CEMENT AND CONCRETE REFERENCE LABORATORY

PROFICIENCY SAMPLE PROGRAM

Final Report
ASR – ASTM C1260 Proficiency Samples
Number 3 and Number 4

August 2017

CCRL
Cement and Concrete
Reference Laboratory

www.ccrl.us

August 21, 2017

TO: Participants in the CCRL ASR – ASTM C1260 Sample Program

SUBJECT: Final Report for ASR Proficiency Samples No. 3 and No. 4

Following is the report for the current pair of CCRL ASR Samples which were distributed in June 2017. The aggregates used for these samples were both fine aggregate.

This report consists of a statistical Summary of Results, a set of general Scatter Diagrams, and associated detailed information. The Table of Results with individualized information for laboratory can be downloaded at our website located at: http://www.ccrl.us/.

The CCRL Proficiency Sample Programs are intended for internal use by the laboratory as a tool to identify potential problems in laboratory procedures or test equipment and to initiate remedial actions. These programs are designed to complement the CCRL Laboratory Inspection Program as part of a total quality system. Care should be taken when using this program for any other purpose.

In addition to test results, laboratories were asked to report the mold release agent used and the type of 80°C storage used. These are results reported –

Mold release agent: 64 used “other”; 36 used “Teflon”
80°C storage: 83 used “oven”, 21 used “water bath”

Additional samples of these two materials and other CCRL samples are available for purchase. These samples may be useful for equipment verification, technician training, and research. Contact CCRL for availability and price.

It is presently anticipated that the next ASR – ASTM C1260 Samples will be distributed in June 2018.

Sincerely,

Robin K. Haupt

Robin K. Haupt
Supervisor, Proficiency Sample Programs
Cement and Concrete Reference Laboratory

TO: Participants in the CCRL ASR - ASTM C1260 Proficiency Sample Program

FROM: Robin K. Haupt, Supervisor, PSP

SUBJECT: Explanation of Final Report on Results of Tests on ASR Proficiency Samples No. 3 and No. 4

This letter and the material included with it constitute the final report and summary of results for the current pair of ASR Proficiency Samples, which were distributed in June 2017. This material includes a Table of Results for Individual laboratory data, a statistical Summary of Results, and a set of general scatter diagrams. Your unique laboratory number is displayed at the top of the Individual Table of Results.

An explanation of the program is contained in the paper: "Statistical Evaluation of Interlaboratory Cement Tests" by J. R. Crandall and R. L. Blaine View Document, and "Statistical Aspects of the Cement Testing Program" by W.J. Youden View Document, which can be found in Volume 59, Proceedings of the 62nd Annual Meeting of the Society, June 25, 1959, American Society for Testing and Materials.

Laboratory Ratings

Each laboratory receives an individualized Laboratory Ratings. Each line of the ratings shows the test title and the reporting unit in the first two columns. After that it lists in order, the laboratory's results for the odd and even numbered samples, overall averages for the odd and even numbered samples, and the laboratory's ratings for the odd and even samples.

The ratings for the individual laboratory were determined in the manner described by Crandall and Blaine using a rating scale of 1 to 5 instead of 0 to 4. The ratings have no valid standing beyond showing the difference between the individual laboratory result and the average for a particular test. Laboratory Ratings are calculated using the unrounded values for average and standard deviation.

The following table details the relationship between the ratings and the averages.

Ratings	Range (Number of Standard Deviations)	Number (Per 100) of Laboratories achieving the rating [1]
5	Less than 1	69
4	1 to 1.5	18
3	1.5 to 2	9
2	2 to 2.5	3
1	Greater than 2.5	1

The sign of the rating merely shows whether the result reported was greater or less than the average obtained.

[1]Youden, W.J., "Statistical Aspects of the Cement Testing Program", *Proceedings of the American Society for testing and Materials Volume 59*, 1959.

In cases where some laboratories' results are eliminated, averages, standard deviations, coefficients of variation, and the ratings of the other laboratories' results, are recalculated using the data remaining after the elimination. Since the laboratory ratings given are the results from this one series of tests, you need not attach too much significance to a single low rating, or pair of ratings, from this one series. A continuing tendency to get low ratings on several pairs of samples should lead a laboratory to consider the types of error, systematic and random, contribute to ratings that are low. Systematic error, which is indicated by low ratings with the same signs on each pair of samples, means a consistent error is occurring in equipment and/or test procedures. One indication of random error is low ratings on both samples with different signs.. Since systematic error occurs with more regularity, its cause is generally easier to find than the cause of random error.

Summary of Results

The Summary of Results provide the statistical summary for each test. Each line lists the test, the number of participants represented, the averages, standard deviations and coefficients of variations. When necessary the data from the test is represented in two lines, one line with all results reported, and then a second line with outlying results omitted. Sometimes two or more recalculations are required to eliminate all outliers from the test. In these cases, all of the laboratories omitted in previous recalculations are also omitted in subsequent ones. Results omitted are values that are more than three standard deviations from the mean of one or both samples. Elimination of these outlying results may little effect on the average, but may have a more pronounced effect on the standard deviation and coefficient of variation.

Scatter Diagrams

General scatter diagrams are supplied with this report. Crandall and Blaine describe the manner of preparing scatter diagrams, and their interpretation, in the paper published in the 1959 ASTM Proceedings.

Using the results received from each laboratory, a scatter diagram is generated for each test method by plotting the value for the odd numbered samples on the *X*, or horizontal axis, against the value for the even numbered samples on the *Y*, or vertical axis. Vertical and horizontal dashed lines, which divide the diagrams into four sections or quadrants, place the average values for the odd and even numbered samples, respectively. The first line of print under the diagram includes the test number, as given on the data sheet, the test title, and the number of data points on the diagrams. The number of plotted points may not agree with the total number of data pairs included in the analysis because a few points may be off the diagram, and some points may represent several data pairs, which are identical. Laboratories whose points are off the diagram will have a rating of ±1 for that particular test.

As described in Crandall and Blaine, a tight circular pattern of points around the intersection of the median lines is the ideal situation. Stretching out of the pattern into the first (upper right) and third (lower left) quadrants, suggests some kind of bias, or tendency for laboratories to get high or low results on both samples. Examination of the scatter diagrams indicates strong evidence of bias on many tests.

CCRL PROFICIENCY SAMPLE PROGRAM

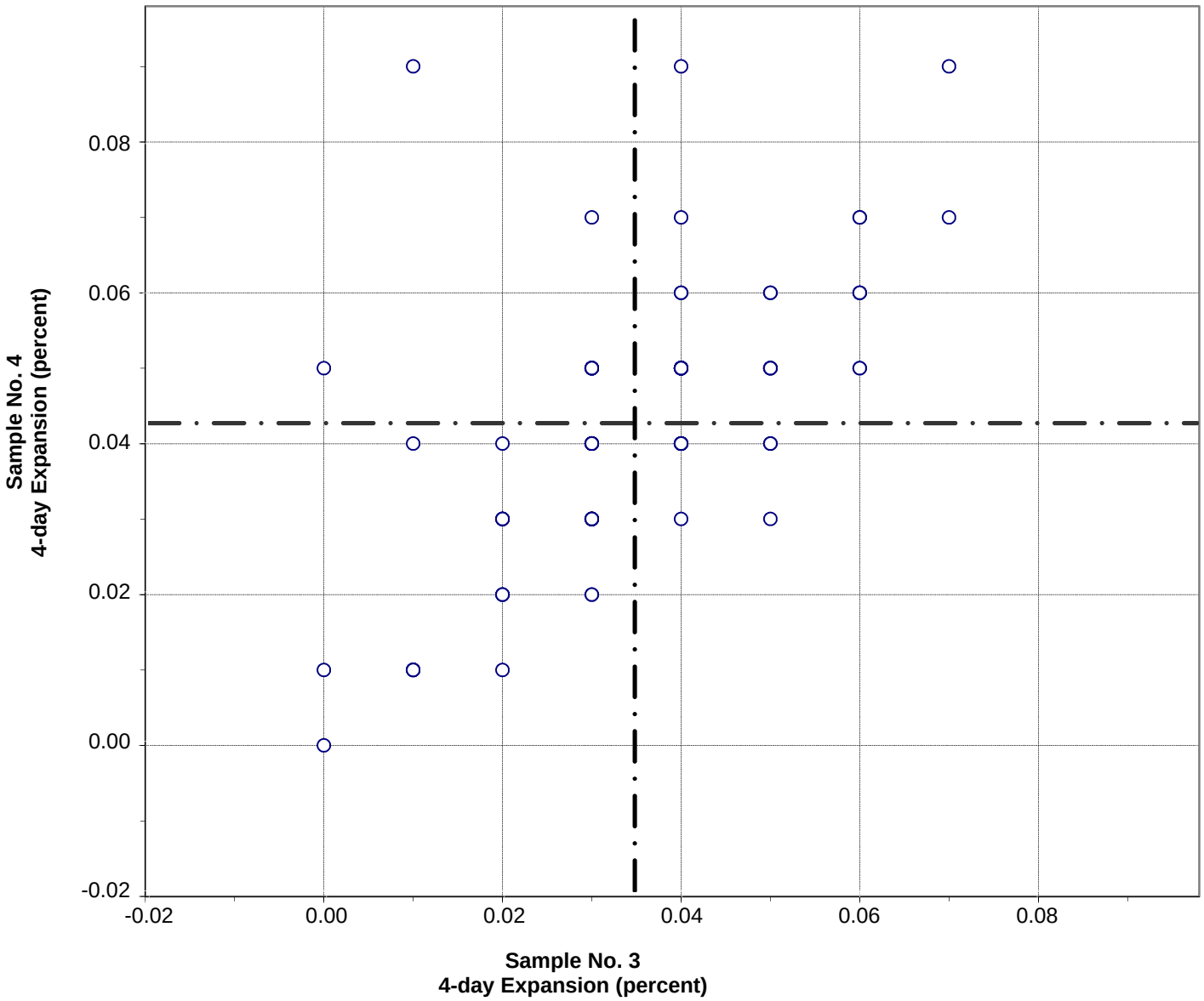
C1260 ASR Proficiency Samples No. 3 and No. 4

Final Report – August 21, 2017

SUMMARY OF RESULTS

Test (unit)	#Labs	Sample No.3 Average	S.D.	C.V.	Sample No. 4 Average	S.D.	C.V.
4-day Expansion (**percent**)							
	97	0.04	0.02	53.8	0.05	0.06	108.0
	*92	0.03	0.02	43.3	0.04	0.02	41.3
* Labs Eliminated - 202, 474, 515, 823, 1110							
7-day Expansion (**percent**)							
	102	0.09	0.03	33.8	0.11	0.04	35.8
	*97	0.09	0.02	26.2	0.10	0.03	25.5
* Labs Eliminated - 202, 515, 753, 823, 3875							
11-day Expansion (**percent**)							
	99	0.16	0.04	26.8	0.19	0.05	26.3
	*92	0.16	0.03	18.7	0.19	0.03	15.9
* Labs Eliminated - 10, 202, 753, 823, 928, 3566, 3875							
14-day Expansion (**percent**)							
	104	0.20	0.06	27.8	0.23	0.06	26.5
	*98	0.21	0.04	19.2	0.24	0.04	16.6
* Labs Eliminated - 10, 202, 210, 753, 3566, 3875							
21-day Expansion (**percent**)							
	94	0.28	0.07	24.9	0.33	0.07	22.0
	*89	0.29	0.05	18.1	0.33	0.05	14.9
* Labs Eliminated - 10, 202, 533, 753, 3566							
28-day Expansion (**percent**)							
	91	0.35	0.09	25.1	0.40	0.09	22.2
	*86	0.35	0.07	18.6	0.41	0.06	15.5
* Labs Eliminated - 10, 202, 533, 753, 3566							

CCRL Proficiency Sample Program
4-day Expansion
C1260 ASR Samples No. 3 and No. 4

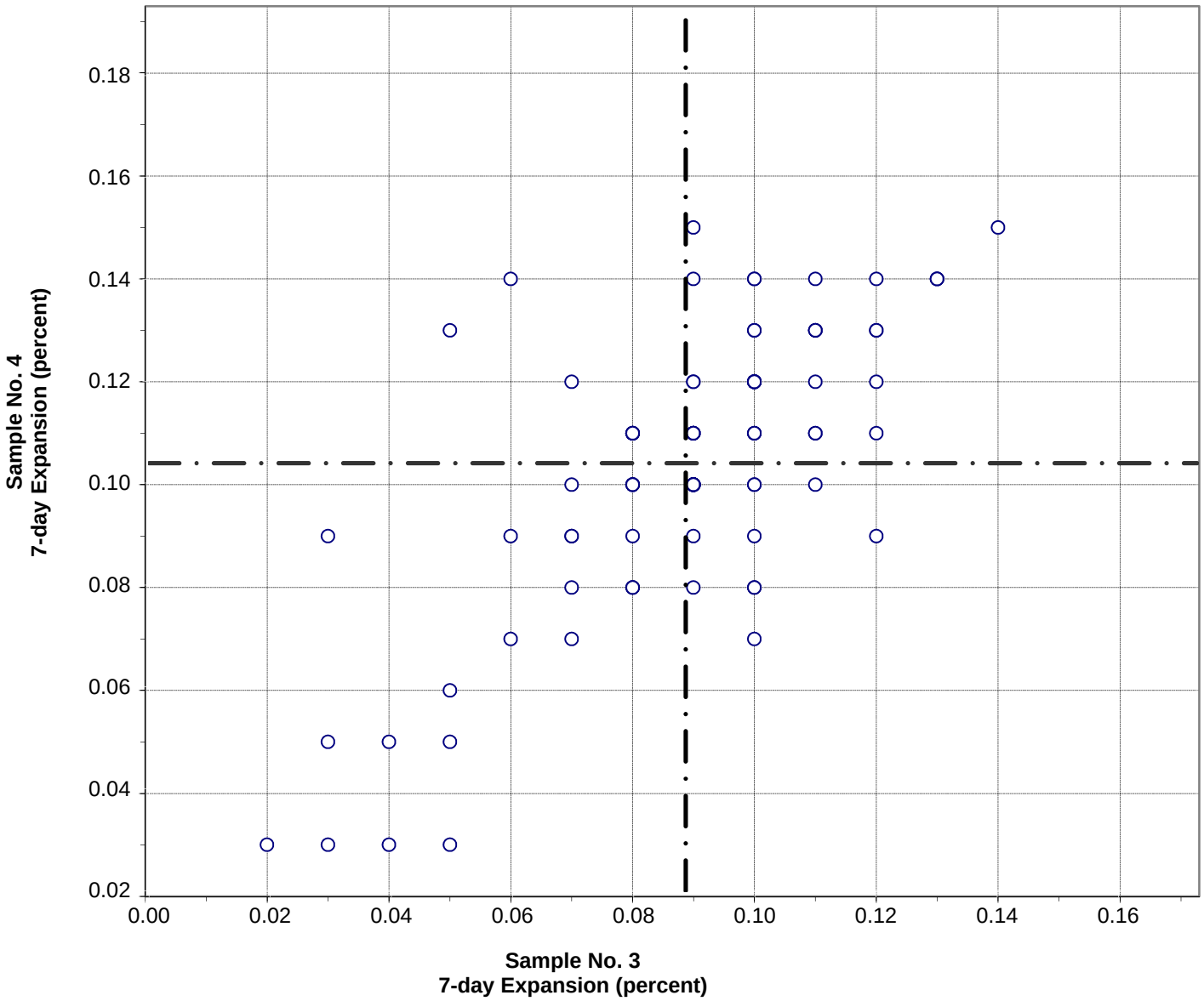


Test No. 2020 4-day Expansion 92 Points

Sample No. 3	Ave	0.03	S.D.	0.02	C.V. 43.3
Sample No. 4	Ave	0.04	S.D.	0.02	C.V. 41.3

Labs Eliminated: 202, 474, 515, 823, 1110

CCRL Proficiency Sample Program
7-day Expansion
C1260 ASR Samples No. 3 and No. 4

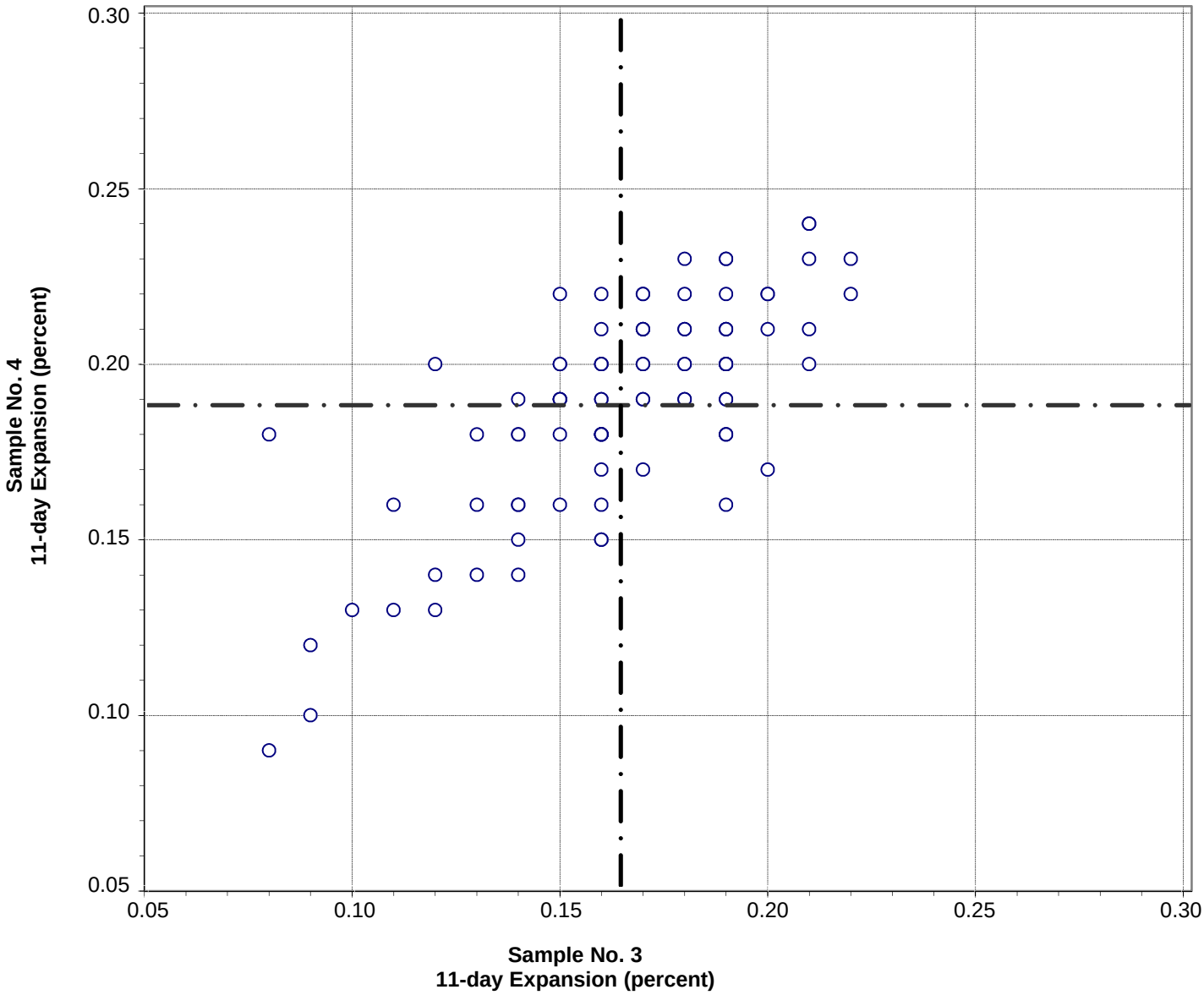


Test No. 2030 7-day Expansion 97 Points

Sample No. 3	Ave	0.09	S.D.	0.02	C.V. 26.2
Sample No. 4	Ave	0.10	S.D.	0.03	C.V. 25.5

Labs Eliminated: 202, 515, 753, 823, 3875

CCRL Proficiency Sample Program
11-day Expansion
C1260 ASR Samples No. 3 and No. 4

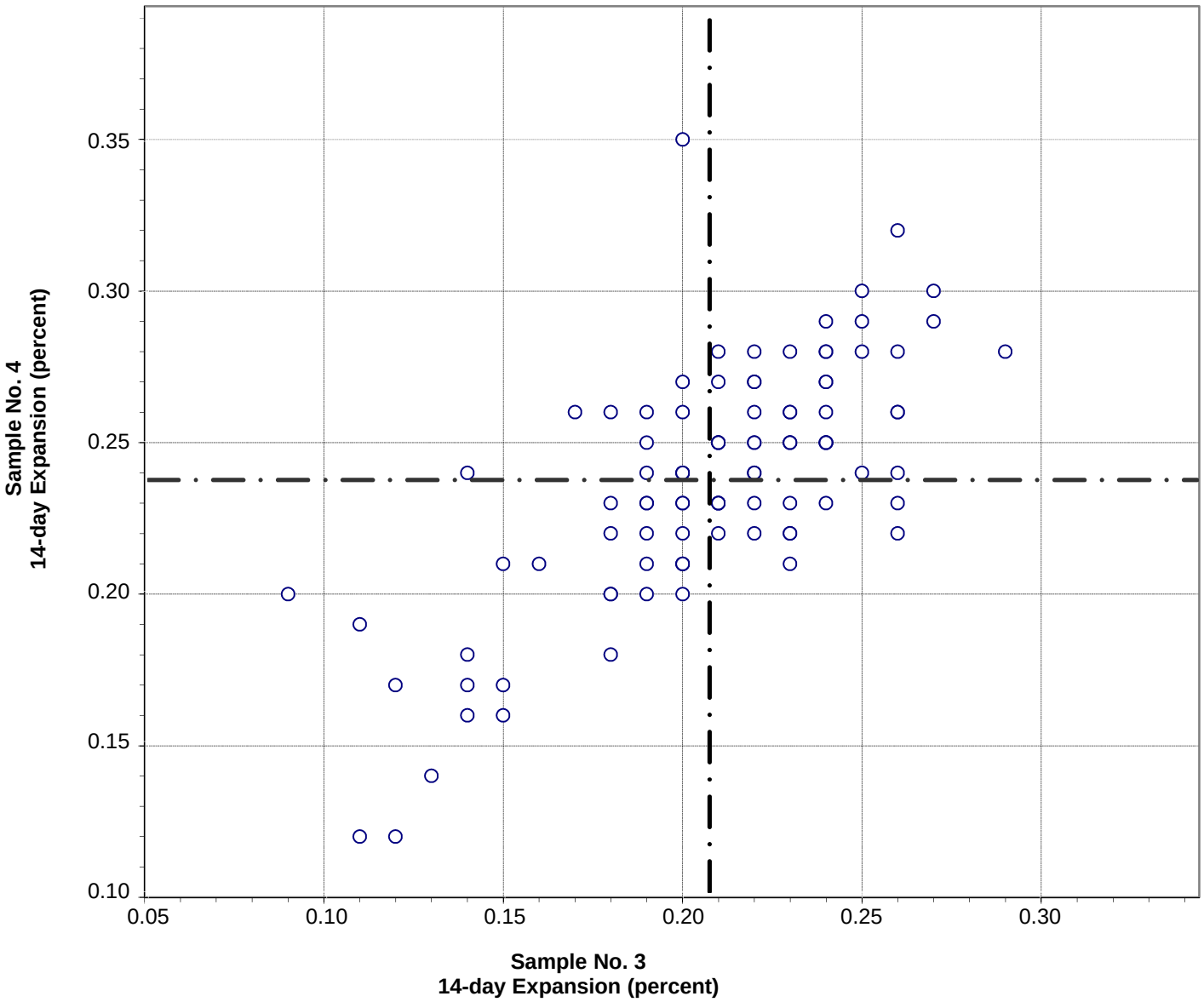


Test No. 2040 11-day Expansion 92 Points

Sample No. 3	Ave	0.16	S.D.	0.03	C.V.	18.7
Sample No. 4	Ave	0.19	S.D.	0.03	C.V.	15.9

Labs Eliminated: 10, 202, 753, 823, 928, 3566, 3875

CCRL Proficiency Sample Program
14-day Expansion
C1260 ASR Samples No. 3 and No. 4

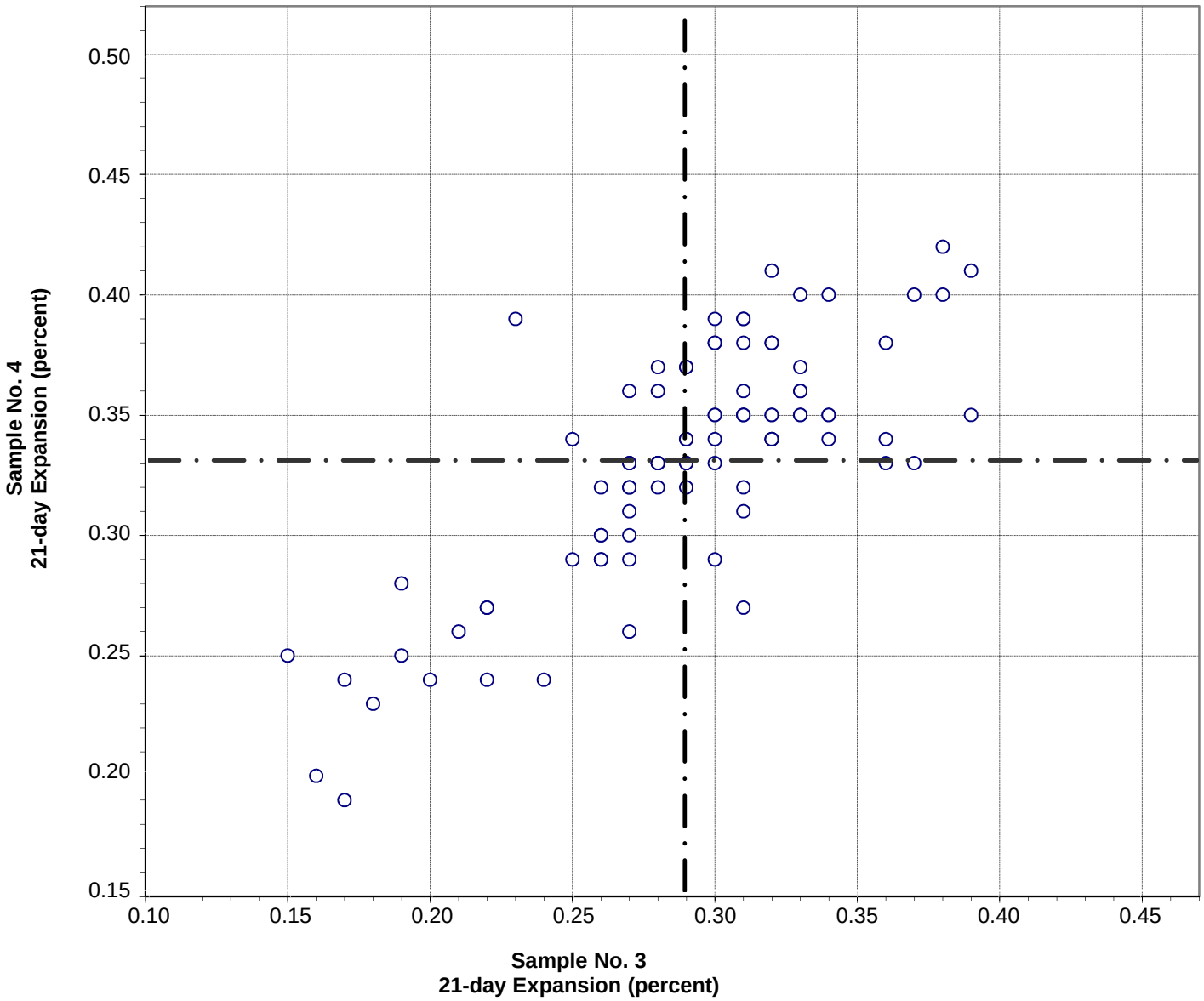


Test No. 2050 14-day Expansion 98 Points

Sample No. 3	Ave	0.21	S.D.	0.04	C.V. 19.2
Sample No. 4	Ave	0.24	S.D.	0.04	C.V. 16.6

Labs Eliminated: 10, 202, 210, 753, 3566, 3875

CCRL Proficiency Sample Program
21-day Expansion
C1260 ASR Samples No. 3 and No. 4

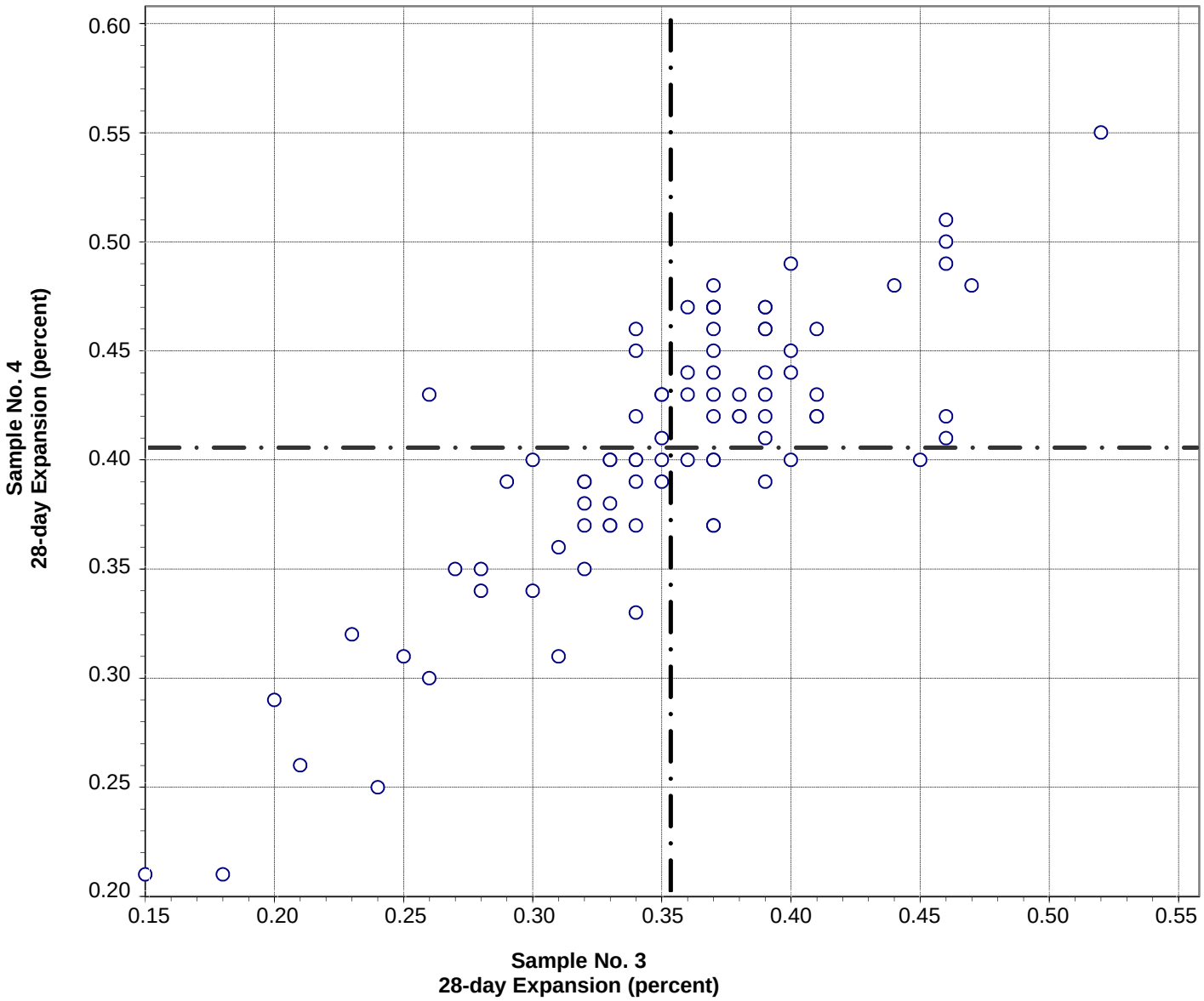


Test No. 2060 21-day Expansion 89 Points

Sample No. 3	Ave	0.29	S.D.	0.05	C.V. 18.1
Sample No. 4	Ave	0.33	S.D.	0.05	C.V. 14.9

Labs Eliminated: 10, 202, 533, 753, 3566

CCRL Proficiency Sample Program
28-day Expansion
C1260 ASR Samples No. 3 and No. 4



Test No. 2070 28-day Expansion 86 Points

Sample No. 3	Ave	0.35	S.D.	0.07	C.V.	18.6
Sample No. 4	Ave	0.41	S.D.	0.06	C.V.	15.5

Labs Eliminated: 10, 202, 533, 753, 3566