Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206-4489
(412) 365-1000

MEMORANDUM: 00-171

DATE: November 30, 2000

TO: Stacy Bond,
Chairman, Single Cylinder Diesel Surveillance Panel

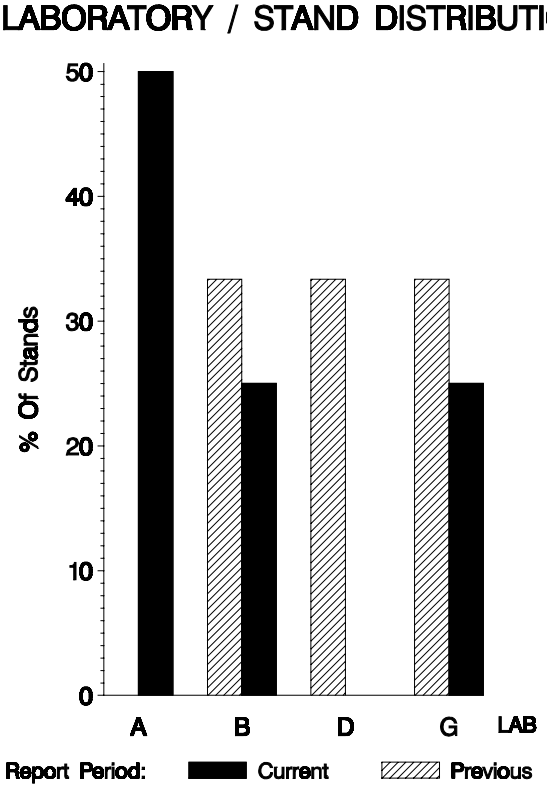
FROM: Scott Parke

SUBJECT: 1K Testing from April 1, 2000 through September 30, 2000

Four calibration tests were reported to the Test Monitoring Center during the period from April 1, 2000 through September 30, 2000. The data from the operationally valid tests is shown on page 7. Following is a summary of testing activity this period.

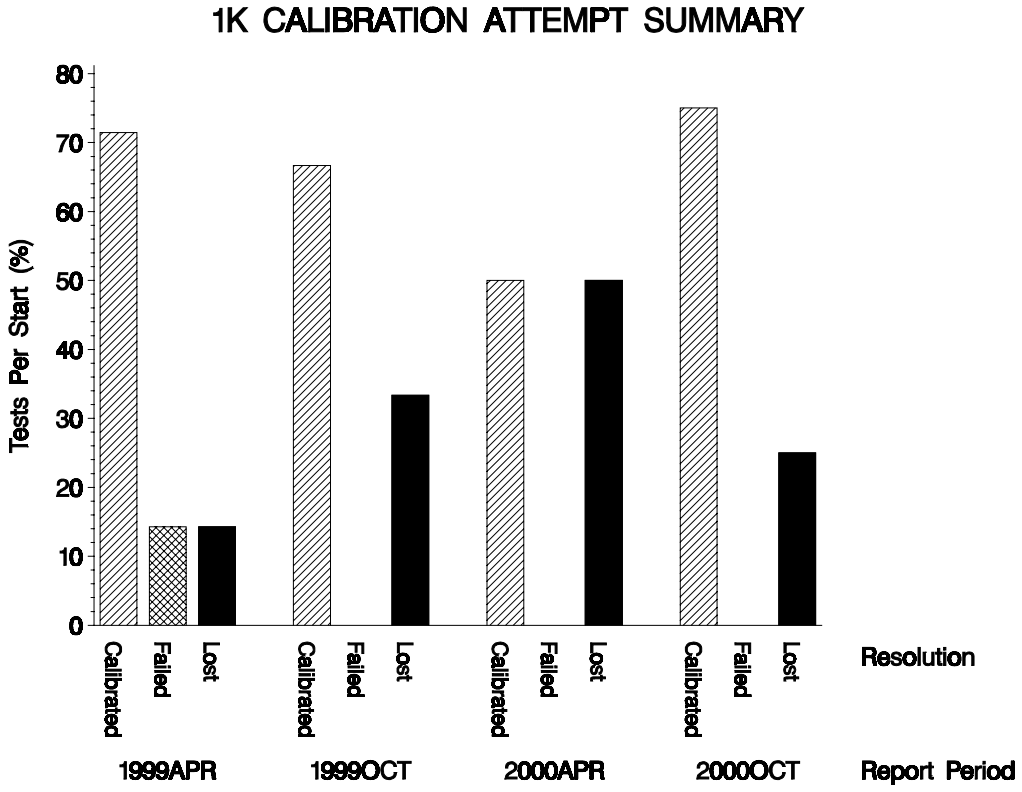
	Reporting Data	Calibrated on 3-31-00
Number of Labs	3	4
Number of Stands	4	5

Stands reporting data this period were distributed as shown below:

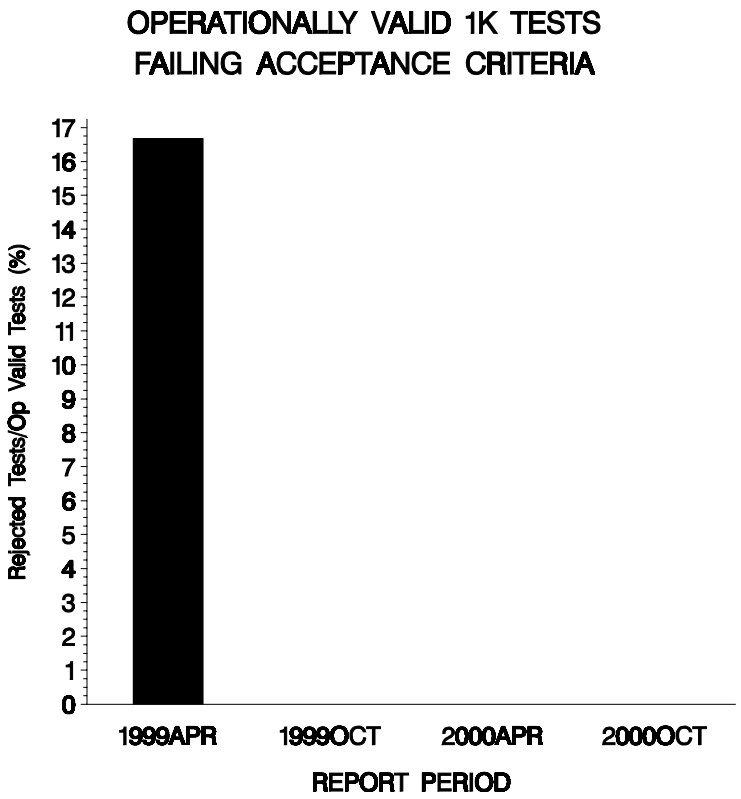


Test Distribution by Oil and Validity

		809-1	810-2	811-1	Totals Last Period	Totals This Period
Accepted for Calibration	AC	2	0	1	2	3
Rejected Mild	OC	0	0	0	0	0
Rejected Severe	OC	0	0	0	0	0
Rejected for EWMA Precision	OC	0	0	0	0	0
Rejected for Shewhart Precision	OC	0	0	0	0	0
Operationally Invalid (lab)	LC	0	0	0	0	0
Operationally Invalid (lab/TMC)	RC	0	0	0	1	0
Aborted Calibration	XC	1	0	0	1	1
Total		3	0	1	4	4



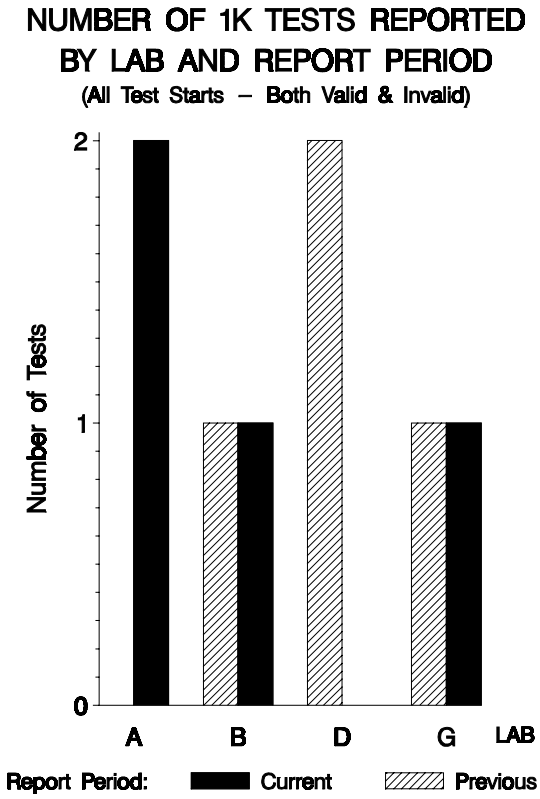
Testing volume this period was too low to draw meaningful conclusions from this chart but it is provided for historical context.



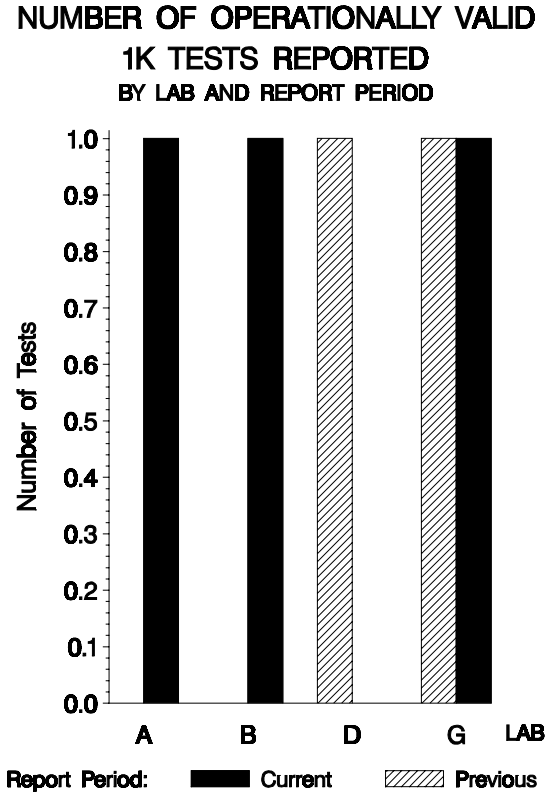
The above chart shows the percentage of failed but operationally valid tests. No tests failed to meet the acceptance criteria (LTMS) this period.

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

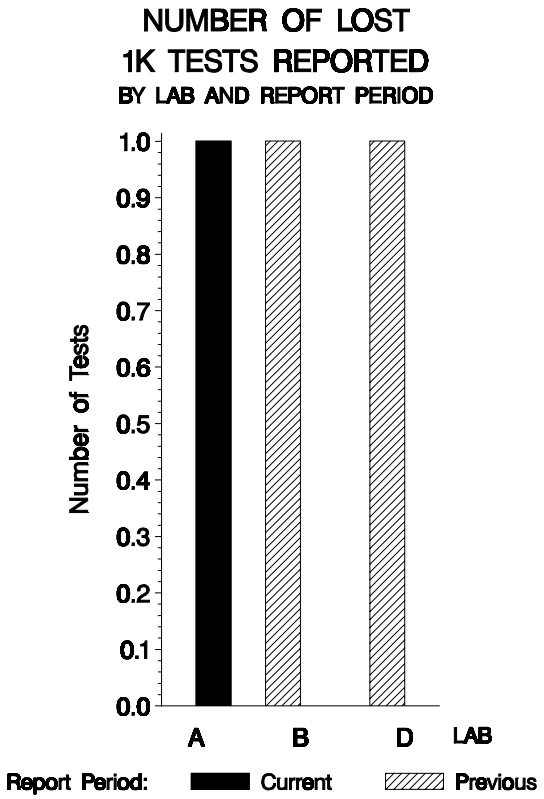
By lab, the tests run this report period were distributed as shown below:



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



And the by-lab distribution of lost tests:



Lost Tests per Start by Oil and Lab

	809-1			810-2			811-1			Total		
Lab	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%
A	1	2	50							1	2	50
B	0	1	0							0	1	0
G							0	1	0	0	1	0
Total	1	3	33				0	1	0	1	4	25

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

Causes for Lost Tests

		Oil			Validity				Loss Rate		
Lab	Cause	809-1	810-1	811-1	LC	RC	XC	MC	Lost	Starts	%
A	Rod bearing failed at 50 hours.	●					●		1	2	50%
	Lost	1	0	0	0	0	1	0			
	Starts	4	0	0	4	4	4	4			
	%	25%	0%	0%	0%	0%	25%	0%			

Average Δ/s by Lab						
Lab	n	TGF	WDK	TTLHC*	BSOC	EOTOC
A	1	-0.159	-1.185	-0.550	-0.469	-0.193
B	1	-0.669	-0.916	-0.550	-0.400	-0.012
G	1	-1.102	-0.830	-0.175	-0.794	-0.203
Industry	3	-0.643	-0.977	-0.425	-0.554	-0.136
809/809-1	2	-0.414	-1.051	-0.550	-0.434	-0.102

* Transformed TLHC

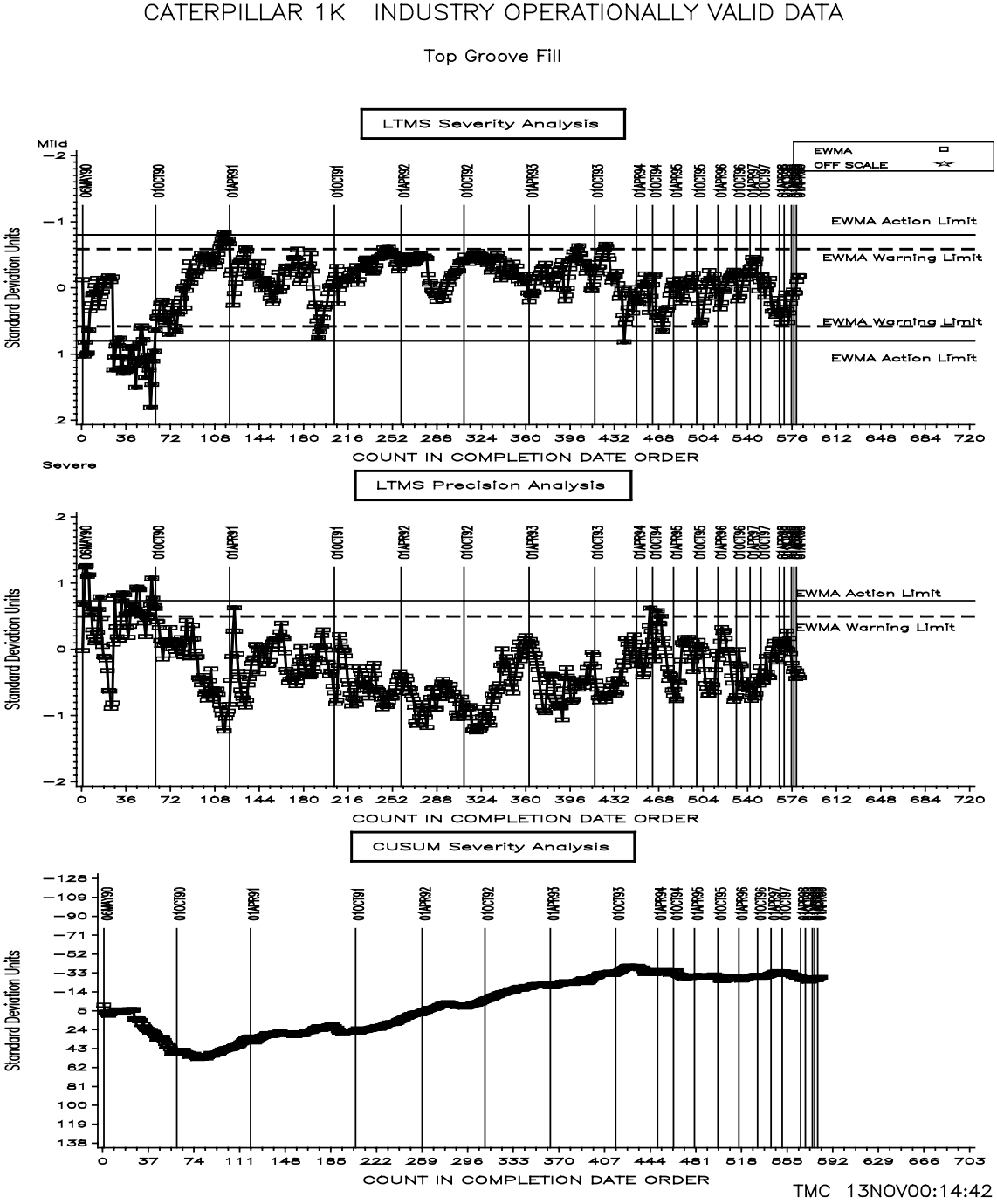
DATA FROM ALL OPERATIONALLY VALID TESTS REPORTED THIS PERIOD:

LTMS DATE	LAB	STAND	OIL	TG	WD	TL	OC	ETOC	TGYI	WDYI	TLYI	OCYI	ETOCYI
20000507	G	5	811-1	9	281.3	1	0.19	0.20	-1.102	-0.830	-0.175	-0.794	-0.203
20000509	B	12A	809-1	7	183.8	0	0.21	0.28	-0.669	-0.916	-0.550	-0.400	-0.012
20000719	A	6	809-1	15	174.2	0	0.20	0.22	-0.159	-1.185	-0.550	-0.469	-0.193

DISCUSSION OF INDUSTRY PERFORMANCE OVER THIS PERIOD

TGF:

During this report period the industry average TGF Yi (shown in the table on the previous page) was at -0.643. Using 809-1's test target standard deviation of 15.7 to compute an average Δ yields 10% TGF mild.

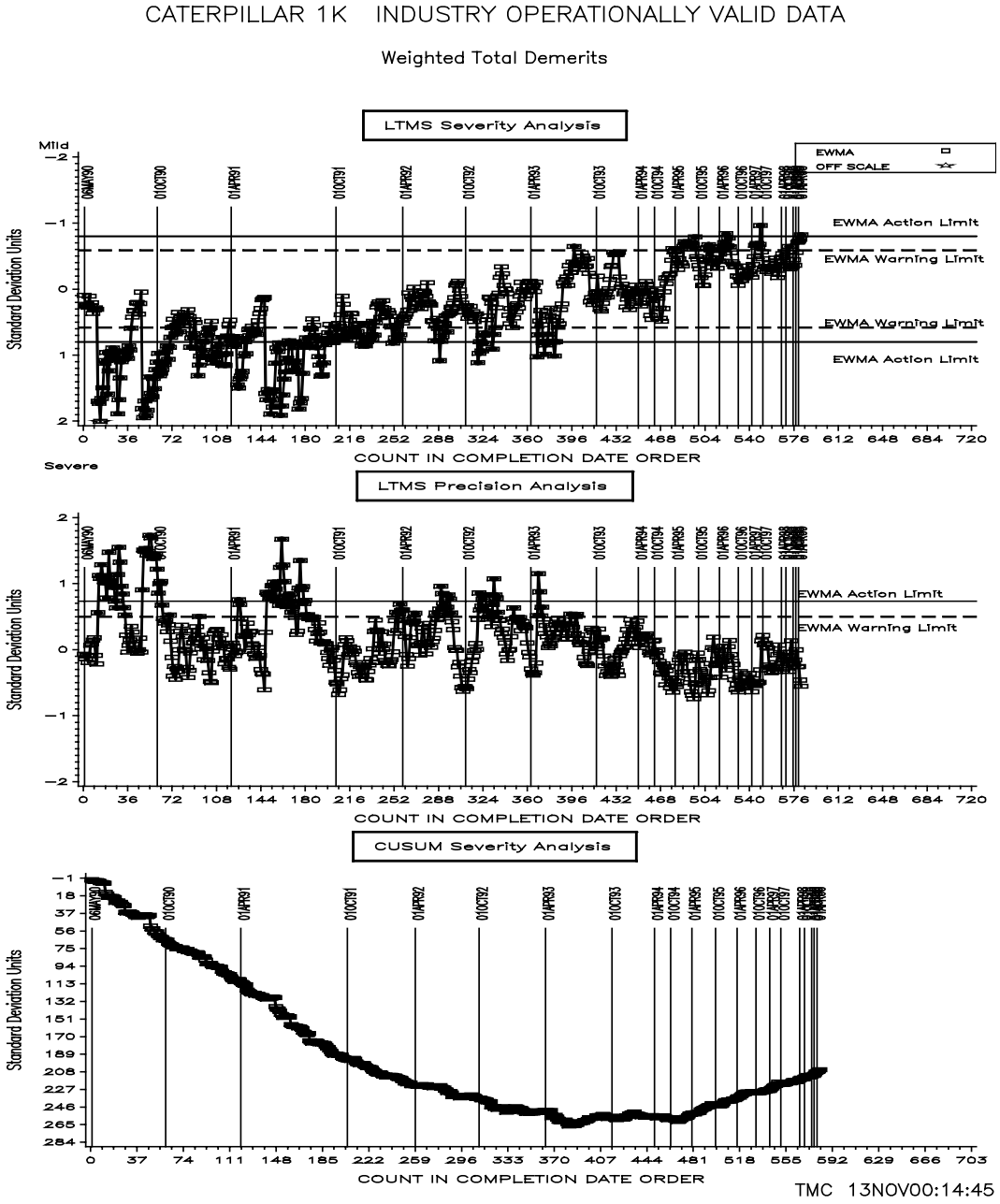


Shown above is the LTMS/Cusum plot for TGF. Over this report period, TGF remained within both severity and precision LTMS limits.

The CUSUM plot for TGF is also unremarkable and has been virtually flat since January of 1994.

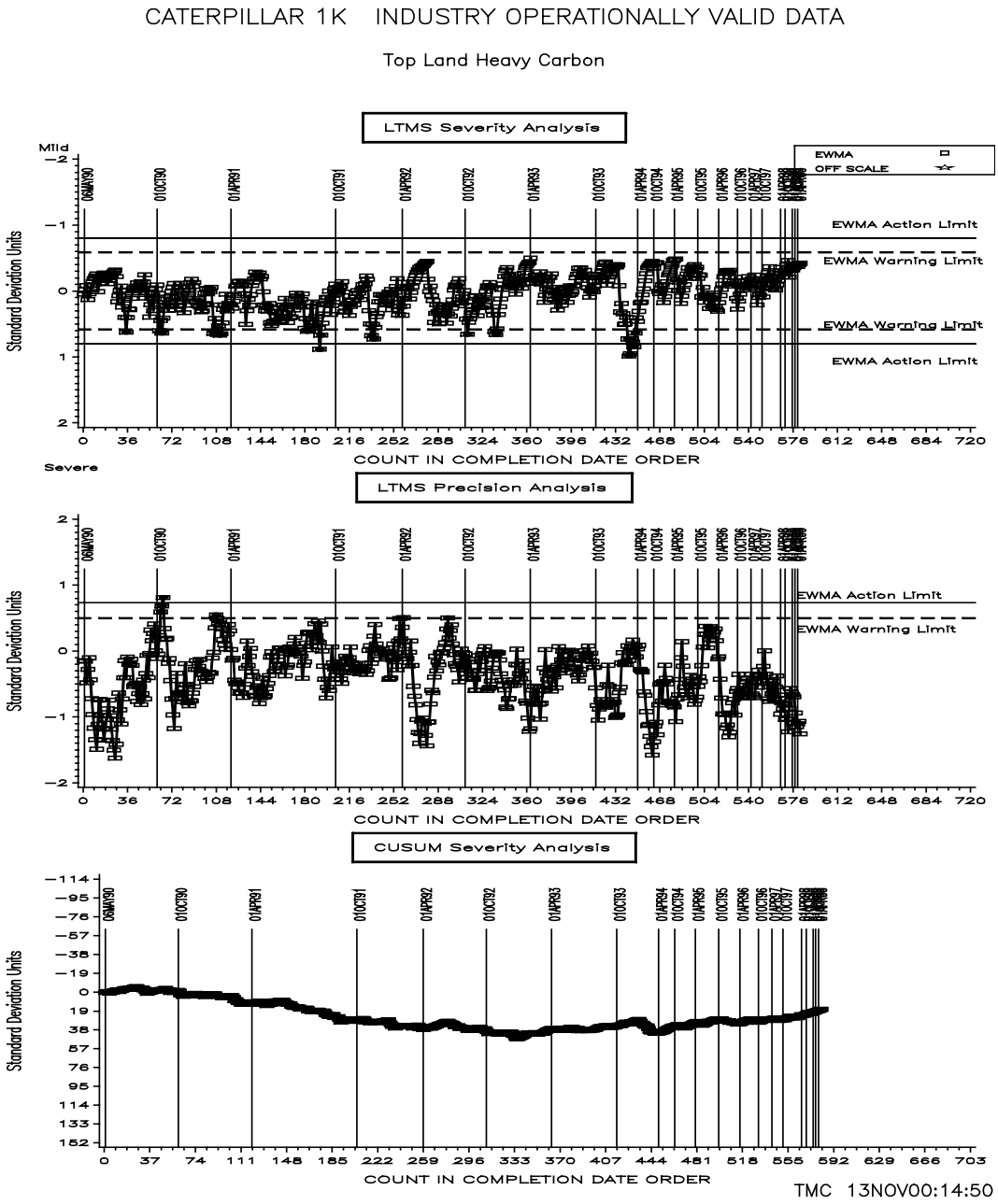
WDK:

WDK continues to trend slightly mild overall. Industry average Yi for this period was –0.977 (see table on page 7). Using the target standard deviation for 809-1 (35.6) converts this to 56.5 demerits mild. The LTMS/Cusum plot is shown below. Industry WDK is currently exceeding the EWMA severity warning limit. Precision remains within limits.



TLHC:

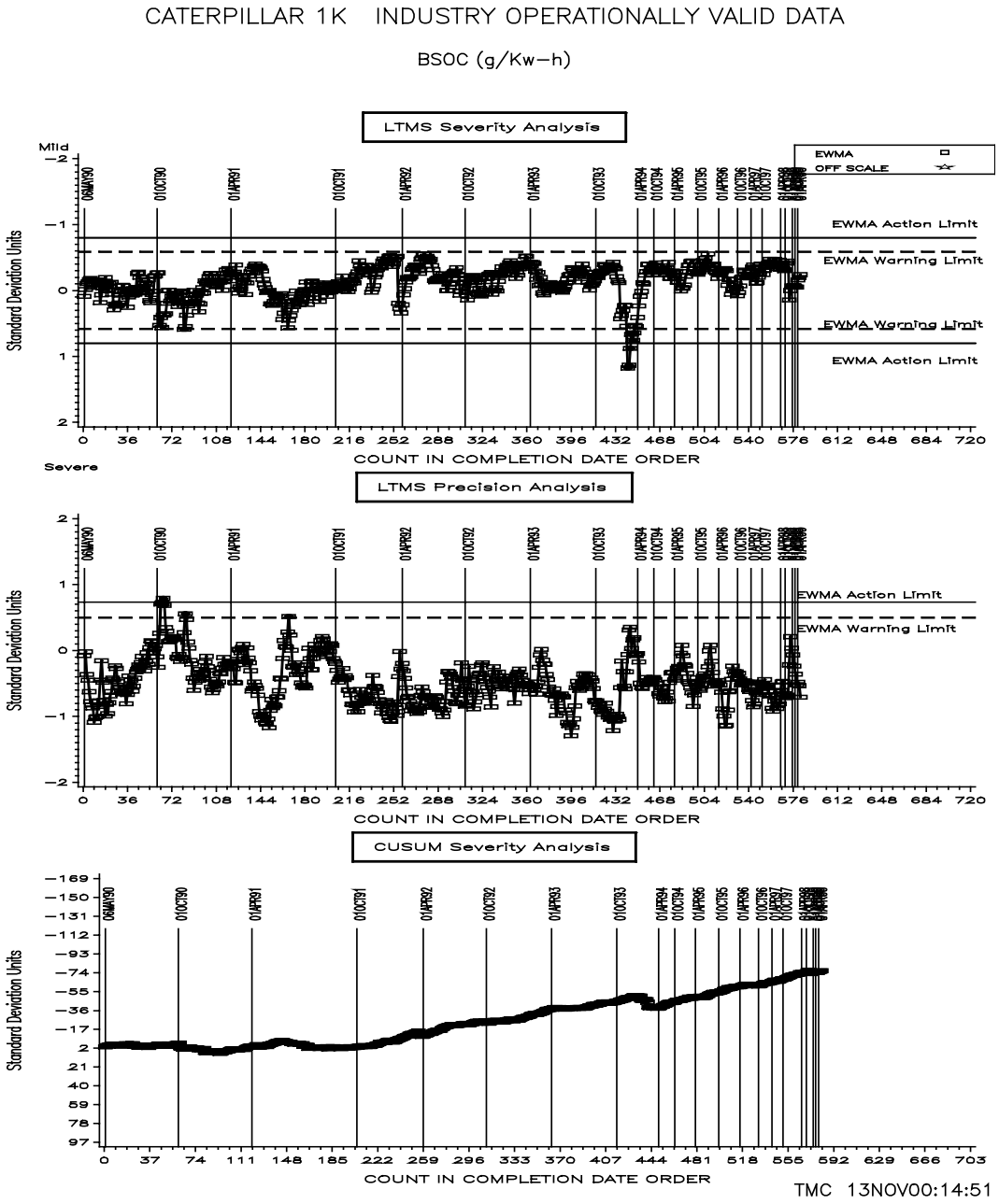
The average transformed TLHC Yi for this report period was -0.425 mild (see table on page 7). Using the test target standard deviation of 1.1 from oil 809-1 to compute an average transformed delta yields 0.468. Back-transforming this value gives 0.6% TLHC mild. Overall, this parameter has exhibited on-target performance for the life of this test.



The LTMS/Cusum plot for transformed TLHC is shown above. Precision and severity were both within limits throughout this report period.

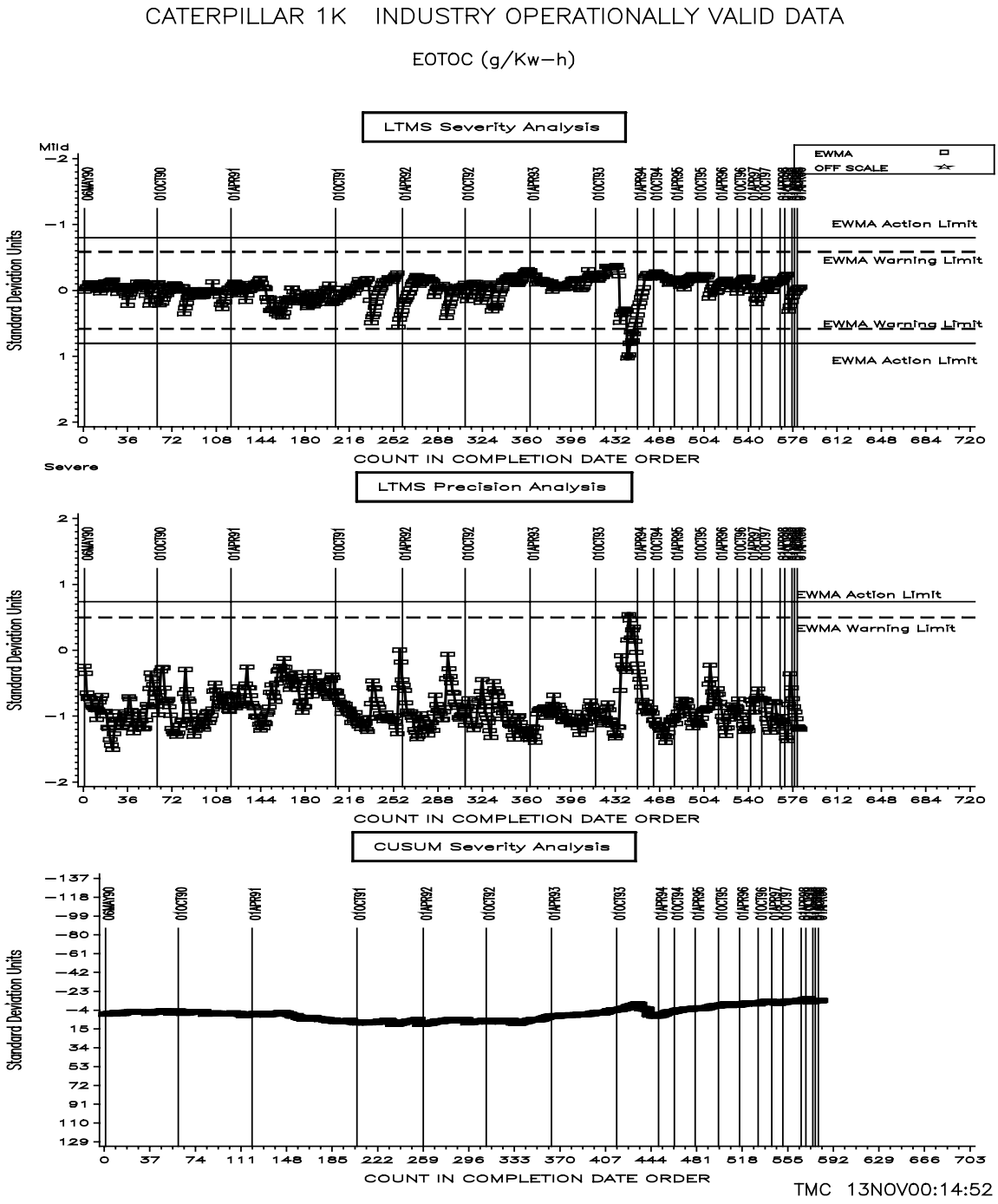
BSOC:

Over the current report period, average BSOC Yi was –0.554. Computing an average delta using the test target standard deviation of 0.145 for oil 809-1 gives 0.08 g/kWh. The LTMS/Cusum plot for BSOC is shown below. The Cusum plot indicates a slight but continuous mild trend throughout the life of the test.



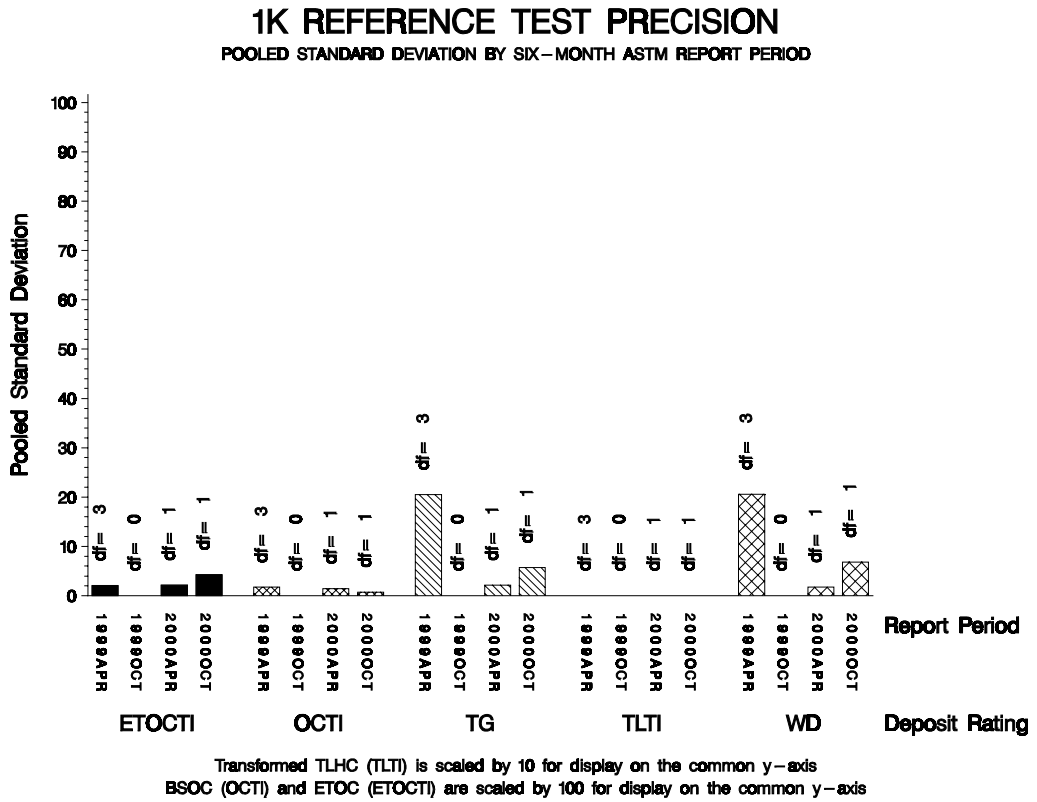
EOTOC:

As usual, EOTOC closely mirrors BSOC. Over the current report period, EOTOC had an average Yi of -0.136. Multiplying by the target standard deviation for 809-1 (0.332 g/kWh) gives an equivalent EOTOC of 0.05 g/kWh. The LTMS/Cusum plot for EOTOC is shown below.



POOLED S:

Shown below is a bar chart comparing the pooled s values for the 1K 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 and EOTOC have been multiplied by 100 to allow these parameters to be shown on the same plot as the other parameters. The small n-size of recent periods prohibits the drawing of meaningful conclusions.



STATUS OF REFERENCE OIL SUPPLY:

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

		@ TMC	
Oil	Cans @ Labs	Cans	Gallons
809	5	0	0
809-1	19	310	3108
810-2	15	360	3606
811-1	19	5	52
811-2	0	173	1732
Total	58	848	8498

* 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 1K test area. All of these oils are also used in the 1N test area and 809-1 is used in several other test areas.

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

Effective Date	Info Letter	
19891002		START OF 1K TESTING
19900506		FIRST TEST FOR 1K CALIBRATION
19901215		FIRST USE OF 811-1
19910220		FIRST USE OF 810-1
19910407		LAST USE OF 811
19910710	2	INDUSTRY CORRECTION FACTORS FOR CANDIDATE TESTING
19910723		LAST USE OF 810
19910816		FIRST USE OF 809-1
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
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	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
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
19950403		LAST USE OF 809
19950531		LAST NON-DISCRIMINATION RUN ON 810-X
19950907		FIRST LTMS TEST
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)
19961217		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

RATING:
During this report period, no second referee ratings were requested. The table below summarizes the re-rates for this report period:

Rating Re-rate Summary

Total number of re-rates requested	0
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 lab visits were completed this report period.

INFORMATION LETTERS:
No information letters were issued this report period.

FUEL BATCH APPROVAL:
During this period, the following fuel batches were approved for testing: 0004270, 0005354, 0006441, 0008540, and 0009620.

SUMMARY

- The small n-size seen again this report period limits the value of any conclusions that might be drawn but TGF, TLHC, BSOC, and EOTOC severity all remained within acceptable limits. Industry WDK is currently exceeding the EWMA severity warning limit.

- Precision for all parameters remained within acceptable limits throughout this report period.

SDP/sdp/astm1000.doc/m00-171.sdp.doc
c: J. L. Zalar
F. M. Farber
A. C. Hahn
Single Cylinder Diesel Surveillance Panel