ASTM Technical Guidance Committee Meeting Minutes

August 22, 1994

Marriott Courtyard - Pittsburgh Airport

The ASTM Technical Guidance Committee meeting was called to order by Chairman Farnsworth at 9:30 A.M. on August 22, 1994 at the Courtyard Marriott Hotel in Coraopolis, Pennsylvania. A copy of the agenda is Attachment 1. There were 10 voting members, (Mr. Johnson represented Messrs. Akucewich and Schiemann; Mr. Guinther represented Messrs. Beck and Sutherland; and Mr. Groff represented Messrs. Huron and Kitchens), and 11 invited guests in attendance. The attendance roster is Attachment 2.

1. AGENDA

Mr. Guinther requested two additional items be included under New Business:

1. Reporting uncalibrated test stands to the Test Monitoring Center.

2. Analysis of Sequence VIA reference oils. Mr. Franklin stated that he would like to speak on this item also.

2. APPROVAL OF MINUTES

The minutes of the last TGC meeting, August 11, 1993, were corrected to show that Mr. Johnson represented Mr. Akucewich at the meeting. With this correction being made, Mr. Ballard made a motion that the minutes be approved. The motion was seconded by Mr. Romano and was approved unanimously.

3. MEMBERSHIP

There were a number of changes to the membership and invited guest list. A corrected copy is Attachment 3. Chairman Farnsworth asked those in attendance to add their FAX numbers to the attendance roster.

4. FORMAT FOR HANDLING TEST PROCEDURE PRECISION TABLES - TRANSFORMED AND NON-TRANSFORMED DATA

Chairman Farnsworth read a letter from Registration Systems, Inc., Attachment 4, which he and Mr. Guinther had received stating that there seemed to be two nonequivalent methods to determine precision of transformed data in the Sequence IIIE and Sequence VE Test Procedures. Dr. Zalar stated that the tables which appear in the Sequence VE and will appear in the Sequence IIIE Standards, Attachment 5, attempt to present precision of transformed variables in both transformed and non-transformed units. He added that RSI was questioning the percent of the mean, and he verified that if the

formula for percent of the mean is used the results are not consistent. He suggested that precision tables in the Sequence IIIE and Sequence VE be modified to segregate transformed and non-transformed variables and that percent of the mean be eliminated. Mr. Guinther made a motion which was seconded by Mr. Bergin that precision information be presented in transformed units for transformed variables and in original units for non-transformed variables. Mr. Bergin asked that the minutes reflect that this motion does not imply that transformations must be used in all circumstances.

5. GUIDE FOR HARDWARE CONTROL

Mr. Ballard presented the draft of the Standard Guide for Test Hardware Control in ASTM D02.B Test Methods and Practices (Attachment 6) which was developed by his Task Group. TGC members were asked to forward comments prior to the meeting and Attachment 7 are comments received from Messrs. Groff and Koehler. Mr. Ballard requested that the TGC review the document and make any changes and then consider it for balloting in Subcommittee B. After reviewing each section of the report and making changes to the Guide, Mr. Ballard was asked to make the changes and forward a copy to the TGC membership and invited guest list. A motion was made, seconded and approved unanimously that the Guide be approved as revised. Chairman Farnsworth will present the revised document to the Test Monitoring Board in December for their approval and recommend that it be sent to Subcommittee B for ballot.

6. DEVELOP COMMON PRECISION AND DISCRIMINATION DEFINITION/MEASURES

Chairman Farnsworth reported that the Test Monitoring Board had asked the TGC to try to develop common definitions for discrimination and precision so that they could be compared across test types. Mr. Lonardo described the methods the Chemical Manufacturers Association and the Coordinating European Council were using to handle precision discrimination. A copy of his viewgraph is Attachment 8. After comparing the methods, Mr. Johnson suggested that a survey of TGC members and invited guests be conducted to gather opinions on tolerable differences between two test results on the same oil. This is similar to the CMA survey. Messrs. Scinto, Lonardo and Zalar were asked to conduct the survey on the following test areas: Sequence IID, Sequence IIIE, Sequence VE, Sequence VI, L-38, Caterpillar 1M-PC, 1K, 1N, GM 6.2L, Mack T8 and Detroit Diesel 6V92TA.

7. REPORTING UNCALIBRATED TEST STANDS TO THE TMC

Mr. Guinther stated that some labs were not reporting stands which were out of calibration to the TMC and RSI. Mr. Johnson suggested that the LTMS document include a requirement that when a lab goes out of calibration for a reason other than exceeding

the time limit as published in the procedure, then the lab should notify the TMC. The TMC was asked to send a letter, including affected pages of the LTMS document to all the labs informing them of this change, which will take effect 30 days from the date of the letter. No motion was made, however, there was consensus of the TGC members on this item.

8. ANALYSIS OF REFERENCE OIL

Mr. Franklin reported that a decision by the Sequence VIA Task Force to allow analysis of physical properties of Sequence VIA reference oils raised a number of concerns regarding the current policy on reference oil use. A copy of these concerns are included in Attachment 9. After discussing the problem and finding that the policy for handling reference oils by the TMC may be outdated, Chairman Farnsworth formed a Task Force consisting of Messrs. Franklin, Zalar, Johnson, Guinther, Buscher and himself to study the policy and make appropriate recommendations to the TGC.

9. ADJOURNMENT

The meeting was adjourned at 4:14 P.M.

Respectfully submitted,

Grace E. Berriker

Grace E. Berriker
Acting Secretary

geb

Attachments

Agenda

ASTM Technical Guidance Committee

Pittsburgh, PA

August 22, 1994

1. Approval of minutes from August 11, 1993 meeting.
2. Membership changes
3. Format for handling test procedure precision tables. Transformed and untransformed data.
4. Finalize standard guide for test hardware control - (Gordon Ballard)
5. Develop common precision and discrimination definition/measures (All)
6. Old business.
7. New business.

pjr

Agenda

TECHNICAL GUIDANCE COMMITTEE MEETING

August 22, 1994

Courtyard Marriott/Pittsburgh Airport
Pittsburgh, PA

Attendance Roster

Name	Company and Address	Phone No. FAX No.	Present
Members:			
~~Fred A. Antoen~~ ~~Chm. D-471 S.P.~~	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092	(216) 943-4200	
Edward S. Akucewich Chm. L-37 S.P.	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092	(216) 943-1200 Ext. 2415	
Gordon Ballard Chm. Seq. IID S.P.	Lubrizol Corporation Suite 1404 - 3000 Town Center Southfield, MI 48075-1201	(810) 357-0954 FAX 353-3985	
John W. Beck Chm. L-42 S.P.	Ethyl Corporation 500 Spring St. - P.O. Box 2158 Richmond, VA 23217	(804) 788-5219 Fax 788-6358	GHG for JWB
Stephen P. Bergin Dev./Test Sponsor	General Motors Research Fuels & Lubricants Dept. 12 Mile and Mound Roads Warren, MI 48090-9057	(810) 986-1923	
G. E. Callis Chm. ASTM Section B.6	Chevron Res. & Tech. Co. 100 Chevron Way Richmond, CA 94802-0627	(510) 242-4625	
Gordon R. Farnsworth Chairman TGC Chm. Seq. VE S.P.	Exxon Chemical Company P.O. Box 536 Linden, NJ 07036	(908) 474-3351 908 474-3597	
Jim Frampton Chm. L-33 S.P.	Mobil Research & Development Corp. Billingsport Road Paulsboro, NJ 08066	(609) 224-3008	
Tom Franklin Chm. ASTM Section B.1	Royal Lubricants Co., Inc. City View, 10999 IH-10 West, Suite 305 San Antonio, TX 78230-1349	(210) 561-9074 (210) 561 9366	
John Graham Chm. NTC-400 S.P.	Cummins Engine Company Box 3005, Mail Code 50160 1900 McKinley Avenue Columbus, IN 47202-3005	(812) 377-6569	

Name	Company and Address	Phone No.	Present
Members:			
Greg H. Guinther Chm. Seq. IIIE S.P.	Ethyl Corporation 500 Spring St. Richmond, VA 23217-2158	(804) 788-5368 fax 788-6207	
Allen C. Hahn Dev./Test Sponsor	Caterpillar, Inc. TC-L Engr. G.O., Test & Eval. 100 N.E. Adams St. Peoria, IL 61629	(309) 578-3617	
Daniel H. Heath Chm. Seq. VI S.P.	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092	(216) 943-1200 Ext. 2309 FAX 943-9011	
John Huron Chm. L-60 S.P.	Southwest Research Insitute P.O. Box 28510 San Antonio, TX ~~78284~~ 78228	(210) 522-2378 (210) 684-7523	
Johnny Kitchens Chm. ASTM Section B.5	Southwest Research Institute P.O. Box 28510 San Antonio, TX ~~78284~~ 78228	(210) 684-5111 (210)684-7523	
Brian Koehler Chm. L-38 S.P.	Southwest Research Institute ~~6200 Culebra Road~~ P.O. Box 28510 San Antonio, TX ~~78284~~ 78228	(210) 522-3588 Fax #(210) 684-7523	
Danny E. Larkin Dev./Test Sponsor	Detroit Diesel Allison 13400 W. Outer Drive K-15 Detroit, MI 48239-4001	(313) 592-5730	
Beth Morgan Chm. Two Cycle S.P.	Exxon Chemical Company P.O. Box 536 Linden, NJ 07036	(908) 474-2838	
Robert M. Olree Chm. 6.2L S.P.	GM Powertrain Mail Code 324-01 30003 Van Dyke Ave. Warren, MI 28090-9060	(810) 492-6445	
JOHN SAWA ~~Donald L. Powell~~ Chm. Mack Cyclic Transmission Test	AutoResearch Laboratories, Inc. 6735 S. Old Harlem Avenue Chicago, IL 60638	(708) 563-0900	

Name	Company and Address	Phone No.	Present
Members:			
Michael J. Quinn Chm. ASTM Section B.2	Caterpillar, Inc. Engine Division A-2 P.O. Box 610 Mossville, IL 61552-0610	(309) 578-6142	_____
Ron Romano Dev./Test Sponsor	Ford Motor Company EEE Bldg., D-145 (Box 44) 21500 Oakwood Blvd. Dearborn, MI 48121-2053	(313) 322-6522 FAX (313) 845-3169	
Greg Shank Dev./Test Sponsor	Mack Trucks, Inc. 13301 Pennsylvania Avenue Hagerstown, MD 21795	(301) 790-5817	_____
Lee F. Schiemann Chm. ASTM Section B.3	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092-2298	(216) 943-4200 Ext. 2477	
John Stimson, Jr. Dev./Test Sponsor	Labeco 156 E. Harrison St. Mooresville, IN 46158	(317) 831-2990 fax 317 831 2978	
Mark Sutherland Chm. 1K S.P.	~~Chevron Res. & Tech. Co.~~ Ethyl Corp ~~4502 Centerview Dr., Suite 210~~ ~~San Antonio, TX 78~~228 Call for address	(210) 558-2818 OK	
John L. Zalar TMC Administrator	ASTM Test Monitoring Center 4400 Fifth Avenue Pittsburgh, PA 15213	(412) 268-3316	

Name	Company and Address	Phone No.	Present
Guests:			
Grace E. Berriker	ASTM Test Monitoring Center 4400 Fifth Avenue Pittsburgh, PA 15213	(412) 268-3315	gcb
Dwight H. Bowden	Bowden Manufacturing Corp. 4950 Beidler Rd. Willoughby, OH 44092	DWIGHT H. BOWDEN OH TECHNOLOGIES, INC. P.O. Box [redacted] 217 AUSTINBURG, OH 44010-0217 Phone (216) 289-3058 Fax (216) 289-0982	DHB
BRENT SHOFFNER FOR John W. Glaser	EG&G Automotive Research, Inc. 5404 Bandera Road San Antonio, TX 78238-1993 FAX (210) 523 4607	(210) 647-9459	BAS
Rick L. Johnson	The Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 449092	(216) 943-4200 x2731 (216) 943-9018 FAX	RLJ
Tony Lonardo	Paramin/Exxon Chemical 1900 Linden Avenue Linden, NJ 07036	(908) 474-2846 FAX 908-474-3363	TL
William Buscher, A. Jr.	Texaco, Inc. P.O. Box 509 Beacon, ~~NY~~ 12508 NY	(914) 838-7618 Fax (914) 838-7123	WAB
Rick Oliver	Texaco, Inc. 14855 Blanco Rd. Suite 414 San Antonio, TX 78216	(210) 493-2112	
Mark Cooper	Chevron Chemical Co. 4502 Centerview Dr., Suite 210 San Antonio, TX 78228	(210) ~~734-4381~~ 731-5606 Fax (210) 731-5699	MC
STEVEN HANDY for Irwin Goldblatt	Castrol, Inc. 240 Centennial Ave. Piscataway, NJ 08854-3947	(908) 980-3606 FAX (908) 980-9519	SBH
Philip R. Sinto	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092	(216) 943-4200	
Virginia Wiszniewski	Mobil Res. & Dev. Corp. Billingsport Road Paulsboro, NJ 08066	(609) 224-2907	

Guests:

Name	Company and Address	Phone No.
Walter Graff	SwRI San Antonio	210-522-2823 Fax#(210) 684-7523
Frank Fernandez	Orosite Technology 4502 Centerview Dr, Suite 210 San Antonio, Tx 78228	(210) 731-5603 FAX# (210) 731-5699
JERRY SCHMUS	AERORESEARCH LABS 6735 S. OLD HARLEM AVE. CHICAGO, ILL. 60638	708-563-4257 708-563-0087 FAX.

TECHNICAL GUIDANCE COMMITTEE

Membership List

Members:	Company and Address	Phone & FAX Nos.
Edward S. Akucewich Chm. L-37 S.P.	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092	(216) 943-1200 Ext. 2415 FAX (216) 943-9011
Gordon Ballard Chm. Seq. IID S.P.	Lubrizol Corporation Suite 1404 - 3000 Town Center Southfield, MI 48075-1201	(810) 357-0954 FAX (810) 353-3988
John W. Beck Chm. L-42 S.P.	Ethyl Corporation 500 Spring St. - P.O. Box 2158 Richmond, VA 23217	(804) 788-5219 FAX (804) 788-6358
Stephen P. Bergin Dev./Test Sponsor	General Motors Research Fuels & Lubricants Dept. 12 Mile and Mound Roads Warren, MI 48090-9057	(810) 986-1923
G. E. Callis Chm. ASTM Section B.6	Chevron Res. & Tech. Co. 100 Chevron Way Richmond, CA 94802-0627	(510) 242-4625
Gordon R. Farnsworth Chairman TGC Chm. Seq. VE S.P.	Exxon Chemical Company P.O. Box 536 Linden, NJ 07036	(908) 474-3351 FAX (908) 474-3597
Tom Franklin Chm. ASTM Section B.1	Royal Lubricants Co., Inc. City View, 10999 IH-10 West, Suite 305 San Antonio, TX 78230-1349	(210) 561-9074 FAX (210) 561-9366
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Greg H. Guinther Chm. Seq. IIIE S.P.	Ethyl Corporation 500 Spring St. Richmond, VA 23217-2158	(804) 788-5368 FAX (804) 788-6207
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John Huron Chm. L-60 S.P.	Southwest Research Insitute P.O. Box 28510 San Antonio, TX 78228	(210) 522-2378 FAX (210) 680-1777
Johnny Kitchens Chm. ASTM Section B.5	Southwest Research Institute P.O. Box 28510 San Antonio, TX 78228	(210) 684-5111 FAX (210) 684-7523
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John Stimson, Jr. Dev./Test Sponsor	Labeco 156 E. Harrison St. Mooresville, IN 46158	(317) 831-2990 FAX (317) 831-2978
Robert Stockwell Chm. 6.2L S.P.	Southwest Research Insitute 6220 Culebra Road San Antonio, TX 78228	(210) 522-5913
William T. Sullivan Chm. L-33 S.P.	Mobil Chemical Company P.O. Box 250 Edison, NJ 08818	(908) 321-3354 FAX (908) 321-6064
Mark Sutherland Chm. 1K S.P.	Ethyl Corporation 9001 1H 10W, Suite 800 San Antonio, TX 78230	(210) 558-2818
Barb Waldron Chm. D-471 S.P.	AutoResearch Laboratories, Inc. 6947 West 59th St. Chicago, IL 60638	(708) 563-0900
John L. Zalar TMC Administrator	ASTM Test Monitoring Center 4400 Fifth Avenue Pittsburgh, PA 15213	(412) 268-3316 FAX (412) 268-6899

Invited Guests	Company and Address	Phone No.
Grace E. Berriker	ASTM Test Monitoring Center 4400 Fifth Avenue Pittsburgh, PA 15213	(412) 268-3315 FAX (412) 268-6899
Dwight H. Bowden	OH Technologies, Inc. P.O. Box 217 Austinburg, OH 44010-0217	(216) 289-3058 FAX (216) 289-0982
William A. Buscher	Texaco, Inc. P.O. Box 509 Beacon, NJ 12508	(914) 838-7618 FAX (914) 838-7123
Mark Cooper	Chevron Chemical Co. 4502 Centerview Dr., Suite 210 San Antonio, TX 78228	(210) 731-5606 FAX (210) 731-5699

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Irwin Goldblatt	Castrol, Inc. 240 Centennial Ave. Piscataway, NJ 08854-3947	(908) 980-3606 FAX (908) 980-9519
Walter P. Groff	Southwest Research Institute 6220 Culebra Road San Antonio, TX 78284	(210) 684-5111 FAX (210) 684-7523
Rick L. Johnson	The Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 449092	(216) 943-4200 x 2731 FAX (216) 943-9018
John W. Knight	Test Engineering, Inc. 12657 Cimarron Path - Suite 102 San Antonio, TX 78249	(210) 690-1958 FAX (210) 690-1959
Tony Lonardo	Paramin/Exxon Chemical 1900 Linden Avenue Linden, NJ 07036	(908) 474-2846 FAX 908-474-3363
Rick Oliver	Texaco, Inc. 14855 Blanco Rd. Suite 414 San Antonio, TX 78216	(210) 493-2112
Jerry Schaus	AutoResearch Laboratories, Inc. 6735 S. Old Harlem Avenue Chicago, IL 60638	(708) 563-4257 FAX (708) 563-0087
Philip R. Sinto	Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092	(216) 943-4200
Virginia Wiszniewski	Mobil Res. & Dev. Corp. Billingsport Road Paulsboro, NJ 08066	(609) 224-2907

Registration Systems, Inc.
CMA Monitoring Agency
12500 San Pedro, Suite 560
San Antonio, TX 78216
(210) 545-1889

July 20, 1994

Gordon R. Farnsworth
Chair of ASTM Sequence VE Surveillance Panel
c/o Exxon Chemical Company
PARAMINS Technology Division
1600 East Linden Avenue
P.O. Box 536
Linden, NJ 07036

Greg H. Guinther
Chair of ASTM Sequence IIIE Surveillance Panel
c/o Ethyl Corporation
500 Spring Street
Richmond, VA 23217-2158

Dear Messrs Farnsworth and Guinther:

The ASTM Sequence VE and Sequence IIIE test procedures now have two "equivalent" methods to determine reproducibility[1] of transformed data. As I understand, the second method (R=% of mean) was a recent addition and was taken from section 8 of ASTM Research Report RR: D02-1007 on Retransformation of Precision Parameters.

RSI recently tested two test results for significance using R-values identified in the test procedure as R and R=% of mean. The methods produced two different conclusions.

Is RSI properly interpreting the application of R=% of mean for tests of significance between two variables? We think the verbiage in RR: D02-1007 mathematically states that significant differences exist when:

$$\frac{\Delta_{results}}{\text{Avg of results}} \times 100 > R_{\%\ of\ mean}$$

The values for $R_{\%\ of\ mean}$ are listed in the respective ASTM engine test procedures.

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[1] *R value for determination of the significance of the difference in two test results.*

Determination of R-Values for Sequence VE and IIIE tests
July 20, 1994

Based upon this formula, significant differences from the published IIIE tables are mathematically impossible for ACLW and MCLW. Please advise how to use R=% of mean and how equivalency is established to R.

Part 8 of ASTM RR: D02-1007 illustrates three different methods to calculate the numerical value of R. We think the R-values for VE average cam wear should be calculated as a power function instead of a log transformation. Perhaps the VE Surveillance Panel should review this.

RSI looks forward to receiving your timely response and recommendations. For your reference, I am enclosing section 8 of ASTM RR: D02-1007 and Frank Wood's internal memo to me on Significant Differences.

Sincerely,

Daniel C. Ludwig
Program Manager
President - RSI

cc: Carol Stack - CMA
John Zalar - ASTM TMC

Enclosures

Section 8 of Precision Manual

8. RETRANSFORMATION OF PRECISION PARAMETERS

8.1 Introduction. This Section describes means for converting values of *Repeatability and Reproducibility* calculated from evaluations of data that has been arithmetically transformed (Section 4) in the process of stabilizing the variance. These two parameters of precision are converted to a form compatible with the manner in which the test data is normally expressed.

8.2 Calculations. If a transformation of the form

$$X' = f(X)$$

has been used, then the Reproducibility of Repeatability of X, R(X), is given approximately as:

$$R(X) = R(X)' \left| \frac{dX}{dX'} \right|$$

8.2.1 If a logarithmic transformation (see 4.3.2) was used, calculate the Repeatability or Reproducibility as follows:

$$R(X) = MDF\,[(\text{Antilog}_{10}\sqrt{V}) - 1] \times 100$$

where:

V = logarithmic value of Repeatability Variance (V_r) or Reproducibility variance (V_R) (using $\log_{10}$ transformation)

R(X) = Repeatability or Reproducibility as percent of the mean

MDF = Multiplier (Table 7.1) incorporating product of student t-factor and $\sqrt{2}$ as described in Section

8.2.2 Power Retransformation. If a power transformation was used (see 4.3.3) precision is given as:

$$R(X) = R(X') \left| \frac{M^b}{(b-1)} \right|$$

where M is the average of 2 results.

8.2.3 Angular Retransformation. If an angular transformation was used (see 4.3.4) precision is given as:

$$R(X) = 2\,R(X')\,\sqrt{M\,(100-M)}$$

where M is the average of 2 results.

8.2.3.1 The positive root of the average M must be taken.

Registration Systems, Inc.
CMA Monitoring Agency
12500 San Pedro, Suite 560
San Antonio, TX 78216
(210) 545-1889

TO: DCL

FROM: FCW FCW

DATE: June 28, 1994

SUBJECT: Significant Difference Between two Test Results

The VE Standard (ASTM D 5302) refers to Table 8 for determination of the significance of the difference between two test results. Table 8 originally only had R values listed as percent of mean, however has since been modified by means of Information Letter 93-5 to add R values in transformed units. Based on discussion with the Test Monitoring Center, the IIIE standard, when issued, will present R in transformed units as well as percent of mean in measured units.

I applied the two methods in response to a query from a sponsor regarding the significance of two test results for Sequence IIIE. A significant difference was detected using the transformed unit method while the percent of mean difference indicated no significant difference. This was by no means a borderline type of situation.

I evaluated the two processes and have determined the following:

> The R values currently listed are not equivalent which can lead to differing conclusions for significant difference depending on which method is used.
>
> Using the Precision Manual formula (Section 8 of ASTM RR: D02-1007, extract attached), as it was applied to develop the R values listed in the procedures, can result in R values > 200 % of mean. Mathematically, % of mean for two results will never exceed 200 % unless one of the results is negative. This will never be the case when a logarithmic transformation has been applied since conversions can not be performed on negative numbers. Sequence IIIE MCLW and ACLW have R values greater than this apparent 200 % limitation.

I have derived the following formula for calculating the percent of mean R value. The R value obtained using this formula will provide identical conclusions to the transformed R method when a logarithmic transformation has been used to estimate the variability of the test method. It also meets the condition of never producing an R value greater than 200%.

$$R = 200 * \frac{\text{antilog}(MDF * \sqrt{V}) - 1}{\text{antilog}(MDF * \sqrt{V}) + 1}$$

The format of this formula when compared to the precision manual formula does not readily provide any insight as to potential misapplication of the precision manual formula as used to produce the procedural percent of mean R values.

It appears that R in % of mean units should not have been used for Sequence VE Average Cam Wear. While equivalency can be established directly between logarithmic transformations and % of mean, this is not the case with power functions such as Average Cam Wear which uses square root (.5 power). There may be indirect methods for performing this application, however, I do not intend to pursue this at this point. Section 8 of the precision manual is not clear on this point. Repeatability as percent of mean is only discussed in subsection 8.2.1 for logarithmic transformations. Subsection 8.2.2 contains a different formula for calculating R when a power transformation was used to calculate variance. It is not readily apparent how to obtain R with the formula as presented or the relationship to measured units against which this R will be compared.

I have worked closely with Dr. John Zalar of the TMC and he has verified my conclusions.

It does not seem likely that a test standard would intentionally contain information which could lead to conflicting conclusions or establish limits which would be impossible to meet. Therefore, it would seem that either the formula in Section 8.2.1 of the Precision Manual is not correct or the R values, as listed in the respective test procedures, are in error due to a misapplication of this formula.

TABLE 13 Sequence IIIE Reference Oil Precision Statistics[A]

Non-Transformed (as-measured) Units

Variable	Repeatability[B]			Reproducibility[C]		
	s_r[D]	r[E]	r = % of Mean[E]	s_R[D]	R[E]	r = % of Mean[E]
Hours to 375 % viscosity increase (based on mm^2/s at 40°C), relative to the viscosity at the end of the 10-min timing run	5.17	14.48	...	5.83	16.32	...
Average cam-plus-lifter wear, µm	...	...	301.0	...	...	301.0
Maximum cam-plus-lifter wear, µm	...	...	466.0	...	...	466.0
Average piston varnish, merits	0.18	0.51	...	0.20	0.56	...
Average engine sludge, demerits[F]	...	...	45.3	...	...	51.9
Oil ring land deposits, merits	0.71	1.99	...	0.82	2.30	...

Transformed Units

Variable	Repeatability[B]		Reproducibility[C]	
	s_r[D]	r[E]	s_R[D]	R[E]
Average cam-plus-lifter wear, ln(µm)	0.73	2.04	0.73	2.04
Maximum cam-plus-lifter wear, ln(µm)	0.98	2.74	0.98	2.74
Average engine sludge, −ln(10-merits)	0.15	0.42	0.17	0.48

[A] These statistics are based on results obtained on Test Monitoring Center Reference Oils 402, 404-1, 424-1, 425-1, and 1002.

[B] Repeatability values refer to tests run on the same oil in the same laboratory.

[C] Reproducibility values refer to tests run on the same oil in different laboratories.

[D] s = standard deviation.

[E] On the basis of test error alone, the difference, in absolute value, between two test results will be expected to exceed this value only about 5 % of the time.

[F] Demerits = 10 − merit rating.

TABLE 17 Sequence IIIE Reference Oil Precision Statistics[A]

Non-Transformed (as-measured) Units

Variable	Repeatability[B] s_r[D]	Repeatability[B] r[E]	Reproducibility[C] s_R[D]	Reproducibility[C] R[E]
Hours to 375% Viscosity Increase, mm^2/s at 40°C, relative to viscosity at end of 10 minute timing run	5.17	14.48	5.83	16.32
Average Piston Varnish, merits	0.18	0.51	0.20	0.56
Oil Ring Land Deposits, merits	0.71	1.99	0.82	2.30

Transformed Units

Variable	Repeatability[B] s_r[D]	Repeatability[B] r[E]	Reproducibility[C] s_R[D]	Reproducibility[C] R[E]
Average Cam plus lifter Wear, ln(μm)	0.73	2.04	0.73	2.04
Average Engine Sludge, demerits[F]	0.98	2.74	0.98	2.74
Maximum Cam plus lifter Wear, ln(μm)	0.15	0.42	0.17	0.48

[A]These statistics are based on results obtained on ASTM Test Monitoring Center Reference Oils 402, 404-1, 424-1, 425-1, and 1002.

[B]Repeatability values refer to tests run on the same oil in the same laboratory.

[C]Reproducibility values refer to tests run on the same oil in different laboratories.

[D]s = standard deviation.

[E]On the basis of test error alone, the difference, in absolute value, between two test results will be expected to exceed this value only about 5% of the time.

[F]Demerits = -ln(10 - merit rating)

Table 8 Candidate Oil Precision Statistics[A]

NON-TRANSFORMED (AS-MEASURED) UNITS

VARIABLE	REPRODUCIBILITY[B] s_R[C]	R^D	R^D = % of mean
Average Engine Sludge, demerits[E]	---	---	107.7
Rocker Cover Sludge, demerits[E]	---	---	131.1
Average Engine Varnish, merits	0.43	1.19	---
Average Piston Varnish, merits	0.28	0.78	---
Average Cam Wear, mils	---	---	159.4
Maximum Cam Wear, mils	---	---	169.4

TRANSFORMED UNITS

VARIABLE	REPRODUCIBILITY[B] s_R[C]	R^D
Average Engine Sludge, -ln(9.65-merits)	0.33	0.92
Rocker Cover Sludge, -ln(9.65-merits)	0.38	1.06
Average Cam Wear, √(mils)	0.45	1.26
Maximum Cam Wear, ln(mils)	0.47	1.32

A These statistics are based on candidate test results obtained over the period of June 1989 through June 1990.

B Reproducibility values refer to tests run on the same oil in different laboratories.

C s = standard deviation.

D On the basis of test error alone, the difference, in absolute value, between two test results will be expected to exceed this value about 5 percent of the time.

E Demerits = 9.65 - merit rating.

Table 8 Candidate Oil Precision Statistics[A]

NON-TRANSFORMED (AS-MEASURED) UNITS

VARIABLE	REPRODUCIBILITY[B] s_R[C]	REPRODUCIBILITY[B] R[D]
Average Engine Varnish, merits	0.43	1.19
Average Piston Varnish, merits	0.28	0.78

TRANSFORMED UNITS

VARIABLE	REPRODUCIBILITY[B] s_R[C]	REPRODUCIBILITY[B] R[D]
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A These statistics are based on candidate test results obtained over the period of June 1989 through June 1990.

B Reproducibility values refer to tests run on the same oil in different laboratories.

C s = standard deviation.

D On the basis of test error alone, the difference, in absolute value, between two test results will be expected to exceed this value about 5 percent of the time.

E Demerits = 9.65 - merit rating.

Table A11.1 Reference Oil Precision Statistics[A]

NON-TRANSFORMED (AS-MEASURED) UNITS

VARIABLE	REPEATABILITY[B] s_r^D	r^B	r^E = % of mean	REPRODUCIBILITY[C] s_R^D	R^E	R^E = % of mean
Average Engine Sludge, demerits[F]	---	---	117.5	---	---	120.4
Rocker Cover Sludge, demerits[F]	---	---	103.7	---	---	106.0
Average Engine Varnish, merits	0.34	0.95	---	0.36	1.01	---
Average Piston Varnish, merits	0.23	0.64	---	0.25	0.70	---
Average Cam Wear, mils	---	---	151.9	---	---	156.4
Maximum Cam Wear, mils	---	---	164.2	---	---	167.0

TRANSFORMED UNITS

VARIABLE	REPEATABILITY[B] s_r^D	r^E	REPRODUCIBILITY[C] s_R^D	R^E
Average Engine Sludge, -ln(9.65-merits)	0.35	0.98	0.36	1.01
Rocker Cover Sludge, -ln(9.65-merits)	0.32	0.90	0.32	0.90
Average Cam Wear, √(mils)	0.43	1.20	0.44	1.23
Maximum Cam Wear, ln(mils)	0.46	1.29	0.47	1.32

A These statistics are based on results obtained on Test Monitoring Center Reference Oils 200-3, 903-2, 915-1, 916-1, 923-1, 924, 924-1, 925, 925-1, 925-2, 926, 926-1, 927, 928 and 929.

B Repeatability values refer to tests run on the same oil in the same laboiratory.

C Reproducibility values refer to tests run on the same oil in different laboratories.

D s = standard deviation.

E On the basis of test error alone, the difference, in absolute value, between two test results will be expected to exceed this value about 5 percent of the time.

F Demerits = 9.65 - merit rating.

Table A11.1 Reference Oil Precision Statistics[A]

NON-TRANSFORMED (AS-MEASURED) UNITS

VARIABLE	REPEATABILITY[B] s_r^D	REPEATABILITY[B] r^B	REPRODUCIBILITY[C] s_R^D	REPRODUCIBILITY[C] R^E
Average Engine Varnish, merits	0.34	0.95	0.36	1.01
Average Piston Varnish, merits	0.23	0.64	0.25	0.70

TRANSFORMED UNITS

VARIABLE	REPEATABILITY[B] s_r^D	REPEATABILITY[B] r^E	REPRODUCIBILITY[C] s_R^D	REPRODUCIBILITY[C] R^E
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Rocker Cover Sludge, -ln(9.65-merits)	0.32	0.90	0.32	0.90
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Maximum Cam Wear, ln(mils)	0.46	1.29	0.47	1.32

A These statistics are based on results obtained on Test Monitoring Center Reference Oils 200-3, 903-2, 915-1, 916-1, 923-1, 924, 924-1, 925, 925-1, 925-2, 926, 926-1, 927, 928 and 929.

B Repeatability values refer to tests run on the same oil in the same laboiratory.

C Reproducibility values refer to tests run on the same oil in different laboratories.

D s = standard deviation.

E On the basis of test error alone, the difference, in absolute value, between two test results will be expected to exceed this value about 5 percent of the time.

F Demerits = 9.65 - merit rating.

SUBCOMMITTEE D02.B STANDARD GUIDE FOR TEST CONTROL IN ASTM D02.B TEST METHODS AND PRACTICES

1. Scope

Subcommittee D02.B recognizes there are numerous variables inherently a part of many of the test methods employed for the evaluation of petroleum products and lubricants. These variables include, among others, differences in hardware as defined in section 3.2.1. In many full-scale engine test methods, it is necessary to use new hardware each test and, therefore, consume large quantities of hardware as the test life progresses. This high hardware usage rate is compounded by the fact that each test method may be run by numerous laboratories, each requiring its own inventory of hardware. Because of the potential for variations in hardware resulting in a negative impact on the precision and severity of each test method, Subcommittee D02.B has found it desirable to formalize a set of standard guidelines which describe the actions required to ensure the uniform manufacture, procurement, distribution, storage and consumption of hardware by all involved testing facilities.

The purpose of these guidelines, therefore, is to maintain and improve the quality of test hardware, ensure that a consistent quality of hardware is used among laboratories, ensure availability of hardware and thus guard against interruption of testing, provide accountability and traceability of hardware, promote concurrent hardware batch turnover within industry, aid in tracking and quantifying severity and precision trends as related to hardware, and promote a concurrent parts phase out to the end of test life (see note 1).

Note 1 - Committee D-2 Guidelines for Equipment Supply, Listing and Replacement in ASTM Test Methods and Practices (revised 8/14/89) shall govern.

2. Referenced Documents

2.1 ASTM Regulations Governing ASTM Technical Committees

2.2 Committee D-2 Guidelines for Equipment Supply, Listing and Replacement in ASTM Test Methods and Practices (revised 8/14/89)

3. Terminology

3.1 Definitions

3.1.1 Batch - a quantity of parts which are manufactured to defined specifications and acceptable levels of variability given the prescribed manufacturing process and statistical sampling methods.

3.1.2 Central Parts Distributor - organization or agent used to procure, document, and distribute all critical parts and other parts as directed by the appropriate Committee.

3.1.3 Committee - the main committee having jurisdiction over the standard method, or its designated subsidiary such as a subcommittee, section, etc.

3.1.4 Critical Parts - those parts which are known to affect test severity.

3.1.5 First-In First-Out (FIFO) - inventory method in which parts are used or distributed in the same order in which they are received.

3.1.6 Industry - all laboratories which conduct testing under ASTM standards and methods which are under the jurisdiction of Subcommittee D02.B.

3.1.7 Non-Production Parts - parts no longer available except through the Central Parts Distributor or special order through the Test Developer/Sponsor.

3.1.8 Service Parts - those parts available through the OEM dealer or agent network.

3.1.9 Special Test Parts - those test parts required for the test but not within the categories defined in items 3.1.4, 3.1.7, or 3.1.8.

3.2 Deifintions of Terms Specific to this Standard

3.2.1 Hardware - all material consumed during a test including engine components, solvents, cleaning reagents, and fuel.

4. Summary of Guide

Those test parts categorized as having an impact on test severity or precision shall be tracked and distributed by a designated organization. Minimum and maximum inventories to be held by the distributing organization and testing laboratories, respectively, will be established as well as usage and tracking guidelines. When a

laboratory approaches the end of a batch life, a voluntary redistribution system is implemented among all laboratories involved in the effected test method.

5. Significance and Use

5.1 These guidelines were designed to minimize test variability resulting from inherent batch-to-batch differences in engine components, fuel, cleaning agents and other reagents specified in many test methods. The guidelines are useful in tracking the parts and consumables used in test methods and, therefore, as a means of relating severity and precision of the test to changes made in any of these components.

5.2 These guidelines should be used for any test method, new or existing, under the jurisdiction of Subcommittee D02.B in which new parts deemed to influence test severity are used each test or in which the potential exists for different laboratories to use parts from different batches in the same test method at a given time. For existing test methods, the Committee may decide that the inventory or redistribution requirements set forth in these guidelines may be inappropriate since decisions as to the initial purchase, and resulting investment, of inventories were made without the restrictions set forth herein.

5.3 This guide does not imply that the hardware used in the affected test methods is not suited for its designed use, but that under the controlled conditions of ASTM Test Methods, variability within and among laboratories can be minimized. Furthermore, this guide is not intended to imply that all test severity and precision variability is related to test hardware as defined in Section 3.2.1. It is widely recognized that the overall test processes including test procedures, engine build techniques, test stand configuration, rating methods, audit mechanisms, and reference oils must be considered and controlled for optimal testing.

6. Procedure

6.1 The Committee shall designate all hardware used for a test method as Critical, Non-Production, Service, or Special and publish this classification listing in the test standard.

6.2 The Committee shall designate a Central Parts Distributor (CPD). If the Original Equipment Manufacturer (OEM) which developed or sponsors the applicable test does not elect to perform the duties of the CPD as outlined in these guidelines, that OEM shall elect a CPD according to the criteria outlined below. The Committee shall review the CPD's performance on an annual basis and make appropriate recommendations resulting from that review to the OEM. In the case where an OEM is neither the Test Developer nor Test Sponsor, the Committee shall elect a CPD according to the criteria outlined below.

6.2.1 The CPD shall have demonstrated previous knowledge of quality control concepts.

6.2.2 The CPD shall demonstrate active involvement in various ASTM panels as a voting or non-voting member.

6.2.3 The CPD shall have the capability to serialize and track all necessary test parts.

6.2.4 The CPD shall have the capability to provide shipping, controlled environment storage, and appropriate security warehousing. A split storage or warehousing capability is required to ensure a constant supply of parts in the event of a natural disaster.

6.2.5 The CPD must be able to demonstrate financial stability. This financial stability can be demonstrated by the ability of the distributor to stock a three month inventory of parts out-of-pocket.

The following criteria are preferred but not mandatory:

6.2.6 The CPD should have in-house machine capability.

6.2.7 The CPD should have in-house inspection capability.

6.3 The Committee shall define the party or parties responsible for all hardware as defined in section 3.2.1 as well as reporting requirements on the status and inventroy of the hardware to the Committee.

6.4 The Committee shall implement parts procurement, inventory, and usage procedures outlined below.

6.4.1 All hardware is to be consumed on a FIFO basis.

6.4.2 The CPD is required to maintain an industry inventory of critical parts as specified by the Committee and must also rotate this inventory according to the FIFO process. The maximum order quantity, in terms of estimated inventory utilization time, of critical parts allowed to be distributed to any laboratory shall also be specified by the Committee. Laboratory order quantities for Non-Production, Service, and Special Test Parts should be as small as practical to ensure a concurrent industry turnover and to avoid excess material on-hand if a part becomes obsolete or is upgraded.

6.4.3 No laboratory shall maintain an inventory greater than that established, in terms of estimated utilization time, by the Committee. Minimum inventories are encouraged to ensure a concurrent industry turnover and to avoid excess material on-hand if a part becomes obsolete or is upgraded. However, consideration should be given to ensure that adequate inventories are on-hand to continue testing despite an unforeseen interruption in hardware supply.

6.4.4 All critical parts are to be identified by serial number or by batch lot control numbers.

6.4.5 The Committee shall establish a monitoring process to test fuel, solvent, and cleaning reagent quality at delivery and over time in order to detect deterioration or contamination.

6.4.6 All parts are to be used as received unless modifications are specified in the test standard or method.

6.4.7 A process of hardware traceability and accountability to determine if hardware is consumed or rejected by a laboratory will be maintained as prescribed by the Committee. If any critical or special test parts are rejected by a laboratory, the reason for rejection must be stated and reported to the Test Developer/Sponsor, Central Parts Distributor (if other than the Test Developer/Sponsor), and the ASTM Test Monitoring Center. Test reports shall include a hardware documentation section which lists critical part batches used for that particular test.

6.4.8 A service parts list is to be updated periodically via the Test Monitoring System Information Letter process. No part number deviations from this list are

permitted without authorization from the Committee via the Information Letter process and must then be recorded in the accompanying test report or summary.

6.4.9 When a laboratory approaches the end of a particular batch of critical parts, a redistribution among laboratories may take place if so agreed by those laboratories. If the end of test life is caused by the inability to obtain a further supply of test parts, such as the loss or changeover of plant production capacity, the final phase of the redistribution process will be the voluntary concurrent phase out of hardware throughout the industry.

7. Applicable Regulations

7.1. All recommendations for changes in listing shall go through the full ASTM letter ballot approval process at such time as these or other changes result in a proposed revision of the applicable standard. Prior to the revision of the applicable standard, the Information Letter process will be used as an expedient to maintain testing.

7.2. The ASTM Regulations Governing ASTM Technical Committees shall be in effect with full appeal process.

8. Review of Guidelines

A complete review of these Guidelines shall be carried out two years after their adoption and at least every 5 years thereafter, and the resultant Guidelines shall be reballoted. This review and reballot is based on the concern that the total impact of the Guidelines on a voluntary system is unforeseeable and a formal second look is in order to assure that the Guidelines have the desired effect of improving Committee operations and test method performance.

KEYWORDS

Batch
Committee
Consumables
Critical
Developer
Distribution
Distributor
FIFO
Fuel
Hardware
Industry
Inventory
Laboratory
Non-Production
OEM
Reagents
Redistribution
Service
Solvent
Special
Sponsor
Storage

August 16, 1994

To: Technical Guidance Committee

From: Brian Koehler, SwRI
Walter P. Groff, SwRI

Subject: TGC Hardware Control Guideline

Many thanks for the diligent work towards the development of common guidelines for the handling of critical lubricant test parts. We've reviewed "draft #2" issued April 27, 1994, and offer the following observations and comments:

Section 3.1.1 details the definition of a "batch" of test hardware. This definition is too broad and doesn't consider the time factor which is frequently associated with groupings of hardware. For example, if a supplier produces parts on a quarterly basis, then we would want to designate a minimum of four batches over the year, even though all parts met the specifications and acceptable levels of variability.

It seems that the guidelines are meant to cover a broad range of "hardware" such as engine parts, fuels, cleaning agents, etc. (see section 5.1). Yet, in section 6, it appears that the intent is to establish one CPD for each test method, whose responsibility would cover the broad spectrum of materials that are consumed in each test method. If one assumes that a test fuel could be considered "critical", then it appears that the CPD would have some responsibility to track and control that component. We're not sure if that was the intent of the guideline. Perhaps each test type would have multiple "Central Parts Distributors".

Our next comment refers to section 6.4.8. It is our experience that "service" part numbers change frequently, and at least yearly as in the case of the Sequence VE engine parts kits. To monitor these changes via the formal TMC Information Letter process would be an unnecessary burden on the Industry. In the past, such documentation of changes have been handled by various techniques, such as OEM service bulletins, announcements and handouts at Surveillance or O&H meetings, parts solicitations, etc. Perhaps section 6.4.8 should apply only to "critical" components.

Section 6.4.5 calls for the establishment of monitoring processes to evaluate contamination of test reagents (including fuel) at delivery and to detect deterioration over time. To detect contamination at delivery, in real time, would be impractical and cost prohibitive. To apply such monitoring processes to all chemicals and reagents used in the test procedures would increase costs for which potential benefits should be considered.

Paragraph 6.4.6 states that "all parts are to be used as received unless modifications are specified in the test standard or method." It would be unfortunate if the interpretation of this statement would disapprove of laboratory inspections and non-destructive evaluation of received hardware (including service parts, fuel, etc.). All hardware used for testing is inspected with respect to OEM specifications (if known), or test requirements, or the laboratory's internal quality standards.

SwRI looks forward to a future meeting where other discussion of the "guidelines" can be made. For example, we don't want section 6.2.5 to imply that the CPD or a testing laboratory should only carry a 3 month inventory of hardware. And we would like for the annual review of the CPD performance to include an assessment as to whether actual CPD inventory quantities (max and minimum ordering points) are considered adequate. Such information should be made available to the overseeing committee.

We would support a liberal approach to inventory guidelines in order to keep the test meaningful, yet available. The "just-in-time" concept doesn't work for lubricant engine tests and leads to an unstable test operations (such as getting a handle on blowby control and ring gapping when batches change frequently). In fact, some tests require 5-year parts batches and inventories. Section 6.4.3 states that minimum inventories at labs are encouraged. Yet, purchase commitments are often required many months in advance and conflicts with the CPD can arise if forecasted utilization doesn't materialize. An independent laboratory must be allowed to configure their parts supplies commensurate with client demand and client contractural arrangements. The inference that 3 month inventories are adequate can lead to disastrous consequences for independent laboratories. Of course, if dependent labs run out of parts, they can buy tests elsewhere.

Lastly, it appears that mandatory redistribution of hardware will never occur, so the guidelines do not make provision for it. Therefore, if the system is voluntary and up to individual labs to trade and barter, then it is not necessary to mention voluntary redistribution in the guidelines document. And please recall that other "TGC guidelines" have been issued in years past (e.g. February 18, 1985) to address the ethics and logistics of transfer of parts between laboratories. Perhaps these methods should be melded into the set of guidelines we are presently establishing.

Thank you for considering the above comments.

Methods for Comparing Test Precision

	Template Acceptable Precision	Template Discrimination	CEC Discrimination
Method			
Statistic	$E_P = \frac{\delta_P}{S_{PP}}$	$D_d = R1_{(0.1)} - R2_{(0.9)}$	$K = \frac{D_P}{\Delta}$ $D_P = (1.645 + 1.96)\sqrt{2}\sigma$ $\Delta = X_1 - X_2$
Define	Where, δp = smallest diff. of practical importance S_{PP} = Pooled stdev at target level	Where, $R1_{(0.1)}$ = 10 th percentile, higher ref. oil $R2_{(0.9)}$ = 90 th percentile, lower ref. oil	Where, D_p - Calculated to give prob. of α & β > 5 % σ – Test stdev Δ – Diff. between ref. oil
Note	-Assume normality - δ_p found through industry expert consensus	- Based on non-parametric approach (not impacted by non normal results or outliers) - No more than 10% overlap between distributions	- Assumes Normality - (Guide) Tests with K>2 considered poor.

ASTM REFERENCE OILS

Analysis Issues

Current

1. The TGC should be aware that Sequence VIA reference oils are being released by the TMC to outside labs for physical/chemical analysis and bench wear testing.

2. There is currently no clear definition of the tests to be performed, the labs eligible to perform the tests, and the requirements for reporting of results.

3. Written approval must be obtained from the reference oil supplier for the TMC to release the oil. Suppliers are free to set their own conditions for the analysis.

4. Is the TGC supportive of these Sequence VIA TF actions?

Long-Term

1. Are non-analysis restrictions on all ASTM reference oils still necessary and can they actually be enforced.?

2. Should we require that future reference suppliers provide more detailed physical/chemical analyses to industry for publication in research reports, etc.?

3. If reference oil analysis is allowed, what labs can perform the analysis? Those participating on the appropriate task force or surveillance panel?

4. Should labs be required to report all reference oil analyses to the appropriate task force or surveillance panel?