



Test Monitoring Center

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MEMORANDUM: 09-056

DATE: November 6, 2009

TO: Mark Cooper, Chairman, Mack Test Surveillance Panel

FROM: Jeff Clark

SUBJECT: T-8/T-8E, T-10A, T-11, and T-12 Calibration Testing for the October 2009 ASTM Report Period

The following is a summary of T-8/T-8E, T-10A, T-11, and T-12 reference oil tests completed during the October 2009 ASTM report period, which began on April 1, 2009 and ended on September 30, 2009.

Test Status	TMC Validity Code	Number of Tests			
		T-8/T-8E	T-10A	T-11	T-12
Acceptable Calibration Test	AC	5	1	4	3
Failed Calibration Test (LTMS Criteria)	OC	0	0	0	0
Operationally Invalid Test	LC	1	0	0	0
Aborted	XC	0	0	1	0
Total		6	1	5	3

One T-8 test was invalid due to the inlet air restriction being out of specification. One T-11 was aborted due to high oil consumption.

T-8 Severity:

Viscosity Increase at 3.8% Soot (VI38), Relative Viscosity at 4.8% Soot, 50% Loss (RV48), and Relative Viscosity at 4.8% Soot, 100% Loss (RV2) are all currently within control chart limits. All three parameters are trending slightly mild with average Δ/s values of -0.46, -0.42, and -0.57 for VI38, RV48, and RV2, respectively. Figures 1, 2, and 3 (attached) show the current industry EWMA severity, EWMA precision, and cusum charts for VI38, RV48, and RV2, respectively.

T-10A Severity:

MRV Viscosity (MRV) is currently within control chart limits. Since January 2006, MRV has been trending an average of 0.56 Δ/s severe, which is approximately 280 cP. Figure 4 (attached) shows the current industry EWMA severity and cusum charts for MRV.

T-11 Severity:

Soot at 12 cSt Viscosity Increase (SOOT), MRV Viscosity (MRV), Soot at 4 cSt Viscosity Increase (SOOT4), and Soot at 15 cSt Viscosity Increase (SOOT5) are all currently within control chart limits. Figures 5 through 8 (attached) show the current industry EWMA severity, EWMA precision, and cusum charts for SOOT, MRV, SOOT4, and SOOT5, respectively.

T-12 Severity:

Delta PB @ EOT (PB), Cylinder Liner Wear (CLW), Top Ring Weight Loss (TRWL), and Delta PB 250 – 300 Hours (PB2) are all currently within control chart limits. Oil Consumption (OC) is currently in an EWMA precision warning alarm. PB, CLW, OC, and PB2 are not exhibiting any pronounced severity trends, while TRWL may be showing some evidence of a severe trend. Figures 9 through 13 (attached) show the current industry EWMA severity, EWMA precision, and cusum charts for PB, CLW, TRWL, OC, and PB2, respectively.

Reference Test Precision Estimates:

Precision estimates, and any relevant commentary, will be provided on an annual basis in the sections below. Please note that due to low testing frequency, precision estimates are not available for the T-10A.

The preliminary 2009 T-8/T-8E precision estimates show slight improvement compared to 2007. It is difficult to compare with 2006 when the T-8/T-8E was using oil 1004-3 instead of 1005-2. Due to low activity levels, estimates are not available for 2005 and 2008.

T-8 / T-8E Precision Estimates

Parameter	2005	2006	2007	2008	2009
df	N/A	4	4	N/A	6
VI38	N/A	0.83	0.71	N/A	0.64
RV48	N/A	0.51	0.09	N/A	0.06
RV2	N/A	0.57	0.11	N/A	0.07

The preliminary 2009 T-11 precision estimates show improvement for MRV. Precision for SOOT, SOOT4, and SOOT 5 are comparable to recent levels.

T-11 Precision Estimates

Parameter	2005	2006	2007	2008	2009
df	21	17	9	16	4
SOOT	0.23	0.22	0.18	0.18	0.19
MRV	1410	1251	820	967	688
SOOT4	0.22	0.22	0.32	0.33	0.31
SOOT5	0.26	0.23	0.18	0.18	0.19

The T-12 2008 precision estimates show some improvement for PB, CLW, TRWL, and PB2, with the OC precision estimate remaining relatively steady. Due to low activity levels, no estimates of precision are yet available for 2009

T-12 Precision Estimates

Parameter	2005	2006	2007	2008	2009
df	21	11	6	7	
PB (ln units)	0.252	0.2030	0.274	0.164	
CLW	3.9	3.8	3.1	2.7	
TRWL	28.4	28.6	33.4	18.2	
OC (ln units)	0.080	0.087	0.086	0.090	
PB2 (ln units)	0.344	0.321	0.321	0.238	

Reference Oil Test Targets:

The current T-8/T-8E reference oil test targets are shown in the table below. To date, eleven tests have been completed on TMC 1005-2. For the consideration of a possible target update, the eleven test data set is summarized in the table below.

T-8/T-8E Reference Oil Test Targets

Oils	N	Parameter	Mean	S
1005-2 ^A	5	VI38	5.11	0.66
		RV48	1.78	0.11
		RV2	2.03	0.12
1005-2 ^B	11	VI38	5.06	0.62
		RV48	1.77	0.08
		RV2	2.01	0.09

^ATest Targets.

^BPresented for comparison purposes.

The current T-10A reference oil test targets are shown in the table below.

T-10A Reference Oil Test Targets

Oils	N	Parameter	Mean	S
820-2	30	MRV	13128	497

The current T-11 reference oil test targets are shown in the table below. To date, 35 tests have been completed on oil 820-3 and the results are presented for comparison purposes. The Surveillance Panel may soon wish to consider updating the T-11 targets.

T-11 Reference Oil Test Targets

Oil	N	Parameter	Mean (cSt)	s
820-3	11	SOOT	5.92	0.22
		MRV	14981	916
		SOOT4	3.95	0.30
		SOOT5	6.51	0.20
820-3	35 ^C	SOOT	5.96	0.19
		MRV	14645	926
		SOOT4	4.05	0.31
		SOOT5	6.55	0.18

^CPresented for comparison purposes.

The current T-12 reference oil test targets are shown in the following table. Note that the current targets for oil 821-1 are based on the previous blend of the reference oil. To date, ten tests have been completed on oil 821-1 and the results are presented for the consideration of a possible target update.

T-12 Reference Oil Test Targets

Oils	N	Parameter	Mean	S
821-1	25 ^D	PB (ln units)	3.106	0.242
		CLW	16.2	3.7
		TRWL	62.0	28.2
		OC (ln units)	4.093	0.079
		PB2 (ln units)	2.125	0.333
821-1	10 ^E	PB (ln units)	3.149	0.168
		CLW	18.0	3.2
		TRWL	75.6	16.6
		OC (ln units)	4.144	0.086
		PB2 (ln units)	2.226	0.234

^DBased on twenty-five tests on oil 821.

^EPresented for comparison purposes.

Reference Oil Supply:

The following table shows current reference oil inventories. Based upon these levels, no action regarding reference oil supply is necessary at this time.

Reference Oil Inventory and Estimated Life

Oil	Tests	TMC Inventory ^F	Lab Inventory ^G	Estimated Life ^H
820-2	T-10A, T-11	10	3	> 1 year
820-3	T-10A, T-11	1371	6	5 years
821-1	T-12	573	7	3 years
1005-2	T-8/T-8E ^I	0	4	~ 1 year
1005-3 ^J	T-8/T-8E	2200	0	5+ years

^FInventories are expressed in gallons.

^GActive laboratories.

^HTime estimate is based on most recent activity levels.

^IThe T-8/T-8E shares reference oils with other tests. Activity levels all tests are taken into account in the estimated life of the reference oils.

^JTMC will release 1005-3 to labs upon completion of Quality Assurance analysis.

Information Letters:

No information letters were issued this period.

TMC Laboratory Visits:

No laboratory visits were conducted this period.

Quality Index:

No QI deviations were issued this report period.

Additional Information:

The T-8/T-8E, T-10A, T-11, and T-12 databases, timelines, and alarm logs can be accessed from the links in the table below. If you have any questions about this information, please contact the TMC.

Mack Surveillance Panel Information Links

Test Area	Information Link
T-8/T-8E	ftp://ftp.astmtmc.cmu.edu/refdata/diesel/t8/data/
T-10A	ftp://ftp.astmtmc.cmu.edu/refdata/diesel/t10a/data/
T-11	ftp://ftp.astmtmc.cmu.edu/refdata/diesel/t11/data/
T-12	ftp://ftp.astmtmc.cmu.edu/refdata/diesel/t12/data/

JAC/jac/mem09-056.jac.doc

Attachments

c: F.M. Farber, TMC

Mack Surveillance Panel

<ftp://ftp.astmtmc.cmu.edu/docs/diesel/mack/semiannualreports/MACK-10-2009.pdf>

Distribution: Email

FIGURE 1

T-8/T-8E INDUSTRY OPERATIONALLY VALID DATA

VISCOSITY INCREASE AT 3.8% SOOT

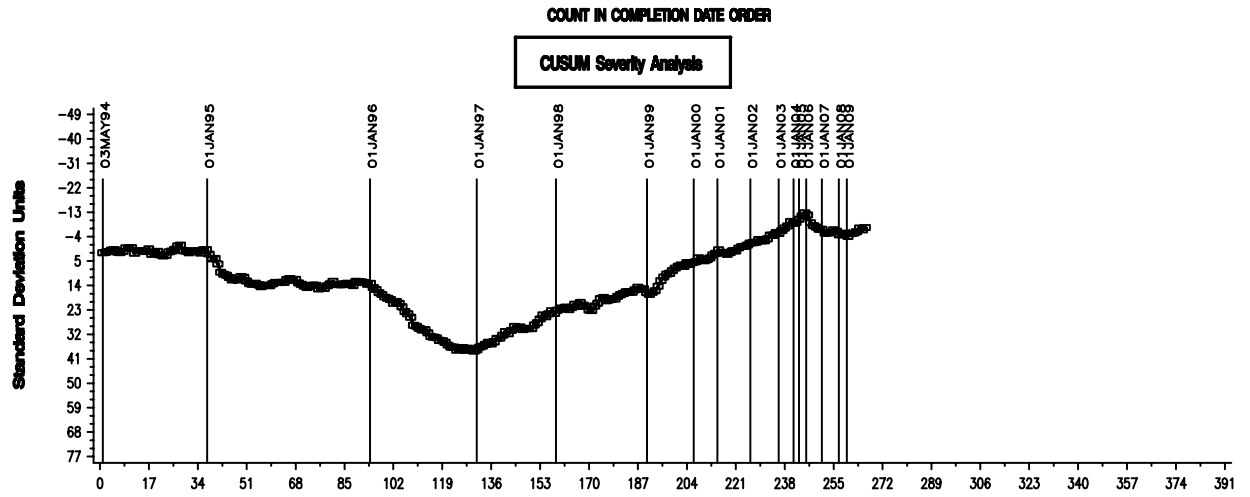
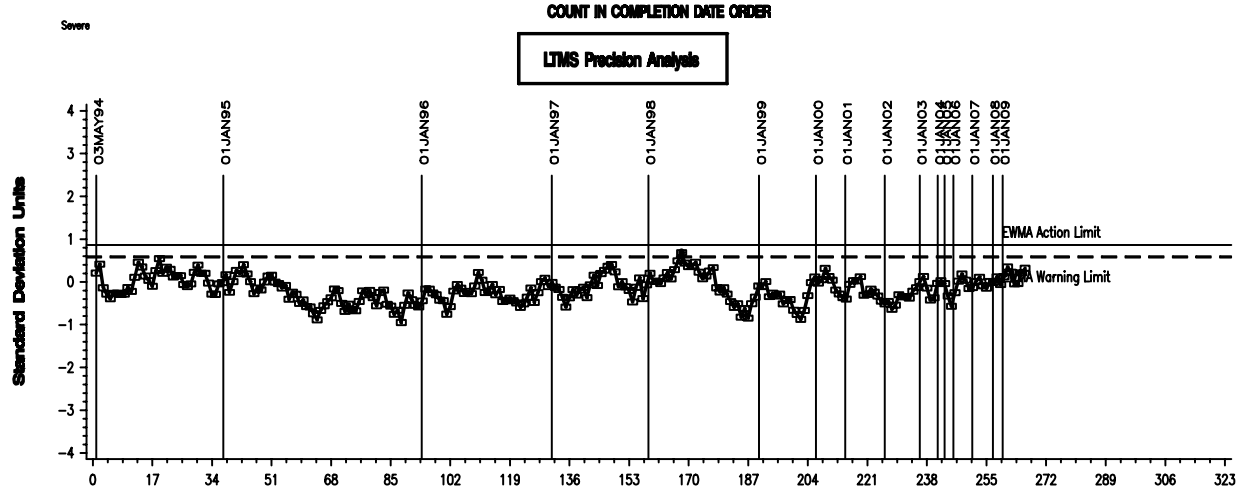
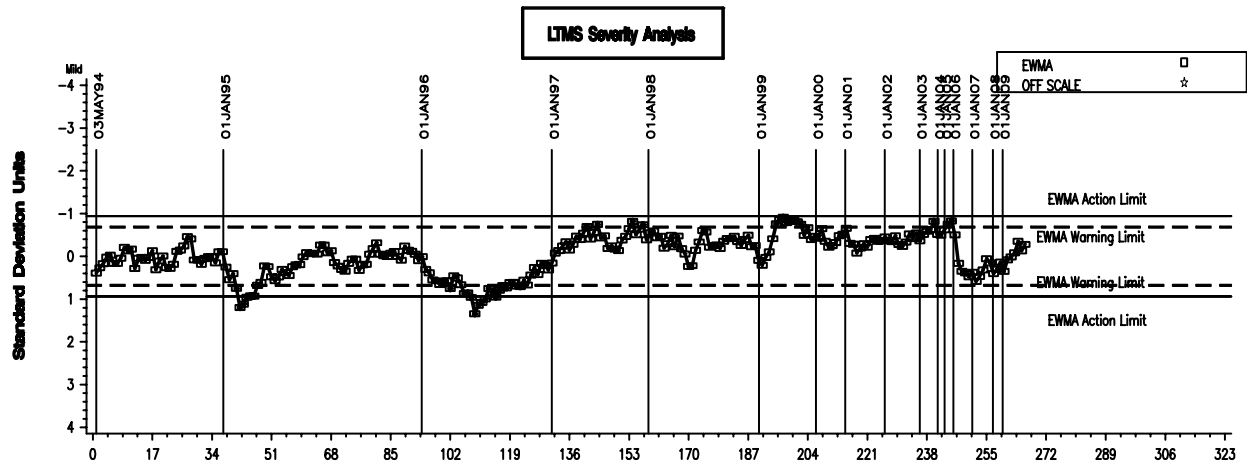


FIGURE 2
T-8/T-8E INDUSTRY OPERATIONALLY VALID DATA

RELATIVE VISCOSITY AT 4.8% (50% LOSS)

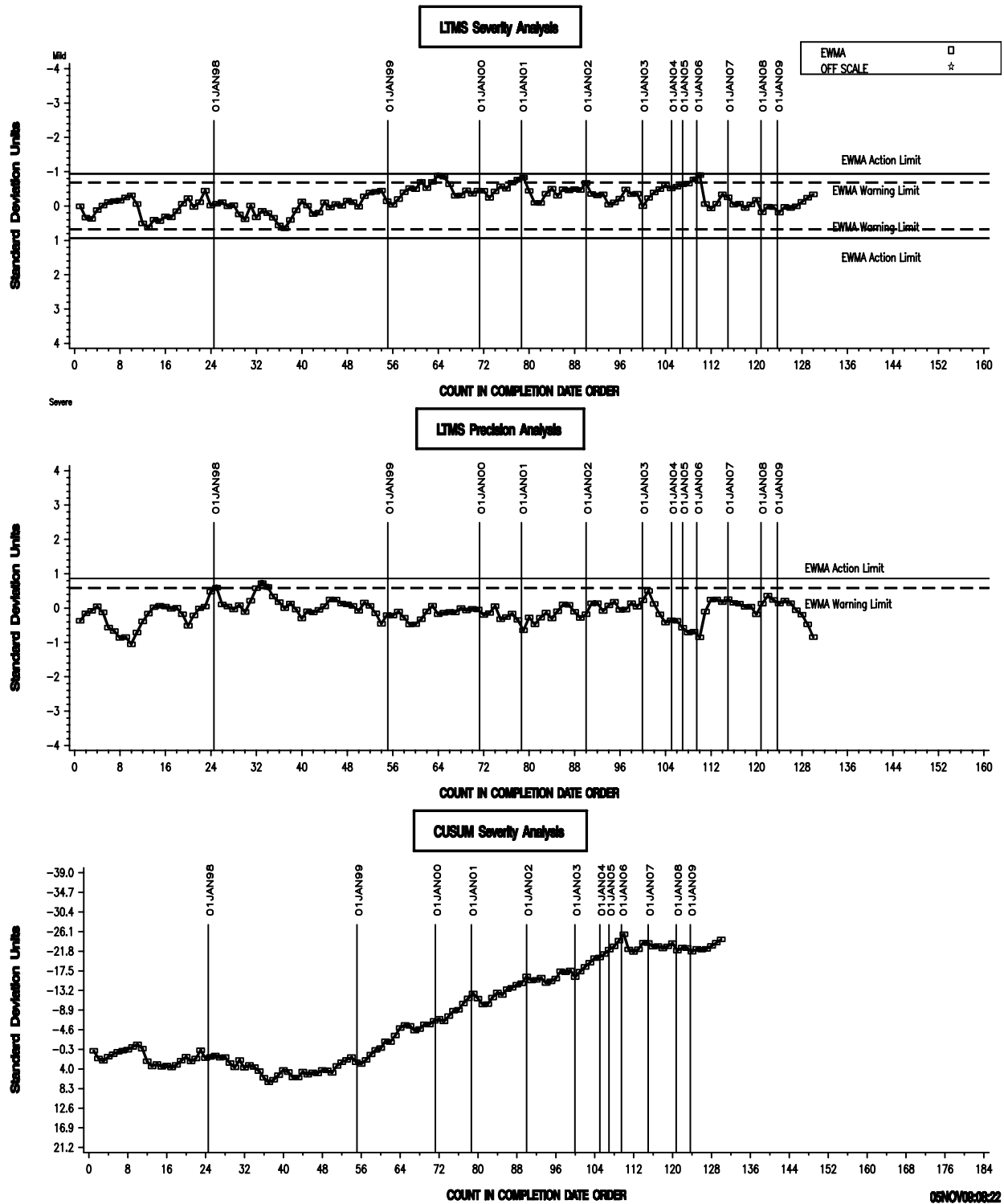


FIGURE 3
T-8/T-8E INDUSTRY OPERATIONALLY VALID DATA
REFERENCE RELATIVE VISCOSITY AT 4.8% (100% LOSS)

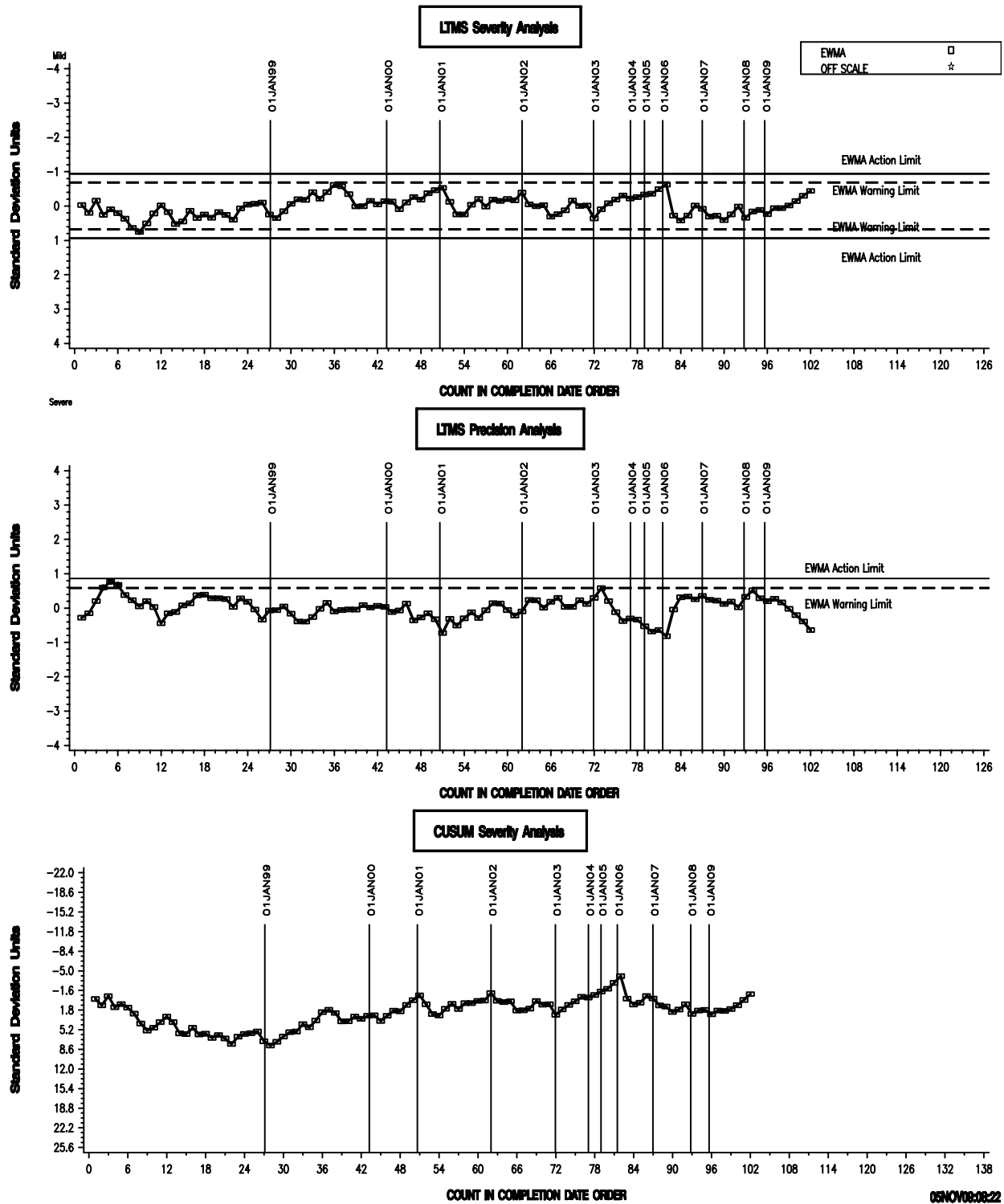


FIGURE 4
TYQA INDUSTRY OPERATIONALLY VALID DATA

MRV VISCOSITY @ 75H

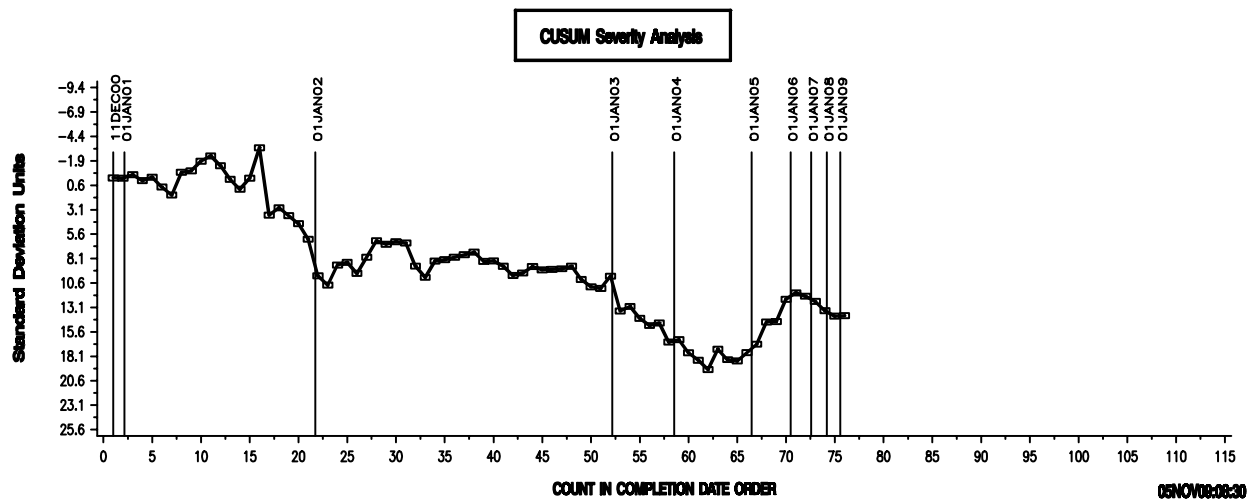
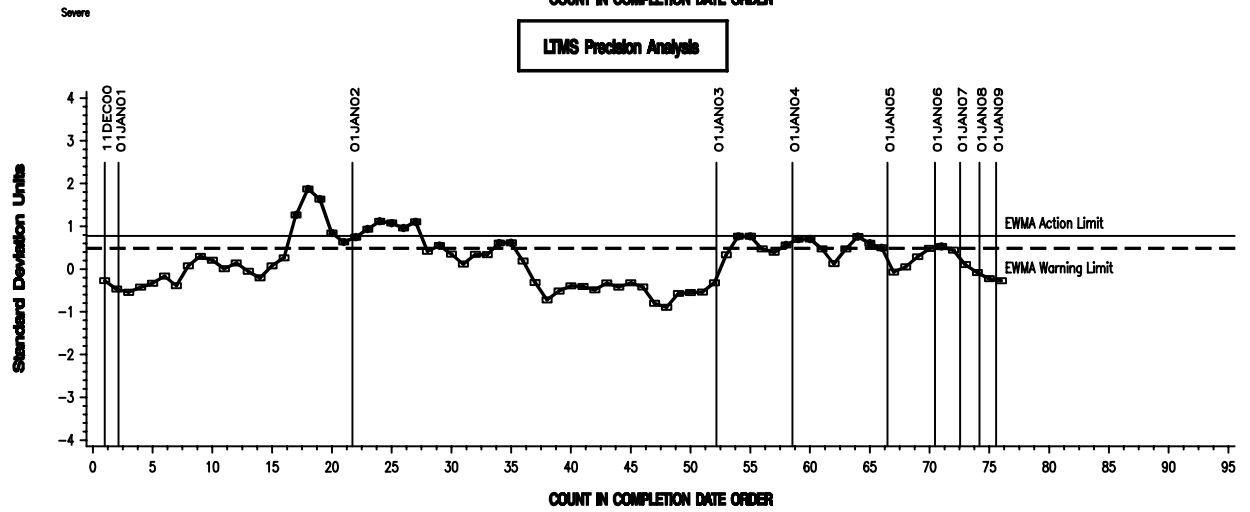
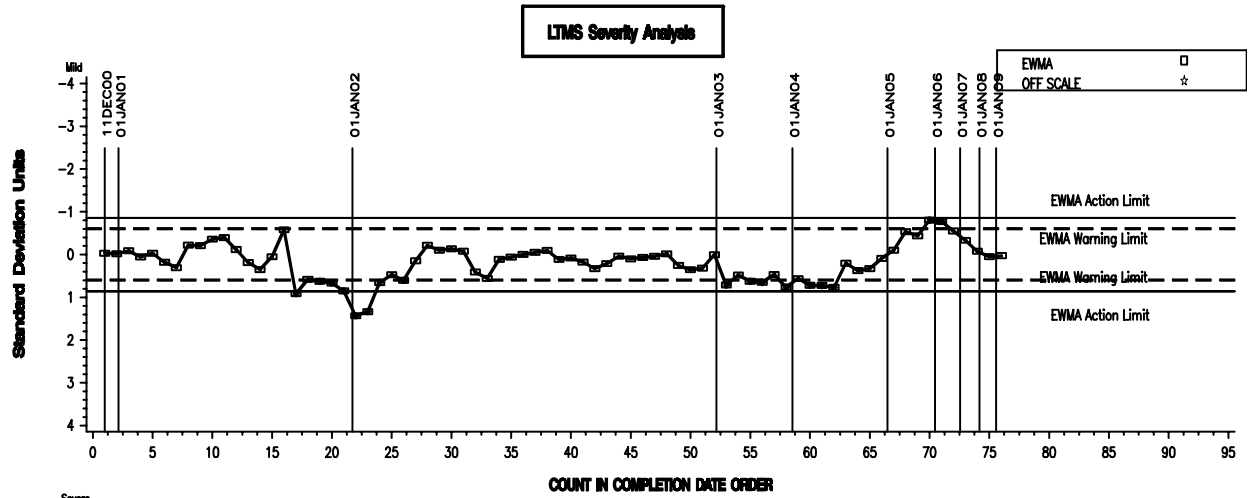


FIGURE 5
T-11 INDUSTRY OPERATIONALLY VALID DATA

SOOT AT 12 cSt

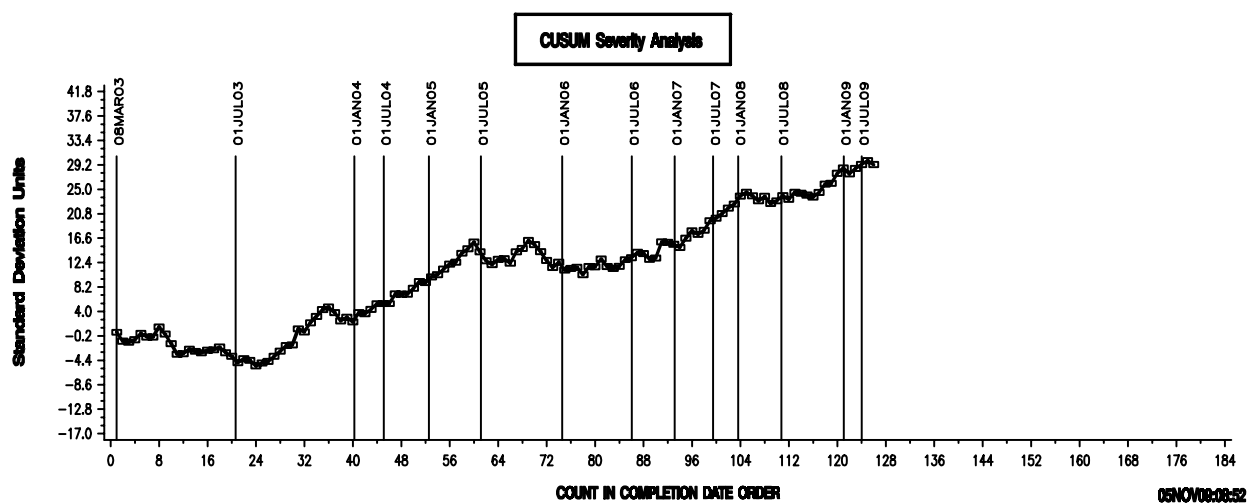
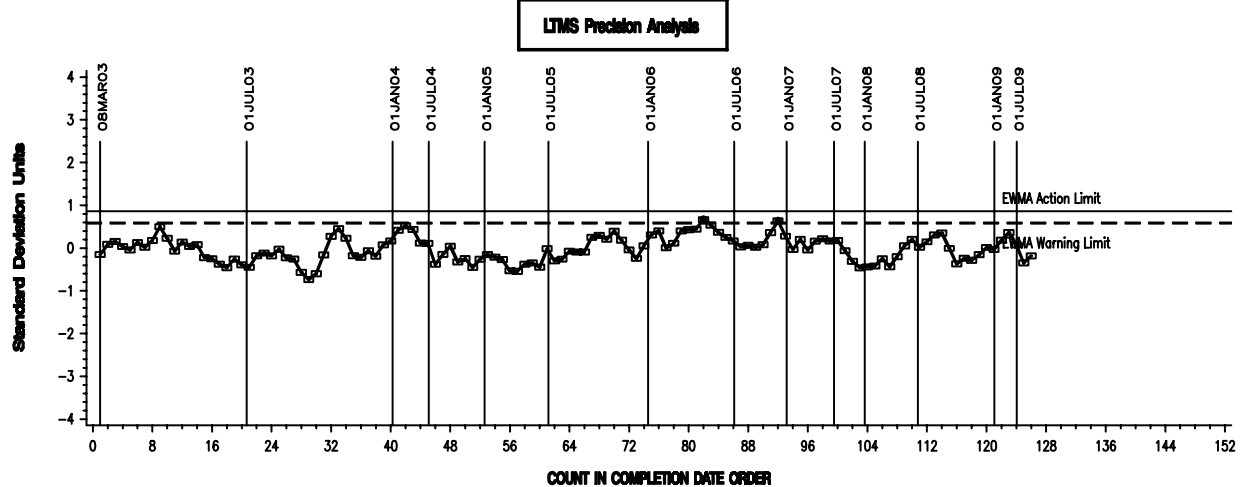
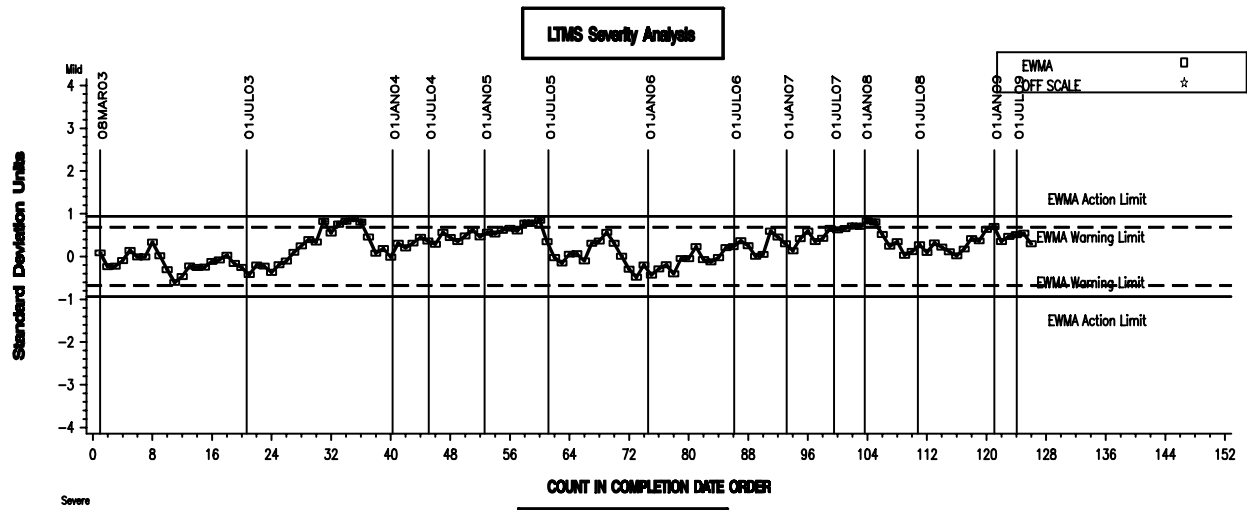


FIGURE 6
T-11 INDUSTRY OPERATIONALLY VALID DATA

MRV VISCOSITY

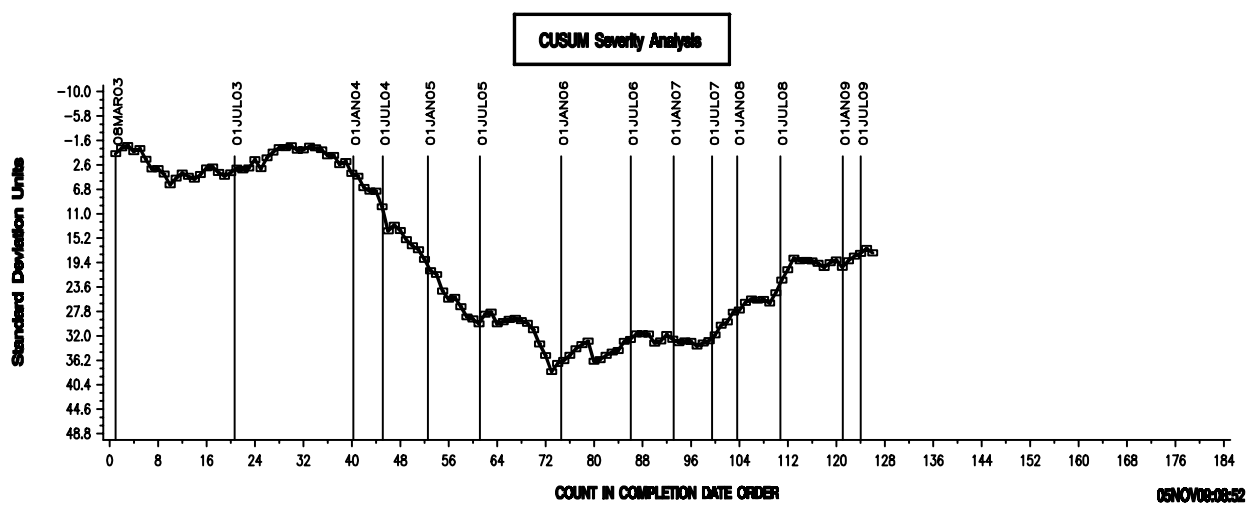
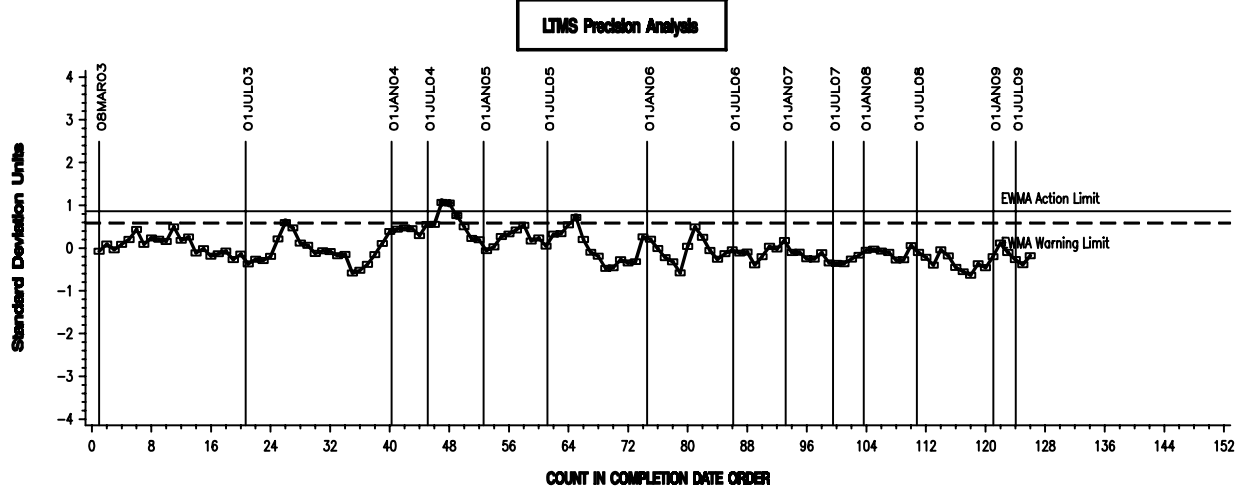
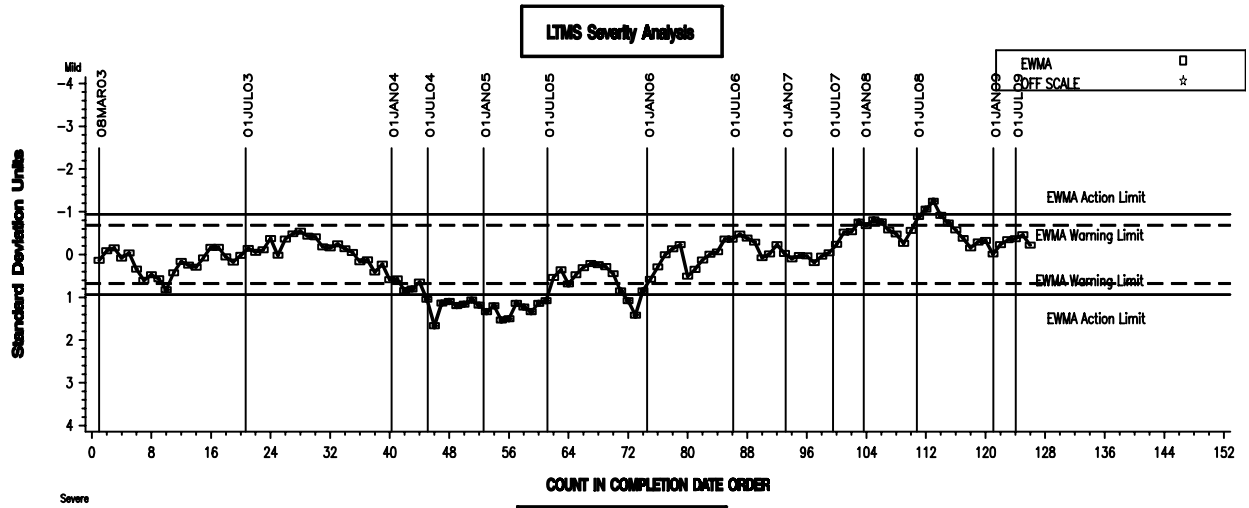


FIGURE 7

T-11 INDUSTRY OPERATIONALLY VALID DATA

SOOT @ 4 cSt - FINAL RESULT

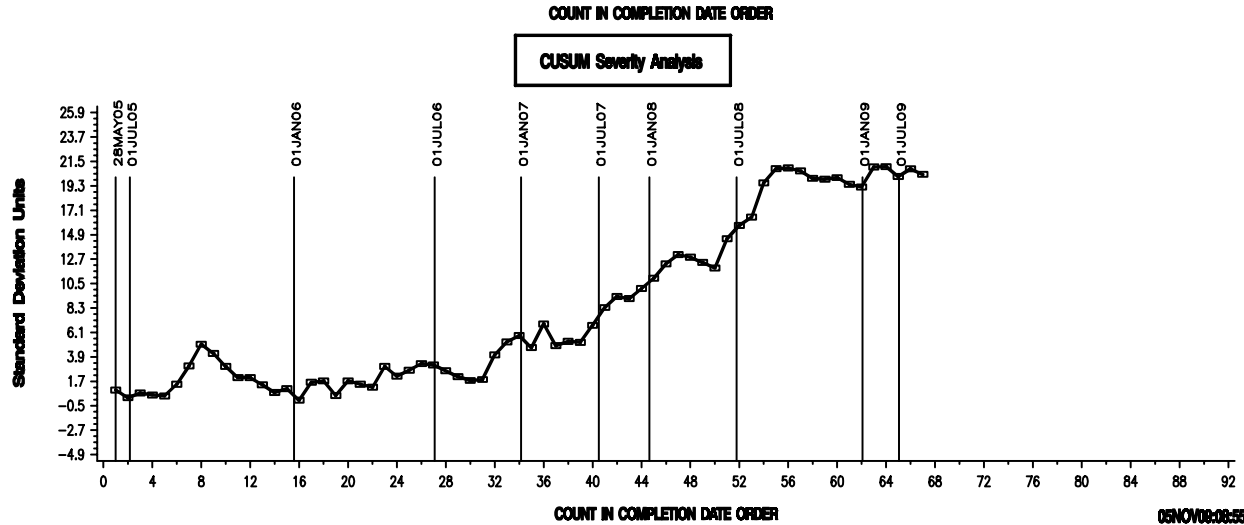
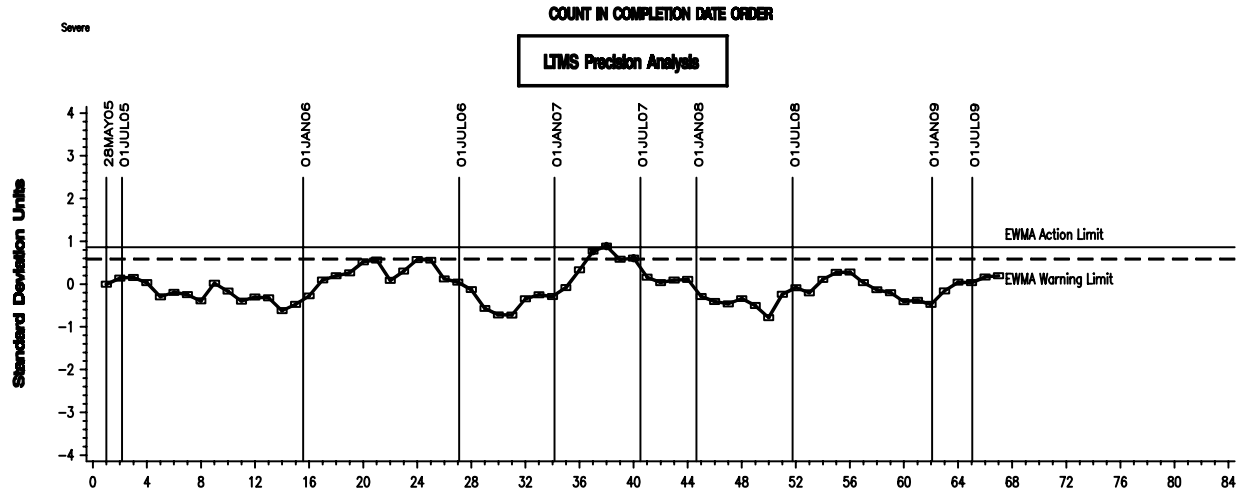
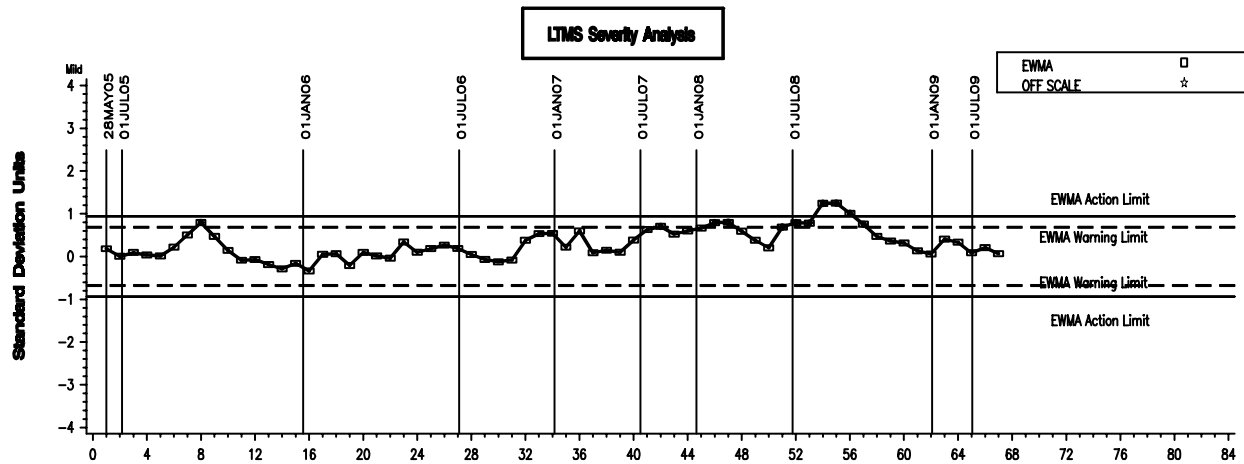


FIGURE 8
T-11 INDUSTRY OPERATIONALLY VALID DATA

SOOT @ 15 cSt - FINAL RESULT

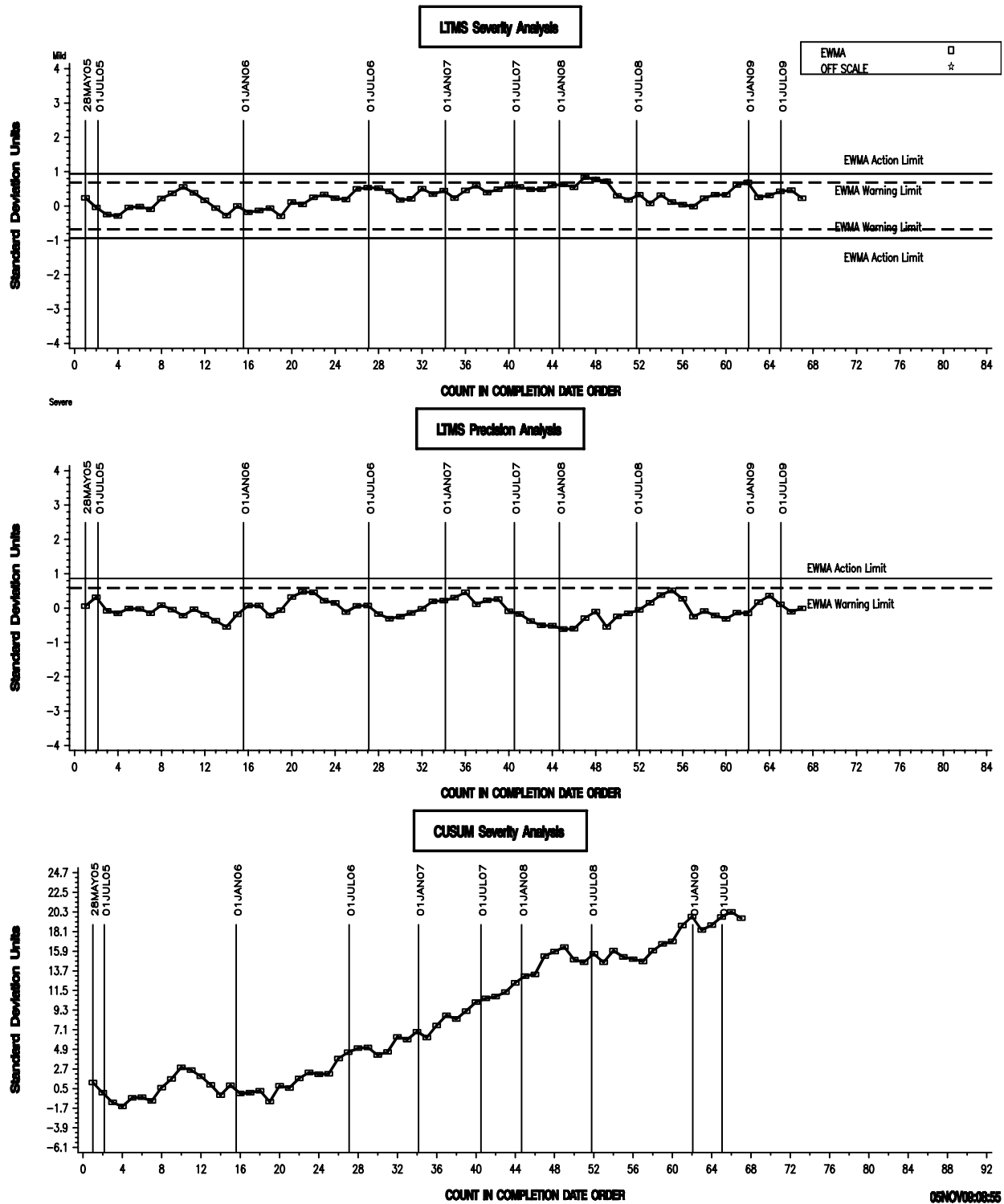


FIGURE 9

MACK T-12 INDUSTRY OPERATIONALLY VALID DATA

DELTA PB @ EOT (PB)

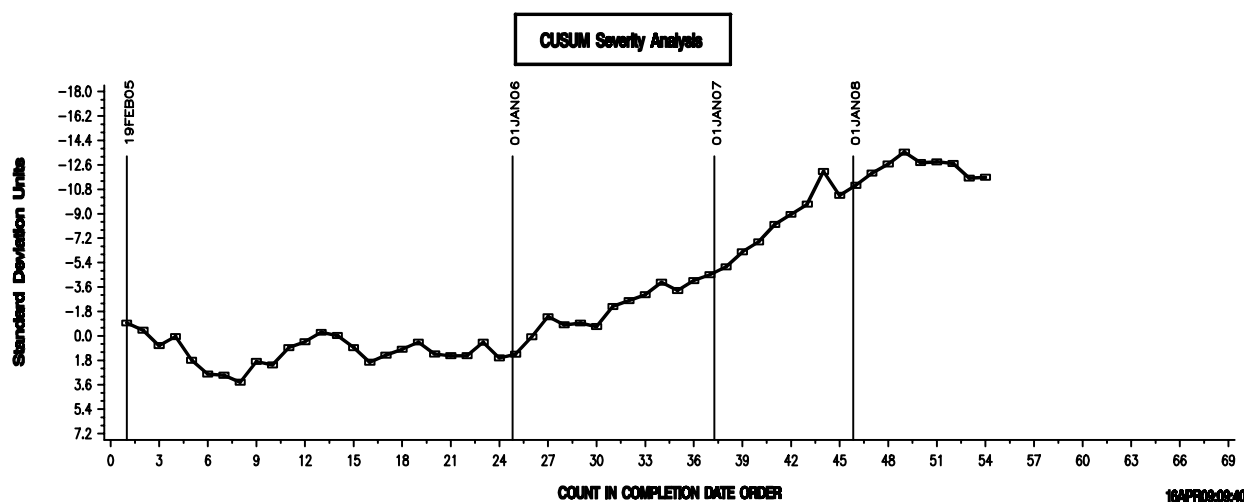
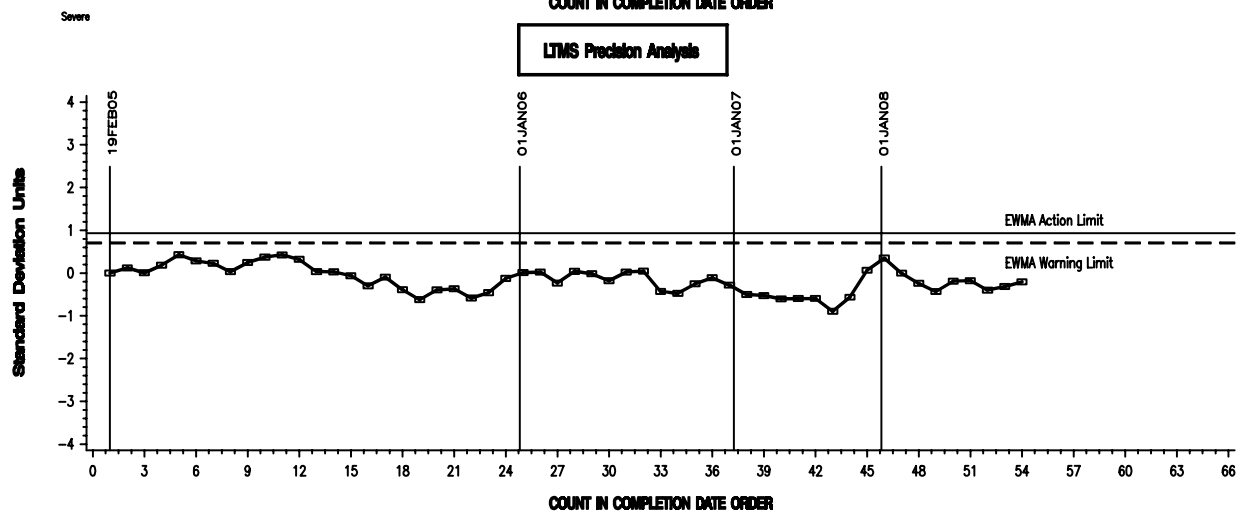
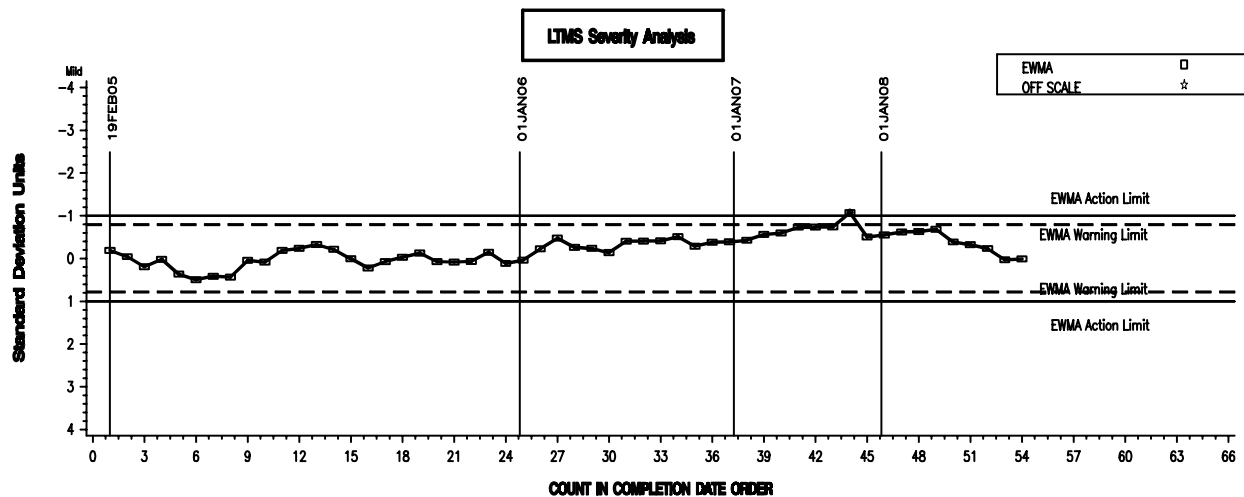


FIGURE 10
MACK T-12 INDUSTRY OPERATIONALLY VALID DATA
AVG. CYLINDER LINER WEAR (CLW)

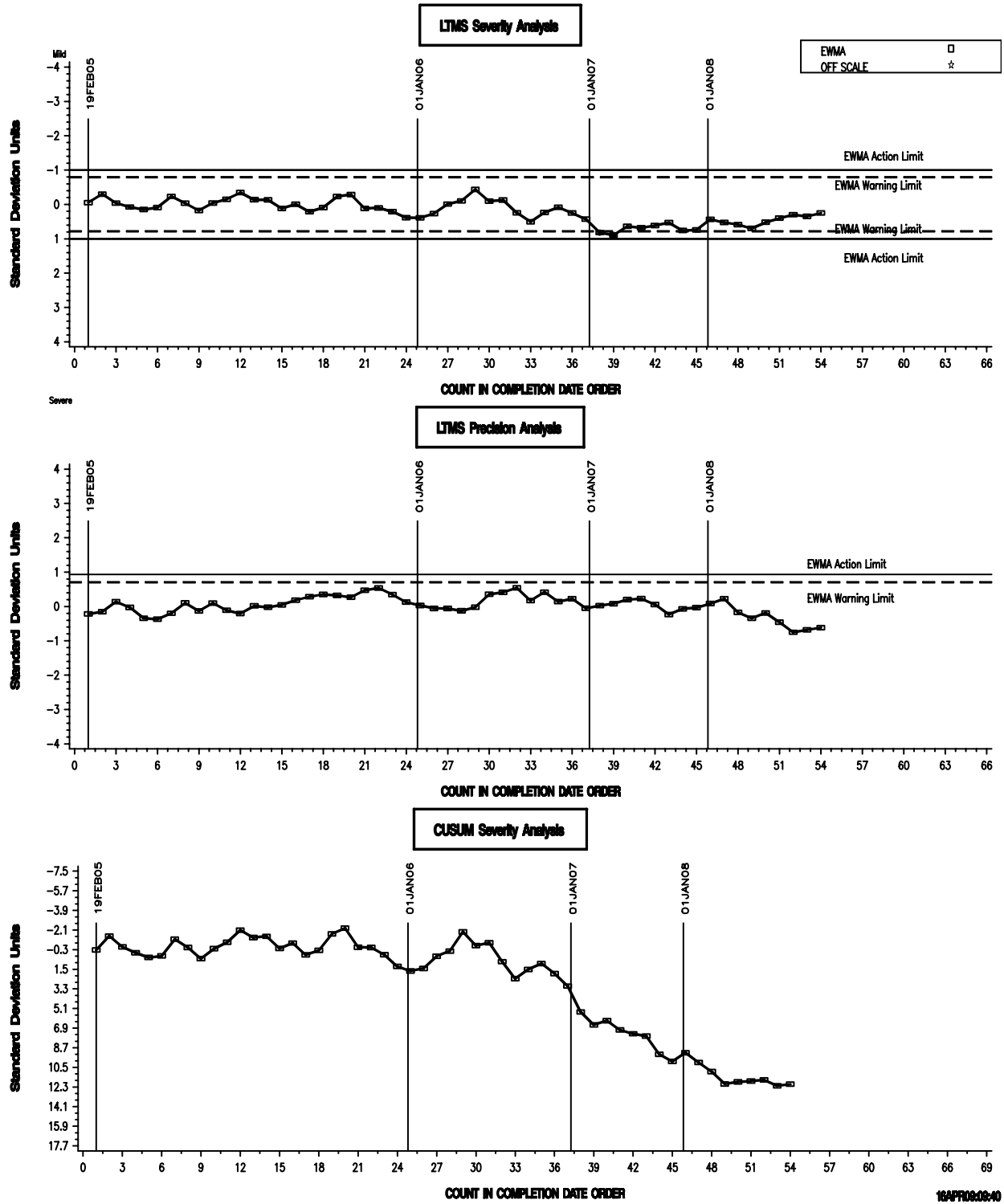


FIGURE 11
MACK T-12 INDUSTRY OPERATIONALLY VALID DATA

AVG. TOP RING WEIGHT LOSS (TRWL)

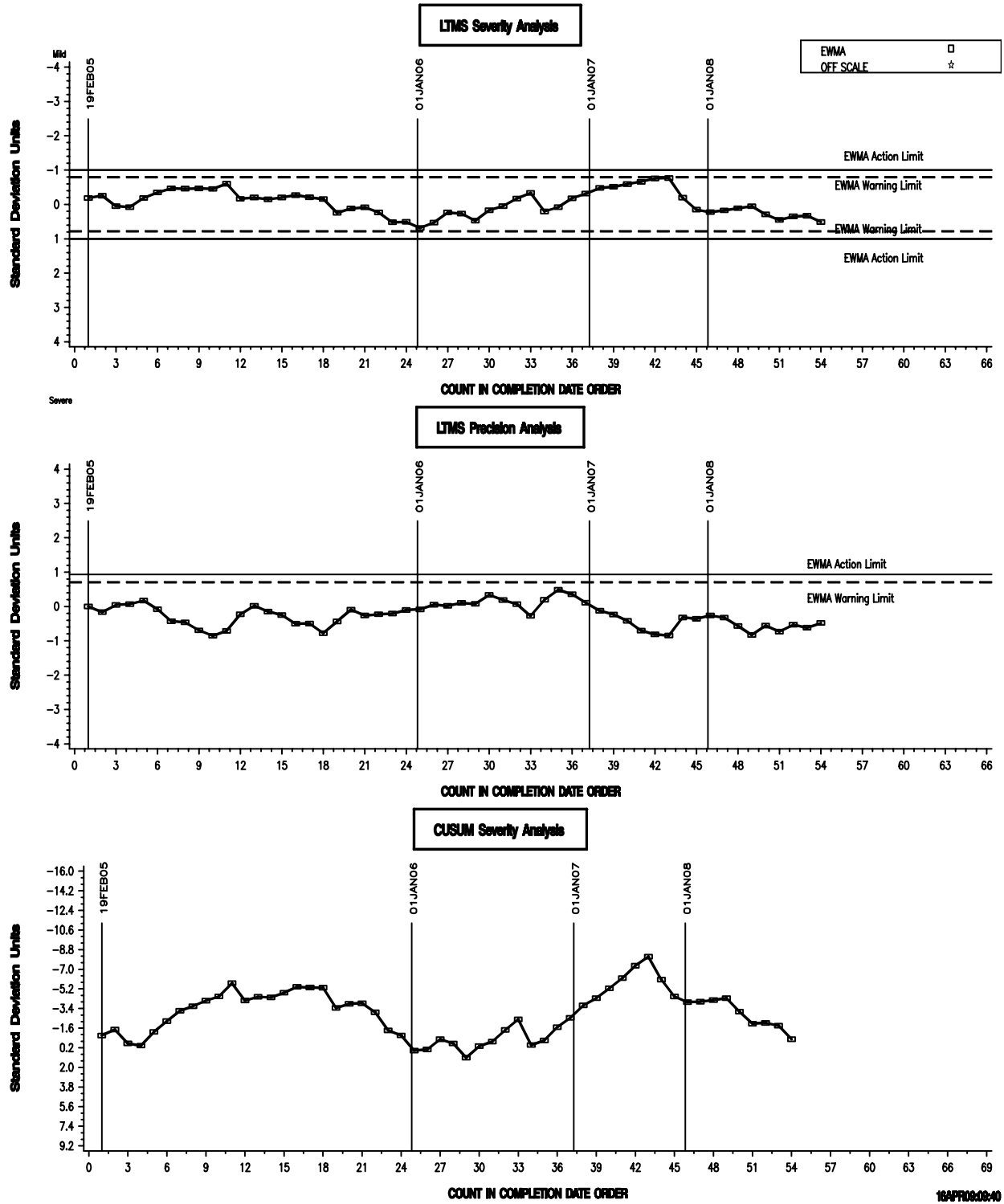


FIGURE 12
MACK T-12 INDUSTRY OPERATIONALLY VALID DATA

OIL CONSUMPTION (OC)

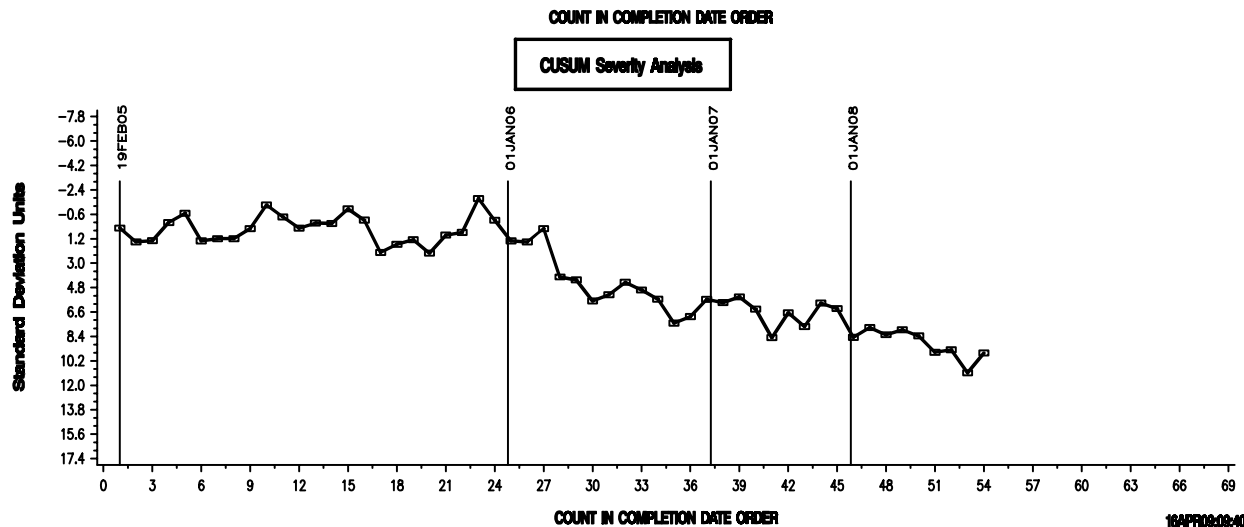
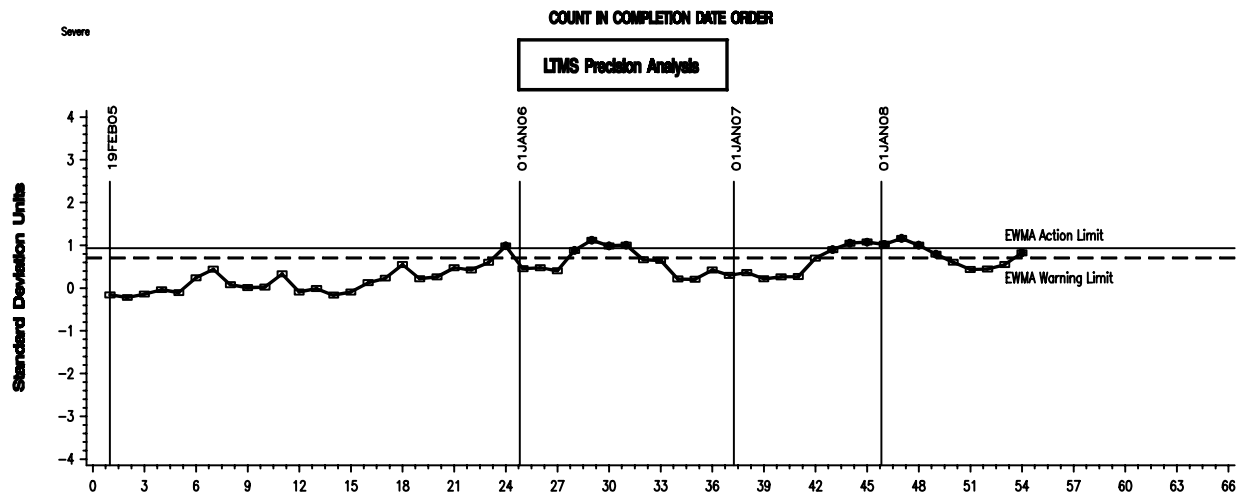
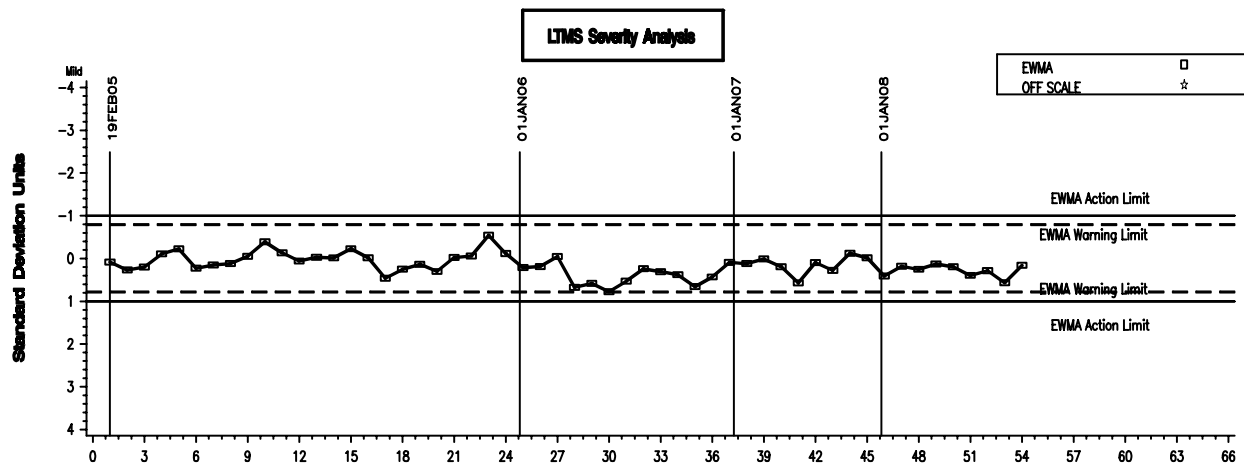


FIGURE 13
MACK T-12 INDUSTRY OPERATIONALLY VALID DATA
DELTA PB 250-300H (PB2)

