

**MEETING MINUTES OF  
D02.B0.07 ON BENCH TEST MONITORING  
December 9, 2019**

**Galerie 1**

**Marriott New Orleans, New Orleans, LA**

**1. CALL TO ORDER**

Dennis Gaal called meeting to order at 10:10 A.M. The ASTM Antitrust Statement and that electronic recording of ASTM meetings is prohibited was shown. Chair Gaal announced the unfortunate circumstances of secretary Hap Thompson to which Jessica Villarreal volunteered to collect meeting minutes for the surveillance panel.

**2. AGENDA**

The agenda was approved as posted.

**3. MEETING MINUTES**

The June 24, 2019 minutes were approved as posted on the D02 website.

**4. SURVILANCE PANEL REPORTS**

**A. Mike Burke with Elastomers EOEC and LDEOC (ASTM D7216)**

**EOEC**

- Total of 321 tests that were accepted for calibration.
- Six total failed calibration tests for this period.
- No invalidated or lost EOEC tests were reported this period.
- Reference oil 1006-2 is nearly depleted and a re-blend is not possible. A round robin has been completed with SL107 as a potential replacement reference oil. A teleconference will be held on December 19<sup>th</sup> to evaluate the round robin results on SL107 with the potential that the SP will be able to approve limits for SL107.

**LDEOC**

- 370 tests were accepted for calibration.
- 5 failed calibrations tests, 4 for silicone and 1 for polyacrylate.
- There were 5 aborted calibration tests due to power failure.
- Polyacrylate and Ethylene Acrylate (AEM1) severity parameters are overall trending mild.

-Reference oil 1006-2 is nearly depleted and a re-blend is not possible. A round robin has been completed with SL107 as a potential replacement reference oil. A teleconference will be held on December 19<sup>th</sup> to evaluate the round robin results on SL107 with the potential that the SP will be able to approve limits for SL107.

*(Refer to EOEC-LDEOC Surveillance Panel Report for additional information)*

**B. Amy Ross with Volatility (ASTM D6417 & D5800)**

**D6417**

- There were 19 acceptable calibration tests this period.
- Fail rate of operationally valid tests was 0%.
- Precision (Pooled s) is more precise than prior period, found to be more precise than target precision.
- Performance (Mean  $\Delta/s$ ) is 0.10 s severe (on-target).
- CUSUM plot shows overall slight severe performance with leveling to nearly on target performance this reporting period.

**D5800**

- There were 147 tests that were accepted for calibration.
- Fail rate of operationally valid tests was 10%.
- Precision is less precise than the target LTMS pooled precision of 0.73 mass %, but comparable to the prior report period.
- Performance is 0.65 s severe.
- Two tests exceeded 3 s from targets.
- CUSUM plot shows a continuing (and increasing) overall severe trend with reference testing.
- Surveillance Panel activities:
  - Panel voted to add a statement to the LTMS guidelines which defines the procedure for applying both a severity adjustment and a translation factor to Noack results (Procedure A/C to B/D, or vice-versa); statement will be included in 02/07/2020 LTMS document update.
  - Correction requested for placement of reference to TMC calibration requirements within Appendix X4 of revised D5800 standard; completed by Greg Miller.
  - Upon review of the results for the Noack calibration fluids, the stats team recommended a Natural Log transform being applied to the severity adjustment calculation. Adopting the Ln transform will improve the accuracy of the severity adjustment across the expected typical Noack range for candidate samples.

*(Refer to Volatility Surveillance Panel Report for additional information)*

**C. Jessica Villarreal with Ball Rust Test (ASTM D6557)**

- 190 accepted calibrated runs.
- 6 invalidated runs from labs reasons being acid contamination, air flow failure, and acid pump malfunction.
- Precision is found to be slightly worse this period.
- CUSUM severity is showing stable and on target for this period.

- Pass rate of 90.5% versus previous period of 97.1%.  
*(Refer to BRT Surveillance Panel Report for additional information)*

**D. Mike Lopez with CBT and HTCBT (ASTM D5968 & D6594)**

**D5968**

- Over the course of this report period, both copper and lead performance continued on the existing mild trend.
- Precision has slightly improved for copper and improved for lead.
- Pooled s for this period is 2.13 for copper from 2.25 and 8.47 for lead from 12.03 from the first part of the year.
- Currently testing with Batch N coupons for D6594 and D5968.
- All Batch M coupons has been exhausted at TMC.
- 17 total runs were accepted for calibration for this period.
- 3 tests were rejected this period - 2 tests for mild copper concentration and 1 test for mild lead concentration.
- 2 labs are currently reporting for CBT.
- No information letters were sent out this period.

**D6594**

- Over the course of this report period, copper and lead severity was trending severe.
- Pooled s for this period is 0.36 for copper the same as last period and 10.00 for lead from 7.37 from the previous period.
- Two HTCBT Information Letters were issued this period. These information letters included standardization of test result calculation precision and reporting, as well as clarification of test result calculation precision and reporting.
- 248 tests were accepted for calibration.
- Invalid calibration tests were due to power failure, airflow control problems, and unapproved hardware.  
*(Refer to CBT-HTCBT Surveillance Panel Report for additional information)*

**E. Mike Faile with TEOST 33C and MHT-4 (ASTM D6335 & D7097)**

**D6335**

- Precision is less precise than prior period and less precise than target precision.
- Performance is 0.47 s severe.
- Fail rate of 23% is high again for the period.
- Four consecutive failing runs, ranging from 3 to 7 s severe, were reported on the same instrument (G1) following instrument conversion (two-test calibration sequences).
- Oil 75-1 (re-blend) was approved in April, 2019 to replace severe performing reference oil 75, which is depleted at the TMC. The reference oil is still being assigned out of lab inventories until consumed.
- All tests this period report using Rod Batch M.

**D7097**

- 102 test were accepted for calibration this period.
  - Precision is less precise than the prior report period and less precise than target precision.
  - Performance is -0.30 s mild.
  - Fail rate of operationally valid test was 6%.
  - Five operationally invalid calibration test reported this period, 3 of the tests were due to test sample leak, and 2 tests had air flow interruption during testing.
  - Overall severity of catalyst batch 18AB (n=199) appears to be about -0.3 s mild, and comparably mild on both reference oils.
  - All operationally valid calibration tests this period report using Catalyst Batch 16DA (n=11) or 18AB (n=98).
  - All operationally valid tests this period report using Rod Batch M.
  - 8 industry information runs to evaluate proposed replacement oil 434-3 (AG).
  - 14 industry information runs to screen new catalyst batch 19BA (AG, OG).
- (Refer to TEOST-MTEOS Surveillance Panel Report for additional information)*

**F. Justin Mills with ROBO (ASTM D7528)**

- Currently there are 5 labs and 17 calibrated test stands for ROBO.
  - 80 tests were accepted for calibration this period.
    - Fail Rate of Operationally Valid Tests: 16% (up from 15% as reported last period)
  - Total of 7 invalid runs, 3 tests were invalidated due to NO<sub>2</sub> flow issues, 2 due to stirrer failures, 1 test exceeding the testing time frame, and 1 improper sample preparation.
  - Precision is slightly improved since last semester; however, still less precise than target.
  - Initial results for TMC 434-3 reviewed (only 6 available) and determined to be suitable replacement for 434-2. SP agreed more data was needed for final assessment and limit setting.
  - CUSUM Severity Plot shows a continued mild trend for the test.
  - SP agreed that results using dilute NO<sub>2</sub> and concentrated NO<sub>2</sub> were comparable – next step will be to update method/procedure to include dilute NO<sub>2</sub> as an approved alternative.
  - Final limits for 438-2 were set.
- (Refer to ROBO Surveillance Panel Report for additional information)*

**G. Young-Li McFarland with EOFT and EOWTT (ASTM D6795 & D6794)****D6795**

- 160 tests were accepted for calibration this period
- There was a fail rate of 3.6% of operationally valid test.
- Performance is slightly mild for this period.
- Precision, by pooled standard deviation, has improved to 5.56 from 6.73 (last period).
- Test is currently in maintenance mode.

**D6794**

- There was a total of 958 tests that were accepted for calibration.
- The fail rate improved to 0.82% of operational valid tests for this period.
- Performance was severe for all treat rates.

- Precision is slightly better than previous periods, but comparable to historical values.
- Teleconference in March approved updates to method with Info Letter 19-1 issued April 1, 2019, became D6794-19.

*(Refer to EOFT EOWTT Surveillance Panel Report for additional information)*

#### **H. Matt Schlaff with High Temp FOAM (ASTM D6082)**

- 14 total tests were accepted for calibration.
- Foam Tendency Precision is comparable to the prior report period and more precise than target precision.
- Performance is on target (slight mild bias).
- No non-zero occurrences of Foam Stability.
- All six severe oil discrimination runs (on TMC oil 66) demonstrated acceptable discrimination.
- Replacement oil FOAMB18 was introduced this period.

*(Refer to High Temp FOAM Surveillance Panel Report for additional information)*

#### **I. Matt Schlaff with Sulfated Ash (ASTM D874)**

- Total of 8 accepted calibrated runs for this period.
- Zero failed calibrated tests.
- Precision is comparable to prior periods, found more precise than target precision.
- Performance is -0.18 s mild.
- Test in maintenance mode.
- Open Action items: Approve Calibration Requirements to LTMS document. Anticipated completion by spring of 2020.

*(Refer to Sulfated Ash Surveillance Panel Report for additional information)*

#### **J. Matt Schlaff with Scanning Brookfield (ASTM D5133)**

- 43 tests were accepted for calibration this period.
- Fail rate of 9% for operationally valid tests.
- Four tests (all different heads) at two labs invalidated in post-test review after failing TMC calibration due to discovery of bad heads requiring service.
- Performance is -0.25 s mild.
- Precision (Pooled s) is more precise than target precision.
- New version of method released: D5133-19.
- Teleconference planned for early 2020 to adopt head base calibration system and discuss EWMA vs Shewhart system.

*(Refer to Scanning Brookfield Surveillance Panel Report for additional information)*

## **5. OLD BUSINESS**

Mike Burke provided a presentation for WK59475 on ASTM D3525. The presentation listed the labs that participated in the ILS as well as the repeatability and reproducibility calculated from this work.

A proposal to ballot these changes concurrently in the subcommittee and main was discussed and will be proposed to D02.B0.

## **6. NEW BUSINESS**

Review is needed on D3524. It is expected that the same group which completed work on D3525 will progress updates on D3524, but reapproval of D3524 may need to be done due to timing. This will be discussed further at the June, 2020 meeting.

## **7. NEXT MEETING**

The next meeting will be held on Monday, June 29th, 2020 at the Washington Marriott Wardman Park, Washington DC.

## **8. ADJOURNMENT**

The meeting was adjourned at 11:56 A.M.

Respectfully Submitted,

Jessica Villarreal



**ASTM D02.B07**

**ASTM D7216**

**ENGINE OIL ELASTOMER COMPATIBILITY (EOEC)  
&  
LIGHT DUTY ENGINE OIL COMPATIBILITY (LDEOC)**

New Orleans Marriott; New Orleans, LA

Mike Birke

Southwest Research Institute

Petroleum Products Research Department

# Surveillance Panel Membership

- Terry Bates, ASTM Facilitator
- Udo Boeker, ISP
- Jason Bowden, OHT
- Gail Evans, Lubrizol
- Joe Franklin, Intertek Automotive Research
- Adebayo Gbolarumi, Cummins
- Mike Birke, SWRI
- Tom Schofield, TMC
- Greg Lytle, Solray
- Vince Donndelinger, Lubrizol
- Greg Miiller - Savant
- Kimberly Gutierrez , Intertek Automotive Research
- Andrew Ritchie, Infineum
- Man Hon Tsang , Chevron
- Gary Svidron, Navistar
- Gefei Wu, Ashland



# Current Business (EOEC)

		Fluoroelast.	Nitrile	Polyacrylate	Silicone	VAMAC	Total
Acceptable Calibration Test	AC	60	59	64	61	77	321
Failed Calibration Test	OC	1	0	1	2	2	6
Operationally Invalid, by lab	LC	0	0	0	0	0	0
Operationally Invalid, by TMC	RC	0	0	0	0	0	0
Aborted	XC	0	0	0	0	0	0
Donated – SL107	AG, OG	35	35	39	35	35	179
Total		96	94	104	98	114	506

# EOEC Lost Tests\*

Status	Cause	#
	No invalidated or lost EOEC tests reported this period.	0
Total		0

\*Invalid and aborted calibration tests

# EOEC Test Severity

## ▶ Fluoroelastomer (FKM)

Parameter	Period Mean D/s	Status
Volume Change	-0.07	On-target
Points Hardness Change	0.04	On-target
Tensile Strength Change	-0.03	On-target
Elongation Change	-0.83	Mild

# EOEC Test Severity

► Nitrile (NBR)

Parameter	Period Mean D/s	Status
Volume Change	1.97	Severe
Points Hardness Change	0.49	Severe
Tensile Strength Change	-0.78	Mild
Elongation Change	-0.11	Mild

# EOEC Test Severity

► Polyacrylate (ACM)

Parameter	Period Mean D/s	Status
Volume Change	2.11	Severe
Points Hardness Change	0.16	Severe
Tensile Strength Change	0.05	On-target
Elongation Change	0.84	Severe

# EOEC Test Severity

► Silicone (VMQ)

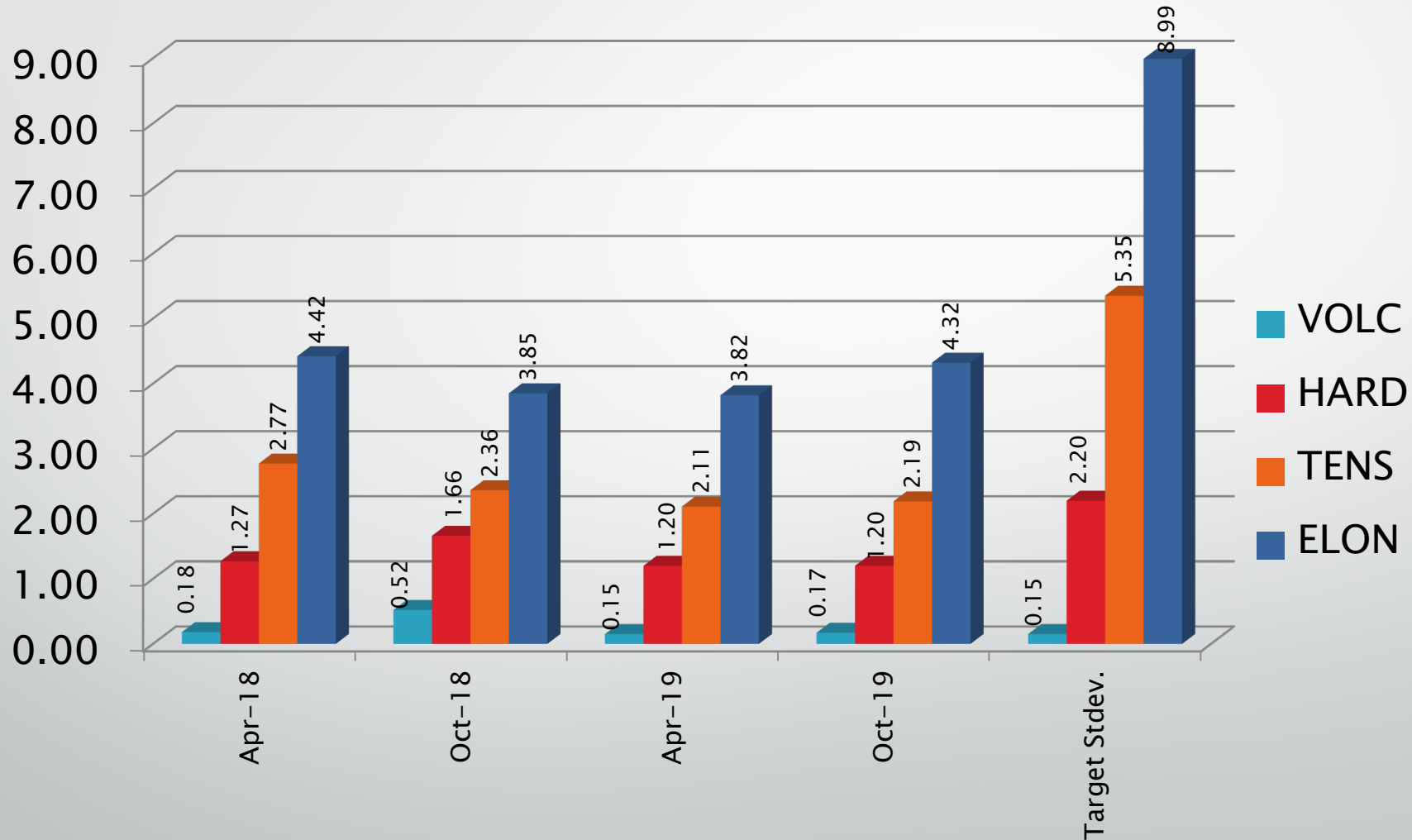
Parameter	Period Mean D/s	Status
Volume Change	0.84	Severe
Points Hardness Change	-0.56	Mild
Tensile Strength Change	-0.04	On-target
Elongation Change	-0.60	Mild

# EOEC Test Severity

► VAMAC (MAC)

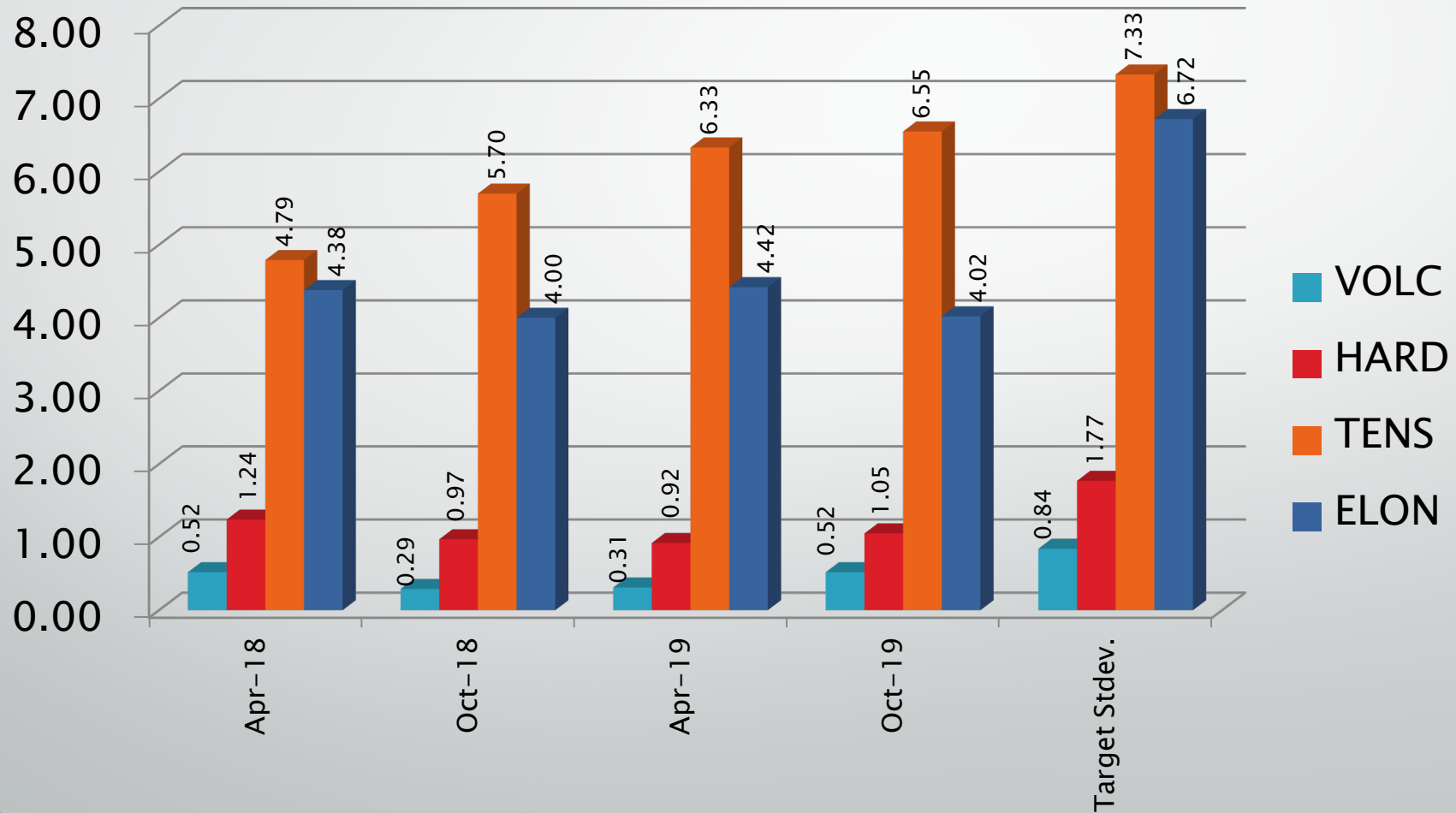
Parameter	Period Mean D/s	Status
Volume Change	0.44	Severe
Points Hardness Change	-1.61	Mild
Tensile Strength Change	-0.40	Mild
Elongation Change	-0.33	Mild

# EOEC Precision Estimates - Fluoroelastomer

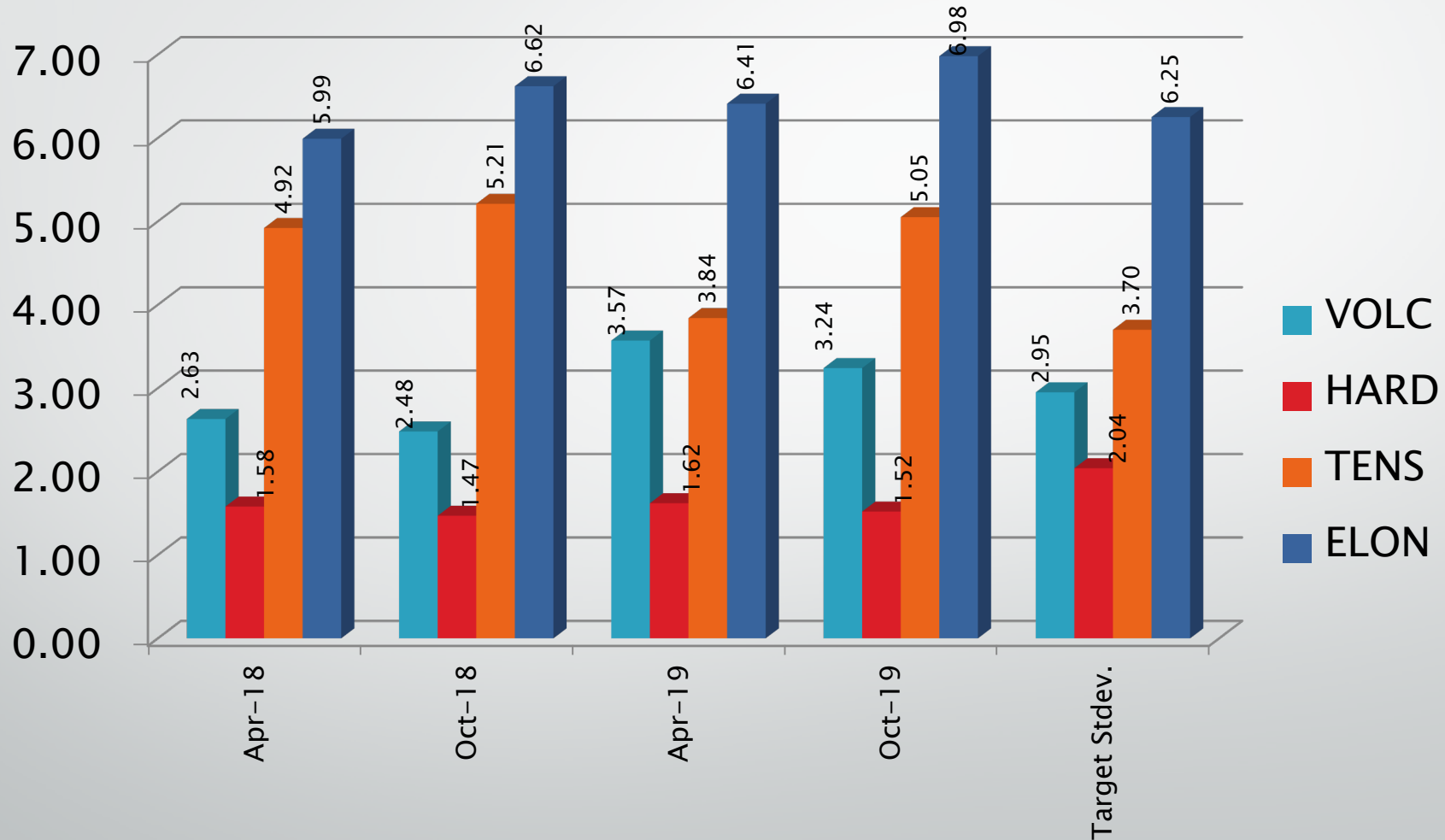




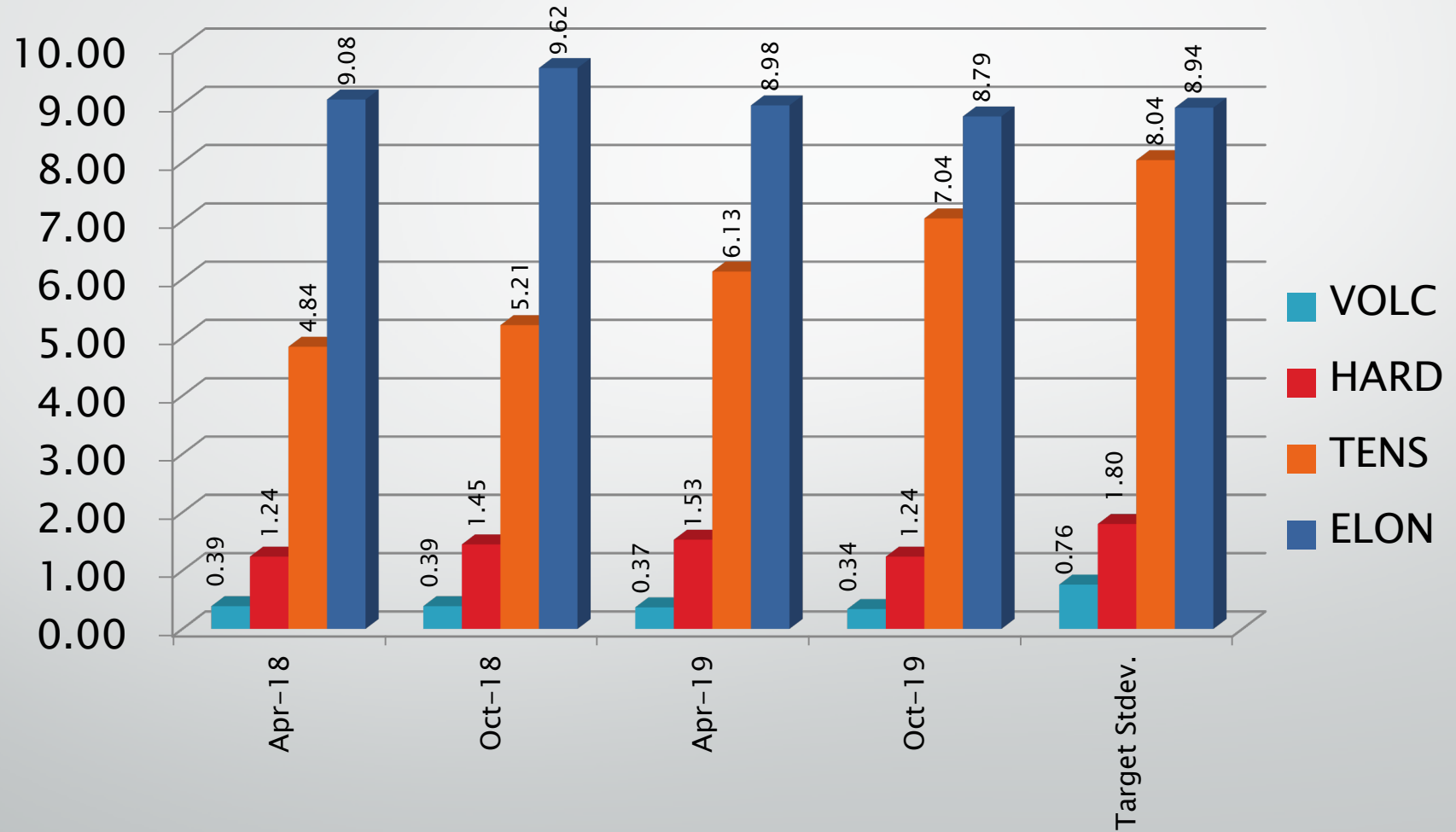
# EOEC Precision Estimates - Nitrile



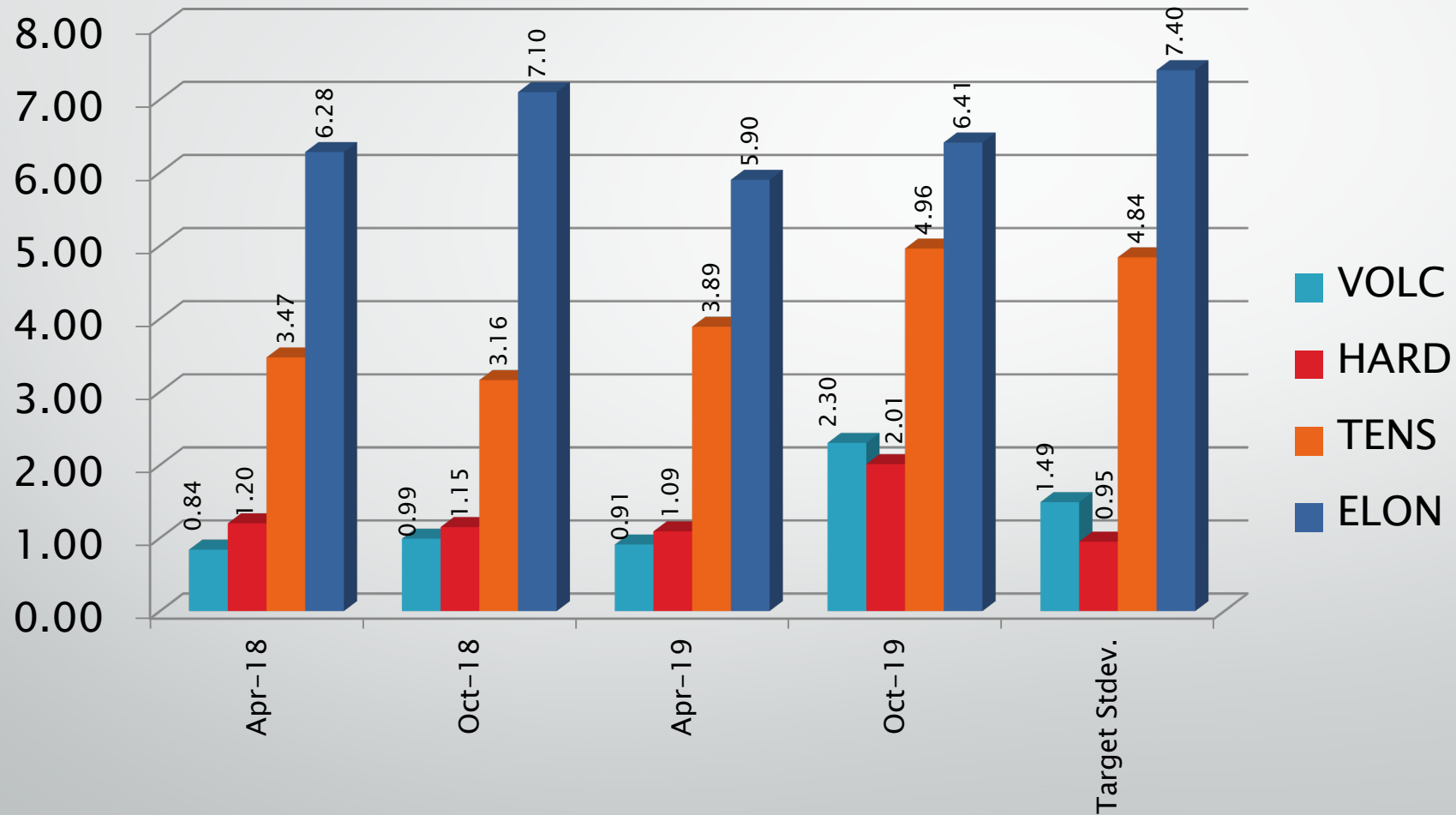
# EOEC Precision Estimates - Silicone



# EOEC Precision Estimates - Polyacrylate



# EOEC Precision Estimates - VAMAC



# Information Letters

Test	Date	IL	Topic
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# Reference Oil Inventory Estimated Life

Oil	TMC Inventory Gallons	Gallons Shipped Past 12 Months	Estimated Life
1006-2 <sup>A</sup>	55	456	< 3 Months
SL107 <sup>A, B</sup>	3759	108	5+ years

<sup>A</sup>TMC Inventory is used across several test methods

<sup>B</sup>1006 reblends are no longer available. SL107 is the replacement oil, targets pending approval.

# LDEOC Test Activity\*

Test Status		Ethylene Acrylate	Fluoroelast.	Nitrile	Polyacrylate	Silicone	Total
Acceptable Calibration Test	AC	68	72	77	75	78	370
Failed Calibration Test	OC	0	0	0	1	4	5
Operationally Invalid, by lab	LC	0	0	0	0	0	0
Operationally Invalid, by TMC	RC	0	0	0	0	0	0
Aborted	XC	1	1	1	1	1	5
Donated – SL107	AG, OG, XG	41	41	43	39	41	205
<b>Total</b>		<b>110</b>	<b>114</b>	<b>121</b>	<b>116</b>	<b>124</b>	<b>585</b>

\*April 1, 2019 – September 30, 2019

# LDEOC Lost Tests\*

Status	Cause	#
XC	Aborted Calibration, power failure	5
Total		5

\*Invalid and aborted calibration tests



# LDEOC Test Severity

- ▶ Ethylene Acrylate (AEM1)

Parameter	Period Mean D/s	Status
Volume Change	-0.31	Mild
Points Hardness Change	-1.03	Mild
Tensile Strength Change	-0.45	Mild

# LDEOC Test Severity

## ▶ Fluoroelastomer (FKM1)

Parameter	Period Mean D/s	Status
Volume Change	-0.53	Mild
Points Hardness Change	0.14	Severe
Tensile Strength Change	0.22	Severe

# LDEOC Test Severity

## ▶ Nitrile (NBR1)

Parameter	Period Mean D/s	Status
Volume Change	1.66	Severe
Points Hardness Change	-0.54	Mild
Tensile Strength Change	-0.83	Mild

# LDEOC Test Severity

## ▶ Polyacrylate (ACM1)

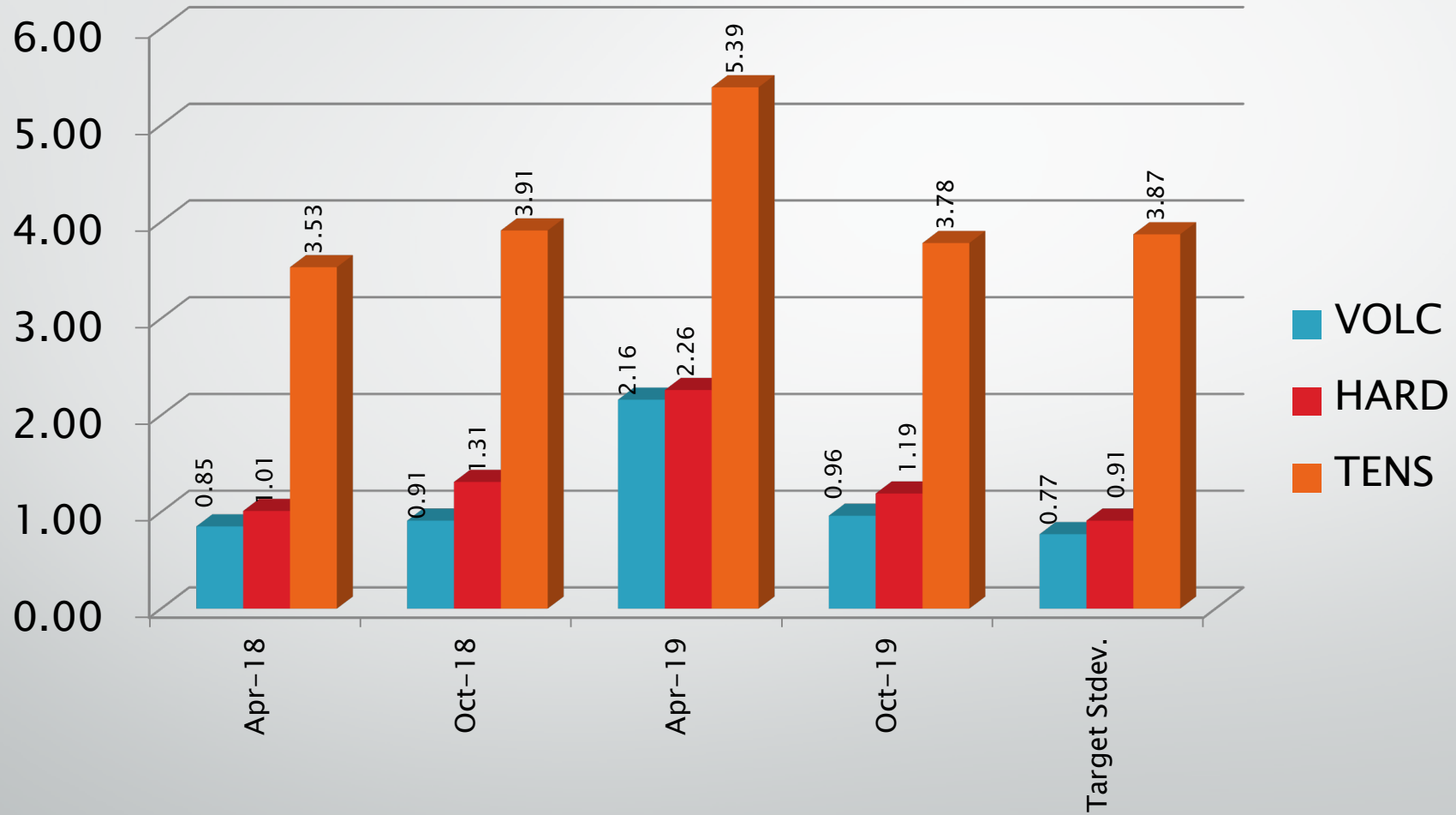
Parameter	Period Mean D/s	Status
Volume Change	-0.52	Mild
Points Hardness Change	-0.72	Mild
Tensile Strength Change	-0.53	Mild

# LDEOC Test Severity

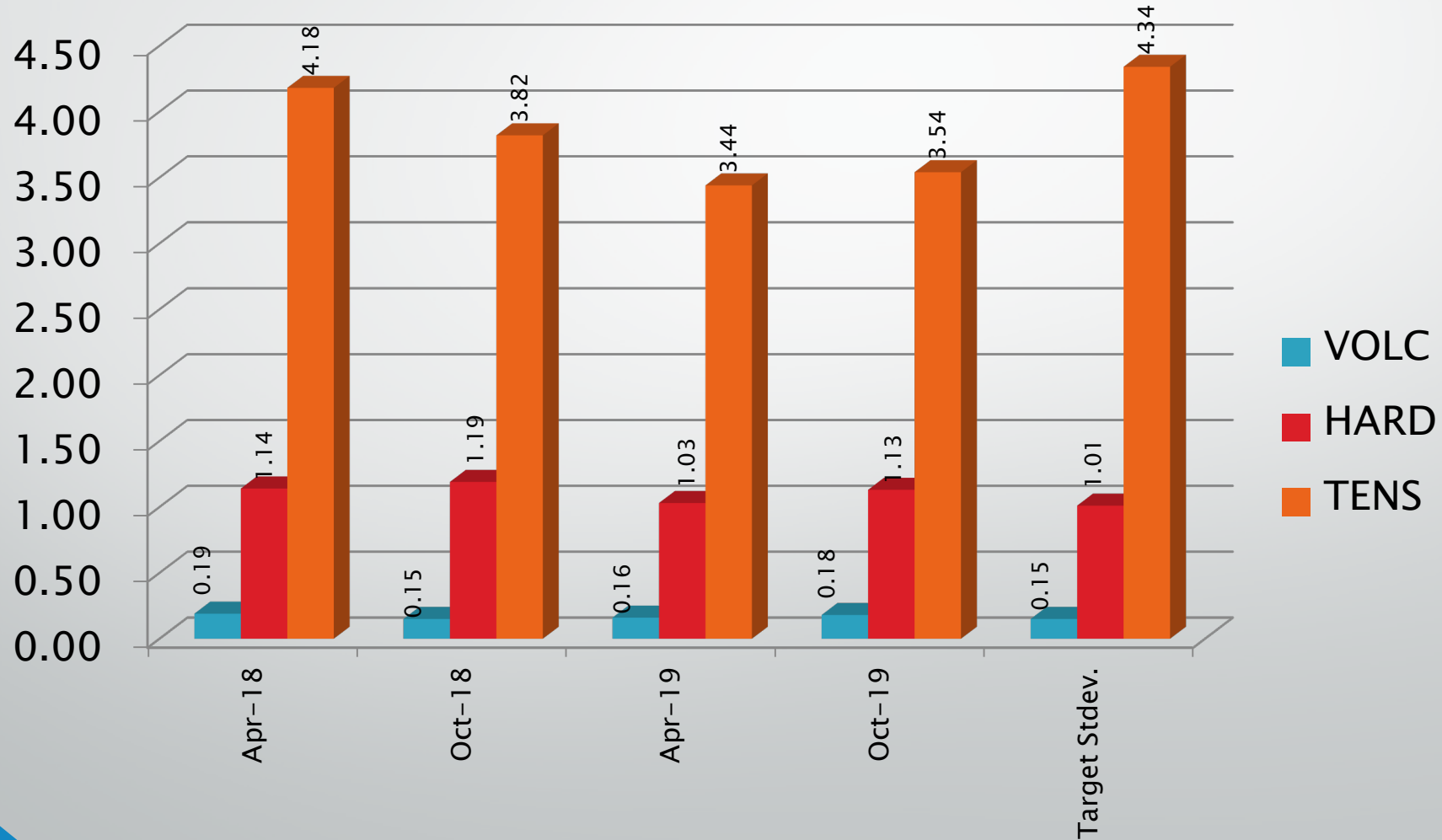
## ▶ Silicone (VMQ1)

Parameter	Period Mean D/s	Status
Volume Change	0.45	Severe
Points Hardness Change	-0.69	Mild
Tensile Strength Change	1.45	Severe

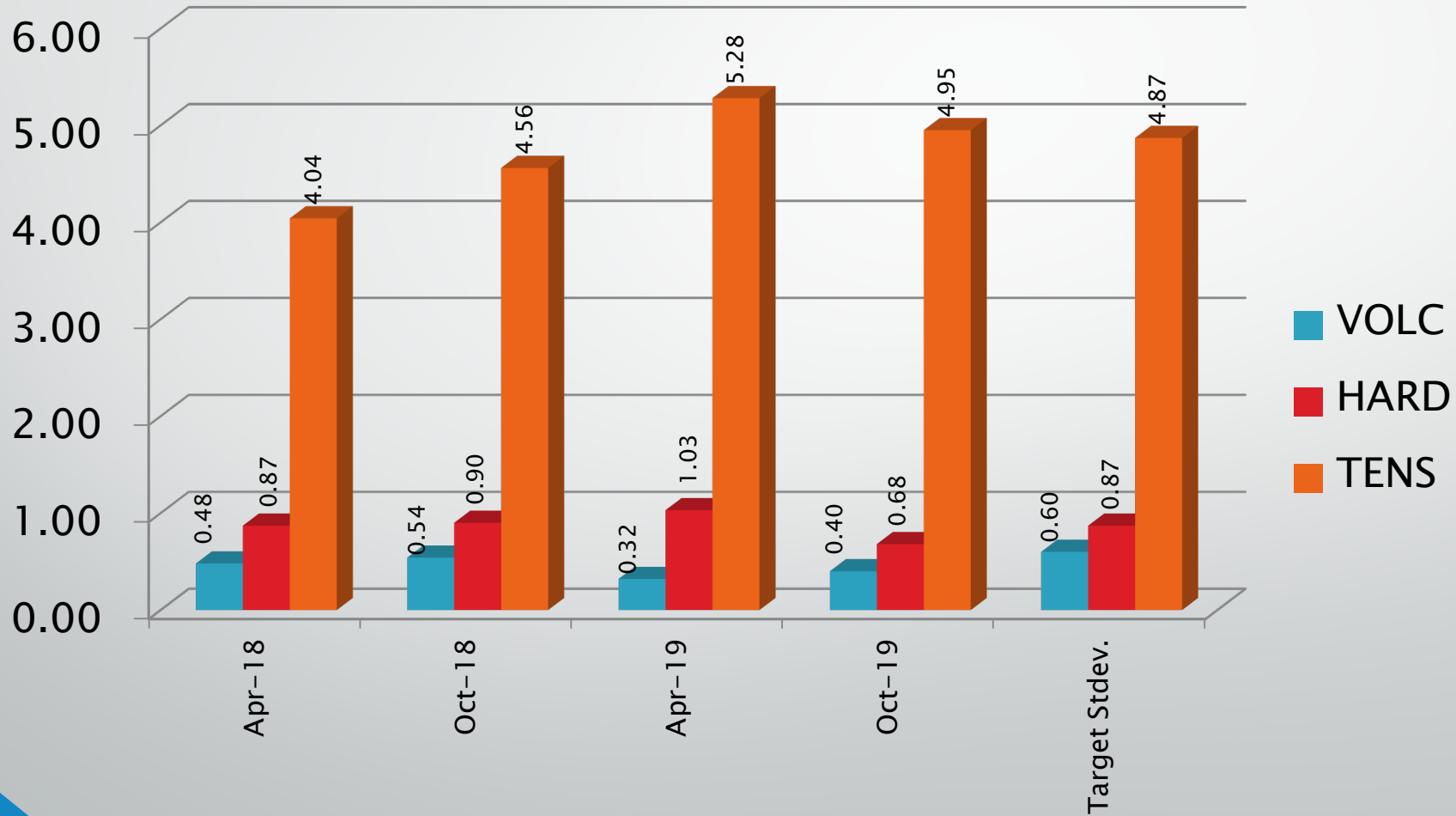
# LDEOC Precision Estimates – Ethylene Acrylate



# LDEOC Precision Estimates - Fluoroelastomer

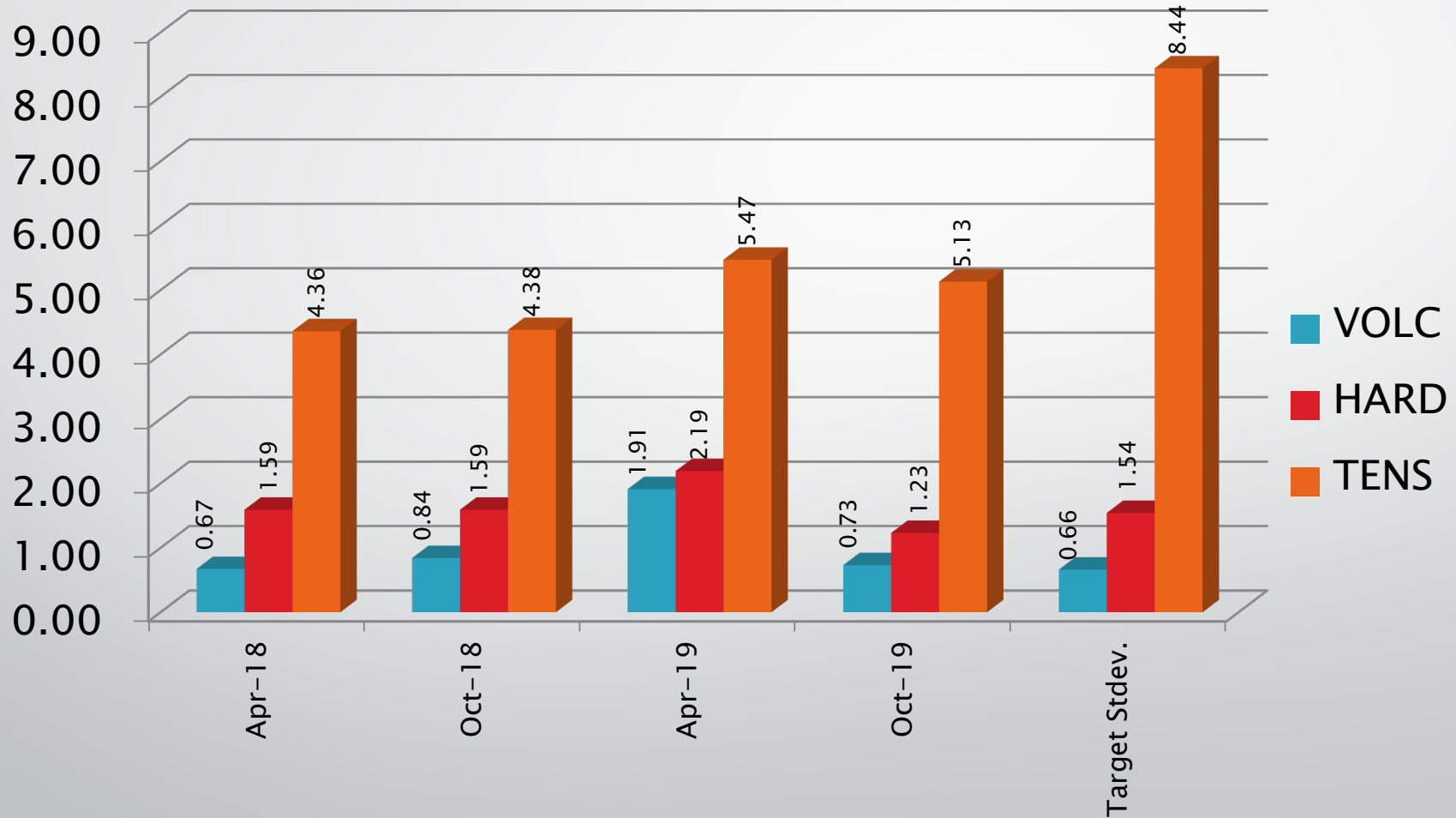


# LDEOC Precision Estimates - Nitrile

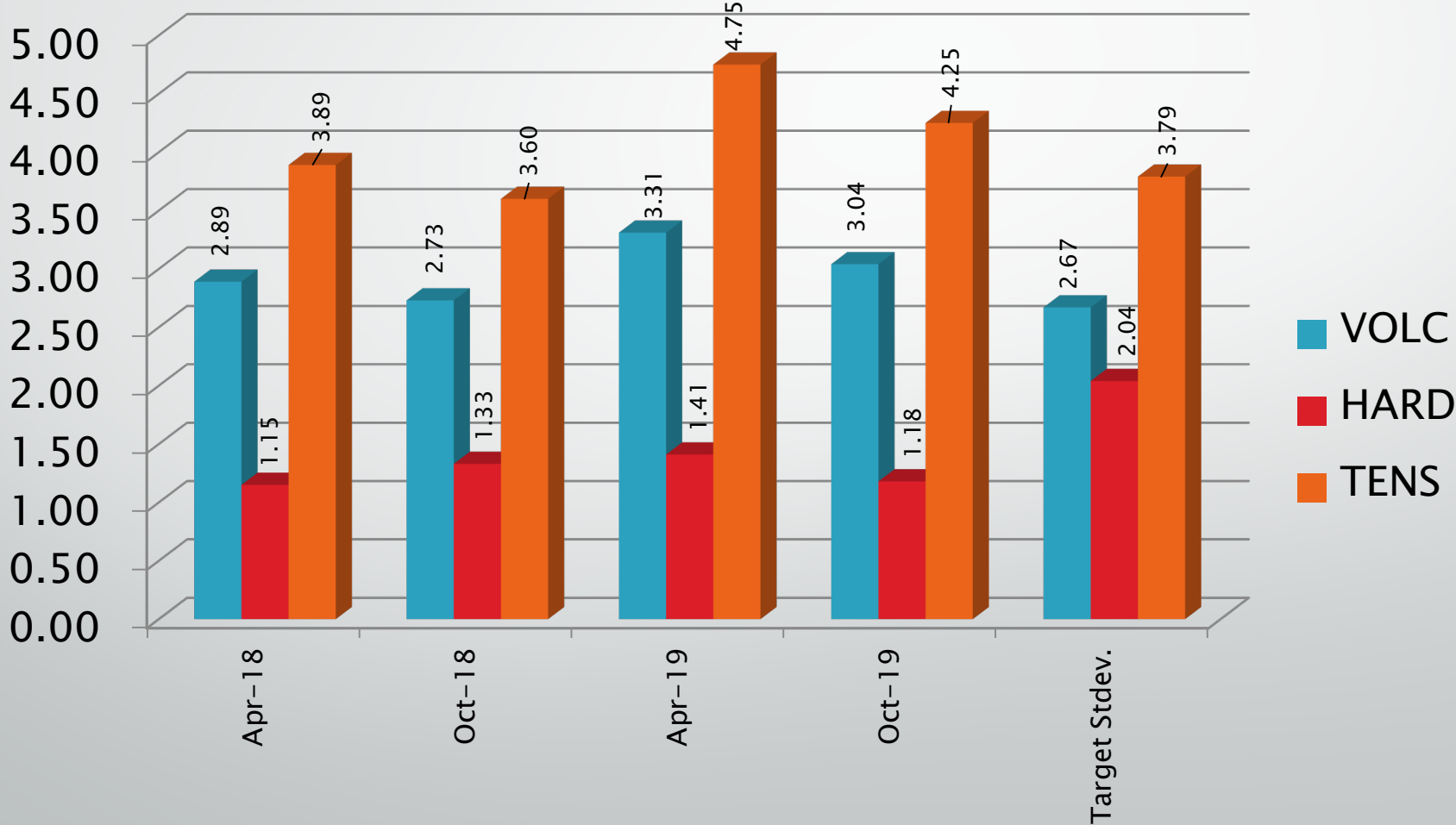




# LDEOC Precision Estimates - Polyacrylate



# LDOEC Precision Estimates - Silicone



# Information Letters

Test	Date	IL	Topic
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# Reference Oil Inventory Estimated Life

Oil	TMC Inventory Gallons	Gallons Shipped Past 12 Months	Estimated Life
1006-2 <sup>A</sup>	55	456	< 3 Months
SL107 <sup>A, B</sup>	3759	108	5+ years

<sup>A</sup>TMC Inventory is used across several test methods

<sup>B</sup>1006 reblends are no longer available. SL107 is the replacement oil, targets pending approval.

# Miscellaneous Information

- Available on TMC Website:
  - Oil Assignment Request and Test File Upload
  - Live Reference Test Data Bases
  - Surveillance Panel Meeting Minutes
- [www.astmtmc.cmu.edu](http://www.astmtmc.cmu.edu)



# B07 Volatility Surveillance Panel Update

ASTM 09 December 2019

Amy Ross

# Members List (Updated 11/12/2019)

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# Volatility Surveillance Panel Updates

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- On 09/25/2019, the panel voted to add a statement to the LTMS guidelines which defines the procedure when applying a severity adjustment and a translation factor to Noack results (Procedure A/C to B/D, or vise-versa); statement will be included in 02/07/2020 LTMS document update
- Correction requested for placement of reference to TMC calibration requirements within Appendix X4 of revised D5800 standard; completed by Greg Miller
- Request submitted for Stats team annual review of Noack calibration fluids
  - Calibration interval to remain at 30 days
  - QC data retention within LTMS database for 2 years
  - SD of calibration oils (next slide)
  - Will continue to evaluate annually



# Volatility Surveillance Panel Updates

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- Natural Log transform approval

- Upon review of the pooled standard deviation of Noack calibration fluids, the stats team recommended the Natural Log transform of data sets; Adopting the Ln transform represents an improvement when applying severity adjustments to candidates across the range of likely candidate results
  - Severity adjustments will be issued in natural log units
  - Procedure: Convert result (% volatilized) to Ln units, apply SA, then convert back to original units (% volatilized); translation factors are to be applied to the severity-adjusted result, in original units
- Approved by panel 11/05/2019; to be implemented 02/07/2020
  - LTMS Guidelines Updates:
    - 1A Reference Oils and Critical Parameters – including reference to natural log transformed units; updating critical parameters table
    - 3 Transitioning Instruments to EWMA Monitoring Using Transformed Units – description of process to transition population to natural log units
    - 5 Mandatory Daily QC Check Sample and Data Submission – no transform to daily QC results
    - 6 Zi Level 1 – application of SA, translation factor application procedure, calibration interval



D6417

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## Estimation of Engine Oil Volatility by Capillary GC

## D6417 (Volatility by GC)

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- 7 labs, 9 stands calibrated (as of 09/30/2019)
- Precision (Pooled s) is more precise than prior period
  - More precise than target precision
- Performance (Mean  $\Delta/s$ ) is 0.10 s severe (on-target)
- CUSUM plot shows overall slight severe performance with leveling to nearly on-target this report period.

## D6417: Estimation of Engine Oil Volatility by Capillary GC

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Test Status	Validity Code	No. Tests
Acceptable Calibration Test	AC	19
Failed Calibration Test	OC	0
Operationally Invalidated by Lab	LC, XC	0
Operationally Invalidated After Initially Reported as Valid	RC	0
<b>Total</b>		<b>19</b>

Number of Labs Reporting Data: 8  
Fail Rate of Operationally Valid Tests: 0%

## D6417: Estimation of Engine Oil Volatility by Capillary GC

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Statistically Unacceptable Tests (OC)	No. Of Tests
Volatility Loss Mild	0
Volatility Loss Severe	0

- There were no operationally invalidated D6417 tests reported this period.
- Calibration requirement updates are issued as LTMS document updates

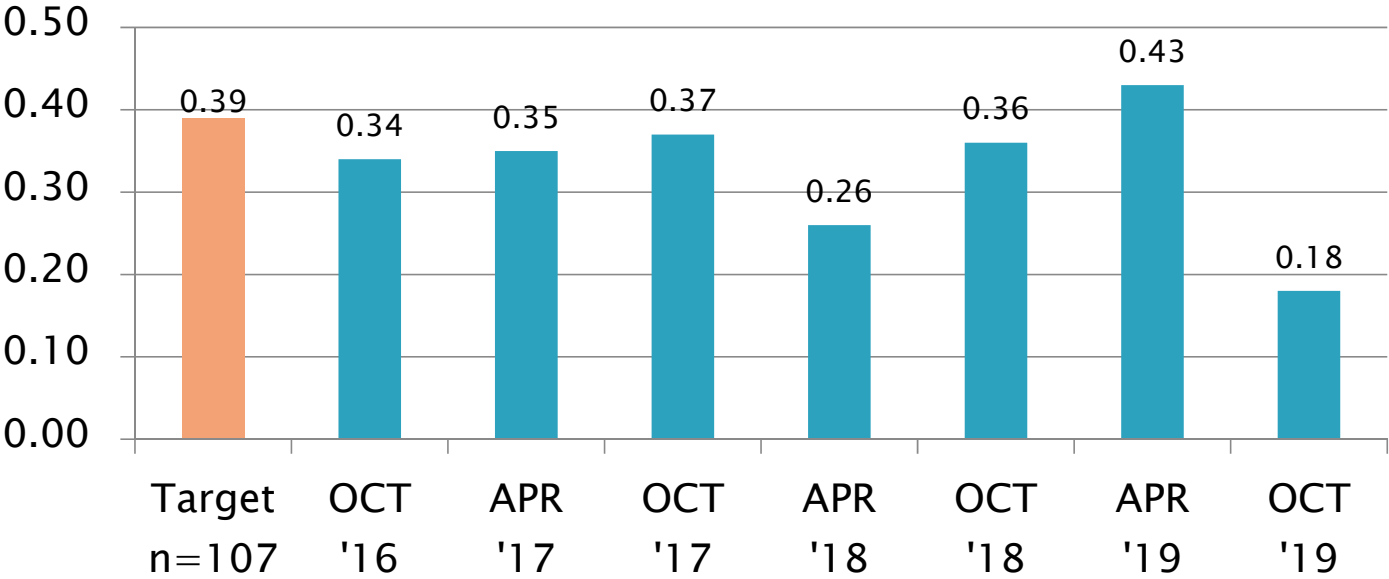
## D6417: Estimation of Engine Oil Volatility by Capillary GC

Period Precision and Severity Estimates

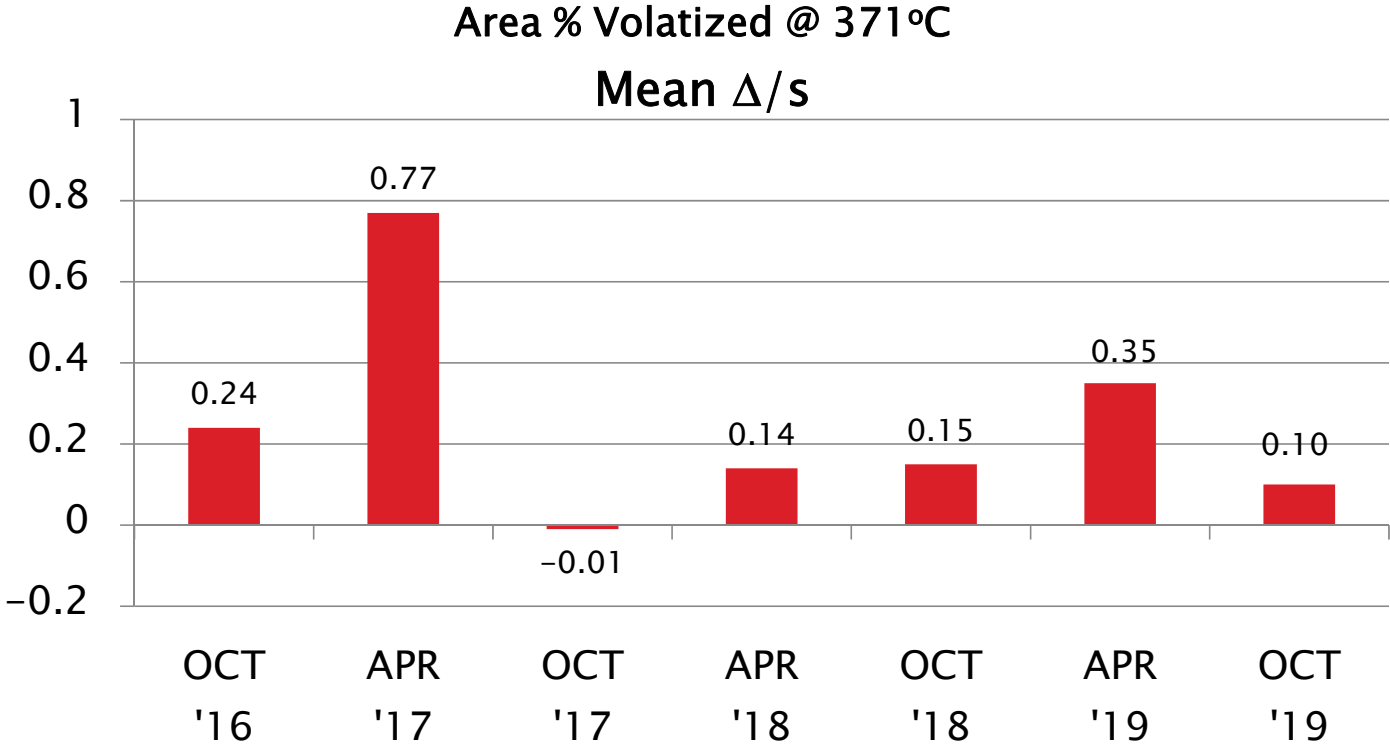
Area % Volatized @ 371°C	n	df	Pooled s	Mean Δ/s
Initial Selected Oils from RR	54	51	0.39	-----
4/1/16 through 9/30/16	11	8	0.34	0.24
10/1/16 through 3/31/17	13	10	0.35	0.77
4/1/17 through 9/30/17	15	12	0.37	-0.01
10/1/17 through 3/31/18	15	12	0.26	0.14
4/1/18 through 9/30/18	16	13	0.36	0.15
10/1/18 through 3/31/19	19	16	0.43	0.35
4/1/19 through 9/30/19	19	16	0.18	0.10

# D6417 Precision Estimates

Area % Volatized @ 371°C  
Pooled s

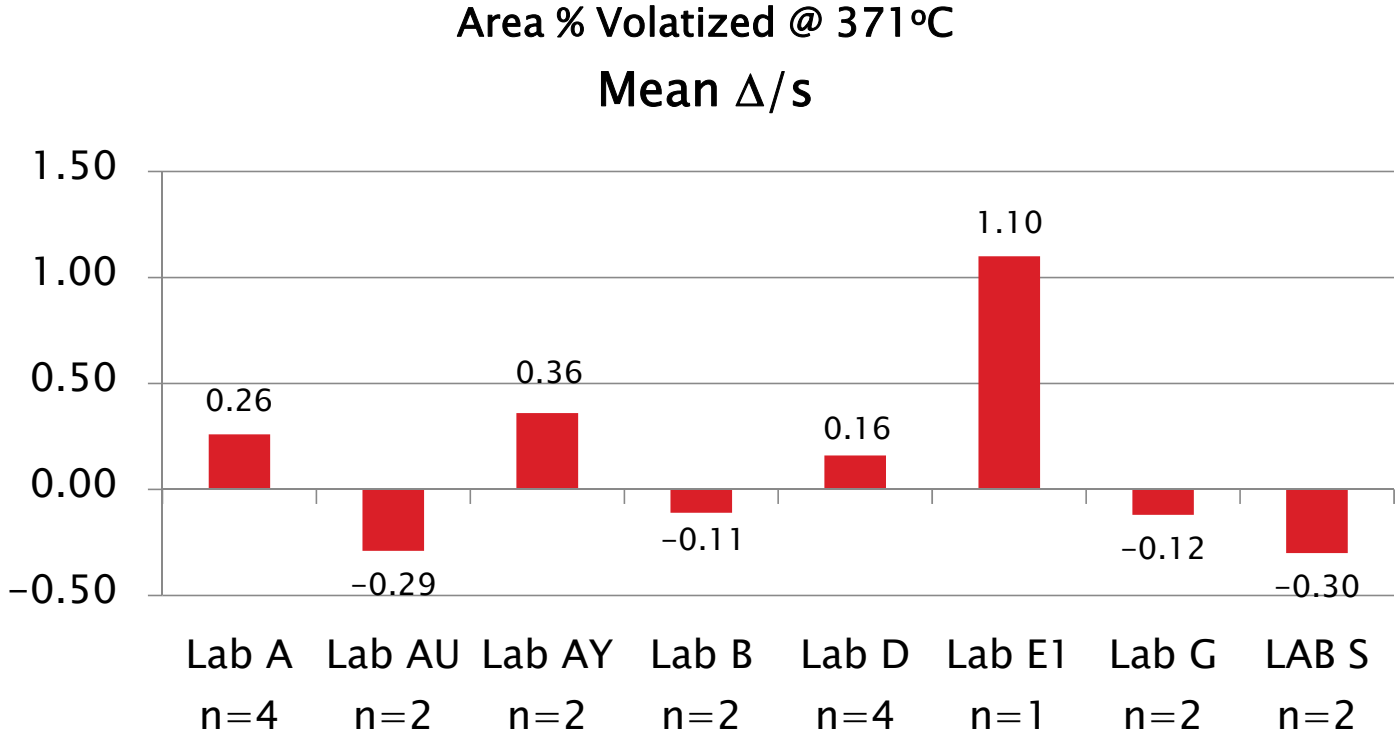


# D6417 Severity Estimates





# D6417 Lab Severity Estimates

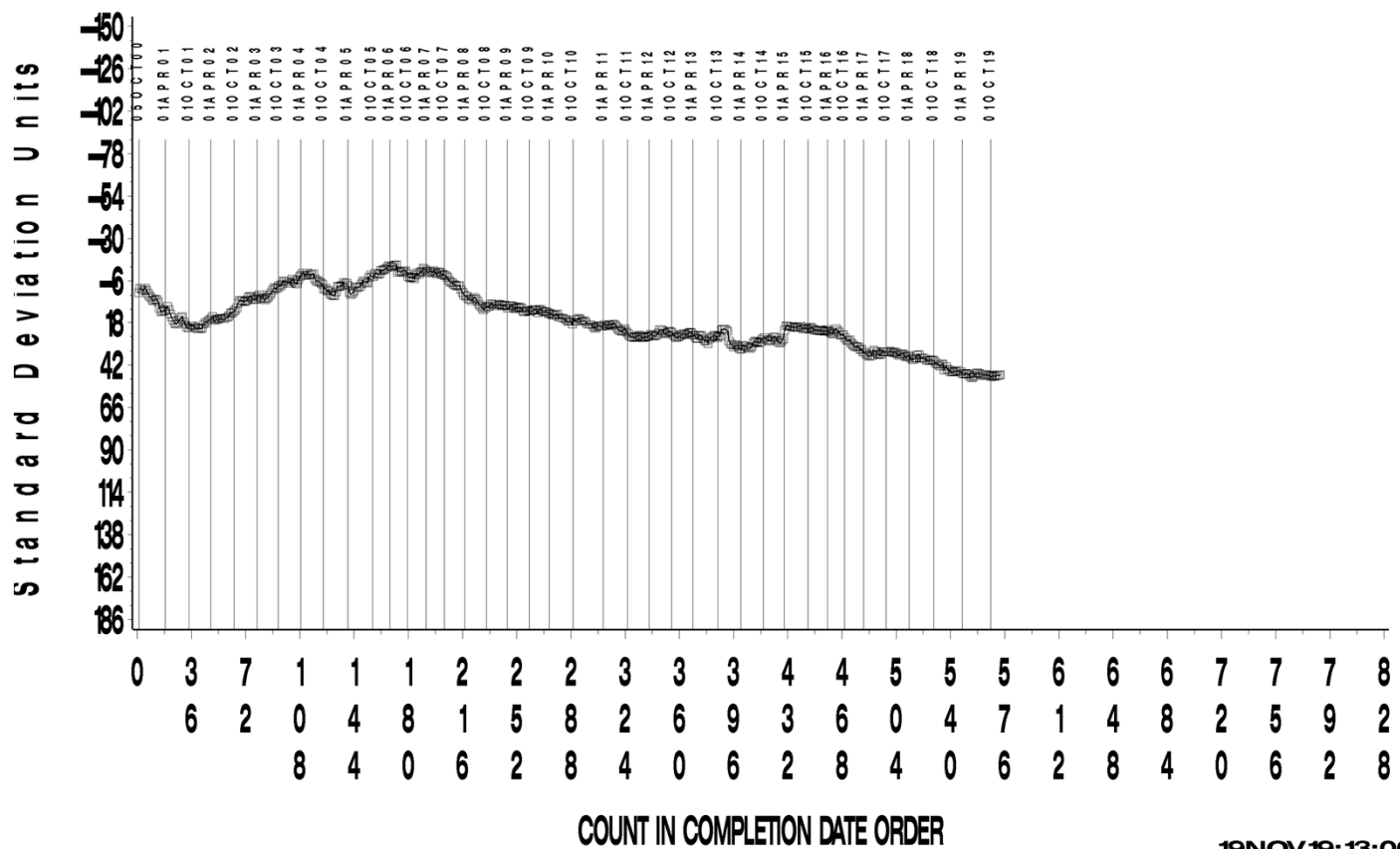


D6417 VOLATILITY BY GC INDUSTRY OPERATIONALLY VALID



SAMPLE AREA % VOLATIZED

CUSUM Severity Analysis

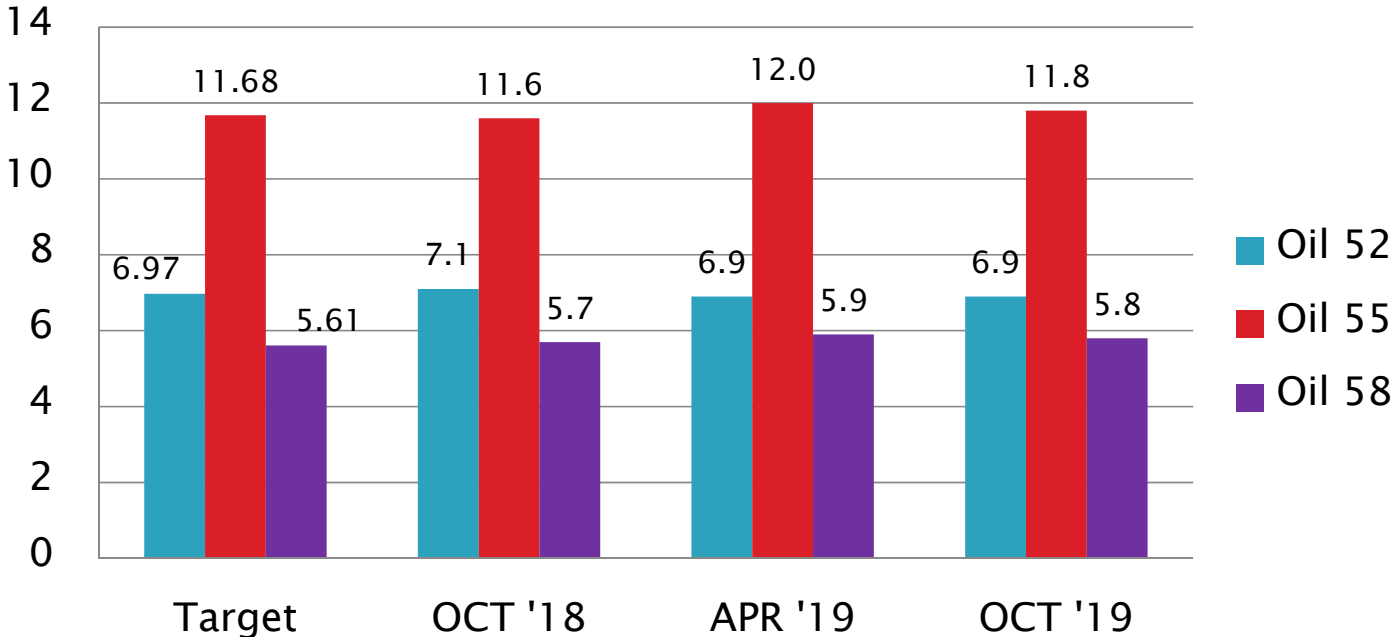


19NOV19: 13:00

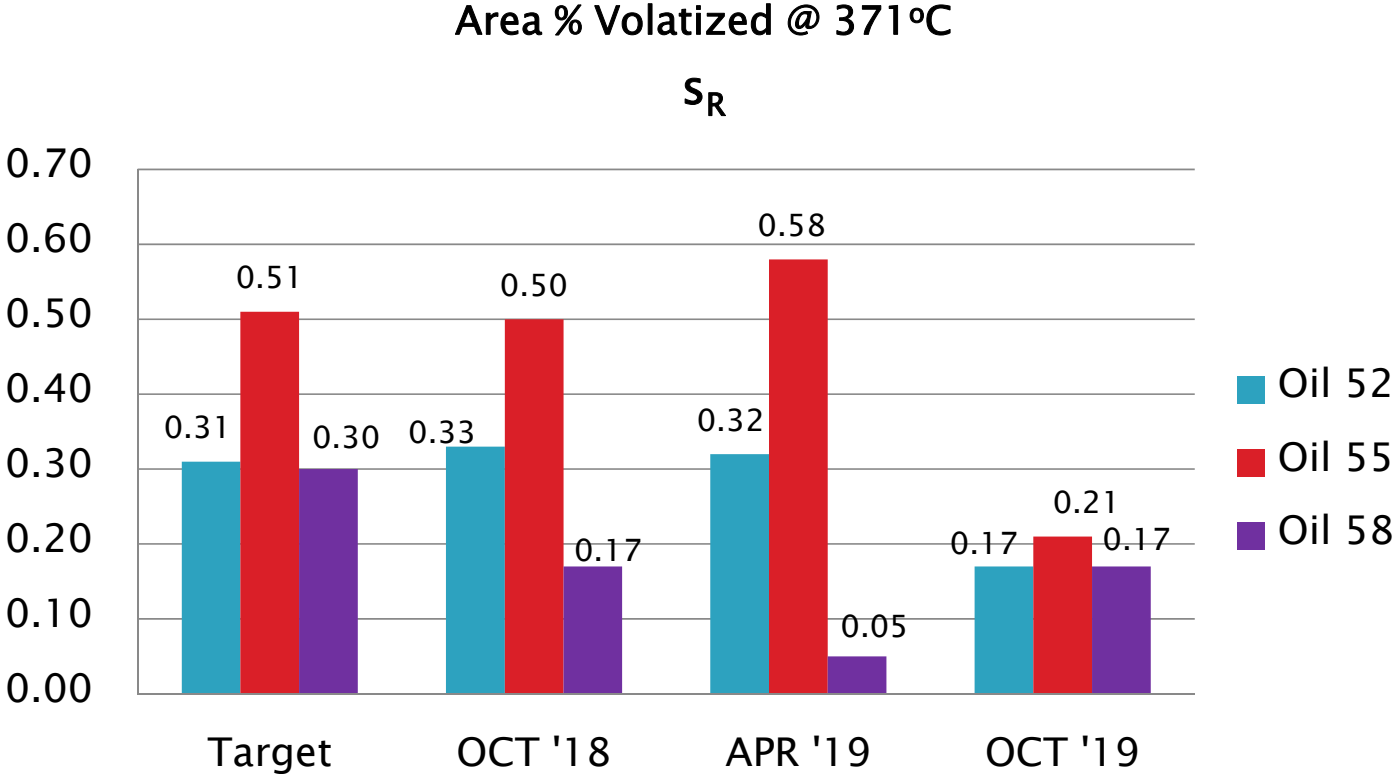


# D6417 Performance by Oil

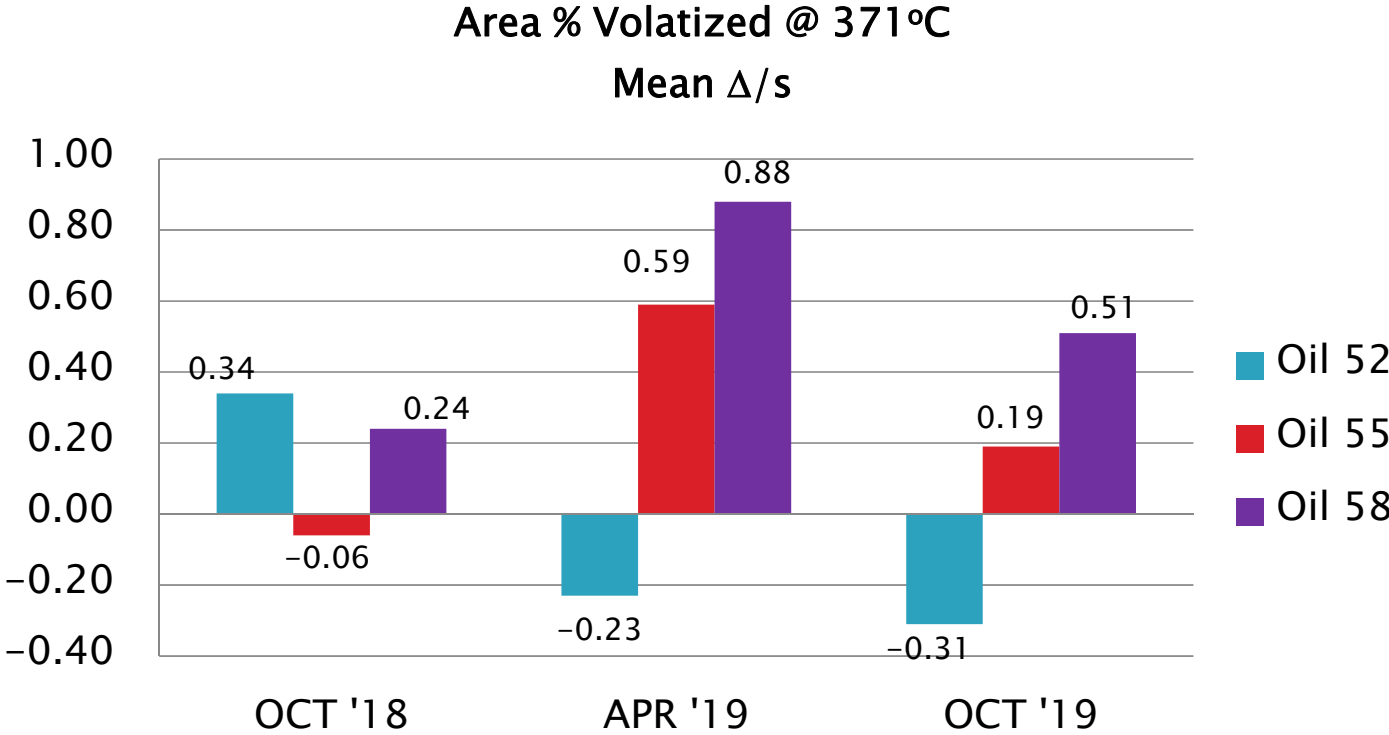
## Area % Volatized @ 371°C Mean



# D6417 Performance by Oil



# D6417 Performance by Oil



# Reference Oil Inventory

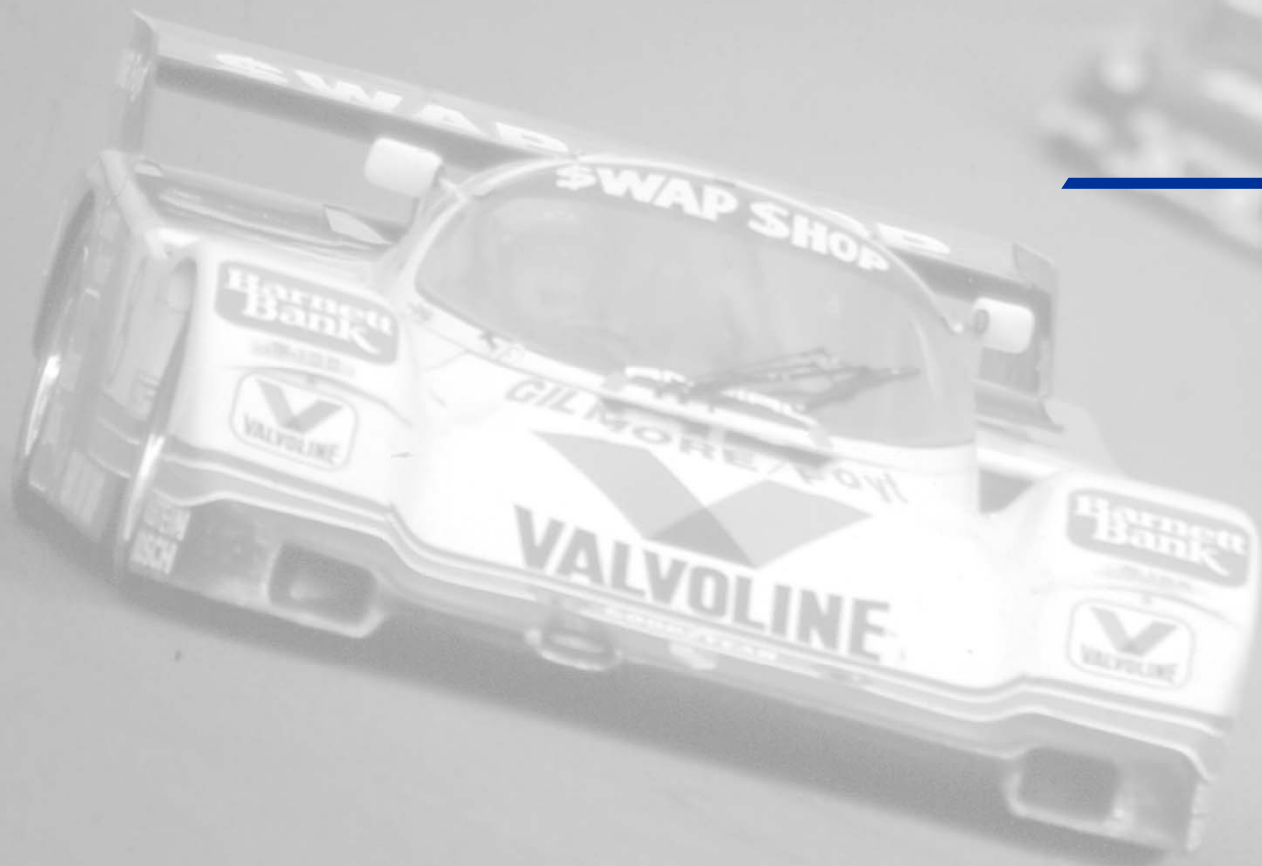
## D6417, GI

Oil	Year Rec'd By TMC <sup>A</sup>	Tests	TMC Inventory, gallons	Gallons Shipped last 12 months
52	1995	D6417	59.5	0.01
55	1995	D6417	66.0	0.01
58 <sup>B</sup>	1998	D6417, GI	115.3	0.2
62 <sup>C</sup>	1996	GI	0.3	0.1
GIA17 <sup>C</sup>	2017	GI	9.8	0.1
1009	2002	GI	37.8	0.2

<sup>A</sup> The integrity of TMC reference oils is confirmed annually by analytical QC testing of chemical and physical properties.

<sup>B</sup> 58 is also used as D6417 QC Check Oil

<sup>C</sup> GIA17 is approved to replace oil 62



D5800

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Evaporation Loss of  
Lubricating Oil by Noack  
Method

## D5800 (Volatility by Noack)

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- 9 labs, 22 stands calibrated (as of 09/30/2019)
- Precision (Pooled s) is less precise than the target LTMS pooled precision of 0.73 mass %, but comparable to the prior report period.
- Performance (Mean  $\Delta/s$ ) is 0.65 s severe.
- Two tests exceeded 3 s from targets (rig G6 +3.5 s; rig J5 +4.2 s)
- Fail rate of operationally valid tests (AC & OC) has increased to 10% this period, and was 7% last period (much influenced both periods by Lab J failing test results). The fail rate had dropped to 5% or less for the prior four report periods using EWMA LTMS, compared to approximately 26% under the Shewhart severity only system.
- CUSUM plot shows a continuing (and increasing) overall severe trend with reference testing.



## D5800: Evaporation Loss of Lubricating Oil by Noack Method

Test Status	Validity Code	No. Tests
Acceptable Calibration Test	AC	147
Failed Calibration Test	OC	17
Operationally Invalidated by Lab	LC, XC	4
Operationally Invalidated After Initially Reported as Valid	RC	2
Non-Blind Instrument Shakedown	NN	20
Held out of statistics (new rig, failed to calibrate)	MC	2
<b>Total</b>		<b>192</b>

Number of Labs Reporting Data: 12  
Fail Rate of Operationally Valid Tests: 10%

## D5800: Evaporation Loss of Lubricating Oil by Noack Method

Statistically Unacceptable Tests (OC)	No. Of Tests
Ei Level 3 Precision Alarm Mild	3
Ei Level 3 Precision Alarm Severe	3
Zi Level 2 Severity Severe	13
Zi Level 2 Severity Mild	0

- The 17 OC tests were on nine different rigs at five labs.
  - Two tests triggered both Ei L3 and Zi L2 alarms
  - Five OC tests from lab/rig J5 (three were consecutive fails; this same rig had four OC fails last period; rig is presently not calibrated)
  - Four OC tests from lab/rig G6 (two consecutive fails followed by a passing run, repeated twice in the period)
- Six operationally invalid calibration runs reported this period:
  - Three tests with the QC sample result off-spec (LC, RC)
  - One test where the lab invalidated the run because the EOT sample was improperly processed (LC)
  - One invalidated because clogged orifice found during post-test discovery after receiving a failing TMC evaluation (RC)
  - One aborted due to pressure failure mid-test.(XC)

## D5800: Evaporation Loss of Lubricating Oil by Noack Method

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- Non-calibration tests reported for the period:
  - Twenty non-blind shakedown runs to troubleshoot instruments (NN).
  - Two test held out of statistics; new rig that failed to demonstrate a passing initial calibration (MC)
- No TMC technical updates were issued this report period.
- Calibration requirement updates are issued as LTMS document updates

# D5800: Evaporation Loss of Lubricating Oil by Noack Method

## Period Precision and Severity Estimates

Sample Evaporation Loss, mass %	n	df	Pooled s	Mean $\Delta/s$
Targets Effective 10/19/2016	--	--	0.73	-----
10/1/16 through 3/31/17	136	133	0.70	0.53
4/1/17 through 9/30/17*	147	144	1.13	0.56
4/1/17 through 9/30/17*	146	143	0.84	0.47
10/1/17 through 3/31/18	133	130	0.81	0.15
4/1/18 through 9/30/18*	149	146	0.82	0.40
4/1/18 through 9/30/18*	148	145	0.76	0.44
10/1/18 through 3/31/19	151	148	0.81	0.51
4/1/19 through 9/30/19	164	161	0.81	0.65

\*Extreme OC result included and excluded

# D5800: Evaporation Loss of Lubricating Oil by Noack Method

## Performance Comparison by Procedure & Model Sample Evaporation Loss, Mass %

Procedure	n	df	Pooled s	Mean $\Delta/s$
Procedure B	128	125	0.69	0.93
Procedure C	No Procedure C tests reported this period.			
Procedure D	36	33	0.64	-0.34

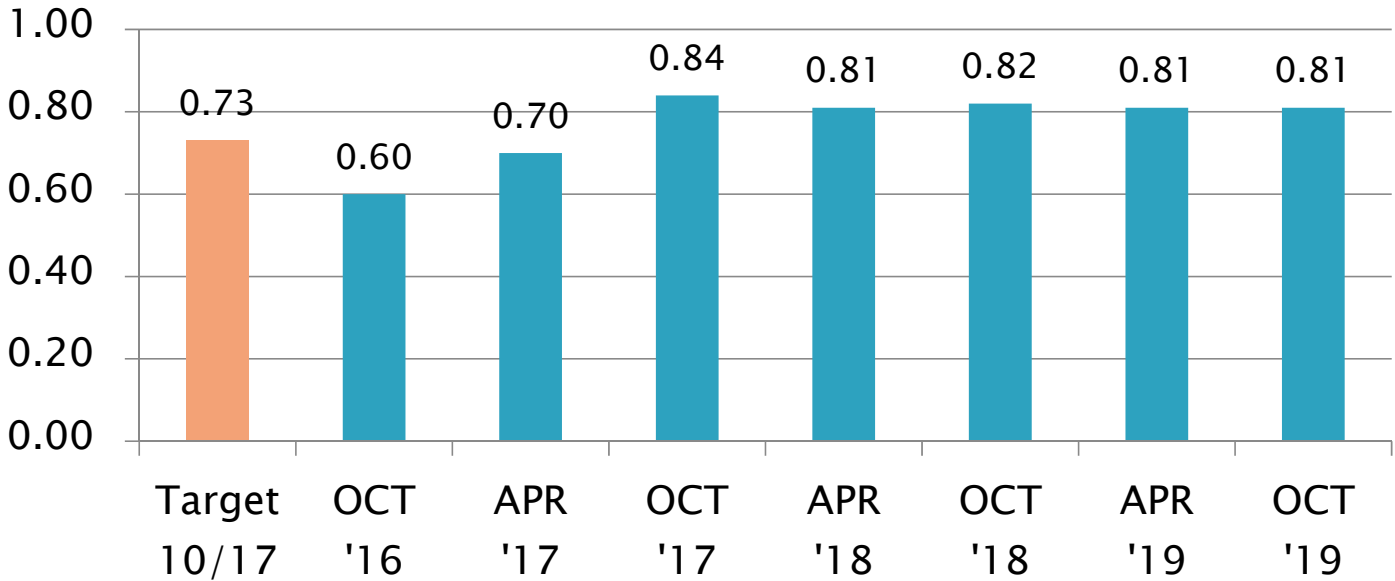
  

Model	n	df	Pooled s	Mean $\Delta/s$
NCK2	9	6	0.42	0.61
NCK25G	119	116	0.70	0.96
NS2	36	33	0.64	-0.34

2 Procedure B NCK2 Rigs  
24 Procedure B NCK25G Rigs  
7 Procedure D NS2 Rigs

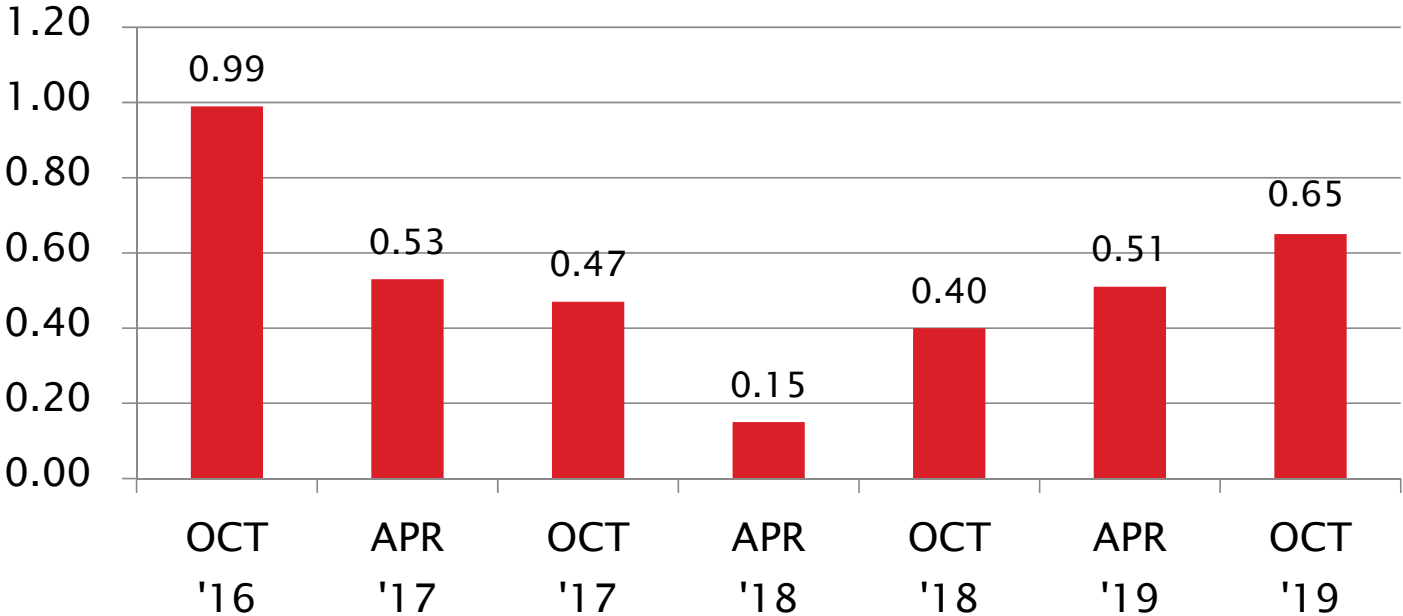
# D5800 Precision Estimates

Sample Evaporation Loss, mass %  
Pooled s



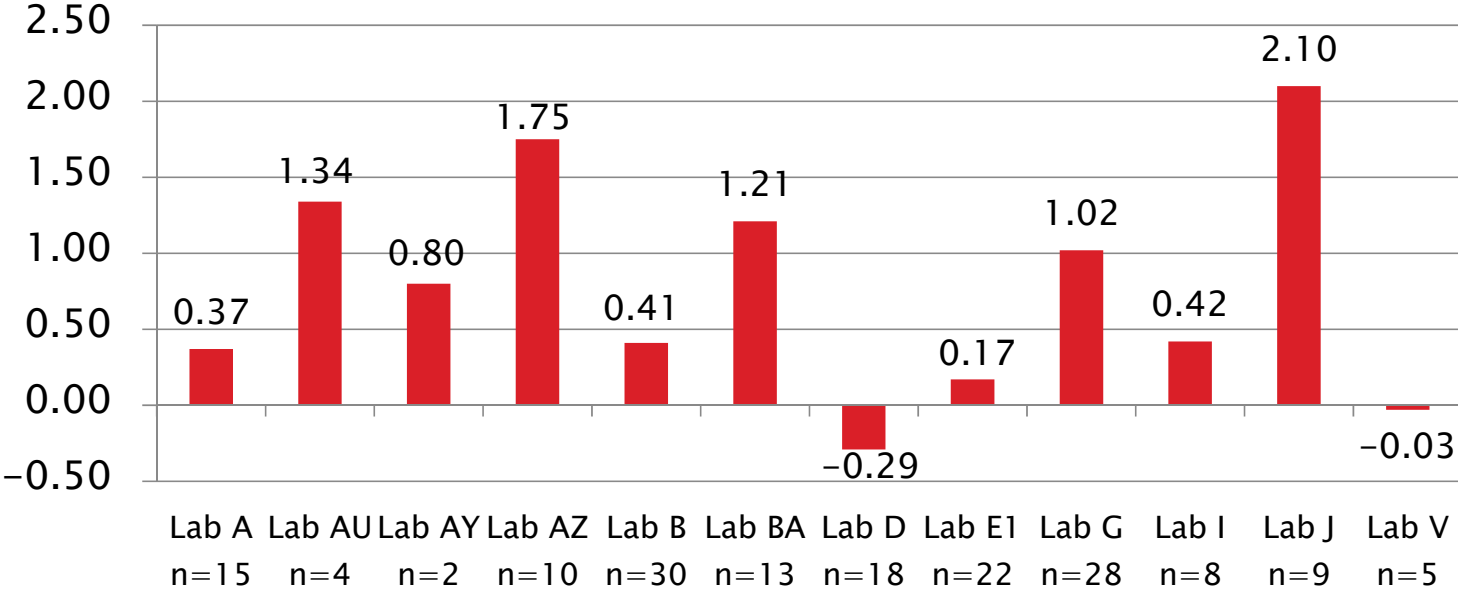
# D5800 Severity Estimates

Sample Evaporation Loss, mass %  
Mean  $\Delta/s$



# D5800 Lab Severity Estimates

Sample Evaporation Loss, mass %  
Mean  $\Delta/s$



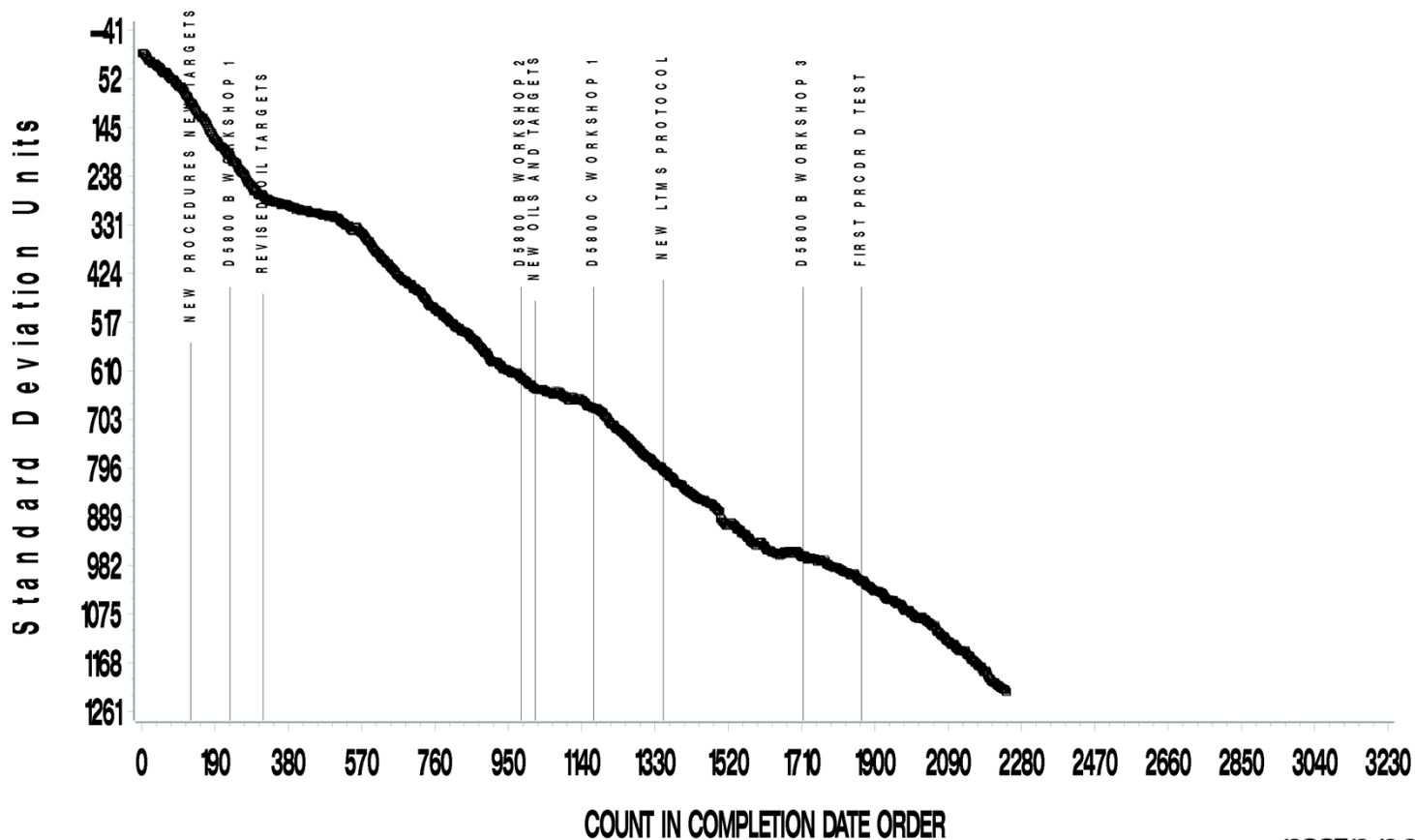


D5800 VOLATILITY BY NOACK INDUSTRY OPERATIONALLY VALID DATA



EVAPORATION LOSS, MASS%

CUSUM Severity Analysis

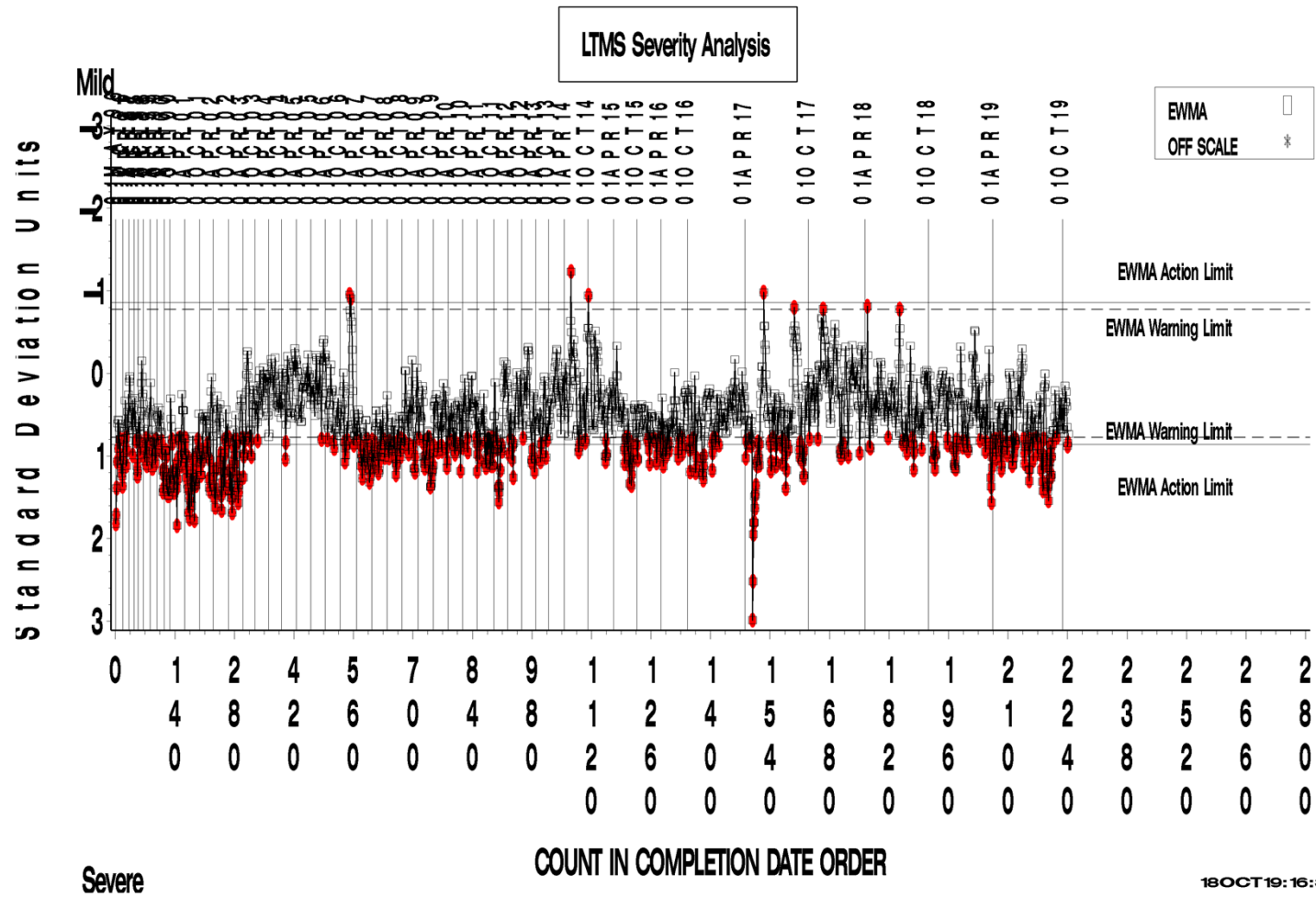


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D5800 VOLATILITY BY NOACK INDUSTRY OPERATIONALLY VALID DATA



EVAPORATION LOSS, MASS%

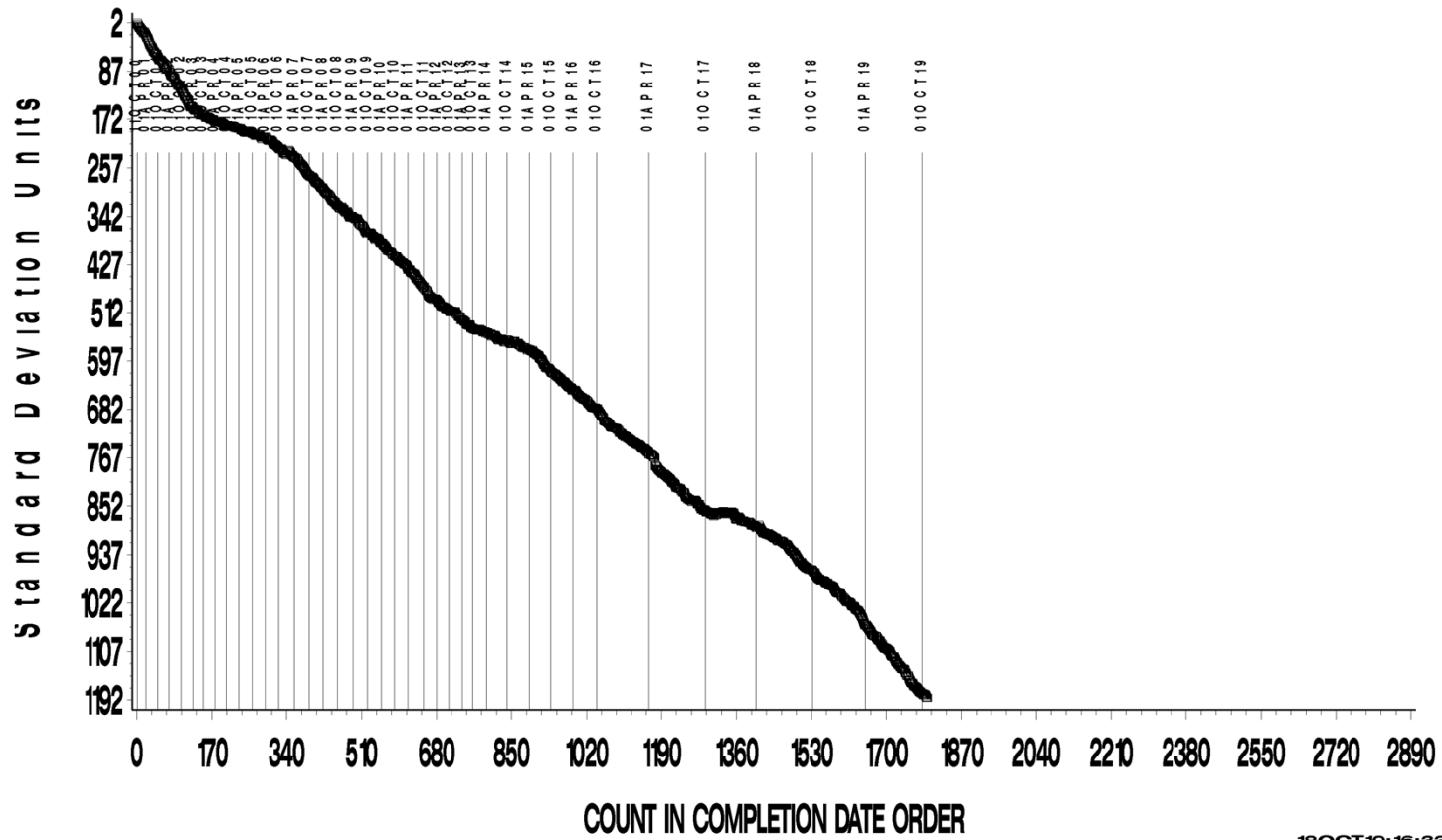


Severe

D5800 VOLATILITY BY NOACK INDUSTRY OPERATIONALLY VALID DATA  
 PRCDR= 'B'  
 EVAPORATION LOSS, MASS%



CUSUM Severity Analysis

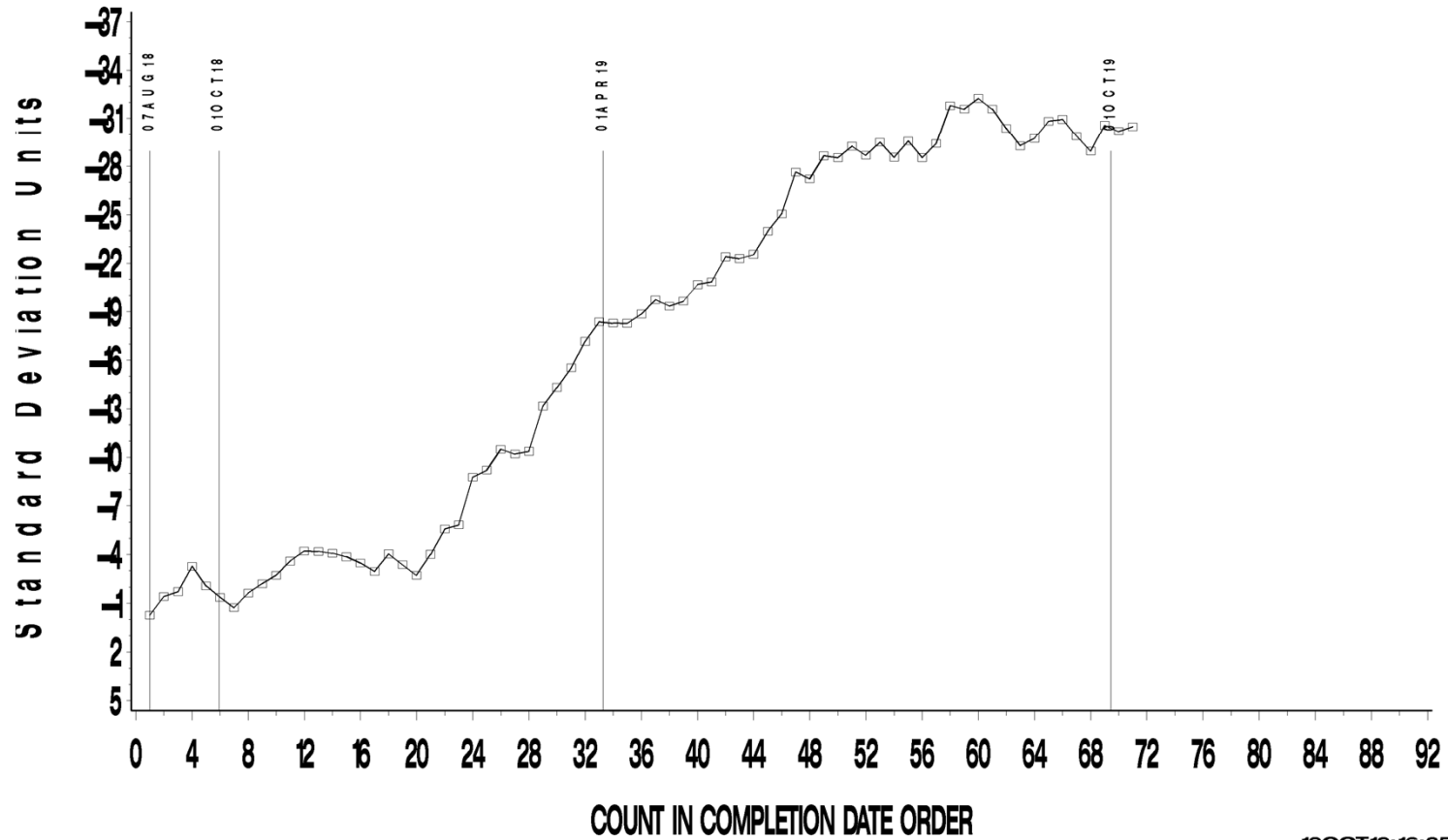


18OCT19:16:33

D5800 VOLATILITY BY NOACK INDUSTRY OPERATIONALLY VALID DATA  
PRCDR='D'  
EVAPORATION LOSS, MASS%



CUSUM Severity Analysis

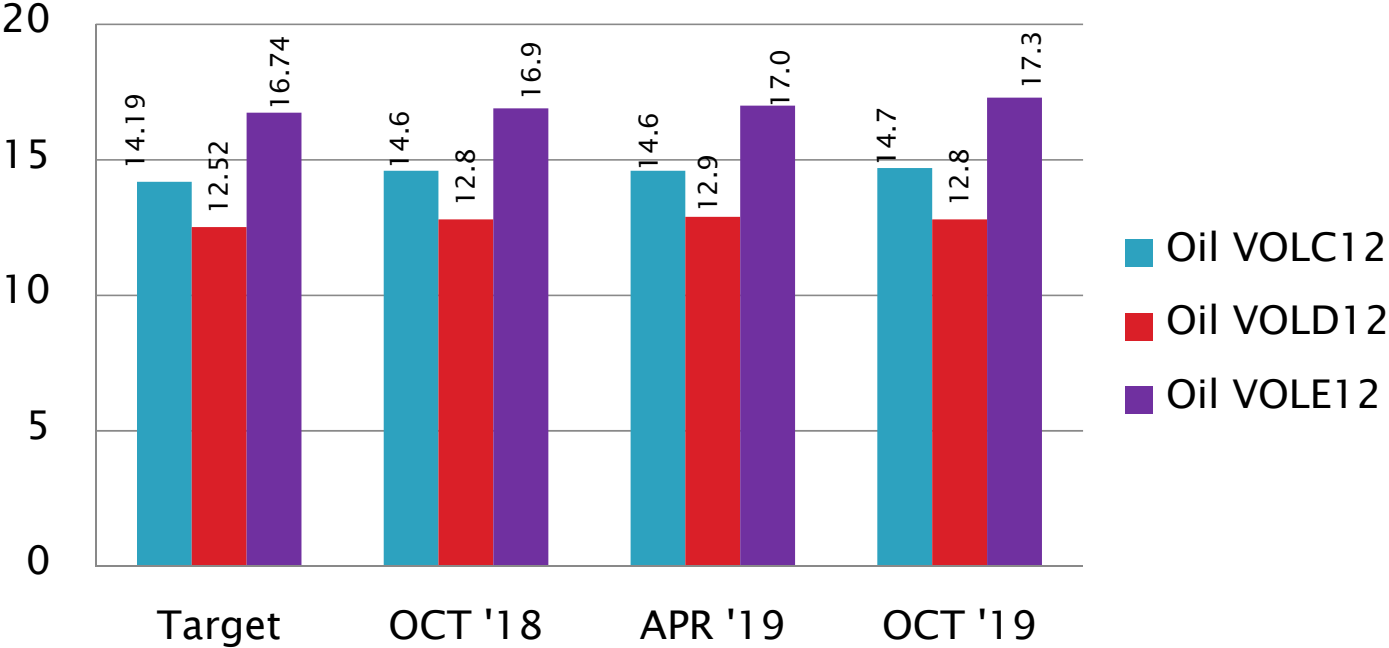


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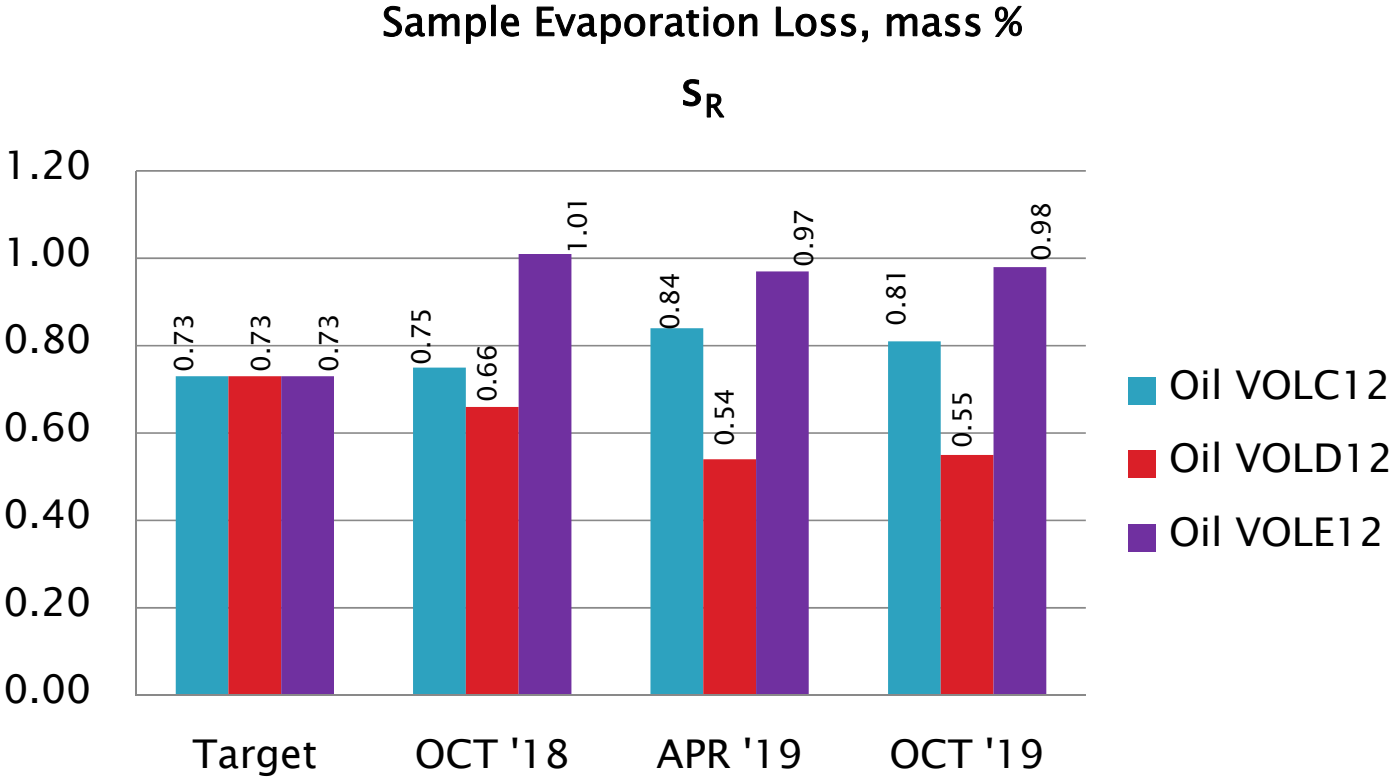


# D5800 Performance by Oil

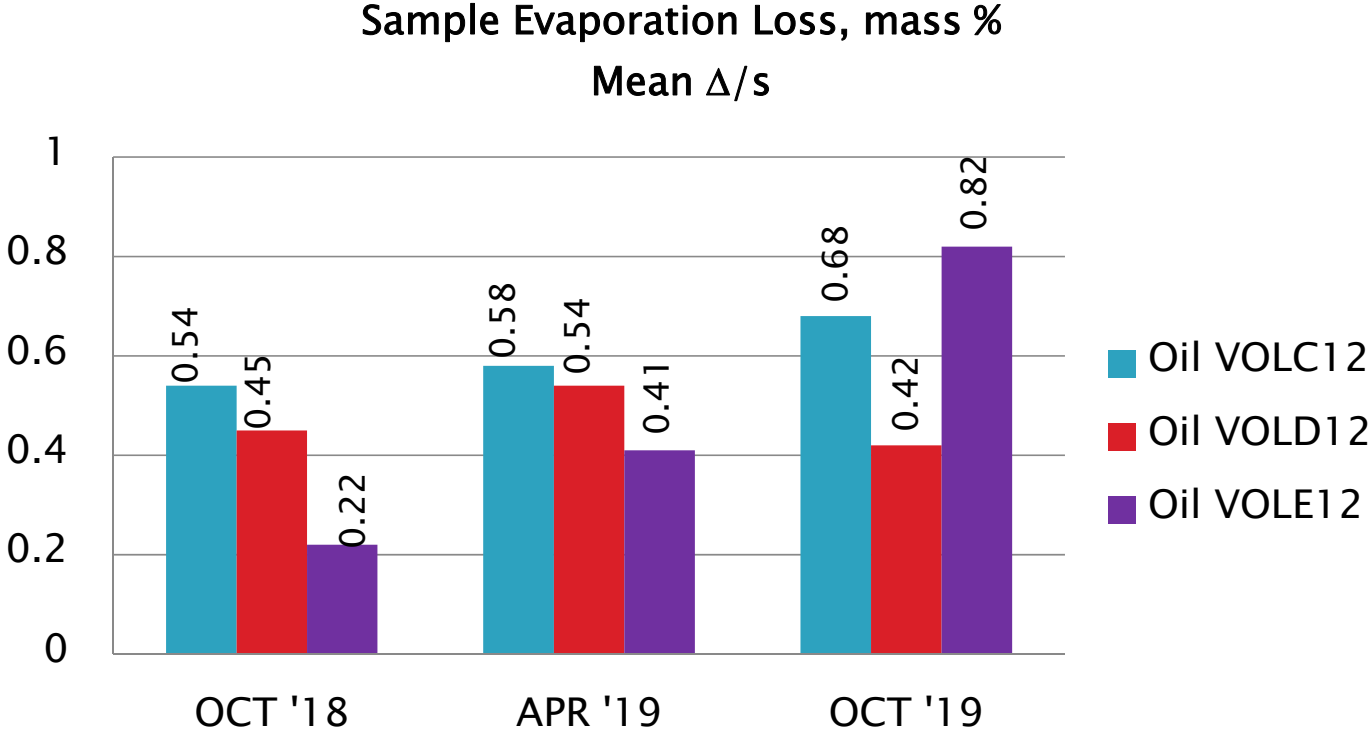
Sample Evaporation Loss, mass %  
Mean



# D5800 Performance by Oil



# D5800 Performance by Oil



# Reference Oil Inventory

## D5800

Oil	Year Rec'd By TMC <sup>A</sup>	Tests	TMC Inventory, gallons	Gallons Shipped last 12 months
VOLC12	2013	D5800	32.5	2.7
VOLD12	2013	D5800	30.7	2.8
VOLE12	2013	D5800	28.8	3.1
VOLD14 <sup>B</sup>	2014	D5800QC	2.4	26.6
VOLD18 <sup>B</sup>	2018	D5800QC	1031	57.6

<sup>A</sup> The integrity of TMC reference oils is confirmed annually by analytical QC testing of chemical and physical properties.

<sup>B</sup> VOLD18 is approved to replace oil VOLD14 as D5800 Daily QC Check Oil



# **BRT SURVEILLANCE PANEL**

**ASTM D02.B0.7**

**December, 2019**

**New Orleans, Louisiana**



# MEMBERSHIP



Jessica Villarreal  
Michelle Stefanac  
Michael Faile  
Brian Brown  
Clayton Knight  
Mike Kasimirsky  
Patrick Lang  
Christine Eickstead  
Matthew Batchelor  
Ted Selby  
Stephanie Mabry  
Andrew Ritchie  
Kaustav Sinha  
Dennis Gaal

Intertek Automotive Research  
The Lubrizol Corporation  
The Lubrizol Corporation  
The Lubrizol Corporation  
TEI  
ASTM TMC  
Southwest Research Institute  
Southwest Research Institute  
Meyer Instruments  
Savant Group  
Afton  
Infineum  
Chevron Oronite  
Exxon Mobil



# BRT TEST ACTIVITY

- This period consisted of 4 rejected test (OC), six tests invalidated by lab (LC)
- 190 tests were accepted for calibration (AC), a increase from the previous period of 133

Test Status	Validity Code	Validity
Accepted Calibrations	AC	190
Failed Calibrations	OC	4
Operationally Invalid, by lab	LC	6
Acceptable Shakedown Run	NN	8
Unacceptable Shakedown Run	MN	2
<b>Total</b>		<b>210</b>



# BRT LOST TESTS

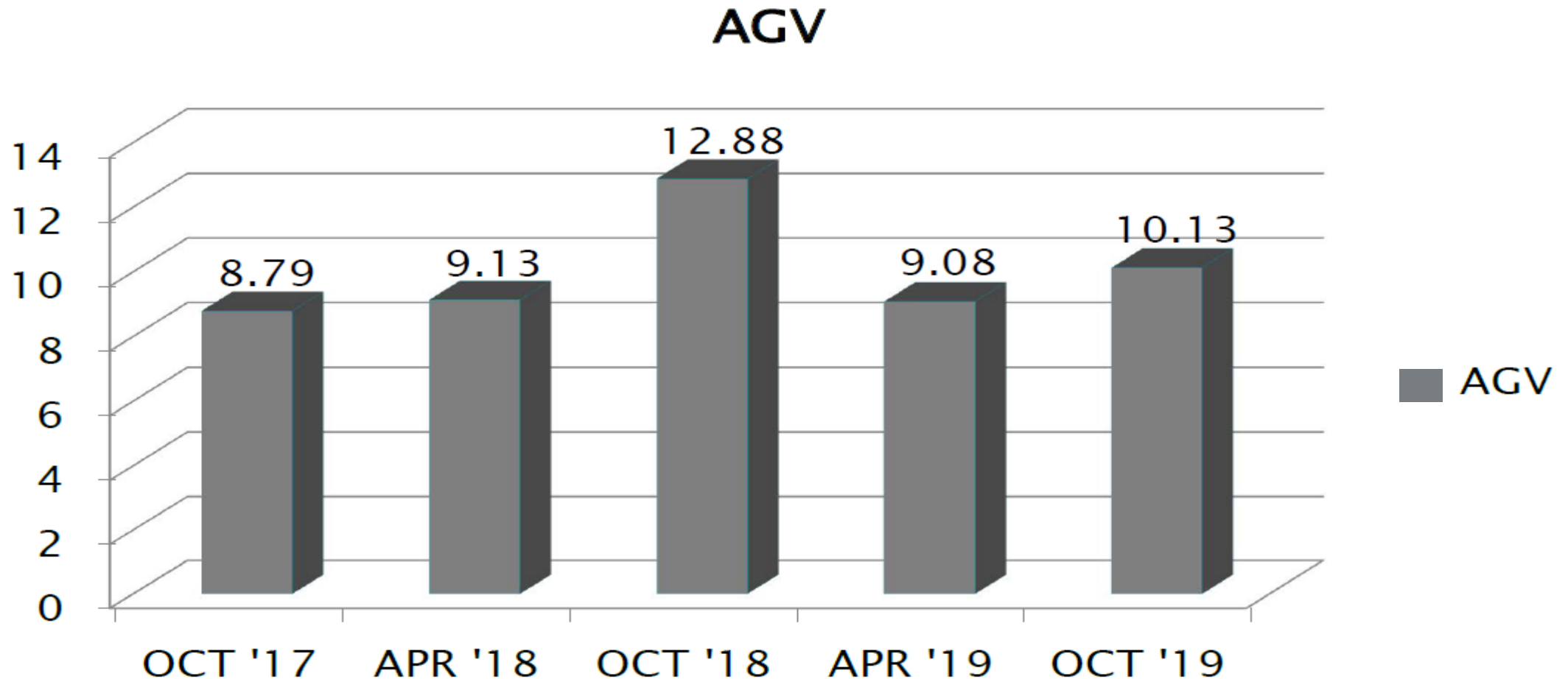
- Causes of invalidated and/or aborted tests include acid contamination, syringe acid pump malfunction and failure to maintain proper air flow

Status	Cause	#
Invalid	Air Flow Control Problem	2
Invalid	Acid Pump Malfunction	3
Invalid	Acid Contamination	1
<b>Total</b>		<b>6</b>

# SEVERITY AND PRECISION

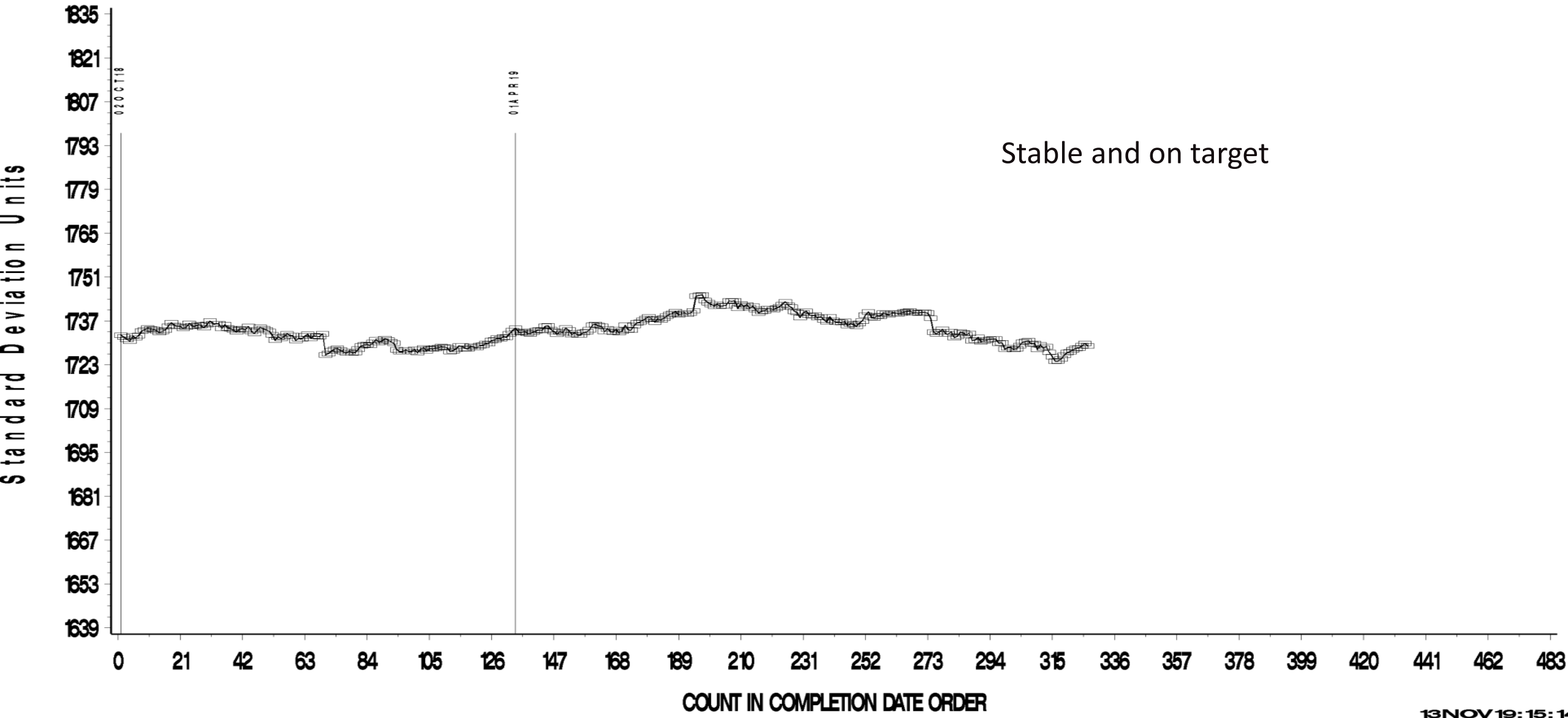


- Over the course of this report, AGV severity as measured by CUSUM, is on target
- Pooled s for this period is 10.13, slightly worse then previous period.



REFERENCE AVERAGE GRAY VALUE

CUSUM Severity Analysis





# REFERENCE OIL SUPPLY

- Reference oils 86 and 87 have been approved for calibration use
- Oils 81 and 82 have been placed out of testing scope

Oil	TMC Inventory (gallons)	Quantity Shipped in last 6 months	Lab Inventory (samples)	Estimated Life
1006	32.6	0.6	37	5+ years
82-1	5.0	0.6	38	5+ years
86	52.3	0.6	35	5+ years
87	96.1	0.6	35	5+ years

# STATUS



- This period we had a pass rate of 90.5% versus the previous period at 97.1% pass rate
- No information letters were issued this period





**intertek**

**Total Quality. Assured.**

***CBT/HTCBT Surveillance Panel Report***  
***DECEMBER 2019***  
**NEW ORLEANS, LA**

**D02.B0.07**

Mike Lopez presenting





## **CBT/HTCBT SURVEILLANCE PANEL MEMBERSHIP:**

- **ISP Institute**
- **Southwest Research Institute**
- **Afton Chemical**
- **Lubrizon**
- **Intertek Automotive Research**
- **TEI**
- **Infineum**
- **Chevron**
- **Savant**
- **OH Tech**
- **TMC**

Please email me if you wish to be a member: [mike.lopez@intertek.com](mailto:mike.lopez@intertek.com)

# COUPON REPORT



Currently we are testing with Batch N coupons for D6594 and D5968.

All Batch M has been exhausted at TMC.

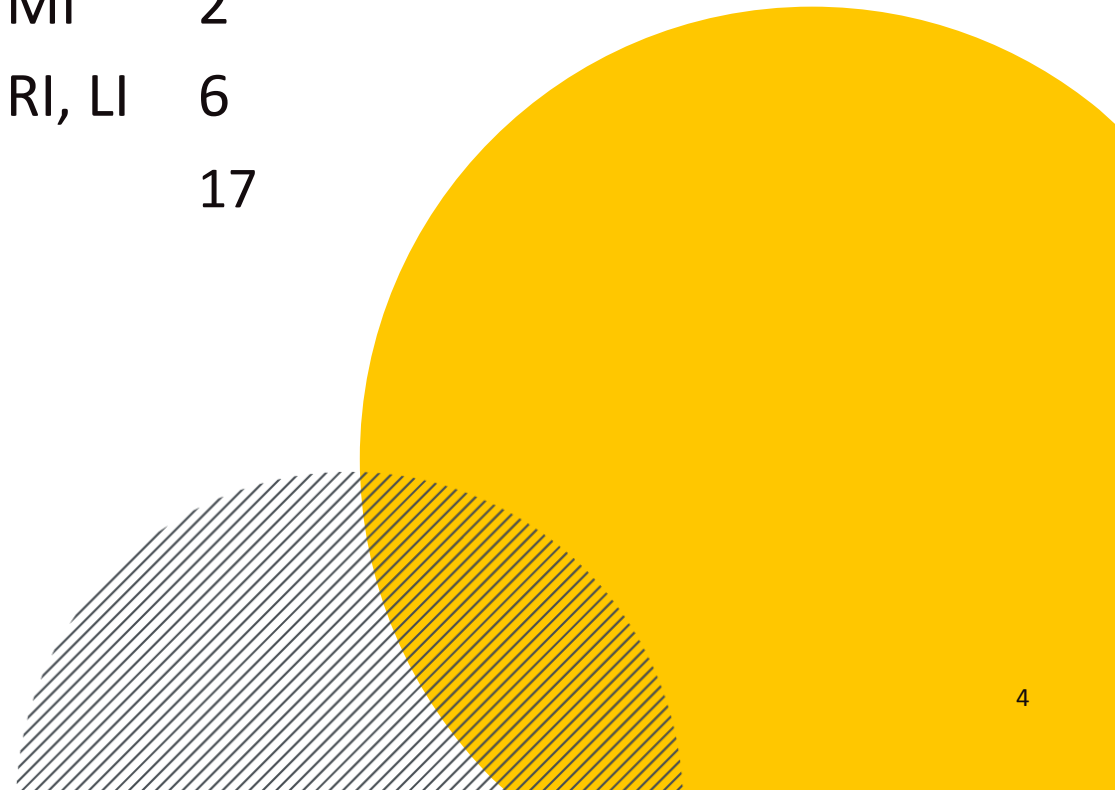




# CBT (D5968)

## Test Distribution by Validity

• Accepted for Calibration	AC	2
• Rejected	OC	3
• Hardware Run – N Coupons	NI	4
• Unacceptable Hardware Run–N coupons	MI	2
• Invalid Hardware Run – N coupons	RI, LI	6
• Total		17



# CBT (D5968)



## CAUSES FOR LOST TESTS

### Summary of Reasons for Failed Tests

Mild Lead Concentration	1
Mild Copper Concentration	2

### Summary of Reasons for Invalid Tests

Tests which were invalid this period	0
--------------------------------------	---

### Summary of Reasons for Aborted Tests

Tests which were aborted this period	0
--------------------------------------	---



# CORROSION BENCH TEST D5968



This is for test period from April 1, 2019 –September 30, 2019.

Number of labs reporting: 2

Over the course of this report period, both copper and lead severity continued the existing mild trend.

Precision, as measured by pooled standard deviation, has slightly improved for copper and improved for lead.

Pooled s for this period is 2.13 for copper from 2.25 and 8.47 for lead from 12.03 from the first part of the year.

TMC Reference is Oil 43 for CBT remains in good supply. There are currently 35 samples at the test labs and as much as 32.0 gallons at TMC.

No information letters were issued this period.



# HTCBT(D6594)





## Test Distribution by Validity

• Acceptable Calibration Test	AC	248
• Unacceptable Calibration Test	OC	25
• Invalid Calibration Test	LC	8
• Invalid by TMC Calibration Test	RC	1
• Aborted Calibration Test	XC	3
• Acceptable Shakedown Run	NN	7
• Unacceptable Shakedown Run	MN	8
• Invalid Shakedown Run	LN	2
• Hardware Run –N coupons	NI	14
• Unacceptable Hardware Run – N coupons	MI	2
• Invalid Hardware Run – N coupons	LI, RI	8
• Total		<u>326</u>



## CAUSES FOR LOST TESTS

### Summary of Reasons for Failed Tests

- Severe Lead Concentration 12
- Severe Copper Concentration 5
- Severe Copper & Lead Concentration 6
- Mild Copper Concentration 2

### Summary of Reasons for Invalid Tests

- Power Failure 7
- Airflow Control Problems 2
- Unapproved Hardware 1

### Summary of Reasons for Aborted Tests

- Sample Spilled 1
- Temperature Control Problems 1



# HTCBT TMC Reference Oils



- There are no immediate problems with the reference oils for HTCBT.
- Reference oil 44-4 – There are 22.3 gal. at TMC and 81 four-ounce samples at the labs.
- Reference oil 1005-5 - There are 43.8 gal. at TMC and 200 four-ounce samples at the labs.

# HTCBT (D6594)

## SUMMARY OF SEVERITY & PRECISION



### Severity

- Over the course of this report period, copper severity was trending severe.
- Over the course of this report period, lead severity was trending severe.

### Precision

- Pooled  $s$  for this period is 0.36 for copper the same as last period and 10.00 for lead from 7.37 from the previous period.



## INFORMATION LETTERS

- Two HTCBT Information Letters were issued this period, from April 1, 2019 – September 30, 2019.
- Standardization of Test Result Calculation Precision and Reporting
- Clarification of Test Result Calculation Precision and Reporting

# Calibrated Labs and Stands\*

Test	Labs	Stands
D6335 (TEOST)	6	9
D7097 (MTEOS)	11	47

\*As of 9/30/2019

# D6335: Deposits by TEOST-33C

Test Status	Validity Code	No. Tests
Acceptable Calibration Test	AC	23
Failed Calibration Test	OC	7
Operationally Invalidated by Lab	LC, XC	1
Operationally Invalidated After Initially Reported as Valid	RC	1
Excluded from statistics (two-test fail on new rig)	MC	2
Non-Blind Instrument Shakedown	NN	2
<b>Total</b>		<b>36</b>

Number of Labs Reporting Data: 9  
Fail Rate of Operationally Valid Tests: 23%

# D6335: Deposits by TEOST-33C

Statistically Unacceptable Tests (OC)	No. Of Tests
Total Deposits Mild	3
Total Deposits Severe	4

- Four consecutive failing runs, ranging from 3 to 7 s severe, were reported on the same instrument (G1) following instrument conversion (two-test calibration sequences).
  - Followed by two shakedown runs (the only two reported this period).
  - Rig subsequently passed a two-test calibration sequence but the lab did not invalidate the prior failing runs.
  - **Period statistics are shown with and without these four results.**
- One test invalidated after failing TMC calibration, airflow problem discovered post-test (RC).
- One aborted run (XC) reported due to off-spec catalyst weight.
- Initial two-test sequence on new lab/rig (P1) excluded from statistics (validity MC) because 1<sup>st</sup> test failed mild, instrument failed to demonstrate an initial passing calibration. To date, this rig has not calibrated.
- Calibration requirement updates are issued as LTMS document updates.



# D6335: Deposits by TEOST-33C

## Period Precision and Severity Estimates

Total Deposits, mg	n	df	Pooled s	Mean $\Delta/s$
Updated Targets 20130415	60	58	5.73	-----
10/1/16 through 3/31/17	21	19	6.77	-0.14
4/1/17 through 9/30/17*	26	24	6.81	0.00
4/1/17 through 9/30/17*	23	21	5.19	-0.28
10/1/17 through 3/31/18**	27	25	8.32	-0.61
10/1/17 through 3/31/18**	26	24	6.43	-0.45
4/1/18 through 9/30/18	21	19	4.72	-0.33
10/1/18 through 3/31/19	25	23	7.37	0.11
4/1/17 through 9/30/17***	30	28	12.66	0.47
4/1/17 through 9/30/17***	26	24	7.35	-0.23

\*Three consecutive OC results on same rig included and excluded.

\*\*Single result of -4.6 s mild included and excluded

\*\*\* Four consecutive OC results on same rig included and excluded.

Test Monitoring Center

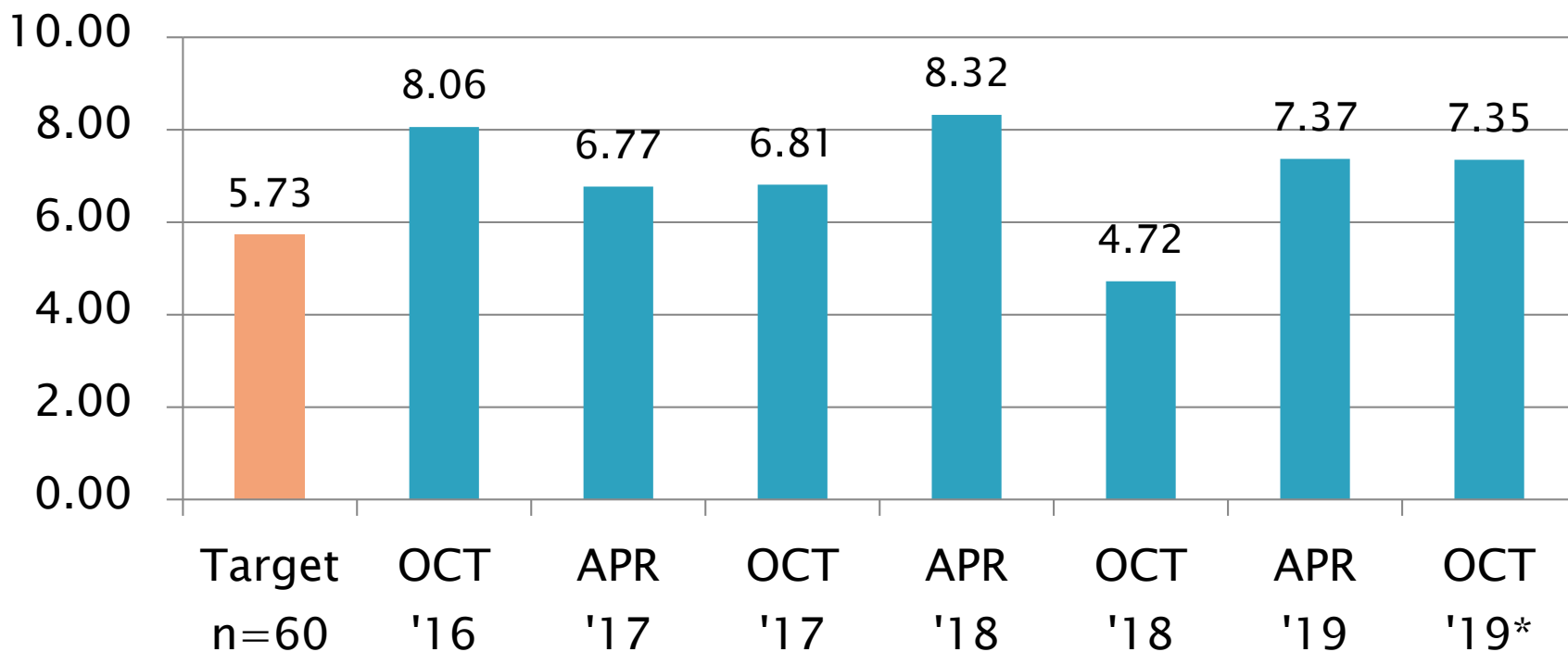
<http://astmtmc.cmu.edu>



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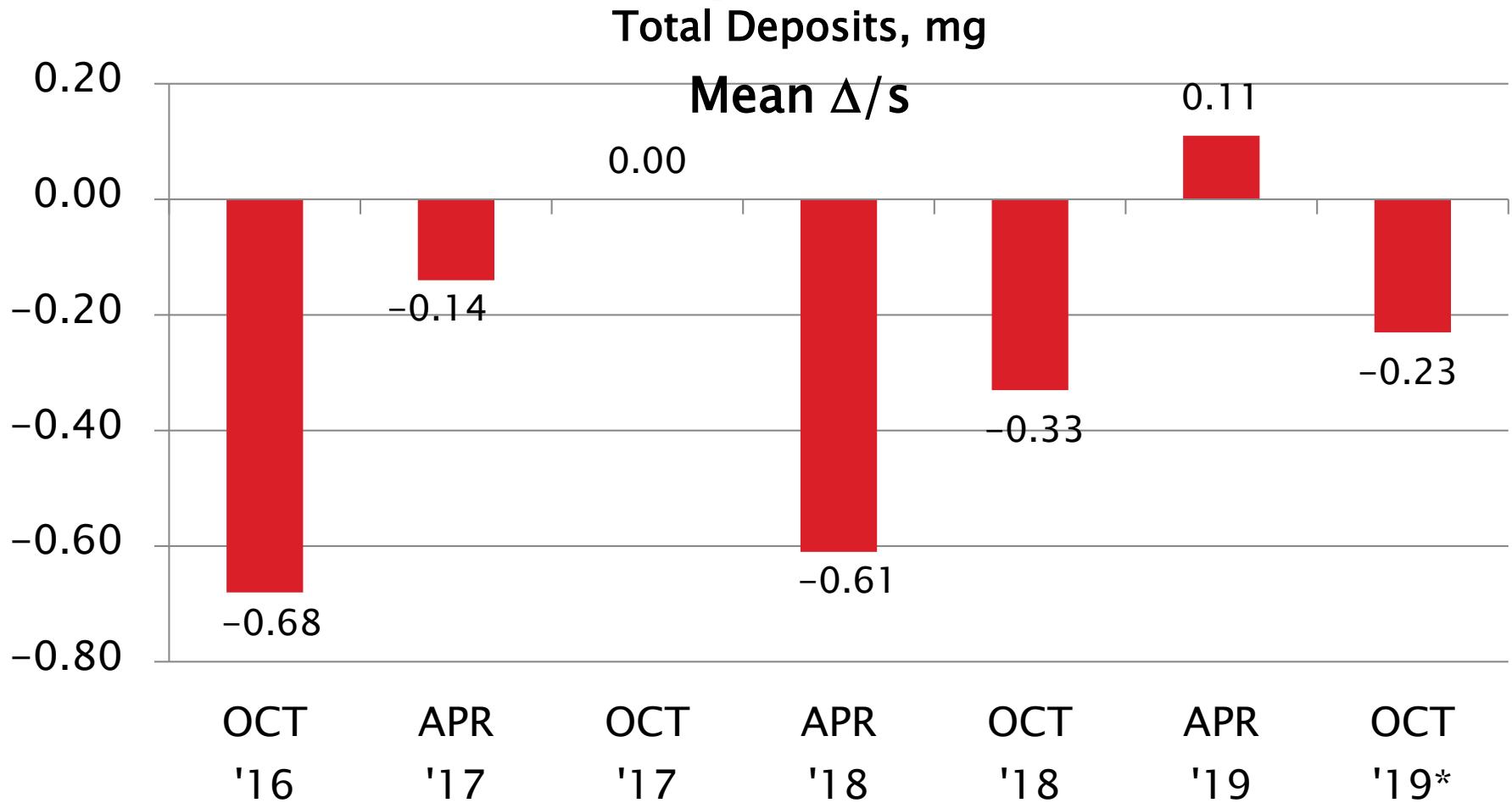
# D6335 Precision Estimates

## Total Deposits, mg Pooled s



\* Four consecutive OC results on same rig excluded.

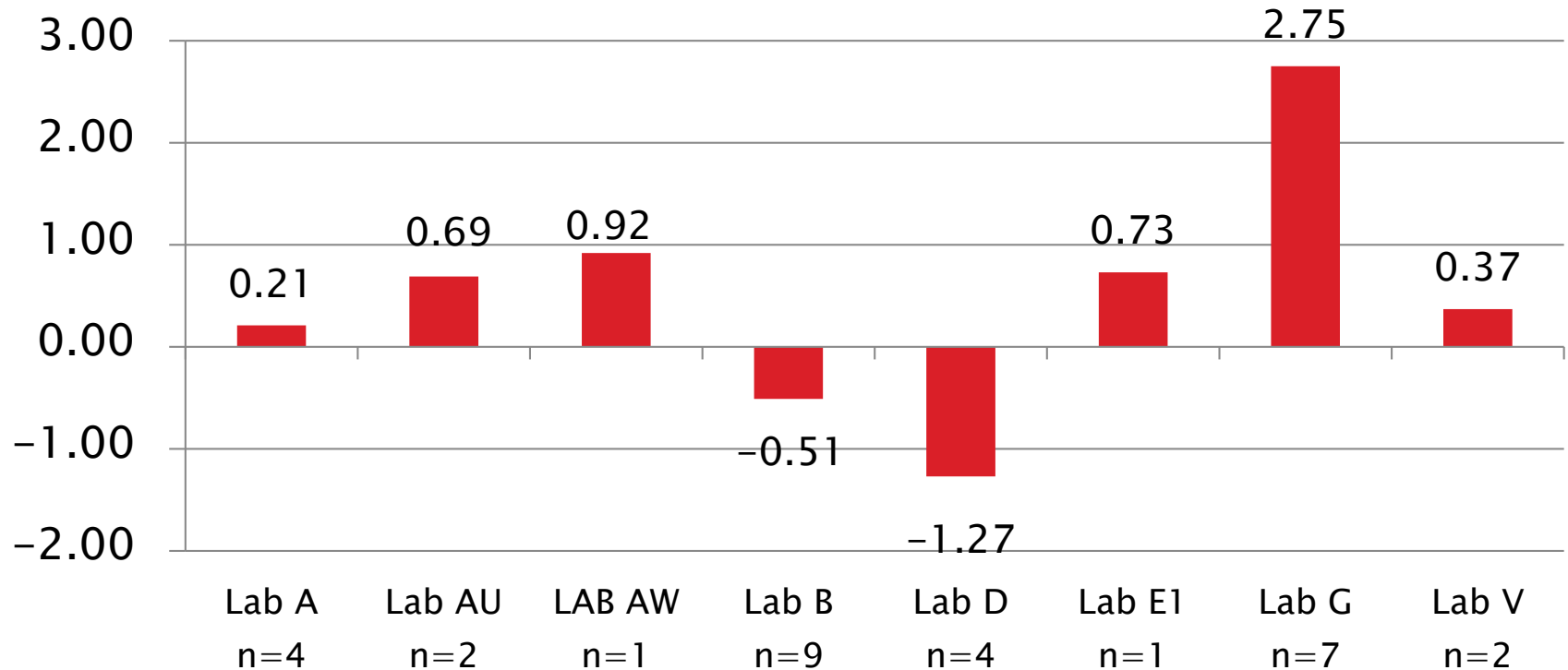
# D6335 Severity Estimates



\* Four consecutive OC results on same rig excluded.

# D6335 Lab Severity Estimates

Total deposits, mg  
Mean  $\Delta/s$

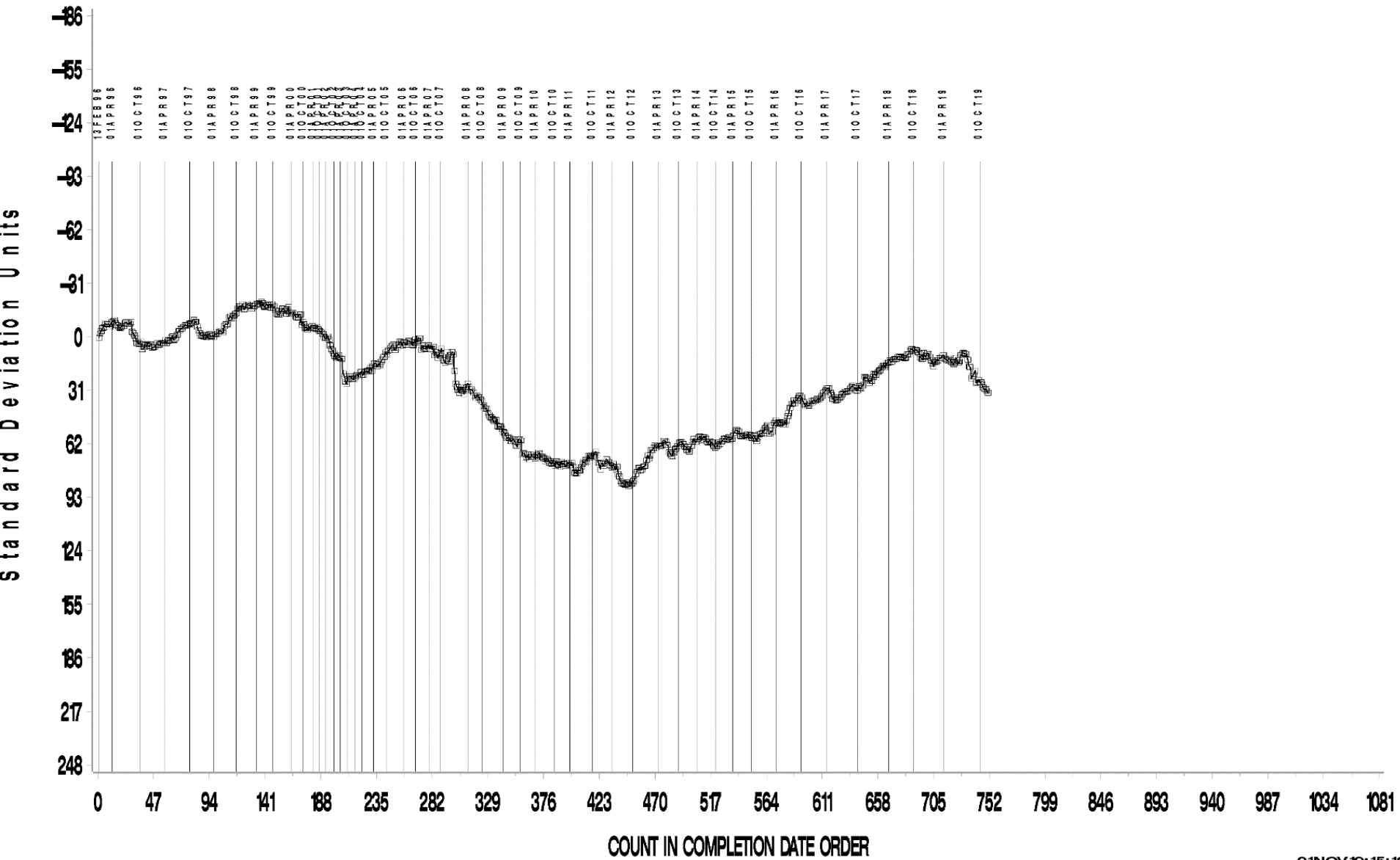


# D6335: Deposits by TEOST-33C

- ▶ Precision (Pooled  $s$ ) is less precise than prior period, and less precise than target precision.
  - Comparable to prior period with four results from rig G1 excluded, but still less precise than target precision.
- ▶ Performance (Mean  $\Delta/s$ ) is 0.47 s severe.
  - -0.27 s mild excluding four results from rig G1.
- ▶ Fail rate of 23% is high again for the period.
  - Comparable to last period (20%).
- ▶ All tests this period report using Rod Batch M.
- ▶ Oil 75-1 (reblend) was approved on 20190404 to replace severe performing reference oil 75, which is depleted at the TMC
  - Still assigning oil 75 out of lab inventories until gone.

TOTAL DEPOSITS MG

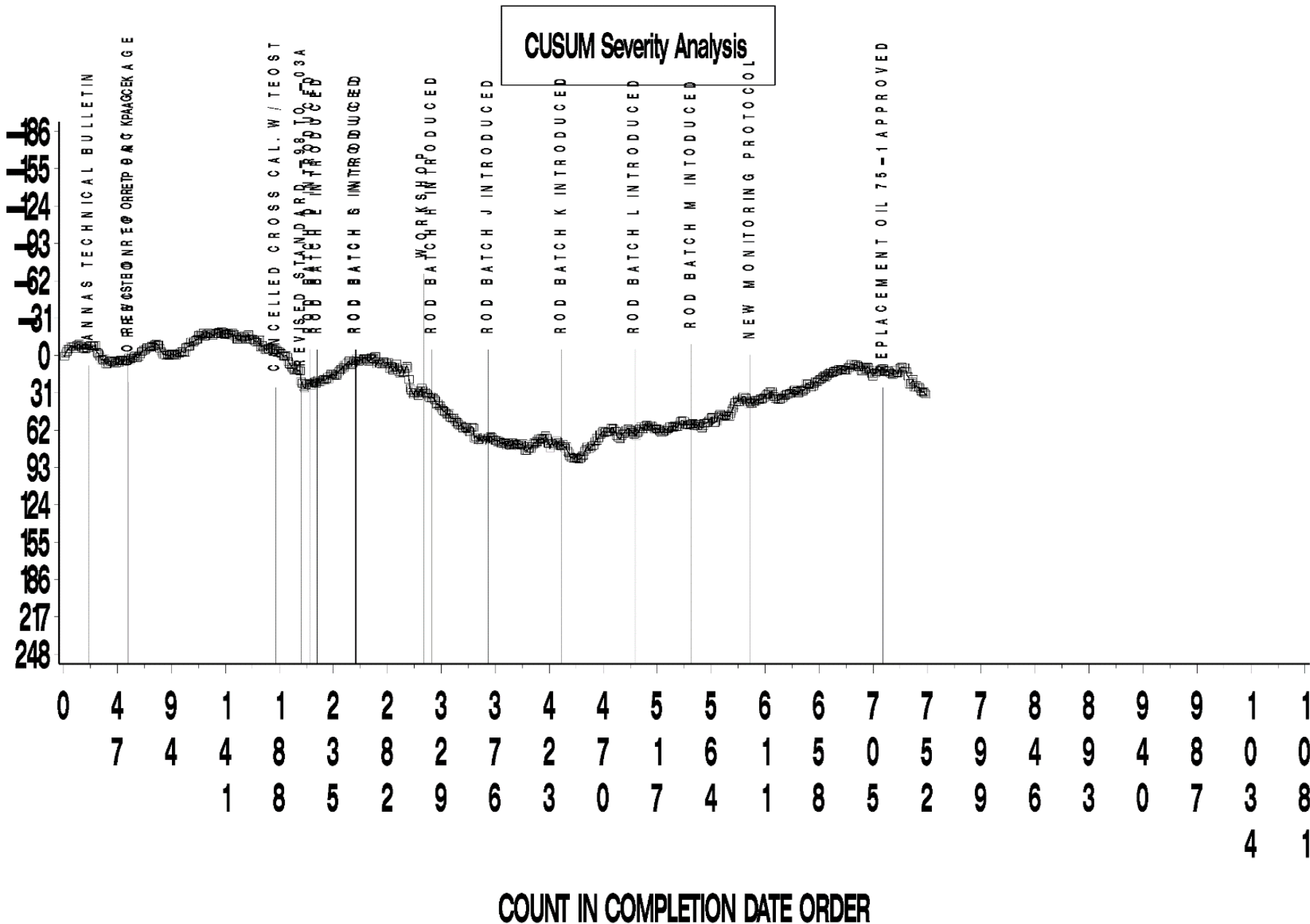
CUSUM Severity Analysis



TOTAL DEPOSITS MG

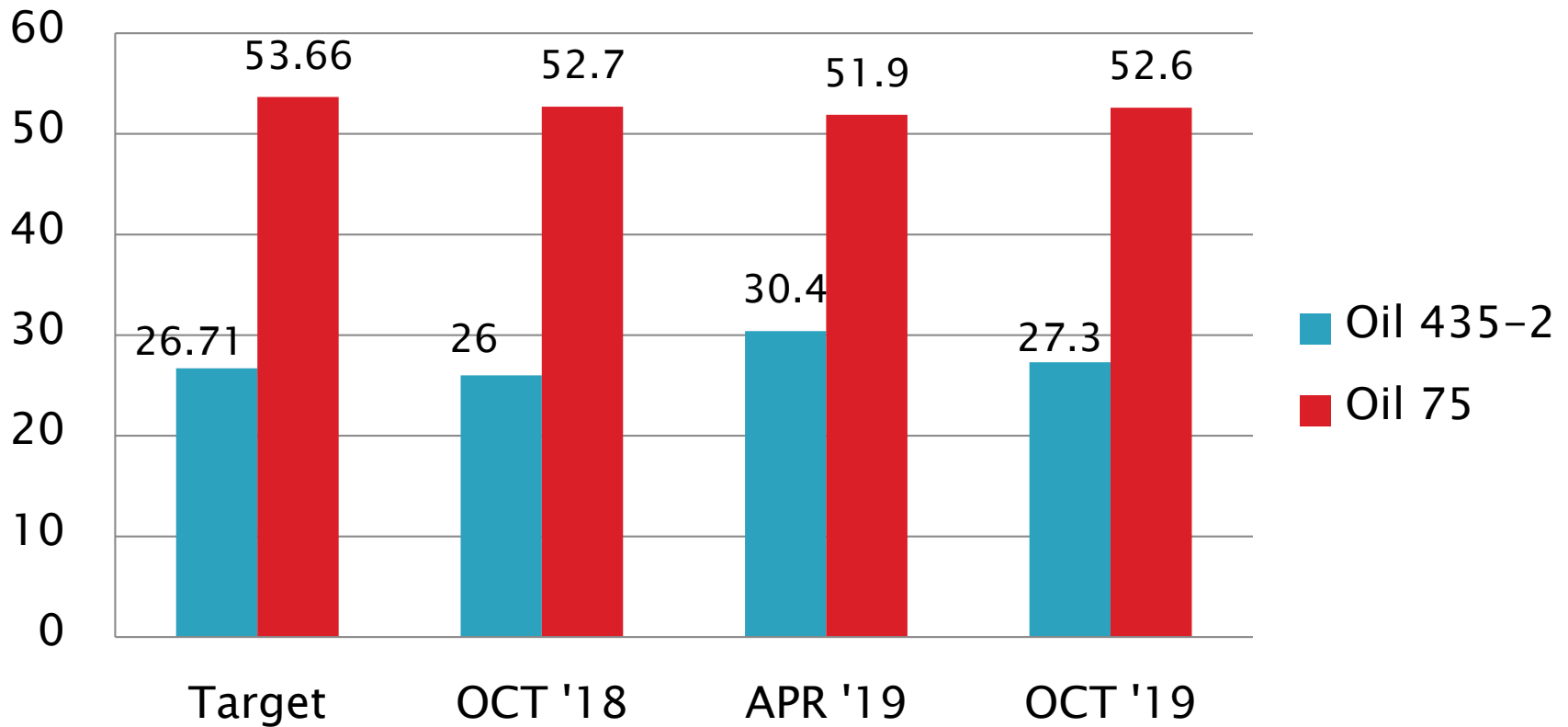
Standard Deviation Units

CUSUM Severity Analysis



# D6335 Performance by Oil

Total Deposits, mg  
Mean

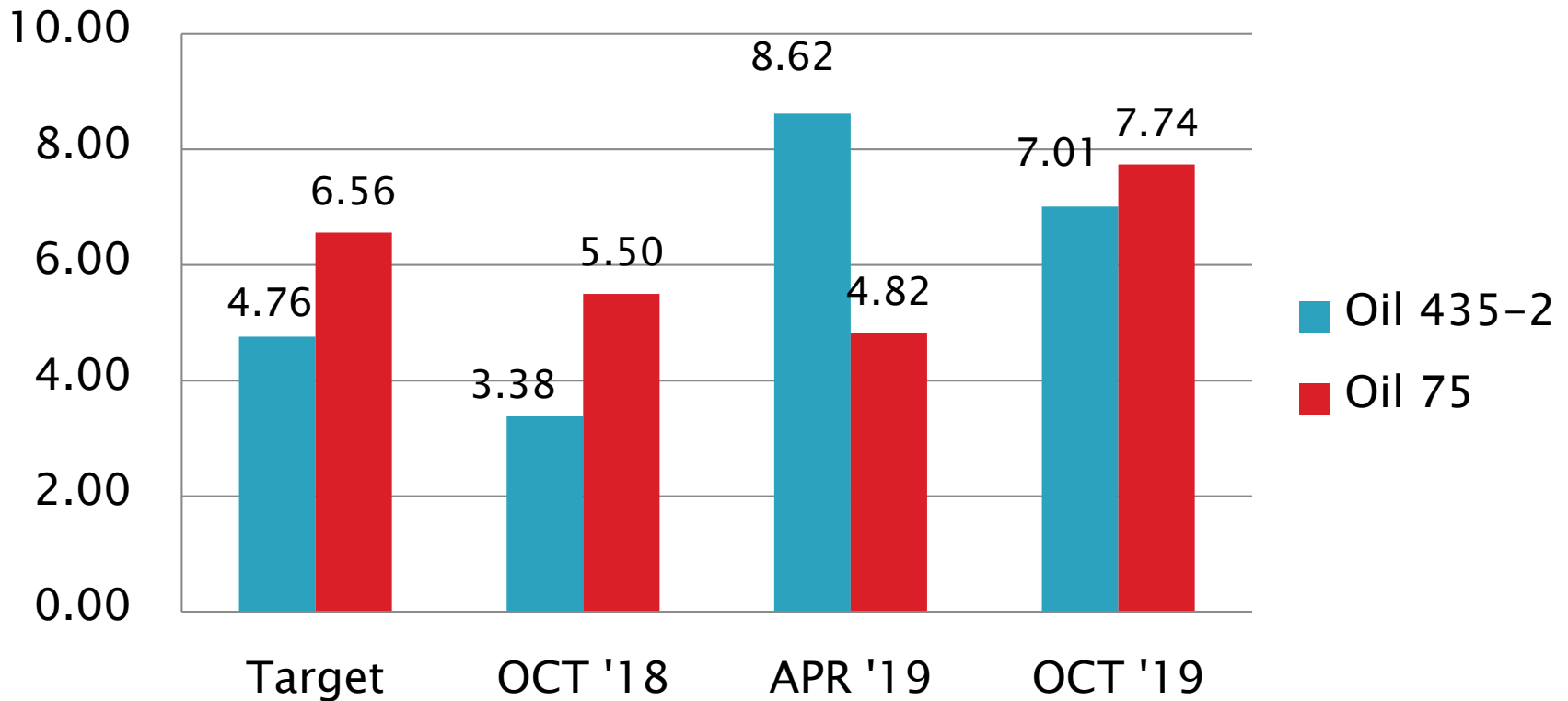




# D6335 Performance by Oil

Total Deposits, mg

$S_R$



Test Monitoring Center

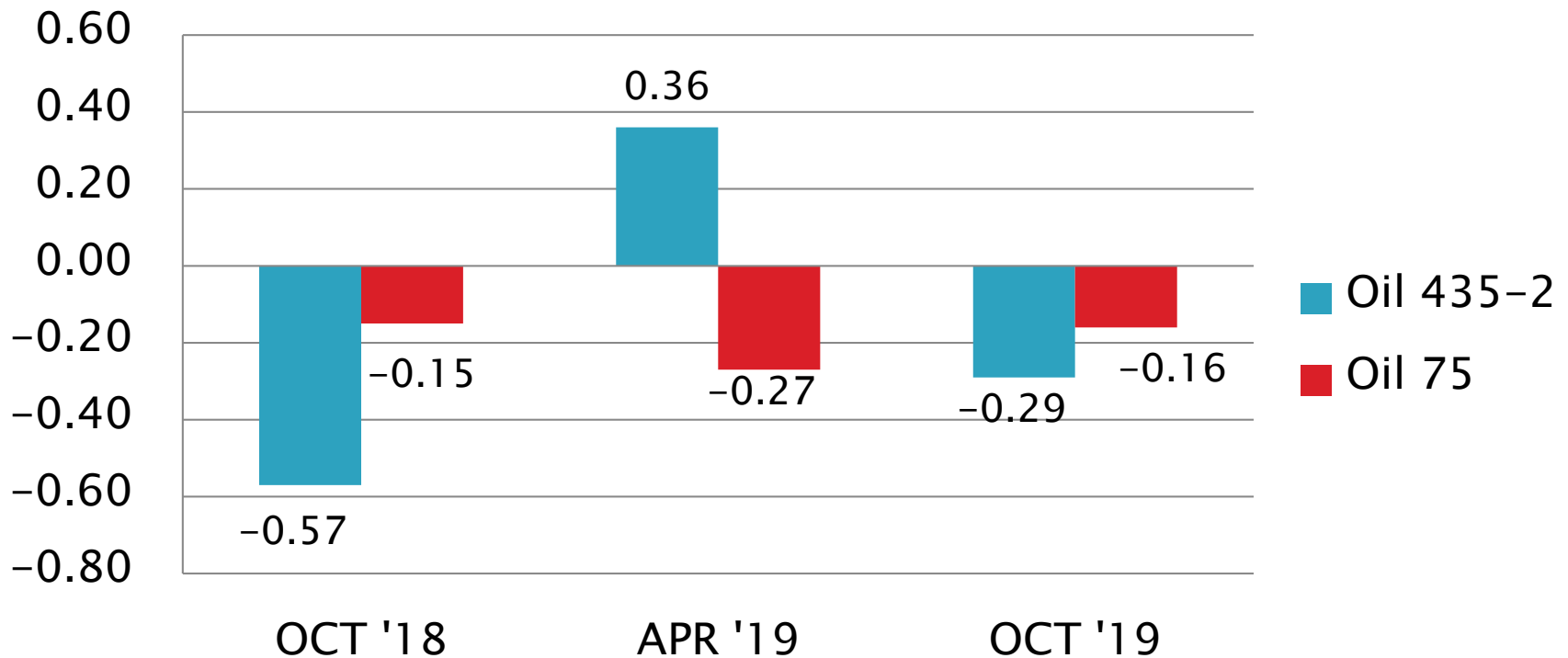
<http://astmtmc.cmu.edu>



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# D6335 Performance by Oil

Total Deposits, mg  
Mean  $\Delta/s$



[Return to Executive Summary](#)

# D7097: Deposits by MHT TEOST

Test Status	Validity Code	No. Tests
Acceptable Calibration Test	AC	102
Failed Calibration Test	OC	7
Operationally Invalidated by Lab	LC, XC	5
Operationally Invalidated After Initially Reported as Valid	RC	0
Industry Information Runs	AG, OG	22
<b>Total</b>		<b>136</b>

Number of Labs Reporting Data: 11  
Fail Rate of Operationally Valid Tests: 6%

# D7097: Deposits by MHT TEOST

Statistically Unacceptable Tests (OC)	No. Of Tests
Total Deposits Mild	2
Total Deposits Severe	5

- Five operationally invalid calibration test reported this period:
  - 3 test sample leak (XC)
  - 2 air flow interruption during test (LC)
- 8 industry information runs to evaluate proposed replacement oil 434-3 (AG)
- 14 industry information runs to screen new catalyst batch 19BA (AG, OG)
- Calibration requirement updates are issued as LTMS document updates.

# D7097: Deposits by MHT TEOST

## Period Precision and Severity Estimates

Total Deposits, mg	n	df	Pooled s	Mean $\Delta/s$
Current Targets 7/31/2006	90	87	5.63	-----
10/1/16 through 3/31/17*	105	103	7.11	0.17
10/1/16 through 3/31/17*	97	95	6.50	0.03
4/1/17 through 9/30/17	83	81	5.15	0.14
10/1/17 through 3/31/18	88	86	5.28	0.33
4/1/18 through 9/30/18**	95	93	6.69	0.29
4/1/18 through 9/30/18**	94	92	5.46	0.20
10/1/18 through 3/31/19	97	95	5.86	-0.14
4/1/19 through 9/30/19	109	107	6.40	-0.30

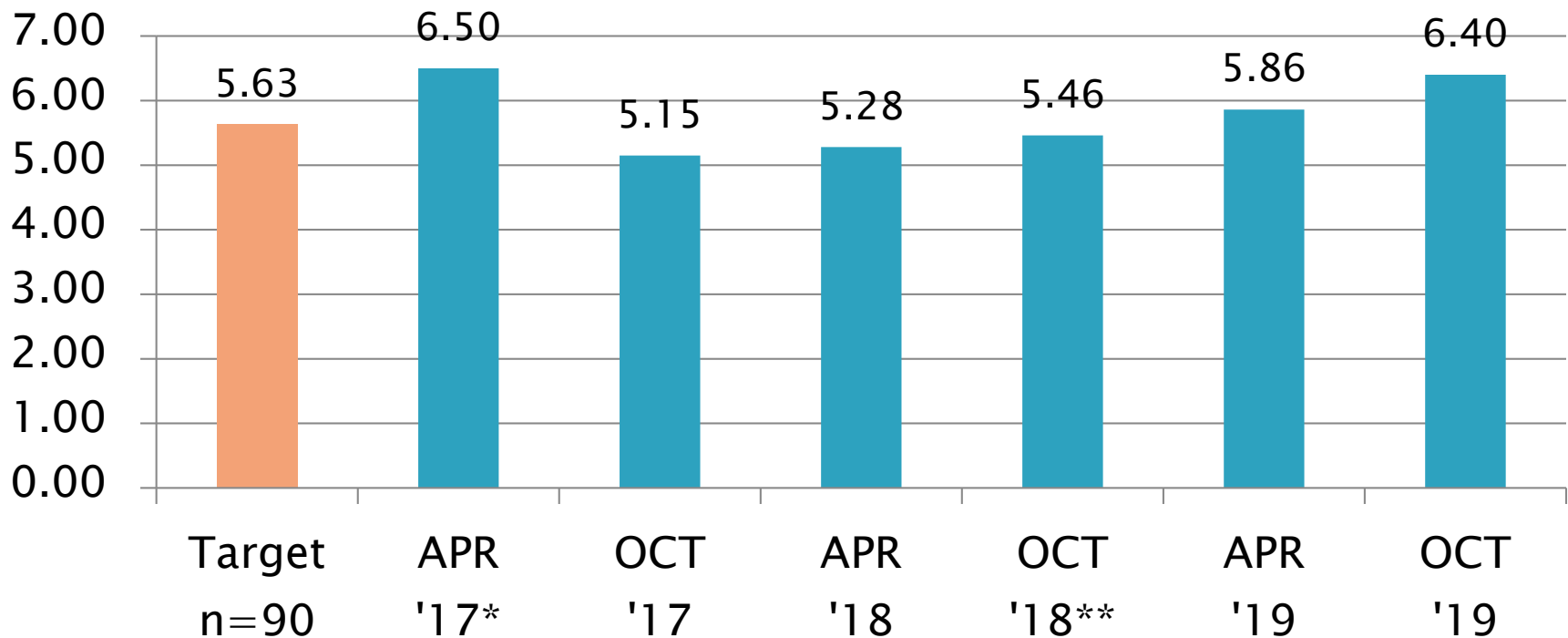
\*Eight 2TESTCAL tests from instrument J2 included and excluded

\*\*One severe OC test from instrument G5 included and excluded (8.9 s)

# D7097 Precision Estimates

Total Deposits, mg

Pooled s



\*Eight tests instrument J2 excluded (failed to calibrate)

\*\*One severe OC test from instrument G5 excluded (8.9 s)

Test Monitoring Center

<http://astmtmc.cmu.edu>

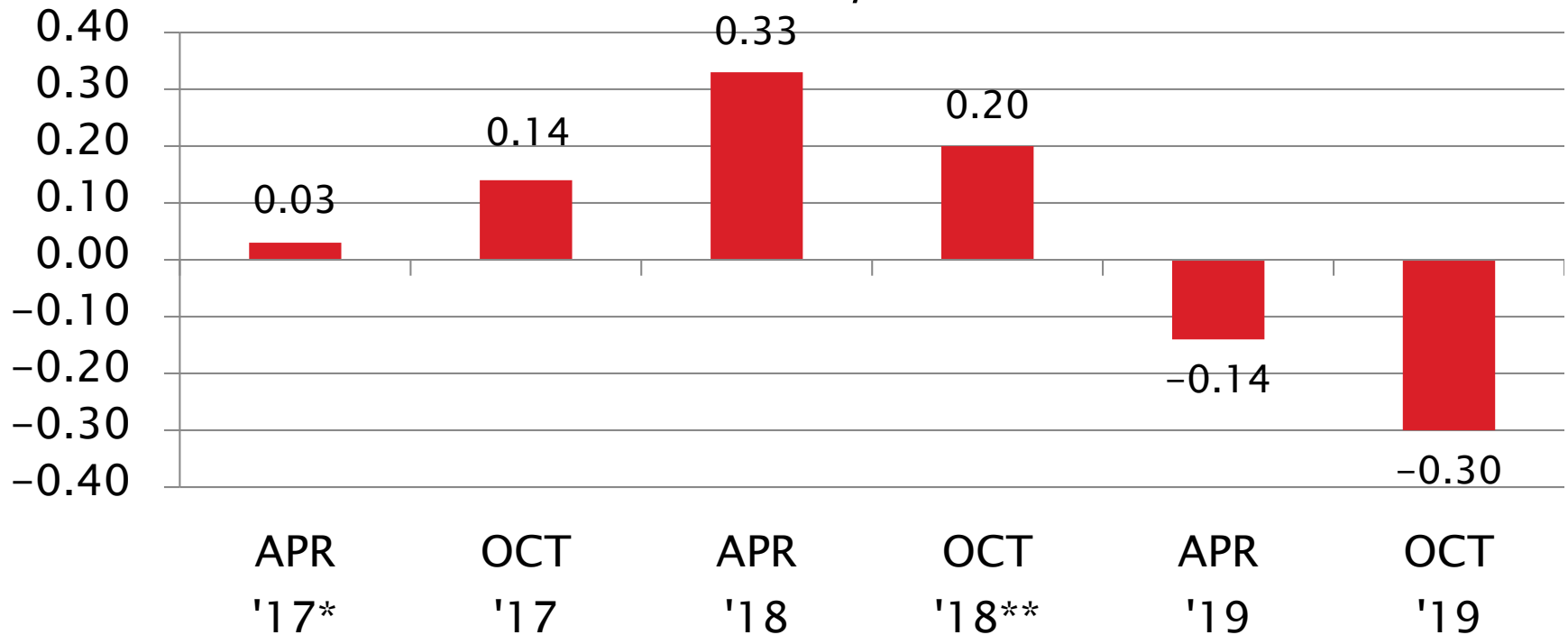


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# D7097 Severity Estimates

Total Deposits, mg

Mean  $\Delta/s$



\*Eight tests instrument J2 excluded (failed to calibrate)

\*\*One severe OC test from instrument G5 excluded (8.9 s)

Test Monitoring Center

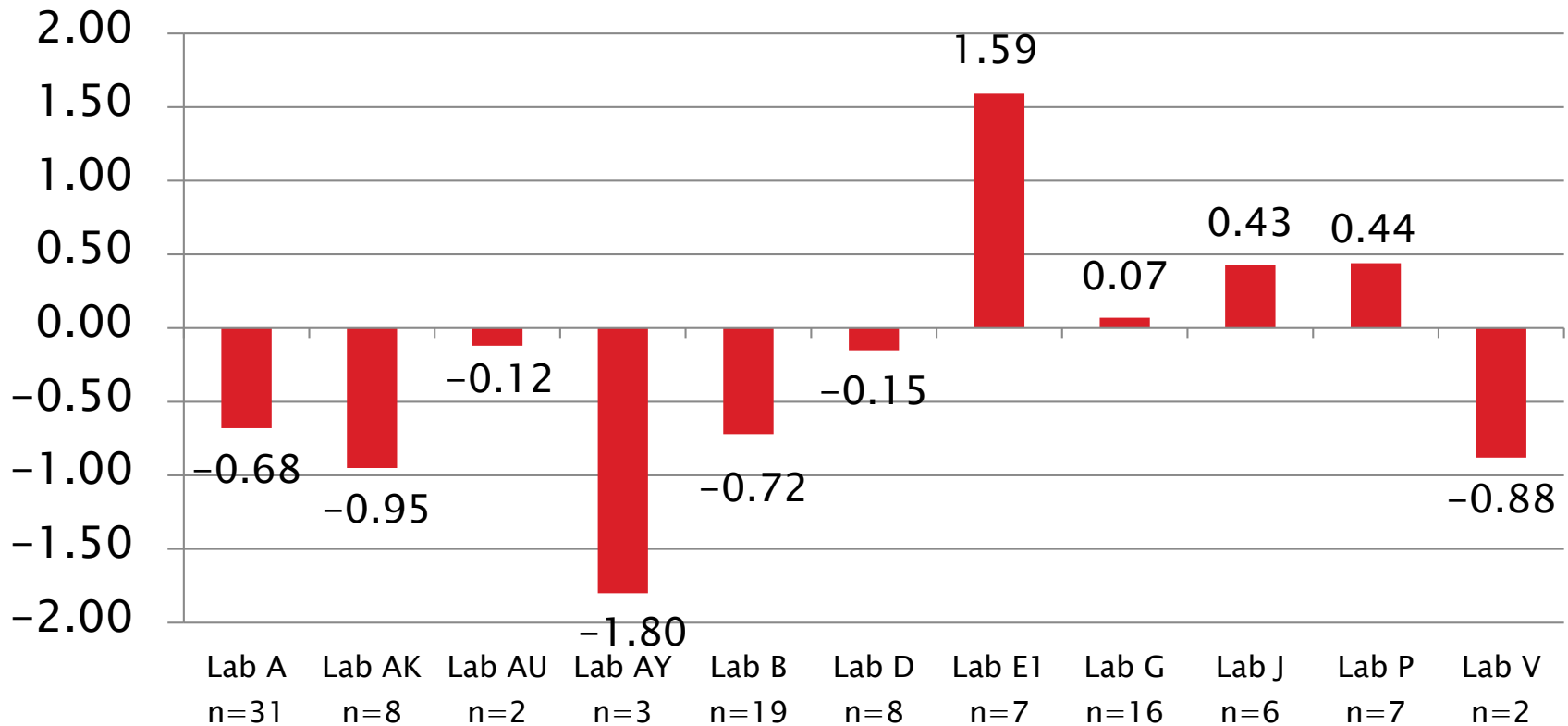
<http://astmtmc.cmu.edu>



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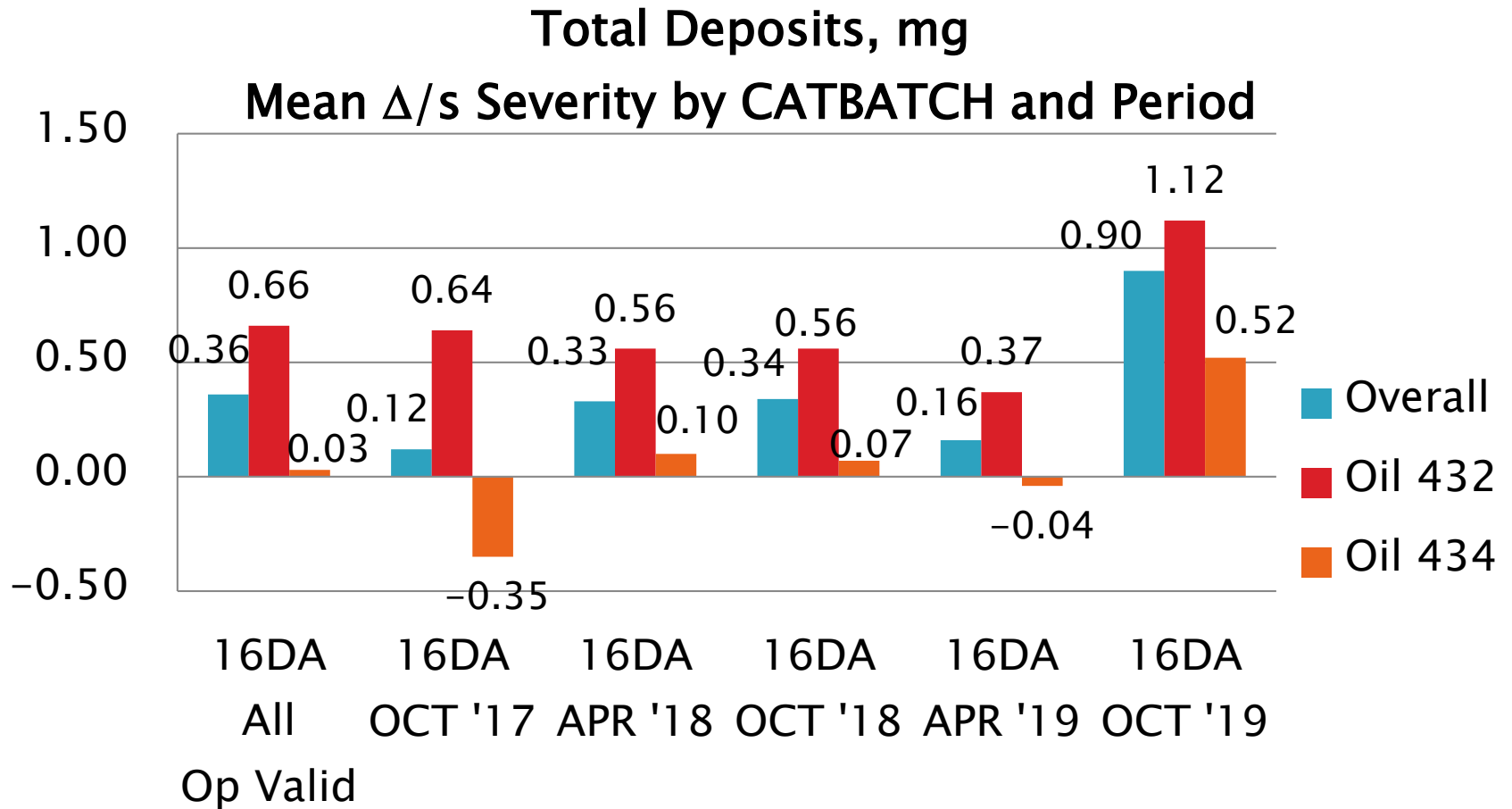
# D7097 Lab Severity Estimates

Total Deposits, mg  
Mean  $\Delta/s$



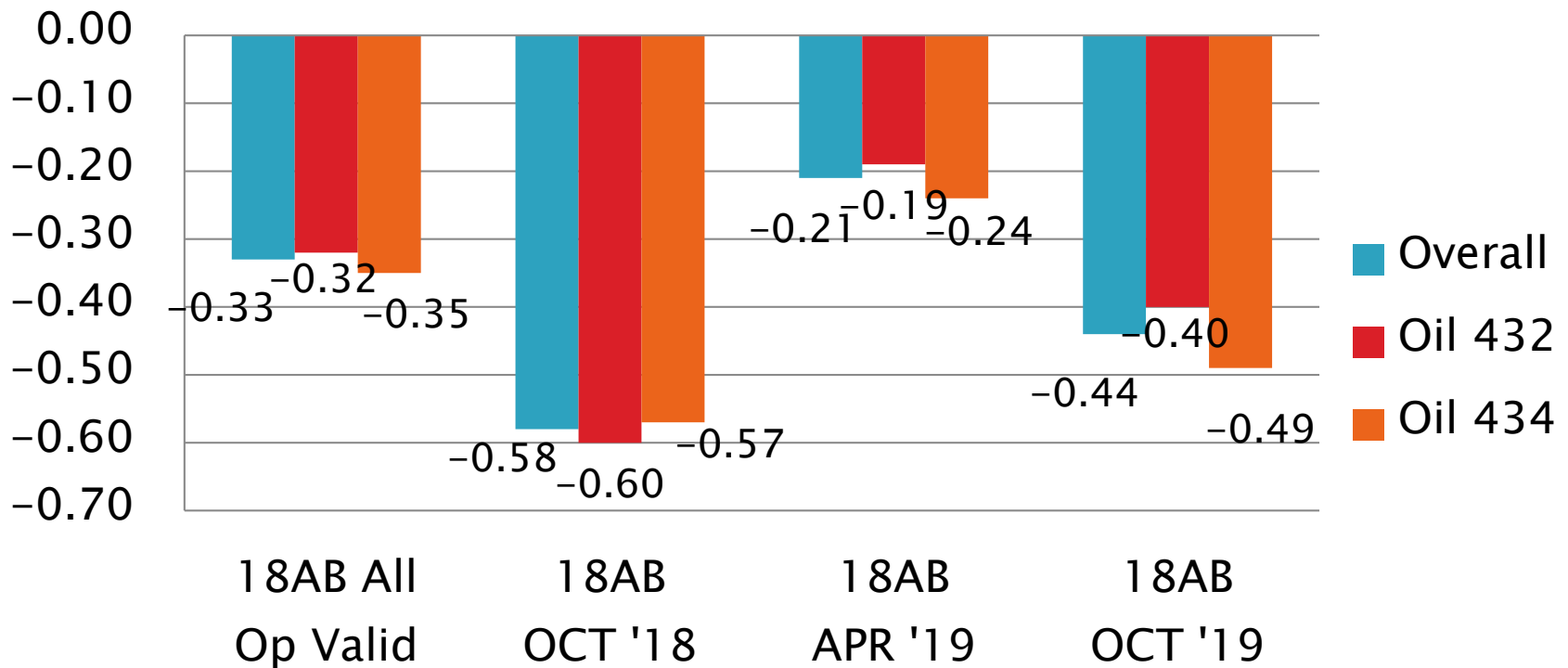


# D7097: Deposits by MHT TEOST



# D7097: Deposits by MHT TEOST

Total Deposits, mg  
Mean  $\Delta/s$  Severity by CATBATCH and Period

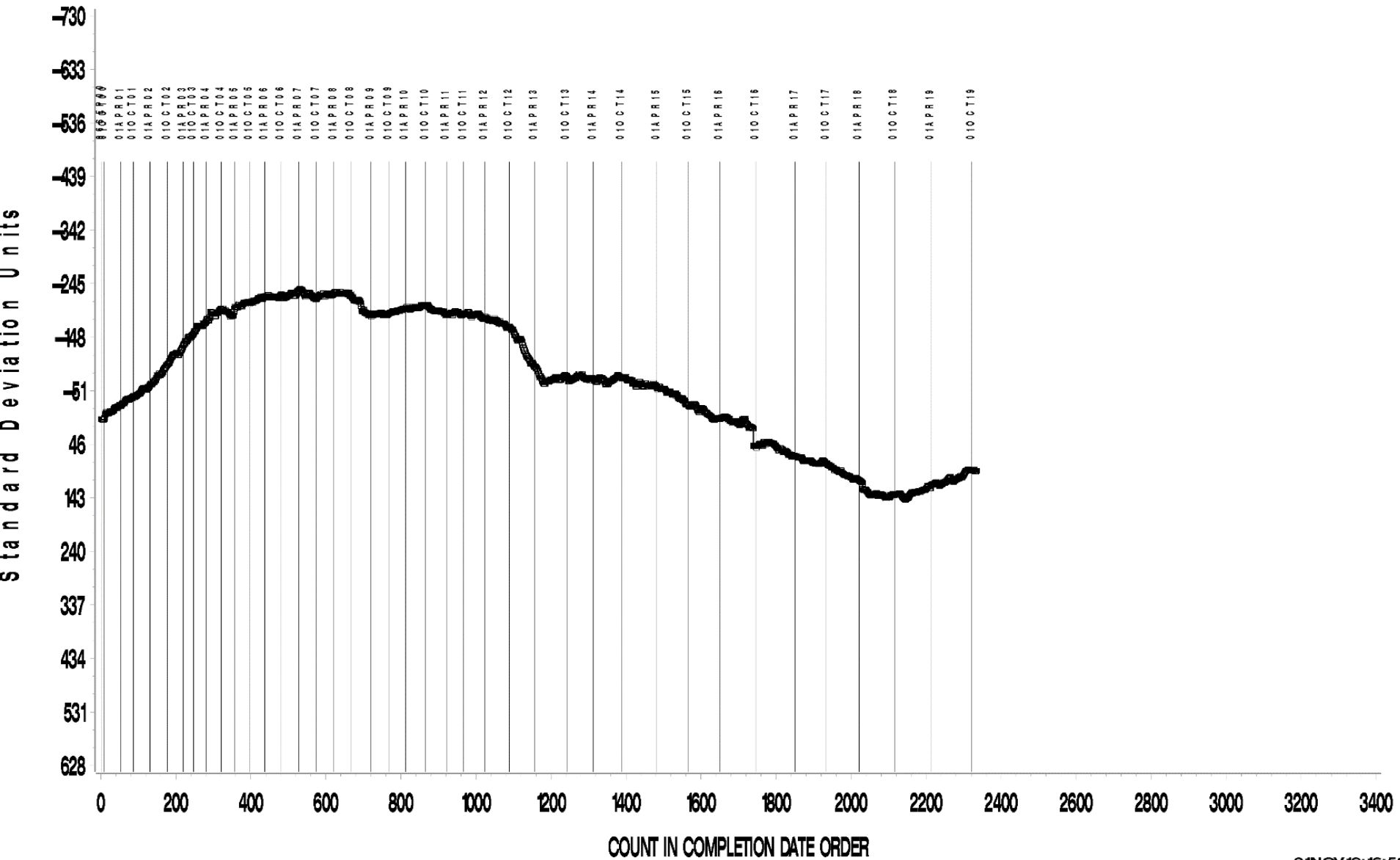


# D7097: Deposits by MHT TEOST

- ▶ Precision (Pooled  $s$ ) is less precise than the prior report period and less precise than target precision
- ▶ Performance (Mean  $\Delta/s$ ) is  $-0.30$  s mild.
- ▶ All operationally valid tests this period report using Rod Batch M
- ▶ All operationally valid calibration tests this period report using Catalyst Batch 16DA ( $n=11$ ) or 18AB ( $n=98$ ).
- ▶ Overall severity of catalyst batch 18AB ( $n=199$ ) appears to be about  $-0.3$  s mild, and comparably mild on both reference oils.

TOTAL DEPOSITS MG

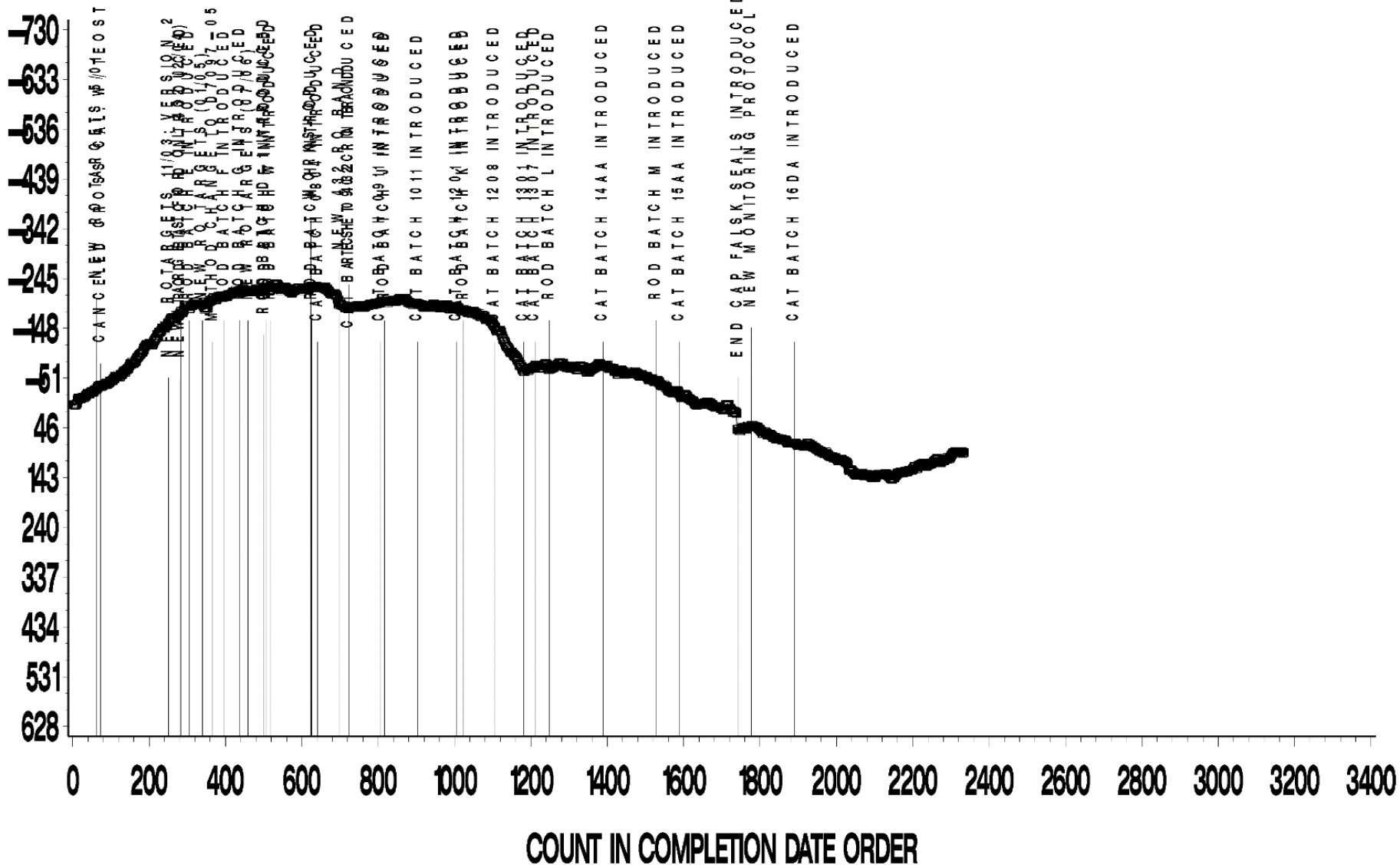
CUSUM Severity Analysis



TOTAL DEPOSITS MG

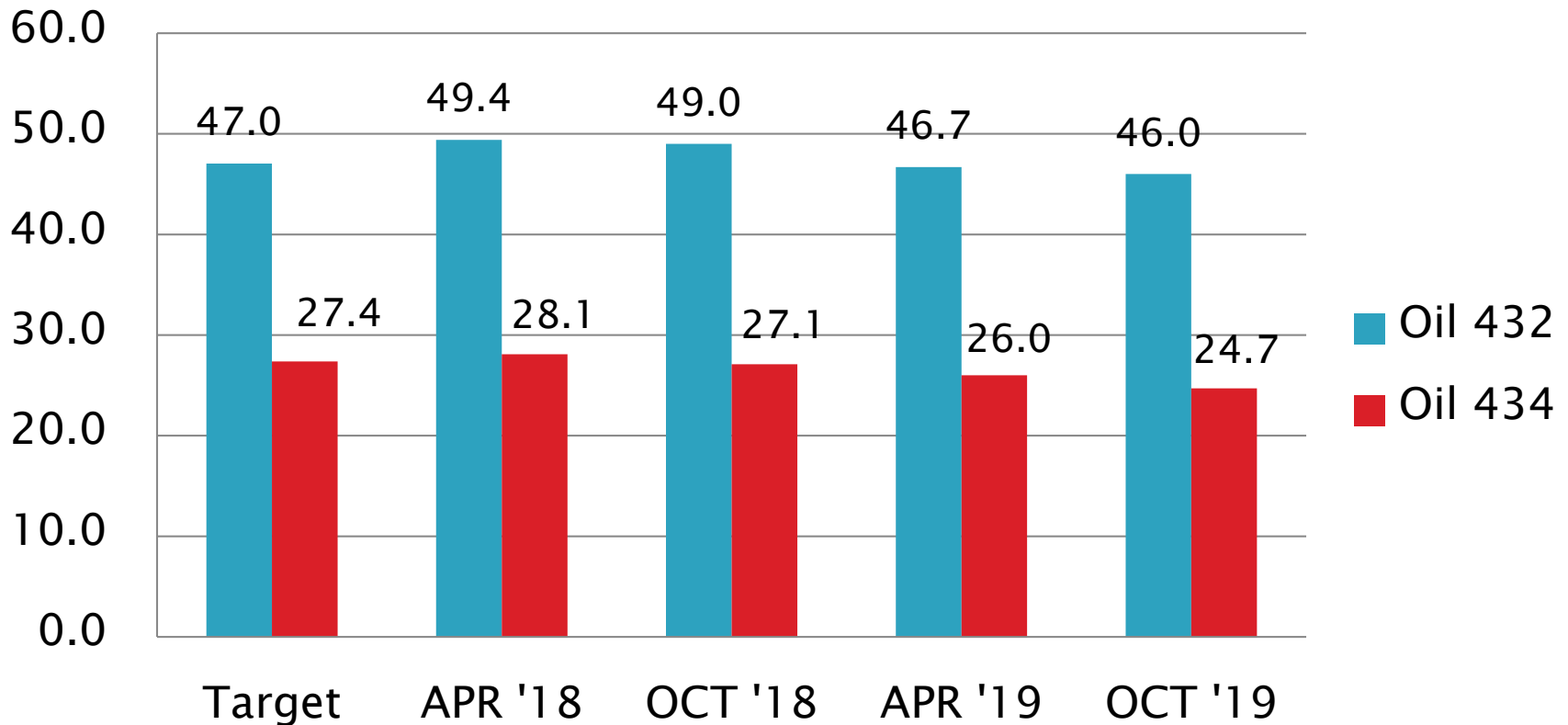
CUSUM Severity Analysis

Standard Deviation Units



# D7097 Performance by Oil

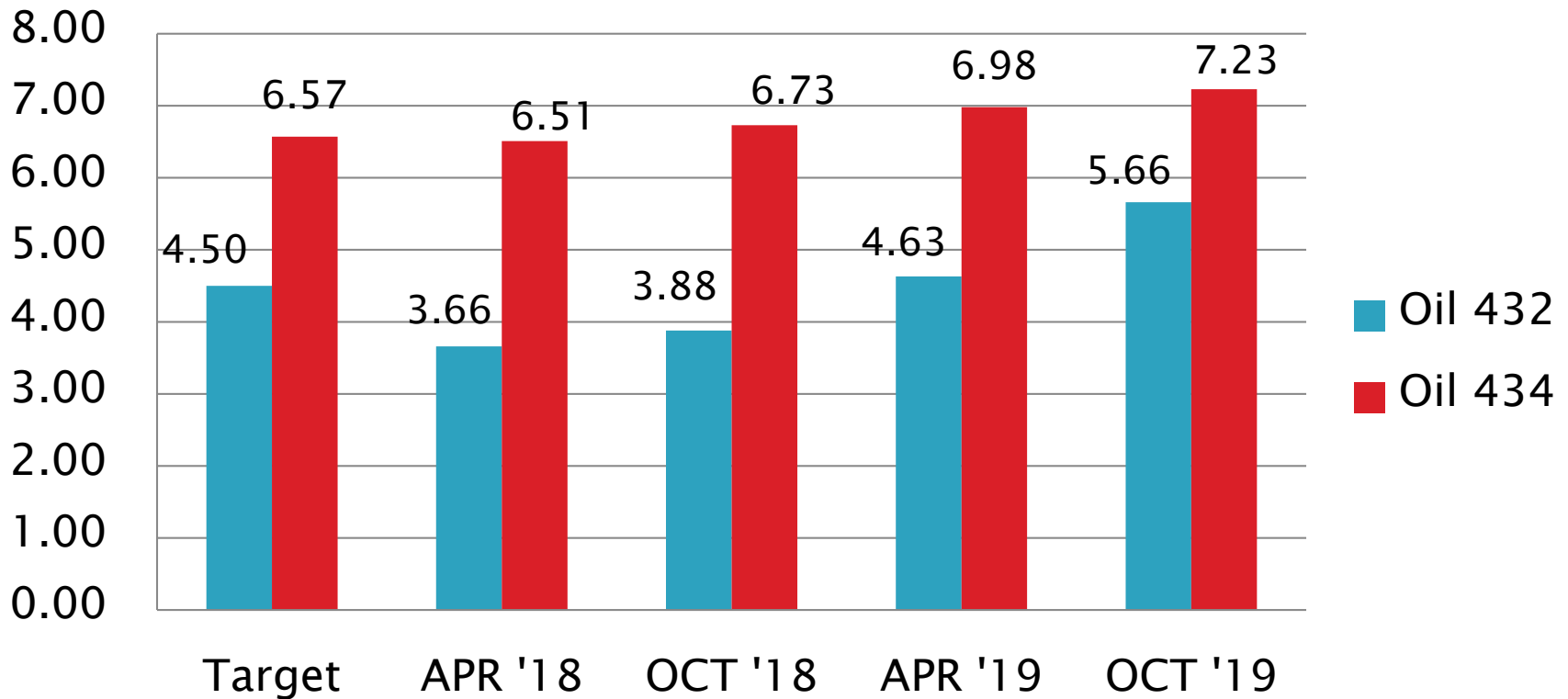
Total Deposits, mg  
Mean



# D7097: Deposits by MHT TEOST

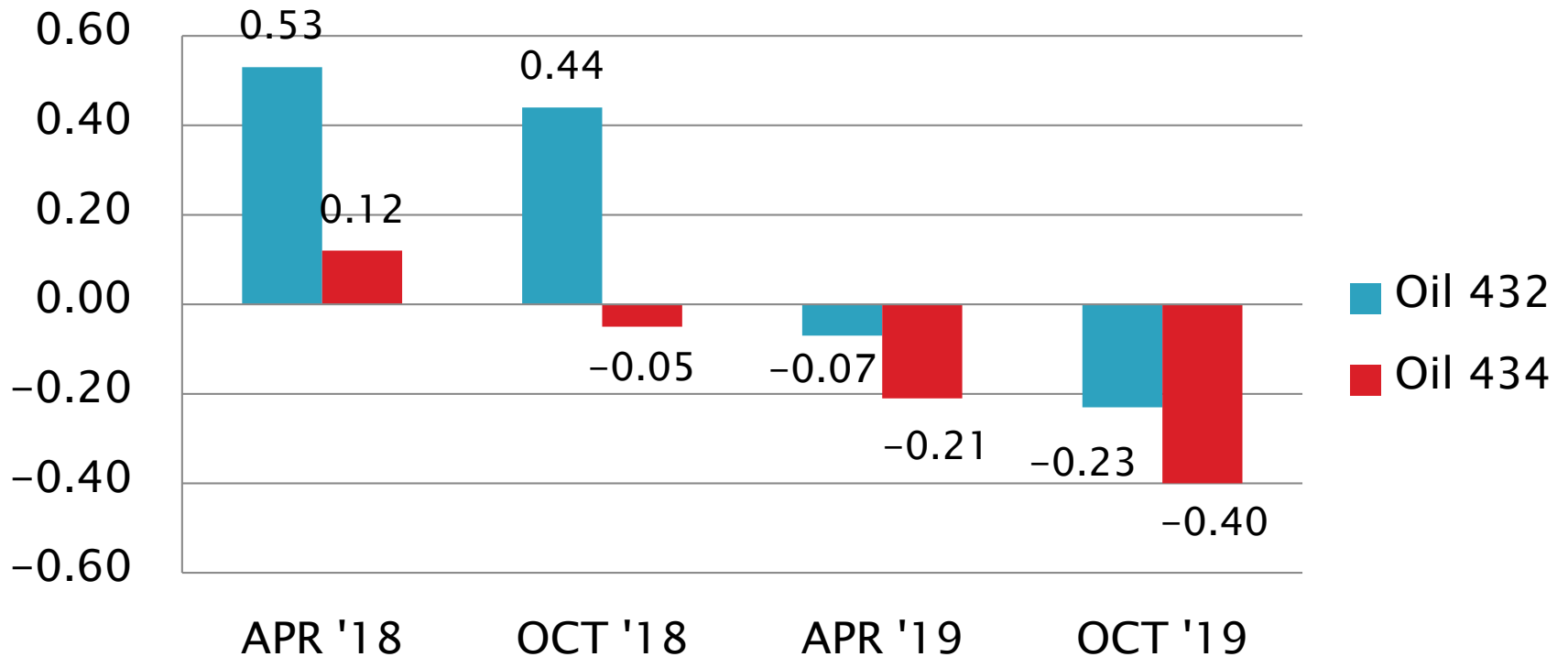
Total Deposits, mg

$S_R$



# D7097: Deposits by MHT TEOST

Total Deposits, mg  
Mean  $\Delta/s$



[Return to Executive Summary](#)



# Reference Oil Inventory

## TEOST, MTEOS & ROBO

Oil	Year Rec'd By TMC <sup>A</sup>	Tests	TMC Inventory, gallons	Gallons Shipped last 12 months
432	1998	MTEOS	103.7	0.5
434 <sup>B</sup>	2003	MTEOS	0.7	0.6
75-1	2016	TEOST	8.0	0.0
435-2 <sup>C</sup>	2010	TEOST	41.5	0.8
434-3 <sup>B,C</sup>	2017	ROBO/MTEOS	49.0	0.0

<sup>A</sup>The integrity of TMC reference oils is confirmed annually by analytical QC testing of chemical and physical properties.

<sup>B</sup> 434-3 replaces 434-2 for ROBO and proposed to replace 434 in MTEOS

<sup>C</sup> Multi-test oil; estimated aliquot reserved for bench testing.

Test Monitoring Center

<http://astmtmc.cmu.edu>



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# ASTM D7528: ROBO Surveillance Panel Update

ASTM D02.B0.07

Justin Mills | December 9, 2019

# Surveillance Panel Membership

## Last updated October 24, 2019

---

Ace Glass	Dave Lawrence, Tom Petrocella
Afton	Shelia Thompson, Jeff Yang, Todd Dvorak
ASTM TMC	Tom Schofield
BASF	
Chevron Oronite	Man Hon Tsang, Robert Stockwell
ExxonMobil	Dennis Gaal
Infineum	Andy Richie, Sapna Eticala
Intertek	Joe Franklin, Matt Schlaff
Lubrizol	Mike Faile, Aimee Shinhearl, Rick Hartman, Greg Lentz
PetroChina	Li Shaohui , Sun Ruihua, Peng Wang, Xiaogang Li, Xu Li
Evonik Oil Additives	Justin Mills, Bruce Zweitzig, Joan Souchik, Gabe Walkup, Justin Kontra
Vanderbilt Chemicals	Al Filho, Ron Hiza
SwRI	Becky Grinfield, Joe De La Cruz, Mike Birke, Yong-Li McFarland
Valvoline	Amol Savant, Kevin Figgatt, Steve Lazzara
Koehler Instruments	Raj Shah, Vincent Colantuini
Tannas/Savant	Greg Miller, Ted Selby
General Interest	Alan Flamberg

## TMC Monitoring: April 1, 2019 – September 30, 2019

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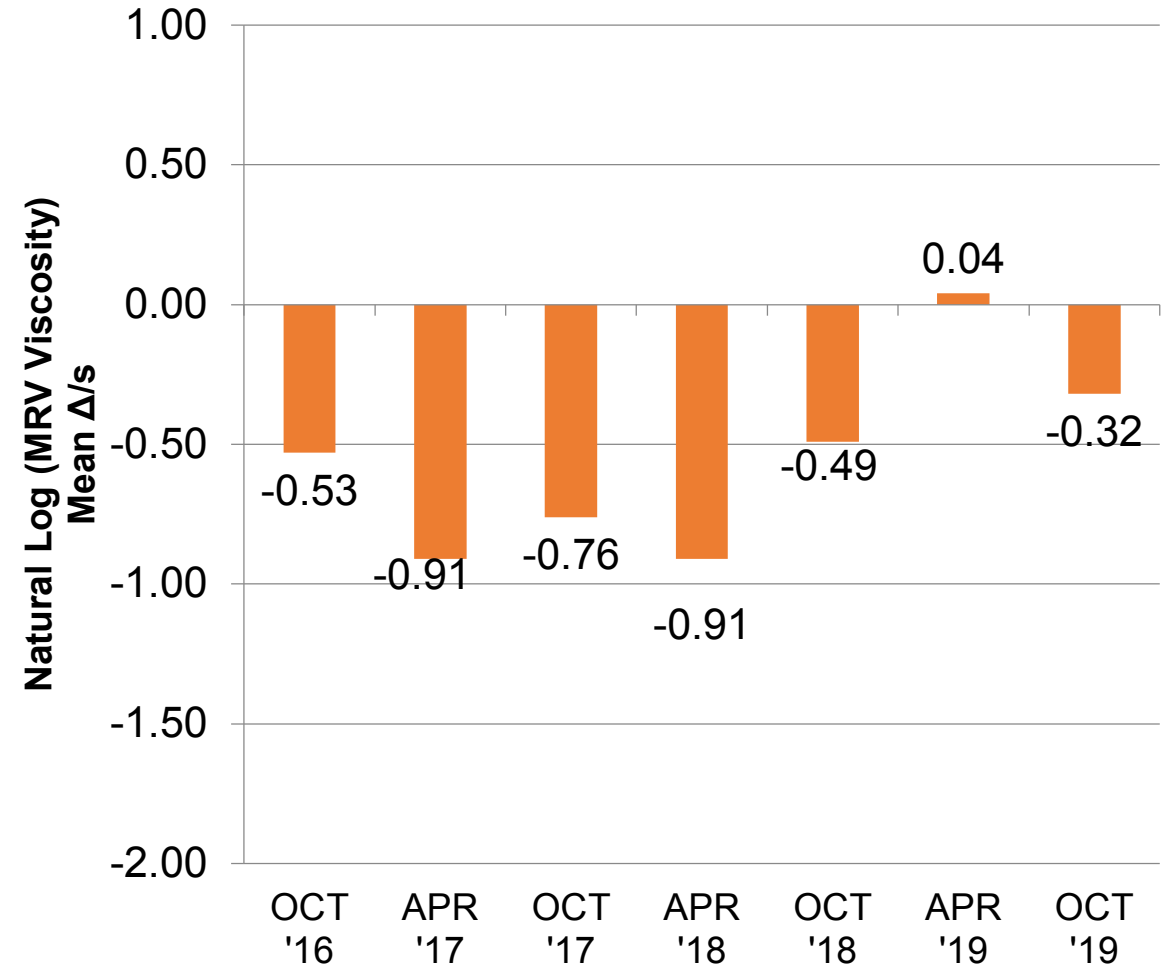
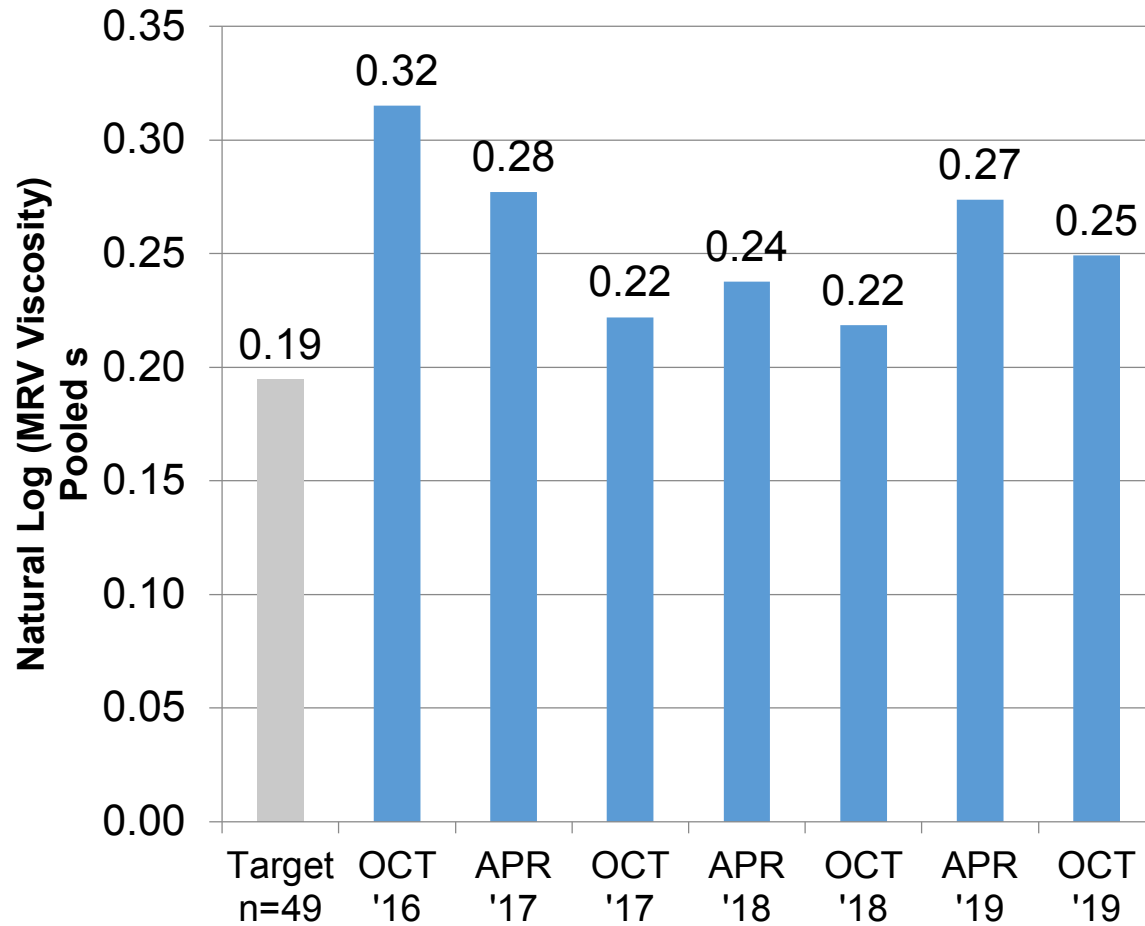
- As of 9/30/2019 there are 5 labs and 17 calibrated test stands for ROBO
- 118 calibration tests from 6 labs (Down from 146 tests in previous semester – included 20 donated runs)
  - 68% (80 AC) passed
  - 13% (15 OC) failed – 11 mild, 4 severe
  - 19% other
    - 6% (7 LC, XC) Invalid runs – 3 NO<sub>2</sub> flow issues, 2 stirrer failures, 1 exceeded run time, 1 improper sample preparation
    - 0% (0 RC) Operationally invalid after initially reported as valid
    - 14% (16 AG, LG, OG) Donated runs – 13 runs for 434-3 replacement and 3 runs for dilute NO<sub>2</sub> study
    - 0% (0 NN) Shakedown runs – Pre-calibration and/or confirming operation prior to converting to dilute NO<sub>2</sub>
- Fail Rate of Operationally Valid Tests: 16% (up from 15% as reported last period)

## ROBO Industry Statistics Based Upon LTMS Data Sets through September 30<sup>th</sup>

Period	N-size	Degrees of Freedom	Pooled s	Mean $\Delta/s$	Comments
Current Targets	49	46	0.1945	-----	
4/1/16 through 9/30/16	74	71	0.3152	-0.53	
10/1/16 through 3/31/17	78	75	0.2771	-0.91	
4/1/17 through 9/30/17	99	95	0.2220	-0.76	
10/1/17 through 3/31/18**	90	86	0.2376	-0.91	Period statistics with and without seven suspect results from two rigs
10/1/17 through 3/31/18**	83	79	0.2076	-0.74	
4/1/18 through 9/30/18	126	122	0.2184	-0.49	
10/1/18 through 3/31/19	100	96	0.2738	0.04	
4/1/19 through 9/30/19	95	91	0.2492	-0.32	

- Precision is slightly improved since last semester; however, still less precise than target.
- Test is running with a slight mild bias.

# ROBO precision and bias

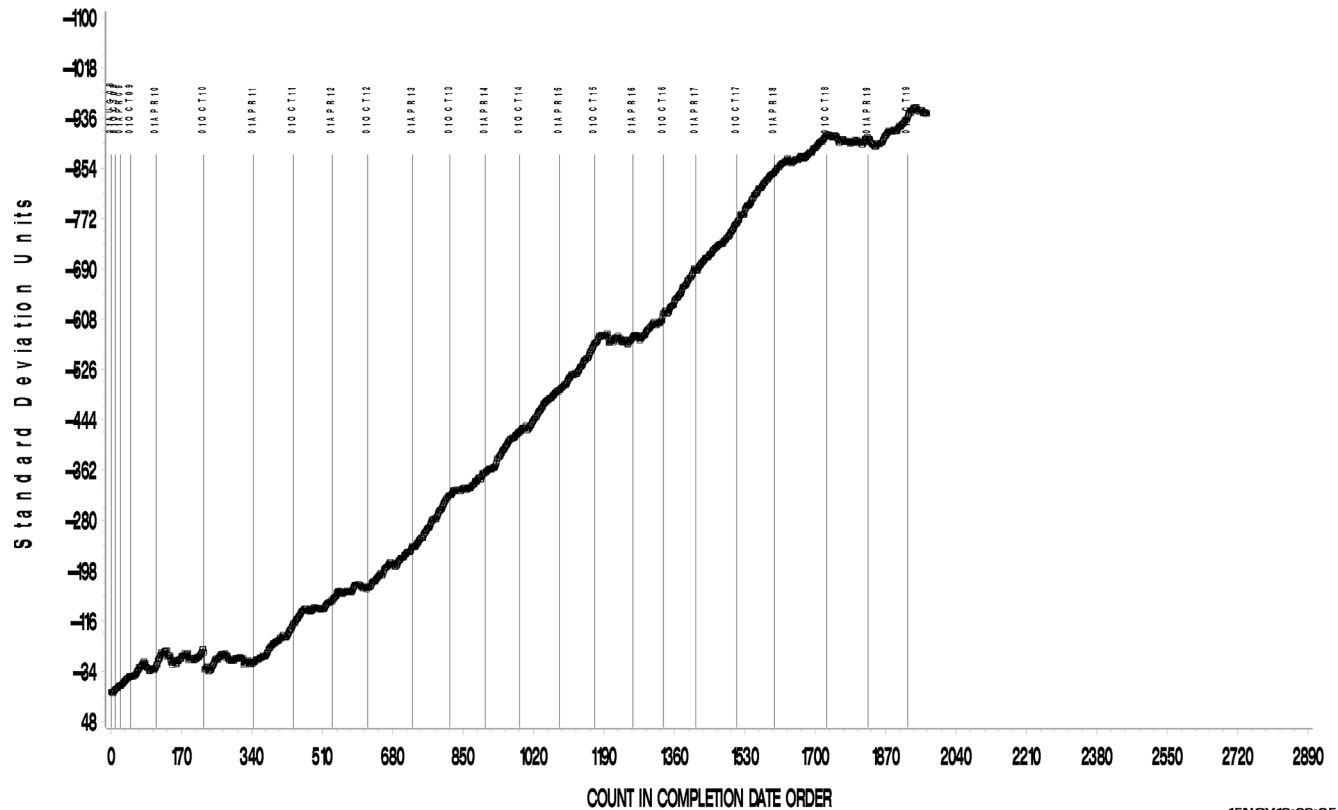


# CUSUM Severity Analysis

ROBO TEST INDUSTRY OPERATIONALLY VALID DATA  
AGED OIL MRV APPARENT VISCOSITY



CUSUM Severity Analysis



- CUSUM Severity Plot shows an overall mild trend since the 01APR11 timeline
- Leveling off from October 2018 through March 2019 (indicating no bias)
- Mild trend resumed through October 2019
  - 3 of 5 labs ran mild in semester
- Running slightly severe in current semester



## D7528 (ROBO) TMC Calibration Requirements

Oil	n	Natural Log Transformed Mean (ln)	Mean in Original Units	s.d. (ln)	95% band in mPa's Min <sup>1</sup>	95% band in mPa's Max <sup>1</sup>	95% Bands Min (ln)	95% Bands Max (ln)
434-1	13	10.6599	42,612	0.1672	30,706	59,136	10.3322	10.9876
434-2	36	<sup>2</sup> 10.9284	<sup>2</sup> 55,737	0.1551	<sup>2</sup> 41,126	<sup>2</sup> 76,008	<sup>2</sup> 10.6244	<sup>2</sup> 11.2386
434-3	13	<sup>2</sup> 10.8411	<sup>2</sup> 51,078	0.1342	<sup>2</sup> 39,265	<sup>2</sup> 66,443	<sup>2</sup> 10.5781	<sup>2</sup> 11.1041
435	15	11.4895	97,685	0.2932	<sup>3</sup> 60,000	173,546	<sup>3</sup> 11.0021	12.0642
435-1	22	11.0416	62,420	0.20295	<sup>4</sup> 44,570	92,910	<sup>4</sup> 10.7048	11.4394
438	14	10.2676	28,785	0.2037	19,308	42,912	9.8683	10.6669
438-2	19	<sup>2</sup> 10.5404	<sup>2</sup> 37,813	0.2596	<sup>2</sup> 22,734	<sup>2</sup> 62,894	<sup>2</sup> 10.0316	<sup>2</sup> 11.0492

<sup>2</sup> A bias adjustment has been applied to the mean of reference oils 434-2, 434-3 and 438-2 to account for biases observed in the TMC reference data during the periods that each oil target dataset was generated.

Source: ASTM Test Monitoring Center Requirements for Engine Test Stand/Laboratory Calibration (11-2019)

## Reference oil supply

---

TMC Reference Oil	Year received by TMC	TMC inventory for ROBO, gallons	Shipped last 12 months, gallons	Comments
434-2	2014	4.4	6.4	To be replaced by 434-3
434-3	2017	49.0	0.0	Replacement for 434-2
435-1	2008	405	17.9	Ample supply. No issues to report.
438-2	2017	46.8	1.5	Replacement for 438

No issues to report. Ample supply of **current** reference oils.

## Surveillance Panel Meetings: April 1, 2019 through today

---

- April 11, 2019
  - SP agreed to evaluate 434-3 as a replacement for 434-2 due to low inventory.
  - SP agreed that results using dilute NO<sub>2</sub> and concentrated NO<sub>2</sub> were comparable – next step will be to update method/procedure to include dilute NO<sub>2</sub> as an approved alternative.
- June 20, 2019
  - Initial results for TMC 434-3 reviewed (only 6 available) and determined to be suitable replacement for 434-2. SP agreed more data was needed for final assessment and limit setting.
- August 8, 2019
  - Primary topic of this meeting was method housekeeping. A number of potential changes were discussed. SP agreed to track changes and do bulk update coinciding with dilute NO<sub>2</sub> revision.
- October 24, 2019
  - Final limits for 438-2 were set.
  - Interim limits for 434-3 were set.
  - Justin Mills and Tom Schofield agreed to work on dilute NO<sub>2</sub> method revision in early 2020.
- Next meeting will be January or February 2020.

## Surveillance panel plans for this semester

---

- Reference Oils:

- Approve permanent limits for TMC 434-3 once >20 data points are available.

- Dilute NO<sub>2</sub>:

- Draft and implement dilute NO<sub>2</sub> procedure in ASTM D7528

- Expect to have draft completed in Q1 2020.






- Method housekeeping:

- Section 9 of the method needs to be updated. Footnote #11 is no longer valid because calibration requirements for ROBO will no longer be a standalone document and will instead be included in TMC's LTMS document.

- SP is reviewing method for any other area that may require attention.

# Summary

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Status	Test Aspect	Comments
	Method	<ul style="list-style-type: none"><li>▪ ASTM D7528-17a was published in October 2017.</li><li>▪ Monitored by the TMC</li><li>▪ Active Surveillance Panel</li></ul>
	Parts Availability	<ul style="list-style-type: none"><li>▪ All ROBO hardware and test materials are available</li><li>▪ Nitrogen dioxide, the primary catalyst for ROBO, is available from multiple suppliers</li></ul>
	Reference Oils	<ul style="list-style-type: none"><li>▪ All current reference oils are in good supply at TMC:<ul style="list-style-type: none"><li>▪ TMC 438-2 limits finalized</li><li>▪ Interim limits for TMC 434-3</li></ul></li></ul>
	Test Availability	<ul style="list-style-type: none"><li>▪ ROBO test is available at 2 independent labs and 3+ dependent labs</li><li>▪ Queue building at independent test labs due to GF-6 qualification.</li></ul>
	Severity and Precision	<ul style="list-style-type: none"><li>▪ Precision is slightly improved since last semester; however, still less precise than target.</li><li>▪ Test ran with slight mild bias April 2019 – September 2019, but currently running slightly severe.</li></ul>

**ASTM D6795**  
**Engine Oil Filterability Test (EOFT)**  
**and**  
**ASTM D6794**  
**Engine Oil Water Tolerance Test (EOWTT)**

December 9, 2019  
New Orleans Marriott Hotel  
New Orleans, LA

Yong-Li McFarland  
Chair



# Surveillance Panel Membership

## 16 members

Ernest Morel, Afton Chemical

Man Hon Tsang, Chevron Oronite

Dennis Gaal, Exxonmobil

Joe Franklin, Intertek

Udo Boecker, ISP

Michael Johnscher, ISP

Jeff Winfield, Lubrizol

Litchi Xie, Lubrizol Additive (Zhuhai) Co., Ltd.

Michael Faile, Lubrizol

Jason Bowden, OH Technologies Inc

Greg Miiller, Savant Inc.

Becky Grinfield, SwRI

Yong-Li McFarland\*, SwRI

Brittany Pfleegor, TMC

Frank Farber, TMC

Hap Thompson

\*Chair

## Scope and Objective

It is the responsibility of this panel to provide surveillance over Test Methods D6794 and D6795 bench tests used in the ILSAC and API passenger car oil categories. The surveillance panel will review data semi-annually supporting the precision for each bench test and when necessary, conduct workshops to bring the bench tests within accepted limits. The surveillance panel will function with the support of the ASTM Test Monitoring Center (TMC) in an effort to monitor the bench tests and maintain appropriate and adequate supplies of reference oils for the monitoring process. The panel will maintain a liaison with the “expert groups” in ASTM, which may help in the maintenance and improvement of the bench test methods used in support of the current ILSAC and API categories. The surveillance panel will make recommendations for appropriate action through Subcommittee D02.B, Section 7.



# ASTM D6795 Engine Oil Filterability Test (EOFT)

**Title:** Standard Test Method For Measuring The Effect On Filterability Of Engine Oils After Treatment With Water And Dry Ice And A Short (30 min) Heating Time

## Current Business

- 6 labs calibrated
- Worsened 3.6% fail rate of operational valid tests
- CIFA Severity, by CUSUM plotting, is slightly mild
- Precision, by pooled standard deviation, has improved to 5.56 from 6.73 (last period)
- 1 reference oil, Oil 79, a reblend of oil 78-2
- **Test in maintenance mode**
  
- Method became D6795-19

Test Distribution	Oil 79
Accepted for Calibration (AC)	160
Failed Acceptance Criteria (OC)	2
Aborted Calibration (XC)	0
Acceptable Shakedown (NN)	0
Unacceptable Shakedown (MN)	0
Invalid Shakedown (LN)	0
Total	162 (144*)

\* Previous period total

Reference Oil Supply	Oil 79
Samples at Labs	129
Gallons shipped in last 6 months	66.8
Gallons at TMC	535.4

Period: April 1, 2019 to September 30, 2019





# ASTM D6794 Engine Oil Water Tolerance Test (EOWTT)


**Title:** Standard Test Method For Measuring The Effect On Filterability Of Engine Oils After Treatment With Various Amounts Of Water And A Long (6 H) Heating Time

## Current Business

- 5 labs calibrated
- Improved 0.82% fail rate of operational valid tests
- CIFA Severity, by CUSUM plotting, was severe for all treat rates
- Precision, by pooled standard deviation, is slightly better than previous periods, but comparable to historical values
- 2 reference oils, Oil 79 and Oil 77-3
- **Test in maintenance mode**
- Teleconference in March held approved updates to method with Info Letter 19-1 issued April 1, 2019, became D6794-19
- Teleconference in November held to update method to match current process of testing at each treat level, not required to run all 4.

Period: April 1, 2019 to September 30, 2019

Test Distribution	Oil 77-3	Oil 79	Total
Accepted for Calibration (AC)	481	477	958
Failed Acceptance Criteria (OC)	5	3	8
Aborted (XC)	5	1	6
Acceptable Shakedown (NN)	0	0	0
Unacceptable Shakedown (MN)	0	0	0
Total	491	481	972 (865*)

\* Previous period total 

Reference Oil Supply	Oil 77-3	Oil 79	Total
Samples at Labs	107	110	217
Gallons shipped in last 6 months	47	67	114
Gallons at TMC	672	535	1207

## Old EOFT & EOWTT Business

EOWTT reference oil contaminants update:

- TMC sending CMIRs in Nalgene bottles

TMC effort to add EOWTT & EOFT to LTMS in near future

## New EOFT & EOWTT Business

None

Thanks to TMC and Brittany Pfleegor!



# D6082 High Temperature Foam Surveillance Panel Report

ASTM Subcommittee D02.B0.07

December 2019

New Orleans, LA

Matt Schlaff

# Member List

First Name	Last Name	Company	Email
Andrew	Ritchie	INFINEUM USA L. P.	andrew.ritchie@infineum.com
Ariana	Marbley	Chevron Global Lubricants	amzp@chevron.com
Damian	Beardmore	Afton Chemical Ltd.	Damian.Beardmore@AftonChemical.com
Dan	Dotson	The Valvoline Company	ddotson@ashland.com
Earl	Hap Thompson	PPL Standards Development	hapjthom@aol.com
George	Pearson	The Lubrizol Corporation	george.pearson@lubrizol.com
Gilbert	Reinhard	Intertek Automotive Research	gil.reinhard@intertek.com
Ginny	O'Neil	Savant, Inc.	voneil@savantgroup.com
Gordon	Farnsworth	INFINEUM USA L. P.	gordon.farnsworth@infineum.com
Gordon	Cox	Tannas Company	gcox@savantgroup.com
Greg	Miller	Tannas Company	gmiiller@savantgroup.com
Janet	Barker	Southwest Research Institute	jbarker@swri.org
Jeanne	Jenks	Southwest Research Institute	jjenks@swri.org
Joe	Franklin	Intertek Automotive Research	joe.franklin@intertek.com

# Member List (cont)

First Name	Last Name	Company	Email
Kaustav	Sinha	Chevron Oronite Company, LLC	LFNQ@chevron.com
Maggie	Smerdon	Savant, Inc.	msmerdon@savantgroup.com
Matt	Schlaff	Intertek Automotive Research	matt.schlaff@intertek.com
Michael	Long	Chevron Global Lubricants	melo@chevrontexaco.com
Rebecca	Grinfield	Southwest Research Institute	bgrinfield@swri.org
Rick	Hartman	The Lubrizol Corporation	rick.hartman@lubrizol.com
Samina	Azad	Savant, Inc.	sazad@savantgroup.com
Tara	Kirchner	The Lubrizol Corporation	tara.kirchner-jean@lubrizol.com
Ted	Selby	Savant Incorporated	tselby@savantgroup.com
Tom	Schofield	ASTM Test Monitoring Center	tms@astmtmc.cmu.edu
WenTong	Lu	Research Institute of	luwt.ripp@sinopec.com
Yong-Li	McFarland	Southwest Research Institute	yongli.mcfarland@swri.org
Yvette	Mauricia	Chevron Global Lubricants	ymah@chevron.com

# Overview

Test Status	Validity Code	No. Tests
Acceptable Calibration Test	AC	14
Acceptable Discrimination Test	AS	6
Failed Calibration Test	OC	0
Failed Discrimination Test	OS	0
Operationally Invalidated by Lab	LC, LS	0
Operationally Invalidated After Initially Reported as Valid	RC	0
Instrument Shakedown Run	NN	0
<b>Total</b>		<b>21</b>

Number of Labs Reporting Data: 6

Fail Rate of Operationally Valid Calibration Tests: 0%

# Unacceptable Tests

<b>Statistically Unacceptable Tests (OC,OS)</b>	<b>No. Of Tests</b>
Foam Tendency Mild	0
Foam Tendency Severe	0

- Six of seven severe oil discrimination runs (on TMC oil 66) demonstrated acceptable discrimination.
  - Discrimination runs are not evaluated for overall period precision or severity due to poor test precision above 100 ml foam tendency.
- No invalid runs this period.
- One instrument shakedown run reported (new instrument).
- Calibration requirement updates are issued as LTMS document updates.

# Precision and Severity

Period Precision and Severity Estimates Oil 1007

Foam Tendency, ml	n	Mean	Pooled s	Mean $\Delta/s$
<b>Current Targets</b>	<b>28</b>	<b>65.71</b>	<b>19.28</b>	-----
10/1/15 through 3/31/16	8	58	10	-0.45
4/1/16 through 9/30/16	12	59	18	-0.38
10/1/16 through 3/31/17	14	54	19	-0.62
4/1/17 through 9/30/17	12	69	10	0.17
10/1/17 through 3/31/18*	14	66	17	-0.02
10/1/17 through 3/31/18*	13	62	11	-0.19
4/1/18 through 9/30/18	14	65	9	-0.07
10/1/18 through 3/31/19	14	65	12	-0.07
<b>4/1/19 through 9/30/19</b>	<b>14</b>	<b>12</b>	<b>12</b>	<b>-0.18</b>

\*Single OC result  $Y_i=2.3$  s severe included and excluded



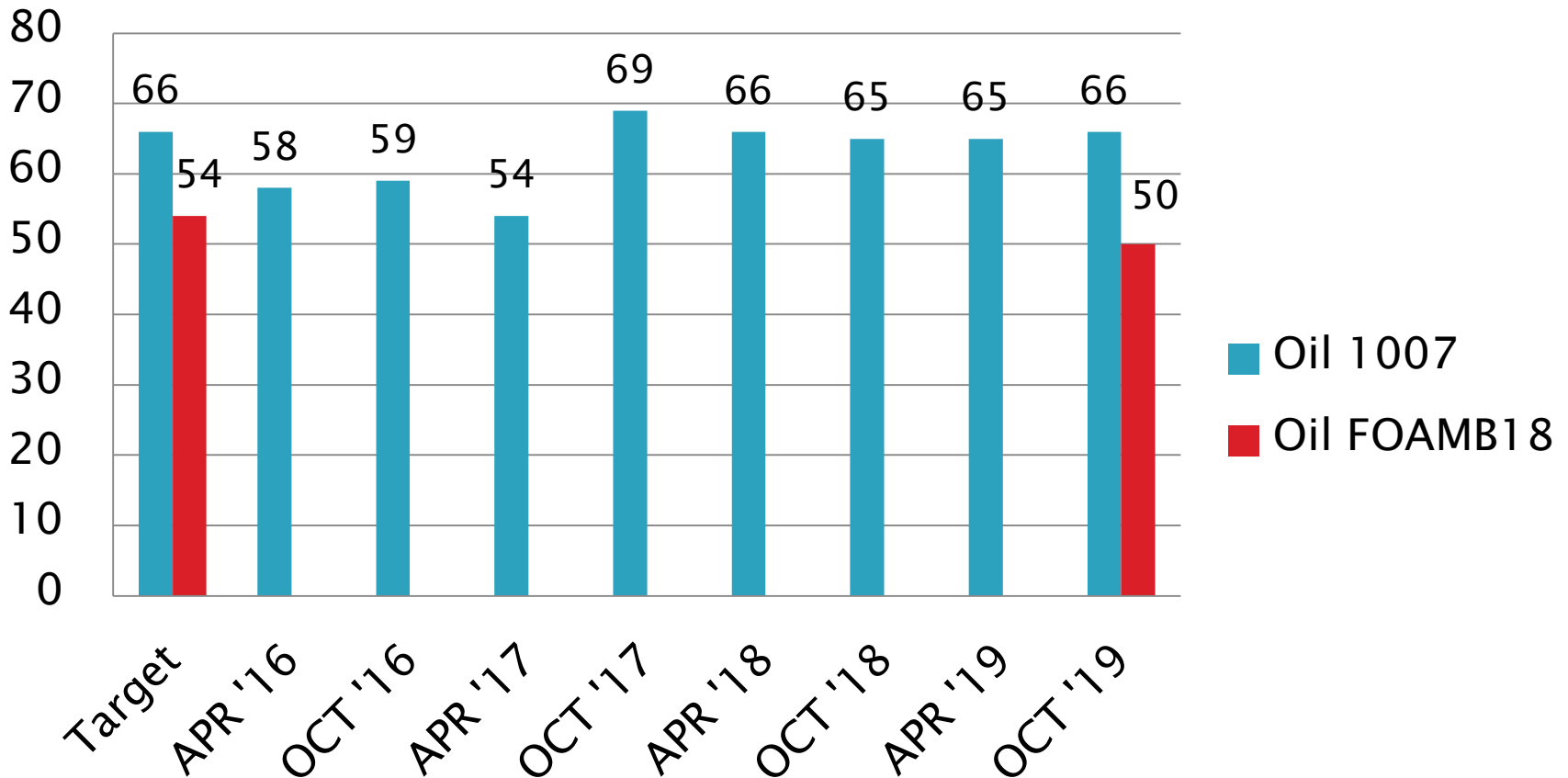
# Foam Stability @ 1 min: Precision and Severity

Period Precision and Severity Estimates Oil 1007

Date	n	Mean	s
Current Targets	28	0.00	19.28
10/1/15 through 3/31/16	8	No non-zero occurrences	
4/1/16 through 9/30/16	12	No non-zero occurrences	
10/1/16 through 3/31/17	14	No non-zero occurrences	
4/1/17 through 9/30/17	12	No non-zero occurrences	
10/1/17 through 3/31/18	14	No non-zero occurrences	
4/1/18 through 9/30/18	14	No non-zero occurrences	
10/1/18 through 3/31/19	14	No non-zero occurrences	
4/1/19 through 9/30/19	14	No non-zero occurrences	

# Mean: By Period

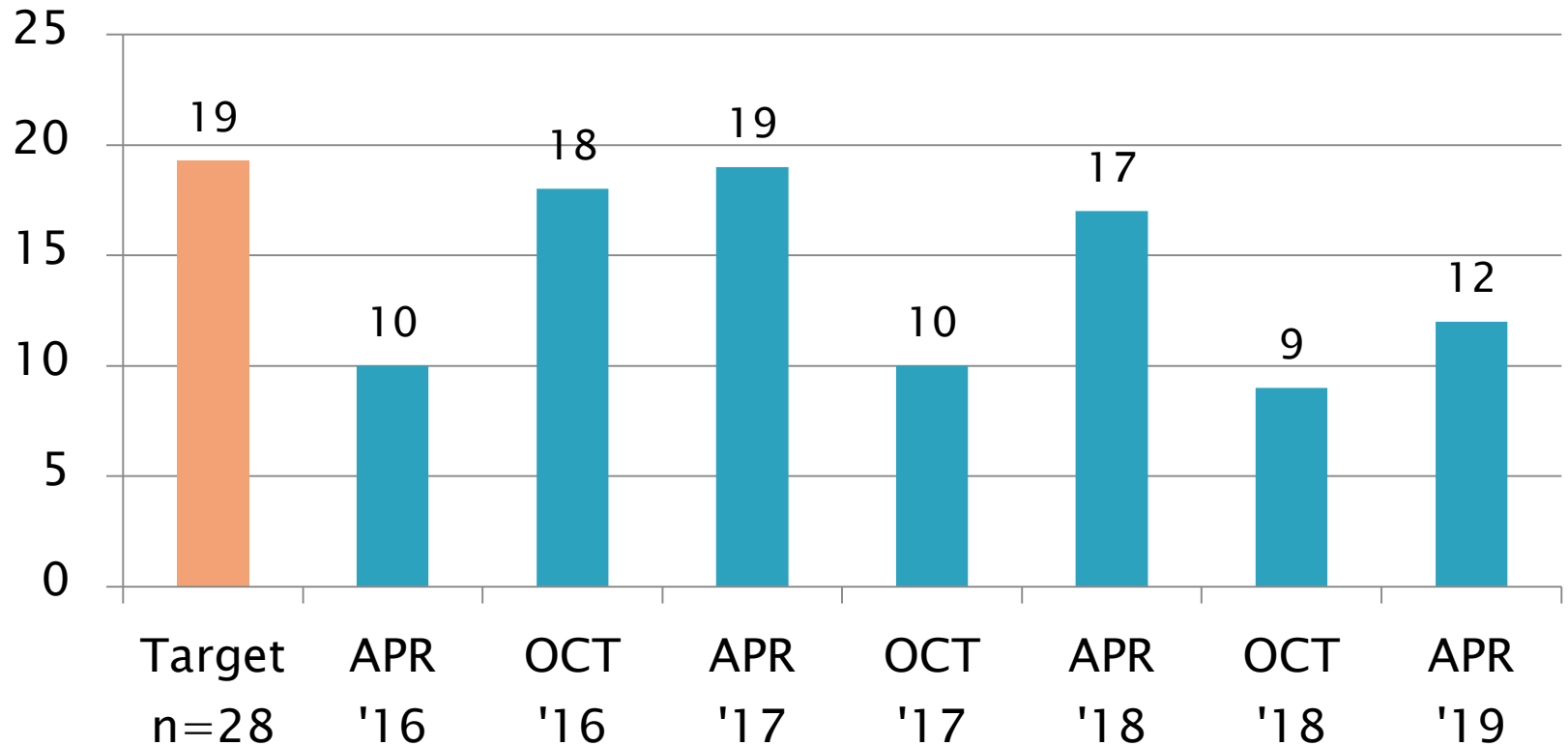
Foam Tendency, ml  
Mean



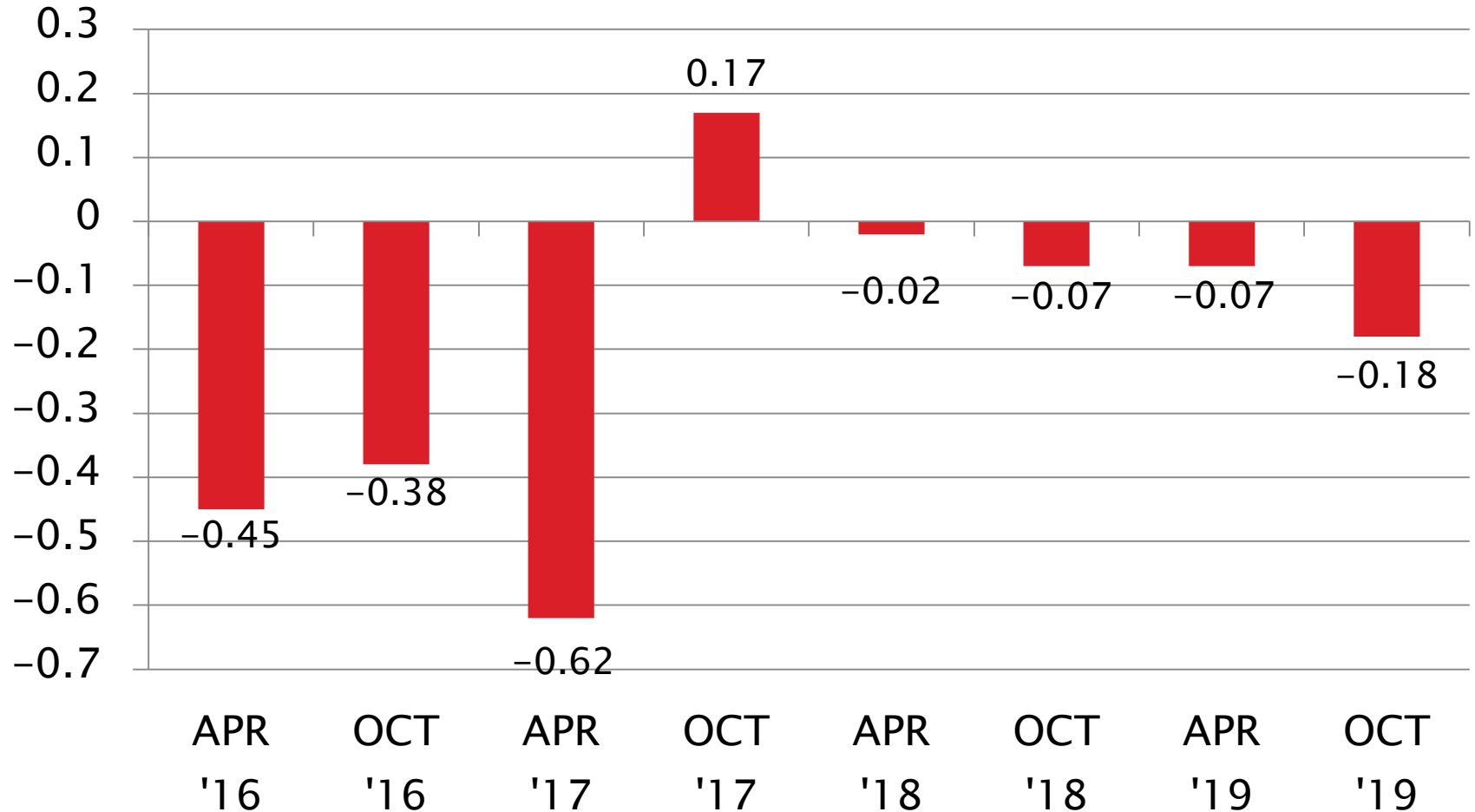
# Precision: By Period

Foam Tendency, ml

Pooled s

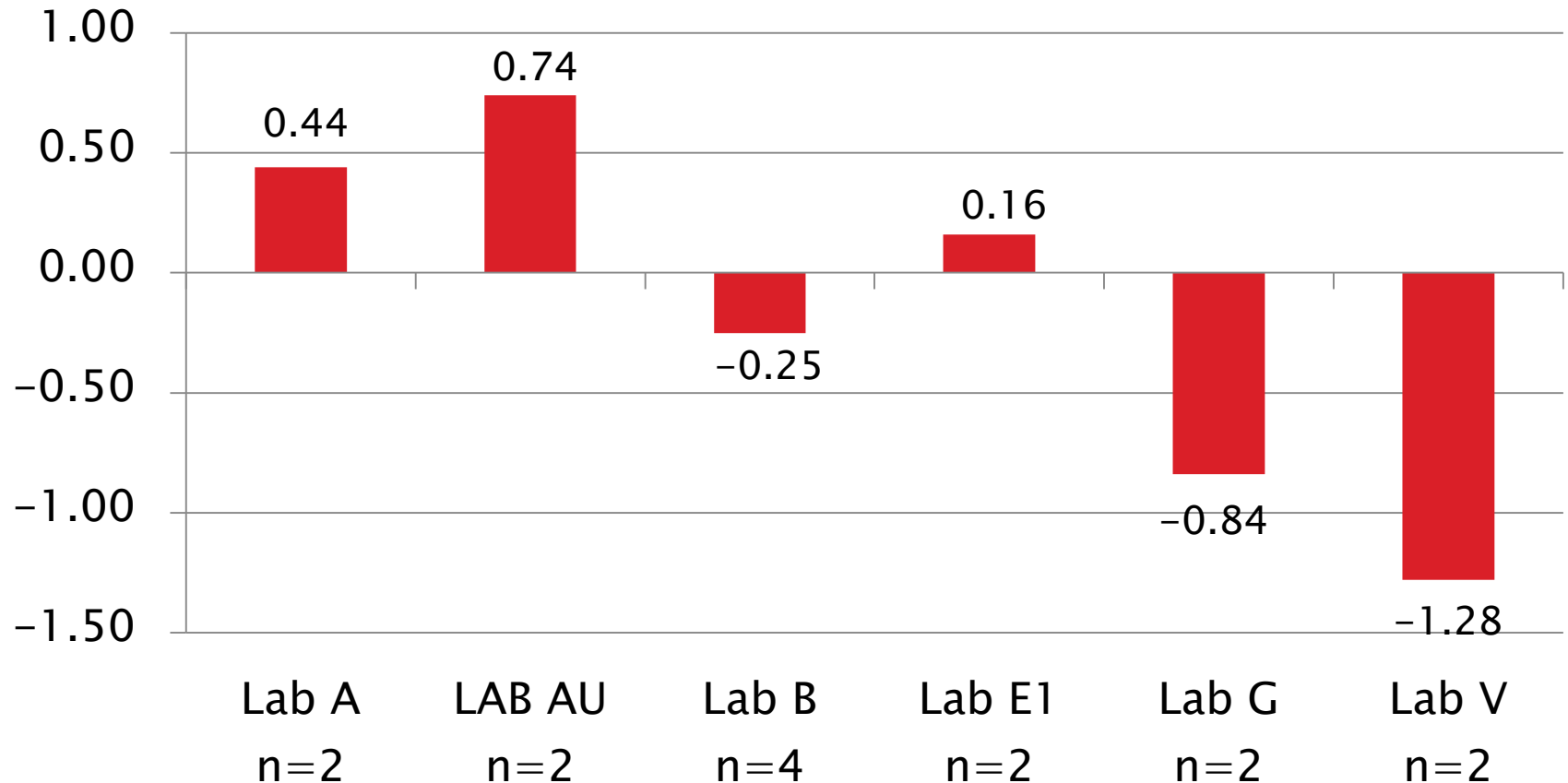


# Severity: By Period

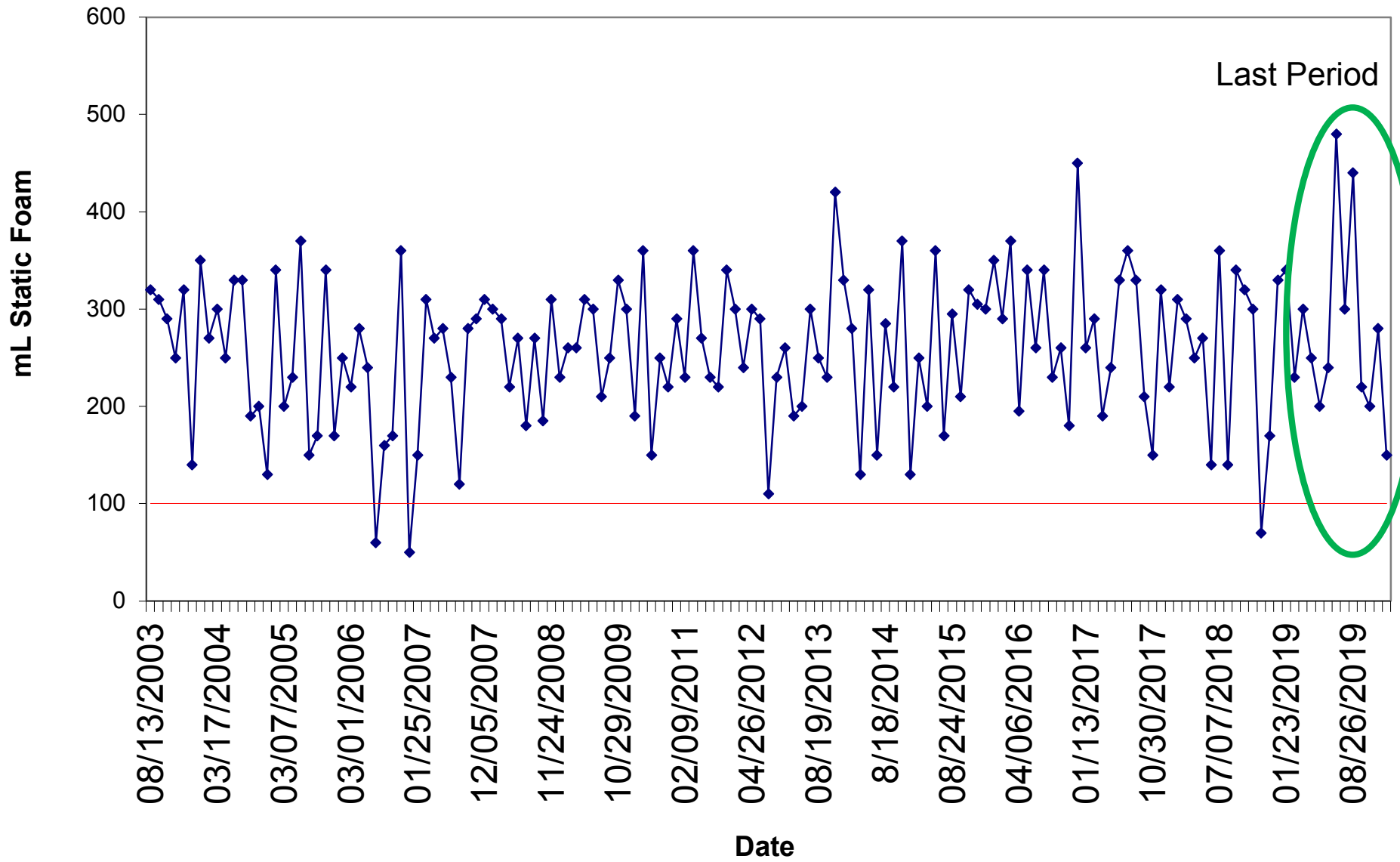


# Severity: By Lab

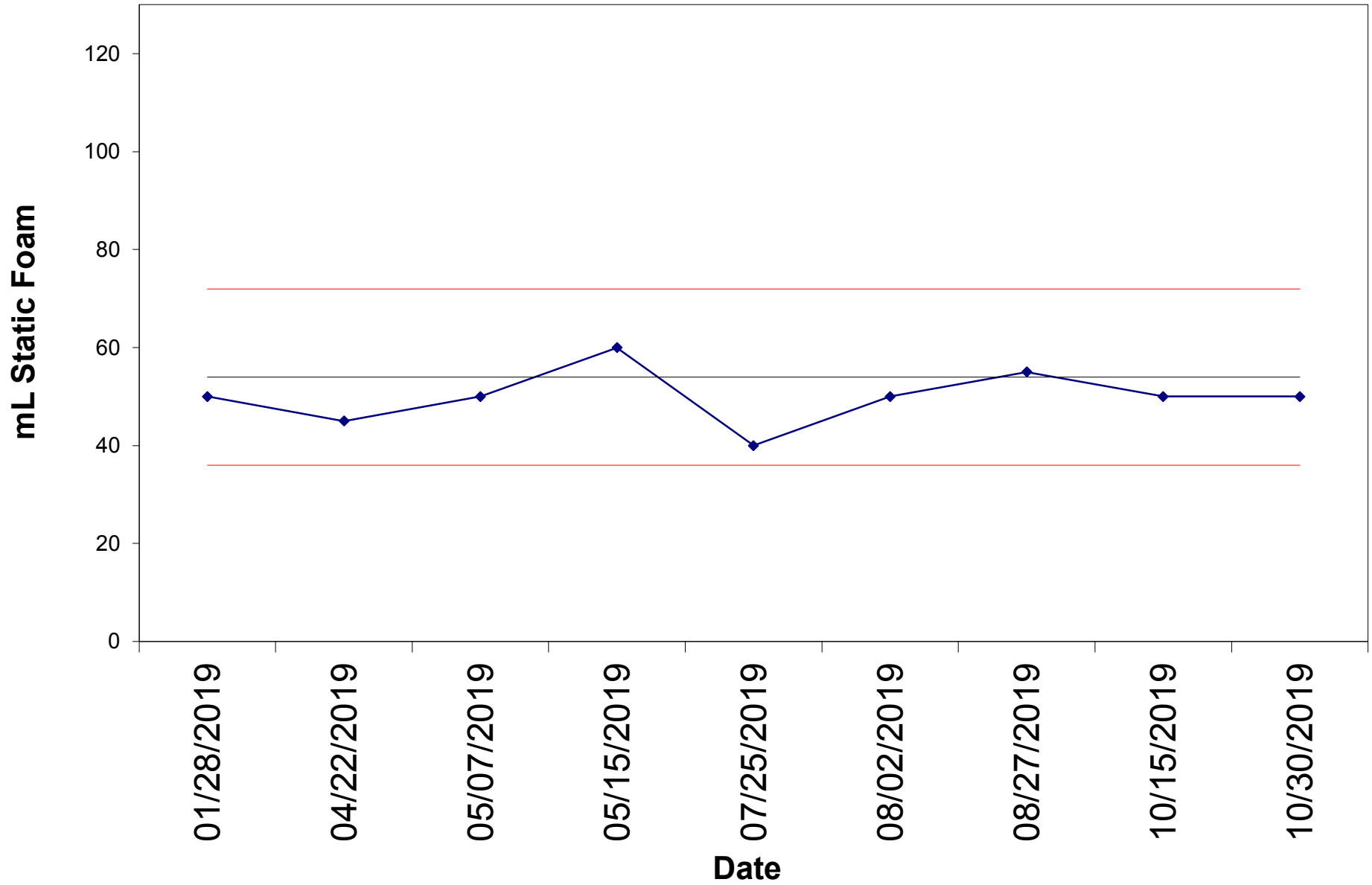
Current Period Severity Estimates by Lab  
Foam Tendency, ml



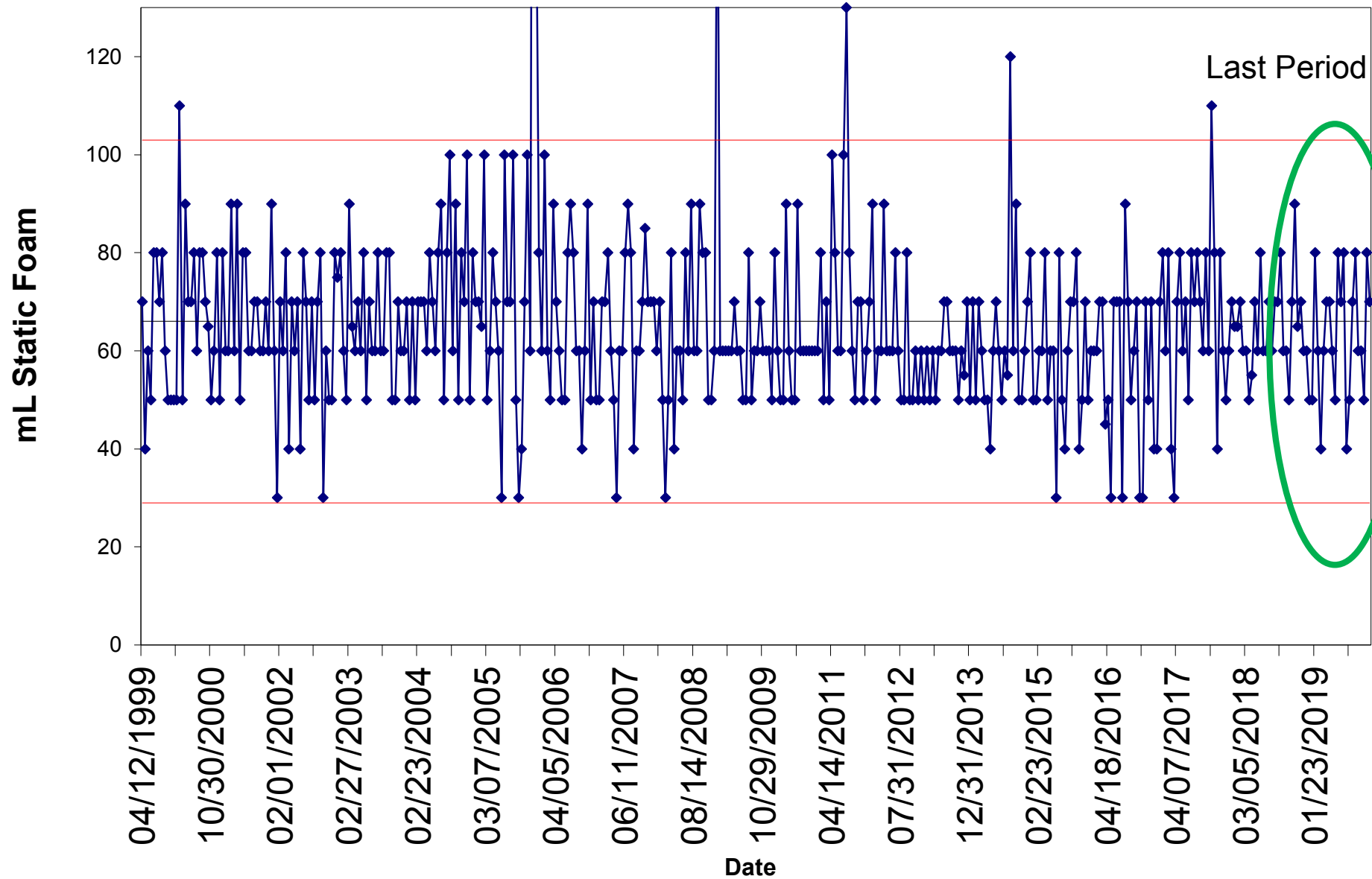
# Oil 66 (2003 - Present)



# Oil FOAMB18 (2019 - Present)



# Oil 1007 (1999 - Present)





D6082 HIGH TEMPERATURE FOAM INDUSTRY OPERATIONALLY VALID DA  
 IND in ('1007', 'FOAMB18')  
 FOAM TENDENCY



CUSUM Severity Analysis



# Oil Inventory

<b>Oil</b>	<b>Year Rec'd By TMC</b>	<b>TMC Inventory, Gallons</b>	<b>Gallons Shipped last 12 Months</b>
66	2002	76.8	3.1
FOAMB18*	2018	92.3	6.0

525 mL per sample aliquot

- \*FOAMB18 replaced depleted 1007
- 101 gallons of FOAMA18 but not in use

# D6082: High Temperature Foam

- Foam Tendency Precision (Pooled s) is comparable to the prior report period
  - More precise than target precision
- Performance (Mean  $\Delta/s$ ) is on target (slight mild bias)
- No non-zero occurrences of Foam Stability
- All six severe oil discrimination runs (on TMC oil 66) demonstrated acceptable discrimination.
- Replacement oil FOAMB18 was introduced this period.
  - Period estimates are a combination of oils 1007 and FOAMB18.

# D874 Sulfated Ash Surveillance Panel Report

ASTM Subcommittee D02.B0.07

December 2019

New Orleans, LA

Matt Schlaff

# Member List

First Name	Last Name	Company	Email
Ariana	Marbley	Chevron Global Lubricants	amzp@chevron.com
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Gordon	Cox	Tannas Company	gcox@savantgroup.com
Jack	Reynolds	Lubrizol Ltd.	gry@lubrizol.com
Janet	Barker	Southwest Research Institute	jbarker@swri.org
Jeanne	Jenks	Southwest Research Institute	jjenks@swri.org
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Joe	Franklin	Intertek Automotive Research	joe.franklin@intertek.com
Kaustav	Sinha	Chevron Oronite Company, LLC	LFNQ@chevron.com
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# Member List

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Yong-Li	McFarland	Southwest Research Institute	yongli.mcfarland@swri.org

# Overview

Test Status	Validity Code	No. Tests
Acceptable Calibration Test	AC	8
Failed Calibration Test	OC	0
Operationally Invalidated by Lab	LC, XC	0
Operationally Invalidated After Initially Reported as Valid	RC	0
<b>Total</b>		<b>8</b>

Number of Labs Reporting Data: 4  
Fail Rate of Operationally Valid Tests: 0%

# Unacceptable Tests

<b>Statistically Unacceptable Tests (OC)</b>	<b>No. Of Tests</b>
Sulfated Ash Mild	0
Sulfated Ash Severe	0

- No statistically invalid tests reported this period
- One operationally invalid test reported this period:
  - Failed expected result on control sample(LC)
- No TMC technical updates issued this period

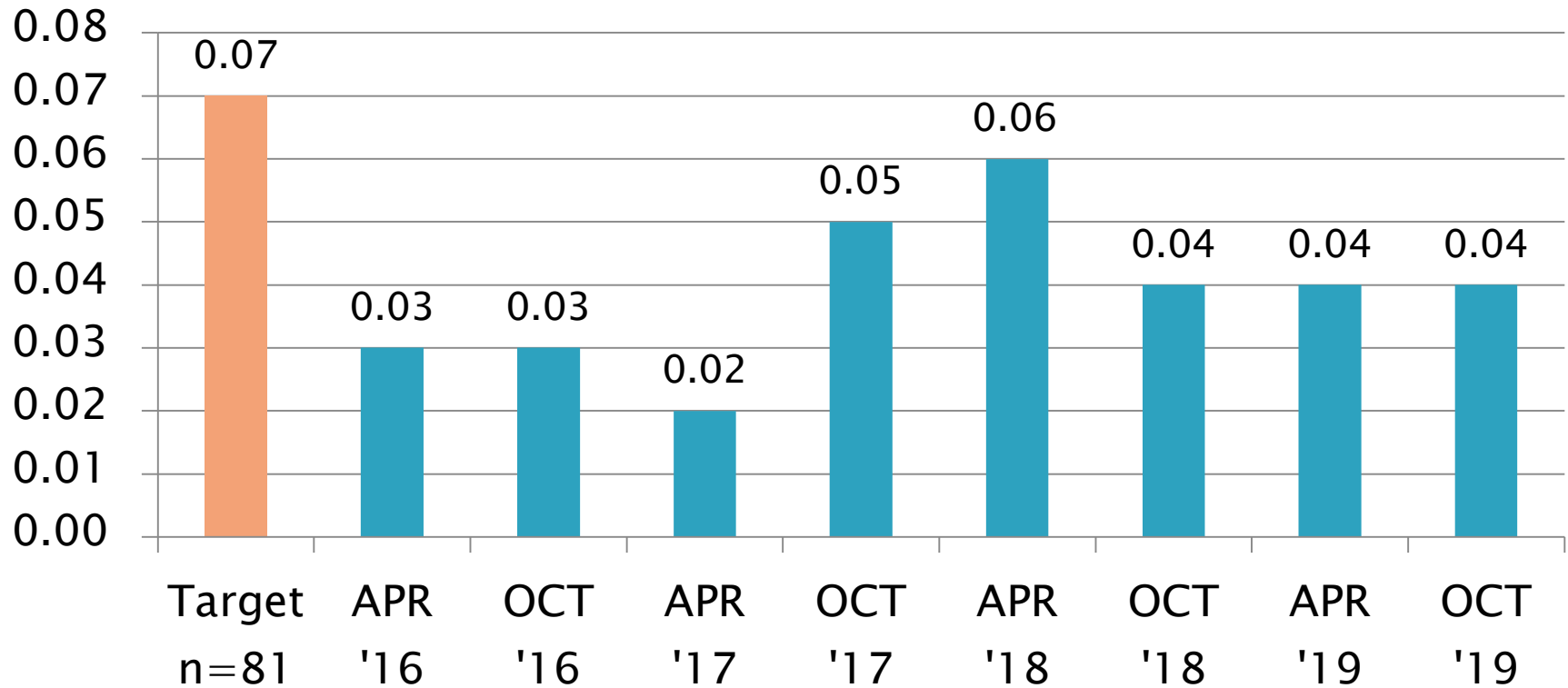


# Precision And Severity

Total Deposits, mg	n	df	Pooled s	Mean $\Delta/s$
<b>Current Targets</b>	<b>81</b>	<b>79</b>	<b>0.07</b>	-----
10/1/15 through 3/31/16	7	4	0.03	-0.41
4/1/16 through 9/30/16	6	3	0.03	-0.41
10/1/16 through 3/31/17	7	4	0.02	-0.21
4/1/17 through 9/30/17	8	5	0.05	-0.35
10/1/17 through 3/31/18	8	5	0.06	0.37
4/1/18 through 9/30/18	8	5	0.04	-0.22
10/1/18 through 3/31/19	8	5	0.04	-0.33
<b>4/1/19 through 9/30/19</b>	<b>8</b>	<b>5</b>	<b>0.04</b>	<b>-0.18</b>

# Precision: By Period

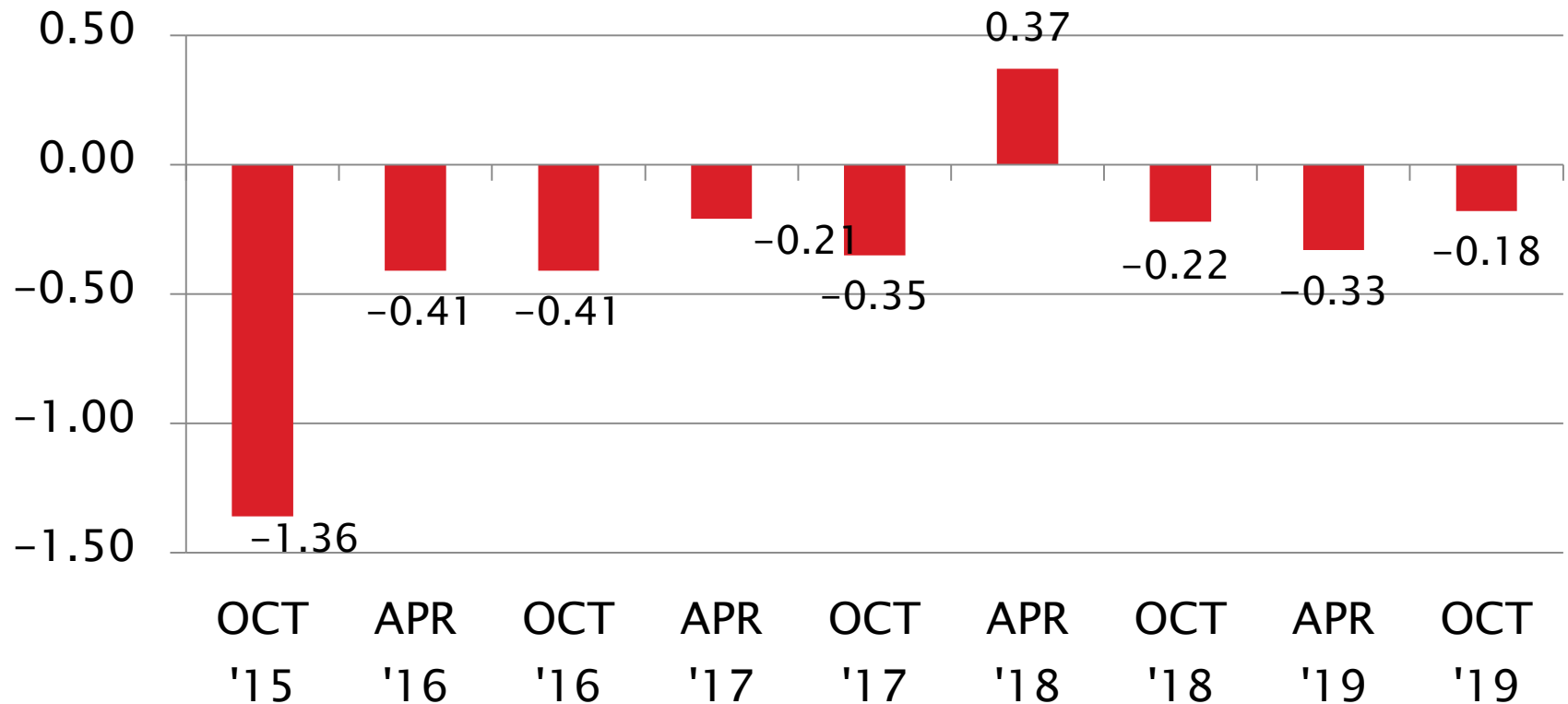
Sulfated Ash, mass%  
Pooled s



# Severity: By Period

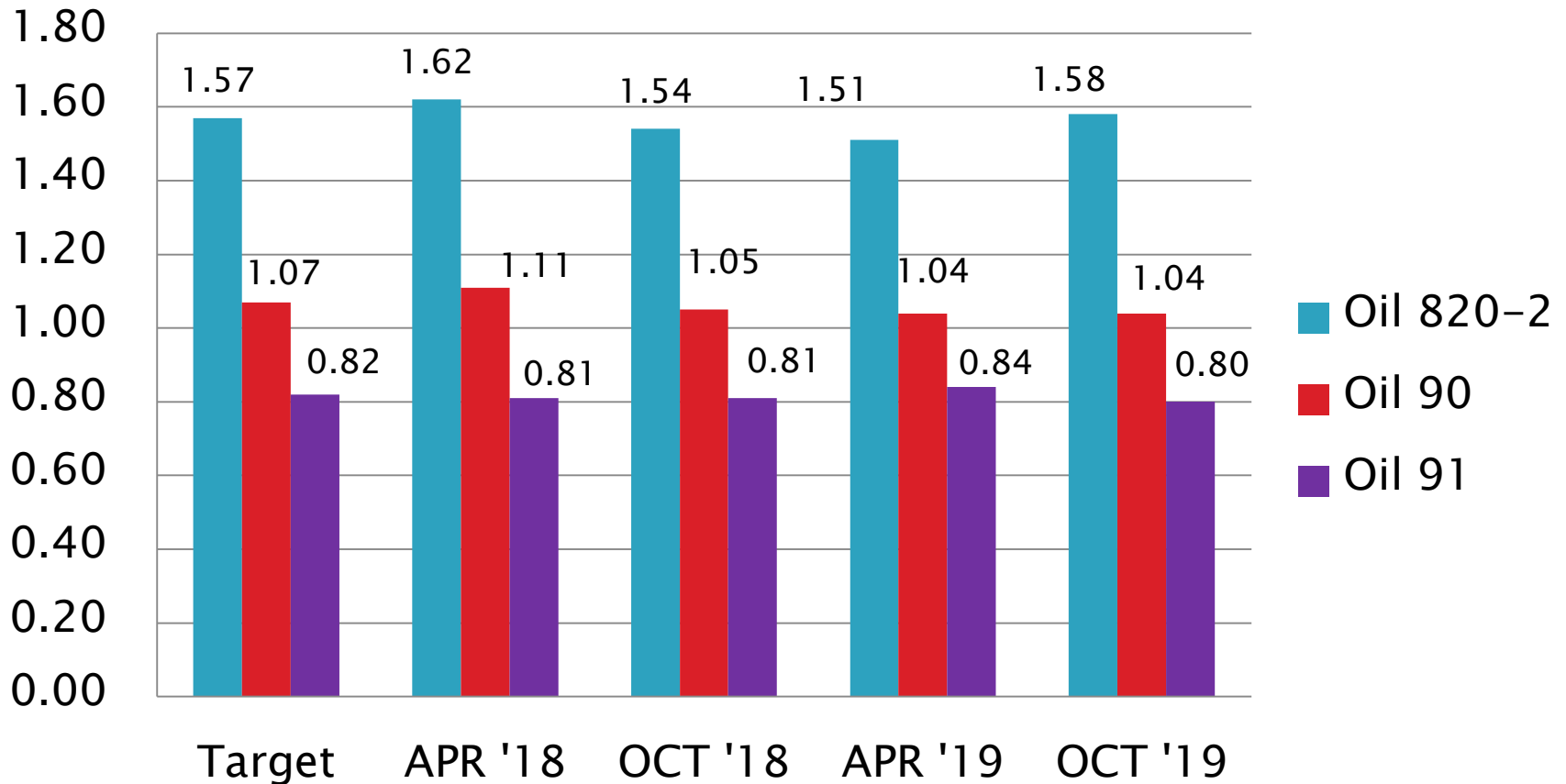
Sulfated Ash, mass%

Mean  $\Delta/s$



# Oil Mean By Period

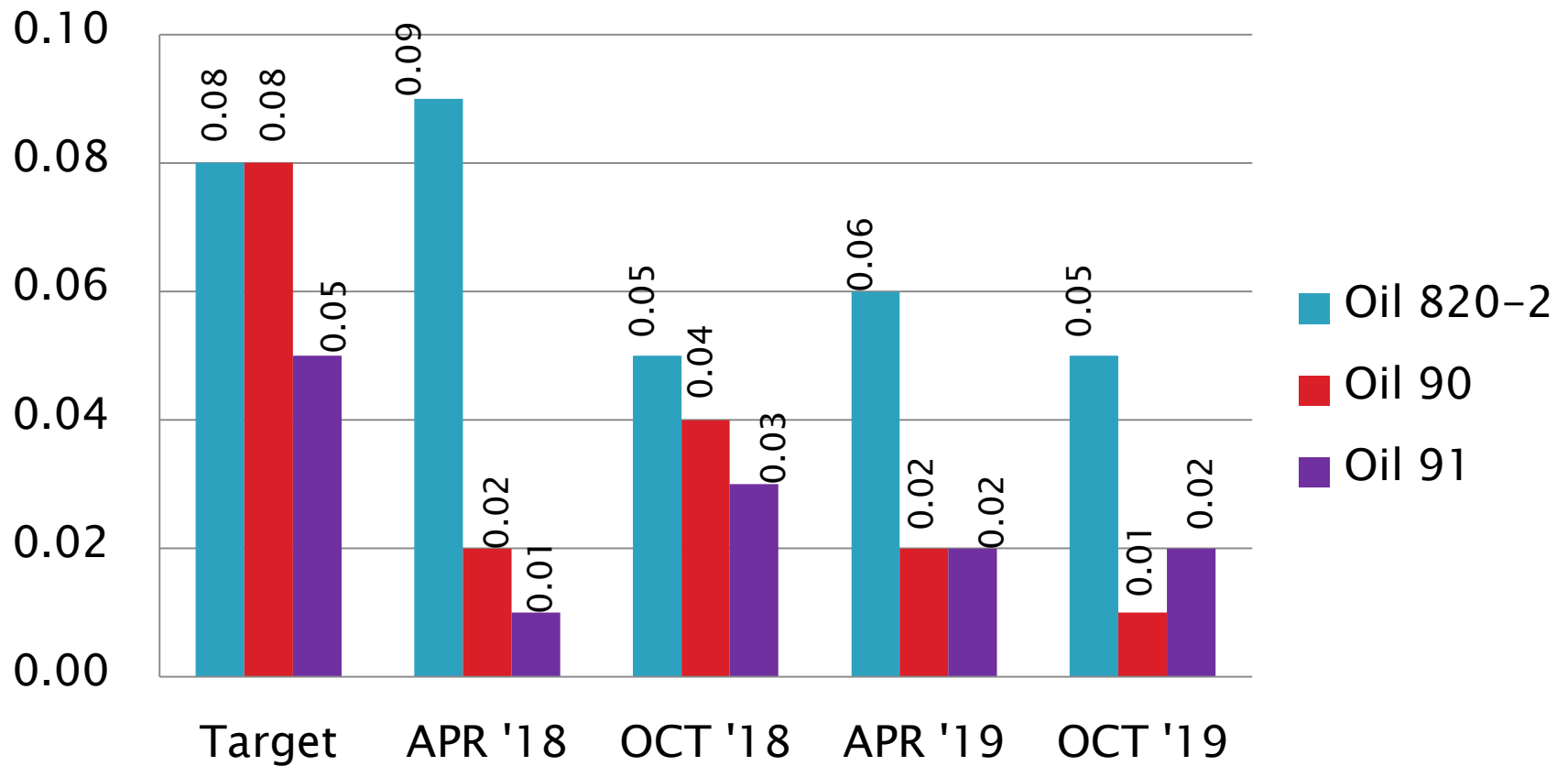
Sulfated Ash, mass%  
Mean



# Precision: By Oil

Sulfated Ash, mass%

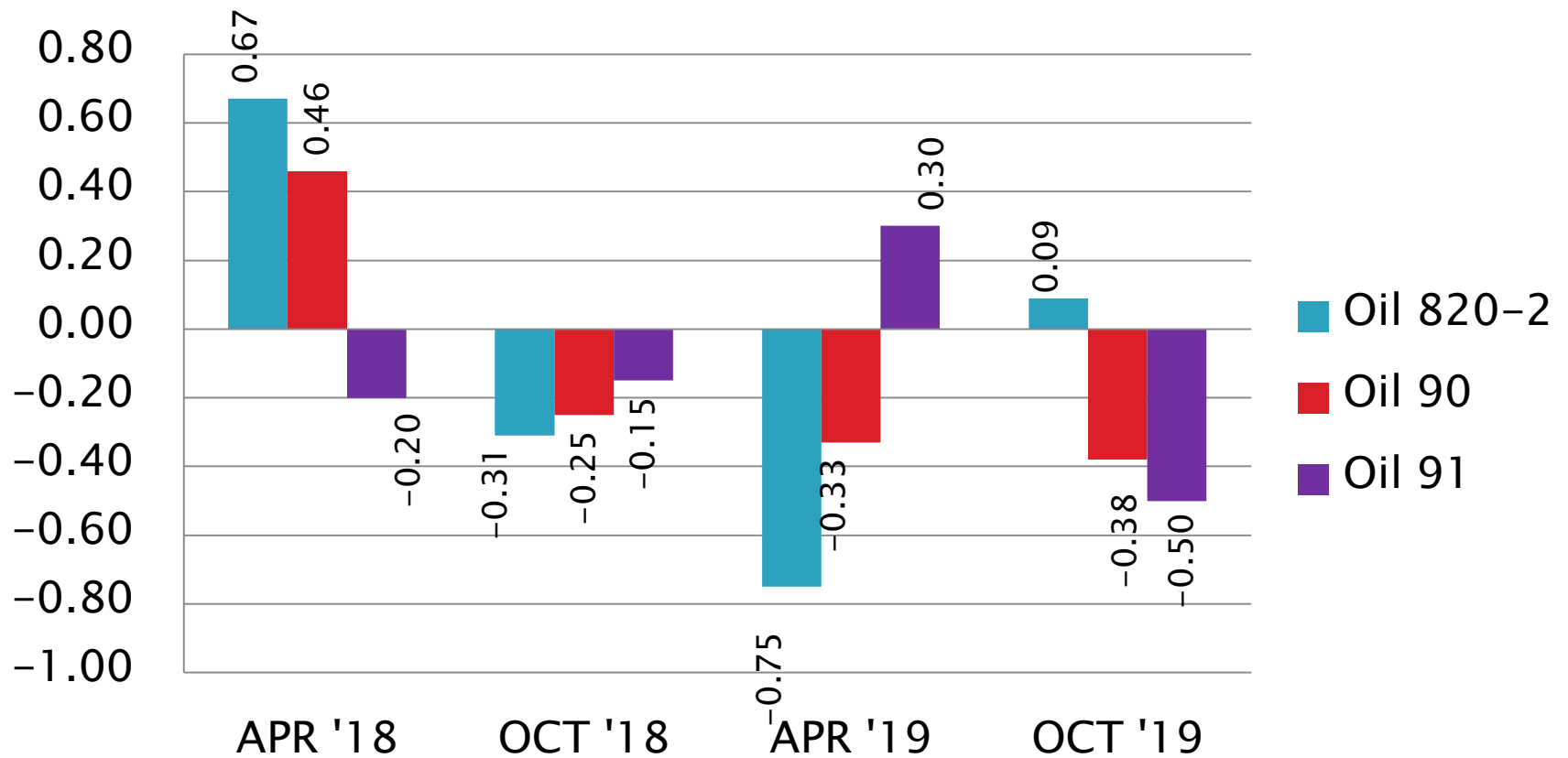
$S_R$



# Severity: By Oil

Sulfated Ash, mass%

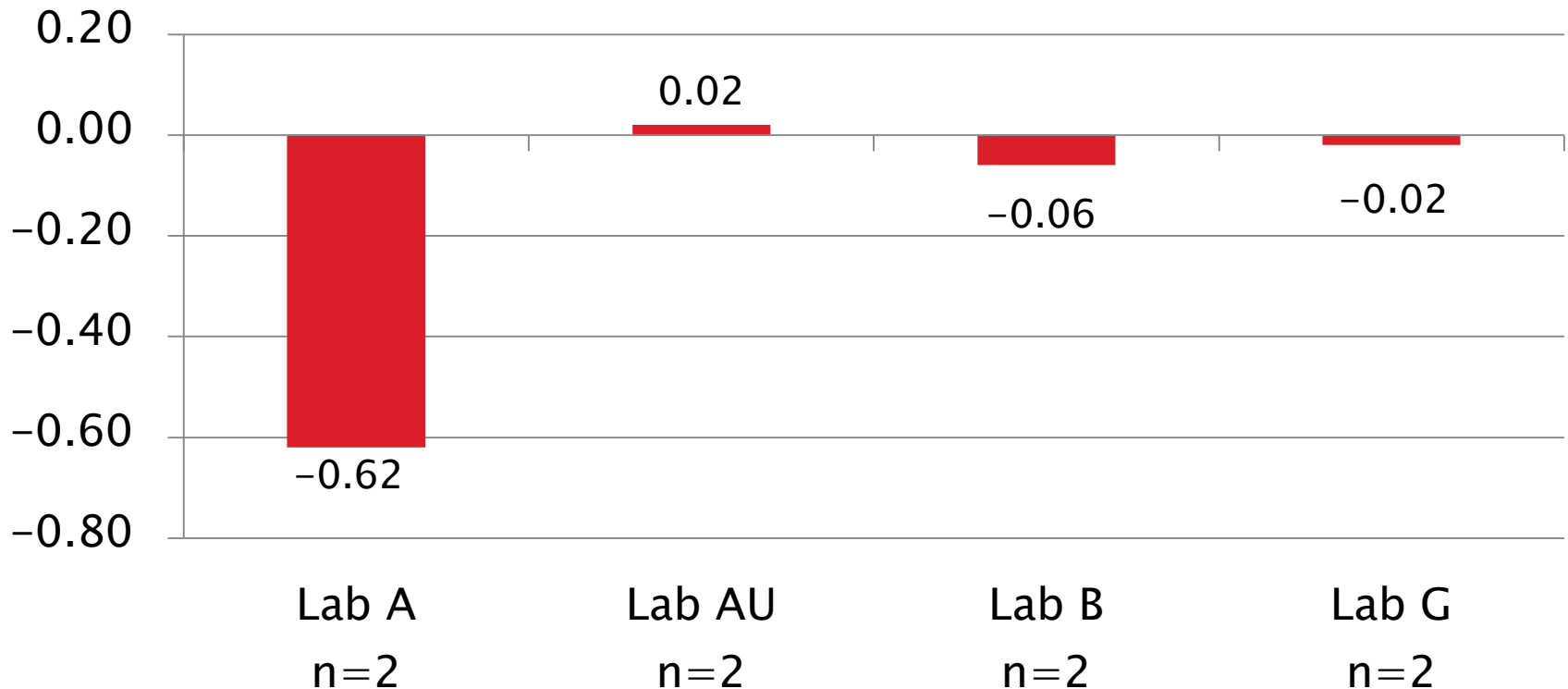
Mean  $\Delta/s$



# Severity: By Lab

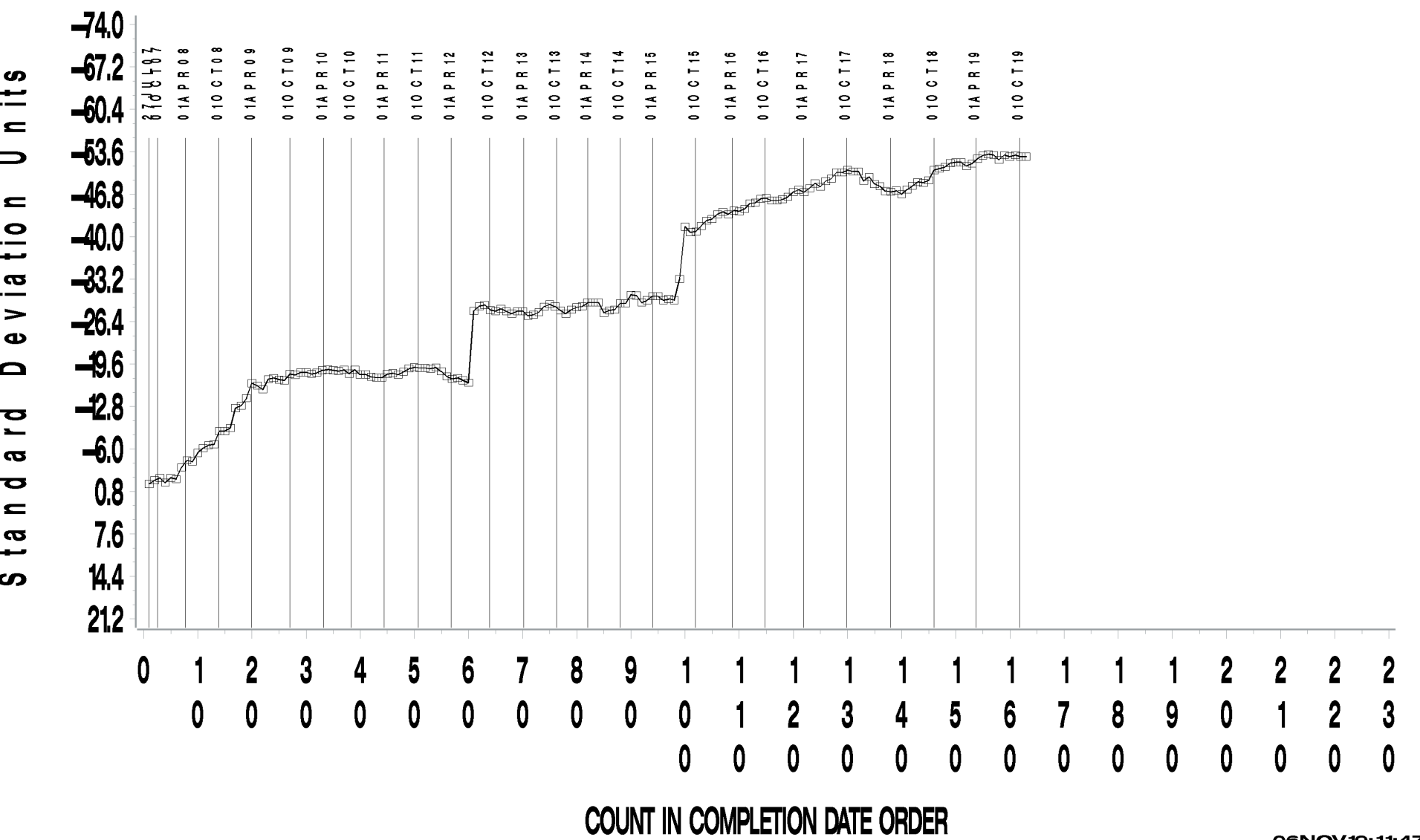
Sulfated Ash, mass%

Mean  $\Delta/s$



TEST SAMPLE PERCENT SULFATED ASH

CUSUM Severity Analysis





# Oil Inventory

Oil	Year Rec'd By TMC	TMC Inventory, Gallons	Gallons Shipped last 12 Months
820-2	2001	8.9	0.0
90	2005	17.7	1.9
91	2006	3.6	0.0

- 32 mL per sample aliquot
- Oil 90 also used as QC Check Oil

# D874: Sulfated Ash

- Precision (Pooled s) is comparable to prior periods
  - More precise than target precision
- Performance (Mean  $\Delta/s$ ) is -0.18 s mild
- Test in maintenance mode
- Open Action items: Approve Calibration Requirements to LTMS document
  - Anticipated completion: Spring 2020

# D5133 Scanning Brookfield Surveillance Panel Report

ASTM Subcommittee D02.B0.07

December 2019

New Orleans, LA

Matt Schlaff

# Member List

D02.0B.07 D5133 Scanning Brookfield Membership List

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Matt	Schlaff	Intertek Automotive Research	matt.schlaff@intertek.com
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Maggie	Smerdon	Savant Labs	msmerdon@savantgroup.com

# Member List (cont)

D02.0B.07 D5133 Scanning Brookfield Membership List			
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Carmen	Robles-Feeney	The Lubrizol Corporation	Carman.Robles-Feeney@Lubrizol.com
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Tom	Schofield	The Test Monitoring Center	<a href="mailto:tms@astmtmc.cmu.edu">tms@astmtmc.cmu.edu</a>

# Overview

Test Status	Validity Code	No. Tests
Acceptable Calibration Test	AC	43
Failed Calibration Test	OC	4
Operationally Invalidated by Lab	LC, XC	5
Operationally Invalidated After Initially Reported as Valid	RC	5
Non-Blind Instrument Shakedown	NN	3
<b>Total</b>		<b>55</b>

Number of Labs Reporting Data: 9

Fail Rate of Operationally Valid Tests: 9%

# Unacceptable Tests

Statistically Unacceptable Tests (OC)	No. Of Tests
Gelation Index Mild	3
Gelation Index Severe	1

- Five operationally invalid calibration runs reported this period:
  - One test invalidated in post-test review after failing TMC calibration due to discovery of a loose electrical contact (RC).
  - **Four tests (all different heads) at two labs invalidated in post-test review after failing TMC calibration due to discovery of bad heads requiring service (RC).**
- Three non-blind shakedown runs to troubleshoot two instruments at one lab (NN).

# Precision and Severity

Period Precision and Severity Estimates

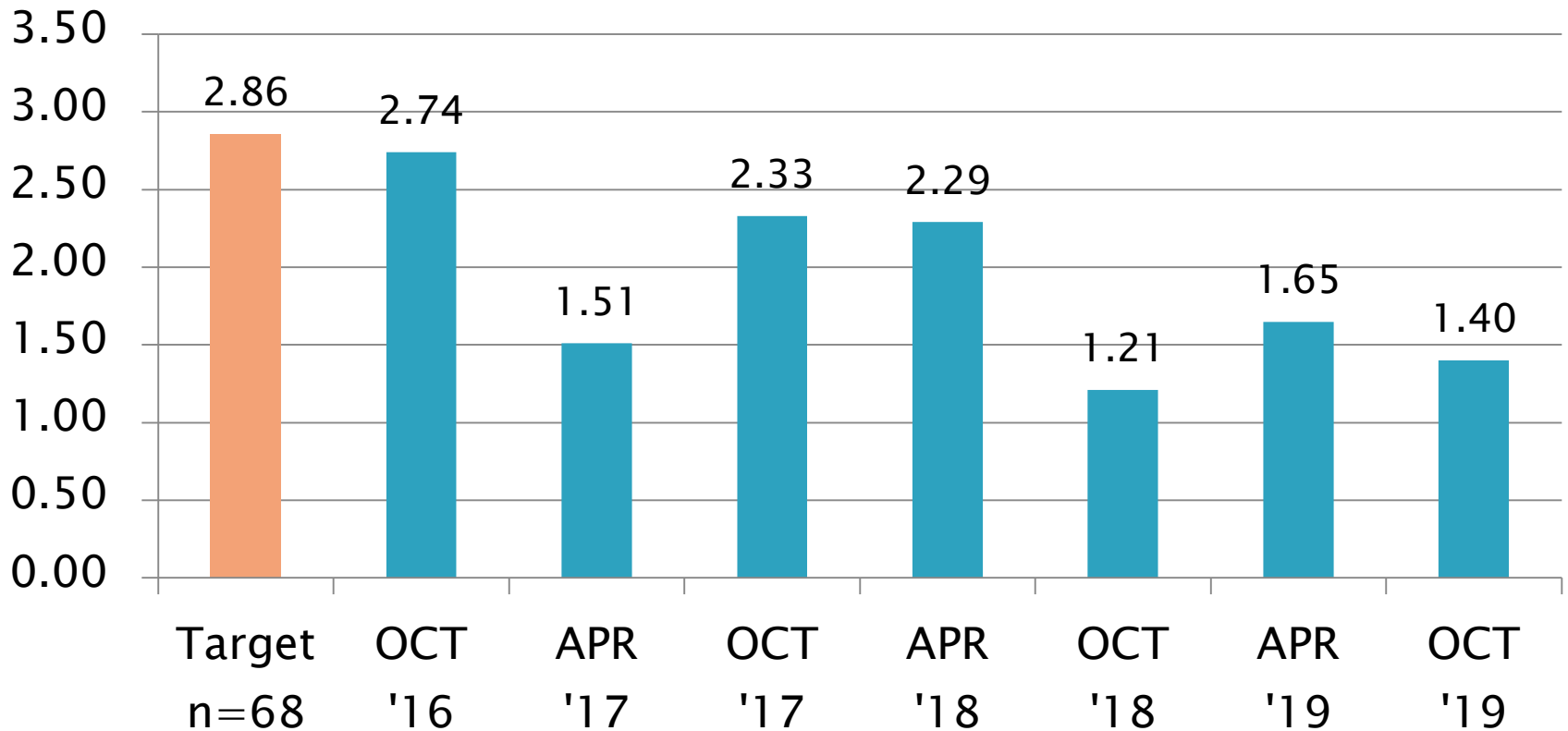
Relation Index	n	df	Pooled s	Mean $\Delta/s$
<b>Current Targets 7/15/2003</b>	<b>68</b>	<b>65</b>	<b>2.86</b>	-----
10/1/16 through 3/31/17	35	32	1.51	-0.25
4/1/17 through 9/30/17*	30	27	4.69	-0.08
4/1/17 through 9/30/17*	29	26	2.33	-0.25
10/1/17 through 3/31/18	36	33	2.29	0.16
4/1/18 through 9/30/18*	32	29	1.21	0.15
4/1/18 through 9/30/18*	31	28	1.03	-0.02
10/1/18 through 3/31/19	27	24	1.65	0.13
<b>4/1/19 through 9/30/19</b>	<b>47</b>	<b>44</b>	<b>1.40</b>	<b>-0.25</b>

\*Extreme OC result included and excluded



# Precision: By Period

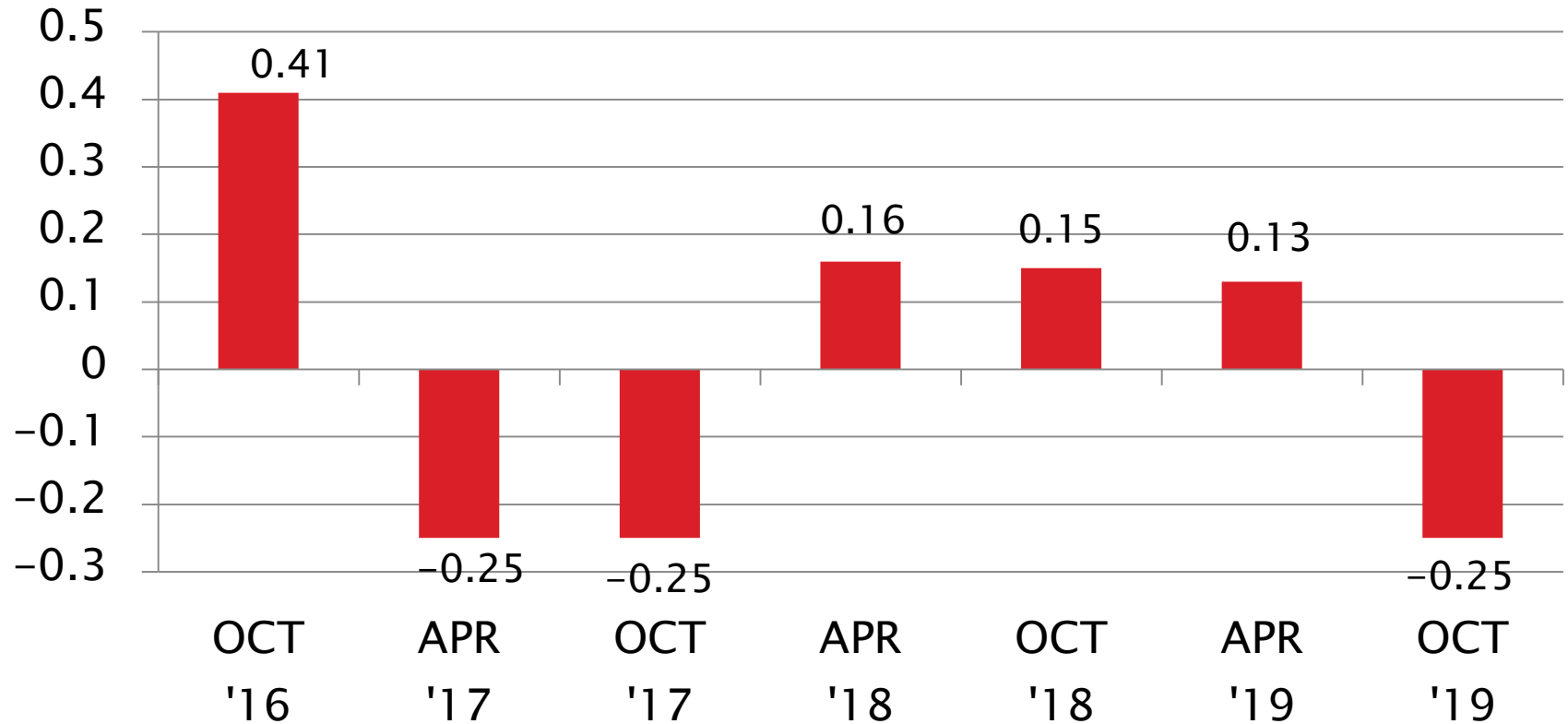
Gelation Index  
Pooled s



# Severity: By Period

Gelation Index

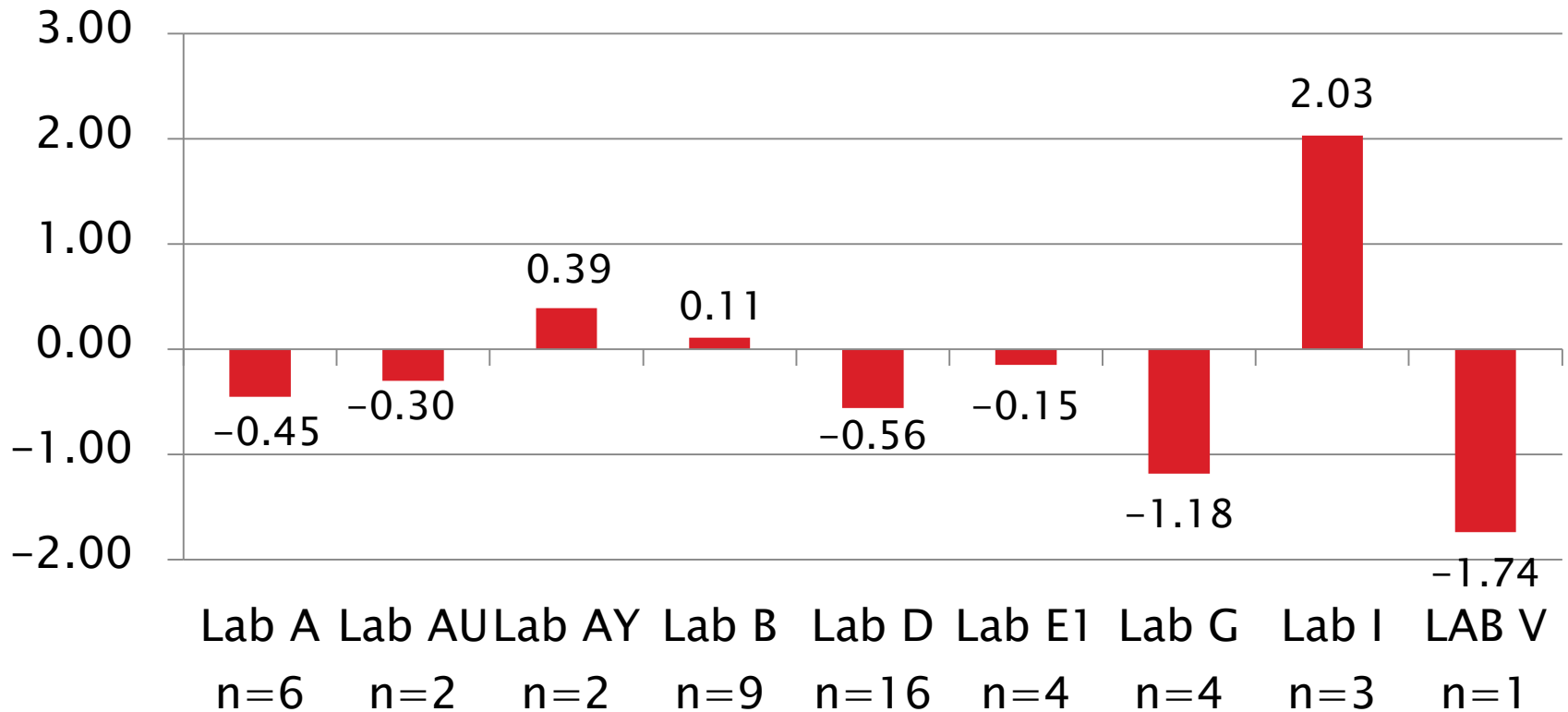
Mean  $\Delta/s$



# Severity: By Lab

Gelation Index

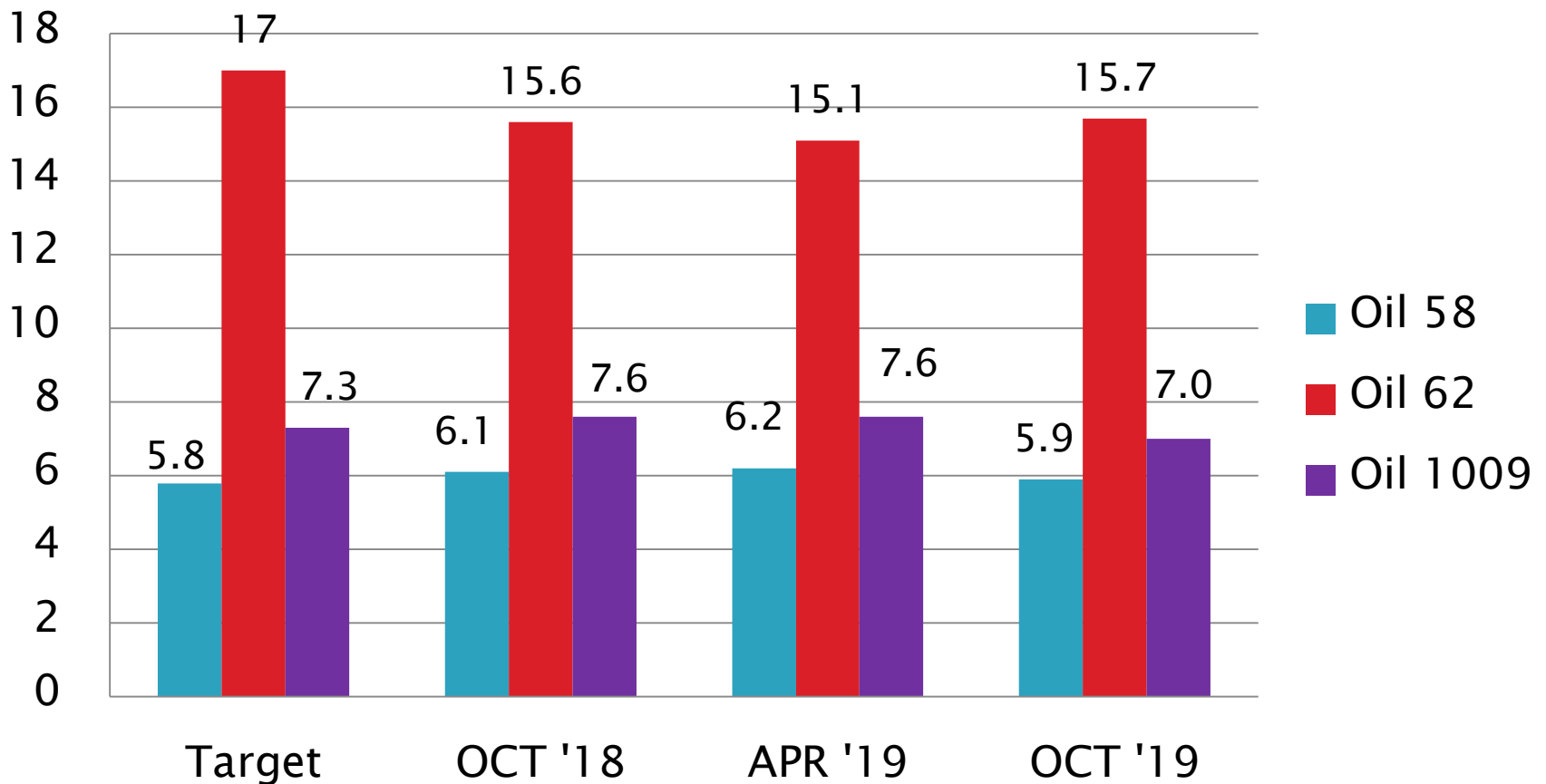
Mean  $\Delta/s$



# Mean: By Period By Oil

Gelation Index

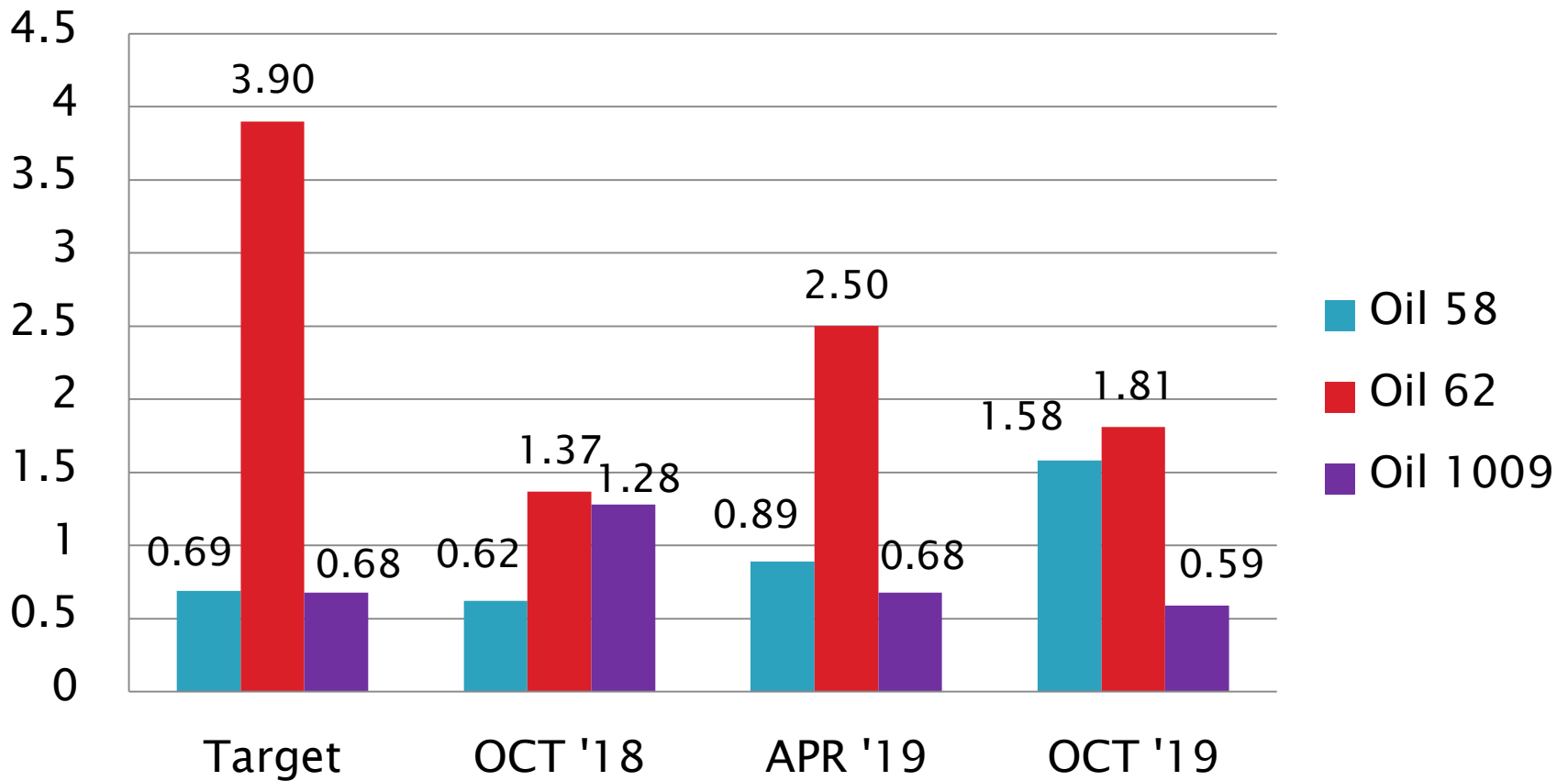
Mean



# Precision: By Oil by Time

Gelation Index

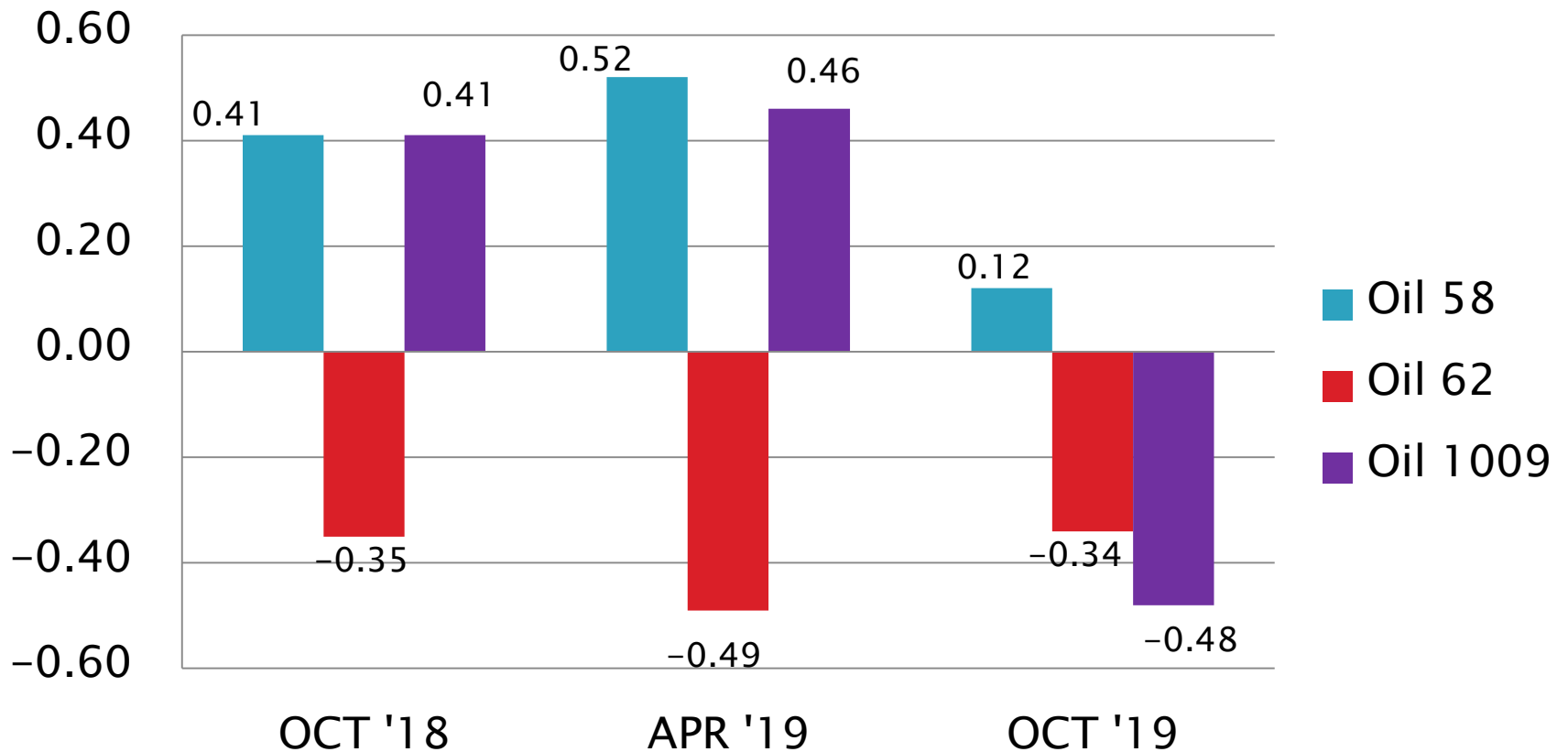
$S_R$



# Severity: By Oil by Time

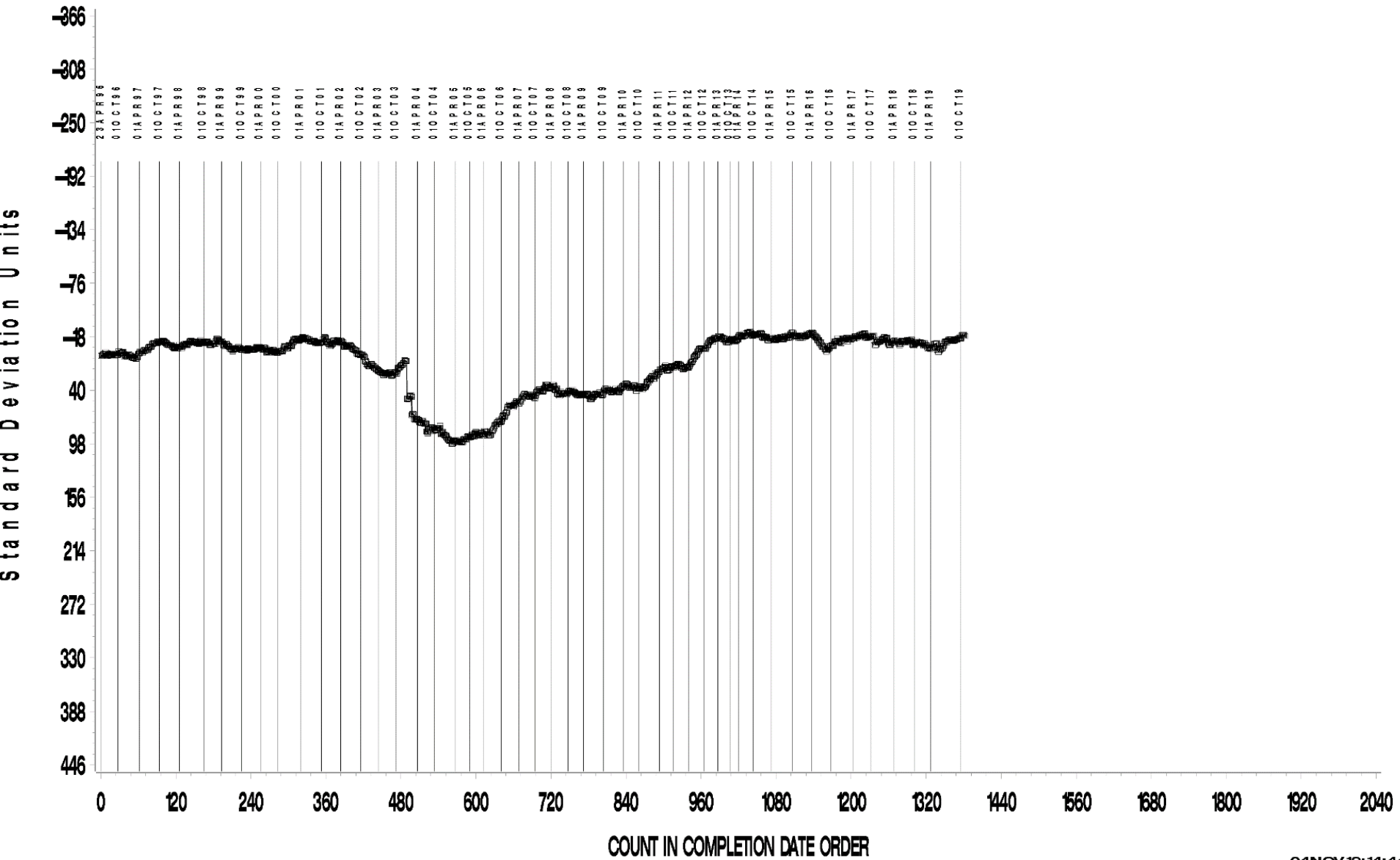
Gelation Index

Mean  $\Delta/s$



GELATION INDEX

CUSUM Severity Analysis



# Oil Inventory

Oil	Year Rec'd By TMC	TMC Inventory, Gallons	Gallons Shipped last 12 Months
58*	1998	115.3	0.2
62	1996	0.3	0.1
1009	2002	37.8	0.1
GIA17**	2017	9.8	0.1

25 mL per sample aliquot

\*Also used for D6417

\*\* GIA17 replacement of 62



# D5133: Gelation Index

- Fail rate of operationally valid tests is 9% this period. Historic period fail rates have ranged between 6% and 26%.
- Performance (Mean  $\Delta/s$ ) is -0.25 s mild
- Precision (Pooled s) is more precise than target precision.
- New version of method released: D5133-19

# D5133: Gelation Index

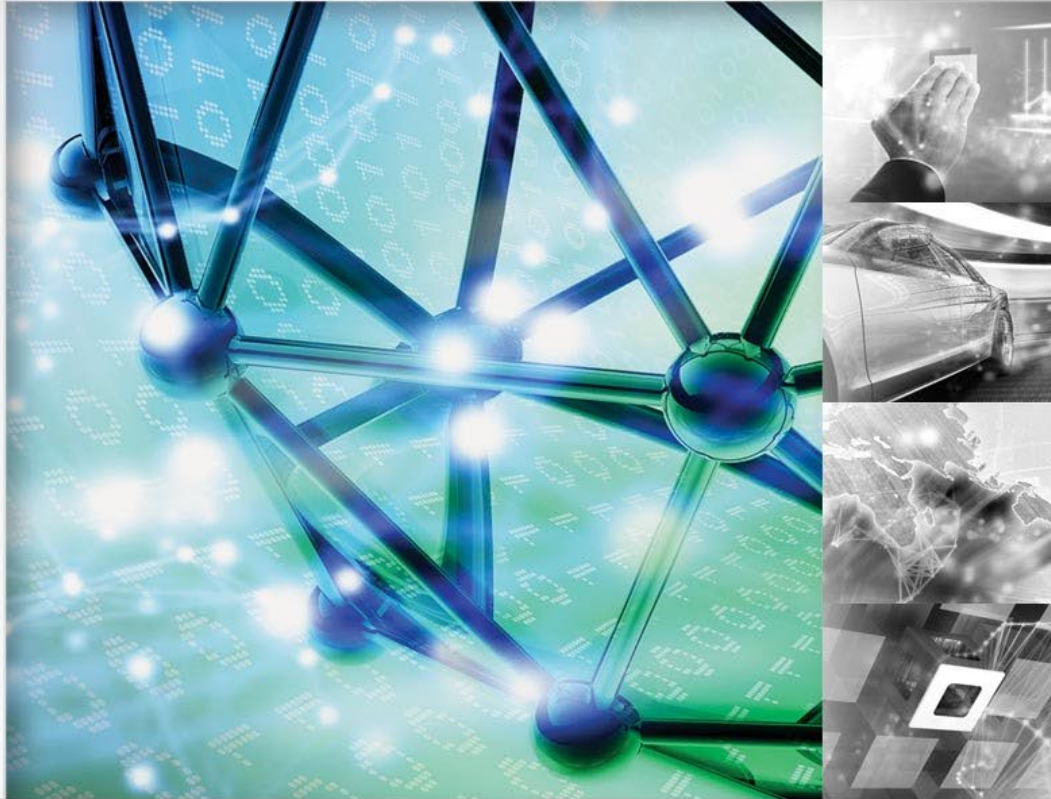
## SUMMARY OF CHANGES

Subcommittee D02.07 has identified the location of selected changes to this standard since the last issue (D5133 – 15) that may impact the use of this standard. (Approved Nov. 1, 2019.)

- (1) The wording was revised in 9.1, 10, and 11 to clarify steps and specify the frequency of checks and calibrations.
- (2) The wording in 9.2 was revised to eliminate contradictory information and clarify steps for preparing the cooling bath.
- (3) DCT criteria were added as Table 1 for the independent temperature indicator.
- (4) Tables were renumbered.
- (5) Table 2 was revised and Note 7 was added to include the possibility of a 1 °C calibration.
- (6) Values for slopes and correlation in paragraph 11.1.8 were moved into new Table 4. In addition, the values for viscometers with additional ranges were added to Table 4.
- (7) Optional Note 8 was removed and replaced with a requirement regarding the use of an oil of known gelation index in new paragraph 11.2.
- (8) Notes and paragraphs have been renumbered.
- (9) Language was revised in 10.1 to clarify that an independent temperature indicator must be used to verify the indicator integral to the thermoregulator in the bath.
- (10) The DCT definition was added to the main terminology section rather than method-specific terminology and was harmonized with the other DCT definitions in SC7 methods.
- (11) Language 10.1 in was revised to indicate the required insertion for the thermometer and DCT.
- (12) Appendix X4 was added with language and Notes X4.1 and X4.2 to clarify the procedure for ensuring that the computer software is correctly reading the torques and temperatures.
- (13) Removed paragraph 10.5, which was redundant.

# D5133: Gelation Index

- Two labs each reported very extreme results as operationally valid, but subsequently found the heads to be bad and in need of service. Another lab reports a result of 6.8 s severe as operationally valid. Also, two of the three mild failing results (OC) were on oil 58, presently with a lower limit set below GI 6.0. These results lend additional support to moving to a head-based calibration system, and reclassifying oil 58 as a discrimination oil with no lower limit.
- No SP teleconferences this semester
- Teleconference planned for early 2020 to adopt head base calibration system and discuss EWMA vs Shewhart system



## D3525 Work Item (WK59475)

**Mike Birke / SwRI      Vince Donndelinger / Lubrizol**

December 2019

## Method Revision Complete (WK59475)

- Mega-Bore Capillary Column (0.53 mm)
- C<sub>16</sub> Internal Standard
  - ISTD Aligns with Parent Engine Tests

# D3525 ILS Complete



## Five (5) Laboratories Participated

Lab Name	Contact Name		Data Submitted
Intertek	Joe	Franikin	✓
Lubrizol - Operator 1	Vince	Donndelinger	✓
Lubrizol - Operator 2	Chuck	Story	✓
Savant Labs	Mike	Habitz	✓
Southwest Research Institute (SwRI)	Mike	Birke	✓

## Precision Calculated

$$\textit{Repeatability (r)} = 0.4188 X^{0.5679} \text{ Mass \%}$$

$$\textit{Reproducibility (R)} = 1.0603 X^{0.5679} \text{ Mass \%}$$

# Propose Move to Ballot



SUCCESS  
TOGETHER

## Propose balloting to D02.B0





## Working together, achieving great things

When your company and ours combine energies, great things can happen. You bring ideas, challenges and opportunities. We'll bring powerful additive and market expertise, unmatched testing capabilities, integrated global supply and an independent approach to help you differentiate and succeed.