

Mount Shaw Copper-Gold Project November 2022

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Who we are



Kent is an Australian exploration geologist graduating from the Univeristy of Melbourne with a Bachelor of Science in 2010. Since then Kent has worked in Australia, Africa, North America and Central Asia gaining experience in Coal Seam Gas, Iron Ore, Mineral Sands, Gold and Base Metals. Kent moved to Kazakhstan in 2013 and was the first boots on the ground for Iluka Resouces in Kazkhstan that led to Iluka gaining tenure over ~60,000sqkm in North Kazakhstan. Subsequent to this Kent was co founder and Chief Geologist of Aurora Minerals Group in Kazakhstan. Aurora Minerals Group is a full service consultancy and was the agent of SkyTEM in the former Soviet Union. In 2017 Kent returned to Australia and founded Gippsland Prospecting which was sold in a cash and share transaction to Battery Minerals (ASX:BAT) in 2020.



Dr Thomas Fromhold is an Australian exploration geologist graduating from the University of Melbourne with a BSc. (Hons) in 2005, and subsequently completed a PhD at the University of Melbourne in 2011. Since then, Thomas has attained a solid 10+ years of hands on industry experience as an exploration geologist in both Australia and Scandinavia. For 4 of these years he held the role of Exploration Manager with Mandalay Resources Corporation, which included a broad spectrum of responsibilities ranging from district-scale exploration throughout Scandinavia to the near-mine environment to support the Björkdal gold mining operation in northern Sweden. Over the last four years Thomas has been an independent prospector (responsible for the Dalbacken Au-discovery north-west of Skelleteå), and director of Fromhold Geoconsult Pty Ltd. & Fromhold Geoconsult AB, his geological consulting companies, servicing clients in both Australia and Scandinavia. Thomas is also a director of Elemental Exploration Scandinavia AB, a private exploration company with gold and nickel-copper-cobalt assets in Sweden. Thomas presently resides in northern Sweden near the town of Skellefteå.



Dr Malek Ghantous graduated from the University of Melbourne with a Bachelor of Science (Hons) and a Bachelor of Arts before completing his PhD in physical oceanography there in 2011. Following on from this he took on a Research Fellowship at Swinburne University of Technology, becoming an Adjunct Fellow after moving to Toulouse, France, where he has been a research engineer for the National Centre for Scientific Research (CNRS) and the national weather forecasting body, Meteo France. His research involved physical modelling of the ocean and waves and assimilation of satellite observations. He currently works at CLS (Collecte Localisation Satellites), an international company started by and part-owned by the French space agency (CNES), specialising in radar altimetry for observing the ocean surface height and waves. His work covers a broad range of subjects involving physical oceanography, remote sensing and advanced mathematical and statistical techniques and machine learning.



LANGDON WARNER PROPOSAL

- We present the Mount Shaw Copper Project located in Queensland, Australia, as the basis for consideration of investment.
- We aim to combine traditional field and geophysical techniques with novel machine-learning algorithms to guide the exploration process.
- Data-streams so far planned to be captured and integrated include soil geochemistry, alteration/structural mapping, ground/drone geophysics and all forms of applicable and available satellite imagery.
- Once the technique proves itself successful in the camp/tenement-scale, and targets identified/tested, the algorithms can be up-scaled to the regional/district scales created a powerful exploration tool for regional and 'first-mover' explorers

Mt Shaw Copper Project – Overview

- A new exploration project, Located in Central Queensland, Australia
- 370 km NW of Brisbane
- 243 square km granted as EPM27891 for 5 years, beginning June 2022
- Ownership 100% Langdon Warner Pty Ltd.



Regional geology

- Project lies in the Northern New England orogen, proximal to some known Porphyry systems.
- A known porphyry district (see "Porphyry-type Copper and Molybdenum mineralization in Eastern Queensland, Horton 1982").
- The project is proximal to the Cracow (3moz) and Mount Morgan (8moz) mines.



Location of EPM27891 superimposed on Figure 2 and Figure 5 from Horton 1982. Black dots are known Porphyry systems



Mt Shaw Copper Project – Geology





- Permian age Camboon volcanics (host to the 80k Oz/yr Cracow gold deposit)
- Triassic age intermediate intrusives
- Grevillia thrust fault defines the major central lineament
- Existing historical copper occurrences present
 - 9 tonnes @ 35% Cu, 4g Au, 120g Ag recorded from historical workings
 - Supergene-style mineralisation

Mt Shaw Copper Project Reconnaissance fieldwork – July 2022

MTS00042

- 50 samples taken in initial orientation survey – first 10 rock chips received
- Peak Cu value 18% over Mount Shaw historical workings
- Clear geochemical affinities present among Cu-enriched samples -> geochem. vectors present

MTS0043

MTS0045

0.0002

0.0002

0.055

0.028

0.56

0.13

5.25 <2

0.72 <2

48.5

10.1

0.036

0.013



3.57

0.385

7.69

2.46

43.2

11.65

0.255

0.026

105.5

76.6

1.28

1.08

2.03

0.446

0.022

0.005

0.116

0.036

0.009

0.002 < 0.005

0.013

0.03

0.01

0.0368

0.0158

22.3

1.41

0.192

0.014

MTS00042

Sample 0042: Fresh propylitic altered volcanics, 5000ppm Cu.



MTS0042 location





Mt Shaw Copper Project Previous work

- Previous work by Solgold (Central Minerals, 2012/13) solely targeted shallow historical working; the Mount Shaw, Valencia and Lone Hand mines
- No further geologically controlled targets were pursued
- A significant intrusion central to all three historical mines was overlooked







Mt Shaw Copper Project Geochemistry program November 2022





- Orientation soil sampling completed in July 2022 50 samples results have recently been received.
- Follow up geochemical sampling program completed in November 2022, results expected in December 2022.

Mt Shaw Copper Project Machine Learning Approach

- Some of the funds provided by the BHP Xplore grant will be used for an development of an Al tool to guide exploration decisions
- To use a multi-disciplinary approach to find subtle features contained in available satellite and in situ data
 - Geosciences Australia
 - Geological data for Australia (GADDS)
 - Includes elevation, gravity, magnetic and radiometric datasets, collected over 100 years
 - Combines individual and national surveys
 - Classic geophysical variables
 - Others:
 - Copernicus (EU)
 - Airbus







Machine Learning techniques can uncover relationships in big, highly non-linear datasets.

- They can be adapted to very dissimilar data sets
- Train with known deposits from mines, drill correct

geoc

Mt Shaw Copper Project -October/November 2022

- A geochemical sampling program was completed in November 2022 to test the interpreted central intrusion and extend the anomalism identified on the N-S lineament.
- A large area of alteration was seen in the field over the interpreted intrusion.
- The N-S lineament had clear signs of mineralisation.
- Intrusive rocks were seen in contact with Permian sediments in the field.





Mineralised camboon volcanics

Mt Shaw Copper Project



Mount Shaw project timeline 2022-2024	2022				2023				2024			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Historical data collation and analysis												
Geochemistry - Orientation survey												
Geochemistry - Soil sampling												
Petrography												
Cultural heritage surveys												
Machine Learning Development												
Geophysics - Ground IP												
RC/Diamond drilling												

PRESENT



Investment offer

- Private raising of \$500,000 to fund exploration work in 2023.
- Funds will be used for ground geophysics, geochemistry and machine-learning algorithm development (and associated data-acquisitions)



COMPETENT PERSONS STATEMENT

The information in this document that relates to *exploration results* is based on information reviewed by Dr Thomas Fromhold, a Competent Person who is a Member of the Australian Institute of Mining and Metallurgy (Membership No. 3002256).

Dr Thomas Fromhold is an employee of Fromhold Geoconsult AB.

Dr Thomas Fromhold has sufficient experience, which is relevant to the style of mineralisation and types of deposits under consideration and to the activity which has been undertaken to qualify as a Competent Person as defined in the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code).

Dr Thomas Fromhold consents to the inclusion in the report of the matters based on her information in the form and context in which it appears.

Historical Work of note

Right: Central Minerals soil copper with geology at VRTP magnetics

Left: Fawson and Skett field map with soil values – note the mapped porphyry lithologies.



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Historical Work of note

- Fawdon and Skett 1991 held a 4 graticule block EPM over Mount Shaw. They completed good quality geological mapping, rock chip sampling and soil sampling. Dropped the tenure due to low gold values.
- Central Minerals (Solgold) held the tenure in 2012-13. Completed stream sediment sampling and soil sampling, defining an ~2km geochemical anomaly.

Appendix

Previous work

- In 2017 an analysis was made of the Hamersley Basin Iron formations. This was done in by Aurora Minerals Group in conjunction with Solve Geosolutions (now Datarock).
- A machine learning base classification model was used to predict the mapped extents of 9 units (8 from the Hammersley Group, 1 from the Gorge Creek Group) by learning the signature of each unit within regional geophysics and remote sensing datasets (Landat8, Radiometrics, DEM and Magnetics).
- Models with 3 variants of input data were produced at 100m resolution over an area of 300,000 km2
- Overall results have been interesting, with units such as the Gorge Creek showing high probability zones (
 with a very similar signature to mapped Gorge Creek) appearing outside of existing mapping areas. Some of
 these targets are coherent and maybe worthy of follow up validation.
- Several of the iron-bearing units can be difficult to distinguish in the model due to their similar signatures in the input data. To address this we have investigated which variables can distinguish the units from one another (using RFE) and produced graphical breakdowns of the differences between the Iron-bearing units.



Previous work - Data Compilation

Datasets were downloaded at the highest available free resolution from the USGS and GSWA

- Radiometrics (80 m) of Western Australia (2016 version 1) downloaded from http://www.dmp.wa.gov.au/Geological-Survey/Regional-geophysical-survey-data-1392.aspx
- Aeromagnetic data Magnetic anomaly grids (40 m) of Western Australia (2017 version 1) downloaded from <u>http://www.dmp.wa.gov.au/Geological-Survey/Regional-geophysical-survey-data-1392.aspx</u>
- DEM SRTM 1-Arc second (30m) Global <u>https://lta.cr.usgs.gov/SRTM1Arc</u> downloaded from <u>https://earthexplorer.usgs.gov/</u>
- Landsat 8 OLI (30m bands 2-7) <u>https://lta.cr.usgs.gov/L8</u> downloaded from <u>https://earthexplorer.usgs.gov/</u>



The Hamersley model extent:

- ~300,000 square km of the Hamersley provice was modelled
- A Random Forest model classification was used to identify zones that have a high probability of being unmapped Banded Iron Fomation units.





Example using the Brockman Iron Fm

We want to build a predictive model that can classify every pixel into either Brockman Iron Formation or background (i.e. any other unit).

The basic steps are as follows:

- 1. Create a training set from by selecting training points from the mapped extent of the Brockman (random sample of around 10,000 samples), then take a random sample of approximately twice as much background (i.e 20,000 points from everywhere else)
- 2. Train the model to learn the signature (in the input datasets) of the Brockman and Background
- 3. Feed all the points not used in the training (test points) through the classification model.
- 4. Because the random forest uses a multitude of decision trees each pixel gets sent down 50 or 100 trees. We can then look at which class (either Brockman or background) the pixel (data point) fell into over each of these trees and use this proportion as a probability **see appendix for more information**
- 5. Export a probability grid for the Brockman Iron Formation that maps the similarity (RF probability) of each pixel to the learned from the mapped Brockman Iron Formation.

You can think of the probability grids as maps of similarity to how the lithology looks where it has been mapped.