Minutes from 1/27/11 Sequence VG Surveillance Panel Conference Call

Attendees:

Andrew Ritchie, Gordon Farnsworth, Mike McMillan, Doyle Boese – Infineum

Jo Martinez, Mark Sutherland – Chevron

Ron Romano, Chuck Richardson – Ford

Bruce Matthews – GM

Jim Linden - Toyota

Raham Kirkwood, Bill Buscher – SwRI

Al Lopez – Intertek

Ed Altman, Todd Dvorak, Bill Colucci – Afton

Rich Grundza – TMC

Jerry Brys, Alison Rajakumar, George Szappanos – Lubrizol

Mark Overaker, Wayne Petersen, Jim Carter – Halterman

Timothy Caudill – Ashland

Dwight Bowden, Adam Bowden, Jason Bowden, Matthew Bowden – OHT

Zack Bishop, Clayton Knight - TEI

1) Chairman Ritchie summarized the intent of the meeting as being to review the data from the complete fuel testing matrix, and to decide what action to take in approving the new fuel batch (YJ0621NX10). Chairman Ritchie outlined two options that he wanted the group to be ready to consider later in the meeting:
    a. Accept the new fuel batch either unconditionally or perhaps conditionally with certain constraints, or

    b. Reject the new fuel batch. If this action is taken, the group should be prepared to reconvene next week to decide on the best subsequent further course of action.
2) Chairman Ritchie opened discussion on the options by summarizing the criteria he believed were imperative for accepting any proposed corrections to the matrix data obtained. The two criteria were as follows:
    a. The average sludge rating for Oil 925-3 must be less than 7.95 merits (that is, this oil is a fail on average compared to the GF-5 AES requirement), and
    b. At a minimum, the two independent test laboratories demonstrate statistical discrimination between Oils 925-3 and 1009.
3) Jo Martinez then went through her presentation on proposed correction factors, pointing out that the correction factors she developed while increasing sludge severity, failed to meet the two criteria outlined above.
4) Doyle Boese went through his analysis. His proposed correction factor is able to correct the data so that Oil 925-3 fails consistently, but is unable to discriminate between Oils 925-3 and 1009. Doyle pointed out that no correction factor will be able to do this, however, because for both of the two independent laboratories, the uncorrected AES results for Oil 925-3 fall between the extremes of the results for Oil 1009.
5) Alison Rajakumar went through her analysis, and similar to Doyle's proposed correction factor, her proposed correction factor is able to correct all 925-3 oil results to be failing (although some are still mild of the target for AES for this oil), but again Alison's proposed correction factor could not achieve discrimination between Oils 925-3 and 1009.
6) Chairman Ritchie asked Gordon Farnsworth for his views as past chairman of the VG Surveillance Panel. Gordon commented that, after reviewing all of the fuel batch (YJ0621NX10) matrix results, he sees two significant problems in the data:
    a. The new fuel batch appears mild for AES. Gordon recommends that the surveillance panel work to get the fuel batch severity for sludge increased.
    b. Based on the matrix data from just the two independent labs, which is the majority of the tests, there is no difference in average engine sludge performance between Oils 925-3 and 1009 at either Lab A or G. Also, the severity level of average engine sludge appears to be

different for these two labs. Gordon suggests that the Surveillance Panel form a subgroup to investigate these lab severity differences.

7) Further discussion highlighted the fact that there is a significant variation between the AES results from the two independent labs. Rich Grundza expressed his concern about the variability given that none of the four test laboratories currently has a bias. Ed Altman expressed the concern that, if we do reject the fuel batch, it is uncertain what we would do to modify the batch to increase severity. Results from a fuel roundtable held last Friday, January 21, confirmed that no one at this point has a definitive plan on what to do if the fuel batch were to be rejected, but that many of the participants in the call believed that Halterman should rebalance hydrocarbon components in the formulation rather than adding new additive components to address the problem. Wayne Petersen from Halterman confirmed this based on the analyses of the new and current batches, which appear almost identical. Wayne further indicated that Halterman has already started work to understand what it takes to make sludge generation more severe. George Szappanos from Lubrizol agreed with others that the fuel batch appears to be mild. He also expressed concern about the variability among laboratories that is being shown by the matrix results. Jason Bowden echoed this concern. Bill Buscher stated that from his analysis it appears that Oil 925-3 has shifted to the mild side much more than the other oils. Dwight Bowden questioned whether we should be condemning the fuel at this point rather than making certain the labs are each running the test properly. The possibility of a group lab visitation was suggested. It was also suggested that the variability seen in the matrix data may be the result of differences in the source of parts (used versus remanufactured, etc), other VG test equipment, or perhaps differences in the test procedures being conducted at the various labs.
8) Chairman Ritchie asked for clarification that Halterman intends to conduct a (crash) program to understand fuel contribution to sludge formation. Halterman confirmed this to be the case. Chairman Ritchie then reiterated the two options outlined at the onset of the meeting (see Items 1a and 1b above). Ron Romano moved that the new fuel batch (YJ0621NX10) be rejected and that this be accompanied by an investigation of lab variability. The motion was seconded by Bruce Matthews. In discussing the motion, Halterman indicated they would like to delay any action in terms of fuel blend modifications until after the parts variability issue is addressed. It

was agreed that this would be advisable. A roll call vote was taken; the results were 7 approve, 2 disapprove, 4 waives, so the motion carried*.

9) It was agreed that a meeting to discuss the next steps will be held on Monday, January 31, at 2:00 pm. It was also suggested that a group of laboratory engineers be formed and meet very soon to address the lab variability issues identified.

*Note: For the record the voting was:

Approves: Infineum, Ford, GM, Intertek, Afton, Lubrizol, Ashland

Disapprove: Chevron, SwRI

Waive: TMC, Halterman, TEI, OHT

VG Fuel Correction

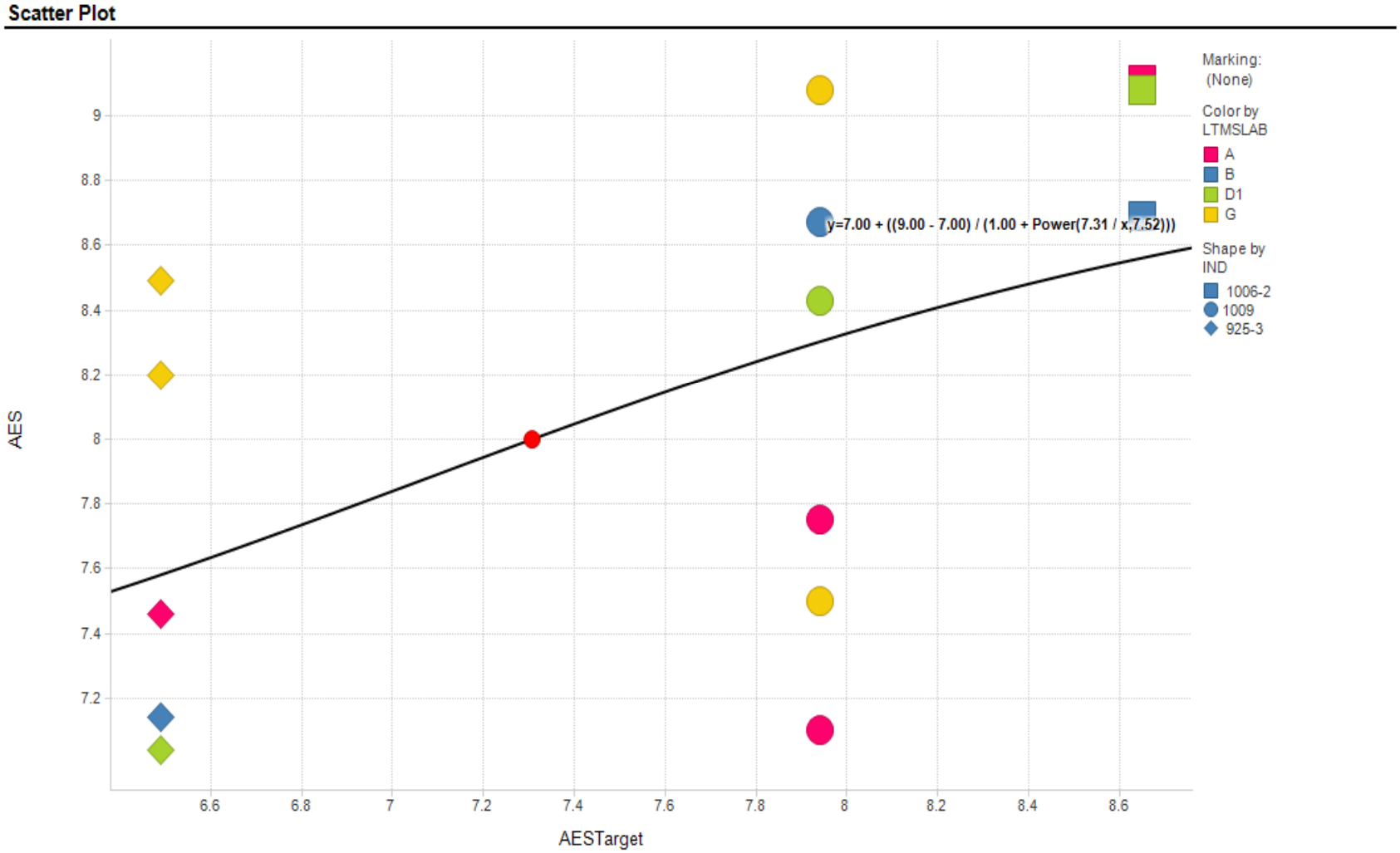
Jo Martinez

January 26, 2011

Summary

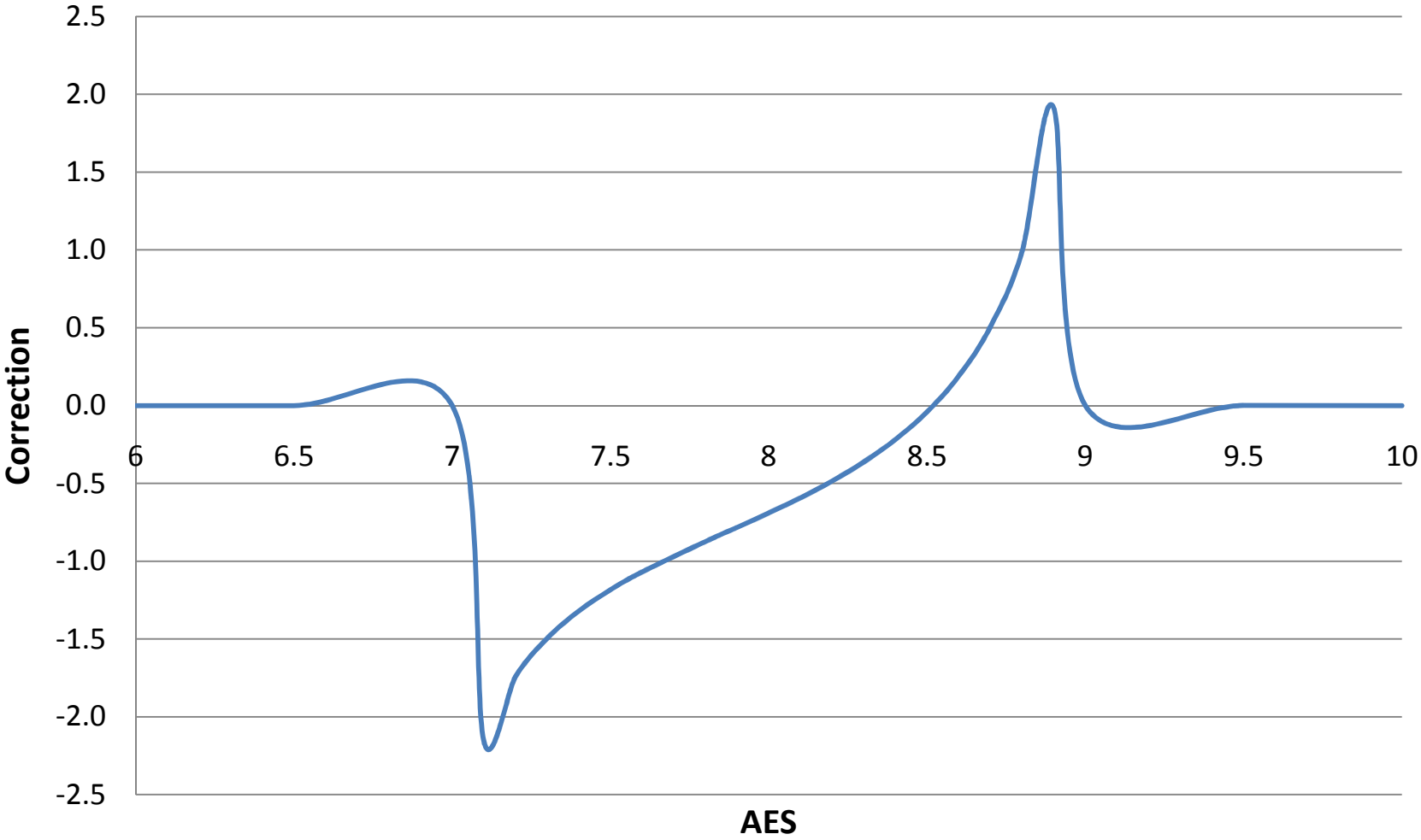
- Used logistic regression curve to calculate correction
- If parameter values are outside the range of the curve, do not apply correction
- Ranges where logistic equation apply
  - AES: 7 - 9
  - RAC: 7 - 9.4
  - AEV: 8.5 - 9.4
  - APV: 7 - 8.3
  - LnOSCR: 0.65 - 4

AES

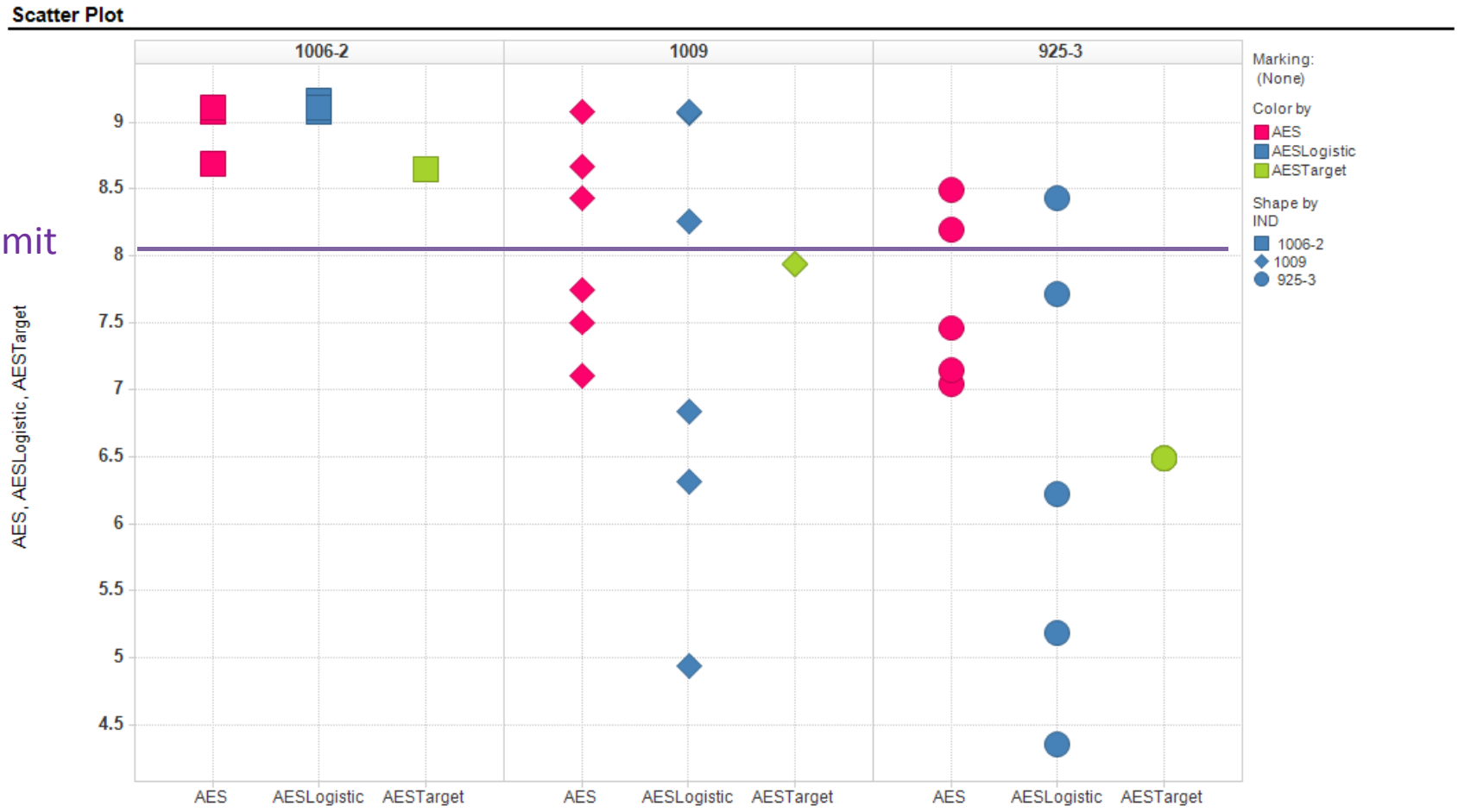


AESCor=EXP((LN((7.31^7.52)/(((9-7)/(AES-7))-1))/7.52))

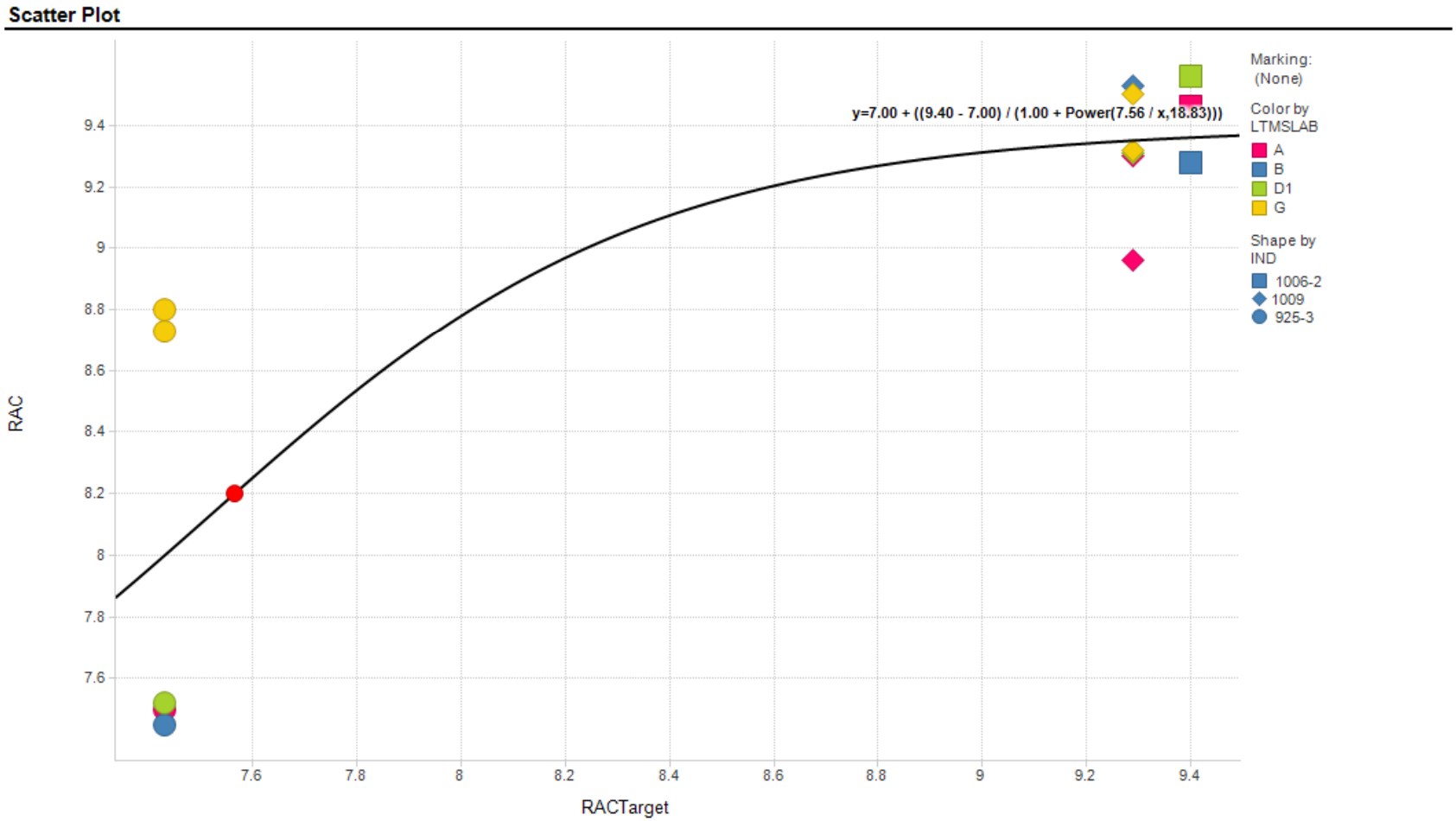
AES Correction



AES Corrected

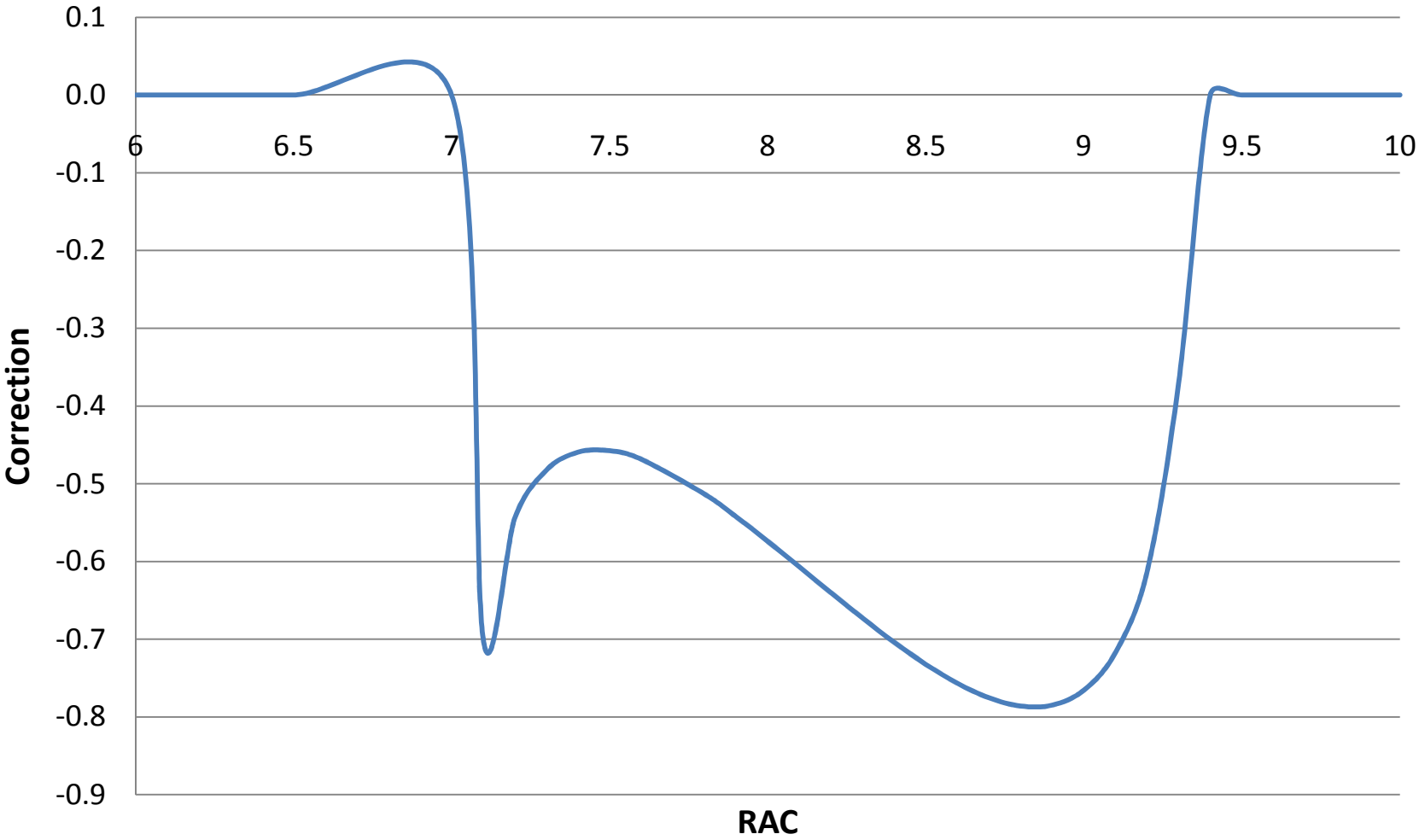


RAC

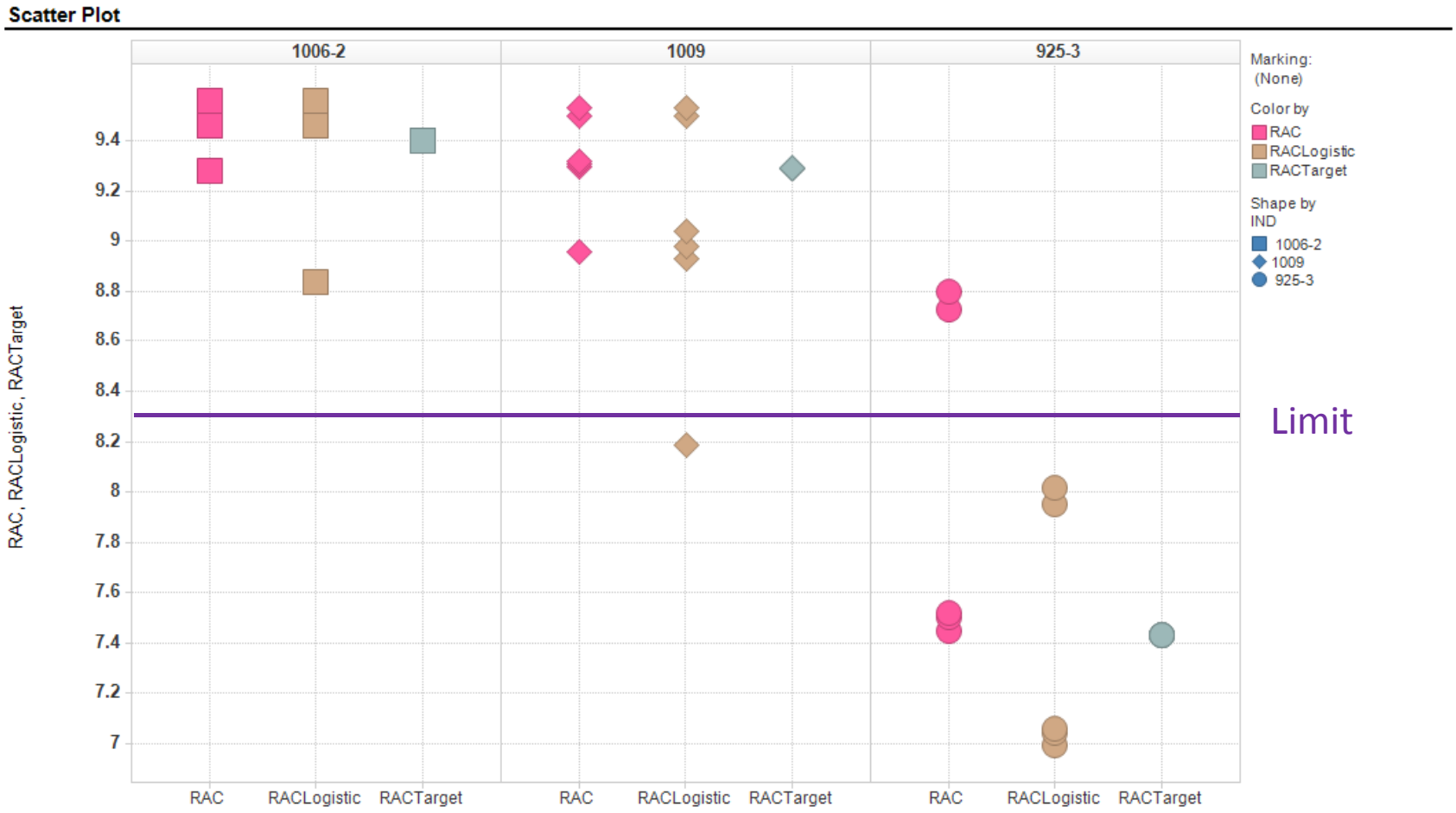


RACCor=EXP((LN((7.56^18.83)/(((9.4-7)/(RAC-7))-1))/18.83))

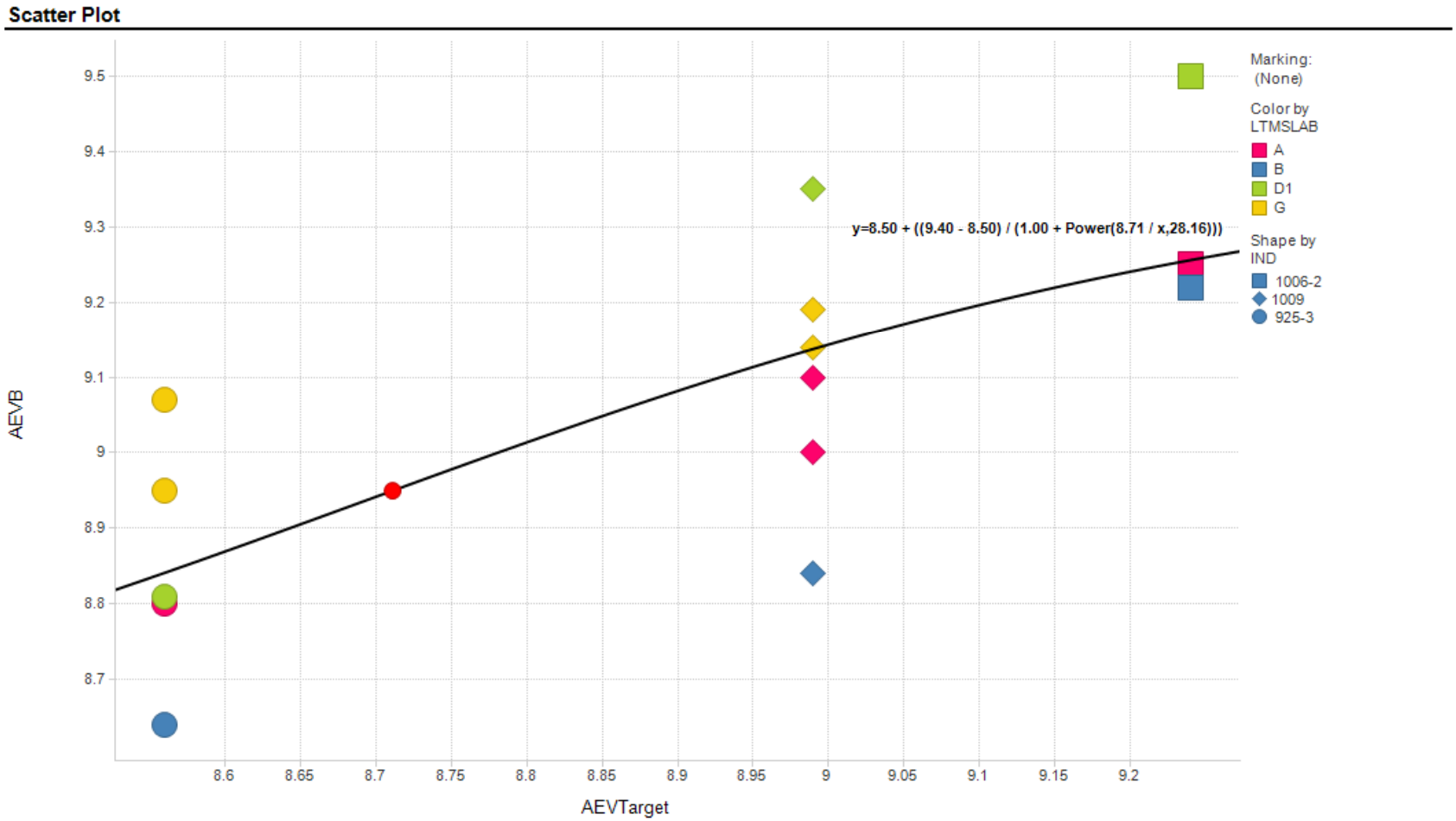
RAC Correction



RAC Corrected

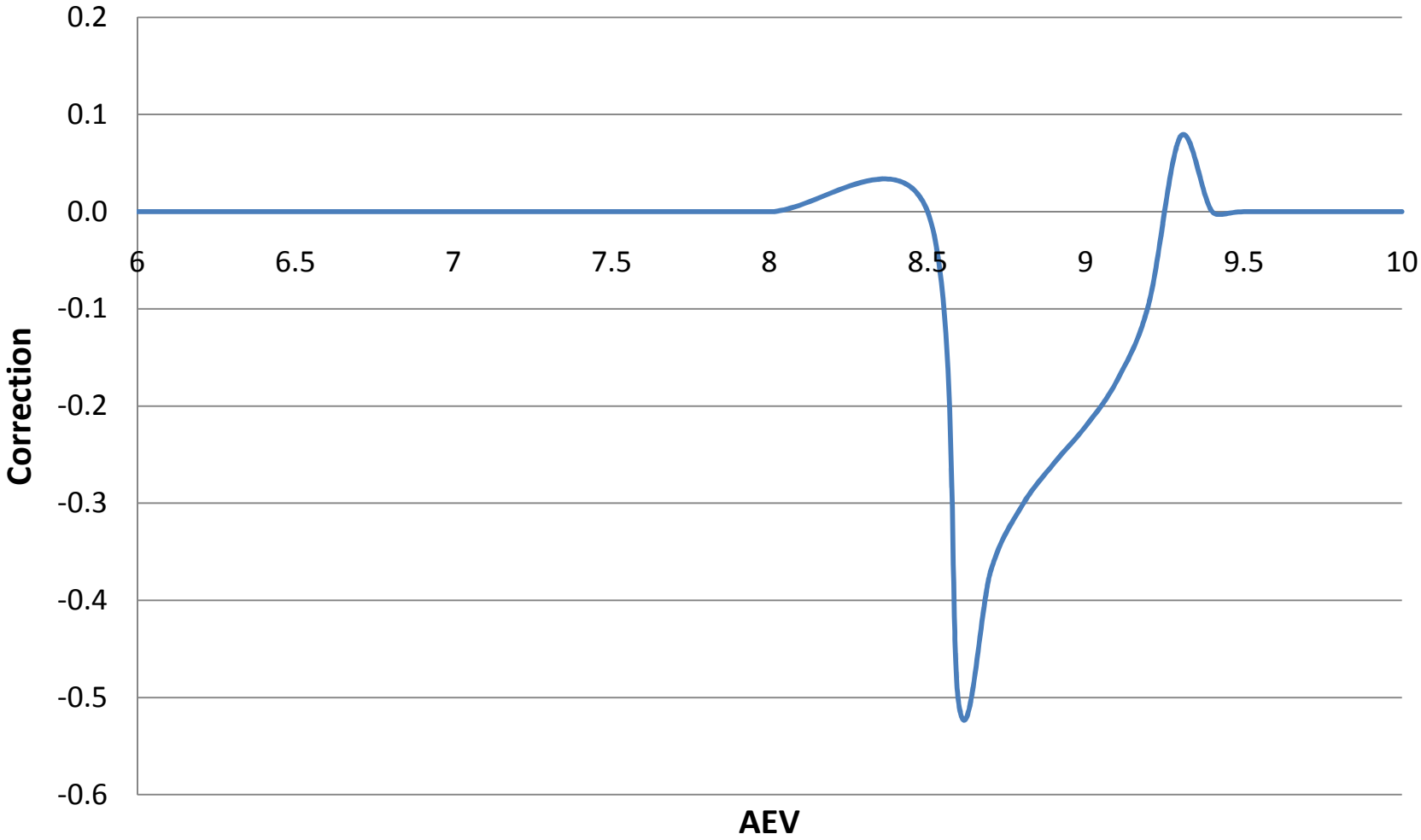


AEV

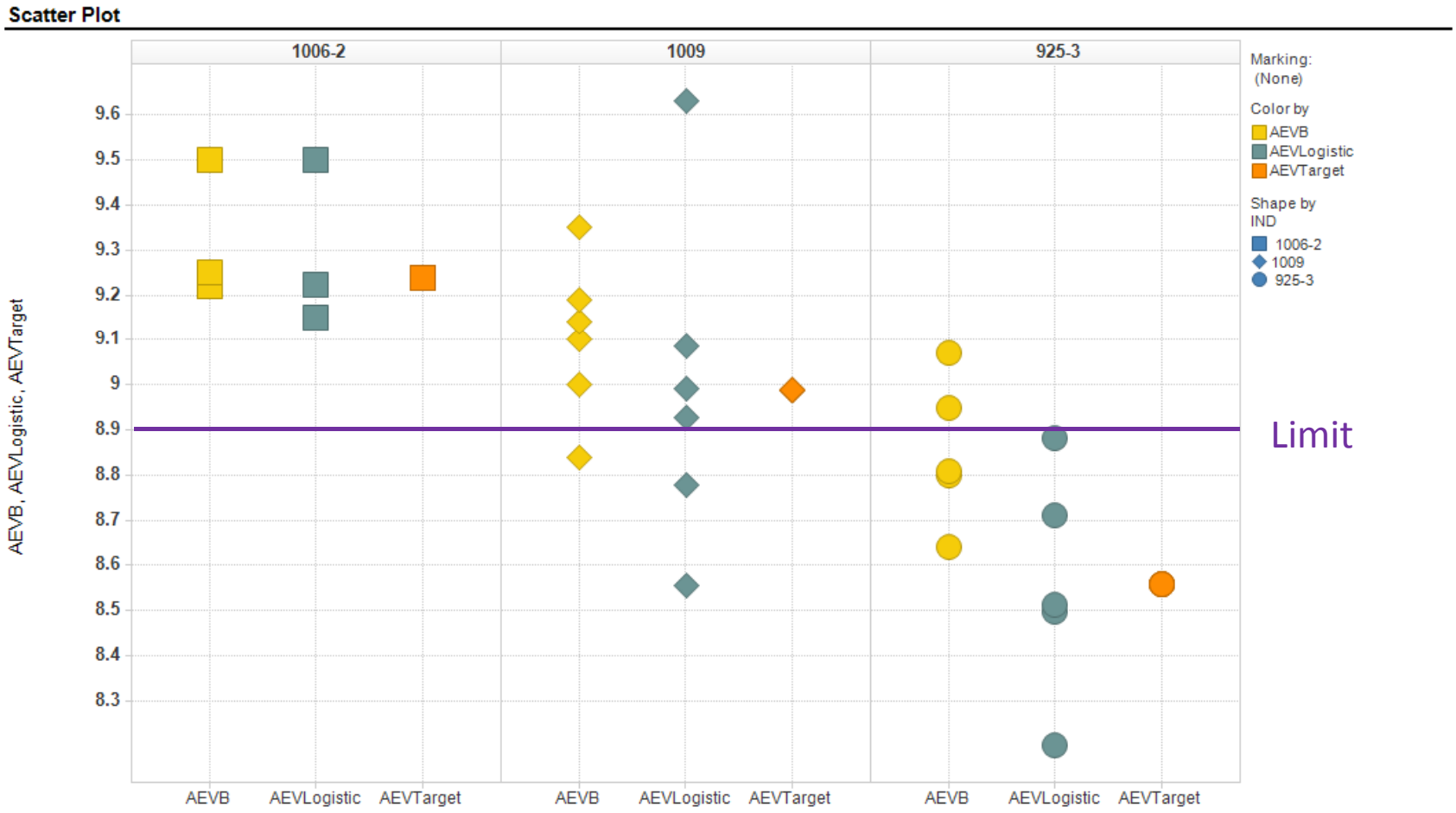


AEVCor=EXP((LN((8.71^28.16)/(((9.4-8.5)/(AEV-8.5))-1))/28.16))

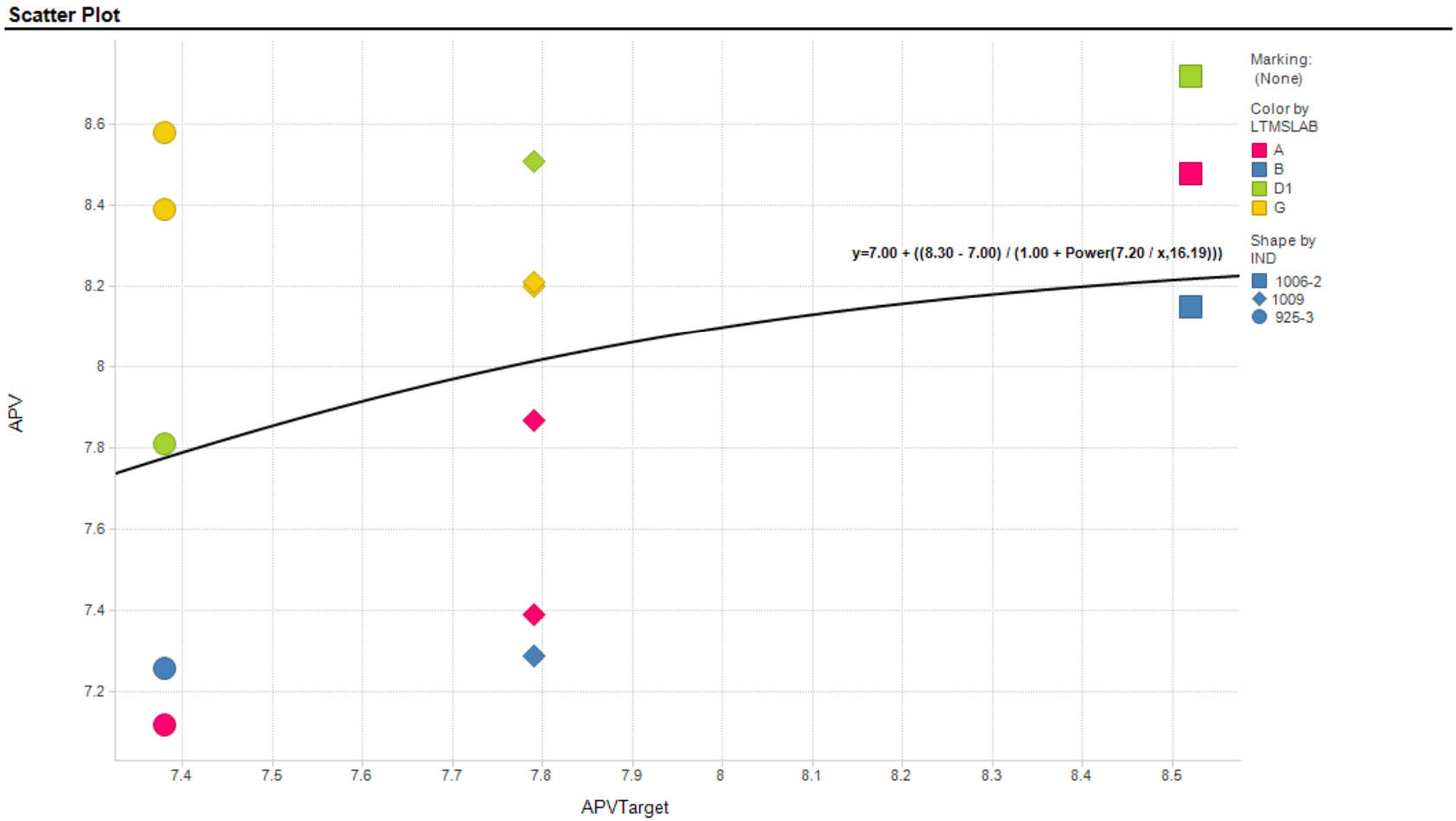
AEV Correction



AEV Corrected

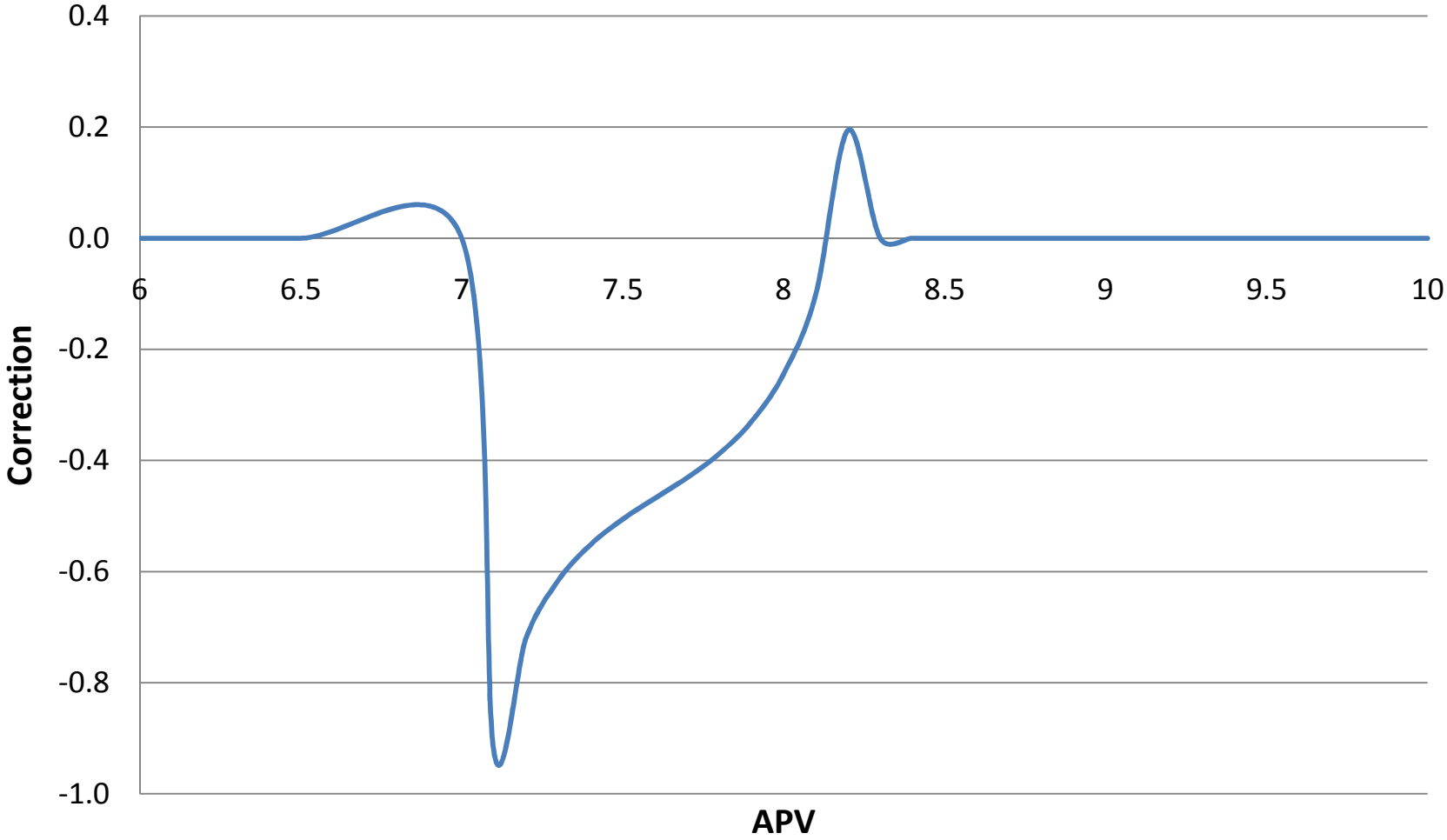


APV

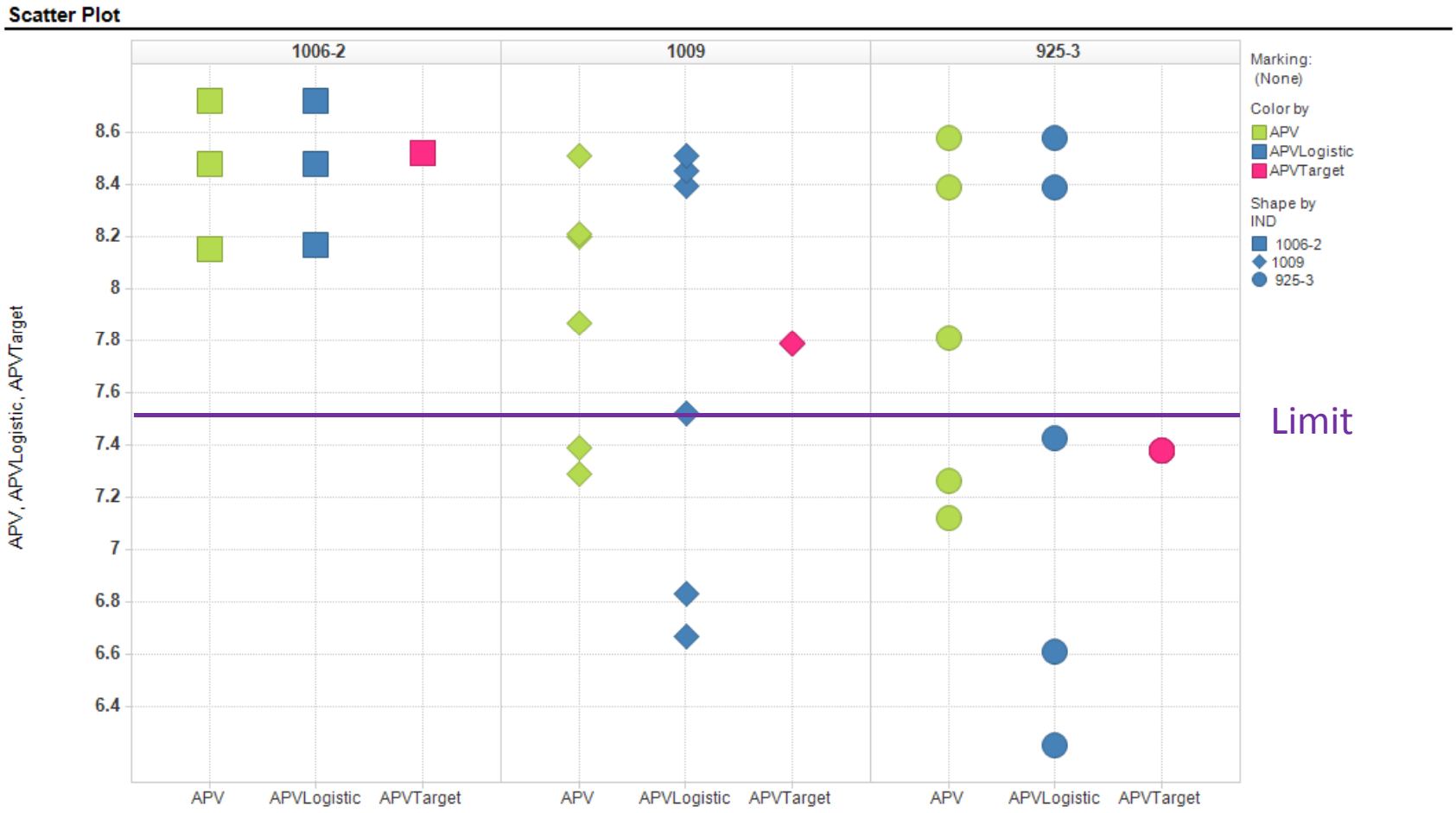


APVCor=EXP((LN((7.2^16.19)/(((8.3-7)/(APV-7))-1))/16.19))

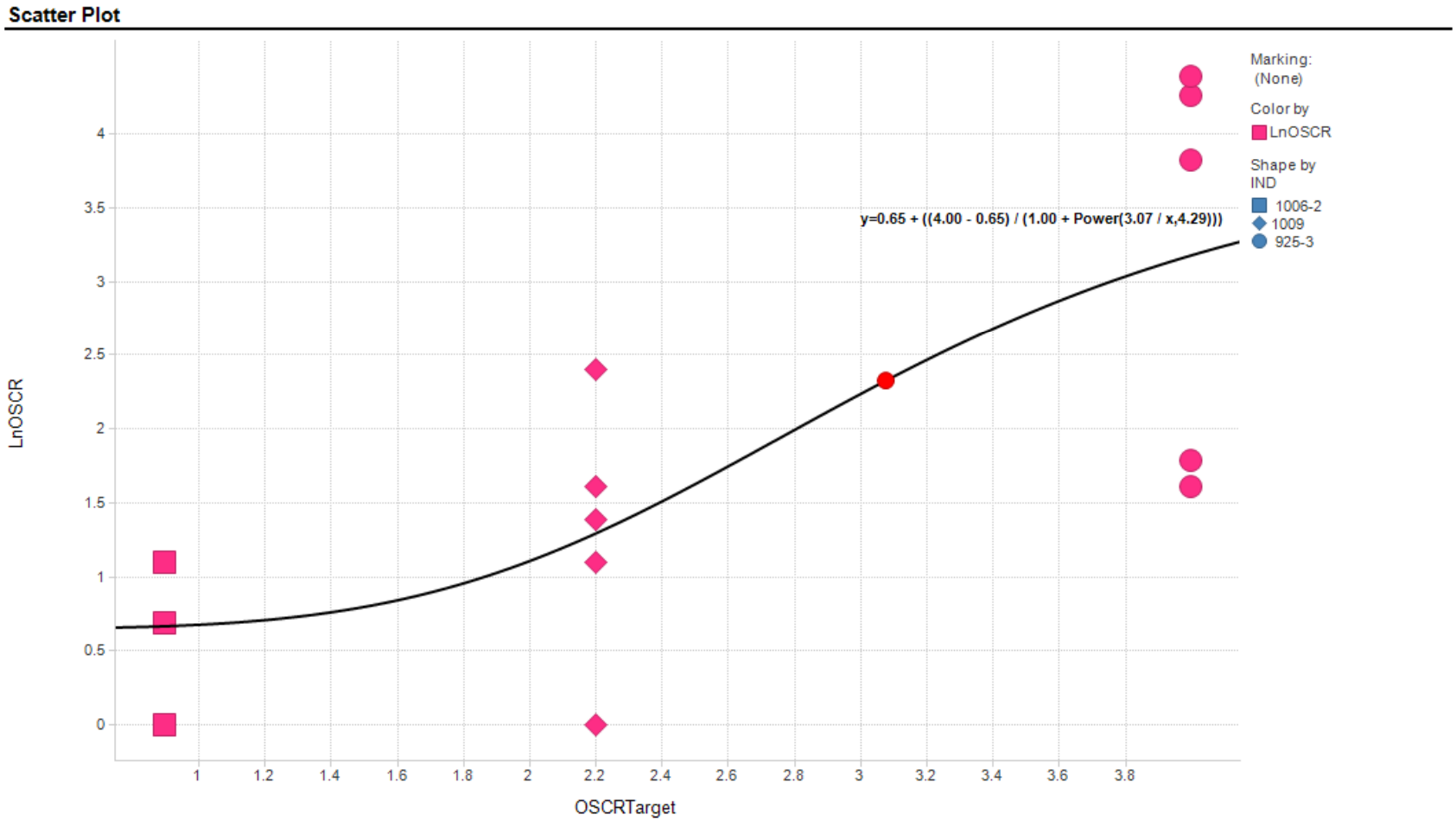
APV Correction



APV Corrected

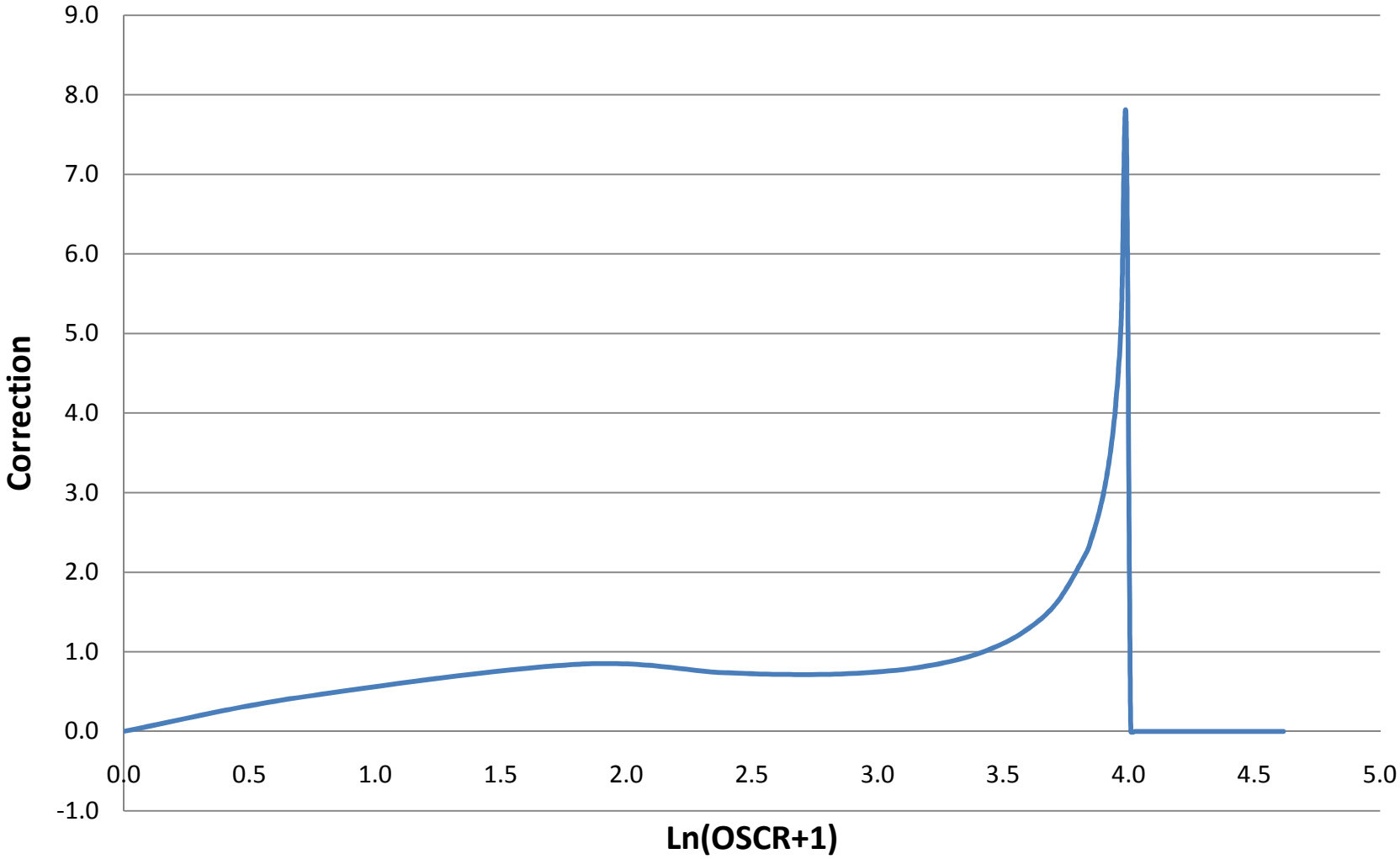


LnOSCR

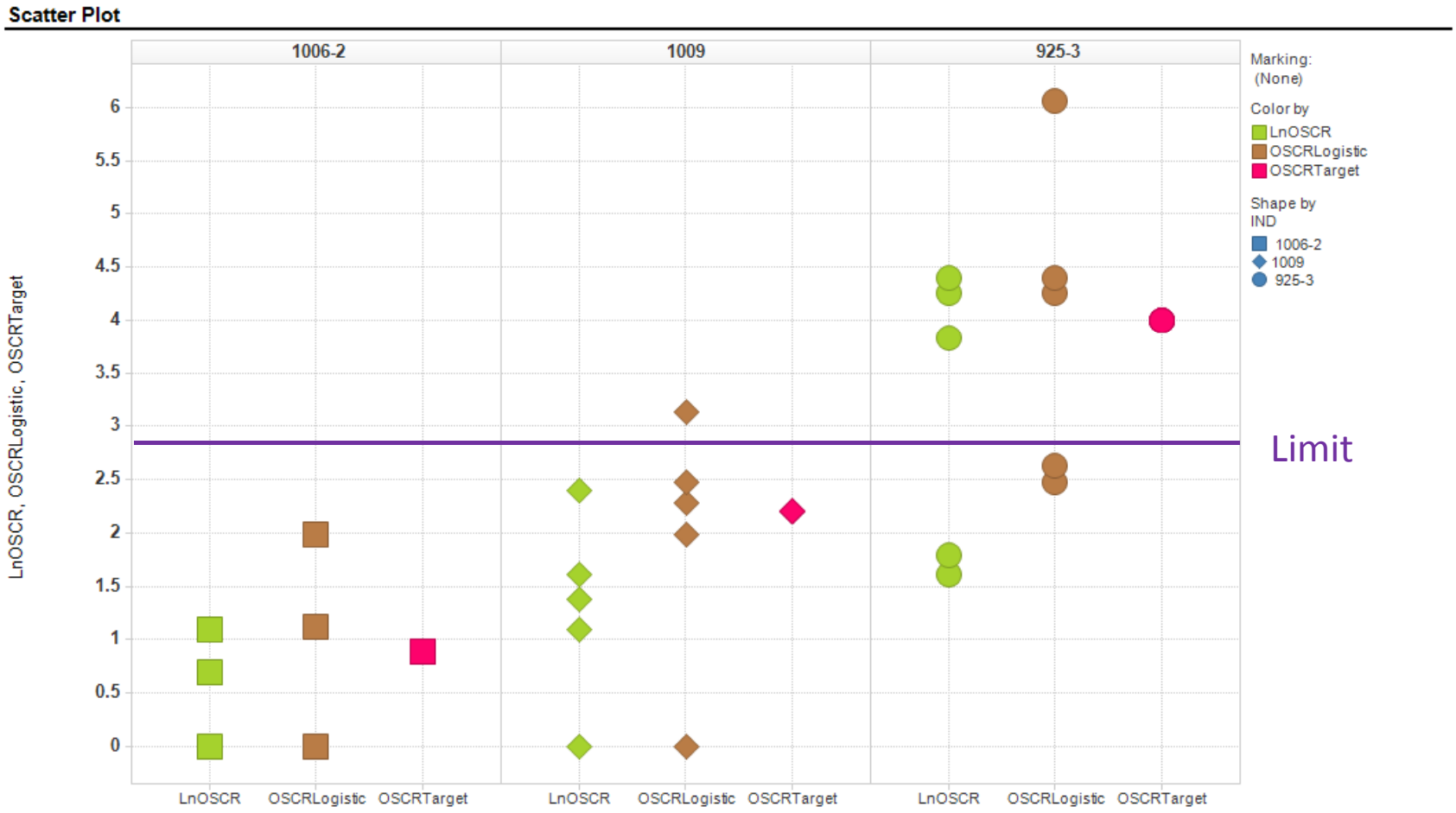


LnOSCRCor=EXP((LN((3.07^4.29)/(((4-0.65)/(LnOSCR-0.65))-1))/4.29))

LnOSCR1 Correction



LnOSCR Corrected



Fuel Batch Correction Methods

D. Boese

January 26, 2011

Summary

Based on the Fuel Batch Matrix results:

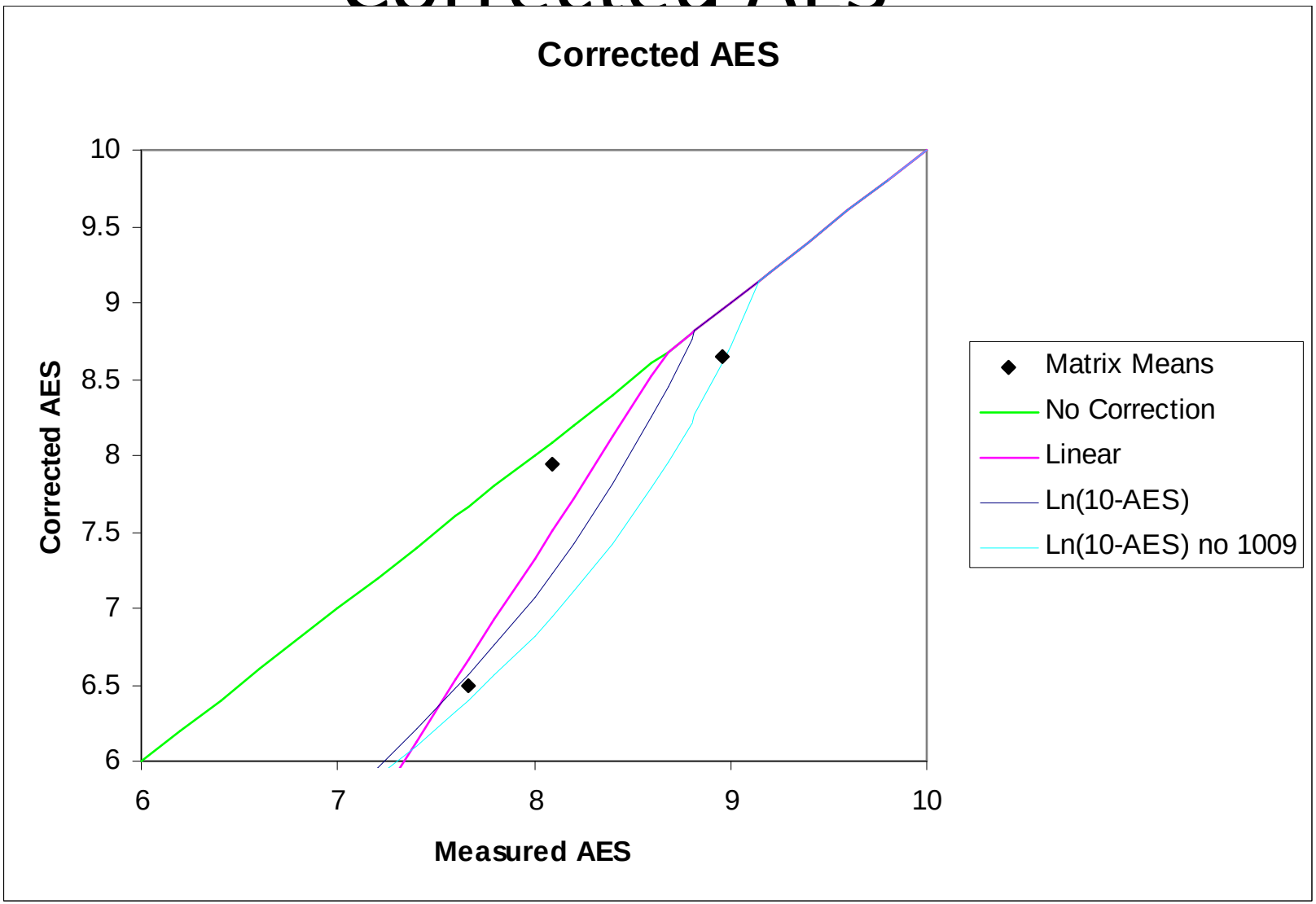
- Fuel batch corrections are statistically significant for AES, RAC and AEV. Various forms of corrections are provided.
- Fuel batch corrections for APV and OSCR are not statistically significant.

AES Correction Methods

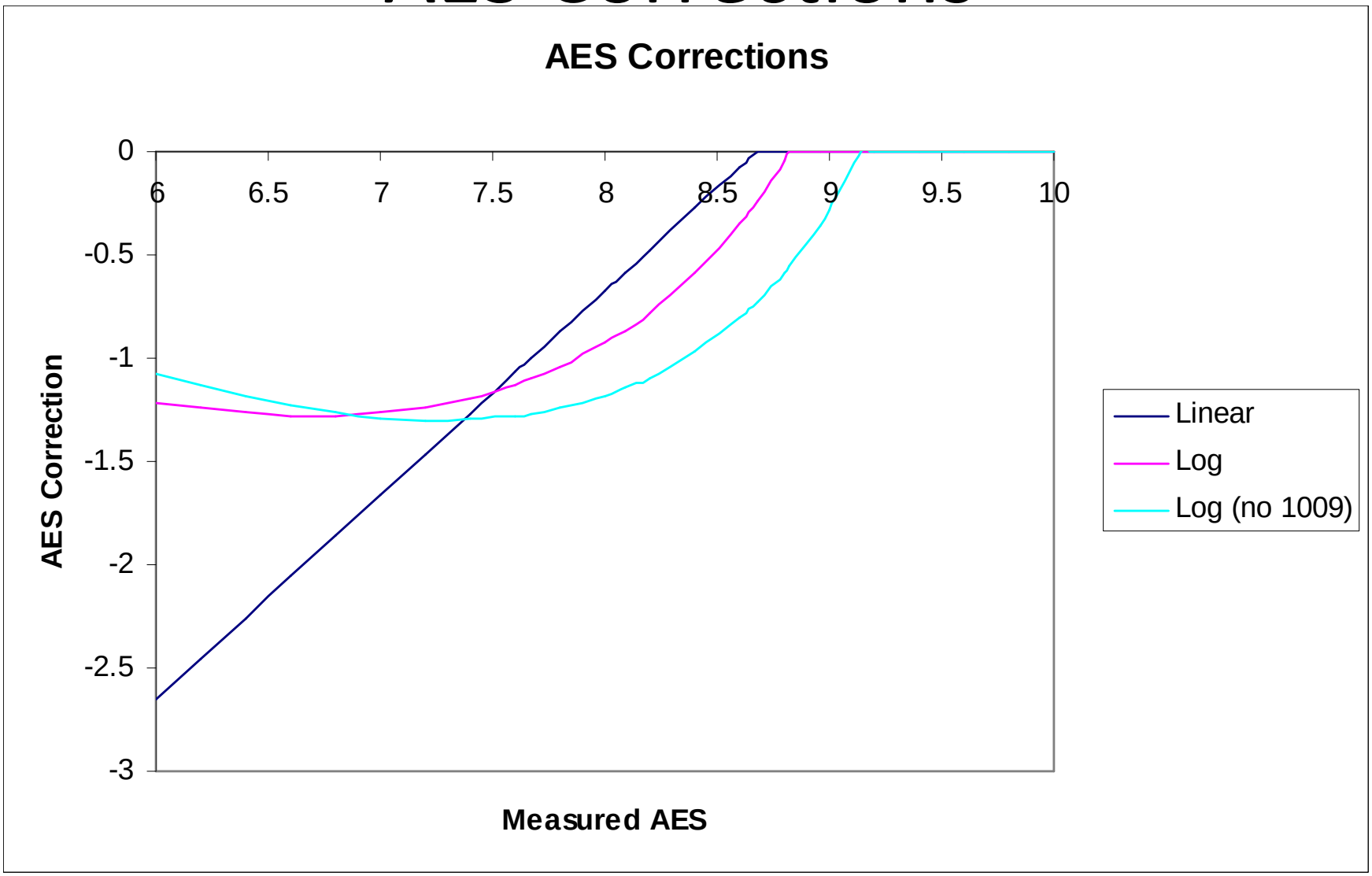
Models developed (where B_0 and B_1 are estimated intercept and slope):

- M1: Linear – $AES = B_0 + B_1 AES\ Target$
  - Simple model and correction factor calculation
- M2: Log – $Ln(10 – AES) = B_0 + B_1(10 - AES\ Target)$
  - Transformation improves model
- M3: Log (omitted RO 1009) - $Ln(10 – AES) = B_0 + B_1(10 - AES\ Target)$
  - Results in no matrix RO 925-3 AES passes

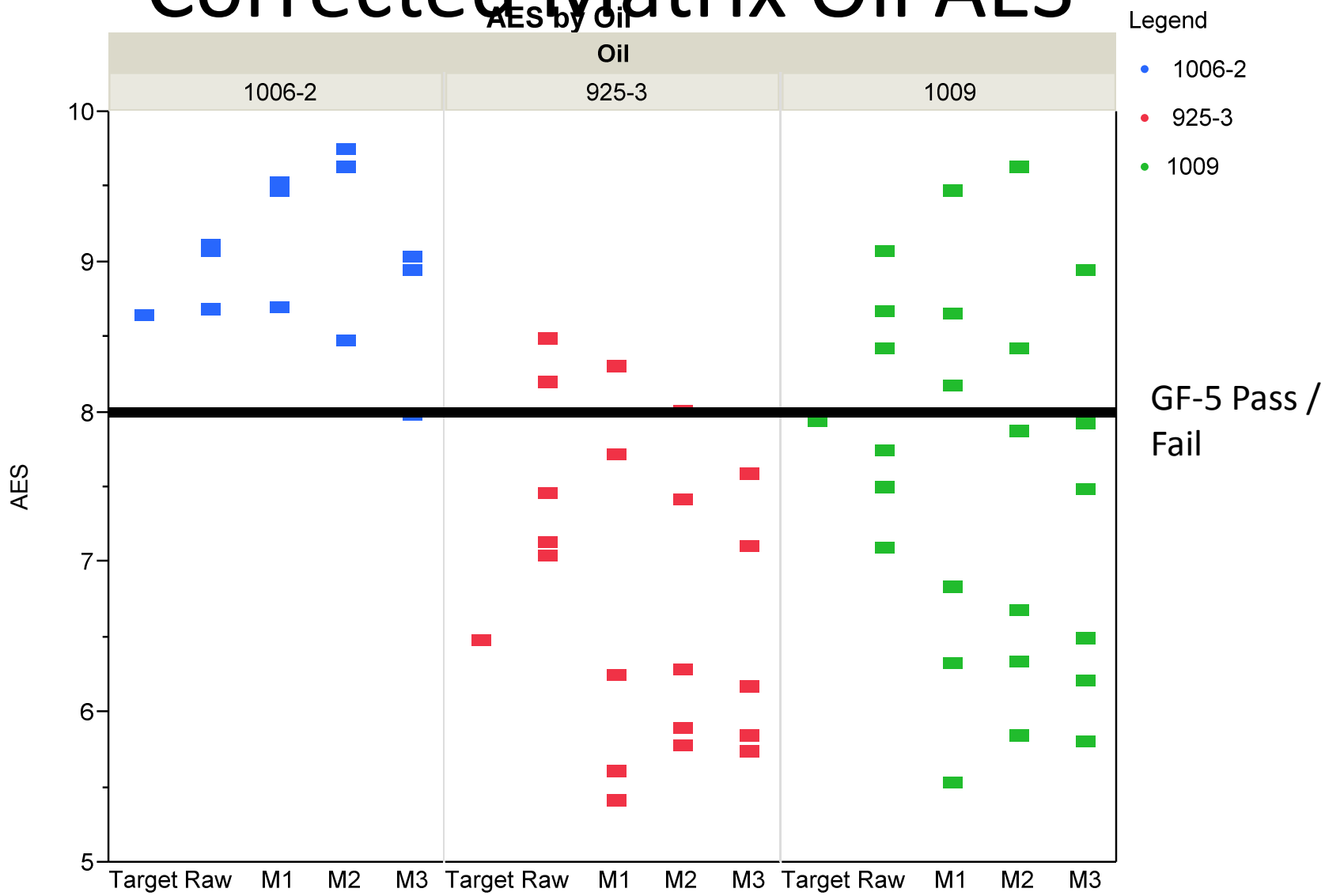
Corrected AES



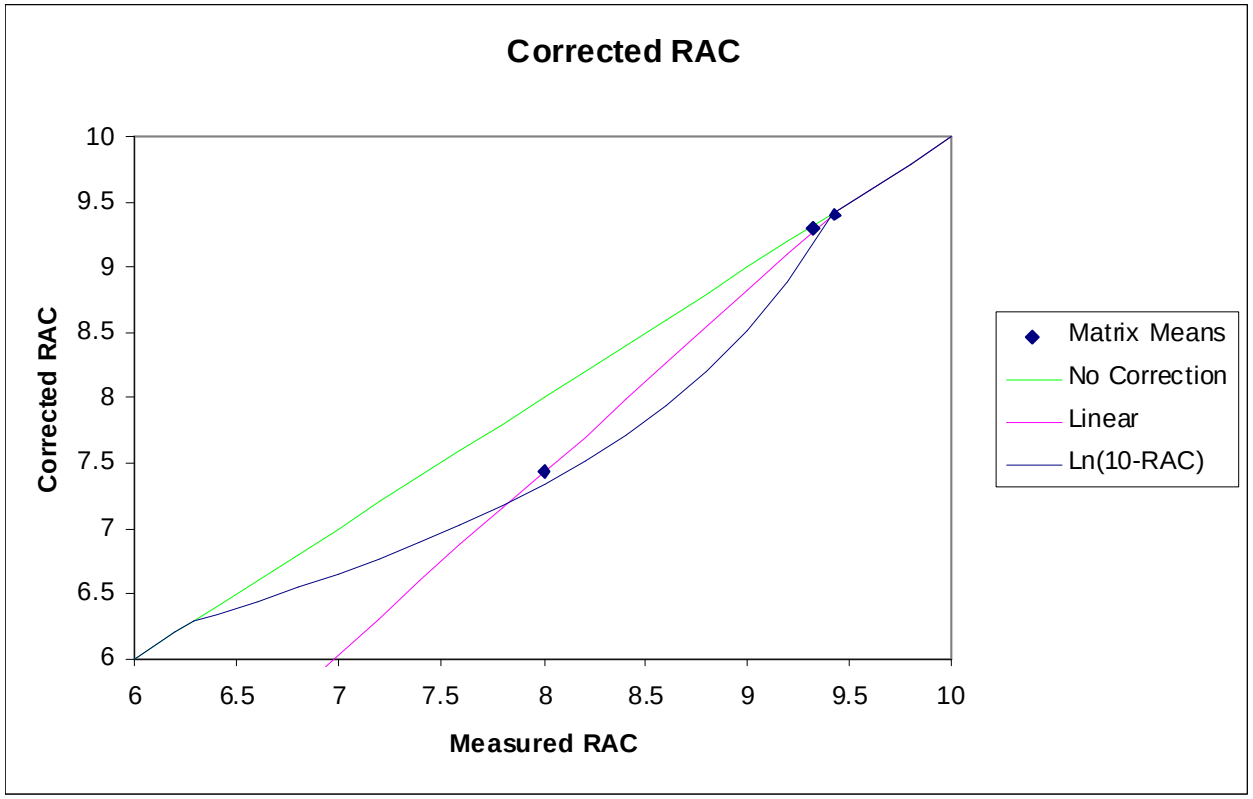
AES Corrections



Corrected Matrix Oil AES

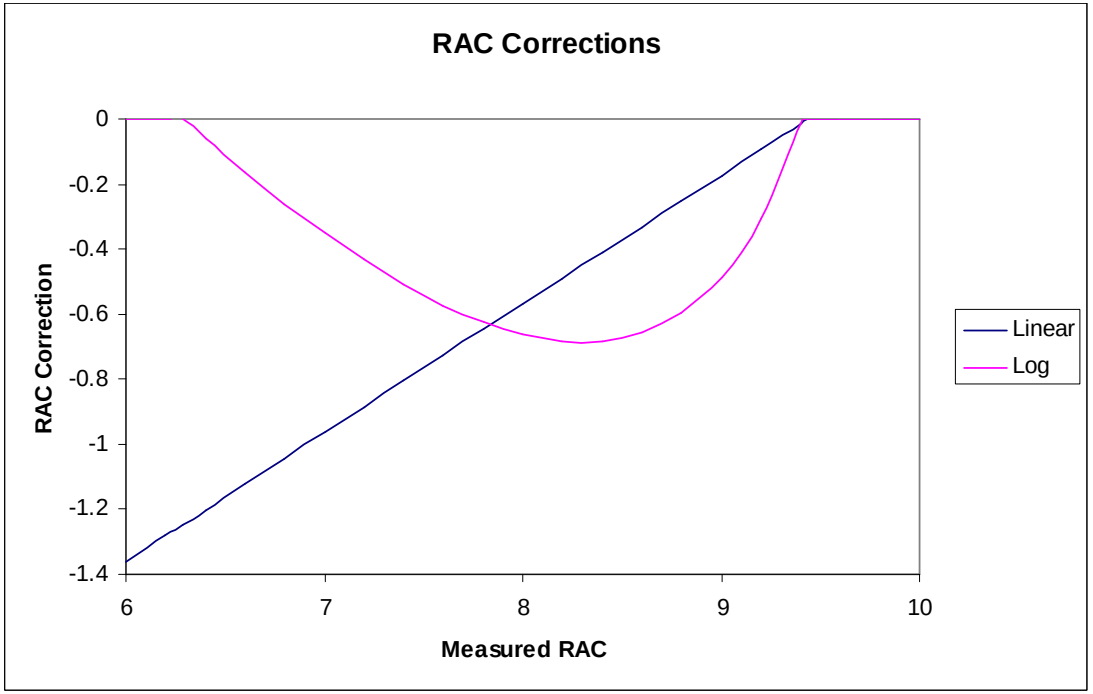


RAC Correction



- Linear Model - *RAC* = $B_0 + B_1$*RAC Target*
  - –Model and correction equation are simple
- Log Model – Ln[10 – RAC] = $B_0 + B_1$(10 - *RAC Target*)
  - –Improves consistency of variation

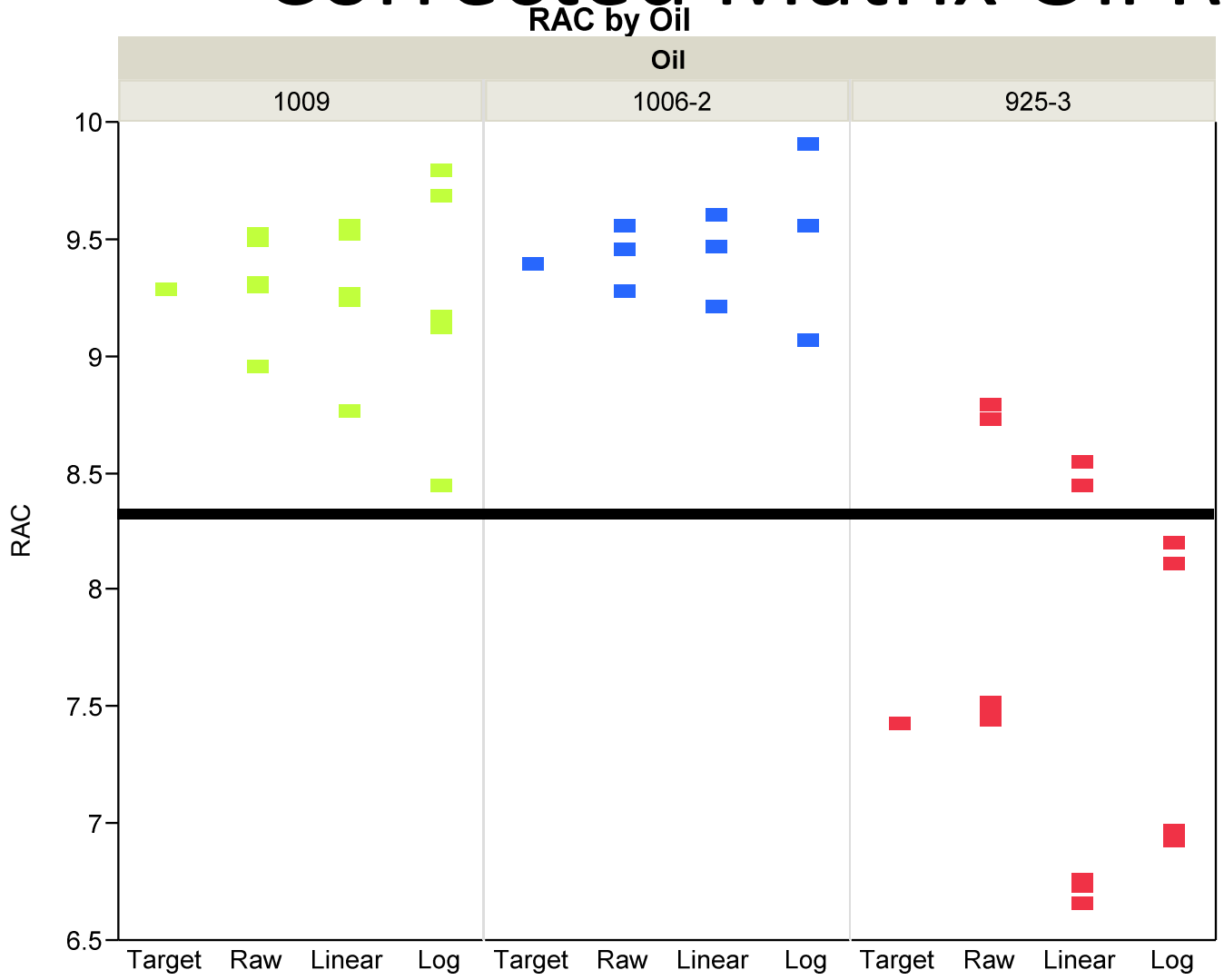
RAC Corrections



Corrections:

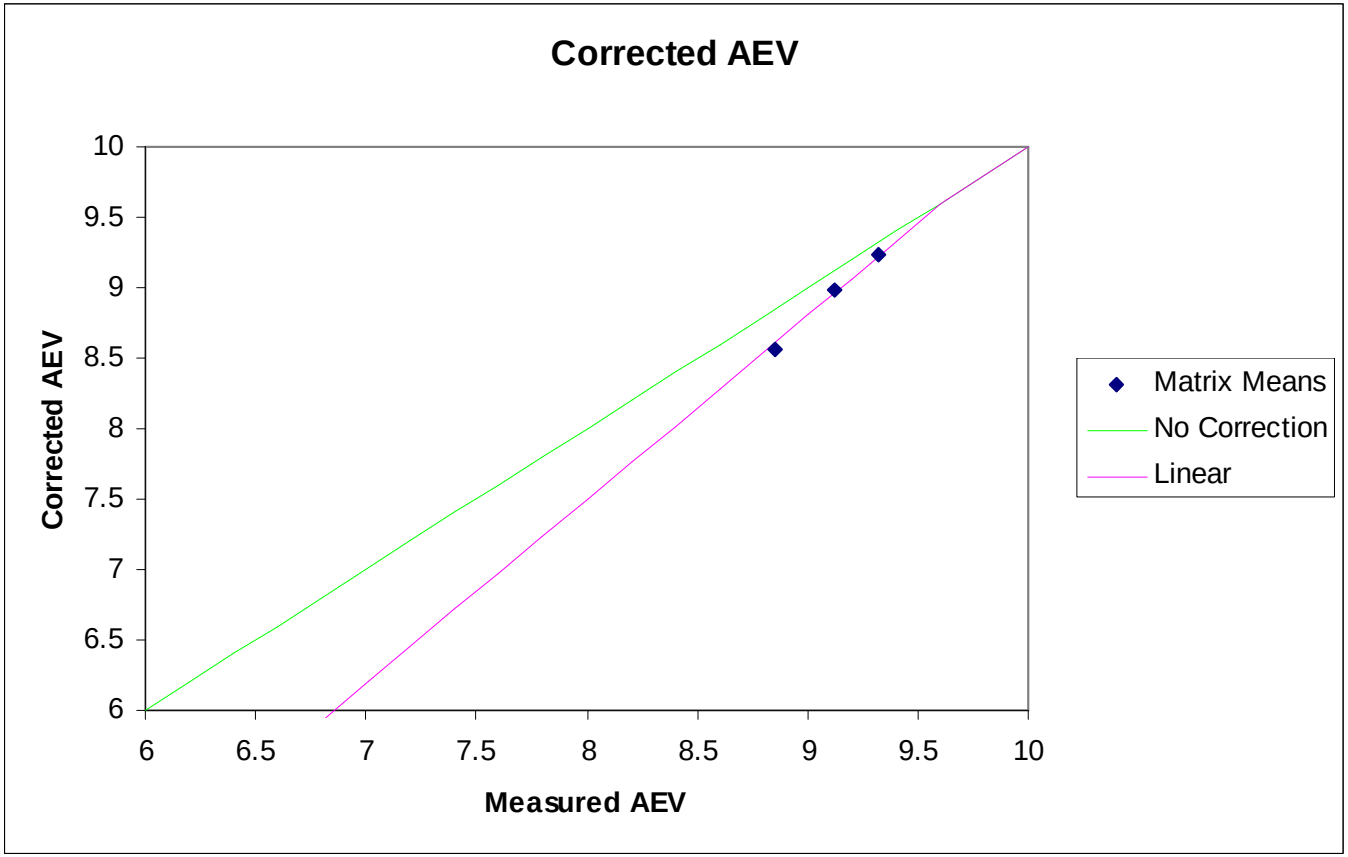
- Linear
  - –Through 9.44 merits: Corrected RAC = (RAC – 2.68)/0.72
  - –9.44 – 10 merits: no correction
- Log
  - –Through 6.29 merits: no correction
  - –Between 6.29 and 9.24 merits: Corrected RAC = 10 – ((Ln[10 – RAC] +0.87)/0.59)
  - –9.44 – 10 merits: no correction

Corrected Matrix Oil RAC



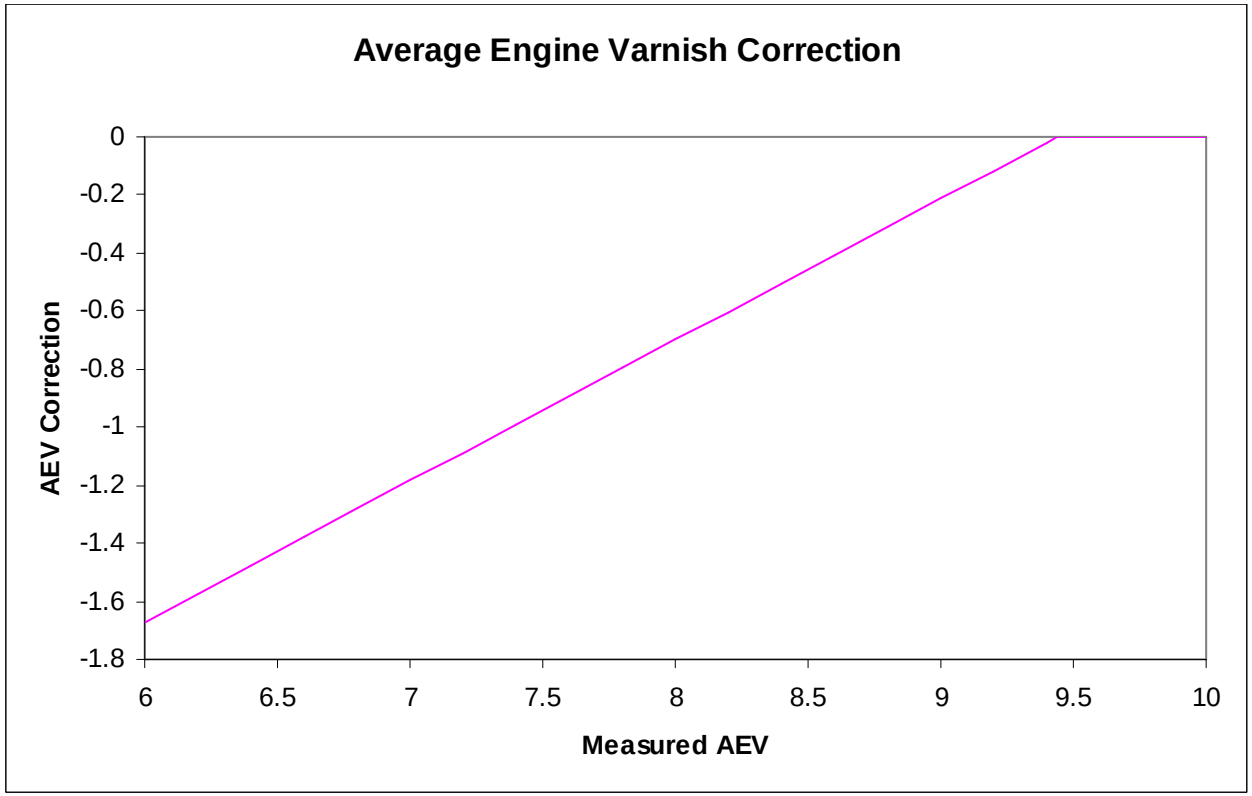
GF-5 Pass / Fail

AEV Correction



- Model - *RAC* = B_0 + B_1*RAC Target* + B_2*Lab*
  - –Simple linear model including statistically significant Lab effect
  - –Variation of each of the reference oils is similar and therefore the Log transformation is not required

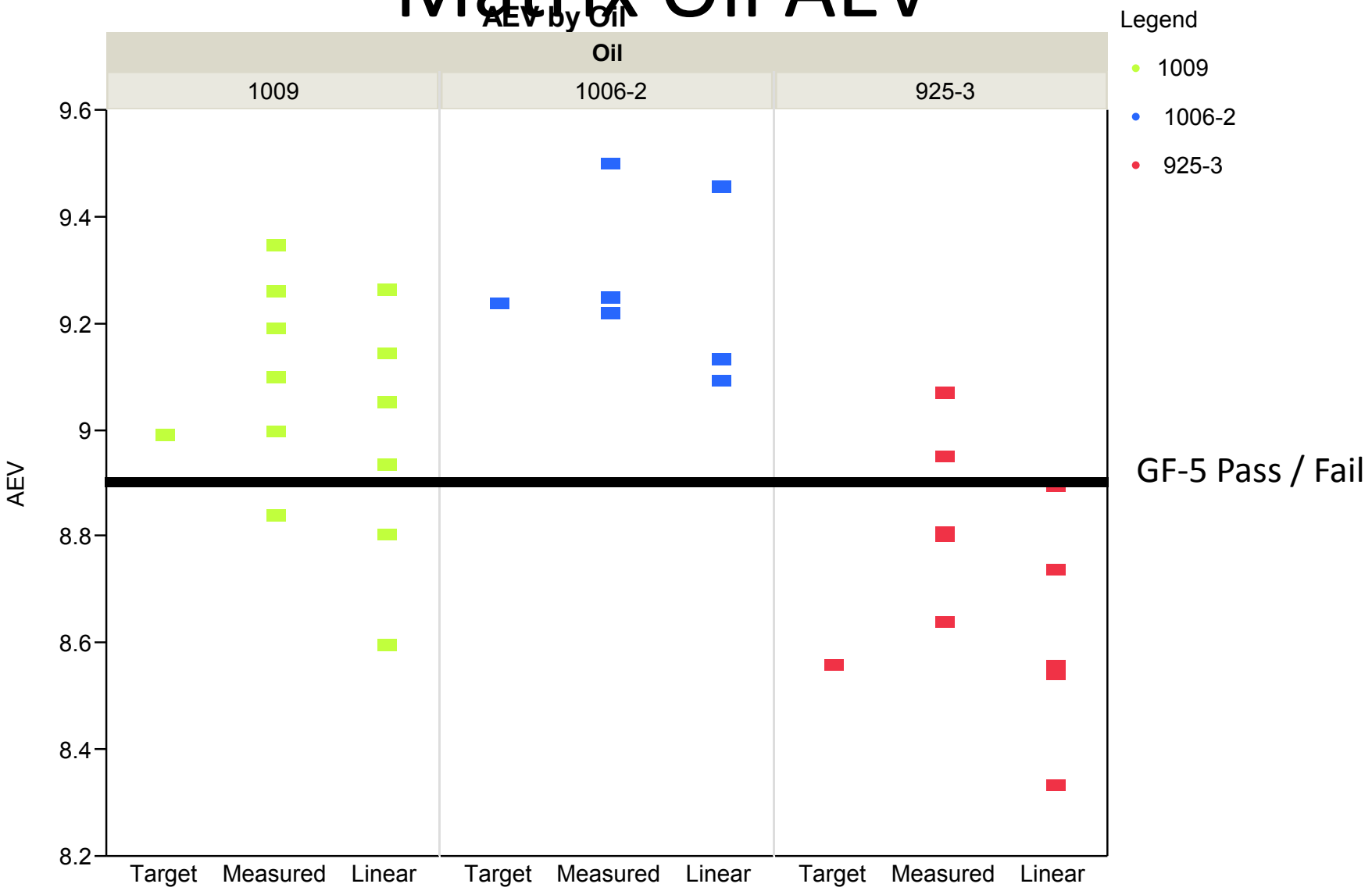
AEV Correction



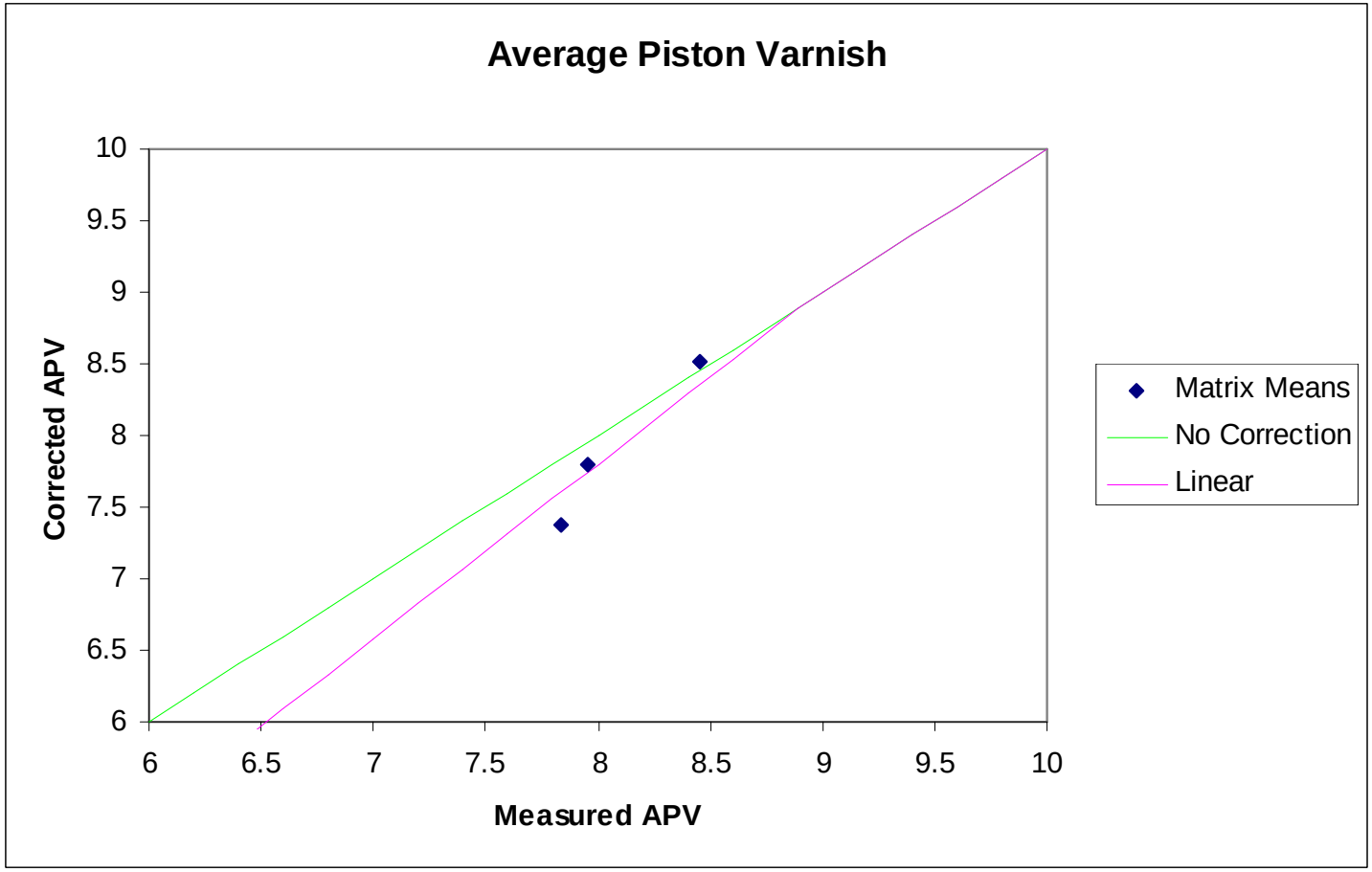
Correction:

- –Through 9.63 merits: AEV Correction = (AEV – 2.27)/0.76
- –9.63 – 10 merits: no correction

Matrix Oil AEV

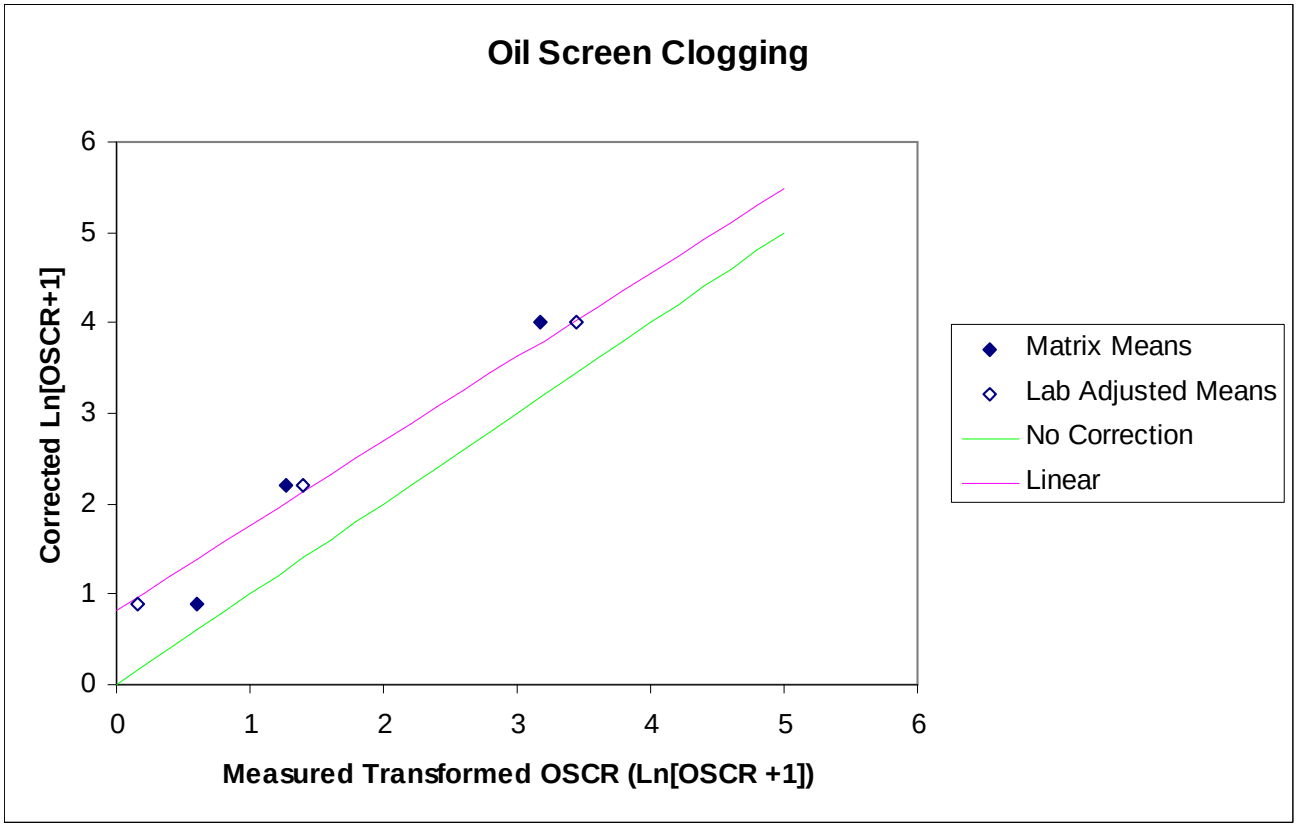


APV Correction



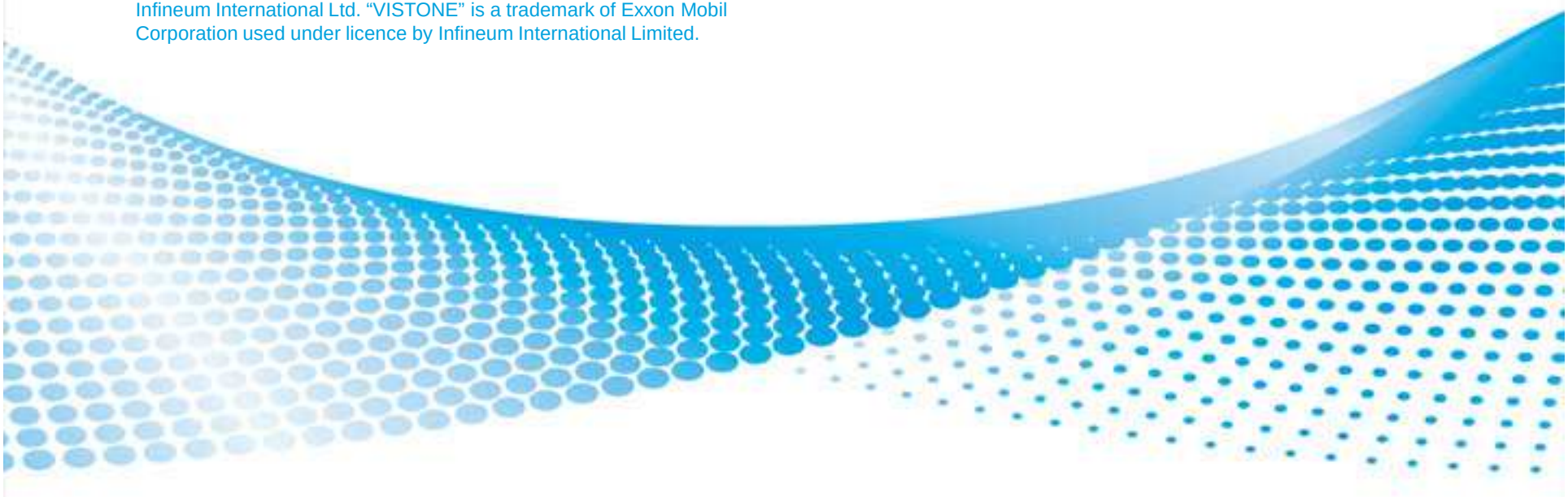
- Model - $APV = B_0 + B_1 APV\ Target + B_2 Lab$ (simple linear model with statistically significant lab effect)
- B_0 and B_1 are not statistically significant (relative to 0 and 1, respectively), therefore a correction is not required.

OSCR Correction



•Model – *Ln(OSCR+1)* = B_0 + B_1*OSCR Target* + B_2 *Lab* (simple linear model with statistically significant lab effect)

•B_0 and B_1 are not statistically significant (relative to 0 and 1, respectively), therefore a correction is not required.



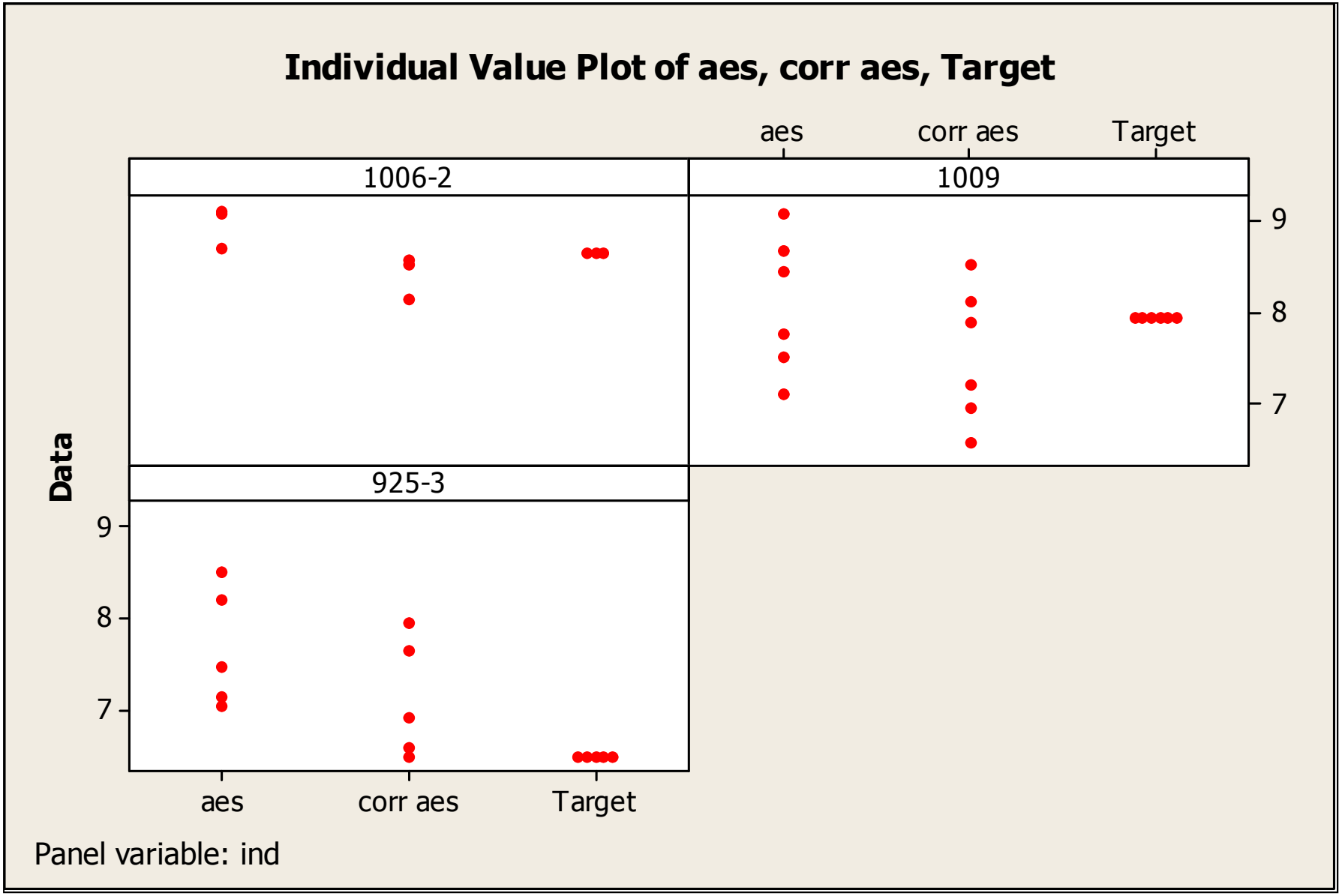
Correction Factor From Lubrizol

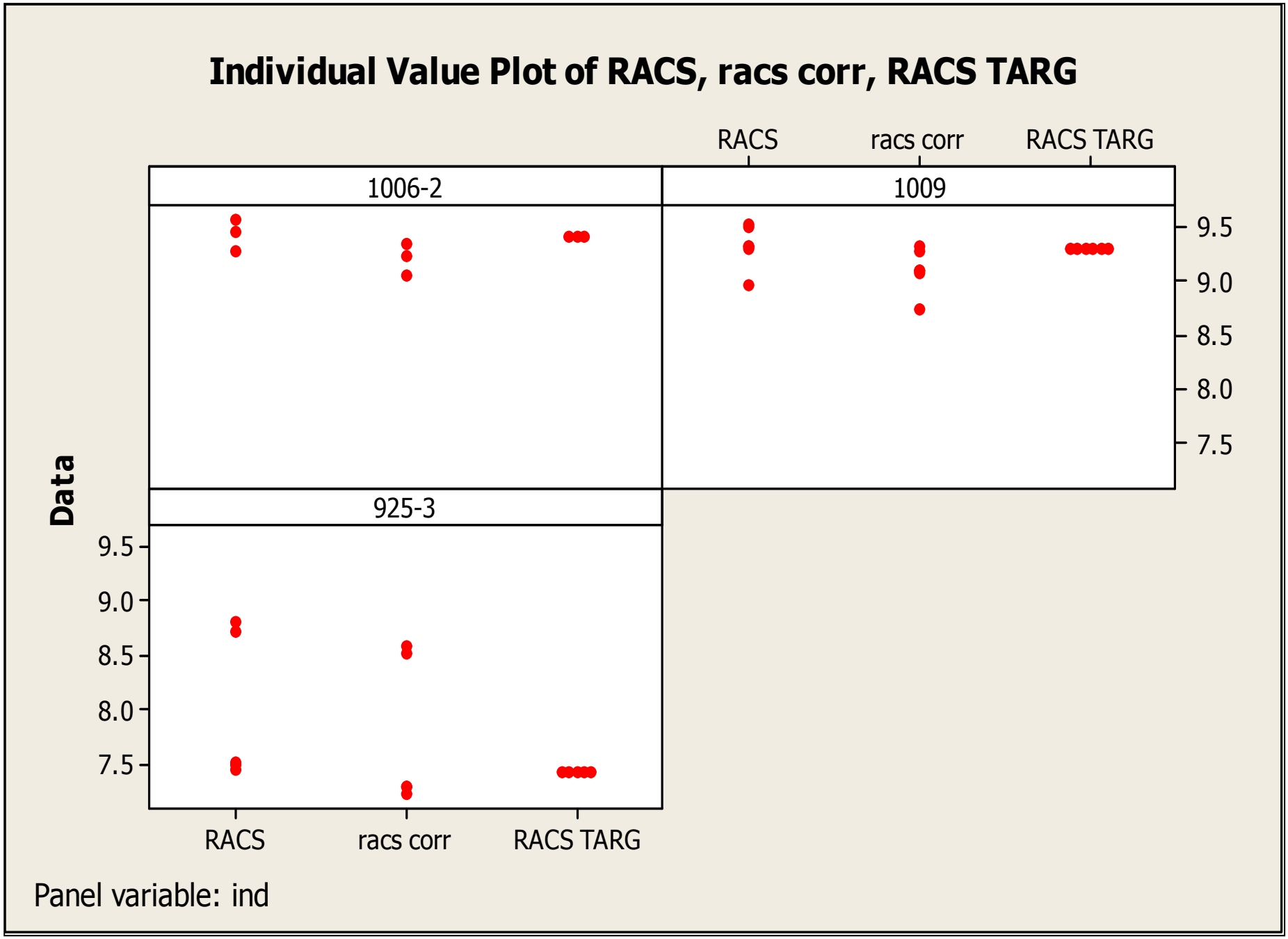
Allison Rajakumar

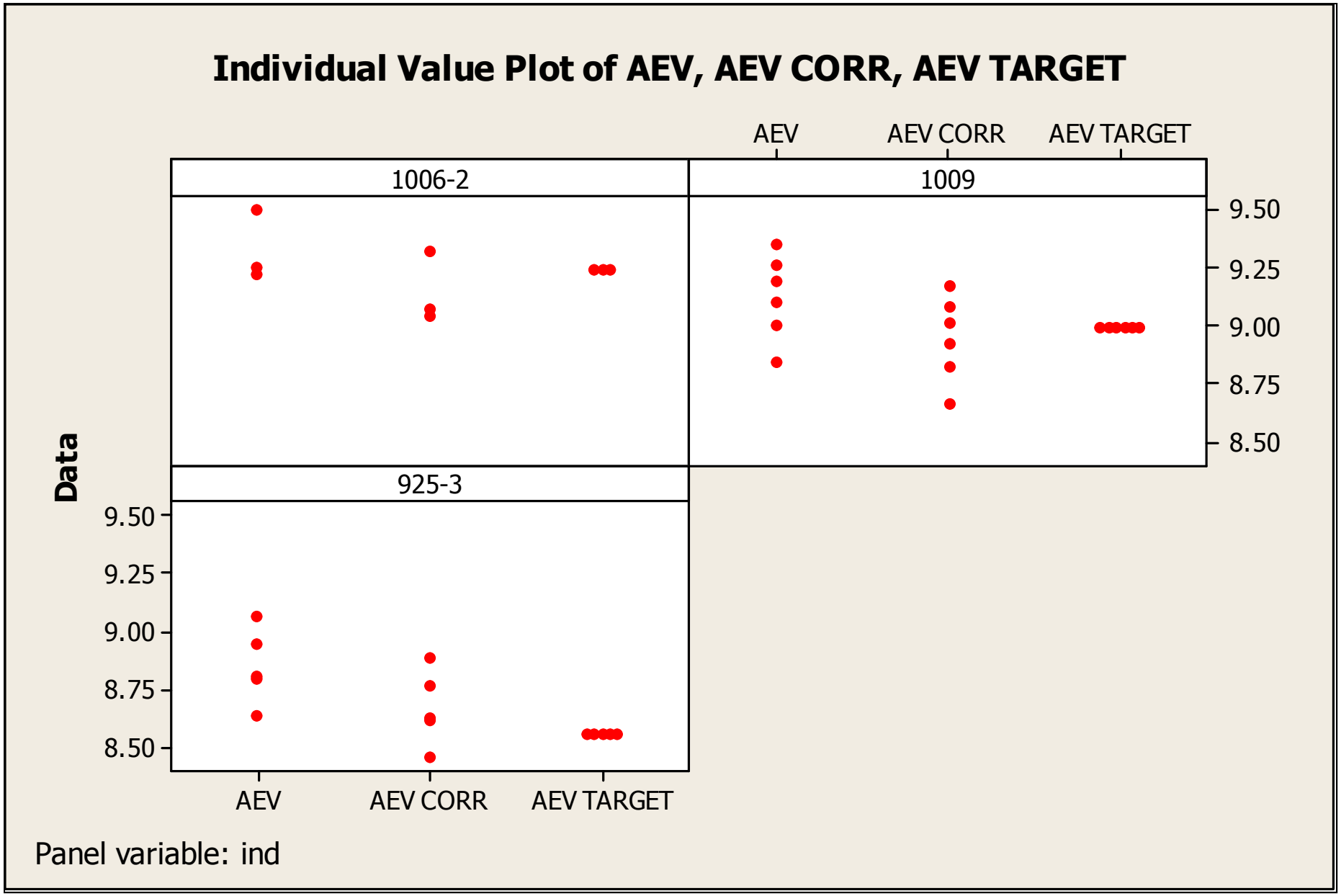
January 26, 2011

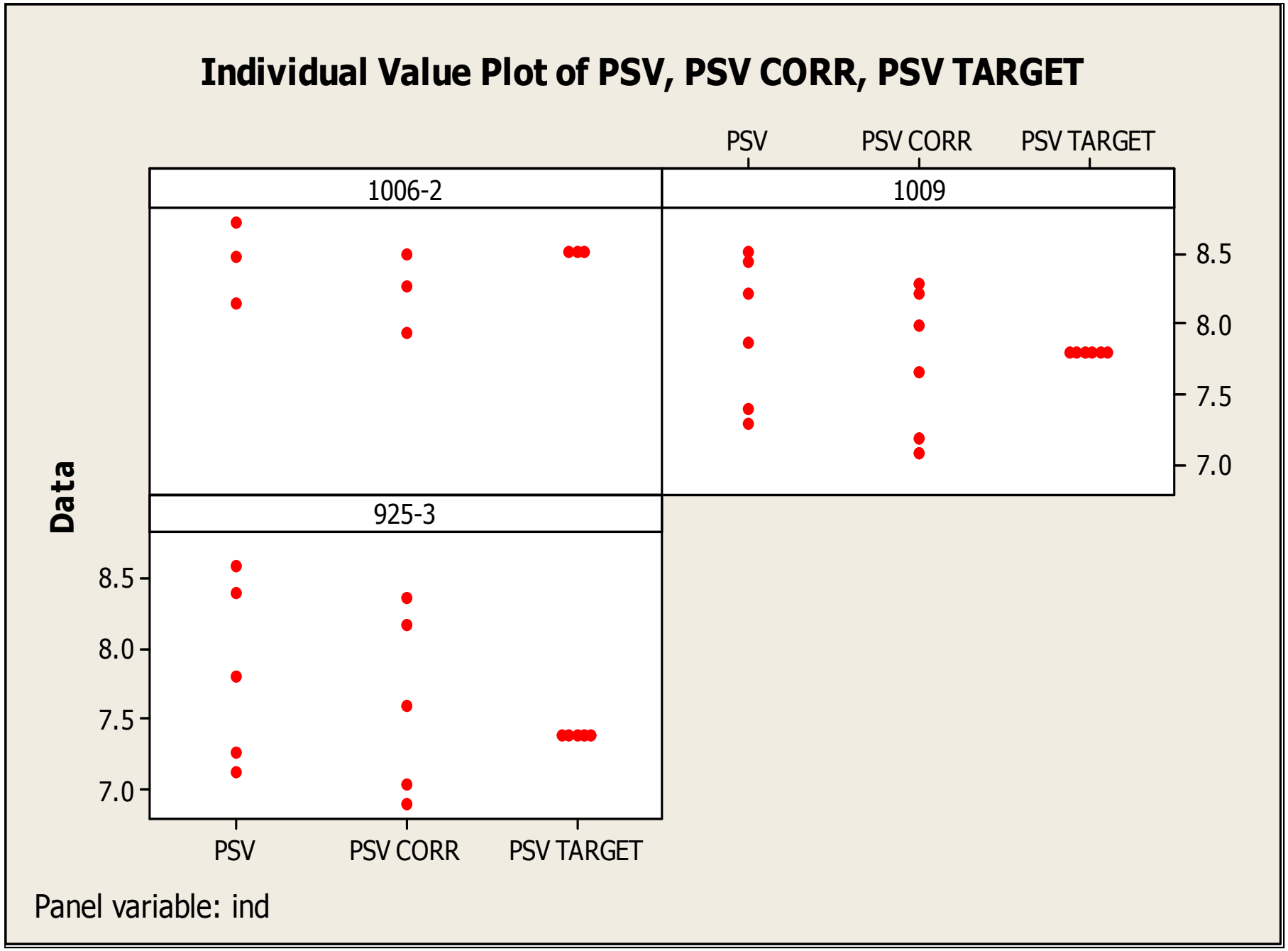
Laboratory	Date	Oil	AES	AES CF	RACS	RACS CF	AEV	AEV CF	PSV	PSV CF	OSC	LN(OSCR +1)	OSC CF
		925-3	**6.49**	**-0.55**	**7.43**	**-0.22**	**8.56**	**-0.18**	**7.38**	**-0.22**	**53.00**	**3.989**	**0.749**
A	12/4/2010		7.46	6.91	7.50	7.28	8.80	8.62	7.12	6.90	45.00	3.829	4.578
B	12/8/2010		7.14	6.59	7.45	7.23	8.64	8.46	7.26	7.04	70.00	4.263	5.012
G	12/16/2010		8.49	7.94	8.73	8.51	9.07	8.89	8.58	8.36	4.00	1.609	2.358
D	1/5/2010		7.04	6.49	7.52	7.30	8.81	8.63	7.81	7.59	80.00	4.394	5.143
G	1/24/2011		8.20	7.65	8.80	8.58	8.95	8.77	8.39	8.17	5.00	1.792	2.541
			7.67	**7.12**	**8.00**	**7.78**	**8.85**	**8.67**	**7.83**	**7.61**	**40.80**	**3.177**	**3.926**
			7.57	**7.02**	**7.90**	**7.68**	**8.83**	**8.64**	**7.72**	**7.49**		**3.436**	**4.185**
		1006-2	**8.65**		**9.40**		**9.24**		**8.52**		**1.40**	**0.875**	
D	12/2/2010		9.08	8.53	9.56	9.34	9.50	9.32	8.72	8.50	0.00	0.000	0.000
B	12/18/2010		8.69	8.14	9.28	9.06	9.22	9.04	8.15	7.93	1.00	0.693	1.442
A	1/5/2011		9.11	8.56	9.46	9.24	9.25	9.07	8.48	8.26	2.00	1.099	1.848
			8.96	**8.41**	**9.43**	**9.21**	**9.32**	**9.14**	**8.45**	**8.23**	**1.00**	**0.597**	**1.097**
			9.13	**8.58**	**9.60**	**9.38**	**9.37**	**9.19**	**8.63**	**8.43**		**0.167**	**0.916**
		1009	**7.94**		**9.29**		**8.99**		**7.79**		**8.00**	**2.197**	
G	12/4/2010		9.08	8.53	9.50	9.28	9.26	9.08	8.44	8.22	0.00	0.000	0.000
D	12/16/2010		8.43	7.88	9.31	9.09	9.35	9.17	8.51	8.29	4.00	1.609	2.358
A	12/17/2010		7.10	6.55	8.96	8.74	9.00	8.82	7.39	7.17	10.00	2.398	3.147
G	1/3/2011		7.50	6.95	9.32	9.10	9.19	9.01	8.21	7.99	2.00	1.099	1.848
B	1/8/2011		8.67	8.12	9.53	9.31	8.84	8.66	7.29	7.07	3.00	1.386	2.135
A	1/21/2011		7.75	7.20	9.30	9.08	9.10	8.92	7.87	7.65	2.00	1.099	1.848
			8.09	**7.54**	**9.32**	**9.10**	**9.12**	**8.94**	**7.95**	**7.73**	**3.50**	**1.265**	**1.889**
			8.06	**7.51**	**9.27**	**9.05**	**9.09**	**8.93**	**7.87**	**7.69**		**1.397**	**2.145**

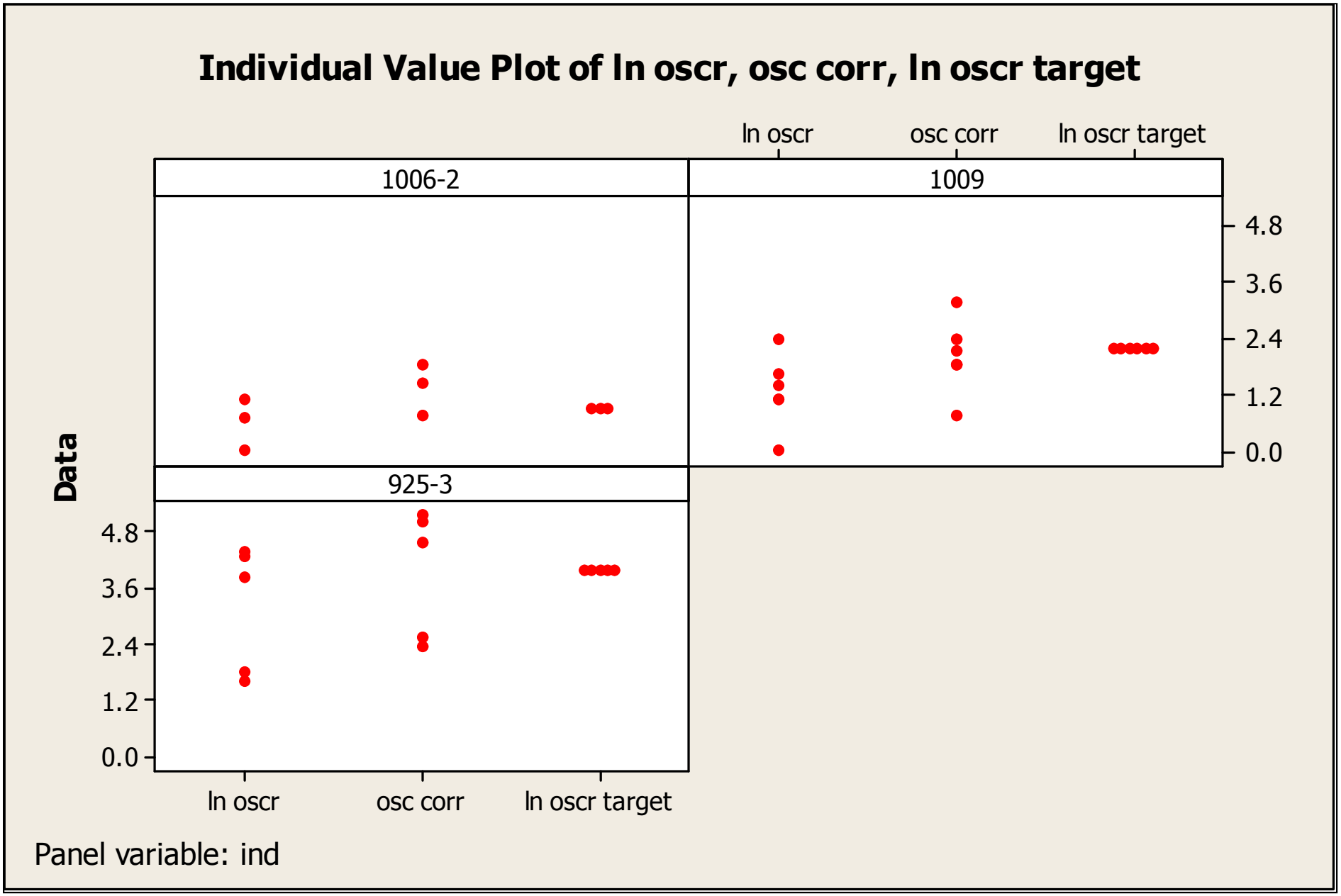
Average
LS Means
Target
CF CF based on average difference from target


Individual Value Plot of aes, corr aes, Target
aes
corr aes
Target
1006-2
1009
925-3
Data
9
8
7
aes
corr aes
Target
Panel variable: ind


Individual Value Plot of RACS, racs corr, RACS TARG
RACS
racs corr
RACS TARG
1006-2
1009
925-3
Data
9.5
9.0
8.5
8.0
7.5
RACS
racs corr
RACS TARG
Panel variable: ind


Individual Value Plot of AEV, AEV CORR, AEV TARGET
AEV
AEV CORR
AEV TARGET
1006-2
1009
925-3
Data
9.50
9.25
9.00
8.75
8.50
AEV
AEV CORR
AEV TARGET
Panel variable: ind


Individual Value Plot of PSV, PSV CORR, PSV TARGET
PSV
PSV CORR
PSV TARGET
1006-2
1009
925-3
Data
8.5
8.0
7.5
7.0
PSV
PSV CORR
PSV TARGET
Panel variable: ind


Individual Value Plot of ln oscr, osc corr, ln oscr target
ln oscr
osc corr
ln oscr target
1006-2
1009
925-3
Data
4.8
3.6
2.4
1.2
0.0
ln oscr
osc corr
ln oscr target
Panel variable: ind