



## Test Monitoring Center

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

MEMORANDUM: 01-054

DATE: May 15, 2001

TO: Dr. Clifford Venier  
Chair, D02.B07 Engine Oil Volatility Surveillance Panel

FROM: Tom Schofield

SUBJECT: Statistical Comparison of Procedures in Test Method D5800-00a

Attached please find a TMC summary comparing the calibration performance of the different procedures allowed under test method D5800-00a (volatility by Noack). Several individuals have expressed interest in the TMC's analysis of our D5800 reference data comparing the three procedures.

Please direct any inquiries to my attention.

Thomas Schofield  
ASTM Test Monitoring Center  
6555 Penn Avenue  
Pittsburgh, PA 15206  
Voice: 412-365-1011  
Fax: 412-365-1049  
Internet: [tms@tmc.astm.cmri.cmu.edu](mailto:tms@tmc.astm.cmri.cmu.edu)

Attachment

TMS/tms

c: M. Lane (TMC)  
J. Zalar (TMC)  
<ftp://tmc.astm.cmri.cmu.edu/docs/bench/d5800/memos/mem01-054.pdf>

D02.B07 mailing list contacts notified by e-mail of ftp posting on the TMC's website.



## Test Monitoring Center

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

### **Comparison of TMC Calibration Statistics for the Different Procedures in Test Method D5800-00a**

#### **Background**

Test method D5800-00a allows for three Noack procedures to determine the volatility of oil. Procedure A is for the Wood's metal apparatus, Procedure B is for the non-Wood's metal apparatus and Procedure C is for the Selby-Noack apparatus. The TMC was directed to monitor all three procedures as one method using the same reference oil test targets and acceptance bands for all three procedures.

However, several individuals have requested the TMC to investigate if the three methods are in fact performing equivalently in terms of overall precision and severity, within the scope and limits of the calibration test data reported to the TMC.

Prior to September 26, 2000, all TMC monitored D5800 test results were run using the Wood's metal apparatus (effectively, Procedure A as that was the only procedure available before the approval and publication of D5800-00a). As of September 26, 2000, the TMC began collecting data on Procedures A, B & C as allowed in method D5800-00a.

#### **Data**

The TMC performed a statistical analysis of all operationally valid TMC calibration tests completed from April 1, 2000 (the start of the latest TMC report period) through May 8, 2001. (Tests completed prior to September 26, 2000 were run using D5800-99 or -00 which allowed the use of Wood's metal apparatus only; tests completed September 26 and later were run using method D5800-00a which allows Procedures A, B & C.)

This data set gave us 27 operationally valid test results reported by "Procedure A" (13 tests from April 1, 2000 through September 25, 2000, another 14 tests on Procedure A from September 26, 2000 through May 8, 2001), 22 tests on Procedure B and 3 tests using Procedure C. Statistical performance comparisons between Procedures A and B are made in this summary, however Procedure C was excluded because the very limited data collected so far (three tests) does not lend itself to any meaningful comparative analysis.

#### **Analysis**

The TMC ran a General Linear Models (GLM) analysis of the data accounting for the effects of lab and oil performance differences. This allowed us to better isolate the effects that the two procedures (A & B) have on performance from other effects such as labs performing differently from each other and the three reference oils performing differently (as would be expected).

The TMC also ran a pooled standard deviation (pooled s) across all oils and labs, by method, to compare the precision of the methods.

### **Findings**

The GLM analysis shows that, based on the TMC's data set of mass % volatized results for TMC oils 52, 55 and 58, Procedures A & B are not performing significantly (95% confidence) different from each other, though Procedure A is performing directionally more severe than procedure B (by about 0.1 mass % volatized at a mean of 15.3 mass % volatized). The TMC's analysis also shows that there are no significant lab performance differences and the performance of the three oils is clearly discriminated.

The pooled s analysis shows the following results:

Procedure	n	Pooled s
A	27	0.71
B	22	0.69

The pooled s analysis indicates that the precision of the two procedures is similar.

### **Conclusion**

The TMC's calibration data strongly suggests that the overall performance (mass % volatized) of test method D5800's Procedure A is not significantly different from Procedure B and the two methods have similar precision. Meaningful comparison of Procedure C could not be made at this time because of the limited amount of procedure C data collected to date.

Thomas Schofield  
ASTM Test Monitoring Center  
6555 Penn Avenue  
Pittsburgh, PA 15206  
Voice: 412-365-1011  
Fax: 412-365-1049  
Internet: [tms@tmc.astm.cmri.cmu.edu](mailto:tms@tmc.astm.cmri.cmu.edu)