that all drifts, capital infrastructure, drill drifts and slots are completed ahead of stoping requirements.

### 16.8.1 LOM Capital Development – Declines and Access

Considerable capital development is also required to set up the South Crofty mineralized zones for mining. Mine capital development consists of new ramps and level accesses, vertical raising, new underground service excavation chambers, and old infrastructure rehabilitation. Over the LOM there is approximately 58.6 km of new and old infrastructure work required to support the South Crofty mine plan (Table 16.3).

**TABLE 16.3**
**LOM DEVELOPMENT SCHEDULE**

| UG Development Schedule | Units | Y-1 | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | LOM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Level Rehabilitation | m | 3,780 | 7,560 | 7,560 | 7,560 | 7,560 | 404 | - | 770 | - | 35,194 |
| Ramp Development | m | 1,800 | 2,700 | 2,543 | 2,568 | - | - | 381 | - | - | 9,992 |
| Level Development | m | 360 | 1,620 | 1,777 | 1,576 | 540 | 192 | 883 | 310 | - | 7,258 |
| Vertical Development (raising) | m | 880 | 760 | 600 | 600 | 600 | 600 | 700 | 600 | 574 | 5,914 |
| **LOM Development Metres** | | **7,109** | **12,640** | **12,480** | **12,304** | **8,700** | **1,196** | **1,964** | **1,680** | **574** | **58,647** |
| | | | | | | | | | | | |
| **LOM Development Excavations** | | | | | | | | | | | |
| Mining Equipment and Ventilation | $m^3$ | 3,000 | - | - | - | - | - | - | - | - | 3,000 |
| Sub-surface Mineralized Material Transfer 2,050 m level | $m^3$ | 3,000 | - | - | - | - | - | - | - | - | 3,000 |
| Loading Pocket & Crushing 1,480 m level | $m^3$ | 5,000 | - | - | - | - | - | - | - | - | 5,000 |

## 16.9 DIAMOND DRILLING

The diamond drill program should be designed and planned in conjunction with the mine production plan. P&E has scheduled approximately 40,000 m of underground diamond drilling over the LOM for stope definition. These holes should be drilled from horizontal strike drifts in a vertical fan pattern.

Once in mining operation, additional diamond drill holes must be dedicated for other areas outside the current known mineralized structures within the mine exploration target areas to reasonable depth. No exploration holes were considered or included in this study cost estimate.

## 16.10 WATER SUPPLY

Fresh water supply is available at the existing site location via a six-inch main line and is supplied by South West Water utility. P&E understands that this line actually passes through the location of the future process plant building and the line will need to be rerouted. P&E estimated the cost of relocating the pipeline and included them in the general site utilities installation cost.

When in operation the mine and process water supply will be sourced from the underground workings. The site has an adequate water supply to sustain and support the operations.

## 16.11 MOBILE EQUIPMENT REQUIREMENTS

A summary of the mobile equipment requirements for the 1,000 tpd schedule is presented in Table 16.4.

**TABLE 16.4**
**MOBILE EQUIPMENT FLEET**

| Description | Units |
|---|---|
| Single Boom Jumbo | 5 |
| LHD (3 t) | 5 |
| 20 tonne Mine Truck | 2 |
| Rock Bolter | 3 |
| Pneumatic Longhole Drill | 2 |
| Scissor Lift | 2 |
| Scissor Lift with Charging Wagon | 1 |
| Boom Truck | 1 |
| Flat Bed Carrier | 1 |
| Fuel and Lube Truck | 1 |
| Kubota Tractor | 2 |
| Kubota Man Carrier | 2 |
| Explosive Light Vehicle | 2 |
| Explosives Bulk Carrier (2 t) | 1 |
| Normet Telehandler | 1 |
| Diamond Drill | 1 |
| IT Tool Carrier | 1 |
| Ancillaries (Shop Tools) | Lot |

## 16.12 UNDERGROUND MAINTENANCE

### 16.12.1 Underground Infrastructure Maintenance

Infrastructure to support the underground mining operations at South Crofty will include, but not limited to, the following facilities:

- UG workshop including wash-down and environmental facilities;
- Cement thickened tailings plant;
- Secure store warehouse and yard;
- Office complex including change rooms and emergency first aid facilities;
- Compressor (compressed air) facilities;

- Dewatering and water treatment facilities;
- Main ventilation fans 4-unit assembly;
- Main UG sumps and pumps;
- UG electrical infrastructure;
- NCK shaft hoisting system;
- Tuckingmill conveyor;
- Shaft loadout system including primary crusher;
- New Roskear shaft escape hoist;
- Internal escape and refuge areas;
- Ventilation doors, regulators and walls;
- Core shed and core preparation area;
- Storage yard and underground material laydown areas;
- Communication infrastructure; and
- Other surface and underground facilities.

It should be noted that plans have been developed to construct an underground maintenance/service area. This Project must optimize equipment availability and effective utilization by reducing equipment downtime through an effective and well-planned maintenance program. Surface mobile machinery will be maintained at the surface workshop by Company mechanics and electricians.

### 16.12.2 Underground Mobile Fleet Maintenance

All maintenance and repair of heavy vehicles and machinery will be carried out under a Company maintenance management plan. Once the underground workings are in operation, P&E recommends that the Company should construct a designated maintenance shop to service the following heavy equipment: front-end loaders, production drills, development jumbo drills, and underground support equipment. All major heavy equipment will be maintained underground in the designated maintenance area including work on all associated parts, ground engaging tools and tires.

Since mine development is intensive for only five years, the development equipment will not reach their potential maximum lifetime operating hours. After production year five, lateral development reduces below 2,500 m/year and development jumbos become less of a risk in terms of reliability and operational cost, therefore replacing the units does not make economic sense.

As previously noted, the longhole drill fleet will be capable of drilling up and down holes at various ranges from 51 mm to 106 mm, which will have the capacity to meet production drilling demands of the LOM plan. To address loading and hauling, 20 t trucks combined with 3 t loaders will be purchased.

### 16.12.3 Services Fleet Maintenance

Activities will be carried out by the Company’s underground services crew using a Company fleet to support underground mining. Maintenance of this fleet will be undertaken by the South Crofty maintenance department following a Company maintenance management system.

## 17.0 RECOVERY METHODS

The South Crofty process plant operated until 1988 when processing was transferred to the Wheal Jane process plant and continued until the South Crofty mine was shut down. Material differences in the two flowsheets were the application of heavy media separation ("HMS") at South Crofty and tin flotation at Wheal Jane. Wheal Jane mineralized material contained recoverable copper and zinc which were not present in recoverable concentrations at South Crofty.

The recovery of tin from South Crofty feed was superior at Wheal Jane, attributed in large part to the successful application of tin flotation. For the purposes of this study the South Crofty gravity circuit as it existed at the time of the process plant shutdown and the tin flotation circuit from Wheal Jane were used as a somewhat simplified flowsheet primarily to minimize the number of recycle streams. Metallurgical testwork on representative samples from the current Mineral Resource and a detailed review of past metallurgical work will be required to develop and optimize the flowsheet.

The current provisional flowsheet does not initially include copper-zinc recovery; however late in the mine life commercial levels of copper and zinc in the process plant feed are expected and additional flotation equipment will then be added for their recovery. In addition, removal of sulphides from tin concentrates via flotation may be required. The sulphide flotation circuit, if employed, would be very small and may be operated on a campaign or batch basis.

Figures 17.1 through 17.3 outline the proposed flowsheet. Initial crushing is conducted underground using a jaw crusher and underground surge bin. After hoisting, material is delivered by conveyor to secondary and tertiary cone crushers operating in closed circuit with screens to produce a suitable feed to the grinding circuit. South Crofty process plant feed is characterized as "slimey" and washing of coarse feed using a trommel screen is included. HMS is potentially applicable.

Crushed process plant feed is fed to a conventional rod mill - ball mill combination with the ball mill in closed circuit with screens. Rod mill discharge is fed to a primary gravity circuit using spirals for concentration. Spiral concentrate is cleaned in two stages and fines are directed to the tin flotation circuit. The remainder of the solids reports to a ball mill - classification circuit and secondary spirals. Potentially, a finished concentrate may be generated within this circuit.

Historically, classification was accomplished using spiral classifiers and hydroseparators for size separation prior to gravity concentration. Hydrocyclones may be employed in any future circuit. The classified product is fed to clusters of spiral concentrators to potentially produce a finished concentrate and a middlings product. The middlings are directed to the tin flotation circuit.

A conventional flotation circuit recovers fine tin not recovered by gravity concentration. De-sliming of the flotation feed via cyclones may be required. The flotation circuit is comprised of a rougher-scavenger stage followed by two stages of cleaning to produce a finished tin flotation concentrate.

Toward the end of mine life copper and zinc values in the feed will increase and it is planned to install conventional flotation circuits comprising rougher and multiple cleaner stages for the separate recovery of copper and zinc concentrates.

There are a number of equipment choices and process options available for evaluation which are not incorporated in this study, however, they may be beneficially employed to enhance recovery and/or grade.

**Figure 17.1 Crushing/Grinding Circuit**

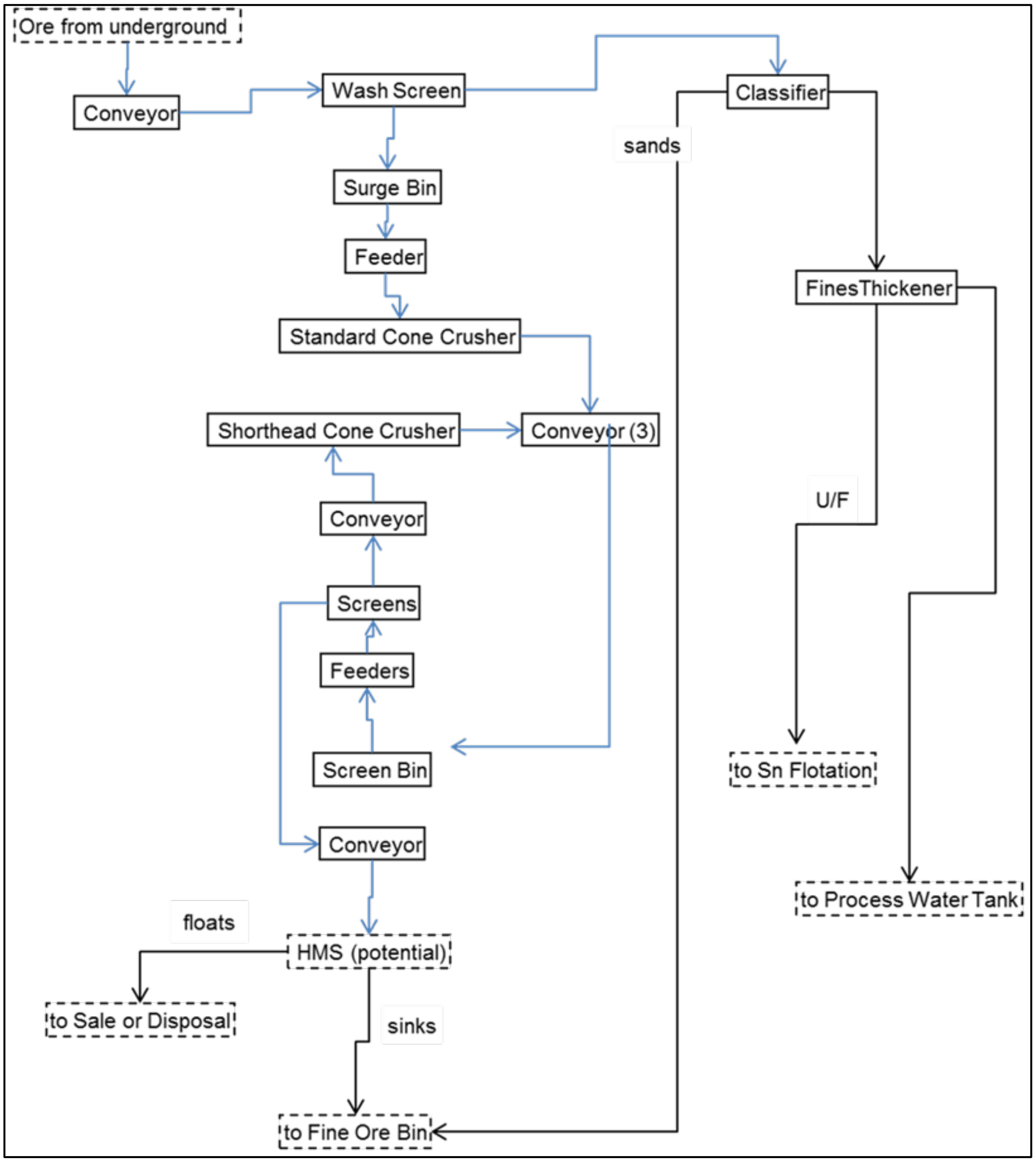
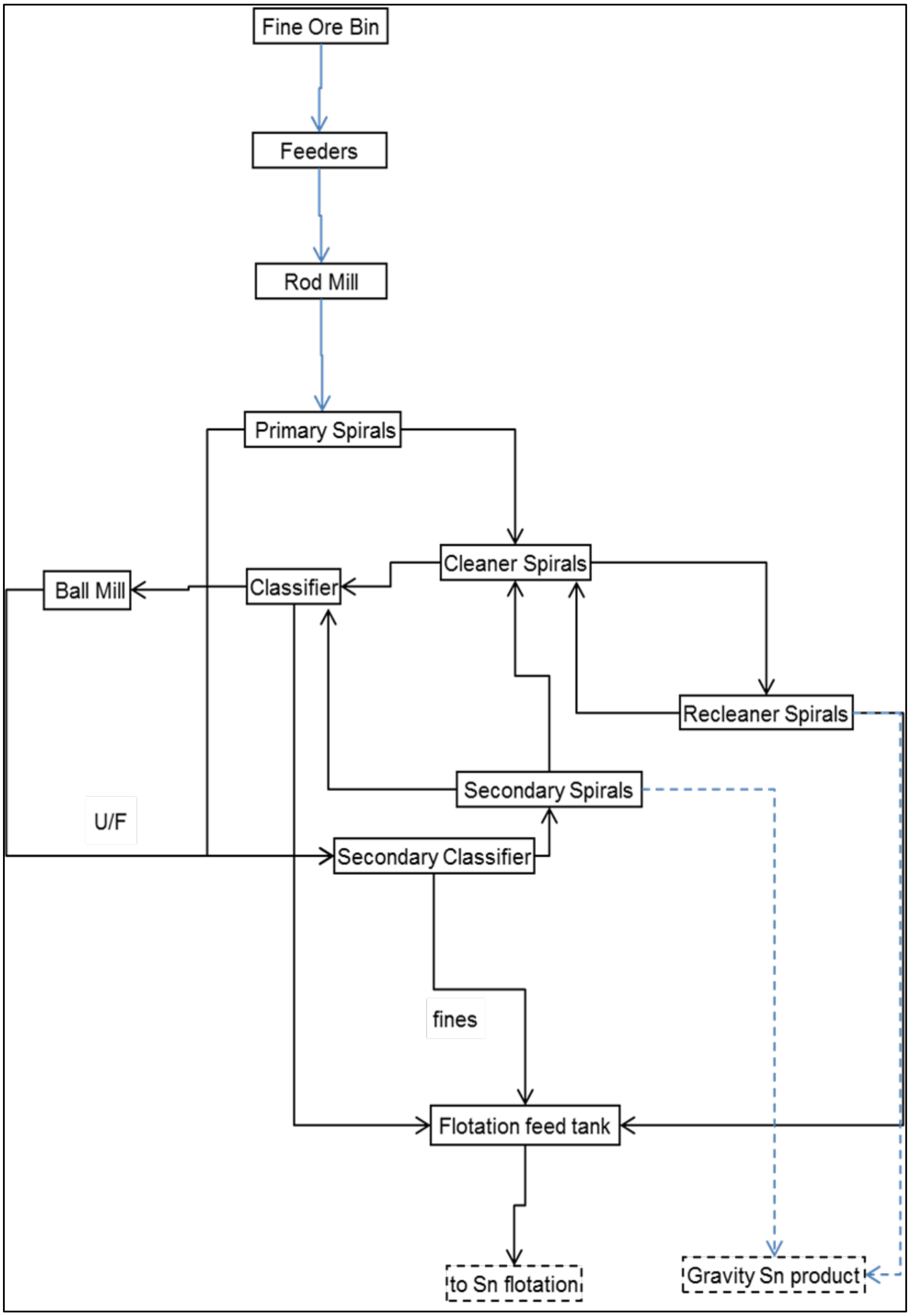
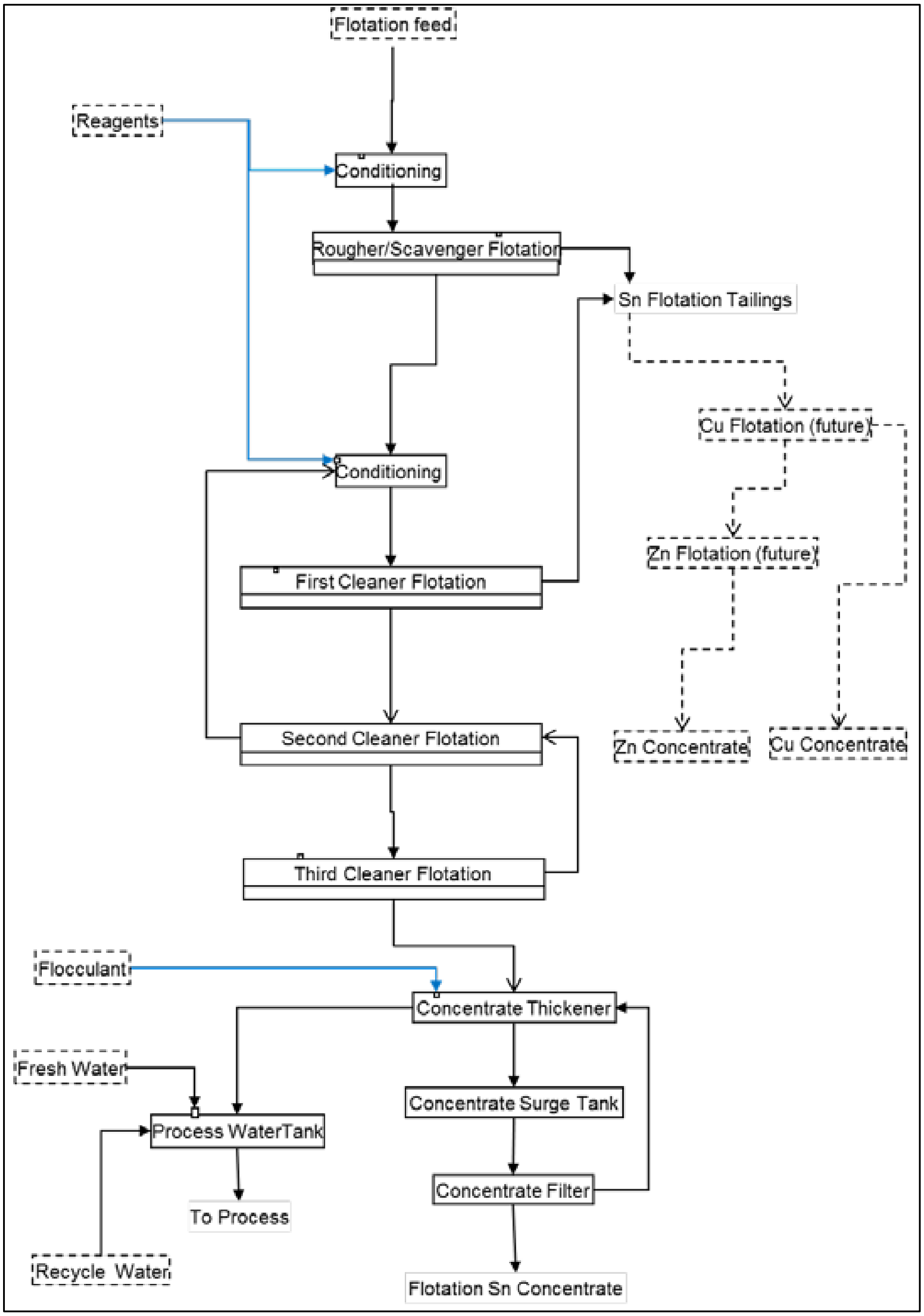


**Figure 17.2 Gravity Circuit**



## Figure 17.3 Flotation/Concentrate Circuit



# 18.0 PROJECT INFRASTRUCTURE

## 18.1 SITE ACCESS ROAD

The Property is readily accessible by a network of existing all-weather paved highways and local roads. These include the two-lane dual paved carriageway highway known as the A30 which is accessed directly using the two-lane paved dual carriageway Dudnance Lane and by the two-lane paved road known as the A3047 which both border the mine site. The main entrance to the Project site is off Forth Kegyn which provides access to Dudnance Lane and the A3047. Refer to Figure 18.3 at the end of this report section for a site layout.

## 18.2 SITE ROADS

The existing gravel road off of Forth Kegyn provides access to the site. A series of on-site gravel roads will be refurbished or re-constructed to allow access from the mine offices and the main site road to the HSE (“Health, Safety and Environment”) store, power generation building, tailings treatment plant, process plant building, water storage tank and the high-density thickeners.

There is an existing emergency exit gate located just south of the existing office building, which provides access to Forth Kegyn. An alternate emergency exit will be created to provide access to Dudnance Lane in the event Forth Kegyn cannot be accessed.

## 18.3 POWER SUPPLY

The power supply network to the mining, processing and support activities on site can be grouped in three areas, namely Grid Power, Voltage Transformer Substation, and Power Distribution.

### 18.3.1 Grid Power

The Project site is located within an industrial area with a highly developed power supply and regional distribution and has two 33 kV overhead power lines which cross the Property. A 5MW dedicated electrical power supply is available now from the national power grid through the existing 3.5MW substation at New Cook’s Kitchen Shaft and it is estimated that 10-12MW can be accessed in the future with proper infrastructure including a new substation.

The total power connected load for the Project is estimated at 10-12MW. However when the Project is operating at steady-state production the power draw is estimated to average 5MW.

### 18.3.2 New Substation

The main substation would include all the switchgear, protection and metering equipment, along with the necessary step-down and/or step-up transformers, to combine emergency generator power with the power available from the national power grid. Power factor correction equipment, if required, would also be located at the main substation level within the vicinity of the Project. The transformers and main switchgear would be outdoors rated and located within a site fenced enclosure area to protect the employees, contractors and visitors, while the metering, protection relaying and control equipment would be housed in a prefabricated containerized shelter in accordance with the power supplier’s design.

### 18.3.3 Second Source of Power (Emergency Power)

Upgrading the existing 3.5MW supply to 5MW will provide emergency power for essential items which can be supported by two 1MW gas turbine generators in the event of complete power failure on the national grid.

### 18.3.4 Power Distribution to Process and Service Areas

Equipment for the power distribution to the required process and service areas will include dedicated breakers for each process area. These will be located at the main substation switchgear. The power will be delivered at a medium voltage level to each process area, where a distribution transformer will step-down the voltage to the level required by the process load Motor Control Center ("MCC"). The battery limits will be at the load side of a breaker or fused disconnect switch on the secondary side of the distribution transformer. The process MCC is included with the process control system.

One MCC will be included for service loads such as general plant lighting, water pumps, etc.

## 18.4 WASTE WATER DISPOSAL

Water treatment trials were carried out at South Crofty from November, 2016, to March, 2017. The purpose of the testing was to demonstrate that suspended solids and metals in solution, principally iron oxide, in the historical South Crofty mine water could be successfully treated, reducing metal content to acceptable standards to allow safe discharge of the water into the nearby Red River. Untreated mine water is presently discharging continuously into the Red River, therefore the proposal to treat the water during the dewatering phase represents a significant improvement over the current conditions of the Red River environment. The large scale trial treated 18 $m^3$/hr of mine water. The trial utilized Siltbuster Processing Solutions' High Density Sludge process ("HDS"). The trial provided performance data for design of a full-scale plant and will be used to support the Company's upcoming Discharge Consent permit application. The Company intends to apply for a permit to treat and discharge up to 25,000 $m^3$/day of mine water. This will allow the mine to be dewatered over an 18 - 24 month period. Similar treatment facilities are already in place at the nearby former Wheal Jane tin mine, and have been operating successfully since 2000.

The proposed process is a 6-stage Siltbuster designed system:

1) Add hydrogen peroxide to oxidise the water to convert As3+ to As5+.
2) Lime dosing to increase the pH of the mine water to 10.5 from 6.5.
3) Pass water through the HDS tank. Slurry promotes effective adsorption of metals.
4) Add flocculent.
5) Collect flocs in a lamellar settling tank.
6) Add $CO_2$ to reduce the pH below 9 for discharge.

Sludge will initially be disposed of at a nearby tailings facility, and once in production will be mixed with tailings as backfill and deposited underground.

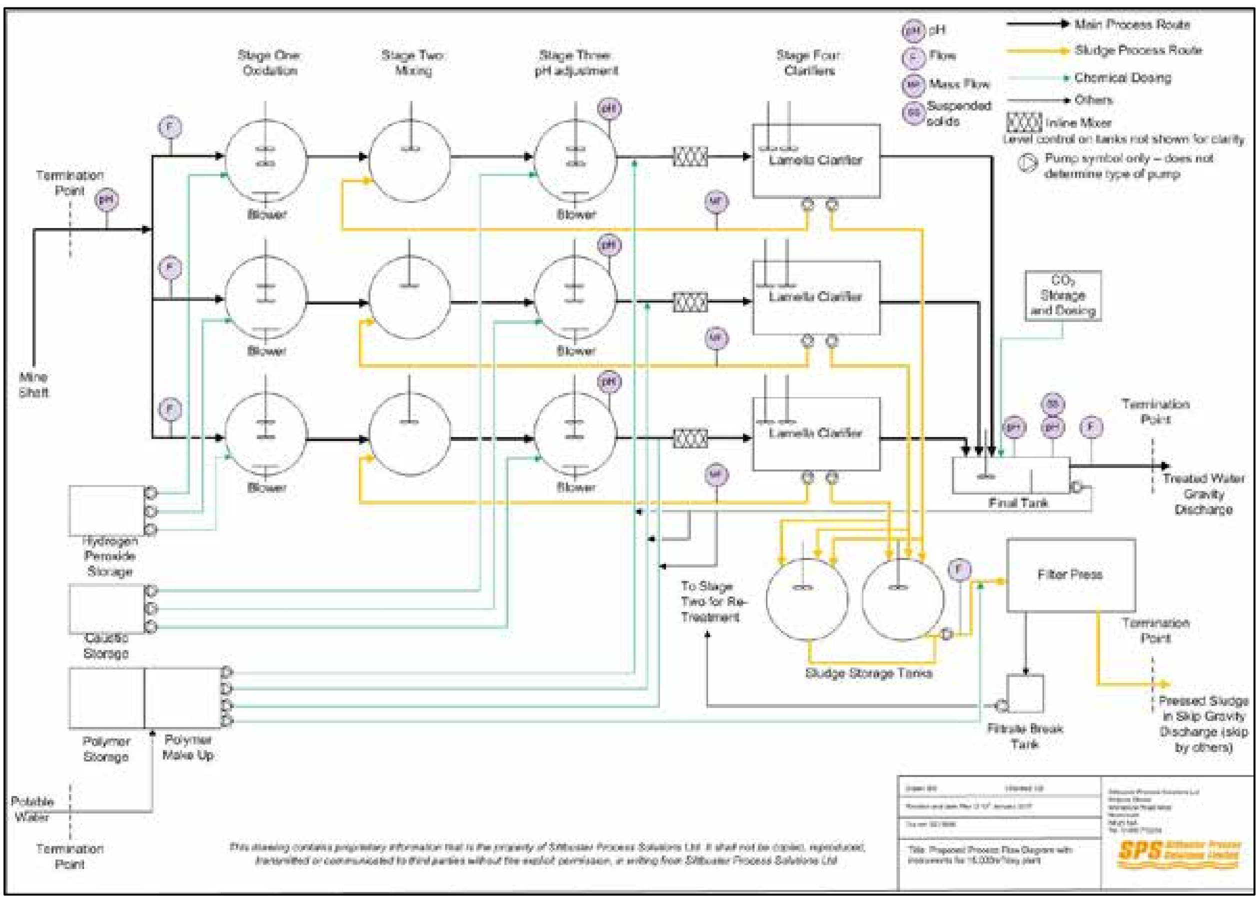
During production, a steady-state dewatering program of 5,500 to 6,500 $m^3$/day will be maintained subject to annual precipitation variations.

Two water treatment plants with capacities each of 10,000 m$^3$/day and 15,000 m$^3$/day will be installed beside each other, located next to the main process plant. The two treatment plants will essentially make up a single plant with 5 x 5,000 m$^3$/day treatment lines running in parallel, sharing a single reagent make-up system and sludge de-watering system but with individual dosing and process control systems for each line. Strongbow is anticipating to permit two discharge points:

- 1 x 10,000 m$^3$/day surface water discharge into the Red River next to the process plant; and
- 1 x up to 25,000 m$^3$/day groundwater discharge to Middle Engine Shaft, which is located adjacent to the treatment plant. This shaft is connected to Dolcoath Deep Adit and will eventually discharge into the Red River further downstream at Roscroggan.

A drawing of the process flow diagram for a 15,000 m$^3$/day water treatment is presented in Figure 18.1.

**Figure 18.1 Water Treatment Plant Process Flow Diagram for 15,000 m$^3$/day**




Mine water will be pumped from New Cook's Kitchen Shaft to the combined treatment plant and then treated water will discharge via either or both discharge points, depending on the flood risk in the Red River at any given time.

Once the mine is dewatered, the water treatment plant will reduce to steady-state running and 3 of the 5 lines could either be decommissioned / sold or they could be retained and used to treat water from the Dolcoath Mine or Carn Brea Mines, if it is decided to dewater these areas in the future.

A portion of the treated waste water will be recycled back into the process plant for re-use.

## 18.5 BUILDINGS

The site will accommodate a process plant, tailings treatment and pumping plant, underground mine accesses (shafts and decline ramp), core storage area, two-story mine and administration building/office, access site gate house, and supply infrastructure such as power plant, electric substation, miners dry/change building, maintenance shop (electrical and mechanical), fuel storage tanks, warehouse and stores, and compressor house.

Costs for all buildings and structures include site preparation, construction and construction materials, installation of all mechanical and electrical equipment, testing and commissioning.

The process plant and the mine related surface infrastructure are included elsewhere within this report.

### 18.5.1 Emergency Power Generation

The emergency power generation structure will either be a fully enclosed pre-fabricated building including all auxiliary equipment or a series of connected containers;

### 18.5.2 Substation

The substation will be a fully enclosed pre-fabricated structure;

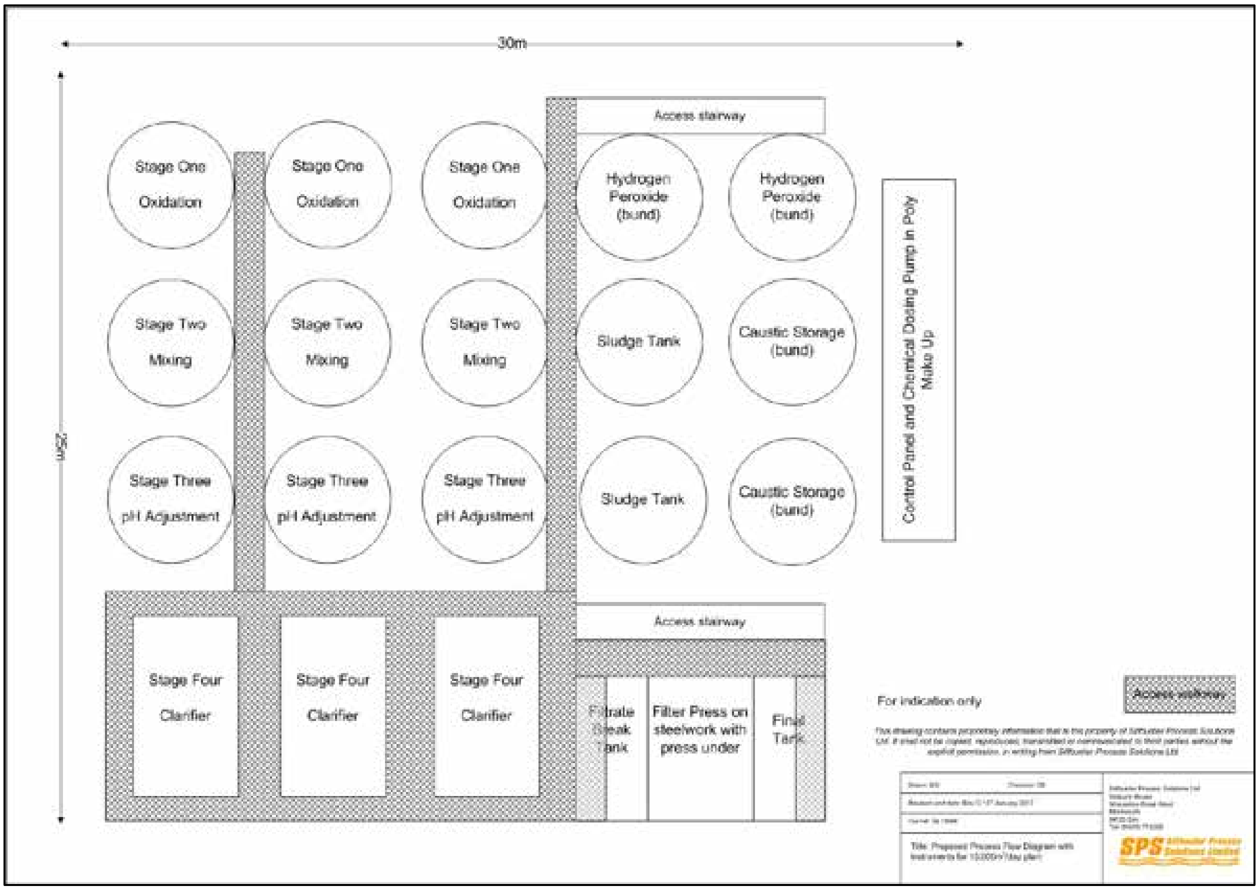
### 18.5.3 Water Treatment Plant

The water treatment plant will house all tanks, relays, connections and pumps in a pre-fabricated structure. Figure 18.2 presents a possible configuration for the 15,000 $m^3$/day water treatment plant.

### 18.5.4 Environmental Office and Water Treatment Supplies Store

The Environmental Supplies Store will contain combustible material and therefore be a more robust structure, with fencing and a perimeter berm to protect the employees, contractors, visitors and environment.

**Figure 18.2 15,000 m³/day Water Treatment Plant Layout**




## 18.6 ANCILLARY FACILITIES

### 18.6.1 Existing Office Depot

There is an existing office structure on site that is expected to be maintained in good condition. It will likely require some refurbishing, including appropriate partitioning and updating of electrical facilities and lighting.

### 18.6.2 Two Story Mine Office

This structure will include a new addition to the existing office structure. This will be a pre-fabricated, two-story office building with allowances for all fixtures, basic furnishings and finishes.

### 18.6.3 Miners Dry

This structure is a new pre-fabricated structure containing adequate wash and change facilities and related infrastructure.

### 18.6.4 Explosives Storage Facility

This structure would be constructed at a safe distance from surrounding facilities, according to regulations.

#### 18.6.5 Weighbridge and Security Office

This pre-fabricated structure would house staff for controlling access and egress of personnel and weigh-in/weigh-out of equipment.

#### 18.6.6 Archive and Store

This is a new structure for goods in and stored, document archive, drill core facility etc.

#### 18.6.7 Fuel Depot

The fuel depot will be an open air depot that will house pumping stations for both diesel and gas powered vehicles, as well as diesel for the plant. It will be constructed with adequate surrounding berms according to local regulations.

### 18.7 OTHER

#### 18.7.1 Ponds

Containment ponds for industrial use will be constructed, including one for fire suppression water/process water. Although the primary source of water for the fire suppression system will come from the municipality, the pond will act as a backup and will be tied into the fire loop.

#### 18.7.2 Sewage

Sewage will be collected from the various facilities and pumped to the municipal sewage collection system.

#### 18.7.3 Temporary Construction Facilities

For the duration of the preproduction construction work, portable temporary office and facility trailers will be used.

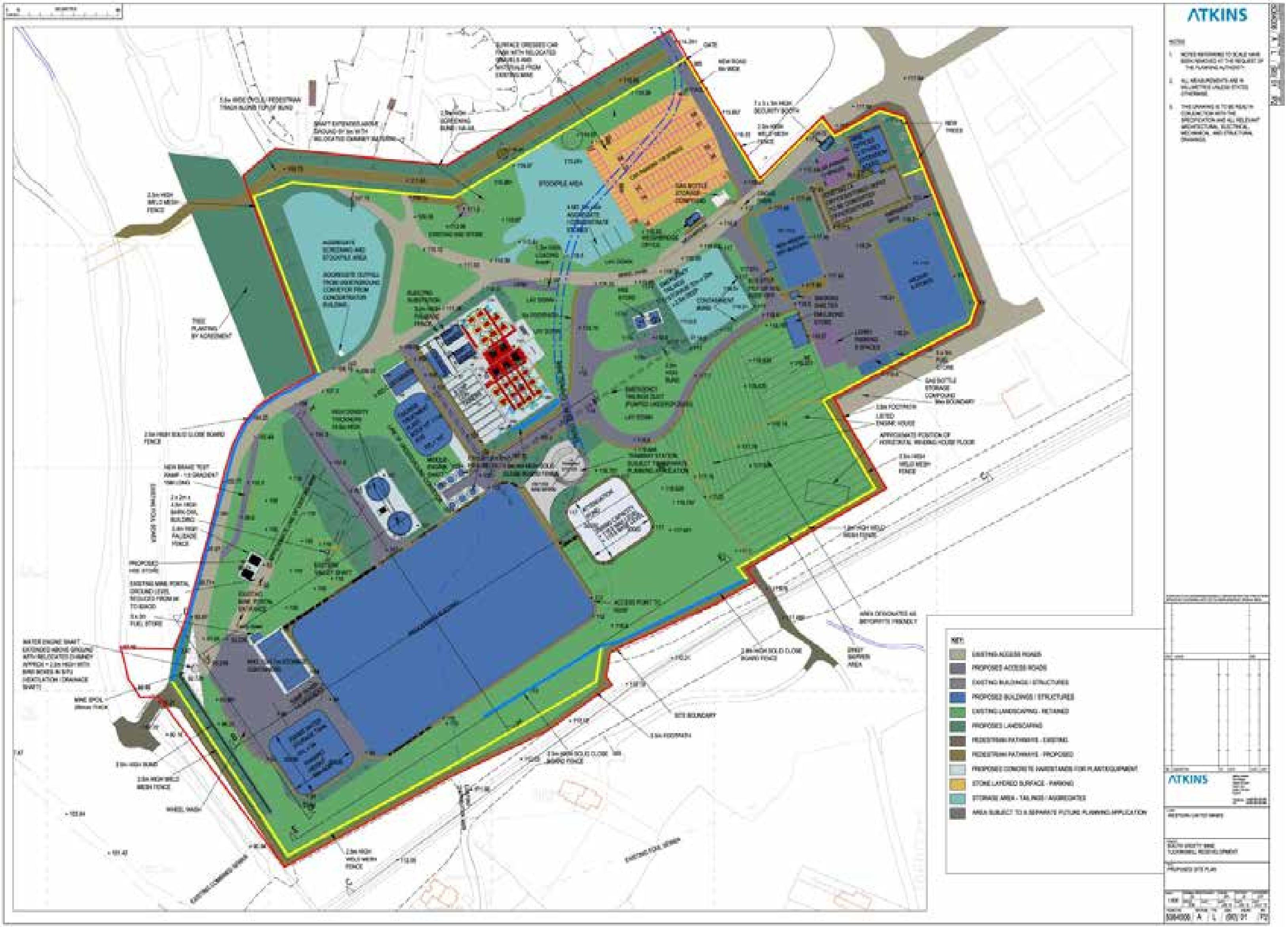
#### 18.7.4 Construction Fill Materials

Structural fill material will be sourced on-site or will be imported from local suppliers as required.

### 18.8 SITE LAYOUT

The proposed site layout (Figure 18.3) is based on the drawings developed by Atkins for permit applications. The Project will be developed and constructed in accordance with the current permitted site layout, which received full conditional planning permission on November 3, 2011, and was confirmed to be extant by Cornwall Council on January 30, 2017.

## Figure 18.3 Schematic Surface Layout



## 19.0 MARKET STUDIES AND CONTRACTS

There are no material contracts pertaining to the South Crofty Project. The Project is open to the spot tin price market, along with copper and zinc, and there are no streaming or forward sales contracts in place.

A tin price of US$10/lb has been based on a five year forecast to 2020 by BMI Research in their report titled "BMI Tin Report Q1 2017" dated October, 2016. The report states that "(Tin) p*rices will increase gradually to USD22,000/tonne by 2020…as the global tin market posts sustained market deficits and inventories dwindle.*"

A copper price of US$2.65/lb and a zinc price of US$0.90/lb have been based on LME approximate two-year trailing averages at March 31, 2016, which were current prices when P&E compiled the Mineral Resource Estimate.

## 20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

The historic South Crofty Mine is situated in the town of Pool between Camborne and Redruth in Cornwall, England. It is part of the Cornwall and West Devon Mining Landscape, and is part of a United Nations Educational, Scientific and Cultural Organization ("UNESCO") designated World Heritage Site comprised of mining landscapes in Cornwall and West Devon. Mining activities at South Crofty are thought to have started circa 1592 with full scale mining commencing in the mid-17$^{th}$ century. Mining activities ceased at South Crofty in 1998.

Conditional permissions were granted for the above-ground (surface) and below-ground (underground) activities at the South Crofty mine in 2011 and 2013, respectively, based on a proposal that had been prepared and submitted by WUM. The Environment Agency has agreed with WUM that the standard for the interim water discharge quality that will apply while dewatering will be set at the conclusion of dewatering trials that have just been completed.

Environmental Statements for the Project as proposed by WUM were prepared in support of its applications for permissions. The Project as proposed at that time received local government and public support and was later opposed to by UNESCO in 2012. However, UNESCO has no jurisdiction over UK planning decisions. UNESCO World Heritage Sites are managed and represented in the UK by Historic England (formerly English Heritage) a non-departmental public body of the British Government sponsored by the Department of Culture, Media and Sport. Historic England ("HE") is the consultee under UK planning law charged with protecting and managing the interests of UK World Heritage Sites. Accordingly, HE was the consultee during the South Crofty surface planning application process and was consulted on all aspects of the application. Agreement was reached between WUM, HE and Cornwall Council, and the conditional planning was duly granted on November 3, 2011 and subsequently declared to be lawfully implemented and extant on 30$^{th}$ January, 2017.

The reader is cautioned that P&E has not reviewed the permitting requirements for the Project and has relied on summary information regarding permitting that has been provided by Strongbow.

## 20.1 SCOPE OF THE PROJECT

For the purposes of this PEA the scope of the "Project" includes:

- A 1,000 tpd underground mechanized mining operation;
- An on-site mineral processing facility;
- Tailings would be used as thickened backfill, and along with development waste rock, would all be disposed underground;
- Excess water would be treated and discharged into the Red River, where it would make its way to the sea; and
- Tin, copper and zinc concentrates would be trucked offsite.

The scope of works described in the existing surface and underground conditional permissions are likely adequate for the future development of the Project. This Technical Report includes a recommendation that the Project be advanced to the next level of engineering study. As the Project moves through advanced levels of study the scope of the Project and the scopes described in the conditional permissions should be critically compared and assessed on an ongoing basis taking the Outstanding Universal Value ("OUV") and other relevant aspects into consideration.

## 20.2 PERMITTING

Cornwall Council, the Local Planning Authority ("LPA"), issued a Grant of Conditional Planning Permission ("permission") for Project-related surface activities in 2011 and another for Project-related underground activities in 2013 based on the scope described in the applications submitted by WUM. These two permissions permit mining and milling operations to 2071. Under the Town and Country Act 1990, Schedule 5, Part 1, s.1(2) the winning and working of minerals or the deposit of mine waste must cease not later than 60 years after the date of the permission (www.legislation.gov.uk).

This PEA assumes that waste rock and thickened tailings would be used to backfill mined-out workings. The underground permission requires tailings leach testing and LPA approval before tailings can be used for underground backfilling. The permissions also require other LPA approvals as the Project is advanced and the PEA assumes that such approvals would be obtained.

The next permit that WUM will apply for is the Mine Waste Permit with Water Discharge Consent. Once this permit is granted, then WUM will be able to commence dewatering activities and discharge treated mine water into the Red River via the consented discharge points.

### 20.2.1 Surface Permission

Cornwall Council issued the Grant of Conditional Planning Permission (Decision PA10/04564, dated November 3, 2011) for the Project surface activities. The scope of the Project as described in a July 2010 application included the proposed modernization of the South Crofty Mine to allow continuation of winning and working of minerals by relocation to land surrounding the Tuckingmill Decline and by erection of buildings, plant and works for mineral processing, ancillary processes, associated operations and deliveries, comprising:

- The main processing plant building also containing associated engineering works for additional accesses to the underground mine;
- Electricity substation, aggregate store, fuel storage, explosives storage;
- Tailings treatment;
- Emergency tailings storage;
- Ancillary buildings (i.e. high density thickeners, security, pumped mine water storage, loading ramp, chemical silo's, bottled gas compound, offices, changing rooms, stores, archive, vehicle and plant maintenance, storage containers);
- Earth works, mine shaft ventilation caps;
- Surface water management, water treatment plant;
- Access roads, car park areas, weighbridge and wheel washes; and
- Aggregate screening and stockpiling area.

Under the terms of the surface permission, the permitted surface development was to be commenced by November 3, 2016. In September and October, 2016, eight key surface conditions (numbers 6, 7, 8, 9, 10, 11, 12 and 32) were discharged by Cornwall Council which allowed construction work to commence. A 5 m section of concrete kerb was then installed along the main road into the Project site and a Certificate of Lawfulness for Proposed Use or

Development was issued by Cornwall Council dated January 30, 2017, effective November 18, 2016. The Certificate of Lawfulness states that development has materially commenced in connection with PA10/04564 and that permission is therefore considered to be extant. The Grant of Conditional Planning Permission extends to June 30, 2071.

The surface permission takes local and regional planning into consideration. As indicated in the surface permission, the development plan for this area comprises the Cornwall Structure Plan, adopted 2004; and the Cornwall Minerals Local Plan ("CMLP") adopted in 1998. Other documents of material consideration are the Regional Planning Guidance ("RPG10") adopted in 2001, the Regional Economic Strategy 2006 and National Planning Policy in the form of Planning Policy Statements ("PPS"s) and Minerals Policy Statements ("MPS"s). Part of the site falls within the Camborne and Redruth Mining District World Heritage Site ("WHS"). The installed Kerrier District Local Plan ("KDLP") and the emerging Camborne Pool, Illogan and Redruth Area Action Plan were also material considerations. The KDLP having not been adopted was given limited weight.

### 20.2.2 Underground Permission

Cornwall Council issued the Grant of Conditional Planning Permission (Decision PA10/05145, dated January 7, 2013) for underground activities and authorises:

- The underground winning and working of minerals within an area outlined on an drawing attached to the application;
- The development of surface operations ancillary to mining including the use of seven shafts for mechanical ventilation purposes (namely Robinsons, Middle Engine, Trevenson, Taylors, Williams, New Roskear and Simms);
- The continued use of New Cook's Kitchen Shaft with the potential for mineralized material hoisting only with the prior written approval of the LPA;
- The retention of use of Maynes, Palmers, Caravan, Tredinnicks, Druids Whim, Dunns, Daylight shafts and their existing surface developments;
- The use of Water Engine and Gossan shafts and their proposed surface developments as approved by the LPA; and
- The development of surface operations at or the use of other shafts (apart from those listed above) for access /ventilation purposes, necessary for and ancillary to mining operations with the prior written approval of the LPA.

## 20.3 ENVIRONMENTAL STUDIES

Atkins Engineering Limited completed two environmental statements for the below-ground and above-ground works at the South Crofty Mine. The combined cumulative impacts are summarized in Table 20.1. Hogg (2012) indicates that permits are in place for future operations including water discharge subject to definition of discharge criteria to be determined by the Environment Agency on the conclusion of WUM's water treatment trials.

| TABLE 20.1<br>ENVIRONMENTAL ASPECTS AND IMPACTS | |
|---|---|
| **Level of Impact** | **Aspect** |
| Very High Importance | Economic and Social Impacts are major, and beneficial.<br>Cultural Heritage and Archaeology impacts are moderately beneficial. |
| High Importance | Landscape and Visual impacts are moderate adverse (nil for underground).<br>Land Stability impacts are nil. |
| Medium Importance | Flood Risk and Surface Water Drainage impacts are slightly adverse (surface).<br>Hydrology and Hydrogeology impacts are slightly adverse (underground).<br>Noise and Vibration impacts are slightly adverse.<br>Air Quality impacts are slightly adverse.<br>Ecology impacts of the surface redevelopment are slightly adverse, but of the underground operations are beneficial.<br>Traffic and Transport impacts are slightly adverse (nil for underground). |
| Low Importance | The impact on Land Quality is nil. |

***Source:*** *Hogg (2012).*

Atkins (2014) reports the proposals included the relocation of the processing plant and associated silos, tanks and other structures close to the existing mine portal at Tuckingmill Decline. This would allow the mine to function in a more efficient and environmentally sustainable way. The relocation would release land to enable completion of a link road and other proposed regeneration strategies for the area. The EIA addressed the special cultural heritage of the site, which has three Grade II listed mine structures and lies partly within the Cornwall and West Devon Mining Landscape World Heritage Site. Other assessed issues included mine drainage, surface water run-off and dealing with contamination from former mining activities. The site has important ecology, including lichens, bryophytes and bats which have evolved because of the mining activities, and is maintained and managed through an environmental management plan developed through the EIA.

## 20.4 SOCIAL OR COMMUNITY IMPACT

Environmental Statements for the Project as proposed by WUM were prepared in support of its applications for permissions.

Based on P&E's review of Project documentation provided to it and publicly available information, the Project as proposed in 2011 was not materially objected to with one exception. It is understood that in 2012 UNESCO expressed its opposition to the Project as proposed in 2011. It is worthy to note that UNESCO has no jurisdiction over planning decisions in the UK and its statement of opposition was made after the conditional planning permission had been granted.

## 20.5 CLOSURE

The mine would be closed in an orderly manner based on a closure plan that would be regularly updated and refined over the life of the Project. The key objectives of the closure plan would be to provide a safe and physically and chemically stable closed site, and comply with surface and underground planning permission closure requirements. Valued historic buildings and features including any facilities to be left in place at closure would be protected. P&E expects that certain site features would need to be left in place to help maintain the valued historic aesthetics and character of the area. Equipment, hazardous and non-hazardous wastes and unused fuel, lubricants and chemicals would be removed and disposed in accordance with regulatory requirements.

The shafts and portals would be gated to accommodate bat refuges or otherwise securely sealed. The underground mine would be allowed to naturally flood and water draining from the lowest mine opening at surface would be directed to the Red River and then to the sea. It is envisaged that the reclaimed site would be available for commercial and aesthetics amenity uses.

The mine would progressive carry out closure works over the operating life of the mine and complete the final closure works at the end of operations. It would then monitor the performance of the closure works for five years consistent with surface permission aftercare period requirements. A certificate of compliance would be issued to the mine owner by the Mineral Planning Authority ("MPA") upon the acceptance of the completed closure works and aftercare monitoring results. It is assumed that the mine would set aside funds for the care and maintenance of the mine drainage pipe line and shaft caps over the long term, and that the closure funding would be accrued over the life of the mine on a cost per tonne processed basis.

### 20.5.1 Surface Permission Closure Requirements

As defined in the surface permission, a surface restoration scheme would need to be submitted for approval at least two years prior to the expiration of the date in the permission or within two years of the permanent cessation of mineral working whichever is the sooner. The scheme is to detail:

- The nature of the intended after-use of the site;
- The sequence and phasing of the restoration;
- Remediation of any contaminated land as necessary;
- The ripping of any compacted layers of the final cover to ensure adequate drainage and aeration; such ripping to take place before the placing of topsoil.
- The machinery to be used in any soil re-spreading operations;
- The final levels of the reclaimed land and grading to prevent ponding of surface water.
- Drainage of the reclaimed land including the formation of suitably graded contours and the installation of artificial drainage as necessary;
- The reinstatement of the site and access roads by clearing plant, buildings and machinery, hardstandings, concrete and brickwork;
- Surface treatment of reclaimed areas.
- The planting and maintenance of trees, shrubs and hedgerows as appropriate including location, species, size, number and spacing.
- The seeding, fertilising, watering, draining or other treatment of the land;
- Location and type of fencing and gates; and
- Time-scales for implementing and completing the works, and schedule of buildings and structures to remain and those to be removed. The surface permission indicates the structures that are to be removed as part of the restoration scheme, and the buildings/structures (capable of non-mineral after-use) that may be retained.

### 20.5.2 Underground Permission Closure Requirements

A restoration scheme for the surface features and shafts needs to be submitted for approval by the LPA at least two years prior to the expiration of the permission or within two years of the permanent cessation of mineral working. The scheme needs to detail:

- The nature of the intended after-use of the surface features and shafts;
- Mine water treatment;
- Ventilation fans removal;
- Reinstatement of shafts to accommodate bat refuges; and
- Restoration sequence, phasing and timescales.

## 21.0 CAPITAL AND OPERATING COSTS

### 21.1 BASIS OF COST ESTIMATES

The South Crofty mine has been in operation under different ownerships until 1998. Mining ceased as a result of low tin prices and narrow mining zones with low production levels. For this study a 350,000 tpy production rate has been targeted and scheduled after two years of ramp-up, with one final year of wind down. It was assumed that historical mine costs will not be relevant for the current exercise, therefore first principle and equipment quotes from similar projects have been considered when estimating the operating and capital costs.

Consequently, the cost estimates for this Project are based on the following methodologies and assumptions:

- First principle development and stoping costs;
- Major equipment budgetary quotes on many items. P&E database used for other major mine and plant equipment purchase costs;
- First principle equipment operating costs;
- First principle labour costs including burden and other contribution levels paid by the Company;
- LOM production schedules as developed by P&E;
- Mining equipment requirements as established by P&E;
- Freight, duties, taxes and vendor commissioning costs are included in equipment costs;
- Actualized estimates to Q4 2016 dollar value for the backfill work, based on a 2008 quotation;
- P&E assumed cost for mine closure;
- P&E experience to build and operate a cemented thickened tailings backfill plant, including cement requirements;
- Exploration drilling requirements as established by P&E. Note that current costs have been assumed from similar projects to estimate the annual cost for this activity;
- Mine production labour levels derived from P&E's LOM production schedule;
- Company supplied figures for concentrate freight, smelter treatment and refining costs were accepted in the current estimates, after comparison with P&E's database;
- The estimates are expressed in Q4 2016 US dollars, without escalation; and
- Where applicable, the exchange rate used was 1.25 USD per GBP.

Capital cost estimates have an accuracy level of ±35% for all items and include a 15% contingency on all capital items except for the process plant for which a 35% contingency has been applied. This is in line with accuracy levels expected for a PEA.

This report does not include any contingency on operating costs due to incorporating first principle calculations.

### 21.2 CAPITAL COSTS

The starting point for financial analysis and capital cost estimation is from the time that a production decision is made by the Company. It assumes that engineering studies and Project financing arrangements are in place, and that Company costs to sustain the Project in the interim have been paid.

The initial dewatering, surface and underground infrastructure capital for the South Crofty Project is estimated at US$118.7M. The estimate was assembled using historical data from similar projects, scoping level input from various vendors and owner supplied costs which are considered to be reasonable within the current estimates for this report.

The pre-production capital cost estimate is presented in Table 21.1.

**TABLE 21.1**
**PRE-PRODUCTION CAPITAL COST ESTIMATE**

| Capital Cost Area | Y-2 | Y-1 | Total US$M |
|---|---|---|---|
| Pumping, Shaft Refurb and Water Treatment | 25.2 | 8.8 | 34.0 |
| Mining Equipment and Ventilation | - | 3.6 | 3.6 |
| Mine Development | - | 4.2 | 4.2 |
| Sub-surface Material Transfer and Conveyor to Mill | 2.5 | 3.5 | 6.0 |
| Level Development Rehab | - | 2.8 | 2.8 |
| Surface Processing Plant | 22.6 | 15.1 | 37.7 |
| Thickened Tailings Fill Plant | 3.5 | 7.5 | 11.0 |
| Site Infrastructure | 7.5 | - | 7.5 |
| Owners Costs | 0.6 | 0.7 | 1.3 |
| Contingency @ 15%* | 5.9 | 4.7 | 10.6 |
| | | | |
| **Total Pre-production Capital Cost** | **67.8** | **50.9** | **118.7** |

***Note:*** *The process plant contingency is 35% and is not included in the overall 15% contingency.*

Once the Mine Waste Permit With Water Discharge Consent is applied for and obtained, dewatering of underground workings can proceed. Pumping will start after a 25,000 m3/day water treatment plant has been installed on surface and a specialized shaft mining contractor has been hired. Site rehabilitation, pumps, and set up for dewatering is estimated at US$3.2M. The shaft contractor will refurbish the New Cook's Kitchen Shaft as dewatering occurs, from a stage (working platform), which will also hold the dewatering pump. New Cook's Kitchen shaft rehabilitation is estimated at US$13.8M and includes new skips, cages, ropes, drives, controls and refurbishment. Mine dewatering is estimated at US$13.2M, and includes the water treatment plant estimated at US$5.5M based on a quotation from Siltbuster, and sludge disposal. Sludge from the water treatment plant will be transported to a local waste facility and disposed in the tailings dam.

The amount of water to be pumped from the South Crofty underground openings is estimated at 10M m3. This estimate is based on the principle that it took approximately two years of free inflow to fully flood the mine after it shut down in 1998. Pumping records from last year of operation have also been considered to estimate the daily inflow.

The pumping and underground rehabilitation work will operate in tandem with a network of high-head / high-capacity turbo submersible pumps connected to two 10 inch shaft dewatering main pipelines. The mine will dewater the workings progressively and concurrently as the refurbishing of the mine level accesses and required shaft stations advance.

The South Crofty Mine is to be accessed as part of the Project using the New Cook's Kitchen Shaft as the main access, progressively dewatered to the lowest levels of the mine. As part of the dewatering program the New Cook's Kitchen and Roskear Shafts will be refurbished. All levels required to access the mineralized zones will be enlarged for trackless mining equipment and/or rehabilitated to ensure safe access into all designed mining areas. The mineralized material-pass/waste-pass system will be re-established, along with the shaft process plant feed transfer system, including but not limited to, a decline conveyor from the lowest level of the mine to the shaft loading pocket level, one connection level between the two shafts for second egress purposes and ventilation, and the Tuckingmill rock transfer decline and conveyor to the South Crofty process plant.

Table 21.2 presents the process plant capital cost estimates. The costs do not include the Cu/Zn recovery circuit, as it is installed later in the mine life. The total capital cost to build the process plant is estimated at US$37.7M and includes a 35% contingency.

**TABLE 21.2**
**PROCESS PLANT CAPITAL COST ESTIMATE**

| Cost Item | US$M |
|---|---|
| **Direct Costs** | |
| Site Development | 1.0 |
| Feed Receiving | 1.2 |
| Crushing | 5.3 |
| Grinding | 4.2 |
| Rougher Scavenging | 1.8 |
| Cleaner Flotation | 0.1 |
| Product Thickener | 0.5 |
| Flotation Filtration | 0.4 |
| Flotation Reagents | 0.1 |
| Utilities and Services | 1.6 |
| Process Building | 2.4 |
| Laboratory | 0.1 |
| Tailings | 0.2 |
| Subtotal | 19.0 |
| Construction Indirects | 3.9 |
| Project Indirects | 5.1 |
| Contingency @ 35% | 9.8 |
| | |
| **Total** | **37.7** |

A tailings disposal facility which includes tails thickener, two agitator tanks, tails pump and cement slurry installation is estimated at US$ 11.0M. The Project permits do not allow for a tailings dam, so all of the tailings will need to be placed underground. Since the rock strength conditions at the mine are good, the tailings will require minimal cement content. Thickened tailings with cement can be used to maximize mineralized material extraction and minimize dilution in longitudinal longhole stopes, and can be used to build sill pillars. A detailed engineering study should be completed during the next stage of engineering study for the backfill plant including unconfined compressive strength and rheology testwork for South Crofty tailings, and to determine if less expensive thickened tailings are suitable for disposal underground compared to paste fill.

The sustaining capital cost to develop or refurbish all required mining levels at South Crofty has been estimated at US$83.8M which includes underground development, equipment sustaining capital, all associated labour, stope definition diamond drilling, and other surface and underground infrastructure to support the Project for the duration of the mine life. Sustaining capital also includes US$3.7M in Production Year 7 for the installation of a Cu/Zn recovery circuit so that the Upper Mine zones can be processed at the end of the mine life. All sustaining capital includes a 15% contingency.

Underground capital development quantities over the LOM at South Crofty are presented in Table 21.3.

**TABLE 21.3**
**UNDERGROUND CAPITAL DEVELOPMENT QUANTITIES**

| UG Development Item | LOM Metres |
|---|---|
| Level Rehabilitation | 35,194 |
| Ramp Development | 9,992 |
| Level Development | 7,258 |
| Vertical Development (raising) | 5,914 |
| Mineralized Material Development | 9,923 |
| Total LOM Development | 68,281 |
| | |
| **Service Excavations** | **LOM Cubic Metres** |
| Mining Equipment and Ventilation | 3,000 |
| Sub-surface Material Transfer 2,050 m Level | 3,000 |
| 1,480 m Level Loading Pocket & Crushing | 5,000 |

The closure cost for South Crofty Project has been treated as an annual operating fund contribution according to the total mined tonnes in each particular year, so is not included in capital costs. Salvage costs have not been estimated to be material given the life of the mine, and have not been included as a credit in total capital costs.

Annual capital costs over the LOM are presented in Table 21.4 and are estimated to total US$202.6M including pre-production and sustaining capital costs.

| Table 21.4<br>Annual Capital Cost Estimates Over LOM (US$M) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Capital Cost Area** | **Y-2** | **Y-1** | **Y1** | **Y2** | **Y3** | **Y4** | **Y5** | **Y6** | **Y7** | **Y8** | **Total** |
| Pumping and Shaft Refurb | 25.2 | 8.8 | - | - | - | - | - | - | - | - | 34.0 |
| Mining Equipment and Ventilation | - | 3.6 | 3.4 | 3.4 | 3.4 | - | - | - | - | - | 13.8 |
| Mine Development | - | 4.2 | 6.3 | 5.9 | 5.7 | 1.0 | 0.7 | 2.1 | 0.8 | 0.5 | 27.3 |
| Sub-surface Material Transfer and Conveyor to Mill | 2.5 | 3.5 | 0.4 | - | - | - | - | - | - | - | 6.4 |
| Level Development Rehab | - | 2.8 | 5.7 | 5.7 | 5.7 | 5.7 | 0.3 | - | 0.6 | - | 26.4 |
| Processing Plant | 22.6 | 15.1 | - | - | - | - | - | - | 3.7 | - | 41.4 |
| Thickened Tailings Fill Plant | 3.5 | 7.5 | - | - | - | - | - | - | - | - | 11.0 |
| Site Infrastructure | 7.5 | - | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 10.0 |
| Owners Costs | 0.6 | 0.7 | - | - | - | - | - | - | - | - | 1.3 |
| Stope Definition Drilling | - | - | 0.8 | 1.1 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 9.6 |
| Contingency @ 15% | 5.9 | 4.7 | 2.5 | 2.4 | 2.4 | 1.3 | 0.4 | 0.6 | 1.0 | 0.3 | 21.5 |
| | | | | | | | | | | | |
| **Total US$M** | **67.8** | **50.9** | **19.4** | **18.8** | **18.8** | **9.6** | **3.0** | **4.3** | **7.7** | **2.3** | **202.6** |

## 21.3 OPERATING COSTS

### 21.3.1 Mining Costs

The operating costs have been derived from first principle estimates. Costs have been modeled by cost area, major activity or department, and by cost element, including detail on major consumables, inputs and other costs. Production metrics drive major consumables and inputs (eg. diesel and power) consumptions, while equipment hours are the basis for the equipment maintenance costs.

### 21.3.2 Mine Development and Production Costs

Table 21.5 presents mine development unit direct costs per metre. Costs are inclusive of equipment operating and maintenance, mining consumables and operating labour costs.

**TABLE 21.5**
**MINE DEVELOPMENT DIRECT COSTS**

| Item | Direct Cost (US$/m) |
|---|---|
| Rehab Drift Mechanized 3.5m x 3.5m | 751 |
| Ramp Development 3.5m x 3.5m | 1,290 |
| Lateral Development 3.5m x 3.5m | 1,238 |
| Cross-cut 3.5m x 3.0m | 1,126 |
| Mineralized Material Development 3.5m x 3.0m | 1,142 |
| Slot Raise 2.0m x 2.0m | 696 |
| Raise Excavation (OP/WP) | 2,500 |
| Definition Diamond Drilling | 125 |

Table 21.6 presents mine production unit operating costs per tonne mined.

**TABLE 21.6**
**UNDERGROUND MINING OPERATING COSTS**

| Cost Item | US$/t |
|---|---|
| Mineralized Material Development | 4.40 |
| Stoping | 13.97 |
| Backfill (Thickened Tailings) | 5.52 |
| Crushing | 3.50 |
| Hoisting | 5.23 |
| Rock Transport UG Truck Haulage | 2.91 |
| Rock Transport Surface Conveyor Haulage | 1.50 |
| Tailings Disposal UG | 2.08 |
| DD Definition Drilling | 3.72 |
| UG Mine Overhead Cost | 11.60 |
| UG Mine Services | 9.20 |
| UG Mine Fixed Equipment Maintenance | 3.01 |
| | |
| **Total** | **66.65** |

### 21.3.3 Mine Equipment Maintenance Costs

Mine equipment maintenance costs include parts, filters, fuel and lube, tires, ground engaging tools and mechanical labour. A summary of South Crofty fixed equipment estimated maintenance costs are presented in Table 21.7. Mobile equipment maintenance cost estimates are presented in Table 21.8.

**TABLE 21.7**
**FIXED EQUIPMENT MAINTENANCE COSTS**

| Cost Area | Cost (US$/month) |
|---|---|
| Ventilation | 3,500 |
| Pumping | 4,500 |
| Compressed Air | 750 |
| Sumps | 1,200 |
| Process Water | 750 |
| Buildings | 5,000 |
| Electrical Distribution | 7,500 |
| Maintenance Shop | 5,000 |
| Second Egress Shaft | 3,000 |
| Crushing | 43,750 |
| Site Buildings | 2,500 |
| Tailings Disposal Plant | 7,290 |

**TABLE 21.8**
**MOBILE EQUIPMENT MAINTENANCE COST**

| Cost Area | Cost (US$/hour) |
|---|---|
| Single Boom Jumbo | 85 |
| LHD (3 tonnes) | 90 |
| 20t Mine Truck | 120 |
| Mine Bolter | 125 |
| Air Longhole Drill | 45 |
| Scissor Lift | 65 |
| Boom Truck | 55 |
| Flat Bed | 55 |
| Fuel Lube | 25 |
| Kubota Tractor | 15 |
| Explosive LV | 15 |
| IT Tool Carrier | 55 |
| Ancillaries (Shop Tools) | 5 |

### 21.3.4 Processing Costs

Process plant operating cost estimates are presented in Table 21.9 for steady-state production of 350,000 tpy or 1,000 tpd. Almost half of the cost is labour. The process is primarily grinding and gravity, hence the reagent cost is low compared to many base metal plants.

**TABLE 21.9**
**PROCESS PLANT OPERATING COSTS AT 1,000 TPD**

| Item | US$M/yr | US$/t |
|---|---|---|
| Operating Labour | 4.0 | 11.41 |
| Power | 1.8 | 5.17 |
| Reagents | 0.3 | 0.94 |
| Operating Supplies | 2.0 | 5.66 |
| | | |
| **Total** | **8.1** | **23.18** |

At throughput rates in the first two years of production of 210,000 tpy and 280,000 tpy, the process plant operating costs are estimated to increase to US$31.83/t and US$26.42/t, respectively.

Once the Cu/Zn recovery circuit is installed during production year seven, the plant operating cost is estimated to increase from steady-state of US$23.18/t to US$23.69/t. The average processing cost over the LOM is estimated at US$24.30/t.

### 21.3.5 Power Costs

The Project will be connected to the national power grid located within the proximity. A second source of power (emergency power) is required in case there are issues with the main supply source. Two 1MW backup power generators will be connected to the underground power distribution via a separate line for emergency purpose only. The emergency station will power the following underground items:

- All underground pumps
- Main ventilation fans
- Secondary fans
- Second egress hoist
- Underground lighting
- Electro-hydraulic drilling equipment
- Surface compressors
- Critical pumps within the process plant and tailings disposal
- Water treatment plant
- Other critical equipment as required

For this Project, the power cost per kilowatt-hour (“kWh”) is US$0.1074 and is a blended cost based on peak and off-peak rates. The current power supply at the Project is 0.6MW (750kVA) which can be uprated to a maximum of 3MW (3,750kVA) for the two year mine dewatering period. When the new electrical equipment is installed at the process plant site it can be increased further to around 10MW (12,500kVA), however, it is estimated that 5MW will be required when at steady-state production.

The largest power consumer across the entire Project is the processing plant for the crushing and grinding stages, followed by underground operations for the hoists, primary crusher, main pumps, primary ventilation fans, secondary fans, development jumbos, electrical distribution, and underground ancillary equipment.

The power costs, including standing and connections charges, are estimated at US$3.3M/year for the underground operation and US$1.9M/year for the process plant and ancillary equipment.

### 21.3.6 Site G&A Costs

The Project's operational cost includes a fixed global G&A cost which includes all related labour, consumables, and services that are used by the site, as shown in Table 21.10. The costs were estimated based on other similar Project costs and labour rates provided by the Company who is familiar with, and has a very good understanding of, the current market and skills availability within the communities surrounding the Project. A website with jobs in the Cornwall area was also reviewed to verify the relative wage scales used in this report.

Based on the mining schedule, the Project will have two years of dewatering and pre-production and eight years mine life thereafter. Based on this schedule, the G&A costs have been broken down into the two categories: dewatering and preproduction portion, and LOM portion, to better understand the distribution of the costs.

**TABLE 21.10**
**LOM G&A COSTS**

| G&A Labour | Pre-production (US$M) | Ops G&A (US$M) | LOM (US$M) |
|---|---|---|---|
| G&A Labour | 0.6 | 11.2 | 11.8 |
| Office, Buildings and Warehouse | - | 1.3 | 1.3 |
| Site fencing, Security and Roads | - | 0.8 | 0.8 |
| Site Administration Costs | 0.1 | 5.6 | 5.7 |
| | | | |
| **TOTAL G&A (US$M)** | **0.7** | **18.9** | **19.6** |
| **G&A Operating Cost Per Tonne** | | **7.33** | |

Table 21.11 presents the breakdown of the global G&A annual labour costs during production.

| TABLE 21.11<br>G&A LABOUR SCHEDULE LOM | | |
|---|---|---|
| **G&A Labour** | **Qty** | **Salary (US$ '000)** |
| General Site Management | 1 | 135 |
| Governmental Affairs | 1 | 102 |
| Site Finance & Accounting | 3 | 74 |
| Employee Training | 1 | 61 |
| Site Health and Safety | 1 | 61 |
| Site HR | 1 | 61 |
| Site IT | 1 | 61 |
| Site Supply Chain & Warehousing | 3 | 61 |
| Site Security | 6 | 27 |
| Site Services | 1 | 61 |
| Site Environmental | 1 | 61 |
| Logistics & Expediting | 1 | 61 |
| CSR Mine Site Programs | 1 | 61 |
| Nurse | 3 | 34 |
| | | |
| **TOTAL G&A** | **25** | **921** |

The site G&A contracts include items such as security, insurance, medical personnel and ambulance lease, key operational personnel and management, telecommunications contract (i.e. internet, phone, servers, printers), general site maintenance (i.e. vegetation clearance, air conditioning, pest control, etc.), environmental equipment, auditing costs, and consultants. General liability and property insurance is based on similar Project premiums and is estimated at US$300,000 per year.

### 21.3.7 Closure Costs

Closure costs for the Project are estimated at US$10M. To achieve that target by the end of LOM, an operating cost fund will be established at a cost of US$3.06/t processed. This fund will accrue at 5% interest from the start of production. By the end of production the fund will be at a principle amount of US$7.9M plus US$2.1 interest, equal in total to US$10M. The cost estimate is based on similar project closure costs and will need to be updated by a detailed closure study at the next stage of Project study.

### 21.3.8 Summary of Project Manpower

For the mine, manpower numbers have been established based on production crews required according to the mine schedule. For the plant, plant maintenance, site and administration, labour levels have been determined based on estimated number of positions required to maintain, operate and support the plant/site at the various levels of production.

Total manpower per annum is presented in Table 21.13. The labour summary includes contractor labour for initial dewatering work, and four consultants during production.

### 21.3.9 Summary of Operating Costs

Total operating costs for the South Crofty Project have been estimated to average US$101.35/t processed over the LOM, and are presented in Table 21.12.

| **TABLE 21.12<br>TOTAL OPERATING COSTS** | |
|---|---|
| **Item** | **Cost<br>US$/t Processed** |
| Mining | 66.65 |
| Processing | 24.30 |
| G&A | 7.33 |
| Closure Fund | 3.06 |
| | |
| **Total** | **101.35** |

**TABLE 21.13**
**ANNUAL MANPOWER REQUIREMENTS OVER LOM**

| Department | Y-2 | Y-1 | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 |
|---|---|---|---|---|---|---|---|---|---|---|
| Shaft Supervision | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Shaft Miners | 4 | 4 | - | - | - | - | - | - | - | - |
| Shaft Support | 5 | 5 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| G&A Dewatering | 9 | 9 | - | - | - | - | - | - | - | - |
| Nurse/First Aid | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| UG Mining | - | 64 | 92 | 92 | 92 | 92 | 82 | 74 | 64 | 64 |
| Mining Overheads | - | 4 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 |
| Technical Services | - | 10 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| UG Maintenance and Support | - | 6 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| OHS Department | - | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| Process Plant incl. Maintenance | - | - | 80 | 80 | 80 | 80 | 80 | 80 | 82 | 84 |
| Thickened Tails Plant | - | - | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| UG Crushing | - | - | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Site G&A | - | - | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| External Consultants | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | | | | | | | | | | |
| **LABOUR TOTAL** | **27** | **112** | **277** | **277** | **277** | **277** | **267** | **259** | **251** | **250** |

## 22.0 ECONOMIC ANALYSIS

The economic analysis is based on the 2017 South Crofty underground Project LOM plan comprised of mining the South Crofty, Upper and Lower Dolcoath, Lodes 2, 4 and 8, Roskear and Pryces-Tincroft deposits including updated production plans, underground development design, stoping, vertical raising, conveyor installation, refurbishing of all required access including New Cook's Kitchen Shaft and Roskear Shaft, underground and surface infrastructure, required manpower to operate the mine and all operating costs. The LOM plan covers a ten year period, comprised of two years of pre-production, and eight years of production.

Mining has been sequenced to start on the 1,350 mEL Level and mine upwards towards the shaft loading pocket levels and above. It is planned that Lodes 2, 4 and 8 will be accessed for stoping concurrently with the Lower Dolcoath Section, and subsequently the production areas will move towards Pryces, Tincroft and Roskear. Ultimately the Upper Dolcoath Section will be mined where Cu/Zn mineralization is encountered and requires additional float cells in the process plant flotation circuit. The cost to install the Cu/Zn flotation circuit has been included within the process plant sustaining capital.

The LOM plan and economic analysis is based on the Company obtaining the necessary permit to commence dewatering of South Crofty underground voids and recommence mining operations approximately two years later once the water level is at the bottom of the New Cook's Kitchen Shaft. Operational costs are based on first principle estimates for development, process plant, underground mining and G&A including all mining consumables, labour, maintenance, overheads, and mine services based on the Project mine schedule.

Capital work consists of dewatering, shaft and level rehabilitation, new declines and level drifts, and undergoing infrastructure such as main ventilation fans, shaft loading system, mineralized material-pass/waste-pass system, new Tuckingmill Decline including conveyor installation, discharge system below surface (1,550 mEL Level proposed), new intermediate pumping stations, bottom shaft pumping station, mine bottom pumping station and underground primary crusher chamber excavation, construction and installation.

All work has been envisioned and estimated to be completed in accordance with UK mining law and regulations. Refurbishment of the New Cook's Kitchen Shaft and the Tuckingmill conveyor drift have been scheduled to start during pre-production and the initial capital expenditure is mainly related to accessing the shaft bottom and installing the required surface infrastructure. Surface capital work has been scheduled concurrently with accessing the underground and its completion/readiness is planned to be at the same time with underground stope production.

All costs are in Q4 2016 US dollar nominal terms and inflation has not been considered in the cash flow analysis. Neither costs nor revenue have been escalated with any Consumer Price Index ("CPI") or other base commodities inflation. A 1.25 (USD:GBP) exchange rate has been used in calculations in the financial model unless otherwise noted.

## 22.1 REVENUE

- The Project averages 0.25 Mtpy mined during the first two years of production and approximately 0.35 Mtpy thereafter to the end of mine life.
- Average Sn production of 9.71M lb/year over the eight year LOM.
- All process plant feed will be supplied directly to the process plant via the New Cook's Kitchen Shaft and Tuckingmill conveyor and processed with no substantial build-up of stockpiled material.
- Average diluted grade mined is estimated at 1.55 % SnEq.
- Average process recoveries of 88% for Sn, 85% for Cu, and 70% for Zn.
- 59% Sn concentrate grade is planned.
- For the LOM, the Sn price is US$10.00/lb produced at 100% payable metal during smelting and refining.
- Cu and Zn metal have been converted to SnEq using metal prices of $2.65/lb Cu and $0.90/lb Zn.
- Sales costs (concentrate transportation, smelting and refining charges) are estimated at US$0.60/lb-recovered-Sn.
- Royalty varies by zone and Sn price from 0.42% for Sn prices less than US$22,000/t to 0.63% for Sn prices over US$25,000/t. The average royalty is 0.52% over the LOM. There are no other applicable royalties.
- For the purposes of simple financial modeling, revenue is recognised at the time Sn concentrate shipments leave the Port of Plymouth.

## 22.2 COSTS

- Two year pre-production period, followed by eight years of production.
- Initial capital cost of US$118.7M including 15% contingency on all items, except 35% contingency on the process plant.
- LOM sustaining capital costs of US$83.8M including 15% contingency for capital development, underground equipment, construction of Cu/Zn flotation circuit, ventilation, site infrastructure, and Mineral Resource upgrade diamond drilling.
- Average operating cost over LOM of US$101.35 per tonne processed.
- Average cash cost per lb of SnEq of US$3.36/lb over LOM and an all-in sustaining cash cost ("AISC") of US$4.44/lb SnEq.
- Freight and refining costs for tin concentrate has been based on historical costs and data from other tin projects and are subject to market adjustment. Concentrate transportation, smelting and refining of Sn, Cu and Zn product costs are estimated at US$0.60 per recovered pound (lb) of tin. South Crofty tin concentrate has historically sustained low deleterious element penalties, and none were considered in this estimate.
- Corporate tax rate of 17% based on new UK legislation effective as of 2020.

## 22.3 NET PRESENT VALUE

The after-tax Net Present Value ("NPV") at a 5% discount rate from pre-production through to completion of LOM for the base case is estimated at US$130.5M and the Internal Rate of Return ("IRR") is estimated at 23%, with a payback of 3.8 years from start of production, at assumed metal prices of US$10.00/lb Sn, US$2.65/lb Cu and US$0.90/lb Zn. Project economics are summarized in Table 22.1.

**TABLE 22.1**
**AFTER-TAX PROJECT ECONOMIC SUMMARY**

| Operating Statistics | LOM |
|---|---|
| Tonnes Mined (000's) | 2,575 |
| SnEq grade (%) | 1.55 |
| Process Plant Recovery (%) | 88 |
| Concentrate Grade (% SnEq) | 59 |
| Concentrate Produced (t) | 59,699 |
| Metal Contained in Concentrate (M lb SnEq) | 77.65 |
| Cash Cost (US$/lb SnEq) | 3.36 |
| All-in Sustaining Cost (US$/lb SnEq) | 4.44 |
| | |
| Estimated Cash Flow | (US$ M) |
| SnEq Revenue | 776.5 |
| Concentrate Transport & Refining | (46.6) |
| Royalties | (3.8) |
| Net Smelter Return (NSR) | 726.1 |
| | |
| Cost Summary | (US$ M) |
| Mining Cost | (171.6) |
| Processing Cost | (62.6) |
| G&A Cost | (18.9) |
| Closure Cost | (7.9) |
| Pre-Tax Cash Earnings | 465.1 |
| Depreciation | (176.7) |
| EBITDA | 288.4 |
| Losses Carried Forward | (25.9) |
| Taxable Income | 262.5 |
| Corporate Tax | (48.2) |
| VAT Payable | (40.5) |
| VAT Rebate | 40.5 |
| Capital and Sustaining Capital Cost | 202.6 |
| After-Tax Cash Flow | 214.4 |
| | |
| NPV @ 5% | 130.5 |
| IRR (%) | 23 |
| Payback Period (years from start of production) | 3.8 |

Table 22.2 presents a summary of the Project financial model.

## Table 22.2
## South Crofty Project LOM Operating Statement

| | | Y-2 | Y-1 | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PRODUCTION** | | | | | | | | | | | | |
| Tonnes Processed | kt | - | - | 210 | 280 | 350 | 350 | 350 | 350 | 350 | 335 | 2,575 |
| Processed Head Grade SnEq | % | - | - | 1.99 | 1.85 | 1.58 | 1.75 | 1.64 | 1.56 | 1.33 | 0.95 | 1.55 |
| Process Recovery | % | - | - | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| SnEq Payable | % | - | - | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Concentrate Produced | t | - | - | 6,233 | 7,723 | 8,246 | 9,139 | 8,556 | 8,120 | 6,927 | 4,756 | 59,699 |
| Recovered lb's SnEq | Mlbs | - | - | 8.11 | 10.05 | 10.73 | 11.89 | 11.13 | 10.56 | 9.01 | 6.19 | 77.65 |
| Tin Price | US$/lb | - | - | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| **SALES** | | | | | | | | | | | | |
| SnEq lbs Sold | MLbs | - | - | 8.11 | 10.05 | 10.73 | 11.89 | 11.13 | 10.56 | 9.01 | 6.19 | 77.65 |
| REVENUE | US$M | - | - | 81.07 | 100.45 | 107.26 | 118.87 | 111.29 | 105.62 | 90.10 | 61.87 | 776.53 |
| **PRODUCTION COST** | | | | | | | | | | | | |
| Mining | US$M | - | 1.22 | 18.20 | 20.93 | 23.35 | 23.18 | 22.83 | 21.10 | 20.78 | 20.00 | 171.59 |
| Processing | US$M | - | - | 6.68 | 7.40 | 8.11 | 8.11 | 8.11 | 8.11 | 8.11 | 7.93 | 62.58 |
| G&A | US$M | - | - | 3.03 | 3.24 | 3.42 | 3.42 | 3.42 | 3.42 | 3.42 | 3.38 | 26.76 |
| TOTAL OPERATING COST | US$M | - | 1.22 | 27.91 | 31.57 | 34.89 | 34.72 | 34.37 | 32.64 | 32.32 | 31.30 | 260.93 |
| Transportation & Refining | US$M | - | - | 4.86 | 6.03 | 6.44 | 7.13 | 6.68 | 6.34 | 5.41 | 3.71 | 46.59 |
| Royalties | US$M | - | - | 0.70 | 0.73 | 0.42 | 0.57 | 0.52 | 0.48 | 0.40 | 0.00 | 3.82 |
| TOTAL CASH COST | US$M | - | 1.22 | 33.47 | 38.33 | 41.75 | 42.42 | 41.57 | 39.46 | 38.13 | 35.01 | 311.34 |
| Depreciation | US$M | -9.69 | -16.96 | -19.73 | -22.42 | -25.11 | -26.47 | -26.89 | -17.82 | -11.65 | 0.00 | -176.74 |
| TOTAL CASH & NON-CASH COST | US$M | -9.69 | -15.74 | 13.74 | 15.91 | 16.64 | 15.95 | 14.68 | 21.64 | 26.48 | 35.01 | 134.60 |
| PRE-TAX CASH EARNINGS | US$M | -9.69 | -18.18 | 27.87 | 39.70 | 40.40 | 49.98 | 42.83 | 48.34 | 40.32 | 26.86 | 288.45 |
| **TAX & CREDITS** | | | | | | | | | | | | |
| Taxable Income | US$M | -5.00 | -15.91 | 14.72 | 42.41 | 43.10 | 51.35 | 43.25 | 39.26 | 34.16 | 15.20 | 262.54 |
| Less Cash Taxes (Corporation Tax) | US$M | - | - | -2.50 | -7.21 | -7.33 | -8.73 | -7.35 | -6.67 | -5.81 | -2.58 | -48.18 |
| AFTER-TAX CASH EARNINGS | US$M | -9.69 | -18.18 | 25.37 | 32.49 | 33.07 | 41.25 | 35.48 | 41.67 | 34.51 | 24.28 | 240.25 |
| Depreciation (Added back) | US$M | 9.69 | 16.96 | 19.73 | 22.42 | 25.11 | 26.47 | 26.89 | 17.82 | 11.65 | 0.00 | 176.74 |
| (Less) Change in VAT Account | US$M | -1.13 | 0.12 | -3.96 | -0.60 | -0.55 | 0.18 | 0.17 | 0.26 | 0.00 | 5.51 | 0.00 |
| Capital Cost | US$M | -67.84 | -50.89 | -19.38 | -18.82 | -18.82 | -9.55 | -2.96 | -4.34 | -7.69 | -2.28 | -202.56 |
| CASH FLOW | US$M | -68.97 | -51.99 | 21.76 | 35.49 | 38.81 | 58.35 | 59.58 | 55.41 | 38.47 | 27.51 | 214.44 |
| NPV @ 5% | US$M | | | | | | | | | | | 130.5 |
| IRR | % | | | | | | | | | | | 23 |
| | | | | | | | | | | | | |
| CASH COST (C1) $/lb sold | US$/lb Sn | - | - | 2.68 | 3.55 | 3.63 | 4.92 | 5.36 | 5.25 | 4.28 | 3.60 | 2.77 |
| Mining $/tonne | US$/t | - | - | 86.66 | 74.74 | 66.72 | 66.23 | 65.23 | 60.30 | 59.37 | 59.75 | 66.65 |
| Processing $/tonne | US$/t | - | - | 31.83 | 26.42 | 23.18 | 23.18 | 23.18 | 23.18 | 23.18 | 23.69 | 24.30 |
| G&A & Closure $/tonne processed | US$/t | - | - | 14.41 | 11.57 | 9.78 | 9.78 | 9.78 | 9.78 | 9.78 | 10.09 | 10.39 |
| TOTAL COST $/tonne processed | US$/t | - | - | 132.90 | 112.73 | 99.69 | 99.19 | 98.19 | 93.26 | 92.33 | 93.53 | 101.35 |
| ALL INCLUSIVE COST (C2) $/tonne | US$/t | - | - | 225.17 | 179.95 | 153.45 | 126.47 | 106.66 | 105.66 | 114.30 | 100.35 | 180.02 |

## 22.4 SENSITIVITY ANALYSIS

Key economic risks for the South Crofty Project were examined by running sensitivity analyses on the following:

- Sn Price;
- Operating Costs; and
- Capital Costs.

The sensitivities and the impact on cash flows have been calculated for -20% to +20 % variations against the base case, as presented in Table 22.3. The analysis is presented graphically in Figures 22.1, 22.2 and 22.3.

| TABLE 22.3<br>SOUTH CROFTY SENSITIVITY ANALYSIS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sn Price Sensitivity (After-Tax US$M)** | | | | | | | | | |
| **US$/lb** | **9.00** | **9.25** | **9.50** | **9.75** | **10.00*** | **10.25** | **10.50** | **10.75** | **11.00** |
| NPV | 73.7 | 88.0 | 102.3 | 116.6 | **130.5** | 145.2 | 159.5 | 173.8 | 188.1 |
| CF | 137.3 | 156.7 | 176.1 | 195.5 | **214.4** | 234.4 | 253.8 | 273.2 | 292.6 |
| IRR(%) | 16 | 18 | 20 | 22 | **23** | 25 | 27 | 28 | 30 |
| **NPV (After-Tax US$M)** | | | | | | | | | |
| **%** | **-20%** | **-15%** | **-10%** | **-5%** | **Base Case** | **5%** | **10%** | **15%** | **20%** |
| Capex | 166.5 | 157.6 | 148.7 | 139.8 | **130.5** | 122.0 | 113.1 | 104.2 | 95.3 |
| Opex | 169.1 | 159.5 | 150.0 | 140.4 | **130.5** | 121.3 | 111.8 | 102.2 | 92.7 |
| **Cash Flow (After-Tax US$M)** | | | | | | | | | |
| **%** | **-20%** | **-15%** | **-10%** | **-5%** | **Base Case** | **5%** | **10%** | **15%** | **20%** |
| Capex | 255.5 | 245.3 | 235.2 | 225.1 | **214.4** | 204.8 | 194.7 | 184.6 | 174.4 |
| Opex | 267.1 | 254.1 | 241.0 | 228.0 | **214.4** | 201.9 | 188.9 | 175.8 | 162.8 |
| **IRR (After-Tax %)** | | | | | | | | | |
| **%** | **-20%** | **-15%** | **-10%** | **-5%** | **Base Case** | **5%** | **10%** | **15%** | **20%** |
| Capex | 32 | 30 | 27 | 25 | **23** | 22 | 20 | 18 | 17 |
| Opex | 28 | 27 | 26 | 25 | **23** | 22 | 21 | 20 | 19 |

***Note:*** ** represents Base Case scenario*

Figure 22.1 South Crofty NPV Sensitivity

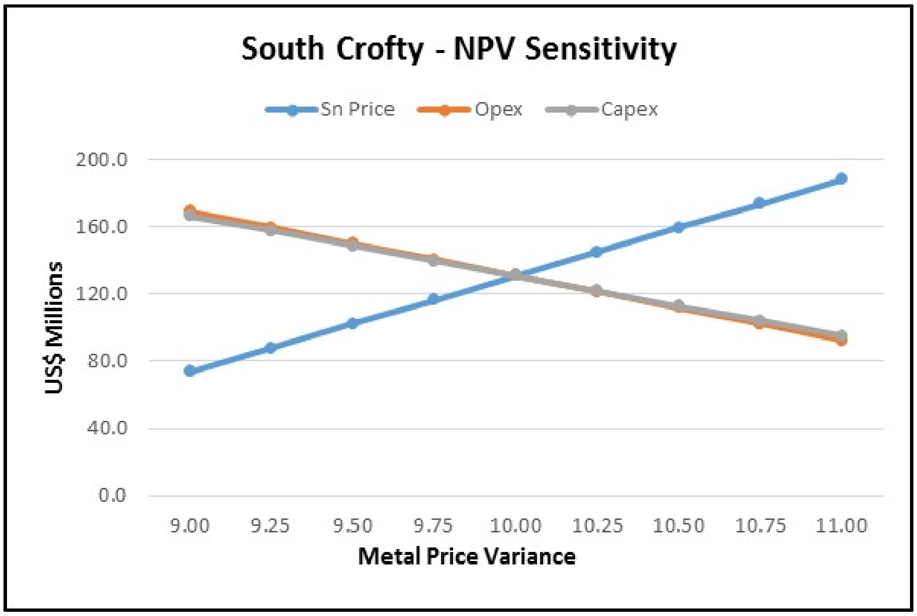



Figure 22.2 South Crofty Cash Flow Sensitivity

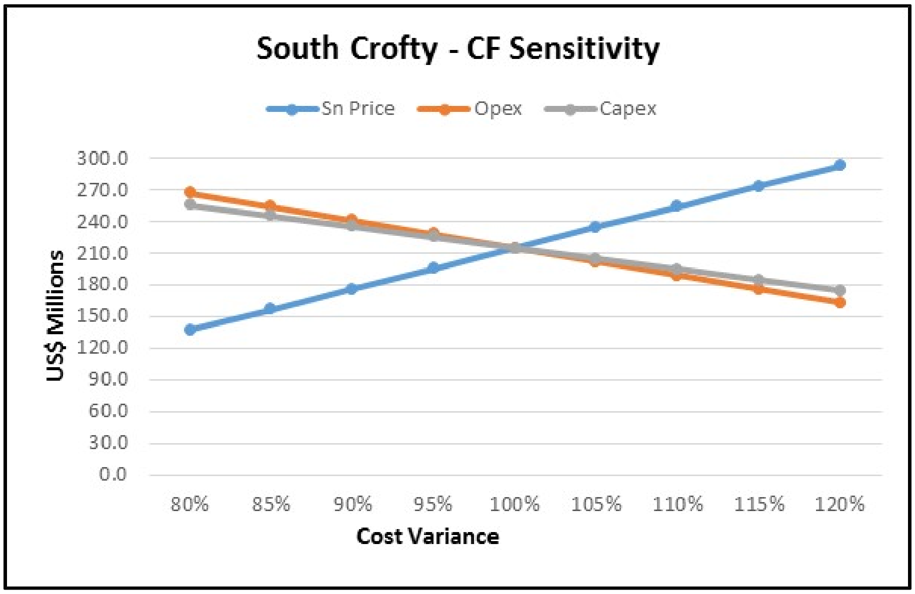
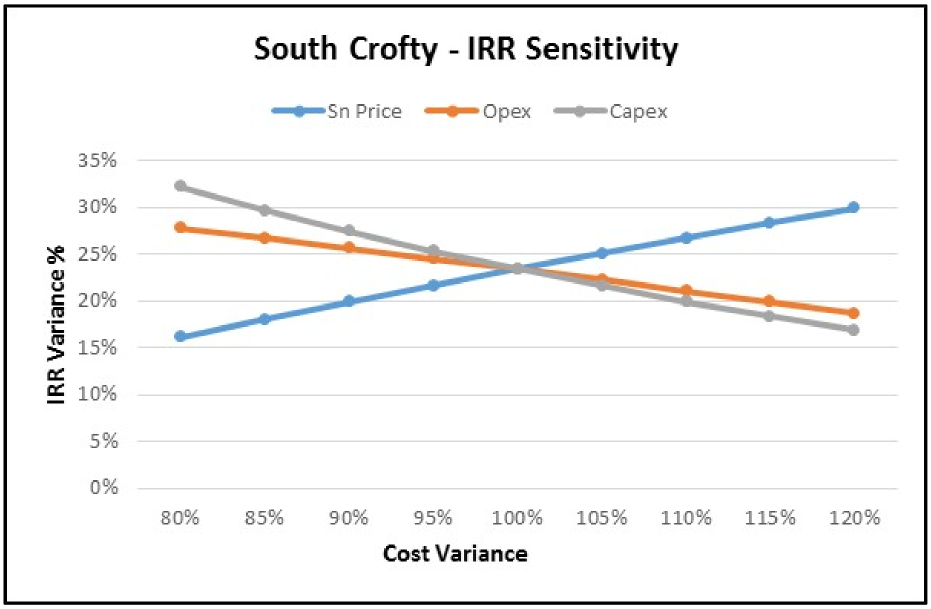


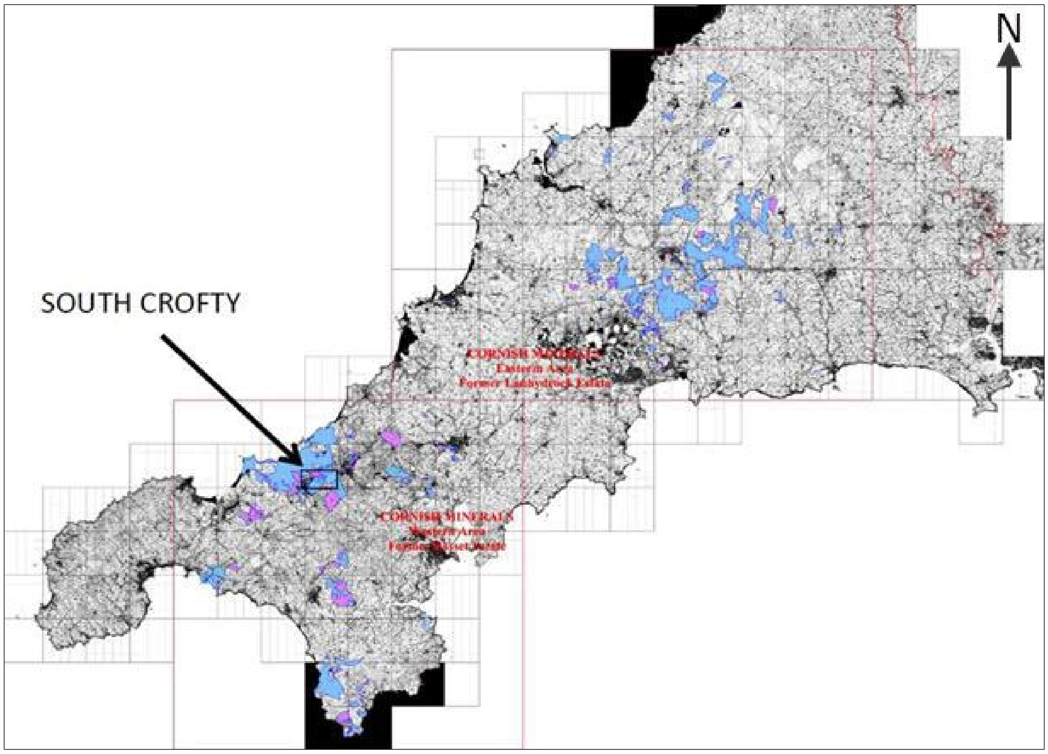
**Figure 22.3 South Crofty IRR Sensitivity**



## 23.0 ADJACENT PROPERTIES

Cornish Minerals Limited (Bermuda), the sister company of Western United Mines Limited, holds a number of mineral rights in Cornwall that cover a total area of approximately 150 $km^2$, and are indicated by the blue and purple regions in Figure 23.1.

**Figure 23.1 Adjacent Properties Map showing CML (Bermuda) properties in Cornwall.**




**Blue properties – 100% ownership; Pink properties – Partial ownership*
***Source:*** *WUM (2014)*

There are many historical and past-producing mines throughout Cornwall and some of them proximal to South Crofty. A Qualified Person has been unable to verify the information on the adjacent properties held by Cornish Minerals Limited (Bermuda).

Wolf Minerals Ltd., an Australian and London AIM listed specialty metals company, has developed the Drakelands open pit tungsten-tin project in the neighbouring county of Devon and started production in 2015.

# 24.0 OTHER RELEVANT DATA AND INFORMATION

To the best of P&E's knowledge there is no other relevant data, additional information or explanation necessary to make the report understandable and not misleading.

## 25.0 INTERPRETATION AND CONCLUSIONS

P&E concludes that the South Crofty Project has economic potential as an underground mining operation, utilizing a new processing plant to produce tin, copper and zinc concentrates. The PEA outlines 2.575 Mt of process plant feed (inclusive of mining dilution and loss factors) averaging 1.55% SnEq from four main underground areas. The process plant feed from the Mineral Resource Estimate supporting this tonnage contains both Indicated and Inferred Mineral Resources. The Project has an estimated pre-production capital cost at US$118.7 million and robust economics with an after-tax NPV of C$130.5M, an after-tax IRR of 23%, and a 3.8 year payback period using base case metal prices of US$10.00/lb Sn, US$2.65/lb Cu and US$0.90/lb Zn.

P&E recommends that Strongbow advance the South Crofty Project with extended and advanced technical studies, including a drill program, with the intention of advancing the Project to a production decision.

The following itemizes the conclusions that can be drawn from the information provided in this PEA. The conclusions highlight facts which characterize the study or are otherwise significant in terms of defining the Project value.

### 25.1 MINERAL RESOURCE ESTIMATE

The South Crofty Project represents a significant part of the mining history of Cornwall and the significant metal endowment of southwest England. The past-producing mines within the South Crofty Project represent over 400 years of production history, initially for copper and later for tin. The Project is located in a well-known metallogenic province with excellent regional infrastructure, however little modern exploration has been conducted.

The South Crofty Project is an advanced Property with extensive underground development and permits in place. Although the structural controls are locally complex, the mineralized lodes overall present a relatively simple geometry with lode formation controlled by conjugate fracture sets that producing branching lodes, which are generally steeply dipping either to the south or the north at 60° to 80° to depths over 1,000 m from surface. Most lodes follow a similar northeast strike direction in a zone over 4 km long.

The Great Crosscourse fault is a late structure that separates the Project into east and west segments and influenced the historical development of the Project. The Great Crosscourse is a cemented fault, and is itself partially mineralized. It acts as a hydraulic barrier that may potentially allow staged dewatering and operation of the eastern and western parts of the Project separately.

The South Crofty Project benefits from an extensive historical Mineral Resource database for deep lodes with over 55,000 m of channel sampling combined with 31,000 m of modern drilling, which has enabled an NI 43-101 Mineral Resource Estimate to be reported for the Property. Extensive and high quality models of the underground development and previously mined volumes have been produced for the Project from original survey data, giving excellent insight to the geometry of the worked lodes and areas of opportunity. Review of sampling protocols and QA/QC for the modern drilling concluded practices were adequate but identified opportunities for improvement.

P&E carried out assay data verification for the recent drilling in March-April, 2015. The assay certificates in spreadsheet format were obtained directly from AGAT, SGS and WAI laboratories. A total of 5,597 records for tin, copper, zinc and lead assays contained in the mineral resource wireframes were extracted for verification against laboratory assay records. Approximately 1,798 assays were located and checked. A number of discrepancies were noted and the database was corrected and updated.

In addition to the data verification reported above, P&E reviewed the QA/QC for the South Crofty Project analyses from the recent drilling and concludes that the analyses are acceptable for Mineral Resource estimation.

P&E's site visit confirmed that core recovery was generally good, the lodes were reasonably competent and recovery was over 90% for core examined.

In P&E's opinion the drill hole and assay/analytical databases were suitable for the estimation of Mineral Resources and future Mineral Reserves.

Mineral Resource Estimates were classified as Indicated and Inferred based on completeness of channel sampling (levels above/below, raises), the drill hole spacing, confidence in the assaying for drilling, and geologic confidence in grade continuity. The Indicated and Inferred Mineral Resource Estimate for the Lower Mine includes pillars and sills, some of which may not be recoverable pending an engineering study.

The South Crofty Project Indicated Mineral Resource Estimate for a 0.6% SnEq block cut-off grade is 1.92 million tonnes averaging 1.70% SnEq. The Inferred Resource Estimate for a 0.6% SnEq block cut-off grade is 1.20 million tonnes averaging 1.52% SnEq.

Although there are number of uncertainties in the historic data, appropriate due diligence has been exercised to compile and verify data from mine records and in P&E's opinion, the Mineral Resource Estimate has no fatal flaws, is reasonable and has been undertaken according to industry standard practice.

There are many opportunities to both increase these resources and to raise the confidence category of those resources by additional drilling and development.

Similarly, there are additional historic but unconnected mines within the mineral rights area that represent additional exploration or development potential to the Project.

The wealth of information available enhances the Project understanding, and significantly de-risks the interpretation of the geology and distribution of mineralized lodes and contained metal as well as the extent of underground workings and previously mined areas. However, it is clear that some parts of the historic data set are lost or otherwise incomplete, and that this represents some risk to the Project.

## 25.2 MINING STUDY

The Property is readily accessible by a network of existing all-weather paved highways and local roads. The required site infrastructure can be built within the current industrial area available. Adequate electrical power is readily available and accessible from the national grid.

Conditional permissions were granted for the above-ground (surface) and below-ground (underground) activities at the South Crofty mine in 2011 and 2013, respectively, based on a proposal that had been prepared and submitted by WUM.

A water treatment system has been trial tested and is expected to provide a viable method of treating the large amount of water that needs to be pumped out of the existing underground workings. The Environment Agency has agreed with WUM that the standard for the interim water discharge quality that will apply while dewatering will be set at the conclusion of dewatering trials that have just been completed. All water removed from the mine workings by mechanical pumping will pass through an onsite water treatment plant before being discharged to the Red River and out to the sea. Application is planned in 2017 so that the current permit to discharge water at a rate of 10,000 $m^3$/day from the mine workings can be increased to 25,000 $m^3$/day. Once the mine is dewatered, which is estimated to take place over a two year period, steady-state dewatering is estimated to be between 5,500 $m^3$/day and 6,500 $m^3$/day, subject to annual precipitation variations.

The underground mine has been scheduled at a steady-state production rate of 1,000 tpd on a seven day per week work schedule. The mine design layout and the mining method selection have been done at a PEA level and it is assumed that sublevel longhole stopes spaced at 30 m vertical level intervals is appropriate. The NCK shaft hoisting facility will have the capacity to handle the scheduled production.

The New Roskear and Taylor's shafts will be accessed by the development and will be used for ventilation and manways. The NCK shaft will be the main production shaft after refurbishment once new hoist components, conveyances and all services are installed and commissioned.

In order to meet surface permit permissions that stipulate no tailings facility, all tailings will be pumped underground. Thickened tails is the preferred and most cost effective type of backfill.

For this study a 350,000 tpy production rate has been targeted and scheduled after two years of ramp-up, with one final year of wind down. At a cut-off value of 0.70% SnEq the mineralized material mined is estimated at 2.575 Mt at an average grade of 1.55% SnEq.

## 25.3 ECONOMIC ANALYSIS

The long history of past production from the Property leaves little doubt that a viable metallurgical process with acceptable recoveries can be developed. It is probable that a new process plant would incorporate gravity and flotation recovery of tin, generally as practiced at Wheal Jane. South Crofty successfully employed heavy media separation and this unit operation could be adopted in a new process plant if economics warrant. Saleable concentrates for tin, copper and zinc are expected to be produced at reasonable recoveries.

For this study a 350,000 tpy production rate has been targeted and scheduled after two years of ramp-up, with one final year of tail down. It was assumed that historical mine costs will not be relevant for the current exercise, therefore first principle and equipment quotes from similar projects have been considered when estimating the operating and capital costs.

Capital cost estimates have an accuracy level of ±35% for all items and include a 15% contingency on all capital items except for the process plant for which a 35% contingency has been applied. The initial dewatering, surface and underground infrastructure capital for the South Crofty Project is estimated at US$118.7M.

The LOM sustaining capital cost to develop or refurbish all required mining levels at South Crofty has been estimated at US$83.8M which includes underground development, equipment sustaining capital, all associated labour, stope definition diamond drilling, and other surface and underground infrastructure to support the Project for the duration of the mine life.

Total capital costs over the LOM are estimated at US$202.6M including pre-production and sustaining capital costs.

The underground mine production unit operating costs are estimated at US$66.65/tonne mined. The average processing cost over the LOM is estimated at US$24.30/t processed. Fixed global G&A costs which include all related labour, consumables, and services that are used by the site, are estimated at US$7.33/t processed. Total operating costs for the South Crofty Project have been estimated to average US$101.35/t processed over the LOM.

Total manpower to be employed at the Project during steady-state production is estimated at 277 people.

Closure costs for the Project are estimated at US$10M. To achieve that target by the end of LOM, an operating cost fund will be established at a cost of US$3.06/t processed. This cost is included in the underground mining operating cost. The mine would be closed in an orderly manner based on a closure plan that would be regularly updated and refined over the life of the Project.

## 26.0 RECOMMENDATIONS

P&E recommends in-fill drilling to upgrade a portion of the Lower Mine Inferred Mineral Resources to Indicated Mineral Resources as a basis for Pre-Feasibility or Feasibility Study and estimation of future Mineral Reserves. A preliminary diamond drilling campaign of 26,500 m is proposed to upgrade approximately 800,000 tonnes of Mineral Resources in No. 2 and Dolcoath South lodes in the Lower Mine, and to test areas adjacent to the Dolcoath and Roskear lodes where there is potential for a material increase in the Mineral Resource Estimate. The campaign assumes access from surface or upper level workings and controlled drilling of wedged holes off pilot holes. P&E estimates preliminary costs for the drill program at $5.3 million.

Once the in-fill drilling program is completed and the Mineral Resource Estimate is updated, and assuming that sufficient Mineral Resources are upgraded to the Indicated Mineral Resource category, P&E recommends that Strongbow proceed to the next stage of engineering, which would be a Pre-Feasibility Study.

The next permit that WUM should acquire is the Mine Waste Permit with Water Discharge Consent. Once this permit is granted WUM will be able to commence dewatering activities and discharge treated mine water into the Red River via the consented discharge points.

To improve the Mineral Resource Estimate QA/QC protocol, P&E recommends Strongbow locate a non-mineralized blank to replace the one currently being used.

The potential for Mineral Resources at the Roskear D and North Pool lodes was not addressed as part of this report and should be considered in future work programs.

Metallurgical testwork on representative samples from the current Mineral Resource Estimate and a detailed review of past metallurgical work will be required to develop and optimize the process plant flowsheet.

P&E recommends thickened tailings as the preferred and most cost effective type of backfill. Testwork is recommended on tailings and backfill material to determine rheology and strength at various cement contents, and to determine if less expensive thickened tailings could be used for deposition underground instead of paste tailings.

P&E recommends the following related to future underground mining:

- During the pre-production period a long-term ventilation management plan should be developed by the mine ventilation engineer.
- The Company should develop a waste rock/aggregate strategy through an engineering study at a later stage.
- Permanent dewatering pumps should be multistage Sulzer type pumps with one on duty and one on standby for maintenance flexibility. When in production, to take advantage of lower power rates, P&E recommends that pumping from the shaft bottom to the 1,750 m level and the 2,060 m level pump stations should occur during night hours.

A comprehensive closure plan is recommended as part of a Pre-Feasibility Study.

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# 28.0 CERTIFICATES

## CERTIFICATE OF QUALIFIED PERSON

### EUGENE J. PURITCH, P.ENG., FEC

I, Eugene J. Puritch, P. Eng., residing at 44 Turtlecreek Blvd., Brampton, Ontario, L6W 3X7, do hereby certify that:

1. I am an independent mining consultant and President of P&E Mining Consultants Inc.
2. This certificate applies to the technical report titled “Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project, Cornwall, United Kingdom”, (the “Technical Report”) with an effective date of February 16, 2017.
3. I am a graduate of The Haileybury School of Mines, with a Technologist Diploma in Mining, as well as obtaining an additional year of undergraduate education in Mine Engineering at Queen’s University. In addition I have also met the Professional Engineers of Ontario Academic Requirement Committee’s Examination requirement for Bachelor’s Degree in Engineering Equivalency. I am a mining consultant currently licensed by Professional Engineers and Geoscientists New Brunswick (License No. 4778), Professional Engineers, Geoscientists Newfoundland & Labrador (License No. 5998), Association of Professional Engineers and Geoscientists Saskatchewan (License No. 16216), Ontario Association of Certified Engineering Technicians and Technologists (License No. 45252) the Professional Engineers of Ontario (License No. 100014010) and Association of Professional Engineers and Geoscientists of British Columbia (License No. 42912). I am also a member of the National Canadian Institute of Mining and Metallurgy.

   I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.

   I have practiced my profession continuously since 1978. My summarized career experience is as follows:

   - Mining Technologist - H.B.M.& S. and Inco Ltd.,............................................................................ 1978-1980
   - Open Pit Mine Engineer – Cassiar Asbestos/Brinco Ltd.,................................................................. 1981-1983
   - Pit Engineer/Drill & Blast Supervisor – Detour Lake Mine,............................................................ 1984-1986
   - Self-Employed Mining Consultant – Timmins Area,........................................................................ 1987-1988
   - Mine Designer/Resource Estimator – Dynatec/CMD/Bharti,............................................................ 1989-1995
   - Self-Employed Mining Consultant/Resource-Reserve Estimator,..................................................... 1995-2004
   - President – P&E Mining Consultants Inc,......................................................................................2004-Present

4. I have not visited the Property that is the subject of this report.
5. I am responsible for co-authoring Sections 14, 25 and 26 of the Technical Report along with those sections of the Summary pertaining thereto.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Property that is the subject of this Technical Report in a technical report titled “Technical Report and Resource Estimate on the South Crofty Tin Project, Cornwall, United Kingdom” dated May 31, 2016.
8. I have read NI 43-101 and Form 43-101F1. This Technical Report has been prepared in compliance therewith.
9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: February 16, 2017
Signing Date: March 31, 2017

***{SIGNED AND SEALED}***
*[Eugene J. Puritch]*

______________________________
Eugene J. Puritch, P.Eng., FEC

# CERTIFICATE of QUALIFIED PERSON

**ANDREW BRADFIELD, P. ENG.**

I, Andrew Bradfield, P. Eng., residing at 5 Patrick Drive, Erin, Ontario, N0B1T0, do hereby certify that:

1. I am an independent mining engineer contracted by P&E Mining Consultants.
2. This certificate applies to the technical report titled "Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project, Cornwall, United Kingdom", (the "Technical Report") with an effective date of February 16, 2017.
3. I am a graduate of Queen's University, with an honours B.Sc. degree in Mining Engineering in 1982. I have practiced my profession continuously since 1982. I am a Professional Engineer of Ontario (License No.4894507). I am also a member of the National CIM.

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

   My relevant experience for the purpose of this Technical Report is:

   - Various Engineering Positions – Palabora Mining Company…………………….….1982-1986
   - Mines Project Engineer – Falconbridge Limited………………………………...1986-1987
   - Senior Mining Engineer – William Hill Mining Consultants Limited…………….1987-1990
   - Independent Mining Engineer……………………………………………………1990-1991
   - GM Toronto – Bharti Engineering Associates Inc………………………………1991-1996
   - VP Technical Services, GM of Australian Operations – William Resources Inc…1996-1999
   - Independent Mining Engineer……………………………………………………1999-2001
   - Principal Mining Engineer – SRK Consulting……………………………………...2001-2003
   - COO – China Diamond Corp……………………………………………………….2003-2006
   - VP Operations – TVI Pacific Inc…………………………………………………...2006-2008
   - COO – Avion Gold Corporation…………………………………………………2008-2012
   - Independent Mining Engineer……………………………………………………2012-2013
   - Independent Mining Engineer, COO - P&E Mining Consultants…………………2014-Present

4. I visited the Property that is the subject of this report, from June 17-18, 2014.
5. I am responsible for authoring Sections 2, 3, 15, 18, 19, 20, 22 and 24 and coauthoring Sections 16, 21, 25 and 26 of the Technical Report along with those sections of the Summary pertaining thereto.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had no prior involvement with the Property that is the subject of this Technical Report.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective date: February 16, 2017
Signing date: March 31, 2017

*{SIGNED AND SEALED}*
*[Andrew Bradfield]*

Andrew Bradfield, P. Eng.

## CERTIFICATE OF QUALIFIED PERSON

**JARITA BARRY, P.GEO.**

I, Jarita Barry, P.Geo., residing at 2485B Hwy 3A, Nelson, British Columbia, V1L 6K7, do hereby certify that:

1. I am an independent geological consultant contracted by P & E Mining Consultants Inc.
2. This certificate applies to the technical report titled "Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project, Cornwall, United Kingdom", (the "Technical Report") with an effective date of February 16, 2017.
3. I am am a graduate of RMIT University of Melbourne, Victoria, Australia, with a B.Sc. in Applied Geology. I have worked as a geologist for over 10 years since obtaining my B.Sc. degree. I am a geological consultant currently licensed by the Associations of Professional Engineers and Geoscientists of British Columbia (License No. 40875) and Professional Engineers and Geoscientists Newfoundland & Labrador (License No. 08399). I am also a member of the Australasian Institute of Mining and Metallurgy of Australia (Member No. 305397);

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:

   - Geologist, Foran Mining Corp. ....................2004
   - Geologist, Aurelian Resources Inc. ....................2004
   - Geologist, Linear Gold Corp. ....................2005-2006
   - Geologist, Búscore Consulting ....................2006-2007
   - Consulting Geologist (AusIMM) ....................2008-2014
   - Consulting Geologist, P.Geo. (APEGBC/AusIMM) ....................2014-Present.

4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for co-authoring Sections 11, 12, 25 and 26 of this Technical Report along with those sections of the Summary pertaining thereto.
6. I am independent of the Issuer applying all of the tests in section 1.5 of National Instrument 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Property that is the subject of this Technical Report in a technical report titled "Technical Report and Resource Estimate on the South Crofty Tin Project, Cornwall, United Kingdom" dated May 31, 2016.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: February 16, 2017
Signing Date: March 31, 2017

***{SIGNED AND SEALED}***
*[Jarita Barry]*

__________________________________
Jarita Barry, P.Geo.

# CERTIFICATE OF QUALIFIED PERSON

**ALFRED S. HAYDEN, P. ENG.**

I, Alfred S. Hayden, P. Eng., residing at 284 Rushbrook Drive, Ontario, L3X 2C9, do hereby certify that:

1. I am currently President of:
   EHA Engineering Ltd.,
   Consulting Metallurgical Engineers
   Box 2711, Postal Stn. B.
   Richmond Hill, Ontario, L4E 1A7
2. This certificate applies to the technical report titled "Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project, Cornwall, United Kingdom", (the "Technical Report") with an effective date of February 16, 2017.
3. I graduated from the University of British Columbia, Vancouver, B.C. in 1967 with a Bachelor of Applied Science in Metallurgical Engineering. I am a member of the Canadian Institute of Mining, Metallurgy and Petroleum and a Professional Engineer and Designated Consulting Engineer registered with Professional Engineers Ontario. I have worked as a metallurgical engineer for over 49 years since my graduation from university.

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
4. I have not visited the Property that is the subject of this report.
5. I am responsible for authoring of Sections 13 and 17, and co-authoring Sections 25 and 26 of the Technical Report along with those sections of the Summary pertaining thereto.
6. I am independent of the issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Property that is the subject of this Technical Report in a technical report titled "Technical Report and Resource Estimate on the South Crofty Tin Project, Cornwall, United Kingdom" dated May 31, 2016.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: February 16, 2017
Signing Date: March 31, 2017

***{SIGNED AND SEALED}***
*[Alfred Hayden]*

____________________________
Alfred S. Hayden, P.Eng.

## CERTIFICATE OF QUALIFIED PERSON

**RICHARD E. ROUTLEDGE, P.GEO.**

I, Richard E. Routledge, P.Geo., residing at 1386 Queen's Line, PO Box 335, Minden, Ontario, K0M 2K0, do hereby certify that:

1. I am an independent Consulting Geologist who has been contracted by P&E Mining Consultants Inc.
2. This certificate applies to the technical report titled "Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project, Cornwall, United Kingdom", (the "Technical Report") with an effective date of February 16, 2017.
3. I graduated with a Bachelor of Science degree, Major in Geology, from Sir George Williams (Concordia) University in 1971 and with a Masters degree in Applied Exploration Geology from McGill University in 1973. I have worked as a geologist for 44 years since post-graduation. I am a Professional Geologist registered in the Province of Ontario (APGO No. 1354) and licensed by the Northwest Territories (NAPEGG No. L744).

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:

   | | |
   |---|---|
   | · Independent Consulting Geologist. | 2011 – Present |
   | · Roscoe Postle Associates Inc., Consulting Geologist | 1998 – 2011 |
   | · Independent Consulting Geologist | 1994 – 1997 |
   | · Vice President Exploration, Greater Lenora Resources Corp. | 1993 – 1994 |
   | · Teck Explorations Ltd, Evaluations and Mineral Commodities Geologist. | 1985 – 1992 |
   | · Derry, Michener, Booth & Wahl, Exploration and Consulting Geologist. | 1973 – 1985 |

4. I have visited the Property that is the subject of this Technical Report on November 17 to 21, 2014.
5. I am responsible for co-authoring Sections 11, 12, 14, 25 and 26 of the Technical Report along with those sections of the Summary pertaining thereto.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Property that is the subject of this Technical Report in a technical report titled "Technical Report and Resource Estimate on the South Crofty Tin Project, Cornwall, United Kingdom" dated May 31, 2016.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: February 16, 2017
Signing Date: March 31, 2017

***{SIGNED AND SEALED}***
*[Richard E. Routledge]*

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Richard E. Routledge, P. Geo.

# CERTIFICATE OF QUALIFIED PERSON

**DAVID BURGA, P.GEO.**

I, David Burga, P. Geo., residing at 3884 Freeman Terrace, Mississauga, Ontario, do hereby certify that:

1. I am an independent geological consultant contracted by P & E Mining Consultants Inc.
2. This certificate applies to the technical report titled "Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project, Cornwall, United Kingdom", (the "Technical Report") with an effective date of February 16, 2017.
3. I am a graduate of the University of Toronto with a Bachelor of Science degree in Geological Sciences (1997). I have worked as a geologist for 20 years since obtaining my B.Sc. degree. I am a geological consultant currently licensed by the Association of Professional Geoscientists of Ontario (License No 1836).

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:

   - Exploration Geologist, Cameco Gold......................................................................1997-1998
   - Field Geophysicist, Quantec Geoscience ...................................................................1998-1999
   - Geological Consultant, Andeburg Consulting Ltd. ...................................................1999-2003
   - Geologist, Aeon Egmond Ltd.....................................................................................2003-2005
   - Project Manager, Jacques Whitford ...........................................................................2005-2008
   - Exploration Manager – Chile, Red Metal Resources ................................................2008-2009
   - Consulting Geologist.............................................................................................2009-Present

4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for authoring Sections 4 to 10 and 23, and co-authoring Sections 25 and 26 of the Technical Report along with those sections of the Summary pertaining thereto.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Property that is the subject of this Technical Report in a technical report titled "Technical Report and Resource Estimate on the South Crofty Tin Project, Cornwall, United Kingdom" dated May 31, 2016.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: February 16, 2017
Signing Date: March 31, 2017

***{SIGNED AND SEALED}***
*[David Burga]*

______________________________
David Burga, P.Geo.

# CERTIFICATE OF QUALIFIED PERSON

**ERNEST BURGA, P. ENG.**

I, Ernest Burga, P. Eng., residing at 3385 Aubrey Rd., Mississauga, Ontario, L5L 5E3, do hereby certify that:

1. I am an Associate Mechanical Engineer and President of Andeburg Consulting Services Inc.
2. This certificate applies to the technical report titled "Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project, Cornwall, United Kingdom", (the "Technical Report") with an effective of February 16, 2017.
3. I am a graduate of the National University of Engineering located in Lima, Peru at which I earned my Bachelor Degree in Mechanical Engineering (B.Eng. 1965). I have practiced my profession continuously since graduation and in Canada since 1975. I am licensed by the Professional Engineers of Ontario (License No. 6067011).

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

   My summarized career experience is as follows:

   - Maintenance Engineer – Backus and Johnston Brewery of Peru ............................................. 1966-1975
   - Design Mechanical Engineer – Cambrian Engineering Group................................................. 1975-1978
   - Design Mechanical Engineer – Reid Crowther Bendy............................................................. 1979-1981
   - Lead Mechanical Engineer – Cambrian Engineering Group.................................................... 1981-1987
   - Project Engineer – HG. Engineering ........................................................................................ 1988-2003
   - Lead Mechanical Engineer – AMEC Americas ........................................................................ 2003-2005
   - Sr. Mechanical Engineer – SNC Lavalin Ltd. .......................................................................... 2005-2009
   - President – Andeburg Consulting Services Inc. ................................................................2004 to present
   - Contracted Mechanical Engineer – P&E Mining Consultants Inc. ....................................2009 to present

4. I have not visited Property that is the subject of this report.
5. I am responsible for co-authoring Sections 21, 25 and 26 of this Technical Report along with those sections of the Summary pertaining thereto.
6. I am independent of the issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had no prior involvement with the Property that is the subject of this Technical Report.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: February 16, 2017
Signing Date: March 31, 2017

***{SIGNED AND SEALED}***
*[Ernest Burga]*

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Ernest Burga, P. Eng.

## CERTIFICATE OF QUALIFIED PERSON

### ALEXANDRU VERESEZAN, P. ENG.

I, Alexandru Veresezan of 25 Stookes Crescent, Richmond Hill, Ontario, L4E 0J4, do hereby certify that:

1. I am an independent mining engineer contracted by P&E Mining Consultants Inc.
2. This certificate applies to the technical report titled "Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project, Cornwall, United Kingdom" (the "Technical Report"), with an effective date of February 16, 2017.
3. I am a graduate of Mining Engineering with a Master of Engineering, Honors Underground Mining degree from the University of Petrosani in 1993. I have practiced my profession as a Mining Engineer since graduation. I am a Registered Professional Engineer in good standing with the Professional Engineers Ontario (License No. 100078587).

   I have read the definition of "qualified person" set out in NI 43-101 and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purpose of NI 43- 101.

   My summarized career experience is as follows:

   - P&E Mining Consultants Inc.: (Sr. Associate Mining Engineer)..................................2016-Present
   - Barrick Gold Corp.: Copper Division: (Mine Manager/ Alternate GM)............................2012-2015
   - Barrick Gold Corp.: (Manager, Underground Mining, Corporate Office) ........................2008-2012
   - Wardrop Engineering Inc.: (Sr. Mining Engineer) ..........................................................2006-2008
   - Cementation SKANSKA Canada Inc.: (Mining Eng/Estimator/ Proj. Cost Control) .......2002-2006
   - Dynatec Corp.: (Estimator / EIT) .....................................................................................2001-2002
   - S.C. Grandemar S.A.: (Open Pit Manager) .......................................................................1999-2000
   - Cluj, Romania Various: (Junior-Senior Project Engineer) ...............................................1993-1999

4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for co-authoring Sections 16, 21, 25, 26 of the Technical Report along with those sections of the Summary pertaining thereto.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have not had prior involvement with the Property that is the subject of the Technical Report.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading;

Effective date: February 16, 2017
Signing date: March 31, 2017

***{SIGNED AND SEALED}***
*[Alex Veresezan]*

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Alex Veresezan, P. Eng.

# CERTIFICATE OF QUALIFIED PERSON

**YUNGANG WU, P.GEO.**

I, Yungang Wu, P. Geo., residing at 3246 Preserve Drive, Oakville, Ontario, L6M 0X3, do hereby certify that:

1. I am an independent consulting geologist contracted by P&E Mining Consultants Inc.
2. This certificate applies to the technical report titled “Technical Report and Preliminary Economic Assessment on the South Crofty Tin Project, Cornwall, United Kingdom”, (the “Technical Report”) with an effective date of February 16, 2017.
3. I am a graduate of Jilin University, China with a Master Degree in Mineral Deposits (1992). I am a geological consultant and a registered practising member of the Association of Professional Geoscientist of Ontario (Registration No. 1681). I am also a member of the Ontario Prospectors Association.

   I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is as follows:

   - Geologist –Geology and Mineral Bureau, Liaoning Province, China…………………….. 1992-1993
   - Senior Geologist – Committee of Mineral Resources and Reserves of Liaoning, China… 1993-1998
   - VP – Institute of Mineral Resources and Land Planning, Liaoning, China……………….. 1998-2001
   - Project Geologist–Exploration Division, De Beers Canada……………………………….. 2003-2009
   - Mine Geologist – Victor Diamond Mine, De Beers Canada………………………………. 2009-2011
   - Resource Geologist– Coffey Mining Canada……………………………………………….2011-2012
   - Consulting Geologist……………………………………………………………………Present

4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for co-authoring Sections 14, 25 and 26 of the Technical Report along with those sections of the Summary pertaining thereto.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Property that is the subject of the Technical Report in a technical report titled “Technical Report and Resource Estimate on the South Crofty Tin Project, Cornwall, United Kingdom” dated May 31, 2016.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading;

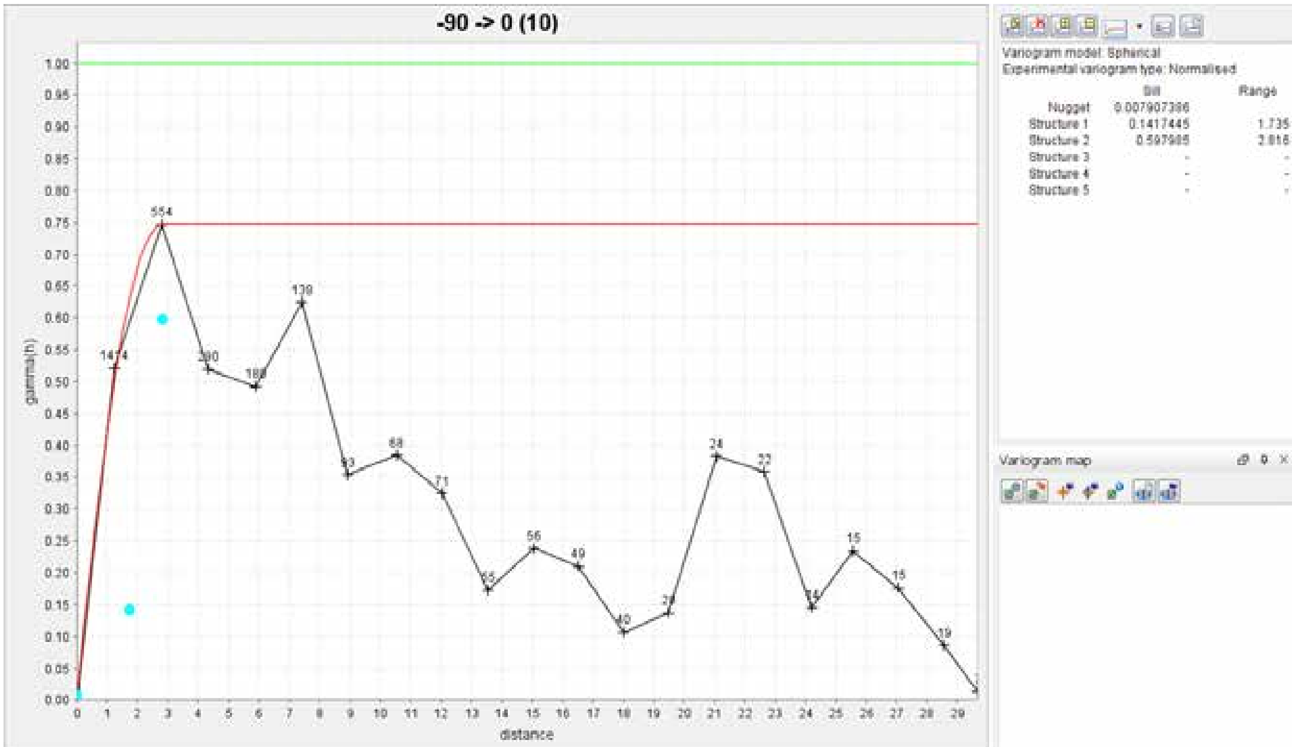
Effective Date: February 16, 2017
Signing Date: March 31, 2017

***{SIGNED AND SEALED}***
*[Yungang Wu]*

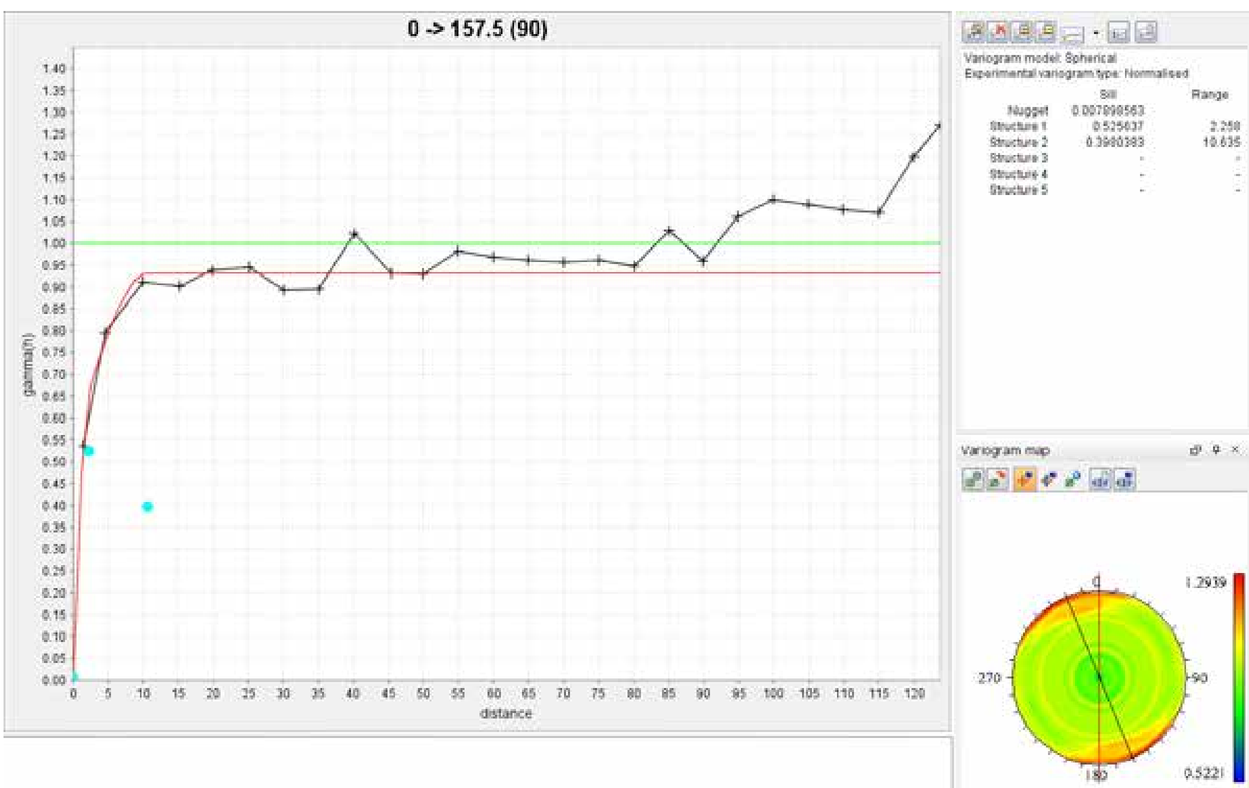
Yungang Wu, P.Geo.

# APPENDIX I. VARIOGRAMS

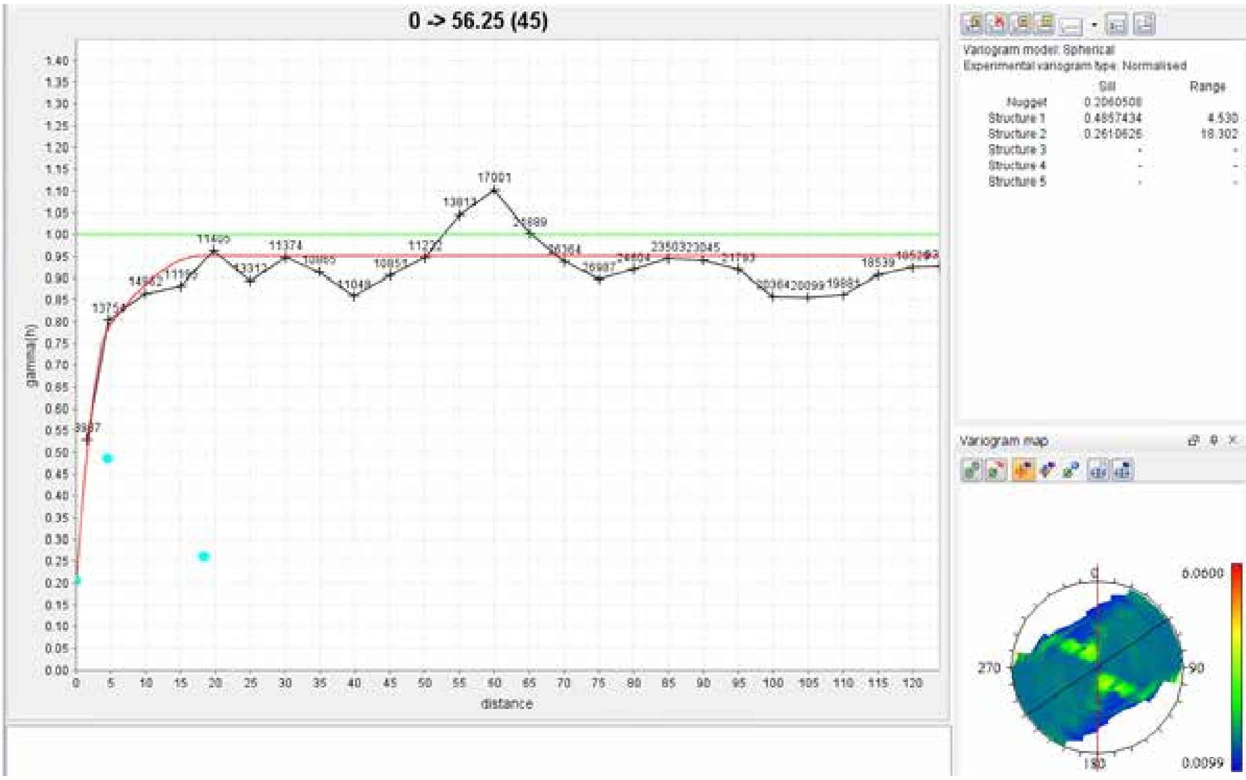
Channel Composites Sn% (All) Downhole Linear



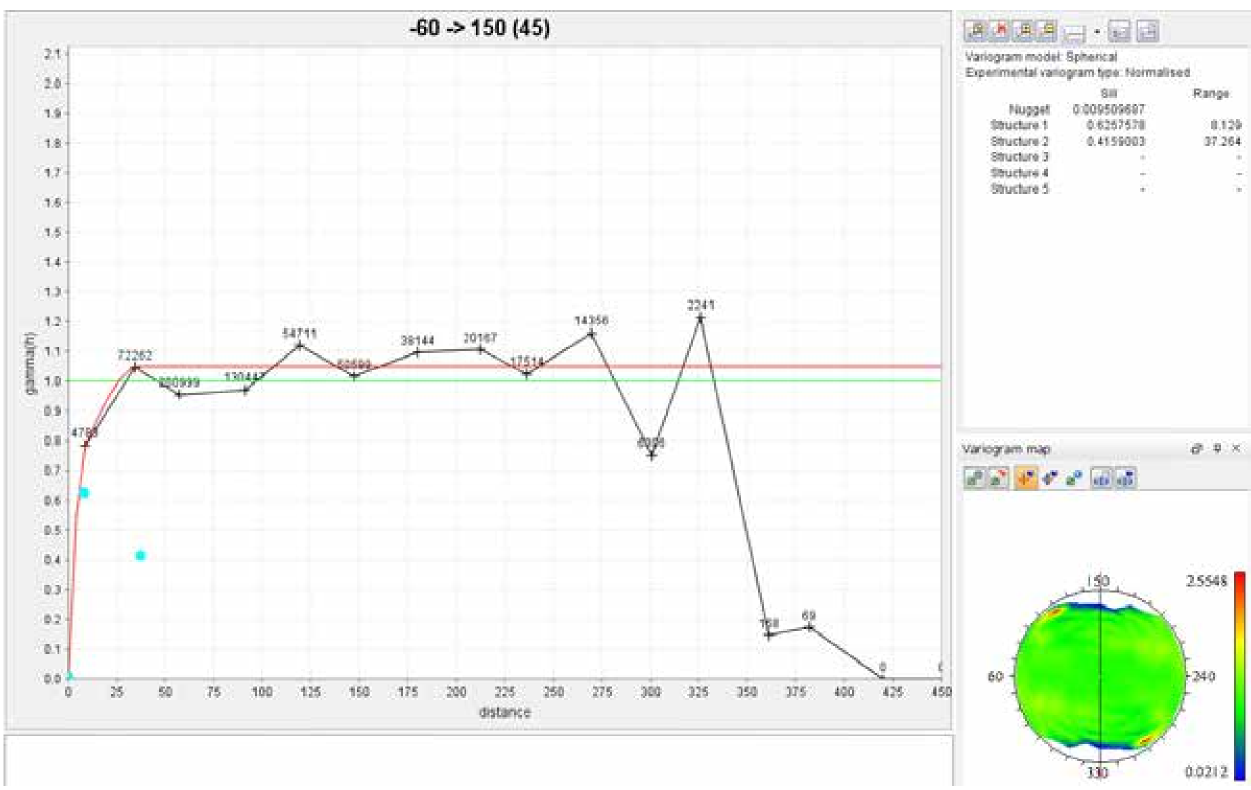

Channel Composites (All) 3D Sn% Omni Strike (5 m Lag)



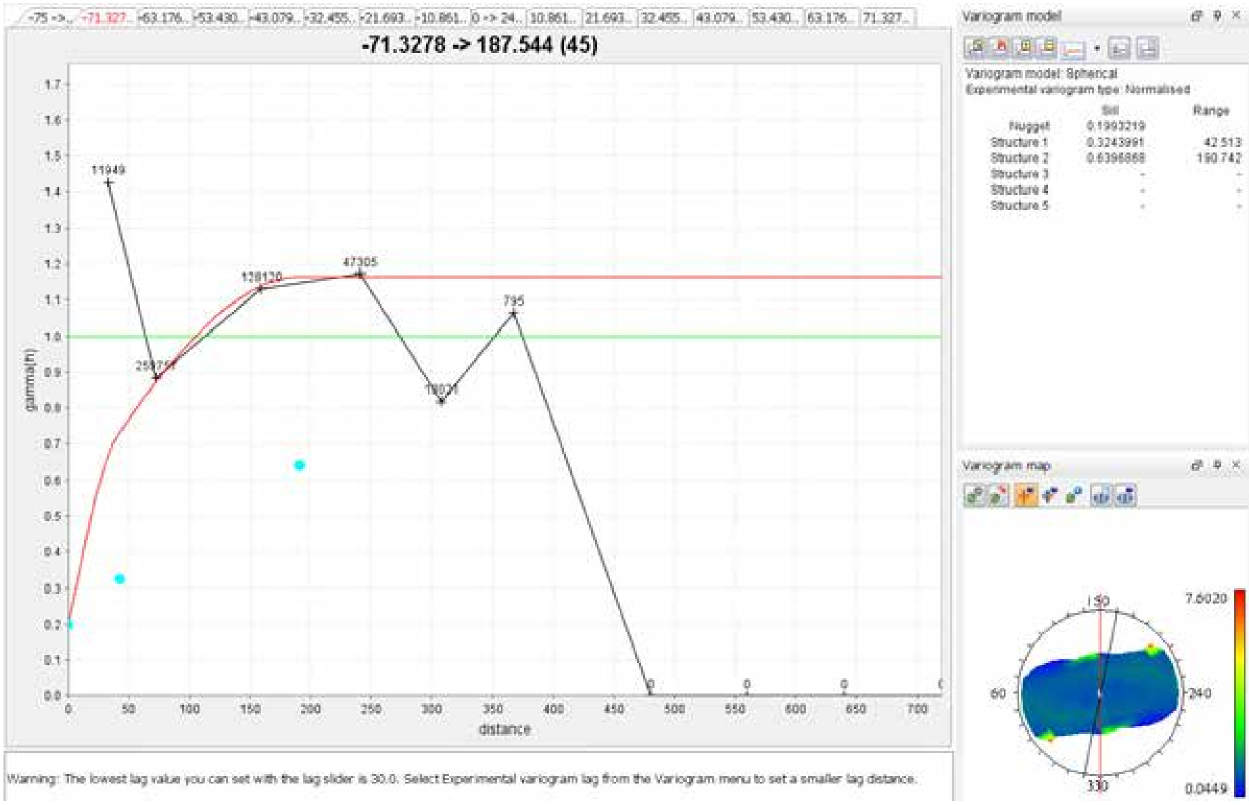
Channel Composites (All) 3D Strike (5 m Lag 45° Spread)



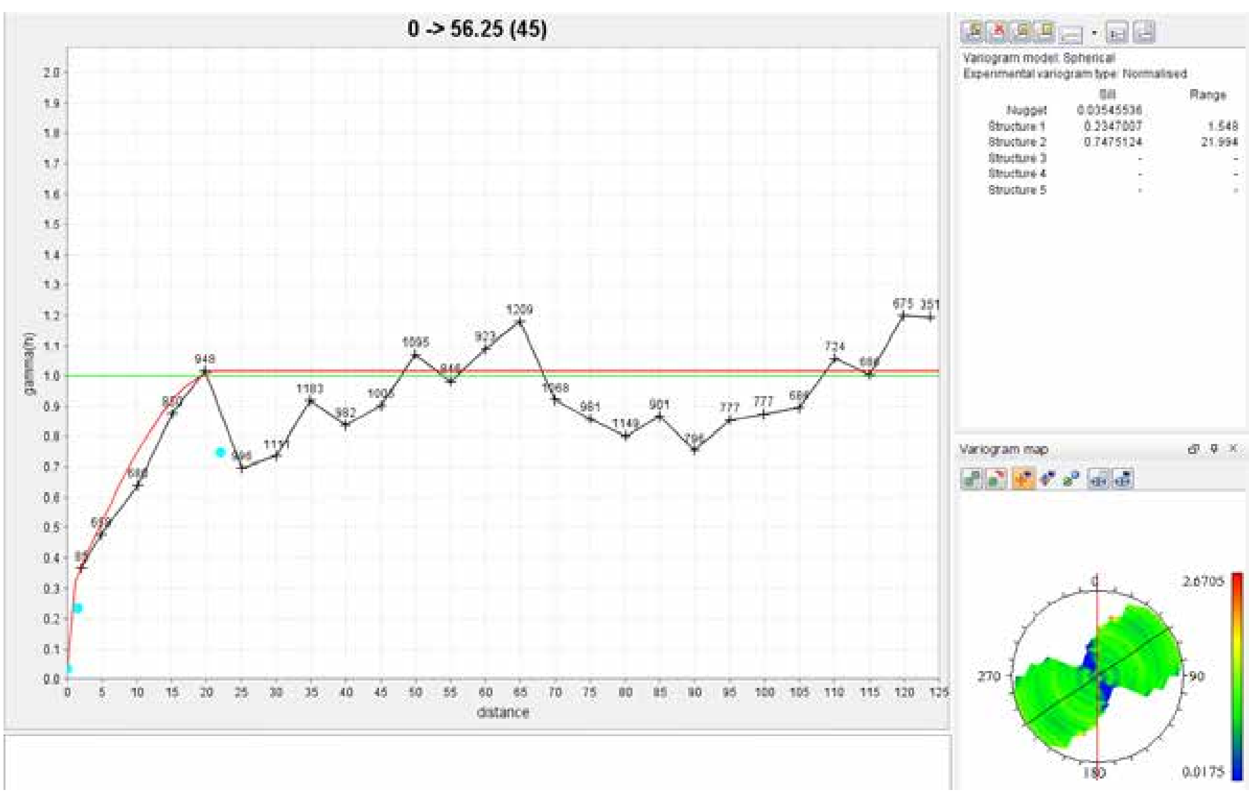

Channel Composites (All) 3D Sn% on Dip (30 m Lag 45° Spread)



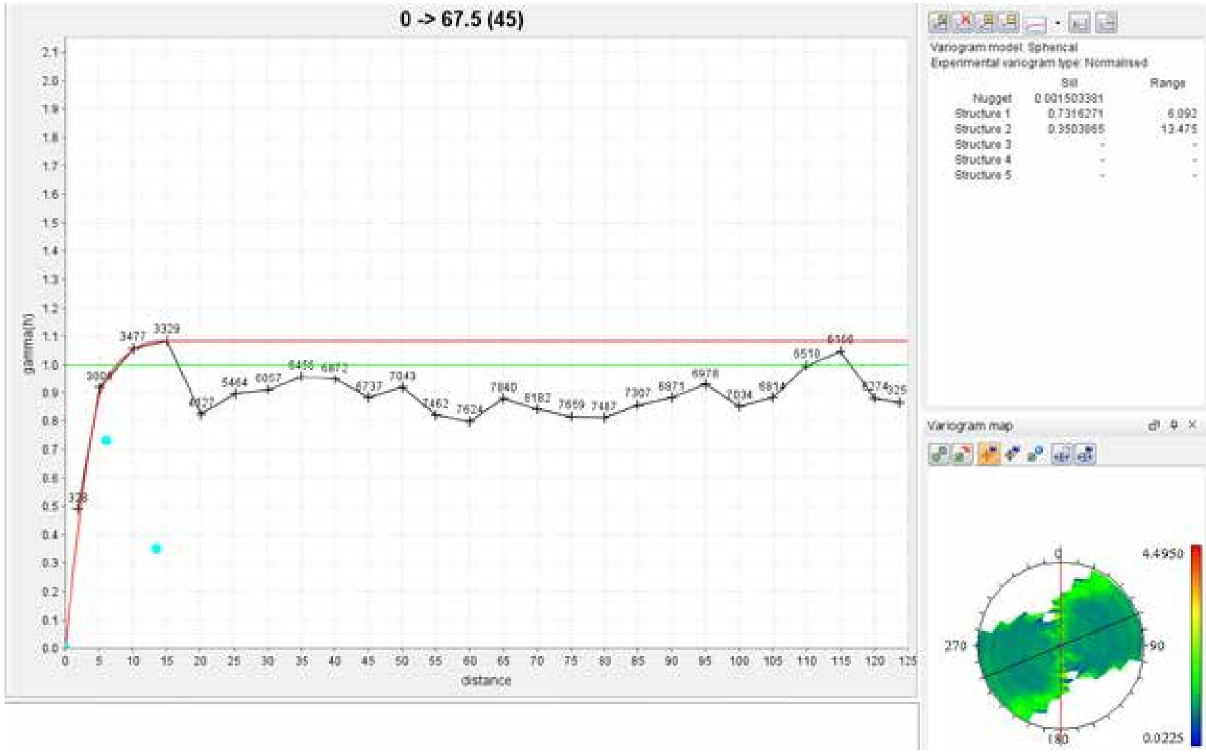
Channel Composites (All) 3D Sn% on Plunge (30 m Lag 45° Spread)



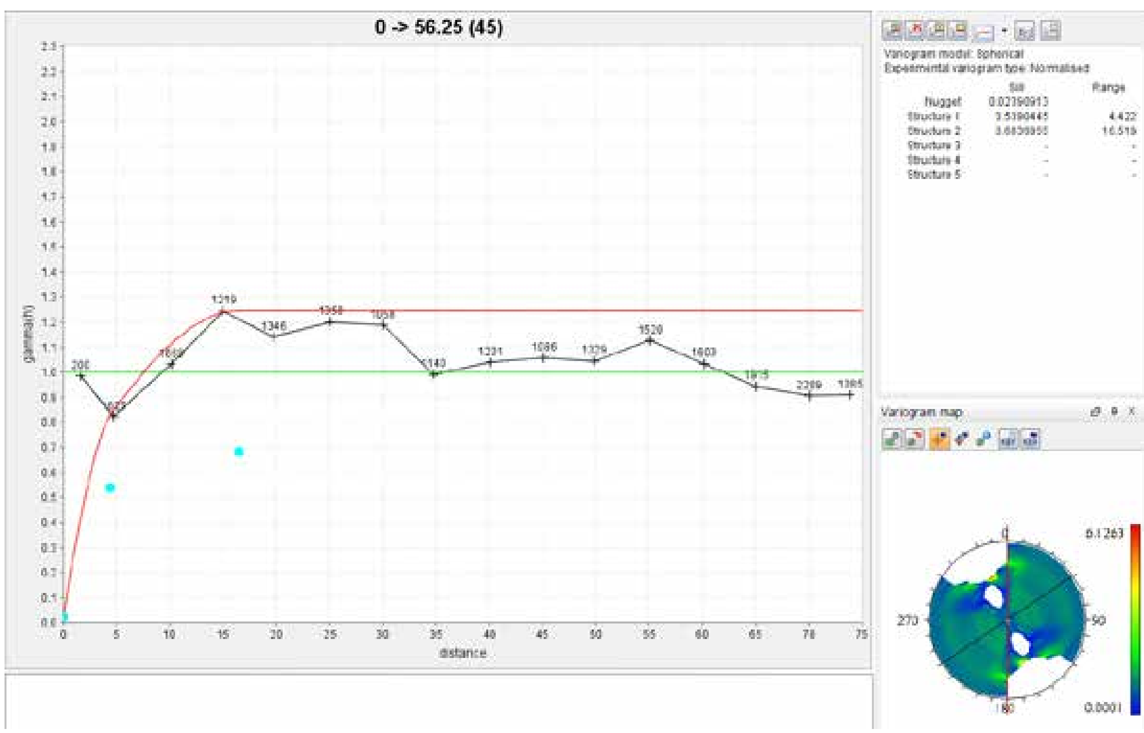

Roskear A Channels Strike (5 m Lag)



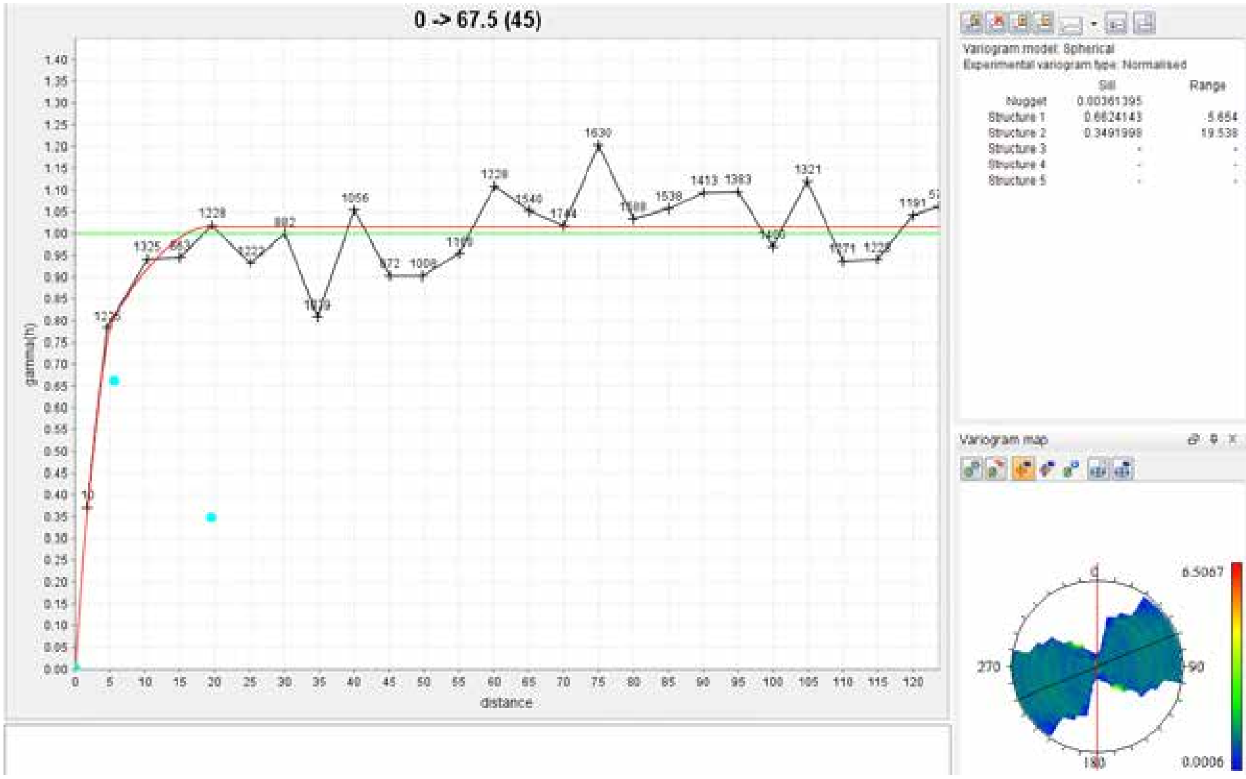
Roskear B Channels Strike (5 m Lag)



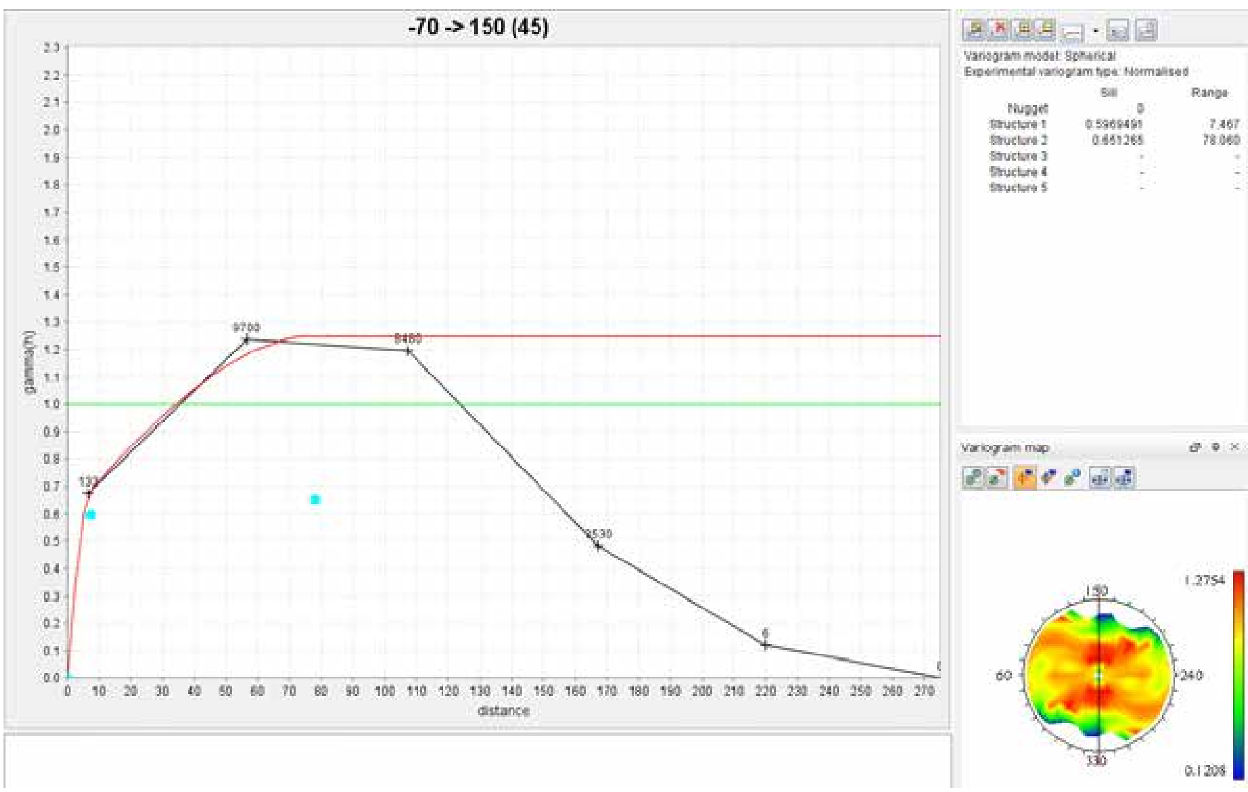

Pryces Channels Strike (5 m Lag)



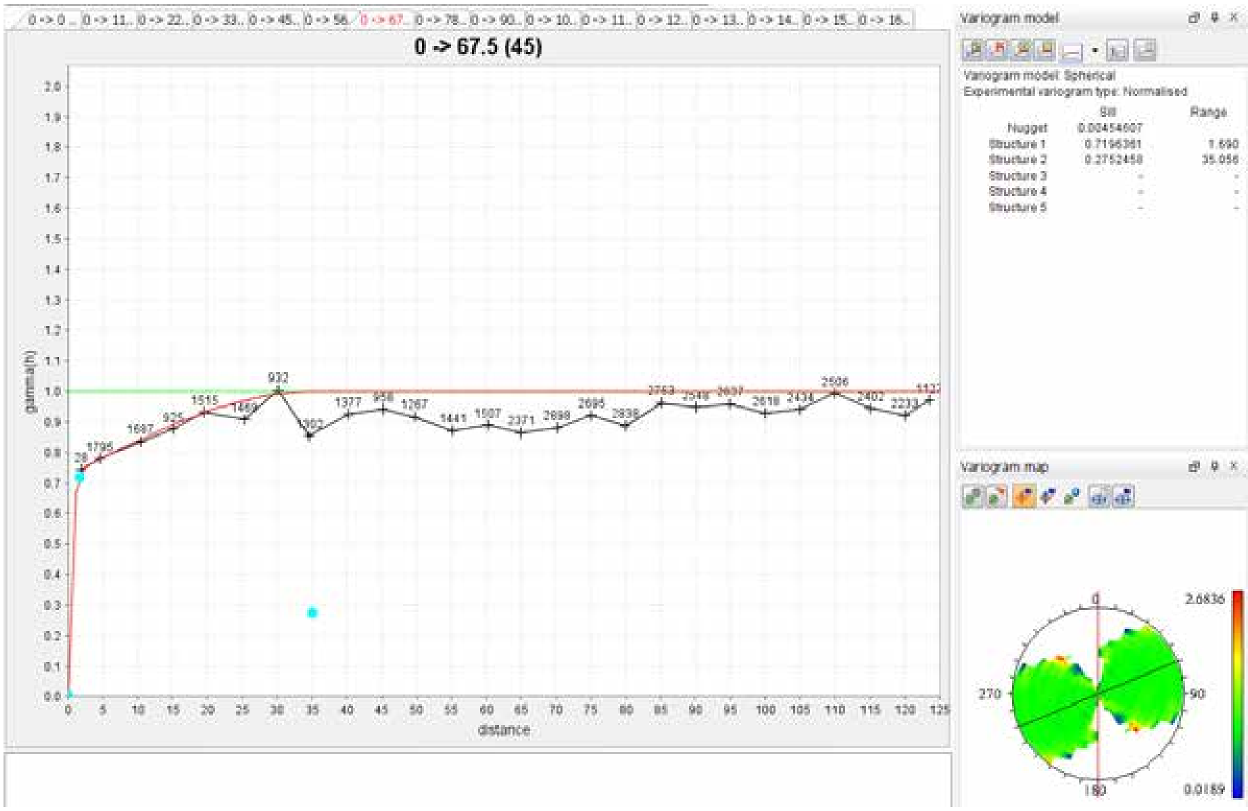
Dolcoath North Composites Strike (5 m Lag)



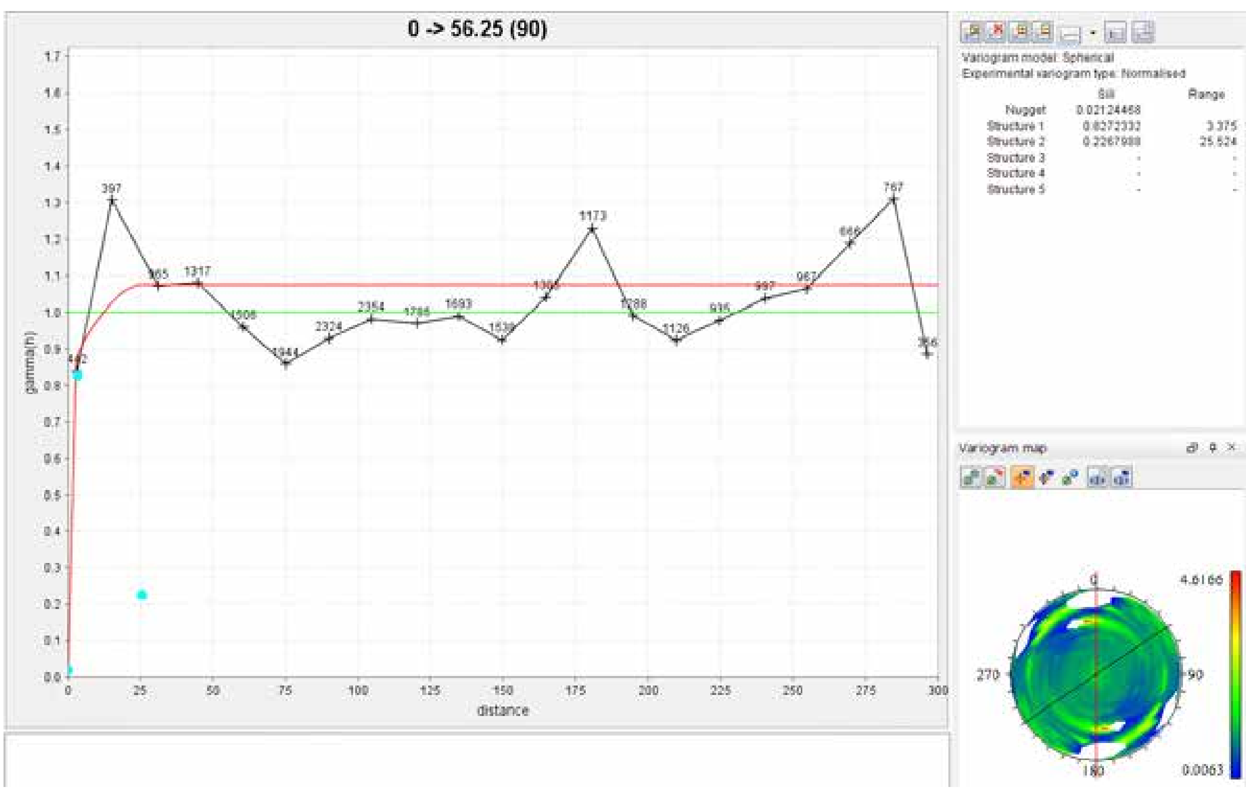

Dolcoath North Sn% Composites Dip (5 m Lag)



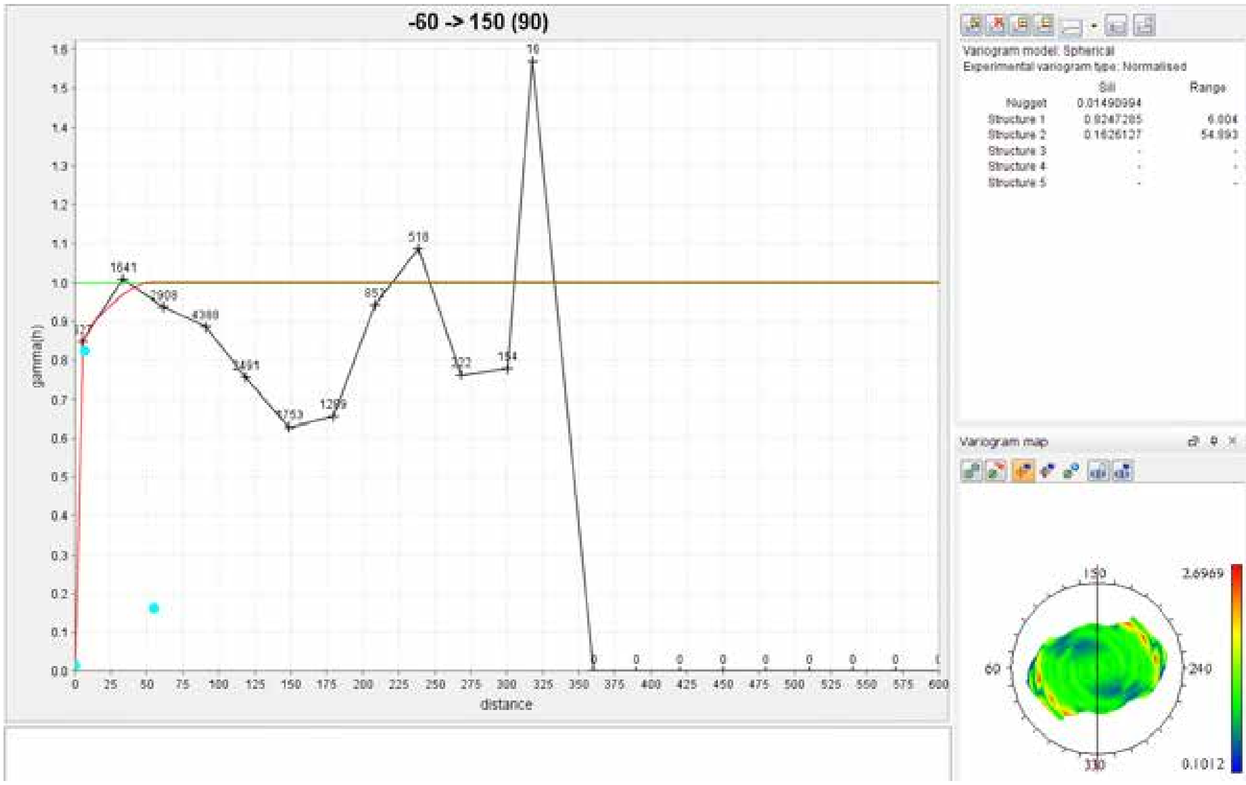
Dolcoath South Composites Strike (5 m Lag)



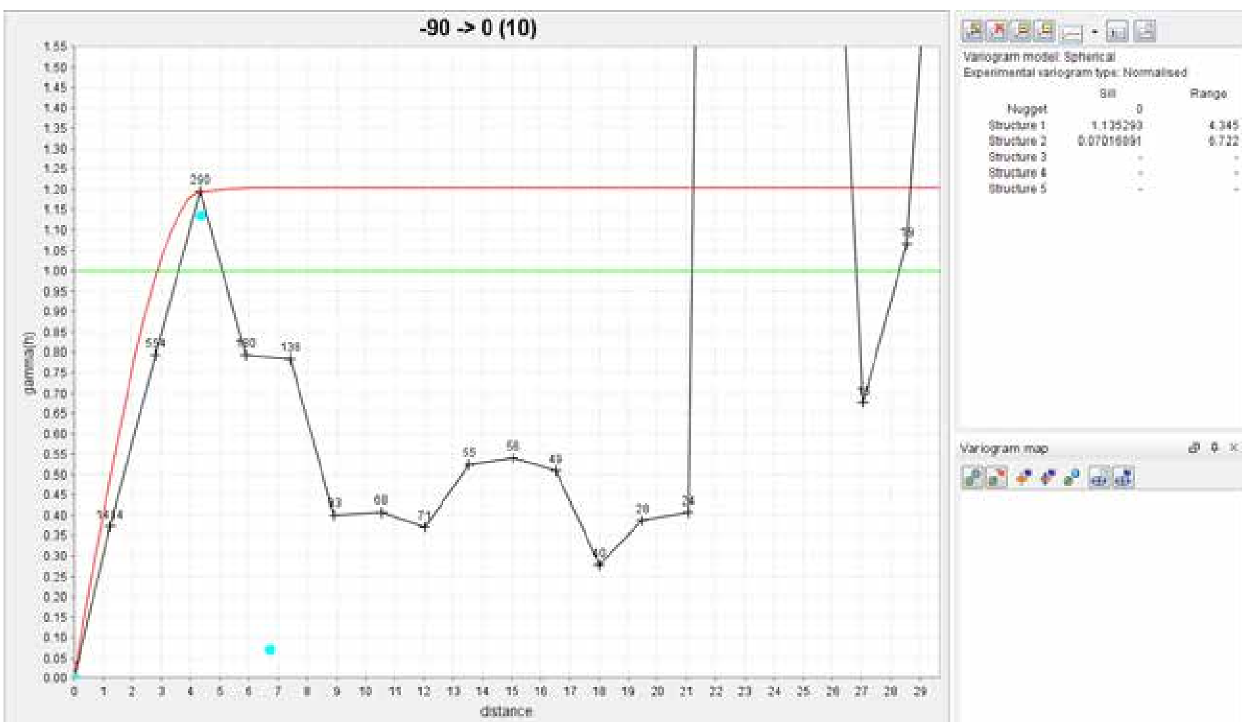

Dolcoath Upper Main Sn Composites Strike Omni (15 m Lag)



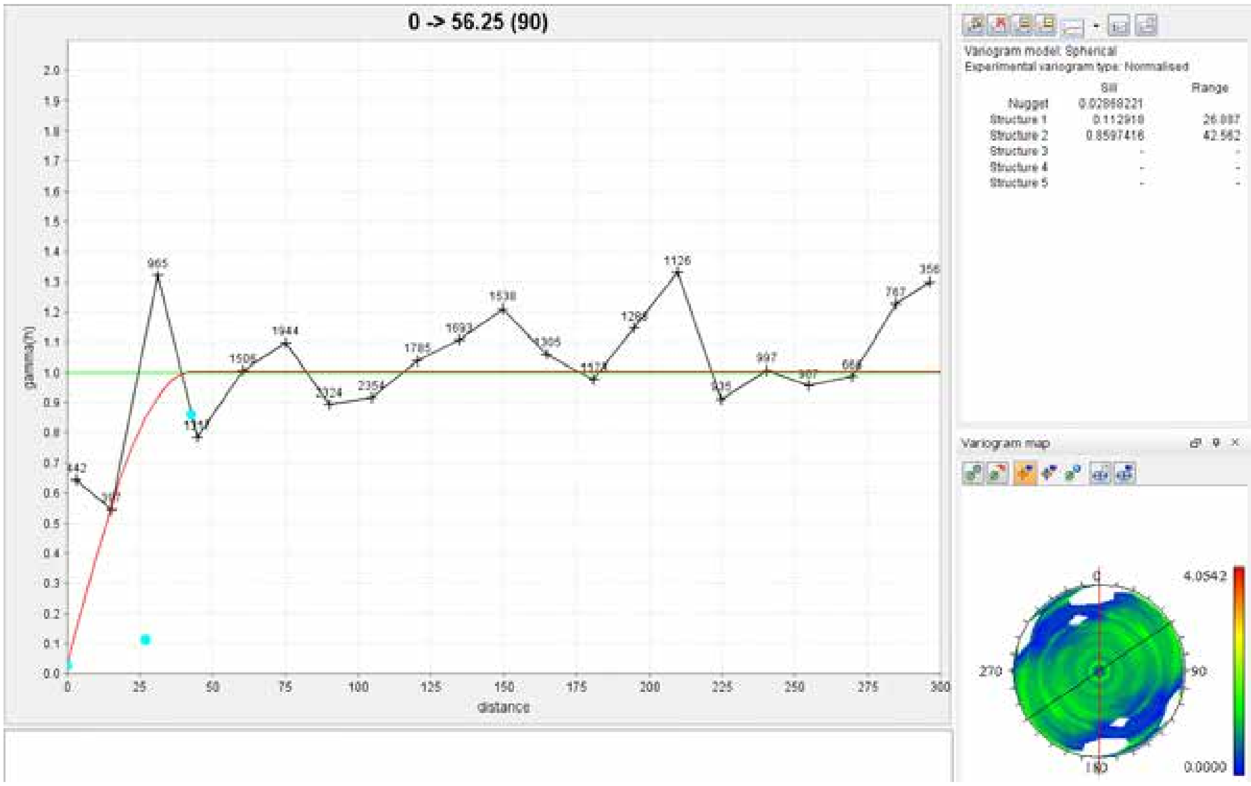
Dolcoath Upper Main Sn Composites Dip Omni (15 m Lag)



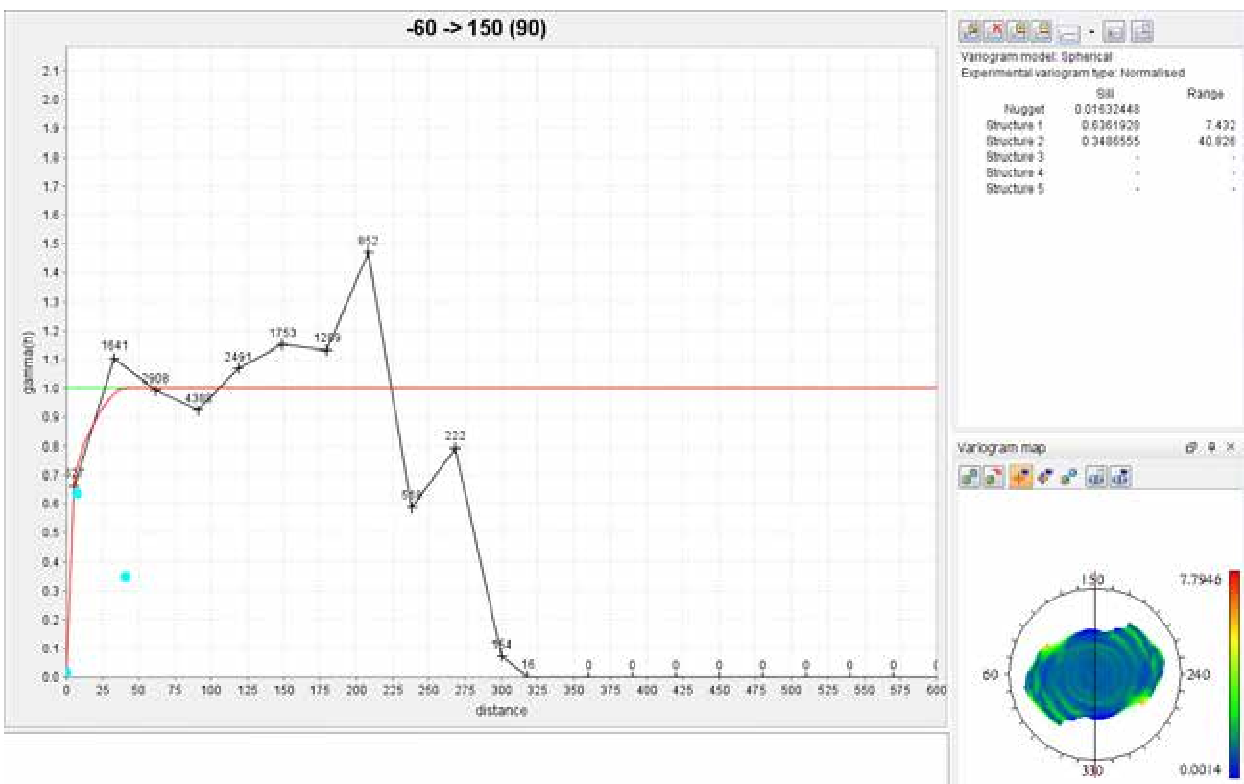

Dolcoath Upper Main Cu Composites Linear Downhole



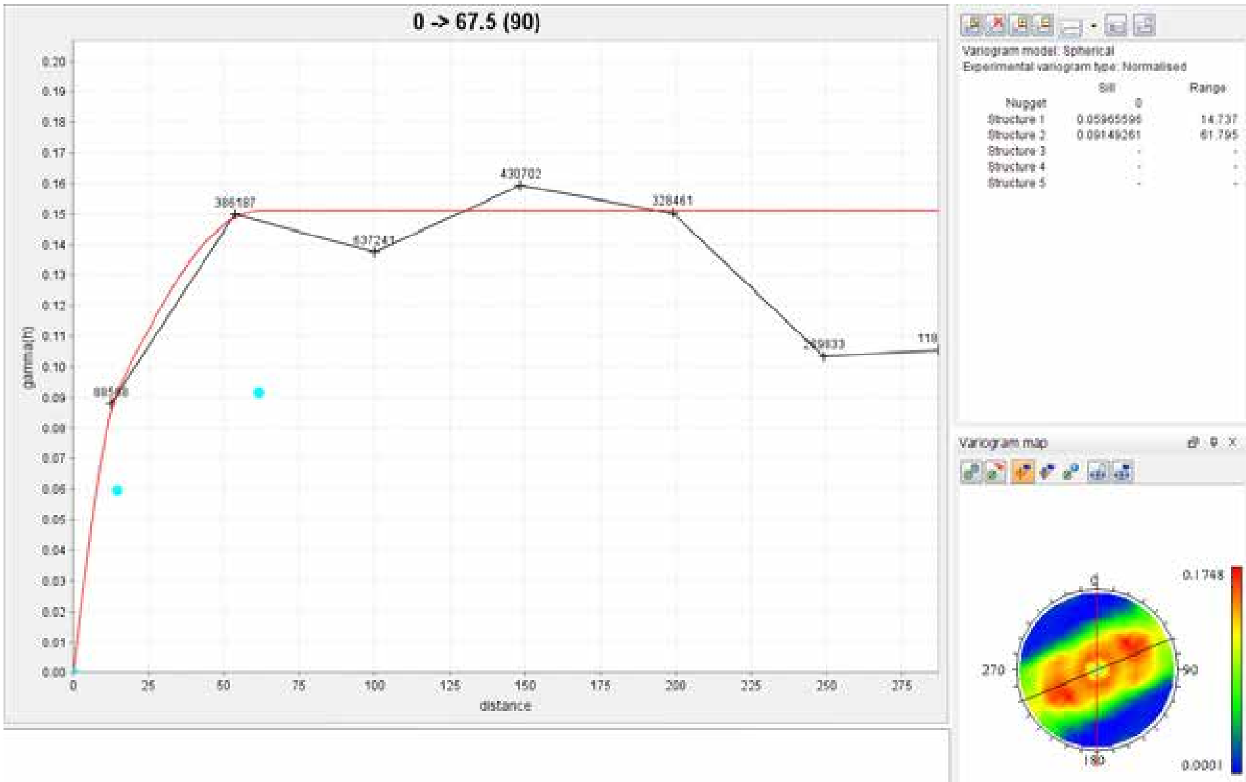
Dolcoath Upper Main Cu Composites Strike Omni (15 m Lag)




Dolcoath Upper Main Cu Composites Dip Omni (15 m Lag)



Dolcoath Middle Cu Composites Strike Omni (50 m Lag)




Dolcoath Upper Main Zn Composites Strike Omni (15 m Lag)