



Test Monitoring Center

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MEMORANDUM: 09-007

DATE: April 8, 2009

TO: Jim Moritz, Chairman, Cummins Surveillance Panel

FROM: Jeff Clark

SUBJECT: ISB and ISM Calibration Testing for the April 2009 ASTM Report Period

The following is a summary of ISB and ISM reference oil tests completed during the April 2009 ASTM report period, which began on October 1, 2008 and ended on March 31, 2009.

Test Status	TMC Validity Code	Number of Tests	
		ISB	ISM
Acceptable Calibration Test	AC	0	5
Failed Calibration Test (LTMS Criteria)	OC	1	0
Operationally Invalid Test	LC	0	0
Aborted	XC	0	0
Total		1	5

One ISB test failed due to severe average camshaft wear and severe tappet weight loss.

ISB Severity:

With only one chartable test, 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 action 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 within control chart limits.

ISM Severity:

Figure 3 (attached) shows the current industry EWMA severity and cusum charts for Crosshead Weight Loss (CWL). CWL is within control chart limits. For this period, CWL is averaging 0.36 Δ/s severe which is approximately 0.5 mg.

Figure 4 (attached) shows the current industry EWMA severity and cusum charts for Filter Plugging Delta P (FPD). FPD is currently within control chart limits. For this period, FPD is averaging 0.49 Δ/s mild which is approximately 2 kPa at the ISM Merit Anchor of 13 kPa.

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 2009 are not yet available.

The ISB precision estimate for 2005 was primarily generated from the PC-10 matrix program. Precision estimates for 2006 show improvement for ACSW and degradation for ATWL. The 2007 estimates show continued improvement for ACSW and a return to 2005 levels for ATWL. The 2008 estimate shows degradation for ACSW.

ISB Precision Estimates

Parameter	2005	2006	2007	2008	2009
df	15	5	5	3	
ACSW	6.69	5.58	3.45	7.94	
ATWL	14.13	22.29	15.62	17.66	

The ISM 2007 precision estimate for CWL shows some degradation in comparison to previous levels. FPD and ASR are within historical levels, and IAS shows some improvement. The 2008 estimate continues to show degradation in CWL precision, and it also shows some degradation in both ASR and IAS precision.

ISM Precision Estimates

Parameter	2004	2005	2006	2007	2008
df	6	2	4	9	5
CWL	1.4	0.5	0.7	1.9	1.9
FPD (ln units)	0.4227	0.2561	0.1166	0.3736	0.3211
ASR	0.13	0.15	0.15	0.13	0.18
IAS	7.0	5.0	5.4	4.0	5.8

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

The first five tests on oil 831-1 will be judged using the 831 targets. To date, three 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 ^A (years)
831	17	50	0.5
831-1	906	195	5+
Total Estimated Life of All Reference Oils			5.5

^AThe 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, as well as the 30 test averages for 830-2, are shown below:

ISM Reference Oil Test Targets and 30 Test Averages

Oil	N	Parameter	Mean (cSt)	S
830-2	21 ^A	CWL	5.1	1.5
		FPD	2.5209	0.3274
		ASR	9.0	0.15
		IAS	29.5	5.7
830-2	30 ^B	CWL	5.3	1.6
		FPD	2.5010	0.3341
		ASR	9.0	0.15
		IAS	29.7	5.4

^ACurrent Test Targets.

^BFor consideration of a target update.

Thirty tests have been run on oil 830-2, and the surveillance panel may wish to consider updating the test targets accordingly.

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	1740	8	5+

Information Letters:

No ISB or ISM information letters were issued this period.

TMC Laboratory Visits:

No laboratory visits were conducted this period.

Quality Index:

One ISM Quality Index deviation was issued this period for intake manifold temperature. 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/mem09-007.jac.doc

Attachments

c: J.L. Zalar, TMC
F.M. Farber, TMC
Cummins Surveillance Panel
<ftp://ftp.astmtmc.cmu.edu/docs/diesel/cummins/semiannualreports/ISM/ISM-04-2009.pdf>
<ftp://ftp.astmtmc.cmu.edu/docs/diesel/cummins/semiannualreports/ISM/ISB-04-2009.pdf>

Distribution: Email

FIGURE 1
CUMMINS ISB INDUSTRY OPERATIONALLY VALID DATA

AVERAGE CAMSHAFT WEAR

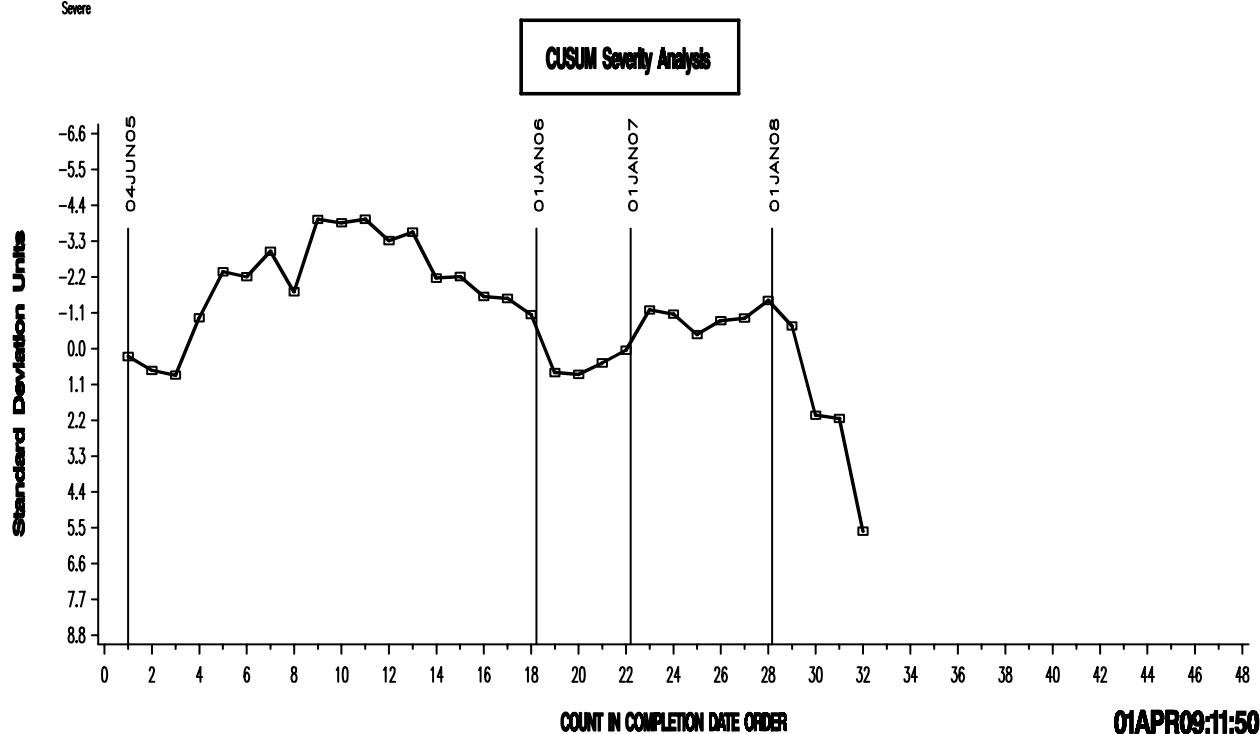
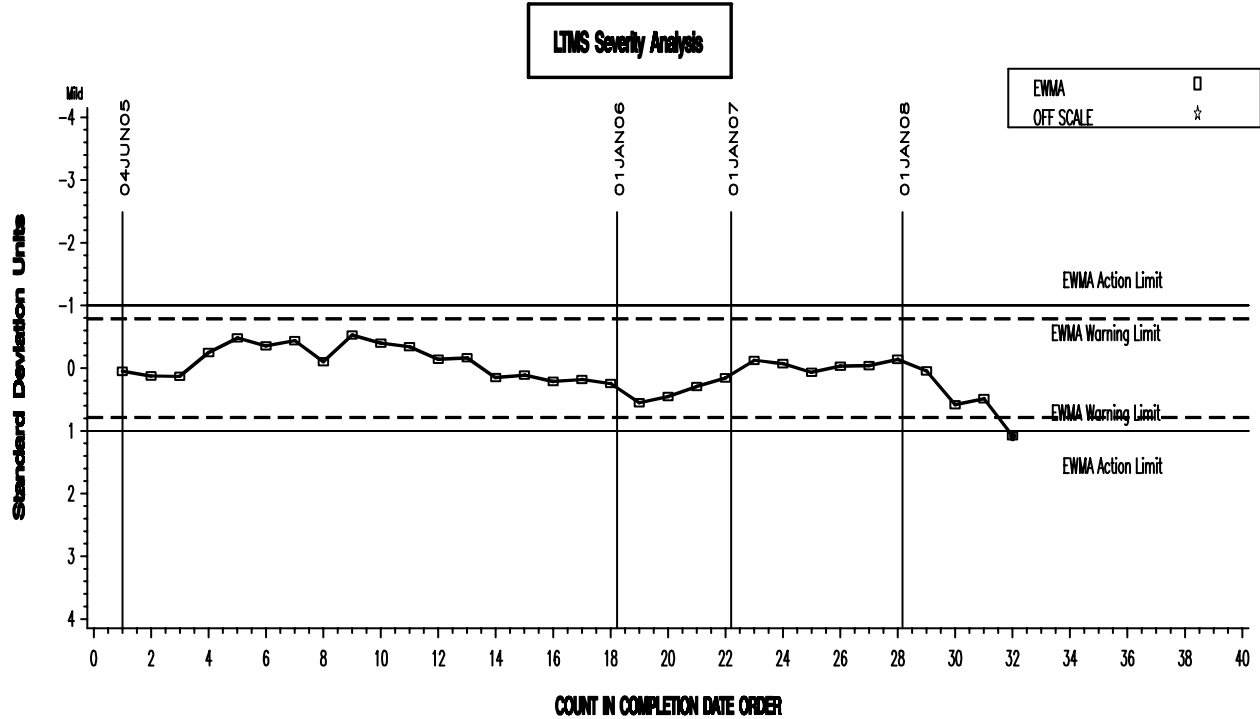


FIGURE 2
CUMMINS ISB INDUSTRY OPERATIONALLY VALID DATA

AVERAGE TAPPET WEIGHT LOSS

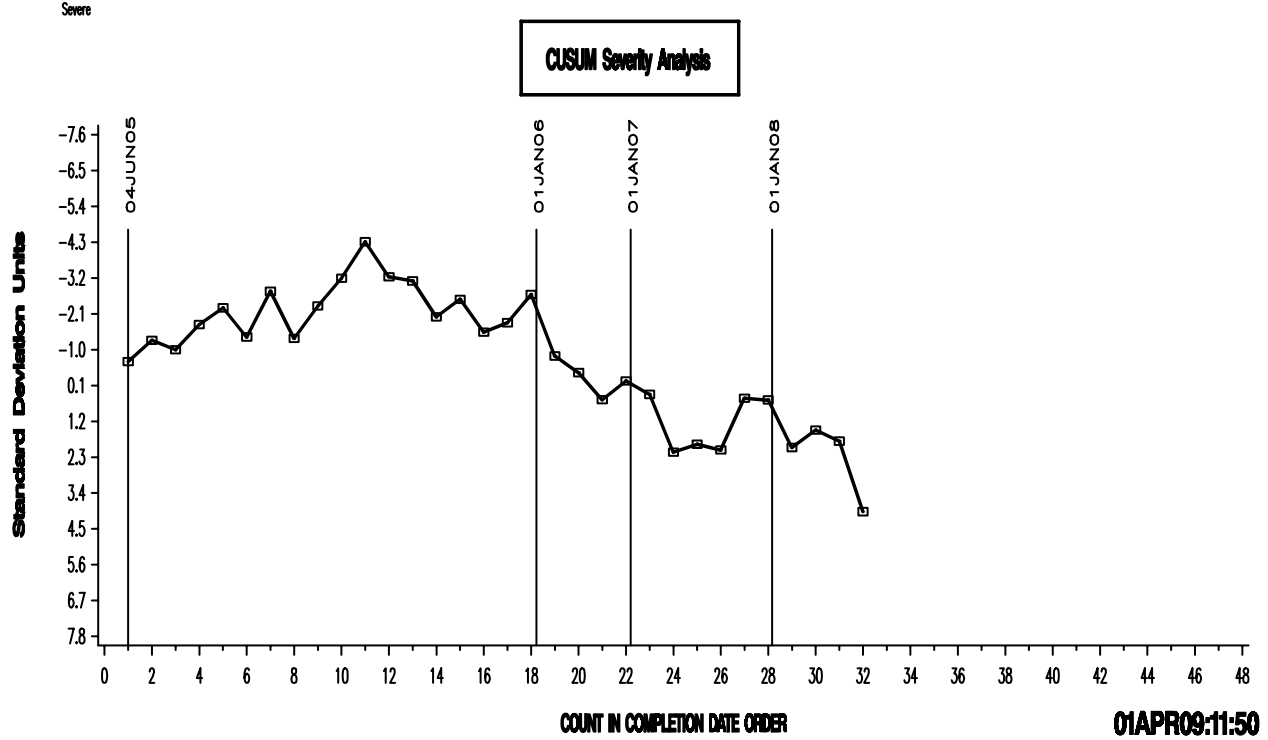
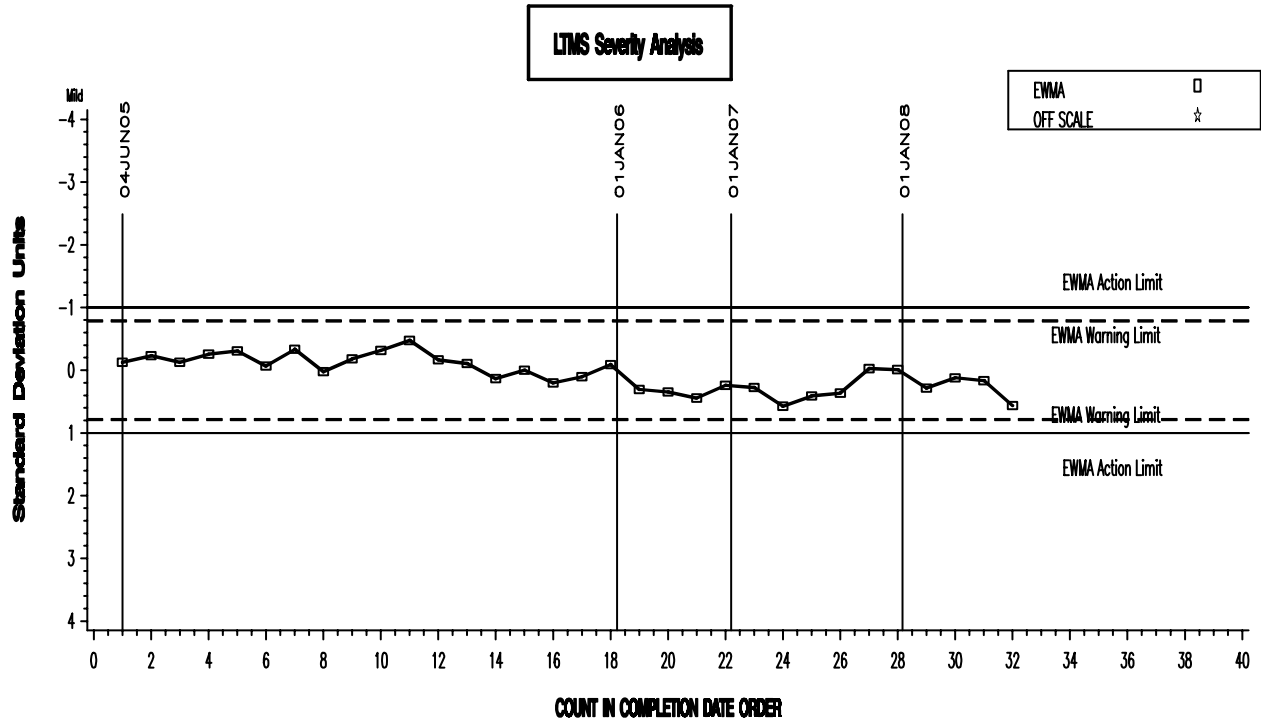


FIGURE 3 ISM INDUSTRY OPERATIONALLY VALID DATA

CROSSHEAD WEIGHT LOSS ADJUSTED TO 3.9 % SOOT

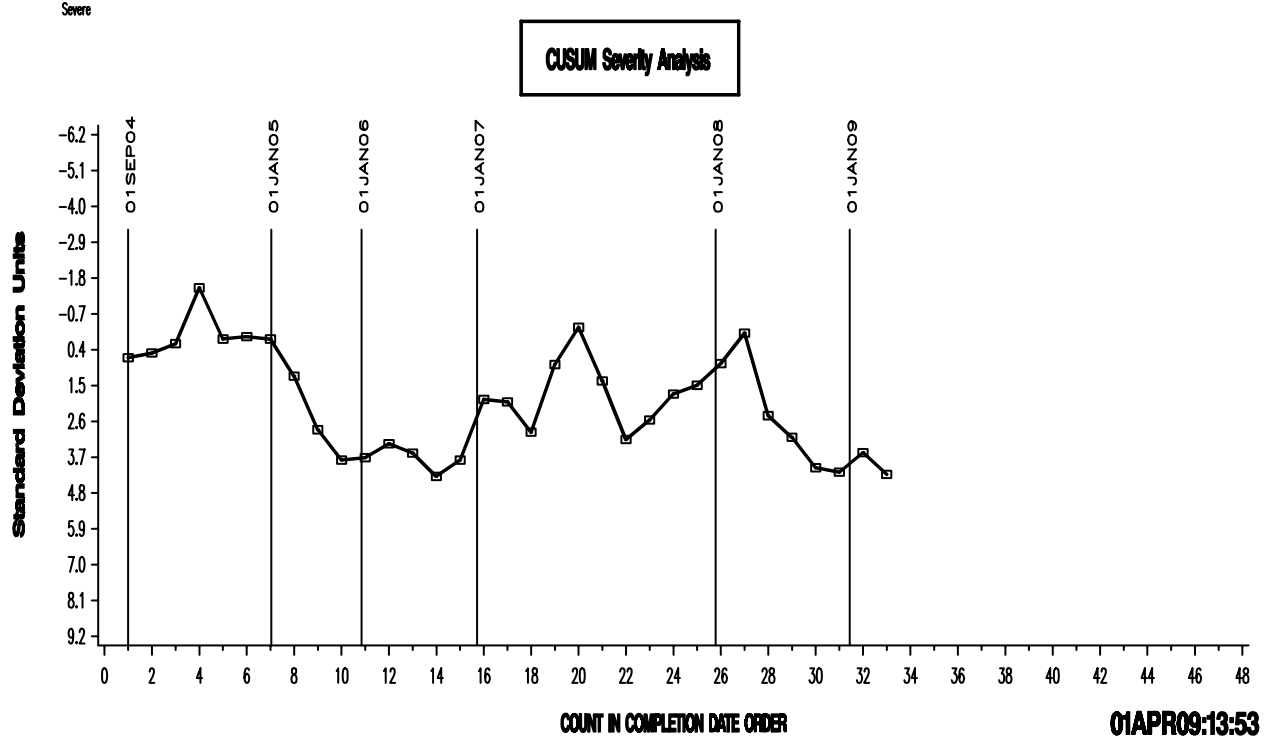
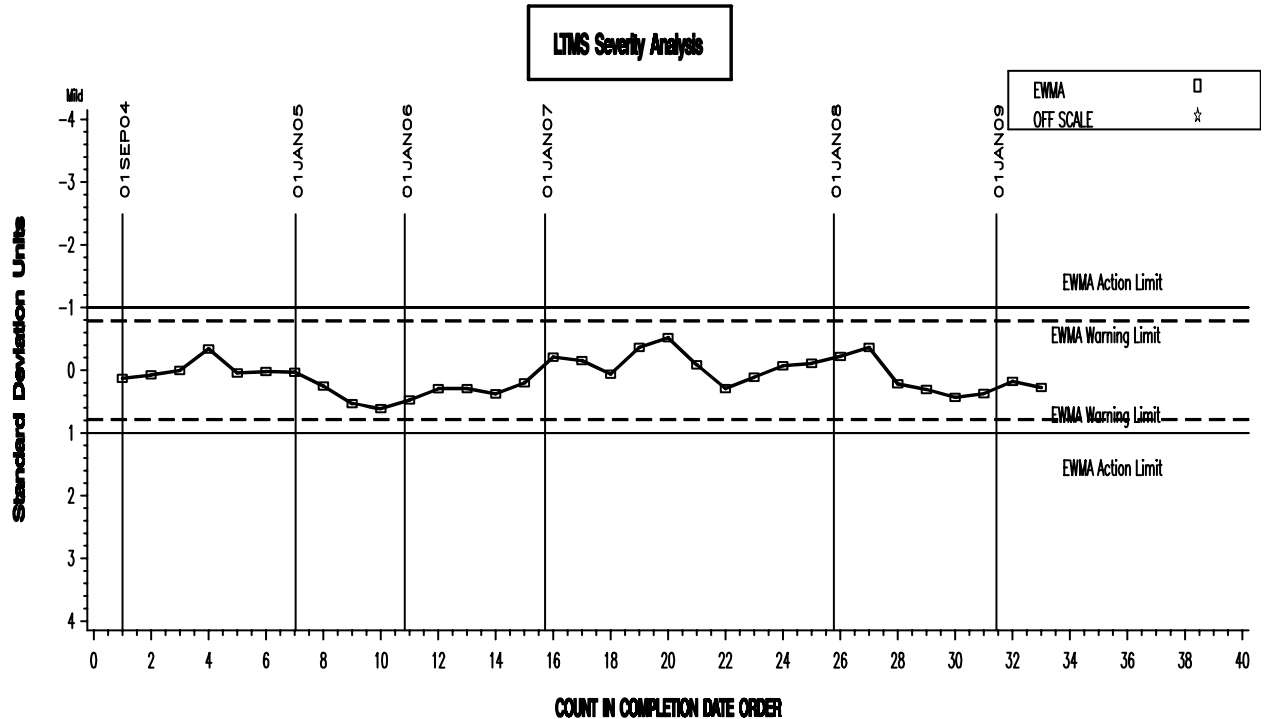


FIGURE 4
ISM INDUSTRY OPERATIONALLY VALID DATA

FILTER PLUGGING DELTA P

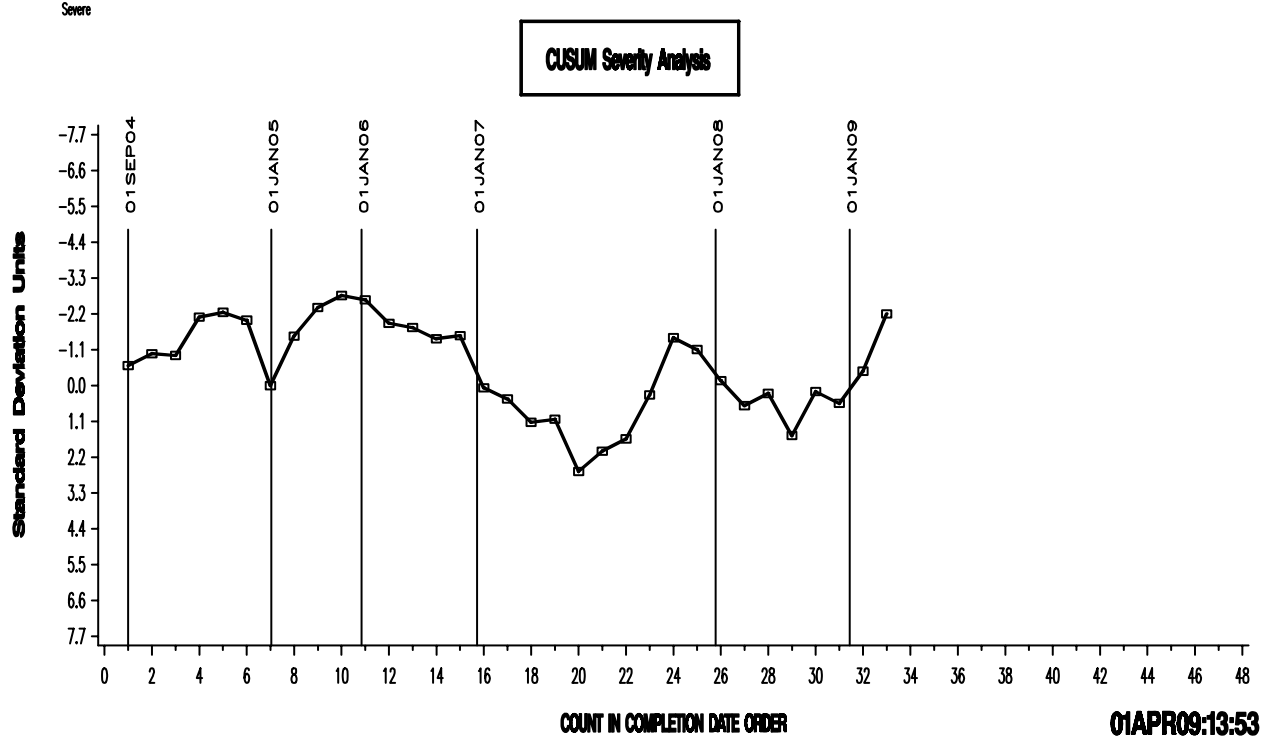
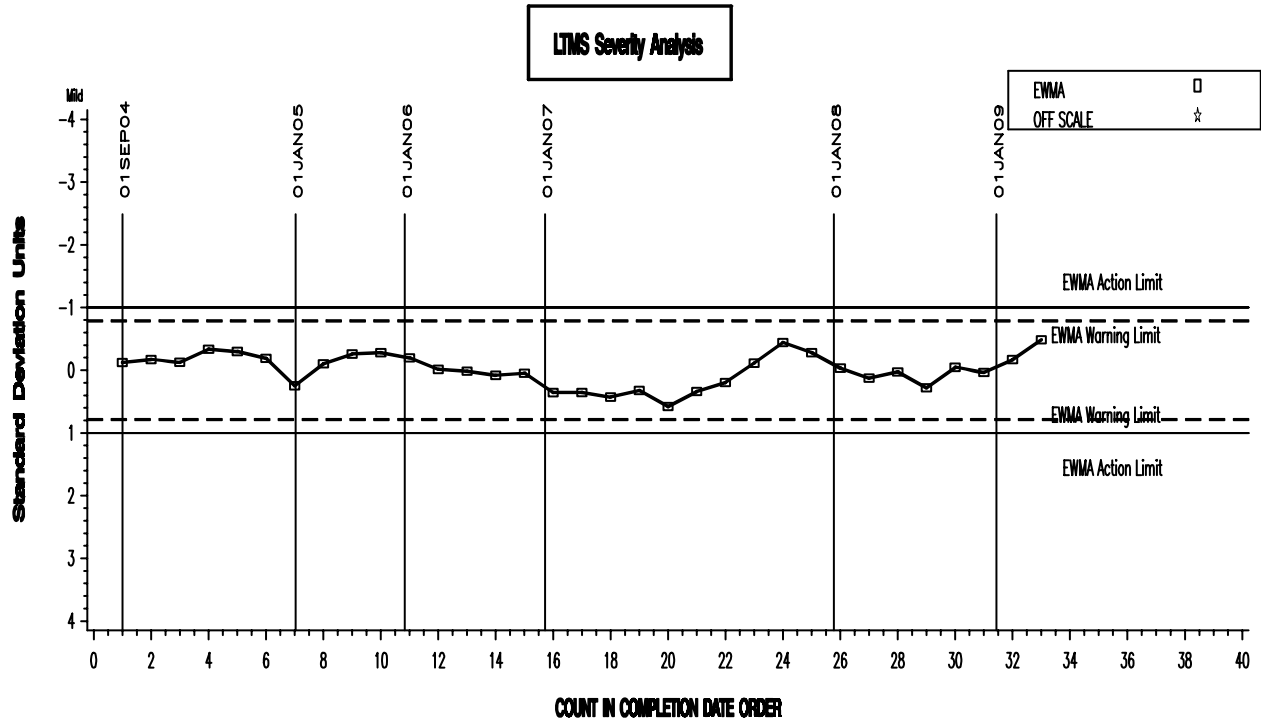


FIGURE 5
ISM INDUSTRY OPERATIONALLY VALID DATA

AVERAGE SLUDGE RATING

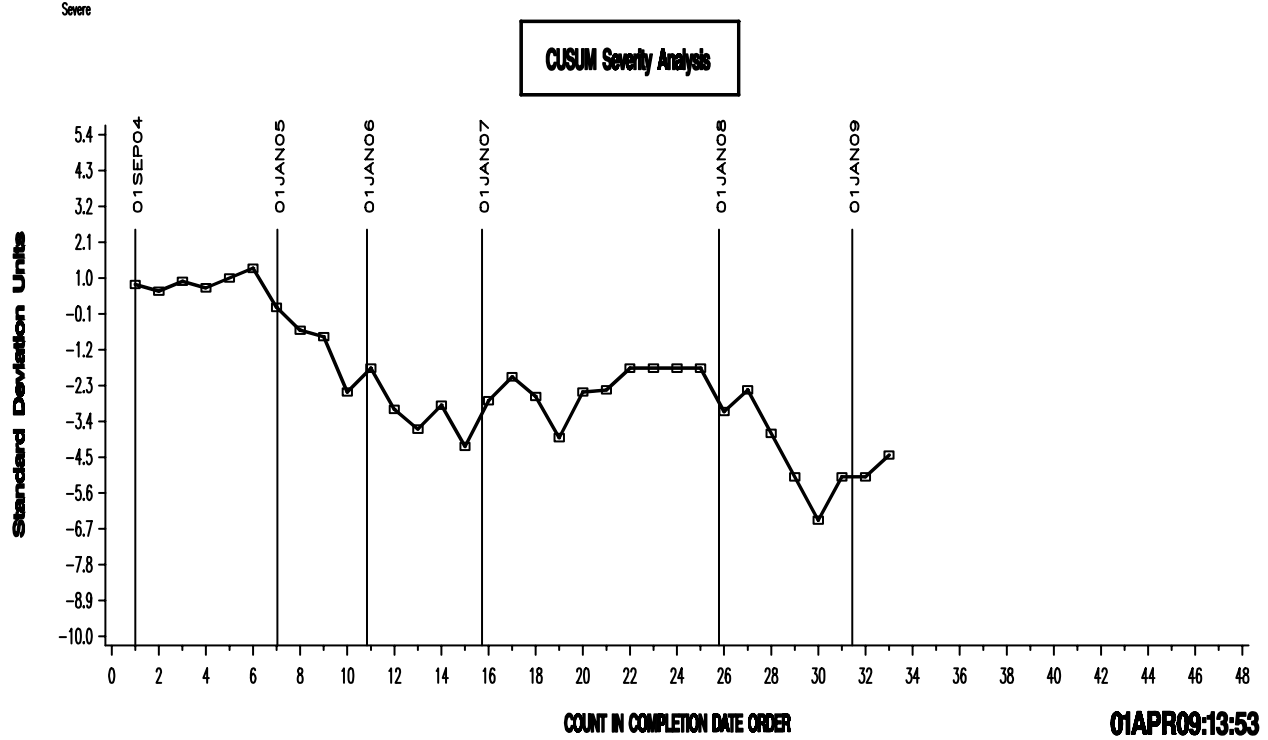
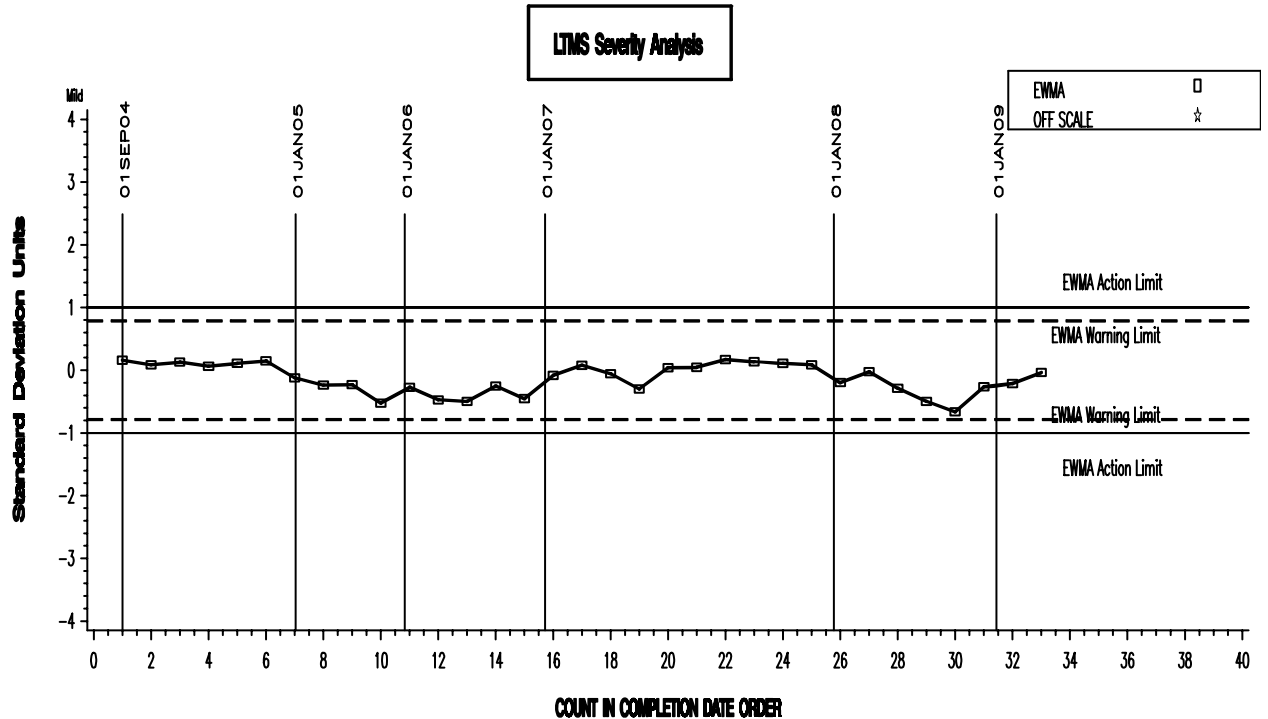


FIGURE 6
ISM INDUSTRY OPERATIONALLY VALID DATA

INJECTOR SCREW WEIGHT LOSS ADJUSTED TO 3.9% SOOT

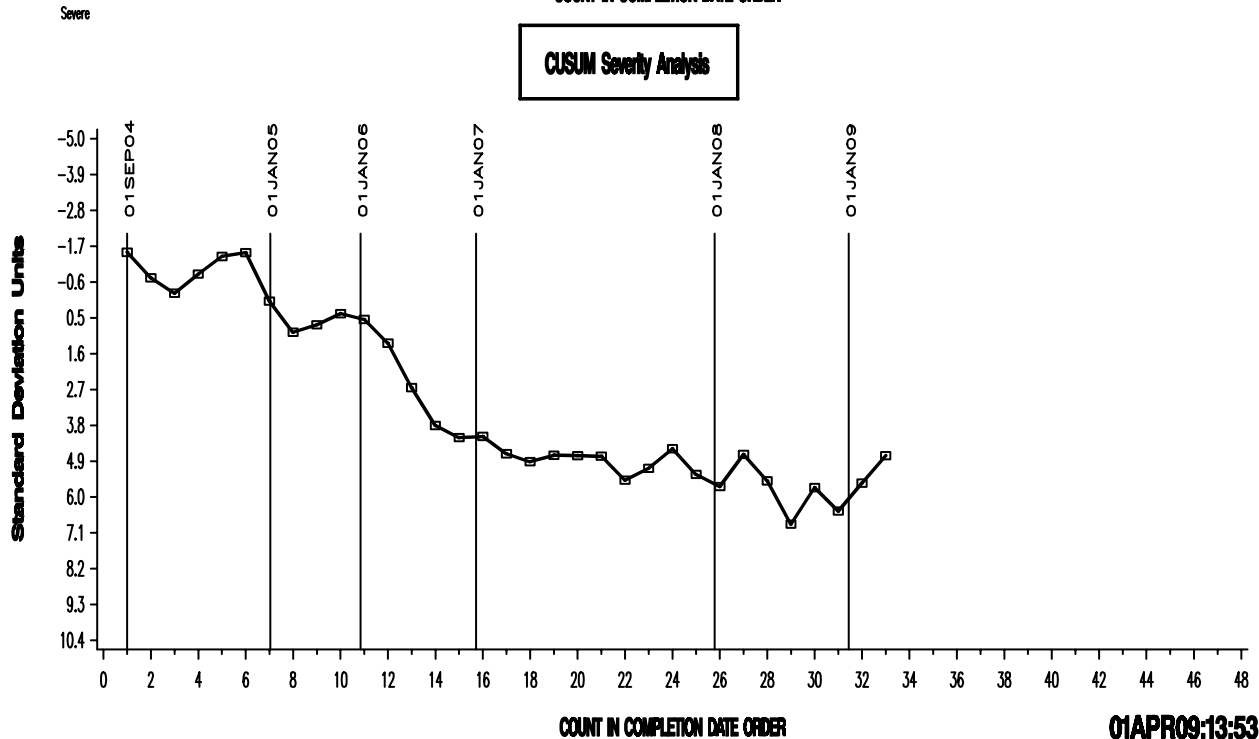
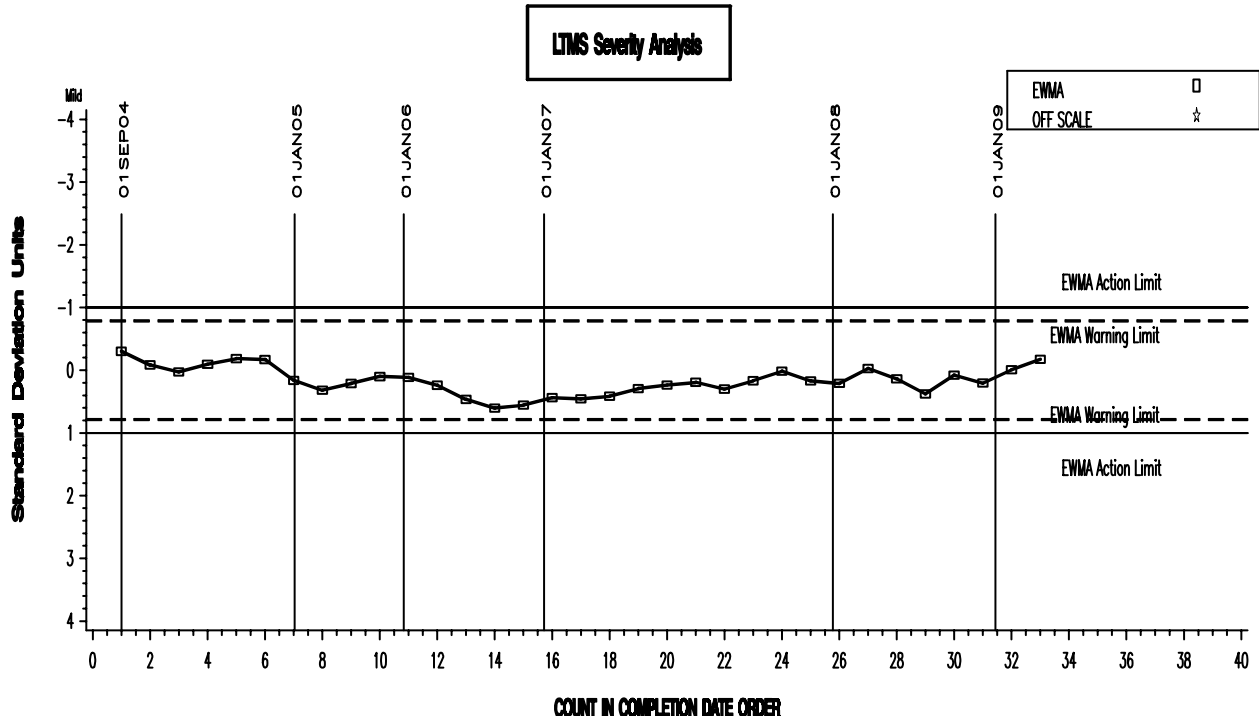


FIGURE 7

ISB Timeline

08:26 Friday, October 24, 2008 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.

FIGURE 8

ISM Timeline

08:26 Friday, October 24, 2008 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		Industry correction factor of +19.1 mg implemented for Injector Adjusting Screw weight loss.
12	20070628		Industry correction factor of +1.7 mg implemented for Crosshead weight loss.
13	20070807		TWENTY-ONE TEST TARGETS IMPLEMENTED FOR OIL 830-2