

**THE 2008 CANADIAN ASPHALT EXCHANGE PROGRAM
(CAEP)
2008 DETAILED REPORT (Apr 09)**

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1. INTRODUCTION

The Canadian Asphalt Exchange Program (CAEP) is part of the CANADIAN ASPHALT AND MIX PROGRAM (CAMP). The exchange program is operated by a steering committee under the umbrella of the Canadian User Producer Group for Asphalt (CUPGA).

Sixteen participants obtained samples in the five different parts of the asphalt exchange program. The asphalt exchange program consisted of the following testing programs:

1. Asphalt Cement Testing (9 labs)
2. Cutback Asphalt Testing (7 labs)
3. Emulsified Asphalt Testing (9 labs)
4. Polymer Modified Emulsified Asphalt Testing (6 labs)
5. SHRP (Strategic Highway Research Program) Binder Testing (10 labs)

Participation in the exchange program is voluntary. The results cannot be used for pre-qualification or specification purposes as indicated on the cover page of the report. Laboratory results are confidential and are tabulated based on a randomly assigned laboratory number that is known to the particular laboratory and the co-ordinating agency only. The names of the participating laboratories are shown in Appendix C. The order in which the names are presented is not related to the laboratory numbers used in the other tables contained in this report.

The exchange program operates on an annual basis with samples shipped to participants in July. Test results are returned to the co-ordinating agency by the middle of November. The final report is distributed in June of the following year. Asphalt exchange test results were analysed according to ASTM (American Society for Testing and Materials) test procedure E 691-92 Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method.

Saskatchewan Ministry of Highways and Infrastructure (MHI) is the co-ordinating agency for the asphalt exchange program. Their responsibilities include:

- developing participant lists
- providing instructions for handling and testing of the materials
- arranging and co-ordinating material suppliers
- supplying data collection forms
- collecting and compiling the test data
- preparing and distributing a final report to all participants
- preparing a final report for the CTAA (Canadian Technical Asphalt Association) Proceedings

The material samples were shipped collect to the participants directly by the asphalt suppliers. The co-ordinating agency provided the asphalt suppliers with the participant lists and addresses. The instruction and test forms were distributed separately from the material samples.

2. ASPHALT CEMENT

The asphalt cement testing was done on three replicate samples of 150-200A penetration grade asphalt cement. The replicate samples were prepared and shipped by Imperial Oil of Sarnia, Ontario.

All of the specified tests were performed on each replicate sample. The results reported were to be the result of a single determination, not the average of two or more (except in cases where an average was called for in the test procedure). Each individual test should have been performed by the same operator on all the replicate samples. However, it was not necessary that the same operator did every single test.

2.1 Original Asphalt Cement

The following tests were performed on the original asphalt cement:

1. Penetration of Bituminous Materials - ASTM D5
 - The average of three penetrations at 25°C, 100 g, 5 s, whose values did not differ more than the amount given in ASTM D5 reported to the nearest whole unit.
2. Penetration of Bituminous Materials - ASTM Method D5
 - The average of three penetrations at 4°C, 100 g, 5 s, whose values did not differ more than the amount given in ASTM D5 reported to the nearest whole unit.
3. Solubility of Bituminous Materials in Organic Solvents - ASTM Method D2042
 - The percentage of material soluble in trichloroethylene reported to the nearest 0.01 %.
4. Specific Gravity of Semi-Solid Bituminous Materials - ASTM Method D70
 - The specific gravity of the asphalt cement at 25°C relative to water at 25°C reported to the nearest 0.001.
5. Kinematic Viscosity of Asphalts - ASTM Method D2170
 - The kinematic viscosity at 135°C reported to the nearest mm²/s.
6. Absolute Viscosity of Asphalts - ASTM Method D2171
 - The absolute viscosity at 60°C, 300 mm Hg vacuum reported to the nearest 0.1 Pa·s.

2.2 Thin Film Oven Test (T.F.O.T.)

The following tests were performed on the samples after they were aged in the Thin Film Oven:

1. Thin Film Oven Test - ASTM Method D1754
 - The average loss or gain of the material in the two containers.
2. Penetration of the Residue - ASTM Method D5
 - The average of three penetrations at 25°C, 100 g, 5 s, whose values did not differ by more than the amount given in ASTM D5 reported to the nearest whole unit.
3. Penetration of the Residue - ASTM Method D5
 - The average of three penetrations at 4°C, 100 g, 5 s, whose values did not differ by more than the amount given in ASTM D5 reported to the nearest whole unit.
4. Retained Penetration after T.F.O.T. - ASTM Method D5
 - The percentage of the original penetration (at 25°C) reported to the nearest percent.
5. Kinematic Viscosity of the Residue - ASTM Method D2170
 - The kinematic viscosity at 135°C reported to the nearest mm²/s.
6. Absolute Viscosity of the Residue - ASTM Method D2171

- The absolute viscosity of the residue at 60°C, 300 mm Hg vacuum reported to the nearest 0.1 Pa·s.

2.3 Rolling Thin Film Oven Test (R.T.F.O.T.)

Participants were given the option of performing tests after the samples were aged in the Rolling Thin Film Oven. The following tests were performed after the rolling thin film oven:

1. Rolling Thin Film Oven Test - ASTM Method D2872
 - The average loss or gain of the material in the two containers.
2. Penetration of the Residue - ASTM Method D5
 - The average of three penetrations at 25°C, 100 g, 5 s, whose values did not differ by more than the amount given in ASTM D5 reported to the nearest whole unit.
3. Penetration of the Residue - ASTM Method D5
 - The average of three penetrations at 4°C, 100 g, 5 s, whose values did not differ by more than the amount given in ASTM D5 reported to the nearest whole unit.
4. Retained Penetration after R.T.F.O.T. - ASTM Method D5
 - The percentage of the original penetration (at 25°C) reported to the nearest percent.
5. Kinematic Viscosity of the Residue - ASTM Method D2170
 - The kinematic viscosity at 135°C reported to the nearest mm²/s.
6. Absolute Viscosity of the Residue - ASTM Method D2171
 - The absolute viscosity of the residue at 60°C, 300 mm Hg vacuum reported to the nearest 0.1 Pa·s.

3. CUTBACK ASPHALT

The cutback asphalt testing was done on three replicate samples of MC 250 cutback asphalt. The replicate samples were prepared and shipped by Husky Energy of Lloydminster, Saskatchewan.

All of the specified tests were performed on each replicate sample. The results reported were to be the result of a single determination, not the average of two or more (except in cases where an average was called for in the test procedure). The same operator should have performed each individual test. However, it was not necessary that the same operator did every single test.

3.1 Original Material

The following tests were performed on each replicate sample of the cutback asphalt:

1. Kinematic Viscosity of Liquid Asphalts - ASTM Method D2170
 - The kinematic viscosity at 60°C reported to the nearest 0.1 mm²/s.
2. Flash Point of Cutback Asphalt with Tag Open Cup Apparatus - ASTM Method D3143
 - The result of a single determination reported to the nearest 0.5°C.
3. Specific Gravity of Liquid Asphalt - ASTM Method D3142
 - The specific gravity reported to the nearest 0.001 and the test temperature.
4. Distillation of Liquid Asphalt - ASTM Method D402

- The volume of distillate to 190°C, 225°C, 260°C and 316°C reported both in millilitres to the nearest 0.5 ml and as a percent of the total distillate to the nearest 0.1 %.
5. Penetration Test (On Residue after Distillation) - ASTM Method D5
- The average of three penetrations at 25°C, 100 g, 5 s, whose values did not differ by more than the amount given in ASTM D5 reported to the nearest whole unit.

4. EMULSIFIED ASPHALT

The emulsified asphalt testing was done on three replicate samples of an HF-150S emulsion. The replicate samples were prepared and shipped by Ambertec Ltd. of Macklin, Saskatchewan.

All of the specified tests were performed on each replicate sample. The results reported were to be the result of a single determination, not the average of two or more (except in cases where an average was called for in the test procedure). The same operator should have performed each individual test. However, it was not necessary that the same operator did every single test.

The laboratories were asked to conduct their emulsified asphalt testing within four weeks of the dispatch of the samples. The samples were to have been thoroughly mixed before pouring for the individual tests. Care should have been taken not to entrain air into the samples during mixing.

Unless otherwise specified, all testing for the specified properties was conducted in accordance with the National Standards of Canada “CAN 2-16.5-M84 Asphalt, Emulsified, High Float-type for Road Purposes”.

4.1 Tests on Emulsion

The following tests were performed on each replicate sample of the emulsified asphalt:

1. Saybolt-Furol Viscosity at 50°C, (seconds)
 - The same orifice should have been used for all tests.
2. Residue by Distillation, (% by mass)
 - The same still apparatus should have been used for all tests.
3. Oil Portion of Distillate, (% by volume)
4. Demulsibility, 50 ml, 5.55 g/l CaCl₂, (% by mass)

4.2 Tests on Residue

1. Penetration at 25°C, 100 g, 5 seconds, (dmm)
 - In addition to the test procedure outlined in ASTM D244 and in the National Standard of Canada, CAN2-16.5-M84 clause 6.2.4 Penetration, the following modifications were used to prepare the distillation residue for penetration testing:
 - a. Pour the residue into the penetration (pen) can as described in clause 6.2.4.2 of CAN2-16.5-M84.
 - b. Immediately remove the pen can from the hot plate after pouring of the sample. Place the pen can on a 20mm thick plywood base covered with a paper towel. Note that the piece of plywood should be large enough to ensure full contact with the inverted glass beaker.

- c. Cover the pen can with a 600 ml low-form glass beaker. As specified in clause 6.2.4.2 of CAN2-16.5-M84, let the sample sit 1 1/2 hours at room temperature and 1 1/2 hours in the temperature bath (25°C exactly) before running the penetration test.
- d. Distilled water should be used in the temperature bath for conditioning sample.
- e. Report to nearest whole unit the average of three penetrations whose values do not differ by more than the following:

If first reading is between:	Maximum difference between highest and lowest reading:
101 - 150	20
151 - 200	25
201 - 250	30
251 - 300	35

- If, after five penetrations of an individual residue sample three acceptable values were not obtained, then a second residue should have been prepared from the same emulsion sample.
- The method had been modified to standardise the procedure for residue conditioning in air. The procedure described above, reduced the effects of variable heat loss due to air conditioning, drafts, and varying types of counter tops.

2. Apparent Viscosity at 60°C, (Pa-s)

- The same viscosity tube should have been used for all tests.
- The participants were to follow ASTM D4957, Standard Test Method for Apparent Viscosity of Asphalt Emulsion Residues and Non-Newtonian Bitumens by Vacuum Capillary Viscometer, with the following being taken into account:
 - a. Select a viscometer that will give a flow time between 50 s and 200 s for the C zone of a Modified Koppers viscometer.
 - b. All viscosity testing shall be conducted at 60°C under a 30 cm Hg vacuum. Viscosity determinations with Modified Koppers shall be reported at the shear rate of 0.5 s⁻¹.
 - c. If the residues rise into be B zone of Modified Koppers tubes prior to applying the vacuum, use only the C, D, E, and F zone flow times for viscosity and shear rate determinations.
 - d. Cooling of residues to ambient temperature and re-heating for testing at a later time shall not be permitted.
 - e. Koch Materials Ltd. suggests a tube size of mK 100 for testing this emulsion residue.

5. POLYMER MODIFIED EMULSIFIED ASPHALT

The polymer modified emulsified asphalt testing was done on three replicate samples of an HF-150P polymer modified emulsion. The replicate samples were prepared and shipped by Pounder Emulsions of Saskatoon, Saskatchewan.

All of the specified tests were performed on each replicate sample. The results reported were to be the result of a single determination, not the average of two or more (except in cases where an average was called for in the test procedure). Each individual test should have been performed by the same operator on both replicate samples. However, it was not necessary that the same operator did every single test.

The laboratories were asked to conduct their polymer-modified emulsion testing within four weeks of the dispatch of the samples. Prior to any testing, the emulsion sample should have been heated and stirred according to ASTM D 244 Par.3.1. Anything unusual was reported.

5.1 Tests on Polymer Modified Emulsion

The following tests were performed on the polymer-modified emulsion:

1. Saybolt-Furol Viscosity at 50°C, (seconds)
 - The same orifice was used for all tests.
 - Labs were to follow ASTM D244 with the following modification:
 - a. Pour about 100 grams of the sample through the 1000 µm sieve. Heat the sample to $51.4 \pm 0.3^\circ\text{C}$ before pouring into the viscosity tube. Wait 2 minutes, turn off viscometer agitator, and run the test.
 - The results were reported to the nearest 0.1 seconds.
2. Residue by Distillation, (% by mass)
 - The same still apparatus was used for all tests.
 - The shear and thermal history of High Float emulsion residues prior to testing could cause variations in their physical properties. Careful distillation and subsequent handling of the residues was important to obtain consistent results.
 - Labs were to use only the aluminium alloy still. They were to check the cover and flanges periodically for flatness to ensure perfect seal. Composition gaskets, approximately 1 mm thick, were used between the still and its cover.
 - Labs were to follow ASTM D244 with the following modifications:
 - a. Wash the stills after use with petroleum solvent, rinse twice with 1,1,1-trichloroethane or similar solvent, and allow to dry thoroughly before reuse.
 - b. Drop the ring burner to the bottom of the still when temperature reaches 170°C.
 - c. The rate of distillation will affect the consistency of the final residue. Total distillation time including conditioning at 205°C, shall be 60 ± 5 minutes. Maintain the final temperature at $205 \pm 5^\circ\text{C}$ accurately for 30 minutes. This 30 minute period shall commence when the residue temperature reaches 200°C.
 - d. At the termination of the distillation process weigh the still and place it on the hot plate while you take off the cover. Stir the contents in the still with a preheated spatula for 10 seconds (about 30 times).
 - e. Pour the residue into the preheated 89 ml (3 oz.) penetration container until it is approximately half full. Pour residue into a preheated 50 ml beaker with a pouring spout and set aside as required for viscosity, float, elastic recovery and solubility/ash content tests. Pour remaining residue into the penetration container. Do not pour

residual asphalt through a sieve. (Note: These containers shall be preheated on a hot plate set so that its surface temperature is $205 \pm 10^{\circ}\text{C}$. Since Polymer High Float residue is poured at lower temperatures than regular High Float residue, it is advisable to pour into the Float Thimble as soon as possible to prevent any jelling structure development in the beaker.)

- f. Use a preheated spatula or utility knife to cut off polymer-asphalt strings between pouring.
 - g. Residue in the still should be poured within 2 minutes from the termination of the burner to prevent the oil vapour from re-condensing into the residual asphalt.
 - h. All residues shall be conditioned and tested as required immediately after distillation. Cooling and re-heating at a later time for testing is not permitted.
- The residual content was reported to the nearest 0.1 %.
3. Oil Portion of Distillate, (% by volume)
 - The oil portion of the distillate was calculated as a percentage of the emulsion as follows:
$$\% \text{ oil} = \frac{\text{Total volume of oil distillate, ml}}{200 \text{ g emulsion}} \times 100$$
 - This value was reported to the nearest 0.1 % as the "Oil Portion of Distillate, vol./wt%".
 4. Demulsibility, 50 ml, 5.55 g/l CaCl_2 , (% by mass)
 - Labs were to follow ASTM D244 and verify the calcium chloride solution concentration according to one of the methods outlined in ASTM D511.
 5. Sieve Test
 - Labs were to follow ASTM D244 except that a 1000 μm sieve was used instead of the 850 μm sieve specified. Note: The requirements for such a sieve are specified in CAN/CGSB-8.2-M88.

5.2 Tests on Polymer Modified Emulsion Residue

The following tests were performed on the polymer modified emulsion residue:

1. Penetration at 25°C , 100 g, 5 seconds, (dmm)
 - In addition to test procedures given in ASTM D244 and in the National Standard of Canada, CAN2-16.5-M84 clause 6.2.4 Penetration, the following procedure was used to prepare the distillation residue for penetration testing:
 - a. Pour the residue into the penetration can as described in clause 6.2.4.2 of CAN2-16.5-M84.
 - b. Immediately remove the pen can from the hot plate after pouring of the sample. Place the pen can on a 20mm thick plywood base covered with a paper towel. Note that the piece of plywood should be large enough to ensure full contact with the inverted glass beaker.
 - c. Cover the pen can with a 600 ml low-form glass beaker. As specified in clause 6.2.4.2 of CAN2-16.5-M84, let the sample sit 1 1/2 hours at room temperature and 1 1/2 hours in the temperature bath (25°C exactly) before running the penetration test.
 - d. Distilled water should be used in the temperature bath for conditioning sample.

- e. Report to nearest whole unit the average of three penetrations whose values do not differ by more than the following:

If first reading is between:	Maximum difference between Highest and lowest reading:
101 - 150	20
151 - 200	25
201 - 250	30
251 - 300	35

- If, after five penetrations of an individual residue sample, three acceptable values were not obtained, then a second residue should have been prepared from the same emulsion sample.
 - The intent was to standardise the procedure for residue conditioning in air. The described procedure reduced the effects of variable heat loss due to air conditioning, drafts, and varying types of counter tops.
2. Apparent Viscosity at 60°C, (Pa·s)
- The same viscosity tube was used for all tests.
 - Labs were to follow ASTM D4957 with the following modification:
 - a. All viscosity testing shall be conducted at 60°C under a 30 cm Hg vacuum. Viscosity determinations with Modified Koppers shall be reported at the shear rate of 0.5 s⁻¹.
 - b. If the residues rise into the B zone of Modified Koppers tubes prior to applying the vacuum, use only the C, D, E and F zone flow times for viscosity and shear rate determinations.
 - c. Flow time in the C zone should be within 50 and 200 seconds.
 - d. Cooling of residues to ambient temperature and re-heating for testing at a later time is not permitted.
 - e. Modified Koppers mK150 or mK 200 is the recommended tube size.
3. Float Test
- Labs were to follow ASTM D139 with the following modifications from CAN2-16.5-M84 Clause 6.2.6:
 - a. Pour the sample immediately after completion of distillation into a suitable container. The container shall be preheated and maintained after filling on a 205 ± 10°C hot plate. The temperature of the hot plate can be confirmed with a suitable bi-metallic surface thermometer. As soon as possible, pour the residue into the float collar. (Note: cooling of residue and re-heating for testing at a later time is not permitted.)
 - b. If desired, the pouring temperature can be confirmed by the use of a 30 gauge thermocouple probe and suitable recording device as follows:
 - Position the probe into the top centre of the thimble, from above. Record the maximum temperature measured while the bitumen is being poured into the thimble.

- c. Allow the residue to cool to room temperature for 30 ± 2 minutes.
 - d. Place the plate and thimble in the ice bath for 5 minutes.
 - e. Trim the material flush to the top of the thimble with a slightly heated spatula.
 - f. Place the charged collar in the ice bath for a period of 30 ± 2 minutes.
 - g. Maintain the test bath at $60 \pm 0.5^{\circ}\text{C}$
 - Note: Upon cooling, soft residues may have shrunk well below the top of collar. If the collars were "topped" up, the additional residue should have been poured at approximately 205°C . This practice should have been reported.
4. Solubility Test
- Labs were to follow ASTM D2042.
5. Ash Content Test
- Labs were to follow ASTM D2415.
6. Elastic Recovery Test
- Labs were to follow ASTM D113 with the following modification:
 - a. Keep specimen at 10°C for 85 - 95 minutes. Immediately after conditioning, place the specimen in the ductilometer and proceed to elongate the sample to 20 cm. The rate of pull shall be 5 cm/minute. After the 20 cm elongation has been reached, stop the ductilometer and hold the sample in its elongated position for 5 minutes.
 - b. At this time, clip the sample approximately in half by means of preconditioned scissors or other suitable cutting devices. Let the sample remain in the ductilometer in an undisturbed condition for one (1) hour. At the end of this time period, retract the half sample specimen until the two broken ends touch. Record the elongation in cm.
 - c. Calculate percent recovery by the following formula:

$$\% \text{ Recovery} = \frac{20 - x}{20} \times 100$$
 Where: x = observed elongation after rejoining of sample, cm.
 - d. Report the Elastic Recovery to the nearest 0.1 %.

6. SHRP BINDER

The SHRP Binder testing was done on three replicate samples of PG 58-28 performance grade asphalt binder. The replicate samples were prepared and shipped by Imperial Oil of Sarnia, Ontario.

All of the specified tests were performed on each replicate sample according to the AASHTO (American Association of State Highway and Transportation Officials) or ASTM Standard Method indicated. The results reported were to be the result of a single determination, not the average of two or more (except in cases where an average was called for in the test procedure). The same operator should have performed each individual test. However, it was not necessary that the same operator did every single test.

6.1 Tests on Original Binder

The following tests were performed on the original binder:

1. Rotational Viscosity - ASTM D4402
 - Determine the viscosity at 135°C using the rotational viscosity apparatus. Report the viscosity to the nearest 0.01 Pa·s.
2. Dynamic Shear Rheometer (DSR) - AASHTO T315
 - Determine the complex shear modulus (G^*) and the phase angle (δ) at 58°C and at 64°C, using a frequency of 10 rad/s, a 25 mm plate, a 1mm gap and the strain or stress values specified in the method. Report G^* to the nearest 0.01 kPa, δ to the nearest 0.1 degree and $G^*/\sin(\delta)$ to the nearest 0.01 kPa. Also report the testing mode (constant stress or constant strain), the actual stress or strain level used, the test temperature, the DSR manufacturer and model number.

6.2 Tests on TFOT or RTFOT Residue

The following tests were performed on the binder aged by the Thin Film or Rolling Thin Film Oven:

1. Thin-Film Oven Test AASHTO T179 or ASTM D1754: Change in Mass OR Rolling Thin-Film Oven Test AASHTO T240 or ASTM D2872: Change in Mass
 - Weigh the sample and containers to the nearest milligram. Report to the nearest 0.001 percent of the average change in mass of the material in all of the containers if the Thin-Film Oven is used, but only two of the containers if the Rolling Thin-Film Oven is used. Also check the appropriate boxes to indicate the oven used and a mass gain or loss.
2. Dynamic Shear Rheometer (DSR), AASHTO T315
 - Determine the complex shear modulus (G^*) and the phase angle (δ) at 58°C and 64°C, using a frequency of 10 rad/s, a 25 mm plate, a 1 mm gap and the strain or stress values specified in the method. Report G^* to the nearest 0.01 kPa, δ to the nearest 0.1 degree and $G^*/\sin(\delta)$ to the nearest 0.01 kPa.

6.3 Tests on Pressure Aging Vessel (PAV) Residue

The following tests were performed on the binder aged by the Pressure Aging Vessel:

1. Accelerated Aging of Asphalt Binder Using a Pressure Aging Vessel (PAV), AASHTO R28
 - Age the asphalt binder at a temperature of 100°C using the pressure aging vessel.
2. Dynamic Shear Rheometer (DSR), AASHTO T315
 - Determine the complex shear modulus (G^*) and the phase angle (δ) at 19°C and 16°C, using a frequency of 10 rad/s, an 8 mm plate, a 2 mm gap, and the strain or stress values specified in the method. Report G^* to the nearest kPa, δ to the nearest 0.1 degree and $G^* \times \sin(\delta)$ to the nearest kPa.
3. Bending Beam Rheometer (BBR), AASHTO T313
 - Determine the flexural creep stiffness at -18°C and -24°C. Report the creep stiffness after 60 s in MPa to three significant figures. Report the slope (m) to the nearest 0.001.
4. Direct Tension (DT), AASHTO T314

- Determine the failure stress and failure strain at a temperature of -18°C and -24°C and a strain rate of 1 mm/min. Report the failure stress to the nearest 0.01 MPa and the failure strain to the nearest 0.01 percent.

7.0 SUMMARY OF TEST RESULTS

The 2008 asphalt exchange test results were analysed using ASTM test procedure E691-92, Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method. A summary of the results for the Asphalt Cement, Cutback Asphalt, Emulsified Asphalt, Polymer Emulsified Asphalt, and SHRP Binder testing is presented in Tables A1-A5.

The average of the test values along with the repeatability standard deviation, s_r , and reproducibility standard deviation, s_R , is provided for each test procedure. For example, in Table A1 for the Penetration @ 25°C, 100 g, 5 seconds, the average value reported by all of the laboratories was 169. The repeatability standard deviation, s_r , was 2.8 and reproducibility standard deviation, s_R , was 6.95.

The 95 % confidence limit for repeatability is computed with the following equation:

$$95 \% \text{ Repeatability Confidence Limit} = 1.96 \times \sqrt{2} \times s_r$$

The 95 % confidence limit for repeatability means that approximately 95 % of all pairs of test results on a given material from within a laboratory could be expected to differ in absolute value by $1.96 \times \sqrt{2} \times s_r$.

For example, the 95 % Repeatability Confidence Limit in Table A1 for Penetration @ 25 °C, 100 g, 5 seconds was computed to be $1.96 \times \sqrt{2} \times 2.8 = 7.8$. This means that approximately 95 % of all pairs of test results on a given material from within a laboratory could be expected to differ in absolute value by 7.8. In other words, two test results from the same lab on the same material would be considered suspect if they differed in absolute value by more than 7.8.

The 95 % confidence limit for reproducibility is computed with the following equation:

$$95 \% \text{ Reproducibility Confidence Limit} = 1.96 \times \sqrt{2} \times s_R$$

The 95 % confidence limit for reproducibility means that approximately 95 % of all pairs of test results on a given material from between laboratories could be expected to differ in absolute value by $1.96 \times \sqrt{2} \times s_R$.

For example, the 95 % Reproducibility Confidence Limit in Table A1 for Penetration @ 25 °C, 100 g, 5 seconds was computed to be $1.96 \times \sqrt{2} \times 6.95 = 19.2$. This means that approximately 95 % of all pairs of test results on a given material from between two laboratories could be expected to differ in absolute value by 19.2. Two test results from different labs on the same material would be considered suspect if they differed in absolute value by more than 19.2.

Tables A1-A5 also indicate which labs have between laboratory consistency statistics (h consistency statistic) that exceed (Labs Out h -stat) or are close (Labs Close h -stat) to the critical between laboratory consistency statistic, h_{crit} . These tables also show the laboratories that have within laboratory consistency statistics (k consistency statistic) that exceed (Labs Out k -stat) or are close (Labs Close k -stat) to the critical within laboratory consistency statistic, k_{crit} .

If a lab has a between laboratory consistency statistic (h consistency statistic) that exceeds the critical between laboratory consistency statistic, h_{crit} , then its average test result is significantly different from the average obtained by the other laboratories. It may have difficulty correlating to other laboratories and should investigate its testing equipment and procedures.

If a lab has a between laboratory consistency statistic (h consistency statistic) that was close to the critical between laboratory consistency statistic, h_{crit} , then its average test result is not significantly different from the average obtained by the other laboratories. However, the lab may want to consider taking precautions to ensure that there are not any problems with its testing procedures and equipment.

If a lab has a within laboratory consistency statistic (k consistency statistic) that exceeds the critical within laboratory consistency statistic, k_{crit} , then its within laboratory standard deviation is significantly different from that obtained by all of the laboratories combined. The laboratory is having problems repeating test results in its own laboratory and should investigate its testing procedures and equipment.

If a lab has a within laboratory consistency statistic (k consistency statistic) that was close to the critical within laboratory consistency statistic, k_{crit} , then its within laboratory standard deviation is not significantly different from that obtained by all of the laboratories combined. However, the lab may want to consider taking precautions to ensure that there are not any problems with its testing procedures and equipment.

Using Specific Gravity from Table A1 as an example, Lab 7 had a between laboratory consistency statistic (h consistency statistic) that exceeded the critical consistency statistic, h_{crit} . This indicates that this laboratory's average test result is significantly different from the average obtained by the other laboratories. It may have difficulty correlating to other laboratories and should investigate its testing equipment and procedures.

From Table A5 for Rotational Viscosity @ 135°C, Lab 2 had a within laboratory consistency statistic (k consistency statistic) that exceeded the critical consistency statistic, k_{crit} . Its within laboratory standard deviation is significantly different from that obtained by all of the laboratories combined. This laboratory is having problems repeating test results in its own laboratory and should investigate its testing procedures and equipment.

8. ADDITIONAL ASPHALT EXCHANGE INFORMATION

The test results are summarised in Tables A1-A5. A list of participating laboratories is shown in Appendix C. The order of the participating laboratories shown in Appendix C does not relate to the listing of test results by laboratory number shown in Tables A1-A5.

The definitions and formulae for the statistical equations used in the analysis of the test results are included in Appendix B. Additional elaboration on the statistical analysis can be found in ASTM E691-92 Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method.

The entire report is available for viewing and/or printing from the following Saskatchewan Ministry of Highways and Infrastructure web site:

<http://www.highways.gov.sk.ca/camp/>

9. CONTACTING THE AUTHOR

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Appendix A

2008 CAEP-SUMMARY OF RESULTS

Table A1: Asphalt Cement Testing 2008 Summary

Asphalt Cement 2008														
Test	1		2		3		4		5		Labs Out		Labs Close	
	Average	S _x	S _r	S _R	2.77S _r	2.77S _R	h-stat	k-stat	h-stat	k-stat	h-stat	k-stat	h-stat	k-stat
101 - Penetration @ 25°C, 100g, 5s (dmm)	169	6.6	2.8	6.95	7.8	19.2								
102 - Penetration @ 4°C, 100g, 5s (dmm)	25	19	2.6	19	7.3	54	17	17						
103 - Solubility in Trichloroethylene (%)	99.98	0.014	0.025	0.025	0.069	0.069		11						
104 - Specific Gravity 25/25°C	1.028	0.0029	0.0016	0.0032	0.004	0.009	7							
105 - Kinematic Viscosity @ 135°C (mm ² /s)	249	20	27.5	30	76	84		4	19					
106 - Absolute Viscosity @ 60°C (Pa•s)	75.3	3.0	2.6	3.7	7	10.1		11						
107 - TFO Loss on Heating (%)	0.177	0.02	0.026	0.03	0.071	0.09			19					
108 - TFO Penetration of Residue @ 25°C, 100g, 5s (dmm)	95	3.0	2.5	3.6	7	10								
109 - TFO Penetration of Residue @ 4°C, 100g, 5s (dmm)	19	16.7	1.88	16.7	5.2	46	11							
110 - TFO Percent of Original Penetration (%)	55	1.8	1.0	2.0	2.8	5.6		11						
111 - TFO Kinematic Viscosity of Residue (mm ² /s)	371	19	10.0	21	28	58		4	19					
112 - TFO Absolute Viscosity of Residue (Pa•s)	187.3	12	7	14	19	38		11						
113 - RTFO Loss on Heating (%)	0.235	0.041	0.026	0.046	0.071	0.127								
114 - RTFO Penetration of Residue @ 25°C, 100g, 5s (dmm)	92	4.5	1.47	4.7	4.1	13.0								
115 - RTFO Penetration of Residue @ 4°C, 100g, 5s (dmm)	16	11.7	2.8	11.9	7.7	32.9		14	11					
116 - RTFO Percent of Original Penetration (%)	46	19.1	1.0	19.1	2.9	52.9	14							
117 - RTFO Kinematic Viscosity of Residue (mm ² /s)	378	18	5.0	19	13.9	51.6								
118 - RTFO Absolute Viscosity of Residue (Pa•s)	207.2	23	5.5	24	15.3	65.3			6					

Legend

- 1 Standard Deviation
- 2 Repeatability Standard Deviation
- 3 Reproducibility Standard Deviation
- 4 95% Confidence Limits for Repeatability (k-stat)
- 5 95% Confidence Limits for Reproducibility (h-stat)

TFO = Thin Film Oven
RTFO = Rolling Thin Film Oven

Table A2: Cutback Asphalt Testing 2008 Summary

Cutback Asphalt 2008										
Test	1	2	3	4	5	Labs Out		Labs Close		
	Average	S _x	S _r	S _R	2.77S _r	2.77S _R	h-stat	k-stat	h-stat	k-stat
201 - Kinematic Viscosity @ 60°C (mm ² /s)	266	14	7	15	20.1	42.8		11		
202 - Flash Point, Tag (°C)	77	10.9	2.2	11.0	6.0	30.5		11		
203 - Specific Gravity @ 15.6°C	0.970	0.0052	0.0017	0.0054	0.0	0.0	4	11		
204 - Volume of Distillate to 190°C (mL)	0.0	0.0000	0.0000	0.0000	0.0	0.0				
205 - Volume of Distillate to 225°C (mL)	0.4	0.6	0.31	0.7	0.9	1.8	8			
206 - Volume of Distillate to 260°C (mL)	16.4	4.4	1.6	4.6	4.3	12.6	11			8
207 - Volume of Distillate to 316°C (mL)	43.9	3.3	0.8	3.3	2.2	9.3			11	
208 - Volume of Distillate to 360°C (mL)	57.0	2.3	0.9	2.4	2.5	6.7			11	
209 - Percent by Volume of Total Distillate to 360°C to 190°C (%)	0.0	0.0000	0.0000	0.0000	0.0	0.0				
210 - Percent by Volume of Total Distillate to 360°C to 225°C (%)	0.3	0	0.39	1	1.1	1.5		15		
211 - Percent by Volume of Total Distillate to 360°C to 260°C (%)	25.0	9	1.9	9	5.2	25.4				
212 - Percent by Volume of Total Distillate to 360°C to 316°C (%)	68.8	19.9	0.94	19.9	2.6	55.2	8	11		
213 - Percent by Volume of Total Distillate to 360°C to 360°C (%)	89.9	26.8	0.20	26.8	0.6	74.1	8	8		
214 - Residue % by Volume of Original Sample to 360°C (%)	71.1	1.3	0.45	1.4	1.3	3.9			11	
215 - Penetration of Residue @ 25°C, 100g, 5s (dmm)	179	43	7	44	18.0	120.6		4		

Legend
1 Standard Deviation
2 Repeatability Standard Deviation
3 Reproducibility Standard Deviation
4 95% Confidence Limits for Repeatability (k-stat)
5 95% Confidence Limits for Reproducibility (h-stat)

Table A3: Emulsified Asphalt Testing 2008 Summary

Emulsified Asphalt 2008														
Test	1		2		3		4		5		Labs Out		Labs Close	
	Average	S _x	S _r	S _R	2.77S _r	2.77S _R	h-stat	k-stat	h-stat	k-stat	h-stat	k-stat	h-stat	k-stat
301 - Saybolt-Furol Viscosity @ 50°C (s)	43.6	12	13.4	16	37.1	44.1		18						
302 - Residue by Distillation (% by mass)	63.1	1.96	2.76	3.0	7.7	8.3		4	4					
303 - Total Distillation Time (minutes)	60	4.5	4.0	5.5	11.0	15.3	7	7						
304 - Oil Portion of Distillate (% by Volume of Emulsion)	0.9	0.31	0.13	0.33	0.4	0.9		8	8					
305 - Demulsibility, 50 mL, 5.55 g/CaCl ₂ (% by Mass)	95.1	3.8	4.2	5.2	11.7	14.3		18						
306 - Penetration of Residue @ 25°C, 100g, 5s (dmm)	1887	15	7.3	16	20.2	43.6		4						
307 - Residue Conditioning Time in Air (minutes)	90	0.0	0.00	0.0	0.0	0.0								
308 - Residue Conditioning Time in Water Bath (minutes)	90	0.0	0.00	0.0	0.0	0.0								
309 - Apparent Viscosity @ 60°C (Pa•s)	230	61	20	63	55.6	175.5								

Legend
1 Standard Deviation
2 Repeatability Standard Deviation
3 Reproducibility Standard Deviation
4 95% Confidence Limits for Repeatability (k-stat)
5 95% Confidence Limits for Reproducibility (h-stat)

Table A4: Polymer Modified Emulsion Testing 2008 Summary

Polymer Modified Emulsified Asphalt 2008														
Test	1		2		3		4		5		Labs Out		Labs Close	
	Average	S _x	S _r	S _R	2.77S _r	2.77S _R	h-stat	k-stat	h-stat	k-stat	h-stat	k-stat	h-stat	k-stat
301P - Saybolt-Furol Viscosity @ 50°C (s)	67.4	8	4	8	12.1	23.2								18
302P - Residue by Distillation (% by mass)	66.3	0.36	0.43	0.50	1.2	1.4		4						
303P - Total Distillation Time (minutes)	61	2.8	1.6	3.1	4.4	8.7		19						
304P - Oil Portion of Distillate (% by Volume of Emulsion)	1.0	0.37	0.20	0.41	0.5	1.1								
305P - Demulsibility, 50 mL, 5.55 g/CaCl ₂ (% by Mass)	96.3	3.9	1.2	4.0	3.4	11.1								
306P - Penetration of Residue @ 25°C, 100g, 5s (dmm)	170	10	4	11	9.9	30.0								4
307P - Residue Conditioning Time in Air (minutes)	90.0	0.0	0.0	0.0	0.0	0.0								
308P - Residue Conditioning Time in Water Bath (minutes)	90.0	0.0	0.0	0.0	0.0	0.0								
309P - Apparent Viscosity @ 60°C (Pa•s)	237	96	92	122	255.7	337.6	4	4						
310p - Sieve Test	0.03	0.0306	0.0049	0.0309	0.0	0.1		19	19					
311P - Float Test (s)	1200	0	0	0	0.0	0.0								
312P - Solubility in Trichloroethylene (%)	99.6		0.439		1.2	0.0								
313P - Ash Content	0.55	0.13	0.00	0.13	0.0	0.4								
314P - Elastic Recovery (%)	69	7.2	1.2	7.3	3.4	20.1								

Legend
1 Standard Deviation
2 Repeatability Standard Deviation
3 Reproducibility Standard Deviation
4 95% Confidence Limits for Repeatability (k-stat)
5 95% Confidence Limits for Reproducibility (h-stat)

Table A5: SHRP Binder Testing 2008 Summary

SHRP Binder Testing 2008														
Test	1		2		3		4		5		Labs Out		Labs Close	
	Average	S _x	S _r	S _R	2.77S _x	2.77S _R	h-stat	k-stat	h-stat	k-stat	h-stat	k-stat		
401 - Rotational Viscosity @ 135°C (Pa·s)	0.30	0.024	0.0082	0.025	0.0	0.1	1	2						
402 - DSR 58°C, 25mm Plate, 1mm Gap, Complex Shear Modulus, G* (kPa)	1.39	0.18	0.030	0.18	0.1	0.5	1							
403 - DSR 58°C, 25mm Plate, 1mm Gap, Phase Angle (°)	86.5	0.7	0.19	0.7	0.5	2.0	15	15						
404 - DSR 58°C, 25mm Plate, 1mm Gap, G*/Sin δ (kPa)	1.39	0.18	0.031	0.18	0.1	0.5	1							
405 - DSR 64°C, 25mm Plate, 1mm Gap, Complex Shear Modulus, G* (kPa)	0.65	0.081	0.023	0.084	0.1	0.2	1							
406 - DSR 64°C, 25mm Plate, 1mm Gap, Phase Angle (°)	87.7	0.8	0.24	0.9	0.7	2.4	15	15						
407 - DSR 64°C, 25mm Plate, 1mm Gap, G*/Sin δ (kPa)	0.65	0.082	0.023	0.084	0.1	0.2	1							
408 - TFO/RTFO Change in Mass (%)	0.271	0.068	0.039	0.075	0.1	0.2		19						
409 - TFO/RTFO DSR 58°C, 25mm, 1mm Gap, Complex Shear Modulus G* (kPa)	3.54	0.51	0.13	0.52	0.4	1.4	1							
410 - TFO/RTFO DSR 58°C, 25mm, 1mm Gap, Phase Angle (°)	82.5	0.6	0.3	0.6	0.7	1.7	1							
411 - TFO/RTFO DSR 58°C, 25mm, 1mm Gap, G*/Sin δ (kPa)	3.57	0.51	0.13	0.52	0.4	1.5	1							
412 - TFO/RTFO DSR 64°C, 25mm, 1mm Gap, Complex Shear Modulus G* (kPa)	1.61	0.22	0.064	0.23	0.2	0.6	1							
413 - TFO/RTFO DSR 64°C, 25mm, 1mm Gap, Phase Angle (°)	84.6	0.5	0.21	0.6	0.6	1.6	1	15						
414 - TFO/RTFO DSR 64°C, 25mm, 1mm Gap, G*/Sin δ (kPa)	1.61	0.22	0.065	0.23	0.2	0.6	1							
415 - PAV @ 100°C DSR 19°C, 8mm Plate, 2mm Gap, Complex Shear Modulus G* (kPa)	4494	753	488	852	1353.1	2359.2								
416 - PAV @ 100°C DSR 19°C, 8mm Plate, 2mm Gap, Phase Angle (°)	48.7	1.3	0.61	1.4	1.7	4.0								
417 - PAV @ 100°C DSR 19°C, 8mm Plate, 2mm Gap, G*xSin δ (kPa)	3549	550	338	615	937.0	1704.4								
418 - PAV @ 100°C DSR 16°C, 8mm Plate, 2mm Gap, Complex Shear Modulus G* (kPa)	6981	1112	484	1180	1341.0	3268.0								
419 - PAV @ 100°C DSR 16°C, 8mm Plate, 2mm Gap, Phase Angle (°)	46.0	1.4	0.50	1.5	1.4	4.0								
420 - PAV @ 100°C DSR 16°C, 8mm Plate, 2mm Gap, G*xSin δ (kPa)	5328	775	335	822	929.3	2277.3								
421 - BBR Creep Stiffness @ -18°C, 60s (MPa)	190	28	5.6	28	15.6	77.3	1							
422 - BBR Slope, m, @ -18°C, 60s	0.349	0.017	0.0050	0.018	0.0	0.0								
423 - BBR Creep Stiffness @ -24°C, 60s	421	49	11	50	31.8	137.2	1							
424 - BBR Slope, m, @ -24°C, 60s	0.282	0.017	0.0062	0.018	0.0	0.0	1	11						
425 - DT Failure Stress @ -18°C, 1mm/min (MPa)	4.01	0.39	0.52	0.58	1.5	1.6				19				
426 - DT Failure Strain @ -18°C, 1mm/min (%)	1.49	0.4	0.20	0.4	0.5	1.1								
427 - DT Failure Stress @ -24°C, 1mm/min (MPa)	3.80	0.87	0.85	1.11	2.4	3.1				12				
428 - DT Failure Strain @ -24°C, 1mm/min (%)	0.57	0.17	0.160	0.21	0.4	0.6				12				

Legend

- 1 Standard Deviation
- 2 Repeatability Standard Deviation
- 3 Reproducibility Standard Deviation
- 4 95% Confidence Limits for Repeatability (k-stat)
- 5 95% Confidence Limits for Reproducibility (h-stat)

- (R)TFO = (Rolling) Thin Film Oven
- PAV = Pressure Aging Vessel
- DSR = Dynamic Shear Rheometer
- BBR = Bending Beam Rheometer
- DT = Direct Tension

Appendix B
Formulas Used in Calculating Precision Tests

Appendix B

Formulas Used in Calculating Precision Tests (ASTM E691-92)

x = Individual test result

n = Number of test results per lab/cell

p = Number of laboratories

$$x_{\text{ave}} = \bar{x} = \text{Lab/cell Average} = \frac{\sum^n x}{n}$$

$$(x_{\text{ave}})_{\text{ave}} = x_a = \text{Average of lab/cell averages} = \frac{\sum^p \bar{x}}{p}$$

$$s = \text{Lab/cell standard deviation} = \sqrt{\frac{\sum^n (x - \bar{x})^2}{n - 1}}$$

$$d = \text{Lab/cell deviation} = \bar{x} - x_a$$

$$s_{X_{\text{ave}}} = \text{Standard deviation of lab/cell averages} = \sqrt{\frac{\sum^p d^2}{p - 1}}$$

$$s_r = \text{Repeatability standard deviation} = \sqrt{\frac{\sum^p s^2}{p}}$$

s_R = Reproducibility standard Deviation

$$= \text{the larger of } s_r \text{ and } \sqrt{(s_{X_{\text{ave}}})^2 + (s_r)^2 \times \frac{(n-1)}{n}}$$

$$h = \text{The between-laboratory consistency statistic} = \frac{d}{s_{X_{\text{ave}}}}$$

$$k = \text{The within-laboratory consistency statistic} = \frac{s}{s_r}$$

Reference: ASTM E691 Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method.

Appendix C
2008 CAEP-Participating Laboratories

Table C1: Participating Laboratories

- Ambertec Ltd.
Macklin, Saskatchewan
(EP)
- EBA Engineering Consultants Ltd.
Calgary, Alberta
(A)
- Husky Oil Operations Ltd.
Lloydminster, Alberta
(S)
- Imperial Oil
Sarnia Ontario
(ASC)
- John Emery Geotechnical Eng. Ltd.
Toronto, Ontario
(ASCEP)
- Golder Associates
Whitby, Ontario
(SCE)
- Ontario Ministry of Transportation
Downsview, Ontario
(ASCEP)
- Saskatchewan Ministry of Highways &
Infrastructure
Regina, Saskatchewan
(ACEP)
- DBA Engineering Ltd
Markham, Ontario
(ASE)
- Government of Yukon
Whitehorse, Yukon
(CE)
- Imperial Oil
Edmonton, Alberta
(A)
- Intertek Caleb Brett
Saint Johns, New Brunswick
(S)
- Manitoba Infrastructure & Transportation
Winnipeg, Manitoba
(ASEP)
- Ministère des Transports du Québec
St-Foy, Québec
(S)
- Pounder Emulsions
Saskatoon, Saskatchewan
(ACEP)
- Construction Testing Asphalt Lab Ltd.
Oakville, Ontario
(S)

Legend:

A- Asphalt Testing

S-Sharp Binder Testing

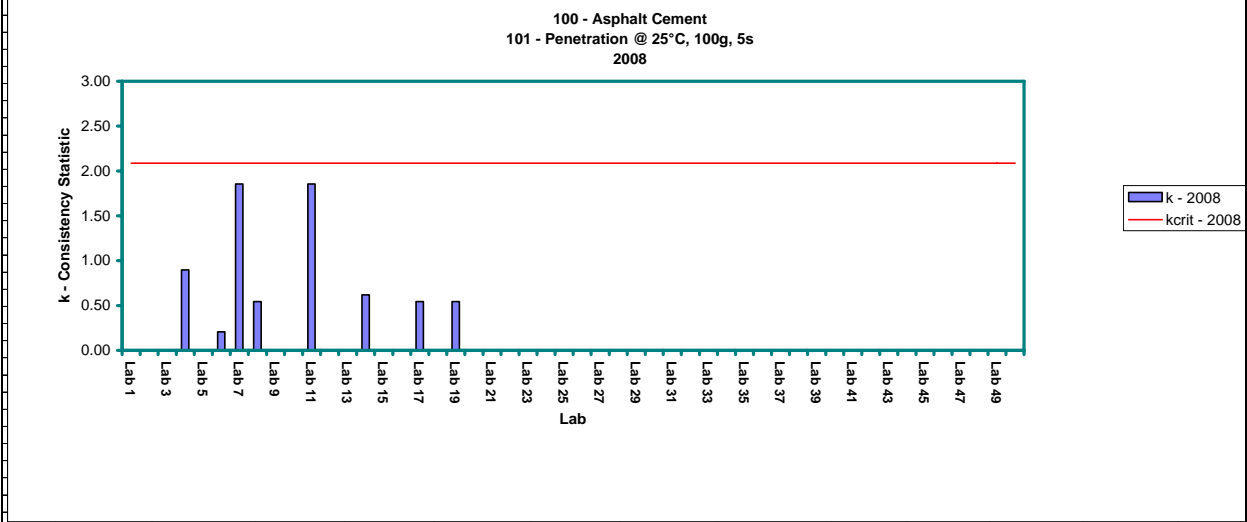
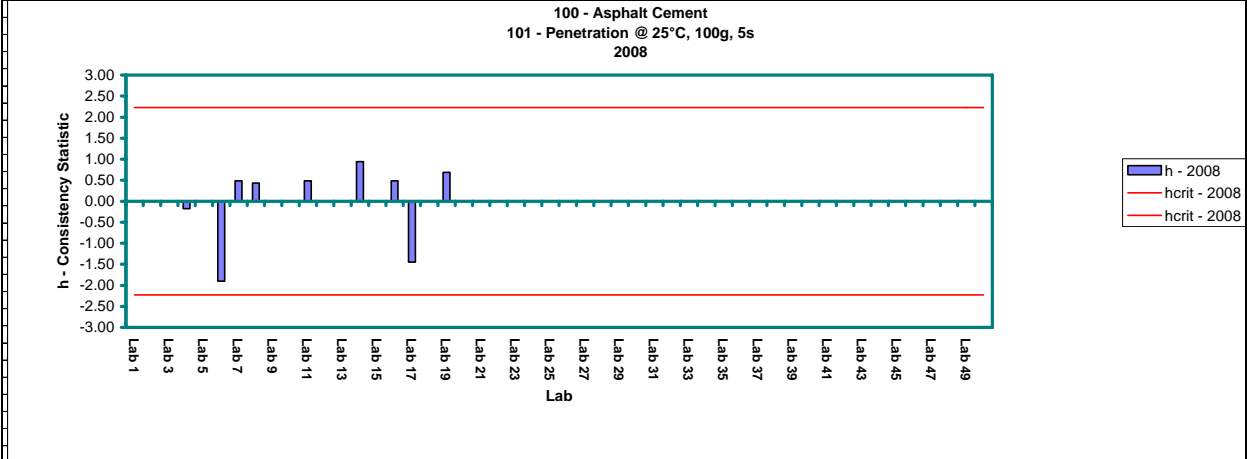
C-Cutback Asphalt Testing

E-Emulsion Asphalt Testing

P-Polymer Asphalt Testing

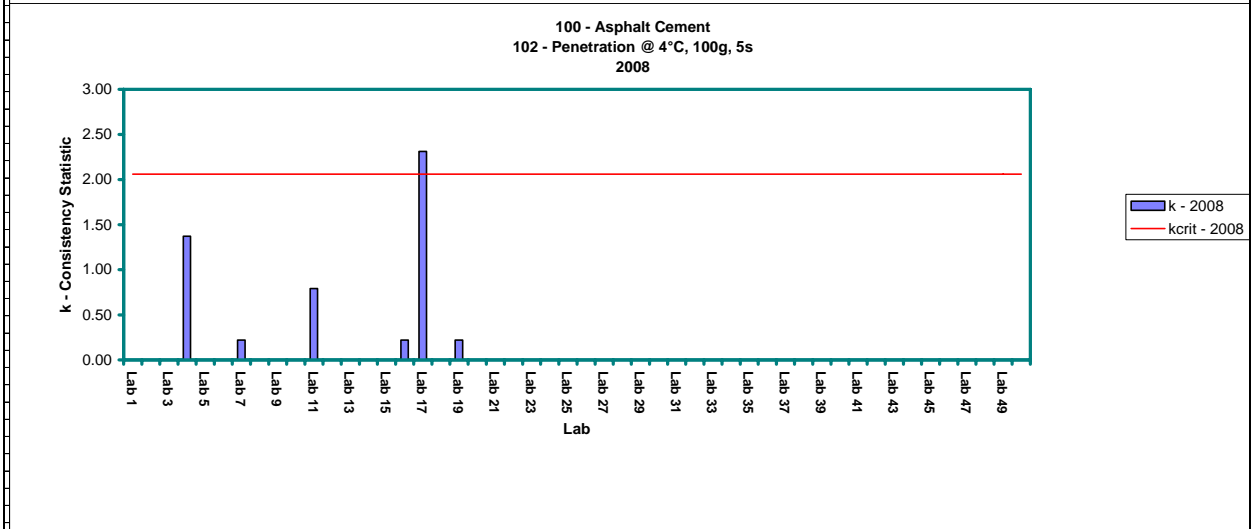
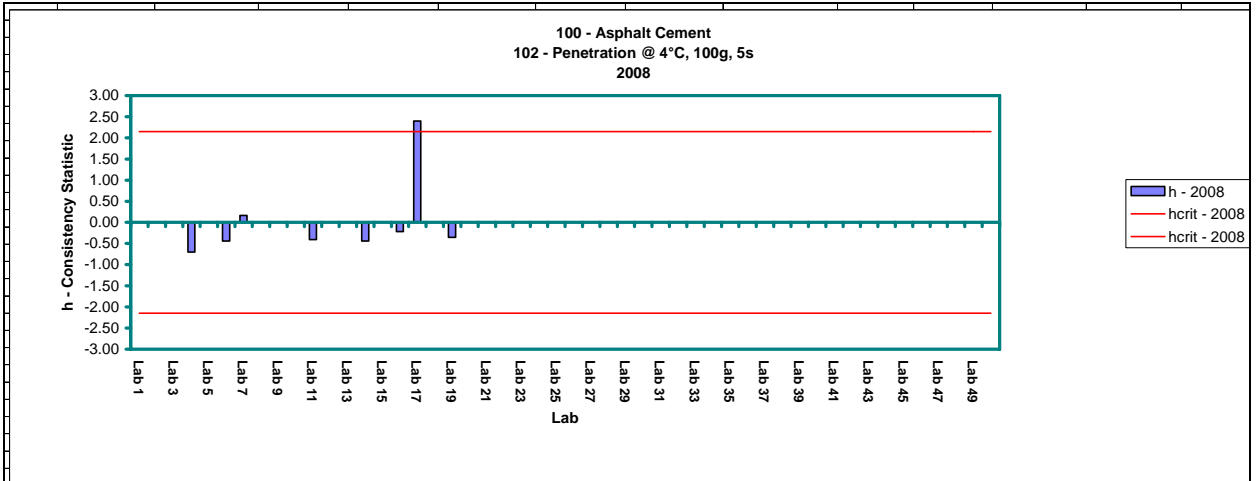
**APPENDIX D
TEST RESULTS
2008 CAEP**

100 - Asphalt Cement 101 - Penetration @ 25°C, 100g, 5s 2008													
Data				n = 3	(X _{ave}) _{ave} = 168.8148	S _r = 2.8021	Check S _{Xave} = 6.5598						
				p = 9	S _{Xave} = 6.5598	S _R = 6.9473	r = 2.8 S _r = 7.7671						
				Significance Level = 0.5%		S _R = 6.9473	R = 2.8 S _R = 19.2570						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.23	-2.23	2.09
Lab 2											2.23	-2.23	2.09
Lab 3											2.23	-2.23	2.09
Lab 4	168.0000	165.0000	170.0000		167.6667	2.5166	-1.1481	6.3333	-0.18	0.90	2.23	-2.23	2.09
Lab 5											2.23	-2.23	2.09
Lab 6	156.0000	156.0000	157.0000		156.3333	0.5774	-12.4815	0.3333	-1.90	0.21	2.23	-2.23	2.09
Lab 7	169.0000	169.0000	178.0000		172.0000	5.1962	3.1852	27.0000	0.49	1.85	2.23	-2.23	2.09
Lab 8	173.0000	170.0000	172.0000		171.6667	1.5275	2.8519	2.3333	0.43	0.55	2.23	-2.23	2.09
Lab 9											2.23	-2.23	2.09
Lab 10											2.23	-2.23	2.09
Lab 11	178.0000	169.0000	169.0000		172.0000	5.1962	3.1852	27.0000	0.49	1.85	2.23	-2.23	2.09
Lab 12											2.23	-2.23	2.09
Lab 13											2.23	-2.23	2.09
Lab 14	177.0000	174.0000	174.0000		175.0000	1.7321	6.1852	3.0000	0.94	0.62	2.23	-2.23	2.09
Lab 15											2.23	-2.23	2.09
Lab 16	172.0000	172.0000	172.0000		172.0000	0.0000	3.1852	0.0000	0.49	0.00	2.23	-2.23	2.09
Lab 17	161.0000	159.0000	158.0000		159.3333	1.5275	-9.4815	2.3333	-1.45	0.55	2.23	-2.23	2.09
Lab 18											2.23	-2.23	2.09
Lab 19	172.0000	175.0000	173.0000		173.3333	1.5275	4.5185	2.3333	0.69	0.55	2.23	-2.23	2.09
Lab 20											2.23	-2.23	2.09
Lab 21											2.23	-2.23	2.09
Lab 22											2.23	-2.23	2.09
Lab 23											2.23	-2.23	2.09
Lab 24											2.23	-2.23	2.09
Lab 25											2.23	-2.23	2.09
Lab 26											2.23	-2.23	2.09
Lab 27											2.23	-2.23	2.09
Lab 28											2.23	-2.23	2.09
Lab 29											2.23	-2.23	2.09
Lab 30											2.23	-2.23	2.09
Lab 31											2.23	-2.23	2.09
Lab 32											2.23	-2.23	2.09
Lab 33											2.23	-2.23	2.09
Lab 34											2.23	-2.23	2.09
Lab 35											2.23	-2.23	2.09
Lab 36											2.23	-2.23	2.09
Lab 37											2.23	-2.23	2.09
Lab 38											2.23	-2.23	2.09
Lab 39											2.23	-2.23	2.09
Lab 40											2.23	-2.23	2.09
Lab 41											2.23	-2.23	2.09
Lab 42											2.23	-2.23	2.09
Lab 43											2.23	-2.23	2.09
Lab 44											2.23	-2.23	2.09
Lab 45											2.23	-2.23	2.09
Lab 46											2.23	-2.23	2.09
Lab 47											2.23	-2.23	2.09
Lab 48											2.23	-2.23	2.09
Lab 49											2.23	-2.23	2.09
Lab 50											2.23	-2.23	2.09
Additional Statistics				Minimum X _{ave}	156.3333	r = 2.8 S _r =	7.7671	h _{crit} =	2.23				
				Maximum X _{ave}	175.0000	R = 2.8 S _R =	19.2570	h _{crit} =	-2.23				
				Check S _{Xave}	6.5598			k _{crit} =	2.09				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		S _{Xave} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		S _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		S _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		S _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



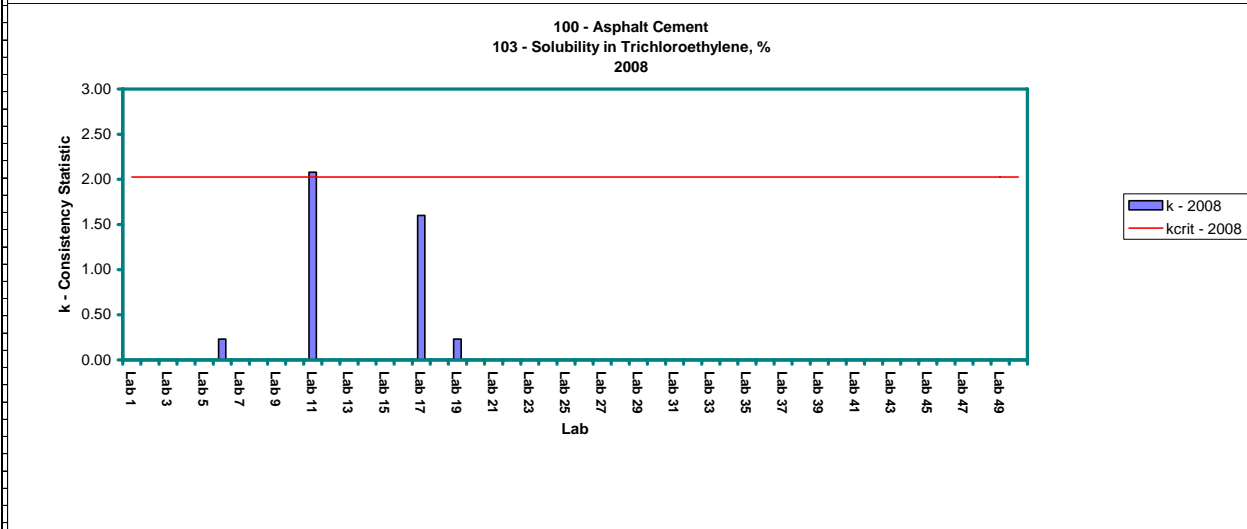
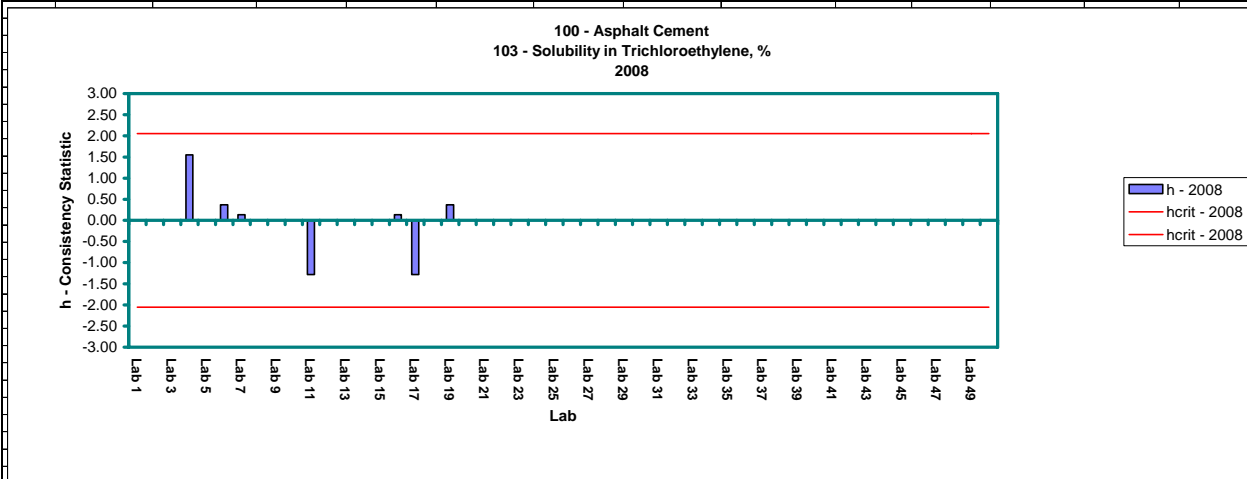
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(\bar{X}_{ave})_{ave}$ = Average of Cell Averages	
\bar{X}_{ave} =	Cell Average	$s_{(ave)}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R1} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (\bar{X}_{ave})_{ave}$)	s_{R2} =	Reproducibility Standard Deviation (Larger of s_r and s_{R1})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

100 - Asphalt Cement													
102 - Penetration @ 4°C, 100g, 5s													
2008													
Data				n =	3	(X_{ave}) _{ave} =	24.5417	s_r =	2.6300	Check $s_{X_{ave}}$ = 19.3628			
				p =	8	$S_{X_{ave}}$ =	19.3628	s_{R^*} =	19.4815	$r = 2.8$ $s_r = 7.2899$			
				Significance Level =			0.5%	s_R =	19.4815	$R = 2.8$ $s_R = 54.0000$			
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.15	-2.15	2.06
Lab 2											2.15	-2.15	2.06
Lab 3											2.15	-2.15	2.06
Lab 4	14.0000	12.0000	7.0000		11.0000	3.6056	-13.5417	13.0000	-0.70	1.37	2.15	-2.15	2.06
Lab 5											2.15	-2.15	2.06
Lab 6	16.0000	16.0000	16.0000		16.0000	0.0000	-8.5417	0.0000	-0.44	0.00	2.15	-2.15	2.06
Lab 7	27.0000	28.0000	28.0000		27.6667	0.5774	3.1250	0.3333	0.16	0.22	2.15	-2.15	2.06
Lab 8											2.15	-2.15	2.06
Lab 9											2.15	-2.15	2.06
Lab 10											2.15	-2.15	2.06
Lab 11	19.0000	16.0000	15.0000		16.6667	2.0817	-7.8750	4.3333	-0.41	0.79	2.15	-2.15	2.06
Lab 12											2.15	-2.15	2.06
Lab 13											2.15	-2.15	2.06
Lab 14	16.0000	16.0000	16.0000		16.0000	0.0000	-8.5417	0.0000	-0.44	0.00	2.15	-2.15	2.06
Lab 15											2.15	-2.15	2.06
Lab 16	20.0000	21.0000	20.0000		20.3333	0.5774	-4.2083	0.3333	-0.22	0.22	2.15	-2.15	2.06
Lab 17	68.0000	67.0000	78.0000		71.0000	6.0828	46.4583	37.0000	2.40	2.31	2.15	-2.15	2.06
Lab 18											2.15	-2.15	2.06
Lab 19	18.0000	18.0000	17.0000		17.6667	0.5774	-6.8750	0.3333	-0.36	0.22	2.15	-2.15	2.06
Lab 20											2.15	-2.15	2.06
Lab 21											2.15	-2.15	2.06
Lab 22											2.15	-2.15	2.06
Lab 23											2.15	-2.15	2.06
Lab 24											2.15	-2.15	2.06
Lab 25											2.15	-2.15	2.06
Lab 26											2.15	-2.15	2.06
Lab 27											2.15	-2.15	2.06
Lab 28											2.15	-2.15	2.06
Lab 29											2.15	-2.15	2.06
Lab 30											2.15	-2.15	2.06
Lab 31											2.15	-2.15	2.06
Lab 32											2.15	-2.15	2.06
Lab 33											2.15	-2.15	2.06
Lab 34											2.15	-2.15	2.06
Lab 35											2.15	-2.15	2.06
Lab 36											2.15	-2.15	2.06
Lab 37											2.15	-2.15	2.06
Lab 38											2.15	-2.15	2.06
Lab 39											2.15	-2.15	2.06
Lab 40											2.15	-2.15	2.06
Lab 41											2.15	-2.15	2.06
Lab 42											2.15	-2.15	2.06
Lab 43											2.15	-2.15	2.06
Lab 44											2.15	-2.15	2.06
Lab 45											2.15	-2.15	2.06
Lab 46											2.15	-2.15	2.06
Lab 47											2.15	-2.15	2.06
Lab 48											2.15	-2.15	2.06
Lab 49											2.15	-2.15	2.06
Lab 50											2.15	-2.15	2.06
Additional Statistics				Minimum X_{ave}	11.0000	$r = 2.8$ $s_r =$	7.2899	$h_{crit} =$	2.15				
				Maximum X_{ave}	71.0000	$R = 2.8$ $s_R =$	54.0000	$h_{crit} =$	-2.15				
				Check $s_{X_{ave}}$	19.3628			$k_{crit} =$	2.06				
Where:	$x_1, \dots, x_n =$	Individual Test Result			Where:	$(X_{ave})_{ave} =$	Average of Cell Averages						
	$X_{ave} =$	Cell Average				$s_{ave} =$	Standard Deviation of Cell Averages						
	n =	Number of Test Results per Cell				$s_r =$	Repeatability Standard Deviation						
	s =	Cell Standard Deviation				$s_{R^*} =$	Interim Reproducibility Standard Deviation						
	d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})						
	$s^2 =$	Cell Variation				h =	Between Laboratory Consistency Statistic						
	p =	Number of Laboratories				k =	Within Laboratory Consistency Statistic						
	$h_{crit} =$	Critical Between Laboratory Consistency Statistic				r =	95% Confidence Limit for Repeatability						
	$k_{crit} =$	Critical Within Laboratory Consistency Statistic				R =	95% Confidence Limit for Reproducibility						



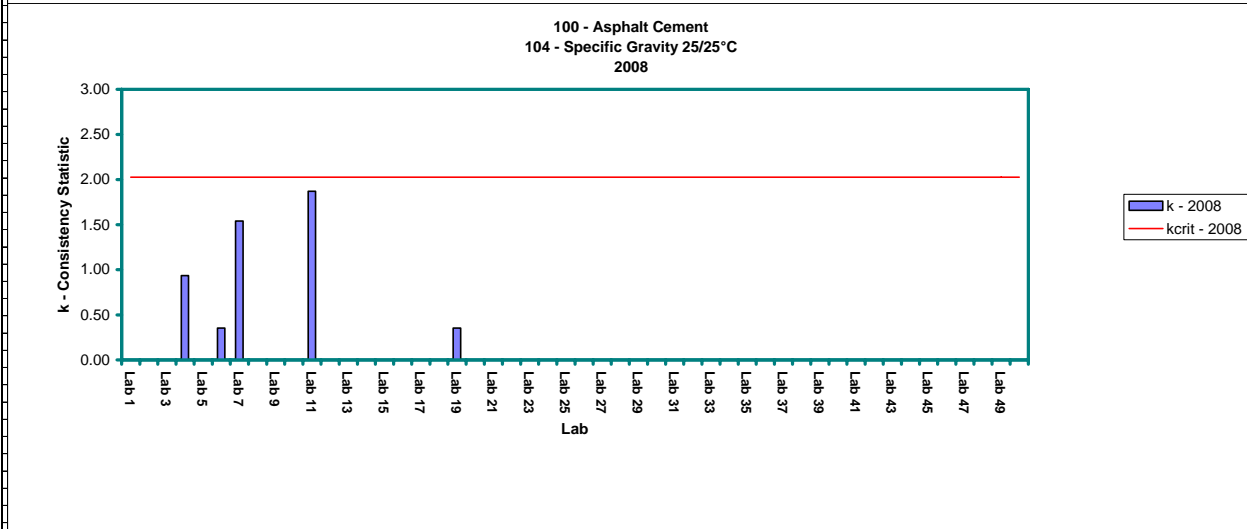
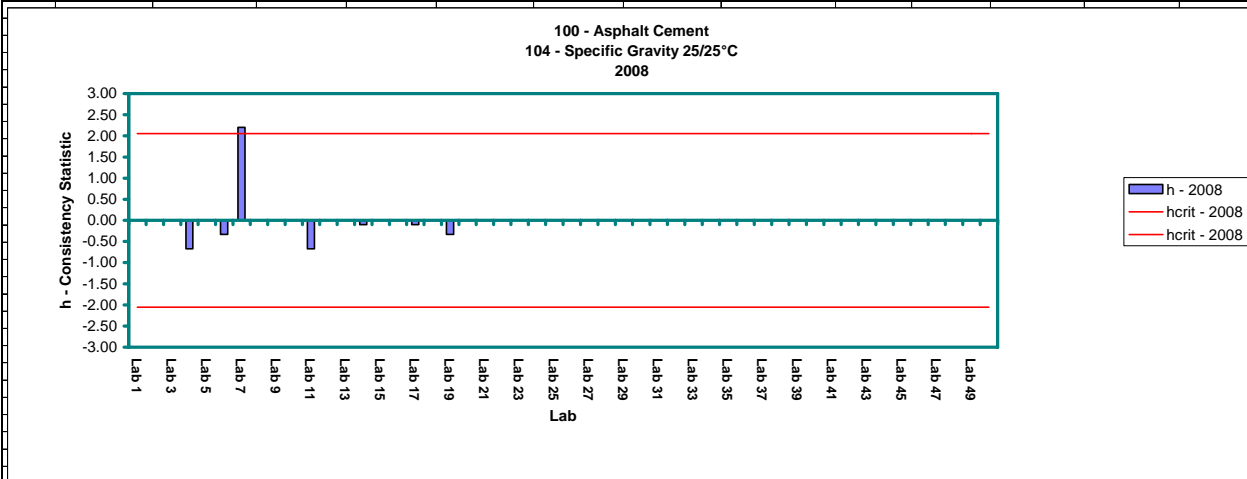
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{(ave)}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
103 - Solubility in Trichloroethylene, %													
2008													
Data				n = 3	(X_{ave}) _{ave} = 99.9781	s_r = 0.0250	Check $s_{X_{ave}}$ = 0.0141						
				p = 7	$S_{X_{ave}}$ = 0.0141	s_{R^*} = 0.0248	$r = 2.8 s_r = 0.0692$						
				Significance Level = 0.5%		s_R = 0.0250	$R = 2.8 s_R = 0.0692$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	100.0000	100.0000	100.0000		100.0000	0.0000	0.0219	0.0000	1.55	0.00	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	99.9800	99.9800	99.9900		99.9833	0.0058	0.0052	0.0000	0.37	0.23	2.05	-2.05	2.03
Lab 7	99.9800	99.9800	99.9800		99.9800	0.0000	0.0019	0.0000	0.13	0.00	2.05	-2.05	2.03
Lab 8											2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10											2.05	-2.05	2.03
Lab 11	99.9900	99.9900	99.9000		99.9600	0.0520	-0.0181	0.0027	-1.28	2.08	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15											2.05	-2.05	2.03
Lab 16	99.9800	99.9800	99.9800		99.9800	0.0000	0.0019	0.0000	0.13	0.00	2.05	-2.05	2.03
Lab 17	100.0000	99.9600	99.9200		99.9600	0.0400	-0.0181	0.0016	-1.28	1.60	2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	99.9800	99.9900	99.9800		99.9833	0.0058	0.0052	0.0000	0.37	0.23	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X_{ave}	99.9600	$r = 2.8 s_r =$	0.0692	$h_{crit} =$	2.05				
				Maximum X_{ave}	100.0000	$R = 2.8 s_R =$	0.0692	$h_{crit} =$	-2.05				
				Check $s_{X_{ave}}$	0.0141			$k_{crit} =$	2.03				
Where: $x_1, \dots, x_n =$				Individual Test Result	Where: $(X_{ave})_{ave} =$		Average of Cell Averages						
$X_{ave} =$				Cell Average	$s_{(ave)} =$		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation						
s =				Cell Standard Deviation	$s_{R^*} =$		Interim Reproducibility Standard Deviation						
d =				Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})						
$s^2 =$				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
$h_{crit} =$				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
$k_{crit} =$				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



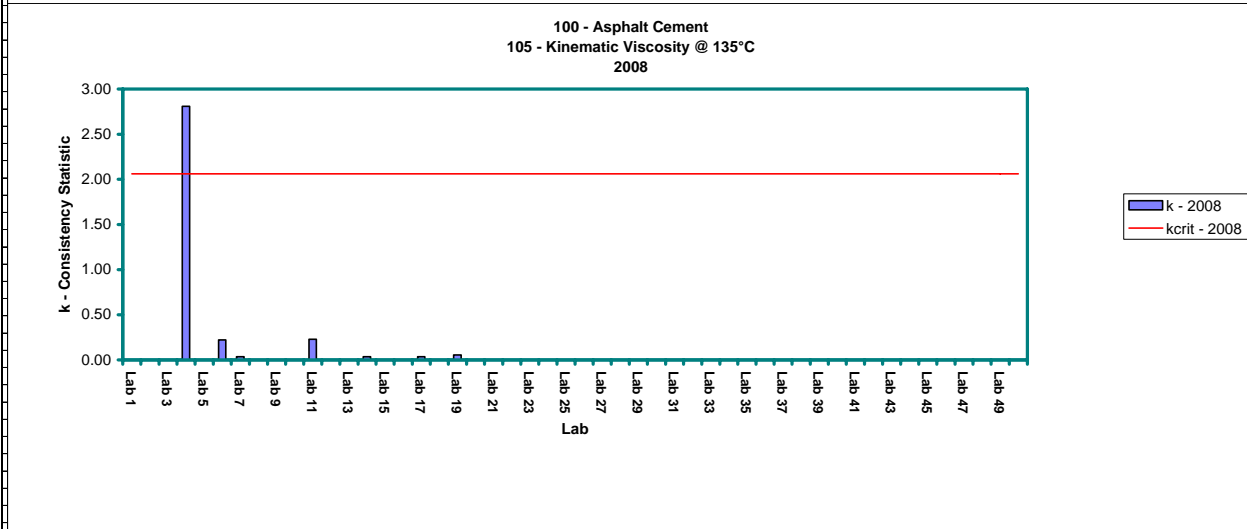
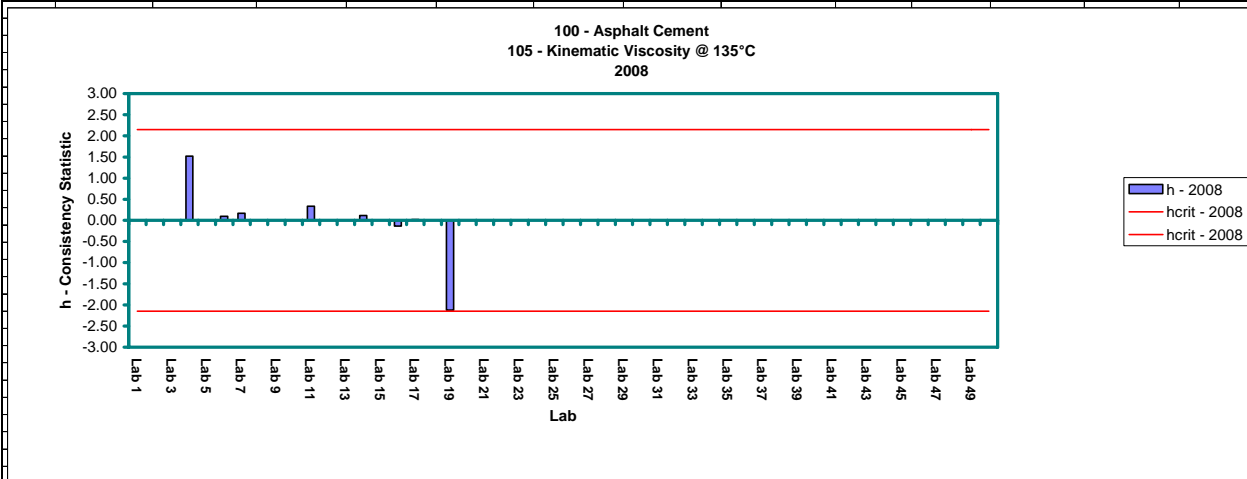
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{(ave)}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
104 - Specific Gravity 25/25°C													
2008													
Data				n =	3	(X _{ave}) _{ave} =	1.0283	s _r =	0.0016	Check s _{Xave} = 0.0029			
				p =	7	S _{Xave} =	0.0029	s _R =	0.0032	r = 2.8 s _r = 0.0045			
				Significance Level =	0.5%			s _R =	0.0032	R = 2.8 s _R = 0.0088			
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	1.0250	1.0280	1.0260		1.0263	0.0015	-0.0020	0.0000	-0.67	0.94	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	1.0280	1.0270	1.0270		1.0273	0.0006	-0.0010	0.0000	-0.33	0.35	2.05	-2.05	2.03
Lab 7	1.0350	1.0370	1.0320		1.0347	0.0025	0.0064	0.0000	2.20	1.54	2.05	-2.05	2.03
Lab 8											2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10											2.05	-2.05	2.03
Lab 11	1.0230	1.0290	1.0270		1.0263	0.0031	-0.0020	0.0000	-0.67	1.87	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14	1.0280	1.0280	1.0280		1.0280	0.0000	-0.0003	0.0000	-0.10	0.00	2.05	-2.05	2.03
Lab 15											2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17	1.0280	1.0280	1.0280		1.0280	0.0000	-0.0003	0.0000	-0.10	0.00	2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	1.0270	1.0280	1.0270		1.0273	0.0006	-0.0010	0.0000	-0.33	0.35	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X _{ave}	1.0263	r = 2.8 s _r =	0.0045	h _{crit} =	2.05				
				Maximum X _{ave}	1.0347	R = 2.8 s _R =	0.0088	h _{crit} =	-2.05				
				Check s _{Xave} =	0.0029			k _{crit} =	2.03				
Where:	x ₁ ...x _n =	Individual Test Result		Where:	(X _{ave}) _{ave} =	Average of Cell Averages							
	X _{ave} =	Cell Average			s _{Xave} =	Standard Deviation of Cell Averages							
	n =	Number of Test Results per Cell			s _r =	Repeatability Standard Deviation							
	s =	Cell Standard Deviation			s _R =	Interim Reproducibility Standard Deviation							
	d =	Cell Deviation (X _{ave} - (X _{ave}) _{ave})			s _R =	Reproducibility Standard Deviation (Larger of s _r and s _R)							
	s ² =	Cell Variation			h =	Between Laboratory Consistency Statistic							
	p =	Number of Laboratories			k =	Within Laboratory Consistency Statistic							
	h _{crit} =	Critical Between Laboratory Consistency Statistic			r =	95% Confidence Limit for Repeatability							
	k _{crit} =	Critical Within Laboratory Consistency Statistic			R =	95% Confidence Limit for Reproducibility							



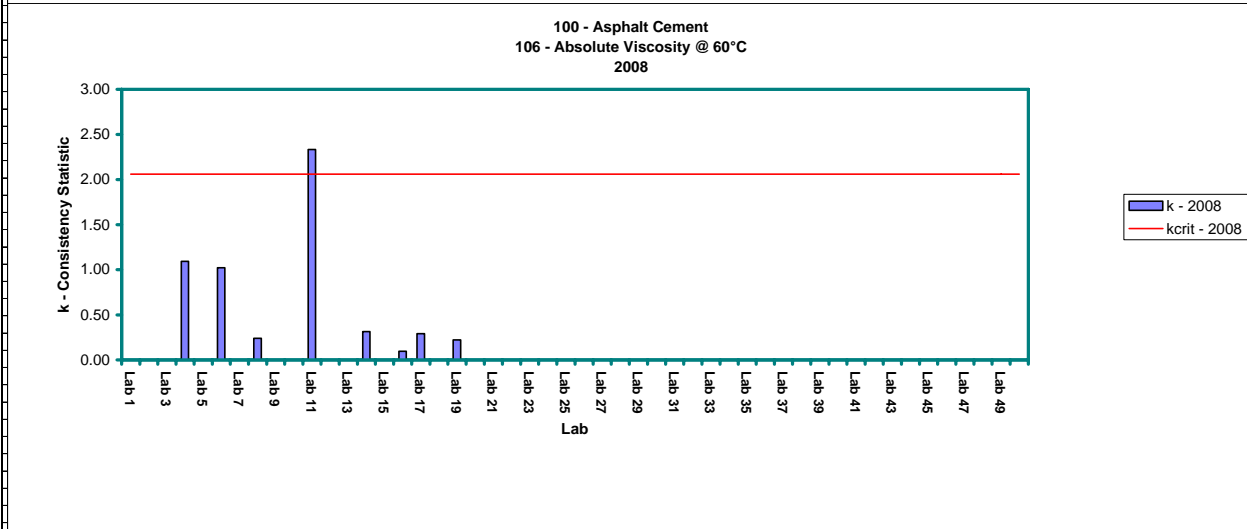
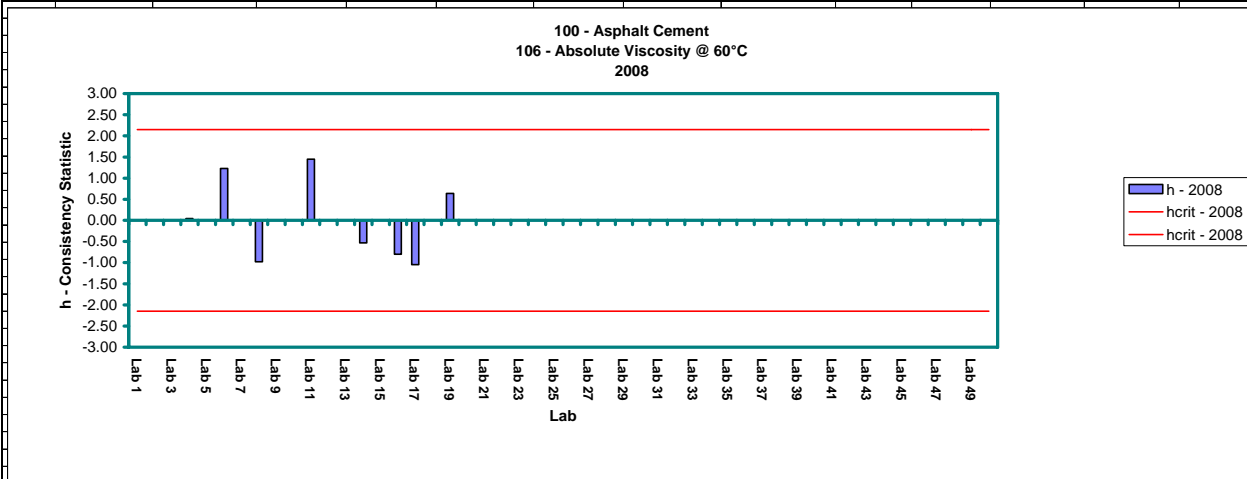
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages	
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

100 - Asphalt Cement													
105 - Kinematic Viscosity @ 135°C													
2008													
Data				n =	3	(X _{ave}) _{ave} =	248.6550	s _r =	27.7484	Check s _{X_{ave}} =			19.9431
				p =	8	S _{X_{ave}} =	19.9431	s _R =	30.1835	r = 2.8 s _r =			76.9148
				Significance Level =			0.5%	s _R =	30.1835	R = 2.8 s _R =			83.6644
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.15	-2.15	2.06
Lab 2											2.15	-2.15	2.06
Lab 3											2.15	-2.15	2.06
Lab 4	235.0000	233.0000	369.0000		279.0000	77.9487	30.3450	6.076.0000	1.52	2.81	2.15	-2.15	2.06
Lab 5											2.15	-2.15	2.06
Lab 6	250.1500	244.6200	256.9500		250.5733	6.1759	1.9183	38.1416	0.10	0.22	2.15	-2.15	2.06
Lab 7	251.0000	253.0000	252.0000		252.0000	1.0000	3.3450	1.0000	0.17	0.04	2.15	-2.15	2.06
Lab 8											2.15	-2.15	2.06
Lab 9											2.15	-2.15	2.06
Lab 10											2.15	-2.15	2.06
Lab 11	248.0000	259.0000	259.0000		255.3333	6.3509	6.6783	40.3333	0.33	0.23	2.15	-2.15	2.06
Lab 12											2.15	-2.15	2.06
Lab 13											2.15	-2.15	2.06
Lab 14	250.0000	252.0000	251.0000		251.0000	1.0000	2.3450	1.0000	0.12	0.04	2.15	-2.15	2.06
Lab 15											2.15	-2.15	2.06
Lab 16	246.0000	246.0000	246.0000		246.0000	0.0000	-2.6550	0.0000	-0.13	0.00	2.15	-2.15	2.06
Lab 17	248.0000	250.0000	249.0000		249.0000	1.0000	0.3450	1.0000	0.02	0.04	2.15	-2.15	2.06
Lab 18											2.15	-2.15	2.06
Lab 19	206.0000	205.0000	208.0000		206.3333	1.5275	-42.3217	2.3333	-2.12	0.06	2.15	-2.15	2.06
Lab 20											2.15	-2.15	2.06
Lab 21											2.15	-2.15	2.06
Lab 22											2.15	-2.15	2.06
Lab 23											2.15	-2.15	2.06
Lab 24											2.15	-2.15	2.06
Lab 25											2.15	-2.15	2.06
Lab 26											2.15	-2.15	2.06
Lab 27											2.15	-2.15	2.06
Lab 28											2.15	-2.15	2.06
Lab 29											2.15	-2.15	2.06
Lab 30											2.15	-2.15	2.06
Lab 31											2.15	-2.15	2.06
Lab 32											2.15	-2.15	2.06
Lab 33											2.15	-2.15	2.06
Lab 34											2.15	-2.15	2.06
Lab 35											2.15	-2.15	2.06
Lab 36											2.15	-2.15	2.06
Lab 37											2.15	-2.15	2.06
Lab 38											2.15	-2.15	2.06
Lab 39											2.15	-2.15	2.06
Lab 40											2.15	-2.15	2.06
Lab 41											2.15	-2.15	2.06
Lab 42											2.15	-2.15	2.06
Lab 43											2.15	-2.15	2.06
Lab 44											2.15	-2.15	2.06
Lab 45											2.15	-2.15	2.06
Lab 46											2.15	-2.15	2.06
Lab 47											2.15	-2.15	2.06
Lab 48											2.15	-2.15	2.06
Lab 49											2.15	-2.15	2.06
Lab 50											2.15	-2.15	2.06
Additional Statistics				Minimum X _{ave}	206.3333	r = 2.8 s _r =	76.9148	h _{crit} =	2.15				
				Maximum X _{ave}	279.0000	R = 2.8 s _R =	83.6644	h _{crit} =	-2.15				
				Check s _{X_{ave}} =	19.9431			k _{crit} =	2.06				
Where: x ₁ ...x _n =		Individual Test Result		Where:		(X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =		Cell Average		s _{ave} =		s _{ave} =		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell		s _r =		s _r =		Repeatability Standard Deviation					
s =		Cell Standard Deviation		s _R =		s _R =		Interim Reproducibility Standard Deviation					
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
s ² =		Cell Variation		h =		h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories		k =		k =		Within Laboratory Consistency Statistic					
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		r =		95% Confidence Limit for Repeatability					
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		R =		95% Confidence Limit for Reproducibility					



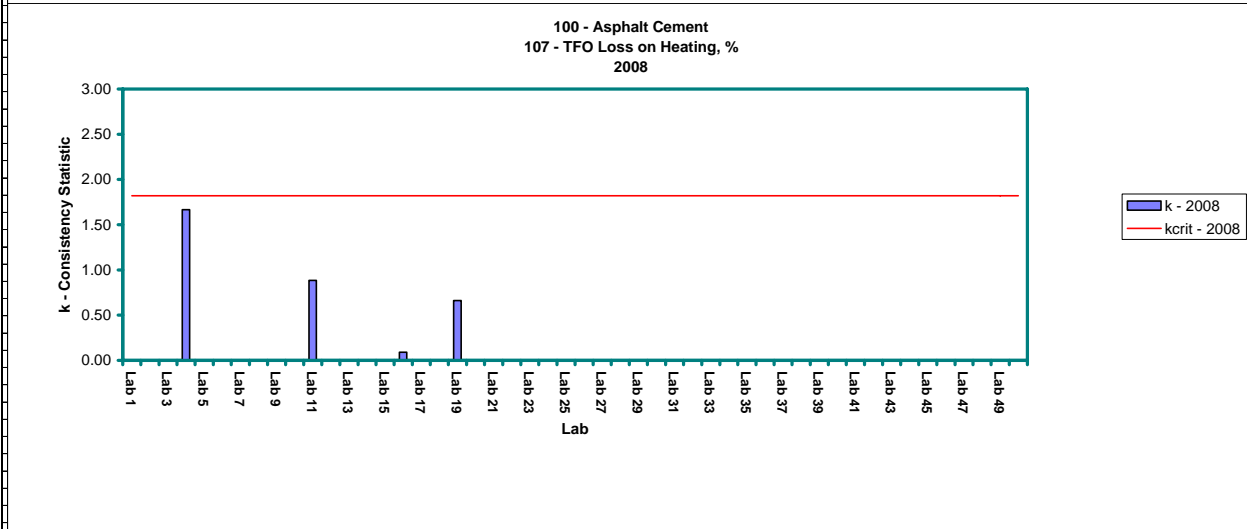
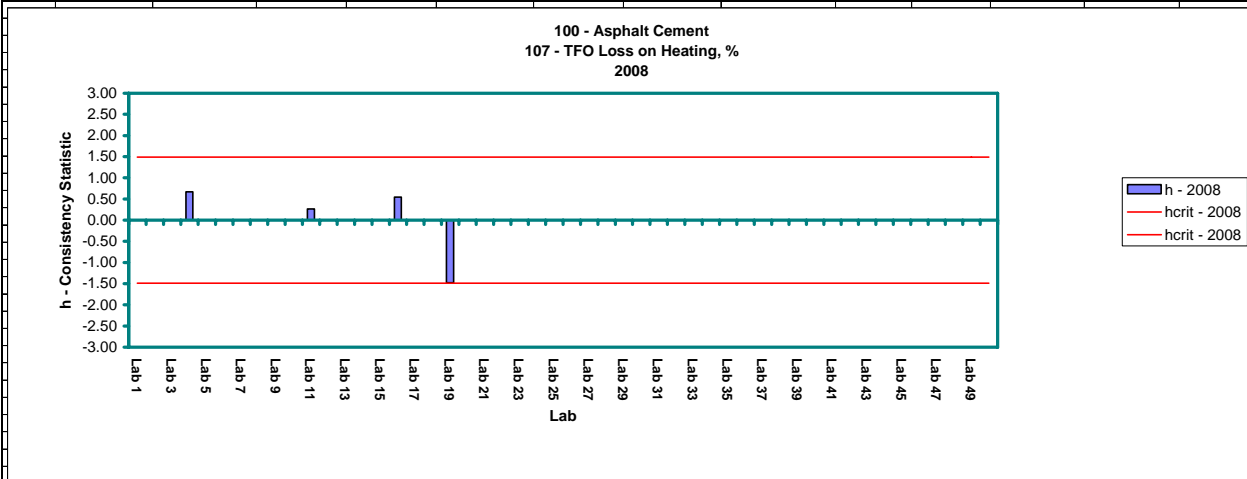
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

100 - Asphalt Cement 106 - Absolute Viscosity @ 60°C 2008													
Data				n = 3	(X_{ave}) _{ave} = 75.3288	s_r = 2.5856	Check $s_{X_{ave}}$ = 2.9903						
				p = 8	$S_{X_{ave}}$ = 2.9903	s_{R^*} = 3.6604	r = 2.8 s_r = 7.1670						
				Significance Level = 0.5%		s_R = 3.6604	R = 2.8 s_R = 10.1461						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.15	-2.15	2.06
Lab 2											2.15	-2.15	2.06
Lab 3											2.15	-2.15	2.06
Lab 4	73.6200	74.0500	78.7200		75.4633	2.8285	0.1346	8.0006	0.05	1.09	2.15	-2.15	2.06
Lab 5											2.15	-2.15	2.06
Lab 6	81.0000	76.0000	80.0000		79.0000	2.6458	3.6712	7.0000	1.23	1.02	2.15	-2.15	2.06
Lab 7											2.15	-2.15	2.06
Lab 8	72.2000	73.1000	71.9000		72.4000	0.6245	-2.9288	0.3900	-0.98	0.24	2.15	-2.15	2.06
Lab 9											2.15	-2.15	2.06
Lab 10											2.15	-2.15	2.06
Lab 11	72.7000	82.9000	83.4000		79.6667	6.0385	4.3379	36.4633	1.45	2.34	2.15	-2.15	2.06
Lab 12											2.15	-2.15	2.06
Lab 13											2.15	-2.15	2.06
Lab 14	72.8000	74.1000	74.3000		73.7333	0.8145	-1.5954	0.6633	-0.53	0.31	2.15	-2.15	2.06
Lab 15											2.15	-2.15	2.06
Lab 16	73.2000	72.7000	72.9000		72.9333	0.2517	-2.3954	0.0633	-0.80	0.10	2.15	-2.15	2.06
Lab 17	72.3000	71.4000	72.9000		72.2000	0.7550	-3.1288	0.5700	-1.05	0.29	2.15	-2.15	2.06
Lab 18											2.15	-2.15	2.06
Lab 19	77.9000	76.9000	76.9000		77.2333	0.5774	1.9046	0.3333	0.64	0.22	2.15	-2.15	2.06
Lab 20											2.15	-2.15	2.06
Lab 21											2.15	-2.15	2.06
Lab 22											2.15	-2.15	2.06
Lab 23											2.15	-2.15	2.06
Lab 24											2.15	-2.15	2.06
Lab 25											2.15	-2.15	2.06
Lab 26											2.15	-2.15	2.06
Lab 27											2.15	-2.15	2.06
Lab 28											2.15	-2.15	2.06
Lab 29											2.15	-2.15	2.06
Lab 30											2.15	-2.15	2.06
Lab 31											2.15	-2.15	2.06
Lab 32											2.15	-2.15	2.06
Lab 33											2.15	-2.15	2.06
Lab 34											2.15	-2.15	2.06
Lab 35											2.15	-2.15	2.06
Lab 36											2.15	-2.15	2.06
Lab 37											2.15	-2.15	2.06
Lab 38											2.15	-2.15	2.06
Lab 39											2.15	-2.15	2.06
Lab 40											2.15	-2.15	2.06
Lab 41											2.15	-2.15	2.06
Lab 42											2.15	-2.15	2.06
Lab 43											2.15	-2.15	2.06
Lab 44											2.15	-2.15	2.06
Lab 45											2.15	-2.15	2.06
Lab 46											2.15	-2.15	2.06
Lab 47											2.15	-2.15	2.06
Lab 48											2.15	-2.15	2.06
Lab 49											2.15	-2.15	2.06
Lab 50											2.15	-2.15	2.06
Additional Statistics				Minimum X_{ave}	72.2000	$r = 2.8$ $s_r =$	7.1670	$h_{crit} =$	2.15				
				Maximum X_{ave}	79.6667	$R = 2.8$ $s_R =$	10.1461	$h_{crit} =$	-2.15				
				Check $s_{X_{ave}}$	2.9903			$k_{crit} =$	2.06				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{(ave)} =$		Standard Deviation of Cell Averages					
$n =$		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
$s =$		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
$d =$		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				$h =$		Between Laboratory Consistency Statistic					
$p =$		Number of Laboratories				$k =$		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				$r =$		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				$R =$		95% Confidence Limit for Reproducibility					



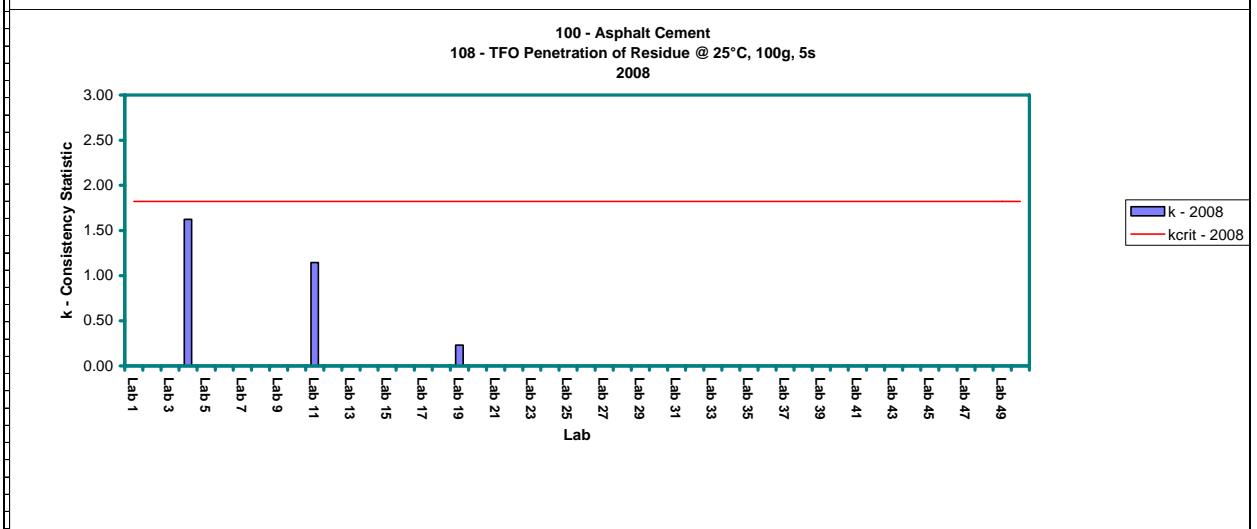
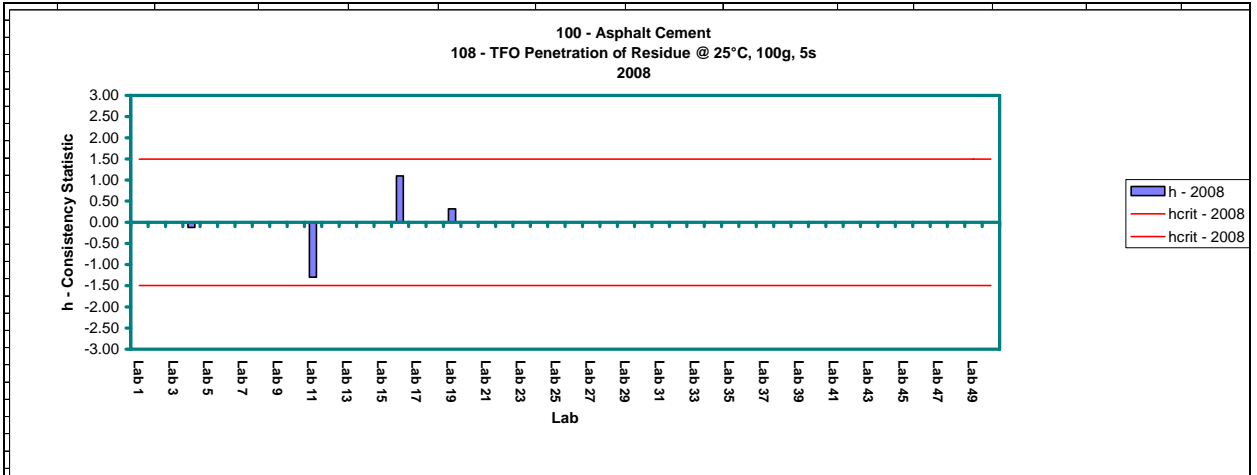
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages	
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

100 - Asphalt Cement													
107 - TFO Loss on Heating, %													
2008													
Data				n = 3	(X_{ave}) _{ave} = 0.1768	s_r = 0.0258	Check $s_{X_{ave}}$ = 0.0231						
				p = 4	$S_{X_{ave}}$ = 0.0231	s_{R^*} = 0.0312	$r = 2.8 s_r = 0.0715$						
				Significance Level = 0.5%		s_R = 0.0312	$R = 2.8 s_R = 0.0866$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.49	-1.49	1.82
Lab 2											1.49	-1.49	1.82
Lab 3											1.49	-1.49	1.82
Lab 4	0.2200	0.2140	0.1427		0.1922	0.0430	0.0155	0.0018	0.67	1.67	1.49	-1.49	1.82
Lab 5											1.49	-1.49	1.82
Lab 6											1.49	-1.49	1.82
Lab 7											1.49	-1.49	1.82
Lab 8											1.49	-1.49	1.82
Lab 9											1.49	-1.49	1.82
Lab 10											1.49	-1.49	1.82
Lab 11	0.2088	0.1664	0.1732		0.1828	0.0228	0.0060	0.0005	0.26	0.88	1.49	-1.49	1.82
Lab 12											1.49	-1.49	1.82
Lab 13											1.49	-1.49	1.82
Lab 14											1.49	-1.49	1.82
Lab 15											1.49	-1.49	1.82
Lab 16	0.1880	0.1920	0.1880		0.1893	0.0023	0.0126	0.0000	0.55	0.09	1.49	-1.49	1.82
Lab 17											1.49	-1.49	1.82
Lab 18											1.49	-1.49	1.82
Lab 19	0.1440	0.1250	0.1590		0.1427	0.0170	-0.0341	0.0003	-1.48	0.66	1.49	-1.49	1.82
Lab 20											1.49	-1.49	1.82
Lab 21											1.49	-1.49	1.82
Lab 22											1.49	-1.49	1.82
Lab 23											1.49	-1.49	1.82
Lab 24											1.49	-1.49	1.82
Lab 25											1.49	-1.49	1.82
Lab 26											1.49	-1.49	1.82
Lab 27											1.49	-1.49	1.82
Lab 28											1.49	-1.49	1.82
Lab 29											1.49	-1.49	1.82
Lab 30											1.49	-1.49	1.82
Lab 31											1.49	-1.49	1.82
Lab 32											1.49	-1.49	1.82
Lab 33											1.49	-1.49	1.82
Lab 34											1.49	-1.49	1.82
Lab 35											1.49	-1.49	1.82
Lab 36											1.49	-1.49	1.82
Lab 37											1.49	-1.49	1.82
Lab 38											1.49	-1.49	1.82
Lab 39											1.49	-1.49	1.82
Lab 40											1.49	-1.49	1.82
Lab 41											1.49	-1.49	1.82
Lab 42											1.49	-1.49	1.82
Lab 43											1.49	-1.49	1.82
Lab 44											1.49	-1.49	1.82
Lab 45											1.49	-1.49	1.82
Lab 46											1.49	-1.49	1.82
Lab 47											1.49	-1.49	1.82
Lab 48											1.49	-1.49	1.82
Lab 49											1.49	-1.49	1.82
Lab 50											1.49	-1.49	1.82
Additional Statistics				Minimum X_{ave}	0.1427	$r = 2.8 s_r =$	0.0715	$h_{crit} =$	1.49				
				Maximum X_{ave}	0.1922	$R = 2.8 s_R =$	0.0866	$h_{crit} =$	-1.49				
				Check $s_{X_{ave}}$	0.0231			$k_{crit} =$	1.82				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: $(X_{ave})_{ave} =$		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{X_{ave}} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



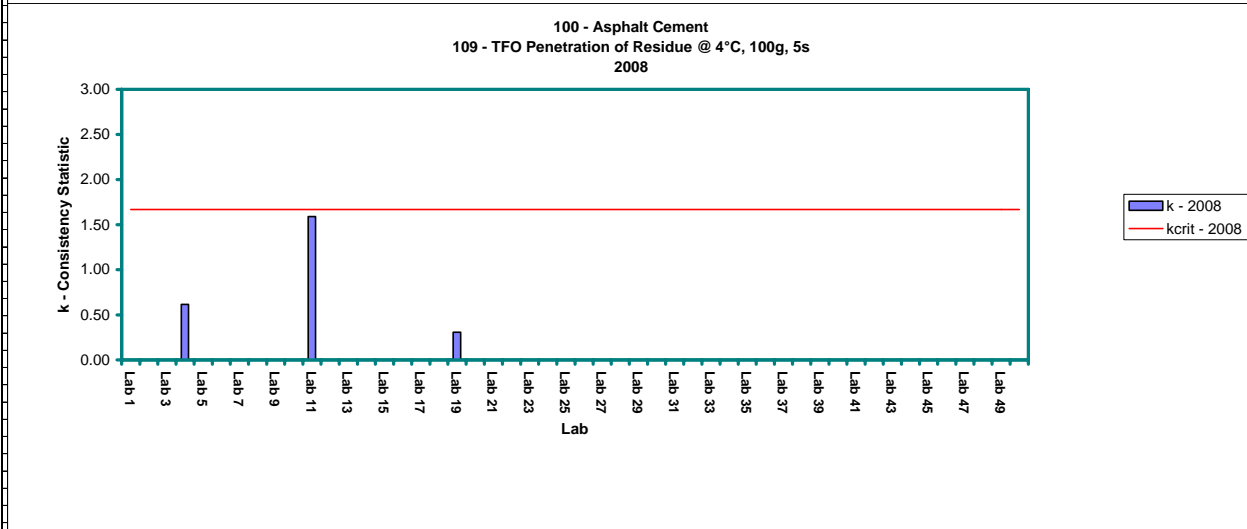
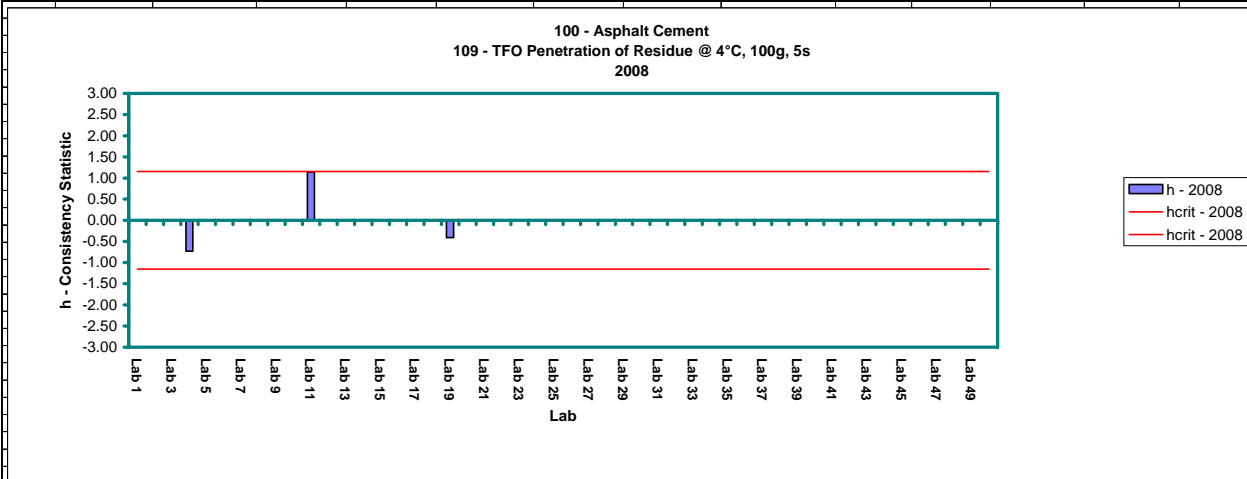
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$S_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
108 - TFO Penetration of Residue @ 25°C, 100g, 5s													
2008													
Data				n = 3	(X _{ave}) _{ave} = 94.7000	s _r = 2.4898	Check s _{X_{ave}} = 3.0094						
				p = 4	S _{X_{ave}} = 3.0094	S _R = 3.6317	r = 2.8 s _r = 6.9014						
				Significance Level = 0.5%		S _R = 3.6317	R = 2.8 S _R = 10.0665						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.49	-1.49	1.82
Lab 2											1.49	-1.49	1.82
Lab 3											1.49	-1.49	1.82
Lab 4	92.0000	99.0000	92.0000		94.3333	4.0415	-0.3667	16.3333	-0.12	1.62	1.49	-1.49	1.82
Lab 5											1.49	-1.49	1.82
Lab 6											1.49	-1.49	1.82
Lab 7											1.49	-1.49	1.82
Lab 8											1.49	-1.49	1.82
Lab 9											1.49	-1.49	1.82
Lab 10											1.49	-1.49	1.82
Lab 11	93.7000	88.0000	90.7000		90.8000	2.8513	-3.9000	8.1300	-1.30	1.15	1.49	-1.49	1.82
Lab 12											1.49	-1.49	1.82
Lab 13											1.49	-1.49	1.82
Lab 14											1.49	-1.49	1.82
Lab 15											1.49	-1.49	1.82
Lab 16	98.0000	98.0000	98.0000		98.0000	0.0000	3.3000	0.0000	1.10	0.00	1.49	-1.49	1.82
Lab 17											1.49	-1.49	1.82
Lab 18											1.49	-1.49	1.82
Lab 19	95.0000	96.0000	96.0000		95.6667	0.5774	0.9667	0.3333	0.32	0.23	1.49	-1.49	1.82
Lab 20											1.49	-1.49	1.82
Lab 21											1.49	-1.49	1.82
Lab 22											1.49	-1.49	1.82
Lab 23											1.49	-1.49	1.82
Lab 24											1.49	-1.49	1.82
Lab 25											1.49	-1.49	1.82
Lab 26											1.49	-1.49	1.82
Lab 27											1.49	-1.49	1.82
Lab 28											1.49	-1.49	1.82
Lab 29											1.49	-1.49	1.82
Lab 30											1.49	-1.49	1.82
Lab 31											1.49	-1.49	1.82
Lab 32											1.49	-1.49	1.82
Lab 33											1.49	-1.49	1.82
Lab 34											1.49	-1.49	1.82
Lab 35											1.49	-1.49	1.82
Lab 36											1.49	-1.49	1.82
Lab 37											1.49	-1.49	1.82
Lab 38											1.49	-1.49	1.82
Lab 39											1.49	-1.49	1.82
Lab 40											1.49	-1.49	1.82
Lab 41											1.49	-1.49	1.82
Lab 42											1.49	-1.49	1.82
Lab 43											1.49	-1.49	1.82
Lab 44											1.49	-1.49	1.82
Lab 45											1.49	-1.49	1.82
Lab 46											1.49	-1.49	1.82
Lab 47											1.49	-1.49	1.82
Lab 48											1.49	-1.49	1.82
Lab 49											1.49	-1.49	1.82
Lab 50											1.49	-1.49	1.82
Additional Statistics				Minimum X _{ave}	90.8000	r = 2.8 s _r =	6.9014	h _{crit} =	1.49				
				Maximum X _{ave}	98.0000	R = 2.8 s _R =	10.0665	h _{crit} =	-1.49				
				Check s _{X_{ave}}	3.0094			k _{crit} =	1.82				
Where: x ₁ ...x _n =		Individual Test Result		Where:		(X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =		Cell Average		s _{ave} =		S _{ave} =		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell		s _r =		S _r =		Repeatability Standard Deviation					
s =		Cell Standard Deviation		s _R =		S _R =		Interim Reproducibility Standard Deviation					
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		h =		R =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
s ² =		Cell Variation		k =				Between Laboratory Consistency Statistic					
p =		Number of Laboratories		r =				Within Laboratory Consistency Statistic					
h _{crit} =		Critical Between Laboratory Consistency Statistic		R =				95% Confidence Limit for Repeatability					
k _{crit} =		Critical Within Laboratory Consistency Statistic						95% Confidence Limit for Reproducibility					



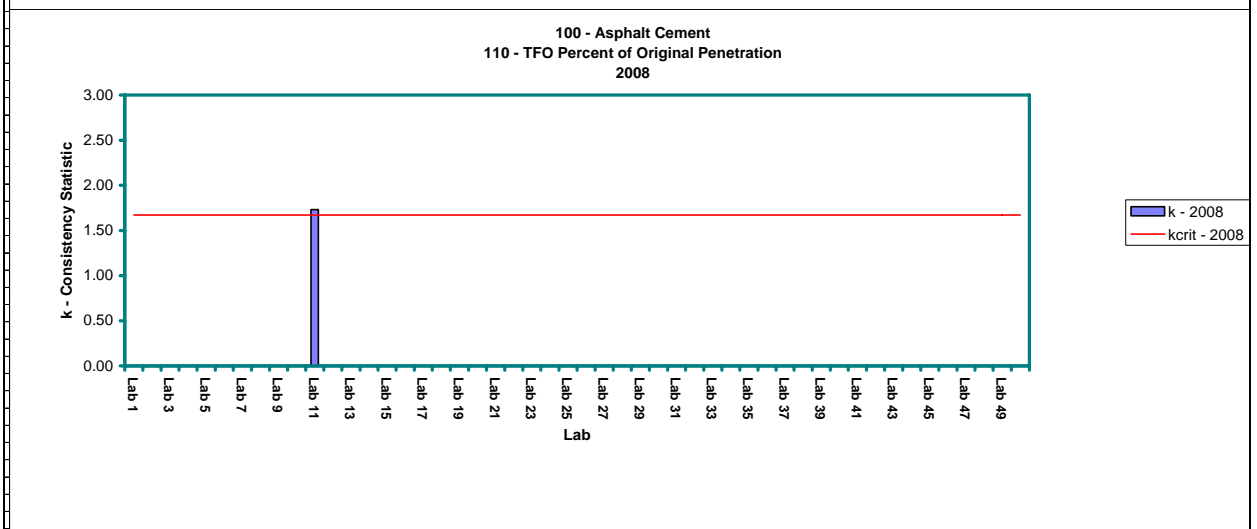
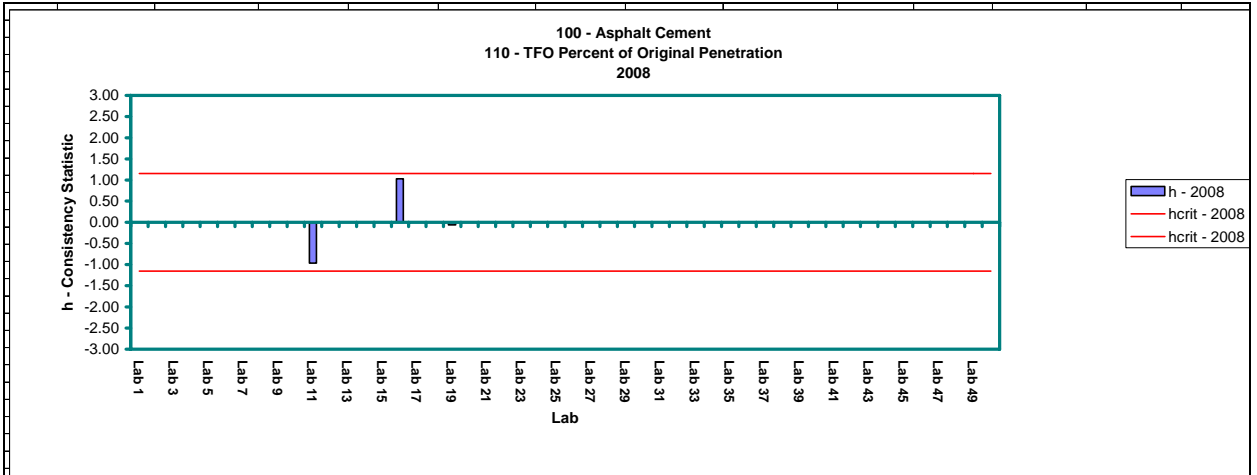
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{(ave)}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
109 - TFO Penetration of Residue @ 4°C, 100g, 5s													
2008													
Data				n = 3	(X _{ave}) _{ave} = 18.5000	s _r = 1.8759	Check s _{X_{ave}} = 16.6692						
				p = 3	S _{X_{ave}} = 16.6692	s _R = 16.7394	r = 2.8 s _r = 5.1996						
				Significance Level = 0.5%		s _R = 16.7394	R = 2.8 s _R = 46.3992						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.15	-1.15	1.67
Lab 2											1.15	-1.15	1.67
Lab 3											1.15	-1.15	1.67
Lab 4	5.0000	7.0000	7.0000		6.3333	1.1547	-12.1667	1.3333	-0.73	0.62	1.15	-1.15	1.67
Lab 5											1.15	-1.15	1.67
Lab 6											1.15	-1.15	1.67
Lab 7											1.15	-1.15	1.67
Lab 8											1.15	-1.15	1.67
Lab 9											1.15	-1.15	1.67
Lab 10											1.15	-1.15	1.67
Lab 11	40.7000	37.0000	34.8000		37.5000	2.9816	19.0000	8.8900	1.14	1.59	1.15	-1.15	1.67
Lab 12											1.15	-1.15	1.67
Lab 13											1.15	-1.15	1.67
Lab 14											1.15	-1.15	1.67
Lab 15											1.15	-1.15	1.67
Lab 16											1.15	-1.15	1.67
Lab 17											1.15	-1.15	1.67
Lab 18											1.15	-1.15	1.67
Lab 19	12.0000	12.0000	11.0000		11.6667	0.5774	-6.8333	0.3333	-0.41	0.31	1.15	-1.15	1.67
Lab 20											1.15	-1.15	1.67
Lab 21											1.15	-1.15	1.67
Lab 22											1.15	-1.15	1.67
Lab 23											1.15	-1.15	1.67
Lab 24											1.15	-1.15	1.67
Lab 25											1.15	-1.15	1.67
Lab 26											1.15	-1.15	1.67
Lab 27											1.15	-1.15	1.67
Lab 28											1.15	-1.15	1.67
Lab 29											1.15	-1.15	1.67
Lab 30											1.15	-1.15	1.67
Lab 31											1.15	-1.15	1.67
Lab 32											1.15	-1.15	1.67
Lab 33											1.15	-1.15	1.67
Lab 34											1.15	-1.15	1.67
Lab 35											1.15	-1.15	1.67
Lab 36											1.15	-1.15	1.67
Lab 37											1.15	-1.15	1.67
Lab 38											1.15	-1.15	1.67
Lab 39											1.15	-1.15	1.67
Lab 40											1.15	-1.15	1.67
Lab 41											1.15	-1.15	1.67
Lab 42											1.15	-1.15	1.67
Lab 43											1.15	-1.15	1.67
Lab 44											1.15	-1.15	1.67
Lab 45											1.15	-1.15	1.67
Lab 46											1.15	-1.15	1.67
Lab 47											1.15	-1.15	1.67
Lab 48											1.15	-1.15	1.67
Lab 49											1.15	-1.15	1.67
Lab 50											1.15	-1.15	1.67
Additional Statistics				Minimum X _{ave}	6.3333	r = 2.8 s _r =	5.1996	h _{crit} =	1.15				
				Maximum X _{ave}	37.5000	R = 2.8 s _R =	46.3992	h _{crit} =	-1.15				
				Check s _{X_{ave}} =	16.6692			k _{crit} =	1.67				
Where: x ₁ ...x _n =	Individual Test Result			Where:	(X _{ave}) _{ave} =	Average of Cell Averages							
X _{ave} =	Cell Average				s _{ave} =	Standard Deviation of Cell Averages							
n =	Number of Test Results per Cell				s _r =	Repeatability Standard Deviation							
s =	Cell Standard Deviation				s _R =	Interim Reproducibility Standard Deviation							
d =	Cell Deviation (X _{ave} - (X _{ave}) _{ave})				s _R =	Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =	Cell Variation				h =	Between Laboratory Consistency Statistic							
p =	Number of Laboratories				k =	Within Laboratory Consistency Statistic							
h _{crit} =	Critical Between Laboratory Consistency Statistic				r =	95% Confidence Limit for Repeatability							
k _{crit} =	Critical Within Laboratory Consistency Statistic				R =	95% Confidence Limit for Reproducibility							



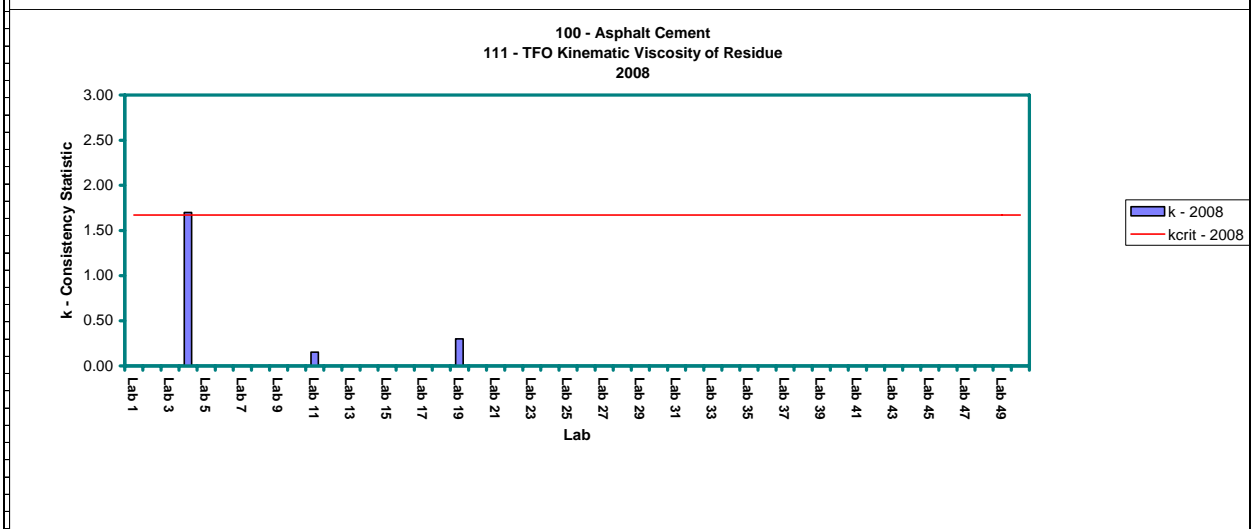
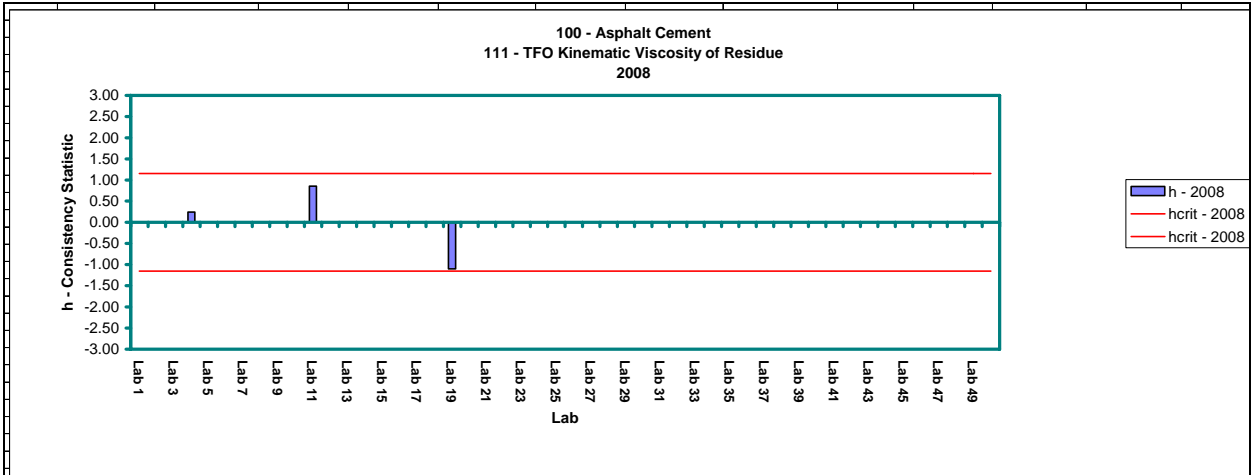
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
110 - TFO Percent of Original Penetration													
2008													
Data					n = 3	(X_{ave}) _{ave} = 55.1111	s_r = 0.9939	Check $S_{X_{ave}}$ = 1.8359					
					p = 3	$S_{X_{ave}}$ = 1.8359	s_{R^*} = 2.0072	$r = 2.8 s_r = 2.7549$					
					Significance Level = 0.5%		s_R = 2.0072	$R = 2.8 s_R = 5.5637$					
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.15	-1.15	1.67
Lab 2											1.15	-1.15	1.67
Lab 3											1.15	-1.15	1.67
Lab 4											1.15	-1.15	1.67
Lab 5											1.15	-1.15	1.67
Lab 6											1.15	-1.15	1.67
Lab 7											1.15	-1.15	1.67
Lab 8											1.15	-1.15	1.67
Lab 9											1.15	-1.15	1.67
Lab 10											1.15	-1.15	1.67
Lab 11	52.6000	52.1000	55.3000		53.3333	1.7214	-1.7778	2.9633	-0.97	1.73	1.15	-1.15	1.67
Lab 12											1.15	-1.15	1.67
Lab 13											1.15	-1.15	1.67
Lab 14											1.15	-1.15	1.67
Lab 15											1.15	-1.15	1.67
Lab 16	57.0000	57.0000	57.0000		57.0000	0.0000	1.8889	0.0000	1.03	0.00	1.15	-1.15	1.67
Lab 17											1.15	-1.15	1.67
Lab 18											1.15	-1.15	1.67
Lab 19	55.0000	55.0000	55.0000		55.0000	0.0000	-0.1111	0.0000	-0.06	0.00	1.15	-1.15	1.67
Lab 20											1.15	-1.15	1.67
Lab 21											1.15	-1.15	1.67
Lab 22											1.15	-1.15	1.67
Lab 23											1.15	-1.15	1.67
Lab 24											1.15	-1.15	1.67
Lab 25											1.15	-1.15	1.67
Lab 26											1.15	-1.15	1.67
Lab 27											1.15	-1.15	1.67
Lab 28											1.15	-1.15	1.67
Lab 29											1.15	-1.15	1.67
Lab 30											1.15	-1.15	1.67
Lab 31											1.15	-1.15	1.67
Lab 32											1.15	-1.15	1.67
Lab 33											1.15	-1.15	1.67
Lab 34											1.15	-1.15	1.67
Lab 35											1.15	-1.15	1.67
Lab 36											1.15	-1.15	1.67
Lab 37											1.15	-1.15	1.67
Lab 38											1.15	-1.15	1.67
Lab 39											1.15	-1.15	1.67
Lab 40											1.15	-1.15	1.67
Lab 41											1.15	-1.15	1.67
Lab 42											1.15	-1.15	1.67
Lab 43											1.15	-1.15	1.67
Lab 44											1.15	-1.15	1.67
Lab 45											1.15	-1.15	1.67
Lab 46											1.15	-1.15	1.67
Lab 47											1.15	-1.15	1.67
Lab 48											1.15	-1.15	1.67
Lab 49											1.15	-1.15	1.67
Lab 50											1.15	-1.15	1.67
Additional Statistics					Minimum X_{ave}	53.3333	$r = 2.8 s_r =$	2.7549	$h_{crit} =$	1.15			
					Maximum X_{ave}	57.0000	$R = 2.8 s_R =$	5.5637	$h_{crit} =$	-1.15			
					Check $S_{X_{ave}} =$	1.8359			$k_{crit} =$	1.67			
Where: $x_1, \dots, x_n =$					Individual Test Result	Where: (X_{ave}) _{ave} =			Average of Cell Averages				
$X_{ave} =$					Cell Average	$s_{X_{ave}} =$			Standard Deviation of Cell Averages				
n =					Number of Test Results per Cell	$s_r =$			Repeatability Standard Deviation				
s =					Cell Standard Deviation	$s_{R^*} =$			Interim Reproducibility Standard Deviation				
d =					Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$			Reproducibility Standard Deviation (Larger of s_r and s_{R^*})				
$s^2 =$					Cell Variation	h =			Between Laboratory Consistency Statistic				
p =					Number of Laboratories	k =			Within Laboratory Consistency Statistic				
$h_{crit} =$					Critical Between Laboratory Consistency Statistic	r =			95% Confidence Limit for Repeatability				
$k_{crit} =$					Critical Within Laboratory Consistency Statistic	R =			95% Confidence Limit for Reproducibility				



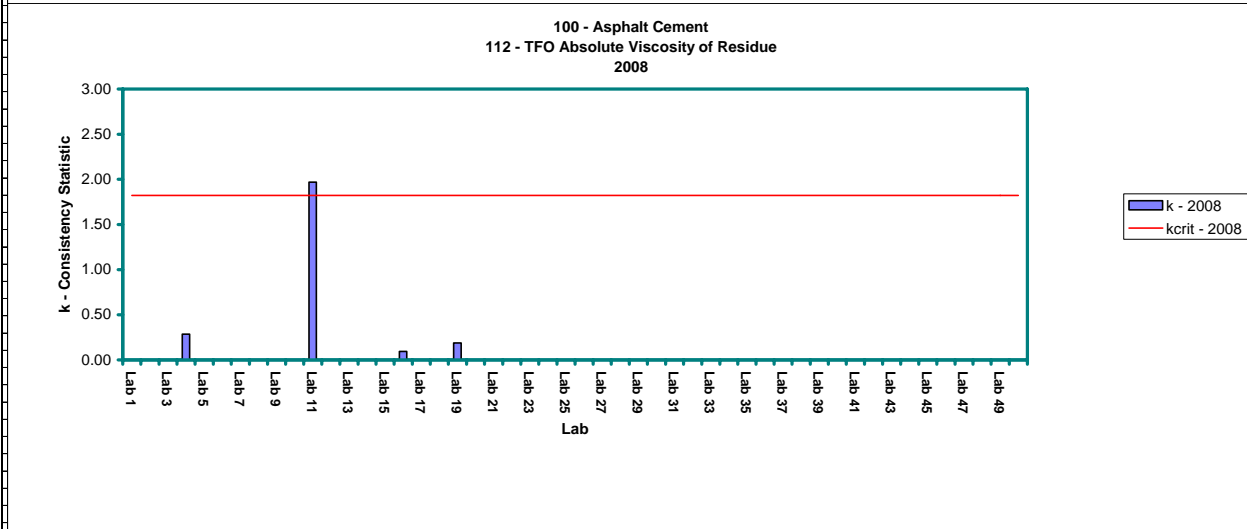
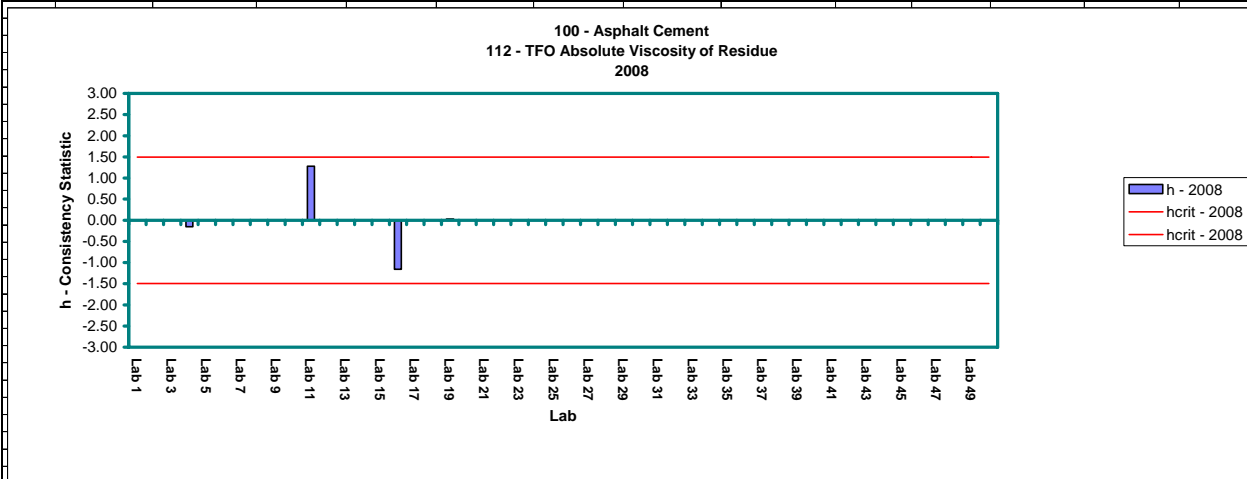
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation $(X_{ave} - (X_{ave})_{ave})$	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
111 - TFO Kinematic Viscosity of Residue													
2008													
Data				n = 3	$(X_{ave})_{ave} = 370.9867$	$s_r = 9.9809$	Check $s_{X_{ave}} = 19.0943$						
				p = 3	$S_{X_{ave}} = 19.0943$	$s_{Rr} = 20.7606$	$r = 2.8 s_r = 27.6655$						
				Significance Level = 0.5%		$s_R = 20.7606$	$R = 2.8 s_R = 57.5455$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.15	-1.15	1.67
Lab 2											1.15	-1.15	1.67
Lab 3											1.15	-1.15	1.67
Lab 4	356.7700	380.4900	389.6200		375.6267	16.9564	4.6400	287.5196	0.24	1.70	1.15	-1.15	1.67
Lab 5											1.15	-1.15	1.67
Lab 6											1.15	-1.15	1.67
Lab 7											1.15	-1.15	1.67
Lab 8											1.15	-1.15	1.67
Lab 9											1.15	-1.15	1.67
Lab 10											1.15	-1.15	1.67
Lab 11	387.0000	389.0000	386.0000		387.3333	1.5275	16.3467	2.3333	0.86	0.15	1.15	-1.15	1.67
Lab 12											1.15	-1.15	1.67
Lab 13											1.15	-1.15	1.67
Lab 14											1.15	-1.15	1.67
Lab 15											1.15	-1.15	1.67
Lab 16											1.15	-1.15	1.67
Lab 17											1.15	-1.15	1.67
Lab 18											1.15	-1.15	1.67
Lab 19	350.0000	353.0000	347.0000		350.0000	3.0000	-20.9867	9.0000	-1.10	0.30	1.15	-1.15	1.67
Lab 20											1.15	-1.15	1.67
Lab 21											1.15	-1.15	1.67
Lab 22											1.15	-1.15	1.67
Lab 23											1.15	-1.15	1.67
Lab 24											1.15	-1.15	1.67
Lab 25											1.15	-1.15	1.67
Lab 26											1.15	-1.15	1.67
Lab 27											1.15	-1.15	1.67
Lab 28											1.15	-1.15	1.67
Lab 29											1.15	-1.15	1.67
Lab 30											1.15	-1.15	1.67
Lab 31											1.15	-1.15	1.67
Lab 32											1.15	-1.15	1.67
Lab 33											1.15	-1.15	1.67
Lab 34											1.15	-1.15	1.67
Lab 35											1.15	-1.15	1.67
Lab 36											1.15	-1.15	1.67
Lab 37											1.15	-1.15	1.67
Lab 38											1.15	-1.15	1.67
Lab 39											1.15	-1.15	1.67
Lab 40											1.15	-1.15	1.67
Lab 41											1.15	-1.15	1.67
Lab 42											1.15	-1.15	1.67
Lab 43											1.15	-1.15	1.67
Lab 44											1.15	-1.15	1.67
Lab 45											1.15	-1.15	1.67
Lab 46											1.15	-1.15	1.67
Lab 47											1.15	-1.15	1.67
Lab 48											1.15	-1.15	1.67
Lab 49											1.15	-1.15	1.67
Lab 50											1.15	-1.15	1.67
Additional Statistics				Minimum X_{ave}	350.0000	$r = 2.8 s_r =$	27.6655	$h_{crit} =$	1.15				
				Maximum X_{ave}	387.3333	$R = 2.8 s_R =$	57.5455	$h_{crit} =$	-1.15				
				Check $s_{X_{ave}} =$	19.0943			$k_{crit} =$	1.67				
Where:	$x_1, \dots, x_n =$	Individual Test Result			Where:	$(X_{ave})_{ave} =$	Average of Cell Averages						
	$X_{ave} =$	Cell Average				$s_{ave} =$	Standard Deviation of Cell Averages						
	n =	Number of Test Results per Cell				$s_r =$	Repeatability Standard Deviation						
	s =	Cell Standard Deviation				$s_{Rr} =$	Interim Reproducibility Standard Deviation						
	d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$	Reproducibility Standard Deviation (Larger of s_r and s_{Rr})						
	$s^2 =$	Cell Variation				h =	Between Laboratory Consistency Statistic						
	p =	Number of Laboratories				k =	Within Laboratory Consistency Statistic						
	$h_{crit} =$	Critical Between Laboratory Consistency Statistic				r =	95% Confidence Limit for Repeatability						
	$k_{crit} =$	Critical Within Laboratory Consistency Statistic				R =	95% Confidence Limit for Reproducibility						



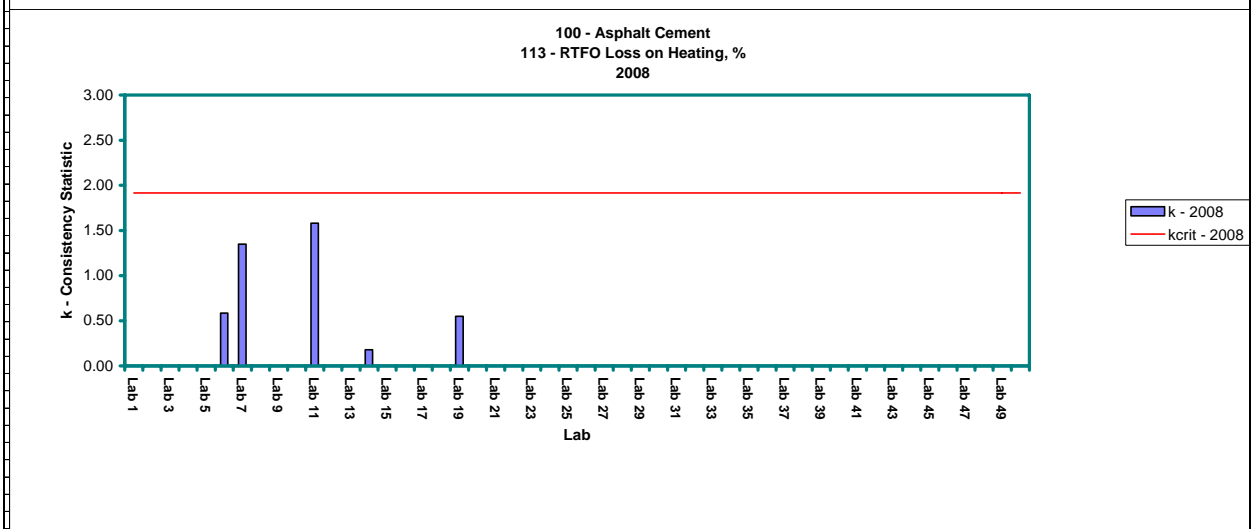
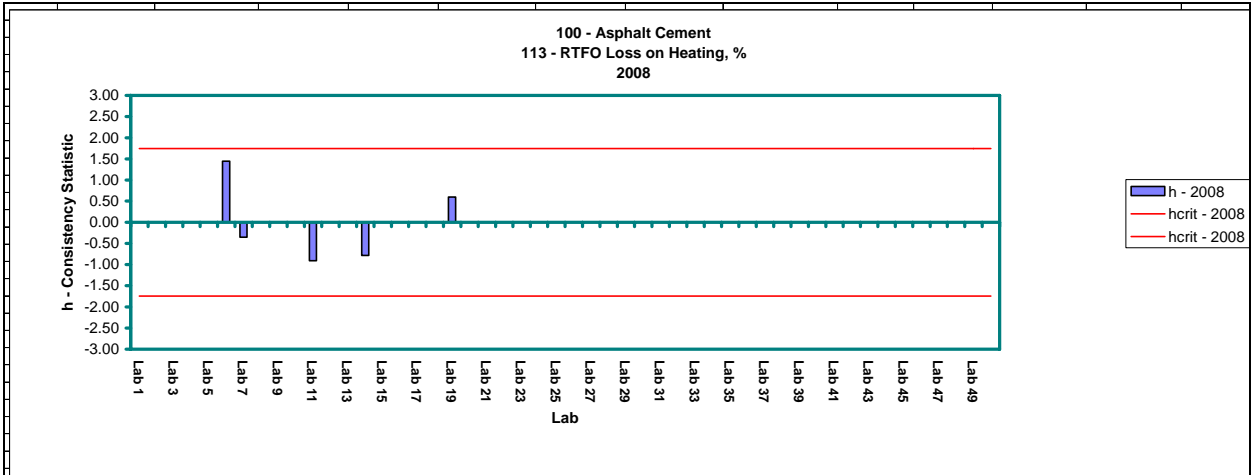
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation $(X_{ave} - (X_{ave})_{ave})$	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
112 - TFO Absolute Viscosity of Residue													
2008													
Data				n = 3	$(X_{ave})_{ave} = 187.3417$	$s_r = 6.7727$	Check $s_{X_{ave}} = 12.4340$						
				p = 4	$S_{X_{ave}} = 12.4340$	$s_{R^*} = 13.6083$	$r = 2.8 s_r = 18.7731$						
				Significance Level = 0.5%		$s_R = 13.6083$	$R = 2.8 s_R = 37.7202$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.49	-1.49	1.82
Lab 2											1.49	-1.49	1.82
Lab 3											1.49	-1.49	1.82
Lab 4	186.0000	187.0700	183.3300		185.4667	1.9262	-1.8750	3.7102	-0.15	0.28	1.49	-1.49	1.82
Lab 5											1.49	-1.49	1.82
Lab 6											1.49	-1.49	1.82
Lab 7											1.49	-1.49	1.82
Lab 8											1.49	-1.49	1.82
Lab 9											1.49	-1.49	1.82
Lab 10											1.49	-1.49	1.82
Lab 11	189.4000	216.0000	204.3000		203.2333	13.3320	15.8917	177.7433	1.28	1.97	1.49	-1.49	1.82
Lab 12											1.49	-1.49	1.82
Lab 13											1.49	-1.49	1.82
Lab 14											1.49	-1.49	1.82
Lab 15											1.49	-1.49	1.82
Lab 16	173.2000	173.4000	172.2000		172.9333	0.6429	-14.4083	0.4133	-1.16	0.09	1.49	-1.49	1.82
Lab 17											1.49	-1.49	1.82
Lab 18											1.49	-1.49	1.82
Lab 19	187.0000	189.2000	187.0000		187.7333	1.2702	0.3917	1.6133	0.03	0.19	1.49	-1.49	1.82
Lab 20											1.49	-1.49	1.82
Lab 21											1.49	-1.49	1.82
Lab 22											1.49	-1.49	1.82
Lab 23											1.49	-1.49	1.82
Lab 24											1.49	-1.49	1.82
Lab 25											1.49	-1.49	1.82
Lab 26											1.49	-1.49	1.82
Lab 27											1.49	-1.49	1.82
Lab 28											1.49	-1.49	1.82
Lab 29											1.49	-1.49	1.82
Lab 30											1.49	-1.49	1.82
Lab 31											1.49	-1.49	1.82
Lab 32											1.49	-1.49	1.82
Lab 33											1.49	-1.49	1.82
Lab 34											1.49	-1.49	1.82
Lab 35											1.49	-1.49	1.82
Lab 36											1.49	-1.49	1.82
Lab 37											1.49	-1.49	1.82
Lab 38											1.49	-1.49	1.82
Lab 39											1.49	-1.49	1.82
Lab 40											1.49	-1.49	1.82
Lab 41											1.49	-1.49	1.82
Lab 42											1.49	-1.49	1.82
Lab 43											1.49	-1.49	1.82
Lab 44											1.49	-1.49	1.82
Lab 45											1.49	-1.49	1.82
Lab 46											1.49	-1.49	1.82
Lab 47											1.49	-1.49	1.82
Lab 48											1.49	-1.49	1.82
Lab 49											1.49	-1.49	1.82
Lab 50											1.49	-1.49	1.82
Additional Statistics				Minimum X_{ave}	172.9333	$r = 2.8 s_r =$	18.7731	$h_{crit} =$	1.49				
				Maximum X_{ave}	203.2333	$R = 2.8 s_R =$	37.7202	$h_{crit} =$	-1.49				
				Check $s_{X_{ave}} =$	12.4340			$k_{crit} =$	1.82				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: $(X_{ave})_{ave} =$		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{ave} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



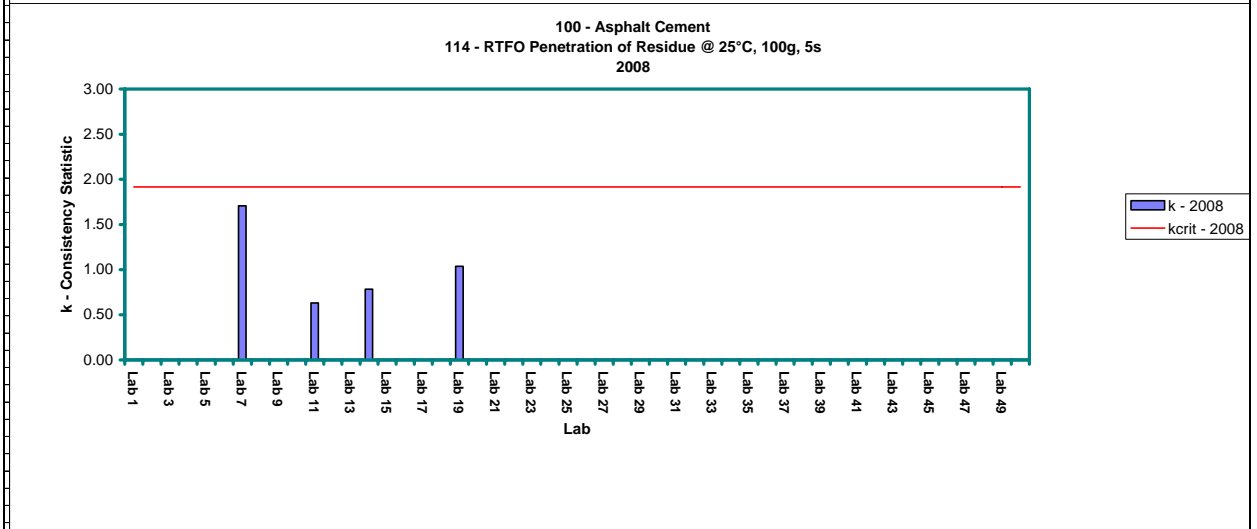
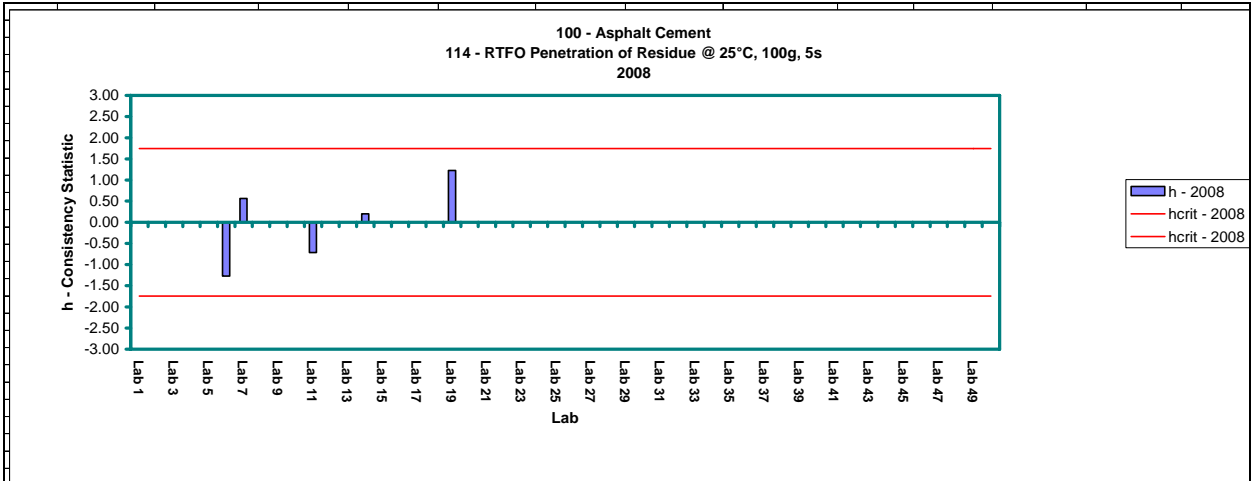
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
113 - RTFO Loss on Heating, %													
2008													
Data				n =	3	$(X_{ave})_{ave} =$	0.2346	$s_r =$	0.0256	Check $s_{X_{ave}} =$			0.0409
				p =	5	$S_{X_{ave}} =$	0.0409	$s_{R^*} =$	0.0459	$r = 2.8 s_r =$			0.0710
				Significance Level =	0.5%			$s_R =$	0.0459	$R = 2.8 s_R =$			0.1272
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.74	-1.74	1.92
Lab 2											1.74	-1.74	1.92
Lab 3											1.74	-1.74	1.92
Lab 4											1.74	-1.74	1.92
Lab 5											1.74	-1.74	1.92
Lab 6	0.2770	0.2980	0.3060		0.2937	0.0150	0.0590	0.0002	1.44	0.59	1.74	-1.74	1.92
Lab 7	0.1850	0.2220	0.2540		0.2203	0.0345	-0.0143	0.0012	-0.35	1.35	1.74	-1.74	1.92
Lab 8											1.74	-1.74	1.92
Lab 9											1.74	-1.74	1.92
Lab 10											1.74	-1.74	1.92
Lab 11	0.2443	0.1752	0.1732		0.1976	0.0405	-0.0371	0.0016	-0.91	1.58	1.74	-1.74	1.92
Lab 12											1.74	-1.74	1.92
Lab 13											1.74	-1.74	1.92
Lab 14	0.2000	0.2080	0.2000		0.2027	0.0046	-0.0320	0.0000	-0.78	0.18	1.74	-1.74	1.92
Lab 15											1.74	-1.74	1.92
Lab 16											1.74	-1.74	1.92
Lab 17											1.74	-1.74	1.92
Lab 18											1.74	-1.74	1.92
Lab 19	0.2440	0.2720	0.2610		0.2590	0.0141	0.0244	0.0002	0.60	0.55	1.74	-1.74	1.92
Lab 20											1.74	-1.74	1.92
Lab 21											1.74	-1.74	1.92
Lab 22											1.74	-1.74	1.92
Lab 23											1.74	-1.74	1.92
Lab 24											1.74	-1.74	1.92
Lab 25											1.74	-1.74	1.92
Lab 26											1.74	-1.74	1.92
Lab 27											1.74	-1.74	1.92
Lab 28											1.74	-1.74	1.92
Lab 29											1.74	-1.74	1.92
Lab 30											1.74	-1.74	1.92
Lab 31											1.74	-1.74	1.92
Lab 32											1.74	-1.74	1.92
Lab 33											1.74	-1.74	1.92
Lab 34											1.74	-1.74	1.92
Lab 35											1.74	-1.74	1.92
Lab 36											1.74	-1.74	1.92
Lab 37											1.74	-1.74	1.92
Lab 38											1.74	-1.74	1.92
Lab 39											1.74	-1.74	1.92
Lab 40											1.74	-1.74	1.92
Lab 41											1.74	-1.74	1.92
Lab 42											1.74	-1.74	1.92
Lab 43											1.74	-1.74	1.92
Lab 44											1.74	-1.74	1.92
Lab 45											1.74	-1.74	1.92
Lab 46											1.74	-1.74	1.92
Lab 47											1.74	-1.74	1.92
Lab 48											1.74	-1.74	1.92
Lab 49											1.74	-1.74	1.92
Lab 50											1.74	-1.74	1.92
Additional Statistics				Minimum X_{ave}	0.1976	$r = 2.8 s_r =$	0.0710	$h_{crit} =$	1.74				
				Maximum X_{ave}	0.2937	$R = 2.8 s_R =$	0.1272	$h_{crit} =$	-1.74				
				Check $s_{X_{ave}} =$	0.0409			$k_{crit} =$	1.92				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{ave} =$		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
s =		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories				k =		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				r =		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				R =		95% Confidence Limit for Reproducibility					



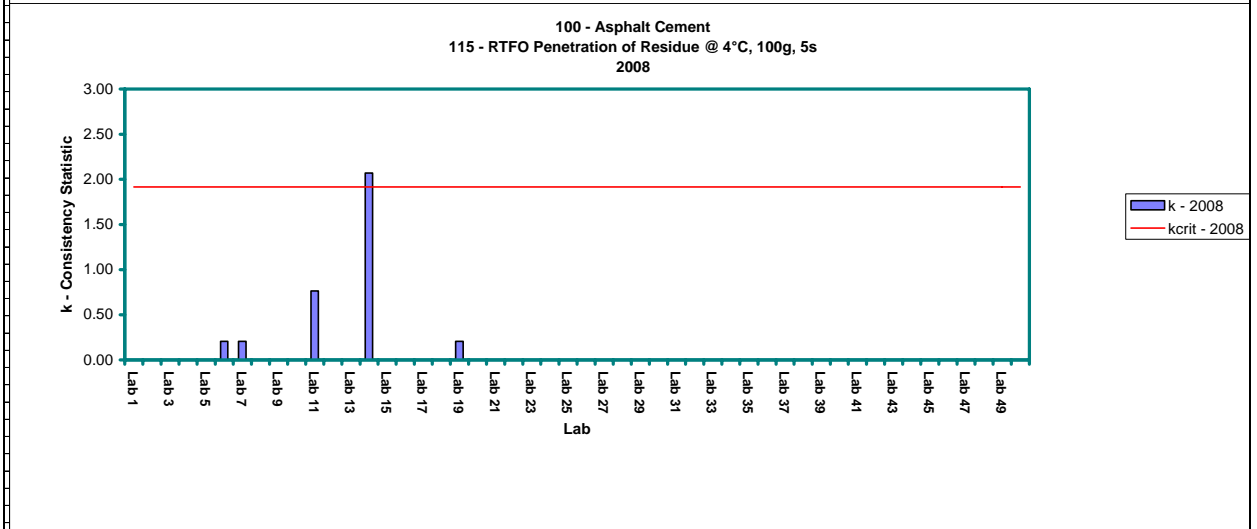
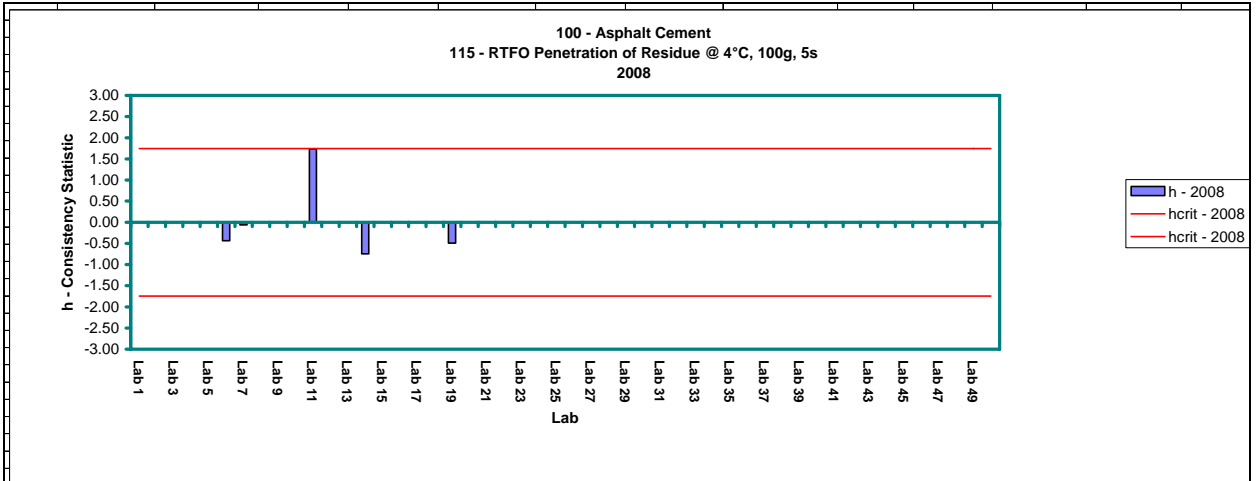
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
114 - RTFO Penetration of Residue @ 25°C, 100g, 5s													
2008													
Data				n = 3	(X _{ave}) _{ave} = 91.7733	s _r = 1.4740	Check s _{X_{ave}} = 4.5303						
				p = 5	S _{X_{ave}} = 4.5303	s _R = 4.6874	r = 2.8 s _r = 4.0857						
				Significance Level = 0.5%		s _R = 4.6874	R = 2.8 s _R = 12.9929						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.74	-1.74	1.92
Lab 2											1.74	-1.74	1.92
Lab 3											1.74	-1.74	1.92
Lab 4											1.74	-1.74	1.92
Lab 5											1.74	-1.74	1.92
Lab 6	86.0000	86.0000	86.0000		86.0000	0.0000	-5.7733	0.0000	-1.27	0.00	1.74	-1.74	1.92
Lab 7	92.0000	94.0000	97.0000		94.3333	2.5166	2.5600	6.3333	0.57	1.71	1.74	-1.74	1.92
Lab 8											1.74	-1.74	1.92
Lab 9											1.74	-1.74	1.92
Lab 10											1.74	-1.74	1.92
Lab 11	89.3000	87.5000	88.8000		88.5333	0.9292	-3.2400	0.8633	-0.72	0.63	1.74	-1.74	1.92
Lab 12											1.74	-1.74	1.92
Lab 13											1.74	-1.74	1.92
Lab 14	94.0000	92.0000	92.0000		92.6667	1.1547	0.8933	1.3333	0.20	0.78	1.74	-1.74	1.92
Lab 15											1.74	-1.74	1.92
Lab 16											1.74	-1.74	1.92
Lab 17											1.74	-1.74	1.92
Lab 18											1.74	-1.74	1.92
Lab 19	96.0000	99.0000	97.0000		97.3333	1.5275	5.5600	2.3333	1.23	1.04	1.74	-1.74	1.92
Lab 20											1.74	-1.74	1.92
Lab 21											1.74	-1.74	1.92
Lab 22											1.74	-1.74	1.92
Lab 23											1.74	-1.74	1.92
Lab 24											1.74	-1.74	1.92
Lab 25											1.74	-1.74	1.92
Lab 26											1.74	-1.74	1.92
Lab 27											1.74	-1.74	1.92
Lab 28											1.74	-1.74	1.92
Lab 29											1.74	-1.74	1.92
Lab 30											1.74	-1.74	1.92
Lab 31											1.74	-1.74	1.92
Lab 32											1.74	-1.74	1.92
Lab 33											1.74	-1.74	1.92
Lab 34											1.74	-1.74	1.92
Lab 35											1.74	-1.74	1.92
Lab 36											1.74	-1.74	1.92
Lab 37											1.74	-1.74	1.92
Lab 38											1.74	-1.74	1.92
Lab 39											1.74	-1.74	1.92
Lab 40											1.74	-1.74	1.92
Lab 41											1.74	-1.74	1.92
Lab 42											1.74	-1.74	1.92
Lab 43											1.74	-1.74	1.92
Lab 44											1.74	-1.74	1.92
Lab 45											1.74	-1.74	1.92
Lab 46											1.74	-1.74	1.92
Lab 47											1.74	-1.74	1.92
Lab 48											1.74	-1.74	1.92
Lab 49											1.74	-1.74	1.92
Lab 50											1.74	-1.74	1.92
Additional Statistics				Minimum X _{ave}	86.0000	r = 2.8 s _r =	4.0857	h _{crit} =	1.74				
				Maximum X _{ave}	97.3333	R = 2.8 s _R =	12.9929	h _{crit} =	-1.74				
				Check s _{X_{ave}}	4.5303			k _{crit} =	1.92				
Where: x ₁ ...x _n =		Individual Test Result		Where:		(X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =		Cell Average		s _{ave} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



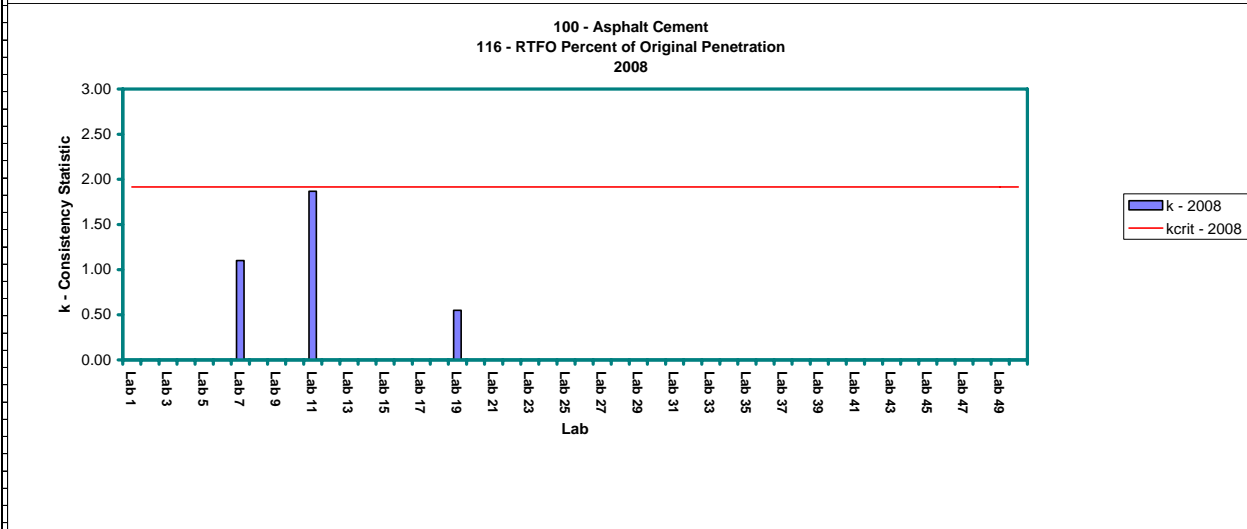
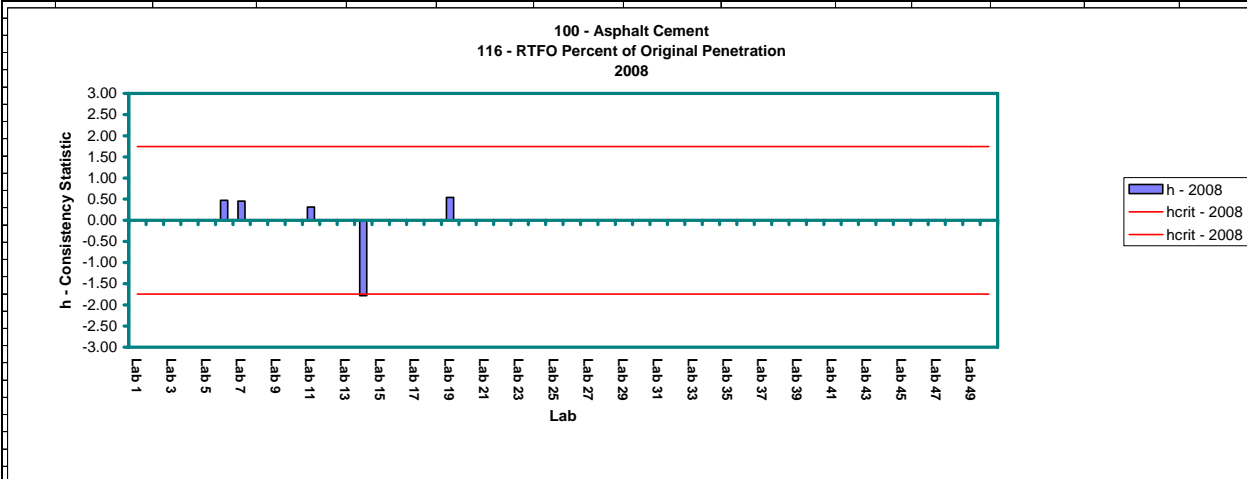
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
115 - RTFO Penetration of Residue @ 4°C, 100g, 5s													
2008													
Data				n = 3	(X _{ave}) _{ave} = 16.3867	s _r = 2.7880	Check s _{X_{ave}} = 11.6554						
				p = 5	S _{X_{ave}} = 11.6554	s _R = 11.8756	r = 2.8 s _r = 7.7278						
				Significance Level = 0.5%		s _R = 11.8756	R = 2.8 s _R = 32.9174						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.74	-1.74	1.92
Lab 2											1.74	-1.74	1.92
Lab 3											1.74	-1.74	1.92
Lab 4											1.74	-1.74	1.92
Lab 5											1.74	-1.74	1.92
Lab 6	12.0000	11.0000	11.0000		11.3333	0.5774	-5.0533	0.3333	-0.43	0.21	1.74	-1.74	1.92
Lab 7	16.0000	16.0000	15.0000		15.6667	0.5774	-0.7200	0.3333	-0.06	0.21	1.74	-1.74	1.92
Lab 8											1.74	-1.74	1.92
Lab 9											1.74	-1.74	1.92
Lab 10											1.74	-1.74	1.92
Lab 11	38.5000	34.3000	37.0000		36.6000	2.1284	20.2133	4.5300	1.73	0.76	1.74	-1.74	1.92
Lab 12											1.74	-1.74	1.92
Lab 13											1.74	-1.74	1.92
Lab 14	11.0000	11.0000	1.0000		7.6667	5.7735	-8.7200	33.3333	-0.75	2.07	1.74	-1.74	1.92
Lab 15											1.74	-1.74	1.92
Lab 16											1.74	-1.74	1.92
Lab 17											1.74	-1.74	1.92
Lab 18											1.74	-1.74	1.92
Lab 19	11.0000	11.0000	10.0000		10.6667	0.5774	-5.7200	0.3333	-0.49	0.21	1.74	-1.74	1.92
Lab 20											1.74	-1.74	1.92
Lab 21											1.74	-1.74	1.92
Lab 22											1.74	-1.74	1.92
Lab 23											1.74	-1.74	1.92
Lab 24											1.74	-1.74	1.92
Lab 25											1.74	-1.74	1.92
Lab 26											1.74	-1.74	1.92
Lab 27											1.74	-1.74	1.92
Lab 28											1.74	-1.74	1.92
Lab 29											1.74	-1.74	1.92
Lab 30											1.74	-1.74	1.92
Lab 31											1.74	-1.74	1.92
Lab 32											1.74	-1.74	1.92
Lab 33											1.74	-1.74	1.92
Lab 34											1.74	-1.74	1.92
Lab 35											1.74	-1.74	1.92
Lab 36											1.74	-1.74	1.92
Lab 37											1.74	-1.74	1.92
Lab 38											1.74	-1.74	1.92
Lab 39											1.74	-1.74	1.92
Lab 40											1.74	-1.74	1.92
Lab 41											1.74	-1.74	1.92
Lab 42											1.74	-1.74	1.92
Lab 43											1.74	-1.74	1.92
Lab 44											1.74	-1.74	1.92
Lab 45											1.74	-1.74	1.92
Lab 46											1.74	-1.74	1.92
Lab 47											1.74	-1.74	1.92
Lab 48											1.74	-1.74	1.92
Lab 49											1.74	-1.74	1.92
Lab 50											1.74	-1.74	1.92
Additional Statistics				Minimum X _{ave}	7.6667	r = 2.8 s _r =	7.7278	h _{crit} =	1.74				
				Maximum X _{ave}	36.6000	R = 2.8 s _R =	32.9174	h _{crit} =	-1.74				
				Check s _{X_{ave}}	11.6554			k _{crit} =	1.92				
Where: x ₁ ...x _n =		Individual Test Result		Where:		(X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =		Cell Average		s _{ave} =		s _{ave} =		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell		s _r =		s _r =		Repeatability Standard Deviation					
s =		Cell Standard Deviation		s _R =		s _R =		Interim Reproducibility Standard Deviation					
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
s ² =		Cell Variation		h =		h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories		k =		k =		Within Laboratory Consistency Statistic					
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		r =		95% Confidence Limit for Repeatability					
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		R =		95% Confidence Limit for Reproducibility					



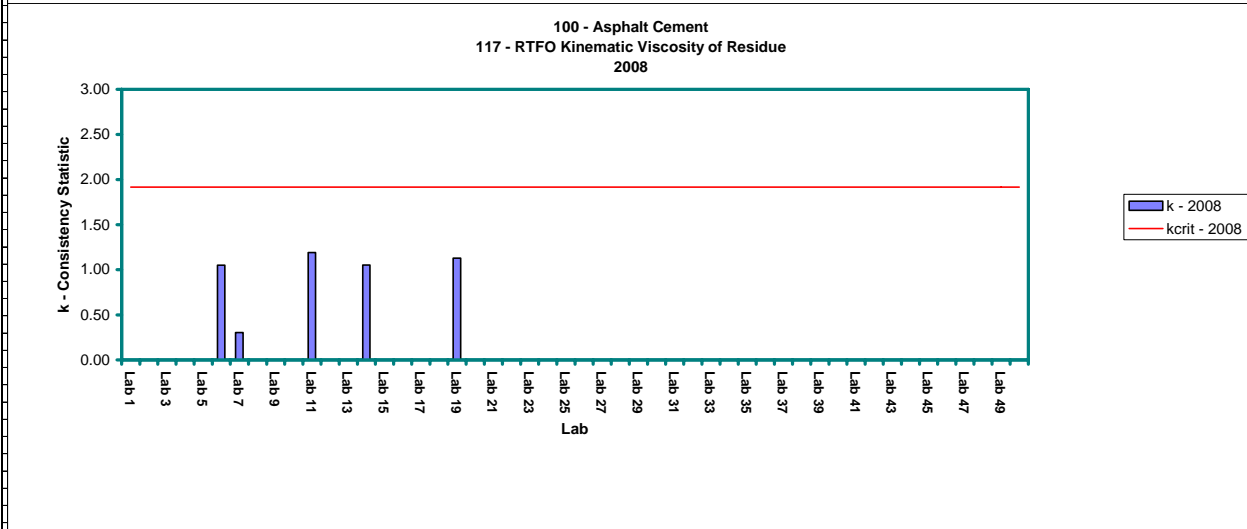
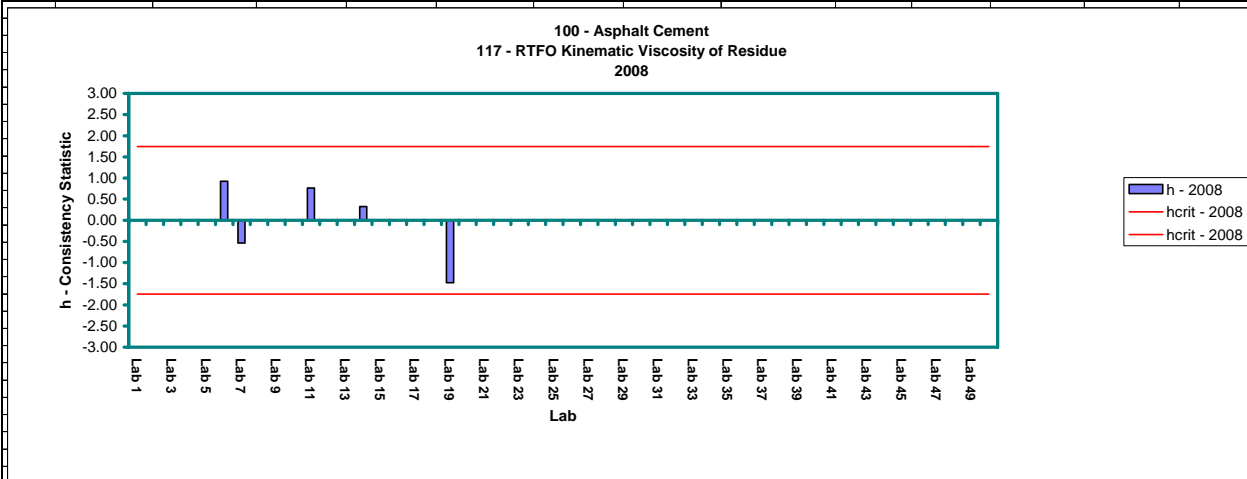
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
116 - RTFO Percent of Original Penetration													
2008													
Data				n =	3	(X_{ave}) _{ave} =	46.0067	s_r =	1.0498	Check $s_{X_{ave}}$ = 19.0741			
				p =	5	$S_{X_{ave}}$ =	19.0741	s_{R^*} =	19.0934	$r = 2.8$ $s_r = 2.9098$			
				Significance Level =			0.5%	s_R =	19.0934	$R = 2.8$ $s_R = 52.9241$			
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.74	-1.74	1.92
Lab 2											1.74	-1.74	1.92
Lab 3											1.74	-1.74	1.92
Lab 4											1.74	-1.74	1.92
Lab 5											1.74	-1.74	1.92
Lab 6	55.0000	55.0000	55.0000		55.0000	0.0000	8.9933	0.0000	0.47	0.00	1.74	-1.74	1.92
Lab 7	54.0000	56.0000	54.0000		54.6667	1.1547	8.6600	1.3333	0.45	1.10	1.74	-1.74	1.92
Lab 8											1.74	-1.74	1.92
Lab 9											1.74	-1.74	1.92
Lab 10											1.74	-1.74	1.92
Lab 11	50.2000	51.8000	54.1000		52.0333	1.9604	6.0267	3.8433	0.32	1.87	1.74	-1.74	1.92
Lab 12											1.74	-1.74	1.92
Lab 13											1.74	-1.74	1.92
Lab 14	12.0000	12.0000	12.0000		12.0000	0.0000	-34.0067	0.0000	-1.78	0.00	1.74	-1.74	1.92
Lab 15											1.74	-1.74	1.92
Lab 16											1.74	-1.74	1.92
Lab 17											1.74	-1.74	1.92
Lab 18											1.74	-1.74	1.92
Lab 19	56.0000	57.0000	56.0000		56.3333	0.5774	10.3267	0.3333	0.54	0.55	1.74	-1.74	1.92
Lab 20											1.74	-1.74	1.92
Lab 21											1.74	-1.74	1.92
Lab 22											1.74	-1.74	1.92
Lab 23											1.74	-1.74	1.92
Lab 24											1.74	-1.74	1.92
Lab 25											1.74	-1.74	1.92
Lab 26											1.74	-1.74	1.92
Lab 27											1.74	-1.74	1.92
Lab 28											1.74	-1.74	1.92
Lab 29											1.74	-1.74	1.92
Lab 30											1.74	-1.74	1.92
Lab 31											1.74	-1.74	1.92
Lab 32											1.74	-1.74	1.92
Lab 33											1.74	-1.74	1.92
Lab 34											1.74	-1.74	1.92
Lab 35											1.74	-1.74	1.92
Lab 36											1.74	-1.74	1.92
Lab 37											1.74	-1.74	1.92
Lab 38											1.74	-1.74	1.92
Lab 39											1.74	-1.74	1.92
Lab 40											1.74	-1.74	1.92
Lab 41											1.74	-1.74	1.92
Lab 42											1.74	-1.74	1.92
Lab 43											1.74	-1.74	1.92
Lab 44											1.74	-1.74	1.92
Lab 45											1.74	-1.74	1.92
Lab 46											1.74	-1.74	1.92
Lab 47											1.74	-1.74	1.92
Lab 48											1.74	-1.74	1.92
Lab 49											1.74	-1.74	1.92
Lab 50											1.74	-1.74	1.92
Additional Statistics				Minimum X_{ave}	12.0000	$r = 2.8$ $s_r =$	2.9098	$h_{crit} =$	1.74				
				Maximum X_{ave}	56.3333	$R = 2.8$ $s_R =$	52.9241	$h_{crit} =$	-1.74				
				Check $s_{X_{ave}}$	19.0741			$k_{crit} =$	1.92				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: (X_{ave}) _{ave} =		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{X_{ave}} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



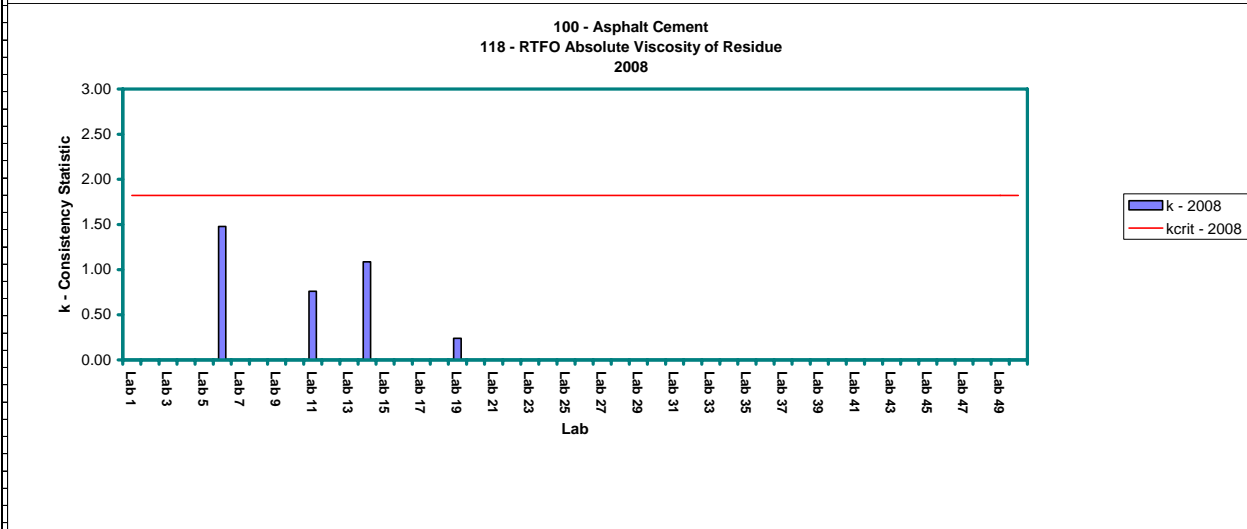
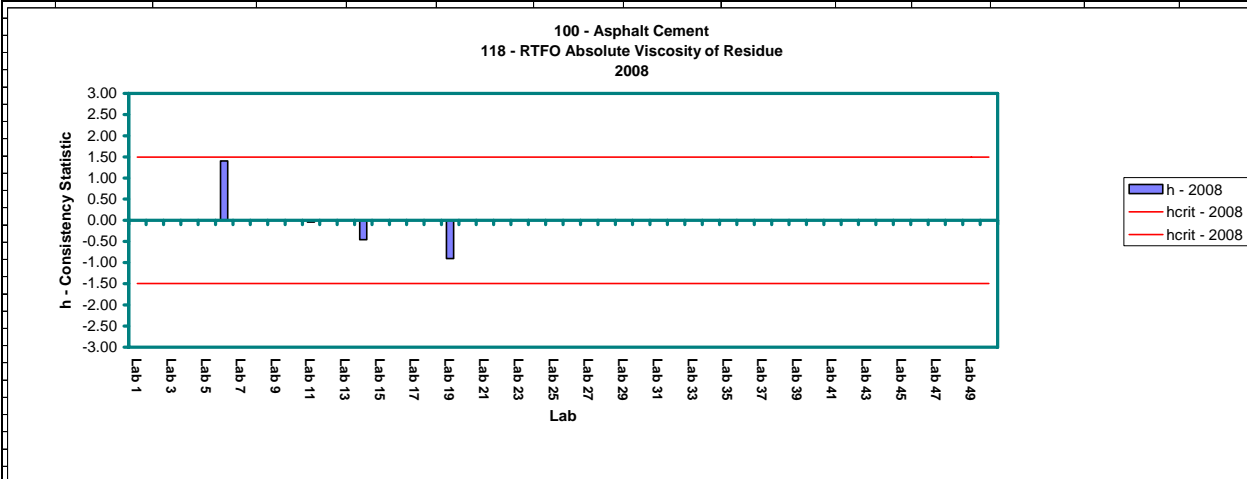
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

100 - Asphalt Cement													
117 - RTFO Kinematic Viscosity of Residue													
2008													
Data				n = 3	(X_{ave}) _{ave} = 378.1067	s_r = 5.0325	Check $s_{X_{ave}}$ = 18.1727						
				p = 5	$S_{X_{ave}}$ = 18.1727	s_{R^*} = 18.6314	r = 2.8 s_r = 13.9495						
				Significance Level = 0.5%		s_R = 18.6314	R = 2.8 s_R = 51.6437						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.74	-1.74	1.92
Lab 2											1.74	-1.74	1.92
Lab 3											1.74	-1.74	1.92
Lab 4											1.74	-1.74	1.92
Lab 5											1.74	-1.74	1.92
Lab 6	390.6200	393.1900	400.7900		394.8667	5.2883	16.7600	27.9656	0.92	1.05	1.74	-1.74	1.92
Lab 7	367.0000	370.0000	368.0000		368.3333	1.5275	-9.7733	2.3333	-0.54	0.30	1.74	-1.74	1.92
Lab 8											1.74	-1.74	1.92
Lab 9											1.74	-1.74	1.92
Lab 10											1.74	-1.74	1.92
Lab 11	398.0000	392.0000	386.0000		392.0000	6.0000	13.8933	36.0000	0.76	1.19	1.74	-1.74	1.92
Lab 12											1.74	-1.74	1.92
Lab 13											1.74	-1.74	1.92
Lab 14	378.0000	386.0000	388.0000		384.0000	5.2915	5.8933	28.0000	0.32	1.05	1.74	-1.74	1.92
Lab 15											1.74	-1.74	1.92
Lab 16											1.74	-1.74	1.92
Lab 17											1.74	-1.74	1.92
Lab 18											1.74	-1.74	1.92
Lab 19	345.0000	353.0000	356.0000		351.3333	5.6862	-26.7733	32.3333	-1.47	1.13	1.74	-1.74	1.92
Lab 20											1.74	-1.74	1.92
Lab 21											1.74	-1.74	1.92
Lab 22											1.74	-1.74	1.92
Lab 23											1.74	-1.74	1.92
Lab 24											1.74	-1.74	1.92
Lab 25											1.74	-1.74	1.92
Lab 26											1.74	-1.74	1.92
Lab 27											1.74	-1.74	1.92
Lab 28											1.74	-1.74	1.92
Lab 29											1.74	-1.74	1.92
Lab 30											1.74	-1.74	1.92
Lab 31											1.74	-1.74	1.92
Lab 32											1.74	-1.74	1.92
Lab 33											1.74	-1.74	1.92
Lab 34											1.74	-1.74	1.92
Lab 35											1.74	-1.74	1.92
Lab 36											1.74	-1.74	1.92
Lab 37											1.74	-1.74	1.92
Lab 38											1.74	-1.74	1.92
Lab 39											1.74	-1.74	1.92
Lab 40											1.74	-1.74	1.92
Lab 41											1.74	-1.74	1.92
Lab 42											1.74	-1.74	1.92
Lab 43											1.74	-1.74	1.92
Lab 44											1.74	-1.74	1.92
Lab 45											1.74	-1.74	1.92
Lab 46											1.74	-1.74	1.92
Lab 47											1.74	-1.74	1.92
Lab 48											1.74	-1.74	1.92
Lab 49											1.74	-1.74	1.92
Lab 50											1.74	-1.74	1.92
Additional Statistics				Minimum X_{ave}	351.3333	$r = 2.8$ $s_r =$	13.9495	$h_{crit} =$	1.74				
				Maximum X_{ave}	394.8667	$R = 2.8$ $s_R =$	51.6437	$h_{crit} =$	-1.74				
				Check $s_{X_{ave}}$	18.1727			$k_{crit} =$	1.92				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{ave} =$		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
s =		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories				k =		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				r =		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				R =		95% Confidence Limit for Reproducibility					



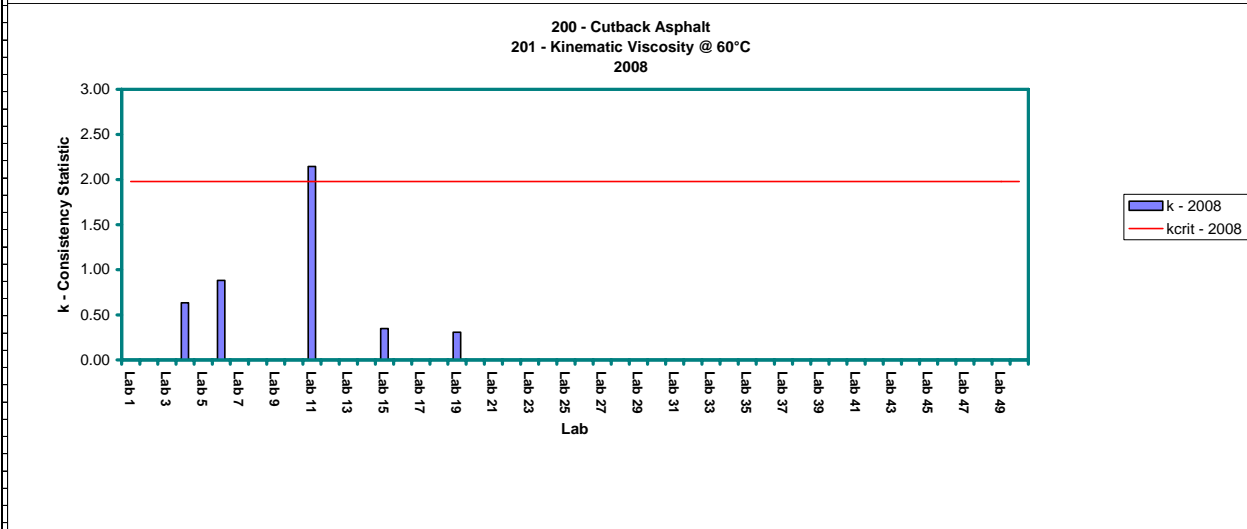
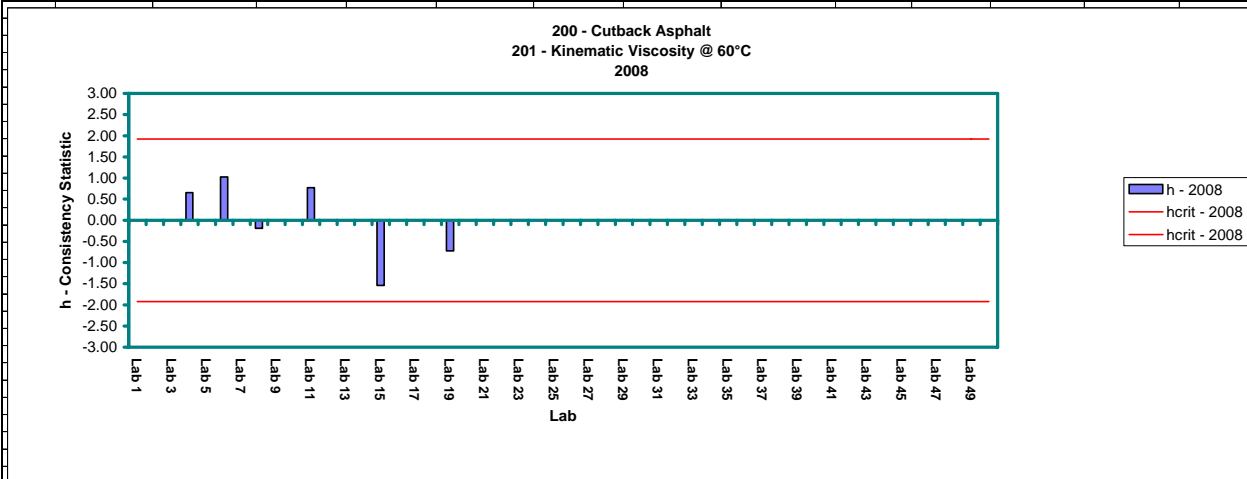
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages	
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell		S_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation		S_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		S_R =	Reproducibility Standard Deviation (Larger of S_r and S_{R^*})	
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility	

100 - Asphalt Cement													
118 - RTFO Absolute Viscosity of Residue													
2008													
Data				n = 3	(X_{ave}) _{ave} = 207.1917	s_r = 5.5144	Check $s_{X_{ave}}$ = 23.1392						
				p = 4	$S_{X_{ave}}$ = 23.1392	s_{R^*} = 23.5732	r = 2.8 s_r = 15.2851						
				Significance Level = 0.5%		s_R = 23.5732	R = 2.8 s_R = 65.3416						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.49	-1.49	1.82
Lab 2											1.49	-1.49	1.82
Lab 3											1.49	-1.49	1.82
Lab 4											1.49	-1.49	1.82
Lab 5											1.49	-1.49	1.82
Lab 6	236.0000	249.0000	234.0000		239.6667	8.1445	32.4750	66.3333	1.40	1.48	1.49	-1.49	1.82
Lab 7											1.49	-1.49	1.82
Lab 8											1.49	-1.49	1.82
Lab 9											1.49	-1.49	1.82
Lab 10											1.49	-1.49	1.82
Lab 11	201.5000	209.5000	207.7000		206.2333	4.1968	-0.9583	17.6133	-0.04	0.76	1.49	-1.49	1.82
Lab 12											1.49	-1.49	1.82
Lab 13											1.49	-1.49	1.82
Lab 14	189.8000	199.1000	201.0000		196.6333	5.9936	-10.5583	35.9233	-0.46	1.09	1.49	-1.49	1.82
Lab 15											1.49	-1.49	1.82
Lab 16											1.49	-1.49	1.82
Lab 17											1.49	-1.49	1.82
Lab 18											1.49	-1.49	1.82
Lab 19	184.7000	187.0000	187.0000		186.2333	1.3279	-20.9583	1.7633	-0.91	0.24	1.49	-1.49	1.82
Lab 20											1.49	-1.49	1.82
Lab 21											1.49	-1.49	1.82
Lab 22											1.49	-1.49	1.82
Lab 23											1.49	-1.49	1.82
Lab 24											1.49	-1.49	1.82
Lab 25											1.49	-1.49	1.82
Lab 26											1.49	-1.49	1.82
Lab 27											1.49	-1.49	1.82
Lab 28											1.49	-1.49	1.82
Lab 29											1.49	-1.49	1.82
Lab 30											1.49	-1.49	1.82
Lab 31											1.49	-1.49	1.82
Lab 32											1.49	-1.49	1.82
Lab 33											1.49	-1.49	1.82
Lab 34											1.49	-1.49	1.82
Lab 35											1.49	-1.49	1.82
Lab 36											1.49	-1.49	1.82
Lab 37											1.49	-1.49	1.82
Lab 38											1.49	-1.49	1.82
Lab 39											1.49	-1.49	1.82
Lab 40											1.49	-1.49	1.82
Lab 41											1.49	-1.49	1.82
Lab 42											1.49	-1.49	1.82
Lab 43											1.49	-1.49	1.82
Lab 44											1.49	-1.49	1.82
Lab 45											1.49	-1.49	1.82
Lab 46											1.49	-1.49	1.82
Lab 47											1.49	-1.49	1.82
Lab 48											1.49	-1.49	1.82
Lab 49											1.49	-1.49	1.82
Lab 50											1.49	-1.49	1.82
Additional Statistics				Minimum X_{ave}	186.2333	r = 2.8 s_r =	15.2851	h_{crit} =	1.49				
				Maximum X_{ave}	239.6667	R = 2.8 s_R =	65.3416	h_{crit} =	-1.49				
				Check $s_{X_{ave}}$ =	23.1392			k_{crit} =	1.82				
Where: x_1, \dots, x_n =		Individual Test Result		Where: (X_{ave}) _{ave} =		Average of Cell Averages							
X_{ave} =		Cell Average		s_{ave} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s_r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s_{R^*} =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
s^2 =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h_{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k_{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



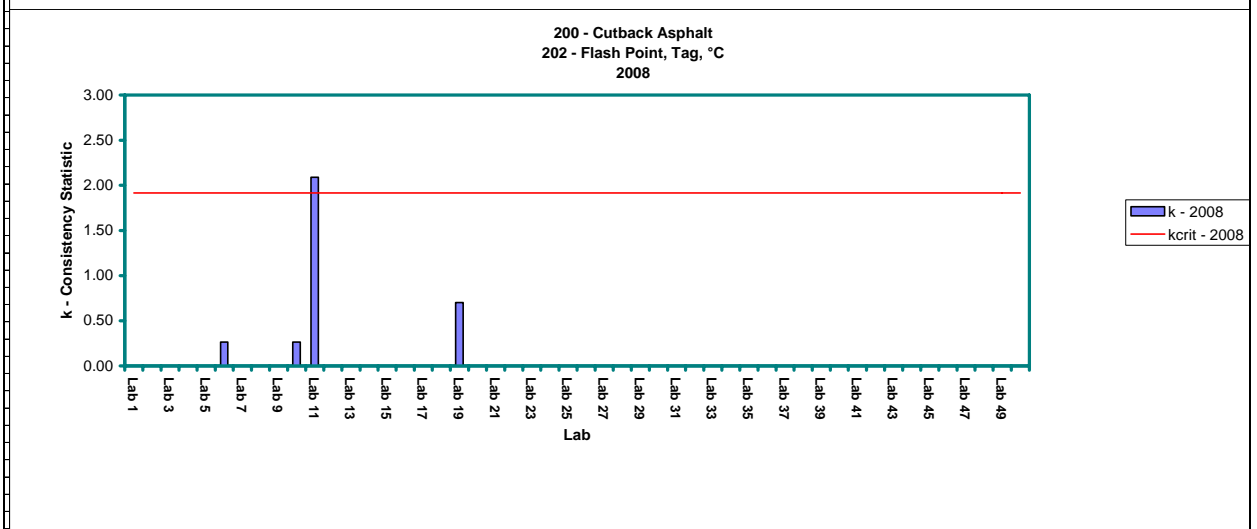
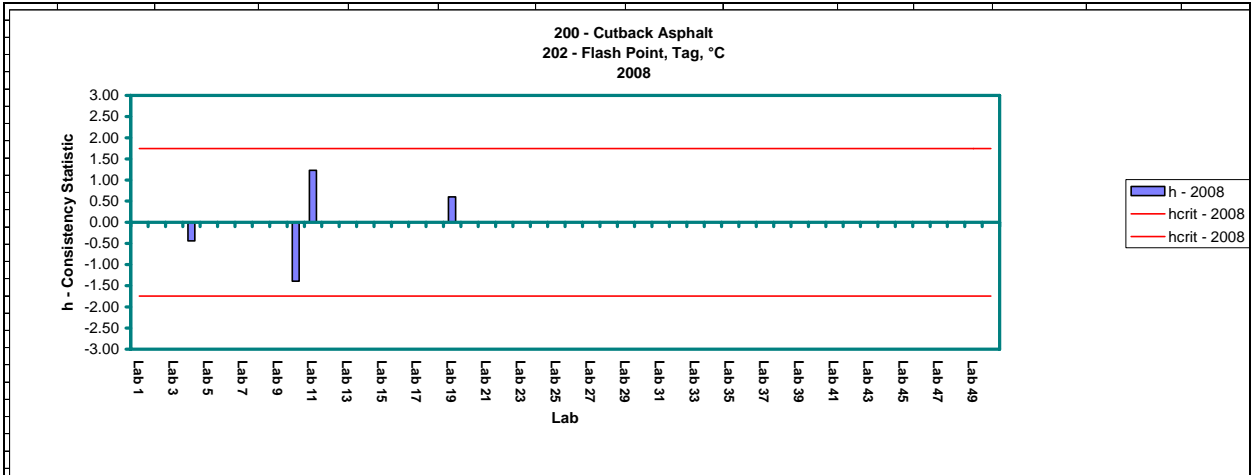
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages	
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	S_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	S_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	S_R =	Reproducibility Standard Deviation (Larger of s_r and S_{R^*})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

200 - Cutback Asphalt													
201 - Kinematic Viscosity @ 60°C													
2008													
Data				n = 3	(X _{ave}) _{ave} = 265.6744	s _r = 7.2403	Check s _{X_{ave}} = 14.2732						
				p = 6	S _{X_{ave}} = 14.2732	S _R = 15.4490	r = 2.8 s _r = 20.0691						
				Significance Level = 0.5%		S _R = 15.4490	R = 2.8 S _R = 42.8226						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	279.3700	275.5500	270.2300		275.0500	4.5905	9.3756	21.0724	0.66	0.63	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	275.4500	287.5100	277.8300		280.2633	6.3876	14.5889	40.8017	1.02	0.88	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	263.0000	263.0000	263.0000		263.0000	0.0000	-2.6744	0.0000	-0.19	0.00	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11	264.0000	294.0000	272.0000		276.6667	15.5349	10.9922	241.3333	0.77	2.15	1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14											1.92	-1.92	1.98
Lab 15	246.0000	244.0000	241.0000		243.6667	2.5166	-22.0078	6.3333	-1.54	0.35	1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18											1.92	-1.92	1.98
Lab 19	257.2000	252.9000	256.1000		255.4000	2.2338	-10.2744	4.9900	-0.72	0.31	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X _{ave}	243.6667	r = 2.8 s _r =	20.0691	h _{crit} =	1.92				
				Maximum X _{ave}	280.2633	R = 2.8 s _R =	42.8226	h _{crit} =	-1.92				
				Check s _{X_{ave}}	14.2732			k _{crit} =	1.98				
Where: x ₁ ...x _n =		Individual Test Result		Where:		(X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =		Cell Average		s _{ave} =		S _{ave} =		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell		s _r =		S _r =		Repeatability Standard Deviation					
s =		Cell Standard Deviation		s _R =		S _R =		Interim Reproducibility Standard Deviation					
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		S _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
s ² =		Cell Variation		h =		k =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories		r =		R =		Within Laboratory Consistency Statistic					
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		R =		95% Confidence Limit for Repeatability					
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =				95% Confidence Limit for Reproducibility					



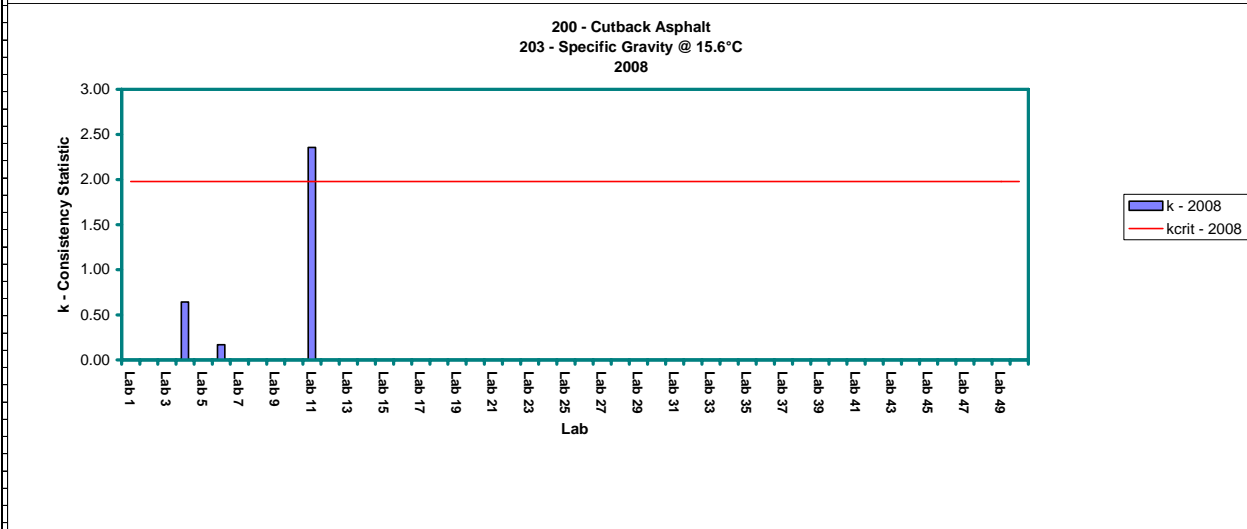
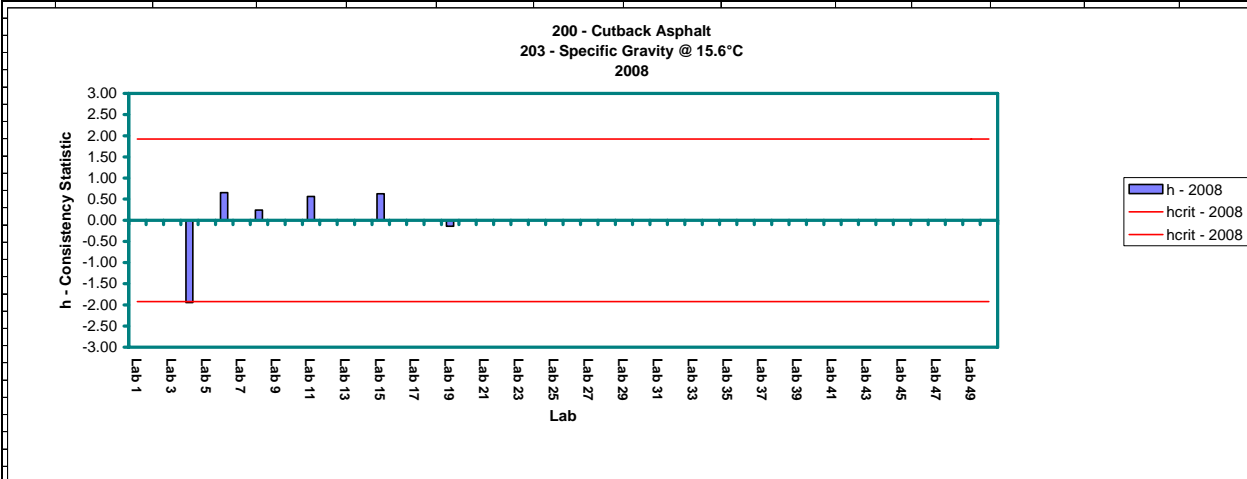
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{(ave)}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
202 - Flash Point, Tag, °C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 76.8000	s_r = 2.1718	Check $s_{X_{ave}}$ = 10.8790						
				p = 5	$S_{X_{ave}}$ = 10.8790	s_{R^*} = 11.0226	$r = 2.8$ $s_r = 6.0199$						
				Significance Level = 0.5%		s_R = 11.0226	$R = 2.8$ $s_R = 30.5530$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.74	-1.74	1.92
Lab 2											1.74	-1.74	1.92
Lab 3											1.74	-1.74	1.92
Lab 4	72.0000	72.0000	72.0000		72.0000	0.0000	-4.8000	0.0000	-0.44	0.00	1.74	-1.74	1.92
Lab 5											1.74	-1.74	1.92
Lab 6	77.5000	76.5000	76.5000		76.8333	0.5774	0.0333	0.3333	0.00	0.27	1.74	-1.74	1.92
Lab 7											1.74	-1.74	1.92
Lab 8											1.74	-1.74	1.92
Lab 9											1.74	-1.74	1.92
Lab 10	62.0000	61.0000	62.0000		61.6667	0.5774	-15.1333	0.3333	-1.39	0.27	1.74	-1.74	1.92
Lab 11	85.0000	93.5000	92.0000		90.1667	4.5369	13.3667	20.5833	1.23	2.09	1.74	-1.74	1.92
Lab 12											1.74	-1.74	1.92
Lab 13											1.74	-1.74	1.92
Lab 14											1.74	-1.74	1.92
Lab 15											1.74	-1.74	1.92
Lab 16											1.74	-1.74	1.92
Lab 17											1.74	-1.74	1.92
Lab 18											1.74	-1.74	1.92
Lab 19	82.0000	85.0000	83.0000		83.3333	1.5275	6.5333	2.3333	0.60	0.70	1.74	-1.74	1.92
Lab 20											1.74	-1.74	1.92
Lab 21											1.74	-1.74	1.92
Lab 22											1.74	-1.74	1.92
Lab 23											1.74	-1.74	1.92
Lab 24											1.74	-1.74	1.92
Lab 25											1.74	-1.74	1.92
Lab 26											1.74	-1.74	1.92
Lab 27											1.74	-1.74	1.92
Lab 28											1.74	-1.74	1.92
Lab 29											1.74	-1.74	1.92
Lab 30											1.74	-1.74	1.92
Lab 31											1.74	-1.74	1.92
Lab 32											1.74	-1.74	1.92
Lab 33											1.74	-1.74	1.92
Lab 34											1.74	-1.74	1.92
Lab 35											1.74	-1.74	1.92
Lab 36											1.74	-1.74	1.92
Lab 37											1.74	-1.74	1.92
Lab 38											1.74	-1.74	1.92
Lab 39											1.74	-1.74	1.92
Lab 40											1.74	-1.74	1.92
Lab 41											1.74	-1.74	1.92
Lab 42											1.74	-1.74	1.92
Lab 43											1.74	-1.74	1.92
Lab 44											1.74	-1.74	1.92
Lab 45											1.74	-1.74	1.92
Lab 46											1.74	-1.74	1.92
Lab 47											1.74	-1.74	1.92
Lab 48											1.74	-1.74	1.92
Lab 49											1.74	-1.74	1.92
Lab 50											1.74	-1.74	1.92
Additional Statistics				Minimum X_{ave}	61.6667	$r = 2.8$ $s_r =$	6.0199	$h_{crit} =$	1.74				
				Maximum X_{ave}	90.1667	$R = 2.8$ $s_R =$	30.5530	$h_{crit} =$	-1.74				
				Check $s_{X_{ave}}$	10.8790			$k_{crit} =$	1.92				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{ave} =$		Standard Deviation of Cell Averages					
$n =$		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
$s =$		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
$d =$		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				$h =$		Between Laboratory Consistency Statistic					
$p =$		Number of Laboratories				$k =$		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				$r =$		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				$R =$		95% Confidence Limit for Reproducibility					



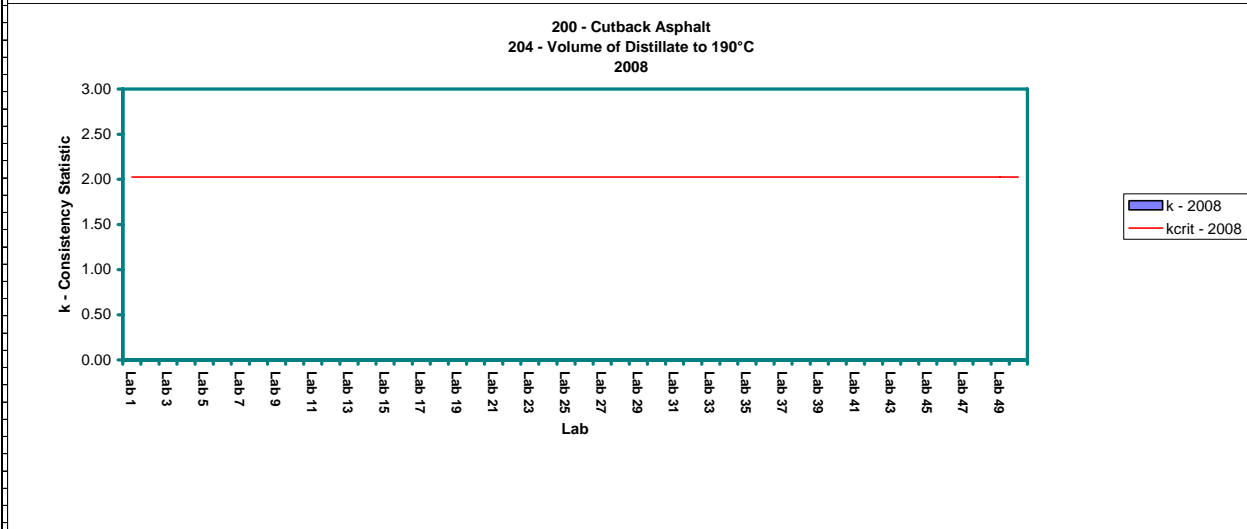
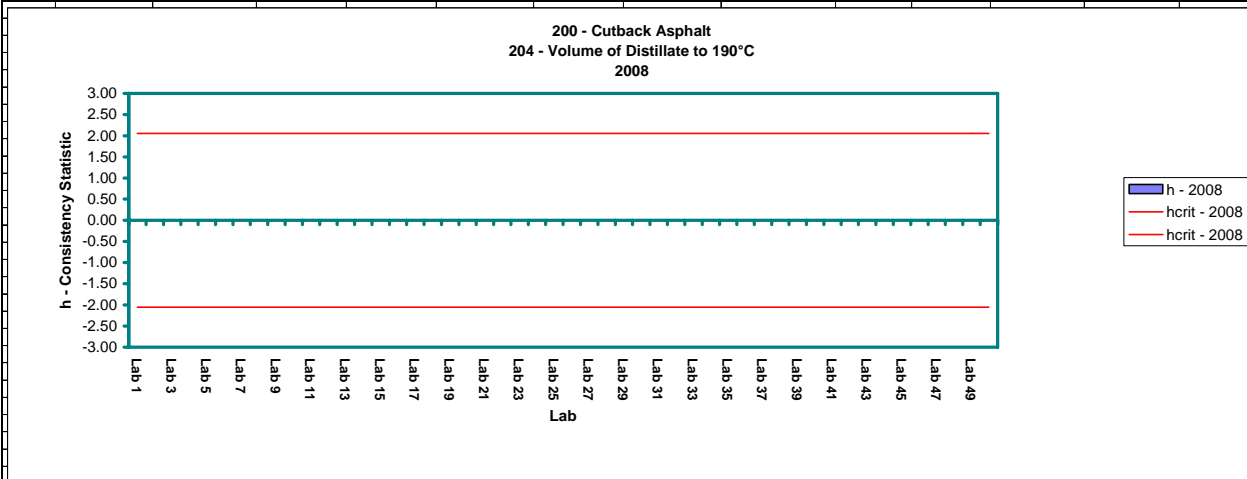
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{(X_{ave})_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
203 - Specific Gravity @ 15.6°C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 0.9697	s_r = 0.0017	Check $s_{X_{ave}}$ = 0.0052						
				p = 6	$S_{X_{ave}}$ = 0.0052	s_{R^*} = 0.0054	$r = 2.8 s_r = 0.0048$						
				Significance Level = 0.5%		s_R = 0.0054	$R = 2.8 s_R = 0.0150$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	0.9603	0.9601	0.9583		0.9596	0.0011	-0.0102	0.0000	-1.95	0.64	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	0.9730	0.9730	0.9735		0.9732	0.0003	0.0034	0.0000	0.66	0.17	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	0.9710	0.9710	0.9710		0.9710	0.0000	0.0013	0.0000	0.24	0.00	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11	0.9690	0.9720	0.9770		0.9727	0.0040	0.0029	0.0000	0.56	2.36	1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14											1.92	-1.92	1.98
Lab 15	0.9730	0.9730	0.9730		0.9730	0.0000	0.0033	0.0000	0.63	0.00	1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18											1.92	-1.92	1.98
Lab 19	0.9690	0.9690	0.9690		0.9690	0.0000	-0.0007	0.0000	-0.14	0.00	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X_{ave}	0.9596	$r = 2.8 s_r =$	0.0048	$h_{crit} =$	1.92				
				Maximum X_{ave}	0.9732	$R = 2.8 s_R =$	0.0150	$h_{crit} =$	-1.92				
				Check $s_{X_{ave}}$	0.0052			$k_{crit} =$	1.98				
Where: $x_1, \dots, x_n =$				Individual Test Result	Where: $(X_{ave})_{ave} =$		Average of Cell Averages						
$X_{ave} =$				Cell Average	$s_{(ave)} =$		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation						
s =				Cell Standard Deviation	$s_{R^*} =$		Interim Reproducibility Standard Deviation						
d =				Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})						
$s^2 =$				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
$h_{crit} =$				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
$k_{crit} =$				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



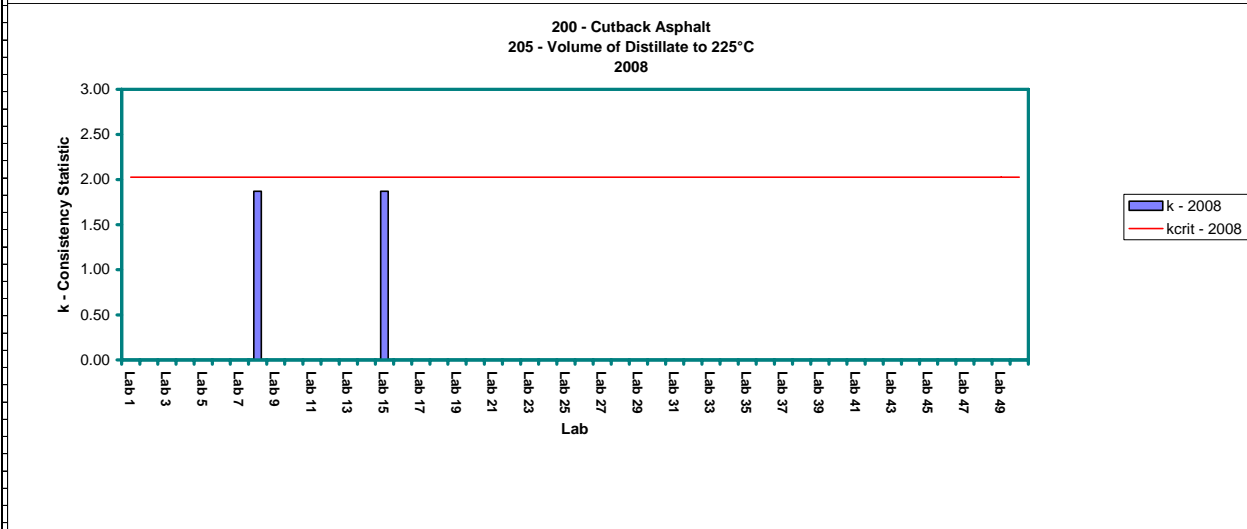
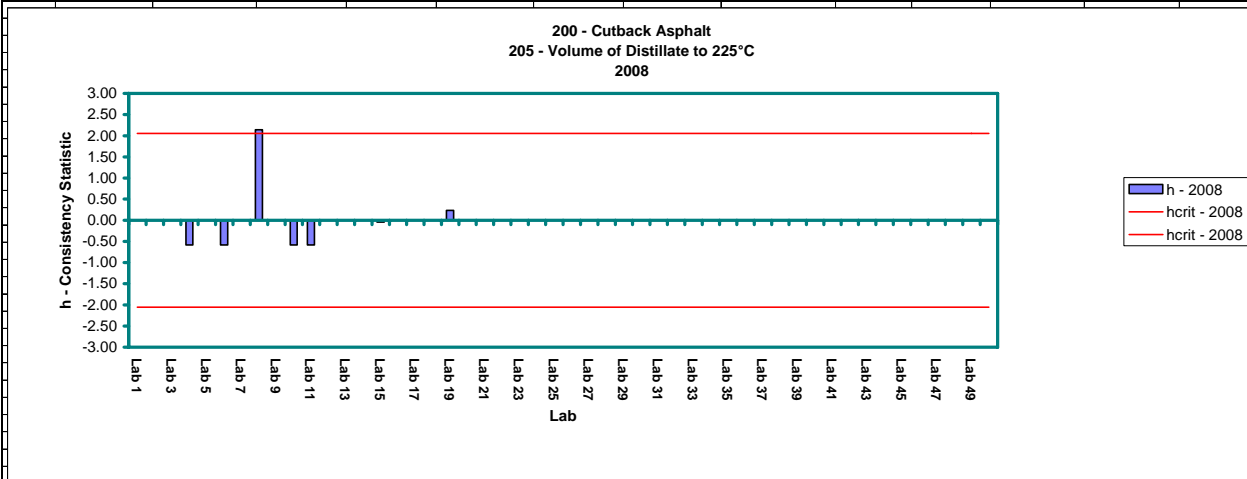
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{(ave)}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
204 - Volume of Distillate to 190°C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 0.0000	s_r = 0.0000	Check $s_{X_{ave}}$ = 0.0000						
				p = 7	$S_{X_{ave}}$ = 0.0000	s_{R^*} = 0.0000	$r = 2.8 s_r = 0.0000$						
				Significance Level = 0.5%		s_R = 0.0000	$R = 2.8 s_R = 0.0000$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 11	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X_{ave}	0.0000	$r = 2.8 s_r =$	0.0000	$h_{crit} =$	2.05				
				Maximum X_{ave}	0.0000	$R = 2.8 s_R =$	0.0000	$h_{crit} =$	-2.05				
				Check $s_{X_{ave}}$	0.0000			$k_{crit} =$	2.03				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: $(X_{ave})_{ave} =$		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{ave} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



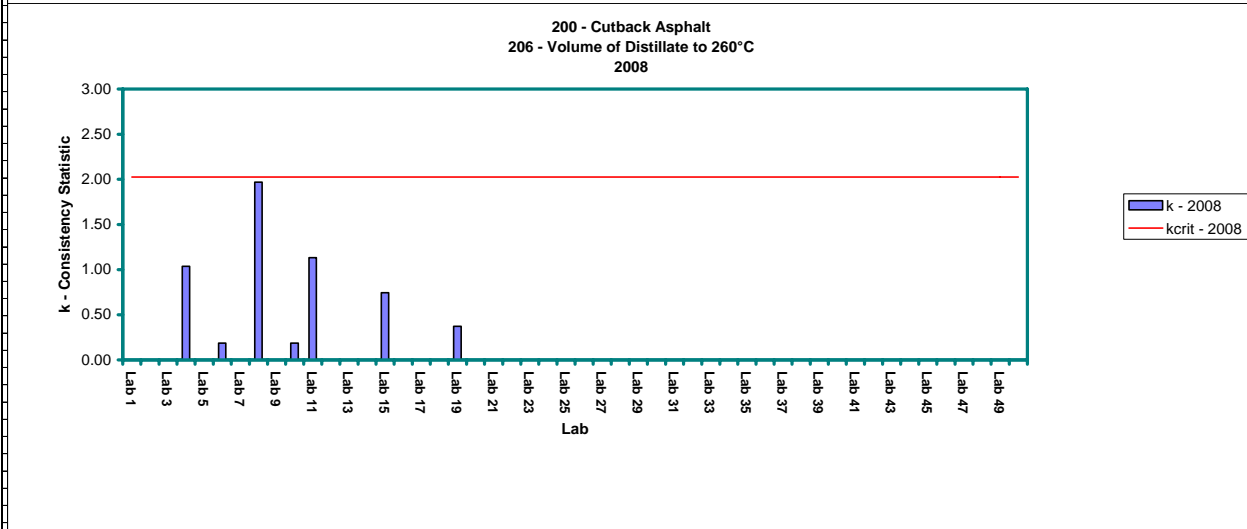
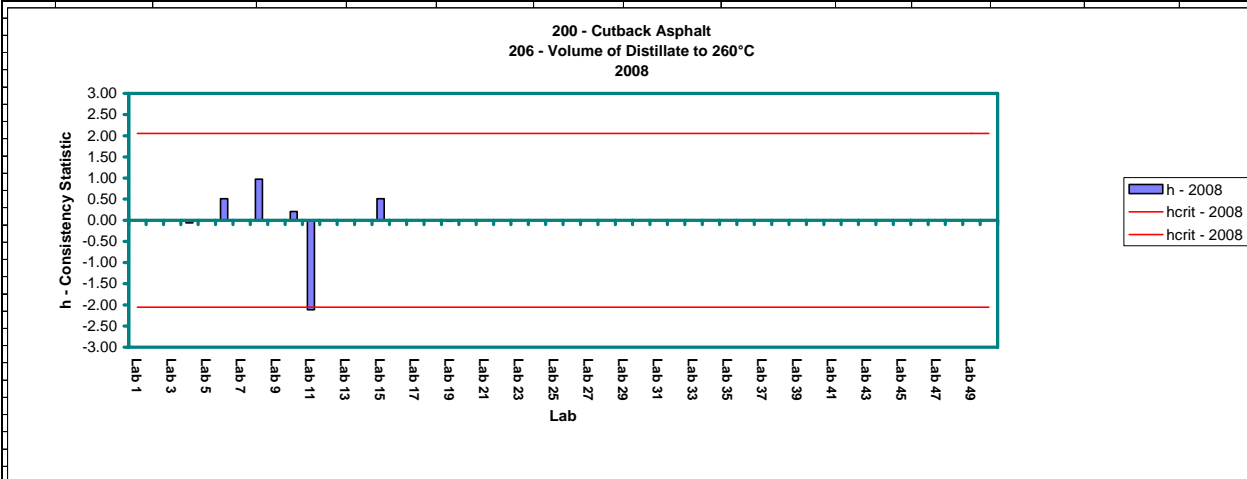
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation $(X_{ave} - (X_{ave})_{ave})$	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
205 - Volume of Distillate to 225°C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 0.3571	s_r = 0.3086	Check $s_{X_{ave}}$ = 0.6118						
				p = 7	$s_{X_{ave}}$ = 0.6118	s_{R^*} = 0.6617	$r = 2.8 s_r = 0.8554$						
				Significance Level = 0.5%		s_R = 0.6617	$R = 2.8 s_R = 1.8341$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	0.0000	0.0000	0.0000		0.0000	0.0000	-0.3571	0.0000	-0.58	0.00	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	0.0000	0.0000	0.0000		0.0000	0.0000	-0.3571	0.0000	-0.58	0.00	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	2.0000	2.0000	1.0000		1.6667	0.5774	1.3095	0.3333	2.14	1.87	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	0.0000	0.0000	0.0000		0.0000	0.0000	-0.3571	0.0000	-0.58	0.00	2.05	-2.05	2.03
Lab 11	0.0000	0.0000	0.0000		0.0000	0.0000	-0.3571	0.0000	-0.58	0.00	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	0.0000	0.0000	1.0000		0.3333	0.5774	-0.0238	0.3333	-0.04	1.87	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	0.5000	0.5000	0.5000		0.5000	0.0000	0.1429	0.0000	0.23	0.00	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X_{ave}	0.0000	$r = 2.8 s_r =$	0.8554	$h_{crit} =$	2.05				
				Maximum X_{ave}	1.6667	$R = 2.8 s_R =$	1.8341	$h_{crit} =$	-2.05				
				Check $s_{X_{ave}}$	0.6118			$k_{crit} =$	2.03				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: $(X_{ave})_{ave} =$		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{ave} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



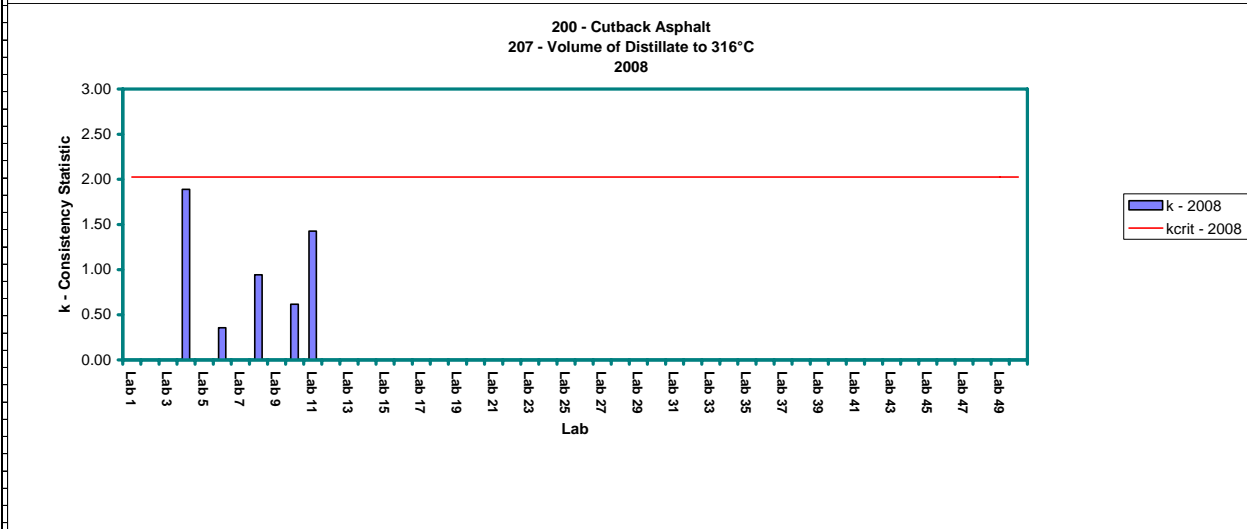
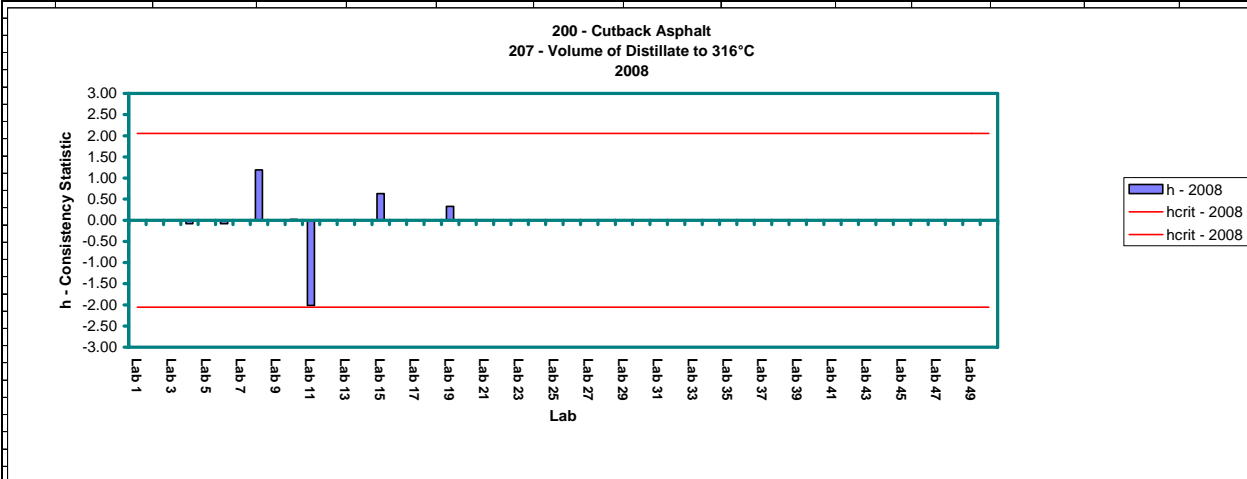
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages	
X_{ave} =	Cell Average		$s_{(ave)}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility	

200 - Cutback Asphalt													
206 - Volume of Distillate to 260°C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 16.4286	s_r = 1.5507	Check $s_{X_{ave}}$ = 4.3715						
				p = 7	$S_{X_{ave}}$ = 4.3715	s_{R^*} = 4.5511	$r = 2.8$ $s_r = 4.2984$						
				Significance Level = 0.5%		s_R = 4.5511	$R = 2.8$ $s_R = 12.6151$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	15.5000	18.0000	15.0000		16.1667	1.6073	-0.2619	2.5833	-0.06	1.04	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	18.5000	18.5000	19.0000		18.6667	0.2887	2.2381	0.0833	0.51	0.19	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	20.0000	24.0000	18.0000		20.6667	3.0551	4.2381	9.3333	0.97	1.97	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	17.0000	17.5000	17.5000		17.3333	0.2887	0.9048	0.0833	0.21	0.19	2.05	-2.05	2.03
Lab 11	9.0000	5.5000	7.0000		7.1667	1.7559	-9.2619	3.0833	-2.12	1.13	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	18.0000	18.0000	20.0000		18.6667	1.1547	2.2381	1.3333	0.51	0.74	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	16.0000	17.0000	16.0000		16.3333	0.5774	-0.0952	0.3333	-0.02	0.37	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X_{ave}	7.1667	$r = 2.8$ $s_r =$	4.2984	$h_{crit} =$	2.05				
				Maximum X_{ave}	20.6667	$R = 2.8$ $s_R =$	12.6151	$h_{crit} =$	-2.05				
				Check $s_{X_{ave}}$	4.3715			$k_{crit} =$	2.03				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{X_{ave}} =$		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
s =		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories				k =		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				r =		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				R =		95% Confidence Limit for Reproducibility					



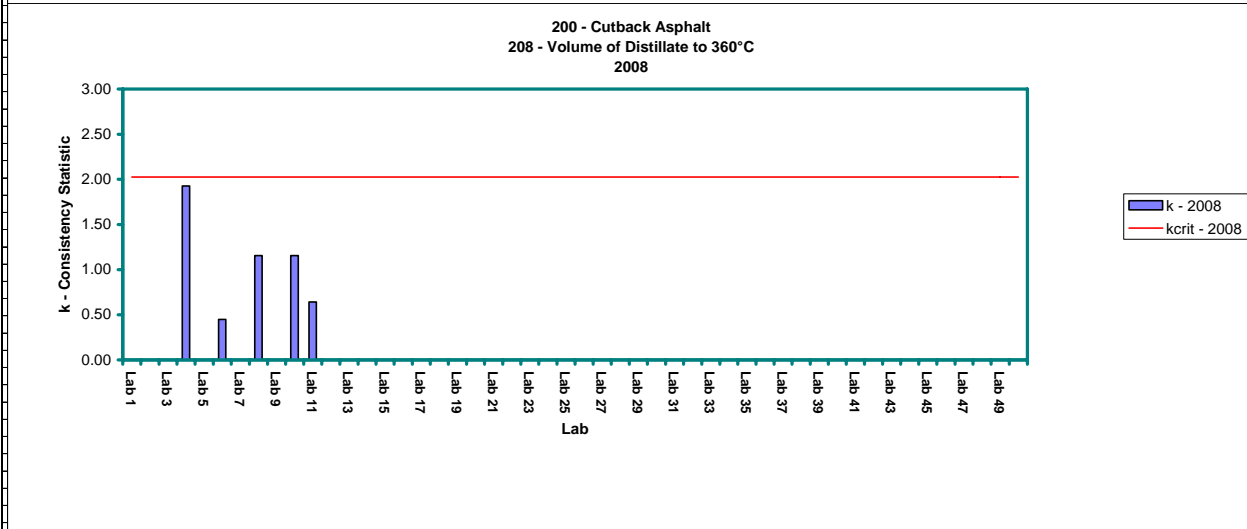
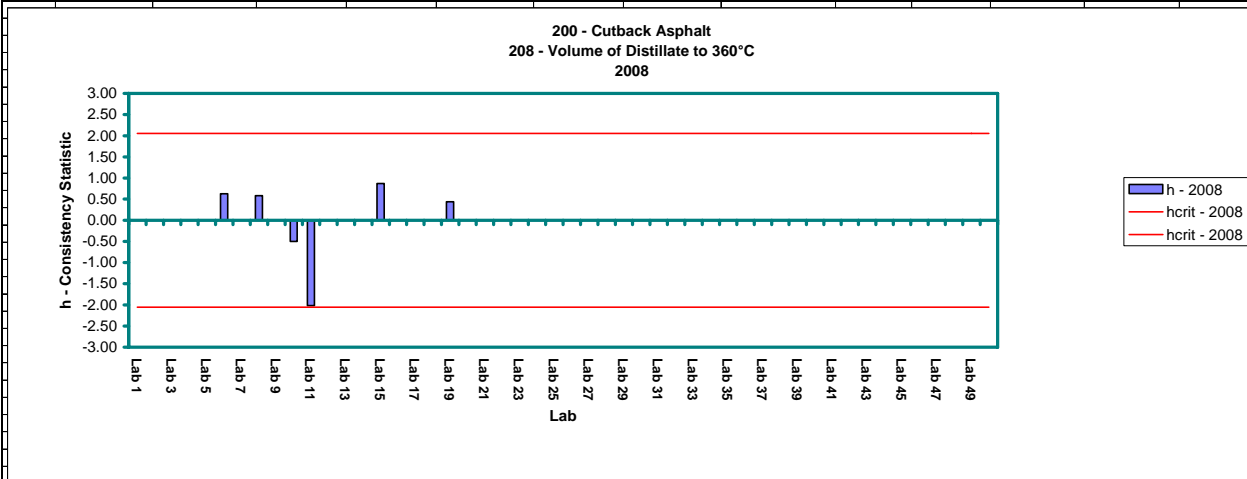
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$S_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
207 - Volume of Distillate to 316°C													
2008													
Data				n = 3	(X _{ave}) _{ave} = 43.9286	s _r = 0.8092	Check s _{X_{ave}} = 3.2743						
				p = 7	S _{X_{ave}} = 3.2743	s _R = 3.3403	r = 2.8 s _r = 2.2429						
				Significance Level = 0.5%		s _R = 3.3403	R = 2.8 s _R = 9.2588						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	42.0000	44.0000	45.0000		43.6667	1.5275	-0.2619	2.3333	-0.08	1.89	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	43.5000	43.5000	44.0000		43.6667	0.2887	-0.2619	0.0833	-0.08	0.36	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	48.0000	48.5000	47.0000		47.8333	0.7638	3.9048	0.5833	1.19	0.94	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	43.5000	44.5000	44.0000		44.0000	0.5000	0.0714	0.2500	0.02	0.62	2.05	-2.05	2.03
Lab 11	38.0000	36.0000	38.0000		37.3333	1.1547	-6.5952	1.3333	-2.01	1.43	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	46.0000	46.0000	46.0000		46.0000	0.0000	2.0714	0.0000	0.63	0.00	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	45.0000	45.0000	45.0000		45.0000	0.0000	1.0714	0.0000	0.33	0.00	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X _{ave}	37.3333	r = 2.8 s _r =	2.2429	h _{crit} =	2.05				
				Maximum X _{ave}	47.8333	R = 2.8 s _R =	9.2588	h _{crit} =	-2.05				
				Check s _{X_{ave}}	3.2743			k _{crit} =	2.03				
Where:	x ₁ ...x _n =	Individual Test Result		Where:	(X _{ave}) _{ave} =	Average of Cell Averages							
	X _{ave} =	Cell Average			s _{ave} =	Standard Deviation of Cell Averages							
	n =	Number of Test Results per Cell			s _r =	Repeatability Standard Deviation							
	s =	Cell Standard Deviation			s _R =	Interim Reproducibility Standard Deviation							
	d =	Cell Deviation (X _{ave} - (X _{ave}) _{ave})			s _R =	Reproducibility Standard Deviation (Larger of s _r and s _R)							
	s ² =	Cell Variation			h =	Between Laboratory Consistency Statistic							
	p =	Number of Laboratories			k =	Within Laboratory Consistency Statistic							
	h _{crit} =	Critical Between Laboratory Consistency Statistic			r =	95% Confidence Limit for Repeatability							
	k _{crit} =	Critical Within Laboratory Consistency Statistic			R =	95% Confidence Limit for Reproducibility							



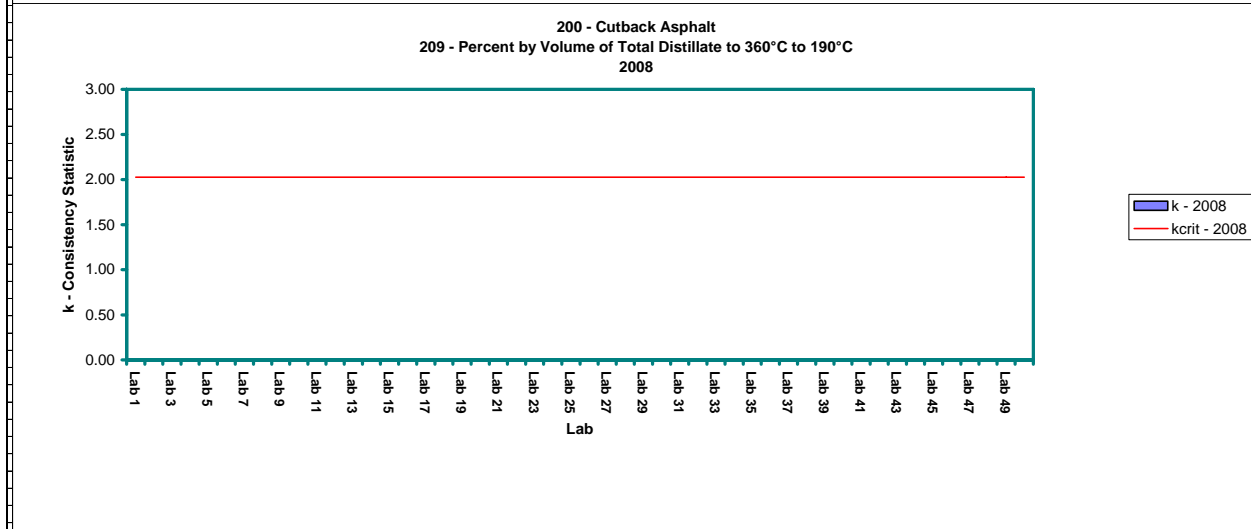
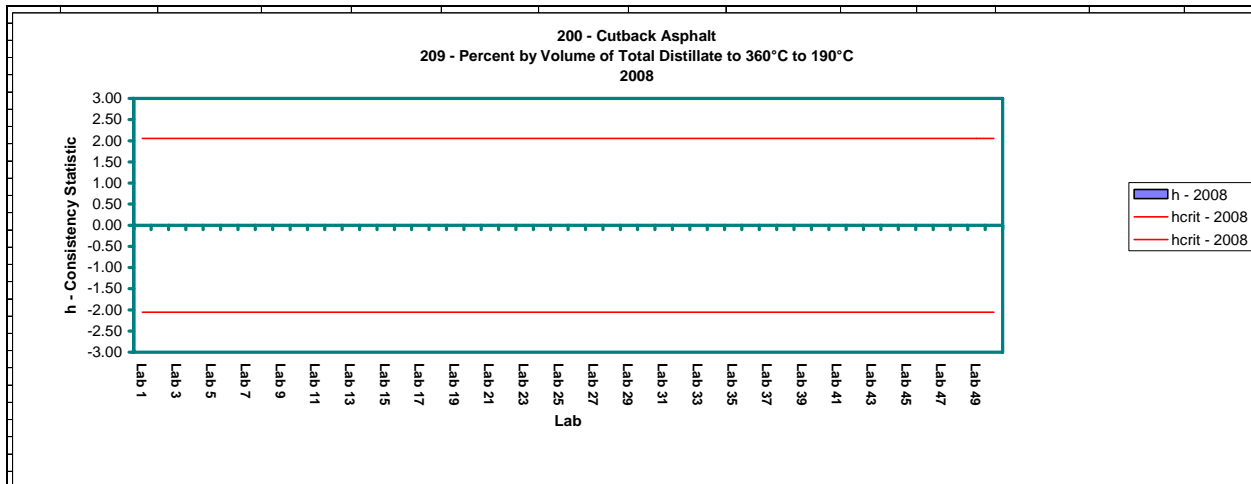
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
208 - Volume of Distillate to 360°C													
2008													
Data				n =	3	(X_{ave}) _{ave} =	56.9905	s_r =	0.8995	Check $s_{X_{ave}}$ = 2.3083			
				p =	7	$S_{X_{ave}}$ =	2.3083	s_{R^*} =	2.4223	$r = 2.8$ $s_r = 2.4932$			
				Significance Level =			0.5%	s_R =	2.4223	$R = 2.8$ $s_R = 6.7144$			
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	55.0000	58.0000	58.0000		57.0000	1.7321	0.0095	3.0000	0.00	1.93	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	58.0000	58.5000	58.8000		58.4333	0.4041	1.4429	0.1633	0.63	0.45	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	58.0000	59.5000	57.5000		58.3333	1.0408	1.3429	1.0833	0.58	1.16	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	55.0000	57.0000	55.5000		55.8333	1.0408	-1.1571	1.0833	-0.50	1.16	2.05	-2.05	2.03
Lab 11	52.0000	52.0000	53.0000		52.3333	0.5774	-4.6571	0.3333	-2.02	0.64	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	59.0000	59.0000	59.0000		59.0000	0.0000	2.0095	0.0000	0.87	0.00	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	58.0000	58.0000	58.0000		58.0000	0.0000	1.0095	0.0000	0.44	0.00	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X_{ave}	52.3333	$r = 2.8$ $s_r =$	2.4932	$h_{crit} =$	2.05				
				Maximum X_{ave}	59.0000	$R = 2.8$ $s_R =$	6.7144	$h_{crit} =$	-2.05				
				Check $s_{X_{ave}}$	2.3083			$k_{crit} =$	2.03				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{ave} =$		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
s =		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories				k =		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				r =		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				R =		95% Confidence Limit for Reproducibility					



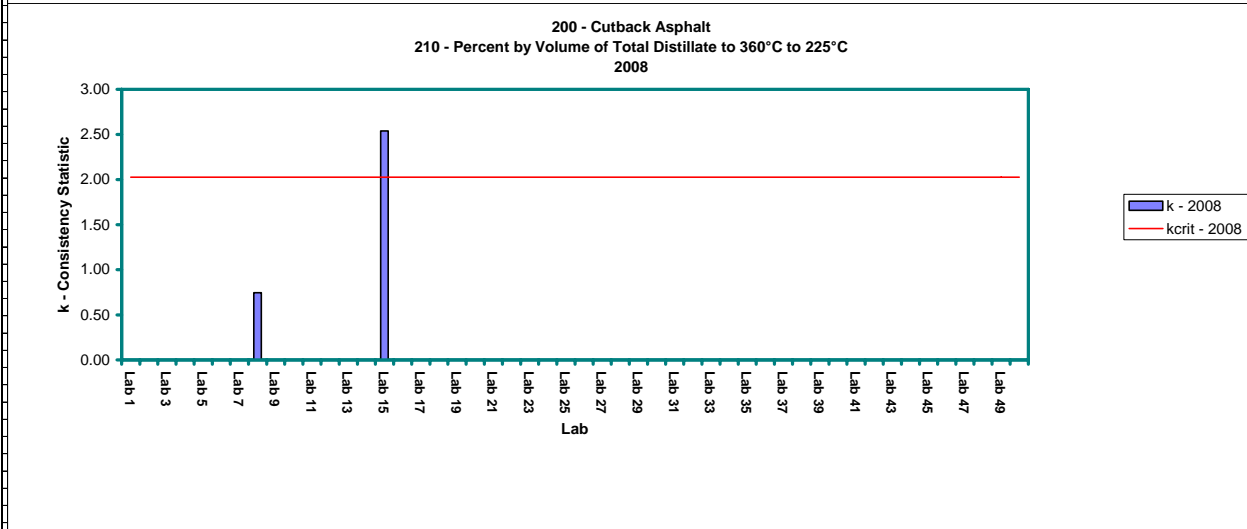
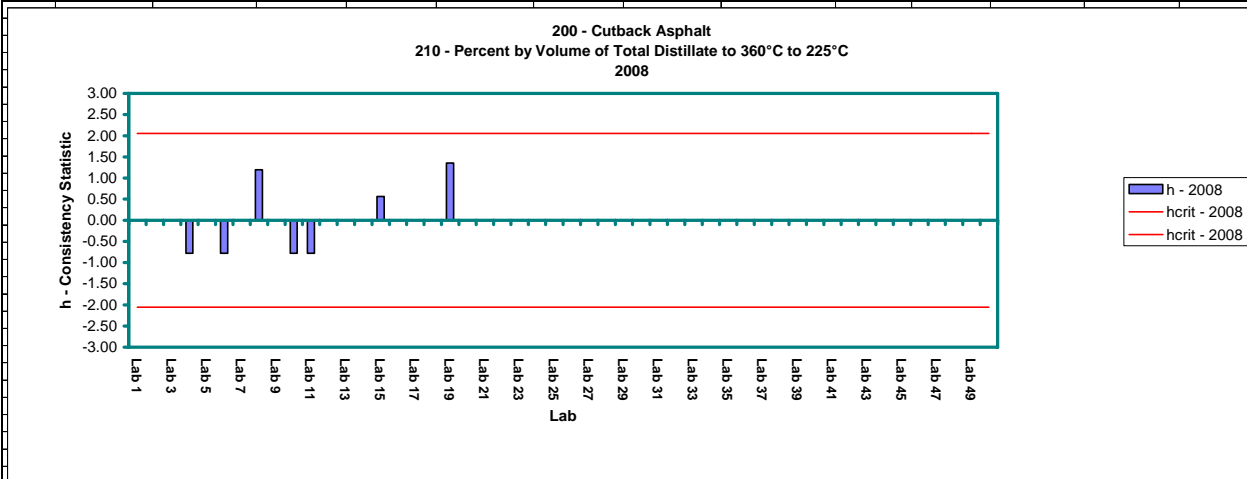
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
209 - Percent by Volume of Total Distillate to 360°C to 190°C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 0.0000	s_r = 0.0000	Check $s_{X_{ave}}$ = 0.0000						
				p = 7	$S_{X_{ave}}$ = 0.0000	s_{R^*} = 0.0000	$r = 2.8 s_r = 0.0000$						
				Significance Level = 0.5%		s_R = 0.0000	$R = 2.8 s_R = 0.0000$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 11	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X_{ave}	0.0000	$r = 2.8 s_r =$	0.0000	$h_{crit} =$	2.05				
				Maximum X_{ave}	0.0000	$R = 2.8 s_R =$	0.0000	$h_{crit} =$	-2.05				
				Check $s_{X_{ave}}$	0.0000			$k_{crit} =$	2.03				
Where: $x_1, \dots, x_n =$				Individual Test Result	Where: $(X_{ave})_{ave} =$		Average of Cell Averages						
$X_{ave} =$				Cell Average	$s_{(ave)} =$		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation						
s =				Cell Standard Deviation	$s_{R^*} =$		Interim Reproducibility Standard Deviation						
d =				Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})						
$s^2 =$				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
$h_{crit} =$				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
$k_{crit} =$				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



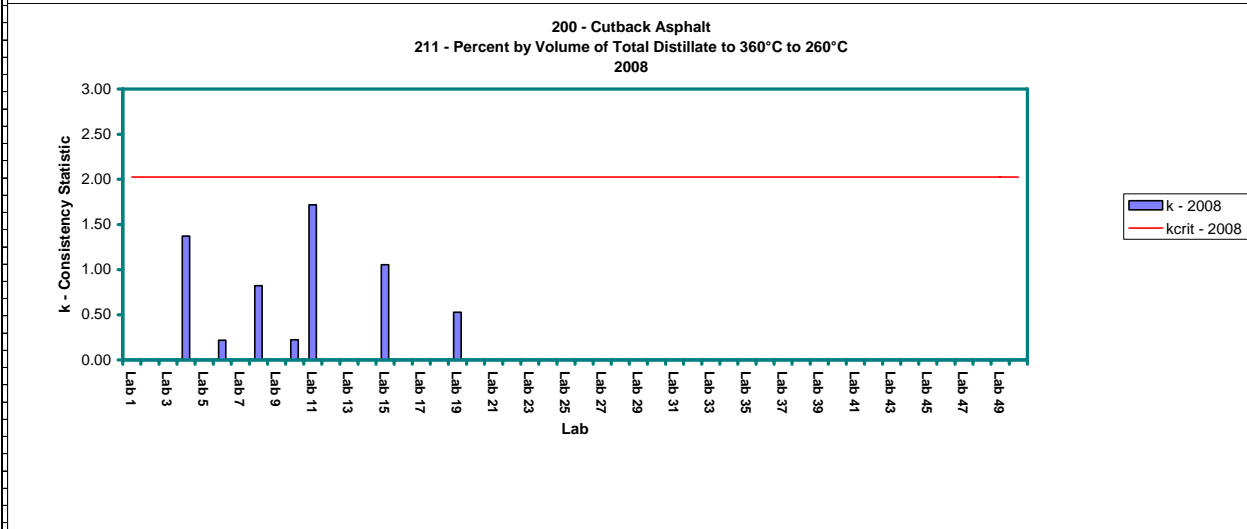
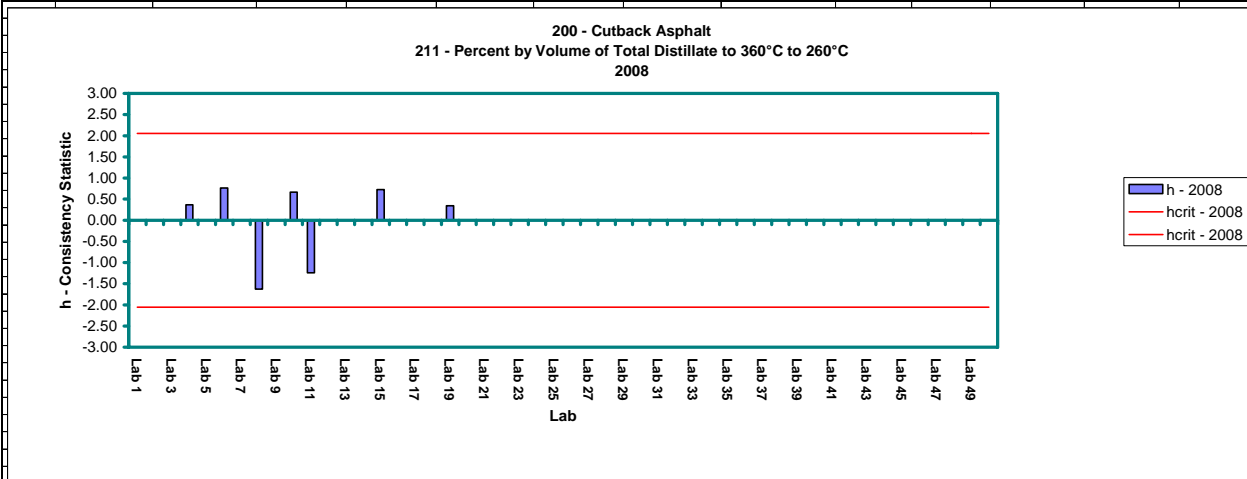
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(\bar{X}_{ave})_{ave}$ =	Average of Cell Averages
\bar{X}_{ave} =	Cell Average	$s_{\bar{X}_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation $(X_{ave} - (\bar{X}_{ave})_{ave})$	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
210 - Percent by Volume of Total Distillate to 360°C to 225°C													
2008													
Data				n = 3	(X _{ave}) _{ave} = 0.3286	s _r = 0.3867	Check s _{Xave} = 0.4223						
				p = 7	S _{Xave} = 0.4223	s _R = 0.5272	r = 2.8 s _r = 1.0718						
				Significance Level = 0.5%		s _R = 0.5272	R = 2.8 s _R = 1.4615						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	0.0000	0.0000	0.0000		0.0000	0.0000	-0.3286	0.0000	-0.78	0.00	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	0.0000	0.0000	0.0000		0.0000	0.0000	-0.3286	0.0000	-0.78	0.00	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	1.0000	1.0000	0.5000		0.8333	0.2887	0.5048	0.0833	1.20	0.75	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	0.0000	0.0000	0.0000		0.0000	0.0000	-0.3286	0.0000	-0.78	0.00	2.05	-2.05	2.03
Lab 11	0.0000	0.0000	0.0000		0.0000	0.0000	-0.3286	0.0000	-0.78	0.00	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	0.0000	0.0000	1.7000		0.5667	0.9815	0.2381	0.9633	0.56	2.54	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	0.9000	0.9000	0.9000		0.9000	0.0000	0.5714	0.0000	1.35	0.00	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X _{ave}	0.0000	r = 2.8 s _r =	1.0718	h _{crit} =	2.05				
				Maximum X _{ave}	0.9000	R = 2.8 s _R =	1.4615	h _{crit} =	-2.05				
				Check s _{Xave} =	0.4223			k _{crit} =	2.03				
Where: x ₁ ...x _n =		Individual Test Result		Where:		(X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =		Cell Average		s _{ave} =		S _{ave} =		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell		s _r =		s _r =		Repeatability Standard Deviation					
s =		Cell Standard Deviation		s _R =		S _R =		Interim Reproducibility Standard Deviation					
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		h =		h =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
s ² =		Cell Variation		k =		k =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories		r =		r =		Within Laboratory Consistency Statistic					
h _{crit} =		Critical Between Laboratory Consistency Statistic		R =		R =		95% Confidence Limit for Repeatability					
k _{crit} =		Critical Within Laboratory Consistency Statistic						95% Confidence Limit for Reproducibility					



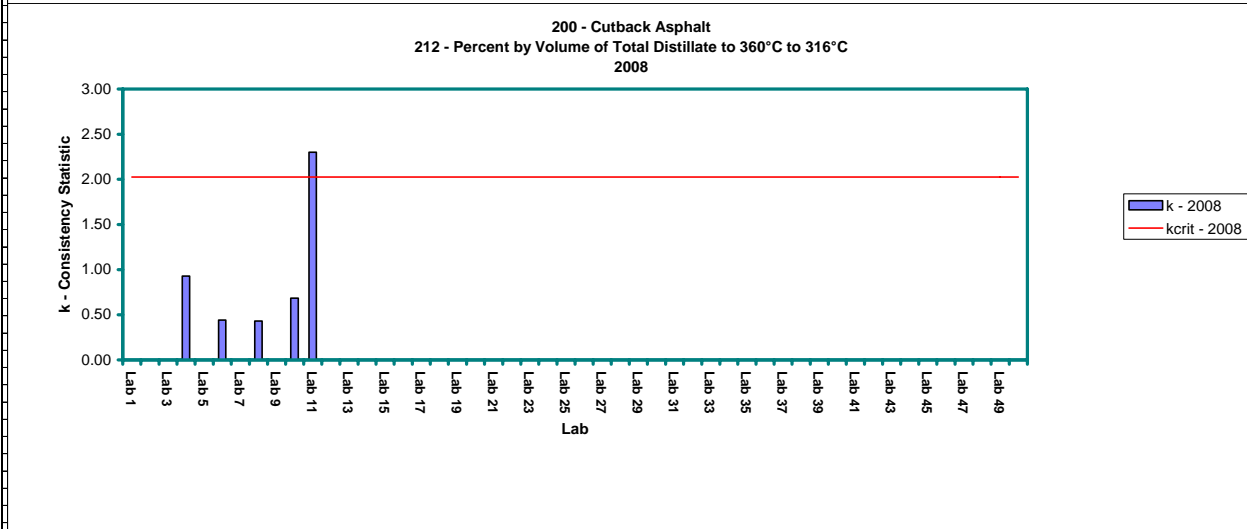
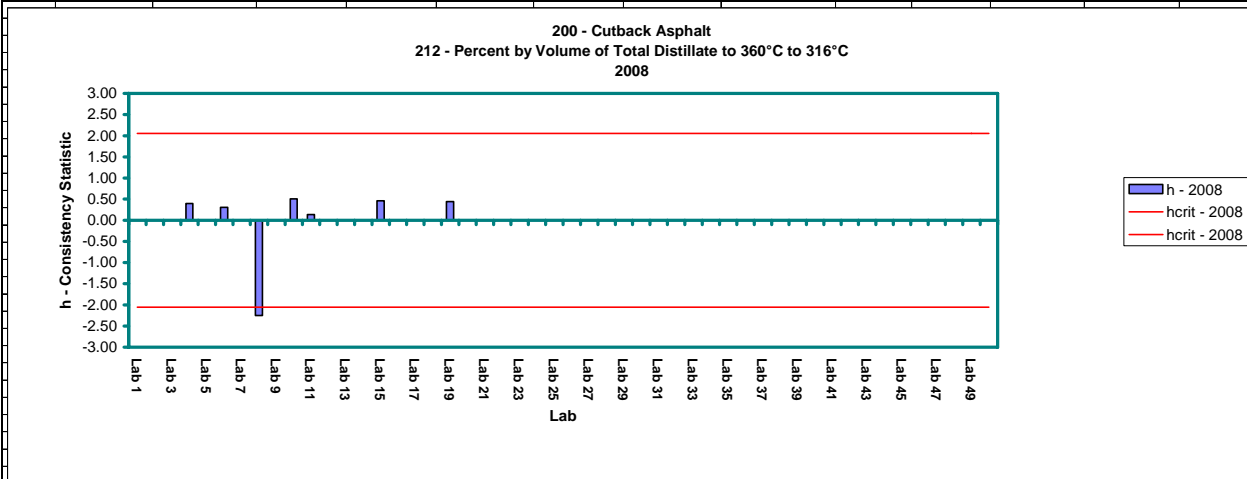
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(\bar{X}_{ave})_{ave}$ =	Average of Cell Averages	
\bar{X}_{ave} =	Cell Average		$s_{\bar{X}_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (\bar{X}_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility	

200 - Cutback Asphalt													
211 - Percent by Volume of Total Distillate to 360°C to 260°C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 25.0476	s_r = 1.8606	Check $s_{X_{ave}}$ = 9.0378						
				p = 7	$S_{X_{ave}}$ = 9.0378	s_{R^*} = 9.1646	$r = 2.8$ $s_r = 5.1574$						
				Significance Level = 0.5%		s_R = 9.1646	$R = 2.8$ $s_R = 25.4029$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	28.2000	31.0000	25.9000		28.3667	2.5541	3.3190	6.5233	0.37	1.37	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	31.9000	31.6000	32.4000		31.9667	0.4041	6.9190	0.1633	0.77	0.22	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	10.0000	12.0000	9.0000		10.3333	1.5275	-14.7143	2.3333	-1.63	0.82	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	30.9000	30.7000	31.5000		31.0333	0.4163	5.9857	0.1733	0.66	0.22	2.05	-2.05	2.03
Lab 11	17.3000	11.0000	13.2000		13.8333	3.1974	-11.2143	10.2233	-1.24	1.72	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	30.5000	30.5000	33.9000		31.6333	1.9630	6.5857	3.8533	0.73	1.06	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	27.6000	29.3000	27.6000		28.1667	0.9815	3.1190	0.9633	0.35	0.53	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X_{ave}	10.3333	$r = 2.8$ $s_r =$	5.1574	$h_{crit} =$	2.05				
				Maximum X_{ave}	31.9667	$R = 2.8$ $s_R =$	25.4029	$h_{crit} =$	-2.05				
				Check $s_{X_{ave}}$	9.0378			$k_{crit} =$	2.03				
Where: $x_1, \dots, x_n =$				Individual Test Result	Where: $(X_{ave})_{ave} =$		Average of Cell Averages						
$X_{ave} =$				Cell Average	$s_{(ave)} =$		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation						
s =				Cell Standard Deviation	$s_{R^*} =$		Interim Reproducibility Standard Deviation						
d =				Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})						
$s^2 =$				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
$h_{crit} =$				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
$k_{crit} =$				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



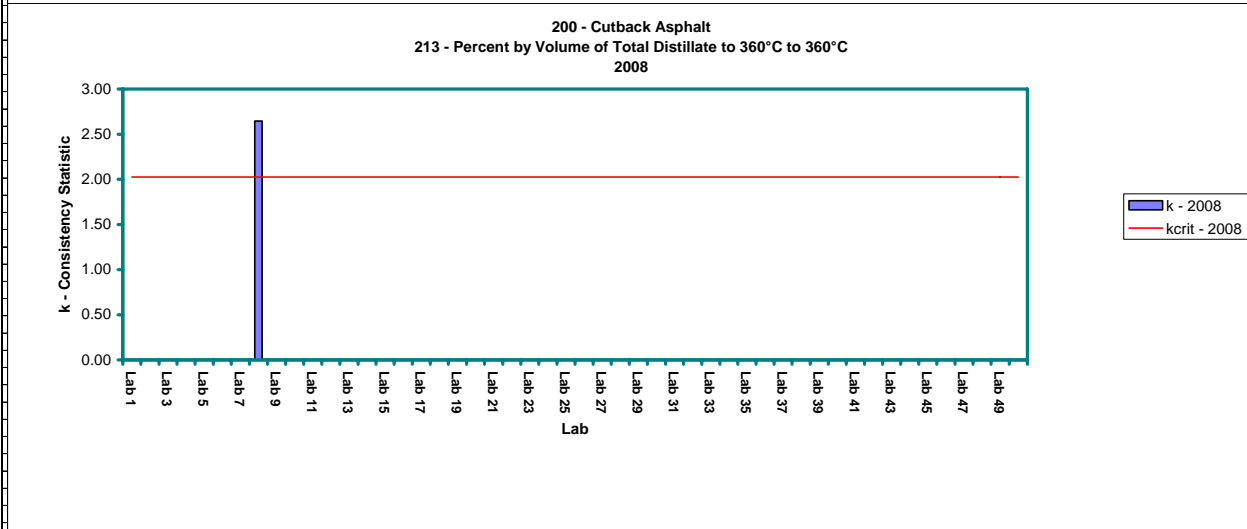
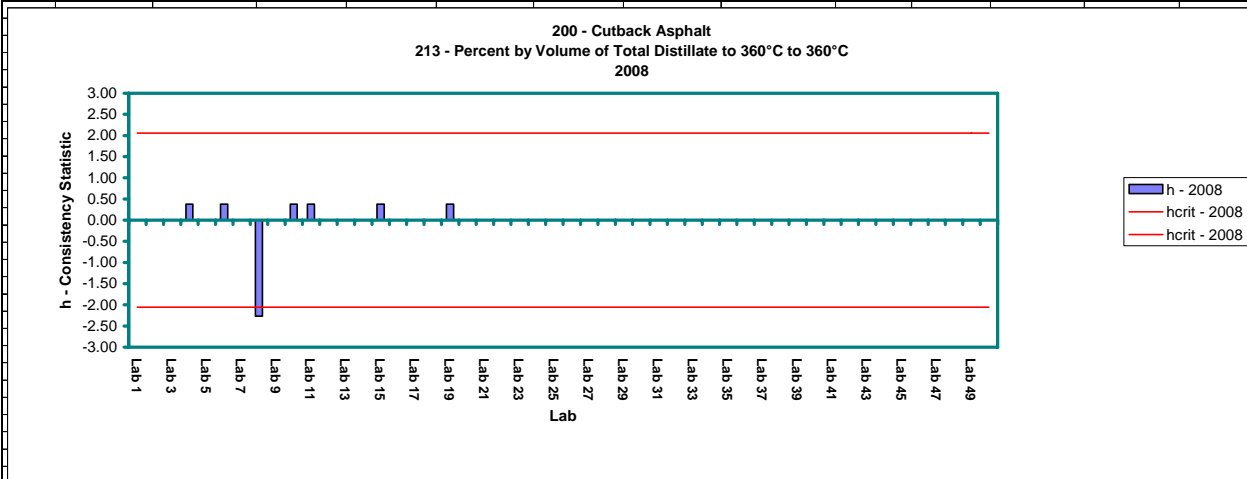
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		S_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		S_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		S_R =	Reproducibility Standard Deviation (Larger of s_r and S_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
212 - Percent by Volume of Total Distillate to 360°C to 316°C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 68.7619	s_r = 0.9394	Check $s_{X_{ave}}$ = 19.9208						
				p = 7	$S_{X_{ave}}$ = 19.9208	s_{R^*} = 19.9356	$r = 2.8$ $s_r = 2.6037$						
				Significance Level = 0.5%		s_R = 19.9356	$R = 2.8$ $s_R = 55.2586$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	76.4000	75.9000	77.6000		76.6333	0.8737	7.8714	0.7633	0.40	0.93	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	75.0000	74.4000	75.2000		74.8667	0.4163	6.1048	0.1733	0.31	0.44	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	24.0000	24.3000	23.5000		23.9333	0.4041	-44.8286	0.1633	-2.25	0.43	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	79.1000	78.1000	79.3000		78.8333	0.6429	10.0714	0.4133	0.51	0.68	2.05	-2.05	2.03
Lab 11	73.5000	69.2000	71.7000		71.4667	2.1595	2.7048	4.6633	0.14	2.30	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	78.0000	78.0000	78.0000		78.0000	0.0000	9.2381	0.0000	0.46	0.00	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	77.6000	77.6000	77.6000		77.6000	0.0000	8.8381	0.0000	0.44	0.00	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X_{ave}	23.9333	$r = 2.8$ $s_r =$	2.6037	$h_{crit} =$	2.05				
				Maximum X_{ave}	78.8333	$R = 2.8$ $s_R =$	55.2586	$h_{crit} =$	-2.05				
				Check $s_{X_{ave}}$	19.9208			$k_{crit} =$	2.03				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{(ave)} =$		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
s =		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories				k =		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				r =		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				R =		95% Confidence Limit for Reproducibility					



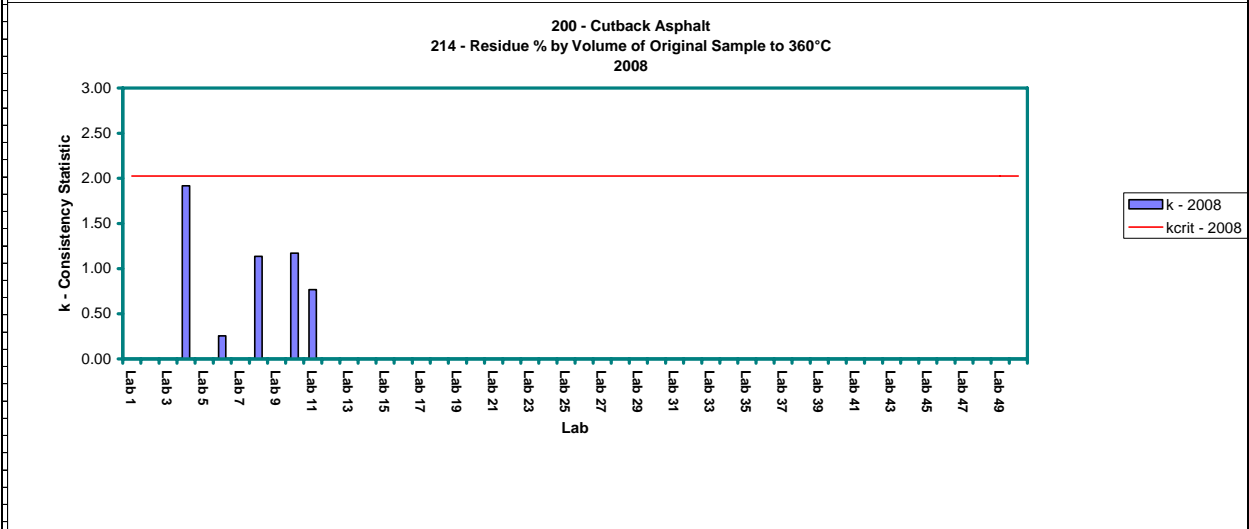
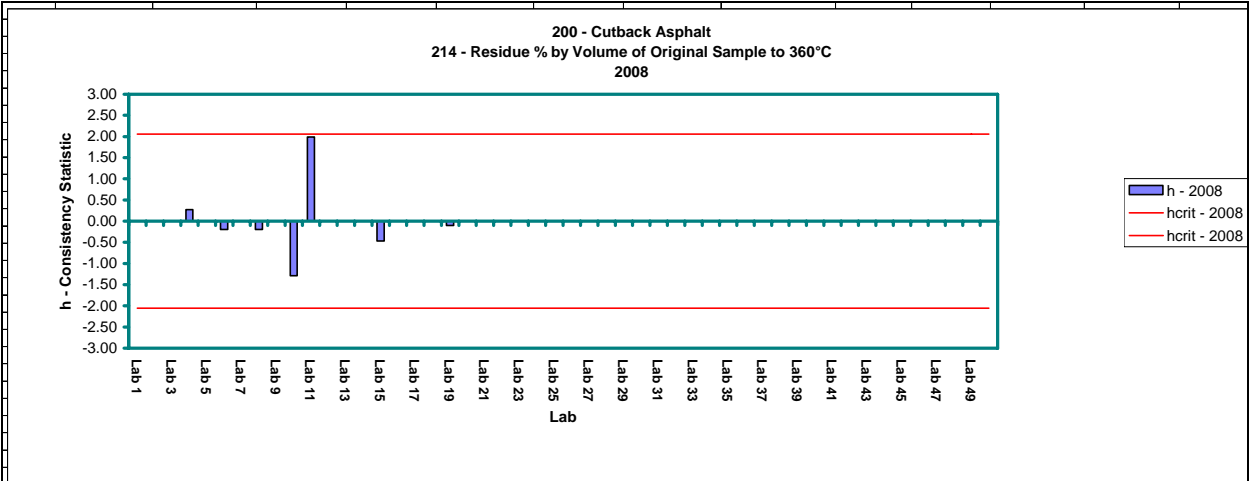
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
213 - Percent by Volume of Total Distillate to 360°C to 360°C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 89.8857	s_r = 0.2000	Check $s_{X_{ave}}$ = 26.7599						
				p = 7	$S_{X_{ave}}$ = 26.7599	s_{R^*} = 26.7604	$r = 2.8$ $s_r = 0.5544$						
				Significance Level = 0.5%		s_R = 26.7604	$R = 2.8$ $s_R = 74.1760$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	100.0000	100.0000	100.0000		100.0000	0.0000	10.1143	0.0000	0.38	0.00	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	100.0000	100.0000	100.0000		100.0000	0.0000	10.1143	0.0000	0.38	0.00	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	29.0000	29.8000	28.8000		29.2000	0.5292	-60.6857	0.2800	-2.27	2.65	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	100.0000	100.0000	100.0000		100.0000	0.0000	10.1143	0.0000	0.38	0.00	2.05	-2.05	2.03
Lab 11	100.0000	100.0000	100.0000		100.0000	0.0000	10.1143	0.0000	0.38	0.00	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	100.0000	100.0000	100.0000		100.0000	0.0000	10.1143	0.0000	0.38	0.00	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	100.0000	100.0000	100.0000		100.0000	0.0000	10.1143	0.0000	0.38	0.00	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X_{ave}	29.2000	$r = 2.8$ $s_r =$	0.5544	$h_{crit} =$	2.05				
				Maximum X_{ave}	100.0000	$R = 2.8$ $s_R =$	74.1760	$h_{crit} =$	-2.05				
				Check $s_{X_{ave}}$	26.7599			$k_{crit} =$	2.03				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: $(X_{ave})_{ave} =$		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{ave} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



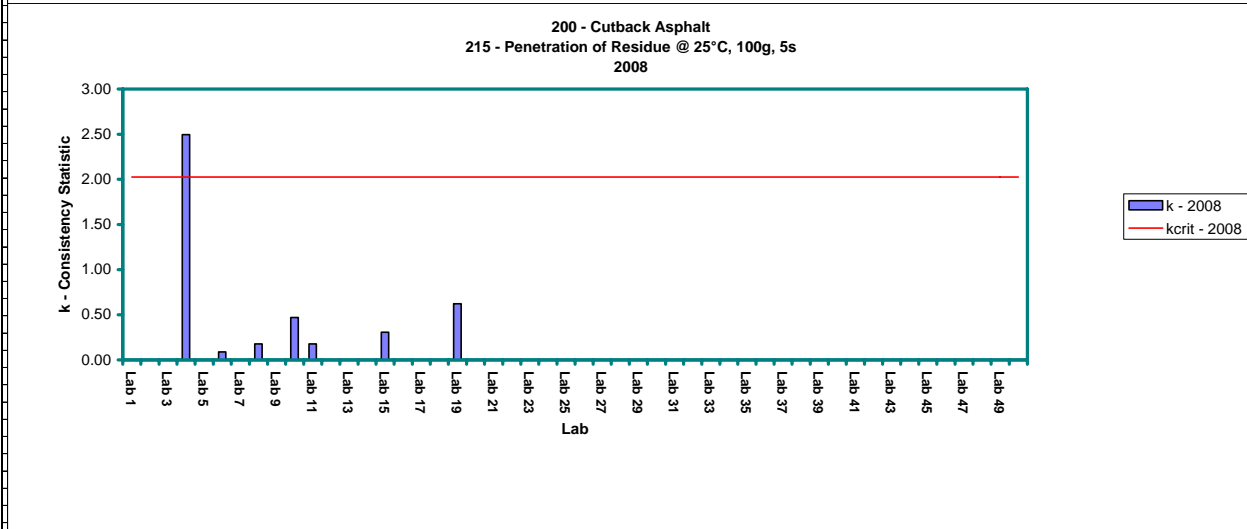
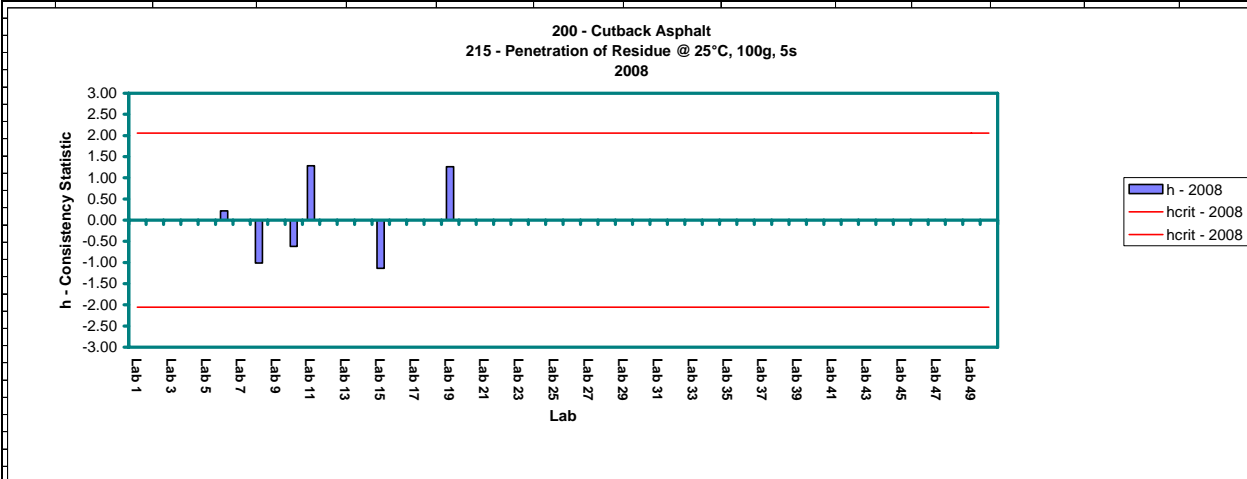
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

200 - Cutback Asphalt													
214 - Residue % by Volume of Original Sample to 360°C													
2008													
Data				n = 3	(X _{ave}) _{ave} = 71.1333	s _r = 0.4515	Check s _{X_{ave}} = 1.3423						
				p = 7	S _{X_{ave}} = 1.3423	s _R = 1.3920	r = 2.8 s _r = 1.2514						
				Significance Level = 0.5%		s _R = 1.3920	R = 2.8 s _R = 3.8585						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	72.5000	71.0000	71.0000		71.5000	0.8660	0.3667	0.7500	0.27	1.92	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	71.0000	70.8000	70.8000		70.8667	0.1155	-0.2667	0.0133	-0.20	0.26	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	71.0000	70.3000	71.3000		70.8667	0.5132	-0.2667	0.2633	-0.20	1.14	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	69.8000	68.8000	69.6000		69.4000	0.5292	-1.7333	0.2800	-1.29	1.17	2.05	-2.05	2.03
Lab 11	74.0000	74.0000	73.4000		73.8000	0.3464	2.6667	0.1200	1.99	0.77	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	70.5000	70.5000	70.5000		70.5000	0.0000	-0.6333	0.0000	-0.47	0.00	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	71.0000	71.0000	71.0000		71.0000	0.0000	-0.1333	0.0000	-0.10	0.00	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X _{ave}	69.4000	r = 2.8 s _r =	1.2514	h _{crit} =	2.05				
				Maximum X _{ave}	73.8000	R = 2.8 s _R =	3.8585	h _{crit} =	-2.05				
				Check s _{X_{ave}}	1.3423			k _{crit} =	2.03				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		s _{X_{ave}} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



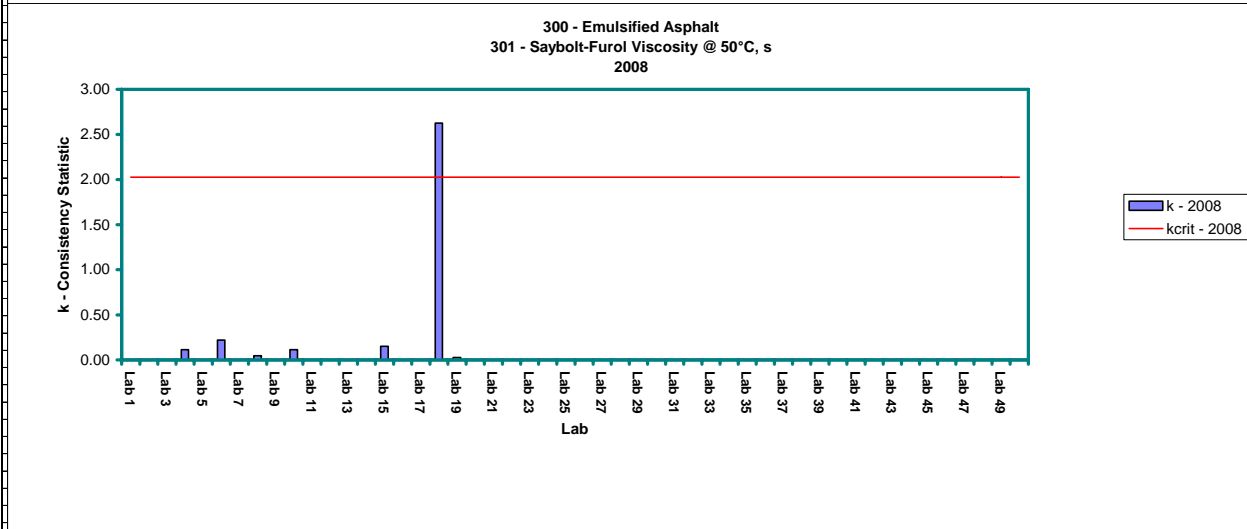
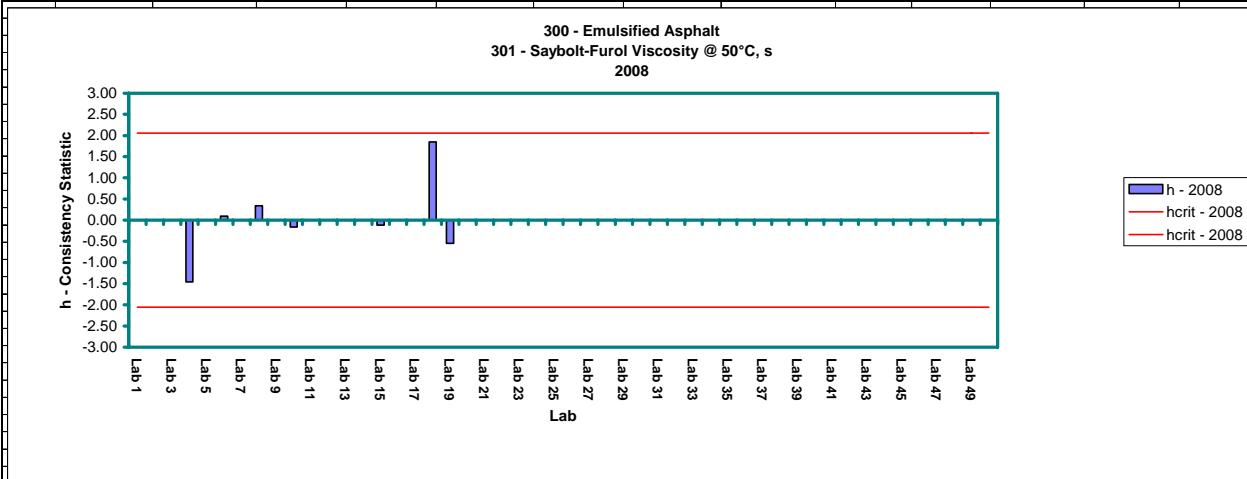
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages	
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R^2} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^2})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

200 - Cutback Asphalt													
215 - Penetration of Residue @ 25°C, 100g, 5s													
2008													
Data				n = 3	(X _{ave}) _{ave} = 179.1095	s _r = 6.5049	Check s _{X_{ave}} = 43.2039						
				p = 7	S _{X_{ave}} = 43.2039	s _R = 43.5292	r = 2.8 s _r = 18.0307						
				Significance Level = 0.5%		s _R = 43.5292	R = 2.8 s _R = 120.6567						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	162.0000	194.3000	181.0000		179.1000	16.2336	-0.0095	263.5300	0.00	2.50	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	189.0000	189.0000	188.0000		188.6667	0.5774	9.5571	0.3333	0.22	0.09	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	136.0000	134.0000	136.0000		135.3333	1.1547	-43.7762	1.3333	-1.01	0.18	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	153.0000	149.0000	155.0000		152.3333	3.0551	-26.7762	9.3333	-0.62	0.47	2.05	-2.05	2.03
Lab 11	234.0000	236.0000	234.0000		234.6667	1.1547	55.5571	1.3333	1.29	0.18	2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	132.0000	130.0000	128.0000		130.0000	2.0000	-49.1095	4.0000	-1.14	0.31	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18											2.05	-2.05	2.03
Lab 19	230.0000	233.0000	238.0000		233.6667	4.0415	54.5571	16.3333	1.26	0.62	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics				Minimum X _{ave}	130.0000	r = 2.8 s _r =	18.0307	h _{crit} =	2.05				
				Maximum X _{ave}	234.6667	R = 2.8 s _R =	120.6567	h _{crit} =	-2.05				
				Check s _{X_{ave}}	43.2039			k _{crit} =	2.03				
Where: x ₁ ...x _n =	Individual Test Result			Where:	(X _{ave}) _{ave} =	Average of Cell Averages							
X _{ave} =	Cell Average			s _{X_{ave}} =	Standard Deviation of Cell Averages								
n =	Number of Test Results per Cell			s _r =	Repeatability Standard Deviation								
s =	Cell Standard Deviation			s _R =	Interim Reproducibility Standard Deviation								
d =	Cell Deviation (X _{ave} - (X _{ave}) _{ave})			s _R =	Reproducibility Standard Deviation (Larger of s _r and s _R)								
s ² =	Cell Variation			h =	Between Laboratory Consistency Statistic								
p =	Number of Laboratories			k =	Within Laboratory Consistency Statistic								
h _{crit} =	Critical Between Laboratory Consistency Statistic			r =	95% Confidence Limit for Repeatability								
k _{crit} =	Critical Within Laboratory Consistency Statistic			R =	95% Confidence Limit for Reproducibility								



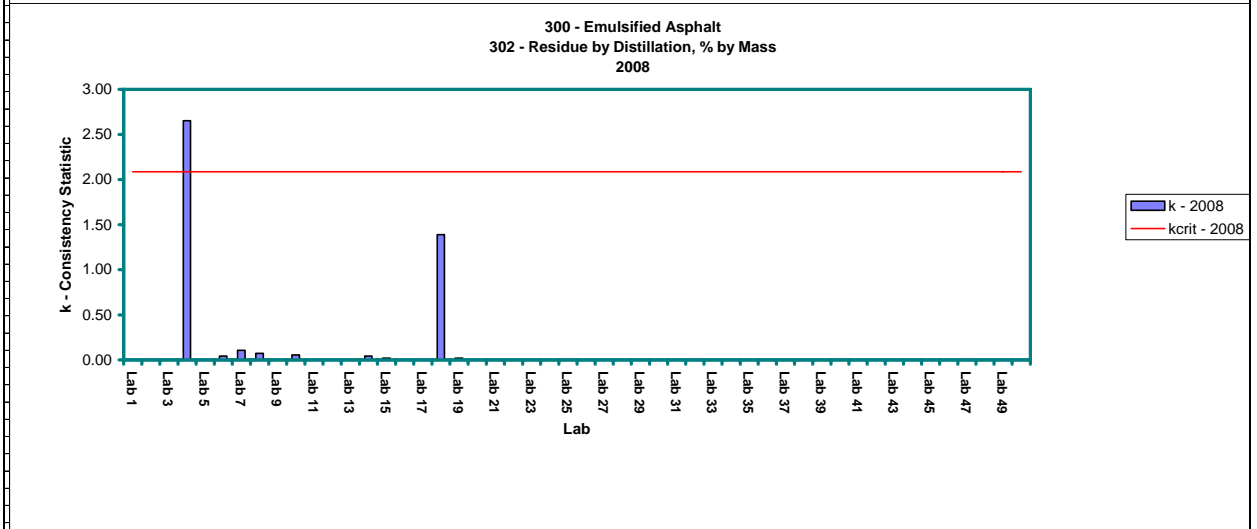
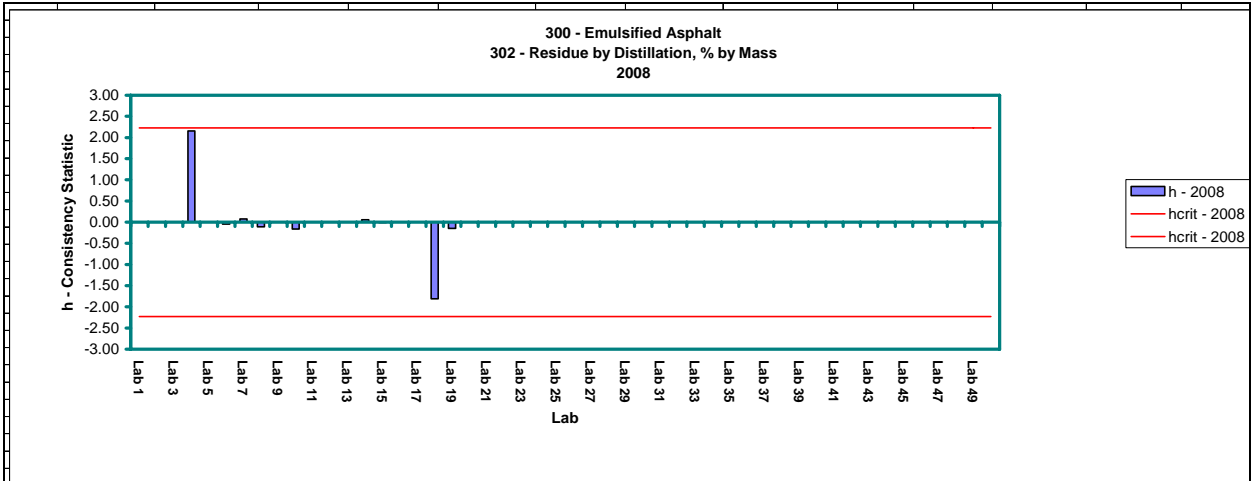
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$S_{(ave)}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

300 - Emulsified Asphalt													
301 - Saybolt-Furol Viscosity @ 50°C, s													
2008													
Data					n = 3	(X _{ave}) _{ave} = 43.5614	s _r = 13.3844	Check s _{Xave} = 11.6017					
					p = 7	S _{Xave} = 11.6017	s _R = 15.9383	r = 2.8 s _r = 37.0998					
					Significance Level = 0.5%		s _R = 15.9383	R = 2.8 s _R = 44.1786					
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.05	-2.05	2.03
Lab 2											2.05	-2.05	2.03
Lab 3											2.05	-2.05	2.03
Lab 4	27.0000	25.0000	28.0000		26.6667	1.5275	-16.8948	2.3333	-1.46	0.11	2.05	-2.05	2.03
Lab 5											2.05	-2.05	2.03
Lab 6	47.9500	43.8400	42.2000		44.6633	2.9621	1.1019	8.7740	0.09	0.22	2.05	-2.05	2.03
Lab 7											2.05	-2.05	2.03
Lab 8	48.0000	46.8000	47.7000		47.5000	0.6245	3.9386	0.3900	0.34	0.05	2.05	-2.05	2.03
Lab 9											2.05	-2.05	2.03
Lab 10	42.0000	40.0000	43.0000		41.6667	1.5275	-1.8948	2.3333	-0.16	0.11	2.05	-2.05	2.03
Lab 11											2.05	-2.05	2.03
Lab 12											2.05	-2.05	2.03
Lab 13											2.05	-2.05	2.03
Lab 14											2.05	-2.05	2.03
Lab 15	43.9000	42.8000	40.0000		42.2333	2.0108	-1.3281	4.0433	-0.11	0.15	2.05	-2.05	2.03
Lab 16											2.05	-2.05	2.03
Lab 17											2.05	-2.05	2.03
Lab 18	39.0000	105.0000	51.0000		65.0000	35.1568	21.4386	1,236.0000	1.85	2.63	2.05	-2.05	2.03
Lab 19	36.8000	37.3000	37.5000		37.2000	0.3606	-6.3614	0.1300	-0.55	0.03	2.05	-2.05	2.03
Lab 20											2.05	-2.05	2.03
Lab 21											2.05	-2.05	2.03
Lab 22											2.05	-2.05	2.03
Lab 23											2.05	-2.05	2.03
Lab 24											2.05	-2.05	2.03
Lab 25											2.05	-2.05	2.03
Lab 26											2.05	-2.05	2.03
Lab 27											2.05	-2.05	2.03
Lab 28											2.05	-2.05	2.03
Lab 29											2.05	-2.05	2.03
Lab 30											2.05	-2.05	2.03
Lab 31											2.05	-2.05	2.03
Lab 32											2.05	-2.05	2.03
Lab 33											2.05	-2.05	2.03
Lab 34											2.05	-2.05	2.03
Lab 35											2.05	-2.05	2.03
Lab 36											2.05	-2.05	2.03
Lab 37											2.05	-2.05	2.03
Lab 38											2.05	-2.05	2.03
Lab 39											2.05	-2.05	2.03
Lab 40											2.05	-2.05	2.03
Lab 41											2.05	-2.05	2.03
Lab 42											2.05	-2.05	2.03
Lab 43											2.05	-2.05	2.03
Lab 44											2.05	-2.05	2.03
Lab 45											2.05	-2.05	2.03
Lab 46											2.05	-2.05	2.03
Lab 47											2.05	-2.05	2.03
Lab 48											2.05	-2.05	2.03
Lab 49											2.05	-2.05	2.03
Lab 50											2.05	-2.05	2.03
Additional Statistics					Minimum X _{ave} = 26.6667	r = 2.8 s _r = 37.0998	h _{crit} = 2.05						
					Maximum X _{ave} = 65.0000	R = 2.8 s _R = 44.1786	h _{crit} = -2.05						
					Check s _{Xave} = 11.6017		k _{crit} = 2.03						
Where: x ₁ ...x _n = Individual Test Result		Where: (X _{ave}) _{ave} = Average of Cell Averages											
X _{ave} = Cell Average		s _{Xave} = Standard Deviation of Cell Averages											
n = Number of Test Results per Cell		s _r = Repeatability Standard Deviation											
s = Cell Standard Deviation		s _R = Interim Reproducibility Standard Deviation											
d = Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R = Reproducibility Standard Deviation (Larger of s _r and s _R)											
s ² = Cell Variation		h = Between Laboratory Consistency Statistic											
p = Number of Laboratories		k = Within Laboratory Consistency Statistic											
h _{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability											
k _{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility											



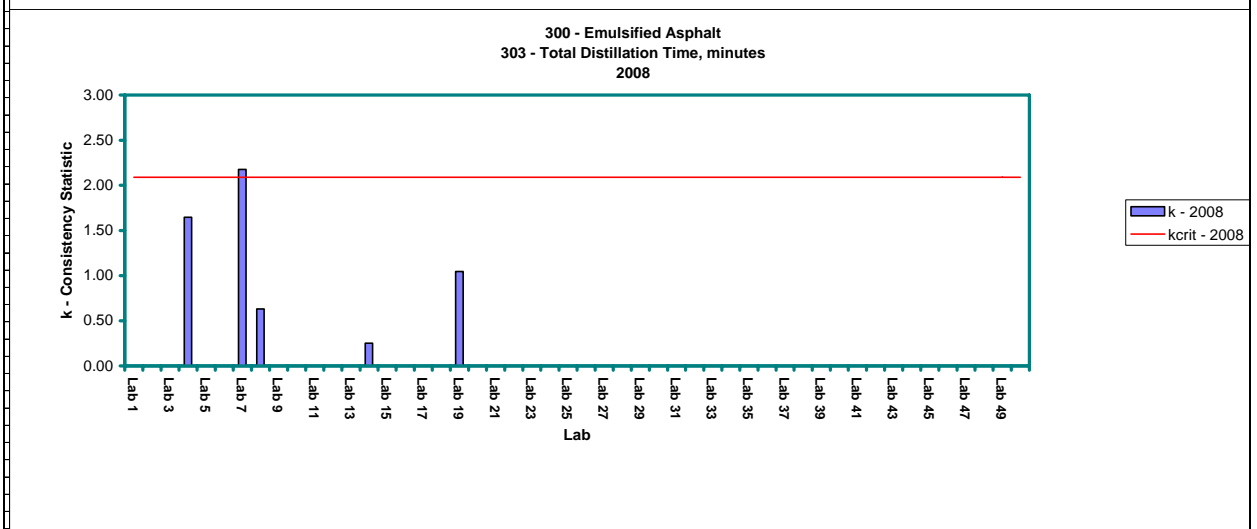
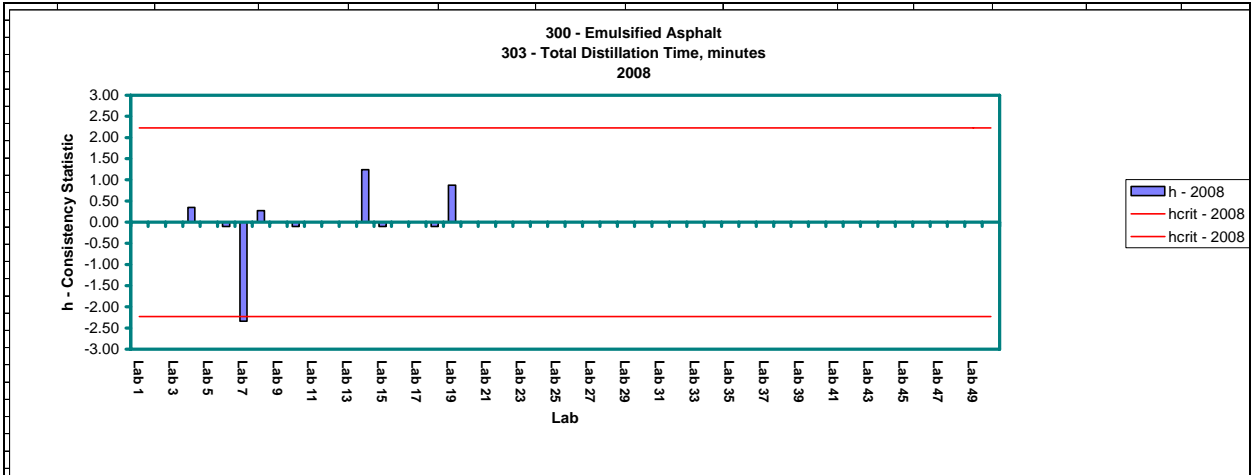
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

300 - Emulsified Asphalt													
302 - Residue by Distillation, % by Mass													
2008													
Data				n = 3	(X _{ave}) _{ave} = 63.0537	s _r = 2.7634	Check s _{Xave} = 1.9620						
				p = 9	S _{Xave} = 1.9620	s _R = 2.9900	r = 2.8 s _r = 7.6597						
				Significance Level = 0.5%		s _R = 2.9900	R = 2.8 s _R = 8.2879						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.23	-2.23	2.09
Lab 2											2.23	-2.23	2.09
Lab 3											2.23	-2.23	2.09
Lab 4	63.0000	75.7500	63.1000		67.2833	7.3325	4.2296	53.7658	2.16	2.65	2.23	-2.23	2.09
Lab 5											2.23	-2.23	2.09
Lab 6	63.1000	62.9000	62.9000		62.9667	0.1155	-0.0870	0.0133	-0.04	0.04	2.23	-2.23	2.09
Lab 7	62.9000	63.2000	63.5000		63.2000	0.3000	0.1463	0.0900	0.07	0.11	2.23	-2.23	2.09
Lab 8	62.9000	63.0000	62.6000		62.8333	0.2082	-0.2204	0.0433	-0.11	0.08	2.23	-2.23	2.09
Lab 9											2.23	-2.23	2.09
Lab 10	62.9000	62.7000	62.6000		62.7333	0.1528	-0.3204	0.0233	-0.16	0.06	2.23	-2.23	2.09
Lab 11											2.23	-2.23	2.09
Lab 12											2.23	-2.23	2.09
Lab 13											2.23	-2.23	2.09
Lab 14	63.3000	63.1000	63.1000		63.1667	0.1155	0.1130	0.0133	0.06	0.04	2.23	-2.23	2.09
Lab 15	63.1000	63.0000	63.0000		63.0333	0.0577	-0.0204	0.0033	-0.01	0.02	2.23	-2.23	2.09
Lab 16											2.23	-2.23	2.09
Lab 17											2.23	-2.23	2.09
Lab 18	61.2000	55.1000	62.2000		59.5000	3.8432	-3.5537	14.7700	-1.81	1.39	2.23	-2.23	2.09
Lab 19	62.7000	62.8000	62.8000		62.7667	0.0577	-0.2870	0.0033	-0.15	0.02	2.23	-2.23	2.09
Lab 20											2.23	-2.23	2.09
Lab 21											2.23	-2.23	2.09
Lab 22											2.23	-2.23	2.09
Lab 23											2.23	-2.23	2.09
Lab 24											2.23	-2.23	2.09
Lab 25											2.23	-2.23	2.09
Lab 26											2.23	-2.23	2.09
Lab 27											2.23	-2.23	2.09
Lab 28											2.23	-2.23	2.09
Lab 29											2.23	-2.23	2.09
Lab 30											2.23	-2.23	2.09
Lab 31											2.23	-2.23	2.09
Lab 32											2.23	-2.23	2.09
Lab 33											2.23	-2.23	2.09
Lab 34											2.23	-2.23	2.09
Lab 35											2.23	-2.23	2.09
Lab 36											2.23	-2.23	2.09
Lab 37											2.23	-2.23	2.09
Lab 38											2.23	-2.23	2.09
Lab 39											2.23	-2.23	2.09
Lab 40											2.23	-2.23	2.09
Lab 41											2.23	-2.23	2.09
Lab 42											2.23	-2.23	2.09
Lab 43											2.23	-2.23	2.09
Lab 44											2.23	-2.23	2.09
Lab 45											2.23	-2.23	2.09
Lab 46											2.23	-2.23	2.09
Lab 47											2.23	-2.23	2.09
Lab 48											2.23	-2.23	2.09
Lab 49											2.23	-2.23	2.09
Lab 50											2.23	-2.23	2.09
Additional Statistics				Minimum X _{ave}	59.5000	r = 2.8 s _r =	7.6597	h _{crit} =	2.23				
				Maximum X _{ave}	67.2833	R = 2.8 s _R =	8.2879	h _{crit} =	-2.23				
				Check s _{Xave} =	1.9620			k _{crit} =	2.09				
Where: x ₁ ...x _n =		Individual Test Result		Where:		(X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =		Cell Average		s _{Xave} =		s _{ave} =		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell		s =		s _r =		Repeatability Standard Deviation					
s =		Cell Standard Deviation		d =		s _R =		Interim Reproducibility Standard Deviation					
s ² =		Cell Variation		p =		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
h _{crit} =		Critical Between Laboratory Consistency Statistic		k =		h =		Between Laboratory Consistency Statistic					
k _{crit} =		Critical Within Laboratory Consistency Statistic		r =		k =		Within Laboratory Consistency Statistic					
				R =		r =		95% Confidence Limit for Repeatability					
						R =		95% Confidence Limit for Reproducibility					



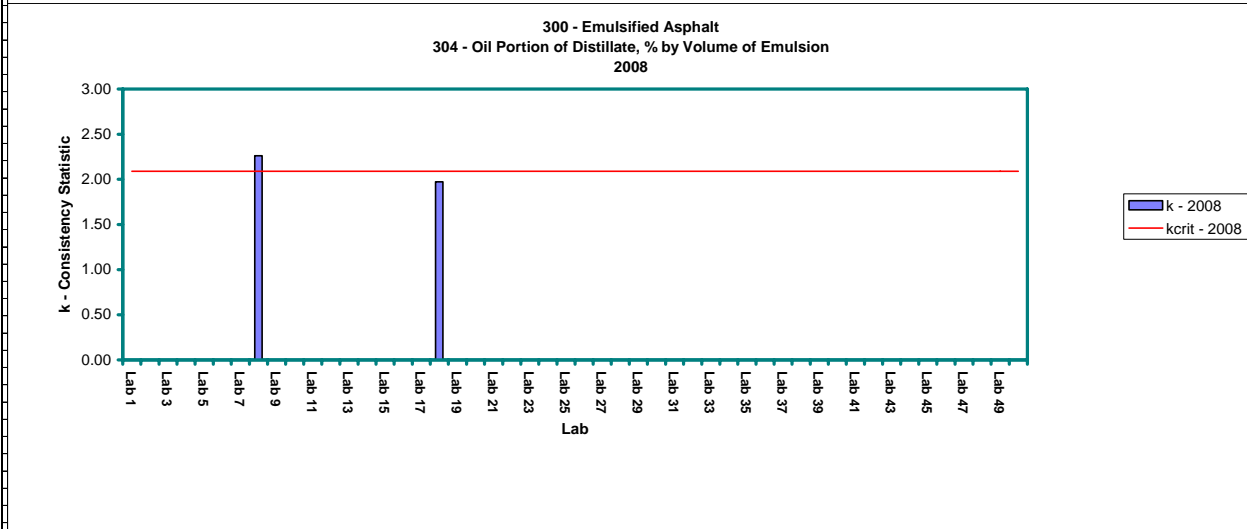
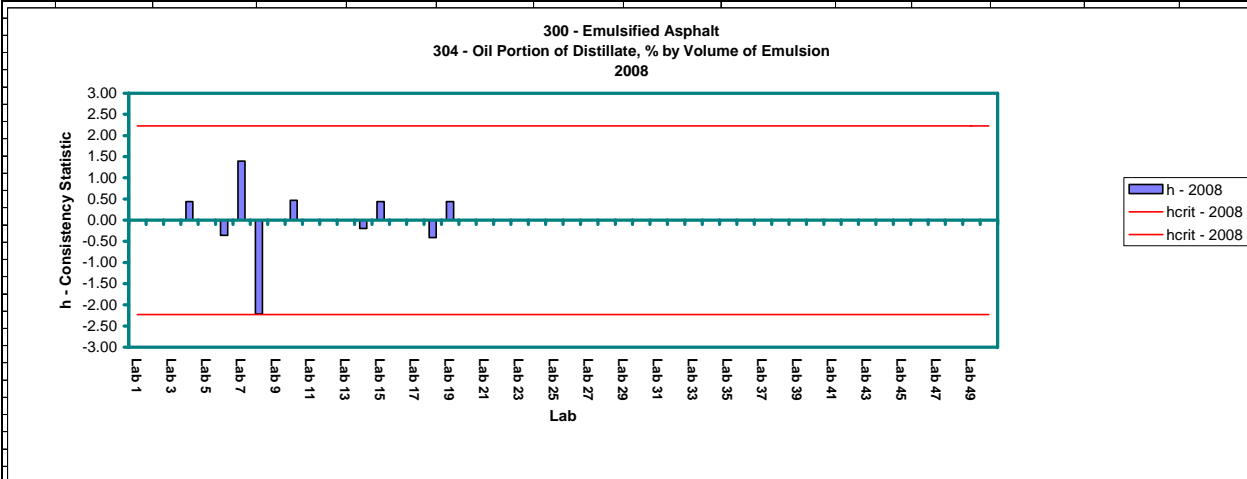
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation $(X_{ave} - (X_{ave})_{ave})$	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300 - Emulsified Asphalt													
303 - Total Distillation Time, minutes													
2008													
Data					n = 3	(X_{ave}) _{ave} = 60.4444	s_r = 3.9814	Check $s_{X_{ave}}$ = 4.4690					
					p = 9	$S_{X_{ave}}$ = 4.4690	s_{R^*} = 5.5263	r = 2.8 s_r = 11.0360					
					Significance Level = 0.5%		s_R = 5.5263	R = 2.8 s_R = 15.3182					
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.23	-2.23	2.09
Lab 2											2.23	-2.23	2.09
Lab 3											2.23	-2.23	2.09
Lab 4	56.0000	69.0000	61.0000		62.0000	6.5574	1.5556	43.0000	0.35	1.65	2.23	-2.23	2.09
Lab 5											2.23	-2.23	2.09
Lab 6	60.0000	60.0000	60.0000		60.0000	0.0000	-0.4444	0.0000	-0.10	0.00	2.23	-2.23	2.09
Lab 7	45.0000	45.0000	60.0000		50.0000	8.6603	-10.4444	75.0000	-2.34	2.18	2.23	-2.23	2.09
Lab 8	64.0000	59.0000	62.0000		61.6667	2.5166	1.2222	6.3333	0.27	0.63	2.23	-2.23	2.09
Lab 9											2.23	-2.23	2.09
Lab 10	60.0000	60.0000	60.0000		60.0000	0.0000	-0.4444	0.0000	-0.10	0.00	2.23	-2.23	2.09
Lab 11											2.23	-2.23	2.09
Lab 12											2.23	-2.23	2.09
Lab 13											2.23	-2.23	2.09
Lab 14	65.0000	67.0000	66.0000		66.0000	1.0000	5.5556	1.0000	1.24	0.25	2.23	-2.23	2.09
Lab 15	60.0000	60.0000	60.0000		60.0000	0.0000	-0.4444	0.0000	-0.10	0.00	2.23	-2.23	2.09
Lab 16											2.23	-2.23	2.09
Lab 17											2.23	-2.23	2.09
Lab 18	60.0000	60.0000	60.0000		60.0000	0.0000	-0.4444	0.0000	-0.10	0.00	2.23	-2.23	2.09
Lab 19	63.0000	61.0000	69.0000		64.3333	4.1633	3.8889	17.3333	0.87	1.05	2.23	-2.23	2.09
Lab 20											2.23	-2.23	2.09
Lab 21											2.23	-2.23	2.09
Lab 22											2.23	-2.23	2.09
Lab 23											2.23	-2.23	2.09
Lab 24											2.23	-2.23	2.09
Lab 25											2.23	-2.23	2.09
Lab 26											2.23	-2.23	2.09
Lab 27											2.23	-2.23	2.09
Lab 28											2.23	-2.23	2.09
Lab 29											2.23	-2.23	2.09
Lab 30											2.23	-2.23	2.09
Lab 31											2.23	-2.23	2.09
Lab 32											2.23	-2.23	2.09
Lab 33											2.23	-2.23	2.09
Lab 34											2.23	-2.23	2.09
Lab 35											2.23	-2.23	2.09
Lab 36											2.23	-2.23	2.09
Lab 37											2.23	-2.23	2.09
Lab 38											2.23	-2.23	2.09
Lab 39											2.23	-2.23	2.09
Lab 40											2.23	-2.23	2.09
Lab 41											2.23	-2.23	2.09
Lab 42											2.23	-2.23	2.09
Lab 43											2.23	-2.23	2.09
Lab 44											2.23	-2.23	2.09
Lab 45											2.23	-2.23	2.09
Lab 46											2.23	-2.23	2.09
Lab 47											2.23	-2.23	2.09
Lab 48											2.23	-2.23	2.09
Lab 49											2.23	-2.23	2.09
Lab 50											2.23	-2.23	2.09
Additional Statistics					Minimum X_{ave}	50.0000	$r = 2.8$ $s_r =$	11.0360	$h_{crit} =$	2.23			
					Maximum X_{ave}	66.0000	$R = 2.8$ $s_R =$	15.3182	$h_{crit} =$	-2.23			
					Check $s_{X_{ave}}$	4.4690			$k_{crit} =$	2.09			
Where: $x_1, \dots, x_n =$					Individual Test Result	Where: (X_{ave}) _{ave} =		Average of Cell Averages					
$X_{ave} =$					Cell Average	$s_{ave} =$		Standard Deviation of Cell Averages					
n =					Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation					
s =					Cell Standard Deviation	$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =					Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$					Cell Variation	h =		Between Laboratory Consistency Statistic					
p =					Number of Laboratories	k =		Within Laboratory Consistency Statistic					
$h_{crit} =$					Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability					
$k_{crit} =$					Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility					



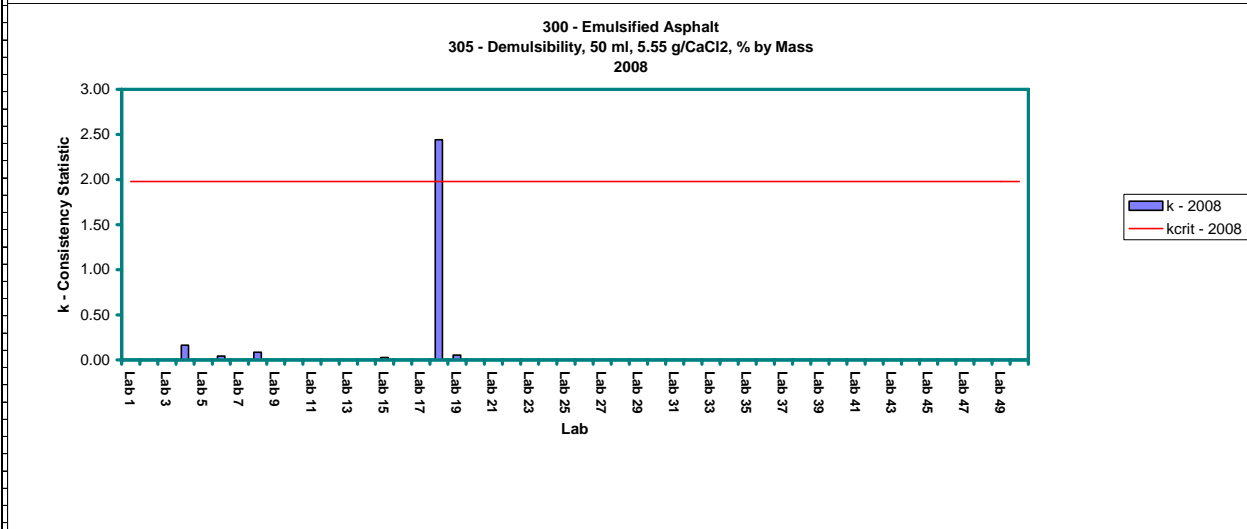
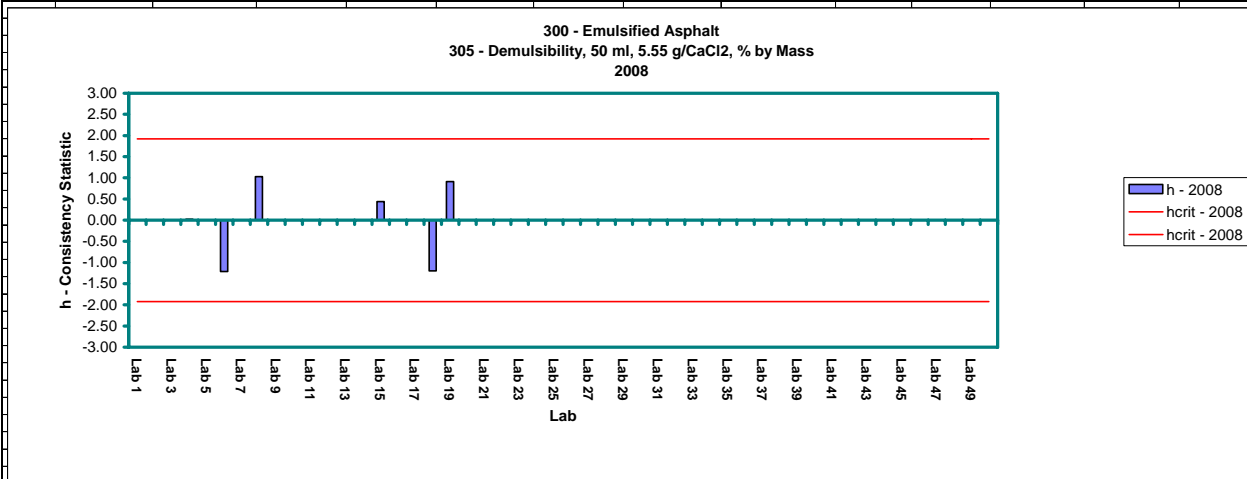
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

300 - Emulsified Asphalt													
304 - Oil Portion of Distillate, % by Volume of Emulsion													
2008													
Data					n = 3	$(X_{ave})_{ave} = 0.8622$	$s_r = 0.1277$	Check $s_{X_{ave}} = 0.3137$					
					p = 9	$s_{X_{ave}} = 0.3137$	$s_{R'} = 0.3306$	$r = 2.8 s_r = 0.3538$					
					Significance Level = 0.5%		$s_R = 0.3306$	$R = 2.8 s_R = 0.9163$					
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.23	-2.23	2.09
Lab 2											2.23	-2.23	2.09
Lab 3											2.23	-2.23	2.09
Lab 4	1.0000	1.0000	1.0000		1.0000	0.0000	0.1378	0.0000	0.44	0.00	2.23	-2.23	2.09
Lab 5											2.23	-2.23	2.09
Lab 6	0.7500	0.7500	0.7500		0.7500	0.0000	-0.1122	0.0000	-0.36	0.00	2.23	-2.23	2.09
Lab 7	1.3000	1.3000	1.3000		1.3000	0.0000	0.4378	0.0000	1.40	0.00	2.23	-2.23	2.09
Lab 8	0.5000	0.0000	0.0000		0.1667	0.2887	-0.6956	0.0833	-2.22	2.26	2.23	-2.23	2.09
Lab 9											2.23	-2.23	2.09
Lab 10	1.0100	1.0100	1.0100		1.0100	0.0000	0.1478	0.0000	0.47	0.00	2.23	-2.23	2.09
Lab 11											2.23	-2.23	2.09
Lab 12											2.23	-2.23	2.09
Lab 13											2.23	-2.23	2.09
Lab 14	0.8000	0.8000	0.8000		0.8000	0.0000	-0.0622	0.0000	-0.20	0.00	2.23	-2.23	2.09
Lab 15	1.0000	1.0000	1.0000		1.0000	0.0000	0.1378	0.0000	0.44	0.00	2.23	-2.23	2.09
Lab 16											2.23	-2.23	2.09
Lab 17											2.23	-2.23	2.09
Lab 18	0.7000	0.5000	1.0000		0.7333	0.2517	-0.1289	0.0633	-0.41	1.97	2.23	-2.23	2.09
Lab 19	1.0000	1.0000	1.0000		1.0000	0.0000	0.1378	0.0000	0.44	0.00	2.23	-2.23	2.09
Lab 20											2.23	-2.23	2.09
Lab 21											2.23	-2.23	2.09
Lab 22											2.23	-2.23	2.09
Lab 23											2.23	-2.23	2.09
Lab 24											2.23	-2.23	2.09
Lab 25											2.23	-2.23	2.09
Lab 26											2.23	-2.23	2.09
Lab 27											2.23	-2.23	2.09
Lab 28											2.23	-2.23	2.09
Lab 29											2.23	-2.23	2.09
Lab 30											2.23	-2.23	2.09
Lab 31											2.23	-2.23	2.09
Lab 32											2.23	-2.23	2.09
Lab 33											2.23	-2.23	2.09
Lab 34											2.23	-2.23	2.09
Lab 35											2.23	-2.23	2.09
Lab 36											2.23	-2.23	2.09
Lab 37											2.23	-2.23	2.09
Lab 38											2.23	-2.23	2.09
Lab 39											2.23	-2.23	2.09
Lab 40											2.23	-2.23	2.09
Lab 41											2.23	-2.23	2.09
Lab 42											2.23	-2.23	2.09
Lab 43											2.23	-2.23	2.09
Lab 44											2.23	-2.23	2.09
Lab 45											2.23	-2.23	2.09
Lab 46											2.23	-2.23	2.09
Lab 47											2.23	-2.23	2.09
Lab 48											2.23	-2.23	2.09
Lab 49											2.23	-2.23	2.09
Lab 50											2.23	-2.23	2.09
Additional Statistics					Minimum X_{ave}	0.1667	$r = 2.8 s_r =$	0.3538	$h_{crit} =$	2.23			
					Maximum X_{ave}	1.3000	$R = 2.8 s_R =$	0.9163	$h_{crit} =$	-2.23			
					Check $s_{X_{ave}} =$	0.3137			$k_{crit} =$	2.09			
Where:	$x_1, \dots, x_n =$	Individual Test Result			Where:	$(X_{ave})_{ave} =$	Average of Cell Averages						
	$X_{ave} =$	Cell Average				$s_{X_{ave}} =$	Standard Deviation of Cell Averages						
	n =	Number of Test Results per Cell				$s_r =$	Repeatability Standard Deviation						
	s =	Cell Standard Deviation				$s_{R'} =$	Interim Reproducibility Standard Deviation						
	d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$	Reproducibility Standard Deviation (Larger of s_r and $s_{R'}$)						
	$s^2 =$	Cell Variation				h =	Between Laboratory Consistency Statistic						
	p =	Number of Laboratories				k =	Within Laboratory Consistency Statistic						
	$h_{crit} =$	Critical Between Laboratory Consistency Statistic				r =	95% Confidence Limit for Repeatability						
	$k_{crit} =$	Critical Within Laboratory Consistency Statistic				R =	95% Confidence Limit for Reproducibility						



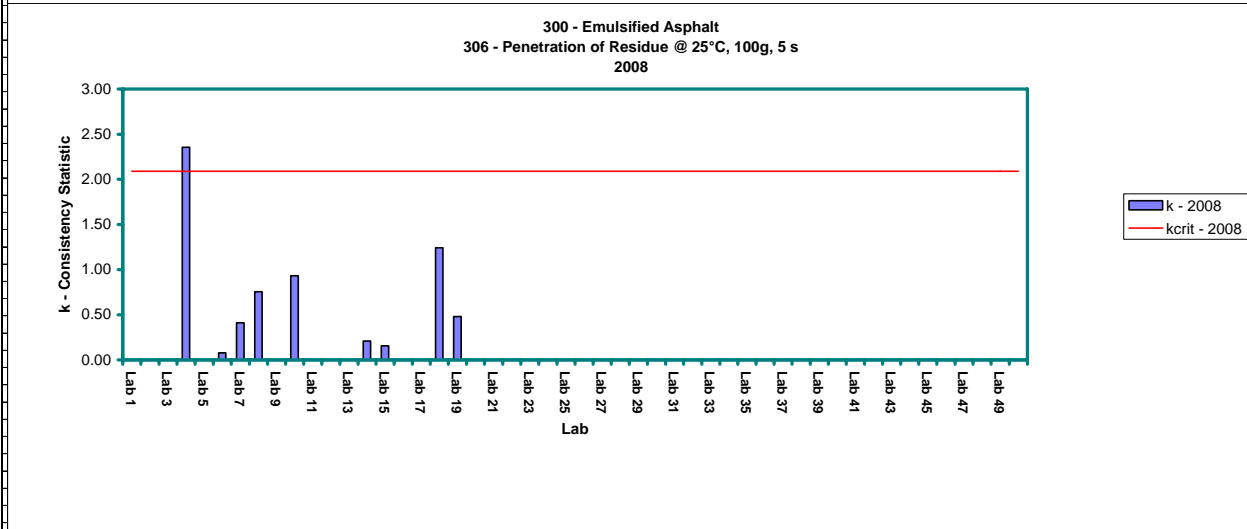
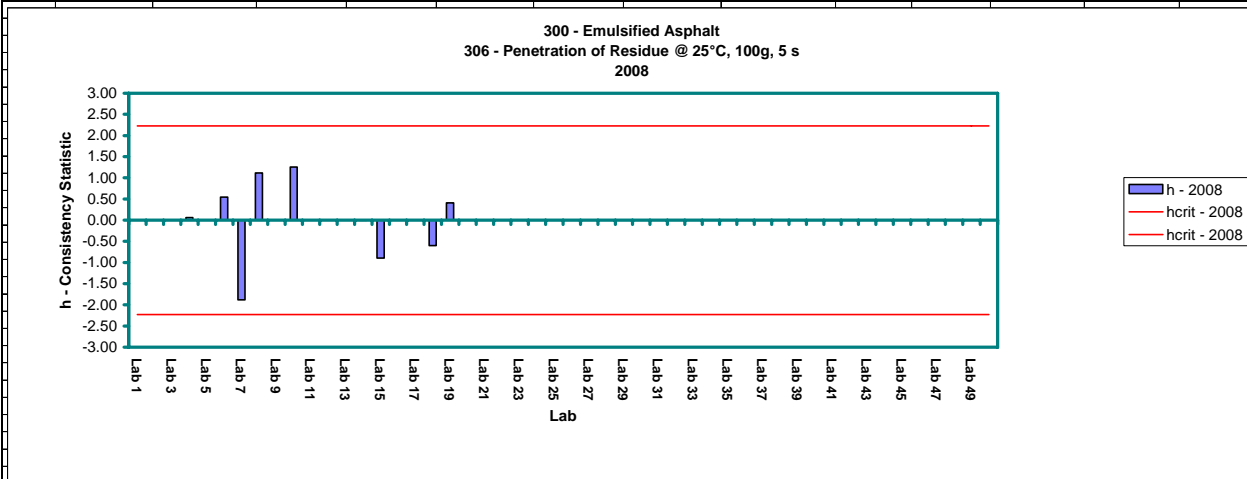
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		S_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		S_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		S_R =	Reproducibility Standard Deviation (Larger of s_r and S_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

300 - Emulsified Asphalt													
305 - Demulsibility, 50 ml, 5.55 g/CaCl2, % by Mass													
2008													
Data				n = 3	(X _{ave}) _{ave} = 95.1344	s _r = 4.2339	Check s _{X_{ave}} = 3.8408						
				p = 6	S _{X_{ave}} = 3.8408	s _R = 5.1675	r = 2.8 s _r = 11.7358						
				Significance Level = 0.5%		s _R = 5.1675	R = 2.8 s _R = 14.3235						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	94.4500	95.7800	95.4700		95.2333	0.6959	0.0989	0.4842	0.03	0.16	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	90.6600	90.3000	90.4600		90.4733	0.1804	-4.6611	0.0325	-1.21	0.04	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	99.0000	99.5000	98.8000		99.1000	0.3606	3.9656	0.1300	1.03	0.09	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11											1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14											1.92	-1.92	1.98
Lab 15	96.9000	96.9000	96.7000		96.8333	0.1155	1.6989	0.0133	0.44	0.03	1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18	96.3000	78.6000	96.7000		90.5333	10.3365	-4.6011	106.8433	-1.20	2.44	1.92	-1.92	1.98
Lab 19	98.5000	98.5000	98.9000		98.6333	0.2309	3.4989	0.0533	0.91	0.05	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X _{ave}	90.4733	r = 2.8 s _r =	11.7358	h _{crit} =	1.92				
				Maximum X _{ave}	99.1000	R = 2.8 s _R =	14.3235	h _{crit} =	-1.92				
				Check s _{X_{ave}}	3.8408			k _{crit} =	1.98				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		s _{X_{ave}} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



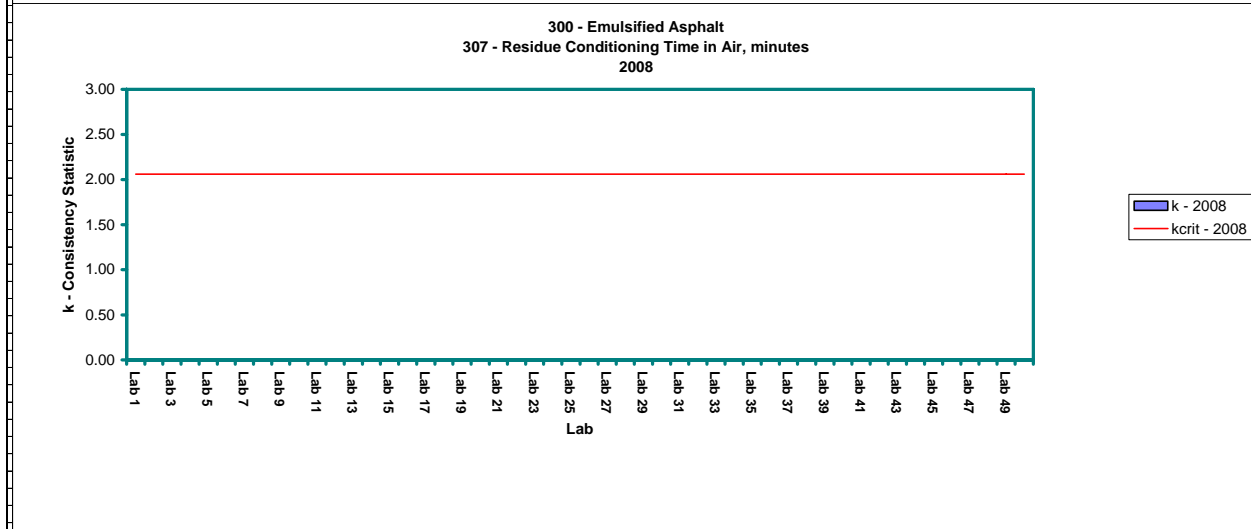
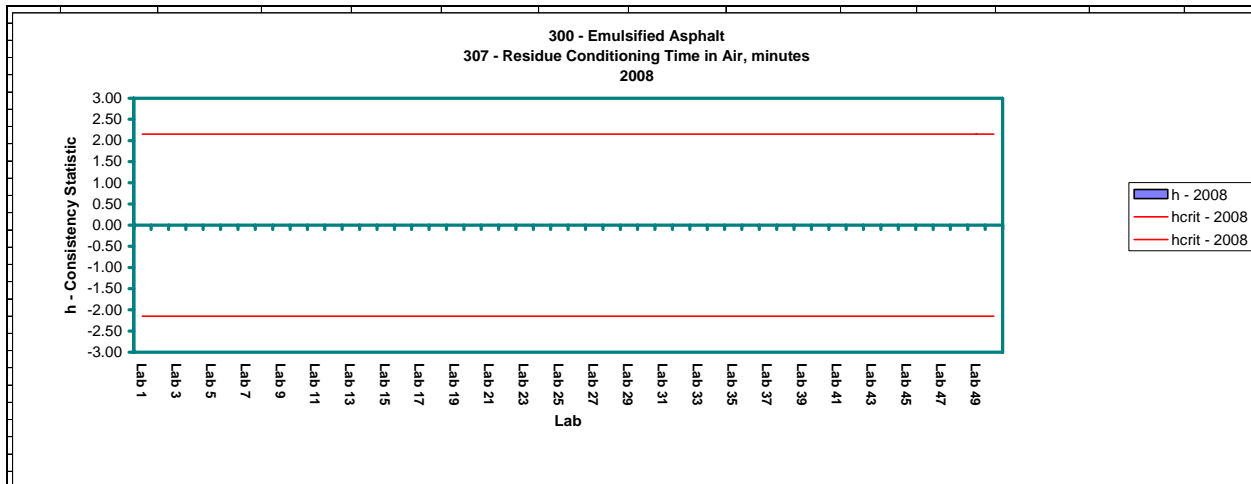
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

300 - Emulsified Asphalt													
306 - Penetration of Residue @ 25°C, 100g, 5 s													
2008													
Data				n = 3	(X _{ave}) _{ave} = 187.4074	s _r = 7.3080	Check s _{X_{ave}} = 14.5562						
				p = 9	S _{X_{ave}} = 14.5562	s _R = 15.7317	r = 2.8 s _r = 20.2568						
				Significance Level = 0.5%		s _R = 15.7317	R = 2.8 s _R = 43.6062						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.23	-2.23	2.09
Lab 2											2.23	-2.23	2.09
Lab 3											2.23	-2.23	2.09
Lab 4	208.0000	181.0000	176.0000		188.3333	17.2143	0.9259	296.3333	0.06	2.36	2.23	-2.23	2.09
Lab 5											2.23	-2.23	2.09
Lab 6	195.0000	196.0000	195.0000		195.3333	0.5774	7.9259	0.3333	0.54	0.08	2.23	-2.23	2.09
Lab 7	157.0000	160.0000	163.0000		160.0000	3.0000	-27.4074	9.0000	-1.88	0.41	2.23	-2.23	2.09
Lab 8	204.0000	198.0000	209.0000		203.6667	5.5076	16.2593	30.3333	1.12	0.75	2.23	-2.23	2.09
Lab 9											2.23	-2.23	2.09
Lab 10	198.0000	211.0000	208.0000		205.6667	6.8069	18.2593	46.3333	1.25	0.93	2.23	-2.23	2.09
Lab 11											2.23	-2.23	2.09
Lab 12											2.23	-2.23	2.09
Lab 13											2.23	-2.23	2.09
Lab 14	186.0000	189.0000	187.0000		187.3333	1.5275	-0.0741	2.3333	-0.01	0.21	2.23	-2.23	2.09
Lab 15	173.0000	175.0000	175.0000		174.3333	1.1547	-13.0741	1.3333	-0.90	0.16	2.23	-2.23	2.09
Lab 16											2.23	-2.23	2.09
Lab 17											2.23	-2.23	2.09
Lab 18	187.0000	169.0000	180.0000		178.6667	9.0738	-8.7407	82.3333	-0.60	1.24	2.23	-2.23	2.09
Lab 19	193.0000	190.0000	197.0000		193.3333	3.5119	5.9259	12.3333	0.41	0.48	2.23	-2.23	2.09
Lab 20											2.23	-2.23	2.09
Lab 21											2.23	-2.23	2.09
Lab 22											2.23	-2.23	2.09
Lab 23											2.23	-2.23	2.09
Lab 24											2.23	-2.23	2.09
Lab 25											2.23	-2.23	2.09
Lab 26											2.23	-2.23	2.09
Lab 27											2.23	-2.23	2.09
Lab 28											2.23	-2.23	2.09
Lab 29											2.23	-2.23	2.09
Lab 30											2.23	-2.23	2.09
Lab 31											2.23	-2.23	2.09
Lab 32											2.23	-2.23	2.09
Lab 33											2.23	-2.23	2.09
Lab 34											2.23	-2.23	2.09
Lab 35											2.23	-2.23	2.09
Lab 36											2.23	-2.23	2.09
Lab 37											2.23	-2.23	2.09
Lab 38											2.23	-2.23	2.09
Lab 39											2.23	-2.23	2.09
Lab 40											2.23	-2.23	2.09
Lab 41											2.23	-2.23	2.09
Lab 42											2.23	-2.23	2.09
Lab 43											2.23	-2.23	2.09
Lab 44											2.23	-2.23	2.09
Lab 45											2.23	-2.23	2.09
Lab 46											2.23	-2.23	2.09
Lab 47											2.23	-2.23	2.09
Lab 48											2.23	-2.23	2.09
Lab 49											2.23	-2.23	2.09
Lab 50											2.23	-2.23	2.09
Additional Statistics				Minimum X _{ave}	160.0000	r = 2.8 s _r =	20.2568	h _{crit} =	2.23				
				Maximum X _{ave}	205.6667	R = 2.8 s _R =	43.6062	h _{crit} =	-2.23				
				Check s _{X_{ave}}	14.5562			k _{crit} =	2.09				
Where: x ₁ ...x _n =		Individual Test Result		Where:		(X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =		Cell Average		s _{ave} =		s _{ave} =		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell		s _r =		s _r =		Repeatability Standard Deviation					
s =		Cell Standard Deviation		s _R =		s _R =		Interim Reproducibility Standard Deviation					
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
s ² =		Cell Variation		h =		h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories		k =		k =		Within Laboratory Consistency Statistic					
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		r =		95% Confidence Limit for Repeatability					
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		R =		95% Confidence Limit for Reproducibility					



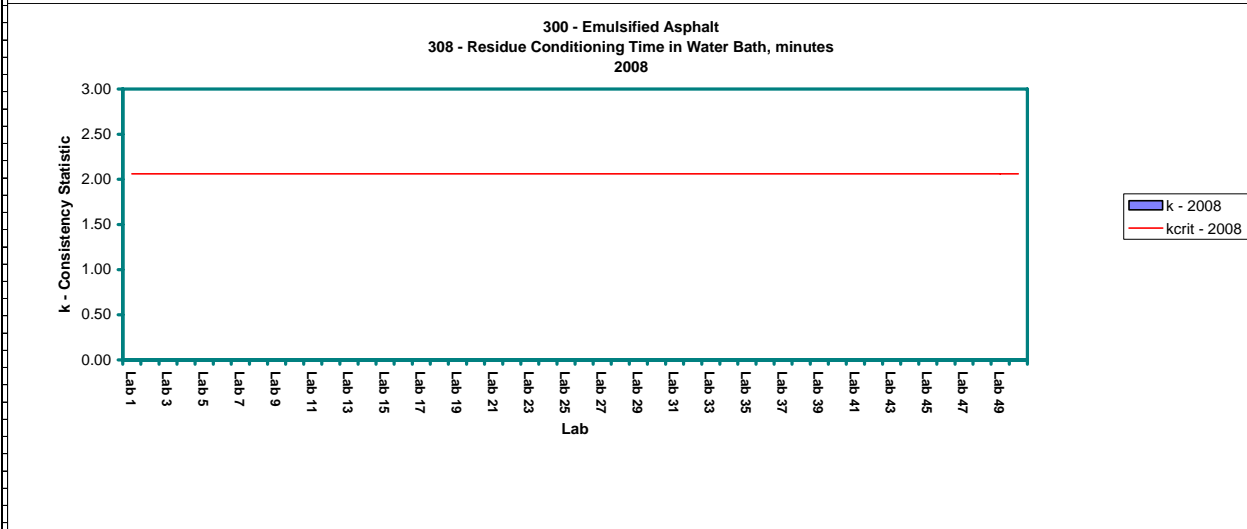
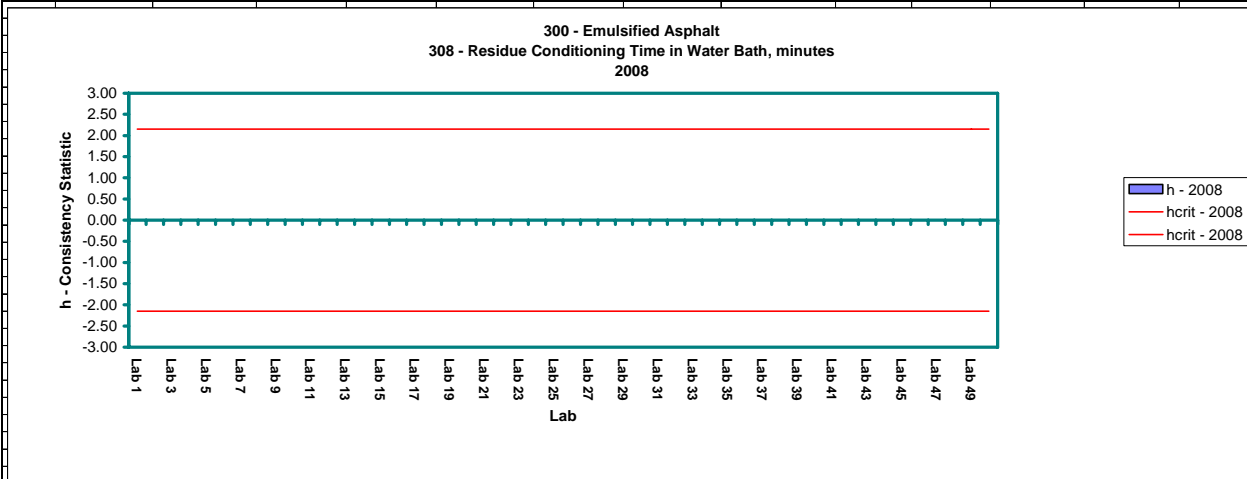
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$S_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

300 - Emulsified Asphalt													
307 - Residue Conditioning Time in Air, minutes													
2008													
Data				n = 3	(X_{ave}) _{ave} = 90.0000	s_r = 0.0000	Check $s_{X_{ave}}$ = 0.0000						
				p = 8	$S_{X_{ave}}$ = 0.0000	s_{R^*} = 0.0000	$r = 2.8 s_r = 0.0000$						
				Significance Level = 0.5%		s_R = 0.0000	$R = 2.8 s_R = 0.0000$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.15	-2.15	2.06
Lab 2											2.15	-2.15	2.06
Lab 3											2.15	-2.15	2.06
Lab 4	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 5											2.15	-2.15	2.06
Lab 6	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 7											2.15	-2.15	2.06
Lab 8	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 9											2.15	-2.15	2.06
Lab 10	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 11											2.15	-2.15	2.06
Lab 12											2.15	-2.15	2.06
Lab 13											2.15	-2.15	2.06
Lab 14	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 15	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 16											2.15	-2.15	2.06
Lab 17											2.15	-2.15	2.06
Lab 18	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 19	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 20											2.15	-2.15	2.06
Lab 21											2.15	-2.15	2.06
Lab 22											2.15	-2.15	2.06
Lab 23											2.15	-2.15	2.06
Lab 24											2.15	-2.15	2.06
Lab 25											2.15	-2.15	2.06
Lab 26											2.15	-2.15	2.06
Lab 27											2.15	-2.15	2.06
Lab 28											2.15	-2.15	2.06
Lab 29											2.15	-2.15	2.06
Lab 30											2.15	-2.15	2.06
Lab 31											2.15	-2.15	2.06
Lab 32											2.15	-2.15	2.06
Lab 33											2.15	-2.15	2.06
Lab 34											2.15	-2.15	2.06
Lab 35											2.15	-2.15	2.06
Lab 36											2.15	-2.15	2.06
Lab 37											2.15	-2.15	2.06
Lab 38											2.15	-2.15	2.06
Lab 39											2.15	-2.15	2.06
Lab 40											2.15	-2.15	2.06
Lab 41											2.15	-2.15	2.06
Lab 42											2.15	-2.15	2.06
Lab 43											2.15	-2.15	2.06
Lab 44											2.15	-2.15	2.06
Lab 45											2.15	-2.15	2.06
Lab 46											2.15	-2.15	2.06
Lab 47											2.15	-2.15	2.06
Lab 48											2.15	-2.15	2.06
Lab 49											2.15	-2.15	2.06
Lab 50											2.15	-2.15	2.06
Additional Statistics				Minimum X_{ave}	90.0000	$r = 2.8 s_r =$	0.0000	$h_{crit} =$	2.15				
				Maximum X_{ave}	90.0000	$R = 2.8 s_R =$	0.0000	$h_{crit} =$	-2.15				
				Check $s_{X_{ave}}$	0.0000			$k_{crit} =$	2.06				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{X_{ave}} =$		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
s =		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories				k =		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				r =		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				R =		95% Confidence Limit for Reproducibility					



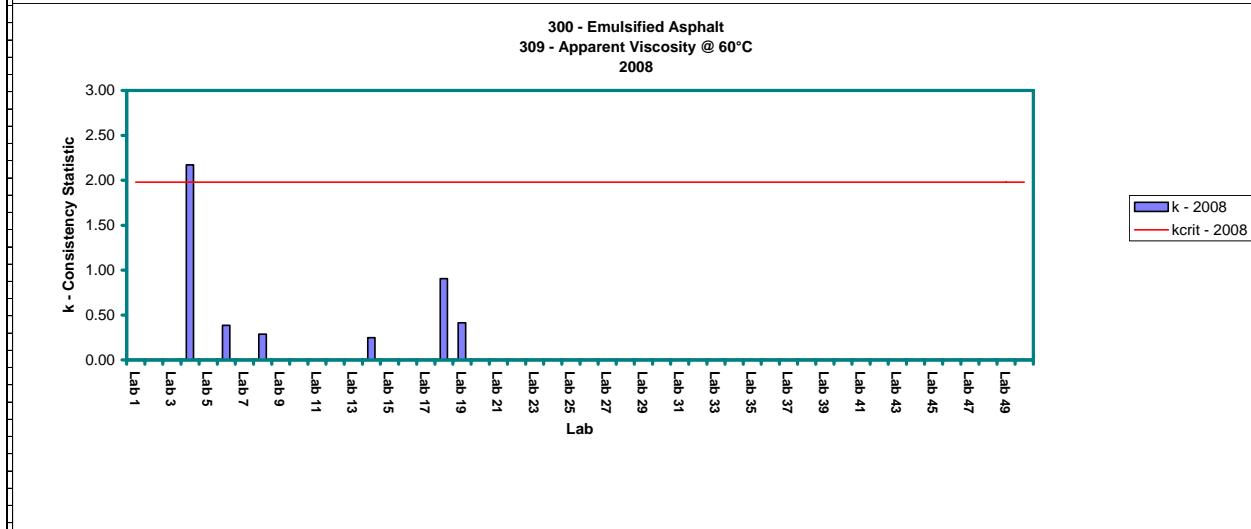
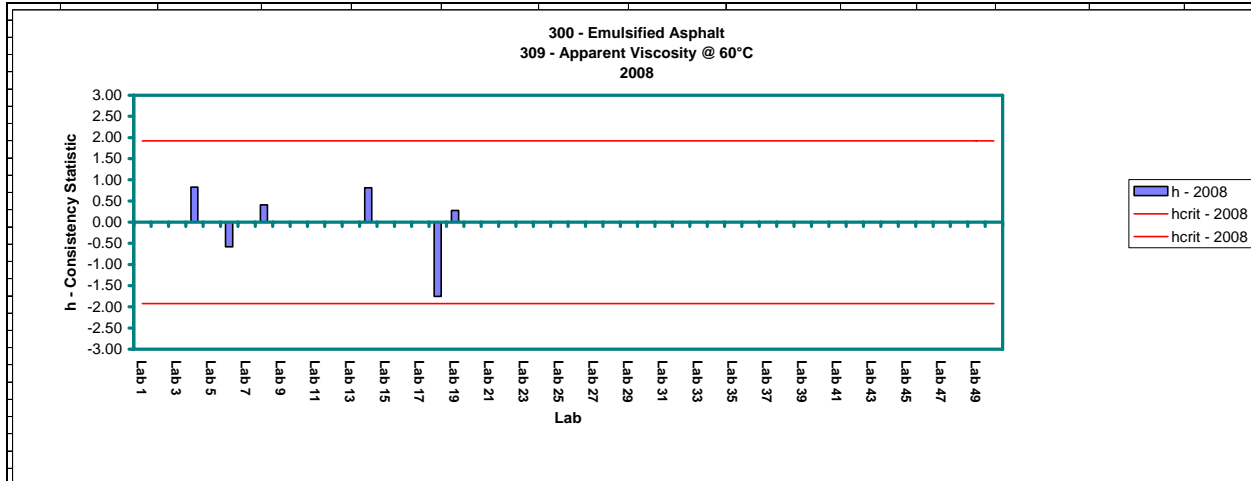
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages	
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation $(X_{ave} - (X_{ave})_{ave})$	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

300 - Emulsified Asphalt													
308 - Residue Conditioning Time in Water Bath, minutes													
2008													
Data				n = 3	(X_{ave}) _{ave} = 90.0000	s_r = 0.0000	Check $s_{X_{ave}}$ = 0.0000						
				p = 8	$S_{X_{ave}}$ = 0.0000	s_{R^*} = 0.0000	$r = 2.8 s_r = 0.0000$						
				Significance Level = 0.5%		s_R = 0.0000	$R = 2.8 s_R = 0.0000$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											2.15	-2.15	2.06
Lab 2											2.15	-2.15	2.06
Lab 3											2.15	-2.15	2.06
Lab 4	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 5											2.15	-2.15	2.06
Lab 6	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 7											2.15	-2.15	2.06
Lab 8	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 9											2.15	-2.15	2.06
Lab 10	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 11											2.15	-2.15	2.06
Lab 12											2.15	-2.15	2.06
Lab 13											2.15	-2.15	2.06
Lab 14	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 15	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 16											2.15	-2.15	2.06
Lab 17											2.15	-2.15	2.06
Lab 18	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 19	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	2.15	-2.15	2.06
Lab 20											2.15	-2.15	2.06
Lab 21											2.15	-2.15	2.06
Lab 22											2.15	-2.15	2.06
Lab 23											2.15	-2.15	2.06
Lab 24											2.15	-2.15	2.06
Lab 25											2.15	-2.15	2.06
Lab 26											2.15	-2.15	2.06
Lab 27											2.15	-2.15	2.06
Lab 28											2.15	-2.15	2.06
Lab 29											2.15	-2.15	2.06
Lab 30											2.15	-2.15	2.06
Lab 31											2.15	-2.15	2.06
Lab 32											2.15	-2.15	2.06
Lab 33											2.15	-2.15	2.06
Lab 34											2.15	-2.15	2.06
Lab 35											2.15	-2.15	2.06
Lab 36											2.15	-2.15	2.06
Lab 37											2.15	-2.15	2.06
Lab 38											2.15	-2.15	2.06
Lab 39											2.15	-2.15	2.06
Lab 40											2.15	-2.15	2.06
Lab 41											2.15	-2.15	2.06
Lab 42											2.15	-2.15	2.06
Lab 43											2.15	-2.15	2.06
Lab 44											2.15	-2.15	2.06
Lab 45											2.15	-2.15	2.06
Lab 46											2.15	-2.15	2.06
Lab 47											2.15	-2.15	2.06
Lab 48											2.15	-2.15	2.06
Lab 49											2.15	-2.15	2.06
Lab 50											2.15	-2.15	2.06
Additional Statistics				Minimum X_{ave}	90.0000	$r = 2.8 s_r =$	0.0000	$h_{crit} =$	2.15				
				Maximum X_{ave}	90.0000	$R = 2.8 s_R =$	0.0000	$h_{crit} =$	-2.15				
				Check $s_{X_{ave}}$	0.0000			$k_{crit} =$	2.06				
Where:	$x_1, \dots, x_n =$	Individual Test Result			Where:	$(X_{ave})_{ave} =$	Average of Cell Averages						
	$X_{ave} =$	Cell Average				$s_{X_{ave}} =$	Standard Deviation of Cell Averages						
	n =	Number of Test Results per Cell				$s_r =$	Repeatability Standard Deviation						
	s =	Cell Standard Deviation				$s_{R^*} =$	Interim Reproducibility Standard Deviation						
	d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})						
	$s^2 =$	Cell Variation				h =	Between Laboratory Consistency Statistic						
	p =	Number of Laboratories				k =	Within Laboratory Consistency Statistic						
	$h_{crit} =$	Critical Between Laboratory Consistency Statistic				r =	95% Confidence Limit for Repeatability						
	$k_{crit} =$	Critical Within Laboratory Consistency Statistic				R =	95% Confidence Limit for Reproducibility						



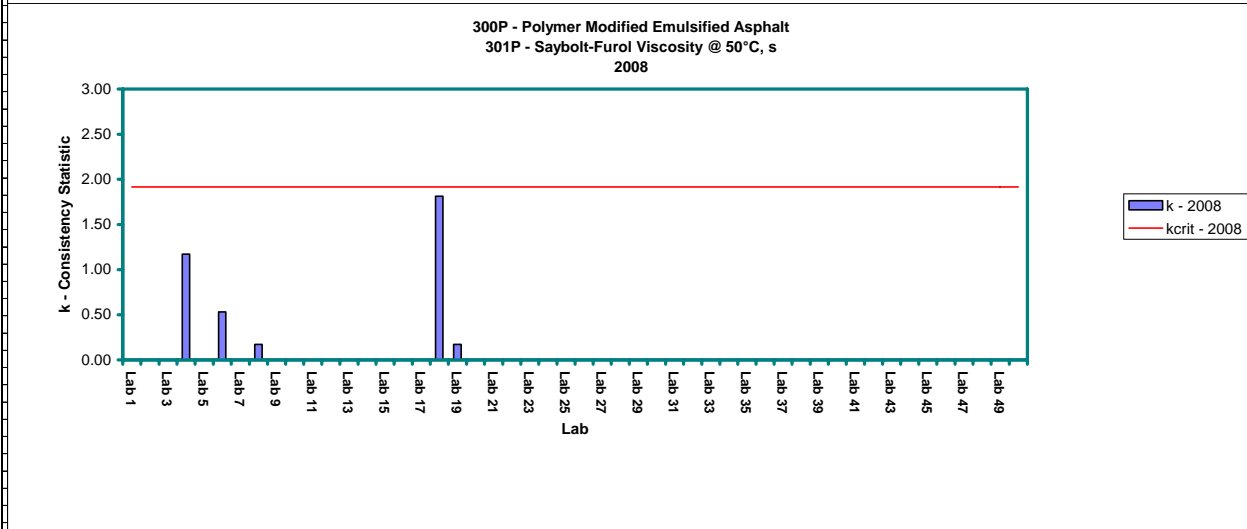
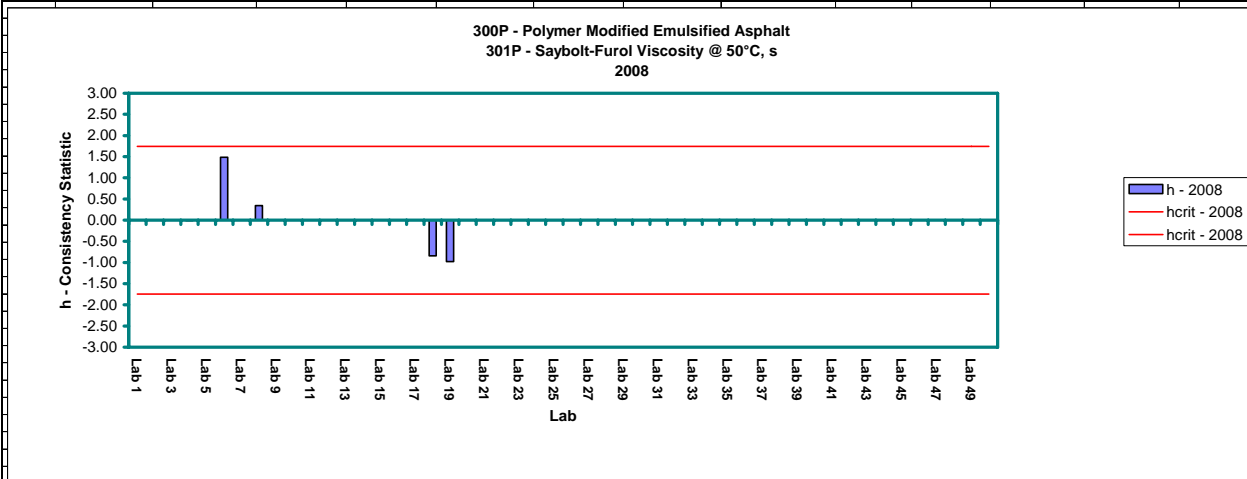
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages	
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility	

300 - Emulsified Asphalt 309 - Apparent Viscosity @ 60°C 2008													
Data					n = 3	(X_{ave}) _{ave} = 229.7944	s_r = 20.0807	Check $s_{X_{ave}}$ = 61.1971					
					p = 6	$S_{X_{ave}}$ = 61.1971	s_{R^*} = 63.3555	$r = 2.8 s_r = 55.6608$					
					Significance Level = 0.5%		s_R = 63.3555	$R = 2.8 s_R = 175.6124$					
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	233.2000	289.2000	319.1000		280.5000	43.6058	50.7056	1,901.4700	0.83	2.17	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	192.0000	203.0000	188.0000		194.3333	7.7675	-35.4611	60.3333	-0.58	0.39	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	258.0000	248.0000	258.0000		254.6667	5.7735	24.8722	33.3333	0.41	0.29	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11											1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14	284.8000	279.6000	274.8000		279.7333	5.0013	49.9389	25.0133	0.82	0.25	1.92	-1.92	1.98
Lab 15											1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18	105.1000	141.4000	121.3000		122.6000	18.1849	-107.1944	330.6900	-1.75	0.91	1.92	-1.92	1.98
Lab 19	237.7000	253.7000	249.4000		246.9333	8.2803	17.1389	68.5633	0.28	0.41	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics					Minimum X_{ave}	122.6000	$r = 2.8 s_r =$	55.6608	$h_{crit} =$	1.92			
					Maximum X_{ave}	280.5000	$R = 2.8 s_R =$	175.6124	$h_{crit} =$	-1.92			
					Check $s_{X_{ave}}$	61.1971			$k_{crit} =$	1.98			
Where: $x_1, \dots, x_n =$					Individual Test Result	Where: $(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$					Cell Average	$s_{X_{ave}} =$		Standard Deviation of Cell Averages					
n =					Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation					
s =					Cell Standard Deviation	$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =					Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$					Cell Variation	h =		Between Laboratory Consistency Statistic					
p =					Number of Laboratories	k =		Within Laboratory Consistency Statistic					
$h_{crit} =$					Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability					
$k_{crit} =$					Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility					



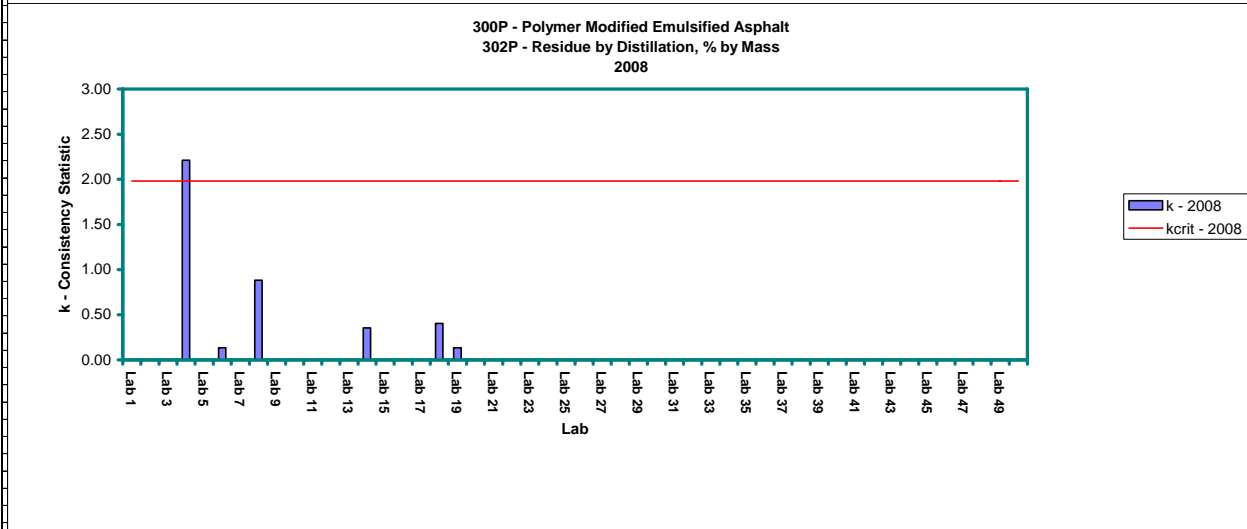
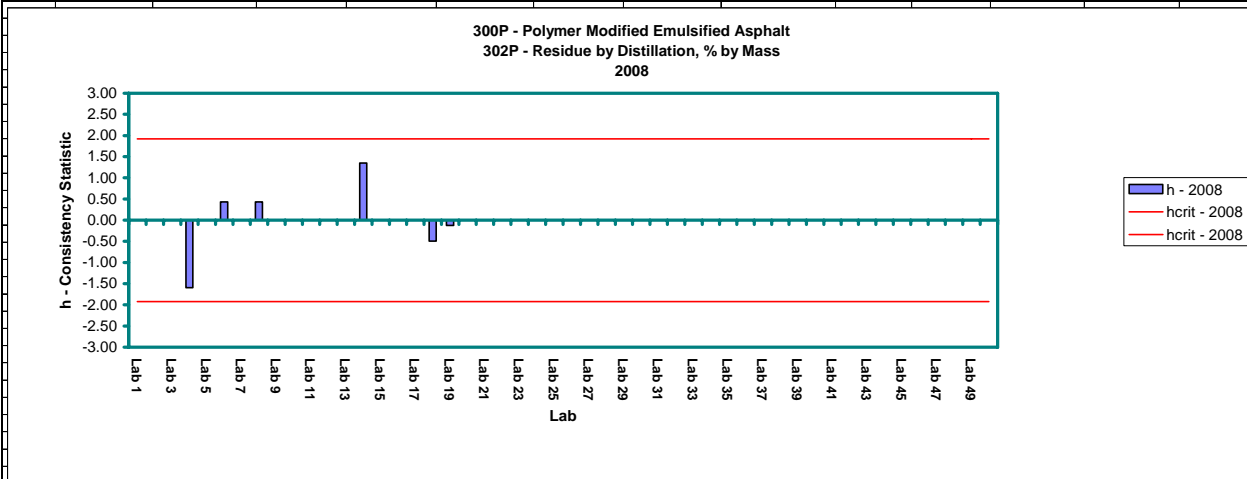
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt													
301P - Saybolt-Furol Viscosity @ 50°C, s													
2008													
Data				n = 3	(X_{ave}) _{ave} = 67.3960	s_r = 4.3792	Check $s_{X_{ave}}$ = 7.5659						
				p = 5	$S_{X_{ave}}$ = 7.5659	s_{R^*} = 8.3683	$r = 2.8$ $s_r = 12.1385$						
				Significance Level = 0.5%		s_R = 8.3683	$R = 2.8$ $s_R = 23.1957$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.74	-1.74	1.92
Lab 2											1.74	-1.74	1.92
Lab 3											1.74	-1.74	1.92
Lab 4	73.0000	63.0000	66.0000		67.3333	5.1316	-0.0627	26.3333	-0.01	1.17	1.74	-1.74	1.92
Lab 5											1.74	-1.74	1.92
Lab 6	79.9900	79.9900	75.9600		78.6467	2.3267	11.2507	5.4136	1.49	0.53	1.74	-1.74	1.92
Lab 7											1.74	-1.74	1.92
Lab 8	70.8000	69.3000	69.9000		70.0000	0.7550	2.6040	0.5700	0.34	0.17	1.74	-1.74	1.92
Lab 9											1.74	-1.74	1.92
Lab 10											1.74	-1.74	1.92
Lab 11											1.74	-1.74	1.92
Lab 12											1.74	-1.74	1.92
Lab 13											1.74	-1.74	1.92
Lab 14											1.74	-1.74	1.92
Lab 15											1.74	-1.74	1.92
Lab 16											1.74	-1.74	1.92
Lab 17											1.74	-1.74	1.92
Lab 18	70.0000	55.0000	58.0000		61.0000	7.9373	-6.3960	63.0000	-0.85	1.81	1.74	-1.74	1.92
Lab 19	60.8000	59.9000	59.3000		60.0000	0.7550	-7.3960	0.5700	-0.98	0.17	1.74	-1.74	1.92
Lab 20											1.74	-1.74	1.92
Lab 21											1.74	-1.74	1.92
Lab 22											1.74	-1.74	1.92
Lab 23											1.74	-1.74	1.92
Lab 24											1.74	-1.74	1.92
Lab 25											1.74	-1.74	1.92
Lab 26											1.74	-1.74	1.92
Lab 27											1.74	-1.74	1.92
Lab 28											1.74	-1.74	1.92
Lab 29											1.74	-1.74	1.92
Lab 30											1.74	-1.74	1.92
Lab 31											1.74	-1.74	1.92
Lab 32											1.74	-1.74	1.92
Lab 33											1.74	-1.74	1.92
Lab 34											1.74	-1.74	1.92
Lab 35											1.74	-1.74	1.92
Lab 36											1.74	-1.74	1.92
Lab 37											1.74	-1.74	1.92
Lab 38											1.74	-1.74	1.92
Lab 39											1.74	-1.74	1.92
Lab 40											1.74	-1.74	1.92
Lab 41											1.74	-1.74	1.92
Lab 42											1.74	-1.74	1.92
Lab 43											1.74	-1.74	1.92
Lab 44											1.74	-1.74	1.92
Lab 45											1.74	-1.74	1.92
Lab 46											1.74	-1.74	1.92
Lab 47											1.74	-1.74	1.92
Lab 48											1.74	-1.74	1.92
Lab 49											1.74	-1.74	1.92
Lab 50											1.74	-1.74	1.92
Additional Statistics				Minimum X_{ave}	60.0000	$r = 2.8$ $s_r =$	12.1385	$h_{crit} =$	1.74				
				Maximum X_{ave}	78.6467	$R = 2.8$ $s_R =$	23.1957	$h_{crit} =$	-1.74				
				Check $s_{X_{ave}}$	7.5659			$k_{crit} =$	1.92				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: (X_{ave}) _{ave} =		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{ave} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



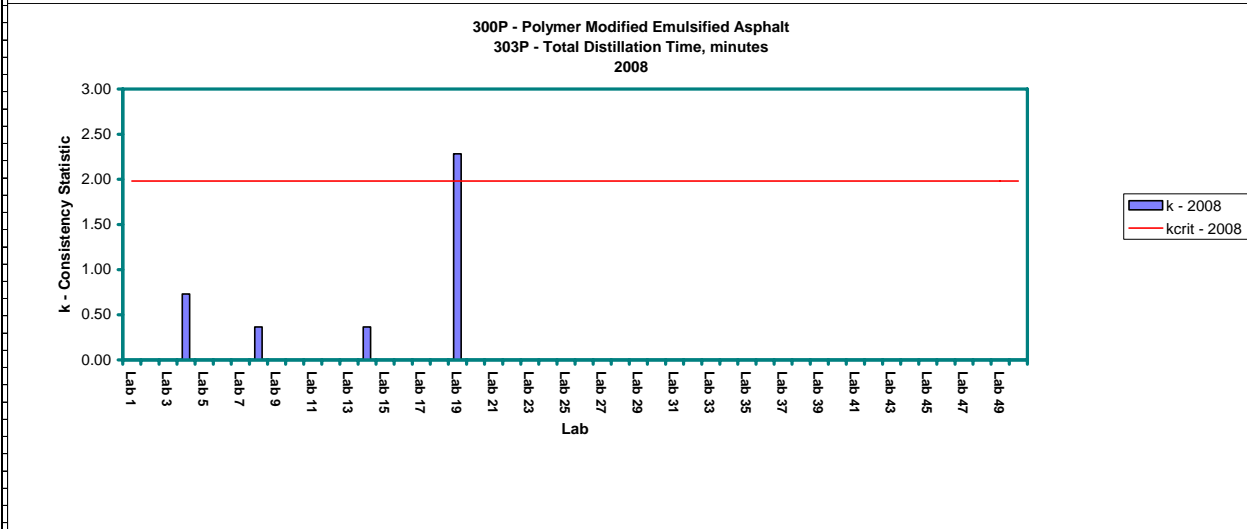
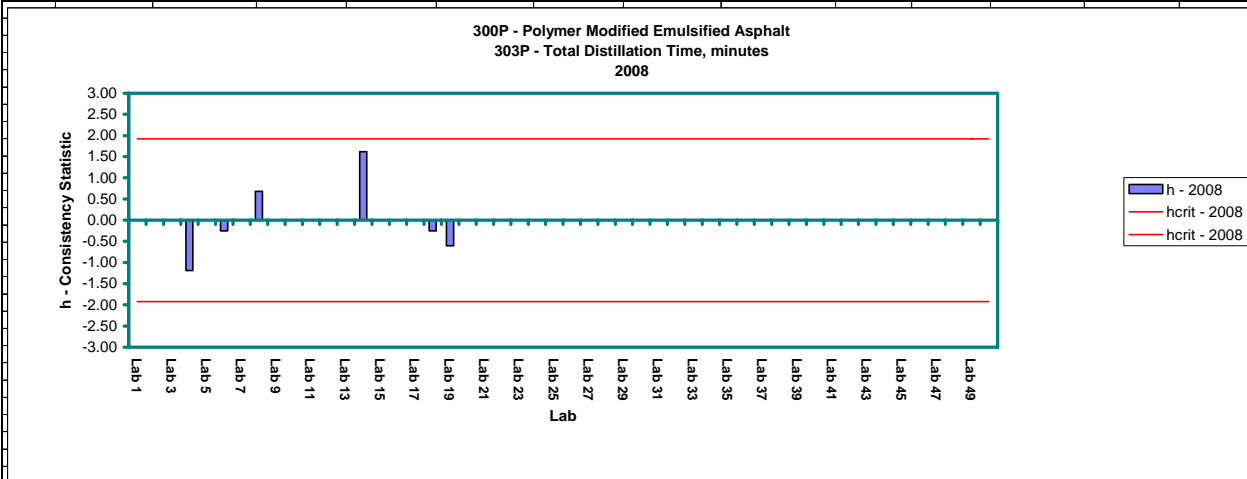
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages	
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility	

300P - Polymer Modified Emulsified Asphalt 302P - Residue by Distillation, % by Mass 2008													
Data				n = 3	(X_{ave}) _{ave} = 66.2778	s_r = 0.4293	Check $s_{X_{ave}}$ = 0.3619						
				p = 6	$S_{X_{ave}}$ = 0.3619	s_{R^*} = 0.5038	$r = 2.8 s_r = 1.1900$						
				Significance Level = 0.5%		s_R = 0.5038	$R = 2.8 s_R = 1.3965$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	64.6500	66.5000	65.9500		65.7000	0.9500	-0.5778	0.9025	-1.60	2.21	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	66.5000	66.4000	66.4000		66.4333	0.0577	0.1556	0.0033	0.43	0.13	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	66.7000	66.6000	66.0000		66.4333	0.3786	0.1556	0.1433	0.43	0.88	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11											1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14	66.9000	66.8000	66.6000		66.7667	0.1528	0.4889	0.0233	1.35	0.36	1.92	-1.92	1.98
Lab 15											1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18	66.2000	66.2000	65.9000		66.1000	0.1732	-0.1778	0.0300	-0.49	0.40	1.92	-1.92	1.98
Lab 19	66.2000	66.3000	66.2000		66.2333	0.0577	-0.0444	0.0033	-0.12	0.13	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X_{ave}	65.7000	$r = 2.8 s_r =$	1.1900	$h_{crit} =$	1.92				
				Maximum X_{ave}	66.7667	$R = 2.8 s_R =$	1.3965	$h_{crit} =$	-1.92				
				Check $s_{X_{ave}} =$	0.3619			$k_{crit} =$	1.98				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: $(X_{ave})_{ave} =$		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{X_{ave}} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



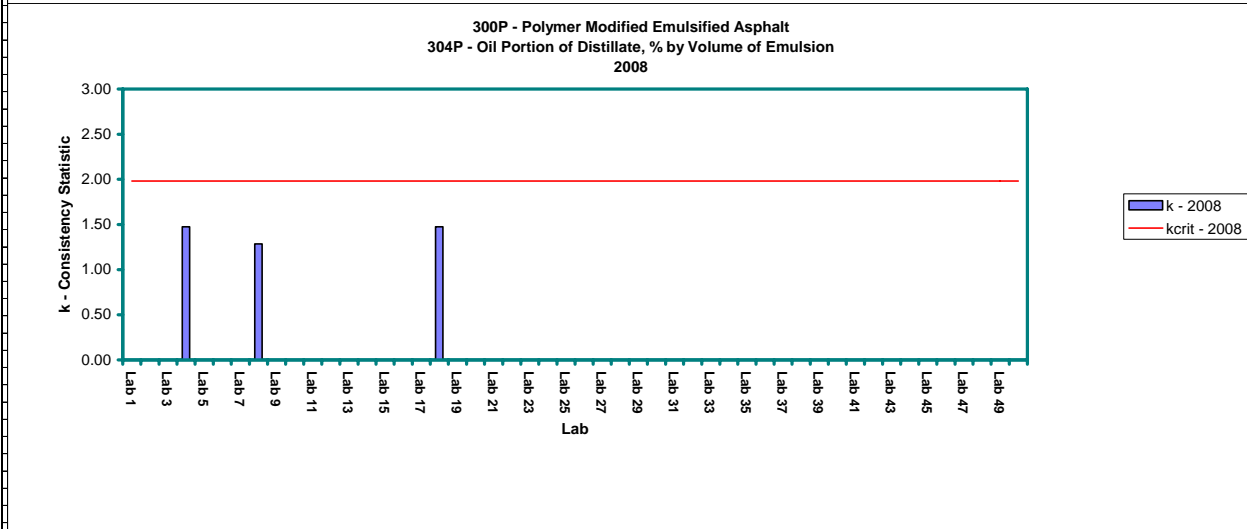
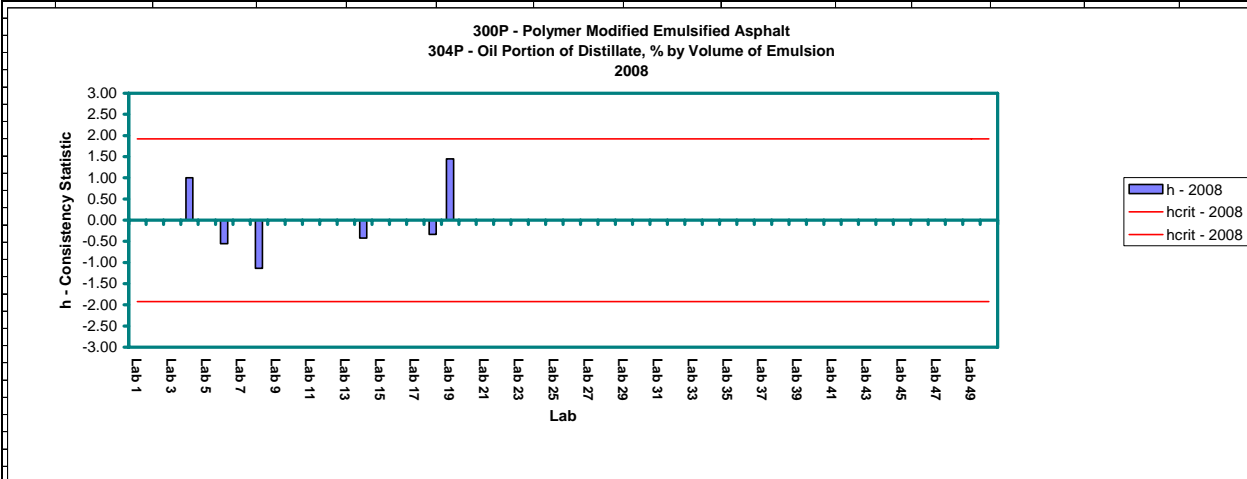
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt													
303P - Total Distillation Time, minutes													
2008													
Data				n = 3	(X_{ave}) _{ave} = 60.7222	s_r = 1.5811	Check $s_{X_{ave}}$ = 2.8474						
				p = 6	$S_{X_{ave}}$ = 2.8474	s_{R^*} = 3.1264	r = 2.8 s_r = 4.3827						
				Significance Level = 0.5%		s_R = 3.1264	R = 2.8 s_R = 8.6658						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	58.0000	58.0000	56.0000		57.3333	1.1547	-3.3889	1.3333	-1.19	0.73	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	60.0000	60.0000	60.0000		60.0000	0.0000	-0.7222	0.0000	-0.25	0.00	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	63.0000	63.0000	62.0000		62.6667	0.5774	1.9444	0.3333	0.68	0.37	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11											1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14	65.0000	66.0000	65.0000		65.3333	0.5774	4.6111	0.3333	1.62	0.37	1.92	-1.92	1.98
Lab 15											1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18	60.0000	60.0000	60.0000		60.0000	0.0000	-0.7222	0.0000	-0.25	0.00	1.92	-1.92	1.98
Lab 19	62.0000	55.0000	60.0000		59.0000	3.6056	-1.7222	13.0000	-0.60	2.28	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X_{ave}	57.3333	$r = 2.8$ $s_r =$	4.3827	$h_{crit} =$	1.92				
				Maximum X_{ave}	65.3333	$R = 2.8$ $s_R =$	8.6658	$h_{crit} =$	-1.92				
				Check $s_{X_{ave}}$	2.8474			$k_{crit} =$	1.98				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: $(X_{ave})_{ave} =$		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{(ave)} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



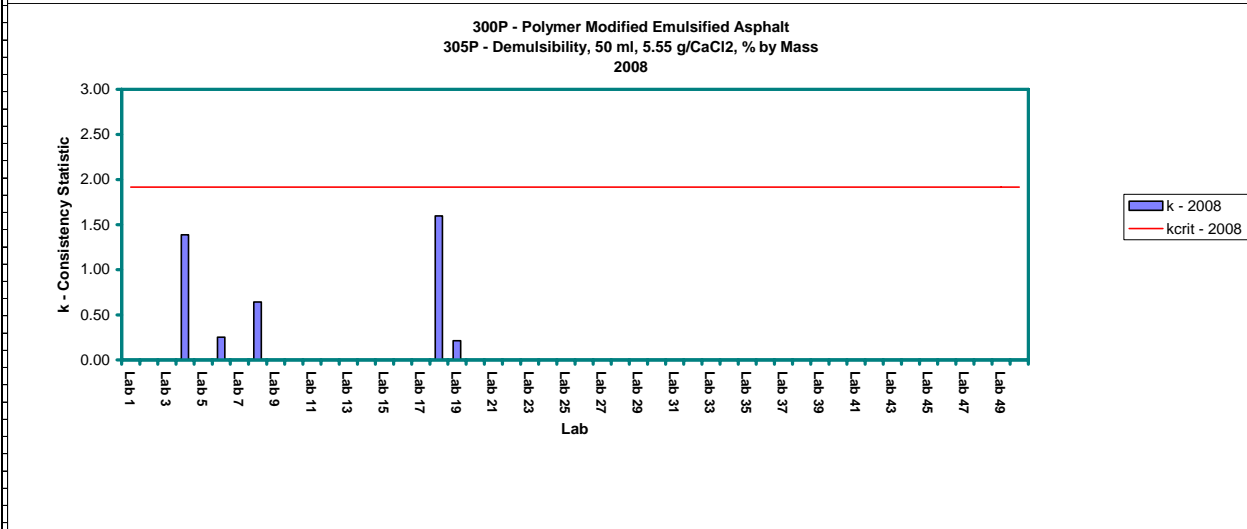
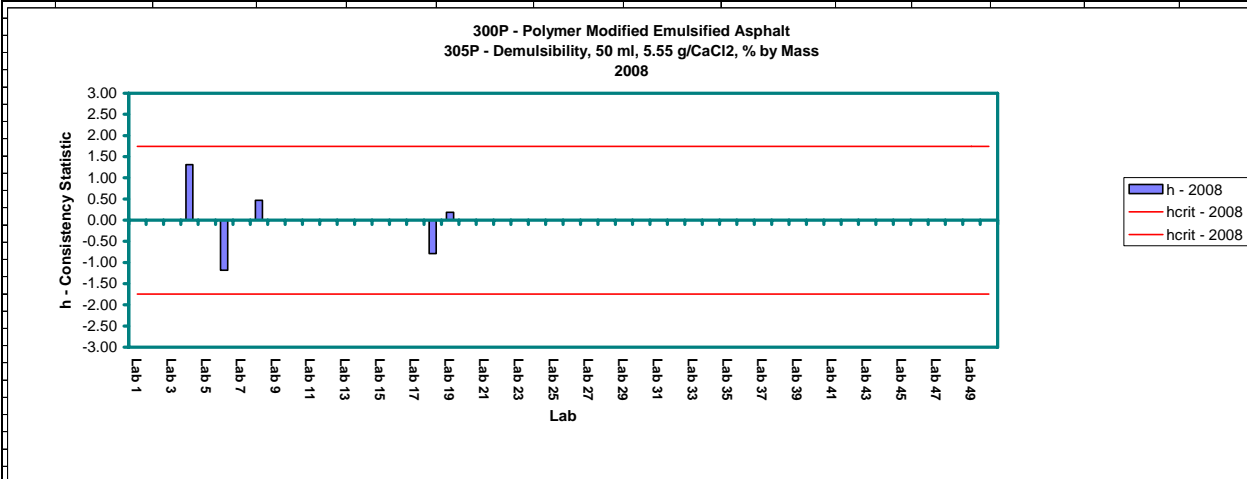
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt 304P - Oil Portion of Distillate, % by Volume of Emulsion 2008													
Data				n = 3	(X _{ave}) _{ave} = 0.9583	s _r = 0.1958	Check s _{X_{ave}} = 0.3738						
				p = 6	S _{X_{ave}} = 0.3738	s _R = 0.4066	r = 2.8 s _r = 0.5427						
				Significance Level = 0.5%		s _R = 0.4066	R = 2.8 s _R = 1.1270						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	1.5000	1.0000	1.5000		1.3333	0.2887	0.3750	0.0833	1.00	1.47	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	0.7500	0.7500	0.7500		0.7500	0.0000	-0.2083	0.0000	-0.56	0.00	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	0.8000	0.5000	0.3000		0.5333	0.2517	-0.4250	0.0633	-1.14	1.29	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11											1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14	0.8000	0.8000	0.8000		0.8000	0.0000	-0.1583	0.0000	-0.42	0.00	1.92	-1.92	1.98
Lab 15											1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18	1.0000	1.0000	0.5000		0.8333	0.2887	-0.1250	0.0833	-0.33	1.47	1.92	-1.92	1.98
Lab 19	1.5000	1.5000	1.5000		1.5000	0.0000	0.5417	0.0000	1.45	0.00	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X _{ave}	0.5333	r = 2.8 s _r =	0.5427	h _{crit} =	1.92				
				Maximum X _{ave}	1.5000	R = 2.8 s _R =	1.1270	h _{crit} =	-1.92				
				Check s _{X_{ave}}	0.3738			k _{crit} =	1.98				
Where: x ₁ ...x _n =		Individual Test Result		Where:		(X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =		Cell Average		s _{ave} =		S _{ave} =		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell		s _r =		s _r =		Repeatability Standard Deviation					
s =		Cell Standard Deviation		s _R =		S _R =		Interim Reproducibility Standard Deviation					
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		S _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
s ² =		Cell Variation		h =		h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories		k =		k =		Within Laboratory Consistency Statistic					
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		r =		95% Confidence Limit for Repeatability					
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		R =		95% Confidence Limit for Reproducibility					



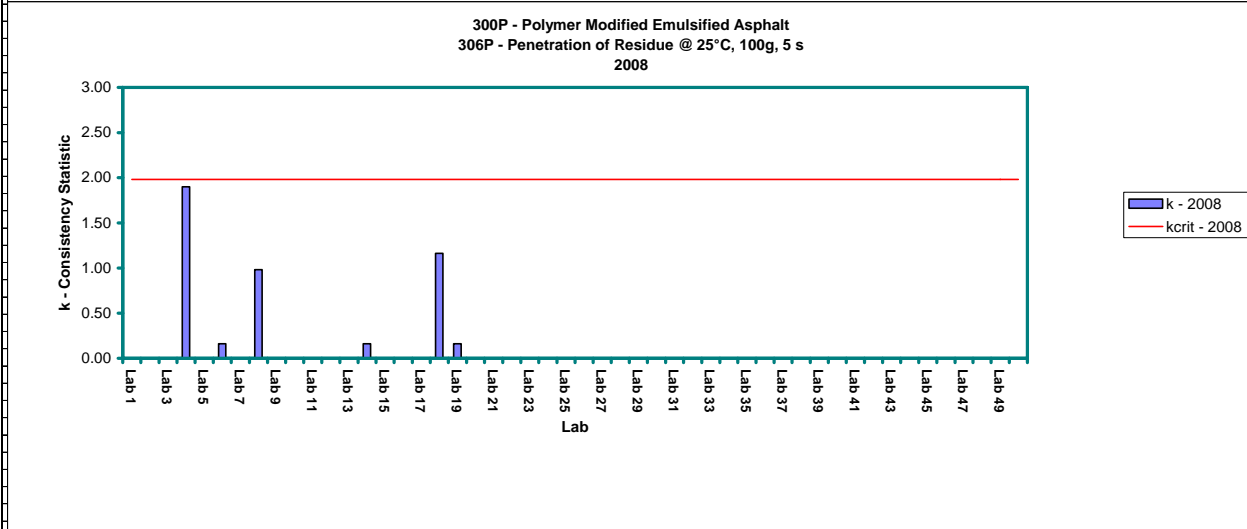
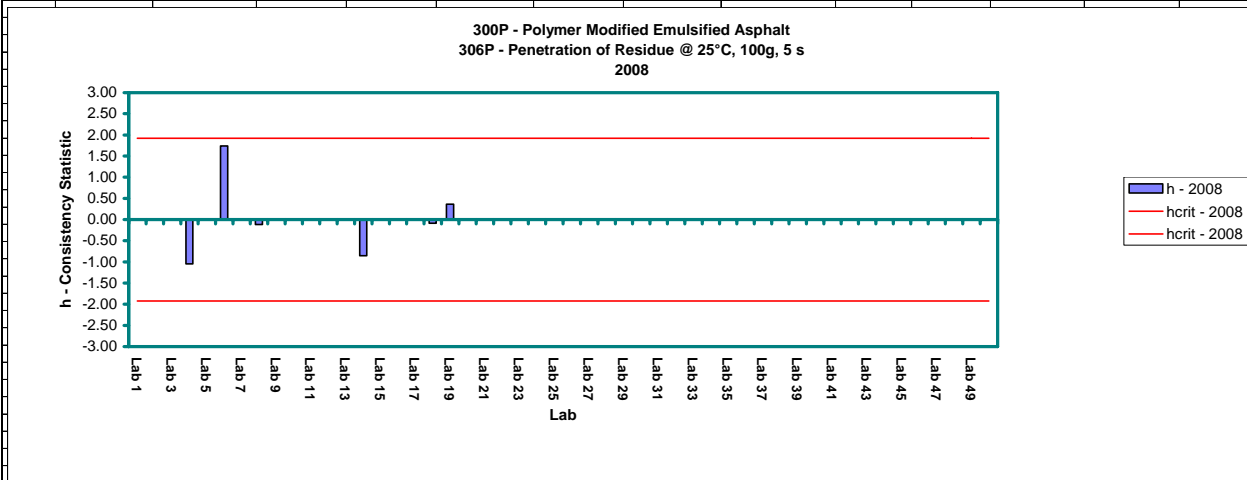
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt 305P - Demulsibility, 50 ml, 5.55 g/CaCl ₂ , % by Mass 2008													
Data					n = 3	(X _{ave}) _{ave} = 96.2667	s _r = 1.2321	Check s _{X_{ave}} = 3.8862					
					p = 5	S _{X_{ave}} = 3.8862	s _R = 4.0143	r = 2.8 s _r = 3.4152					
					Significance Level = 0.5%		s _R = 4.0143	R = 2.8 s _R = 11.1269					
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.74	-1.74	1.92
Lab 2											1.74	-1.74	1.92
Lab 3											1.74	-1.74	1.92
Lab 4	103.1700	99.7700	101.1500		101.3633	1.7100	5.0967	2.9241	1.31	1.39	1.74	-1.74	1.92
Lab 5											1.74	-1.74	1.92
Lab 6	91.4300	91.5600	92.0200		91.6700	0.3100	-4.5967	0.0961	-1.18	0.25	1.74	-1.74	1.92
Lab 7											1.74	-1.74	1.92
Lab 8	97.2000	98.4000	98.7000		98.1000	0.7937	1.8333	0.6300	0.47	0.64	1.74	-1.74	1.92
Lab 9											1.74	-1.74	1.92
Lab 10											1.74	-1.74	1.92
Lab 11											1.74	-1.74	1.92
Lab 12											1.74	-1.74	1.92
Lab 13											1.74	-1.74	1.92
Lab 14											1.74	-1.74	1.92
Lab 15											1.74	-1.74	1.92
Lab 16											1.74	-1.74	1.92
Lab 17											1.74	-1.74	1.92
Lab 18	93.5000	95.0000	91.1000		93.2000	1.9672	-3.0667	3.8700	-0.79	1.60	1.74	-1.74	1.92
Lab 19	97.3000	96.9000	96.8000		97.0000	0.2646	0.7333	0.0700	0.19	0.21	1.74	-1.74	1.92
Lab 20											1.74	-1.74	1.92
Lab 21											1.74	-1.74	1.92
Lab 22											1.74	-1.74	1.92
Lab 23											1.74	-1.74	1.92
Lab 24											1.74	-1.74	1.92
Lab 25											1.74	-1.74	1.92
Lab 26											1.74	-1.74	1.92
Lab 27											1.74	-1.74	1.92
Lab 28											1.74	-1.74	1.92
Lab 29											1.74	-1.74	1.92
Lab 30											1.74	-1.74	1.92
Lab 31											1.74	-1.74	1.92
Lab 32											1.74	-1.74	1.92
Lab 33											1.74	-1.74	1.92
Lab 34											1.74	-1.74	1.92
Lab 35											1.74	-1.74	1.92
Lab 36											1.74	-1.74	1.92
Lab 37											1.74	-1.74	1.92
Lab 38											1.74	-1.74	1.92
Lab 39											1.74	-1.74	1.92
Lab 40											1.74	-1.74	1.92
Lab 41											1.74	-1.74	1.92
Lab 42											1.74	-1.74	1.92
Lab 43											1.74	-1.74	1.92
Lab 44											1.74	-1.74	1.92
Lab 45											1.74	-1.74	1.92
Lab 46											1.74	-1.74	1.92
Lab 47											1.74	-1.74	1.92
Lab 48											1.74	-1.74	1.92
Lab 49											1.74	-1.74	1.92
Lab 50											1.74	-1.74	1.92
Additional Statistics					Minimum X _{ave}	91.6700	r = 2.8 s _r =	3.4152	h _{crit} =	1.74			
					Maximum X _{ave}	101.3633	R = 2.8 s _R =	11.1269	h _{crit} =	-1.74			
					Check s _{X_{ave}}	3.8862			k _{crit} =	1.92			
Where: x ₁ ...x _n = Individual Test Result					Where: (X _{ave}) _{ave} = Average of Cell Averages								
X _{ave} = Cell Average					s _{ave} = Standard Deviation of Cell Averages								
n = Number of Test Results per Cell					s _r = Repeatability Standard Deviation								
s = Cell Standard Deviation					s _R = Interim Reproducibility Standard Deviation								
d = Cell Deviation (X _{ave} - (X _{ave}) _{ave})					s _R = Reproducibility Standard Deviation (Larger of s _r and s _R)								
s ² = Cell Variation					h = Between Laboratory Consistency Statistic								
p = Number of Laboratories					k = Within Laboratory Consistency Statistic								
h _{crit} = Critical Between Laboratory Consistency Statistic					r = 95% Confidence Limit for Repeatability								
k _{crit} = Critical Within Laboratory Consistency Statistic					R = 95% Confidence Limit for Reproducibility								



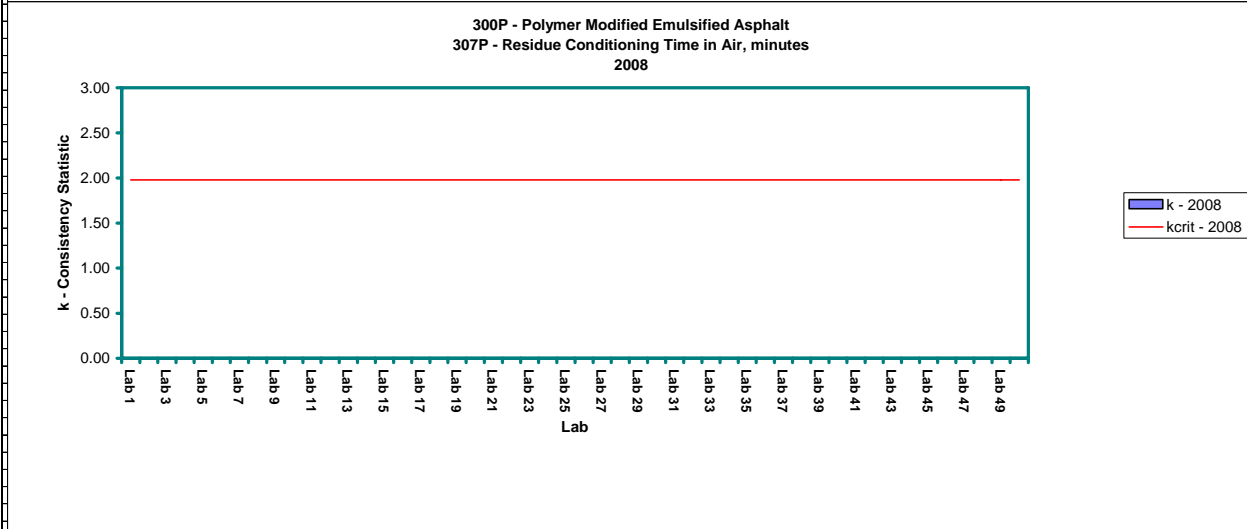
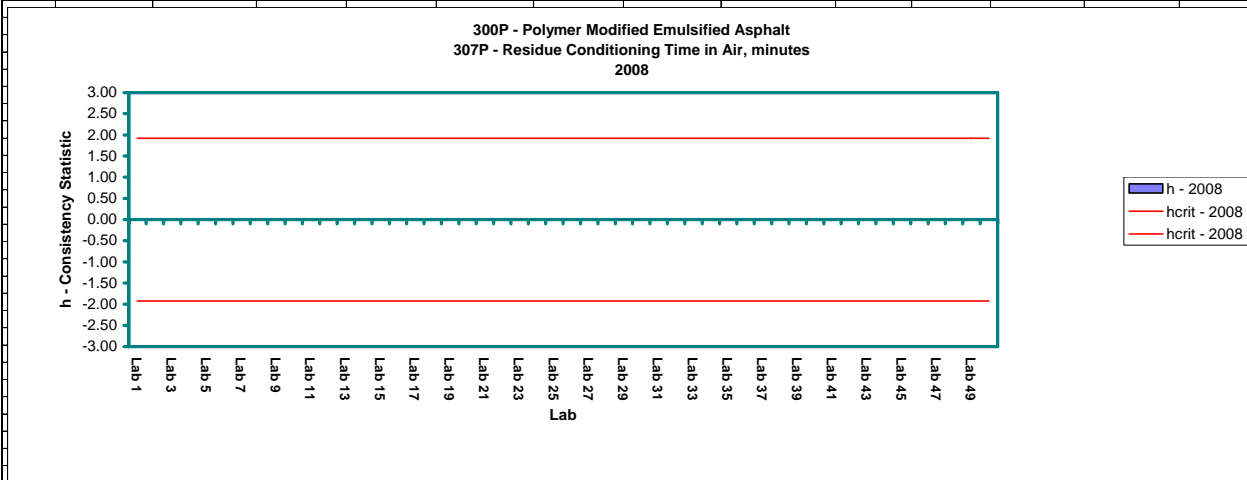
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(\bar{X}_{ave})_{ave}$ =	Average of Cell Averages
\bar{X}_{ave} =	Cell Average	$s_{\bar{X}_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (\bar{X}_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt 306P - Penetration of Residue @ 25°C, 100g, 5 s 2008													
Data				n = 3	(X _{ave}) _{ave} = 169.5556	s _r = 3.5824	Check s _{X_{ave}} = 10.4130						
				p = 6	S _{X_{ave}} = 10.4130	s _R = 10.8160	r = 2.8 s _r = 9.9298						
				Significance Level = 0.5%		s _R = 10.8160	R = 2.8 s _R = 29.9803						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	161.0000	164.0000	151.0000		158.6667	6.8069	-10.8889	46.3333	-1.05	1.90	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	188.0000	187.0000	188.0000		187.6667	0.5774	18.1111	0.3333	1.74	0.16	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	172.0000	165.0000	168.0000		168.3333	3.5119	-1.2222	12.3333	-0.12	0.98	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11											1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14	161.0000	160.0000	161.0000		160.6667	0.5774	-8.8889	0.3333	-0.85	0.16	1.92	-1.92	1.98
Lab 15											1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18	170.0000	172.0000	164.0000		168.6667	4.1633	-0.8889	17.3333	-0.09	1.16	1.92	-1.92	1.98
Lab 19	173.0000	174.0000	173.0000		173.3333	0.5774	3.7778	0.3333	0.36	0.16	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X _{ave}	158.6667	r = 2.8 s _r =	9.9298	h _{crit} =	1.92				
				Maximum X _{ave}	187.6667	R = 2.8 s _R =	29.9803	h _{crit} =	-1.92				
				Check s _{X_{ave}}	10.4130			k _{crit} =	1.98				
Where:	x ₁ ...x _n =	Individual Test Result			Where:	(X _{ave}) _{ave} =	Average of Cell Averages						
	X _{ave} =	Cell Average				s _{ave} =	Standard Deviation of Cell Averages						
	n =	Number of Test Results per Cell				s _r =	Repeatability Standard Deviation						
	s =	Cell Standard Deviation				s _R =	Interim Reproducibility Standard Deviation						
	d =	Cell Deviation (X _{ave} - (X _{ave}) _{ave})				s _R =	Reproducibility Standard Deviation (Larger of s _r and s _R)						
	s ² =	Cell Variation				h =	Between Laboratory Consistency Statistic						
	p =	Number of Laboratories				k =	Within Laboratory Consistency Statistic						
	h _{crit} =	Critical Between Laboratory Consistency Statistic				r =	95% Confidence Limit for Repeatability						
	k _{crit} =	Critical Within Laboratory Consistency Statistic				R =	95% Confidence Limit for Reproducibility						



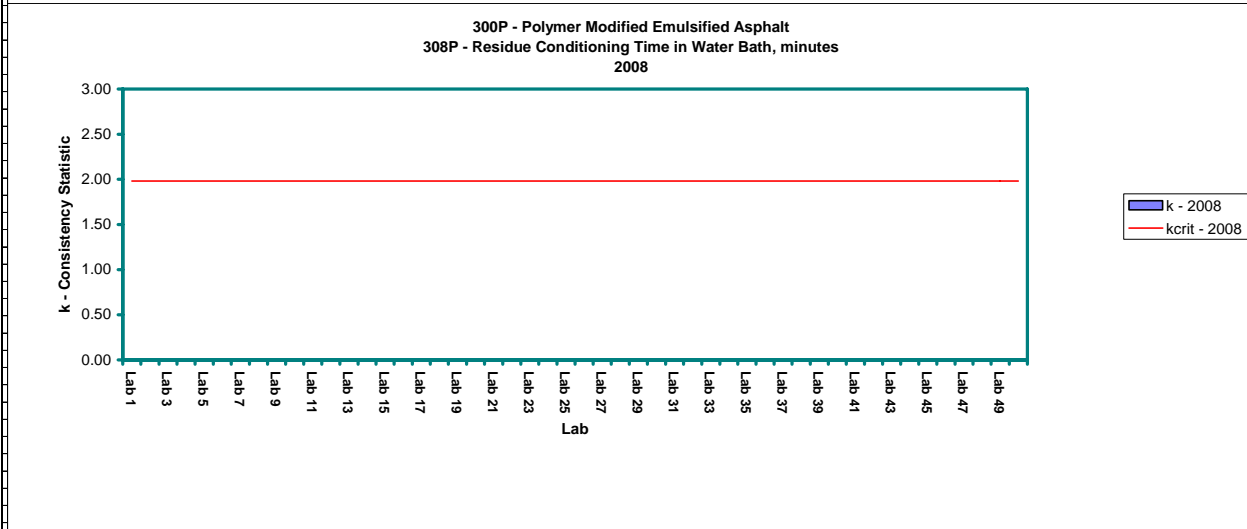
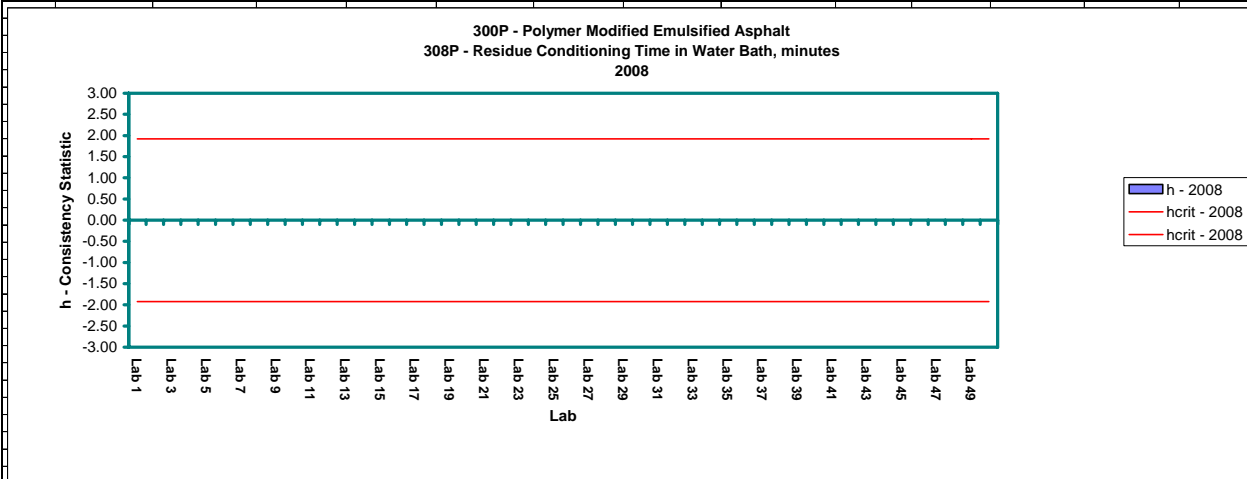
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages	
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

300P - Polymer Modified Emulsified Asphalt 307P - Residue Conditioning Time in Air, minutes 2008													
Data				n = 3	(X_{ave}) _{ave} = 90.0000	s_r = 0.0000	Check $s_{X_{ave}}$ = 0.0000						
				p = 6	$S_{X_{ave}}$ = 0.0000	s_{R^*} = 0.0000	$r = 2.8 s_r = 0.0000$						
				Significance Level = 0.5%		s_R = 0.0000	$R = 2.8 s_R = 0.0000$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11											1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 15											1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 19	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X_{ave}	90.0000	$r = 2.8 s_r =$	0.0000	$h_{crit} =$	1.92				
				Maximum X_{ave}	90.0000	$R = 2.8 s_R =$	0.0000	$h_{crit} =$	-1.92				
				Check $s_{X_{ave}}$	0.0000			$k_{crit} =$	1.98				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: $(X_{ave})_{ave} =$		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{X_{ave}} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



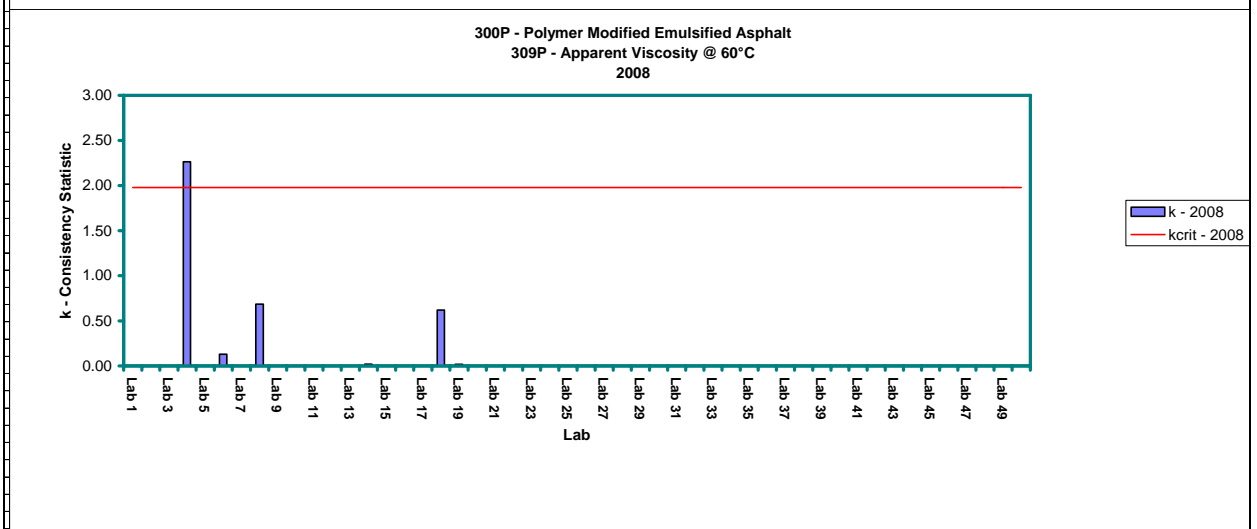
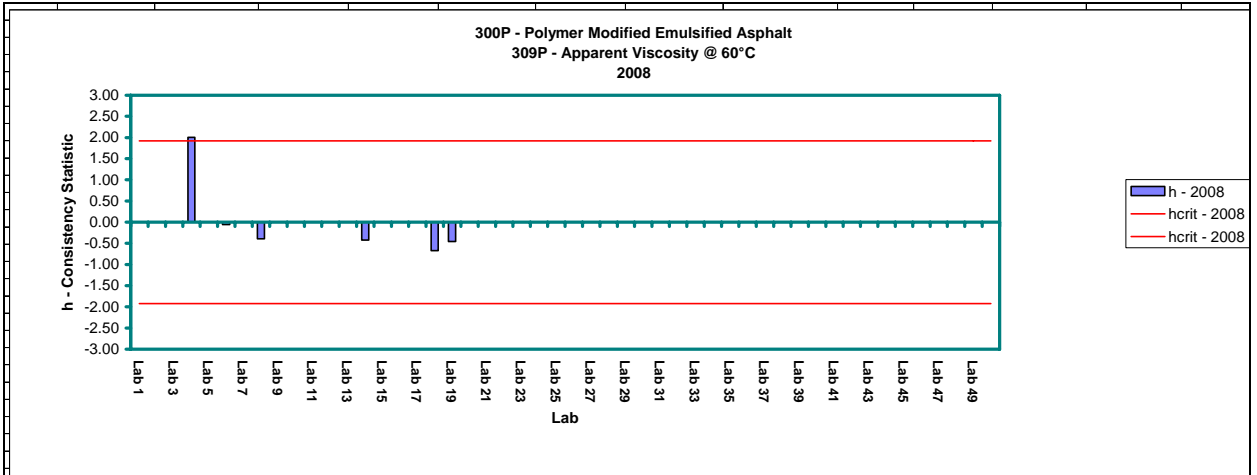
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(\bar{X}_{ave})_{ave}$ =	Average of Cell Averages
\bar{X}_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (\bar{X}_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt													
308P - Residue Conditioning Time in Water Bath, minutes													
2008													
Data				n = 3	(X_{ave}) _{ave} = 90.0000	s_r = 0.0000	Check $s_{X_{ave}}$ = 0.0000						
				p = 6	$S_{X_{ave}}$ = 0.0000	s_{R^*} = 0.0000	$r = 2.8 s_r = 0.0000$						
				Significance Level = 0.5%		s_R = 0.0000	$R = 2.8 s_R = 0.0000$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11											1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 15											1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 19	90.0000	90.0000	90.0000		90.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X_{ave}	90.0000	$r = 2.8 s_r =$	0.0000	$h_{crit} =$	1.92				
				Maximum X_{ave}	90.0000	$R = 2.8 s_R =$	0.0000	$h_{crit} =$	-1.92				
				Check $s_{X_{ave}}$	0.0000			$k_{crit} =$	1.98				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{ave} =$		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
s =		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories				k =		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				r =		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				R =		95% Confidence Limit for Reproducibility					



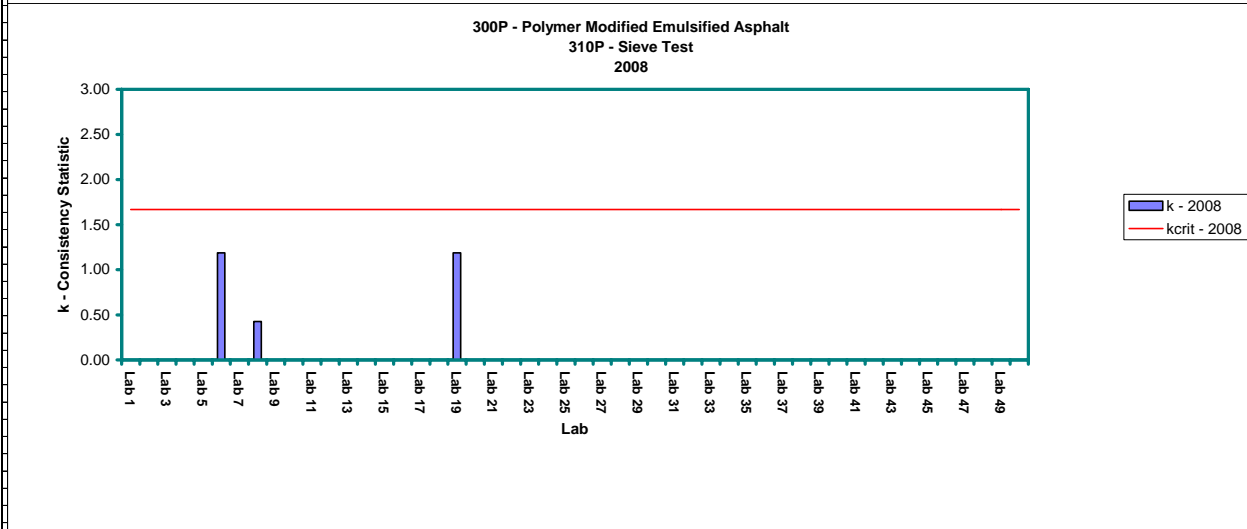
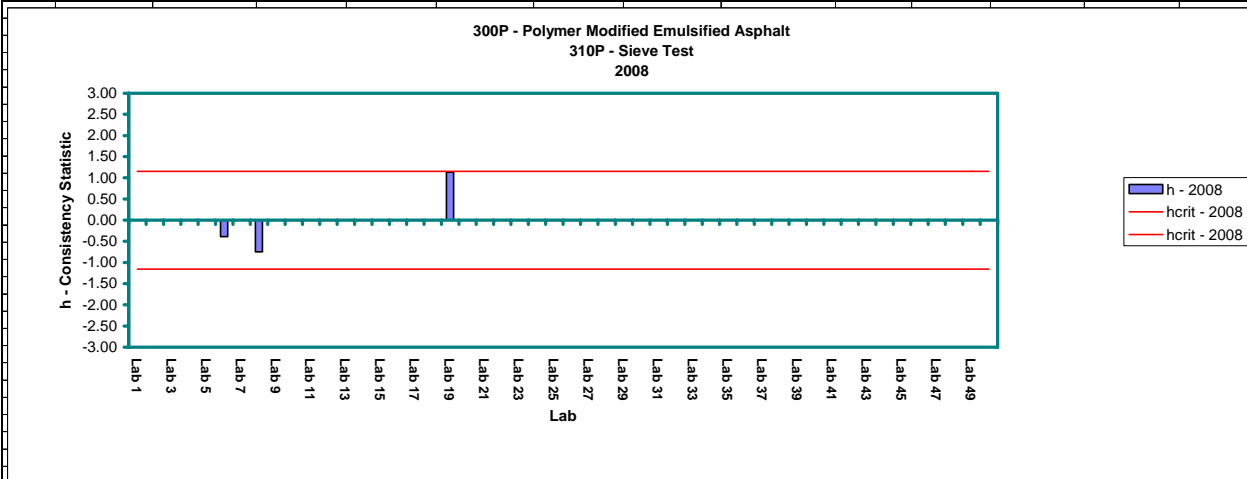
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation $(X_{ave} - (X_{ave})_{ave})$	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt													
309P - Apparent Viscosity @ 60°C													
2008													
Data				n = 3	(X_{ave}) _{ave} = 236.6667	s_r = 92.3264	Check $s_{X_{ave}}$ = 95.7509						
				p = 6	$S_{X_{ave}}$ = 95.7509	s_{R^*} = 121.8647	$r = 2.8$ $s_r = 255.9157$						
				Significance Level = 0.5%		$s_R = 121.8647$	$R = 2.8$ $s_R = 337.7918$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.92	-1.92	1.98
Lab 2											1.92	-1.92	1.98
Lab 3											1.92	-1.92	1.98
Lab 4	434.5000	634.2000	216.2000		428.3000	209.0690	191.6333	43,709.8300	2.00	2.26	1.92	-1.92	1.98
Lab 5											1.92	-1.92	1.98
Lab 6	243.0000	219.0000	231.0000		231.0000	12.0000	-5.6667	144.0000	-0.06	0.13	1.92	-1.92	1.98
Lab 7											1.92	-1.92	1.98
Lab 8	160.0000	165.0000	272.0000		199.0000	63.2693	-37.6667	4,003.0000	-0.39	0.69	1.92	-1.92	1.98
Lab 9											1.92	-1.92	1.98
Lab 10											1.92	-1.92	1.98
Lab 11											1.92	-1.92	1.98
Lab 12											1.92	-1.92	1.98
Lab 13											1.92	-1.92	1.98
Lab 14	194.7000	195.6000	198.2000		196.1667	1.8175	-40.5000	3.3033	-0.42	0.02	1.92	-1.92	1.98
Lab 15											1.92	-1.92	1.98
Lab 16											1.92	-1.92	1.98
Lab 17											1.92	-1.92	1.98
Lab 18	209.6000	106.4000	201.1000		172.3667	57.2867	-64.3000	3,281.7633	-0.67	0.62	1.92	-1.92	1.98
Lab 19	193.2000	191.4000	194.9000		193.1667	1.7502	-43.5000	3.0633	-0.45	0.02	1.92	-1.92	1.98
Lab 20											1.92	-1.92	1.98
Lab 21											1.92	-1.92	1.98
Lab 22											1.92	-1.92	1.98
Lab 23											1.92	-1.92	1.98
Lab 24											1.92	-1.92	1.98
Lab 25											1.92	-1.92	1.98
Lab 26											1.92	-1.92	1.98
Lab 27											1.92	-1.92	1.98
Lab 28											1.92	-1.92	1.98
Lab 29											1.92	-1.92	1.98
Lab 30											1.92	-1.92	1.98
Lab 31											1.92	-1.92	1.98
Lab 32											1.92	-1.92	1.98
Lab 33											1.92	-1.92	1.98
Lab 34											1.92	-1.92	1.98
Lab 35											1.92	-1.92	1.98
Lab 36											1.92	-1.92	1.98
Lab 37											1.92	-1.92	1.98
Lab 38											1.92	-1.92	1.98
Lab 39											1.92	-1.92	1.98
Lab 40											1.92	-1.92	1.98
Lab 41											1.92	-1.92	1.98
Lab 42											1.92	-1.92	1.98
Lab 43											1.92	-1.92	1.98
Lab 44											1.92	-1.92	1.98
Lab 45											1.92	-1.92	1.98
Lab 46											1.92	-1.92	1.98
Lab 47											1.92	-1.92	1.98
Lab 48											1.92	-1.92	1.98
Lab 49											1.92	-1.92	1.98
Lab 50											1.92	-1.92	1.98
Additional Statistics				Minimum X_{ave}	172.3667	$r = 2.8$ $s_r =$	255.9157	$h_{crit} =$	1.92				
				Maximum X_{ave}	428.3000	$R = 2.8$ $s_R =$	337.7918	$h_{crit} =$	-1.92				
				Check $s_{X_{ave}}$	95.7509			$k_{crit} =$	1.98				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: $(X_{ave})_{ave} =$		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{X_{ave}} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



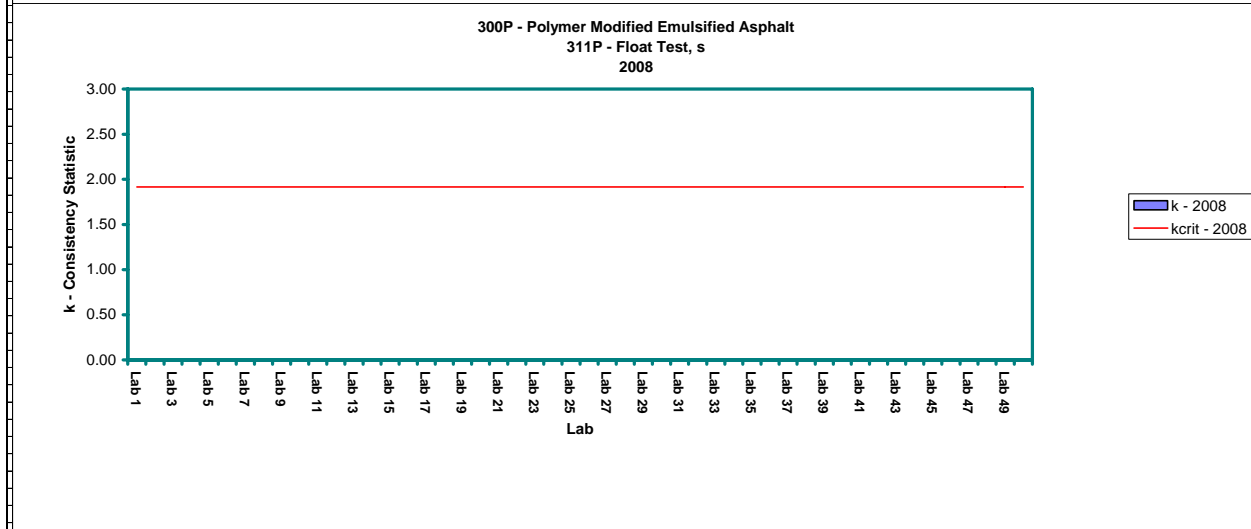
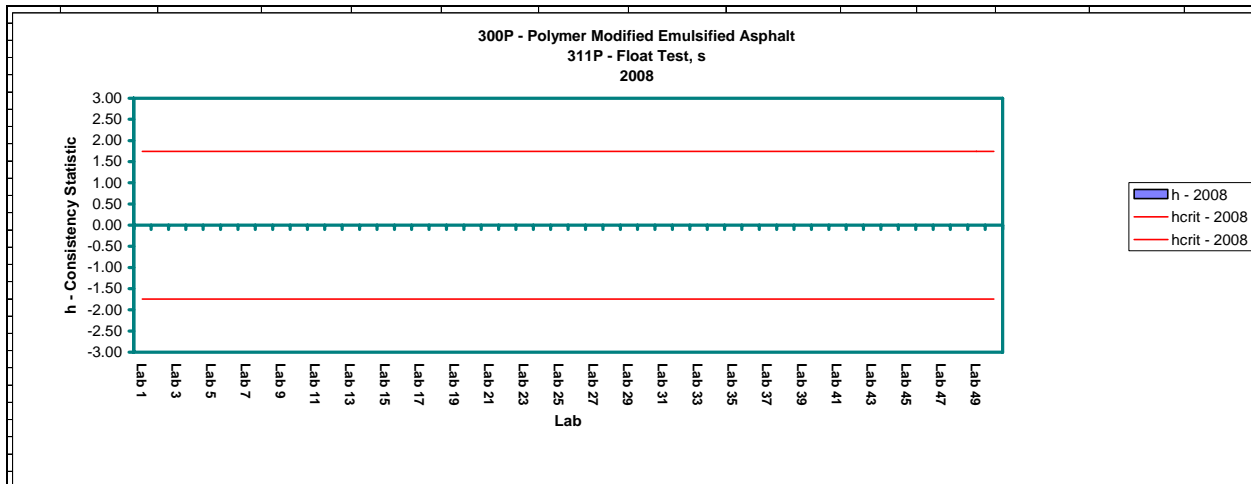
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt													
310P - Sieve Test													
2008													
Data				n = 3	$(X_{ave})_{ave} = 0.0286$	$s_r = 0.0049$	Check $s_{X_{ave}} = 0.0306$						
				p = 3	$S_{X_{ave}} = 0.0306$	$s_{R^*} = 0.0309$	$r = 2.8 s_r = 0.0135$						
				Significance Level = 0.5%		$s_R = 0.0309$	$R = 2.8 s_R = 0.0856$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.15	-1.15	1.67
Lab 2											1.15	-1.15	1.67
Lab 3											1.15	-1.15	1.67
Lab 4											1.15	-1.15	1.67
Lab 5											1.15	-1.15	1.67
Lab 6	0.0200	0.0200	0.0100		0.0167	0.0058	-0.0119	0.0000	-0.39	1.19	1.15	-1.15	1.67
Lab 7											1.15	-1.15	1.67
Lab 8	0.0040	0.0050	0.0080		0.0057	0.0021	-0.0229	0.0000	-0.75	0.43	1.15	-1.15	1.67
Lab 9											1.15	-1.15	1.67
Lab 10											1.15	-1.15	1.67
Lab 11											1.15	-1.15	1.67
Lab 12											1.15	-1.15	1.67
Lab 13											1.15	-1.15	1.67
Lab 14											1.15	-1.15	1.67
Lab 15											1.15	-1.15	1.67
Lab 16											1.15	-1.15	1.67
Lab 17											1.15	-1.15	1.67
Lab 18											1.15	-1.15	1.67
Lab 19	0.0700	0.0600	0.0600		0.0633	0.0058	0.0348	0.0000	1.14	1.19	1.15	-1.15	1.67
Lab 20											1.15	-1.15	1.67
Lab 21											1.15	-1.15	1.67
Lab 22											1.15	-1.15	1.67
Lab 23											1.15	-1.15	1.67
Lab 24											1.15	-1.15	1.67
Lab 25											1.15	-1.15	1.67
Lab 26											1.15	-1.15	1.67
Lab 27											1.15	-1.15	1.67
Lab 28											1.15	-1.15	1.67
Lab 29											1.15	-1.15	1.67
Lab 30											1.15	-1.15	1.67
Lab 31											1.15	-1.15	1.67
Lab 32											1.15	-1.15	1.67
Lab 33											1.15	-1.15	1.67
Lab 34											1.15	-1.15	1.67
Lab 35											1.15	-1.15	1.67
Lab 36											1.15	-1.15	1.67
Lab 37											1.15	-1.15	1.67
Lab 38											1.15	-1.15	1.67
Lab 39											1.15	-1.15	1.67
Lab 40											1.15	-1.15	1.67
Lab 41											1.15	-1.15	1.67
Lab 42											1.15	-1.15	1.67
Lab 43											1.15	-1.15	1.67
Lab 44											1.15	-1.15	1.67
Lab 45											1.15	-1.15	1.67
Lab 46											1.15	-1.15	1.67
Lab 47											1.15	-1.15	1.67
Lab 48											1.15	-1.15	1.67
Lab 49											1.15	-1.15	1.67
Lab 50											1.15	-1.15	1.67
Additional Statistics				Minimum X_{ave}	0.0057	$r = 2.8 s_r =$	0.0135	$h_{crit} =$	1.15				
				Maximum X_{ave}	0.0633	$R = 2.8 s_R =$	0.0856	$h_{crit} =$	-1.15				
				Check $s_{X_{ave}} =$	0.0306			$k_{crit} =$	1.67				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{ave} =$		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
s =		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories				k =		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				r =		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				R =		95% Confidence Limit for Reproducibility					



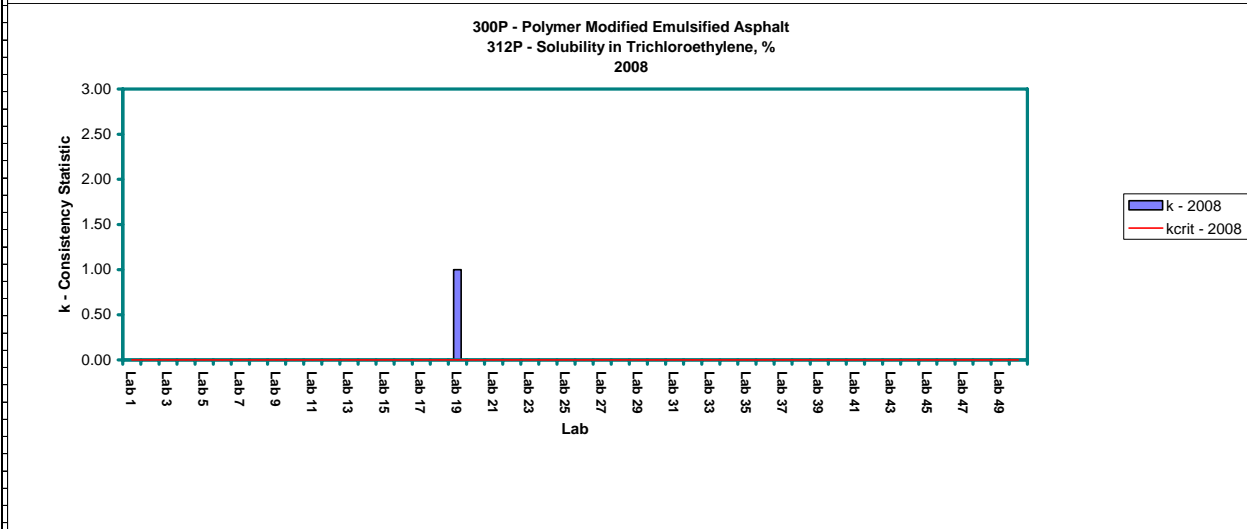
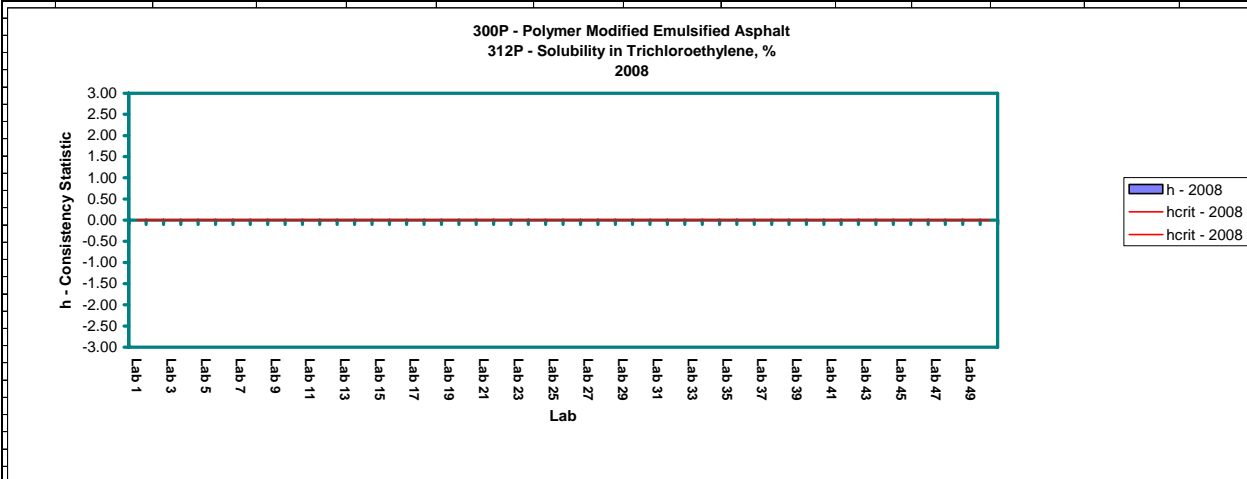
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		S_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		S_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		S_R =	Reproducibility Standard Deviation (Larger of S_r and S_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt													
311P - Float Test, s													
2008													
Data				n = 3	$(X_{ave})_{ave} = 1,200.0000$	$s_r = 0.0000$	Check $s_{X_{ave}} = 0.0000$						
				p = 5	$S_{X_{ave}} = 0.0000$	$s_{R^*} = 0.0000$	$r = 2.8 s_r = 0.0000$						
				Significance Level = 0.5%		$s_R = 0.0000$	$R = 2.8 s_R = 0.0000$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.74	-1.74	1.92
Lab 2											1.74	-1.74	1.92
Lab 3											1.74	-1.74	1.92
Lab 4	1,200.0000	1,200.0000	1,200.0000		1,200.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.74	-1.74	1.92
Lab 5											1.74	-1.74	1.92
Lab 6	1,200.0000	1,200.0000	1,200.0000		1,200.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.74	-1.74	1.92
Lab 7											1.74	-1.74	1.92
Lab 8	1,200.0000	1,200.0000	1,200.0000		1,200.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.74	-1.74	1.92
Lab 9											1.74	-1.74	1.92
Lab 10											1.74	-1.74	1.92
Lab 11											1.74	-1.74	1.92
Lab 12											1.74	-1.74	1.92
Lab 13											1.74	-1.74	1.92
Lab 14											1.74	-1.74	1.92
Lab 15											1.74	-1.74	1.92
Lab 16											1.74	-1.74	1.92
Lab 17											1.74	-1.74	1.92
Lab 18	1,200.0000	1,200.0000	1,200.0000		1,200.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.74	-1.74	1.92
Lab 19	1,200.0000	1,200.0000	1,200.0000		1,200.0000	0.0000	0.0000	0.0000	#DIV/0!	#DIV/0!	1.74	-1.74	1.92
Lab 20											1.74	-1.74	1.92
Lab 21											1.74	-1.74	1.92
Lab 22											1.74	-1.74	1.92
Lab 23											1.74	-1.74	1.92
Lab 24											1.74	-1.74	1.92
Lab 25											1.74	-1.74	1.92
Lab 26											1.74	-1.74	1.92
Lab 27											1.74	-1.74	1.92
Lab 28											1.74	-1.74	1.92
Lab 29											1.74	-1.74	1.92
Lab 30											1.74	-1.74	1.92
Lab 31											1.74	-1.74	1.92
Lab 32											1.74	-1.74	1.92
Lab 33											1.74	-1.74	1.92
Lab 34											1.74	-1.74	1.92
Lab 35											1.74	-1.74	1.92
Lab 36											1.74	-1.74	1.92
Lab 37											1.74	-1.74	1.92
Lab 38											1.74	-1.74	1.92
Lab 39											1.74	-1.74	1.92
Lab 40											1.74	-1.74	1.92
Lab 41											1.74	-1.74	1.92
Lab 42											1.74	-1.74	1.92
Lab 43											1.74	-1.74	1.92
Lab 44											1.74	-1.74	1.92
Lab 45											1.74	-1.74	1.92
Lab 46											1.74	-1.74	1.92
Lab 47											1.74	-1.74	1.92
Lab 48											1.74	-1.74	1.92
Lab 49											1.74	-1.74	1.92
Lab 50											1.74	-1.74	1.92
Additional Statistics				Minimum X_{ave}	1200.0000	$r = 2.8 s_r =$	0.0000	$h_{crit} =$	1.74				
				Maximum X_{ave}	1200.0000	$R = 2.8 s_R =$	0.0000	$h_{crit} =$	-1.74				
				Check $s_{X_{ave}} =$	0.0000			$k_{crit} =$	1.92				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average				$s_{ave} =$		Standard Deviation of Cell Averages					
n =		Number of Test Results per Cell				$s_r =$		Repeatability Standard Deviation					
s =		Cell Standard Deviation				$s_{R^*} =$		Interim Reproducibility Standard Deviation					
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})					
$s^2 =$		Cell Variation				h =		Between Laboratory Consistency Statistic					
p =		Number of Laboratories				k =		Within Laboratory Consistency Statistic					
$h_{crit} =$		Critical Between Laboratory Consistency Statistic				r =		95% Confidence Limit for Repeatability					
$k_{crit} =$		Critical Within Laboratory Consistency Statistic				R =		95% Confidence Limit for Reproducibility					



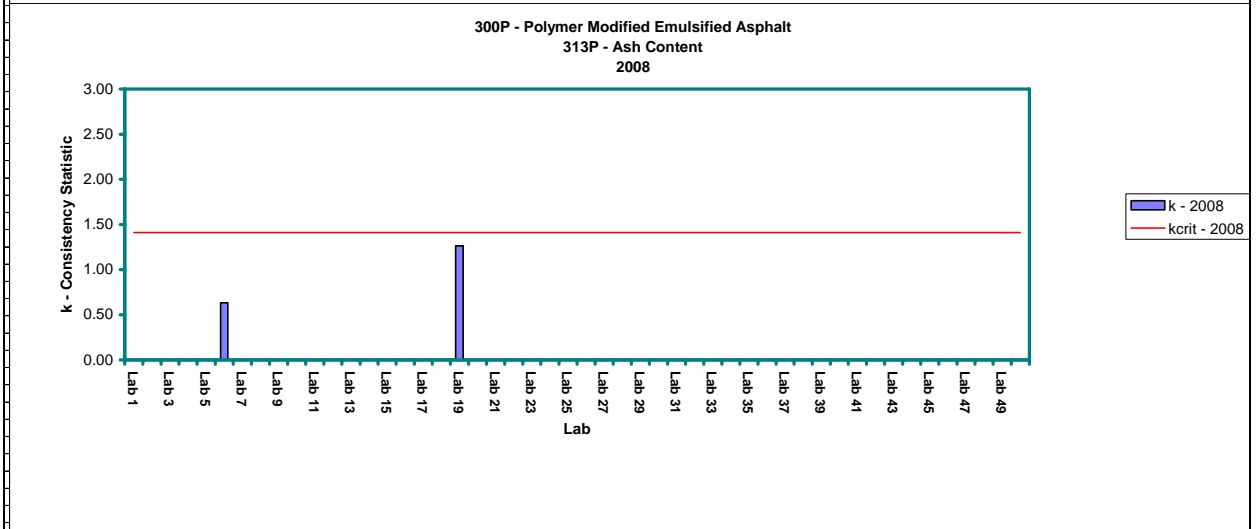
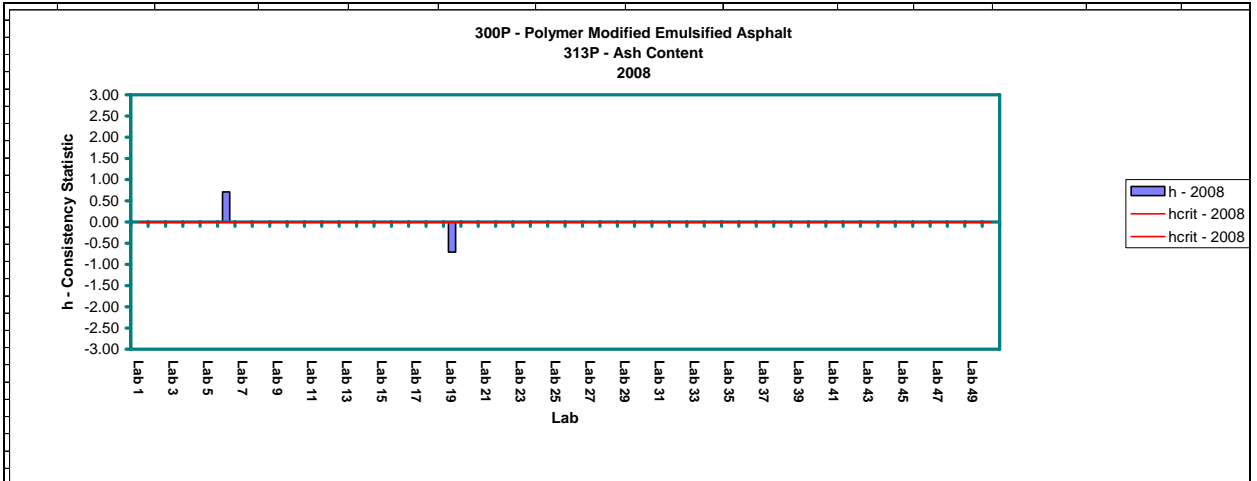
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	S_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	S_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation $(X_{ave} - (X_{ave})_{ave})$	S_R =	Reproducibility Standard Deviation (Larger of S_r and S_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt 312P - Solubility in Trichloroethylene, % 2008													
Data					n = 3	(X_{ave}) _{ave} = 99.6067	s_r = 0.4389	Check $s_{X_{ave}}$ = #DIV/0!					
					p = 1	$S_{X_{ave}}$ = #DIV/0!	s_{R^*} = #DIV/0!	$r = 2.8$ $s_r = 1.2166$					
					Significance Level = 0.5%		s_R = #DIV/0!	$R = 2.8$ $s_R = #DIV/0!$					
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											#NUM!	#NUM!	#NUM!
Lab 2											#NUM!	#NUM!	#NUM!
Lab 3											#NUM!	#NUM!	#NUM!
Lab 4											#NUM!	#NUM!	#NUM!
Lab 5											#NUM!	#NUM!	#NUM!
Lab 6											#NUM!	#NUM!	#NUM!
Lab 7											#NUM!	#NUM!	#NUM!
Lab 8											#NUM!	#NUM!	#NUM!
Lab 9											#NUM!	#NUM!	#NUM!
Lab 10											#NUM!	#NUM!	#NUM!
Lab 11											#NUM!	#NUM!	#NUM!
Lab 12											#NUM!	#NUM!	#NUM!
Lab 13											#NUM!	#NUM!	#NUM!
Lab 14											#NUM!	#NUM!	#NUM!
Lab 15											#NUM!	#NUM!	#NUM!
Lab 16											#NUM!	#NUM!	#NUM!
Lab 17											#NUM!	#NUM!	#NUM!
Lab 18											#NUM!	#NUM!	#NUM!
Lab 19	99.8700	99.8500	99.1000		99.6067	0.4389	0.0000	0.1926	#DIV/0!	1.00	#NUM!	#NUM!	#NUM!
Lab 20											#NUM!	#NUM!	#NUM!
Lab 21											#NUM!	#NUM!	#NUM!
Lab 22											#NUM!	#NUM!	#NUM!
Lab 23											#NUM!	#NUM!	#NUM!
Lab 24											#NUM!	#NUM!	#NUM!
Lab 25											#NUM!	#NUM!	#NUM!
Lab 26											#NUM!	#NUM!	#NUM!
Lab 27											#NUM!	#NUM!	#NUM!
Lab 28											#NUM!	#NUM!	#NUM!
Lab 29											#NUM!	#NUM!	#NUM!
Lab 30											#NUM!	#NUM!	#NUM!
Lab 31											#NUM!	#NUM!	#NUM!
Lab 32											#NUM!	#NUM!	#NUM!
Lab 33											#NUM!	#NUM!	#NUM!
Lab 34											#NUM!	#NUM!	#NUM!
Lab 35											#NUM!	#NUM!	#NUM!
Lab 36											#NUM!	#NUM!	#NUM!
Lab 37											#NUM!	#NUM!	#NUM!
Lab 38											#NUM!	#NUM!	#NUM!
Lab 39											#NUM!	#NUM!	#NUM!
Lab 40											#NUM!	#NUM!	#NUM!
Lab 41											#NUM!	#NUM!	#NUM!
Lab 42											#NUM!	#NUM!	#NUM!
Lab 43											#NUM!	#NUM!	#NUM!
Lab 44											#NUM!	#NUM!	#NUM!
Lab 45											#NUM!	#NUM!	#NUM!
Lab 46											#NUM!	#NUM!	#NUM!
Lab 47											#NUM!	#NUM!	#NUM!
Lab 48											#NUM!	#NUM!	#NUM!
Lab 49											#NUM!	#NUM!	#NUM!
Lab 50											#NUM!	#NUM!	#NUM!
Additional Statistics					Minimum X_{ave}	99.6067	$r = 2.8$ $s_r =$	1.2166	$h_{crit} =$	#NUM!			
					Maximum X_{ave}	99.6067	$R = 2.8$ $s_R =$	#DIV/0!	$h_{crit} =$	#NUM!			
					Check $s_{X_{ave}}$	#DIV/0!			$k_{crit} =$	#NUM!			
Where: $x_1, \dots, x_n =$					Individual Test Result	Where: (X_{ave}) _{ave} =			Average of Cell Averages				
$X_{ave} =$					Cell Average	$s_{ave} =$			Standard Deviation of Cell Averages				
n =					Number of Test Results per Cell	$s_r =$			Repeatability Standard Deviation				
s =					Cell Standard Deviation	$s_{R^*} =$			Interim Reproducibility Standard Deviation				
d =					Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$			Reproducibility Standard Deviation (Larger of s_r and s_{R^*})				
$s^2 =$					Cell Variation	h =			Between Laboratory Consistency Statistic				
p =					Number of Laboratories	k =			Within Laboratory Consistency Statistic				
$h_{crit} =$					Critical Between Laboratory Consistency Statistic	r =			95% Confidence Limit for Repeatability				
$k_{crit} =$					Critical Within Laboratory Consistency Statistic	R =			95% Confidence Limit for Reproducibility				



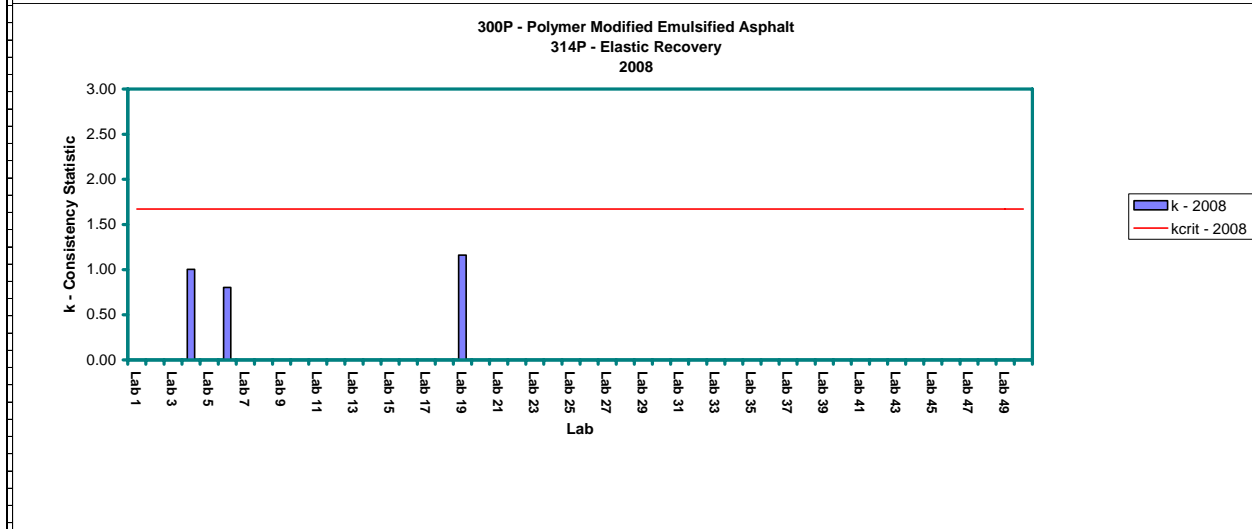
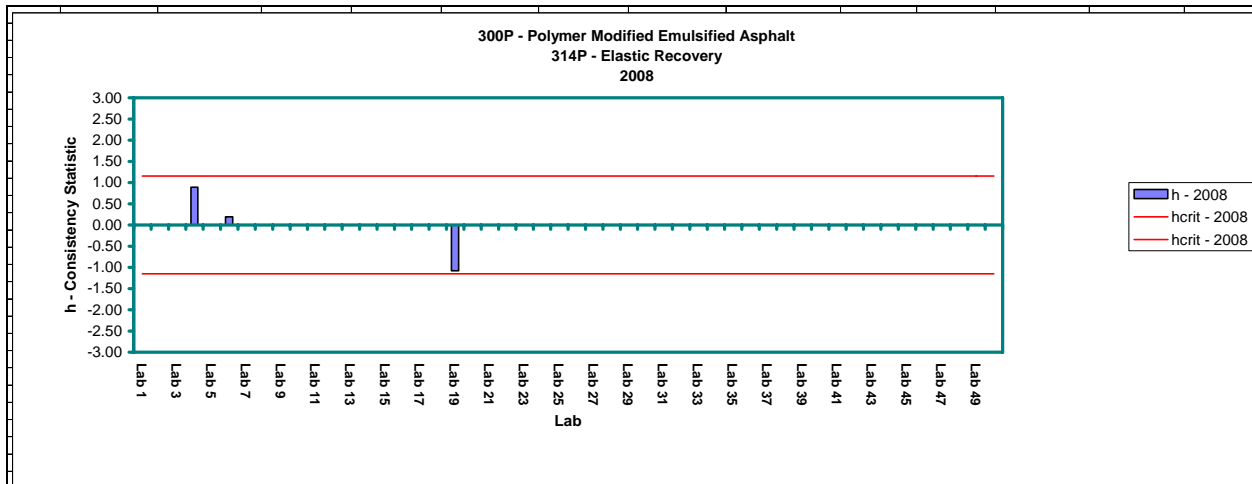
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt													
313P - Ash Content													
2008													
Data				n = 3	$(X_{ave})_{ave} = 0.5507$	$S_r = 0.0046$	Check $S_{X_{ave}} = 0.1329$						
				p = 2	$S_{X_{ave}} = 0.1329$	$S_{R^*} = 0.1330$	$r = 2.8 S_r = 0.0127$						
				Significance Level = 0.5%		$S_R = 0.1330$	$R = 2.8 S_R = 0.3686$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											#NUM!	#NUM!	1.41
Lab 2											#NUM!	#NUM!	1.41
Lab 3											#NUM!	#NUM!	1.41
Lab 4											#NUM!	#NUM!	1.41
Lab 5											#NUM!	#NUM!	1.41
Lab 6	0.6480	0.6430	0.6430		0.6447	0.0029	0.0940	0.0000	0.71	0.63	#NUM!	#NUM!	1.41
Lab 7											#NUM!	#NUM!	1.41
Lab 8											#NUM!	#NUM!	1.41
Lab 9											#NUM!	#NUM!	1.41
Lab 10											#NUM!	#NUM!	1.41
Lab 11											#NUM!	#NUM!	1.41
Lab 12											#NUM!	#NUM!	1.41
Lab 13											#NUM!	#NUM!	1.41
Lab 14											#NUM!	#NUM!	1.41
Lab 15											#NUM!	#NUM!	1.41
Lab 16											#NUM!	#NUM!	1.41
Lab 17											#NUM!	#NUM!	1.41
Lab 18											#NUM!	#NUM!	1.41
Lab 19	0.4600	0.4500	0.4600		0.4567	0.0058	-0.0940	0.0000	-0.71	1.26	#NUM!	#NUM!	1.41
Lab 20											#NUM!	#NUM!	1.41
Lab 21											#NUM!	#NUM!	1.41
Lab 22											#NUM!	#NUM!	1.41
Lab 23											#NUM!	#NUM!	1.41
Lab 24											#NUM!	#NUM!	1.41
Lab 25											#NUM!	#NUM!	1.41
Lab 26											#NUM!	#NUM!	1.41
Lab 27											#NUM!	#NUM!	1.41
Lab 28											#NUM!	#NUM!	1.41
Lab 29											#NUM!	#NUM!	1.41
Lab 30											#NUM!	#NUM!	1.41
Lab 31											#NUM!	#NUM!	1.41
Lab 32											#NUM!	#NUM!	1.41
Lab 33											#NUM!	#NUM!	1.41
Lab 34											#NUM!	#NUM!	1.41
Lab 35											#NUM!	#NUM!	1.41
Lab 36											#NUM!	#NUM!	1.41
Lab 37											#NUM!	#NUM!	1.41
Lab 38											#NUM!	#NUM!	1.41
Lab 39											#NUM!	#NUM!	1.41
Lab 40											#NUM!	#NUM!	1.41
Lab 41											#NUM!	#NUM!	1.41
Lab 42											#NUM!	#NUM!	1.41
Lab 43											#NUM!	#NUM!	1.41
Lab 44											#NUM!	#NUM!	1.41
Lab 45											#NUM!	#NUM!	1.41
Lab 46											#NUM!	#NUM!	1.41
Lab 47											#NUM!	#NUM!	1.41
Lab 48											#NUM!	#NUM!	1.41
Lab 49											#NUM!	#NUM!	1.41
Lab 50											#NUM!	#NUM!	1.41
Additional Statistics				Minimum X_{ave}	0.4567	$r = 2.8 S_r =$	0.0127	$h_{crit} =$	#NUM!				
				Maximum X_{ave}	0.6447	$R = 2.8 S_R =$	0.3686	$h_{crit} =$	#NUM!				
				Check $S_{X_{ave}} =$	0.1329			$k_{crit} =$	1.41				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where:		$(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$		Cell Average		$S_{X_{ave}} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$S_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$S_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$S_R =$		Reproducibility Standard Deviation (Larger of S_r and S_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



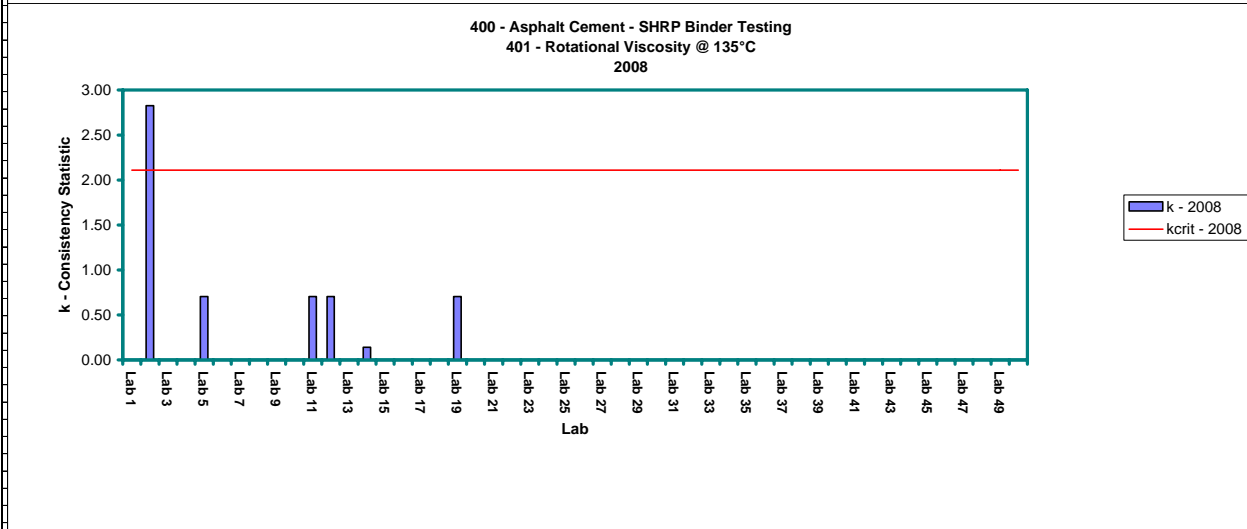
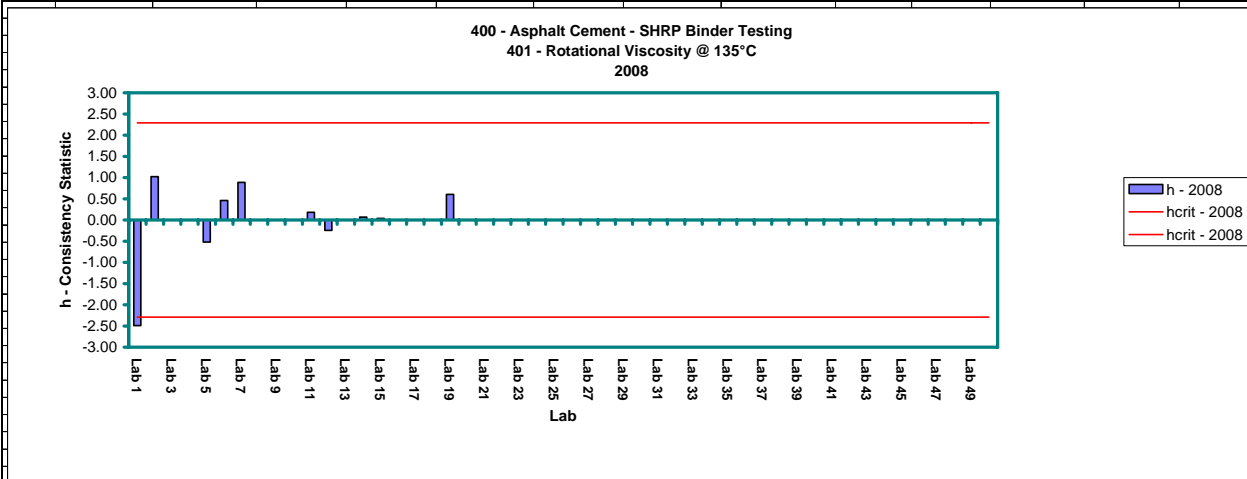
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

300P - Polymer Modified Emulsified Asphalt 314P - Elastic Recovery 2008													
Data					n = 3	$(X_{ave})_{ave} = 68.6111$	$s_r = 1.2444$	Check $s_{X_{ave}} = 7.1847$					
					p = 3	$S_{X_{ave}} = 7.1847$	$s_{Rr} = 7.2562$	$r = 2.8 s_r = 3.4494$					
					Significance Level = 0.5%		$s_R = 7.2562$	$R = 2.8 s_R = 20.1132$					
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.15	-1.15	1.67
Lab 2											1.15	-1.15	1.67
Lab 3											1.15	-1.15	1.67
Lab 4	73.7500	76.2500	75.0000		75.0000	1.2500	6.3889	1.5625	0.89	1.00	1.15	-1.15	1.67
Lab 5											1.15	-1.15	1.67
Lab 6	70.0000	69.0000	71.0000		70.0000	1.0000	1.3889	1.0000	0.19	0.80	1.15	-1.15	1.67
Lab 7											1.15	-1.15	1.67
Lab 8											1.15	-1.15	1.67
Lab 9											1.15	-1.15	1.67
Lab 10											1.15	-1.15	1.67
Lab 11											1.15	-1.15	1.67
Lab 12											1.15	-1.15	1.67
Lab 13											1.15	-1.15	1.67
Lab 14											1.15	-1.15	1.67
Lab 15											1.15	-1.15	1.67
Lab 16											1.15	-1.15	1.67
Lab 17											1.15	-1.15	1.67
Lab 18											1.15	-1.15	1.67
Lab 19	62.5000	60.0000	60.0000		60.8333	1.4434	-7.7778	2.0833	-1.08	1.16	1.15	-1.15	1.67
Lab 20											1.15	-1.15	1.67
Lab 21											1.15	-1.15	1.67
Lab 22											1.15	-1.15	1.67
Lab 23											1.15	-1.15	1.67
Lab 24											1.15	-1.15	1.67
Lab 25											1.15	-1.15	1.67
Lab 26											1.15	-1.15	1.67
Lab 27											1.15	-1.15	1.67
Lab 28											1.15	-1.15	1.67
Lab 29											1.15	-1.15	1.67
Lab 30											1.15	-1.15	1.67
Lab 31											1.15	-1.15	1.67
Lab 32											1.15	-1.15	1.67
Lab 33											1.15	-1.15	1.67
Lab 34											1.15	-1.15	1.67
Lab 35											1.15	-1.15	1.67
Lab 36											1.15	-1.15	1.67
Lab 37											1.15	-1.15	1.67
Lab 38											1.15	-1.15	1.67
Lab 39											1.15	-1.15	1.67
Lab 40											1.15	-1.15	1.67
Lab 41											1.15	-1.15	1.67
Lab 42											1.15	-1.15	1.67
Lab 43											1.15	-1.15	1.67
Lab 44											1.15	-1.15	1.67
Lab 45											1.15	-1.15	1.67
Lab 46											1.15	-1.15	1.67
Lab 47											1.15	-1.15	1.67
Lab 48											1.15	-1.15	1.67
Lab 49											1.15	-1.15	1.67
Lab 50											1.15	-1.15	1.67
Additional Statistics					Minimum X_{ave}	60.8333	$r = 2.8 s_r =$	3.4494	$h_{crit} =$	1.15			
					Maximum X_{ave}	75.0000	$R = 2.8 s_R =$	20.1132	$h_{crit} =$	-1.15			
					Check $s_{X_{ave}} =$	7.1847			$k_{crit} =$	1.67			
Where: $x_1, \dots, x_n =$					Individual Test Result	Where: $(X_{ave})_{ave} =$		Average of Cell Averages					
$X_{ave} =$					Cell Average	$s_{ave} =$		Standard Deviation of Cell Averages					
n =					Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation					
s =					Cell Standard Deviation	$s_{Rr} =$		Interim Reproducibility Standard Deviation					
d =					Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{Rr})					
$s^2 =$					Cell Variation	h =		Between Laboratory Consistency Statistic					
p =					Number of Laboratories	k =		Within Laboratory Consistency Statistic					
$h_{crit} =$					Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability					
$k_{crit} =$					Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility					



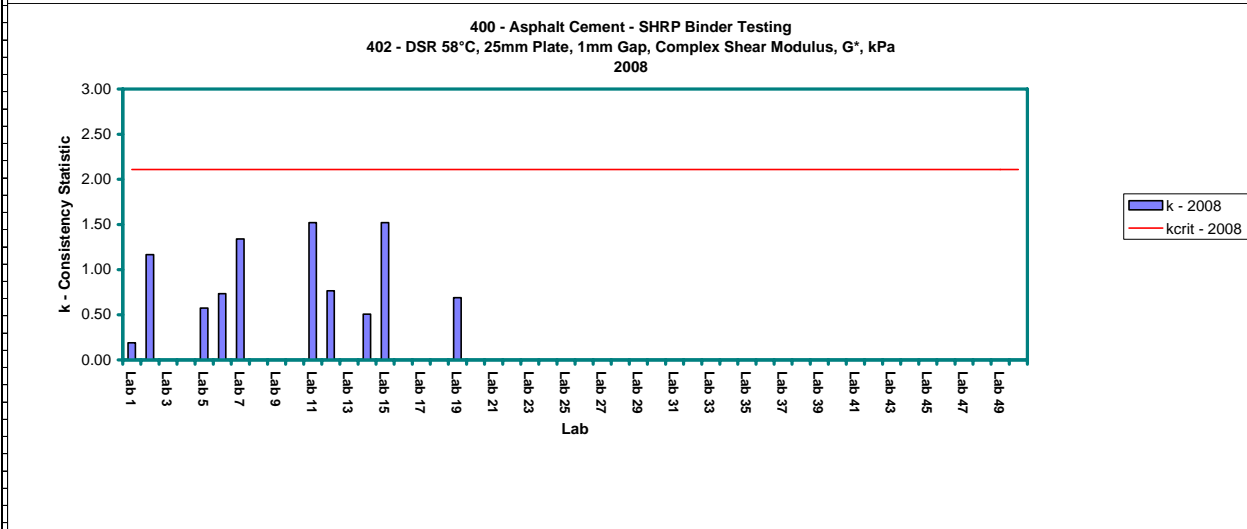
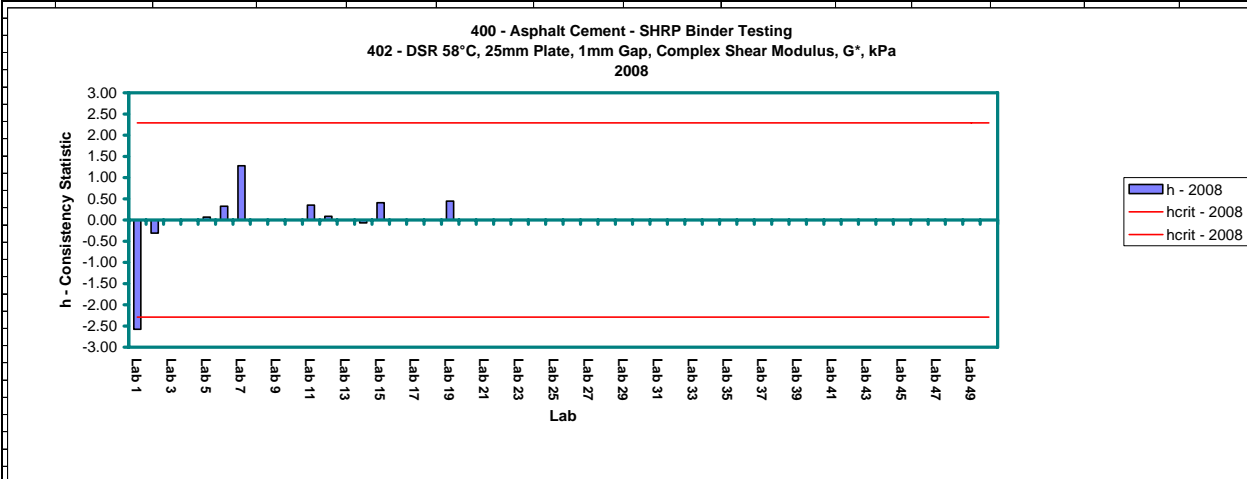
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
401 - Rotational Viscosity @ 135°C													
2008													
Data				n = 3	(X _{ave}) _{ave} = 0.2991	s _r = 0.0082	Check s _{Xave} = 0.0237						
				p = 10	S _{Xave} = 0.0237	s _R = 0.0246	r = 2.8 s _r = 0.0227						
				Significance Level = 0.5%		s _R = 0.0246	R = 2.8 s _R = 0.0682						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	0.2400	0.2400	0.2400		0.2400	0.0000	-0.0591	0.0000	-2.49	0.00	2.29	-2.29	2.11
Lab 2	0.3500	0.3100	0.3100		0.3233	0.0231	0.0243	0.0005	1.02	2.83	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	0.2900	0.2800	0.2900		0.2867	0.0058	-0.0124	0.0000	-0.52	0.71	2.29	-2.29	2.11
Lab 6	0.3100	0.3100	0.3100		0.3100	0.0000	0.0109	0.0000	0.46	0.00	2.29	-2.29	2.11
Lab 7	0.3200	0.3200	0.3200		0.3200	0.0000	0.0209	0.0000	0.88	0.00	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	0.3000	0.3100	0.3000		0.3033	0.0058	0.0043	0.0000	0.18	0.71	2.29	-2.29	2.11
Lab 12	0.2900	0.2900	0.3000		0.2933	0.0058	-0.0057	0.0000	-0.24	0.71	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	0.3000	0.3020	0.3000		0.3007	0.0012	0.0016	0.0000	0.07	0.14	2.29	-2.29	2.11
Lab 15	0.3000	0.3000	0.3000		0.3000	0.0000	0.0009	0.0000	0.04	0.00	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	0.3200	0.3100	0.3100		0.3133	0.0058	0.0143	0.0000	0.60	0.71	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	0.2400	r = 2.8 s _r =	0.0227	h _{crit} =	2.29				
				Maximum X _{ave}	0.3233	R = 2.8 s _R =	0.0682	h _{crit} =	-2.29				
				Check s _{Xave} =	0.0237			k _{crit} =	2.11				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		s _{Xave} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



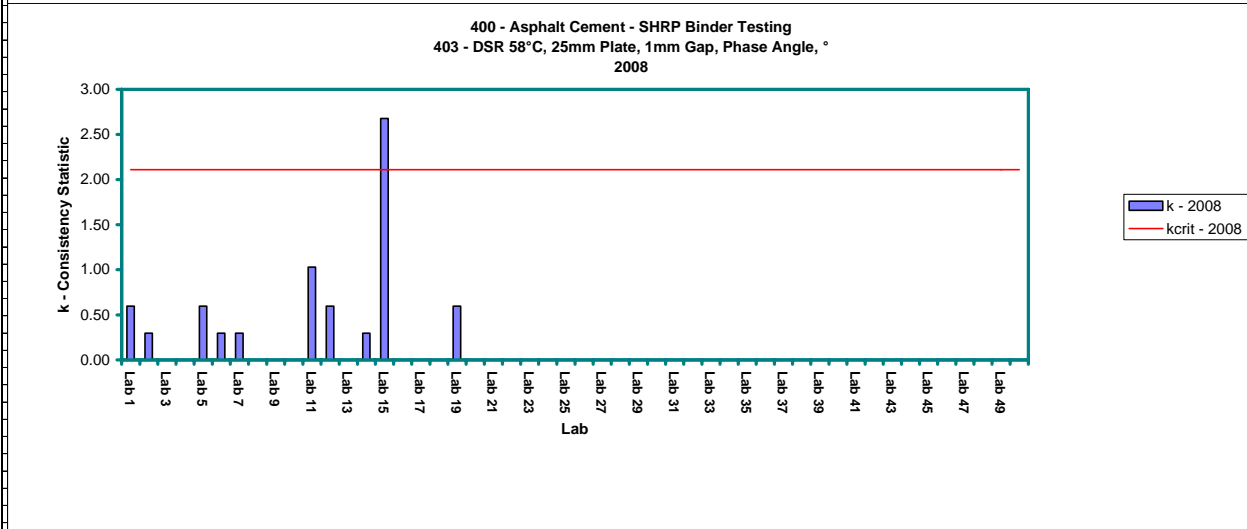
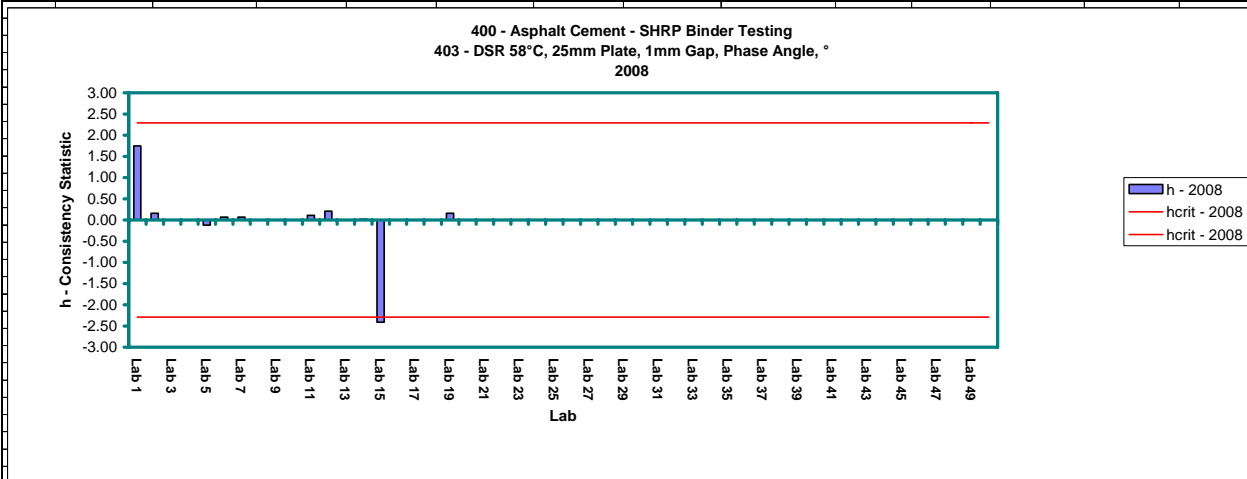
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
402 - DSR 58°C, 25mm Plate, 1mm Gap, Complex Shear Modulus, G*, kPa													
2008													
Data					n = 3	(X _{ave}) _{ave} = 1.3882	s _r = 0.0301	Check s _{X_{ave}} = 0.1762					
					p = 10	S _{X_{ave}} = 0.1762	s _R = 0.1779	r = 2.8 s _r = 0.0836					
					Significance Level = 0.5%		s _R = 0.1779	R = 2.8 s _R = 0.4932					
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	0.9300	0.9300	0.9400		0.9333	0.0058	-0.4549	0.0000	-2.58	0.19	2.29	-2.29	2.11
Lab 2	1.3700	1.3300	1.3000		1.3333	0.0351	-0.0549	0.0012	-0.31	1.16	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	1.4100	1.3800	1.4100		1.4000	0.0173	0.0118	0.0003	0.07	0.57	2.29	-2.29	2.11
Lab 6	1.4690	1.4430	1.4250		1.4457	0.0221	0.0574	0.0005	0.33	0.73	2.29	-2.29	2.11
Lab 7	1.6500	1.5700	1.6200		1.6133	0.0404	0.2251	0.0016	1.28	1.34	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	1.4000	1.4900	1.4600		1.4500	0.0458	0.0618	0.0021	0.35	1.52	2.29	-2.29	2.11
Lab 12	1.3900	1.4300	1.3900		1.4033	0.0231	0.0151	0.0005	0.09	0.77	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	1.3600	1.3800	1.3900		1.3767	0.0153	-0.0116	0.0002	-0.07	0.51	2.29	-2.29	2.11
Lab 15	1.4200	1.5100	1.4500		1.4600	0.0458	0.0718	0.0021	0.41	1.52	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	1.4600	1.4900	1.4500		1.4667	0.0208	0.0784	0.0004	0.45	0.69	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics					Minimum X _{ave}	0.9333	r = 2.8 s _r =	0.0836	h _{crit} =	2.29			
					Maximum X _{ave}	1.6133	R = 2.8 s _R =	0.4932	h _{crit} =	-2.29			
					Check s _{X_{ave}}	0.1762			k _{crit} =	2.11			
Where: x ₁ ...x _n = Individual Test Result					Where: (X _{ave}) _{ave} = Average of Cell Averages								
X _{ave} = Cell Average					s _{X_{ave}} = Standard Deviation of Cell Averages								
n = Number of Test Results per Cell					s _r = Repeatability Standard Deviation								
s = Cell Standard Deviation					s _R = Interim Reproducibility Standard Deviation								
d = Cell Deviation (X _{ave} - (X _{ave}) _{ave})					s _R = Reproducibility Standard Deviation (Larger of s _r and s _R)								
s ² = Cell Variation					h = Between Laboratory Consistency Statistic								
p = Number of Laboratories					k = Within Laboratory Consistency Statistic								
h _{crit} = Critical Between Laboratory Consistency Statistic					r = 95% Confidence Limit for Repeatability								
k _{crit} = Critical Within Laboratory Consistency Statistic					R = 95% Confidence Limit for Reproducibility								



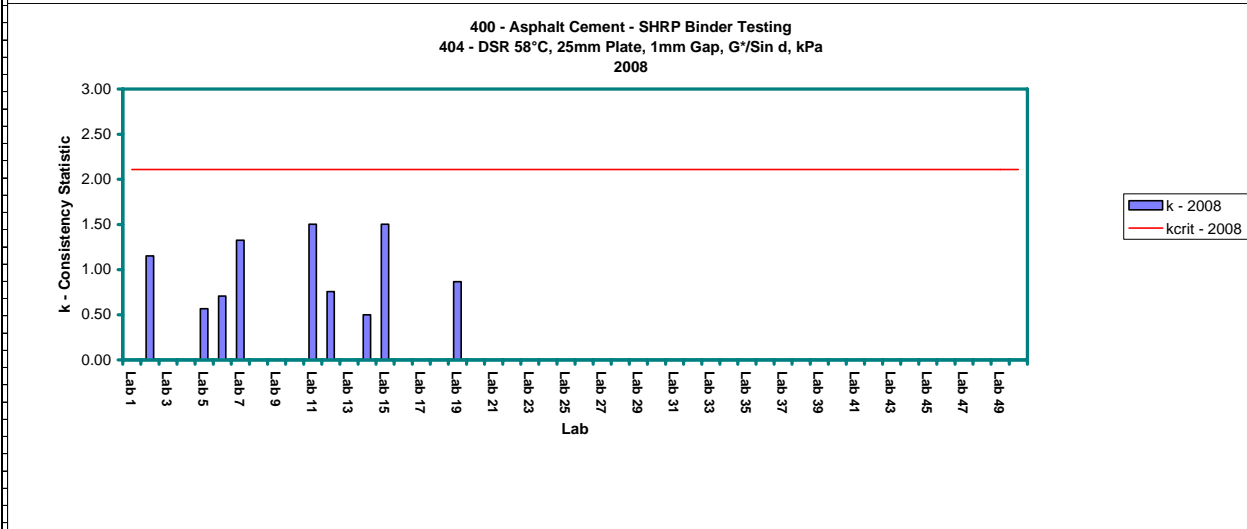
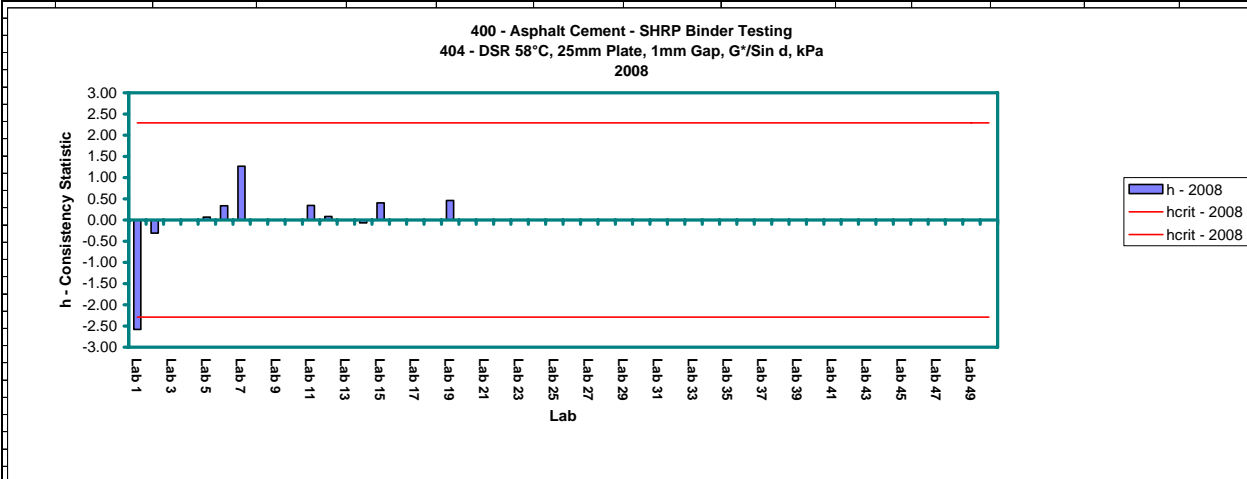
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages	
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell		S_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation		S_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		S_R =	Reproducibility Standard Deviation (Larger of s_r and S_{R^*})	
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility	

400 - Asphalt Cement - SHRP Binder Testing 403 - DSR 58°C, 25mm Plate, 1mm Gap, Phase Angle, ° 2008													
Data				n = 3	(X _{ave}) _{ave} = 86.5200	s _r = 0.1941	Check s _{X_{ave}} = 0.7132						
				p = 10	S _{X_{ave}} = 0.7132	s _R = 0.7306	r = 2.8 s _r = 0.5380						
				Significance Level = 0.5%		s _R = 0.7306	R = 2.8 s _R = 2.0252						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	87.7000	87.7000	87.9000		87.7667	0.1155	1.2467	0.0133	1.75	0.59	2.29	-2.29	2.11
Lab 2	86.6000	86.7000	86.6000		86.6333	0.0577	0.1133	0.0033	0.16	0.30	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	86.5000	86.3000	86.5000		86.4333	0.1155	-0.0867	0.0133	-0.12	0.59	2.29	-2.29	2.11
Lab 6	86.6000	86.5000	86.6000		86.5667	0.0577	0.0467	0.0033	0.07	0.30	2.29	-2.29	2.11
Lab 7	86.5000	86.6000	86.6000		86.5667	0.0577	0.0467	0.0033	0.07	0.30	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	86.8000	86.6000	86.4000		86.6000	0.2000	0.0800	0.0400	0.11	1.03	2.29	-2.29	2.11
Lab 12	86.8000	86.6000	86.6000		86.6667	0.1155	0.1467	0.0133	0.21	0.59	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	86.5000	86.6000	86.5000		86.5333	0.0577	0.0133	0.0033	0.02	0.30	2.29	-2.29	2.11
Lab 15	84.5000	84.5000	85.4000		84.8000	0.5196	-1.7200	0.2700	-2.41	2.68	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	86.7000	86.5000	86.7000		86.6333	0.1155	0.1133	0.0133	0.16	0.59	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	84.8000	r = 2.8 s _r =	0.5380	h _{crit} =	2.29				
				Maximum X _{ave}	87.7667	R = 2.8 s _R =	2.0252	h _{crit} =	-2.29				
				Check s _{X_{ave}} =	0.7132			k _{crit} =	2.11				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		s _{X_{ave}} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



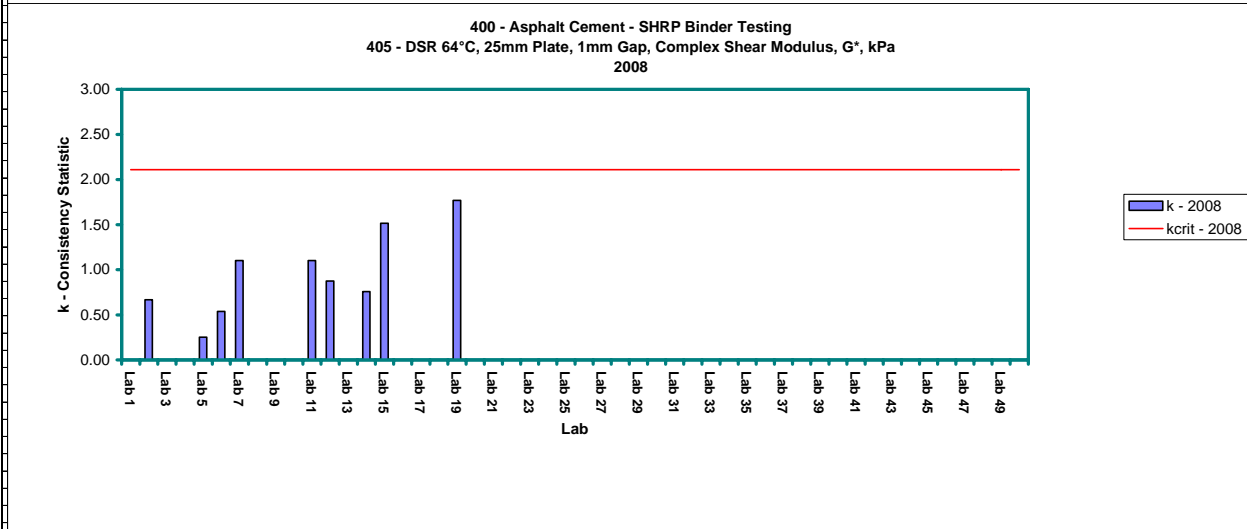
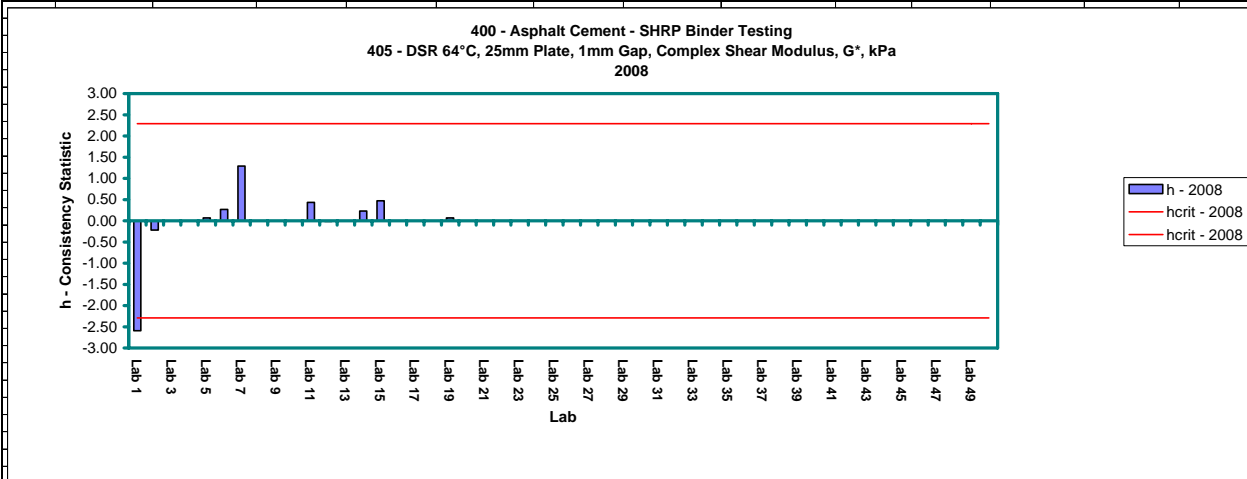
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 404 - DSR 58°C, 25mm Plate, 1mm Gap, G*/Sin d, kPa 2008													
Data					n = 3 p = 10 Significance Level = 0.5%	(X_{ave}) _{ave} = 1.3885 $S_{X_{ave}}$ = 0.1775	s_r = 0.0305 s_{R^*} = 0.1792 s_R = 0.1792	Check $s_{X_{ave}}$ = 0.1775 r = 2.8 s_r = 0.0845 R = 2.8 s_R = 0.4967					
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	0.9300	0.9300	0.9300		0.9300	0.0000	-0.4585	0.0000	-2.58	0.00	2.29	-2.29	2.11
Lab 2	1.3700	1.3300	1.3000		1.3333	0.0351	-0.0552	0.0012	-0.31	1.15	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	1.4100	1.3800	1.4100		1.4000	0.0173	0.0115	0.0003	0.06	0.57	2.29	-2.29	2.11
Lab 6	1.4710	1.4460	1.4280		1.4483	0.0216	0.0598	0.0005	0.34	0.71	2.29	-2.29	2.11
Lab 7	1.6500	1.5700	1.6200		1.6133	0.0404	0.2248	0.0016	1.27	1.33	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	1.4000	1.4900	1.4600		1.4500	0.0458	0.0615	0.0021	0.35	1.50	2.29	-2.29	2.11
Lab 12	1.3900	1.4300	1.3900		1.4033	0.0231	0.0148	0.0005	0.08	0.76	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	1.3600	1.3800	1.3900		1.3767	0.0153	-0.0118	0.0002	-0.07	0.50	2.29	-2.29	2.11
Lab 15	1.4200	1.5100	1.4500		1.4600	0.0458	0.0715	0.0021	0.40	1.50	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	1.4600	1.5000	1.4500		1.4700	0.0265	0.0815	0.0007	0.46	0.87	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics					Minimum X_{ave} = 0.9300	r = 2.8 s_r = 0.0845	h_{crit} = 2.29						
					Maximum X_{ave} = 1.6133	R = 2.8 s_R = 0.4967	h_{crit} = -2.29						
					Check $s_{X_{ave}}$ = 0.1775		k_{crit} = 2.11						
Where: x_1, \dots, x_n = Individual Test Result				Where: (X_{ave}) _{ave} = Average of Cell Averages									
X_{ave} = Cell Average				$s_{X_{ave}}$ = Standard Deviation of Cell Averages									
n = Number of Test Results per Cell				s_r = Repeatability Standard Deviation									
s = Cell Standard Deviation				s_{R^*} = Interim Reproducibility Standard Deviation									
d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)				s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})									
s^2 = Cell Variation				h = Between Laboratory Consistency Statistic									
p = Number of Laboratories				k = Within Laboratory Consistency Statistic									
h_{crit} = Critical Between Laboratory Consistency Statistic				r = 95% Confidence Limit for Repeatability									
k_{crit} = Critical Within Laboratory Consistency Statistic				R = 95% Confidence Limit for Reproducibility									



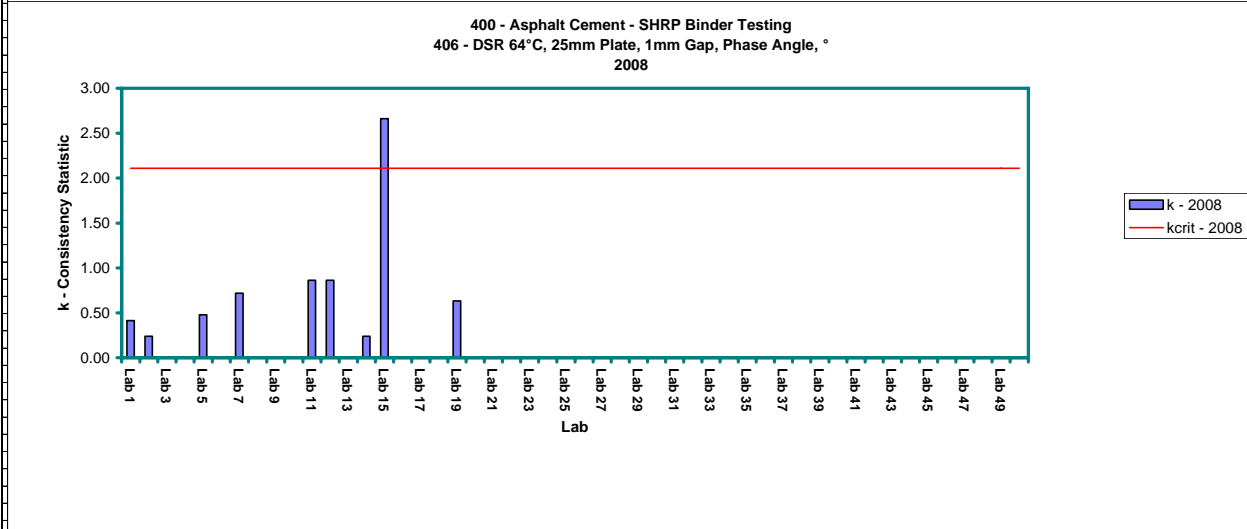
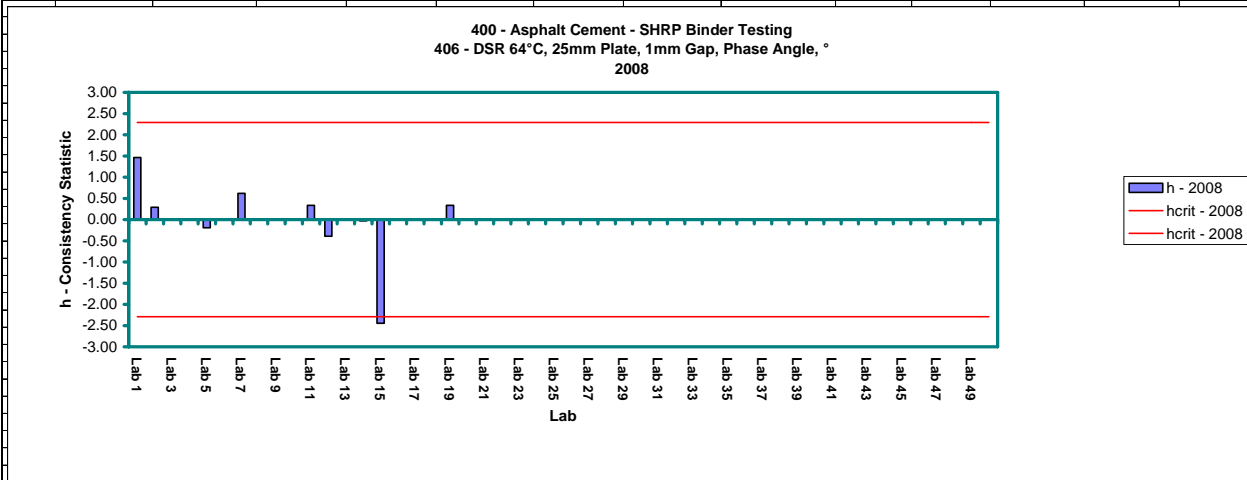
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{(ave)}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
405 - DSR 64°C, 25mm Plate, 1mm Gap, Complex Shear Modulus, G*, kPa													
2008													
Data				n = 3	(X _{ave}) _{ave} = 0.6513	s _r = 0.0228	Check s _{X_{ave}} = 0.0814						
				p = 10	S _{X_{ave}} = 0.0814	s _R = 0.0836	r = 2.8 s _r = 0.0633						
				Significance Level = 0.5%		s _R = 0.0836	R = 2.8 s _R = 0.2316						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	0.4400	0.4400	0.4400		0.4400	0.0000	-0.2113	0.0000	-2.59	0.00	2.29	-2.29	2.11
Lab 2	0.6500	0.6300	0.6200		0.6333	0.0153	-0.0180	0.0002	-0.22	0.67	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	0.6600	0.6500	0.6600		0.6567	0.0058	0.0054	0.0000	0.07	0.25	2.29	-2.29	2.11
Lab 6	0.6640	0.6870	0.6680		0.6730	0.0123	0.0217	0.0002	0.27	0.54	2.29	-2.29	2.11
Lab 7	0.7300	0.7600	0.7800		0.7567	0.0252	0.1054	0.0006	1.29	1.10	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	0.6600	0.7100	0.6900		0.6867	0.0252	0.0354	0.0006	0.43	1.10	2.29	-2.29	2.11
Lab 12	0.6500	0.6700	0.6300		0.6500	0.0200	-0.0013	0.0004	-0.02	0.88	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	0.6800	0.6800	0.6500		0.6700	0.0173	0.0187	0.0003	0.23	0.76	2.29	-2.29	2.11
Lab 15	0.6700	0.7300	0.6700		0.6900	0.0346	0.0387	0.0012	0.48	1.52	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	0.6800	0.6800	0.6100		0.6567	0.0404	0.0054	0.0016	0.07	1.77	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	0.4400	r = 2.8 s _r =	0.0633	h _{crit} =	2.29				
				Maximum X _{ave}	0.7567	R = 2.8 s _R =	0.2316	h _{crit} =	-2.29				
				Check s _{X_{ave}}	0.0814			k _{crit} =	2.11				
Where:	x ₁ ...x _n	Individual Test Result			Where:	(X _{ave}) _{ave}	Average of Cell Averages						
	X _{ave}	Cell Average				s _{ave}	Standard Deviation of Cell Averages						
	n	Number of Test Results per Cell				s _r	Repeatability Standard Deviation						
	s	Cell Standard Deviation				s _R	Interim Reproducibility Standard Deviation						
	d	Cell Deviation (X _{ave} - (X _{ave}) _{ave})				s _R	Reproducibility Standard Deviation (Larger of s _r and s _R)						
	s ²	Cell Variation				h	Between Laboratory Consistency Statistic						
	p	Number of Laboratories				k	Within Laboratory Consistency Statistic						
	h _{crit}	Critical Between Laboratory Consistency Statistic				r	95% Confidence Limit for Repeatability						
	k _{crit}	Critical Within Laboratory Consistency Statistic				R	95% Confidence Limit for Reproducibility						



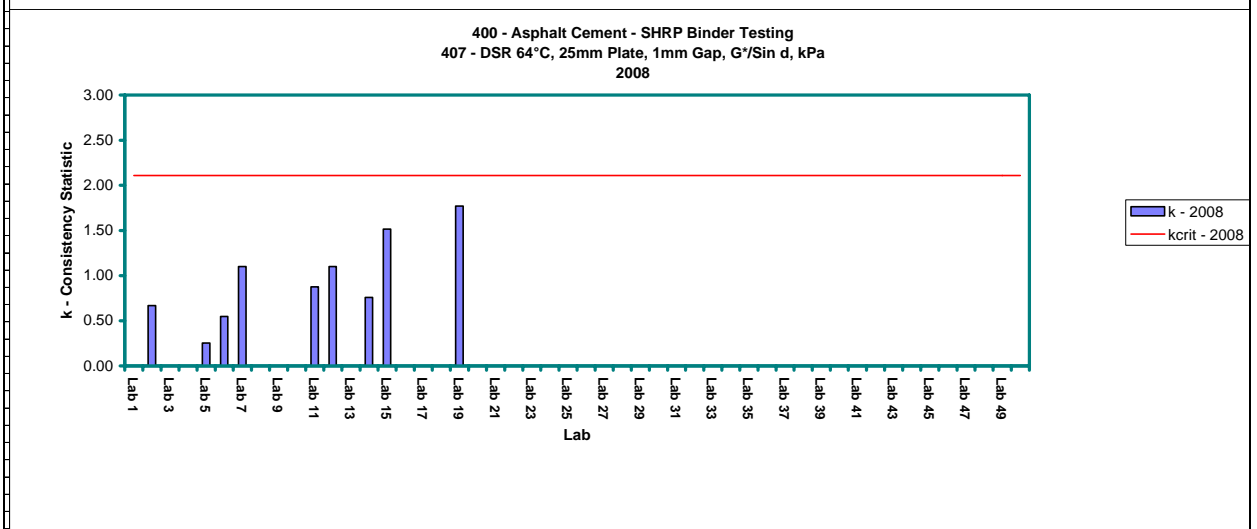
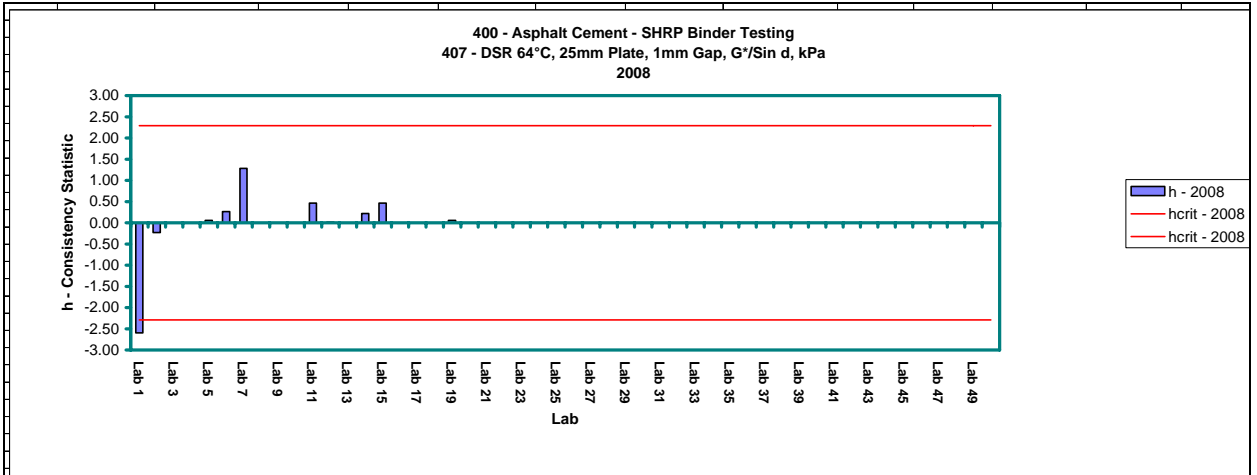
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$S_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 406 - DSR 64°C, 25mm Plate, 1mm Gap, Phase Angle, ° 2008													
Data				n = 3	(X _{ave}) _{ave} = 87.6900	s _r = 0.2415	Check s _{X_{ave}} = 0.8273						
				p = 10	S _{X_{ave}} = 0.8273	s _R = 0.8505	r = 2.8 s _r = 0.6695						
				Significance Level = 0.5%		s _R = 0.8505	R = 2.8 s _R = 2.3575						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	88.9000	88.8000	89.0000		88.9000	0.1000	1.2100	0.0100	1.46	0.41	2.29	-2.29	2.11
Lab 2	87.9000	88.0000	87.9000		87.9333	0.0577	0.2433	0.0033	0.29	0.24	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	87.6000	87.4000	87.6000		87.5333	0.1155	-0.1567	0.0133	-0.19	0.48	2.29	-2.29	2.11
Lab 6	87.7000	87.7000	87.7000		87.7000	0.0000	0.0100	0.0000	0.01	0.00	2.29	-2.29	2.11
Lab 7	88.1000	88.4000	88.1000		88.2000	0.1732	0.5100	0.0300	0.62	0.72	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	88.2000	87.9000	87.8000		87.9667	0.2082	0.2767	0.0433	0.33	0.86	2.29	-2.29	2.11
Lab 12	87.6000	87.3000	87.2000		87.3667	0.2082	-0.3233	0.0433	-0.39	0.86	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	87.7000	87.7000	87.6000		87.6667	0.0577	-0.0233	0.0033	-0.03	0.24	2.29	-2.29	2.11
Lab 15	85.2000	86.4000	85.4000		85.6667	0.6429	-2.0233	0.4133	-2.45	2.66	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	88.0000	88.1000	87.8000		87.9667	0.1528	0.2767	0.0233	0.33	0.63	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	85.6667	r = 2.8 s _r =	0.6695	h _{crit} =	2.29				
				Maximum X _{ave}	88.9000	R = 2.8 s _R =	2.3575	h _{crit} =	-2.29				
				Check s _{X_{ave}} =	0.8273			k _{crit} =	2.11				
Where: x ₁ ...x _n =				Individual Test Result	Where: (X _{ave}) _{ave} =		Average of Cell Averages						
X _{ave} =				Cell Average	s _{ave} =		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	s _r =		Repeatability Standard Deviation						
s =				Cell Standard Deviation	s _R =		Interim Reproducibility Standard Deviation						
d =				Cell Deviation (X _{ave} - (X _{ave}) _{ave})	s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)						
s ² =				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
h _{crit} =				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
k _{crit} =				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



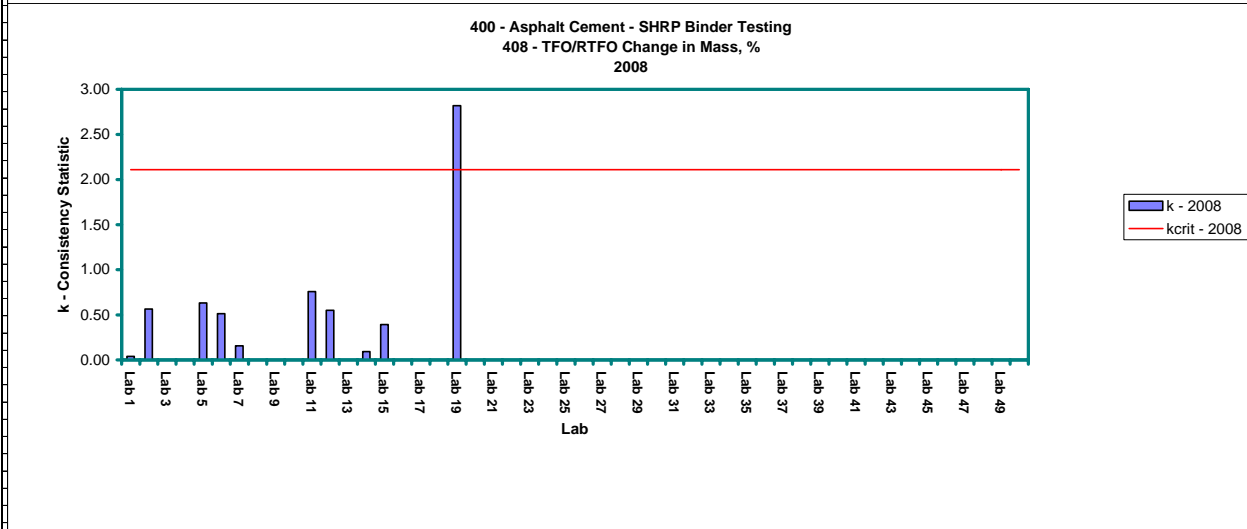
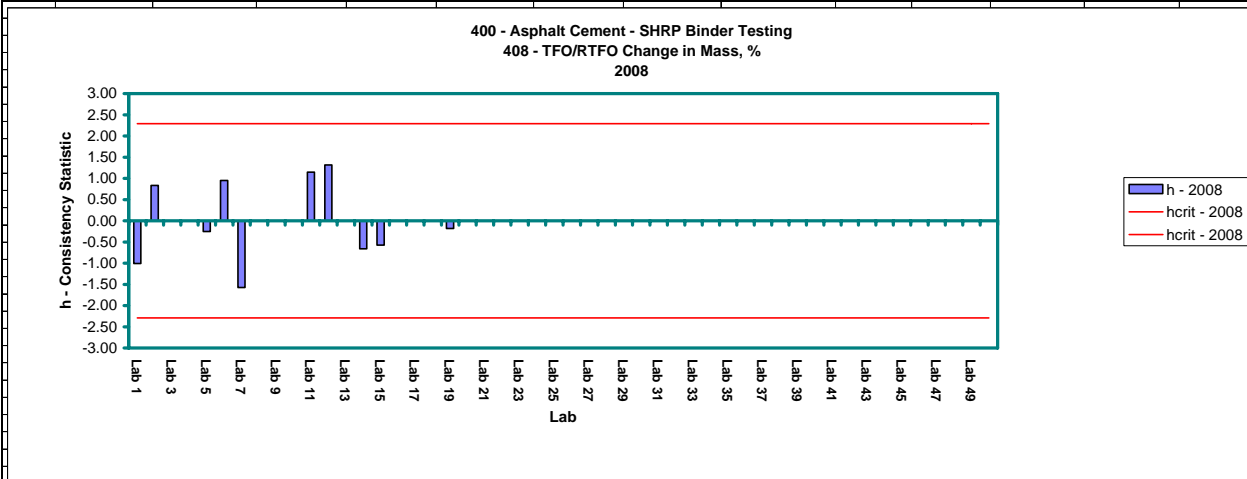
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages	
X_{ave} =	Cell Average	$s_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R^2} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^2})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

400 - Asphalt Cement - SHRP Binder Testing 407 - DSR 64°C, 25mm Plate, 1mm Gap, G*/Sin d, kPa 2008													
Data				n = 3	(X _{ave}) _{ave} = 0.6520	s _r = 0.0229	Check s _{X_{ave}} = 0.0816						
				p = 10	S _{X_{ave}} = 0.0816	s _R = 0.0837	r = 2.8 s _r = 0.0633						
				Significance Level = 0.5%		s _R = 0.0837	R = 2.8 s _R = 0.2321						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	0.4400	0.4400	0.4400		0.4400	0.0000	-0.2120	0.0000	-2.60	0.00	2.29	-2.29	2.11
Lab 2	0.6500	0.6300	0.6200		0.6333	0.0153	-0.0187	0.0002	-0.23	0.67	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	0.6600	0.6500	0.6600		0.6567	0.0058	0.0046	0.0000	0.06	0.25	2.29	-2.29	2.11
Lab 6	0.6650	0.6880	0.6680		0.6737	0.0125	0.0216	0.0002	0.27	0.55	2.29	-2.29	2.11
Lab 7	0.7300	0.7600	0.7800		0.7567	0.0252	0.1046	0.0006	1.28	1.10	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	0.6700	0.7100	0.6900		0.6900	0.0200	0.0380	0.0004	0.47	0.88	2.29	-2.29	2.11
Lab 12	0.6500	0.6800	0.6300		0.6533	0.0252	0.0013	0.0006	0.02	1.10	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	0.6800	0.6800	0.6500		0.6700	0.0173	0.0180	0.0003	0.22	0.76	2.29	-2.29	2.11
Lab 15	0.6700	0.7300	0.6700		0.6900	0.0346	0.0380	0.0012	0.47	1.52	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	0.6800	0.6800	0.6100		0.6567	0.0404	0.0046	0.0016	0.06	1.77	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	0.4400	r = 2.8 s _r =	0.0633	h _{crit} =	2.29				
				Maximum X _{ave}	0.7567	R = 2.8 s _R =	0.2321	h _{crit} =	-2.29				
				Check s _{X_{ave}}	0.0816			k _{crit} =	2.11				
Where: x ₁ ...x _n	Individual Test Result			Where:	(X _{ave}) _{ave}	Average of Cell Averages							
X _{ave}	Cell Average			s _{X_{ave}}	Standard Deviation of Cell Averages								
n	Number of Test Results per Cell			s _r	Repeatability Standard Deviation								
s	Cell Standard Deviation			s _R	Interim Reproducibility Standard Deviation								
d	Cell Deviation (X _{ave} - (X _{ave}) _{ave})			s _R	Reproducibility Standard Deviation (Larger of s _r and s _R)								
s ²	Cell Variation			h	Between Laboratory Consistency Statistic								
p	Number of Laboratories			k	Within Laboratory Consistency Statistic								
h _{crit}	Critical Between Laboratory Consistency Statistic			r	95% Confidence Limit for Repeatability								
k _{crit}	Critical Within Laboratory Consistency Statistic			R	95% Confidence Limit for Reproducibility								



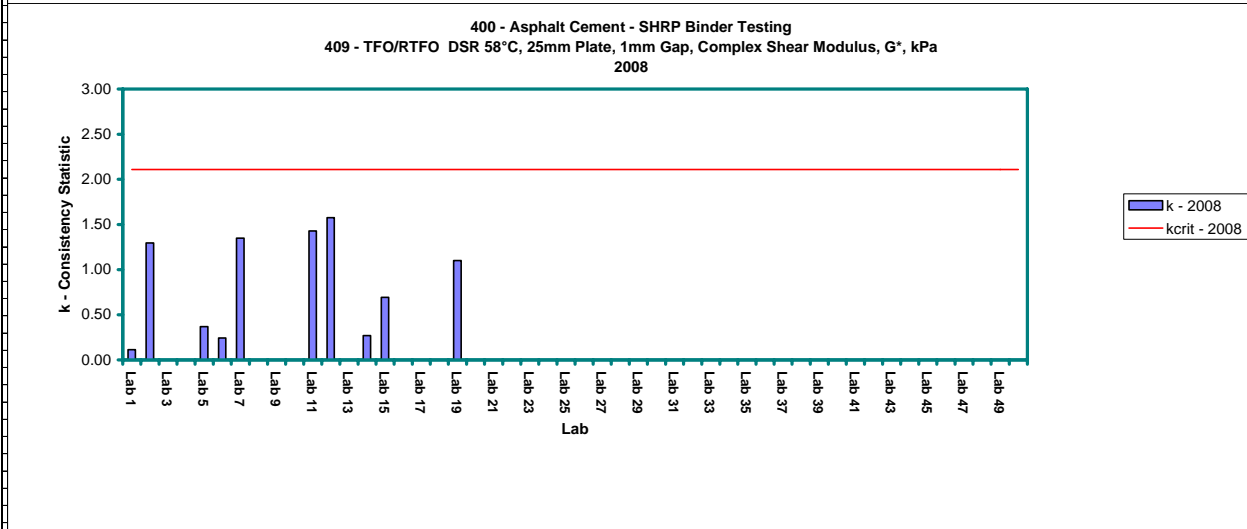
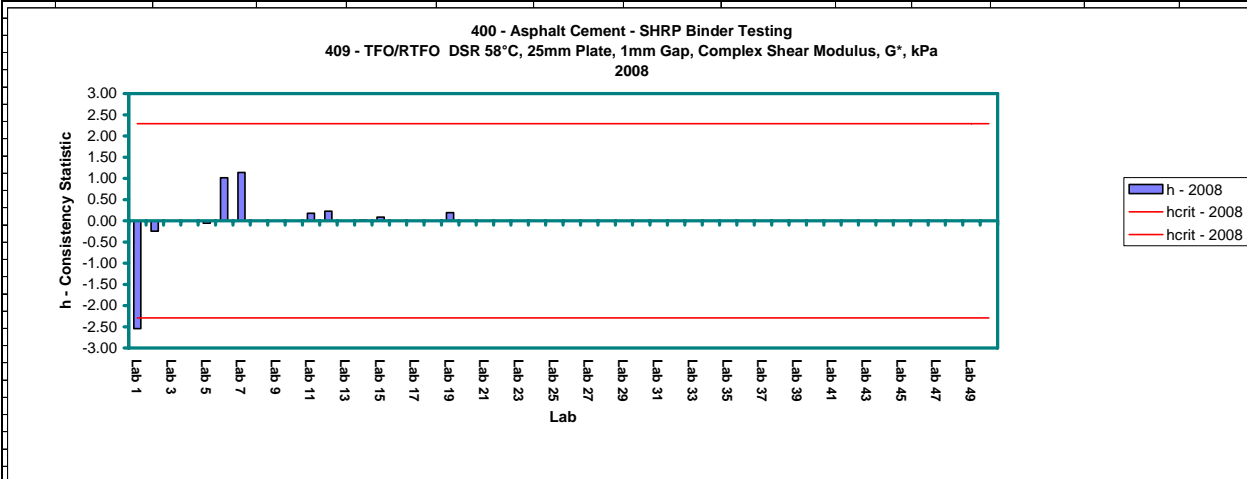
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
408 - TFO/RTFO Change in Mass, %													
2008													
Data				n = 3	(X_{ave}) _{ave} = 0.2706	s_r = 0.0388	Check $s_{X_{ave}}$ = 0.0677						
				p = 10	$S_{X_{ave}}$ = 0.0677	s_{R^*} = 0.0748	r = 2.8 s_r = 0.1075						
				Significance Level = 0.5%		s_R = 0.0748	R = 2.8 s_R = 0.2072						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	0.2010	0.2020	0.2040		0.2023	0.0015	-0.0682	0.0000	-1.01	0.04	2.29	-2.29	2.11
Lab 2	0.3180	0.3110	0.3520		0.3270	0.0219	0.0564	0.0005	0.83	0.57	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	0.2780	0.2530	0.2290		0.2533	0.0245	-0.0172	0.0006	-0.25	0.63	2.29	-2.29	2.11
Lab 6	0.3120	0.3460	0.3470		0.3350	0.0199	0.0644	0.0004	0.95	0.51	2.29	-2.29	2.11
Lab 7	0.1570	0.1680	0.1670		0.1640	0.0061	-0.1066	0.0000	-1.57	0.16	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	0.3800	0.3430	0.3220		0.3483	0.0294	0.0778	0.0009	1.15	0.76	2.29	-2.29	2.11
Lab 12	0.3550	0.3830	0.3410		0.3597	0.0214	0.0891	0.0005	1.32	0.55	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	0.2300	0.2250	0.2230		0.2260	0.0036	-0.0446	0.0000	-0.66	0.09	2.29	-2.29	2.11
Lab 15	0.2490	0.2260	0.2200		0.2317	0.0153	-0.0389	0.0002	-0.57	0.39	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	0.3810	0.1710	0.2230		0.2583	0.1094	-0.0122	0.0120	-0.18	2.82	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X_{ave}	0.1640	$r = 2.8 s_r =$	0.1075	$h_{crit} =$	2.29				
				Maximum X_{ave}	0.3597	$R = 2.8 s_R =$	0.2072	$h_{crit} =$	-2.29				
				Check $s_{X_{ave}}$	0.0677			$k_{crit} =$	2.11				
Where: $x_1, \dots, x_n =$				Individual Test Result	Where: $(X_{ave})_{ave} =$		Average of Cell Averages						
$X_{ave} =$				Cell Average	$s_{X_{ave}} =$		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation						
s =				Cell Standard Deviation	$s_{R^*} =$		Interim Reproducibility Standard Deviation						
d =				Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})						
$s^2 =$				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
$h_{crit} =$				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
$k_{crit} =$				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



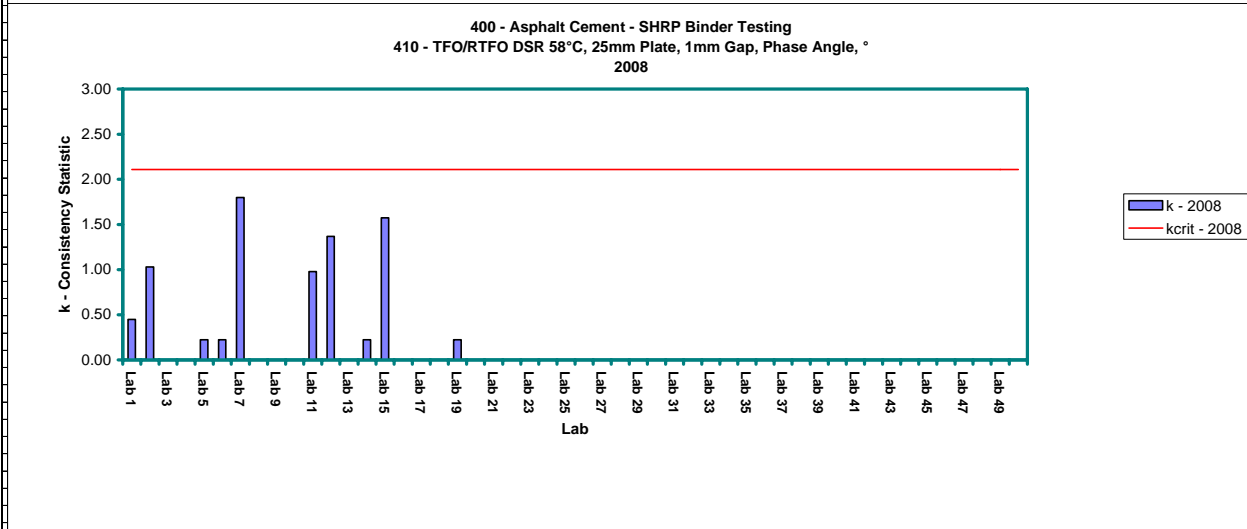
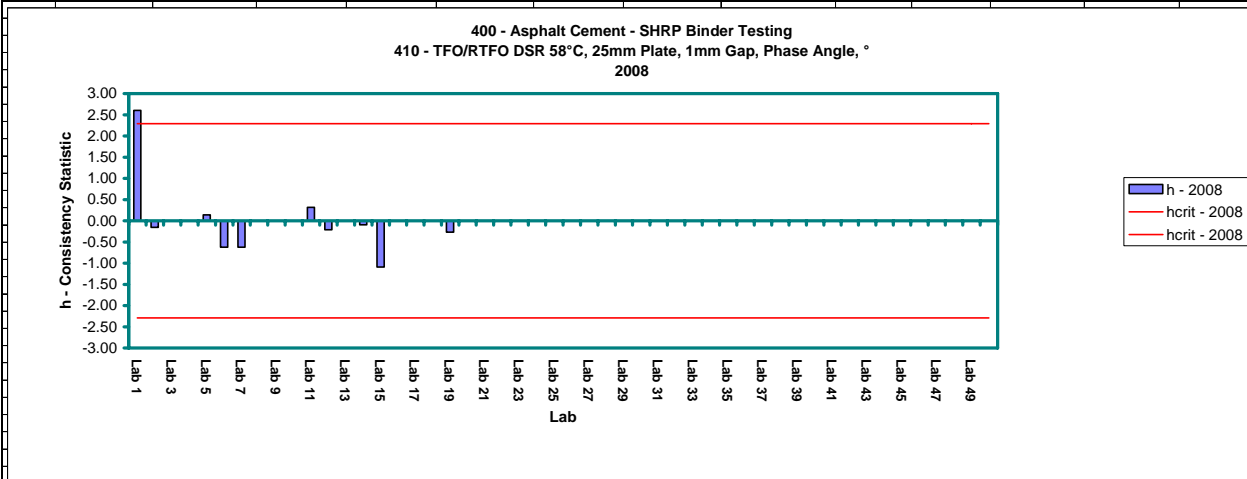
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages	
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

400 - Asphalt Cement - SHRP Binder Testing													
409 - TFO/RTFO DSR 58°C, 25mm Plate, 1mm Gap, Complex Shear Modulus, G', kPa													
2008													
Data				n = 3	(X _{ave}) _{ave} = 3.5429	s _r = 0.1340	Check s _{X_{ave}} = 0.5064						
				p = 10	S _{X_{ave}} = 0.5064	s _R = 0.5181	r = 2.8 s _r = 0.3713						
				Significance Level = 0.5%		s _R = 0.5181	R = 2.8 s _R = 1.4360						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	2.2400	2.2500	2.2700		2.2533	0.0153	-1.2896	0.0002	-2.55	0.11	2.29	-2.29	2.11
Lab 2	3.2300	3.4600	3.5700		3.4200	0.1735	-0.1229	0.0301	-0.24	1.30	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	3.4800	3.5700	3.4900		3.5133	0.0493	-0.0296	0.0024	-0.06	0.37	2.29	-2.29	2.11
Lab 6	4.0900	4.0530	4.0250		4.0560	0.0326	0.5131	0.0011	1.01	0.24	2.29	-2.29	2.11
Lab 7	4.2900	4.1400	3.9300		4.1200	0.1808	0.5771	0.0327	1.14	1.35	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	3.6900	3.7900	3.4200		3.6333	0.1914	0.0904	0.0366	0.18	1.43	2.29	-2.29	2.11
Lab 12	3.6300	3.8800	3.4600		3.6567	0.2113	0.1137	0.0446	0.22	1.58	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	3.5800	3.5600	3.5100		3.5500	0.0361	0.0071	0.0013	0.01	0.27	2.29	-2.29	2.11
Lab 15	3.5600	3.5100	3.6900		3.5867	0.0929	0.0437	0.0086	0.09	0.69	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	3.8000	3.5100	3.6100		3.6400	0.1473	0.0971	0.0217	0.19	1.10	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	2.2533	r = 2.8 s _r =	0.3713	h _{crit} =	2.29				
				Maximum X _{ave}	4.1200	R = 2.8 s _R =	1.4360	h _{crit} =	-2.29				
				Check s _{X_{ave}}	0.5064			k _{crit} =	2.11				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		s _{ave} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



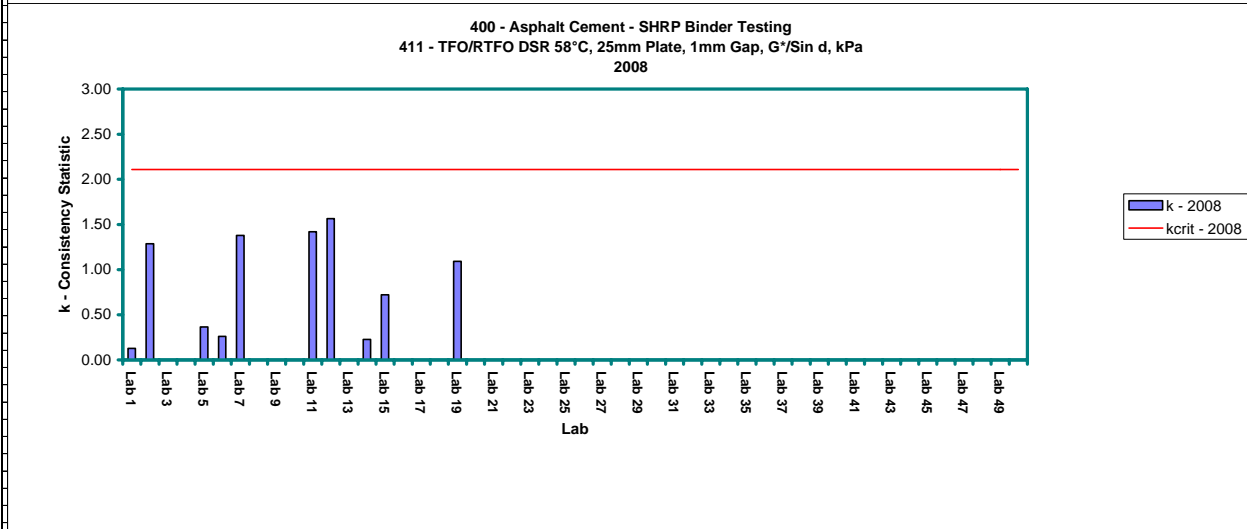
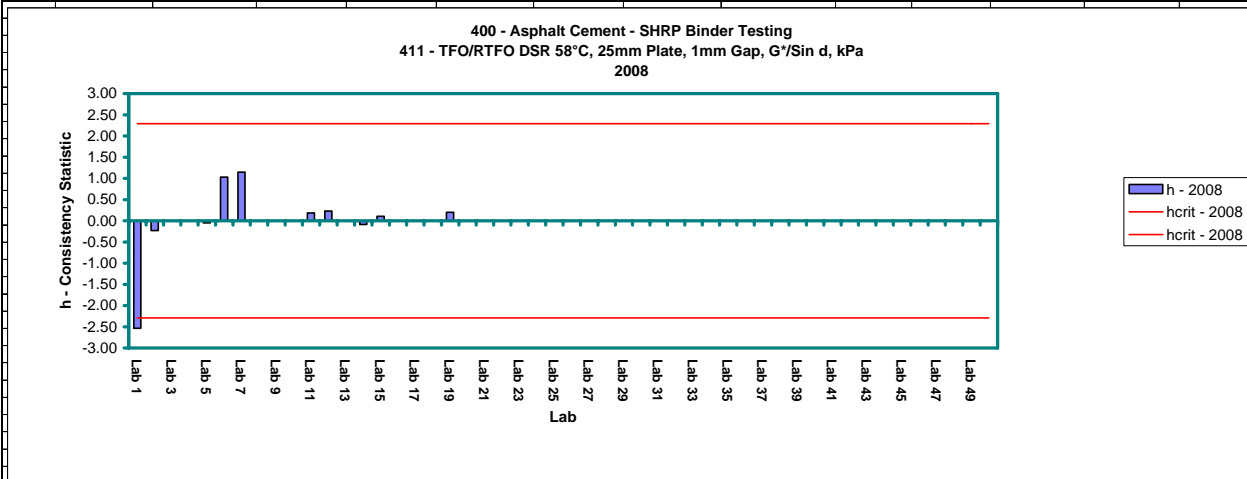
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
410 - TFO/RTFO DSR 58°C, 25mm Plate, 1mm Gap, Phase Angle, °													
2008													
Data				n = 3	(X_{ave}) _{ave} = 82.4867	s_r = 0.2569	Check $s_{X_{ave}}$ = 0.5688						
				p = 10	$s_{X_{ave}}$ = 0.5688	s_{R^*} = 0.6062	r = 2.8 s_r = 0.7121						
				Significance Level = 0.5%		s_R = 0.6062	R = 2.8 s_R = 1.6804						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	83.9000	84.1000	83.9000		83.9667	0.1155	1.4800	0.0133	2.60	0.45	2.29	-2.29	2.11
Lab 2	82.7000	82.3000	82.2000		82.4000	0.2646	-0.0867	0.0700	-0.15	1.03	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	82.6000	82.5000	82.6000		82.5667	0.0577	0.0900	0.0033	0.14	0.22	2.29	-2.29	2.11
Lab 6	82.1000	82.2000	82.1000		82.1333	0.0577	-0.3533	0.0033	-0.62	0.22	2.29	-2.29	2.11
Lab 7	81.6000	82.4000	82.4000		82.1333	0.4619	-0.3533	0.2133	-0.62	1.80	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	82.9000	82.4000	82.7000		82.6667	0.2517	0.1800	0.0633	0.32	0.98	2.29	-2.29	2.11
Lab 12	82.7000	82.0000	82.4000		82.3667	0.3512	-0.1200	0.1233	-0.21	1.37	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	82.4000	82.4000	82.5000		82.4333	0.0577	-0.0533	0.0033	-0.09	0.22	2.29	-2.29	2.11
Lab 15	82.1000	82.1000	81.4000		81.8667	0.4041	-0.6200	0.1633	-1.09	1.57	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	82.3000	82.3000	82.4000		82.3333	0.0577	-0.1533	0.0033	-0.27	0.22	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X_{ave}	81.8667	$r = 2.8$ $s_r =$	0.7121	$h_{crit} =$	2.29				
				Maximum X_{ave}	83.9667	$R = 2.8$ $s_R =$	1.6804	$h_{crit} =$	-2.29				
				Check $s_{X_{ave}}$	0.5688			$k_{crit} =$	2.11				
Where: $x_1, \dots, x_n =$				Individual Test Result	Where: $(X_{ave})_{ave} =$		Average of Cell Averages						
$X_{ave} =$				Cell Average	$s_{ave} =$		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation						
s =				Cell Standard Deviation	$s_{R^*} =$		Interim Reproducibility Standard Deviation						
d =				Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})						
$s^2 =$				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
$h_{crit} =$				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
$k_{crit} =$				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



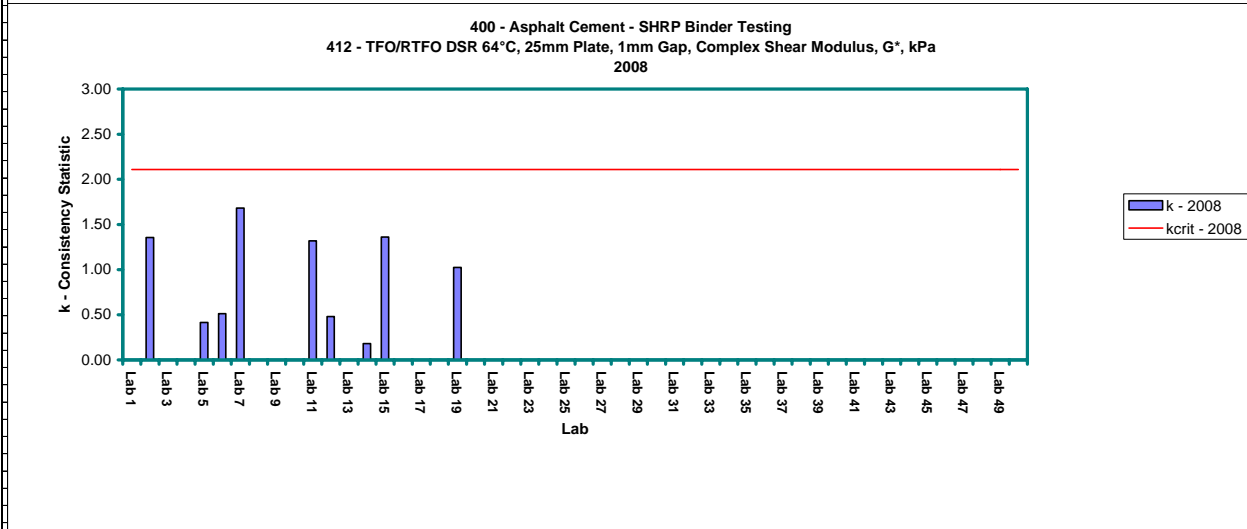
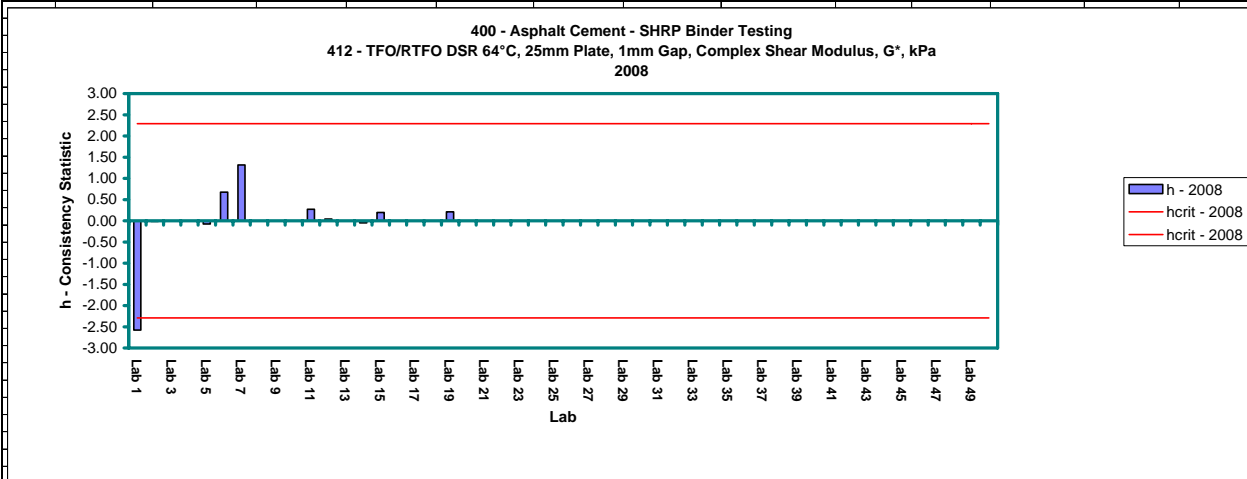
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$S_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
411 - TFO/RTFO DSR 58°C, 25mm Plate, 1mm Gap, G'/Sin d, kPa													
2008													
Data				n = 3	(X _{ave}) _{ave} = 3.5682	s _r = 0.1349	Check s _{X_{ave}} = 0.5124						
				p = 10	S _{X_{ave}} = 0.5124	s _R = 0.5241	r = 2.8 s _r = 0.3740						
				Significance Level = 0.5%		s _R = 0.5241	R = 2.8 s _R = 1.4527						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	2.2600	2.2600	2.2900		2.2700	0.0173	-1.2982	0.0003	-2.53	0.13	2.29	-2.29	2.11
Lab 2	3.2600	3.4900	3.6000		3.4500	0.1735	-0.1182	0.0301	-0.23	1.29	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	3.5100	3.6000	3.5200		3.5433	0.0493	-0.0249	0.0024	-0.05	0.37	2.29	-2.29	2.11
Lab 6	4.1330	4.0910	4.0630		4.0957	0.0352	0.5274	0.0012	1.03	0.26	2.29	-2.29	2.11
Lab 7	4.3300	4.1800	3.9600		4.1567	0.1861	0.5884	0.0346	1.15	1.38	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	3.7200	3.8200	3.4500		3.6633	0.1914	0.0951	0.0366	0.19	1.42	2.29	-2.29	2.11
Lab 12	3.6600	3.9100	3.4900		3.6867	0.2113	0.1184	0.0446	0.23	1.57	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	3.5500	3.5300	3.4900		3.5233	0.0306	-0.0449	0.0009	-0.09	0.23	2.29	-2.29	2.11
Lab 15	3.6000	3.5400	3.7300		3.6233	0.0971	0.0551	0.0094	0.11	0.72	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	3.8300	3.5400	3.6400		3.6700	0.1473	0.1018	0.0217	0.20	1.09	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	2.2700	r = 2.8 s _r =	0.3740	h _{crit} =	2.29				
				Maximum X _{ave}	4.1567	R = 2.8 s _R =	1.4527	h _{crit} =	-2.29				
				Check s _{X_{ave}}	0.5124			k _{crit} =	2.11				
Where: x ₁ ...x _n =				Individual Test Result	Where: (X _{ave}) _{ave} =		Average of Cell Averages						
X _{ave} =				Cell Average	s _{X_{ave}} =		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	s _r =		Repeatability Standard Deviation						
s =				Cell Standard Deviation	s _R =		Interim Reproducibility Standard Deviation						
d =				Cell Deviation (X _{ave} - (X _{ave}) _{ave})	s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)						
s ² =				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
h _{crit} =				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
k _{crit} =				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



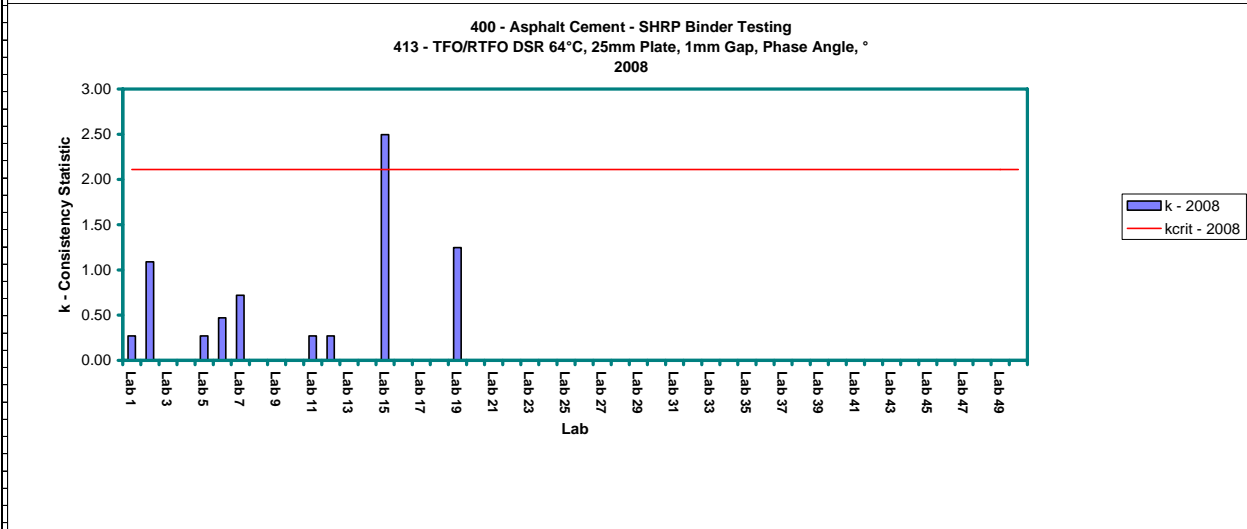
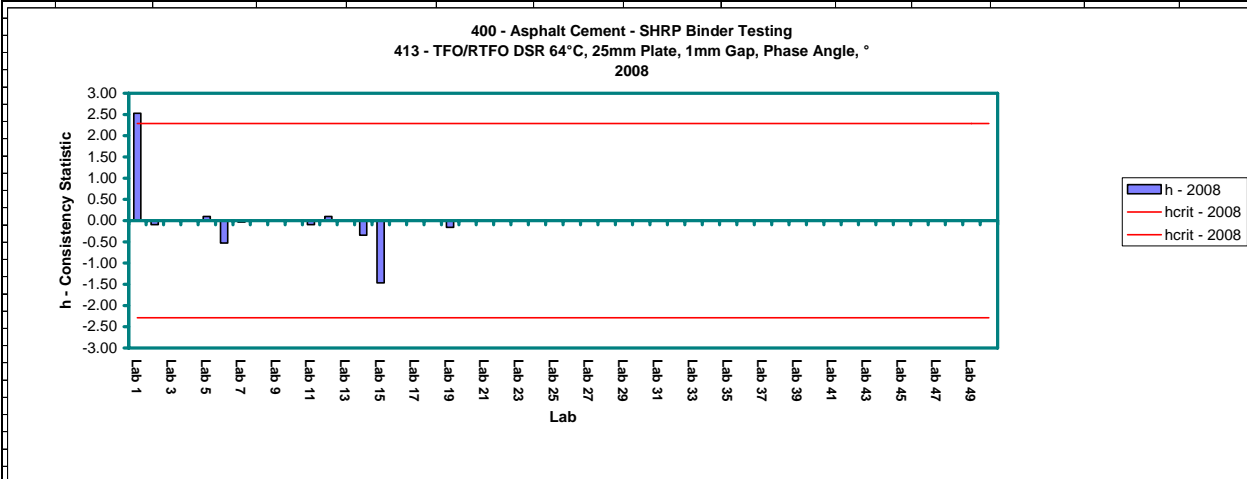
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		S_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		S_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		S_R =	Reproducibility Standard Deviation (Larger of s_r and S_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
412 - TFO/RTFO DSR 64°C, 25mm Plate, 1mm Gap, Complex Shear Modulus, G*, kPa													
2008													
Data				n = 3	(X _{ave}) _{ave} = 1.6068	s _r = 0.0636	Check s _{Xave} = 0.2199						
				p = 10	S _{Xave} = 0.2199	s _R = 0.2260	r = 2.8 s _r = 0.1763						
				Significance Level = 0.5%		s _R = 0.2260	R = 2.8 s _R = 0.6264						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	1.0400	1.0400	1.0400		1.0400	0.0000	-0.5668	0.0000	-2.58	0.00	2.29	-2.29	2.11
Lab 2	1.5100	1.6200	1.6800		1.6033	0.0862	-0.0035	0.0074	-0.02	1.36	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	1.5700	1.6200	1.5800		1.5900	0.0265	-0.0168	0.0007	-0.08	0.42	2.29	-2.29	2.11
Lab 6	1.7310	1.7920	1.7420		1.7550	0.0325	0.1482	0.0011	0.67	0.51	2.29	-2.29	2.11
Lab 7	2.0200	1.8300	1.8400		1.8967	0.1069	0.2898	0.0114	1.32	1.68	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	1.7100	1.7200	1.5700		1.6667	0.0839	0.0598	0.0070	0.27	1.32	2.29	-2.29	2.11
Lab 12	1.6100	1.6500	1.5900		1.6167	0.0306	0.0098	0.0009	0.04	0.48	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	1.5900	1.6100	1.5900		1.5967	0.0115	-0.0102	0.0001	-0.05	0.18	2.29	-2.29	2.11
Lab 15	1.7000	1.5500	1.7000		1.6500	0.0866	0.0432	0.0075	0.20	1.36	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	1.7200	1.6500	1.5900		1.6533	0.0651	0.0465	0.0042	0.21	1.02	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	1.0400	r = 2.8 s _r =	0.1763	h _{crit} =	2.29				
				Maximum X _{ave}	1.8967	R = 2.8 s _R =	0.6264	h _{crit} =	-2.29				
				Check s _{Xave} =	0.2199			k _{crit} =	2.11				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		s _{Xave} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



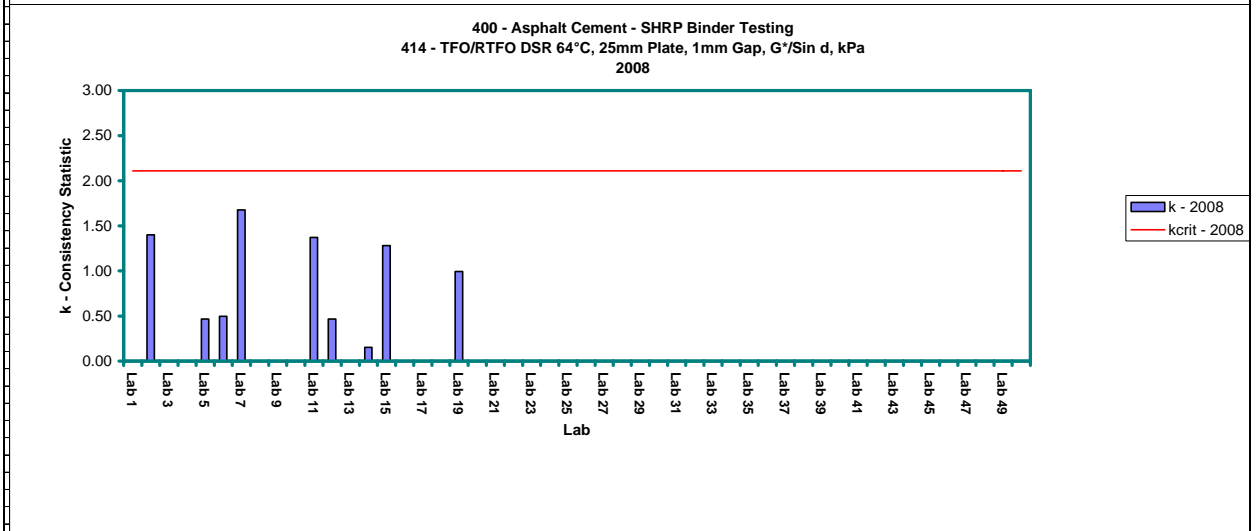
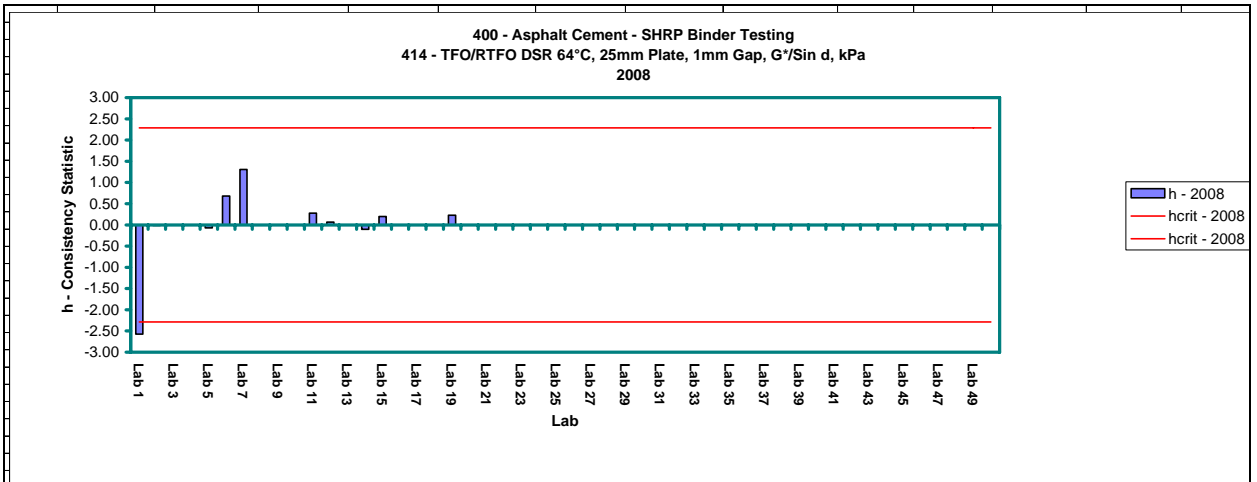
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		S_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		S_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		S_R =	Reproducibility Standard Deviation (Larger of s_r and S_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 413 - TFO/RTFO DSR 64°C, 25mm Plate, 1mm Gap, Phase Angle, ° 2008													
Data				n = 3	(X _{ave}) _{ave} = 84.5833	s _r = 0.2121	Check s _{X_{ave}} = 0.5341						
				p = 10	S _{X_{ave}} = 0.5341	s _R = 0.5615	r = 2.8 s _r = 0.5880						
				Significance Level = 0.5%		s _R = 0.5615	R = 2.8 s _R = 1.5563						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	85.9000	85.9000	86.0000		85.9333	0.0577	1.3500	0.0033	2.53	0.27	2.29	-2.29	2.11
Lab 2	84.8000	84.4000	84.4000		84.5333	0.2309	-0.0500	0.0533	-0.09	1.09	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	84.7000	84.6000	84.6000		84.6333	0.0577	0.0500	0.0033	0.09	0.27	2.29	-2.29	2.11
Lab 6	84.3000	84.4000	84.2000		84.3000	0.1000	-0.2833	0.0100	-0.53	0.47	2.29	-2.29	2.11
Lab 7	84.4000	84.6000	84.7000		84.5667	0.1528	-0.0167	0.0233	-0.03	0.72	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	84.6000	84.5000	84.5000		84.5333	0.0577	-0.0500	0.0033	-0.09	0.27	2.29	-2.29	2.11
Lab 12	84.7000	84.6000	84.6000		84.6333	0.0577	0.0500	0.0033	0.09	0.27	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	84.4000	84.4000	84.4000		84.4000	0.0000	-0.1833	0.0000	-0.34	0.00	2.29	-2.29	2.11
Lab 15	84.0000	84.2000	83.2000		83.8000	0.5292	-0.7833	0.2800	-1.47	2.49	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	84.3000	84.4000	84.8000		84.5000	0.2646	-0.0833	0.0700	-0.16	1.25	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	83.8000	r = 2.8 s _r =	0.5880	h _{crit} =	2.29				
				Maximum X _{ave}	85.9333	R = 2.8 s _R =	1.5563	h _{crit} =	-2.29				
				Check s _{X_{ave}} =	0.5341			k _{crit} =	2.11				
Where: x ₁ ...x _n =				Individual Test Result	Where: (X _{ave}) _{ave} =		Average of Cell Averages						
X _{ave} =				Cell Average	s _{X_{ave}} =		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	s _r =		Repeatability Standard Deviation						
s =				Cell Standard Deviation	s _R =		Interim Reproducibility Standard Deviation						
d =				Cell Deviation (X _{ave} - (X _{ave}) _{ave})	s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)						
s ² =				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
h _{crit} =				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
k _{crit} =				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



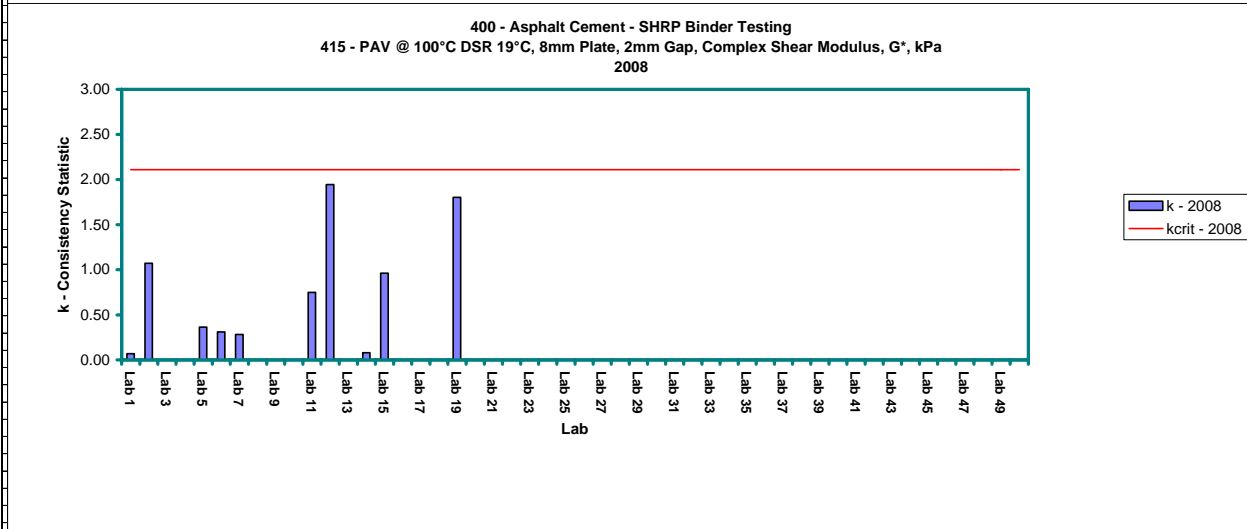
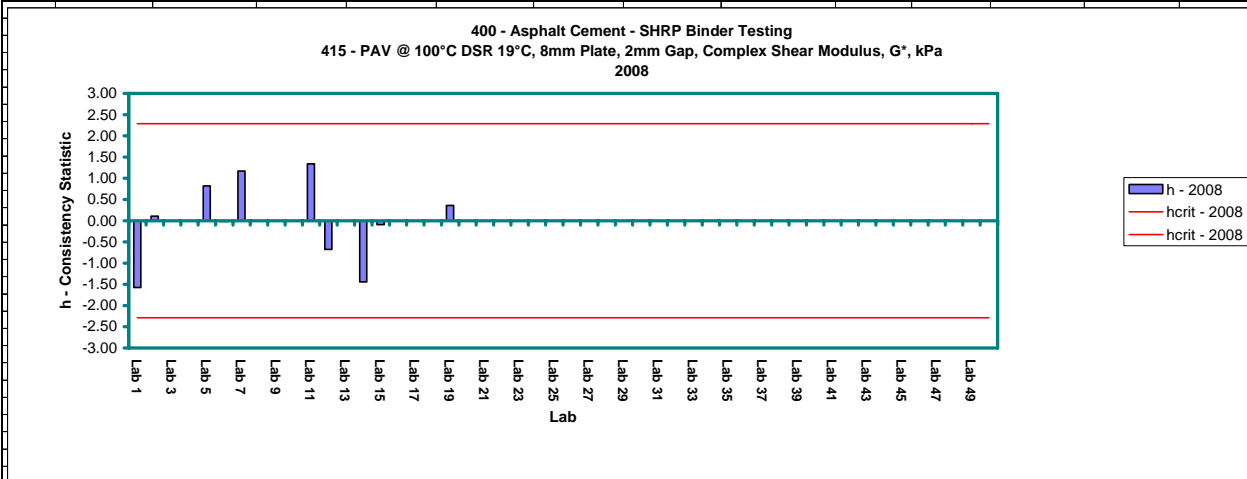
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{(ave)}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
414 - TFO/RTFO DSR 64°C, 25mm Plate, 1mm Gap, G'/Sin d, kPa													
2008													
Data				n = 3	(X _{ave}) _{ave} = 1.6124	s _r = 0.0654	Check s _{Xave} = 0.2222						
				p = 10	S _{Xave} = 0.2222	s _R = 0.2286	r = 2.8 s _r = 0.1812						
				Significance Level = 0.5%		s _R = 0.2286	R = 2.8 s _R = 0.6335						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	1.0400	1.0400	1.0400		1.0400	0.0000	-0.5724	0.0000	-2.58	0.00	2.29	-2.29	2.11
Lab 2	1.5100	1.6300	1.6900		1.6100	0.0917	-0.0024	0.0084	-0.01	1.40	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	1.5700	1.6300	1.5900		1.5967	0.0306	-0.0157	0.0009	-0.07	0.47	2.29	-2.29	2.11
Lab 6	1.7400	1.8010	1.7510		1.7640	0.0325	0.1516	0.0011	0.68	0.50	2.29	-2.29	2.11
Lab 7	2.0300	1.8400	1.8400		1.9033	0.1097	0.2909	0.0120	1.31	1.68	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	1.7200	1.7300	1.5700		1.6733	0.0896	0.0609	0.0080	0.27	1.37	2.29	-2.29	2.11
Lab 12	1.6200	1.6600	1.6000		1.6267	0.0306	0.0143	0.0009	0.06	0.47	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	1.5900	1.6000	1.5800		1.5900	0.0100	-0.0224	0.0001	-0.10	0.15	2.29	-2.29	2.11
Lab 15	1.7000	1.5600	1.7100		1.6567	0.0839	0.0443	0.0070	0.20	1.28	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	1.7300	1.6600	1.6000		1.6633	0.0651	0.0509	0.0042	0.23	1.00	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	1.0400	r = 2.8 s _r =	0.1812	h _{crit} =	2.29				
				Maximum X _{ave}	1.9033	R = 2.8 s _R =	0.6335	h _{crit} =	-2.29				
				Check s _{Xave} =	0.2222			k _{crit} =	2.11				
Where: x ₁ ...x _n =				Individual Test Result	Where: (X _{ave}) _{ave} =		Average of Cell Averages						
X _{ave} =				Cell Average	s _{Xave} =		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	s _r =		Repeatability Standard Deviation						
s =				Cell Standard Deviation	s _R =		Interim Reproducibility Standard Deviation						
d =				Cell Deviation (X _{ave} - (X _{ave}) _{ave})	s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)						
s ² =				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
h _{crit} =				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
k _{crit} =				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



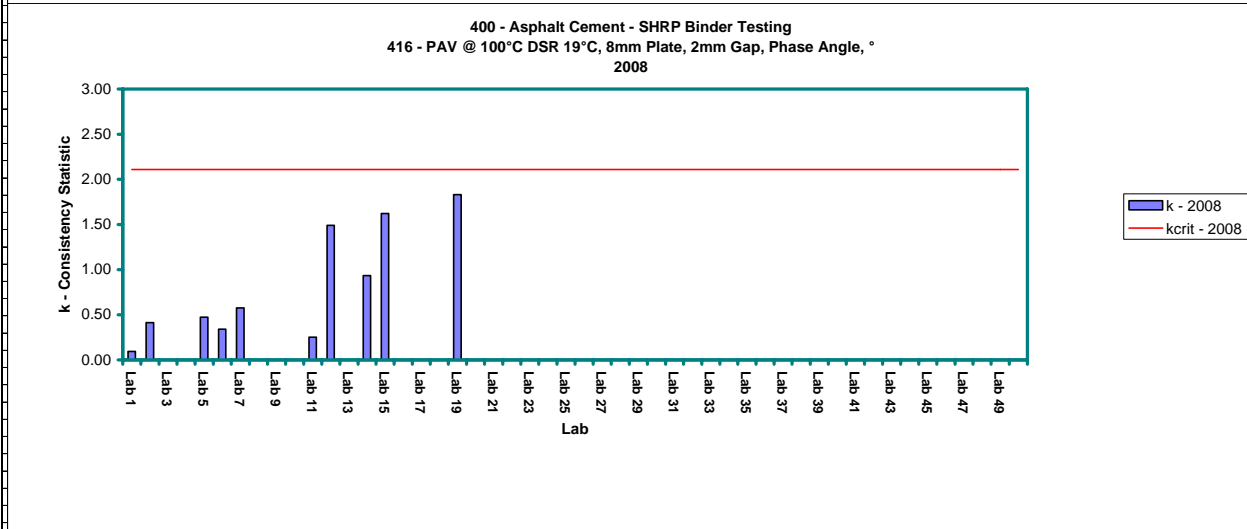
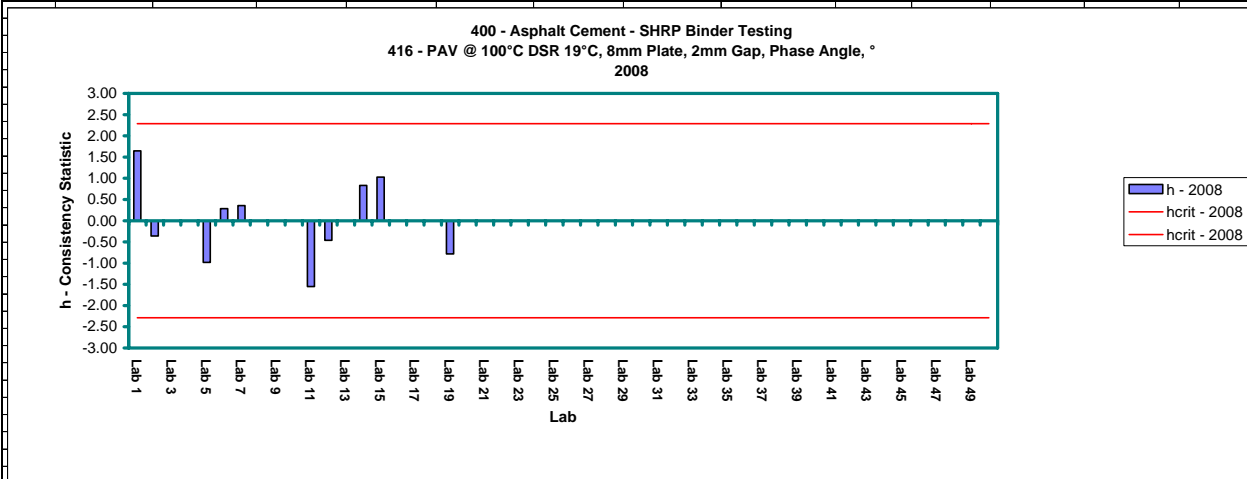
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages	
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

400 - Asphalt Cement - SHRP Binder Testing													
415 - PAV @ 100°C DSR 19°C, 8mm Plate, 2mm Gap, Complex Shear Modulus, G*, kPa													
2008													
Data				n = 3	(X _{ave}) _{ave} = 4,494.0667	s _r = 488.4699	Check s _{X_{ave}} = 752.5328						
				p = 10	S _{X_{ave}} = 752.5328	s _R = 851.6890	r = 2.8 s _r = 1,353.9695						
				Significance Level = 0.5%			s _R = 851.6890	R = 2.8 s _R = 2,360.7615					
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	3,333.0000	3,322.0000	3,270.0000		3,308.3333	33.6502	-1,185.7333	1,132.3333	-1.58	0.07	2.29	-2.29	2.11
Lab 2	5,086.0000	4,605.0000	4,039.0000		4,576.6667	524.0747	82.6000	274,654.3333	0.11	1.07	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	5,181.0000	4,911.0000	5,246.0000		5,112.6667	177.6467	618.6000	31,558.3333	0.82	0.36	2.29	-2.29	2.11
Lab 6	4,638.0000	4,335.0000	4,475.0000		4,482.6667	151.6454	-11.4000	22,996.3333	-0.02	0.31	2.29	-2.29	2.11
Lab 7	5,230.0000	5,507.0000	5,380.0000		5,372.3333	138.6591	878.2667	19,226.3333	1.17	0.28	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	5,208.0000	5,387.0000	5,912.0000		5,502.3333	365.8966	1,008.2667	133,880.3333	1.34	0.75	2.29	-2.29	2.11
Lab 12	4,463.0000	4,603.0000	2,891.0000		3,985.6667	950.5900	-508.4000	903,621.3333	-0.68	1.95	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	3,370.0000	3,410.0000	3,450.0000		3,410.0000	40.0000	-1,084.0667	1,600.0000	-1.44	0.08	2.29	-2.29	2.11
Lab 15	4,233.0000	4,959.0000	4,077.0000		4,423.0000	470.6974	-71.0667	221,556.0000	-0.09	0.96	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	4,873.0000	3,838.0000	5,590.0000		4,767.0000	880.7968	272.9333	775,803.0000	0.36	1.80	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	3308.3333	r = 2.8 s _r =	1,353.9695	h _{crit} =	2.29				
				Maximum X _{ave}	5502.3333	R = 2.8 s _R =	2,360.7615	h _{crit} =	-2.29				
				Check s _{X_{ave}}	752.5328			k _{crit} =	2.11				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		s _{X_{ave}} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



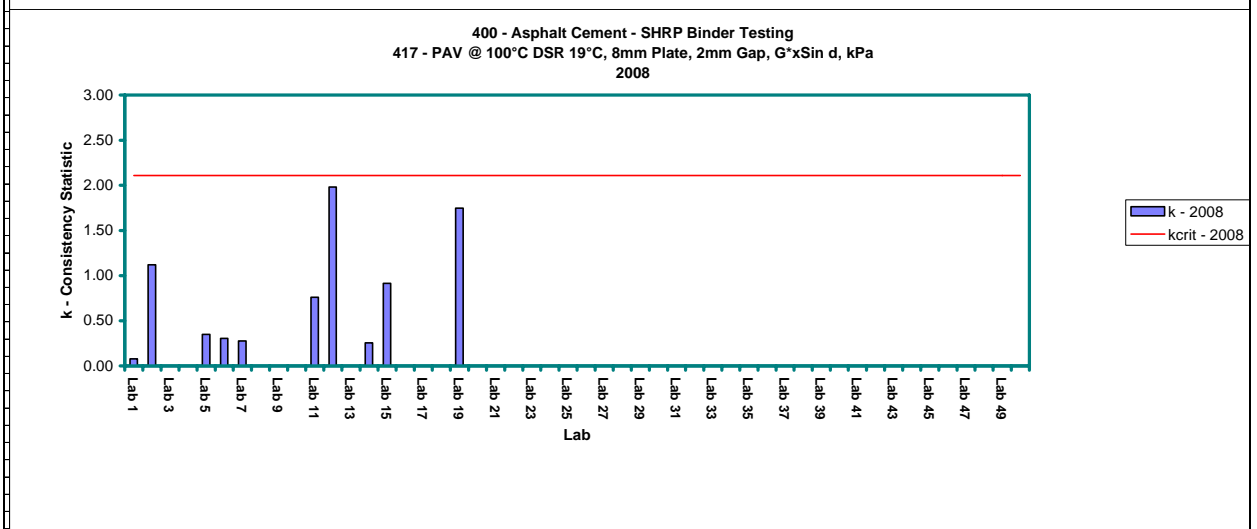
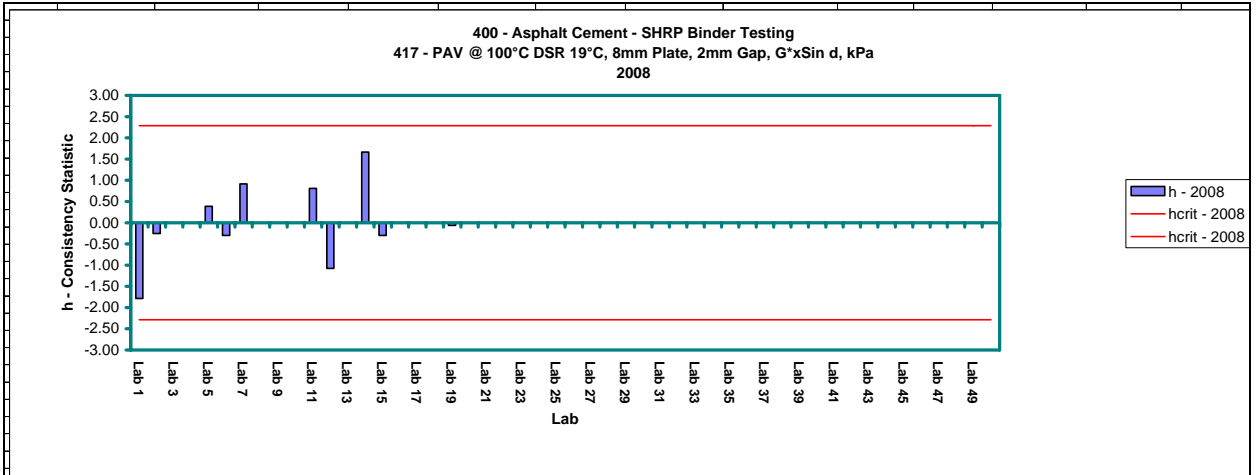
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages	
X_{ave} =	Cell Average	$S_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility	

400 - Asphalt Cement - SHRP Binder Testing													
416 - PAV @ 100°C DSR 19°C, 8mm Plate, 2mm Gap, Phase Angle, °													
2008													
Data				n = 3	(X _{ave}) _{ave} = 48.6533	s _r = 0.6083	Check s _{X_{ave}} = 1.3435						
				p = 10	S _{X_{ave}} = 1.3435	S _R = 1.4324	r = 2.8 s _r = 1.6861						
				Significance Level = 0.5%		S _R = 1.4324	R = 2.8 s _R = 3.9703						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	50.9000	50.8000	50.9000		50.8667	0.0577	2.2133	0.0033	1.65	0.09	2.29	-2.29	2.11
Lab 2	47.9000	48.2000	48.4000		48.1667	0.2517	-0.4867	0.0633	-0.36	0.41	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	47.5000	47.5000	47.0000		47.3333	0.2887	-1.3200	0.0833	-0.98	0.47	2.29	-2.29	2.11
Lab 6	48.8000	49.2000	49.1000		49.0333	0.2082	0.3800	0.0433	0.28	0.34	2.29	-2.29	2.11
Lab 7	49.1000	48.8000	49.5000		49.1333	0.3512	0.4800	0.1233	0.36	0.58	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	46.6000	46.7000	46.4000		46.5667	0.1528	-2.0867	0.0233	-1.55	0.25	2.29	-2.29	2.11
Lab 12	47.9000	47.2000	49.0000		48.0333	0.9074	-0.6200	0.8233	-0.46	1.49	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	50.4000	49.6000	49.3000		49.7667	0.5686	1.1133	0.3233	0.83	0.93	2.29	-2.29	2.11
Lab 15	50.5000	48.9000	50.7000		50.0333	0.9866	1.3800	0.9733	1.03	1.62	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	47.4000	48.8000	46.6000		47.6000	1.1136	-1.0533	1.2400	-0.78	1.83	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	46.5667	r = 2.8 s _r =	1.6861	h _{crit} =	2.29				
				Maximum X _{ave}	50.8667	R = 2.8 s _R =	3.9703	h _{crit} =	-2.29				
				Check s _{X_{ave}} =	1.3435			k _{crit} =	2.11				
Where: x ₁ ...x _n =				Individual Test Result	Where: (X _{ave}) _{ave} =		Average of Cell Averages						
X _{ave} =				Cell Average	s _{X_{ave}} =		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	s _r =		Repeatability Standard Deviation						
s =				Cell Standard Deviation	S _R =		Interim Reproducibility Standard Deviation						
d =				Cell Deviation (X _{ave} - (X _{ave}) _{ave})	s _R =		Reproducibility Standard Deviation (Larger of s _r and S _R)						
s ² =				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
h _{crit} =				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
k _{crit} =				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



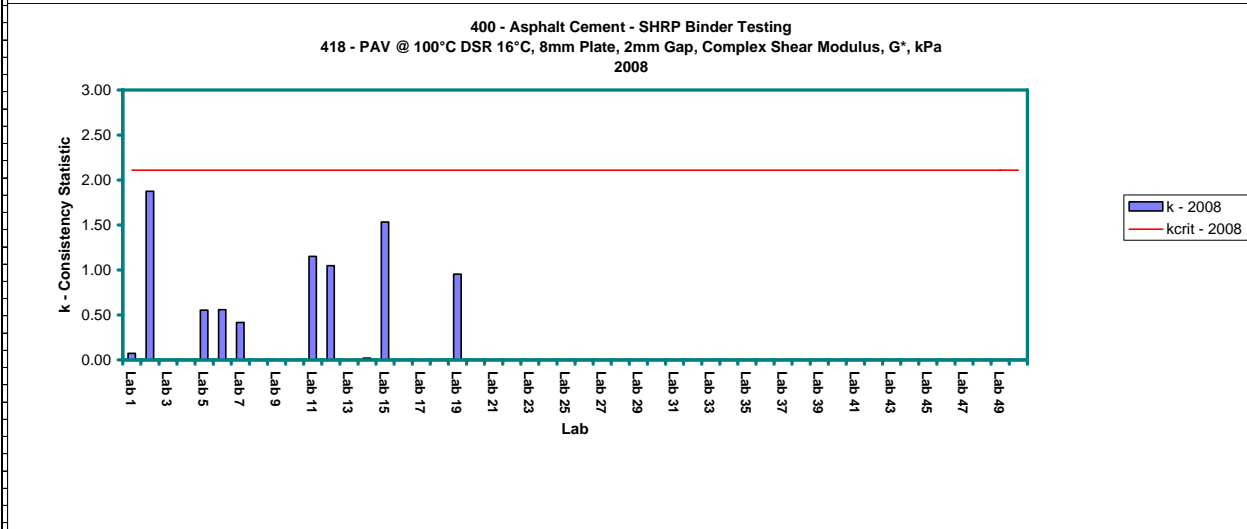
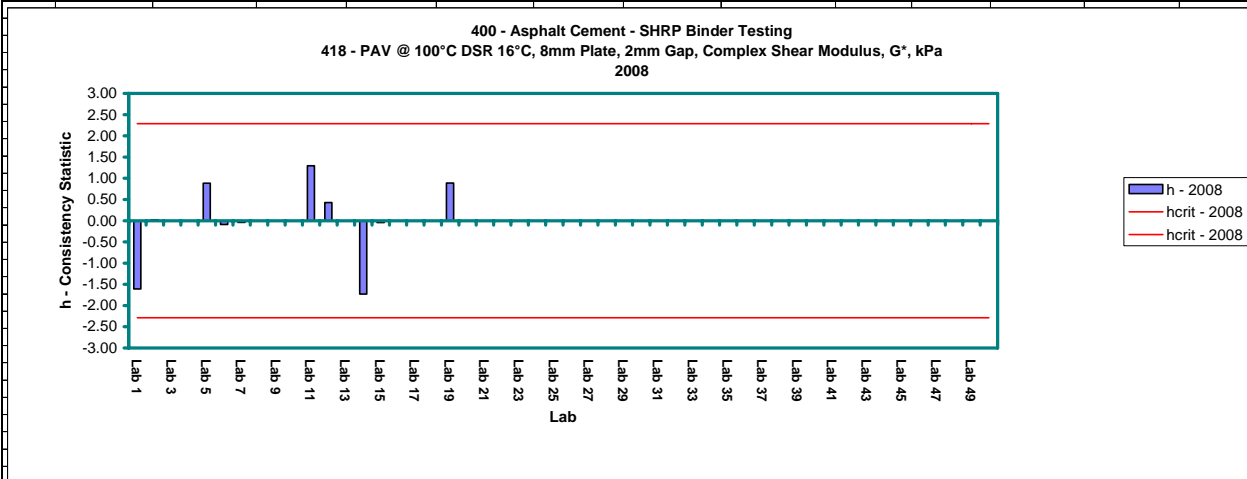
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
417 - PAV @ 100°C DSR 19°C, 8mm Plate, 2mm Gap, G*xSin d, kPa													
2008													
Data					n = 3	(X _{ave}) _{ave} = 3,548.5000	s _r = 338.2813	Check s _{X_{ave}} = 549.8215					
					p = 10	S _{X_{ave}} = 549.8215	s _R = 615.2993	r = 2.8 s _r = 937.6679					
					Significance Level = 0.5%		s _R = 615.2993	R = 2.8 s _R = 1,705.5226					
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	2,588.0000	2,576.0000	2,537.0000		2,567.0000	26.6646	-981.5000	711.0000	-1.79	0.08	2.29	-2.29	2.11
Lab 2	3,776.0000	3,432.0000	3,019.0000		3,409.0000	379.0237	-139.5000	143,659.0000	-0.25	1.12	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	3,819.0000	3,623.0000	3,836.0000		3,759.3333	118.3737	210.8333	14,012.3333	0.38	0.35	2.29	-2.29	2.11
Lab 6	3,490.0000	3,283.0000	3,383.0000		3,385.3333	103.5197	-163.1667	10,716.3333	-0.30	0.31	2.29	-2.29	2.11
Lab 7	3,953.0000	4,138.0000	4,066.0000		4,052.3333	93.2541	503.8333	8,696.3333	0.92	0.28	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	3,782.0000	3,918.0000	4,280.0000		3,993.3333	257.4050	444.8333	66,257.3333	0.81	0.76	2.29	-2.29	2.11
Lab 12	3,313.0000	3,373.0000	2,184.0000		2,956.6667	669.8211	-591.8333	448,660.3333	-1.08	1.98	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	4,370.0000	4,480.0000	4,540.0000		4,463.3333	86.2168	914.8333	7,433.3333	1.66	0.25	2.29	-2.29	2.11
Lab 15	3,264.0000	3,736.0000	3,155.0000		3,385.0000	308.8220	-163.5000	95,371.0000	-0.30	0.91	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	3,589.0000	2,889.0000	4,063.0000		3,513.6667	590.6144	-34.8333	348,825.3333	-0.06	1.75	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics					Minimum X _{ave}	2567.0000	r = 2.8 s _r =	937.6679	h _{crit} =	2.29			
					Maximum X _{ave}	4463.3333	R = 2.8 s _R =	1,705.5226	h _{crit} =	-2.29			
					Check s _{X_{ave}}	549.8215			k _{crit} =	2.11			
Where: x ₁ ...x _n =					Individual Test Result	Where: (X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =					Cell Average	s _{ave} =		Standard Deviation of Cell Averages					
n =					Number of Test Results per Cell	s _r =		Repeatability Standard Deviation					
s =					Cell Standard Deviation	s _R =		Interim Reproducibility Standard Deviation					
d =					Cell Deviation (X _{ave} - (X _{ave}) _{ave})	s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
s ² =					Cell Variation	h =		Between Laboratory Consistency Statistic					
p =					Number of Laboratories	k =		Within Laboratory Consistency Statistic					
h _{crit} =					Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability					
k _{crit} =					Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility					



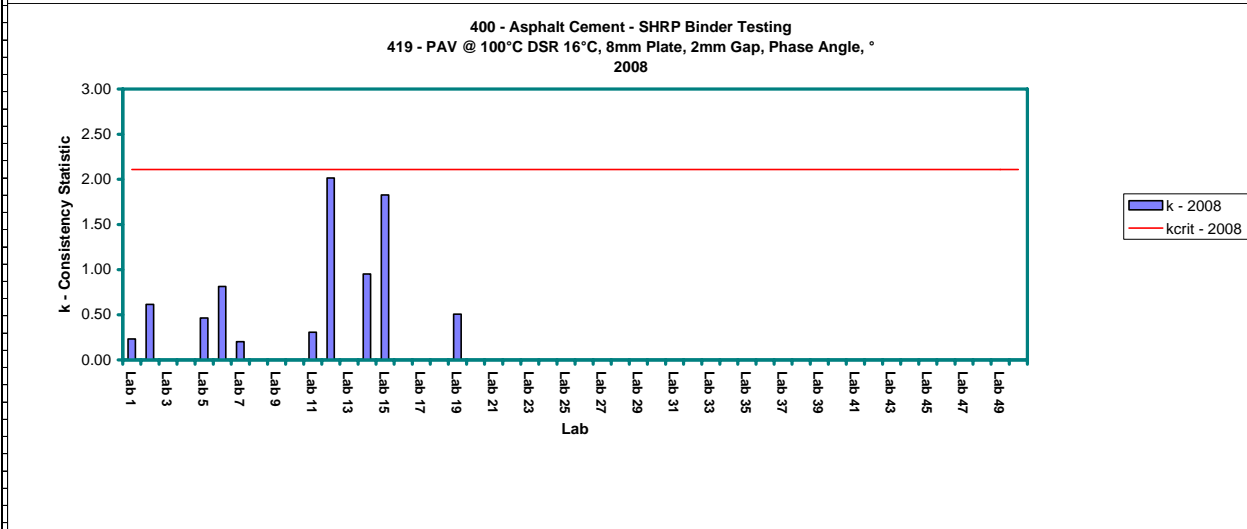
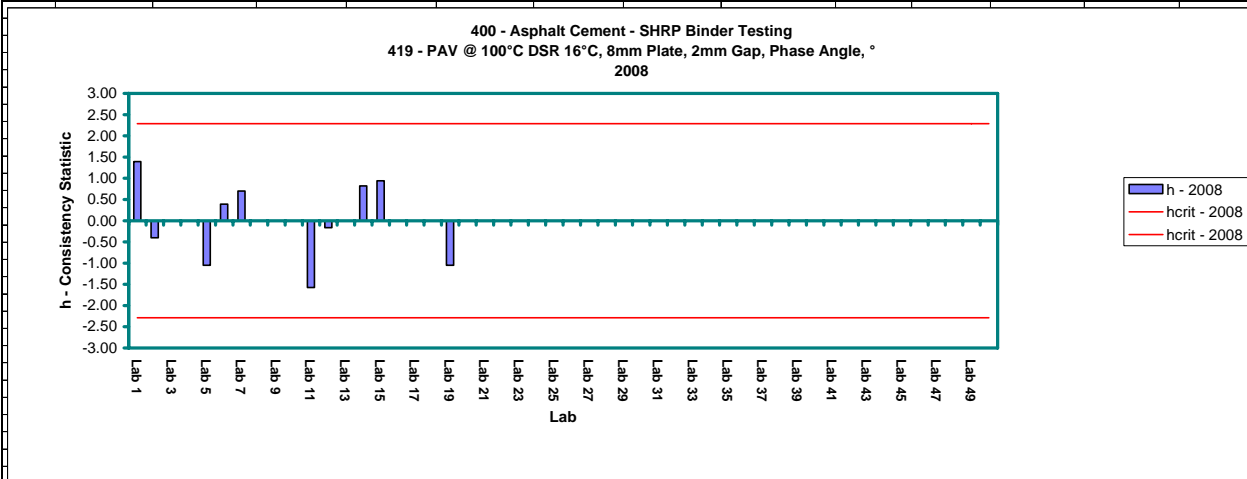
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$S_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
418 - PAV @ 100°C DSR 16°C, 8mm Plate, 2mm Gap, Complex Shear Modulus, G*, kPa													
2008													
Data					n = 3	(X _{ave}) _{ave} = 6,980.6333	s _r = 484.1173	Check s _{X_{ave}} = 1,111.5951					
					p = 10	S _{X_{ave}} = 1,111.5951	s _R = 1,179.7839	r = 2.8 s _r = 1,341.9047					
					Significance Level = 0.5%		s _R = 1,179.7839	R = 2.8 s _R = 3,270.1941					
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	5,166.0000	5,233.0000	5,178.0000		5,192.3333	35.7258	-1,788.3000	1,276.3333	-1.61	0.07	2.29	-2.29	2.11
Lab 2	7,848.0000	7,121.0000	6,044.0000		7,004.3333	907.6411	23.7000	823,812.3333	0.02	1.87	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	8,081.0000	7,653.0000	8,147.0000		7,960.3333	268.1964	979.7000	71,929.3333	0.88	0.55	2.29	-2.29	2.11
Lab 6	7,150.0000	6,609.0000	6,889.0000		6,882.6667	270.5556	-97.9667	73,200.3333	-0.09	0.56	2.29	-2.29	2.11
Lab 7	6,769.0000	6,875.0000	7,160.0000		6,934.6667	202.2136	-45.9667	40,890.3333	-0.04	0.42	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	7,954.0000	8,258.0000	9,035.0000		8,415.6667	557.4803	1,435.0333	310,784.3333	1.29	1.15	2.29	-2.29	2.11
Lab 12	6,984.0000	7,396.0000	7,994.0000		7,458.0000	507.8464	477.3667	257,908.0000	0.43	1.05	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	5,050.0000	5,060.0000	5,070.0000		5,060.0000	10.0000	-1,920.6333	100.0000	-1.73	0.02	2.29	-2.29	2.11
Lab 15	6,155.0000	7,633.0000	7,007.0000		6,931.6667	741.8742	-48.9667	550,377.3333	-0.04	1.53	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	7,562.0000	7,868.0000	8,470.0000		7,966.6667	461.9711	986.0333	213,417.3333	0.89	0.95	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics					Minimum X _{ave}	5060.0000	r = 2.8 s _r =	1,341.9047	h _{crit} =	2.29			
					Maximum X _{ave}	8415.6667	R = 2.8 s _R =	3,270.1941	h _{crit} =	-2.29			
					Check s _{X_{ave}} =	1111.5951			k _{crit} =	2.11			
Where: x ₁ ...x _n = Individual Test Result					Where: (X _{ave}) _{ave} = Average of Cell Averages								
X _{ave} = Cell Average					s _{X_{ave}} = Standard Deviation of Cell Averages								
n = Number of Test Results per Cell					s _r = Repeatability Standard Deviation								
s = Cell Standard Deviation					s _R = Interim Reproducibility Standard Deviation								
d = Cell Deviation (X _{ave} - (X _{ave}) _{ave})					s _R = Reproducibility Standard Deviation (Larger of s _r and s _R)								
s ² = Cell Variation					h = Between Laboratory Consistency Statistic								
p = Number of Laboratories					k = Within Laboratory Consistency Statistic								
h _{crit} = Critical Between Laboratory Consistency Statistic					r = 95% Confidence Limit for Repeatability								
k _{crit} = Critical Within Laboratory Consistency Statistic					R = 95% Confidence Limit for Reproducibility								



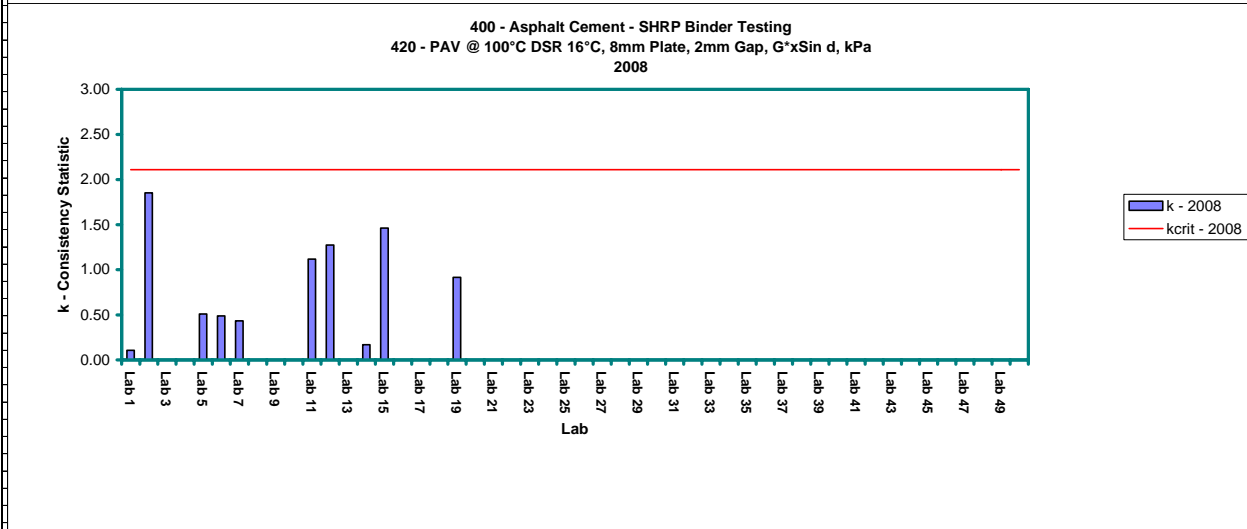
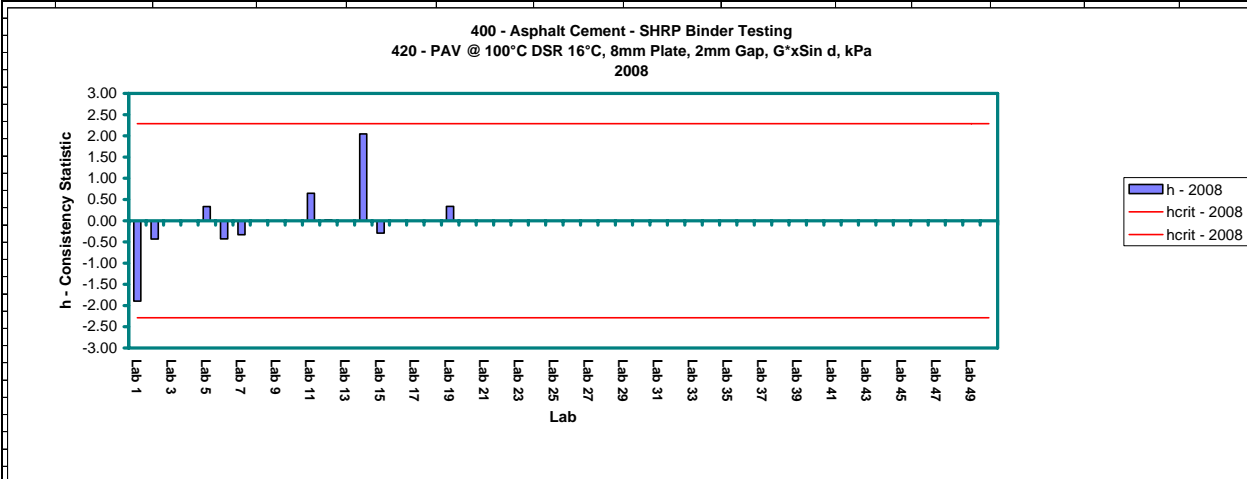
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$S_{(ave)}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
419 - PAV @ 100°C DSR 16°C, 8mm Plate, 2mm Gap, Phase Angle, °													
2008													
Data				n = 3	(X _{ave}) _{ave} = 46.0267	s _r = 0.4967	Check s _{Xave} = 1.3924						
				p = 10	S _{Xave} = 1.3924	s _R = 1.4502	r = 2.8 s _r = 1.3767						
				Significance Level = 0.5%		s _R = 1.4502	R = 2.8 s _R = 4.0198						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	47.9000	48.1000	47.9000		47.9667	0.1155	1.9400	0.0133	1.39	0.23	2.29	-2.29	2.11
Lab 2	45.2000	45.4000	45.8000		45.4667	0.3055	-0.5600	0.0933	-0.40	0.62	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	44.7000	44.7000	44.3000		44.5667	0.2309	-1.4600	0.0533	-1.05	0.46	2.29	-2.29	2.11
Lab 6	46.2000	47.0000	46.5000		46.5667	0.4041	0.5400	0.1633	0.39	0.81	2.29	-2.29	2.11
Lab 7	47.0000	47.1000	46.9000		47.0000	0.1000	0.9733	0.0100	0.70	0.20	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	43.8000	44.0000	43.7000		43.8333	0.1528	-2.1933	0.0233	-1.58	0.31	2.29	-2.29	2.11
Lab 12	45.8000	44.8000	46.8000		45.8000	1.0000	-0.2267	1.0000	-0.16	2.01	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	47.7000	47.0000	46.8000		47.1667	0.4726	1.1400	0.2233	0.82	0.95	2.29	-2.29	2.11
Lab 15	48.0000	46.3000	47.7000		47.3333	0.9074	1.3067	0.8233	0.94	1.83	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	44.6000	44.8000	44.3000		44.5667	0.2517	-1.4600	0.0633	-1.05	0.51	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X _{ave}	43.8333	r = 2.8 s _r =	1.3767	h _{crit} =	2.29				
				Maximum X _{ave}	47.9667	R = 2.8 s _R =	4.0198	h _{crit} =	-2.29				
				Check s _{Xave} =	1.3924			k _{crit} =	2.11				
Where: x ₁ ...x _n = Individual Test Result				Where: (X _{ave}) _{ave} = Average of Cell Averages									
X _{ave} = Cell Average				s _{Xave} = Standard Deviation of Cell Averages									
n = Number of Test Results per Cell				s _r = Repeatability Standard Deviation									
s = Cell Standard Deviation				s _R = Interim Reproducibility Standard Deviation									
d = Cell Deviation (X _{ave} - (X _{ave}) _{ave})				s _R = Reproducibility Standard Deviation (Larger of s _r and s _R)									
s ² = Cell Variation				h = Between Laboratory Consistency Statistic									
p = Number of Laboratories				k = Within Laboratory Consistency Statistic									
h _{crit} = Critical Between Laboratory Consistency Statistic				r = 95% Confidence Limit for Repeatability									
k _{crit} = Critical Within Laboratory Consistency Statistic				R = 95% Confidence Limit for Reproducibility									



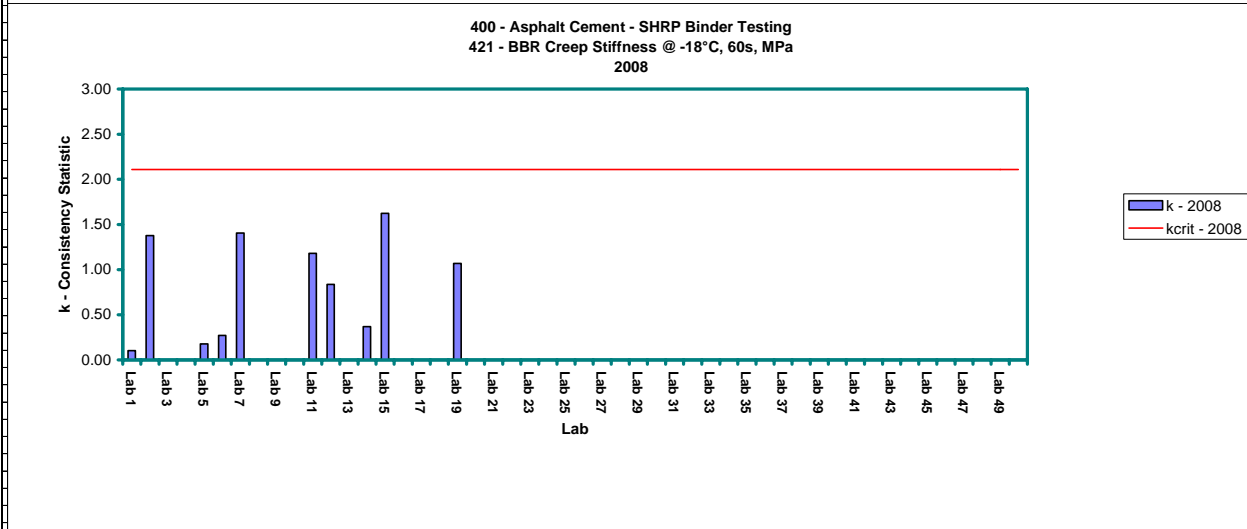
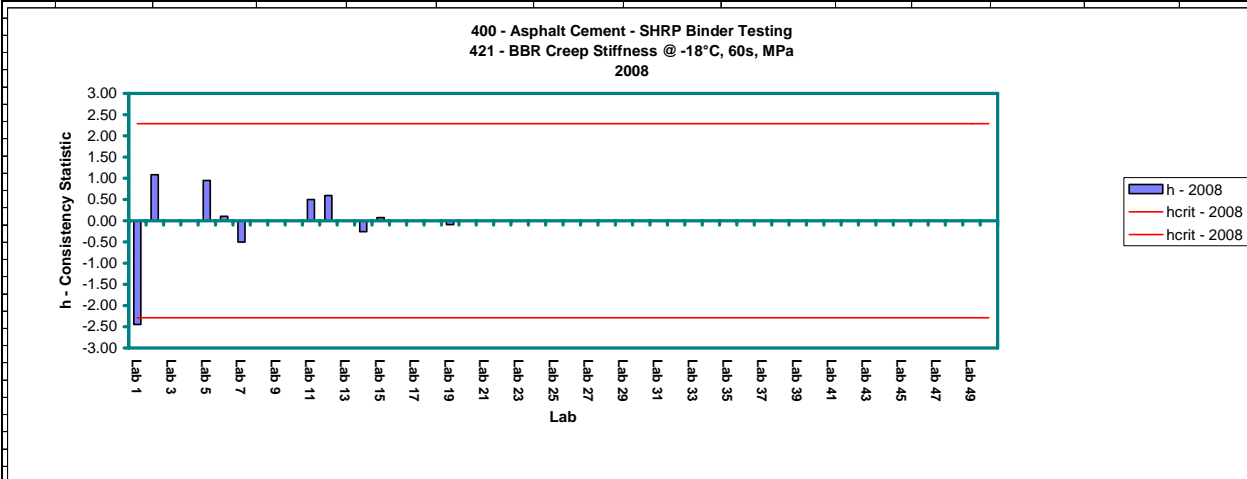
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing													
420 - PAV @ 100°C DSR 16°C, 8mm Plate, 2mm Gap, G*xSin d, kPa													
2008													
Data					n = 3	(X _{ave}) _{ave} = 5,327.6667	s _r = 335.4904	Check s _{Xave} = 775.1617					
					p = 10	S _{Xave} = 775.1617	s _R = 822.1384	r = 2.8 s _r = 929.9319					
					Significance Level = 0.5%		s _R = 822.1384	R = 2.8 s _R = 2,278.8515					
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	3,833.0000	3,898.0000	3,839.0000		3,856.6667	35.9212	-1,471.0000	1,290.3333	-1.90	0.11	2.29	-2.29	2.11
Lab 2	5,569.0000	5,071.0000	4,334.0000		4,991.3333	621.3424	-336.3333	386,066.3333	-0.43	1.85	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	5,681.0000	5,387.0000	5,687.0000		5,585.0000	171.4993	257.3333	29,412.0000	0.33	0.51	2.29	-2.29	2.11
Lab 6	5,159.0000	4,832.0000	4,997.0000		4,996.0000	163.5023	-331.6667	26,733.0000	-0.43	0.49	2.29	-2.29	2.11
Lab 7	4,947.0000	5,031.0000	5,230.0000		5,069.3333	145.3421	-258.3333	21,124.3333	-0.33	0.43	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	5,510.0000	5,737.0000	6,242.0000		5,829.6667	374.6950	502.0000	140,396.3333	0.65	1.12	2.29	-2.29	2.11
Lab 12	5,003.0000	5,210.0000	5,825.0000		5,346.0000	427.5430	18.3333	182,793.0000	0.02	1.27	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	6,850.0000	6,930.0000	6,960.0000		6,913.3333	56.8624	1,585.6667	3,233.3333	2.05	0.17	2.29	-2.29	2.11
Lab 15	4,572.0000	5,541.0000	5,184.0000		5,099.0000	490.0602	-228.6667	240,159.0000	-0.29	1.46	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	5,309.0000	5,544.0000	5,918.0000		5,590.3333	307.1324	262.6667	94,330.3333	0.34	0.92	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics					Minimum X _{ave}	3856.6667	r = 2.8 s _r =	929.9319	h _{crit} =	2.29			
					Maximum X _{ave}	6913.3333	R = 2.8 s _R =	2,278.8515	h _{crit} =	-2.29			
					Check s _{Xave} =	775.1617			k _{crit} =	2.11			
Where: x ₁ ...x _n =					Individual Test Result	Where: (X _{ave}) _{ave} =		Average of Cell Averages					
X _{ave} =					Cell Average	s _{Xave} =		Standard Deviation of Cell Averages					
n =					Number of Test Results per Cell	s _r =		Repeatability Standard Deviation					
s =					Cell Standard Deviation	s _R =		Interim Reproducibility Standard Deviation					
d =					Cell Deviation (X _{ave} - (X _{ave}) _{ave})	s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)					
s ² =					Cell Variation	h =		Between Laboratory Consistency Statistic					
p =					Number of Laboratories	k =		Within Laboratory Consistency Statistic					
h _{crit} =					Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability					
k _{crit} =					Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility					



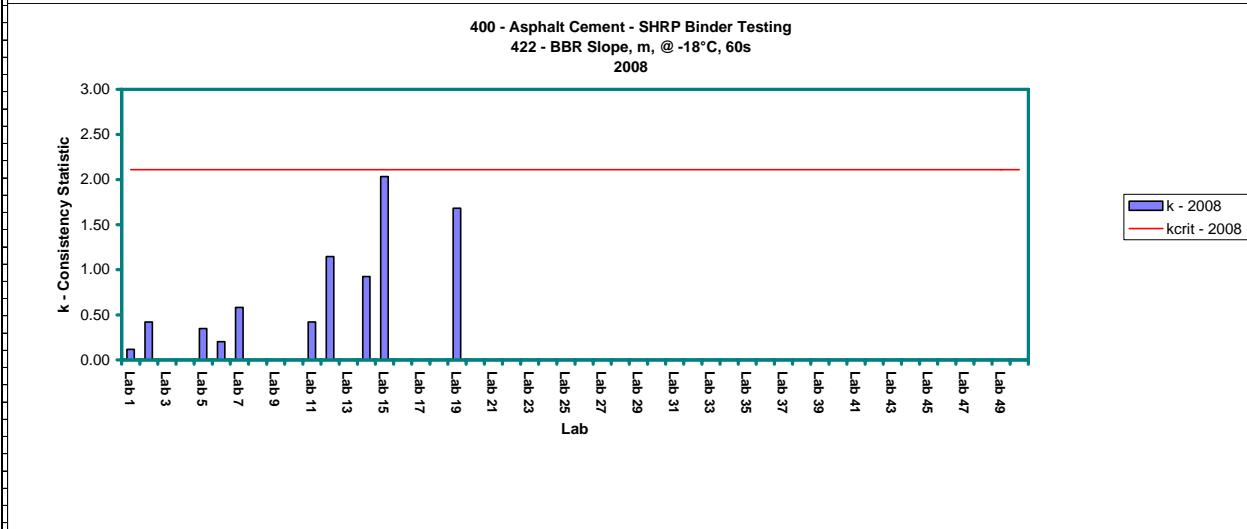
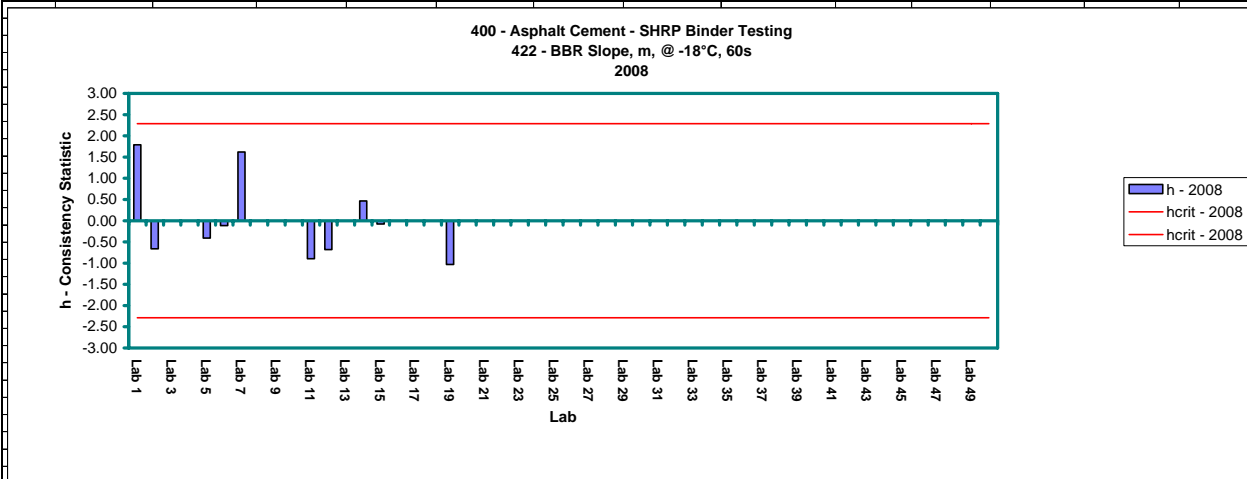
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$S_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 421 - BBR Creep Stiffness @ -18°C, 60s, MPa 2008													
Data				n = 3	(X_{ave}) _{ave} = 189.9000	s_r = 5.6421	Check $s_{X_{ave}}$ = 27.5103						
				p = 10	$s_{X_{ave}}$ = 27.5103	s_{R^*} = 27.8933	$r = 2.8$ $s_r = 15.6391$						
				Significance Level = 0.5%		s_R = 27.8933	$R = 2.8$ $s_R = 77.3164$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	122.0000	123.0000	123.0000		122.6667	0.5774	-67.2333	0.3333	-2.44	0.10	2.29	-2.29	2.11
Lab 2	222.0000	211.0000	226.0000		219.6667	7.7675	29.7667	60.3333	1.08	1.38	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	217.0000	215.0000	216.0000		216.0000	1.0000	26.1000	1.0000	0.95	0.18	2.29	-2.29	2.11
Lab 6	191.0000	194.0000	193.0000		192.6667	1.5275	2.7667	2.3333	0.10	0.27	2.29	-2.29	2.11
Lab 7	182.0000	179.0000	167.0000		176.0000	7.9373	-13.9000	63.0000	-0.51	1.41	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	208.0000	207.0000	196.0000		203.6667	6.6583	13.7667	44.3333	0.50	1.18	2.29	-2.29	2.11
Lab 12	208.0000	210.0000	201.0000		206.3333	4.7258	16.4333	22.3333	0.60	0.84	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	181.0000	185.0000	182.0000		182.6667	2.0817	-7.2333	4.3333	-0.26	0.37	2.29	-2.29	2.11
Lab 15	190.0000	202.0000	184.0000		192.0000	9.1652	2.1000	84.0000	0.08	1.62	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	181.0000	188.0000	193.0000		187.3333	6.0277	-2.5667	36.3333	-0.09	1.07	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics		Minimum X_{ave}	122.6667	$r = 2.8$ $s_r =$	15.6391	$h_{crit} =$	2.29						
		Maximum X_{ave}	219.6667	$R = 2.8$ $s_R =$	77.3164	$h_{crit} =$	-2.29						
		Check $s_{X_{ave}}$	27.5103			$k_{crit} =$	2.11						
Where:	$x_1, \dots, x_n =$	Individual Test Result		Where:	$(X_{ave})_{ave} =$	Average of Cell Averages							
	$X_{ave} =$	Cell Average			$s_{X_{ave}} =$	Standard Deviation of Cell Averages							
	n =	Number of Test Results per Cell			$s_r =$	Repeatability Standard Deviation							
	s =	Cell Standard Deviation			$s_{R^*} =$	Interim Reproducibility Standard Deviation							
	d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)			$s_R =$	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
	$s^2 =$	Cell Variation			h =	Between Laboratory Consistency Statistic							
	p =	Number of Laboratories			k =	Within Laboratory Consistency Statistic							
	$h_{crit} =$	Critical Between Laboratory Consistency Statistic			r =	95% Confidence Limit for Repeatability							
	$k_{crit} =$	Critical Within Laboratory Consistency Statistic			R =	95% Confidence Limit for Reproducibility							



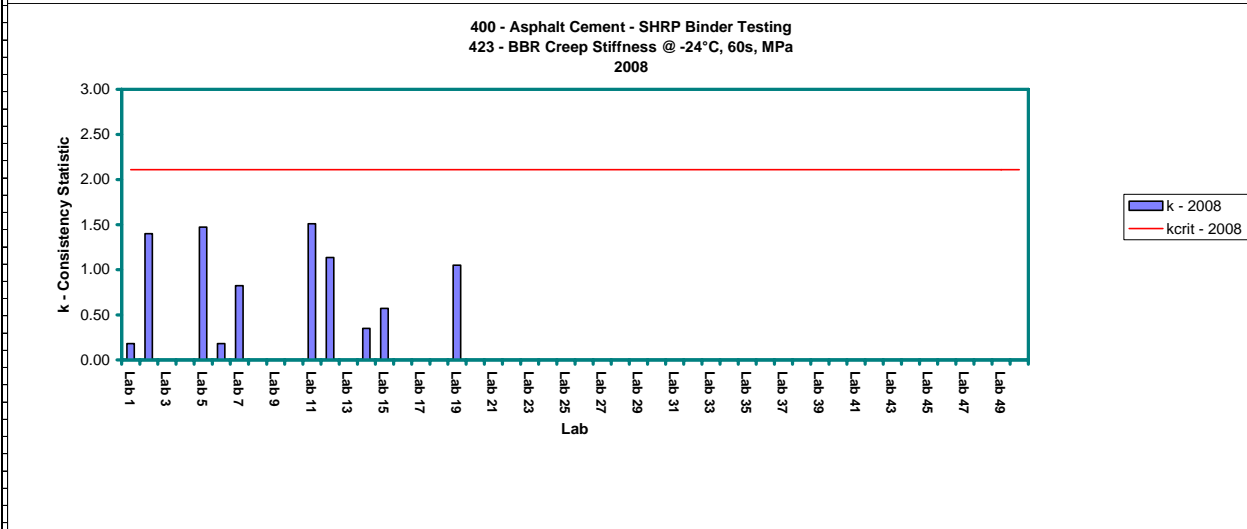
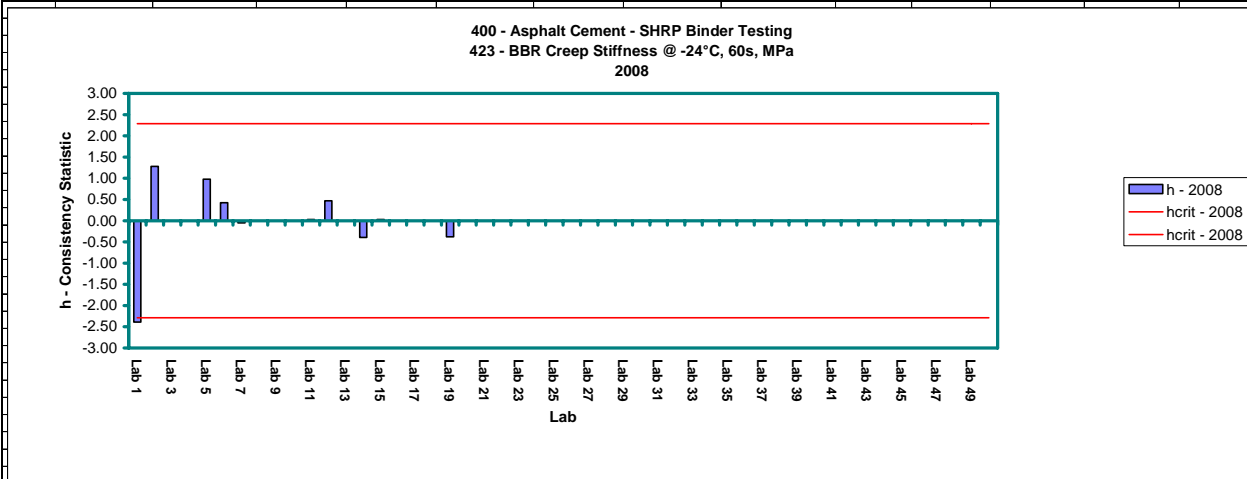
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$S_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 422 - BBR Slope, m, @ -18°C, 60s 2008													
Data					n = 3 p = 10 Significance Level = 0.5%	(X _{ave}) _{ave} = 0.3490 S _{Xave} = 0.0171	s _r = 0.0050 s _R = 0.0176 s _R = 0.0176	Check s _{Xave} = 0.0171 r = 2.8 s _r = 0.0137 R = 2.8 s _R = 0.0487					
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	0.3790	0.3800	0.3800		0.3797	0.0006	0.0307	0.0000	1.79	0.12	2.29	-2.29	2.11
Lab 2	0.3360	0.3370	0.3400		0.3377	0.0021	-0.0113	0.0000	-0.66	0.42	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	0.3440	0.3410	0.3410		0.3420	0.0017	-0.0070	0.0000	-0.41	0.35	2.29	-2.29	2.11
Lab 6	0.3470	0.3460	0.3480		0.3470	0.0010	-0.0020	0.0000	-0.12	0.20	2.29	-2.29	2.11
Lab 7	0.3750	0.3800	0.3750		0.3767	0.0029	0.0277	0.0000	1.62	0.58	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	0.3320	0.3360	0.3330		0.3337	0.0021	-0.0153	0.0000	-0.90	0.42	2.29	-2.29	2.11
Lab 12	0.3390	0.3310	0.3420		0.3373	0.0057	-0.0117	0.0000	-0.68	1.15	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	0.3610	0.3520	0.3580		0.3570	0.0046	0.0080	0.0000	0.47	0.93	2.29	-2.29	2.11
Lab 15	0.3570	0.3370	0.3490		0.3477	0.0101	-0.0013	0.0001	-0.08	2.03	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	0.3340	0.3380	0.3220		0.3313	0.0083	-0.0177	0.0001	-1.03	1.68	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics					Minimum X _{ave} = 0.3313	r = 2.8 s _r = 0.0137	h _{crit} = 2.29						
					Maximum X _{ave} = 0.3797	R = 2.8 s _R = 0.0487	h _{crit} = -2.29						
					Check s _{Xave} = 0.0171		k _{crit} = 2.11						
Where: x ₁ ...x _n = Individual Test Result		X _{ave} = Cell Average		Where: (X _{ave}) _{ave} = Average of Cell Averages		s _{Xave} = Standard Deviation of Cell Averages							
n = Number of Test Results per Cell		s = Cell Standard Deviation		s _r = Repeatability Standard Deviation		s _R = Interim Reproducibility Standard Deviation							
d = Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s ² = Cell Variation		s _R = Reproducibility Standard Deviation (Larger of s _r and s _R)		h = Between Laboratory Consistency Statistic							
p = Number of Laboratories		h _{crit} = Critical Between Laboratory Consistency Statistic		k = Within Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability							
k _{crit} = Critical Within Laboratory Consistency Statistic				R = 95% Confidence Limit for Reproducibility									



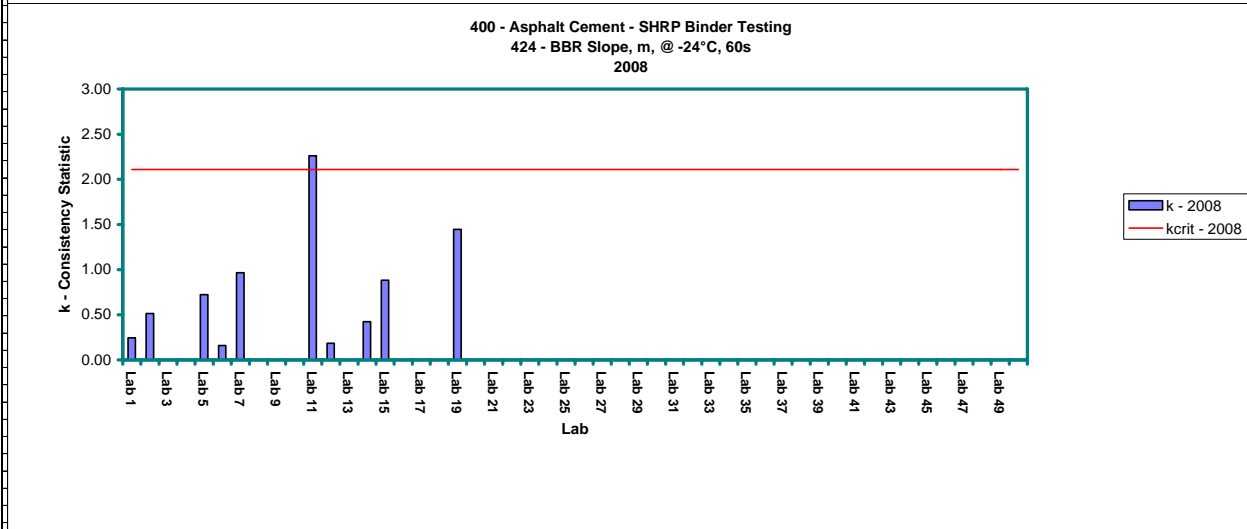
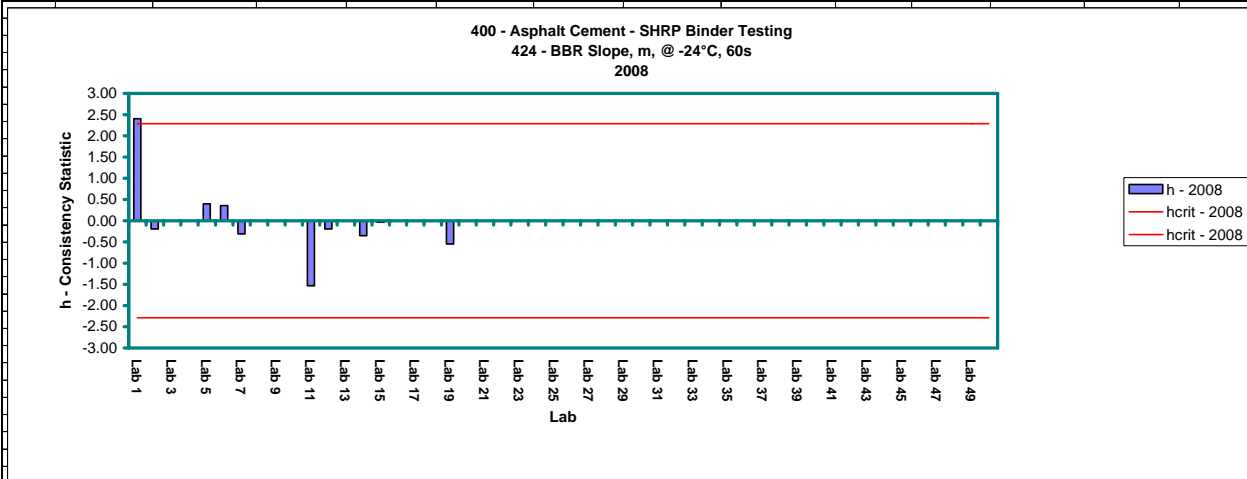
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{(ave)}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 423 - BBR Creep Stiffness @ -24°C, 60s, MPa 2008													
Data				n = 3	(X_{ave}) _{ave} = 420.7333	s_r = 11.4862	Check $s_{X_{ave}}$ = 48.6207						
				p = 10	$S_{X_{ave}}$ = 48.6207	s_{R^*} = 49.5169	r = 2.8 s_r = 31.8382						
				Significance Level = 0.5%		s_R = 49.5169	R = 2.8 s_R = 137.2539						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	307.0000	303.0000	304.0000		304.6667	2.0817	-116.0667	4.3333	-2.39	0.18	2.29	-2.29	2.11
Lab 2	466.0000	485.0000	498.0000		483.0000	16.0935	62.2667	259.0000	1.28	1.40	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	487.0000	464.0000	454.0000		468.3333	16.9214	47.6000	286.3333	0.98	1.47	2.29	-2.29	2.11
Lab 6	442.0000	443.0000	439.0000		441.3333	2.0817	20.6000	4.3333	0.42	0.18	2.29	-2.29	2.11
Lab 7	429.0000	415.0000	411.0000		418.3333	9.4516	-2.4000	89.3333	-0.05	0.82	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	433.0000	431.0000	402.0000		422.0000	17.3494	1.2667	301.0000	0.03	1.51	2.29	-2.29	2.11
Lab 12	445.0000	456.0000	430.0000		443.6667	13.0512	22.9333	170.3333	0.47	1.14	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	398.0000	406.0000	401.0000		401.6667	4.0415	-19.0667	16.3333	-0.39	0.35	2.29	-2.29	2.11
Lab 15	415.0000	428.0000	423.0000		422.0000	6.5574	1.2667	43.0000	0.03	0.57	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	391.0000	401.0000	415.0000		402.3333	12.0554	-18.4000	145.3333	-0.38	1.05	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X_{ave}	304.6667	$r = 2.8$ $s_r =$	31.8382	$h_{crit} =$	2.29				
				Maximum X_{ave}	483.0000	$R = 2.8$ $s_R =$	137.2539	$h_{crit} =$	-2.29				
				Check $s_{X_{ave}}$	48.6207			$k_{crit} =$	2.11				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: (X_{ave}) _{ave} =		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{ave} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



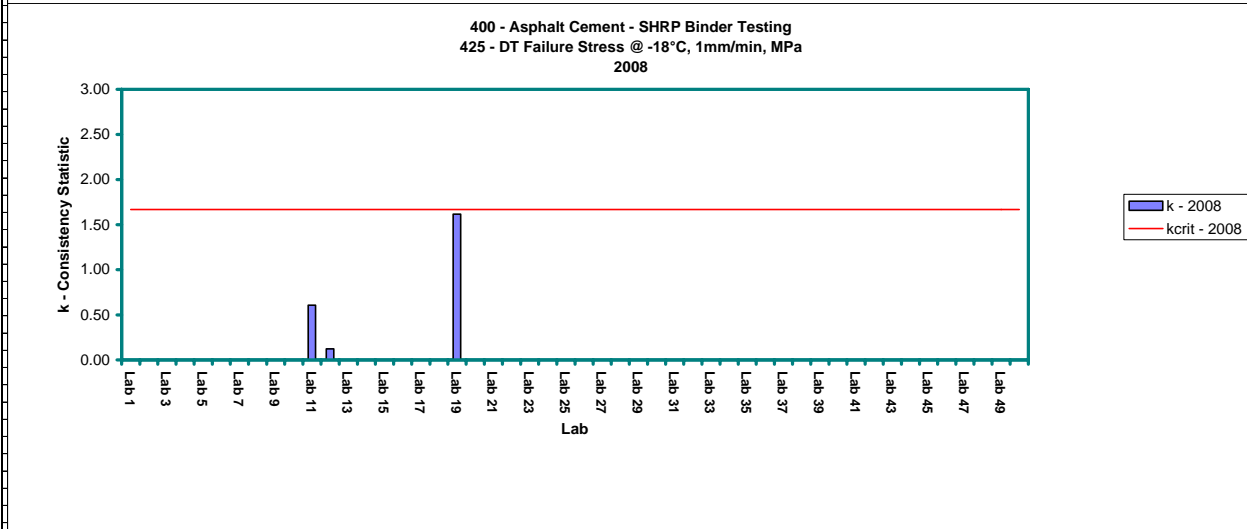
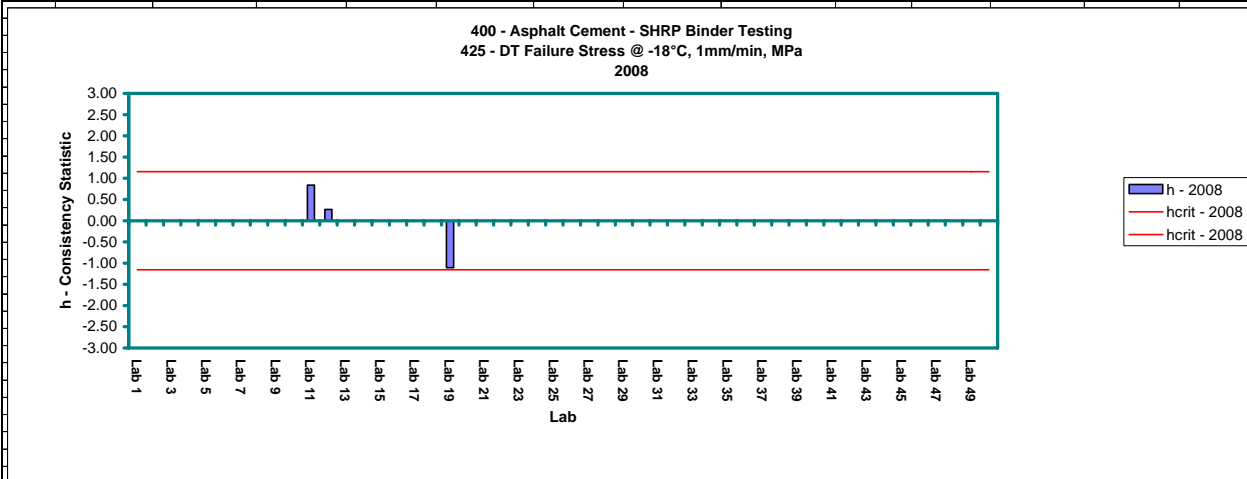
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages	
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages	
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation	
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation	
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})	
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic	
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic	
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability	
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility	

400 - Asphalt Cement - SHRP Binder Testing 424 - BBR Slope, m, @ -24°C, 60s 2008													
Data				n = 3	(X_{ave}) _{ave} = 0.2819	s_r = 0.0062	Check $s_{X_{ave}}$ = 0.0169						
				p = 10	$s_{X_{ave}}$ = 0.0169	s_{R^*} = 0.0177	$r = 2.8 s_r = 0.0173$						
				Significance Level = 0.5%		s_R = 0.0177	$R = 2.8 s_R = 0.0490$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1	0.3210	0.3240	0.3230		0.3227	0.0015	0.0407	0.0000	2.40	0.24	2.29	-2.29	2.11
Lab 2	0.2750	0.2810	0.2800		0.2787	0.0032	-0.0033	0.0000	-0.19	0.52	2.29	-2.29	2.11
Lab 3											2.29	-2.29	2.11
Lab 4											2.29	-2.29	2.11
Lab 5	0.2840	0.2930	0.2890		0.2887	0.0045	0.0067	0.0000	0.40	0.72	2.29	-2.29	2.11
Lab 6	0.2880	0.2890	0.2870		0.2880	0.0010	0.0061	0.0000	0.36	0.16	2.29	-2.29	2.11
Lab 7	0.2760	0.2710	0.2830		0.2767	0.0060	-0.0053	0.0000	-0.31	0.97	2.29	-2.29	2.11
Lab 8											2.29	-2.29	2.11
Lab 9											2.29	-2.29	2.11
Lab 10											2.29	-2.29	2.11
Lab 11	0.2690	0.2580	0.2410		0.2560	0.0141	-0.0259	0.0002	-1.53	2.26	2.29	-2.29	2.11
Lab 12	0.2800	0.2780	0.2780		0.2787	0.0012	-0.0033	0.0000	-0.19	0.19	2.29	-2.29	2.11
Lab 13											2.29	-2.29	2.11
Lab 14	0.2780	0.2730	0.2770		0.2760	0.0026	-0.0059	0.0000	-0.35	0.42	2.29	-2.29	2.11
Lab 15	0.2840	0.2750	0.2850		0.2813	0.0055	-0.0006	0.0000	-0.04	0.88	2.29	-2.29	2.11
Lab 16											2.29	-2.29	2.11
Lab 17											2.29	-2.29	2.11
Lab 18											2.29	-2.29	2.11
Lab 19	0.2820	0.2720	0.2640		0.2727	0.0090	-0.0093	0.0001	-0.55	1.45	2.29	-2.29	2.11
Lab 20											2.29	-2.29	2.11
Lab 21											2.29	-2.29	2.11
Lab 22											2.29	-2.29	2.11
Lab 23											2.29	-2.29	2.11
Lab 24											2.29	-2.29	2.11
Lab 25											2.29	-2.29	2.11
Lab 26											2.29	-2.29	2.11
Lab 27											2.29	-2.29	2.11
Lab 28											2.29	-2.29	2.11
Lab 29											2.29	-2.29	2.11
Lab 30											2.29	-2.29	2.11
Lab 31											2.29	-2.29	2.11
Lab 32											2.29	-2.29	2.11
Lab 33											2.29	-2.29	2.11
Lab 34											2.29	-2.29	2.11
Lab 35											2.29	-2.29	2.11
Lab 36											2.29	-2.29	2.11
Lab 37											2.29	-2.29	2.11
Lab 38											2.29	-2.29	2.11
Lab 39											2.29	-2.29	2.11
Lab 40											2.29	-2.29	2.11
Lab 41											2.29	-2.29	2.11
Lab 42											2.29	-2.29	2.11
Lab 43											2.29	-2.29	2.11
Lab 44											2.29	-2.29	2.11
Lab 45											2.29	-2.29	2.11
Lab 46											2.29	-2.29	2.11
Lab 47											2.29	-2.29	2.11
Lab 48											2.29	-2.29	2.11
Lab 49											2.29	-2.29	2.11
Lab 50											2.29	-2.29	2.11
Additional Statistics				Minimum X_{ave}	0.2560	$r = 2.8 s_r =$	0.0173	$h_{crit} =$	2.29				
				Maximum X_{ave}	0.3227	$R = 2.8 s_R =$	0.0490	$h_{crit} =$	-2.29				
				Check $s_{X_{ave}}$	0.0169			$k_{crit} =$	2.11				
Where: $x_1, \dots, x_n =$				Individual Test Result	Where: (X_{ave}) _{ave} =		Average of Cell Averages						
$X_{ave} =$				Cell Average	$s_{X_{ave}} =$		Standard Deviation of Cell Averages						
n =				Number of Test Results per Cell	$s_r =$		Repeatability Standard Deviation						
s =				Cell Standard Deviation	$s_{R^*} =$		Interim Reproducibility Standard Deviation						
d =				Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})						
$s^2 =$				Cell Variation	h =		Between Laboratory Consistency Statistic						
p =				Number of Laboratories	k =		Within Laboratory Consistency Statistic						
$h_{crit} =$				Critical Between Laboratory Consistency Statistic	r =		95% Confidence Limit for Repeatability						
$k_{crit} =$				Critical Within Laboratory Consistency Statistic	R =		95% Confidence Limit for Reproducibility						



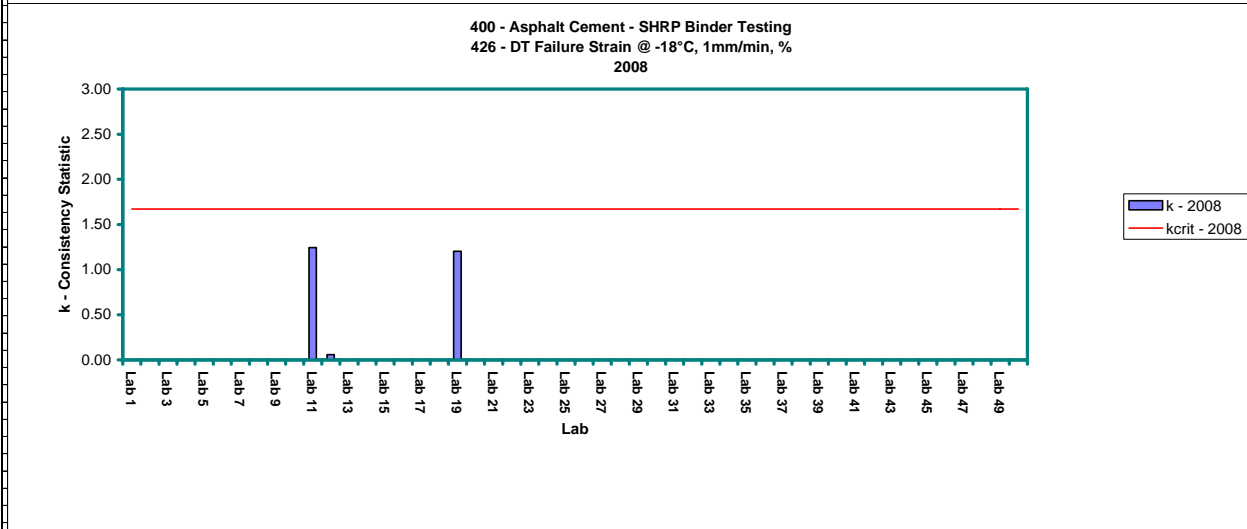
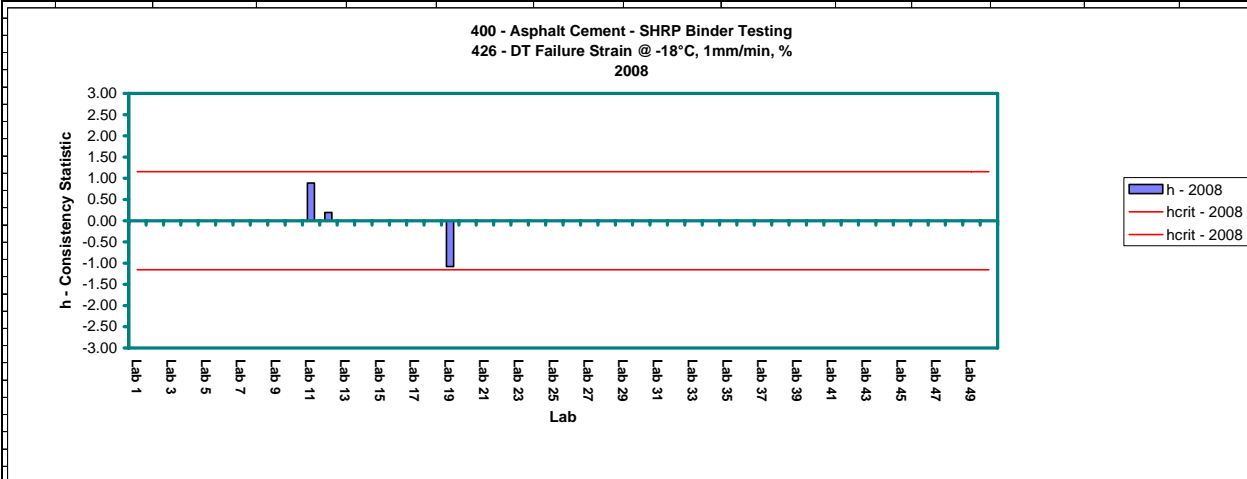
Where:	x_1, \dots, x_n = Individual Test Result	Where:	$(X_{ave})_{ave}$ = Average of Cell Averages
	X_{ave} = Cell Average		$s_{X_{ave}}$ = Standard Deviation of Cell Averages
	n = Number of Test Results per Cell		s_r = Repeatability Standard Deviation
	s = Cell Standard Deviation		s_{R^*} = Interim Reproducibility Standard Deviation
	d = Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R = Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
	s^2 = Cell Variation		h = Between Laboratory Consistency Statistic
	p = Number of Laboratories		k = Within Laboratory Consistency Statistic
	h_{crit} = Critical Between Laboratory Consistency Statistic		r = 95% Confidence Limit for Repeatability
	k_{crit} = Critical Within Laboratory Consistency Statistic		R = 95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 425 - DT Failure Stress @ -18°C, 1mm/min, MPa 2008													
Data				n = 3	(X_{ave}) _{ave} = 4.0133	s_r = 0.5240	Check $s_{X_{ave}}$ = 0.3888						
				p = 3	$S_{X_{ave}}$ = 0.3888	s_{R^*} = 0.5781	$r = 2.8 s_r = 1.4525$						
				Significance Level = 0.5%		s_R = 0.5781	$R = 2.8 s_R = 1.6024$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.15	-1.15	1.67
Lab 2											1.15	-1.15	1.67
Lab 3											1.15	-1.15	1.67
Lab 4											1.15	-1.15	1.67
Lab 5											1.15	-1.15	1.67
Lab 6											1.15	-1.15	1.67
Lab 7											1.15	-1.15	1.67
Lab 8											1.15	-1.15	1.67
Lab 9											1.15	-1.15	1.67
Lab 10											1.15	-1.15	1.67
Lab 11	4.3900	4.0000	4.6300		4.3400	0.3180	0.3267	0.1011	0.84	0.61	1.15	-1.15	1.67
Lab 12	4.1200	4.1800	4.0500		4.1167	0.0651	0.1033	0.0042	0.27	0.12	1.15	-1.15	1.67
Lab 13											1.15	-1.15	1.67
Lab 14											1.15	-1.15	1.67
Lab 15											1.15	-1.15	1.67
Lab 16											1.15	-1.15	1.67
Lab 17											1.15	-1.15	1.67
Lab 18											1.15	-1.15	1.67
Lab 19	3.1500	3.0400	4.5600		3.5833	0.8476	-0.4300	0.7184	-1.11	1.62	1.15	-1.15	1.67
Lab 20											1.15	-1.15	1.67
Lab 21											1.15	-1.15	1.67
Lab 22											1.15	-1.15	1.67
Lab 23											1.15	-1.15	1.67
Lab 24											1.15	-1.15	1.67
Lab 25											1.15	-1.15	1.67
Lab 26											1.15	-1.15	1.67
Lab 27											1.15	-1.15	1.67
Lab 28											1.15	-1.15	1.67
Lab 29											1.15	-1.15	1.67
Lab 30											1.15	-1.15	1.67
Lab 31											1.15	-1.15	1.67
Lab 32											1.15	-1.15	1.67
Lab 33											1.15	-1.15	1.67
Lab 34											1.15	-1.15	1.67
Lab 35											1.15	-1.15	1.67
Lab 36											1.15	-1.15	1.67
Lab 37											1.15	-1.15	1.67
Lab 38											1.15	-1.15	1.67
Lab 39											1.15	-1.15	1.67
Lab 40											1.15	-1.15	1.67
Lab 41											1.15	-1.15	1.67
Lab 42											1.15	-1.15	1.67
Lab 43											1.15	-1.15	1.67
Lab 44											1.15	-1.15	1.67
Lab 45											1.15	-1.15	1.67
Lab 46											1.15	-1.15	1.67
Lab 47											1.15	-1.15	1.67
Lab 48											1.15	-1.15	1.67
Lab 49											1.15	-1.15	1.67
Lab 50											1.15	-1.15	1.67
Additional Statistics				Minimum X_{ave}	3.5833	$r = 2.8 s_r =$	1.4525	$h_{crit} =$	1.15				
				Maximum X_{ave}	4.3400	$R = 2.8 s_R =$	1.6024	$h_{crit} =$	-1.15				
				Check $s_{X_{ave}}$	0.3888			$k_{crit} =$	1.67				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: (X_{ave}) _{ave} =		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{ave} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



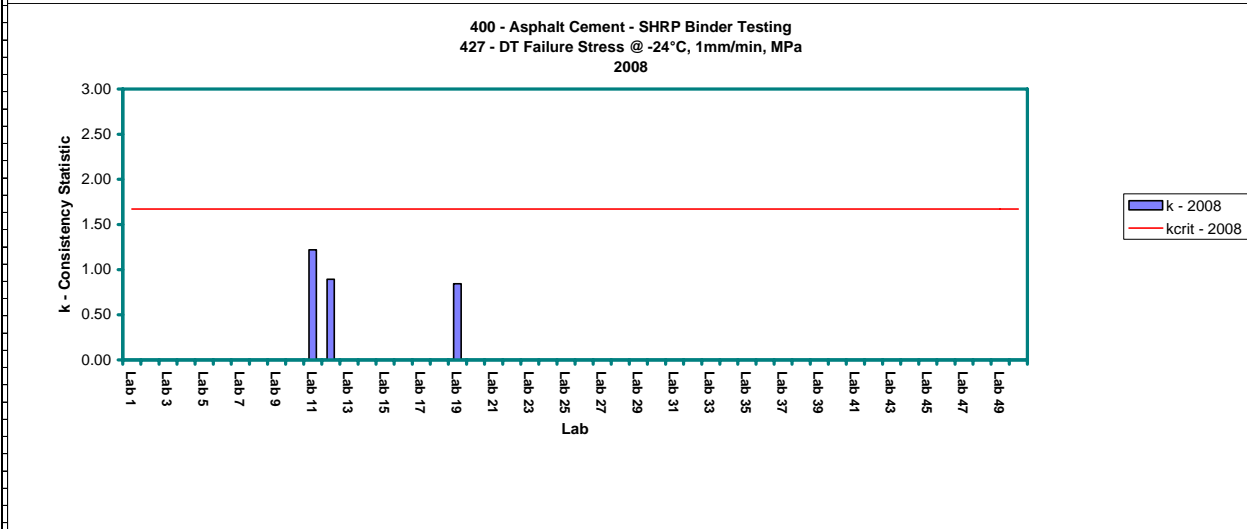
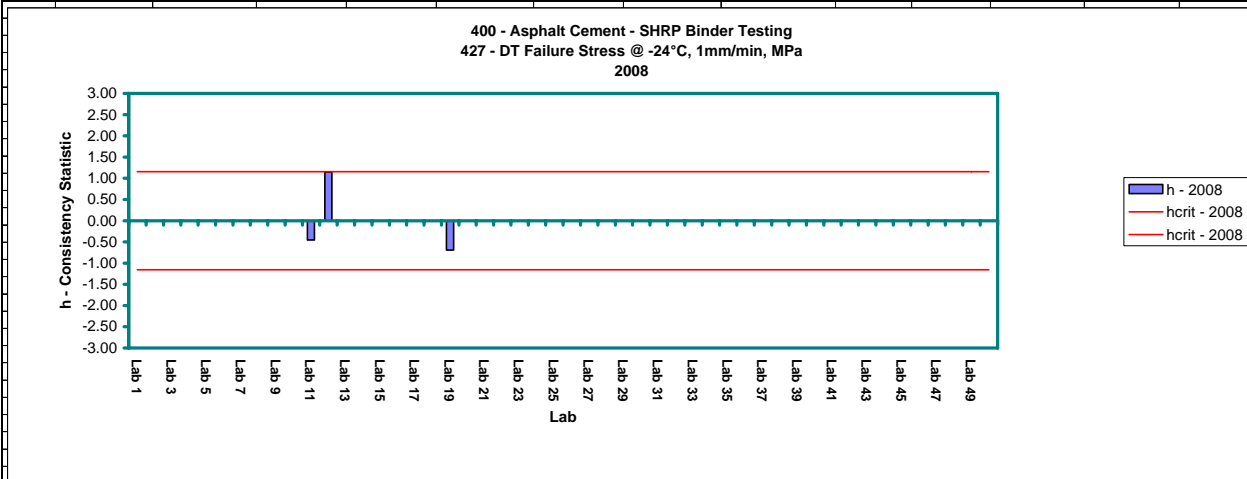
Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{(ave)}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation $(X_{ave} - (X_{ave})_{ave})$	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 426 - DT Failure Strain @ -18°C, 1mm/min, % 2008													
Data				n = 3	(X _{ave}) _{ave} = 1.4878	s _r = 0.1950	Check s _{X_{ave}} = 0.3518						
				p = 3	S _{X_{ave}} = 0.3518	s _R = 0.3861	r = 2.8 s _r = 0.5405						
				Significance Level = 0.5%		s _R = 0.3861	R = 2.8 s _R = 1.0703						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.15	-1.15	1.67
Lab 2											1.15	-1.15	1.67
Lab 3											1.15	-1.15	1.67
Lab 4											1.15	-1.15	1.67
Lab 5											1.15	-1.15	1.67
Lab 6											1.15	-1.15	1.67
Lab 7											1.15	-1.15	1.67
Lab 8											1.15	-1.15	1.67
Lab 9											1.15	-1.15	1.67
Lab 10											1.15	-1.15	1.67
Lab 11	1.7300	1.6000	2.0700		1.8000	0.2427	0.3122	0.0589	0.89	1.24	1.15	-1.15	1.67
Lab 12	1.5700	1.5500	1.5500		1.5567	0.0115	0.0689	0.0001	0.20	0.06	1.15	-1.15	1.67
Lab 13											1.15	-1.15	1.67
Lab 14											1.15	-1.15	1.67
Lab 15											1.15	-1.15	1.67
Lab 16											1.15	-1.15	1.67
Lab 17											1.15	-1.15	1.67
Lab 18											1.15	-1.15	1.67
Lab 19	1.0300	0.9200	1.3700		1.1067	0.2346	-0.3811	0.0550	-1.08	1.20	1.15	-1.15	1.67
Lab 20											1.15	-1.15	1.67
Lab 21											1.15	-1.15	1.67
Lab 22											1.15	-1.15	1.67
Lab 23											1.15	-1.15	1.67
Lab 24											1.15	-1.15	1.67
Lab 25											1.15	-1.15	1.67
Lab 26											1.15	-1.15	1.67
Lab 27											1.15	-1.15	1.67
Lab 28											1.15	-1.15	1.67
Lab 29											1.15	-1.15	1.67
Lab 30											1.15	-1.15	1.67
Lab 31											1.15	-1.15	1.67
Lab 32											1.15	-1.15	1.67
Lab 33											1.15	-1.15	1.67
Lab 34											1.15	-1.15	1.67
Lab 35											1.15	-1.15	1.67
Lab 36											1.15	-1.15	1.67
Lab 37											1.15	-1.15	1.67
Lab 38											1.15	-1.15	1.67
Lab 39											1.15	-1.15	1.67
Lab 40											1.15	-1.15	1.67
Lab 41											1.15	-1.15	1.67
Lab 42											1.15	-1.15	1.67
Lab 43											1.15	-1.15	1.67
Lab 44											1.15	-1.15	1.67
Lab 45											1.15	-1.15	1.67
Lab 46											1.15	-1.15	1.67
Lab 47											1.15	-1.15	1.67
Lab 48											1.15	-1.15	1.67
Lab 49											1.15	-1.15	1.67
Lab 50											1.15	-1.15	1.67
Additional Statistics				Minimum X _{ave}	1.1067	r = 2.8 s _r =	0.5405	h _{crit} =	1.15				
				Maximum X _{ave}	1.8000	R = 2.8 s _R =	1.0703	h _{crit} =	-1.15				
				Check s _{X_{ave}} =	0.3518			k _{crit} =	1.67				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		s _{ave} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		s _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		s _R =		Reproducibility Standard Deviation (Larger of s _r and s _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



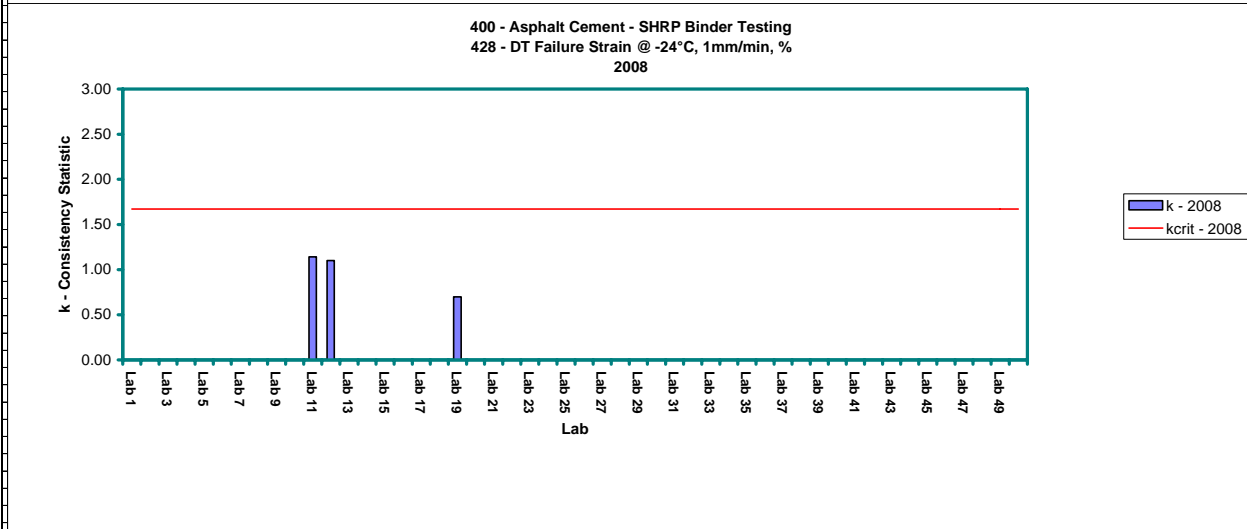
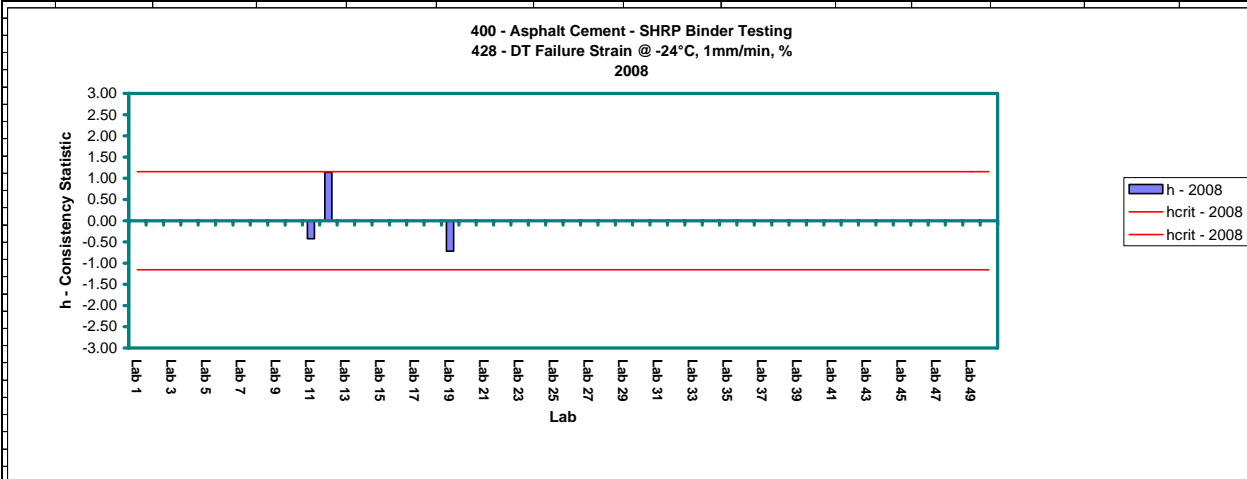
Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 427 - DT Failure Stress @ -24°C, 1mm/min, MPa 2008													
Data				n = 3	(X _{ave}) _{ave} = 3.7978	s _r = 0.8528	Check s _{X_{ave}} = 0.8653						
				p = 3	S _{X_{ave}} = 0.8653	S _R = 1.1107	r = 2.8 s _r = 2.3638						
				Significance Level = 0.5%		S _R = 1.1107	R = 2.8 S _R = 3.0786						
Lab #	x ₁	x ₂	x ₃	x ₄	X _{ave}	s	d	s ²	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.15	-1.15	1.67
Lab 2											1.15	-1.15	1.67
Lab 3											1.15	-1.15	1.67
Lab 4											1.15	-1.15	1.67
Lab 5											1.15	-1.15	1.67
Lab 6											1.15	-1.15	1.67
Lab 7											1.15	-1.15	1.67
Lab 8											1.15	-1.15	1.67
Lab 9											1.15	-1.15	1.67
Lab 10											1.15	-1.15	1.67
Lab 11	3.2000	2.4800	4.5300		3.4033	1.0400	-0.3944	1.0816	-0.46	1.22	1.15	-1.15	1.67
Lab 12	4.9500	5.4600	3.9600		4.7900	0.7627	0.9922	0.5817	1.15	0.89	1.15	-1.15	1.67
Lab 13											1.15	-1.15	1.67
Lab 14											1.15	-1.15	1.67
Lab 15											1.15	-1.15	1.67
Lab 16											1.15	-1.15	1.67
Lab 17											1.15	-1.15	1.67
Lab 18											1.15	-1.15	1.67
Lab 19	3.2000	3.9200	2.4800		3.2000	0.7200	-0.5978	0.5184	-0.69	0.84	1.15	-1.15	1.67
Lab 20											1.15	-1.15	1.67
Lab 21											1.15	-1.15	1.67
Lab 22											1.15	-1.15	1.67
Lab 23											1.15	-1.15	1.67
Lab 24											1.15	-1.15	1.67
Lab 25											1.15	-1.15	1.67
Lab 26											1.15	-1.15	1.67
Lab 27											1.15	-1.15	1.67
Lab 28											1.15	-1.15	1.67
Lab 29											1.15	-1.15	1.67
Lab 30											1.15	-1.15	1.67
Lab 31											1.15	-1.15	1.67
Lab 32											1.15	-1.15	1.67
Lab 33											1.15	-1.15	1.67
Lab 34											1.15	-1.15	1.67
Lab 35											1.15	-1.15	1.67
Lab 36											1.15	-1.15	1.67
Lab 37											1.15	-1.15	1.67
Lab 38											1.15	-1.15	1.67
Lab 39											1.15	-1.15	1.67
Lab 40											1.15	-1.15	1.67
Lab 41											1.15	-1.15	1.67
Lab 42											1.15	-1.15	1.67
Lab 43											1.15	-1.15	1.67
Lab 44											1.15	-1.15	1.67
Lab 45											1.15	-1.15	1.67
Lab 46											1.15	-1.15	1.67
Lab 47											1.15	-1.15	1.67
Lab 48											1.15	-1.15	1.67
Lab 49											1.15	-1.15	1.67
Lab 50											1.15	-1.15	1.67
Additional Statistics				Minimum X _{ave}	3.2000	r = 2.8 s _r =	2.3638	h _{crit} =	1.15				
				Maximum X _{ave}	4.7900	R = 2.8 S _R =	3.0786	h _{crit} =	-1.15				
				Check s _{X_{ave}} =	0.8653			k _{crit} =	1.67				
Where: x ₁ ...x _n =		Individual Test Result		Where: (X _{ave}) _{ave} =		Average of Cell Averages							
X _{ave} =		Cell Average		s _{X_{ave}} =		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		s _r =		Repeatability Standard Deviation							
s =		Cell Standard Deviation		S _R =		Interim Reproducibility Standard Deviation							
d =		Cell Deviation (X _{ave} - (X _{ave}) _{ave})		S _R =		Reproducibility Standard Deviation (Larger of s _r and S _R)							
s ² =		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
h _{crit} =		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
k _{crit} =		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



Where: x_1, \dots, x_n =	Individual Test Result	Where: $(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average	$s_{(ave)}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell	s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation	s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)	s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation	h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories	k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic	r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic	R =	95% Confidence Limit for Reproducibility

400 - Asphalt Cement - SHRP Binder Testing 428 - DT Failure Strain @ -24°C, 1mm/min, % 2008													
Data				n = 3	(X_{ave}) _{ave} = 0.5689	s_r = 0.1595	Check $s_{X_{ave}}$ = 0.1702						
				p = 3	$S_{X_{ave}}$ = 0.1702	s_{R^*} = 0.2143	$r = 2.8 s_r = 0.4421$						
				Significance Level = 0.5%		s_R = 0.2143	$R = 2.8 s_R = 0.5941$						
Lab #	x_1	x_2	x_3	x_4	X_{ave}	s	d	s^2	h - 2008	k - 2008	hcrit - 2008	hcrit - 2008	kcrit - 2008
Lab 1											1.15	-1.15	1.67
Lab 2											1.15	-1.15	1.67
Lab 3											1.15	-1.15	1.67
Lab 4											1.15	-1.15	1.67
Lab 5											1.15	-1.15	1.67
Lab 6											1.15	-1.15	1.67
Lab 7											1.15	-1.15	1.67
Lab 8											1.15	-1.15	1.67
Lab 9											1.15	-1.15	1.67
Lab 10											1.15	-1.15	1.67
Lab 11	0.4400	0.3500	0.7000		0.4967	0.1818	-0.0722	0.0330	-0.42	1.14	1.15	-1.15	1.67
Lab 12	0.7800	0.9300	0.5800		0.7633	0.1756	0.1944	0.0308	1.14	1.10	1.15	-1.15	1.67
Lab 13											1.15	-1.15	1.67
Lab 14											1.15	-1.15	1.67
Lab 15											1.15	-1.15	1.67
Lab 16											1.15	-1.15	1.67
Lab 17											1.15	-1.15	1.67
Lab 18											1.15	-1.15	1.67
Lab 19	0.4900	0.5300	0.3200		0.4467	0.1115	-0.1222	0.0124	-0.72	0.70	1.15	-1.15	1.67
Lab 20											1.15	-1.15	1.67
Lab 21											1.15	-1.15	1.67
Lab 22											1.15	-1.15	1.67
Lab 23											1.15	-1.15	1.67
Lab 24											1.15	-1.15	1.67
Lab 25											1.15	-1.15	1.67
Lab 26											1.15	-1.15	1.67
Lab 27											1.15	-1.15	1.67
Lab 28											1.15	-1.15	1.67
Lab 29											1.15	-1.15	1.67
Lab 30											1.15	-1.15	1.67
Lab 31											1.15	-1.15	1.67
Lab 32											1.15	-1.15	1.67
Lab 33											1.15	-1.15	1.67
Lab 34											1.15	-1.15	1.67
Lab 35											1.15	-1.15	1.67
Lab 36											1.15	-1.15	1.67
Lab 37											1.15	-1.15	1.67
Lab 38											1.15	-1.15	1.67
Lab 39											1.15	-1.15	1.67
Lab 40											1.15	-1.15	1.67
Lab 41											1.15	-1.15	1.67
Lab 42											1.15	-1.15	1.67
Lab 43											1.15	-1.15	1.67
Lab 44											1.15	-1.15	1.67
Lab 45											1.15	-1.15	1.67
Lab 46											1.15	-1.15	1.67
Lab 47											1.15	-1.15	1.67
Lab 48											1.15	-1.15	1.67
Lab 49											1.15	-1.15	1.67
Lab 50											1.15	-1.15	1.67
Additional Statistics				Minimum X_{ave}	0.4467	$r = 2.8 s_r =$	0.4421	$h_{crit} =$	1.15				
				Maximum X_{ave}	0.7633	$R = 2.8 s_R =$	0.5941	$h_{crit} =$	-1.15				
				Check $s_{X_{ave}} =$	0.1702			$k_{crit} =$	1.67				
Where: $x_1, \dots, x_n =$		Individual Test Result		Where: (X_{ave}) _{ave} =		Average of Cell Averages							
$X_{ave} =$		Cell Average		$s_{ave} =$		Standard Deviation of Cell Averages							
n =		Number of Test Results per Cell		$s_r =$		Repeatability Standard Deviation							
s =		Cell Standard Deviation		$s_{R^*} =$		Interim Reproducibility Standard Deviation							
d =		Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		$s_R =$		Reproducibility Standard Deviation (Larger of s_r and s_{R^*})							
$s^2 =$		Cell Variation		h =		Between Laboratory Consistency Statistic							
p =		Number of Laboratories		k =		Within Laboratory Consistency Statistic							
$h_{crit} =$		Critical Between Laboratory Consistency Statistic		r =		95% Confidence Limit for Repeatability							
$k_{crit} =$		Critical Within Laboratory Consistency Statistic		R =		95% Confidence Limit for Reproducibility							



Where: x_1, \dots, x_n =	Individual Test Result	Where:	$(X_{ave})_{ave}$ =	Average of Cell Averages
X_{ave} =	Cell Average		$s_{X_{ave}}$ =	Standard Deviation of Cell Averages
n =	Number of Test Results per Cell		s_r =	Repeatability Standard Deviation
s =	Cell Standard Deviation		s_{R^*} =	Interim Reproducibility Standard Deviation
d =	Cell Deviation ($X_{ave} - (X_{ave})_{ave}$)		s_R =	Reproducibility Standard Deviation (Larger of s_r and s_{R^*})
s^2 =	Cell Variation		h =	Between Laboratory Consistency Statistic
p =	Number of Laboratories		k =	Within Laboratory Consistency Statistic
h_{crit} =	Critical Between Laboratory Consistency Statistic		r =	95% Confidence Limit for Repeatability
k_{crit} =	Critical Within Laboratory Consistency Statistic		R =	95% Confidence Limit for Reproducibility