Orion Minerals

ASX/JSE RELEASE: 24 September 2018

Fixed Loop TDEM results confirm Cu-Zn massive sulphide targets at Boksputs.

- **Two compelling volcanogenic massive sulphide targets identified from fixed-loop electro-magnetic surveys.**
- **Targets lie within the known Boksputs VMS camp on the Masiqhame Prospecting Right.**
- **High conductance of the modelled plates suggests massive sulphide mineralisation.**
- **Modelled conductors coincide with highly prospective stratigraphic and structural settings.**

Orion's Managing Director and CEO, Errol Smart, commented:

"The fixed loop TDEM survey is rapidly confirming our expectations from the SkyTEM™ survey. The combination of strong conductors identified in close proximity to known Zn-Cu sulphides is very encouraging. Orion continues to identify and prioritise drill targets on the Masiqhame prospecting right."

Orion Minerals Limited (**ASX/JSE: ORN**) (**Orion** or **Company**) is pleased to report positive Fixed-Loop Electro-Magnetic (**FLEM**) survey results over Cu-Zn targets on the Masiqhame prospecting right in the Areachap Belt, South Africa (Figure 1). FLEM surveys and geological mapping following up on helicopter-borne Electro-Magnetic (**AEM** or **SkyTEM™**) anomalies on the Masiqhame prospecting right commenced in July 2018. Orion is targeting Volcanogenic Massive Sulphide (**VMS**) Zn – Cu mineralisation at Masiqhame.

Historic exploration by various companies including Anglovaal, Anglo American Prospecting Services, Shell Minerals and Iscor during the 1970s to 1990s confirmed the presence of VMS deposits on the Masiqhame prospecting right. These include the well-documented Zn-Cu deposits of Kantienpan and Boksputs. These deposits occur on the western and eastern margins of the Areachap Belt respectively, in the northern part of the Masiqhame prospecting right and 110km north-west of Orion's Prieska Zinc-Copper Project (Figure 1).

Three FLEM grids have been surveyed by Orion over the Boksputs area, following up on anomalism detected by Orion's SkyTEM™ survey. Two strongly conductive plates were modelled on the grids named B1 and B4 (Figure 2). The two conductors present high priority, historically unexplored, compelling drill targets, in close proximity to the known Boksputs VMS deposits.

The plate modelled at target B1 is highly conductive, with a conductance of 3000 Siemens (**S**) (Table 1). The modelled plate measures 1,000m by 1,000m with the top of the plate 500m below surface. Geological mapping indicates the plate lies along the contact between meta-psammitic rocks (sedimentary rocks) and amphibolite (mafic volcanic rocks) (Figure 3). This setting is similar to that of the VMS style mineralisation discovered by Shell Minerals at Boksputs in the 1970s. The depth to the top of the B1 anomaly is probably beyond the detection limits of the geophysical instruments available to previous explorers and thus the area has not been subjected to historical exploration.

The anomaly at target B4 has a moderate conductance of 400 S. The modelled conductor has dimensions of 1,000m by 300m. Structural interpretation shows that the anomaly occurs in the same stratigraphic position as the Boksputs mineralisation and is coincident with the plunge of a tight fold closure (Figure 3). The B4 conductor is of particular interest as strata-bound sulphide mineralisation in highly-deformed metamorphic terrains is commonly localised within fold closures.

A third, lower-priority target at BS1 is of some interest due to the identification of a thin exhalite at the outcrop position. Such exhalites are often strong indicators for VMS mineralisation.

Orion's geophysical surveys have been undertaken using equipment designed specifically to test for massive sulphide mineralisation. The data is validated and processed by Spectral Geophysics in South Africa and then interpreted by Southern Geoscience Consultants (Perth, Western Australia). FLEM surveys and geological mapping in the area are ongoing.

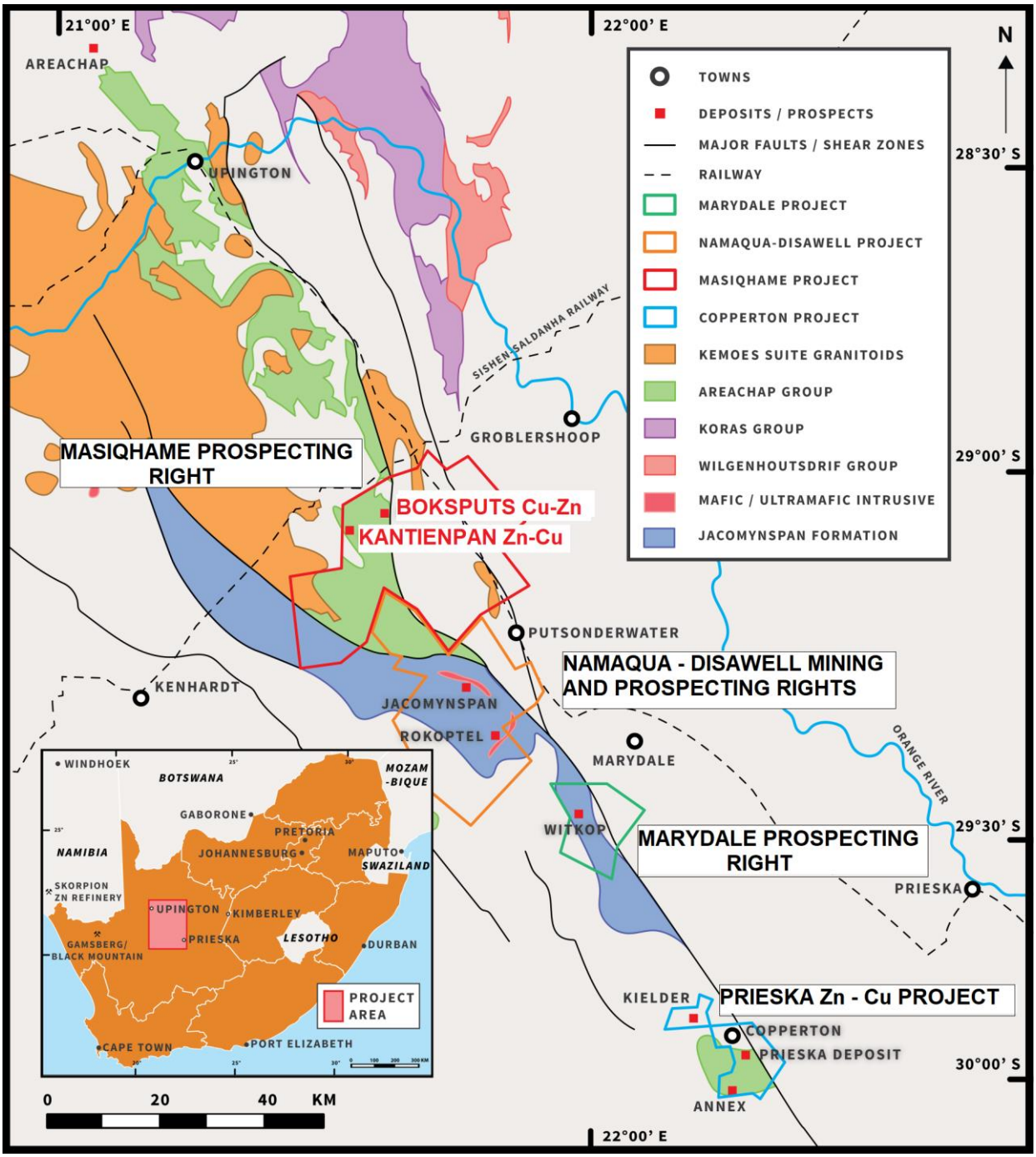


Figure 1: Areachap Project summary geology map showing the Masiqhame and Disawell prospecting rights.

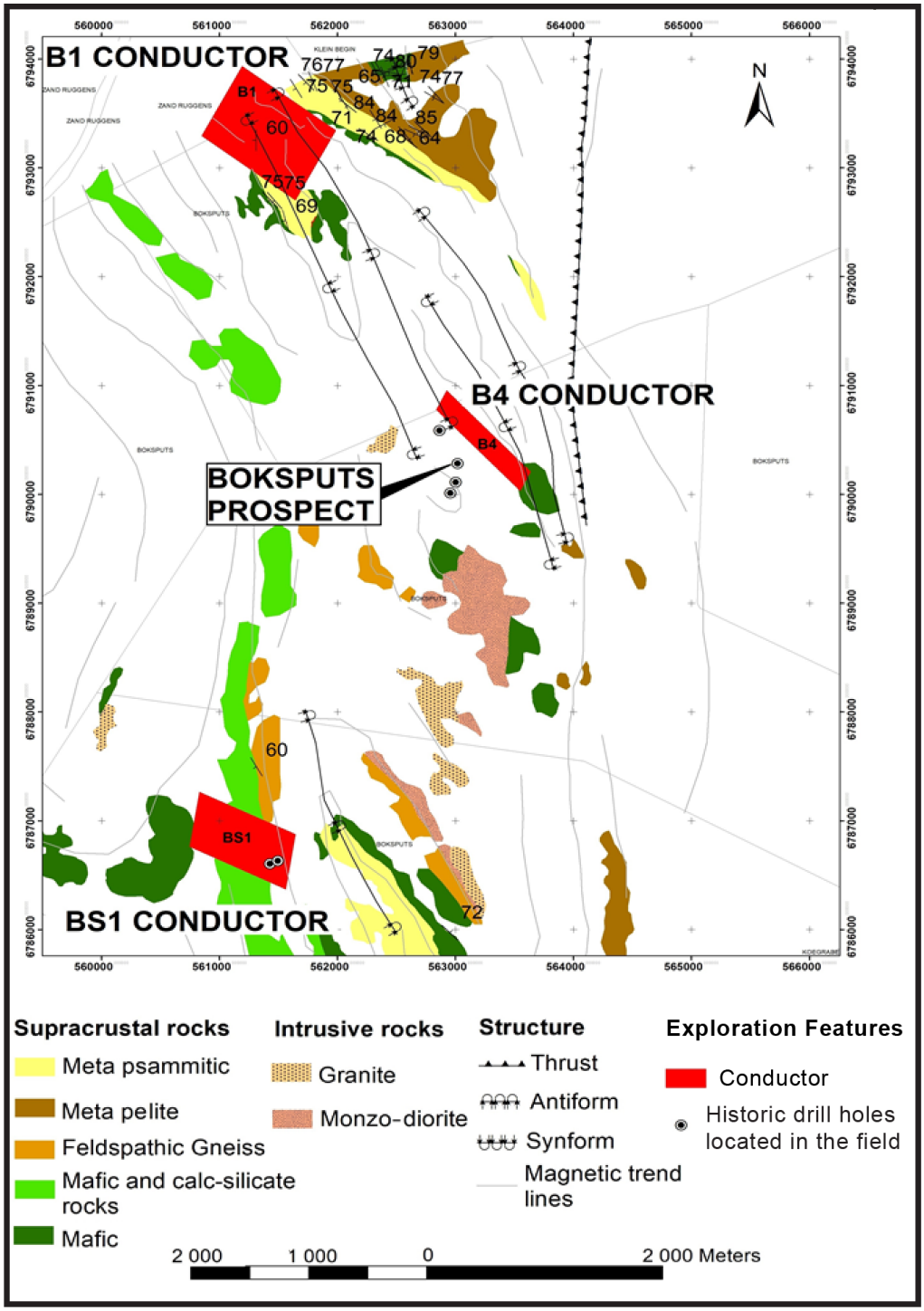


Figure 2: Geological map of the Boksputs area showing the three conductors modelled from the FLEM survey.

ID	Size	Depth	Conductance	Dip	Geology
B1	1000 X 1000m	500m	3000S	SW	Meta-psammite / pelite and amphibolite. Minor exhalites present.
B4	300 X 1000m	350m	400S	60SW	Plunge north-west. Sand covered. Magnetic interpretation shows associated fold closure.
BS1	800 X 700m	<100m	40S	W	Meta-volcano sedimentary package. Thin exhalite horizon present.

Table 1: Table showing VMS targets selected for follow-up and targets covered with FLEM on the Masiqhame prospecting right.

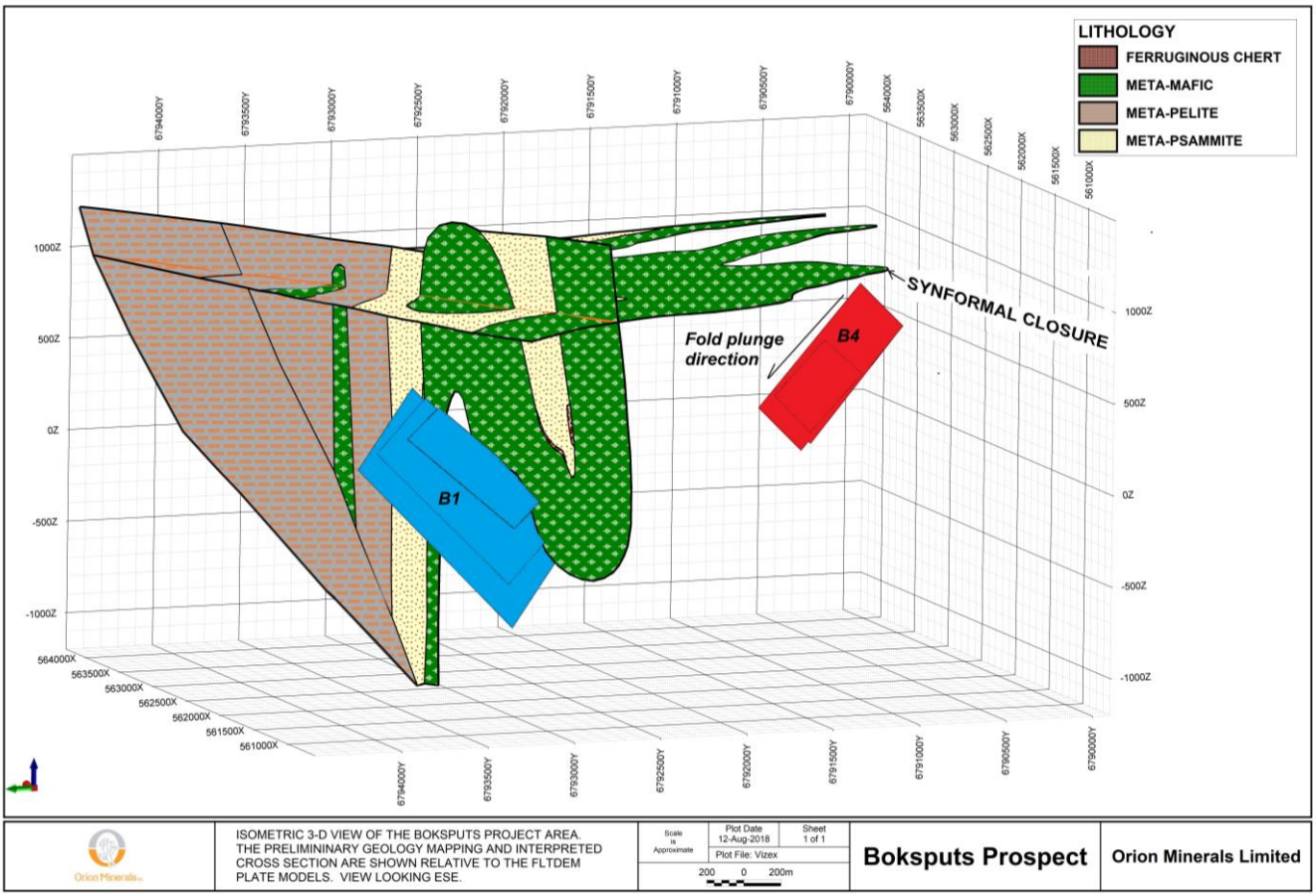


Figure 3: 3D view of B1 and B4 illustrating the strata bound nature and association with the amphibolite – metasediment contact and structural setting of the two conductors.

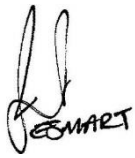
About the Boksputs Deposits

Sulphide mineralisation at Boksputs was drilled by Shell (South Africa) in the 1970s. Mineralisation occurs as intercalated lenses within a sequence of amphibolite, biotite-quartz-feldspar gneiss and mica schist. Mineralisation was reported to consist of disseminated to semi-massive sulphides in lenses of 200m by 300m and 3m in width. Massive sulphide zones do occur within these lenses. Host rocks to the sulphide mineralisation are chlorite gneiss, amphibole-feldspar gneiss, amphibolite and garnet-biotite gneiss. Chalcopyrite and sphalerite are the dominant economic minerals. Mineralisation occurs as chalcopyrite/sphalerite/pyrite and magnetite/chalcopyrite types.

Features such as the association of predominantly pyrite and chalcopyrite hosting rocks, with basaltic host rocks of low-K tholeiitic composition and distinctive REE distribution curves of the amphibolite suite, were reported to indicate a positive correlation to an island arc setting and Besshi type deposits. Besshi type deposits are known for their large tonnages (e.g. Besshi in Japan (230 Mt) and Windy Craggy in British Columbia (297 Mt)).

Details of TDEM system in use

The AEM survey targets are followed up with a best-in-class electromagnetic (**EM**) receiver manufactured in Perth, Western Australia, by Electromagnetic Technologies. The current source is a custom-built, Time Domain Electro-magnetic (**TDEM**) transmitter, capable of transmitting 140 Amps into a 1km-by-1km aluminium wire loop. This current source is coupled with military-grade fluxgate sensors for shallow exploration and super sensitive, high-temperature Super Conducting Quantum Interference Devices (**SQUIDs**) sourced from Germany, which are state-of-the-art sensors for deep exploration. The SQUID system, together with the high-powered TDEM transmitter, can detect moderate- to super-conductors to depths of approximately 1,000m. Readings are taken every 50-100m on grid-lines spaced 200m apart.



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Competent Person Statement

The information in this report that relates to Exploration Results is based on information compiled by Mr Richard Hornsey (Pr.Sci.Nat.) Registration No: 400071/96, a Competent Person who is a member of the South African Council for Natural Scientific Professionals, a Recognised Professional Organisation (**RPO**). Mr Hornsey is a Consultant to Orion. Mr Hornsey has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the JORC Code. Mr Hornsey consents to the inclusion in this announcement of the matters based on his information in the form and context in which it appears.

Disclaimer

This release may include forward-looking statements. Such forward-looking statements may include, among other things, statements regarding targets, estimates and assumptions in respect of metal production and prices, operating costs and results, capital expenditures, mineral reserves and mineral resources and anticipated grades and recovery rates, 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 based on management's expectations and beliefs concerning future events. Forward-looking statements inherently involve subjective judgement and analysis and are necessarily subject to risks, uncertainties and other factors, many of which are outside the control of Orion. Actual results and developments may vary materially from those expressed in this release. Given these uncertainties, readers are cautioned not to place undue reliance on such forward-looking statements. Orion makes no undertaking to subsequently update or revise the forward-looking statements made in this release to reflect events or circumstances after the date of this release. All information in respect of Exploration Results and other technical information should be read in conjunction with Competent Person Statements in this release (where applicable). To the maximum extent permitted by law, Orion and any of its related bodies corporate and affiliates and their officers, employees, agents, associates and advisers:

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Appendix 1: The following tables are provided as a requirement under the JORC Code (2012) requirements for the reporting of Exploration Results for the Masiqhame Project.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

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 mineral rights to the property are vested in the state and the Act regulates the exploration and mining industry in South Africa • A prospecting right in accordance with the Act was granted to Masiqhame Trading 855 Pty Ltd (**Masiqhame**) to prospect for a period of five years effective from 12 March 2014. • The prospecting right was granted in respect of the farm Koegrabie 117 comprising Portions 2 – 11; Boksputs 118 Portions 1,7,8,9,10; Kantien Pan 119 Portions 1 and 2; Van Wyks Pan Portions 1-5; and Zonderpan Portions 1,5,6,7,8 situated in the Magisterial / Administrative District of Kenhardt, Northern Cape Province. The total Area measures 98435.8548Ha in extend.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Much of the background information in this announcement was sourced from: o Humphreys, H.C, 1986. Metamorphic imprints upon sulphide mineralisation at Boksputs, Northern Cape South Africa. Mineral. Deposita 21, p271 – 277. o Geringer, G.J, Pretorius, J.J and F.H. Cilliers, 1987. Strata-bound copper-iron sulphide mineralisation in a Proterozoic front arc setting at Boksputs, Northwest Cape, South Africa. Mineral. Deposita 22, p81 – 89. o Council of Geoscience, 2008. Geological Map of the Republic of South Africa. o Previous exploration in the Areachap Belt including at the Boksputs and Kantienpan deposits were carried out by Shell South Africa, Anglovaal, Phelps Dodge, Anglo American and Iscor. o Exploration activities across the Project area included surface geochemical sampling, geophysical surveying, diamond core and air drilling.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• Mineralisation at Kantienpan and Boksputs are of the Volcanogenic Massive Sulphide Type. • Mineralisation occur in the Proterozoic Areachap Group that also host other VMS deposits including Areachap, Kielder and Prieska. • The mineralisation is strata-bound, and sulphide concentrations range from disseminated to massive.
Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information*	• N/A

Criteria	JORC Code explanation	Commentary
	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.*	
Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated.* • *Where aggregate intercepts incorporate short lengths of highgrade 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.*	• N/A
Relationship between mineralisation widths and intercept lengths	• *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 reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').*	• N/A
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.*	• N/A
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.*	• N/A
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 geology mapping, geochemical sampling, and airborne and ground geophysical programmes were undertaken by previous explorers, using the equipment and methods available at that time. These geophysical data are not all available. • In 2017 and 2018 Orion undertook a regional SkyTEM™ geophysical survey. The results are reported in ASX releases 1 February 2018 and 8 March 2018. Interpretation of the results is ongoing. • Ground EM surveys are underway.

Criteria	JORC Code explanation	Commentary
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.*	• Further ground-based Fixed Loop Electromagnetic surveys will be undertaken to cover the extent of airborne conductors identified from the recent SkyTEM™ airborne survey. The detailed location and extent of this work is yet to be finalised.