



# Test Monitoring Center

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MEMORANDUM: 06-033  
DATE: May 2, 2006  
TO: Wim van Dam, Chairman, Mack Test Surveillance Panel  
FROM: Jeff Clark  
SUBJECT: T-12 Calibration Testing for the April 2006 ASTM Report Period

The following is a summary of T-12 reference oil tests completed during the April 2006 ASTM report period, which began on October 1, 2005 and ended on March 31, 2006.

Test Status	TMC Validity Code	Number of Tests
Acceptable Calibration Test	AC	6
Failed Calibration Test (LTMS Criteria)	OC	1
Operationally Invalid Test	LC	2
Aborted Test	XC	0
Non-blind, Information	NN	2
Total		11

The test that failed the LTMS criteria (OC validity) was due to severe oil consumption. One test was operationally invalid (LC validity) due to a broken centrifugal oil filter and one test was invalid due to a broken wrist pin bushing which caused piston scuffing. The two non-blind tests (NN validity) were part of a base oil interchange program.

#### Severity and Precision:

Figure 1 (attached) shows the current industry EWMA severity, EWMA precision, and cusum charts for Delta PB at EOT (PB). PB is currently within control chart limits. However, for this period, PB is trending an average of 0.39  $\Delta/s$  mild. This is equivalent to 0.112 natural log units or approximately 2.6 ppm at the CJ-4 Mack Merit Anchor of 25 ppm.

Figure 2 (attached) shows the current industry EWMA severity, EWMA precision, and cusum charts for Cylinder Liner Wear (CLW). CLW is currently within control chart limits. However, for this period, CLW is trending an average of 0.37  $\Delta/s$  severe. This is equivalent to 1.3  $\mu m$ .

Figure 3 (attached) shows the current industry EWMA severity, EWMA precision, and cusum charts for Top Ring Weight Loss (TRWL). TRWL is currently within control chart limits. However, for this period, CLW is trending an average of 0.46  $\Delta/s$  severe. This is equivalent to 11.5 mg.

Figure 4 (attached) shows the current industry EWMA severity, EWMA precision, and cusum charts for Oil Consumption (OC). OC is within severity control chart limits but is also currently in an EWMA precision warning alarm. For this period, OC is trending an average of 0.26  $\Delta/s$  mild. This is equivalent to 0.016 natural log units or approximately 1.0 g/h at the CJ-4 Mack Merit Anchor of 65 g/h.

Figure 5 (attached) shows the current industry EWMA severity, EWMA precision, and cusum charts for Delta PB 250 – 300 Hours (PB2). PB2 is currently within control chart limits. However, for this period, PB2 is trending an average of 0.43  $\Delta/s$  mild. This is equivalent to 0.156 natural log units or approximately 1.4 ppm at the CJ-4 Mack Merit Anchor of 10 ppm.

Precision estimates will be presented on an annual basis, in the table below. The precision estimate for 2005 was primarily generated from PC-10 Matrix or concurrent reference test results. No estimate is yet available for 2006.

#### T-12 Precision Estimates

Parameter	2005	2006	2007	2008
df	21			
PB (ln units)	0.259			
CLW	3.87			
TRWL	28.4			
OC (ln units)	0.080			
PB2 (ln units)	0.344			

#### Reference Oils:

The current reference oil test targets are shown below:

Oils	N	Parameter	Mean (cSt)	S
821 (PC10E)	6	PB	3.259	0.288
		CLW	15.1	3.4
		TRWL	66.4	24.9
		OC	4.083	0.061
		PB2	2.251	0.363

To date, 10 tests have been completed on TMC oil 821, which includes four tests since the intake manifold pressure specification was implemented. One test is currently running. At the conclusion of this test, the TMC will notify the surveillance panel so that a test target update may be considered.

#### Information Letters:

No T-12 information letters were issued this ASTM period.

TMC Laboratory Visits:

No TMC laboratory visits were conducted this ASTM period.

Additional Information:

The T-12 database, timeline, and alarm logs can be accessed on the TMC's homepage. If you have any questions on how to access this information, contact the TMC.

JAC/jac/mem06-033.jac.doc

Attachments

c: J.L. Zalar, TMC

F.M. Farber, TMC

Mack Test Surveillance Panel

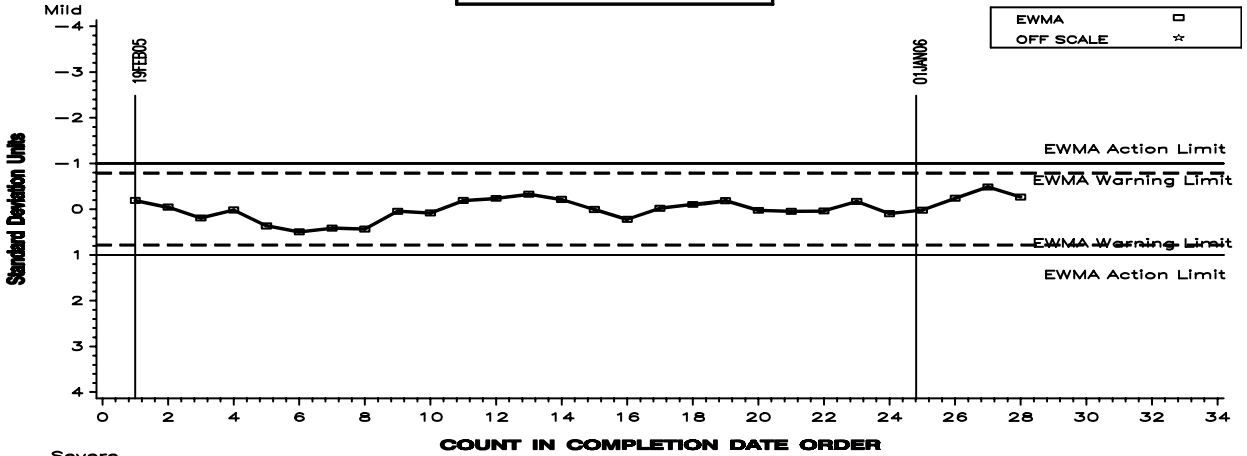
<ftp://ftp.astmtmc.cmu.edu/docs/diesel/mack/semiannualreports/T12-04-2006.pdf>

Distribution: Email

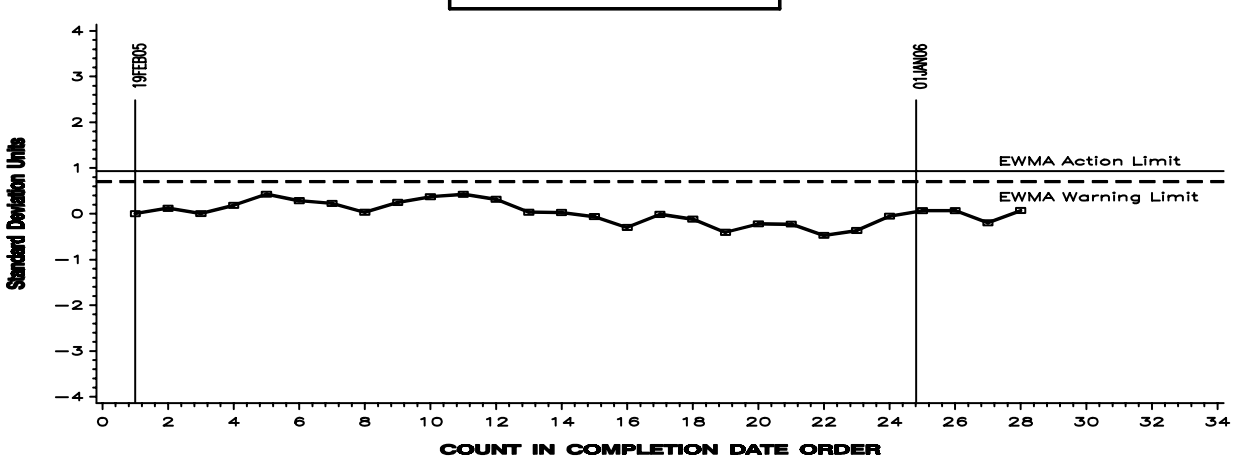
**FIGURE 1**  
**MACK T12 INDUSTRY OPERATIONALLY VALID DATA**

**DELTA PB @ EOT (PB)**

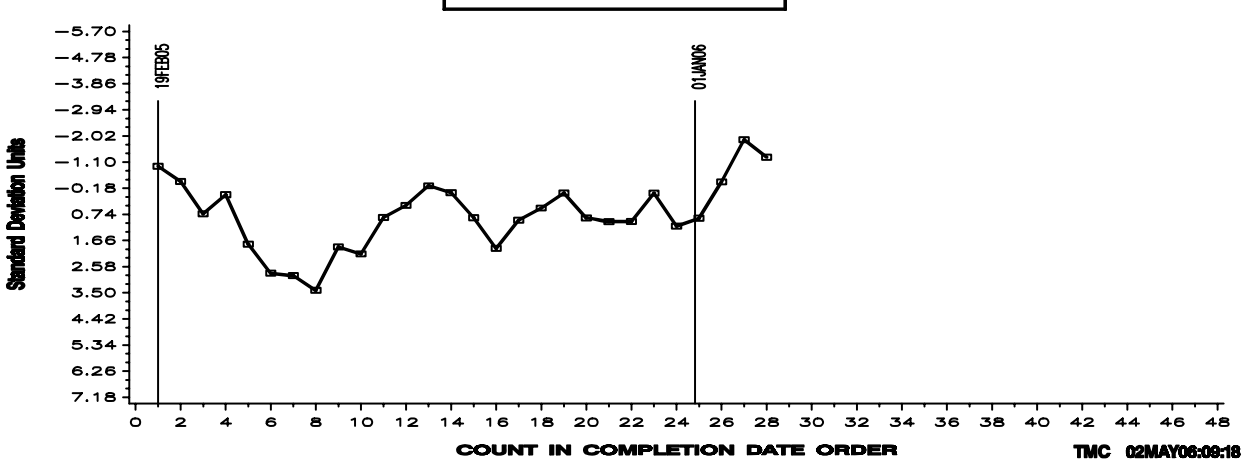
**LTMS Severity Analysis**



**LTMS Precision Analysis**

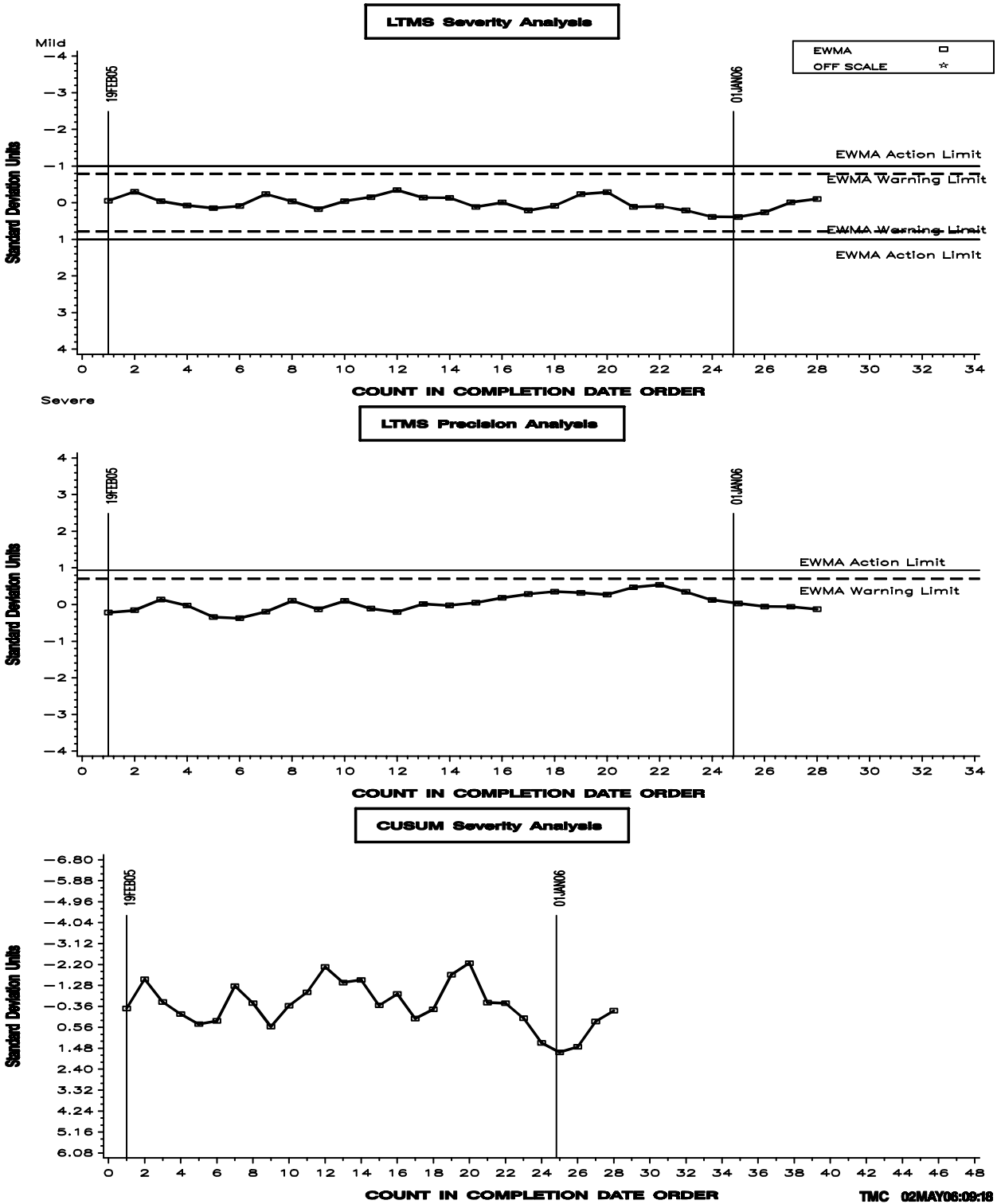


**CUSUM Severity Analysis**



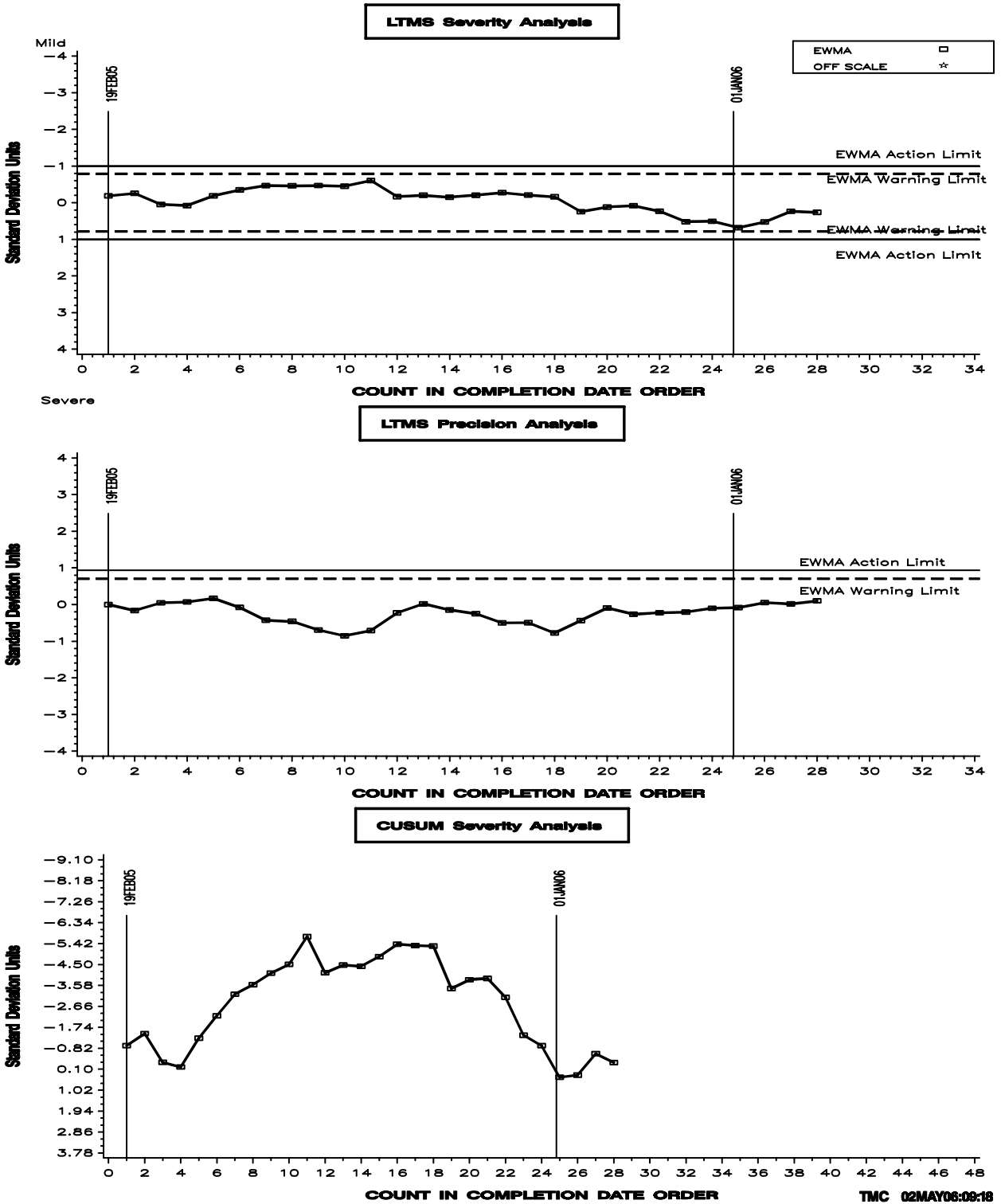
# FIGURE 2 MACK T12 INDUSTRY OPERATIONALLY VALID DATA

## AVG. CYLINDER LINER WEAR (CLW)

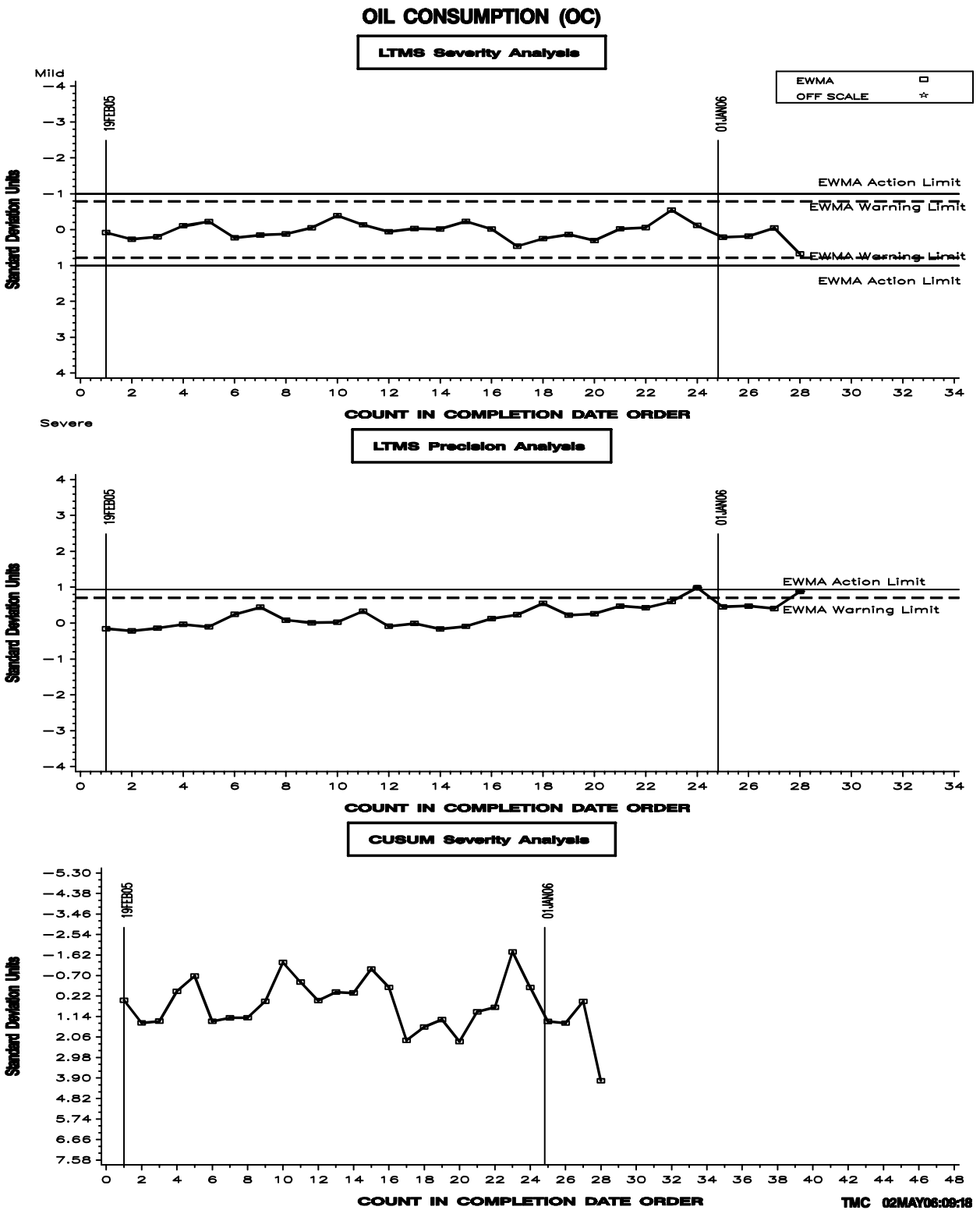


# FIGURE 3 MACK T12 INDUSTRY OPERATIONALLY VALID DATA

## AVG. TOP RING WEIGHT LOSS (TRWL)



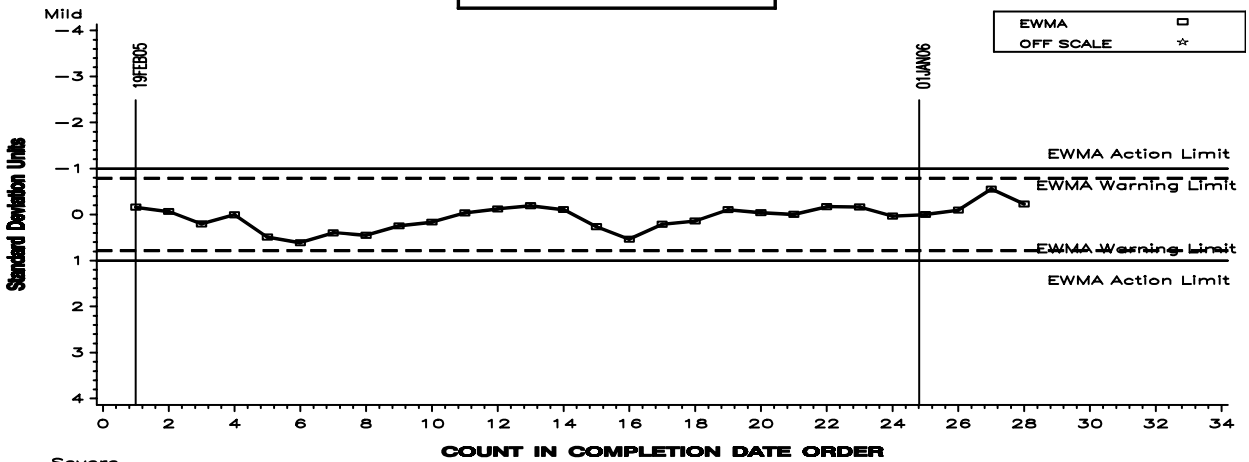
**FIGURE 4**  
**MACK T12 INDUSTRY OPERATIONALLY VALID DATA**



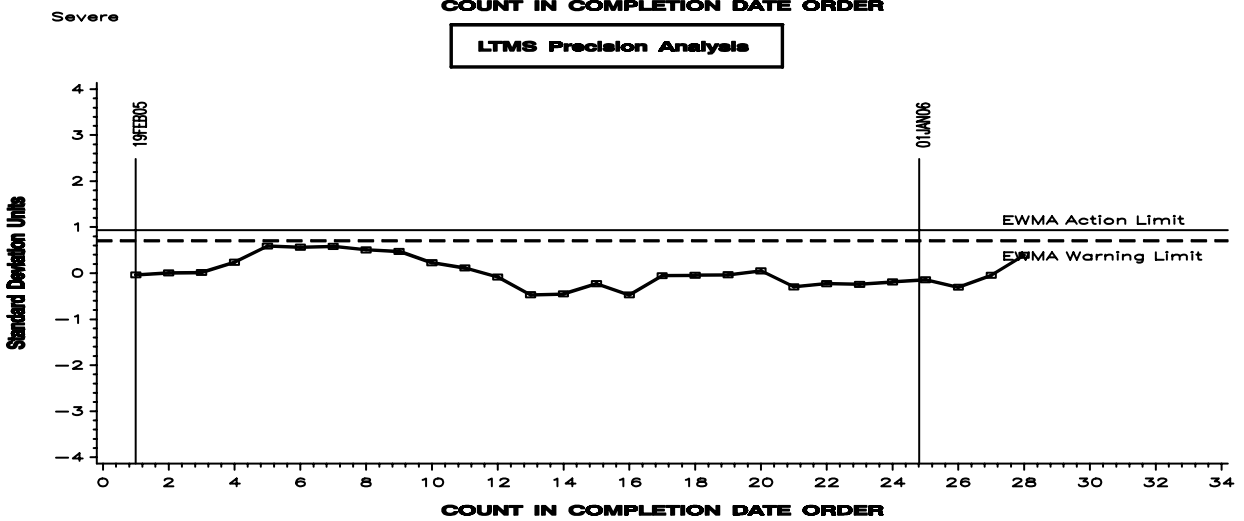
**FIGURE 5**  
**MACK T12 INDUSTRY OPERATIONALLY VALID DATA**

**DELTA PB 250-300H (PB2)**

**LTMS Severity Analysis**



**LTMS Precision Analysis**



**CUSUM Severity Analysis**

