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MEMORANDUM: 03-058

DATE: May 27, 2003

TO: Mr. Frank Gotto, Chair D02.B07 High Temperature Foam Surveillance Panel

FROM: Tom Schofield

SUBJECT: D6082 Round-Robin Results: Proposed Reference Oil TMC 66
Second Round-Robin

A second D6082 High Temperature Foam round-robin matrix was completed by participating TMC monitored labs, under the auspices of the ASTM D02.B07 High Temperature Foam Surveillance Panel, on proposed TMC reference oil 66. Initial screener tests on oil 66 gave expectations of severe performance with respect to the current API SL passing limit of 100 ml Static Foam Tendency (Immediately Before Air Disconnect). The failing (severe) oil would be expected to compliment the current passing D6082 reference oil, TMC 1007, and replace TMC 1002 which was discontinued as a reference oil because of its inappropriately severe and imprecise performance. The round robin was expected to provide data to propose initial performance targets and acceptance bands on oil 66.

A first round-robin was conducted in 2002 and reported in my memo 02-069 of September 16, 2002. The results of that study showed unacceptably poor precision in the data. A teleconference "workshop" was completed on March 12, 2003, to try to improve operational conformance between the participants. A follow-up second round robin was then conducted on Oil 66.

The second round-robin test results for the proposed new D6082 reference oil, TMC 66, have been reported to the TMC by the participating laboratories. The matrix consisted of four TMC monitored laboratories each running a sample of TMC 66 in duplicate using the D6082 test method for a total of eight results. This is the same design as the first matrix except that the participants agreed that instead of running the duplicate runs out of the same sample at each lab concurrently, separate samples should be run two days or more apart.

The individual test results of the second round-robin are included in the attached table. Table 1 is a summary of the reported results:

Table 1
TMC Oil 66 D6082 Round-Robin 2 Summary

	n	FTIB	FS1M
Max	--	380	0
Avg	8	226	0
s_R	8	94.41	0.00
s_r	8	62.75	0.00
Min	--	140	0

FTIB = Foam Tendency Immediately Before Air Disconnect, ml
FS1M = Foam Stability 1 Minute After Air Disconnect, ml

For comparison, Table 2 is a summary of the first round-round robin:

Table 2
TMC Oil 66 D6082 Round-Robin 1 Summary

	n	FTIB	FS1M
Max	--	400	0
Avg	8	256	0
s_R	8	107.03	0.00
s_r	8	13.69	0.00
Min	--	120	0

FTIB = Foam Tendency Immediately Before Air Disconnect, ml
FS1M = Foam Stability 1 Minute After Air Disconnect, ml

As with the first round-robin, the range of data in Table 1 is unreasonably broad and standard deviation of reproducibility (s_R; between labs) is unreasonably poor. The standard deviation of repeatability (s_r; within labs) also degraded compared to the first round-robin.

The TMC's opinion is that the second round-robin data is also too variable to be used for setting any realistic acceptance bands on TMC oil 66. Using a 95% confidence treatment of the results (mean +/- 1.960 s_R), the acceptance range for Foam Tendency Immediately Before Disconnect would be 41 to 411 ml. This would not provide a useful range to allow discrimination from oil 1007 (range 28 to 103), or to verify a lab's ability to discriminate between an API SL category passing and failing oil.

It might appear, from these two round-robins, and from the TMC reference data on severe oil 1002, that this test method may not be sufficiently precise on severe performing oils for the application of any meaningful statistical monitoring. In both Oil 66 round-robins, however, all labs could discriminate that oil 66 performed well above the current D4485 Oil Specification limit of 100 ml (static foam tendency FTIB). Perhaps oil 66 could be introduced purely as a discrimination oil for calibration monitoring purposes.

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Attachment

c: D02.B07 (D6082) High Temperature Foam Surveillance Panel
D02.B07 (D6082) High Temperature Foam Mailing List
D02.B07 (D6082) High Temperature Foam Participants
Dr. John Zalar, TMC
ftp://www.astmtmc.cmu.edu/docs/bench/d6082/memos/mem03-058.pdf

Distribution: Email

D6082 Round-Robin 2 Test Results for Proposed Reference Oil TMC 66
(April-May 2003 Study)

LAB	CMIR	DTCOMP	IND	FTIB	FTIBy i	FS1 M	BAROPRES	BLENDCAL	DIFFPOR E	DIFFPER M	AIRDEWPT		Comments
B	47747	20030402	66	150	-0.808	0	740.4	22381	23	4263	-65.3	(house air)	
B	47748	20030404	66	200	-0.278	0	737.4	21811	22	4280	-65.3	(house air)	
G	47745	20030421	66	170	-0.596	0	747.1	23158	22	4600	Not Reported		
G	47746	20030423	66	340	1.205	0	738.6	23711	19	4950	Not Reported		
I	47749	20030502	66	150	-0.808	0	Not Reported	22000	24	4870	Not Reported		
I	47750	20030508	66	140	-0.914	0	Not Reported	22000	23	4375	Not Reported		
A	47752	20030423	66	280	0.569	0	742.0	23800	21	3886	Zero Air	(Bottled)	
A	47751	20030408	66	380	1.629	0	747	23800	21	3886	Zero Air	(Bottled)	IT IS UNUSUAL TO SEE 0 KINETIC FOAM.
		Min		140		0							
		Mean		226		0							
		Max		380		0							
		sr		62.75		0.00							
		sR		94.41		0.00							
(Lab D data excluded because the lab ran the samples on an instrument that was not TMC calibrated; lab declined to rerun on calibrated instrument)													