SOCIETY OF HAIR TESTING

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

Sevilla, February, 2012

Proficiency Test 2011-2

Laboratory Code: **«Lab_code»**

Dear participants,

Enclosed you will find the report of the Proficiency Test 2011-2 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 thirty nine participating laboratories. Thirty six of them sent the report forms back.

Sample contents were as follows:

∗ Sample A was a drug-addict hair sample positive for opiates (6-MAM, morphine and codeine), cocainics (cocaine and BE), cannabis (THC, CBD, CBN and THC-COOH), which also contained methadone, tramadol and traces amphetamine compounds (methamphetamine, MDMA).

∗ Sample B was a drug-addict hair sample positive for cocainics (cocaine and BE), methamphetamine, and cannabis (THC, CBD, CBN and THC-COOH), which also contained methadone, dihydrocodeine, tramadol and traces opiates (6-MAM and morphine), of amphetamine compounds (amphetamine, MDMA).

∗ Sample C was a drug-free hair sample.

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:

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

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-score $\leq \pm 2$

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

Unsatisfactory results: Z-score ≥ 3

Certificate

A certificate has been mailed to all the participants.

Yours faithfully,

Carmen Jurado

QUALITATIVE RESULTS

Laboratory Code:

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									
THC		P									

The concentration of THC in Sample A is very low. The median concentration reported by the participating laboratories is 0.09.

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

Comments:
- Sample A contains THC-COOH, methadone, tramadol and traces amphetamine compounds (methamphetamine, MDMA). All of the concentrations reported for amphetamine compounds are below 0.2 ng/mg, which is the cut-off proposed by SoHT for these compounds.
- Sample B contains THC-COOH, methadone, dihydrocodeine, tramadol and traces opiates (6-MAM and morphine) and amphetamine compounds (amphetamine, MDMA). All of the concentrations of MAM, morphine, amphetamine and MDMA are below 0.2 ng/mg.

Sample A - MAM
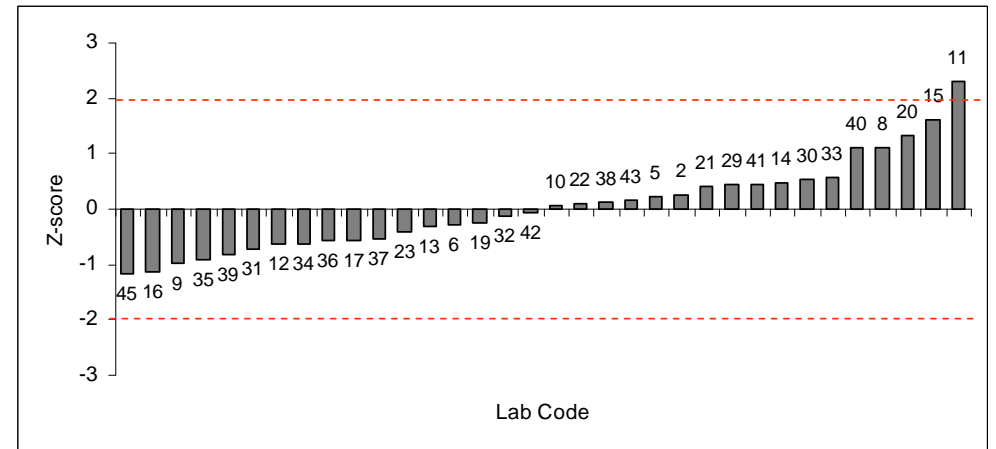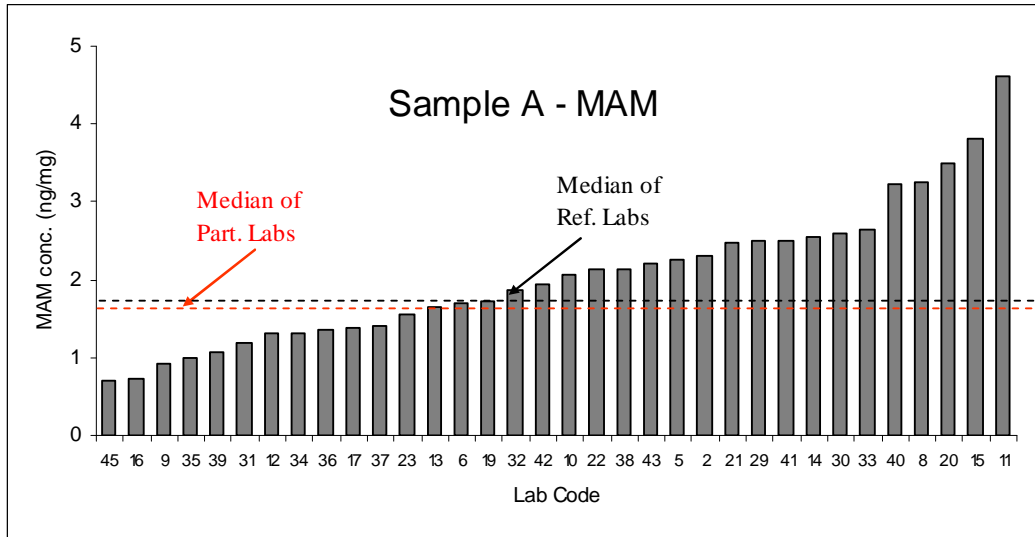
Lab. No.	MAM (ng/mg)	Z-score	Result
45	0,7	-1,17	Satisfactory
16	0,74	-1,13	Satisfactory
9	0,92	-0,97	Satisfactory
35	1,00	-0,90	Satisfactory
39	1,08	-0,83	Satisfactory
31	1,18	-0,74	Satisfactory
12	1,30	-0,63	Satisfactory
34	1,30	-0,63	Satisfactory
36	1,37	-0,57	Satisfactory
17	1,39	-0,55	Satisfactory
37	1,40	-0,54	Satisfactory
23	1,56	-0,40	Satisfactory
13	1,65	-0,32	Satisfactory
6	1,70	-0,28	Satisfactory
19	1,73	-0,25	Satisfactory
32	1,87	-0,12	Satisfactory
42	1,95	-0,05	Satisfactory
10	2,07	0,05	Satisfactory
22	2,13	0,11	Satisfactory
38	2,14	0,12	Satisfactory
43	2,20	0,17	Satisfactory
5	2,26	0,22	Satisfactory
2	2,30	0,26	Satisfactory

Lab. No.	MAM (ng/mg)	Z-score	Result
21	2,48	0,42	Satisfactory
29	2,50	0,44	Satisfactory
41	2,50	0,44	Satisfactory
14	2,55	0,48	Satisfactory
30	2,60	0,53	Satisfactory
33	2,65	0,57	Satisfactory
40	3,24	1,10	Satisfactory
8	3,25	1,11	Satisfactory
20	3,50	1,33	Satisfactory
15	3,82	1,62	Satisfactory
11	4,60	2,31	Questionable
44	NA		
46	NA		
Average	2,05		
SD	0,89		
CV%	43,49		
Median	2,01		
Minimum	0,70		
Quartile 25	1,37		
Quartile 75	2,50		
Maximum	4,60		
Iqr	1,12		
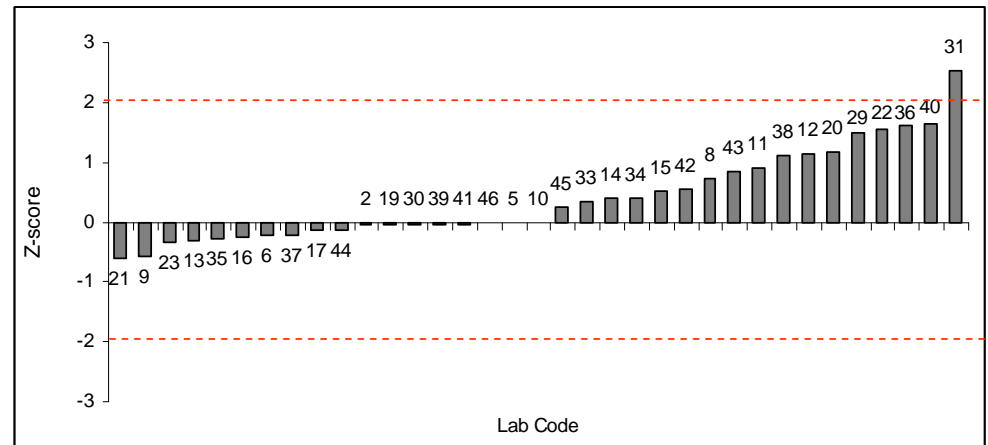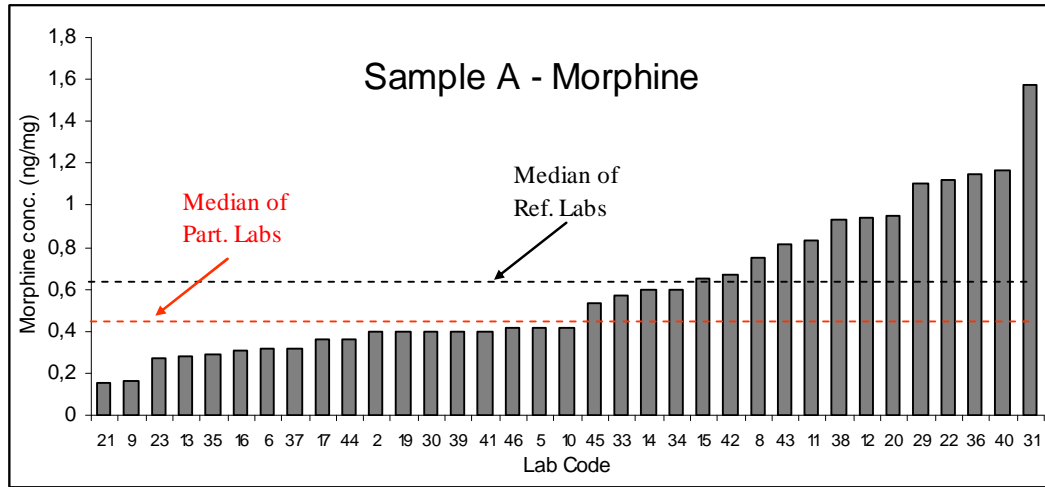
Lab. No.	Morphine (ng/mg)	Z-score	Result
21	0,15	-0,59	Satisfactory
9	0,16	-0,56	Satisfactory
23	0,27	-0,33	Satisfactory
13	0,28	-0,30	Satisfactory
35	0,29	-0,28	Satisfactory
16	0,31	-0,24	Satisfactory
6	0,32	-0,22	Satisfactory
37	0,32	-0,22	Satisfactory
17	0,36	-0,13	Satisfactory
44	0,36	-0,13	Satisfactory
2	0,40	-0,04	Satisfactory
19	0,40	-0,04	Satisfactory
30	0,40	-0,04	Satisfactory
39	0,40	-0,04	Satisfactory
41	0,40	-0,04	Satisfactory
46	0,42	0	Satisfactory
5	0,42	0	Satisfactory
10	0,42	0	Satisfactory
45	0,53	0,24	Satisfactory
33	0,57	0,33	Satisfactory
14	0,60	0,39	Satisfactory
34	0,60	0,39	Satisfactory
15	0,65	0,50	Satisfactory

Lab. No.	Morphine (ng/mg)	Z-score	Result
42	0,67	0,54	Satisfactory
8	0,75	0,72	Satisfactory
43	0,81	0,85	Satisfactory
11	0,83	0,89	Satisfactory
38	0,93	1,11	Satisfactory
12	0,94	1,13	Satisfactory
20	0,95	1,15	Satisfactory
29	1,10	1,48	Satisfactory
22	1,12	1,52	Satisfactory
36	1,15	1,59	Satisfactory
40	1,17	1,63	Satisfactory
31	1,57	2,50	Questionable
32	>0,60		
Average	0,60		
SD	0,34		
CV%	55,77		
Median	0,42		
Minimum	0,15		
Quartile 25	0,36		
Quartile 75	0,82		
Maximum	1,57		
Iqr	0,46		

Sample A - Codeine
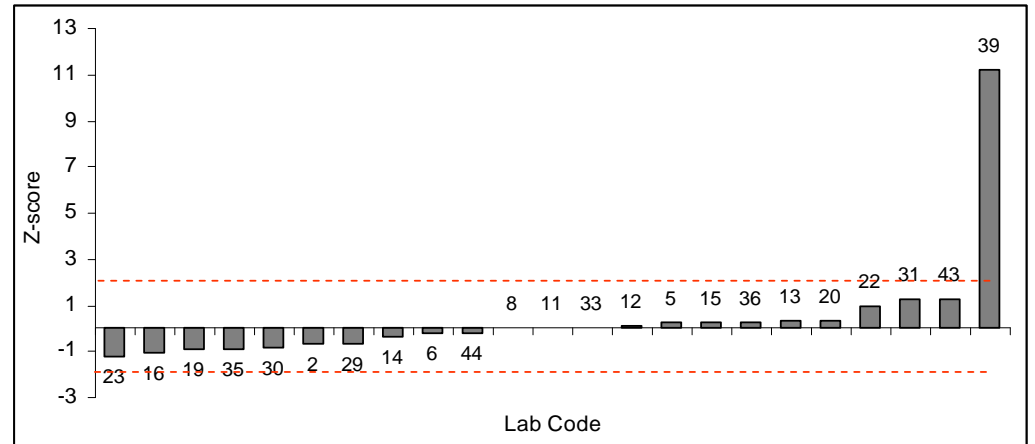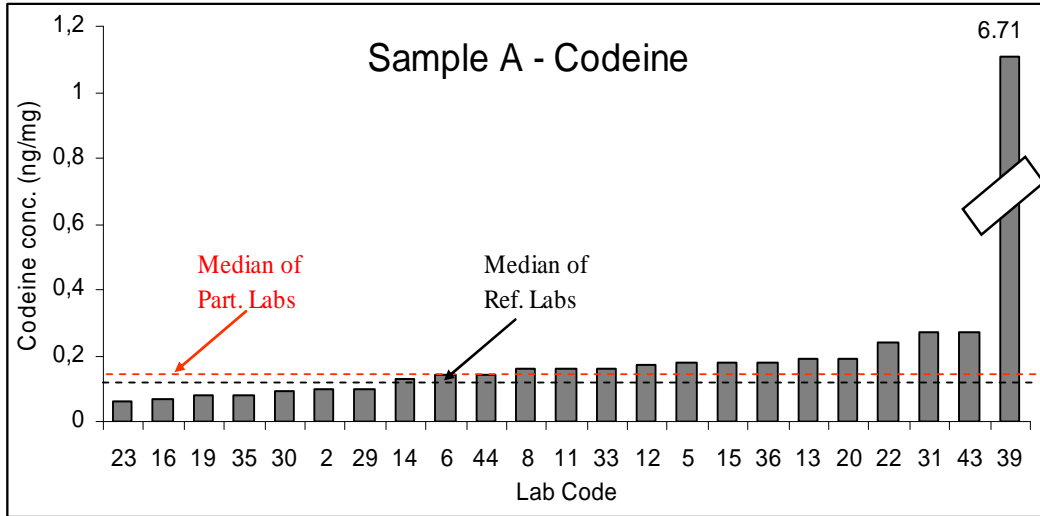
Lab. No.	Codeine (ng/mg)	Z-score	Result
23	0,06	-1,17	Satisfactory
16	0,07	-1,06	Satisfactory
19	0,08	-0,94	Satisfactory
35	0,08	-0,94	Satisfactory
30	0,09	-0,82	Satisfactory
2	0,10	-0,70	Satisfactory
29	0,10	-0,70	Satisfactory
14	0,13	-0,35	Satisfactory
6	0,14	-0,23	Satisfactory
44	0,14	-0,23	Satisfactory
8	0,16	0	Satisfactory
11	0,16	0	Satisfactory
33	0,16	0	Satisfactory
12	0,17	0,12	Satisfactory
5	0,18	0,23	Satisfactory
15	0,18	0,23	Satisfactory
36	0,18	0,23	Satisfactory
13	0,19	0,35	Satisfactory
20	0,19	0,35	Satisfactory
22	0,24	0,94	Satisfactory
31	0,27	1,29	Satisfactory
43	0,27	1,29	Satisfactory
39	6,71	77,06	Unsatisfactory

Lab. No.	Codeine (ng/mg)	Z-score	Result
9	<0,10		
17	N		
32	N		
34	N		
38	N		
40	N		
41	N		
42	N		
45	N		
46	N		
10	NA		
21	NA		
37	NR		
Average	0,44		
SD	1,34		
CV%	306,36		
Median	0,16		
Minimum	0,06		
Quartile 25	0,10		
Quartile 75	0,18		
Maximum	6,71		
Iqr	0,08		

Sample A - Cocaine
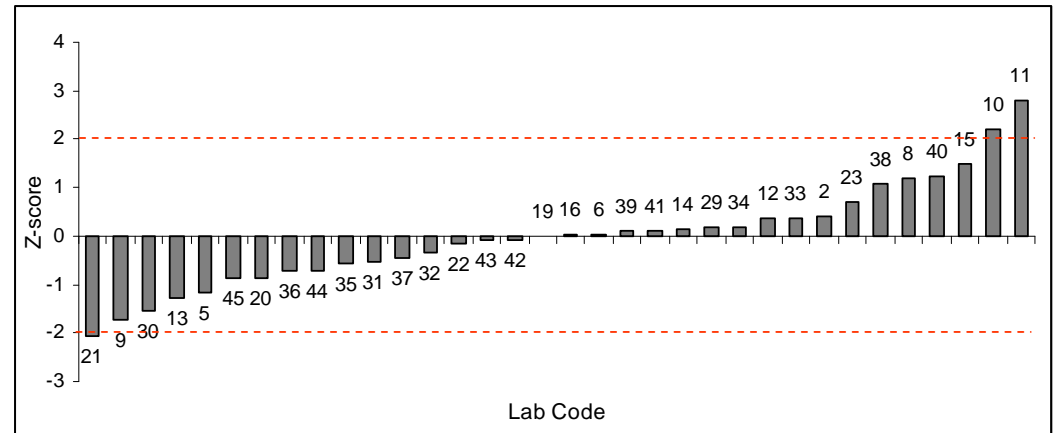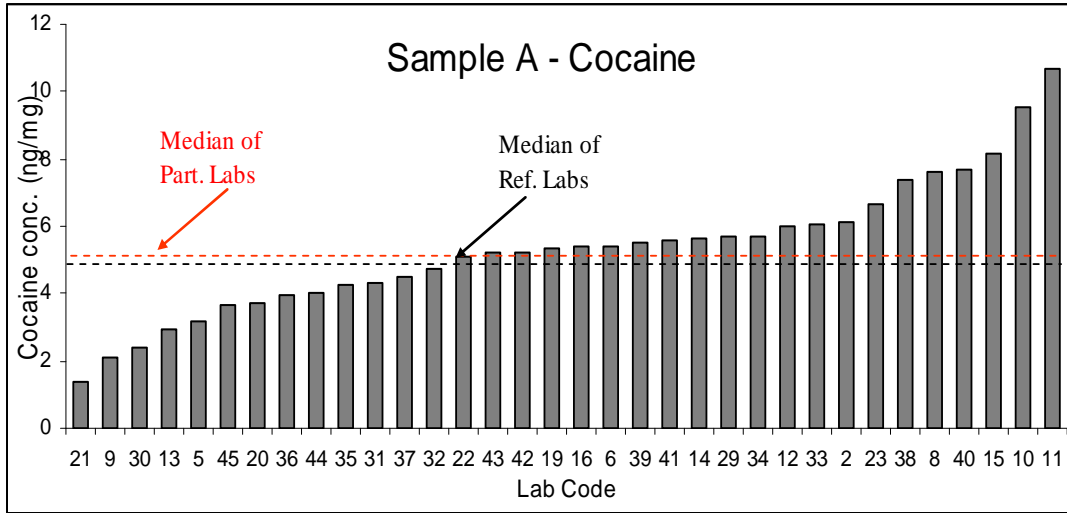
Lab. No.	Cocaine (ng/mg)	Z-score	Result
21	1,41	-2,07	Questionable
9	2,10	-1,71	Satisfactory
30	2,40	-1,55	Satisfactory
13	2,95	-1,26	Satisfactory
5	3,16	-1,15	Satisfactory
45	3,68	-0,87	Satisfactory
20	3,70	-0,86	Satisfactory
36	3,98	-0,72	Satisfactory
44	4,01	-0,70	Satisfactory
35	4,28	-0,56	Satisfactory
31	4,34	-0,53	Satisfactory
37	4,50	-0,44	Satisfactory
32	4,72	-0,33	Satisfactory
22	5,07	-0,14	Satisfactory
43	5,20	-0,07	Satisfactory
42	5,21	-0,07	Satisfactory
19	5,34	0	Satisfactory
16	5,39	0,03	Satisfactory
6	5,40	0,03	Satisfactory
39	5,52	0,09	Satisfactory
41	5,56	0,12	Satisfactory
14	5,62	0,12	Satisfactory
29	5,70	0,19	Satisfactory

Lab. No.	Cocaine (ng/mg)	Z-score	Result
34	5,70	0,19	Satisfactory
12	6,01	0,36	Satisfactory
33	6,07	0,39	Satisfactory
2	6,10	0,41	Satisfactory
23	6,68	0,71	Satisfactory
38	7,39	1,08	Satisfactory
8	7,61	1,20	Satisfactory
40	7,69	1,24	Satisfactory
15	8,16	1,49	Satisfactory
10	9,54	2,22	Questionable
11	10,65	2,80	Questionable
46	>0,80		
17	NA		
Average	5,32		
SD	1,952		
CV%	36,742		
Median	5,362		
Minimum	1,41		
Quartile 25	4,08		
Quartile 75	6,05		
Maximum	10,65		
Iqr	1,98		
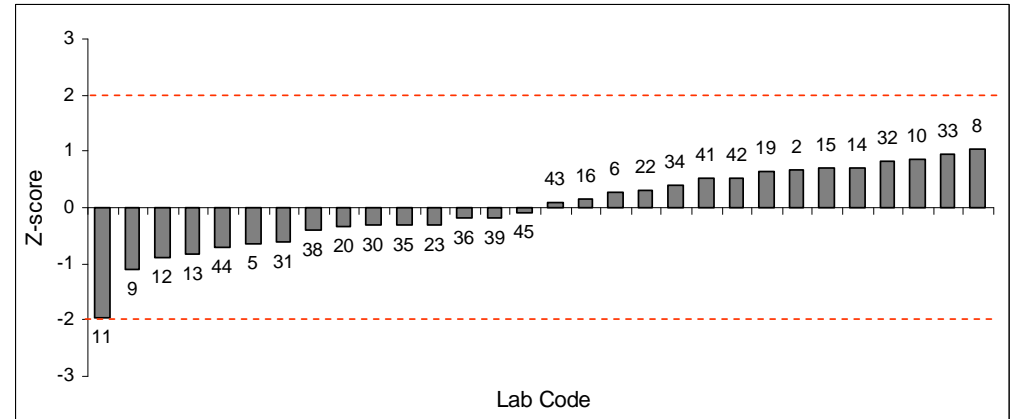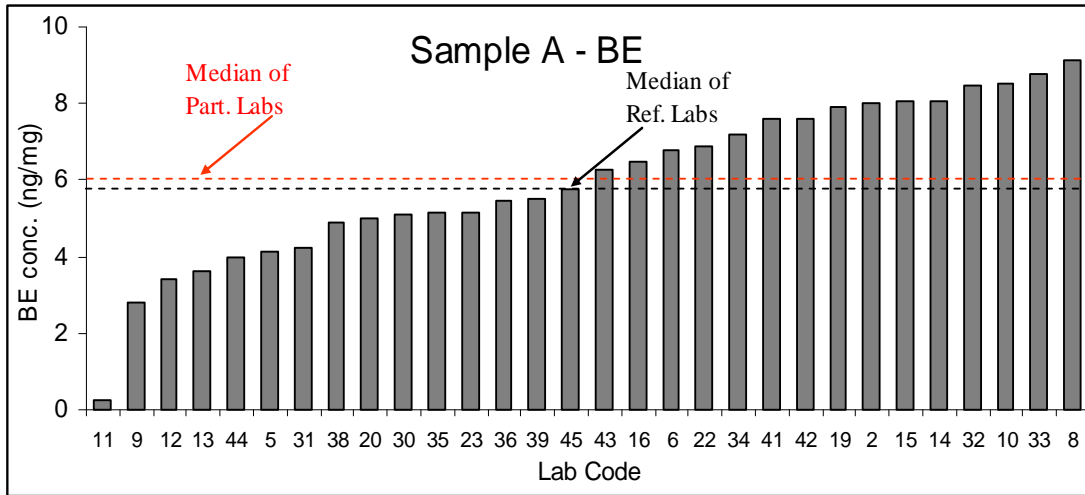
Lab. No.	BE (ng/mg	Z-score	Result
11	0,25	-1,97	Satisfactory
9	2,80	-1,10	Satisfactory
12	3,43	-0,89	Satisfactory
13	3,60	-0,83	Satisfactory
44	3,97	-0,70	Satisfactory
5	4,12	-0,65	Satisfactory
31	4,26	-0,60	Satisfactory
38	4,88	-0,39	Satisfactory
20	5,00	-0,35	Satisfactory
30	5,10	-0,32	Satisfactory
35	5,14	-0,30	Satisfactory
23	5,15	-0,30	Satisfactory
36	5,48	-0,19	Satisfactory
39	5,49	-0,18	Satisfactory
45	5,75	-0,09	Satisfactory
43	6,30	0,09	Satisfactory
16	6,47	0,15	Satisfactory
6	6,80	0,26	Satisfactory
22	6,90	0,30	Satisfactory
34	7,20	0,40	Satisfactory
41	7,58	0,53	Satisfactory
42	7,58	0,53	Satisfactory
19	7,92	0,65	Satisfactory

Lab. No.	BE (ng/mg)	Z-score	Result
2	8,00	0,67	Satisfactory
15	8,07	0,70	Satisfactory
14	8,08	0,70	Satisfactory
32	8,46	0,83	Satisfactory
10	8,54	0,86	Satisfactory
33	8,76	0,93	Satisfactory
8	9,11	1,05	Satisfactory
46	>0,80		
37	>1,00		
17	NA		
21	NA		
29	NA		
40	NA		
Average	6,01		
SD	2,05		
CV%	34,08		
Median	6,02		
Minimum	0,25		
Quartile 25	4,91		
Quartile 75	7,83		
Maximum	9,11		
Iqr	2,92		

Sample A -THC
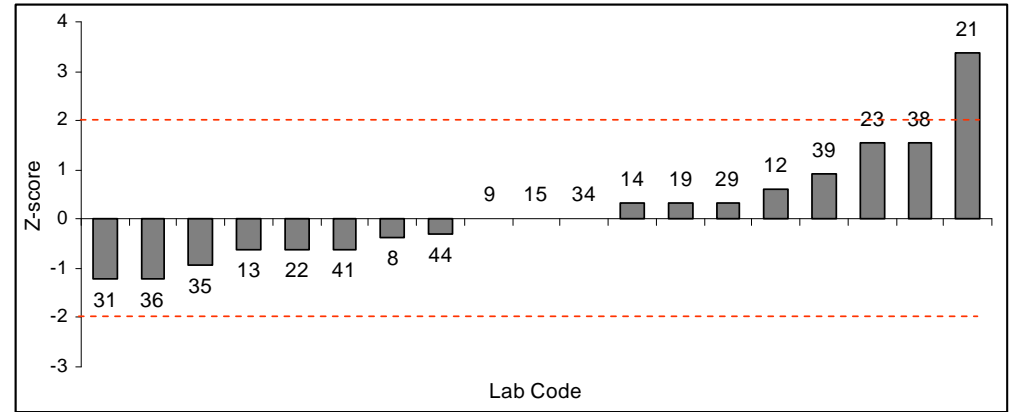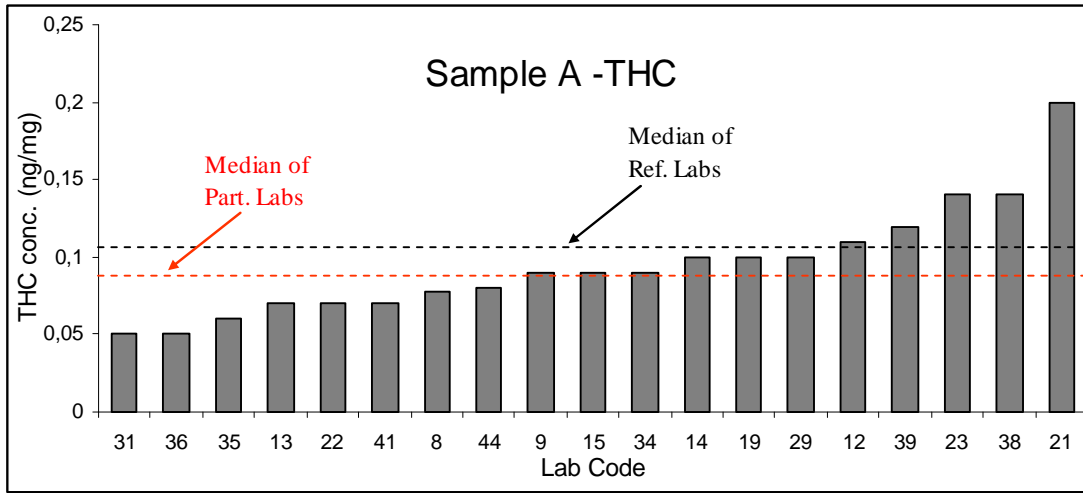
Lab. No.	THC (ng/mg)	Z-score	Result
31	0,05	-1,23	Satisfactory
36	0,05	-1,23	Satisfactory
35	0,06	-0,92	Satisfactory
13	0,07	-0,61	Satisfactory
22	0,07	-0,61	Satisfactory
41	0,07	-0,61	Satisfactory
8	0,08	-0,37	Satisfactory
44	0,08	-0,31	Satisfactory
9	0,09	0	Satisfactory
15	0,09	0	Satisfactory
34	0,09	0	Satisfactory
14	0,10	0,31	Satisfactory
19	0,10	0,31	Satisfactory
29	0,10	0,31	Satisfactory
12	0,11	0,61	Satisfactory
39	0,12	0,92	Satisfactory
23	0,14	1,54	Satisfactory
38	0,14	1,54	Satisfactory
21	0,20	3,38	Unsatisfactory
5	N		
10	N		
11	N		
16	N		

Lab. No.	THC (ng/mg)	Z-score	Result
30	N		
42	N		
45	N		
46	N		
2	NA		
6	NA		
17	NA		
20	NA		
33	NA		
40	NA		
43	NA		
37	NR		
32	POS		
Average	0,09		
SD	0,03		
CV%	37,14		
Median	0,09		
Minimum	0,05		
Quartile 25	0,07		
Quartile 75	0,105		
Maximum	0,20		
Iqr	0,035		

Sample B - Cocaine
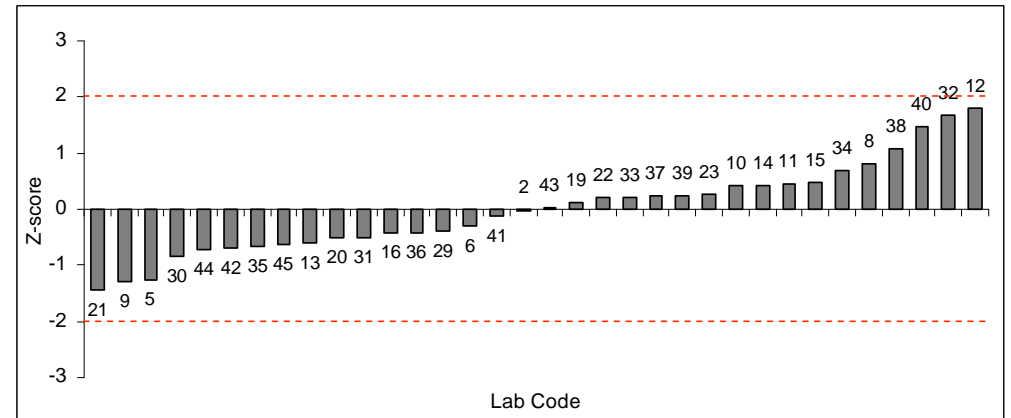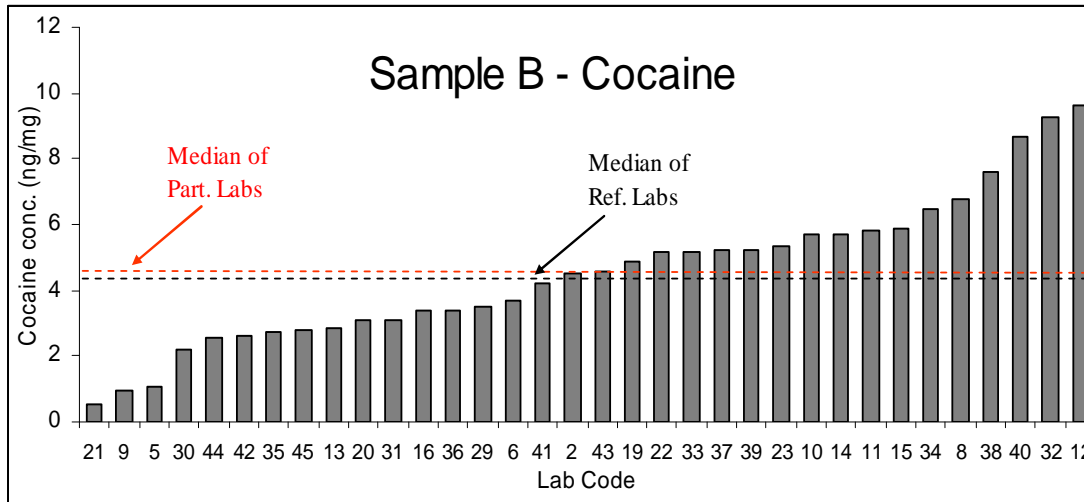
Lab. No.	Cocaine (ng/mg)	Z-score	Result
21	0,56	-1,43	Satisfactory
9	0,98	-1,28	Satisfactory
5	1,07	-1,25	Satisfactory
30	2,20	-0,84	Satisfactory
44	2,53	-0,72	Satisfactory
42	2,64	-0,68	Satisfactory
35	2,74	-0,65	Satisfactory
45	2,81	-0,62	Satisfactory
13	2,85	-0,61	Satisfactory
20	3,10	-0,52	Satisfactory
31	3,11	-0,52	Satisfactory
16	3,37	-0,42	Satisfactory
36	3,40	-0,41	Satisfactory
29	3,50	-0,38	Satisfactory
6	3,70	-0,30	Satisfactory
41	4,23	-0,11	Satisfactory
2	4,50	-0,02	Satisfactory
43	4,60	0,02	Satisfactory
19	4,89	0,12	Satisfactory
22	5,17	0,22	Satisfactory
33	5,17	0,22	Satisfactory
37	5,20	0,23	Satisfactory
39	5,21	0,23	Satisfactory

Lab. No.	Cocaine (ng/mg)	Z-score	Result
23	5,33	0,28	Satisfactory
10	5,68	0,40	Satisfactory
14	5,71	0,41	Satisfactory
11	5,80	0,45	Satisfactory
15	5,88	0,47	Satisfactory
34	6,50	0,70	Satisfactory
8	6,80	0,81	Satisfactory
38	7,60	1,09	Satisfactory
40	8,65	1,47	Satisfactory
32	9,26	1,69	Satisfactory
12	9,60	1,81	Satisfactory
46	>0,80		
17	NA		
Average	4,54		
SD	2,19		
CV%	48,24		
Median	4,55		
Minimum	0,56		
Quartile 25	2,92		
Quartile 75	5,709		
Maximum	9,60		
Iqr	2,79		

Sample B - BE
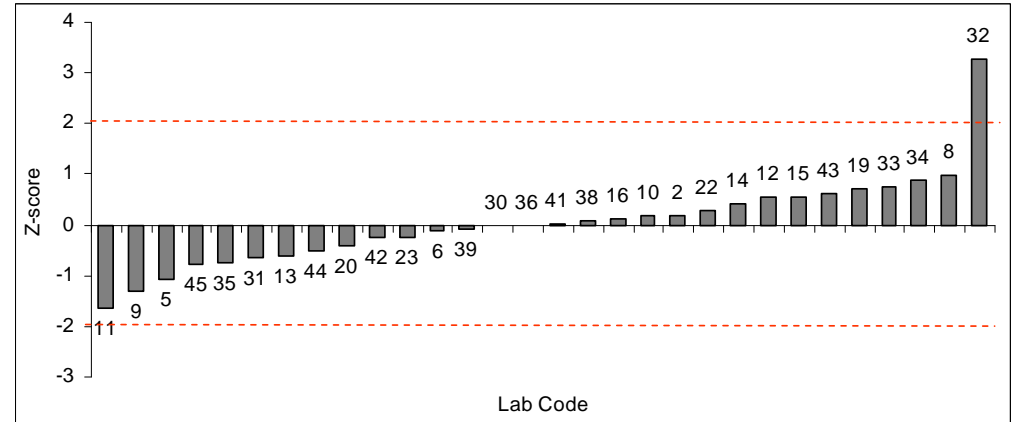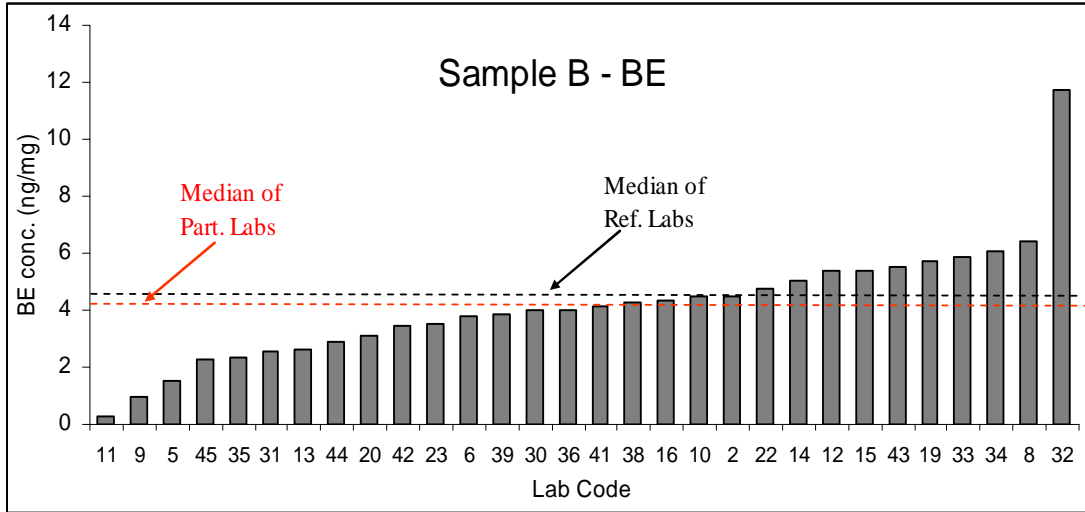
Lab. No.	BE (ng/mg)	Z-score	Result
11	0,26	-1,63	Satisfactory
9	1,00	-1,31	Satisfactory
5	1,52	-1,09	Satisfactory
45	2,25	-0,78	Satisfactory
35	2,36	-0,73	Satisfactory
31	2,55	-0,65	Satisfactory
13	2,65	-0,61	Satisfactory
44	2,87	-0,51	Satisfactory
20	3,10	-0,41	Satisfactory
42	3,48	-0,25	Satisfactory
23	3,49	-0,25	Satisfactory
6	3,80	-0,11	Satisfactory
39	3,85	-0,09	Satisfactory
30	4,00	-0,03	Satisfactory
36	4,02	-0,02	Satisfactory
41	4,12	0,02	Satisfactory
38	4,30	0,10	Satisfactory
16	4,33	0,11	Satisfactory
10	4,49	0,18	Satisfactory
2	4,50	0,18	Satisfactory
22	4,73	0,28	Satisfactory
14	5,03	0,41	Satisfactory
12	5,35	0,55	Satisfactory

Lab. No.	BE (ng/mg)	Z-score	Result
15	5,38	0,56	Satisfactory
43	5,50	0,61	Satisfactory
19	5,72	0,70	Satisfactory
33	5,83	0,75	Satisfactory
34	6,10	0,88	Satisfactory
8	6,40	0,99	Satisfactory
32	11,73	3,27	Unsatisfactory
46	>0,80		
37	>1,00		
17	NA		
21	NA		
29	NA		
40	NA		
Average	4,15		
SD	2,04		
CV%	49,15		
Median	4,07		
Minimum	0,26		
Quartile 25	2,92		
Quartile 75	5,27		
Maximum	11,73		
Iqr	2,34		

Sample B - Methamphetamine
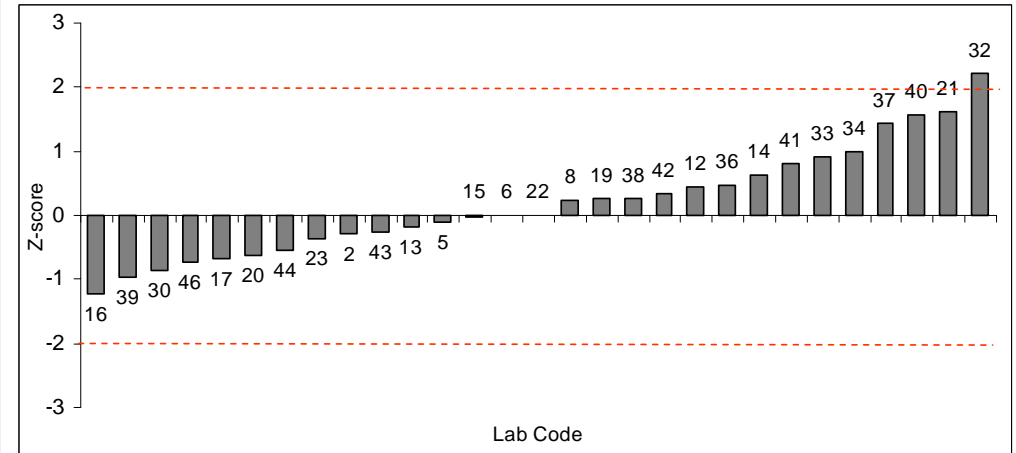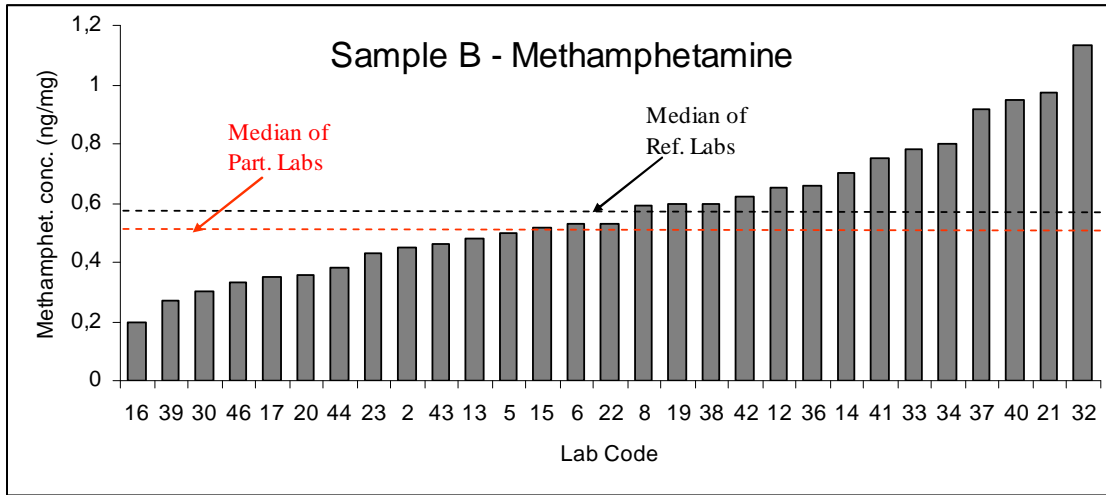
Lab. No.	Methamphet. (ng/mg)	Z-score	Result
16	0,20	-1,22	Satisfactory
39	0,27	-0,96	Satisfactory
30	0,30	-0,85	Satisfactory
46	0,33	-0,74	Satisfactory
17	0,35	-0,66	Satisfactory
20	0,36	-0,63	Satisfactory
44	0,38	-0,55	Satisfactory
23	0,43	-0,37	Satisfactory
2	0,45	-0,29	Satisfactory
43	0,46	-0,26	Satisfactory
13	0,48	-0,18	Satisfactory
5	0,50	-0,11	Satisfactory
15	0,52	-0,04	Satisfactory
6	0,53	0	Satisfactory
22	0,53	0	Satisfactory
8	0,59	0,22	Satisfactory
19	0,60	0,26	Satisfactory
38	0,60	0,26	Satisfactory
42	0,62	0,33	Satisfactory
12	0,65	0,44	Satisfactory
36	0,66	0,48	Satisfactory
14	0,70	0,63	Satisfactory
41	0,75	0,81	Satisfactory

Lab. No.	Methamphet. (ng/mg)	Z-score	Result
33	0,78	0,92	Satisfactory
34	0,80	1,00	Satisfactory
37	0,92	1,44	Satisfactory
40	0,95	1,55	Satisfactory
21	0,97	1,63	Satisfactory
32	1,13	2,22	Questionable
9	N		
11	N		
31	N		
35	N		
45	N		
10	NA		
29	NA		
Average	0,58		
SD	0,22		
CV%	38,62		
Median	0,53		
Minimum	0,20		
Quartile 25	0,43		
Quartile 75	0,70		
Maximum	1,13		
Iqr	0,27		

Sample B - THC
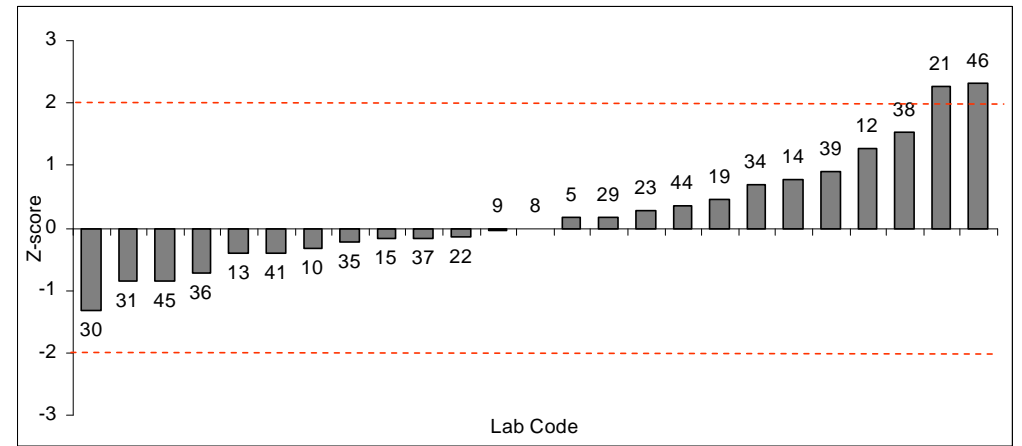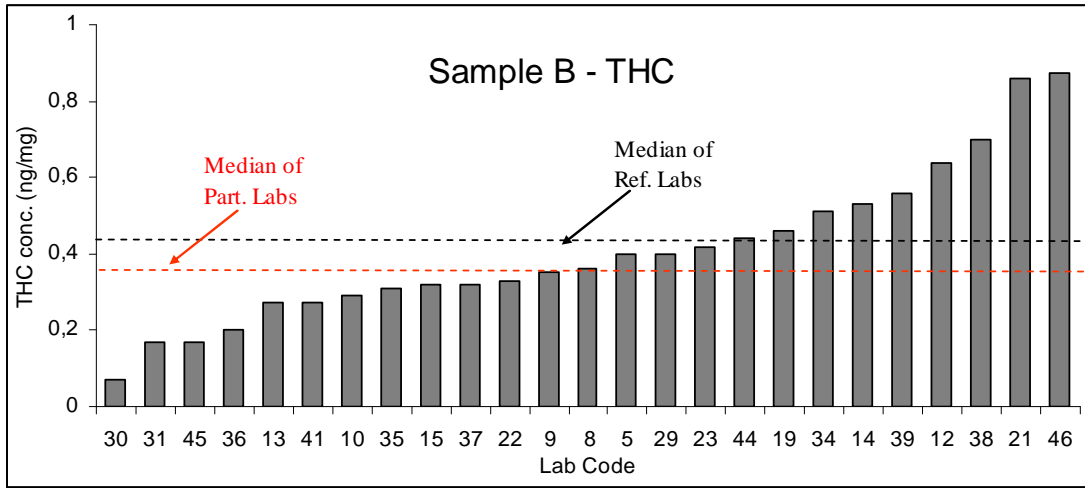
Lab. No.	THC (ng/mg)	Z-score	Result
30	0,07	-1,32	Satisfactory
31	0,17	-0,86	Satisfactory
45	0,17	-0,86	Satisfactory
36	0,2	-0,73	Satisfactory
13	0,27	-0,41	Satisfactory
41	0,27	-0,41	Satisfactory
10	0,29	-0,32	Satisfactory
35	0,31	-0,23	Satisfactory
15	0,32	-0,18	Satisfactory
37	0,32	-0,18	Satisfactory
22	0,33	-0,13	Satisfactory
9	0,35	-0,04	Satisfactory
8	0,36	0	Satisfactory
5	0,40	0,18	Satisfactory
29	0,40	0,18	Satisfactory
23	0,42	0,27	Satisfactory
44	0,44	0,36	Satisfactory
19	0,46	0,45	Satisfactory
34	0,51	0,68	Satisfactory
14	0,53	0,77	Satisfactory
39	0,56	0,91	Satisfactory
12	0,64	1,27	Satisfactory
38	0,70	1,54	Satisfactory

Lab. No.	THC (ng/mg)	Z-score	Result
21	0,86	2,27	Questionable
46	0,87	2,32	Questionable
11	N		
16	N		
42	N		
2	NA		
6	NA		
17	NA		
20	NA		
33	NA		
40	NA		
43	NA		
32	POS		
Average	0,41		
SD	0,19		
CV%	48,17		
Median	0,36		
Minimum	0,07		
Quartile 25	0,29		
Quartile 75	0,51		
Maximum	0,87		
Iqr	0,22		