



«Tit» «Name» «Fam_Nam»
«Organization»
«Address1»
«Address_2»
«PO_Box» «City». «Country»

Sevilla, August, 2014

Proficiency Test 2014-1

Laboratory Code: «**Lab_code**»

Dear participants,

Enclosed you will find the report of the Proficiency Test 2014-1 on Drugs of Abuse in Hair, organized by the Society of Hair Testing.

Each of the participating laboratories received an identifying code. Your particular code is «**Lab_code**».

Sets of three samples were sent to forty seven participating laboratories. Forty of them sent the report forms back.

Sample contents were as follows:

- * Sample A contained opiates (6-MAM, morphine and codeine) and cocainics (cocaine, BE, cocaethylene and norcocaine). It also contained dihydrocodeine, diazepam, nordiazepam, AEME and traces of amphetamine, THC, THC-COOH, methadone and EDDP.
- * Sample B contained cocainics (cocaine, BE, cocaethylene and norcocaine), amphetamine compounds (methamphetamine, and traces of amphetamine and MDMA) and cannabis (THC, CBD, CBN and THC-COOH). It also contained traces of methadone and opiates (6-MAM and morphine).
- * Sample C was a drug-free hair sample
- * Sample D contained synthetic opiates and other pharmaceutical drugs (Annex 1)

Z-score

Z-score has been calculated based on robust estimators (median instead of mean and interquartile instead of standard deviation).

Z-score has been calculated as follows:

$$Z\text{-score} = (x - \chi) / IQR$$

Where:

x: Concentration reported by the participant

χ : Median concentration obtained from the participating laboratories

IQR: Interquartile range: It is calculated as: Q3-Q1 (the upper quartile minus the lower quartile)

Q3: Third quartile (percentile 75)

Q1: First quartile (percentile 25)

Decision criteria

The following criteria have been adopted:

Satisfactory results: $Z\text{-score} \leq \pm 2$

Questionable results: $2 < Z\text{-score} \leq 3$

Unsatisfactory results: $Z\text{-score} \geq 3$

Yours faithfully,

Carmen Jurado

QUALITATIVE RESULTS

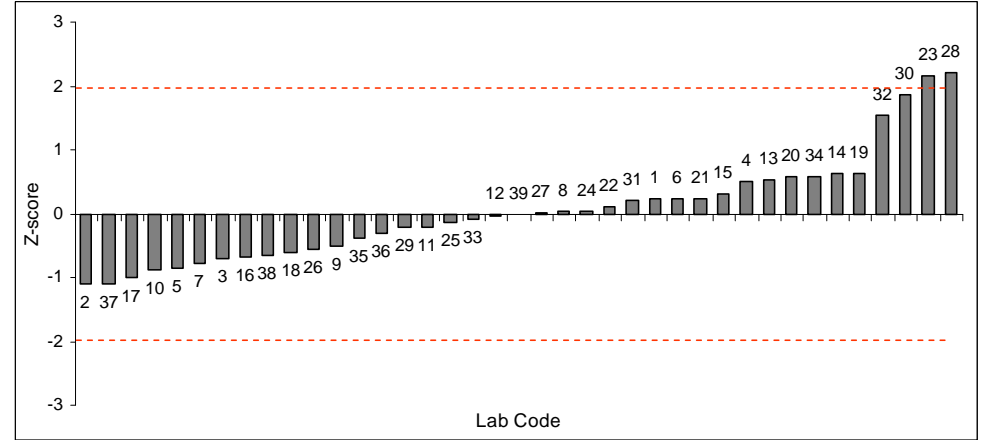
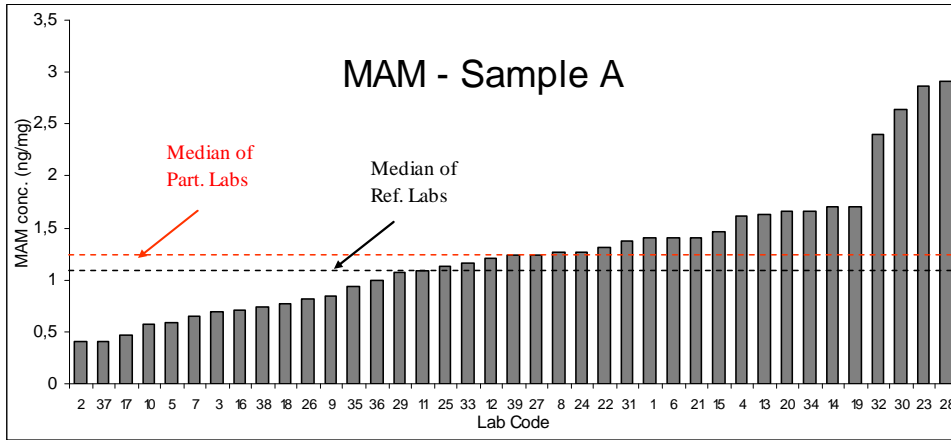
Laboratory Code: **Lab**

Sample A				Sample B				Sample C			
Substances	A	T	F	Substances	A	T	F	Substances	A	T	F
MAM		P		Cocaine		P		Drugs		N	
Morphine		P		BE		P					
Codeine*		P		Methamphetamine		P					
Cocaine		P		THC		P					
BE		P									

* The median concentration of codeine in Sample A is 0.18 ng/mg, which is lower than the cut-off proposed by SoHT (0.2 ng/mg)

A: Your answer**T:** True answer**F:** False answer**P:** Positive**N:** Negative**NR:** Not reported**NA:** Not analyzed**FN:** False Negative**FP:** False Positive**Comments:**

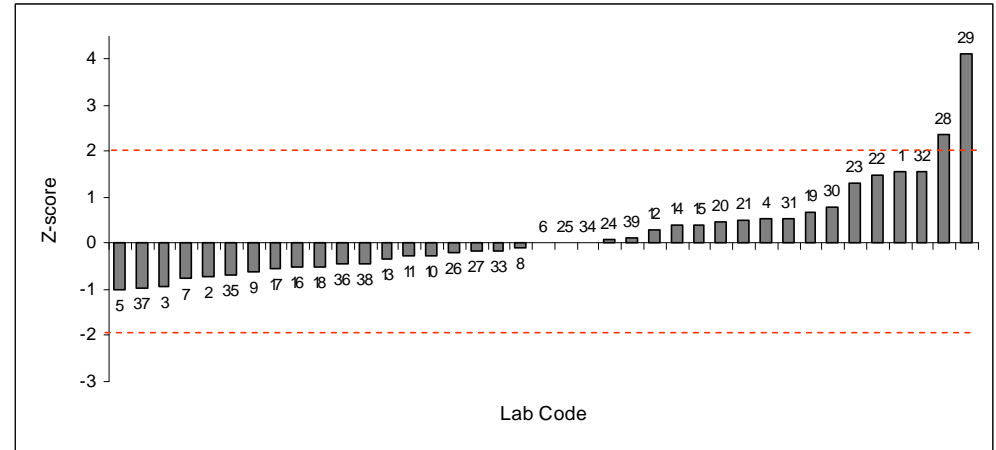
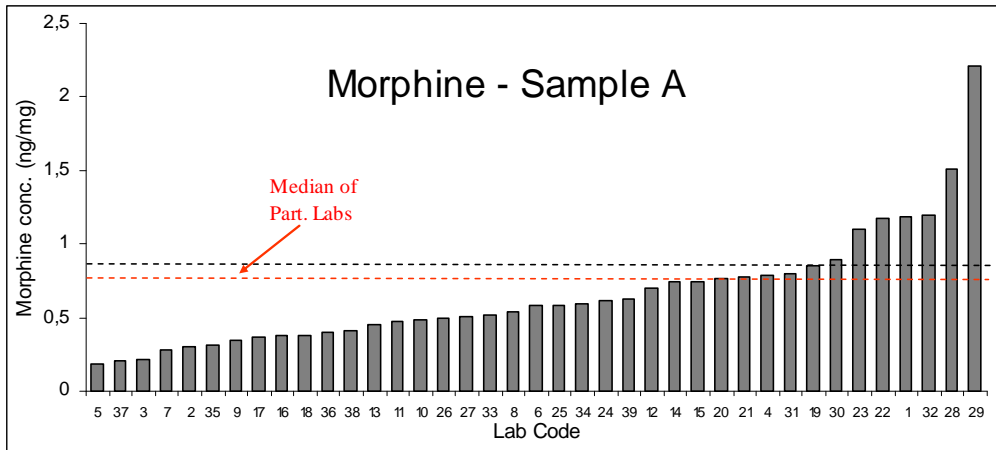
- Sample A contains norcocaine, cocaethylene, dihydrocodeine, diazepam, nordiazepam, AEME and traces of amphetamine (0.07 ng/mg, median concentration), THC (0.014 ng/mg, median concentration), methadone (0.15 ng/mg, median concentration), THC-COOH and EDDP.
- Sample B contains THC-COOH, norcocaine, cocaethylene, AEME and traces of methadone (0.15 ng/mg, median concentration), MAM (0.06 ng/mg, median concentration), morphine (0.03 ng/mg, median concentration), amphetamine (0.04 ng/mg, median concentration) and MDMA (0.06 ng/mg, median concentration).



Lab.	MAM (ng/mg)	Z-score	Result
2	0,4	-1,10	Satisfactory
37	0,4	-1,10	Satisfactory
17	0,47	-1,01	Satisfactory
10	0,57	-0,87	Satisfactory
5	0,59	-0,85	Satisfactory
7	0,642	-0,78	Satisfactory
3	0,699	-0,70	Satisfactory
16	0,71	-0,69	Satisfactory
38	0,74	-0,65	Satisfactory
18	0,77	-0,61	Satisfactory
26	0,81	-0,566	Satisfactory
9	0,84	-0,52	Satisfactory
35	0,94	-0,38	Satisfactory
36	1	-0,30	Satisfactory
29	1,068	-0,21	Satisfactory
11	1,08	-0,20	Satisfactory
25	1,13	-0,13	Satisfactory
33	1,16	-0,09	Satisfactory
12	1,21	-0,03	Satisfactory
39	1,23	0	Satisfactory
27	1,24	0,01	Satisfactory
8	1,26	0,04	Satisfactory
24	1,26	0,04	Satisfactory
22	1,31	0,11	Satisfactory
31	1,38	0,20	Satisfactory
1	1,41	0,24	Satisfactory

Lab.	MAM (ng/mg)	Z-score	Result
6	1,41	0,24	Satisfactory
21	1,41	0,24	Satisfactory
15	1,47	0,32	Satisfactory
4	1,62	0,52	Satisfactory
13	1,63	0,53	Satisfactory
20	1,66	0,57	Satisfactory
34	1,66	0,57	Satisfactory
14	1,7	0,62	Satisfactory
19	1,7	0,62	Satisfactory
32	2,4	1,55	Satisfactory
30	2,644	1,87	Satisfactory
23	2,87	2,17	Questionable
28	2,907	2,22	Questionable
40	P		

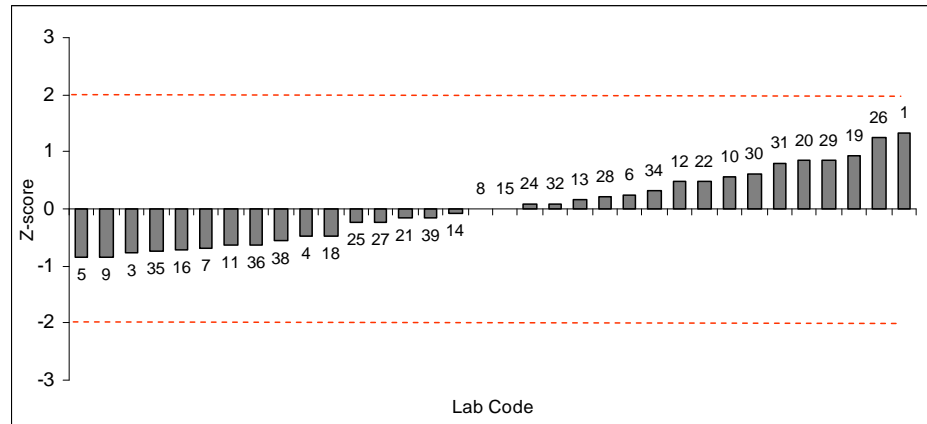
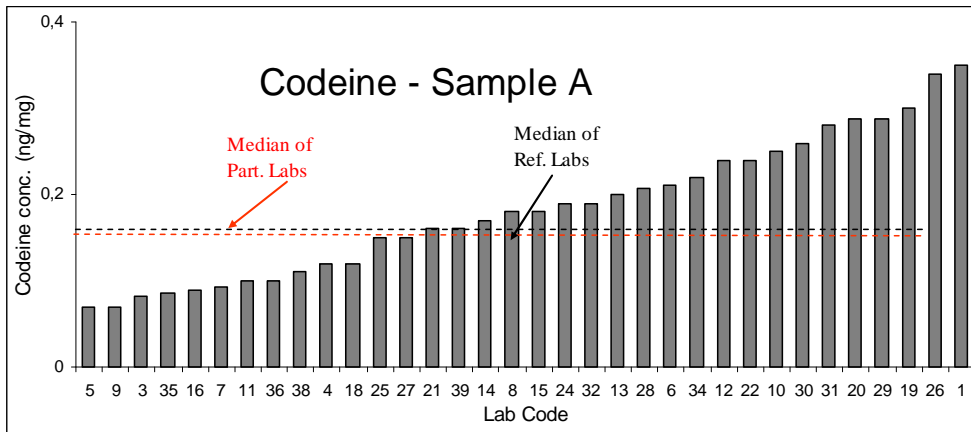
Average	1,27
SD	0,62
CV%	48,64
Median	1,23
Minimum	0,4
Quartile 25	0,79
Quartile 75	1,545
Maximum	2,907
Iqr	0,755



Lab.	Morphine (ng/mg)	Z-score	Result
5	0,18	-1,01	Satisfactory
37	0,2	-0,96	Satisfactory
3	0,213	-0,93	Satisfactory
7	0,278	-0,76	Satisfactory
2	0,3	-0,71	Satisfactory
35	0,311	-0,68	Satisfactory
9	0,34	-0,61	Satisfactory
17	0,37	-0,53	Satisfactory
16	0,38	-0,51	Satisfactory
18	0,38	-0,51	Satisfactory
36	0,4	-0,45	Satisfactory
38	0,41	-0,43	Satisfactory
13	0,45	-0,33	Satisfactory
11	0,47	-0,28	Satisfactory
10	0,48	-0,25	Satisfactory
26	0,5	-0,20	Satisfactory
27	0,51	-0,18	Satisfactory
33	0,522	-0,15	Satisfactory
8	0,54	-0,10	Satisfactory
6	0,58	0	Satisfactory
25	0,58	0	Satisfactory
34	0,59	0,02	Satisfactory
24	0,61	0,07	Satisfactory
39	0,63	0,13	Satisfactory
12	0,7	0,30	Satisfactory
14	0,74	0,40	Satisfactory

Lab.	Morphine (ng/mg)	Z-score	Result
15	0,74	0,40	Satisfactory
20	0,76	0,45	Satisfactory
21	0,78	0,51	Satisfactory
4	0,79	0,53	Satisfactory
31	0,8	0,56	Satisfactory
19	0,85	0,68	Satisfactory
30	0,89	0,79	Satisfactory
23	1,1	1,32	Satisfactory
22	1,17	1,49	Satisfactory
1	1,19	1,54	Satisfactory
32	1,2	1,57	Satisfactory
28	1,507	2,35	Questionable
29	2,205	4,11	Unsatisfactory
40	P		

Average	0,66
SD	0,39
CV%	59,76
Median	0,58
Minimum	0,18
Quartile 25	0,39
Quartile 75	0,785
Maximum	2,205
Iqr	0,395

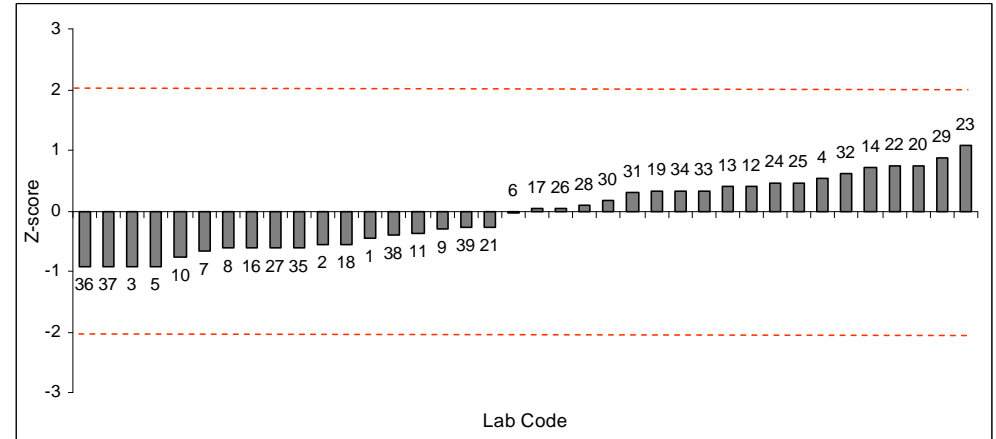
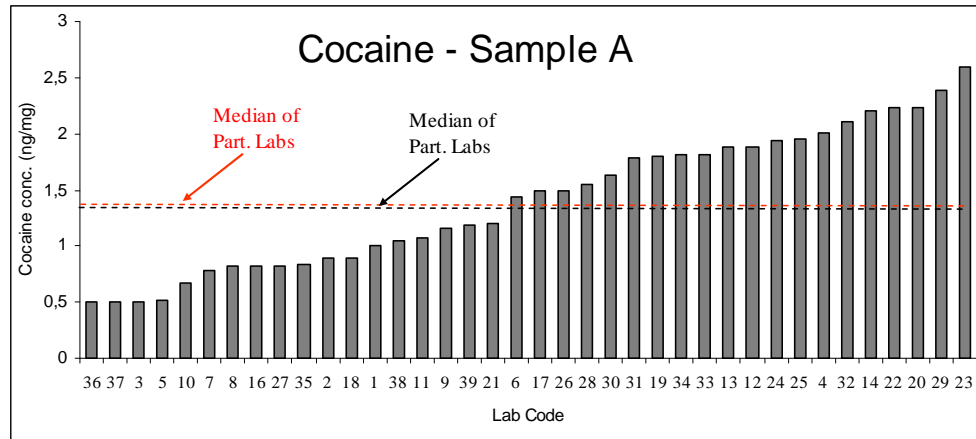


Lab.	Codeine (ng/mg)	Z-score	Result
5	0,07	-0,86	Satisfactory
9	0,07	-0,86	Satisfactory
3	0,083	-0,76	Satisfactory
35	0,085	-0,74	Satisfactory
16	0,09	-0,71	Satisfactory
7	0,092	-0,69	Satisfactory
11	0,1	-0,63	Satisfactory
36	0,1	-0,63	Satisfactory
38	0,11	-0,55	Satisfactory
4	0,12	-0,47	Satisfactory
18	0,12	-0,47	Satisfactory
25	0,15	-0,23	Satisfactory
27	0,15	-0,23	Satisfactory
21	0,16	-0,15	Satisfactory
39	0,16	-0,15	Satisfactory
14	0,17	-0,08	Satisfactory
8	0,18	0	Satisfactory
15	0,18	0	Satisfactory
24	0,19	0,08	Satisfactory
32	0,19	0,08	Satisfactory
13	0,2	0,15	Satisfactory
28	0,208	0,22	Satisfactory
6	0,21	0,23	Satisfactory
34	0,22	0,31	Satisfactory
12	0,24	0,47	Satisfactory
22	0,24	0,47	Satisfactory

Lab.	Codeine (ng/mg)	Z-score	Result
10	0,25	0,55	Satisfactory
30	0,259	0,62	Satisfactory
31	0,28	0,78	Satisfactory
20	0,287	0,84	Satisfactory
29	0,287	0,84	Satisfactory
19	0,3	0,94	Satisfactory
26	0,34	1,25	Satisfactory
1	0,35	1,33	Satisfactory
2	N		
37	N		
40	N		
17	NR		
33	P		
23	NA		

Average	0,18
SD	0,08
CV%	42,78
Median	0,18
Minimum	0,07
Quartile 25	0,1125
Quartile 75	0,24
Maximum	0,35
Iqr	0,1275

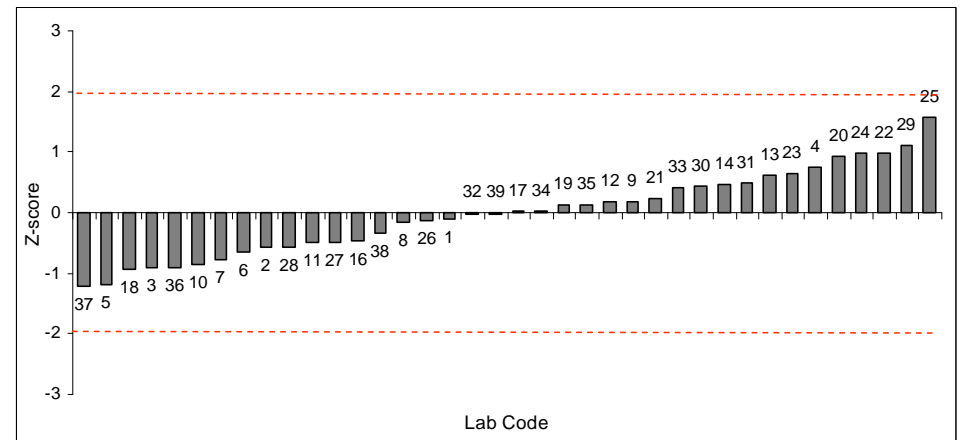
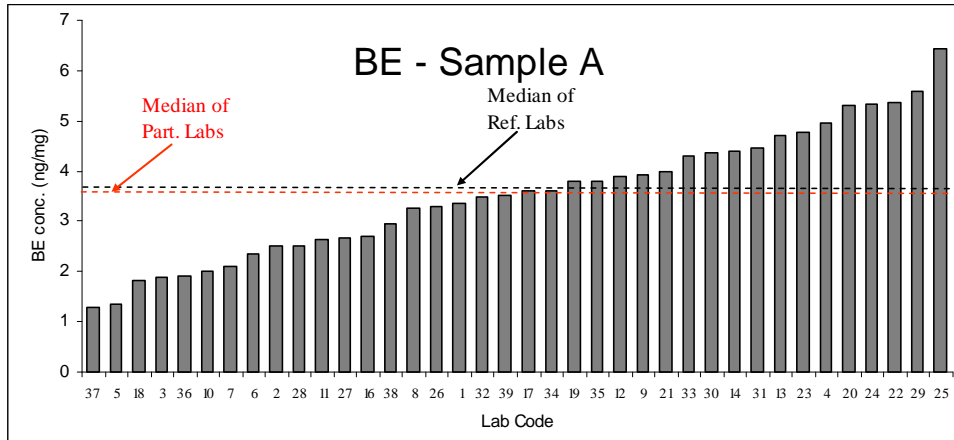
The median Codeine concentration is below the cut-off proposed by SoHT (0.20 ng/mg)



Lab.	Cocaine (ng/mg)	Z-score	Result
36	0,5	-0,93	Satisfactory
37	0,5	-0,93	Satisfactory
3	0,506	-0,93	Satisfactory
5	0,52	-0,91	Satisfactory
10	0,67	-0,77	Satisfactory
7	0,776	-0,67	Satisfactory
8	0,83	-0,61	Satisfactory
16	0,83	-0,61	Satisfactory
27	0,83	-0,61	Satisfactory
35	0,831	-0,61	Satisfactory
2	0,9	-0,55	Satisfactory
18	0,9	-0,55	Satisfactory
1	1	-0,45	Satisfactory
38	1,04	-0,41	Satisfactory
11	1,07	-0,38	Satisfactory
9	1,16	-0,30	Satisfactory
39	1,18	-0,28	Satisfactory
21	1,2	-0,26	Satisfactory
6	1,44	-0,03	Satisfactory
17	1,5	0,03	Satisfactory
26	1,5	0,03	Satisfactory
28	1,551	0,08	Satisfactory
30	1,634	0,16	Satisfactory
31	1,78	0,30	Satisfactory
19	1,8	0,32	Satisfactory
34	1,81	0,33	Satisfactory

Lab.	Cocaine (ng/mg)	Z-score	Result
33	1,82	0,34	Satisfactory
13	1,88	0,39	Satisfactory
12	1,89	0,40	Satisfactory
24	1,94	0,45	Satisfactory
25	1,95	0,46	Satisfactory
4	2,01	0,52	Satisfactory
32	2,1	0,60	Satisfactory
14	2,2	0,70	Satisfactory
22	2,23	0,73	Satisfactory
20	2,236	0,74	Satisfactory
29	2,387	0,88	Satisfactory
23	2,59	1,08	Satisfactory
15	NA		
40	P		

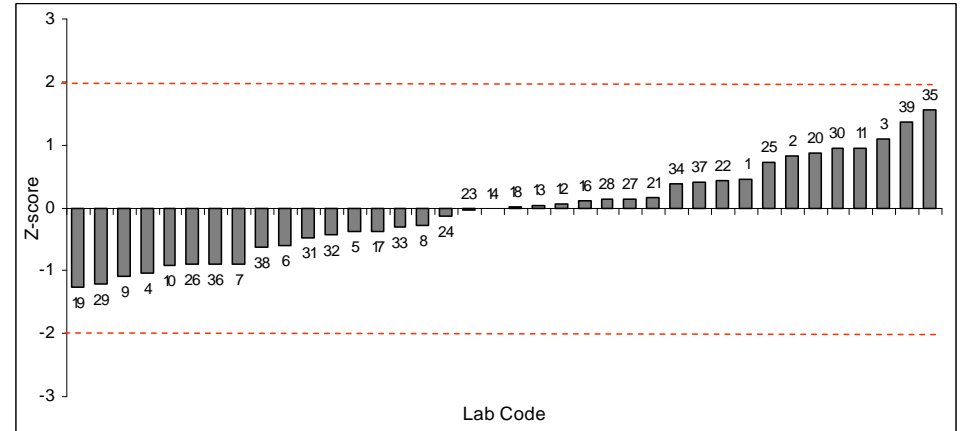
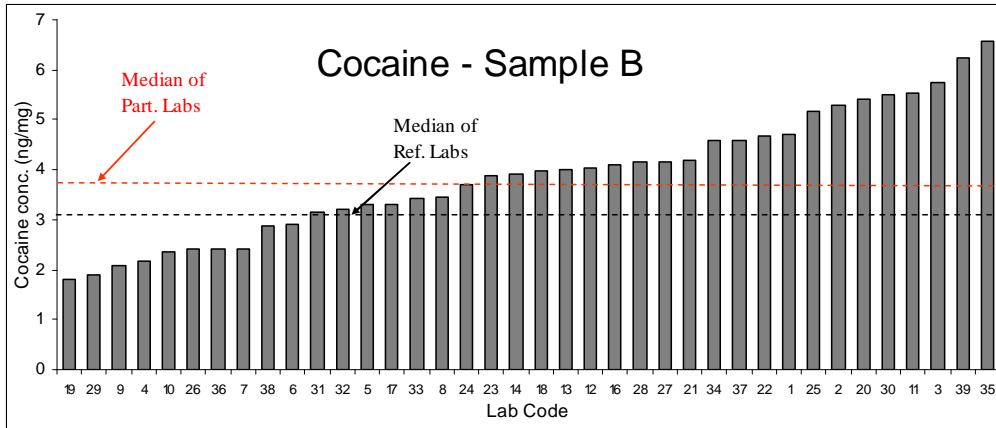
Average	1,41
SD	0,60
CV%	42,42
Median	1,47
Minimum	0,5
Quartile 25	0,85
Quartile 75	1,89
Maximum	2,59
Iqr	1,03925



Lab.	BE (ng/mg)	Z-score	Result
37	1,3	-1,23	Satisfactory
5	1,35	-1,20	Satisfactory
18	1,83	-0,94	Satisfactory
3	1,882	-0,91	Satisfactory
36	1,9	-0,90	Satisfactory
10	2	-0,85	Satisfactory
7	2,11	-0,79	Satisfactory
6	2,36	-0,65	Satisfactory
2	2,5	-0,57	Satisfactory
28	2,515	-0,57	Satisfactory
11	2,65	-0,49	Satisfactory
27	2,66	-0,49	Satisfactory
16	2,7	-0,46	Satisfactory
38	2,96	-0,32	Satisfactory
8	3,27	-0,16	Satisfactory
26	3,3	-0,14	Satisfactory
1	3,35	-0,11	Satisfactory
32	3,5	-0,03	Satisfactory
39	3,52	-0,02	Satisfactory
17	3,6	0,02	Satisfactory
34	3,61	0,03	Satisfactory
19	3,8	0,13	Satisfactory
35	3,81	0,13	Satisfactory
12	3,9	0,18	Satisfactory
9	3,91	0,19	Satisfactory
21	4	0,24	Satisfactory

Lab.	BE (ng/mg)	Z-score	Result
33	4,31	0,41	Satisfactory
30	4,362	0,43	Satisfactory
14	4,4	0,46	Satisfactory
31	4,47	0,49	Satisfactory
13	4,72	0,63	Satisfactory
23	4,76	0,65	Satisfactory
4	4,95	0,75	Satisfactory
20	5,29	0,94	Satisfactory
24	5,35	0,97	Satisfactory
22	5,36	0,98	Satisfactory
29	5,59	1,10	Satisfactory
25	6,45	1,57	Satisfactory
40	P		
15	NA		

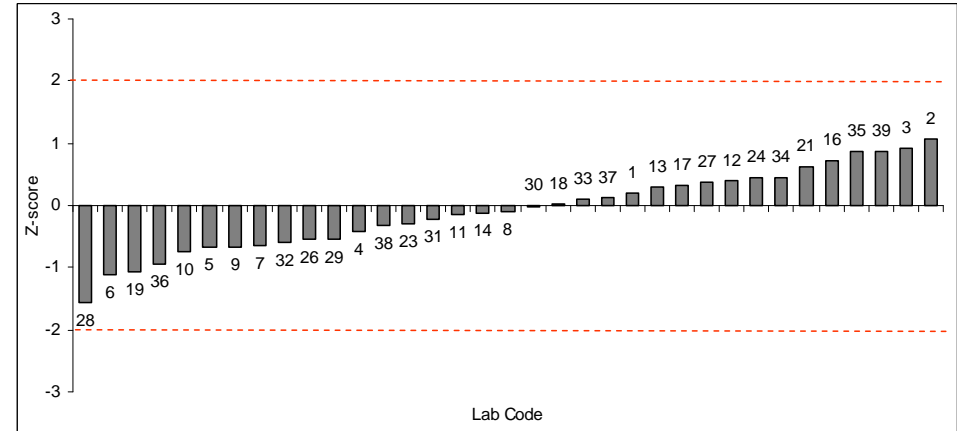
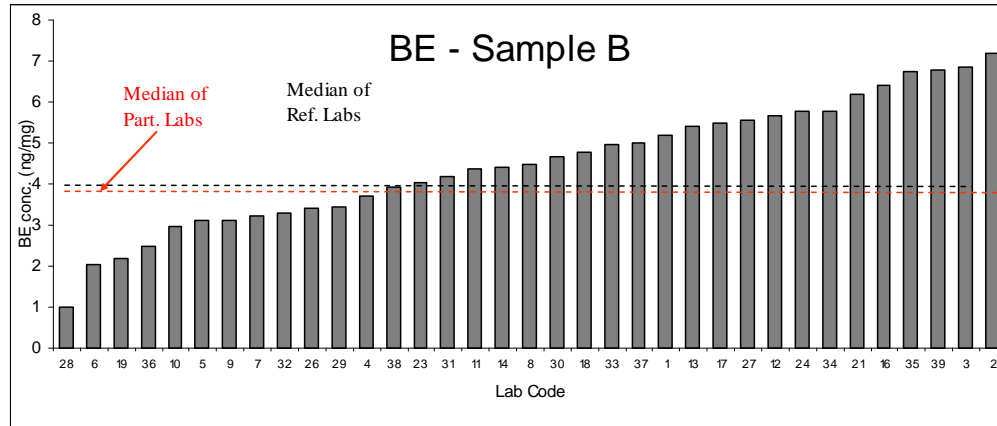
Average	3,53
SD	1,25
CV%	35,43
Median	3,56
Minimum	1,3
Quartile 25	2,55
Quartile 75	4,39
Maximum	6,45
Iqr	1,84



Lab.	Cocaine (ng/mg)	Z-score	Result
19	1,8	-1,26	Satisfactory
29	1,88	-1,21	Satisfactory
9	2,07	-1,10	Satisfactory
4	2,18	-1,03	Satisfactory
10	2,36	-0,93	Satisfactory
26	2,4	-0,90	Satisfactory
36	2,4	-0,90	Satisfactory
7	2,41	-0,90	Satisfactory
38	2,87	-0,63	Satisfactory
6	2,9	-0,61	Satisfactory
31	3,14	-0,47	Satisfactory
32	3,2	-0,43	Satisfactory
5	3,3	-0,37	Satisfactory
17	3,3	-0,37	Satisfactory
33	3,42	-0,30	Satisfactory
8	3,45	-0,28	Satisfactory
24	3,69	-0,14	Satisfactory
23	3,87	-0,03	Satisfactory
14	3,9	-0,02	Satisfactory
18	3,96	0,02	Satisfactory
13	3,99	0,03	Satisfactory
12	4,05	0,07	Satisfactory
16	4,1	0,10	Satisfactory
28	4,161	0,13	Satisfactory
27	4,17	0,14	Satisfactory
21	4,2	0,16	Satisfactory

Lab.	Cocaine (ng/mg)	Z-score	Result
34	4,59	0,39	Satisfactory
37	4,6	0,39	Satisfactory
22	4,67	0,43	Satisfactory
1	4,7	0,45	Satisfactory
25	5,16	0,73	Satisfactory
2	5,3	0,81	Satisfactory
20	5,4	0,87	Satisfactory
30	5,514	0,93	Satisfactory
11	5,53	0,94	Satisfactory
3	5,754	1,08	Satisfactory
39	6,24	1,36	Satisfactory
35	6,58	1,56	Satisfactory
40	P		
15	NA		

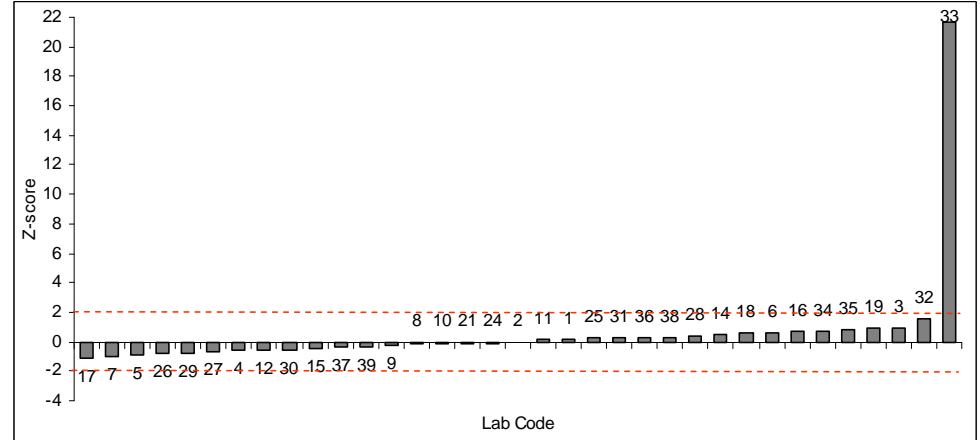
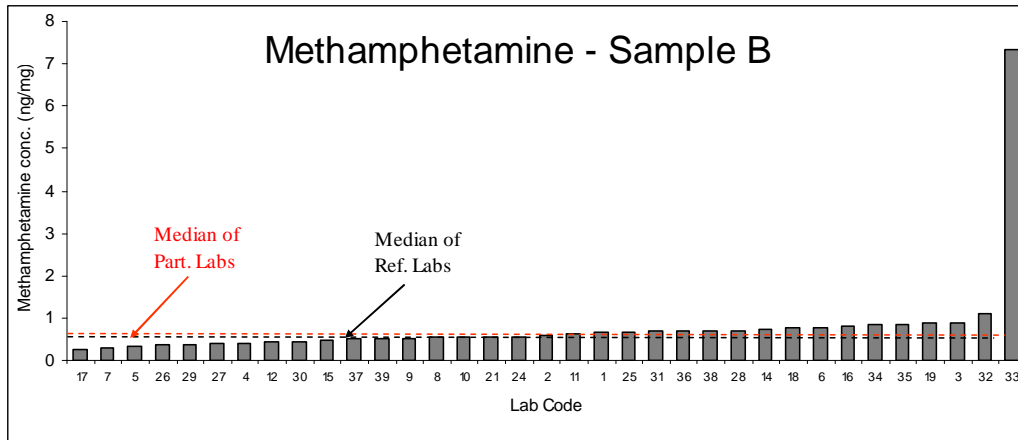
Average	3,87
SD	1,23
CV%	31,85
Median	3,93
Minimum	1,8
Quartile 25	2,96
Quartile 75	4,65
Maximum	6,58
Iqr	1,69



Lab.	BE (ng/mg)	Z-score	Result
28	1,001	-1,57	Satisfactory
6	2,05	-1,12	Satisfactory
19	2,2	-1,06	Satisfactory
36	2,5	-0,93	Satisfactory
10	2,97	-0,73	Satisfactory
5	3,1	-0,68	Satisfactory
9	3,12	-0,67	Satisfactory
7	3,21	-0,63	Satisfactory
32	3,3	-0,60	Satisfactory
26	3,4	-0,55	Satisfactory
29	3,428	-0,54	Satisfactory
4	3,69	-0,43	Satisfactory
38	3,92	-0,33	Satisfactory
23	4,03	-0,29	Satisfactory
31	4,18	-0,22	Satisfactory
11	4,38	-0,14	Satisfactory
14	4,4	-0,13	Satisfactory
8	4,47	-0,10	Satisfactory
30	4,676	-0,01	Satisfactory
18	4,76	0,02	Satisfactory
33	4,96	0,10	Satisfactory
37	5	0,12	Satisfactory
1	5,19	0,20	Satisfactory
13	5,39	0,29	Satisfactory
17	5,5	0,33	Satisfactory
27	5,57	0,36	Satisfactory

Lab.	BE (ng/mg)	Z-score	Result
12	5,65	0,40	Satisfactory
24	5,77	0,45	Satisfactory
34	5,77	0,45	Satisfactory
21	6,2	0,63	Satisfactory
16	6,4	0,72	Satisfactory
35	6,75	0,86	Satisfactory
39	6,77	0,87	Satisfactory
3	6,865	0,91	Satisfactory
2	7,2	1,05	Satisfactory
20	7,278	1,09	Satisfactory
22	8,35	1,54	Satisfactory
25	9,34	1,96	Satisfactory
15	NA		
40	P		

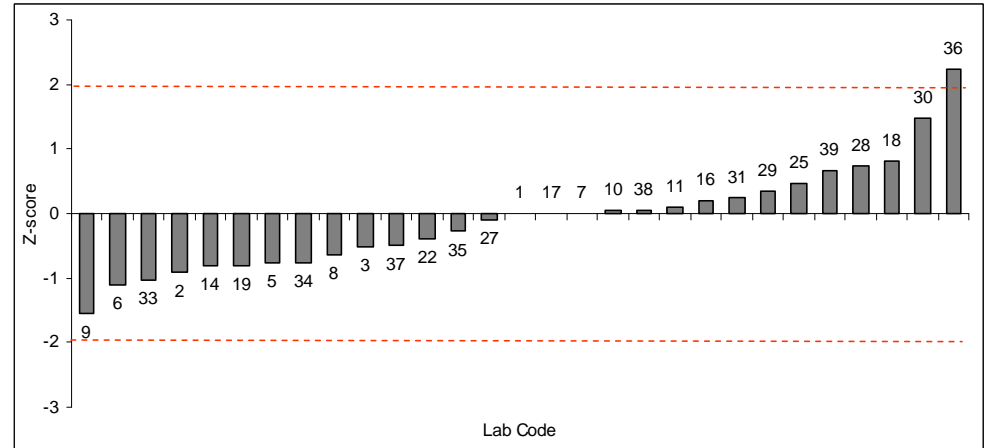
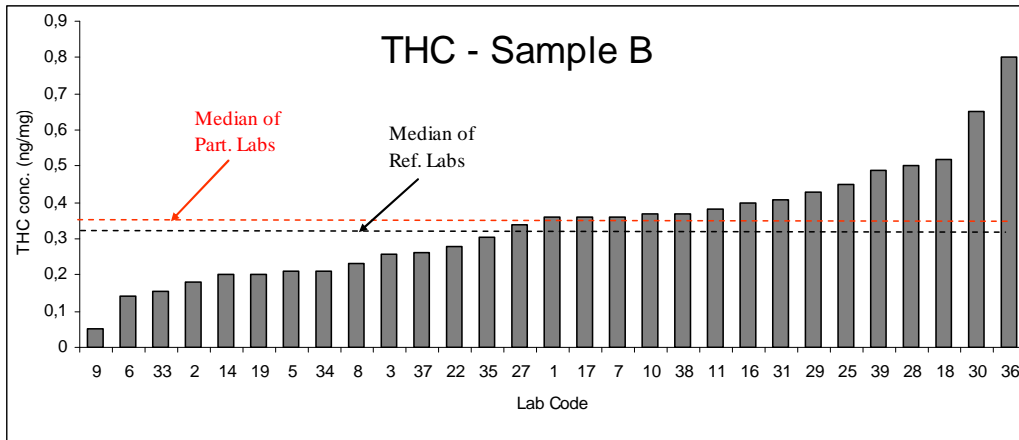
Average	4,81
SD	1,78
CV%	37,11
Median	4,718
Minimum	1,001
Quartile 25	3,407
Quartile 75	5,77
Maximum	9,34
Iqr	2,363



Lab.	Methamphetamine (ng/mg)	Z-score	Result
17	0,26	-1,10	Satisfactory
7	0,285	-1,02	Satisfactory
5	0,33	-0,87	Satisfactory
26	0,37	-0,74	Satisfactory
29	0,37	-0,74	Satisfactory
27	0,4	-0,65	Satisfactory
4	0,41	-0,61	Satisfactory
12	0,43	-0,55	Satisfactory
30	0,431	-0,55	Satisfactory
15	0,47	-0,42	Satisfactory
37	0,5	-0,32	Satisfactory
39	0,5	-0,32	Satisfactory
9	0,51	-0,29	Satisfactory
8	0,54	-0,19	Satisfactory
10	0,55	-0,16	Satisfactory
21	0,55	-0,16	Satisfactory
24	0,55	-0,16	Satisfactory
2	0,6	0	Satisfactory
11	0,64	0,13	Satisfactory
1	0,66	0,19	Satisfactory
25	0,68	0,26	Satisfactory
31	0,7	0,32	Satisfactory
36	0,7	0,32	Satisfactory
38	0,7	0,32	Satisfactory
28	0,717	0,38	Satisfactory
14	0,75	0,48	Satisfactory

Lab.	Methamphetamine (ng/mg)	Z-score	Result
18	0,77	0,55	Satisfactory
6	0,78	0,58	Satisfactory
16	0,82	0,71	Satisfactory
34	0,83	0,74	Satisfactory
35	0,848	0,80	Satisfactory
19	0,87	0,87	Satisfactory
3	0,878	0,90	Satisfactory
32	1,1	1,61	Satisfactory
33	7,32	21,71	Unsatisfactory
40	P		
20	N		
22	N		
13	NA		
23	NA		

Average	0,79
SD	1,13
CV%	142,84
Median	0,6
Minimum	0,26
Quartile 25	0,45
Quartile 75	0,76
Maximum	7,32
Iqr	0,3095



Lab.	THC (ng/mg)	Z-score	Result
9	0,05	-1,56	Satisfactory
6	0,14	-1,11	Satisfactory
33	0,154	-1,03	Satisfactory
2	0,18	-0,90	Satisfactory
14	0,2	-0,80	Satisfactory
19	0,2	-0,80	Satisfactory
5	0,21	-0,75	Satisfactory
34	0,21	-0,75	Satisfactory
8	0,23	-0,65	Satisfactory
3	0,257	-0,51	Satisfactory
37	0,26	-0,5	Satisfactory
22	0,28	-0,40	Satisfactory
35	0,304	-0,28	Satisfactory
27	0,34	-0,09	Satisfactory
1	0,359	0	Satisfactory
17	0,36	0	Satisfactory
7	0,361	0,01	Satisfactory
10	0,37	0,06	Satisfactory
38	0,37	0,06	Satisfactory
11	0,38	0,11	Satisfactory
16	0,4	0,28	Satisfactory
31	0,408	0,25	Satisfactory
29	0,427	0,34	Satisfactory
25	0,45	0,46	Satisfactory
39	0,49	0,66	Satisfactory
28	0,503	0,73	Satisfactory

Lab.	THC (ng/mg)	Z-score	Result
18	0,52	0,81	Satisfactory
30	0,653	1,48	Satisfactory
36	0,8	2,23	Questionable
40	P		
4	NA		
12	NA		
13	NA		
15	NA		
20	NA		
21	NA		
23	NA		
24	NA		
26	NA		
32	NA		

Average	0,34
SD	0,156
CV%	46,028
Median	0,359
Minimum	0,05
Quartile 25	0,21
Quartile 75	0,408
Maximum	0,8
Iqr	0,198