



## Test Monitoring Center

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412-365-1000

MEMORANDUM: 10-012

DATE: April 28, 2010

TO: Jim Moritz, Chairman, Cummins Surveillance Panel

FROM: Jeff Clark

SUBJECT: ISB and ISM Calibration Testing for the April 2010 ASTM Report Period

The following is a summary of ISB and ISM reference oil tests completed during the April 2010 ASTM report period, which began on October 1, 2010 and ended on March 31, 2010.

Test Status	TMC Validity Code	Number of Tests	
		ISB	ISM
Acceptable Calibration Test	AC	2	0
Failed Calibration Test (LTMS Criteria)	OC	2	0
Operationally Invalid Test	LC	0	0
Aborted	XC	0	0
Total		4	0

One ISB test failed due to severe tappet wear. One failed due to severe tappet wear and severe camshaft wear. Both failed tests occurred at the same lab, on the same stand.

### ISB Severity:

With low test volume, it is difficult to offer commentary regarding trends for this ASTM period. Commentary is thus restricted to only the current control chart status of the test parameters.

Figure 1 (attached) shows the current industry EWMA severity and cusum charts for Average Camshaft Wear (ACSW). ACSW is currently in an industry warning for severity, in the severe direction.

Figure 2 (attached) shows the current industry EWMA severity, and cusum charts for Average Tappet Weight Loss (ATWL). ATWL is currently in an industry action for severity, in the severe direction.

ISM Severity:

With no chartable tests, it is difficult to offer commentary regarding trends for this ASTM period. Commentary is thus restricted to only the current control chart status of the test parameters.

Figure 3 (attached) shows the current industry EWMA severity and cusum charts for Crosshead Weight Loss (CWL). CWL is within control chart limits.

Figure 4 (attached) shows the current industry EWMA severity and cusum charts for Filter Plugging Delta P (FPD). FPD is currently in an industry warning for severity, in the mild direction.

Figure 5 (attached) shows the current industry EWMA severity and cusum charts for Average Sludge Rating (ASR). ASR is currently within control chart limits.

Figure 6 (attached) shows the current industry EWMA severity and cusum charts for Injector Adjusting Screw Weight Loss (IAS). IAS is currently within control chart limits.

Reference Test Precision Estimates:

Precision estimates, and any relevant commentary, will be provided on an annual basis in the sections below. Note that estimates for 2010 are not yet available.

The ISB preliminary precision estimates for 2009 show improvement for ACSW and degradation in ATWL compared to 2008.

**ISB Precision Estimates**

<b>Parameter</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
df	15	5	5	3	4
ACSW	6.69	5.58	3.45	7.94	4.23
ATWL	14.13	22.29	15.62	17.66	28.60

The ISM precision estimates for 2009 show improvement for all parameters compared to 2007 and 2008.

**ISM Precision Estimates**

<b>Parameter</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
df	2	4	9	5	4
CWL	0.5	0.7	1.9	1.9	1.6
FPD (ln units)	0.2561	0.1166	0.3736	0.3211	0.1062
ASR	0.15	0.15	0.13	0.18	0.04
IAS	5.0	5.4	4.0	5.8	3.3

Reference Oils:

The current ISB reference oil test targets are shown below:

**ISB Reference Oil Test Targets**

Oils	N	Parameter	Mean	S
831 (PC10B)	14	ACSW (µm)	42.5	5.0
		ATWL (mg)	97.2	14.8

Tests run on oil 831-1 are judged using the 831 targets. To date, eight tests have been completed on oil 831-1.

The table below shows the supply levels of oils 831 and 831-1.

**ISB Reference Oil Supply**

Oil	TMC Inventory (gallons)	Lab Inventory (gallons)	Estimated Life <sup>A</sup> (years)
831	17	25	< 1 year
831-1	751	130	5+
Total Estimated Life of All Reference Oils			5+

<sup>A</sup>The ISB shares reference oils with the C-13 test. Activity levels of both tests are taken into account in the estimated life of the reference oils.

The current ISM reference oil test targets are shown below:

**ISM Reference Oil Test Targets and 30 Test Averages**

Oil	N	Parameter	Mean (cSt)	S
830-2	21	CWL	5.1	1.5
		FPD	2.5209	0.3274
		ASR	9.0	0.15
		IAS	29.5	5.7

The table below shows supply levels of oil 830-2.

**ISM Reference Oil Supply**

Oils	TMC Inventory (gallons)	Lab Inventory (# of samples)	Estimated Life (years)
830-2	1537	6	5+

Information Letters:

No ISB Information Letters were issued this period.

ISM Information Letter 10-1, Sequence No. 5, was issued March 17, 2010. This letter updated the crosshead weight loss correction factor.

TMC Laboratory Visits:

No laboratory visits were conducted this period.

Quality Index:

No ISM Quality Index deviations were issued this period. For the history of the ISM, a total of two deviations have been issued.

Additional Information:

The ISB and ISM timelines are attached as Figures 6 and 7. The ISB and ISM databases 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.

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Attachments

c: F.M. Farber, TMC

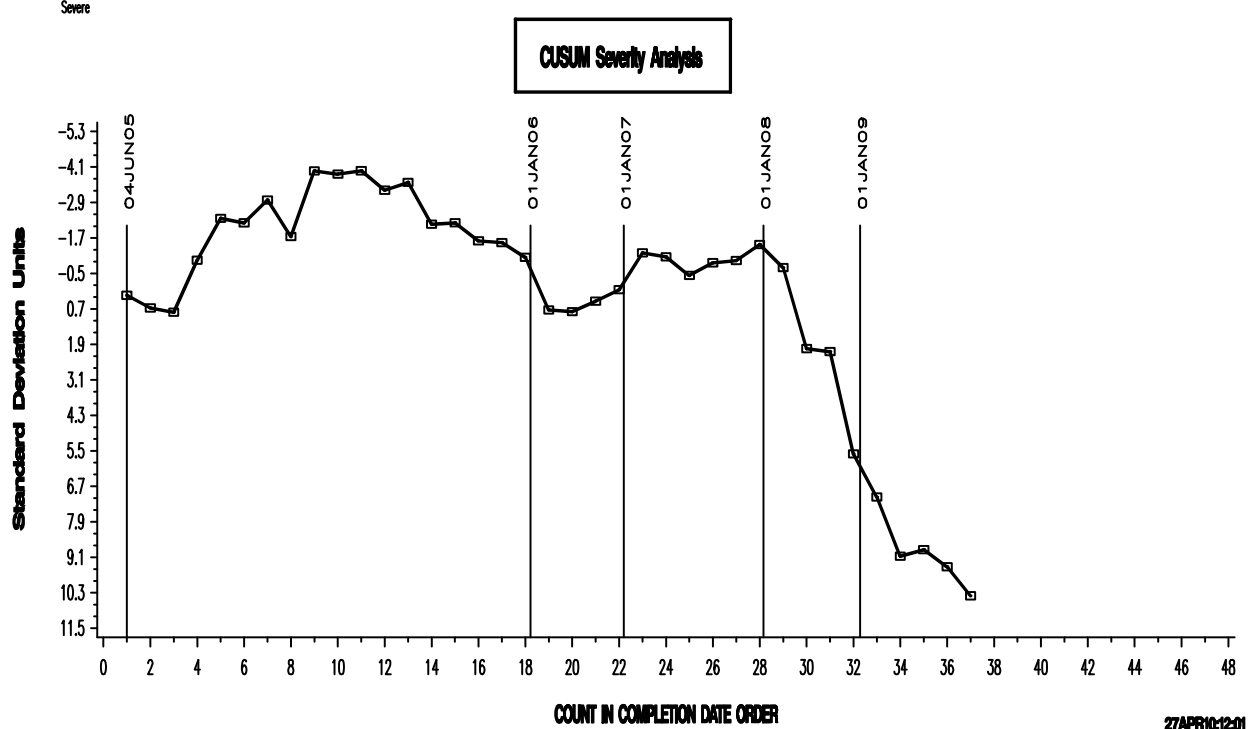
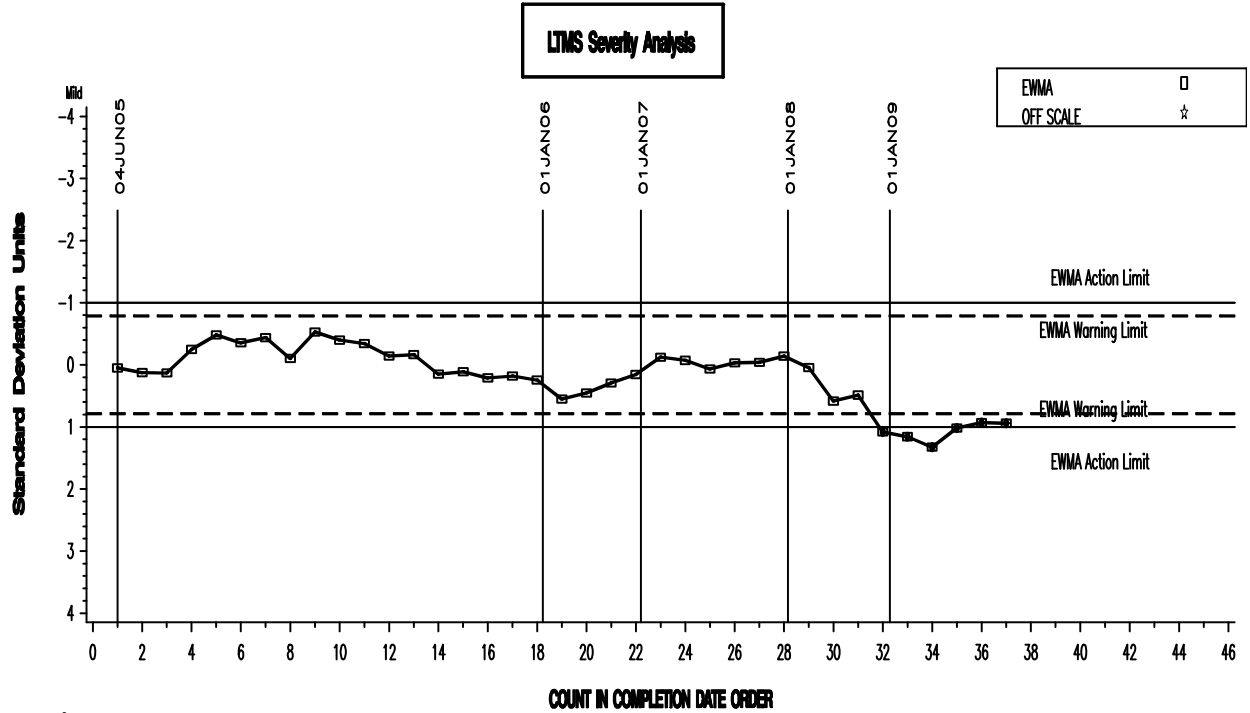
Cummins Surveillance Panel

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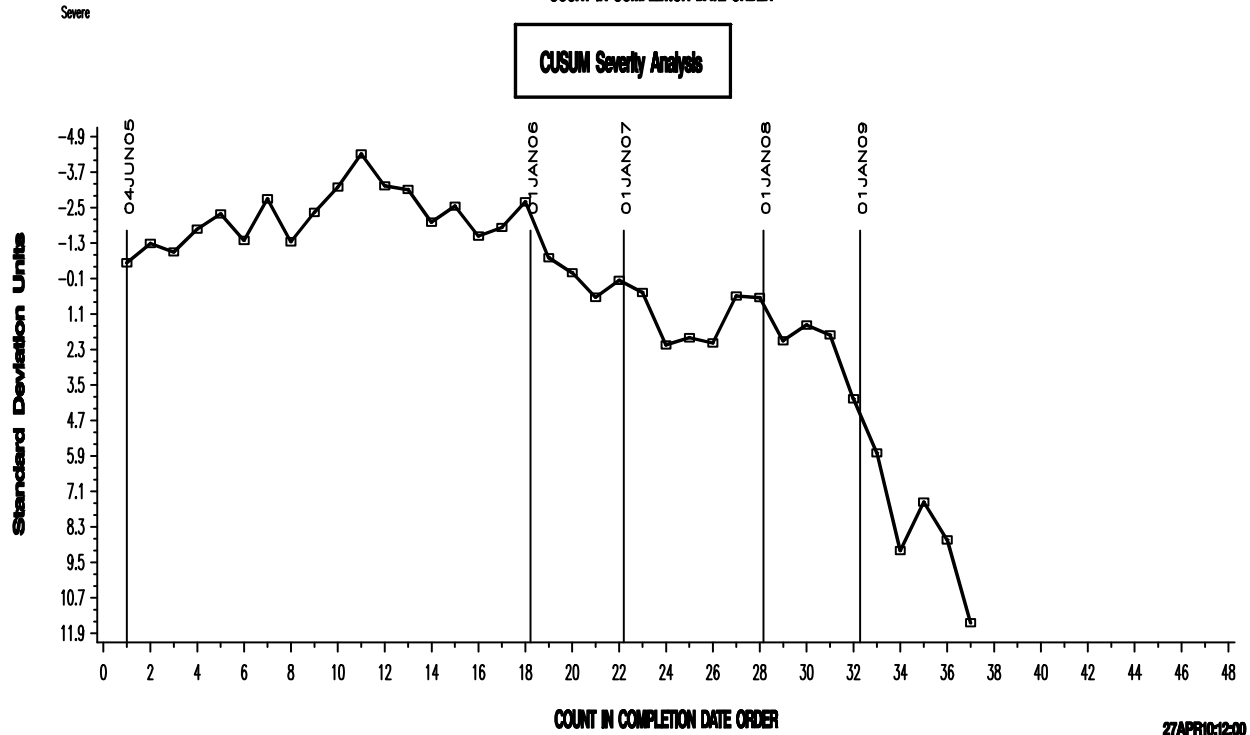
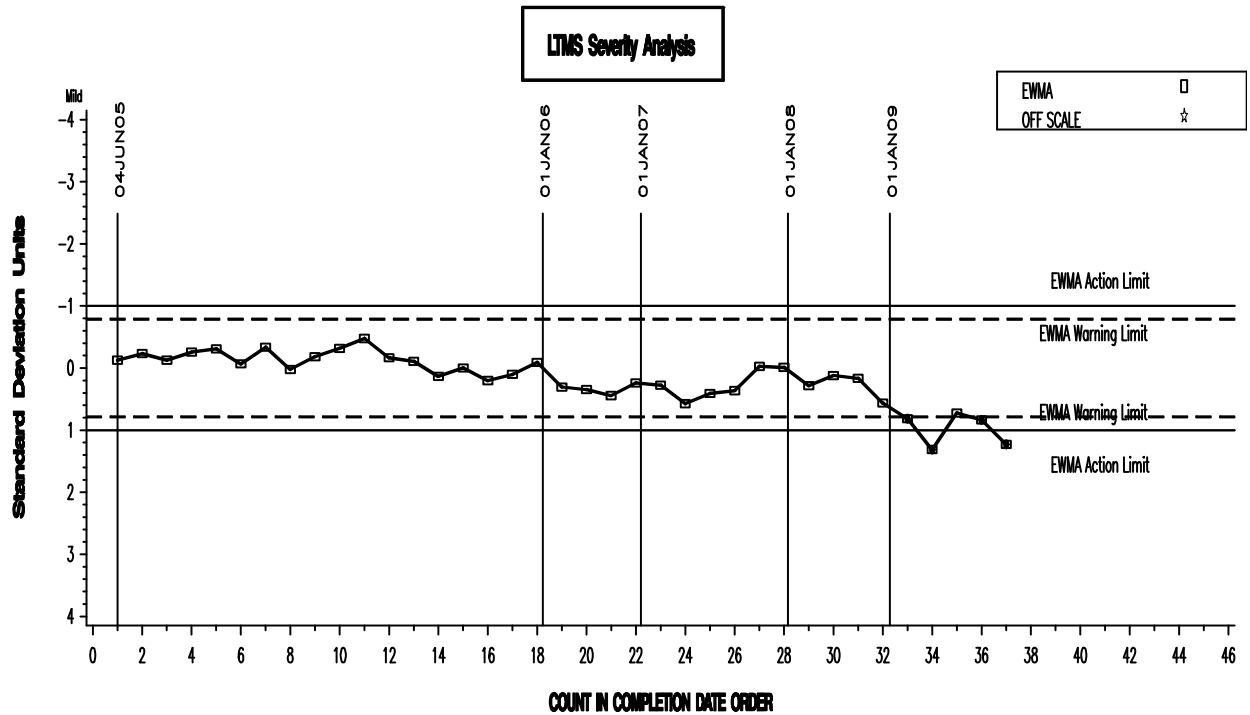
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Distribution: Email

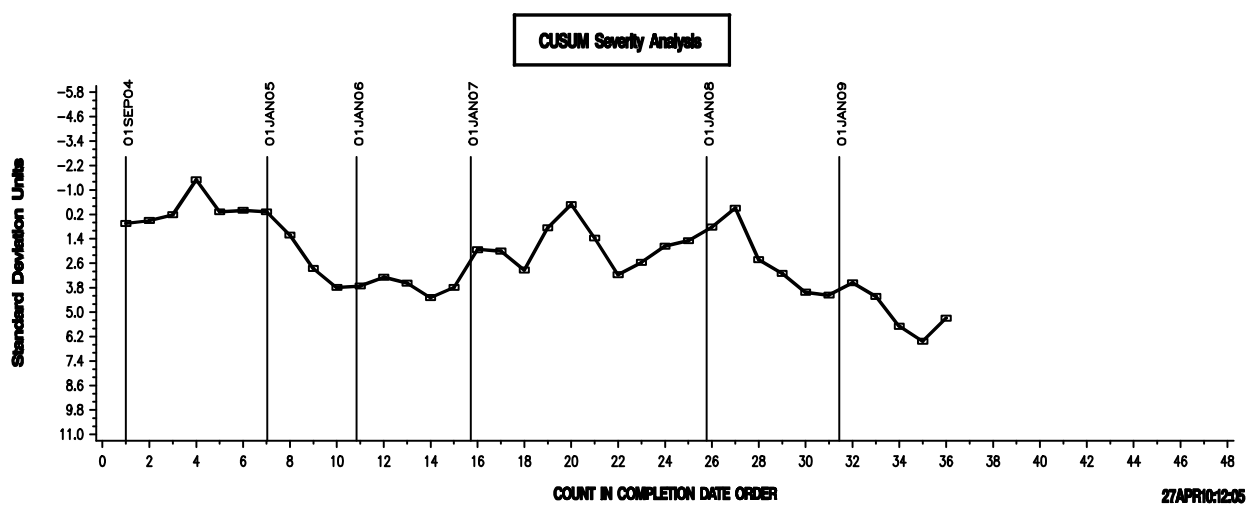
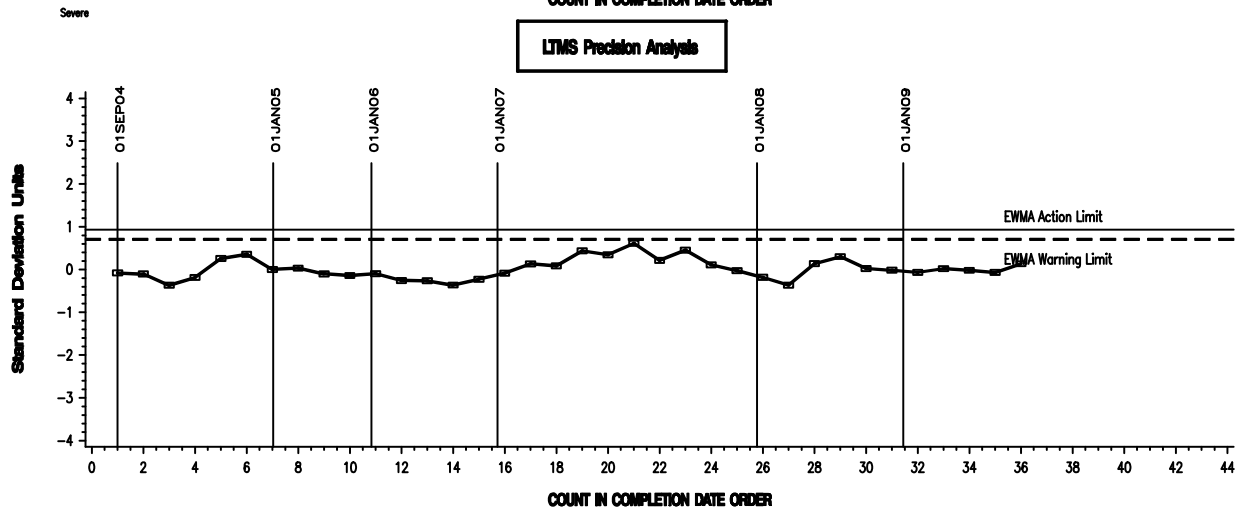
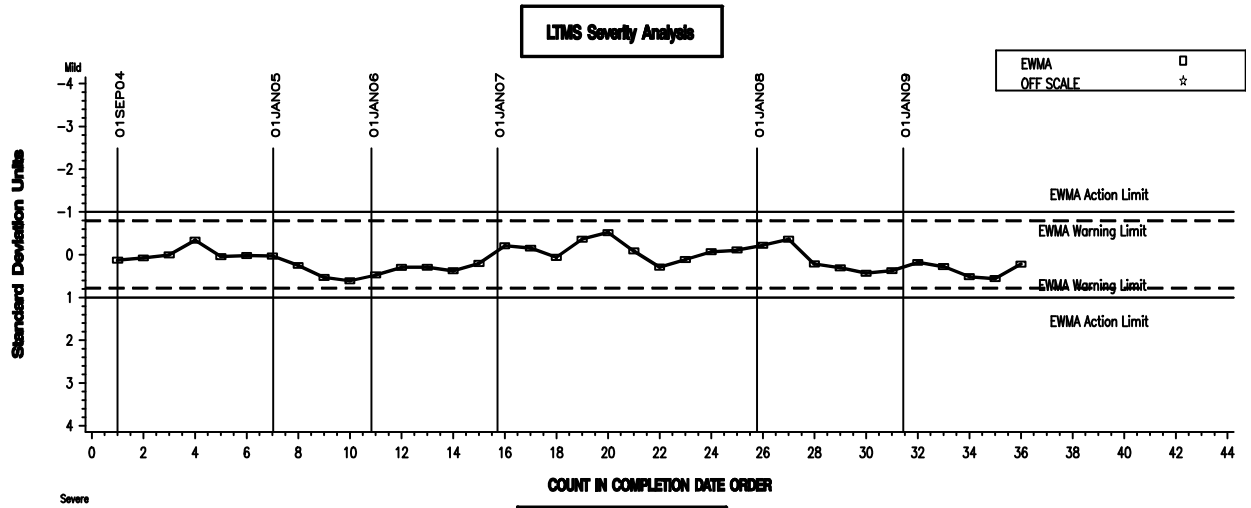
**FIGURE 1**  
**CUMMINS ISB INDUSTRY OPERATIONALLY VALID DATA**  
**AVERAGE CAMSHAFT WEAR**



**FIGURE 2**  
**CUMMINS ISB INDUSTRY OPERATIONALLY VALID DATA**  
**AVERAGE TAPPET WEIGHT LOSS**

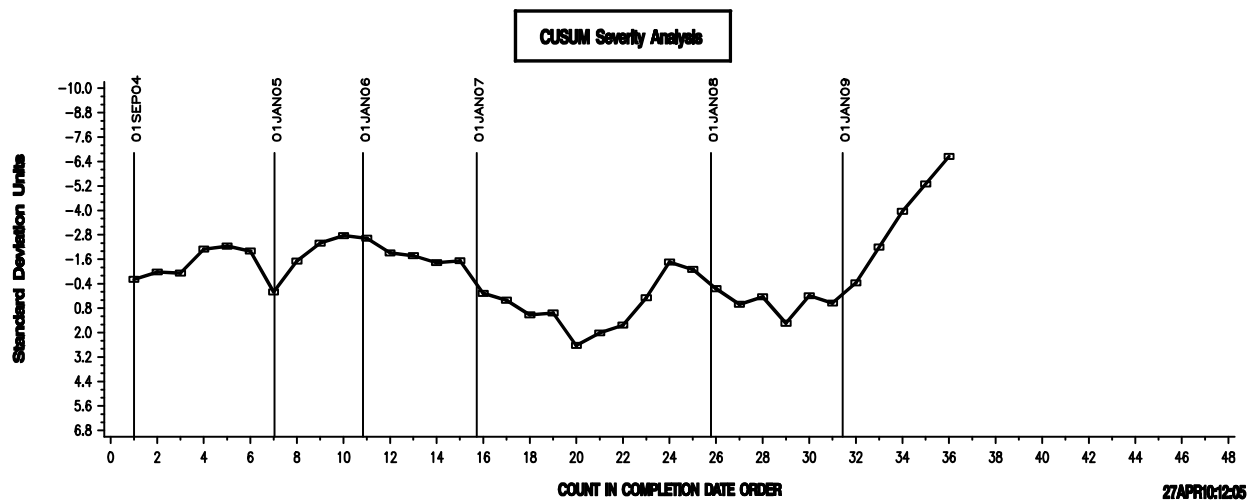
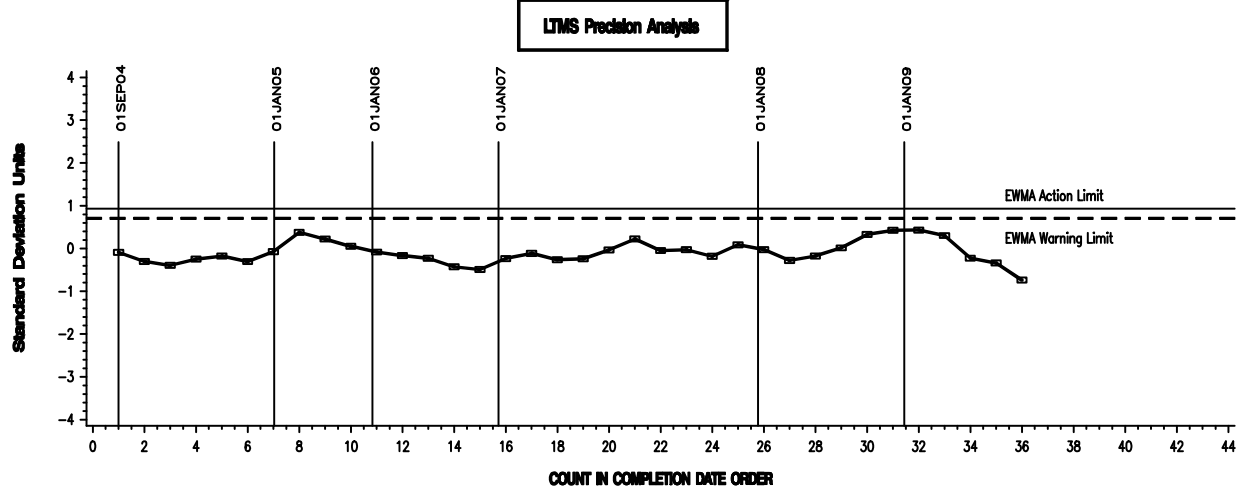
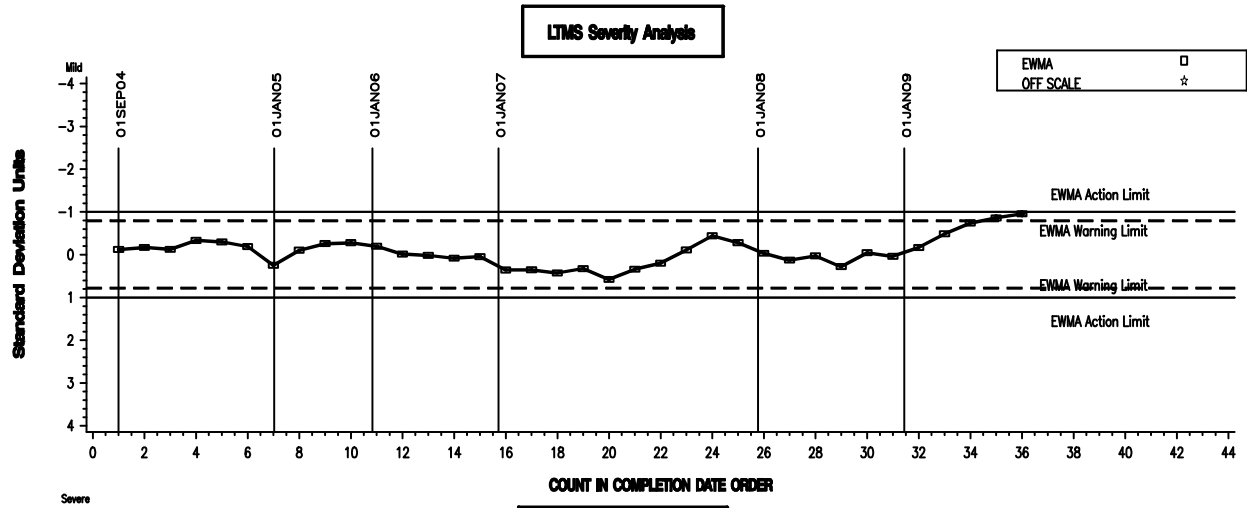


**FIGURE 3**  
**ISM INDUSTRY OPERATIONALLY VALID DATA**  
**CROSSHEAD WEIGHT LOSS ADJUSTED TO 3.9 % SOOT**



**FIGURE 4**  
**ISM INDUSTRY OPERATIONALLY VALID DATA**

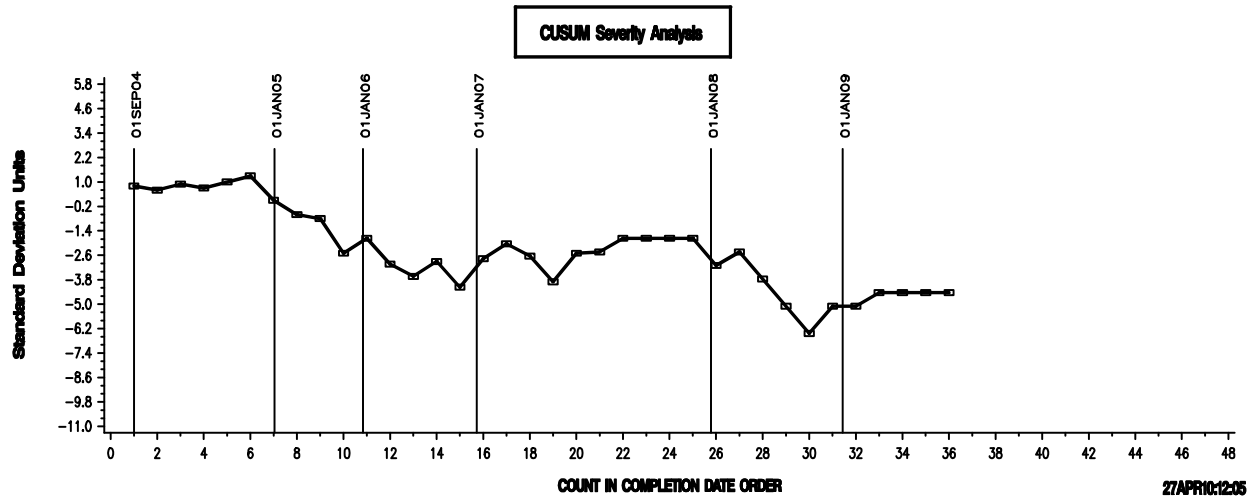
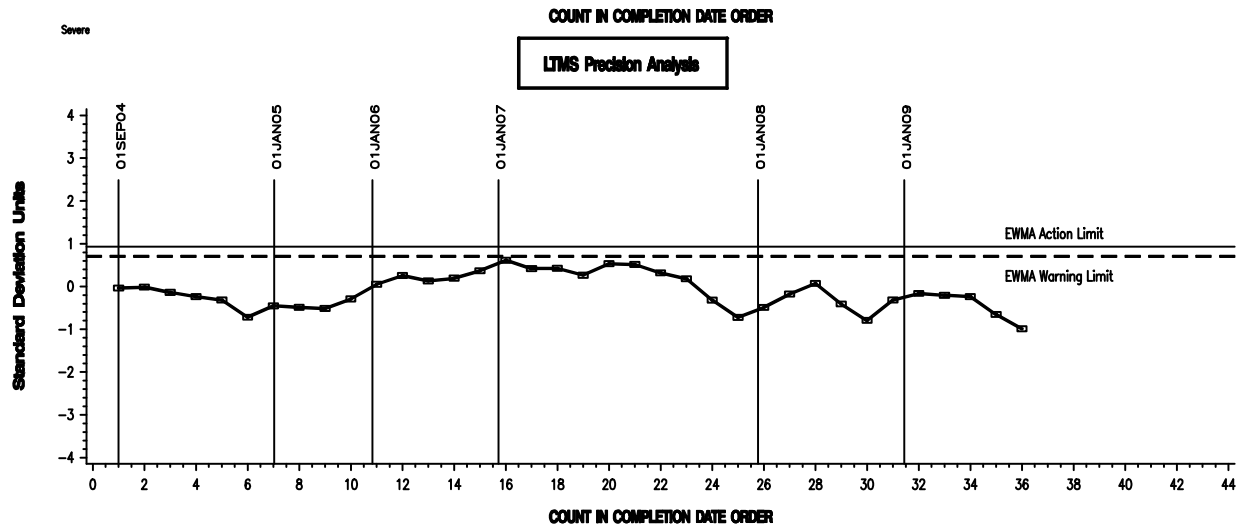
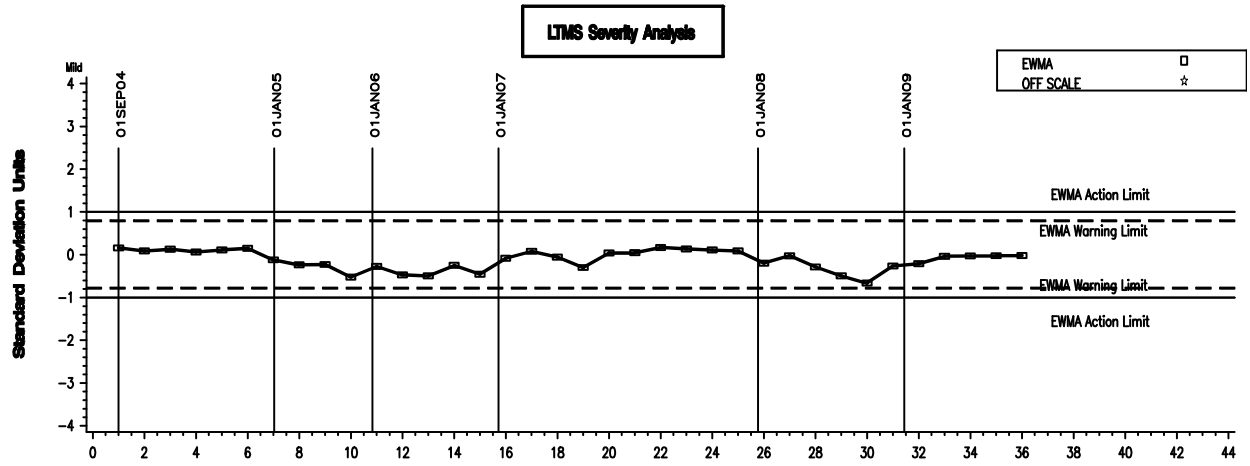
**FILTER PLUGGING DELTA P**



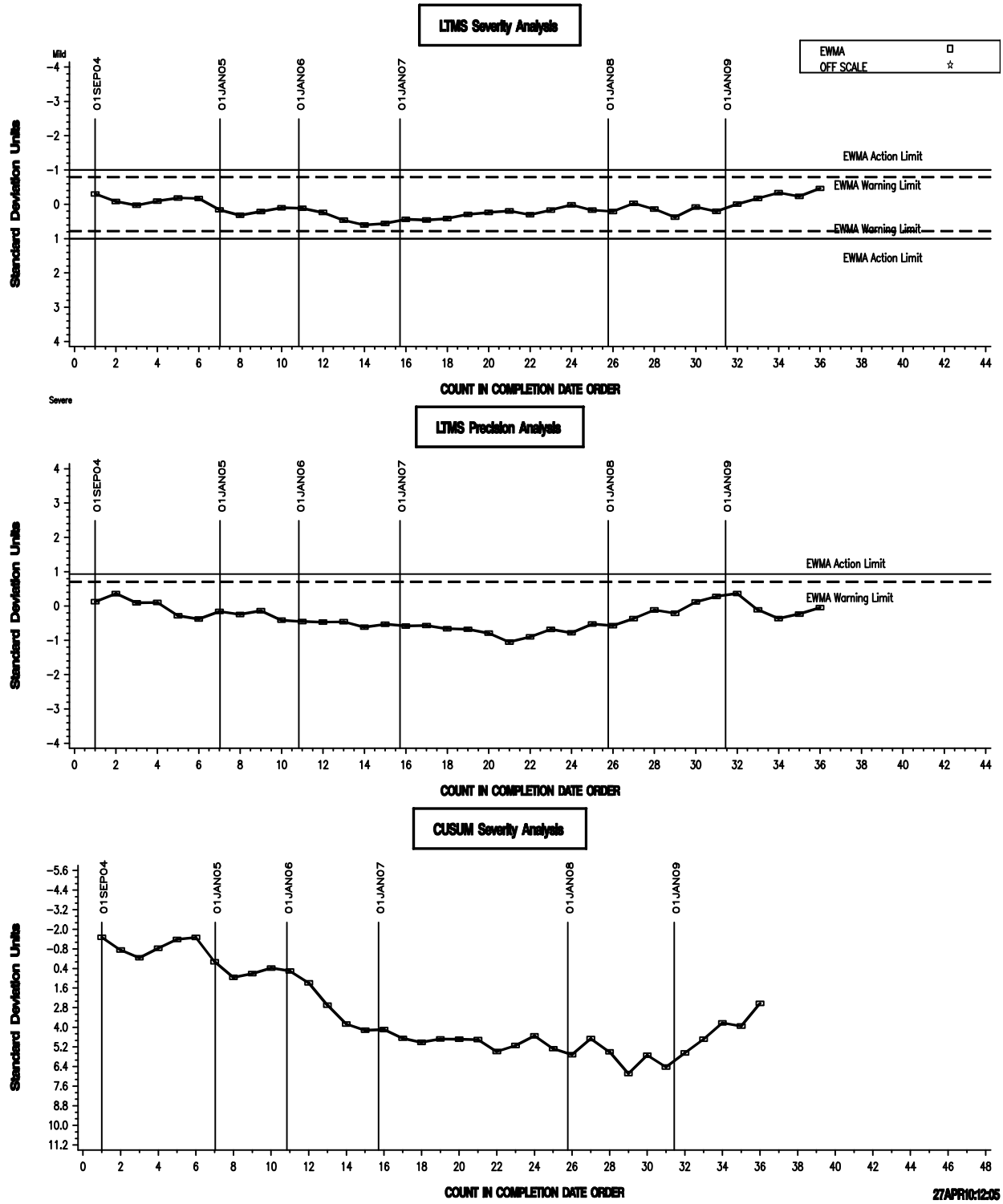


**FIGURE 5**  
**ISM INDUSTRY OPERATIONALLY VALID DATA**

**AVERAGE SLUDGE RATING**



**FIGURE 6**  
**ISM INDUSTRY OPERATIONALLY VALID DATA**  
**INJECTOR SCREW WEIGHT LOSS ADJUSTED TO 3.9% SOOT**



## FIGURE 7

### ISB Timeline

14:12 Tuesday, April 27, 2010 1

Obs	effective_date	info_letter_number	event
1	20050520		BEGINNING OF PC-10 MATRIX
2	20050915		COMPLETION OF PC-10 MATRIX
3	20051123		LTMS IMPLEMENTED
4	20060804		ISB Procedure Draft - August 4, 2006 issued.
5	20061128		ISB Procedure Draft - November 28, 2006 issued.
6	20061218	06-1	Vulkan Driveline coupling supply information added.
7	20061218	06-1	Intake Air Tube diameter corrected from 3.5" to 4.0".
8	20070125	07-1	Soot adjustment calculation modified for ATWL.
9	20070129		ISB Procedure Draft - January 29, 2007 issued.
10	20070202	07-1	D 129 removed from fuel sulfur measurement methods.
11	20070202	07-1	DACA II Report specified for accuracy and resolution of measurement systems.
12	20070807		14 TEST TARGETS FOR OIL 831 (PC-10B).
13	20080309		OIL 831-1 INTRODUCED.
14	20090819	09-1	Hardcopy reference test reports no longer sent to TMC.

## FIGURE 8

**ISM Timeline**

14:12 Tuesday, April 27, 2010 1

Obs	effective_date	info_letter_number	event
1	20040324		BEGINNING OF DEVELOPMENT AND DISCRIMINATION MINI-MATRIX
2	20050217		DECISION TO SCREEN INJECTOR ADJUSTING SCREWS FOR TOOLING MARKS.
3	20050322		COMPLETION OF MINI-MATRIX ANALYSIS AND IMPLEMENTATION OF SOOT ADJUSTMENTS FOR WEAR PARAMETERS
4	20050328		LTMS IMPLEMENTED
5	20051201		TEN-TEST TARGETS IMPLEMENTED FOR OIL 830-2
6	20070130	07-1	DRAFT 10 OF THE TEST PROCEDURE RELEASED.
7	20070208	07-1	DACA II REPORT USED FOR OPERATIONAL MEASUREMENT ACCURACY & PRECISION
8	20070208	07-1	D 129 REMOVED FROM LIST OF FUEL SULFUR MEASUREMENTS.
9	20070208	07-1	NON-INTERPRETABLE TESTS INCLUDED IN CALIBRATION PERIOD TEST COUNT.
10	20070402	07-2	CALIBRATION PERIOD SET AT 12 MONTHS OR 12 TESTS.
11	20070628	07-3	Industry correction factor of +19.1 mg implemented for Injector Adjusting Screw weight loss.
12	20070628	07-3	Industry correction factor of +1.7 mg implemented for Crosshead weight loss.
13	20070807		TWENTY-ONE TEST TARGETS IMPLEMENTED FOR OIL 830-2
14	20090819	09-1	Hardcopy reference test reports no longer sent to TMC.
15	20100304	10-1	Update Crosshead Weight Loss Industry correction factor from +1.7 mg to +1.3 mg.