

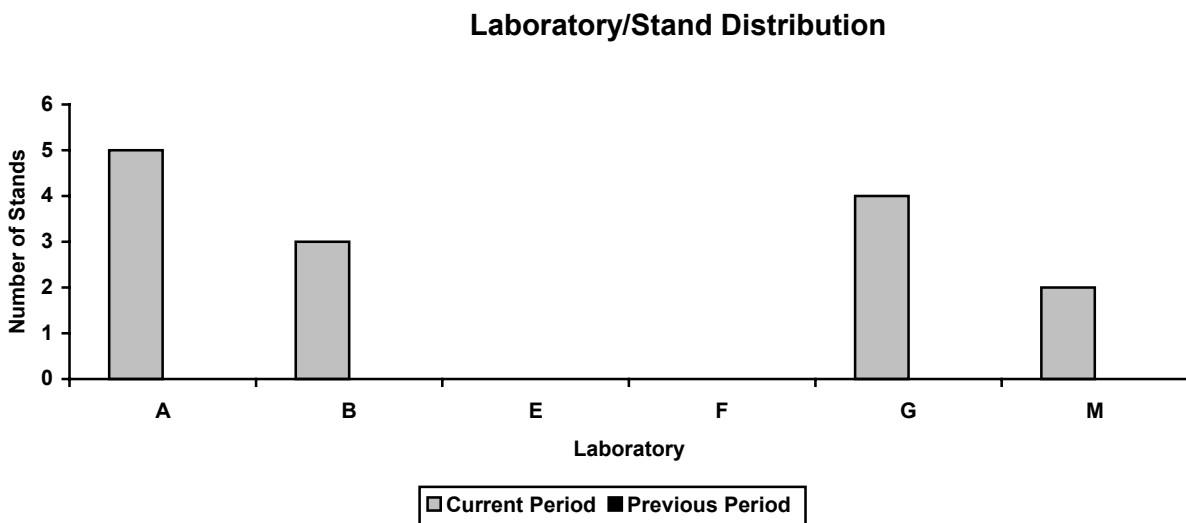
Memorandum: 00-156
 Date: November 2, 2000
 To: William M. Nahumck, Chairman, Sequence IIIF Surveillance Panel
 From: Michael T. Kasimirsky
 Subject: Sequence IIIF Semiannual Report: April 1, 2000 through September 30, 2000

The following is a summary of Sequence IIIF reference tests that were reported to the Test Monitoring Center during the period April 1, 2000 through September 30, 2000.

Lab/Stand Distribution

	Reporting Data	Calibrated as of September 30, 2000
Number of Laboratories:	4	4
Number of Test Stands:	14	13

The following chart shows the laboratory/stand distribution:



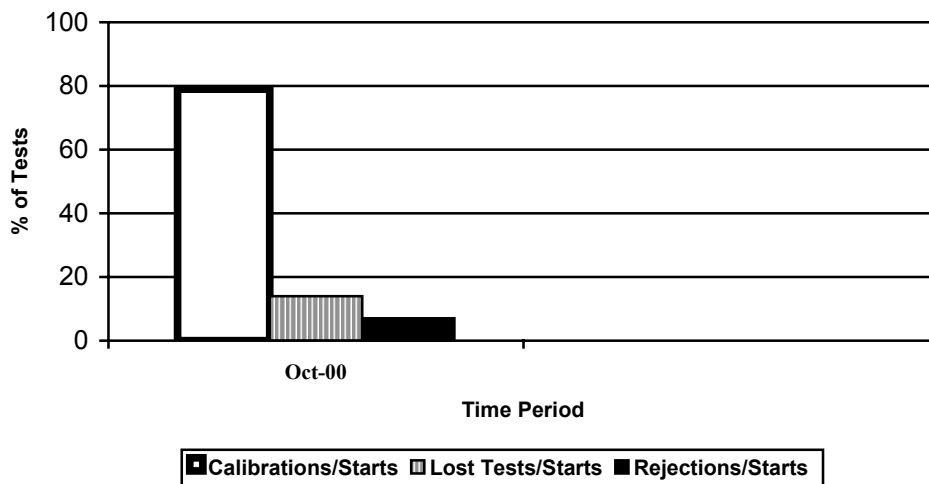
The following summarizes the status of the reference oil tests reported to the TMC:

Calibration Start Outcomes	TMC Validity Codes	No. of Tests
Operationally and Statistically Acceptable	AC	11
Failed Acceptance Criteria	OC	1
Operationally Invalid (Laboratory Judgment)	LC	1
Operationally Invalid (Lab & TMC Judgment)	RC	0
Aborted	XC	1
Total		14

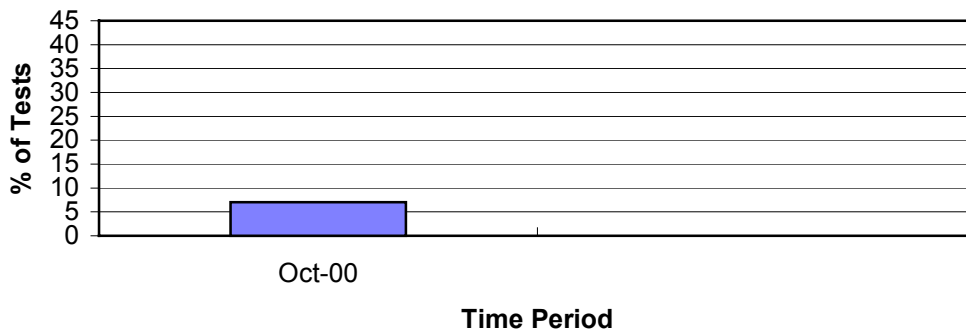
Donated & Industry Support Outcomes	TMC Validity Codes	No. of Tests
Acceptable Matrix Results – IIF Redevelopment Prove-out Matrix	AO	14
Unacceptable Matrix Results – IIF Redevelopment Prove-out Matrix	OO	1
Test run with extra 0.5L of oil added at hour 40 oil level	NI	1
Test Conducted on Reference Oil 1007	NI	1
Total		17

Calibrations per start, lost tests per start and rejection rates are summarized below:

Calibration Attempt Summary



Rejected Test Rate



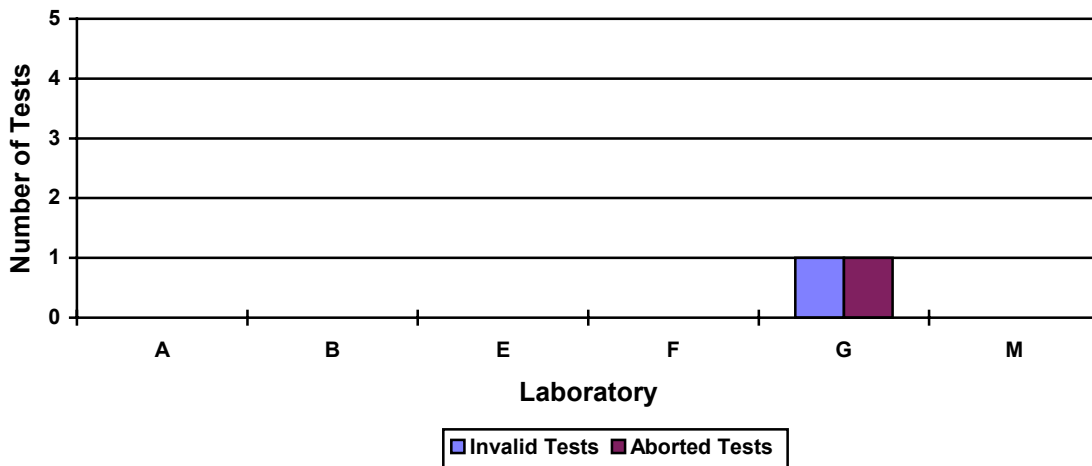
There were two failing tests for the period; one failed due to an APV Shewhart Precision alarm and the other failed due to an APV Shewhart Severity alarm in the mild direction as well as an EWMA Stand Precision Alarm on WPD.

There were no LTMS Deviations this period. There have been no deviations from the LTMS since its introduction in 2000.

Lost Test Summary

Two tests were lost this period, one for oil temperature control problems and another for a calibration error in the coolant outlet temperature thermocouple.

Lost Test Distribution



Information Letters

Sequence IIIF Information Letter No. 00-1, Sequence No. 1, dated September 8, 2000, was issued during the period and contained Draft 3 of the Sequence IIIF Test Procedure.

Severity and Precision Analysis

Below is a summary of the average Δ/s , pooled standard deviation, and average Δ in reported units for the tests reported during this period. Also below is a summary of the average Δ/s value, by parameter, for all laboratories reporting data during this period.

Industry Severity Summary			
Parameter	Average Δ/s	Pooled standard deviation (degrees of freedom)	Average Δ , in reported units
PVIS	0.054	0.012 (df=24)	5.8% Viscosity Increase ¹
APV	0.124	0.232 (df=24)	0.03 merits
WPD	0.276	0.663 (df=24)	0.18 merits

¹ At the GF-3 Pass Limit of 275% Viscosity Increase

Average Δ/s Results, by Laboratory			
Laboratory	PVIS	APV	WPD
A	0.26	-0.01	-0.55
B	0.26	1.11	1.72
E	-	-	-
F	-	-	-
G	-0.21	-0.22	-0.01
M	-0.09	-0.31	0.41

Percent Viscosity Increase (PVIS)

The industry has been within limits for the period, except for a four-test severity alarm due to one test result on reference oil 1008. This test generated a result of 75.2% Viscosity Increase, which is approximately 3.2 standard deviations mild of target. Subsequent testing has returned the industry within limits. Precision for the period has been within limits.

Average Piston Skirt Varnish (APV)

The industry has been within limits for severity on APV for the period. Industry precision has exceeded the warning limit for three out of the last five data points (a one-point alarm and a two-point alarm). These two alarms were caused by three different reference oil tests, on three different stands, at two laboratories. The first test was conducted on reference oil 1006 and it generated APV results of 9.72 merits or 2.21 standard deviations mild of target. The second test was conducted on reference oil 1008 and it generated APV results of 9.93 merits or 1.74 standard deviations mild of target. The final test generated APV results of 8.88 merits or 2.06 standard deviations severe of target. The latest data point returned the industry within limits for precision. No cause for these results has been found.

Weighted Piston Deposits (WPD)

The industry was within limits for both severity and precision for the period, with one exception. The exception was alarms of two data points on both severity and precision, caused by a single reference oil test on oil 1006. This test generated WPD results of 4.94 merits or 5.81 standard deviations mild of target. This large deviation from target caused both the severity and precision alarms in the industry. No cause for the large deviation was found and subsequent runs on that stand have generated acceptable WPD results.

QI Deviations

There were three QI Deviations for the period. There have been three deviations from the QI Limits since the test was introduced in 2000.

One deviation was due to Oil Filter Block Temperature dropping below the zero limit due to loss of oil temperature control resulting from viscosity increase on reference oil 1006.

The second deviation was due to Condenser Coolant Temperature QI results dropping below the zero limit. Since the panel was going to readdress the QI Constants on this parameter, the TMC granted the deviation.

The final deviation was due to Oil Filter Block Temperature, Condenser Coolant Temperature, and both Left and Right Air-to-Fuel Ratio. The Oil Filter Block Temperature results were again due to viscosity increase related to reference oil 1006. The remaining QI deviations were granted again due to the upcoming reexamination of the QI Constants used in generation of the QI results.

Hardware

No hardware changes were made this period.

Reference Oils

Oil	TMC Inventory, in gallons	TMC Inventory, in tests	Laboratory Inventory, in tests	Estimated life
1006	1,552	388	14	5+ years ¹
1007	660	165	12	not currently used in IIIF ¹
1008	1,019	254	12	5+ years ¹
432	118	29	12	not currently used in IIIF
433	64	16	9	9 months

¹ Multiple test area reference oil; total TMC inventory shown

MTK/mtk

Attachments

- c: F. M. Farber, TMC
 Sequence IIIF Surveillance Panel
<ftp://tmc.astm.cmri.cmu.edu/docs/gas/sequenceiii/semiannualreports/IIIF-10-2000.pdf>

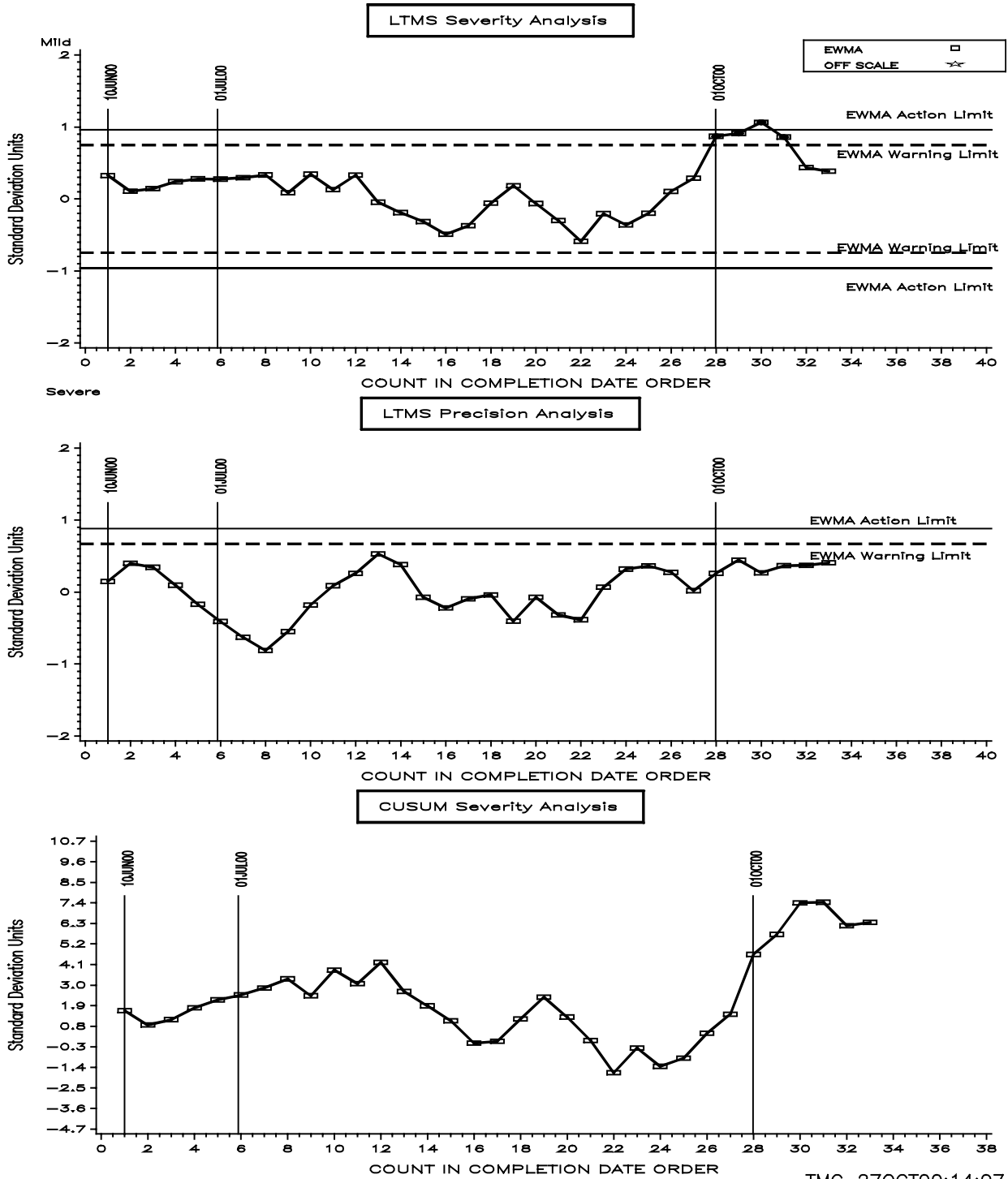
List of Figures

- Figures 1, 2, and 3 are EWMA severity and precision control charts and also the CUSUM Δ/s plots of PVIS, APV, and WPD, annotated with date lines, using the same data set as the EWMA severity and precision control charts. Transformed units are used, when appropriate.
- Figures 4, 5, and 6 are bar charts of average Δ/s , by report period, for PVIS, APV, and WPD.
- Figures 7, 8, and 9 are bar charts of pooled standard deviation, by report period, for PVIS, APV, and WPD.

SEQUENCE IIIF INDUSTRY OPERATIONALLY VALID DATA

VISCOSITY INCREASE FINAL ORIG UNIT RES (%)

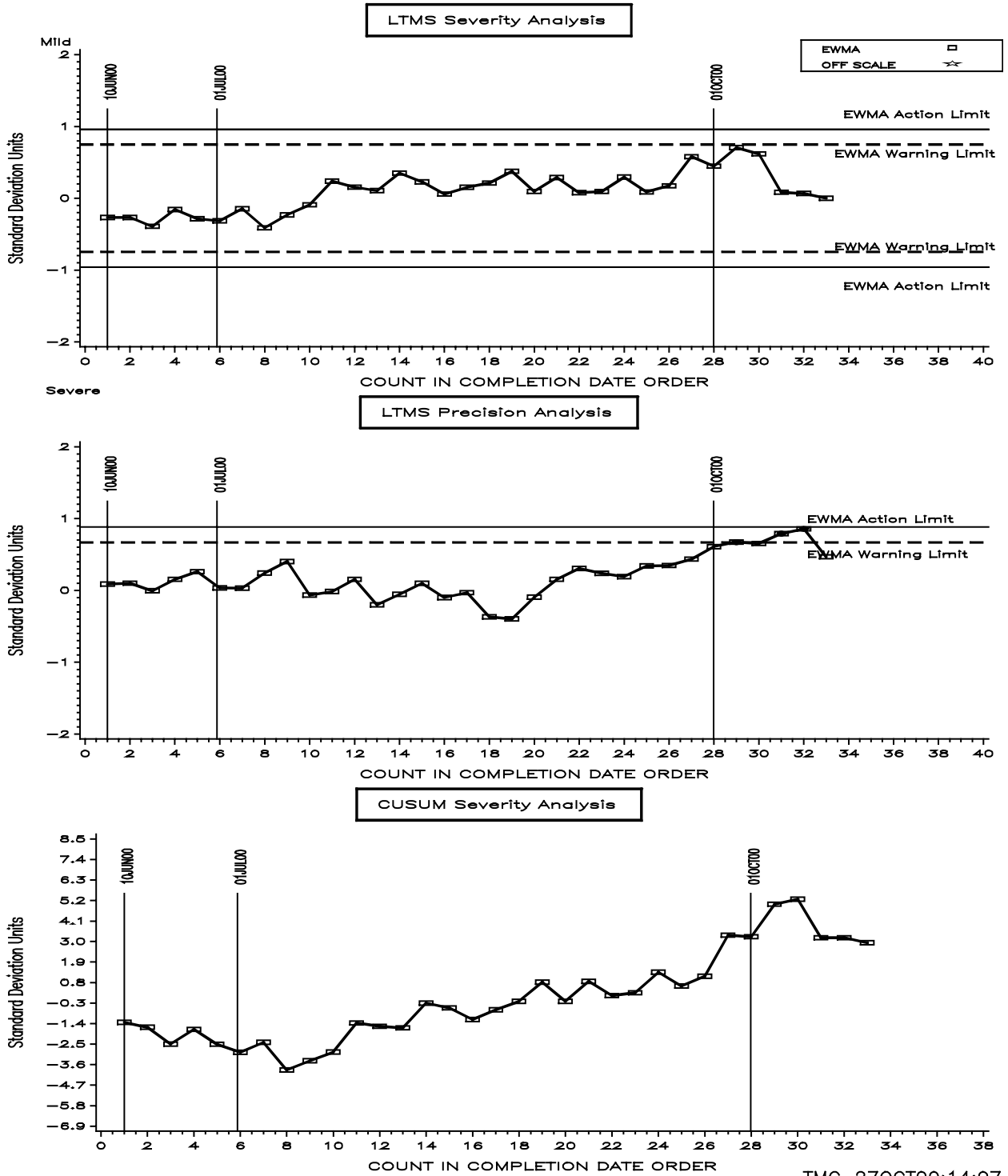
Figure 1



SEQUENCE IIIF INDUSTRY OPERATIONALLY VALID DATA

AVERAGE PISTON SKIRT VARNISH FINAL ORIG UNIT RES (

Figure 2



SEQUENCE III F INDUSTRY OPERATIONALLY VALID DATA

AVERAGE WEIGHTED PISTON DEPOSITS FNL ORIG UNIT RES

Figure 3

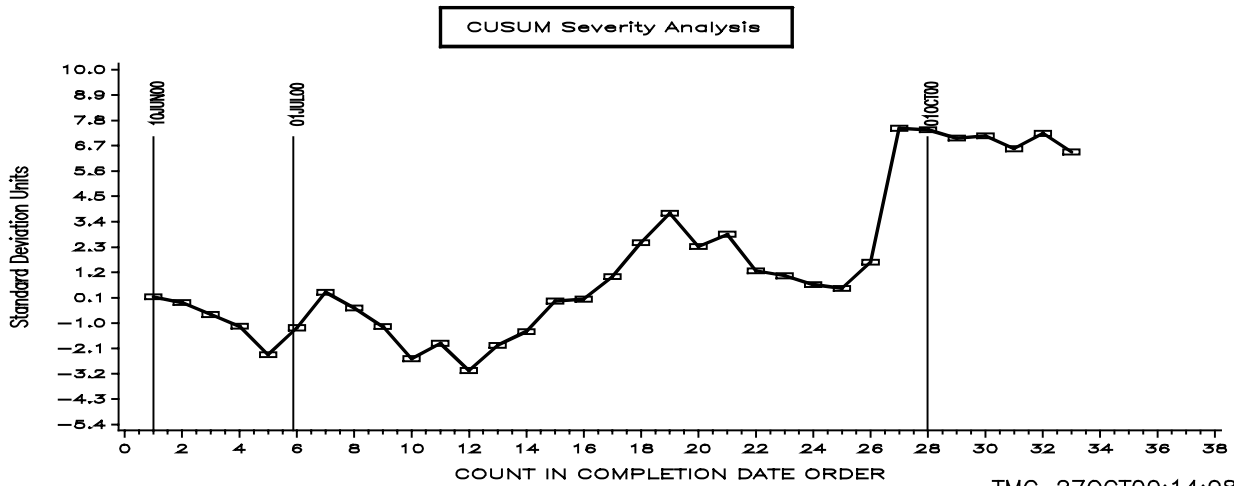
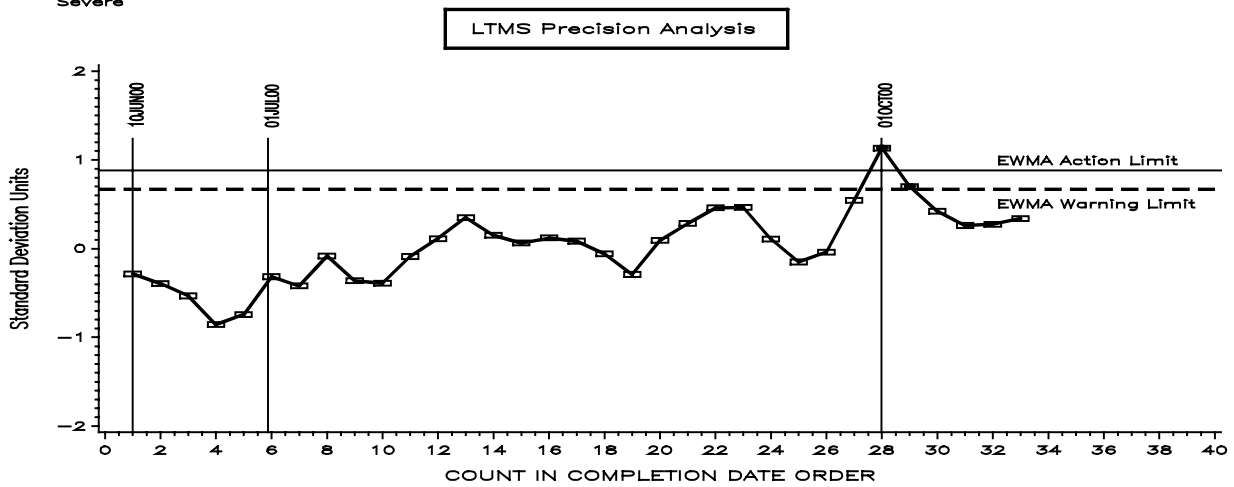
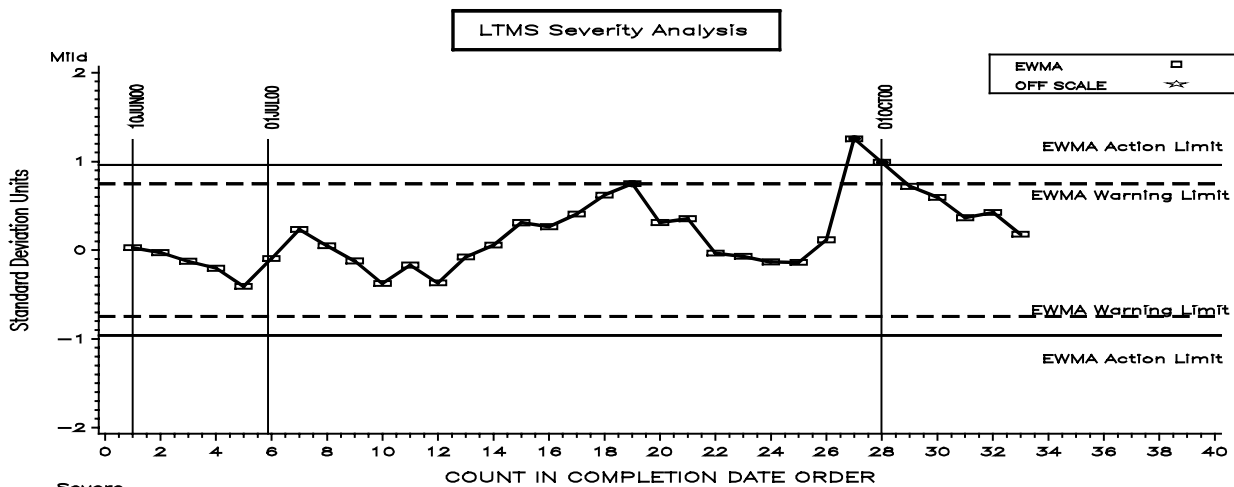


Figure 4 - Percent Viscosity Increase, Average Delta/s

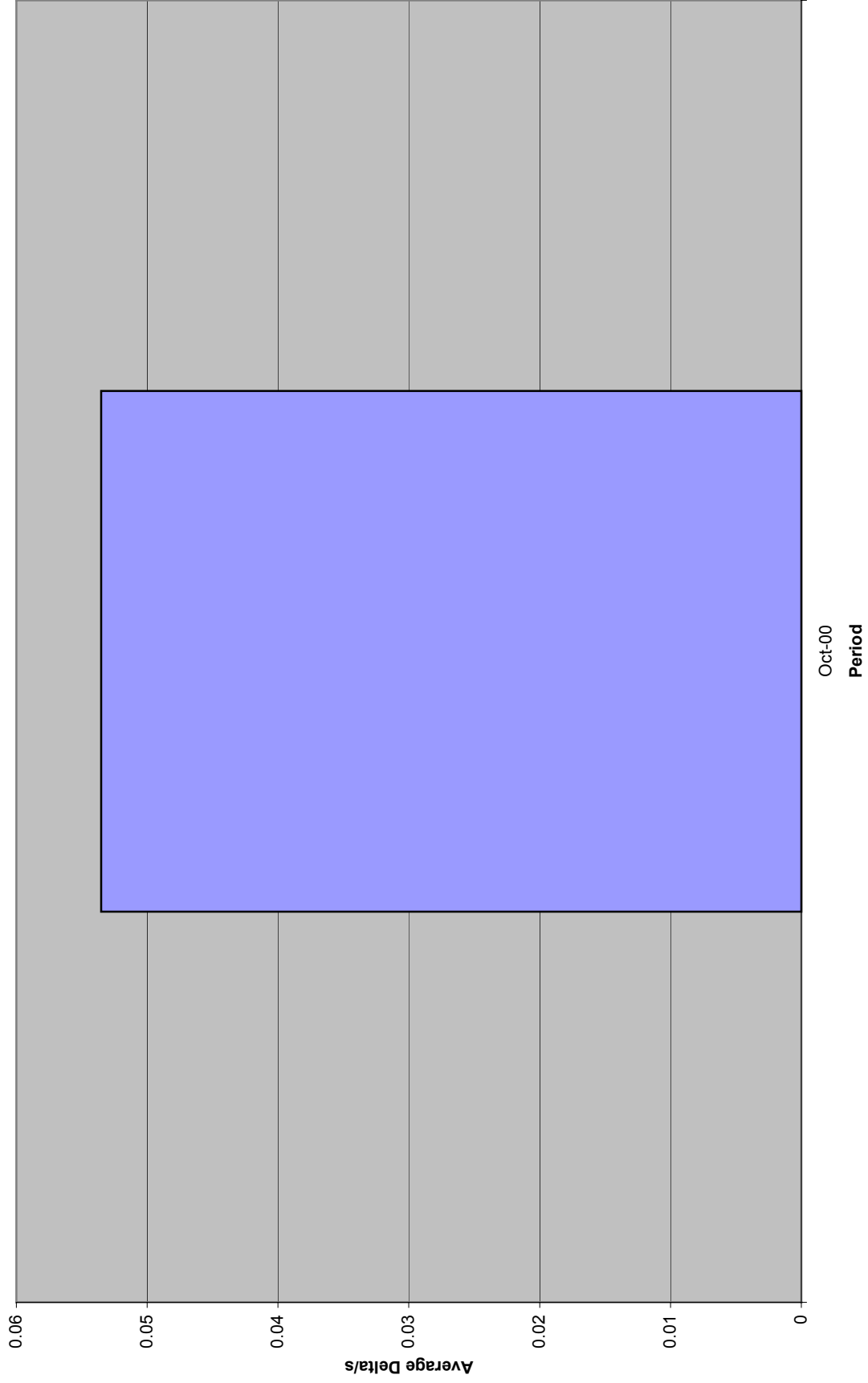


Figure 5 - Average Piston Skirt Varnish, Average Delta/s

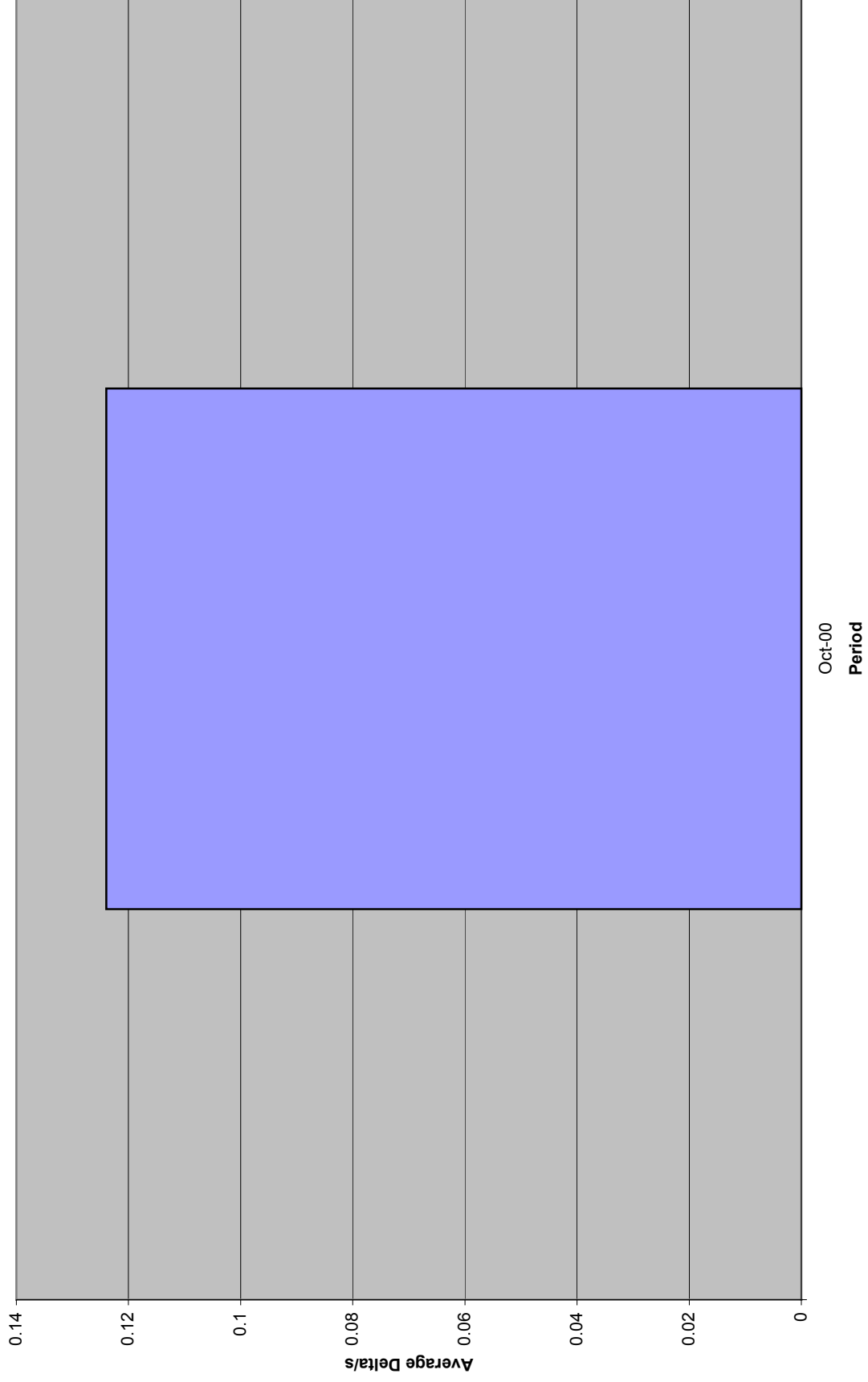


Figure 6 - Weighted Piston Deposits, Average Delta/s

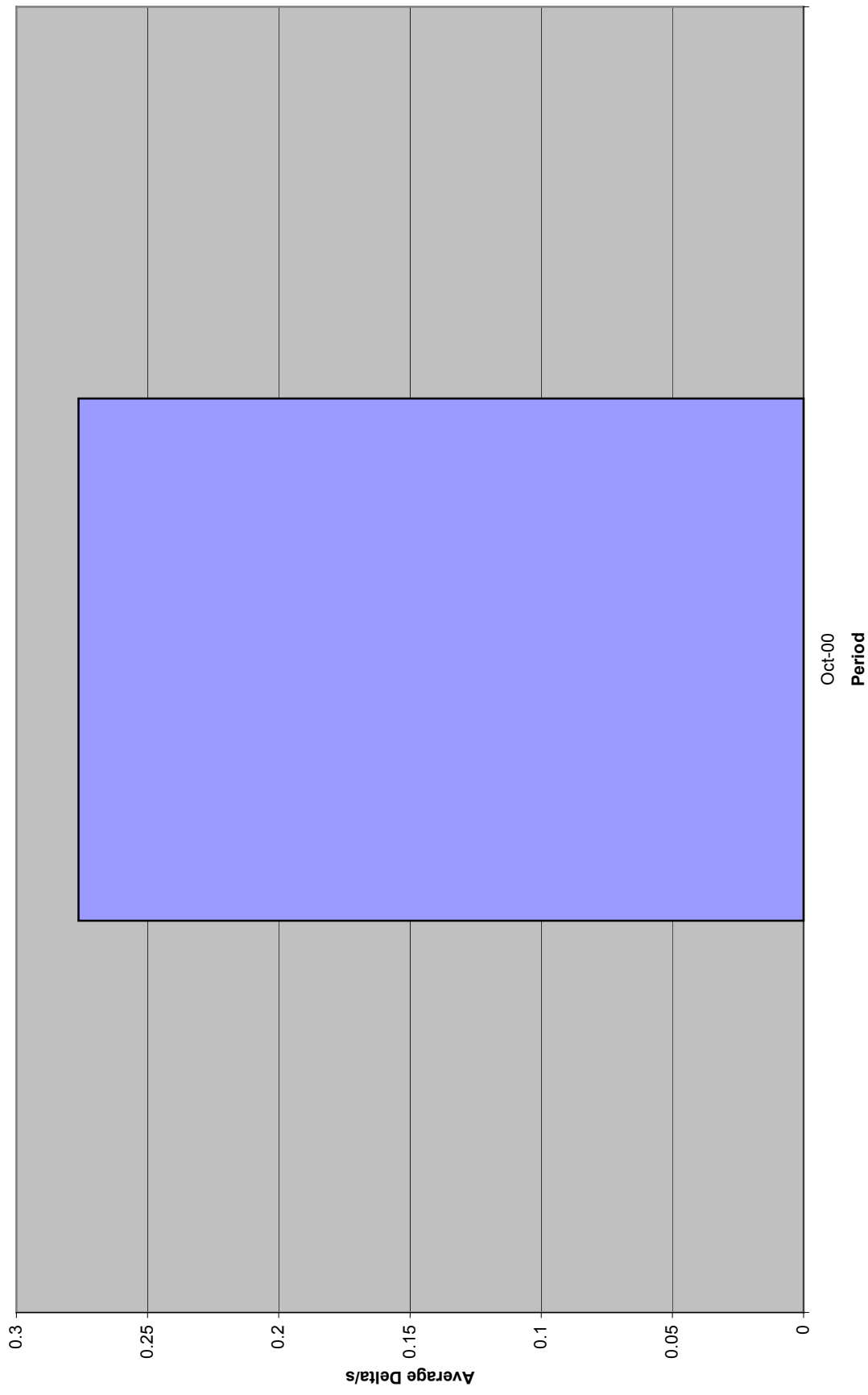


Figure 7 - Percent Viscosity Increase, Pooled Standard Deviation

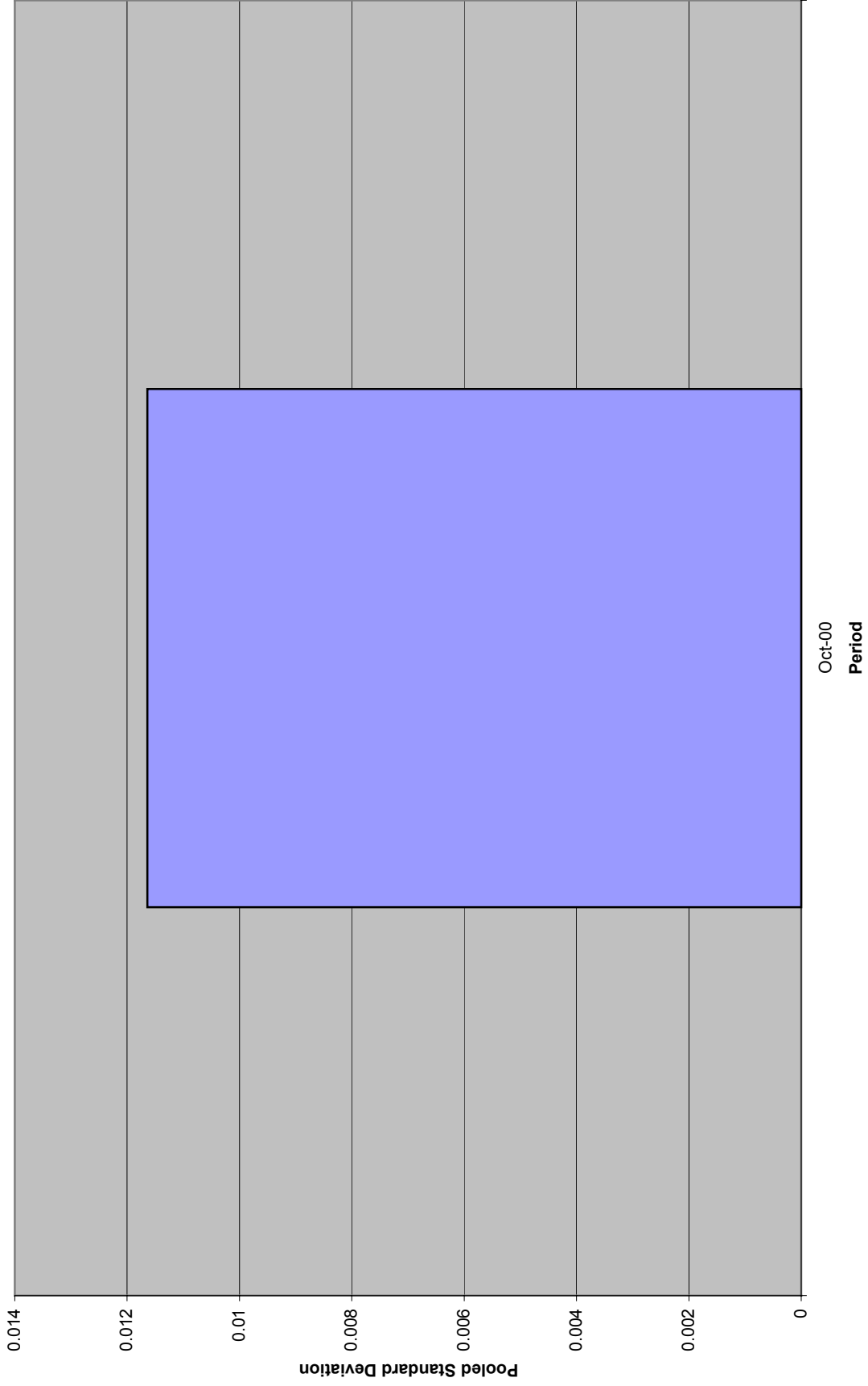


Figure 8 - Average Piston Skirt Varnish, Pooled Standard Deviation

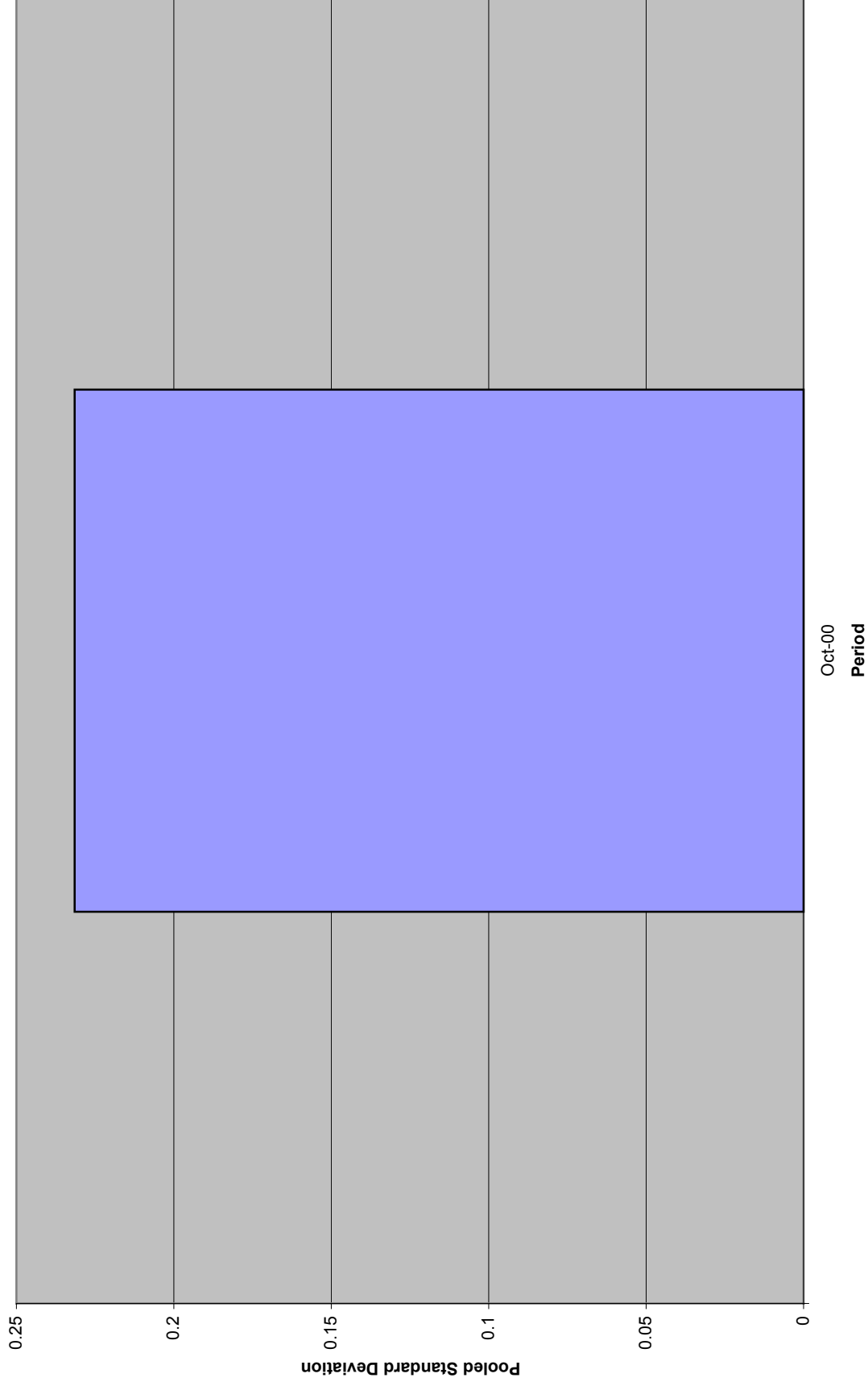


Figure 9 - Weighted Piston Deposits, Pooled Standard Deviation

