
Test Procedure for

PREPARING CONTROL CHARTS FOR ASPHALT BINDERS



TxDOT Designation: **Tex-552-C**

Effective Date: September 2019

1. SCOPE

- 1.1 Use this method to graphically display and track test results for all types of asphalt binders covered in Item 300. The use of this chart is required to determine eligibility of producers to be included in the Department's Materials Producer List (MPL) for asphalt binders.
- 1.2 The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.
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2. PROCEDURE

- 2.1 Create an Excel spreadsheet that includes the following information.
- Producer name
 - Producer or terminal location
 - Contact information
 - Material type
 - Material grade
 - Date of sampling
 - Test type
 - Test condition (i.e., temperature, pressure, and frequency)
 - Test parameter measured
- 2.2 Tabulate the test data on the spreadsheet.
- 2.3 Calculate the average and standard deviation for the parameter of interest using the data from producer for the past 120 days, according to the following equations:

$$\bar{y} = \frac{\sum_{i=1}^n y_i}{n}$$

-AND-

$$s = \sqrt{\frac{\sum_{i=1}^n [y_i^2] - n \cdot \bar{y}^2}{n - 1}}$$

Where:

y_i = individual values of the parameter of interest

n = number of samples

\bar{y} = the mathematical average of all y values

s = standard deviation.

- 2.4 Create the Asphalt Binder Statistical Process Control Chart (SPC) by plotting the parameter of interest on the y-axis versus the date of sampling on the x-axis, according to the following instructions. Use a plot similar to Figure 1 for plotting purposes.
- 2.4.1 On the y-axis, locate the Lower Specification Limit (LSL) and Upper Specification Limit (USL) and draw corresponding lines horizontally across the graph.
- 2.4.2 On the y-axis locate points at \bar{y} , $\bar{y} + s$, $\bar{y} + 2s$, $\bar{y} + 3s$, $\bar{y} - s$, $\bar{y} - 2s$, and $\bar{y} - 3s$; and draw horizontal lines across the graph.
- 2.4.3 Identify the horizontal lines at \bar{y} , $\bar{y} + 3s$ and $\bar{y} - 3s$ as Mean, UCL (Upper Control Limit) and LCL (Lower Control Limit), respectively.
- 2.4.4 Identify the area between $\bar{y} - s$ and $\bar{y} + s$ as Zone A.
- 2.4.5 Identify the areas between $\bar{y} + s$ and $\bar{y} + 2s$, and between $\bar{y} - s$ and $\bar{y} - 2s$, as Zone B.
- 2.4.6 Identify the areas between $\bar{y} + 2s$ and $\bar{y} + 3s$, and between $\bar{y} - 2s$ and $\bar{y} - 3s$, as Zone C.
- 2.4.7 Plot the data points from the producer for the past 120 days on the Statistical Process Control (SPC) Chart using "•" symbols.
- 2.4.8 Add any data from MTD prequalification samples, if available, to the SPC Chart and identify them using "x" symbols.
- 2.4.9 Add any data from project verification samples, if available, to the SPC Chart and identify them using "+" symbols.
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3. TEST RECORD FORMS

- 3.1 Use forms similar to [Form 1965](#), "Asphalt Binder Statistical Process Control Chart," to satisfy part of reporting requirement outlined in Tex-545-C. Form 1965 is provided by MTD to assist with preparation of SPC chart. Figure 1 shows an example of SPC Chart generated using Form 1965.

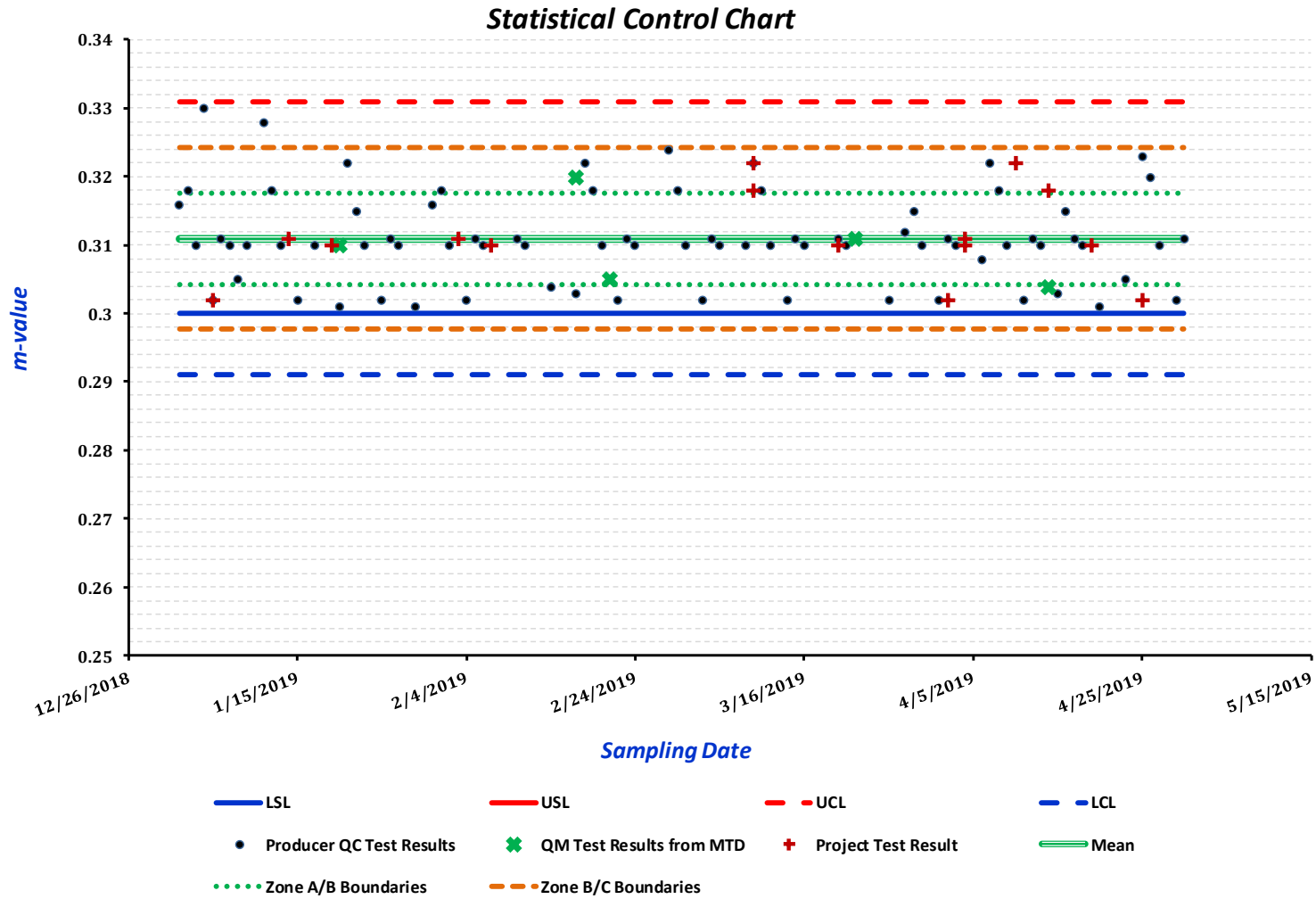


Figure 1—Asphalt Binder Statistical Process Control Chart