



Results of the 12th Proficiency Test First round on Milk

Community Reference Laboratory
for Chemical Elements in Food of Animal Origin
at the Istituto Superiore di Sanità
(CRL- ISS)

Brief technical information

Assigned values (\hat{X})

The assigned values were calculated from the participants' results.

According to the “International Harmonised Protocol for the Proficiency Testing of Analytical Chemistry Laboratories”, IUPAC (Pure Appl. Chem., vol. 78, no. 1, pp. 145-196, 2006), the robust mean (H15 Algorithm) was used; only for lead–sample B, the consensus value was identified as the median value.

Target standard deviation(σ_p)

As for σ for proficiency assessment, the acceptable variation between NRLs was set at 15% for As and Cd, and at 18% for Pb. Nevertheless, to allow a useful comparison with your previous results (or with results obtained in other PT schemes), a z-score calculated by using the σ Horwitz was also reported.

Sample A						
Lab. Code	As		Cd		Pb	
	mean	sd	mean	sd	mean	sd
C (mg kg ⁻¹)						
1	0.019	0.001	0.0052	0.00008	0.0170	0.0003
2	0.122	0.0048	0.0050	0.00004	0.029	0.0011
3	0.109	0.006	0.0060	0	0.012	0.001
4	0.020	0.0011	0.0056	0.0002	0.0399	0.0004
5	0.121	0.001	0.0045	0.00050	0.024	0.002
6	0.145	0.0016	0.0126	0.0001	<0.03	-
7	0.127	0.003	0.0060	0	0.035	0.002
8	0.018	0.00086	0.0058	0.000058	0.0190	0.00085
10	0.121	0.001	0.0050	0.0007	0.025	0.0002
11	0.143	0.002	0.0060	0.001	0.028	0.002
12	-	-	0.0040		0.024	
13	0.133	0.0015	0.0060	0.0005	0.028	0.0006
14	0.124	0.0046	0.0051	0.00033	0.032	0.00320
15	-	-	0.0043	0.0001	0.021	0.001
16	0.123	0.001	0.0070	0.00	0.018	0.0017
17	-	-	0.0060	0.0002	0.025	0.001
18	-	-	0.0059	0.0002	0.029	0.001
19	0.140	0.002	0.0060	0.00001	0.028	0.0004
20	0.177	0.0053	0.0068	0.0005	0.0363	0.0021
22	0.120	0.0127	0.0060	0	0.024	0.001
23	-	-	0.0063	0.0001	0.0265	0.0006
24	0.124	0.003	0.0060	0	0.028	-
25	0.108	0.014	0.0060	0.0004	0.026	0.002
26	0.208	0.011	0.0037	0.0003	0.025	0.004
9A	0.117	0.005	0.0059	0.0002	0.032	0.004
9B	0.128	0.006	0.0064	0.0010	0.028	0.006

Statistics			
Nr. of Results	21	26	26
Nr. of data for statistics	16	24	23
min	0.108	0.0040	0.0170
max	0.145	0.0070	0.0363
Mean	0.125	0.0057	0.0264
Std Dev	0.011	0.0007	0.0049
Median	0.124	0.0060	0.0265
H15 Robust mean	0.125	0.0058	0.0265
H15 Std Dev	0.011	0.0007	0.0041

Assigned value and Std Dev for proficiency assessment			
Assigned value \hat{X}	0.125 [^]	0.0058 [^]	0.0265 [^]
u_x	0.0028	0.0001	0.001
σ_{pCRL}	0.019	0.0009	0.005
$\sigma_{Horwitz}$	0.027	0.0013 [*]	0.007

([^])= H15 Robust mean, (^{*})= $\sigma_{Thompson}$

Sample B						
Lab. Code	As		Cd		Pb	
	mean	sd	mean	sd	mean	sd
C (mg kg ⁻¹)						
1	0.0238	0.002	0.0058	0.0002	0.0219	0.0008
2	0.167	0.0013	0.0049	0.00008	0.031	0.0017
3	0.050	0.006	0.006	0	0.017	0
4	0.0298	0.0018	0.0055	0.0003	0.0495	0.0016
5	0.180	0.001	0.0046	0.0006	0.026	0.003
6	0.211	0.0000	0.0124	0.0001	<0.03	-
7	0.190	0.0060	0.006	0	0.036	0.001
8	0.0229	0.0057	0.00596	0.00019	0.0242	0.0008
10	0.185	0.001	0.005	0.001	0.032	0.0001
11	0.209	0.003	0.007	0.001	0.034	0.002
12	-	-	0.005	-	0.030	-
13	0.197	0.004	0.005	0.0006	0.036	0.0028
14	0.188	0.0059	0.0058	0.00026	0.038	0.00350
15	-	-	0.0058	0.0001	0.037	0.0005
16	0.166	0.001	0.007	0.0	0.022	0.00058
17	-	-	0.006	0.001	0.033	0.003
18	-	-	0.0059	0.0003	0.035	0.001
19	0.21	0.012	0.006	0.0005	0.035	0.002
20	0.2753	0.0183	0.0074	0.0006	0.0479	0.0039
22	0.192	0.0127	0.006	0	0.033	0.003
23	-	-	0.0062	0.00006	0.0341	0.0009
24	0.184	0.002	0.006	-	0.035	-
25	0.156	0.016	0.006	0.0005	0.031	0.002
26	0.221	0.01500	0.0040	0.0005	0.029	0.003
9A	0.1707	0.003	0.007	0.0007	0.045	0.011
9B	0.189	0.006	0.0058	0.0008	0.025	0.003

Statistics			
Nr. of Results	21	26	26
Nr. of data for statistics	16	22	22
min	0.156	0.0049	0.0219
max	0.221	0.0070	0.0450
Mean	0.189	0.0059	0.0319
Std Dev	0.018	0.0006	0.0056
Median	0.189	0.0060	0.0330
H15 Robust mean	0.189	0.0059	0.0319
H15 Std Dev	0.020	0.0005	0.0054

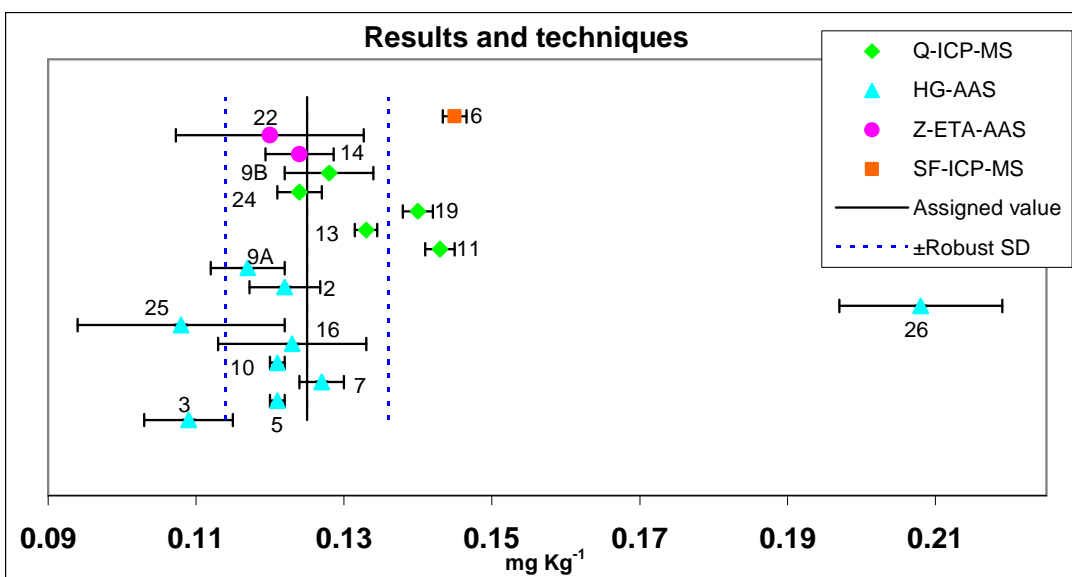
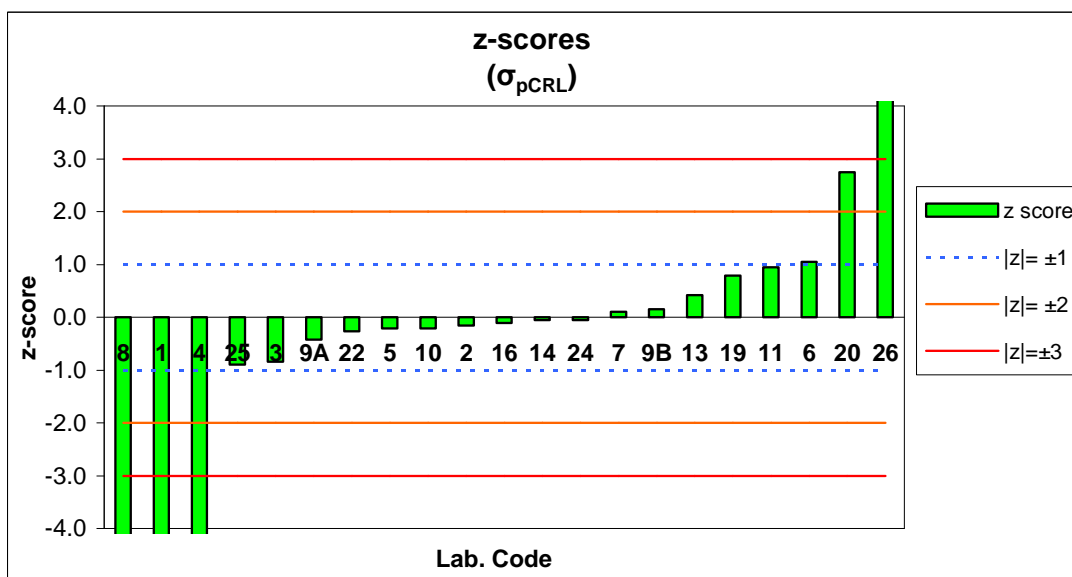
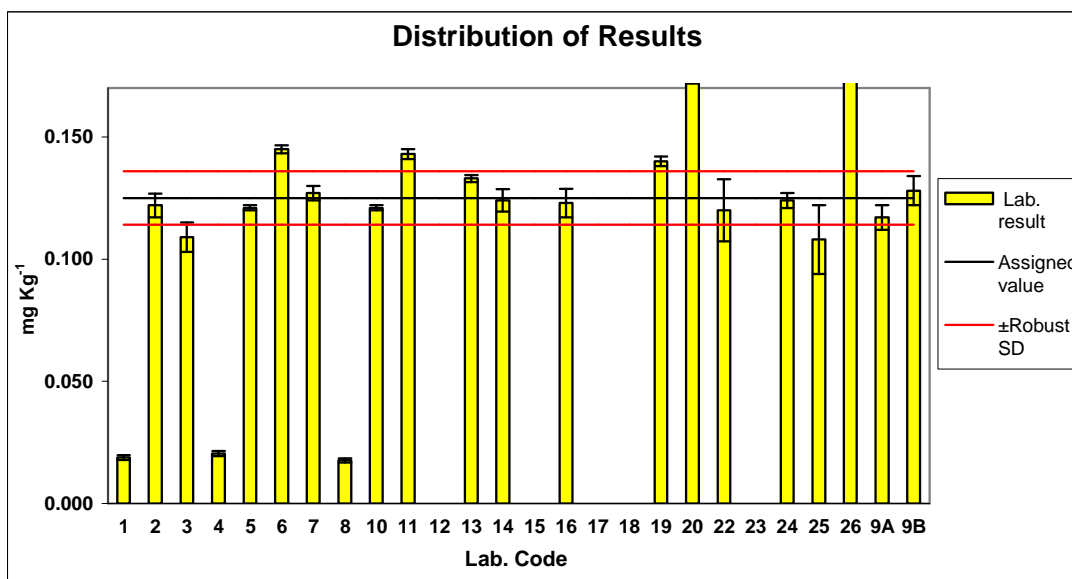
Assigned value and Std Dev for proficiency assessment			
Assigned value \hat{X}	0.189 [^]	0.0059 [^]	0.0330 [°]
u_x	0.005	0.0001	0.001
σ_{pCRL}	0.028	0.0009	0.006
$\sigma_{Horwitz}$	0.039	0.0013 [*]	0.009

([^])= H15 Robust mean, (^{*})= $\sigma_{Thompson}$, ([°])= median

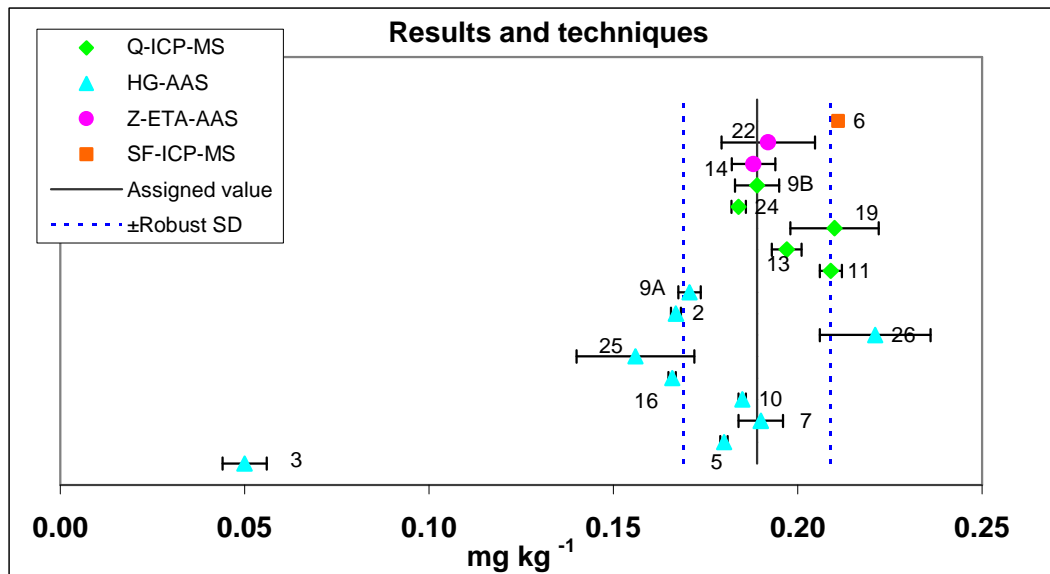
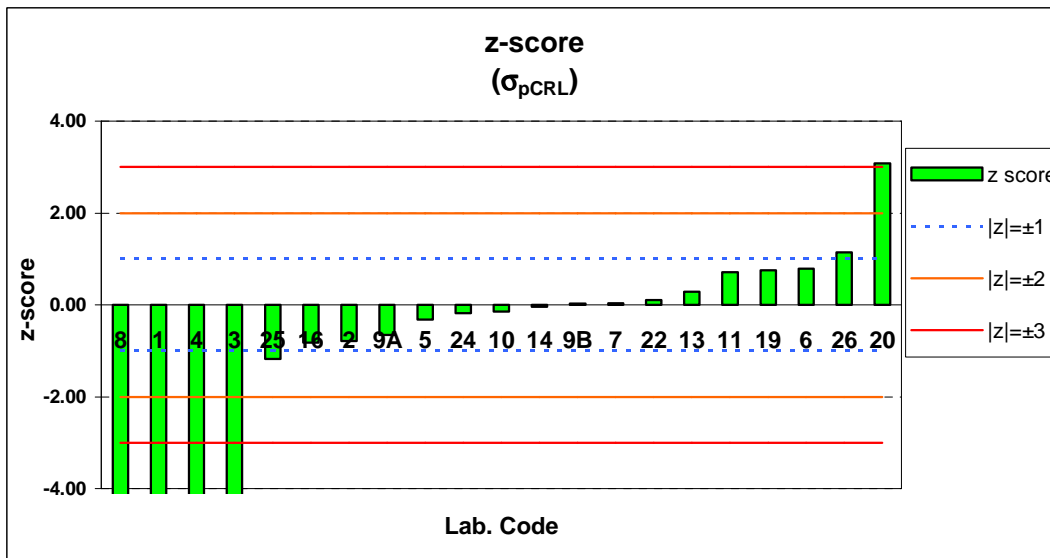
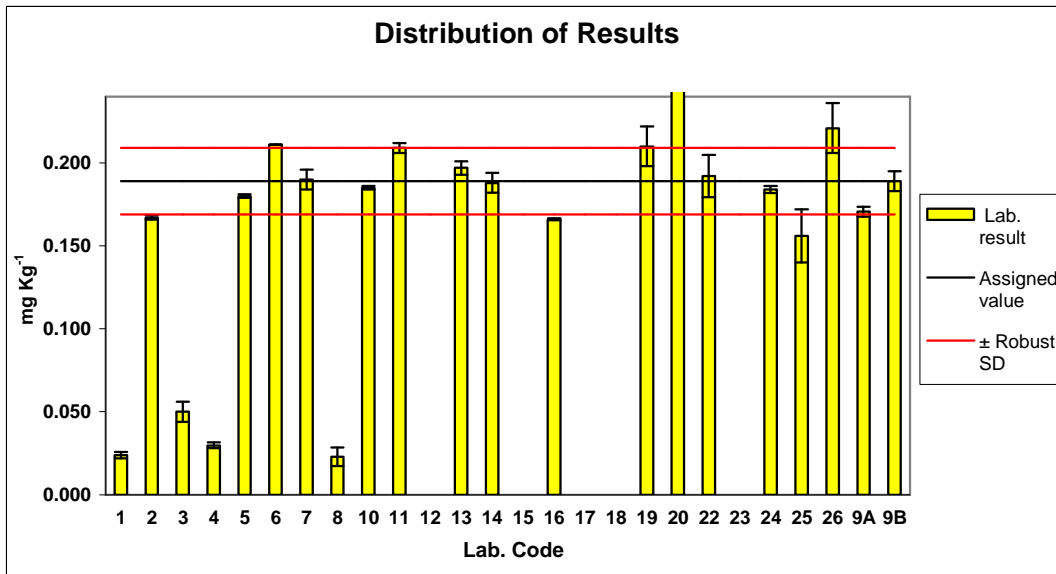
Lab. Code	z-score (σ_{pCRL})					
	As		Cd		Pb	
	Level A	Level B	Level A	Level B	Level A	Level B
1	-5.59	-5.90	-0.67	-0.11	-1.90	-1.85
2	-0.16	-0.79	-0.89	-1.11	0.50	-0.33
3	-0.84	-4.96	0.22	0.11	-2.90	-2.67
4	-5.51	-5.69	-0.22	-0.44	2.68	2.75
5	-0.21	-0.32	-1.44	-1.44	-0.50	-1.17
6	1.05	0.79	7.56	7.22		
7	0.10	0.04	0.22	0.11	1.70	0.50
8	-5.65	-5.93	0.00	0.07	-1.50	-1.47
10	-0.21	-0.14	-0.89	-1.00	-0.30	-0.17
11	0.95	0.71	0.22	1.22	0.30	0.17
12			-2.00	-1.00	-0.50	-0.50
13	0.42	0.29	0.22	-1.00	0.30	0.50
14	-0.05	-0.04	-0.78	-0.11	1.10	0.83
15			-1.67	-0.11	-1.10	0.67
16	-0.11	-0.82	1.33	1.22	-1.70	-1.83
17			0.22	0.11	-0.30	0.00
18			0.11	0.00	0.50	0.33
19	0.79	0.75	0.22	0.11	0.30	0.33
20	2.75	3.08	1.11	1.67	1.96	2.48
22	-0.27	0.11	0.22	0.11	-0.50	0.00
23			0.56	0.33	0.00	0.18
24	-0.05	-0.18	0.22	0.11	0.30	0.33
25	-0.90	-1.18	0.22	0.11	-0.10	-0.33
26	4.37	1.14	-2.33	-2.11	-0.30	-0.67
09A	-0.42	-0.65	0.11	1.22	1.10	2.00
09B	0.16	0.00	0.67	-0.11	0.30	-1.33

Lab. Code	z-score ($\sigma_{Horwitz}$)					
	As		Cd		Pb	
	Level A	Level B	Level A	Level B	Level A	Level B
1	-3.88	-4.25	-0.47	-0.08	-1.36	-1.25
2	-0.11	-0.57	-0.63	-0.77	0.36	-0.22
3	-0.59	-3.58	0.16	0.08	-2.07	-1.80
4	-3.83	-4.10	-0.16	-0.31	1.91	1.85
5	-0.15	-0.23	-1.02	-1.00	-0.36	-0.79
6	0.73	0.57	5.33	5.01		
7	0.07	0.03	0.16	0.08	1.21	0.34
8	-3.93	-4.28	0.00	0.05	-1.07	-0.99
10	-0.15	-0.10	-0.63	-0.69	-0.21	-0.11
11	0.66	0.51	0.16	0.85	0.21	0.11
12			-1.41	-0.69	-0.36	-0.34
13	0.29	0.21	0.16	-0.69	0.21	0.34
14	-0.038	-0.03	-0.55	-0.08	0.79	0.56
15			-1.18	-0.08	-0.79	0.45
16	-0.075	-0.59	0.94	0.85	-1.21	-1.24
17			0.16	0.08	-0.21	0.00
18			0.08	0.00	0.36	0.22
19	0.55	0.54	0.16	0.08	0.21	0.22
20	1.91	2.22	0.78	1.16	1.40	1.67
22	-0.18	0.08	0.16	0.08	-0.36	0.00
23			0.39	0.23	0.00	0.12
24	-0.038	-0.13	0.16	0.08	0.21	0.22
25	-0.62	-0.85	0.16	0.08	-0.07	-0.22
26	3.03	0.82	-1.65	-1.46	-0.21	-0.45
09A	-0.29	-0.47	0.08	0.85	0.79	1.35
09B	0.11	0.00	0.47	-0.08	0.21	-0.90

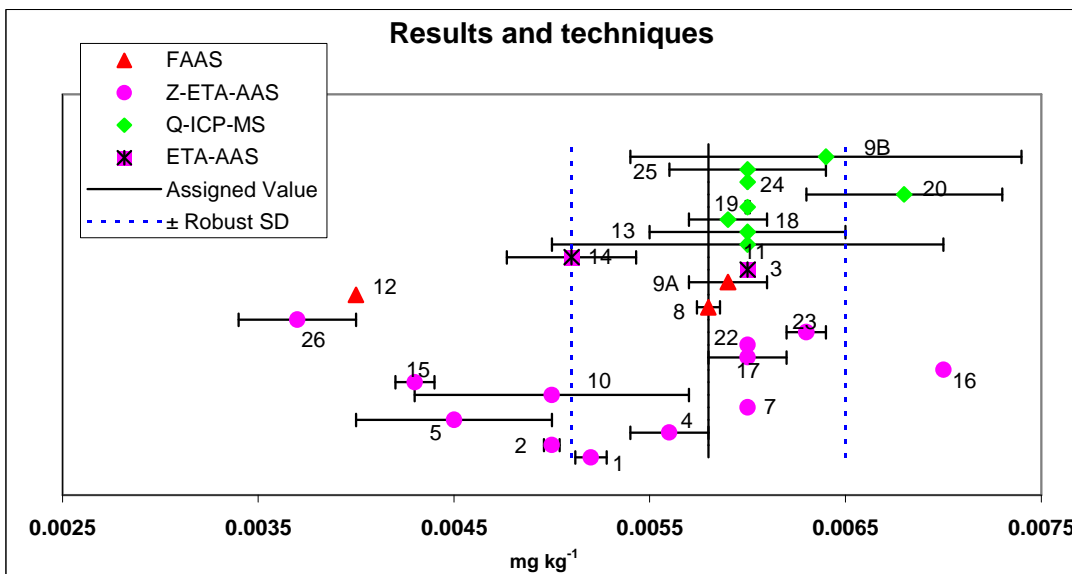
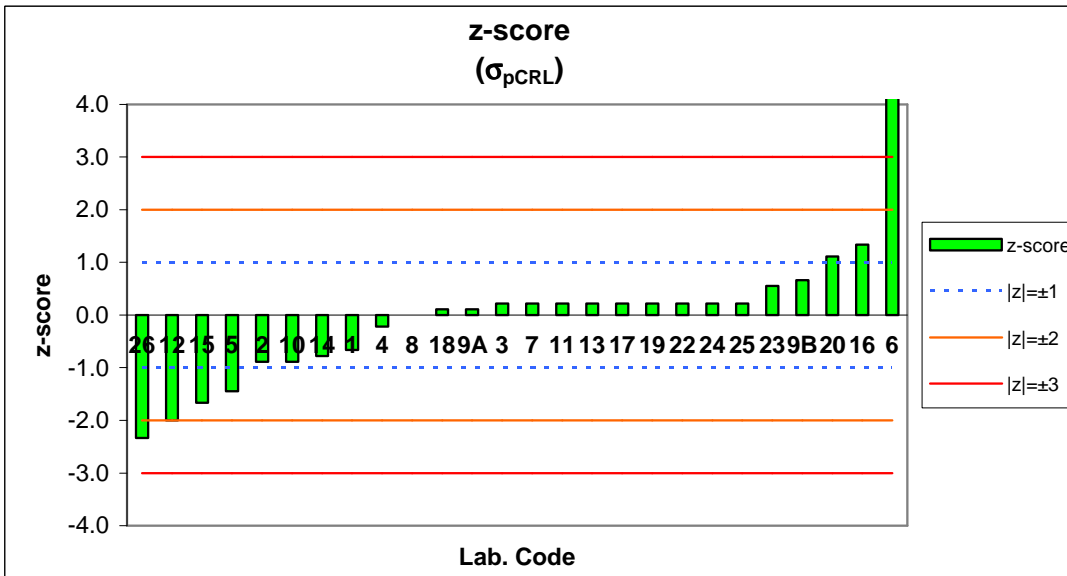
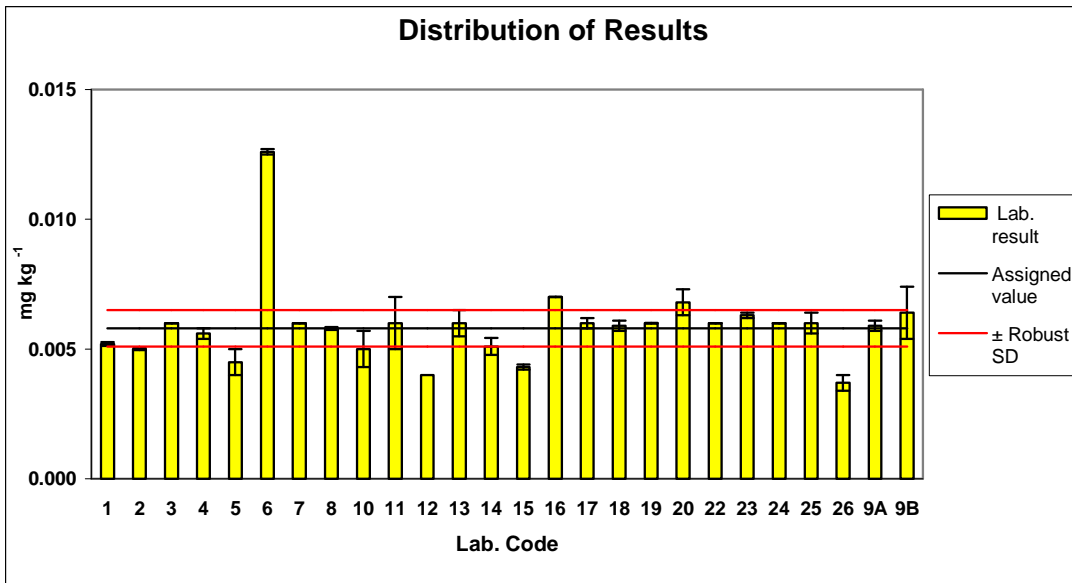
As Sample A



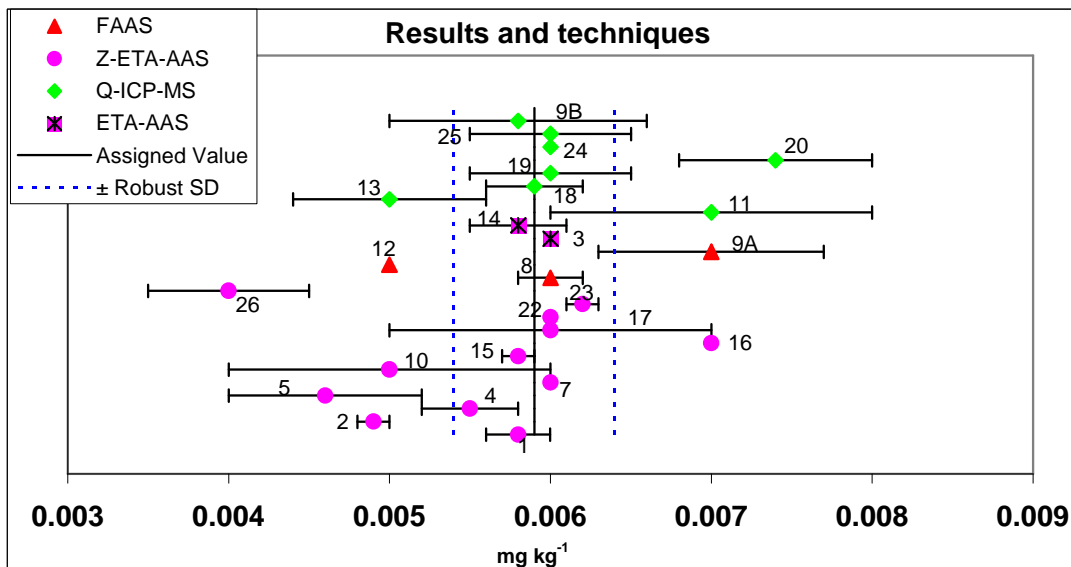
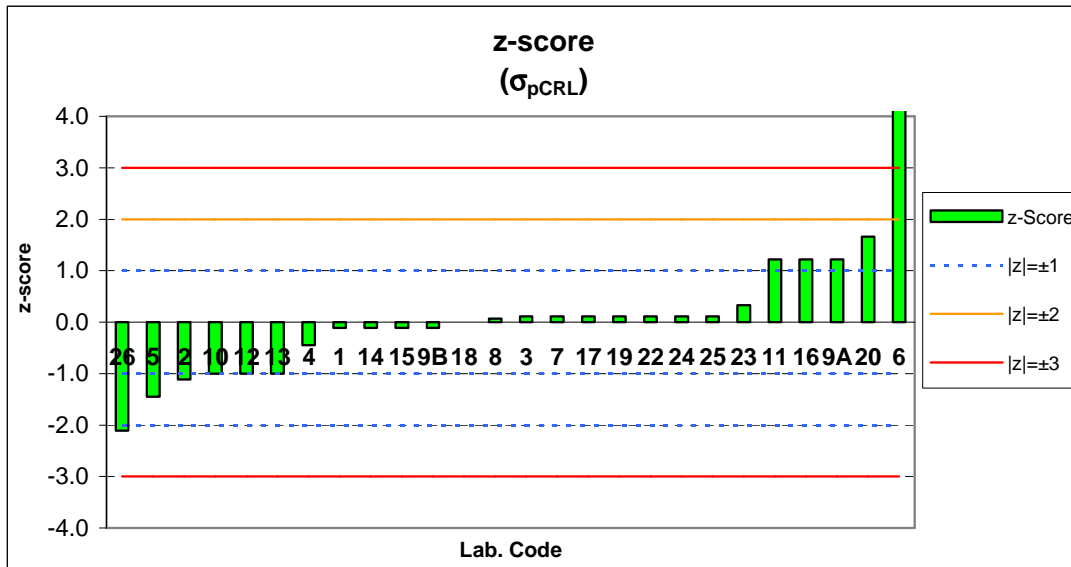
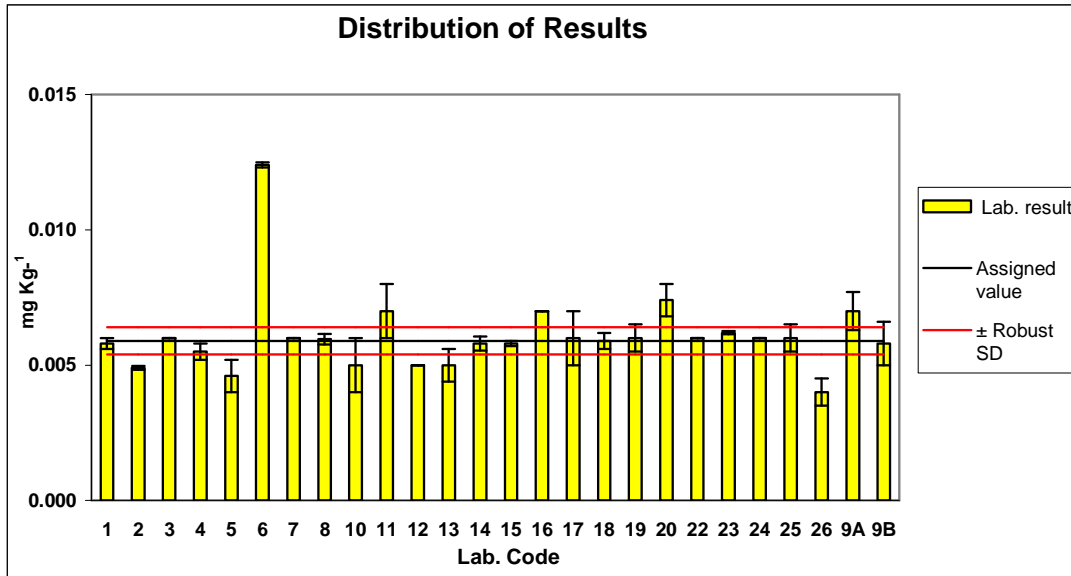
As Sample B



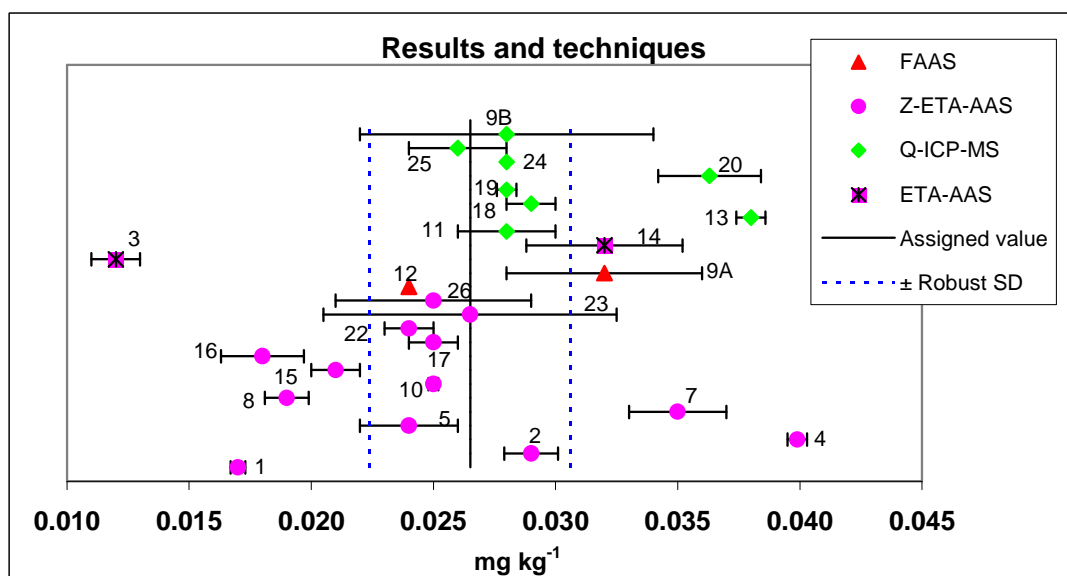
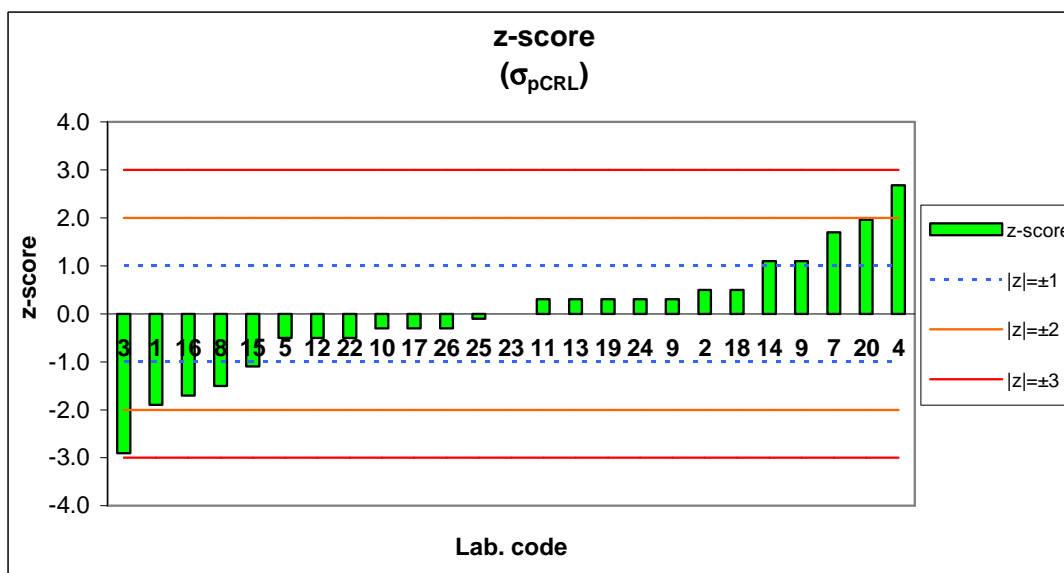
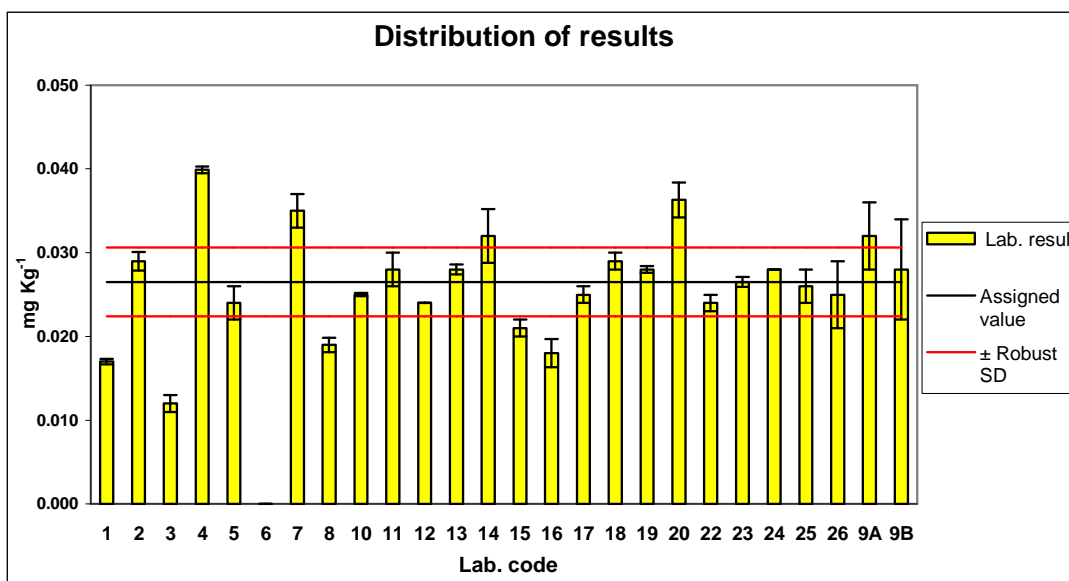
Cd Sample A



Cd Sample B



Pb Sample A



Pb Sample B

