Analysis report, Metal analysis regarding order numbers L0904529 & L0904530

1. Sample preparation

Salt samples were placed in plastic Zip-lock bag and crushed to <1 cm size. From each sample, six 2.00±0.02 g sub-samples were weighted into acid-washed 125 ml HDPE bottles. For analysis of waters-soluble content, salt aliquot was first dissolved at room temperature in 8 ml de-ionized MQ-water, followed by further dilution of resulted brine to 90 ml with MQ-water. For analysis of total concentrations, salt aliquot was first digested in 10 ml HNO_3 (SP) + 0.1 ml HF(SP) mixture at 80 oC water batch, followed by dilution of digest to 100 ml with MQ-water. For each preparation method, three separate blank samples were prepared, using same labware and reagents as for salt samples.

2. Sample analysis

Dissolved/digested salt samples were analysed by ICP-SFMS (ELEMENT2, Thermo Scientific Finnigan, Bremen, Germany) after additional 50-fold dilution with 0.14 M HNO_3 (SP). The instrument was equipped with Teflon introduction system, high-performance X-cones and shielded plasma. Methane was added to Ar sample gas at 4 ml min^{-1} rate to decrease spectral/non-spectral interferences and to increase ionization efficiency. Measurements were performed in low, medium and high resolutions (six scans in each resolution), using external calibration and internal standardization (In) to correct for instrumental drift. Calibration was checked against QC sample prepared using stock standard solutions from alternative suppliers. Acceptance criteria (>10% deviation from theoretical value) were fulfilled for all calibrated elements.

3. Data handling

Raw intensities data were exported to validated evaluation software (I2D) and concentrations in salt samples (mg kg-1) were calculated from concentrations in measuring solution multiplied by dilution factor. Method limits of determination (LOD) for dissolution/digestion were calculated as three times the standard deviation for concentrations measured in preparation blanks for respective preparation method. For each salt sample, mean concentration and standard deviation were calculated from three parallel preparation/analyses.

For results, see enclosed appendix 1.

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Appendix 1, page 1(3)

			Enhet	As75(HR)	Ba138(LR)	Ca44(HR)	Ca44(MR)	Cd114(LR)	Cr52(MR)	Cu63(MR)	Fe54(MR)
TO5 1200m	Mean	Digestion	mg/kg	0.0088	0.09	4553	4762	0.0008	0.052	0.069	7.4
	SD	Digestion	mg/kg	*0.0005*	*0.01*	*714*	*813*	*0.0001*	*0.013*	*0.020*	*1.8*
TO6 1610m	Mean	Digestion	mg/kg	0.0126	0.73	4779	5090	0.0017	0.078	0.055	18.5
	SD	Digestion	mg/kg	*0.0063*	*0.09*	*519*	*387*	*0.0002*	*0.008*	*0.006*	*0.4*
TO7 1208m	Mean	Digestion	mg/kg	0.0084	3.27	4214	4498	0.0017	0.159	0.061	19.4
	SD	Digestion	mg/kg	*0.0053*	*1.43*	*693*	*687*	*0.0002*	*0.017*	*0.006*	*4.1*
TO8 1306m	Mean	Digestion	mg/kg	0.0176	1.63	4124	4278	0.0016	0.067	0.116	37.1
	SD	Digestion	mg/kg	*0.0025*	*0.36*	*288*	*362*	*0.0005*	*0.008*	*0.024*	*6.6*
TO9 1123m	Mean	Digestion	mg/kg	0.0167	0.80	5388	5764	0.0015	0.049	0.063	20.5
	SD	Digestion	mg/kg	*0.0071*	*0.15*	*643*	*815*	*0.0003*	*0.012*	*0.009*	*1.8*
TO10 1309m	Mean	Digestion	mg/kg	0.0300	32.21	2739	2903	0.0017	0.042	0.468	30.9
	SD	Digestion	mg/kg	*0.0060*	*4.44*	*633*	*676*	*0.0006*	*0.008*	*0.057*	*6.7*
TO11 1300m	Mean	Digestion	mg/kg	0.0091	0.19	5851	6463	0.0008	0.036	0.061	24.9
	SD	Digestion	mg/kg	*0.0051*	*0.08*	*614*	*432*	*0.0001*	*0.014*	*0.025*	*2.2*
LOQ		Digestion	mg/kg	0.0051	0.00	7	7	0.0002	0.001	0.003	0.2
			Enhet								
TO5 1200m	Mean	Dissolution	mg/kg	0.0072	0.02	1953	2104	0.0004	0.012	0.036	0.2
	SD	Dissolution	mg/kg	*0.0051*	*0.00*	*83*	*136*	*0.0001*	*0.004*	*0.005*	*0.0*
TO6 1610m	Mean	Dissolution	mg/kg	0.0028	0.81	1549	1754	0.0008	0.020	0.048	1.3
	SD	Dissolution	mg/kg	*0.0049*	*0.24*	*146*	*127*	*0.0001*	*0.003*	*0.006*	*0.1*
TO7 1208m	Mean	Dissolution	mg/kg	0.0057	2.00	2212	2506	0.0024	0.028	0.062	4.4
	SD	Dissolution	mg/kg	*0.0031*	*1.22*	*359*	*505*	*0.0009*	*0.004*	*0.009*	*0.8*
TO8 1306m	Mean	Dissolution	mg/kg	0.0104	0.68	805	891	0.0008	0.016	0.053	4.8
	SD	Dissolution	mg/kg	*0.0068*	*0.27*	*48*	*48*	*0.0001*	*0.001*	*0.010*	*1.7*
TO9 1123m	Mean	Dissolution	mg/kg	0.0039	0.51	3712	4162	0.0006	0.041	0.047	2.2
	SD	Dissolution	mg/kg	*0.0046*	*0.49*	*810*	*876*	*0.0001*	*0.018*	*0.007*	*0.6*
TO10 1309m	Mean	Dissolution	mg/kg	0.0204	41.63	2139	2479	0.0007	0.041	0.060	17.4
	SD	Dissolution	mg/kg	*0.0095*	*11.84*	*403*	*465*	*0.0001*	*0.007*	*0.008*	*2.0*
TO11 1300m	Mean	Dissolution	mg/kg	0.0042	0.16	1720	1932	0.0010	0.030	0.059	3.5
	SD	Dissolution	mg/kg	*0.0011*	*0.08*	*387*	*415*	*0.0002*	*0.014*	*0.009*	*1.6*
LOQ		Dissolution	mg/kg	0.0087	0.00	2	0	0.0004	0.011	0.001	0.1

Red - results <LOQ

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Appendix 1, page 2(3)

			Enhet	Fe56(MR)	Hg201(LR)	Hg202(LR)	K39(HR)	Mg24(MR)	Mg26(MR)	Mn55(MR)	Na23(MR)
TO5 1200m	Mean	Digestion	mg/kg	7.6	0.0036	0.0027	51	25.4	26.9	0.111	413632
	SD	Digestion	mg/kg	*1.8*	*0.0002*	*0.0014*	*3*	*6.1*	*5.5*	*0.034*	*25526*
TO6 1610m	Mean	Digestion	mg/kg	19.1	0.0037	0.0029	103	23.3	23.4	0.154	417114
	SD	Digestion	mg/kg	*0.7*	*0.0013*	*0.0005*	*2*	*0.9*	*0.9*	*0.014*	*4669*
TO7 1208m	Mean	Digestion	mg/kg	21.6	0.0033	0.0021	145	127.9	130.3	0.308	424460
	SD	Digestion	mg/kg	*5.3*	*0.0014*	*0.0008*	*27*	*15.3*	*16.4*	*0.039*	*16090*
TO8 1306m	Mean	Digestion	mg/kg	37.8	0.0020	0.0016	60	69.4	71.2	0.526	418720
	SD	Digestion	mg/kg	*6.4*	*0.0026*	*0.0005*	*2*	*8.4*	*8.3*	*0.075*	*17341*
TO9 1123m	Mean	Digestion	mg/kg	21.4	0.0055	0.0045	93	44.5	45.3	0.315	395601
	SD	Digestion	mg/kg	*2.3*	*0.0008*	*0.0003*	*3*	*5.3*	*5.8*	*0.029*	*10665*
TO10 1309m	Mean	Digestion	mg/kg	28.9	0.0019	0.0014	4359	2220.7	2292.0	0.223	406839
	SD	Digestion	mg/kg	*3.7*	*0.0011*	*0.0003*	*337*	*327.7*	*348.7*	*0.020*	*20497*
TO11 1300m	Mean	Digestion	mg/kg	26.4	0.0007	0.0005	67	39.5	40.1	0.368	396413
	SD	Digestion	mg/kg	*2.4*	*0.0004*	*0.0003*	*2*	*4.3*	*3.8*	*0.021*	*16900*
LOQ		Digestion	mg/kg	0.1	0.0052	0.0012	61	1.1	1.3	0.005	42
			Enhet								
TO5 1200m	Mean	Dissolution	mg/kg	0.3	0.0005	0.0000	52	4.2	5.6	0.018	422309
	SD	Dissolution	mg/kg	*0.1*	*0.0009*	*0.0003*	*1*	*1.0*	*1.9*	*0.008*	*11770*
TO6 1610m	Mean	Dissolution	mg/kg	1.6	-0.0004	-0.0003	103	2.9	2.8	0.041	418596
	SD	Dissolution	mg/kg	*0.4*	*0.0004*	*0.0006*	*3*	*0.9*	*0.6*	*0.020*	*9184*
TO7 1208m	Mean	Dissolution	mg/kg	4.6	0.0007	0.0001	155	107.7	108.2	0.168	418319
	SD	Dissolution	mg/kg	*1.4*	*0.0004*	*0.0006*	*21*	*28.3*	*28.4*	*0.054*	*5291*
TO8 1306m	Mean	Dissolution	mg/kg	3.9	0.0008	0.0001	54	15.7	17.4	0.137	414366
	SD	Dissolution	mg/kg	*1.1*	*0.0005*	*0.0002*	*1*	*2.6*	*5.8*	*0.035*	*2795*
TO9 1123m	Mean	Dissolution	mg/kg	2.3	0.0005	0.0006	95	9.2	11.7	0.072	411545
	SD	Dissolution	mg/kg	*0.1*	*0.0017*	*0.0001*	*2*	*1.9*	*4.7*	*0.009*	*5064*
TO10 1309m	Mean	Dissolution	mg/kg	13.9	-0.0003	-0.0001	4911	4119.9	4216.1	0.192	404557
	SD	Dissolution	mg/kg	*2.8*	*0.0004*	*0.0004*	*444*	*3664.0*	*3792.6*	*0.053*	*18689*
TO11 1300m	Mean	Dissolution	mg/kg	3.2	-0.0001	-0.0002	67	10.0	10.2	0.142	409486
	SD	Dissolution	mg/kg	*1.2*	*0.0012*	*0.0005*	*5*	*5.8*	*6.9*	*0.046*	*3590*
LOQ		Dissolution	mg/kg	0.1	0.0007	0.0015	1	0.2	0.4	0.009	2

Red - results <LOQ

Ilia Rodushkin

Appendix 1, page 3(3)

			Enhet	Ni60(MR)	Pb208(LR)	S32(MR)	SO4-calc.	Sr88(LR)	V51(MR)	Zn64(MR)	Zn66(MR)
TO5 1200m	Mean	Digestion	mg/kg	0.024	0.316	3313	9737	21.7	0.020	0.292	0.274
	SD	Digestion	mg/kg	*0.007*	*0.026*	*644*		*4.5*	*0.004*	*0.070*	*0.106*
TO6 1610m	Mean	Digestion	mg/kg	0.029	0.295	3818	11223	19.2	0.065	0.468	0.486
	SD	Digestion	mg/kg	*0.003*	*0.043*	*336*		*1.0*	*0.007*	*0.043*	*0.091*
TO7 1208m	Mean	Digestion	mg/kg	0.029	0.759	3458	10165	26.0	0.058	0.323	0.351
	SD	Digestion	mg/kg	*0.009*	*0.092*	*632*		*4.6*	*0.014*	*0.210*	*0.205*
TO8 1306m	Mean	Digestion	mg/kg	0.044	1.248	3224	9477	22.9	0.087	0.548	0.488
	SD	Digestion	mg/kg	*0.006*	*0.260*	*249*		*2.2*	*0.018*	*0.120*	*0.018*
TO9 1123m	Mean	Digestion	mg/kg	0.039	0.285	4252	12499	29.9	0.076	0.265	0.327
	SD	Digestion	mg/kg	*0.012*	*0.044*	*746*		*4.2*	*0.021*	*0.131*	*0.090*
TO10 1309m	Mean	Digestion	mg/kg	0.016	0.565	3537	10396	14.8	0.014	0.977	1.022
	SD	Digestion	mg/kg	*0.005*	*0.054*	*326*		*3.5*	*0.005*	*0.305*	*0.340*
TO11 1300m	Mean	Digestion	mg/kg	0.046	0.929	4576	13450	34.0	0.050	1.162	1.191
	SD	Digestion	mg/kg	*0.007*	*0.294*	*510*		*2.0*	*0.011*	*0.405*	*0.421*
LOQ		Digestion	mg/kg	0.009	0.001	2	7	0.0	0.003	0.191	0.171
			Enhet								
TO5 1200m	Mean	Dissolution	mg/kg	0.004	0.199	1427	4195	9.3	0.012	0.207	0.224
	SD	Dissolution	mg/kg	*0.002*	*0.052*	*190*		*1.5*	*0.012*	*0.048*	*0.043*
TO6 1610m	Mean	Dissolution	mg/kg	0.003	0.197	1232	3622	6.6	0.018	0.483	0.468
	SD	Dissolution	mg/kg	*0.004*	*0.031*	*114*		*0.4*	*0.005*	*0.104*	*0.089*
TO7 1208m	Mean	Dissolution	mg/kg	0.012	0.419	1839	5404	16.9	0.019	0.241	0.254
	SD	Dissolution	mg/kg	*0.009*	*0.064*	*300*		*2.9*	*0.006*	*0.092*	*0.101*
TO8 1306m	Mean	Dissolution	mg/kg	0.010	0.632	597	1755	5.0	0.021	0.265	0.266
	SD	Dissolution	mg/kg	*0.003*	*0.198*	*47*		*0.3*	*0.012*	*0.039*	*0.061*
TO9 1123m	Mean	Dissolution	mg/kg	0.009	0.194	2969	8728	22.0	0.015	0.198	0.198
	SD	Dissolution	mg/kg	*0.003*	*0.083*	*729*		*5.1*	*0.004*	*0.057*	*0.100*
TO10 1309m	Mean	Dissolution	mg/kg	0.008	0.657	5467	16070	13.9	0.019	0.633	0.623
	SD	Dissolution	mg/kg	*0.005*	*0.165*	*5084*		*3.8*	*0.005*	*0.127*	*0.091*
TO11 1300m	Mean	Dissolution	mg/kg	0.013	1.071	1289	3790	11.1	0.020	1.436	1.400
	SD	Dissolution	mg/kg	*0.005*	*0.322*	*233*		*2.0*	*0.010*	*0.722*	*0.690*
LOQ		Dissolution	mg/kg	0.006	0.002	8	23	0.0	0.001	0.165	0.156

Red - results <LOQ

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