



# Test Monitoring Center

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(412) 365-1000

MEMORANDUM: 07-081

DATE: November 26, 2007

TO: James McCord,  
Chairman, Single Cylinder Diesel Surveillance Panel

FROM: Scott Parke

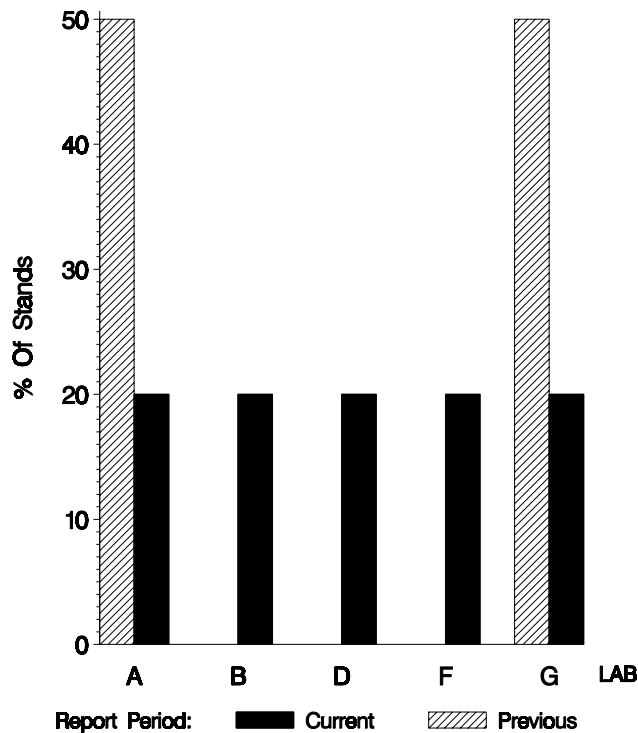
SUBJECT: 1P Testing from April 1, 2007 through September 30, 2007

Eight calibration tests were reported to the Test Monitoring Center during the period from April 1, 2007 through September 30, 2007. The data from the operationally valid tests is shown on page 7. Following is a summary of testing activity this period.

	Reporting Data	Calibrated on 9-30-07
Number of Labs	5	2
Number of Stands	5	2

Stands reporting data this period were distributed as shown below:

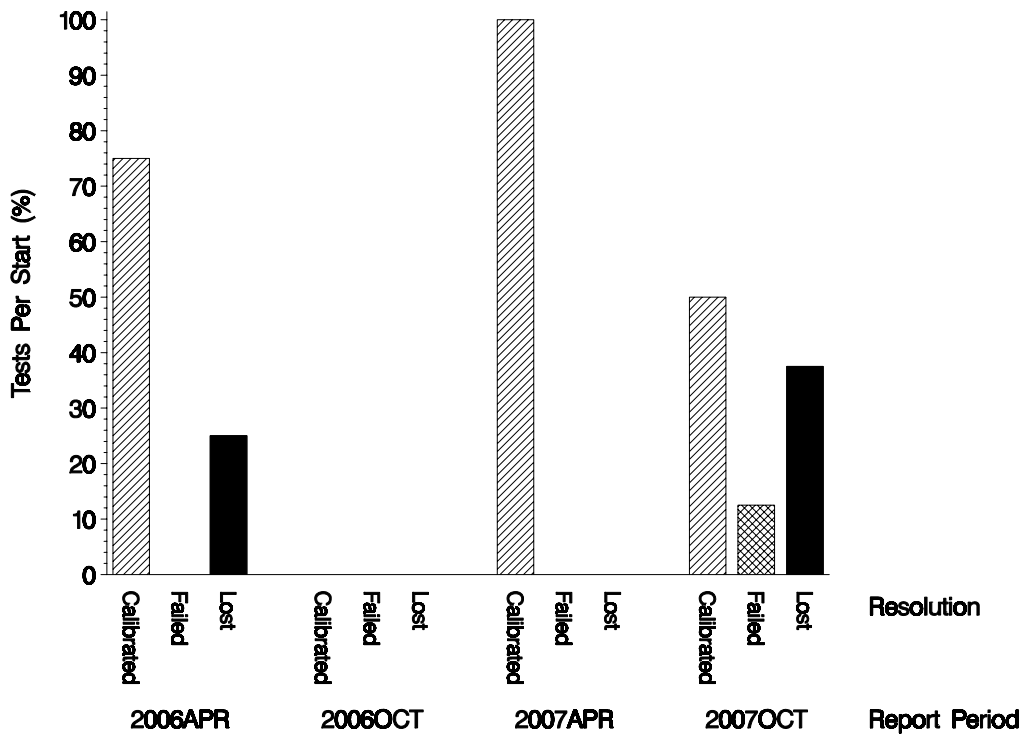
## 1P LABORATORY / STAND DISTRIBUTION

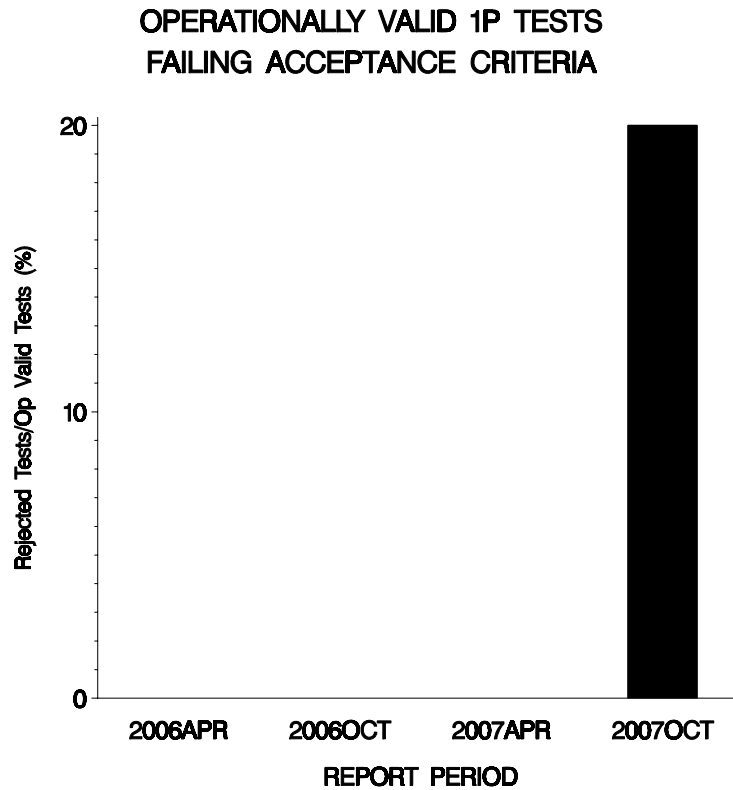


**Test Distribution by Oil and Validity**

		Totals				
		1004-3	1005-1	1005-2	Last Period	This Period
Accepted for Calibration	AC	0	0	4	2	4
Rejected Mild	OC	0	0	0	0	0
Rejected Severe	OC	0	0	1	0	1
Operationally Invalid (lab)	LC	0	0	1	0	1
Operationally Invalid (lab/TMC)	RC	0	0	0	0	0
Aborted Calibration	XC	0	0	0	0	0
Hardware Information Run	NI	0	0	2	0	2
<b>Total</b>		<b>0</b>	<b>0</b>	<b>8</b>	<b>2</b>	<b>8</b>

**1P CALIBRATION ATTEMPT SUMMARY**

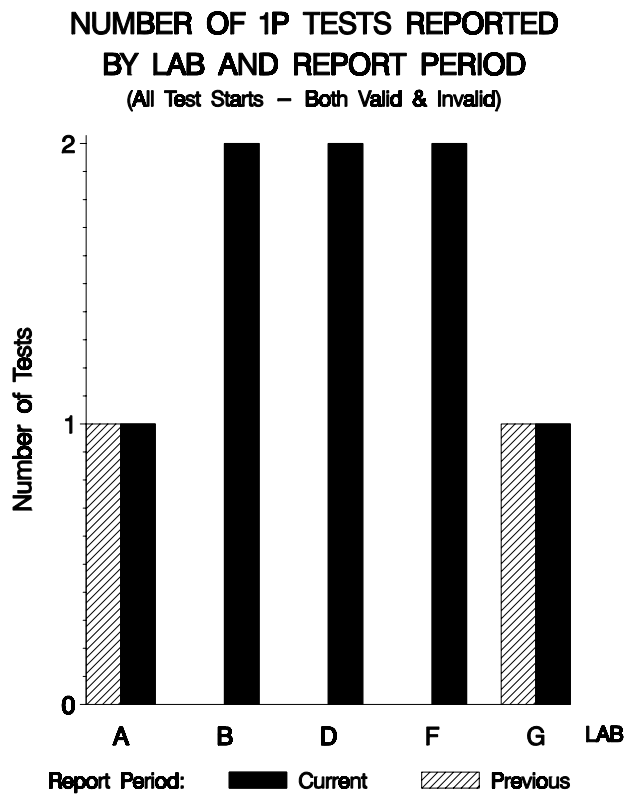




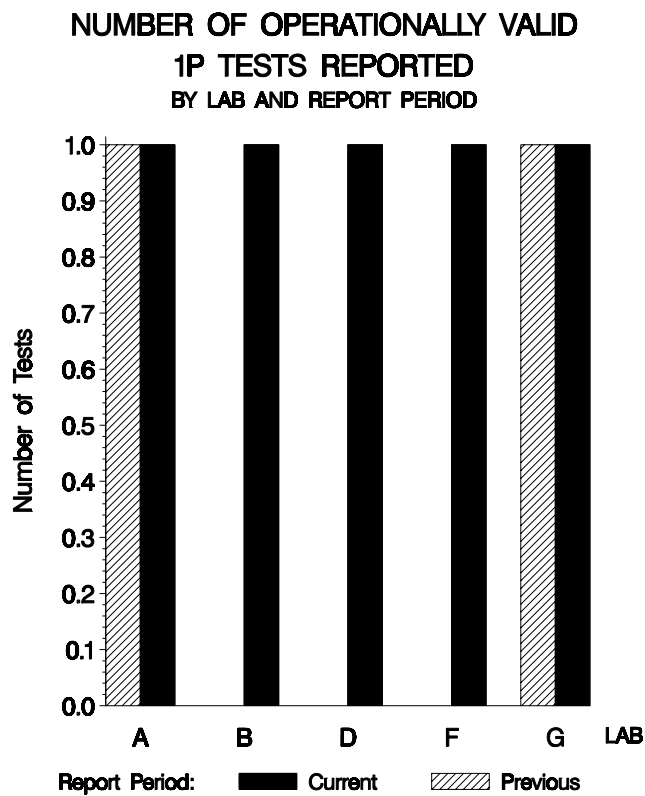
The above chart shows the percentage of failed but operationally valid tests. One test failed this period; it was severe on all parameters. The last previous failing test completed in March of 2003.

No LTMS deviations were written this period (none have ever been written for this test).

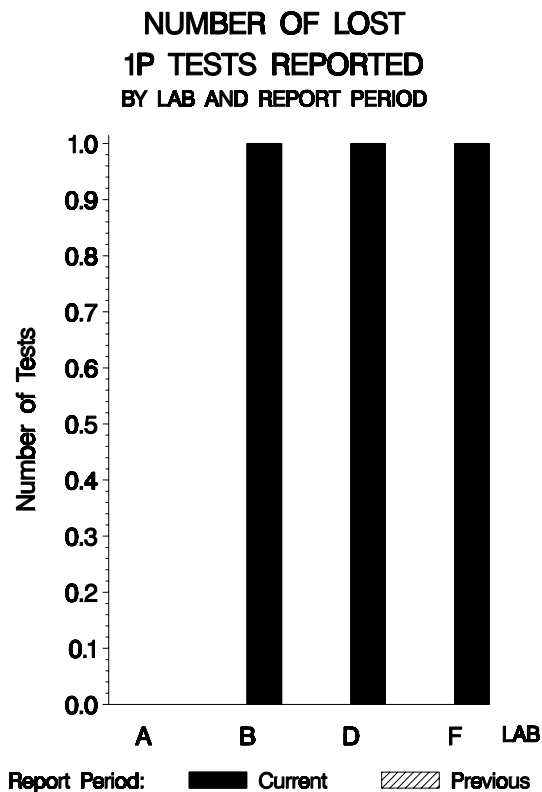
By lab, the tests run this report period were distributed as shown below:



With all operationally invalid tests removed, the distribution looks like this:



And the by-lab distribution of lost tests:



One test was lost this period; two others were not-for-calibration runs to generate hardware data.

Lost Tests per Start by Oil and Lab

Lab	1004-3			1005-1			1005-2			Total		
	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%
A							0	1	0	0	1	0
B							0	2	0	0	2	0
D							0	2	0	0	2	0
F							1	2	50	1	2	50
G							0	1	0	0	1	0
Total							1	8	13	1	8	13

Lost tests are those that were either aborted, rejected by lab, or operationally invalid.

Causes for Lost Tests

Lab	Cause	Oil			Validity			Loss Rate		
		1004-3	1005-1	1005-2	LC	RC	XC	Lost	Starts	%
F	Wristpin failure.			●	●			1	2	50%
	Lost	0	0	1	1	0	0			
	Starts	0	0	8	8	8	8			
	%	0%	0%	13%	13%	0%	0%			

Average $\Delta$ /s by Lab						
Lab	n	TGC	WDP	TLC	OC*	EOTOC*
A	1	0.401	0.675	0.637	1.704	1.770
B	1	-0.472	-0.139	-0.010	0.382	1.107
D	1	-0.310	-0.502	-0.029	0.296	0.609
F	1	4.987	4.003	2.462	2.371	3.552
G	1	-0.213	0.078	-0.257	0.665	1.063
Industry	5	0.879	0.823	0.560	1.084	1.620

\* Transformed

DATA FROM ALL OPERATIONALLY VALID TESTS REPORTED THIS PERIOD:**LTMS**

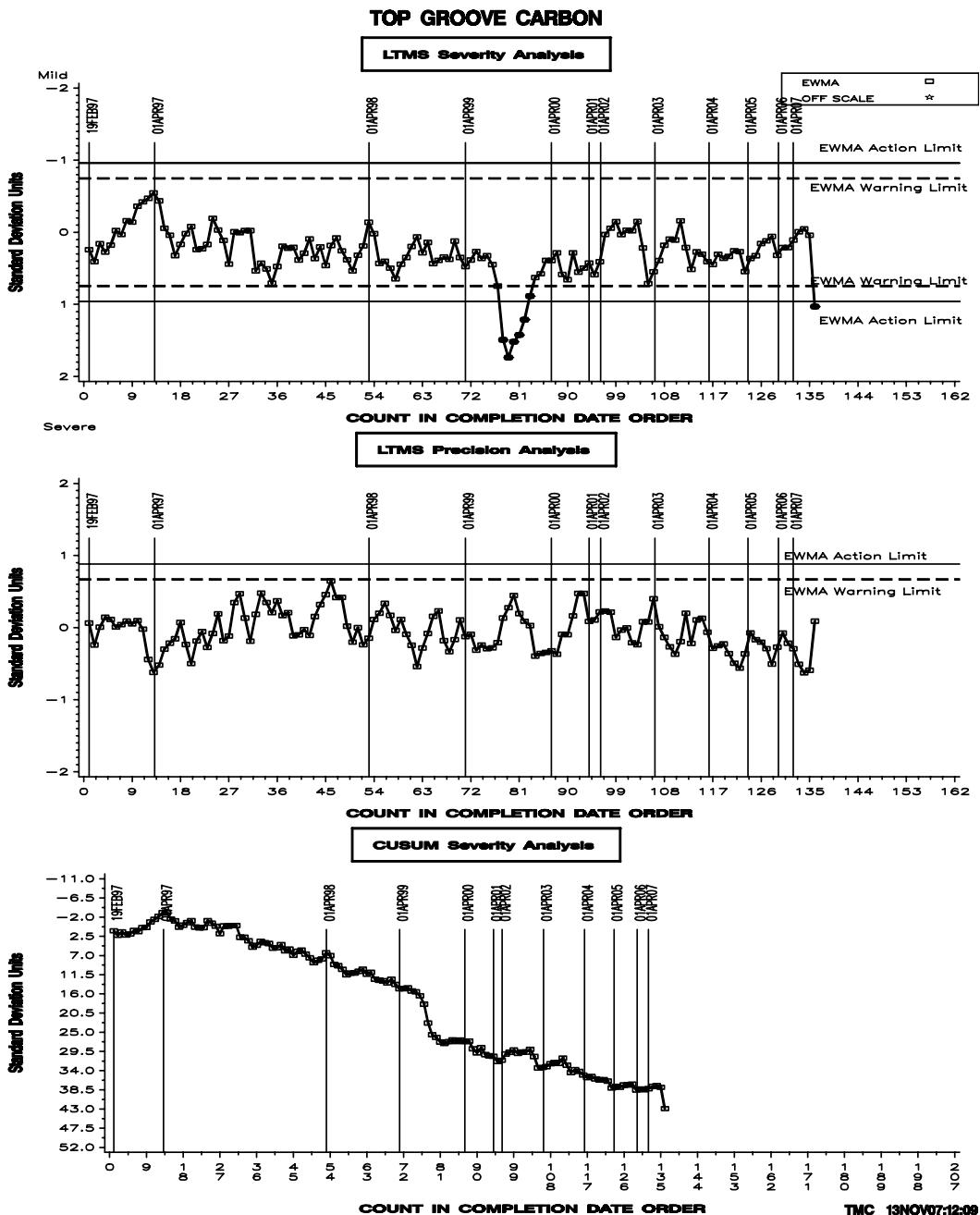
DATE	LAB	STAND	OIL	TG	WD	TL	OC	ETOC	TGYI	WDYI	TLYI	OCYI	ETOCYI
20070403	D	2A	1005-2	26.25	256.4	30.50	7.1	6.8	-0.310	-0.502	-0.029	0.296	0.609
20070421	B	2	1005-2	25.00	277.3	30.75	7.3	8.8	-0.472	-0.139	-0.010	0.382	1.107
20070508	G	4	1005-2	27.00	289.8	27.50	8	8.6	-0.213	0.078	-0.257	0.665	1.063
20070831	A	5	1005-2	31.75	324.2	39.25	11.2	12.4	0.401	0.675	0.637	1.704	1.770
20070915	F	2	1005-2	67.25	515.9	63.25	13.9	31.2	4.987	4.003	2.462	2.371	3.552

DISCUSSION OF INDUSTRY PERFORMANCE OVER THIS PERIOD

TGC:

The average  $Y_i$  reported this period was 0.879 (see table on previous page). Using the homogeneous dataset standard deviation for TGC (7.74 demerits) to compute an average  $\Delta$  yields 6.80 demerits severe. The most recent test was an extremely severe failing test with TGC of 67.25 ( $Y_i=4.987$ ).

**CATERPILLAR 1P INDUSTRY OPERATIONALLY VALID DATA**



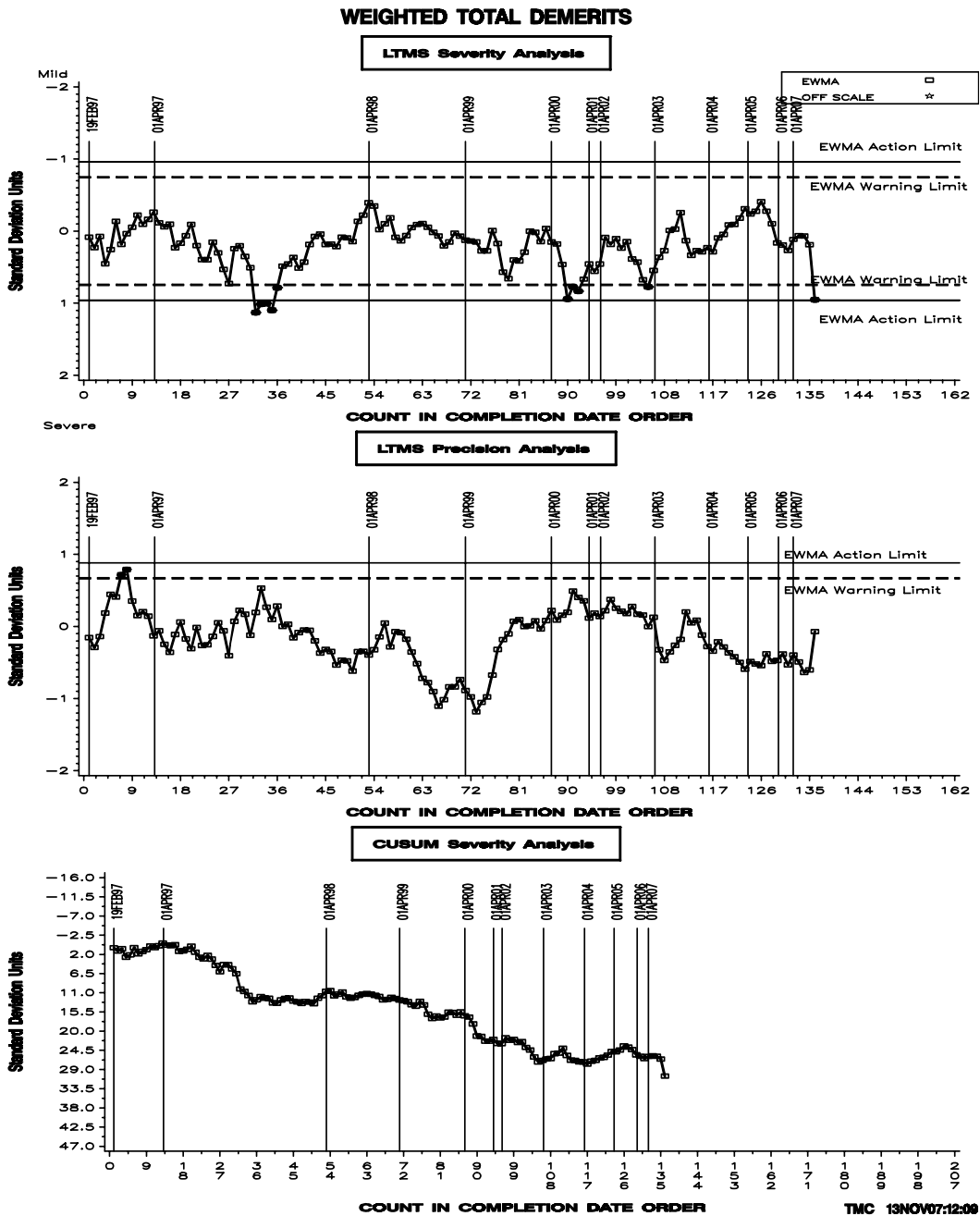
Shown above is the LTMS/Cusum plot for TGC.



WDP:

The average  $Y_i$  reported for WDP this period was 0.823 severe (see table on page 7). The homogeneous dataset standard deviation of 57.6 converts this to 47.40 demerits. Again, the most recent test was extremely severe ( $Y_i=4.003$ ). The LTMS/Cusum plot is shown below.

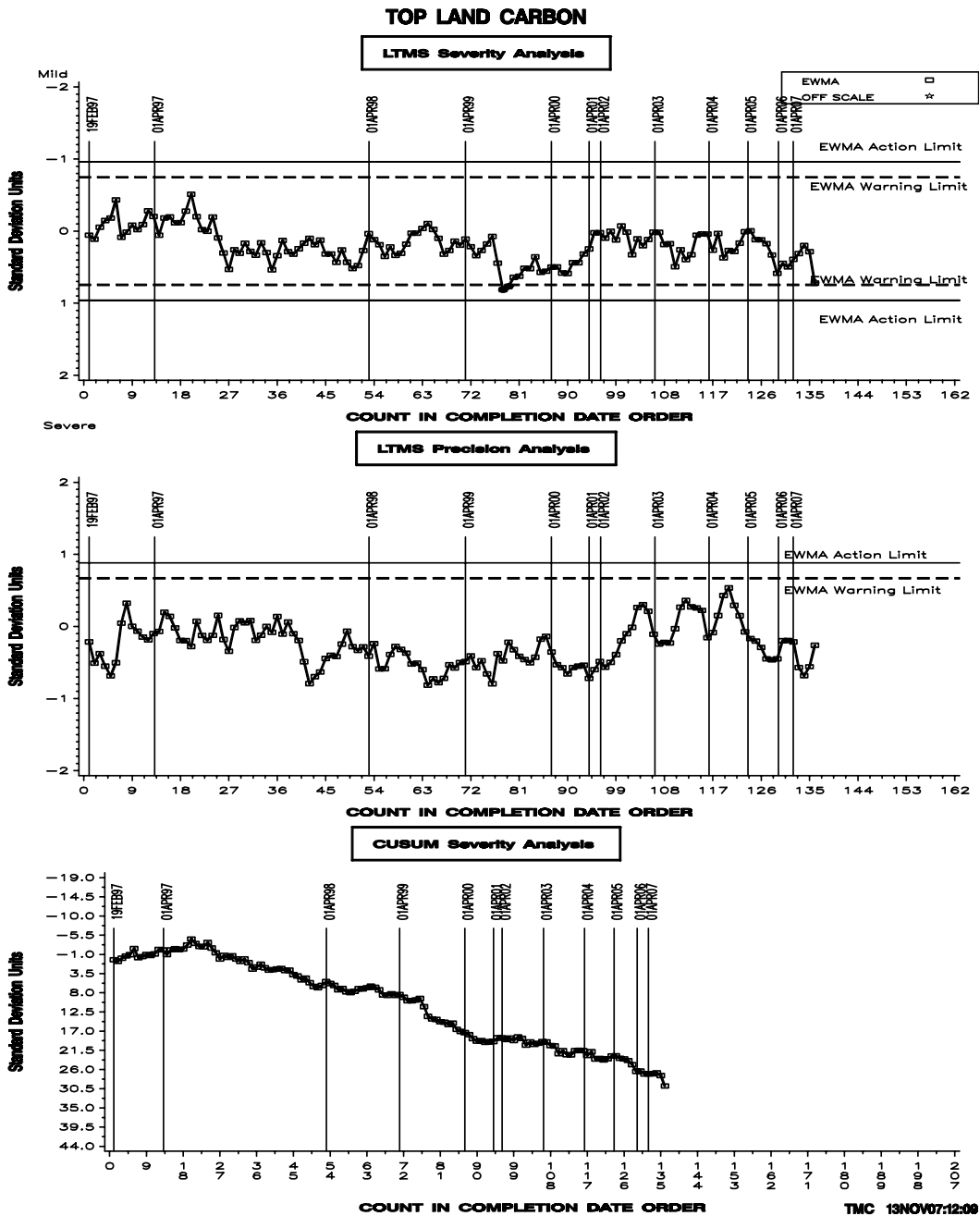
**CATERPILLAR 1P INDUSTRY OPERATIONALLY VALID DATA**



TLC:

The average TLC Yi reported this period was 0.56 (see table on page 7). Using the homogeneous dataset standard deviation of 13.15 to compute an average delta yields 7.36 severe. TLC remained within both severity and precision limits. The LTMS/Cusum chart is shown below.

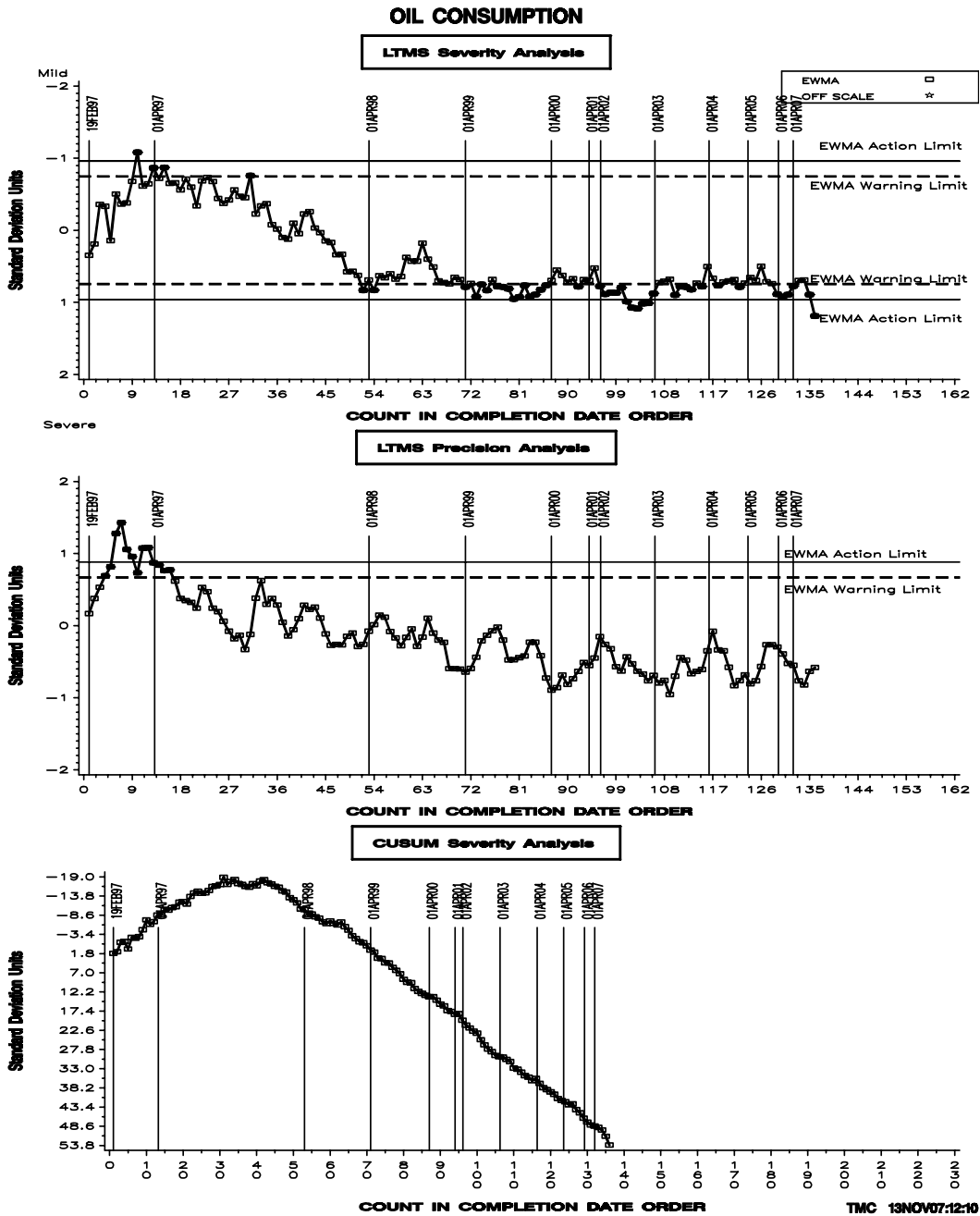
**CATERPILLAR 1P INDUSTRY OPERATIONALLY VALID DATA**



Oil Consumption (OC):

The average transformed OC  $Y_i$  this period was 1.084 (see table on page 7). Computing an average transformed delta using the homogeneous dataset standard deviation of 0.3238 gives 0.3510. Back-transforming this value gives 1.42 g/h severe. This parameter has been severe since the completion of the matrix. The most recent test was severe on oil consumption as well. The LTMS/Cusum plot for OC is shown below.

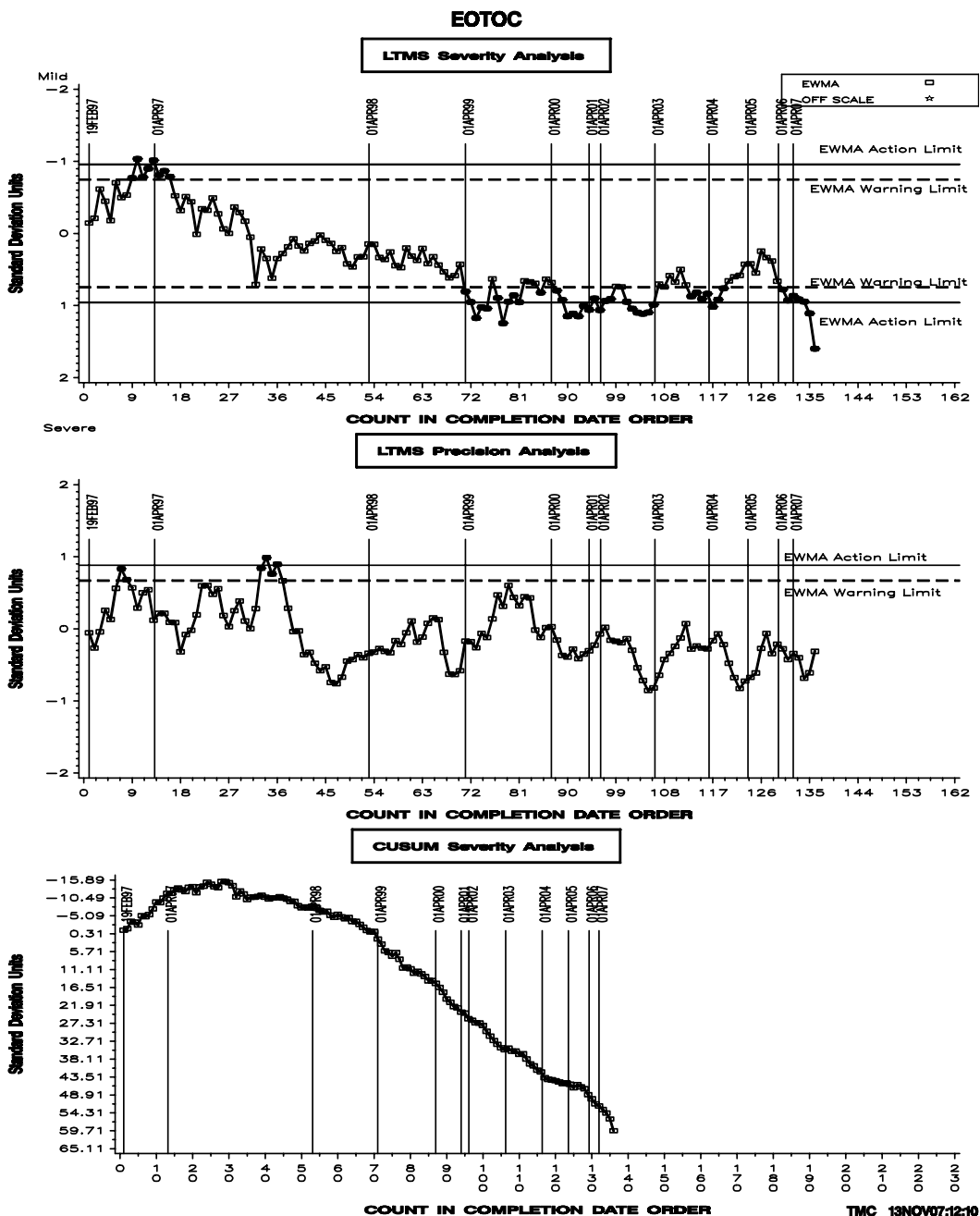
**CATERPILLAR 1P INDUSTRY OPERATIONALLY VALID DATA**



EOT Oil Consumption (ETOC):

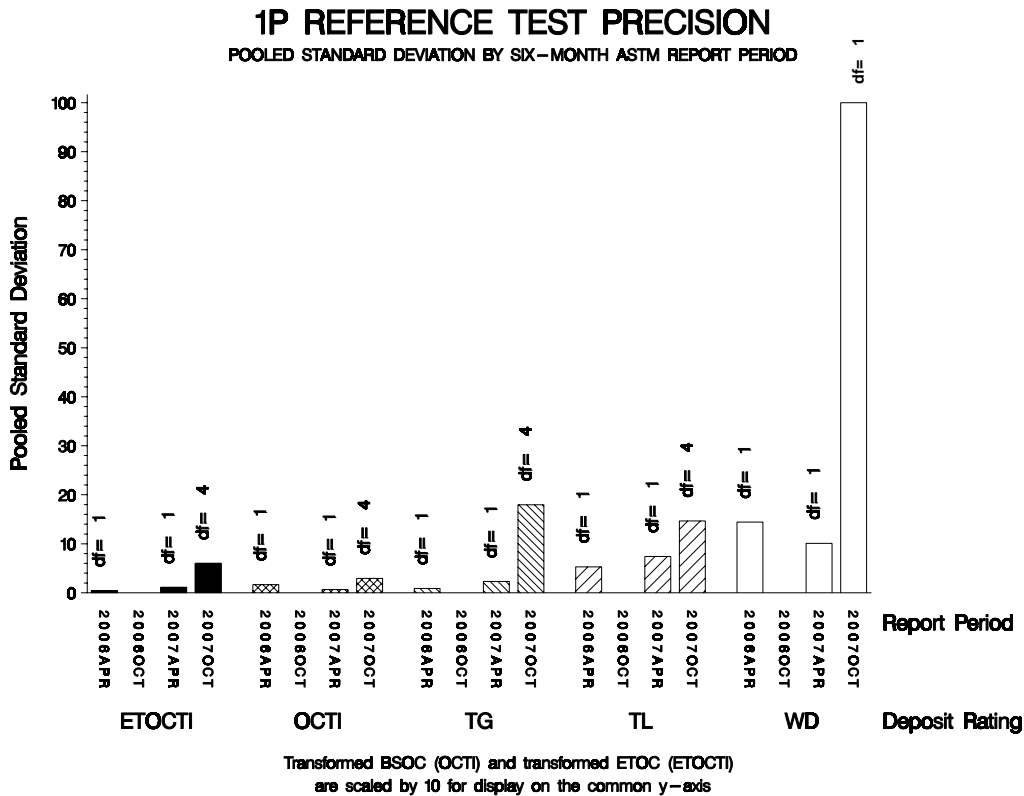
The average transformed ETOC  $Y_i$  this period was 1.62 (see table on page 7) which, using the homogeneous dataset standard deviation of 0.5177, converts to 0.8387 which back-transforms to 2.31 g/h. As with average oil consumption, ETOC has been severe since the end of the matrix. The LTMS/Cusum plot for ETOC is shown below.

**CATERPILLAR 1P INDUSTRY OPERATIONALLY VALID DATA**



POOLED S:

Shown below is a bar chart comparing the pooled s values for the 1P test parameters over the last four report periods. Please note that the values for oil consumption (OCTI) and end of test oil consumption (ETOCTI) have been multiplied by 10 to allow these parameters to be shown on the same plot as the other parameters. Where degrees of freedom equal zero, no bars are shown. This will occur where only one test was reported or where multiple tests are reported but all are on different oils. The extremely severe test reported this period had a negative impact on pooled s for all parameters, particularly WD.



QUALITY INDEX:

No Quality Index Deviations were written this period. A total of nine have been written for this test.

The first three Quality Index Deviations were written for tests from a lab experiencing QI implementation problems during the installation of new control hardware in February of 1998 (the QI requirements were implemented in January of 1998). The fourth was for the same lab while again installing the same hardware on another stand in May of 1998.

The fifth and sixth were written when a lab experienced a lab-wide catastrophic failure of the air handling system that caused an instantaneous loss of air pressure in June of 1998.

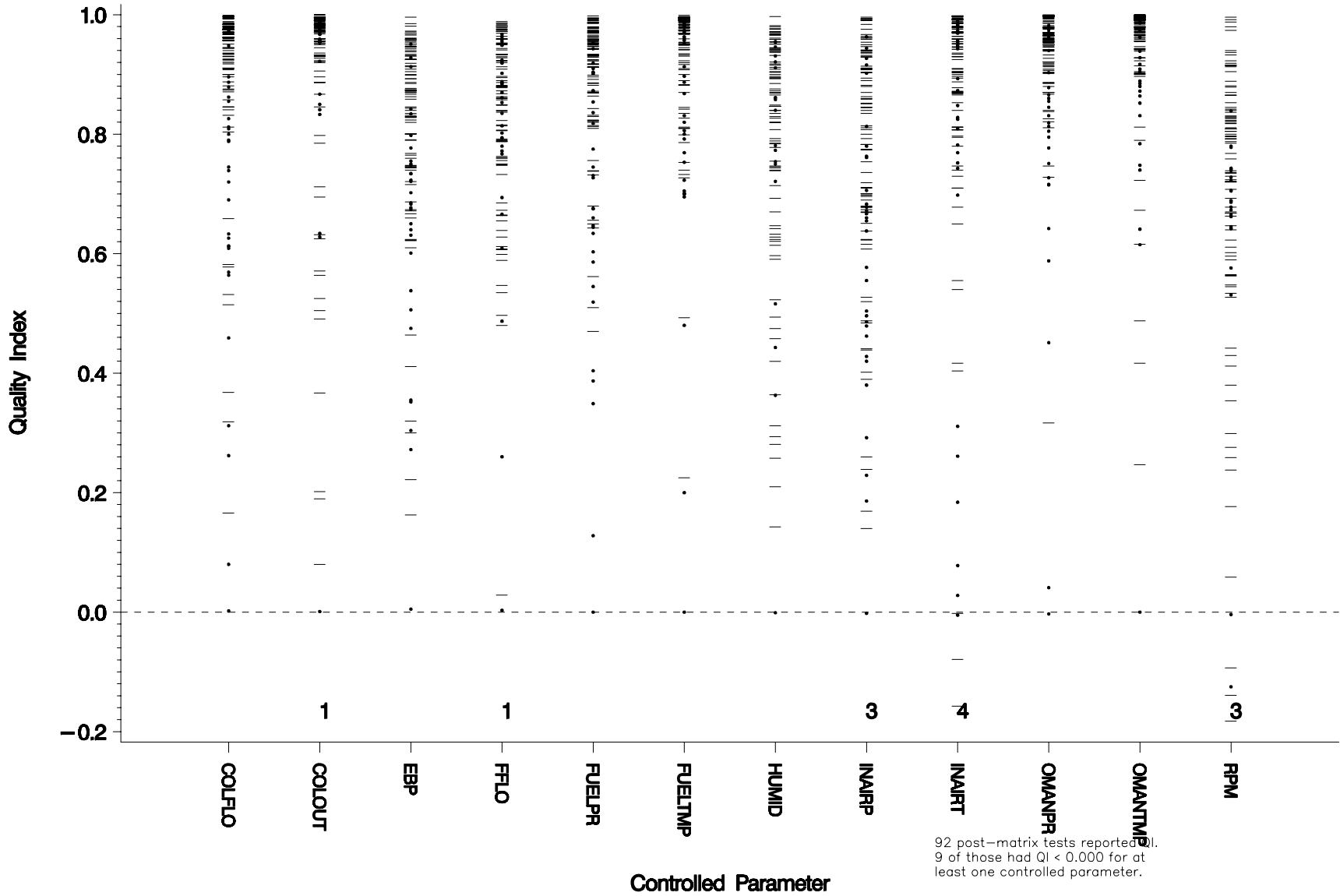
The seventh was due to a valve failure (caught and corrected within one hour) that caused an off spec coolant out temperature for a test reported in August of 1999.

The eighth was written in May of 2000 when a lab's air handling system was disrupted by the direct inlet-to-exhaust airflow path provided by the EGR cooler on an adjacent 1Q stand. Until 1Q control strategies were revised, unexpected 1Q shutdowns caused air pressure spikes throughout the lab.

The ninth was written in November of 2005 for a lab that had indications of fuel flow disruption caused by the sudden loss of a pump at the fuel tank farm due to flooding caused by heavy rain. The loss of fuel pressure affected the fuel flow readings but was determined not to have effected engine operation.

Shown on the following page is a plot showing all QI's reported to date for all controlled parameters.

### 1P Quality Index



Figures along the horizontal axis indicate the number of post-matrix tests where QI < 0.000  
Dots represent matrix tests; dashes represent post-matrix tests

STATUS OF REFERENCE OIL SUPPLY:

At the end of this report period, the testing oil supply stood as outlined in the following table:

Oil	Cans @ Labs	@ TMC	
		Cans	Gallons
*1004-3	4	1	29
1005	0	1	19
1005-1	0	0	4
1005-2	4	57	860
<b>Total</b>	<b>8</b>	<b>59</b>	<b>912</b>

\* Future reblends of oils marked with an asterisk are not obtainable by TMC.

Be aware that this table presumes that all of each of these oils is dedicated to the 1P test area. This is not the case; all of these oils are also used in other diesel test areas. TMC has been informed that the components necessary to make a 1004 reblend are no longer available.

TIMELINE OF SIGNIFICANT EVENTS IN THE LIFE OF THE 1P TEST:

Effective Date	Info Letter	
19970219		START OF 1P MATRIX
19970604		LAST 1P MATRIX TEST
19980924	98-1	SPEC AND CALIBRATION PROCEDURE FOR OIL WEIGH SCALE PUMPS ADDED
19980924	98-1	BRAIDED STAINLESS STEEL/TEFLON HOSES REQUIRED FOR WEIGH SCALE
19980924	98-1	PRE-TEST LINER CLEANING - USE ONLY EF-411 FOR RUST PREVENTION
19980924	98-1	INSTRUCTIONS FOR VALIDITY DECLARATION
19980924	98-1	RATING VERIFICATION REQUIRED
19980924	98-1	REVISIONS TO THERMOCOUPLE SPECIFICATIONS - DIAMETER SPEC REMOVED
19980924	98-1	DUMMY INLET AIR HEATERS PERMITTED
19980924	98-1	INSTRUCTIONS FOR GROUPING AND ROUNDING PISTON AREAS FOR RATING
19980924	98-1	REPORT FORM AND DATA DICTIONARY CHANGES
19990419	99-1	TEST STAND INSTRUMENTATION CALIBRATION REQUIREMENTS
19990419	99-1	VISUAL INSPECTION OF INTAKE AIR BARRELS
19990419	99-1	RE-CALIBRATION REQUIREMENTS WHEN CRANK IS REMOVED
19990419	99-1	USE OF MOBIL EF-411 AS BUILD-UP/FLUSHING OIL
20031121	03-1	NICKEL-PLATED OIL COOLER APPROVED FOR USE
20031121	03-1	DATA DICTIONARY AND REPORT FORMS (VERSION=20031105) DD AND FORMS SEPARATED FROM THE STANDARD
20040924		FIRST PC-9 FUEL TEST
20050321	05-1	PC-9 FUEL REPLACES LSRD4 AND SEVERAL EDITORIAL CHANGES



RATING:

No IP re-rates were required during this report period. The table below summarizes the re-rates for this report period:

<b>Rating Re-rate Summary</b>	
Number of tests where lab rating was changed	0
Number of tests where referee rating was changed	0
Number of tests where no changes were made	0
Total number of re-rates requested	<u>0</u>

LAB VISITS:

One IP lab visit was completed during this report period. No significant deficiencies were noted.

INFORMATION LETTERS:

No information letters were issued during this report period

SUMMARY

- Over the course of this report period, TGC, WD, and TLC remained within acceptable severity limits apart from the most recent extremely severe failing test. OC (and ETOC) have been severe since the completion of the matrix.
- Precision for all parameters remained within acceptable limits prior to the most recent severe test.

SDP/sdp/astm1007.doc/mem07-081.sdp.doc

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<ftp://ftp.astmtmc.cmu.edu/docs/diesel/scote/semiannualreports/1p-10-2007.pdf>

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