Orion Minerals

ASX/JSE RELEASE: 28 November 2018

Significant New VMS Discovery at Ayoba Confirms Strong Near-Mine Exploration Potential at Prieska

- **10.6m zone of copper-zinc bearing sulphides, including 5.2m of massive sulphides, intersected at Ayoba Prospect.**
- **Intersection was drilled 5.3km south-west of the Prieska Zinc-Copper Project.**
- **Mineralisation and associated alteration typical of Volcanogenic Massive Sulphide (VMS) deposits.**
- **Discovery hole tested an electro-magnetic (EM) plate with a 1.1km strike and 450m dip extent.**
- **The discovery validates Orion's expectations that there is excellent potential to discover a cluster of VMS deposits around the Prieska Project.**
- **The exploration methodology adopted is validated by the success of the first hole drilled as part of the Near-Mine Exploration Program.**

Errol Smart, Orion Managing Director and CEO, commented:

"*The discovery at Ayoba is a very important breakthrough, which clearly demonstrates the potential for large satellite deposits to be discovered in close proximity to our advanced Prieska Zinc-Copper Project. VMS deposits tend to occur in clusters and yet there has been virtually no exploration outside of the known deposits at Prieska in several decades. In fact, this intersection is the first new VMS discovery in the Areachap Belt for the past 36 years.*

This important discovery demonstrates the huge potential to find additional deposits within a 5-10km radius of the proposed processing plant and mine infrastructure at Prieska, validating our exploration strategy which is aimed at unlocking the value of this rich mineral province. It also demonstrates the advantage of using modern geophysical exploration techniques in such a well mineralised VMS terrain and is the deepest 'blind deposit' ever discovered in the Areachap."

Orion Minerals Limited (**ASX/JSE: ORN**) (**Orion** or **Company**) is pleased to announce the discovery of a new copper-zinc bearing massive sulphide body located in close proximity to the Company's flagship Prieska Zinc-Copper Project (**Prieska Project** or **Prieska Deposit**), in the Areachap Belt, Northern Cape Province, South Africa (Figure 2).

The discovery hole, OAXD002, was drilled at the Ayoba Prospect, a satellite exploration target, and is both the first exploration hole drilled as part of the Company's Near-Mine Exploration Project (Table 1) and the first hole to test for new mineralisation surrounding the historical Prieska Mine in more than 36 years.

Diamond drill-hole OAXD002 intersected **10.55m of sulphide mineralisation**, including **5.17m of massive sulphides (>70% sulphides)** from a down-hole depth of 653.2m (Figure 1). The discovery was made by drill testing a Fixed Loop Electro Magnetic (**FLEM**) conductor located 5.3km south-southwest of the Company's

Hutchings Shaft at the Prieska Project and 1.6km west and along strike of known copper mineralisation at Annex (refer ASX release 25 October 2018) (Figure 3).

The modelled conductor has a strike length of 1.1km and extends down-dip to at least 800m below surface. The vertical depth to the top of the conductor is 500m.

The identification of copper (chalcopyrite) and zinc (sphalerite) associated with the massive sulphide mineralisation, and with host lithology similar to that at the Prieska Deposit, suggests the discovery of a Volcanogenic Massive Sulphide (**VMS**) deposit (Figure 1).

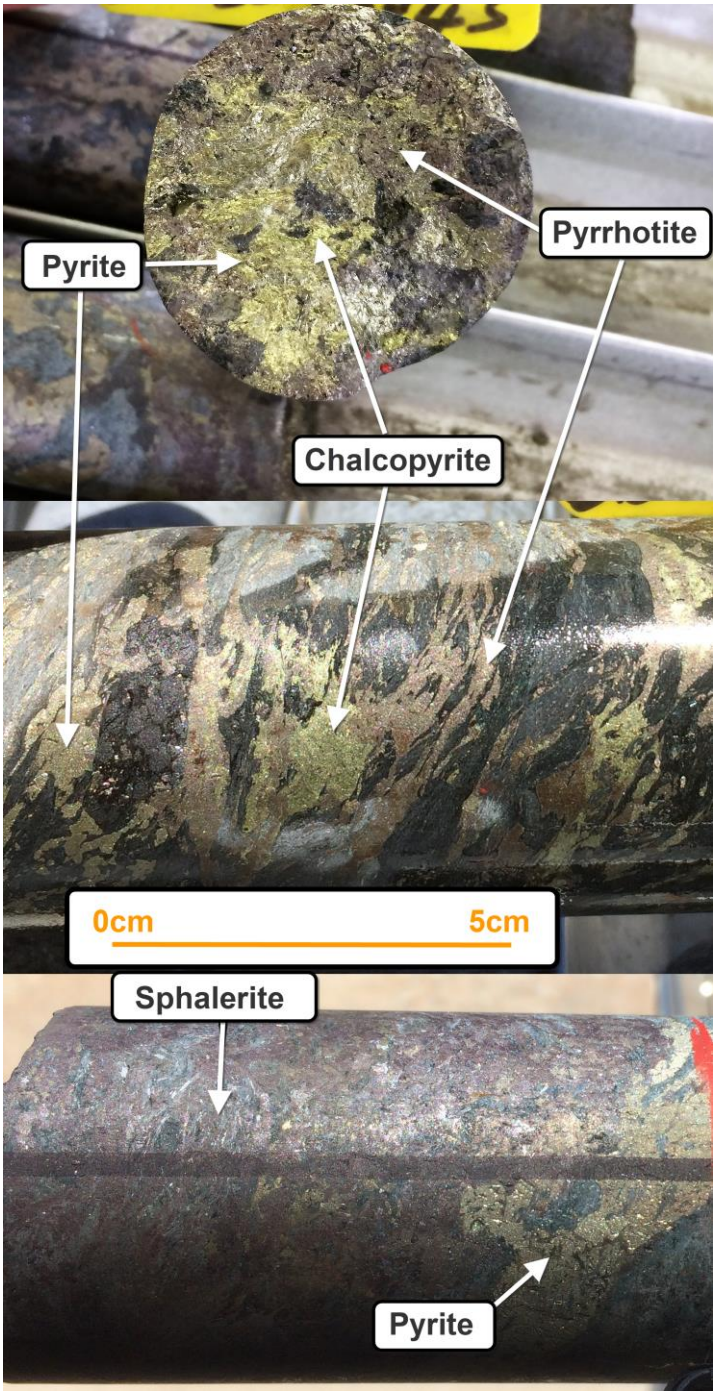

Figure 1: Sulphide mineralisation in OAXD002.

Alteration associated with the deposit is noted to be similar to the alteration associated with the Prieska VMS deposit. The modelled FLEM plate suggests the potential for a large, low conductive sulphide body at Ayoba. The geology, as seen in the drilled core, suggests the stratigraphy to be structurally overturned with potential for further folded repetition of the mineralisation.

The current structural interpretation shows that the newly discovered mineralisation, as well as the Annex and Prieska Deposits all occur on the same stratigraphic horizon (Figure 4). This conforms to Orion's exploration model of VMS deposits clustering around giant VMS deposits like the Prieska Deposit to form VMS camps.

Giant VMS deposits form on, or immediately below a paleo-seafloor. To accumulate the large tonnages of sulphides necessary to form a giant VMS deposit, the paleo-seafloor must be stable over a long period of time, increasing the chances for other large deposits to form in proximity during this hiatus in the geological history.

The paleo-seafloor setting as mapped at Ayoba - Annex defines the target stratigraphic position in the VMS camp and guided the targeting positions for surveying with FLEM.

Modelling of the FLEM data at Ayoba showed a conductor with a low conductance of 100 to 150S (Siemens) which correlates well with the intersected mineralisation, being pyrite dominated, with minor pyrrhotite which is unlikely to yield strong conductance.

The subtle geophysical anomaly and deep-seated character of Ayoba provide encouragement that the mineralisation may be traced beyond the confines of the initial electro-magnetic (**EM**) survey plate model. The key stratigraphic horizon remains untested by geophysics or drilling for 1000m along strike to the western tenement boundary (Figure 3).

Logging and sampling of the drill core is currently underway with assays expected in late December 2018. Further EM surveys, including down hole EM, are being planned, before follow-up drilling.

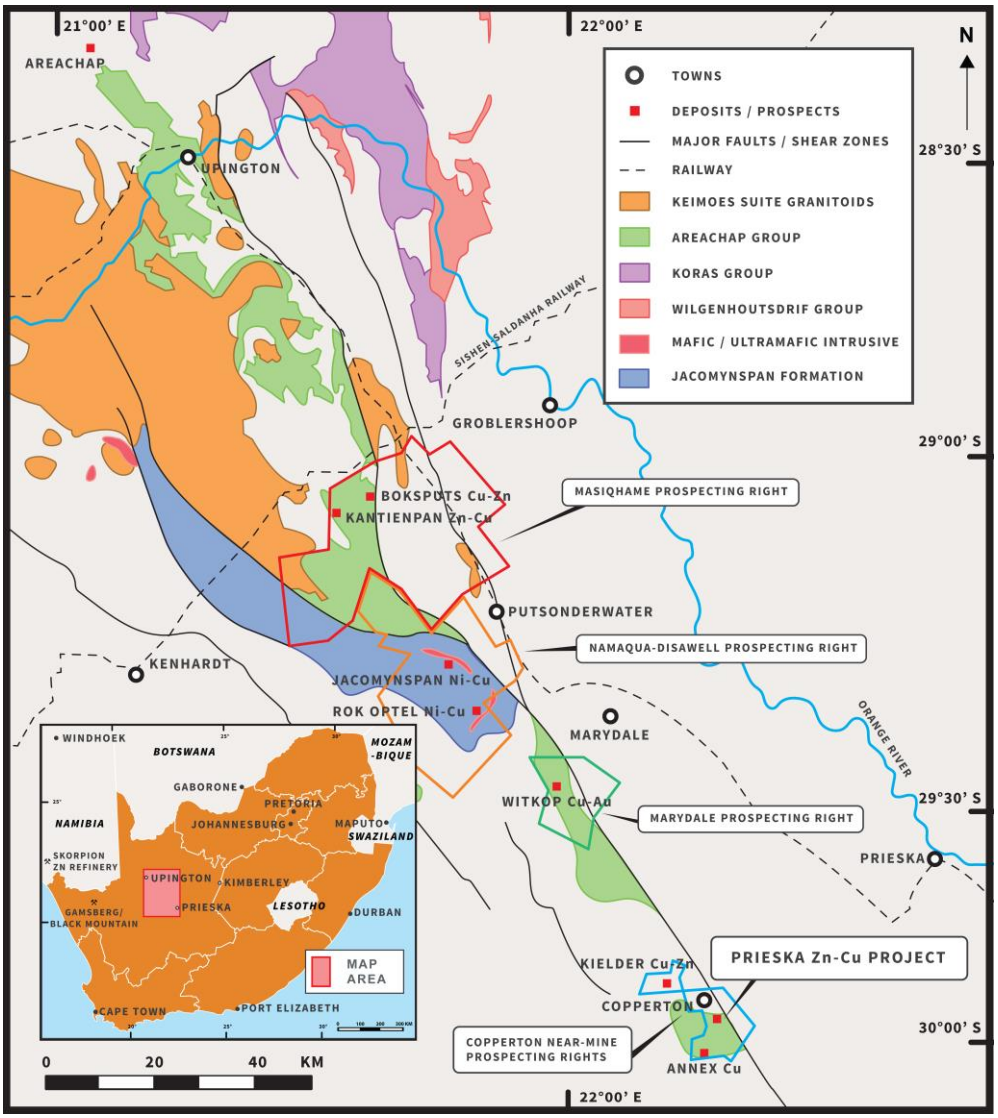

Figure 2: Location map showing Orion Prospecting rights in the Areachap Belt, South Africa.

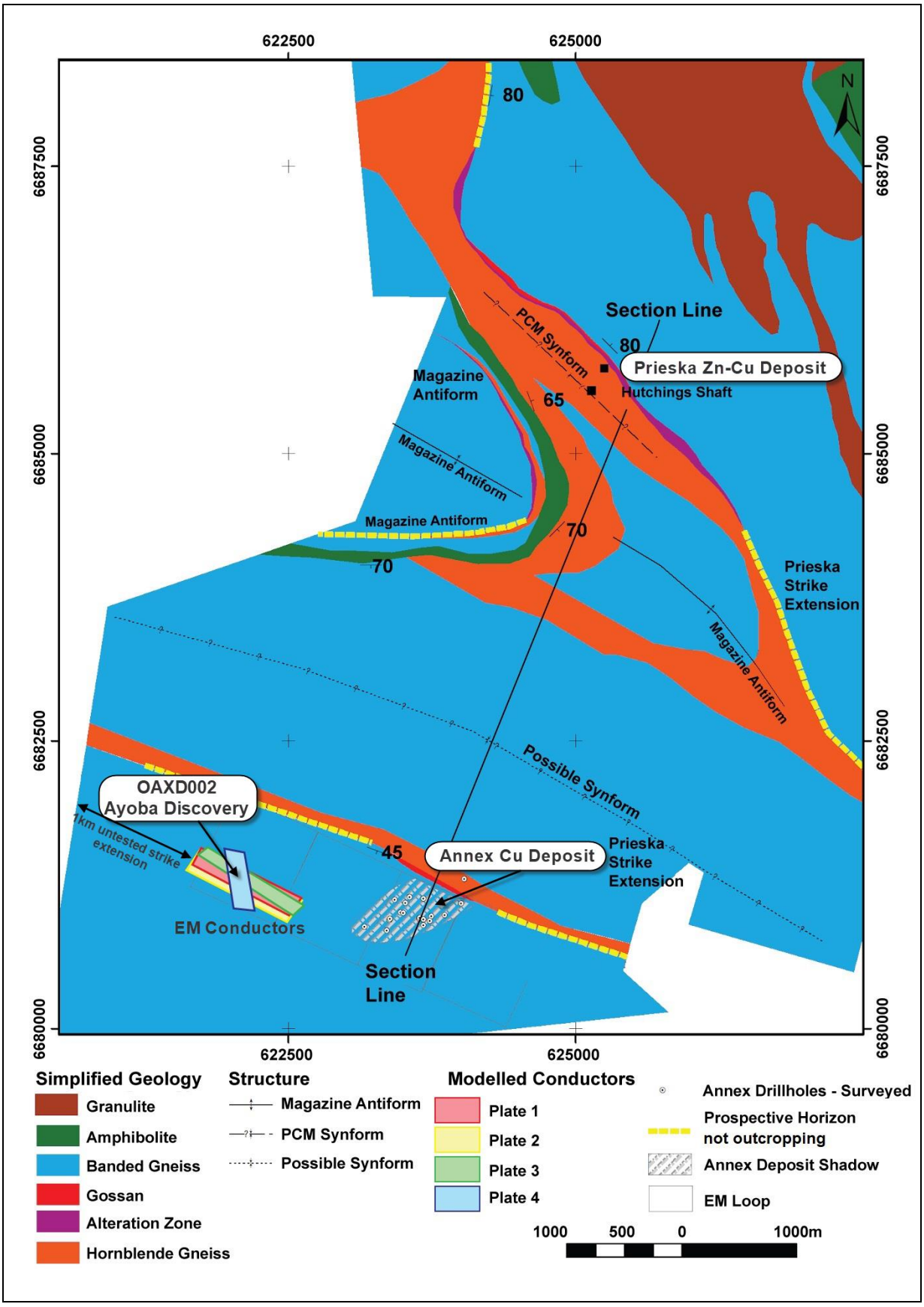

Figure 3: Geology map of the Copperton area.

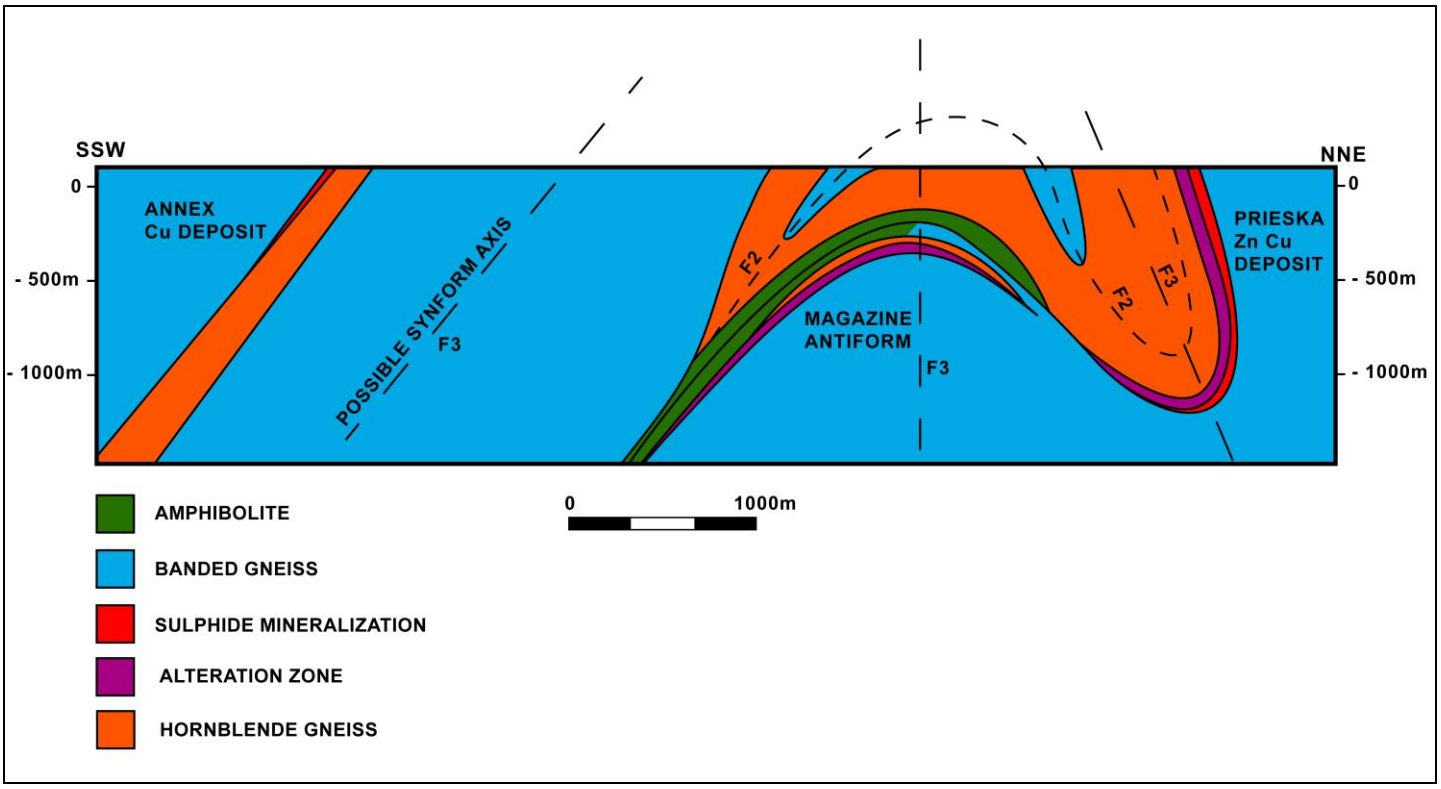

Figure 4: Geology Cross Section of the Copperton Area – refer to Figure 3 for the Section Line.

Table 1: Collar location of drill hole at the Ayoba discovery.

Drill hole	East	North	From	To	Depth	Azimuth	Inclination
	(UTM 34 SOUTH)	(UTM 34 SOUTH)	(m)	(m)	(m)		
OAXD002	622130	6681090	0.00	701.00	701.00*	26°	-73°

*Hole still in progress, depth as at 24 November 2018.

Errol Smart
Managing Director and CEO

ENQUIRIES

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Competent Person's Statement

The information in this report that relates to Exploration Results is not in contravention of 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's 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.

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 in accordance with the JORC Code (2012) for the reporting of Exploration Results for Prieska Near Mine Project.

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.*	• Diamond core is cut at the core yard and half core is taken as the sample. • The core is sampled at 1m intervals where possible with sample lengths adjusted to ensure samples do not cross geological boundaries or other features. • Mineralised zones are drilled using core drilling. • Sampling is carried out under supervision of a qualified geologist using procedures outlined below including industry standard QA/QC. • Samples submitted for analysis to ALS Chemex (Pty) Ltd (**ALS**) are pulverised in its entirety at ALS and split to obtain a 0.2g sample for digestion and analysis.
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.).*	• Diamond core drilling using NQ sized core. • In the near-surface weathered zone HQ core was drilled.
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.*	• All mineralised intersections are done with core drilling. • Core stick-ups reflecting the depth of the drill hole are recorded at the rig at the end of each core run. • A block with the depth of the hole written on it is placed in the core box at the end of each run. • At the core yard, the length of core in the core box is measured for each run. The measured length of core is subtracted from the length of the run as recorded from the stick-up measured at the rig to determine the core lost. • Core recovery in all the mineralised intersections are good. • No assay results available as yet.

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.*	• Core of the entire hole length was geologically logged and recorded on standardised log sheets by qualified geologists. • Qualitative logging of colour, grain size, weathering, structural fabric, lithology, alteration type and sulphide mineralogy carried out. • Quantitative estimate of sulphide mineralogy. • Logs are recorded at the core yard and entered into digital templates at the project office.
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.*	• NQ core to be cut at core yard and half core taken as sample. • The entire sample length is cut and sampled. • Sample preparation planned to be undertaken at ALS, an ISO accredited laboratory. ALS utilises industry best practise for sample preparation for analysis, involving drying of samples, crushing to <5mm if required and then pulverising so that +85% of the sample passes 75 microns. • Certified Reference Materials (**CRM**), blanks and duplicates are inserted and analysed with each batch. Insertion rates for the current reporting is: CRMs = 10%, blanks = 5% and field duplicates = 2%.
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.*	• No assays results as yet.
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.* • *Discuss any adjustment to assay data.*	• The Competent Person is personally supervising the drilling and sampling along with a team of experienced geologists. • The Competent Person reviews the calculation of the significant intersections. • For the EM survey, data is collected on site and validated by a geophysical technician daily. Data (raw and processed) is 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.*	• Drill hole collar positions are laid out using a handheld GPS. • After completion of the drilling all collars were surveyed by a qualified surveyor using a Trimble R8 differential GPS.

Criteria	JORC Code explanation	Commentary
	• *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• Down hole surveys are completed using a North-Seeking Gyro instrument. • All survey data is in the WGS84 ellipsoid in the WG23 Zone with the Hartebeeshoek 1994 Datum. The coordinates are also supplied in Clarke 1880 and in UTM WGS84 Zone 34 (Southern Hemisphere).
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.*	• Drill holes aim to intersect mineralisation on spacings sufficient to establish geological and grade continuity appropriate for Mineral Resource and Ore Reserve estimations. • No sample compositing will be applied.
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.*	• Drilling is oriented perpendicular, or at a maximum achievable angle to, the anticipated attitude of the mineralisation. • The geometry of the mineralisation can not yet be determined and the effect of drill angle is not known
Sample security	• *The measures taken to ensure sample security.*	• Chain of custody is managed throughout, and the policy managed through an appropriate SOP. Samples are stored on site in a secure locked building and then freighted directly to the laboratory.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• SRK Consulting has carried out a review on the sampling techniques and data.

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 Bartotrax (Pty) Ltd, which is a subsidiary of Orion.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• No previous exploration has been conducted at Ayoba.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• The deposit is a Volcanogenic Massive Sulphide (**VMS**) deposit which is situated in the southernmost exposures of the north-northwest trending Kakamas Terrain, which forms part of the Mid-Proterozoic Namaqualand

Criteria	JORC Code explanation	Commentary
		Metamorphic Complex. • The deposit is hosted by the Copperton Formation of the Areachap Group. The Areachap Group, hosts several VMS deposits such as the Prieska, Areachap, Boksputs, Kantien Pan, Kielder and Annex Vogelstruisbult deposits.

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.*
		• Drill hole collar coordinates, elevation, inclination and azimuth, down hole length, interception depth and hole length are available in Orion's geological database and are not all included in this release.

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').*	• All intersection widths quoted are down hole widths. • OAXD002 intersected the mineralisation at high angle to the attitude of the mineralisation.
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 (plan, cross section and long section) are shown in the release text.
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.*	• All drill hole results referred to in the release are listed in Table 1. • The Company has presented all available information in this report in a balanced manner and has provided appropriate context for the Exploration Results to allow a considered and balanced judgement of their significance.
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.*	• Hardcopy maps are available for a range of other exploration data. This includes mine survey plans, geological maps, airborne magnetics, ground magnetics, electromagnetics, gravity and induced polarisation. All available exploration data has been viewed by the Competent Person. • The Prieska Mine operated from 1972 to 1991 and is reported to have milled a total of 45.68 Mt of ore at a grade of 1.11% copper and 2.62%

Criteria	JORC Code explanation	Commentary
		zinc, recovering 0.43 Mt of copper and 1.01 Mt of zinc. Detailed production and metallurgical results are available for the life of the mine. • In addition, 1.76 Mt of pyrite concentrates and 8,403 t of lead concentrates as well as amounts of silver and gold were recovered. • Copper and zinc recoveries averaged 84.9% and 84.3% respectively during the life of the mine.
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 drilling and geophysical surveys are planned to follow up OAXD002. • Assays for metals in core from OAXD002 will be submitted to ALS Laboratory in Johannesburg for analysis.