Asia Pacific Laboratory Accreditation Cooperation
Proficiency Testing Programme

[APLAC PT T099: DIESEL FUEL]

DIESEL FUEL

FINAL REPORT

Coordinated by:

Accreditation Body:
National Accreditation Board for Testing and Calibration Laboratories (NABL)

Proficiency Testing Provider:
Bharat Petroleum Corporation Limited (BPCL)

November 2016

Content

Summary

1. This proficiency Testing program (APLAC PT T099) was organized by National Accreditation Board for Testing and Calibration Laboratories (NABL) in collaboration with Bharat Petroleum Corporation Limited (BPCL), under the auspices of Asia-Pacific Laboratory Accreditation Cooperation (APLAC).

2. A total of 123 laboratories from 54 economies have registered in the PT Program. Out of 123 laboratories, 95 laboratories were finally enrolled in the program. 91 laboratories submitted their results on time. The results of 90 labs were considered for final statistical analysis. One laboratory result was not considered for evaluation as the sample was tested and reported by different test methods than those mentioned in the testing protocol.

3. Assigned value x_{pt} is the robust average of the participant results determined by Algorithm A of ISO 13258:2015. The z- score is used as the numerical indicator to assess individual participant's performance in the programme.

4. The Standard Deviation for Proficiency Assessment (SDPA) was derived as per clause 8.5 of ISO 13528:2015 i.e. with information on repeatability and reproducibility of the standard method.

5. Summary of participants statistical results is given in Table 1 to 3.

Table 1 : Overview of participants' results for Distillation, Auto, ASTM D 86

Test Parameter & Method	IBP, °C	5%, °C	10%, °C	20%, °C	30%, °C	40%, °C	50%, °C	60%, °C	70%, °C	80%, °C	90%, °C	95%, °C	FBP, °C
	Distillation, Auto, ASTM D 86												
Total No.of Results	61	59	61	60	60	60	61	60	60	60	61	60	61
No. of Rejected Results	1	1	2	1	0	1	1	1	1	1	1	1	1
No. of Valid Results	60	58	59	59	60	59	60	59	59	59	60	59	60
Robust Mean (x*)	137.2	165.1	180.1	208.7	232.8	251.6	267.5	283.1	299.9	318.9	342.5	358.6	367.8
Standard Deviation for Proficiency Assessment (σ_{pt})	7.49	9.03	3.94	4.58	3.0	3.0	3.0	3.0	3.0	4.79	5.15	9.21	7.10
$\|z\| \leq 2$	60	58	58	58	58	57	60	59	59	59	60	59	60
$2< \|z\| <3$	0	0	1	1	2	2	0	0	0	0	0	0	0
$\|z\| \geq 3$	1	1	2	1	0	1	1	1	1	1	1	1	1
$2< \|z\| <3$ (Warning Signal) Code of Participating Laboratory	NIL	NIL	070	013	068,070	068, 070	NIL	NIL	NIL	NIL	NIL	NIL	NIL
$\|z\| \geq 3$ (Action Signal) Code of Participating Laboratory	049	049	049, 068	068	NIL	049	049	049	049	049	049	049	049
Max	142.5	170.4	185.6	213.8	236.7	261.9	283.8	305.9	328.5	353.3	382.1	399.0	433.1
Min	95.1	137.3	155.9	194.4	223.9	244.3	261.9	277.8	295.8	315.0	338.9	354.1	358.9
Range	47.4	33.1	29.7	19.4	12.8	17.6	21.9	28.1	32.7	38.3	43.2	44.9	74.2

Table 2 : Overview of participants' results for Distillation, Manual, ASTM D 86

Test Parameter & Method	IBP, °C	5%, °C	10%, °C	20%, °C	30%, °C	40%, °C	50%, °C	60%, °C	70%, °C	80%, °C	90%, °C	95%, °C	FBP, °C
	Distillation, Manual, ASTM D 86												
Total No. of Results	32	29	32	32	31	31	32	31	31	31	32	32	31
No. of Rejected Results	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of Valid Results	32	29	32	32	31	31	32	31	31	31	32	32	31
Robust Mean (x*)	138.4	162.4	178.4	206.7	231.5	250.5	266.5	282.4	299.7	318.7	342.6	358.2	368.4
Standard Deviation for Proficiency Assessment (σ_{pt})	7.20	7.10	6.30	5.30	4.70	4.10	3.90	4.00	4.20	4.70	5.00	5.90	4.50
$\|z\| \leq 2$	30	29	32	32	30	30	31	30	30	29	30	31	28
$2< \|z\| <3$	2	0	0	0	1	1	1	1	1	2	2	1	3
$\|z\| \geq 3$	0	0	0	0	0	0	0	0	0	0	0	0	0
$2< \|z\| <3$ (Warning Signal) Code of Participating Laboratory	009, 046	NIL	NIL	NIL	009	009	009	065	065	009, 065	009, 046	046	009, 046, 065
$\|z\| \geq 3$ (Action Signal) Code of Participating Laboratory	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Max	154.0	169.0	184.0	211.0	236.0	256.0	272.0	292.0	310.0	330.0	356.0	375.5	380.0
Min	120.0	152.5	169.0	199.5	222.0	240.0	258.0	278.0	294.5	312.2	333.0	350.0	358.0
Range	34.0	16.5	15.0	11.5	14.0	16.0	14.0	14.0	15.5	17.8	23.0	25.5	22.0

Table 3 : Overview of participants' results for Density, Flash point, Pour point, Sulphur and Kinematic Viscosity.

Test Parameter & Method	Density at 15 °C g/ml	Density at 15 °C, g/ml	Flash Point, °C	Pour Point, °C	Sulphur, mg/Kg	Sulphur, mg/Kg	Sulphur, mg/Kg	Kinematic Viscosity at 40 °C, cSt	Kinematic Viscosity at 40 °C, cSt
	ASTM D 1298	ASTM D 4052	ASTM D 56	ASTM D 97	ASTM D 2622	ASTM D 4294	ASTM D 5453	ASTM D 445	ASTM D 7042
Total No.of Results	41	69	36	66	14	32	45	71	21
No. of Rejected Results	0	1	0	0	1	5	1	6	1
No. of Valid Results	41	68	36	66	13	27	44	65	20
Robust Mean (x*)	0.8238	0.82377	42.8	-3.0	31.38	33.58	31.04	2.464	2.467
Standard Deviation for Proficiency Assessment (σ_{pt})	0.0012	0.0005	4.3	9.0	9.954	7.090	7.616	0.055	0.144
$\|z\| \leq 2$	41	67	36	66	13	24	43	64	20
$2< \|z\| <3$	0	1	0	0	0	3	1	1	0
$\|z\| \geq 3$	0	1	0	0	1	5	1	6	1
$2< \|z\| <3$ (Warning Signal) Code of Participating Laboratory	NIL	069	NIL	NIL	NIL	104,105 , 120	117	010	NIL
$\|z\| \geq 3$ (Action Signal) Code of Participating Laboratory	NIL	094	NIL	NIL	062	021,036, 038,079, 083	110	032,039, 049,062, 090,120	041
Max	0.8260	0.8259	47.0	0.0	306.0	190.0	48.0	4.600	2.595
Min	0.8232	0.8226	40.0	-9.0	23.5	1.0	4.9	2.380	1.981
Range	0.0028	0.0033	7.0	9.0	282.5	189.0	43.1	2.220	0.614

6. Summary of Z score of participants is given in Table 4

Table 4 : Summary of the Z score of the participants

Test Parameter & Method		Z Score Distribution					
		|z| ≤ 2		2< |z| <3		|z| ≥3	
Distillation Auto	ASTM D 86	No of participants	%	No of participants	%	No of participants	%
IBP		60	98.36	0	0.00	1	1.64
5%		58	98.31	0	0.00	1	1.69
10%		58	95.08	1	1.64	2	3.28
20%		58	96.67	1	1.67	1	1.67
30%		58	96.67	2	3.33	0	0.00
40%		57	95.00	2	3.33	1	1.67
50%		60	98.36	0	0.00	1	1.64
60%		59	98.33	0	0.00	1	1.67
70%		59	98.33	0	0.00	1	1.67
80%		59	98.33	0	0.00	1	1.67
90%		60	98.36	0	0.00	1	1.64
95%		59	98.33	0	0.00	1	1.67
FBP		60	98.36	0	0.00	1	1.64
Distillation Manual	ASTM D 86						
IBP		30	93.75	2	6.25	0	0.00
5%		29	100.00	0	0.00	0	0.00
10%		32	100.00	0	0.00	0	0.00
20%		32	100.00	0	0.00	0	0.00
30%		30	96.77	1	3.23	0	0.00
40%		30	96.77	1	3.23	0	0.00
50%		31	96.88	1	3.13	0	0.00
60%		30	96.77	1	3.23	0	0.00
70%		30	96.77	1	3.23	0	0.00
80%		29	93.55	2	6.45	0	0.00
90%		30	93.75	2	6.25	0	0.00
95%		31	96.88	1	3.13	0	0.00
FBP		28	90.32	3	9.68	0	0.00
Density, 15 °C, g/ml	ASTM D 1298	41	100.00	0	0.00	0	0.00
Density, 15 °C, g/ml	ASTM D 4052	67	97.10	1	1.45	1	1.45
Flash Point, °C	ASTM D 56	36	100.00	0	0.00	0	0.00
Pour Point, °C	ASTM D 97	66	100.00	0	0.00	0	0.00
Sulphur, mg/Kg	ASTM D 2622	13	92.86	0	0.00	1	7.14
Sulphur, mg/Kg	ASTM D 4294	24	75.00	3	9.38	5	15.63
Sulphur, mg/Kg	ASTM D 5453	43	95.56	1	2.22	1	2.22
Kinematic Viscosity at 40^0C, cSt	ASTMD 445	64	90.14	1	1.41	6	8.45
Kinematic Viscosity at 40^0C, cSt	ASTMD 7042	20	95.24	0	0.00	1	4.76

1. Introduction

1.1. This proficiency testing programme (APLAC PT T099) was organized by National Accreditation Board for Testing and Calibration Laboratories (NABL) in support with Bharat Petroleum Corporation Limited (BPCL) a Conformity Assessment Body of NABL, under the auspices of Asia-Pacific Laboratory Accreditation Cooperation (APLAC).

1.2. The design of the proficiency test followed the requirements in ISO/IEC 17043:2010 Conformity Assessment – General Requirements for Proficiency Testing [1] and the test results submitted by participants were processed in accordance with the statistical techniques outlined in ISO13528:2015 Statistical Methods for Use in Proficiency Testing by Inter laboratory Comparisons [2].

1.3. Each participant was confidentially assigned with a unique laboratory code (001 to 0123) which is used throughout the programme.

1.4. The program was carried out as per the schedule below.

Event	**Planned**
Invitation	Dec 15 - Jan 2016
Dispatch of Samples	April 2016
Submit the results	31st May 2016
Interim Report	July 2016
Draft Final Report	Sept 2016
Release of Final Report	Oct 2016

2. Objective

2.1. The aim of the program was to assess the competency of participating laboratories to perform the analysis for the Density, Distillation, Kinematic Viscosity, Flash Point, Pour Point and Sulphur content of High Speed Diesel through inter-laboratory comparison.

Besides the above, individual labs could also utilize the results for any of the following purposes as considered appropriate:

a) To identify problems in laboratories and to initiate corrective actions, if required, which may be related to, for example, performance of individual testing personnel, calibration of equipment, types of Certified Reference Material used for estimation of test results, test methods used for determination of different parameters, etc.

b) To provide additional confidence to laboratory testing staff as well as to the user departments or customers.

2.2. Test results from participants were evaluated according to the statistical techniques outlined in ISO 13528:2015 Statistical methods for use in proficiency testing by inter laboratory comparisons. The z-score was used as a numerical indicator to assess individual participant's performance in the scheme.

3. Proficiency Testing Item

3.1. About 400 litres of Diesel Fuel sourced from Refinery was made thoroughly homogeneous by agitation through stirring in a stainless steel barrel. After homogenization, the product was filled into fresh and clean 2 litres aluminium containers, which were then tightly capped, sealed and stored at ambient temperature prior to dispatch.

3.2. The homogeneity study and stability study of the test material was carried out by BPCL in accordance with the procedures stipulated in Clause 9. The results indicated that the test material was considered to be sufficiently homogeneous and stable for the proficiency testing programme.

3.3. The samples along with relevant documents were distributed by courier in March-April 2016. Relevant documents were also provided via e-mail, which can be referred to ANNEXURE 3.

3.4. Upon receipt of the proficiency test samples, participants were required to immediately check the physical conditions of the bottles and promptly acknowledge BPCL by returning the “Sample Receipt Form” via the e-mail box of the contact. Participants were advised to go through the instruction sheet in detail and handle the sample strictly as per the instruction. Also, participants were advised to send the test results as per the result sheet provided to them.

4. Test procedure:

4.1. Each participant was provided with one Diesel sample. A single result was obtained for each measurand per method. Participants were required to test the Diesel sample for Density, Distillation, Kinematic Viscosity, Flash point, Pour point and Sulphur content.

4.2. Participants were required to use any/all of the prescribed test methods and record the results in the result sheet as per the described criteria. The test results in italic are transformed as per the reporting requirement of testing protocol after necessary communication with respective laboratories.

Test Parameter	Test Method
Density at 15^0C	ASTM D 1298/ASTM D 4052
Distillation	ASTM D 86
Sulphur	ASTM D 2622/ASTM D4294/ASTM D5453
Kinematic Viscosity at 40^0C	ASTM D 445/ASTM D 7042
Pour Point	ASTM D97
Flash Point	ASTM D56

5. Statistical Evaluation:

5.1. Assigned Value was determined on the basis of consensus of results obtained from participant laboratories.

Assigned value x_{pt} is the robust average of the participant results determined by Algorithm A. The standard uncertainty of assigned value is estimated as;

$$[u(xpt)] = \frac{1.25}{\sqrt{p}} \times s^*$$

Where, S^* is the robust standard deviation

5.2. In this PT SDPA is determined in accordance with the method stipulated in section 8.5.1 of ISO 13528:2015. – using repeatability and reproducibility standard deviations of the test method given in ASTM standard test methods for different test parameters. The values of repeatability and reproducibility standard deviations given in the concerned ASTM method is used to calculate SDPA and are summarized in Table 5A

Table 5A : Values of Repeatability Standard Deviation σ_r and Reproducibility Standard Deviation σ_R

Test Parameter	Density at 15 °C g/ml		Flash Point, °C	Pour Point, °C	Sulphur, mg/Kg			Kinematic Viscosity at 40 °C, cSt	
Test Method	ASTM D 1298	ASTM D 4052	ASTM D 56	ASTM D 97	ASTM D 2622	ASTM D 4294	ASTM D 5453	ASTM D 445	ASTM D 7042
$\pm_r$	0.0005	0.00016	1.2	3	3.40	2.4	2.35	0.014	0.046
$\pm_R$	0.0012	0.00052	4.3	9	9.95	7.1	7.62	0.055	0.144

Test Parameter and Method	Distillation in °C (Manual, ASTM D 86)												
	IBP	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	FBP
$\pm_r$	2.7	2.6	2.4	2.1	1.9	1.7	1.7	1.7	1.8	1.9	2.0	2.3	1.9
$\pm_R$	7.2	7.1	6.3	5.3	4.7	4.1	3.9	4.0	4.2	4.7	5.0	5.9	4.5
Test Parameter & Method	Distillation in °C (Auto, ASTM D 86)												
$\pm_r$	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
$\pm_R$	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5

Standard deviation for proficiency assessment (σpt) shall be calculated using this information, as follows: $\pm_{pt} = \sqrt{\pm_R^2 - \pm_r^2 (1 - 1/m)}$

where m is the number of replicate measurements each participant is to perform in a round of the proficiency testing scheme. Here m is taken as 1, as participants have tested each measurand once .

SDPA is independent of the results reported by the participants, so number of participants is not going to influence SDPA.

5.3. The assigned values (x_{pt}) , standard uncertainties ($u(x_{pt})$) and Standard Deviation for Proficiency Assessment (σ_{pt}) are summarized in Table 5B

Table 5B: Assigned Value and Standard Uncertainty

Analyte	x_{pt}	$u(x_{pt})$	σ_{pt}
Flash Point, °C	42.8	0.31	4.3
Pour Point, °C	-3	0.0	9.0
Sulphur, mg/Kg	31.38	1.185	9.954
Sulphur, mg/Kg	33.58	0.796	7.090
Sulphur, mg/Kg	31.04	0.471	7.616
Kinematic Viscosity at 40^0C, cSt	2.464	0.00252	0.055
Kinematic Viscosity at 40^0C, cSt	2.467	0.00686	0.144
Density, 15 °C, g/ml	0.8238	0.00006	0.0012
Density, 15 °C, g/ml	0.82377	0.00002	0.0005

Analyte	x_{pt}	$u(x_{pt})$	σ_{pt}	x_{pt}	$u(x_{pt})$	σ_{pt}
Distillation	Auto			Manual		
IBP	137.2	0.440	7.49	138.4	0.817	7.20
5%	165.1	0.338	9.03	162.4	0.873	7.10
10%	180.1	0.322	3.94	178.4	0.579	6.30
20%	208.7	0.306	4.58	206.7	0.528	5.30
30%	232.8	0.237	3.00	231.5	0.459	4.70
40%	251.6	0.212	3.00	250.5	0.397	4.10
50%	267.5	0.187	3.00	266.5	0.347	3.90
60%	283.1	0.189	3.00	282.4	0.425	4.00
70%	299.9	0.179	3.00	299.7	0.438	4.20
80%	318.9	0.181	4.79	318.7	0.410	4.70
90%	342.5	0.245	5.15	342.6	0.502	5.00
95%	358.6	0.290	9.21	358.2	0.468	5.90
FBP	367.8	0.320	7.10	368.4	0.478	4.50

5.4 The participant's results are evaluated using the robust z-score which is calculated as follow:

$$Z_i = \frac{x_i - x_{pt}}{\pm \text{pt}}$$

Where, x_{pt} is the assigned value, and
σ_{pt} is the standard deviation for proficiency assessment.

5.5 The criteria for laboratory's performance evaluation are interpreted as follows:

$\|z\| \leq 2$	Satisfactory	
$2 < \|z\| < 3$	Questionable	Warning signal
$\|z\| \geq 3$	Unsatisfactory	Action signal

5.6 Participants having $|z| \geq 3$ should thoroughly investigate their results for finding the root cause. Participants having z-scores in the range $2.0 < |z| < 3.0$ are also encouraged to review their results.

5.7 In addition to tables of the results, z-scores, and summary statistics, the ordered z-score histograms are included in the report. On these charts each laboratory's z-score is shown in order of magnitude. The lab with $2.0 < |z| < 3$ are marked with blue colour bar on the graph. The laboratory with $|z| > 3$ are not reflected in histogram. From these charts each laboratory can readily compare its performance relative to other laboratories.

6 Test results of Participants:

6.4 Total 123 laboratories from 53 economies initially enrolled in the program. Out of 123 laboratories, 112 labs confirmed their participation and accordingly registered for participation. Out of 112 registered laboratories, the test results were submitted by 91 laboratories. The test results of one laboratory were not considered for evaluation for the reason mentioned under the clause 7.3. The geographical distribution of the laboratories is as given in Table-6.

6.5 The information on the method of analysis used for each measurand was also obtained along with the test results. The test results reported by the participating laboratories were subjected to robust statistical analysis to eliminate the influence of outliers. The summary of test method is given in Table-7.

Table 6 : Geographical Distribution of Participants

Sr. No	Economy	Registered number	Reported number	Sr. No	Economy	Registered number	Reported number
1	Algeria	2	2	24	Kingdome Of Saudi Arabia	4	4
2	Australia	2	2	25	Latvia	2	2
3	Austria	4	2	26	Malaysia	3	3
4	Bangladesh	1	0	27	Montevideo – Uruguay	1	1
5	Belgium	2	0	28	MOROCCO	3	0
6	Bolivia	1	0	29	New Zealand	3	3
7	Canada	4	3	30	Pakistan	2	2
8	Colombia	2	0	31	Philippines	4	3
9	Costa Rica	2	2	32	Portugal	2	2
10	Cyprus	2	2	33	Republic Of Korea	4	4
11	Czech Republic	2	2	34	Republic Of Serbia	2	2
12	Egypt	3	0	35	Russia	4	4
13	Estonia	2	2	36	Slovenia	2	2
14	Ethiopia	1	1	37	Sudan	2	2
15	Finland	2	2	38	Sultanate Of Oman	2	2
16	Greece	1	1	39	Sweden	2	2
17	India	3	3	40	Switzerland	1	1
18	Indonesia	4	0	41	Taiwan	4	4
19	Iraq	1	1	42	Thailand	5	5
20	Israel	2	2	43	Tunisia	3	3
21	Italy	2	2	44	United Arab Emirates	2	2
22	Jordan	1	1	45	USA	4	3
23	Kenya	1	1	46	Viet Nam	4	4
					TOTAL (Sr.No. 1 to 46)	112	91

6.6 Robust Z-score distribution table, The z-score distribution among participants and the lab codes with questionable or unsatisfactory results are summarized as follows:

Table 7 : Summary ot test method

Test Parameter	Method	Total No. of Labs	Percentage (%)
Distillation Auto	ASTM D 86	61	68%
Distillation Manual	ASTM D 86	32	36%
Density	ASTM D 1298	41	46%
Density	ASTM D 4052	69	77%
Flash Point	ASTM D 56	36	40%
Pour Point	ASTM D 97	66	73%
Sulphur	ASTM D 2622	14	16%
Sulphur	ASTM D 4294	32	36%
Sulphur	ASTM D 5453	45	50%
Kinematic Viscosity at 40^0C	ASTMD 445	71	79%
Kinematic Viscosity at 40^0C	ASTMD 7042	21	23%

7 Comments:

7.4 The test results highlighted in yellow are transformed as per the reporting requirement of testing protocol after necessary communication with respective laboratories.

7.5 The test results reported by some of the laboratories are not considered as it was reported by different test methods than those mentioned in the testing protocol.

7.6 The laboratory code APLAC PT T099-082 reported all the results by different test methods than those mentioned in the testing protocol. Therefore none of the results of this lab were considered for evaluation.

7.7 One participant (Lab code: APLAC PT T099-025) informed that results cannot be submitted for non functioning of lab due to wild fire.

7.8 One participant (Lab code: APLAC PT T099-048) could not submit the test results as per the time schedule.

7.9 One participant (Lab code: APLAC PT T099-006) could not submit test results due to leakage of sample reported by lab.

7.10 The test results received from 90 laboratories were considered for evaluation.

8 Remarks:

8.4 Contributions from all accreditation bodies, participants to this program are gratefully noted. Special thanks are also extended to APLAC PT Committee and the NABL for their support to the program.

8.5 If the participants have any queries about this report, please contact the coordinator of this proficiency testing programme as follows:

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8.6 Use of the report other than the demonstration of the performance shall only be allowed with the written permission from APLAC.

8.7 We would like to thank the members of advisory group as given in Appendix A who made valuable contribution for this evaluation.

9 Homogeneity & stability assessment:

9.4 Homogeneity

Prior to distribution, test samples were checked for homogeneity. Ten randomly selected samples, each divided into two portions, were analyzed for Density, Kinematic Viscosity at 40^{o}C and Total Sulphur under repeatability conditions; i.e., same laboratory, same operator, same method, and same apparatus. The results, together with their statistical evaluations are given below in Table 1A, 1B, 1C. The results of homogeneity testing indicated that there was no significant variation of test parameters existed in the samples. Therefore, any extreme results subsequently identified should not be attributed to sample variability.

Table-1A

APLAC PT T099 : DIESEL				
Homogeneity Study				
Density at 15deg C, Kg/m^3 by ASTM D1298				
Bottle ID	**Replicate 1**	**Replicate 2**	**Sample Average**	**Between-test-portion ranges, w_t**
10	824.0	824.1	**824.05**	**0.100**
29	824.1	824.0	**824.05**	**0.100**
52	824.0	824.1	**824.05**	**0.100**
70	824.1	824.0	**824.05**	**0.100**
99	824.0	824.1	**824.05**	**0.100**
119	824.1	824.0	**824.05**	**0.100**
126	824.0	824.1	**824.05**	**0.100**
150	824.1	824.0	**824.05**	**0.100**
170	824.0	824.1	**824.05**	**0.100**
197	824.1	824.0	**824.05**	**0.100**
Number of samples g			**10**	
Overall average			**824.05**	
SD of averages			**0.000**	
Within-samples STD , s_w			**0.071**	
Estimate of Between-samples STD, s_S			**0.0500**	
Standard Deviation of Proficiency Assessment (SDPA), σ_{pt}				
σ_{pt} Calculated from Standard test method (Precision Experiment)				**1.20**
Condition for Homogeneity			**Ss ≤ 0.3 × SDPA**	
Check value			**0.3 × σ_{pt}**	**0.3600**
Homogeneity using σ_{pt}			**Pass**	**Ss < check value, so homogeneity is sufficient**

Table-1B

APLAC PT T099 : DIESEL				
Homogeneity Study				
Sulphur content, mg/Kg by ASTM D4294				
Bottle ID	**Replicate 1**	**Replicate 2**	**Sample Average**	**Between-test-portion ranges, w_t**
10	34.1	30.2	**32.2**	**3.900**
29	34.2	33.1	**33.7**	**1.100**
52	34.0	32.3	**33.2**	**1.700**
70	34.1	30.9	**32.5**	**3.200**
99	34.7	32.0	**33.4**	**2.700**
119	34.4	32.5	**33.5**	**1.900**
126	34.1	36.5	**35.3**	**2.400**
150	32.9	33.4	**33.2**	**0.500**
170	32.4	30.4	**31.4**	**2.000**
197	36.6	32.6	**34.6**	**4.000**
Number of samples g			**10**	
Overall average			**33.27**	
SD of averages			**1.128**	
Within-samples STD , s_w			**1.823**	
Estimate of Between-samples STD, s_S			**0.6243**	
Standard Deviation of Proficiency Assessment (SDPA), σ_{pt}				
σ_{pt} Calculated from Standard test method (Precision Experiment)				**7.0902**
Condition for Homogeneity		**Ss ≤ 0.3 × SDPA**		
Check value		**0.3 × σ_{pt}**		**2.1271**
Homogeneity using σ_{pt}		**Pass**		**Ss < check value, so homogeneity is sufficient**

Table-1C

APLAC PT T099 : DIESEL				
Homogeneity Study				
Kinematic Viscosity at 40^0C, cSt by ASTM D445				
Bottle ID	**Replicate 1**	**Replicate 2**	**Sample Average**	**Between-test-portion ranges, w_t**
10	2.459	2.485	**2.4720**	**0.026**
29	2.481	2.463	**2.4720**	**0.018**
52	2.466	2.478	**2.4720**	**0.012**
70	2.476	2.470	**2.4730**	**0.006**
99	2.474	2.477	**2.4755**	**0.003**
119	2.474	2.476	**2.4750**	**0.002**
126	2.479	2.474	**2.4765**	**0.005**
150	2.471	2.476	**2.4735**	**0.005**
170	2.487	2.471	**2.4790**	**0.016**
197	2.470	2.491	**2.4805**	**0.021**
Number of samples g			**10**	
Overall average			**2.4749**	
SD of averages			**0.0030**	
Within-samples STD , s_w			**0.0098**	
Estimate of Between-samples STD, s_S			**0.0063**	
Standard Deviation of Proficiency Assessment (SDPA), σ_{pt}				
σ_{pt} Calculated from Standard test method (Precision Experiment)				**0.0554**
Condition for Homogeneity			**Ss ≤ 0.3 × SDPA**	
Check value			**0.3 × σ_{pt}**	**0.0166**
Homogeneity using σ_{pt}			**Pass**	**Ss < check value, so homogeneity is sufficient**

9.5 Stability

Assessment of the adequacy of stability & transport stability was calculated by comparing the general average of the measurements obtained in the homogeneity testing with the general average of the results obtained in the stability testing (ISO 13528:2015). Statistical analysis showed that the sample remained stable over the time of preparation to the last day of analysis and during transportation. The results are shown below in Table 2A,2B,2C – Stability and Table 3A,3B,3C – Transport Stability.

Table-2A

APLAC PT T099 : DIESEL		
Density at 15deg C, Kg/m^3 by ASTM D1298		
Stability sample	**Replicate 1**	**Replicate 2**
5	823.9	823.9
113	823.5	823.9
186	823.5	823.5
Number of samples g		**3**
Overall average:		**823.70**
General Average, Homogeneity	**X =**	**824.05**
General Average, Stability	**Y =**	**823.70**
Difference from Homogeneity mean:	**|X-Y|=**	**0.350**
Standard Deviation of Proficiency Assessment (SDPA)		
σ_{pt} Calculated from Standard test method (Precision Experiment)		**1.2000**
Condition for Stability	**|X-Y| ≤ 0.3 × SDPA**	
Check value	**0.3 × SDPA 1**	**0.36000**
Stability using SDPA 1	**PASS**	|X-Y|< check value, so stability is sufficient.

Table-2B

APLAC PT T099 : DIESEL		
Kinematic Viscosity at 40^0C, cSt by ASTM D445		
Stability sample	**Replicate 1**	**Replicate 2**
5	2.469	2.474
113	2.478	2.468
186	2.474	2.469
Number of samples g		**3**
Overall average:		**2.472**
General Average, Homogeneity	**X =**	**2.475**
General Average, Stability	**Y =**	**2.472**
Difference from Homogeneity mean:	**|X-Y|=**	**0.0029**
Standard Deviation of Proficiency Assessment (SDPA)		
σ_{pt} Calculated from Standard test method (Precision Experiment)		**0.0554**
Condition for Stability	**|X-Y| ≤ 0.3 × SDPA**	
Check value	**0.3 × SDPA 1**	**0.01663**
Stability using SDPA 1	**PASS**	|X-Y|< check value, so stability is sufficient.

Table-2C

APLAC PT T099 : DIESEL		
Sulphur content, mg/Kg by ASTM D4294		
Stability sample	**Replicate 1**	**Replicate 2**
5	30.2	30.9
113	33.1	32.0
186	32.3	32.3
Number of samples g		**3**
Overall average:		**31.80**
General Average, Homogeneity	**X =**	**33.27**
General Average, Stability	**Y =**	**31.80**
Difference from Homogeneity mean:	**|X-Y|=**	**1.47**
Standard Deviation of Proficiency Assessment (SDPA)		
σ_{pt} Calculated from Standard test method (Precision Experiment)		**7.0902**
Condition for Stability	**|X-Y| ≤ 0.3 × SDPA**	
Check value	**0.3 × SDPA 1**	**2.12706**
Stability using SDPA 1	**PASS**	|X-Y|< check value, so stability is sufficient.

Table-3A

APLAC PT T099 : DIESEL		
Density at 15deg C, Kg/m^3 by ASTM D1298		
Stability sample	**Replicate 1**	**Replicate 2**
23	823.9	823.9
101	823.8	823.9
158	823.9	824.0
Number of samples g		**3**
Overall average:		**823.90**
General Average, Homogeneity	**X =**	**824.05**
General Average, Stability	**Y =**	**823.90**
Difference from Homogeneity mean:	**|X-Y|=**	**0.15000**
Standard Deviation of Proficiency Assessment (SDPA)		
σ_{pt} Calculated from Standard test method (Precision Experiment)		**1.2000**
Condition for Stability	**|X-Y| ≤ 0.3 × SDPA**	
Check value	**0.3 × SDPA 1**	**0.36000**
Stability using SDPA 1	**PASS**	|X-Y|< check value, so stability is sufficient.

Table-3B

APLAC PT T099 : DIESEL		
Kinematic Viscosity at 40^0C, cSt by ASTM D445		
Stability sample	**Replicate 1**	**Replicate 2**
23	2.475	2.474
101	2.478	2.479
158	2.474	2.479
Number of samples g		**3**
Overall average:		**2.477**
General Average, Homogeneity	**X =**	**2.475**
General Average, Stability	**Y =**	**2.477**
Difference from Homogeneity mean:	**|X-Y|=**	**0.002**
Standard Deviation of Proficiency Assessment (SDPA)		
σ_{pt} Calculated from Standard test method (Precision Experiment)		**0.0554**
Condition for Stability	**|X-Y| ≤ 0.3 × SDPA**	
Check value	**0.3 × SDPA 1**	**0.01663**
Stability using SDPA 1	**PASS**	|X-Y|< check value, so stability is sufficient.

Table-3C

APLAC PT T099 : DIESEL		
Sulphur content, mg/Kg by ASTM D4294		
Stability sample	**Replicate 1**	**Replicate 2**
23	32.2	31.9
101	33.1	32.0
158	32.8	32.3
Number of samples g		**3**
Overall average:		**32.383**
General Average, Homogeneity	**X =**	**33.270**
General Average, Stability	**Y =**	**32.383**
Difference from Homogeneity mean:	**|X-Y|=**	**0.887**
Standard Deviation of Proficiency Assessment (SDPA)		
σ_{pt} Calculated from Standard test method (Precision Experiment)		**7.0902**
Condition for Stability	**|X-Y| ≤ 0.3 × SDPA**	
Check value	**0.3 × SDPA 1**	**2.12706**
Stability using SDPA 1	**PASS**	|X-Y|< check value, so stability is sufficient.

10 Confidentiality:

Bharat Petroleum Corporation Limited (BPCL) and National Accreditation Board for Testing and Calibration Laboratories (NABL) ensure that the identity of each and every participant in this proficiency testing scheme is kept confidential by use of codes and known only to persons involved in the operation of the proficiency testing scheme. However, in exceptional circumstances, if a regulatory authority or accreditation body requires the proficiency testing results to be directly provided to them, the concerned participants shall be notified of this action in writing.

11 References:

[1] ISO/IEC 17043:2010. Conformity Assessment – General Requirements for Proficiency Testing, International Standards Organization, Geneva, Switzerland, 2010.

[2] International Standards Organization. ISO 13528:2015, Statistical Methods for Use in Proficiency Testing by Interlaboratory Comparisons, ISO, Geneva, Switzerland, 2015.

Annexure 1: Participants results & z scores

Table 8 : Density at 15^{0}C,g/ml, ASTM D 1298

APLAC PT T099								
Density at 15^{0}C,g/ml, ASTM D 1298								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	0.8239	0.1	036	DNS	---	075	DNS	---
002	DNS	---	037	0.8234	-0.3	077	0.8232	-0.5
003	0.8240	0.2	038	DNS	---	078	DNS	---
004	DNS	---	039	DNS	---	079	0.8249	0.9
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	0.8237	-0.1	081	0.8237	-0.1
008	DNS	---	045	0.8235	-0.2	083	DNS	---
009	0.8236	-0.2	046	DNS	---	087	0.8242	0.3
010	0.8233	-0.4	049	DNS	---	088	DNS	---
012	0.8237	-0.1	050	DNS	---	089	0.8240	0.2
013	DNS	---	052	DNS	---	090	0.8240	0.2
015	DNS	---	054	0.8239	0.1	091	DNS	---
016	DNS	---	055	DNS	---	093	0.8240	0.2
017	0.8237	-0.1	056	0.8239	0.1	094	0.8260	1.8
019	DNS	---	057	DNS	---	095	0.8237	-0.1
020	0.8238	0.0	058	0.8238	0.0	096	0.8237	-0.1
021	DNS	---	059	DNS	---	098	0.8236	-0.2
022	0.8247	0.8	061	DNS	---	100	DNS	---
023	DNS	---	062	0.8242	0.3	102	DNS	---
024	0.8237	-0.1	064	DNS	---	104	DNS	---
026	DNS	---	065	DNS	---	105	DNS	---
027	DNS	---	066	0.8238	0.0	108	DNS	---
028	DNS	---	067	0.8237	-0.1	110	0.8240	0.2
029	DNS	---	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	0.8232	-0.5
031	0.8240	0.2	070	0.8239	0.1	115	DNS	---
032	0.8239	0.1	071	0.8235	-0.2	117	0.8235	-0.2
033	DNS	---	072	DNS	---	118	DNS	---
034	0.8234	-0.3	073	0.8240	0.2	119	0.8238	0.0
035	0.8238	0.0	074	0.8238	0.0	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 9 : Density at 15^{0}C,g/ml, ASTM D 4052

APLAC PT T099								
Density at 15^{0}C,g/ml, ASTM D 4052								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	0.8241	0.6	036	0.8233	-0.9	075	0.8238	0.1
002	0.8238	0.1	037	0.8237	-0.1	077	DNS	---
003	DNS	---	038	0.8239	0.3	078	DNS	---
004	0.8239	0.3	039	0.8237	-0.1	079	0.8240	0.4
005	0.8237	-0.1	041	0.8237	-0.1	080	0.8237	-0.1
007	0.8238	0.1	043	0.8238	0.1	081	0.8238	0.1
008	0.8237	-0.1	045	0.8236	-0.3	083	0.8237	-0.1
009	0.8237	-0.1	046	0.8238	0.1	087	DNS	---
010	0.8232	-1.1	049	0.8238	0.1	088	0.8238	0.1
012	DNS	---	050	0.8236	-0.3	089	DNS	---
013	DNS	---	052	0.8237	-0.1	090	DNS	---
015	0.8237	-0.1	054	DNS	---	091	0.8239	0.3
016	0.8237	-0.1	055	0.8237	-0.1	093	0.8237	-0.1
017	DNS	---	056	DNS	---	094	0.8259	4.1
019	0.8237	-0.1	057	0.8237	-0.1	095	0.8237	-0.1
020	0.8238	0.1	058	0.8242	0.8	096	DNS	---
021	DNS	---	059	0.8238	0.1	098	DNS	---
022	DNS	---	061	0.8238	0.1	100	0.8237	-0.1
023	0.8239	0.3	062	DNS	---	102	0.8238	0.1
024	0.8238	0.1	064	DNS	---	104	0.8239	0.3
026	0.8237	-0.1	065	0.8239	0.3	105	0.8238	0.1
027	0.8238	0.1	066	DNS	---	108	0.8237	-0.1
028	0.8237	-0.1	067	0.8238	0.1	110	0.8238	0.1
029	0.8237	-0.1	068	DNS	---	112	0.8239	0.3
030	0.8238	0.1	069	0.8226	-2.2	113	0.8237	-0.1
031	0.8237	-0.1	070	DNS	---	115	0.8239	0.2
032	0.8240	0.4	071	0.8237	-0.1	117	DNS	---
033	0.8238	0.1	072	0.8237	-0.1	118	0.8237	-0.1
034	0.8239	0.3	073	0.8239	0.3	119	0.8236	-0.3
035	0.8237	-0.1	074	0.8238	0.1	120	0.8241	0.6

Note1: “DNS” Data Not Submitted

Table 10: Flash Point, °C, ASTM D 56

APLAC PT T099								
Flash Point, °C, ASTM D 56								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	43.0	0.1	036	44.0	0.3	075	DNS	---
002	42.0	-0.2	037	DNS	---	077	DNS	---
003	43.0	0.1	038	41.5	-0.3	078	DNS	---
004	DNS	---	039	42.5	-0.1	079	41.0	-0.4
005	DNS	---	041	DNS	---	080	41.0	-0.4
007	DNS	---	043	43.5	0.2	081	DNS	---
008	DNS	---	045	44.5	0.4	083	42.5	-0.1
009	DNS	---	046	DNS	---	087	DNS	---
010	DNS	---	049	DNS	---	088	DNS	---
012	DNS	---	050	43.0	0.1	089	DNS	---
013	DNS	---	052	44.0	0.3	090	DNS	---
015	DNS	---	054	DNS	---	091	41.0	-0.4
016	DNS	---	055	DNS	---	093	41.0	-0.4
017	44.0	0.3	056	41.0	-0.4	094	42.0	-0.2
019	DNS	---	057	DNS	---	095	44.0	0.3
020	DNS	---	058	DNS	---	096	DNS	---
021	DNS	---	059	44.0	0.3	098	DNS	---
022	DNS	---	061	DNS	---	100	DNS	---
023	43.0	0.1	062	45.0	0.5	102	DNS	---
024	DNS	---	064	40.5	-0.5	104	43.0	0.1
026	DNS	---	065	47.0	1.0	105	40.0	-0.6
027	45.0	0.5	066	DNS	---	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	DNS	---	068	DNS	---	112	43.5	0.2
030	43.0	0.1	069	DNS	---	113	DNS	---
031	DNS	---	070	DNS	---	115	43.5	0.2
032	42.0	-0.2	071	DNS	---	117	44.0	0.3
033	DNS	---	072	DNS	---	118	41.5	-0.3
034	DNS	---	073	42.0	-0.2	119	43.0	0.1
035	DNS	---	074	42.5	-0.1	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 11: Pour Point, °C, ASTM D 97

APLAC PT T099								
Pour Point, °C, ASTM D 97								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	0	0.3	075	DNS	---
002	-3	0.0	037	DNS	---	077	DNS	---
003	-6	-0.3	038	-6	-0.3	078	DNS	---
004	-6	-0.3	039	-3	0.0	079	-3	0.0
005	DNS	---	041	DNS	---	080	-3	0.0
007	-3	0.0	043	-3	0.0	081	-3	0.0
008	-3	0.0	045	DNS	---	083	-3	0.0
009	-3	0.0	046	-6	-0.3	087	-6	-0.3
010	-3	0.0	049	DNS	---	088	-3	0.0
012	-3	0.0	050	-3	0.0	089	-6	-0.3
013	-6	-0.3	052	0	0.3	090	-3	0.0
015	-3	0.0	054	-6	-0.3	091	DNS	---
016	-3	0.0	055	-3	0.0	093	-6	-0.3
017	-3	0.0	056	DNS	---	094	-6	-0.3
019	-6	-0.3	057	DNS	---	095	-3	0.0
020	-3	0.0	058	-9	-0.7	096	-6	-0.3
021	-6	-0.3	059	-3	0.0	098	-6	-0.3
022	-6	-0.3	061	DNS	---	100	-3	0.0
023	-3	0.0	062	DNS	---	102	DNS	---
024	-3	0.0	064	DNS	---	104	-6	-0.3
026	DNS	---	065	DNS	---	105	-3	0.0
027	0	0.3	066	-6	-0.3	108	-3	0.0
028	-6	-0.3	067	-3	0.0	110	-3	0.0
029	-3	0.0	068	-3	0.0	112	DNS	---
030	-3	0.0	069	DNS	---	113	DNS	---
031	-6	-0.3	070	DNS	---	115	-3	0.0
032	-9	-0.7	071	-6	-0.3	117	-3	0.0
033	DNS	---	072	DNS	---	118	-3	0.0
034	-6	-0.3	073	-6	-0.3	119	-3	0.0
035	-3	0.0	074	-3	0.0	120	-9	-0.7

Note1: “DNS” Data Not Submitted

Table 12 : Sulphur, mg/Kg, ASTM D 2622

APLAC PT T099								
Sulphur, mg/Kg, ASTM D 2622								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	33	0.2	037	DNS	---	077	DNS	---
003	29	-0.2	038	DNS	---	078	DNS	---
004	DNS	---	039	DNS	---	079	DNS	---
005	DNS	---	041	27	-0.4	080	DNS	---
007	DNS	---	043	DNS	---	081	33	0.1
008	DNS	---	045	DNS	---	083	DNS	---
009	DNS	---	046	DNS	---	087	DNS	---
010	DNS	---	049	DNS	---	088	DNS	---
012	DNS	---	050	DNS	---	089	32	0.1
013	DNS	---	052	DNS	---	090	DNS	---
015	DNS	---	054	DNS	---	091	DNS	---
016	36	0.5	055	DNS	---	093	DNS	---
017	DNS	---	056	DNS	---	094	36	0.5
019	31	0.0	057	DNS	---	095	DNS	---
020	24	-0.8	058	DNS	---	096	DNS	---
021	DNS	---	059	DNS	---	098	DNS	---
022	DNS	---	061	DNS	---	100	DNS	---
023	DNS	---	062	306	27.6	102	30	-0.1
024	DNS	---	064	DNS	---	104	DNS	---
026	DNS	---	065	DNS	---	105	DNS	---
027	DNS	---	066	31.0	0.0	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	DNS	---	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	DNS	---	070	DNS	---	115	DNS	---
032	DNS	---	071	DNS	---	117	DNS	---
033	DNS	---	072	30	-0.1	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	34	0.3	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 13: Sulphur, mg/Kg, ASTM D 4294

APLAC PT T099								
Sulphur, mg/Kg, ASTM D 4294								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	70	5.1	075	DNS	---
002	DNS	---	037	34	0.1	077	36	0.3
003	DNS	---	038	110	10.8	078	DNS	---
004	DNS	---	039	DNS	---	079	190	22.1
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	34	0.1
008	DNS	---	045	DNS	---	083	85	7.3
009	DNS	---	046	DNS	---	087	DNS	---
010	40	0.9	049	DNS	---	088	DNS	---
012	DNS	---	050	DNS	---	089	35	0.2
013	DNS	---	052	DNS	---	090	DNS	---
015	31	-0.4	054	DNS	---	091	33	0.0
016	DNS	---	055	DNS	---	093	DNS	---
017	20	-1.9	056	DNS	---	094	32	-0.2
019	DNS	---	057	DNS	---	095	DNS	---
020	DNS	---	058	37	0.5	096	33	-0.1
021	1	-4.6	059	DNS	---	098	DNS	---
022	DNS	---	061	DNS	---	100	DNS	---
023	DNS	---	062	DNS	---	102	DNS	---
024	31	-0.4	064	DNS	---	104	19	-2.1
026	DNS	---	065	DNS	---	105	54	2.9
027	DNS	---	066	DNS	---	108	DNS	---
028	DNS	---	067	34	0.1	110	DNS	---
029	DNS	---	068	34	0.0	112	DNS	---
030	36	0.3	069	DNS	---	113	34	0.0
031	32	-0.2	070	36	0.3	115	DNS	---
032	33	-0.1	071	25	-1.2	117	DNS	---
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	29	-0.6	119	32	-0.2
035	35	0.2	074	34	0.1	120	49	2.2

Note1: “DNS” Data Not Submitted

Table 14 : Sulphur, mg/Kg, ASTM D 5453

APLAC PT T099								
Sulphur, mg/Kg, ASTM D 5453								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	33	0.3	037	DNS	---	077	DNS	---
003	DNS	---	038	DNS	---	078	DNS	---
004	DNS	---	039	31	0.0	079	DNS	---
005	DNS	---	041	30	-0.1	080	33	0.3
007	29	-0.3	043	30	-0.1	081	30	-0.1
008	43	1.6	045	32	0.1	083	26	-0.7
009	DNS	---	046	DNS	---	087	27	-0.5
010	DNS	---	049	35	0.5	088	DNS	---
012	28	-0.4	050	31	0.0	089	33	0.3
013	DNS	---	052	DNS	---	090	DNS	---
015	DNS	---	054	31	0.0	091	DNS	---
016	DNS	---	055	32	0.1	093	DNS	---
017	DNS	---	056	DNS	---	094	36	0.7
019	DNS	---	057	DNS	---	095	40	1.2
020	25	-0.7	058	DNS	---	096	DNS	---
021	DNS	---	059	31	0.0	098	29	-0.3
022	33	0.3	061	31	-0.1	100	30	-0.1
023	29	-0.3	062	DNS	---	102	DNS	---
024	DNS	---	064	DNS	---	104	DNS	---
026	DNS	---	065	DNS	---	105	DNS	---
027	32	0.1	066	DNS	---	108	33	0.3
028	31	0.0	067	31	0.0	110	5	-3.4
029	30	-0.1	068	DNS	---	112	DNS	---
030	31	0.0	069	DNS	---	113	31	0.0
031	29	-0.3	070	DNS	---	115	33	0.3
032	31	0.0	071	29	-0.3	117	48	2.2
033	32	0.1	072	32	0.1	118	31	0.0
034	DNS	---	073	27	-0.5	119	27	-0.5
035	DNS	---	074	33	0.2	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 15 : Kinematic Viscosity at 40°C, cSt, ASTM D 445

APLAC PT T099								
Kinematic Viscosity at 40°C, cSt, ASTM D 445								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	2.380	-1.5	077	2.427	-0.7
003	2.421	-0.8	038	2.476	0.2	078	DNS	---
004	2.464	0.0	039	4.457	35.9	079	2.492	0.5
005	DNS	---	041	2.459	-0.1	080	DNS	---
007	DNS	---	043	2.457	-0.1	081	2.465	0.0
008	2.462	0.0	045	DNS	---	083	2.448	-0.3
009	DNS	---	046	2.417	-0.9	087	2.470	0.1
010	2.601	2.5	049	4.198	31.3	088	2.465	0.0
012	2.465	0.0	050	2.476	0.2	089	2.461	-0.1
013	2.470	0.1	052	2.417	-0.9	090	2.893	7.7
015	2.463	0.0	054	DNS	---	091	DNS	---
016	2.449	-0.3	055	DNS	---	093	2.468	0.1
017	2.464	0.0	056	DNS	---	094	2.443	-0.4
019	2.461	-0.1	057	2.509	0.8	095	2.464	0.0
020	2.489	0.4	058	2.479	0.3	096	2.455	-0.2
021	DNS	---	059	DNS	---	098	2.484	0.4
022	2.472	0.1	061	2.453	-0.2	100	2.498	0.6
023	2.465	0.0	062	4.600	38.5	102	2.467	0.0
024	2.454	-0.2	064	2.522	1.0	104	2.450	-0.3
026	2.457	-0.1	065	2.452	-0.2	105	2.455	-0.2
027	2.462	0.0	066	2.446	-0.3	108	DNS	---
028	DNS	---	067	2.463	0.0	110	2.469	0.1
029	2.507	0.8	068	2.452	-0.2	112	DNS	---
030	2.459	-0.1	069	2.496	0.6	113	2.461	-0.1
031	2.448	-0.3	070	2.476	0.2	115	2.464	0.0
032	2.660	3.5	071	2.460	-0.1	117	2.506	0.7
033	2.467	0.0	072	2.459	-0.1	118	2.454	-0.2
034	2.467	0.0	073	2.464	0.0	119	2.458	-0.1
035	2.482	0.3	074	2.503	0.7	120	2.744	5.0

Note1: “DNS” Data Not Submitted

Table 16 : Auto Distillation, Deg C, IBP, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, IBP, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	135.9	-0.2	036	128.4	-1.2	075	DNS	---
002	142.5	0.7	037	DNS	---	077	DNS	---
003	138.6	0.2	038	DNS	---	078	DNS	---
004	DNS	---	039	131.2	-0.8	079	DNS	---
005	140.7	0.5	041	140.1	0.4	080	136.0	-0.2
007	139.9	0.4	043	138.9	0.2	081	133.9	-0.4
008	136.0	-0.2	045	136.3	-0.1	083	DNS	---
009	DNS	---	046	DNS	---	087	139.1	0.3
010	DNS	---	049	95.1	-5.6	088	138.0	0.1
012	DNS	---	050	DNS	---	089	135.8	-0.2
013	139.0	0.2	052	DNS	---	090	DNS	---
015	140.9	0.5	054	133.2	-0.5	091	135.7	-0.2
016	139.9	0.4	055	136.4	-0.1	093	140.6	0.5
017	139.4	0.3	056	137.9	0.1	094	140.2	0.4
019	135.1	-0.3	057	DNS	---	095	133.8	-0.5
020	137.4	0.0	058	134.7	-0.3	096	136.0	-0.2
021	133.9	-0.4	059	141.8	0.6	098	DNS	---
022	140.3	0.4	061	139.6	0.3	100	DNS	---
023	137.6	0.1	062	DNS	---	102	137.1	0.0
024	135.8	-0.2	064	DNS	---	104	139.4	0.3
026	139.8	0.3	065	DNS	---	105	DNS	---
027	136.0	-0.2	066	136.1	-0.1	108	135.4	-0.2
028	136.1	-0.1	067	135.2	-0.3	110	136.5	-0.1
029	DNS	---	068	122.4	-2.0	112	138.3	0.1
030	139.8	0.3	069	DNS	---	113	136.1	-0.1
031	137.0	0.0	070	131.5	-0.8	115	136.8	-0.1
032	DNS	---	071	138.2	0.1	117	DNS	---
033	137.5	0.0	072	138.7	0.2	118	135.3	-0.3
034	137.4	0.0	073	140.0	0.4	119	128.6	-1.1
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 17 : Auto Distillation, Deg C, 5% Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 5% Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	163.5	-0.2	075	DNS	---
002	166.2	0.1	037	DNS	---	077	DNS	---
003	163.4	-0.2	038	DNS	---	078	DNS	---
004	DNS	---	039	169.3	0.5	079	DNS	---
005	166.8	0.2	041	165.8	0.1	080	160.3	-0.5
007	164.3	-0.1	043	166.6	0.2	081	164.6	-0.1
008	167.2	0.2	045	164.7	0.0	083	DNS	---
009	DNS	---	046	DNS	---	087	166.3	0.1
010	DNS	---	049	137.3	-3.1	088	166.1	0.1
012	DNS	---	050	DNS	---	089	162.7	-0.3
013	165.1	0.0	052	DNS	---	090	DNS	---
015	168.0	0.3	054	163.7	-0.2	091	DNS	---
016	166.5	0.2	055	166.7	0.2	093	165.4	0.0
017	165.7	0.1	056	165.5	0.0	094	166.8	0.2
019	158.6	-0.7	057	DNS	---	095	163.1	-0.2
020	165.1	0.0	058	163.7	-0.2	096	164.0	-0.1
021	158.7	-0.7	059	169.1	0.4	098	DNS	---
022	166.4	0.1	061	165.2	0.0	100	DNS	---
023	166.2	0.1	062	DNS	---	102	163.6	-0.2
024	167.5	0.3	064	DNS	---	104	166.7	0.2
026	163.1	-0.2	065	DNS	---	105	DNS	---
027	163.6	-0.2	066	163.9	-0.1	108	165.0	0.0
028	166.0	0.1	067	164.5	-0.1	110	166.0	0.1
029	DNS	---	068	148.9	-1.8	112	163.3	-0.2
030	170.4	0.6	069	DNS	---	113	164.6	-0.1
031	163.3	-0.2	070	156.5	-0.9	115	167.0	0.2
032	DNS	---	071	162.5	-0.3	117	DNS	---
033	166.8	0.2	072	166.7	0.2	118	167.1	0.2
034	165.6	0.1	073	165.5	0.0	119	159.9	-0.6
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 18 : Auto Distillation, Deg C, 10 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 10 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	180.3	0.0	036	176.9	-0.8	075	DNS	---
002	181.6	0.4	037	DNS	---	077	DNS	---
003	179.0	-0.3	038	DNS	---	078	DNS	---
004	DNS	---	039	182.8	0.7	079	DNS	---
005	182.5	0.6	041	180.9	0.2	080	176.4	-0.9
007	181.3	0.3	043	181.3	0.3	081	178.3	-0.5
008	181.2	0.3	045	181.1	0.2	083	DNS	---
009	DNS	---	046	DNS	---	087	182.9	0.7
010	DNS	---	049	155.9	-6.1	088	179.4	-0.2
012	DNS	---	050	DNS	---	089	178.6	-0.4
013	180.0	0.0	052	DNS	---	090	DNS	---
015	182.1	0.5	054	178.9	-0.3	091	179.2	-0.2
016	182.1	0.5	055	180.5	0.1	093	182.0	0.5
017	181.4	0.3	056	180.4	0.1	094	180.8	0.2
019	174.9	-1.3	057	DNS	---	095	179.1	-0.3
020	180.2	0.0	058	179.6	-0.1	096	179.0	-0.3
021	174.6	-1.4	059	183.1	0.8	098	DNS	---
022	181.8	0.4	061	180.1	0.0	100	DNS	---
023	181.0	0.2	062	DNS	---	102	179.2	-0.2
024	181.2	0.3	064	DNS	---	104	182.2	0.5
026	178.9	-0.3	065	DNS	---	105	DNS	---
027	177.6	-0.6	066	179.1	-0.3	108	180.3	0.0
028	181.5	0.3	067	178.0	-0.5	110	177.5	-0.7
029	DNS	---	068	163.7	-4.2	112	180.9	0.2
030	185.6	1.4	069	DNS	---	113	180.0	0.0
031	177.7	-0.6	070	171.5	-2.2	115	180.3	0.0
032	DNS	---	071	178.5	-0.4	117	DNS	---
033	181.5	0.3	072	181.8	0.4	118	182.6	0.6
034	180.2	0.0	073	179.8	-0.1	119	173.8	-1.6
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 19: Auto Distillation, Deg C, 20 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 20 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	207.6	-0.2	036	206.5	-0.5	075	DNS	---
002	206.3	-0.5	037	DNS	---	077	DNS	---
003	208.3	-0.1	038	DNS	---	078	DNS	---
004	DNS	---	039	209.7	0.2	079	DNS	---
005	211.3	0.6	041	208.8	0.0	080	206.4	-0.5
007	209.1	0.1	043	209.7	0.2	081	207.6	-0.2
008	209.3	0.1	045	211.6	0.6	083	DNS	---
009	DNS	---	046	DNS	---	087	211.4	0.6
010	DNS	---	049	203.1	-1.2	088	210.2	0.3
012	DNS	---	050	DNS	---	089	208.5	0.0
013	195.1	-3.0	052	DNS	---	090	DNS	---
015	210.4	0.4	054	207.9	-0.2	091	DNS	---
016	211.1	0.5	055	208.5	0.0	093	209.2	0.1
017	210.6	0.4	056	209.3	0.1	094	207.7	-0.2
019	204.5	-0.9	057	DNS	---	095	206.7	-0.4
020	210.9	0.5	058	210.3	0.4	096	208.0	-0.1
021	205.0	-0.8	059	211.5	0.6	098	DNS	---
022	209.1	0.1	061	208.4	-0.1	100	DNS	---
023	208.8	0.0	062	DNS	---	102	208.2	-0.1
024	209.6	0.2	064	DNS	---	104	209.8	0.2
026	208.0	-0.1	065	DNS	---	105	DNS	---
027	207.3	-0.3	066	208.7	0.0	108	209.2	0.1
028	209.5	0.2	067	207.1	-0.3	110	208.9	0.0
029	DNS	---	068	194.4	-3.1	112	210.4	0.4
030	213.8	1.1	069	DNS	---	113	208.9	0.0
031	206.1	-0.6	070	200.5	-1.8	115	208.8	0.0
032	DNS	---	071	208.0	-0.1	117	DNS	---
033	209.8	0.2	072	209.6	0.2	118	210.3	0.4
034	208.5	0.0	073	207.8	-0.2	119	204.2	-1.0
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 20 : Auto Distillation, Deg C, 30 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 30 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	231.5	-0.4	036	230.8	-0.7	075	DNS	---
002	229.8	-1.0	037	DNS	---	077	DNS	---
003	232.5	-0.1	038	DNS	---	078	DNS	---
004	DNS	---	039	234.0	0.4	079	DNS	---
005	235.1	0.8	041	233.1	0.1	080	230.8	-0.7
007	233.1	0.1	043	234.3	0.5	081	232.1	-0.2
008	232.5	-0.1	045	235.3	0.8	083	DNS	---
009	DNS	---	046	DNS	---	087	234.4	0.5
010	DNS	---	049	236.0	1.1	088	233.5	0.2
012	DNS	---	050	DNS	---	089	232.3	-0.2
013	233.2	0.1	052	DNS	---	090	DNS	---
015	233.9	0.4	054	232.0	-0.3	091	DNS	---
016	234.9	0.7	055	232.3	-0.2	093	233.1	0.1
017	234.4	0.5	056	233.6	0.3	094	231.0	-0.6
019	228.6	-1.4	057	DNS	---	095	230.3	-0.8
020	234.4	0.5	058	233.4	0.2	096	232.1	-0.2
021	228.5	-1.4	059	234.3	0.5	098	DNS	---
022	232.2	-0.2	061	233.1	0.1	100	DNS	---
023	233.2	0.1	062	DNS	---	102	232.0	-0.3
024	233.8	0.3	064	DNS	---	104	233.3	0.2
026	233.2	0.1	065	DNS	---	105	DNS	---
027	232.1	-0.2	066	232.4	-0.1	108	233.0	0.1
028	233.2	0.1	067	231.4	-0.5	110	232.7	0.0
029	DNS	---	068	223.9	-3.0	112	233.2	0.1
030	236.7	1.3	069	DNS	---	113	232.3	-0.2
031	231.8	-0.3	070	225.5	-2.4	115	233.2	0.1
032	DNS	---	071	233.2	0.1	117	DNS	---
033	233.8	0.3	072	233.4	0.2	118	233.8	0.3
034	232.7	0.0	073	233.0	0.1	119	228.7	-1.4
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 21 : Auto Distillation, Deg C, 40 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 40 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	250.9	-0.2	036	249.0	-0.9	075	DNS	---
002	250.1	-0.5	037	DNS	---	077	DNS	---
003	250.8	-0.3	038	DNS	---	078	DNS	---
004	DNS	---	039	253.0	0.5	079	DNS	---
005	253.9	0.8	041	251.5	0.0	080	249.7	-0.6
007	252.2	0.2	043	252.8	0.4	081	250.8	-0.3
008	251.8	0.1	045	254.0	0.8	083	DNS	---
009	DNS	---	046	DNS	---	087	253.3	0.6
010	DNS	---	049	261.9	3.4	088	253.1	0.5
012	DNS	---	050	DNS	---	089	250.8	-0.3
013	251.8	0.1	052	DNS	---	090	DNS	---
015	252.8	0.4	054	251.4	-0.1	091	DNS	---
016	252.9	0.4	055	251.5	0.0	093	251.4	-0.1
017	253.2	0.5	056	253.1	0.5	094	249.8	-0.6
019	249.6	-0.7	057	DNS	---	095	250.5	-0.4
020	252.3	0.2	058	251.4	-0.1	096	251.5	0.0
021	248.2	-1.1	059	252.1	0.2	098	DNS	---
022	251.2	-0.1	061	251.2	-0.1	100	DNS	---
023	252.2	0.2	062	DNS	---	102	250.9	-0.2
024	252.4	0.3	064	DNS	---	104	251.6	0.0
026	252.2	0.2	065	DNS	---	105	DNS	---
027	250.9	-0.2	066	251.4	-0.1	108	251.2	-0.1
028	252.0	0.1	067	251.6	0.0	110	251.5	0.0
029	DNS	---	068	244.3	-2.4	112	251.4	-0.1
030	255.0	1.1	069	DNS	---	113	251.1	-0.2
031	249.8	-0.6	070	245.5	-2.0	115	251.1	-0.2
032	DNS	---	071	251.8	0.1	117	DNS	---
033	252.4	0.3	072	252.5	0.3	118	253.3	0.6
034	252.2	0.2	073	251.4	-0.1	119	247.6	-1.3
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 22 : Auto Distillation, Deg C, 50 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 50 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	267.0	-0.2	036	265.4	-0.7	075	DNS	---
002	266.5	-0.3	037	DNS	---	077	DNS	---
003	267.0	-0.2	038	DNS	---	078	DNS	---
004	DNS	---	039	268.4	0.3	079	DNS	---
005	269.4	0.6	041	267.4	0.0	080	265.5	-0.7
007	267.4	0.0	043	268.7	0.4	081	266.8	-0.2
008	268.0	0.2	045	269.5	0.7	083	DNS	---
009	DNS	---	046	DNS	---	087	269.3	0.6
010	DNS	---	049	283.8	5.4	088	269.4	0.6
012	DNS	---	050	DNS	---	089	267.5	0.0
013	267.4	0.0	052	DNS	---	090	DNS	---
015	268.6	0.4	054	266.9	-0.2	091	268.2	0.2
016	268.7	0.4	055	267.1	-0.1	093	267.1	-0.1
017	268.6	0.4	056	268.9	0.5	094	265.8	-0.6
019	266.5	-0.3	057	DNS	---	095	266.8	-0.2
020	268.2	0.2	058	267.6	0.0	096	267.7	0.1
021	265.1	-0.8	059	267.0	-0.2	098	DNS	---
022	267.4	0.0	061	267.4	0.0	100	DNS	---
023	267.9	0.1	062	DNS	---	102	267.5	0.0
024	268.8	0.4	064	DNS	---	104	265.9	-0.5
026	268.2	0.2	065	DNS	---	105	DNS	---
027	266.7	-0.3	066	267.6	0.0	108	267.1	-0.1
028	267.6	0.0	067	267.6	0.0	110	268.3	0.3
029	DNS	---	068	261.9	-1.9	112	267.6	0.0
030	271.7	1.4	069	DNS	---	113	267.0	-0.2
031	265.9	-0.5	070	262.5	-1.7	115	267.3	-0.1
032	DNS	---	071	267.9	0.1	117	DNS	---
033	268.2	0.2	072	268.0	0.2	118	268.8	0.4
034	267.9	0.1	073	267.8	0.1	119	264.7	-0.9
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 23 : Auto Distillation, Deg C, 60 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 60 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	281.9	-0.4	036	281.7	-0.5	075	DNS	---
002	282.3	-0.3	037	DNS	---	077	DNS	---
003	283.9	0.3	038	DNS	---	078	DNS	---
004	DNS	---	039	283.9	0.3	079	DNS	---
005	285.1	0.7	041	282.8	-0.1	080	281.2	-0.6
007	283.3	0.1	043	284.3	0.4	081	282.6	-0.2
008	283.2	0.0	045	284.8	0.6	083	DNS	---
009	DNS	---	046	DNS	---	087	285.1	0.7
010	DNS	---	049	305.9	7.6	088	284.1	0.3
012	DNS	---	050	DNS	---	089	282.6	-0.2
013	283.0	0.0	052	DNS	---	090	DNS	---
015	284.3	0.4	054	282.5	-0.2	091	DNS	---
016	284.6	0.5	055	282.8	-0.1	093	282.6	-0.2
017	284.4	0.4	056	284.6	0.5	094	281.7	-0.5
019	281.7	-0.5	057	DNS	---	095	282.8	-0.1
020	283.7	0.2	058	282.8	-0.1	096	283.4	0.1
021	281.3	-0.6	059	282.6	-0.2	098	DNS	---
022	283.0	0.0	061	282.8	-0.1	100	DNS	---
023	283.2	0.0	062	DNS	---	102	283.1	0.0
024	284.3	0.4	064	DNS	---	104	281.5	-0.5
026	283.5	0.1	065	DNS	---	105	DNS	---
027	282.4	-0.2	066	283.3	0.1	108	282.3	-0.3
028	283.0	0.0	067	283.6	0.2	110	284.0	0.3
029	DNS	---	068	277.8	-1.8	112	283.0	0.0
030	287.0	1.3	069	DNS	---	113	282.7	-0.1
031	281.1	-0.7	070	278.5	-1.5	115	282.5	-0.2
032	DNS	---	071	283.5	0.1	117	DNS	---
033	283.5	0.1	072	283.6	0.2	118	284.1	0.3
034	283.5	0.1	073	283.5	0.1	119	280.5	-0.9
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 24: Auto Distillation, Deg C, 70 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 70 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	298.0	-0.6	036	298.6	-0.4	075	DNS	---
002	299.7	-0.1	037	DNS	---	077	DNS	---
003	300.5	0.2	038	DNS	---	078	DNS	---
004	DNS	---	039	300.2	0.1	079	DNS	---
005	301.5	0.5	041	299.8	0.0	080	298.1	-0.6
007	299.8	0.0	043	300.9	0.3	081	299.5	-0.1
008	300.1	0.1	045	301.3	0.5	083	DNS	---
009	DNS	---	046	DNS	---	087	302.1	0.7
010	DNS	---	049	328.5	9.5	088	300.3	0.1
012	DNS	---	050	DNS	---	089	300.2	0.1
013	299.7	-0.1	052	DNS	---	090	DNS	---
015	300.8	0.3	054	299.5	-0.1	091	DNS	---
016	301.5	0.5	055	299.6	-0.1	093	299.7	-0.1
017	301.2	0.4	056	301.0	0.4	094	298.7	-0.4
019	298.3	-0.5	057	DNS	---	095	299.3	-0.2
020	300.6	0.2	058	299.6	-0.1	096	300.2	0.1
021	298.1	-0.6	059	299.5	-0.1	098	DNS	---
022	299.6	-0.1	061	300.1	0.1	100	DNS	---
023	299.6	-0.1	062	DNS	---	102	299.4	-0.2
024	301.4	0.5	064	DNS	---	104	298.2	-0.6
026	300.0	0.0	065	DNS	---	105	DNS	---
027	299.1	-0.3	066	300.1	0.1	108	299.0	-0.3
028	299.3	-0.2	067	300.6	0.2	110	300.8	0.3
029	DNS	---	068	295.8	-1.4	112	299.8	0.0
030	303.6	1.2	069	DNS	---	113	299.7	-0.1
031	298.6	-0.4	070	296.0	-1.3	115	299.3	-0.2
032	DNS	---	071	300.1	0.1	117	DNS	---
033	300.0	0.0	072	300.4	0.2	118	300.3	0.1
034	300.2	0.1	073	300.6	0.2	119	297.3	-0.9
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 25 : Auto Distillation, Deg C, 80 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 80 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	316.3	-0.5	036	318.2	-0.2	075	DNS	---
002	319.2	0.1	037	DNS	---	077	DNS	---
003	319.6	0.1	038	DNS	---	078	DNS	---
004	DNS	---	039	318.7	0.0	079	DNS	---
005	320.7	0.4	041	318.6	-0.1	080	317.2	-0.4
007	318.9	0.0	043	320.0	0.2	081	318.5	-0.1
008	319.5	0.1	045	320.1	0.2	083	DNS	---
009	DNS	---	046	DNS	---	087	321.9	0.6
010	DNS	---	049	353.3	7.2	088	319.9	0.2
012	DNS	---	050	DNS	---	089	319.3	0.1
013	319.0	0.0	052	DNS	---	090	DNS	---
015	320.2	0.3	054	318.4	-0.1	091	DNS	---
016	321.2	0.5	055	319.1	0.0	093	319.2	0.1
017	320.2	0.3	056	319.9	0.2	094	318.1	-0.2
019	316.5	-0.5	057	DNS	---	095	319.5	0.1
020	320.3	0.3	058	318.6	-0.1	096	319.3	0.1
021	317.5	-0.3	059	318.6	-0.1	098	DNS	---
022	318.3	-0.1	061	319.5	0.1	100	DNS	---
023	318.1	-0.2	062	DNS	---	102	317.9	-0.2
024	320.9	0.4	064	DNS	---	104	317.5	-0.3
026	318.7	0.0	065	DNS	---	105	DNS	---
027	318.3	-0.1	066	319.5	0.1	108	318.2	-0.2
028	317.6	-0.3	067	319.5	0.1	110	319.4	0.1
029	DNS	---	068	315.6	-0.7	112	318.8	0.0
030	323.0	0.9	069	DNS	---	113	318.9	0.0
031	318.0	-0.2	070	315.0	-0.8	115	318.3	-0.1
032	DNS	---	071	319.4	0.1	117	DNS	---
033	319.1	0.0	072	319.4	0.1	118	319.0	0.0
034	318.9	0.0	073	319.4	0.1	119	315.9	-0.6
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 26 : Auto Distillation, Deg C, 90 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 90 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	339.6	-0.6	036	342.7	0.0	075	DNS	---
002	344.7	0.4	037	DNS	---	077	DNS	---
003	343.0	0.1	038	DNS	---	078	DNS	---
004	DNS	---	039	341.6	-0.2	079	DNS	---
005	344.5	0.4	041	341.3	-0.2	080	340.3	-0.4
007	342.5	0.0	043	343.6	0.2	081	342.3	0.0
008	342.3	0.0	045	342.8	0.0	083	DNS	---
009	DNS	---	046	DNS	---	087	345.9	0.7
010	DNS	---	049	382.1	7.7	088	344.5	0.4
012	DNS	---	050	DNS	---	089	342.8	0.0
013	342.8	0.0	052	DNS	---	090	DNS	---
015	344.0	0.3	054	342.3	0.0	091	344.9	0.5
016	346.1	0.7	055	342.0	-0.1	093	343.3	0.1
017	343.3	0.1	056	343.6	0.2	094	343.1	0.1
019	340.3	-0.4	057	DNS	---	095	343.6	0.2
020	344.4	0.4	058	341.9	-0.1	096	343.5	0.2
021	341.4	-0.2	059	341.5	-0.2	098	DNS	---
022	341.4	-0.2	061	343.6	0.2	100	DNS	---
023	341.0	-0.3	062	DNS	---	102	340.8	-0.3
024	344.4	0.4	064	DNS	---	104	340.5	-0.4
026	341.8	-0.1	065	DNS	---	105	DNS	---
027	341.8	-0.1	066	343.2	0.1	108	342.3	0.0
028	341.1	-0.3	067	343.5	0.2	110	342.3	0.0
029	DNS	---	068	340.5	-0.4	112	342.3	0.0
030	347.2	0.9	069	DNS	---	113	342.8	0.0
031	341.7	-0.2	070	339.5	-0.6	115	341.3	-0.2
032	DNS	---	071	343.6	0.2	117	DNS	---
033	342.8	0.0	072	343.1	0.1	118	341.5	-0.2
034	342.9	0.1	073	342.5	0.0	119	338.9	-0.7
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 27 : Auto Distillation, Deg C, 95 % Rec, ASTM D 86

APLAC PT T099								
Auto Distillation, Deg C, 95 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	356.2	-0.3	036	359.5	0.1	075	DNS	---
002	362.3	0.4	037	DNS	---	077	DNS	---
003	359.1	0.1	038	DNS	---	078	DNS	---
004	DNS	---	039	357.4	-0.1	079	DNS	---
005	360.8	0.2	041	356.9	-0.2	080	356.0	-0.3
007	359.2	0.1	043	359.4	0.1	081	358.5	0.0
008	358.2	0.0	045	358.3	0.0	083	DNS	---
009	DNS	---	046	DNS	---	087	363.4	0.5
010	DNS	---	049	399.0	4.4	088	362.0	0.4
012	DNS	---	050	DNS	---	089	359.2	0.1
013	359.2	0.1	052	DNS	---	090	DNS	---
015	360.5	0.2	054	358.0	-0.1	091	DNS	---
016	363.6	0.5	055	358.0	-0.1	093	360.2	0.2
017	358.9	0.0	056	359.5	0.1	094	360.7	0.2
019	356.1	-0.3	057	DNS	---	095	359.7	0.1
020	360.1	0.2	058	358.3	0.0	096	359.5	0.1
021	358.1	-0.1	059	356.9	-0.2	098	DNS	---
022	357.5	-0.1	061	360.0	0.2	100	DNS	---
023	355.3	-0.4	062	DNS	---	102	356.6	-0.2
024	360.2	0.2	064	DNS	---	104	355.8	-0.3
026	358.0	-0.1	065	DNS	---	105	DNS	---
027	357.7	-0.1	066	359.4	0.1	108	359.0	0.0
028	357.0	-0.2	067	358.4	0.0	110	357.7	-0.1
029	DNS	---	068	358.4	0.0	112	358.1	-0.1
030	363.9	0.6	069	DNS	---	113	358.8	0.0
031	356.5	-0.2	070	356.0	-0.3	115	356.8	-0.2
032	DNS	---	071	360.0	0.2	117	DNS	---
033	358.8	0.0	072	359.5	0.1	118	356.9	-0.2
034	359.3	0.1	073	358.5	0.0	119	354.1	-0.5
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 28 : Auto Distillation, deg C, FBP, ASTM D 86

APLAC PT T099								
Auto Distillation, deg C, FBP, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	369.9	0.3	036	369.9	0.3	075	DNS	---
002	370.4	0.4	037	DNS	---	077	DNS	---
003	369.3	0.2	038	DNS	---	078	DNS	---
004	DNS	---	039	366.4	-0.2	079	DNS	---
005	369.8	0.3	041	366.9	-0.1	080	367.6	0.0
007	368.9	0.1	043	369.4	0.2	081	366.2	-0.2
008	367.2	-0.1	045	369.6	0.2	083	DNS	---
009	DNS	---	046	DNS	---	087	372.3	0.6
010	DNS	---	049	433.1	9.2	088	369.4	0.2
012	DNS	---	050	DNS	---	089	368.5	0.1
013	366.0	-0.3	052	DNS	---	090	DNS	---
015	368.7	0.1	054	366.8	-0.1	091	369.7	0.3
016	366.6	-0.2	055	367.3	-0.1	093	367.2	-0.1
017	368.1	0.0	056	369.4	0.2	094	367.2	-0.1
019	365.6	-0.3	057	DNS	---	095	369.0	0.2
020	364.6	-0.5	058	367.4	-0.1	096	369.0	0.2
021	369.8	0.3	059	365.6	-0.3	098	DNS	---
022	365.2	-0.4	061	370.6	0.4	100	DNS	---
023	368.6	0.1	062	DNS	---	102	367.3	-0.1
024	370.3	0.3	064	DNS	---	104	368.0	0.0
026	367.3	-0.1	065	DNS	---	105	DNS	---
027	364.4	-0.5	066	368.9	0.1	108	366.6	-0.2
028	362.9	-0.7	067	367.7	0.0	110	372.1	0.6
029	DNS	---	068	362.3	-0.8	112	367.2	-0.1
030	369.2	0.2	069	DNS	---	113	367.1	-0.1
031	368.5	0.1	070	368.5	0.1	115	358.9	-1.3
032	DNS	---	071	366.2	-0.2	117	DNS	---
033	367.7	0.0	072	369.7	0.3	118	365.4	-0.3
034	367.6	0.0	073	369.3	0.2	119	364.5	-0.5
035	DNS	---	074	DNS	---	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 29 : Manual Distillation deg c, IBP, ASTM D 86

APLAC PT T099								
Manual Distillation deg c, IBP, ASTM D 86								
Lab Code	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	132.5	-0.8	077	137.0	-0.2
003	DNS	---	038	136.0	-0.3	078	DNS	---
004	DNS	---	039	DNS	---	079	134.5	-0.5
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	137.0	-0.2
009	154.0	2.2	046	120.0	-2.6	087	DNS	---
010	139.0	0.1	049	DNS	---	088	DNS	---
012	DNS	---	050	138.0	-0.1	089	137.5	-0.1
013	DNS	---	052	135.0	-0.5	090	135.0	-0.5
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	140.0	0.2
017	DNS	---	056	DNS	---	094	142.0	0.5
019	DNS	---	057	140.0	0.2	095	DNS	---
020	DNS	---	058	142.5	0.6	096	138.5	0.0
021	DNS	---	059	DNS	---	098	138.5	0.0
022	DNS	---	061	DNS	---	100	135.0	-0.5
023	DNS	---	062	146.0	1.1	102	DNS	---
024	134.0	-0.6	064	DNS	---	104	DNS	---
026	DNS	---	065	148.0	1.3	105	138.0	-0.1
027	DNS	---	066	138.0	-0.1	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	139.0	0.1	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	137.0	-0.2	070	DNS	---	115	DNS	---
032	142.0	0.5	071	140.0	0.2	117	145.0	0.9
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	138.0	-0.1	074	135.5	-0.4	120	140.5	0.3

Note1: “DNS” Data Not Submitted

Table 30 : Manual Distillation deg c, 5% Rec, ASTM D 86

APLAC PT T099								
Manual Distillation deg c, 5% Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	DNS	---	077	161.0	-0.2
003	DNS	---	038	155.5	-1.0	078	DNS	---
004	DNS	---	039	DNS	---	079	164.5	0.3
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	162.0	-0.1
009	162.0	-0.1	046	152.5	-1.4	087	DNS	---
010	166.0	0.5	049	DNS	---	088	DNS	---
012	DNS	---	050	160.0	-0.3	089	163.0	0.1
013	DNS	---	052	159.0	-0.5	090	165.0	0.4
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	DNS	---
017	DNS	---	056	DNS	---	094	167.5	0.7
019	DNS	---	057	166.0	0.5	095	DNS	---
020	DNS	---	058	156.0	-0.9	096	162.5	0.0
021	DNS	---	059	DNS	---	098	165.5	0.4
022	DNS	---	061	DNS	---	100	159.0	-0.5
023	DNS	---	062	158.0	-0.6	102	DNS	---
024	166.0	0.5	064	DNS	---	104	DNS	---
026	DNS	---	065	164.0	0.2	105	163.5	0.2
027	DNS	---	066	162.0	-0.1	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	169.0	0.9	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	163.0	0.1	070	DNS	---	115	DNS	---
032	157.0	-0.8	071	161.5	-0.1	117	164.0	0.2
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	165.0	0.4	074	163.5	0.2	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 31 : Manual Distillation deg c, 10 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation deg c, 10 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	174.5	-0.6	077	180.0	0.2
003	DNS	---	038	178.5	0.0	078	DNS	---
004	DNS	---	039	DNS	---	079	184.0	0.9
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	177.5	-0.2
009	182.0	0.6	046	171.0	-1.2	087	DNS	---
010	179.0	0.1	049	DNS	---	088	DNS	---
012	DNS	---	050	178.0	-0.1	089	177.5	-0.2
013	DNS	---	052	175.0	-0.5	090	177.0	-0.2
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	169.0	-1.5
017	DNS	---	056	DNS	---	094	180.0	0.2
019	DNS	---	057	180.5	0.3	095	DNS	---
020	DNS	---	058	177.0	-0.2	096	178.0	-0.1
021	DNS	---	059	DNS	---	098	181.0	0.4
022	DNS	---	061	DNS	---	100	173.5	-0.8
023	DNS	---	062	178.0	-0.1	102	DNS	---
024	179.0	0.1	064	DNS	---	104	DNS	---
026	DNS	---	065	184.0	0.9	105	183.0	0.7
027	DNS	---	066	178.5	0.0	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	179.5	0.2	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	177.0	-0.2	070	DNS	---	115	DNS	---
032	177.0	-0.2	071	178.0	-0.1	117	178.0	-0.1
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	181.0	0.4	074	178.5	0.0	120	179.5	0.2

Note1: “DNS” Data Not Submitted

Table 32 : Manual Distillation, deg c, 20 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation, deg c, 20 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	205.0	-0.3	077	209.0	0.4
003	DNS	---	038	207.0	0.1	078	DNS	---
004	DNS	---	039	DNS	---	079	211.0	0.8
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	207.0	0.1
009	204.0	-0.5	046	199.5	-1.4	087	DNS	---
010	208.0	0.2	049	DNS	---	088	DNS	---
012	DNS	---	050	206.5	0.0	089	205.5	-0.2
013	DNS	---	052	204.0	-0.5	090	204.0	-0.5
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	206.0	-0.1
017	DNS	---	056	DNS	---	094	206.5	0.0
019	DNS	---	057	207.0	0.1	095	DNS	---
020	DNS	---	058	208.5	0.3	096	206.0	-0.1
021	DNS	---	059	DNS	---	098	206.0	-0.1
022	DNS	---	061	DNS	---	100	202.5	-0.8
023	DNS	---	062	209.0	0.4	102	DNS	---
024	208.0	0.2	064	DNS	---	104	DNS	---
026	DNS	---	065	210.0	0.6	105	207.0	0.1
027	DNS	---	066	206.5	0.0	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	206.5	0.0	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	206.0	-0.1	070	DNS	---	115	DNS	---
032	204.0	-0.5	071	209.0	0.4	117	211.0	0.8
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	208.0	0.2	074	204.0	-0.5	120	209.5	0.5

Note1: “DNS” Data Not Submitted

Table 33 : Manual Distillation deg C, 30 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation deg C, 30 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	229.5	-0.4	077	230.0	-0.3
003	DNS	---	038	233.5	0.4	078	DNS	---
004	DNS	---	039	DNS	---	079	234.0	0.5
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	230.5	-0.2
009	222.0	-2.0	046	231.5	0.0	087	DNS	---
010	231.0	-0.1	049	DNS	---	088	DNS	---
012	DNS	---	050	230.5	-0.2	089	232.0	0.1
013	DNS	---	052	229.0	-0.5	090	229.0	-0.5
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	232.0	0.1
017	DNS	---	056	DNS	---	094	232.0	0.1
019	DNS	---	057	232.0	0.1	095	DNS	---
020	DNS	---	058	234.5	0.6	096	231.5	0.0
021	DNS	---	059	DNS	---	098	232.5	0.2
022	DNS	---	061	DNS	---	100	228.5	-0.6
023	DNS	---	062	234.0	0.5	102	DNS	---
024	231.0	-0.1	064	DNS	---	104	DNS	---
026	DNS	---	065	236.0	1.0	105	230.0	-0.3
027	DNS	---	066	231.0	-0.1	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	232.0	0.1	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	233.0	0.3	070	DNS	---	115	DNS	---
032	230.0	-0.3	071	232.0	0.1	117	236.0	1.0
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	232.0	0.1	074	229.5	-0.4	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 34: Manual Distillation deg C, 40 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation deg C, 40 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	249.0	-0.4	077	250.0	-0.1
003	DNS	---	038	253.0	0.6	078	DNS	---
004	DNS	---	039	DNS	---	079	253.0	0.6
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	250.0	-0.1
009	240.0	-2.6	046	252.0	0.4	087	DNS	---
010	250.0	-0.1	049	DNS	---	088	DNS	---
012	DNS	---	050	249.5	-0.2	089	251.0	0.1
013	DNS	---	052	248.0	-0.6	090	249.0	-0.4
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	251.0	0.1
017	DNS	---	056	DNS	---	094	248.5	-0.5
019	DNS	---	057	251.0	0.1	095	DNS	---
020	DNS	---	058	252.0	0.4	096	250.5	0.0
021	DNS	---	059	DNS	---	098	251.5	0.2
022	DNS	---	061	DNS	---	100	248.5	-0.5
023	DNS	---	062	253.5	0.7	102	DNS	---
024	250.0	-0.1	064	DNS	---	104	DNS	---
026	DNS	---	065	256.0	1.3	105	248.0	-0.6
027	DNS	---	066	250.0	-0.1	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	251.5	0.2	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	251.0	0.1	070	DNS	---	115	DNS	---
032	249.5	-0.2	071	251.0	0.1	117	252.0	0.4
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	251.0	0.1	074	249.5	-0.2	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 35: Manual Distillation deg C, 50 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation deg C, 50 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	265.0	-0.4	077	265.0	-0.4
003	DNS	---	038	269.0	0.6	078	DNS	---
004	DNS	---	039	DNS	---	079	270.0	0.9
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	266.0	-0.1
009	258.0	-2.2	046	271.0	1.2	087	DNS	---
010	266.0	-0.1	049	DNS	---	088	DNS	---
012	DNS	---	050	266.5	0.0	089	266.0	-0.1
013	DNS	---	052	262.5	-1.0	090	266.0	-0.1
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	267.0	0.1
017	DNS	---	056	DNS	---	094	265.5	-0.3
019	DNS	---	057	266.5	0.0	095	DNS	---
020	DNS	---	058	267.5	0.3	096	266.0	-0.1
021	DNS	---	059	DNS	---	098	267.5	0.3
022	DNS	---	061	DNS	---	100	263.0	-0.9
023	DNS	---	062	269.5	0.8	102	DNS	---
024	266.0	-0.1	064	DNS	---	104	DNS	---
026	DNS	---	065	272.0	1.4	105	264.0	-0.6
027	DNS	---	066	266.5	0.0	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	267.0	0.1	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	267.0	0.1	070	DNS	---	115	DNS	---
032	266.5	0.0	071	267.0	0.1	117	269.0	0.6
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	266.5	0.0	074	266.0	-0.1	120	266.0	-0.1

Note1: “DNS” Data Not Submitted

Table 36 : Manual Distillation deg C, 60 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation deg C, 60 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	281.0	-0.3	077	280.0	-0.6
003	DNS	---	038	284.5	0.5	078	DNS	---
004	DNS	---	039	DNS	---	079	285.5	0.8
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	281.0	-0.3
009	278.0	-1.1	046	286.5	1.0	087	DNS	---
010	282.0	-0.1	049	DNS	---	088	DNS	---
012	DNS	---	050	282.5	0.0	089	281.5	-0.2
013	DNS	---	052	278.5	-1.0	090	282.0	-0.1
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	283.0	0.2
017	DNS	---	056	DNS	---	094	278.0	-1.1
019	DNS	---	057	282.0	-0.1	095	DNS	---
020	DNS	---	058	284.5	0.5	096	282.0	-0.1
021	DNS	---	059	DNS	---	098	283.0	0.2
022	DNS	---	061	DNS	---	100	281.0	-0.3
023	DNS	---	062	283.5	0.3	102	DNS	---
024	282.0	-0.1	064	DNS	---	104	DNS	---
026	DNS	---	065	292.0	2.4	105	280.0	-0.6
027	DNS	---	066	282.5	0.0	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	282.5	0.0	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	283.0	0.2	070	DNS	---	115	DNS	---
032	283.0	0.2	071	284.0	0.4	117	284.0	0.4
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	282.0	-0.1	074	282.5	0.0	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 37 : Manual Distillation deg C, 70 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation deg C, 70 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	299.5	-0.1	077	297.0	-0.7
003	DNS	---	038	302.5	0.7	078	DNS	---
004	DNS	---	039	DNS	---	079	303.5	0.9
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	299.0	-0.2
009	302.0	0.5	046	305.0	1.3	087	DNS	---
010	298.0	-0.4	049	DNS	---	088	DNS	---
012	DNS	---	050	299.5	-0.1	089	300.5	0.2
013	DNS	---	052	295.5	-1.0	090	299.0	-0.2
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	300.5	0.2
017	DNS	---	056	DNS	---	094	294.5	-1.2
019	DNS	---	057	299.5	-0.1	095	DNS	---
020	DNS	---	058	301.5	0.4	096	300.0	0.1
021	DNS	---	059	DNS	---	098	299.5	-0.1
022	DNS	---	061	DNS	---	100	298.5	-0.3
023	DNS	---	062	301.5	0.4	102	DNS	---
024	300.0	0.1	064	DNS	---	104	DNS	---
026	DNS	---	065	310.0	2.4	105	295.5	-1.0
027	DNS	---	066	299.5	-0.1	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	299.5	-0.1	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	298.0	-0.4	070	DNS	---	115	DNS	---
032	299.0	-0.2	071	300.0	0.1	117	300.0	0.1
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	299.0	-0.2	074	300.5	0.2	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 38 : Manual Distillation deg C, 80 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation deg C, 80 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	319.0	0.1	077	318.0	-0.2
003	DNS	---	038	322.0	0.7	078	DNS	---
004	DNS	---	039	DNS	---	079	319.5	0.2
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	317.5	-0.3
009	330.0	2.4	046	326.0	1.5	087	DNS	---
010	317.0	-0.4	049	DNS	---	088	DNS	---
012	DNS	---	050	317.5	-0.3	089	318.5	-0.1
013	DNS	---	052	314.5	-0.9	090	318.0	-0.2
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	319.0	0.1
017	DNS	---	056	DNS	---	094	312.0	-1.4
019	DNS	---	057	319.0	0.1	095	DNS	---
020	DNS	---	058	321.0	0.5	096	319.0	0.1
021	DNS	---	059	DNS	---	098	318.0	-0.2
022	DNS	---	061	DNS	---	100	317.5	-0.3
023	DNS	---	062	319.5	0.2	102	DNS	---
024	318.0	-0.2	064	DNS	---	104	DNS	---
026	DNS	---	065	330.0	2.4	105	315.0	-0.8
027	DNS	---	066	319.5	0.2	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	318.5	-0.1	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	317.0	-0.4	070	DNS	---	115	DNS	---
032	319.0	0.1	071	318.5	-0.1	117	321.0	0.5
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	318.0	-0.2	074	319.5	0.2	120	DNS	---

Note1: “DNS” Data Not Submitted

Table 39 : Manual Distillation deg C, 90 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation deg C, 90 % Rec, ASTM D 86								
DNS	DNS	DNS	DNS	DNS	DNS	DNS	DNS	DNS
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	343.0	0.1	077	340.0	-0.5
003	DNS	---	038	345.5	0.6	078	DNS	---
004	DNS	---	039	DNS	---	079	346.0	0.7
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	342.5	0.0
009	356.0	2.7	046	353.5	2.2	087	DNS	---
010	340.0	-0.5	049	DNS	---	088	DNS	---
012	DNS	---	050	342.5	0.0	089	343.0	0.1
013	DNS	---	052	338.0	-0.9	090	341.0	-0.3
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	343.0	0.1
017	DNS	---	056	DNS	---	094	333.0	-1.9
019	DNS	---	057	342.0	-0.1	095	DNS	---
020	DNS	---	058	345.5	0.6	096	343.0	0.1
021	DNS	---	059	DNS	---	098	340.5	-0.4
022	DNS	---	061	DNS	---	100	342.5	0.0
023	DNS	---	062	345.5	0.6	102	DNS	---
024	342.0	-0.1	064	DNS	---	104	DNS	---
026	DNS	---	065	341.0	-0.3	105	340.5	-0.4
027	DNS	---	066	342.5	0.0	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	341.5	-0.2	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	340.0	-0.5	070	DNS	---	115	DNS	---
032	342.0	-0.1	071	344.0	0.3	117	344.0	0.3
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	343.0	0.1	074	343.0	0.1	120	342.5	0.0

Note1: “DNS” Data Not Submitted

Table 40 : Manual Distillation, deg C, 95 % Rec, ASTM D 86

APLAC PT T099								
Manual Distillation, deg C, 95 % Rec, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	359.5	0.2	077	358.0	0.0
003	DNS	---	038	361.5	0.6	078	DNS	---
004	DNS	---	039	DNS	---	079	361.0	0.5
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	358.5	0.1
009	366.0	1.3	046	375.5	2.9	087	DNS	---
010	356.0	-0.4	049	DNS	---	088	DNS	---
012	DNS	---	050	357.5	-0.1	089	357.5	-0.1
013	DNS	---	052	354.0	-0.7	090	359.0	0.1
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	360.0	0.3
017	DNS	---	056	DNS	---	094	350.0	-1.4
019	DNS	---	057	358.0	0.0	095	DNS	---
020	DNS	---	058	359.0	0.1	096	358.0	0.0
021	DNS	---	059	DNS	---	098	356.5	-0.3
022	DNS	---	061	DNS	---	100	357.5	-0.1
023	DNS	---	062	359.5	0.2	102	DNS	---
024	358.0	0.0	064	DNS	---	104	DNS	---
026	DNS	---	065	350.0	-1.4	105	357.0	-0.2
027	DNS	---	066	358.5	0.1	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	357.0	-0.2	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	358.0	0.0	070	DNS	---	115	DNS	---
032	357.0	-0.2	071	356.0	-0.4	117	360.0	0.3
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	360.5	0.4	074	358.5	0.1	120	356.0	-0.4

Note1: “DNS” Data Not Submitted

Table 41 : Manual Distillation, deg C, FBP, ASTM D 86

APLAC PT T099								
Manual Distillation, deg C, FBP, ASTM D 86								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	DNS	---	075	DNS	---
002	DNS	---	037	370.5	0.5	077	369.0	0.1
003	DNS	---	038	369.0	0.1	078	DNS	---
004	DNS	---	039	DNS	---	079	372.0	0.8
005	DNS	---	041	DNS	---	080	DNS	---
007	DNS	---	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	368.5	0.0
009	378.0	2.1	046	380.0	2.6	087	DNS	---
010	368.0	-0.1	049	DNS	---	088	DNS	---
012	DNS	---	050	367.5	-0.2	089	368.5	0.0
013	DNS	---	052	366.0	-0.5	090	370.0	0.3
015	DNS	---	054	DNS	---	091	DNS	---
016	DNS	---	055	DNS	---	093	370.0	0.3
017	DNS	---	056	DNS	---	094	368.0	-0.1
019	DNS	---	057	370.5	0.5	095	DNS	---
020	DNS	---	058	369.0	0.1	096	368.5	0.0
021	DNS	---	059	DNS	---	098	368.5	0.0
022	DNS	---	061	DNS	---	100	363.0	-1.2
023	DNS	---	062	364.5	-0.9	102	DNS	---
024	369.0	0.1	064	DNS	---	104	DNS	---
026	DNS	---	065	358.0	-2.3	105	369.5	0.2
027	DNS	---	066	368.0	-0.1	108	DNS	---
028	DNS	---	067	DNS	---	110	DNS	---
029	365.0	-0.8	068	DNS	---	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	368.0	-0.1	070	DNS	---	115	DNS	---
032	369.0	0.1	071	367.0	-0.3	117	370.0	0.3
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	DNS	---	119	DNS	---
035	368.0	-0.1	074	365.5	-0.7	120	DNS	---

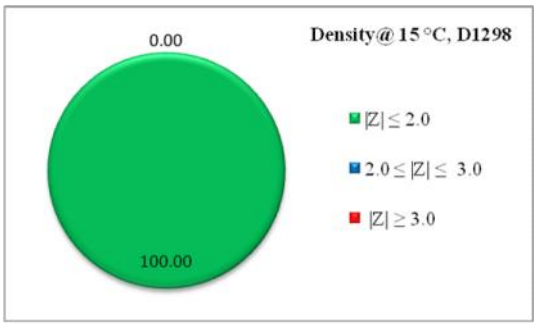
Note1: “DNS” Data Not Submitted

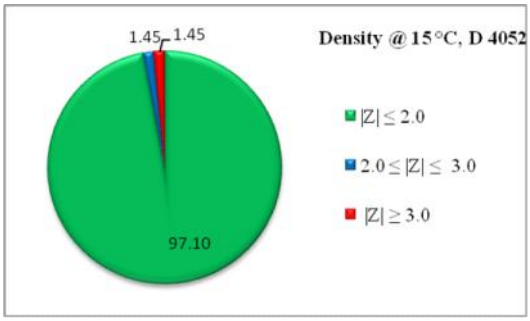
Table 42 : Kinematic Viscosity at 40°C, cSt, ASTM D 7042

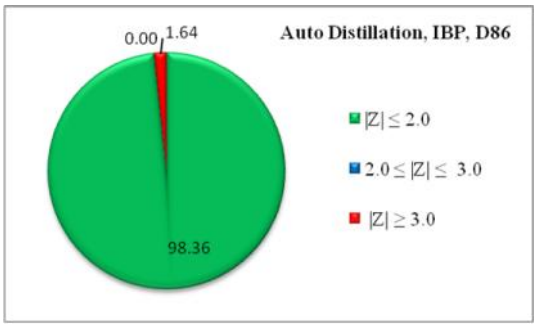
APLAC PT T099								
Kinematic Viscosity at 40°C, cSt, ASTM D 7042								
Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score	Lab Codes	Test Results	Z Score
001	DNS	---	036	2.437	-0.2	075	DNS	---
002	2.476	0.1	037	DNS	---	077	DNS	---
003	DNS	---	038	DNS	---	078	2.473	0.0
004	DNS	---	039	DNS	---	079	2.483	0.1
005	DNS	---	041	1.981	-3.4	080	2.464	0.0
007	2.442	-0.2	043	DNS	---	081	DNS	---
008	DNS	---	045	DNS	---	083	DNS	---
009	DNS	---	046	DNS	---	087	DNS	---
010	2.595	0.9	049	DNS	---	088	DNS	---
012	DNS	---	050	DNS	---	089	DNS	---
013	DNS	---	052	DNS	---	090	DNS	---
015	DNS	---	054	DNS	---	091	DNS	---
016	2.491	0.2	055	2.456	-0.1	093	DNS	---
017	DNS	---	056	DNS	---	094	2.444	-0.2
019	DNS	---	057	DNS	---	095	DNS	---
020	DNS	---	058	DNS	---	096	DNS	---
021	2.447	-0.1	059	2.466	0.0	098	DNS	---
022	DNS	---	061	DNS	---	100	DNS	---
023	DNS	---	062	DNS	---	102	DNS	---
024	DNS	---	064	DNS	---	104	2.468	0.0
026	2.498	0.2	065	DNS	---	105	DNS	---
027	DNS	---	066	DNS	---	108	2.447	-0.1
028	2.429	-0.3	067	DNS	---	110	DNS	---
029	DNS	---	068	2.461	0.0	112	DNS	---
030	DNS	---	069	DNS	---	113	DNS	---
031	2.485	0.1	070	DNS	---	115	DNS	---
032	DNS	---	071	2.466	0.0	117	DNS	---
033	DNS	---	072	DNS	---	118	DNS	---
034	DNS	---	073	2.497	0.2	119	DNS	---
035	DNS	---	074	DNS	---	120	DNS	---

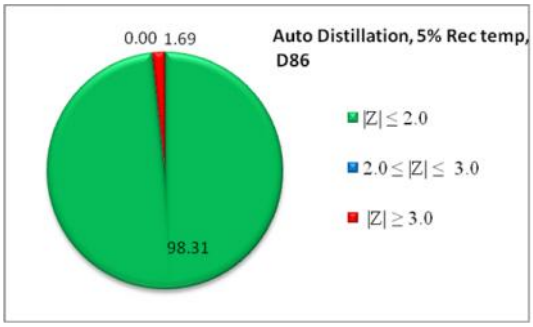
Note1: “DNS” Data Not Submitted

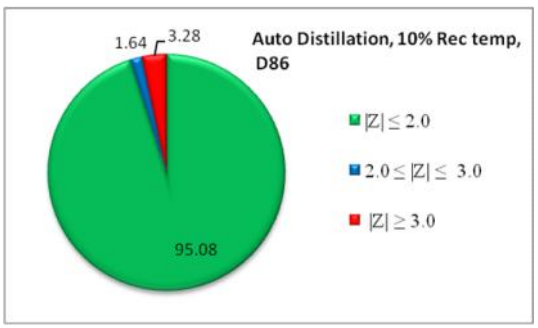
Annexure 2 : Z Score Distribution Charts

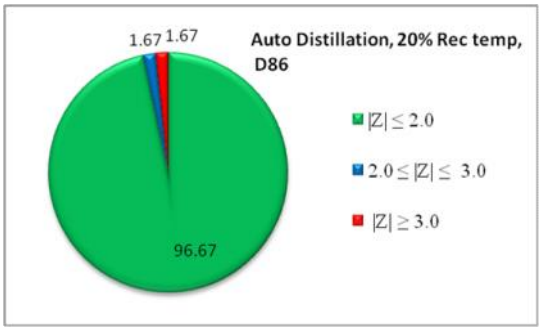


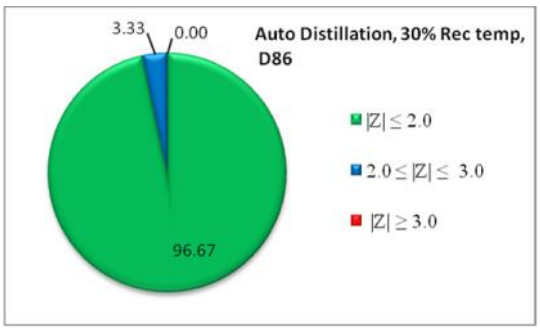


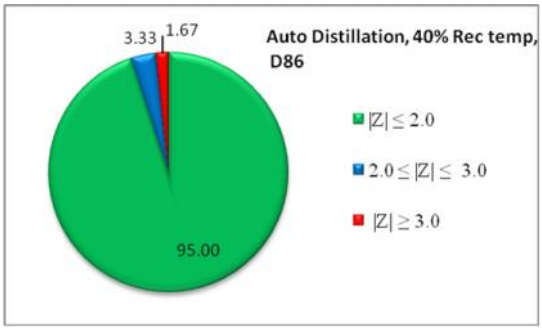


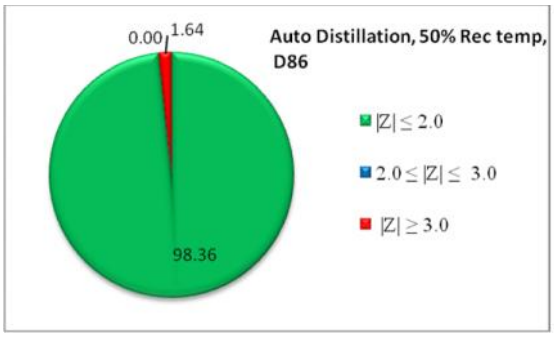


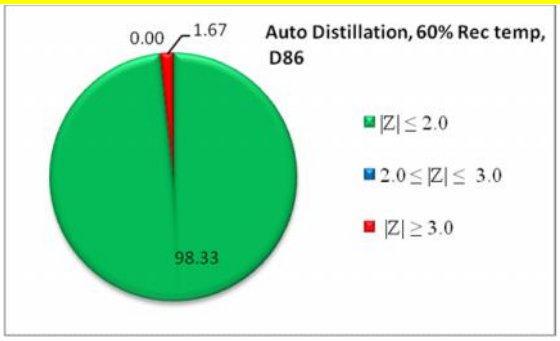


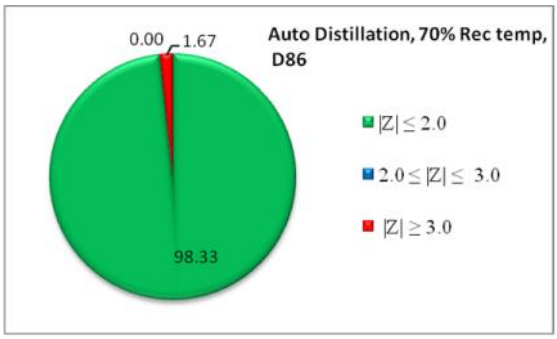


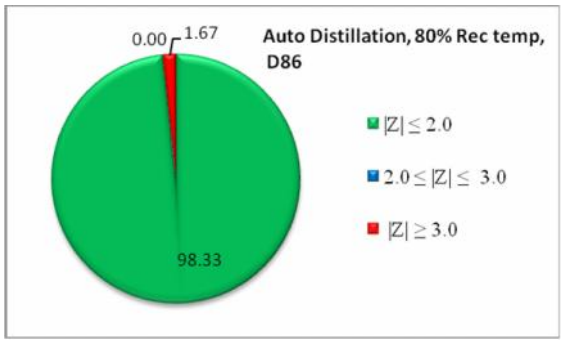


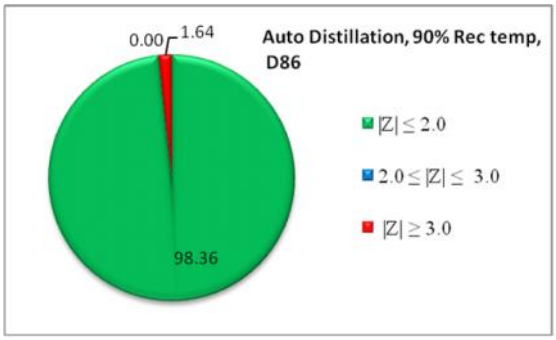


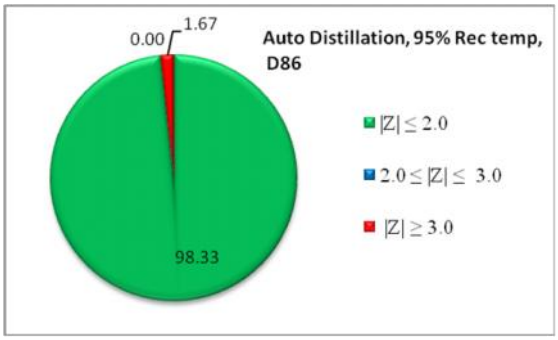

0.00
1.64
98.36
Auto Distillation, 50% Rec temp, D86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

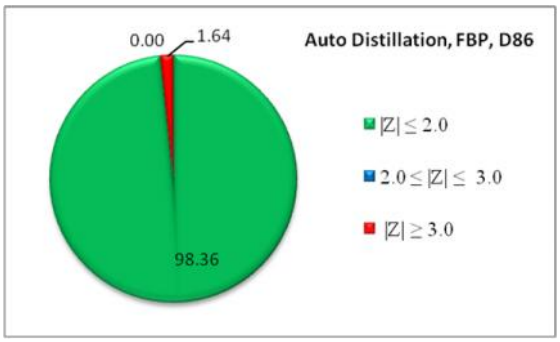

0.00
1.67
98.33
Auto Distillation, 60% Rec temp, D86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

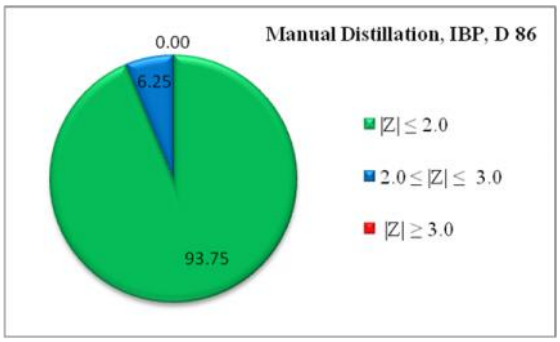

0.00
1.67
98.33
Auto Distillation, 70% Rec temp, D86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

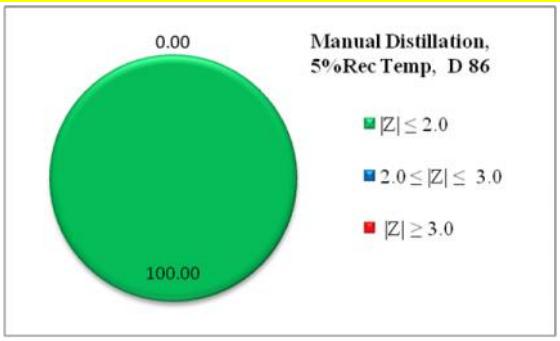

0.00
1.67
98.33
Auto Distillation, 80% Rec temp, D86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

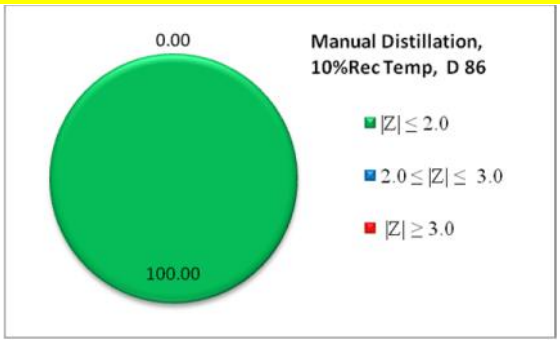

0.00
1.64
98.36
Auto Distillation, 90% Rec temp, D86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

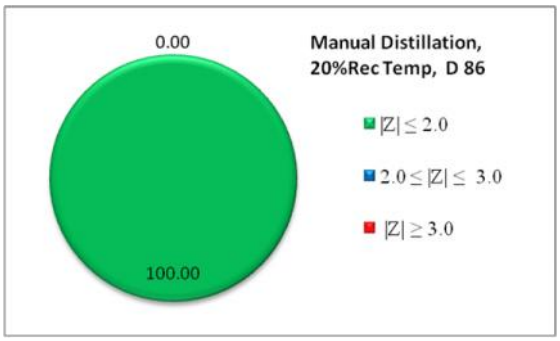

0.00
1.67
98.33
Auto Distillation, 95% Rec temp, D86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

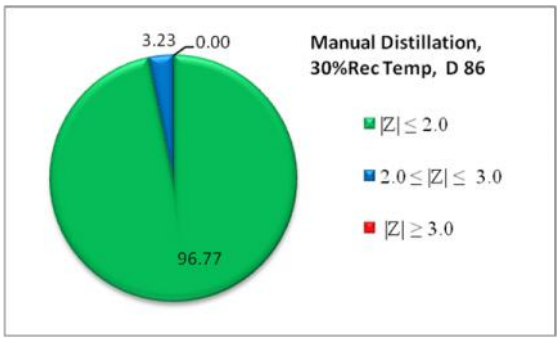

0.00
1.64
98.36
Auto Distillation, FBP, D86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

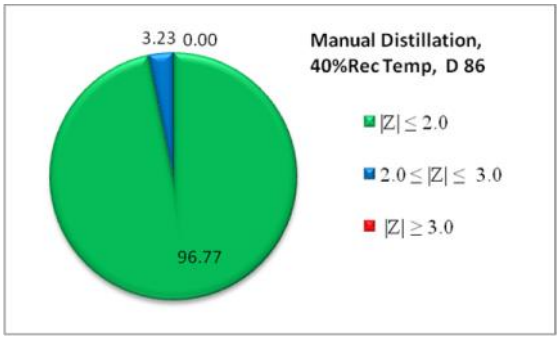

0.00
6.25
93.75
Manual Distillation, IBP, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

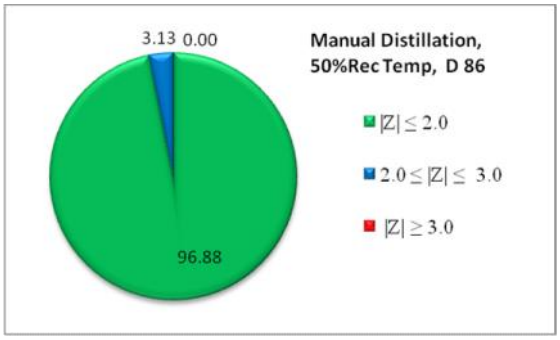

0.00
100.00
Manual Distillation, 5%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

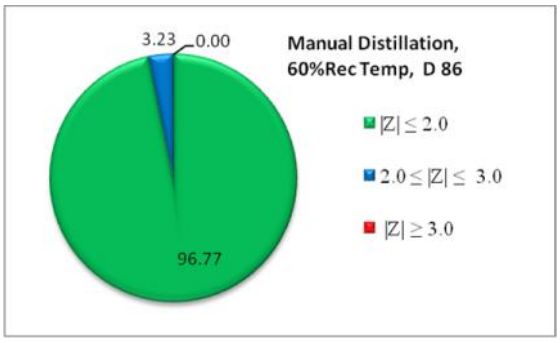

0.00
100.00
Manual Distillation, 10%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

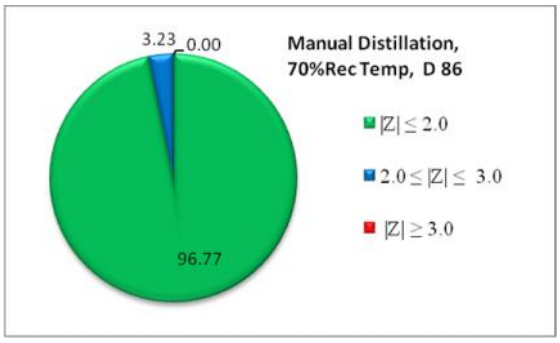

0.00
100.00
Manual Distillation, 20%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

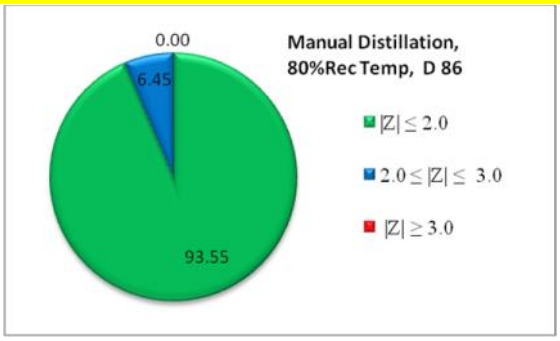

3.23
0.00
96.77
Manual Distillation, 30%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

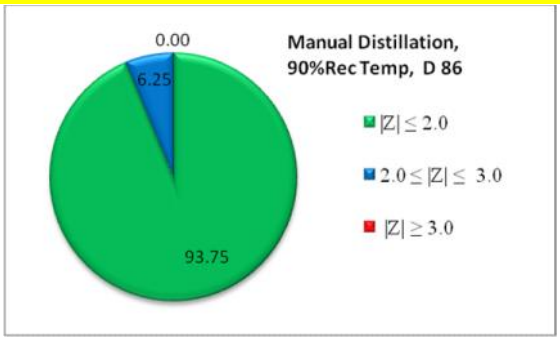

3.23
0.00
96.77
Manual Distillation, 40%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

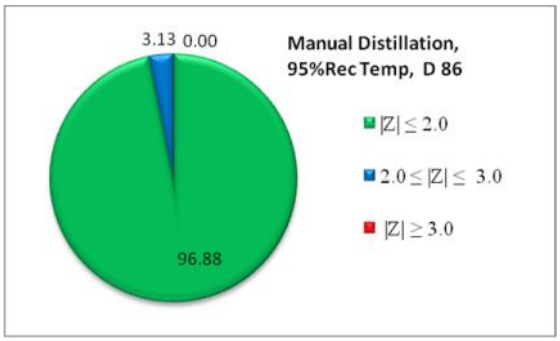

3.13
0.00
96.88
Manual Distillation, 50%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

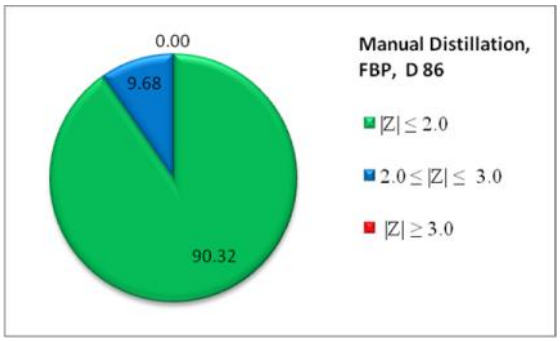

3.23
0.00
96.77
Manual Distillation, 60%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

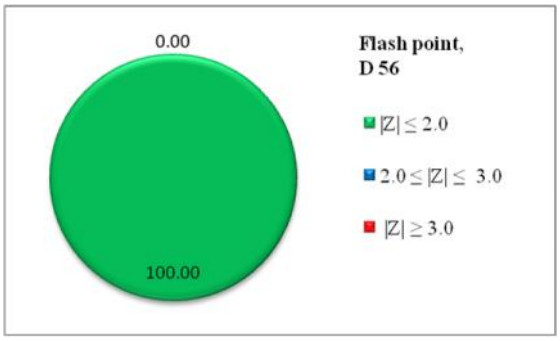

3.23
0.00
96.77
Manual Distillation, 70%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

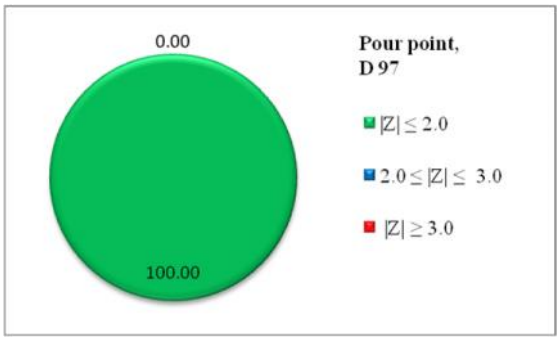

0.00
6.45
93.55
Manual Distillation, 80%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

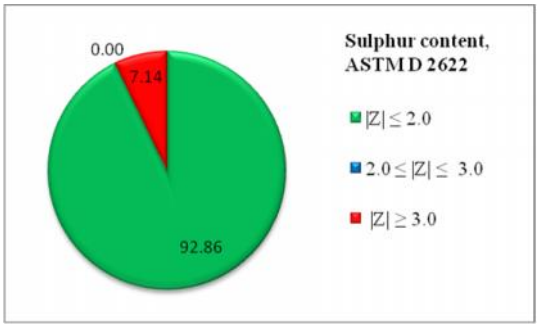

0.00
6.25
93.75
Manual Distillation, 90%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

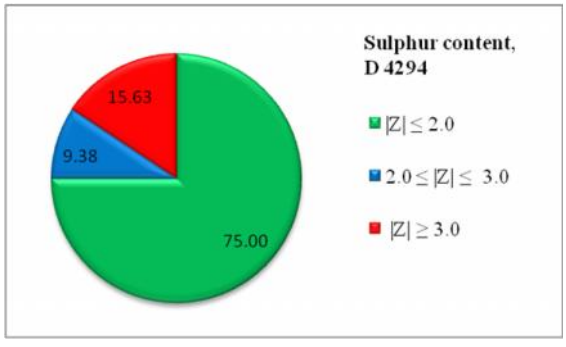

3.13
0.00
96.88
Manual Distillation, 95%Rec Temp, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

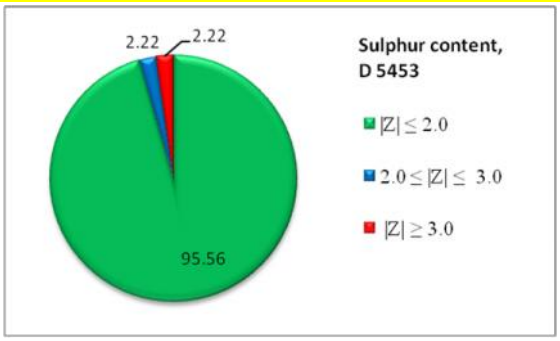

0.00
9.68
90.32
Manual Distillation, FBP, D 86
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

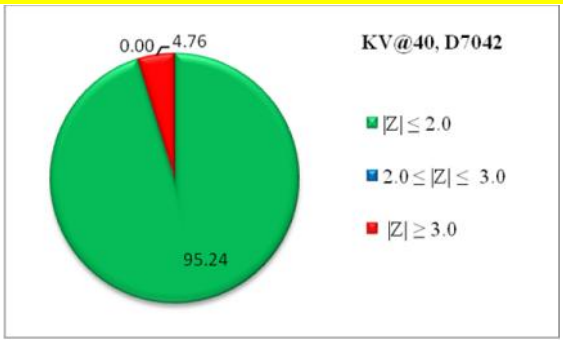

0.00
100.00
Flash point, D 56
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

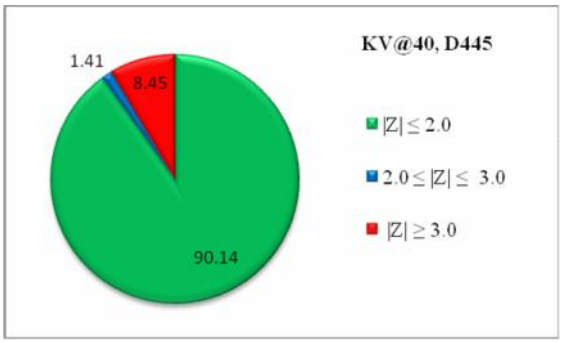

0.00
100.00
Pour point, D 97
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0

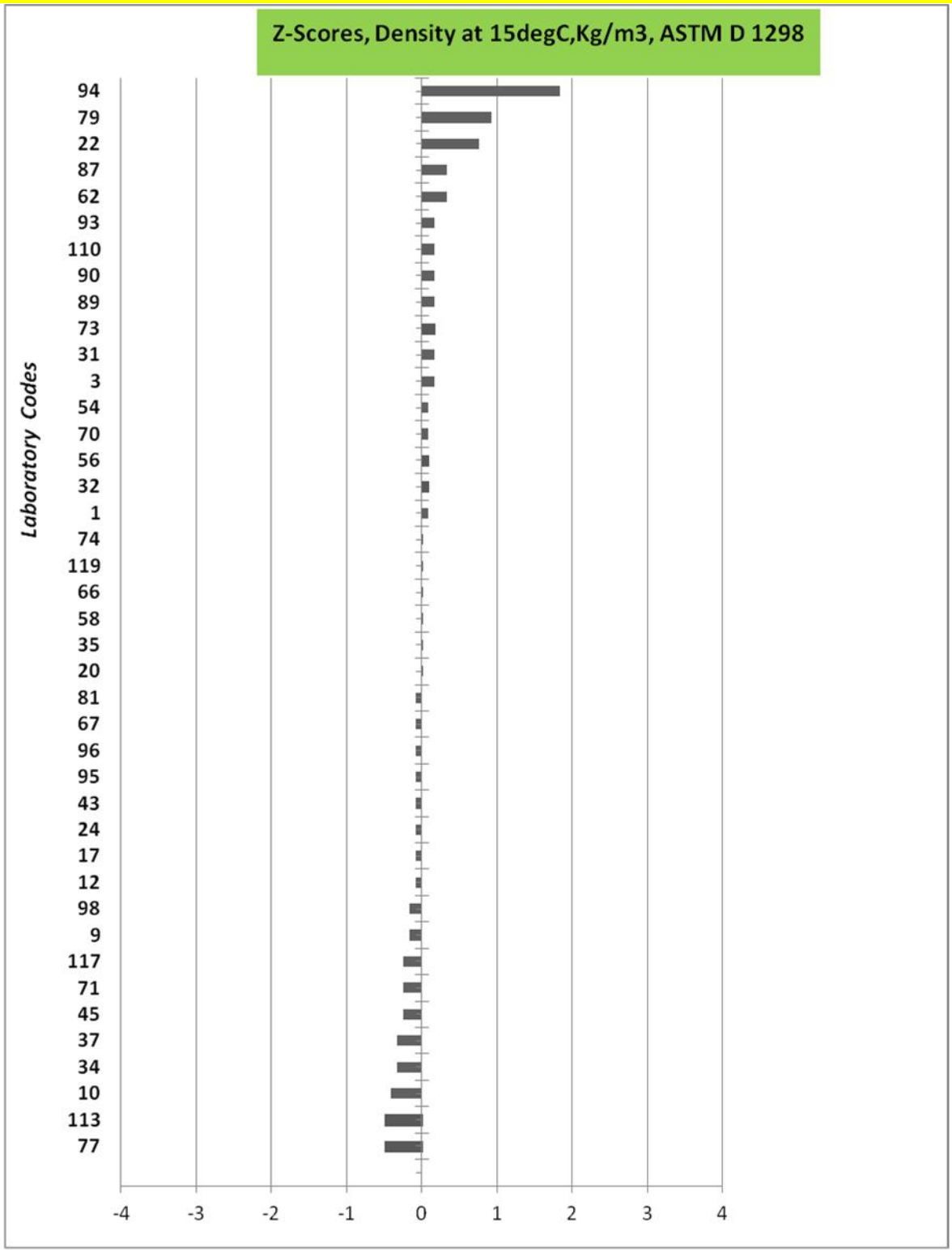

0.00
7.14
92.86
Sulphur content, ASTM D 2622
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0


15.63
9.38
75.00
Sulphur content, D 4294
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0


2.22
2.22
95.56
Sulphur content, D 5453
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0


0.00
4.76
95.24
KV@40, D7042
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0


1.41
8.45
90.14
KV@40, D445
|Z| ≤ 2.0
2.0 ≤ |Z| ≤ 3.0
|Z| ≥ 3.0


Z-Scores, Density at 15degC,Kg/m3, ASTM D 1298
Laboratory Codes
94
79
22
87
62
93
110
90
89
73
31
3
54
70
56
32
1
74
119
66
58
35
20
81
67
96
95
43
24
17
12
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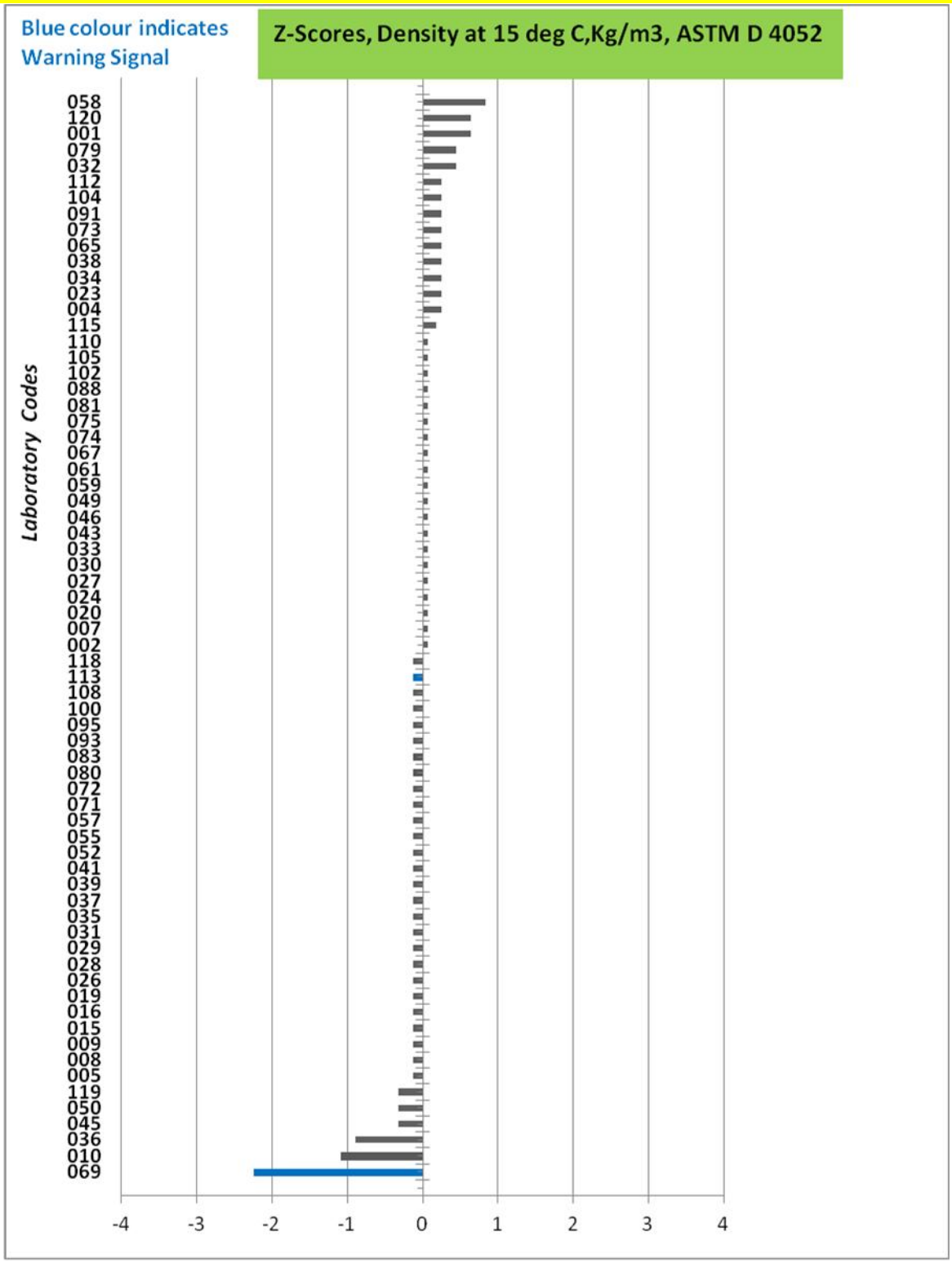
Blue colour indicates
Warning Signal
Z-Scores, Density at 15 deg C,Kg/m3, ASTM D 4052
Laboratory Codes
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120
001
079
032
112
104
091
073
065
038
034
023
004
115
110
105
102
088
081
075
074
067
061
059
049
046
043
033
030
027
024
020
007
002
118
113
108
100
095
093
083
080
072
071
057
055
052
041
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031
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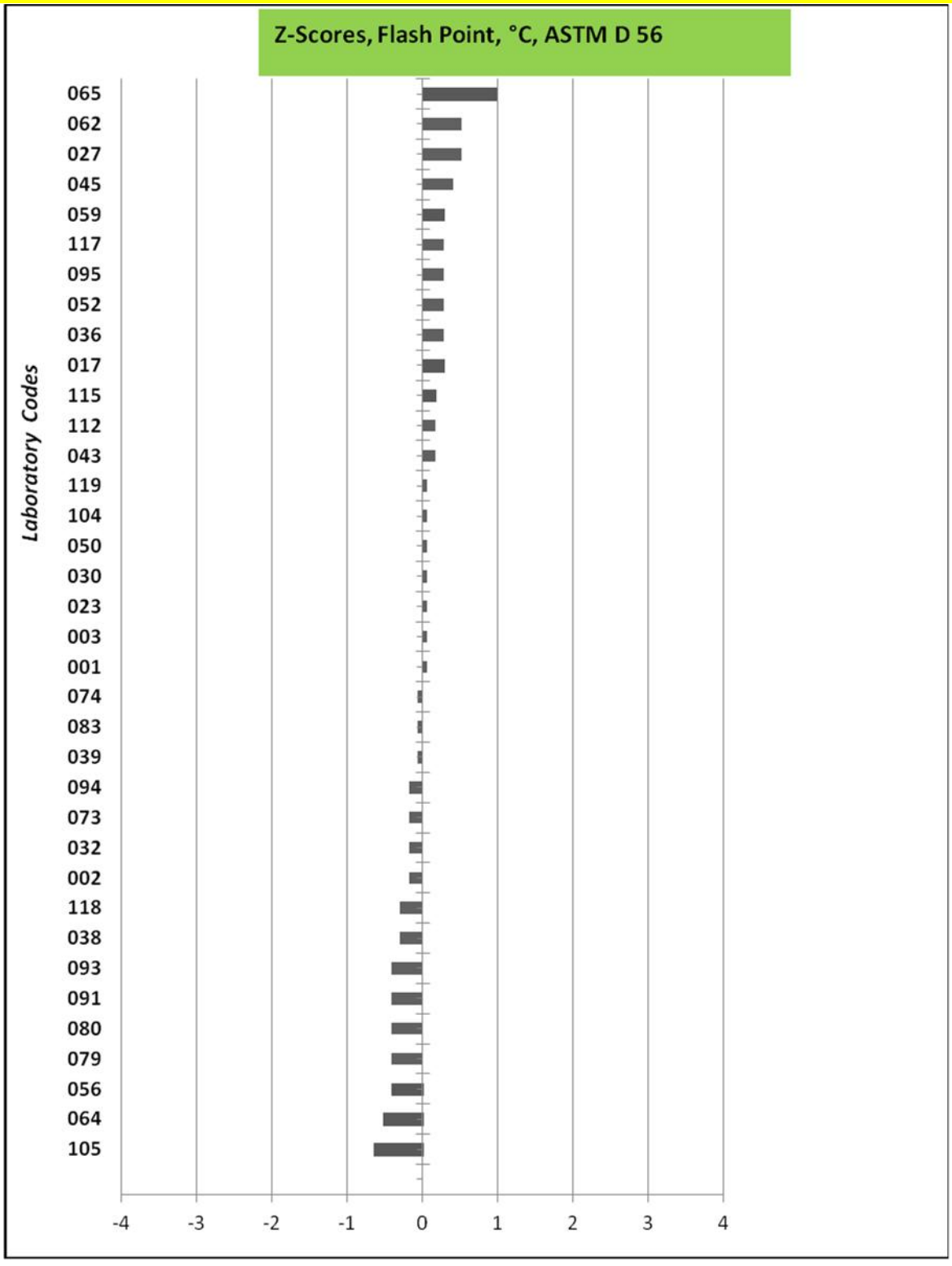
Z-Scores, Flash Point, °C, ASTM D 56
Laboratory Codes
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045
059
117
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036
017
115
112
043
119
104
050
030
023
003
001
074
083
039
094
073
032
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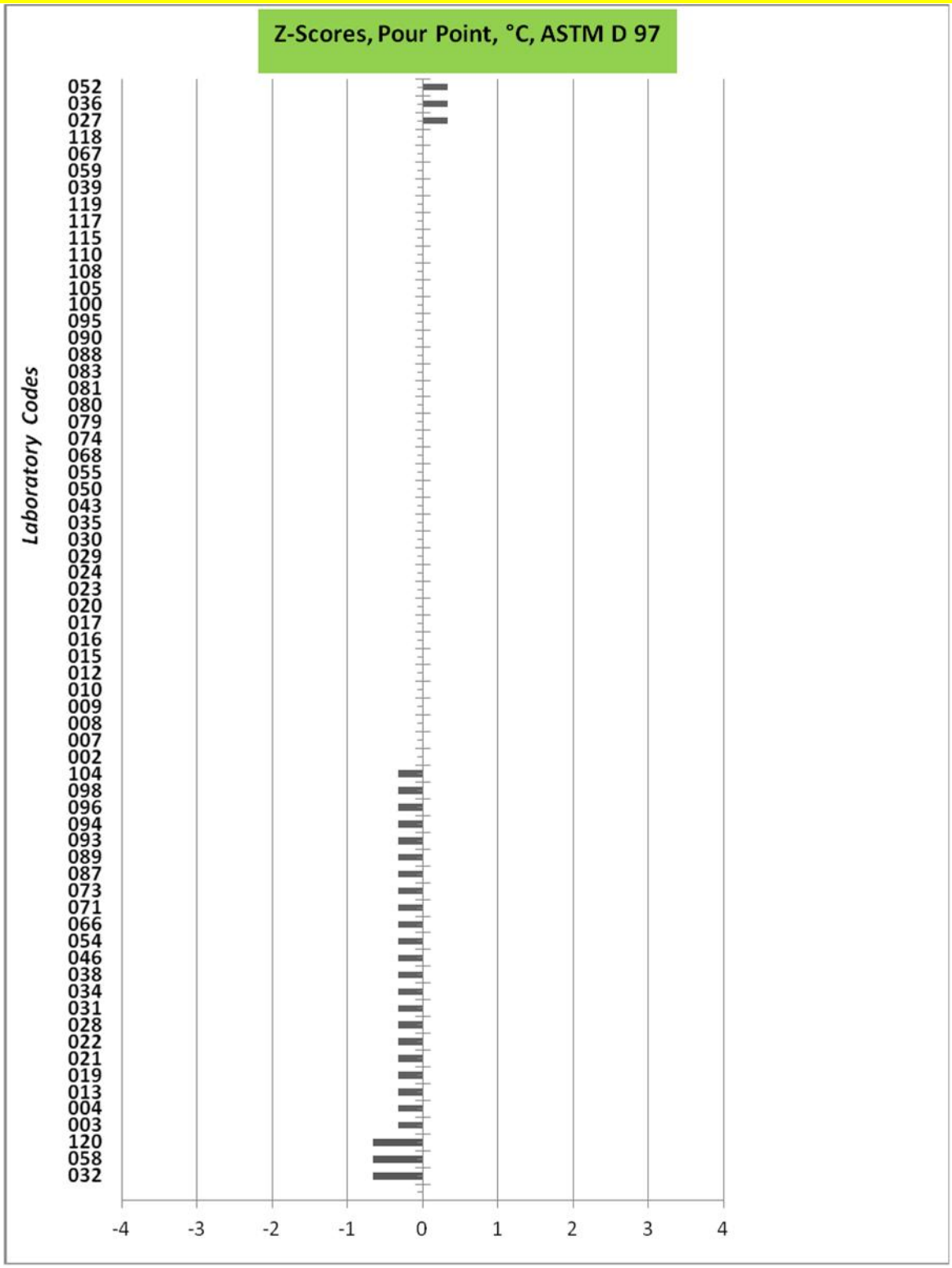
Z-Scores, Pour Point, °C, ASTM D 97
Laboratory Codes
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036
027
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067
059
039
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117
115
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105
100
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090
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081
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079
074
068
055
050
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035
030
029
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023
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002
104
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096
094
093
089
087
073
071
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031
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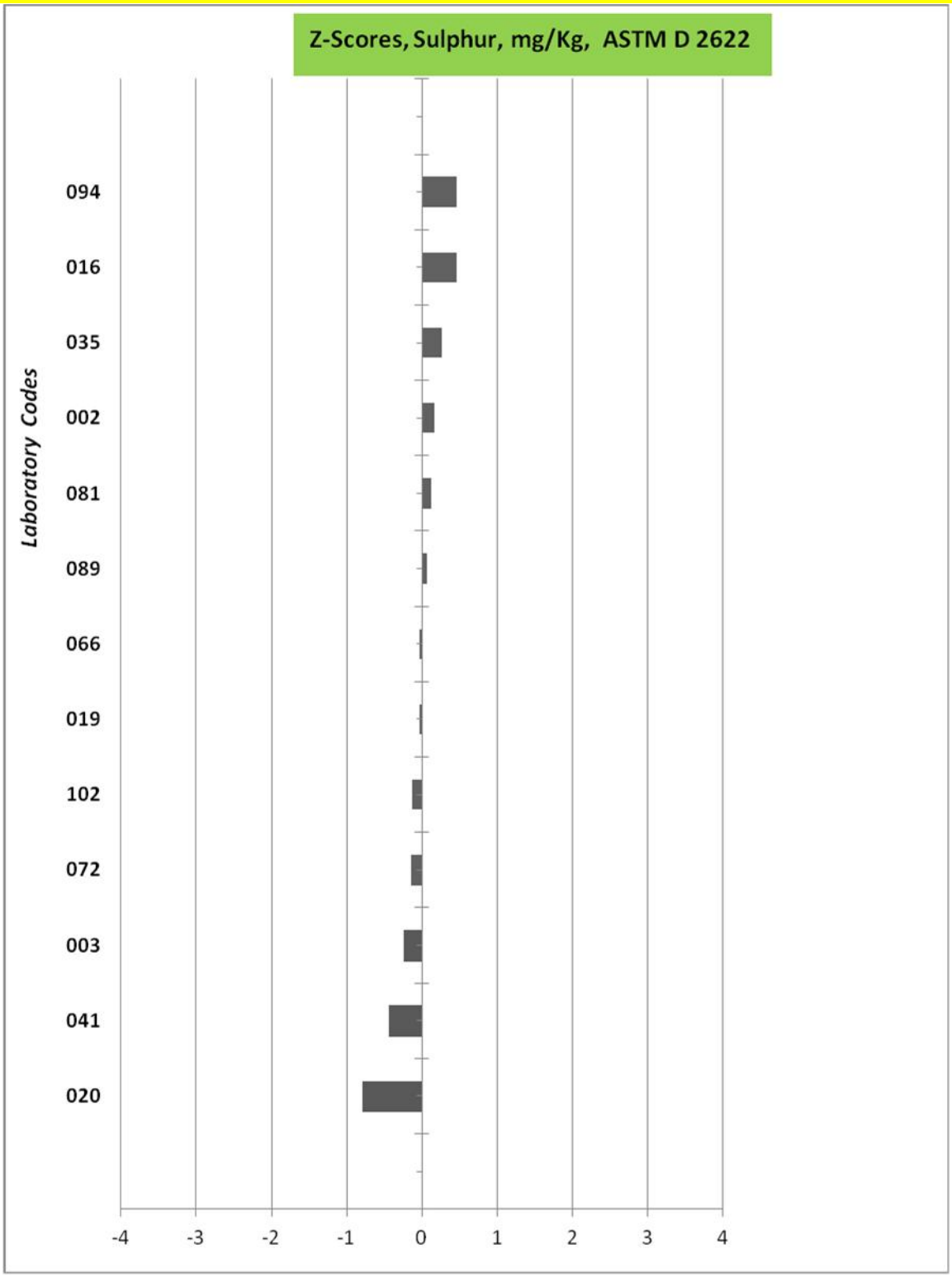
Z-Scores, Sulphur, mg/Kg, ASTM D 2622
Laboratory Codes
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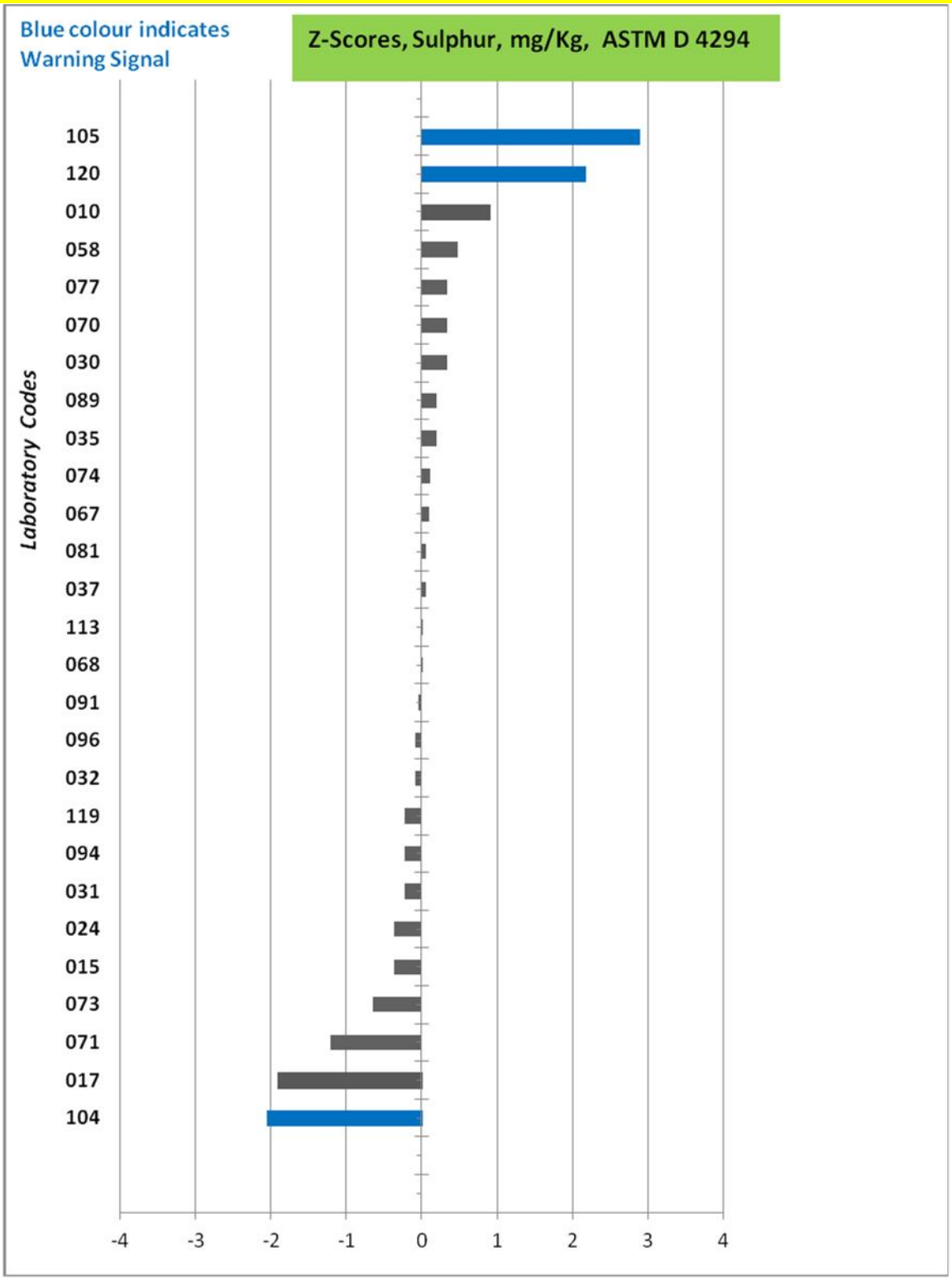
Blue colour indicates
Warning Signal
Z-Scores, Sulphur, mg/Kg, ASTM D 4294
Laboratory Codes
105
120
010
058
077
070
030
089
035
074
067
081
037
113
068
091
096
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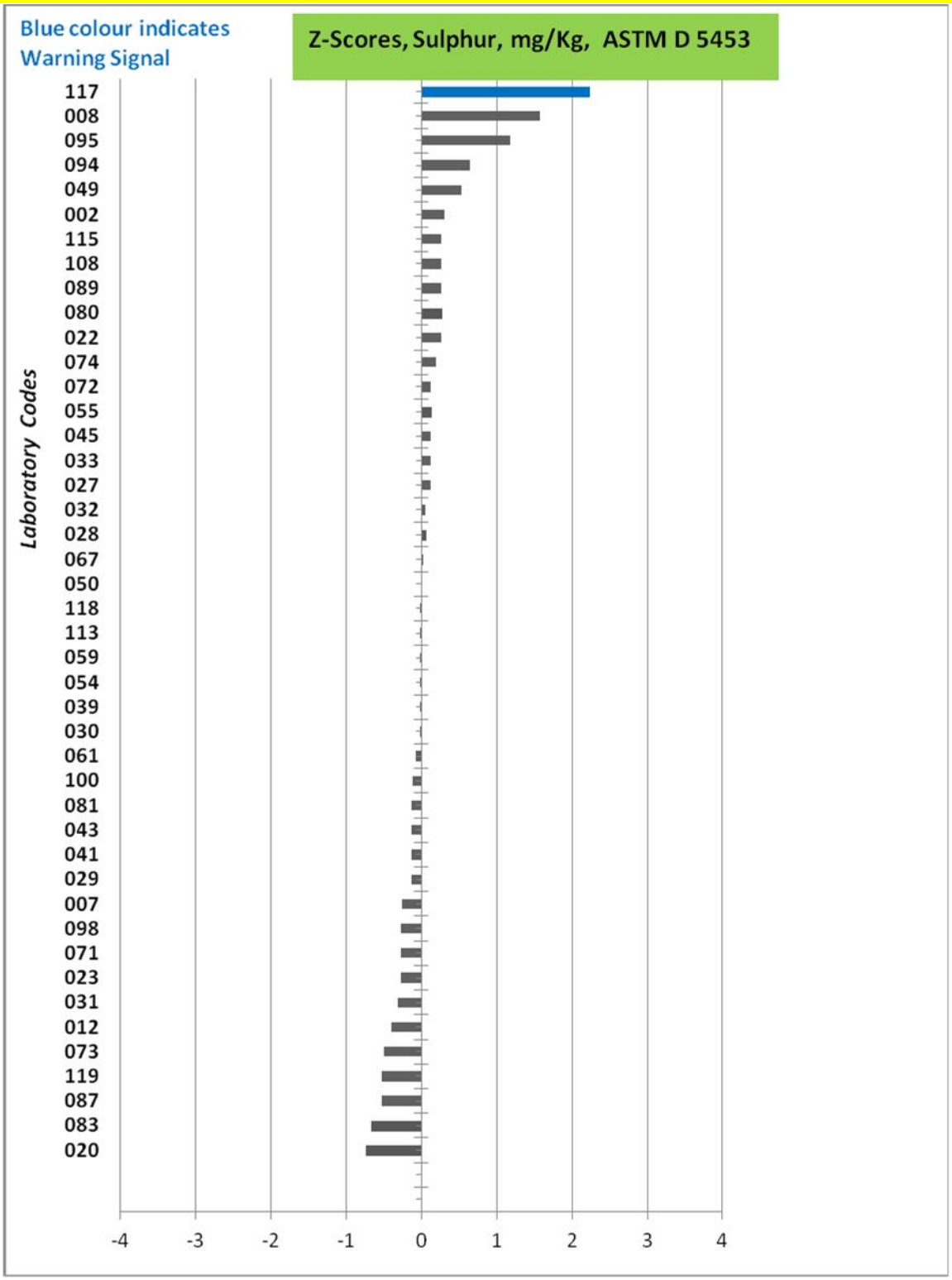
Blue colour indicates
Warning Signal
Z-Scores, Sulphur, mg/Kg, ASTM D 5453
Laboratory Codes
117
008
095
094
049
002
115
108
089
080
022
074
072
055
045
033
027
032
028
067
050
118
113
059
054
039
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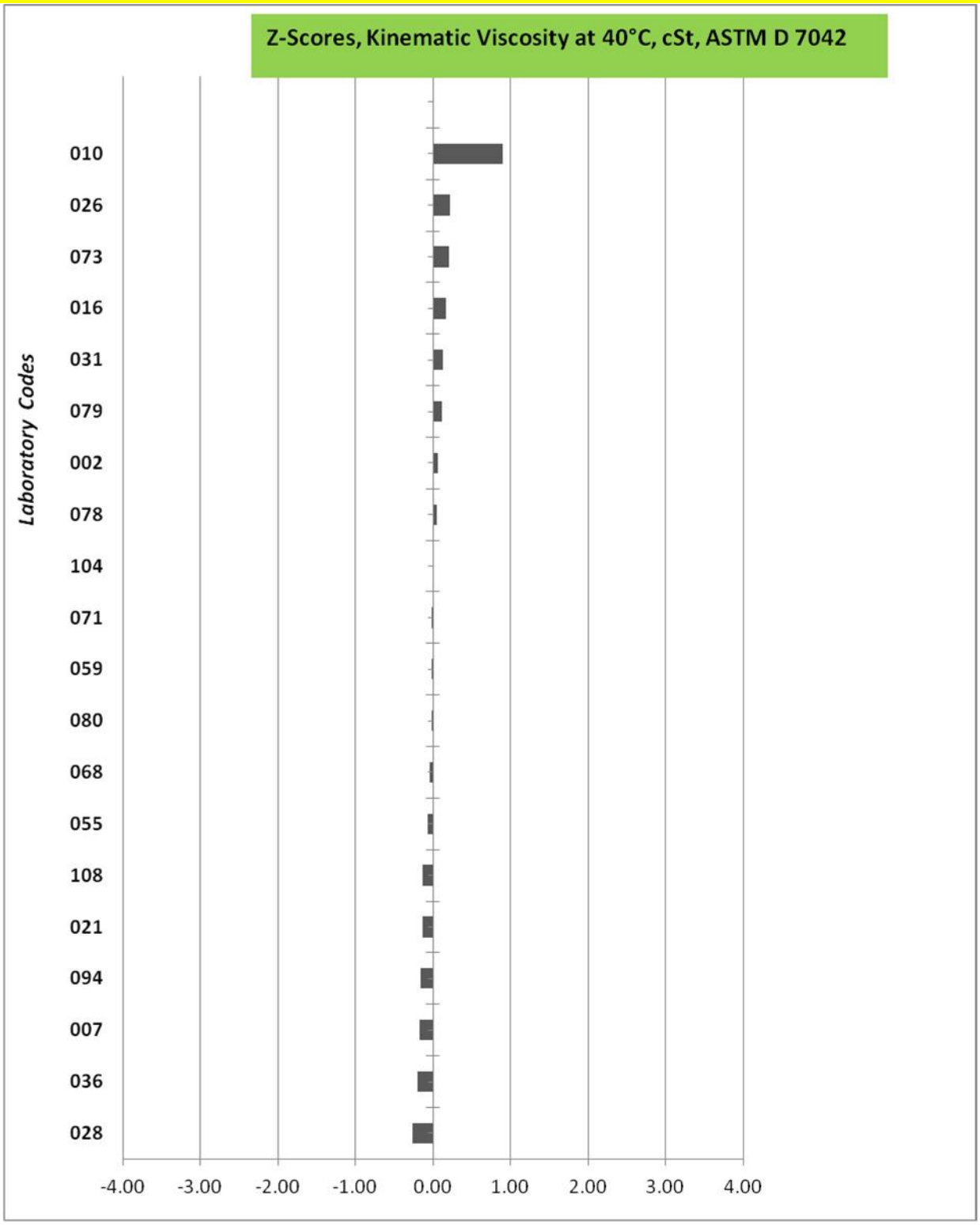
Z-Scores, Kinematic Viscosity at 40°C, cSt, ASTM D 7042
Laboratory Codes
010
026
073
016
031
079
002
078
104
071
059
080
068
055
108
021
094
007
036
028
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-1.00
0.00
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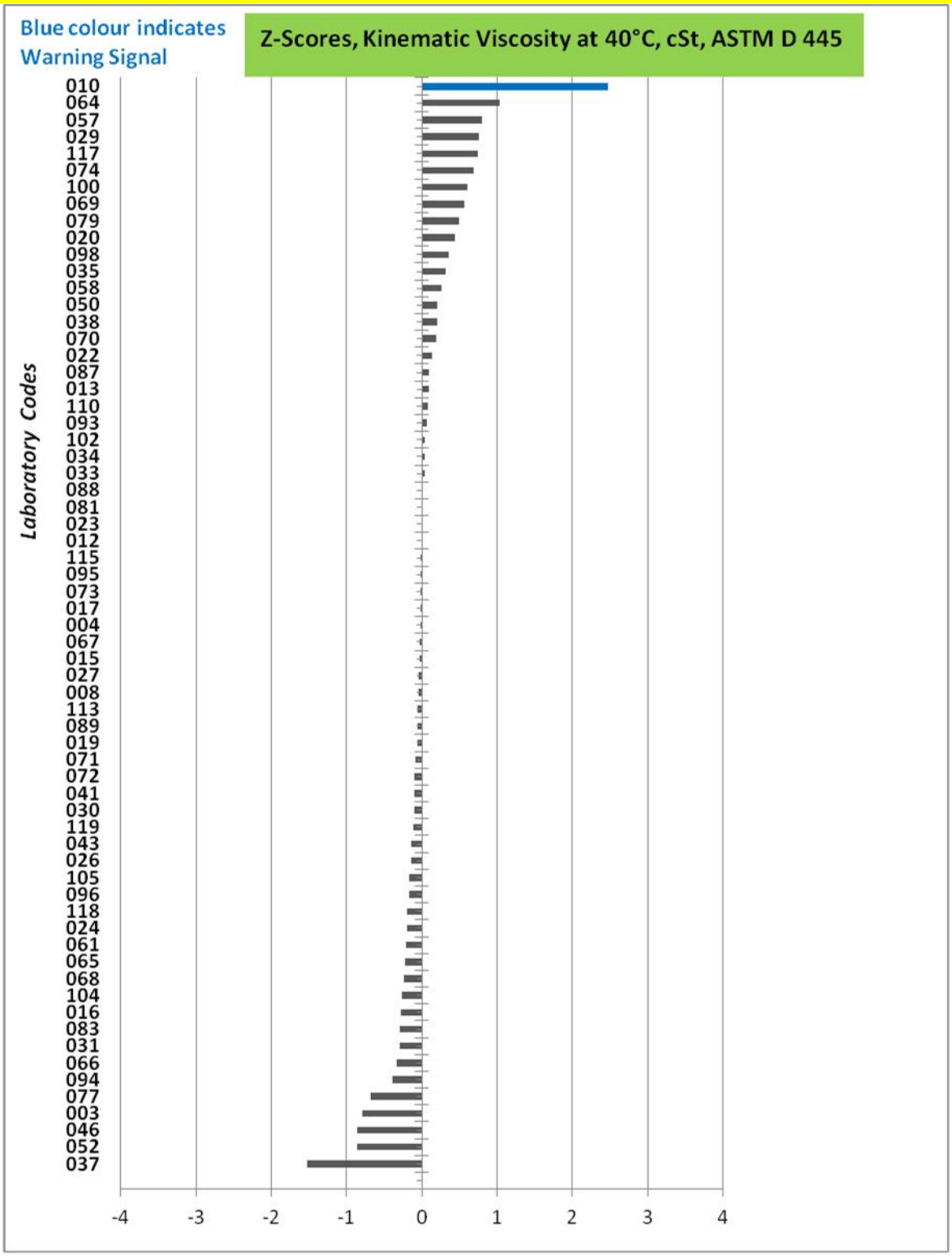
2.00
3.00
4.00


Blue colour indicates
Warning Signal
Z-Scores, Kinematic Viscosity at 40°C, cSt, ASTM D 445
Laboratory Codes
010
064
057
029
117
074
100
069
079
020
098
035
058
050
038
070
022
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110
093
102
034
033
088
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089
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071
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016
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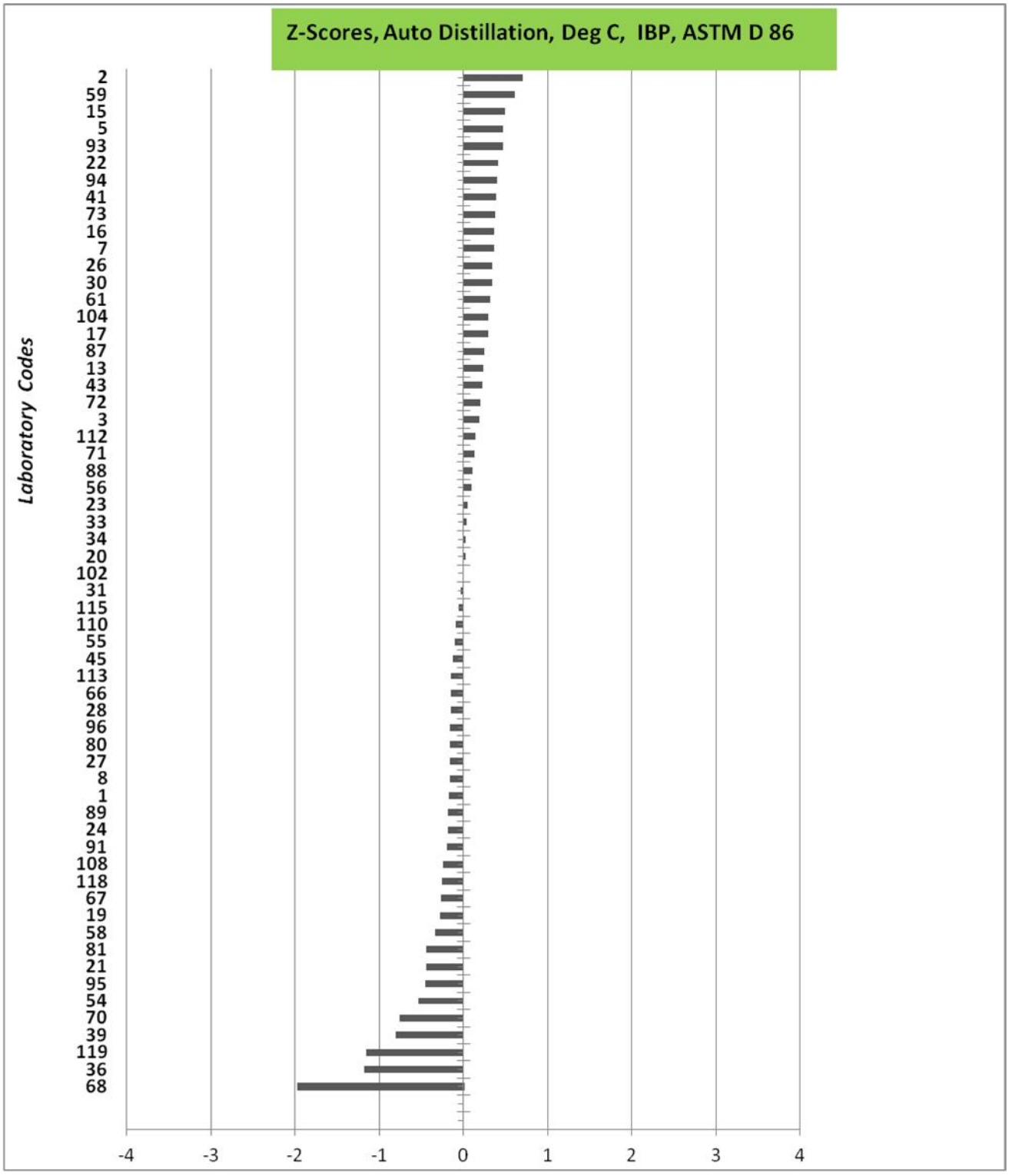
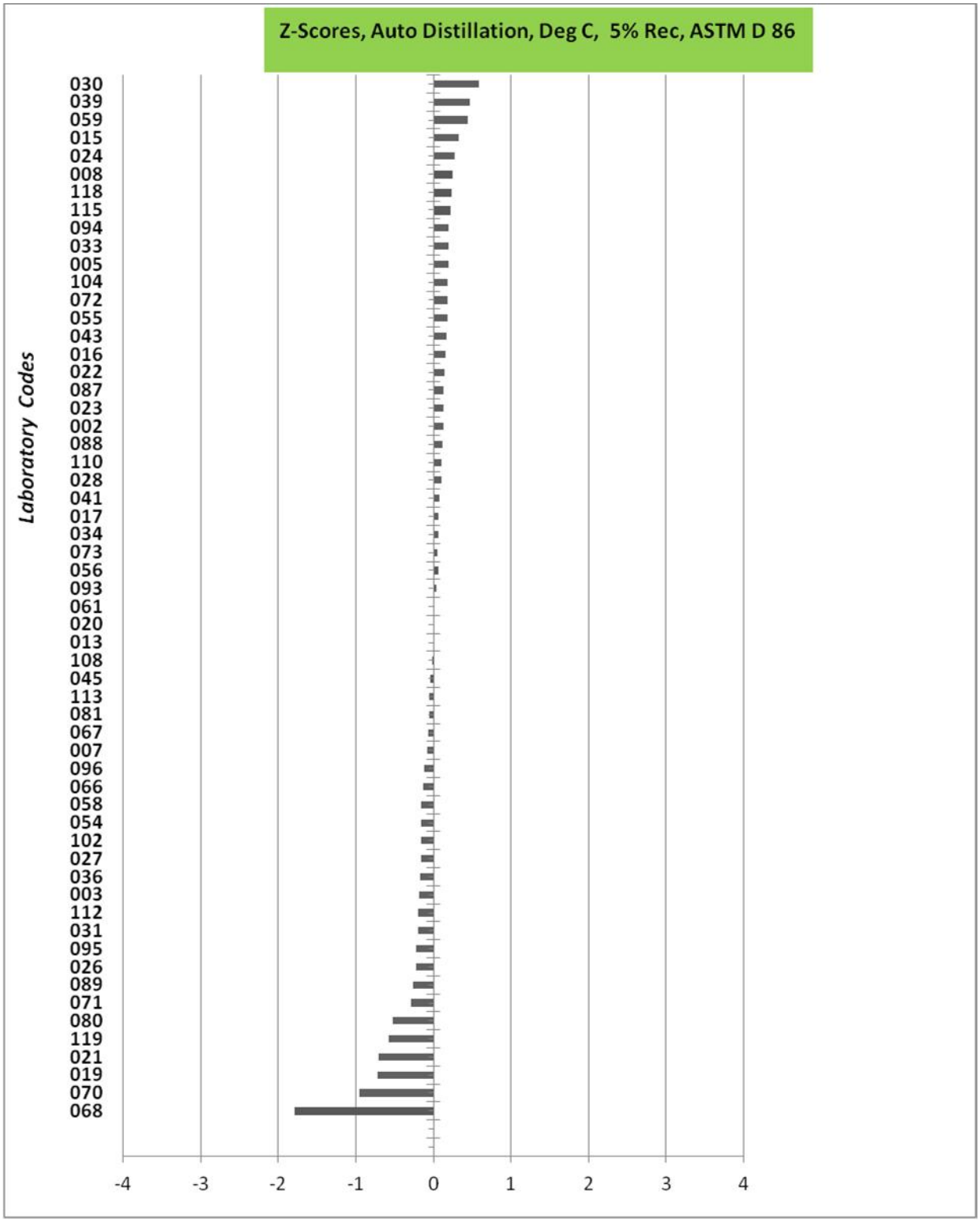
Z-Scores, Auto Distillation, ASTM D 86




Z-Scores, Auto Distillation, Deg C, 5% Rec, ASTM D 86
Laboratory Codes
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039
059
015
024
008
118
115
094
033
005
104
072
055
043
016
022
087
023
002
088
110
028
041
017
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073
056
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013
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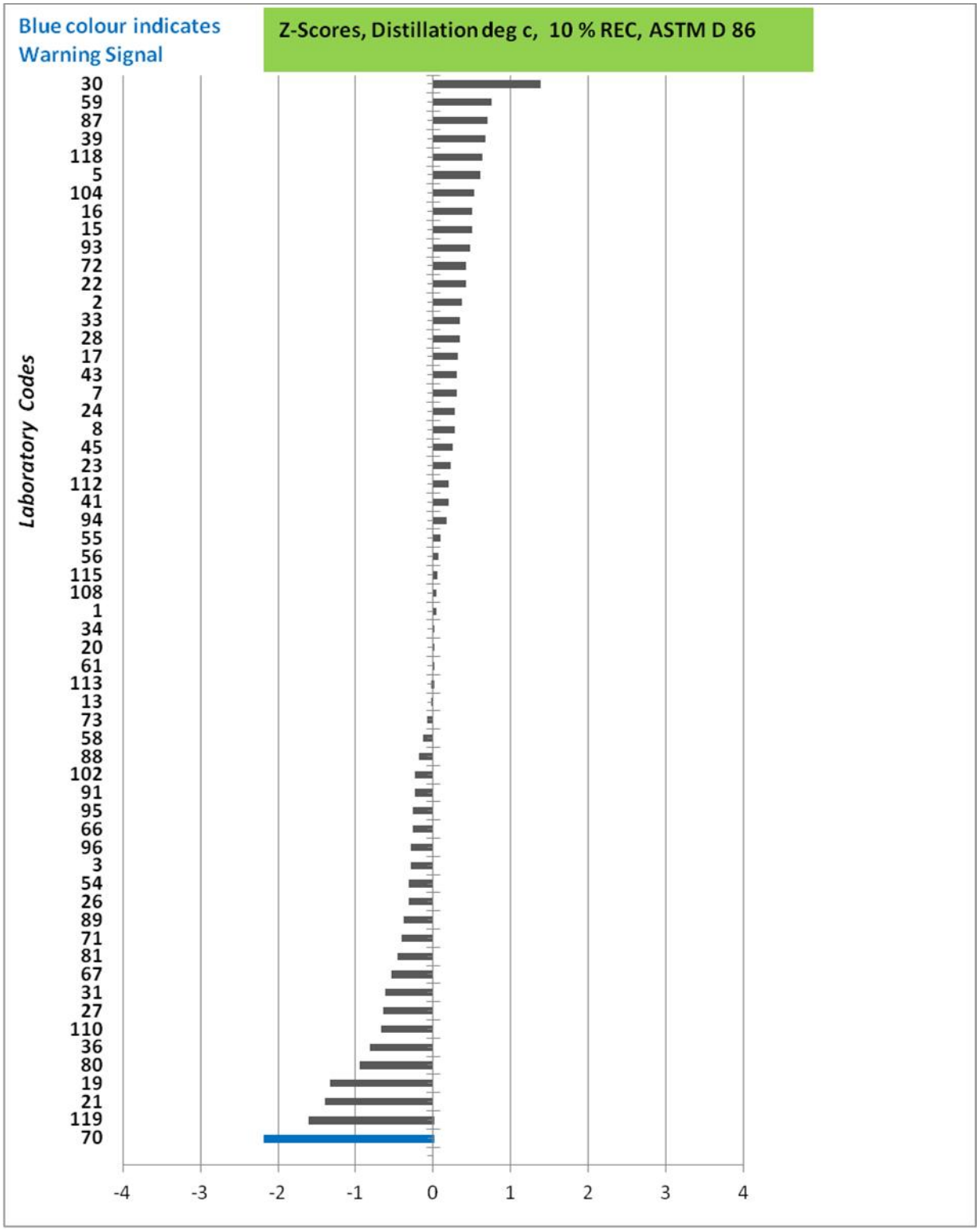
Blue colour indicates
Warning Signal
Z-Scores, Distillation deg c, 10 % REC, ASTM D 86
Laboratory Codes
30
59
87
39
118
5
104
16
15
93
72
22
2
33
28
17
43
7
24
8
45
23
112
41
94
55
56
115
108
1
34
20
61
113
13
73
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54
26
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71
81
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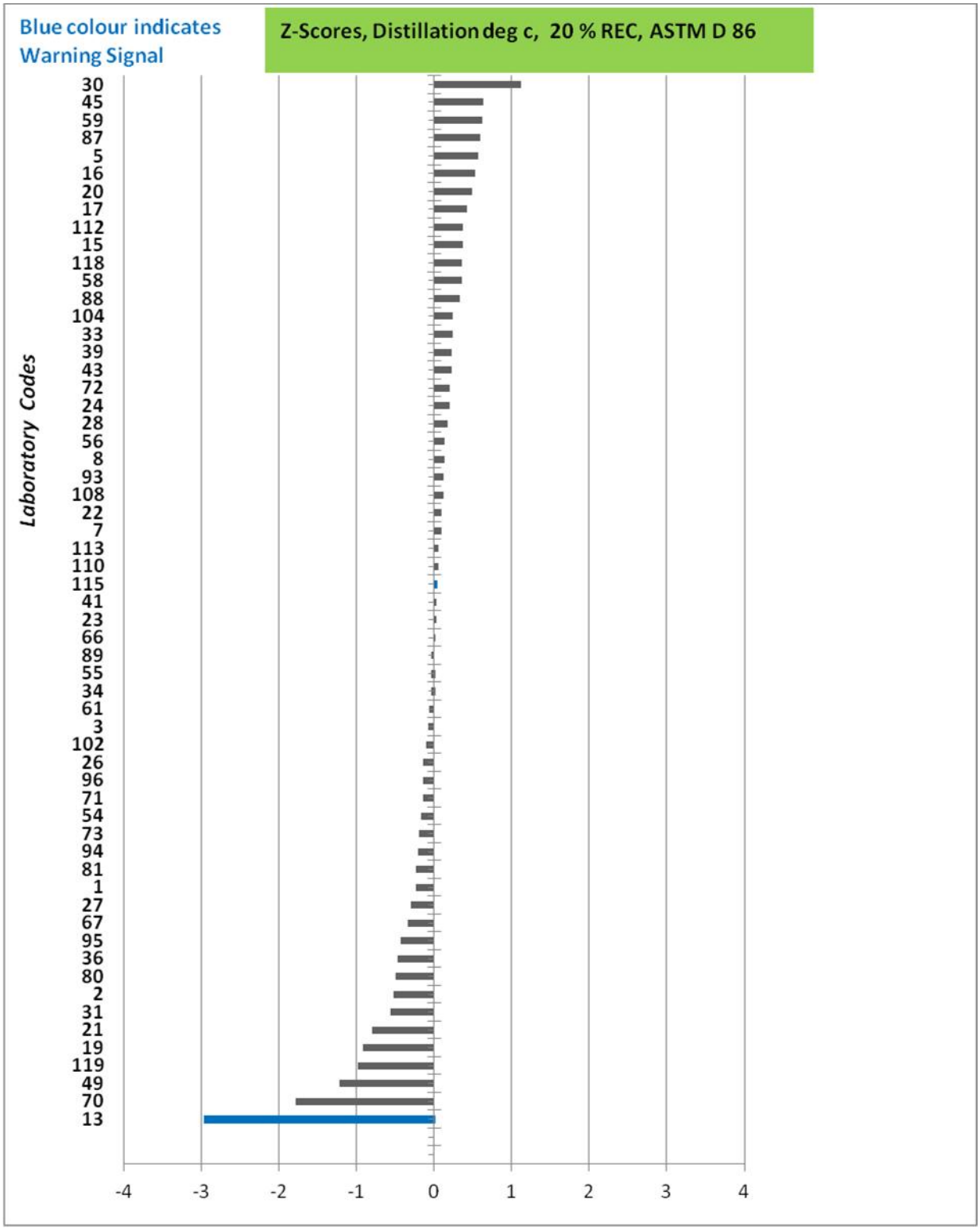
Blue colour indicates
Warning Signal
Z-Scores, Distillation deg c, 20 % REC, ASTM D 86
Laboratory Codes
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45
59
87
5
16
20
17
112
15
118
58
88
104
33
39
43
72
24
28
56
8
93
108
22
7
113
110
115
41
23
66
89
55
34
61
3
102
26
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71
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73
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81
1
27
67
95
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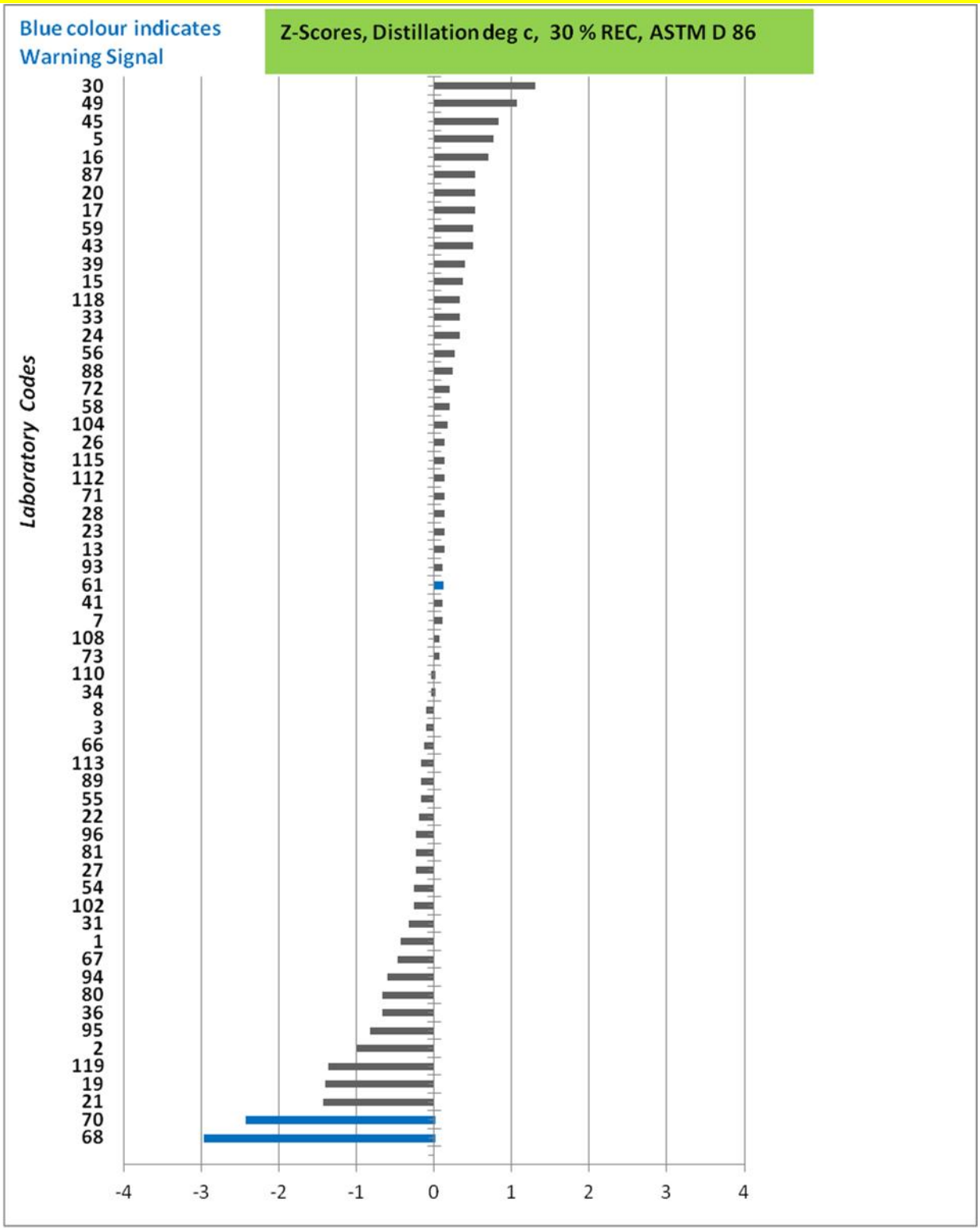
Blue colour indicates
Warning Signal
Z-Scores, Distillation deg c, 30 % REC, ASTM D 86
Laboratory Codes
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49
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5
16
87
20
17
59
43
39
15
118
33
24
56
88
72
58
104
26
115
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28
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61
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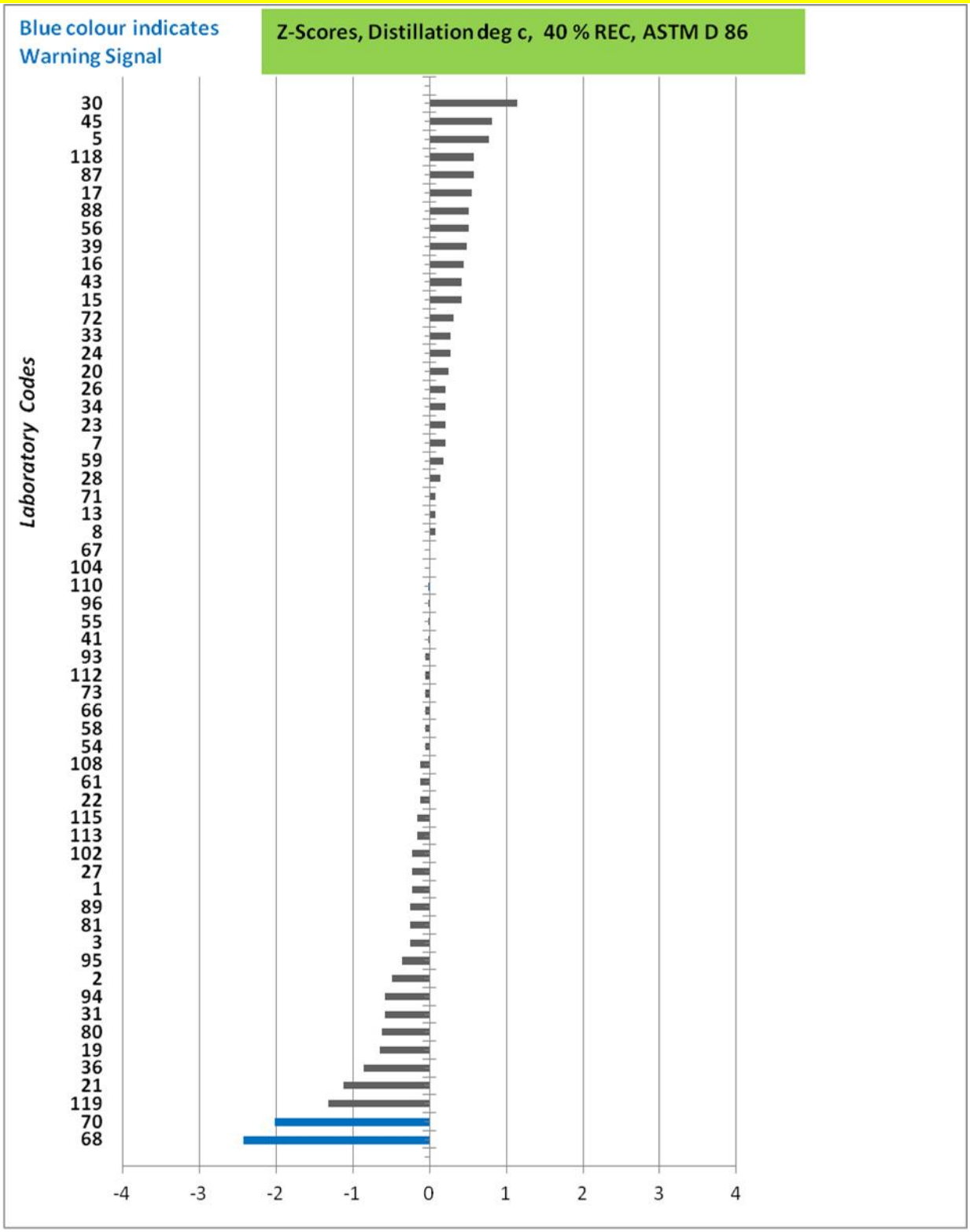
Blue colour indicates
Warning Signal
Z-Scores, Distillation deg c, 40 % REC, ASTM D 86
Laboratory Codes
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45
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56
39
16
43
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33
24
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26
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23
7
59
28
71
13
8
67
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58
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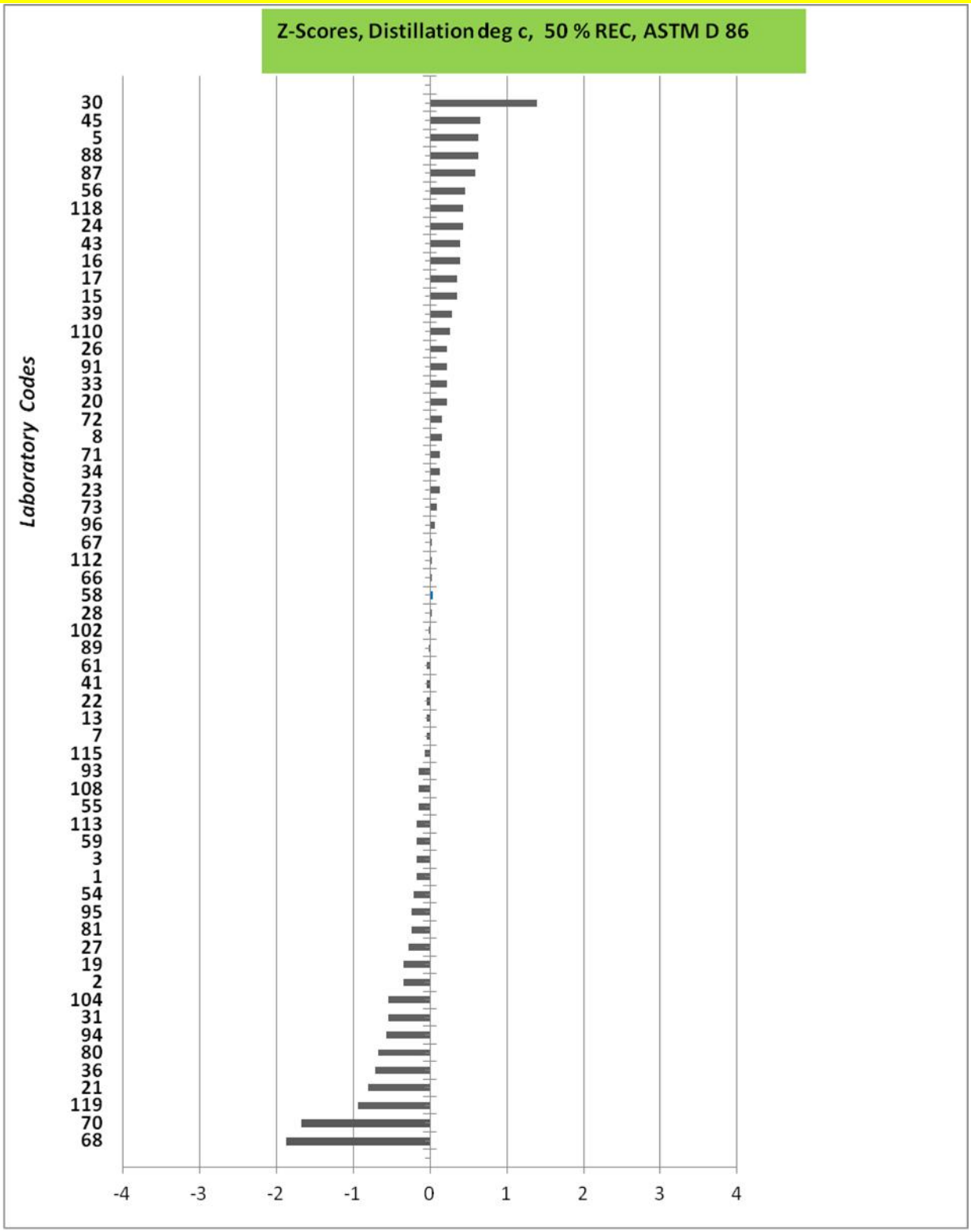
Z-Scores, Distillation deg c, 50 % REC, ASTM D 86
Laboratory Codes
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45
5
88
87
56
118
24
43
16
17
15
39
110
26
91
33
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72
8
71
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23
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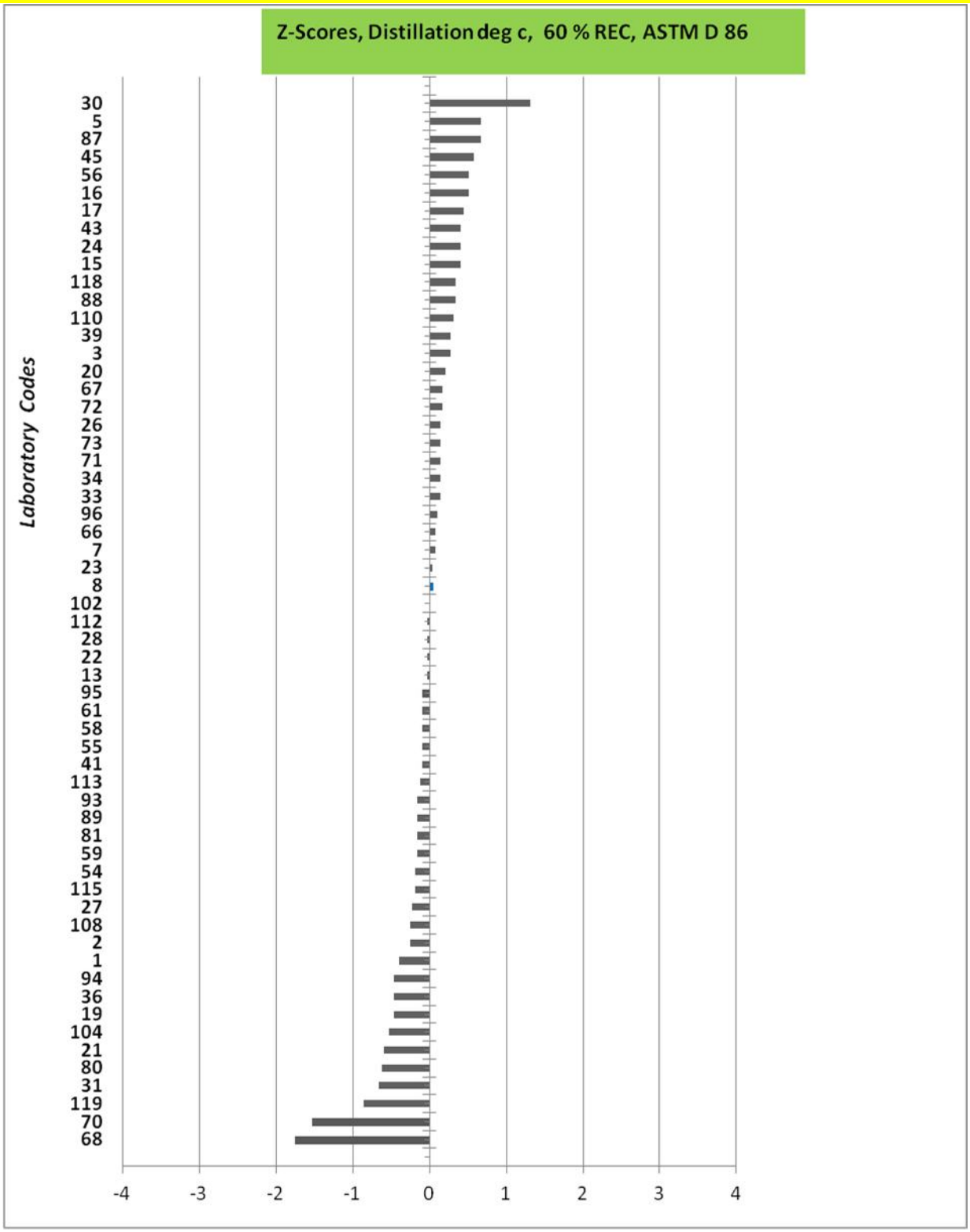
Z-Scores, Distillation deg c, 60 % REC, ASTM D 86
Laboratory Codes
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5
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45
56
16
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24
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110
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3
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72
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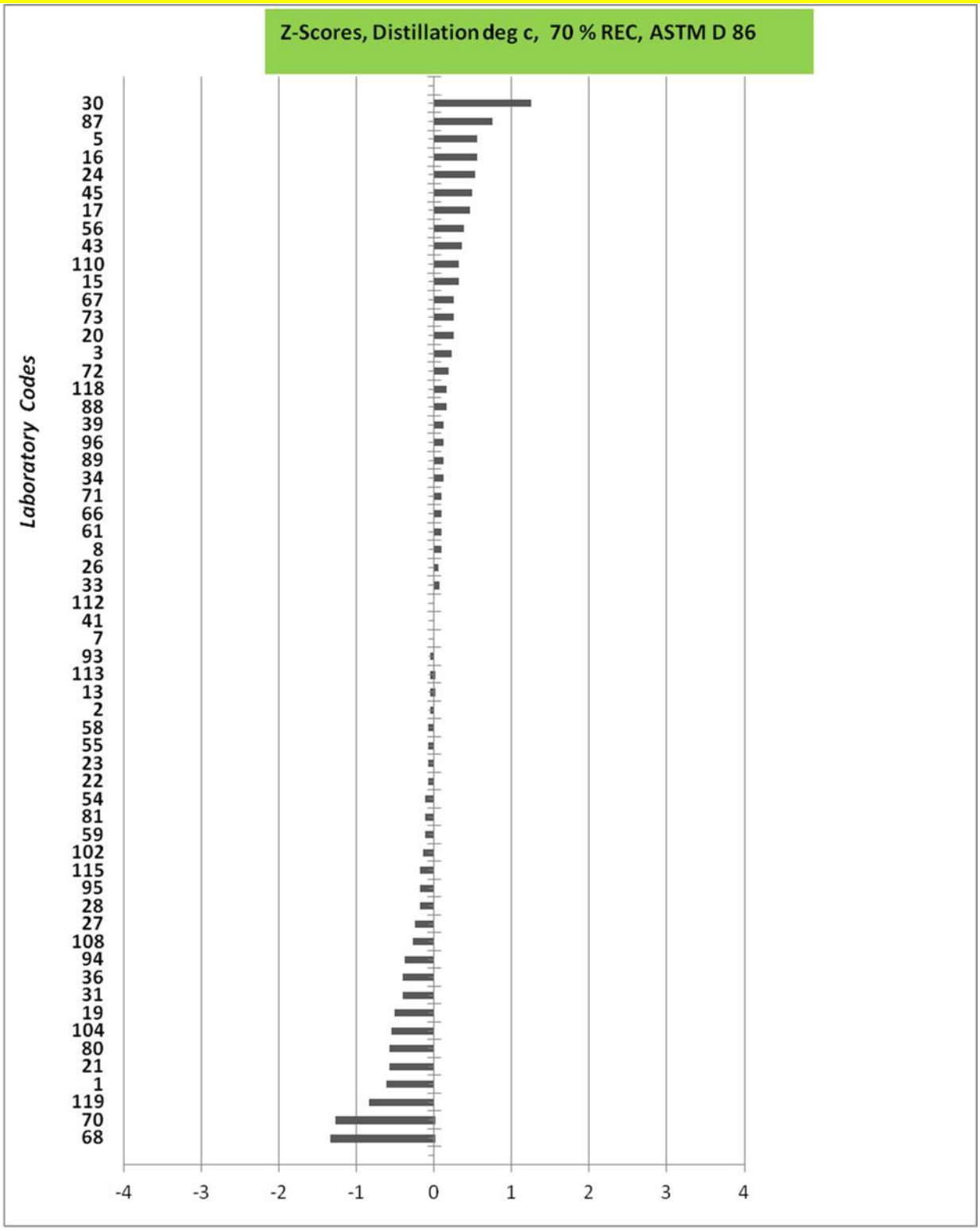
Z-Scores, Distillation deg c, 70 % REC, ASTM D 86
Laboratory Codes
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87
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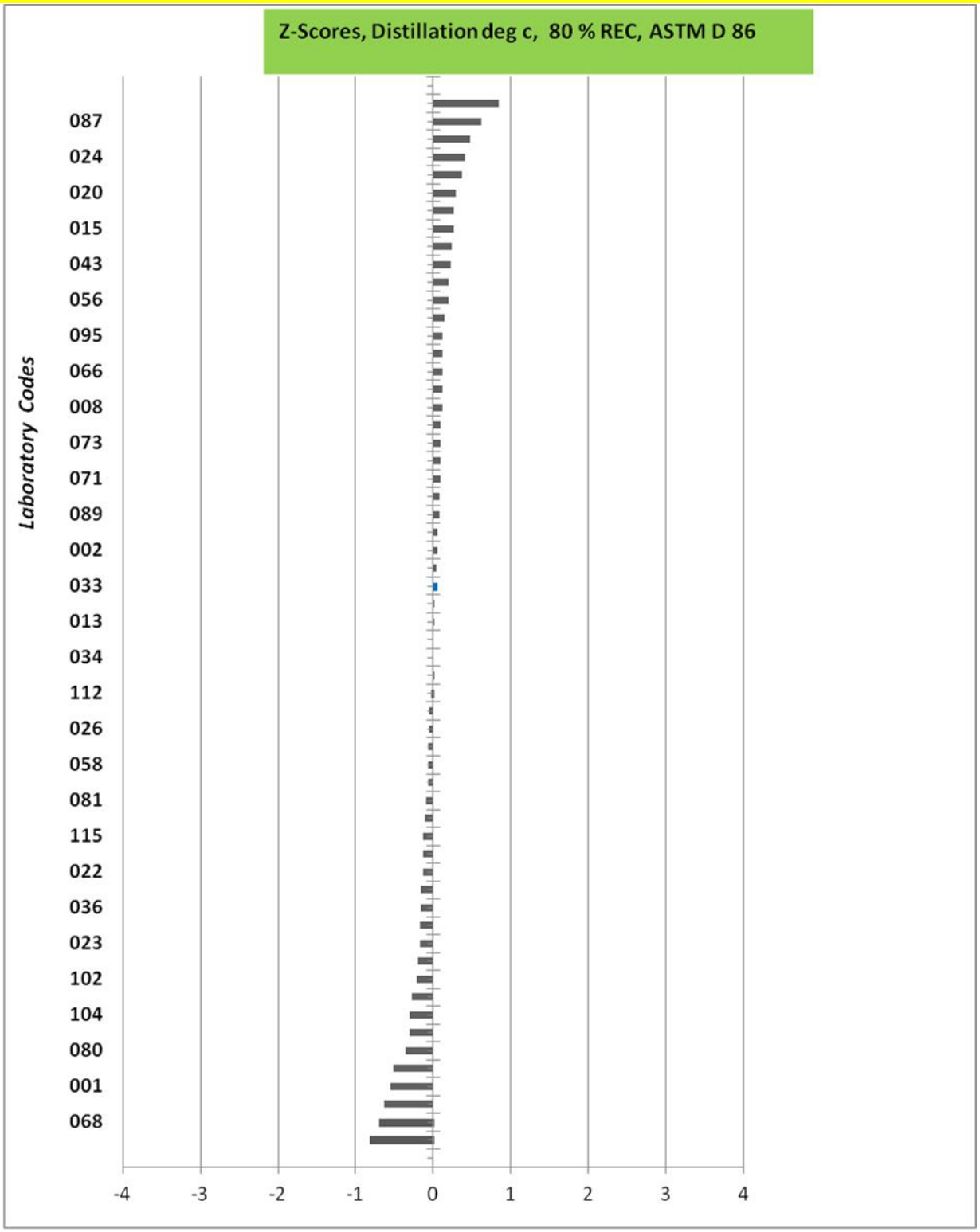
Z-Scores, Distillation deg c, 80 % REC, ASTM D 86
Laboratory Codes
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024
020
015
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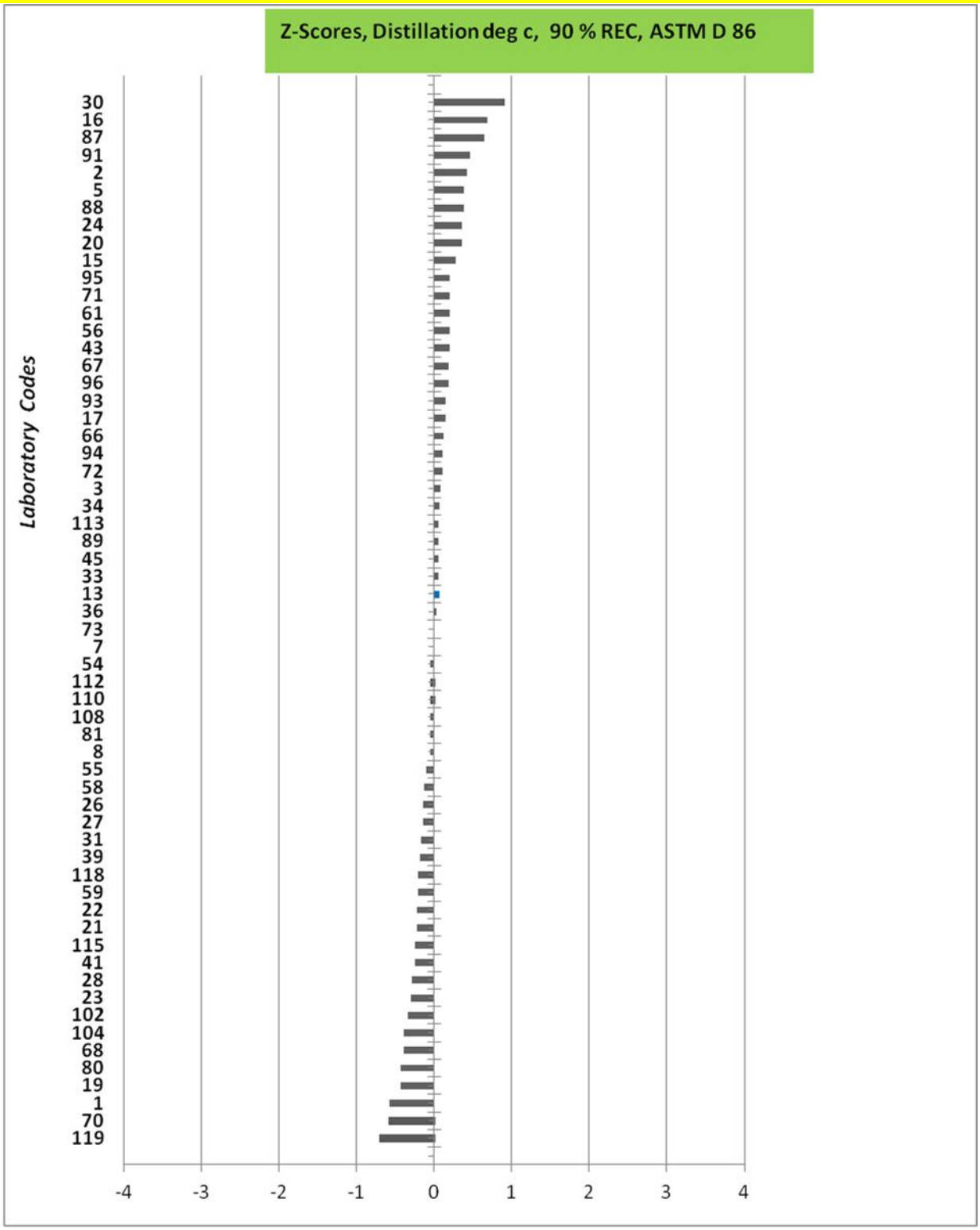
Z-Scores, Distillation deg c, 90 % REC, ASTM D 86
Laboratory Codes
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16
87
91
2
5
88
24
20
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71
61
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43
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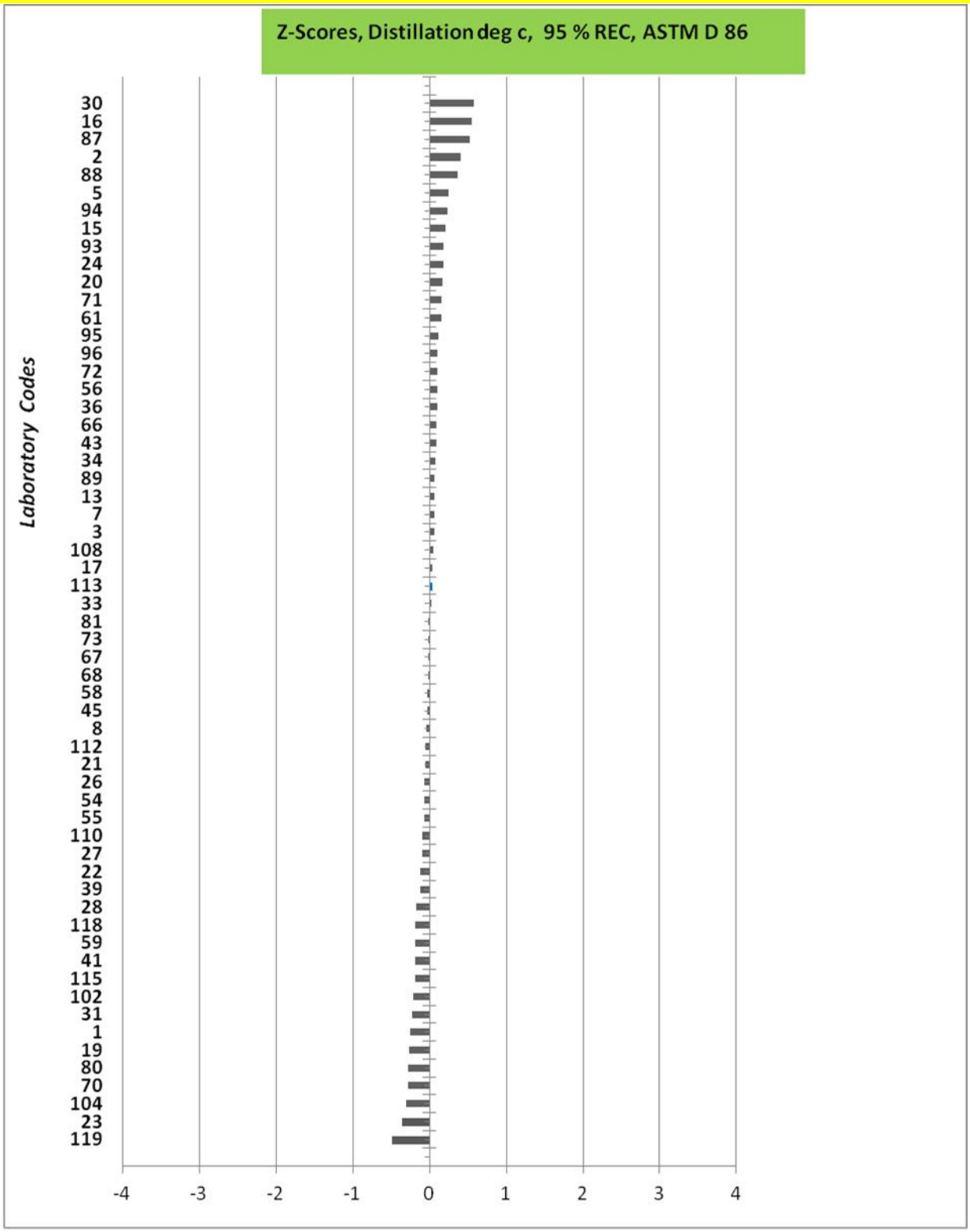
Z-Scores, Distillation deg c, 95 % REC, ASTM D 86
Laboratory Codes
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16
87
2
88
5
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15
93
24
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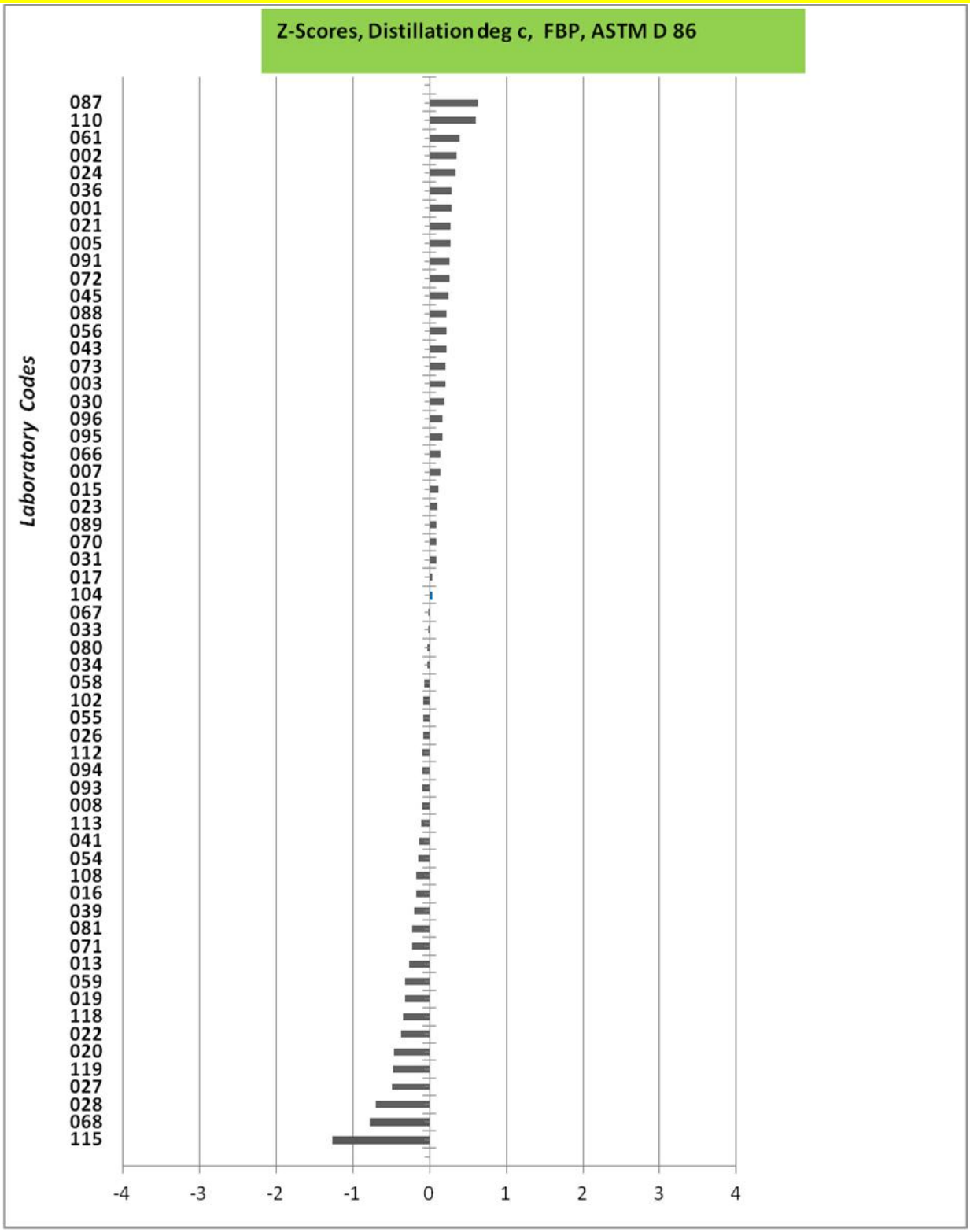
Z-Scores, Distillation deg c, FBP, ASTM D 86
Laboratory Codes
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024
036
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021
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072
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088
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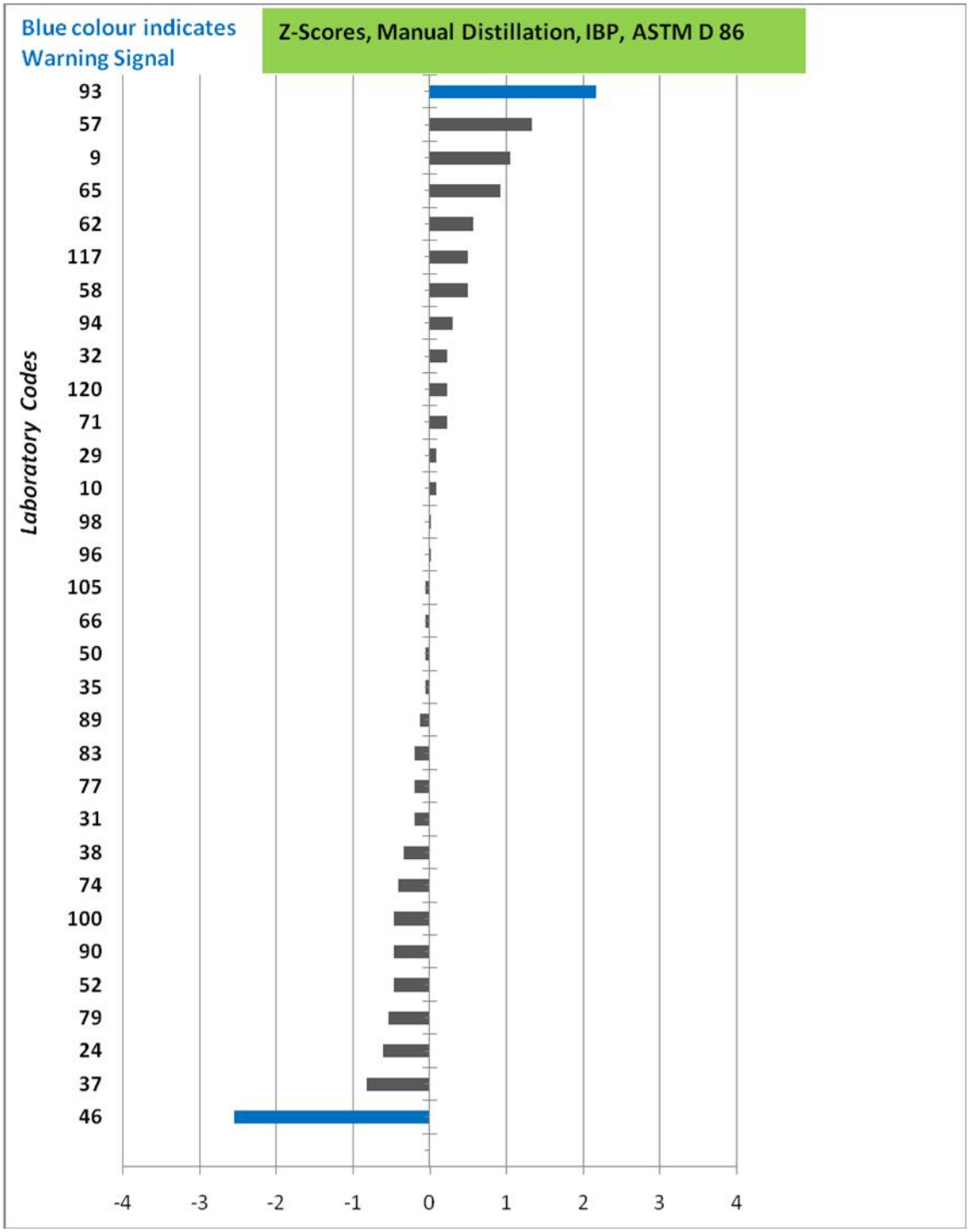
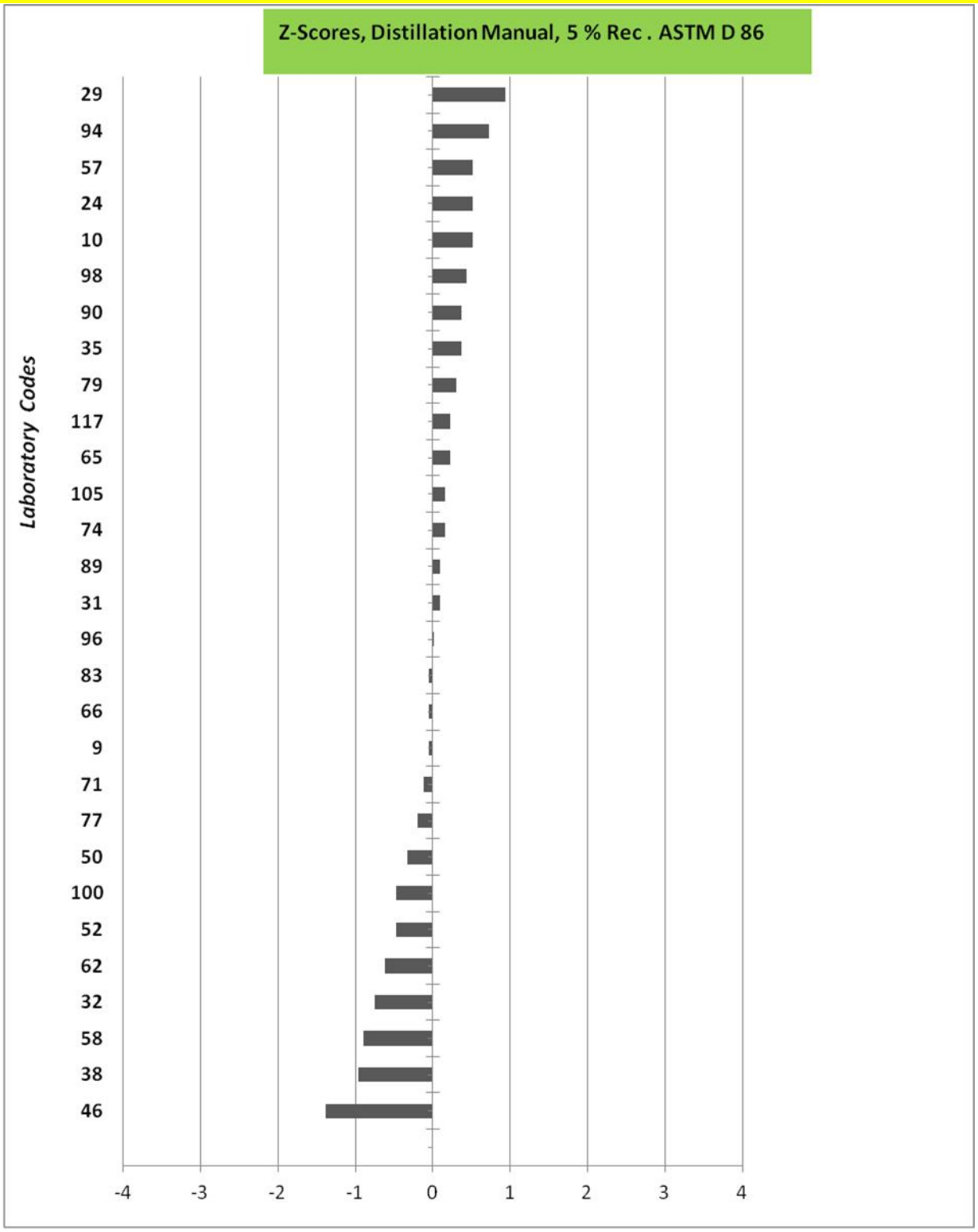
Z-Scores, Manual Distillation, ASTM D 86




Z-Scores, Distillation Manual, 5 % Rec . ASTM D 86
Laboratory Codes
29
94
57
24
10
98
90
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117
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105
74
89
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96
83
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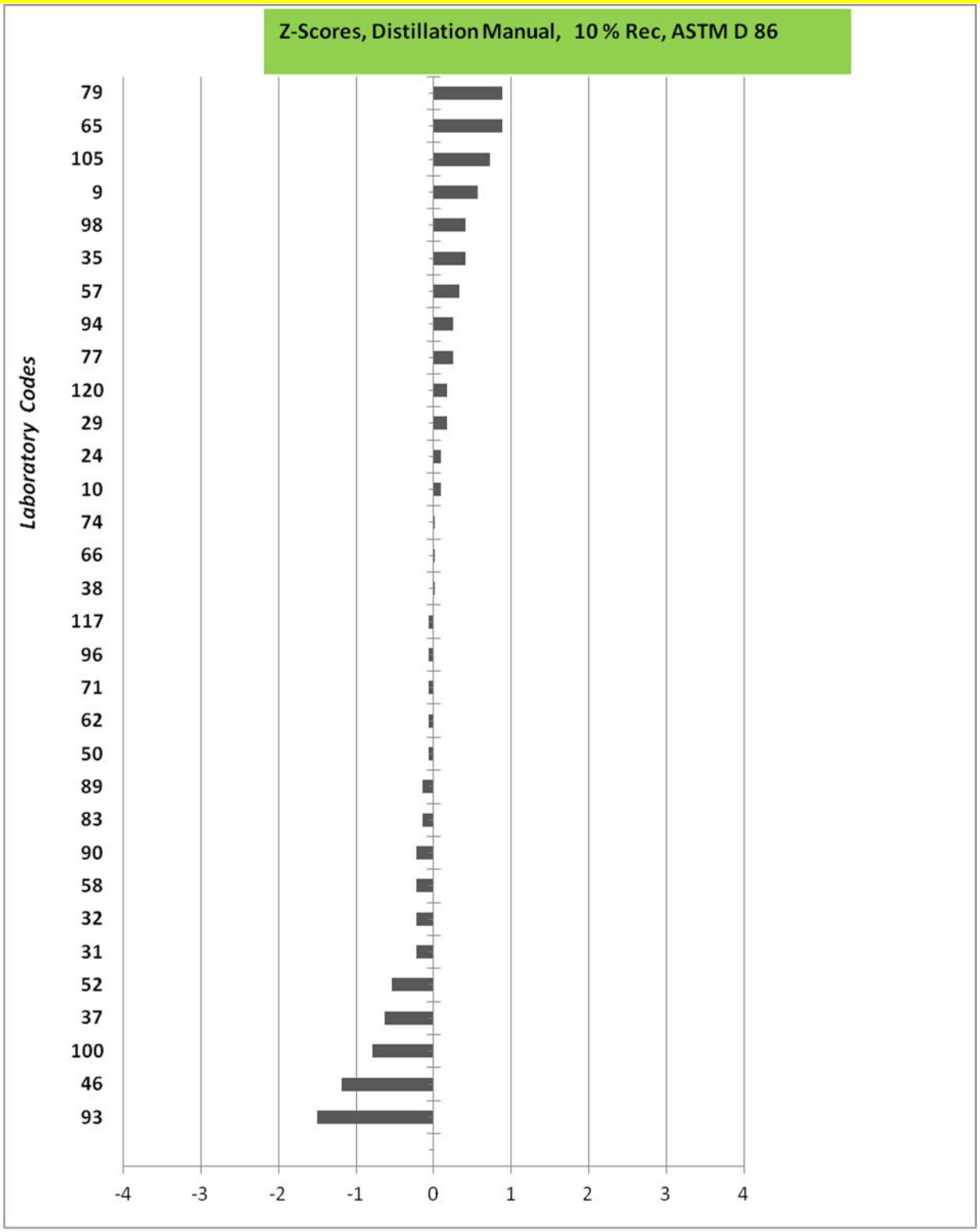
Z-Scores, Distillation Manual, 10 % Rec, ASTM D 86
Laboratory Codes
79
65
105
9
98
35
57
94
77
120
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24
10
74
66
38
117
96
71
62
50
89
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46
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-4
-3
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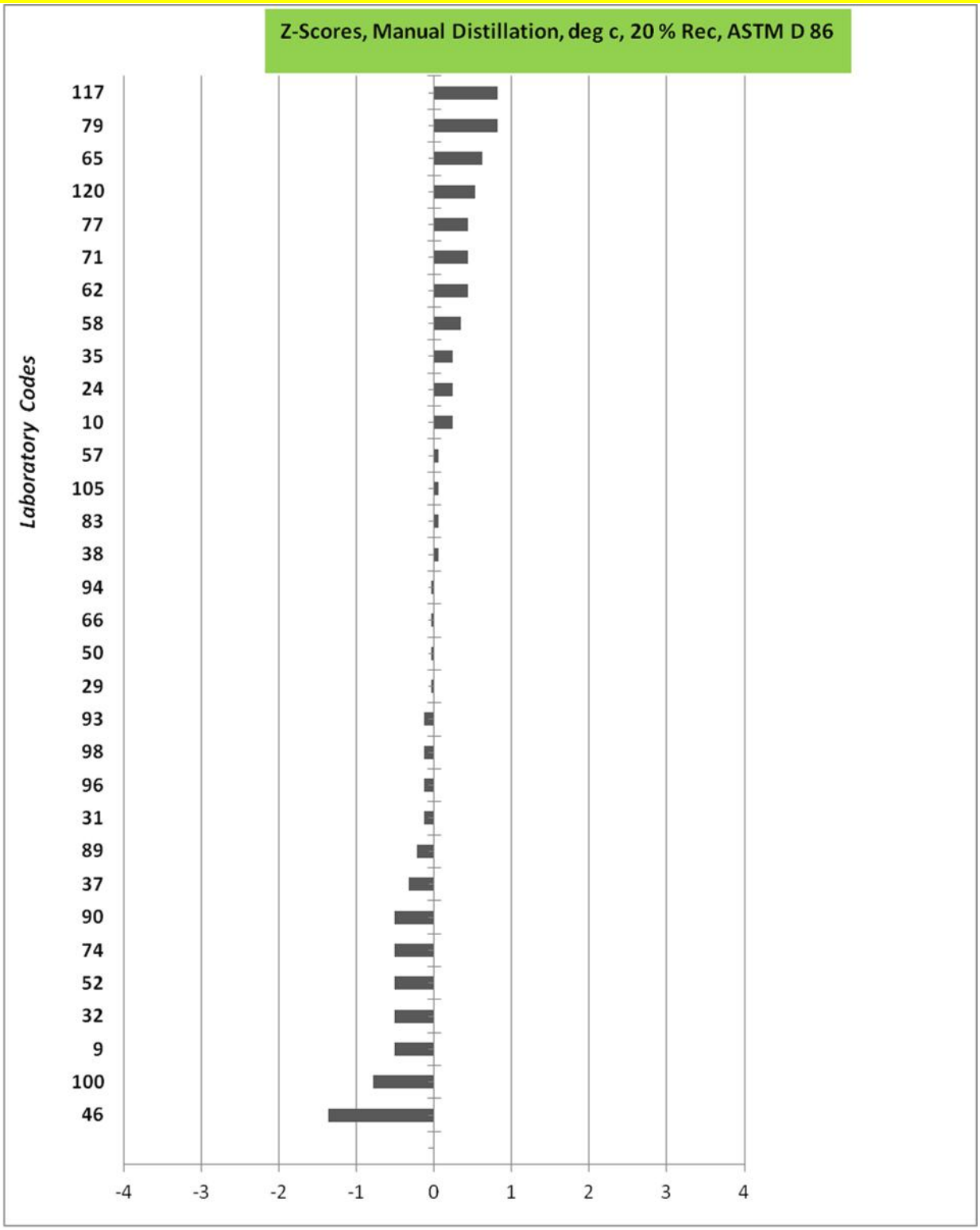
4


Z-Scores, Manual Distillation, deg c, 20 % Rec, ASTM D 86
Laboratory Codes
117
79
65
120
77
71
62
58
35
24
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57
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83
38
94
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50
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93
98
96
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100
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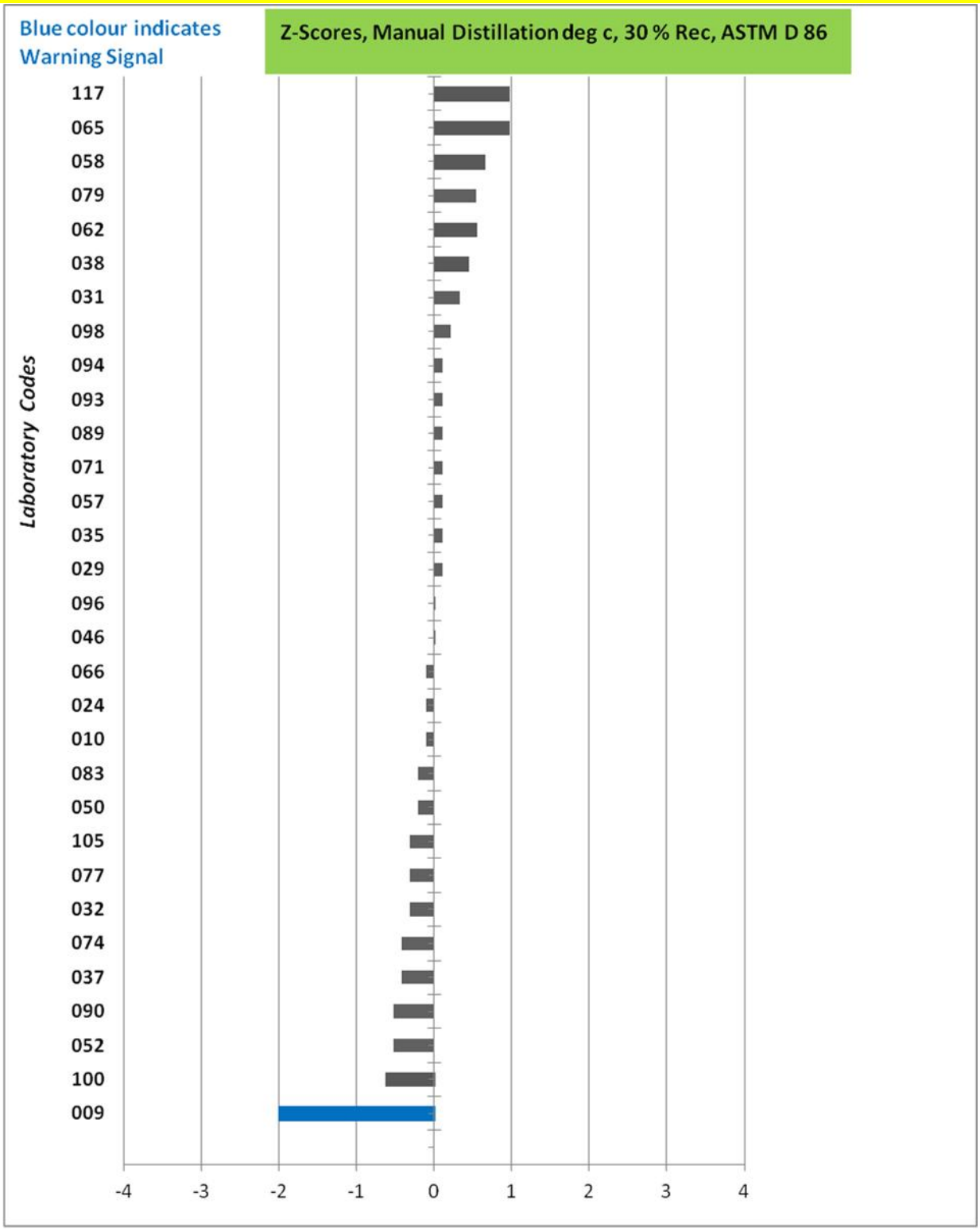
Blue colour indicates
Warning Signal
Z-Scores, Manual Distillation deg c, 30 % Rec, ASTM D 86
Laboratory Codes
117
065
058
079
062
038
031
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094
093
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046
066
024
010
083
050
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090
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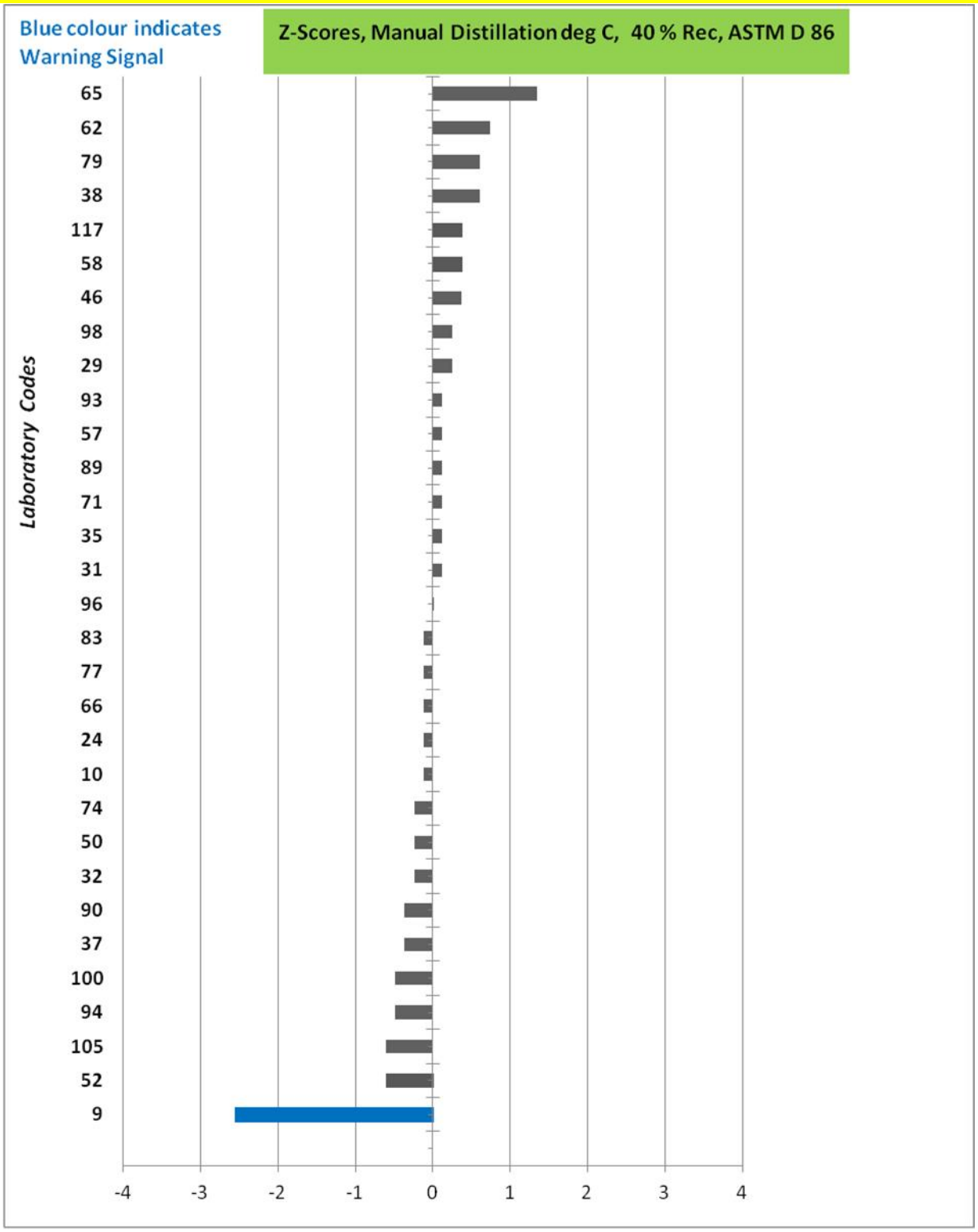
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Warning Signal
Z-Scores, Manual Distillation deg C, 40 % Rec, ASTM D 86
Laboratory Codes
65
62
79
38
117
58
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98
29
93
57
89
71
35
31
96
83
77
66
24
10
74
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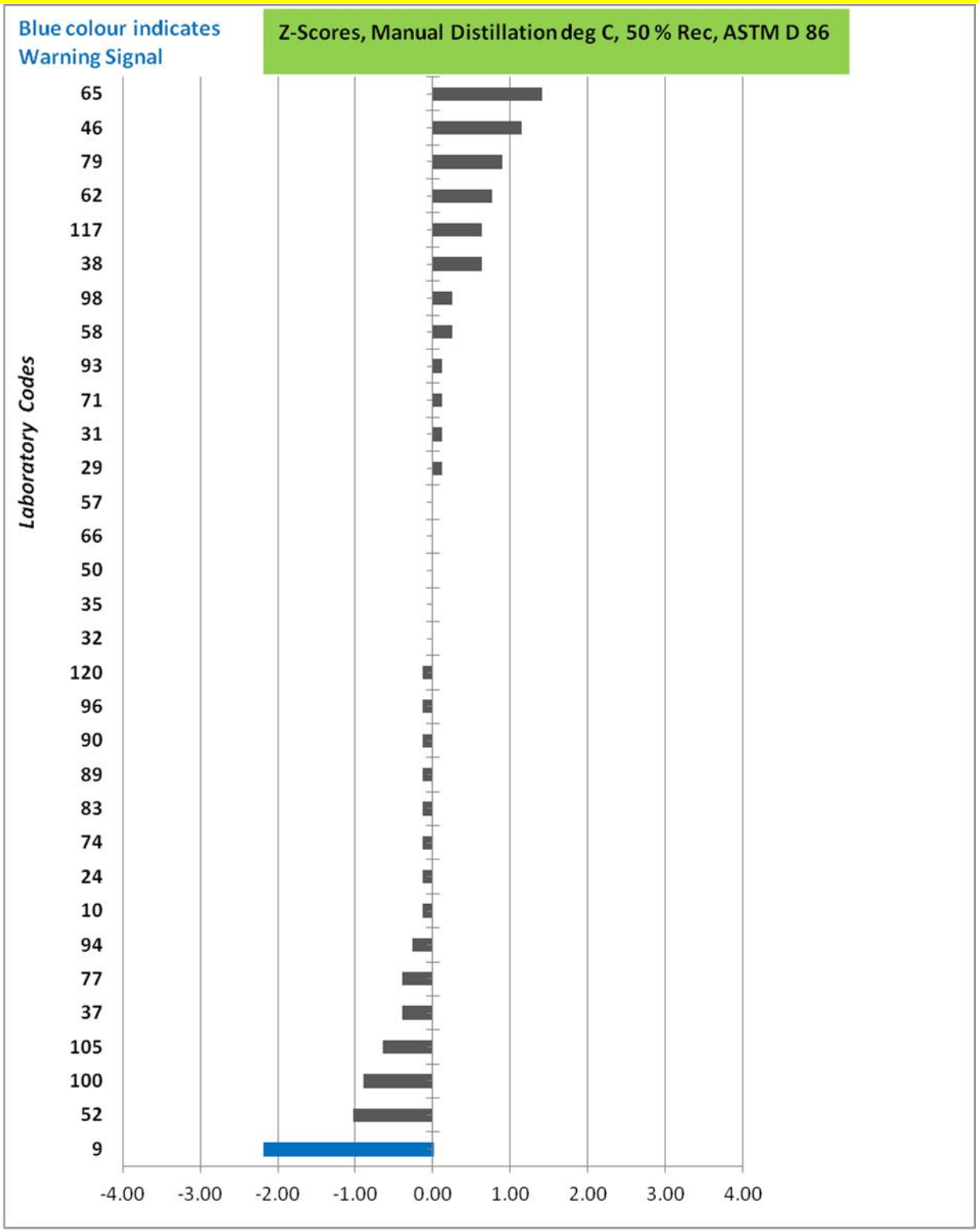
Blue colour indicates Warning Signal
Z-Scores, Manual Distillation deg C, 50 % Rec, ASTM D 86
Laboratory Codes
65
46
79
62
117
38
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93
71
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120
96
90
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77
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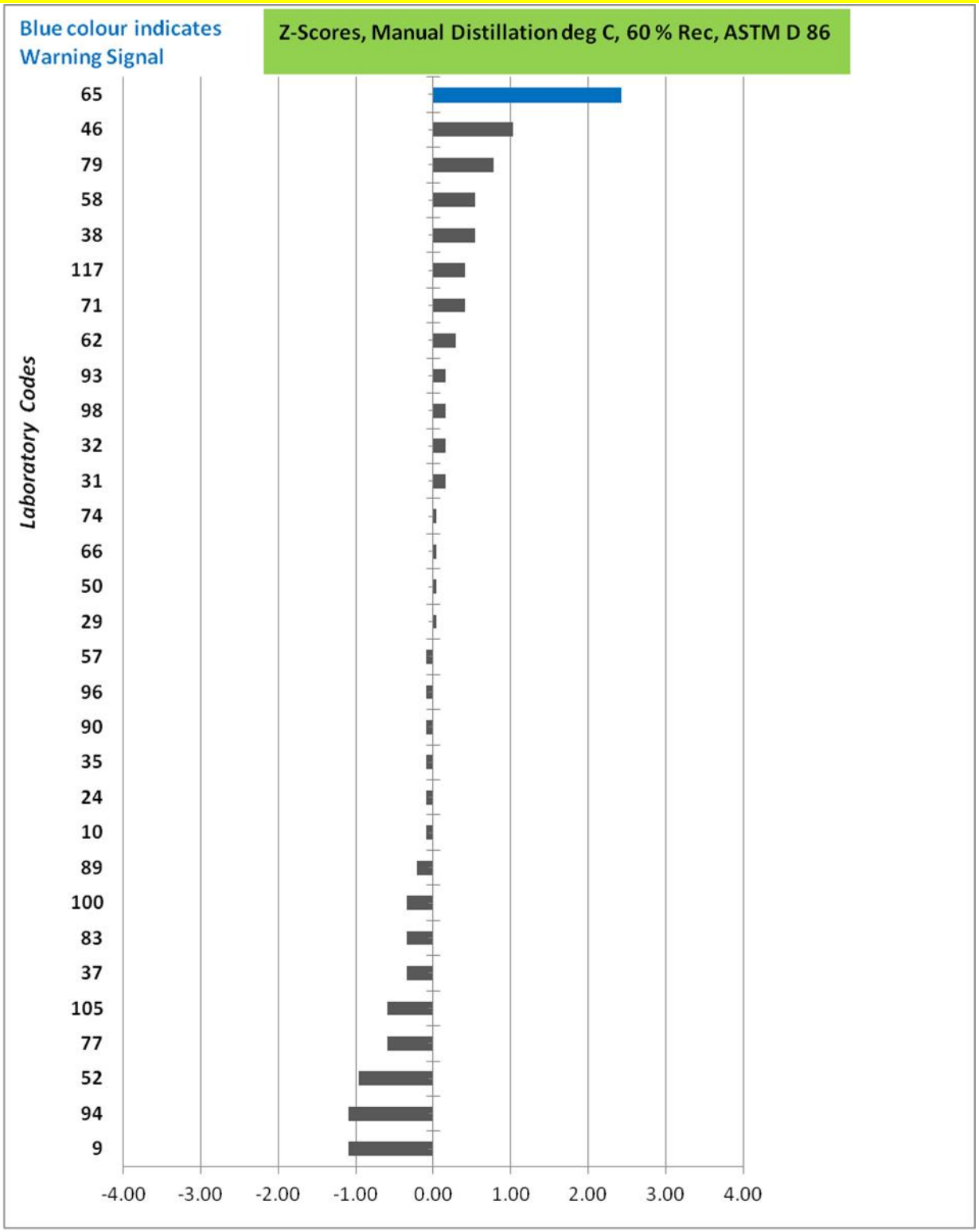
Blue colour indicates Warning Signal
Z-Scores, Manual Distillation deg C, 60 % Rec, ASTM D 86
Laboratory Codes
65
46
79
58
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117
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32
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74
66
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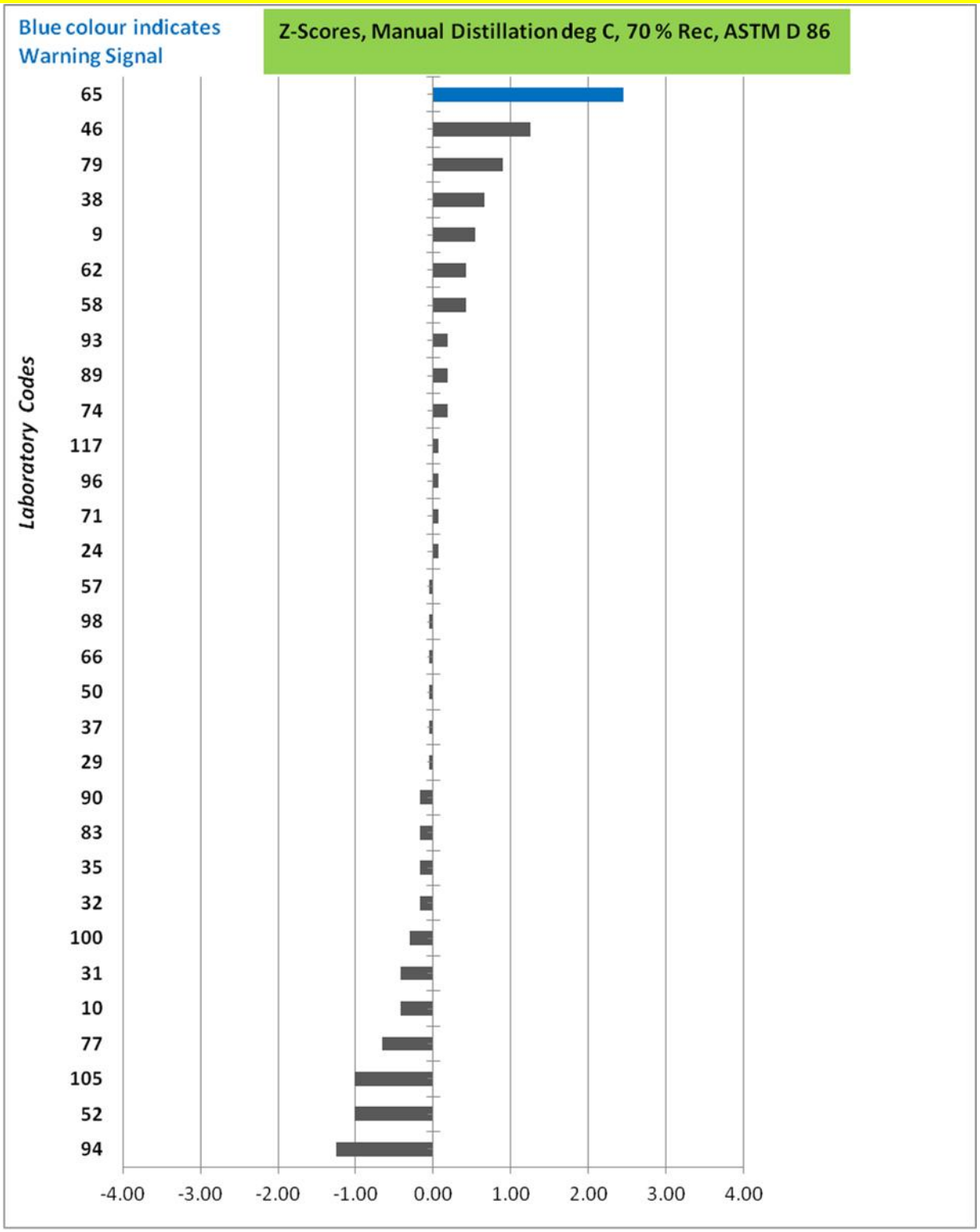
Blue colour indicates Warning Signal
Z-Scores, Manual Distillation deg C, 70 % Rec, ASTM D 86
Laboratory Codes
65
46
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38
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62
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74
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71
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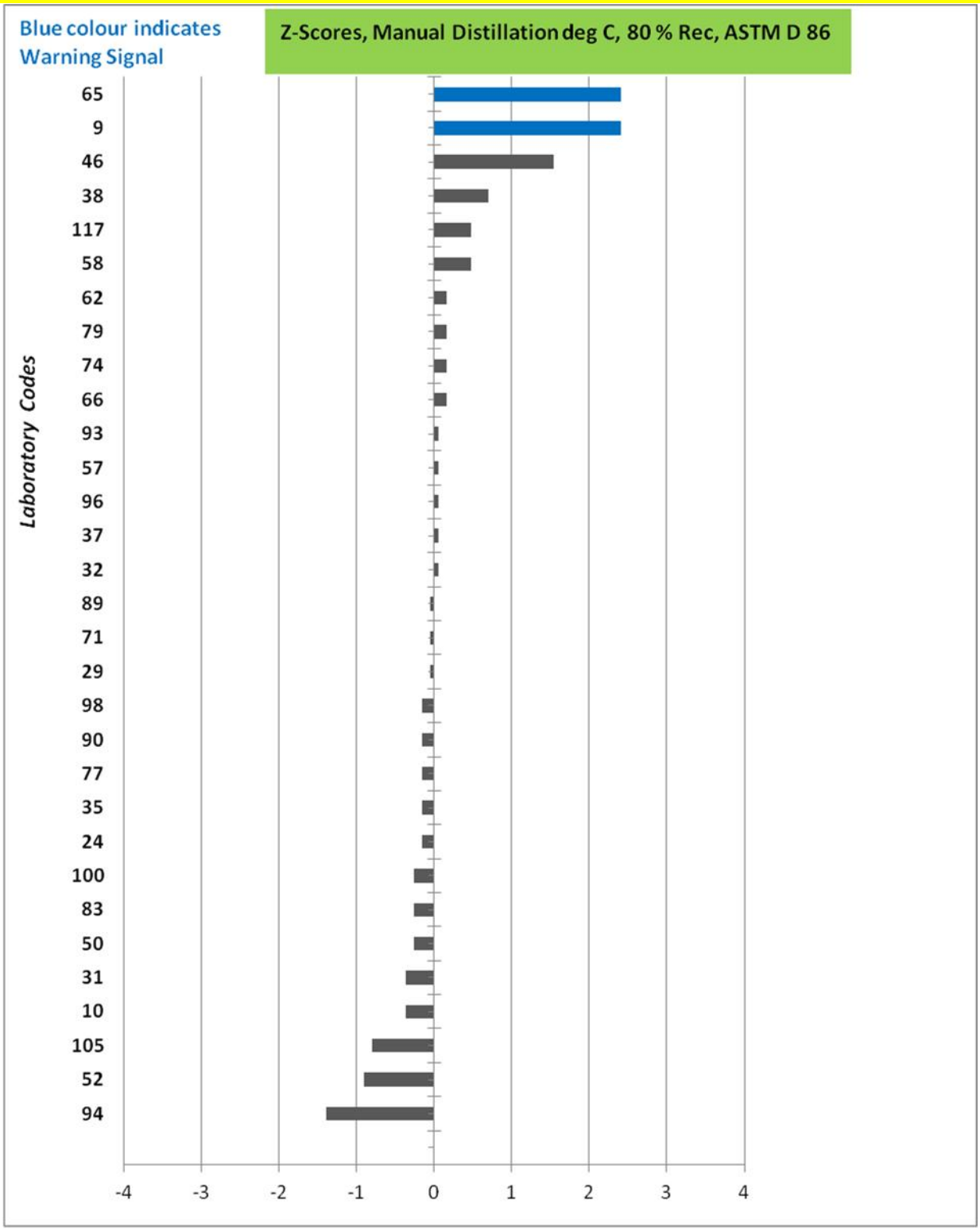
Blue colour indicates Warning Signal
Z-Scores, Manual Distillation deg C, 80 % Rec, ASTM D 86
Laboratory Codes
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117
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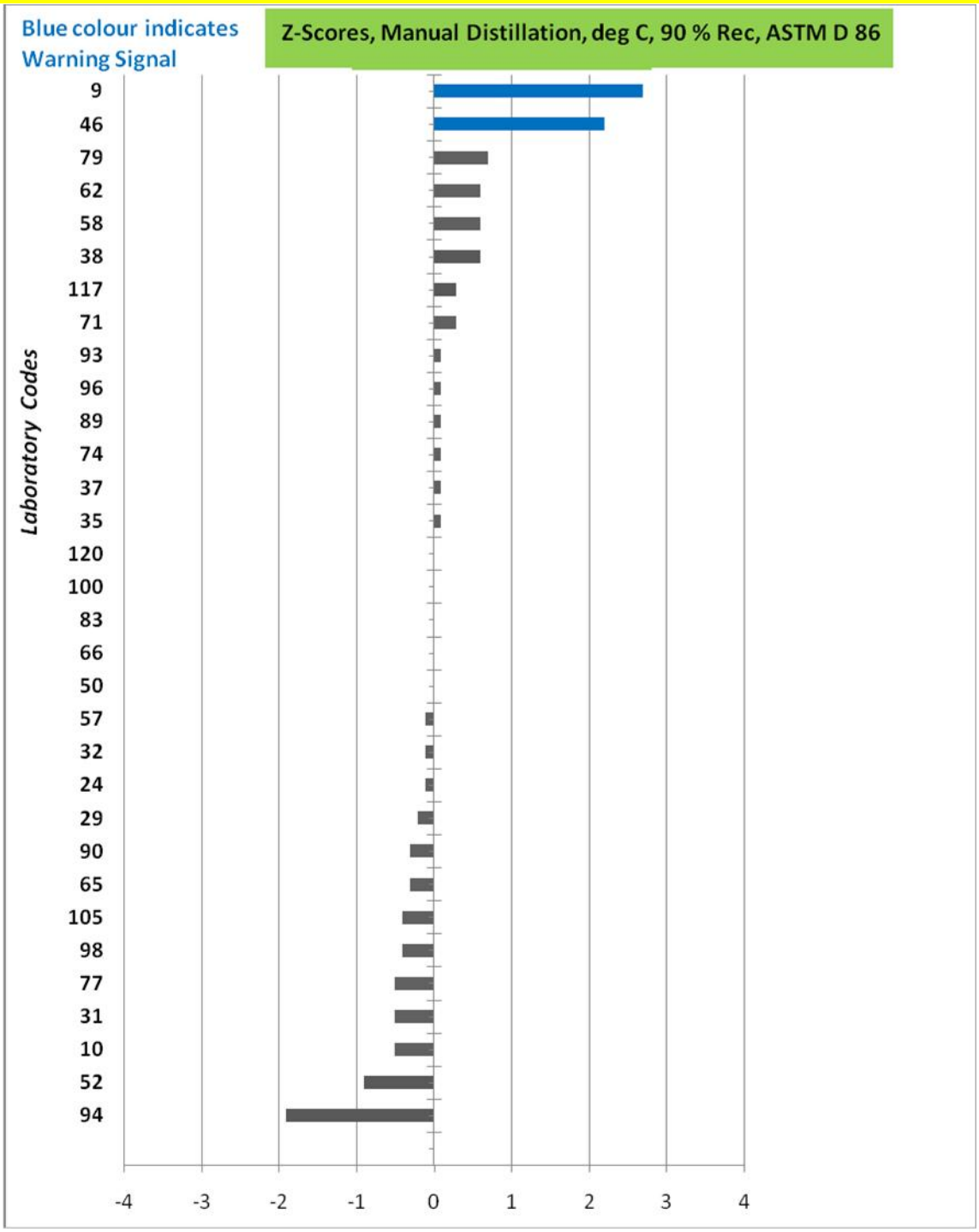
Blue colour indicates
Warning Signal
Z-Scores, Manual Distillation, deg C, 90 % Rec, ASTM D 86
Laboratory Codes
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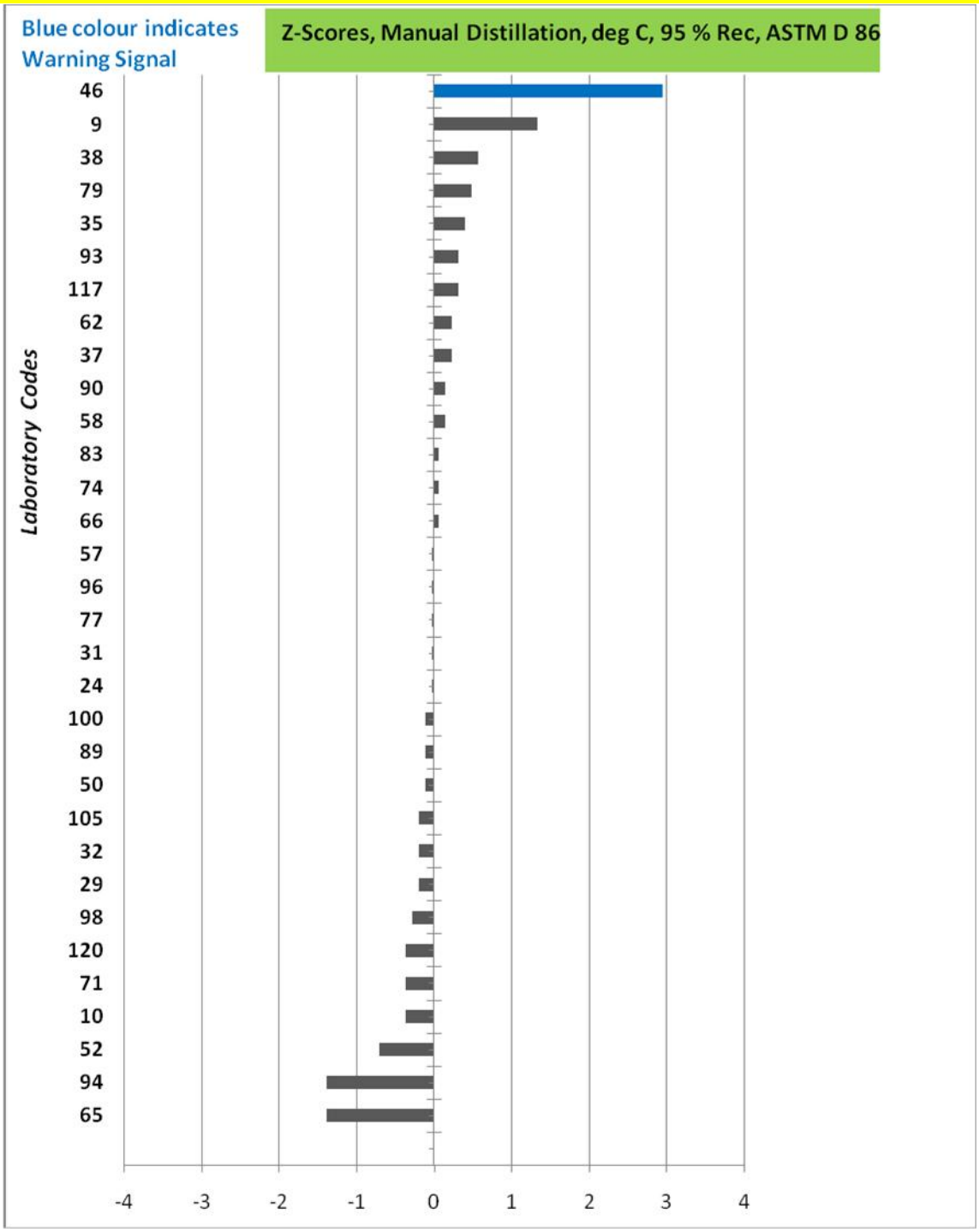
Blue colour indicates
Warning Signal
Z-Scores, Manual Distillation, deg C, 95 % Rec, ASTM D 86
Laboratory Codes
46
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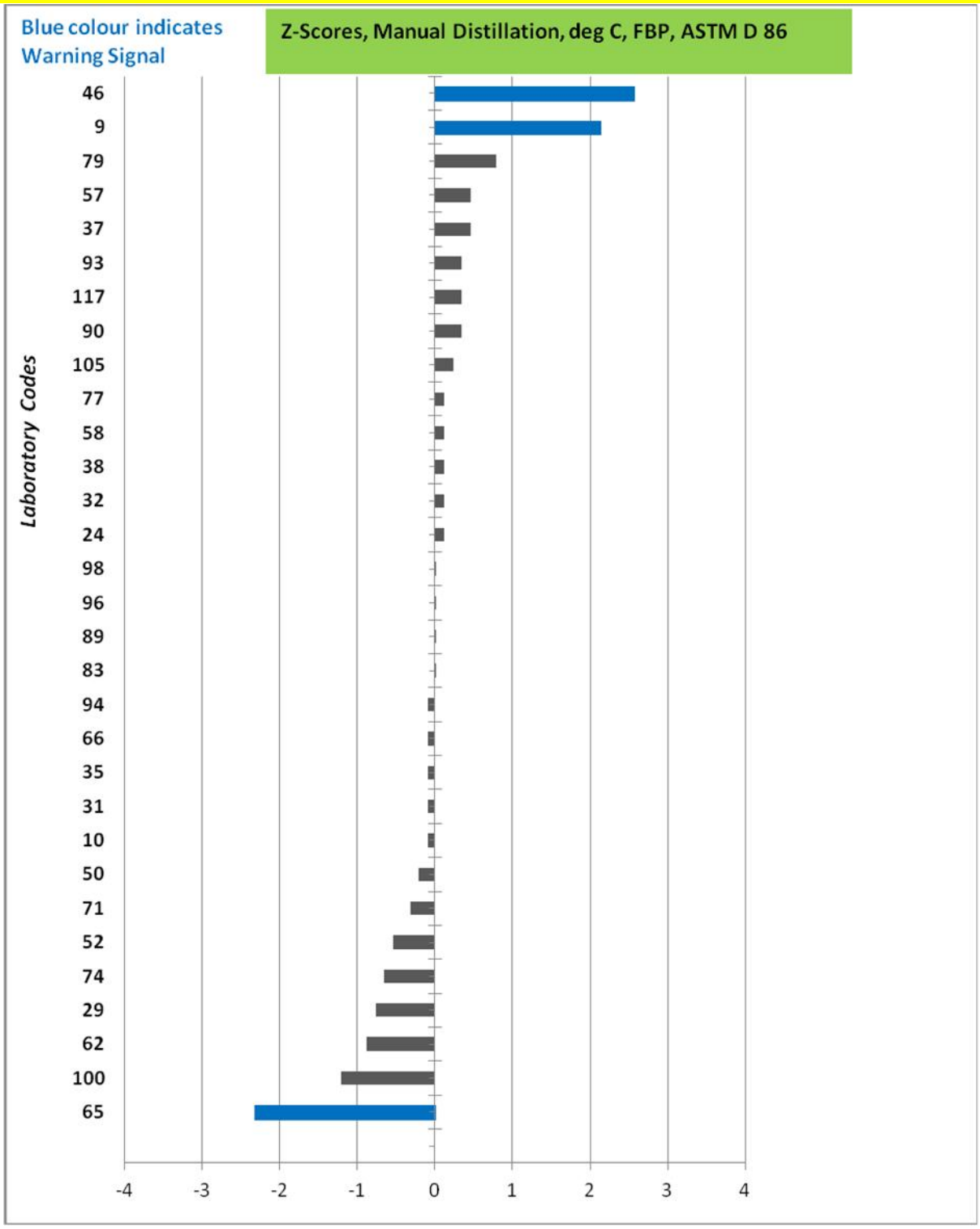
Blue colour indicates
Warning Signal
Z-Scores, Manual Distillation, deg C, FBP, ASTM D 86
Laboratory Codes
46
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117
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77
58
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24
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Annexure 3 : Relevant Documents

(I). INSTRUCTIONS TO PARTICIPATING LABORATORIES.

Welcome to participate in Diesel Fuel Proficiency Testing Program of APLAC and organized by NABL in association with Bharat Petroleum Corporation Limited. The confidentiality of participant is ensured using the lab code throughout the program.

To ensure that results from this program can be analyzed properly, participants are asked to adhere carefully to the following instructions.

1. INTRODUCTION

This protocol describes the procedures to be followed by laboratories participating in the programme.

The objective of the exercise is to evaluate the performance of participating laboratories by means of inter laboratory comparison. The analytes to be determined are listed in Section 7.

2. RECEIPT OF SAMPLES

On receipt of the test sample, check that the sample (approx 2 lit. in self locking Aluminium container) has been received in an undamaged condition and that they are clearly labeled. There is also a serial number mentioned on the container.

Send the "Sample Receipt Form (Participating Laboratories)"electronically to tawadedm@bharatpetroleum.in with cc to anita@nabl-india.org and your Accreditation body.

If there are any problems with the samples, contact PT Coordinator

QA Laboratory
Bharat Petroleum Corporation Limited
Sewree K Installation, Sewree Fort Road, Sewree (East)
Mumbai-400015
Telephone: 022-24176383, 24176376 Fax: 022-24117914
Email: tawadedm@bharatpetroleum.in

3. STORAGE OF SAMPLES

Store your samples in the original packaging between 10 to 25 ^{0}C, until the analysis is to be carried out.

4. TESTING PERIOD

Testing may commence as soon as samples are received.

5. INITIAL PREPARATION OF THE PT SAMPLE

When you are ready to analyse the PT sample, allow the container to come to Lab Ambient temperature before opening. When a sub-sample is taken, ensure that it is representative of the contents of the entire container. Mix and homogenate by shaking before removing the test portion. When weighing out a test portion, always use a balance that has been checked using certified weights that are having valid traceability.

6. ANALYTICAL METHOD TO BE USED

a) The PT sample should be tested in the same manner as is done in routine samples.

b) All the tests to be performed within the participant's laboratory facilities using the specified ASTM standards (in enclosed result sheet).

c) Participants must not perform tests by a subcontracting laboratory or deviate from the standard procedure.

d) Participants are to utilize the most currently available edition of the ASTM standards.

e) The initial single determination by each laboratory for each test conducted is required. The program does not allow the reporting of averages of replicate determinations or the reporting of results from subsequent attempts following the initial result.

f) In case the Density, please convert the data to 15^0C using the density conversion table and report.

g) In case of Flash Point report the results after taking Barometric pressure correction.

h) In case of Distillation report the results after taking Barometric pressure correction

7. ANALYTES TO BE DETERMINED

a) Density
b) Distillation
c) Total Sulphur
d) Pour Point
e) Flash Point
f) Kinematic Viscosity at 40^0C

8. REPORTING OF RESULTS

a) All results should be reported on the Excel spreadsheet provided.
b) Test results are to be recorded according to the specified units of measurement indicated on the Result Entry sheet. The units of measurements requested are consistent with the relevant ASTM standards or that required in relevant specifications.
c) Participants will be responsible for any conversions necessary to comply with the report form.
d) Please DO NOT USE COMMAS FOR DECIMAL POINTS.
e) Values reported as less than (<) or greater than (>) cannot be numerically treated AND SHALL BE REJECTED.

9. DOCUMENT SUBMITTING

a) The result reporting form should be sent to your accreditation body electronically by 31st May 2016.
b) At the same time, please provide the electronic copy of the above to tawadedm@bharatpetroleum.in with cc to anita@nabl-india.org Test data received after this date will not be included in the published statistical summary reports.
c) The accreditation body is required to ensure that the above information has been supplied by their laboratories in time, and should provide translation into English where necessary.

10. GENERAL INFORMATION

Additional information may be obtained from:

Mr. Deepak Tawade
PT Coordinator, BPCL Proficiency Testing
QA Laboratory
Bharat Petroleum Corporation Limited
Sewree K Installation, Sewree Fort Road, Sewree (East), Mumbai-400015
Telephone: 022-24176384, Fax: 022-24117914
Email: tawadedm@bharatpetroleum.in, susantar@bharatpetroleum.in

(II) RESULT SHEET SENT TO PARTICIPANTS.

Results Report Form
(Deadline: May 31, 2016)

Lab Code

DATE SAMPLE RECEIVED: _____

SAMPLE CONTAINER NO : _____

DATE SAMPLE TESTING: _____

REPORT DATE:_____

Sr. No.	Test Parameter	Reporting Criteria	Test Method	Test Result (with unit)	Measurement Uncertainty	Accreditation Status(Y/N)
1	Density at 15^{0}C	Report result to nearest 0.0001 gm/cc	ASTM D 1298			
2	Density at 15^{0}C	Report result to nearest 0.0001 gm/cc	ASTM D 4052			
3	Distillation Auto	Report result corrected to pressure. For Automatic: Report to nearest 0.1°C or 0.1%	ASTM D86			
	IBP					
	5%					
	10%					
	20%					
	30%					
	40%					
	50%					
	60%					
	70%					
	80%					
	90%					
	95%					
	FBP					

Sr. No.	Test Parameter	Reporting Criteria	Test Method	Test Result (with unit)	Measurement Uncertainty	Accreditation Status(Y/N)
4	Distillation Manual	Report result corrected to pressure. For Manual : Report to nearest 0.5°C or 0.5%	ASTM D 86			
	IBP					
	5%					
	10%					
	20%					
	30%					
	40%					
	50%					
	60%					
	70%					
	80%					
	90%					
	95%					
	FBP					
5	Flash Point,	Report results as corrected to Pressure. Report result to nearest 0.5°C.	ASTM D 56			
6	Pour Point,	Report result in 30C increment by adding 30C to the temperature recorded when flow of sample is ceased	ASTM D 97			
7	Sulphur	Report result to nearest 1.0 in mg/kg	ASTM D 2622			
8	Sulphur	Report result to nearest 1.0 in mg/kg	ASTM D 4294			
9	Sulphur	Report result to nearest 1.0 in mg/kg	ASTM D 5453			
10	Kinematic Viscosity at 400c	Report Kinematic Viscosity(cSt) to 4 Significant Figures.	ASTM D 445			
11	Kinematic Viscosity at 400c	Report Kinematic Viscosity(cSt) to 4 Significant Figures.	ASTM D 7042			

DECLARATION OF NON DISCLOSURE OF TEST RESULTS BY LABORATORY REPRESENTATIVE:

We hereby declare that the test results of our laboratory are not disclosed to any other laboratory.

name & signature of authorized person : Date:

(III) SAMPLE RECEIPT FORM

Sample Receipt Form
(Participating Laboratories)

Institute/
Laboratory: _____

Postal address: _____

Contact person: _____ _____ _____

Title Given name Surname

E-mail: _____

Print name/
Signature: _____

Date: _____

Confirmation of Package Contents

I hereby acknowledge the receipt of the sealed shipping box for the APLAC proficiency testing programme (T099). The box contains:

- ☐ One sample with container number _____
- ☐ The sample is Intact & Sealed / Broken / Missing*and should be Suitable / Not Suitable*for analysis (* Please delete as appropriate).
- ☐ Instruction to participants.
- ☐ Declaration to Customs and Officer.
- ☐ Result Report Form

Other comments: _____

Upon receipt of the sample, please complete this form and return it to the co-ordinator of the proficiency testing programme (E-mail: tawadedm@bharatpetroleum.in with cc to anita@nabl-india.org)

Annexure 4: Checklist for Investigating the root cause of unsatisfactory analytical performance

- Check for typographical errors.
- Check for instrument calibration using a CRM / SRM or as per method.
- Check whether proper barometric corrections are applied to the test results.
- Check whether the instrument dimensions are as per method. Ensure that calibrated instruments and glassware are used.
- Check the position and status of temperature probe/thermometer as per method in case of Flash Point and Distillation.
- Check whether the instrument and glassware dimensions are conforming to the method requirements in case of Manual distillation
- Check whether the bath temperature is uniform as per method.
- Ensure that the viscometers in use are regularly washed with chromic acid and the capillary is not blocked.
- Ensure that the sample is filtered through 75 micron filter before charging in the viscometers.
- Since various types of viscometers are in use, ensure that the use of viscometers is done as per ASTM D446.
- Check the sample handling and reporting practice of the laboratory if the laboratory performed badly in unusually large number of test parameters.
- Training of Laboratory Technical Staff
- Proper documentation of the incident for preventive actions.

Annexure 5 : Overall Performance of Laboratories in this APLAC PT Programme

Total no. of Warning and Action Signals for Laboratories			
Lab Codes	**Number of Evaluated Test Parameters in which the lab participated**	**No. of Warning Signals 2< |z| <3**	**No. of Action Signals |z| ≥3**
APLAC PT T099-001	15	0	0
APLAC PT T099-002	19	0	0
APLAC PT T099-003	18	0	0
APLAC PT T099-004	3	0	0
APLAC PT T099-005	1	0	0
APLAC PT T099-007	17	0	0
APLAC PT T099-008	17	0	0
APLAC PT T099-009	16	7	0
APLAC PT T099-010	19	1	0
APLAC PT T099-012	4	0	0
APLAC PT T099-013	15	0	1
APLAC PT T099-015	17	0	0
APLAC PT T099-016	18	0	0
APLAC PT T099-017	18	0	0
APLAC PT T099-019	17	0	0
APLAC PT T099-020	19	0	0
APLAC PT T099-021	16	0	1
APLAC PT T099-022	17	0	0
APLAC PT T099-023	18	0	0
APLAC PT T099-024	31	0	0
APLAC PT T099-026	3	0	0
APLAC PT T099-027	18	0	0
APLAC PT T099-028	17	0	0
APLAC PT T099-029	17	0	0
APLAC PT T099-030	19	0	0

Overall Performance of Laboratories in this APLAC PT Programme

Total no. of Warning and Action Signals for Laboratories			
Lab Codes	**Number of Evaluated Test Parameters in which the lab participated**	**No. of Warning Signals 2< |z| <3**	**No. of Action Signals |z| ≥3**
APLAC PT T099-031	33	0	0
APLAC PT T099-032	20	0	1
APLAC PT T099-033	16	0	0
APLAC PT T099-034	17	0	0
APLAC PT T099-035	19	0	0
APLAC PT T099-036	18	0	1
APLAC PT T099-037	16	0	0
APLAC PT T099-038	18	0	1
APLAC PT T099-039	4	0	1
APLAC PT T099-041	18	0	1
APLAC PT T099-043	19	0	0
APLAC PT T099-045	17	0	0
APLAC PT T099-046	16	4	0
APLAC PT T099-049	16	0	12
APLAC PT T099-050	18	0	0
APLAC PT T099-052	17	0	0
APLAC PT T099-054	4	0	0
APLAC PT T099-055	17	0	0
APLAC PT T099-056	15	0	0
APLAC PT T099-057	2	0	0
APLAC PT T099-058	31	0	0
APLAC PT T099-059	15	0	0
APLAC PT T099-061	16	0	0
APLAC PT T099-062	8	0	2
APLAC PT T099-064	2	0	0
APLAC PT T099-065	16	4	0

Overall Performance of Laboratories in this APLAC PT Programme

Total no. of Warning and Action Signals for Laboratories			
Lab Codes	**Number of Evaluated Test Parameters in which the lab participated**	**No. of Warning Signals 2< |z| <3**	**No. of Action Signals |z| ≥3**
APLAC PT T099-066	30	0	0
APLAC PT T099-067	4	0	0
APLAC PT T099-068	17	1	3
APLAC PT T099-069	2	1	0
APLAC PT T099-070	16	3	0
APLAC PT T099-071	33	0	0
APLAC PT T099-072	17	0	0
APLAC PT T099-073	21	0	0
APLAC PT T099-074	18	0	0
APLAC PT T099-075	1	0	0
APLAC PT T099-077	16	0	0
APLAC PT T099-078	1	0	0
APLAC PT T099-079	20	0	1
APLAC PT T099-080	18	0	0
APLAC PT T099-081	19	0	0
APLAC PT T099-083	19	0	1
APLAC PT T099-087	17	0	0
APLAC PT T099-088	16	0	0
APLAC PT T099-089	32	0	0
APLAC PT T099-090	16	0	1
APLAC PT T099-091	8	0	0
APLAC PT T099-093	3	0	0
APLAC PT T099-094	35	0	1
APLAC PT T099-095	19	0	0
APLAC PT T099-096	30	0	0
APLAC PT T099-098	17	0	0
APLAC PT T099-100	17	0	0

Overall Performance of Laboratories in this APLAC PT Programme

Total no. of Warning and Action Signals for Laboratories			
Lab Codes	**Number of Evaluated Test Parameters in which the lab participated**	**No. of Warning Signals 2< |z| <3**	**No. of Action Signals |z| ≥3**
APLAC PT T099-102	16	0	0
APLAC PT T099-104	19	1	0
APLAC PT T099-105	18	1	0
APLAC PT T099-108	17	0	0
APLAC PT T099-110	18	0	1
APLAC PT T099-112	15	0	0
APLAC PT T099-113	18	0	0
APLAC PT T099-115	18	0	0
APLAC PT T099-117	18	1	0
APLAC PT T099-118	3	0	0
APLAC PT T099-119	20	0	0
APLAC PT T099-120	10	1	1

Note to all participants:

In case of any appeal against the evaluation of performance in proficiency testing scheme, you may contact the PT Coordinator who shall guide you on Procedure for appeal". All such appeals are dealt by PT coordinator for redressal.

Appendix A

Advisory/Steering Committee

- Mr. S.Subramanian
- Mr. Ashutosh Debnath
- Mr. Susanta Rout
- Mr. Venkateswaran. N
- Ms. Anita Rani
- Mr. Deepak Tawade

*** END OF REPORT ***