XANADU MINES

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Technical Report Released To Support Kharmagtai Mineral Resource Upgrade

Xanadu Mines Ltd (**ASX: XAM, TSX: XAM**) (**"Xanadu"** or **"the Company"**) is pleased to announce the release of the Technical Report "Kharmagtai Copper-Gold Project Mineral Resource Update, Mongolia"

The Mineral Resource Technical Report has been prepared by independent consultants, CSA Global Pty Ltd ("CSA Global") and is reported in accordance with the JORC Code (2012 Edition) and *National Instrument* 43-101 ("NI 43-101").

Xanadu's Managing Director and Chief Executive Officer, Dr Andrew Stewart, said:

"We are extremely pleased to release the Technical Report supporting our recent Mineral Resource Upgrade for Kharmagtai. This Resource Upgrade and Report represents another step forward for our flagship project Kharmagtai"

The Technical Report is attached and can be found on the SEDAR website at https://www.sedar.com

QUALIFIED PERSON STATEMENT

The information in this announcement that relates to Mineral Resources is based on information compiled by Dmitry Pertel who is responsible for the Mineral Resource estimate. Mr Pertel is a full time employee of CSA Global and is a Member of the Australian Institute of Geoscientists, has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity he is undertaking to qualify as the "Qualified Person" as defined in the CIM Guidelines and National Instrument 43-101. Mr Pertel consents to the inclusion in the report of the matters based on this information in the form and context in which it appears.

The information in this announcement that relates to exploration results is based on information compiled by Dr Andrew Stewart who is responsible for the exploration data, comments on exploration target sizes, QA/QC and geological interpretation and information. Dr Stewart, who is an employee of Xanadu and is a Member of the Australian Institute of Geoscientists, has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity he is undertaking to qualify as the "Competent Person" as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves" and the National Instrument 43-101. Dr Stewart consents to the inclusion in the report of the matters based on this information in the form and context in which it appears.

DISCLAIMER

This ASX/TSX release has been prepared by Xanadu Mines Ltd and neither the ASX or the TSX, nor their regulation service providers accept responsibility for the adequacy or accuracy of this press release.

Forward-looking statements

Certain statements contained in this press release, including information as to the future financial or operating performance of Xanadu and its projects may also include statements which are 'forward-looking statements' that may include, amongst other things, statements regarding targets, estimates and assumptions in respect of mineral reserves and mineral resources and anticipated grades and recovery rates, production and prices, recovery costs and results, capital expenditures and are or may be based on assumptions and estimates related to future technical, economic, market, political, social and other conditions. These 'forward–looking statements' are necessarily based upon a number of estimates and assumptions that, while considered reasonable by Xanadu, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies and involve known and unknown risks and uncertainties that could cause actual events or results to differ materially from estimated or anticipated events or results reflected in such forward-looking statements.

Xanadu disclaims any intent or obligation to update publicly or release any revisions to any forward-looking statements, whether as a result of new information, future events, circumstances or results or otherwise after today's date or to reflect the occurrence of unanticipated events, other than required by the Corporations Act and ASX and TSX Listing Rules. The words 'believe', 'expect', 'anticipate', 'indicate', 'contemplate', 'target', 'plan', 'intends', 'continue', 'budget', 'estimate', 'may', 'will', 'schedule' and similar expressions identify forward-looking statements.

All forward-looking statements made in this press release are qualified by the foregoing cautionary statements. Investors are cautioned that forward-looking statements are not guarantees of future performance and accordingly investors are cautioned not to put undue reliance on forward-looking statements due to the inherent uncertainty therein.

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APPENDIX 1: KHARMAGTAI TABLE 1 (JORC 2012)

Set out below is Section 1 and Section 2 of Table 1 under the JORC Code, 2012 Edition for the Kharmagtai project. Data provided by Xanadu. This Table 1 updates the JORC Table 1 disclosure dated 31 July 2018.

1.1 JORC TABLE 1 - SECTION 1 - SAMPLING TECHNIQUES AND DATA

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *Aspects of the determination of mineralisation that are Material to the Public Report.* • *In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.*	• The resource estimate is based on diamond drill core samples, RC chip samples and channel samples from surface trenches. • Representative ½ core samples were split from PQ, HQ & NQ diameter diamond drill core on site using rock saws, on a routine 2m sample interval that also honours lithological/intrusive contacts. • The orientation of the cut line is controlled using the core orientation line ensuring uniformity of core splitting wherever the core has been successfully oriented. • Sample intervals are defined and subsequently checked by geologists, and sample tags are attached (stapled) to the plastic core trays for every sample interval. • RC chip samples are ¼ splits from one meter intervals using a 75%:25% riffle splitter to obtain a 3kg sample • RC samples are uniform 2m samples formed from the combination of two ¼ split 1m samples.
Drilling techniques	• *Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	• The Mineral Resource estimation has been based upon diamond drilling of PQ, HQ and NQ diameters with both standard and triple tube core recovery configurations, RC drilling and surface trenching with channel sampling. • All drill core drilled by Xanadu has been oriented using the "Reflex Ace" tool.
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	• Diamond drill core recoveries were assessed using the standard industry (best) practice which involves: removing the core from core trays; reassembling multiple core runs in a v-rail; measuring core lengths with a tape measure, assessing recovery against core block depth measurements and recording any measured core loss for each core run. • Diamond core recoveries average 97% through mineralization.

Criteria	JORC Code explanation	Commentary
		• Overall, core quality is good, with minimal core loss. Where there is localized faulting and or fracturing core recoveries decrease, however, this is a very small percentage of the mineralized intersections. • RC recoveries are measured using whole weight of each 1m intercept measured before splitting • Analysis of recovery results vs grade shows no significant trends that might indicate sampling bias introduced by variable recovery in fault/fracture zones.
Logging	• *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	• All drill core is geologically logged by well-trained geologists using a modified “Anaconda-style” logging system methodology. The Anaconda method of logging and mapping is specifically designed for porphyry Cu-Au mineral systems and is entirely appropriate to support Mineral Resource Estimation, mining and metallurgical studies. • Logging of lithology, alteration and mineralogy is intrinsically qualitative in nature. However, the logging is subsequently supported by 4 Acid ICP-MS (48 element) geochemistry and SWIR spectral mineralogy (facilitating semi-quantitative/calculated mineralogical, lithological and alteration classification) which is integrated with the logging to improve cross section interpretation and 3D geological model development. • Drill core is also systematically logged for both geotechnical features and geological structures. Where drill core has been successfully oriented, the orientation of structures and geotechnical features are also routinely measured. • Both wet and dry core photos are taken after core has been logged and marked-up but before drill core has been cut.
Sub-sampling techniques and sample preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.*	• All drill core samples are ½ core splits from either PQ, HQ or NQ diameter cores. A routine 2m sample interval is used, but this is varied locally to honour lithological/intrusive contacts. The minimum allowed sample length is 30cm. • Core is appropriately split (onsite) using diamond core saws with the cut line routinely located relative to the core orientation line (where present) to provide consistency of sample split selection. • The diamond saws are regularly flushed with water to minimize potential contamination. • A field duplicate ¼ core sample is collected every 30th sample to ensure the “representivity of the in situ material collected”. The performance of

Criteria	JORC Code explanation	Commentary
	• *Whether sample sizes are appropriate to the grain size of the material being sampled.*	these field duplicates are routinely analysed as part of Xanadu's sample QC process. • Routine sample preparation and analyses of DDH samples were carried out by ALS Mongolia LLC (ALS Mongolia), who operates an independent sample preparation and analytical laboratory in Ulaanbaatar. • All samples were prepared to meet standard quality control procedures as follows: Crushed to 75% passing 2mm, split to 1kg, pulverised to 85% passing 200 mesh (75 microns) and split to 150g sample pulp. • ALS Mongolia Geochemistry labs quality management system is certified to ISO 9001:2008. • The sample support (sub-sample mass and comminution) is appropriate for the grainsize and Cu-Au distribution of the porphyry Cu-Au mineralization and associated host rocks.
Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* • *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	• All samples were routinely assayed by ALS Mongolia for gold • Au is determined using a 25g fire assay fusion, cupelled to obtain a bead, and digested with Aqua Regia, followed by an atomic absorption spectroscopy (AAS) finish, with a lower detection (LDL) of 0.01 ppm. • All samples were also submitted to ALS Mongolia for the 48 element package ME-ICP61 using a four acid digest (considered to be an effective total digest for the elements relevant to the MRE). Where copper is over-range (>1% Cu), it is analysed by a second analytical technique (Cu-OG62), which has a higher upper detection limit (UDL) of 5% copper. • Quality assurance has been managed by insertion of appropriate Standards (1:30 samples – suitable Ore Research Pty Ltd certified standards), Blanks (1:30 samples), Duplicates (1:30 samples – ¼ core duplicate) by XAM. • Assay results outside the optimal range for methods were re-analysed by appropriate methods. • Ore Research Pty Ltd certified copper and gold standards have been implemented as a part of QC procedures, as well as coarse and pulp blanks, and certified matrix matched copper-gold standards. • QC monitoring is an active and ongoing processes on batch by batch basis by which unacceptable results are re-assayed as soon as practicable. • Prior to 2014: Cu, Ag, Pb, Zn, As and Mo were routinely determined

Criteria	JORC Code explanation	Commentary
		using a three-acid-digestion of a 0.3g sub-sample followed by an AAS finish (AAS21R) at SGS Mongolia. Samples were digested with nitric, hydrochloric and perchloric acids to dryness before leaching with hydrochloric acid to dissolve soluble salts and made to 15ml volume with distilled water. The LDL for copper using this technique was 2ppm. Where copper was over-range (>1% Cu), it was analysed by a second analytical technique (AAS22S), which has a higher upper detection limit (UDL) of 5% copper. Gold analysis method was essentially unchanged.
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	• All assay data QAQC is checked prior to loading into XAM's Geobank data base. • The data is managed by XAM geologists. • The data base and geological interpretation is managed by XAM. • Check assays are submitted to an umpire lab (SGS Mongolia) for duplicate analysis. • No twinned drill holes exist. • There have been no adjustments to any of the assay data.
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• Diamond drill holes have been surveyed with a differential global positioning system (DGPS) to within 10cm accuracy. • The grid system used for the project is UTM WGS-84 Zone 48N • Historically, Eastman Kodak and Flexit electronic multi-shot downhole survey tools have been used at Kharmagtai to collect down hole azimuth and inclination information for the majority of the diamond drill holes. Single shots were typically taken every 30m to 50m during the drilling process, and a multi-shot survey with readings every 3-5m are conducted at the completion of the drill hole. As these tools rely on the earth's magnetic field to measure azimuth, there is some localised interference/inaccuracy introduced by the presence of magnetite in some parts of the Kharmagtai mineral system. The extent of this interference cannot be quantified on a reading-by-reading basis. • More recently (since September 2017), a north-seeking gyro has been employed by the drilling crews on site (rented and operated by the drilling contractor), providing accurate downhole orientation measurements unaffected by magnetic effects. Xanadu have a permanent calibration station setup for the gyro tool, which is routinely calibrated every 2 weeks (calibration records are maintained and were sighted)

Criteria	JORC Code explanation	Commentary
		• The project DTM is based on 1 m contours from satellite imagery with an accuracy of ±0.1 m.
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	• Holes spacings range from <50m spacings within the core of mineralization to +500m spacings for exploration drilling. Hole spacings can be determined using the sections and drill plans provided. • Holes range from vertical to an inclination of -60 degrees depending on the attitude of the target and the drilling method. • The data spacing and distribution is sufficient to establish anomalism and targeting for porphyry Cu-Au, tourmaline breccia and epithermal target types. • Holes have been drilled to a maximum of 1,300m vertical depth. • The data spacing and distribution is sufficient to establish geological and grade continuity, and to support the Mineral Resource classification.
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	• Drilling is conducted in a predominantly regular grid to allow unbiased interpretation and targeting. • Scissor drilling, as well as some vertical and oblique drilling, has been used in key mineralised zones to achieve unbiased sampling of interpreted structures and mineralised zones, and in particular to assist in constraining the geometry of the mineralised hydrothermal tourmaline-sulphide breccia domains.
Sample security	• *The measures taken to ensure sample security.*	• Samples are delivered from the drill rig to the core shed twice daily and are never left unattended at the rig. • Samples are dispatched from site in locked boxes transported on XAM company vehicles to ALS lab in Ulaanbaatar. • Sample shipment receipt is signed off at the Laboratory with additional email confirmation of receipt. • Samples are then stored at the lab and returned to a locked storage site.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• Internal audits of sampling techniques and data management are undertaken on a regular basis, to ensure industry best practice is employed at all times. • External reviews and audits have been conducted by the following groups: • 2012: AMC Consultants Pty Ltd. was engaged to conduct an

Criteria	JORC Code explanation	Commentary
		Independent Technical Report which reviewed drilling and sampling procedures. It was concluded that sampling and data record was to an appropriate standard. • 2013: Mining Associates Ltd. was engaged to conduct an Independent Technical Report to review drilling, sampling techniques and QAQC. Methods were found to conform to international best practice. • 2018: CSA Global reviewed the entire drilling, logging, sampling, sample shipping and laboratory processes during the competent persons site visit for the 2018 MRe, and found the systems and adherence to protocols to be to an appropriate standard.

1.2 JORC TABLE 1 - SECTION 2 - REPORTING OF EXPLORATION RESULTS

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	• The Project comprises 1 Mining Licence (MV-17387A). • The Kharmagtai mining license MV-17387A is 100% owned by Oyut Ulaan LLC. THR Oyu Tolgoi Ltd (a wholly owned subsidiary of Turquoise Hill Resources Ltd) ("THR") owns 90% of Oyut Ulaan LLC. The remaining 10% is owned by Quincunx Ltd ("Quincunx"). • The Mongolian Minerals Law (2006) and Mongolian Land Law (2002) govern exploration, mining and land use rights for the project.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Detailed exploration was conducted by Quincunx Ltd, Ivanhoe Mines Ltd and Turquoise Hill Resources Ltd including extensive surface mapping, trenching, diamond drilling, surface geochemistry and geophysics.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• The mineralisation is characterised as porphyry copper-gold type. • Porphyry copper-gold deposits are formed from magmatic hydrothermal fluids typically associated with felsic intrusive stocks that have deposited metals as sulphides both within the intrusive and the intruded host rocks. Quartz stockwork veining is typically associated with sulphides occurring both within the quartz veinlets and disseminated thought out the wall rock. Porphyry deposits are typically large tonnage deposits ranging from low to high grade and are generally mined by large scale open pit or underground bulk

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>mining methods. The prospects at Kharmagtai are atypical in that they are associated with intermediate intrusions of diorite to quartz diorite composition; however the deposits are significant in terms of gold:copper ratio, and similar to other gold-rich porphyry deposits.</td></tr>
<tr><td>Drill hole Information</td><td>A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:
easting and northing of the drill hole collar
elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar
dip and azimuth of the hole
down hole length and interception depth
hole length.
If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.</td><td>Diamond holes, RC holes and trenches are the principal source of geological and grade data for the Project.
<table>
<tr><th>Timing</th><th>RC Holes</th><th>Metre</th><th>DDH Holes</th><th>Metre</th><th>RC & DDH</th><th>Metre</th><th>Trench</th><th>Metre</th></tr>
<tr><td>Drilling <2015</td><td>155</td><td>24553</td><td>252</td><td>88511</td><td>0</td><td>0</td><td>106</td><td>39774</td></tr>
<tr><td>Drilling >2015</td><td>68</td><td>13107</td><td>116</td><td>57876</td><td>22</td><td>5323</td><td>17</td><td>5618</td></tr>
<tr><td>Total</td><td>223</td><td>37660</td><td>368</td><td>146387</td><td>22</td><td>5323</td><td>123</td><td>45392</td></tr>
</table>
See figures in main report.</td></tr>
<tr><td>Data aggregation methods</td><td>In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.
Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.
The assumptions used for any reporting of metal equivalent values should be clearly stated.</td><td>Weighted averages have not been used in this work
Some compositing has been used in this resource but with statistically relevant techniques that do not include internal dilution
The following metal equivalent calculations were used:
CuEq = Cu% + (Au g/t x 0.51139)

Formula is based on a $3.1/lb copper price and a $1,320/oz gold price. A relative gold to copper recovery factor of 82.35% was used (85% copper recovery and 70% gold recovery), gold to copper conversion factor of 0.62097 was applied. All prices are in USD.</td></tr>
<tr><td>Relationship between mineralisation widths and intercept lengths</td><td>These relationships are particularly important in the reporting of Exploration Results.
If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.
If it is not known and only the down hole lengths are</td><td>Mineralised structures are variable in orientation, and therefore drill orientations have been adjusted from place to place in order to allow intersection angles as close as possible to true widths.
Exploration results have been reported as an interval with 'from' and 'to' stated in tables of significant economic intercepts. Tables clearly indicate that true widths will generally be narrower than those</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
	reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').	reported.
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• See figures in main report.
Balanced reporting	• *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	• Resources have been reported at a range of cut-off grades, above a minimum suitable for open pit mining, and above a minimum suitable for underground mining.
Other substantive exploration data	• *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	• Extensive work in this area has been done and is reported separately. See the company website for significant announcements and milestones. Work that has been done includes; relogging of core, structural studies, alteration studies, geotechnical studies and preliminary metallurgical test works. The project has been subject to various geophysical studies including aeromagnetic, radiometric surveys and electromagnetic surveys over discrete targets.
Further work	• *The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).* • *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	• The mineralisation is open at depth and along strike. • Current estimates are restricted to those expected to be reasonable for open pit mining. Limited drilling below this depth (- 300m rl) shows widths and grades potentially suitable for underground extraction. • Exploration is on-going.

1.3 JORC TABLE 1 – SECTION 3 ESTIMATION AND REPORTING OF MINERAL RESOURCES

Criteria	JORC Code explanation	Commentary
Database integrity	• *Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* • *Data validation procedures used.*	• The database is managed using Micromine Geobank software. Data is logged directly into an Excel spread sheet logging system with drop down field lists. Validation checks are written into the importing program ensures all data is of high quality. Digital assay data is obtained from the Laboratory, QA/QC checked and imported. Geobank exported to CSV TEXT and imported directly to the Micromine software used for the

Criteria	JORC Code explanation	Commentary
		MRE. • The combined database was provided for the MRE. • Validation of the data import include checks for the following: • Duplicate drill hole or trench names, • One or more drill hole collar or trench coordinates missing in the collar file, • FROM or TO missing or absent in the assay file, • FROM > TO in the assay file, • Sample intervals overlap in the assay file, • First sample is not equal to 0 m in the assay file, • First depth is not equal to 0 m in the survey file, • Several downhole survey records exist for the same depth, • Azimuth is not between 0 and 360° in the survey file, • Dip is not between 0 and 90° in the survey file, • Azimuth or dip is missing in survey file, • Total depth of the holes is less than the depth of the last sample, • Total length of trenches is less than the total length of all samples. • Negative sample grades. • No logical errors were identified in the analytical data.
Site visits	• *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* • *If no site visits have been undertaken indicate why this is the case.*	• Warren Potma, an employee of CSA Global, visited the Kharmagtai project, located in Mongolia, over 4 days from 18th to 22nd September 2018. • The site visit was required for the purposes of inspection, ground truthing, review of activities, and collection of information and data.
Geological interpretation	• *Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* • *Nature of the data used and of any assumptions made.* • *The effect, if any, of alternative interpretations on Mineral Resource estimation.* • *The use of geology in guiding and controlling Mineral Resource estimation.* • *The factors affecting continuity both of grade and geology.*	• Geological data has been collected in a consistent manner that has allowed the development of geological models to support the Mineral Resource estimate. Copper and gold mineralisation is controlled by porphyry phases, oxidation zone, level of veining, breccia, country rocks and barren dykes. Full geological models of all major geological formations were developed for each deposit, and the block models were domained accordingly. Domaining of the deposit mineralisation was based on the current understanding of the deposits' geology. All major geological formations were wireframed by Xanadu geologists using Leapfrog software,

Criteria	JORC Code explanation	Commentary
		including porphyry phases, country rocks, barren dyke, base of oxidation surface and breccia bodies. All geological formations were domained by the level of development of stockwork - <0.5% veining, 0.5-1.5% veining and >1.5% veining. All provided wireframe models were imported into Micromine software and validated by CSA Global. • Geological interpretation and wireframing were based on sampling results of drill holes and trenches, which were logged at 2 m intervals (average). • No alternative interpretations were adopted. • Lithological logging was mainly used to interpret and to wireframe the geological formations. Geological logging of veining was used to wireframe the stockwork and breccia domains.
Dimensions	• *The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	• Altan Tolgoi: The strike length of the mineralised zone is about 1,200 m. Width is up to 800 m, no plunging, traced down dip to 1,030 m. Mineralisation is outcropped at the surface. • Tsagaan Sudal: The strike length of the mineralised zone is about 1,200 m. Width is up to 730 m, no plunging, traced down dip to 1,080 m. Mineralisation is outcropped at the surface. • Zesen Uul: The strike length of the mineralised zone is about 630 m. Width is up to 150 m with apparent plunging to SW at about 40 degrees. traced down dip to 420 m dipping 70 degrees to SE. Mineralisation is outcropped at the surface.
Estimation and modelling techniques	• *The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.* • *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.* • *The assumptions made regarding recovery of by-products.*	• The MRE is based on surface drilling and trenching results using Ordinary Kriging (OK) to inform 20 m x 20 m x 20 m blocks. The block model was constrained by wireframes modelled for the geological formations of the deposits and coded and domained by the level of oxidation and level of veining. The OK interpolation was carried out separately for each geological domain of each deposit. Hard boundaries were used between the interpreted geological domains. The drill hole and trench data were composited to a target length of 2 m based on the length analysis of raw intercepts. Top-cuts were estimated separately for gold and coper grades for each modelled domain and applied to sampled intervals before length compositing. Interpolation parameters were as follows:

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td>
Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulphur for acid mine drainage characterisation).
In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.
Any assumptions behind modelling of selective mining units.
Any assumptions about correlation between variables.
Description of how the geological interpretation was used to control the resource estimates.
Discussion of basis for using or not using grade cutting or capping.
The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.
</td><td>
<table>
<tr><td>Interpolation method</td><td colspan="4">Ordinary Kriging</td></tr>
<tr><td>Search radii</td><td>Less or equal to 1/3 of semi-variogram ranges</td><td>Less or equal to 2/3 of semi-variogram ranges</td><td>Less of equal to semi-variogram ranges</td><td>Greater than semi-variogram ranges</td></tr>
<tr><td>Minimum no. of samples</td><td>3</td><td>3</td><td>3</td><td>1</td></tr>
<tr><td>Maximum no. of samples</td><td>16</td><td>16</td><td>16</td><td>16</td></tr>
<tr><td>Minimum no. of drillholes or trenches</td><td>2</td><td>2</td><td>2</td><td>1</td></tr>
</table>

Previous JORC-compliant Mineral Resources were estimated by Mining Associates, and the estimate was available for review.

No current mining is occurring at the Kharmagtai project.

No by-products are assumed at this stage. Estimated molybdenum and silver grades appear to be sub-economic to extract at this stage of the project evaluation.
Sulphur grades were interpolated into the models to establish their potential affect to metallurgical processing.
The optimal parent cell size was selected in the course of block modelling. The linear parent cell dimensions along X- and Y-axes were 20 m x 20 m. The vertical parent cell dimension was 20 m. Block grades were interpolated using parent cell estimation. Nominal drill spacing was about 40 m x 40 m at the central parts of the deposits.
It was assumed that a 20 m x 20 m x 20 m parent cell approximately reflects SMU for large scale open pit mining.
No assumptions about correlation between variables were made.
Geological interpretation was based on the results of detailed geological logging, which resulted in the development of wireframe models for all major geological formations for each deposit, which control copper and gold mineralisation (country rocks, porphyry phases, barren dyke. Logging of the level of veining and level of oxidation was used to develop wireframe models for the stockwork development (<0.5% veining, 0.5-1.5% veining and >1.5% veining) and also for breccia pipe and surface for the base of oxidation surface. The wireframe models for stockwork, breccia and oxidation were used to sub-domain the main geological formations of each deposit. All wireframe models were developed by Xanadu geologists using Leapfrog software.
Top-cutting was applied separately for each geological domain and sub-domain based on the results of the classical statistical analysis.
Grade estimation was validated using visual inspection of interpolated block grades vs. sample data, alternative interpolation methods and
</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
		swath plots.
Moisture	• *Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	• Moisture was not considered in the density assignment and all tonnage estimates are based on dry tonnes.
Cut-off parameters	• *The basis of the adopted cut-off grade(s) or quality parameters applied.*	• A cut-off grade of 0.3% CuEq was used to report the Mineral Resources for open pit mining within the limits of ultimate undiscounted pit shell, and a cut-off of 0.5% CuEq was used to report the Mineral Resources for underground mining below the ultimate undiscounted pit shell.
Mining factors or assumptions	• *Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	• No mining factors have been applied to the in-situ grade estimates for mining dilution or loss as a result of the grade control or mining process. The deposit is amenable to large scale bulk mining. The Mineral Resource is reported above and outside of an optimised ultimate pit shell (Lerch Grossman algorithm), mineralisation below the pit shell is reported at a higher cut-off to reflect the increased costs associated with block cave underground mining.
Metallurgical factors or assumptions	• *The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	• No metallurgical factors have been applied to the in-situ grade estimates. Metallurgical recoveries were used when copper equivalent grades were calculated in the model. The applied recoveries were 85% for copper and 70% for gold. Relative gold to copper recovery was 82%.
Environmental factors or assumptions	• *Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation.*	• An environmental baseline study was completed in 2003 by Eco Trade Co. Ltd. of Mongolia in cooperation with Sustainability Pty Ltd of Australia. The baseline study report was produced to meet the requirements for screening under the Mongolian Environmental Impact Assessment (EIA) Procedures administered by the Mongolian Ministry

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td>While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.</td><td>for Nature and Environment (MNE).</td></tr>
<tr><td>Bulk density</td><td>Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.
The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc.), moisture and differences between rock and alteration zones within the deposit.
Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.</td><td>A total of 4428 measurements for bulk density are recorded in the database, all of which were determined by the water immersion method.
The average density of all samples is approximately 2.75 t/m^3. In detail there are some differences in density between different rock types. Therefore, since the model includes all major geological domains, density values were applied separately for each domain:
<table>
<tr><th>Deposit</th><th>Domain</th><th>Density, t/m3</th></tr>
<tr><td rowspan="5">TS</td><td>OXIDE ZONE</td><td>2.65</td></tr>
<tr><td>CRD</td><td>2.76</td></tr>
<tr><td>CRS</td><td>2.74</td></tr>
<tr><td>P2</td><td>2.78</td></tr>
<tr><td>P5</td><td>2.80</td></tr>
<tr><td rowspan="7">AT</td><td>Breccia</td><td>2.78</td></tr>
<tr><td>OXIDE ZONE</td><td>2.65</td></tr>
<tr><td>CR</td><td>2.73</td></tr>
<tr><td>P1</td><td>2.78</td></tr>
<tr><td>P2</td><td>2.78</td></tr>
<tr><td>P3</td><td>2.77</td></tr>
<tr><td>TAND</td><td>2.76</td></tr>
<tr><td rowspan="5">ZU</td><td>OXIDE ZONE</td><td>2.65</td></tr>
<tr><td>CR</td><td>2.71</td></tr>
<tr><td>P1</td><td>2.81</td></tr>
<tr><td>P2</td><td>2.76</td></tr>
<tr><td>P3</td><td>2.76</td></tr>
</table>
Average bulk density values were applied for each geological domain, though there could be variations in density values due to presence of sulphides or level of alteration.</td></tr>
<tr><td>Classification</td><td>The basis for the classification of the Mineral Resources into varying confidence categories.
Whether appropriate account has been taken of</td><td>The Mineral Resource has been classified based on the guidelines specified in the JORC Code. The classification level is based upon an assessment of geological understanding of the deposit, geological and</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
	all relevant factors (i.e. relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data). • *Whether the result appropriately reflects the Competent Person's view of the deposit.*	mineralization continuity, drill hole spacing, QC results, search and interpolation parameters and an analysis of available density information. The following approach was adopted: o Measured Resources: Not reported. o Indicated Resources: It was decided that Indicated Mineral Resources be assigned to blocks which were explored with the drill density not exceeding approximately 65 m x 65 m with at least two mineralization intersections on exploration lines. Geological structures are relatively well understood and interpreted. o Inferred Resources: Inferred Mineral Resources are model blocks lying outside the Indicated wireframes, which still display reasonable strike continuity and down dip extension, based on the current drill hole and trench intersections. • Data quality, grade continuity, structural continuity and drill spacing were assessed by CSA Global to form an opinion regarding resource confidence. • The classification reflects the Competent Person's view of the deposit.
Audits or reviews	• *The results of any audits or reviews of Mineral Resource estimates.*	• The Mineral Resource block model was peer reviewed internally by a Principal Resource Geologist employed by CSA Global and the conclusion was made that the procedures used to estimate and classify the Mineral Resource are appropriate.
Discussion of relative accuracy/ confidence	• *Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* • *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation.*	• Industry standard modelling techniques were used, including but not limited to: o Classical statistical analysis, o Interpretation and wireframing of main geological formations, o Top-cutting and interval compositing, o Domaining of the model using level of logging veining, breccia and zone of oxidation, o Geostatistical analysis, o Block modelling and grade interpolation techniques, o Model classification, validation and reporting, The relative accuracy of the estimate is reflected in the classification of the deposit. • The estimate is related to the global estimate of the deposit suitable for subsequent PFS or further exploration at the deposit. • No historical production data is available for comparison with the MRE.

Criteria	JORC Code explanation	Commentary
	Documentation should include assumptions made and the procedures used. • *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	• The Mineral Resource accuracy is communicated through the classification assigned to various parts of the deposit.

1.4 JORC TABLE 1 – SECTION 4 ESTIMATION AND REPORTING OF ORE RESERVES

Ore Reserves are not reported so this is not applicable to this report.

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NI 43-101 Technical Report

on the

KHARMAGTAI COPPER-GOLD PROJECT MINERAL RESOURCE UPDATE, MONGOLIA

By

CSA Global Pty Ltd

For

Xanadu Mines Ltd

Authors and Qualified Persons:

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Report Date: 14 December 2018
Report Effective Date: 01 October 2018
Report No: R559.2018

CSA Global Internal Documentation

Report prepared for

Client Name	Xanadu Mines Ltd
Project Name/Job Code	Kharmagtai Copper Gold, NI 43-101 Report XAMNIR01
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Division	Resources

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1 Summary

1.1 Executive Summary

In August 2018, CSA Global Pty Ltd (CSA Global) was commissioned by Xanadu Mines Ltd (Xanadu) to update a Mineral Resource estimate and to prepare an NI 43-101 Technical Report for the Kharmagtai copper-gold deposit, located in the Omnogovi Province of southern Mongolia. Xanadu has a 76.5% beneficial interest the Kharmagtai project which forms part of a larger package of projects in Mongolia in which Xanadu has an interest.

The Mineral Resource estimate update and report were commissioned by Xanadu to support the continued development of the project and fundraising activities following results of the additional exploration drilling completed in 2017–2018. Xanadu is listed on the TSX-Venture Exchange and as such, this document will be published and available to third parties or the general public.

Xanadu have been investigating the Kharmagtai project since late 2014 and have undertaken multiple phases of exploration and evaluation programs. These programs have included: Data compilation; validation and re-interpretation; surface sampling; trenching; diamond drilling (52,959 m); RC drilling (12,022 m); regional rotary percussion drilling (18,532 m); reprocessing and modelling of geophysics datasets; acquisition of infill ground magnetics data; new ground gravity data acquisition, geological modelling, integrated exploration targeting exercises, Mineral Resource updates and preliminary mining and metallurgical studies.

This report contains information on all main phases and stages of work that contributed to the Mineral Resource estimation upgrade including results of quality assurance/quality control (QAQC) analysis. At this time, more detailed studies of the project, in terms of mining or project economics, has not been undertaken.

Warren Potma, Principal Geologist for CSA Global, visited the Kharmagtai project area in September 2018 at the request of Xanadu. The purpose of the visit was to examine resource definition drilling practices used at Xanadu, collect QAQC data, and to inspect the sample preparation laboratory in Mongolia (Ulaanbaatar).

Review and analysis of both the historical and recent QAQC data, procedures and protocols indicate that the quality of data is acceptable to allow a Mineral Resources to be reported in accordance with the CIM Guidelines. The risk associated with the quality of the data is believed to be low.

The most recent exploration programs at the deposit were run by the Xanadu exploration team, including drilling in 2017–2018. Xanadu provided CSA Global with all exploration results completed to date and an updated project database. The database included drillhole collar coordinates, lithological codes and analytical information for copper, gold and a suite of other elements. The gold grades were determined using fire assays and copper was determined using four-acid inductively coupled plasma-atomic emission spectrometry (ICP-AES) methods (as part of a 34-element suite) with over-range assays re-analysed using a suitable high-grade method. The topographic surface was also provided in the form of a digital terrain model (DTM).

Geological interpretation and wireframing were completed by Xanadu geologists and supplied to CSA Global. It included interpretation of the main geological formations at the deposits, including country rocks, porphyry intrusion phases, three grades of veining, stockwork, barren dyke and breccia. Closed wireframe models were generated for each modelled geological formation.

The Ordinary Kriging (OK) method was chosen to interpolate copper and gold grades into a block model. Dry bulk density values were estimated separately for each geological domain and assigned to the model (see Table 2 notes).

The Mineral Resources have been classified and reported in accordance with the CIM guidelines. Mineral Resource classification is based on confidence in the adopted sampling methods, geological interpretation, drill hole spacing and geostatistical measures.

Mineral Resources are reported in two parts, those that that have potential for extraction by open cut mining methods and the deeper higher-grade material outside of the open pit that may be amenable to underground mining. The open pit Mineral Resources are the parts of the deposit above a cut-off of 0.3% CuEq that fall within a conceptual optimised pit shell. Higher-grade material above a cut-off grade of 0.5% CuEq outside of the optimised pit shell was considered for underground mining.

The Mineral Resource statement is shown in Table 1 and Table 2.

Table 1: Kharmagtai Open Pit Mineral Resources as at 1 October 2018

Deposit	Classification	Tonnes (Mt)	Grades			Contained metal		
			CuEq, %	Cu, %	Au, g/t	CuEq, Kt	Cu, Kt	Au, Koz
Tsagaan Sudal	Indicated	45.2	0.42	0.30	0.23	189	135	340
Altan Tolgoi		74.4	0.59	0.38	0.41	441	286	972
Zesen Uul		9.7	0.76	0.48	0.54	73	47	167
Total Indicated		**129.3**	**0.54**	**0.36**	**0.36**	**703**	**468**	**1,479**
Tsagaan Sudal	Inferred	412.8	0.40	0.31	0.17	1,653	1,299	2,227
Altan Tolgoi		55.4	0.47	0.30	0.34	263	167	601
Zesen Uul		0.7	0.39	0.31	0.16	3	2	4
Total Inferred		**468.9**	**0.41**	**0.31**	**0.19**	**1,919**	**1,468**	**2,832**

Table 2: Kharmagtai Underground Mineral Resources as at 1 October 2018

Deposit	Classification	Tonnes (Mt)	Grades			Contained metal		
			CuEq, %	Cu, %	Au, g/t	CuEq, Kt	Cu, Kt	Au, Koz
Altan Tolgoi	Indicated	1.2	0.68	0.45	0.46	8	5	18
Zesen Uul		0.2	0.63	0.46	0.33	1	1	2
Total Indicated		**1.5**	**0.67**	**0.45**	**0.44**	**10**	**7**	**21**
Tsagaan Sudal	Inferred	3.5	0.56	0.46	0.19	19	16	21
Altan Tolgoi		4.8	0.68	0.43	0.49	33	21	77
Total Inferred		**8.3**	**0.63**	**0.44**	**0.37**	**52**	**37**	**98**

Notes:

- *Mineral Resources are classified according to CIM Definition Standards for Mineral Resources and Mineral Reserves (10 May 2014).*
- *Mineral Resources for open pit mining are estimated within the limits of an ultimate pit shell.*
- *Mineral Resources for underground mining are estimated outside the limits of ultimate pit shell.*
- *A cut-off grade of 0.3% CuEq has been applied for open pit mineral resources.*
- *A cut-off grade of 0.5% CuEq has been applied for underground mineral resources.*
- *Dry bulk density values of 2.65 t/m^3 for oxide zones; 2.76, 2.74, 2.73 and 2.71 t/m^3 for country rocks, 2.78, 2.80, 2.77, 2.81 and 2.76 t/m^3 for porphyries and 2.76 t/m^3 for andesite dyke were used for the model cells.*
- *CuEq – copper equivalent was calculated using conversion factor 0.62097 for gold. Metal prices were 3.1 $/lb for copper and 1320 $/oz for gold, recoveries – 70% for gold and 85% for copper (82.35% relative gold to copper recovery), copper equivalent formula applied: CuEq = Cu + Au * 0.62097 * 0.8235.*
- *Rows and columns may not add up exactly due to rounding.*

1.2 Conclusions

CSA Global concludes and recommends the following:

- The data and work completed to date is of high standard allowing the estimation of a reliable Mineral Resource for the project.
- The mineral resource model classified as Indicated is sufficiently reliable to support engineering and design studies to evaluate the economic viability of a mining project.
- Continued exploration and evaluation programs are warranted at the project, and completion of a preliminary economic analysis study is warranted (leading to more detailed feasibility studies in the future).
- Significant upside exists to extend and upgrade the Mineral Resources across the Kharmagtai Project. Mineralisation at the three existing Mineral Resources (defined herein) is open at depth, with potential to increase tonnages and upgrade classifications with additional drill density at depth. The existing Resources are also potentially amenable to infill and extension drilling nearer to surface, particularly if slightly lower cut-off grades can be justified. Numerous other priority exploration targets across the tenement would also benefit significantly from additional exploration, infill and extension drilling to a level that can potentially support the estimation of additional Resources on other porphyry centres away from the existing Resources at Stockwork Hill, Copper Hill and White Hill.
- Infill drilling in critical areas would significantly reduce any potential risk in future Mineral Resource updates and economic assessment of the project, particularly at the deeper parts of the deposit that may be amenable to underground mining.
- Utilisation of existing multi-element geochemistry and SWIR spectral mineralogy data to develop quantitative 3D geometallurgical models providing: improved 3D oxidation surface models; more quantitative (calculated mineralogy) constrained 3D geological models; improved metallurgical testwork sampling protocols and confidence in the representivity of metallurgical testwork samples.

1.3 Recommendations

CSA Global recommends the following are completed to support the exploration and evaluation effort:

- Current QAQC procedures should be maintained to ensure high-quality data is available for subsequent Mineral Resource estimates.
- Additional drilling of the other known Cu/Au-rich porphyry centres within the Kharmagtai project area is highly recommended. There are several high-priority targets with significant intercepts, that are demonstrably under-explored, and have the potential to contribute to the Mineral Resource inventory with additional infill and extension drilling.
- Infill drilling of Inferred Mineral Resource areas to upgrade to a higher classification.
- Additional metallurgical studies to refine and improve recoveries for all mineral domains in the deposit.
- Additional geotechnical study to refine the physical rock characteristics required for mine design
- Application of quantitative geometallurgical characterisation, classification and 3D modelling using existing four-acid ICP-AES geochemistry and SWIR spectral mineralogy would greatly enhance future metallurgical testwork program design, and the 3D mineralogical models would also contribute to further improvement of 3D geological models for ongoing exploration targeting and future Mineral Resource upgrades.
- Advance to the project to a preliminary economic assessment
- Complete supporting study work for other disciplines required for more advanced technical studies such as tailings characterisation, hydrogeology, environmental and community engagement.

More detailed recommendations are provided in the main body of the report.

1.4 Technical Summary

1.4.1 Property Description and Location

The Kharmagtai porphyry copper-gold project is located within the Omnogovi Province of southern Mongolia, approximately 420 km southeast of Ulaanbaatar and 120 km north of Oyu Tolgoi porphyry copper-gold project.

1.4.2 Land Tenure

The Kharmagtai project is covered by a Mining Licence (MV-017387) which is approximately 66.5 km^2, was granted on 27 September 2013 and is valid for 30 years.

1.4.3 Existing Infrastructure

The property can be accessed via paved road from Ulaanbaatar requiring six hours of travel time, with the last 1.5 hours on approximately 60 km of unsealed roads. The soum (sub-province) centre of Tsogttsetsii is situated approximately 60 km south from the project area and is serviced by daily flights from Ulaanbaatar requiring 45 mins travel time. The Xanadu exploration camp is located just outside the southwest corner of the Mining Licence and comprises a semi-permanent modified sea-container-constructed core processing, office and messing facilities and gur accommodation.

1.4.4 History

Historic exploration activities included:

- 1960–1975: Joint Mongolian–Eastern Block Exploration including mapping, geochemistry, geophysics, diamond drilling and a Russian standard resource estimate of 193 Mt @ 0.25% Cu.
- 1991–1995: Japan International Cooperation Agency (JICA) and Metal Mining Agency of Japan (MMAJ) conducted regional reconnaissance, geophysics and identified porphyry copper affinities of the Kharmagtai project.
- 1996–1998: Quincunx (QGGX) completed geological mapping, rock chip and soil sampling and trenching and limited diamond drilling confirming porphyry mineral system affinities.
- 2001–2006: Ivanhoe Mines Mongolia (IMMI) undertook detailed geological mapping, extensive trenching, geophysics, significant reverse circulation (RC) and diamond drilling and delivered the first combined resources for Stockwork Hill, White Hill and Copper Hill of 174 Mt @ 0.5% CuEq.
- 2007–2012: AGC (Asia Gold, a subsidiary of IMMI) drill tested deep geophysical anomalies, and completed additional geophysics followed up with drill testing of geophysical targets.
- The project was subsequently acquired by Xanadu Mines in 2014.

1.4.5 Geology and Mineralisation

Kharmagtai is located within the Central Asian Fold Belt (CAFB), in the southern Mongolian fold system (Ruzhentsev and Pospelov, 1992), which comprises a zone of arc-continent collision that was active during several episodes from the Silurian to Early Carboniferous along the southern margin of the Siberian Craton. Kharmagtai lies within the Gurvansaikhan terrane, which forms an arcuate belt 600 km long and up to 200 km wide through southern Mongolia. The Gurvansaikan terrane hosts most of the known porphyry and intrusion-related mineralization in the South Gobi, including the Oyu Tolgoi copper-gold porphyry (Perello *et al.,* 2001; Crane and Kavalieris, 2013) and the Tsagaan Suvarga copper-molybdenum porphyry (Watanabe and Stein, 2000).

Mineralisation at the Kharmagtai porphyry mineral system comprises multi-stage vein and breccia-hosted copper-gold mineralisation associated with multiple telescoped poly-phase porphyritic intrusive stocks.

1.4.6 Exploration Status

Since acquiring the Property in 2014, Xanadu has undertaken substantial additional exploration and evaluation work including:

- Geophysics: 1,200 line-km ground magnetics acquisition, acquisition of 2,225 100 m-spaced ground gravity stations and reprocessing of historical datasets
- Trenching: 5,618 m
- Drilling: 71,553 m DDH, 14,220 m RC, 6,662 m RC-DDH, 26,136 m RPD for regional litho-geochemical sampling of basement rocks
- Multielement geochemical analyses and spectral analyses
- Structural studies
- Regional target ranking exercises integrating new data with historical data.

2 Introduction

2.1 Issuer

Xanadu Mines Ltd ("Xanadu" or "the Issuer") is a public mineral exploration and development company listed on both the ASX (Australian Securities Exchange) and TSX (Toronto Stock Exchange) and based in Toronto, Ontario, Canada. Xanadu has been successfully investigating the copper-gold potential of three permits in Mongolia: the Kharmagtai Project is located in the Omnogovi province Tsogt Tsetsii soum and covers 6647.05 ha or 66.47 km^2; the Red Mountain Project is located in the Dornogobi province Saikhandulaan soum and covers 5757.04 ha or 57.57 km^2 and; the Yellow Mountain Project is located in the Bulgan province Selenge, Bugat soum and covers 23534.84 ha or 235.35 km^2.

Xanadu's Mineral Resource assets in Mongolia occur across several deposits within the Kharmagtai Project area. The most advanced investigation has occurred at the Stockwork Hill (previously Altan Tolgoi), White Hill (previously Tsagaan Sudal) and Copper Hill (previously Zesen Uul) deposits all within the Kharmagtai group of tenements. Exploration and evaluation programs completed to date are sufficient to estimate Mineral Resources on these three deposits. Other tenement areas have also been explored and have demonstrated potential for copper-gold mineralisation which have the potential to result in additional Mineral Resources over time.

CSA Global Pty Ltd (CSA Global) is a geological, mining and management consulting company with more than 30 years' experience in the international mining industry. Headquartered in Perth, Western Australia, the company has ten offices located in Australia, Canada, the UK, South Africa, Indonesia, Singapore and Dubai. CSA Global services cover all aspects of the mining industry from project generation to exploration, evaluation, development, operations and corporate advice. CSA Global has undertaken the geological assessment and Mineral Resource estimation for the Kharmagtai Project, including the site and laboratory inspection.

2.2 Terms of Reference

Xanadu engaged CSA Global to prepare this Independent Technical Report ("the Report"), on the Kharmagtai Project ("the Project" or "the Property"), in accordance with standards dictated by Canadian National Instrument (NI) 43-101 (30 June 2011), companion policy NI 43-101CP, and Form 43-101F1 (Standards of Disclosure for Mineral Projects). The primary purpose of this Report is to provide an updated estimate of the Mineral Resources of the Kharmagtai Project. The Mineral Resource update has been prepared in accordance with CIM Definition Standards for Mineral Resources and Mineral Reserves (10 May 2014) and CIM "Estimation of Mineral Resource and Mineral Reserves Best Practice Guidelines" (CIM Council, 2003) as per NI 43-101 requirements. Only Mineral Resources are estimated – no Mineral Reserves are defined.

Mr Andy Holloway, B.Eng., C.Eng., P. Eng., Partner and Principal Process Engineer of AGP Mining Consultants Inc. (AGP) wrote and is acting as Qualified Person for Section 13 of the Report.

This Technical Report is based on the outcomes of the exploration programs completed by Xanadu up to and including 1 September 2018. The Effective Date of this Technical Report and of CSA Global's Mineral Resource estimate is 1 October 2018.

CSA Global and AGP acted independently as Xanadu's consultant and was paid fees based on standard hourly rates for the services provided. The fee was commensurate with the work completed and was not contingent on the outcome of the work. Neither CSA Global, AGP, nor any of the staff rendering the services in connection with this Report, had any material, financial or pecuniary interest in Xanadu or its subsidiaries, or in the Project.

The Issuer reviewed draft copies of this Report for factual errors. Any changes made because of these reviews did not include alterations to the interpretations and conclusions made. Therefore, the statements 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 date of this Report.

2.3 Qualified Persons

This Report was prepared by the Qualified Persons listed in *Table 3*.

Table 3: Qualified Persons – Report responsibilities

Qualified Person	Report section responsibility
Warren Potma, MSc Structural Geology, MAIG, MAUSIMM, Principal Geologist, CSA Global	Sections 2 to 12, 16, 18, 23 and 24, 27 and relevant parts of Sections 1, 25 and 26 Property visit in September 2018
Dmitry Pertel, MSc (Geology), MAIG, GAA Manager Resources, Principal Geologist, CSA Global	Section 12, 14 to 15, 19 to 22 and relevant parts of Sections 1, 25 and 26
Andy Holloway, BEng (Hons), C.Eng., P. Eng., Partner and Principal Process Engineer AGP Mining Consultants Inc.	Section 13, 17 and relevant parts of Sections 1 and 26

The Authors are Qualified Persons with the relevant experience, education and professional standing for the portions of the Report for which they are responsible.

2.4 Qualified Person Property Inspection

The CSA Global Qualified Person, Mr Warren Potma, undertook a site visit to the Kharmagtai exploration camp and the deposits between 19 and 22 September 2018. The Qualified Person inspected core drilling, mark-up, logging and storage facilities, QAQC protocols and procedures, local geology of the deposit, reviewed sample preparation techniques and visited the laboratory in Ulaanbaatar.

The Authors consider Mr Potma's 2018 site visit current under Section 6.2 of NI 43-101.

2.5 Sources of Information

Xanadu supplied CSA Global with the results of previous work completed and compiled by Xanadu management and technical staff, consultants and contractors in the course of exploration and evaluation of the Project. These results included geological reports, the results of drilling and trenching in a digital database, geophysical surveys (surface, trench and downhole) and the results of previous Mineral Resource estimates.

The primary dataset used to inform the Mineral Resource is the digital drillhole and trench database provided by Xanadu at commencement of our engagement. The Authors have reviewed the data, completed relevant QAQC checks and are satisfied the data is adequate for estimation of Mineral Resources.

It should be noted that coordinates in all figures and images are presented either in Latitude and Longitude (degrees, minutes, seconds) or in WGS84 UTM Zone 48N.

2.6 Prospect and Deposit Naming

Xanadu is in the process of changing the names of mineral deposits and prospects at the Kharmagtai Project from anglicised Mongolian to English. All reports and references predating this technical report use the anglicised Mongolian names. Table 4 provides a cross reference between current and previous mineral deposit/prospect names at Kharmagtai. Note that in Section 14 (Mineral Resource Estimates), abbreviations for mineralised domains are based on previous names, as indicated in brackets in Table 4.

Table 4: Deposit/Prospect naming conventions, Kharmagtai Project

Current name	Previous name
Stockwork Hill	Altan Tolgoi (AT)
White Hill	Tsagaan Sudal (TS)
Copper Hill	Zesen Uul (ZU)
Golden Eagle	Altan Burged
Wolf	Chun

3 Reliance on Other Experts

For the purpose of this Report, CSA Global and the responsible Qualified Person have relied on ownership information provided by Xanadu, presented in Section 4 of this Report. To the extent possible, CSA Global and the responsible Qualified Person have reviewed the reliability of the data but have not researched property title or mineral rights for the Kharmagtai Project except other than confirming the ownership company and licence coordinates on the Mineral Resources Authority of Mongolia's online tenement viewing system (https://cmcs.mrpam.gov.mn/cmcs#c=License&a=Details&i=). CSA Global and the responsible Qualified Person express no opinion as to the ownership status of the property. The Property description presented in Section 4 of this Report is not intended to represent a legal, or any other opinion as to title.

4 Property Location, Tenure and Encumbrances

4.1 Location of Property

The Kharmagtai porphyry copper-gold project is located within the Omnogovi Province of southern Mongolia, approximately 420 km southeast of capital city of Ulaanbaatar (Figure 1). The country is bordered by Russia in the north and China in the south.

This area of Mongolia contains several major mineral deposits. The Kharmagtai project is located 120 km north of the Oyu Tolgoi porphyry copper-gold project, 150 km west of the Tsagaan Suvarga copper deposit, and 60 km north of the Tavan Tolgoi coal deposit. CSA Global has not verified the information on these deposits and the information is not necessarily indicative of the mineralisation on the Kharmagtai property that is the subject of this technical report.

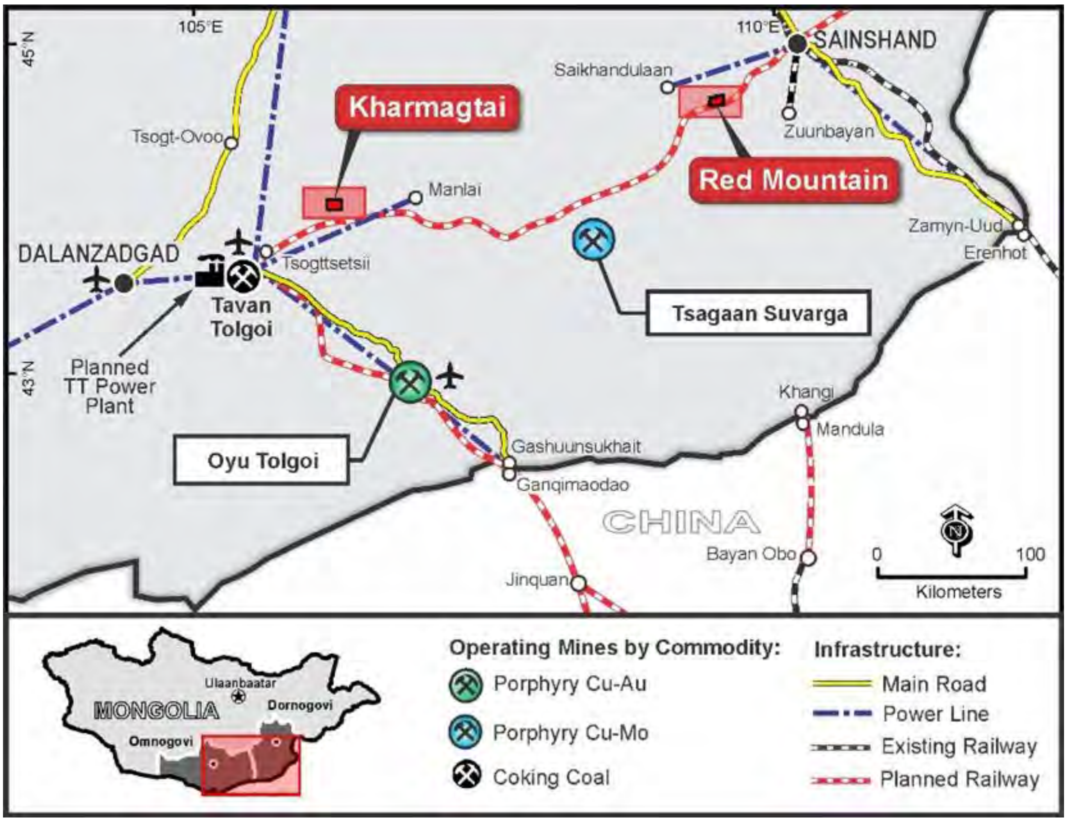


Figure 1: Location plan of Xanadu's Kharmagtai Project

4.2 Mineral Tenure

The Property is covered by Mining Licence 17387A as shown in Figure 2. The tenement's status has not been independently verified by CSA Global and the responsible Qualified Person, except for the ownership company and licence coordinates on the Mineral Resources Authority of Mongolia's (MRAM) online tenement viewing system (https://cmcs.mrpam.gov.mn/cmcs#c=License&a=Details&i=17387).

Title to the Property is held by Oyut Ulaan LLC, a Mongolian registered company that is 90% owned by Xanadu's joint venture company, Mongol Metals LLC. The remaining 10% of Oyut Ulaan LLC is owned by QGX Ltd a private company registered in Canada .

In early 2014, 90% of the Kharmagtai project was acquired by Mongol Metals LLC from Turquoise Hill Resources. Xanadu was granted the right to earn up to 85% of Mongol Metals LLC by expenditure on the Property. At the date of this report, Xanadu had met all expenditure necessary to own 85% of Mongol Metals, equal to a 76.5% beneficial interest in the whole project.

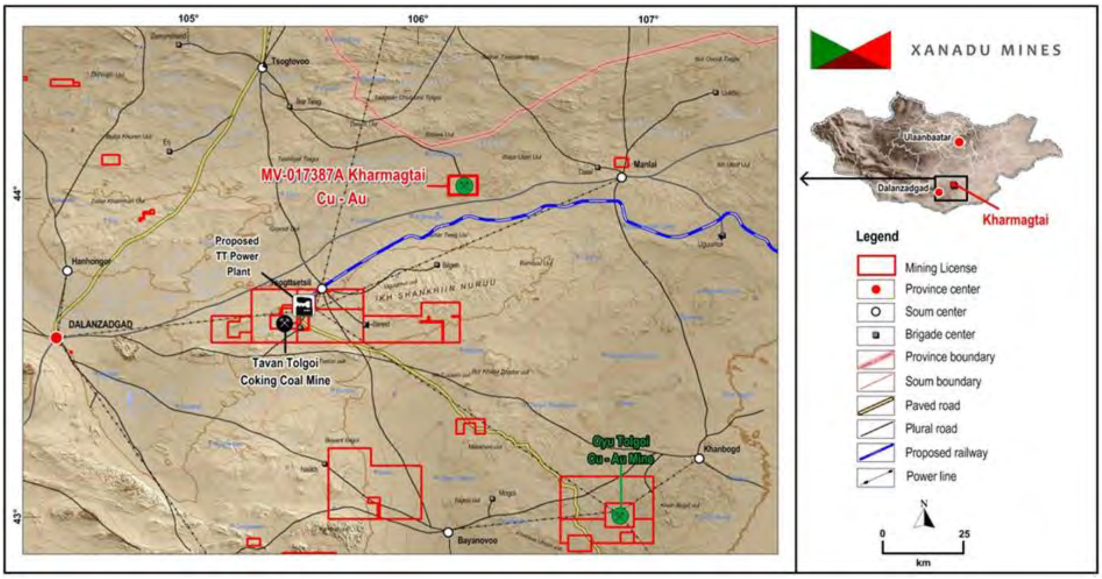


Figure 2: Exploration permits and location of the Kharmagtai project

The area and geographic coordinates for the Kharmagtai permit are summarised in Table 5.

Table 5: Kharmagtai Mining Licence details

Kharmagtai		
Tenement type: Mining Licence (MV-017387) Company: Oyut-Ulaan LLC Date granted: 27 September 2013 Validity: 30 years Area: 6,647.05 ha (66.5 km^2)		
Point	**Longitude East (WGS-84)**	**Latitude North (WGS-84)**
A	106° 14’ 31.36”	44° 00’ 39.46”
B	106° 07’ 5.36”	44° 00’ 39.45”
C	106° 07’ 5.36”	44° 04’ 16.46”
D	106° 14’ 31.36”	44° 04’ 16.46”

4.3 Property Rights and Obligations

Rights and obligations for mineral tenure are governed by the Minerals Law of Mongolia introduced in 2006. Several amendments to the Law have been subsequently enacted, including some key changes in 2014.

Mining licences are granted for a period of 30 years, extendable twice, for 20 years each time. A mining license holder has the right to conduct mining activities throughout the licence area and to construct structures within the licence area that are related to its mining activities. All such activities must be conducted in compliance with the 2006 Minerals Law and relevant Mongolian laws pertaining to health and safety, environment protection and reclamation.

Upon the expiration of a mining licence, the licence and the rights under such licence revert to the Government of Mongolia. In the case of all minerals other than coal and common construction minerals (e.g. sand and gravel), annual licence fees of US$15.0 are payable per hectare of the relevant mining licence area. A mining licence is subject to cancellation if applicable licence fees are not paid on time or other requirements under the 2006 Minerals Law or other relevant laws are not satisfied.

To receive a mining licence, an exploration licence holder must submit an application to the MRAM together with, among other documents, an environmental impact assessment and a resource report. Holders of mining licences must also prepare environmental protection and reclamation plans and satisfy various reporting and security deposit requirements. Obligations of a mining licence require submitting a feasibility study (as defined under Mongolian law) on the development of the deposit prepared by an accredited technical expert within one year of obtaining the mining licence; ensuring that those feasibility studies include detailed information on the transportation of mining products, development of infrastructure, and funds required for mine restoration and closure work.

4.4 Royalties, Agreements and Encumbrances

Mongolia's mining ministry imposes a 5% royalty on all minerals other than coal that are sold, shipped for sale, or used. In 2010, the Mongolian parliament introduced a new surtax royalty, effective from 1 January 2011. Under the new two-tier system, an incremental surtax royalty is imposed on the total sales value of 23 minerals in addition to the standard flat rate. The royalty amount varies depending on the mineral, its market price and the degree of processing. Surtax rates for copper and gold are shown in Table 6. It should be noted that that several companies operating mines in Mongolia and shipping concentrates have been able to renegotiate these terms to lower levels.

Table 6: Mongolian Government Surtax Royalty Rates for copper and gold

Mineral	Unit of measure	Future market price (US$)	Surtax Royalty rates (%)		
			Ore	Concentrate	Product
Copper	Tonnes	0-5000	0	0	0
		5000-6000	22	11	1
		6000-7000	24	12	2
		7000-8000	26	13	3
		8000-9000	28	14	4
		9000 and above	30	15	5
Gold*	Troy ounces	0-900			0
		900-1000			1
		1000-1100			2
		1000-1200			3
		1200-1300			4
		1300 and above			5

Source: Ernst & Young Mongolia Mining and Tax Guide 2012/13
**Gold that is sold to the Mongol Bank is charged at a flat royalty rate of 2.5%, regardless of market price.*

4.5 Environmental Liabilities

To the extent known by CSA Global and the responsible Qualified Person, there are no known environmental liabilities on the Property.

4.6 Other Potential Significant Factors and Risks

To the best of CSA Global's and the responsible Qualified Person's knowledge, there are no other environmental, permitting, legal, title, taxation, socio-economic, marketing, and political or other relevant issues, liabilities and risks associated with the Project at this time that may affect access, title or the right or ability to perform the work recommended in this Report within the Project area.

5 Property Description

5.1 Accessibility

Road access to the area follows a paved road from Ulaanbaatar requiring six hours of travel time, with the last 1.5 hours on approximately 60 km of unsealed roads. The soum (sub-province) centre of Tsogt Tsetsii is situated approximately 60 km southwest of the Project area and is serviced by daily flights from Ulaanbaatar requiring 45 minutes travel time. (Figure 3).

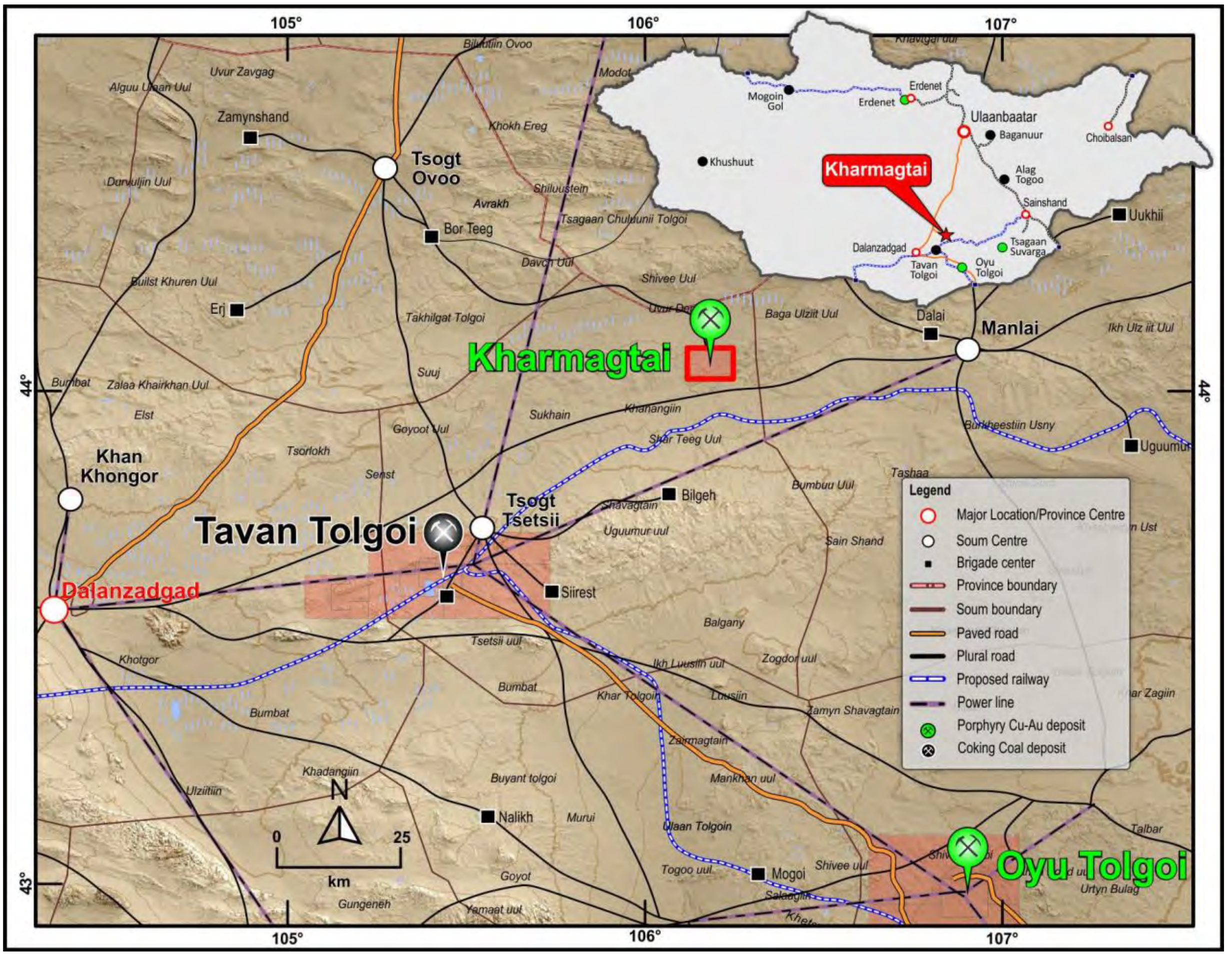


Figure 3: Kharmagtai Project access map

The Xanadu exploration camp (Figure 4), is located approximately 5 km southwest of White Hill, just outside the southwest corner of the Mining Licence.

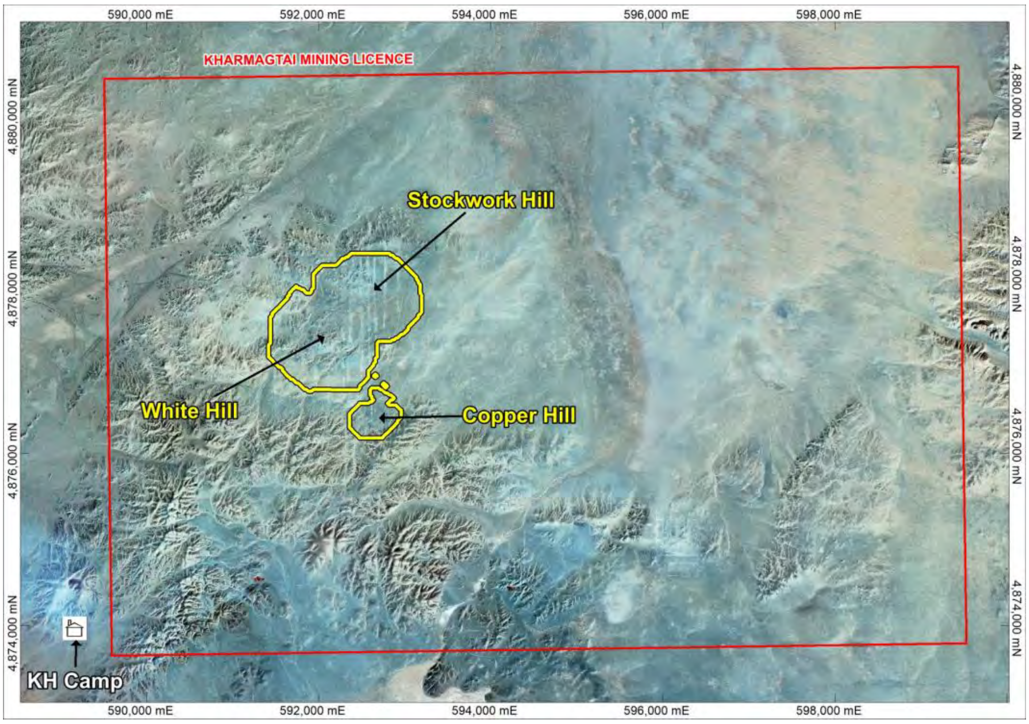


Figure 4: Location of Xanadu exploration camp (UTM WGS 84 Zone 48N)

5.2 Climate

The Property is located within the Gobi Desert, an area classified as a "cold desert" climate. The region experiences generally arid continental climatic conditions, with temperatures varying between +30°C and -30°C and average rainfall around 194 mm. Most rainfall occurs within the summer months from May to September. Due to low humidity and high winds, snow accumulation in winter is limited to isolated drifts, with generally very shallow snow cover away from these drifts.

CSA Global believes that the climate of the Project area presents no risk to the development of the Project. Exploration activities such as diamond drilling may be conducted year-round; however, some other ground exploration activities may be seasonally specific. Mine operations in the region can operate year-round with supporting infrastructure.

5.3 Physiography

Topography in the licence area is subdued and characterised by flat gravel covered plains and low undulating hills which range from 1,360 m to 1,250 m above sea level (Figure 5). Vegetation is sparse with low shrubs and grassy plains

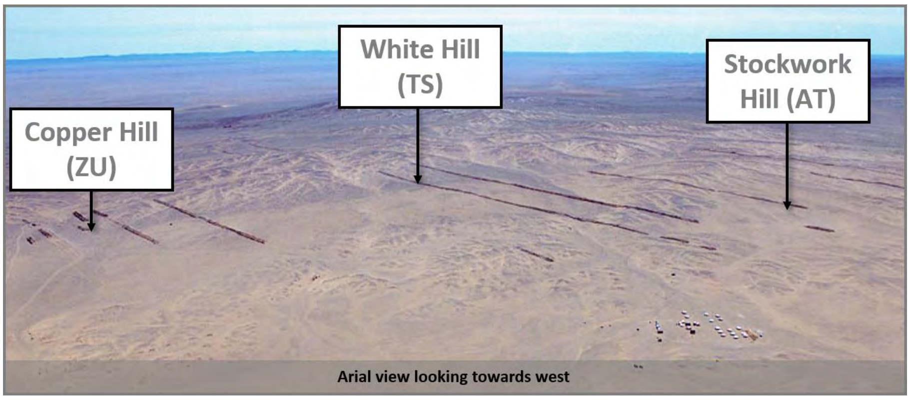


Figure 5: Typical terrain at Kharmagtai Project area

5.4 Local Resources and Infrastructure

The Property lies 140 km east-northeast of the Omnogovi Aimag capital, Dalanzagrad (population 19,400 in 2011). A paved road connects Dalanzagrad and Ulaanbaatar, and a new airport with a paved runway was constructed in 2007. Two major mining projects are also located within 150 km of the Property: the Tavan Tolgoi coking/thermal coal mine (65 km southwest) and the Oyu Tolgoi copper-gold mine (125 km south-southeast).

Two major infrastructure projects of relevance to the Property are in the planning/feasibility stage:

1) A proposed 450 MW coal fired power station at Tavan Tolgoi, which is intended to supply power to the Oyu Tolgoi mine. Japan's Marubeni Corporation was awarded the tender in February 2016 (The Asia Miner, 11 October 2016), and construction is expected to take four years.
2) A proposed rail line linking Tavan Tolgoi and Sainshand which would likely pass within about 30 km of the Property. The Mongolian government is seeking investors for the project.

Construction has recently been completed on a 50 MW wind farm located at Tsogt Tetsii (60 km southwest of the Property). This windfarm is now operational.

The current mining licence provides for sufficient surface rights for mining operations. Given the topography and climate, there are no expected impediments to the siting of mining infrastructure (process plant, tailings storage facilities, waste dumps etc). Xanadu has defined by drilling, and registered with the government, sufficient groundwater to support a mining operation.

IT is anticipated that the workforce for the project would be a mixture of expatriate technical managers and locally trained mining and processing staff. As a result of significant mining in the region it is anticipated a competent local workforce will be available.

6 History

6.1 Previous Ownership and Exploration

Historical exploration activities and Property ownership is summarised in Table 7 and described in further detail below.

Any mineral resource estimates noted in this section are "historical" in nature and not in compliance with NI 43-101. A Qualified Person has not done the work necessary to verify the historical estimates as current estimates under NI 43-101 and as such they should not be relied upon. The Authors, CSA Global and Xanadu are not treating the historical estimates as current Mineral Resources; they are presented for informational purposes only.

Between 1960 and 1975, several geological surveys and mineral exploration programs were conducted in the Kharmagtai district under cooperation of former Soviet Union and Eastern European geological groups (Shabalovski *et al.,* 1976; Shabalovski *et al.,* 1978). This work included regional geological mapping, geochemistry, ground magnetics, induced polarisation (IP) (chargeability and resistivity) and airborne magnetic/radiometric surveys (Goldenberg *et al.,* 1978; Shmelyov *et al.,* 1983). Outcropping copper mineralisation was noted in the Kharmagtai area in 1979, and tourmaline gold mineralisation was subsequently identified at Ovoot Khyar in 1980. Recognition of porphyry-style mineralisation sparked an extensive exploration program, which involved excavation of numerous trenches and drilling of 17 shallow, widely spaced vertical diamond drillholes (Sharkhuu 1980). This exploration work resulted in a preliminary Russian standard resource estimate (Table 7). Gold assays during these programs were by atomic absorption spectrometer and are not considered to be reliable.

Between 1991 and 1995, the Japan International Cooperation Agency (JICA) and Metal Mining Agency of Japan (MMAJ) commenced mineral exploration in the South Gobi region at the request of the Mineral Authority of Mongolia (JICA, 1995). This exploration included regional reconnaissance, airborne magnetic and radiometric surveys, and based on this work Kharmagtai was re-identified as an area of porphyry related alteration and mineralisation.

Exploration by QGX (previously Quincunx) at Kharmagati during 1995 and 1996 included the collection of approximately 181 rock-chip samples and 475 soil samples. Rock-chip samples from mineralised stockwork at Stockwork Hill returned anomalous results for gold greater than 1 g/t Au (Atkinson *et al.,* 1998b). Based on encouraging results a further 2,980 soil samples were taken as part of a grid-based soil survey and the Ovoot Khyar area was identified as a priority target. In late 1996 a total of 240 line-km of ground magnetic data was collected, and 64 trenches (14.7 km total length) excavated (Roscoe and MacCormack, 1997). Exploration continued in 1997 with detailed geological mapping, trenching (2,411 m) and geophysics focused on shallow replacement-style gold mineralisation at Ovoot Khyar (OV3). This resulted in the drilling of five shallow holes (1,060 m) which intersected narrow intervals of near surface low-grade gold mineralisation (up to 0.83 g/t Au) hosted in phyllic altered sedimentary rock (Atkinson, 1998). This highlighted the potential for replacement-style gold mineralisation typically found in the peripheral zones of porphyry copper deposits.

Following the intersection of low-grade gold mineralisation at Ovoot Khyar in 1998, exploration by QGX moved to the previously identified porphyry copper prospects at Stockwork Hill (formerly known as KH1) and White Hill (formerly known as KH2). Detailed IP surveys were completed and six drillholes (859 m total) targeted shallow porphyry stockwork mineralisation at Stockwork Hill. Drilling confirmed the presence of porphyry-related alteration and mineralisation with the best results of 43 m grading 1.89 g/t Au, 0.58% Cu (KH97-01).

Ivanhoe Mines Mongolia (IMMI) geologists visited Kharmagtai several times between 1997 and 2001 (Kirwin, 1997). However, it was not until 2002 that IMMI made a decision to earn into the Property based on encouraging geology and widespread porphyry-related alteration. Between 2002 and 2006, IMMI collected 2,960 rock-chip samples, excavated 119 trenches (65,636 m), and drilled 208 RC holes (27,747 m) and 172 diamond drillholes (54,269 m). Diamond drilling focused on testing and defining the Stockwork Hill, Copper Hill, White Hill, Chun, Burged and OV3 prospects. Geological mapping, stream sediment and soil sample surveys, gradient array IP (289 km), ground magnetics (589 km^2), ground gravity (39 km^2) and aerial magnetics and aerial gravity (259 km^2) surveys were also conducted during this period. Drilling delineated multiple mineralised intercepts at Stockwork Hill, Copper Hill and White Hill (see Section 6.2 and Table 7). These resources were predominately near surface and mineralisation remained open both at depth and along strike at Stockwork Hill and White Hill.

Between 2007 and 2011, Asia Gold (a subsidiary of Ivanhoe Mines) assumed control of exploration at Kharmagtai and focused on deep copper mineralisation associated with late stage tourmaline breccia previously recognised in deeper drillholes drilled by IMMI. Fifteen diamond drillholes totalling 5,170.6 m were drilled at Kharmagtai during 2007 to test deeply seated geophysical anomalies. A detailed 3D IP survey was completed in 2011, and 19 diamond holes totalling 15,345.3 m targeted deep geophysical anomalies associated with tourmaline breccia mineralisation under the Stockwork Hill and White Hill deposits. All holes intersected broad low-grade mineralisation indicating the tourmaline breccias were part of a major copper system with significant exploration potential.

Table 7: Summary of historical exploration

Period	Description of work	References
1960–1975	**Joint Mongolian Eastern Block Exploration** • Regional geological mapping, geochemistry, ground magnetics, IP (chargeability and resistivity) and airborne magnetic/radiometric surveys. • Diamond drill 17 vertical drillholes. • Historical Russian standard resource estimate of 193 Mt @ 0.25% Cu.*	Goldenberg *et al.,* 1978 Shabalovski *et al.,* 1976 Shabalovski *et al.,* 1978 Sharkhuu, 1980 Shmelyov *et al.,* 1983
1991–1995	**JICA and MMAJ** • Regional reconnaissance, airborne magnetic and radiometric surveys. • Kharmagtai re-identified as an area of porphyry related alteration and mineralisation.	JICA, 1995
1996–1998	**QGX (Quincunx)** • Regional geological mapping, geochemistry (1,500 rock-chip and 4,000 soil samples), trenching (19 km), geophysics (240 km). • Diamond drilling of five shallow holes (1,060 m) – sediment-hosted Au mineralisation at Ovoot Khyar discovered. • Diamond drill 19 shallow widely spaced holes – define widespread porphyry alteration and mineralisation Kharmagati.	Atkinson, 1997 Atkinson, 1998 Atkinson & Setterfield, 1998 Atkinson *et al.,* 1998a Atkinson *et al.*, 1998b Roscoe & MacCormack, 1997
2001–2006	**IMMI** • Detailed geological mapping, geochemistry (2,960 rock-chip), 119 trenches (66 km). Geophysics included gradient array IP (289 km^2), ground magnetics (589 km^2), ground gravity (39 km^2) and aerial magnetics and aerial gravity. • Drilled 208 RC (27,747 m) and 172 diamond drillholes (54,269 m). Drilling focused on testing and defining the Stockwork Hill, Copper Hill, White Hill, Chun, Burged and OV3 prospects. • Historical Combined resource at Stockwork Hill, Copper Hill and White Hill of 174 Mt at 0.50% CuEq.*	Kirwin, 1997 Kirwin *et al.,* 2003 Wolfe, 2004 Wolfe & Wilson, 2004 Wolfe, R., 2006a Wolfe, R., 2006b Wolfe, R., 2007
2007–2012	**Asia Gold (AGC, a subsidiary of IMMI)** • Deep diamond drilling (5,170.60) m testing deeply seated geophysical anomalies. • A detailed 3D IP survey was completed was completed in 2011 and 19 diamond holes (15,345.30 m).	Orssich, C., 2012

**The mineral resource estimates noted in this table are "historical" in nature and not in compliance with NI 43-101. A Qualified Person has not done the work necessary to verify the historical estimates as current estimates under NI 43-101 and as such they should not be relied upon. The Authors, CSA Global and Xanadu are not treating the historical estimates as current Mineral Resources; they are presented for informational purposes only.*

6.2 Previous Mineral Resource Estimations

The mineral resource estimates noted in this section are “historical” in nature and not in compliance with NI 43-101. A Qualified Person has not done the work necessary to verify the historical estimates as current estimates under NI 43-101 and as such they should not be relied upon. The Authors, CSA Global and Xanadu are not treating the historical estimates as current Mineral Resources; they are presented for informational purposes only. The historical resource estimates are superseded by the 2018 CSA Global mineral resource estimate update presented in Section 14 of this Report.

6.2.1 Mining Associates (2015)

A historical Mineral Resource estimation for the Kharmagtai Project was previously undertaken by Mining Associates in April 2015 and reported under JORC 2012 guidelines (Table 8) for total Mineral Resources, reported above 0.3% CuEq for open pit mining and above 0.5% CuEq for underground mining, which also include high-grade core (Table 9) reported above 0.6% CuEq for both open pit and underground mining methods.

Table 8: Historical Mineral Resource Statement, Kharmagtai Cu-Au Project (Total Resources), Mongolia, Mining Associates, April 2015*

Mining method	Cut-off (CuEq, %)	Category	Tonnage (Mt)	Grade			Metal	
				Cu, %	Au, g/t	CuEq, %	Cu, %	Au, Koz
OC	0.3	Indicated	23	0.41	0.55	0.8	203	401
		Inferred	107	0.27	0.24	0.4	641	833
		Total	**129**	**0.30**	**0.30**	**0.5**	**844**	**1,234**
UG	0.5	Indicated	24	0.43	0.47	0.7	225	359
		Inferred	51	0.42	0.36	0.6	463	591
		Total	**74**	**0.42**	**0.40**	**0.7**	**688**	**950**
TOTAL UG + OC		**Indicated**	**46**	**0.42**	**0.51**	**0.7**	**428**	**759**
		Inferred	**157**	**0.32**	**0.28**	**0.5**	**1,104**	**1,424**

Table 9: Mineral Resource Statement, Kharmagtai Cu-Au Project (High Grade Core), Mongolia, Mining Associates, April 2015*

Mining Method	Cut-off (CuEq, %)	Category	Tonnage (Mt)	Grade			Metal	
				Cu, %	Au, g/t	CuEq, %	Cu, %	Au, Koz
OC	0.6	Indicated	9	0.52	0.87	1.1	102	249
		Inferred	1	0.38	0.82	0.9	11	34
		Total	**10**	**0.50**	**0.86**	**1.1**	**113**	**282**
UG	0.6	Indicated	20	0.46	0.57	0.8	203	368
		Inferred	26	0.46	0.50	0.8	263	418
		Total	**46**	**0.46**	**0.53**	**0.8**	**465**	**786**
TOTAL UG + OC		**Indicated**	**29**	**0.48**	**0.66**	**0.9**	**305**	**616**
		Inferred	**27**	**0.46**	**0.52**	**0.8**	**274**	**452**

* *All figures rounded to reflect the relative accuracy of the estimates. Mineral resources are not mineral reserves and have not demonstrated economic viability.*

** *Open pit mineral resources reported at a cut-off grade of 0.3% of CuEq for Total MR and 0.6% CuEq for High Grade core.*

** *Underground mineral resources reported at a cut-off grade of 0.5% of CuEq for Total MR and 0.6% CuEq for High Grade core.*

*** *CuEq calculated using the following formula: CuEq = Cu(%) + Au (g/t)*0.6378, based on a copper price of $2.60/lb, and a gold price of $1300/oz, with assumed recoveries of 90% for copper and 70.85% for gold.*

6.3 Production from the Property

No production from the Property is known.

7 Geological Setting and Mineralisation

7.1 Regional Geology

Kharmagtai is located within the Central Asian Fold Belt (CAFB), one of the largest orogenic belts in the world, extending for over 5,000 km from northern China to the Urals in Russia. Contained within this orogenic belt is the southern Mongolian fold system (Ruzhentsev and Pospelov, 1992), which comprises a zone of arc-continent collision that was active during several episodes from the Silurian to Early Carboniferous along the southern margin of the Siberian Craton.

An excellent description of regional geology and mineralisation can be found in Porter (2017), relevant parts of which are summarised in this section. The tectonics of Mongolia is interpreted as a series of fault-bounded accreted terranes (Badarch *et al.,* 2002). Kharmagtai lies within the Gurvansaikhan terrane, which forms an arcuate belt 600 km long and up to 200 km wide through southern Mongolia (Figure 6). It comprises Middle to Late Palaeozoic volcanic and sedimentary rocks, intruded by Late Devonian and Carboniferous granitoids (Lamb and Badarch, 1997; Badarch *et al.,* 2002). Amalgamation of Mongolian terranes was followed by uplift and thrusting that unroofed the magmatic arcs. Late Carboniferous to early Triassic age continental sediments were deposited in thrust-controlled foreland basins (Edel *et al.,* 2014). Extensive intracontinental rifting and subsidence with associated metamorphic core complex development occurred during the late Jurassic to early Cretaceous (Webb *et al,* 1999), forming syn-rift basins with up to 2 km of sediments, controlled by movement on northeast-southwest faults. These cover rocks preserved earlier formed porphyry deposits from further erosion, and alluvial plain and aeolian red bed deposition continued into the late Cretaceous. The current geometry and distribution of volcanic belts in southern Mongolia is attributed to post-accretion disruption and dislocation by transpressional faulting related to the Himalayan collision (Cunningham, 2010).

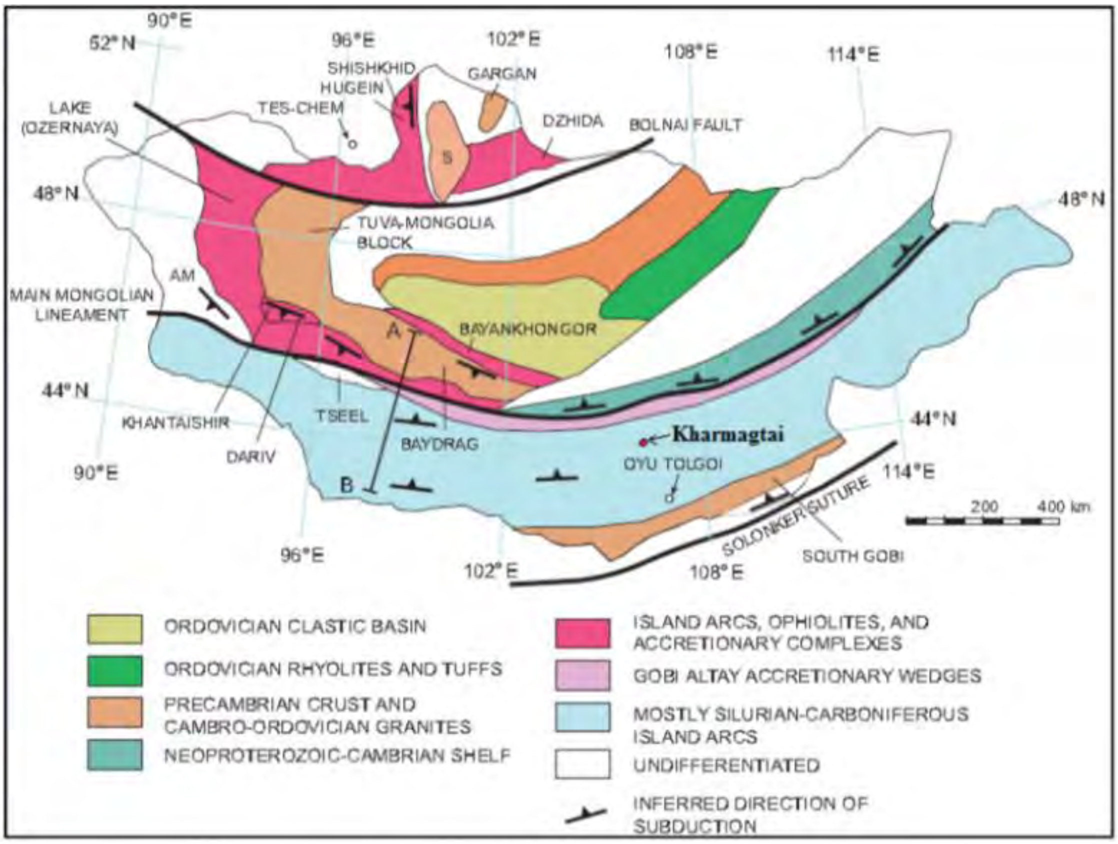


Figure 6: Major terranes and terrane-bounding structures of Mongolia (AMC, 2012)

The Gurvansaikan terrane hosts most of the known porphyry and intrusion-related mineralisation in the South Gobi, including the Oyu Tolgoi copper-gold porphyry (Perello *et al.,* 2001; Crane and Kavalieris, 2013) and the Tsagaan Suvarga copper-molybdenum porphyry (Watanabe and Stein, 2000).

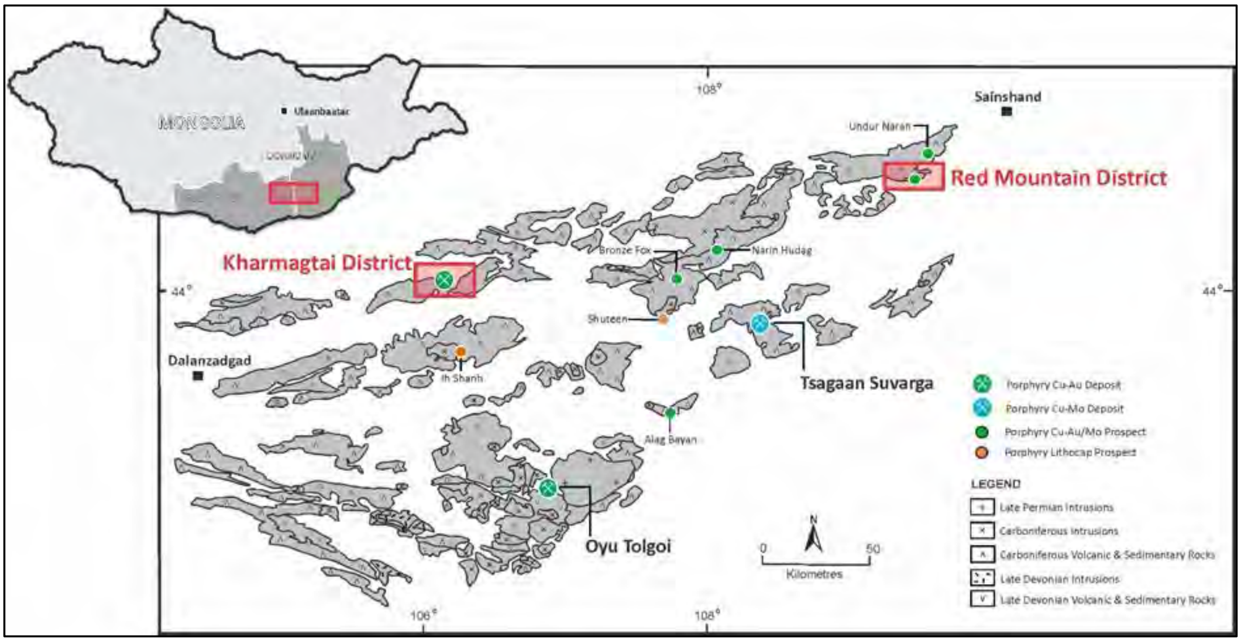


Figure 7: Regional outcrop geology map (AMC, 2012)

7.2 Structural Setting

The Kharmagtai Project lies within the Altai and Transbaikal-Mongolian Neoproterozoic to Paleozoic orogenic belts, which consist of accreted terrains of island arc, back arc, ophiolites, accretionary wedges and cratonic fragments between the Siberian Craton to the north, the North China Craton to the southeast, the Tarim Craton to the Southwest, and the East European Craton to the west, (Yakubchuk, 2005). The Transbaikal-Mongolian orogenic belts are thought to have been part of the circum-Pacific orogenic belt, detached from the Siberian craton in the Ordovician, resulting in strike-slip duplication, (Sengor, 1993).

The Kharmagtai Project occurs within the southern Mongolia portion of the Transbaikal-Mongolian orogenic belt. The project is hosted within the Gurvansayhan island arc terrane of the southern Mongolian orogenic belt, consisting of volcanic and sedimentary rocks ranging from Ordovician to Carboniferous in age. (Badarch, 2005).

During the Ordovician to Silurian, the area resided within an oceanic setting with mature sedimentation from a continental source or the eroded roots of an arc to the north. The Devonian to Carboniferous periods were dominated by island arc volcanism. The Paleo-Asian ocean closed with arc collision during the Carboniferous, (Lamb, 2001) and were consolidated by late Carboniferous to Permian continental granitic plutons suggesting that amalgamation took place not later than the Carboniferous time, (Yakubchuk, 2005).

Porphyry style mineral deposits hosted within the Gurvansaikhan terrane formed in two distinct tectonic settings, corresponding to early island arc formation in the late Devonian and collisional to subduction setting in the early Carboniferous (Ochir, 2005).

7.3 Property Geology

Outcrop throughout the Kharmagtai district is sparse with Quaternary sand forming a thin cover over most of the district. The current geological understanding is derived mainly from diamond drilling, supported by mapping of localised outcrop and trenches. Copper-gold mineralisation at Kharmagtai is hosted within the Lower Carboniferous Kharmagtai Igneous Complex (KIC), which was emplaced into a Late Devonian volcano-sedimentary sequence (Kharmagtai Volcanic Group; Figure 8). The Kharmagtai Volcanic Group has a minimum stratigraphic thickness of 1,500 m and dominates the western part of the district. The true thickness of the succession is poorly constrained, due to structural and alteration complexities. The volcanic group predominantly comprises hornblende-phyric andesite interbedded with poorly sorted breccia and finely laminated volcaniclastic units.

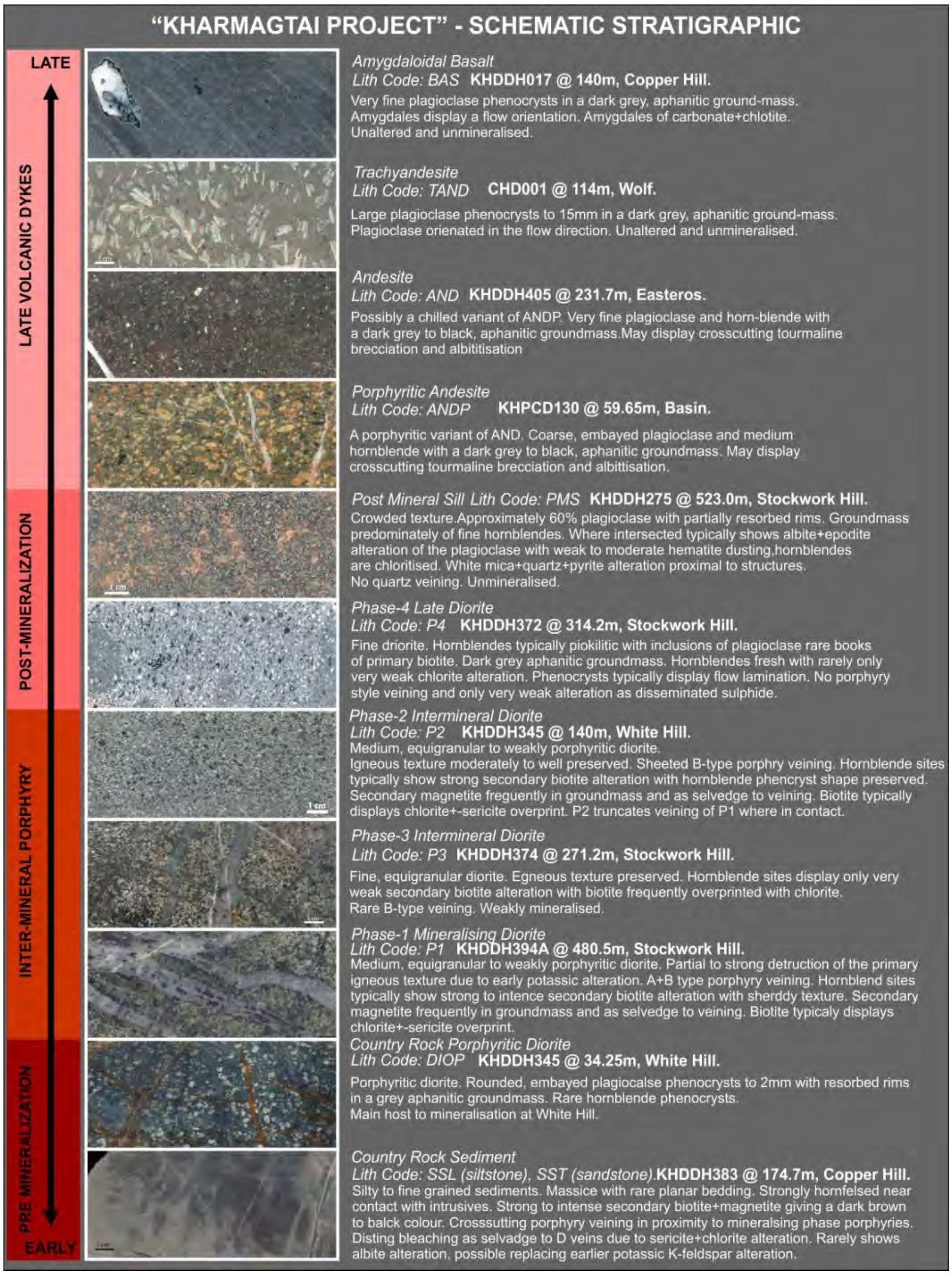


Figure 8: Kharmagtai Project stratigraphic column

The KIC is characterised by a composite porphyritic diorite to quartz diorite intrusive complex characterised by a high-K calc-alkaline island arc geochemical signature (Jargalan *et al.,* 2006). The complex covers approximately 5–6 km^2, extending from White Hill in the west, to Wolf prospect in the east (Figure 9). The intrusive complex is predominately composed of diorite, quartz-diorite and monzodiorite intrusions, with granodiorite and syenite on its eastern margin. Intrusions appear to become more evolved the further east they are in the igneous complex. Early-mineral intrusions are typically equigranular stocks, or weakly mineralised dark-grey to black diorite, that have been cut by a series of quartz diorite porphyry pipes and dykes of early- and inter-mineral timing (Figure 10 to Figure 12). The dimensions of the composite mineralised pipes at Kharmagtai are around 100–200 m in diameter, with vertical extents up 1 km (Figure 13 to Figure 15). Unidirectional solidification textures (UST), such as crenulated quartz layers, brain rock and vein dykes typically occur in most of the mineralised intrusions, indicating an intimate relationship between intrusive emplacement, volatile exsolution and mineralisation. The final intrusive phase comprises plagioclase-phyric andesite dykes that were emplaced along northwest-trending shear zones.

A large proportion (70%) of the Property is covered by young sediments, with an average thickness of 35 m and a maximum thickness of 85 m. These cover sediments comprise basal conglomerate overlain by red-brown clays of probable Cretaceous age with an upper layer of Quaternary colluvium (sand, gravel and clay).

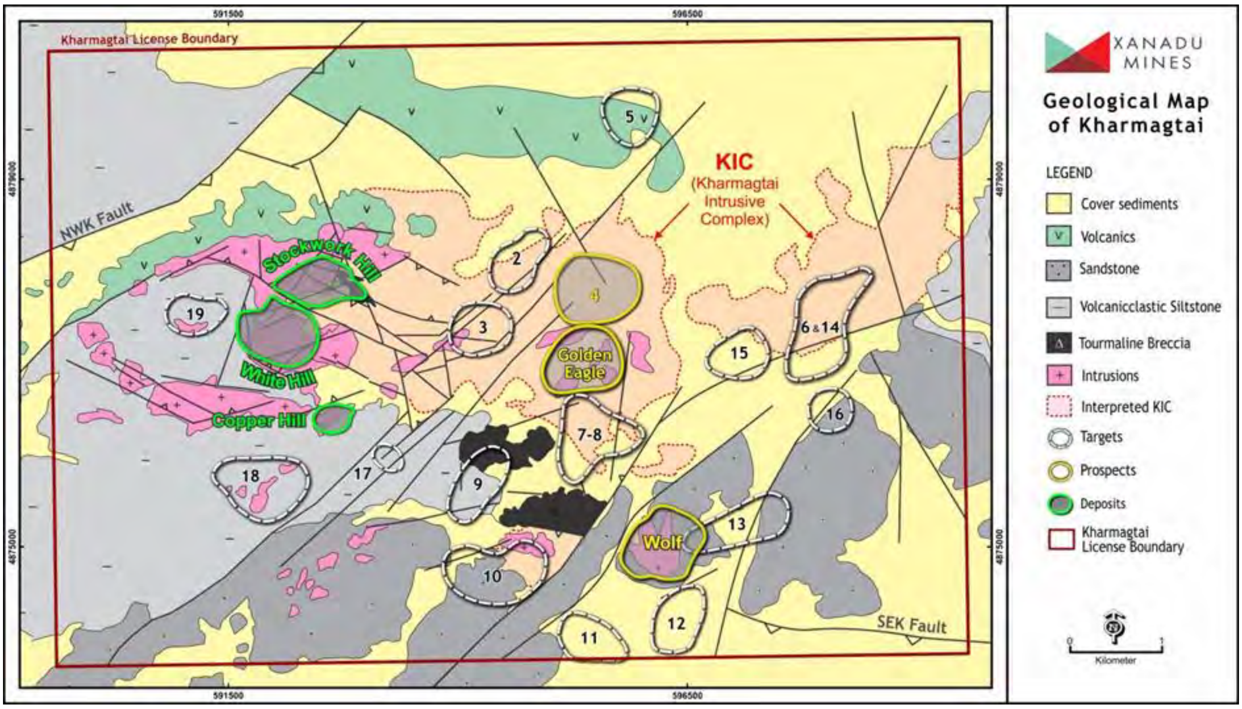


Figure 9: Geological map of Kharmagtai licence area: Solid geology interpretation of lithologies and major structures derived from limited outcrop exposure, drillholes, and interpretation of geophysical datasets

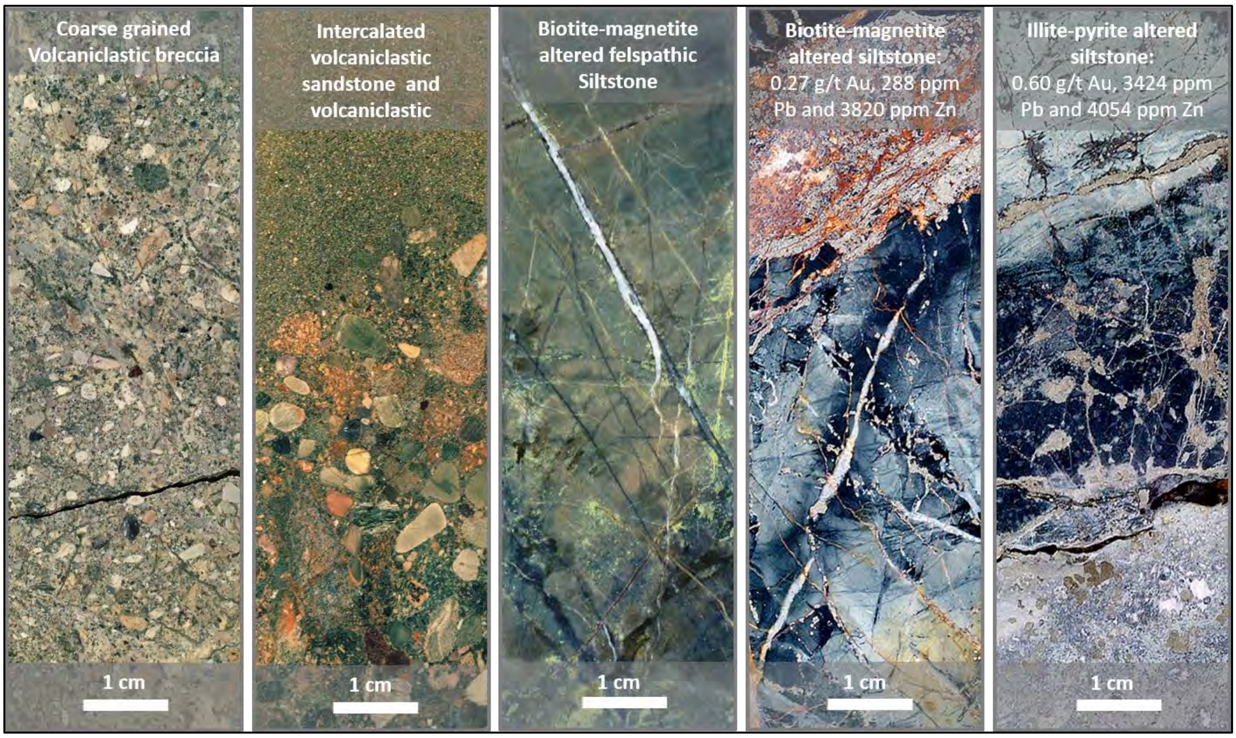


Figure 10: Late Devonian sedimentary and volcaniclastic host rocks

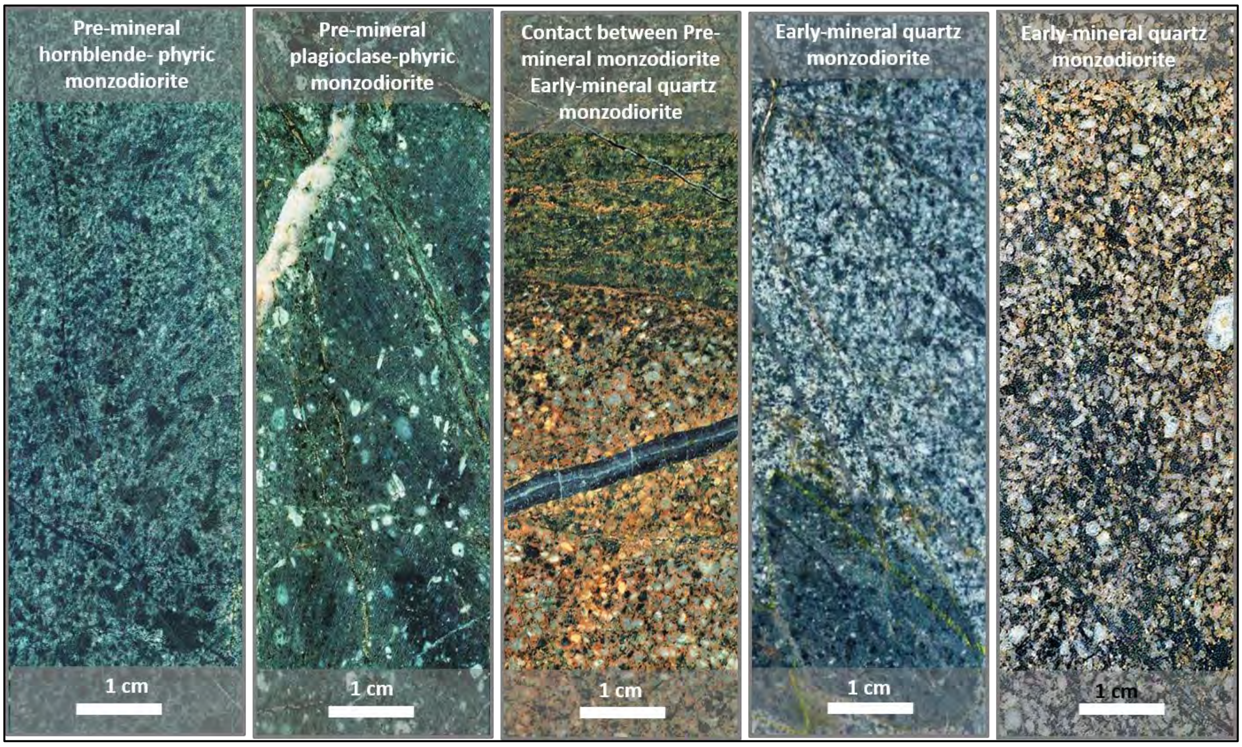


Figure 11: Kharmagtai Intrusive Complex pre-early mineral intrusions

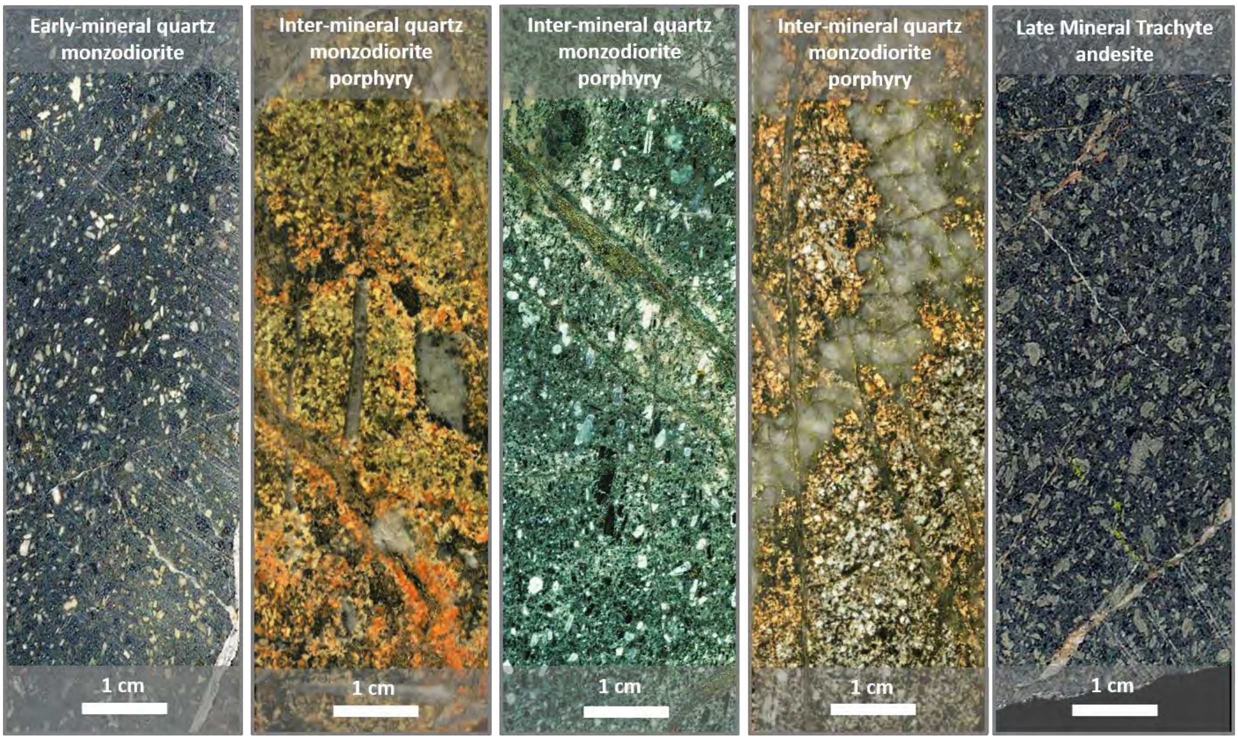


Figure 12: Kharmagtai Intrusive Complex early-inter-late mineral intrusions

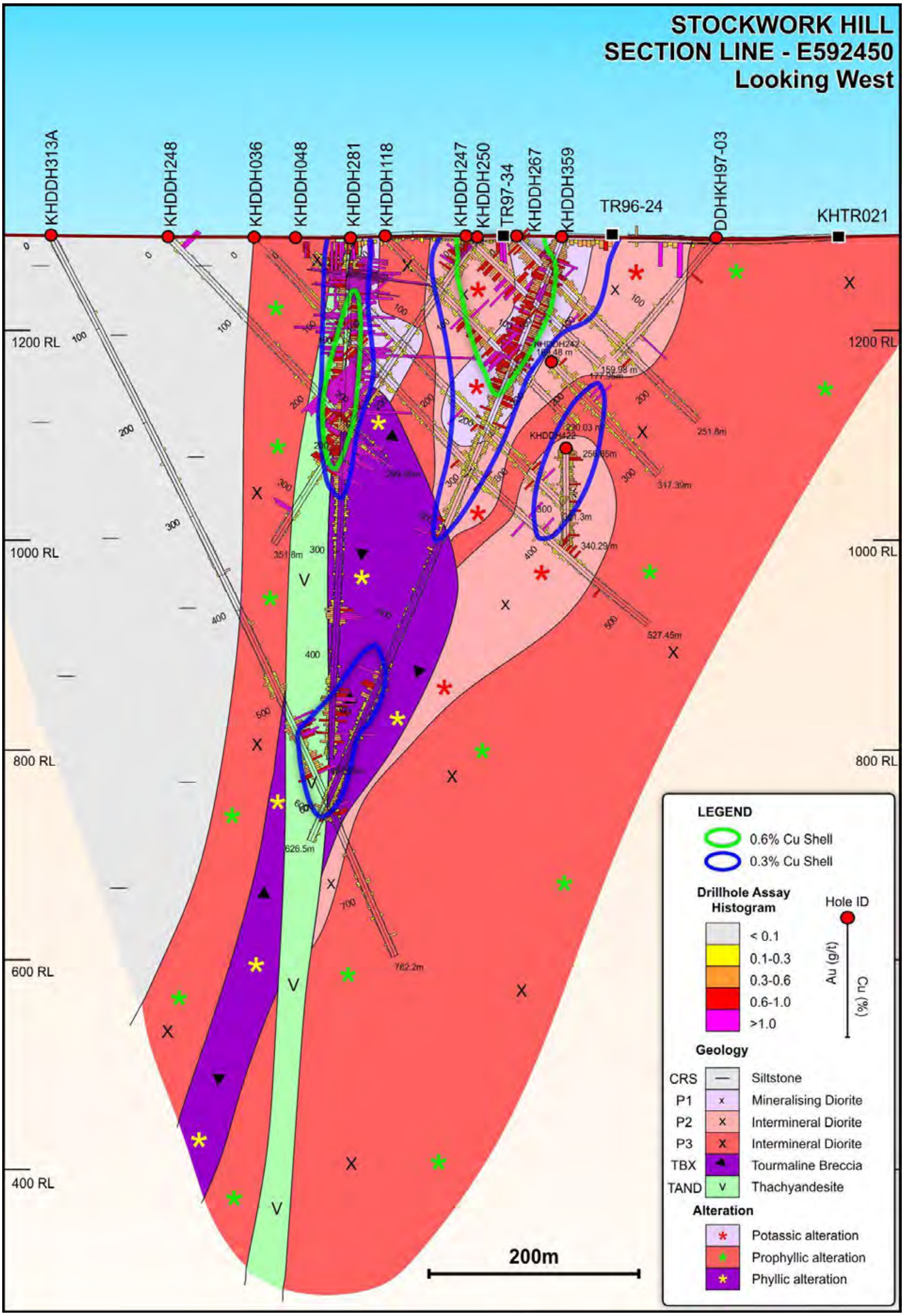


Figure 13: Stockwork Hill example geological cross section

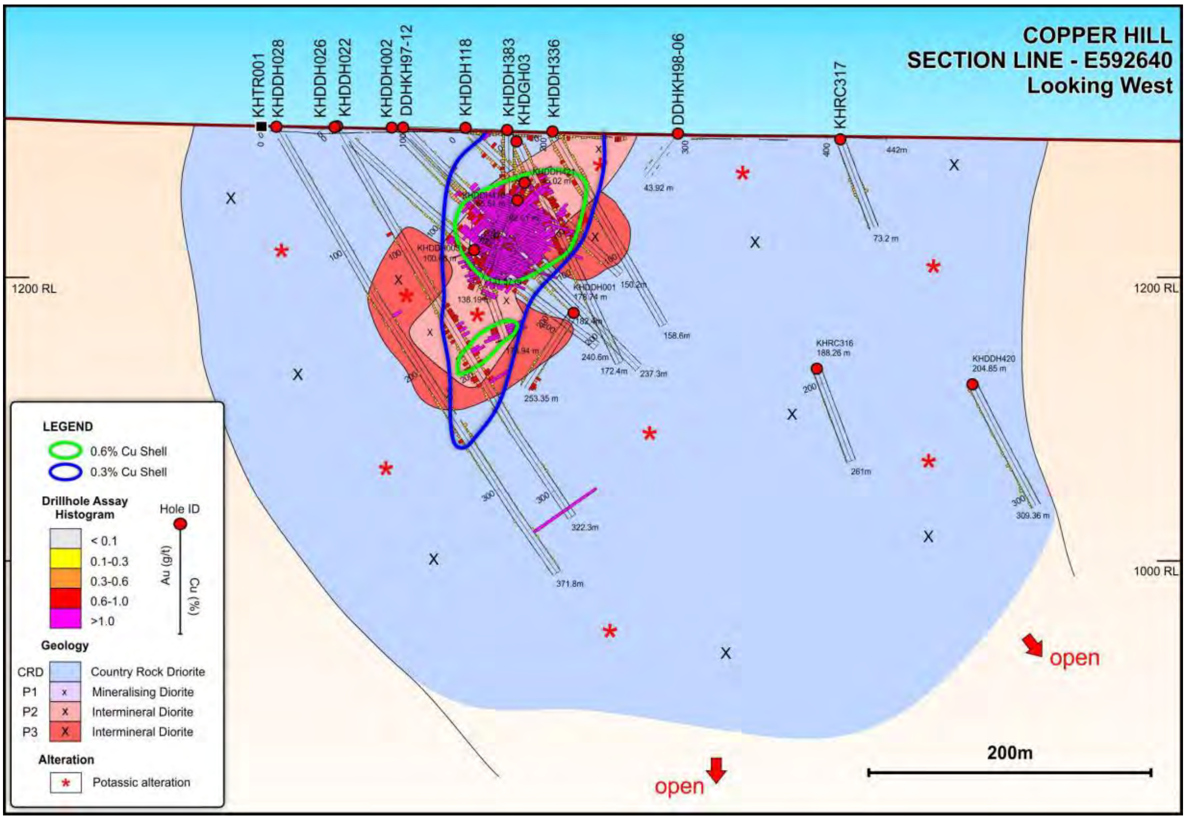


Figure 14: Copper Hill example geological cross section

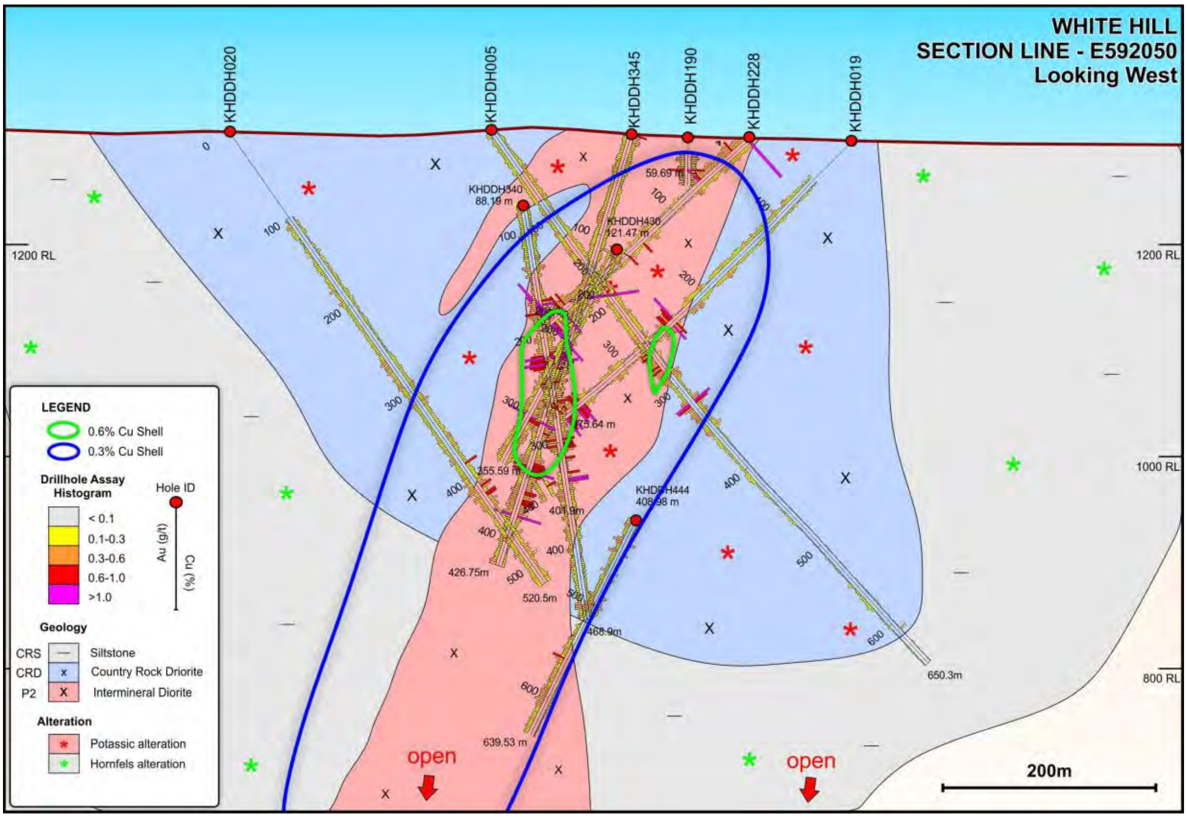


Figure 15: White Hill example geological cross section

7.4 Structural Geology of the Property

All the units within the Kharmagtai region have been disrupted by extensive northeast-trending shear zones that appear to have been reactivated as normal faults during later basin and range extension, juxtaposing deeper equigranular plutons with shallower locally argillic-altered volcanic units (Figure 16). Porphyry mineralisation at Kharmagtai has been emplaced along west-northwest-trending structures on the margins of the KIC. These controlling structures have been reactivated as dextral shear zones post mineralisation, disrupting the orebodies.

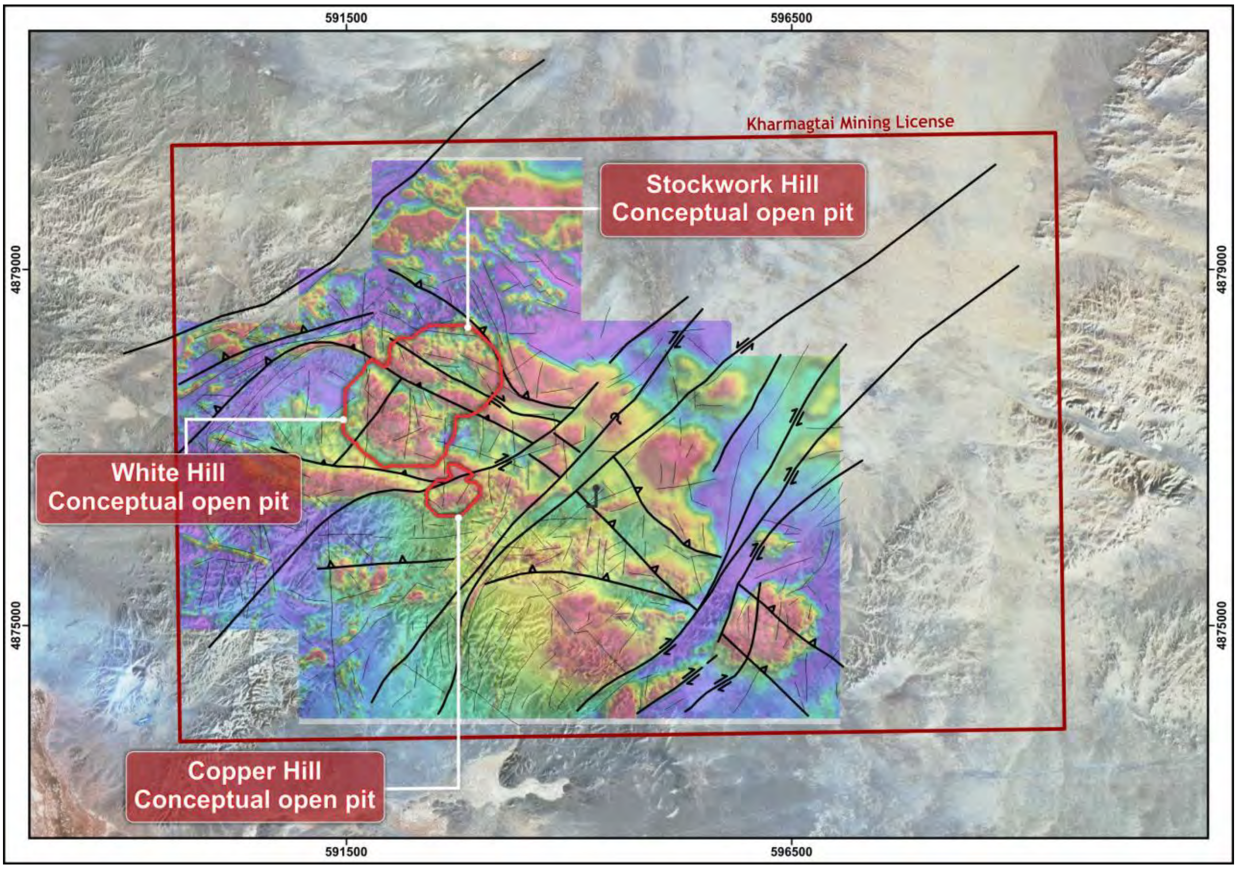


Figure 16: Kharmagtai structural map

7.5 Copper-Gold Mineralization

Mineralisation at Kharmagtai is directly related to typical porphyry-style vein and hydrothermal breccia assemblages. These assemblages demonstrate both spatial zonation and temporal overprinting relationships commonly associated with porphyry Cu-Au systems, with multiple overprinting phases of intrusions and mineralisation ("telescoping" characteristics).

All deposits and prospects across the Kharmagtai project demonstrate some (if not all) of the following mineralisation characteristics: early quartz-chalcopyrite-pyrite-magnetite (M) veins (commonly laminated and/or sheeted) (Figure 17); rare early irregular sugary-textured quartz-sulphide A-veins with disseminated chalcopyrite-bornite (Figure 18); predominant quartz-chalcopyrite B-veins with prominent sulphide centre lines and regular vein margins which are observed as both sheeted vein arrays and stockworks (Figure 19); late sulphide only veins commonly comprising massive chalcopyrite (± pyrite and/or bornite) (Figure 20) that typically overprint all quartz-sulphide veins and either predate or are synchronous with mineralised hydrothermal breccias; Late mineralised tourmaline-sulphide hydrothermal breccias (Figure 21, Figure 22), and a variety of other hydrothermal breccia types (Figure 23).

Figure 17: Laminated Quartz-Magnetite M-veins in potassic-altered porphyry host rock with later crosscutting Quartz-Chalcopyrite B-veins

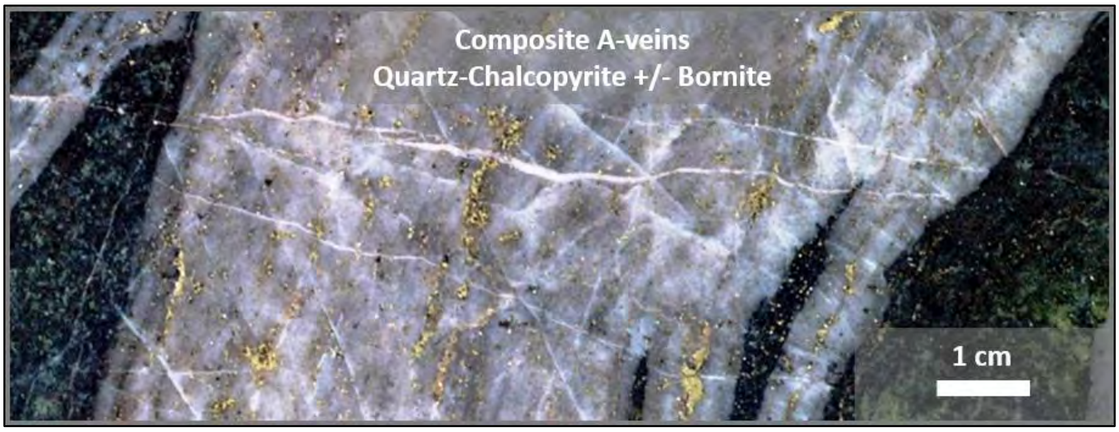


Figure 18: Rare composite Quartz-Chalcopyrite-Bornite A-veins

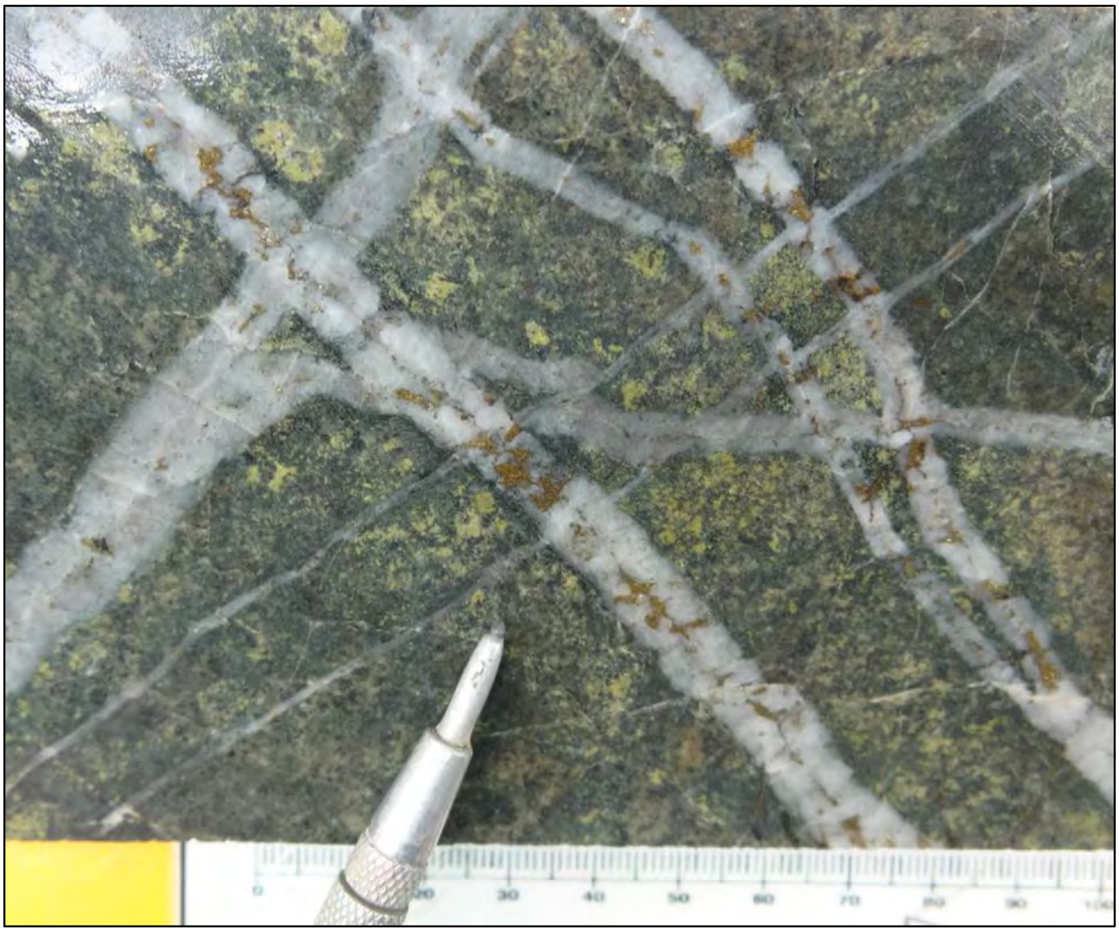


Figure 19: Typical Kharmagtai B-vein stockwork

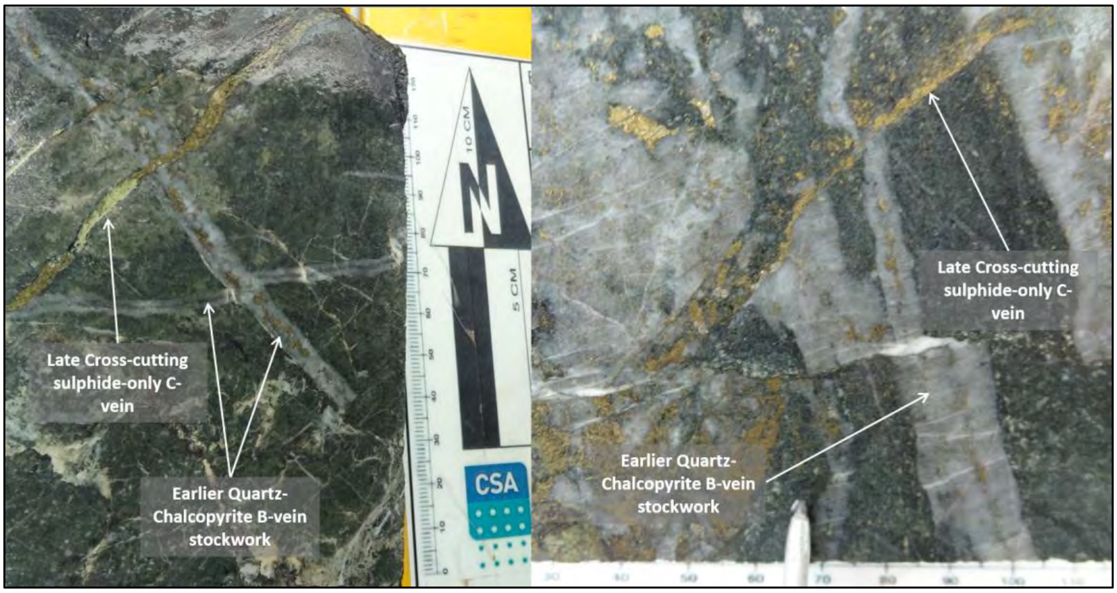


Figure 20: Late sulphide-only C-veins overprinting earlier quartz-sulphide B-veins

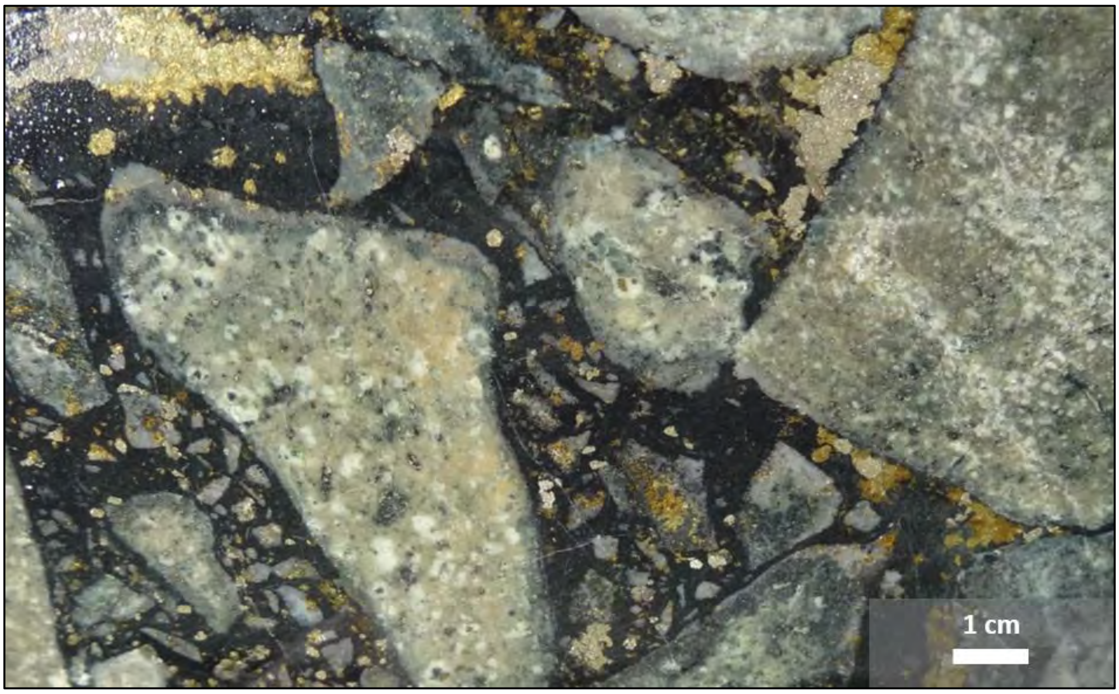


Figure 21: Tourmaline-pyrite-chalcopyrite-bornite cemented hydrothermal breccia

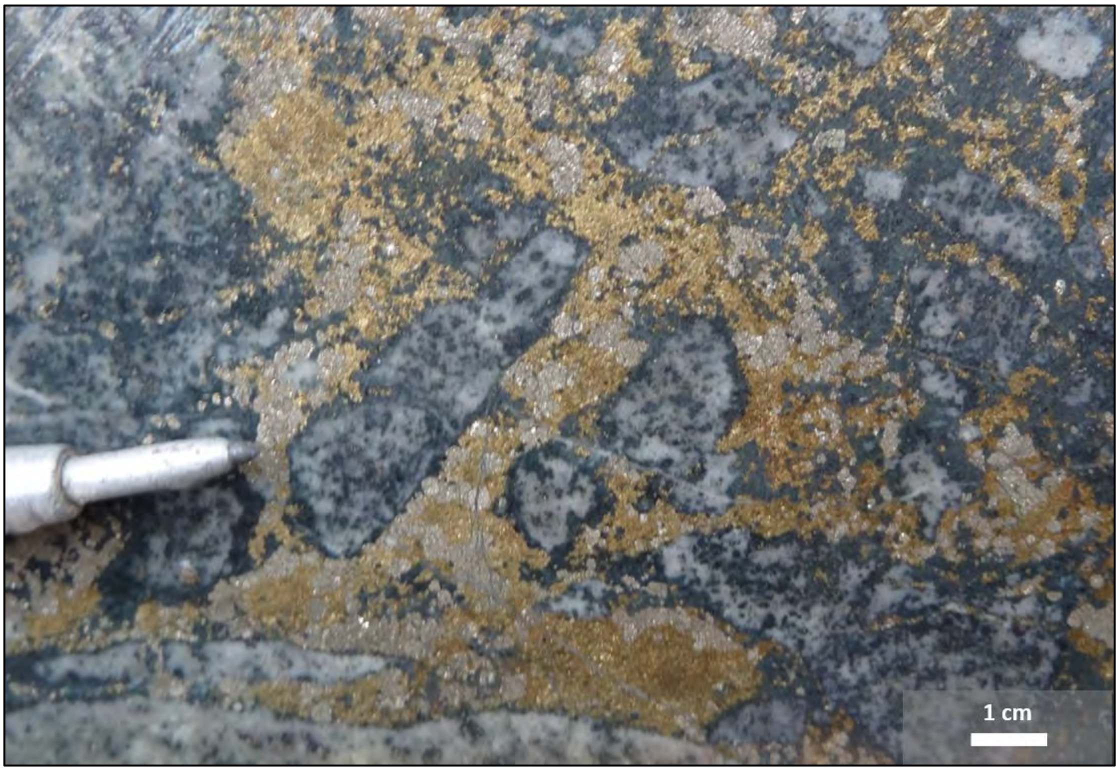


Figure 22: Pyrite-chalcopyrite cemented hydrothermal breccia

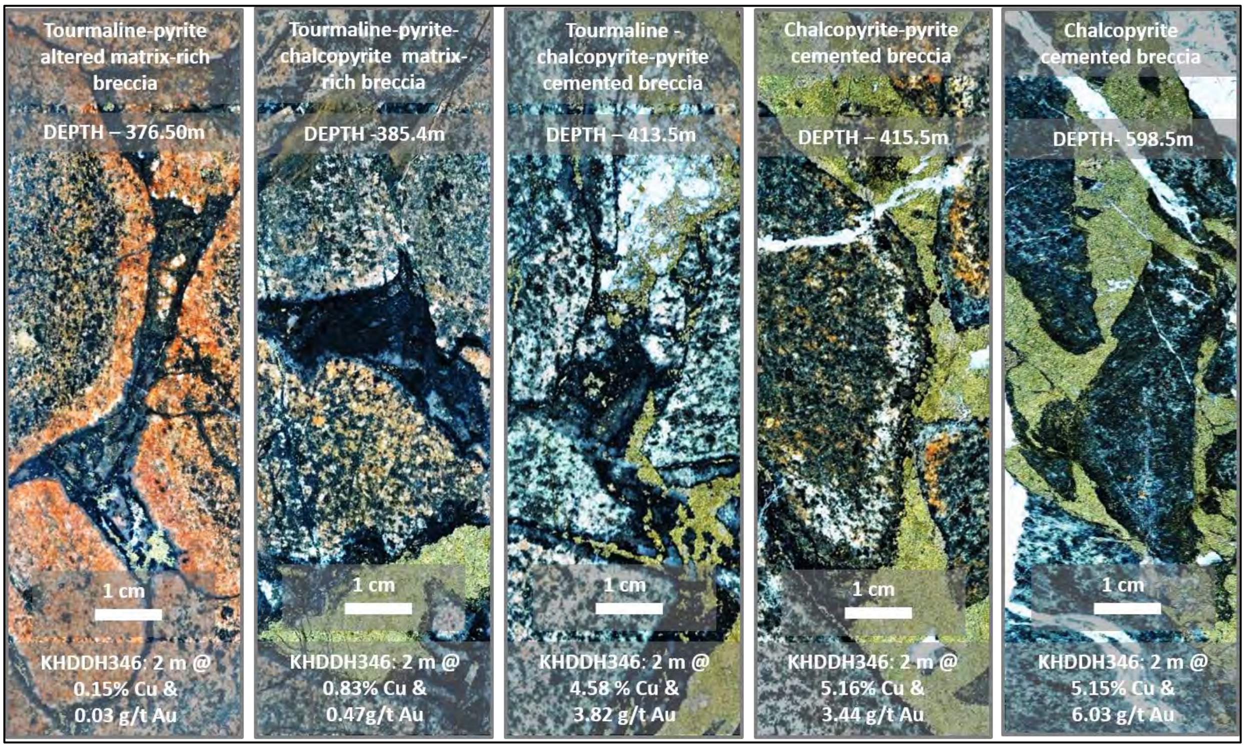


Figure 23: Hydrothermal breccia examples

Note: Cu-Au grades show relationship to the relative proportions of hydrothermal cement vs host rock flour breccia matrix vs host rock clasts.

The principal minerals of economic interest in all Kharmagtai deposits are chalcopyrite, bornite and gold, which occur primarily as infill within the veins and breccia cements, as well as minor chalcocite. Gold is intergrown with chalcopyrite and bornite. Mineralised zones at Stockwork Hill, White Hill and Copper Hill are associated with paragenetically early-stage quartz veins (M-, A- and predominantly B-veins) that were intensely developed in and around quartz diorite intrusive rocks. The vein systems manifest as both sheeted vein arrays and stockwork zones, demonstrating clear structural and temporal controls on vein domain morphology. A subsequent late stage of sulphide only C-veins (chalcopyrite ± pyrite ± bornite) overprint the quartz-sulphide vein assemblages and is commonly associated with higher Cu-Au grades. Visual overprinting relationships indicate that these sulphide-only C-veins both predate and are locally synchronous with the late stage tourmaline and sulphide-rich hydrothermal breccias. At the deposit-scale, sulphide mineralisation is zoned from a bornite-rich core outward to chalcopyrite-rich and then outer pyritic haloes, with gold grades closely associated with chalcopyrite and bornite abundance.

Drilling indicates that the supergene profile has been oxidised to depths of up to 60 m below the surface. The oxide zone comprises fracture-controlled copper and iron oxides. There is no obvious depletion or enrichment of gold in the oxide domain.

Four broad styles of mineralisation occur within the deposit area, which, due to their metal ratios, spatial distribution, and structural setting, are interpreted to be separate mineralising events. The first two are of most immediate economic interest:

1) Large zones with complex geometries associated with typical porphyry style quartz veins and moderate grades of copper and gold, such as White Hill and the northern part of Stockwork Hill. Gold to copper ratio of about 1 to 1 (Au ppm : Cu %).
2) Steeply dipping, structurally controlled breccia zones with high grades of gold and copper (in that order), examples being Stockwork Hill South and Copper Hill. Gold to copper ratio of 2 to 1 or higher.

3) Tourmaline Breccia zones seen at depth in White Hill and in the eastern part of Stockwork Hill. Where mineralised, breccias are characterised by gold to copper ratios of 1 to 2.
4) Zones of late carbonate-base metal veining associated with northwest-trending structures. Zones range from 10 cm to 5 m wide and can contain gold grades from 1 g/t to 119 g/t.

There is a strong structural control to the mineralisation, particularly at Stockwork Hill and Copper Hill, and most of the higher grades occur within local crosscutting structures and at the margins of quartz diorite porphyries (breccia), with broad low-grade mineralisation typically draping the top of intrusive bodies.

The top of deeper copper-rich tourmaline breccia mineralisation is typically intersected in drillholes at depths of more than 200 m. Recent drilling by Xanadu has shown tourmaline breccia to be quite extensive at depth. Tourmaline-bearing breccia pipes, both mineralized and barren, are commonly associated with Andean porphyry copper deposits, e.g. Toquepala (Zweng and Clark, 1995), Los Pelambres (Sillitoe, 1973) and Los Bronces (Skewes *et al.,* 2003). At Los Bronces the breccias offer great potential for moderate grade bulk mineralisation (0.6–1.2% Cu, Warnaars *et al.,* 1985) as they can be traced over about 2 km of strike.

7.5.1 Alteration Assemblages

Porphyry copper deposit (PCD) alteration assemblages at Kharmagtai are somewhat discontinuous, non-symmetrical, and not all alteration styles occur in every deposit. The classic porphyry-style alteration zonation (potassic core-phyllic halo-peripheral propylitic zone), as described by Lowell and Guilbert (1970) and expanded by Sillitoe 2010, is not ubiquitous at Kharmagtai. This is potentially due to the multiplicity of intrusions, their associated overprinting hydrothermal alteration assemblages, and the fault-controlled distribution of the late-stage sericitic assemblages. Of particular note/curiosity is the abundance of albite-rich sodic (Na) alteration that is coincident with significant Cu/Au-rich quartz B-vein stockworks. Sodic-calcic alteration is normally associated with lower-grade or unmineralised anulus surrounding the deeper higher temperature mineralised potassic roots of PCD stocks (Figure 28). Cu/Au-rich B-vein stockwork mineralisation is normally associated with the potassic altered central and upper domains of a PCD.

Although each deposit is unique in terms of alteration zonation and paragenesis, there are many common features, which are described below.

The earliest formed alteration assemblage recognised in the core of the porphyry deposits of Kharmagtai are sodic (albite), potassic (K-feldspar-biotite-magnetite) and propylitic (epidote-chlorite-magnetite alteration). At the Stockwork Hill deposit, early albite-magnetite alteration, occurs within the margins of quartz diorite dykes and is locally associated with a very high gold grade quartz-bornite-chalcopyrite vein stockwork containing common native gold. Early albite-magnetite-alteration is followed by selective and patchy strong epidote-chlorite-magnetite alteration related to emplacement of the main high gold grade quartz-chalcopyrite-pyrite-magnetite vein stockwork mineralisation. At Copper Hill, early sodic alteration is characterised by albitization of plagioclase and is overprinted by high intensity K-feldspar variant of the potassic alteration, which destroys all primary textures. Composition and textures of country rocks affected the spatial extents, intensities and style of alteration assemblages that developed around the porphyry complex at Stockwork Hill. The early, epidote-chlorite-magnetite has the greatest volumetric extent of all alteration assemblages.

Early potassic and inner propylitic assemblages were overprinted by a sericite-pyrite ± tourmaline alteration assemblage. This phyllic zone is characterised by pervasive sericite-tourmaline-chlorite-yellow epidote alteration, tourmaline-sericite-carbonate-pyrite breccias, and quartz-pyrite-tourmaline-carbonate veins. Discontinuous 1–15 m wide zones of pervasive sericite alteration are typically associated with carbonate-quartz-sericite-pyrite-tourmaline infilled fault zones. Extensive fault- and fracture-related phyllic alteration is typically unmineralised; however, rare 2–10 m wide zones of 0.5% to >5% Cu and <0.01 g/t to 0.3 g/t Au are associated with chalcopyrite bearing tourmaline breccias and carbonate-filled fault zones.

Distal alteration at Kharmagtai produced an outer propylitic alteration assemblage (chlorite-calcite-carbonate-hematite-pyrite). This assemblage appears to have formed throughout the hydrothermal system, and the presence of hematite and epidote indicates oxidising conditions of formation. The propylitic alteration has a complicated distribution, and there appears to be several discrete episodes. At Stockwork Hill, propylitic and potassic assemblages occur together, with epidote locally occurring in quartz-chalcopyrite-pyrite-magnetite veins. Similar intricate relationships between potassic, sodic and propylitic alteration assemblages have been described from high-grade porphyry deposits in the Lachlan Fold Belt of eastern Australia (Wilson *et al.,* 2003). Propylitic alteration assemblages were overprinted by an extensive late unmineralised alteration assemblage consisting of carbonate-zeolite. This occurs as both selectively pervasive alteration and extensive veins, both commonly associated with shear zones.

The complex overprinting alteration zonation and veining relationships observed in the Kharmagtai drill core are consistent with those expected in a porphyry mineral system cluster, where multiple porphyry intrusive stocks intrude at different stratigraphic levels over time. This porphyry mineral system "telescoping" process is well documented (Sillitoe, 2010) and typically results in multiple closely spaced, to potentially overlapping, porphyry intrusive centres, each with multiple porphyritic intrusive phases with their own alteration zonation halos (both mineralised and barren) overprinting each other in an often-complex temporal sequence and spatial distribution.

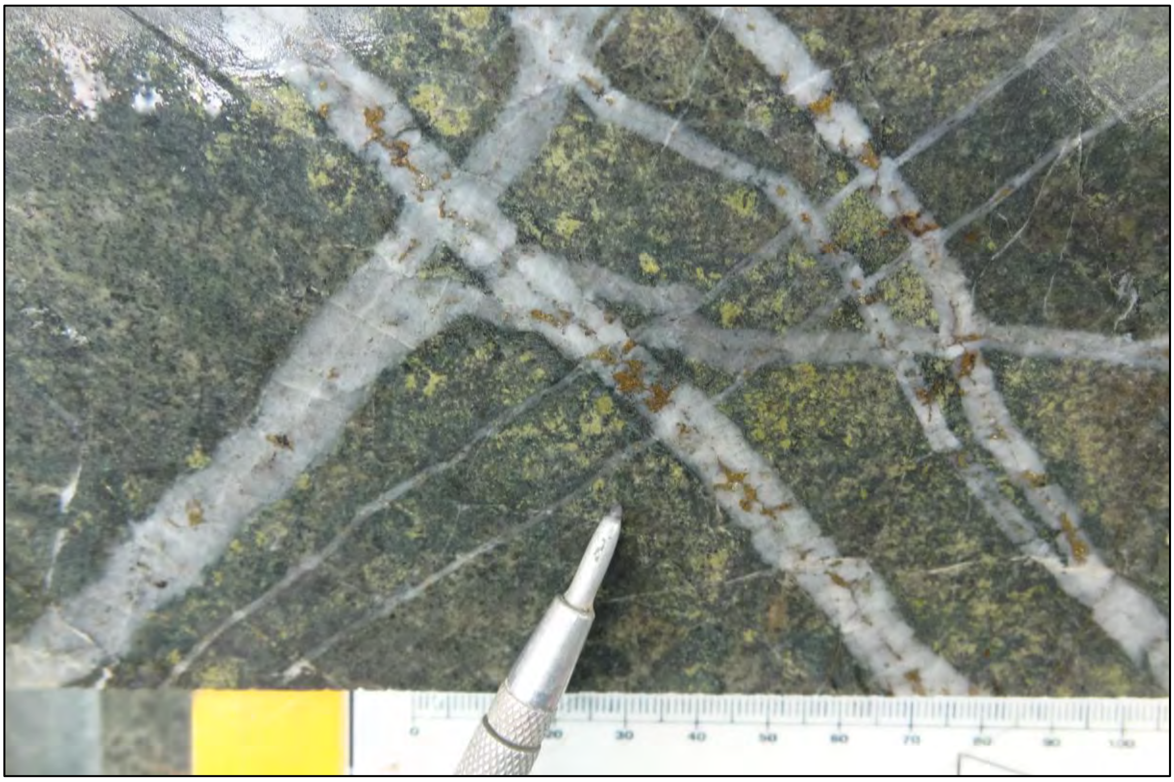


Figure 24: Epidote-chlorite-albite alteration with quartz-sulphide B-vein stockwork-related mineralisation

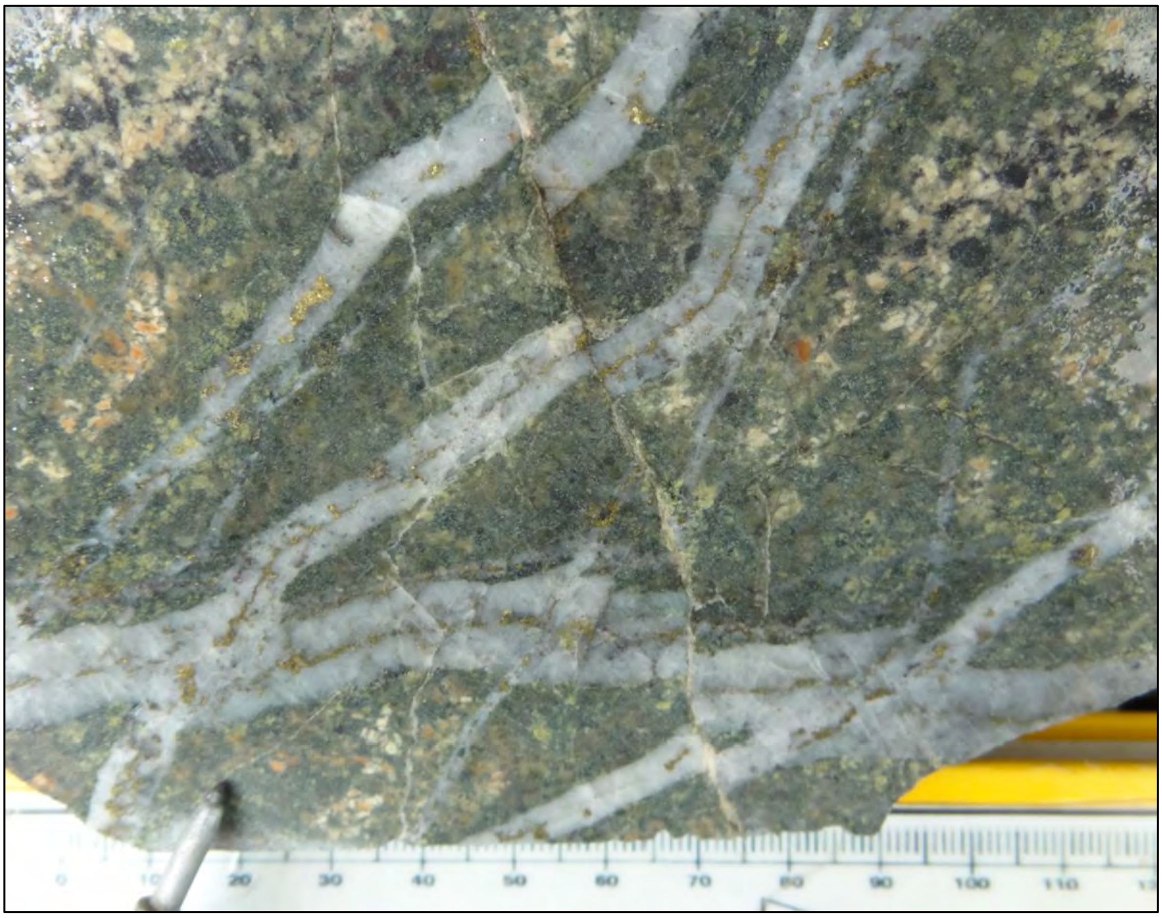


Figure 25: B-vein stockwork with early potassic host-rock alteration (K-spar and biotite) overprinted by epidote-chlorite and weak sericitic alteration

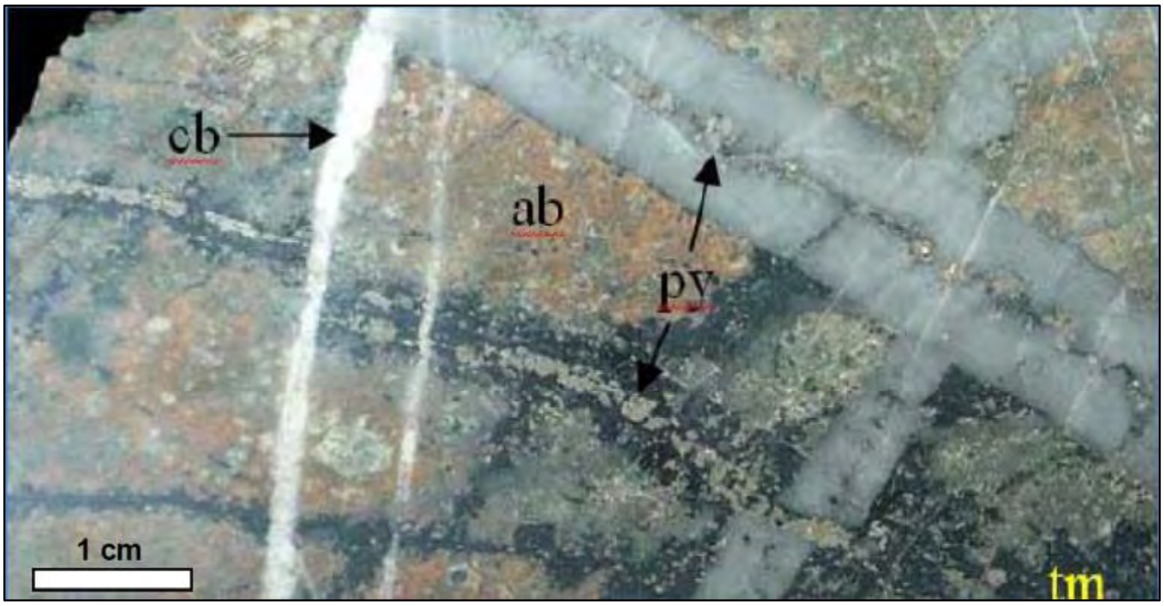


Figure 26: Tsagaan Sudal – Stockwork B-veins with pervasive pink albite (possibly K-spar) host-rock alteration and localised dark chloritic selvedges to late C-veins (Kirwan et al., 2005b)

7.6 Stockwork Hill

Stockwork Hill was a significant exploration focus during the period that IMMI owned the Property. Two main mineralised zones were recognised, named the Northern Stock Zone (NSZ) and Southern Stockwork Zone (SSZ). These two zones are approximately 100 m apart and are hosted in diorite and quartz diorite porphyries.

The SSZ is at least 550 m long, 600 m deep and contains strong quartz-chalcopyrite-pyrite stockwork veining and associated high grade copper-gold mineralisation. The stockwork zone widens eastward from a 20–70 m wide high-grade zone in the western and central sections, to a 200 m wide medium-grade zone in the eastern-most sections. Mineralisation remains open at depth and along strike to the east. Quartz veins are tightly focused within the pipe-like stockwork zone, with typical vein densities of two to >15 veins per metre (providing grades of 0.7 g/t to >5 g/t Au and 0.3% to >4% Cu. Stockwork veining is associated with narrow 10 cm to 10 m wide quartz diorite dykes. These dykes can be traced vertically for up to 150 m between holes. The SSZ has been deformed by a post-mineralisation 130° striking dextral shear zone, and quartz veins within the SSZ are typically strongly fractured. The shear zone has bisected the SSZ and a 2–30 m wide post alteration/mineralisation andesite dyke has been emplaced along the shear zone. The stockwork on either side of the shear zone appears to have been displaced by approximately 200 m of dextral movement.

The NSZ consists of a broad halo of quartz veins (typically ranging from one vein every 5 m to two to three veins per metre, the later with grades of 0.3 g/t to 0.6 g/t Au and 0.1% to 0.5% Cu). The zone is approximately 250 m long, 150 m wide long and at least 350 m deep. Within this zone are pockets of abundant quartz stockwork veins with sample interval grades that range from 0.6 g/t to 1.5 g/t Au and 0.3% to 0.5% Cu. The broad shallow zone of weak quartz veining appears to coalesce into narrower pipes (30–40 m wide) of stronger stockwork mineralization at depth. The quartz veins form a broad halo centred on several 1–30 m wide quartz diorite dykes. The largest quartz diorite dyke forms a stock that is 200 m long, 20 m wide and at least 300 m deep. The southern and south-western margins of the NSZ appear to grade out, through a series of faults, into unaltered or sericite-altered quartz diorite. The north-eastern margin of the NSZ has been sheared off by a southeast-trending fault zone. The eastern extension of the NSZ is marked by a 50 m wide zone of quartz veins and associated weak malachite mineralisation, with any further extension to the east obscured by Quaternary cover.

The summarised sequence of geological events observed at Stockwork Hill comprises:

1) Pre-mineralisation pyroxene and hornblende diorite intrusions.
2) Pre-mineralisation hornblende-quartz diorite intrusions (main host to mineralisation).
3) Early network of fine magnetite veining and alteration (M-veins)
4) Stockwork zones of centreline quartz-magnetite and laminated quartz magnetite veins with minor chalcopyrite (B-veins) trending roughly east-west and south dipping with tabular to pipe-like geometry, associated with epidote-magnetite alteration.
5) Earlier centreline and laminated stockwork veins re-opened and overprinted by strong chalcopyrite mineralisation (sulphide-only C-veins).
6) Pre-post mineralisation hornblende quartz diorite dykes.
7) Syn-post mineralisation tourmaline breccia. Tourmaline breccia is zoned from chlorite cement infill to pyrite then chalcopyrite within the core of the breccia domain.
8) Post-mineralisation, northwest to west-northwest trending, andesite dyke emplacement and dextral strike-slip faulting offsets the SSZ.
9) East-northeast trending faulting, offsets andesite dykes and tourmaline breccia with approximately 300 m dextral strike slip to the southwest and 120 m dip-slip. This set of late structures host many of the carbonate base metal gold veins within the Property.

Most phases of diorite are texturally and compositionally similar, so it is not feasible to separate these in drill core logs and model separately. Wolfe (2004) noted that high gold grades even occur in zones with relatively low density of stockwork veining, suggesting that highest gold grades may be a separate later event, possibly related to sulphide-only C-veining, major shearing and/or the emplacement of tourmaline breccias. More recent work suggests higher grade gold occurs in areas of early laminated quartz-magnetite-chalcopyrite M-veins within the stockwork zones, which were subsequently overprinted and reactivated by strong chalcopyrite bearing B-veins. Additional high-grade gold is associated with late carbonate base metal gold veins and can be easily distinguished by their associated lead and zinc values.

7.7 White Hill

White Hill is located some 300 m south of Stockwork Hill, and it is the largest and lowest-grade body of mineralisation defined on the Property. Mineralisation occurs as a main quartz B-vein stockwork zone and tourmaline breccia bodies hosted by diorite porphyry.

The White Hill stockwork zone consists of a broad halo of quartz B-veins (typically ranging from one vein every 5 m to two to three veins per metre, the latter with grades of 0.1 g/t to 0.3 g/t Au and 0.3% to 0.4% Cu) and hydrothermal breccias that are approximately 850 m long, 550 m wide and at least 500 m deep. The mineralisation forms a steeply plunging pipe-like geometry. The broad, shallow zone of weak quartz veining appears to coalesce into narrower pipes (30–40 m wide) containing higher grade stronger stockwork mineralisation at depth. Higher grade mineralisation (>0.5% Cu and 1 g/t Au) appears to be associated with narrow hydrothermal breccia bodies (less than 10 m wide) which are spatially related to the margins of inter-mineral quartz diorite dykes. Breccias range from clast- to cement-supported and comprise diorite clasts set in a hydrothermal cement of chlorite-magnetite-chalcopyrite. Stockwork veining and breccias are associated with 10 cm to 10 m wide quartz diorite dykes. The largest quartz diorite dyke forms a stock 100 m long, 20 m wide and at least 500 m deep.

Wolfe (2004) describes the main host at White Hill as a porphyritic diorite that intruded volcaniclastic siltstones, strongly altered with magnetite largely converted to hematite. Fine-grained late-stage diorite dykes cross-cut mineralisation. The presence of hematite rather than magnetite implies that magnetics should not be solely relied on for defining exploration targets.

Drilling at White Hill is more widely spaced than the other deposits, with collars on an approximate 100 m grid spacing with inconsistent drill directions. White Hill has received less attention than Stockwork Hill and Copper Hill due to the generally lower grades encountered in drilling. However, holes drilled in 2011 and late 2017 intersected wide zones of deeper mineralisation and the deposit remains open at depth and not adequately closed off along strike.

7.8 Copper Hill

At Copper Hill, stockwork mineralisation is zoned around a vertically attenuated leucocratic, distinctly crystal-crowded, quartz diorite stock that intruded volcaniclastic siltstone/sandstone. The stockwork zone forms a roughly tabular body of quartz-chalcopyrite-pyrite mineralisation trending east to east-northeast and dipping steeply south. Dimensions of the stockwork are approximately 350 m by 100 m by at least 200 m vertical extent.

The deposit has a well-defined high-grade core (grades 1–3% Cu and 2–7 g/t Au) with quartz veining tightly focused within the pipe-like stockwork zone, and typical vein densities of five to >15 veins per metre. Quartz veins are generally planar and display centre line textures (B-veins). Zones of high-grade mineralisation are characterised by gold to copper ratios that typically exceed 2:1 (Au ppm : Cu %). Initial potassic alteration and veining was overprinted by phyllic/propylitic, which may indicate thermal collapse of an initial high temperature system (Kirwin *et al.,* 2003).

Mineralisation dies out abruptly along strike in both directions and down-dip, where the vertical truncation defines a southwest plunge. Termination is most sudden to the west, while to the east the mineralised body becomes narrower. Truncation of monzodiorite intrusions and mineralisation at the east and west extents of Copper Hill may be due to low angle faults that were not intersected by the mainly north-south oriented drilling.

7.9 Tourmaline Breccia Mineralisation

In the deeper (typically below 200 m) parts of Stockwork Hill and White Hill, early stockwork copper-gold mineralization has been overprinted by late stage tourmaline-sericite-carbonate-pyrite-chalcopyrite-bornite hydrothermal breccias (Figure 21 to Figure 23) and quartz-pyrite-tourmaline-carbonate-chalcopyrite veins associated with a pervasive, structurally-controlled phyllic (sericite-tourmaline-chlorite) alteration. Tourmaline breccias are very widespread at depth and appear to be part of a much larger system of breccias which extends for several kilometres in a northwest-southeast direction. The hydrothermal breccias appear to be structurally controlled and form highly irregular bodies where the amount of breccia and the style of brecciation vary dramatically on scales of metres to tens of metres.

Breccias range from 10 cm to 40 m wide, can be either clast- or hydrothermal cement-supported, and consist of angular to sub-rounded, locally derived, variably silica-sericite-sulphide-altered clasts (ranging in width from 1 cm to 4 m; typically, 2 cm to 15 cm) set in a tourmaline-pyrite quartz-carbonate ± chalcopyrite-bornite cement. Breccias are strongly zoned with central tourmaline-quartz-pyrite giving way outwards to chlorite ± tourmaline ± carbonate ± pyrite ± chalcopyrite ± molybdenite ± gold mineralisation and further to pale sericite ± carbonate ± chalcopyrite ± carbonate ± sphalerite ± galena ± gold mineralisation. Mineralisation occurs predominantly as cavity filling and associated alteration in the breccia clasts. Chalcopyrite-mineralised tourmaline breccias are associated with strong copper grades (0.5% to >5% Cu) but typically contain little or no gold (below detection to 0.03 g/t Au). Gold-mineralised tourmaline breccias (0.3 g/t to 0.7 g/t Au) typically contain quartz stockwork vein fragments and clasts of stockwork mineralisation, implying that the gold may predate brecciation. Anhydrite appears to have been an important original component of the breccia system but has been completely leached in the upper 300–400 m to create a vuggy, leached appearance in places. At deeper levels, anhydrite has been hydrated to gypsum, most likely through the action of meteoric waters.

7.10 Other Significant Prospects

Other significant zones of mineralisation are known on the Property, defined by historical and current exploration programs.

7.10.1 Golden Eagle

Golden Eagle is a new prospect, defined by Xanadu drilling in 2016, that lies beneath about 27 m of cover sediments. Mineralisation has currently been intersected over an area 250 m by 150 m and has a high gold:copper ratio around 4:1, with grades averaging 0.5 g/t Au and 0.15% Cu. Mineralisation is associated with porphyry style A, B and D veins and UST (unidirectional solidification textures), hosted by quartz monzodiorite and monzodiorite with quartz-Kfeldspar-biotite/chlorite alteration. Golden Eagle is interpreted to be a gold-rich cap overlying and peripheral to what is potentially a large porphyry system.

7.10.2 Wolf

Wolf comprises outcropping mineralisation hosted by diorite, quartz diorite and monzodiorite intruded by monzonite and trachyte dykes. Weak gold and copper grades with a gold:copper ratio of 1:1 are associated with A, B and D style porphyry stockwork veining and quartz-Kfeldspar–biotite/chlorite alteration over a large area 1,200 m by 800 m.

7.10.3 Shar Zam

Shar Zam is an early stage prospect that represents a previously unrecognised mineralisation style at Kharmagtai. High gold grades (up to 190 g/t Au over 2 m) are associated with epithermal style carbonate-pyrite-chalcopyrite-sphalerite-galena veining that overprints older tourmaline breccia style mineralisation. Information on this mineralisation style is limited, but it appears to be related to late northwest trending faults.

8 Deposit Type

Mineralisation at Kharmagtai is classified as porphyry style. Porphyry copper-gold deposits are formed from magmatic hydrothermal fluids typically associated with felsic to intermediate intrusive stocks that have deposited metals as sulphides, both within the intrusive and the intruded host rocks. Quartz stockwork veins are typically associated with sulphides occurring both within the quartz veinlets and disseminated throughout wall rock. Typical alteration patterns consist of potassic altered cores, grading outward to propylitic altered margins and grading upward to overprinted phyllic alteration. Porphyry deposits are typically large tonnage deposits ranging from low to high grade and are generally mined by large scale open pit or underground bulk mining methods. Richard Sillitoe's Economic Geology review paper entitled "Porphyry Copper Systems" (Sillitoe, 2010) provides an excellent summary overview of the porphyry Cu magmatic-hydrothermal mineral system. The following porphyry mineral system summary diagrams (Figure 27 to Figure 29) are reproduced from Sillitoe 2010.

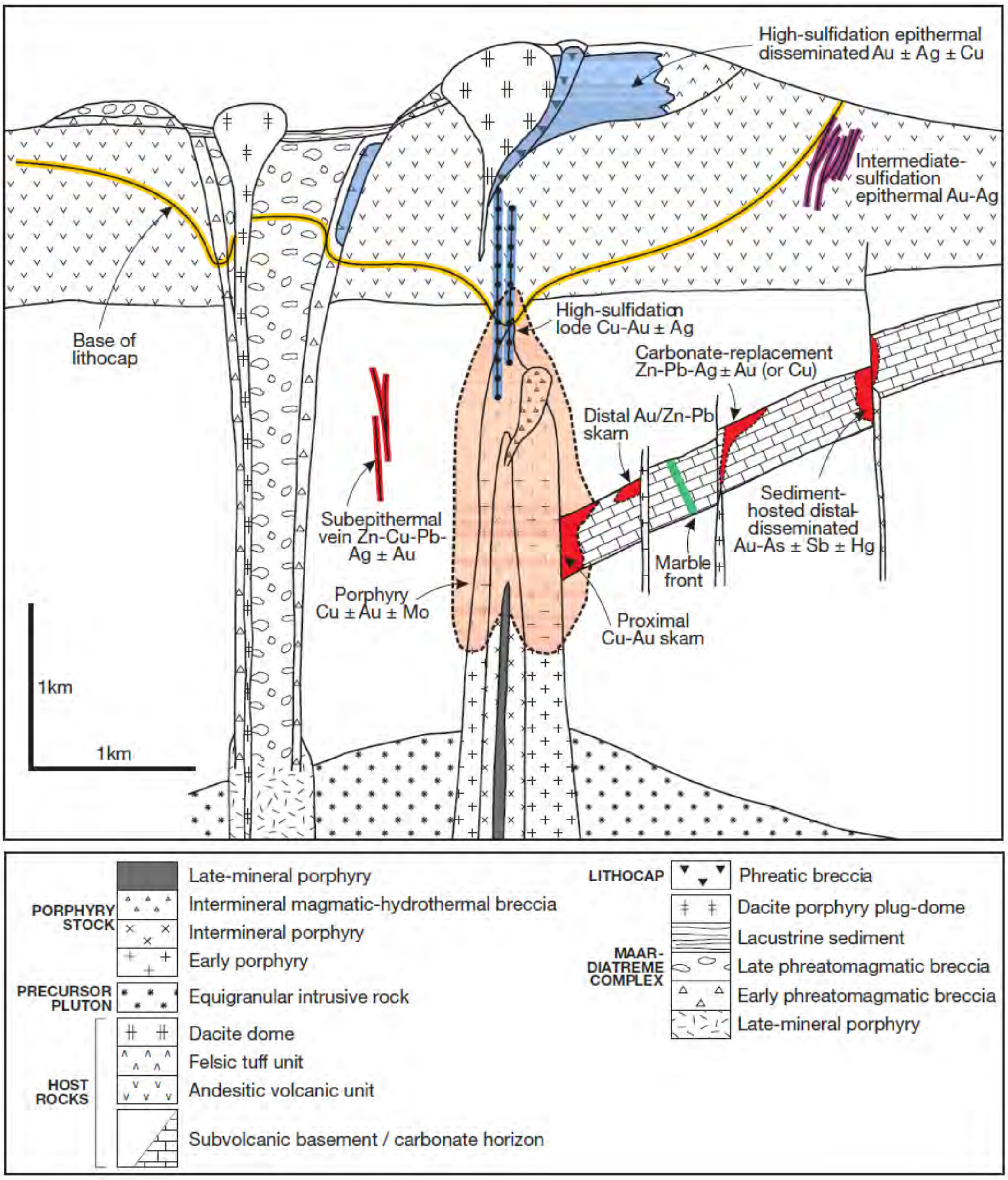


Figure 27: Schematic anatomy of a telescoped porphyry Cu mineral system (Sillitoe, 2010)

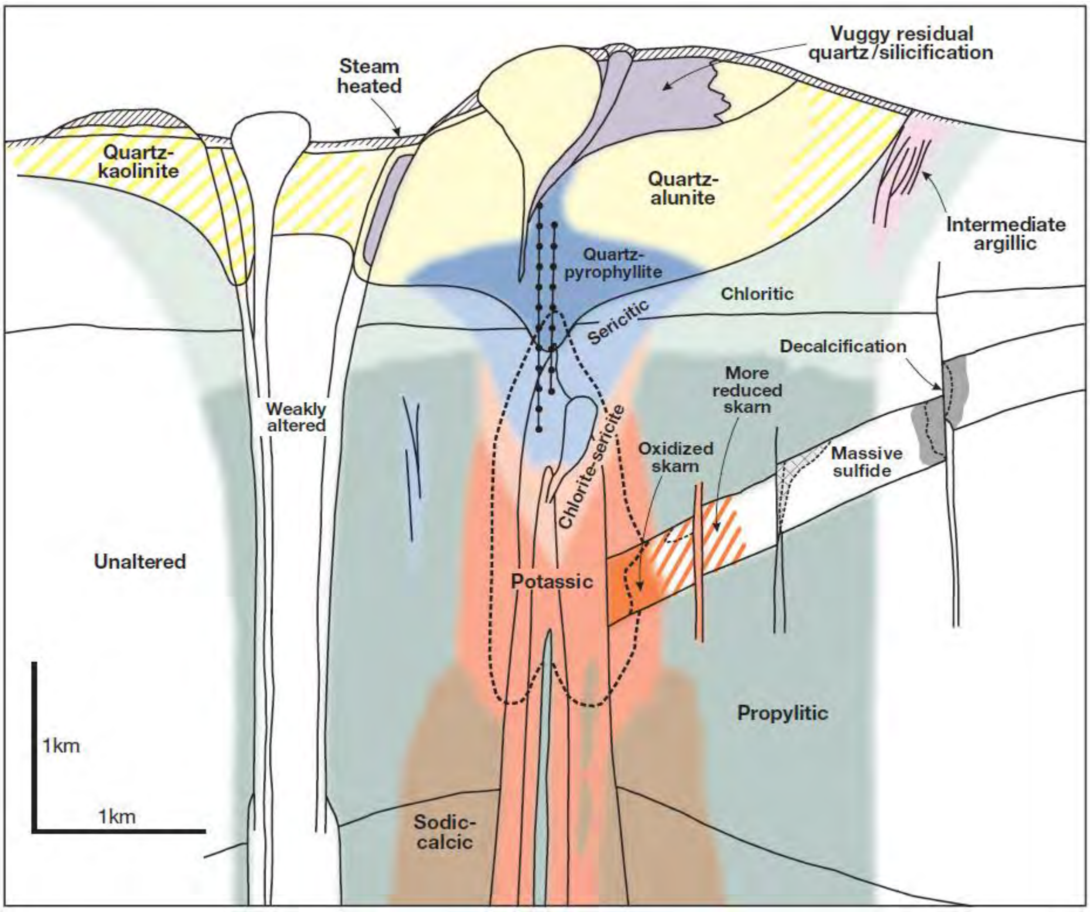


Figure 28: Generalised alteration-mineralisation zoning pattern for telescoped porphyry copper deposits (Sillitoe, 2010)

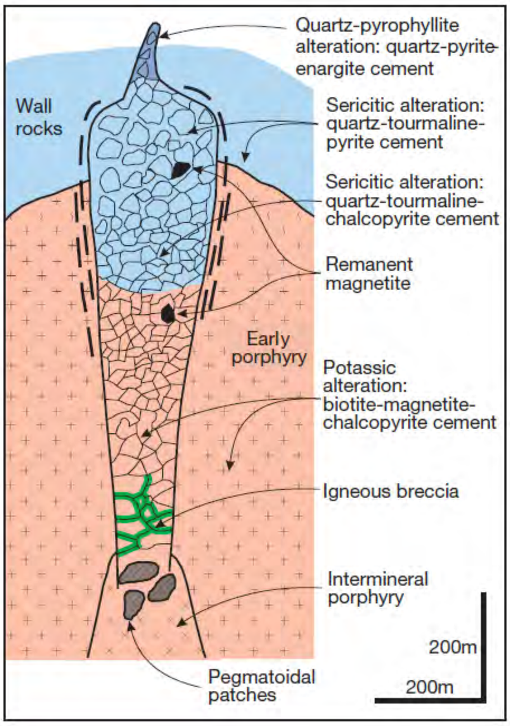


Figure 29: Schematic depiction of a large magmatic-hydrothermal breccia body genetically linked to the apex of an inter-mineral porphyry intrusion (Sillitoe, 2010)

Porphyry mineralisation at Kharmagtai is somewhat atypical in that it is associated with intermediate intrusions of diorite to quartz diorite composition, and the alteration assemblages are largely discontinuous, non-symmetrical, and not all alteration domains are observed in every deposit. However, in terms of contained gold, the Kharmagtai deposits are significant, and similar gold-rich porphyry deposits have been an attractive exploration target over the last three decades, with significant discoveries made in the Tertiary volcanoplutonic arcs of the circum-Pacific region (e.g. Grasberg, Batu Hijau, Bajo de la Alumbrera, Far South East, Boyongan) and more recently in Siluro-Devonian island arc terranes in Mongolia (Oyu Tolgoi: Perelló *et al.,* 2001).

9 Exploration

Since acquiring the Property in 2014, Xanadu has undertaken a considerable amount of additional exploration work. Initial work focused on compiling historical data, reprocessing geophysical data and defining target areas for drilling.

From mid-late 2014, Xanadu undertook a drilling program with the aim of extending zones of mineralization beyond the limits defined by previous exploration. Other exploration methods employed by Xanadu include geophysics, trenching and geochemical modelling.

9.1 Data Compilation and Old Drillholes Location

Since acquiring the Kharmagtai Project, Xanadu has relogged all pre-existing diamond drillholes using a standardised logging scheme based on the Anaconda Logging Method devised for Porphyry Deposits. Drillhole collars have been re-located by a registered Mongolian Surveyor using a differential global positioning system (GPS).

9.2 Trenching

The majority of trenching on the Property was carried out by previous operators, and all historical trenches have been rehabilitated. Most trenches were excavated over the main deposits at Stockwork Hill, White Hill and Copper Hill (Figure 30).

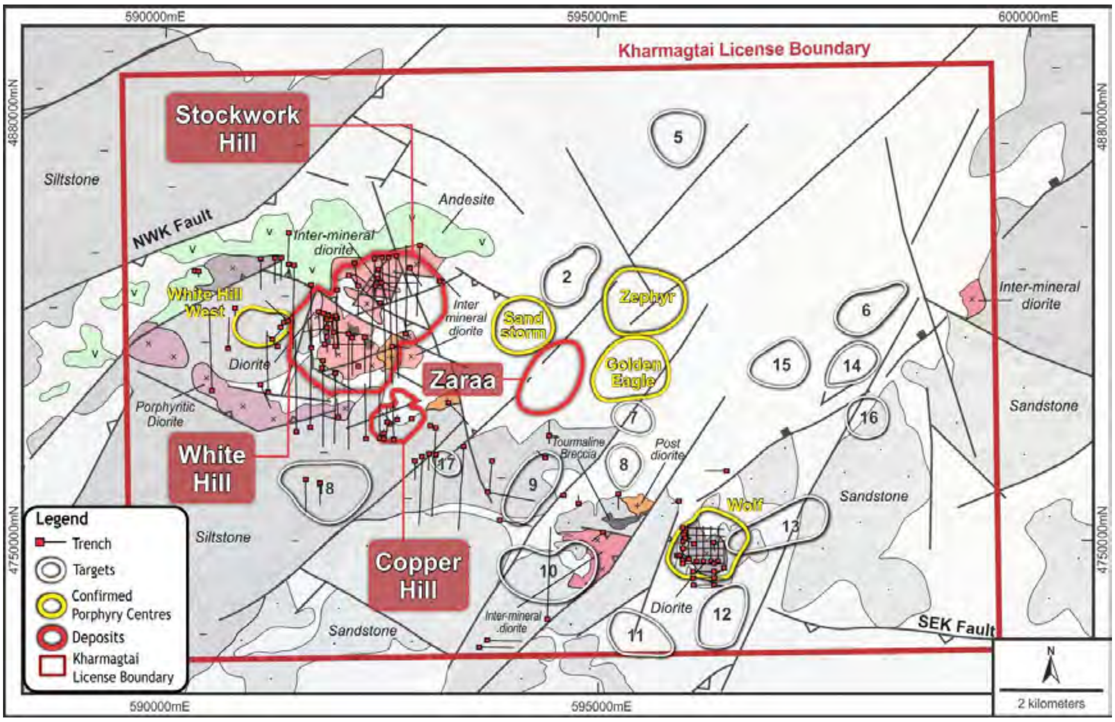


Figure 30: Overview map of Kharmagtai trench locations

Xanadu undertook a trenching program at White Hill and Stockwork Hill in mid-2015 aimed at improving understanding of the strike extents of mineralisation. Xanadu completed 17 trenches totalling 5,618 m in 2015. Most covered the White Hill–Stockwork Hill area, with four short trenches over other targets in the Property. Trenches were dug with an excavator, and were cut, logged, sampled and backfilled all in the same day.

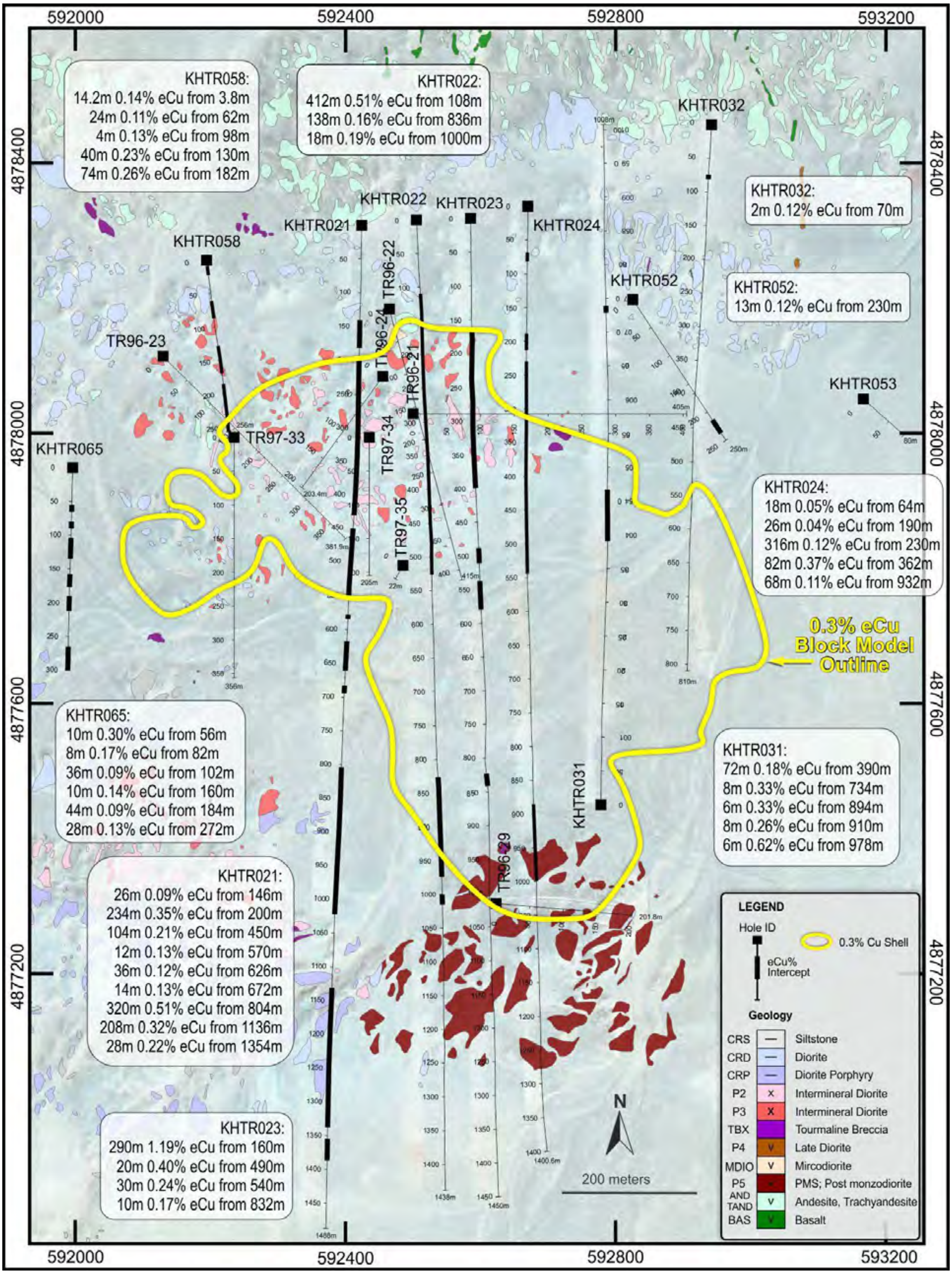


Figure 31: Stockwork Hill trenches with significant intercepts, outcrop geology and 0.3% eCu MRe block model outline projected to surface

All trenches have been surveyed and logged for lithology, alteration and structure by a geologist. Chip channel samples from 2 m intervals were taken from one trench wall, about 10 cm above and parallel to the trench floor. Trench samples were collected on a plastic sheet or tray to reduce potential contamination and placed in numbered sample bags for dispatch to the laboratory. Trenches were logged and sampled the same day they were excavated following strict sampling protocols designed to minimise any potential sampling bias. While chip channel sampling is less precise (in terms of sample support) than drill core, in the opinion of the Qualified Person, the strict sampling protocols employed, coupled with all trench samples being taken from oxide material, 2 m sample intervals, and the distributed nature of porphyry copper-gold oxide domain mineralisation, in combination with significant spatially coincident drill hole data, provides sufficient sample support to justify the inclusion of the trench sample data into the oxide component of the MRe.

All trenches were backfilled and rehabilitated almost immediately upon completion, thus precise trench locations were not able to be verified on the ground during the Qualified Person's site visit.

Trenches at White Hill focused on the north-western extension of mineralisation where there was limited drillhole data. Broad zones of copper and gold mineralisation were encountered, and significant results are shown in Figure 32. Copper grades range from 0.1% Cu to 1% Cu and gold grades from 0.05g/t to 1g/t Au.

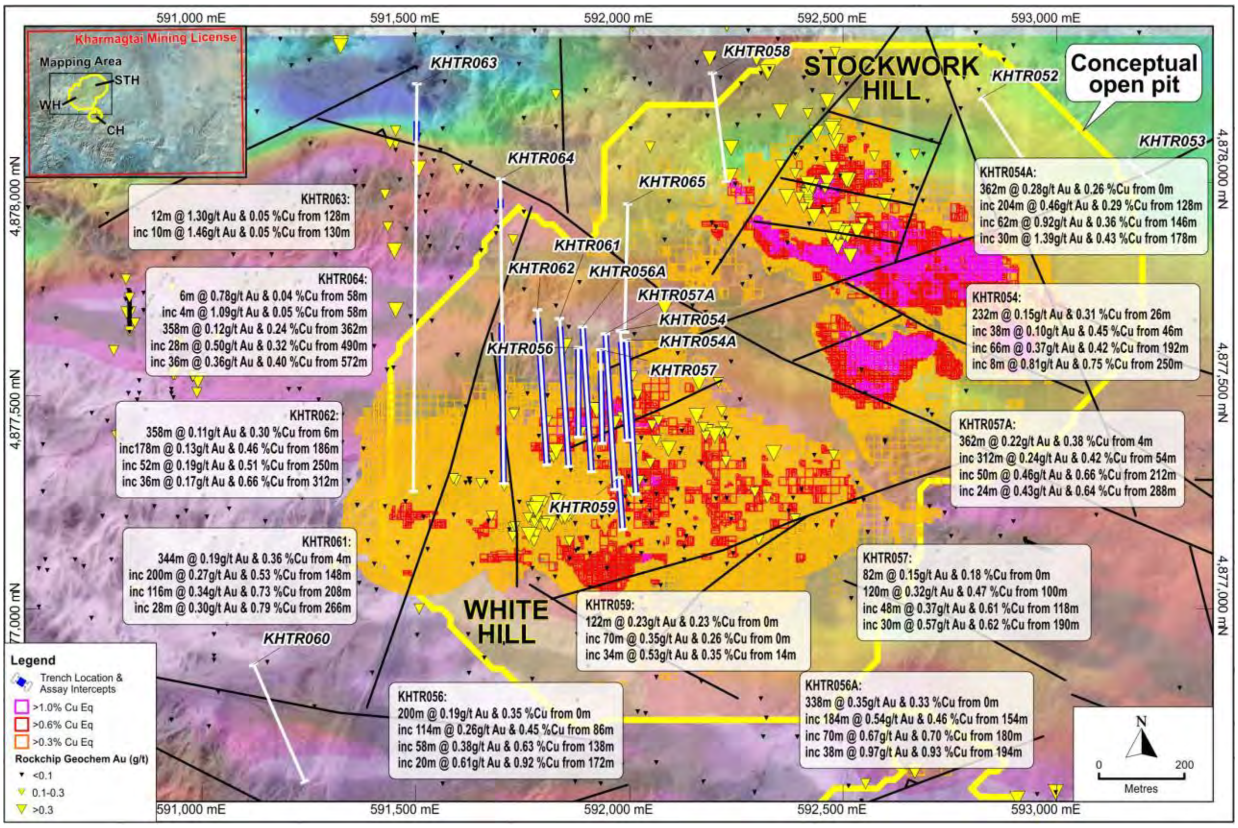


Figure 32: Trenching results from White Hill

9.3 Geophysics

Xanadu has utilised the extensive amount of geophysical data acquired by IMMI and AGC. This includes ground magnetics/radiometrics, ground and airborne gravity, gradient array IP and 3D IP. In early 2016, Xanadu reprocessed these data with the assistance of Fathom Geophysics Australia, to produce multiple 3D geophysical inversions constrained by geology. This work was used to produce new drill targets, particularly in the extensive areas of the property covered by young sedimentary rocks.

In 2015, Xanadu acquired 1,200 line-km of ground magnetics data designed to infill previous surveys. During mid-2016, Xanadu undertook a detailed ground gravity survey over the entire Property (10 km by 6.75 km) at a station spacing of 100 m for 2,225 stations. Magnetics and gravity are considered the best geophysical tools for targeting beneath cover sediments. Although IP is effective in areas of outcrop, conductive clays reduce its effectiveness in areas of cover sediments.

Known porphyry deposits at Kharmagtai are manifested as gravity and magnetic highs (higher density and more magnetite content than surrounding rocks). Fathom Geophysics produced a 3D magnetic and gravity inversion model that Xanadu is utilising for targeting deeper mineralisation centres in the remainder of the Property.

9.4 Geochemistry

In 2016, Xanadu commenced a programme of geochemical sampling of basement rocks, in areas covered by post-mineralisation sediments, in order to define geochemical halos around potential porphyry centres. Sampling was achieved by rotary percussion drilling and coring (see Section 10.1 for details) at a grid spacing of 250 m by 250 m, with infill to 125 m as required. The grid spacing was chosen on the basis of the drilling resolution required to discover the known deposits if they were obscured by cover.

Samples were submitted for four-acid ICP-MS analysis for 61 elements plus major elements via x-ray diffraction (XRD) and Au by Fire Assay

Results of pathfinder trace element analyses were interpreted using a geochemical model for porphyry mineralization proposed by Cohen (2011) and described in Halley *et al* (2015). Concentrations and anomaly sizes of key “pathfinder” elements were used to determine the likely distance (horizontally and vertically) from a mineralised porphyry centre. The final output is a 3D model that can be used for drill targeting (Xanadu quarterly report to ASX, 28 July 2017).

9.5 Targeting

Results from trenching, geophysics and geochemical modelling have been used to define and prioritise targets within the Property. Target locations and relative rankings are shown in Figure 33, with a brief description of each target given in Table 10.

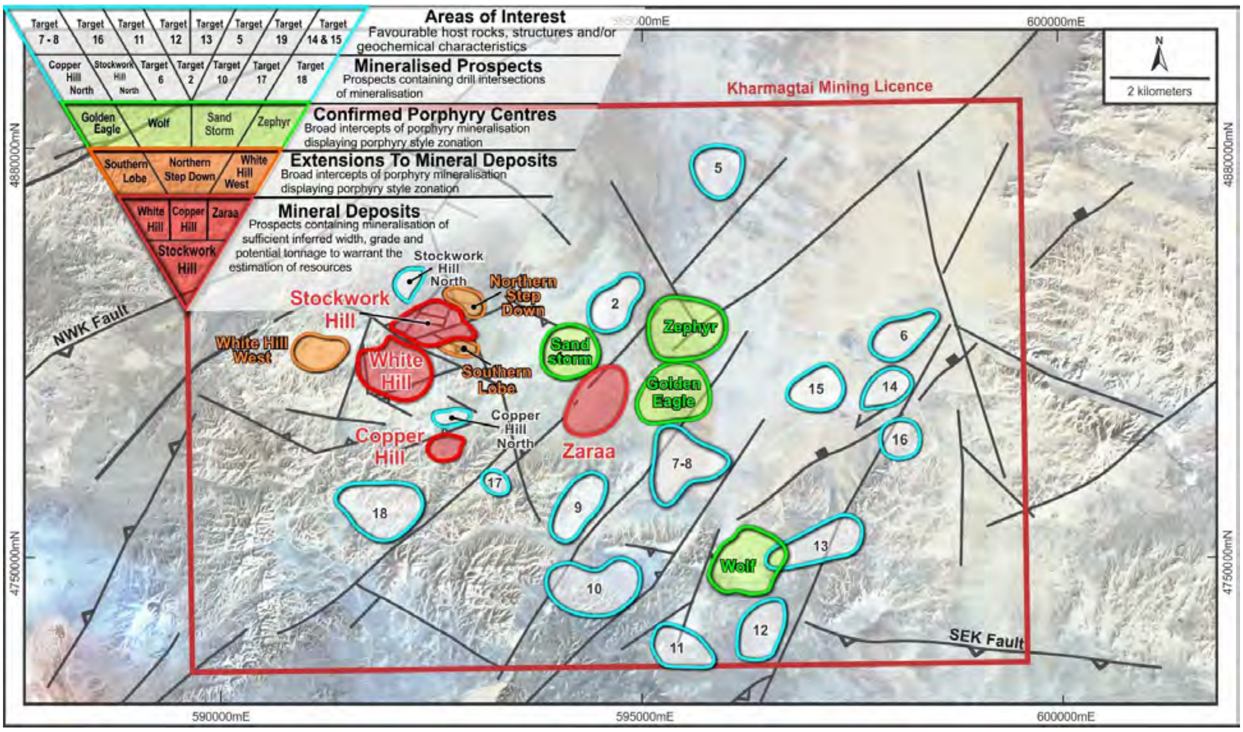


Figure 33: Kharmagtai exploration target areas and relative rankings

Table 10: Kharmagtai exploration target descriptions

Target	Depth of cover	Lithology	Best drill intercepts	Comments
Golden Eagle	27 m	Quartz monzodiorite and monzodiorite	220 m @ 0.64 g/t Au and 0.15% Cu, including 26 m @ 2.27 g/t Au from 42 m. Copper grades in other holes range from 0.03% Cu to 1% Cu over short intervals, gold grades range from 0.01g/t Au to 2.6 g/t Au over short intervals.	Large scale gold-rich porphyry target. Geology from current drilling and 3D geophysical modelling indicates drillholes have tested the top of a very large porphyry system.
Wolf	0 m	Diorite, quartz diorite and monzodiorite cut by monzonite, trachyte dykes	66 m @ 0.2 g/t Au and 0.11% Cu from 8 m; 82 m @ 0.16 g/t Au and 0.08% Cu from 68 m. Copper grades in other holes range from 0.03% Cu to 0.64% Cu over short intervals, gold grades range from 0.01g/t Au to 3.89g/t Au over short intervals.	Large scale porphyry target with a moderate amount of surface work. Geophysical modeling indicates deep system and numerous targets on flanks of system.
Zephyr	30 m	Quartz monzodiorite and monzodiorite, tourmaline breccia dykes	64 m @ 0.06 g/t Au and 0.18% Cu from 86 m; 80 m@ 0.22 g/t Au and 0.19% Cu from 31 m; 105 m @ 0.3 g/t Au and 0.2% Cu from 30 m; 90.1 m @ 0.14 g/t Au and 0.2% Cu from 26.9 m; 91 m @ 0.26 g/t Au and 0.22% Cu from 30 m; 80 m @ 0.19% Cu and 0.21 g/t Au from 31 m; 90.1 m @ 0.20% Cu and 0.14 g/t Au from 26.9 m. Copper grades in other holes range from 0.03% Cu to 0.56% Cu over short intervals, gold grades range from 0.01g/t Au to 2.21g/t Au over short intervals.	Large circular gold and copper anomaly with very strong surface copper-gold concentric porphyry veining and alteration zoning.
Target 6	45 m	Tourmaline breccia in Quartz monzodiorite and monzodiorite	96 m @ 0.35 g/t Au and 0.1% Cu from 95 m; 43 m @ 0.19 g/t Au from 149 m. Copper grades in other holes range from 0.05% Cu to 1% Cu over short intervals, gold grades range from 0.01g/t Au to 1g/t Au over short intervals.	A large-scale moderate copper and gold anomaly associated with a significant volume of tourmaline breccia.
Sandstorm	23 m	Monzodiorite and siltstone, andesite and tourmaline breccia dykes	44 m @ 0.27 g/t Au and 0.19% Cu from 25 m; 420 m @ 0.17 g/t Au and 0.23% Cu from 420 m. Copper grades in other holes range from 0.05% Cu to 0.66% Cu over short intervals, gold grades range from 0.01g/t Au to 0.81g/t Au over short intervals.	Circular gold and copper anomaly along strike from Stockwork Hill.
Target 7-8	35 m	Monzodiorite and siltstone, tourmaline breccia	10 m @ 0.12 g/t Au from 75 m 10 m @ 0.11 g/t Au from 85 m 6 m @ 0.12% Cu from 69 m. Copper grades in other holes range from 0.05% Cu to 0.43% Cu over short intervals, gold grades range from 0.01g/t Au to 0.41g/t Au over short intervals.	Targets 7–8 combined after infill drilling merged the anomalies. Large scale gold anomaly with weak copper anomalism. Tourmaline-py±cpy breccias.
Target 10	0 m	Sandstones intruded by quartz monzodiorite	26 m @ 0.58 g/t Au and 0.26% Cu from 280 m. Copper grades in other holes range from 0.03% Cu to 0.54% Cu	Large moderate but consistent Au-Cu anomaly driven by rock chipping, low density quartz-sulphide B

Target	Depth of cover	Lithology	Best drill intercepts	Comments
			over short intervals, gold grades range from 0.01g/t Au to 1.61g/t Au over short intervals.	veining, abundant malachite fracture filling.
Target 17	0 m	Siltstones and monzodiorite, quartz-tourmaline breccia	No drilling	Au anomaly associated with vuggy quartz-tourmaline veins to 20 cm width, 0.1–1.45 g/t Au in rock chip.
Target 18	0 m	Siltstone, hornblende diorite and quartz monzodiorite, tourmaline breccia dyke	10m @ 0.2 g/t Au and 0.2% Cu from 130 m. Copper grades in other holes range from 0.03% Cu to 0.41% Cu over short intervals, gold grades range from 0.01g/t Au to 0.52g/t Au over short intervals.	Weak gold and copper anomalism in rock chipped siltstones and tourmaline breccia.
Target 16	0 m	Sandstones and quartz-tourmaline dyke	No drilling	Single point Au anomaly in quartz-hematite ± tourmaline vein dykes hosted in sandstone.
Target 2	30–60m	Monzodiorite and siltstone	6m @ 0.32 g/t Au. Copper grades in other holes range from 0.005% Cu to 0.03% Cu over short intervals, gold grades range from 0.01g/t Au to 1.21g/t Au over short intervals.	Linear gold anomaly associated with the interpreted extensions of Kharmagtai Fault zone. Moderate Pb/Zn/As anomalism indicates a carbonate base metal (CBM) source.
Target 11	0 m	Tourmaline breccia float,	No drilling	Driven by single point rock-chip of tourmaline breccia.
Target 12	54 m	Monzodiorite and quartz monzodiorite dykes	Assays pending	Moderate to strong Au and Cu anomalism on margins of Chun.
Target 19	0 m	Siltstone, monzodiorite and quartz monzodiorite	160 m @ 0.13 g/t Au and 0.16% Cu from 80 m. Copper grades in other holes range from 0.03% Cu to 0.54% Cu over short intervals, gold grades range from 0.01g/t Au to 1.01g/t Au over short intervals.	Bleached hornfelsed siltstone and weakly mineralised monzodiorite porphyry west of White Hill.
Target 13	0–6m	Sandstone and monzodiorite	No drilling	Moderate Au and Cu anomalism on margins of Chun.
Target 15	25 m	Siltstones and monzodiorite	No drilling	Weak Cu and Au anomalism associated with porphyry style alteration and tourmaline breccia.
Target 9	0 m	Siltstones and monzodiorite	No drilling	Large but moderate to low level Au-Cu anomalism driven by rock chipping.
Target 5	54 m	Basalts	No drilling	Single point Au anomaly on northern edge of grid. Moderate As, Pb and Zn anomalism suggests CBM potential.

9.6 Topographic Survey

The project DTM is based on 1 m contours from satellite imagery with an accuracy of ±0.1 m.

10 Drilling

10.1 Drilling Methods

Table 11 shows a summary of drilling by different drilling methods undertaken on the Property, subdivided by company. Any drilling prior to QGX's involvement in the Property is not included as the data is not considered reliable.

Table 11: Kharmagtai drillhole summary by company and drilling method

Company	Drilling method	Number of drillholes	Metres drilled
QGX	DDH	41	9,081.12
IMMI	DDH	163	52,805.17
	RC	155	24,553.00
AGC	DDH	26	15,907.10
Xanadu	DDH	151	71,553.67
	RC	73	14,220.7
	RCDDH	24	6,662.85
	RPD	664	26,136.6

Notes: DDH = diamond drillhole; RC = reverse circulation (includes 21 holes with diamond core tails); RPD = rotary mud percussion with diamond core tail.

Drilling and sampling procedures for historic work by IMMI and AGC were independently reviewed by AMC in 2012 (AMC, 2012), who concluded that "sampling protocols are suitable for the purposes of resource estimation on porphyry style deposits."

Xanadu adopted the same protocols for drilling and sampling of diamond core that were used by IMMI and AGC. The current sampling protocols were reviewed by Mr Potma as part of this technical review conducted by CSA Global. In Mr Potma's opinion, the drilling and sampling procedures applied by IMMI and AGC and subsequently continued (and further improved) by Xanadu are thorough and suitable for the purposes of Mineral Resource estimation on porphyry-style deposits.

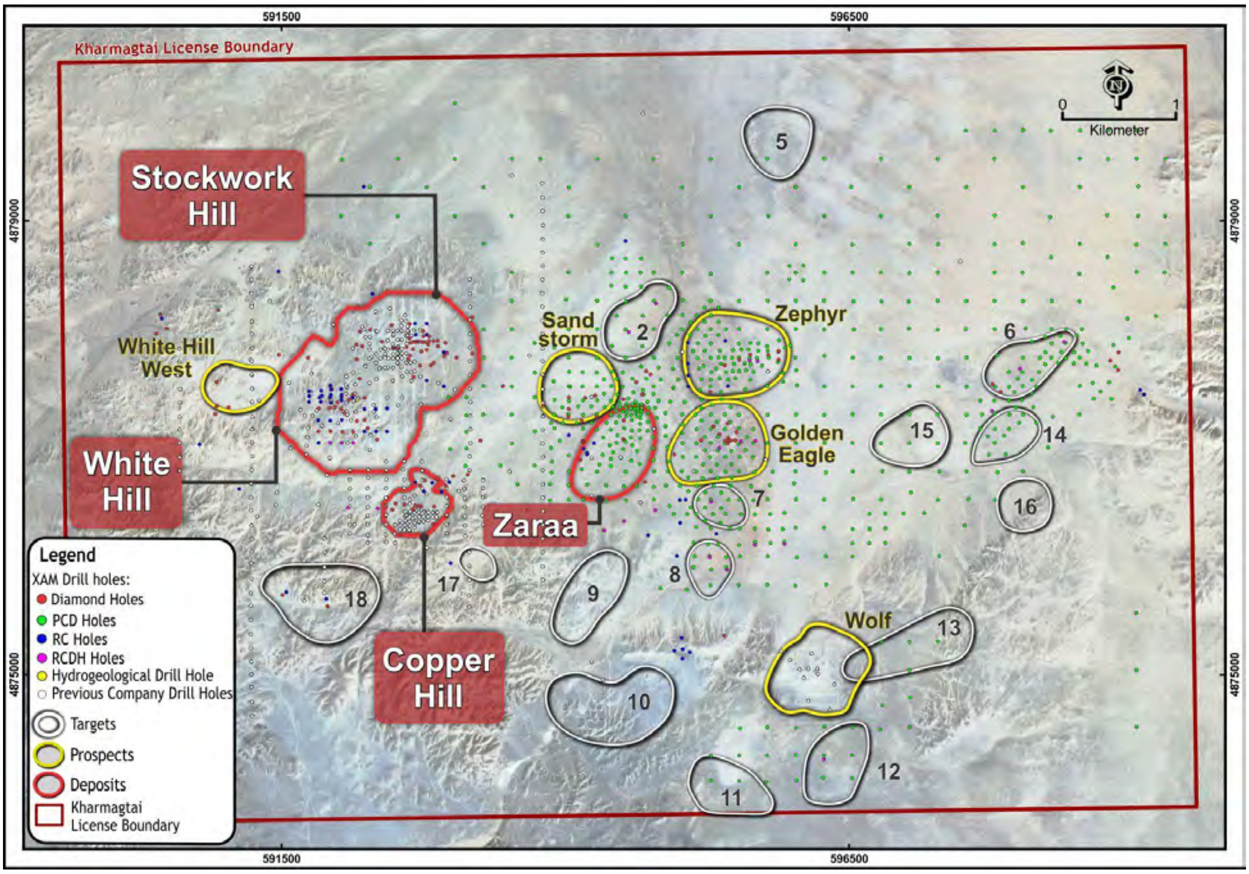


Figure 34: Kharmagtai drillholes location map

10.1.1 Diamond Drillhole Coring Procedure

The majority of drilling on the Property is diamond coring, with supplementary RC drilling. Both diamond and RC drilling data were used (in conjunction with trench assays) to complete the 2018 MRe update. Diamond coring utilised mainly HQ diameter (6.35 cm core) equipment with triple tubing used historically to increase core recovery. NQ (4.76 cm core) equipment was used for deeper portions of drillholes. HQ coring was also used to sample bedrock at the bottom of rotary percussion drillholes.

All diamond core drilled by Xanadu has been oriented using the “Reflex Ace” orientation tool.

10.1.2 Reverse Circulation Drilling Procedure

RC drilling methods were used by IMMI for regional reconnaissance purposes, and more recently by Xanadu for preliminary target testing. RC drilling used a 4.375-inch (11.11 cm) face sampling bit. Some of Xanadu’s RC holes encountered excessive water ingress that prevented a dry sample from being collected. In these cases, the hole was continued to planned depth using HQ diamond coring.

10.1.3 Rotary Mud Drilling Procedure

In 2016, Xanadu undertook a regional bedrock sampling programme over the area covered by younger sedimentary rocks. Rotary mud drilling was used to penetrate the soft cover sediments that might become unstable and collapse holes drilled using diamond or RC methods. When a conglomerate horizon at the base of sediments was encountered, drilling switched to HQ diamond coring. No samples were taken from cover sediments.

10.1.4 Drilling Monitoring

During diamond drilling Xanadu geologists routinely visit each drill rig at least once per day (commonly twice, morning and late afternoon). Drilling procedures, core quality and recoveries, core orientation and core block mark-up are routinely assessed at the rig, and drill core is transported to the core shed twice daily.

When reverse circulation drilling is in progress more oversight is provided. A rig geologist remains at the rig all day during operations. They monitor sample recoveries and quality, conduct geological logging, geochemical sampling and collect chip trays as an historical record of the hole. Each individual sample is weighed to ensure a record of recoveries is kept. Water content is monitored and if excessive, diamond drilling is initiated.

10.2 Drillhole Surveying

10.2.1 Drillhole Collar Surveys

Drillhole collars were initially located using handheld GPS. Final collar surveys were obtained at the completion of drilling by differential GPS.

10.2.2 Downhole Surveys

Historically, Eastman Kodak and Flexit electronic multi-shot downhole survey tools have been used at Kharmagtai to collect down hole azimuth and inclination information for the majority of the diamond drillholes. Single shots were typically taken every 30–50 m during the drilling process, and a multi-shot survey with readings every 3–5 m was conducted at the completion of the drillhole. As these tools rely on the Earth's magnetic field to measure azimuth, there is some localised interference/inaccuracy introduced by the presence of magnetite in some parts of the Kharmagtai mineral system. The extent of this interference cannot be quantified on a reading-by-reading basis.

More recently (since September 2017), a north-seeking gyro has been employed by the drilling crews on site (rented and operated by the drilling contractor), providing accurate downhole orientation measurements unaffected by magnetic effects. Xanadu has a permanent calibration station setup for the gyro tool, which is routinely calibrated every two weeks (calibration records are maintained on-site and were sighted by Mr Potma during the site visit).

10.3 Core Handling Procedures

Xanadu has a standardised procedure for core handling and sampling, which is described in detail in internal instruction manuals and which meets or exceeds industry standards. Core handling is carried out by geologists and supervised geotechnicians, with oversight by senior staff including the exploration manager.

At the drill rig core was removed from the core barrel by the drillers and placed directly in plastic core boxes. Individual drill runs were identified with small wooden blocks, where the depth (m) and hole number were recorded. Unsampled core was never left unattended at the rig: drill core is delivered by the drilling contractor to the camp twice daily, at 6AM and 7PM. The drillers mark the core boxes on the front, side, and top with the hole number, box number, and from-to depths. All core runs are oriented using a Camtech system, with the mark at the bottom of the run.

Upon arrival at the core shed, the core was subject to the following procedures:

- Geotechnicians re-assemble the core, mark the meterage depths on the core boxes, and measure core recoveries.
- Geologists mark the orientation line and measure Rock Quality Designation (RQD), magnetic susceptibility (every 1 m), and specific gravity (every 10 m).

- Core is then photographed dry and then wet under natural light conditions and returned to the tables for geological logging.
- Geological logging: this is completed on paper logging forms, in accordance with the company protocol, which included: header information, lithology description and lithology code, graphic log, coded mineralisation and alteration.
- Core is then transferred to a core saw for cutting.
- Core is cut offset about 1 cm from the orientation line or perpendicular to major veins or structures if present.
- The half core showing the orientation line is placed in the bottom of the core trays, and the core for sampling is placed flat-side up on top to facilitate sampling.
- HQ core samples consist of halved core. PQ core samples consists of quartered core

All diamond core is stored in a secure location at the main camp. Core is stacked on pallets in stable 3 by 3 box configurations to a height of about 15 boxes, and most core stacks are covered with purpose-build canvas covers (Figure 35). Core logging facilities are indoor and core boxes are placed on sturdy steel racks for logging.

10.3.1 Specific Gravity Data

Specific gravity (SG) measurements are made onsite, in the Xanadu core shed, using the Archimedes method on 10 cm blocks of halved core cut perpendicular to the core axis on both ends, following a rigorous procedure described in an internal instruction manual. The manual includes detailed instructions for the use of wax for coating oxidized and friable samples; however, the majority of samples are intact, non-porous rock which are measured without a wax coating.

Scales are calibrated every tenth sample with a standard weight. Until recently all samples used for SG determinations were archived separately in core trays containing only the SG samples from a particular hole, with a wooden block marking the location of SG samples inserted in the original core trays. The current practice is to label the SG samples with the relevant information and return them to the original core trays. There have not been any independent SG determinations done at a commercial laboratory for confirmation.

Figure 35: Drill core storage farm where most drill core stacks are protected by purpose-made covers

10.4 Geological and Geotechnical Logging

All drill core is geologically logged by well-trained geologists using a modified "Anaconda-style" logging system methodology. The Anaconda method of logging and mapping is specifically designed for porphyry Cu-Au mineral systems and is entirely appropriate to support 3D geological modelling, Mineral Resource estimation, mining and metallurgical studies.

Logging of lithology, alteration and mineralogy is intrinsically qualitative in nature. However, the logging is subsequently supported by four-acid ICP-AES (34-element) geochemistry and SWIR spectral mineralogy (facilitating semi-quantitative/calculated mineralogical, lithological and alteration classification) which is integrated with the logging to improve cross section interpretation and 3D geological model development.

Drill core is also systematically logged for both geotechnical features and geological structures. Where drill core has been successfully oriented, the orientation of structures and geotechnical features are also routinely measured.

Both wet and dry core photos are taken after core has been logged and marked-up but before drill core has been cut.

10.5 Sample Recovery and Quality

Core recovery is measured at the core logging area by geology staff where the following measurements are recorded:

- Block interval
- Drill run (m)
- Measured length (m)
- Calculated recovery (%).

Recovery measurements were collected during all core programs and recorded in the master Geobank database. Diamond drill core recoveries are assessed using the standard industry (best) practice which involves: removing the core from core trays; reassembling multiple core runs in a v-rail; measuring core lengths with a tape measure, assessing recovery against core block depth measurements and recording any measured core loss for each core run.

Diamond core recoveries average 97% through mineralisation.

Overall, core quality is good, with minimal core loss. Where there is localised faulting and or fracturing, core recoveries decrease; however, this is a very small percentage of the mineralised intersections.

RC recoveries are currently measured by Xanadu using whole weight of each 1 m intercept measured before splitting; however, it is not clear that this procedure has been followed for all historical RC drilling at Kharmagtai.

Analysis of recovery results vs grade shows no significant trends that might indicate sampling bias introduced by variable recovery in fault/fracture zones.

11 Sample Preparation, Analyses and Security

Xanadu has adopted similar protocols and procedures for sample preparation, analyses and security as those historically used by IMMI and AGC as described in the following subsections.

11.1 Onsite Sample Preparation – Diamond Core

Diamond core sample preparation procedure is as follows:

- The uncovered core boxes are transferred from the logging area to the cutting shed.
- Long pieces of core are broken into smaller segments with a hammer.
- Core is cut with a diamond saw. The orientation of the cut line is controlled using a standard rotation from the core orientation line, ensuring uniformity of core splitting wherever the core has been successfully oriented. The rock saw is regularly flushed with fresh water.
- Both halves of the core are returned to the box in their original orientation.
- The uncovered core boxes are transferred from the cutting shed to the adjacent sampling area. Standard 2 m sample intervals are defined and subsequently checked by geologists, with sample intervals locally modified to honour geological contacts. The minimum allowed sample length is 30 cm.
- Sample tags are attached (stapled) to the plastic core trays for every sample interval, and sample intervals are marked on both the core and the core box with permanent marker; sample tags are stapled to the box at the end of each 2 m sample interval, sample numbers are pre-determined and account for the insertion of QAQC samples (core field duplicates, certified reference materials (CRMs), blanks).
- Samples are individually bagged. Each sample is routinely identified with inner tags and outside marked numbers. Samples are regularly transferred to a sample preparation facility in Ulaanbaatar.
- The unsampled half of the core is retained in the core box, in its original orientation, as a permanent record. It is transferred to the on-site core storage area.

Barren dykes that extend more than 10 m along the core length are generally not sampled.

11.2 Onsite Sample Preparation – RC

Xanadu RC drillholes are sampled on 2 m intervals and subsamples taken using a 25:75 riffle splitter at the drill rig. RC samples are uniform 2 m samples formed from the combination of two quarter-split 1 m samples and are not sampled to geological boundaries.

11.3 Sample Security

After sampling, bagged samples are stored on site within locked containers. Samples are dispatched using secure Xanadu vehicles to the assay laboratory in Ulaanbaatar. Consignments are signed for at the laboratory and a confirmation of receipt email is sent to the Xanadu. Samples are stored at the laboratory for analysis and returned pulps are stored in a secure site.

11.4 Sample Analyses

Until recently, routine sample preparation and analyses of IMMI, AGC and Xanadu samples were carried out by SGS Mongolia LLC (SGS Mongolia), which operates an independent sample preparation and analytical laboratory in Ulaanbaatar.

Between 2002 and June 2016, three sample preparation facilities were used. During 2002 and 2003, samples were prepared at SGS Mongolia LLC (SGS Mongolia), who operate an independent sample preparation facility at Manlai. The preparation facility was installed in 2002 as a dedicated facility for Ivanhoe's Kharmagtai Project during their exploration and resource definition stages. Although the facility mostly dealt with samples from the Property, it also prepared some samples from other IMMI projects in Mongolia. From 2004 to June 2016, samples were sent to SGS Mongolia facilities at Oyu Tolgoi (IMMI and AGC samples) and Ulaanbaatar (Xanadu samples).

Since June 2016, Xanadu has sent samples to ALS Mongolia LLC for analysis. ALS Mongolia LLC (ALS Mongolia) operate an independent sample preparation and analytical laboratory in Ulaanbaatar.

Sample comminution/preparation and analysis protocols have varied slightly over time with different laboratories. These variations are minor and are highly unlikely to impart any bias to assay results.

Prior to June 2016 samples were prepared by SGS Mongolia in line with the following protocols:

- Drying
- Pre-preparation weighing
- Crushed to 75% passing 3.35 mm
- Split to 500 g
- Pulverised to >85% passing 200 mesh (75 microns)
- Split to 150 g.

Prior to 2014, Cu, Ag, Pb, Zn, As and Mo were routinely determined using a three-acid-digestion of a 0.3 g subsample followed by an AAS finish (AAS21R) at SGS Mongolia. Samples were digested with nitric, hydrochloric and perchloric acids to dryness before leaching with hydrochloric acid to dissolve soluble salts and made to 15 ml volume with distilled water. The lower detection limit (LDL) for copper using this technique was 2 ppm. Where copper was over-range (>1% Cu), it was analysed by a second analytical technique (AAS22S), which has a higher upper detection limit (UDL) of 5% copper. The gold analysis method prior to 2014 was essentially from the same as that used between 2014 and 2016 as described below.

Between 2014 and 2016, all samples were routinely assayed by for gold and a four-acid ICP-AES multi-element suite of 34 elements including copper, silver, lead, zinc, arsenic and molybdenum. The SGS assay suite and detection limits are presented in (Table 12).

- Gold was determined at SGS using a 30 g fire assay fusion, cupelled to obtain a bead, and digested with aqua regia, followed by an atomic absorption spectroscopy (AAS) finish, with a LDL of 0.01 ppm Au.
- Multi-element analysis (SGS code ICP40B) used a four-acid digest (perchloric, nitric, hydrofluoric and hydrochloric acids) with the resulting solution analysed by ICP-AES. The digest used is able to dissolve most minerals in a sample and the analytical technique is considered "near-total".

Copper reporting above the UDL of 1% for four-acid ICP-AES was re-analysed using an "ore grade" assay procedure (SGS AAS43B/40C). The sample was dissolved in aqua regia, diluted with de-ionised water and analysed using either ICP-AES, or AAS.

Table 12: Summary of analytical techniques (SGS Mongolia, 2014 to June 2016)

Method	Element	Detection limit	Element	Detection limit
FAA303	Au	0.01-1000 ppm		
ICP40B	Ag	2-50 ppm	Mo	2-10000 ppm
	Al	0.3-15 %	Na	0.01-15 %
	As	5-10000 ppm	Ni	2-10000 ppm
	Ba	5-10000 ppm	P	0.01-15 %
	Be	0.5-2500 ppm	Pb	2-10000 ppm
	Bi	5-10000 ppm	S	0.01-15 %
	Ca	0.01-15 %	Sb	5-10000 ppm
	Cd	1-10000 ppm	Sc	0.5-10000 ppm
	Co	1-10000 ppm	Sn	10-10000ppm
	Cr	10-10000 ppm	Sr	5-5000 ppm
	Cu	2-10000 ppm	Ti	0.01-15 %
	Fe	0.1-15 %	V	2-10000 ppm
	K	0.01-15 %	W	10-10000ppm
	La	1-10000 ppm	Y	1-10000 ppm
	Li	1-10000 ppm	Zn	5-10000 ppm
	Mg	0.02-15 %	Zr	3-10000 ppm
	Mn	5-10000 ppm		
AAS43B	Cu	0.01-40%	Fe	0.1-100%
AAS40C	Cu	0.001-2%		

Since June 2016, all samples have been prepared by ALS Mongolia in line with the following protocols:

- Drying (66°C)
- Pre-preparation weighing
- Entire sample crushed to 90% passing 3.54 mm
- Split to 500 g
- Pulverised to >90% passing 200 mesh (75 microns)
- Split to 150 g sample pulp.

All samples were routinely assayed by for gold and a four-acid ICP-AES multi-element suite of 34 elements including copper, silver, lead, zinc, arsenic and molybdenum. The ALS assay suite and detection limits are presented in (Table 13).

- Gold was determined at SGS using a 25 g fire assay fusion, cupelled to obtain a bead, and digested with Aqua Regia, followed by an atomic absorption spectroscopy (AAS) finish, with a lower detection (LDL) of 0.01 ppm Au.
- Multi-element analysis (ALS code ME-ICP61) used a four-acid digest (perchloric, nitric, hydrofluoric and hydrochloric acids) with the resulting solution analysed by ICP-AES. The digest used is able to dissolve most minerals in a sample and the analytical technique is considered “near-total”.

Copper reporting above the UDL of 1% for four-acid ICP-AES was re-analysed using an “ore grade” assay procedure (ALS ME-OG46). The sample was dissolved in aqua regia, diluted with de-ionised water and analysed using either ICP-AES, or AAS.

Table 13: Summary of analytical techniques (ALS Mongolia, post-June 2016)

Method	Element	Detection limit	Element	Detection limit
Au-AA26	Au	0.01-1000 ppm		
ME-ICP61	Ag	0.5-100 ppm	Mo	1-10000 ppm
	Al	0.01-50 %	Na	0.01-10 %
	As	5-10000 ppm	Ni	1-10000 ppm
	Ba	10-10000 ppm	P	10-10000 ppm
	Be	0.5-1000 ppm	Pb	2-10000 ppm
	Bi	2-10000 ppm	S	0.01-10 %
	Ca	0.01-50 %	Sb	5-10000 ppm
	Cd	0.5-500 ppm	Sc	1-10000 ppm
	Co	1-10000 ppm	Sr	1-10000 ppm
	Cr	1-10000 ppm	Th	20-10000 ppm
	Cu	1-10000 ppm	Ti	0.01-10%
	Fe	0.01-50 %	Tl	10-10000 ppm
	K	0.01-10 %	U	10-10000 ppm
	La	10-10000 ppm	V	1-10000 ppm
	Mg	0.01-50 %	W	10-10000 ppm
	Mn	5-100000 ppm	Zn	2-10000 ppm
	Cu	0.01-40%		
Cu-OG62	Cu	0.001-40%		

11.4.1 Laboratory Independence and Certification

Both SGS Mongolia and ALS Mongolia LLC are independent laboratories located in Ulaanbaatar, Mongolia. Laboratories are accredited by the Mongolian Agency for Standardisation and Metrology to ISO 17025 standards.

11.5 Quality Assurance and Quality Control Programs

Quality assurance (QA) concerns the establishment of measurement systems and procedures to provide adequate confidence that quality is adhered to. Quality control (QC) is one aspect of QA and refers to the use of control checks of the measurements to ensure the systems are working as planned.

The QC terms commonly used to discuss geochemical data are:

- Precision: How close the assay result is to that of a repeat or duplicate of the same sample, i.e. the reproducibility of assay results. Assessed by insertion of duplicate samples at various stages of subsampling, from initial sample split (field duplicate) to final assay pulp (pulp duplicate).
- Accuracy: How close the assay result is to the expected result (of a CRM). Assessed by the insertion of CRMs within sample batches, for which the laboratory does not know the expected grade.
- Bias: The amount by which the analysis varies from the correct result. Also assessed using CRM.
- Contamination: Accidental inclusion of target elements into a sample, which can occur at any sampling stage. Assessed by the insertion of "blank" material into a sample batch that is known to contain very low, levels of target elements.

QAQC procedures and protocols are well described in reports supplied by Xanadu. CSA Global reviewed the results and summarises them in this section of the Report, mainly compiled from the Mining Associates report (2015).

Xanadu implemented QAQC protocols for all drillhole sampling undertaken since acquiring the Kharmagtai Project in 2014. Prior to this, IMMI and AGC used similar QAQC protocols for drill sampling. IMMI's QAQC program was reviewed by AMC (2012) and reported in accordance with NI 43-101 technical reporting standards.

QAQC protocols have evolved at Kharmagtai during the various phases of exploration. A summary of the QAQC protocols applicable to different drillhole series included in the resource estimate are outlined in Table 14. QAQC protocols adopted by Xanadu are very similar to those used by IMMI and AGC from 2011 onwards, although no pulp or coarse reject duplicates were used. Prior to 2011, the majority of drillhole samples were monitored using CRMs and blanks, with field duplicates inserted from 2004 onwards.

11.5.1 Quality Control Program

Xanadu implemented QAQC protocols for all drillhole sampling undertaken since acquiring the Property in 2014. Prior to this, IMMI and AGC used similar QAQC protocols for drill sampling.

QAQC protocols evolved at Kharmagtai during the various phases of exploration. A summary of the QAQC protocols applicable to different drillholes included in the resource estimate are outlined in (Table 14). QAQC protocols adopted by Xanadu are very similar to those used by IMMI and AGC from 2011 onwards, although no pulp or coarse reject duplicates were used by Xanadu. Prior to 2011, the majority of drill hole samples were monitored using CRMs and blanks, with field duplicates inserted from 2004 onwards. IMMI's QAQC program was reviewed by AMC (2012).

In addition to Xanadu's QAQC, SGS Mongolia and ALS Mongolia both conduct their own internal QAQC consisting of CRM testing, duplicate assaying and repeats along with the primary sample analysis.

Table 14: QAQC protocols by drillhole series

Drillhole series	Date range	Company	QAQC protocols
KHDDH001 to KHDDH003	Early 2002	IMMI	No QC samples used
KHDDH004 to KHDDH261	Mid-2002 to 2004	IMMI	CRMs and blanks used in non-uniform sized batches
KHDDH262 to KHDDH317	2004 to mid-2007	IMMI	Two CRMs, one blank and one field duplicate used in batches of 40 samples
KHDDH262 to KHDDH317	2004 to mid-2007	IMMI	Two CRMs, one blank and one field duplicate used in batches of 40 samples
KHDDH318 to KHDDH335 (and KHDDH313A), metallurgical holes	2011-2012	AGC	Two CRMs, two blanks, one core duplicate, one pulp duplicate and one reject duplicate inserted randomly in batches
KHDDH336 to KHDDH385	2014 to mid-2016	XAM	Two CRMs, two blanks and one field duplicate inserted randomly in batches of 45 samples and sent to SGS laboratory
KHDDH386 onwards	mid-2016 to present	XAM	Two CRMs, two blanks and one field duplicate inserted randomly in batches of 45 samples and sent to ALS laboratory

Table 15 shows a summary of QC sample insertion for the main drilling samples. CSA Global believes that the insertion rate of CRMs, blanks and field duplicates are adequate and in accordance with industry standard practices for exploration projects.

Table 15: QC sample insertion summary

	QGX (1997 to 1998)	IMMI (2002 to 2007)	AGC (2011 to 2012)	XAM SGS (2014 to mid-2016)	XAM ALS (mid-2016 to present
Number of routine samples	3,754	21699	3947	16,992	35,080
Number of CRM		776	223	851	1,574
CRM insertion rate		3.6%	5.6%	5.0%	4.5%
Number of blanks		692	219	809	1,381
Blanks insertion rate		3.2%	5.5%	809	3.9%
Number of field duplicates		378	101	391	728
Field duplicate insertion rate		1.7%	2.5%	2.3%	2.1%

Blanks

Blanks have been inserted routinely in all sample batches for all drilling since mid-2002 (KHDDH004). Blank material was sourced locally from outcrops of Khanbogd Mountain granite and coarse crushed to 1 cm particle size.

Monitoring of blanks by IMMI and Xanadu defined a failure as results more than five to 10 times the lower detection limit for the element/analytical method combination being used. Various failures over the period from June 2002 to June 2004 were related mostly to sampling errors caused by switches with CRMs rather than systematic contamination. These errors were corrected using stored data and the database utilised by Xanadu is considered correct. There has been no indication of systematic assaying errors due to contamination. CSA Global has reviewed the data, provided performance control charts and related documents and considers that the results are adequate to support the integrity of the Mineral Resource estimate.

Pulp Duplicates

Pulp duplicates were utilised by IMMI in 2011 and were assessed using scatter plots, ranked scatter plots (Q-Q plots) and relative percentage difference (RPD) plots by AMC (AMC, 2012). AMC (2012) found that more than 98% of gold samples and 92% of copper samples reported an RPD value less than 10%, therefore the results are adequate to support the integrity of the Mineral Resource estimate.

Field Duplicates

Field duplicates for drill core samples have been included as part of QAQC protocols since 2011. Duplicates were created by splitting routine half-core samples using a diamond saw and submitting each resulting quarter-core sample under separate sample numbers.

CSA Global has reviewed field duplicate data for IMMI/AGC and Xanadu samples, including scatterplots and relative percent difference plots. Scatter plots show generally tight distribution (R2 >0.8) about regression lines with slopes more than 0.95. Field duplicate data for Cu shows higher precision than for Au, reflecting more homogenous distribution of copper minerals compared to gold (particularly at Altan Tolgoi). Analysis of RPD plots shows that for gold 80% of duplicate pairs have a relative difference less than 30%, and for copper 80% of duplicate pairs have a relative difference less than 20–25%. Results for IMMI/AGC data and Xanadu data are very similar, although Xanadu Cu analyses show more scatter at high grades (>5,000 ppm) compared with IMMI/AGC.

CSA Global considers that the results reported are adequate to support the integrity of the Mineral Resource estimate.

Certified Reference Materials

CRMs (or standards) have been inserted routinely in sample batches for all drilling after mid-2002. CRMs were sourced from two main commercial suppliers: Ore Research & Exploration in Australia (OREAS) and CDN Resource Laboratories Ltd in Canada (CDN). OREAS CRMs were derived from homogenised porphyry Cu-Au ore material with included Cu-Mo concentrate. CDN CRMs were derived by mixing and homogenising barren granitic material with Cu-Au concentrate. In addition to commercially supplied CRMs, IMMI used a number of internally produced CRMs from 2002 to 2003. The exact nature and source of these CRMs is unknown. Details of CRMs used throughout the history of drilling at Kharmagtai are shown in Table 16.

Table 16: Summary of CRM used at the Kharmagtai Project

CRM code	Au (ppm)	Cu (%)	Usage period	Source
OREAS 501b	0.248	0.260	XAM (2014-2017)	OREAS
OREAS 503b	0.695	0.531	XAM (2014-2017)	OREAS
OREAS 504b	1.61	1.11	XAM (2014-2017)	OREAS
OREAS 50P	0.727	0.691	XAM (2014-2017)	OREAS
OREAS 51P	0.43	0.728	IMMI (2003-2007)	OREAS
OREAS 52P	0.183	0.387	IMMI (2003-2007)	OREAS
OREAS 53P	0.38	0.413	IMMI (2003-2007)	OREAS
CGS-6	0.26	0.318	AGC (2011)	CDN
CGS-21	0.99	1.30	AGC (2011)	CDN
CGS-22	0.64	0.725	AGC (2011)	CDN
CGS-23	0.218	0.182	AGC (2011)	CDN
CGS-24	0.487	0.486	AGC (2011)	CDN
CGS-25	2.40	2.19	AGC (2011)	CDN
STD3	1.269	1.29	IMMI (2002-2003)	IMMI internal
STD5	0.099	0.811	IMMI (2002-2003)	IMMI internal
STD6	0.203	0.254	IMMI (2002-2003)	IMMI internal
STD7	0.499	0.508	IMMI (2002-2003)	IMMI internal
STD8	2.211	0.869	IMMI (2002-2003)	IMMI internal
STD9	3.308	0.953	IMMI (2002-2003)	IMMI internal
STD10	0.215	0.853	IMMI (2002-2003)	IMMI internal

CRM analyses have been routinely monitored on receipt of laboratory results, and IMMI/AGC and Xanadu defined CRM failures as follows:

- One CRM over 3 standard deviations (SD)
- Two CRMs between 2 SD and 3 SD on the same side of the mean value, suggesting consistent bias.

Any batch of samples with a CRM failure were routinely re-assayed until it passed. IMMI and Xanadu included a protocol whereby a geological override was applied for barren batches or marginal failures with low impacts (Wilson, 2005).

CRM control charts for IMMI/AGC and Xanadu drilling have been reviewed by both Mining Associates and CSA Global. Multiple CRM failures in the earliest stages of QC monitoring from 2002 to 2004 could all be traced to CRM handling errors, where the one CRM was recorded in the database, but a different CRM or blank was inserted in the assay batch. The performance control charts demonstrate acceptable levels of accuracy in the analytical procedures being used, with the majority of assays falling within ±2 standard deviations of the certified means. In many cases a slight positive or negative bias is apparent when comparing analyses to the certified values. CSA Global does not consider this to be a major issue since the assayed results still lie within acceptable limits. In CSA Global’s opinion, the results of CRM analyses provide confidence in the assay data and are adequate to support the integrity of a Mineral Resource estimate.

11.6 Discussion on Sampling, Quality Assurance and Quality Control Programs

In the opinion of CSA Global, the sampling preparation, security, and analytical procedures used by Xanadu and historically by IMMI/AGC are consistent with generally accepted industry best practices and are therefore adequate for the purpose of Mineral Resource estimation.

The application of total digest multi-element geochemistry and SWIR spectral mineralogy provides additional rigor to geological models and exceeds current industry standards.

A report prepared by AMC (AMC, 2012) provided a comprehensive review of QAQC for sampling by IMMI up to the end of 2011. Both CSA Global and Mining Associates have reviewed this report and the historic QC results and concur with the conclusion reached by AMC that the historical assay data is considered to have sufficient accuracy and precision to support a mineral resource estimate. Additional drilling undertaken since the end of 2011 has been monitored by similar QAQC protocols, and CSA Global has inspected these protocols on site and at ALS Mongolia.

The general level of diligence and supervision of sample preparation and analytical QC carried out by IMMI/AGC and Xanadu was high. The frequency of insertion of CRM, blanks and pulp duplicates is considered by CSA Global to be sufficient to assure quality of assay data. Fail criteria for assay batches used by IMMI/AGC and Xanadu are considered by CSA Global to be appropriate. Following review of the data and previous reports, in CSA Global's opinion, past and present QAQC protocols and procedures are adequate and appropriate and CSA Global considers the data to be acceptable for use in resource estimation.

CSA Global was not presented with any umpire assay data for review. CSA Global would recommend implementing a routine umpire assays assessment program for ~5% of samples to further improve the reliability of the analytical database.

12 Data Verification

12.1 Drillhole Database

The drillhole database integrity was reviewed for internal consistencies, duplicate sample numbers and assay reference numbers. No significant errors were detected. A random sample of assay results were compared with the original laboratory assay reports and no errors were found.

12.2 Current Qualified Person Personal Inspections

Mr Potma visited the Kharmagtai project site from 19 September 2018 through to 22 September 2018. During the visit, Mr Potma reviewed geological reports, drilling and trenching procedures and surveys, logging and core storage facilities and overall deposit geology. Geological exploration drilling procedures, core recovery methods/documentation and geophysical interpretations have been analysed from the provided reports.

During the site visit, the Qualified Person observed a number of drill collars, took their photographs and geographic coordinates. The measured coordinates were compared with those reported in the provided database. The difference between the measured and reported coordinates were within the acceptable limits. Trench locations could not be verified during the site visit as all trenches had been backfilled and rehabilitated.

In 18 September 2018, Mr Potma visited the ALS Mongolia Laboratory in Ulaanbaatar, where a full lab tour was provided including observations of sample handling/preparation/analysis of Kharmagtai samples. Mr Potma also had an opportunity to interview the lab staff and managers and observe all equipment and procedures. In CSA Global's opinion, the ALS Mongolia Lab equipment, procedures and practices are in line with those expected from an ISO-certified independent international laboratory facility.

CSA Global Qualified Persons have reviewed the drill logs, cross-sections and plan maps for the Kharmagtai geological database.

All work relating to geological exploration, sampling, assaying and geological interpretation were found to be of a high quality. The data and interpretations are considered suitable for Mineral Resource estimation.

The Kharmagtai camp is well constructed and furnished (Figure 36), with a large building fabricated from modified shipping containers with offices, core handling area, enclosed core cutting room, enclosed diesel generator room, kitchen/dining hall, toilets/washrooms/showers, recreation areas with pool and pingpong tables, TV/video room, and first aid station. Core is stored in stacks in a large fenced area adjacent to the office building.

Figure 36: Overview of the Kharmagtai camp, looking south (living quarters are in the ger complex on the right, the office and core handling area is the large building in the centre, core is stacked within the fenced area surrounding the office building)

12.2.1 Drillhole Collar Confirmation

Xanadu uses differential GPS to locate drillhole collars, trench locations, and the like. Drillholes are generally marked with capped PVC pipe cemented in place, but in some cases the actual hole is cemented over with a concrete block. Collars are always marked with the drillhole ID, and sometimes marked with additional information such as azimuth and inclination of the hole and/or surveyed coordinates (Figure 37, Figure 38). Mining Associates (Vigar, 2018) identified a hole ID error written on one location, but in all other cases the information shown at the collar was correct. No collar ID or location errors were identified by CSA Global during the site visit. Collar coordinates were previously confirmed with a handheld GPS for seven holes by Mining Associates (Vigar, 2018), and an additional two collar locations were verified by CSA Global during the site visit, with positions generally not more than 3 m off in northing and/or easting, or within the level of accuracy of the handheld GPS (Table 17). Azimuth and inclination of some holes were checked with a Brunton compass on the PVC casing, where present, with acceptable results. The six drillhole collar location verification photographs below (Figure 37, Figure 38) show a variety of collar position marker styles, including a simple concrete slab covering the hole, a short capped PVC pipe on an RC hole, a cemented PVC pipe with no cap, and a capped and cemented PVC pipe.

Figure 37: GPS confirmation of drillhole collar positions validated by Mining Associates (MK1715 2018)

Figure 38: GPS confirmation of additional drillhole collars by CSA Global

Table 17: DH collar coordinate check results

Hole ID	Differential GPS (Database)		Handheld GPS	
	Easting	Northing	Easting	Northing
KHDDH189	592040.87	4877351.94	592040	4877352
KHDDH345	592064.76	4877380.17	592067	4877376
KHDDH383	592629.43	4876417.41	592632	4876418
KHDDH394	592459.53	4877832.90	582460	4877833
KHDDH401	595401.96	4876995.95	595404	4876995
KHDMH002	592603.32	4876394.00	592602	4876389
KHRC287	591999.97	4877376.40	592003	4877377
KHDD267	592450	4877989	592452	4877989
KHDDH476	591998	4877297	591998	4877300

12.2.2 Drilling and Core Handling

At the time of the Mr Potma's site visit, there was one diamond drill rig operating on the Property and the diamond drilling and core handling procedures were able to be observed (Figure 39).

Figure 39: Diamond drill rig operating at Kharmagtai (September 2018)

Xanadu has a standardised procedure for core handling and sampling, which is described in detail in internal instruction manuals. Stages of the core handling process are tracked with a whiteboard in the core shed, updated continuously (Figure 40).

Figure 40: Whiteboard tracking of steps in core handling process

Core boxes are labelled by the drillers with hole ID, start and end metres and box number. The core orientation line (red line in Figure 41) is marked on by geologists. Note the pieces of cut core in the first and third sections of the central box (close-up on right side of Figure 41), showing the ~1 cm offset from the red orientation line. The orientation line is preserved in the archived witness core.

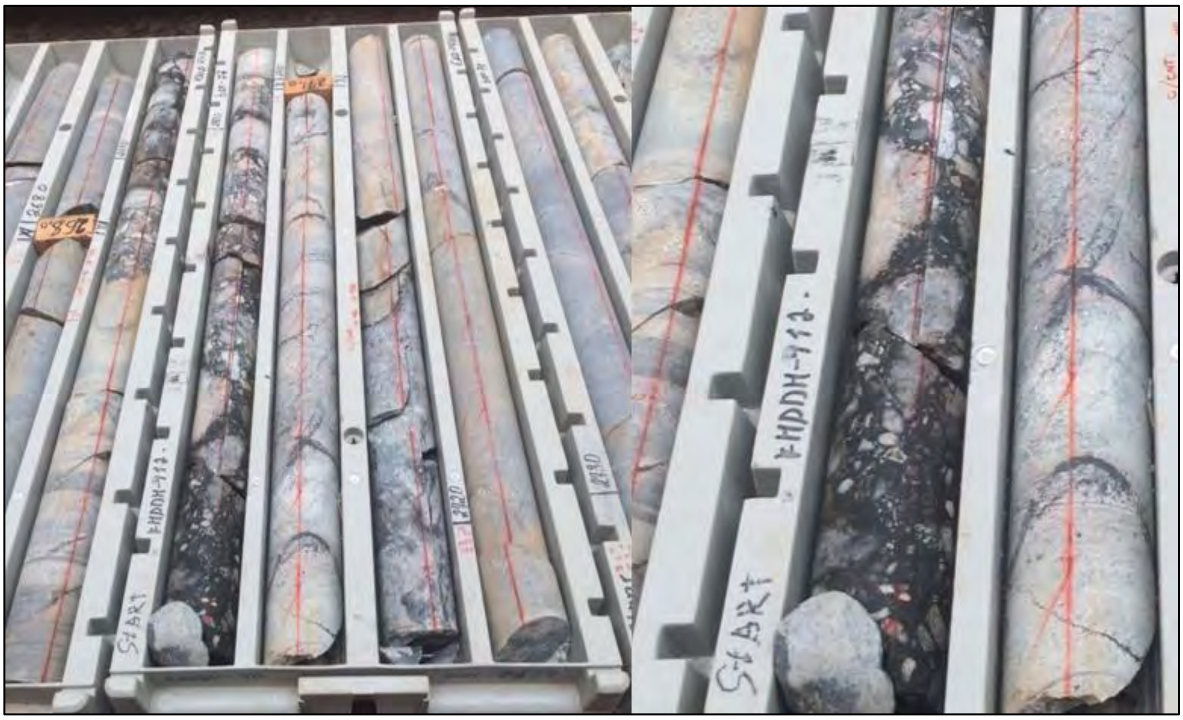


Figure 41: Example of marked-up drill core (KHDD412)

Core was historically photographed wet and dry in natural light, with core boxes propped up at an angle on a frame to prevent shadows from camera interfering with the image. More recently core photos are taken within the core shed with purpose built artificial lighting to produce greater consistency of core photo quality (Figure 42). Each core photograph is labelled with Hole ID, DH interval from-to and core tray numbers.

Figure 42: Core photography setup: Pre-2018 natural light photography (left) current controlled lighting indoor photography frame (right)

Two core saws are available for cutting core within an enclosed area. Cut core ready for sampling is placed cut-side-up on top of witness core to be left in the box (Figure 43). Core trays are then moved to the adjacent sampling area where sample intervals are double-checked by a geologist before samples are bagged and sample number tags are stapled into the core tray at the end of the sample interval with duplicate tags included within the numbered sample bags (Figure 44).

Figure 43: Core cutting area (left) and cut core ready for sampling (right)

Figure 44: Drill core sampling; sample tags stapled into core trays (left), sample bagging and numbering (right)

Specific gravity determinations are made on core use the Archimedean (water displacement) method. The apparatus used by Xanadu is shown in Figure 45. A cable runs from the scale through a hole in the table to a small basket submerged in water in the bucket below. Samples are weighed in the air on the scale, then placed in the basket and lowered into the water for the second reading. The scale is calibrated every tenth sample with the used drill bit to the left.

Figure 45: Apparatus for specific gravity measurements

12.2.3 Independent Samples

Given that Mining Associates completed an independent sample analysis check in early 2018, CSA Global did not deem it necessary to collect and analyse any additional independent samples for Kharmagtai.

Eight check samples were collected earlier in the year by Mining Associates (Vigar, 2018) to confirm assay values stored in Xanadu's database. All samples consisted of quartered PQ core from drillhole KHDDH394 at Stockwork Hill. The hole was drilled through the southern stockwork zone in an easterly direction into mineralised tourmaline breccia. Samples were selected to check copper and gold values at high (>1% Cu and >1 g/t Au), moderate (~0.4% Cu and ~0.4 g/t Au), and low (~0.2% Cu and ~0.2 g/t Au) levels. Samples were submitted to ALS Laboratory in Ulaanbaatar for preparation and analysis using the same methods used by Xanadu. Results are shown in Table 18.

Table 18: Results of independent check sampling conducted by Mining Associates (Vigar, 2018)

Project	Site ID	Lithology	Sample ID	Depth from	Depth to	Au ppm	Cu ppm
Original	KHDDH394	Stockwork mineralisation	XD83255	66.00	68.00	4.04	10,400
Check	KHDDH394		MA-01	66.00	68.00	2.97	7,510
Original	KHDDH394	Stockwork mineralisation	XD83257	70.00	72.00	6.72	23,900
Check	KHDDH394		MA-02	70.00	72.00	5.69	>10,000*
Original	KHDDH394	Stockwork mineralisation	XD83313	170.00	172.00	0.46	3,780
Check	KHDDH394		MA-03	170.00	172.00	0.44	3,460
Original	KHDDH394	Stockwork mineralisation	XD83324	190.00	192.00	0.41	4,320
Check	KHDDH394		MA-04	190.00	192.00	0.37	3,880
Original	KHDDH394	Stockwork mineralisation	XD83337	214.00	216.00	0.38	2,720
Check	KHDDH394		MA-05	214.00	216.00	0.48	3,240
Original	KHDDH394	Tourmaline breccia	XD83356	248.00	250.00	0.18	1,990
Check	KHDDH394		MA-06	248.00	250.00	0.21	1,680
Original	KHDDH394	Tourmaline breccia	XD83378	288.00	290.00	0.32	2,960
Check	KHDDH394		MA-07	288.00	290.00	0.38	2,390

Project	Site ID	Lithology	Sample ID	Depth from	Depth to	Au ppm	Cu ppm
Original	KHDDH394	Tourmaline breccia	XD83386	302.00	304.00	0.24	2,390
Check	KHDDH394		MA-08	302.00	304.00	0.31	3,110
Original mean						1.59	4,080
Check mean						1.36	3,610

** Check sample reported above UDL of 10,000 ppm, not re-assayed for ore grade copper.*
*** Not including over limit sample.*

Mining Associates commented that independent sampling results confirm the overall tenor of mineralisation as sampled and assayed by Xanadu. Differences between original and check samples are attributed to the generally inhomogeneous distribution of mineralisation and reflect similar differences between field duplicate pairs.

12.3 Verification Opinion

CSA Global is of the opinion that the ranges of gold and copper values reported by Xanadu are representative of the values that can be expected from the Kharmagtai mineral deposits. It is CSA Global's opinion that the data is adequate for exploration reporting and Mineral Resource estimation.

13 Mineral Processing and Metallurgical Testing

Xanadu has not conducted any recent metallurgical testwork and so the metallurgical testwork reported herein is considered "Historical Testwork".

13.1 G&T Metallurgical Services, 2008

A program of preliminary metallurgical testwork was completed by G&T Metallurgical Services (Kamloops, Canada) on a batch of nine compostite samples from Mongolia. The samples were reported at that time to have originated from an untested region of the Oyu Tolgoi deposit; however, Xanadu has confirmed that five of the nine composite samples did in fact originate from the region now described as Kharmagtai. Sample origins are described below.

13.1.1 Sample Origins

Nine samples were received with the following identifying marks and chemical characteristics.

Table 19: 2008 testwork samples

Sample ID	Mass (kg)	Description	% Cu	g/t Au	% Fe	% S	% Cu_{ox}	g/t F
AT 001	17.2	Altan Tolgoi (now named Stockwork Hill)	0.53	1.62	7.55	3.17	0.062	525
AT 002	28.5		1.58	2.15	6.05	1.92	0.025	415
AT 003	15.4		0.57	0.46	4.48	0.42	0.329	585
TS 001	16.8	Tsagaan Sudal (White Hill)	0.25	0.24	0.25	1.94	0.01	368
ZU 001	20.7	Zesen Uul (Copper Hill)	1.4	2.18	7.45	1.52	0.152	225
MET 001	36.2	Oyu Tolgoi samples	0.76	0.42	8.75	2.16	0.004	2,502
MET 002	38.2		0.56	2.46	2.38	2.47	0.002	1,405
MET 003	41.3		0.47	1.13	4.47	0.72	0.005	3,098
MET 004	38.5		0.47	0.18	2.17	2.12	0.003	1,754

The MET 001 to MET 004 samples were from the Oyu Tolgoi deposit and are not discussed further in this Report.

The assays above highlight some noteworthy characteristics:

- AT 001 has a relatively high pyrite to copper ratio which could be detrimental to performance
- AT 003 has a relatively high proportion of oxide copper minerals which will negatively impact copper recovery in a sulphide flotation process
- Gold content is generally good, except in AT 003 and TS 001, which are both below 0.6 g/t
- Fluorine content is generally acceptable, with all samples grading less than 600 g/t F.

13.1.2 Mineralogy

A modal analysis was conducted on each sample, after a rod mill grind of approximately 80% -150 microns. A summary of mineral composition data is given in Table 20 below:

Table 20: 2008 testwork samples compositions

Sample ID	Chalco-pyrite	Bornite	Chalcocite	Pyrite	Gangue	Grind, microns
AT 001	1.5	<0.1	<0.1	8.5	90	140
AT 002	1.7	<0.1	<0.1	4.6	94	148
AT 003	0.7	0.6	<0.1	0.7	98	120
TS 001	0.7	<0.1	<0.1	2.6	97	159
ZU 001	3.7	0.1	0.2	0.9	95	167

Pyrite is noted to be the dominant sulphide mineral in all samples. Copper content is mainly associated with chalcopyrite and only AT 003 contained significant concentrations of bornite. At these grinds, an average of 50% of copper sulphides were liberated from other mineral species. These initial observations suggest that only minimal improvements in liberation would be achieved if additional grinding was applied, and that in an industrial setting, the additional energy input required for finer grinds would negate any improvements in metallurgical performance.

13.1.3 Grindability

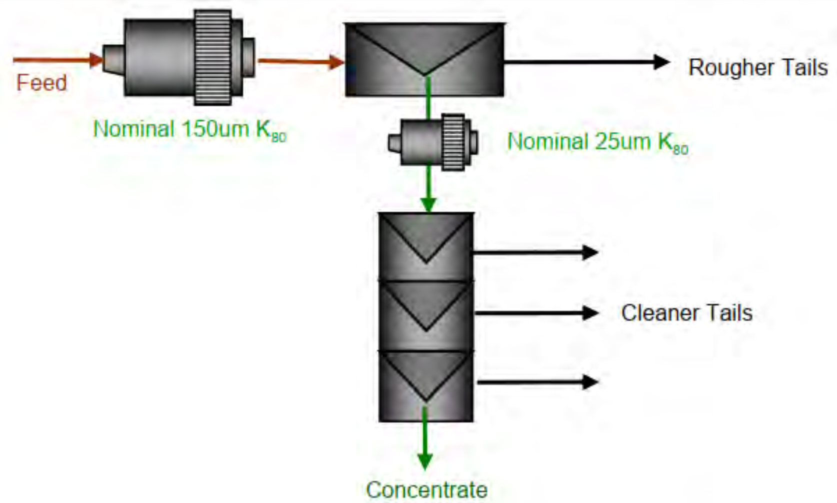
Testwork on these samples consisted of preliminary grindability, mineralogy and flotation testing. Due primarily to sample mass limitations, the grindability studies consisted of estimated (rather than measured) hardness data and this work indicates a medium to hard sample set. The laboratory estimates are given in Table 21 below.

Table 21: Grindability estimates

Sample ID	BWi (kWh/t)
AT 001	14.6
AT 002	18.9
AT 003	22.4
TS 001	25.0
ZU 001	26.0

13.1.4 Flotation Testwork

Flotation testwork on these samples consisted of a series of batch rougher and cleaner tests. No locked cycle testing was completed. The cleaner test flowsheet and range of test conditions is given below.:



NOMINAL CLEANER TEST CONDITIONS

Stage	size –m K_{80}	Regents - g/t			pH
		Lime	3418A	MIBC	
Grind	132 - 166	-	10	-	7.8 - 9.4
Rougher	-	-	0 - 18	8 - 45	7.8 - 9.4
Regrind	10 - 60	200 - 500	-	-	8.3 - 10.5
Cleaners	-	50 - 400	0 - 15	45 - 90	10.5 - 10.8

Figure 46: Cleaner test schematic

In this work, Aerophine 3418A was used as a selective copper sulphide collector and MIBC (Methyl Iso Butyl Carbinol) was used as a flotation frother. Pulp pH was adjusted in the cleaner circuit using lime to increase pH to a point where only moderate pyrite flotation would be expected. Insufficient work was conducted in this preliminary program to really optimise flotation conditions.

Saleable copper concentrates were achieved for all composites with average contents of approximately 30% copper. At these concentrate levels, the recovery of copper ranged between 75% and 90%, although AT 003 achieved only 30% recovery due to the elevated levels of oxide copper mineralisation in this composite. Grade vs recovery curves for the five composites are illustrated below.

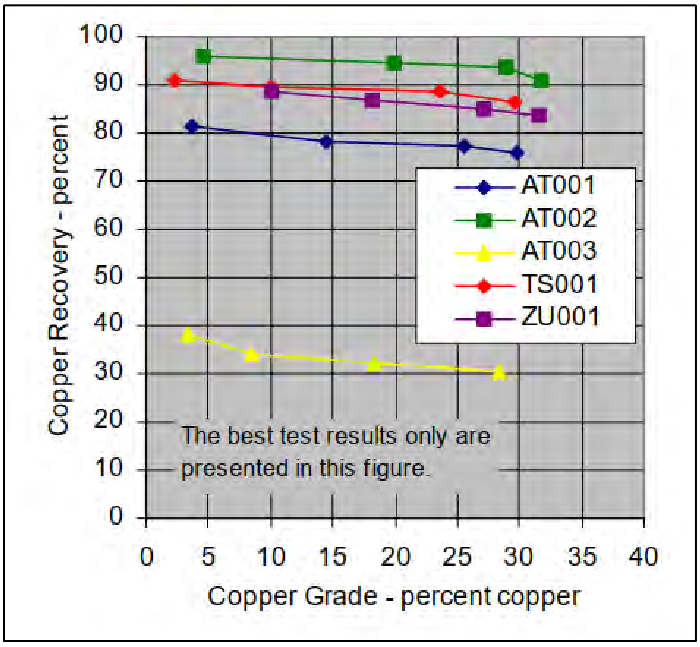


Figure 47: Grade vs recovery flotation testwork

It is important to note that as these tests are batch tests, the cleaner tails streams are not recirculated, and thus these metal units have no chance to report to final concentrate. The locked cycle test addresses this issue and would normally result in an increase in grade or recovery of 1-2% over the batch results.

13.2 Mining Associates Pty Ltd, 2016

A series of preliminary flotation tests were carried out at the Core Resources laboratory (Queensland, Australia) on a composite of deeper, tourmaline breccia mineralisation from a single drillhole within the Altan Tolgoi (Stockwork Hill) deposit.

The composite sample was found to have the chemical composition highlighted within Table 22 below.

Table 22: Head assays and copper speciation

Sample ID	Au (g/t)	Ag (g/t)	% Fe	% S	% Cu CN	% Cu HAS	%CN RES
AT 001	1.86	14.1	7.77	7.2	0.076	0.082	4.21

The copper grade of this composite is clearly much higher than the average resource grade and this should be borne in mind when considering the flotation testwork results.

13.2.1 Grindability

A standard Bond ball mill work index test was completed on the composite, using a 150 micron closing screen size for the work. The Bond Work Index derived from the test results was 18.9 kWh/t and this falls within the range of results calculated for the 2008 testwork.

13.2.2 Flotation

Three rougher flotation tests were carried out, using similar reagents to the 2008 work, and at three different grinds – 80% passing 125 microns, 150 microns and 180 microns. Results were generally good, with copper and gold recoveries both in excess of 93% for all tests. A summary of the three test results is given in Table 23 below.

Table 23: 2016 flotation test results

FT1 - 125µm Grind			
	Feed Grade	**Recovery to Rougher Concentrate**	**Concentrate Grade**
Cu	4.07	95.3	18.9
Au	1.83	93.4	8.33
Ag	12.7	86.7	53.7
FT2 - 150µm Grind			
	Feed Grade	**Recovery to Rougher Concentrate**	**Concentrate Grade**
Cu	3.99	94.8	18.2
Au	1.62	95.1	7.37
Ag	11.4	89.6	48.9
FT3 - 180µm Grind			
	Feed Grade	**Recovery to Rougher Concentrate**	**Concentrate Grade**
Cu	4.13	93.6	17.5
Au	1.69	95.4	7.28
Ag	11.6	89.9	47.2

14 Mineral Resource Estimates

The 2018 Mineral Resource update has been prepared in accordance with CIM Definition Standards for Mineral Resources and Mineral Reserves (10 May 2014) and CIM "Estimation of Mineral Resource and Mineral Reserves Best Practice Guidelines" (CIM Council, 2003) and reported as per NI 43-101 requirements. Only Mineral Resources are estimated – no Mineral Reserves are defined.

Reported Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no guarantee that all or any part, of a Mineral Resource will be converted into a Mineral Reserve.

14.1 Software Used

The Kharmagtai copper-gold deposit Mineral Resources were estimated by CSA Global's responsible Qualified Person using Micromine version 2018.1 software.

14.2 Database Compilation

Xanadu supplied CSA Global with the deposit database in TEXT CSV format. The database included all exploration results for all exploration stages. The supplied data is summarised in Table 24.

Table 24: Summary of supplied data

Category	Amount
Drillholes and trenches	1,402
Metres drilled/channelled	261,133
Survey records	7,745
Assays records	104,605
Au assays	104,583
Cu assays	103,482
Lithology file records	78,406

The databases consisted of several parts:

- Analytical database, including:
  - Drillhole and surface trench channel collar coordinates
  - Drillhole and trench channel survey data
  - Drillhole and trench channel sampling database
  - Drillhole and trench channel geological codes.
- Topographic data in the form of a DTM (Micromine format).
- Oxidation surface (DXF format).
- Wireframes for mineralised envelopes at 0.1, 0.3 and 0.6 Au g/t and Cu % cut-offs (DXF format).
- Wireframes for main geological domains – phases 1-4, breccia, barren andesite dyke (DXF format).
- Wireframes for the grades of veining - >0.5% veining and >1.5% veining (DXF format).

Import of the various data sets into Micromine proceeded successfully without incident.

The analytical database comprised fire assays for gold with AAS finish and AAS assays for copper, as well as AAS assays for Ag, Pb, Zn, As and Mo. In addition to the main elements of interest listed above, Xanadu also analysed for the following elements by ICP-AES: Ag, Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, K, La, Li, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Sn, Sr, Ti, V, W, Y, Zn, Zr.

14.3 Data Validation

The analytical database was provided by Xanadu in CSV and DXF formats. The database was then checked using macros and processes designed to detect the following errors:

- Duplicate drillhole or trench names
- One or more drillhole collar or trench coordinates missing in the collar file
- FROM or TO missing or absent in the assay file
- FROM > TO in the assay file
- Sample intervals are not contiguous in the assay file (gaps exist between the assays)
- Sample intervals overlap in the assay file
- First sample is not equal to 0 m in the assay file
- First depth is not equal to 0 m in the survey file
- Several downhole survey records existing for the same depth
- Azimuth is not between 0 and 360° in the survey file
- Dip is not between 0 and 90° in the survey file
- Azimuth or dip is missing in survey file
- Total depth of the holes is less than the depth of the last sample
- Total length of trenches is less than the total length of all samples.

No logical errors were identified in the supplied analytical data.

The following data manipulations and corrections have been introduced to the database:

- There were 14 holes with no records for downhole surveys at depth 0 m. Azimuth and dip values for those records were copied from the first surveyed point.
- One drillhole name ("kHRC169") had lowercase instead of the uppercase in the assay file at DEPTH_FROM=198. It was replaced with KHRC169.
- All records with negative grade values for copper and gold were replaced with the values equal to the half of the detection limits (0.005 g/t Au or % Cu).

The DTM for the topography surface was validated to make sure that it covered the area of the modelled deposits. Drillhole collars and surface trenches were found to match the topography surface.

14.4 Exploratory Data Analysis – Statistical Analysis

Classical statistical analysis was implemented twice for the deposit. The first study was carried out to estimate the natural cut-off grades for copper and gold mineralisation and to determine the distribution parameters of gold and copper grades.

The Kharmagtai deposits were modelled and estimated using all available analytical datasets. The results of the all analytical data were subject for the QAQC analysis, which is described in Section 11 of the Report.

The main economic elements at the deposits are copper and gold. Therefore, classical statistical analysis was carried out for these two main elements separately for each deposit.

14.4.1 Altan Tolgoi

Figure 48 and Figure 49 summarise the statistical properties of the unrestricted assay databases for copper grades within the Altan Tolgoi deposit. The unrestricted copper grade population approaches log normal distribution and demonstrates possible several mixed grade populations with approximately 0.02, 0.03 and 0.3% Cu boundaries between the populations. A nominal value of 0.1% Cu and 0.3% Cu could be selected from the histogram.

The log probability plot demonstrates one apparent inflection point at 0.3% Cu, which is also supported by the histogram.

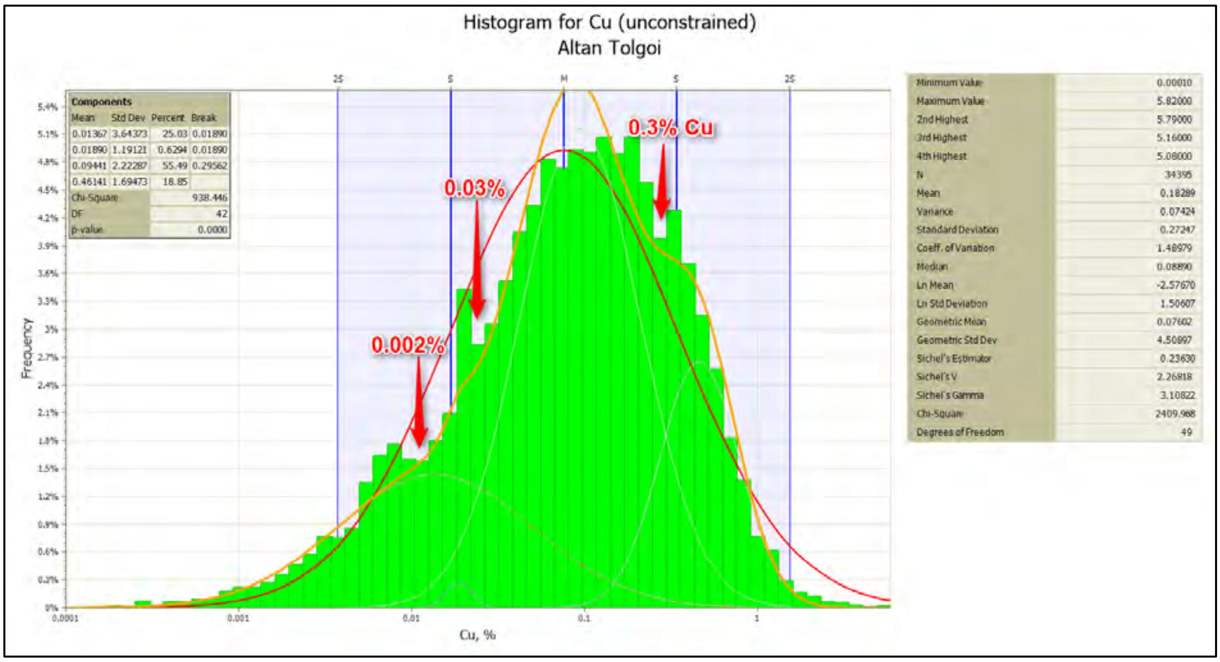


Figure 48: Log histogram for unrestricted copper values – Altan Tolgoi

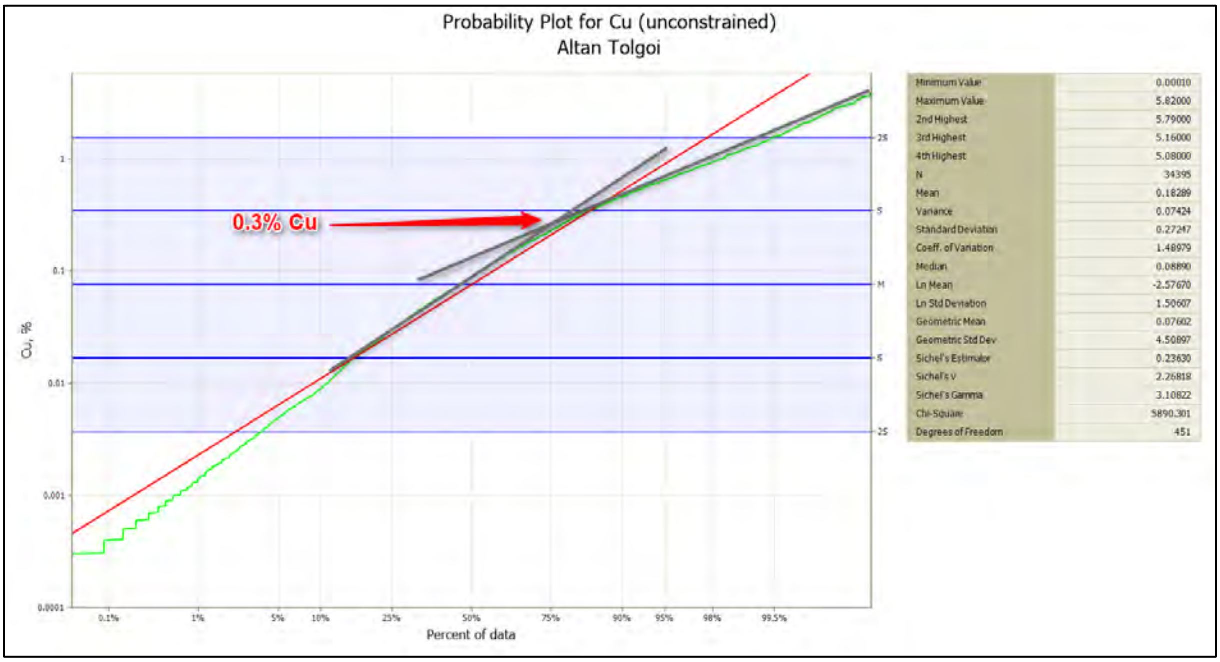


Figure 49: Log probability plot for unrestricted copper values – Altan Tolgoi

Figure 50 and Figure 51 summarise the statistical properties of the unrestricted assay databases for gold grades within the Altan Tolgoi deposit. The unrestricted gold grade population is positively skewed with several apparent mixed grade populations with approximately 0.11 g/t and 0.25 g/t Au boundaries between the populations. Nominal values of 0.1 g/t Au and 0.25 g/t Au could be selected from the histogram.

The log probability plot demonstrates one apparent inflection point at 0.3 g/t Au.

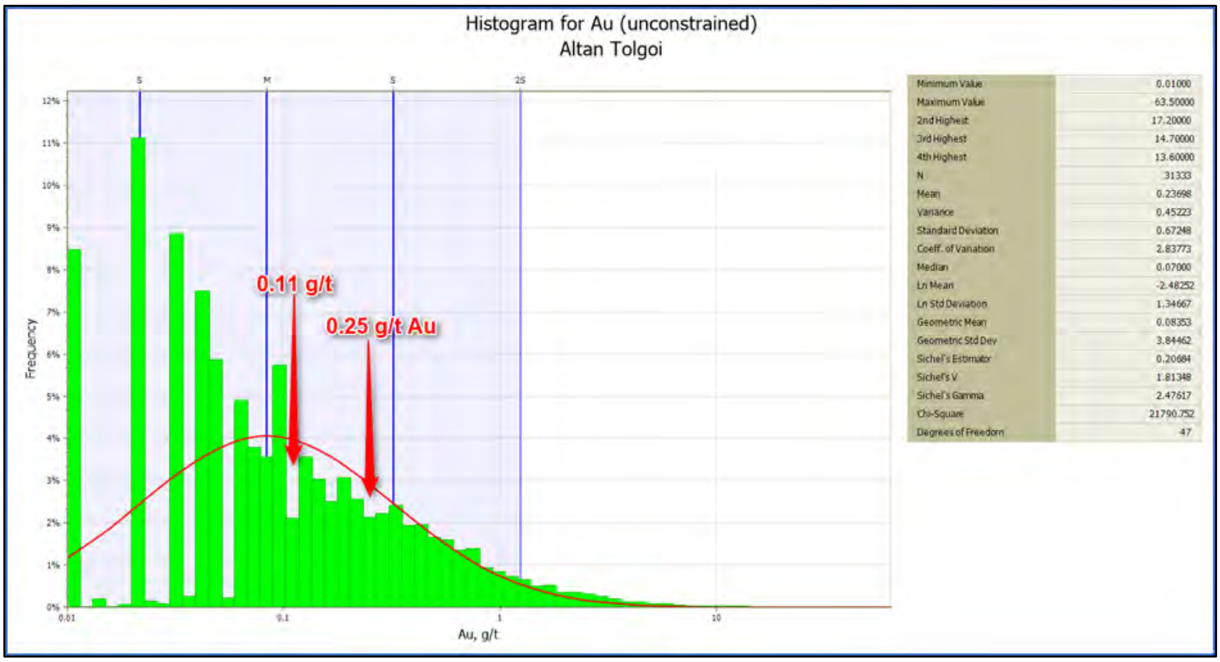


Figure 50: Log histogram for unrestricted copper values – Altan Tolgoi

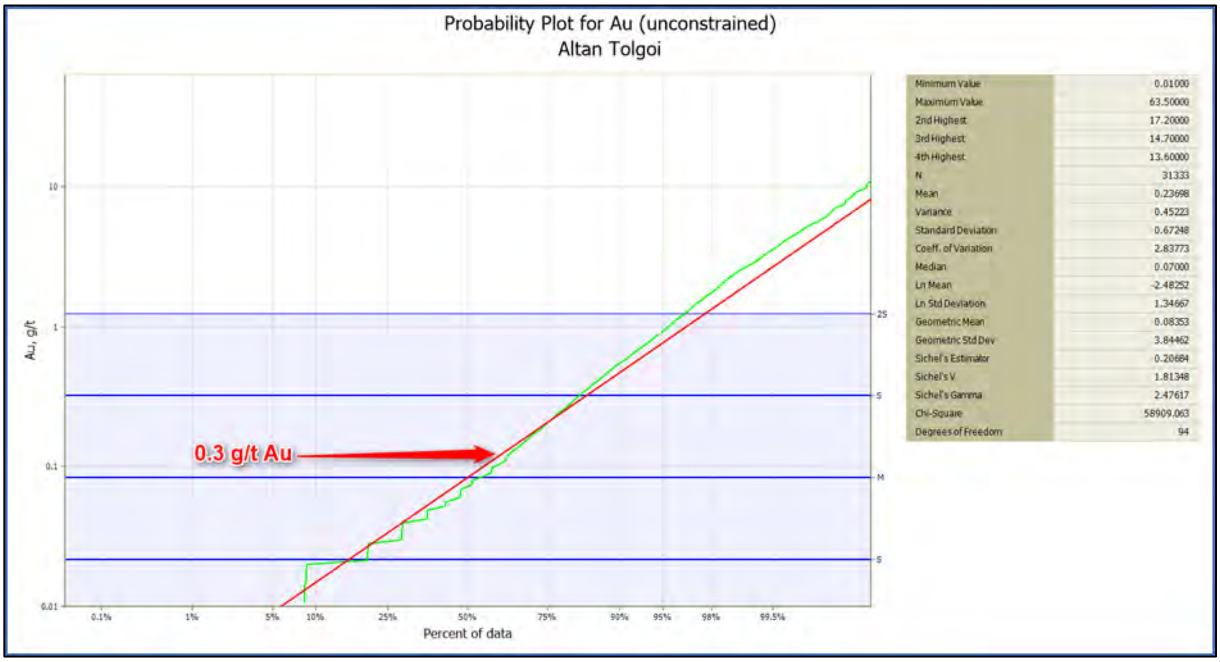


Figure 51: Log probability plot for unrestricted copper values – Altan Tolgoi

14.4.2 Tsagaan Sudal

Figure 52 and Figure 53 summarise the statistical properties of the unrestricted assay databases for copper grades within the Tsagaan Sudal deposit. The unrestricted copper grade population approaches log normal distribution and demonstrates two apparent mixed grade populations with approximately 0.09% Cu boundary between the background grades and mineralised population. A nominal value of 0.1% Cu could be selected from the histogram.

The log probability plot demonstrates two apparent inflection points at 0.09% and 0.6% Cu.

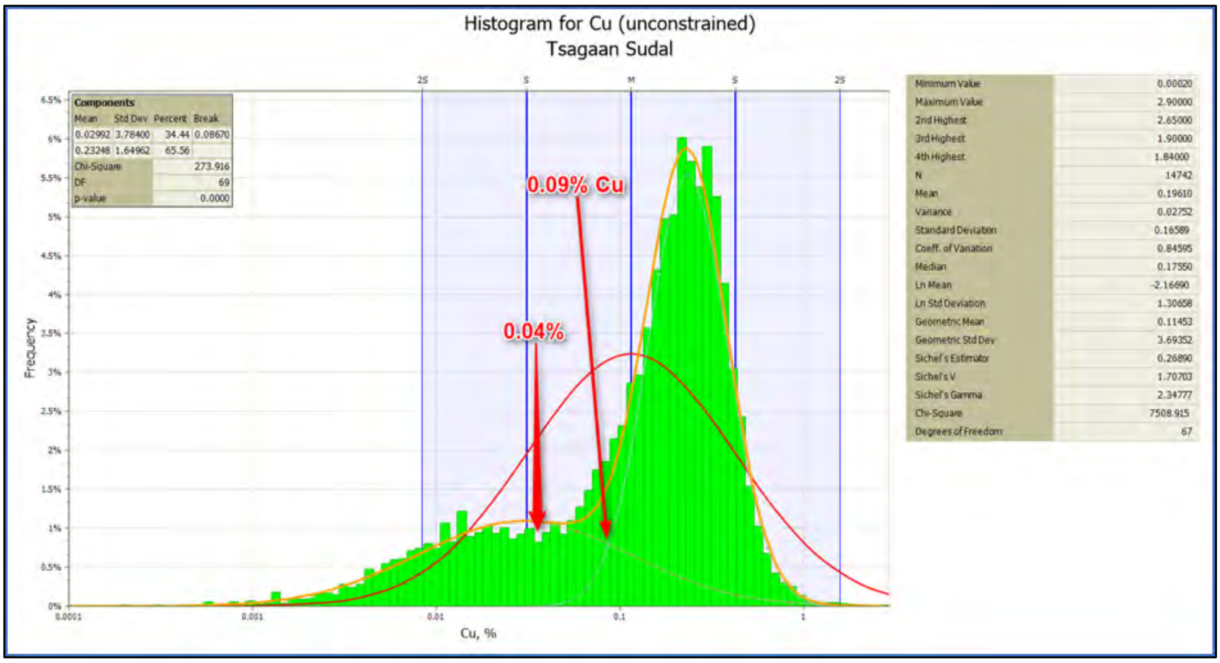


Figure 52: Log histogram for unrestricted copper values – Tsagaan Sudal

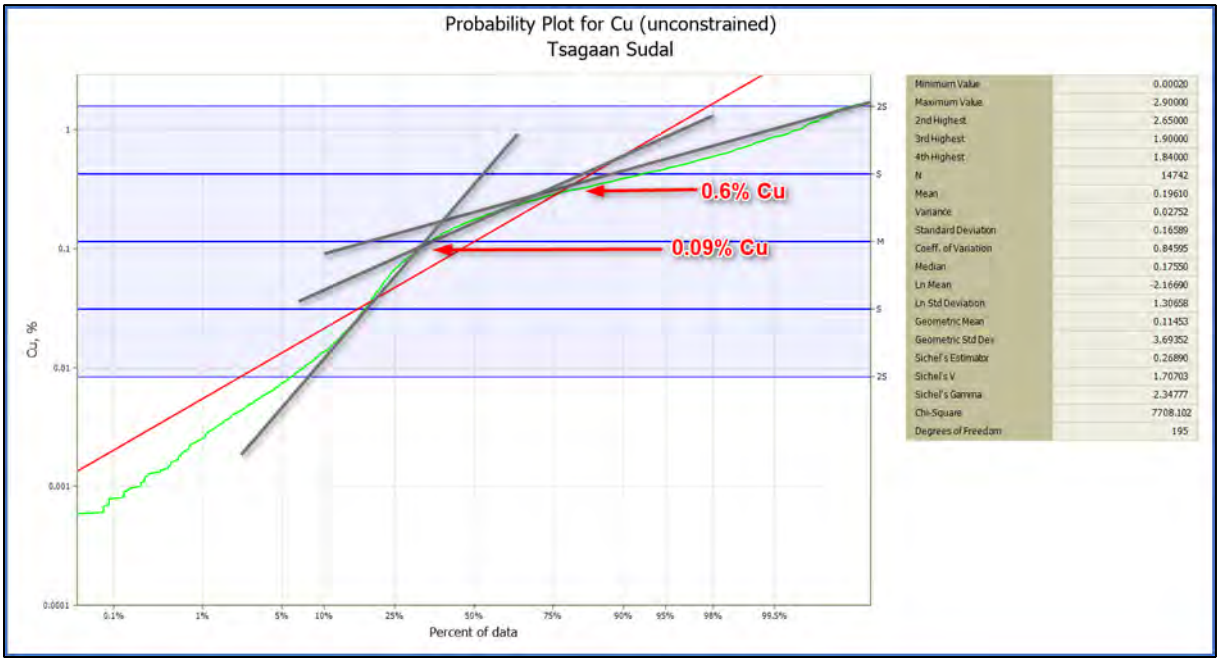


Figure 53: Log probability plot for unrestricted copper values – Tsagaan Sudal

Figure 54 and Figure 55 summarise the statistical properties of the unrestricted assay databases for gold grades within the Tsagaan Sudal deposit. The unrestricted gold grade population demonstrates several mixed grade populations with approximately 0.08 g/t Au and 0.15 g/t Au boundaries between the populations. Nominal values of 0.1 g/t Au and 0.15 g/t Au could be selected from the histogram.

The log probability plot demonstrates two apparent inflection points – at 0.08 g/t Au and 0.5 g/t Au.

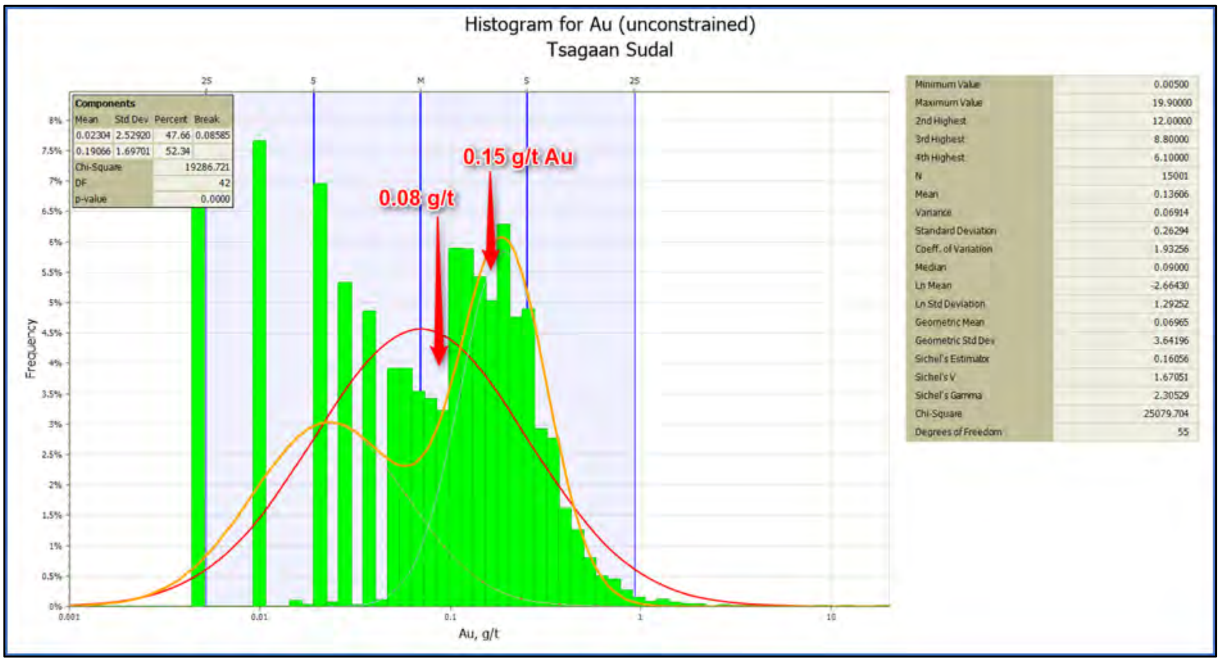


Figure 54: Log histogram for unrestricted gold values – Tsagaan Sudal

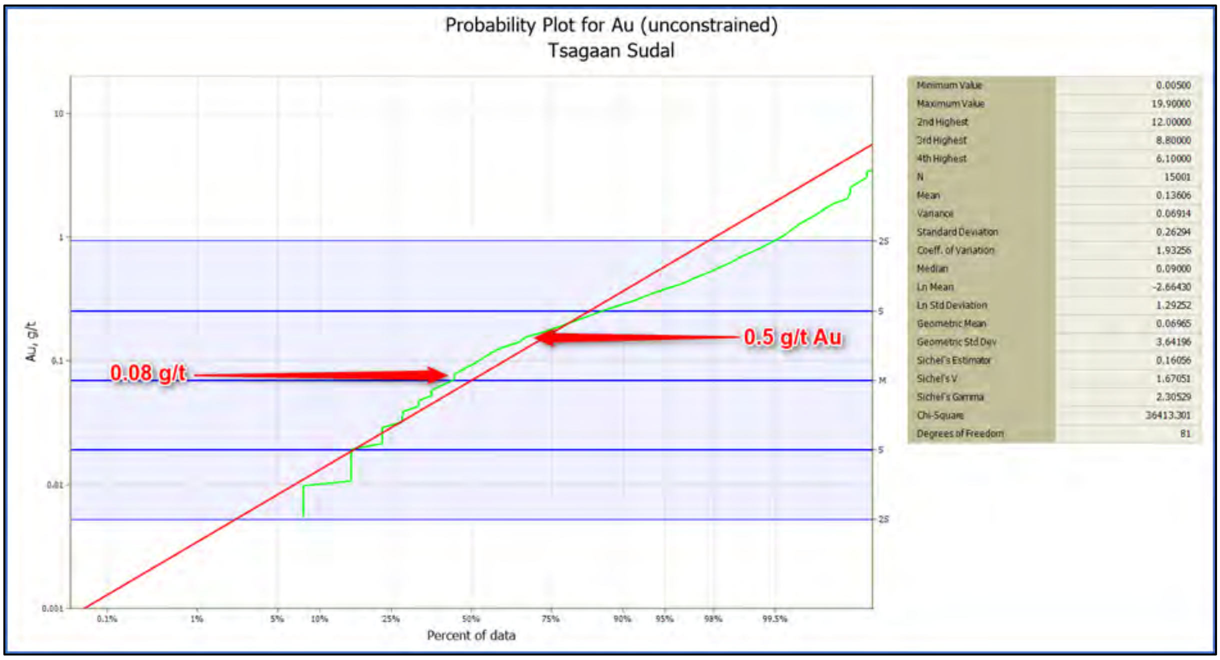


Figure 55: Log probability plot for unrestricted gold values – Tsagaan Sudal

14.4.3 Zesen Uul

Figure 56 and Figure 57 summarise the statistical properties of the unrestricted assay databases for copper grades within the Zesen Uul deposit. The unrestricted copper grade population approaches log normal distribution and demonstrates at least two apparent mixed grade populations with approximately 0.05% or 0.08% Cu boundaries between the populations. A nominal value of 0.1% Cu could be selected from the histogram.

The log probability plot demonstrates one apparent inflection point at 0.07% Cu.

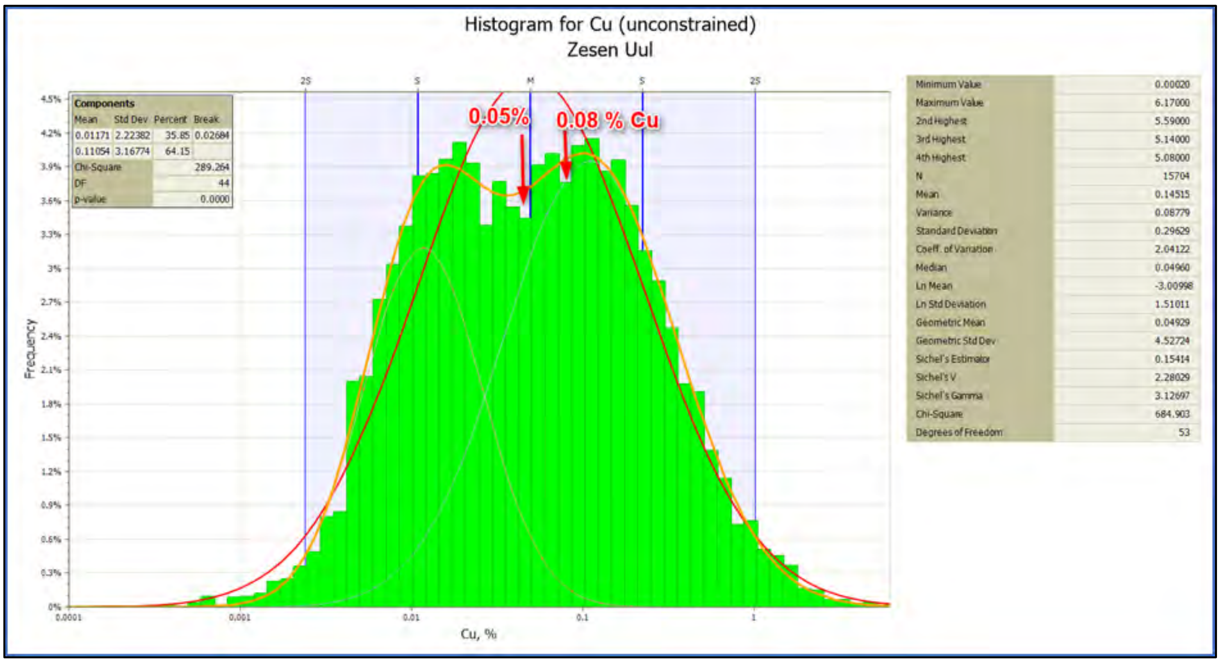


Figure 56: Log histogram for unrestricted copper values – Zesen Uul

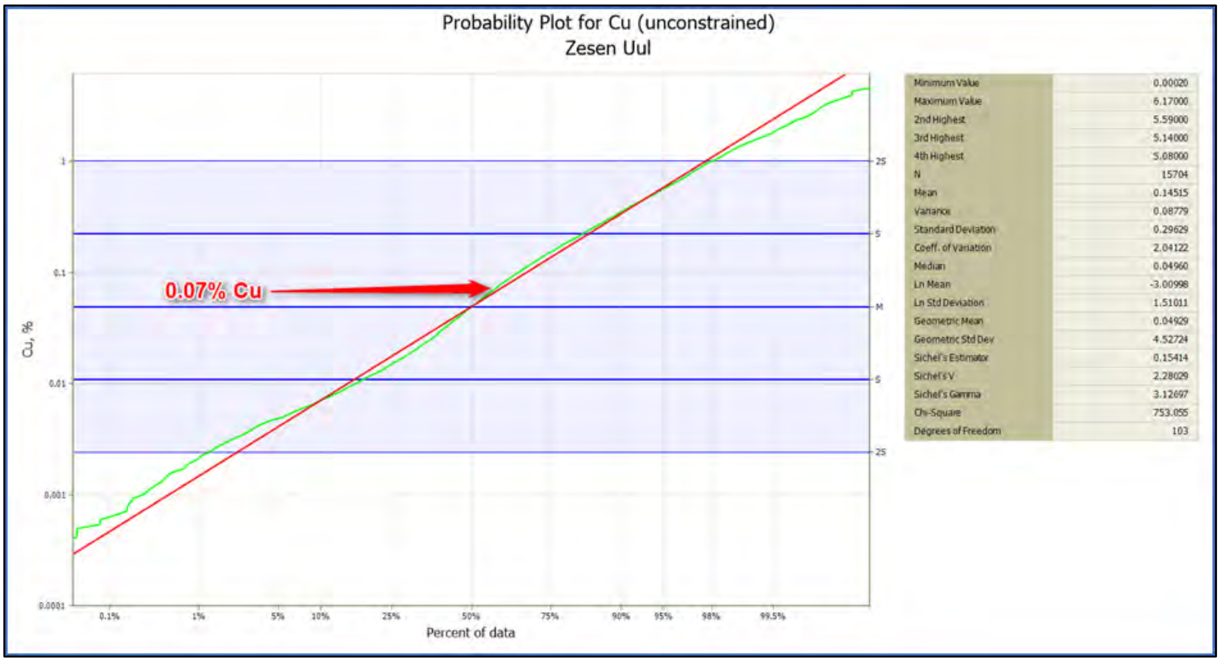


Figure 57: Log probability plot for unrestricted copper values – Zesen Uul

Figure 58 and Figure 59 summarise the statistical properties of the unrestricted assay databases for gold grades within the Zesen Uul deposit. The unrestricted gold grade population is positively skewed with possible several mixed grade populations with approximately 0.15 g/t Au and 0.6 g/t Au boundaries between the populations. Nominal values of 0.1 g/t Au and 0.6 g/t Au could be selected from the histogram.

The log probability plot demonstrates one apparent inflection point at 0.2 g/t Au.

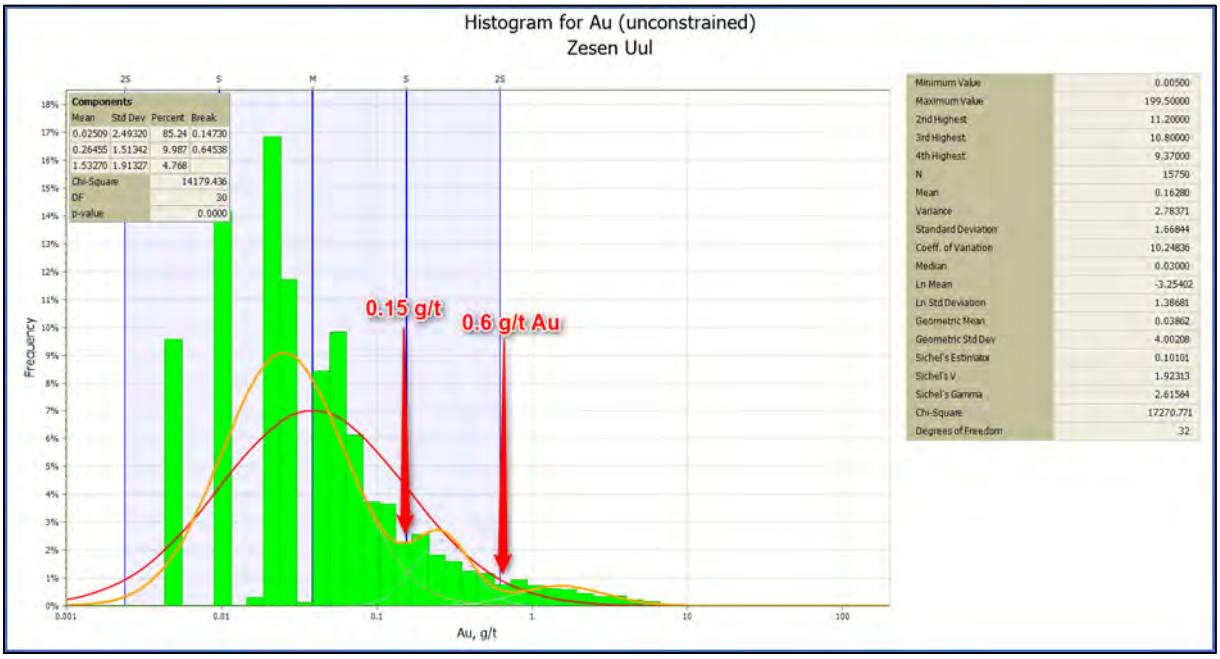


Figure 58: Log histogram for unrestricted gold values – Zesen Uul

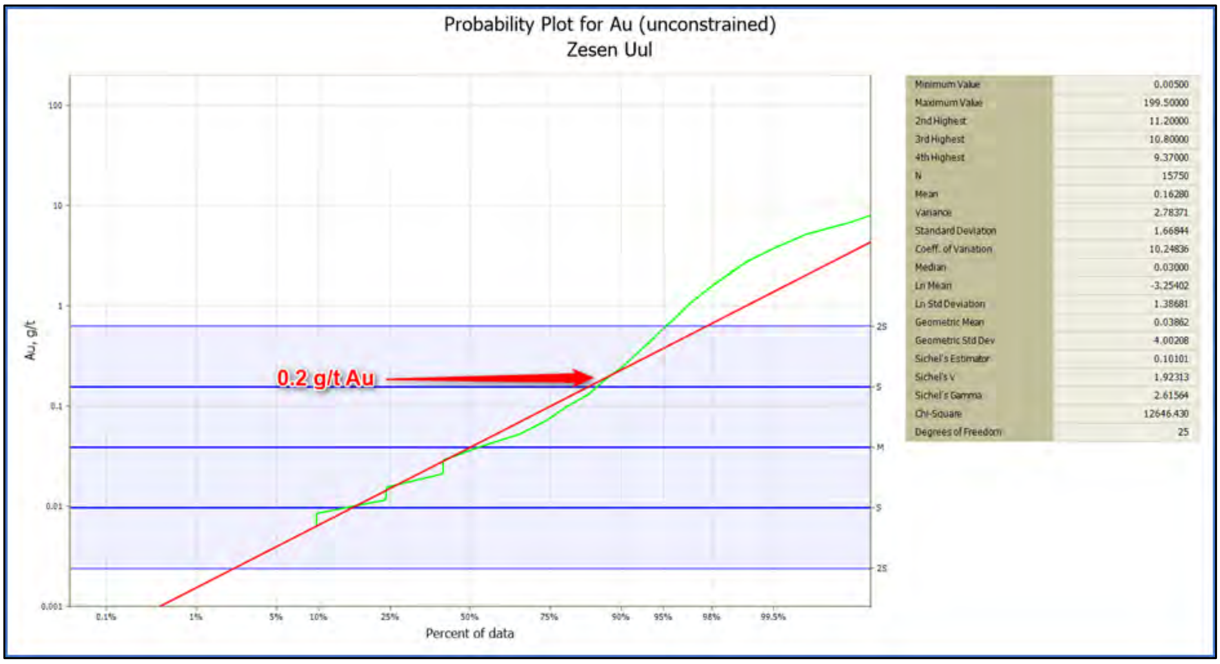


Figure 59: Log probability plot for unrestricted gold values – Zesen Uul

Table 25: Cut-offs summary

Deposit	Cu, %			Au, g/t		
	Histogram	PP	Proposed	Histogram	PP	Proposed
Altan Tolgoi (AT)	0.03, 0.3	0.3	0.1, 0.3	0.11, 0.25	0.3	0.1, 0.3
Tsagaan Sudal (TS)	0.04, 0.09	0.09, 0.6	0.1, 0.6	0.08, 0.15	0.08, 0.5	0.1, 0.5
Zesen Uul (ZU)	0.05, 0.08	0.07	0.1	0.15, 0.6	0.2	0.1, 0.6

Based on the results of the classical statistical analysis for unrestricted copper and gold grades for each deposit (Table 25), CSA Global initially recommended cut-off grades of 0.1%, 0.3% and 0.6% Cu and 0.1, 0.3, 0.5 and 0.6 g/t Au, to be used for modelling of grade shells. However, Given the high quality of the geology model and the strong understanding of vein distribution and its effect on grade it was decided that grade shells would add an unnecessary level of complication, and wireframe models with the level of veining were a better representation of the mineralised envelope and was used instead. It should be noted the vein models approximately correspond to the grade shells.

Once the geological wireframes were developed and the analytical database coded by the wireframes and domained, classical statistical analysis was repeated for the samples within each domain to estimate the top-cut grades for gold and copper.

The database for the Zesen Uul and Tsagaan Sudal deposits was divided into 13 geological domains, and the database for the Altan Tolgoi deposit was divided into 17 geological domains.

Classical statistical analysis (histograms and probability plots) was used to determine top-cut grade values separately for each domain, for each element and for each deposit. The domaining of the deposits and selected top-cut values are shown in Table 26. The coefficients of variation (CV) are shown in the table before the top-cuts were applied. The CV values for copper grades were either close to or below 1 for most of the domains, indicating that there are either no or very few outlier copper grades that require capping. The CV for gold grades were higher, thus more domains required application of top-cuts for gold grades.

Table 26: Deposits' domaining and selected top-cut grade values

Deposit	Domain	Sub-domain	Filter 1	Filter 2	Top-cut Cu, %	CV Cu	Top-cut Au, g/t	CV Au
TS	OXIDE = 1	STOCK = 0	-	-	2.20	1.04	2.20	2.58
		STOCK = 1			-	0.83	1.00	1.14
		STOCK = 2			-	0.51	-	0.64
	CRD	STOCK = 0	-	OXIDE = 0	-	0.59	-	0.81
		STOCK = 1			-	0.52	-	0.72
		STOCK = 2			-	0.41	1.20	1.77
	CRS	STOCK = 0			0.61	0.91	0.45	1.60
		STOCK = 1			-	0.59	0.51	1.06
		STOCK = 2			0.85	0.49	-	0.61
	P2	STOCK = 0			-	0.46	-	0.11
		STOCK = 1			-	0.65	0.58	0.73
		STOCK = 2			-	0.65	2.30	1.07
	P5	STOCK = 0			0.22	1.83	0.11	1.61
AT	BRX = 1	-	excl. TAND	OXIDE = 0	4.00	1.25	4.31	1.87
	OXIDE = 1	STOCK = 0	excl. TAND	-	1.44	1.23	3.75	2.67
		STOCK = 1			1.90	0.73	5.73	1.56
		STOCK = 2			2.20	0.92	4.00	1.10
	CR	STOCK = 0	BRX = 0	OXIDE = 0	-	1.35	0.80	1.74
		STOCK = 1			-	0.88	2.61	1.50
		STOCK = 2			2.25	0.85	4.90	1.26
	P1	STOCK = 0			-	1.01	0.63	1.01
		STOCK = 1			-	0.78	2.12	1.21
		STOCK = 2			-	0.74	7.81	1.09
	P2	STOCK = 0			1.00	1.11	1.15	1.34
		STOCK = 1			1.50	0.86	1.39	1.06
		STOCK = 2			-	0.59	1.46	1.25
	P3	STOCK = 0			1.07	1.53	1.37	3.58
		STOCK = 1			1.65	0.89	2.88	2.82
		STOCK = 2			-	0.61	2.40	0.84

Deposit	Domain	Sub-domain	Filter 1	Filter 2	Top-cut Cu, %	CV Cu	Top-cut Au, g/t	CV Au
	TAND	-	-	-	2.50	1.66	6.28	5.54
ZU	OXIDE = 1	STOCK = 0	-	-	-	1.18	0.92	27.4
		STOCK = 1			-	0.54	1.13	1.34
		STOCK = 2			2.25	0.62	1.92	0.88
	CR	STOCK = 0	-	OXIDE = 0	-	1.28	0.44	5.09
		STOCK = 1			0.96	0.87	0.90	1.94
		STOCK = 2			1.87	0.75	3.60	1.65
	P1	STOCK = 2			4.32	0.81	-	0.78
	P2	STOCK = 0			0.94	1.56	-	1.09
		STOCK = 1			1.38	1.10	2.31	1.87
		STOCK = 2			3.30	0.95	-	1.12
	P3	STOCK = 0			0.93	0.90	0.56	1.13
		STOCK = 1			1.25	0.77	1.06	1.46
		STOCK = 2			1.95	1.29	2.75	2.24

The statistical parameters for gold and copper grades (weighed on sample length) are shown separately for each domain and each deposit for assay and composites files in Table 27.

Table 27: Classical statistics for gold and copper for each domain

Domain	Element	Minimum	Maximum	No. of assays	Mean	Variance	SD	CV	Median
Assay file									
Unconstrained	CU	0.0001	6.17	103,482	0.13	0.05	0.22	1.64	0.059
	AU	0.005	199.5	104,583	0.14	0.67	0.82	5.72	0.040
TS, Oxide, Stock = 0	CU	0.0003	2.65	4,032	0.18	0.04	0.19	1.05	0.136
	AU	0.005	12	4,299	0.12	0.09	0.30	2.59	0.050
TS, Oxide, Stock = 1	CU	0.0246	1.84	331	0.32	0.07	0.26	0.83	0.261
	AU	0.019	3.706	336	0.23	0.07	0.26	1.14	0.170
TS, Oxide, Stock = 2	CU	0.0443	1.26	187	0.24	0.02	0.13	0.52	0.229
	AU	0.005	1.27	201	0.24	0.02	0.15	0.65	0.230
TS, CRD, Stock = 0	CU	0.0177	0.671	805	0.16	0.01	0.10	0.60	0.142
	AU	0.005	0.58	805	0.08	0.00	0.07	0.82	0.060
TS, CRD, Stock = 1	CU	0.0004	0.884	1,499	0.21	0.01	0.12	0.56	0.207
	AU	0.005	1.25	1,499	0.13	0.01	0.10	0.73	0.120
TS, CRD, Stock = 2	CU	0.0064	1.84	3,216	0.27	0.01	0.12	0.44	0.261
	AU	0.005	19.9	3,216	0.21	0.14	0.37	1.77	0.180
TS, CRS, Stock = 0	CU	0.0009	0.768	1,661	0.09	0.01	0.08	0.92	0.072
	AU	0.005	1.84	1,661	0.04	0.00	0.07	1.60	0.030
TS, CRS, Stock = 1	CU	0.0006	0.89	561	0.26	0.02	0.16	0.59	0.233
	AU	0.005	1.43	561	0.10	0.01	0.10	1.06	0.070
TS, CRS, Stock = 2	CU	0.0114	0.919	584	0.27	0.02	0.13	0.50	0.242
	AU	0.005	0.43	584	0.10	0.00	0.06	0.61	0.090
TS, P2, Stock = 0	CU	0.206	0.57	3	0.40	0.03	0.18	0.46	0.410
	AU	0.32	0.4	3	0.36	0.00	0.04	0.11	0.360
TS, P2, Stock = 1	CU	0.0078	1	185	0.28	0.03	0.18	0.65	0.268
	AU	0.005	0.86	185	0.18	0.02	0.13	0.73	0.170
TS, P2, Stock = 2	CU	0.0002	2.9	2,669	0.26	0.03	0.17	0.65	0.231
	AU	0.005	6.1	2,669	0.22	0.05	0.23	1.08	0.170
TS, P5, Stock = 0	CU	0.0011	0.386	557	0.03	0.00	0.05	1.83	0.012
	AU	0.005	0.25	557	0.02	0.00	0.03	1.61	0.010

Domain	Element	Minimum	Maximum	No. of assays	Mean	Variance	SD	CV	Median
AT, BRX	CU	0.0001	5.82	11,725	0.27	0.11	0.33	1.25	0.165
	AU	0.005	13.5	11,727	0.23	0.18	0.43	1.87	0.080
AT, Oxide, Stock = 0	CU	0.0006	1.6	2,926	0.12	0.02	0.15	1.23	0.072
	AU	0.005	8.41	3,263	0.17	0.24	0.49	2.67	0.060
AT, Oxide, Stock = 1	CU	0.0138	2.3525	230	0.34	0.06	0.25	0.74	0.282
	AU	0.005	7	287	0.53	0.63	0.80	1.56	0.300
AT, Oxide, Stock = 2	CU	0.225	4.41	62	0.59	0.30	0.55	0.93	0.466
	AU	0.16	7.35	62	1.00	1.21	1.10	1.10	0.820
AT, CR, Stock = 0	CU	0.0005	0.813	2,078	0.05	0.01	0.07	1.36	0.030
	AU	0.005	1.87	2,078	0.05	0.01	0.08	1.75	0.030
AT, CR, Stock = 1	CU	0.0041	2.16	232	0.33	0.09	0.29	0.88	0.267
	AU	0.005	4.32	232	0.42	0.41	0.64	1.50	0.220
AT, CR, Stock = 2	CU	0.0189	2.94	280	0.42	0.13	0.36	0.86	0.330
	AU	0.005	9.1	280	0.78	0.98	0.99	1.27	0.415
AT, P1, Stock = 0	CU	0.0017	0.76	259	0.14	0.02	0.14	1.02	0.095
	AU	0.005	0.88	259	0.10	0.01	0.10	1.02	0.070
AT, P1, Stock = 1	CU	0.0166	1.07	258	0.25	0.04	0.20	0.79	0.198
	AU	0.005	2.75	258	0.31	0.14	0.37	1.21	0.200
AT, P1, Stock = 2	CU	0.0044	3.7	952	0.61	0.20	0.45	0.74	0.507
	AU	0.02	13.6	952	1.53	2.82	1.68	1.09	0.945
AT, P2, Stock = 0	CU	0.0002	1.76	937	0.12	0.01	0.12	1.11	0.086
	AU	0.005	2.25	939	0.12	0.03	0.16	1.35	0.080
AT, P2, Stock = 1	CU	0.0017	2.09	578	0.23	0.04	0.20	0.86	0.182
	AU	0.005	1.71	578	0.23	0.06	0.25	1.06	0.150
AT, P2, Stock = 2	CU	0.0201	0.959	210	0.25	0.02	0.14	0.60	0.233
	AU	0.005	3.79	210	0.26	0.10	0.31	1.26	0.190
AT, P3, Stock = 0	CU	0.0002	5.16	6,951	0.09	0.02	0.14	1.53	0.058
	AU	0.005	14.7	6,951	0.10	0.13	0.36	3.59	0.040
AT, P3, Stock = 1	CU	0.0009	2.23	935	0.21	0.03	0.19	0.90	0.164
	AU	0.005	17.2	935	0.21	0.38	0.61	2.82	0.110
AT, P3, Stock = 2	CU	0.0196	1.0824	116	0.30	0.04	0.19	0.62	0.258
	AU	0.005	3.7	116	0.51	0.23	0.48	0.85	0.460
AT, TAND	CU	0.0005	4.05	2,267	0.16	0.07	0.26	1.66	0.061
	AU	0.005	63.5	2,278	0.26	2.05	1.43	5.54	0.050
ZU, Oxide, Stock = 0	CU	0.001	0.982	1,257	0.10	0.01	0.12	1.19	0.058
	AU	0.005	199.5	1,265	0.20	31.00	5.57	27.46	0.025
ZU, Oxide, Stock = 1	CU	0.0426	1.16	205	0.31	0.03	0.17	0.55	0.288
	AU	0.005	2.75	205	0.17	0.06	0.24	1.34	0.120
ZU, Oxide, Stock = 2	CU	0.0241	2.61	156	0.52	0.09	0.30	0.62	0.469
	AU	0.01	2.39	156	0.36	0.10	0.31	0.88	0.305
ZU, CR, Stock = 0	CU	0.0004	0.94	2,914	0.06	0.01	0.08	1.28	0.032
	AU	0.005	10.8	2,914	0.05	0.06	0.24	5.10	0.020
ZU, CR, Stock = 1	CU	0.0047	1.43	665	0.18	0.03	0.16	0.88	0.132
	AU	0.005	2.105	665	0.10	0.04	0.19	1.94	0.040
ZU, CR, Stock = 2	CU	0.0378	2.27	118	0.49	0.14	0.37	0.76	0.386
	AU	0.005	5.6	118	0.41	0.45	0.67	1.66	0.180
ZU, P1, Stock = 2	CU	0.0142	5.59	326	1.10	0.77	0.87	0.82	0.872
	AU	0.005	11.2	326	2.38	3.24	1.80	0.79	1.830

Domain	Element	Minimum	Maximum	No. of assays	Mean	Variance	SD	CV	Median
ZU, P2, Stock = 0	CU	0.005	3.54	145	0.21	0.07	0.27	1.56	0.154
	AU	0.005	0.48	145	0.06	0.00	0.07	1.10	0.040
ZU, P2, Stock = 1	CU	0.0188	2.17	241	0.25	0.08	0.28	1.11	0.174
	AU	0.01	5.2	241	0.26	0.25	0.50	1.88	0.130
ZU, P2, Stock = 2	CU	0.013	5.14	857	0.59	0.32	0.57	0.95	0.448
	AU	0.005	6.02	857	0.74	0.68	0.82	1.12	0.470
ZU, P3, Stock = 0	CU	0.0085	1.32	394	0.15	0.02	0.14	0.91	0.119
	AU	0.005	1.01	394	0.08	0.01	0.09	1.13	0.050
ZU, P3, Stock = 1	CU	0.001	1.704	1,214	0.18	0.02	0.14	0.78	0.148
	AU	0.005	3	1,214	0.11	0.02	0.16	1.46	0.070
ZU, P3, Stock = 2	CU	0.005	6.17	279	0.40	0.27	0.52	1.30	0.298
	AU	0.01	9.37	279	0.33	0.54	0.73	2.24	0.160
2 m Composite file									
TS, Oxide, Stock = 0	CU	0.0003	2.65	4,039	0.18	0.04	0.19	1.05	0.136
	AU	0.005	12	4,675	0.12	0.09	0.30	2.49	0.050
TS, Oxide, Stock = 1	CU	0.0246	1.84	330	0.32	0.07	0.26	0.83	0.263
	AU	0.019	3.706	343	0.23	0.07	0.26	1.12	0.172
TS, Oxide, Stock = 2	CU	0.0443	1.26	194	0.24	0.02	0.13	0.52	0.227
	AU	0.005	1.27	227	0.24	0.02	0.15	0.65	0.210
TS, CRD, Stock = 0	CU	0.0177	0.671	808	0.16	0.01	0.10	0.59	0.145
	AU	0.005	0.58	808	0.08	0.00	0.07	0.81	0.060
TS, CRD, Stock = 1	CU	0.0004	0.884	1,513	0.21	0.01	0.12	0.55	0.207
	AU	0.005	1.25	1,513	0.13	0.01	0.10	0.72	0.120
TS, CRD, Stock = 2	CU	0.00694	1.26	3,212	0.27	0.01	0.11	0.42	0.261
	AU	0.005	19.9	3,212	0.21	0.14	0.37	1.77	0.180
TS, CRS, Stock = 0	CU	0.0009	0.768	1,649	0.09	0.01	0.08	0.90	0.072
	AU	0.005	1.84	1,649	0.04	0.00	0.07	1.59	0.030
TS, CRS, Stock = 1	CU	0.0006	0.7988	548	0.26	0.02	0.15	0.59	0.230
	AU	0.005	1.29	548	0.10	0.01	0.10	1.04	0.070
TS, CRS, Stock = 2	CU	0.0114	0.919	578	0.27	0.02	0.13	0.49	0.242
	AU	0.005	0.43	578	0.10	0.00	0.06	0.61	0.090
TS, P2, Stock = 0	CU	0.206	0.57	3	0.40	0.03	0.18	0.46	0.410
	AU	0.32	0.4	3	0.36	0.00	0.04	0.11	0.360
TS, P2, Stock = 1	CU	0.0078	1	184	0.28	0.03	0.18	0.65	0.269
	AU	0.005	0.86	184	0.18	0.02	0.13	0.73	0.170
TS, P2, Stock = 2	CU	0.0002	2.9	2,661	0.26	0.03	0.17	0.64	0.231
	AU	0.005	6.1	2,661	0.22	0.05	0.23	1.07	0.170
TS, P5, Stock = 0	CU	0.0011	0.386	559	0.03	0.00	0.05	1.82	0.012
	AU	0.005	0.25	559	0.02	0.00	0.03	1.59	0.010
AT, BRX	CU	0.0001	5.355	11,544	0.27	0.11	0.33	1.22	0.165
	AU	0.005	13.5	11,545	0.23	0.18	0.42	1.81	0.080
AT, Oxide, Stock = 0	CU	0.0006	1.585	2,933	0.12	0.02	0.15	1.22	0.071
	AU	0.005	8.41	3,676	0.17	0.23	0.48	2.79	0.060
AT, Oxide, Stock = 1	CU	0.0138	2.3525	229	0.34	0.06	0.25	0.73	0.282
	AU	0.005	6.71	359	0.53	0.61	0.78	1.48	0.300
AT, Oxide, Stock = 2	CU	0.225	4.41	62	0.59	0.30	0.55	0.93	0.466
	AU	0.16	7.35	62	1.00	1.21	1.10	1.10	0.820
AT, CR, Stock = 0	CU	0.0005	0.813	2,070	0.05	0.01	0.07	1.36	0.030
	AU	0.005	1.87	2,070	0.05	0.01	0.08	1.75	0.030

Domain	Element	Minimum	Maximum	No. of assays	Mean	Variance	SD	CV	Median
AT, CR, Stock = 1	CU	0.0041	2.16	228	0.33	0.08	0.29	0.89	0.265
	AU	0.005	4.32	228	0.42	0.41	0.64	1.51	0.215
AT, CR, Stock = 2	CU	0.0189	2.94	276	0.42	0.13	0.36	0.86	0.330
	AU	0.005	9.1	276	0.78	0.97	0.98	1.25	0.430
AT, P1, Stock = 0	CU	0.0019	0.76	254	0.14	0.02	0.14	1.00	0.100
	AU	0.005	0.88	254	0.10	0.01	0.10	1.02	0.070
AT, P1, Stock = 1	CU	0.0166	1.07	258	0.25	0.04	0.20	0.79	0.198
	AU	0.005	2.75	258	0.31	0.14	0.37	1.21	0.200
AT, P1, Stock = 2	CU	0.0044	3.7	925	0.61	0.20	0.45	0.74	0.509
	AU	0.02	13.6	925	1.53	2.81	1.68	1.10	0.920
AT, P2, Stock = 0	CU	0.0002	1.36	916	0.12	0.01	0.12	1.01	0.088
	AU	0.005	2.25	918	0.12	0.03	0.16	1.33	0.080
AT, P2, Stock = 1	CU	0.0017	1.88	573	0.23	0.04	0.19	0.84	0.183
	AU	0.005	1.71	573	0.23	0.06	0.25	1.07	0.150
AT, P2, Stock = 2	CU	0.0201	0.9545	186	0.25	0.02	0.14	0.58	0.227
	AU	0.005	2.745	186	0.26	0.09	0.30	1.16	0.170
AT, P3, Stock = 0	CU	0.0002	3.635	6,882	0.09	0.02	0.14	1.48	0.058
	AU	0.005	14.7	6,882	0.10	0.11	0.34	3.34	0.040
AT, P3, Stock = 1	CU	0.0009	2.23	920	0.21	0.03	0.19	0.90	0.163
	AU	0.005	17.2	920	0.21	0.38	0.61	2.89	0.110
AT, P3, Stock = 2	CU	0.0196	1.0824	90	0.30	0.03	0.19	0.61	0.256
	AU	0.005	3.7	90	0.51	0.22	0.47	0.91	0.453
AT, TAND	CU	0.0005	4.05	2,249	0.16	0.07	0.26	1.66	0.061
	AU	0.005	63.5	2,268	0.26	2.05	1.43	5.55	0.050
ZU, Oxide, Stock = 0	CU	0.0014	0.982	1,284	0.10	0.01	0.12	1.18	0.058
	AU	0.005	199.5	1,301	0.20	30.99	5.57	27.68	0.026
ZU, Oxide, Stock = 1	CU	0.0426	1.16	202	0.31	0.03	0.17	0.55	0.279
	AU	0.01	2.75	202	0.17	0.06	0.24	1.36	0.110
ZU, Oxide, Stock = 2	CU	0.0241	1.7975	149	0.52	0.08	0.28	0.55	0.467
	AU	0.01	2.39	149	0.36	0.09	0.30	0.83	0.292
ZU, CR, Stock = 0	CU	0.0004	0.94	2,948	0.06	0.01	0.08	1.29	0.032
	AU	0.005	10.8	2,948	0.05	0.06	0.24	5.10	0.020
ZU, CR, Stock = 1	CU	0.0047	1.43	685	0.18	0.03	0.16	0.87	0.133
	AU	0.005	2.088125	685	0.10	0.04	0.19	1.94	0.040
ZU, CR, Stock = 2	CU	0.0378	2.27	118	0.49	0.14	0.37	0.76	0.386
	AU	0.005	5.6	118	0.41	0.45	0.67	1.66	0.180
ZU, P1, Stock = 2	CU	0.0173	5.59	296	1.10	0.76	0.87	0.79	0.914
	AU	0.0125	11.2	296	2.38	3.23	1.80	0.76	1.960
ZU, P2, Stock = 0	CU	0.005	2.915	139	0.21	0.07	0.27	1.28	0.154
	AU	0.005	0.48	139	0.06	0.00	0.07	1.05	0.040
ZU, P2, Stock = 1	CU	0.0188	2.17	243	0.25	0.08	0.28	1.10	0.174
	AU	0.01	5.2	243	0.26	0.25	0.50	1.88	0.130
ZU, P2, Stock = 2	CU	0.0133	5.14	842	0.59	0.32	0.56	0.95	0.454
	AU	0.01	5.9875	842	0.74	0.68	0.82	1.11	0.490
ZU, P3, Stock = 0	CU	0.0177	1.32	398	0.15	0.02	0.14	0.90	0.119
	AU	0.005	1.01	398	0.08	0.01	0.09	1.13	0.050
ZU, P3, Stock = 1	CU	0.0013	1.704	1,211	0.18	0.02	0.14	0.76	0.149
	AU	0.005	3	1,211	0.11	0.02	0.16	1.45	0.070

Domain	Element	Minimum	Maximum	No. of assays	Mean	Variance	SD	CV	Median
ZU, P3, Stock = 2	CU	0.005	6.17	276	0.40	0.27	0.52	1.29	0.300
	AU	0.01	9.37	276	0.33	0.53	0.73	2.23	0.155

The resource estimation was run several times, first without any top-cut grades applied using the OK method, and secondly, with the corresponding top-cuts applied.

The coefficients of variation for the composited grades was relatively low for all elements, which indicated that the possibility of modelling robust semi-variograms was relatively good.

14.5 Domaining and Wireframing

Interpretation of the deposit was based on the current understanding of the deposit geology. Xanadu geologists developed a geological legend of the main geological formations and then used Leapfrog software to create wireframe solids for the main geological formations, stockworks and grade shells. The generated wireframes were provided to CSA Global to support Mineral Resource estimation. It was decided that grade shells would add an unnecessary level of complication, and wireframe models with the level of veining were used instead as they approximately correspond to the grade shells.

The main rock types that were wireframed are shown in Table 28 and then used to code the model (field "ROCK").

Table 28: Wireframed rock types

Deposit	Code	Description
Tsagaan Sudal	CRD	Country rock diorite
	CRS	Country rock siltstone
	P2	Porphyry phase 1
	P5	Porphyry phase 5
Attan Tolgoi	BRX	Breccia
	CR	Country rock
	P1	Porphyry phase 1
	P2	Porphyry phase 2
	P3	Porphyry phase 3
	TAND	Andesite dyke
Zesen Uul	CR	Country rock
	P1	Porphyry phase 1
	P2	Porphyry phase 2
	P3	Porphyry phase 3

Separate wireframe solids were generated for the level of veining as shown in Table 29.

Table 29: Wireframed levels of veining

Code	Field	Description
0	STOCK = 0	<0.5% veining
1	STOCK = 1	>0.5 and <1.5% veining
2	STOCK = 2	>1.5% veining

A wireframe model for the Breccia rock type was used to overwrite all other rock types, except the barren andesite dyke.

In addition to the above, a surface for the base of oxidation zone was provided by Xanadu and used to code the model for the oxidation zones (field "*OXIDE*" = 0 – fresh, "*OXIDE*" = 1 – oxide zone). The material above the oxide surface is a minor component of the deposit, accounting for ~3% of the total MRE.

Once the blank block model was generated, it was coded by all wireframe models and the combination of codes was used to domain each deposit as shown in Table 30.

Table 30: Domains

Deposit	Domain	Sub-Domain	Filter 1	Filter 2
Tsagaan Sudal	OXIDE = 1	STOCK = 0	-	-
		STOCK = 1		
		STOCK = 2		
	CRD	STOCK = 0	-	OXIDE = 0
		STOCK = 1		
		STOCK = 2		
	CRS	STOCK = 0		
		STOCK = 1		
		STOCK = 2		
	P2	STOCK = 0		
		STOCK = 1		
		STOCK = 2		
	P5	STOCK = 0		
Attan Tolgoi	BRX = 1	-	excl. TAND	OXIDE = 0
	OXIDE = 1	STOCK = 0	excl. TAND	-
		STOCK = 1		
		STOCK = 2		
	CR	STOCK = 0	BRX = 0	OXIDE = 0
		STOCK = 1		
		STOCK = 2		
	P1	STOCK = 0		
		STOCK = 1		
		STOCK = 2		
	P2	STOCK = 0		
		STOCK = 1		
		STOCK = 2		
	P3	STOCK = 0		
		STOCK = 1		
		STOCK = 2		
	TAND	-	-	-
Zesen Uul	OXIDE = 1	STOCK = 0	-	-
		STOCK = 1		
		STOCK = 2		
	CR	STOCK = 0	-	OXIDE = 0
		STOCK = 1		
		STOCK = 2		
	P1	STOCK = 2		
	P2	STOCK = 0		
		STOCK = 1		
		STOCK = 2		
	P3	STOCK = 0		
		STOCK = 1		
		STOCK = 2		

14.6 Treatment of Outliers

A review of grade outliers was undertaken to ensure that extreme grades are treated appropriately during grade interpolation. Although extreme grade outliers within the grade populations of variables are real, they are potentially not representative of the volume they inform during estimation. If these values are not cut, they have the potential to result in significant grade over-estimation on a local basis.

The input sample file was flagged by the modelled mineralised geological domains, oxidation zone and the level of veining. The lognormal histogram and cumulative probability plot were analysed to determine the top-cut grade to be applied to the input analytical data before sample compositing and geostatistical analysis.

Figure 60 is an example showing statistical properties of the assay database for gold restricted within the modelled geological domain P1 with STOCK = 1 at Altan Tolgoi. The histogram does not demonstrate any mixing of grade populations and has the coefficient of variation equal to 1.21. Based on the analysis of the histograms the top-cut of 2.12 g/t was selected for gold grades for this domain. This top-cut was applied to all gold grades before the length compositing process.

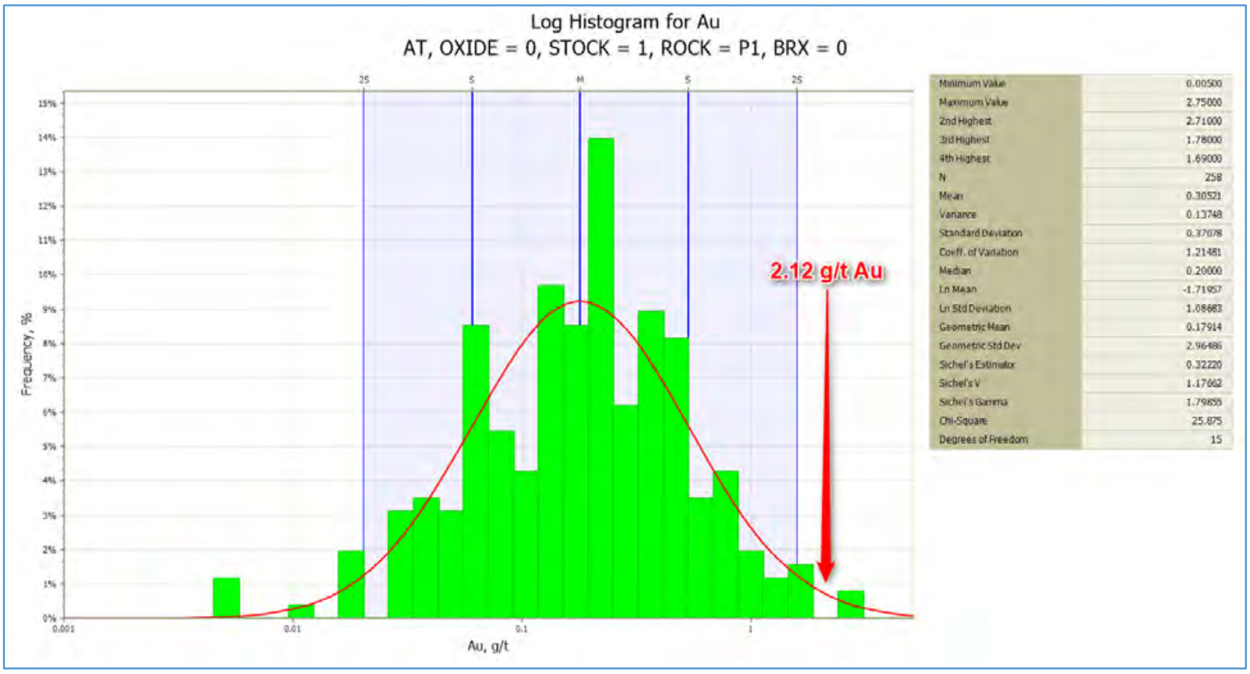


Figure 60: Log histogram for gold, Domain P1, STOCK = 1, Altan Tolgoi

This process was repeated for all 43 domains for both elements, thus a total number of 86 histograms and 86 probability plots were generated and analysed. The results of the analysis and selected top-cuts for copper and gold grades are shown in Table 31. All the coefficient of variation values in the table are shown before the application of top-cuts.

Table 31: Selected top-cuts

Deposit	Domain	Sub-Domain	Filter 1	Filter 2	Top-Cut Cu, %	CV Cu	Top-Cut Au, g/t	CV Au
Tsagaan Sudal	OXIDE = 1	STOCK = 0	-	-	2.20	1.04	2.20	2.58
		STOCK = 1			-	0.83	1.00	1.14
		STOCK = 2			-	0.51	-	0.64
	CRD	STOCK = 0	-		-	0.59	-	0.81

Deposit	Domain	Sub-Domain	Filter 1	Filter 2	Top-Cut Cu, %	CV Cu	Top-Cut Au, g/t	CV Au
		STOCK = 1		OXIDE = 0	-	0.52	-	0.72
		STOCK = 2			-	0.41	1.20	1.77
	CRS	STOCK = 0			0.61	0.91	0.45	1.60
		STOCK = 1			-	0.59	0.51	1.06
		STOCK = 2			0.85	0.49	-	0.61
	P2	STOCK = 0			-	0.46	-	0.11
		STOCK = 1			-	0.65	0.58	0.73
		STOCK = 2			-	0.65	2.30	1.07
	P5	STOCK = 0			0.22	1.83	0.11	1.61
Attan Tolgoi	BRX = 1	-	excl. TAND	OXIDE = 0	4.00	1.25	4.31	1.87
	OXIDE = 1	STOCK = 0	excl. TAND	-	1.44	1.23	3.75	2.67
		STOCK = 1			1.90	0.73	5.73	1.56
		STOCK = 2			2.20	0.92	4.00	1.10
	CR	STOCK = 0	BRX = 0	OXIDE = 0	-	1.35	0.80	1.74
		STOCK = 1			-	0.88	2.61	1.50
		STOCK = 2			2.25	0.85	4.90	1.26
	P1	STOCK = 0			-	1.01	0.63	1.01
		STOCK = 1			-	0.78	2.12	1.21
		STOCK = 2			-	0.74	7.81	1.09
	P2	STOCK = 0			1.00	1.11	1.15	1.34
		STOCK = 1			1.50	0.86	1.39	1.06
		STOCK = 2			-	0.59	1.46	1.25
	P3	STOCK = 0			1.07	1.53	1.37	3.58
		STOCK = 1			1.65	0.89	2.88	2.82
		STOCK = 2			-	0.61	2.40	0.84
	TAND	-	-	-	2.50	1.66	6.28	5.54
Zesen Uul	OXIDE = 1	STOCK = 0	-	-	-	1.18	0.92	27.4
		STOCK = 1			-	0.54	1.13	1.34
		STOCK = 2			2.25	0.62	1.92	0.88
	CR	STOCK = 0	-	OXIDE = 0	-	1.28	0.44	5.09
		STOCK = 1			0.96	0.87	0.90	1.94
		STOCK = 2			1.87	0.75	3.60	1.65
	P1	STOCK = 2			4.32	0.81	-	0.78
	P2	STOCK = 0			0.94	1.56	-	1.09
		STOCK = 1			1.38	1.10	2.31	1.87
		STOCK = 2			3.30	0.95	-	1.12
	P3	STOCK = 0			0.93	0.90	0.56	1.13
		STOCK = 1			1.25	0.77	1.06	1.46
		STOCK = 2			1.95	1.29	2.75	2.24

14.7 Data Coding and Composite Length Selection

Drill hole and trench coding is a standard procedure which ensures the correct samples are used in classical statistical and geostatistical analyses, and grade interpolation. For this purpose, solid wireframes for each geological domain and level of veining were used to select drill hole and trench samples. Samples were then selected for individual mineralised envelopes and flagged using Micromine software.

All wireframes were used to select drill hole and trench samples, and the data was assigned a code in the field '*STOCK*' for the level of veining, field "*ROCK*" for geological domain, field "O*XIDE*" for the level of oxidation and field "*BRX*" for breccia. A summary of the codes used to distinguish the data during geostatistical analysis and estimation is shown in Sections 14.4 and 14.5 of the Report.

Visual validation of the flagged samples was carried out to make sure the correct samples were selected by the wireframes.

Classical statistical analysis was then repeated for all grades within the geological domains. The top-cut grades were applied to the samples before compositing process.

Basic statistical parameters were obtained for the composited data to make sure that compositing has not distorted the statistics.

Based on the drill hole and trench coding, samples from within the resource wireframes were used to conduct a sample length analysis. The majority of raw sample intervals are two metre in length (average 2.004 m) as shown in *Figure 61*. Based on the review, a 2 m composite length was selected. The selected samples within each geological domain were separately composited over 2 m intervals, starting at the drill hole or trench collar and progressing downhole. Compositing was stopped and restarted at all boundaries between geological domains or level of veining. If a gap between samples of less than 20 cm occurred, it was included in the sample composite. If the gap was longer than 20 cm, the composite was stopped, and another composite was started from the next sample.

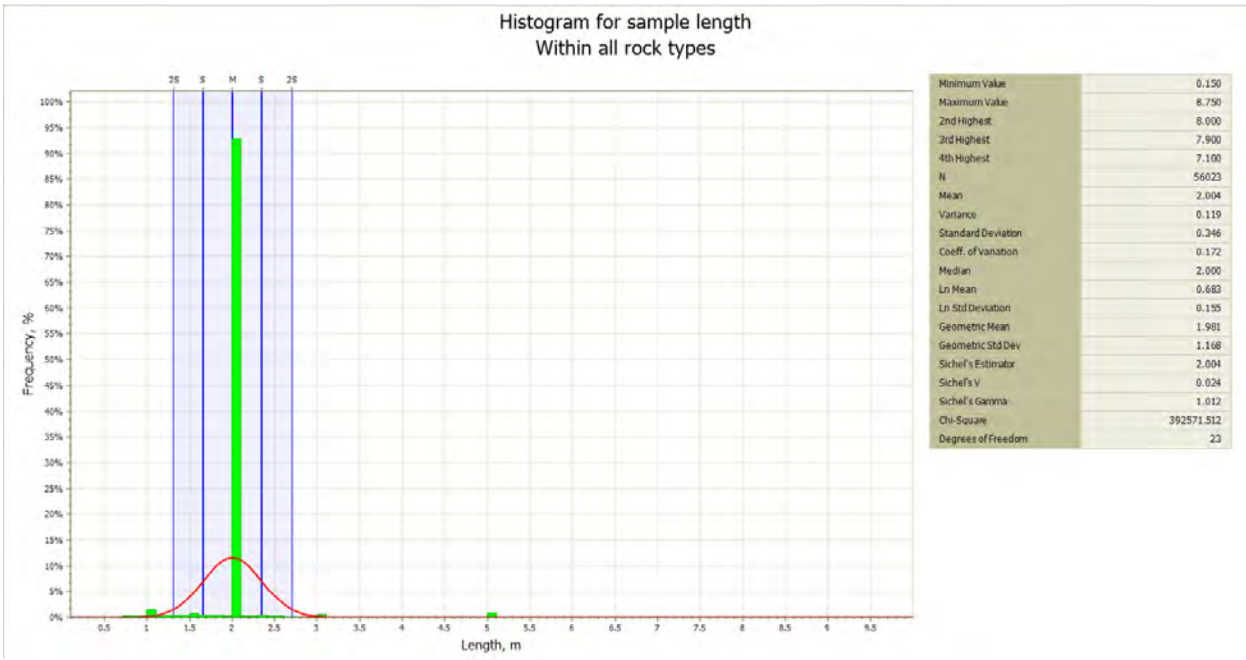


Figure 61: Histogram for sample length

14.8 Geostatistical Analysis

The purpose of geostatistical analysis is to generate a series of semivariograms that can be used as the input weighting mechanism for Kriging algorithms. The semivariogram ranges determined from this analysis contribute heavily to the determination of the search neighbourhood dimensions.

All semivariograms were calculated and modelled for the composited sample file constrained by the corresponding geological domains for copper and gold and with top-cut applied, all levels of veining were combined within each geological domain to ensure the there are enough samples for geostatistical analysis. Various types of semivariograms were modelled for the domains as shown in *Figure 62* below.

Downhole experimental variograms were modelled to estimate the expected nugget effect separately for each element and separately for each domain. The modelled nugget effect was then used when directional semivariograms were modelled.

The main axes for semivariogram modelling were selected using overall geological dimensions of each domain. The parameters of the modelled semivariograms for copper are listed in *Table 32*, and *Table 33* shows all the modelled semivariogram parameters for gold grades. An example of modelled semivariograms for copper, Domain P1 at Altan Tolgoi is shown in *Figure 62*.

The averaged semivariogram ranges for copper and gold for each domain were used to determine the search radii for copper and gold. The ranges were used in the search ellipse and grade interpolation process. Generally, all semivariogram ranges were greater than exploration grid spacing.

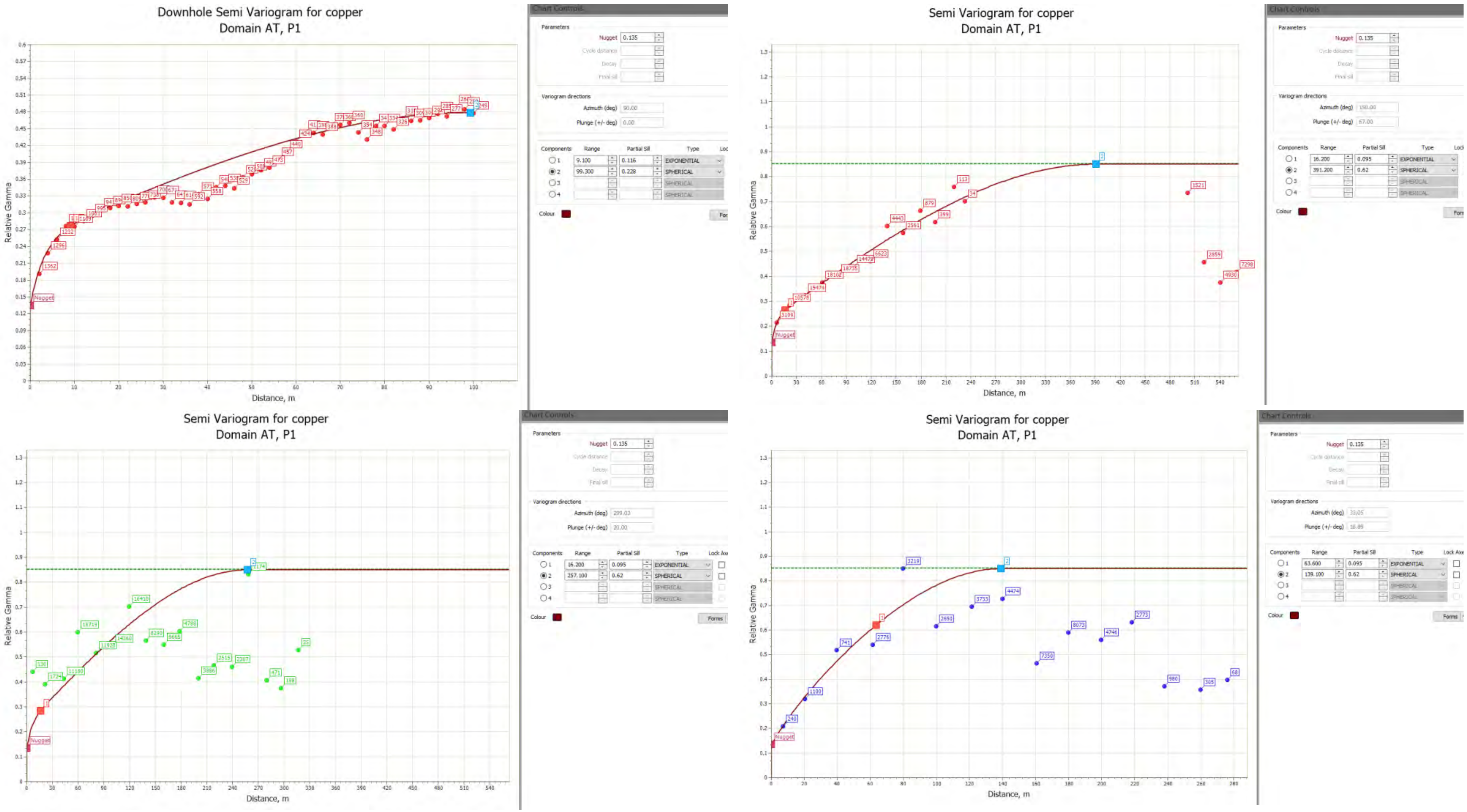


Figure 62: Downhole and directional semivariogram models for copper, Domain AT, P1

Table 32: Semivariogram Characteristics for copper

Deposit	Domain	Type	Axis	Azimuth	Dip	Nugget	Partial Sills	Ranges
TS	OXIDE = 1	Absolute Exponential	Main	21	0	0.00526	0.008 and 0.0324	12.3 and 99.9
			Second	111	0			12.3 and 50.3
			Third	111	90			12.3 and 37.5
	CRD	Absolute Exponential and Spherical	Main	96	0	0.00281	0.00668 and 0.00483	63.8 and 250.4
			Second	186	0			29.9 and 219.6
			Third	186	90			58.5 and 180.3
	CRS	Relative Spherical	Main	18	0	0.0748	0.075, 0.326 and 0.266	128, 166 and 197
			Second	108	0			142, 277 and 318
			Third	108	90			8.9, 327 and Z/A
	P2	Absolute Spherical	Main	180	71	0.00344	0.00697 and 0.0184	7.8 and 52.8
			Second	270	0			12.2 and 39.5
			Third	0	19			12.2 and 30.4
	P5	Absolute Exponential	Main	270	45	0.000471	0.00126	79.3
			Second	0	0			79.3
			Third	90	45			100.1
AT	BRX = 1	Absolute Spherical	Main	200	80	0.0279	0.0338 and 0.0396	12.5 and 119.2
			Second	290	0			7.6 and 81.1
			Third	20	10			66 and 78.4
	OXIDE = 1	Absolute Spherical	Main	125	0	0.00386	0.0282	65.2
			Second	215	0			26.3
			Third	215	90			36.8
	CR	Relative Exponential and Spherical	Main	100	0	0.055	0.181 and 0.674	167.2 and 281.7
			Second	190	0			39.7 and 240.8
			Third	190	90			17. 1 and 322.1
	P1	Relative Exponential and Spherical	Main	150	67	0.135	0.095 and 0.62	16.2 and 391.2
			Second	299.03	20			16.2 and 257.1
			Third	23.05	10.89			63.6 and 139.1
	P2	Relative Exponential and Spherical	Main	220	80	0.139	0.17 and 0.554	27.6 and 345
			Second	310	0			27.6 and 345
			Third	40	10			27.6 and 269.5
	P3	Relative Exponential and Spherical	Main	215	90	0.138	0.215 and 0.317	10.4 and 457.7
			Second	305	0			56.4 and 272.8
			Third	35	0			12.9 and 436.2
	TAND	Relative Exponential and Spherical	Main	35	87	0.132	0.403 and 0.204	21.8 and 284.3
			Second	125	0			21.8 and 158.1
			Third	215	3			36 and 63.5
ZU	OXIDE = 1	Relative Spherical	Main	0	0	0.108	0.006 and 0.924	143.5 and 169.7
			Second	90	0			216.2 and Z/A
			Third	90	90			11.1 and 43
	CR		Main	72	0	0.119		21.4 and 154

Deposit	Domain	Type	Axis	Azimuth	Dip	Nugget	Partial Sills	Ranges
		Relative Spherical	Second	162	0		0.081 and 0.515	21.4 and 94.6
			Third	162	90			25.9 and 104.5
	P1	Relative Spherical	Main	250	20	0.152	0.435	49.6
			Second	340	0			37.7
			Third	70	70			41.8
	P2	Relative Spherical	Main	223	55	0.167	0.083 and 0.402	11.1 and 164.6
			Second	273.52	-24			8.4 and 69.6
			Third	352.16	23.8			8.4 and 69.6
	P3	Relative Exponential	Main	202.41	60.36	0.129	0.076 and 0.291	13.8 and 139.4
			Second	263.54	-15.36			13.8 and 108.5
			Third	346.29	24.69			7.2 and 38.8

Table 33: Semivariogram Characteristics for gold

Deposit	Domain	Type	Axis	Azimuth	Dip	Nugget	Partial Sills	Ranges
TS	OXIDE = 1	Relative Spherical and Exponential	Main	21	0	0.163	0.213 and 0.271	5.1 and 154.7
			Second	111	0			5.1 and 154.7
			Third	111	90			31.2 and 39.4
	CRD	Relative Exponential and Spherical	Main	96	0	0.0608	0.102 and 0.1407	9.8 and 102.9
			Second	186	0			17.9 and 55.7
			Third	186	90			15.5 and 96.4
	CRS	Relative Exponential	Main	18	0	0.135	0.138 and 0.151	33.4 and 63.2
			Second	108	0			145.2 and 241.1
			Third	108	90			13.5 and 201.1
	P2	Relative Exponential and Spherical	Main	180	71	0.073	0.1147 and 0.1941	15.4 and 143.1
			Second	270	0			24.4 and 82.9
			Third	0	19			6.9 and 88.6
	P5	Relative Exponential	Main	270	45	0.157	0.18 and 0.041	117 and 139.8
			Second	0	0			32.5 and 66.2
			Third	90	45			10.6 and 80.3
AT	BRX = 1	Relative Exponential and Spherical	Main	200	80	0.223	0.233 and 0.352	18.6 and 222
			Second	290	0			15.4 and 220.8
			Third	20	10			6.9 anf 139.5
	OXIDE = 1	Relative Spherical	Main	125	0	0.136	0.286 and 0.266	19.2 and 100.4
			Second	215	0			25.6 and 70.4
			Third	215	90			13.1 and 35
	CR	Relative Exponential and Spherical	Main	100	0	0.178	0.052 and 0.411	5.5 and 99.6
			Second	190	0			5.5 and 99.6
			Third	190	90			5.5 and 99.6
	P1	Relative Spherical	Main	150	67	0.114	0.115 and 0.392	10 and 127.6
			Second	299.03	20			10 and 66.6
			Third	23.05	10.89			36.6 and 40.2

Deposit	Domain	Type	Axis	Azimuth	Dip	Nugget	Partial Sills	Ranges
	P2	Relative Spherical	Main	220	80	0.208	0.11 and 0.263	11.6 and 142
			Second	310	0			11.6 and 88.1
			Third	40	10			19.9 and 35.2
	P3	Relative Exponential and Spherical	Main	215	90	0.196	0.291 and 0.184	20.3 and 221.8
			Second	305	0			50 and 133.8
			Third	35	0			19.8 and 41.3
	TAND	Relative Exponential and Spherical	Main	35	87	0.174	0.418 and 0.267	17 and 241.5
			Second	125	0			26.7 and 78.9
			Third	215	3			30.3 and 38.8
ZU	OXIDE = 1	Relative Spherical	Main	0	0	0.134	0.103 and 0.535	9.1 and 80.5
			Second	90	0			23.3 and 173.3
			Third	90	90			5.5 and 47.5
	CR	Relative Exponential	Main	72	0	0.174	0.17 and 0.335	13.4 and 190.3
			Second	162	0			53.7 and 81
			Third	162	90			53.7 and 157.7
	P1	Relative Spherical	Main	250	20	0.123	0.45	30.8
			Second	340	0			30.8
			Third	70	70			19.3
	P2	Relative Spherical	Main	223	55	0.151	0.209 and 0.411	7.8 and 150.8
			Second	273.52	-24			11.8 and 56
			Third	352.16	23.8			20.2 and 66.6
	P3	Relative Exponential and Spherical	Main	202.41	60.36	0.111	0.1534 and 0.31	12.4 and 138.9
			Second	263.54	-15.36			12.4 and 106.3
			Third	346.29	24.69			4.9 and 57.7

14.9 Block Modelling

Block modelling was undertaken by CSA Global using Micromine version 18.0.846.3x64 software.

A block model ("Model_Final.DAT") was created to encompass the full extent of the Kharmagtai deposits. Block model parameters are shown in Table 34 and block model attributes are shown in Table 35.

The block model used a parent cell size of 20 m(E) x 20 m(N) x 20 m(RL) with sub-celling to 4 m(E) x 4 m(N) x 4 m(RL) to maintain the resolution of the wireframed geological domains and rock types. The northing and easting parent cell size was selected based on approximately half of the average drill section spacing at the deposits. The model cell dimensions were also selected to provide sufficient resolution to the block model in all directions.

An empty block model was created within the closed wireframe models for the geological domains, rock types, barren dyke, level of veining (stockwork) and breccia. The model was also coded according to the oxide zones. Each modelled geological domain was assigned several unique codes in the model file (geology, veining and breccia). The block model was then restricted below the topography surface, i.e. all the model cells above the surface were deleted from the model file. The initial filling with a corresponding parent cell size was followed by sub-celling where necessary. The sub-celling occurred near the boundaries of the geological domains or where models were truncated with the topographic surface. The sub-cells were optimised in the models where possible to form larger cells.

Table 34: Block model parameters

Axis	Extent (m)		Block size (m)	Maximum sub-celling (m)	No. of parent blocks
	Minimum	Maximum			
Easting	590,590	593,810	20	4	161
Northing	4,875,590	4,878,910	20	4	166
RL	10	1,430	20	4	71

Table 35: Block model attributes

Field	Description
EAST	Easting, m
NORTH	Northing, m
RL	RL
_EAST	Easting block size, m
_NORTH	Northing block size, m
_RL	RL block size, m
DENSITY	Density values, t/m^3
RESCAT	Resource categories: 2 – Indicated, 3 – Inferred
OXIDE	Code for oxide zone: 0 – fresh, 1 – oxide zone
ROCK	Rock code: COUNTRY ROCK, P1, P2, P3, TAND, TS CRD, TS CRS, TS P2, TS P5 (see *Table 28*)
STOCK	Stockwork code: 0 - <0.5% veining, 1 – 0.5-1.5% veining, 2 - >1.5% veining
BRX	Breccia code: 0 – not breccia, 1 - breccia
DEPOSIT	Deposit code: AT – Altan Tolgoi, TS – Tsagaan Sudal or ZU – Zesen Uul
CUEQ	Copper equivalent grade field, %
CU_CUT	Copper grade field, %
AU_CUT	Gold grade field, g/t
AG	Silver grade field, g/t

14.10 Grade Interpolation

Copper, gold, silver, molybdenum and sulphur grade values were interpolated into the empty block models separately for each modelled geological domain of the deposits using the Ordinary Kriging method. The deposits' domains are based on geological interpretation of rock types, level of veining, breccia, dyke, oxide zone and are listed in *Table 30*.

The gold and copper grades were interpolated into the empty block models with the top-cuts applied, which were estimated separately for each geological domain. Silver, molybdenum and sulphur grades were interpolated without top-cuts applied. The Ordinary Kriging process was performed at different search radii until all cells were interpolated. The search radii were determined for each domain based on the parameters of the modelled semi-variogram ranges averaged for each direction for copper and gold. The first radii were equal to one third of the averaged semi-variogram long ranges in all directions. The second search radii were equal to two thirds of the averaged semi-variogram long ranges in all directions. The third run employed full averaged semi-variogram ranges in all directions, and all subsequent runs were incremented by averaged full semi-variogram ranges in all direction until all model cells were informed with grades.

The orientation of the search ellipse was determined from the geology of the deposits separately for each geological domain.

The blocks were interpolated using only assay composites restricted by the corresponding domain for each deposit. When model cells were estimated using radii not exceeding the full semi-variogram ranges, a restriction of at least three samples from at least two drillholes or trenches was applied to increase the reliability of the estimates. The interpolation strategy is summarised in Figure 63.

Figure 63: Interpolation parameters

Interpolation method	Ordinary Kriging			
Search radii	Less or equal to 1/3 of semi-variogram ranges	Less or equal to 2/3 of semi-variogram ranges	Less of equal to semi-variogram ranges	Greater than semi-variogram ranges
Minimum no. of samples	3	3	3	1
Maximum no. of samples	16	16	16	16
Minimum no. of drillholes or trenches	2	2	2	1

De-clustering was performed during the interpolation process by using four sectors within the search neighbourhood. Each sector was restricted to a maximum of four points for all the deposits, and the search neighbourhood was restricted to an overall minimum of three points for the interpolation runs using radii within the semi-variogram long ranges. The maximum combined number of samples allowable for the interpolation was therefore 16. Change of support was honoured by discretising to 5-points x 5-points x 5-point kriged estimates. These point estimates are simple averages of the block estimates.

14.11 Bulk Density Values

The results of routine bulk density measurements total approximately 4,500 records in the database along with the rock type and state of oxidation.

Xanadu's geologists analysed all results and supplied CSA Global with averaged measurements for each geological domain separately for each deposit. The following bulk density values were directly applied to all the blocks in the models (*Table 36*).

CSA Global considers that the bulk densities defined in the drill hole database are reasonable to derive tonnages for Mineral Resource estimation.

Table 36: Density values

Deposit	Domain	Density, t/m3
TS	OXIDE ZONE	2.65
	CRD	2.76
	CRS	2.74
	P2	2.78
	P5	2.80
AT	Breccia	2.78
	OXIDE ZONE	2.65
	CR	2.73
	P1	2.78
	P2	2.78
	P3	2.77
	TAND	2.76
ZU	OXIDE ZONE	2.65
	CR	2.71
	P1	2.81
	P2	2.76
	P3	2.76

14.12 Mineral Resource Classification Strategy

The Mineral Resource has been prepared and classified in accordance with CIM Definition Standards for Mineral Resources and Mineral Reserves (10 May 2014) as per NI 43-101 requirements. The classification level is based upon an assessment of geological understanding of the deposit, geological and mineralization continuity, drillhole spacing, QC results, search and interpolation parameters and an analysis of available density information.

The following approach was adopted:

- **Measured Resources**: Not reported.
- **Indicated Resources**: Indicated Mineral Resources are assigned to blocks which were explored with the drill density not exceeding approximately 65 m x 65 m with at least two mineralization intersections on exploration lines. Geological structures are relatively well understood and interpreted.
- **Inferred Resources**: Inferred Mineral Resources are model blocks lying outside the Indicated wireframes, which still display reasonable strike continuity and down dip extension, based on the current drillhole and trench intersections.

The resource classification applied is illustrated in Figure 64 (red – Indicated blocks, grey – Inferred blocks).

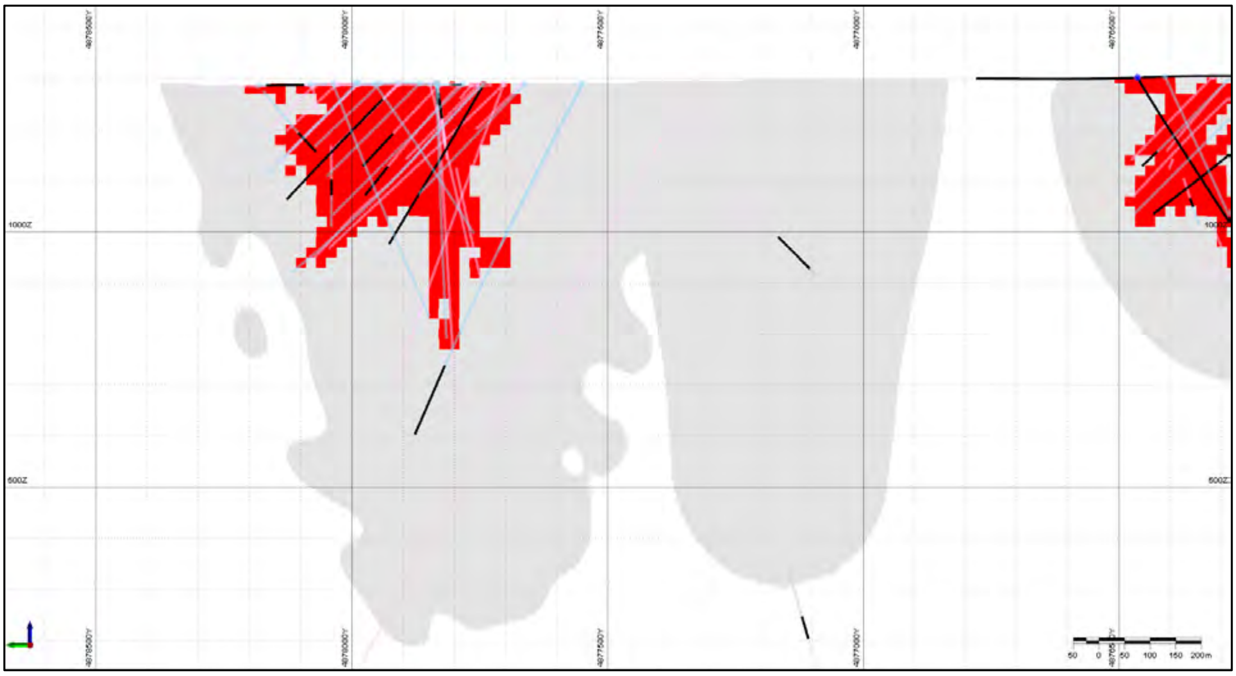


Figure 64: Mineral Resource classification

14.13 Block Model Validation

Validation of the grade estimates was completed by:

- Visual checks on screen in cross-section and plan view to ensure that block model grades honour the grade of sample composites,
- Statistical comparison of sample and block grades,
- Generation of swath plots to compare input and output grades in a semi-local sense, by easting, northing and elevation.

14.13.1 Visual Validation

The block model with interpolated grades was displayed on screen along with the sample grades and colour coded. Visual validation demonstrated close correlation between modelled grades and composited samples (*Figure 65*).

14.13.2 Statistical Validation

The global average copper and gold grades in the models were compared with the global average grades in the composited sample files. It was found that the modelled grades were 5% relative lower than the grades in the composites (0.133 % Cu in the composite file vs. 0.126 % Cu in the block model), and about 43% lower global average gold grades - 0.08 g/t Au in the block model vs 0.14 g/t Au in the composite file, though it was 0.19 g/t Au in the parts of the model classified as Indicated. This is believed to be a natural result due to the data clustering and grade smoothing by all interpolators.

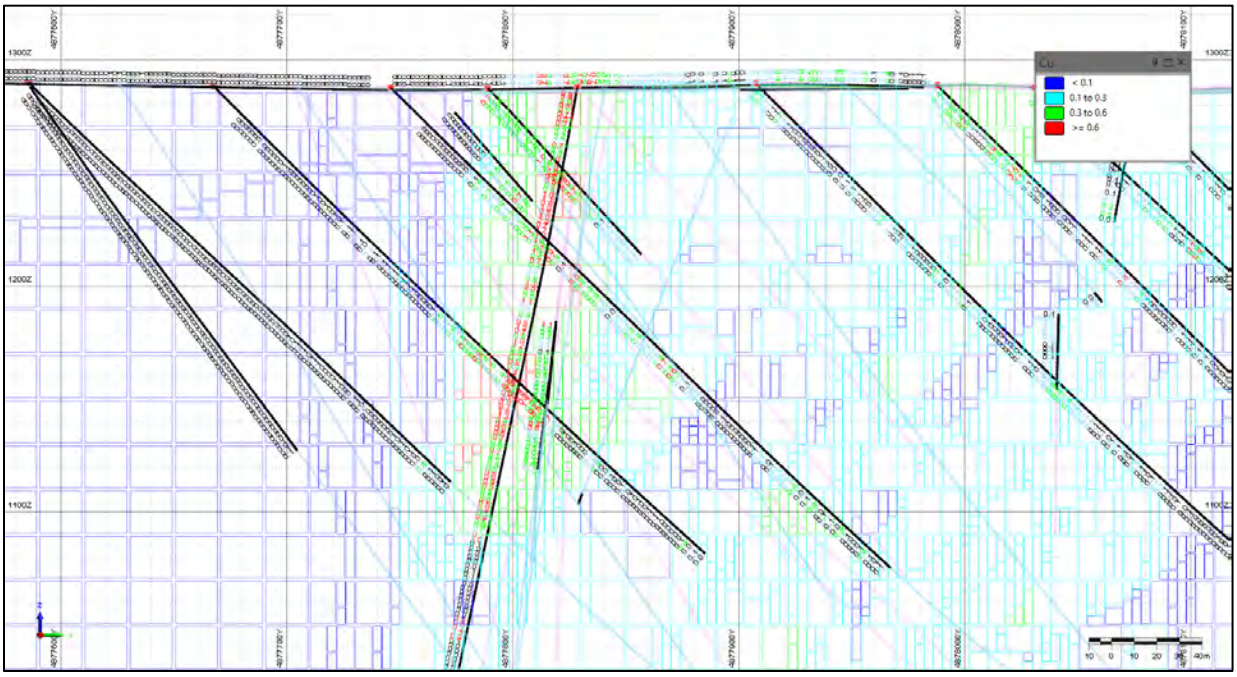


Figure 65: Visual comparison of copper grades in the model vs. assays

14.13.3 Swath Plots

Swath plots were generated for each 20 m bench and each 40 m vertical section in east-west and north-south directions. Swath plots were generated for copper and gold grades separately for each domain. Examples of the results of this validation are shown in *Figure 66* for copper and *Figure 67* for gold for the domain AT-P2-STOCK1. The plots demonstrate close correlation between the modelled copper and gold grades and sample composites. It is apparent that the model has smoothed the composite grades, which is to be expected due to the volume variance effect.

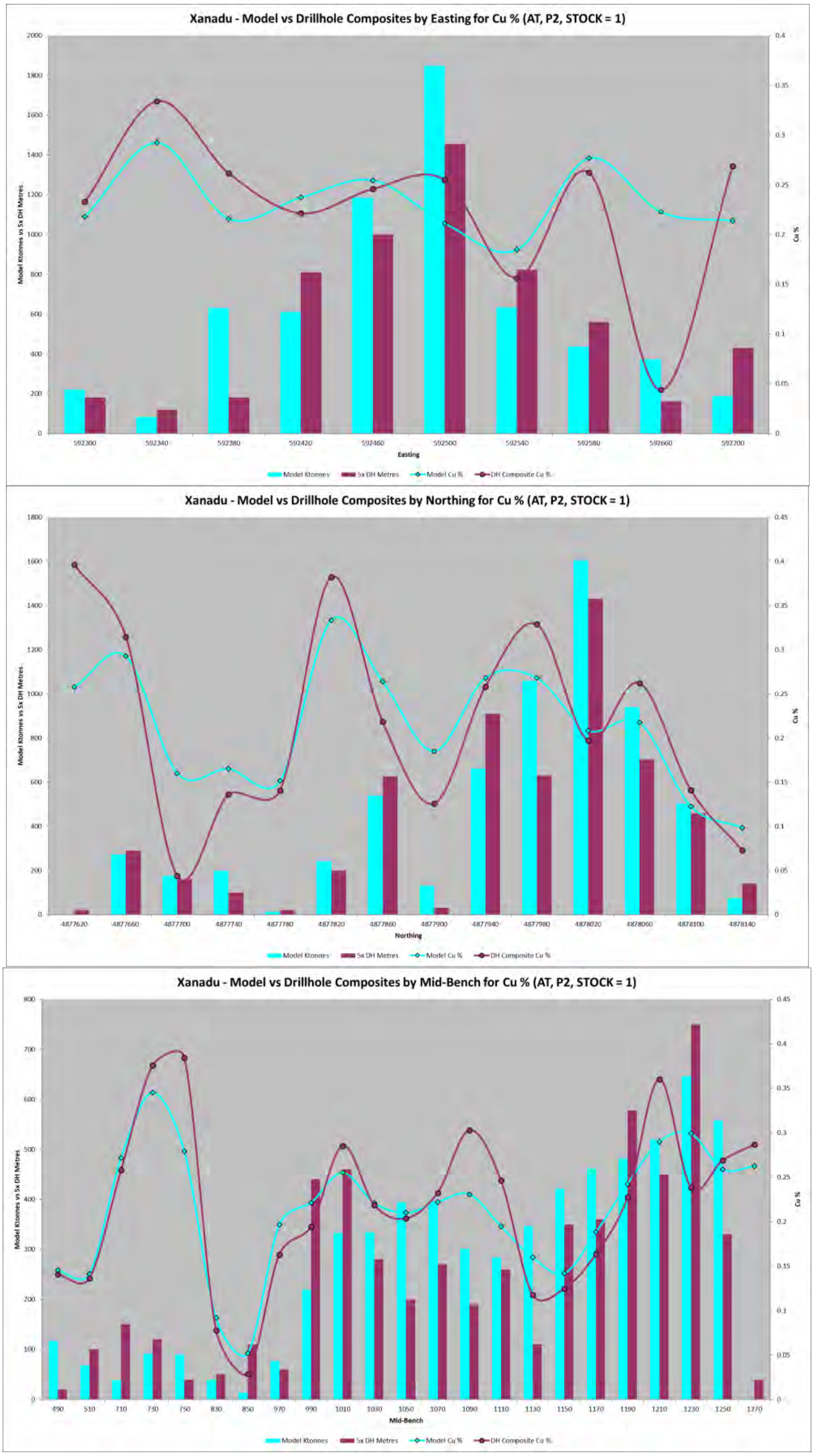


Figure 66: Swath plots for copper grades, Domain AT, P2, STOCK = 1

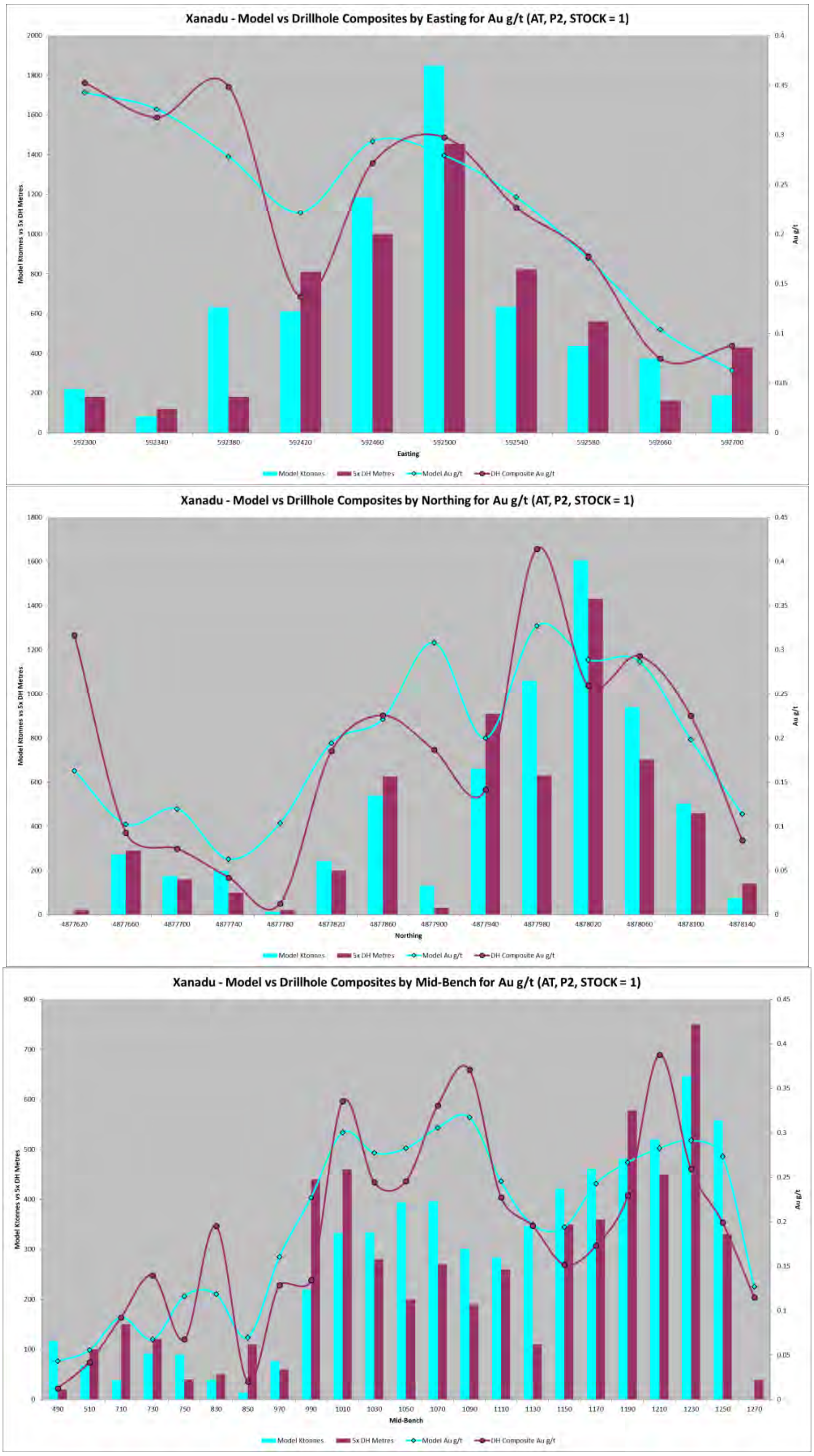


Figure 67: Swath plots for gold grades, Domain AT, P2, STOCK = 1

14.14 Reasonable Prospects of Economic Extraction

CIM Definition Standards for Mineral Resources and Mineral Reserves, adopted by the CIM Council on 10 May 2014 require that resources have “reasonable prospects for economic extraction”. This generally implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resources are reported at an appropriate cut-off grade taking into account possible extraction scenarios and processing recoveries.

CSA Global and the responsible QP consider that portions of the Kharmangtai deposits are amenable to open pit extraction. Deeper drill indicated mineralization that could possibly be extracted by underground mining methods has also been considered.

To meet the reasonable prospects for economic extraction requirement, open pit resources within the block model reported here-in are limited to a preliminary optimised pit shell generated using Micromine™ pit optimization software. Mining and process costs, metal prices as well as process recoveries and pit parameters used to generate the pit shell are presented in Section 14.14.1.

14.14.1 Conceptual pit input parameters

Pit optimization was based on the following information, provided by the Xanadu or generated by CSA Global:

- Block model classified in accordance with CIM Definition Standards (generated by CSA Global)
- Topographic surface (provided by Xanadu)
- Input economic parameters (provided by Xanadu).

The input parameters for the base case are shown in *Table 37* (all costs and prices are in US$).

Table 37: Pit optimisation parameters

Parameters	Units	Value
1. Mining		
Ore mining cost	$/t	2.49
Waste mining cost	$/t	2.49
Mining losses	%	0
Mining dilution	%	5
2. Processing		
Processing cost (including G&A costs)	g/t	4.2
Processing recovery:		
Gold	%	70
Copper	%	85
3. Pricing		
Elements price:		
Gold	$/oz	1,320
Copper	$/t	6,834
Selling cost for Au	$/oz	1,030
Selling cost for Cu	$/t	4
4. Other to optimisation		
SG parameters	t/m^3	2.75
General pit slopes	°	50

CSA Global used 70% recovery for gold and 85% recovery for copper for the conceptual pit optimisation study and for the copper equivalent formula, which are supported by the results of the metallurgical testwork as presented in Section 13.

14.14.2 Pit Optimisation – Conclusions and Recommendations

The QP deems that there are reasonable prospects for eventual economic extraction on the following basis:

- All mineralization is exposed at surface and therefore amenable to lower cost open pit mining.
- Preliminary metallurgical testwork confirmed that Kharmagtai mineralisation is amenable to flotation processes.
- The cut-off grades adopted for reporting (0.3% CuEq for open pit and 0.5% for underground mining methods) are considered reasonable given the Mineral Resource is likely to be exploited mainly by open cut mining methods, possibly followed by underground methods and processed using flotation techniques.

The optimal discounted pit shell for the base case scenario was 2,370 m long x 1,600 m wide and approximately 940 m deep for the combined Altan Tolgoi and Tsagaan Sudal deposits, and it was 630 m long x 410 m wide and approximately 240 m deep for the Zesen Uul deposit (*Figure 68*).

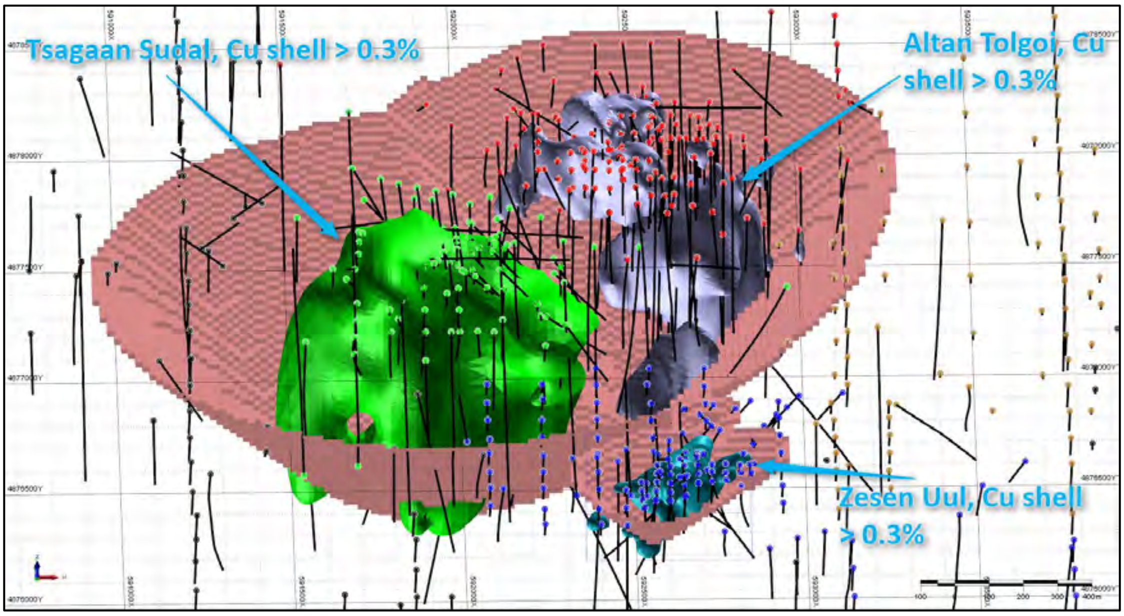


Figure 68: Ultimate and optimal pit shells (looking north)

The pit shell was subsequently used to code the block model so the Mineral Resources could be divided for Open Pit and Underground mining methods.

14.15 Copper Equivalent

Copper equivalent (CuEq) grade values were calculated in the block model post estimation of copper and gold grades. The following formula was applied to each cell in the block model:

$$CuEq = Cu + Au * 0.62097 * 0.8235,$$

Where:

Cu	-	copper grade (%)
Au	-	gold grade (g/t)
0.62097	-	conversion factor (gold to copper)
0.8235	-	relative recovery of gold to copper (82.35%)

The copper equivalent formula was based on the following parameters (prices are in USD):

- Copper price - 3.1 $/lb (or 6834 $/t)
- Gold price - 1320 $/oz
- Copper recovery - 85%
- Gold recovery - 70%

Relative recovery of gold to copper = 70% / 85% = 82.35%.

14.16 Mineral Resource Statement

The MRE has been reported in accordance with the CIM Definition Standards by classification in *Table 38* for open pit mining and in

Table 39 for underground mining method. The Mineral Resources have been reported above a cut-off of 0.3% CuEq for open pit mining with the separate reporting for oxide and primary material, and also sulphide material above 0.5% CuEq for underground mining and are current to 1 October 2018.

Table 38: Kharmagtai Open Pit Mineral Resources as at 1 October 2018

Deposit	Oxide Zone	Classification	Tonnes	Grades			Contained Metal		
			Mt	CuEq, %	Cu, %	Au, g/t	CuEq, Kt	Cu, Kt	Au, Koz
Tsagaan Sudal	Primary	Indicated	37.5	0.42	0.29	0.24	156	111	288
	Oxide		7.6	0.43	0.32	0.21	33	24	52
Altan Tolgoi	Primary		69.4	0.60	0.39	0.40	414	271	900
	Oxide		5.0	0.53	0.31	0.45	27	15	72
Zesen Uul	Primary		8.1	0.81	0.50	0.60	65	40	156
	Oxide		1.6	0.50	0.38	0.22	8	6	12
Total	**Primary**		**115.0**	**0.55**	**0.37**	**0.36**	**636**	**422**	**1,343**
	Oxide		**14.3**	**0.47**	**0.32**	**0.30**	**68**	**46**	**136**
Tsagaan Sudal	Primary	Inferred	408.5	0.40	0.32	0.17	1,638	1,288	2,201
	Oxide		4.2	0.36	0.27	0.19	15	11	26
Altan Tolgoi	Primary		54.9	0.47	0.30	0.34	261	166	596
	Oxide		0.5	0.38	0.23	0.28	2	1	5
Zesen Uul	Primary		0.5	0.36	0.27	0.16	2	1	3
	Oxide		0.2	0.46	0.39	0.14	1	1	1
Total	**Primary**		**463.9**	**0.41**	**0.31**	**0.19**	**1,900**	**1,455**	**2,800**
	Oxide		**5.0**	**0.37**	**0.27**	**0.20**	**18**	**13**	**32**

Table 39: Kharmagtai Underground Mineral Resources as at 1 October 2018

Deposit	Classification	Tonnes	Grades			Contained Metal		
		Mt	CuEq, %	Cu, %	Au, g/t	CuEq, Kt	Cu, Kt	Au, Koz
Altan Tolgoi	Indicated	1.2	0.68	0.45	0.46	8	5	18
Zesen Uul		0.2	0.63	0.46	0.33	1	1	2
Total Indicated		**1.5**	**0.67**	**0.45**	**0.44**	**10**	**7**	**21**
Tsagaan Sudal	Inferred	3.5	0.56	0.46	0.19	19	16	21
Altan Tolgoi		4.8	0.68	0.43	0.49	33	21	77
Total Inferred		**8.3**	**0.63**	**0.44**	**0.37**	**52**	**37**	**98**

Notes:

- *Mineral Resources are classified according to CIM definitions.*
- *Mineral Resources for open pit mining are estimated within the limits of an ultimate pit shell.*
- *Mineral Resources for underground mining are estimated outside the limits of ultimate pit shell.*
- *A cut-off grade of 0.3% CuEq has been applied for open pit resources.*
- *A cut-off grade of 0.5% CuEq has been applied for open pit resources.*
- *Density values of 2.65 t/m^3 for oxide zones; 2.76, 2.74, 2.73 and 2.71 t/m^3 for country rocks, 2.78, 2.80 2.77, 2.81 and 2.76 t/m^3 for porphyries and 2.76 t/m^3 for andesite dyke were used for the model cells.*
- *CuEq – copper equivalent was calculated using conversion factor 0.62097 for gold. Metal prices were 3.1 $/lb for copper and 1320 $/oz for gold, recoveries – 70% for goled and 85% for copper (82.35% relative gold to copper recovery), copper equivalent formula applied: CuEq = Cu + Au * 0.62097 * 0.8235.*
- *Rows and columns may not add up exactly due to rounding.*

Grade-tonnage sensitivity information with cut-off grades between 0.2 and 0.6% CuEq with subdivision to deposits is provided in **Error! Reference source not found.**.

Table 40: Grade Tonnage Sensitivity Summary

Cut-Off CuEq(%)	Mining Method	Resource Category	Material (Mt)	CuEq (%)	Cu (%)	Au (g/t)	Cu (kt)	Au (Koz)	CuEq
0.2	OC	Indicated	187.6	0.45	0.31	0.29	572.5	1737.0	848.8
0.2	OC	Inferred	854.5	0.34	0.26	0.15	2205.6	4228.6	2878.2
0.3	OC	Indicated	129.3	0.54	0.36	0.36	468.0	1478.9	703.2
0.3	OC	Inferred	468.9	0.41	0.31	0.19	1468.2	2831.7	1918.6
0.4	OC	Indicated	80.0	0.67	0.43	0.46	346.0	1172.7	532.5
0.4	OC	Inferred	189.9	0.50	0.38	0.24	718.5	1479.1	953.7
0.4	UG	Indicated	2.3	0.59	0.40	0.37	9.1	27.1	13.4
0.4	UG	Inferred	28.4	0.51	0.38	0.26	106.6	232.9	143.7
0.5	OC	Indicated	49.4	0.80	0.51	0.57	251.1	912.2	396.2
0.5	OC	Inferred	68.2	0.60	0.44	0.33	297.3	723.4	412.4
0.5	UG	Indicated	1.5	0.67	0.45	0.44	6.6	20.6	9.9
0.5	UG	Inferred	8.3	0.63	0.44	0.37	36.7	98.4	52.4
0.6	OC	Indicated	33.0	0.93	0.57	0.69	189.6	736.1	306.7
0.6	OC	Inferred	20.7	0.75	0.50	0.49	103.8	323.9	155.3
0.6	UG	Indicated	0.9	0.75	0.49	0.50	4.5	14.9	6.9
0.6	UG	Inferred	3.9	0.74	0.49	0.49	19.1	60.8	28.7

14.17 Difference from Previous Resource Estimate

Mining Associates Limited ("MA") completed a MRE for the Kharmagtai project in April 2015.

MA reported Mineral Resource using copper equivalent formula as follows: CuEq = Cu + Au * 0.6378, which was based on 2.60 $/lb copper price, 1300 $/oz gold price, 90% copper recovery and 70.85% gold recovery (78.72% relative recovery of gold to copper).

MA reported two statements - Mineral Resource with 0.3% CuEq cut-off for open pit mining and 0.5% CuEq for underground mining, and also with 0.6% CuEq for both open pit and underground mining. The statement with 0.3 and 0.5% CuEq cut-offs is shown in *Table 41*.

Generally, MA reported less tonnage for open pit mining with similar average grades (9.8% relative higher CuEq grade), and significantly higher tonnage for underground mining with similar grades (5% higher CuEq).

The primary differences are due to additional drilling and mineralised intercepts being included in the CSA Resource, improved geological understanding of the deposits, changes in the ultimate pit shell parameters used to estimate the MRE. There is also a difference in the applied copper equivalent formulas – in the MA work no account was made for the metal recoveries in the metal equivalent calculation whereas CSA Global used the recoveries which does generate a more conservative number when looking at the copper equivalent grade.

Table 41: Mining Associates Mineral Resources as at 30 April 2015 (Vigar 2018)

Deposit	Mining Method	Cut-Off CuEq(%)	Resource Category	Material (Mt)	Grade Cu(%)	Grade Au(g/t)	Grade CuEq (%)	Metal Cu(Mlb)	Metal Au(Koz)	Metal CuEq (kt)
Altan Tolgoi	OC	0.3	Indicated	14.5	0.37	0.56	0.73	119	262	105.9
			Inferred	7.5	0.30	0.44	0.58	49	106	43.5
			Subtotal	**22.0**	**0.35**	**0.52**	**0.68**	**168**	**368**	**149.6**
	UG	0.5	Indicated	23.2	0.43	0.47	0.73	219	350	169.4
			Inferred	32.8	0.43	0.43	0.70	311	453	229.6
			Subtotal	**55.9**	**0.43**	**0.45**	**0.71**	**530**	**803**	**396.9**
	Combined		**Indicated**	**37.7**	**0.41**	**0.50**	**0.73**	**338**	**612**	**275.2**
			Inferred	**40.2**	**0.41**	**0.43**	**0.68**	**360**	**559**	**273.4**
			Total	**78.0**	**0.41**	**0.47**	**0.70**	**698**	**1,171**	**546.0**
Tsagaan Sudal	OC	0.3	Indicated	-	-	-	-	-	-	
			Inferred	97.7	0.27	0.23	0.41	581	722	400.6
			Subtotal	**97.7**	**0.27**	**0.23**	**0.41**	**581**	**722**	**400.6**
	UG	0.5	Indicated	-	-	-	-	-	-	
			Inferred	17.7	0.39	0.24	0.54	152	136	95.6
			Subtotal	**17.7**	**0.39**	**0.24**	**0.54**	**152**	**136**	**95.6**
	Combined		**Indicated**	-	-	-	-	-	-	
			Inferred	**115.4**	**0.29**	**0.23**	**0.43**	**733**	**859**	**496.2**
			Total	**115.4**	**0.29**	**0.23**	**0.43**	**733**	**859**	**496.2**
Zesen Uul	OC	0.3	Indicated	8.0	0.5	0.5	0.8	84.6	138.8	64.0
			Inferred	1.4	0.3	0.1	0.4	10.5	5.4	5.6
			Subtotal	**9.4**	**0.46**	**0.48**	**0.76**	**95**	**144**	**71.4**
	UG	0.5	Indicated	0.6	0.4	0.4	0.7	5.7	8.8	4.2
			Inferred	0.1	0.3	0.5	0.6	0.5	1.3	0.6
			Subtotal	**0.7**	**0.40**	**0.44**	**0.67**	**6**	**10**	**4.7**
	Combined		**Indicated**	**8.6**	**0.47**	**0.53**	**0.81**	**90**	**148**	**69.7**
			Inferred	**1.5**	**0.34**	**0.14**	**0.42**	**11**	**7**	**6.3**
			Total	**10.1**	**0.45**	**0.47**	**0.75**	**101**	**154**	**75.8**
All	**OC**	**0.3**	**Indicated**	**23**	**0.41**	**0.55**	**0.76**	**203**	**401**	**174.8**
			Inferred	**107**	**0.27**	**0.24**	**0.42**	**641**	**833**	**449.4**
			Subtotal	**129**	**0.30**	**0.30**	**0.48**	**844**	**1,234**	**619.2**
	UG	**0.5**	**Indicated**	**24**	**0.43**	**0.47**	**0.73**	**225**	**359**	**175.2**
			Inferred	**51**	**0.42**	**0.36**	**0.64**	**463**	**591**	**326.4**
			Subtotal	**74**	**0.42**	**0.40**	**0.67**	**688**	**950**	**495.8**
	Combined		**Indicated**	**46**	**0.42**	**0.51**	**0.74**	**428**	**759**	**340.4**
			Inferred	**157**	**0.32**	**0.28**	**0.49**	**1,104**	**1,424**	**769.3**
			Total	**203**	**0.34**	**0.33**	**0.55**	**1,533**	**2,184**	**1116.5**

15 Mineral Reserve Estimates

This section is not applicable to the current Report.

16 Mining Methods

This section is not applicable to the current Report.

17 Recovery Methods

This section is not applicable to the current Report.

18 Project Infrastructure

This section is not applicable to the current Report.

19 Market Studies and Contracts

This section is not applicable to the current Report.

20 Environmental Studies, Permitting and Social or Community Impact

This section is not applicable to the current Report.

21 Capital and Operating Costs

This section is not applicable to the current Report.

22 Economic Analysis

This section is not applicable to the current Report.

23 Adjacent Properties

The responsible QP is unaware of any significant exploration activity or results on immediately adjacent third-party mineral properties.

24 Other Relevant Data and Information

No additional information or explanation is necessary to make this Technical Report understandable and not misleading.

25 Interpretation and Conclusions

This report was initiated by Xanadu Mines Limited. CSA Global was commissioned to update the Mineral Resources for the Kharmagtai project located in Mongolia incorporating all available exploration results. The report describes the work done by CSA Global to estimate Mineral Resources at the Kharmagtai project, the modelling methodology and results, and results of the site visit, laboratory inspection and QA/QC review. The geological interpretation and modelling work has resulted in CSA Global updating a Mineral Resource and reporting using copper, gold and copper equivalent grades, which were based on the current metal prices and estimated metallurgical recoveries of the metals.

CSA Global and the responsible QP completed all major modelling steps and stages, including database import and validation, interpretation and development of mineralisation model, statistical analyses, grade interpolation and model reporting. Xanadu geologists developed and supplied CSA Global with the 3D wireframe models for the main geological features of the project. The complete analytical data file was used to perform classical statistical analysis. The analytical data was composited to 2 m, which was the most common length for routine sampling of the mineralization. The Ordinary Kriging approach was applied to estimate copper and gold grades.

CSA Global and the responsible QP believes this Mineral Resource is a reliable estimate of the known mineralization present at the Kharmagtai Project. The data used as inputs to the model have been collected and compiled to a high standard and indicate that the project is a high-quality mineral asset. Additionally, the project has significant potential to upgrade Mineral Resources from Inferred category to Indicated, as about 80% of Mineral Resources are classified as Inferred at this stage of the project development. As such, CSA Global and the responsible QP recommends that additional exploration and infill drilling work be conducted at the project to upgrade the classification of the current Mineral Resource to a higher classification, particularly for areas suitable for the open pit mining method, and also to increase the confidence in the estimates.

Initial conceptual pit optimisation indicates that most of the Mineral Resource could potentially be extracted using open pit methods; the remaining areas could potentially be mined by underground method.

A review of the project risks identified the following:

- Initial data: Initial data is of industry standard, and the overall risk related to the quality of the data used for Mineral Resource estimate is considered to be low;
- Mineral Resource: The mineral resource model is based on the current understanding of the deposit geology gained from the results of drill hole logging. Infill drilling in critical areas currently classified as Inferred would significantly reduce any potential risk related to the deposit geology and distribution of grades. The mineral resource model classified as Indicated is sufficiently reliable to support engineering and design studies to evaluate mining project economics.
- QA/QC: Quality Assurance and Quality Control procedures and protocols are well described in the reports supplied by Xanadu and observed onsite by the responsible QP. The QA/QC procedures reflect or exceed accepted industry standards. Therefore QA/QC risk is considered to be low.

- Mining: It is expected that significant part of the deposit will be mined using industry standard open pit mining techniques utilising modern technology with proven success, with no requirement for untried or untested technology. However, some areas of the deposit could potentially be mined using underground methods.
- Processing: Results of the metallurgical test work shows the mineralogy and metallurgy of the Kharmagtai mineralization is readily amenable to flotation with relatively high metal recoveries.
- Environmental and Social: The deposit is located in a sparsely populated cold-climate desert area with very limited population. There are no permanent dwellings within or near the project other than Xanadu's camp facilities, and the dominant land use is seasonal grazing by nomadic livestock herders. Vegetation is dominated by patchy grassland and small plants, with almost no trees, thus environmental and social risks are considered minimal.

26 Recommendations

CSA Global recommends the following actions are completed to support the ongoing exploration and evaluation effort at the Kharmagtai project:

- Current quality assurance procedures should be maintained to ensure high-quality data is available for subsequent resource estimates.
- Further exploration and evaluation programs are recommended (indicative costs are CAD$):
  - Significant upside exists to extend and upgrade the Mineral Resources across the Kharmagtai project. Mineralization at the three existing Mineral Resources (defined herein) is open at depth, with potential to increase tonnages and upgrade classifications with additional drill density at depth ($2M)
    - The existing Resources are also potentially amenable to infill and extension drilling nearer to surface, particularly if slightly lower cut off grades can be justified.
    - Infill drilling will be required within the Inferred areas if a higher classification is sought by Xanadu. CSA Global would recommend a similar drill density to that in place in the Indicated Resources areas reported herein.
    - Infill drilling in critical areas would significantly reduce any potential risk in future Mineral Resource updates and further economic assessment of the project, particularly at the deeper parts of the deposit that may be amenable to underground mining
    - Numerous other priority exploration targets across the tenement would also benefit significantly from additional exploration, infill and extension drilling to a level that can potentially support the estimation of additional Resources on other porphyry centres away from the existing Resources at Stockwork Hill, Copper Hill and White Hill.
- More detailed metallurgical studies to better understand recoveries within the deposit:
  - Application of quantitative geometallurgical characterisation, classification and 3D modelling using existing four-acid ICP-AES geochemistry and SWIR spectral mineralogy would greatly enhance future metallurgical testwork program design, and the 3D mineralogical models would also contribute to further improvement of 3D geological models for ongoing exploration targeting and future Mineral Resource upgrades ($50k).
  - Develop and implement a more detailed metallurgical sampling and test work program designed to collect representative samples from the mineral domains developed from the geometallurgical study ($250k)
  - Complete locked-cycle flotation testwork to refine and improve metallurgical recovery ($200k).
- Complete supporting study work for other disciplines required for more advanced technical studies such as geotechnical assessment, tailings characterisation, hydrogeology, environmental and community engagement ($1-2M).
- Advance to the project to a preliminary economic assessment ($250k)

- Geotechnical and hydrogeological drilling and assessment is required to support pit wall stability, mining parameters and cost estimation.

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28 Dates and Signatures

This Report titled "NI 43-101 Technical Report on Kharmagtai Copper-Gold Project Mineral Resource Update, Mongolia" for Xanadu Mines Ltd and dated December 14, 2018 was prepared and signed by the following co-authors:

["SIGNED"]
{*Warren Potma*}

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Dated at Perth, WA
14 December 2018

Warren Potma, MSc, MAIG, MAUSIMM
Principal Geologist
CSA Global

["SIGNED"]
{*Dmitry Pertel*}

____

Dated at Perth, WA
14 December 2018

Dmitry Pertel, MSc (Geology), MAIG
Manager Resources, Principal Geologist
CSA Global

["SIGNED AND SEALED"]
{*Andy Holloway*}

____

Dated at Peterborough, ON
14 December 2018

Andy Holloway, BEng (Hons), C.Eng., P. Eng.
Partner and Principal Process Engineer
AGP Mining Consultants Inc.

Report Effective Date:

01 October 2018

29 Certificates of Qualification

Certificate of Qualification of Co-Author: Warren Potma, MSc, MAIG, MAUSIMM

I, Warren A. Potma, M.Sc., do hereby certify that:

1) I am employed as a Principal Geologist by CSA Global Pty Ltd located at Level 2, 3 Ord Street, West Perth, Western Australia 6005.
2) I graduated with a degree in Bachelor of Arts, Geology, from Monash University, Melbourne, Australia in 1993 and a Master of Science, Geology, from Monash University in 1996.
3) I am a member of the Australian Institute of Geoscientists (AIG) and the Australasian Institute of Mining and Metallurgy.
4) I have approximately 20 years of direct experience with precious and base metals mineral exploration and mining in Australia, Chile, China, Sudan and Spain including project evaluation JORC CP reporting and management.
5) I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6) I have visited Xanadu's Kharmagtai Project on 19 to 22 September 2018.
7) I am a co-author of the technical report titled: "NI 43-101 Technical Report on Kharmagtai Copper-Gold Project Mineral Resource Update, Mongolia" for Xanadu Mines Ltd and dated December 14, 2018 (the "Technical Report"). I am responsible for Sections 2 to 12, 16, 18, 23 and 24, 27 and relevant parts of Sections 1, 25 and 26 of the Report.
8) I have had limited prior involvement with the issuer and the Property that is the subject of the Technical Report.
9) As of the Effective Date of the technical report (01 October 2018), 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.
10) I am independent of the Issuer, and the Property applying all the tests in section 1.5 of NI 43-101.
11) I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
12) I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

DATED this 14 day of December 2018

["SIGNED"]

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Warren A. Potma, M.Sc., MAIG, MAUSIMM.

Certificate of Qualification of Co-Author: Dmitry Pertel, MSc, MAIG

I, Dmitry Pertel, M.Sc., do hereby certify that:

1) I am employed as a Principal Geologist by CSA Global Pty Ltd located at Level 2, 3 Ord Street, West Perth, Western Australia 6005.
2) I graduated with a Master's degree in Geology from Saint Petersburg Mining University, Russia in 1986.
3) I am a member of the Australian Institute of Geoscientists (AIG).
4) I have approximately 30 years of direct experience with precious and base metals mineral exploration and mining in Australia, Russia, Mongolia, Spain, Bosnia and Hercegovina and Serbia including project evaluation JORC CP reporting and management.
5) I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6) I have not visited Xanadu's Kharmagtai Project.
7) I am a co-author of the technical report titled: "NI 43-101 Technical Report on Kharmagtai Copper-Gold Project Mineral Resource Update, Mongolia" for Xanadu Mines Ltd and dated December 14, 2018 (the "Technical Report"). I am responsible for Sections 12, 14 to 15, 19 to 22 and relevant parts of Sections 1, 25 and 26 of the Report.
8) I have had limited prior involvement with the issuer and the Property that is the subject of the Technical Report.
9) As of the Effective Date of the technical report (01 October 2018), 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.
10) I am independent of the Issuer, and the Property applying all the tests in section 1.5 of NI 43-101.
11) I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
12) I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

DATED this 14 day of December 2018

["SIGNED"]

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Dmitry Pertel, M.Sc., MAIG

Certificate of Qualification of Co-Author –Andy Holloway, CEng., P.Eng.

I, Andy Holloway, CEng., P.Eng. of Peterborough, Ontario Canada as a Qualified Person of this technical report titled "NI 43-101 Technical Report on Kharmagtai Copper-Gold Project Mineral Resource Update, Mongolia" (the "Technical Report") prepared for Xanadu Mines Ltd with an effective date of 01 October 2018 and a report date of 14 December 2018, do hereby certify that:

- I am employed as a Principal Process Engineer with AGP Mining Consultants Inc. located at #246-132K Commerce Park Drive, Barrie Ontario L4N 0Z7.
- I graduated from the University of Newcastle upon Tyne, England, B.Eng. (Hons), 1989.
- I am a member in good standing of Professional Engineers of Ontario, membership #100082475.
- I have practiced my profession in the mining industry continuously since graduation. My relevant experience with respect to metallurgy and mining project management includes 28 years' experience in the mining sector covering mineral processing, process plant operation, design engineering, and operations and project management. I have been involved in numerous projects around the world in both base metal, industrial mineral and precious metal deposits.
- I am responsible for Section 13 and 17 of the technical report.
- 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 associated (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.
- I have not visited Xanadu's Kharmagtai Project.
- I am independent of Xanadu Mines Ltd and CSA Global Canada Geosciences Ltd. as described by Section 1.5 of the instrument.
- I have had no previous involvement with the Xanadu's Kharmagtai Project.
- I have read NI 43-101, and the technical report has been prepared in compliance with NI 43-101 and Form 43-101F1.
- As of the effective date of the technical report, to the best of my knowledge, information, and belief, the sections of the technical report that I am responsible for, contain all scientific and technical information that is required to be disclosed to make those sections of the technical report not misleading.

Dated at Peterborough, Ontario Canada this 14th day of December 2018.

["Signed and Sealed"]

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Andy Holloway, CEng., P.Eng.

Australia • Canada • Indonesia • Russia
Singapore • South Africa • United Kingdom

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CONSENT OF WARREN POTMA

To:
Ontario Securities Commission
Toronto Stock Exchange

Dear Sirs/Mesdames:

Re: Xanadu Mines Ltd. (the "Company")
Filing of Technical Report with date of December 14, 2018

I, Warren Potma, MAIG, consent to the public filing of the technical report titled "NI 43-101 Technical Report on Kharmagtai Copper-Gold Project Mineral Resource Update, Mongolia" for Xanadu Mines Ltd dated December 14, 2018 with an effective date of October 01, 2018 and prepared for the Company by authors Warren Potma and Dmitry Pertel of CSA Global Pty Ltd and Andy Holloway of AGP Mining Consultants Inc. (the "Technical Report").

I also consent to the use of extracts from, or a summary of, the Technical Report in the news release of the Company dated October 31, 2018 (the "News Release").

I confirm that I have read the News Release filed by the Company that the Technical Report supports and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated this 14th day of December 2018.

["SIGNED"]
{Warren Potma}

____
Warren Potma, M.Sc., MAIG
Principal Geologist,
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CONSENT OF DMITRY PERTEL

To:
Ontario Securities Commission
Toronto Stock Exchange

Dear Sirs/Mesdames:

Re: Xanadu Mines Ltd. (the "Company")
Filing of Technical Report with date of December 14, 2018

I, Dmitry Pertel, MAIG, consent to the public filing of the technical report titled "NI 43-101 Technical Report on Kharmagtai Copper-Gold Project Mineral Resource Update, Mongolia" for Xanadu Mines Ltd dated December 14, 2018 with an effective date of October 01, 2018 and prepared for the Company by authors Warren Potma and Dmitry Pertel of CSA Global Pty Ltd and Andy Holloway of AGP Mining Consultants Inc. (the "Technical Report").

I also consent to the use of extracts from, or a summary of, the Technical Report in the news release of the Company dated October 31, 2018 (the "News Release").

I confirm that I have read the News Release filed by the Company that the Technical Report supports and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated this 14th day of December 2018.

["SIGNED"]
{Dmitry Pertel}

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Dmitry Pertel, M.Sc., MAIG
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CONSENT OF ANDY HOLLOWAY

To:
Ontario Securities Commission
Toronto Stock Exchange

Dear Sirs/Mesdames:

Re: Xanadu Mines Ltd. (the "Company")
Filing of Technical Report with date of December 14, 2018

I, Andy Holloway, BEng (Hons), C.Eng., P. Eng., Partner and Principal Process Engineer of AGP Mining Consultants Inc., consent to the public filing of the technical report titled "NI 43-101 Technical Report on Kharmagtai Copper-Gold Project Mineral Resource Update, Mongolia" for Xanadu Mines Ltd dated December 14, 2018 with an effective date of October 01, 2018 and prepared for the Company by authors Warren Potma and Dmitry Pertel of CSA Global Pty Ltd and Andy Holloway of AGP Mining Consultants Inc. (the "Technical Report").

I also consent to the use of extracts from, or a summary of, the Technical Report in the news release of the Company dated October 31, 2018 (the "News Release").

I confirm that I have read the News Release filed by the Company that the Technical Report supports and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated this 14th day of December 2018.

["SIGNED"]
{Andy Holloway}

____
Andy Holloway, BEng (Hons), C.Eng., P. Eng.
Process Engineer,
AGP Mining Consultants Inc.