

Annex 1: Trace element quality assurance data

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ODT

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Recovery and limit of detection

| Element | Recovery (%) | LoD (mg/kg) |
|------------|--------------|-------------|
| Lithium | 91 | 0.005 |
| Beryllium | 98 | 0.001 |
| Boron | 71 | 1 |
| Sodium | 57 | 5 |
| Magnesium | 100 | 1 |
| Aluminium | 64 | 0.5 |
| Silicon | 98 | 100 |
| Phosphorus | 95 | 10 |
| Sulfur | 90 | 500 |
| Potassium | 78 | 20 |
| Calcium | 81 | 5 |
| Scandium | 77 | 0.005 |

| Element | Recovery (%) | LoD (mg/kg) |
|----------------|---------------------|--------------------|
| Titanium | 55 | 0.1 |
| Vanadium | 67 | 0.01 |
| Chromium | 100 | 0.05 |
| Manganese | 100 | 0.1 |
| Iron | 100 | 1 |
| Cobalt | 100 | 0.005 |
| Nickel | 100 | 0.05 |
| Copper | 100 | 0.05 |
| Zinc | 100 | 0.2 |
| Gallium | 80 | 0.01 |
| Germanium | 80 | 0.01 |
| Arsenic | 110 | 0.005 |
| Selenium | 100 | 0.01 |
| Rubidium | 107 | 0.02 |
| Strontium | 95 | 0.02 |
| Yttrium | 91 | 0.001 |
| Zirconium | 89 | 0.01 |
| Niobium | 85 | 0.002 |

| Element | Recovery (%) | LoD (mg/kg) |
|----------------|---------------------|--------------------|
| Molybdenum | 90 | 0.02 |
| Ruthenium | 93 | 0.001 |
| Rhodium | 91 | 0.005 |
| Palladium | 89 | 0.005 |
| Silver | 75 | 0.01 |
| Cadmium | 90 | 0.005 |
| Tin | 99 | 0.005 |
| Antimony | 101 | 0.002 |
| Tellurium | 129 | 0.01 |
| Caesium | 128 | 0.001 |
| Barium | 109 | 0.02 |
| Lanthanum | 111 | 0.001 |
| Cerium | 105 | 0.001 |
| Praseodymium | 100 | 0.001 |
| Neodymium | 95 | 0.001 |
| Samarium | 95 | 0.001 |
| Europium | 95 | 0.001 |
| Gadolinium | 95 | 0.001 |

| Element | Recovery (%) | LoD (mg/kg) |
|----------------|---------------------|--------------------|
| Terbium | 90 | 0.001 |
| Dysprosium | 88 | 0.001 |
| Holmium | 88 | 0.001 |
| Erbium | 85 | 0.001 |
| Thulium | 87 | 0.001 |
| Ytterbium | 87 | 0.001 |
| Lutetium | 84 | 0.001 |
| Hafnium | 69 | 0.001 |
| Tantalum | 66 | 0.001 |
| Tungsten | 79 | 0.002 |
| Rhenium | 89 | 0.001 |
| Osmium | 90 | 0.005 |
| Iridium | 87 | 0.001 |
| Platinum | 97 | 0.001 |
| Gold | 90 | 0.002 |
| Mercury | 95 | 0.005 |
| Thallium | 96 | 0.005 |
| Lead | 94 | 0.005 |

| Element | Recovery (%) | LoD (mg/kg) |
|---------|--------------|-------------|
| Bismuth | 101 | 0.001 |
| Thorium | 89 | 0.001 |
| Uranium | 94 | 0.001 |

Certified reference materials

| Element | NIST 1548a (mg/kg) | Reference (mg/kg) | Bias (%) | INCT-OBTL-5 (mg/kg) | Reference (mg/kg) | Bias (%) |
|------------|--------------------|-------------------|----------|---------------------|-------------------|----------|
| Lithium | 0.028 | None | - | 29.1 | ~19.3 | 51 |
| Beryllium | <0.001 | None | - | 0.085 | ~0.081 | 5 |
| Boron | 4.55 | 4.16 | 9 | 50 | 33.6 | 49 |
| Sodium | 7470 | 8130 | -8 | 407 | ~435 | -7 |
| Magnesium | 325 | 580 | -44 | 8810 | 8530 | 3 |
| Aluminium | 79 | 72.4 | 9 | 3150 | 1980 | 59 |
| Silicon | <100 | ~78.7 | -53 | 2280 | None | - |
| Phosphorus | 2920 | 3490 | -16 | 1720 | 1700 | 1 |
| Sulfur | 1500 | 1930 | -22 | 4840 | 4550 | 6 |
| Potassium | 6360 | 6970 | -9 | 31500 | 22700 | 39 |
| Calcium | 1610 | 1970 | -18 | 51600 | 40000 | 29 |
| Scandium | <0.005 | ~0.0008 | - | 0.782 | 0.64 | 22 |

| Element | NIST 1548a (mg/kg) | Reference (mg/kg) | Bias (%) | INCT-OBTL-5 (mg/kg) | Reference (mg/kg) | Bias (%) |
|-----------|--------------------|-------------------|----------|---------------------|-------------------|----------|
| Titanium | 5.8 | ~4.7 | 23 | 199 | ~80.7 | 146 |
| Vanadium | 0.02 | None | - | 6.41 | 4.01 | 60 |
| Chromium | 0.05 | None | - | 6.27 | ~6.3 | 0 |
| Manganese | 3.5 | 5.75 | -39 | 191 | 180 | 6 |
| Iron | 20 | 35.3 | -42 | 1630 | ~1490 | 9 |
| Cobalt | 0.01 | ~0.028 | -63 | 0.919 | 0.981 | -6 |
| Nickel | 0.24 | 0.37 | -35 | 8.21 | 8.5 | -3 |
| Copper | 1.43 | 2.32 | -38 | 9.64 | 10.1 | -5 |
| Zinc | 16.7 | 24.6 | -32 | 51.9 | 52.4 | -1 |
| Gallium | 0.01 | None | - | 0.92 | None | - |
| Germanium | <0.01 | None | - | 0.17 | None | - |
| Arsenic | 0.195 | 0.2 | -3 | 0.766 | 0.668 | 15 |
| Selenium | 0.23 | 0.25 | -7 | 0.18 | None | - |
| Rubidium | 3.78 | None | - | 17.6 | 19.1 | -8 |
| Strontium | 2.76 | 2.93 | -6 | 116 | 105 | 11 |
| Yttrium | 0.003 | None | - | 1.31 | ~0.963 | 36 |
| Zirconium | 0.05 | None | - | 0.88 | None | - |
| Niobium | 0.002 | None | - | 0.196 | None | - |

| Element | NIST 1548a (mg/kg) | Reference (mg/kg) | Bias (%) | INCT-OBTL-5 (mg/kg) | Reference (mg/kg) | Bias (%) |
|--------------|--------------------|-------------------|----------|---------------------|-------------------|----------|
| Molybdenum | 0.22 | 0.26 | -16 | 0.41 | 0.414 | -2 |
| Ruthenium | <0.001 | None | - | <0.001 | None | - |
| Rhodium | <0.005 | None | - | <0.005 | None | - |
| Palladium | <0.005 | None | - | 0.058 | None | - |
| Silver | <0.01 | None | - | 0.05 | 0.053 | -3 |
| Cadmium | 0.034 | 0.035 | -4 | 3.31 | 2.64 | 25 |
| Tin | 14.7 | 17.2 | -15 | 0.163 | None | - |
| Antimony | 0.0078 | ~0.009 | -14 | 0.059 | 0.076 | -21 |
| Tellurium | <0.01 | None | - | <0.01 | None | - |
| Caesium | 0.0087 | None | - | 0.242 | 0.288 | -16 |
| Barium | 1.08 | 1.1 | -2 | 64.1 | 67.4 | -5 |
| Lanthanum | 0.003 | None | - | 1.48 | 1.69 | -13 |
| Cerium | 0.004 | 0.01 | -56 | 2.82 | 2.99 | -6 |
| Praseodymium | 0.001 | None | - | 0.37 | ~0.321 | 15 |
| Neodymium | 0.003 | None | - | 1.47 | 1.33 | 10 |
| Samarium | 0.001 | None | - | 0.29 | 0.264 | 10 |
| Europium | <0.001 | None | - | 0.065 | 0.06 | 7 |

| Element | NIST 1548a (mg/kg) | Reference (mg/kg) | Bias (%) | INCT-OBTL-5 (mg/kg) | Reference (mg/kg) | Bias (%) |
|------------|--------------------|-------------------|----------|---------------------|-------------------|----------|
| Gadolinium | 0.001 | None | - | 0.268 | ~0.243 | 10 |
| Terbium | <0.001 | None | - | 0.043 | 0.035 | 24 |
| Dysprosium | <0.001 | None | - | 0.246 | ~0.184 | 33 |
| Holmium | <0.001 | None | - | 0.048 | ~0.035 | 39 |
| Erbium | <0.001 | None | - | 0.14 | 0.101 | 38 |
| Thulium | <0.001 | None | - | 0.019 | ~0.014 | 39 |
| Ytterbium | <0.001 | None | - | 0.119 | 0.115 | 3 |
| Lutetium | <0.001 | None | - | 0.018 | ~0.017 | 6 |
| Hafnium | 0.002 | None | - | 0.034 | 0.291 | -88 |
| Tantalum | <0.001 | None | - | 0.01 | 0.042 | -75 |
| Tungsten | 0.002 | None | - | 0.05 | None | - |
| Rhenium | <0.001 | None | - | 0.01 | None | - |
| Osmium | <0.005 | None | - | <0.005 | None | - |
| Iridium | <0.001 | None | - | <0.001 | None | - |
| Platinum | <0.001 | None | - | <0.001 | None | - |
| Gold | <0.002 | None | - | 0.003 | ~0.003 | -4 |
| Mercury | <0.005 | ~0.005 | -49 | 0.018 | 0.021 | -13 |

| Element | NIST 1548a (mg/kg) | Reference (mg/kg) | Bias (%) | INCT-OBTL-5 (mg/kg) | Reference (mg/kg) | Bias (%) |
|----------|--------------------|-------------------|----------|---------------------|-------------------|----------|
| Thallium | <0.005 | None | - | 0.064 | 0.051 | 24 |
| Lead | 0.054 | 0.044 | 22 | 2.16 | 2.01 | 8 |
| Bismuth | 0.001 | None | - | 0.115 | None | - |
| Thorium | 0.001 | None | - | 0.519 | 0.503 | 3 |
| Uranium | 0.002 | None | - | 0.106 | ~0.113 | -6 |

'-' indicates values where they are issued as a reference value.