



Test Monitoring Center

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MEMORANDUM: 08-065

DATE: November 7, 2008

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 2008 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 2008 ASTM report period, which began on April 1, 2008 and ended on September 30, 2008.

Test Status	TMC Validity Code	Number of Tests			
		T-8/T-8E	T-10A	T-11	T-12
Acceptable Calibration Test	AC	1	1	8	5
Failed Calibration Test (LTMS Criteria)	OC	0	0	0	0
Operationally Invalid Test	RC or LC	0	0	0	0
Aborted	XC	2	0	1	1
Total		3	1	9	6

Two T-8 tests were aborted due to missing a soot window. One T-11 was aborted due to data acquisition problems, and one T-12 test was aborted due to problems resulting from incorrectly installed thrust washers.

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 and are not exhibiting any pronounced severity trends. 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 0.35 Δ /s severe, which is approximately 170 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 and are not currently exhibiting any pronounced severity trends. The MRV and SOOT4 mild trends that began in late 2007 appear to have recently abated. 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), Oil Consumption (OC), and Delta PB 250 – 300 Hours (PB2) are all currently within control chart limits and are not exhibiting any pronounced severity trends. 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-8 and T-10A.

The T-11 preliminary precision estimates for 2008 show MRV and SOOT5 precision to be within historical levels. The precision for SOOT shows some improvement compared to recent years, while SOOT4 continues to show some degradation.

T-11 Precision Estimates

Parameter	2005	2006	2007	2008	2009
df	21	17	9	13	
SOOT	0.23	0.22	0.18	0.18	
MRV	1410	1251	820	1014	
SOOT4	0.22	0.22	0.32	0.35	
SOOT5	0.26	0.23	0.18	0.19	

The T-12 2008 preliminary precision estimates show some improvement for PB, CLW, TRWL, and PB2, with the OC precision estimate remaining relatively steady.

T-12 Precision Estimates

Parameter	2005	2006	2007	2008	2009
df	21	11	6	7	
PB (ln units)	0.252	0.2030	0.274	0.165	
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. For the consideration of a possible target update, the TMC will advise the Surveillance Panel when ten tests have been run on oil 1005-2.

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

Oils	N	Parameter	Mean	S
1005-2	5	VI38	5.11	0.66
		RV48	1.78	0.11
		RV2	2.03	0.12

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, 28 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	28 ^A	SOOT	5.95	0.19
		MRV	14551	993
		SOOT4	4.07	0.33
		SOOT5	6.55	0.19

^APresented 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, seven tests have been completed on oil 821-1 and the results are presented for comparison purposes. For the consideration of a

possible target update, the TMC will advise the Surveillance Panel when ten tests have been run on oil 821-1.

T-12 Reference Oil Test Targets

Oils	N	Parameter	Mean	S
821-1	25 ^B	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	7 ^C	PB (ln units)	3.117	0.172
		CLW	17.3	2.0
		TRWL	75.6	19.0
		OC (ln units)	4.114	0.083
		PB2 (ln units)	2.171	0.161

^BBased on twenty-five tests on oil 821.

^CPresented for comparison purposes.

Reference Oil Supply:

The table below 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 ^C	Lab Inventory ^D	Estimated Life ^E
820-2	T-10A, T-11	10	7	1 year
820-3	T-10A, T-11	1712	7	3.8 years
821-1	T-12	649	5	5.2 years
1005-2	T-8/T-8E ^F	474	3	2.5 years

^CInventories are expressed in gallons.

^DActive laboratories.

^ETime estimate is based on most recent activity levels.

^FThe 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.

Information Letters:

No Information Letters were issued during the October 2008 period.

TMC Laboratory Visits:

No laboratory visits were conducted this period.

Quality Index:

One Quality Index deviation was issued this ASTM period, for T-12 intake manifold temperature. The low QI value was caused by a stuck control valve.

Hardware Issues:

T-12 test results from earlier this year indicated a severity shift in cylinder liner wear that was tied to the use of batch P cylinder kits. As a result, a multiplicative correction factor of 0.58 (CLW x 0.58) was approved on October 27, 2008. Implementation details for this correction factor will soon be published in an information letter.

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/mem08-065.jac.doc

Attachments

c: J.L. Zalar, TMC
F.M. Farber, TMC
Mack Surveillance Panel
<ftp://ftp.astmtmc.cmu.edu/docs/diesel/mack/semiannualreports/MACK-10-2008.pdf>

Distribution: Email

FIGURE 3 T-8/T-8E INDUSTRY OPERATIONALLY VALID DATA

REFERENCE RELATIVE VISCOSITY AT 4.8% (100% LOSS)

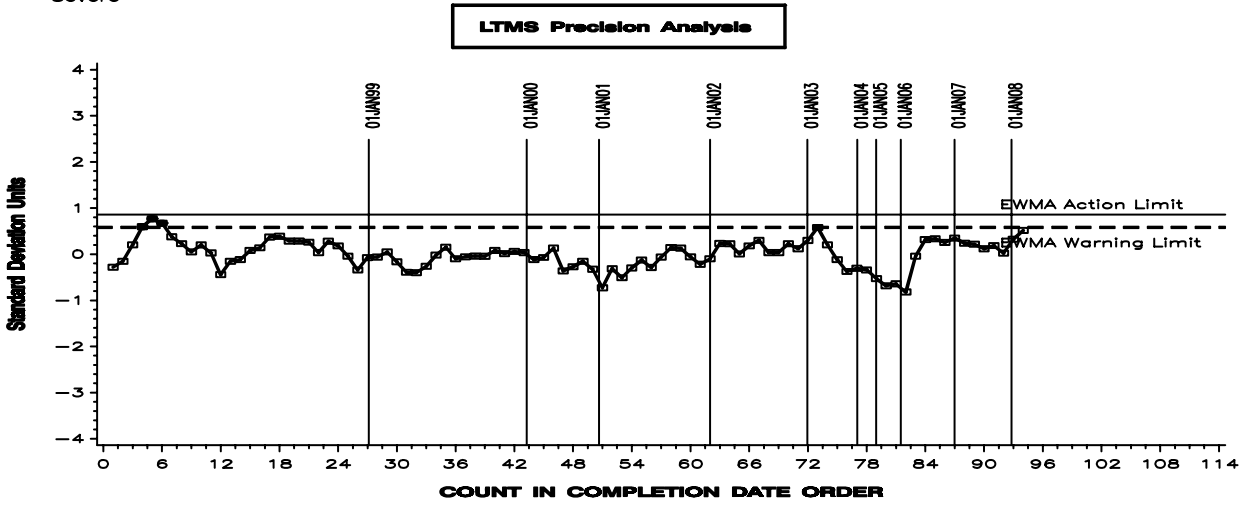
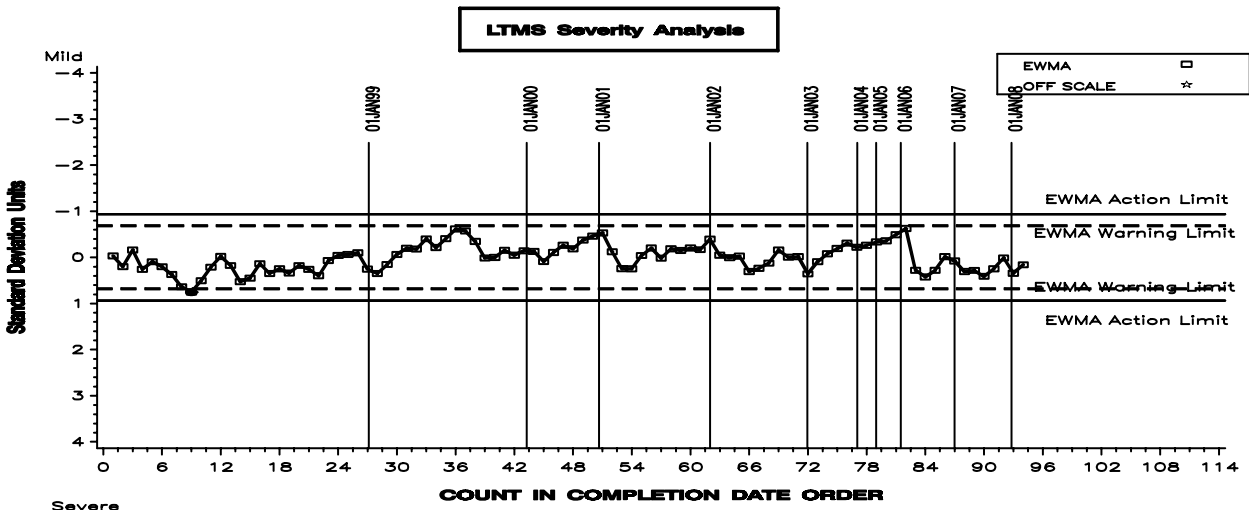


FIGURE 4
T10A INDUSTRY OPERATIONALLY VALID DATA

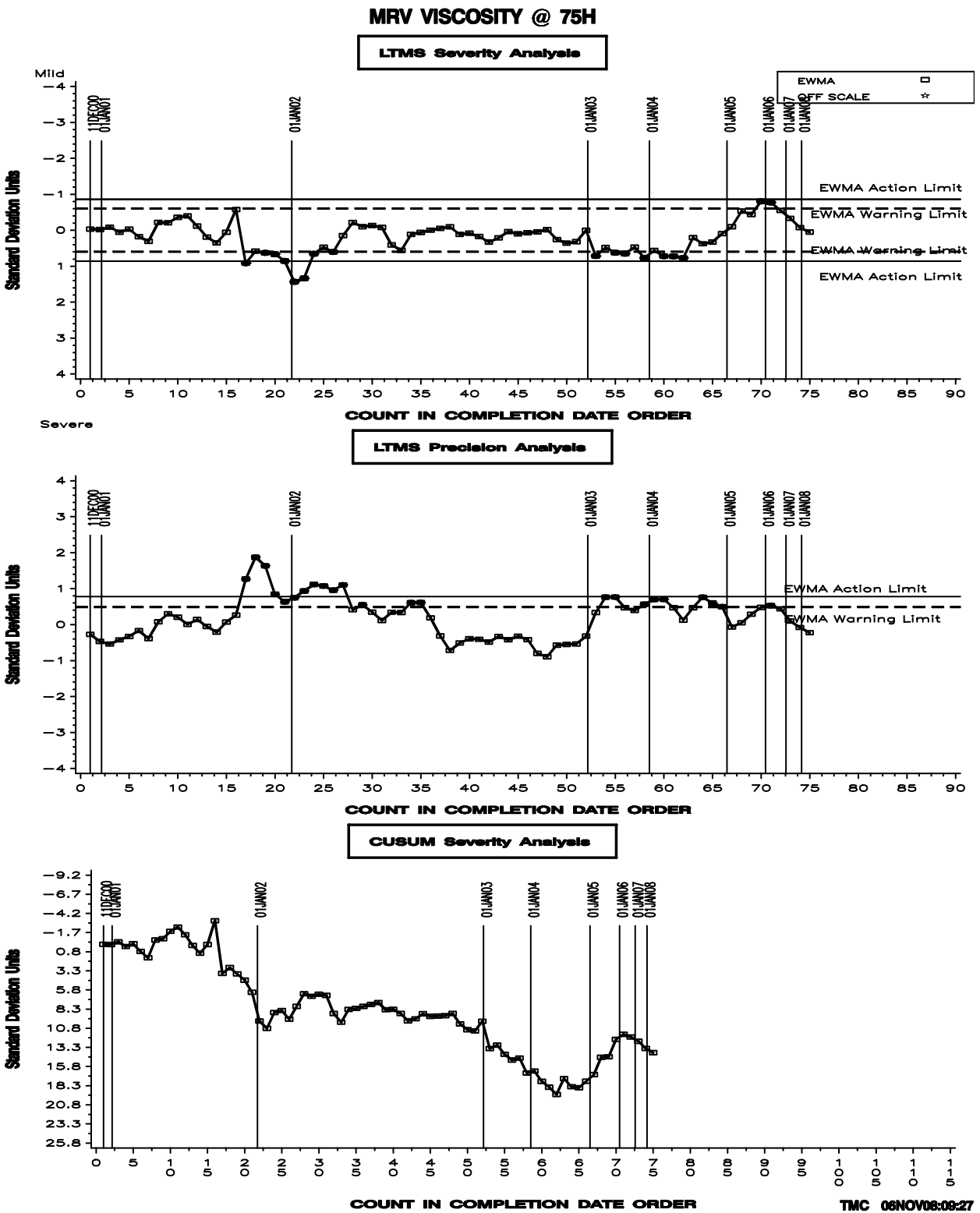


FIGURE 5 T-11 INDUSTRY OPERATIONALLY VALID DATA

SOOT AT 12 cSt

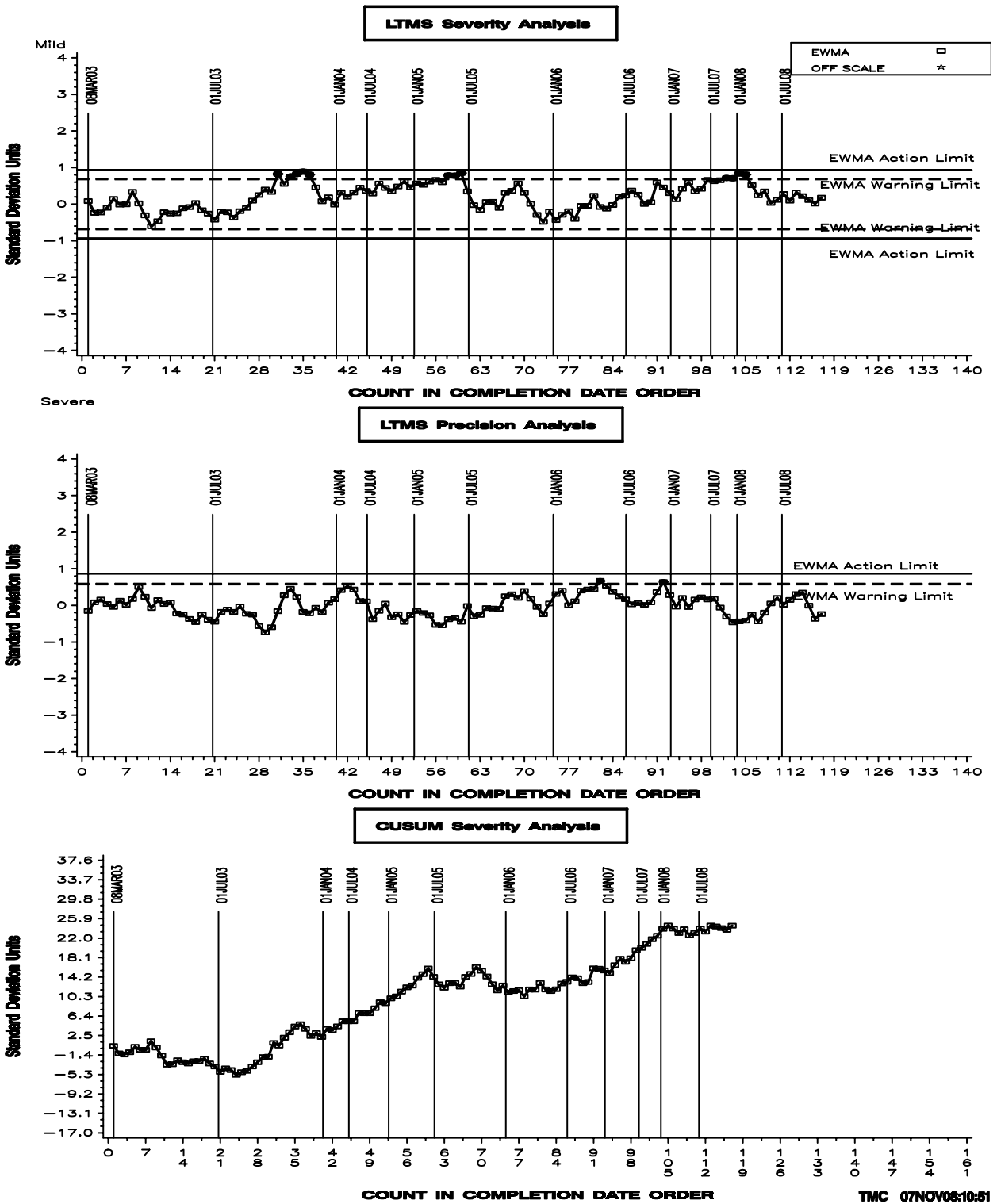


FIGURE 6
T-11 INDUSTRY OPERATIONALLY VALID DATA

MRV VISCOSITY

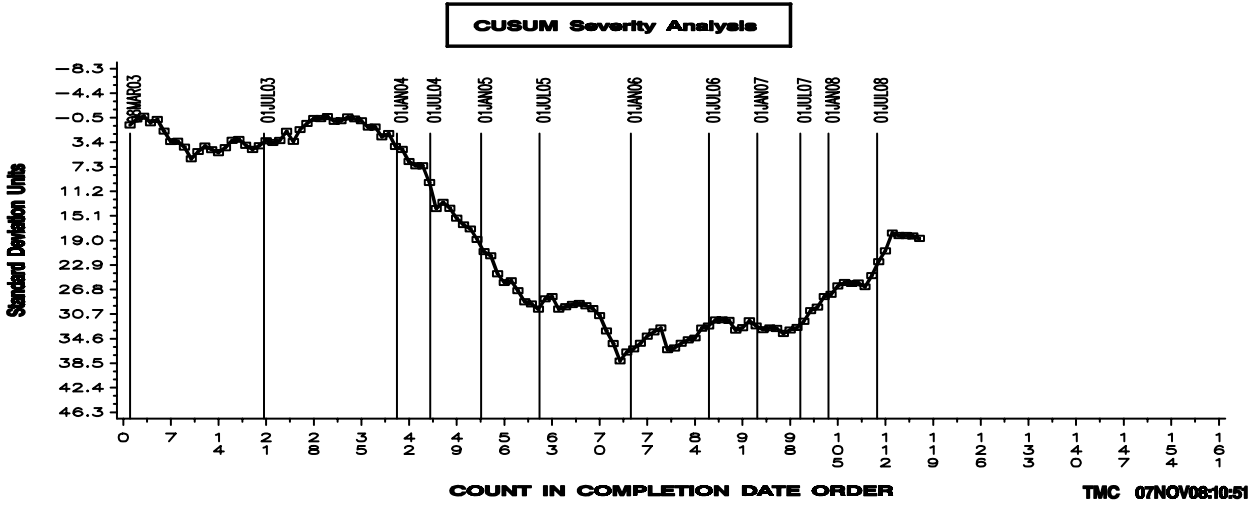
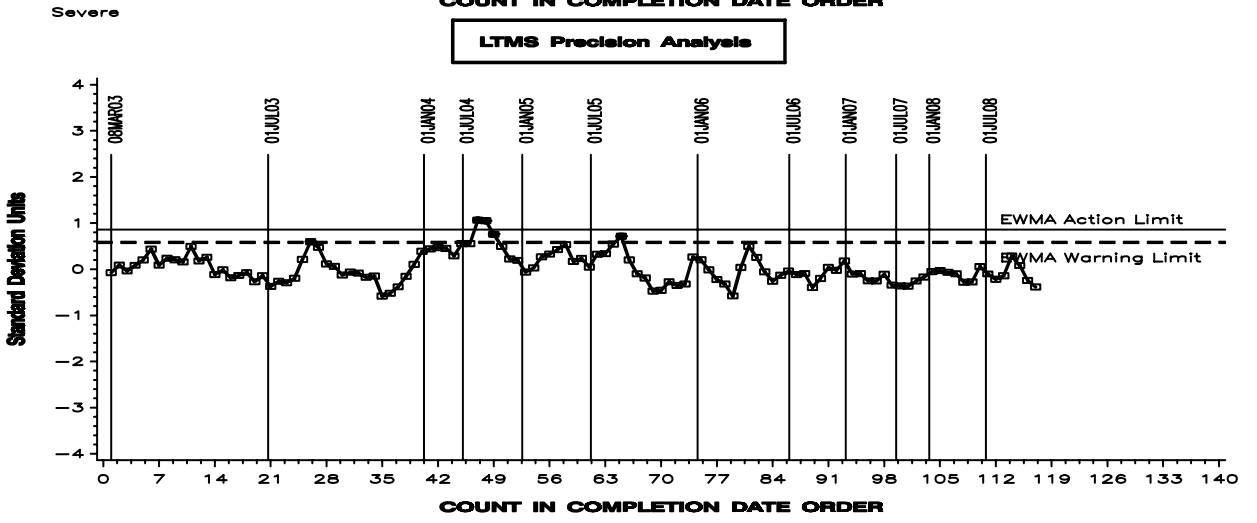
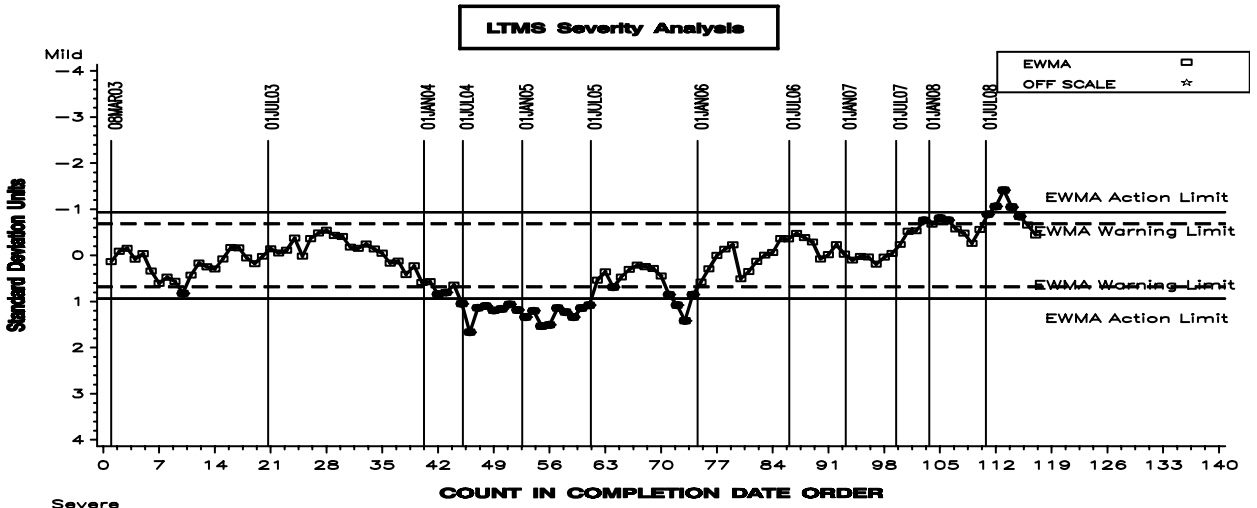


FIGURE 7 T-11 INDUSTRY OPERATIONALLY VALID DATA

SOOT @ 4 cSt - FINAL RESULT

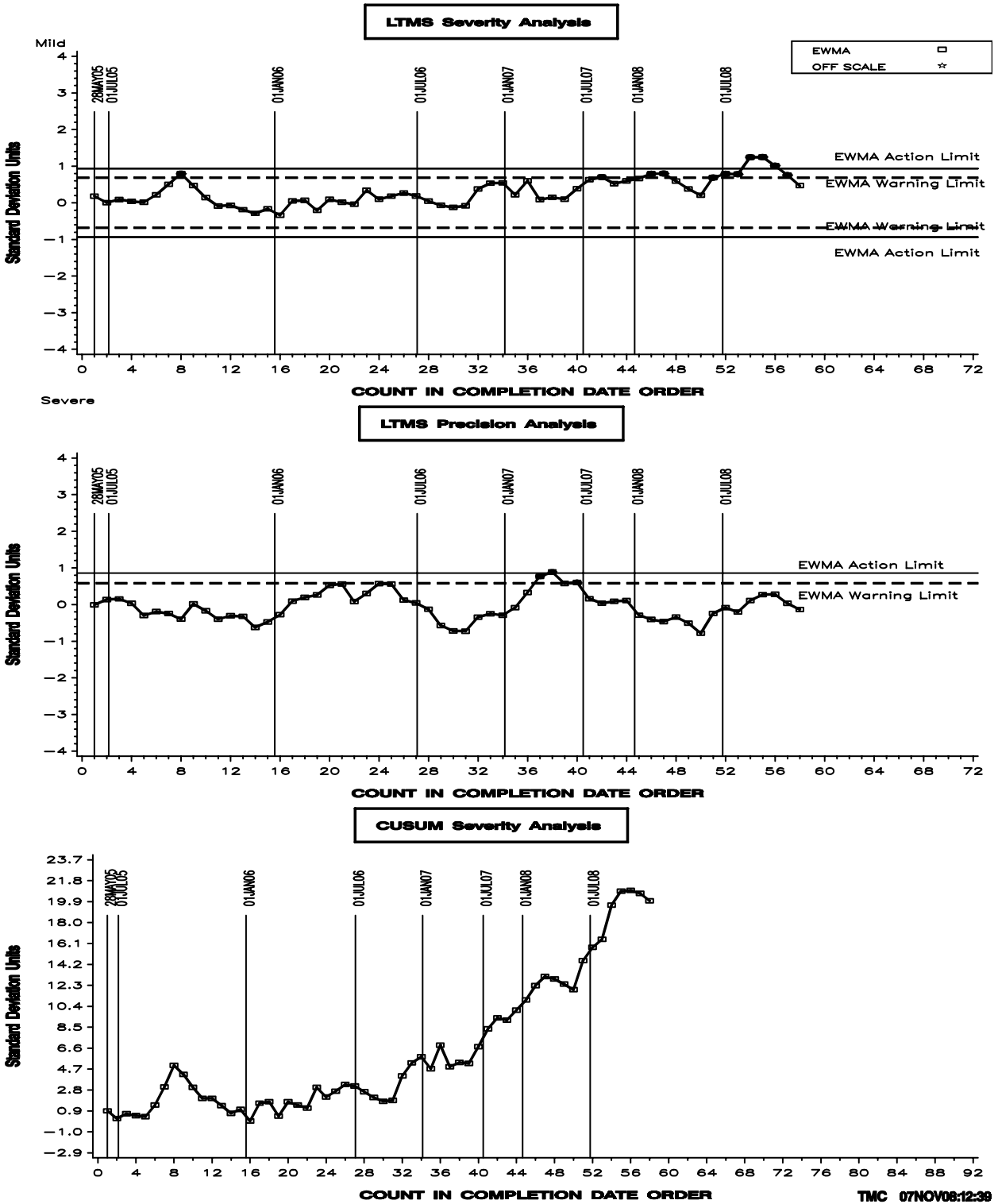


FIGURE 8 T-11 INDUSTRY OPERATIONALLY VALID DATA

SOOT @ 15 cSt - FINAL RESULT

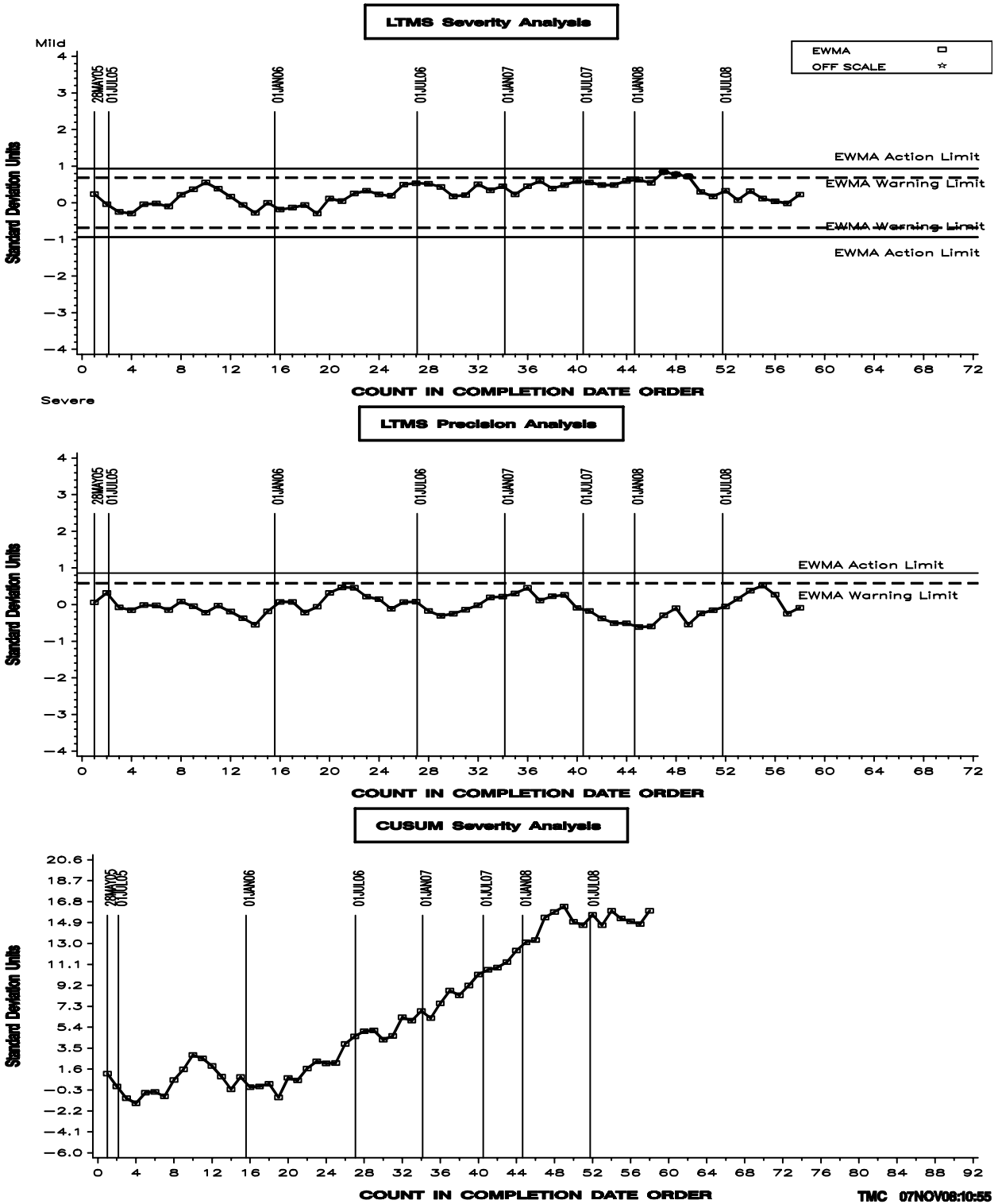


FIGURE 9
MACK T-12 INDUSTRY OPERATIONALLY VALID DATA

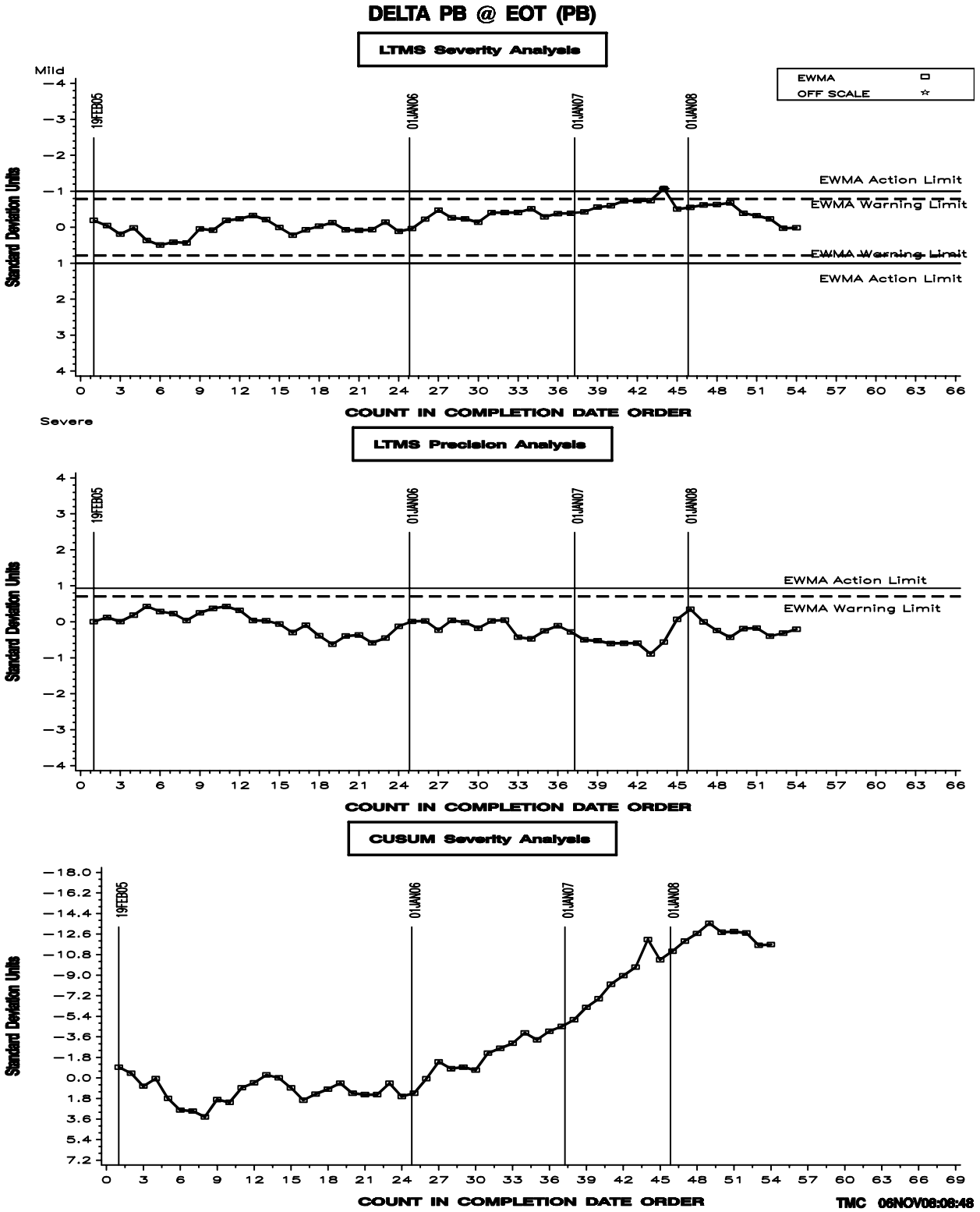


FIGURE 10 MACK T-12 INDUSTRY OPERATIONALLY VALID DATA

AVG. CYLINDER LINER WEAR (CLW)

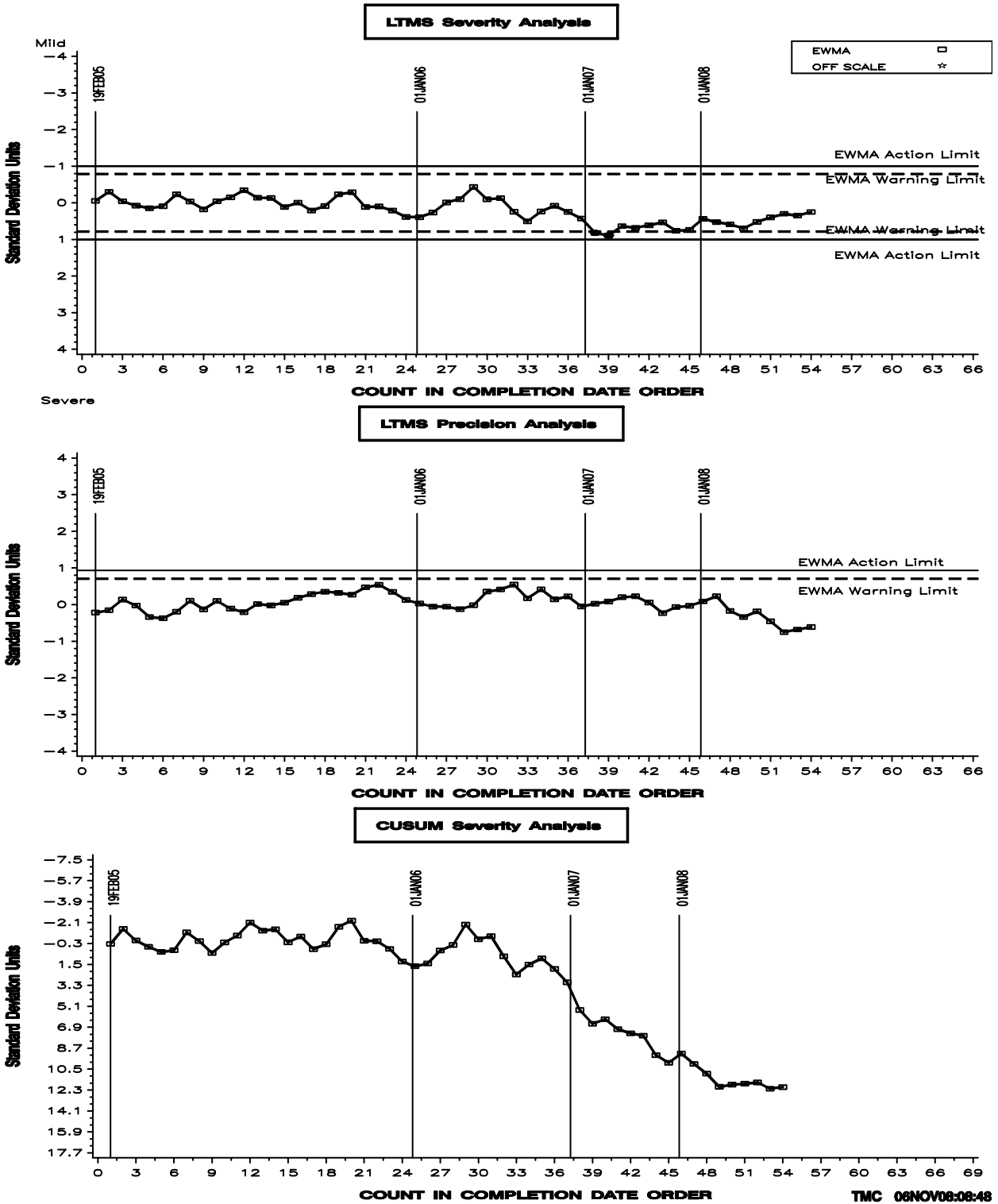


FIGURE 11 MACK T-12 INDUSTRY OPERATIONALLY VALID DATA

AVG. TOP RING WEIGHT LOSS (TRWL)

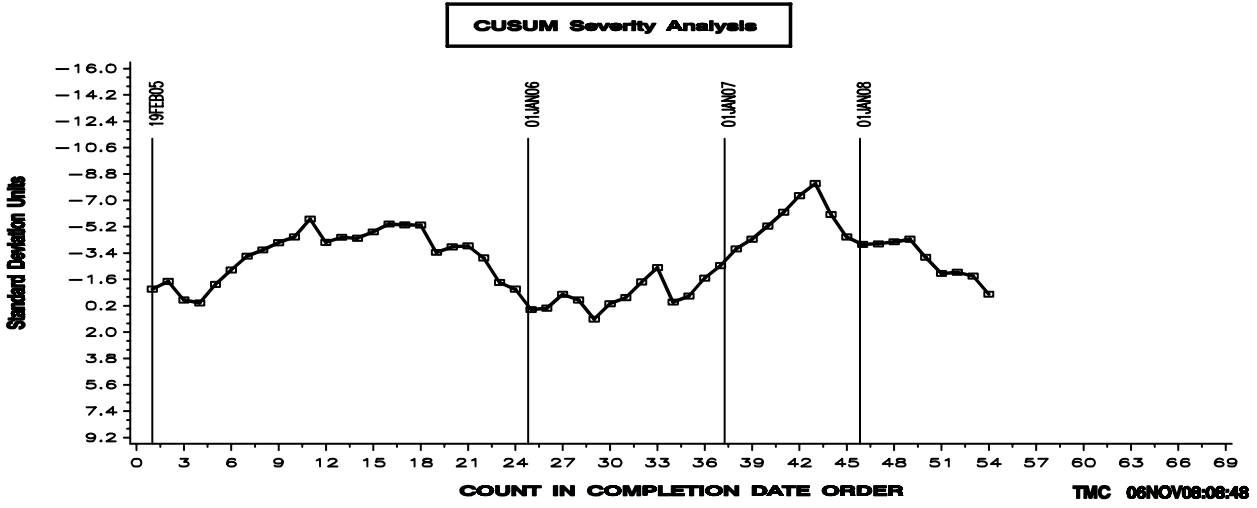
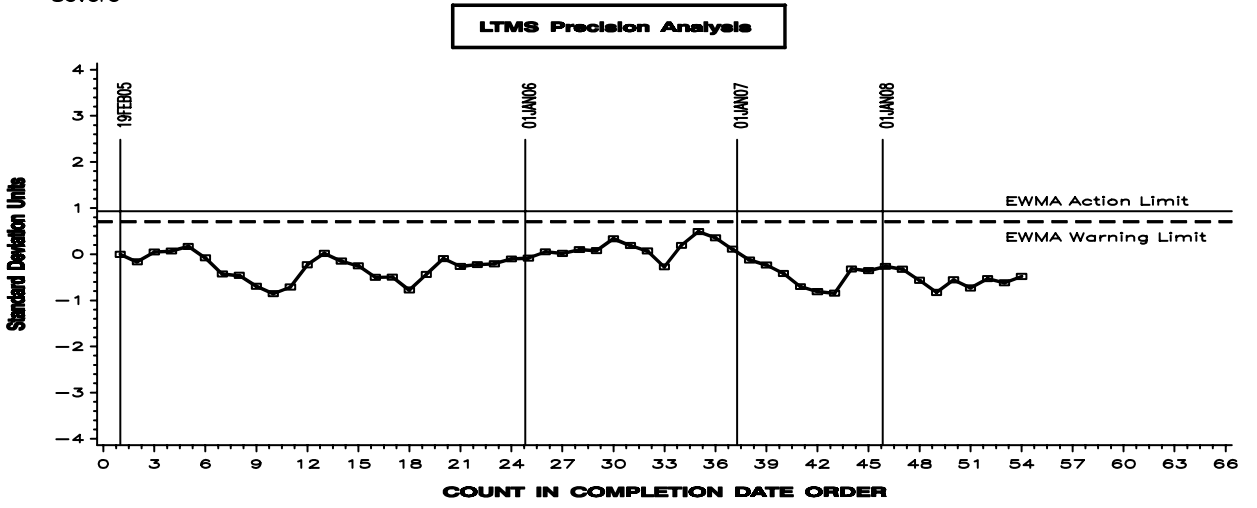
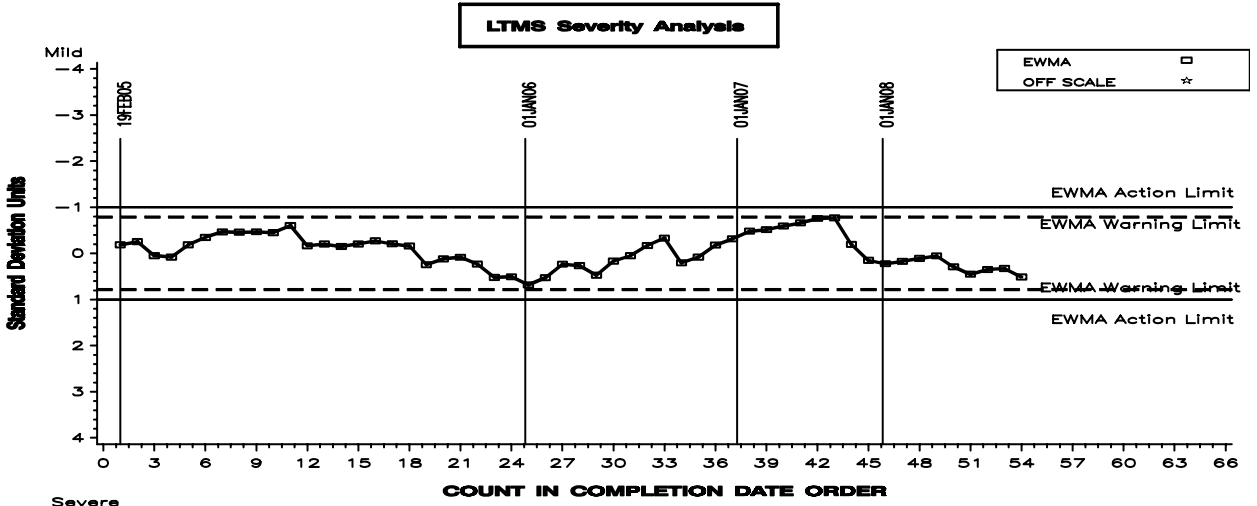


FIGURE 12
MACK T-12 INDUSTRY OPERATIONALLY VALID DATA

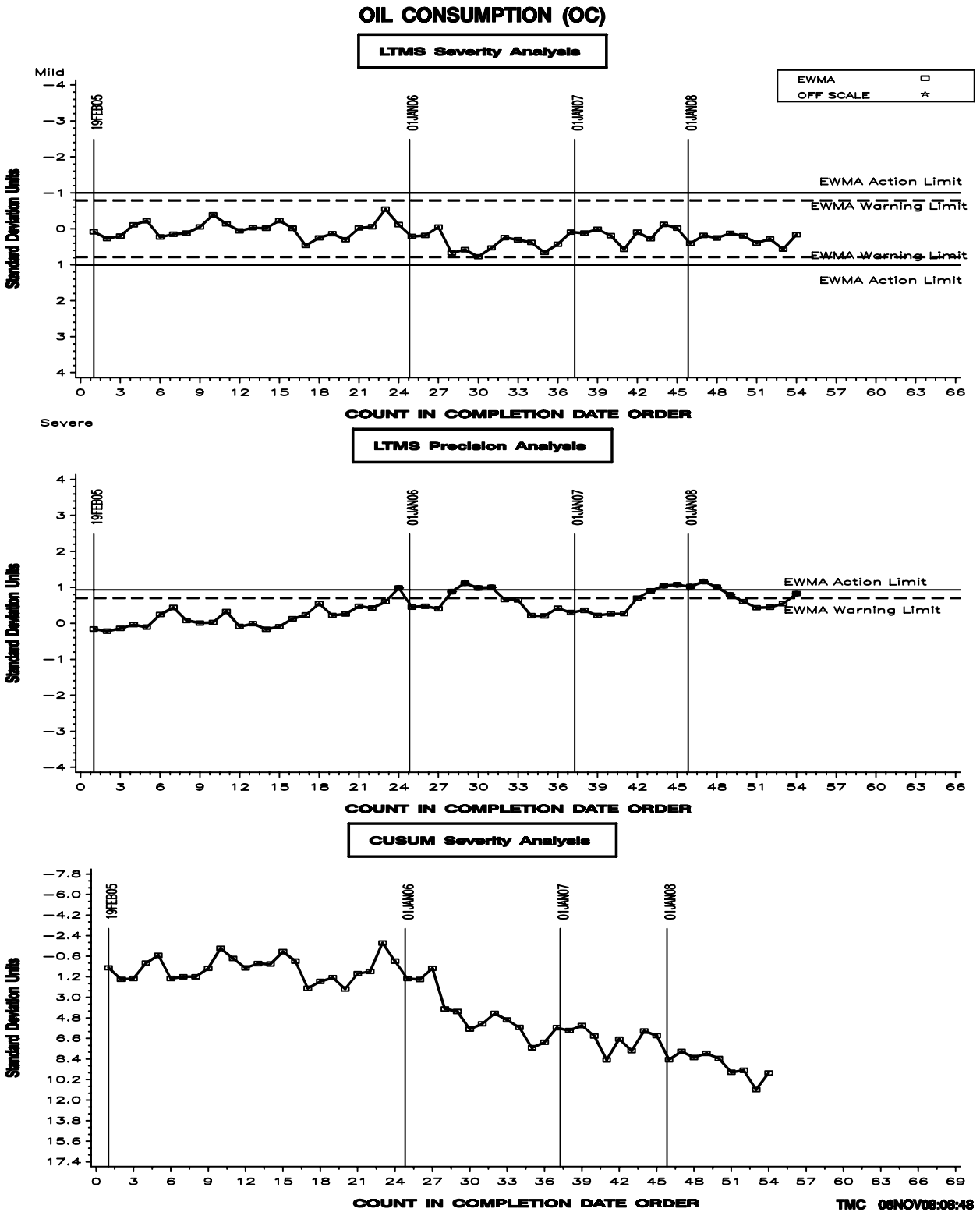


FIGURE 13
MACK T-12 INDUSTRY OPERATIONALLY VALID DATA

DELTA PB 250-300H (PB2)

