

MATERIALS DIVISION

2012
Asphalt Mix
OMRL Report

Sample Numbers
47 & 48



OKLAHOMA DEPARTMENT OF TRANSPORTATION

200 Northeast 21st Street

Oklahoma City, OK 73105-3204

May 4, 2012

TO: Participants in the OMRL Asphalt Mix Proficiency Sample Program

FROM: Materials Division

SUBJECT: Final Report for OMRL Asphalt Mix Proficiency Samples # 47 and # 48

This letter and the accompanying tables and graphical plots constitute the final report for OMRL Asphalt Mix Proficiency Samples # 47 and # 48.

The proficiency samples were prepared in the laboratory. The samples were distributed for testing on January 20, 2012. Results were received from 93 laboratories. Results received after the closing date and prior to this report date were included in the final report.

All data was processed as received. Averages, standard deviations, and coefficients of variations were computed from the data. A rating of "0" was assigned to any pair of test results in which either result was reported as missing or was found to be an outlier. Outliers were determined according to [NCHRP Project 09-26](#). See Appendix A and B of that report for details of outlier determination. Appendix A of this report shows the actual criterion used for each test characteristic to identify outlier data. The outlier method used in [NCHRP Project 09-26](#) was adopted in 2005 and used in previous reports for information only.

The analysis of the data included in this report consists of the following:

1. Summary table of results for both samples.
2. Table of results for individual laboratories.
3. General scatter diagrams (Youden plots).
4. Yearly performance charts (paired plots).
5. Appendix A, outlier criterion tables for each characteristic.

A summary table of results was produced for the sample set. The summary table provides the statistics for each test property or characteristic analyzed both before and after the removal of outlier data. Column 1 of the table gives the test description. Column 2 indicates the number of laboratories with no missing data for either sample and those excluded from the analysis by the outlier criterion in Appendix A. Column 3, 4 and 5 indicate the average or mean result, the standard deviation for the first sample, and the coefficient of variation for the first sample. Columns 6, 7, and 8 indicate the average or mean result, the standard deviation for the first sample, and the coefficient of variation for the second sample.

A table of results was produced for each laboratory. Column 1 of the table gives the test title. Column 2 and 3 show the test data submitted by the laboratory. "NA" in either one of these columns indicates that invalid or missing data was supplied by the laboratory. Columns 4 and 5 indicate the average values for each test. Columns 6 and 7 show the laboratory's ratings based on the following scale:

"The mission of the Oklahoma Department of Transportation is to provide a safe, economical, and effective transportation network for the people, commerce and communities of Oklahoma"

Rating 5 data within 1.0 standard deviation of the mean
Rating 4 data within 1.5 standard deviation of the mean
Rating 3 data within 2.0 standard deviation of the mean
Rating 2 data within 2.5 standard deviation of the mean
Rating 1 data within 3.0 standard deviation of the mean
Rating 0 data 3.0 or more standard deviations from the mean

A negative sign with rating 1 through 5 indicates a result below the mean; a positive number indicates a result above the mean. An absolute value for the rating that is less than 3 is considered a low rating. Significance need not necessarily be attached to a single low rating or pair of low ratings, however, a continuing tendency to get low ratings should lead a laboratory to reexamine its equipment and procedures for this test.

A set of general scatter diagrams or Youden plots was produced for this report. The points on the diagram are located by plotting the test value reported for sample # 48 from a given laboratory on the vertical axis, against the test value reported for sample # 47 by the same laboratory on the horizontal axis. The axes are labeled with the sample numbers. The horizontal and vertical scale limits used in plotting are generally three standard deviations on either side of the mean. The upper limit is set to 100 if the limit exceeds 100. The lower limit is set to 95 if it is equal to 100.

The horizontal red dashed line and the vertical red dashed line represent the mean or average values for the results of sample # 48 and sample # 47, respectively. The laboratories eliminated from the statistical calculations based on outlier criterion in Appendix A are shown on the last line. The values for the mean, standard deviation, and coefficient of variation for each sample is tabulated below the diagram.

Yearly performance charts were produced for each laboratory. These charts will enable a comparison to be made of all the test results reported by the laboratory. The points on the comparison chart are located by plotting the normal deviate of each test performed on the vertical axis, by the pair number of the test set on the horizontal axis.

The normal deviate is computed for each test result of each test performed up to 10 years or 10 pairs. It is computed by subtracting the test result of each sample number from the overall average of test results for that sample number and dividing by the standard deviation of that sample number. Pair number 1 shown on the graph indicates the first pair plotted. The last pair shown indicates the last pair of results. These are the results for sample #47 and sample #48. The title of the graph indicates which pair sets are being plotted. For each sample pair plotted, the symbol "x" represents the odd numbered sample of the pair and symbol "o" represents the even numbered sample.

A graphic representation of within-laboratory precision is given in the length of the vertical lines connecting each of the sample pairs. The closer a pair of symbols for a given sample pair, the better the laboratory's repeatability. Conversely, the farther apart the symbols the greater the laboratory's random error.

The lines connecting the midpoints between each pair of symbols show the trend in the laboratories performance over the period of time covered by the chart. Midpoints between consecutive pairs are connected with a solid line.

Ideally, a laboratory should have all symbols directly on the center line, thus demonstrating exceptional precision and accuracy of testing. Generally speaking, points within 2 normal deviates of the center line are probably acceptable, and a normal deviate of more than 2 may indicate a problem.

Laboratories listed as qualified for asphalt mixture testing on the Materials & Testing e-Guide Qualified Labs List are required to submit nonconformity reports for each sample and each rating of 2, 1, 0, -1, and -2 for each test characteristic. Due to the statistical method used, both samples may receive a rating of "0" that requires a response for that test characteristic. Recompute both sample's rating in the response form to determine if both require a response. Nonconformity response forms are not required for the ½" sieve ratings as the standard deviations are very small. The Qualified Labs List may be found at:

<http://www.okladot.state.ok.us/materials/htm-smap/11069.htm> The nonconformity response form may be found at: <http://www.okladot.state.ok.us/materials/omrlinfo.htm> Nonconformity response forms should be submitted within 45 days of this report's date. Supporting documentation for any calibrations or equipment purchases to address low ratings should be included with the response forms.

If you have any questions concerning this report, please do not hesitate to contact me.



Reynolds H. Toney, P.E.
Materials Engineer

cc: Division Construction Engineers
Director of Operations
Construction Engineer
Materials Engineer
Assistant Materials Engineer
Bituminous Engineer
Asphalt Design Lab Supervisor
FHWA

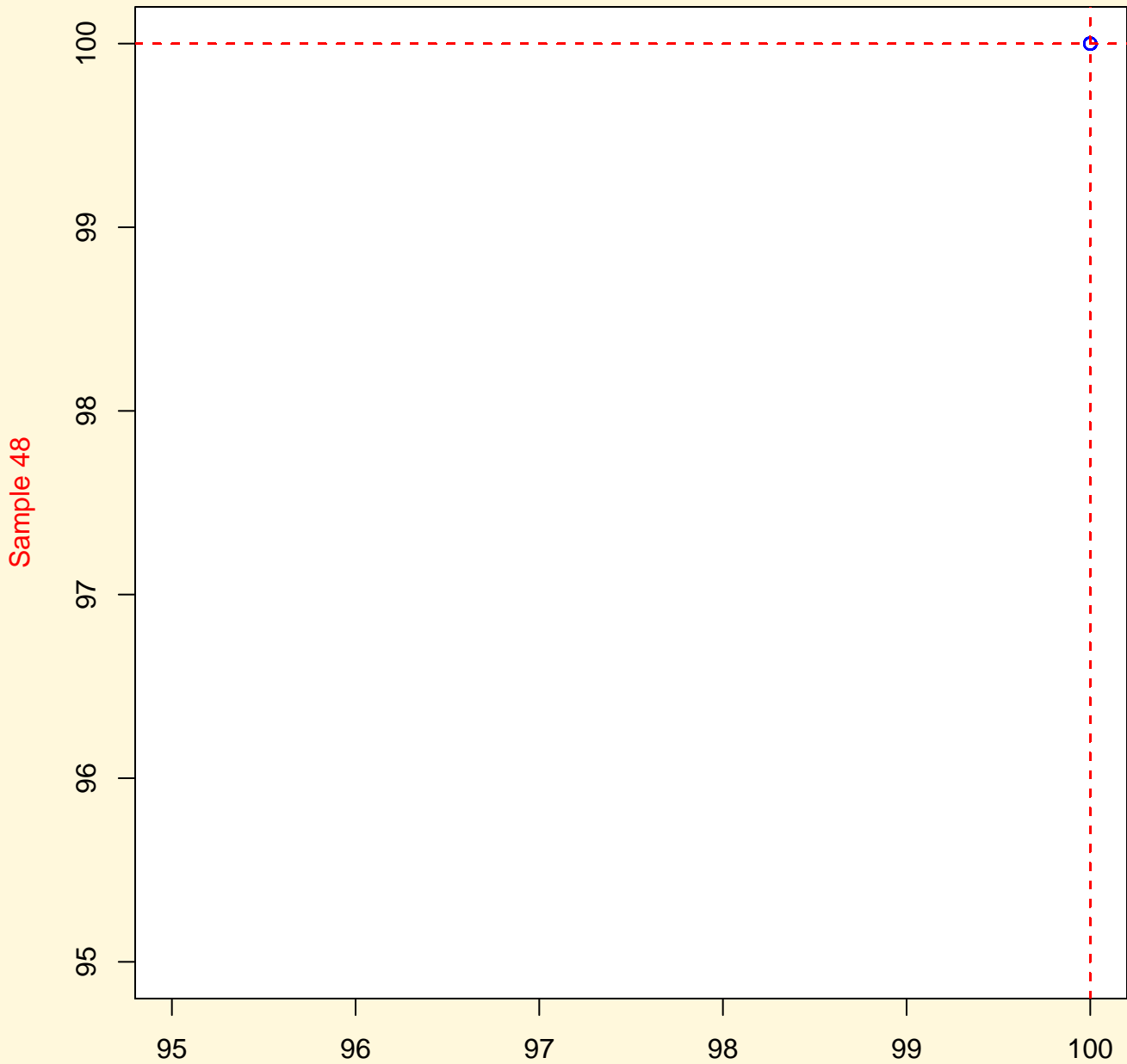
**OMRL Asphalt Mix Proficiency Sample Program
Final Report - Summary Table**

Asphalt Mix Proficiency Samples		Sample Number 47			Sample Number 48		
Test Description	No. of Labs	AVG.	Standard Deviation	Coeff. of Variation	AVG.	Standard Deviation	Coeff. of Variation
AASHTO T 30 - Analysis of Extracted Aggregate: (1) Total Percent Passing 3/4" Sieve (%)	93	100.0	0.0	0.0	100.0	0.0	0.0
	93	100.0	0.0	0.0	100.0	0.0	0.0
(2) Total Percent Passing 1/2" Sieve (%)	93	92.3	1.7	1.9	91.8	1.9	2.0
	93	92.3	1.7	1.9	91.8	1.9	2.0
(3) Total Percent Passing 3/8" (%)	93	81.3	2.1	2.6	80.7	2.3	2.9
	93	81.3	2.1	2.6	80.7	2.3	2.9
(4) Total Percent Passing No. 4 Sieve (%)	93	57.3	2.2	3.8	56.9	2.0	3.5
	93	57.3	2.2	3.8	56.9	2.0	3.5
(5) Total- Percent Passing No. 8 Sieve (%)	93	40.7	1.4	3.4	40.5	1.4	3.4
	92	40.7	1.2	3.0	40.5	1.4	3.4
(6) Total Percent Passing No. 16 Sieve (%)	93	31.4	0.9	3.0	31.3	0.9	2.9
	93	31.4	0.9	3.0	31.3	0.9	2.9
(7) Total Percent Passing No. 30 Sieve (%)	93	24.0	0.8	3.2	23.8	0.8	3.2
	93	24.0	0.8	3.2	23.8	0.8	3.2
(8) Total Percent Passing No. 50 Sieve (%)	93	15.6	0.6	3.8	15.5	0.6	4.2
	93	15.6	0.6	3.8	15.5	0.6	4.2
(9) Total Percent Passing No. 100 Sieve (%)	93	6.1	0.5	8.1	6.1	0.5	8.2
	91	6.1	0.4	6.8	6.1	0.4	6.5
(10) Total Percent Passing No. 200 Sieve (%)	93	2.65	0.25	9.62	2.64	0.31	11.59
	91	2.64	0.24	8.99	2.64	0.25	9.43
OHD L-26 - Asphalt Content (Method A): (11) Ignition Oven Loss (%AC)	93	4.91	0.17	3.44	4.88	0.15	3.13
	93	4.91	0.17	3.44	4.88	0.15	3.13
AASHTO T 209 - Theoretical Max. Specific Gravity: (12) Avg. Rices Gravity (G_{mm})	93	2.492	0.008	0.323	2.493	0.008	0.334
	93	2.492	0.008	0.323	2.493	0.008	0.334
OHD L-14 - Bulk Specific Gravity (Method B): (13) Avg. SGC Bulk Specific Gravity (G_{mb})	93	2.405	0.010	0.403	2.404	0.010	0.417
	93	2.405	0.010	0.403	2.404	0.010	0.417
OHD L-45 - CoreLok™ Bulk Specific Gravity: (14) Avg. SGC Bulk Specific Gravity (G_{mb})	92	2.393	0.018	0.757	2.392	0.014	0.603
	90	2.393	0.014	0.604	2.392	0.014	0.585
OHD L-14 - Percent Absorption: (15) Avg. SGC Absorption (%)	93	0.28	0.12	42.37	0.27	0.11	39.98
	93	0.28	0.12	42.37	0.27	0.11	39.98

NOTE: The shaded rows show results after removing outlying data.

OMRL Asphalt Mix Proficiency Sample Program
Asphalt Mix Analysis
Sample Numbers 47 & 48

Percent Passing 3/4 inch Sieve



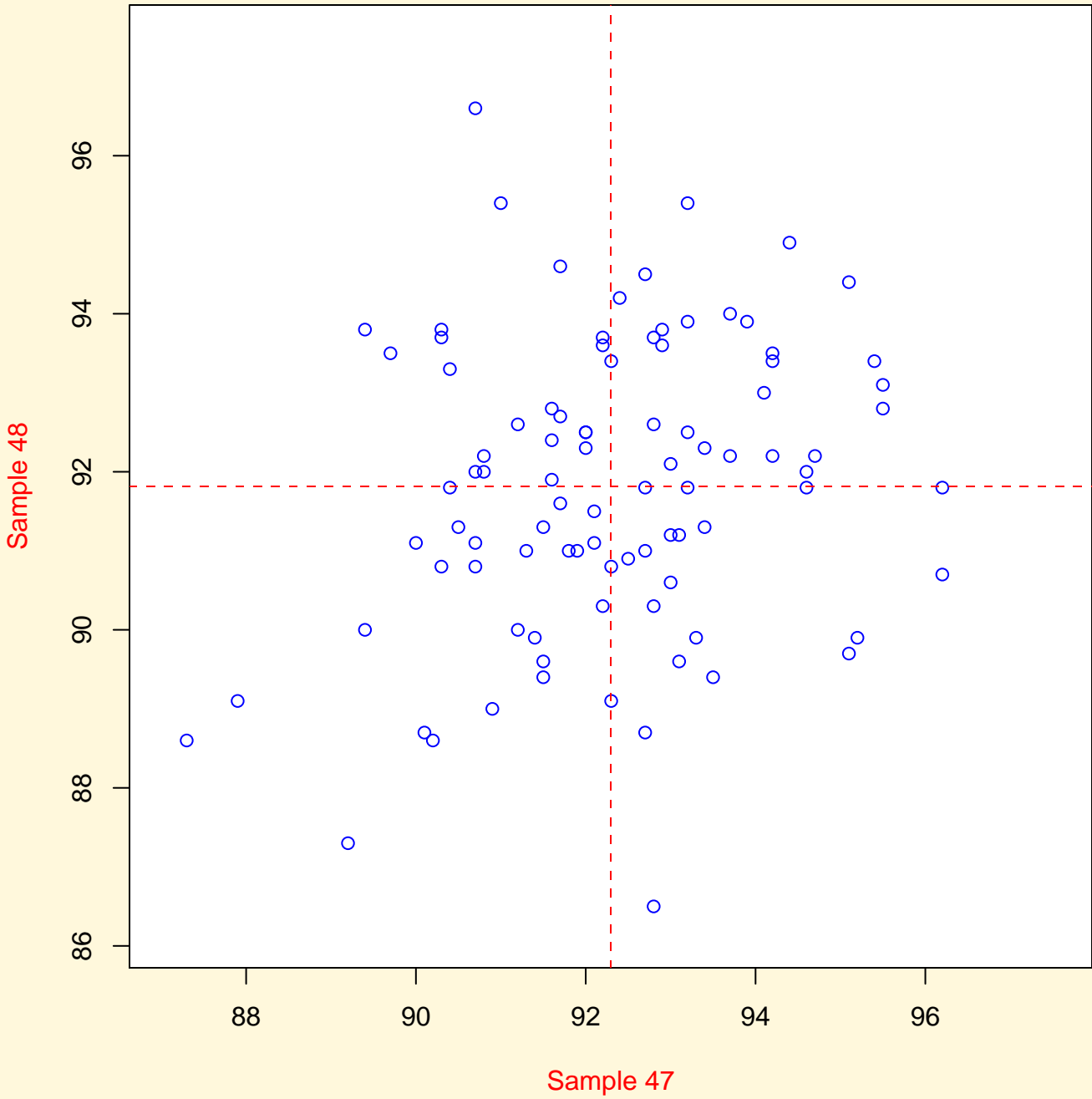
Sample 47

Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	100.0	0.0	0.0
48	100.0	0.0	0.0

Outlier Lab Nos. -

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

Percent Passing 1/2 inch Sieve



Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	92.3	1.7	1.9
48	91.8	1.9	2.0

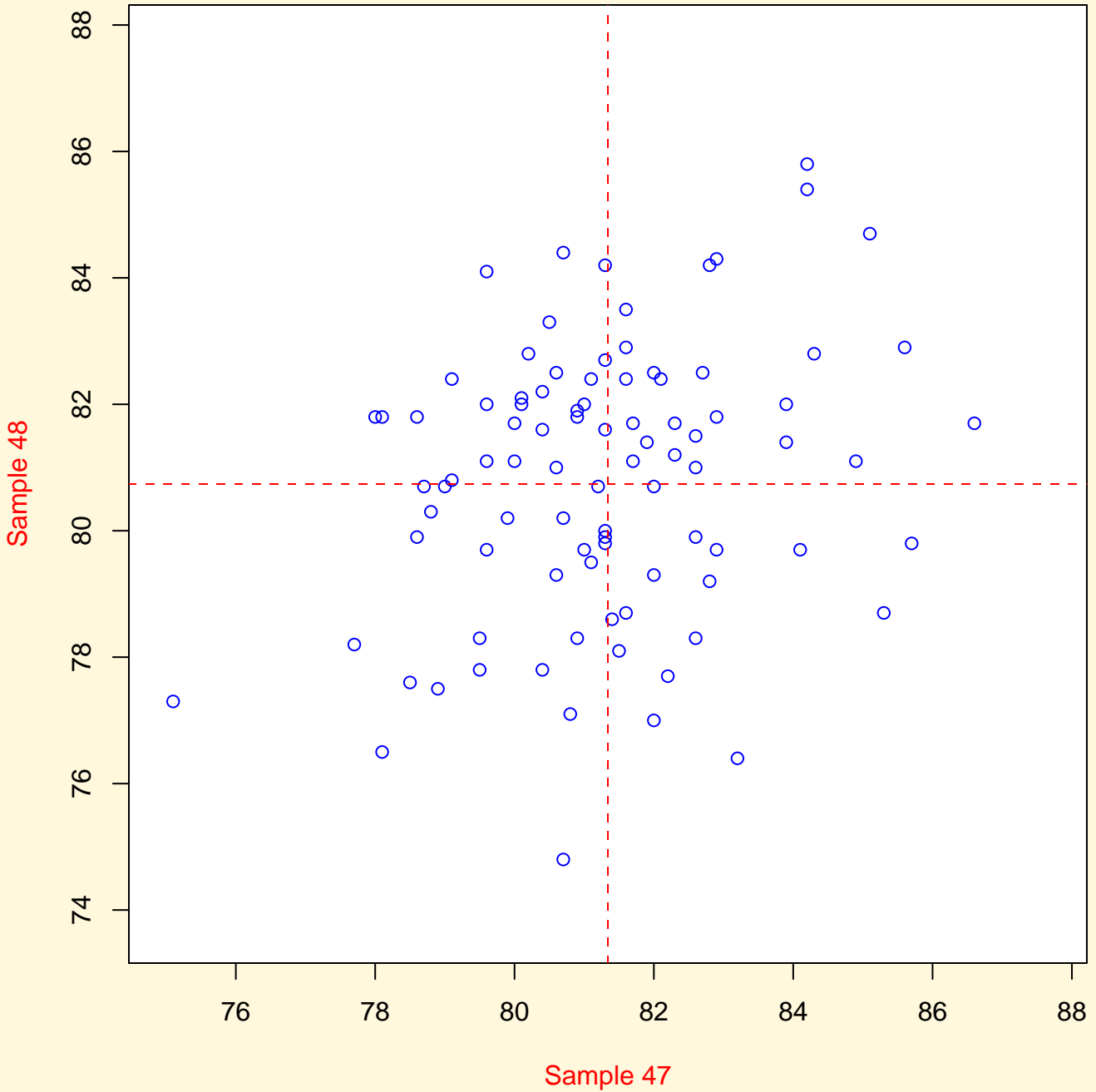
Outlier Lab Nos. -

OMRL Asphalt Mix Proficiency Sample Program

Asphalt Mix Analysis

Sample Numbers 47 & 48

Percent Passing 3/8 inch Sieve



Sample No.

47

48

Mean

81.3

80.7

Std. Dev.

2.1

2.3

Coeff. of Var.

2.6

2.9

Outlier Lab Nos. -

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

Percent Passing No. 4 Sieve

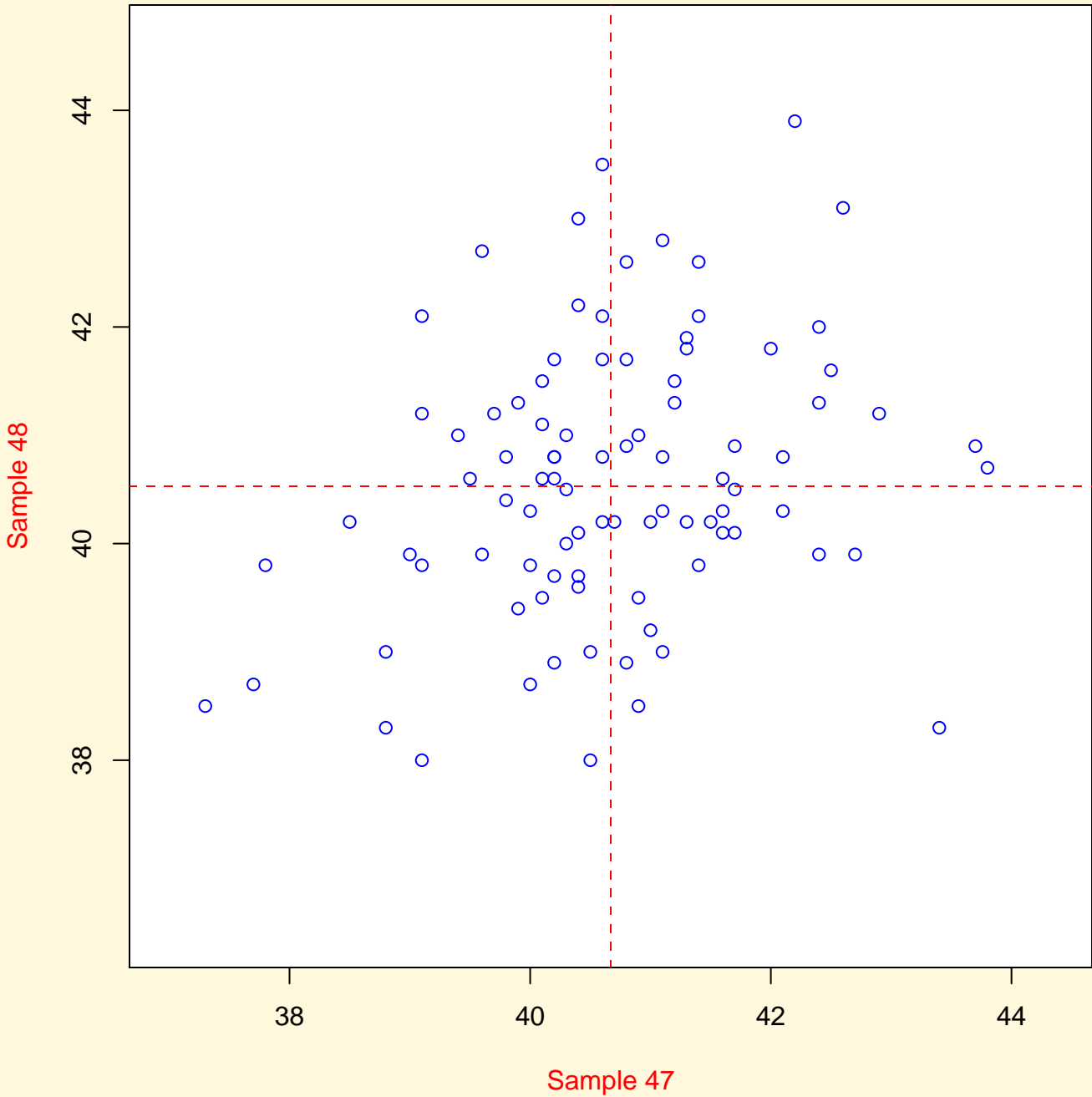


Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	57.3	2.2	3.8
48	56.9	2.0	3.5

Outlier Lab Nos. -

OMRL Asphalt Mix Proficiency Sample Program
Asphalt Mix Analysis
Sample Numbers 47 & 48

Percent Passing No. 8 Sieve



Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	40.7	1.2	3.0
48	40.5	1.4	3.4

Outlier Lab Nos. – 122

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

Percent Passing No. 16 Sieve

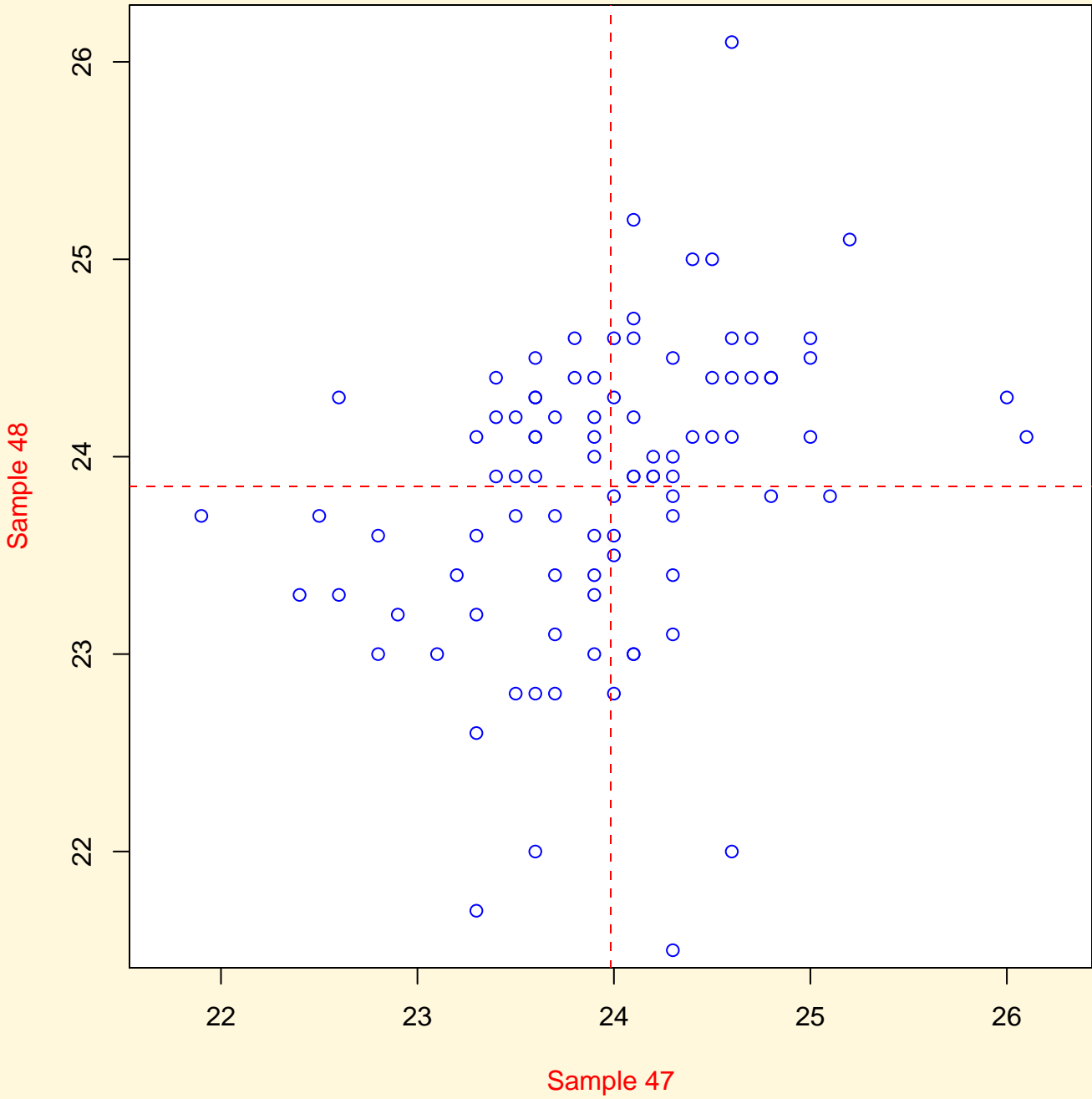


Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	31.4	0.9	3.0
48	31.3	0.9	2.9

Outlier Lab Nos. –

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

Percent Passing No. 30 Sieve

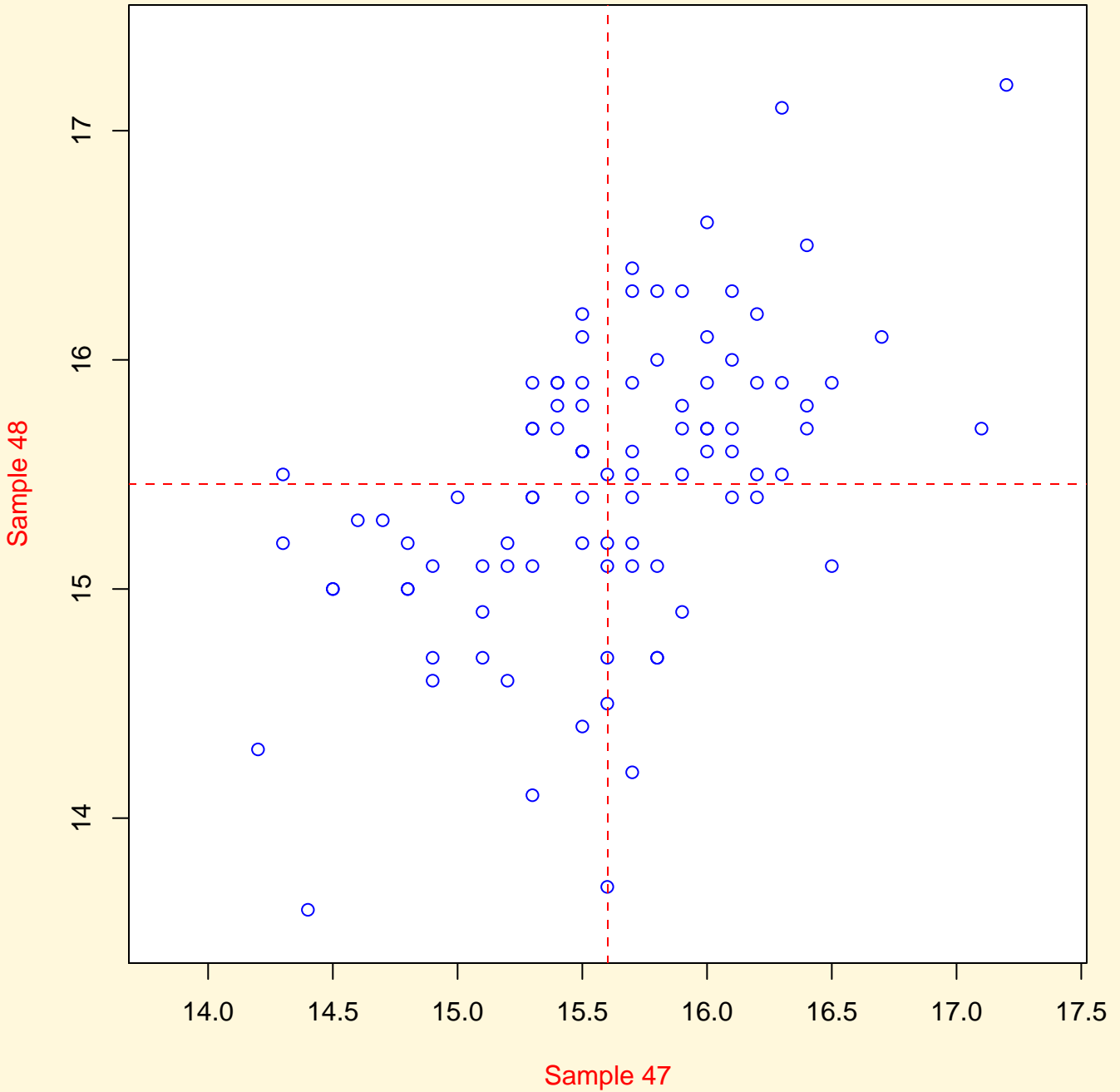


Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	24.0	0.8	3.2
48	23.8	0.8	3.2

Outlier Lab Nos. –

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

Percent Passing No. 50 Sieve

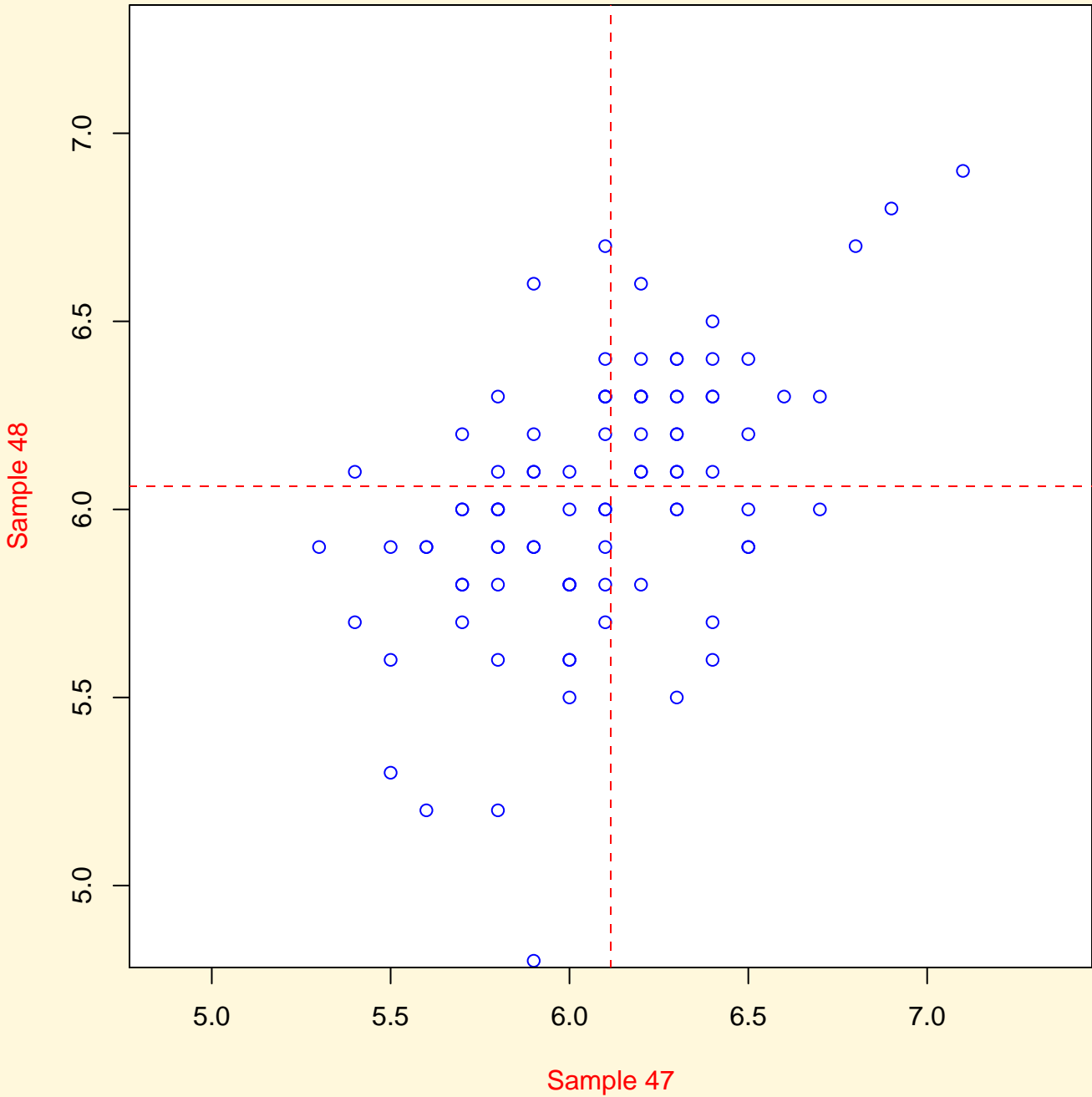


Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	15.6	0.6	3.8
48	15.5	0.6	4.2

Outlier Lab Nos. –

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

Percent Passing No. 100 Sieve

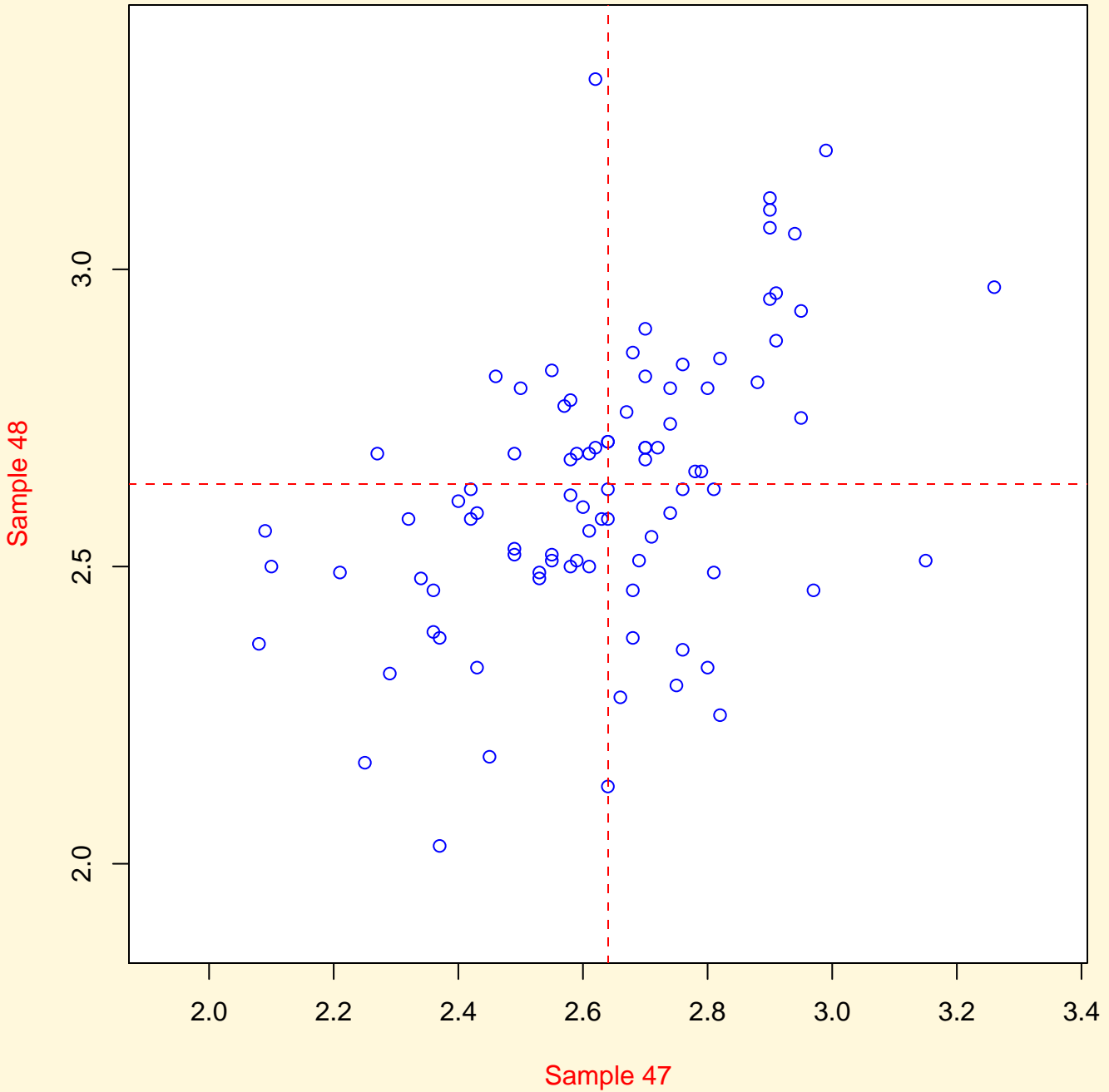


Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	6.1	0.4	6.8
48	6.1	0.4	6.5

Outlier Lab Nos. – 114, 25

OMRL Asphalt Mix Proficiency Sample Program
Asphalt Mix Analysis
Sample Numbers 47 & 48

Percent Passing No. 200 Sieve

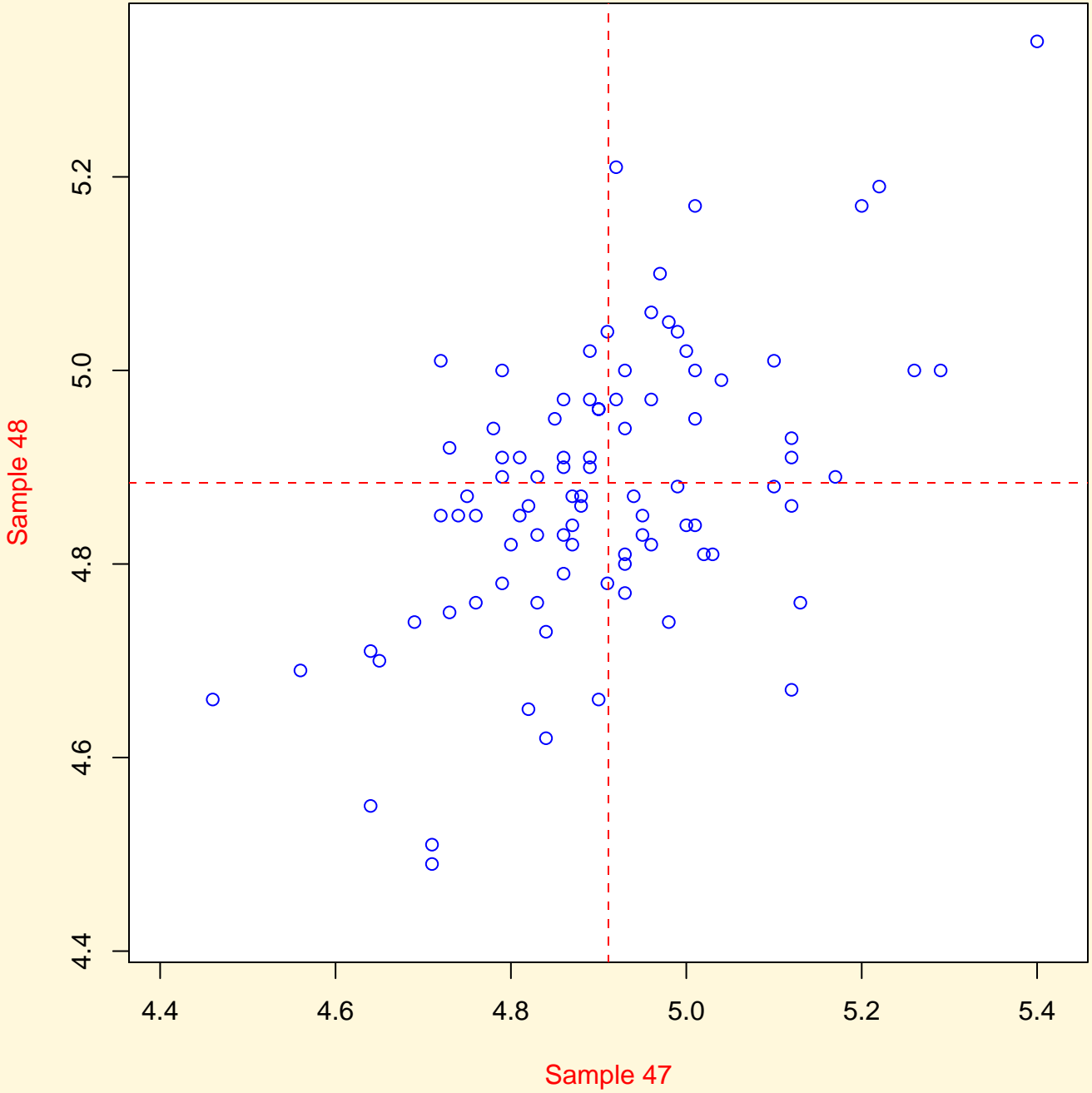


Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	2.64	0.24	8.99
48	2.64	0.25	9.43

Outlier Lab Nos. – 100, 66

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

Percent Asphalt Content (Ignition Oven)

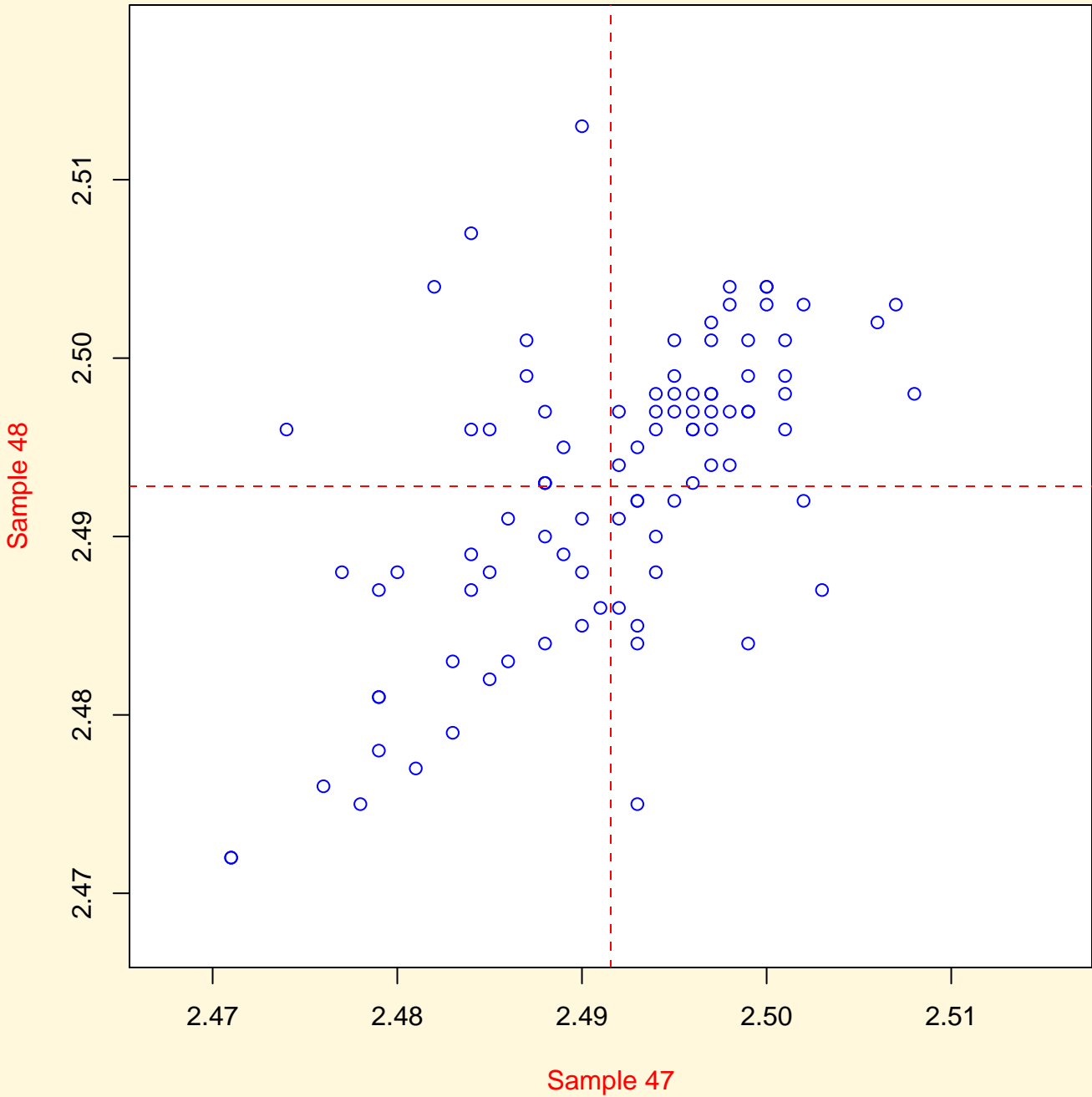


Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	4.91	0.17	3.44
48	4.88	0.15	3.13

Outlier Lab Nos. –

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

Rices Specific Gravity

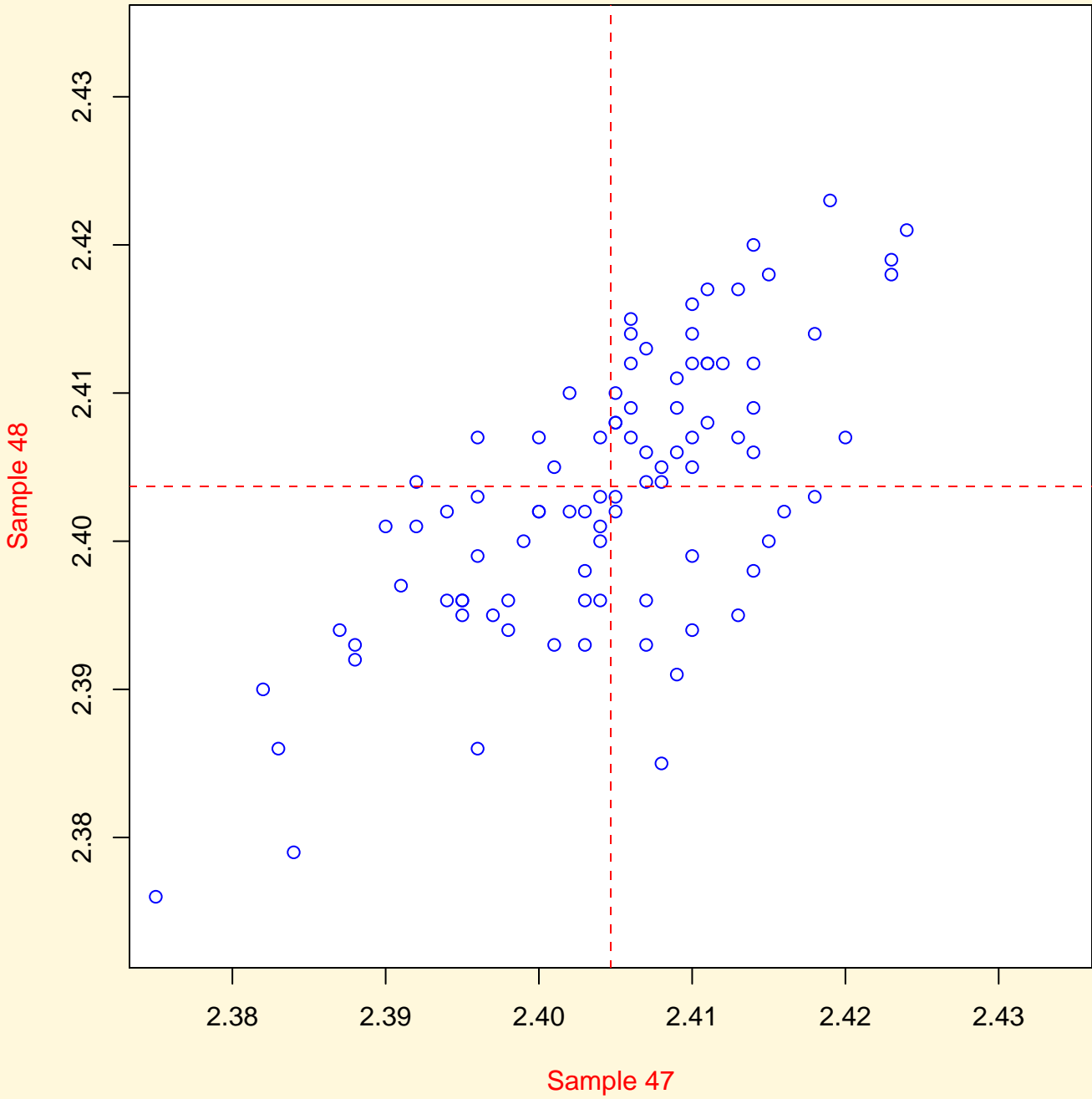


Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	2.492	0.008	0.323
48	2.493	0.008	0.334

Outlier Lab Nos. –

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

SGC Specific Gravity

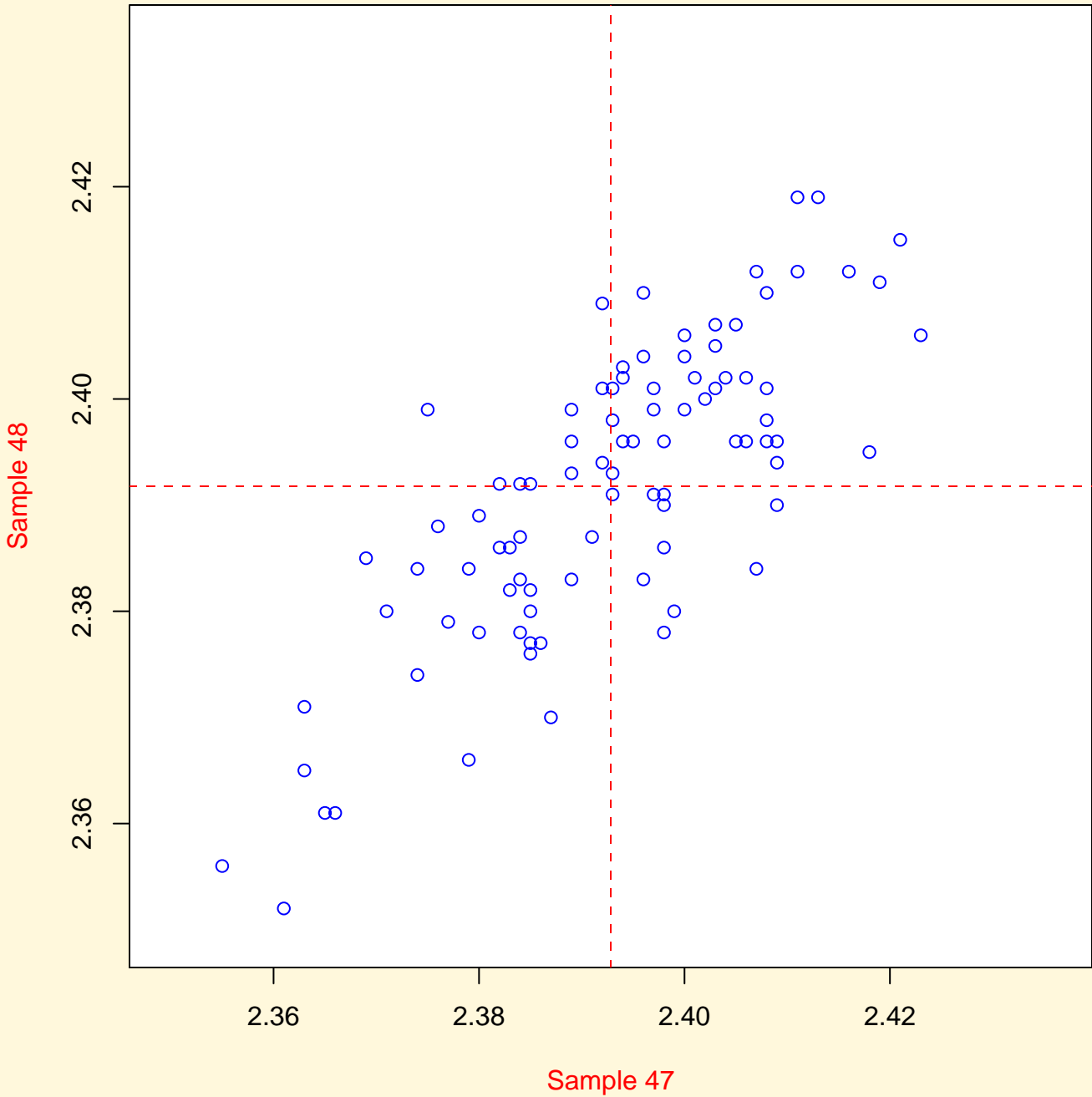


Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	2.405	0.010	0.403
48	2.404	0.010	0.417

Outlier Lab Nos. –

OMRL Asphalt Mix Proficiency Sample Program
 Asphalt Mix Analysis
 Sample Numbers 47 & 48

SGC Specific Gravity-OHD L-45



Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	2.393	0.014	0.604
48	2.392	0.014	0.585

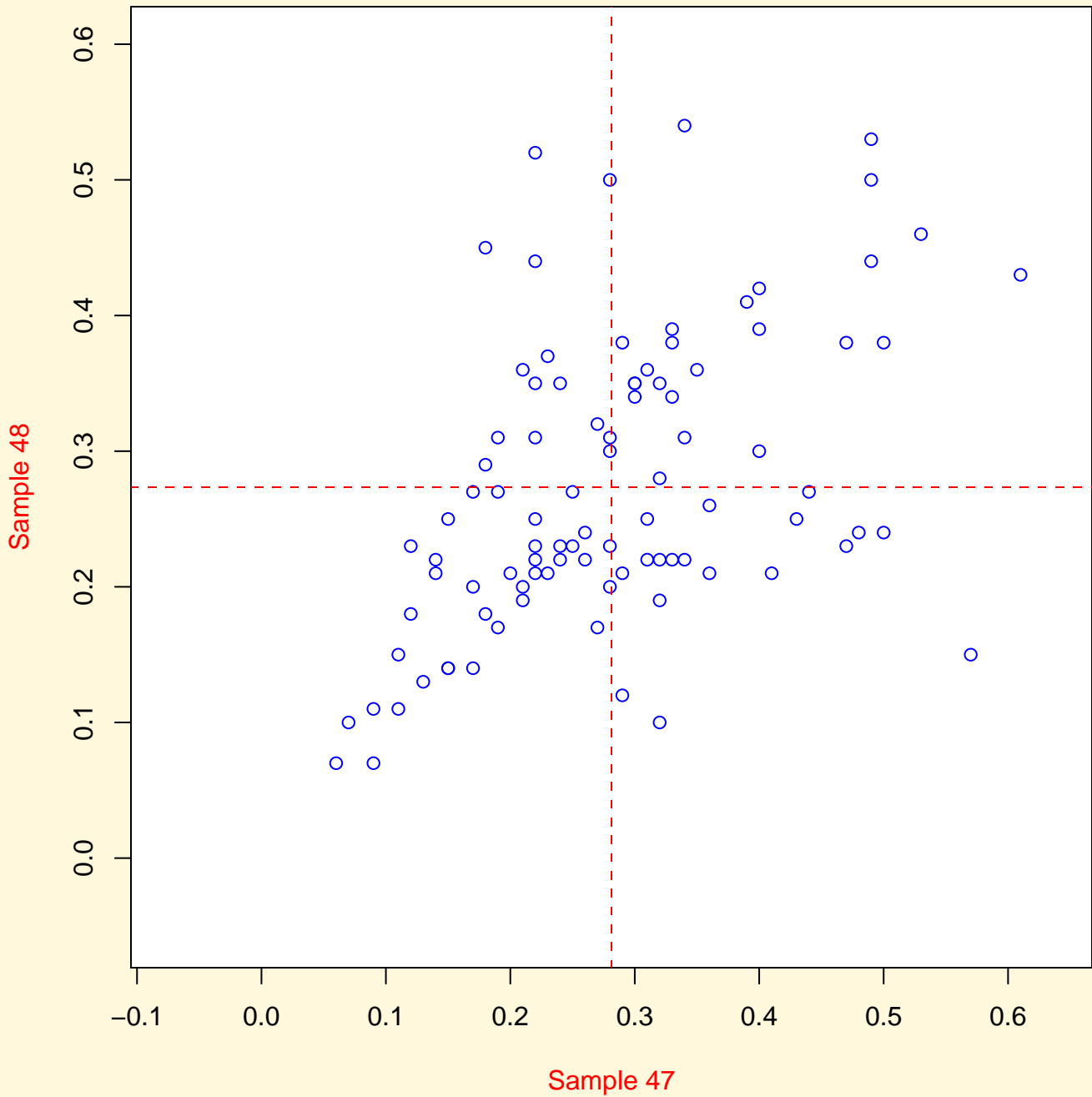
Outlier Lab Nos. – 12, 70

OMRL Asphalt Mix Proficiency Sample Program

Asphalt Mix Analysis

Sample Numbers 47 & 48

Percent Water Absorption—OHD L-14



Sample No.	Mean	Std. Dev.	Coeff. of Var.
47	0.28	0.12	42.37
48	0.27	0.11	39.98

Outlier Lab Nos. -

Appendix A - Outlier Criterion

Percent Passing 3/4 inch Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	100.000	100.0000	0e+00
0.875 Percentile	100.0000	100.0000	0.0000
0.125 Percentile	100.0000	100.0000	0.000000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.00000	0.0000	0.000000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	0.000000	0.000000	0.000000
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	100.00000	100.00000	0.000000
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	100.00000	100.00000	0.000000

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	100.000	100.0000	0e+00
0.875 Percentile	100.000	100.0000	0.000000
0.125 Percentile	100.0000	100.0000	0.0000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.000000	0.00000	0.000000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.000000	0.000000	0.000000
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	100.00000	100.0000	0.000000
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	100.00000	100.0000	0.000000

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion

Percent Passing 1/2 inch Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	92.300	91.9000	-3e-01
0.875 Percentile	94.3000	93.8000	1.8500
0.125 Percentile	90.3500	89.6000	-2.250000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	3.95000	4.2000	4.100000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	6.142250	6.531000	6.375500
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	100.44225	100.33100	8.225500
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	84.20775	83.06900	-8.625500

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	92.300	91.9000	-3e-01
0.875 Percentile	94.300	93.8000	1.850000
0.125 Percentile	90.3500	89.6000	-2.2500
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	3.950000	4.20000	4.100000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	2.662300	2.830800	2.763400
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	96.96230	96.6308	4.613400
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	87.68770	86.7692	-5.013400

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion

Percent Passing 3/8 inch Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	81.300	81.1000	-3e-01
0.875 Percentile	83.9000	82.8500	2.2000
0.125 Percentile	79.0500	77.9500	-3.550000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	4.85000	4.9000	5.750000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	7.541750	7.619500	8.941250
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	91.44175	90.46950	11.141250
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	71.50825	70.33050	-12.491250

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	81.300	81.1000	-3e-01
0.875 Percentile	83.900	82.8500	2.200000
0.125 Percentile	79.0500	77.9500	-3.5500
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	4.850000	4.90000	5.750000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	3.268900	3.302600	3.875500
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	87.16890	86.1526	6.075500
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	75.78110	74.6474	-7.425500

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion

Percent Passing No. 4 Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	57.100	57.1000	-3e-01
0.875 Percentile	59.8000	59.1500	2.5500
0.125 Percentile	55.1500	54.9000	-3.100000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	4.65000	4.2500	5.650000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	7.230750	6.608750	8.785750
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	67.03075	65.75875	11.335750
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	47.91925	48.29125	-11.885750

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	57.100	57.1000	-3e-01
0.875 Percentile	59.800	59.1500	2.550000
0.125 Percentile	55.1500	54.9000	-3.1000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	4.650000	4.25000	5.650000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	3.134100	2.864500	3.808100
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	62.93410	62.0145	6.358100
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	52.01590	52.0355	-6.908100

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion

Percent Passing No. 8 Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	40.600	40.6000	-2e-01
0.875 Percentile	42.1500	42.0500	1.5500
0.125 Percentile	39.4500	39.0000	-1.800000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	2.70000	3.0500	3.350000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	4.198500	4.742750	5.209250
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	46.34850	46.79275	6.759250
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	35.25150	34.25725	-7.009250

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	92	92	92
Median	40.600	40.5500	-5e-02
0.875 Percentile	42.100	42.0625	1.562500
0.125 Percentile	39.4375	39.0000	-1.7625
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	2.662500	3.06250	3.325000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	1.794525	2.064125	2.241050
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	43.89453	44.1266	3.803550
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	37.64298	36.9359	-4.003550

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion Percent Passing No. 16 Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Ymed- Xmed)
Count = Number of Laboratories	93	93	93
Median	31.300	31.3000	-1e-01
0.875 Percentile	32.3000	32.2500	1.1000
0.125 Percentile	30.4000	30.3000	-1.100000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	1.90000	1.9500	2.200000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	2.954500	3.032250	3.421000
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	35.25450	35.28225	4.521000
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	27.44550	27.26775	-4.521000

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Ymed- Xmed)
Count = Number of Laboratories	93	93	93
Median	31.300	31.3000	-1e-01
0.875 Percentile	32.300	32.2500	1.100000
0.125 Percentile	30.4000	30.3000	-1.1000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	1.900000	1.95000	2.200000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	1.280600	1.314300	1.482800
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	33.58060	33.5643	2.582800
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	29.11940	28.9857	-2.582800

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion Percent Passing No. 30 Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	24.000	23.9000	0e+00
0.875 Percentile	24.7000	24.5500	0.8500
0.125 Percentile	23.3000	23.0000	-0.950000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	1.40000	1.5500	1.800000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	2.177000	2.410250	2.799000
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	26.87700	26.96025	3.649000
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	21.12300	20.58975	-3.749000

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	24.000	23.9000	0e+00
0.875 Percentile	24.700	24.5500	0.850000
0.125 Percentile	23.3000	23.0000	-0.9500
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	1.400000	1.55000	1.800000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.943600	1.044700	1.213200
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	25.64360	25.5947	2.063200
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	22.35640	21.9553	-2.163200

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion Percent Passing No. 50 Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	15.600	15.5000	0e+00
0.875 Percentile	16.2000	16.1000	0.6000
0.125 Percentile	14.9000	14.7000	-0.700000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	1.30000	1.4000	1.300000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	2.021500	2.177000	2.021500
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	18.22150	18.27700	2.621500
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	12.87850	12.52300	-2.721500

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	15.600	15.5000	0e+00
0.875 Percentile	16.200	16.1000	0.600000
0.125 Percentile	14.9000	14.7000	-0.7000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	1.300000	1.40000	1.300000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.876200	0.943600	0.876200
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	17.07620	17.0436	1.476200
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	14.02380	13.7564	-1.576200

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion

Percent Passing No. 100 Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	6.100	6.0000	1e-01
0.875 Percentile	6.5000	6.4000	0.4000
0.125 Percentile	5.7000	5.6500	-0.350000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.80000	0.7500	0.750000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	1.244000	1.166250	1.166250
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	7.74400	7.56625	1.566250
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	4.45600	4.48375	-1.516250

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	91	91	91
Median	6.100	6.0000	1e-01
0.875 Percentile	6.500	6.4000	0.400000
0.125 Percentile	5.7000	5.7000	-0.3000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.800000	0.70000	0.700000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.539200	0.471800	0.471800
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	7.03920	6.8718	0.871800
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	5.16080	5.2282	-0.771800

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion

Percent Passing No. 200 Sieve

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	2.640	2.6300	1e-02
0.875 Percentile	2.9000	2.9150	0.2250
0.125 Percentile	2.3700	2.3650	-0.285000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.53000	0.5500	0.510000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	0.824150	0.855250	0.793050
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	3.72415	3.77025	1.018050
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	1.54585	1.50975	-1.078050

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	91	91	91
Median	2.640	2.6300	1e-02
0.875 Percentile	2.900	2.8950	0.220000
0.125 Percentile	2.3700	2.3725	-0.2750
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.530000	0.52250	0.495000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.357220	0.352165	0.333630
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	3.25722	3.2472	0.553630
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	2.01278	2.0203	-0.608630

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion Percent Asphalt Content (Ignition Oven)

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	4.900	4.8700	3e-02
0.875 Percentile	5.1100	5.0200	0.1550
0.125 Percentile	4.7350	4.7350	-0.185000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.37500	0.2850	0.340000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	0.583125	0.443175	0.528700
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	5.69312	5.46317	0.683700
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	4.15188	4.29183	-0.713700

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	4.900	4.8700	3e-02
0.875 Percentile	5.110	5.0200	0.155000
0.125 Percentile	4.7350	4.7350	-0.1850
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.375000	0.28500	0.340000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.252750	0.192090	0.229160
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	5.36275	5.2121	0.384160
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	4.48225	4.5429	-0.414160

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion Rices Specific Gravity

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	2.493	2.4950	-1e-03
0.875 Percentile	2.5000	2.5015	0.0050
0.125 Percentile	2.4815	2.4830	-0.006500
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.01850	0.0185	0.011500
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	0.028767	0.028767	0.017883
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	2.52877	2.53027	0.022882
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	2.45273	2.45423	-0.024383

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	2.493	2.4950	-1e-03
0.875 Percentile	2.500	2.5015	0.005000
0.125 Percentile	2.4815	2.4830	-0.0065
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.018500	0.01850	0.011500
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.012469	0.012469	0.007751
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	2.51247	2.5140	0.012751
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	2.46903	2.4705	-0.014251

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion SGC Specific Gravity

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	2.406	2.4030	3e-03
0.875 Percentile	2.4140	2.4140	0.0100
0.125 Percentile	2.3940	2.3935	-0.007500
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.02000	0.0205	0.017500
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	0.031100	0.031878	0.027213
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	2.44510	2.44588	0.037213
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	2.36290	2.36162	-0.034713

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	2.406	2.4030	3e-03
0.875 Percentile	2.414	2.4140	0.010000
0.125 Percentile	2.3940	2.3935	-0.0075
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.020000	0.02050	0.017500
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.013480	0.013817	0.011795
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	2.42748	2.4278	0.021795
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	2.38052	2.3797	-0.019295

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion SGC Specific Gravity-OHD L-45

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	92	92	92
Median	2.394	2.3935	5e-04
0.875 Percentile	2.4086	2.4070	0.0095
0.125 Percentile	2.3754	2.3770	-0.012125
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.03325	0.0300	0.021625
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	0.051704	0.046650	0.033627
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	2.46033	2.45365	0.043127
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	2.32367	2.33035	-0.045752

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	90	90	90
Median	2.394	2.3935	5e-04
0.875 Percentile	2.408	2.4069	0.009375
0.125 Percentile	2.3761	2.3771	-0.0115
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.031875	0.02975	0.020875
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.021484	0.020051	0.014070
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	2.42948	2.4269	0.023445
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	2.35464	2.3571	-0.025570

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.

Appendix A - Outlier Criterion

Percent Water Absorption-OHD L-14

Table A - Extreme Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	0.280	0.2500	3e-02
0.875 Percentile	0.4350	0.4000	0.1350
0.125 Percentile	0.1500	0.1500	-0.095000
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.28500	0.2500	0.230000
(1.555) x (Range of Inner 75%) = Distance Beyond Inner 75% for 4.725 Std. Dev.	0.443175	0.388750	0.357650
Invalid Upper Limit = (87.5th Percentile) + (1.555) x (Range of Inner 75%)	0.87818	0.78875	0.492650
Invalid Lower Limit = (12.5th Percentile) - (1.555) x (Range of Inner 75%)	-0.29318	-0.23875	-0.452650

Table B - Outliers

Table of Statistics and Limits	Sample 47(X)	Sample 48(Y)	(Y-X)- (Y _{med} - X _{med})
Count = Number of Laboratories	93	93	93
Median	0.280	0.2500	3e-02
0.875 Percentile	0.435	0.4000	0.135000
0.125 Percentile	0.1500	0.1500	-0.0950
Range of Inner 75% = (87.5th Percentile Value) - (12.5th Percentile Value)	0.285000	0.25000	0.230000
(0.674) x (Range of Inner 75%) = Distance Beyond Inner 75% for 2.7 Std. Dev.	0.192090	0.168500	0.155020
Outlier Upper Limit = (87.5th Percentile) + (0.674) x (Range of Inner 75%)	0.62709	0.5685	0.290020
Outlier Lower Limit = (12.5th Percentile) - (0.674) x (Range of Inner 75%)	-0.04209	-0.0185	-0.250020

NOTE: Limits are shown as shaded rows. If either pair of results are designated as "0" in ratings table, both results are removed prior to any analysis. Labs with outlier data exceeding these limits are listed in the paired plots.