ORE Reference Material
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DATA SHEET FOR

ORE REFERENCE MATERIAL

TR-1M

Table 1. Informative Values, SDs, 95% Confidence Limits for TR-1M

Constituent	Informative Value	95% Confidence Limits	
		Low	High
Ag, Silver (mg/kg)	7.56	6.45	8.68
As, Arsenic (mg/kg)	1565.68	1441.08	1690.28
Cu, Copper (mg/kg)	77.05	70.46	83.64
Fe, Iron (wt.%)	3.79	3.6	3.98
Ni, Nickel (mg/kg)	39.01	33.97	44.06
W, Tungsten (mg/kg)	56.20	42.17	70.22
Zn, Zinc (mg/kg)	642.78	604.72	680.84

INTRODUCTION

TR-1M reference materials are designed to provide a low-cost approach for evaluating and enhancing the quality of geological sample analyses. To the geologist, they provide a way of establishing quality control in analytical data sets generated during exploration from the ground up, prospect appraisal, and grade control at mine sites. They provide an efficient way for the analyst to calibrate analytical equipment, evaluate novel techniques, and frequently monitor in-house operations.

SOURCE MATERIAL

TR-1M is source material is linked to both orogenic and intermediate low-sulphidation epithermal mineralization types, which are present in key metallogenic zones within the region. The orogenic mineralization is connected to the KNR deposit found in the Navoiy Region, about 470 kilometers from Tashkent, whereas the intermediate low-sulphidation epithermal features are associated with the Almalyk District, roughly 100 kilometers from Tashkent. The Almalyk area is considered a zone, containing notable concentrations of gold, silver, and base metals such as copper, lead, and zinc. These metals occur in structurally controlled hydrothermal sulphide assemblages within altered volcanic and sedimentary rocks. The primary ore minerals include pyrite, arsenopyrite, chalcopyrite, and galena, with considerable economic importance due to their copper, lead, zinc, gold, and silver content. The formation of these ores is thought to result from metamorphic dehydration processes combined with magmatic-hydrothermal fluids. The mineralization displays transitional characteristics between conventional orogenic and intermediate low-sulphidation epithermal deposits. For reference material preparation, samples were taken from well-mineralized zones reflective of typical sulphide mineral assemblages, hydrothermal alteration, and the district's geochemical profile.

Table 2. Indicative Values for TR-1M

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
4-Acid Digestion continued								
Ag	mg/kg	*7.56*	Cu	mg/kg	*77,05*	Ni	mg/kg	*39,01*
As	mg/kg	*1565,68*	Fe	mg/kg	*3,79*	W	mg/kg	*56,20*
Zn	mg/kg	*642,78*						

Note: intervals may appear asymmetric due to rounding

COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting TR-1M was prepared in the following manner:

- drying to constant mass at 105°C;
- preliminary blending of ores and barren siltstone materials;
- multi-stage milling to approximately 99% less than 75 microns;
- final homogenisation;
- packaging in 20 g units in laminated foil pouches.

ANALYTICAL PROGRAM

Three commercial analytical laboratories participated in the program to characterize the analytes reported in Table 1. The following method was employed for method specific information:

- Four acid (HCl-HNO_3-HF-$HClO_4$) digestion with ICP-OES, (3 laboratories);

For characterization purposes, six test units (20 g each) were distributed to each of three independent laboratories. The samples were considered representative of the entire prepared batch. Each laboratory analyzed the six units and reported replicate analytical results. The obtained data were statistically evaluated to assess the consistency and agreement between laboratories, including within-laboratory and between-laboratory variation. This format enabled nested ANOVA treatment of the results to evaluate homogeneity, i.e. to ascertain whether between-unit variance is greater than within-unit variance. Table 1 presents the informative values together with their associated 1SD's, 95% confidence and tolerance limits and Table 2 shows indicative values. Table 3 provides performance gate intervals for the informative values of each analytical method group based on their pooled 1SD's.

STATISTICAL ANALYSIS

Informative Values, Standard Deviations, Confidence and Tolerance Limits have been determined for each analytical method following removal of individual and laboratory outliers (Table 1). Assigned Values are the mean of means after outlier filtering. The 95% Confidence Limit is a measure of the reliability of the assigned value, i.e. the narrower the Confidence Interval the greater the certainty in the Assigned Value. It should not be used as a control limit for laboratory performance.

Standard Deviation values (1SDs) are reported in Table 1 and provide an indication of a level of performance that might reasonably be expected from a laboratory being monitored by this ORE REFERENCE MATERIAL in a QA/QC program. They take into account errors attributable to measurement uncertainty and ORE REFERENCE MATERIAL variability. For an effective ORE REFERENCE MATERIAL, the contribution of the latter should be negligible in comparison to measurement errors. The Standard Deviation values include all sources of measurement uncertainty: between-lab variance, within-run variance (precision errors) and ORE REFERENCE MATERIAL variability. The SD for each analyte's assigned value is calculated from the same filtered data set used to determine the assigned value, i.e. after removal of all individual, lab dataset (batch) and 3SD outliers (single iteration). These outliers can only be removed after the absolute homogeneity of the ORE REFERENCE MATERIAL has been independently established, i.e. the outliers must be confidently deemed analytical rather than arising from inhomogeneity of the ORE REFERENCE MATERIAL. The standard deviation is then calculated for each analyte from the pooled accepted analyses generated from the inter-laboratory program.

Performance Gates (Table 3) are calculated for two and three standard deviations. As a guide these intervals may be regarded as warning or rejection for multiple 2SD outliers, or rejection for individual 3SD outliers in QC monitoring, although their precise application should be at the discretion of the QC manager concerned.

A second method utilizes a 5% window calculated directly from the informative value. Standard deviation is also shown in relative percent for one, two and three relative standard deviations (1RSD, 2RSD and 3RSD) to facilitate an appreciation of the magnitude of these numbers and a comparison with the 5% window. Caution should be exercised when concentration levels approach lower limits of detection of the analytical methods employed as performance gates calculated from standard deviations tend to be excessively wide whereas those determined by the 5% method are too narrow.

Table 3. Performance Gates for TR-1M

Constituent	Informative Value	Absolute Standard Deviations					Relative Standard Deviations			U (expanded uncertainty)
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	k=2, 95%
4-Acid Digestion										
Ag, mg/kg	7.56	0.348	6.864	8.256	6.516	8.604	4.6%	9.2%	13.8%	1.12
As, mg/kg	1565.68	27.091	1511.498	1619.862	1484.407	1646.953	1.73%	3.46%	5.19%	124.6
Cu, mg/kg	77.05	2.664	71.722	82.378	69.058	85.042	3.46%	6.92%	10.38%	6.59
Fe, wt.%	3.79	0.084	3.622	3.958	3.538	4.042	2.22%	4.44%	3.66%	0.19
Ni, mg/kg	39.01	1.46	36.09	41.93	34.63	43.39	3.74%	7.48%	11.22%	5.04
W, mg/kg	56.20	3.596	49.008	63.392	45.412	66.988	6.4%	12.8%	19.2%	14.02
Zn, mg/kg	642.78	11.839	619.102	666.458	607.263	678.297	1.84%	3.68%	5.52%	38.06

Note: intervals may appear asymmetric due to rounding

The homogeneity of TR-1M has also been evaluated in an ANOVA study for all analytes. This study tests the null hypothesis that no statistically significant difference exists between the *between-unit variance* and the *within-unit variance* (i.e. p- values <0.05 indicate rejection of the null hypothesis). Of the 7 assigned values, no failures were observed indicating no evidence to reject the null hypothesis.

Based on the statistical analysis of the results of the inter-laboratory program it can be concluded that TR-1M is fit-for-purpose as a ore reference material (see 'Intended Use' below).

PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

Reference material TR-1M has been prepared and packaged by:

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It has been packaged in 20g units in laminated foil pouches.

PARTICIPATING LABORATORIES

1. Topfin result LLC, Tashkent, Uzbekistan
2. Argetest Cevher Zenginleştirme Arge Laboratuvar ve Analiz Hizmetleri Mühendislik Danışmanlık Makina Ithalat Ihracat Ticaret Sanayi Limited Sirketi
3. Testing Laboratory of the Institute of Mineral Resources

INTENDED USE

TR-1M is intended for the following uses:

- for the monitoring of laboratory performance in the analysis of geological samples for the analytes reported in Table 1;
- for the verification of analytical methods for analytes reported in Table 1;

STABILITY AND STORAGE INSTRUCTIONS

TR-1M is source material is linked to both orogenic and intermediate low-sulphidation epithermal mineralization types, which are present in key metallogenic zones within the region. It has been packaged in robust foil laminate pouches and under normal storage conditions has long-term stability beyond a month. Any changes observed during the stability monitoring process will be updated every month on topfinresult.uz.

INSTRUCTIONS FOR THE CORRECT USE OF THE REFERENCE MATERIAL

The assigned values for TR-1M refer to the concentration level in its packaged state. It should not be dried prior to weighing and analysis.

HANDLING INSTRUCTIONS

Fine powders pose a risk to eyes and lungs and therefore standard precautions such as the use of safety glasses and dust masks are advised.

LEGAL NOTICE

Ore Research & Exploration Pty Ltd has prepared and statistically evaluated the property values of this reference material to the best of its ability. The Purchaser by receipt hereof releases and indemnifies Ore Research & Exploration Pty Ltd from and against all liability and costs arising from the use of this material and information.

DOCUMENT HISTORY

Revision No.	Date	Changes applied
0	11th May, 2026	First publication.

ASSIGNING OFFICER

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REFERENCES

ISO 33405 Reference materials — Approaches for characterization and assessment of homogeneity and stability.

ISO 5725-2–2025 Accuracy (trueness and precision) of measurement methods and results