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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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Originally Issued: November 21, 2007

Reply to: Richard Grundza
ASTM Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206
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Fax: 412-365-1047
Email: reg@astmtmc.cmu.edu

Unapproved Minutes of the November 14, 2007 Sequence VG Surveillance Panel Meeting held in San Antonio, TX

The meeting was called to order at 8:04 am by Chairman Andy Ritchie. A membership list was circulated for members & guests to sign in. It's shown in Attachment 1.

Agenda Review

Bill Buscher is Action & Motion recorder.

The Agenda was accepted as shown on Attachment 2.

Sequence VG Meeting Minutes
November 14, 2007
San Antonio, TX

Membership Changes

No membership changes were noted.

Chairman's Comments

Andy Ritchie felt he and the panel made a mistake waiting a year between meetings. Andy intends to meet every six months in the future and potentially have conference calls every three months. Andy also briefly presented the report he planned to give to Subcommittee D0.02. B1.

Meeting Minute Status

The November 7, 2006 meeting minutes were approved by the surveillance panel.

Review of Action Items from Last Meeting

As Recorded at the Meeting by Bill Buscher.

1. Action Item – Chairman of the LTMS, Ben Weber to investigate the pros and cons of the new IIIG LTMS system and study how well it could potentially be applied to the VG. Ben will send a request for feedback to the ACC chairman, to obtain additional feedback for this investigation. Report back to the group by the May 2007 meeting.

NOTE: Carryover from May 2005 Surveillance Panel meeting.
Drop and replace with action item 1 and 2 from today's meeting.

2. Action Item – Due to recent Surveillance Panel membership charges, labs to send an update to Jim Carter at Haltermann indicating who should receive the analysis results for their monthly (run tanks) or bi-monthly (storage tanks) fuel tank samples. All fuel tank samples analyses will also be copied to the TMC to be kept in a confidential database.
   NOTE: Carryover from June 2006 Surveillance Panel meeting.
   Data obtained by TMC, Joel Moreno forgot to cc TMC on analysis and said he would make sure it is done in the future. Rich Grundza will discuss briefly under fuel supplier report.
3. Action Item – TMC to assign reference oil 1007 for each lab's next reference test in order to generate data with reference oil 1007 on the new fuel batch. This data will supplement existing reference oil data on the new fuel batch for potentially updating the fuel correction factors.
   NOTE: Carryover from June 2006 Surveillance Panel meeting. Pending test results from labs.
   Data Generated earlier 2007, data included in correction factor update to be discussed today.

4. Motion – Recommend to the Surveillance Panel to widen the time limits on re-ring/re-gaps. Revise Section 12.4.1 of the Sequence VG test procedure, by changing 48 hours to 72 hours. Dan Worcester / no second / tabled for review of additional data
   Will be covered in Old Business today.

5. Action Item – Surveillance Panel to review lost test data from semi-annual RSI report before voting on motion listed above.

6. Motion – Recommend to the surveillance panel to include an optional control method to replace the adjustable pot during Stage 3 conditions with the resistor active in the coolant sensor harness, and an alternate source for the Lambda meter.

   Section X2.1 to include:
   Innovate Technology, Inc.
   5 Jenner, Suite 100
   Irvine, CA 92618
   949.502.8400
   www.innovatemotorsports.com.

   Dan Worcester / no second / tabled for review of additional data
   Will be covered in Old Business today.

7. Action Item – Dan Worcester to obtain and supply additional data for Stage 3 closed loop control. Surveillance Panel to review data before voting on motion listed above.
   Will be covered in Old Business today.

8. Motion – Revise Sequence VG test procedure as follows:

   13.1.5 All raters of Sequence VG engine pistons shall attend a CRC Light Duty Rating Workshop every twelve months ± 30 days and produce data that meets CRC's definition of Blue, Red or White for piston deposits and engine varnish. If a rater is unable to meet this requirement for reasons beyond the rater's control, the rater may follow the steps stated in 13.1.6. Note, the results from the most current workshop are effective 45 days from the completion of the workshop unless a re-test proceeds the 45 days.

   13.1.6 At any time (excluding one week after the most current CRC workshop and between re-tests) a rater who at the most recent CRC Light Duty Rating Workshop produced data falling in CRC's Yellow group may visit the TMC offices to attempt to generate data on Light Duty workshop hardware to assess their performance compared to workshop-produced data. The TMC will provide rating booths and lights for this purpose. The TMC will select a minimum of 6 pistons from a collection of workshop parts for the rater to rate; if he chooses, the rater may rate more than 6 parts if prior arrangement is made with the TMC. Provision of all rating aids necessary to rating the parts shall be the responsibility of the rater. The TMC will analyze the data in the same way as workshop data and determine which CRC color group definition it meets. If the data meets the CRC Blue, Red, or White requirements, ratings produced by the rater may be used for testing. Results from a raters first or second re-test are effective immediately and void the 45 day grace period stated in Section 13.1.5.

   Additional requests to use this procedure are permitted only after the rater receives training from experienced industry raters. After two attempts to complete this procedure, the rater shall attend a CRC Light Duty workshop before making another request.

   Frank Farber / Dwight Bowden / 10 For 0 Against 1 Waive
   COMPLETE

9. Action Item – Clayton Knight to provide a thorough definition of what TEI is providing as the handling service for the industry FCS parts order.
   COMPLETE

Sequence VG Meeting Minutes
November 14, 2007
San Antonio, TX

Test Sponsor Report

Part of the test sponsor report was to include input from Ford Component Sales, who did not receive the request to move the meeting start time to 8 am. Ron Romano discussed some early failures of fuel pumps noted at Afton and Intertek. Southwest Research has seen some early failures, but not to the extent of the other labs. Dwight Bowden informed the panel that the dyno wiring harness is currently not available. The company who manufactured the harness is no longer available. Dwight mentioned there were a couple orders for new harnesses. The connectors and diagrams are still available so Dwight and Ron are actively looking for a vendor to assemble the harnesses. Labs were instructed to not scrap there harnesses and to send defective harnesses to OHT and they would attempt to have them repaired. Ron stated that they are still trying to locate timing gears and tensioners for the next parts order and that they are still awaiting pistons from India from the previous order.

Test Monitoring Center Report

A copy of the TMC report can be obtained from the TMC website. There were no questions or comments regarding the TMC report. Rich presented data on the updated correction factors, based on 40 total tests. The TMC presentation is included as Attachment 3. The correction factors were approved unanimously, and are to be applied to tests completing on or after November 14, 2007.

RSI Report

Reports were previously emailed to panel members and posted to the RSI website. The Chairman reviewed the reports at the meeting.

ACC Selection of new monitoring agency: Frank Farber commented that the TMC has been awarded the ACC&ATC monitoring contracts and would assume registration duties on January 1, 2008.

Fuel Supplier Report

Wayne Peterson, who attended the meeting for Jim Carter, gave a quick summary of fuel consumption and adjustments to maintain RVP in the stored fuel and is included as attachment 4. A summary of fuel consumption is also included in attachment 4. Analysis of fuel in storage is included as attachment 5. The VG fuel will be moved from Dow's Sheldon Road facility to a Dow facility near Houston. This site has analytical capabilities on site and will allow better oversight of the fuel in storage. Wayne anticipates the fuel will be moved in the next few weeks, using one or two dedicated trucks and the fuel will be tested before and after transfer to ensure no contamination or degradation has occurred. Fuel will be stored in two tanks, side by side with recirculation capability between the tanks. Attachment 6 is a copy of Wayne's presentation regarding the fuel movement. 180,000 gallons will be transferred leaving 10 to 20,000 gallons at the current site. Labs may wish to purchase this amount left over so that it won't be lost. Industry consumed 97,000 gallons this year, leaving about an 18 month supply of fuel. Several members asked when a new fuel batch would be blended. The panel decided to begin planning for the next

blend. Rich Grundza was tasked with reviewing the procedure for conducting a new blend and the timeline followed for the previous blend. A small group, consisting of Andy Ritchie, Ron Romano, Jim Carter and Joel Moreno were tasked with planning for the next blend.

Hardware Items

Ford Component Sales representatives Jim Azzouz and Leon Taylor discussed their activities in obtaining parts for Sequence VG testing. FCS was working with 70 + parts and had some issues with vendors, parts changes, etc. They put procedures in place to try and prevent recurrence of these problems. FCS will validate/verify parts with Dan Worcester. He commented that the piston tooling was moved to India and that they noted the inspection level was not adequate for the panel's needs. The have instituted 100% inspections of the pistons before shipping. Labs are to survey their piston needs for a final build out order. Dan Worcester commented that lack of all pistons sizes causes runs on blocks to be lost, for if an intermediate size piston is not available, then that size must be skipped and that run to be lost. FCS indicated they may be able to obtain "clean cores" for blocks and heads to be used for testing. They will do some investigation and advise the panel in the future. The original cam is no longer available and throttle bodies may also not be available. Reforming the O&H Subpanel with Dan Worcester as the head was suggested. FCS committed to continue to work on the hardware availability issues.

Scope and Objectives

A review of the scope and objectives was conducted. The revised scope and objectives are included as attachment 7.

New and Old Business

Items of New business and old business were addressed. As new business, Al Lopez noted he had a VG reference that completed but was not reported and wished to have the date for the correction factor amended to November 10, 2007. Discussion about the implementation ensued, and the updating of severity adjustments were also discussed. It was agreed to apply these correction factors to reference oil test completing on or after 11/10/2007 and for non reference oil tests completing on or after 11/14/2007.

Dan Worcester proposed a change to the fuel management strategy to allow closed loop control in stage 3. He explained that this would replace the potentiometer used to control lambda in stage 3. Dan presented a plot comparing fuel dilution over test length using the potentiometer and closed loop control. Dave Glaenzer expressed reluctance switching to this quickly, as his lab has had no experience with it. Dan said he has this installed on his stands, which brought concerns from some panel members, including Ron Romano, that industry had several labs running differently. Ed Altman expressed concerns about going from a high end AFR sensor and using it for control to using a lower end sensor. After considerable discussion, the panel agreed to form a task force to evaluate closed loop control and define components and strategy. Dan made a motion to increase the upper limit for average blowby through hour 120 from 70 L/min to 73L/min. Dan presented plots showing AESyi versus blowby and these plots and analysis showed little correlation. After some discussion, Dan made a motion to increase the limit, but there was no second. Dan then discussed allowing labs to have valve guides replaced locally.

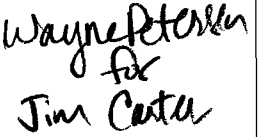
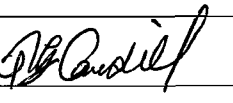
After discussion, it was agreed to allow labs to have valve guides replaced, provided the meet the Ford specifications. Ron Romano agreed to provide the Ford specifications for valve guide clearance, installed, height, etc. The motion was approved with 2 waives. Finally, Dan showed a number of cam baffles and wished to amend the cleaning procedure. He showed a new baffle and wondered if there had been changes to the manufacturing process because the baffle was extremely shiny and expressed concerns that varnish might be removed when the sludge is wiped of the sludge rating sites. Dwight explained that there had been no change to the process and that the electro polishing was specified to provide a uniform surface. Dan had proposed cleaning and polishing to a surface finish of 0.2 to 0.4 Ra surface roughness. Several members cautioned that Ra does not provide a good measure of surface finish, as it can measure the peaks, and not give a good representation. After some discussion, the panel agreed to move this issue to the task force for further study. Dan's presentation, regarding his motions, is included as attachment 8.

A listing of Motions and Action items recorded during the meeting is included as attachment 9.

The meeting was adjourned at 11:50 am.

Attachment 1

MEMBERSHIP
ASTM SEQUENCE VG SURVEILLANCE PANEL

Name	Company-Address-Phone-Fax-Email	Signature	Voting Member
Altman, Ed	Afton Chemical Company 500 Spring Street Richmond VA 23218-2158 Phone: 804-788-5279 Fax: 804-788-6358 Email: ed.altman@aftonchemical.com		Yes
Bendele, Larry	Southwest Research Institute P.O Drawer 28510 San Antonio, TX 78228-0510 Phone: 210-522-2824 Fax No: 210-684-7523 Email: lbendele@swri.edu		No
Bowden, Dwight	OH Technologies, Inc. 9300 Progress Parkway P.O Box 5039 Mentor, OH 44061-5039 Phone: 440-354-7007 Fax: 440-354-7080 Email dhbowden@ohtech.com		Yes
Buck, Ron	Test Engineering, Inc 12718 Cimarron Path San Antonio, TX 78249 Phone: 210-877-0221 Fax No: 210-690-1959 Email: rbuck@tei-net.com		No
Buscher, Bill A.	Buscher Consulting Services P.O. Box 112 Hopewell Junction NY 12533 Phone 845-897-8069 Fax 845-897-8069 Email: buschwa@aol.com		No
Buscher, William A	Southwest Research Institute P.O Drawer 28510 San Antonio, TX 78228-0510 Phone: 210-522-6802 Fax No: 210-684-7523 Email: wbuscher@swri.edu		No
Carter, James	Dow 2296 Hulett Road Okemo MI 48864 Phone: 517 347 3021 Fax: 517-347-1024 Email: jecarter@dow.com		Yes
Caudill, Timothy	Valvoline 22nd and Front Streets		Yes

	Ashland KY 41101 Phone: 606-329-1960, ext 5708 Fax: 606-329-2044 Email: tlcaudill@ashland.com		
Clark, Sid	GM Powertrain Mail Code ~~483-730-322~~ 823 Joslyn Road Pontiac, MI 48340-2920 Phone: ~~586-986-1929~~ Fax: ~~586-9986-2094~~ Email: Sidney.l.clark@gm.com	MC 483-730-312 248 977 9819 Fax ? Sid	Yes
Farber, Frank	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, PA 15206 Phone: 412-365-1030 Fax: 412-365-1045 Email: fmf@astmtmc.cmu.edu	fmf	No
Farnsworth, Gordon	Infineum USA L.P. 1900 East Linden Avenue P.O. Box 735 Linden NJ 07036-0536 Phone: 908-474-3351 Fax: 908-474-3637 Email: Gordon.Farnsworth@infineum.com		Yes
Glaenzer, Dave	Afton Chemical Corporation 500 Spring Street Richmond VA 23218-2158 Phone: 804-788-5214 Fax: 804-788-6358 Email: dave.glaenzer@aftonchemical.com		No
Gomez, Redescal	Intevep S.A. Los Teques, Edo Miranda Adpo 76343 Caracas 1070-A Venezuela Phone: 9-011-582-9086754 Fax: 9-011-582-9087723 Email: gomezriv@pdvsa.com		
Hyndman, C. W.	Roh Max USA 727 Norristown Road Spring House PA 19477 Email: charles.Hyndman@degussa.com		
Knight, Clayton	Test Engineering, Inc 12718 Cimarron Path San Antonio, TX 78249 Phone: 210-877-0222 Fax No: 210-690-1959		Yes

CKnight @ TEI-Net.com

	Email: cknight@tei-net.com		
Lai, Patrick S.	Imperial Oil Limited 453 Christina Street South Sarnia, Ontario N7T 8C8 Canada Phone: 519-339-5611 Fax: 519-339-5866 Email: Patrick.k.lai@esso.ca		No
Lopez, Al	~~PerkinElmer Fluid Sciences~~ INTERTEK 5404 Bandera Road Asst. Research San Antonio, TX 78238 Phone: 210-647-9465 Fax: 210-523-4661 Email: al.lopez@perkinelmer.com		Yes
Miranda, Timothy	BP Lubricants USA 1500 Valley Road Wayne, NJ 07470 Phone: 973-305-3334 Fax: 973-686-4039 Email: timothy.miranda@bp.com		Yes
Romano, Ron	Ford Motor Company Diagnostic Service Center II Room 410 1800 Fairlane Drive Allen Park, MI 48101 Phone: 313-845-4068 Fax: 313-845-3169 Email: mrromano@ford.com		Yes
Ritchie, Andrew	Infineum P. O. Box 735 Linden, NJ 07036-0536 Phone: (908) 474-2097 Email: Andrew.ritchie@infineum.com		Yes
Sutherland, Mark	Chevron Oronite Company, LLC 4502 Centerview Drive Suite 210 San Antonio, TX 78228 Phone: 210-731-5621 Fax: 210-731-5699 Email: msut@chevrontexaco.com		Yes
Szappanos, George	Lubrizol 29400 Lakeland Blvd Wickliffe, OH 44092 Phone: 440-347-2352 Email: GSZ@lubrizol.com		Yes
Walker, David	AER Manufacturing, Inc. P.O Box 979 1605 Surveyor Boulevard		

	Carrollton, TX 75006 Phone: 972-417-3182 Fax: 972-417-3165 Email: davidwalker@aermfg.com		
Worcester, Dan	~~Intertek AR~~ SWRI ~~5404 Bandera Road~~ 528 Tom Sack San Antonio, TX ~~78238~~ 78228 Phone: 210-~~523-4659~~ 522.2405 Fax: 210-~~523-4607~~ ? Email: SWRI.ORG dan.Worcester@~~intertek.com~~		Yes
Grundza, Rich	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, PA 15206 Phone: 412-365-1031 Fax: 412-365-1045 Email: reg@astmtmc.cmu.edu		Yes
	Mailing List		
Oliver, Rick	CMA Monitoring Agency 2805 Beverly Drive Flower Mound, TX 75022 Phone: (972) 724-2136 Fax: 210-341-4038 Email: crickoliver@attbi.com		
Goldblatt, Irwin	Technical Center 240 Centennial Avenue Piscataway, NJ 08854 3910 Phone: 732-980-3603 Fax: 973-686-4224 Email: Irwin.Goldblatt@bp.com		
Martinez, Jo	Chevron Oronite Co. LLC 100 Chevron Way Richmond, CA 94802 Phone: 510-242-5563 Email: jogm@chevron.com		No

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Jim Azzouz Ford JMA JAZZOUZ@ford.com

Leon Taylor Ford LT ltaylo84@Ford.com

Attachment 2

Agenda
Sequence VG Surveillance Panel
November 14, 2007 8:00–12:00 noon
San Antonio

1. Chairman comments.	
2. Attendance sign-in distribution.	
3. Membership changes.	
4. Motion and Action recorders.	
5. Approval of minutes for Nov 7th 2006	**All**
6. Review action items from last meeting.	**Andy Ritchie**
7. Test Sponsor report.	**Ron Romano**
8. TMC Report. **- Questions on semi-annual report.** **- Fuel batch correction factor update.**	**Rich Grundza**
9. RSI Report. **- Questions on semi-annual report.**	
10. Fuel Supply Report.	**James Carter**
11. Operational and Hardware Items.	**All**
12. VG parts supply update	**Ford Component Sales**
13. Review Scope and Objectives.	**All**
14. Old business **Motion on A/F Stage 3 closed loop control**	**All** **Dan Worcester**
15. New business	**All**
16. Adjourn	

Attachment 3

Sequence VG Fuel Batch Correction Factor Update

R. Grundza

November, 2007

Program Summary

- 8 tests from 2 labs
- 2 runs in each lab on oil 1006-2 = 4
- 1 run in each lab on oil 1009 = 2
- 1 run in each lab on oil 925-3 = 2

An additional run was conducted on 1006-2, bringing the Total to 9

Since Program

- 31 tests from 5 labs
- 6 run oil 1006-2
- 13 run on oil 1009
- 7 run on oil 925-3
- 5 run on oil 1007
- Total tests run = 40

Summary of Uncorrected Results*

Lab	IND	AES	RAC	AEV	APV
A	1006-2	8.27	9.3	8.64	7.9
G	1006-2	7.3	8.62	9	7.97
G	1006-2	8.23	9.31	8.88	7.93
A	1006-2	8.23	9.16	9.17	8.25
G	1006-2	8.63	9.19	9	7.98
A	925-3	5.36	7.15	8.76	6.94
G	925-3	5.8	6.99	8.66	6.96
A	1009	7.44	9.09	8.89	7.57
G	1009	7.17	9.22	8.8	7.28
A	1009	5.98	8.86	8.78	7.35
D	1006-2	8.02	9.14	9.11	7.82
D	925-3	6.53	7.7	8.62	7.15
B	1009	8.20	9.36	8.85	7.22
D	1009	7.35	9.26	8.88	7.60
D	925-3	6.74	7.9	8.75	7.37
G	925-3	6	7.02	8.61	7.11
D	1009	7.53	9.21	8.89	7.73
G	1009	7.02	8.78	8.83	7.36
A	925-3	6.35	7.52	8.61	7
A	1009	6.67	8.91	8.61	7.29
B	1006-2	8.92	9.35	9.11	8.01
A	925-3	6.21	7.62	8.52	7.24

*Lab severity adjustments applied using candidate model

Summary of tests (cont)

Lab	IND	AES	RAC	AEV	APV
G	1007	8.81	8.8	8.83	7.76
G	1006-2	8.7	9.37	8.93	8.01
D	1007	8.09	8	8.95	7.69
G	1009	7.44	9.19	8.79	7.5
A	1009	6.74	9.06	8.95	7.52
A	1007	8.71	8.53	9.14	8.18
E	1007	8.98	9.01	9.09	7.85
B	1007	8.99	9.28	9.12	8.05
A	1006-2	8.17	9.05	9.15	8.09
G	925-3	6.07	7	8.66	7.22
D	1006-2	8.49	9.46	9.27	8.73
D	1009	7.82	9.00	9.06	7.87
G	1009	7.25	8.84	8.92	7.54
A	1006-2	8.65	9.36	9.25	8.31
A	1009	7.67	9.06	8.60	7.44
B	925-3	5.74	7.01	8.57	7.30
A	1009	7.14	8.95	8.96	7.22
G	1009	7.9	9.28	8.96	7.73

Summary of Results (cont)

- AES, RAC, AEV and APV all significantly different from target. With an average Δ/s of -0.101, OSCR did not test as significantly different in fuel program, not analyzed for update.
-

	Average	Delta	Delta/s
AES		-0.45	-0.93
RAC		-0.20	-0.92
AEV		-0.12	-1.19
APV		-0.37	-1.97

Correction Approach

- Evaluated Linear Regression
- For AES correction equation is

$AES_{corrected}$ = (AES+0.864)/1.052

For RAC correction equation is

$RAC_{corrected}$ = (RAC - 0.282)/0.947

For AEV correction equation is

$AEV_{corrected}$ = (AEV-3.582)/0.589

- For APV correction equation is

$APV_{corrected}$ = (APV-1.568)/0.758

See plots

Previous Correction Equations

- For AES correction equation is

$AES_{corrected}$ = (AES + 2.175)/1.192

For RAC correction equation is

$RAC_{corrected}$ = (RAC+ 0.627)/1.041

For AEV correction equation is

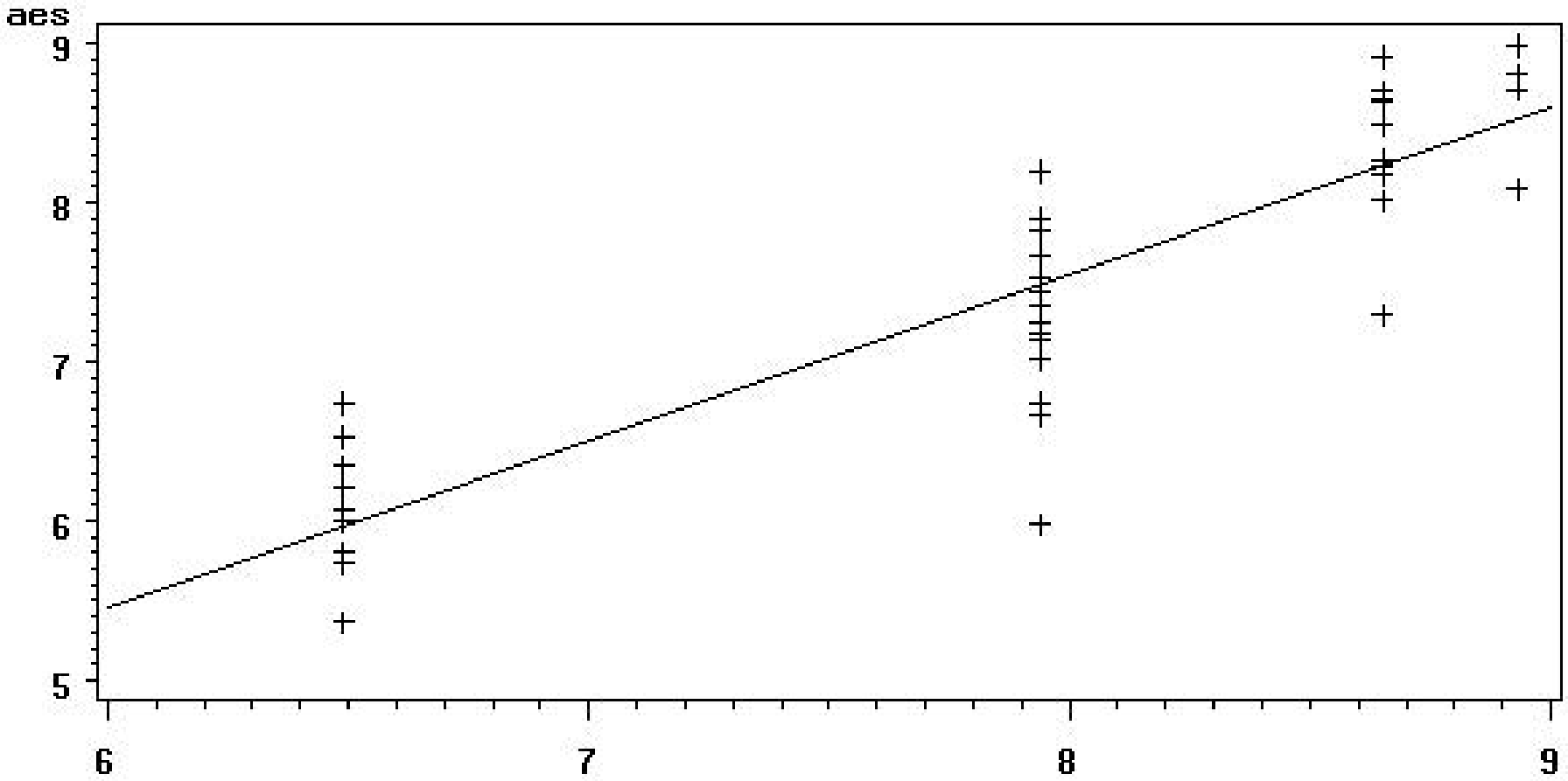
$AEV_{corrected}$ = (AEV-5.735)/0.346

For APV correction equation is

$APV_{corrected}$ = (APV-0.365)/0.898

Sequence VG

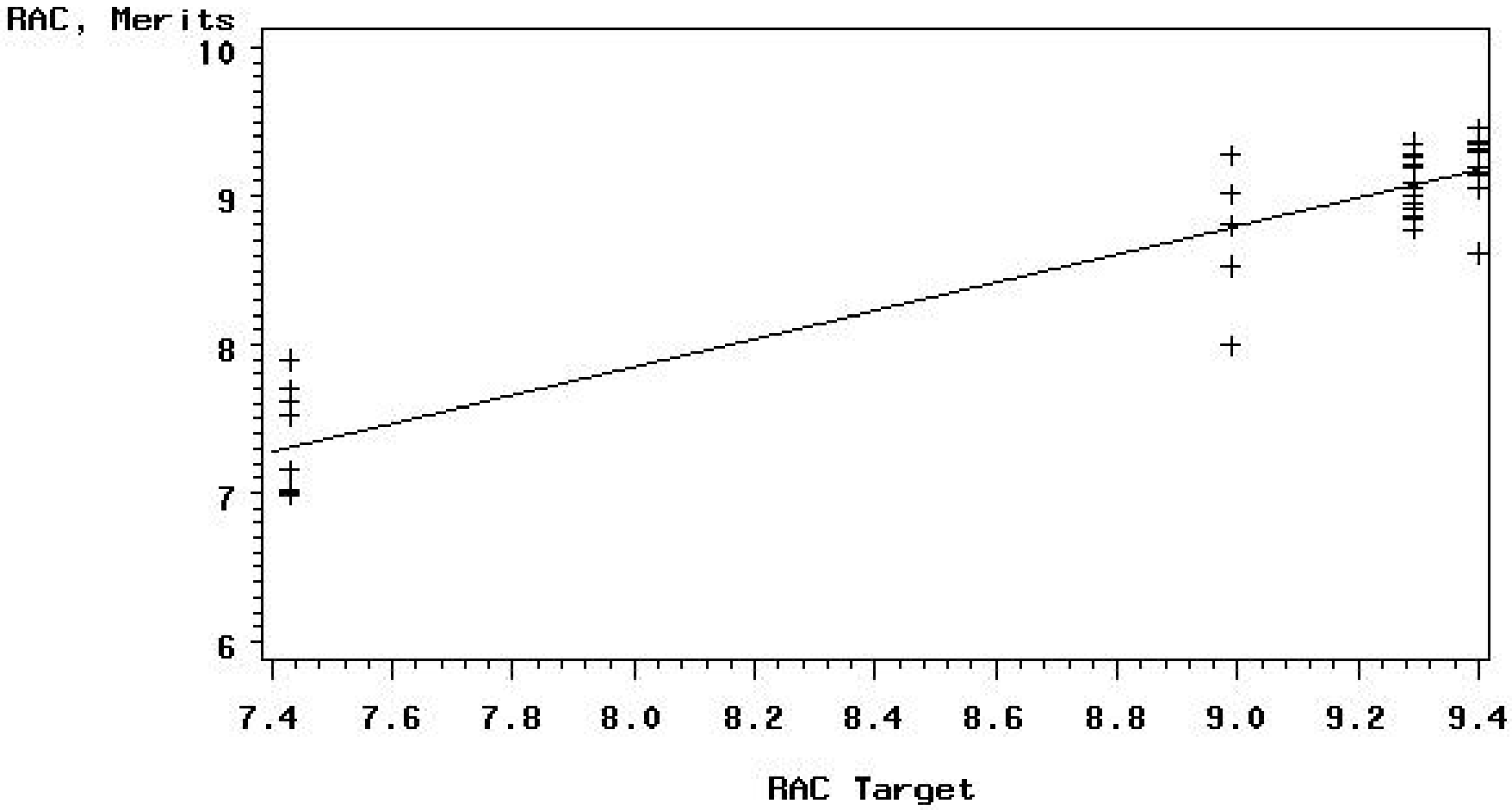
Plot of SA Adjusted AES versus AES Targets



R square = 0.77

Sequence VG

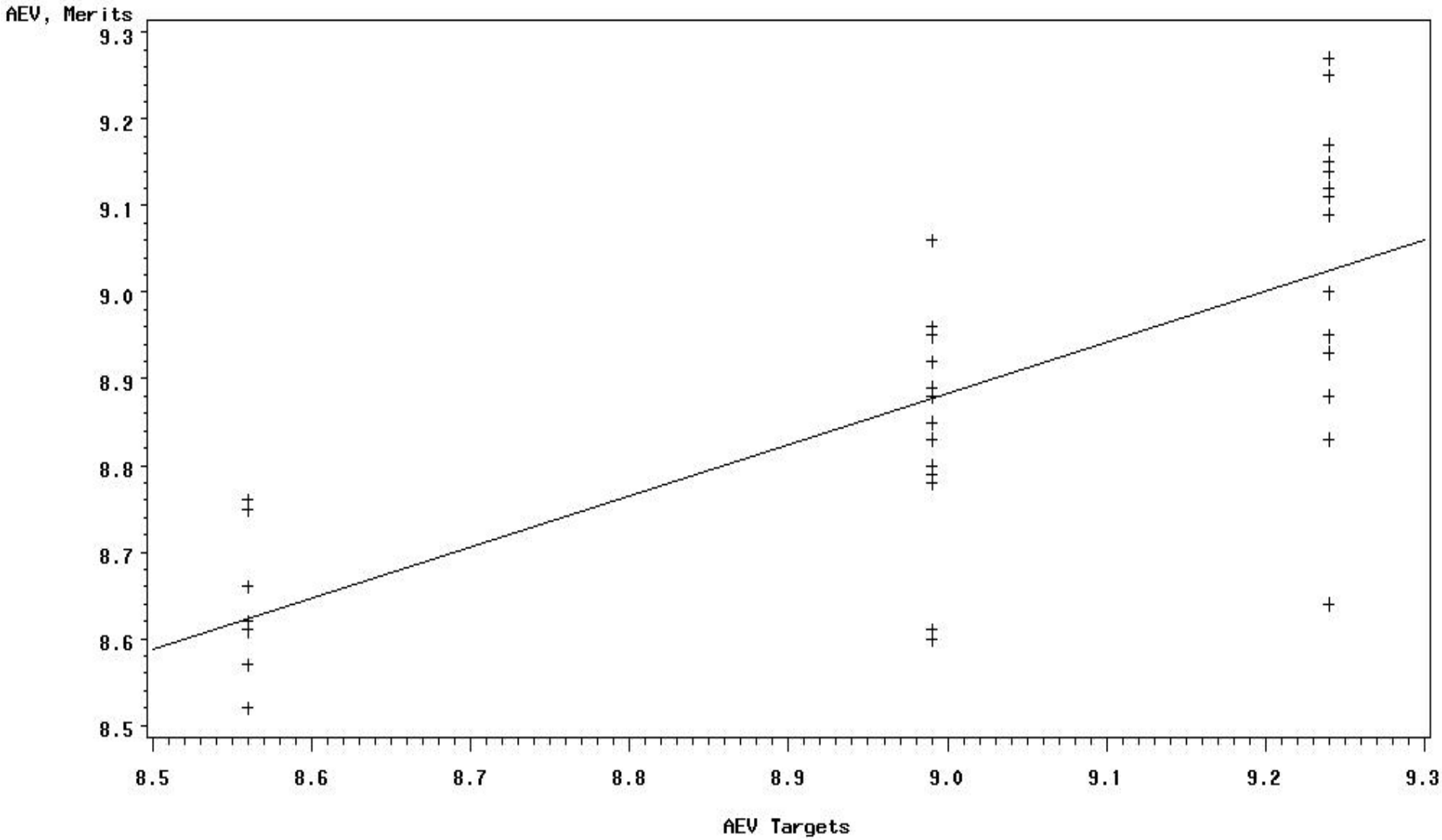
Plot of SA Adjusted RAC versus RAC Targets



R square = 0.88

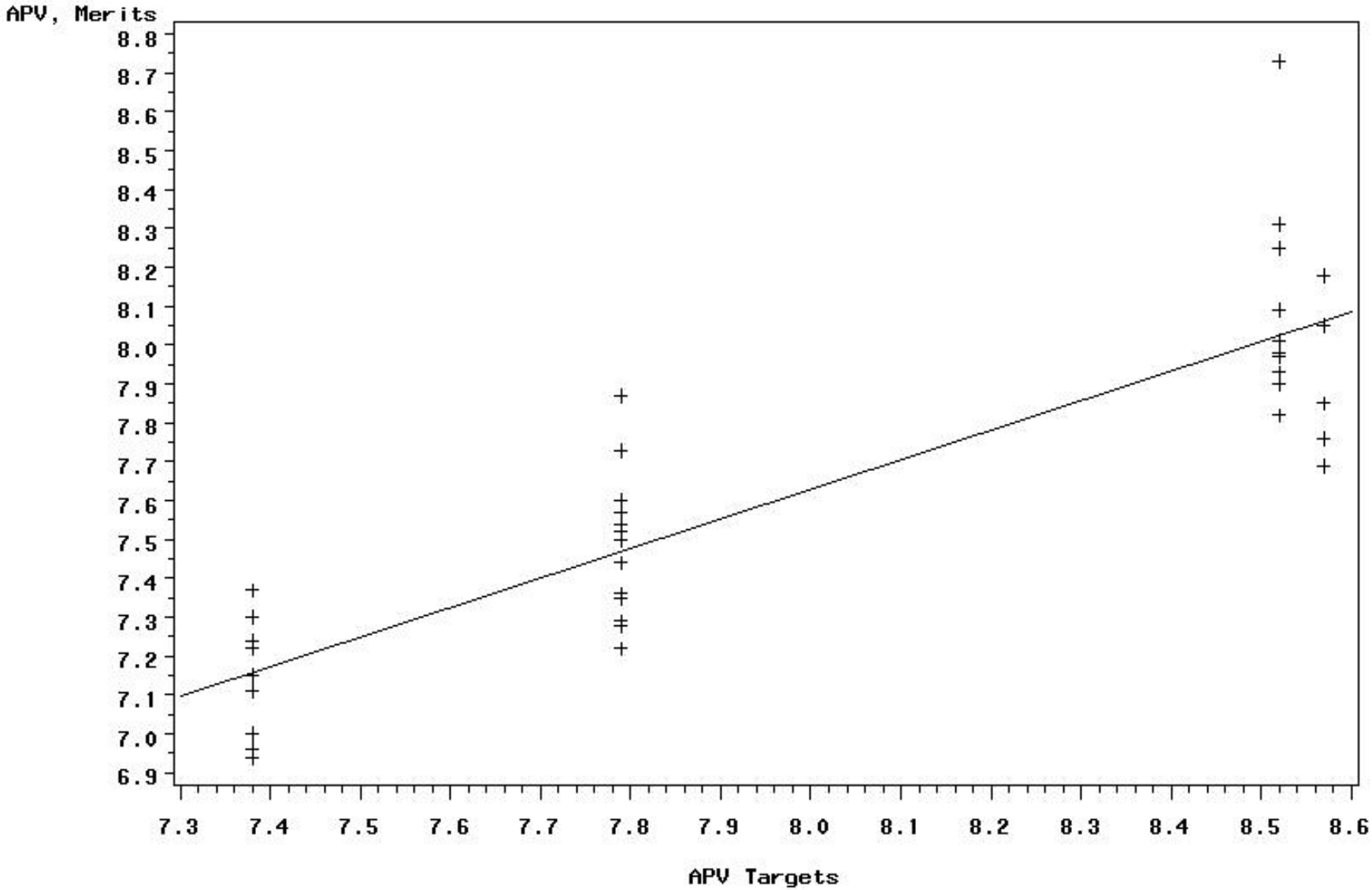
Sequence VG

Plot of SA Adjusted AEV versus AEV Targets



R square = 0.56

Plot of APV versus APV Targets



R square = 0.74

Correction Approach

- Evaluated Fixed Correction Factor
- For AES correction is
  Average delta/s * pooled s -0.93 * 0.45 = -0.42
- For RAC correction is
  Average delta/s * pooled s -0.92 * 0.25 = -0.23
- For AEV correction is
  Average delta/s * pooled s -1.19 * 0.1 = -0.12
- For APV correction is
  Average delta/s * pooled s -1.97 * 0.2 = -0.39

Since batch is severe, signs are changed and correction factor is <u>added</u> to result

Previous Correction Factors

- For AES correction is
  Average delta/s * pooled s -1.32 * 0.45 = -0.59
- For RAC correction is
  Average delta/s * pooled s -1.37 * 0.24 = -0.33
- For AEV correction is
  Average delta/s * pooled s -1.88 * 0.1 = -0.19
- For APV correction is
  Average delta/s * pooled s -2.70 * 0.2 = -0.54

Correction Approach

- Also investigated transformations on all parameters. AES, RCS and APV suggested improvements with transformations.
- For AES and RCS, $-\sqrt{(9.65\text{-AES or RCS})}$
- For APV, $-(10\text{-APV})^2$
- For AEV, no transformation
- Correction factors derived by transforming

Correction Approach (cont)

All 40 results and transforming target values for reference oils.

- Standard deviations calculated by oil for all transformed results. These values used for mean delta/s calculations. Also pooled to calculate the correction factor.
- Correction Factors
- For AES , 0.184 (transformed units)

Correction approach (cont)

- For RCS, 0.167
- For APV, 1.577
- Must be applied to transformed result.
- For APV, $-(10\text{-result})^2$

  add 1.577

  multiply by -1

  take square root

  subtract from 10 and that will give corrected result.

Correction Factor Update

- The following tables compare the mean of the 40 results completed on the new fuel batch. Also tabulated are the mean results corrected by both previous and updated fixed and regression equation. Fixed correction derived and applied in transformed units also tabulated. The target values are also given for comparison purposes. Each set is tabulated by oil.

Impact of Correction Factors

Parameter	Mean Oil 1009	Previous Fixed Correction Factor	Updated Fixed Correction Factor	Previous Regression Correction	Updated Regression Correction	Transformed Correction Factor	Target
AES	7.29	7.88	7.71	7.94	7.75	7.88	7.94
RAC	9.07	9.40	9.30	9.32	9.28	9.32	9.29
AEV	8.85	9.04	8.97	9.01	8.95	N/A	8.99
APV	7.42	7.96	7.81	7.92	7.80	7.81	7.79

Impact of Correction Factors

Parameter	Mean Oil 925-3	Previous Fixed Correction Factor	Updated Fixed Correction Factor	Previous Regression correction	Updated Regression Correction	Transformed Correction Factor	Target
AES	6.09	6.68	6.51	6.93	6.61	6.76	6.49
RAC	7.32	7.65	7.54	7.64	7.44	7.82	7.43
AEV	8.64	8.83	8.76	8.40	8.59	N/A	8.56
APV	7.14	7.68	7.53	7.55	7.36	7.43	7.38

Impact of Correction Factors

Parameter	Mean Oil 1006-2	Previous Fixed Correction Factor	Updated Fixed Correction Factor	Previous Regression correction	Updated Regression Correction	Transformed Correction Factor	Target
AES	8. 33	8.92	8.75	8.81	8.74	8.74	8.65
RAC	9.21	9.54	9.44	9.45	9.43	9.42	9.40
AEV	9.05	9.24	9.17	9.57	9.28	N/A	9.24
APV	8.09	8.63	8.48	8.61	8.60	8.54	8.52

Impact of Correction Factors

Parameter	Mean Oil 1007	Previous Fixed Correction Factor	Updated Fixed Correction Factor	Previous Regression correction	Updated Regression Correction	Transformed Correction Factor	Target
AES	8.72	9.31	9.14	9.14	9.11	9.27	8.93
RAC	8.72	9.05	8.95	8.98	8.91	9.28	8.99
AEV	9.03	9.22	9.15	9.51	9.24	N/A	9.24
APV	7.91	8.45	8.30	8.40	8. 36	8.55	8.57

Other Issues

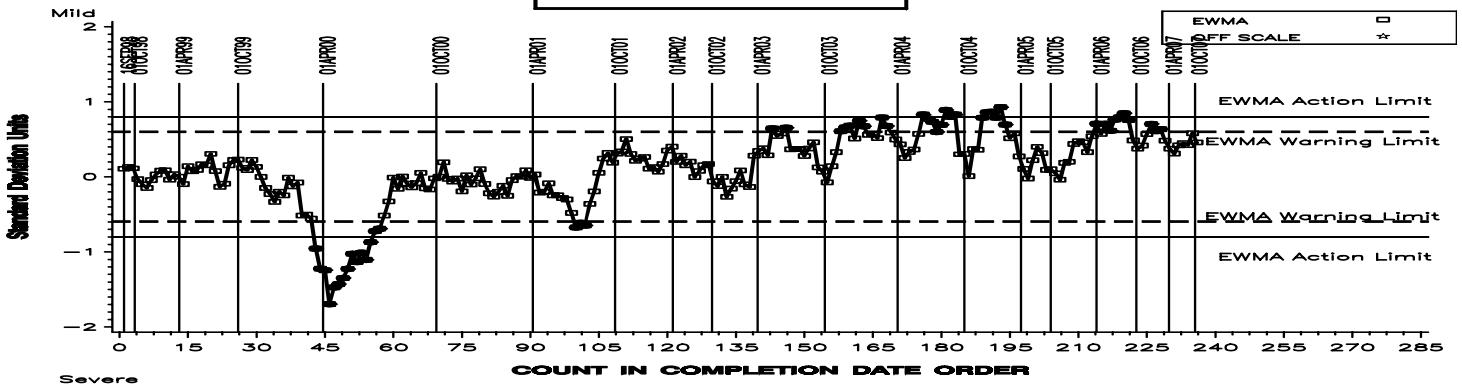
- APV shift for oils 1006-2 and 1007 is much larger than other two oils, -3.01 delta/s for 1006-2 and -4.15 delta/s for 1007, -1.125 for 925-3 and -1.10 for 1009.
- Because of this difference for APV, transforms were investigated for all parameters except OSCR. APV appears to benefit from transformation. Others not so much. Transformation correction does not work for APV results greater than 8.75 merits.

SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

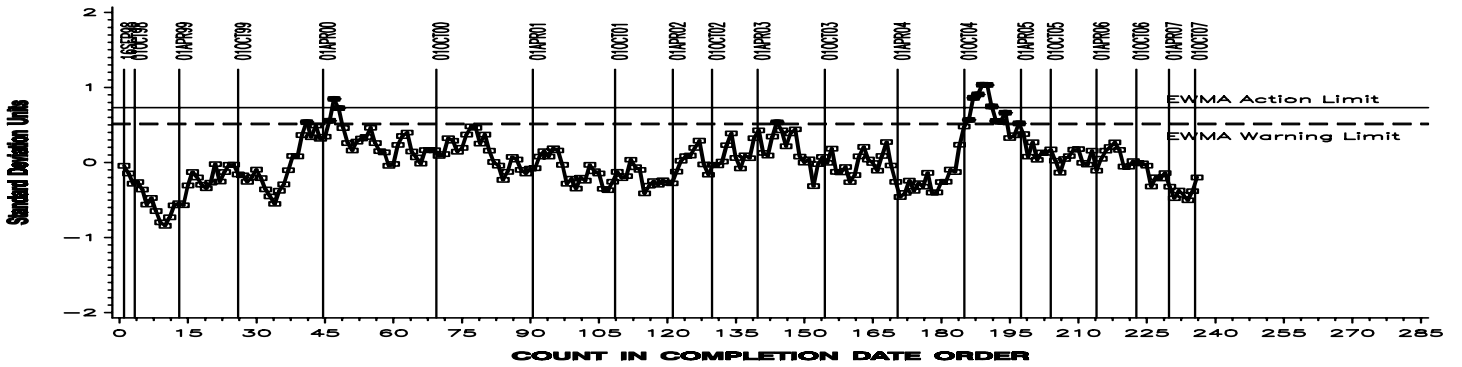
Current Charts

AVERAGE ENGINE SLUDGE

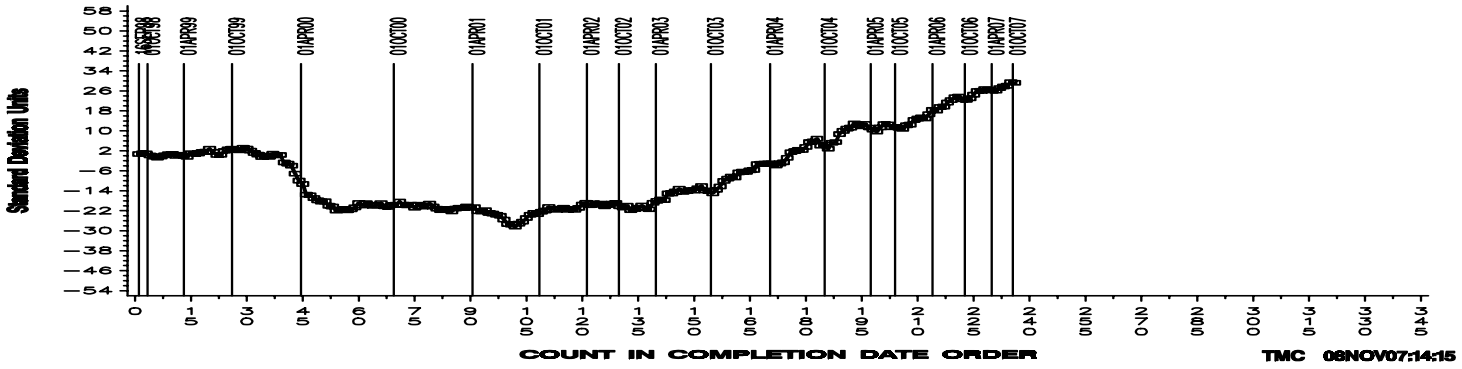
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



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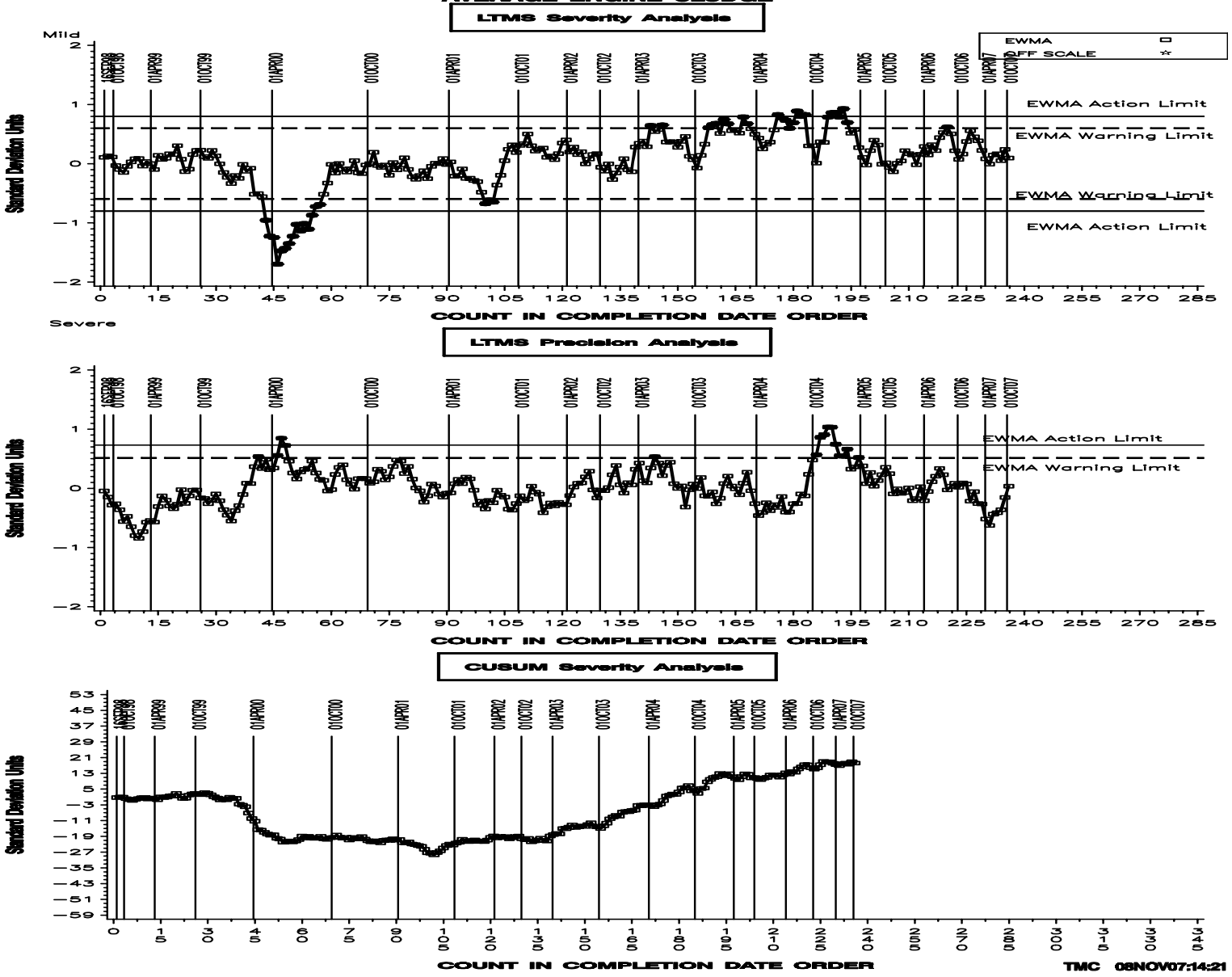
SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

Fuel Batch TF2221LS20 Corrected using updated fixed Correction factor

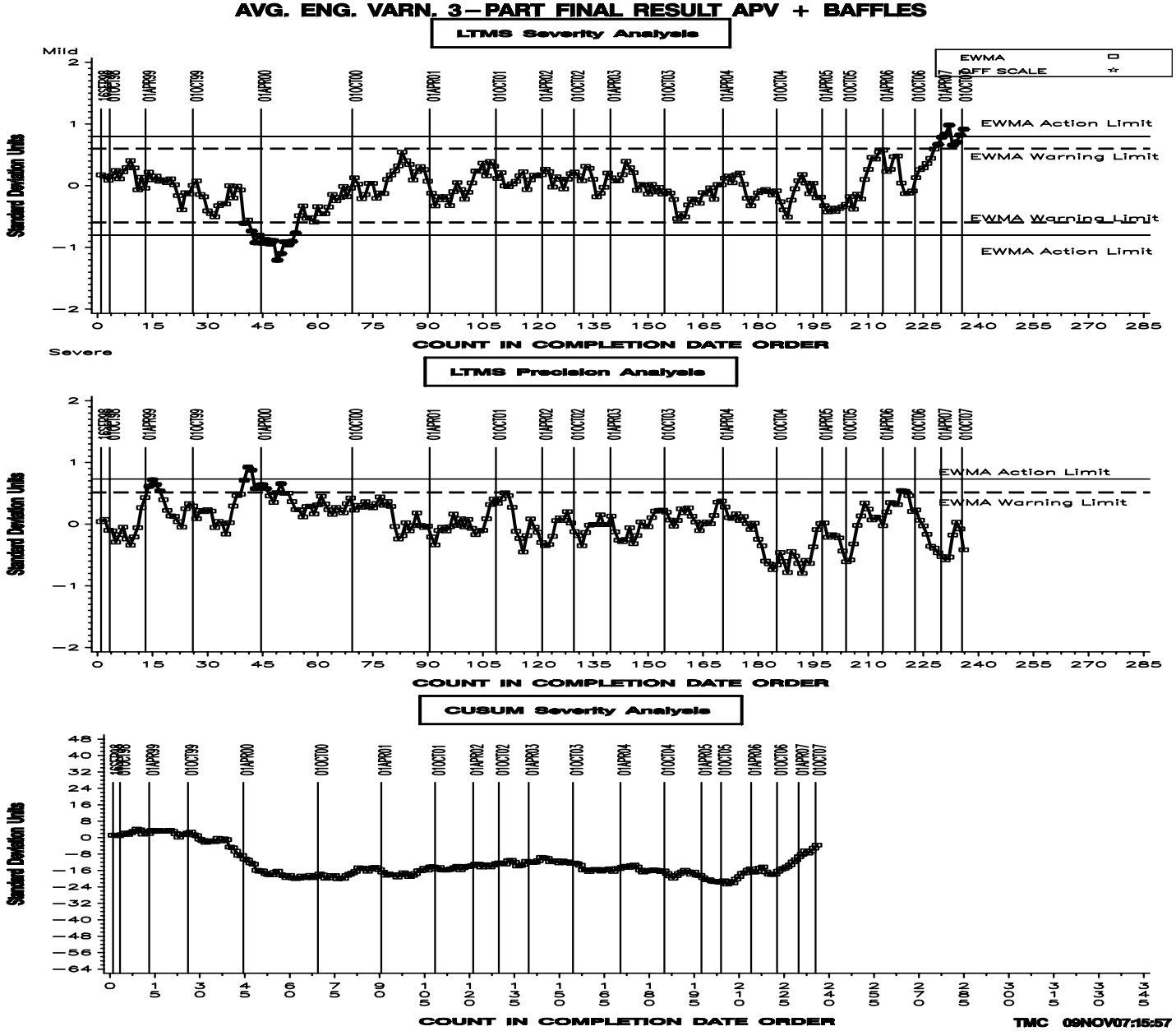
AVERAGE ENGINE SLUDGE



SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

Current Charts

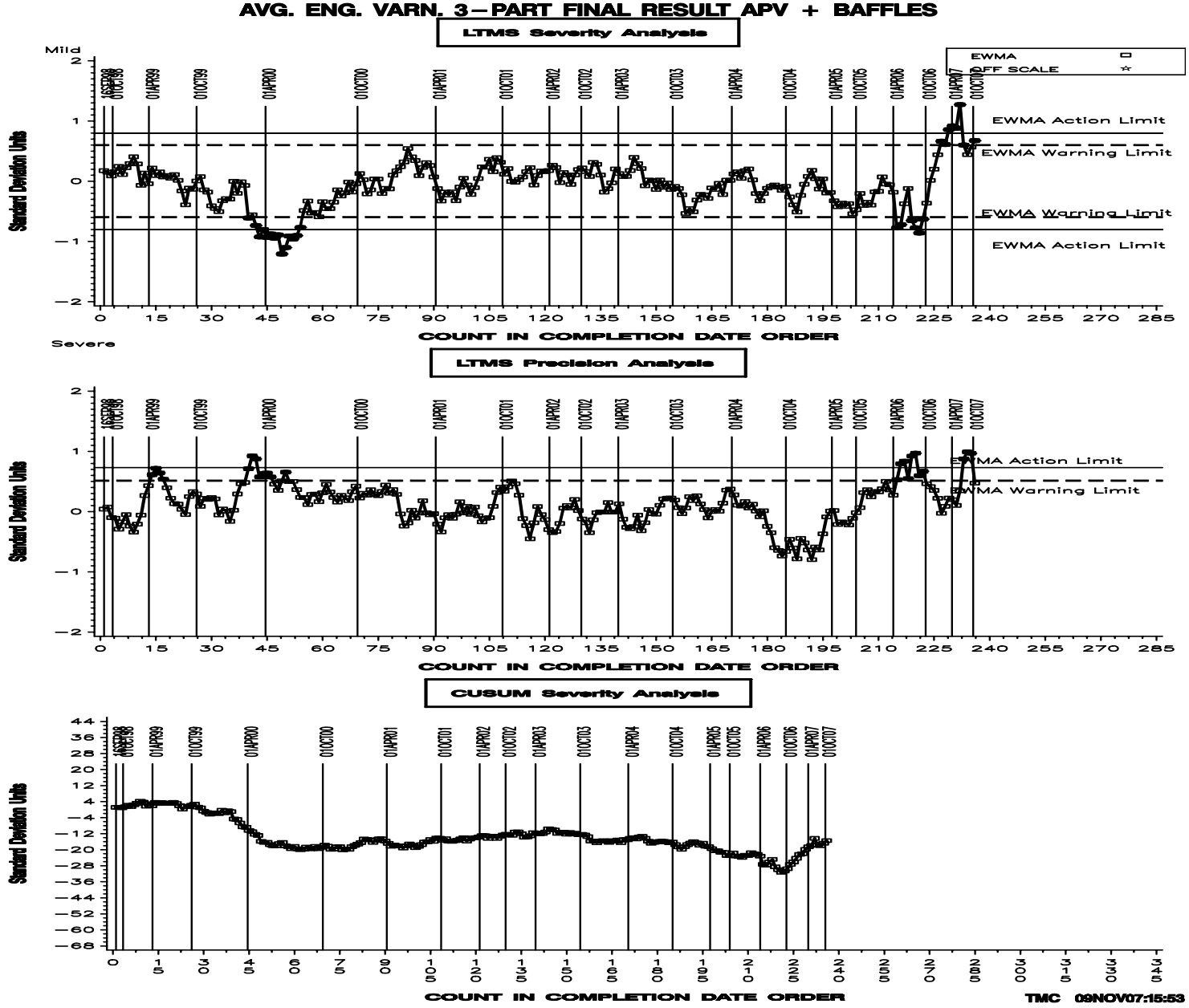
AVG. ENG. VARN. 3—PART FINAL RESULT APV + BAFFLES



SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

Updated using Linear regression correction

AVG. ENG. VARN. 3—PART FINAL RESULT APV + BAFFLES

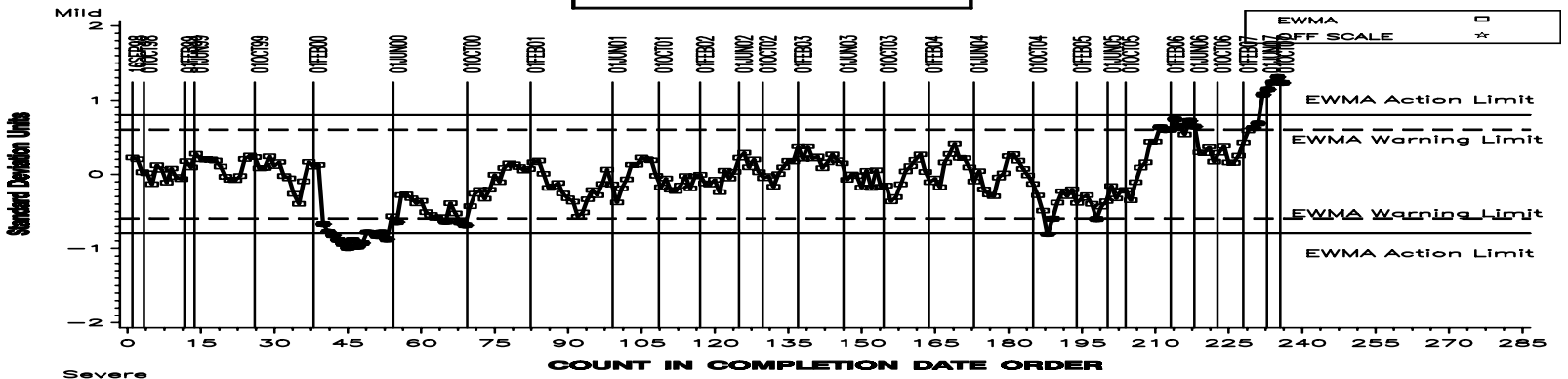


SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

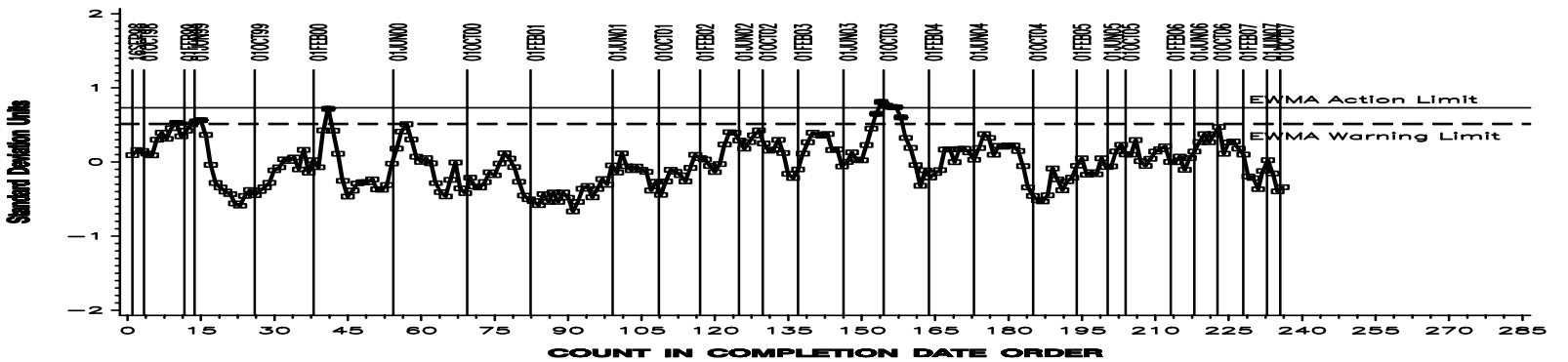
Current Charts

AVG PISTON SKIRT RATING

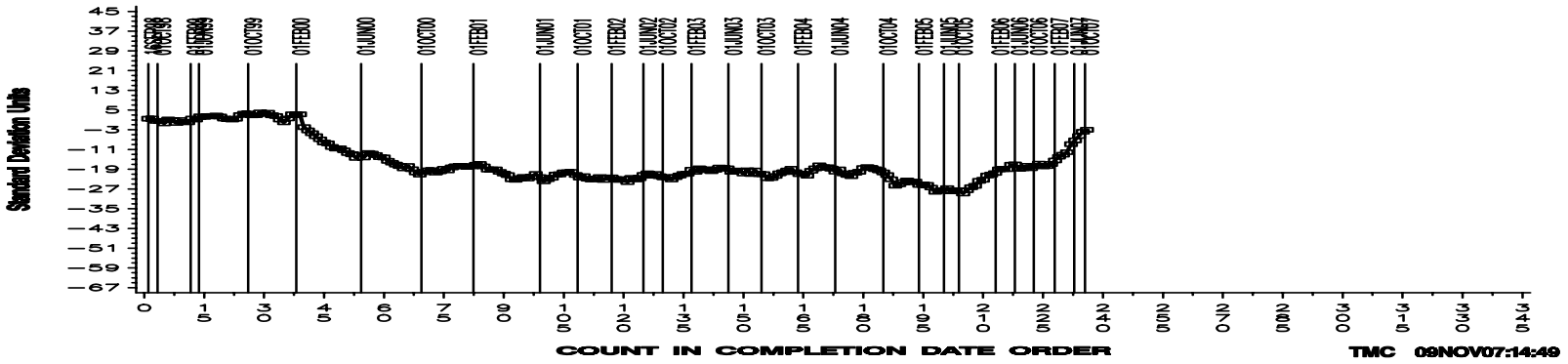
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



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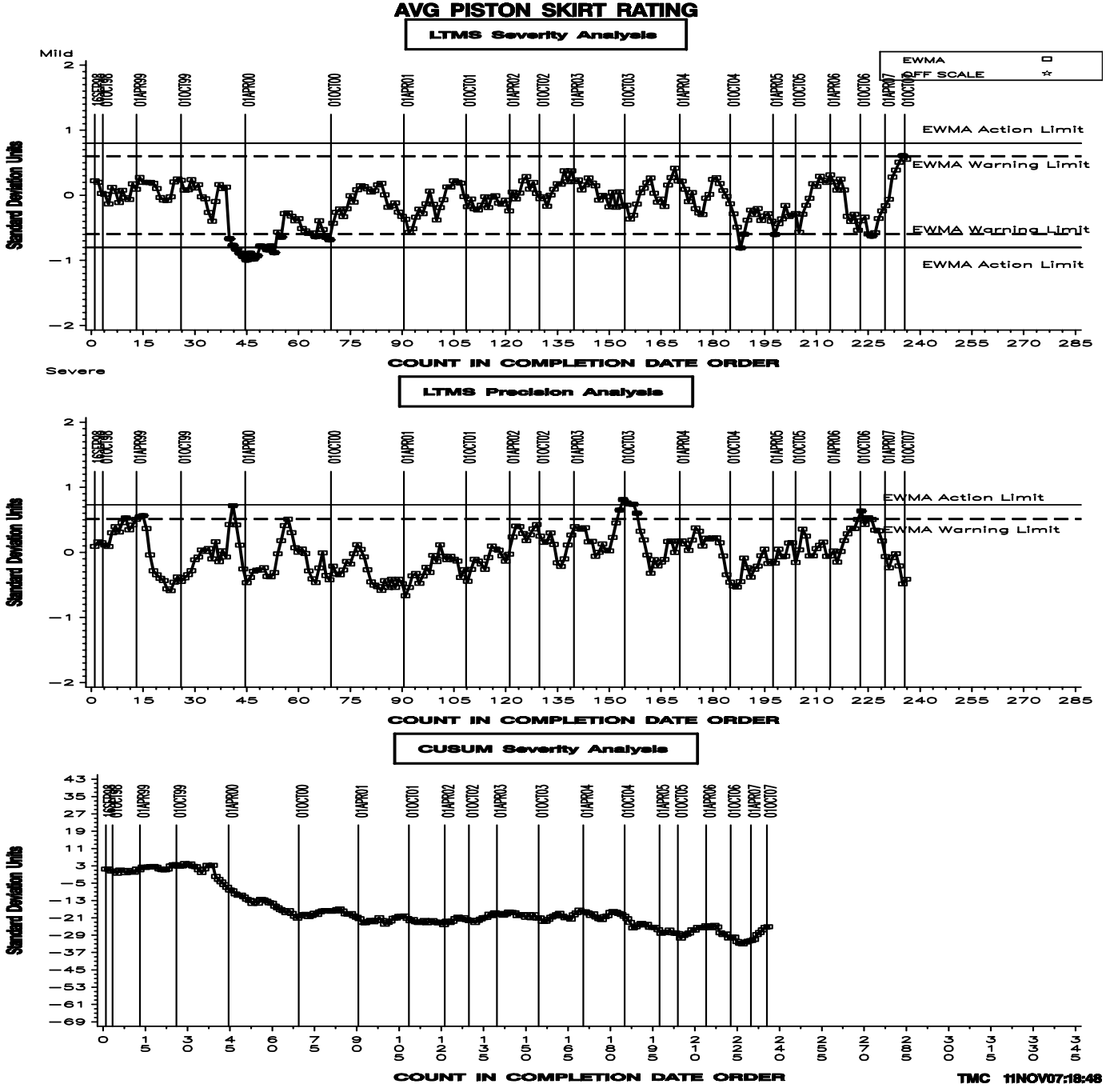
SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

Using Updated Fixed correction Factor

AVG PISTON SKIRT RATING

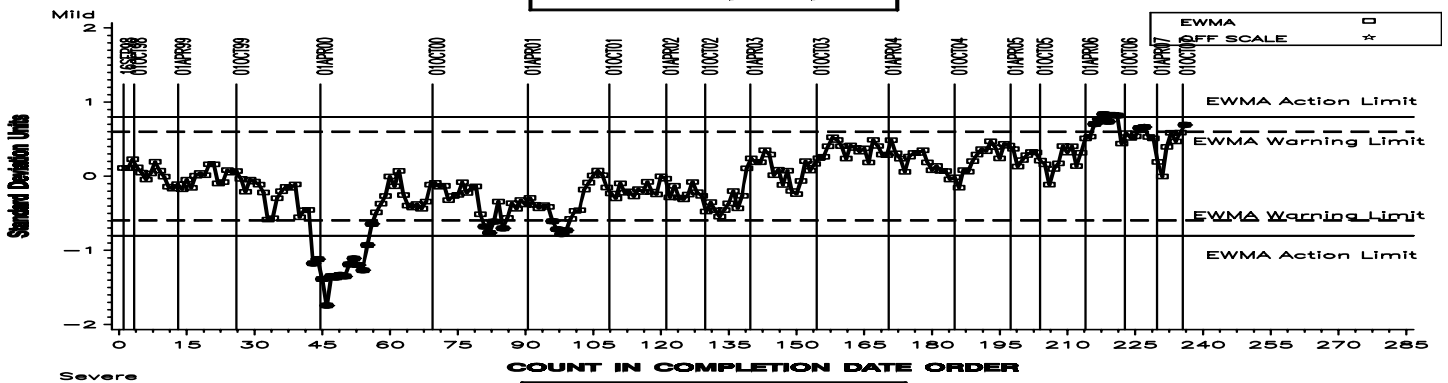


SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

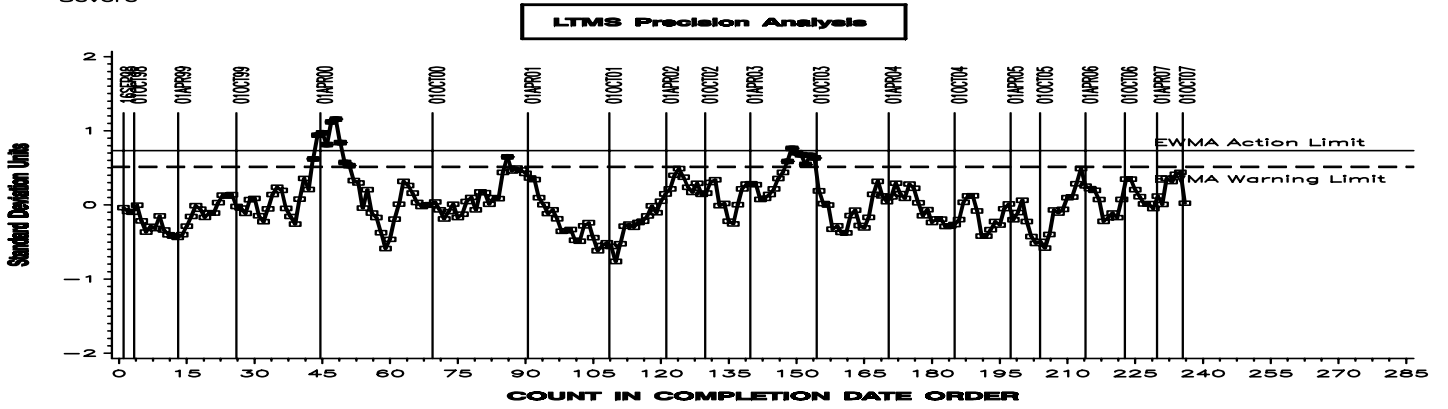
Current Charts

AVERAGE ROCKER COVER SLUDGE

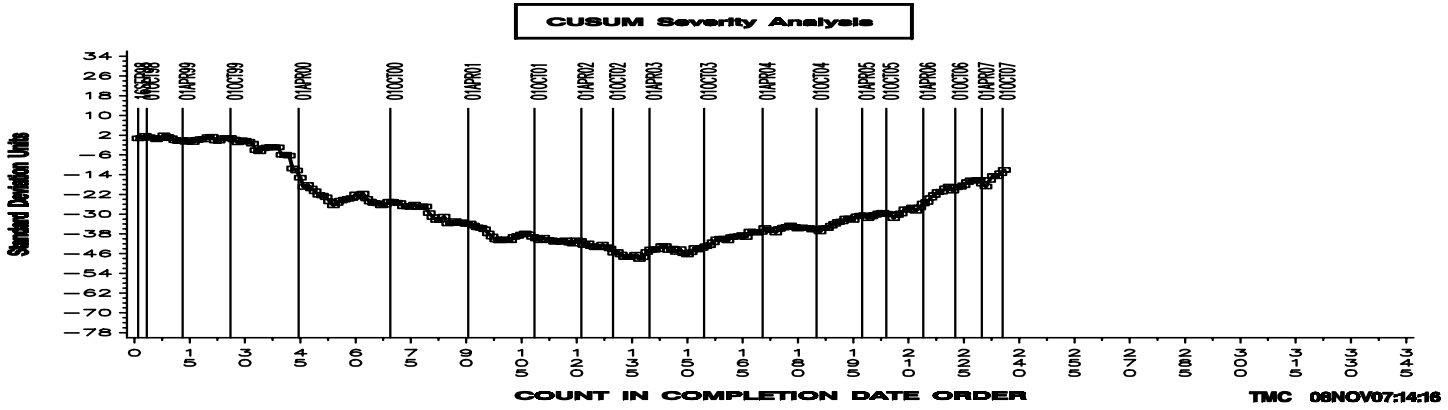
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



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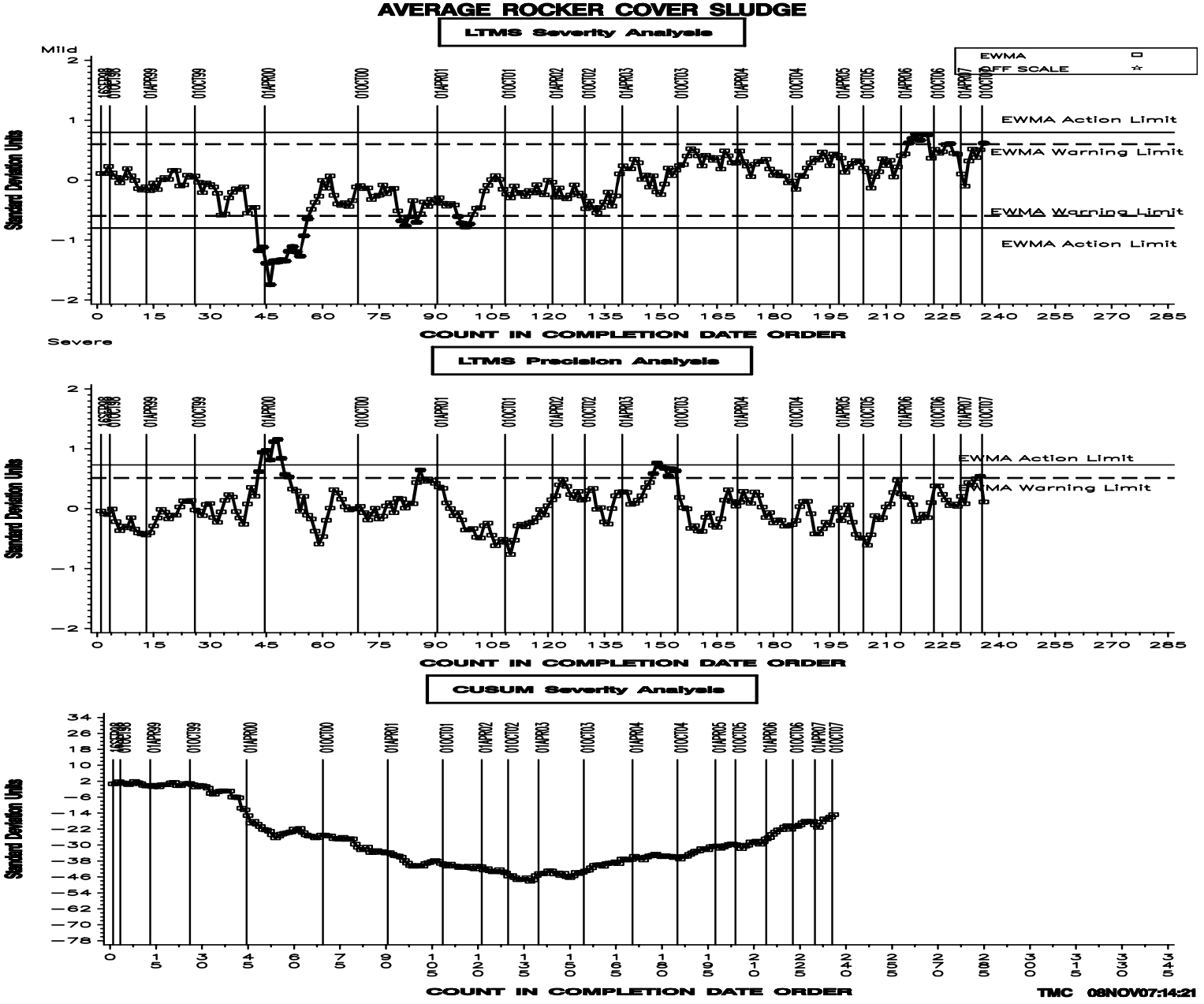
SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

Fuel Batch TF2221LS20 Corrected using updated fixed Correction factor

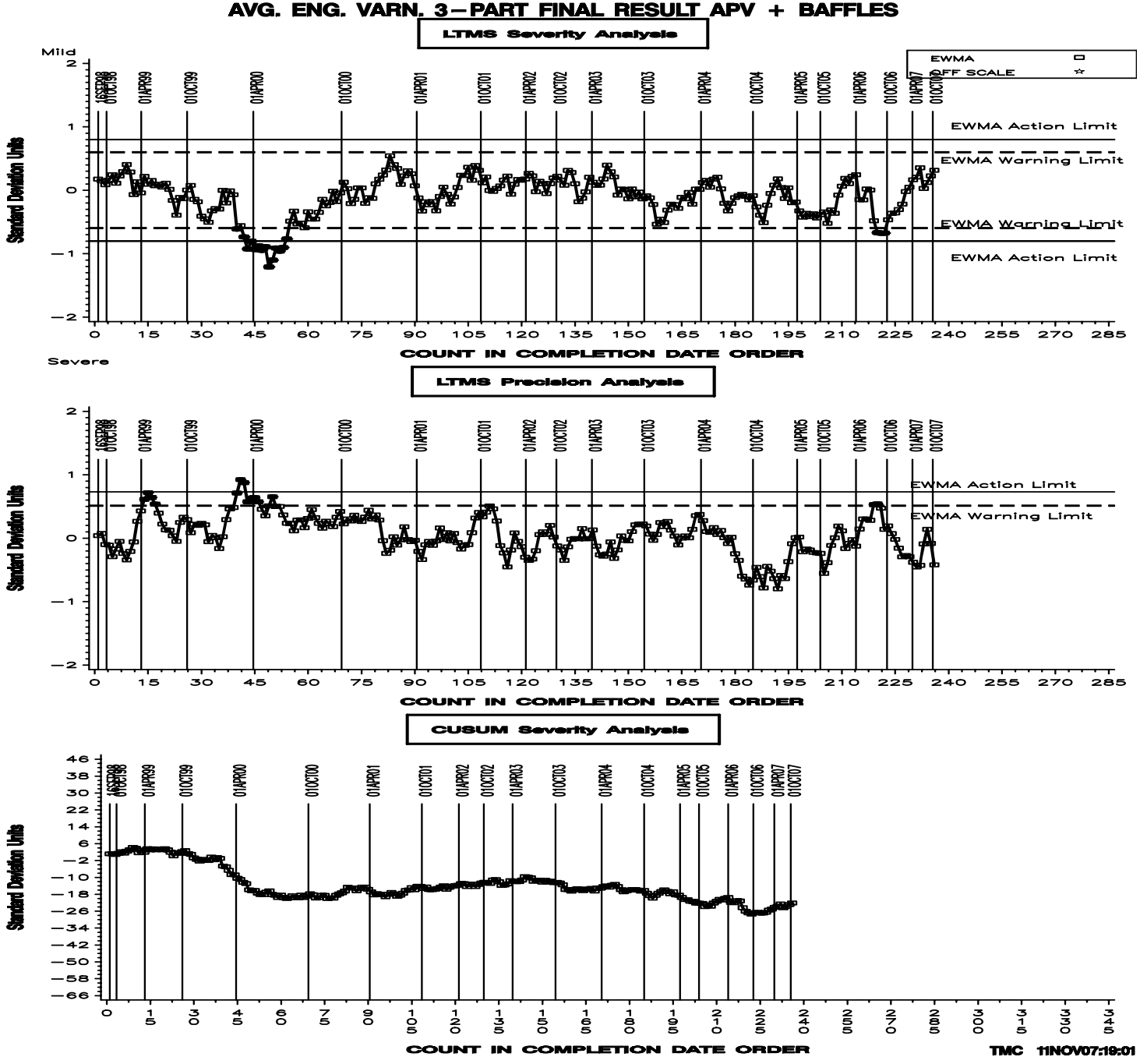
AVERAGE ROCKER COVER SLUDGE



SEQUENCE VG INDUSTRY OPERATIONALLY VALID DATA

Fuel Batch Data corrected using Updated Fixed Correction Factor

AVG. ENG. VARN. 3 – PART FINAL RESULT APV + BAFFLES



Summary

- Fuel Batch severe of target for all parameters except OSCR. OSCR not statistically significant in previous analysis, average Δ/s -0.101, again not significant.
- Severity shift for APV much larger with oils 1006-2 and 1007 versus 1009 and 925-3.
- Both fixed corrections and regression equations seem to adequately correct overall. On an oil basis, one approach may appear to be better than another.
- Regression equations corrections are getting larger with better performance for sludge. A result 7.8 AES corrects by 0.23 merits, while a 8.5 result corrects by 0.40 merits.
- Recommend fixed corrections for AES, RCS, and APV, regression approach for AEV.

Haltermann

SVGM-2 tank adjustment data summary
Update: 01-01-2007 through 11-10-07

					D5191	D5191	D4052		
	Date of Adjustment		Blendstock used	Amount used	RVP before Adjustment	RVP after Adjustment	API Gravity	Amount Adjusted	% Adjusted
					D5191	D5191	D4052		
TK 74	Jun-07	*	Isobutane	1850	8.7	9.18	56.9	333,058	0.56
TK 74	Sep-07	*	Isobutane	1714	8.6	9.2	56.8	302,930	0.57
TK 74	Nov-07		Isobutane	991	8.8	9.2	56.9	267,872	0.37

Haltermann Products
Gasoline Lube Cert Fuel Use Summary **2007**
Use rate in gallons
Update: 11-7-07, JEC

Fuel Decsription	**Test Use**	**Q1**	**Q2**	**Q3**	**Q4(thru Oct.)**	**Total YTD 2007**
KA24E, HF-0008	Seq. IV & VIII	11,036	-	-	-	11,036
SVGM2, HF-0295	Seq. V	30,616	23,852	22,784	20,648	97,900

HALTERMANN FUEL REPORT **November, 2007**

PRODUCT: **SVGM2**

PRODUCT CODE: **HF295**

Seq. VG

Batch No.:	TF2221LS20	TF2221LS20	TF2221LS20
Tank No.:	74	74	74
Analysis Date:	9/5/2007	1/6/2007	8/8/2006

TEST	METHOD	UNITS			RESULTS	RESULTS	RESULTS
			MIN	MAX			
Distillation - IBP	ASTM D86	°F	75	95	86	79	85
5%		°F			113	109	110
10%		°F	120	135	127	122	124
20%		°F			151	145	147
30%		°F			180	175	175
40%		°F			212	210	209
50%		°F	210	240	230	227	228
60%		°F			240	239	239
70%		°F			255	252	254
80%		°F			292	289	289
90%		°F	325	350	344	341	342
95%		°F			361	359	360
Distillation - EP		°F	385	415	415	406	415
Recovery		vol %			97.6	97.0	97.0
Residue		vol %		2.0	1.0	1.0	1.0
Loss		vol %			1.4	1.3	2.0
Gravity	ASTM D4052	°API			57.1	57.2	56.8
Specific Gravity	ASTM D4052	-			0.750	0.750	0.752
Reid Vapor Pressure	ASTM D323	psi	8.8	9.2	9.2	9.0	8.8
Carbon	ASTM E191	wt fraction	0.8580	0.8690	0.8607	0.8607	0.8607
Carbon	ASTM D3343	wt fraction			0.8688	0.8679	0.8686
Oxygen	ASTM D4815	wt %		0.05	<0.01	<0.01	<0.01
Sulfur	ASTM D4294	wt %		0.02	<0.02	<0.02	<0.02
Lead	ASTM D3237	g/gal		0.01	<0.01	<0.01	<0.01
Phosphorous	ASTM D3231	g/gal		0.005	<0.0008	<0.0008	<0.0008
Composition, aromatics	ASTM D1319	vol %		35.0	34.4	32.3	33.4
Composition, olefins	ASTM D1319	vol %	5.0	10.0	6.2	6.6	6.1
Composition, saturates	ASTM D1319	vol %			59.4	61.1	60.5
Oxidation Stability	ASTM D525	minutes	1440		>1440	>1440	>1440
Copper Corrosion	ASTM D130			1	1	1	1

Existent gum, washed	ASTM D381	mg/100mls		3	0.5	1	1
Research Octane Number	ASTM D2699		96.0	98.0	98.0	98.0	97.9
Motor Octane Number	ASTM D2700				87.2	87.7	87.4
R+M/2	D2699/2700				92.6	92.9	92.7
Sensitivity	D2699/2700		7.5		10.8	10.3	10.5
Net Heat of Combustion	ASTM D240	Btu/lb			18379	18379	18379
Additive, Ethyl antioxidant	calculated	ptb			5	5	5

Attachment 6

SVGM2 Seq. V Fuel Changes at Haltermann

November 14, 2007

Wayne Petersen

Changes at Haltermann Products

- Moved fuel manufacturing / blending capabilities to Detroit area
  - Exceptions
    - SVGM2
    - Military fuels
- Haltermann Products Sheldon Road site (Houston) will no longer store SVGM2
- Commercial / fuel expertise or “Business” still remains intact and in Houston area

SVGM2

- Will be moved to new storage location
- Best that it remains in the Texas area due to primary customer base for this fuel to optimize delivered cost
- Industry storage tank capacity tight
- Decision made to move fuel to another Dow site
  - Dow Haltermann Custom Processing
  - Better oversight over fuel integrity
  - Site has full analytical capabilities to test / adjust fuel

SVGM2

- Fuel will be moved in the next few weeks
- Integrity of fuel quality will be a priority
  - Tested immediately before and after move
  - One or two trucks will be dedicated to the move
  - Tanks and trucks will be cleaned and inspected before the move
- Move will be into two tanks with recirculation capabilities to assure we don’t compromise singular batch characteristics
- ~180,000 gallons will be moved to new location
- It would be beneficial for customers to order this fuel in next few weeks before the move

SVGM2

- 180,000 gallons will remain, post-move
- 18 month supply at current use rate

Sequence VG S.P. Report

Sequence VG S.P. Scope

The Sequence V Surveillance Panel is responsible for the surveillance and continued improvement of the Sequence VG test documented in ASTM Standard D6593 as updated by the Information Letter System. Data on test precision and laboratory versus field correlation will be solicited and evaluated at least every six months. Improvements in rating technique, test operation, test monitoring and test validation will be accomplished through continual communication with the Test Sponsor, ASTM Test Monitoring Center, ASTM BO.01, Passenger Car Engine Oil Classification Panel, ASTM Committee B0.01, ACC Monitoring Agency and SAE Deposits/Distress Workshop. Actions to improve the process will be recommended when deemed appropriate based on input from the preceding. Industry transition to new engine hardware batches will be monitored and redistribution of existing hardware facilitated to accomplish uniform industry implementation. Development and correlation of updated test procedures with previous test procedures will be reviewed by the panel. This process will provide the best possible test procedure for evaluating automotive lubricant performance with respect to the lubricant's ability to prevent engine sludge, engine varnish, oil screen plugging, oil ring clogging and ring sticking.

Sequence VG S.P. Report

Sequence VG S.P. Objectives

Objectives	Target Date
1. Ensure a secure supply of Ford 4.6L hardware is available to accommodate testing through GF-5, anticipating the need for additional parts solicitations from Ford.	**On-going**
2. Ensure a secure supply of SVGM2 fuel is available to accommodate testing through GF-5, anticipating the need for one additional batch of SVGM2 fuel to be blended.	**On-going**
3. Monitor the progress of the comprehensive review of the different LTMS systems utilized by the PCMO test types and their pros and cons.	**May 2008**

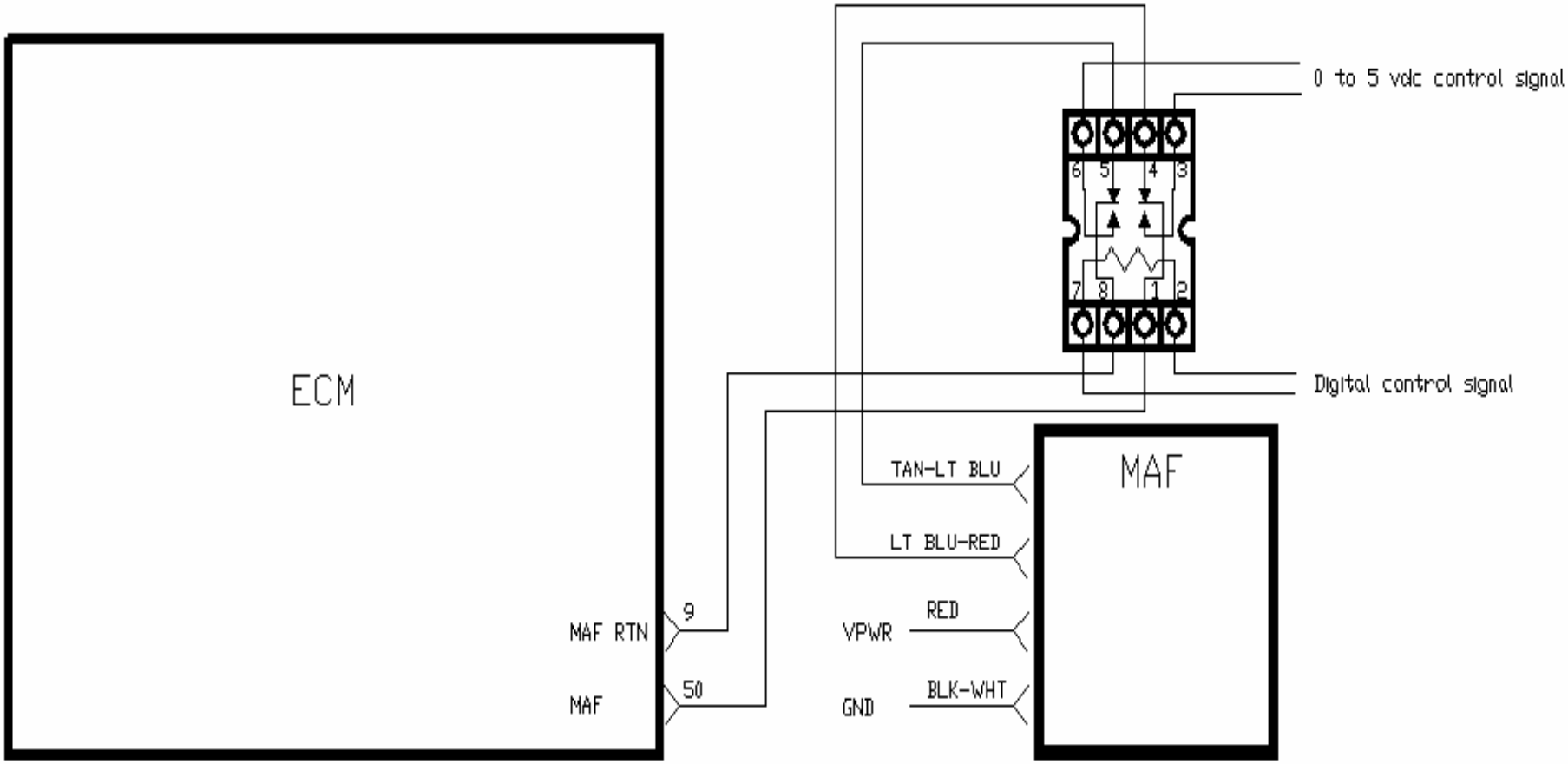
VG MOTIONS

SURVEILLANCE PANEL

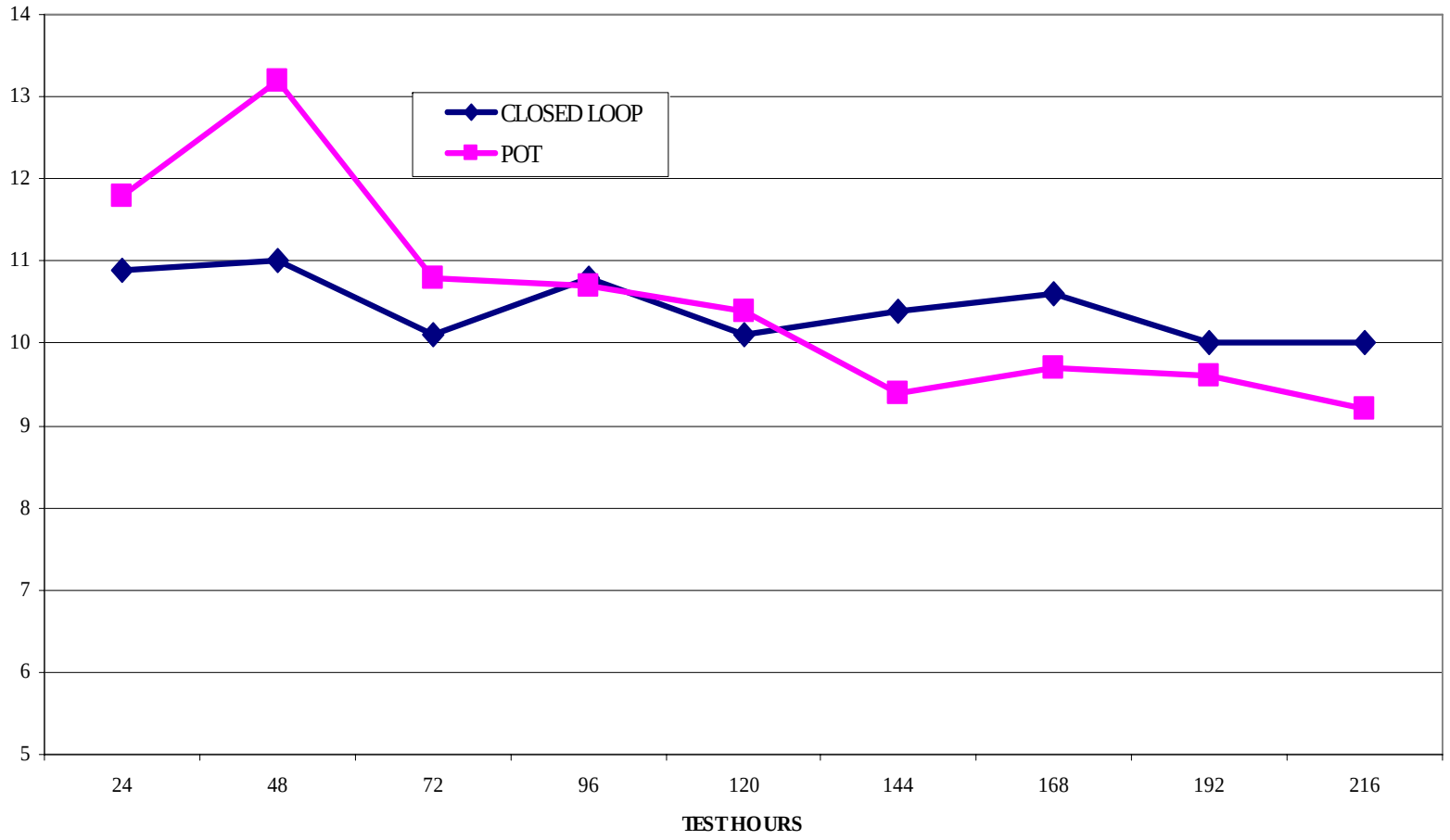
11.14.2007

POT REPLACEMENT

- **Recommend to the Surveillance Panel**
- **That stands be converted to closed loop**
- **fuel flow control in Stage 3.**
- **Section 8.4.3.4 add: Modify the MAF to ECM wiring to give closed loop fuel flow control as shown in Fig. X in Stage 3.**
- **Note that this is a direct replacement of the pot to trim fuel flow, but gives much better control.**


ECM
MAF RTN
9
MAF
50
0 to 5 vdc control signal
6
5
4
3
7
8
1
2
Digital control signal
TAN-LT BLU
LT BLU-RED
VPWR
RED
GND
BLK-WHT
MAF

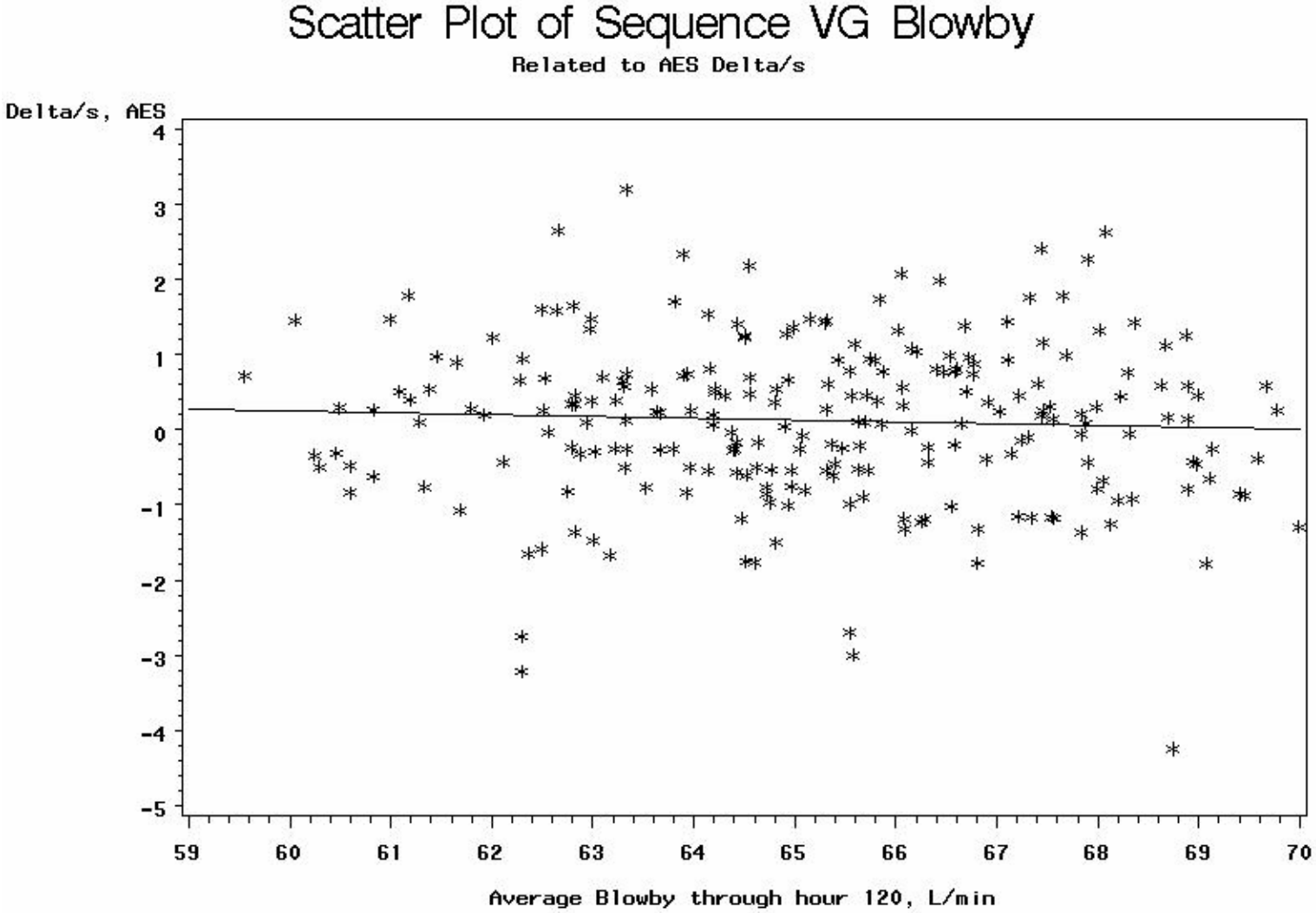
POT vs. CLOSED LOOP



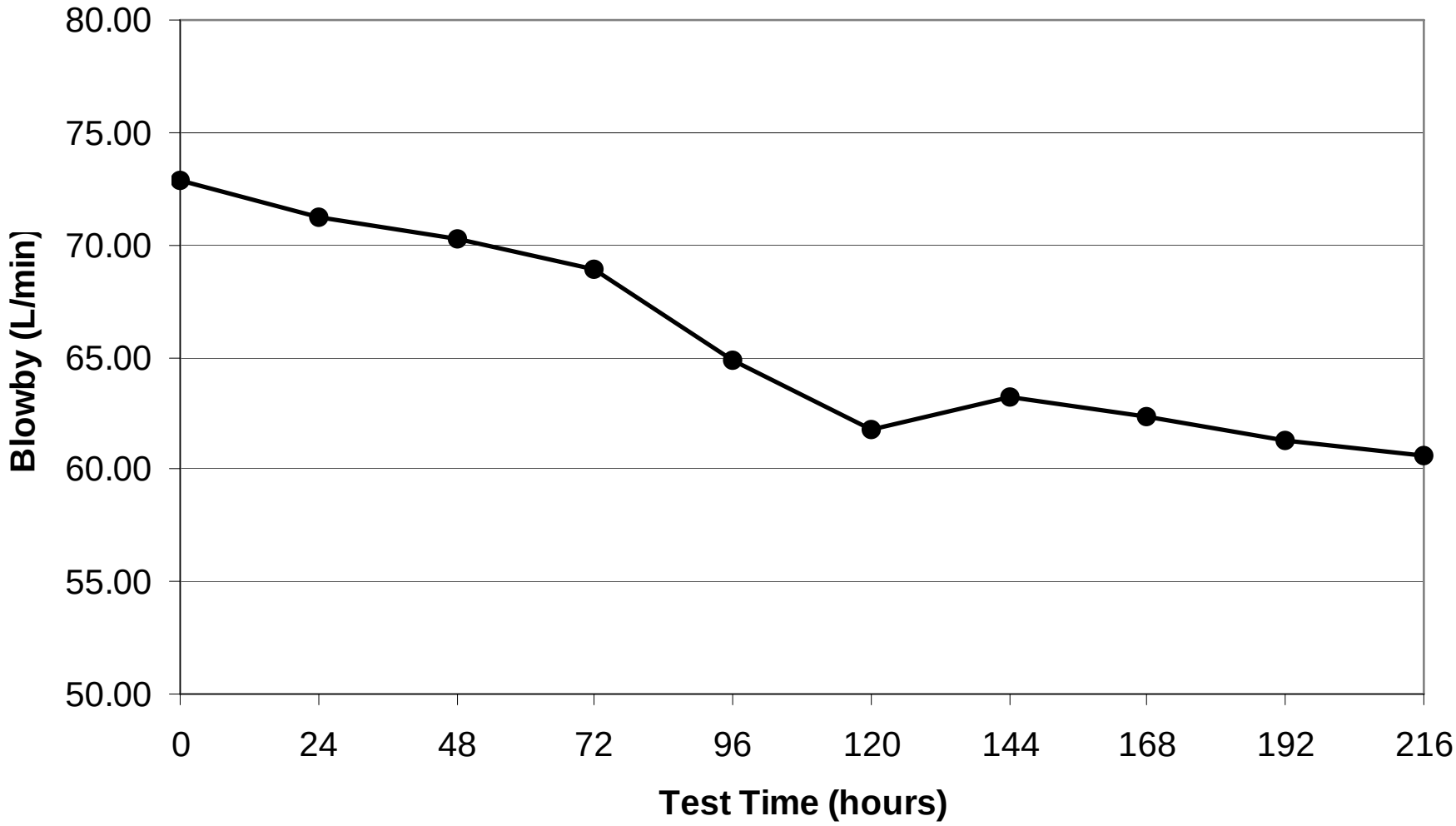
WIDE BAND SENSOR

- **Recommend to the Surveillance Panel a wording change for the wide band O2 sensor used for engine diagnostics.**
- **Section X2.1.22 change:**
- **Use any wide band oxygen sensor that will give sufficient precision to diagnose engine problems.**
- **Section 9.6.2 add: Calibrate, zero, and span the wide band O2 sensor device per the supplier user's manual as needed.**
- **Section 9.6.1.3 delete this section.**

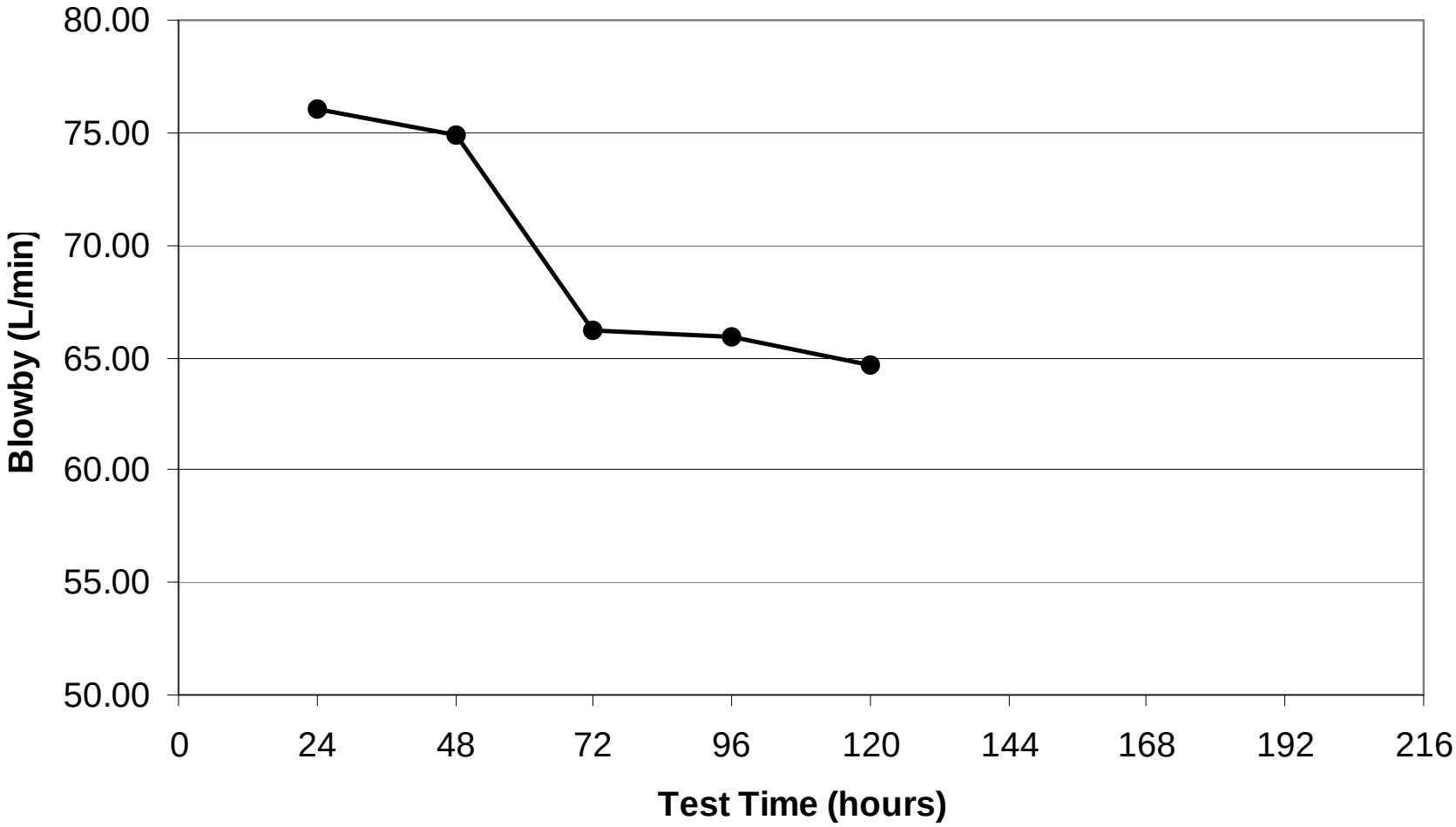
BLOWBY, **R = 0.003**, N = 236



TYPICAL VG BLOWBY



REWORKED VG BLOWBY



BLOWBY LIMITS

- **Recommend to the Surveillance Panel**
- **that blowby validity limits be modified.**
- **Section 12.4.1Blowby Flow Rate Adjustment –**
- **In second sentence,**
- **“Blowby…shall fall within the range**
- **from 60 to 73 L/min.”**

HEAD REWORK

- **Recommend to the Surveillance Panel a change in the Cylinder Head Build procedure.**
- **Section 7.9.4 to be changed as follows: "If cylinder heads are available that have not yet had cam bearings installed, they can be obtained at the supplier listed in A9.3.**

GUIDE REPLACEMENT

- **(3) Determine valve guide clearance at the top and middle of the heads on the transverse side of the guide. If guides are worn, new guides can be installed at a local machine shop (Ford Part Number F5AZ-6510-A, with the mating valve stem seal F6AZ-6571-AA). The new guides must be reamed then the valve seats, stems and guide clearances must meet the Ford Service Manual limits.**

BUILD SPECIFICATIONS

Valve Seats · Width—Intake 1.9-2.1 · Width—Exhaust 1.9-2.1 · Angle 45 degrees · Runout (T.I.R.) Max 0.025 · Intake 0.020-0.069 · Exhaust 0.046-0.095 **Valve Stem Diameter (Std)** · Intake 6.995-6.975 · Exhaust 6.970-6.949	**Valve Face Runout Limit 0.05** **Valve Face Angle 45.5 degrees** **Valve Head Diameter** · Intake 44.5 · Exhaust 34.0 · Gauge Diameters 42.5 and 32.0

CAM BAFFLES

- **1. Recommend to the Surveillance Panel a change in the Cam Baffle cleaning procedure prior to test engine build.**
- **Section 7.6.4 to be changes as follows: "If the before test rating is less than ten on the CRC varnish rating scale (Manual 20), use an abrasive that will give an approximate Ra of 0.2 to 0.4 µm and achieve a medium bright finish per CRC Manual 21.**

Attachment 9

Sequence VG Surveillance Panel
November 14, 2007
8:00AM – 12:00PM
SwRI, Building 209, Conference Room 103
San Antonio, TX

Motions and Action Items
As Recorded at the Meeting by Bill Buscher

1. Action Item – Surveillance panel chairman to request that the chairman of LTMS, Ben Weber, schedule a meeting to conduct a comprehensive review of the different LTMS systems utilized by the PCMO test types and their pros and cons.

2. Action Item – Add to the scope and objective to monitor the progress of the comprehensive review of the different LTMS systems utilized by the PCMO test types and their pros and cons.

3. Action Item – Labs to save their Ford 4.6L engine and dyno harnesses when they become unusable so that they can be repaired or the good connectors from these old harnesses can be reused.

4. Action Item – Labs and Ford to start discussing the coordination of the next hardware order.

5. Motion – Update the fuel batch correction factors by replacing the current correction factors with the fixed correction factors recommended by the TMC (AES = 0.42, RCS = 0.23, AEV = 0.12, APV = 0.39). Effective for all reference tests completing on or after November 10, 2007 and for all candidate tests completing on or after November 14, 2007.

   Rich Grundza / Dan Worcester / Passed Unanimously with 1 Waive

6. Action Item – TMC will review the procedure that the surveillance panel followed for the previous fuel batch transition and report back to the surveillance panel members. Anticipating that this process will start in

mid 2008, based from current inventory levels and usage rates. Surveillance Panel will review fuel status in 3 months.

7. Action Item – Surveillance panel chairman, test sponsor, fuel supplier and TMC will form a task force to review the process for blending a new fuel batch.

8. Action Item – Labs to survey their piston and ring needs for a final build-out of all four piston/ring sizes. The final piston and ring build-out and purchase would be to match the total quantity of pistons and rings to the total quantity of cylinder blocks in inventory at the labs.

9. Action Item – Dan Worcester to supply FCS with the specific cylinder block and cylinder head part number that the VG test uses. FCS will investigate the availability of usable cores for these cylinder blocks and cylinder heads. If these cores are available, then FCS will get the labs in touch with the core supplier.

10. Action Item – Form a VG hardware and operations task force, lead by Dan Worcester, to address all VG hardware issues. This task force will include, members from all labs, test sponsor and FCS.

11. Action Item – The first issue the newly formed VG hardware and operations task force will address is Stage 3 AFR monitoring and control.

12. Motion – Modify section 12.4.1 of the test procedure to change the blowby validity criteria from an average at 120 hours that falls within 60-70 L/m to 60-72 L/m.

    Dan Worcester / No second, motion fails.

13. Motion – Modify section 7.9.4 of the test procedure to allow for replacement of the valve guide on the cylinder heads that have already been remanufactured by AER for camshaft bearing inserts. If guides are worn and no longer within specification, new guides can be installed at a local machine shop (Ford Part Number F5AZ-6510-A, with the mating valve stem seal F6AZ-6571-AA). The new guides must be reamed then the valve seats, stems and guide clearances must meet the Ford Service Manual limits.

Dan Worcester / Ed Altman / Passed Unanimously with 2 Waives

14. Action Item – Ron Romano will obtain the valve guide replacement procedure from Ford's authorized engine remanufacturer and provide it for inclusion into the test procedure.

15. Action Item – The second issue the newly formed VG hardware and operations task force will address is the camshaft baffle cleaning and conditioning procedure.