



Analytical Services External Quality Assurance Assessment: a snap-shot of current performance

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INTRODUCTION

Analytical Services (AS) Laboratory participates in the Wadsworth Center New York State Department of Health Proficiency Testing scheme for trace elements in the following matrices, whole blood, urine and serum as part of Quality Management System in order to comply with all requirements of the ISO guide 15189:2012. AS has maintained this accreditation from 2012 to date. Participation in a proficiency testing scheme is vital as firstly it is a non negotiable requirement under ISO15189 and it provides an independent verification of competency as a testing laboratory. Secondly it demonstrates to the public, customers, accreditation bodies, Quality Assurance Department and management, that procedures and processes are under control at all times and this instills local and international confidence in the service provided. Whereas Internal Quality Control is used to monitor precision, External Quality Assurance provides evidence on the accuracy of the results submitted to clients. Inorganic Section in the AS Department has the following tests registered with this proficiency testing scheme; Arsenic, Cadmium, Chromium, Cobalt, Lead, Mercury and Manganese in blood and urine, Copper and Zinc in urine and Aluminium in Serum. There are three events annually namely, January, July and October. This assessment is a snapshot of the current performance of the laboratory covering data from January 2019 to October 2020. The three sets of test results reflected in this presentation were chosen to reflect overall performance with regards to all the tests performed and techniques used in the laboratory.

RATIONALE

AIM

To provide a snap shot assessment of the current laboratory performance using data from January 2019 to October 2020, through an External Quality Assurance perspective.

OBJECTIVES

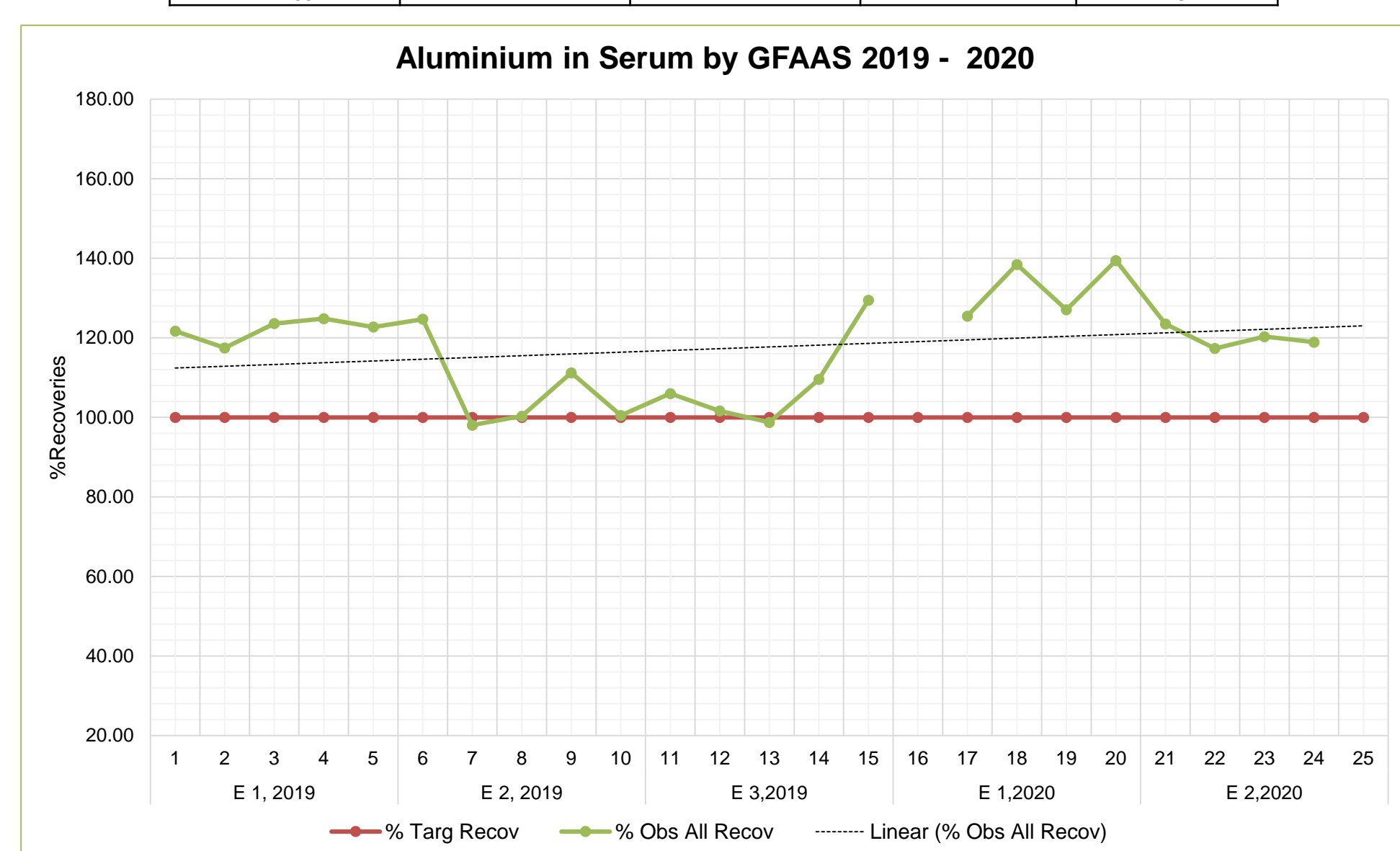
To highlight any existing trends, shifts and bias in the laboratory's performance.

METHODS

Data from EQA reports (January 2019 to October 2020) were entered onto Excel spread sheets for the calculation of percentage recoveries and the drawing up of graphs to assess for trends, shifts and bias.

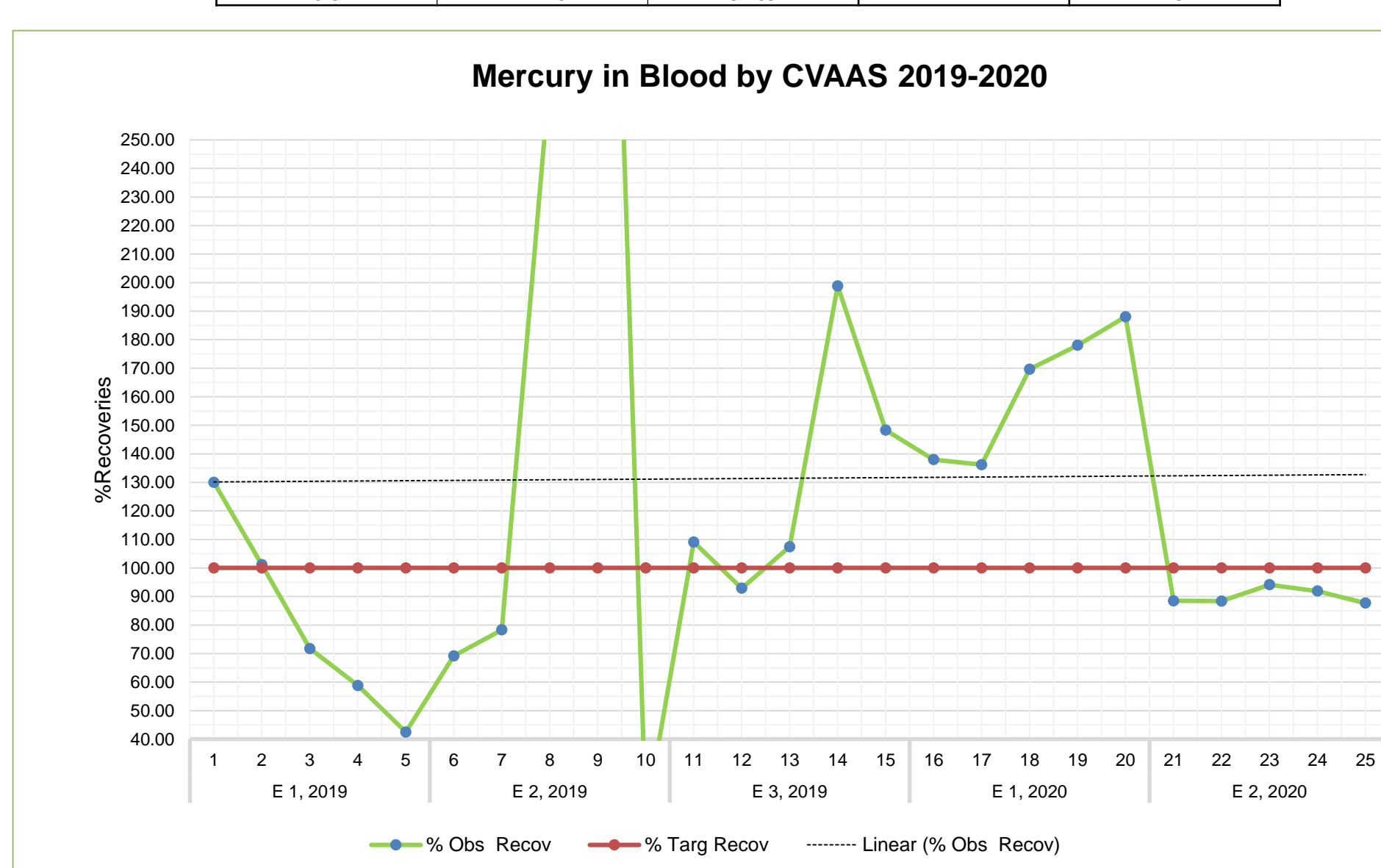
RESULTS

ALUMINIUM IN SERUM - GFAAS				
Observed	All Target	% Obs Recovery All	Event (E) Nr.	Sample Nr.
205.70	169.00	121.72	E 1, 2019	1
49.34	42.00	117.48		2
150.80	122.00	123.61		3
128.60	103.00	124.85		4
83.45	68.00	122.72		5
199.50	160.00	124.69	E 2, 2019	6
201.00	205.00	98.05		7
124.40	124.00	100.32		8
136.80	123.00	111.22		9
78.38	78.00	100.49		10
24.38	23.00	106.00	E 3, 2019	11
24.39	24.00	101.63		12
43.45	44.00	98.75		13
38.35	35.00	109.57		14
119.10	92.00	129.46		15
48.85	NA		E 1, 2020	16
155.60	124.00	125.48		17
239.55	173.00	138.47		18
190.60	150.00	127.07		19
108.77	78.00	139.45		20
85.23	69.00	123.52	E 2, 2020	21
58.67	50.00	117.34		22
154.00	128.00	120.31		23
111.80	94.00	118.94		24
227.60	NA			25



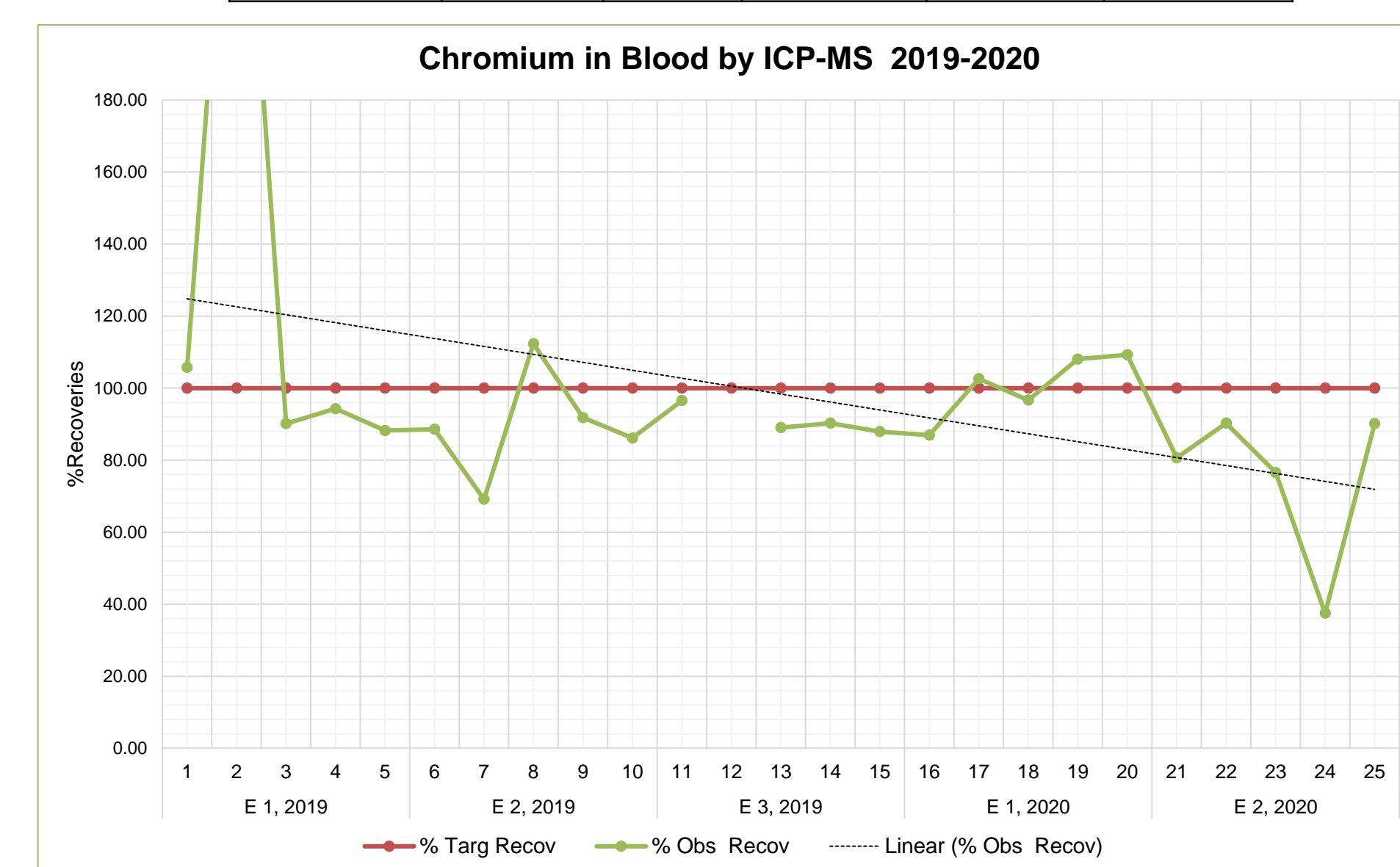
RESULTS

MERCURY IN BLOOD - ICP-MS				
Observed	All Target	% Obs Recovery All	Event (E) Nr.	Sample Nr.
1.66	1.28	130.00	E 1, 2019	1
25.48	25.20	101.13		2
26.54	37.00	71.73		3
9.41	16.00	58.82		4
3.74	8.80	42.47		5
14.88	21.50	69.19	E 2, 2019	6
8.93	11.40	78.30		7
9.12	3.35	273.36		8
38.87	7.30	532.47		9
4.09	32.00	12.79		10
6.22	5.70	109.09	E 3, 2019	11
13.19	14.20	92.89		12
32.22	30.00	107.41		13
1.89	0.95	198.84		14
3.19	2.15	148.33		15
35.32	25.60	137.97	E 1, 2020	16
2.55	1.87	136.20		17
8.99	5.30	169.64		18
17.27	9.70	178.04		19
25.20	13.40	188.06		20
15.57	17.60	88.47	E 2, 2020	21
3.74	3.10	88.39		22
0.80	0.85	94.12		23
6.34	6.90	91.88		24
10.61	12.10	87.69		25



RESULTS

CHROMIUM IN BLOOD - ICP-MS					
Observed	All Target	% Obs Recovery All	% Target Recovery	Event #	Sample Nr.
4.97	4.70	105.74	100.00	E 1, 2019	1
2.31	0.80	288.88	100.00		2
9.20	10.20	90.16	100.00		3
6.98	7.40	94.28	100.00		4
12.18	13.80	88.22	100.00		5
13.73	15.50	88.58	100.00	E 2, 2019	6
2.49	3.60	69.14	100.00		7
1.80	1.60	112.31	100.00		8
11.57	12.60	91.81	100.00		9
7.58	8.80	86.14	100.00		10
2.76	2.86	96.54	100.00	E 3, 2019	11
1.43	NA		100.00		12
4.99	5.60	89.04	100.00		13
3.61	4.00	90.28	100.00		14
9.32	10.60	87.93	100.00		15
10.87	12.50	86.96	100.00	E 1, 2020	16
1.58	1.54	102.60	100.00		17
15.43	15.96	96.68	100.00		18
8.32	7.70	108.05	100.00		19
4.48	4.10	109.27	100.00		20
4.92	6.10	80.66	100.00	E 2, 2020	21
15.71	17.40	90.29	100.00		22
2.22	2.90	76.55	100.00		23
0.33	0.88	37.50	100.00		24
9.29	10.30	90.19	100.00		25



DISCUSSION AND CONCLUSION

According to the scheme, a satisfactory event is defined as achieving $\geq 80\%$ pass while a successful overall performance as passing two out of three annual events. This performance is reflected by a snap shot assessment using three tests namely, Aluminium in serum by Graphite Furnace Atomic Absorption Spectrophotometry (GFAAS), Mercury in blood by Cold Vapour Atomic Absorption Spectrophotometry (CV-AAS) and Chromium in blood by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Mercury in blood and Aluminium in serum failed in Event 1 2020 due to interferences from dust and vibrations generated from drilling for the installation of Aluminium doors during renovations, failure was due to over recovery. Mercury in blood failed in Event 1 and 2 in 2019, failure of Event 1 2019 was as a result of dust generated from adjacent laboratory renovations which led to blockages that resulted in under recovery and the unacceptable performance in Event 2 2019 was due to a transcription error. It is possible that the renovations also contributed to the failure in the performance of Serum Aluminium in Event 1 of 2019 due to contamination of the instrument and/or samples. Other tests that failed but are not displayed in the results section are Lead in Blood by GFAAS and Urine by ICP-MS which failed in Event 1 2020 due to the mentioned renovations. The failure of Mercury in urine by ICP-MS, Event 2 2019 was due to sample integrity being compromised during transportation and storage. Copper in urine by ICP-MS failed in Event 1 2019 possibly due to partial blockages in the instrument as a result of dust generated from the renovations.

The trend line must be assessed for bias and shifts in association with numerical target values as they cover concentration levels ranging from very low to medium to very high as shown on the blood chromium plot, sample number two and 24 are significant events which strongly influenced the trend line. There is a negative shift in recoveries on Aluminium in serum in Event 1 2019 to Event 2 2019, then a positive shift in Event 3 2019. This assessment assists the laboratory in implementing remedial and/or preventive measures and also to monitor the effectiveness thereof. Assessment of the overall performance for 2019 reflects the following; an 85% pass for multielement in blood, 100% for multielement in urine and Aluminium in serum. The overall performance for 2020 can only be assessed in December 2020, however four of the seven blood tests achieved a 100% pass, all nine urine tests a 100% pass and Aluminium in Serum a 50% pass. From this assessment, we conclude that the AS Laboratory has an overall satisfactory performance and hence continues to maintain their ISO15189:2012 accreditation status.

REFERENCES