Unapproved Minutes of the October 28, 2015 Sequence VG Surveillance Panel Meeting

The meeting, held at the USCAR offices in Southfield MI, was called to order by Chairman Andy Ritchie at 9:00 AM EDT.

Mike McMillan agreed to take the minutes of the meeting.

A list of the attendees is included as Attachment 1. In addition to those signing the attendance roster, Matt Bowden (OHT), Teri Kowalski (Toyota) and Jerry Brys (Lubrizol) called in on the conference line.

Chairman Ritchie listed the agenda items he would like to cover in this call:

1) Attendance
2) Approval of minutes from September 15th 2015 call
3) TMC Report
4) Inventories of AK28 fuel batch and projections for batch depletion
5) New fuel batch update (Haltermann)
6) VP Racing fuel testing update
7) Timing and planning for new VG fuel test approval matrix
8) Old business
9) New business
10) Schedule for future V calls

Chairman Ritchie asked if there were any additions or corrections to the minutes from the September 15, 2015 VG Panel conference call. There being none, Jason Bowden moved and Ron Romano seconded a motion to approve the minutes. The motion was approved unanimously.

Chairman Ritchie asked Rich Grundza to give the highlights from his TMC Report (Attachment 2). Rich indicated all parameters were within acceptance bands except for AEV which is in warning mode. Al Lopez asked if we ever agreed to revise the correction factor(s) after additional data was obtained, because his lab is running mild, and with the current correction factor, he is close to not being able to calibrate on this parameter. Other labs indicated they were not having this problem, but Rich indicated he did not recall revising the correction factor for AEV.

Chairman Ritchie asked Mark Overaker from Haltermann to provide an update on the current inventory of the AK28 fuel batch, currently being used for VG testing. Mark indicated Haltermann had 3 isototes (18K gal) of the fuel remaining. Chairman Ritchie then polled the labs as to their supply of the fuel. SwRI indicated they had about 8,000 gal, Afton 3500 gal, IAR 6,000 gal. All of the labs indicated they would be out of fuel by Feb or March of next year.

Chairman Ritchie then asked Mark to provide an update on the blending of a new fuel batch. Mark indicated that the blending is complete, and that some of the labs have supplies of the new fuel batch on hand for the start of the fuel approval matrix, and that fuel is being shipped to the others this week. Chairman Ritchie said he would like to defer discussion of the fuel approval matrix until other Old and New Business was completed.

Chairman Ritchie asked Chris Taylor from VP Racing Fuels for an update on their work. Chris summarized what he had reported during the September call; that they had made a small batch of fuel for testing in a VH engine run on a VG test schedule, but that the oil was too severe. They are currently preparing a new small batch which they believe will be less severe and which will be tested on a VG stand when one becomes available. Chris indicated the results will be presented at the next face-to-face VG Panel meeting.

Jason Bowden asked about wiring harnesses. SwRI indicated they have one engine harness available, but no dynamometer harnesses. OHT indicated they have only one dynamometer harness in stock. Also only one ECM.

Chairman Ritchie then indicated he would like to go through his summary of the Agenda items that he had intended to send to the VG distribution and which is attached to these minutes. (Attachment 3) He said he would particularly like to focus on the VG parts shortage and how this affects the upcoming fuel approval matrix (slide 3). As indicated, the present plan is to approve the new fuel batch with existing VG hardware and then approve unplated VH pistons in a subsequent matrix using the newly approved fuel batch. As also indicated, timing for this approach would be extremely tight, with the possibility that the second matrix would not be completed before the VG test becomes unavailable due to parts becoming unavailable. One possibility of preventing this is to combine the two matrices, and approve the

new fuel batch and the unplated pistons at the same time. Ron Romano indicated he supports proceeding in this manner.

Discussion then turned to what type of matrix would need to be conducted to accomplish both objectives. Several members indicated that they think it is important to establish some tie back to the current VG, if we're moving to new hardware, particularly because it is not only pistons that need to be replaced. It was suggested that a way to do this is to run a partial Row 1 of the Statisticians' proposed fuel approval matrix in the 2 independent labs with Oil 940 and current VG hardware. If the new fuel produces sludge in the approximate magnitude of the current fuel, then the full Statisticians' proposed matrix shown in slide 2 of Attachment 4 would be conducted with the new fuel and all proposed new hardware (unplated pistons, VH block, etc.). A complete list of the new parts required would be prepared by the Parts Group. Following further discussion it was agreed that this path was the best one to follow, and the following action item was agreed to:

Action Item: The first two tests of the Haltermann SVGM2 new fuel batch prove-out matrix will be considered sense check tests and will be conducted using ASTM REO 940 and Sequence VG engine builds using all existing hardware (i.e. pistons, camshaft bearings, engine blocks, etc.). If the results of these two tests are acceptable, the proposed matrix, including all 15 tests, will be conducted using Sequence VG engine builds using all proposed new hardware.

Dan Lanctot brought up the fact that the new hardware would need to include new camshaft bearings, as the stock of these bearings was completely depleted at TEI. The consequences of this led to the following motion made by Al Lopez and seconded by Ron Romano:

Motion: Introduce the replacement aluminum camshaft bearings (TEI p/n VG-FA3-B) into the Sequence VG test at each test laboratory with their next reference test. Once a lab has successfully referenced and switched to the new aluminum camshaft bearings, they cannot switch back to the old lead camshaft bearings. Effective 10/28/15. The motion passed unanimously.

Chairman Ritchie asked if there was any other Old or New Business to be brought before the Panel. There was none. As for future meetings, Chairman Ritchie indicated he would like to go back to meetings on the first Tuesday of the month, but with the start of matrix testing, we may need to

have calls every other week to enable making the required decisions. He indicated that the next meeting would depend on how quickly the two San Antonio labs are able to complete their sense check runs.

Next Meeting: The next VG Panel conference call is at the call of the Chairman.

The meeting was adjourned at 12:15 PM EDT.

VG Attendance October 28, 2015

Name	Affiliation	email address
Rich Grundza	ASTM TMC	ceg@astmtmc.cmu.edu
Dan Lanctot	TEI	dlanctot@tei-net.com
Michael Conrad	Lubrizol	michael.conrad@lubrizol.com
AMOL SAVANT	Ashland/Valvoline	ACSavant@ashland.com
Kevin O'Malley	Lubrizol	KVOM@lubrizol.com
Chris Mileti	Lubrizol	CHTM@lubrizol.com
Ed Altman	Afton	Ed.Altman@Aftonchemical.com
DAVID GLAENZER	Afton	DAVE.GLAENZER@Aftonchemical.com
Bob Campbell	AFTON	Bob.Campbell@AFTONCHEMICAL.com
CHRISTIAN PORTER	AFTON	CHRISTIAN.PORTER@AFTONCHEMICAL.COM
PATRICK LANG	SwRI	patrick.lang@swri.org
COLE HUDSON	SWRI	Cole.Hudson@SWRI.org
Jim Linden	TOYOTA	LINDEN.JIM@JLINDENCONSULTING.com
Ron Romano	FORD	rromano@ford.com
BILL BUSCHER	INTERTEK	william.buscher@intertek.com
CLIFF SALVESEN	EXXONMOBIL	clifford.r.salvesen@exxonmobil.com
Mark Mosher	"	mark.r.mosher@exxonmobil.com
JASON BOWDEN	OHT	jbbowden@ohtech.com
MIKE McMILLAN	INFINEUM	MMCMILLAN73@COMCAST.NET
Ryan Rieth	Infineum	Ryan.Rieth@Infineum.com
Doyle Boese	Infineum	Doyle.Boese@Infineum.com
CHRIS TAYLOR	VP RACING FUELS	CHRIS.TAYLOR@VPRACINGFUELS.com
AL LOPEZ	al.lopez@Intertek	
Jason Soto	jason.soto@intertek.com	
Bruce Matthews	GM	bruce.matthews@gm.com
Andrew Ritchie	Infineum	andrew.ritchie@infineum.com

Name	Affiliation	email
Jo MARTINEZ	ORONITE	jogm@chevron.com
Jeff Hsu	Shell	J.Hsu@Shell.com
Tracey King	Hattemann	
Robert Stockwell	ORONITE	
Rustam Sinha	ORONITE	
George Szappanos	GSZ@lubrizol.com	

Test Monitoring Center

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Attachment 2

ASTM D02.B1 Semiannual Report Passenger Car Reference Oil Testing

October 2015

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Sequence VG

- October 2015

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Sequence VG Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	7
Aborted	XC	1
Operationally Invalid	LC	1
Total		9

Sequence VG – Lost Tests*

Test Status	Cause	#
Aborted	Rocker Cover Coolant Leak	1
Invalid	Faulty O_2 Sensor, High Fuel Flow	1
Totals		**2**

*Invalid and aborted tests

Sequence VG Test Severity

- All parameters in control.

SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

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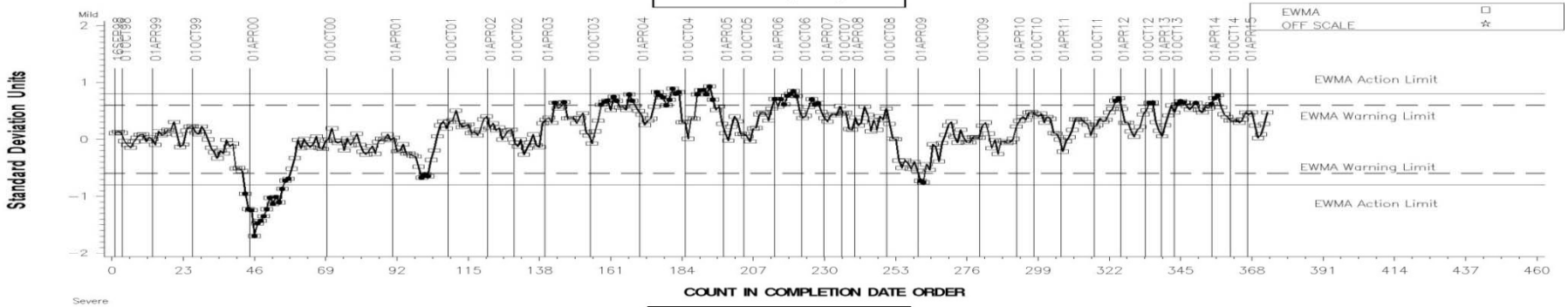
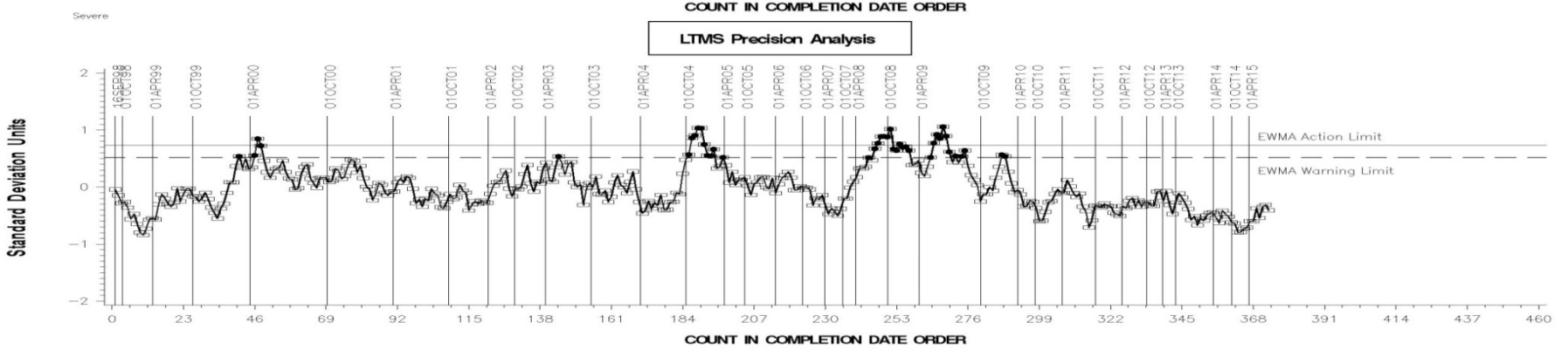
AVERAGE ENGINE SLUDGE

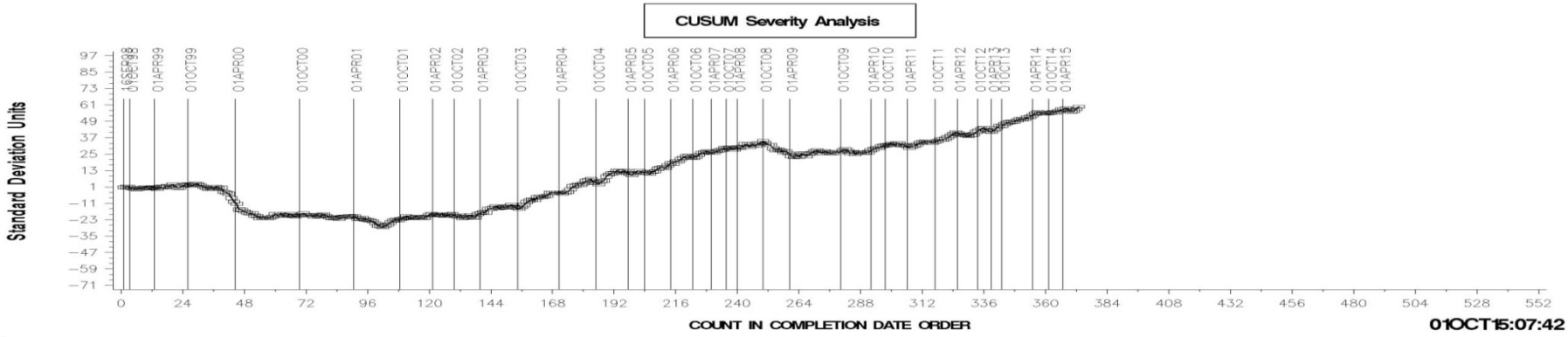
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



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SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

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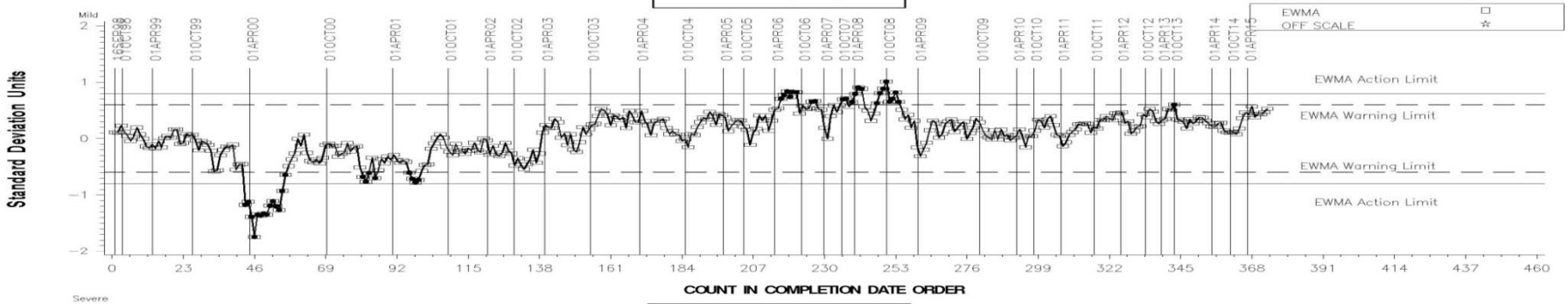
AVERAGE ROCKER COVER SLUDGE

LTMS Severity Analysis



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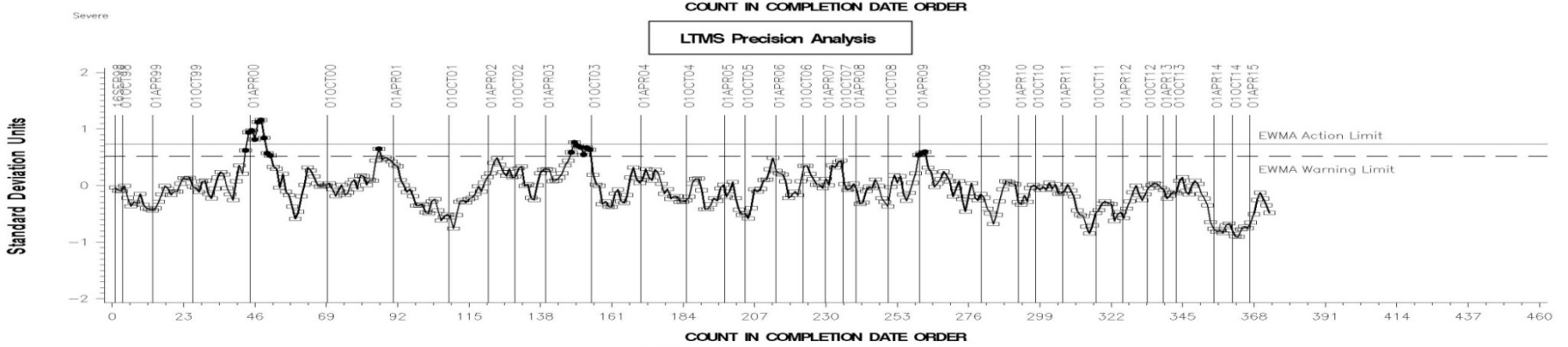

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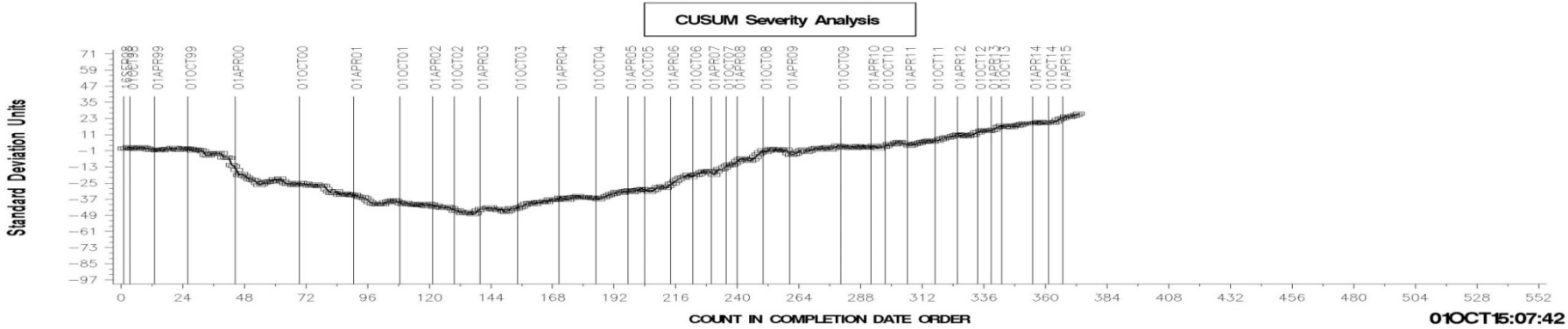

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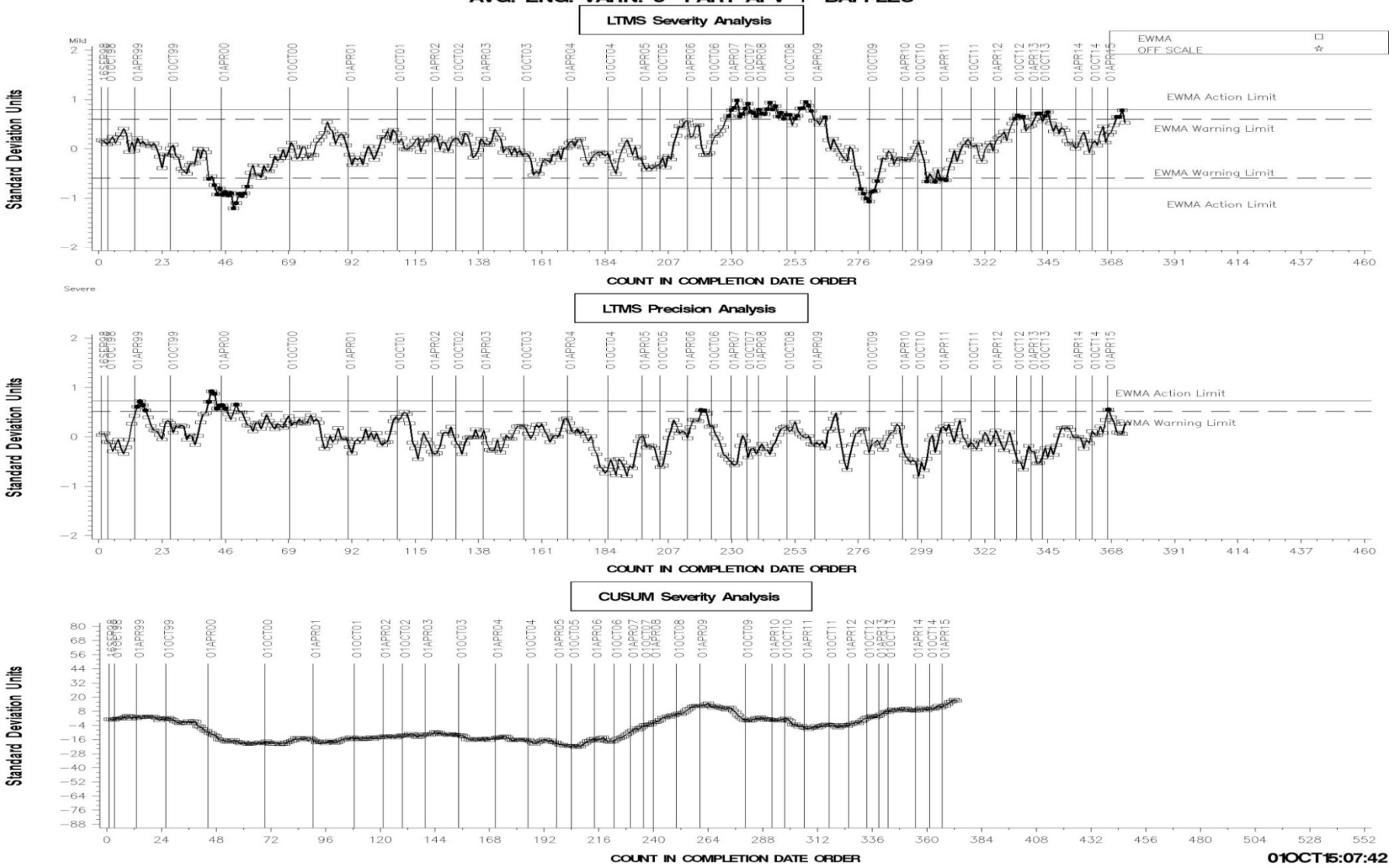
SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

AVG. ENG. VARN. 3—PART APV + BAFFLES



SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

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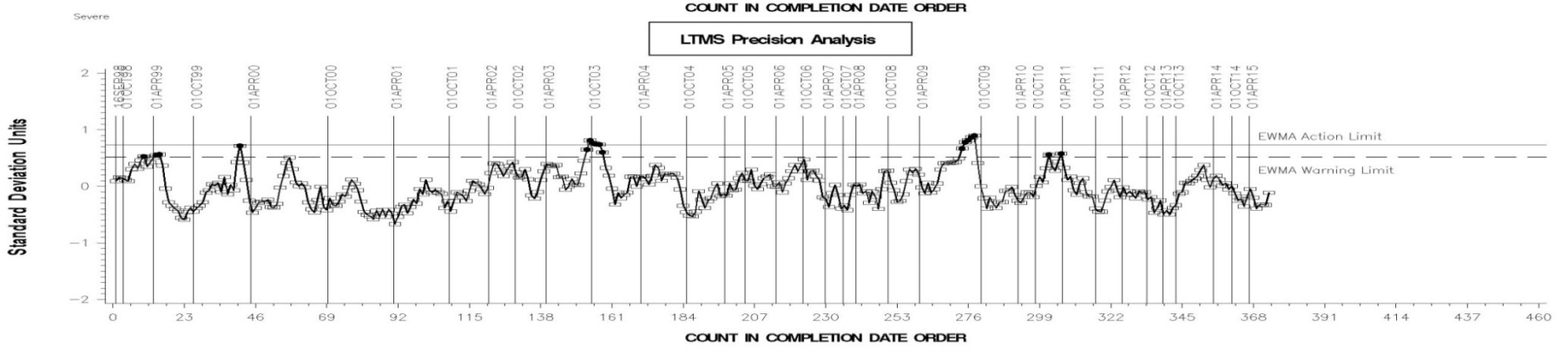
AVG PISTON SKIRT RATING

LTMS Severity Analysis

LTMS Precision Analysis



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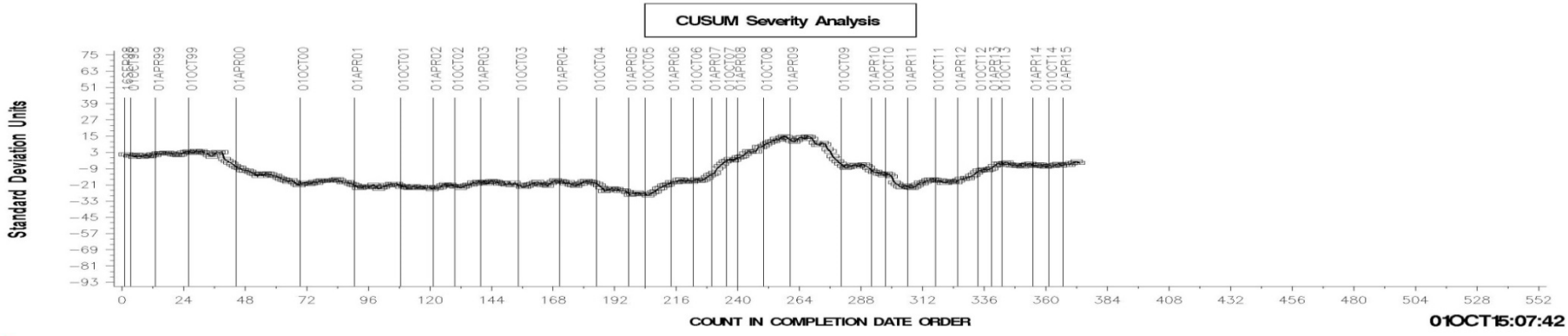

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SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

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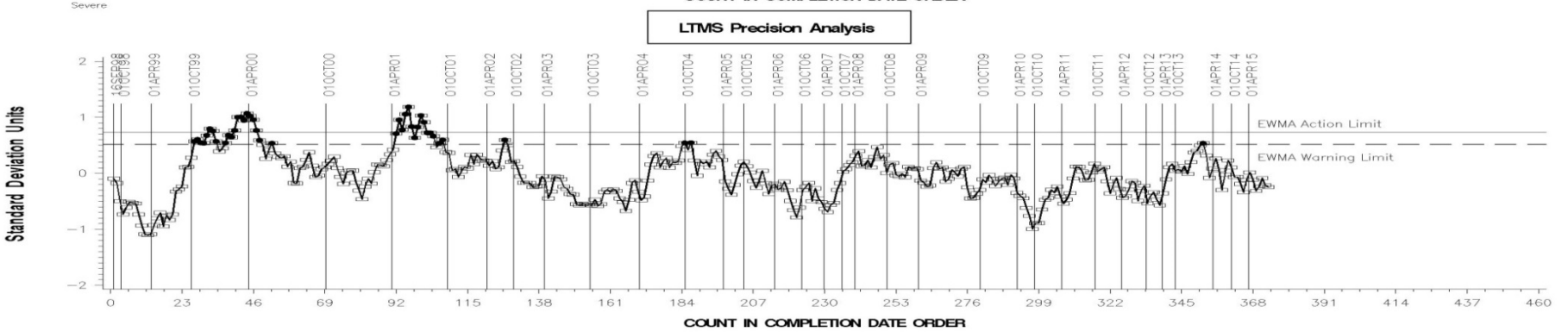
OIL SCREEN SLUDGE

LTMS Severity Analysis

LTMS Precision Analysis



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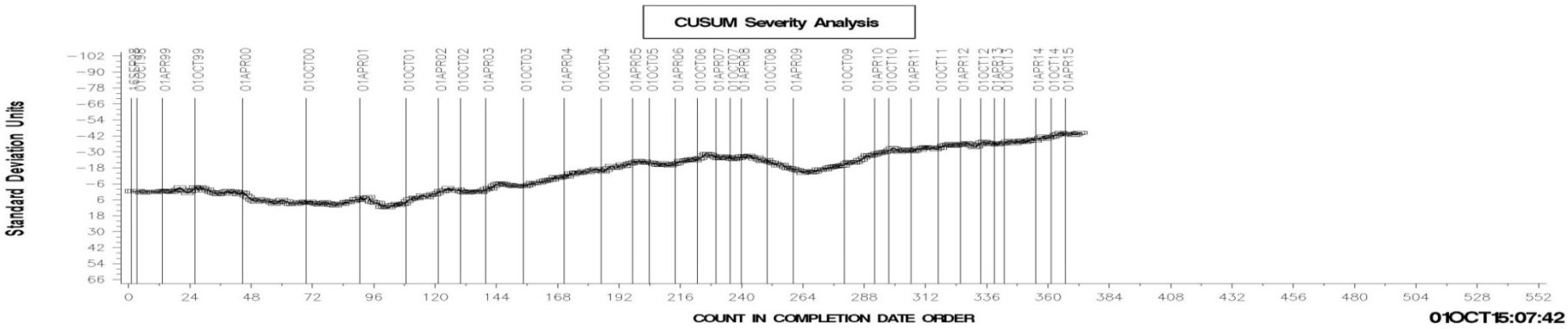

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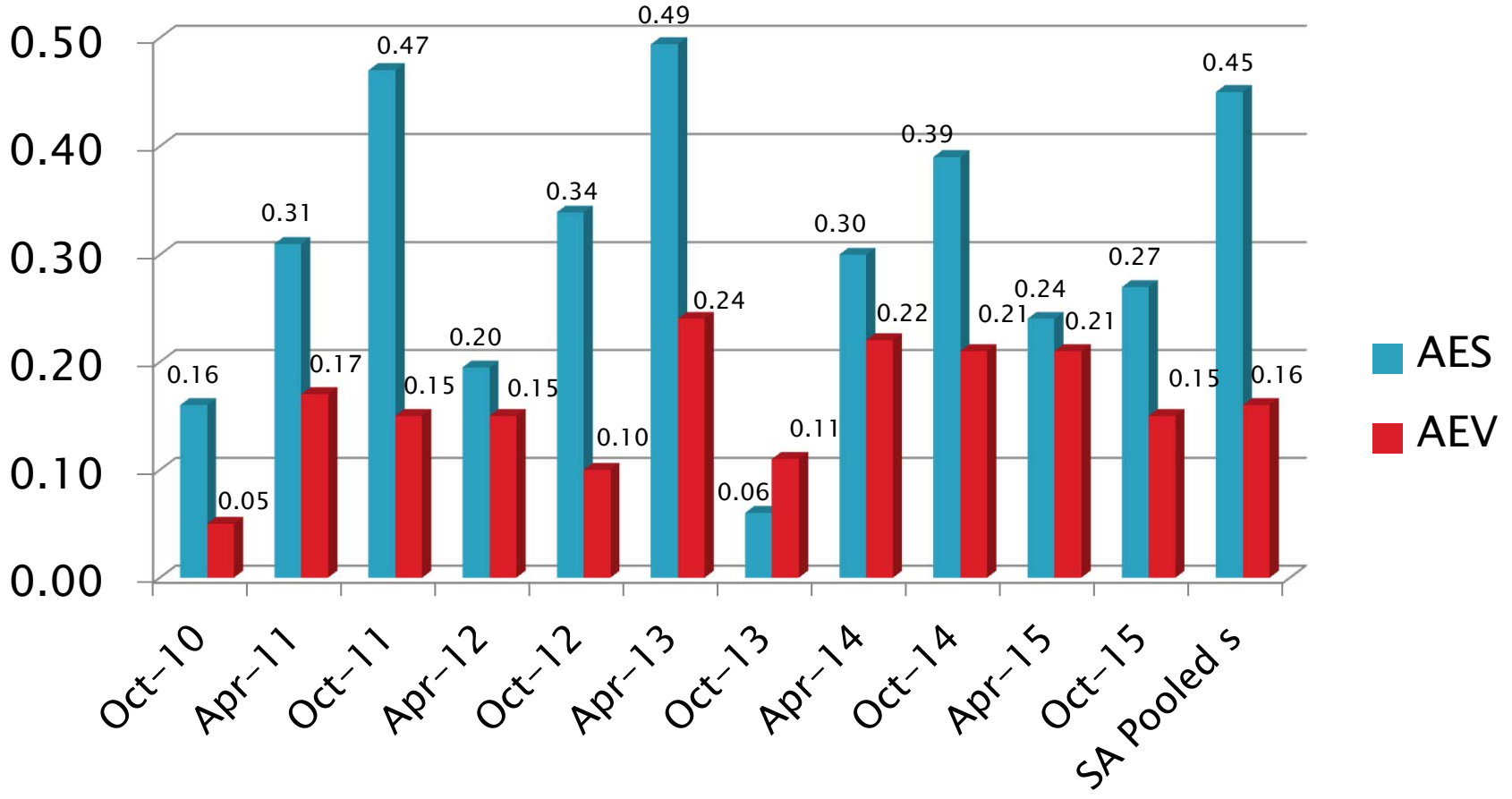
Sequence VG Precision Estimates



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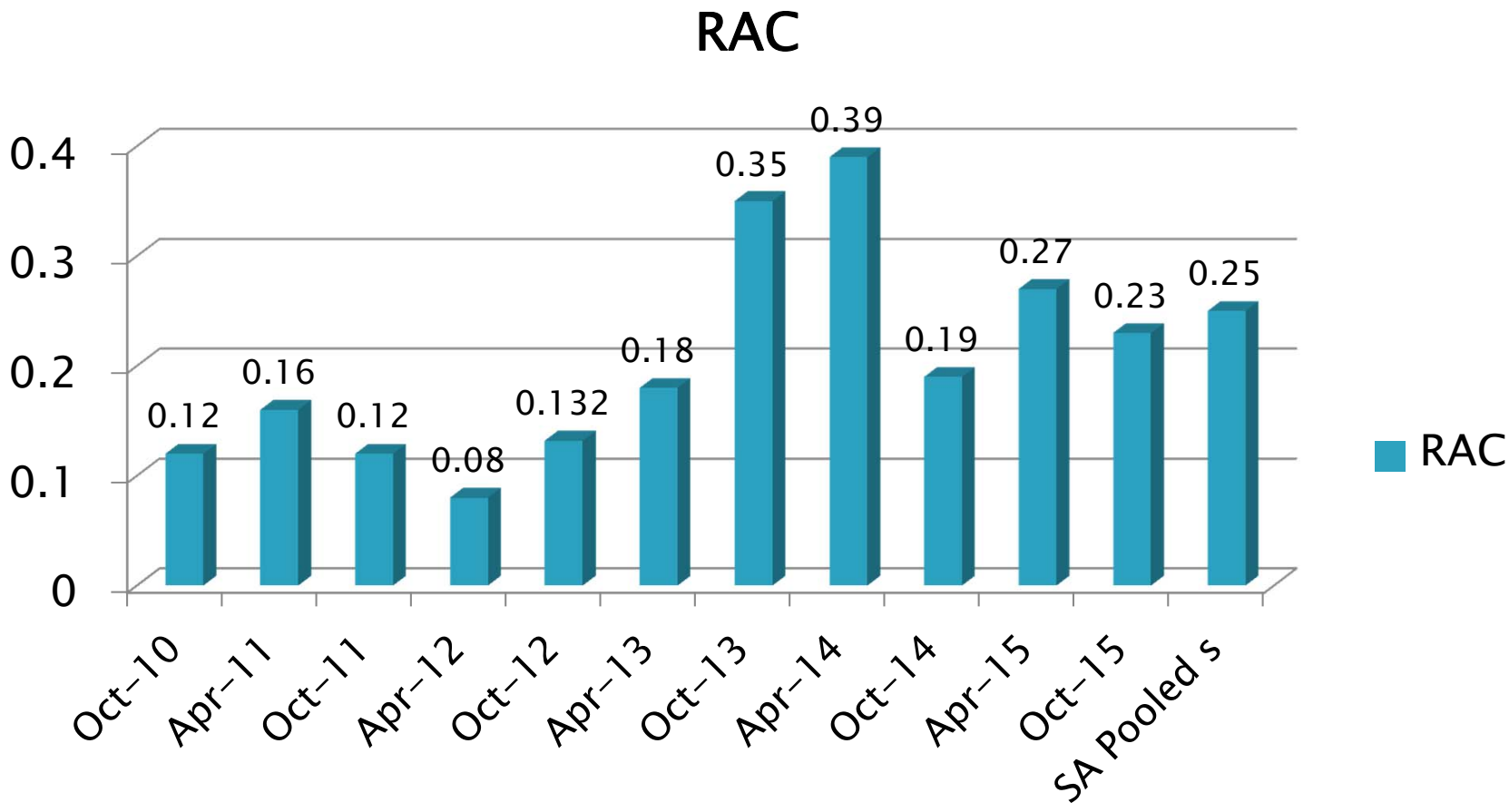

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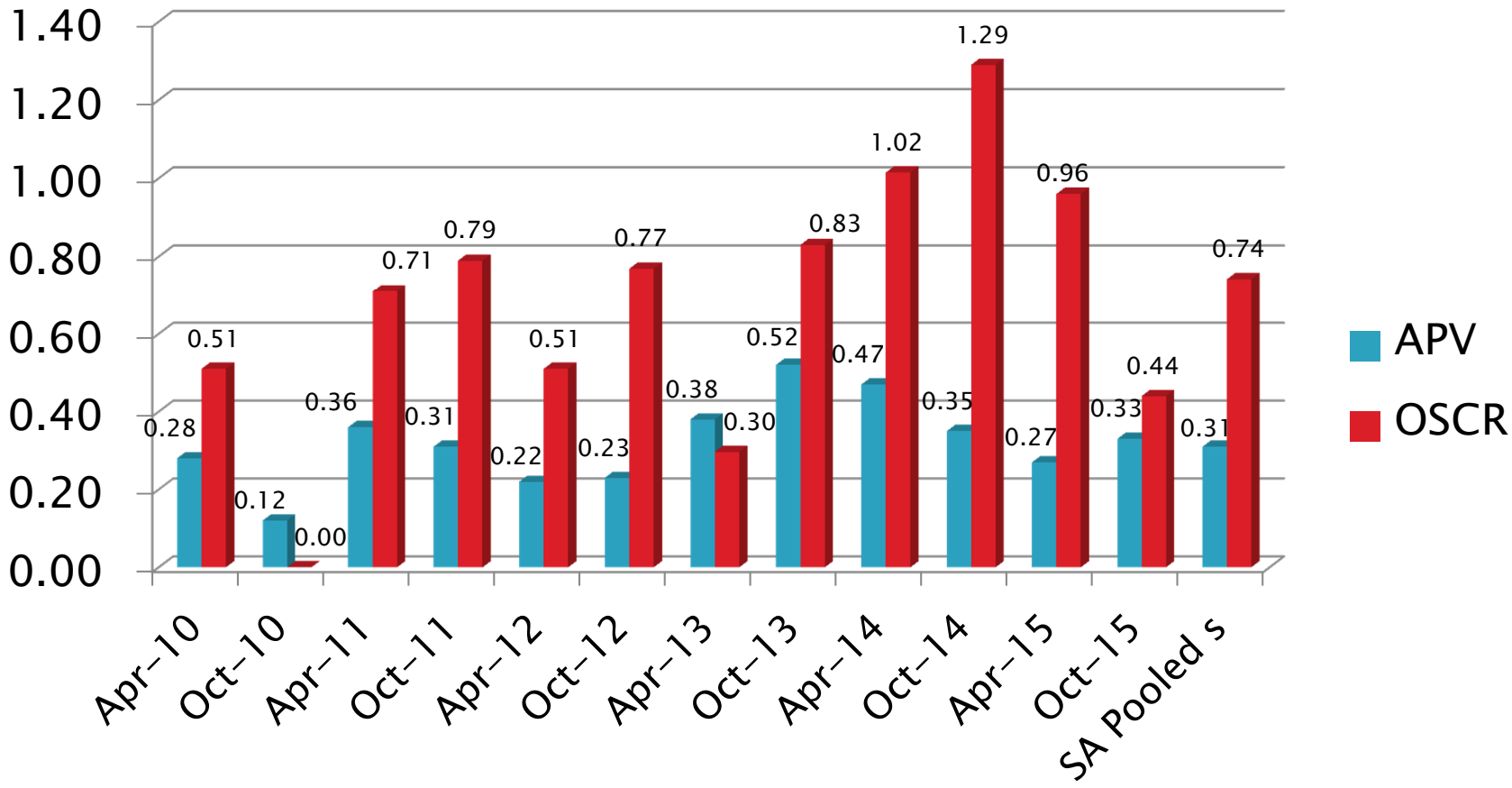

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Sequence VID

- October 2015

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Sequence VID Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	32
Failed Statistically	OC	7
Operationally Invalid	LC	3
Aborted	XC	4
Engine Abandoned, would not Calibrated	MC	5
Total		51

Information Letters

- April 1, 2015 –
  September 30, 2015

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Information Letters*

Test	Date	IL	Topic
VG	20150701	15-1	Allow use of alternate valves, water pump and added new source for wiring harness.
VID	20150916	15-1	Added additional part number for oil coolant heat exchanger.
VIII	20150617	15-1	Added additional part numbers for Permatex Ultra Blue 77B sealant.

*Available from TMC Website

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Reference Oil Inventory

- Actions, Re-blends, Inventories and Estimated Life

Reference Oil Re-blends

- TMC 434
  - Re-blend 434-2 distributed, four successful calibration attempts completed, one failing result.
- TMC438-1
  - Re-blend available; will be used for IIIH.
- TMC 542-3 and 1010-1
  - Re-blend of 542 has been obtained
  - Two results were reported this period on 1010-1. Most labs have enough 1010 to calibrate remaining engines

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Reference Oil Inventory Estimated Life

Oil	Tests	Original Blend Amount	Quantity Shipped in last 6 months	TMC Inventory	Lab Inventory	Estimated Life
300	IVA	330	68	231	60	5+ years
433-1	IIIF	1045	0	0	4	<1 year
433-2	IIIF	500	16	364	28	3+ years
434	IIIG	550	0	<1	12	<1 year
434-1	IIIG	660	52	4	28	1.5 years
434-2	IIIG	495	56	311	20	3+ years
435	IIIG	550	0	2	4	<1 year
435-2	IIIG	550	0	210	28	3+ years
438	IIIG	990	8	68	28	2 years
540	VID	1100	20	273	45	4+ years
541-1	VID	550	0	4	25	<1 year

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Reference Oil Inventory Estimated Life

Oil	Tests	Original Blend Amount	Quantity Shipped in last 6 months	TMC Inventory	Lab Inventory	Estimated Life
542	VID	1100	0	0	5	<1 year
542-1	VID	275	0	3	5	0 years
542-2	VID	1000	175	590	25	1.5 years
704-1	VIII	897	8	142	14	5+ years
925-3	VG	975	0	10	6	<1 year
940	VG, VH	560	45	339	15	5+ years
1006-2	IVA, VG, VIII	5500	94	2852	68	5+ years
1007	IVA, VG	1968	0	0	30	<1 year
1009	VG, VIII	1100	20	120	18	5+ years
1010	IIIG, VID	1100	50	3	30	<1 year
1010-1	IIIG, VID	1760	147	1567	54	5 years

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LTMS Deviations

- April 1, 2015 –
  September 30, 2015

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LTMS Deviations

- No LTMS Deviations in Current Period

LTMS Deviations

Historical Count of PCEO LTMS Deviations

Test	LTMS Deviations
IIIF	6
IIIG	6
IVA	7
VG	8
VID	2
VIII	3

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Quality Index Deviations

- April 1, 2015 –
  September 30, 2015

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Quality Index Deviations

- One Quality Index Deviation this Report Period.
  - VG – RAC coolant flow control.

Historical Count of PCEO Quality Index Deviations

Test	Quality Index Deviations
IIIF	26
IIIG	14
IVA	28
VG	42

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TMC Laboratory Visits

- April 1, 2015 –
  September 30, 2015

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TMC Lab Visits

Test	Number of Labs Visited
III	2
VG	1
VID	2

TMC Lab Visits

- Three discrepancies noted during visits
  - VID – Heat exchanger model number did not match test method.
  - VID – Coolant in T/C had more than 2” of sheathing exposed.
  - VID – Fuel rail temperature thermocouple not properly located.

The laboratories have responded with corrective action.

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Test Area Timelines

- April 1, 2015 –
  September 30, 2015

Test Area Timeline Additions*

Test	Date	Topic	IL
IIIF	20150727	First occurrence of run 78 Pistons.	
IIIG	20150728	First occurrence of run 910 Pistons.	
VG	20150701	Allowed use of aftermarket intake and exhaust valves, alternate water pump and new source for engine wiring harness.	15-1
VID	20141104	Added oil heat exchanger part number 5-694-010-020-002 to test method.	15-1
VIII	20141110	Included additional part numbers for Permatex 77B sealant.	15-1

*As of 09/30/2015

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Rating Workshop Data

- 2015 Light Duty Workshop

Test Monitoring Center

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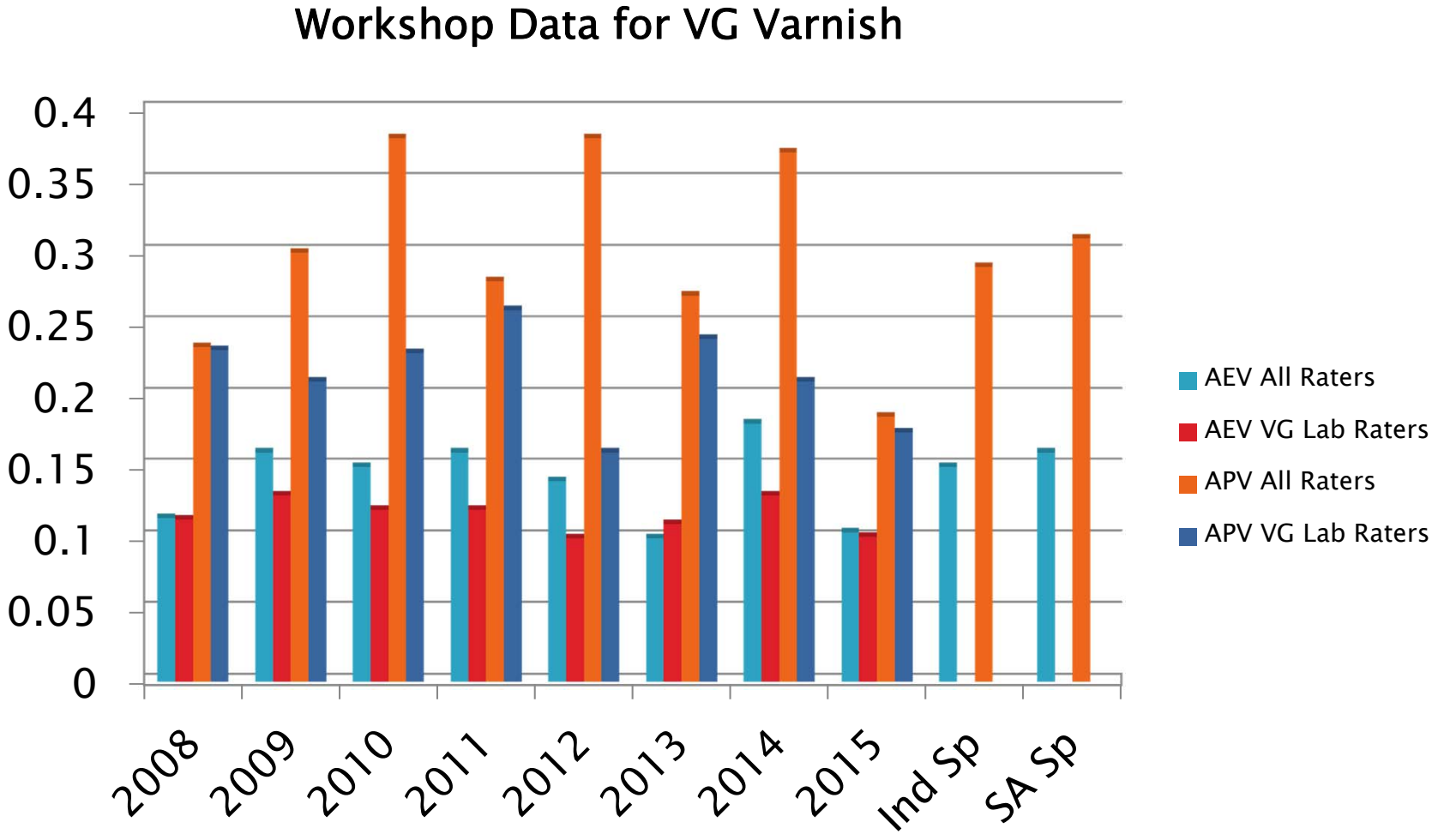
Rating Workshop Data

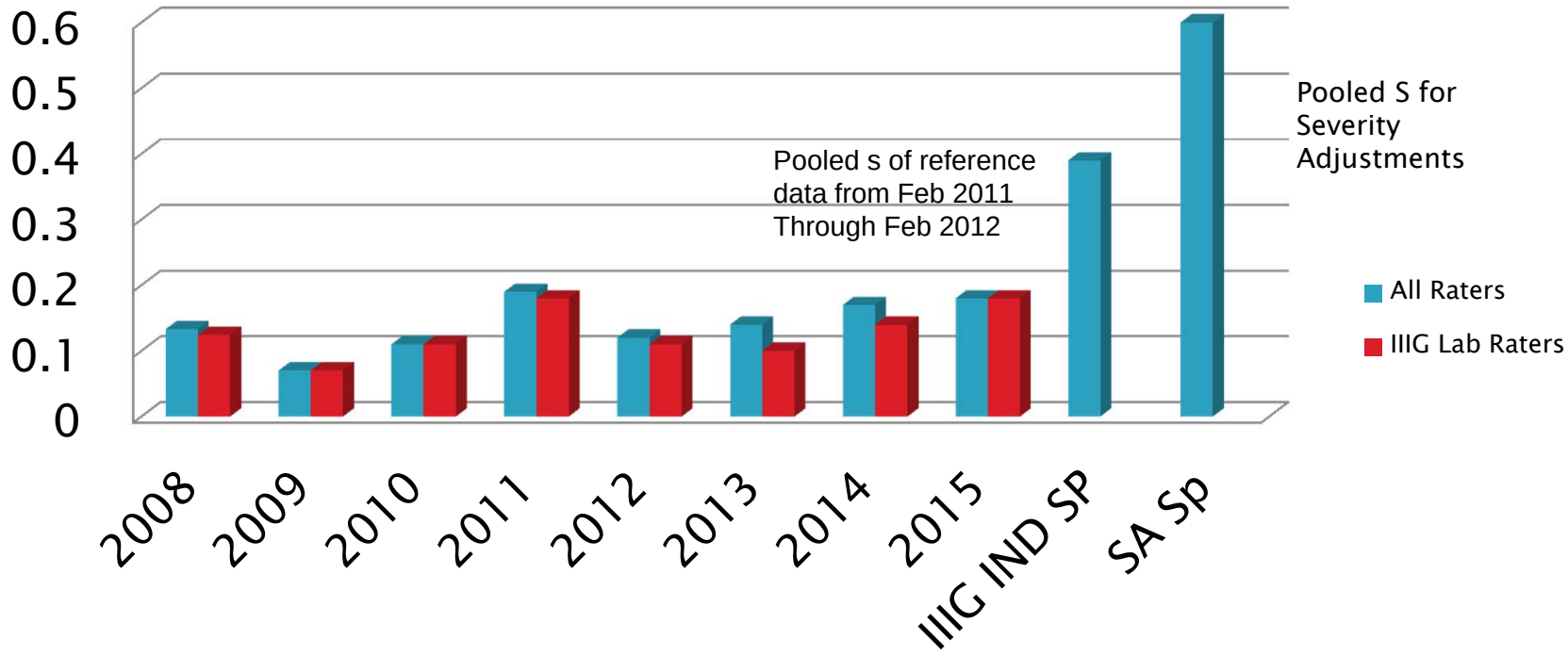
- Summary of Precision Data From Light Duty Rating workshops:
  - VG Average Piston and Average Engine Varnish.
  - IIIG WPD

Sequence VG Precision-Rating Workshop Data



Sequence IIIG Precision – Rating Workshop Data

Comparison of Workshop Pooled Standard Deviations with Industry Pooled Standard Deviations



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Miscellaneous Information

- Available on TMC Website:
  - Live Reference Test Data Bases
  - Surveillance Panel Meeting Minutes
  - Test Area Alarm Logs
  - Complete Test Area Timelines
  - LTMS Manual

- www.astmtmc.cmu.edu

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Attachment 3

VG New Fuel Batch Matrix Proposal

Stats Group

September 29, 2015

Proposed Matrix

Lab	IAR		SwRI		LZ
Stand	Stand 1	Stand 2	Stand 1	Stand 2	Stand 1
Run 1 *		940	940		940
Run 2 *	1009	1009	1009	940	1009
Run 3 *	940	940	1006-2	1009	1006-2
Run 4	1006-2			1009	

- Assumptions:
  - First run: RO 940 in one stand for each lab per request by VG Fuel Matrix TF (9/17/15). (Could revise to 2 tests in Run 1 if desired.)
  - 2 stands at IAR and SwRI, 1 stand at LZ
  - 3 runs per stand
  - Oils: 940, 1006-2 and 1009 with emphasis on 940 and 1009.
- After each run (matrix row), SP review results to verify next row is proper (*).

Attachment 4

Sequence V Agenda Items

1)Existing Fuel Batch (AK2821NX10-1)

a) Lab and Haltermann Inventories

b)Estimated Run-out Date

- IAR =
- SWRI =
- LZ =
- Afton =

2) Fuel Approval Matrix

a) Haltermann report including C of A for new fuel

b) Confirm delivery of fuel to the labs

c) Review run order for the Panel

d) Lab updates on test starts

e) Estimate time for first data review of 940 oil results

VG/VH Hardware

1) Current VG Test limiting parts (pistons/rings)
   - IAR
   - SWRI
   - LZ
   - Afton

2) VG Test can remain in current fuel/hardware configuration for 3+ months.

3) Panel needs to then decide what new hardware to use to extend the VG test

a) Assume life of VG is through 2017.

b) VH Transition timing?

VG fuel and new hardware approval

- Present VG Plan
  - Approve new fuel batch on existing VG hardware
  - Approve unplated pistons on newly approved fuel batch
- Timing may be tight with present VG plan
  - At best fuel approval by end of Dec 2015
  - At best unplated pistons approved by end of Feb 2106
  - Or combine matrixes. Timing to complete should be before Feb 2016
    - Hardware to include in combined matrix, piston, blocks, cams. Not heads
    - Make fuel work with new hardware.

VG Hardware purchase Timing

- FCS solicitation sent to all labs
- Rings need to be bought now
- FCS agrees to have rings on a separate order.
- Labs need to get together to coordinate VG parts buy.

VH Update

Develop VH test after new fuel is approved for VG