Orion Minerals

ASX/JSE RELEASE: 25 February 2019

Compelling extensional and near-mine targets identified by Airborne and Down-Hole EM Surveys at Prieska

- **Final results received from highly successful 148km^2 high-power Airborne Electromagnetic (AEM) survey completed over the Prieska Zinc-Copper Project, South Africa.**
- **Multiple discrete anomalies identified in the dataset.**
- **AEM anomalies detected over known Zn-Cu Volcanic Massive Sulphide (VMS) deposits and Ni-Cu intrusive occurrences.**
- **A number of combined electromagnetic/magnetic anomalies represent compelling follow-up drilling targets.**
- **Down-hole Time Domain Electromagnetic (DHTDEM) results confirm priority target areas for extensions of the Deep Sulphides on the south-eastern limit of the drilled extent of the Prieska Zn-Cu deposit.**
- **DHTDEM results support the Company's geological model for mineralisation to continue well beyond Orion's drill hole intersections in the south-east portion of the Deep Sulphide Resource.**

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

"These are significant results as they show we are well and truly on track to unlock the broader potential of the Prieska Project. VMS deposits generally occur in clusters in close proximity to one large or giant deposit, and often comprise two or three medium-sized deposits and five or six smaller deposits. Despite Prieska being one of the single largest volcanogenic massive sulphide exhalite bodies known in the world, the area around the deposit has had virtually no exploration in over 36 years. Now, with the application of advanced, modern geophysics and the latest geological thinking, we can vector into targets which offer outstanding opportunities for new VMS discoveries.

We now have an impressive pipeline of near-mine exploration opportunities which we intend to pursue in parallel with our development strategy, which is based on the recently released Scoping Study and upcoming Bankable Feasibility Study. It's rare for a junior like Orion to have both a minimum 10-year production and cash-flow project, supported by an updated Mineral Resource of 30.5Mt @ 3.7% Zn and 1.2% Cu (reported in accordance with JORC (2012)), and a multitude of exploration targets with strong potential to grow our production profile and mine life.

The recognition of additional geophysical targets associated with known nickel-copper sulphide mineralisation in close proximity to the proposed Prieska Mine operations, is also encouraging and supports our modelling of the Areachap Belt as a close analogue to the Fraser Range Belt in Western Australia – with the potential for multiple base metal deposits."

Orion Minerals Limited (**ASX/JSE: ORN**) (**Orion** or **Company**) is pleased to advise that it has identified numerous compelling targets for both VMS style zinc-copper mineralisation and nickel-copper sulphide mineralisation within a 15km radius of the world-class Prieska VMS deposit, as a result of highly successful geophysical surveys over its flagship Prieska Zinc-Copper Project in the Northern Cape Province, South Africa.

As part of the Company's Near-Mine Exploration Program, a helicopter-borne magnetic and Electromagnetic survey (**AEM** or **SkyTEM™**) was completed over the Repli, Vardocube and Bartotrax prospecting rights, which form part of the Prieska Zinc-Copper Project, in December 2018 (refer ASX release16 January 2019). In addition, Orion has now received final models for Down-hole Time Domain Electromagnetic (**DHTDEM**) surveys targeting possible extensions of the Deep Sulphide Mineral Resource, from its Perth-based consultants, Southern Geoscience Consultants.

Both surveys have been successful in identifying strong targets for follow-up exploration and drilling.

SkyTEM™ Survey

The SkyTEM™ survey covered an area of 146.78km^2 over the Repli, Vardocube and Bartotrax prospecting rights (see Figure 1 below (Near-Mine Prospecitng Rights)). The survey was flown with the highly innovative SkyTEM™ 312 high-power technology for deep target imaging. This high-power system, with a peak moment up to 1,000,000 NIA, is optimised to provide an exceptional depth of investigation, due to the high moment mode with high current and low base frequency of 12.5 Hz. High-resolution magnetic data was also recorded.

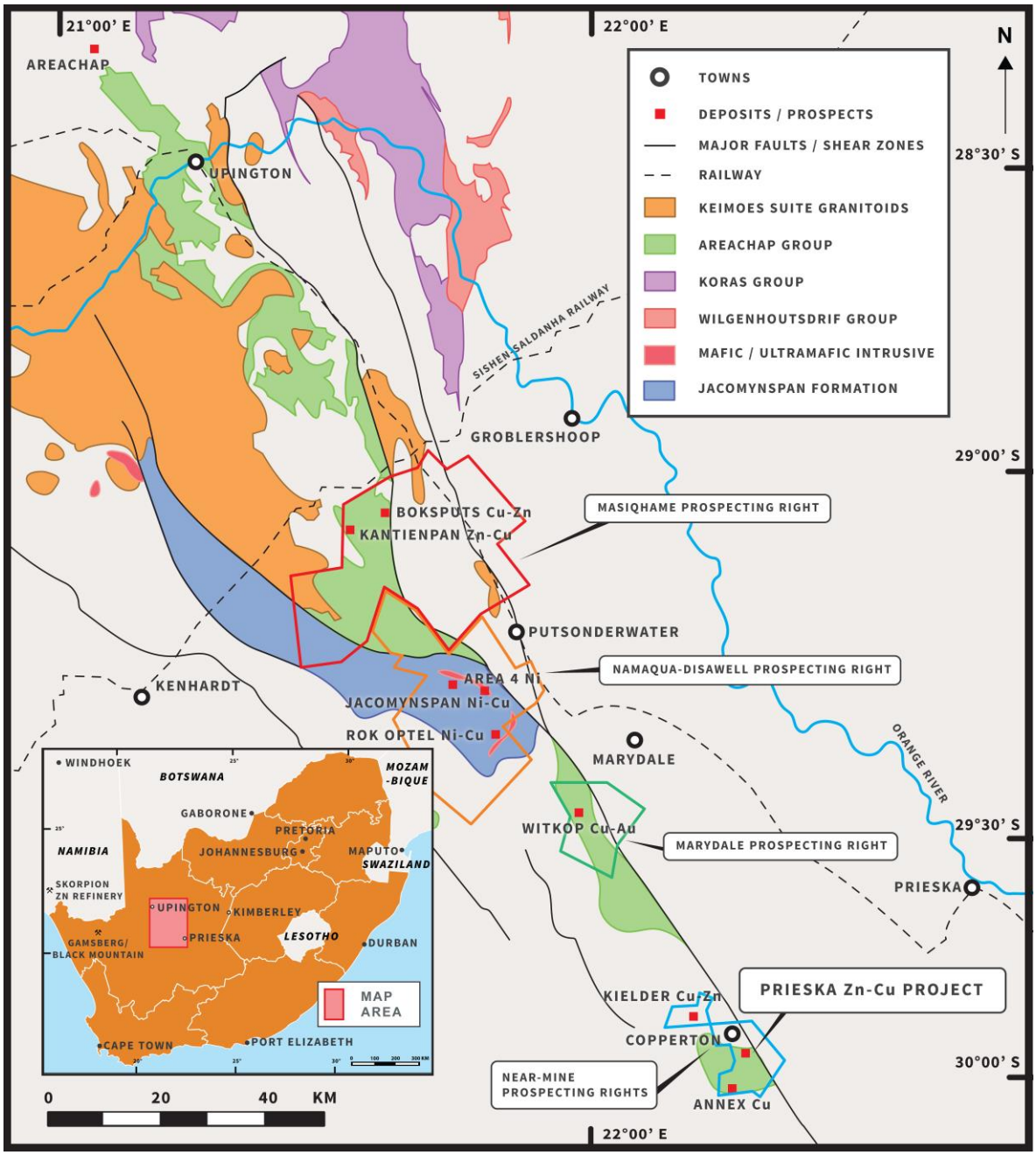

Figure 1: Locality plan showing the Near-Mine prospecting right area covered by the SkyTEM™ survey.

Several AEM anomalies have been identified from the data by Orion's Perth-based geophysical consultants, Southern Geoscience Consultants (see Figure 2).

Due to the high level of "noise" from the Prieska Mine infrastructure, tailings dam, pipelines, Eskom sub-station, solar power plant and power lines, the data required extensive processing to mask the cultural feature noise in order to detect the subtle geological source conductors being targeted.

The primary VMS target mineralisation comprises pyrite, with minor pyhrrotite, sphalerite and chalcopyrite and is unlikely to yield strongly conductive bodies. Integrated analysis of the newly obtained aero-magnetic, AEM and geological data is therefore essential to generate priority drill targets.

VMS deposits tend to occur in clusters in the vicinity of a large deposit. A cluster will typically consist of one very large or giant deposit, two to three medium sized deposits and five to six smaller deposits.

During the exploration boom in the 1970s and early 1980s that followed the discovery of the Prieska VMS deposit in 1968, four VMS deposits and two nickel-copper occurrences were discovered within the Prieska VMS camp (Figure 2).

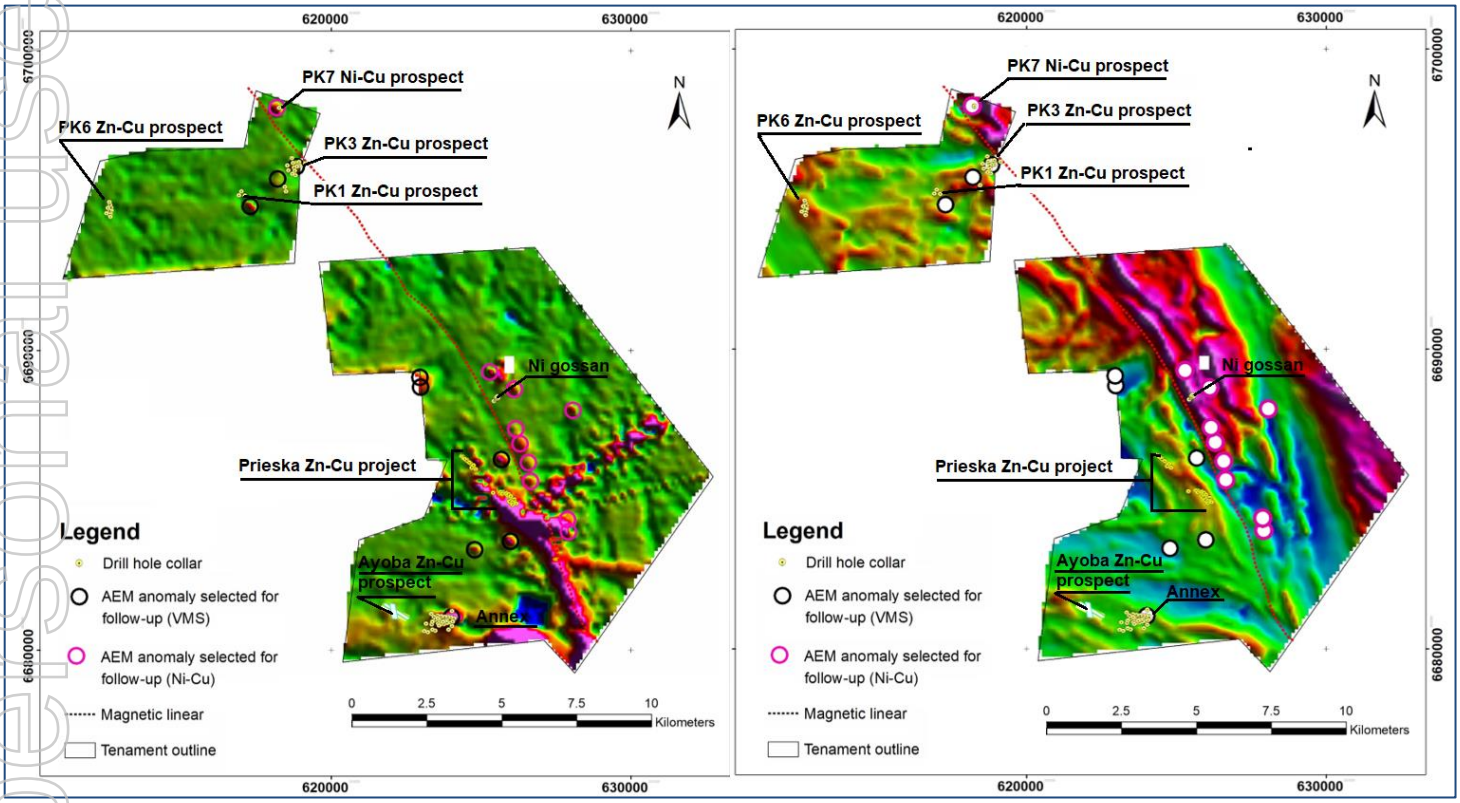

Figure 2: Airborne EM anomalies shown on the AEM Channel 30 map on the left and on the aeromagnetic map on the right. Hot colours represent high conductivity and high susceptibility. The large, linear conductors south and east of the Prieska Zn-Cu Project are caused by infrastructure.

In recent decades, the geological understanding of VMS mineralisation and improved geophysical and geochemical techniques have led to numerous discoveries worldwide of clusters of massive sulphides in "camps" surrounding known major deposits.

The near-mine area at the Prieska Project was not covered during the past 36 years or "modern era" of exploration. Orion now has the advantage of applying the improved geological understanding of VMS deposits, combined with modern geophysical exploration tools to target similar discoveries.

In addition, Magmatic Ni-Cu-Co deposits are now known to intrude along plate margins. These intrusions are therefore commonly emplaced in pre-existing back-arc, valocano sedimenetary stratigraphy that hosts VMS deposits. As a result, these different styles of mineralisation are commonly found alongside each other in the meta volcano-sedimentary belts like the Fraser Range in Australia and in the Areachap Belt which hosts the

Prieska VMS deposit. Importantly, the two different massive sulphide base metal deposit styles are detected by the same geophysical techniques.

Numerous AEM anomalies were identified for follow-up by Southern Geoscience Consultants (Figure 2).

Conductors were detected over known VMS deposits at PK1, PK3 and Annex, as well as at the PK7 and "Ni Gossan" Ni-Cu occurrences, proving AEM to be effective in detecting sulphides in the surveyed area (Figure 2).

Based on the known mineral occurrences and aero-magnetic interpretation, the AEM anomalies are classified as VMS or Magmatic Ni-Cu targets. The Ni-Cu occurrences and targets occur along a north to north-northwest trending structure visible on the newly acquired magnetic data (Figure 2).

Anglovaal reported that percussion scout hole drilling conducted in the 1970s identified nickel-copper mineralisation associated with sulphides at two localities, PK7 and "Ni Gossan", which coincide with the geophysical target. The VMS targets are located on a key stratigraphic horizon that marks a paleo-seafloor and were also tested by historic scout drilling with positive indications of mineralisation.

Moving forward with the exploration program, Orion plans to rank and prioritise the AEM anomalies with the integrated use of existing geological data, supported by detailed field mapping and geochemistry to confirm the geological setting. Fieldwork will take into account the characteristics of VMS deposits including spatial association with the paleo-seafloor, footwall alteration, and structural setting. Orion plans to follow up selected anomalies with high-powered ground EM before testing by diamond drilling.

Down-hole Time Domain Electromagnetic (DHTDEM) results

DHTDEM surveys were completed in selected drill holes at the Prieska Deposit to assess whether there are any off-hole conductors, indicating any extensions to the mineralisation (refer ASX release 16 January 2019) (Figure 3).

Unfortunately, many of the target areas were not suitable for testing due to the large number of metal steering wedges inserted into the mother holes. Conductive plates detected in three of the holes surveyed for characterisation correspond well to the depth and structural orientation of the intersected mineralisation (Figure 4), confirming that DHTDEM is an effective tool to locate off-hole mineralisation at the Prieska Deposit.

An off-hole conductor in the south-eastern most hole drilled by Orion, OCOD137_D2 which intersected 11.3m at 4.47% Zn and 3.70% Cu (refer ASX release 5 November 2018) confirms that the thick massive sulphide intersection persists to the south and east (Figure 5) beyond the drilled area.

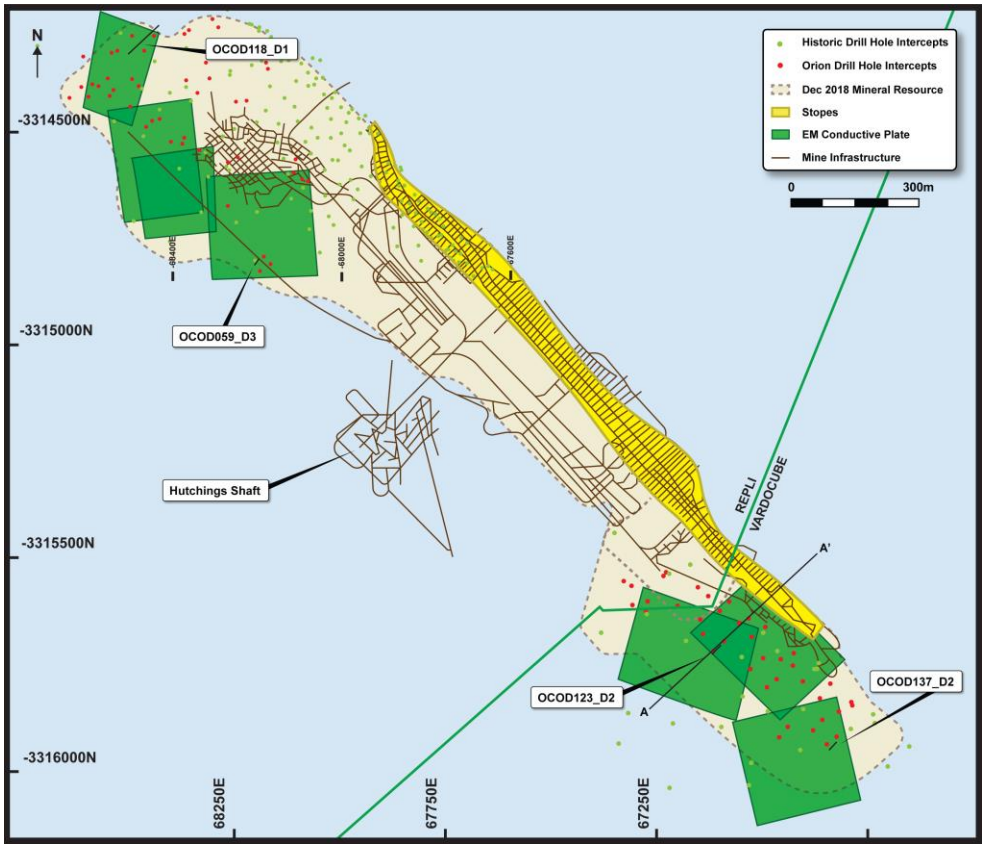

Figure 3: Plan of the Deep Sulphide Resource showing location of drill holes surveyed with DHTDEM and conductive plates indicated.

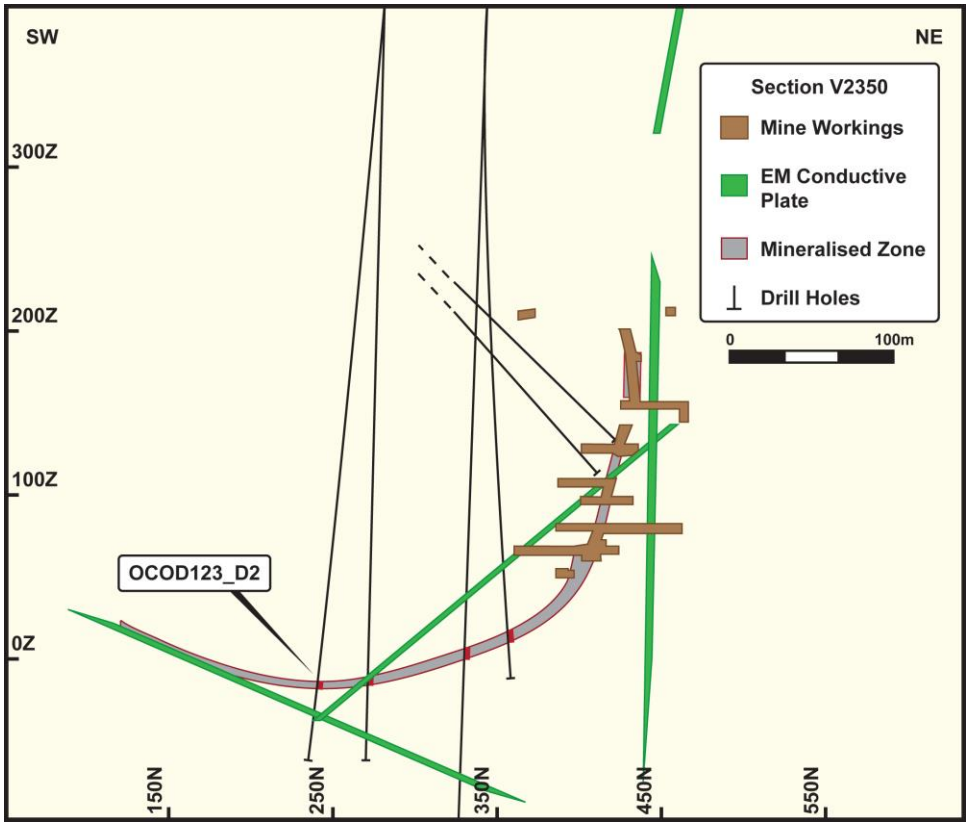

Figure 4: Cross section through drill hole OCOD123_D2 indicating three conductive plates corresponding to the structure of known massive sulphide mineralisation intersected in this hole.

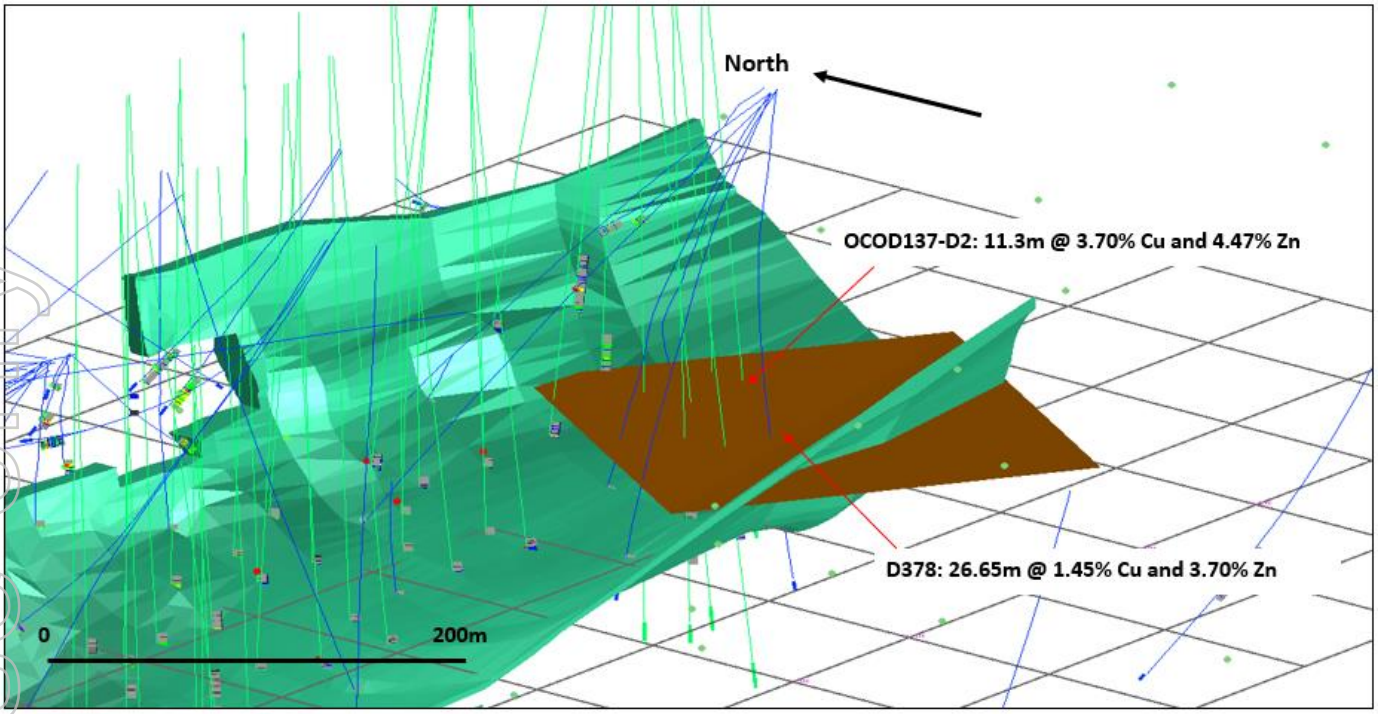

Figure 5: Isometric view of the south-eastern part of the Deep Sulphide Resource (green) showing an off-hole conductive plate (brown) in hole OCOD137_D2, indicating the continuation of the massive sulphide mineralisation along strike to the south and east.

Errol Smart
Managing Director and CEO

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Competent Person's Statement

The information in this report that relates to Orion's Exploration Results at the Prieska Near-Mine Project complies with the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (**JORC Code**) and has been compiled and assessed under the supervision of Mr Errol Smart, Orion Minerals Managing Director. Mr Smart (PrSciNat) is registered with the South African Council for Natural Scientific Professionals, a Recognised Overseas Professional Organisation (**ROPO**) for JORC purposes and 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 Smart consents to the inclusion in this announcement of the matters based on his information in the form and context in which it appears. The Exploration Results are based on standard industry practises for geophysical methods including quality control measures as detailed in Appendix 1.

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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- disclaim all responsibility and liability for these forward-looking statements (including, without limitation, liability for negligence).

Appendix 1: The following tables are provided in accordance with the JORC Code (2012) requirements for the reporting of geophysical Exploration Results for the Prieska and Near-Mine Projects.

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	• Nature and quality of sampling (e.g. 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.	• Not applicable to this report.
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.).*	• Not applicable to this report.
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.*	• Not applicable to this report.

Criteria	JORC Code explanation	Commentary
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.*	• Not applicable to this report.
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.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	• Not applicable to this report.
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 (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.*	**Airborne Electromagnetic and Magnetic Survey** • The survey was flown with the SkyTEM 312 HP system. This high-power system, with a peak moment up to 1,000,000 NIA, is optimised to provide an exceptional depth of investigation, due to the high moment mode with high current and low base frequency of 12.5 Hz. • A total of 146.78km^2 was covered by the SkyTEM™ survey. • Flight line spacing was 200m with 2000m spaced tie lines. • Terrain clearance of transmitter was 30m – 50m. **Down-hole Time Domain Electromagnetis Survey (DHTDEM)** • DHTDEM surveys were carried out using a 3 component Digi-Atlantis probe and ultra high-power transmitter. • A single loop with approximately 6000m circumference was used for the four holes surveyed. Continuous measurements were taken as the probe travelled into the hole and out again.
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.*	**Airborne Electromagnetic and Magnetic Survey** • Data collected was reviewed and qualtity control done daily on site by a consulting geophysicist. • Processing of the EM and magnetic data was done by SkyTEM™.

Criteria	JORC Code explanation	Commentary
	• *Discuss any adjustment to assay data.*	**Down-hole Time Domain Electromagnetis Survey (DHTDEM)** • Data was collected on site and validated by a geophysical technician daily. • Data (raw and processed) was sent to a consultant geophysicist for review and quality control.
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.*	**Airborne Electromagnetic and Magnetic Survey** • GPS base stations were placed at a location of maximum possible view to satellites and away from metallic objects that could influence the GPS antenna. **Down-hole Time Domain Electromagnetis Survey (DHTDEM)** • Downhole survey data using a North-Seeking Gyro instrument was used for the intertretation of the DHTDEM results.
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.*	• Not applicable to this report.
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.*	• Not applicable to this report.
Sample security	• *The measures taken to ensure sample security.*	• Not applicable to this report.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• No review conducted.

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 Prospecting Rights are held by Repli Trading No 27 (Pty) Ltd, Vardocube (Pty) Ltd and Bartotrax (Pty) Ltd, each of which are subsidiaries of Orion.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Anglovaal conducted an airborne EM survey in 1969 followed up by ground magnetic and EM surveys and geological mapping and a second AEM survey in 1982. • Newmont and Anglovaal undertook scout drilling on the northern area in the 1970s and 1980s.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• Mineralisation of Volcanogenic Massive Sulphide (**VMS**) type and possibly Magmatic hosted Cu-Ni type is situated in the southernmost exposures of the north-northwest trending Kakamas Terrain, which forms part of the Mid-Proterozoic Namaqualand Metamorphic Complex. • The mineralisation is hosted by the Copperton Formation of the Areachap Group which hosts several VMS (Prieska, Areachap, Boksputs, Kantien Pan, Kielder and Annex deposit) and Magmatic hosted Cu-Ni deposits (Jacomynspan and Rok Optel).

Drill hole Information	• *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.*
		• Not applicable to this report.

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.*	• Not applicable to this report.

Criteria	JORC Code explanation	Commentary
	• *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.*	
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').*	• Not applicable to this report.
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.*	• Appropriate diagrams (plans and section) are shown in Figures 1 to 4 of the 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.*	• Not applicable to this report.
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.*	• Not applicable to this report.
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 geophysical surveys and follow-up drilling are planned over the AEM anomalies. • Drill testing of the DHTDEM conductive plate is planned.