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CERTIFICATE OF ANALYSIS FOR

CERTIFIED REFERENCE MATERIAL

OREAS 474

Clay-Hosted Rare Earth Element (REE) Ore

TREO + Y_2O_3 = 2009 ppm

Jupiter REE Project, Laverton Region, Western Australia

Accredited for compliance with ISO 17034

COA-1942-OREAS 474-R0 BUP-70-10-04 Ver:1.0	18-February-2026

Table 1. Certified Values, Uncertainty & Tolerance Intervals in OREAS 474.

Constituent	Certified Value	95% Expanded Uncertainty		95% Tolerance Limits	
		Low	High	Low	High
Borate / Peroxide Fusion ICP					
Al_2O_3, Aluminium(III) oxide (wt.%)	24.15	23.37	24.94	23.83	24.48
Ba, Barium (wt.%)	0.446	0.434	0.458	0.440	0.453
Be, Beryllium (ppm)	3.16	2.26	4.06	2.94	3.38
Bi, Bismuth (ppm)	0.42	0.33	0.50	IND	IND
CaO, Calcium oxide (wt.%)	0.467	0.441	0.493	0.452	0.482
CeO_2, Cerium(IV) oxide (ppm)	931	900	961	913	948
Co, Cobalt (ppm)	13.4	12.8	14.1	12.9	14.0
Cr, Chromium (ppm)	68	61	75	66	70
Cs, Caesium (ppm)	9.53	9.06	9.99	9.07	9.99
Cu, Copper (ppm)	70	59	80	66	73
Dy_2O_3, Dysprosium(III) oxide (ppm)	15.6	15.0	16.3	15.2	16.1
Er_2O_3, Erbium(III) oxide (ppm)	6.97	6.66	7.27	6.75	7.19
Eu_2O_3, Europium(III) oxide (ppm)	10.2	9.6	10.7	9.9	10.4
Fe_2O_3, Iron(III) oxide (wt.%)	10.79	10.61	10.97	10.61	10.96
Ga, Gallium (ppm)	33.6	31.2	36.0	32.2	35.0
Gd_2O_3, Gadolinium(III) oxide (ppm)	29.3	28.0	30.5	28.3	30.3
Hf, Hafnium (ppm)	13.1	12.3	13.8	12.5	13.6
Ho_2O_3, Holmium(III) oxide (ppm)	2.66	2.51	2.81	2.57	2.75
In, Indium (ppm)	< 0.2	IND	IND	IND	IND
K_2O, Potassium oxide (wt.%)	3.14	3.07	3.21	3.09	3.19
La_2O_3, Lanthanum(III) oxide (ppm)	428	416	440	418	438
Li, Lithium (ppm)	16.7	14.6	18.9	IND	IND
Lu_2O_3, Lutetium(III) oxide (ppm)	0.79	0.73	0.85	0.75	0.83
MgO, Magnesium oxide (wt.%)	0.992	0.966	1.019	0.974	1.011
MnO, Manganese oxide (wt.%)	0.0578	0.0557	0.0600	0.0563	0.0593
Mo, Molybdenum (ppm)	2.05	1.95	2.14	IND	IND
Na_2O, Sodium oxide (wt.%)	0.632	0.607	0.657	0.616	0.647
Nb, Niobium (ppm)	20.9	19.2	22.6	20.2	21.6
Nd_2O_3, Neodymium(III) oxide (ppm)	348	336	360	340	356
Ni, Nickel (ppm)	39.0	32.0	46.0	36.5	41.5
P_2O_5, Phosphorus(V) oxide (wt.%)	0.678	0.656	0.700	0.665	0.691
Pb, Lead (ppm)	52	49	54	49	54
Pr_6O_{11}, Praseodymium(III,IV) oxide (ppm)	102	99	104	99	104
Rb, Rubidium (ppm)	132	127	136	128	136
S, Sulphur (wt.%)	0.040	0.025	0.056	IND	IND
Sb, Antimony (ppm)	1.04	0.79	1.29	IND	IND
Sc, Scandium (ppm)	24.5	22.7	26.3	23.4	25.6

SI unit equivalents: ppm (parts per million; 1 x 10^{-6}) ≡ mg/kg; wt.% (weight per cent) ≡ % (mass fraction).

Note: intervals may appear asymmetric due to rounding.

IND = indeterminate (due to limited reading resolution of the methods employed. For practical purposes the 95% Expanded Uncertainty can be set between zero and a two times multiple of the upper bound/non-detect limit value).

Table 1 continued.

Constituent	Certified Value	95% Expanded Uncertainty		95% Tolerance Limits	
		Low	High	Low	High
Borate / Peroxide Fusion ICP continued					
SiO_2, Silicon dioxide (wt.%)	47.14	46.29	48.00	46.67	47.62
Sm_2O_3, Samarium(III) oxide (ppm)	48.6	46.3	50.9	47.4	49.8
Sn, Tin (ppm)	5.15	4.40	5.91	4.84	5.47
Sr, Strontium (ppm)	773	748	799	759	787
Ta, Tantalum (ppm)	1.25	1.15	1.35	1.16	1.34
Tb_4O_7, Terbium(III,IV) oxide (ppm)	3.42	3.25	3.59	3.31	3.53
Th, Thorium (ppm)	32.8	31.6	34.0	32.2	33.5
Ti, Titanium (wt.%)	1.17	1.12	1.21	1.14	1.19
Tl, Thallium (ppm)	0.77	0.64	0.89	0.72	0.81
Tm_2O_3, Thulium(III) oxide (ppm)	0.93	0.86	1.00	0.89	0.97
TREO, Total Rare Earth Oxides (ppm)	1930	1872	1988	1894	1966
TREO+Y_2O_3, Total Rare Earth Oxides + Yttrium oxide (ppm)	2009	1948	2069	1972	2046
U, Uranium (ppm)	4.13	3.98	4.28	4.02	4.23
V, Vanadium (ppm)	184	173	195	177	190
W, Tungsten (ppm)	5.19	4.62	5.77	4.83	5.56
Y_2O_3, Yttrium(III) oxide (ppm)	81	77	84	78	83
Yb_2O_3, Ytterbium(III) oxide (ppm)	5.67	5.38	5.96	5.46	5.88
Zn, Zinc (ppm)	105	95	115	101	109
Zr, Zirconium (ppm)	544	520	568	530	558
Borate Fusion XRF					
Al_2O_3, Aluminium(III) oxide (wt.%)	24.19	23.85	24.53	24.03	24.35
BaO, Barium oxide (wt.%)	0.494	0.468	0.521	0.489	0.500
CaO, Calcium oxide (wt.%)	0.461	0.448	0.473	0.452	0.470
CeO_2, Cerium(IV) oxide (ppm)	916	805	1027	876	957
Dy_2O_3, Dysprosium(III) oxide (ppm)	< 100	IND	IND	IND	IND
Eu_2O_3, Europium(III) oxide (ppm)	< 100	IND	IND	IND	IND
Fe_2O_3, Iron(III) oxide (wt.%)	10.84	10.67	11.00	10.76	10.92
Gd_2O_3, Gadolinium(III) oxide (ppm)	76	23	129	IND	IND
Ho_2O_3, Holmium(III) oxide (ppm)	< 100	IND	IND	IND	IND
K_2O, Potassium oxide (wt.%)	3.12	3.08	3.16	3.09	3.15
La_2O_3, Lanthanum(III) oxide (ppm)	473	431	516	467	480
Lu_2O_3, Lutetium(III) oxide (ppm)	< 100	IND	IND	IND	IND
MgO, Magnesium oxide (wt.%)	1.00	0.99	1.02	0.99	1.02
MnO, Manganese oxide (wt.%)	0.0542	0.0455	0.0629	0.0521	0.0562
Na_2O, Sodium oxide (wt.%)	0.618	0.587	0.650	0.603	0.633
P_2O_5, Phosphorus(V) oxide (wt.%)	0.677	0.654	0.699	0.669	0.684
SiO_2, Silicon dioxide (wt.%)	46.46	45.89	47.03	46.26	46.66

SI unit equivalents: ppm (parts per million; 1 x 10^{-6}) ≡ mg/kg; wt.% (weight per cent) ≡ % (mass fraction).

Note: intervals may appear asymmetric due to rounding.

IND = indeterminate (due to limited reading resolution of the methods employed. For practical purposes the 95% Expanded Uncertainty can be set between zero and a two times multiple of the upper bound/non-detect limit value).

Table 1 continued.

Constituent	Certified Value	95% Expanded Uncertainty		95% Tolerance Limits	
		Low	High	Low	High
Borate Fusion XRF continued					
Sm_2O_3, Samarium(III) oxide (ppm)	< 100	IND	IND	IND	IND
SO_3, Sulphur trioxide (wt.%)	0.094	0.081	0.107	IND	IND
Tb_4O_7, Terbium(III,IV) oxide (ppm)	< 100	IND	IND	IND	IND
TiO_2, Titanium dioxide (wt.%)	1.94	1.90	1.97	1.91	1.96
Tm_2O_3, Thulium(III) oxide (ppm)	< 100	IND	IND	IND	IND
V_2O_5, Vanadium(V) oxide (ppm)	328	262	393	296	359
Yb_2O_3, Ytterbium(III) oxide (ppm)	< 100	IND	IND	IND	IND
ZnO, Zinc oxide (ppm)	138	110	166	IND	IND
ZrO_2, Zirconium dioxide (ppm)	703	620	786	666	740
Thermogravimetry					
LOI^{1000}, Loss on ignition @1000 °C (wt.%)	8.81	8.48	9.14	8.76	8.86
4-Acid Digestion					
Al, Aluminium (wt.%)	12.28	11.92	12.64	11.98	12.57
Ba, Barium (wt.%)	0.446	0.435	0.458	0.438	0.455
Be, Beryllium (ppm)	3.25	3.08	3.43	3.15	3.36
Bi, Bismuth (ppm)	0.40	0.38	0.42	0.38	0.42
Ca, Calcium (wt.%)	0.331	0.318	0.343	0.320	0.342
Ce, Cerium (ppm)	734	700	769	712	757
Co, Cobalt (ppm)	14.0	13.4	14.6	13.7	14.3
Cr, Chromium (ppm)	57	54	59	55	58
Cs, Caesium (ppm)	9.46	8.96	9.95	9.11	9.80
Cu, Copper (ppm)	67	65	68	65	68
Dy, Dysprosium (ppm)	13.6	12.9	14.2	13.1	14.1
Er, Erbium (ppm)	6.11	5.78	6.43	5.91	6.30
Eu, Europium (ppm)	8.60	8.12	9.07	8.21	8.98
Fe, Iron (wt.%)	7.36	7.16	7.57	7.26	7.46
Ga, Gallium (ppm)	33.6	32.1	35.1	32.6	34.6
Gd, Gadolinium (ppm)	25.8	24.0	27.6	24.9	26.6
Hf, Hafnium (ppm)	6.06	5.66	6.47	5.87	6.26
Ho, Holmium (ppm)	2.29	2.17	2.41	2.20	2.39
In, Indium (ppm)	0.11	0.10	0.12	0.10	0.11
K, Potassium (wt.%)	2.54	2.45	2.62	2.49	2.58
La, Lanthanum (ppm)	338	313	363	329	347
Li, Lithium (ppm)	16.2	15.7	16.7	15.9	16.5
Lu, Lutetium (ppm)	0.66	0.62	0.71	0.63	0.69
Mg, Magnesium (wt.%)	0.554	0.527	0.580	0.539	0.568
Mn, Manganese (wt.%)	0.0423	0.0408	0.0438	0.0415	0.0430

SI unit equivalents: ppm (parts per million; 1 x 10^{-6}) ≡ mg/kg; wt.% (weight per cent) ≡ % (mass fraction).

Note: intervals may appear asymmetric due to rounding.

IND = indeterminate (due to limited reading resolution of the methods employed. For practical purposes the 95% Expanded Uncertainty can be set between zero and a two times multiple of the upper bound/non-detect limit value).

Table 1 continued.

Constituent	Certified Value	95% Expanded Uncertainty		95% Tolerance Limits	
		Low	High	Low	High
4-Acid Digestion continued					
Mo, Molybdenum (ppm)	2.19	2.09	2.29	2.13	2.26
Na, Sodium (wt.%)	0.460	0.445	0.475	0.448	0.472
Nb, Niobium (ppm)	20.8	20.0	21.6	20.3	21.4
Nd, Neodymium (ppm)	289	270	309	278	301
Ni, Nickel (ppm)	37.5	36.3	38.8	36.7	38.4
P, Phosphorus (wt.%)	0.292	0.281	0.302	0.286	0.297
Pb, Lead (ppm)	51	49	53	49	53
Pr, Praseodymium (ppm)	84	78	89	81	86
Rb, Rubidium (ppm)	130	122	139	125	135
Re, Rhenium (ppm)	< 0.002	IND	IND	IND	IND
S, Sulphur (wt.%)	0.040	0.039	0.041	0.039	0.041
Sb, Antimony (ppm)	1.05	0.98	1.12	1.00	1.10
Sc, Scandium (ppm)	23.3	22.4	24.3	22.7	24.0
Sm, Samarium (ppm)	41.3	39.0	43.6	39.6	43.0
Sn, Tin (ppm)	4.79	4.56	5.01	4.65	4.92
Sr, Strontium (ppm)	748	722	775	731	766
Ta, Tantalum (ppm)	1.18	1.10	1.27	1.14	1.23
Tb, Terbium (ppm)	2.81	2.62	3.00	2.70	2.92
Th, Thorium (ppm)	33.2	31.2	35.2	31.8	34.5
Ti, Titanium (wt.%)	1.07	1.02	1.12	1.05	1.09
Tl, Thallium (ppm)	0.82	0.78	0.87	0.79	0.85
Tm, Thulium (ppm)	0.77	0.72	0.82	0.74	0.80
U, Uranium (ppm)	3.88	3.68	4.07	3.73	4.02
V, Vanadium (ppm)	177	171	183	173	180
W, Tungsten (ppm)	4.67	4.41	4.94	4.51	4.84
Y, Yttrium (ppm)	59	55	63	57	61
Yb, Ytterbium (ppm)	4.74	4.50	4.97	4.55	4.92
Zn, Zinc (ppm)	102	99	105	100	104
Zr, Zirconium (ppm)	255	241	269	248	262

SI unit equivalents: ppm (parts per million; 1 x 10^{-6}) ≡ mg/kg; wt.% (weight per cent) ≡ % (mass fraction).

Note: intervals may appear asymmetric due to rounding.

IND = indeterminate (due to limited reading resolution of the methods employed. For practical purposes the 95% Expanded Uncertainty can be set between zero and a two times multiple of the upper bound/non-detect limit value).

Table 2. Indicative Values for OREAS 474.

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
Borate / Peroxide Fusion ICP								
Ag	ppm	0.277	Cd	ppm	< 10	Se	ppm	3.71
As	ppm	15.9	Ge	ppm	1.43	Te	ppm	< 1
B	ppm	90	Re	ppm	< 0.1			
Borate Fusion XRF								
As_2O_3	ppm	14.1	Hg	ppm	< 20	Re	ppm	< 10
Au	ppm	< 20	I	ppm	< 10	Rh	ppm	< 1
Bi_2O_3	ppm	< 11	In	ppm	< 10	Ru	ppm	< 1
Cd	ppm	< 10	Ir	ppm	< 10	Sb_2O_3	ppm	< 36
Cl	wt.%	0.263	MoO_3	ppm	< 1.5	Sc_2O_3	ppm	30.1
Co_3O_4	ppm	< 50	Nb_2O_5	ppm	91	Se	ppm	< 1
Cr_2O_3	ppm	93	Nd_2O_3	ppm	320	SnO_2	ppm	< 100
Cs_2O	ppm	< 11	NiO	ppm	80	SrO	ppm	920
CuO	ppm	90	Os	ppm	< 10	Ta_2O_5	ppm	< 100
Er_2O_3	ppm	132	PbO	ppm	58	Tc	ppm	< 1
F	ppm	< 5000	Pd	ppb	< 1000	Te	ppm	40.7
Fr	ppm	< 30	Pm	ppm	< 10	Th	ppm	32.0
Ga_2O_3	ppm	168	Pr_6O_{11}	ppm	114	Tl	ppm	< 50
Ge	ppm	< 30	Pt	ppb	< 1000	U_3O_8	ppm	7.97
H_2O-	wt.%	1.59	Ra	ppm	< 20	WO_3	ppm	< 100
HfO_2	ppm	< 100	Rb_2O	ppm	134	Y	ppm	84
Infrared Combustion								
C	wt.%	0.035	S	wt.%	0.035			
4-Acid Digestion								
Ag	ppm	0.075	Ge	ppm	0.87	Te	ppm	0.071
As	ppm	4.86	Hg	ppm	0.009			
Cd	ppm	0.033	Se	ppm	1.71			

SI unit equivalents: ppb (parts per billion; 1 x 10^{-9}) ≡ µg/kg; ppm (parts per million; 1 x 10^{-6}) ≡ mg/kg; wt.% (weight per cent) ≡ % (mass fraction).

Note: the number of significant figures reported is not a reflection of the level of certainty of stated values. They are instead an artefact of ORE's in-house CRM-specific LIMS.

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INTRODUCTION

OREAS reference materials are intended to provide a low-cost method of evaluating and improving the quality of analysis of geological samples. To the geologist they provide a means of implementing quality control in analytical data sets generated in exploration from the grass roots level through to prospect evaluation, and in grade control at mining operations. To the analyst they provide an effective means of calibrating analytical equipment, assessing new techniques and routinely monitoring in-house procedures. OREAS reference materials enable users to successfully achieve process control of these tasks because the observed variance from repeated analysis has its origin almost exclusively in the analytical process rather than the reference material itself. In evaluating laboratory performance with this CRM, the section headed 'Instructions for handling and correct use' should be read carefully.

Table 1 provides the certified values and their associated 95 % expanded uncertainty and tolerance intervals, Table 2 shows indicative values including major and trace element characterisation, Table 3 provides some indicative physical properties, Table 4 shows indicative mineralogy by semi-quantitative XRD analysis and Table 5 presents the performance gate intervals for all certified values.

Tabulated results of all analytes together with uncorrected means, medians, standard deviations, relative standard deviations and per cent deviation of lab means from the corrected mean of means (PDM[3]) are presented in the detailed certification data for this CRM (**OREAS 474-DataPack.1.0.260210_154502.xlsx**). The certified values and uncertainties in this Certificate are the sole authoritative figures. Any additional significant figures in the DataPack are provided for reference only and do not affect the certified results.

Results are also presented in scatter plots for Dy_2O_3, Nd_2O_3, Pr_6O_{11} and Tb_4O_7 by borate/peroxide fusion ICP in Figures 1 to 4 respectively, together with ±3SD (magenta) and ±5 % (yellow) control lines and certified value (green line). Accepted individual results are coloured blue and individual and dataset outliers are identified in red and violet, respectively.

INTENDED USE

OREAS 474 is intended to cover all activities needed to produce a measurement result. This includes extraction, possible separation steps and the actual measurement process (the signal producing step). OREAS 474 may be used to calibrate the entire procedure by producing a pure substance CRM transformed into a calibration solution.

OREAS 474 is intended for the following uses:

- For the monitoring of laboratory performance in the analysis of analytes reported in Table 1 in geological samples;
- For the verification/ validation of analytical methods for analytes reported in Table 1;
- For the calibration of instruments used in the determination of the concentration of analytes reported in Table 1. When a value provided in this certificate is used to calibrate a measurement process, the uncertainty associated with that value should be appropriately propagated into the user's uncertainty calculation. Users can determine an approximation of the standard uncertainty by calculating one fourth of the width of the Expanded Uncertainty interval given in this certificate (Expanded Uncertainty intervals are provided in Table 1).

SOURCE MATERIAL

OREAS 474 is a certified reference material (CRM) produced from a blend of clay-hosted rare earth element (REE) ores and barren kaolin. The REE-bearing ores were sourced from the Jupiter deposit in the Laverton region of Western Australia.
Mineralisation occurs within a deeply weathered regolith developed over an underlying carbonatite–alkaline volcanic sequence. Supergene processes have resulted in enrichment of total rare earth oxides (TREO), including a significant proportion of magnet rare earth oxides (MREO), notably neodymium and praseodymium, with subordinate dysprosium and terbium. The CRM matrix is quartz-rich and comprises abundant mica–illite and kaolinite-group clays, with additional smectite/vermiculite-type clay minerals. Minor iron oxides (goethite and magnetite), traces of hematite and anatase are present as accessory phases. Rare earth elements are interpreted to occur predominantly within fine-grained secondary phases associated with the clay fraction.

MINIMUM SAMPLE SIZE

To relate analytical determinations to the values in this certificate, the minimum mass of sample used should match the typical mass that the laboratories used in the interlaboratory (round robin) certification program. This means that different minimum sample masses should be used depending on the operationally defined methodology as follows:

- Borate fusion /Sodium peroxide with ICP-OES and/or MS finish: ≥0.2 g;
- Borate fusion with X-ray fluorescence finish: ≥0.2 g;
- Loss on Ignition (LOI) at 1000 °C: ≥1 g;
- 4-acid digestion with ICP-OES and/or MS finish: ≥ 0.25 g.

INSTRUCTIONS FOR HANDLING & CORRECT USE

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

Pre-homogenisation of the CRM prior to subsampling and analysis is not necessary as there is no particle segregation under transport [11].

As per routine analysis at commercial laboratories, the certified values derived by borate fusion with XRF finish are on a dry sample basis.

Analytes by all other methods refer to the concentration levels in the packaged state. There is no need for drying prior to weighing and analysis for these methods.

Authoritative Source of Information
This Certificate of Analysis constitutes the primary and authoritative document for the certified values, associated expanded uncertainties, and their correct use. While the accompanying DataPack provides supporting information, including raw data and uncertainty estimates with additional significant figures, these extended figures are provided solely for transparency, convenience and statistical reference. Users must rely exclusively on the values stated in this Certificate, rounded to an appropriate number of significant figures, for all metrological and analytical purposes. Any discrepancy between values

presented in the DataPack and those in this Certificate shall be resolved in favour of the information provided herein.

Notice on Certificate Updates

The version of the Certificate of Analysis (COA) available on the OREAS website is considered the official and most current version. As COAs may be revised following periodic reviews, re-evaluation of data, or the availability of new information, users are strongly advised to refer to the latest online version prior to each use.

It is the user's responsibility to ensure that the most recent and applicable certificate is used to support the traceability, validity, and fitness-for-purpose of the certified reference material (CRM).

Any significant changes to the sections of this certificate will be clearly documented in the revised certificate.

QC monitoring using multiples of the Standard Deviation (SD)

In the application of SD's in monitoring performance it is important to note that not all laboratories function at the same level of proficiency and that different methods in use at a particular laboratory have differing levels of precision. Each laboratory has its own inherent SD (for a specific concentration level and analyte-method pair) based on the analytical process and this SD is not directly related to the round robin program.

The majority of data generated in the round robin program was produced by a selection of world class laboratories. The SD's thus generated are more constrained than those that would be produced across a randomly selected group of laboratories. To produce more generally achievable SD's the 'pooled' SD's provided in this report include interlaboratory bias. This 'one size fits all' approach may require revision at the discretion of the QC manager concerned following careful scrutiny of QC control charts.

The performance gates shown in Table 5 are intended only to be used as a preliminary guide as to what a laboratory may be able to achieve. Over a period of time monitoring your own laboratory's data for this CRM, SD's should be calculated directly from your own laboratory's process. This will enable you to establish more specific performance gates that are fit for purpose for your application as well as the ability to monitor bias. If your long-term trend analysis shows an average value that is within the 95 % expanded uncertainty then generally there is no cause for concern in regard to bias.

PERIOD OF VALIDITY & STORAGE INSTRUCTIONS

The certification of OREAS 474 remains valid, within the specified measurement uncertainties, until at least May 2040, provided the CRM is handled and stored in accordance with the instructions given below. This certification is nullified if the CRM is any way changed or contaminated.

Store in a clean and cool dry place away from direct sunlight.

Long-term stability will be monitored at appropriate intervals and purchasers notified if any changes are observed. The period of validity may well be indefinite and will be reassessed prior to expiry with the aim of extending the validity if possible.

Single-use sachets

OREAS 474 is packaged in single-use, 10 g laminated foil sachets. Following analysis, it is the manufacturer's expectation that any remaining material is discarded. It is the user's responsibility to prevent contamination and avoid prolonged exposure of the sample to the atmosphere prior to analysis.

Repeat-use packaging (e.g., 500 g plastic jars)

After taking a subsample, users should replace the lid of the jar promptly and securely to prevent accidental spills and airborne contamination. OREAS 474 contains a non-hygroscopic* matrix with an indicative value for moisture provided to enable users to check for changes to stored material by determining moisture in the user's laboratory and comparing the result to the value in Table 3 in this certificate. The stability of the CRM in regard to oxidation from the breakdown of sulphide minerals to sulphates is minimal given its low sulphur concentration (~ 0.04 wt.% S).

*A non-hygroscopic matrix means exposure to atmospheres significantly different, in terms of temperature and humidity, from the climate during manufacturing should have negligible impact on the precision of results. Hygroscopic moisture is the amount of adsorped moisture (weakly held H_2O- molecules on the surface of exposed material) following exposure to the local atmosphere. Usually, equilibration of material to the local atmosphere will only occur if the material is spread into a thin (~2mm thick) layer and left exposed for a period of 2 hours.

COMMINUTION AND HOMOGENISATION PROCEDURES

The materials constituting OREAS 474 was prepared in the following manner:

- Crushing and multi-stage milling of the barren material to >95% minus 75 microns;
- Crushing and multi-stage milling of the ores to 100% minus 30 microns;
- Blending the ores and barren materials in appropriate proportions to achieve desired grades;
- Homogenisation using OREAS' novel processing technologies;
- Packaging in 10 g units in laminated foil pouches and 500 g units in plastic wide-mouth jars.

PHYSICAL PROPERTIES

OREAS 474 was tested at ORE Research & Exploration Pty Ltd's onsite facility for various physical properties. Table 3 presents these findings that should be used for informational purposes only.

Table 3. Physical properties of OREAS 474.

Bulk Density (kg/m^3)	Moisture (wt.%)	Munsell Notation‡	Munsell Color‡
543	1.32	10YR 8/2	Very Pale Orange

‡The Munsell Rock Color Chart helps geologists and archaeologists communicate with colour more effectively by cross-referencing ISCC-NBS colour names with unique Munsell alpha-numeric colour notations for rock colour samples.

MINERALOGY

The semi-quantitative XRD results shown in Table 4 below were undertaken by ALS Metallurgy in Balcatta, Western Australia. The results have been normalised to 100 % and represent the relative proportion of crystalline material. Totals greater or less than 100 % are due to rounding errors. Some amorphous material may be present. 'Clay minerals' appears to be mainly smectite, vermiculite and/or illite. A trace of anatase may be present in the samples.

Table 4. Indicative mineralogy of OREAS 474 by semi-quantitative XRD analysis.

Mineral / Mineral Group	% (mass ratio)
Hematite	3
Goethite	7
Clay minerals	9
Serpentine	3
Kandite group	36
Annite - biotite - phlogopite	2
Muscovite - illite	11
Ca amphibole	2
Plagioclase	5
K-feldspar and/or rutile	12
Quartz	8
Apatite group	< 1
Crandallite group	3

ANALYTICAL PROGRAM

Twenty-nine commercial analytical laboratories participated in the program to certify the elements reported in Table 1. The following methods were employed:

- Lithium borate or sodium peroxide fusion with full suite ICP-OES and ICP-MS elemental packages (up to 27 laboratories depending on the element);
- Lithium borate fusion whole rock analysis package by X-ray fluorescence (up to 13 laboratories depending on the element);
- Thermogravimetry: Loss on Ignition (LOI) at 1000 °C (8 laboratories used a thermogravimetric analyser, 6 laboratories included LOI with their fusion package and 3 laboratories used a conventional muffle furnace);
- 4-acid (HNO_3-HF-$HClO_4$-HCl) digestion with full suite ICP-OES and ICP-MS elemental packages (up to 26 laboratories depending on the element).

Samples of this CRM were analysed by Intertek Genalysis Laboratory (Perth, Australia) using ammonium sulphate ionic leaching followed by ICP-MS (method ICL/MS16). A range of ammonium sulphate concentrations and leach pH conditions were tested to assess the method’s effectiveness. Despite these variations, recoveries of rare earth elements remained consistently low, indicating that ammonium sulphate leaching is ineffective for extracting REEs from this material. Therefore, this CRM represents a clay-hosted REE deposit without significant ion-exchangeable rare earth element content typical of ion-adsorbed clays.

For the round robin program, six 2 kg test units were collected at predetermined intervals during the bagging stage, immediately after homogenisation. These units are considered representative of the entire prepared batch. Each participating laboratory received six test portions, obtained by subsampling 15 g from each of the six distinct 2 kg units.

Homogeneity was assessed by submitting 12 pulp samples to a single laboratory for analysis. Paired 15 g samples were drawn from each of the six test units, enabling an Analysis of Variance (ANOVA) to compare within-unit and between-unit variances. This statistical method provides a relative measure of homogeneity and tests the null hypothesis that all units derive from the same population distribution (refer to the ‘Homogeneity Evaluation’ section below).

PARTICIPATING LABORATORIES

1. Actlabs, Ancaster, Ontario, Canada
2. African Natural Resources & Mines Ltd, Suleja, Niger State, Nigeria
3. AGAT Laboratories, Calgary, Alberta, Canada
4. Alex Stewart International, Mendoza, Argentina
5. ALS, Brisbane, QLD, Australia
6. ALS, Lima, Peru
7. ALS, Loughrea, Galway, Ireland
8. ALS, Malaga, WA, Australia
9. ALS, Vancouver, BC, Canada
10. American Assay Laboratories, Sparks, Nevada, USA
11. ARGETEST Mineral Processing, Ankara, Central Anatolia, Turkey
12. Bureau Veritas Commodities Canada Ltd, Vancouver, BC, Canada
13. CERTIMIN, Lima, Peru
14. Inspectorate (BV), Lima, Peru
15. Intertek, Perth, WA, Australia
16. Intertek, Townsville, QLD, Australia
17. Intertek Genalysis, Adelaide, SA, Australia
18. Lucid Laboratories Private Limited, Hyderabad, Telangana, India
19. Ontario Geological Survey, Sudbury, Ontario, Canada
20. Performance Laboratories, Ruwa, Harare, Zimbabwe
21. PT Geoservices Ltd, Cikarang, Jakarta Raya, Indonesia
22. PT Indo Mineral Research, Bungursari, West Java, Indonesia
23. PT Intertek Utama Services, Jakarta Timur, DKI Jakarta, Indonesia
24. SGS, Randfontein, Gauteng, South Africa
25. SGS Australia Mineral Services, Perth, WA, Australia
26. SGS Geosol Laboratorios Ltda, Vespasiano, Minas Gerais, Brazil
27. Shiva Analyticals Ltd, Bangalore North, Karnataka, India
28. Stewart Assay & Environmental Laboratories LLC, Kara-Balta, Chüy, Kyrgyzstan
29. UIS Analytical Services, Centurion, South Africa

Please note: To maintain anonymity of participating laboratories, the alphabetical list above does not correspond to the Lab ID numbers shown in the scatter plots below.

STATISTICAL ANALYSIS

Certified Values and their uncertainty intervals (Table 1) have been determined for each analyte following removal of individual, laboratory dataset (batch) and 3SD outliers (single iteration). Outlier evaluation was conducted in accordance with ISO 17034:2017 and ISO 33405:2024. While formal statistical tests were applied, professional statistical judgment was also exercised in determining the validity of potential outliers. Assessment of systematic bias and performance using independent control materials (CRMs) was incorporated to ensure compliance with the referenced standards and to establish metrological traceability of the certified values.

95% Expanded Uncertainty provides a 95 % probability that the true value of the analyte under consideration lies between the upper and lower limits and is calculated according to the method outlined in [5] and [14]. All known or suspected sources of bias have been investigated or taken into account.

Indicative (uncertified) values (Table 2) are present where the number of laboratories reporting a particular analyte is insufficient (< 5) to support certification or where interlaboratory consensus is poor. This data is intended for 'informational purposes' only.

Standard Deviation intervals (see Table 5, 'Performance Gates') provide an indication of a level of performance that might reasonably be expected from a laboratory being monitored by this CRM in a QA/QC program. They take into account errors attributable to measurement uncertainty and CRM variability. For an effective CRM 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 CRM variability.

The SD for each analyte's certified value is calculated from the same filtered data set used to determine the certified value, i.e., after removal of all individuals, lab dataset (batch) and 3SD outliers (single iteration). These outliers can only be removed after the absolute homogeneity of the CRM has been independently established, i.e., the outliers must be confidently deemed to be analytical rather than arising from inhomogeneity of the CRM. ***The standard deviation is then calculated for each analyte from the pooled accepted analyses generated from the certification program.***

Homogeneity Evaluation
The tolerance limits (ISO 16269:2014) shown in Table 1 were determined using an analysis of precision errors method and are considered a conservative estimate of true homogeneity. The meaning of tolerance limits may be illustrated for Nd_2O_3 by fusion ICP where 99 % of the time ($1-\alpha=0.99$) at least 95 % of subsamples ($\rho=0.95$) will have concentrations lying between 340 and 356 ppm. Put more precisely, this means that if the same number of subsamples were taken and analysed in the same manner repeatedly, 99 % of the tolerance intervals so constructed would cover at least 95 % of the total population, and 1 % of the tolerance intervals would cover less than 95 % of the total population. ***Please note that tolerance limits pertain to the homogeneity of the CRM only and should not be used as control limits for laboratory performance.***

Analysis of Variance (ANOVA) Study
In addition to the precision error method outlined above, homogeneity was also evaluated using an ANOVA study. This involved sending 12 x 20 g pulp samples to the ALS Brisbane, laboratory for analysis by lithium borate fusion with ICP-MS finish (code ME- MS81). The 12 samples consisted of paired samples from each of the six sampling units to enable an

Analysis of Variance (ANOVA) by comparison of within- and between-unit variances across the six pairs. The ANOVA enables a relative measure of homogeneity and permits a test of the null hypothesis that all ‘units’ are drawn from the same population distribution. An ANOVA constructed in this way tests that no statistically significant difference exists in the variance between-units to that of the variance within-units. A *p*-value < 0.05 would indicate rejection of the null hypothesis at the 95 % confidence level (i.e., a significant difference likely does exist; meaning there is evidence of heterogeneity between the sample intervals).

All *p*-values were found to be statistically insignificant, and the Null Hypothesis is therefore retained. It is important to note that ANOVA provides a relative measure of homogeneity and that a CRM having poor absolute homogeneity can still pass these tests if the within-unit heterogeneity is large and similar across all units. Based on the statistical analysis of the results of the interlaboratory certification program, it can be concluded that OREAS 474 is fit-for-purpose as a certified reference material (see ‘Intended Use’ below).

METROLOGICAL TRACEABILITY

The interlaboratory results that underpin the certified values are metrologically traceable to the international measurement scale (SI) of mass (either as a % mass fraction or as milligrams per kilogram (mg/kg)) [14]. In line with popular use, all data within tables in this certificate are expressed as the mass fraction in either weight percent (wt.%) or parts per million (ppm).

The analytical samples sent to participating laboratories were selected in a manner to be representative of the entire prepared batch of CRM. This representativeness was maintained in each submitted laboratory sample batch and ensures the user that the data is traceable from sample selection through to the analytical results. The systematic sampling method was chosen due to the low risk of overlooking repetitive effects or trends in the batch due to the way the CRM was processed. In line with ISO 17025 [7], each analytical data set received from the participating laboratories has been validated by its assayer through the inclusion of internal reference materials and QC checks during and post analysis.

Participating laboratories were selected based on demonstrated analytical competence, including prior performance in interlaboratory comparison programs conducted by ORE Pty Ltd, with consideration given to their expertise in relevant analytical methods, measurands, and sample matrices. For the measurands reported in this certificate (Table 1), data were sourced from laboratories accredited to ISO/IEC 17025. Where formal accreditation was not held for specific operationally defined measurands, metrological traceability was verified through the use of well-characterised, independently certified reference materials (CRMs) included as control samples in the round robin study.

In accordance with ISO 33405:2024-05 [4], clause 9.2.5, and ISO 17034:2016 [8], clause 7.12.4 b), the use of such control samples provides an acceptable means of demonstrating traceability in the absence of formal accreditation. In this certification program, traceability was further supported by the agreement of measured values for control samples with their known certified values, thereby offering additional confidence in the calibration and validity of measurement results across participating laboratories.

Operationally Defined Measurands

In accordance with ISO 33405:2024-05, Clause 9.2.4, measurands (analytes) may be certified as operationally defined. For these measurands, traceability to the SI may not be achievable because the analytical procedure involves sample transformations (e.g., leaching or extraction). While instrument calibration can be traceable to appropriate units, the transformation steps themselves are not directly traceable and can only be evaluated through reference comparisons or harmonized procedures.

Accordingly, characterisation of these measurands has been based on the concordance of results obtained from multiple laboratories using a common, well-defined procedure. This approach ensures fitness-for-purpose and fulfils the requirements for metrological traceability as specified in ISO 17034 and ISO 33405 for operationally defined measurands.

COMMUTABILITY

The certified values reported herein are derived from measurements performed using analytical methods involving sample pre-treatment steps, such as fusion or acid digestion. These processes convert the sample matrix into a chemically simplified and stable form, facilitating calibration traceable to primary standards via solution-based calibration protocols. Due to the established robustness and effectiveness of these pre-treatment methods, issues related to commutability are not expected to impact the suitability of this Certified Reference Material (CRM) for its intended use.

OREAS CRMs are prepared from natural ore materials, ensuring the presence of matrix and mineralogical characteristics representative of typical exploration and mining samples. Consistent with ISO 17034:2016 and ISO Guide 30, users are advised to select CRMs with matrix and mineralisation styles closely matching those of their routine samples to minimize matrix effects and enhance analytical comparability. Detailed descriptions of the CRM’s source material and mineralogical characteristics are provided in the ‘Source Material’ section to guide appropriate CRM selection.

PERFORMANCE GATES

Table 5 below shows intervals 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 (also see ‘Intended Use’ section below). Westgard Rules extend the basics of single-rule QC monitoring using multi-rules (for more information visit www.westgard.com/mltirule.htm). A second method utilises a 5 % window calculated directly from the certified 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. One approach used at commercial laboratories is to set the acceptance criteria at twice the detection level (DL) ± 10 %.

i.e., Certified Value ±10 % ±2DL [1].

Table 5. Performance Gates for OREAS 474.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5 % window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
Borate / Peroxide Fusion ICP											
Al_2O_3, wt.%	24.15	0.793	22.57	25.74	21.78	26.53	3.28%	6.56%	9.85%	22.95	25.36
Ba, wt.%	0.446	0.015	0.417	0.475	0.403	0.490	3.26%	6.52%	9.78%	0.424	0.469
Be, ppm	3.16	0.42	2.32	4.00	1.90	4.42	13.32%	26.63%	39.95%	3.00	3.32
Bi, ppm	0.42	0.05	0.32	0.51	0.28	0.56	11.10%	22.20%	33.31%	0.40	0.44
CaO, wt.%	0.467	0.039	0.389	0.545	0.350	0.584	8.34%	16.68%	25.02%	0.444	0.490
CeO_2, ppm	931	33	865	997	831	1030	3.56%	7.11%	10.67%	884	977
Co, ppm	13.4	0.87	11.7	15.2	10.8	16.1	6.50%	13.00%	19.50%	12.8	14.1
Cr, ppm	68	6.3	55	81	49	87	9.29%	18.58%	27.87%	65	71
Cs, ppm	9.53	0.440	8.65	10.41	8.21	10.85	4.62%	9.23%	13.85%	9.05	10.00
Cu, ppm	70	11	48	92	36	103	15.94%	31.88%	47.83%	66	73
Dy_2O_3, ppm	15.6	0.76	14.1	17.1	13.4	17.9	4.83%	9.67%	14.50%	14.8	16.4
Er_2O_3, ppm	6.97	0.311	6.35	7.59	6.04	7.90	4.46%	8.91%	13.37%	6.62	7.32
Eu_2O_3, ppm	10.2	0.49	9.2	11.1	8.7	11.6	4.87%	9.74%	14.61%	9.6	10.7
Fe_2O_3, wt.%	10.79	0.175	10.44	11.14	10.26	11.31	1.62%	3.24%	4.85%	10.25	11.33
Ga, ppm	33.6	3.05	27.5	39.7	24.4	42.7	9.07%	18.15%	27.22%	31.9	35.3
Gd_2O_3, ppm	29.3	1.70	25.9	32.7	24.2	34.4	5.81%	11.62%	17.42%	27.8	30.7
Hf, ppm	13.1	0.61	11.9	14.3	11.3	14.9	4.64%	9.28%	13.92%	12.4	13.7
Ho_2O_3, ppm	2.66	0.147	2.37	2.95	2.22	3.10	5.52%	11.03%	16.55%	2.53	2.79
In, ppm	< 0.2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
K_2O, wt.%	3.14	0.057	3.03	3.26	2.97	3.31	1.80%	3.60%	5.39%	2.99	3.30
La_2O_3, ppm	428	17	394	462	376	480	4.02%	8.03%	12.05%	407	449
Li, ppm	16.7	1.7	13.4	20.1	11.7	21.8	10.01%	20.02%	30.03%	15.9	17.6
Lu_2O_3, ppm	0.79	0.047	0.70	0.89	0.65	0.94	5.96%	11.93%	17.89%	0.75	0.83
MgO, wt.%	0.992	0.038	0.917	1.068	0.879	1.105	3.80%	7.60%	11.39%	0.943	1.042
MnO, wt.%	0.058	0.002	0.054	0.062	0.051	0.064	3.74%	7.48%	11.23%	0.055	0.061
Mo, ppm	2.05	0.089	1.87	2.22	1.78	2.31	4.35%	8.70%	13.04%	1.94	2.15
Na_2O, wt.%	0.632	0.028	0.575	0.689	0.546	0.717	4.51%	9.01%	13.52%	0.600	0.663
Nb, ppm	20.9	1.93	17.0	24.7	15.1	26.7	9.26%	18.52%	27.78%	19.8	21.9
Nd_2O_3, ppm	348	14	320	376	306	391	4.07%	8.14%	12.21%	331	366
Ni, ppm	39.0	6.0	26.9	51.1	20.9	57.1	15.45%	30.91%	46.36%	37.1	41.0
P_2O_5, wt.%	0.678	0.025	0.629	0.728	0.604	0.753	3.65%	7.29%	10.94%	0.644	0.712
Pb, ppm	52	2.5	47	56	44	59	4.79%	9.59%	14.38%	49	54
Pr_6O_{11}, ppm	102	3	95	108	91	112	3.31%	6.63%	9.94%	96	107
Rb, ppm	132	6	120	144	114	150	4.59%	9.18%	13.76%	125	138
S, wt.%	0.040	0.011	0.019	0.062	0.008	0.073	27.01%	54.02%	81.03%	0.038	0.042
Sb, ppm	1.04	0.16	0.72	1.36	0.56	1.52	15.47%	30.94%	46.41%	0.99	1.09
Sc, ppm	24.5	2.21	20.1	28.9	17.9	31.1	9.01%	18.02%	27.03%	23.3	25.7
SiO_2, wt.%	47.14	1.076	44.99	49.30	43.92	50.37	2.28%	4.56%	6.85%	44.79	49.50
Sm_2O_3, ppm	48.6	2.22	44.1	53.0	41.9	55.3	4.57%	9.14%	13.71%	46.2	51.0
Sn, ppm	5.15	0.444	4.26	6.04	3.82	6.49	8.62%	17.24%	25.86%	4.90	5.41
Sr, ppm	773	20	733	814	713	834	2.61%	5.23%	7.84%	735	812
Ta, ppm	1.25	0.117	1.01	1.48	0.90	1.60	9.37%	18.73%	28.10%	1.19	1.31
Tb_4O_7, ppm	3.42	0.191	3.04	3.80	2.85	4.00	5.57%	11.14%	16.71%	3.25	3.59

SI unit equivalents: ppm (parts per million; 1 x 10^{-6}) ≡ mg/kg; wt.% (weight per cent) ≡ % (mass fraction).

Notes: intervals may appear asymmetric due to rounding; the number of decimal places quoted does not imply accuracy of the certified value to this level but are given to minimise rounding errors when calculating 2SD and 3SD windows.

IND = indeterminate.

Table 5 continued.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5 % window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
Borate / Peroxide Fusion ICP continued											
Th, ppm	32.8	1.60	29.6	36.0	28.0	37.6	4.86%	9.73%	14.59%	31.2	34.5
Ti, wt.%	1.17	0.067	1.03	1.30	0.96	1.37	5.77%	11.53%	17.30%	1.11	1.22
Tl, ppm	0.77	0.13	0.51	1.02	0.38	1.15	16.60%	33.21%	49.81%	0.73	0.80
Tm_2O_3, ppm	0.93	0.049	0.83	1.02	0.78	1.07	5.29%	10.58%	15.86%	0.88	0.97
$TREO+Y_2O_3$, ppm	2009	73	1862	2155	1789	2228	3.64%	7.29%	10.93%	1908	2109
U, ppm	4.13	0.178	3.77	4.48	3.59	4.66	4.30%	8.61%	12.91%	3.92	4.33
V, ppm	184	17	149	219	132	236	9.39%	18.78%	28.17%	175	193
W, ppm	5.19	0.486	4.22	6.17	3.74	6.65	9.35%	18.70%	28.05%	4.93	5.45
Y_2O_3, ppm	81	3.6	73	88	70	91	4.47%	8.93%	13.40%	77	85
Yb_2O_3, ppm	5.67	0.270	5.13	6.21	4.86	6.48	4.76%	9.53%	14.29%	5.38	5.95
Zn, ppm	105	7	91	119	84	126	6.78%	13.57%	20.35%	100	110
Zr, ppm	544	39	467	621	429	660	7.08%	14.17%	21.25%	517	571
Borate Fusion XRF											
Al_2O_3, wt.%	24.19	0.386	23.42	24.96	23.03	25.35	1.60%	3.19%	4.79%	22.98	25.40
BaO, wt.%	0.494	0.030	0.435	0.553	0.406	0.583	5.98%	11.96%	17.95%	0.470	0.519
CaO, wt.%	0.461	0.015	0.431	0.490	0.416	0.505	3.22%	6.45%	9.67%	0.438	0.484
CeO_2, ppm	916	104	708	1124	604	1228	11.36%	22.72%	34.08%	870	962
Dy_2O_3, ppm	< 100	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Eu_2O_3, ppm	< 100	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Fe_2O_3, wt.%	10.84	0.207	10.42	11.25	10.22	11.46	1.91%	3.82%	5.73%	10.30	11.38
Gd_2O_3, ppm	76	66	0	208	0	275	86.57%	173.14%	259.71%	73	80
Ho_2O_3, ppm	< 100	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
K_2O, wt.%	3.12	0.048	3.03	3.22	2.98	3.26	1.52%	3.05%	4.57%	2.96	3.28
La_2O_3, ppm	473	47	379	567	332	614	9.95%	19.91%	29.86%	449	497
Lu_2O_3, ppm	< 100	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
MgO, wt.%	1.00	0.014	0.97	1.03	0.96	1.04	1.36%	2.73%	4.09%	0.95	1.05
MnO, wt.%	0.054	0.005	0.043	0.065	0.038	0.071	10.12%	20.25%	30.37%	0.051	0.057
Na_2O, wt.%	0.618	0.036	0.546	0.691	0.509	0.727	5.88%	11.76%	17.64%	0.587	0.649
P_2O_5, wt.%	0.677	0.029	0.619	0.734	0.591	0.763	4.24%	8.47%	12.71%	0.643	0.710
SiO_2, wt.%	46.46	0.739	44.98	47.94	44.24	48.68	1.59%	3.18%	4.77%	44.14	48.78
Sm_2O_3, ppm	< 100	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
SO_3, wt.%	0.094	0.005	0.083	0.105	0.078	0.110	5.81%	11.62%	17.44%	0.089	0.099
Tb_4O_7, ppm	< 100	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
TiO_2, wt.%	1.94	0.034	1.87	2.00	1.84	2.04	1.73%	3.46%	5.20%	1.84	2.03
Tm_2O_3, ppm	< 100	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
V_2O_5, ppm	328	57	213	442	156	499	17.46%	34.91%	52.37%	311	344
Yb_2O_3, ppm	< 100	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
ZnO, ppm	138	31	77	200	46	231	22.29%	44.59%	66.88%	131	145
ZrO_2, ppm	703	56	591	815	536	870	7.93%	15.87%	23.80%	668	738
Thermogravimetry											
LOI^{1000}, wt.%	8.81	0.566	7.68	9.94	7.11	10.51	6.42%	12.84%	19.26%	8.37	9.25
4-Acid Digestion											
Al, wt.%	12.28	0.473	11.33	13.23	10.86	13.70	3.86%	7.71%	11.57%	11.66	12.89

SI unit equivalents: ppm (parts per million; 1 x 10^{-6}) ≡ mg/kg; wt.% (weight per cent) ≡ % (mass fraction).

Notes: intervals may appear asymmetric due to rounding; the number of decimal places quoted does not imply accuracy of the certified value to this level but are given to minimise rounding errors when calculating 2SD and 3SD windows.

IND = indeterminate.

Table 5 continued.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5 % window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
4-Acid Digestion continued											
Ba, wt.%	0.446	0.011	0.424	0.469	0.413	0.480	2.53%	5.06%	7.59%	0.424	0.469
Be, ppm	3.25	0.232	2.79	3.72	2.56	3.95	7.14%	14.28%	21.42%	3.09	3.42
Bi, ppm	0.40	0.033	0.33	0.47	0.30	0.50	8.32%	16.64%	24.96%	0.38	0.42
Ca, wt.%	0.331	0.018	0.294	0.367	0.276	0.385	5.52%	11.03%	16.55%	0.314	0.347
Ce, ppm	734	51	633	836	582	886	6.90%	13.79%	20.69%	698	771
Co, ppm	14.0	0.66	12.7	15.3	12.0	16.0	4.71%	9.41%	14.12%	13.3	14.7
Cr, ppm	57	4.1	49	65	45	69	7.16%	14.32%	21.48%	54	60
Cs, ppm	9.46	0.459	8.54	10.38	8.08	10.84	4.86%	9.71%	14.57%	8.98	9.93
Cu, ppm	67	2.0	63	71	61	73	3.02%	6.04%	9.05%	63	70
Dy, ppm	13.6	0.74	12.1	15.1	11.3	15.8	5.48%	10.96%	16.44%	12.9	14.3
Er, ppm	6.11	0.413	5.28	6.93	4.87	7.34	6.77%	13.53%	20.30%	5.80	6.41
Eu, ppm	8.60	0.495	7.61	9.59	7.11	10.08	5.76%	11.51%	17.27%	8.17	9.03
Fe, wt.%	7.36	0.158	7.05	7.68	6.89	7.84	2.15%	4.30%	6.46%	6.99	7.73
Ga, ppm	33.6	2.48	28.6	38.6	26.1	41.0	7.39%	14.78%	22.17%	31.9	35.3
Gd, ppm	25.8	3.3	19.1	32.4	15.8	35.7	12.87%	25.75%	38.62%	24.5	27.1
Hf, ppm	6.06	0.574	4.92	7.21	4.34	7.79	9.46%	18.91%	28.37%	5.76	6.37
Ho, ppm	2.29	0.149	1.99	2.59	1.84	2.74	6.52%	13.04%	19.56%	2.18	2.41
In, ppm	0.11	0.007	0.09	0.12	0.09	0.13	6.22%	12.43%	18.65%	0.10	0.11
K, wt.%	2.54	0.092	2.35	2.72	2.26	2.81	3.63%	7.26%	10.88%	2.41	2.66
La, ppm	338	39	260	417	221	456	11.58%	23.17%	34.75%	321	355
Li, ppm	16.2	0.51	15.2	17.2	14.6	17.7	3.14%	6.29%	9.43%	15.4	17.0
Lu, ppm	0.66	0.062	0.54	0.79	0.48	0.85	9.40%	18.80%	28.20%	0.63	0.70
Mg, wt.%	0.554	0.041	0.471	0.636	0.430	0.677	7.43%	14.87%	22.30%	0.526	0.581
Mn, wt.%	0.042	0.002	0.038	0.047	0.035	0.049	5.42%	10.84%	16.27%	0.040	0.044
Mo, ppm	2.19	0.094	2.01	2.38	1.91	2.47	4.27%	8.55%	12.82%	2.08	2.30
Na, wt.%	0.460	0.019	0.421	0.499	0.402	0.518	4.19%	8.38%	12.56%	0.437	0.483
Nb, ppm	20.8	0.94	19.0	22.7	18.0	23.7	4.50%	8.99%	13.49%	19.8	21.9
Nd, ppm	289	27	234	344	207	372	9.50%	19.01%	28.51%	275	304
Ni, ppm	37.5	1.22	35.1	40.0	33.9	41.2	3.25%	6.50%	9.75%	35.7	39.4
P, wt.%	0.292	0.011	0.269	0.315	0.257	0.326	3.92%	7.84%	11.75%	0.277	0.306
Pb, ppm	51	2.0	47	55	45	57	3.88%	7.76%	11.65%	48	53
Pr, ppm	84	6.8	70	97	63	104	8.18%	16.36%	24.54%	79	88
Rb, ppm	130	10	110	151	99	161	7.95%	15.91%	23.86%	124	137
Re, ppm	< 0.002	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
S, wt.%	0.040	0.002	0.037	0.043	0.035	0.045	3.96%	7.92%	11.87%	0.038	0.042
Sb, ppm	1.05	0.058	0.93	1.17	0.87	1.22	5.54%	11.08%	16.62%	1.00	1.10
Sc, ppm	23.3	1.23	20.9	25.8	19.6	27.0	5.27%	10.55%	15.82%	22.2	24.5
Sm, ppm	41.3	2.92	35.4	47.1	32.5	50.1	7.08%	14.15%	21.23%	39.2	43.4
Sn, ppm	4.79	0.194	4.40	5.18	4.21	5.37	4.06%	8.12%	12.18%	4.55	5.03
Sr, ppm	748	31	687	809	657	840	4.08%	8.16%	12.23%	711	786
Ta, ppm	1.18	0.111	0.96	1.41	0.85	1.52	9.40%	18.81%	28.21%	1.12	1.24
Tb, ppm	2.81	0.31	2.20	3.43	1.89	3.73	10.93%	21.87%	32.80%	2.67	2.95
Th, ppm	33.2	3.25	26.7	39.7	23.4	42.9	9.79%	19.58%	29.37%	31.5	34.8

SI unit equivalents: ppm (parts per million; 1 x 10^{-6}) ≡ mg/kg; wt.% (weight per cent) ≡ % (mass fraction).

Notes: intervals may appear asymmetric due to rounding; the number of decimal places quoted does not imply accuracy of the certified value to this level but are given to minimise rounding errors when calculating 2SD and 3SD windows.

IND = indeterminate.

Table 5 continued.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5 % window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
4-Acid Digestion continued											
Ti, wt.%	1.07	0.083	0.90	1.24	0.82	1.32	7.81%	15.61%	23.42%	1.02	1.12
Tl, ppm	0.82	0.053	0.72	0.93	0.67	0.98	6.39%	12.78%	19.16%	0.78	0.87
Tm, ppm	0.77	0.072	0.62	0.91	0.55	0.99	9.39%	18.78%	28.17%	0.73	0.81
U, ppm	3.88	0.239	3.40	4.35	3.16	4.59	6.17%	12.35%	18.52%	3.68	4.07
V, ppm	177	8	161	193	152	201	4.57%	9.15%	13.72%	168	186
W, ppm	4.67	0.315	4.04	5.30	3.73	5.62	6.73%	13.46%	20.19%	4.44	4.91
Y, ppm	59	6	47	72	40	78	10.58%	21.16%	31.74%	56	62
Yb, ppm	4.74	0.327	4.08	5.39	3.76	5.72	6.90%	13.80%	20.70%	4.50	4.97
Zn, ppm	102	4	95	109	91	113	3.52%	7.03%	10.55%	97	107
Zr, ppm	255	22	210	300	188	322	8.79%	17.57%	26.36%	242	268

SI unit equivalents: ppm (parts per million; 1 x 10^{-6}) ≡ mg/kg; wt.% (weight per cent) ≡ % (mass fraction).

Notes: intervals may appear asymmetric due to rounding; the number of decimal places quoted does not imply accuracy of the certified value to this level but are given to minimise rounding errors when calculating 2SD and 3SD windows.

IND = indeterminate.

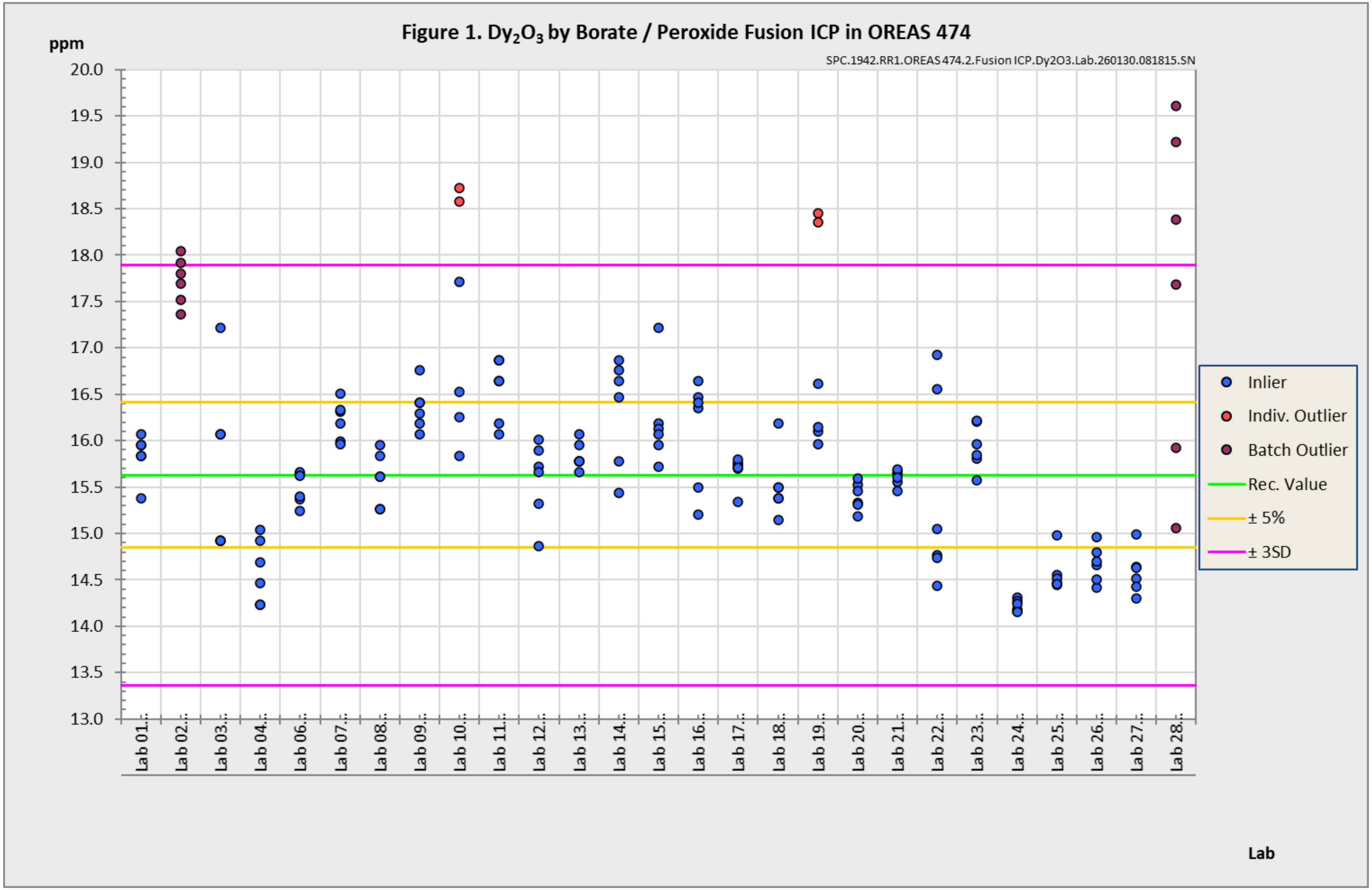


Figure 1. Dy_2O_3 by Borate / Peroxide Fusion ICP in OREAS 474
SPC.1942.RR1.OREAS 474.2.Fusion ICP.Dy2O3.Lab.260130.081815.SN
ppm
20.0
19.5
19.0
18.5
18.0
17.5
17.0
16.5
16.0
15.5
15.0
14.5
14.0
13.5
13.0
Lab 01..
Lab 02..
Lab 03..
Lab 04..
Lab 06..
Lab 07..
Lab 08..
Lab 09..
Lab 10..
Lab 11..
Lab 12..
Lab 13..
Lab 14..
Lab 15..
Lab 16..
Lab 17..
Lab 18..
Lab 19..
Lab 20..
Lab 21..
Lab 22..
Lab 23..
Lab 24..
Lab 25..
Lab 26..
Lab 27..
Lab 28..
Lab
Inlier
Indiv. Outlier
Batch Outlier
Rec. Value
± 5%
± 3SD

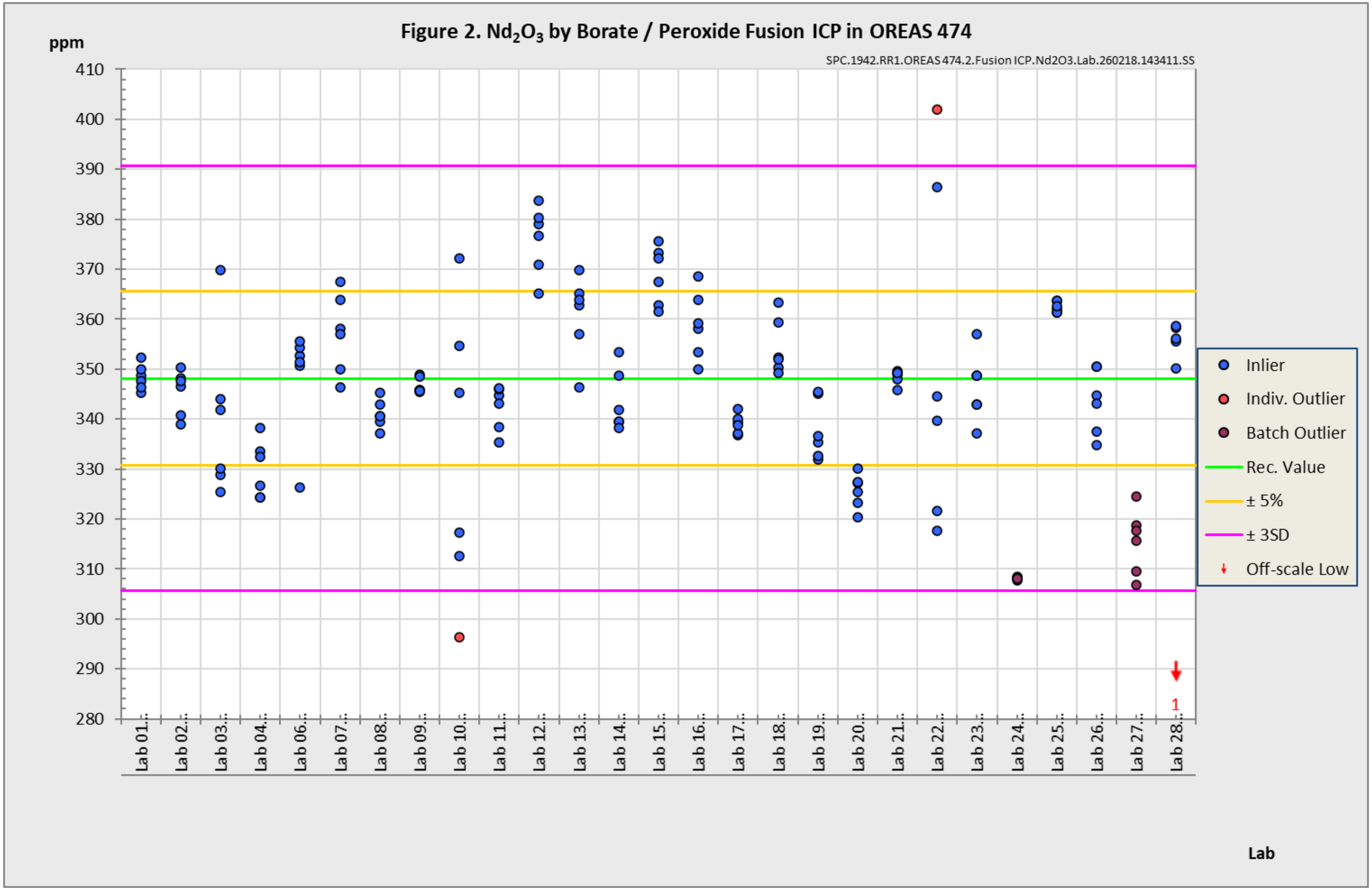
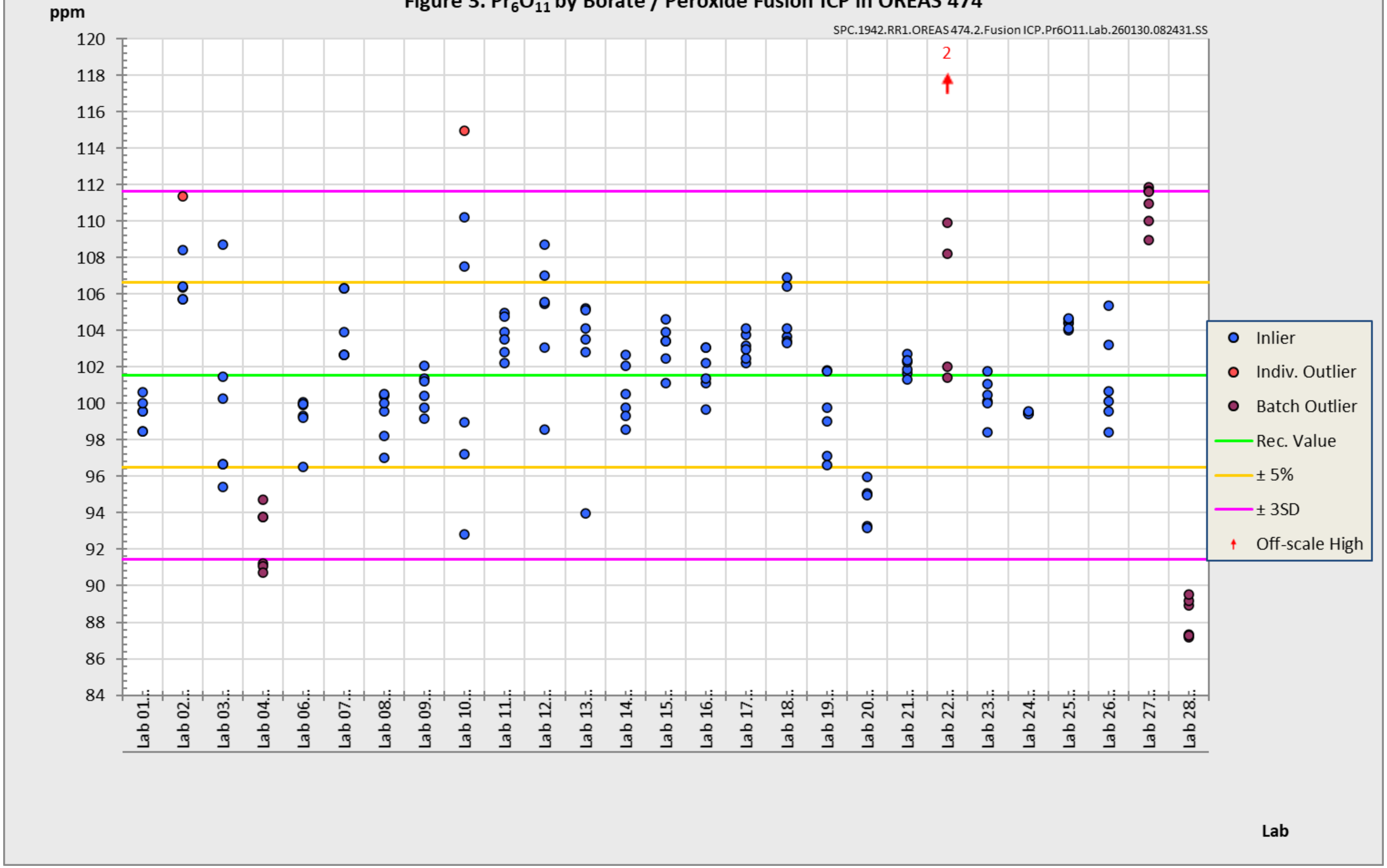


Figure 2. Nd_2O_3 by Borate / Peroxide Fusion ICP in OREAS 474

Figure 3. Pr_6O_{11} by Borate / Peroxide Fusion ICP in OREAS 474



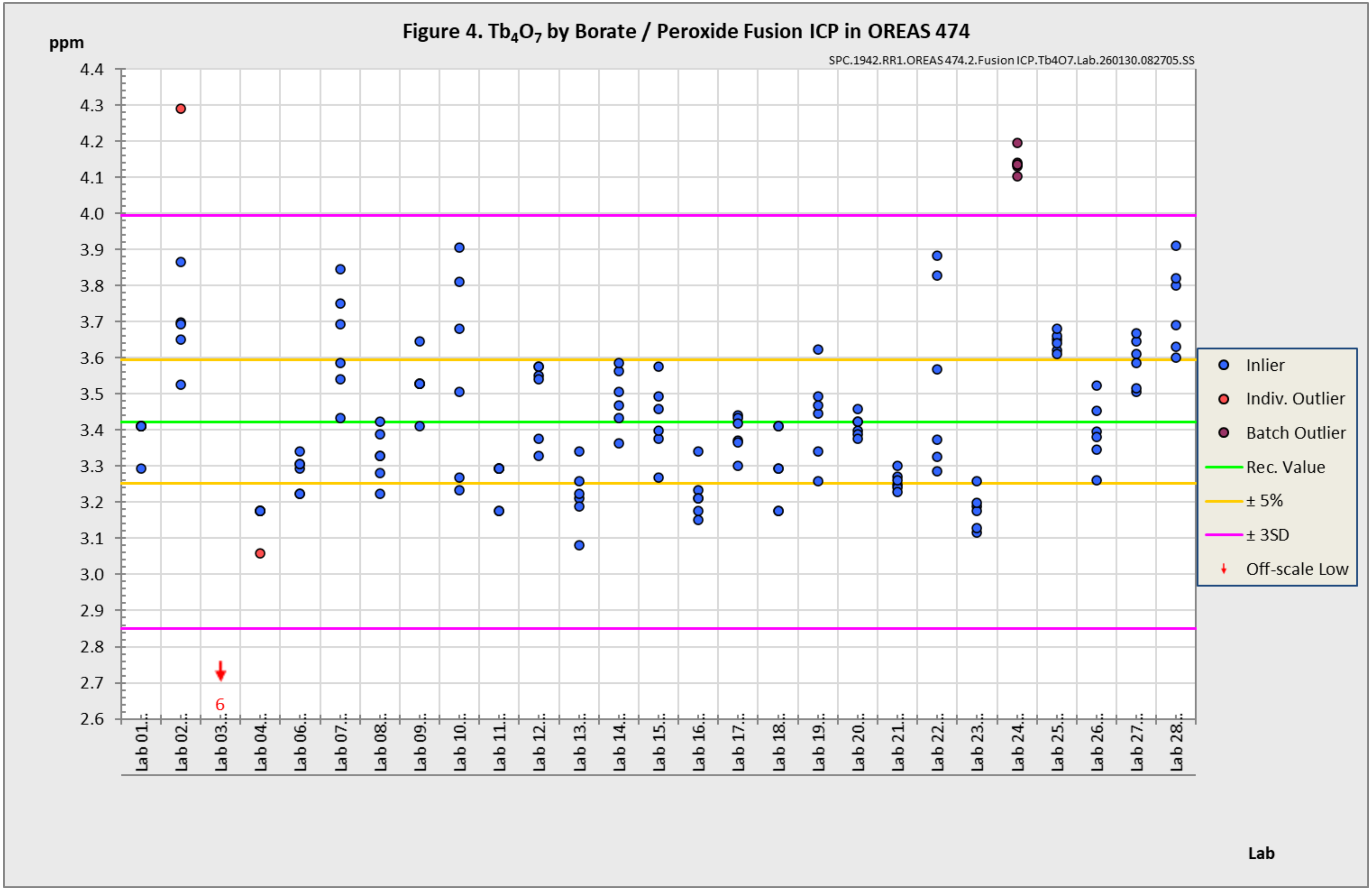


Figure 4. Tb4O7 by Borate / Peroxide Fusion ICP in OREAS 474
SPC.1942.RR1.OREAS 474.2.Fusion ICP.Tb4O7.Lab.260130.082705.SS
ppm
4.4
4.3
4.2
4.1
4.0
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3.0
2.9
2.8
2.7
2.6
6
Lab 01..
Lab 02..
Lab 03..
Lab 04..
Lab 06..
Lab 07..
Lab 08..
Lab 09..
Lab 10..
Lab 11..
Lab 12..
Lab 13..
Lab 14..
Lab 15..
Lab 16..
Lab 17..
Lab 18..
Lab 19..
Lab 20..
Lab 21..
Lab 22..
Lab 23..
Lab 24..
Lab 25..
Lab 26..
Lab 27..
Lab 28..
Inlier
Indiv. Outlier
Batch Outlier
Rec. Value
± 5%
± 3SD
Off-scale Low
Lab

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DOCUMENT HISTORY

Revision No.	Date	Changes applied
0	18th February 2026	First publication.

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