

ASX Announcement (ASX:AXE)

28 October 2019

First Quarter Activities Report

For the three months ending 30 September 2019

Significant Activities

- Archer advances the commercial readiness of its ^{12}CQ room-temperature quantum computing chip by positioning single qubit components with nanoscale precision.
 - Archer CEO, and Quantum Technology Manager, attend the Quantum.Tech Global Business Conference & Exhibition held in Boston, Massachusetts, USA.
 - Testing confirmed Campoona graphite is suitable for down-stream optimisation in lithium-ion battery manufacturing processes with potential off-take partners.
 - Substantial Exploration Target and presence of halloysite reported for the Eyre Peninsula Kaolin Project.
 - Bartels gold project identified as a large epithermal style gold project covering an area of 25km^2 .
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Archer Exploration Limited ("Archer" or the "Company") is pleased to report on its activities for the three-month period ending 30 September 2019 ("Quarter").

Commenting on the first quarter activities Greg English, Executive Chairman of Archer, said, "The assembly of the first qubit material component was a major achievement in the development of a room temperature quantum computer chip. The qubits are only a few tens of nanometres in size and this means we need to have a high level of accuracy in physically positioning our qubits to successfully build a working device. It is incredibly difficult to apply such a high of degree precision in controlling qubit location; however, we have unambiguously achieved this, making it possible to scale our chip qubits."

"Spherical graphite derived from Archer's wholly-owned Campoona Graphite Resource has been successfully tested in lithium-ion (Li-ion) battery configurations. Our results indicate that Archer can produce a spherical graphite product which could work in lithium-ion batteries. We now have the required information that potential partners with the required resources downstream need to perform the optimisation and therefore integrate Campoona graphite in their batteries."

"On the Eyre Peninsula we have declared a large kaolin Exploration Target that is based on a relatively conservative interpolation of grade and tonnage from historical drill results. Furthermore, the confirmation of the presence of halloysite at both Kelly Tank and Bunora confirms our view on the prospectivity of the kaolin Project."

"At Bartels we believe that we have a low sulphidation epithermal style gold project. Bartels is a very large gold target covering an area of 25km^2 and Archer will be seeking a partner to assist in the exploration of Bartels."

Quarterly Activities to 30 September 2019

Archer provides shareholders exposure to financial returns from innovative technologies and the materials that underpin them. The Company's strategy is to build an industry-leading Materials Technology company, that delivers maximum value to shareholders through the commercialisation of assets at various stages of the materials lifecycle. Archer has strong intellectual property (IP), broad-scope mineral tenements, world-class in-house expertise, a diverse advanced materials inventory, and access to over \$300 million of R&D infrastructure.

Advanced Materials

Quantum Technology

The ^{12}CQ Project commenced in April 2019 (ASX Announcement 3 April 2019). The Archer team is now building ^{12}CQ room-temperature qubit processor ("chip") prototypes (ASX Announcement 26 June 2019). In the Quarter, Archer assembled the first qubit material component ("qubit") of the ^{12}CQ chip with nanometre precision (ASX Announcement 26 August 2019). Successful development of Archer's ^{12}CQ chip could potentially enable widespread ownership of quantum computing powered technology and catalyse a global multibillion-dollar industry.

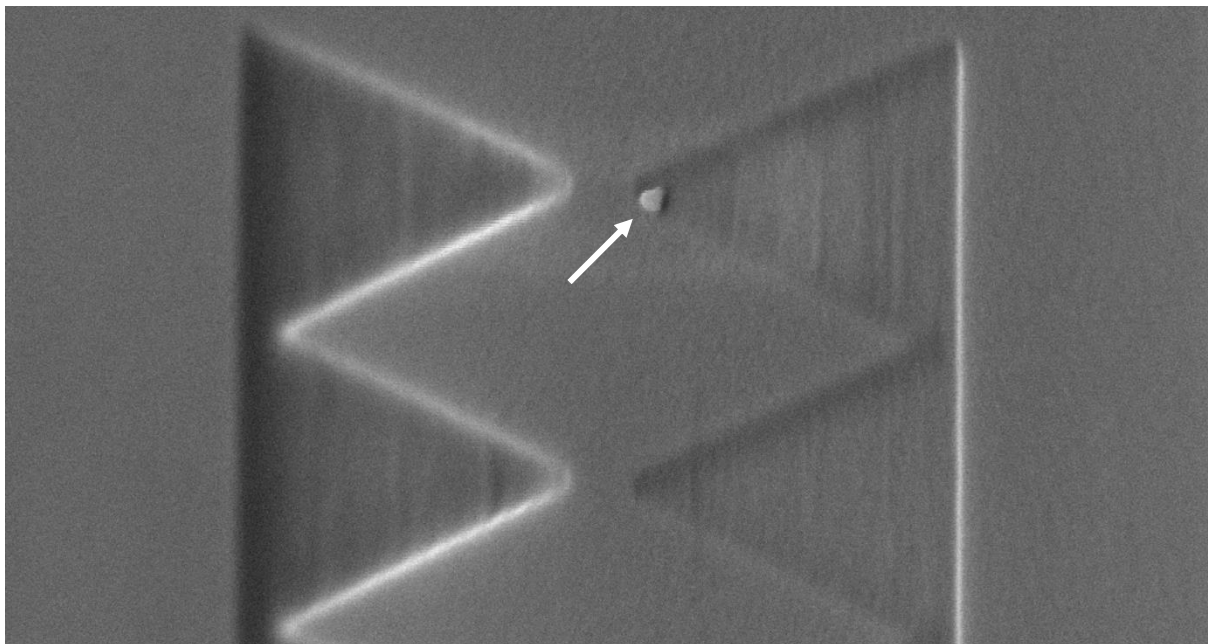


Fig. 1. Electron microscopy image of a single qubit of about 50 nanometre size (indicated by the arrow) positioned with nanometre-scale precision on a silicon wafer surface.

The ability to directly position individual qubits is a key requirement for building a scalable chip. To achieve this, Archer uses a unique carbon-based qubit that has the potential to enable chip operation **at room-temperature and integrate onboard modern devices**. The qubit is the fundamental component of Archer's ^{12}CQ prototype chip, as without the qubit, quantum computing cannot be performed. To assemble the first qubit component of Archer's ^{12}CQ chip, a single qubit was isolated and precisely positioned on a silicon wafer (**Fig. 1**) **at room-temperature**.

The qubit assembly is needed for the next steps in fabrication **addressing industry problems of room-temperature quantum computing operation and ready integration into modern electronics**. Positioning individual qubits derisks Archer's chip technology development while strengthening the ¹²CQ Project commercial readiness. The achievement is definitive proof for addressing a global quantum computing industry key success driver for early-stage quantum computing technology development related to scalability, practicality and use[†].

This qubit assembly is an initial step towards fabricating a working **room-temperature qubit processor** prototype representing a minimum viable product: a product chip representing a commercial readiness that can practically address and validate solutions to **room-temperature quantum computing**.

The Archer team is building chip prototypes at the Research and Prototype Foundry within the world-class, \$150 million purpose-built Sydney Nanoscience Hub facility, at the University of Sydney ("Sydney"). During the Quarter, the Facilities Access Agreement with Sydney (ASX Announcement 3 April 2019) was varied to account for the awarding of competitive NSW TechVoucher funding ("Funding") to Archer's wholly owned subsidiary, Carbon Allotropes Pty. Limited. The maximum Funding amount of \$15,000 was awarded and will be used to continue accessing facilities at Sydney to build chip prototypes.

Following significant progress achieved through technology development derisking activities, Archer CEO, Dr Mohammad Choucair, and Quantum Technology Manager, Dr Martin Fuechsle attended the Quantum.Tech Global Business Conference & Exhibition ("Conference") in Boston, Massachusetts, USA from September 10–11. As a result, Archer is engaged in ongoing discussions with Critical Support Technologies, Full-Service Providers, and Software Companies in the quantum computing economy, and highly resourced organisations to expand our chip development infrastructure access in North America.

Human Health

Archer has provisionally patented a potential solution to printable biosensors capable of multiplexing (ASX Announcement 19 February 2019). Archer is the sole applicant of the provisional patent, maintaining 100% ownership of the biosensor technology IP. **Archer has until 15 February 2020 to consider maturing the application to a full patent**. To mature the provisional patent, support of the claims in Archer's provisional patent requires detailed scientific protocols and evidence of the technical viability of the biosensor technology. During the Quarter, confidential patentability and intelligence reviews ("Reviews") of the provisional patent application were obtained as part of the due diligence process towards a full patent application.

Archer is engaged in a collaboration agreement with the Australian Research Council Graphene Enabled Industry Transformation Research Hub ("ARC Graphene Hub") at the University of Adelaide (ASX Announcement 20 March 2018) and the Company has a Material Transfer Agreement ("MTA") in place with a leading German Biotech (ASX Announcement 27 September 2018). During the Quarter the MTA was renewed for 12 months. Collaboration with the ARC Graphene Hub continued, with a focus on optimising ink formulations and their processing methods to provide strong support for the claims and embodiments in the provisional patent.

[†] <https://www.bcg.com/en-au/publications/2018/next-decade-quantum-computing-how-play.aspx>

Reliable Energy

The ongoing work with UNSW (ASX Announcement 18 April 2018) is focused on addressing the trade-off between cost and battery performance using Archer's Campoona graphite at the anode of lithium-ion batteries and formulating, building, and testing full-cell batteries. Technical development with UNSW to test spherical graphite products in lithium-ion (Li-ion) batteries commenced during the Quarter ("Prototyping and Testing"), **Image 1**.



Image 1. Battery materials formulation, assembly and testing incorporating Archer Campoona graphite being performed at UNSW.

Over 50 batteries were assembled and tested. Prototyping and Testing confirmed that Campoona graphite (and spherical graphite derivatives) are suitable for optimisation in Li-ion battery manufacturing processes with potential off-take partners. Reproducibility and repeatability in spherical graphite performance parameters were determined in both half-cell and full-cell configurations using a variety of commercially relevant cathodes, to address a prerequisite market requirement in technical specification for large-volume production and integrated spherical graphite materials in Li-ion batteries.

Archer plans to continue investigating high-value added graphite products and processes (spherical graphite coating; and graphite purification) and other market opportunities (end-use integration into the Li-ion battery supply chain through co-development) to ensure that the Company can successfully add value to Campoona Graphite Resource, and that the project can be successfully developed to return maximum benefit to shareholders and the community. It should be noted that graphene materials can alternatively be produced from the Carbon Allotropes inventory and not only from Campoona graphite.

Mineral Exploration

Eyre Peninsula Graphite Project

Last quarter, Archer reported that spherical graphite was produced from Campoona graphite materials of uniform 40-micron flake size (99%+ and 95% TCC) using small-scale (kilogram quantity) mechanical milling processes. The spherical graphite products were produced with a particle size centred around 15-microns with a narrow size distribution (i.e. $D_{90/10}$ ratio of less than 3). Testing of the spherical graphite products was completed during the Quarter, with the results reported elsewhere in this document.

Sale of Sugarloaf Land

Archer announced the sale of its Sugarloaf farmland for \$1.35 million (ASX announcement 28 November 2018). The transaction settled on 1 July 2019 with Archer receiving the \$1.35 million sale proceeds in July 2019. The purchaser of the farm land has granted Archer an option to buy back approximately 30% of the Sugarloaf farm land, which may be required for the construction of the Sugarloaf Graphite Processing Facility (Option). The Option may be exercised by Archer any time during the next 20 years.

Eyre Peninsula Kaolin Project

In August 2019, the Company announced a maiden Exploration target for the Eyre Peninsula Kaolin Project (Kaolin Project). The Kaolin Project is located 12km south of Kimba, South Australia, approximately 150km south east of Andromeda Metals Ltd (ASX:ADN) Poochera Project and is within close proximity to existing power, water, road, rail and other critical infrastructure.

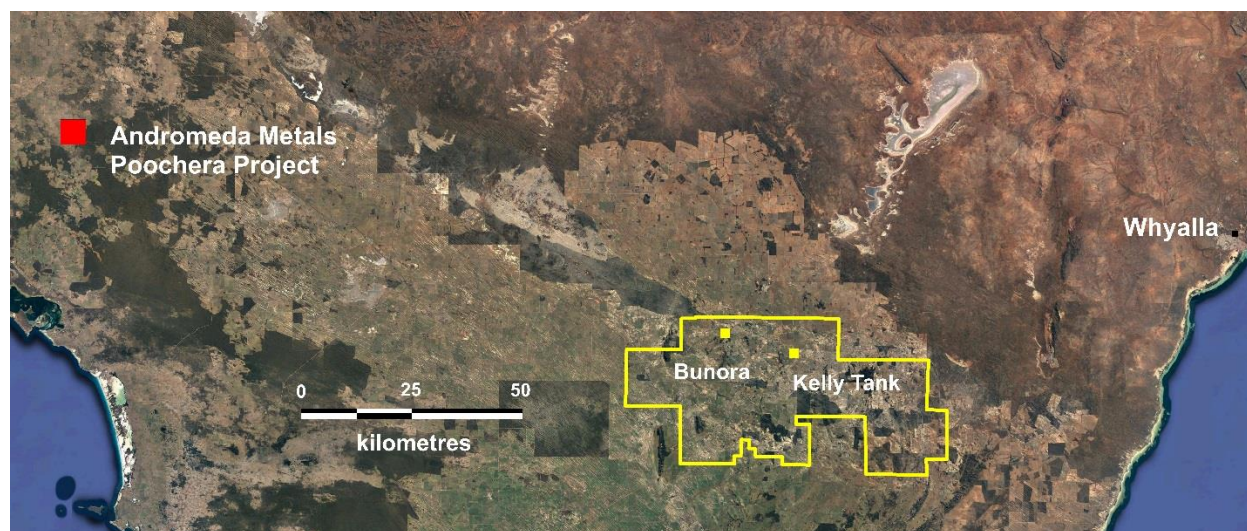


Fig. 2. Kaolin Project location map.

A review of historical drill results by Archer resulted in the establishment of a maiden kaolin Exploration Target of 55Mt – 130Mt at a grade of 33 – 36% Al_2O_3 (-53 μm size fraction) for the EPHPA Project. Kaolin is an aluminous clay that is used as the feedstock for high purity alumina production. Investors should be aware that the potential quantity and grade of the Exploration Target is conceptual in nature, there has been insufficient exploration to estimate a Mineral

Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

The Exploration Target only includes the Kelly Tank and Bunora kaolin prospects (Fig. 2) and does not include other known kaolin occurrences within Archer's Eyre Peninsula tenement area. These other targets include Bunora East, Bunora West.

The Exploration Target is based on historical drilling, across 72 percussion drill holes, and auger drilling undertaken by Pechiney (1968 - 1971) and CSR (1971 - 1973). This historical drilling and trenching intersected substantial widths of high purity alumina (HPA) mineralisation over an extensive area. The initial exploration work was focussed on the exploration for kaolin for use in paper manufacture rather than for HPA production.

Exploration Target calculation and assumptions

The kaolin Exploration Target for the EPHPA Project is reported as a range 55Mt - 130Mt at a grade of 30- 36% Al_2O_3 (at -53 μ m). The following methodology was used in the calculation of the Exploration Target at Kelly Tank and Bunora:

- An outline for each of the Kelly Tank and Bunora areas was created from historical Pechiney results (smaller area, lower range) and CSR exploration results (larger area, upper range). These surface areas were used to calculate the tonnage range estimation.
- Average thickness of 11m has been assumed for Kelly Tank and 10m for Bunora. Both Kelly Tank and Bunora are open at depth. No intervals deeper than 30m from the surface were included in the Exploration Target calculation.
- Density of 2 for kaolin has been assumed for tonnage targets. The density of the material (SG) is theoretical and considered to be conservative. No work has been completed determine the accuracy of the density assumption. It is believed to be conservative estimate due to density work completed on the nearby Campoona gneisses which have a density of +2.
- The Exploration Target is based upon a recovery from the -53 μ size fraction of feed stock, this figure roughly equates to 50% of the feedstock (i.e. kaolin is 50% of the *in-situ* host material).

Location	Tonnes (Mt)		Grade (Al_2O_3 , <53 μ m)	
	Lower	Upper	Lower	upper
Kelly Tank	45	105	30%	36%
Bunora	10	25	30%	36%
Exploration Target	55	130	30%	36%

Table 1. Kaolin Exploration Target showing upper and lower ranges.

Presence of halloysite

A review of historical reports for the Kaolin Project identified the presence of halloysite in composite sampling work undertaken at both Bunora and Kelly Tank. Halloysite is a naturally occurring kaolin mineral that forms as a hollow tubular structure. Halloysite is special due to its

tubular structure and has traditionally been used in the manufacture of porcelain, fine china and bone china. The tubular structure of halloysite allows it to be filled with a variety of active ingredients that can benefit from slow release, these include: personal care products, pharmaceuticals, pesticides and cosmetics. Halloysite has also been used as a petroleum cracking catalyst.

In addition to the identification of halloysite, on a recent site visit the Company observed the presence of outcropping kaolin and collected some rock chip samples from the Kaolin Project area. Widespread pervasive kaolin mineralisation was also identified in areas outside of the Kelly Tank and Bunora project areas.



Image 2. Kaolin within a council borrow pit (looking south) located within Kaolin Project



Image 3. Kaolin inside council borrow pit (looking north)

Bartels Gold Project

The Bartels Epithermal Gold Prospect, located 15km north of the township of Cleve on South Australia's Eyre Peninsula. The Bartels area contains three low sulphidation epithermal systems: Teresa, Bartels and Patricia (Fig. 3)

The area of known alteration at Bartels is very large being at least 1.5km x 1.2km in dimensions and is seen to extend under cover. Geological mapping has defined the Teresa breccia trend over a strike length of 13.5km. Teresa lies a short distance to the NW from the drilled Bartels structural corridor. A second parallel breccia body, the Patricia breccia, has also been identified 4.6 km to the SE. This feature lies along strike from the Emu Plain copper-molybdenum occurrence previously reported by Archer (ASX announcement 9 May 2011).

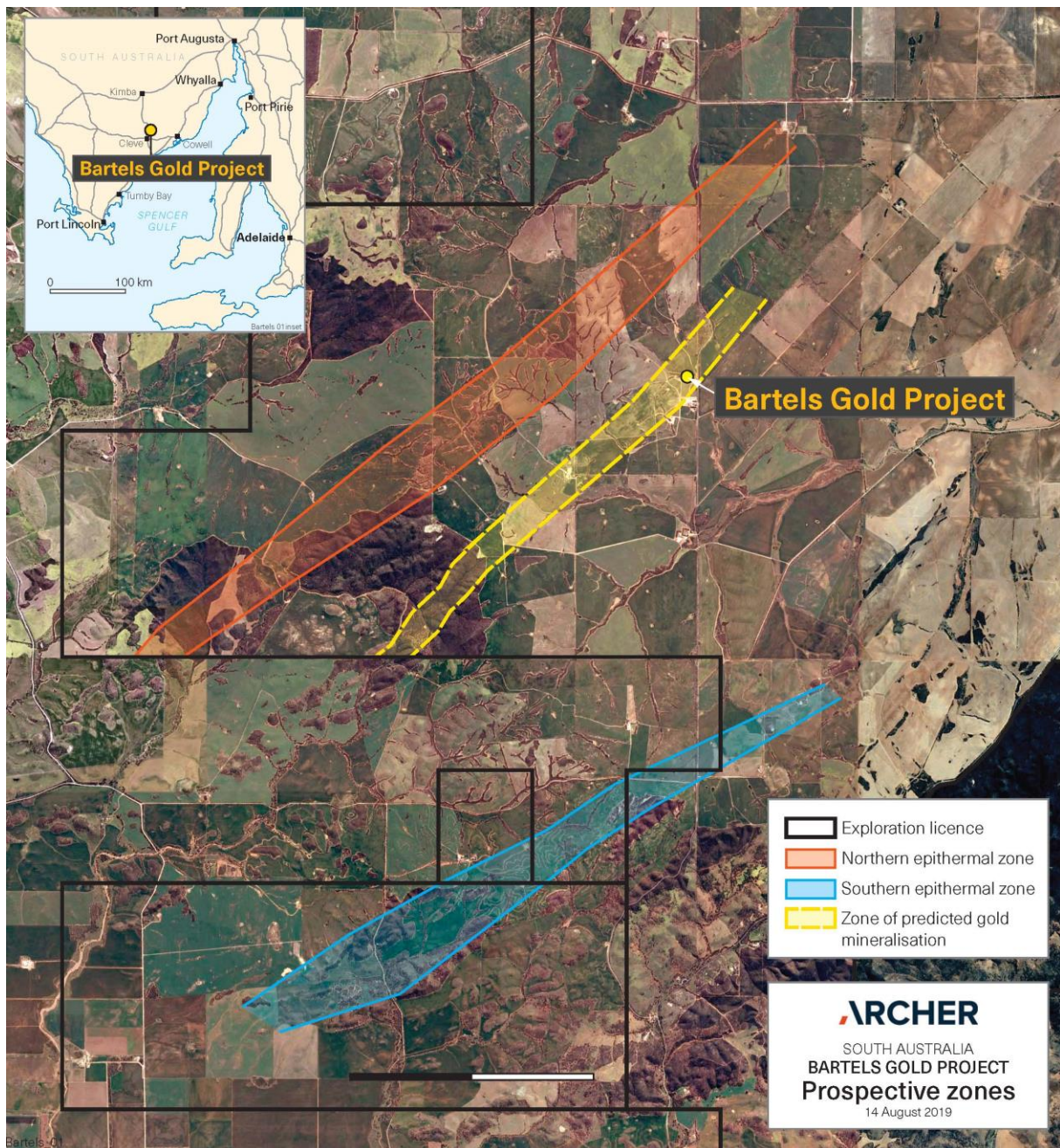


Fig. 3 Map showing location of Bartels, Teresa and Patricia gold targets.

The immediate Bartels area was seen by early explorers as a likely uranium target. Kerr McGee completed diamond drilling on what they designated as the A405 target but did not report the presence of uranium. Archer re-sampled the available drill core and in October 2010 reported anomalous gold (ASX announcement 8 March 2012). The most significant results from the sampling of the six Kerr McGee diamond holes were:

- A405/2 32.3m to 48.8m 16.5m @ 0.32 g/t Au; 7.43 g/t Ag; 146ppm Mo
- A405/3A 31.4m to 37.2m 5.8m @ 0.48 g/t Au; 2.93 g/t Ag

Archer drilled three RC drill holes (EPIRC12_001 to 003) at Bartels in 2012 (ASX announcement 29 August 2012) and an additional two RC drill holes in 2014 (ASX announcement 28 May 2014). The best results from this drilling include:

- EPIRC12_001 intersected a highly anomalous gold interval of 29m grading 0.57g/t Au from 79m downhole (including 1m @ 2.15g/t Au from 84m) within a chlorite rich shear zone. The gold anomalism and alteration appears to correspond with the EM data. The host lithology is a dolomitic unit that has undergone stylolitic quartz and manganese veining and brecciation.
- EPIRC14_002 intersected 22m @ 0.33g/t Au from surface and an additional 8m @ 0.14g/t Au from 26m downhole.

Tin and Tungsten Projects

During the Quarter, the Company announced the discovery of tungsten at the Company's Broken Hill project and the application for a new exploration licence over an area of historic tungsten and tin mining near Stanthorpe, NSW.

Broken Hill Project

A review of historical information at Broken Hill led to the identification of scheelite hosted tungsten mineralisation within the area of Archer's tenements. The tungsten mineralisation is stratigraphically hosted, and it is thought that the scheelite was partially remobilised into fold hinges and retrograde calc-silicate rocks in the deformation history. Worldwide, there are more than 30 known tungsten-bearing minerals with scheelite (along with wolframite) being the most mined type of tungsten deposit.

The known outcrop has been mapped extensively over Archer's tenement area and the mineralised horizon likely extends under cover. The outcropping areas are highly prospective for tungsten mineralisation.

Stanthorpe (NSW)

Archer has made an application for a new exploration licence (EL) over an area of approximately 300km², located east of the township of Stanthorpe, NSW (Fig. 4).

The ELA covers areas of historic tungsten and tin mines and prospects. In 1974 approximately 66,000t of tin concentrate was produced from the ELA area which accounted for 8% of Australian tin production at the time. Almost all of the tin production from the ELA area was from alluvial tin and tungsten deposits with minimal drilling to test the prospectivity of the old mines and deposits below surface.

Archer considers the ELA to be highly prospective for tin and tungsten, given the high volume of tin produced from the ELA area.

Other Projects

No work was undertaken during the Quarter at Archer's other project areas not mentioned in this report.

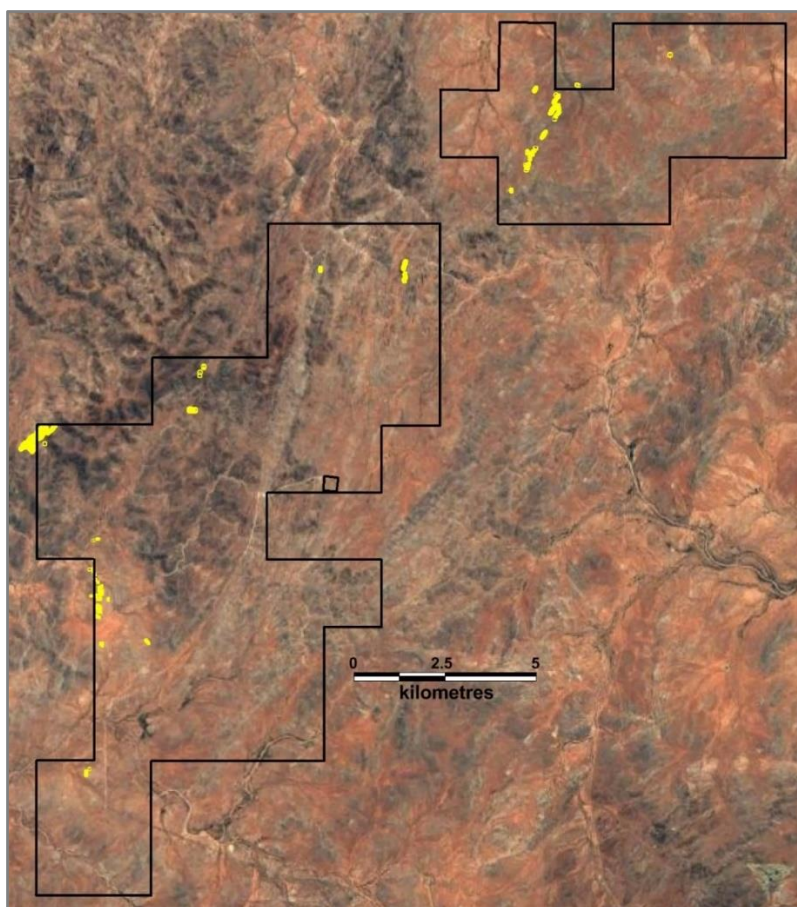


Fig. 4 Mapped tungsten prospective calc-silicate lithologies within tenement boundaries.

Corporate

Cash balance

The Company's cash balance at the end of the Quarter was \$1,423,000. This amount excludes the \$102,000 received from the ATO on 9 October in respect of Archer's R&D tax incentive for the year ended 30 June 2019.

Issued Capital

Time	Shares	Options	Performance Rights
Start of Quarter	196,304,283	Nil	1,050,000
New issues during Quarter	787,500 ⁽¹⁾	Nil	Nil
Exercised/cancelled during Quarter	Nil	Nil	1,050,000 ⁽¹⁾
End of Quarter	197,091,783	Nil	Nil
Date of this Report	197,091,783	Nil	Nil

(1) 787,500 Performance Rights were exercised and 787,500 new shares issued, the remaining 262,500 Performance Rights expired.

List of Archer Tenements

Tenement	Location	Commodity
South Australia		
EL 5434	North Cowell	Graphite
EL 5791	Cockabidnie	Graphite
EL 5804	Wildhorse Plains	Graphite
EL 5815	Waddikee	Graphite
EL 5870	Carpie Puntha	Graphite
EL 5920	Carappee Hill	Graphite
EL 6019 ⁽¹⁾	Witchelina	Magnesite
EL 5730 ⁽¹⁾	Termination Hill	Magnesite
EL 5433	Burra North	Base Metals
EL 5769	Napoleons Hat	Copper / Gold
EL 5794	Blue Hills	Copper / Gold
EL 5935	Whyte Yarcowie	Cobalt / Copper
EL 6000	Pine Creek	Copper / Gold
EL 6029	Altimeter	Copper / Gold
EL 6160	Franklyn	Copper / Gold
EL 6287	Peterborough	Copper / Gold
EL 6354	Bendigo	Copper/Gold
ML 6470	Campoona Shaft	Graphite mining
MPL 150	Sugarloaf	Graphite and graphene processing
MPL 151	Pindari	Process water for Sugarloaf
New South Wales		
EL 8592	Morris's Blow	Cobalt / Copper
EL 8593	Broken Hill	Cobalt / Copper
EL 8594	Broken Hill	Cobalt / Copper
EL 8595	Broken Hill	Cobalt / Copper
EL 8779	Campbells Ck	Cobalt / Copper
EL 8894 ⁽²⁾	Stanthorpe	Tungsten / Tin
EL 8871 ⁽²⁾	Crowie Creek	Copper/Gold
Western Australia		
E53/1926	Mt Keith	Nickel

Notes

- (1) These tenements have been sold with Completion scheduled to occur at the end of calendar year 2019.
- (2) This tenement was granted during the Quarter.

Competent Person Statement

The exploration results reported herein, insofar as they relate to mineralisation, are based on information compiled by Mr. Wade Bollenhagen, Exploration Manager who is an employee of Archer Exploration Limited.

Mr. Bollenhagen is a Member of the Australasian Institute of Mining and Metallurgy who has more than twenty years' experience in the field of activity being reported. Mr Bollenhagen has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity that he is undertaking 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" relating to the reporting of Exploration Results. Mr. Bollenhagen consents to the inclusion in the report of matters based on his information in the form and context in which it appears.

General Enquiries

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For more information about Archer's activities,
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