



Test Monitoring Center

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MEMORANDUM: 11-023

DATE: June 7, 2011

TO: Jim Moritz, Chairman, Cummins Surveillance Panel

FROM: Jeff Clark

SUBJECT: ISB and ISM Calibration Testing for the April 2011 ASTM Report Period

The following is a summary of ISB and ISM reference oil tests completed during the April 2011 ASTM report period, which began on October 1, 2010 and ended on March 31, 2011.

Test Status	TMC Validity Code	Number of Tests	
		ISB	ISM
Acceptable Calibration Test	AC	2	4
Failed Calibration Test (LTMS Criteria)	OC	2	0
Operationally Invalid Test	LC	1	0
Aborted	XC	1	0
Total		6	4

One ISB test failed due to severe Average Tappet Weight Loss and one test failed due to severe Average Camshaft Wear. One ISB test was invalid due to a failed EGR valve and one test was aborted due to an engine failure that resulted from the test oil being contaminated with fuel.

ISB Severity:

Both parameters for the ISB spent the entire period in severity alarm, in the severe direction. This was the continuation of a long-term severity problem. After this report period closed, the Cummins Surveillance Panel determined that the severity shift was hardware related, and correction factors were implemented for both parameters. These correction factors were 'back-applied' to the relevant reference tests so that reference test monitoring would accurately capture industry severity status going forward. As a result, these trends are no longer seen in the industry control charts. Additionally, severity and precision commentary in this report includes the application of the correction factors.

Figure 1 (attached) shows the current industry EWMA severity and cusum charts for Average Camshaft Wear (ACSW). ACSW is currently in control.

Figure 2 (attached) shows the current industry EWMA severity, and cusum charts for Average Tappet Weight Loss (ATWL). ATWL is currently in control but is trending an average of 0.37 Δ /s severe for the period.

ISM Severity:

PC-9-HS fuel, a fuel that was introduced to return the T-11 test to its original severity, was introduced to ISM testing on February 9, 2011. Three of the four tests this report period were run on this fuel.

Figure 3 (attached) shows the current industry EWMA severity and cusum charts for Crosshead Weight Loss (CWL). CWL is within control chart limits, but is trending an average of 0.35 Δ /s mild for the period.

Figure 4 (attached) shows the current industry EWMA severity and cusum charts for Filter Plugging Delta P (FPD). FPD is currently in an industry action for severity, in the mild direction. For this period, FPD is trending an average of 1.12 Δ /s mild for the period. It is worth noting that the current mild trend for FPD began well before the introduction of the new filter batch in May 2010.

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

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, but is trending an average of 0.65 Δ /s severe for the period.

Reference Test Precision Estimates:

Precision estimates, and any relevant commentary, will be provided on an annual basis in the sections below. No ISB estimate is available for 2010 since only one test was run.

The ISB preliminary precision estimates for 2011 show improvement for both ACSW and ATWL compared to historical levels.

ISB Precision Estimates

Parameter	2005	2006	2007	2008	2009	2011
df	15	5	5	3	4	3
ACSW	6.69	5.58	3.45	7.94	4.23	2.84
ATWL	14.13	22.29	15.62	17.66	28.60	3.57

The ISM precision estimates for 2010 shows ASR and IAS to be within historical levels. CWL shows improvement compared to recent years, while FPD shows great degradation in precision. The preliminary 2011 estimates show improvement for all parameters except IAS which shows some degradation.

ISM Precision Estimates

Parameter	2007	2008	2009	2010	2011
df	9	5	4	6	3
CWL	1.9	1.9	1.6	1.3	1.0
FPD (ln units)	0.3736	0.3211	0.1062	0.5537	0.2289
ASR	0.13	0.18	0.04	0.13	0.06
IAS	4.0	5.8	3.3	4.0	6.7

Reference Oils:

The table below shows the supply levels of reference oils for both the ISB and ISM. The TMC is looking into a new re-blend of 831 sometime in 2012, if the surveillance panel agrees that activity levels would support the need for the oil.

Reference Oil Inventory and Estimated Life^A

Oil	Tests	Original Blend Amount	Quantity Used in last 6 months	TMC Inventory	Lab Inventory^B	Estimated Life^C
831-1	C13, ISB	1300	197	459	130	~1.5 years
830-2	ISM	3786	311	1201	250	~2.5 years

^AInventories are expressed in gallons.

^BActive laboratories.

^CTime estimate is based on most recent activity levels.

Information Letters:

No ISB or ISM Information Letters were issued this period.

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.

JAC/jac/mem11-023.jac.doc

Attachments

c: F.M. Farber, TMC

Cummins Surveillance Panel

<ftp://ftp.astmtmc.cmu.edu/docs/diesel/cummins/semiannualreports/ISM/ISM-04-2011.pdf>

<ftp://ftp.astmtmc.cmu.edu/docs/diesel/cummins/semiannualreports/ISB/ISB-04-2011.pdf>

Distribution: Email

FIGURE 1
CUMMINS ISB INDUSTRY OPERATIONALLY VALID DATA



AVERAGE CAMSHAFT WEAR

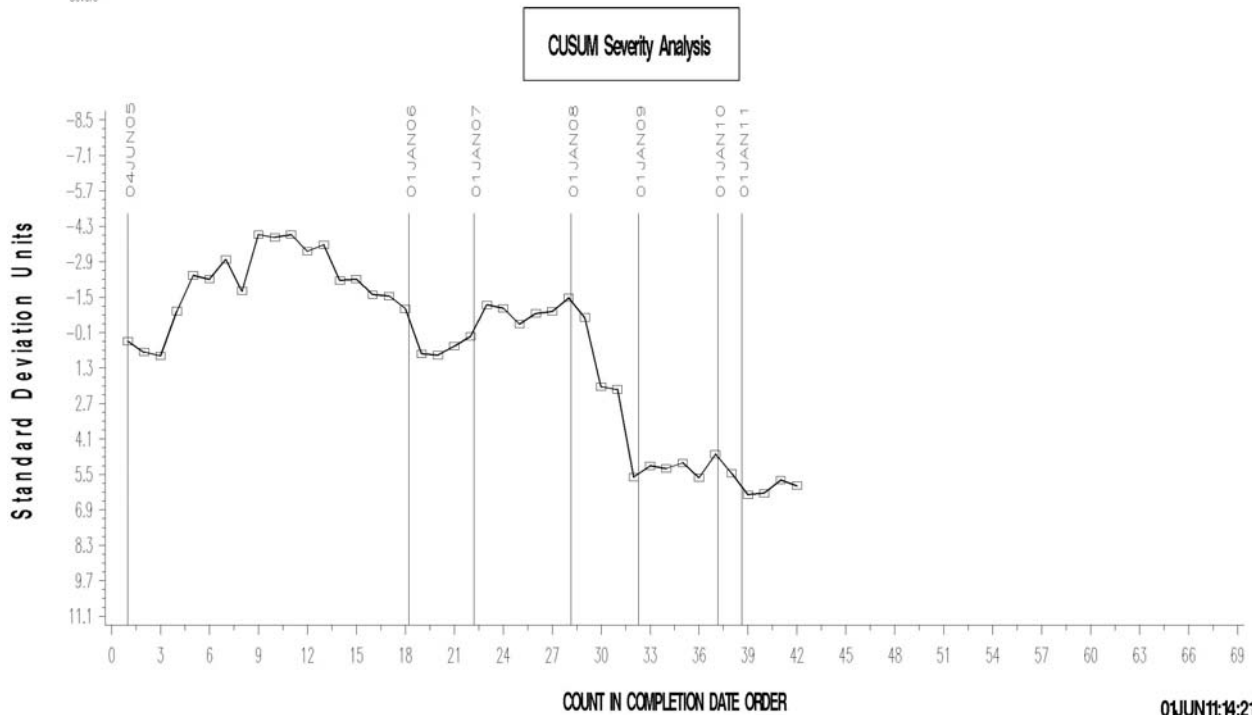
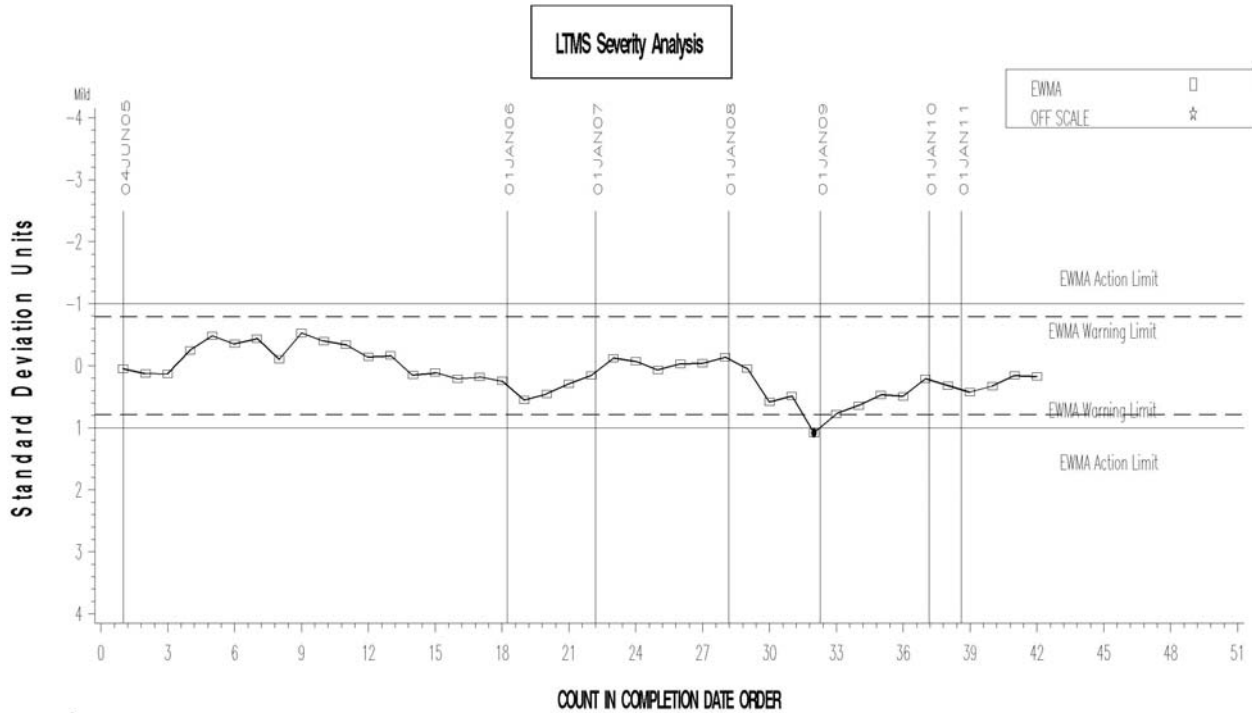


FIGURE 2
CUMMINS ISB INDUSTRY OPERATIONALLY VALID DATA



AVERAGE TAPPET WEIGHT LOSS

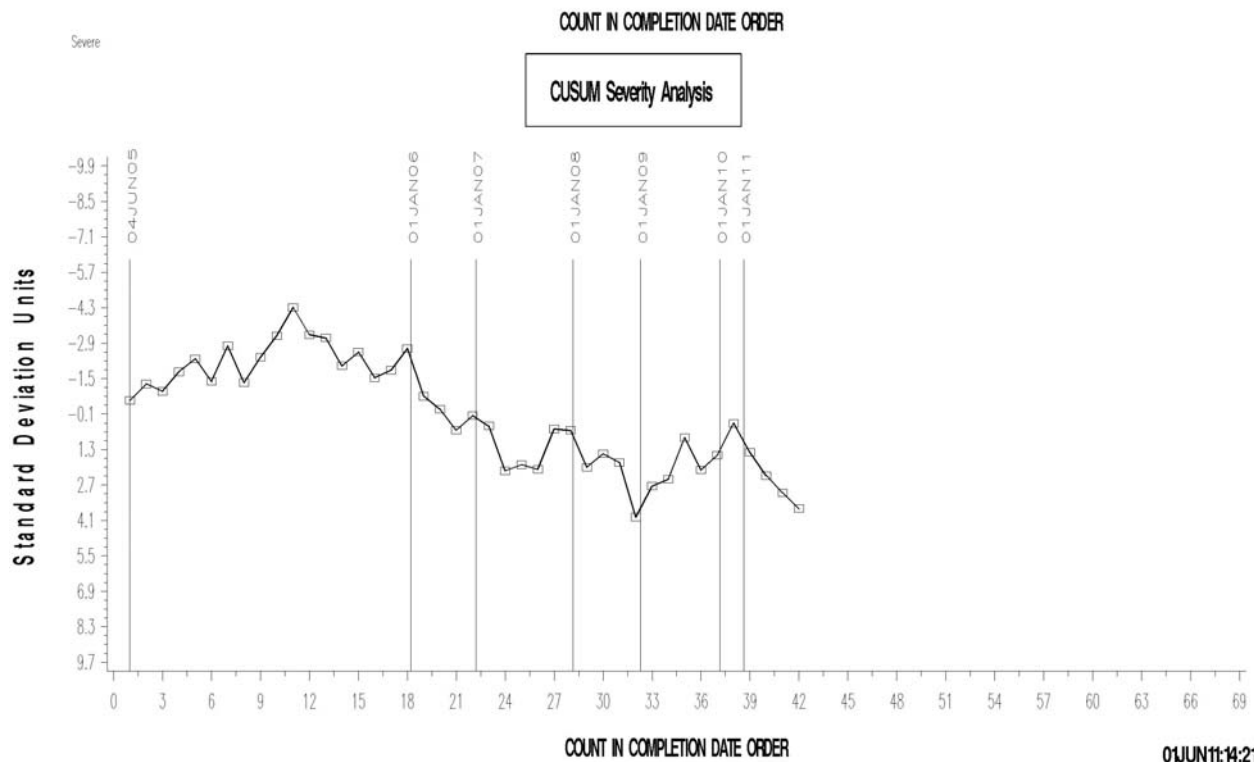
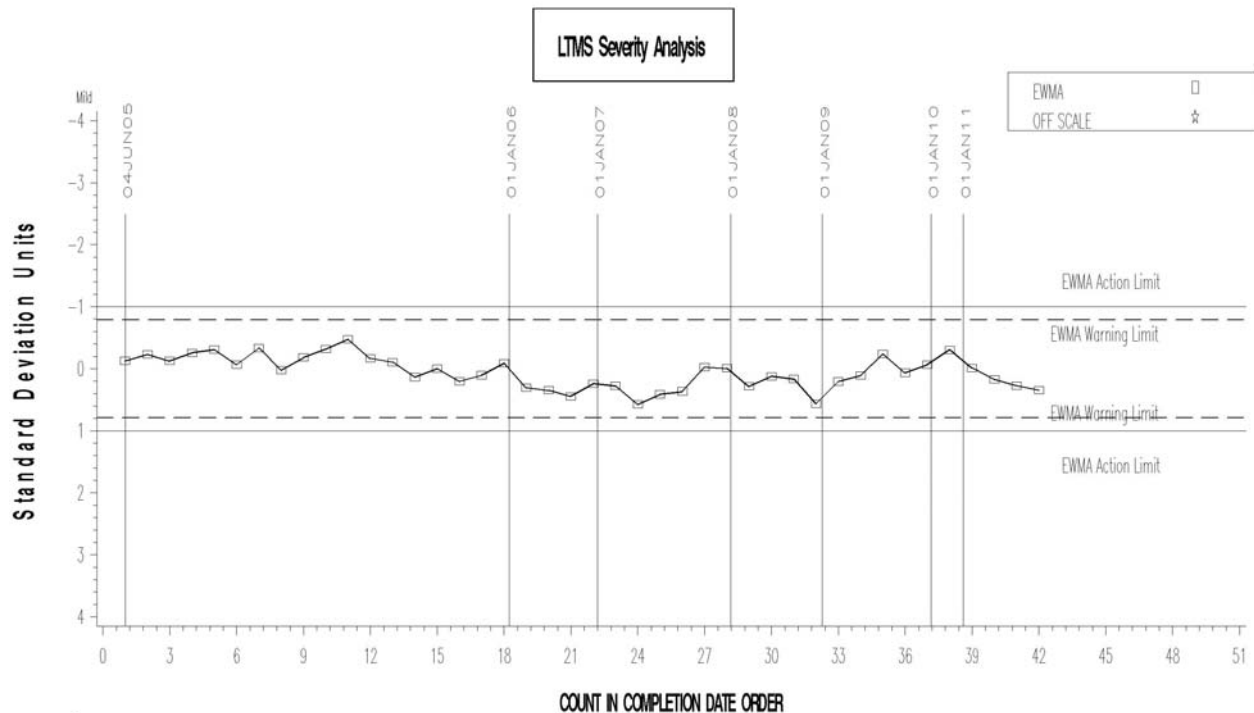


FIGURE 3
ISM INDUSTRY OPERATIONALLY VALID DATA
CROSSHEAD WEIGHT LOSS ADJUSTED TO 3.9 % SOOT

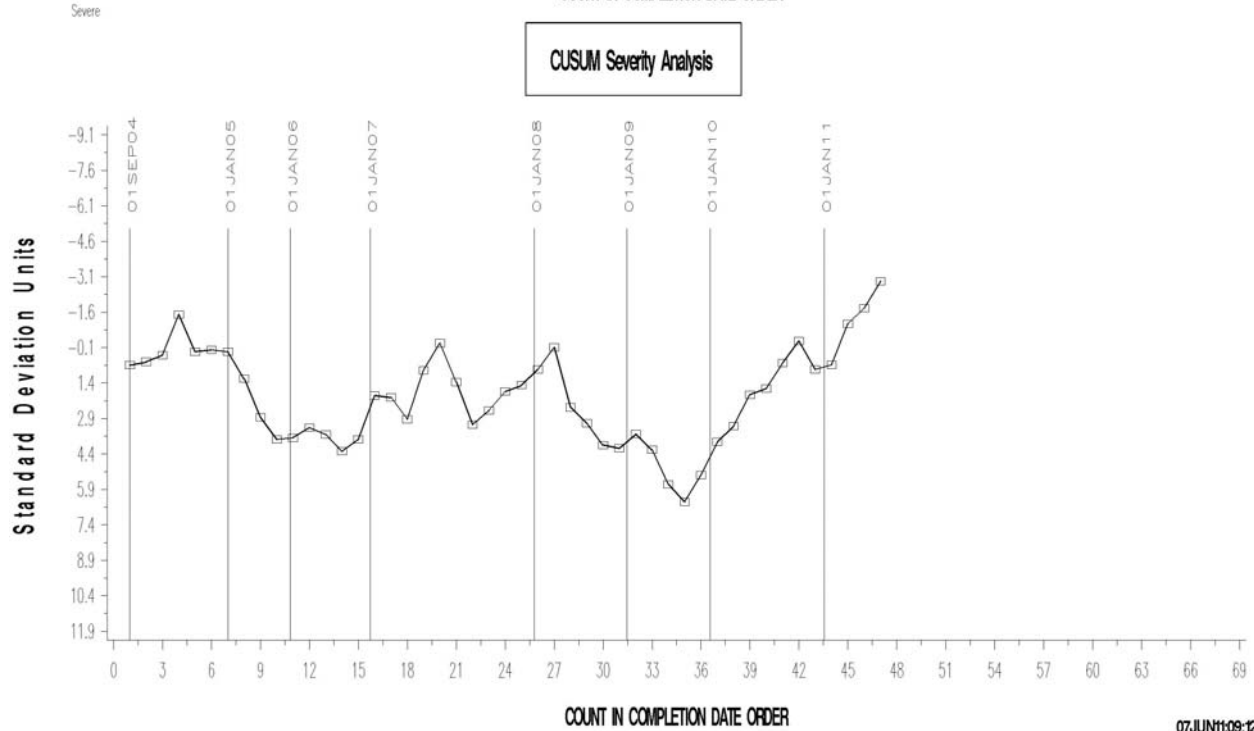
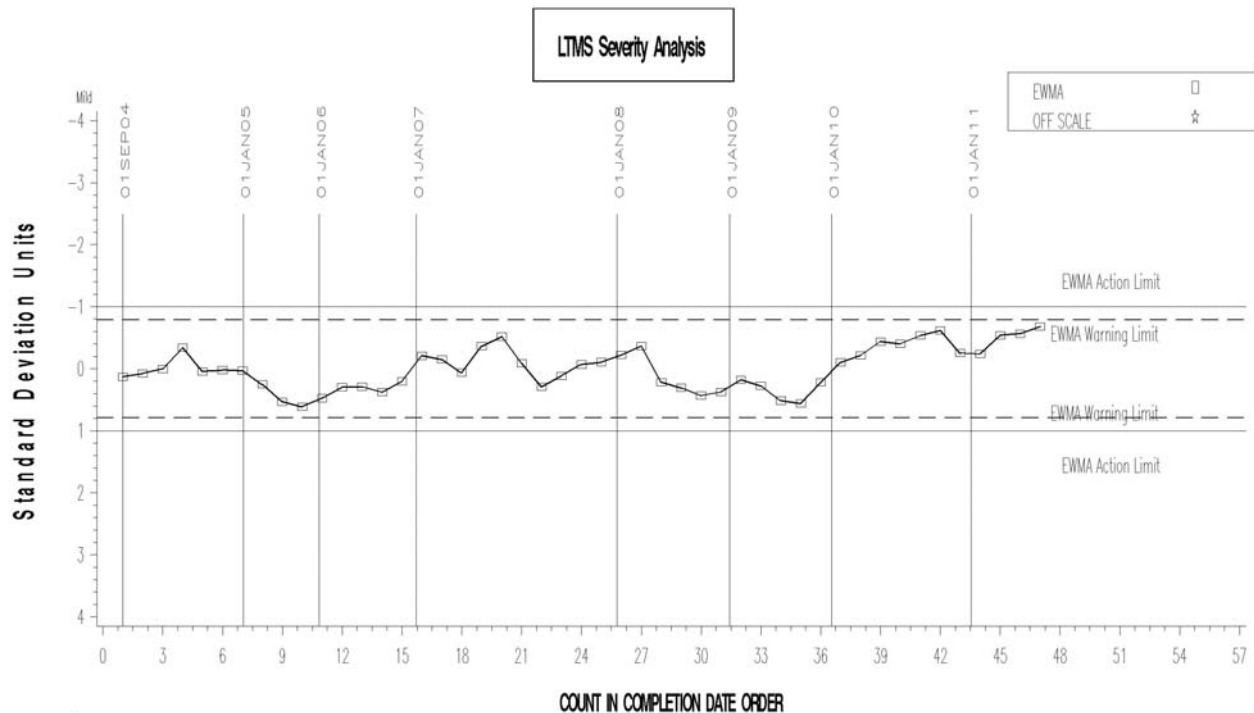


FIGURE 4
ISM INDUSTRY OPERATIONALLY VALID DATA
FILTER PLUGGING DELTA P

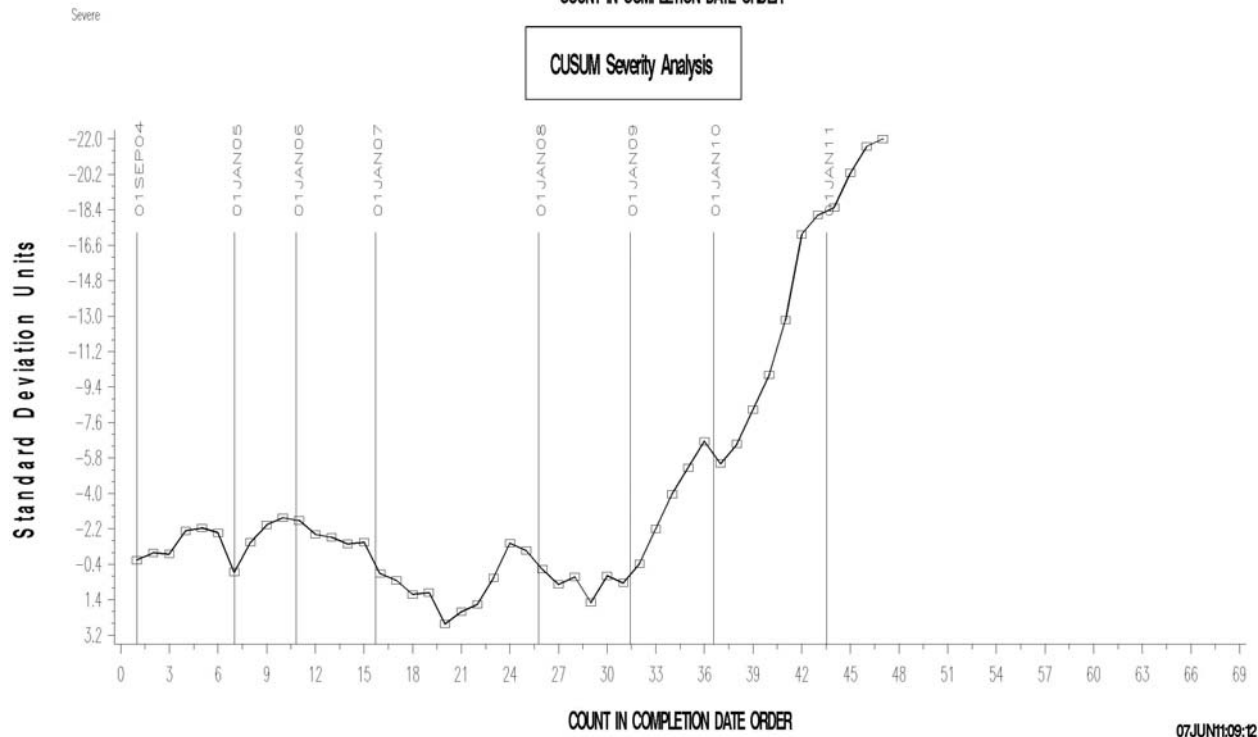
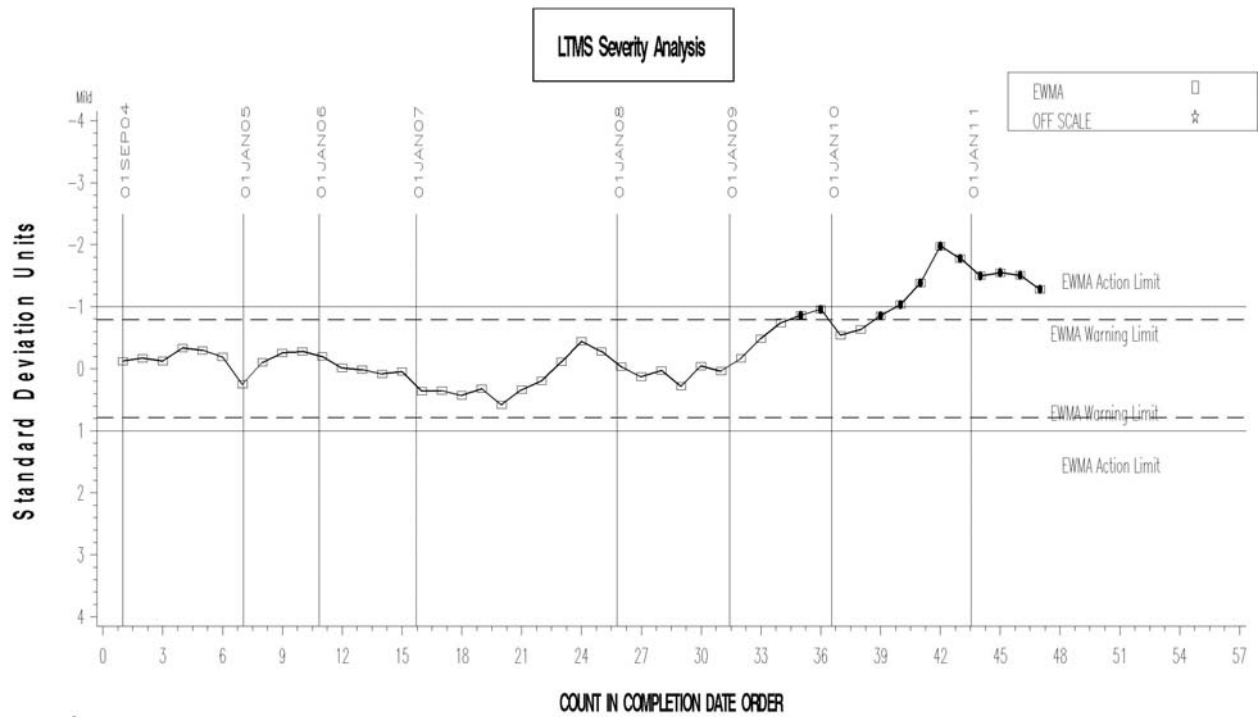


FIGURE 5
ISM INDUSTRY OPERATIONALLY VALID DATA



AVERAGE SLUDGE RATING

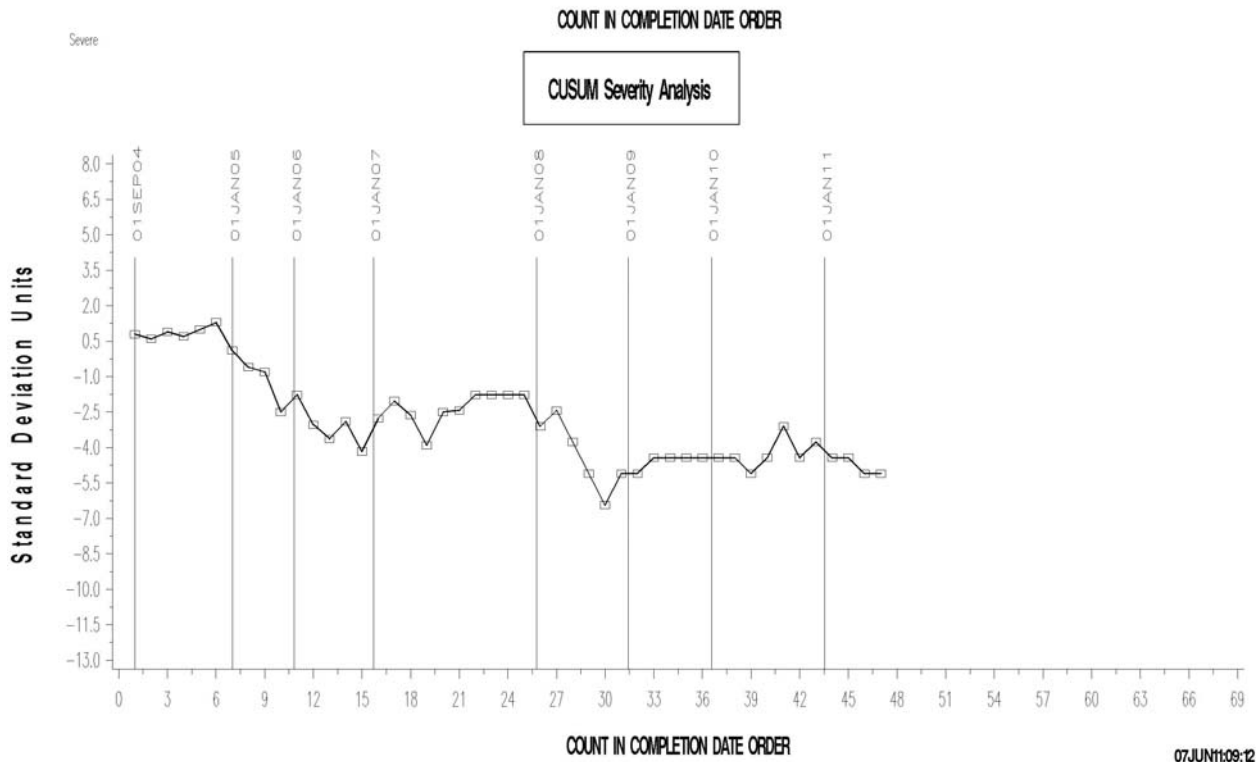
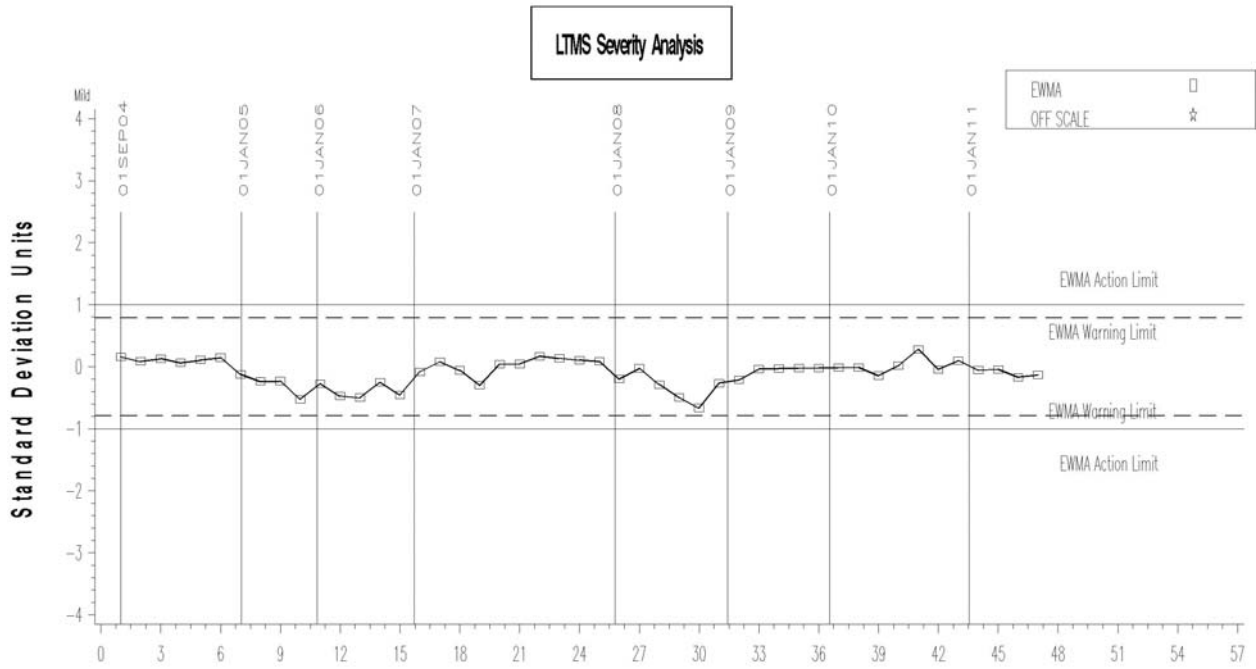


FIGURE 6

ISM INDUSTRY OPERATIONALLY VALID DATA

INJECTOR SCREW WEIGHT LOSS ADJUSTED TO 3.9% SOOT

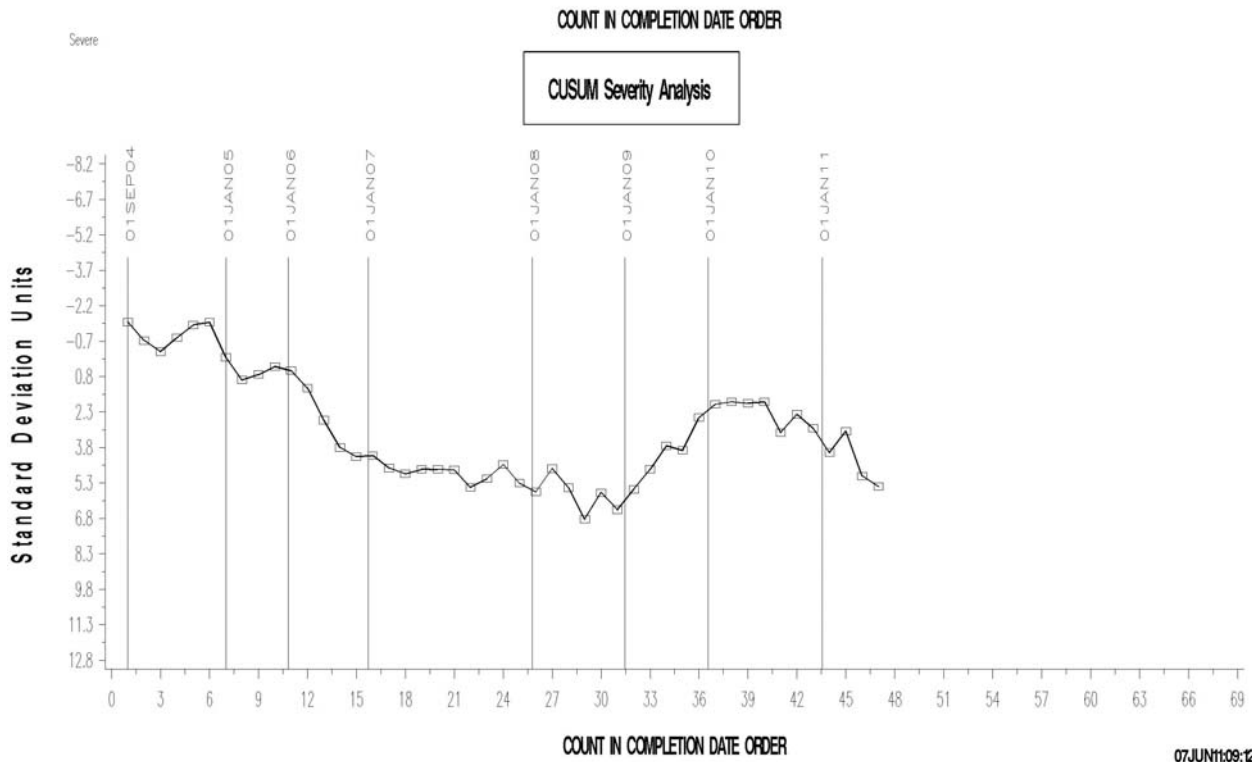
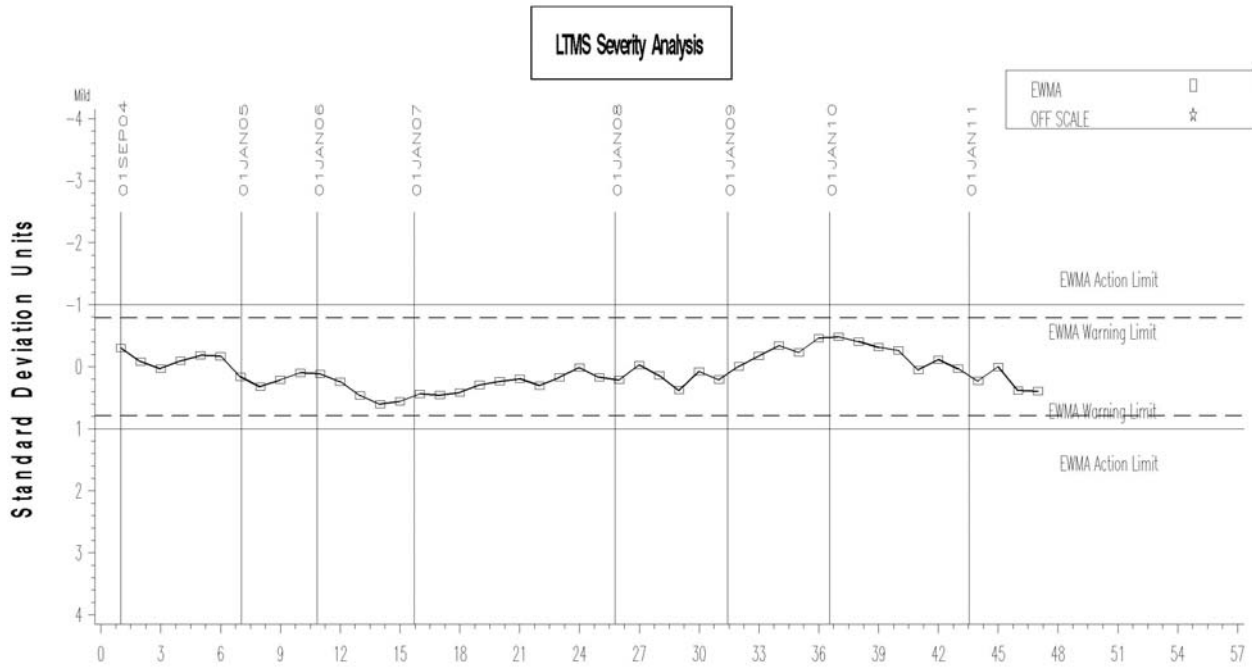


FIGURE 7

ISB Timeline

09:09 Tuesday, June 7, 2011 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.
15	20110421	11-1	Correction Factors implemented for tests using Batch B tappets and Batches E, F, or G camshafts.

FIGURE 8

ISM Timeline

09:09 Tuesday, June 7, 2011 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.
16	20110209		First test completed using PC-9-HS fuel.
17	20110430	11-1	Update Crosshead Weight Loss Industry correction factor from +1.3 mg to +2.5 mg.