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

MEMORANDUM: 01-163

DATE: November 27, 2001

TO: Sequence IIIF Surveillance Panel

FROM: Michael T. Kasimirsky

SUBJECT: LTMS Test Target Updates

At the November 15, 2001, meeting of the Sequence IIIF Surveillance Panel, the panel approved a plan to accept the proposed reference oil test targets for the Percent Viscosity Increase at 60 Hours parameter of the Sequence IIIF-HD test area. This parameter is a subset of the standard Sequence IIIF test results and does not impact the pass/fail results of standard Sequence IIIF test results. The Surveillance Panel also approved the use of a Natural Log transformation on this parameter, which is reflected in the test targets presented to the panel. The targets that the panel accepted are shown below:

Test Targets for Percent Viscosity Increase at 60 Hours			
Oil	N size	Mean	Standard Deviation
1006	34	5.41732	0.230855
1008	38	4.21605	0.122356
433	19	3.31554	0.111867
433-1	6	3.41045	0.111867*

* The Surveillance Panel approved the Task Force recommendation that reference oil 433-1 use the standard deviation for reference oil 433 (shown in the table), instead of the calculated standard deviation of 0.000897, until additional data is generated on this reference oil.

The Surveillance Panel also approved the Task Force recommendation to use 0.17334 as the standard deviation for severity adjustments on this parameter.

A copy of the analysis summary presented to the Test Target Task Force is attached for your review as well. These new targets are effective for all tests completed on or after November 15, 2001.

In addition, at this meeting of the Sequence IIIF Surveillance Panel, the panel approved a plan to revise the reference oil test targets for reference oil 1006 based on 35 data points. The revised targets are shown below:

Final Updated Reference Oil 1006 Test Targets		
Parameter	*Mean*	*Standard Deviation*
PVIS	0.0167362	0.0086503
APV	9.23	0.213
WPD	3.32	0.327

These targets, along with the targets for reference oil 1006 and the individual data points, are displayed graphically in the four attached plots. The first two plots show Percent Viscosity Increase at 80 hours, in transformed and reported units, respectively. The third shows Average Piston Varnish in reported units and the fourth shows Weighted Piston Deposits in reported units. On the last page is a

table showing the individual reference oil test results used in generation of these targets. These new targets are effective for all tests completed on or after December 1, 2001.

MTK/mtk

Attachments

c: John L. Zalar, TMC
ftp://www.tmc.astm.cmri.cmu.edu/docs/gas/sequenceiii/memos/mem01-163

Mike,

In answer to your request, I have updated the IIIF Viscosity Increase at 60 Hours LTMS Targets. The targets are not straightforward in that I discovered a lab effect and a severity effect over time. Although I am not suggesting any here, I also looked at the data for WPD and APV. I would caution that the Surveillance Panel be very careful in updating targets for these parameters and be especially careful in establishing targets for 433-1. This is because there are lab differences in WPD and APV, and there appears to be a severity effect over time as well for APV.

Here is what I have for Viscosity Increase at 60 Hours

1. I downloaded the IIIF reference data from the TMC website on September 4, 2001
2. There were 34 test results on 1006, 38 test results on 1008, 19 test results on 433 and 6 test results on 433-1
3. Analysis of the data indicates that a natural log transformation is needed
4. Analysis of the data indicates that Lab G is different and that there is a run order (time) effect
5. My model of the data is the following

LN (Viscosity Increase @ 60 Hours) = 3.29924 + 0.19603x(Lab G) + 2.10178x(Oil 1006)
+ 0.90051x(Oil 1008) + 0.09491x(Oil 433-1) + 0.00163x(Run Order)
Model R-squared=96% Root MSE=0.17334

	n	**Least Squares Mean Full Oil, Lab, Order Model**	**Standard Deviation Accounting for Lab Only**	Mean	s	Target from Model Equation (Set Run Order = 10)
Oil 433	19	3.38213132	**0.111867**	3.42318	0.15182	**3.31554**
Oil 433-1	6	3.49909464	**0.000897***	3.57838	0.34298	**3.41045**
Oil 1006	34	5.48435181	**0.230855**	5.53517	0.23773	**5.41732**
Oil 1008	38	4.29097052	**0.122356**	4.34246	0.14629	**4.21605**
Pooled s			0.165194		0.198378	

I recommend using the Target from the Model Equation for the Mean Target and the Standard Deviation accounting for Lab for the Standard Deviation Target

The one exception for the Standard Deviation Target would be for Oil 433-1 where I would use the Standard Deviation from Oil 433 (0.111867) until more data is gathered on 433-1

I recommend that 0.17334 be the standard deviation used for severity adjustments. This is the standard deviation from our best model

I recommend that if my recommendation on targets is rejected, that the Least Square Means be used for Targets

I highly recommend that special attention and care be used in updating targets in the future due to differences in Lab and the current Severity Trend.

Thanks,
Phil

-----Original Message-----

From: **Scinto, Phil**
Sent: Friday, June 01, 2001 10:33 AM
To: Michael Kasimirsky (E-mail)
Cc: Frank Farber (E-mail); Jim Rutherford (E-mail); Nahumck, William; Williams, Lewis
Subject: Vis at 60 Targets for the IIIF

Mike,

We had an action item from the Surveillance Panel to derive LTMS Targets for the reference oils in the IIIF for Viscosity Increase at 60 Hours. Here is what I have.

1. I downloaded the IIIF reference data from the TMC website on May 31,2001
2. Initial analysis of the data indicated that a natural log transformation was needed. This need for a transformation was driven by Oil 1006. However, the transformation remains reasonable because it is likely that many candidates will resemble the performance of 1006.
3. Digging into the data, I found that there was very large statistical evidence that the MB cams are severe for Viscosity Increase at 60 hours. This was true for both the transformed and untransformed data. Given that only 5 of the 73 datapoints in my database used these cams, and the fact that this hardware is different as evidenced by the Surveillance Panel's decision to institute a wear correction factor for this hardware, I removed all 5 datapoints generated using these cams from the database to construct targets.
4. In analyzing the remaining datapoints, I also found a lab effect. Therefore, I generated targets taking lab into account. This means the use of least squares means (the means of the oils if equal numbers of tests were run in the labs), and standard deviations accounting for lab effects.

	n	**Least Squares Mean**	**Standard Deviation accounting for lab**	Mean	s
Oil 433	19	**3.40892125**	**0.111867**	3.42318	0.1518
Oil 1006	25	**5.47458043**	**0.186148**	5.48156	0.1914
Oil 1008	24	**4.32559626**	**0.128856**	4.34137	0.1415
Pooled s			**0.1458**		0.1630

I recommend using the Least Squares Mean and the Standard Deviation accounting for lab for our targets

I recommend that NO data from MB cams be used in generating targets for this case or near future reference oil reblends

I recommend that 0.1458 be the standard deviation used for severity adjustments

Thanks,

Phil

Figure A

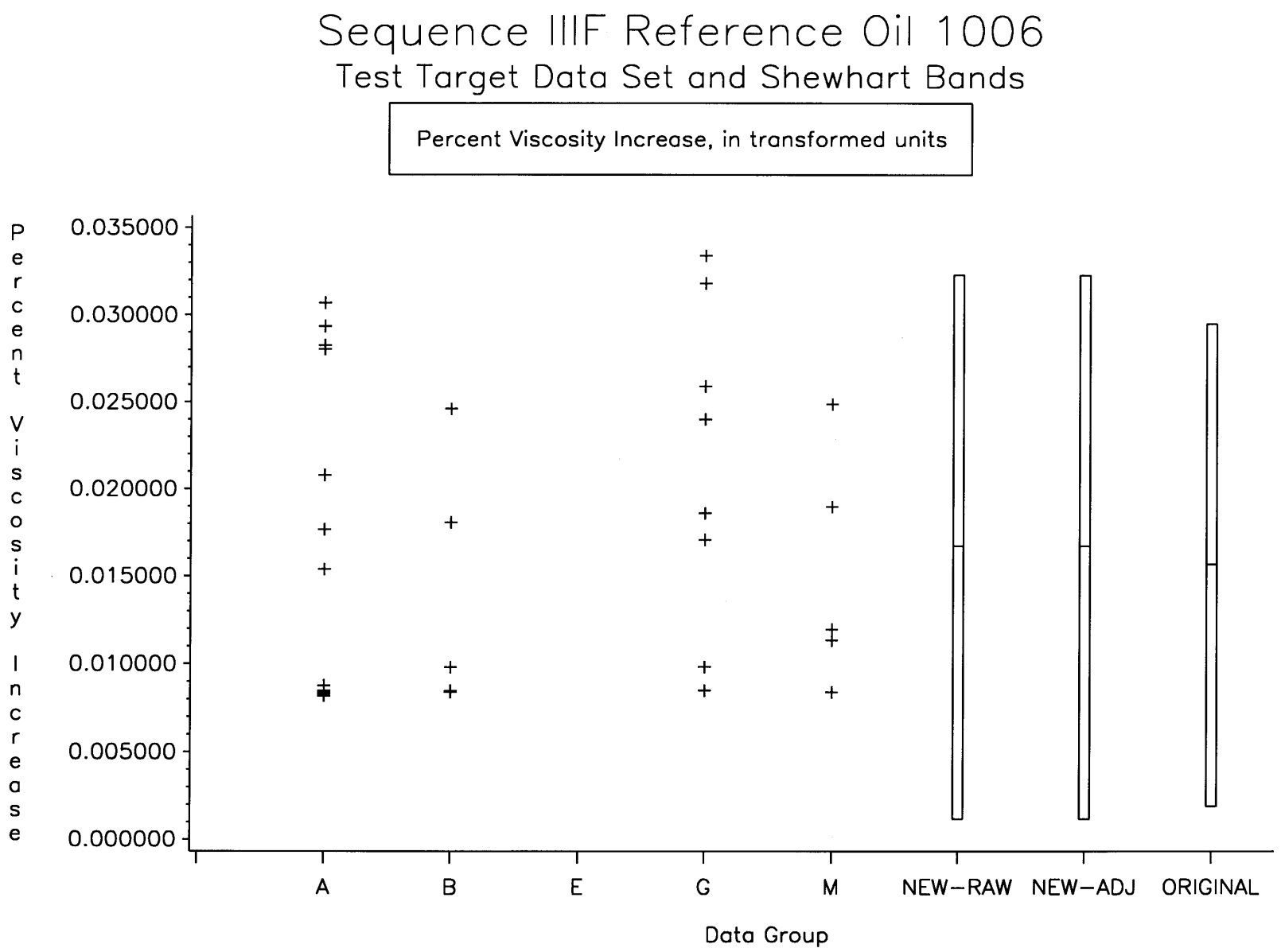

Sequence IIIF Reference Oil 1006
Test Target Data Set and Shewhart Bands
Percent Viscosity Increase, in transformed units
Percent Viscosity Increase
0.035000
0.030000
0.025000
0.020000
0.015000
0.010000
0.005000
0.000000
A
B
E
G
M
NEW–RAW
NEW–ADJ
ORIGINAL
Data Group

Figure B

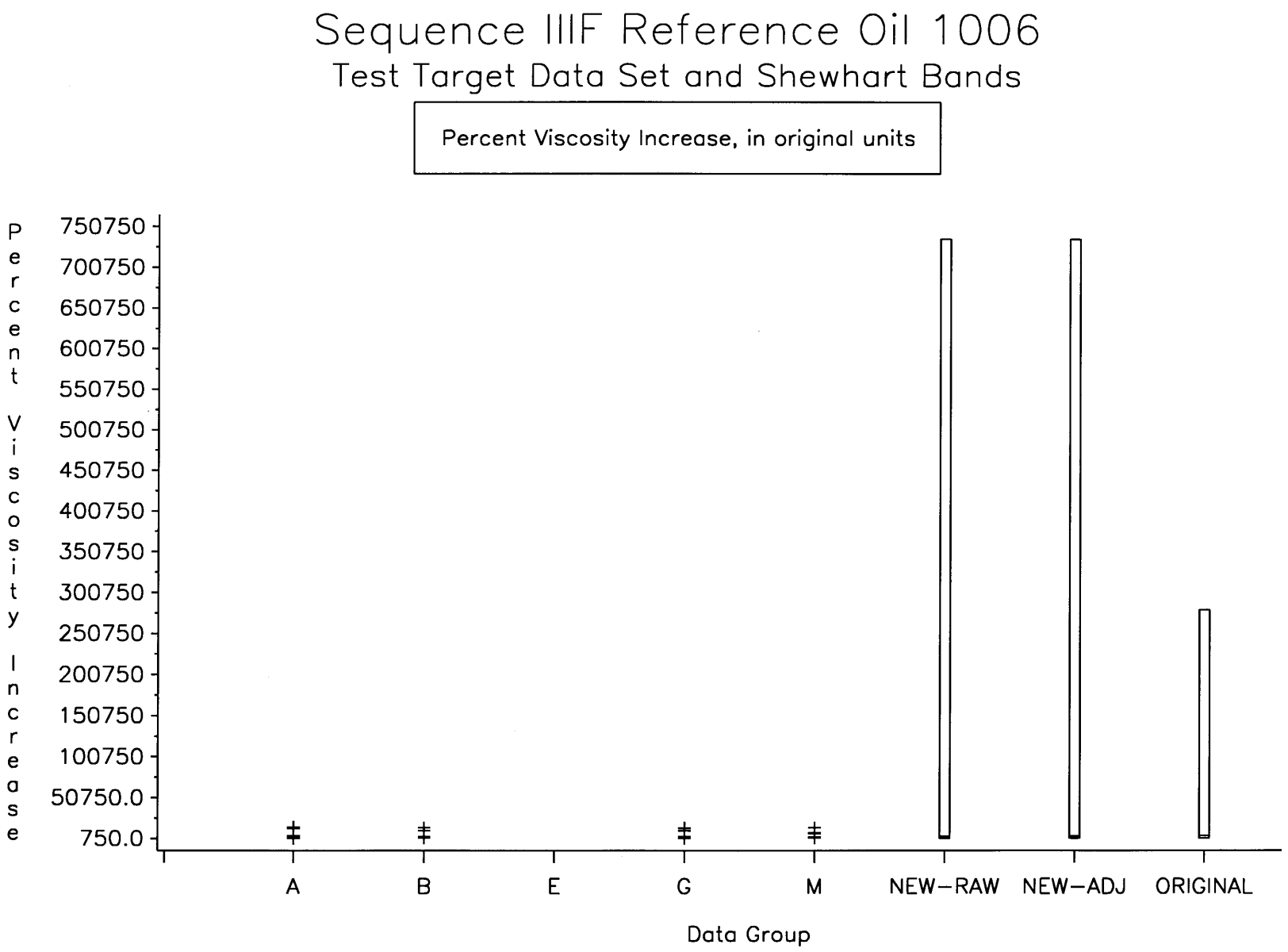

Sequence IIIF Reference Oil 1006
Test Target Data Set and Shewhart Bands
Percent Viscosity Increase, in original units
Percent Viscosity Increase
750750
700750
650750
600750
550750
500750
450750
400750
350750
300750
250750
200750
150750
100750
50750.0
750.0
A
B
E
G
M
NEW–RAW
NEW–ADJ
ORIGINAL
Data Group

Figure C

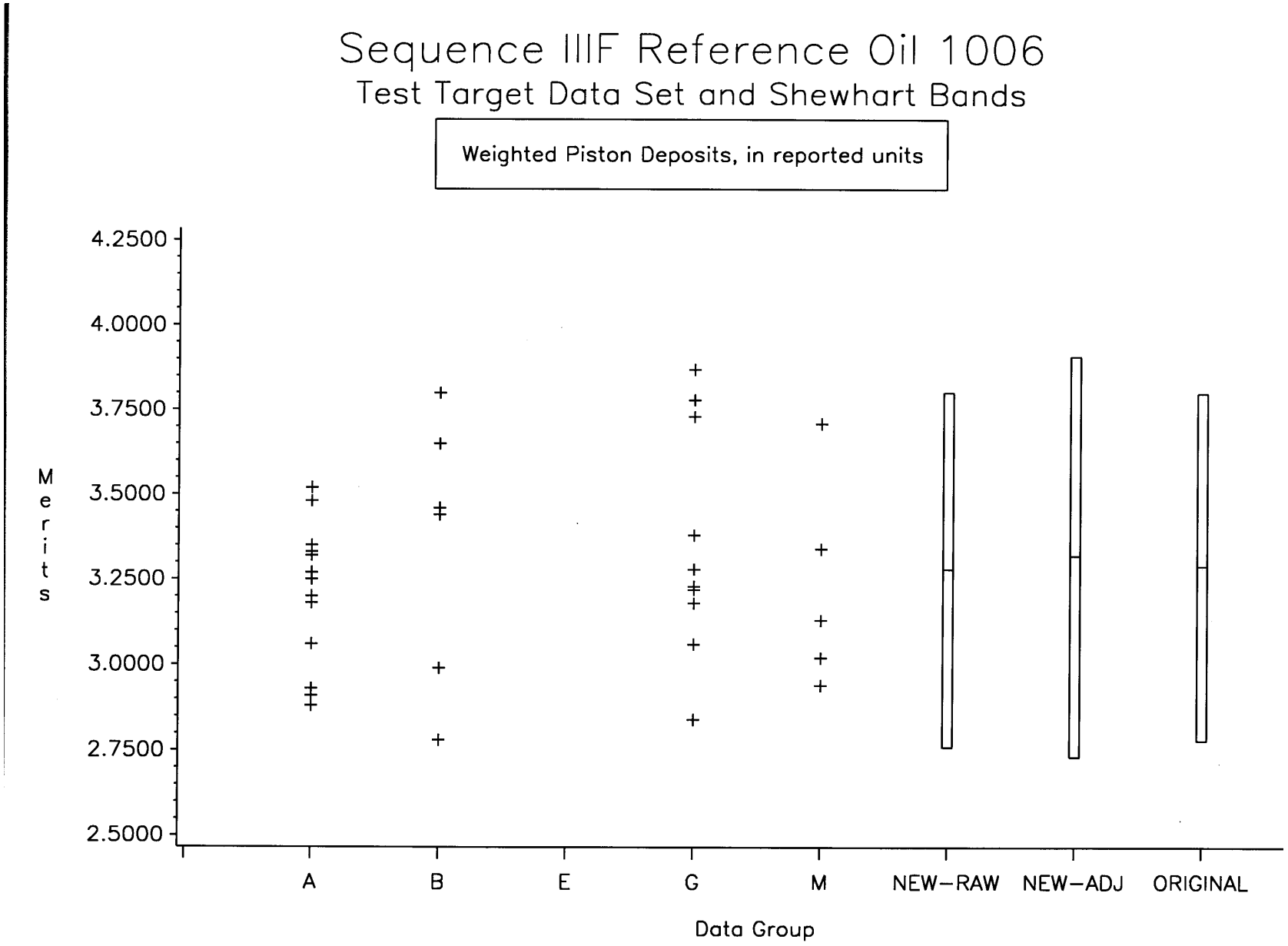
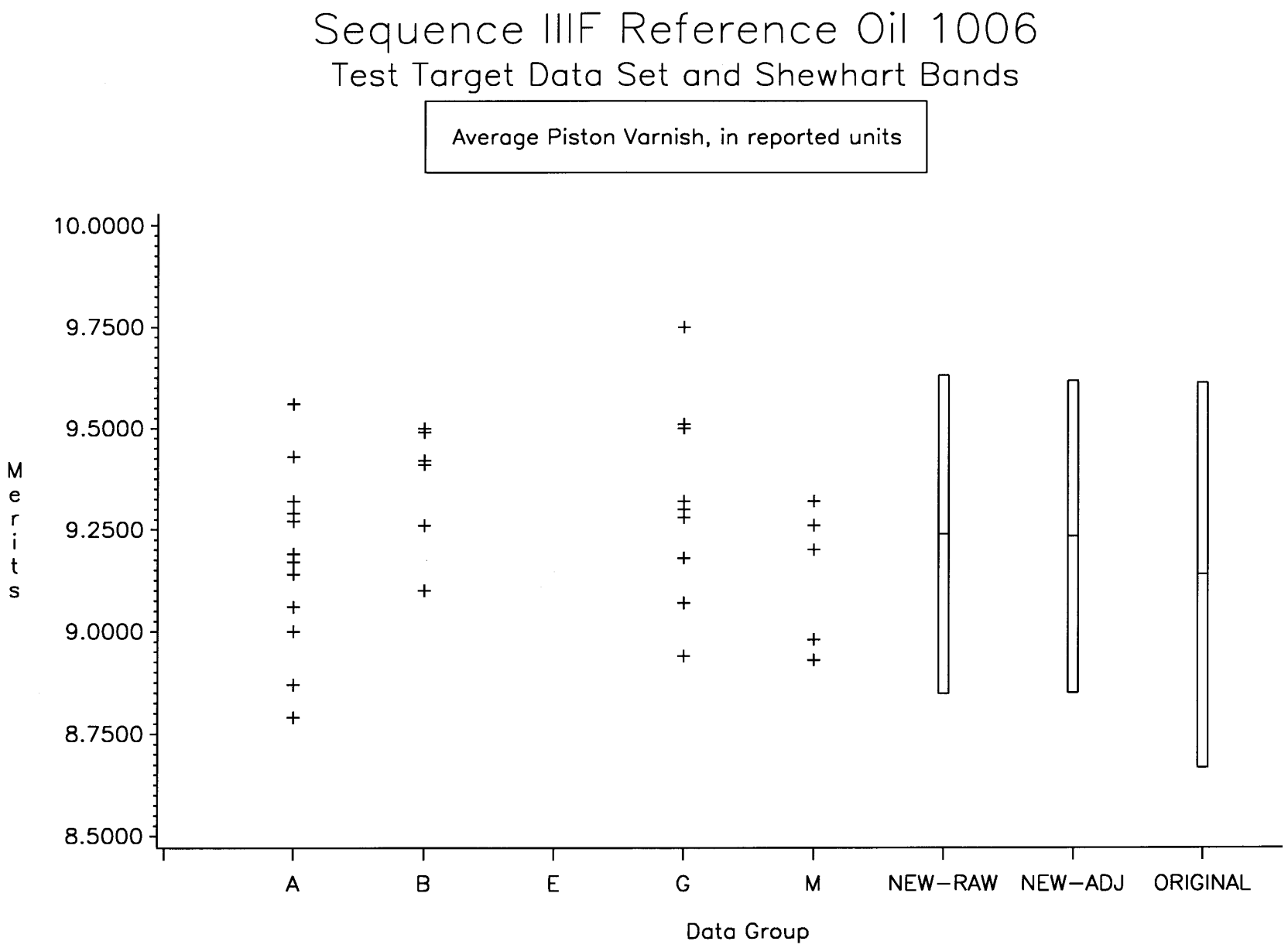

Sequence IIIF Reference Oil 1006
Test Target Data Set and Shewhart Bands
Weighted Piston Deposits, in reported units
4.2500
4.0000
3.7500
3.5000
3.2500
3.0000
2.7500
2.5000
Merits
A
B
E
G
M
NEW–RAW
NEW–ADJ
ORIGINAL
Data Group

Figure D


Sequence IIIF Reference Oil 1006
Test Target Data Set and Shewhart Bands
Average Piston Varnish, in reported units
10.0000
9.7500
9.5000
9.2500
9.0000
8.7500
8.5000
Merits
A
B
E
G
M
NEW–RAW
NEW–ADJ
ORIGINAL
Data Group