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

MEMORANDUM: 07-090

DATE: December 18, 2007

TO: Two-Cycle Diesel Surveillance Panel

FROM: Jeffrey A. Clark JAC

SUBJECT: 6V92TA Test Targets and 6V92TA Candidate Adjustment Factors

Attachment 1 contains the 6V92TA reference test targets that went into effect January 1, 2007. Since no new reference oil data has been generated, these targets will remain in effect through June 30, 2008. Attachment 1 also contains the Five Test Averages of Reference Oil 862-1 and the CF-2 category Candidate Adjustment Factors and Pass Limits. Candidate adjustment factors are provided for each six-month period since the beginning of the 6V92TA test. The adjustment factors represent the shift in the means (Average Fire Ring Distress, Average 2nd & 3rd Ring Distress and Cylinder Liner Distress) of oil 862-1 for each six-month period when compared to the original 12-test means of oil 862-1. After applying the adjustment factors based on the time period in which a 6V92TA test is completed, compare these adjusted test results to the fixed pass limits shown. In two-test or three-test programs, the adjusted test results are first averaged and then compared to the appropriate two-test or three-test fixed limits. Following the targets are lab distribution plots containing the data used to generate the targets. Attachment 2 contains the five-test averages and adjustment factors prior to July 1, 2003, which were derived using the original 12-test means for oil 862.

JAC/jac/mem07-090.jac.doc

Attachments

c: FMF
JLZ
ftp://ftp.astmtmc.cmu.edu/docs/diesel/6v92/memos/mem07-090.pdf

Distribution: Email

ATTACHMENT 1

6V92TA TEST TARGETS
Effective 1/1/07 through 6/30/08

TMC Oil Code	N	Parameter	Test Targets		Acceptance Bands*
			Mean	Standard Deviation	
861-1	15	Fire Ring Distress (demerits)	0.301	0.079	0.159 - 0.443
		2nd & 3rd Ring Distress (demerits)	0.225	0.009	0.209 - 0.241
		Liner Distress (%)	58.6	7.5	45.1 - 72.1
862	24	Fire Ring Distress (demerits)	0.155	0.031	0.100 - 0.210
		2nd & 3rd Ring Distress (demerits)	0.145	0.038	0.077 - 0.213
		Liner Distress (%)	30.3	9.0	14.1 - 46.5
862-1	18	Fire Ring Distress (demerits)	0.117	0.022	0.078 – 0.156
		2nd & 3rd Ring Distress (demerits)	0.117	0.035	0.054 – 0.180
		Liner Distress (%)	20.0	7.4	6.7 – 33.3

*NOTE: Acceptance Bands are for informational purposes only. Test acceptance is based on LTMS. Data has been screened for rare events.

ATTACHMENT 1

Detroit Diesel 6V92TA
Five Test Averages of Reference Oils 862-1

Period	Average Fire Ring Distress (Demerits)	Average 2nd & 3rd Ring Distress (Demerits)	Average Cyl.Liner Distress (%)
Prior to 7/1/03*	0.120	0.117	22.3
7/1/03 – 12/31/03	0.110	0.113	19.6
1/1/04 – 6/30/04	0.100	0.107	17.7
7/1/04 – 12/31/05	0.099	0.104	16.4
1/1/06 – 6/30/06	0.105	0.134	17.6
7/1/06 – 12/31/06	0.104	0.121	15.9
1/1/07 – 6/30/08	0.116	0.126	16.4

*Averages based upon the first 12 tests received on oil 862-1. See Attachment 2 for averages prior to 7/1/03.

CF-2 CATEGORY
Detroit Diesel 6V92TA
Candidate Adjustment Factors and Pass Limits

Period	Adjustment Factors		
	Average Fire Ring Distress	Average 2nd & 3rd Ring Distress	Average Cyl. Liner Distress
1/1/03 – 6/30/03*	+0.048	+0.024	+12.5
7/1/03 – 12/31/03	+0.010	+0.004	+3.7
1/1/04 – 6/30/04	+0.020	+0.010	+4.6
7/1/04 – 12/31/05	+0.021	+0.013	+5.9
1/1/06 – 6/30/06	+0.015	-0.017	+4.7
7/1/06 – 12/31/06	+0.016	-0.004	+6.4
1/1/07 – 6/30/08	+0.004	-0.009	+5.9

*Correction factors derived from original 12 tests on oil 862. See Attachment 2.

Based upon the time period that each test completed, the appropriate parameter adjustment factor is added to the test result. For a first test run, the adjusted results are compared to the following first test limits. For a two or three-test program the average of the adjusted test results are compared to the appropriate pass limits.

ATTACHMENT 1

Three Test Pass Criteria Limits
100 Hour 6V92TA Engine Test

	1 test	2 test	3 test
Cylinder Liner			
Scuffing Area, % Max	45.0	48.0	50.0
Port Plugging Area, % Max			
Average	2%	2%	2%
Single Cylinder	5%	5%	5%
Piston Rings, Face Distress			
Demerits, Max.			
No. 1 (Fire Ring)	0.23	0.24	0.26
Average of No. 2 & 3	0.20	0.21	0.22

All tests conducted on the same formulation are to be included in the reported averages.

1. The application of the 6V92TA test in determining oil performance for the API CF-2 Category allows the running of multiple tests, if necessary. The results of the first 6V92TA test are compared to the one-test limits for cylinder liner scuffing, port plugging area, and piston rings face distress. In applying the limits for two-test and three-test programs, the results for cylinder liner scuffing and piston rings face distress are averaged and compared to the two-test or three-test limits. Limits for port plugging area apply to each test individually.

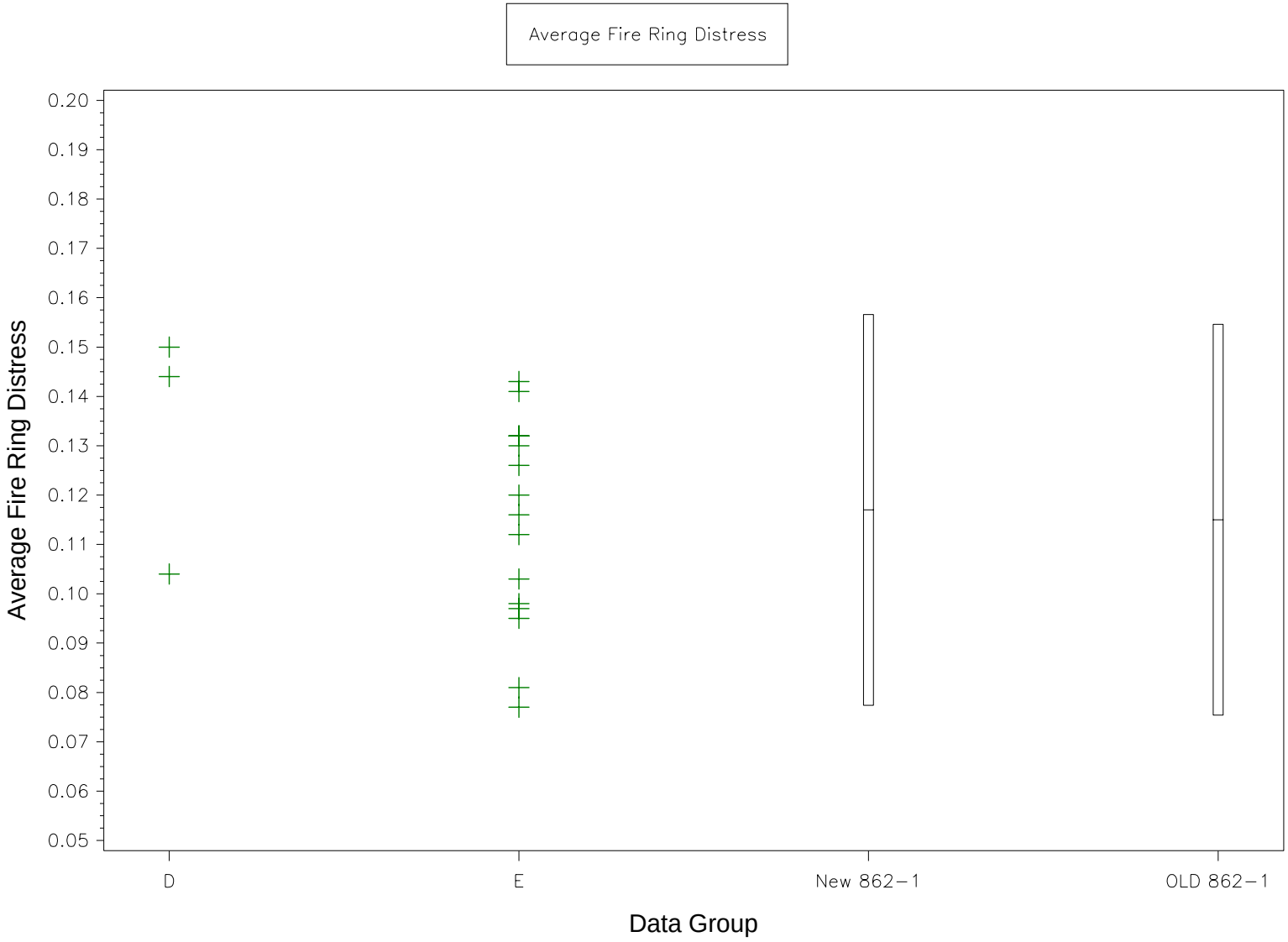
2. In a three-test program, allowance is made for excluding one of the tests as an outlier. The basis for determining whether a test result is an outlier is ASTM E 178. In applying E 178 to the 6V92TA test, each parameter is considered individually. If one parameter on one of the first three tests is more than the limits shown in Table A, then that test may be considered an outlier and the remaining two tests may be used as a two-test program or a fourth test run, if needed. The results of the outlier test are not used in calculating the average results which are compared to the published two-test or three-test limits.

Table A Limits for 6V92TA Test Outlier Determination

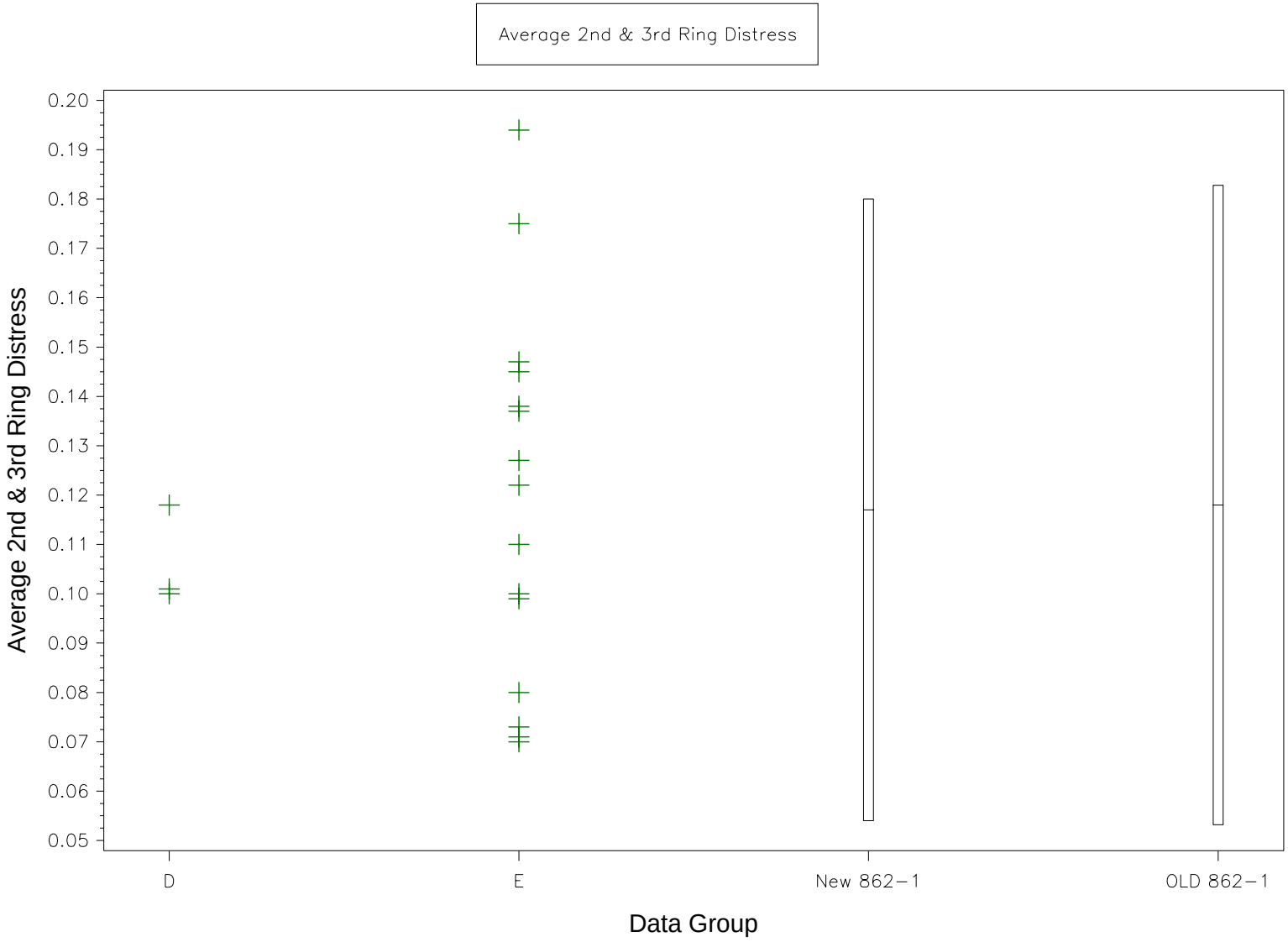
Parameter	Outlier Limit[+]
Cylinder Liner Scuffing Area	Mean + 18.1
Piston Rings Face Distress	
No. 1 (Fire Ring)	Mean + 0.08
Average of No. 2 & 3	Mean + 0.06

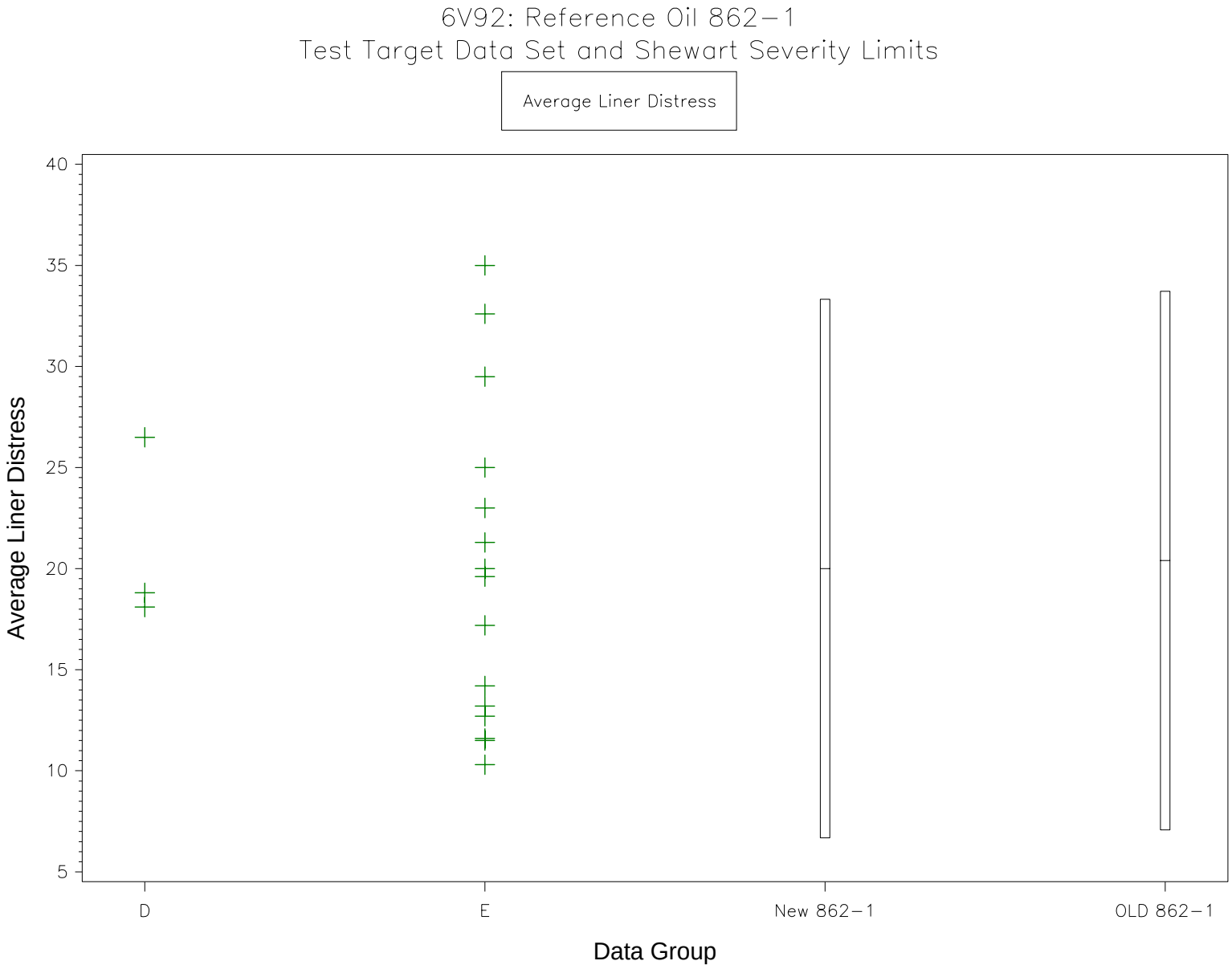
[+] The means used in these limits are the means of the individual parameters for the first three 6V92TA tests in the program. The constants are based on a 95% confidence level (one directional).

6V92: Reference Oil 862–1
Test Target Data Set and Shewart Severity Limits



6V92: Reference Oil 862–1
Test Target Data Set and Shewart Severity Limits




6V92: Reference Oil 862–1
Test Target Data Set and Shewart Severity Limits
Average Liner Distress
Average Liner Distress
40
35
30
25
20
15
10
5
D
E
New 862–1
OLD 862–1
Data Group

ATTACHMENT 2

Detroit Diesel 6V92TA
Five Test Averages of Reference Oils 862 and 862-1

Period	Average Fire Ring Distress (Demerits)	Average 2nd & 3rd Ring Distress (Demerits)	Average Cyl.Liner Distress (%)
Prior to 1/1/94*	0.158	0.137	32.1
1/1/94 - 6/30/94	0.161	0.162	30.1
7/1/94 - 12/31/94	0.149	0.165	30.0
1/1/95 - 6/30/95	0.137	0.141	27.5
7/1/95 - 12/31/95	0.140	0.132	25.1
1/1/96 - 6/30/96	0.144	0.139	25.1
7/1/96 - 12/31/96	0.143	0.142	25.0
1/1/97 - 12/31/97	0.141	0.133	23.3
1/1/98 - 6/30/98	0.139	0.137	24.8
7/1/98 – 12/31/98	0.133	0.141	28.9
1/1/99 – 6/30/99	0.142	0.141	28.8
7/1/99 – 12/31/00	0.141	0.141	29.0
1/1/01 – 12/31/01	0.129	0.103	20.7
1/1/02 – 12/31/02	0.125	0.111	23.0
1/1/03 – 6/30/03	0.110	0.113	19.6

*Averages based upon the first 12 tests received on oil 862.

ATTACHMENT 2

CF-2 CATEGORY
Detroit Diesel 6V92TA
Candidate Adjustment Factors and Pass Limits

Period	Adjustment Factors		
	Average Fire Ring Distress	Average 2nd & 3rd Ring Distress	Average Cyl. Liner Distress
Prior to 1/1/94	0.000	0.000	0.0
1/1/94 - 6/30/94	-0.003	-0.025	+2.0
7/1/94 – 12/31/94	+0.009	-0.028	+2.1
1/1/95 - 6/30/95	+0.021	-0.004	+4.6
7/1/95 – 12/31/95	+0.018	+0.005	+7.0
1/1/96 - 6/30/96	+0.014	-0.002	+7.0
7/1/96 – 12/31/96	+0.015	-0.005	+7.1
1/1/97 – 12/31/97	+0.017	+0.004	+8.8
1/1/98 - 6/30/98	+0.019	0.000	+7.3
7/1/98 – 12/31/98	+0.025	-0.004	+3.2
1/1/99 – 6/30/99	+0.016	-0.004	+3.3
7/1/99 – 12/31/00	+0.017	-0.004	+3.1
1/1/01 – 12/31/01	+0.029	+0.034	+11.4
1/1/02 – 12/31/02	+0.033	+0.026	+9.1
1/1/03 – 6/30/03	+0.048	+0.024	+12.5

Based upon the time period that each test completed, the appropriate parameter adjustment factor is added to the test result. For a first test run, the adjusted results are compared to the following first test limits. For a two or three-test program the average of the adjusted test results are compared to the appropriate pass limits