



# Test Monitoring Center

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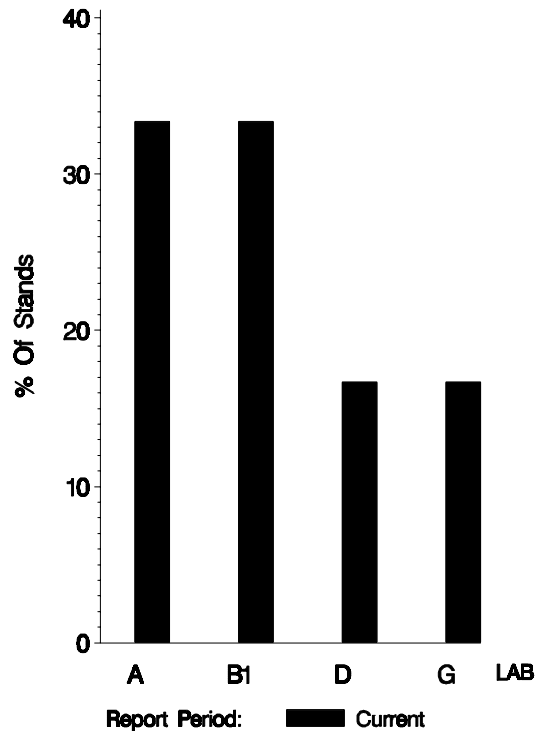
MEMORANDUM: 04-042  
DATE: May 24, 2004  
TO: James McCord,  
Chairman, Single Cylinder Diesel Surveillance Panel  
FROM: Scott Parke  
SUBJECT: 1N Testing from October 1, 2003 through March 31, 2004

Seven calibration tests were reported to the Test Monitoring Center during the period from October 1, 2003 through March 31, 2004. The data from these tests is shown on page 7. Following is a summary of testing activity this period.

	Reporting Data	Calibrated on 3-31-04
Number of Labs	4	4
Number of Stands	6	6

Stands reporting data this period were distributed as shown below:

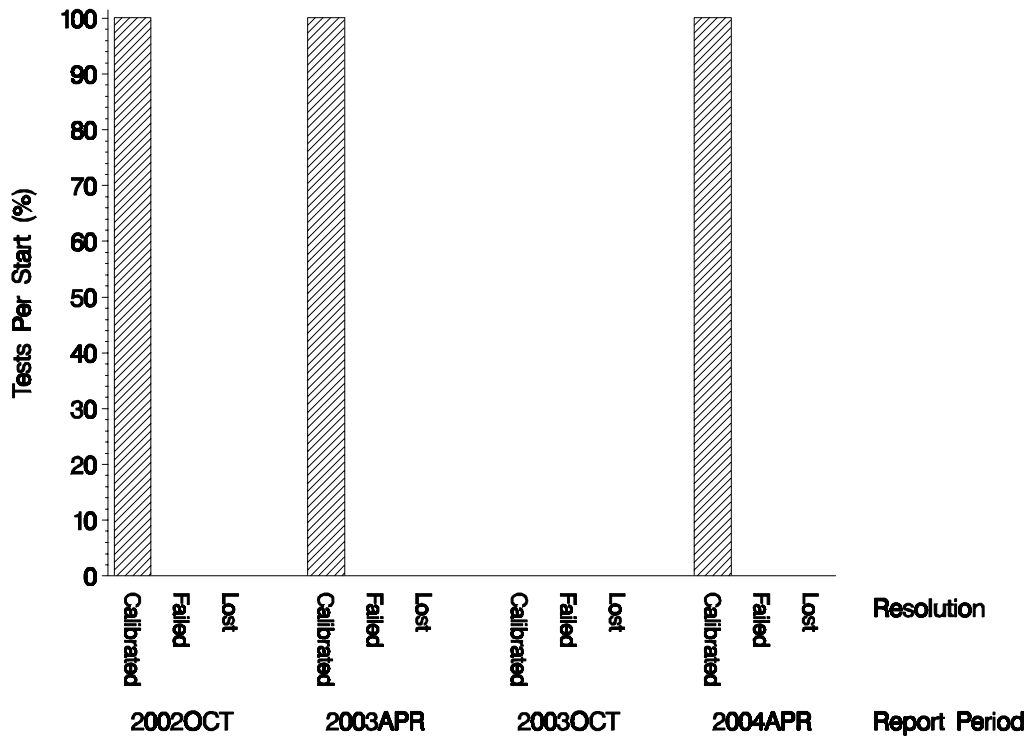
## 1N LABORATORY / STAND DISTRIBUTION



**Test Distribution by Oil and Validity**

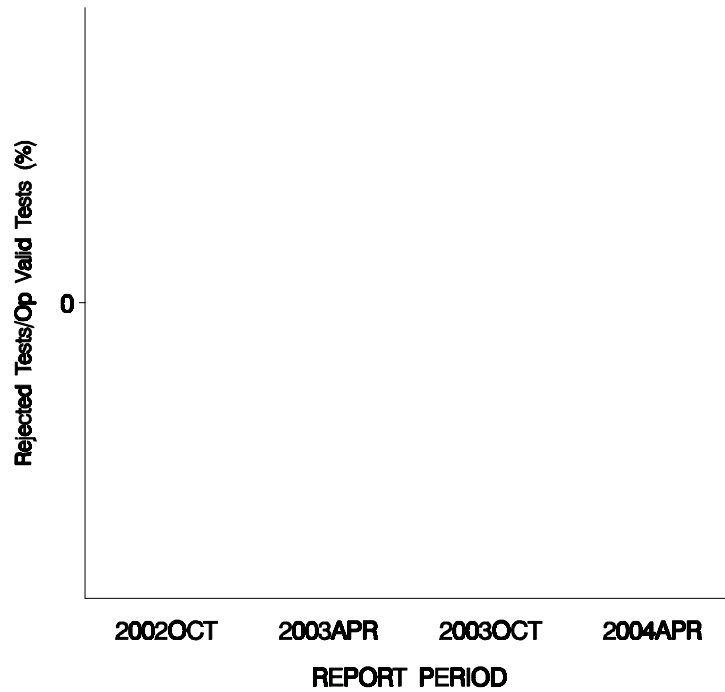
							Totals	
		1004-2	1004-3	809-1	810-2	811-1	Last Period	This Period
Accepted for Calibration	AC/ AO	0	6	1	0	0	0	7
Rejected Mild	OC	0	0	0	0	0	0	0
Rejected Severe	OC	0	0	0	0	0	0	0
Rejected for EWMA Precision	OC	0	0	0	0	0	0	0
Rejected for Shewhart Precision	OC	0	0	0	0	0	0	0
Operationally Invalid (lab)	LC	0	0	0	0	0	0	0
Operationally Invalid (lab/TMC)	RC	0	0	0	0	0	0	0
Aborted Calibration	XC	0	0	0	0	0	0	0
<b>Total</b>		<b>0</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>

**1N CALIBRATION ATTEMPT SUMMARY**



Testing volume for the past several periods has been too low to draw meaningful conclusions from this chart but it is provided for historical context.

**OPERATIONALLY VALID 1N TESTS  
FAILING ACCEPTANCE CRITERIA**

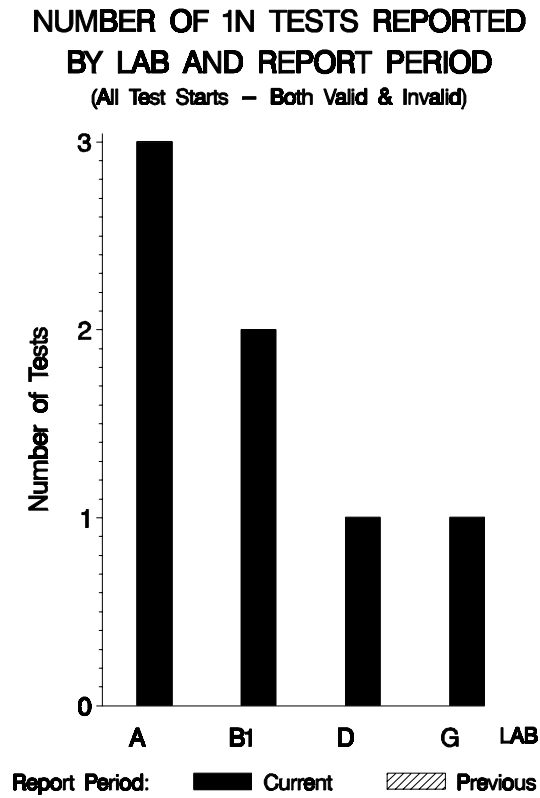


No tests have failed in any of the last four report periods.

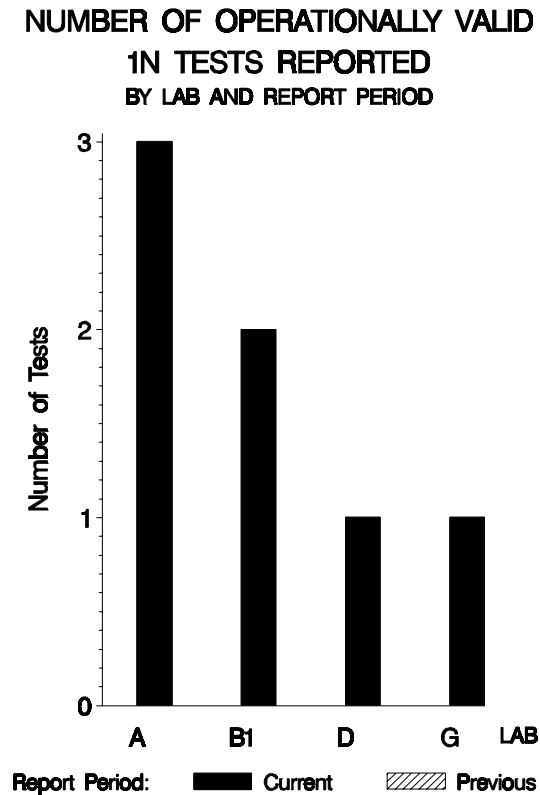
No LTMS deviations were written this period (none have ever been written for this test).

Reduced-K criteria was used in the calibration of one stand.

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



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



Lost Tests per Start by Oil and Lab

Lab	1004-2			1004-3			809-1			810-2			811-1			Total		
	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%
A				0	2	0	0	1	0							0	3	0
B1				0	2	0										0	2	0
D				0	1	0										0	1	0
G				0	1	0										0	1	0
Total				0	6	0	0	1	0							0	7	0

Lost tests are those that were either aborted, rejected by lab, or operationally invalid. No lost tests were reported this period.



Average $\Delta$ /s by Lab					
Lab	n	TGF	WDN	TTLHC*	BSOC
A	3	-0.031	-0.595	-1.293	-0.830
B1	2	-0.849	0.377	-0.650	1.105
D	1	-0.815	-0.563	-0.289	2.158
G	1	-0.610	-0.842	-1.009	0.316
Industry	7	-0.460	-0.348	-0.925	0.314

\* Transformed TLHC

DATA FROM ALL OPERATIONALLY VALID TESTS REPORTED THIS PERIOD:

**LTMS**

DATE	LAB	STAND	OIL	TG	WD	TL	OC	TGYI	WDYI	TLYI	OCYI
20040121	A	2	809-1	15	213.0	0.000	0.25	-0.922	0.450	-1.239	-0.353
20040125	A	3	1004-3	58	200.8	0.000	0.18	1.643	-0.125	-0.609	-0.347
20040314	A	2	1004-3	12	138.6	-0.466	0.08	-0.815	-2.109	-2.032	-1.789
20040316	G	8	1004-3	15	169.9	-0.198	0.16	-0.610	-0.842	-1.009	0.316
20040324	D	1	1004-3	12	176.8	0.068	0.23	-0.815	-0.563	-0.289	2.158
20040326	B1	3A	1004-3	11	199.4	-0.466	0.18	-0.884	0.352	-2.032	0.842
20040327	B1	1A	1004-3	12	200.6	0.603	0.2	-0.815	0.401	0.732	1.368

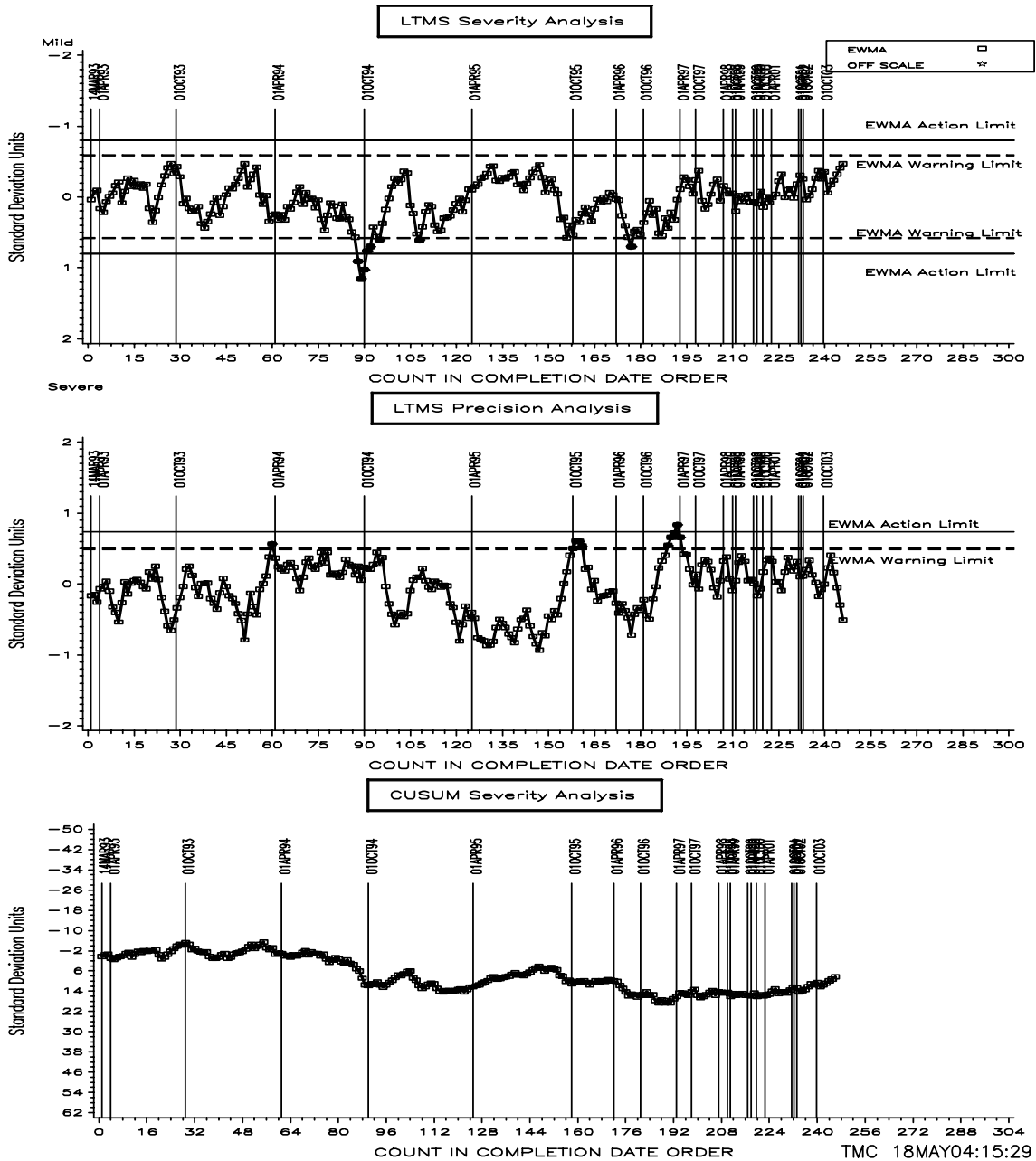
DISCUSSION OF INDUSTRY PERFORMANCE OVER THIS PERIOD

TGF:

The average TGF Yi this period (shown in the table on the previous page) was -0.460 mild. Using 1004-1's test target standard deviation of 14.6 to compute a  $\Delta$  yields 7% TGF.

CATERPILLAR 1N INDUSTRY OPERATIONALLY VALID DATA

Top Groove Fill



The LTMS/Cusum plot for TGF (shown above) is unremarkable for this period.

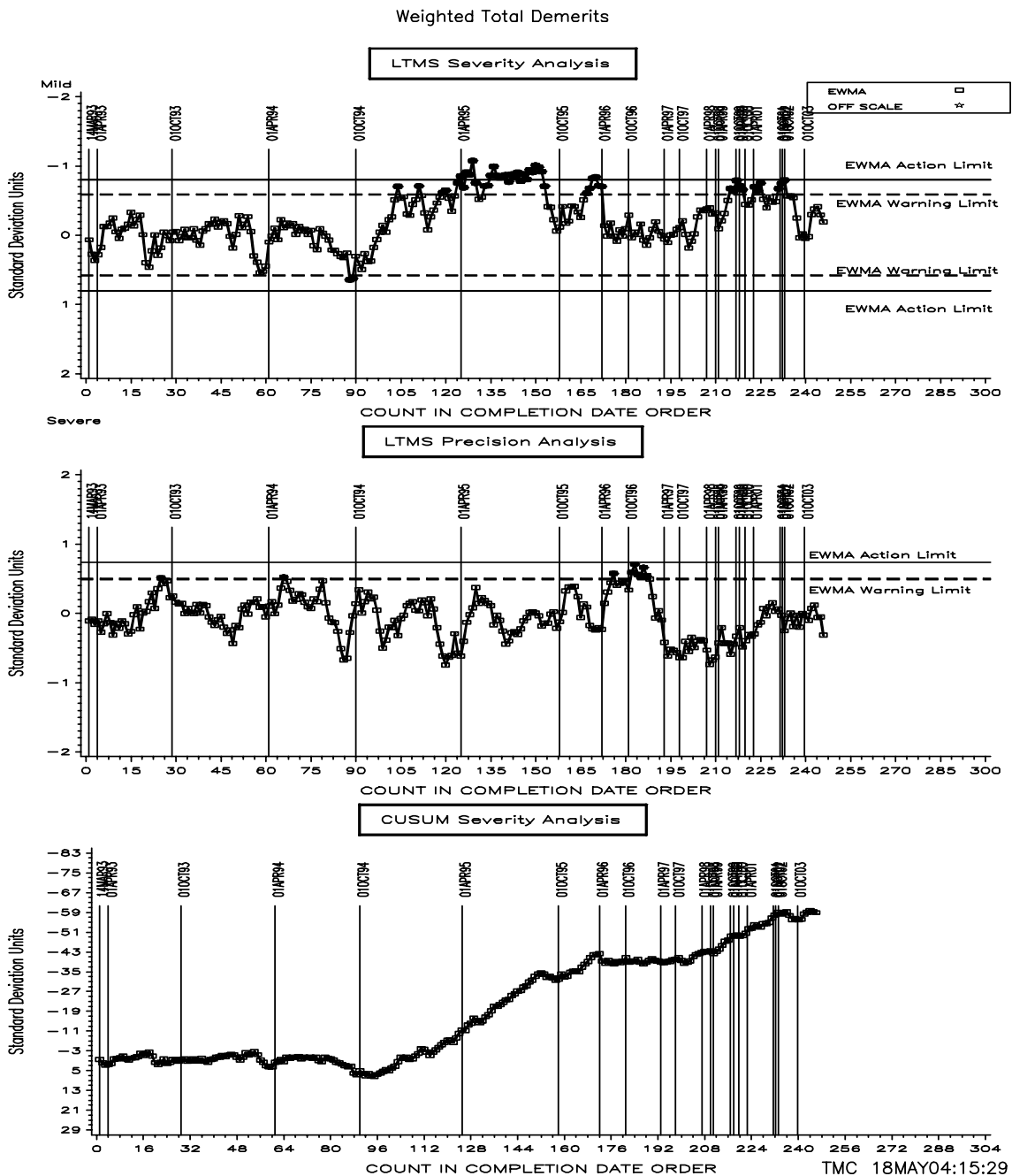


WDN:

The average WDN Yi reported this period was -0.348 mild (see table on page 7). This translates to 9.4 demerits when multiplied by the target standard deviation for 1004-1 (27.1).

The LTMS/Cusum plot is shown below.

CATERPILLAR 1N INDUSTRY OPERATIONALLY VALID DATA

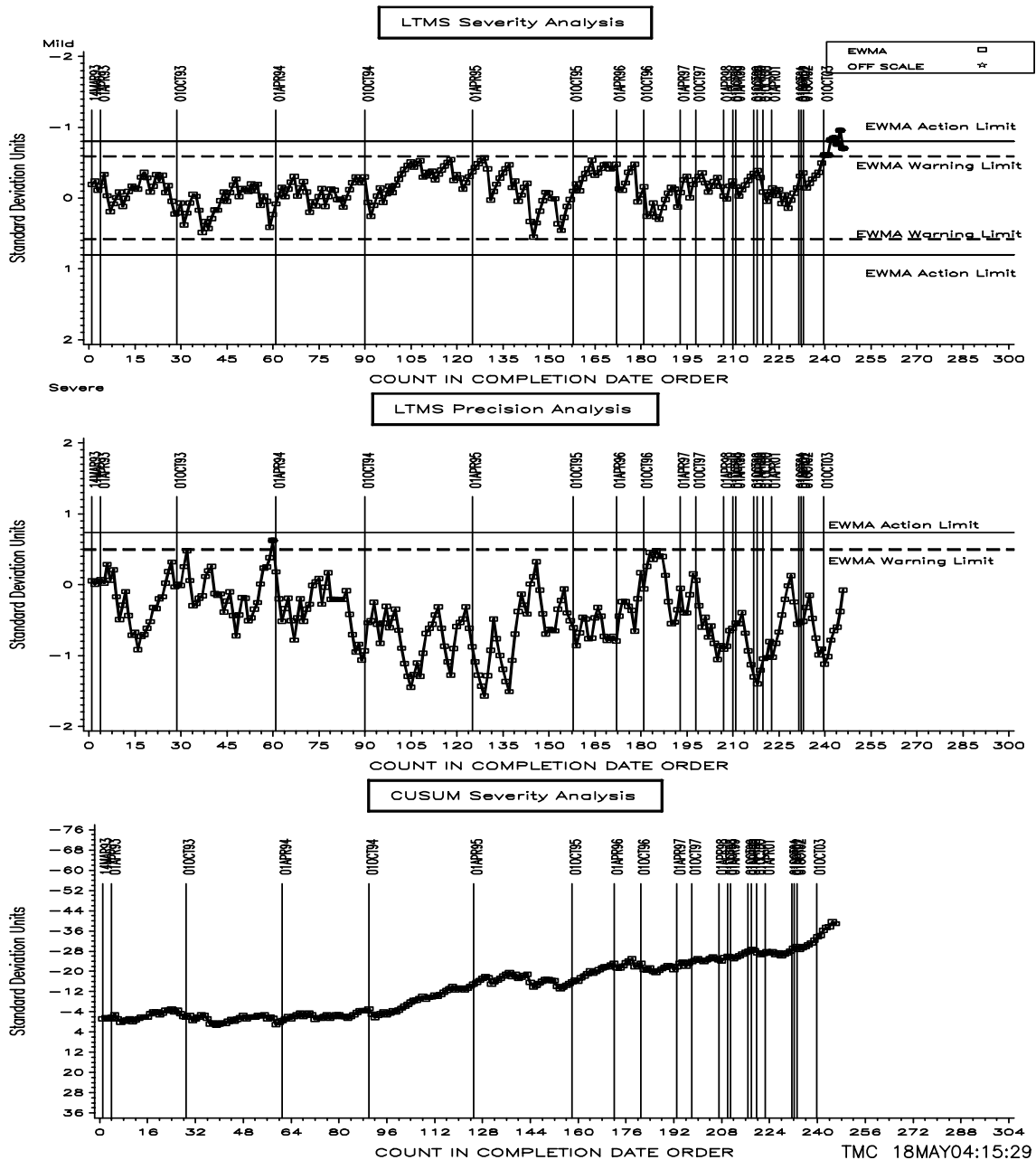


TLHC:

The average TLHC  $Y_i$  reported this period was -0.925 mild (see table on page 7). Five of the seven runs reported this period used the 1Y3998 liner and so have had the industry correction factor of -1.320 applied for TLHC. Using the test target standard deviation of 0.9 from oil 1004-1 to compute a transformed delta yields -0.833. Back-transforming this value gives 1% TLHC mild.

CATERPILLAR 1N INDUSTRY OPERATIONALLY VALID DATA

Top Land Heavy Carbon



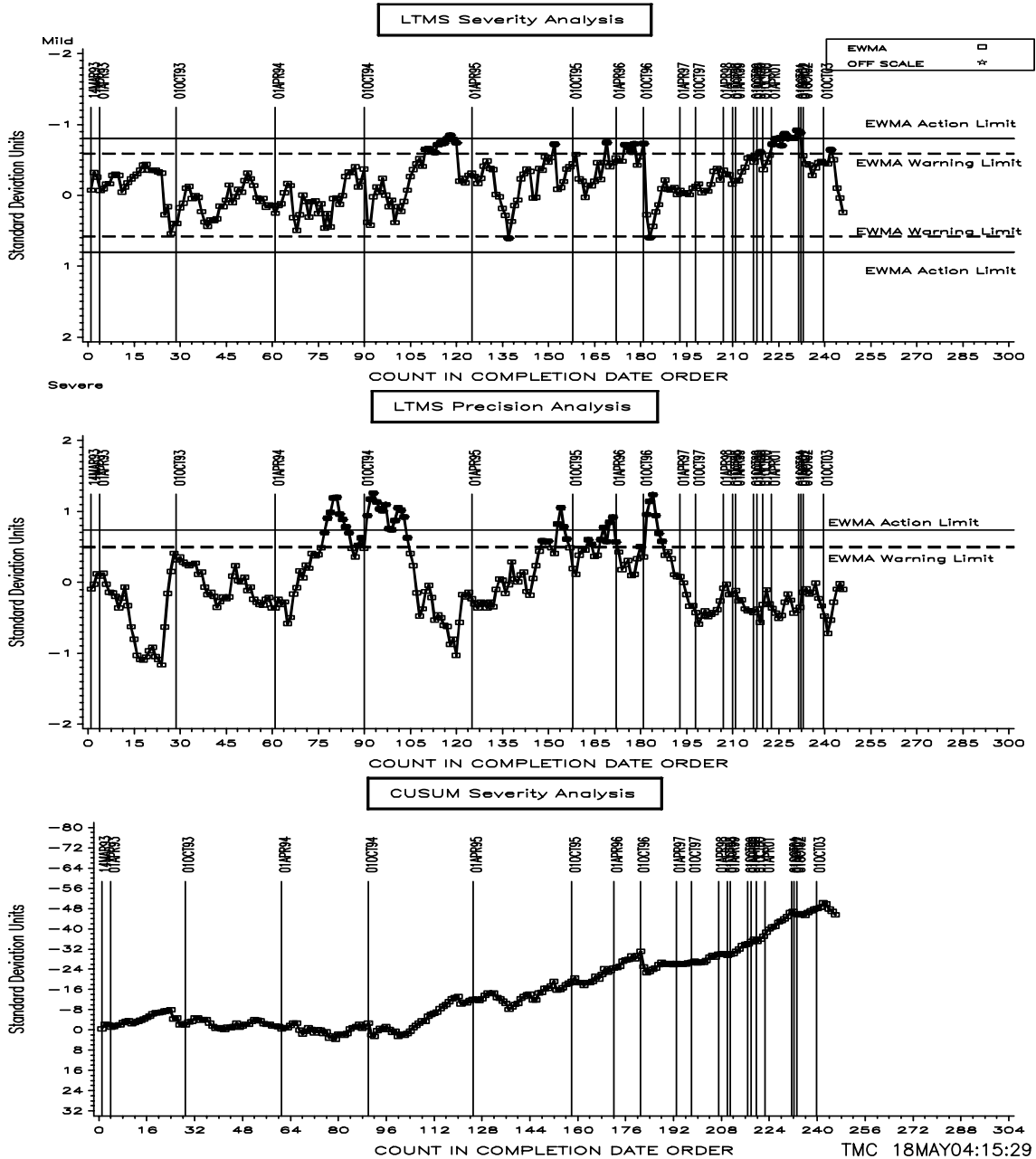
The LTMS/Cusum plot for transformed TLHC is shown above.

**BSOC:**

The average BSOC  $Y_i$  reported this period was 0.314 or, computing a delta using the test target standard deviation of 0.045 for oil 1004-1 gives 0.01g/kW severe. The LTMS/Cusum plot for BSOC is shown below.

CATERPILLAR 1N INDUSTRY OPERATIONALLY VALID DATA

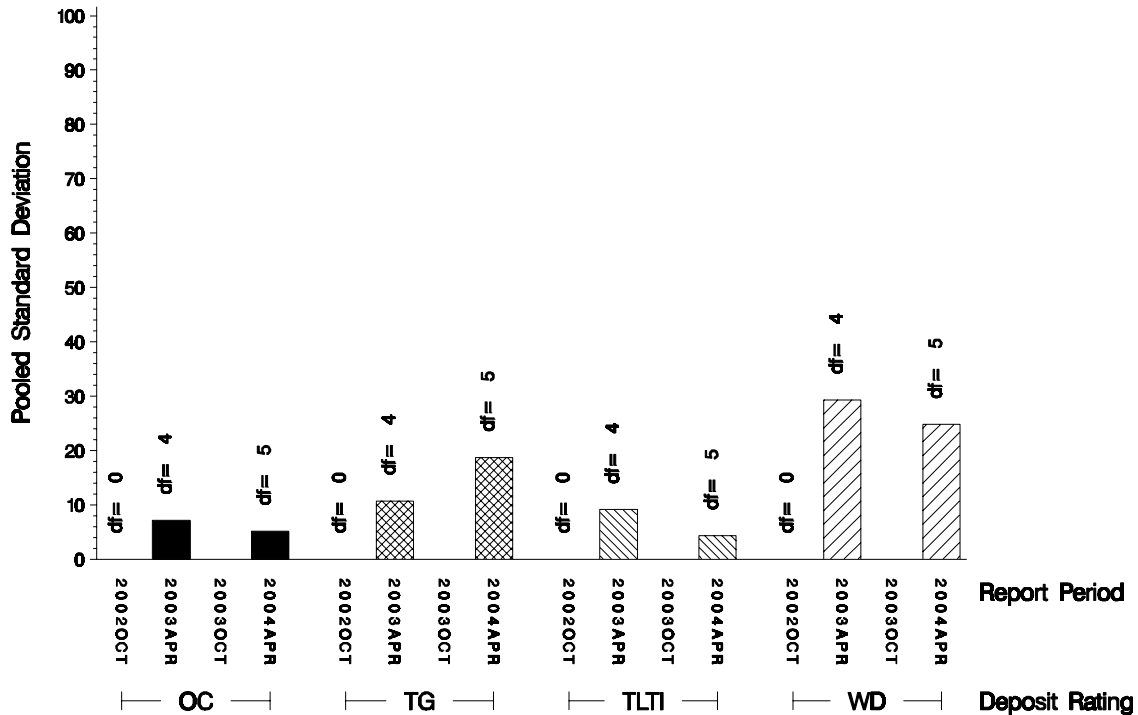
BSOC



POOLED S:

Shown below is a bar chart comparing the pooled s values for the 1N test parameters over the last four report periods. Please note that the values for TLHC have been multiplied by 10 and the values for BSOC have been multiplied by 100 to allow these parameters to be shown on the same plot as the other parameters.

**1N REFERENCE TEST PRECISION**  
**POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD**



Transformed TLHC (TLTI) is scaled by 10 for display on the common y-axis  
 BSOC (OC) is scaled by 100 for display on the common y-axis

STATUS OF REFERENCE OIL SUPPLY:

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

Oil	Cans @ Labs	@ TMC	
		Cans	Gallons
809-1	9	291	2919
810-2	2	360	3605
811-1	10	1	10
811-2	2	166	1662
1004-1	3	0	0
1004-2	0	3	38
1004-3	9	105	1053
<b>Total</b>	<b>35</b>	<b>926</b>	<b>9287</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 1N test area. 809-1 is used in several other test areas; 810-2 and 811-x are used in the 1K test area; and 1004-x is used in several of the other diesel test areas.

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

Effective Date	Info Letter	
19910710	2	INDUSTRY CORRECTION FACTORS FOR CANDIDATE TESTING
19910927	1	INFORMATION LETTER 1 - REWRITTEN PROCEDURE
19911015	3	COOLING SYSTEM MODIFICATION
19911015	3	COOLANT BYPASS VALVE
19911015	3	CYLINDER LINER WEAR MEASUREMENT DEVICE
19911015	3	TEST FUEL NAME CHANGE
19911015	3	REPORT FORMS
19920601	4	CLOSED COOLING SYSTEM
19920601	4	PISTON PACKAGING FOR REFEREE RATING
19920601	4	MINERAL FREE WATER - DEFINITION
19920601	5	FLUSHING CART FLOW DIAGRAM
19920731	6	TEMPERATURE PRESSURE AND SPEED STANDARD CALIBRATION TRACEABILITY
19920731	6	HUMIDITY MONITORING SYSTEM
19921015	7	FUEL INJECTION PUMP TIMING USING THE BUBBLE METHOD
19921015	7	PISTON RATER CALIBRATION
19921015	7	OIL SAMPLING FREQUENCY FOR USED OIL ANALYSIS
19930324	8	INTERNAL ENGINE PAINT AND SUPPLIER
19930629		FIRST USE OF 1004
19930702	9	CATERPILLAR BRAND COOLANT
19930708	10	PROCEDURE DISCLAIMER
19930708	10	CYLINDER HEAD COOLANT PASSAGE CLEANING
19930708	10	CRANKCASE PRESSURE INCREASE DURING BLOWBY MEASUREMENT
19930708	10	ACCEPTABLE CYLINDER HEAD/JUG ASSEMBLIES
19930708	10	RING GAP MEASUREMENT - FEELER GAUGES/TAPER GAUGE
19930708	10	PISTON POSITION DURING DOWNTIME
19930708	10	OIL CONSUMPTION CALCULATIONS
19930708	10	OIL CONSUMPTION CALCULATION AFTER SHUTDOWN
19930708	10	MISSING OR BAD TEST DATA
19930708	10	TYPOGRAPHICAL ERROR IN TABLE A12
19940101		1Y3555 DEADLINE
19940101	11	TEST RUN NUMBERING
19940101	11	PISTON PHOTOGRAPHS
19940101	11	USE OF AN ALIGNMENT FIXTURE IN P-TUBE AIMING
19940101	11	LOCATION OF LINER SURFACE FINISH MEASUREMENTS
19940101	11	LOCATION OF LINER BORE DIAMETER MEASUREMENTS
19940101	11	ENGINE ROTATION SPEED DURING FLUSHING
19940101	11	ACCEPTABLE CYLINDER LINER PART NUMBERS
19940101	11	CALIBRATION FREQUENCY
19940102		CATERPILLAR COOLANT DEADLINE
19940129		START OF EXCLUSIVE USE OF 1004-X OILS
19940205		FIRST USE OF 1004-1
19940226		LAST USE OF 1004
19940301	12	OUTLIERS AS A TEST VALIDITY CRITERIA
19940301	12	INSTRUMENTATION CALIBRATION TOLERANCES AND TIME CONSTANTS
19940316	13	FUEL DILUTION AS AN OPERATIONAL VALIDITY CRITERION
19950401		FIRST LTMS TEST
19950605		811-1 RETURN TO SYSTEM
19950811		FIRST USE OF 1004-2
19950918		809-1 RETURN TO SYSTEM
19960510	96-1	1K/1N DATA DICTIONARY AND REPORT FORMS (VERSION=19960304)
19960913	96-2	BETA TESTED 1K/1N DATA DICTIONARY AND REPORT FORMS (VERSION=19960913)
19961025		FIRST 810-X DISCRIMINATION RUN
19970320	97-1	USE OF LOW SULFUR FUEL FOR THE 1N TEST
19970320	97-1	ADDITION OF END OF TEST OIL CONSUMPTION (EOTOC) AS A REPORTED PARAMETER
19970320	97-1	ENGINE PARTS WARRANTY CLAIM PROCEDURE CHANGE
19970320	97-1	LTMS REQUIREMENTS FOR CALIBRATION
19970320	97-1	CLARIFICATION OF SPECIFICATION FOR HUMIDITY CALIBRATION
19970320	97-1	CLARIFICATION OF WHEN REFEREE RATINGS ARE REQUIRED
19970320	97-1	ADDITION OF DATA DICTIONARY AND REPORT FORMS TO THE PROCEDURE
19970320	97-1	TEST REPORTING DEADLINES
19970320	97-1	EXAMPLES FOR SEVERAL OF THE REPORT FORMS
19980101	98-1	FUEL SUPPLIER NAME CHANGE
19980101	98-1	FUEL SAMPLING REQUIREMENTS
19980101	98-1	REVISED ENGINE PARTS WARRANTY PROCEDURE & FORM
19980101	98-1	810-2 DISCRIMINATION RUNS RETURNED TO LTMS/CAL RUNS, CAL PD = 1YR
19980828	98-2	RATING WORKSHEET ADDED TO TEST REPORT AS FORM 4A
19981111	98-3	ADDED AREAS FOR CLEAN TO RATING SHEETS 5 & 5A
19990419	99-1	TEST STAND INSTRUMENTATION CALIBRATION REQUIREMENTS
19990419	99-1	COOLANT SYSTEM FLUSHING REQUIREMENTS
19990419	99-1	UPDATED INTAKE AIR FILTER 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
19990419	99-1	TIME ZONE FOR USE IN EOT REPORTING
19990419	99-1	EDITORIAL
20000101	00-1	810-X RUNS WILL OCCUR VOLUNTARILY ONCE PER YEAR

TIMELINE (continued):

Effective Date	Info Letter	
20020321	02-1	1K/1N DATA DICTIONARY AND REPORT FORMS (VERSION=20020107)
20040223	04-1	1K/1N DATA DICTIONARY AND REPORT FORMS (VERSION=20040205) DD AND FORMS SEPARATED FROM THE STANDARD

**RATING:**

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

<b>Rating Re-rate Summary</b>	
Total number of re-rates requested	<u>0</u>
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

**LAB VISITS:**

No 1N lab visits were completed during this period.

**INFORMATION LETTERS:**

Information Letter 04-01 was issued this report period. This information letter added the ACC conformance statement to the report forms and removed the report forms from the standard. Report form and data dictionary revisions will henceforth be handled using the Report Packet Revision Notice system. Numerous editorial changes were also made.

**FUEL BATCH APPROVAL:**

During this period, the following fuel batches were approved for testing: RE0521LS10, RG2421LS10, and SB2721LS04.

**NEW LINERS AND TLHC CORRECTION FACTOR:**

This report period marked the beginning of the introduction of 1Y3998 liners into 1N testing. The surveillance panel devised a program of five runs on oil 1004-3 to generate preliminary data and shortened the calibration period for those runs to six months to promote generation of further data. These first five runs hint at a mild shift for TGF though the shift does not cross the threshold of statistical significance at this time. TLHC results for these tests, however, are statistically significantly severe. To compensate, the surveillance panel has enacted a correction factor for all runs on 1Y3998 liners. All 1N tests started on or after May 1, 2004 are required to run 1Y3998 liners. It is expected that future testing will bring both a TGF correction factor and refinement to the TLHC correction factor.

SUMMARY

- The introduction of 1Y3998 liners is still in progress so drawing conclusions from results produced this period is difficult. Further testing will be necessary before anything definitive can be said of the impact of these new liners.
  
- Precision for all parameters remained within limits throughout this report period.

SDP/sdp/astm0404.doc/mem04-042.sdp.doc

c: J. L. Zalar

F. M. Farber

Abdul Cassim

Single Cylinder Diesel Surveillance Panel

<ftp://ftp.astmtmc.cmu.edu/docs/diesel/scote/semiannualreports/1n-04-2004.pdf>

Distribution: internet