



Test Monitoring Center

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MEMORANDUM: 06-082

DATE: November 13, 2006

TO: Mr. Ted Selby, Co-Chair ASTM D02.B0.07
Mr. Mark Devlin, Co-Chair ASTM D02.B0.07

FROM: Tom Schofield

SUBJECT: TMC Bench Reference Test Monitoring Semiannual Report
From April 1, 2006 through September 30, 2006 for Test Areas
D6417, D5800, D6335 (TEOST), D7097 (MTEOS), D5133 (GI) and D6082

I respectfully submit the TMC's ASTM D02.B07 Bench Reference Test Monitoring Semiannual Report for Test Areas D6417, D5800, D6335 (TEOST), D7097 (MTEOS), D5133 (GI) and D6082, with statistical summaries broken down by test area (Attachment 1).

Calibration testing precision and severity are monitored by comparing a recent period of reference test performance to "target" performance (as determined by the surveillance panels), and to performance over previous periods. The TMC monitors test precision by a pooled standard deviation (pooled s), and test severity by mean Δ/s ("mean delta over s "), where:

Pooled s = Standard deviation pooled across labs and reference oils
(i.e., The pooled precision of the test this period.)

$\Delta/s = [(\text{Single Test Result}) - (\text{Reference Oil's Target Mean Performance})] / (\text{R.O.'s Target Precision})$
(i.e., "How many standard deviations from the target mean is this test?")

Mean $\Delta/s = [\Sigma (\Delta/s)] / n$ (across reference oils and labs, and over a period of time)
(i.e., "On average, how many standard deviations from the target mean are all the operationally Valid calibration tests for each period?")

Note that the period severity estimates (mean Δ/s) can be averaged across oils of different performance levels because the individual test results used to calculate mean Δ/s have all been normalized into standard deviations (Δ/s) for each corresponding reference oil. Using a pooled s for estimating precision simplifies the interpretation of precision across all reference oil performance levels. These two calculations (pooled s and mean Δ/s) allow all calibration performance levels to be combined into overall period precision and severity estimates for each test type, providing a means to compare current test performance (precision and severity) to target performance and to prior periods. Individual oil targets, and current performance summaries by oil, are also reported (Attachments 2 and 3).

The tables in Attachment 1, comparing current and previous period precision and severity, have become too large to conveniently show all prior report periods. Some of the oldest period comparison periods have been eliminated to keep the information succinct and relevant.

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The blind lab codes in this report are cross-referenced, as they were in previous reports. That is, in this report, Lab A represents the same lab in each section, which is the same as Lab A in previous reports, and should remain the same lab in future reports. (The initial TMC PCEOCP Bench Test Report, of November 8, 1996, did not cross reference the labs.)

Prior to April 1, 2001, period precision and severity estimates were based on 12-months of data for some tests and six-months of data for other tests. Beginning with the report period April 1, 2001 through September 30, 2001, all test areas are analyzed over consecutive six-month intervals (a TMC report period). For more information on this decision, please refer to the TMC's web page:

<ftp://ftp.astmtmc.cmu.edu/docs/bench/bo7semiannualreports/mem01-143.pdf>

Beginning with this report period (April 1, 2006 through September 30, 2006), TMC semiannual monitoring reports for D6557 (BRT), D6795 (EOFT) and D6794 (EOWT) are being reported separately based on the division of assigned responsibilities within the TMC. (EEOC, CBT & HTCBT have always been reported separately.)

All operationally valid test data and severity plots are available on the TMC's website. Please contact the TMC if you require further information.

Attachments

c: D02.B07 Bench Test Mailing List
J. Zalar (TMC)
<ftp://ftp.astmtmc.cmu.edu/docs/bench/bo7semiannualreports/mem06-082.pdf>

Distribution: Email

ASTM Test Monitoring Center

Semiannual Report

**ASTM D02.B07 Bench Reference Test Monitoring
From April 1, 2006 through September 30, 2006**

D6417, D5800, D6335 (TEOST), D7097 (MTEOS), D5133 (GI) and D6082

D6417: Estimation of Engine Oil Volatility by Capillary Gas Chromatography

STATUS

Table 1 summarizes the reference tests reported to the TMC this period (5 labs reporting):

TABLE 1

	No. of Tests
Statistically Acceptable and Operationally Valid	11
Operationally Valid but Failed Acceptance Criteria	1
Operationally Invalid (initially reported as)	0
Operationally Invalid (after informed of failing calibration)	0
Total	12

Fail Rate of Operationally Valid Tests: 8.3%

Table 2 is a breakdown of the statistically unacceptable tests.

TABLE 2

Reason for Fail	No. of Tests
Area % Volatized @ 371°C Severe	1
Area % Volatized @ 371°C Mild	0

INDUSTRY PERFORMANCE

Table 3 shows the current Industry precision and severity for the Sample Area % Volatized @ 371°C test parameter for all operationally valid tests for the report period. (First calibration test completed 10/5/00.)

TABLE 3

Area % Volatized @ 371°C	n	df	Pooled s	Mean Δ/s
Initial Round Robin Study	107	101	0.46	-----
10/1/02 through 3/31/03	15	12	0.39	-0.47
4/1/03 through 9/30/03	14	11	0.36	-0.45
10/1/03 through 3/31/04	15	12	0.50	-0.42
4/1/04 through 9/30/04	15	12	0.40	0.28
10/1/04 through 3/31/05	16	13	0.46	-0.04
4/1/05 through 9/30/05	17	14	0.61	-0.21
10/1/05 through 3/31/06	11	8	0.23	-0.58
4/1/06 through 9/30/06	12	9	0.45	0.36

Table 4 shows the current severity for the Sample Area % Volatized @ 371°C parameter for each lab for all operationally valid tests for the report period.

TABLE 4

	n	Mean Δ/s
Lab A	4	0.02
Lab B	3	1.28
Lab D	1	1.39
Lab G	2	-0.19
Lab S	2	-0.30

D6417: Estimation of Engine Oil Volatility by Capillary Gas Chromatography, continued

PRECISION AND SEVERITY

D6417 reference testing precision has degraded compared to the previous six-month period but is comparable to the target precision. Overall performance is severe of targets. Severity is represented graphically in Figure 1. A long mild trend between the 01APR05 and 01APR06 timelines is followed by some leveling, and a few severe tests this period for an overall severe performance for the last six-month period. Labs B and D are performing substantially severe, though Lab D's period performance is strongly influenced by a single test that was 4.3 s severe of target (TMC Oil 58; reported as operationally valid).

With only one statistically invalid test this period, the fail rate is as expected. There were no operationally invalid tests reported this period.

TMC MEMORANDA

There were no TMC technical memos issued this report period for the D6417 test method.

D5800: Evaporation Loss of Lubricating Oils by the Noack Method

STATUS

Table 5 summarizes the reference tests reported to the TMC this period (8 labs reporting):

TABLE 5

	No. of Tests
Statistically Acceptable and Operationally Valid	34
Operationally Valid but Failed Acceptance Criteria	1
Operationally Invalid (initially reported as)	0
Operationally Invalid (after informed of failing calibration)	0
Total	35

Fail Rate of Operationally Valid Tests: 2.9%

Table 6 is a breakdown of the statistically unacceptable tests.

TABLE 6

Reason for Fail	No. of Tests
Sample Evaporation Loss Severe	1
Sample Evaporation Loss Mild	0

INDUSTRY PERFORMANCE

Table 7 shows the current Industry precision and severity for the Sample Evaporation Loss test parameter for all operationally valid tests for the report period. (First calibration test completed 5/1/96.)

TABLE 7

Sample Evaporation Loss, mass %	n	df	Pooled s	Mean Δ/s
Initial Round Robin Study	180	175	0.51	-----
New Targets Effective 9/26/00	178	175	0.56	-----
10/1/02 through 3/31/03	34	31	0.63	1.03
New Targets Effective 7/15/2003	102	99	0.70	-----
4/1/03 through 9/30/03	29	26	0.70	0.44
10/1/03 through 3/31/04	32	29	0.64	0.29
4/1/04 through 9/30/04	30	27	0.64	0.24
10/1/04 through 3/31/05	35	32	0.69	0.11
4/1/05 through 9/30/05	34	31	0.55	0.23
10/1/05 through 3/31/06	34	31	0.74	0.07
4/1/06 through 9/30/06	35	32	0.62	0.54

Table 8 shows statistical comparisons by procedure for all operationally valid tests for the report period.

TABLE 8

Sample Evaporation Loss, mass %	n	df	Pooled s	Mean Δ/s
Procedure A	2	0	---	-0.50
Procedure B	30	27	0.63	0.64
Procedure C	3	1	0.21	0.31

D5800: Evaporation Loss of Lubricating Oils by the Noack Method, continued

Table 9 shows the current severity for the Sample Evaporation Loss parameter for each lab for all operationally valid tests for the report period.

TABLE 9

	n	Mean Δ/s
Lab A	6	-0.14
Lab B	6	0.92
Lab D	2	0.01
Lab F	8	1.05
Lab G	5	0.08
Lab H	2	0.75
Lab I	2	0.99
Lab J	4	0.52

PRECISION AND SEVERITY

Effective September 26, 2000, the TMC began monitoring the three Noack procedures under the revised D5800 test method. Revised reference oil targets and acceptance bands for all three current reference oils (52, 55 and 58), based on 18-months of TMC reference data, became effective July 21, 2003.

D5800 reference testing precision has improved for the report period and is more precise than the target precision. Overall performance is unusually severe this period. Severity is graphically represented in Figures 2A and 2B. Figure 2B better illustrates improvement in the severity trend following the revised oil targets timeline. Figure 2A shows an unexplained increase in severe bias between the 01JUL06 and 01OCT06 timelines. Table 8 compares the procedures for the period; with only two Procedure A tests and three Procedure C tests reported this period significant comparisons between procedures cannot be made. There is insufficient data to make any precision evaluation on Procedure A this period.

Failure rates for tests reported to the TMC as operationally valid but evaluated as statistically unacceptable have dropped from a range of 15.2% - 25.7% for the five report periods prior to the revised targets, down to 0.0% to 5.7% for the last six periods. Figure 2B shows an overall severe bias since oil targets were last revised.

TMC MEMORANDA

There was one TMC technical memos issued this report period for the D5800 test method:

Memo 05-055, July 28, 2005: Updated Test Method

D5133: Low Temperature, Low Shear Rate, Viscosity/Temperature Dependence of Lubricating Oils Using a Temperature Scanning Technique (Gelation Index or GI)

STATUS

Table 10 summarizes the reference tests reported to the TMC this period (6 labs reporting):

TABLE 10
Reference Tests

	No. of Tests
Statistically Acceptable and Operationally Valid	24
Operationally Valid but Failed Acceptance Criteria	5
Operationally Invalid (initially reported as)	1
Operationally Invalid (after informed of failing calibration)	0
Total	30

Fail Rate of Operationally Valid Tests: 17.2%

Table 11 is a breakdown of the statistically unacceptable tests.

TABLE 11

Reason for Fail	No. of Tests
Gelation Index Mild	4
Gelation Index Severe	1

INDUSTRY PERFORMANCE

Table 12 shows the current Industry precision and severity for the Gelation Index test parameter for all operationally valid tests for the report period. (First calibration test completed 4/20/96.)

TABLE 12

Gelation Index	n	df	Pooled s	Mean Δ/s
Revised Targets Effective 20011024 (Oils 52, 53 & 62 targets unchanged, added oil 58)	124	120	3.29	-----
10/1/01 through 3/31/02	30	26	4.76	-0.02
*4/1/02 through 9/30/02	32	28	2.15	0.43
*10/1/02 through 3/31/03	29	25	2.02	0.59
Revised Targets Effective 20030715 (Oils 58 & 62 targets unchanged, added oil 1009, dropped oils 52 & 53)	68	65	2.86	-----
4/1/03 through 9/30/03	27	22	2.30	0.06
10/1/03 through 3/31/04	37	34	5.86	1.73
4/1/04 through 9/30/04	27	24	3.05	0.40
10/1/04 through 3/31/05	34	31	2.51	0.40
4/1/05 through 9/30/05	22	19	3.44	-0.17
10/1/05 through 3/31/06	22	19	3.09	-0.16
4/1/06 through 9/30/06	29	26	3.76	-0.46

*Excludes one data point as a rare event (for details, see the TMC's semiannual report for that period).

D5133: Low Temperature, Low Shear Rate, Viscosity/Temperature Dependence of Lubricating Oils Using a Temperature Scanning Technique (Gelation Index or GI), continued

Table 13 shows the current severity for the Gelation Index for each lab for all operationally valid tests for the report period.

TABLE 13

	n	GI Mean Δ/s
Lab A	8	-0.99
Lab B	4	-1.28
Lab G	3	-0.93
Lab H	3	0.62
Lab I	7	-0.04
Lab S	4	0.19

PRECISION AND SEVERITY

Effective July 15, 2003, new D5133 reference oils, targets and acceptance bands were implemented for TMC calibration monitoring. Oils 52 and 53 were dropped and oil 1009 was introduced using performance targets derived from an industry round-robin (targets for oils 58 & 62 continue without revision). Current GI reference oils are 58, 62 & 1009.

Effective March 8, 2006, TMC instrument calibration periods changed from 90-days to 60-days, and a 480-day head calibration period was introduced, for all successful calibrations completed March 8, 2006, or later (see TMC Technical Memo 06-004).

D5133 reference testing precision has degraded slightly compared to last period and continues to be less precise than the target precision. Overall performance is mild of targets and milder than the previous period. Severity is graphically represented in Figures 3A and 3B with an increasing mild trend for the most recent period.

TMC MEMORANDA

There were no TMC technical memos issued this report period for the D5133 test method.

D6335: Determination of High Temperature Deposits by Thermo-Oxidation Engine Oil Simulation Test (TEOST)

STATUS

Table 14 summarizes the reference tests reported to the TMC this period (3 labs reporting):

TABLE 14

	No. of Tests
Statistically Acceptable and Operationally Valid	10
Operationally Valid but Failed Acceptance Criteria	0
Operationally Invalid (initially reported as)	4
Operationally Invalid (after informed of failing calibration)	4
Total	18

Fail Rate of Operationally Valid Tests: 0.0%

Table 15 is a breakdown of the statistically unacceptable tests.

TABLE 15

Reason for Fail	No. of Tests
Total Deposits Mild	0
Total Deposits Severe	0

INDUSTRY PERFORMANCE

Table 16 shows the current Industry precision and severity for the Total Deposits test parameter for all operationally valid tests for the report period. (First calibration test completed 2/13/96.)

TABLE 16

Total Deposits	n	df	Pooled s	Mean Δ/s
Initial Round Robin Study	54	52	4.18	-----
10/1/02 through 3/31/03	5	3	5.44	0.50
4/1/03 through 9/30/03*	5	3	3.84	1.33
10/1/03 through 3/31/04	7	5	7.61	-0.56
4/1/04 through 9/30/04	5	3	3.89	-0.63
10/1/04 through 3/31/05	10	8	6.30	-0.32
4/1/05 through 9/30/05	11	9	4.13	-0.73
10/1/05 through 3/31/06	14	12	4.96	-0.29
4/1/06 through 9/30/06	10	8	5.11	-0.16

*Statistics with extreme result excluded (8.58 s severe)

Table 17 shows the current severity for the Total Deposits parameter for each lab for all operationally valid tests in the report period.

TABLE 17

	n	Mean Δ/s
Lab A	4	0.12
Lab B	4	-0.44
Lab G	2	-0.17

D6335: Determination of High Temperature Deposits by Thermo-Oxidation Engine Oil Simulation Test (TEOST), continued

PRECISION AND SEVERITY

D6335 reference testing precision has degraded over the last two periods and is less precise than the target precision. Overall performance is slightly mild of targets. Severity is graphically represented in Figure 4 (attached) with an overall mild trend since about October 2003, though improved since about January 2006. All 10 operationally valid tests reported this period used Rod Batch G.

It appears the distinct lab biases that the TMC pointed out a year ago (possibly due to biases introduced in different rod cleaning techniques) have abruptly disappeared over the last two report periods as suggested by the fact that the test results have been much more randomly distributed about the target performance means for each oil for all three reporting labs.

However, of concern both this period and last is that a full 22% of the TMC audit tests (4 of 18 each period) initially reported as operationally valid were changed to operationally invalid only after being informed of a statistically failing TMC calibration result. Last period the four results were from three labs and three different instruments; two of the four were results from the same lab on the same instrument run eight days apart. This period those results are from two labs, with three such results coming from Lab B. What this means is that a significant number of reference tests are being reported each period as having been run in an operationally valid manner, but which actually have operationally biased results that the lab was unaware of until being informed of a statistically failing TMC audit result. **This MIGHT imply that a substantial percentage of non-reference D6335 test results, on test samples of unknown performance, could be incorrect due to undetected operational errors.**

TMC MEMORANDA

There were no TMC technical memos issued this report period for the D6335 test method.

D7097: Determination of Moderately High Temperature Piston Deposits by Thermo-oxidation Engine Oil Simulation Test (MTEOS or MHT-4 TEOST)

STATUS

Table 18 summarizes the reference tests reported to the TMC this period (5 labs reporting):

TABLE 18

	No. of Tests
Statistically Acceptable and Operationally Valid	41
Operationally Valid but Failed Acceptance Criteria	2
Operationally Invalid (initially reported as)	1
Operationally Invalid (after informed of failing calibration)	3
Total	47

Fail Rate of Operationally Valid Tests: 4.7%

Table 19 is a breakdown of the statistically unacceptable tests.

TABLE 19

Reason for Fail	No. of Tests
Total Deposits Mild	1
Total Deposits Severe	1

INDUSTRY PERFORMANCE

Table 20 shows the current Industry precision and severity for the Total Deposits test parameter for all operationally valid tests for the report period. (First calibration test completed 9/6/00.)

TABLE 20

Total Deposits	n	df	Pooled s	Mean Δ/s
Updated Targets Effective 2/18/04	50	46	4.92	-----
10/1/03 through 3/31/04	35	31	9.40	-0.69*
4/1/04 through 9/30/04	40	36	7.29	-0.55
Updated Targets Effective 1/12/05	30	27	3.42	-----
10/1/04 through 3/31/05	36	31	5.15	-0.11**
Updated Targets Effective 6/30/05	42	39	4.60	-----
4/1/05 through 9/30/05	39	36	6.36	-0.17**
10/1/05 through 3/31/06	40	37	6.68	-0.26
Updated Targets Effective 7/31/06	90	87	5.62	-----
4/1/06 through 9/30/06	43	40	5.99	-0.09**

*New oil performance targets and acceptance bands were implemented twice during the period; severity is estimated using the targets that were in effect at the time each test was reported.

** New oil performance targets and acceptance bands were implemented during the period; severity is estimated using the targets that were in effect at the time each test was reported.

D7097: Determination of Moderately High Temperature Piston Deposits by Thermo-oxidation Engine Oil Simulation Test (MTEOS or MHT-4 TEOST)

Table 21 shows the current severity for the Total Deposits parameter for each lab for all operationally valid tests in the report period.

TABLE 21

	n	Mean Δ/s
Lab A	12	0.03
Lab B	10	-0.10
Lab D	7	-0.74
Lab G	13	0.21
Lab V	1	-0.92

PRECISION AND SEVERITY

Reference oil targets and acceptance bands were updated effective 20060731; refer to TMC technical memo 06-052 for details.

D7097 reference testing precision is slightly less precise than the updated target precision. Overall performance is on target (small mild bias); the on-target severity is predictable considering some of the period data was also used to set the new performance targets for the reference oils.

The MTEOS severity trend is graphically represented in Figures 5A & 5B, with Figure 5B showing when the new performance targets were implemented, when the monitored test method was changed and when new rod batches are introduced. Figure 5A shows the period severity as reasonably on-target.

TMC MEMORANDA

There were two TMC technical memos issued this report period for the MTEOS test method:

Memo 06-052, July 18, 2006: Adjusted Reference Oil targets and Updated test Method

Memo 06-055, August 10, 2006: Section 10.7 Test Procedure Clarification

D6082: High Temperature Foaming Characteristics of Lubricating Oils

D6082 Monitoring Historical and Statistical References Affecting the Statistical Estimates in This Report

In June 2000, the High Temperature Foam Surveillance Panel had given approval for the TMC to stop collecting data for Total Volume Increase.

On June 18, 2001, the section agreed to suspend the use of the severe performing TMC oil 1002 as a D6082 reference oil due to ongoing calibration precision and severity problems with that oil and on June 17, 2002 the section voted to discontinue the use of 1002 altogether.

On July 21, 2003 a severe performing “discrimination oil”, TMC oil 66, was introduced to the monitoring system to be run by each participating lab once every six-months to show that each lab can discriminate a GF-3/SL passing oil (foam tendency) from a failing oil in the D6082 test method. The first discrimination test using oil 66 was completed on August 13, 2003. Because of apparent poor reproducibility of the D6082 test method on severe performing oils (greater than 100 ml foam tendency) in general, it was agreed that oil 66 discrimination results would not be statistically summarized by the TMC other than a count of the tests that do and don’t meet the acceptance criteria.

On March 28, 2006 the performance targets for oil 1007 were adjusted slightly by rounding the targets from a precision of 0.01 ml to 1 ml; this adjustment slightly changed the acceptance bands on oil 1007 (see TMC technical memo 06-08).

Note that TMC reference oil 1007 has a Foam Stability (one minute after disconnect) target mean performance of zero ml and a target precision (standard deviation) of zero ml. A negative (mild) result for this parameter is unlikely and a severity estimate for any positive result would be indeterminate in standard deviations (Δ/s). Therefore, for Foam Stability, only a count of non-zero occurrences is noted to flag any severity trends.

STATUS

Table 22 summarizes the reference tests reported to the TMC this period (4 labs reporting):

TABLE 22

	No. of Tests
Statistically Acceptable and Operationally Valid	12
Operationally Valid but Failed Acceptance Criteria	0
Operationally Invalid (initially reported as)	0
Operationally Invalid (after informed of failing calibration)	0
Total	12

Fail Rate of Operationally Valid Tests: 0.0%

In addition to the calibration tests, there were four discrimination oil tests reported this period, all met the acceptance criteria for the discrimination oil.

D6082: High Temperature Foaming Characteristics of Lubricating Oils, continued

TMC 1007 INDUSTRY PERFORMANCE

Tables 23 and 24 show the current industry precision and severity for the Foam Tendency and Foam Stability test parameters for all operationally valid tests on oil 1007 for the report period. (First calibration test on TMC 1007 completed 4/12/99.)

TABLE 23

1007 Foam Tendency, ml	n	Mean	s	Mean Δ/s
Initial Round Robin Study (targets)	28	65.71	19.28	-----
10/1/02 through 3/31/03	11	62.7	17.52	-0.15
4/1/03 through 9/30/03	12	65.8	9.96	0.01
10/1/03 through 3/31/04	12	62.5	10.55	-0.17
4/1/04 through 9/30/04	13	72.3	15.89	0.34
10/1/04 through 3/31/05	12	72.9	16.30	0.37
4/1/05 through 9/30/05	10	62.0	25.30	-0.19
10/1/05 through 3/31/06*	11	102	70	1.87
10/1/05 through 3/31/06*	9	74	19	0.45
4/1/06 through 9/30/06	12	66	16	-0.01

*Period statistics with and without two extreme results included.

TABLE 24

1007 Foam Stability @ 1 min., ml	n	Mean	s
Initial Round Robin Study	28	0.00	0.00
10/1/02 through 3/31/03	11	No non-zero occurrences	
4/1/03 through 9/30/03	12	No non-zero occurrences	
10/1/03 through 3/31/04	12	No non-zero occurrences	
4/1/04 through 9/30/04	13	No non-zero occurrences	
10/1/04 through 3/31/05	12	No non-zero occurrences	
4/1/05 through 9/30/05	10	No non-zero occurrences	
10/1/05 through 3/31/06	11	No non-zero occurrences	
4/1/06 through 9/30/06	12	No non-zero occurrences	

Table 25 shows the current 1007 severity for the monitored result parameter for each lab for all operationally valid tests reported for the report period.

TABLE 25
TMC 1007

	n	Foam Tendency Mean Δ/s
Lab A	2	1.00
Lab B	6	0.04
Lab G	2	-0.58
Lab I	2	-0.58

D6082: High Temperature Foaming Characteristics of Lubricating Oils, continued

PRECISION AND SEVERITY

D6082 Foam Tendency precision on TMC oil 1007 is improved for this period and more precise than the target precision. Overall performance is on target. There were no non-zero occurrences of Foam Stability on 1007 suggesting Foam Stability precision is as expected. Foam Tendency severity is graphically represented in Figure 6.

All discrimination tests reported this period meet the acceptance criteria (that is, all reporting labs could discriminate oil 66 as a GF-4/SM failing oil for Foam Tendency).

TMC MEMORANDA

There was one TMC technical memo issued this report period for the D6082 test method:

Memo 06-065, September 29, 2006: Updated Test Method

D6922 Standard Test Method for Determination of Homogeneity and Miscibility in Automotive Engine Oils

The TMC distributes six reference oils for D6922 testing. The TMC does not collect data or monitor any test results for this test at this time.

D874-00 Standard Test Method for Sulfated Ash from Lubricating Oils and Additives

The following progress had been reported for this project:

- Ongoing surveillance panel discussions every two weeks, as scheduled by Eric Olsen, to discuss issues.
- The type of monitoring system has been agreed upon, with 90 day lab-level TMC blind sample audits to calibrate each participating lab and a daily control sample to be run each day that the test is run.
- A round robin has been initiated to select reference oils (6 oils selected for round robin, 9 labs participating and each oil to be run three times by each lab); the protocol and reporting template for the round robin has been issued, all round robin samples have been shipped, the TMC is collecting the data. Deadline for data is October 30, 2006, though it is expected some extension will be necessary.
- A report package for TMC monitoring has been designed and approved by the panel; DCC beta testing is underway to ensure the package meets the standard protocols for electronic data exchange.

REFERENCE OIL SUPPLIES

There is adequate supply of B0.07 Bench Test reference oils on hand at the TMC. Tables 34A and 34B list the PCEOCP bench test reference oils currently on hand at the TMC.

Table 34A

Oil	For Tests	Quantity Left (gallons)	Quantity Used Last 12 Months (gallons)
^51	Obsolete Vol. & GI	94.6	0.0
52	D6417, D5800	67.1	1.1
^53	Obsolete Vol. & GI	96.8	0.0
^54	Obsolete Volatility	97.8	0.0
55	D6417, D5800	72.1	1.1
^57	Old Volatility Candidate	51.2	0.0
58	D6417, D5800, GI	123.6	1.1
62	GI	1.6	0.1
66	D6082 (Discrimination)	99.5	1.0
71	TEOST	2.8	0.7
72	TEOST	2.9	0.7
74	MTEOS	1.8	0.2
90	D874 Daily Check	49.3	0.2
91	D874 Candidate	4.8	0.2
**432	MTEOS	Adequate Supply	-----
^**433	Obsolete MTEOS	Adequate Supply	-----
**434	MTEOS	Adequate	-----
*1007	D6082	Est. 24	-----
**1009	GI	Adequate	-----

^Not selected as reference oil; TMC holding for further instructions from Surveillance Panel.

*One drum of oil is set aside for bench calibration testing; the TMC has a larger supply of this oil.

**Five gallon aliquot set aside for bench testing; hard to get an inventory reading on amount set aside.

REFERENCE OIL SUPPLIES, continued

Table 34B

Oil	For Tests	Quantity Left (gallons)	Quantity Used Last 12 Months (gallons)
HMA	H&M (D6922)	193.2	4.0
HMB	H&M (D6922)	197.2	4.0
HMC	H&M (D6922)	183.2	4.0
HMD	H&M (D6922)	191.2	4.0
HME	H&M (D6922)	176.2	4.0
HMF	H&M (D6922)	199.0	4.0

Shipping aliquots are:

D6417	1 ml
D5480	4 ml
D5800	100 ml
GI	25 ml
MTEOS	17 ml
TEOST	125 ml
D6082	525 ml
H&M	950 ml

MISCELLANEOUS

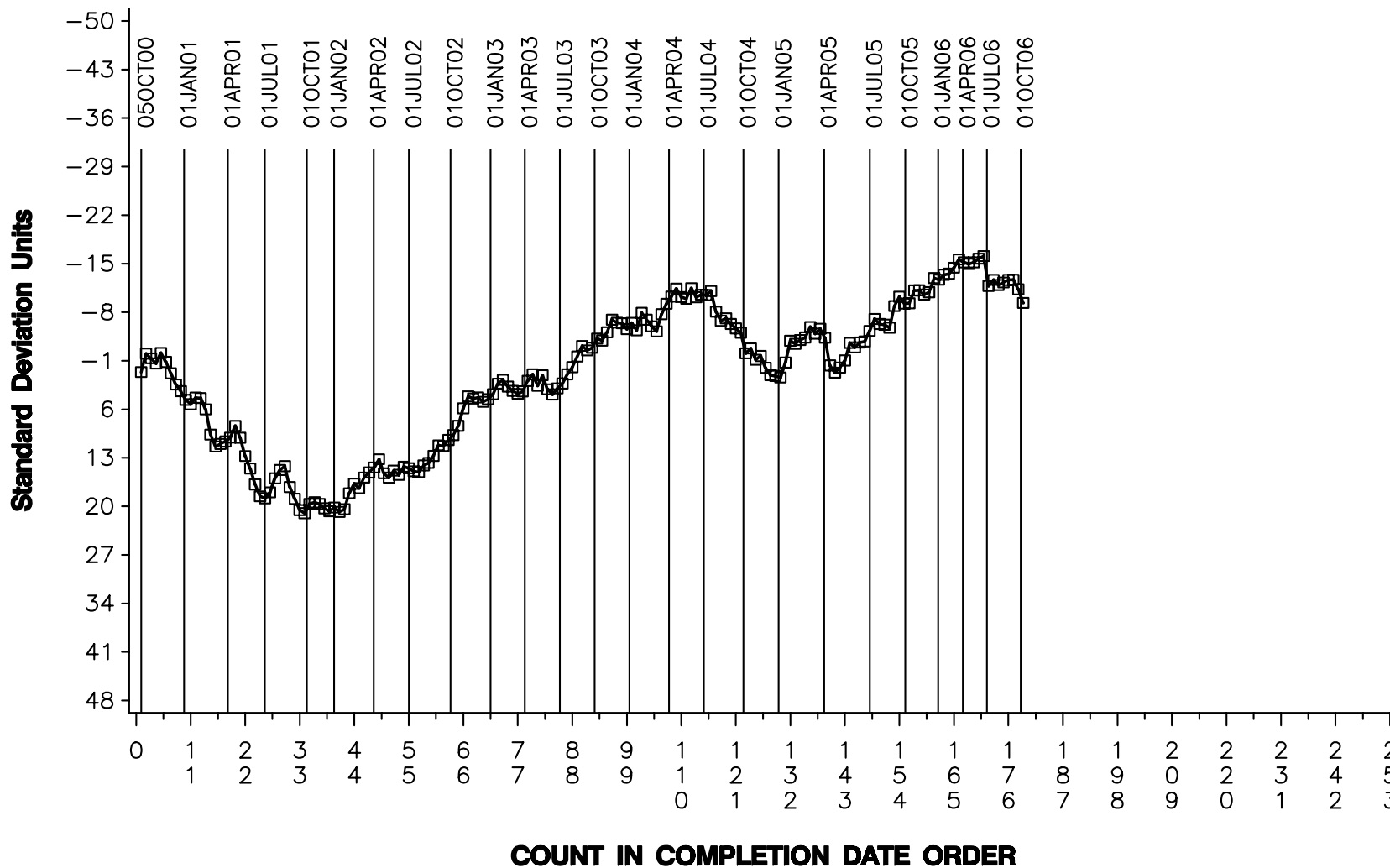
The TMC posts monitored bench test calibration data on the Internet. Selected parameters from all operationally valid reference tests are posted on the TMC's World-Wide-Web page in real time. Lab identifications are coded on the TMC's web site as they are on the previous pages of this report. Also posted are statistics, CUSUM plots, reporting forms, flatfile templates, data dictionaries and data from various round-robin matrix programs. The TMC encourages all interested parties to access and download the data, statistics and plots for individual studies and analyses. Likewise, you are encouraged to access the web site to download the most recent test reporting formats and data dictionaries. The TMC's web site address is www.astmtmc.cmu.edu.

All currently monitored bench test data dictionaries and report form packages have been beta tested by the ASTM Data Communications Committee (DCC) and approved for electronic data transfer. Please contact Tom Schofield at (412) 365-1011 or Rich Grundza at (412) 365-1031 for more information.

D6417 VOLATILITY BY GC INDUSTRY OPERATIONALLY VALID DATA

SAMPLE AREA % VOLATIZED @ 371'C ... 700'F

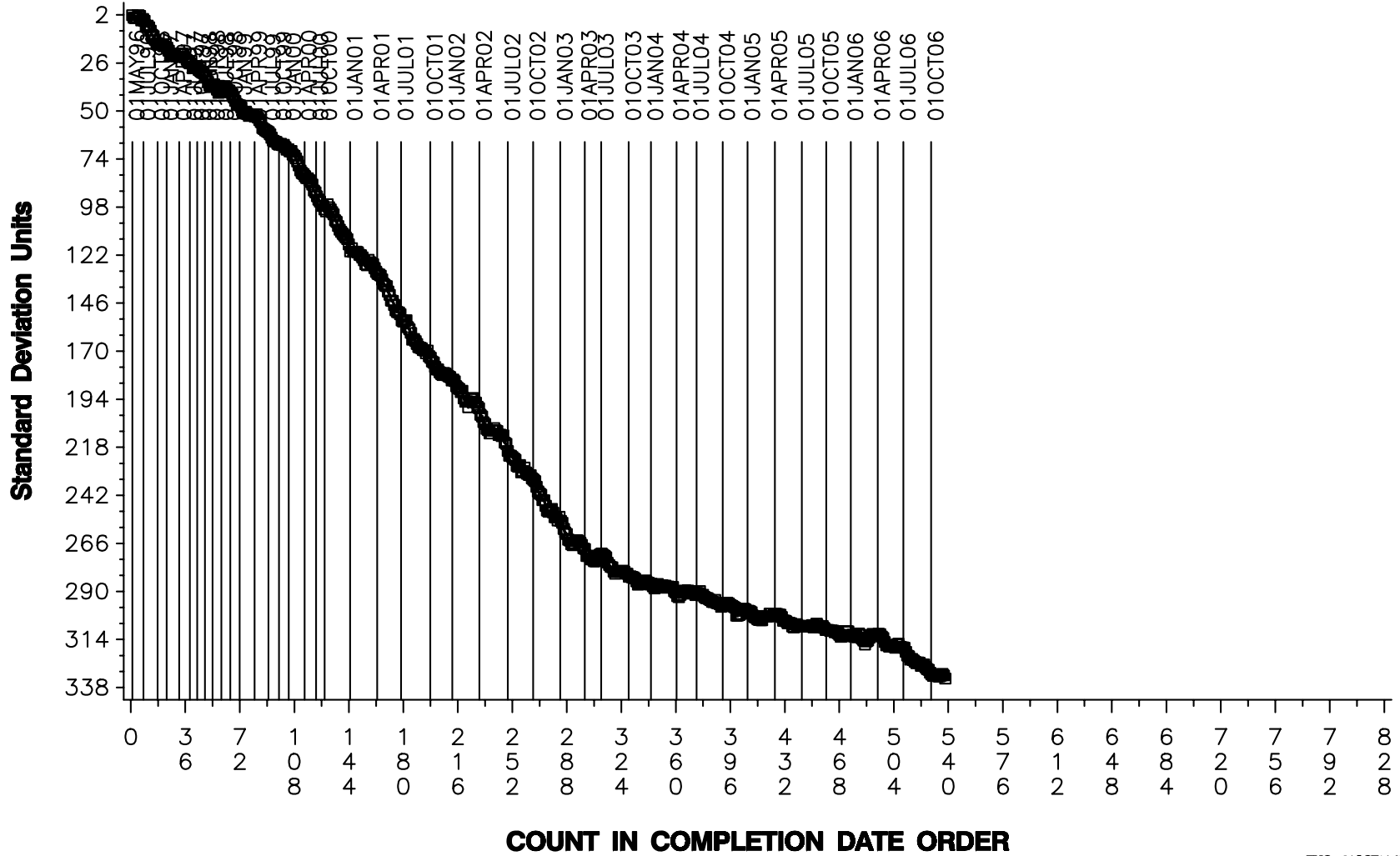
CUSUM Severity Analysis



D5800 VOLATILITY BY NOACK INDUSTRY OPERATIONALLY VALID DATA

TEST OIL SAMPLE EVAPORATION LOSS, MASS%

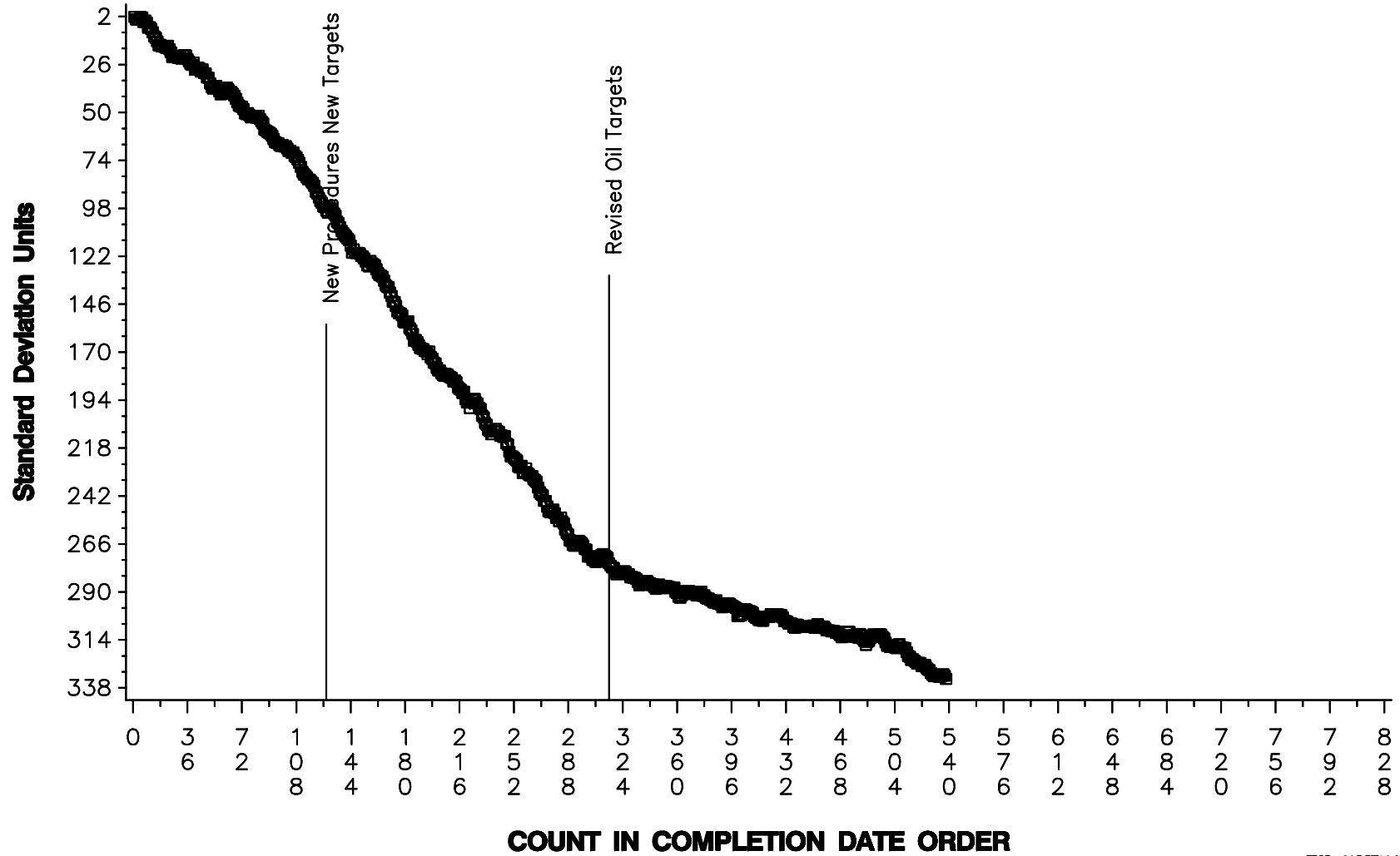
CUSUM Severity Analysis



D5800 VOLATILITY BY NOACK INDUSTRY OPERATIONALLY VALID DATA

TEST OIL SAMPLE EVAPORATION LOSS, MASS%

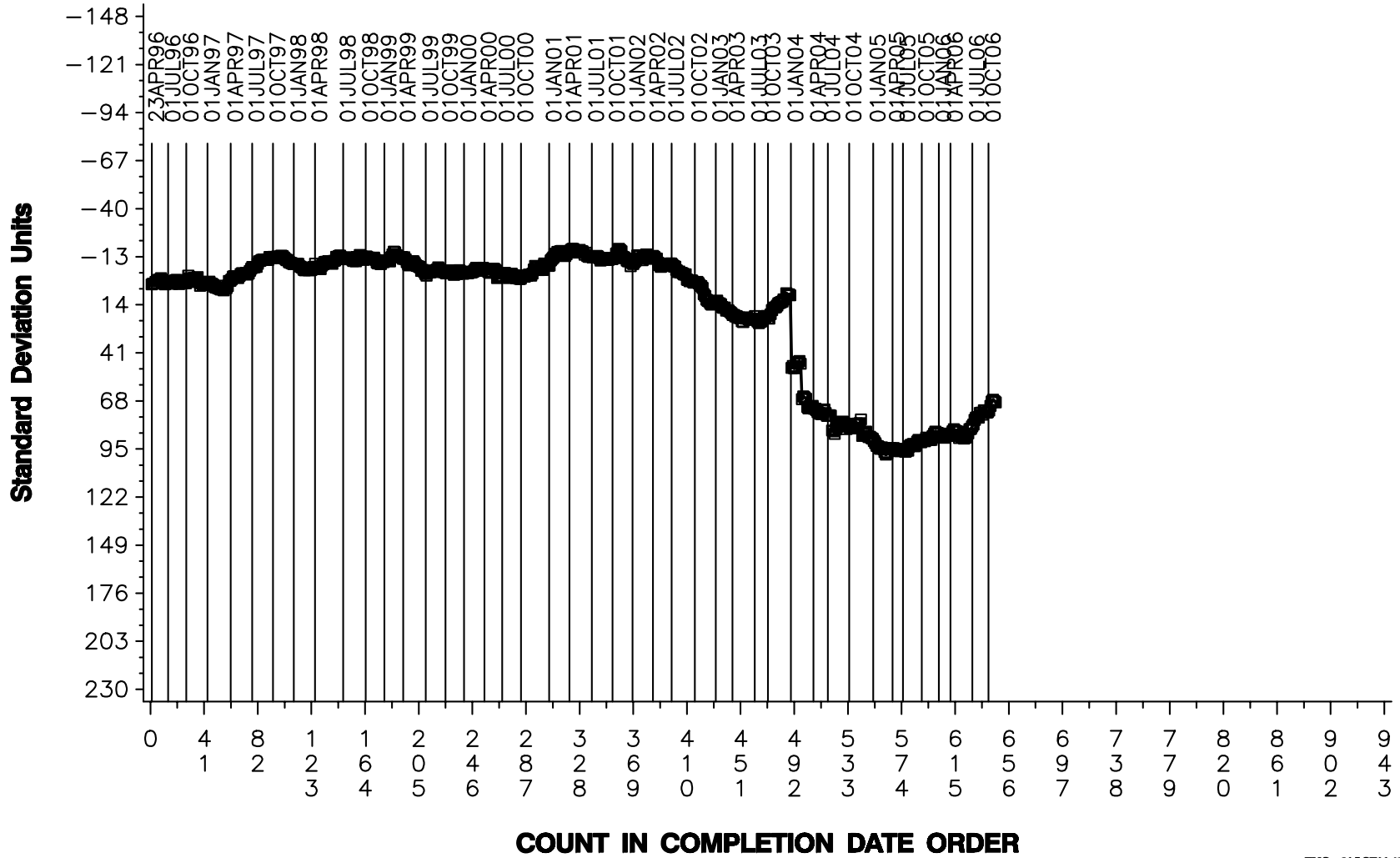
CUSUM Severity Analysis



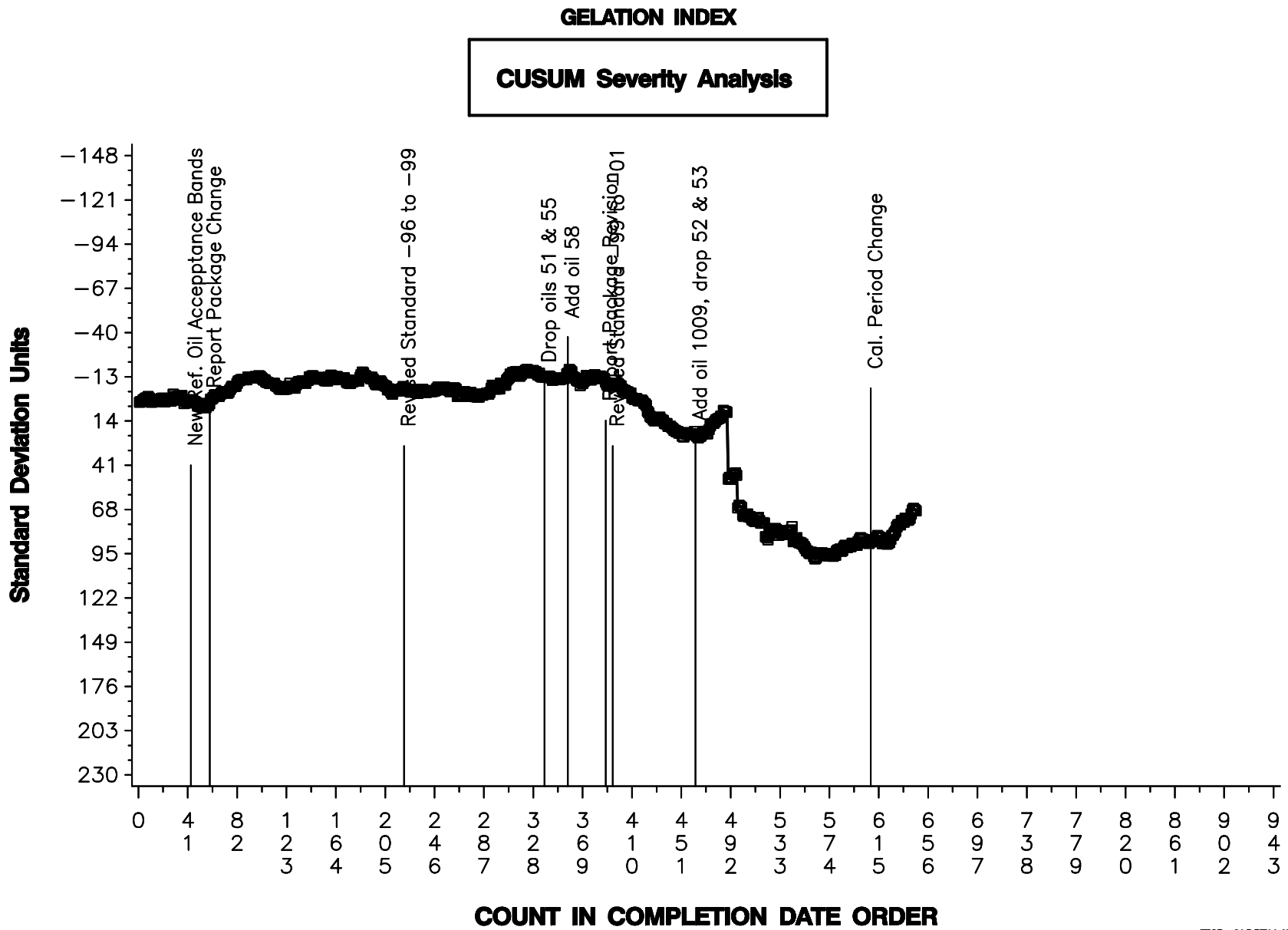
D5133 GELATION INDEX INDUSTRY OPERATIONALLY VALID DATA

GELATION INDEX

CUSUM Severity Analysis

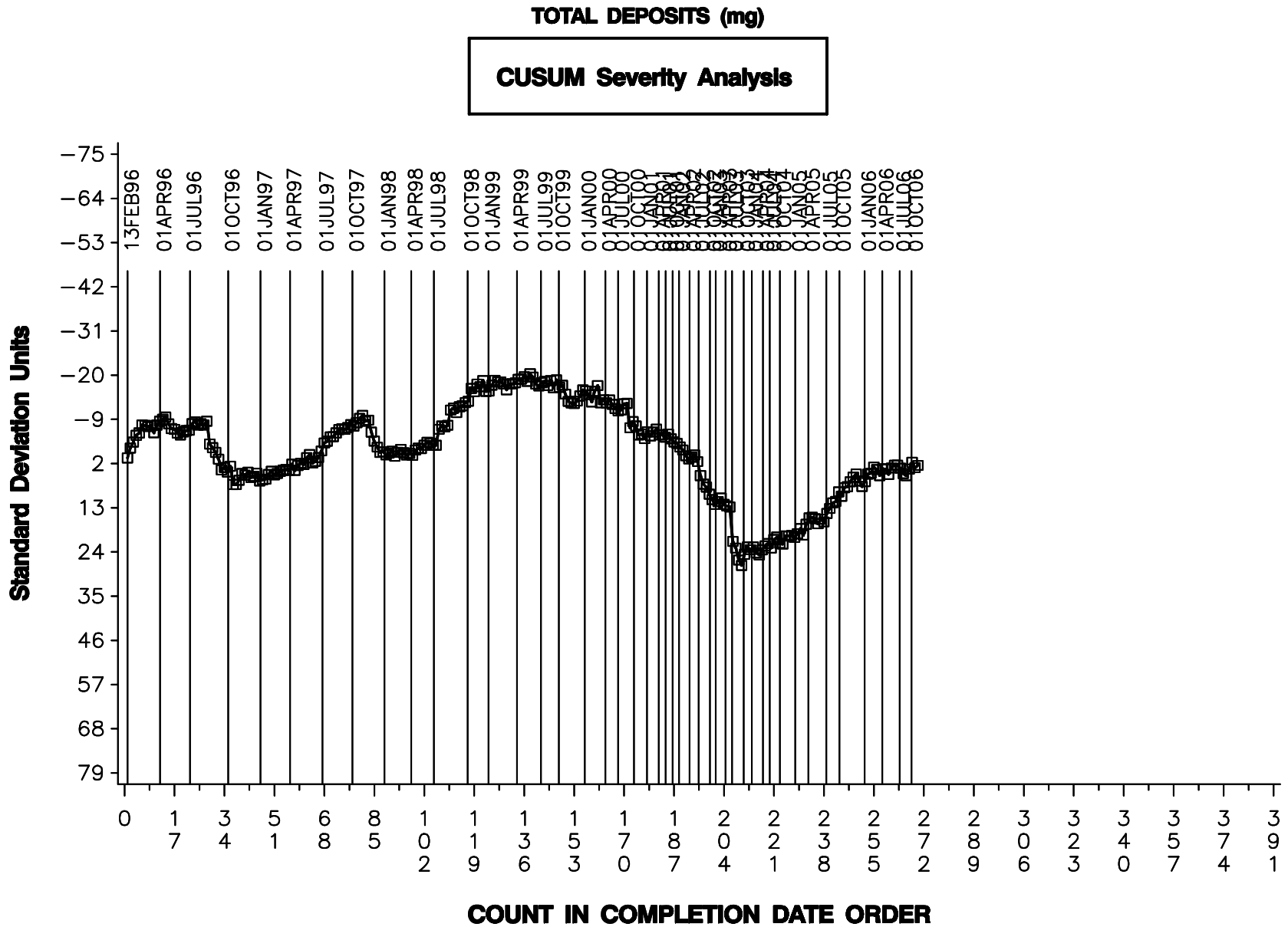


D5133 GELATION INDEX INDUSTRY OPERATIONALLY VALID DATA



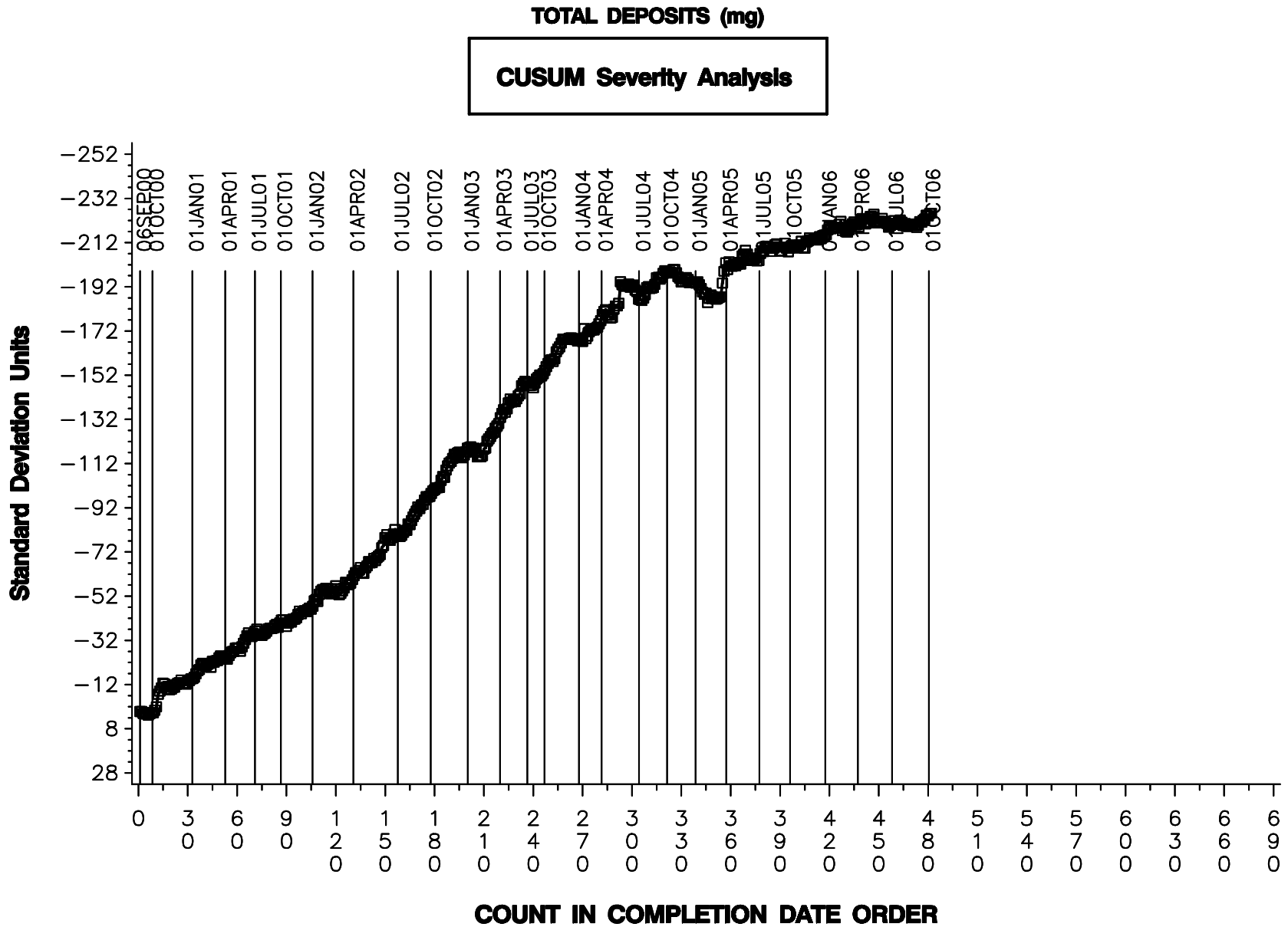
TEOST-33C INDUSTRY OPERATIONALLY VALID DATA

Figure 4



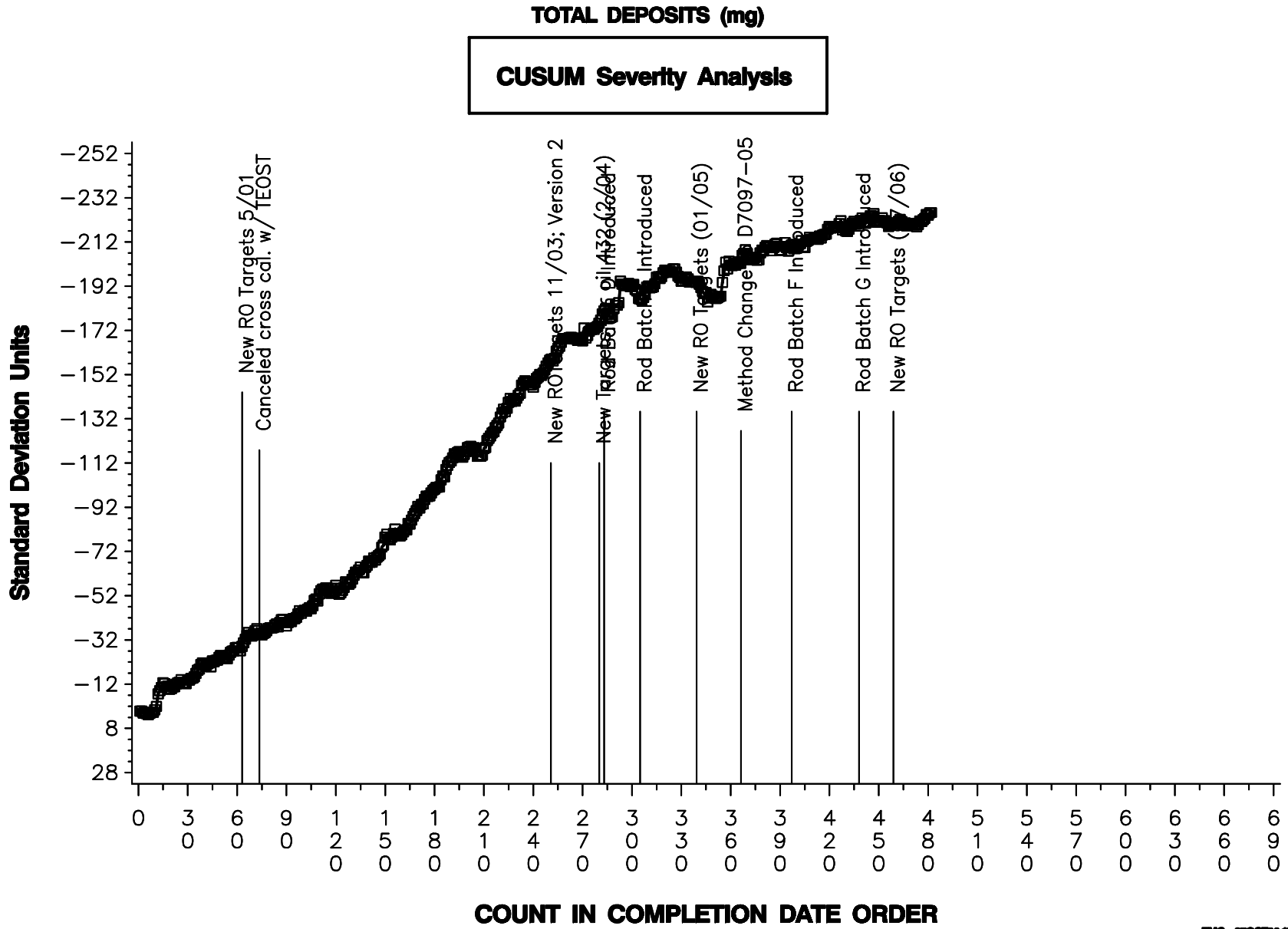
MHT-4 TEOST INDUSTRY OPERATIONALLY VALID DATA

Figure 5A



MHT-4 TEOST INDUSTRY OPERATIONALLY VALID DATA

Figure 5B

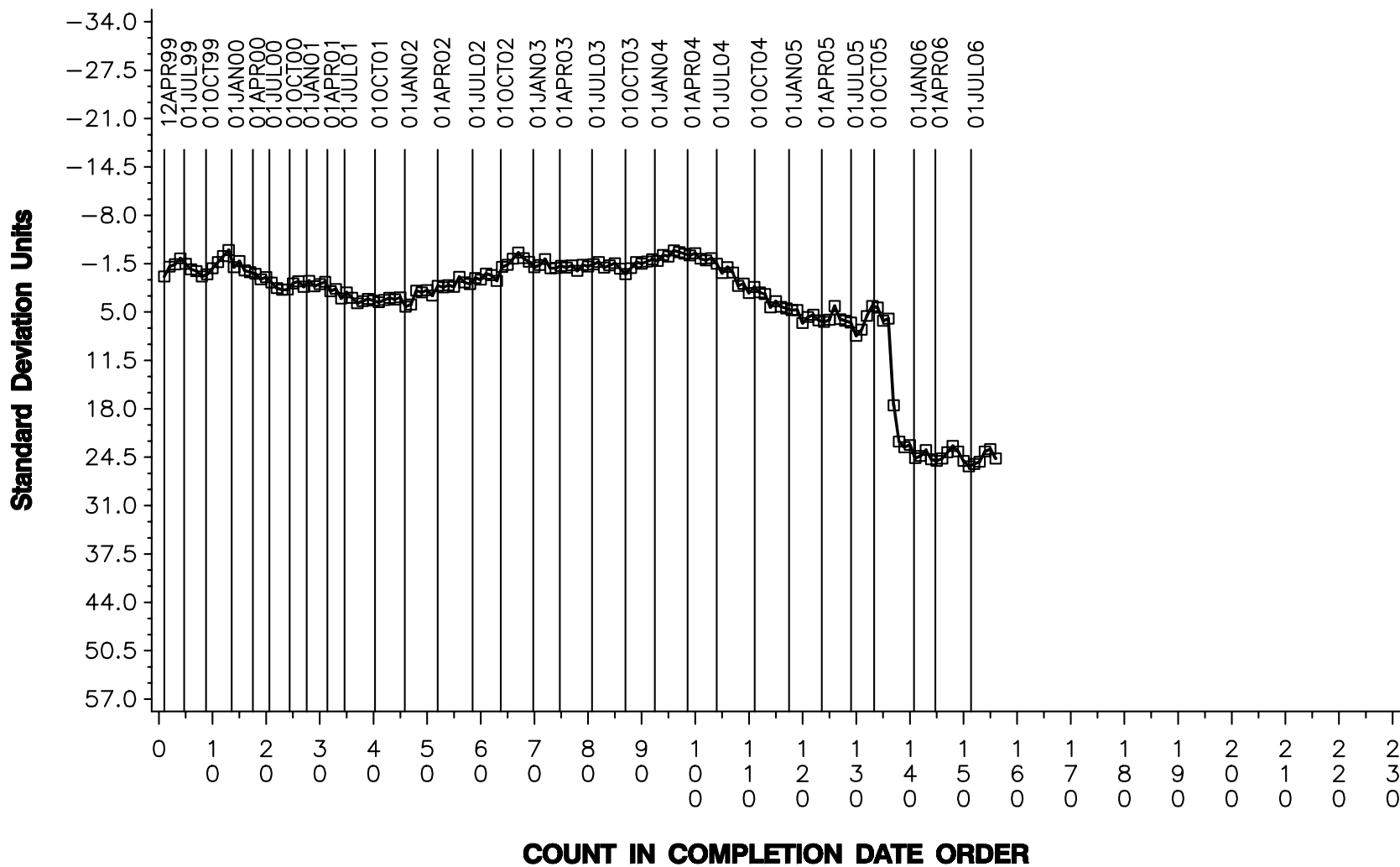


D6082 HIGH TEMPERATURE FOAM INDUSTRY OPERATIONALLY VALID DATA

IND=1007

FOAM TENDENCY, IMMEDIATELY BEFORE DISCONNECT STATI

CUSUM Severity Analysis



**TMC Monitored Bench Tests
Reference Oil Test Targets and Acceptance Bands**

Test	Oil Code	Parameter	n	Mean	sR	Acceptance Bands *	
						95%	
						Lower	Upper
D6417	52	area % volatility loss	18	6.97	0.31	6.4	7.6
	55	area % volatility loss	18	11.68	0.51	10.7	12.7
	58	area % volatility loss	18	5.61	0.30	5.0	6.2
D5800 New Targets 7/21/2003	52	mass % volatility loss	33	13.75	0.61	12.6	14.9
	55	mass % volatility loss	32	17.09	0.76	15.6	18.6
	58	mass % volatility loss	37	15.20	0.72	13.8	16.6
TEOST by D6335	71	Total Deposit wt. (mg)	27	51.79	4.79	42.4	61.2
	72	Total Deposit wt. (mg)	27	26.72	3.46	19.9	33.5
MTEOS by D7097 New Targets 20060731	74	Total Deposit wt. (mg)	30	12.85	5.59	1.9	23.8
	432	Total Deposit wt. (mg)	30	47.04	4.50	38.2	55.9
	434	Total Deposit wt. (mg)	30	27.37	6.57	14.5	40.2
GI by D5133 New Targets 7/15/2003	58	Gelation Index	17	5.8	0.69	4.4	7.2
	62	Gelation Index	35	17.0	3.90	9.4	24.6
	1009	Gelation Index	16	7.3	0.68	6.0	8.6
D6082 (HT FOAM)	1007	Tendency (ml)	28	66	19	29	103
	1007	Stability (ml)	28	0	0	0	0
D6082 (HT FOAM)	66 (DISCRIM)	Tendency (ml)	--	-----	-----	>100	-----
	66 (DISCRIM)	Stability (ml)	--	-----	-----	0	0

**TMC Monitored Bench Tests – Individual Reference Oil Statistics
(Operationally Valid Tests Only)**

Test	Oil Code	Parameter	Targets			4/1/05 - 9/30/05				10/1/05 - 3/31/06				4/1/06 - 9/30/06			
			n	Mean	sR	n	Mean	sR	Mean Δ/s	n	Mean	sR	Mean Δ/s	n	Mean	sR	Mean Δ/s
D6417	52	Area % Volatized	18	6.97	0.31	6	7.0	0.75	0.20	3	6.6	0.15	-1.30	5	7.1	0.27	0.29
	55	Area % Volatized	18	11.68	0.51	7	11.3	0.59	-0.77	2	11.7	0.14	0.04	3	11.6	0.21	-0.22
	58	Area % Volatized	18	5.61	0.30	4	5.6	0.35	0.13	6	5.5	0.27	-0.42	4	5.9	0.68	0.88
D5800 **	52	% volatility loss	33	13.75	0.61	10	13.9	0.41	0.26	13	13.8	0.44	0.04	13	14.1	0.46	0.61
	55	% volatility loss	32	17.09	0.76	12	17.3	0.63	0.24	8	17.5	1.04	0.51	10	17.6	0.85	0.61
	58	% volatility loss	37	15.20	0.72	12	15.3	0.55	0.20	13	15.1	0.77	-0.18	12	15.5	0.55	0.42
TEOST (D6335)	71	Deposit wt. (mg)	27	51.79	4.79	5	45.5	3.87	-1.30	10	48.2	5.04	-0.75	4	51.5	6.46	-0.06
	72	Deposit wt. (mg)	27	26.72	3.46	6	25.8	4.33	-0.25	4	29.7	4.71	0.87	6	25.9	4.10	-0.23
MTEOS (D7097) ***	432	Deposit wt. (mg)	30	47.04	4.50	11	46.0	5.08	-0.23	10	45.9	4.39	-0.56	18	47.2	4.58	-0.05
	434	Deposit wt. (mg)	30	27.37	6.57	14	29.3	7.07	-0.24	15	25.7	9.10	-0.36	14	26.4	7.29	-0.17
	74	Deposit wt. (mg)	30	12.85	5.59	14	12.9	6.49	-0.07	15	12.9	4.79	0.04	11	12.4	6.23	-0.06
GI (D5133) ****	58	Gelation Index	17	5.8	0.69	5	6.0	0.66	0.35	8	6.0	0.66	0.29	9	6.1	1.07	0.42
	62	Gelation Index	35	17.0	3.90	10	17.8	4.97	0.21	6	13.3	5.96	-0.96	13	13.8	5.45	-0.82
	1009	Gelation Index	16	7.30	0.68	7	6.6	0.38	-1.07	8	7.3	0.39	-0.02	7	6.7	0.59	-0.95
D6082	1007	Tendency (ml)	28	65	19	10	62	25	-0.19	11	102	70	1.87	12	66	16	-0.01

**D5800 Targets Adjusted 10/2/00; new oils selected; new procedures approved; targets adjusted again 7/21/03

***MTEOS Targets Adjusted: 6/1/01 (matrix); 11/1/03 (SC9 RR2); 2/18/04 (add 432); 1/12/05 (add 434, drop 433 & 1006); 6/30/05 (Batch E ref. data); 6/31/06 (updated ref. data n=30)

****GI: Added oil 1009 and dropped oils 52 & 53 10/15/03; added oil 58 10/24/01; dropped oils 51 & 55 7/2/01