Maximum grade in-hole drilling data

by

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Abstract

Images and processed maximum grade in-hole data for the most commonly analysed elements can assist with mineral exploration and other mineral-related studies by providing a spatial overview of known mineralization locations, trends and patterns. This digital product has been made possible by extracting analytes from the Western Australian Mineral Exploration reports (WAMEX) database from the many disparate submission names and units into flat tables using a common set of units. This is the first time that this process has been attempted by the Geological Survey of Western Australia (GSWA) and despite being incomplete and incorporating significant known errors, data processing has enabled valuable information to be derived.

Publicly available industry drillhole data provided in digital format (generally from the late 1990s to more than five years old) were used in this compilation. The compilation process is acknowledged to be problematic and incomplete for a variety of reasons. The automated identification of all possible analytes and units of measurement had limitations resulting in the loss of about 15% of the data. Furthermore, the compilation contains significant erroneous data with the main contributor being incorrectly recorded units, resulting in excessively large or small values when converted to the common set. For example, results incorrectly reported as being a percentage (when actually in parts per million) would be incorrect by a factor of 10 000. To partly address these issues, low and high cuts were applied to the data to remove the most obvious erroneous values. This resulted in a further reduction in the dataset by between 7 and 20% (see Table 1) and in addition, the loss of valid data. Furthermore, results from all analytical techniques were combined in the same table, so not all are directly comparable, particularly those derived from portable XRF instruments.

Table 1. Statistics and grade threshold summary for the maximum grade in-hole drilling data

Analyte	No. compiled samples	Minimum grade	Maximum grade	Mineralized threshold	Units	No. samples used	% of compiled samples
Au	1 325 000	1	10 000	500	ppb	1 061 936	80
As	868 250	1	10 000	1000	ppm	697 369	80
Cu	779 385	1	50 000	2500	ppm	720 363	92
Zn	689 186	1	100 000	10 000	ppm	638 546	93
Pb	553 224	1	100 000	10 000	ppm	473 849	86
Ni	677 691	1	50 000	3000	ppm	628 488	93
Co	468 501	1	5 000	1000	ppm	414 946	89

Maximum grade in-hole was identified and attributed to the relevant drill collar coordinates irrespective of drillhole type, depth, orientation or downhole interval. As over 85% of all drillholes are less than 200 m deep, even if inclined at 60 °, the maximum horizontal location error for most results is therefore +/- 100 m.

Data were processed using the point neighbourhood statistics tool in ESRI ArcGIS software to obtain the maximum in-hole grade and density of mineralized drillholes for three different cell sizes (5 km, 300 m and 100 m) smoothed over the adjoining eight cells. These cell sizes enable visualization of mineralization trends at different scales ranging from statewide, through to regional and district scale. Note that the smoothing effect of this approach, while a powerful visualization tool, does exaggerate the apparent spatial extent of mineralization. This effect is readily evident by comparing the imagery for the different cell sizes at any specific location.

To further visualize mineralization trends, smoothed images of maximum in-hole grade overlaying a hill-shaded density of mineralized drillholes were generated using ER Mapper software. Mineralized drillholes were defined as those with a maximum grade corresponding to the definition of a mineral occurrence for greenfields areas in MINEDEX (see 'mineralized threshold' in Table 1).

Noting the above data qualifications, it is strongly recommended that the source data in the original exploration reports (identified by the unique 'A-Number' in the Mineral Exploration Drillholes layer in GeoVIEW.WA) are examined closely to verify the results before using this information for any detailed work, including exploration targeting.

Despite the significant limitations of the dataset, the resultant mineralization footprints agree with the relevant mineralization sites data and provide further detail and information on statewide, regional and district scale mineralization trends.

How to access

Selected data are available as a free download from the Data and Software Centre via Datasets — Statewide spatial datasets — Mineral information — Maximum grade in-hole drilling data.

Smoothed images can also be viewed using GeoVIEW.WA. This online interactive mapping system allows data to be viewed and searched together with other datasets, including orthophotography, geological maps, geophysical images, and mineral exploration datasets.

Recommended reference

Ormsby, WR, Thom, J, Howard, SHD, Then, D, De Biran, S and Tapping, B 2021, Maximum grade in-hole drilling data: Geological Survey of Western Australia, digital dataset.