

ASX announcement

22 January 2024

Frome Project – Induced Polarisation Survey Commenced at the Erudina Uranium Prospect

Argonaut Resources NL (ASX: ARE) (*Argonaut* or the *Company*), to be renamed Orpheus Uranium Limited, is pleased to announce an update on the Erudina prospect, Frome project that is highly prospective for sedimentary-hosted roll-front and tabular-style uranium mineralisation, located within the Frome Embayment of South Australia, Australia, (Figure 1).

Orpheus has commenced a trial Induced Polarisation (IP) Orientation Survey across the Exploration Target Zone at the Erudina prospect, to confirm whether IP may identify sedimentary-hosted disseminated pyrite, associated with uranium mineralisation in the Lower Eyre Formation.

Highlights

- A total of 42 pole-dipole stations are planned for 4 line-km, positioned at 100m spacing across an area known to contain pyritic Eyre Formation that is also host to uranium mineralisation, targeting historic drill hole ER0048 that contains a combined mineralised thickness of 4.05m averaging 272 ppm equivalent uranium oxide U_3O_8 ¹:
 - 1.33m @ 180 ppm U_3O_8 from 168.99m;
 - 0.79m @ 200 ppm U_3O_8 from 172.68m
 - 0.76m @ 687 ppm U_3O_8 from 180.48m (including a maximum grade of 1,764 ppm U_3O_8)
 - 0.12m @ 102 ppm U_3O_8 from 185.98m
 - 1.05m @ 191 ppm U_3O_8 from 186.57m
- Results are expected by the end of January 2024, and subject to the outcome, a Detailed IP Survey may commence in preparation for drilling within the Exploration Target Zone at the Erudina prospect.

Next Steps

- Subject to the results of this trial a detailed IP Survey at the Erudina prospect may commence immediately.
- Heritage Survey with members of the Adnyamathanha Traditional Lands Association (Aboriginal Corporation) RNTBC (ATLA) who are the Traditional Custodians of the land within the Frome project. This survey is planned for February 2024.
- Rotary Mud drilling targeting infill areas within the highly encouraging 12 km Exploration Target Zone at the Erudina prospect and at the Sandyootea Region, located just 12 km northwest of the Goulds Dam Deposit, planned for first half of 2024. A Program for Environment Protection and Rehabilitation (PEPR) for exploration drilling approval has been submitted to the Government of South Australia.

Executive Chairman, Mick Billing states: “Global uranium pricing now sits above US\$100/lb, a level not seen since 2007, and we are very excited at the prospect of our first uranium drilling campaign.

“Petrophysical testing results confirm chargeability contrasts combined with the association of pyrite and uranium mineralisation are tools which can be applied to fine tune drilling targets in this highly prospective region of the Frome project. We look forward to updating investors on our progress.”

¹ Uranium mineralisation at the Erudina prospect has been indicated from gamma logging conducted by Areva Australia Pty Ltd. To date, there has been no Prompt Fission Neutron (PFN) data acquired. Equivalent uranium grades calculated from gamma logs are considered reliable for the estimation of uranium grade, however, do not account for the effects of disequilibrium.

Induced Polarisation Exploration Rationale

- Orpheus conducted a review of historic geological logs that includes sulphide intensity (pyrite) logged as 0 to 3 and has identified a potential association between the occurrence of pyrite proximal to uranium mineralisation, (Figure 2). Pyrite acts as a reductant for uranium to precipitate.
- The objective of the IP Orientation Survey is to assist with drillhole positioning targeting strong IP anomalies, possibly indicative of the roll-front alteration pattern (Figure 3), to include:
 - Oxidised zone; pyrite altered to hematite due to oxidation, no IP response proposed;
 - Redox front; pyrite accumulates where uranium ore precipitates, strong IP response proposed;
 - Unaltered zone; unaltered sediments not penetrated by oxidising groundwaters, weak IP response proposed.

About the Frome Project

The Frome project is comprised of four highly prospective exploration licences in the Frome Embayment area of South Australia which is arguably the most prospective region in Australia for sandstone-hosted uranium deposits, (Figure 1).

The Frome project covers large portions of the Erudina, Curnamona, Frome Downs and Billeroo palaeochannels, located approximately 12 km west of the Goulds Dam deposit held by Boss Energy Ltd who recently announced strong infill drilling results (ASX: BOE – announcement 12 September 2023) and two new satellite prospects adjacent to Goulds Dam (Billeroo and Sunrise) (ASX: BOE – announcement 28 September 2023)².



Uranium Price Chart <https://markets.businessinsider.com/commodities/uranium-price>

² Source: <https://bossenergy.com/investors/asx-announcements>

Erudina Prospect, Exploration Target Zone

Orpheus has identified a highly encouraging, widespread Exploration Target Zone containing significant uranium mineralisation at the Erudina prospect, that extends across a 12 km N-S distance by 7 km E-W, comprising prospective Tertiary sequence stratigraphy located within the Erudina Palaeochannel, (Figure 2). Orpheus believes this 12 km strike length Exploration Target Zone warrants immediate infill drilling, preparations are well underway, planned for the first half of 2024.

For further detail, refer to ARE ASX announcement 18 December 2023.

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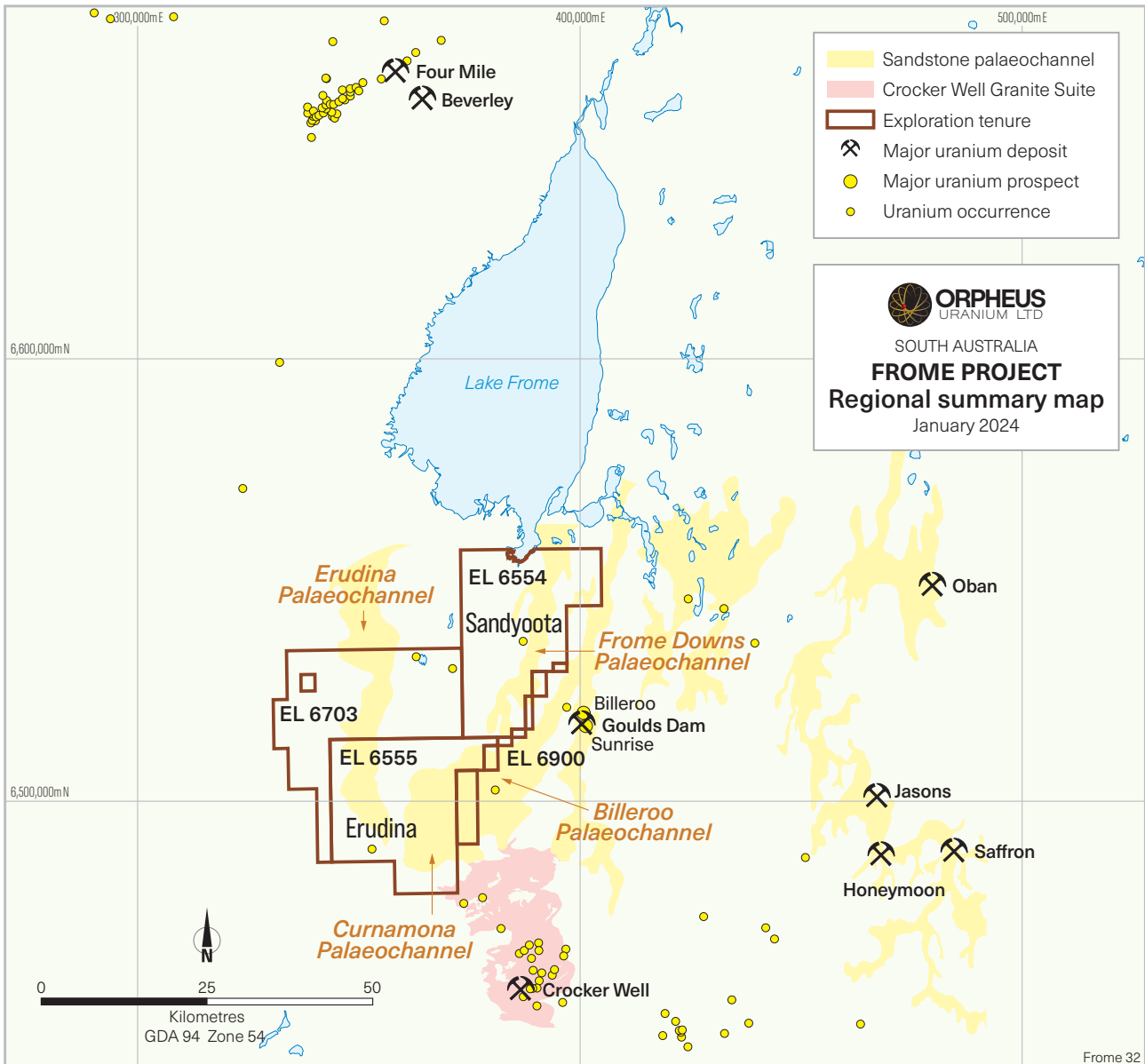


Figure 1 Frome project, Erudina prospect and uranium deposits, showing Eyre Formation sandstone palaeochannels and the Crocker Well Granite Suite which is a uranium-bearing source rock from which oxidised groundwater containing dissolved uranyl species can flow through the palaeochannels until it encounters a reducing environment, such as organic matter and pyrite where it can form concentrated deposits.

Induced Polarisation Orientation Survey Commenced, Erudina Uranium Prospect

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A total of 42 pole-dipole stations are planned for 4 line-km, positioned at 100m spacing across an area known to contain pyritic Eyre Formation that is also host to uranium mineralisation, targeting historic drill hole ER0048 that contains a combined thickness of 4.05m averaging 272 ppm U_3O_8 :

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Induced Polarisation Exploration Methodology

Orpheus conducted a review of historic geological logs that includes sulphide intensity from 0 to 3 and has discerned an association between the occurrence of pyrite proximal to uranium mineralisation. At the Erudina prospect, pyrite abundance has been logged as 0 – no pyrite, 1 – little pyrite, 2 – visible without hand lens and 3 – abundant, the lateral continuation of pyrite abundance has been inferred based on drillhole data (Figure 2).

Pyrite acts as a reductant for uranium to precipitate, potential sources of framboidal and crystalline pyrite in the Tertiary sequence stratigraphy at the Frome project comprises:

- Sedimentary-hosted disseminated pyrite, the lower member of the Eyre Formation contains pebbly, pyritic, carbonaceous medium-grained sand of light to dark grey colour, with yellow to orange zones, overlain by coarse-grained, poorly sorted subangular and sub-rounded sand.³
- Sediments rich in organic matter (OM) can accumulate uranium over time through adsorption with pyrite. Pyrite is commonly present where there is OM, derived from a highly reduced form of sulphur, through biogenic processes. The reactivity of pyrite is due to the presence of Fe_{2+} and sulphide (S^-) with adsorption of uranium predominately coffinite $U(SiO_4)_{1-x}(OH)_{4x}$ and uraninite UO_2 .⁴
- Pyrite is a common accessory mineral associated with roll-front alteration assemblages and uranium mineralisation, where pyrite and uranium accumulate at the 'nose' of the roll-front, (Figure 3).

Induced Polarisation Testwork, Erudina Prospect

Orpheus has completed an IP Detection Study on historic drill core to test chargeability potential. Nine drill core samples were submitted to Terra Petrophysics to conduct petrophysical measurements including: electrical properties to measure chargeability potential, seismic properties to measure acoustic impedance as well as other petrophysical properties.

Importantly, results of the IP detection study confirm significant chargeability contrasts between pyritic core of the Lower Eyre Formation that are more chargeable than the Upper Eyre Formation, underlying Cretaceous sediments and Cambrian sediments, results presented (Table 1). The petrophysical results also confirm strong acoustic impedance contrasts providing reassurance of the passive seismic technique as an exploration method to define the unconformity between the Tertiary sequence and underlying Cambrian basement.

Notably, this is a unique geological setting where basement rock types comprise Cambrian sediments that are not crystalline and therefore IP may be an opportunistic exploration method to identify sedimentary-pyrite that may be associated with uranium mineralisation at the Frome project.

³ Source: Callen, R.A., 1990. 1:250,000 Geological Series Explanatory Notes, Curnamona South Australia Sheet SH/54-14. Department of Mines and Energy, South Australia.

⁴ Source: <https://www.sciencedirect.com/science/article/abs/pii/S0169136821000767>

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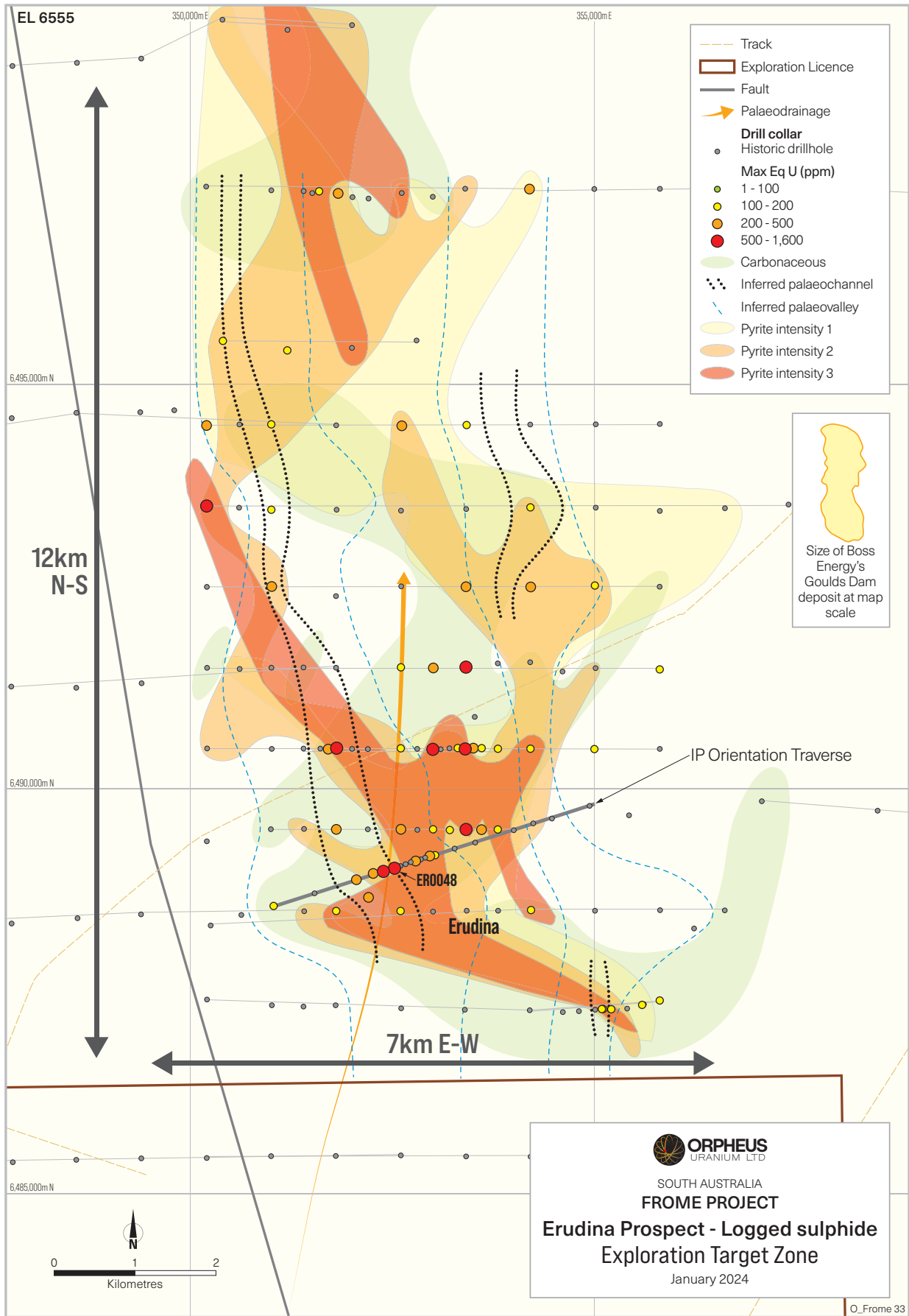
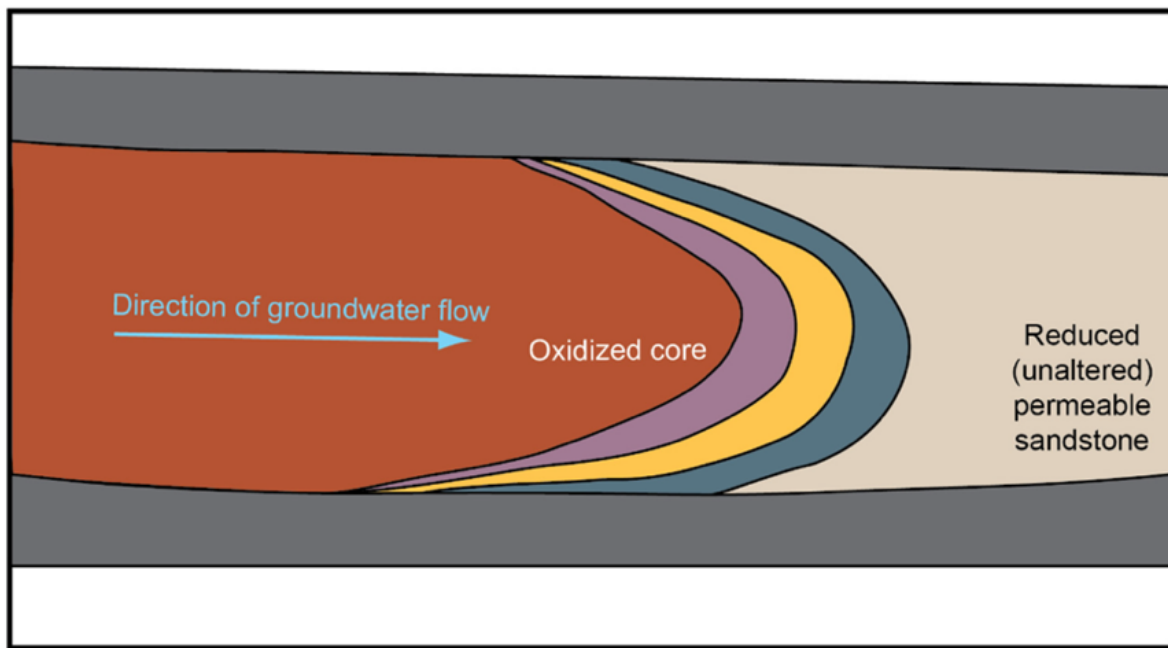


Figure 2 Erudina prospect, 12 km strike length Exploration Target Zone identified from historic drill results of significant uranium intersects (EqU converted from downhole Total Gamma) acquired by Areva Australia Pty Ltd, outlining carbonaceous zone and drillholes that contain logged sulphides of intensity, 1, 2 and 3 (all other drillholes were logged as 0).

Table 1 Petrophysical results confirm strong chargeability contrasts between pyritic zones of the Lower Eyre Formation compared to the Upper Eyre Formation and underlying Cretaceous sediments and Cambrian basement.

| Sample ID | Drillhole ID | From (m) | To (m) | Electrical properties | | Seismic properties | | Sample description |
|-----------|--------------|-------------|-----------|---------------------------------------|-------------------------|--------------------------|--|---|
| | | | | Galvanic resistivity (Ω m) | Chargeability (mV/V) | P-wave velocity (m/s) | Acoustic impedance (g/cm ³)*(m/s) | |
| | | | | 4434338 | ER0202_C | 281.80 | 282.00 | |
| 4434343 | ER0202_C | 183.29 | 183.40 | 4 | 336.5 | N/A | N/A | Lower Eyre Formation – zone logged as containing pyrite |
| 4434346 | ER0202_C | 151.20 | 151.35 | 12 | 40.4 | N/A | N/A | Upper Eyre Formation – no pyrite logged |



| | | | | | |
|---------------|---------------------|-------------------|------------------|-------------------|-----------------------------------|
| | | | | | |
| Oxidized core | Alteration envelope | Ore-stage uranium | Ore-stage pyrite | Reduced sandstone | semi-permeable sandstone or shale |

| | | | | | |
|----------------------------|---------------------------------|--|--|--|---------------------------------|
| hematite, magnetite, clays | siderite, goethite, ferroselite | uraninite, pitchblende, coffinite, pyrite, FeS, Se | pyrite, FeS, molybdenite, calcite, jordisite | diagenitic pyrite, marcasite, calcite, jordisite, organic material | Important mineral phases |
|----------------------------|---------------------------------|--|--|--|---------------------------------|

| | | | | | |
|---|---|--|---|---|---|
| O _{2(aq)} HCO ₃ ⁻ SO ₄ ²⁻ U(VI) | HCO ₃ ⁻ SO ₄ ²⁻ U(VI) Fe ²⁺ | Fe ²⁺ HCO ₃ ⁻ U(VI) | Fe ²⁺ HCO ₃ ⁻ | Fe ²⁺ HCO ₃ ⁻ | Important groundwater components |
|---|---|--|---|---|---|

Figure 3 Model section of a roll-front indicating geochemical alteration assemblages associated with uranium mineralisation, indicating an accumulation of pyrite at the 'nose' of the front containing ore-stage uranium mineralisation, (source).⁵

⁵ Source: <https://www.mdpi.com/2075-163X/12/6/780>

About Argonaut

Argonaut Resources NL is an Australian Securities Exchange listed exploration company which has received shareholder approval to be renamed Orpheus Uranium Limited. The name change is estimated to be complete early in 2024. The strategic direction of the Company is to focus principally on its Australian uranium assets, and has acquired and commenced activities on, an extensive suite of highly prospective uranium licences in South Australia and the Northern Territory, both jurisdictions which allow uranium mining and processing.

This report is authorised for release by:

Mick Billing

Executive Chairman

Argonaut Resources NL

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Figure 4 Location map of uranium assets owned by Orpheus located in South Australia and Northern Territory.

Competent Person Statement

Sections of information contained in this report that relate to Exploration Results were compiled or reviewed by Miss Bethany Lawrence BScAppGeol(Hons), MAIG, GIA(Aff), CG(Aff) who is a Member of the Australian Institute of Geoscientists and is a full-time employee of Argonaut Resources NL and Orpheus Uranium Limited. Miss Lawrence holds shares in Argonaut Resources NL. Miss Lawrence has sufficient experience which is relevant to the style of mineral deposits under consideration and to the activity which she is undertaking to qualify as a Competent Person as defined in the 2012 edition of the “Australasian Code for Reporting of Mineral Resources and Ore Reserves”. Miss Lawrence consents to the inclusion in this report of the matters based on this information in the form and context in which it appears.