Supporting information

Data Processing Strategies for the Improved Analysis of Solder by Electrothermal Vaporization (ETV) coupled to ICP-OES

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Table S1. Technique A integrated peak areas (average +/- standard deviation) of blanks from empty graphite boats after point-by-point internal standardization with Ar I (404.442 nm)

	Integrated peaks (a.u.)					
	Blank 1	**Blank 2**	**Blank 3**	**Blank 4**	**Blank 5**	**Average +/- standard deviation**
Ag	7.15	6.74	6.69	7.39	6.42	6.87 +/- 0.39
As	1.78	1.69	1.56	1.60	1.46	1.62 +/- 0.12
Bi	1.225	1.171	1.130	1.132	1.089	1.149 +/- 0.051
Cr	2.29	1.25	2.65	1.38	3.35	2.18 +/- 0.88
Cu	7.35	7.15	10.12	8.11	7.32	8.0 +/- 1.2
Fe	18.63	17.47	19.28	17.42	18.86	18.34 +/- 0.84
Pb	0.753	0.736	0.681	0.711	0.654	0.707 +/- 0.040
Sb	1.28	1.14	1.06	1.09	1.00	1.12 +/- 0.11
Sn	15.85	9.86	0.41	0.46	0.43	5.4 +/- 7.1

Calculation S1. Detection limit of Ag for Technique A – Blank subtraction

Slope of Ag calibration curve, m = 76000 a.u./mg

Standard deviation of empty graphite boat blanks = 0.39 a.u.

$$LOD = \frac{3\sigma_{blank}}{m}$$

$$= \frac{3 * (0.39\ a.u.)}{76000 \frac{a.u.}{mg}}$$

$$LOD = 2 \times 10^{-5}\ mg\ or\ 20\ ng$$

Table S2. Technique B integrated peak areas (average +/- standard deviation) of backgrounds from standards after point-by-point internal standardization with Ar I (404.442 nm); background integrations scaled by a factor of 2

	Integrated peaks (a.u.)					
	Blank 1	**Blank 2**	**Blank 3**	**Blank 4**	**Blank 5**	**Average +/- standard deviation**
Ag	6.127	6.089	5.970	6.018	6.007	6.044 +/- 0.064
As	1.642	1.675	1.623	1.686	1.626	1.650 +/- 0.029
Bi	1.030	1.040	1.033	1.086	1.052	1.048 +/- 0.023
Cr	0.981	0.971	0.973	0.926	0.935	0.957 +/- 0.025
Cu	5.19	5.14	5.05	5.14	5.11	5.127 +/- 0.052
Fe	15.304	15.137	15.045	15.148	15.118	15.151 +/- 0.095
Pb	0.709	0.716	0.704	0.762	0.692	0.717 +/- 0.027
Sb	0.927	0.887	0.932	0.945	0.933	0.925 +/- 0.022
Sn	0.40	0.38	0.49	0.77	0.98	0.60 +/- 0.26

Calculation S2. Detection limit of Ag for Technique B – Integrated background correction

Slope of Ag calibration curve, m = 76000 a.u./mg

Standard deviation of integrated backgrounds = 0.064 a.u.

$$LOD = \frac{3\sigma_{background}}{m}$$

$$= \frac{3 * (0.064\ a.u.)}{76000 \frac{a.u.}{mg}}$$

$$LOD = 3 \times 10^{-6}\ mg\ or\ 3\ ng$$

Table S3. Technique C peak intensities (average +/- standard deviation) of backgrounds from standards after point-by-point internal standardization with Ar I (404.442 nm)

	Peak intensity (a.u.)					
	Blank 1	**Blank 2**	**Blank 3**	**Blank 4**	**Blank 5**	**Average +/- standard deviation**
Ag	0.01524	0.01515	0.01485	0.01497	0.01494	0.01503 +/- 0.00016
As	0.004084	0.004168	0.004037	0.004193	0.004046	0.004105 +/- 0.000071
Bi	0.002563	0.002586	0.002570	0.002702	0.002618	0.002608 +/- 0.000056
Cr	0.002441	0.002416	0.002422	0.002297	0.002325	0.002380 +/- 0.000064
Cu	0.01291	0.01280	0.01256	0.01278	0.01272	0.01275 +/- 0.00013
Fe	0.03807	0.03765	0.03742	0.03768	0.03761	0.03769 +/- 0.00024
Pb	0.001761	0.001780	0.001749	0.001886	0.001710	0.001777 +/- 0.000066
Sb	0.002306	0.002207	0.002320	0.002351	0.002320	0.002301 +/- 0.000055
Sn	0.00096	0.00088	0.00121	0.00190	0.00242	0.00147 +/- 0.00067

Calculation S3. Detection limit of Ag for Method C – Averaged background correction

Slope of Ag calibration curve, m = 950 mg^{-1}

Standard deviation of averaged background signals = 0.00016 (a.u.)

$$LOD = \frac{3\sigma_{background\ signal}}{m}$$

$$= \frac{3 * (0.00016)}{950\ mg^{-1}}$$

$$LOD = 5 \times 10^{-7}\ mg\ or\ 0.5\ ng$$

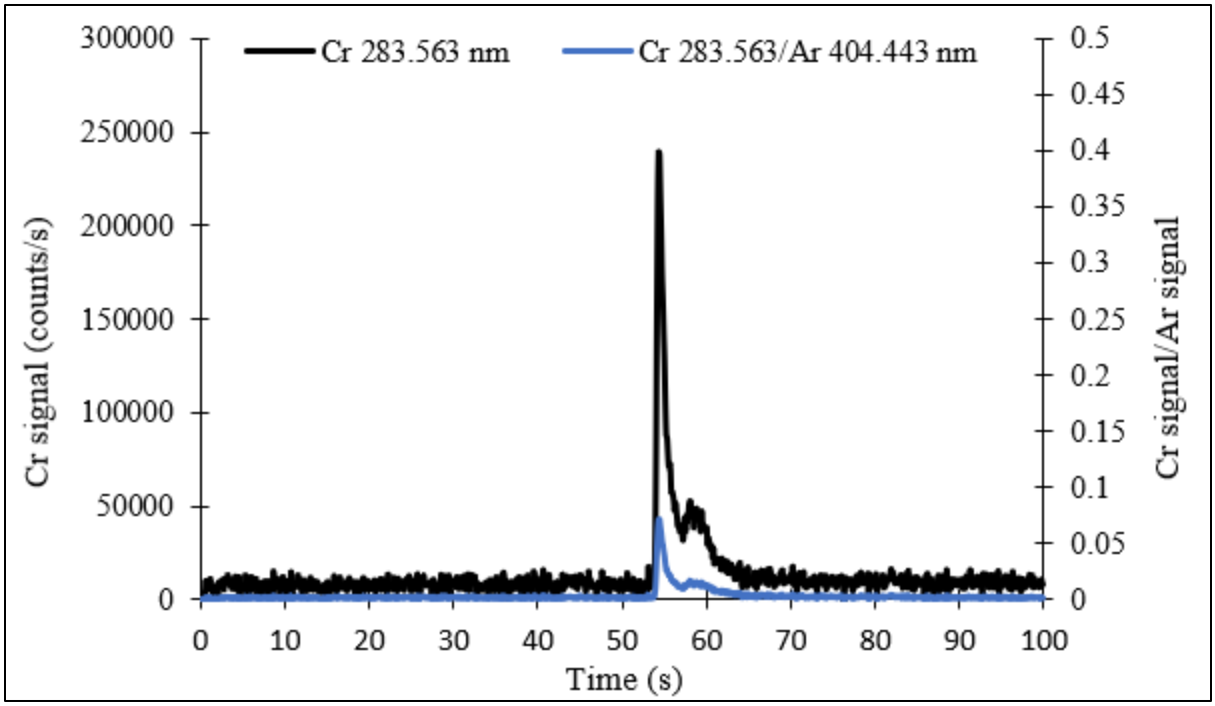

Fig. S1 Temporal ETV-ICPOES signals of Cr I (283.563 nm) with and without internal-standardization using Ar I (404.442 nm). Signals collected from a 2.9 mg sample of CRM NIST 1728 Bullet Lead.

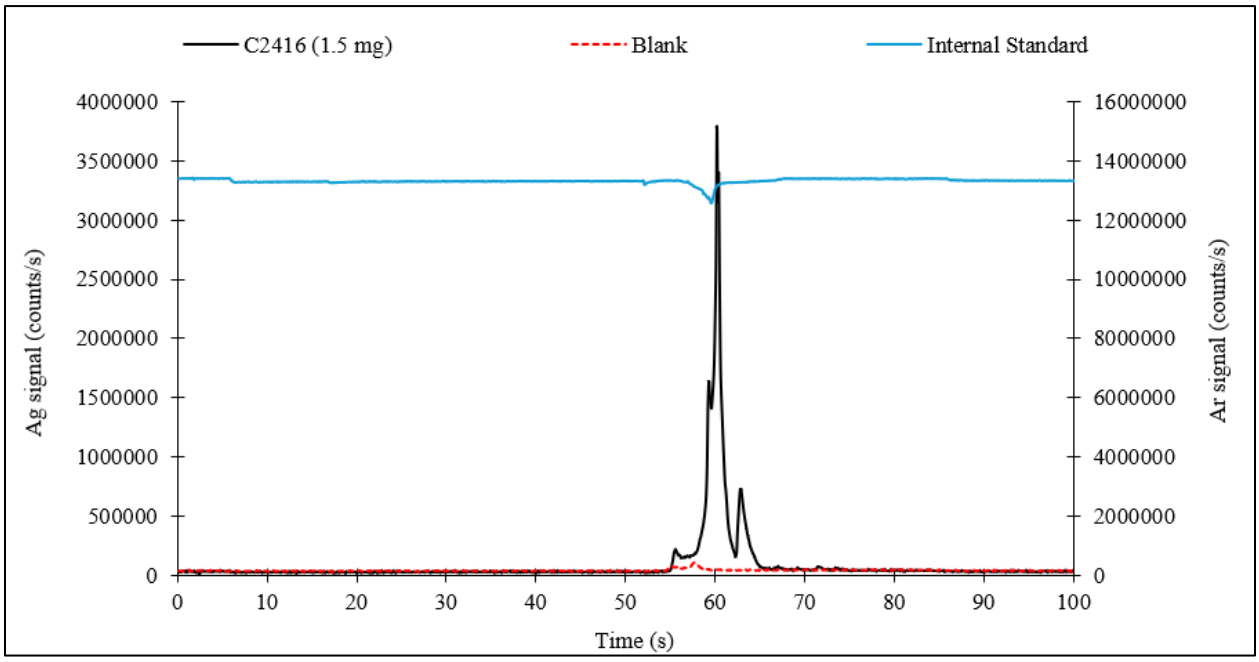

Fig. S2 Temporal ETV-ICPOES signals of Ag I (328.068 nm) in a 1.5 mg sample of CRM NIST C2416 Bullet Lead and a blank (0 mg). Internal standard is Ar I (763.511 nm).

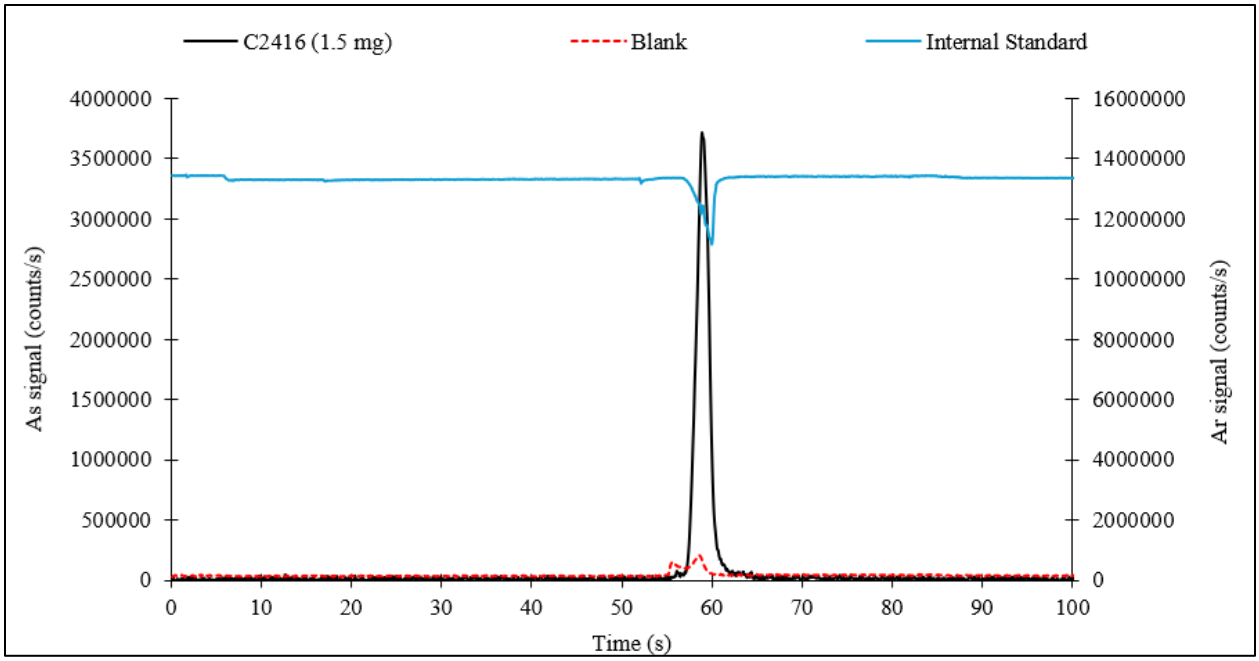

Fig. S3 Temporal ETV-ICPOES signals of As I (189.042 nm) in a 1.5 mg sample of CRM NIST C2416 Bullet Lead and a blank (0 mg). Internal standard is Ar I (763.511 nm).

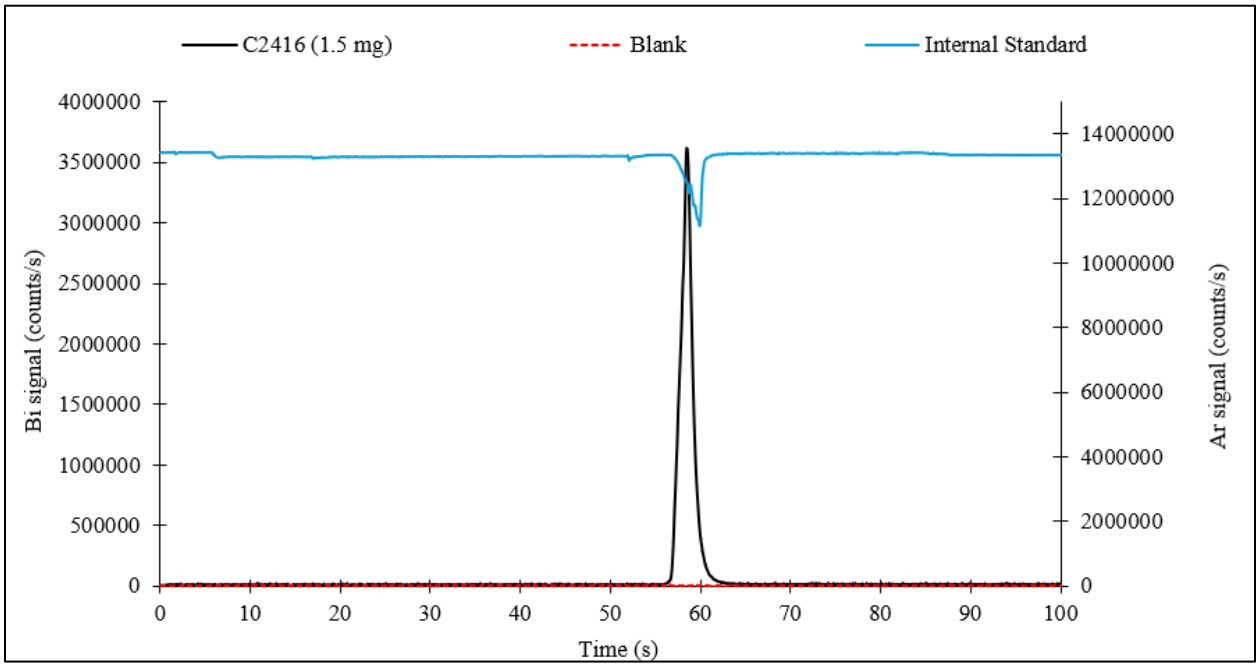

Fig. S4 Temporal ETV-ICPOES signals of Bi I (223.061 nm) in a 1.5 mg sample of CRM NIST C2416 Bullet Lead and a blank (0 mg). Internal standard is Ar I (763.511 nm).

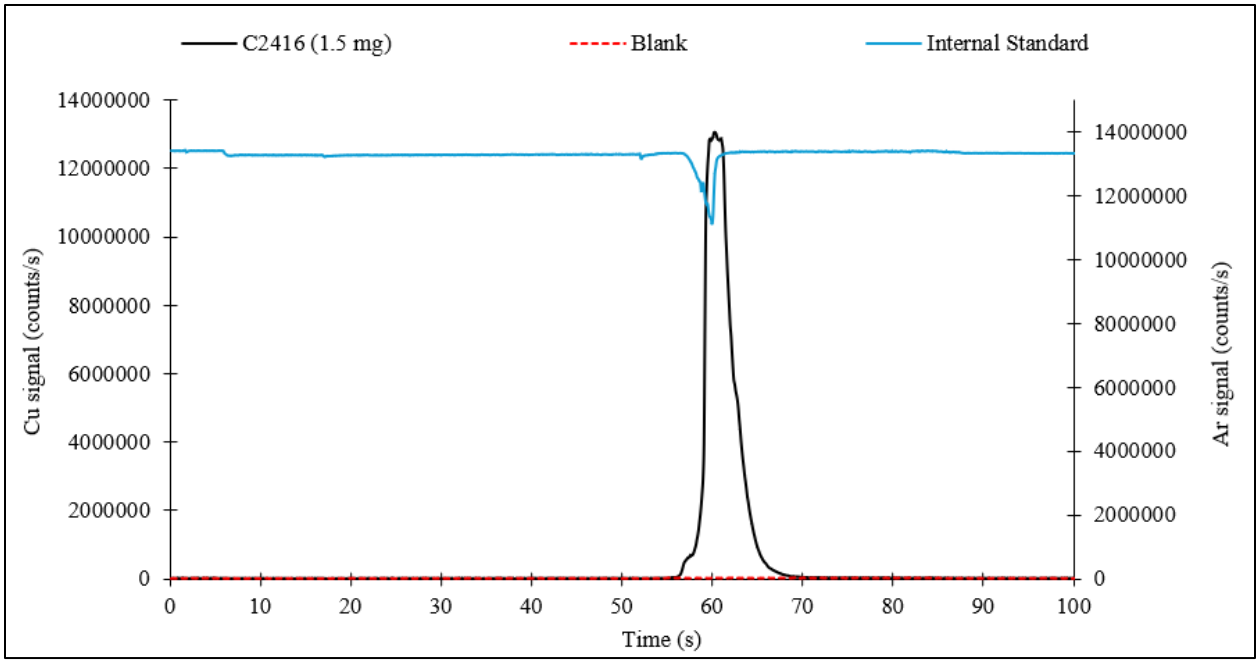

Fig. S5 Temporal ETV-ICPOES signals of Cu I (324.754 nm) in a 1.5 mg sample of CRM NIST C2416 Bullet Lead and a blank (0 mg). Internal standard is Ar I (763.511 nm).

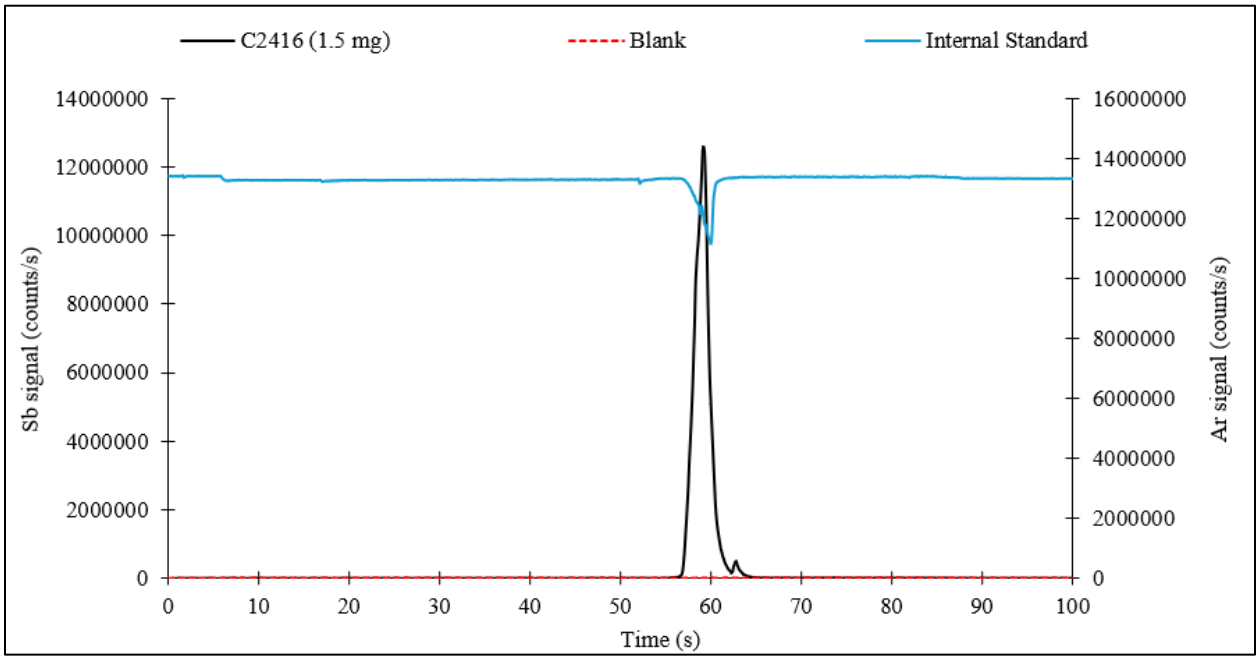

Fig. S6 Temporal ETV-ICPOES signals of Sb I (217.581 nm) in a 1.5 mg sample of NIST C2416 and a blank (0 mg). Internal standard is Ar I (763.511 nm).

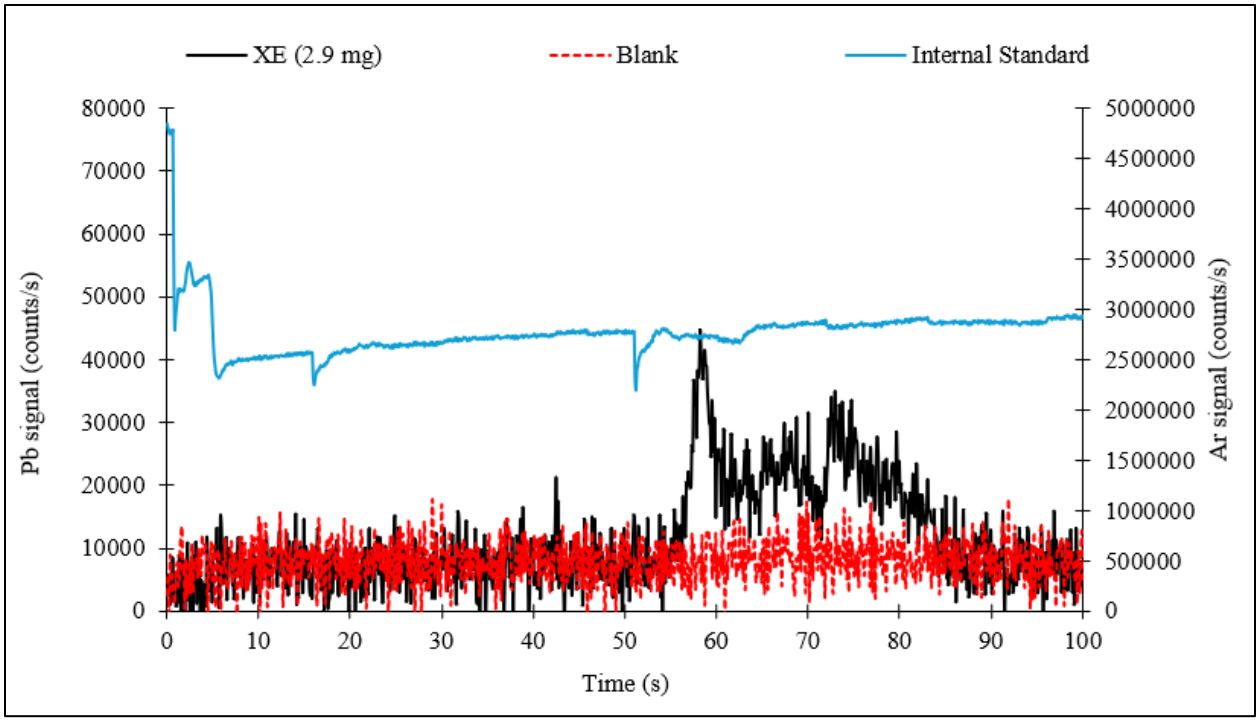

Fig. S7 Temporal ETV-ICPOES signals of Pb II (172.680 nm) in a 2.9 mg sample of CRM ARMI MBH XE F and a blank (0 mg). Internal standard is Ar I (404.442 nm).

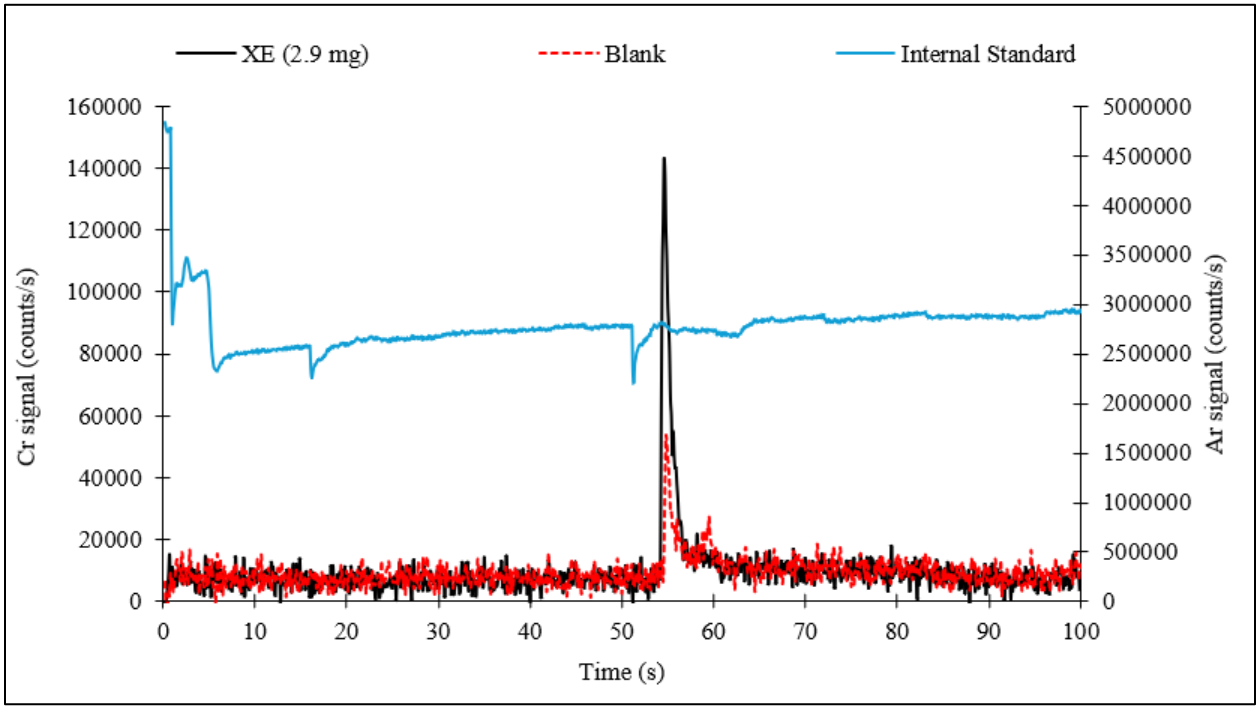

Fig. S8 Temporal ETV-ICPOES signals of Cr I (283.563 nm) in a 2.9 mg sample of CRM ARMI MBH XE F and a blank (0 mg). Internal standard is Ar I (404.442 nm).

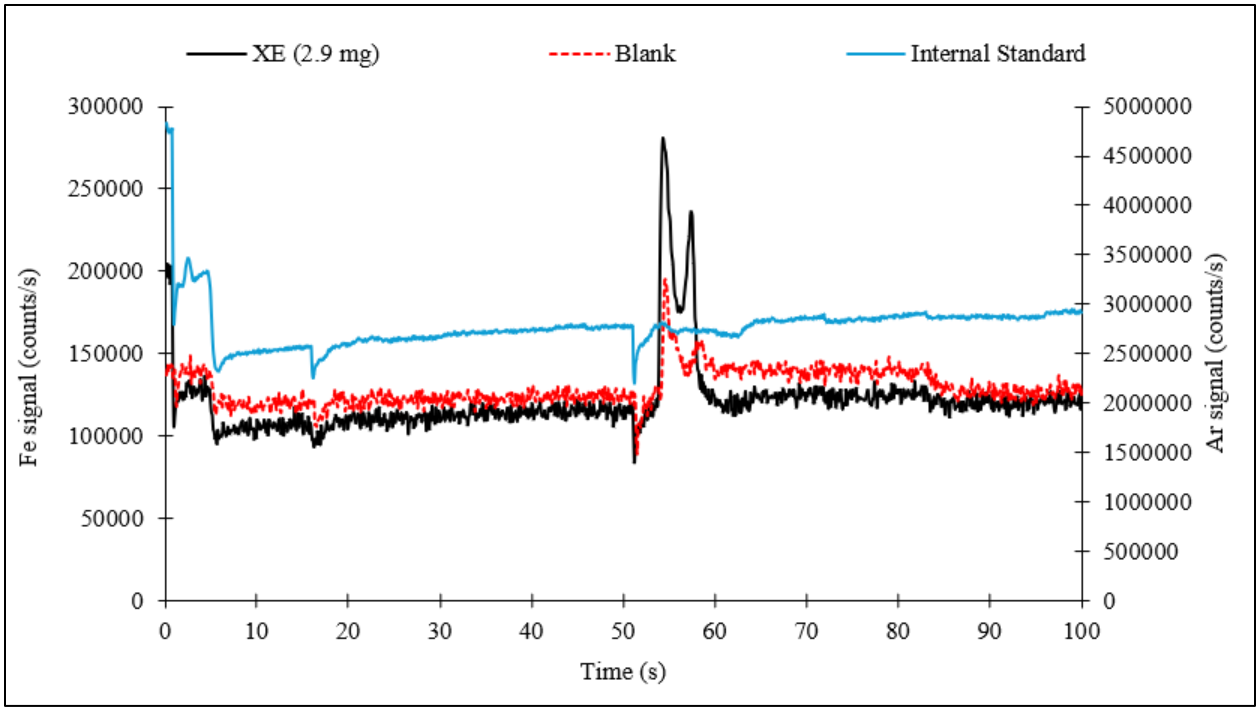

Fig. S9 Temporal ETV-ICPOES signals of Fe I (373.486 nm) in a 2.9 mg sample of CRM ARMI MBH XE F and a blank (0 mg). Internal standard is Ar I (404.442 nm).

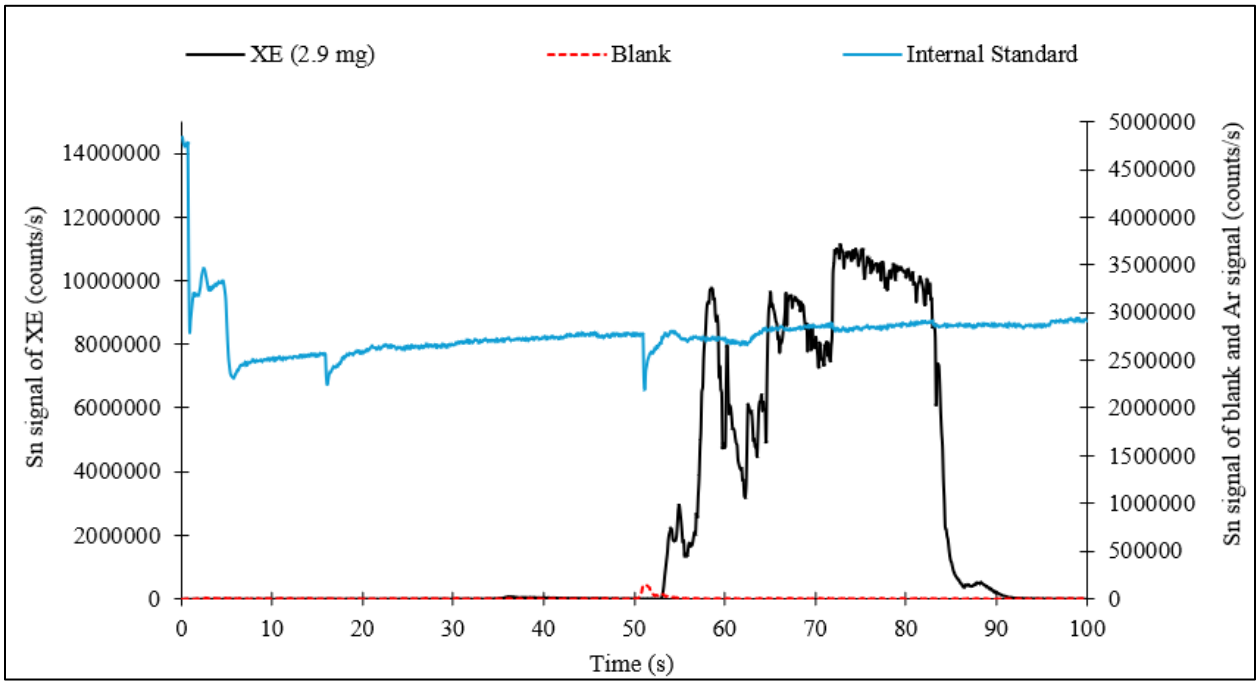

Fig. S10 Temporal ETV-ICPOES signals of Sn II (175.790 nm) in a 2.9 mg sample of CRM ARMI MBH XE F and a blank (0 mg). Internal standard is Ar I (404.442 nm).