CEMENT AND CONCRETE REFERENCE LABORATORY

PROFICIENCY SAMPLE PROGRAM

Final Report
Concrete Proficiency Samples
Number 139 and Number 140

June 2006

CCRL CEMENT AND CONCRETE REFERENCE LABORATORY

CEMENT AND CONCRETE REFERENCE LABORATORY
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SPONSORED BY
COMMITTEE C-1 ON CEMENT
COMMITTEE C-9 ON CONCRETE AND
CONCRETE AGGREGATES
AMERICAN SOCIETY FOR TESTING AND MATERIALS

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June 30, 2006

TO: Participants in the CCRL Portland Cement Concrete Proficiency Sample Program

SUBJECT: Concrete Proficiency Samples No. 139 and No. 140

Enclosed is your copy of the final report on the test results for the CCRL Concrete Proficiency Samples which were distributed in April 2006.

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

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 Concrete Proficiency Samples will be distributed in November 2006.

Sincerely,

Robin K. Haupt

Robin K. Haupt
Supervisor, Proficiency Sample Programs
Cement and Concrete Reference Laboratory
Materials and Construction Research Division
Building and Fire Research Laboratory

Enclosure

TO: Participants in the CCRL Concrete Proficiency Sample Program

FROM: Robin K. Haupt, Supervisor, PSP

SUBJECT: Explanation of Final Report on Results of Tests on Portland Cement Concrete Proficiency Samples No. 139 and No. 140

This letter, and the material included with it, constitute the final report, and summary of results for the current pair of Concrete Proficiency Samples, which were distributed in April 2006. This material includes a statistical Summary of Results, and a set of general Scatter Diagrams. If your laboratory was a participate in this program a Table of Laboratory Results (lab data and ratings) for your laboratory data can be viewed and printed on the CCRL website

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.

Table of Results

Each laboratory receives an individualized Table of Results that contains laboratory test results and ratings. Each line of the test information shows the test title and the reporting unit in the first two columns. After that it lists in order, the laboratory's test 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 Please note that individual laboratory ratings were not given for temperature of concrete.

The ratings for each 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.

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 indicates whether the result reported was greater or less than the average obtained.

[1]Youden, W.J., "Statistical Aspects of the Cement Testing Program",Volume 59, *Proceedings of the 62nd Annual Meeting of the Society, June 25, 1959, American Society for Testing and Materials.*

In cases where some laboratories' results are eliminated, averages, standard deviations, coefficients of variation, and the ratings of the remaining 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, that 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 invalid and 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. Often, elimination of these outlying results has 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
Concrete Proficiency Samples No. 139 and No. 140
Final Report - June 30, 2006

SUMMARY OF RESULTS

		Sample No. 139				Sample No. 140		
Test		#Labs	Average	S.D.	C.V.	Average	S.D.	C.V.
Air Cont, Volume	prcnt	854	1.67	0.47	28.3	1.48	0.54	36.9
Air Cont, Volume	prcnt	* 830	1.67	0.40	23.9	1.45	0.43	29.3
Air Cont, Pressure	prcnt	1023	1.6	0.44	27.2	1.4	0.52	36.3
Air Cont, Pressure	prcnt	* 998	1.6	0.36	22.6	1.4	0.39	28.1
Slump	inch	1031	3.18	1.3	41.6	4.04	1.3	31.8
Slump	inch	*1020	3.15	1.2	39.9	4.01	1.2	30.9
Unit Weight	lb/ft^2	1029	150.4	4.5	3.00	150.1	4.6	3.09
Unit Weight	lb/ft^2	* 990	150.5	1.4	0.935	150.4	1.3	0.895
Comp Str 7 day	psi	1030	4786	429.4	8.97	4505	419.6	9.32
Comp Str 7 day	psi	*1013	4797	391.7	8.16	4515	381.9	8.46
Temperature of Conc	°F	1034	77	6.3	8.22	77	6.2	8.06

* ELIMINATED LABS: Data over three S.D. from the mean

Air Content - Volume 25 75 1196 1200 1276 1278 1359 1453 1465 1611 1800 1852 2033 2071 2089 2153 2222 2346 2364 2390 2472 2695 2989 3000

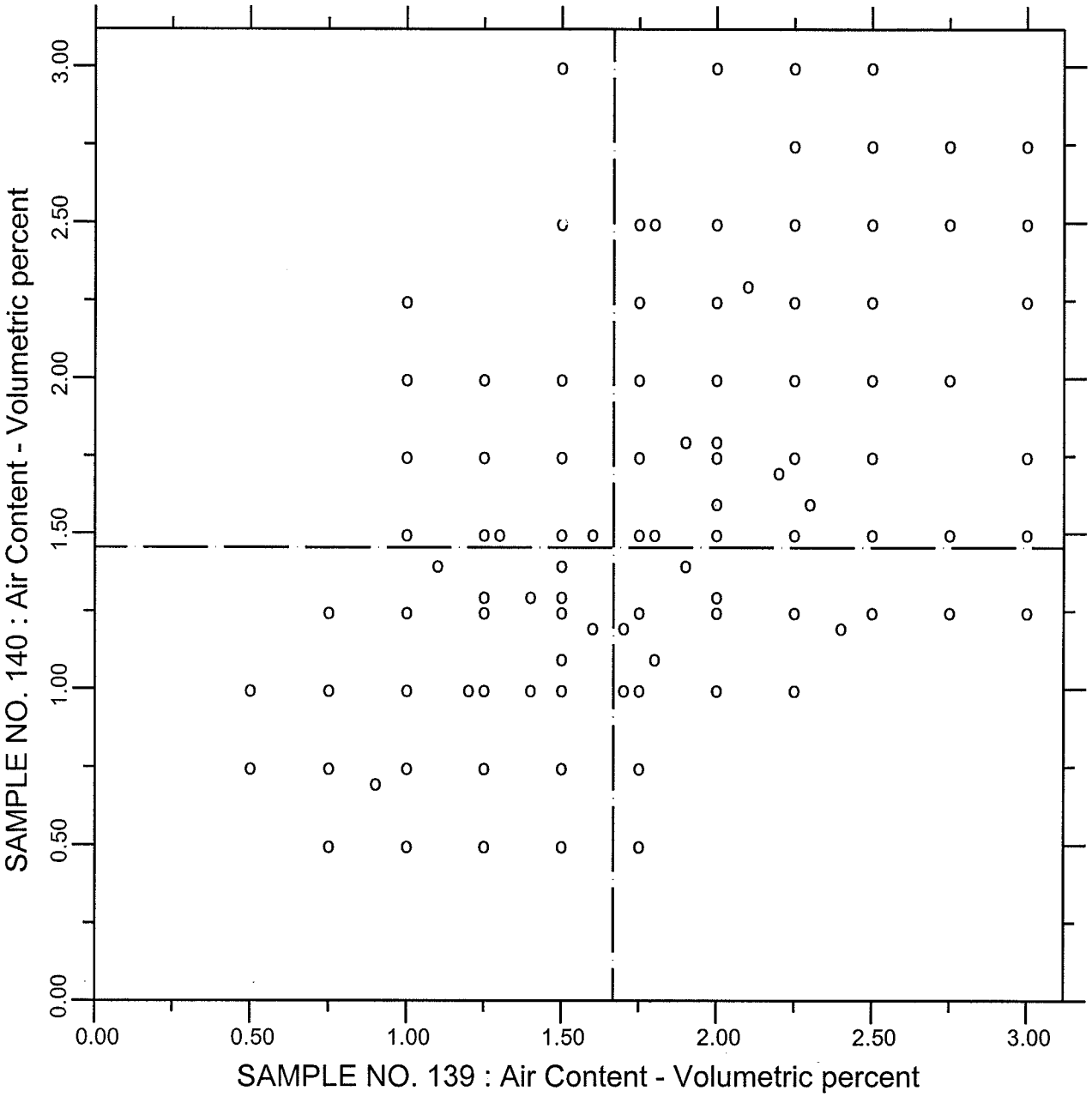
Air Content - Pressure 25 49 447 533 1200 1359 1410 1465 1487 1514 1636 1645 1784 1800 1852 1908 2033 2063 2115 2222 2294 2346 2456 2667 2973

Slump 28 825 1388 1433 1619 2093 2961 3007 3065 3069 3083

Unit Weight 397 1158 1294 1314 1374 1493 2444 2513 3027 49 447 783 1307 1391 1451 1548 1679 1718 1759 1863 1926 1958 2004 2033 2062 2120 2143 2148 2268 2287 2302 2341 2346 2423 2497 2695 2961 2968 3099

Compressive Strength 25 51 829 1276 1408 1422 1428 1645 1649 2033 2093 2431 2438 2439 2584 2667 3065

CCRL PROFICIENCY SAMPLE PROGRAM
Air Content - Volumetric Method
CONCRETE SAMPLES NO. 139 & NO. 140



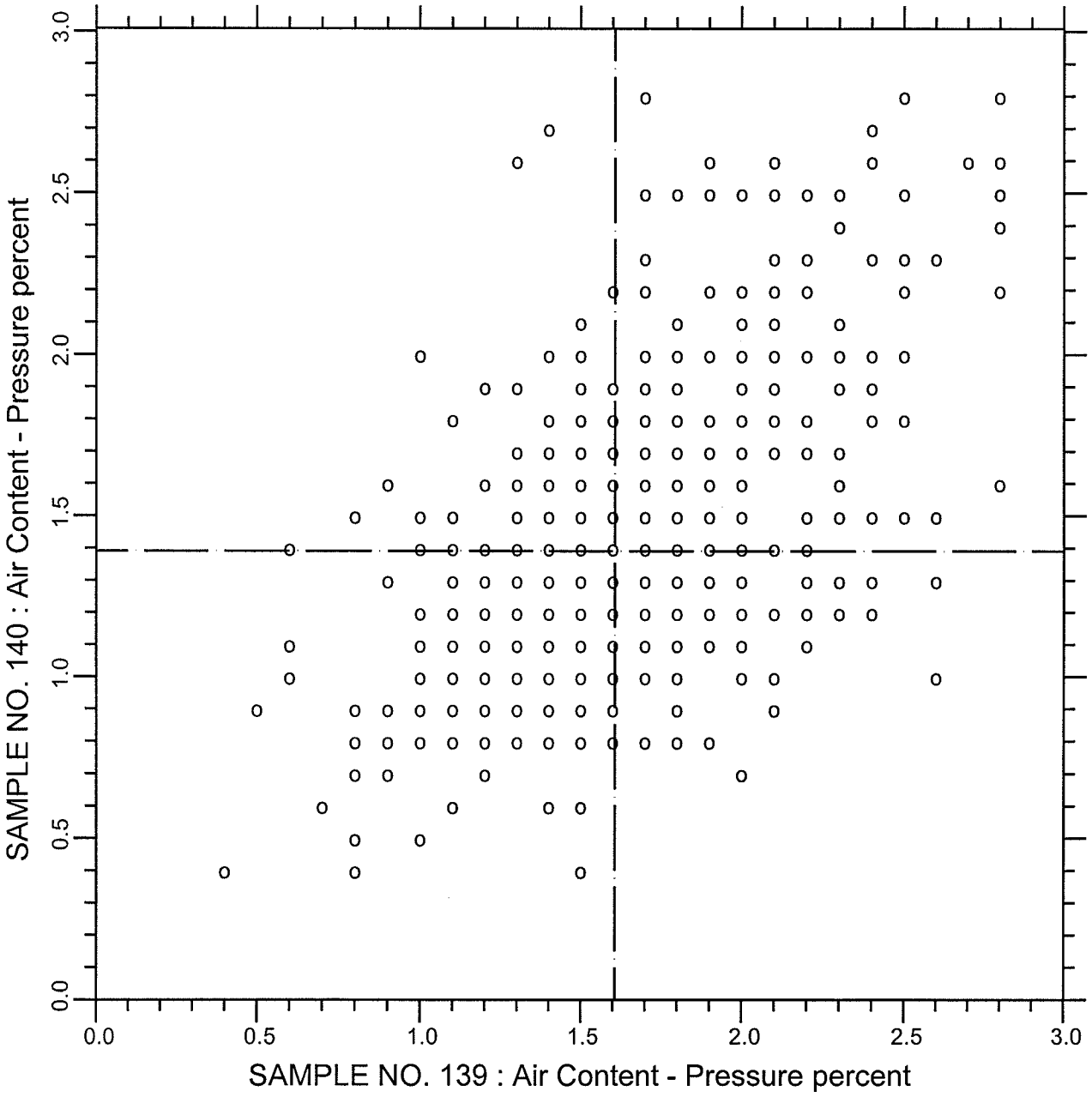
TEST NO.1 Air Content - Volumetric 830 POINTS

SAMPLE NO. 139 AVE 1.668 S.D. 0.40 C.V. 23.9

SAMPLE NO. 140 AVE 1.454 S.D. 0.43 C.V. 29.3

LABS ELIMINATED 25 75 1196 1200 1276 1278 1359 1453 1465 1611 1800 1852 2033 2071 2089 2153 2222 2346 2364 2390 2472 2695 2989 3000

CCRL PROFICIENCY SAMPLE PROGRAM
Air Content - Pressure Method
CONCRETE SAMPLES NO. 139 & NO. 140



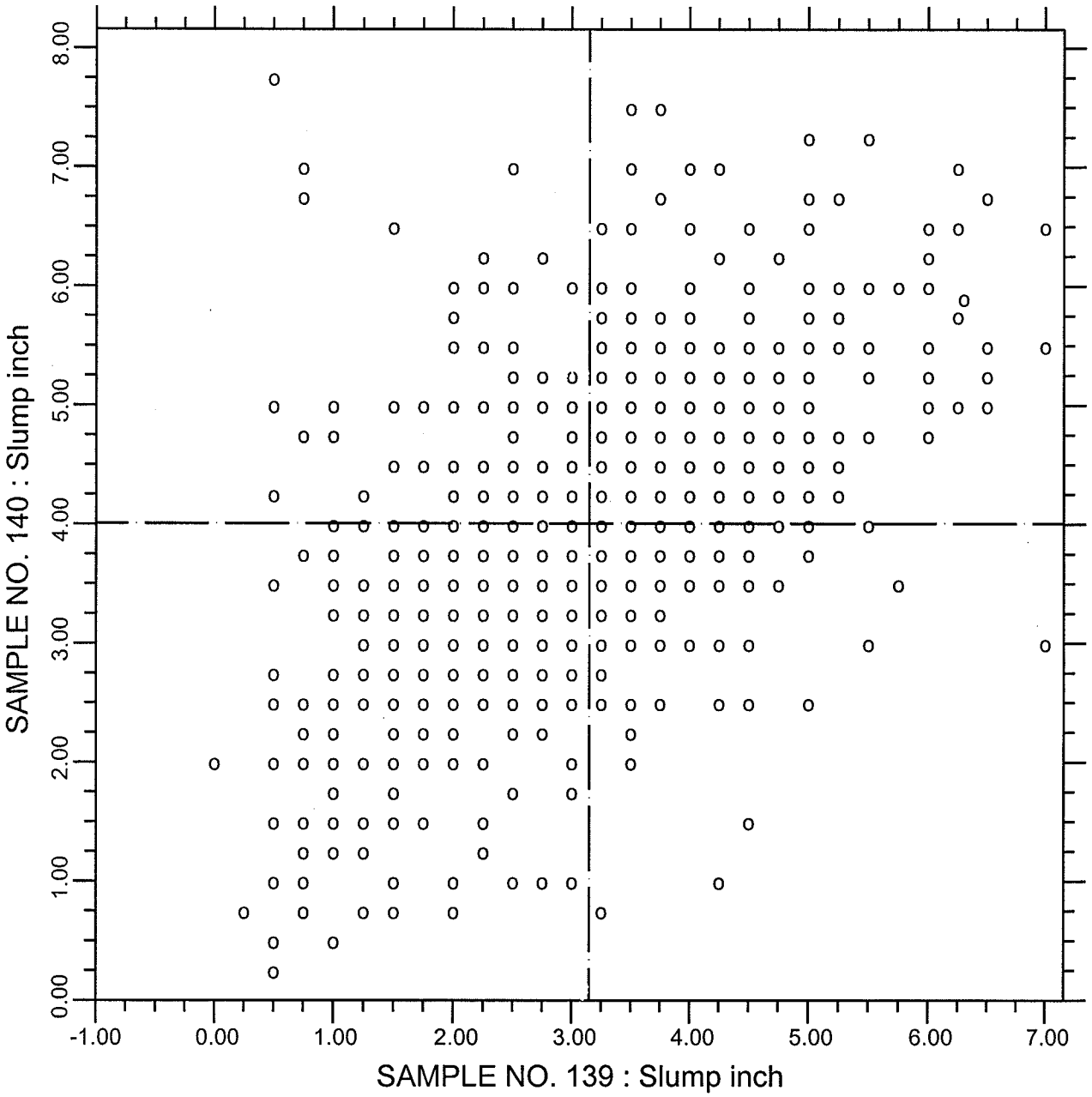
TEST NO.6 Air Content - Pressure 998 POINTS

SAMPLE NO. 139 AVE 1.607 S.D. 0.36 C.V. 22.6

SAMPLE NO. 140 AVE 1.390 S.D. 0.39 C.V. 28.1

LABS ELIMINATED 25 49 447 533 1200 1359 1410 1465 1487 1514 1636 1645 1784 1800 1852 1908 2033 2063 2115 2222 2294 2346 2456 2667 2973

CCRL PROFICIENCY SAMPLE PROGRAM
Slump of Concrete
CONCRETE SAMPLES NO. 139 & NO. 140



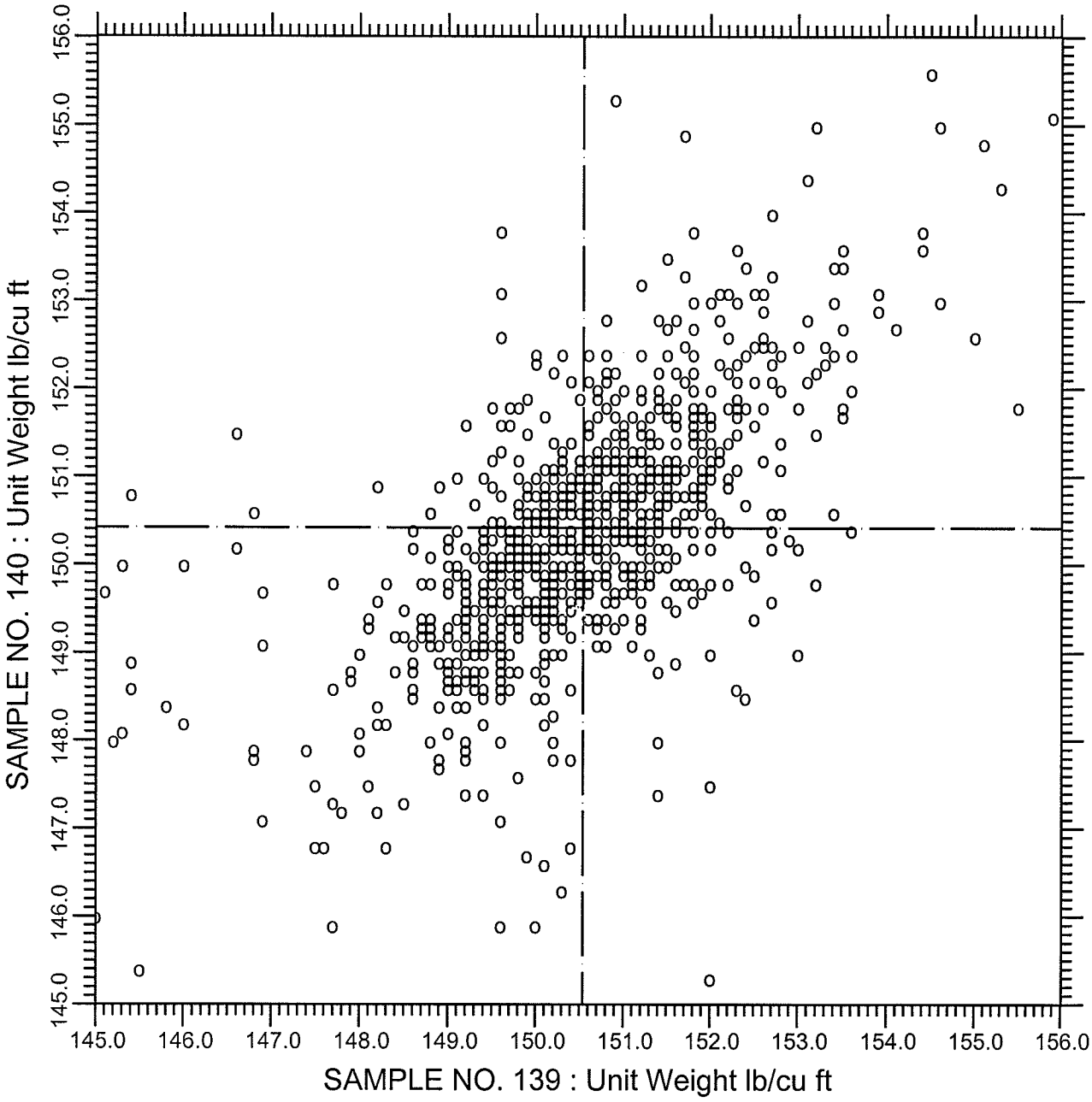
TEST NO.2 Slump 1020 POINTS

SAMPLE NO. 139 AVE 3.148 S.D. 1.2 C.V. 39.9

SAMPLE NO. 140 AVE 4.007 S.D. 1.2 C.V. 30.9

LABS ELIMINATED 28 825 1388 1433 1619 2093 2961 3007 3065 3069 3083

CCRL PROFICIENCY SAMPLE PROGRAM
Unit Weight of Concrete
CONCRETE SAMPLES NO. 139 & NO. 140



TEST NO.3 Unit Weight 989 POINTS

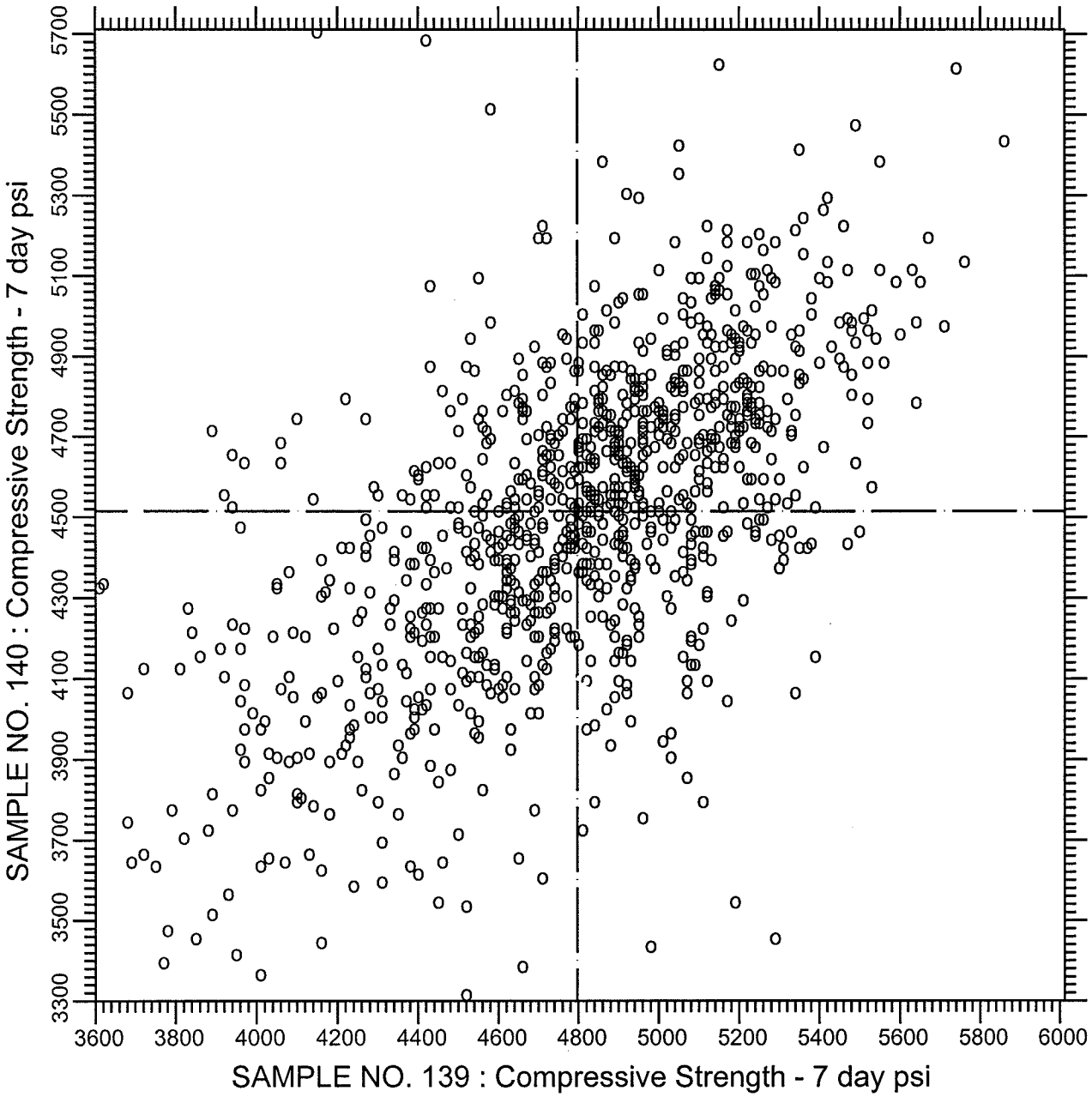
SAMPLE NO. 139 AVE 150.542 S.D. 1.4 C.V. 0.935

SAMPLE NO. 140 AVE 150.418 S.D. 1.3 C.V. 0.895

LABS ELIMINATED

See SUMMARY OF RESULTS page for list of labs.

CCRL PROFICIENCY SAMPLE PROGRAM
Compressive Strength - 7 day
CONCRETE SAMPLES NO. 139 & NO. 140



TEST NO.4 Compressive Strength - 7 day 1011 POINTS

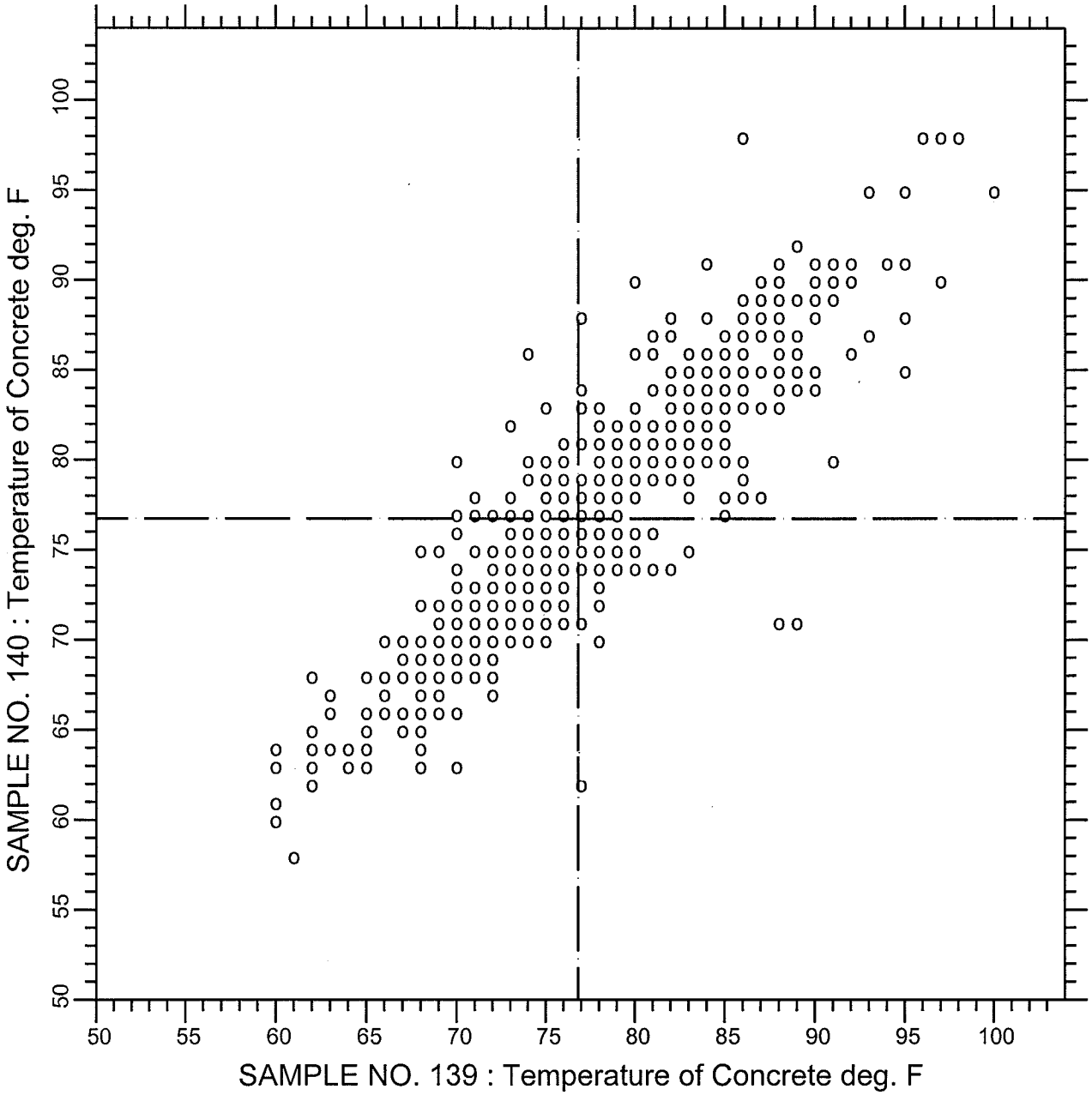
SAMPLE NO. 139 AVE 4796.9 S.D. 391.7 C.V. 8.16

SAMPLE NO. 140 AVE 4515.0 S.D. 381.9 C.V. 8.46

LABS ELIMINATED 25 51 829 1276 1408 1422 1428 1645 1649 2033 2093 2431 2438 2439 2584 2667 3065

LABS OFF DIAGRAM 515 2346

CCRL PROFICIENCY SAMPLE PROGRAM
Temperature of Concrete
CONCRETE SAMPLES NO. 139 & NO. 140



TEST NO.5 Temperature of Concrete 1034 POINTS

SAMPLE NO. 139	AVE	76.84	S.D.	6.3	C.V.	8.22
SAMPLE NO. 140	AVE	76.74	S.D.	6.2	C.V.	8.06