

Cummins Surveillance Panel

Meeting Minutes

March 3, 2010

Columbus, IN

Agenda:

The meeting agenda is shown in **Attachment 1**.

Membership:

Membership / Attendance is shown in **Attachment 2**. No membership changes were announced

Minutes:

The August 2009, December 2009, and February 2010 conference call meeting minutes were approved unanimously.

Scope & Objectives:

Jim Moritz reviewed the panel's Scope & Objectives. The updated S & O document is **Attachment 3**.

TMC Report:

In the absence of new data, the panel felt no need for the TMC to present current test status, which had been covered in prior meetings. The run counters have been added to the report packets and hardcopy test reports are no longer sent to the TMC.

ISB and ISM Test Life:

The panel discussed the parts necessary to ensure the test life of the ISB test. This was requested by the API / EMA DEOAP (**Attachments 4 and 5**). Philippe Saad of Cummins will investigate long term supply of the parts identified. Jim Gutzwiller of Infinuem will forward to Philippe the ISB list that was generated during the ISB development. Test labs are also to examine the list and add to it as necessary. The Cummins SP needs to report back to DEOAP and the HDEOCP in June. Jim Mortiz set the target completion for the parts list as the end of March.

Action Items :

- **Test labs** – check for additional consumables to be added to the test life parts list.
- **Jim Gutzwiller** – forward ISB parts list to Philippe Saad.
- **Philippe Saad** – investigate long term parts availability.
- **Cummins SP** – complete parts list by end of March.
- **Cummins SP** – report to DEOAP and HDEOCP by June.

CPD Report:

Zack Bishop of TEI gave the CPD report, shown in **Attachment 6**. TEI will soon check the surface hardness of the new batch of crossheads for comparison to the previous batch. The 2009 batch of test oil filters are being analyzed by Cummins Filtration. New ISB camshafts (batch F) will be issued soon. No problems have been identified with the cams and the panel was comfortable with making the “rolling change” to the new batch as has been done in the past.

LTMS Task Force Stats Group Report:

The report was presented by Jim Rutherford of Oronite, **Attachment 7**. Jim reviewed the concepts and goals contained in the report. After taking some questions, Jim then presented the ISM Example (**Attachment 8**) for the proposed LTMS as currently drafted. The example attempts to compare the current system with the newer philosophy to show the impact.

ISM Oil Filter Issues:

Philippe Saad is waiting for response from Cummins Filtration. So far, no “smoking gun” has been found. Shawn Whitacre commented that it is unlikely that any post test filter evaluation would reveal a cause. After some discussion, several options were discussed: glue bead filter; new batch of filters; change the test hour during which the filter dp is taken (and allow filter change sooner); suspend the test, try to salvage to old glue bead filters. Much, much more discussion ensued. The path forward evolved into the following:

1. Cummins will obtain a new batch of double wire mesh filters from one roll of media; the batch size should be large enough to last the life of test; assuming a lack of input from Cummins Filtration that there are no quantity issues (300 or more) and that there are no known differences in the filter batches. **Action Item - Cummins.**
2. Labs will run references with: new crossheads, new filters, new filter head. Target time is to start the references by April, assuming no parts availability issues. **Action Items - Labs.**
3. Lab's will submit 6 min log data to TMC for filter dp from previous two reference and the upcoming reference. **Action Item - Labs, TMC.**
4. Cummins SP will reconvene as the data becomes available. At that time, target deadline of May 1st, the panel will determine the next steps forward or will consider declaring the test out of control. **Action Item - Cummins SP**

The above plan was moved and seconded (Fetterman, Matasic); the motion passed 11-0-0.

ISM LTMS 'Version 2':

Jim Rutherford, presenting for Oronite, compared what actually happened to candidates with the current LTMS with what might have happened with the 'Version 2' LTMS (**Attachment 9**). Several questions were asked and philosophical items were discussed.

ISM Correction Factors:

Pat Fetterman of Infineum, presented for Doyle Boese, who was not present (**Attachment 10**). **Pat Fetterman moved that the CF be changed to +1.3 for all tests on or after March 4 (Shank second).** After discussion, the motion marginally **passed on a vote of 4-3-4**. Since information letter changes require unanimity, **the negatives need to be resolved before the IL can be issued, or the IL will have to be balloted before being issued.** Much further discussion ensued about the nature of figuring out the “correct” or “right” CF and how it should be derived. The result of discussion is that two negatives were resolved and changed to affirmatives, one negative was changed to waive. The final tally is now 6-0-5. Thus the IL can be issued with a CF of +1.3, effective for all tests starting on or after March 4, 2010.

The meeting adjourned at 6:30 pm.

ATTACHMENT 1

Cummins Surveillance Panel

**Proposed Meeting Agenda
Wednesday March 3, 2010
9:00 am – 5:00
Columbus Engine Plant (Gate 96)
Columbus, Indiana**

Chairman's Comments	Jim Moritz
Membership / Attendance	Jeff Clark
Approval of Previous Minutes	Jeff Clark
Review Scope and Objectives	Jim Moritz
TMC Report	Jeff Clark
Elimination of Hard Copy Reporting to the TMC	Jeff Clark
'Run counter' for Test Reports	Jeff Clark
5 Year Test Life: Test Parts and Fuel Supply; ISB & ISM	Group
CPD / Parts Supply Update; ISB & ISM	Zack Bishop
LTMS Task Force Statistics Sub-Group Report	Jim Rutherford
Severity Issues and ISM Oil Filter Solutions	Group
Coordinated Round of ISM Referencing	Group
Review ISM Correction Factors and Merit System	Group
LTMS Discussions	Group
Old Business / New Business	Jim Moritz
Next Meeting	Jim Moritz

ATTACHMENT 2

CUMMINS SP

<u>NAME</u>	<u>COMPANY</u>	<u>PHONE</u>	<u>EMAIL</u>
Jeff Clark	TMC	412-365-1032	jack@astmtmc.com
Jim Ruffenbod	Chevron Oronite	510 242 3410	JARM@CHEVRON.COM
Mark Cooper	" "	210-867-8606	markc@chevron.com
Jim Matasic	Lubrizol	440 347-2487	james.matasic@lubrizol.com
Bob Campbell	AFTON	804 788 5346	BobCampbell@AFTON.com
SHAWN WHITACRE	CUMMINS	812-377-6215	SHAWN.WHITACRE@CUMMINS.COM
CHARL CARTANUEN	LUBRIZOL	440 347 2973	CCA@LUBRIZOL.COM
Steven Kennedy	Exxon Mobil	856-224-2432	Steven.Kennedy@exxonmobil.com
Marc Peters	Exxon Mobil	856-224-2710	marc.peters@exxonmobil.com
Riccardo Conti	EXXON MOBIL	856-224-2681	RICCARDO.CONTI@EXXONMOBIL.COM
JIM WELLS	CUMMINS	812-377-2819	JAMES.WELLS@CUMMINS.COM
Ryan D. Johnson	SWRI	210-396-8371	ryan.johnson@swri.org
GREG SHANK	Volvo Powertrain	301-790-5817	greg.shank@volvo.com
Philippe Saad	Cummins	812-377-5552	Philippe.f.saad@Cummins.com
JIM GUTZWILLER	INFINEUM	210-732-8123	JAMES.GUTZWILLER@INFINEUM.COM
ZACK BISHOP	TEI	210-877-0223	ZBISHOP@TEI-NET.COM
Andrew Stevens	Lubrizol	440-347-4020	andrew.stevens@lubrizol.com
PAT FETTERMAN	INFINEUM	(903) 313-2705	pat.fetterman@infineum.com
JIM MORITZ	INTERTEK	(210) 523-4601	JIM.MORITZ@INTERTEK.COM

ATTACHMENT 3

Cummins Surveillance Panel

SCOPE AND OBJECTIVES

SCOPE

The Cummins Surveillance Panel is responsible for the Cummins ISB and ISM tests. The Panel works with the ASTM Test Monitoring Center to monitor test operations and hardware, test statistics, test severity and test precision for these tests. Overall improvements in the test operation and test monitoring are accomplished with the cooperation of the test developer, the Test Monitoring Center and ASTM Subcommittee B0.02.

OBJECTIVES

- Develop ASTM Research Reports for the ISB and ISM engine tests. Target is to have them in place by November 2010.
- Replacement for 5.9L ISB engine. 2015
- Test Life Plan for all tests to last until at least 2015. June 2010.

ATTACHMENT 4

Status of Current API “C” Categories & Tests

Engine Test	Fuel	Active?	Cal Stands	CJ-4	CI-4 PLUS	CI-4	CH-4	Issues
Cat 1K	0.4% S	Y	5			X	X	
Cat 1N	PC-9	Y	5	X				
Cat 1P	PC-9	Y	4				X	
Cat 1R	PC-9	Y	1			X		
Cat C13	ULSD	Y	2	X				
Cummins M11-HST		N					X	
Cummins M11-EGR		N				X		
Cummins ISM	PC-9	Y	5	X		M11-EGR alt	M11-HST alt	OFDP, Wear severity
Cummins ISB	ULSD	Y	3	X				Engine to be replaced
Mack T-8/E	PC-9	Y	3			X	X	
Mack T-11	PC-9	Y	3	X	X			
Mack T-9		N					X	
Mack T-10		N				X		
Mack T-10A	PC-9	N (a)				X		Alternate being evaluated
Mack T-12	ULSD	Y	4	X		T-10 alt	T-9 alt	New hardware pending
RFWT	PC-9	Y	2	X		X	X	
EOAT	PC-9	Y	1	X		X	X	EMA concern w/severity
Seq III/G	--	Y		X		X	X	Tied to light duty specs

(a) Test not currently referenced, but hardware is available

ATTACHMENT 5



1220 L Street, NW
Washington, DC 20005-4070
USA
Telephone 1-202-682-8000
www.api.org

February 24, 2010

Jim Moritz (Cummins Surveillance Panel)
Mark Cooper (Mack Surveillance Panel)
Jim Gutzwiller (C13 Surveillance Panel)
Jim McCord (SCOTE Surveillance Panel)
Dave Glaenzer (IIIG Surveillance Panel)

Dear ASTM Surveillance Panel Chairs:

The API/EMA Diesel Engine Oil Advisory Panel (DEOAP) requests that you and the members of your surveillance panels address the following questions:

- Will the test or tests monitored by your respective surveillance panels be viable until 2015 and beyond (see attached list of tests)?
- If no, what needs to be done to make the test or tests viable until at least 2015?

The members of the DEOAP hope to consider your responses before the next ASTM Heavy Duty Engine Oil Classification Panel meeting in June. Please raise these questions with your surveillance panels as soon as possible and forward any comments or questions to my attention.

We appreciate your help with these questions.

Sincerely,

Greg Shank
Steve Kennedy

Co-Chairs, API/EMA Diesel Engine Oil Advisory Panel

ATTACHMENT 6



12718 CIMARRON PATH
SAN ANTONIO, TEXAS 78249-3423 USA
VX 210 690 1958 FX 210 690 1959
www.TEI-net.com

CPD Report

Cummins Surveillance Panel

March 3, 2010

- **Expect new batch of ISM Crossheads during 1st or 2nd week of March. TEI will check surface hardness and compare values to previous batch.**
- **ISM Wire Mesh Test Oil Filters (2009 batch) being analyzed by Cummins Filtration.**
- **TEI has approximately 200 EGR M-11 Glue Beaded Oil Filters (2001 batch) in storage. Each filter is wrapped in cellophane and all are well preserved.**
- **New batch of ISB camshafts (Batch “F”) will be introduced this month. TEI is down to one Batch “E” cam. New batch is from same supplier as last batch and cam dimensions fall within print tolerances.**



12718 CIMARRON PATH
SAN ANTONIO, TEXAS 78249-3423 USA
VX 210 690 1958 FX 210 690 1959
www.TEI-net.com

CPD Report

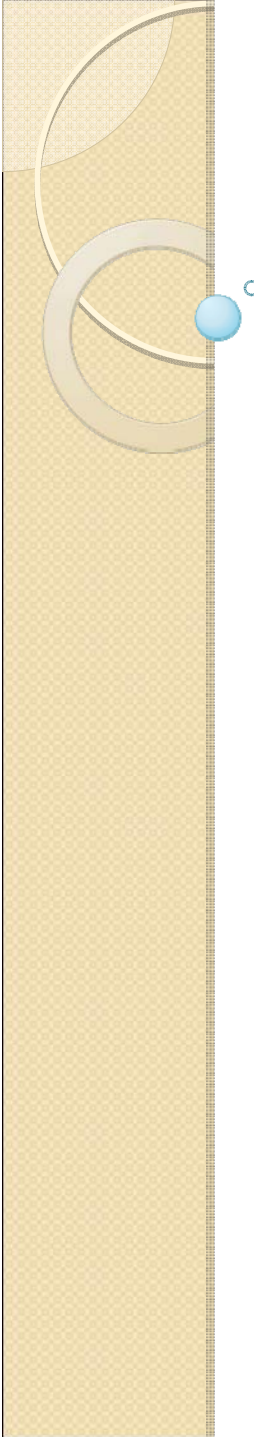
Cummins Surveillance Panel

March 3, 2010

ISM Wire Mesh Filter vs. EGR M11 Glue Bead Filter



ATTACHMENT 7



**LTMS Task Force
Statistics Subgroup
Report to
Joint LTMS TF and
Technical Guidance Committee**

Warren, Michigan
February 25, 2010



Outline

- ◆ Statistics Subpanel
- ◆ Expectations
- ◆ Concepts and Goals
- ◆ Formulae
- ◆ Flow Charts
- ◆ Examples



Statistics Subgroup

- ◆ Arthur Andrews, ExxonMobil
- ◆ Doyle Boese, Infineum
- ◆ Janet Buckingham, SwRI
- ◆ Martin Chadwick, Intertek
- ◆ Jeff Clark, TMC
- ◆ Todd Dvorak, Afton
- ◆ Jo Martinez, Chevron Oronite
- ◆ Bob Mason, SwRI
- ◆ Allison Rajakumar, Lubrizol
- ◆ Jim Rutherford, Chevron Oronite
- ◆ Phil Scinto, Lubrizol
- ◆ Dan Worcester, SwRI



Expectations

- ◆ Today
 - ◆ Sharing with our parent group, LTMS TF, and their parent TGC
 - ◆ Understanding of our goals and approach
 - ◆ Exploring implications and practical outcomes
 - ◆ Gathering reactions, feedback, and suggestions
- ◆ Next Steps?
 - ◆ Next week
 - ◆ HD Surveillance Panels to learn about version 2?
 - ◆ Before May
 - ◆ LTMS TF and TGC endorse version 2?
 - ◆ May
 - ◆ PC Surveillance Panels consider version 2?



Concepts and Goals

- ◆ Models more closely reflect real world
- ◆ Focus on knowing where the laboratory is relative to target
 - Trigger additional tests **not** when the lab is “off target”, but when we don’t know where the lab is relative to target
 - Provide incentives in reduced reference frequency when a lab is consistent and close to target
- ◆ Procedure for dealing with a suspicious reference result
- ◆ Tool for surveillance panels to enable market forces to provide incentive for labs to measure the same performance mechanism



Concepts and Goals (Continued)

- ◆ Encourage consistency across test types
- ◆ Reduced need for industry corrections based on limited information
- ◆ More adaptive to parts and other uncontrolled test changes
- ◆ Improved LTMS should lead to less lost reference tests
- ◆ The goal is a more efficient and useful reference testing system – both testing and other industry efforts
- ◆ The greatest benefit of improved LTMS is in the precision and accuracy of candidate testing



Formulae

For each severity adjustment entity,

- $T_i = i^{\text{th}}$ test result in appropriate units
- $Y_i = i^{\text{th}}$ standardized test result

$$Y_i = \frac{T_i - \text{Target}}{\text{Standard Deviation}}$$

where target and standard deviation are as currently defined for the reference oil used in the reference test

Formulae (continued)

For each severity adjustment entity,

- $Z_i = \text{EWMA}$

$$Z_i = \lambda Y_i + (1 - \lambda) Z_{i-1}$$

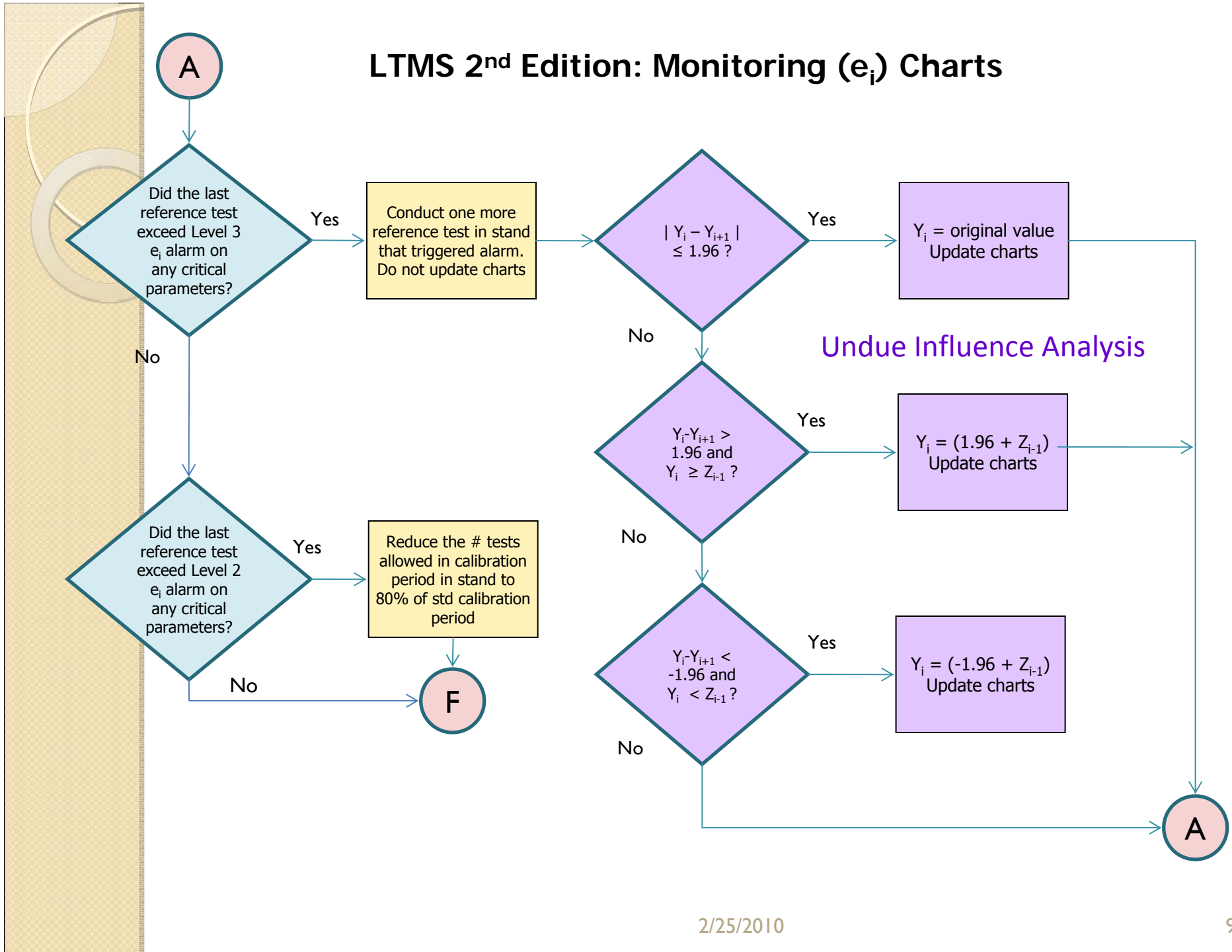
For default LTMS, $\lambda=0.2$

Fast start is used, i.e., $Z_0 = \text{average of } Y1, Y2, \text{ and } Y3$

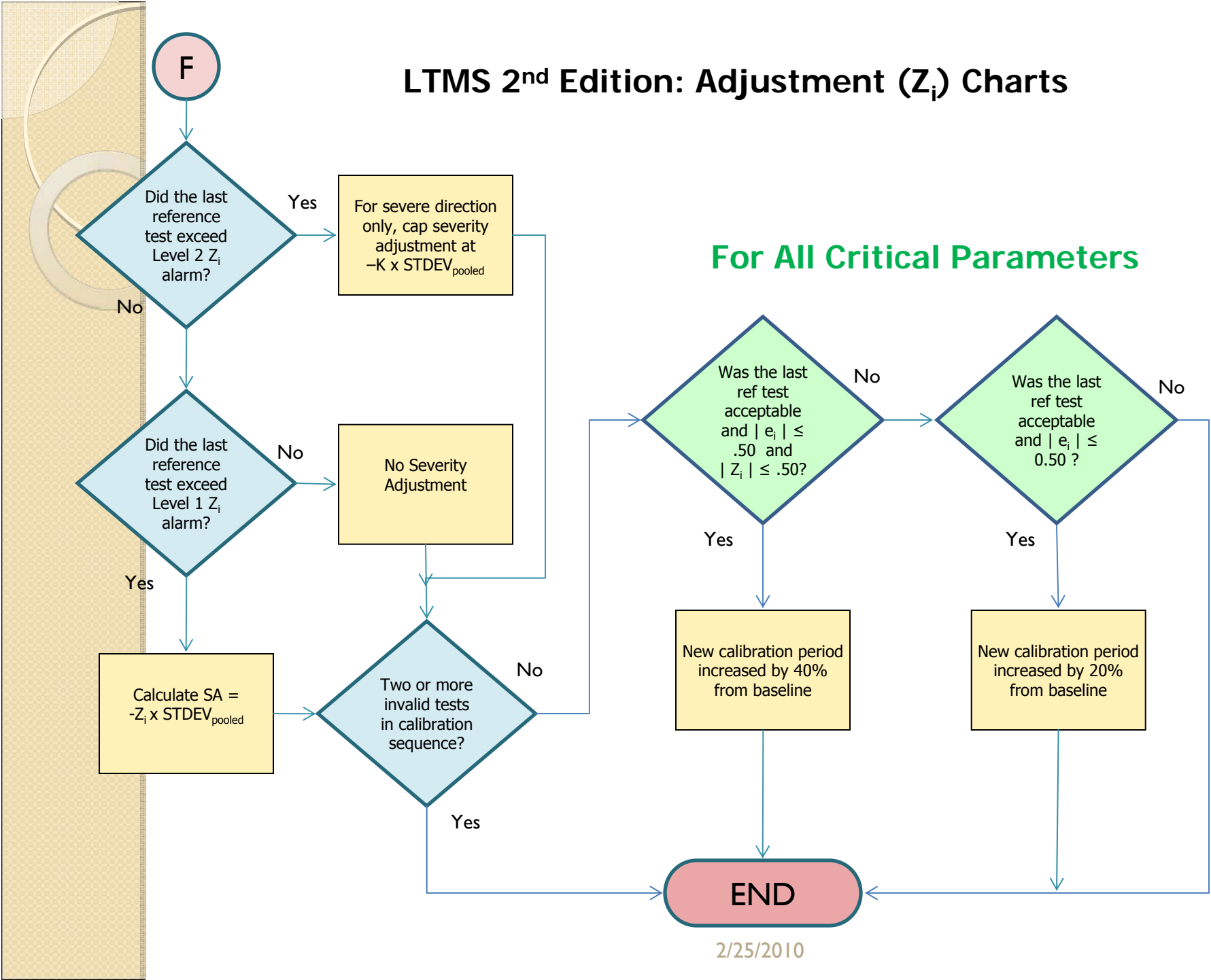
- $e_i = \text{prediction error from EWMA}$

$$e_i = Y_i - Z_{i-1}$$

LTMS 2nd Edition: Monitoring (e_i) Charts



LTMS 2nd Edition: Adjustment (Z_i) Charts




For All Critical Parameters



Examples

- ◆ Industry could maybe best understand LTMS proposals by using historical data from an existing test do demonstrate how it works and what happens. But we should be very careful in how we interpret this exercise. There is no way that historical data from the previous system can be manipulated to determine what would have happened if the revised LTMS system had been in place.
- ◆ Sequence IVA - Doyle
- ◆ Sequence IIIG - Todd / Allison
- ◆ Cummins ISM - Jim
- ◆ Common results from examples
 1. Review of alarms and actions
 2. Prediction error
 3. Example plot of effective pass limit

ATTACHMENT 8



LTMS Task Force
Statistics Subgroup
Report to
Joint LTMS TF and
Technical Guidance Committee
Cummins ISM Example

**Revised for
Cummins Surveillance Panel**

Columbus, Indiana
March 3, 2010

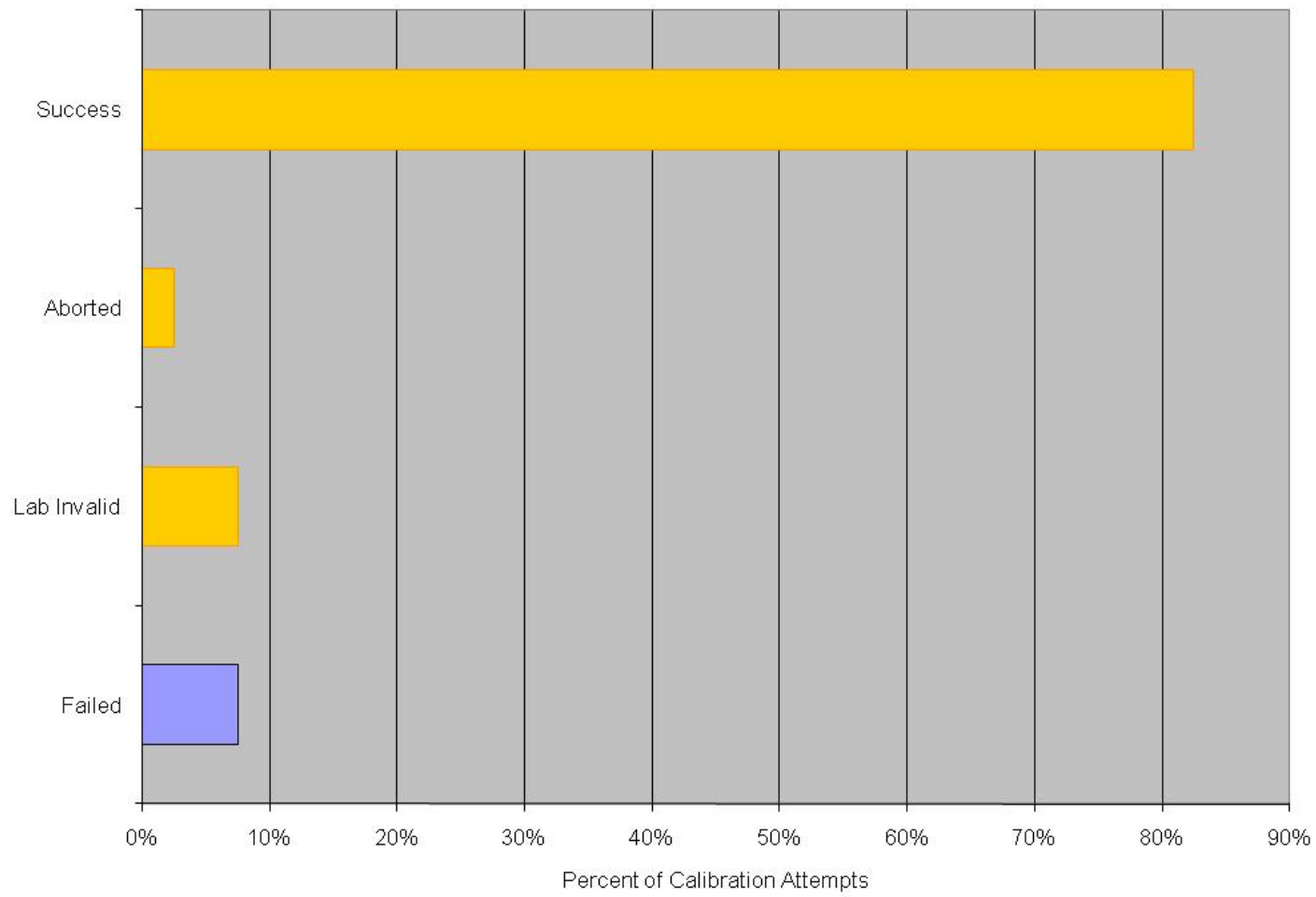


Examples

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- ◆ Common results from examples
 1. Review of alarms and actions
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 3. Example plot of effective pass limit

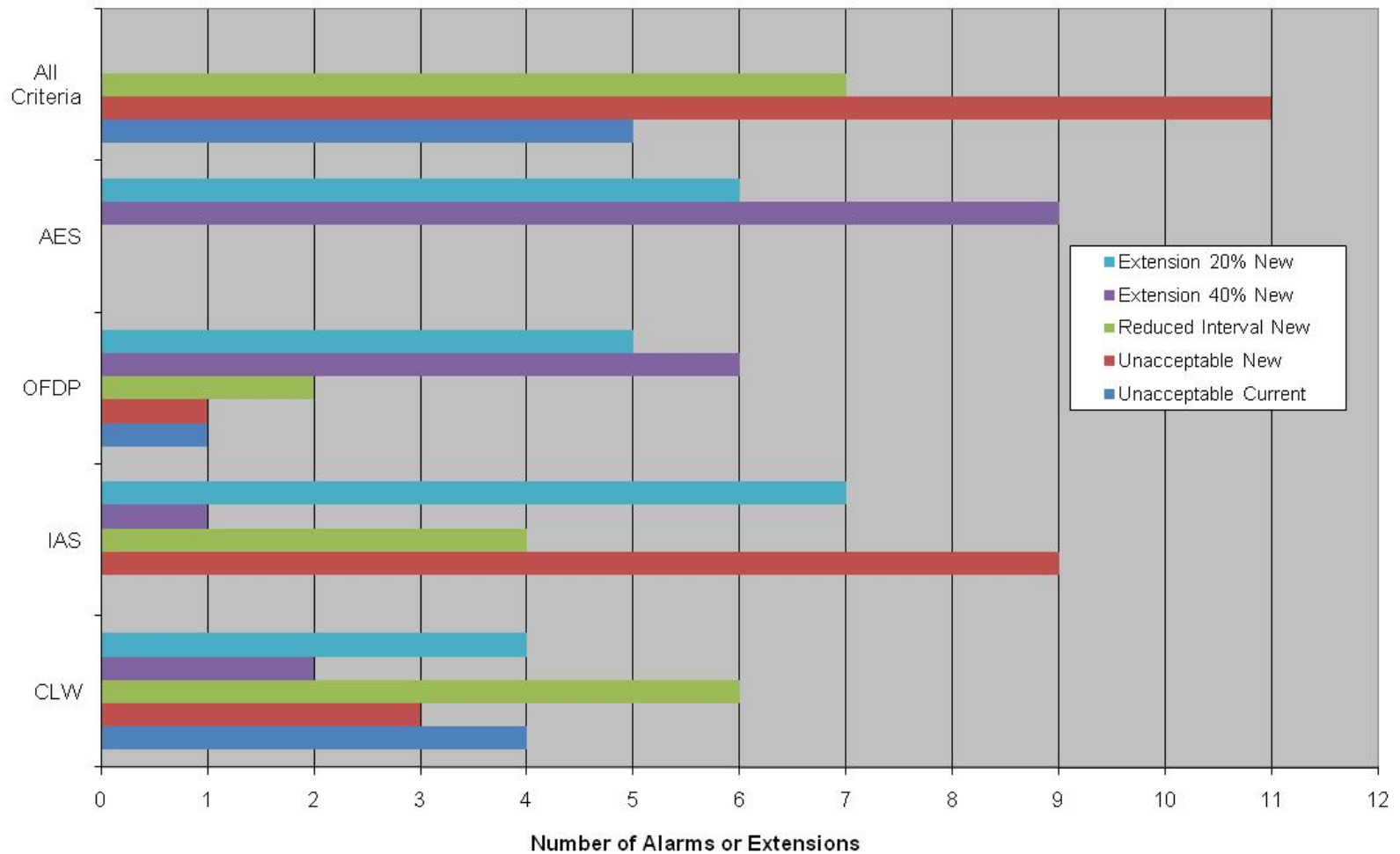
Review of alarms and actions

Fate of ISM Calibration Attempts
from LTMS Dataset -- Current System



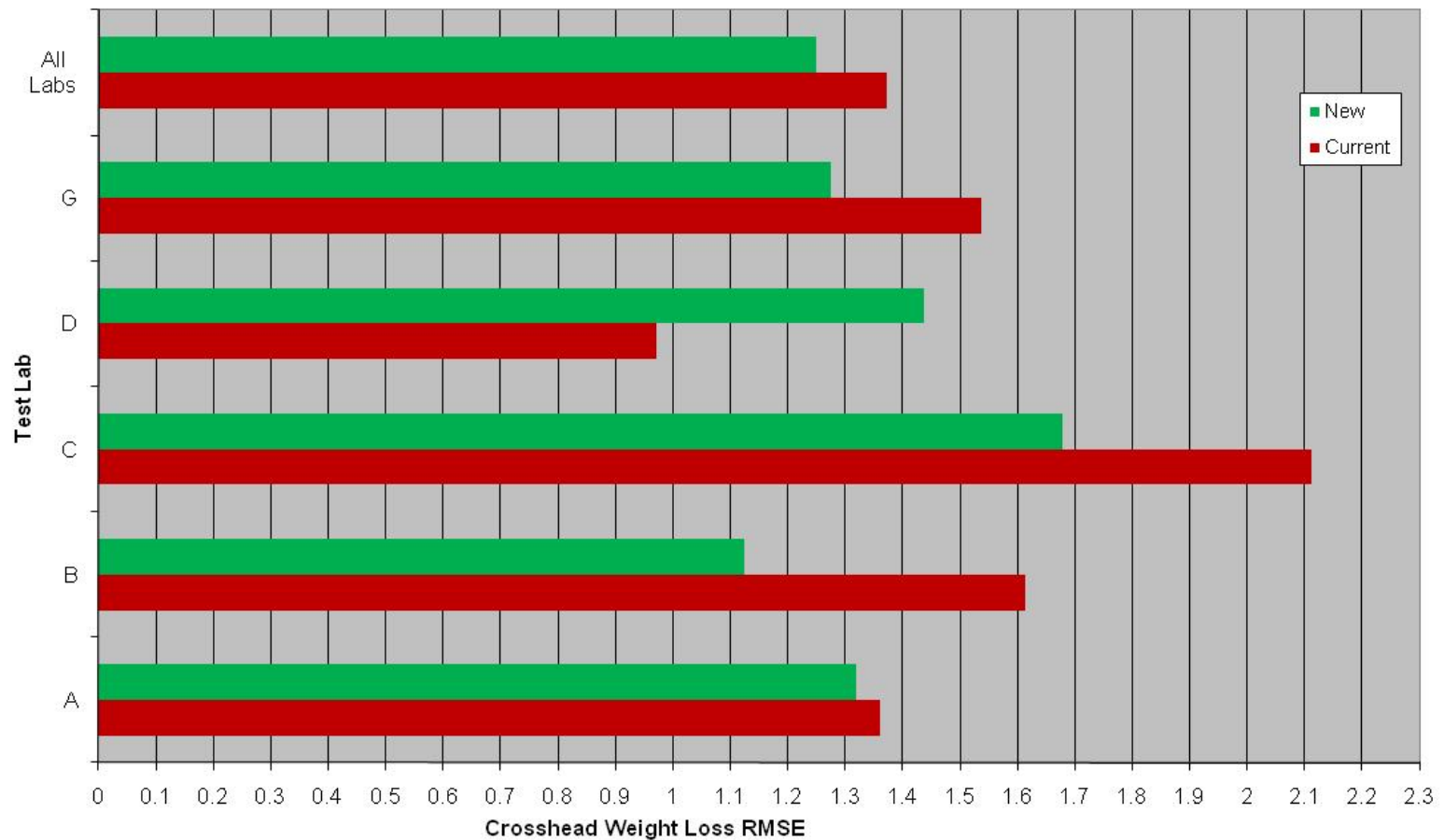
Review of alarms and actions

LTMS Alarms and Reference Period Extensions in the Cummins ISM



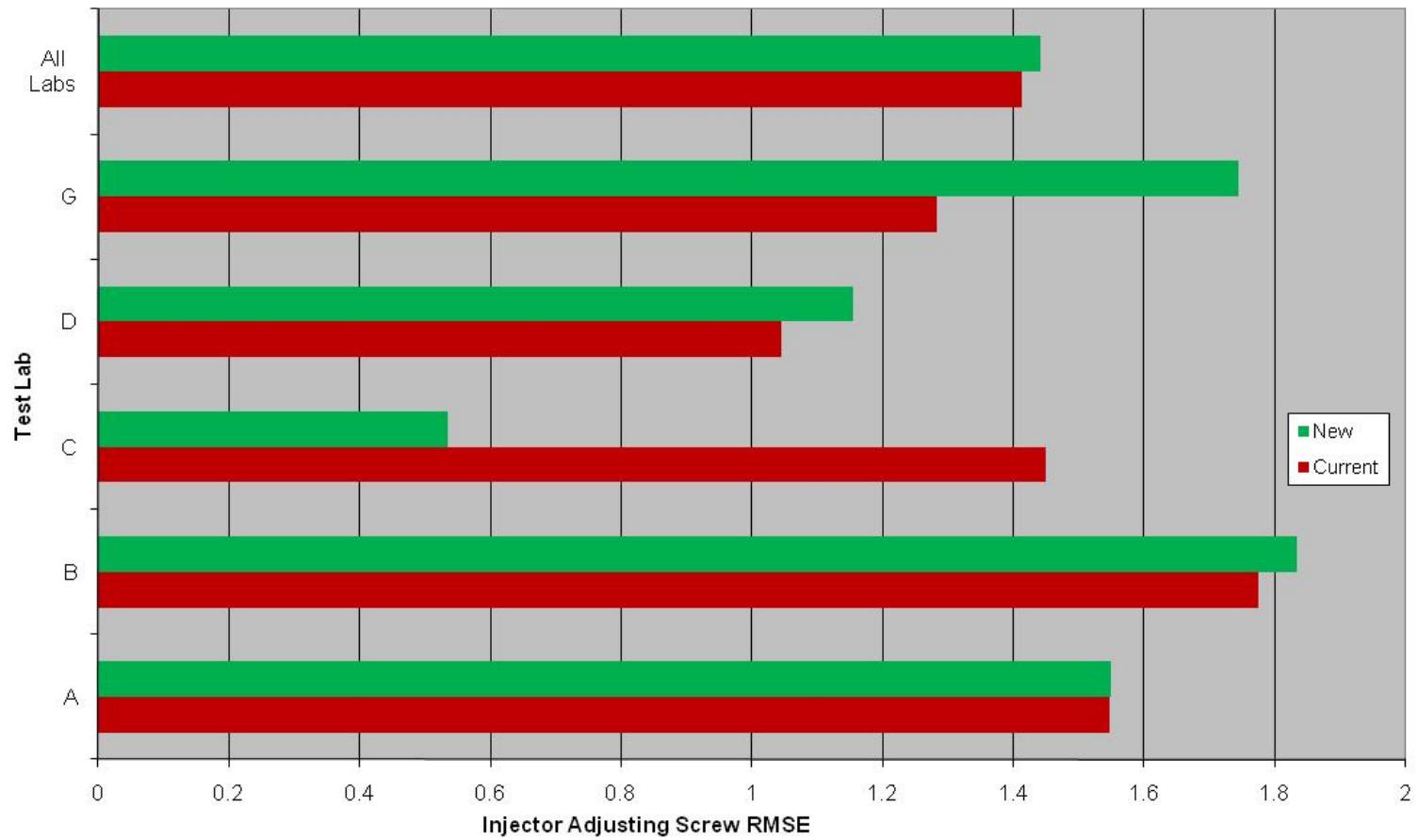
Prediction Error

Candidate Oil Test Result Target Variability in the Cummins ISM



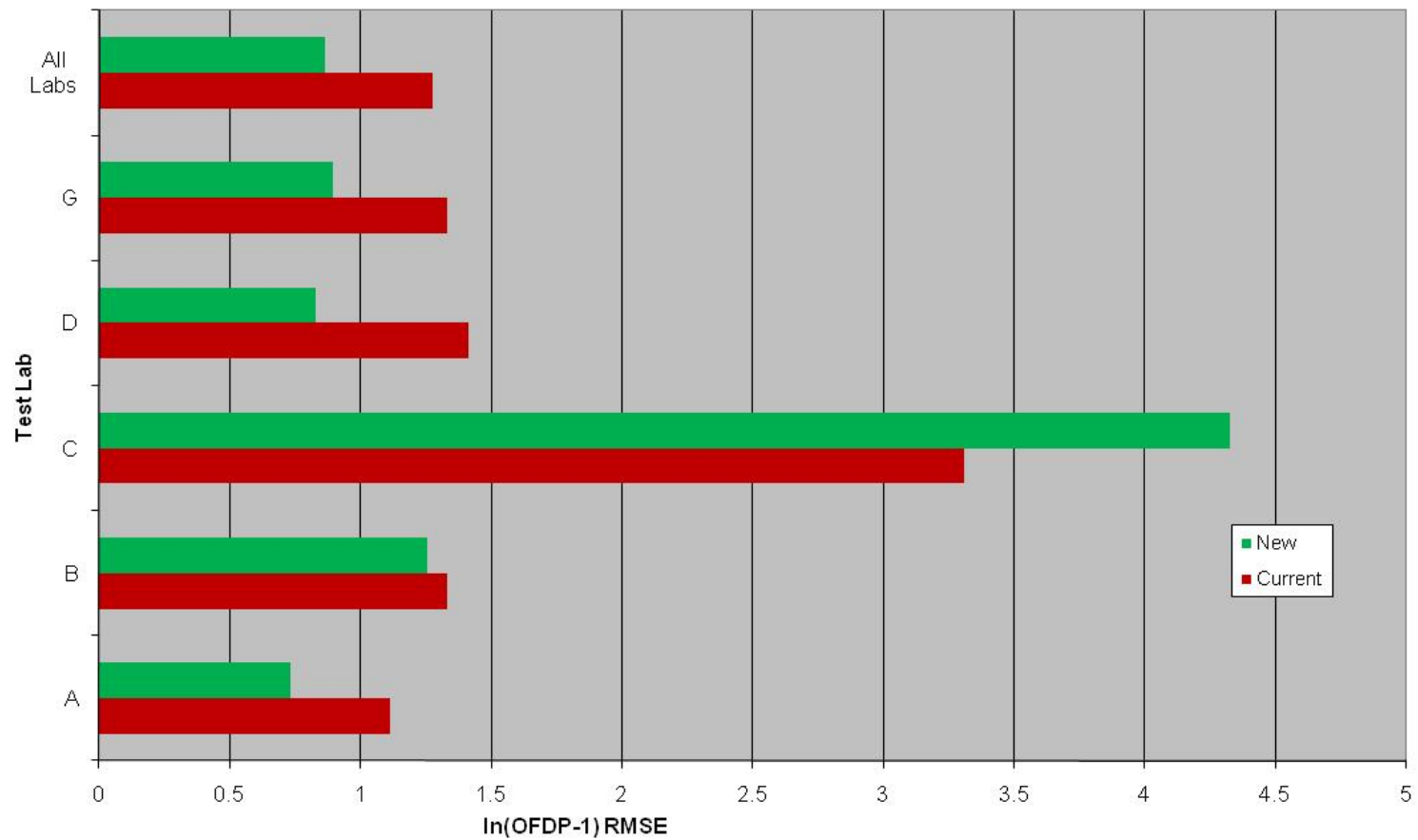
Prediction Error

Candidate Oil Test Result Target Variability in the Cummins ISM



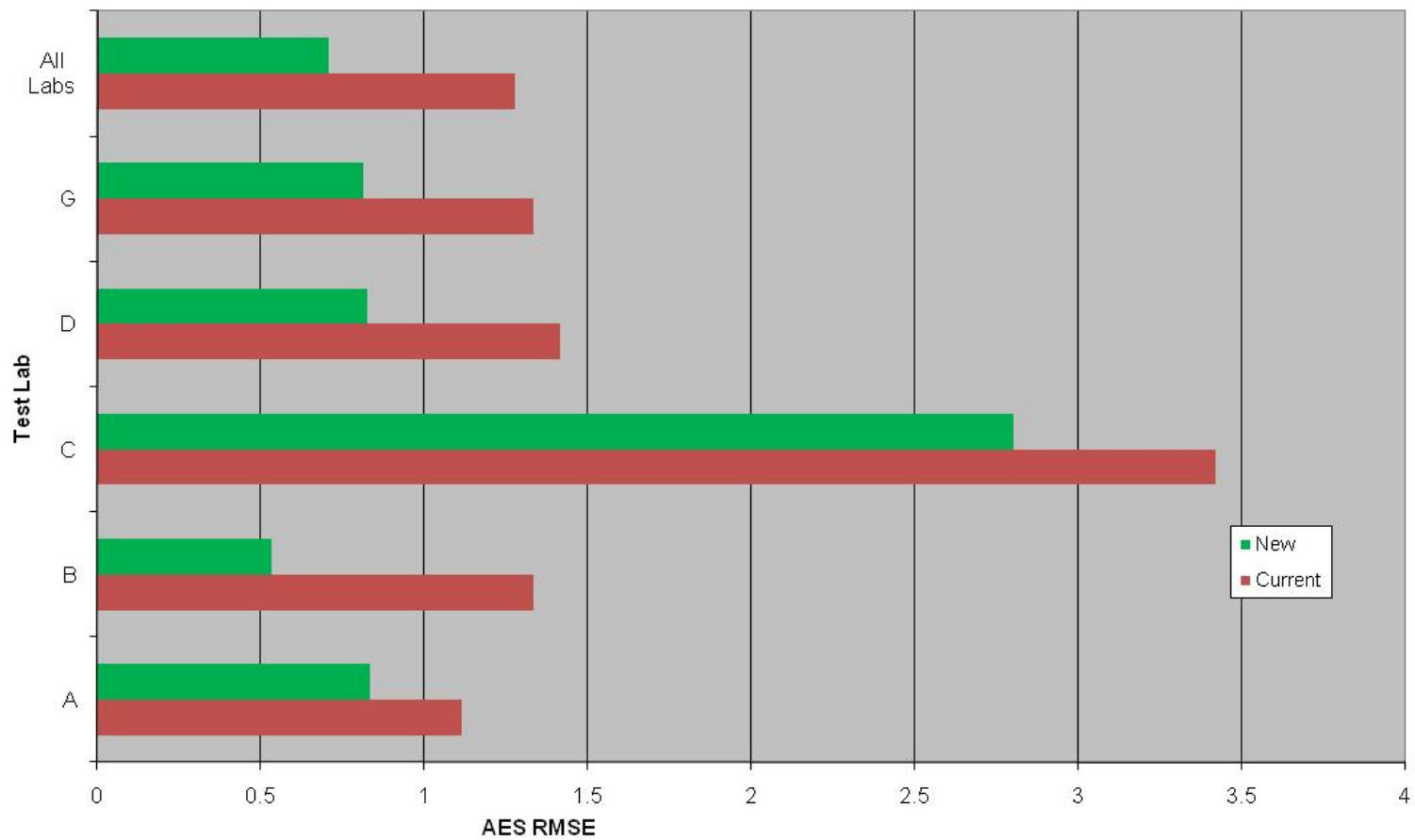
Prediction Error

Candidate Oil Test Result Target Variability in the Cummins ISM



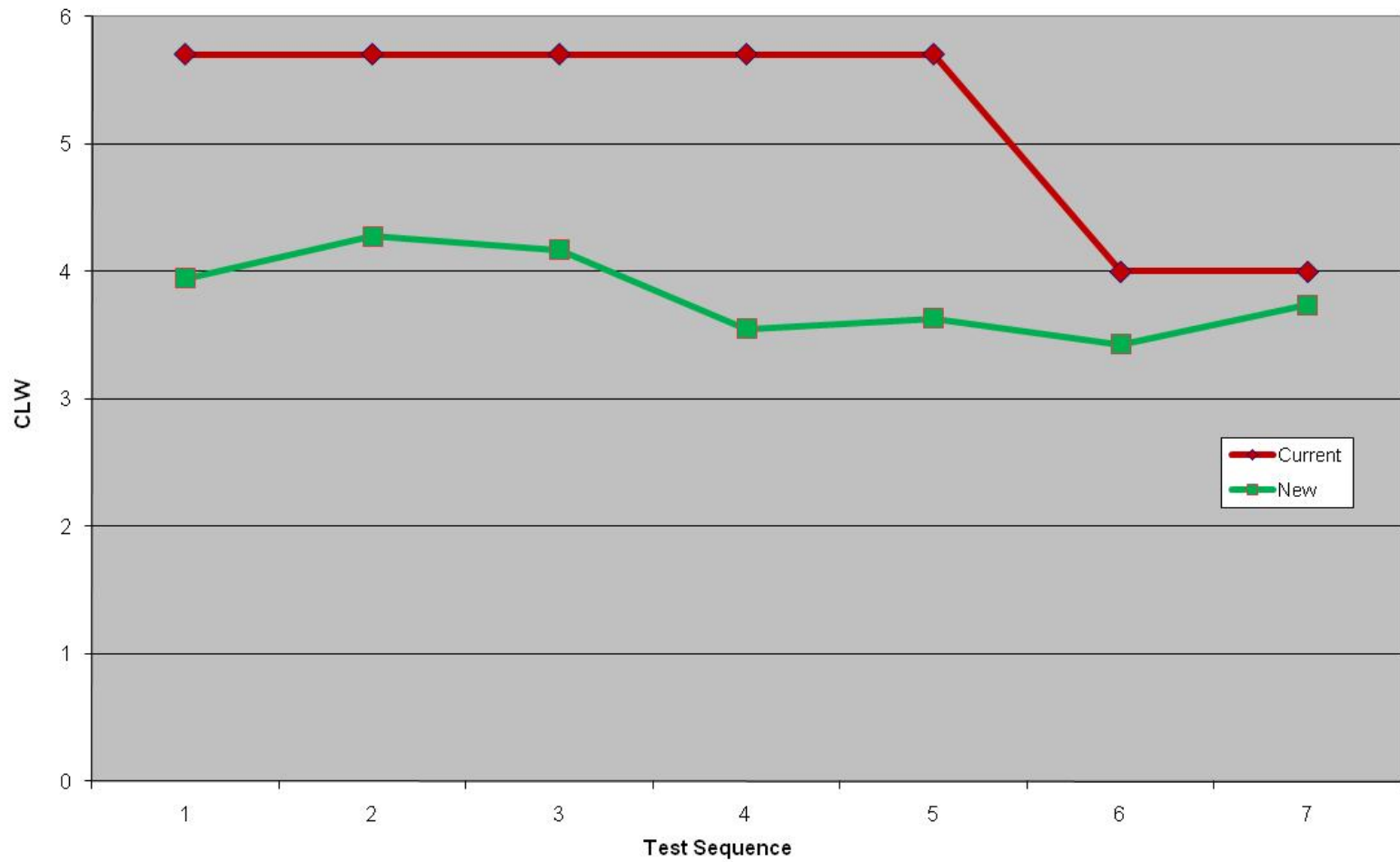
Prediction Error

Candidate Oil Test Result Target Variability in the Cummins ISM



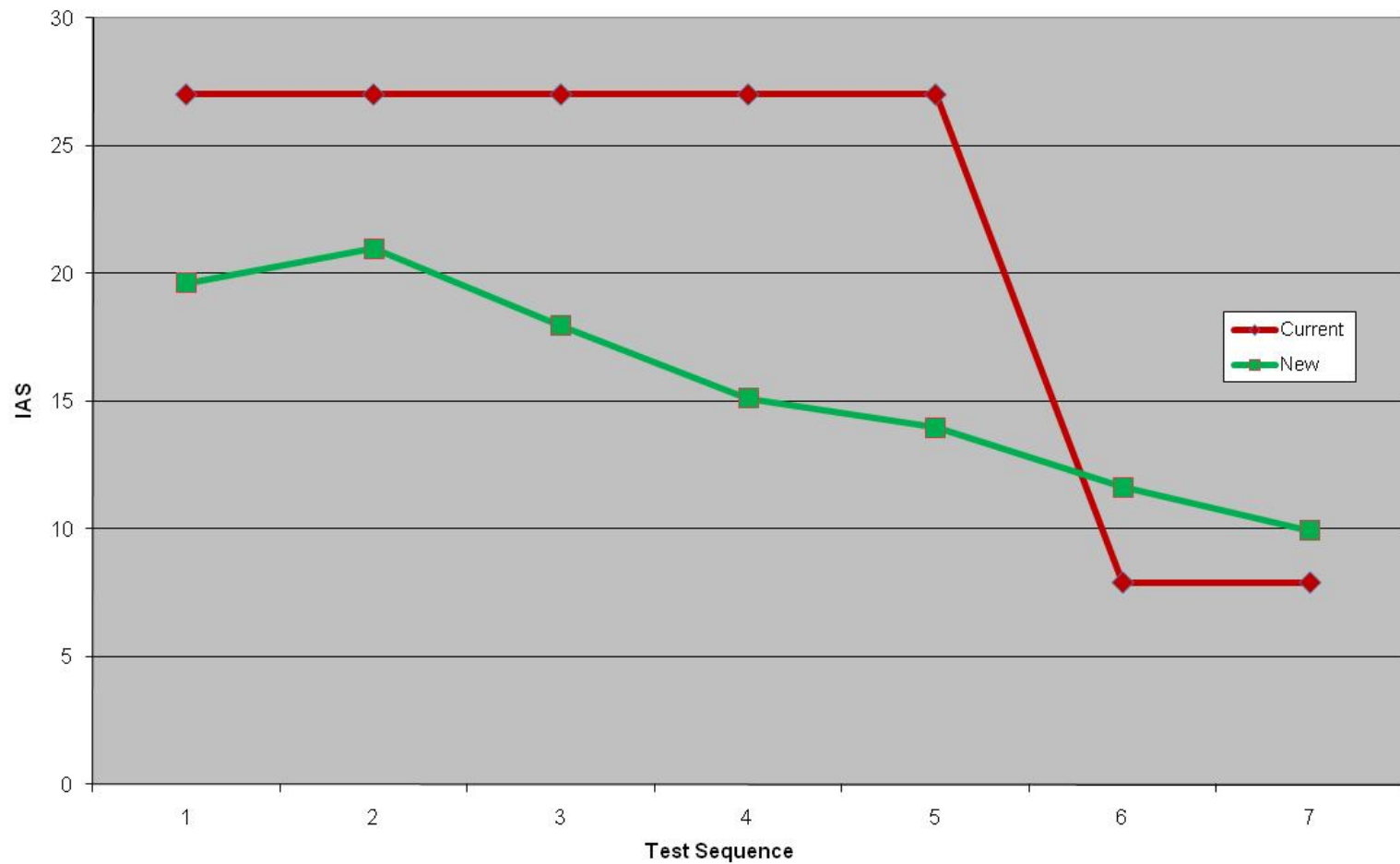
Effective anchor

Effective Anchor Given Severity Adjustment for One of the Labs



Effective anchor

Effective Anchor Given Severity Adjustment for One of the Labs



ATTACHMENT 9

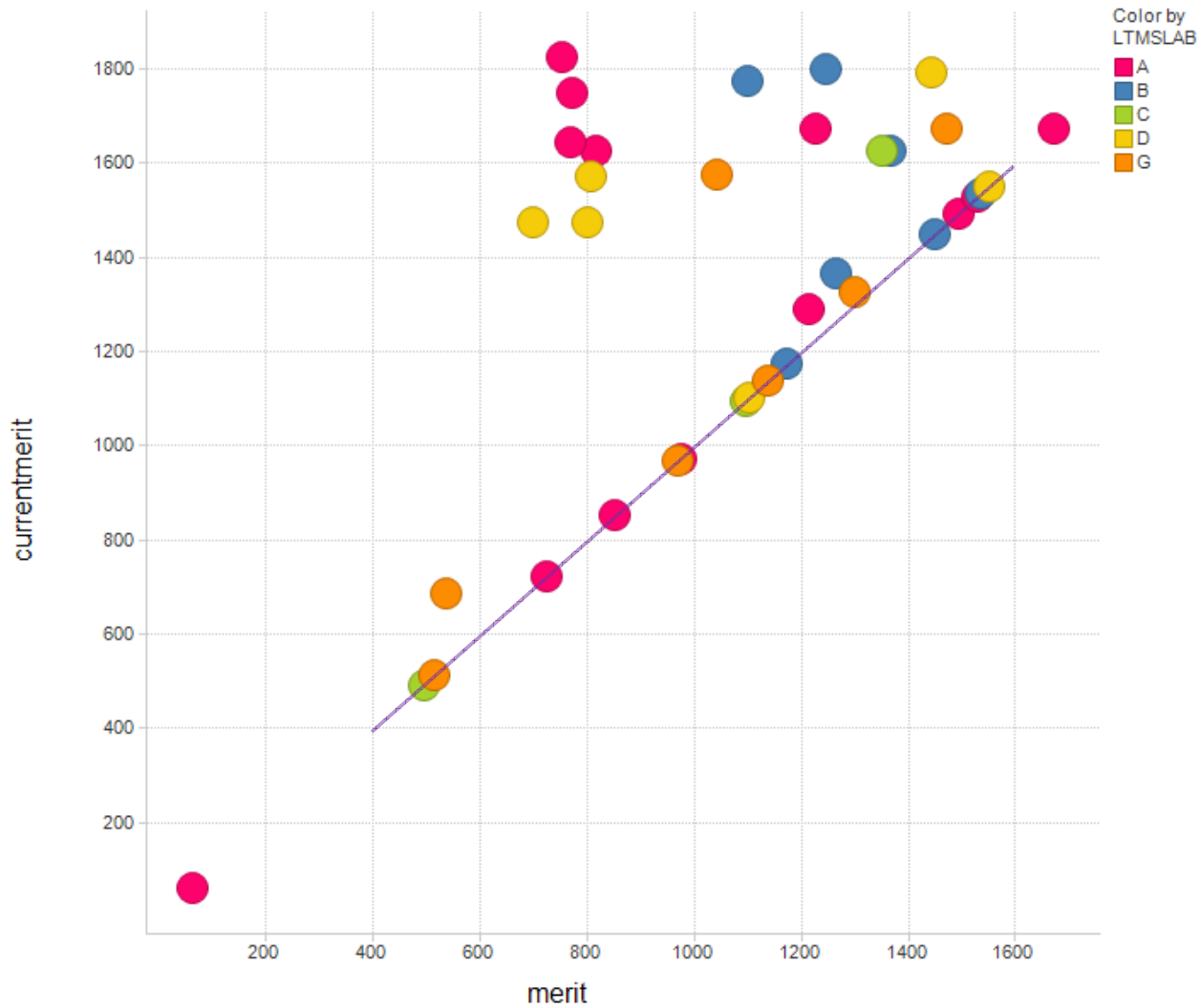


Oronite

Extended ISM LTMS Version 2 Example for Cummins Surveillance Panel

**Columbus, Indiana
March 3, 2010**

Comparison of Merit Calculated from Reference Results with Merit Calculated from Effective Reference Results with Current Version LTMS

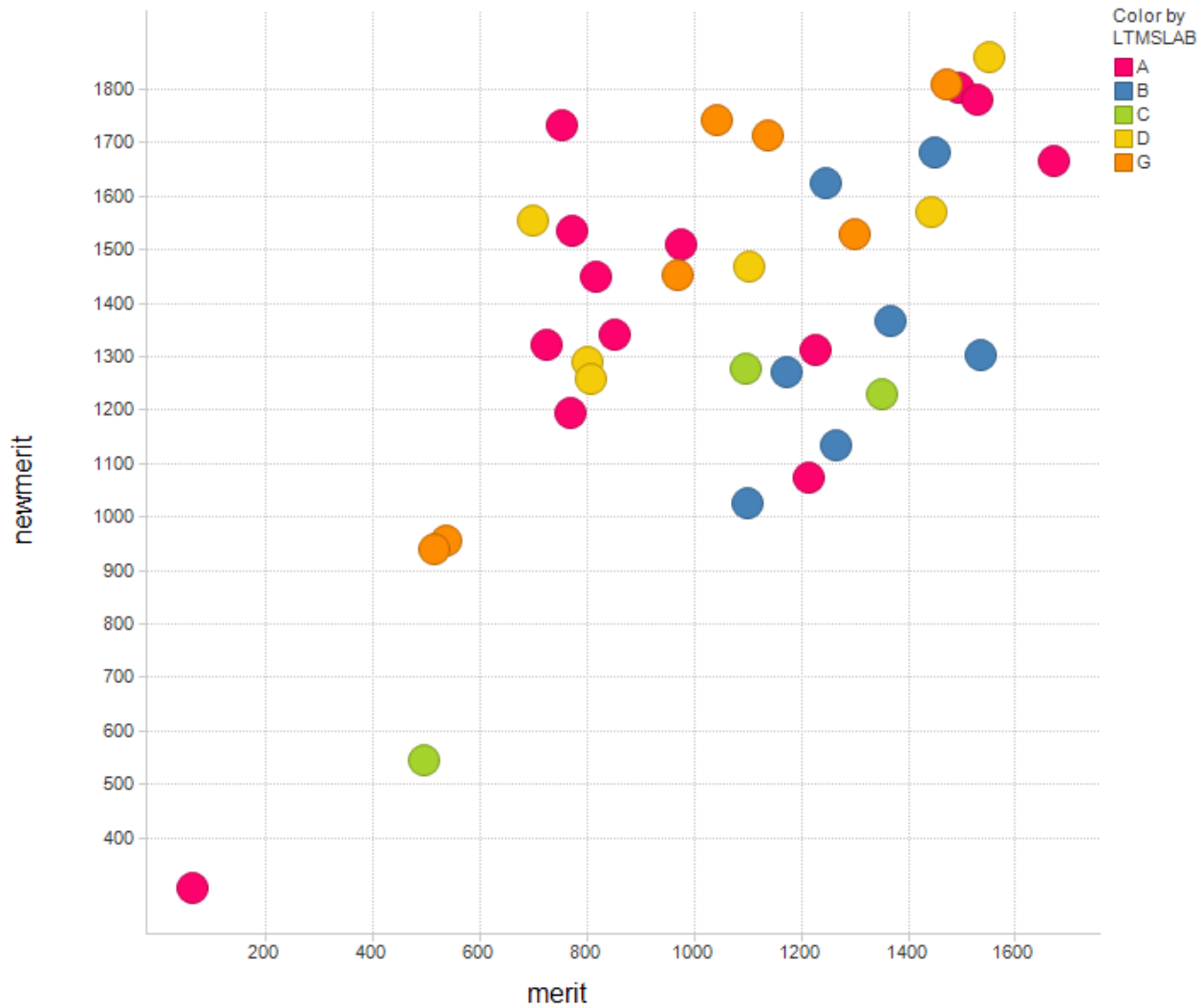


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Comparison of Merit Calculated from Reference Results with Merit Calculated from Effective Reference Results with New Version LTMS

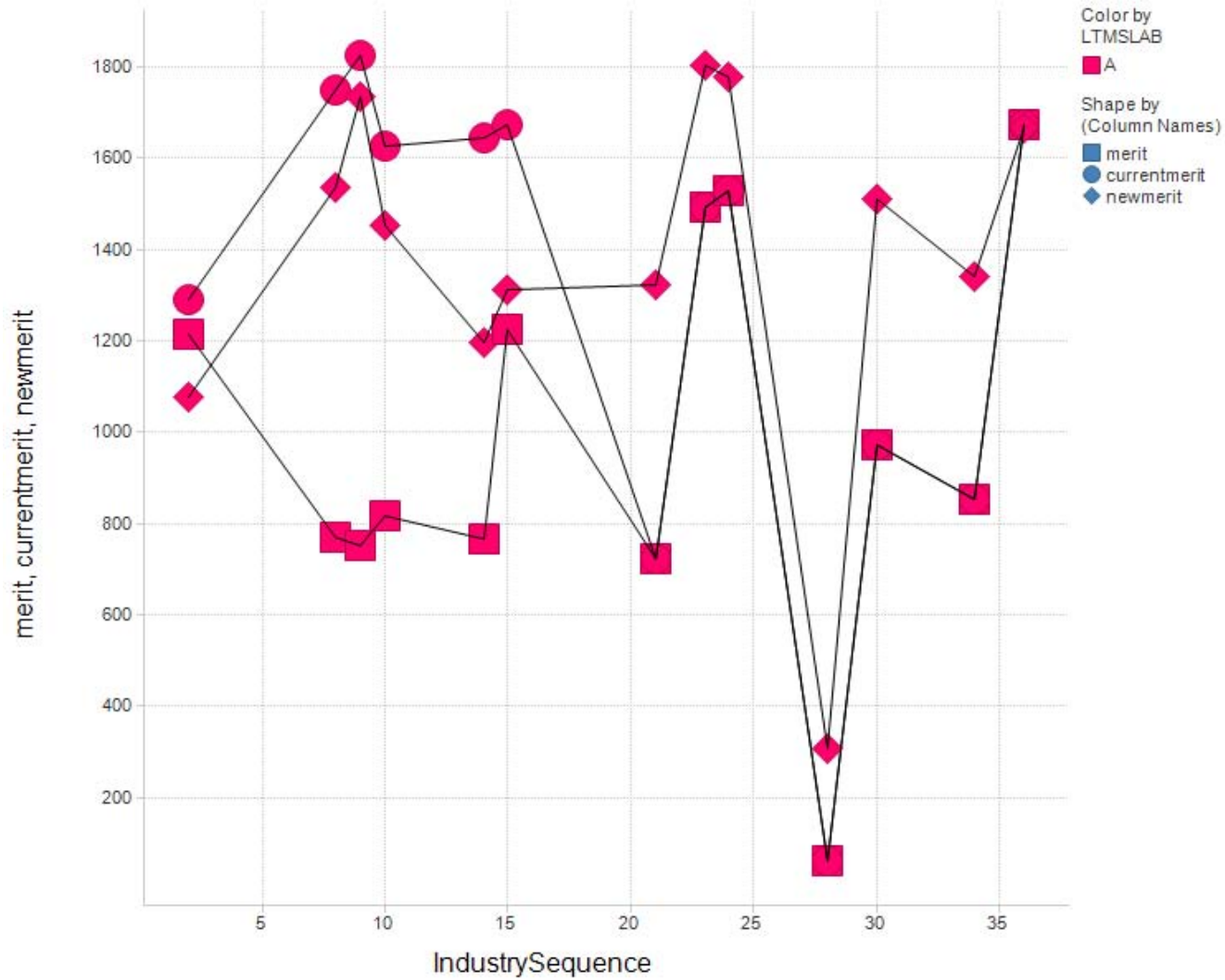


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Comparison of Three Merit Calculations by Lab

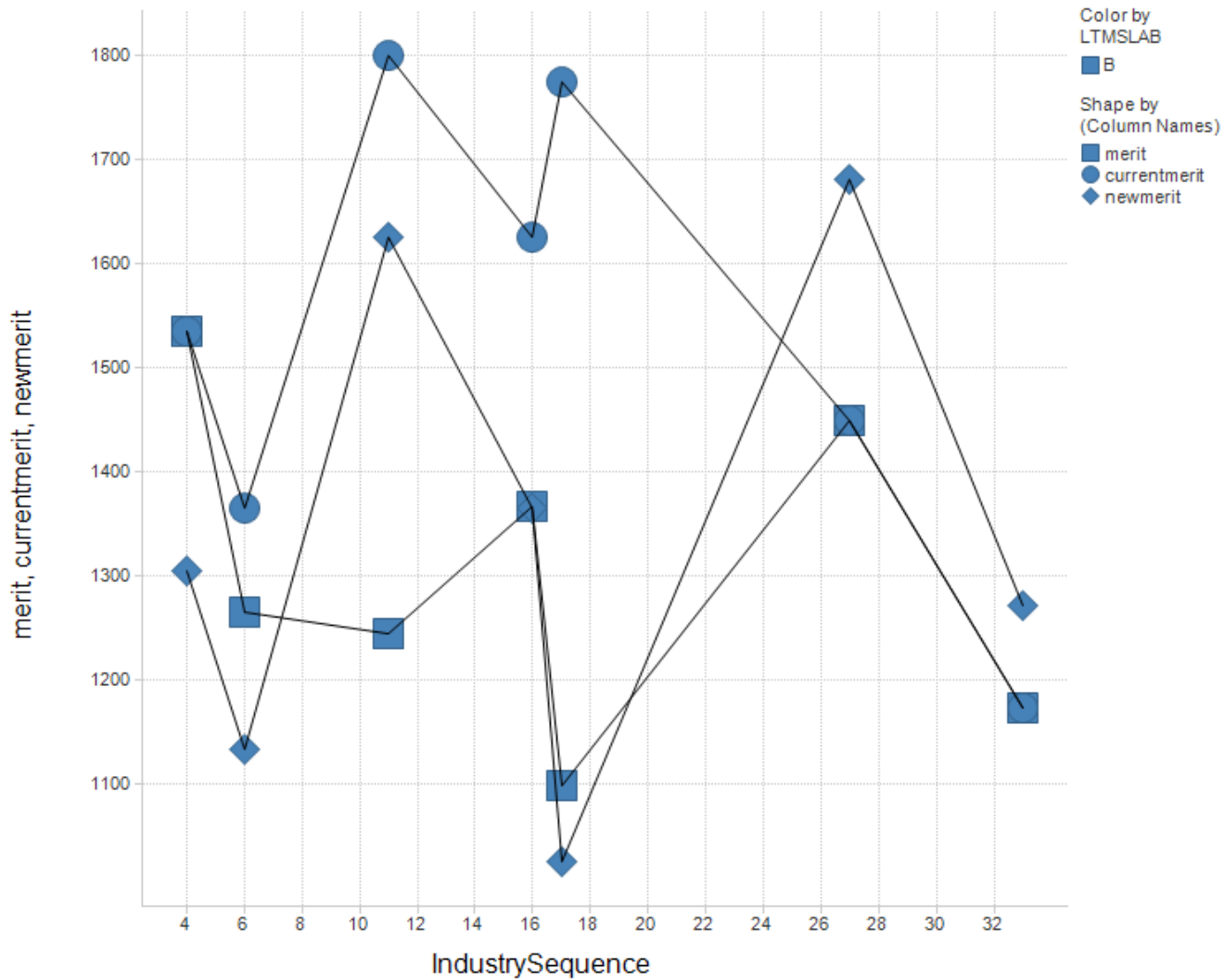


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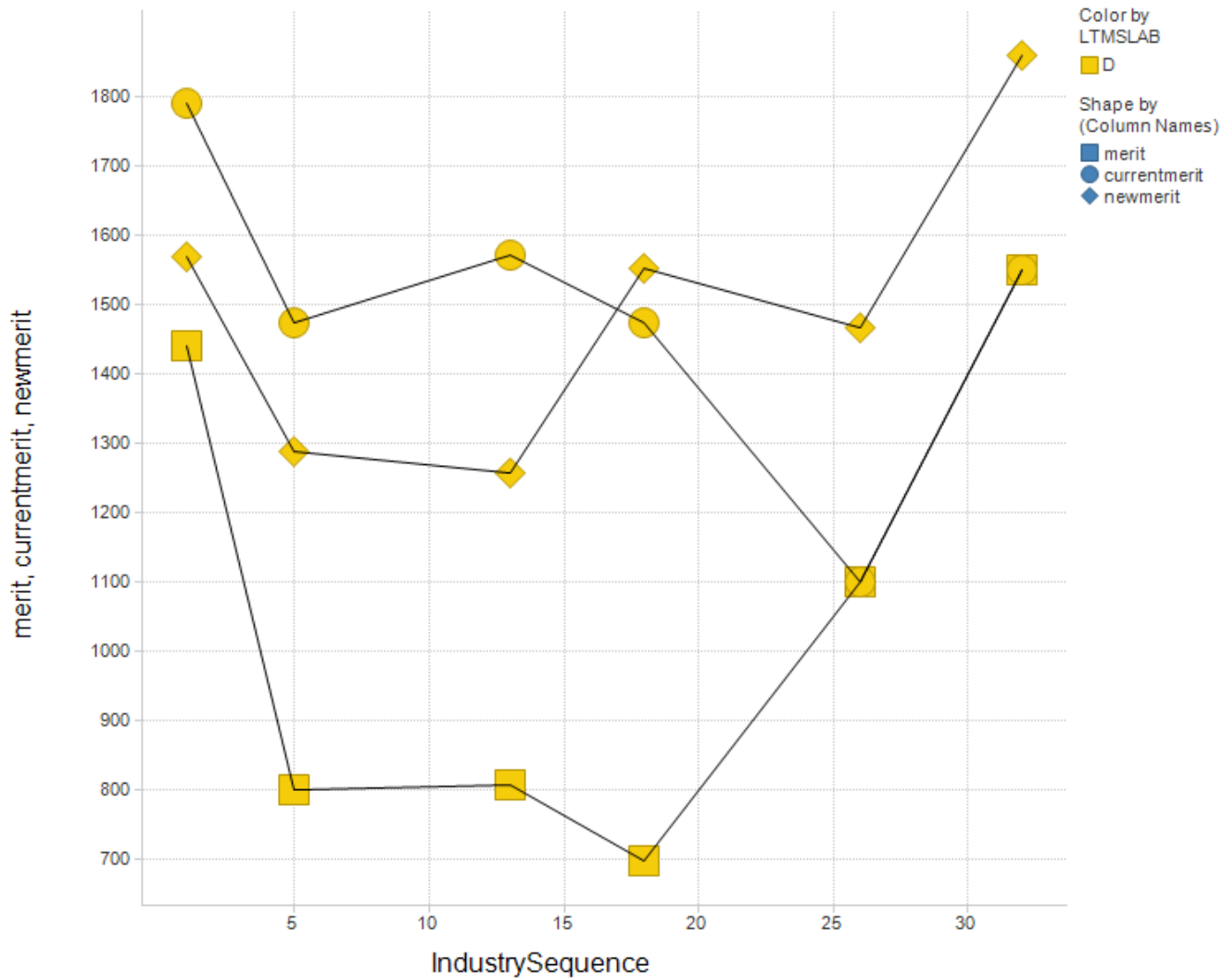


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Comparison of Three Merit Calculations by Lab

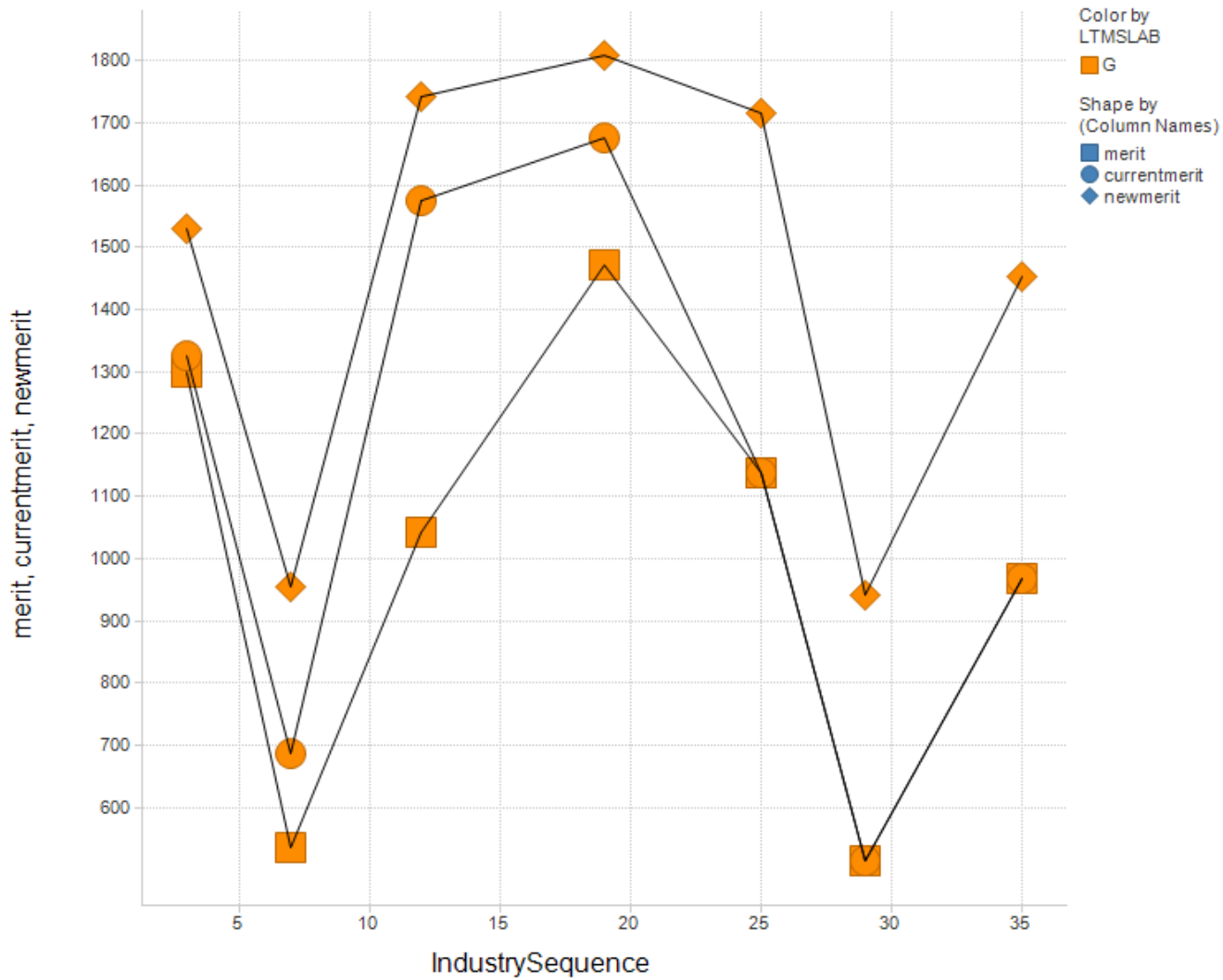


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Comparison of Three Merit Calculations by Lab

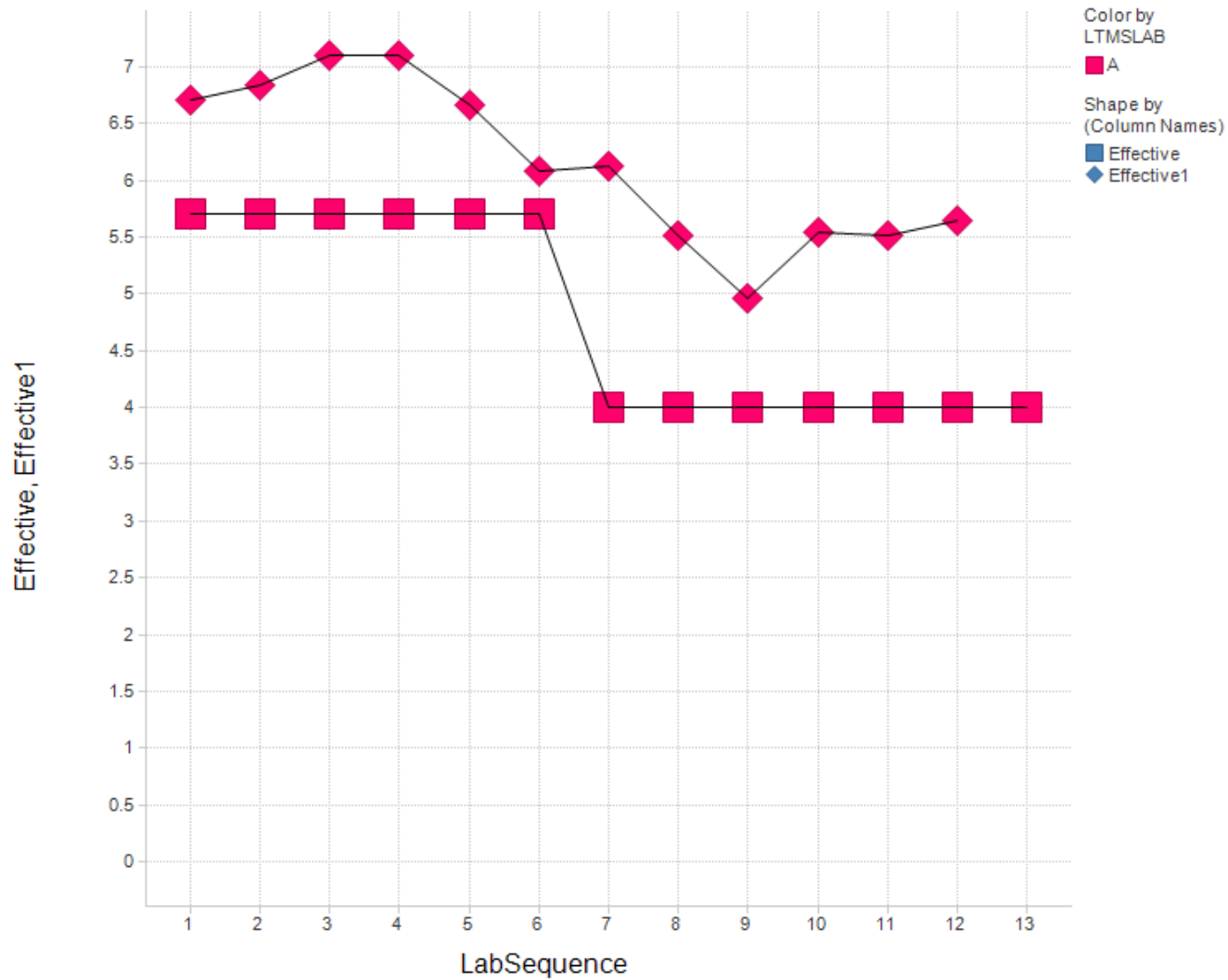


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Comparison of Effective CWL Anchor by Lab (Effective=Current, Effective1=New)

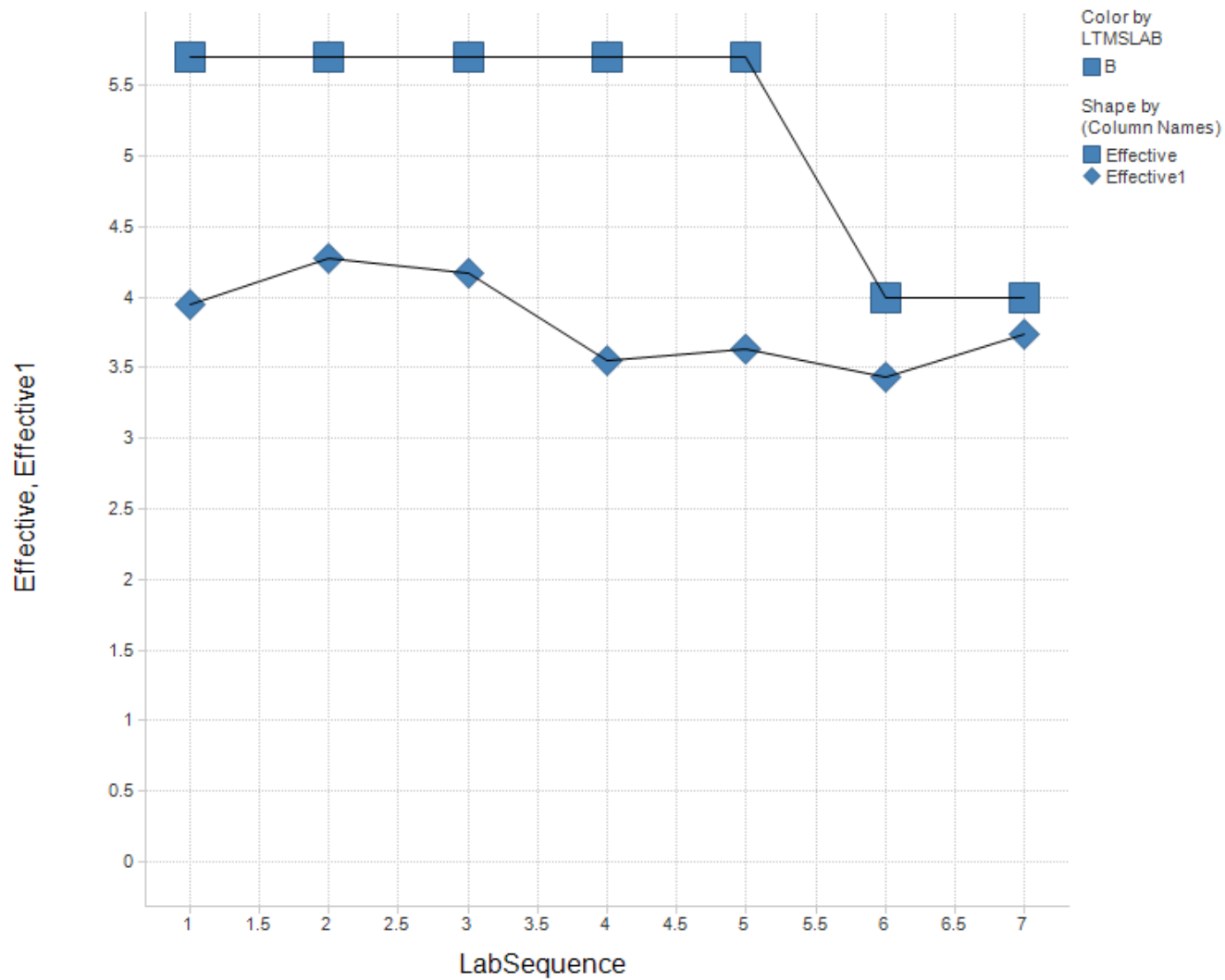


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Comparison of Effective CWL Anchor by Lab (Effective=Current, Effective1=New)

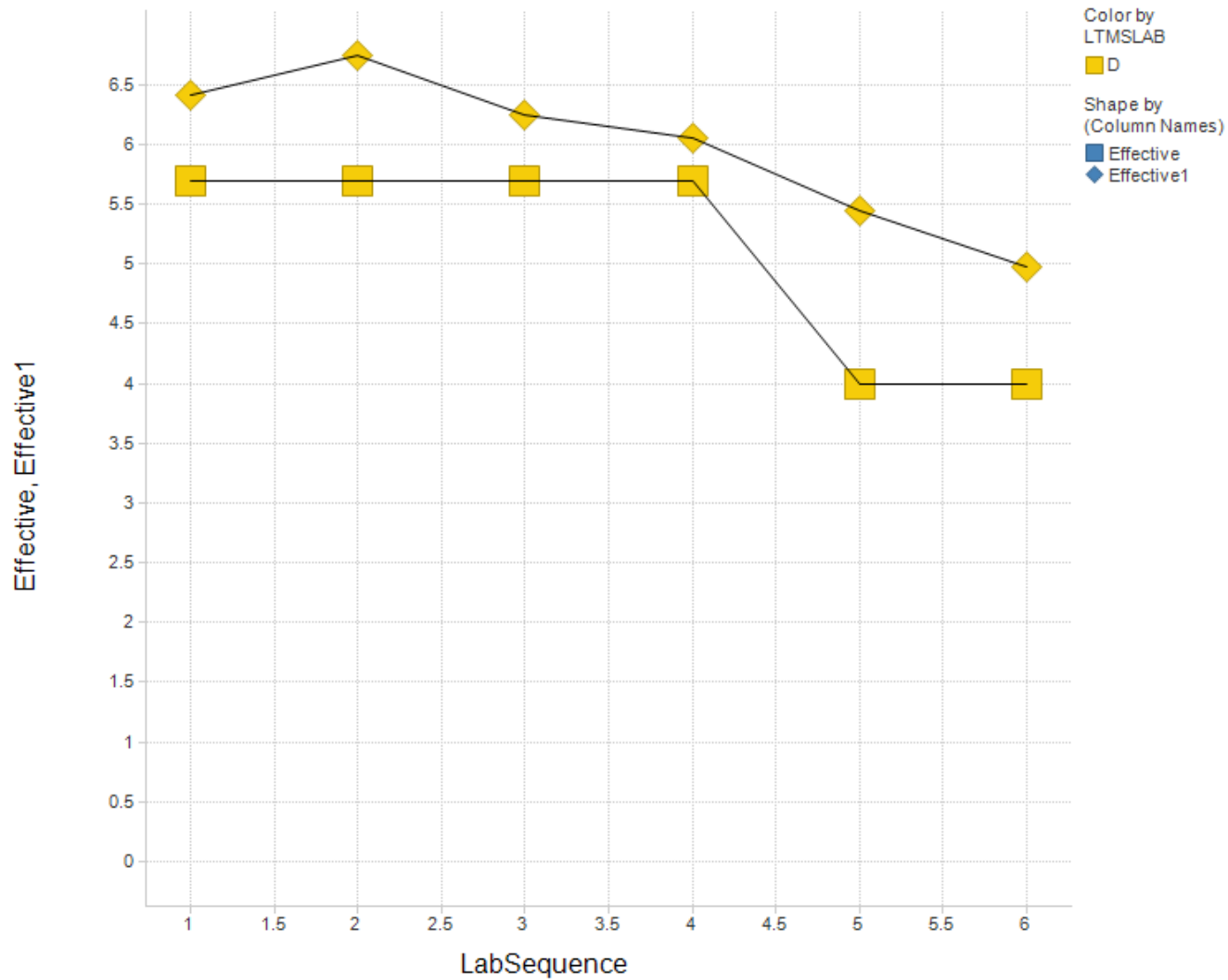


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Comparison of Effective CWL Anchor by Lab (Effective=Current, Effective1=New)

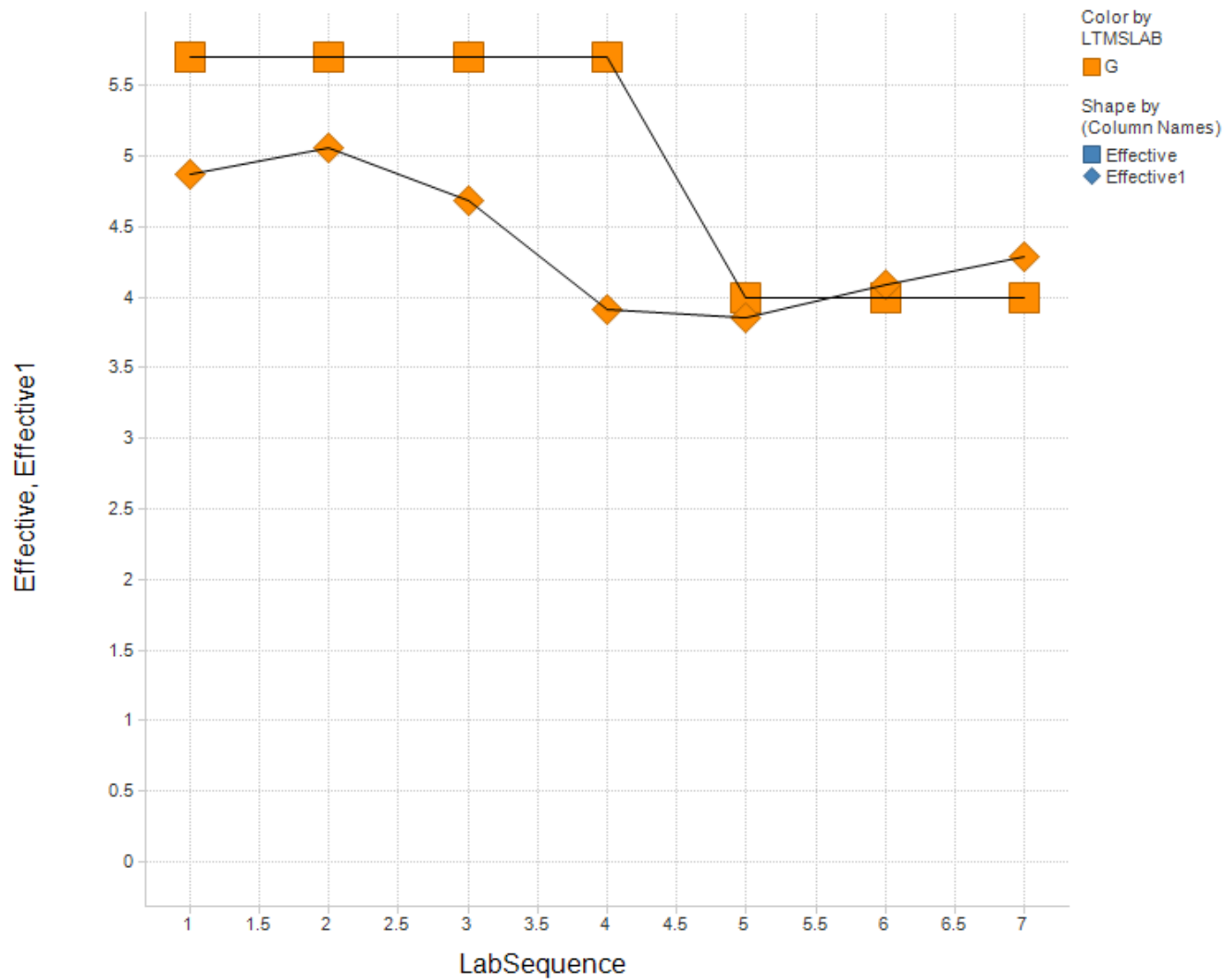


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Comparison of Effective CWL Anchor by Lab (Effective=Current, Effective1=New)

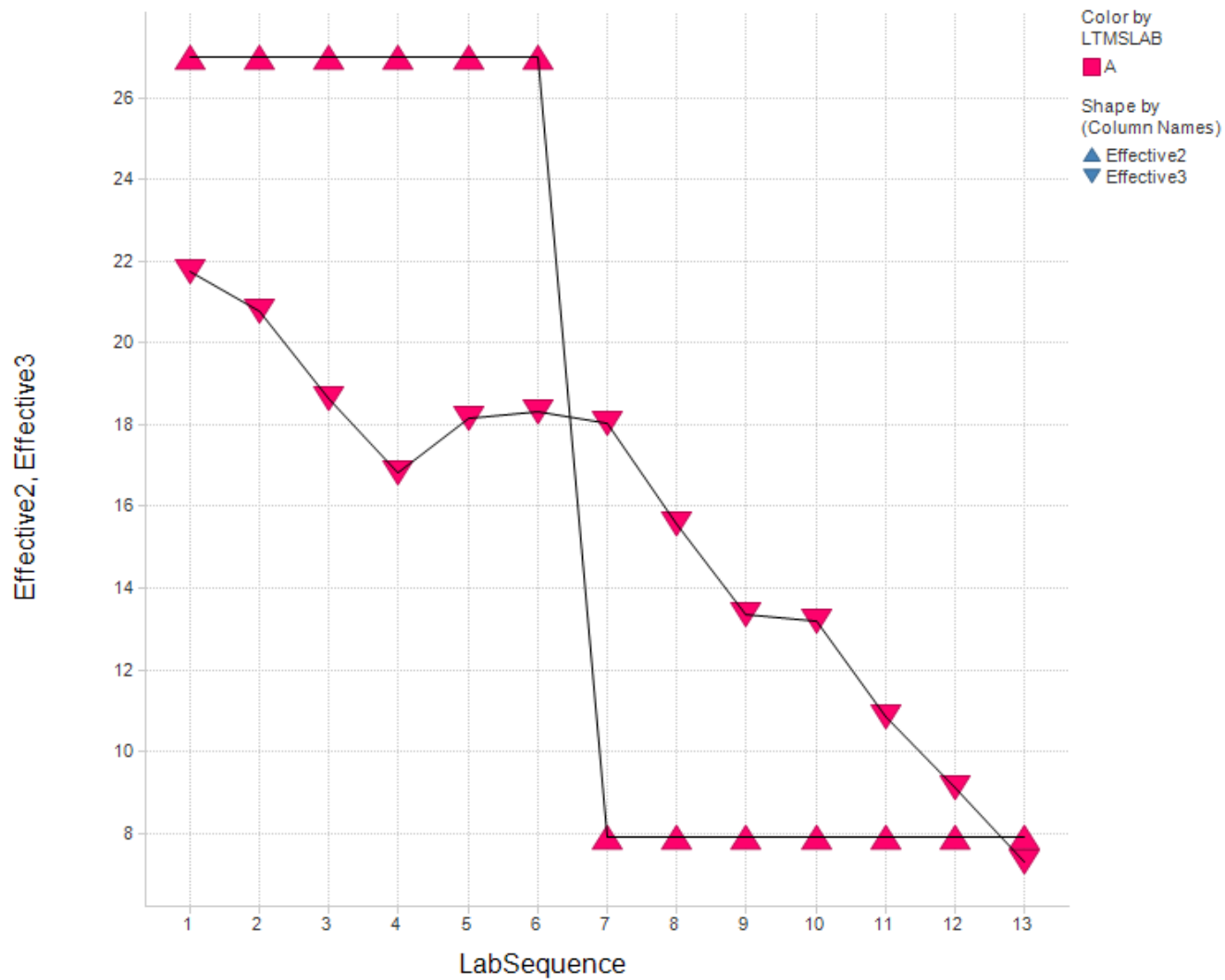


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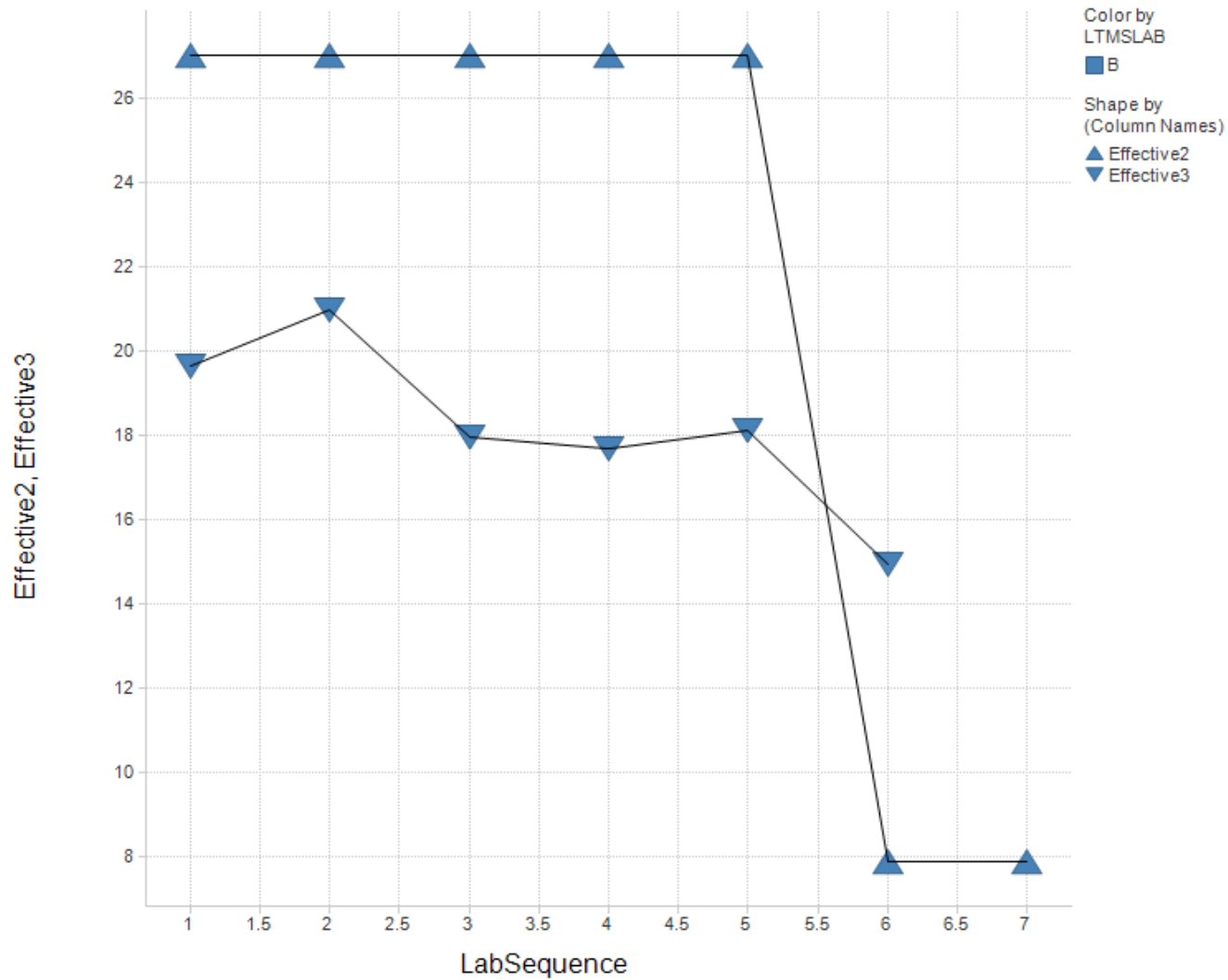


Oronite

Comparison of Effective TRWL Anchor by Lab (Effective2=Current, Effective3=New)



Comparison of Effective TRWL Anchor by Lab (Effective2=Current, Effective3=New)

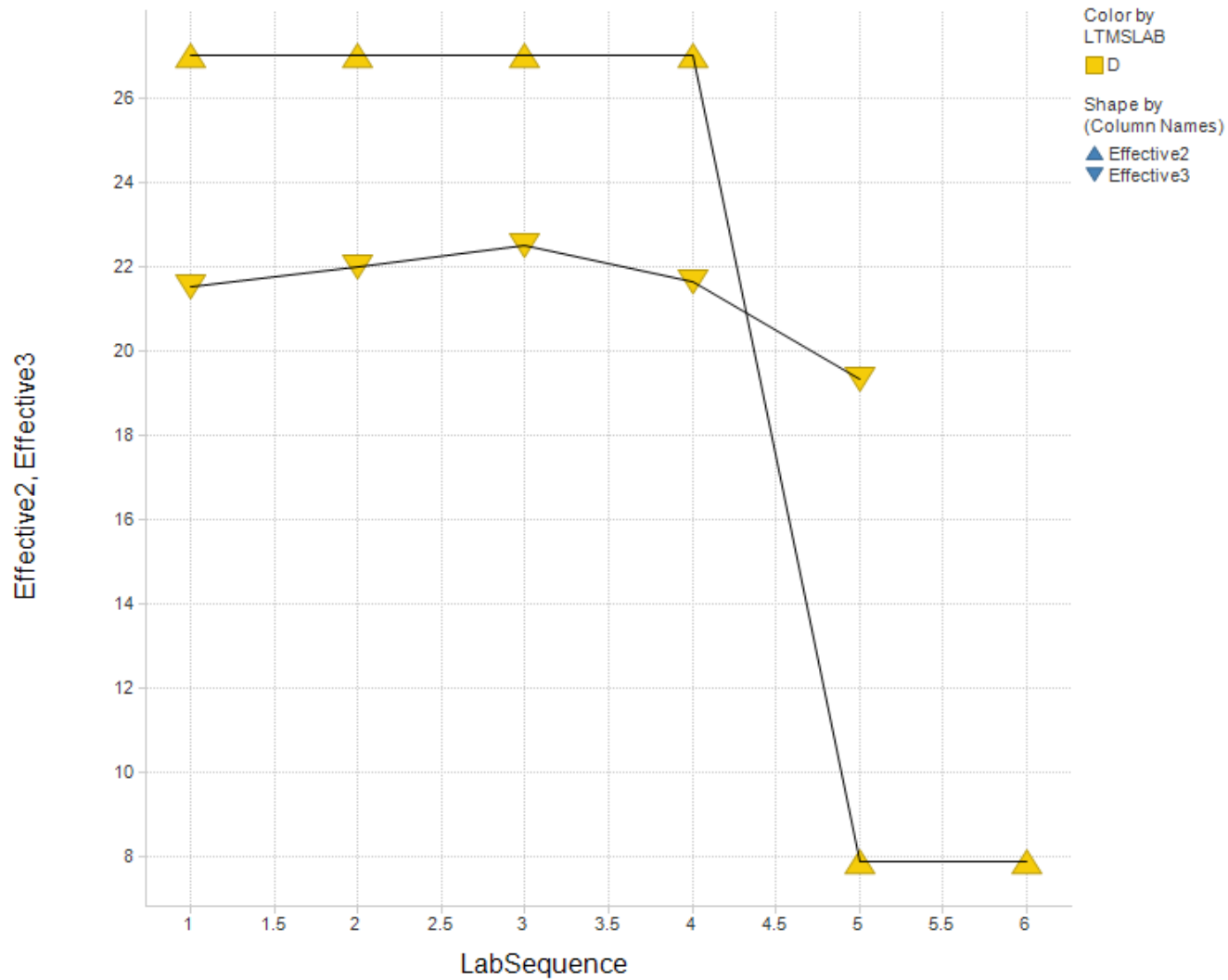


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Comparison of Effective TRWL Anchor by Lab (Effective2=Current, Effective3=New)

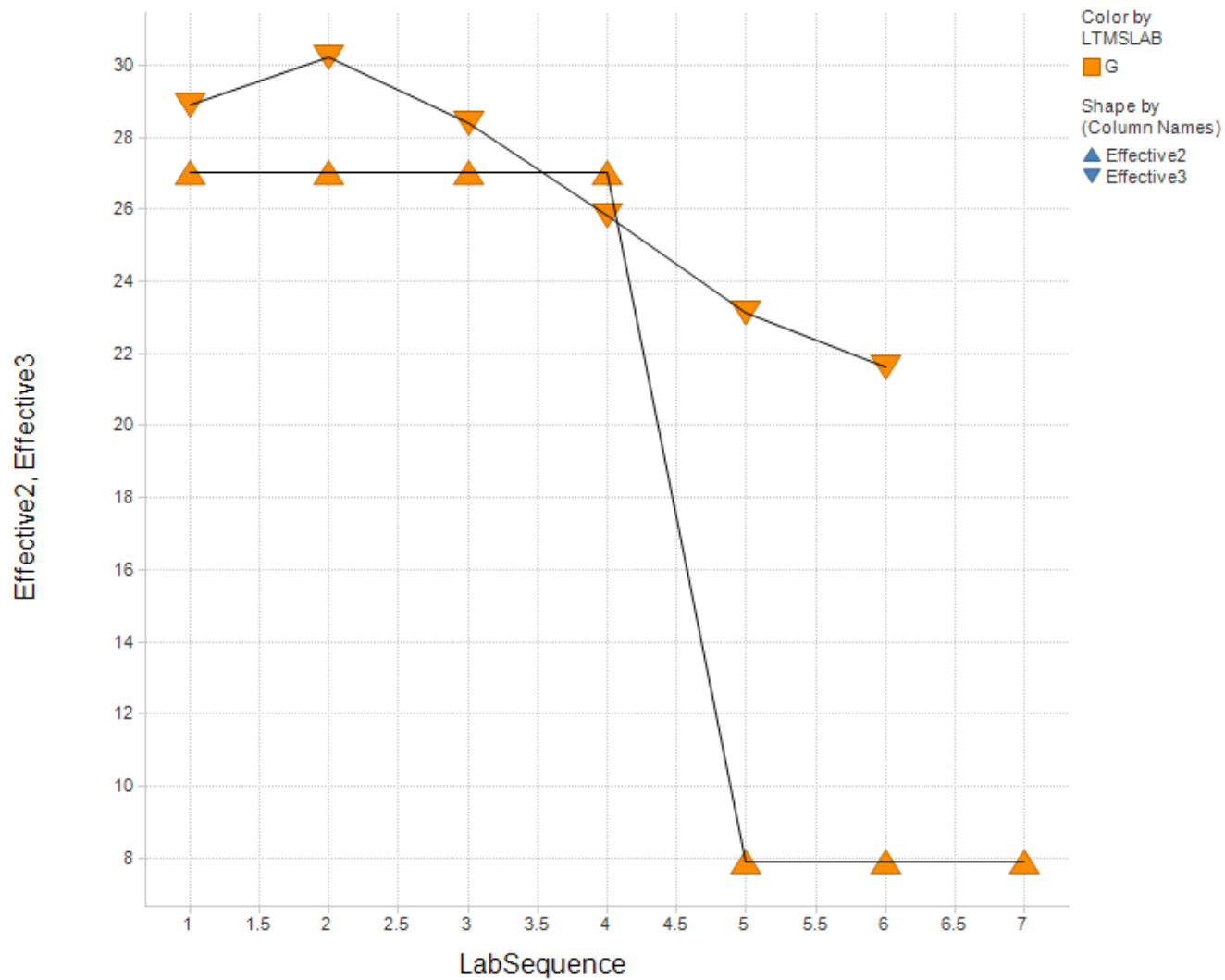


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Comparison of Effective TRWL Anchor by Lab (Effective2=Current, Effective3=New)

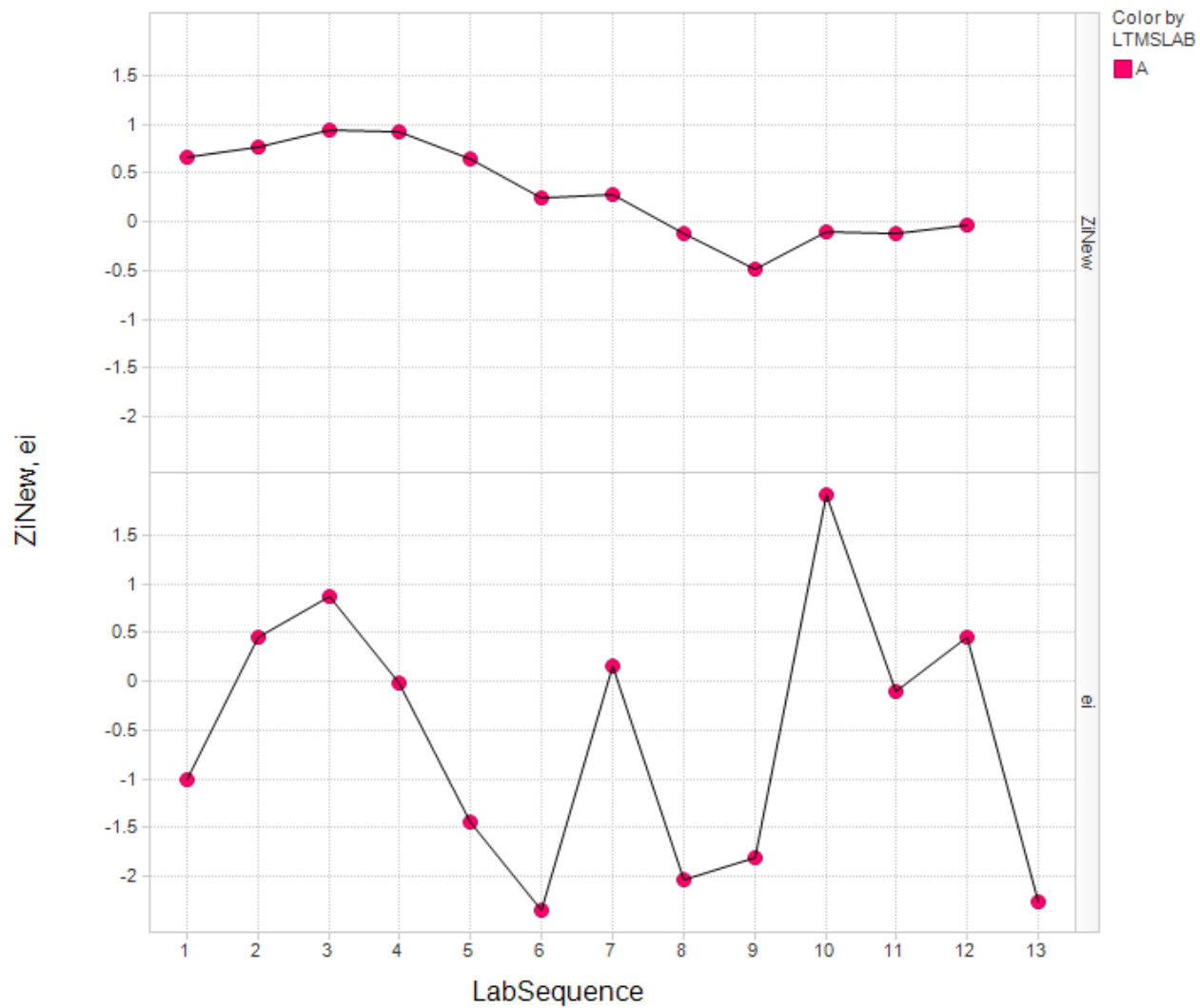


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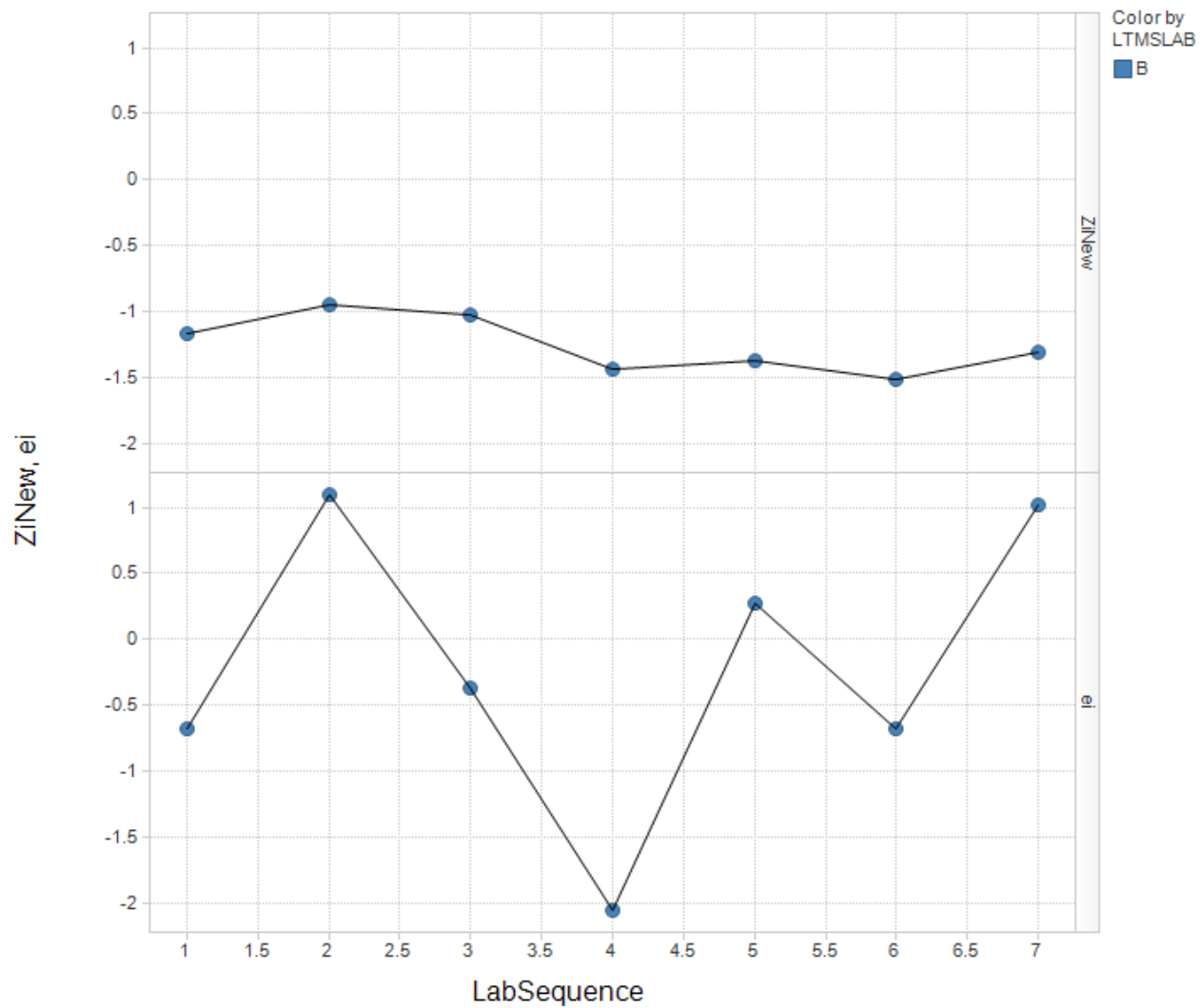


Oronite

Zi and ei charts for CWL by Lab



Zi and ei charts for CWL by Lab

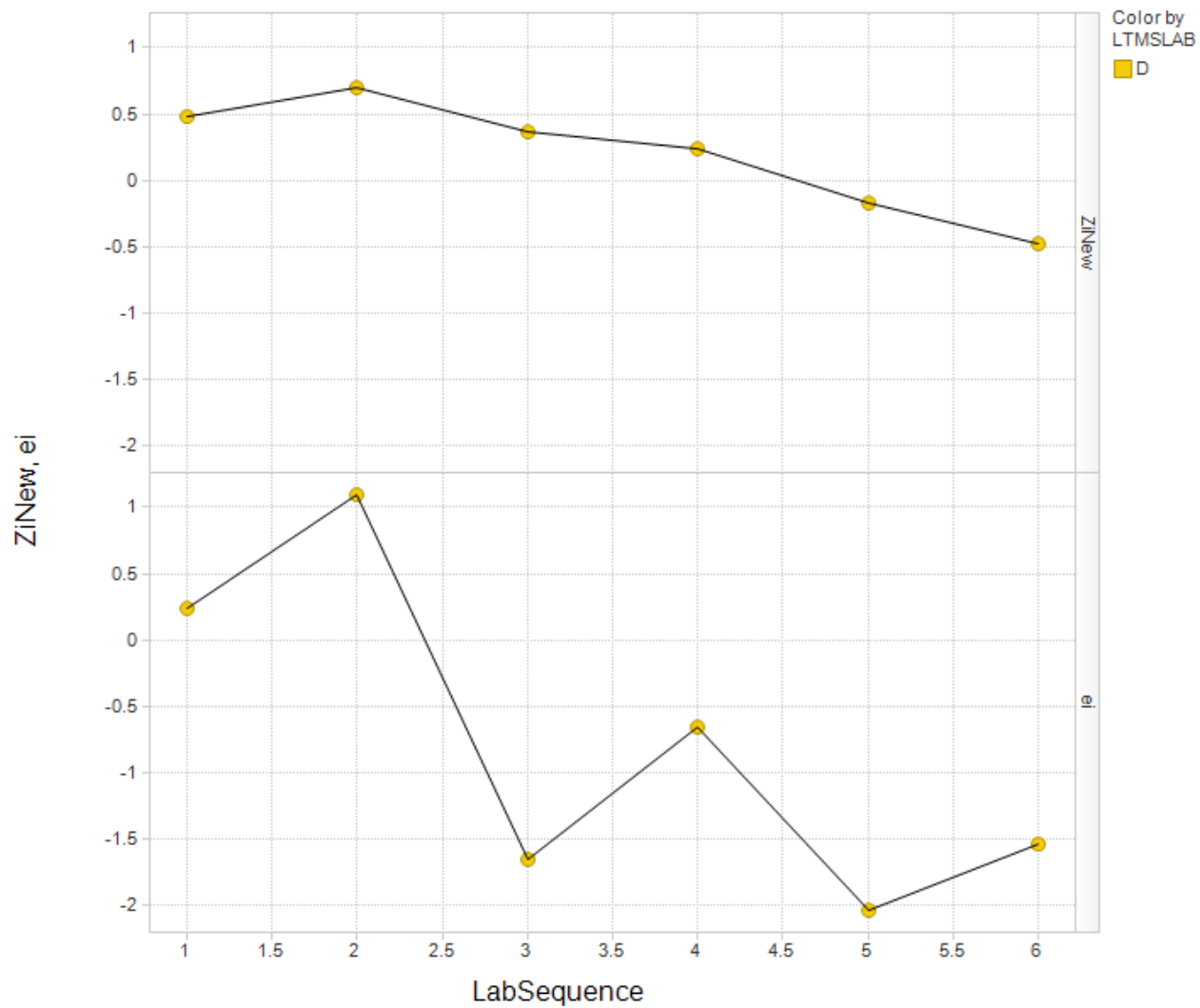


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Zi and ei charts for CWL by Lab

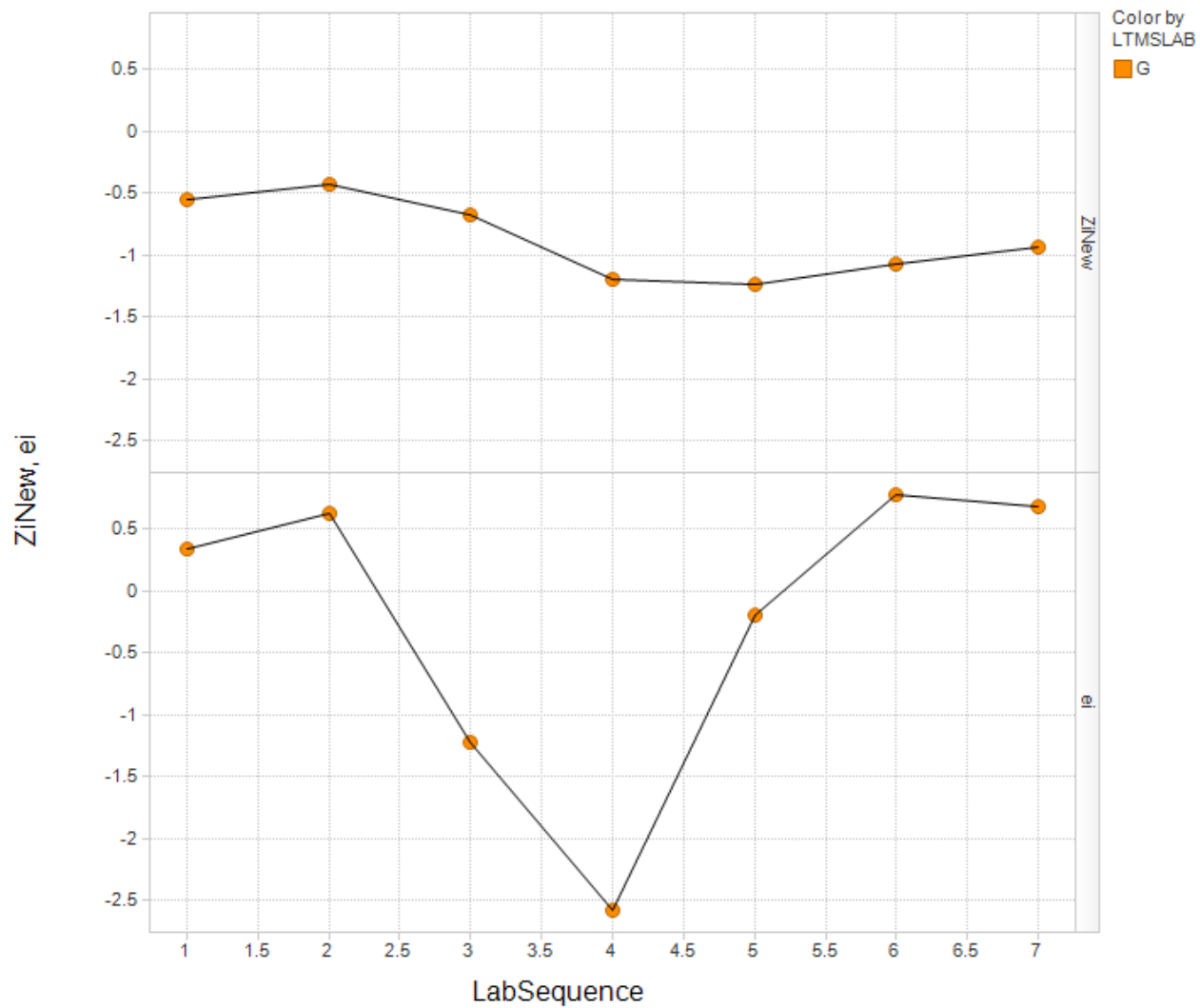


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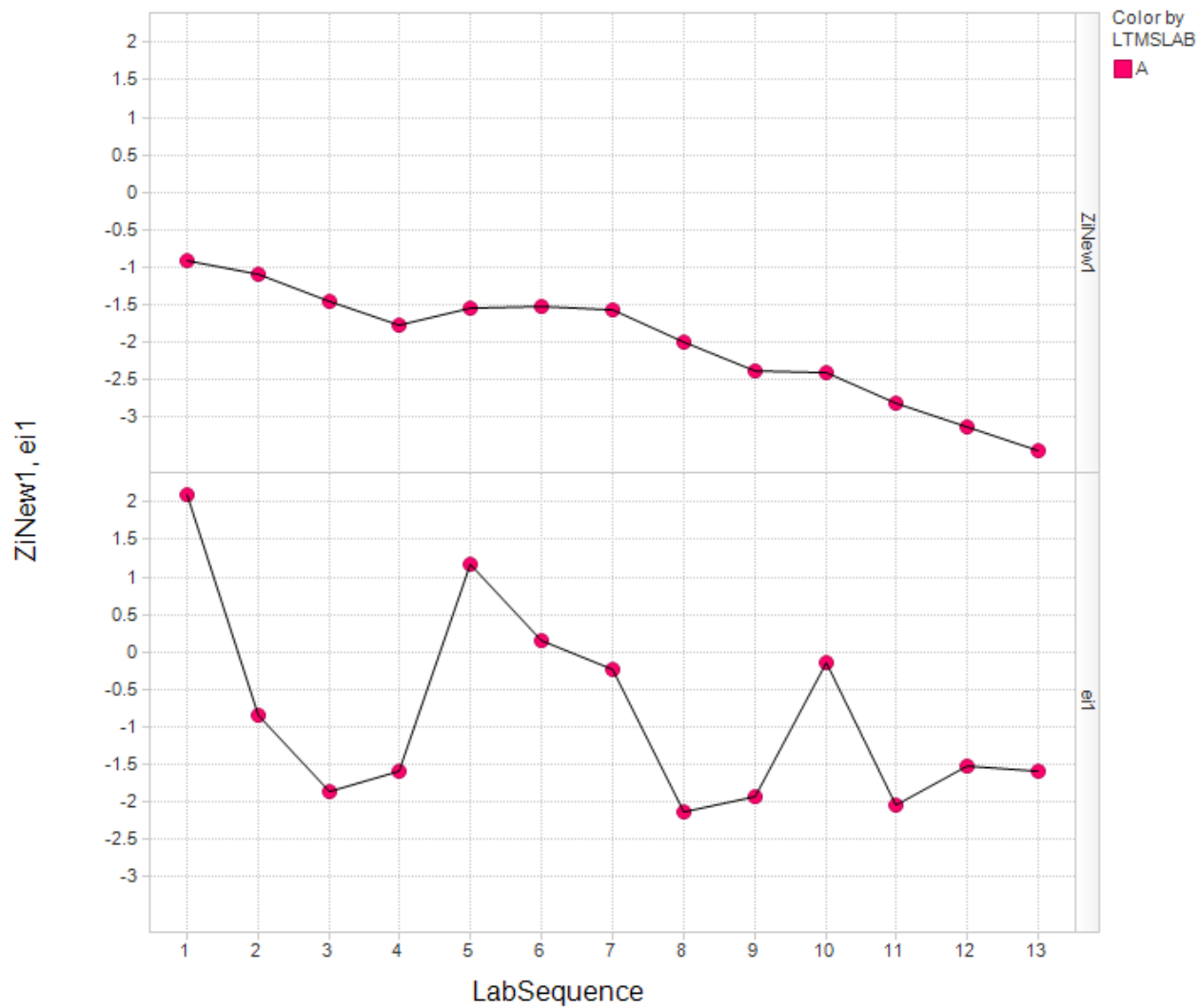


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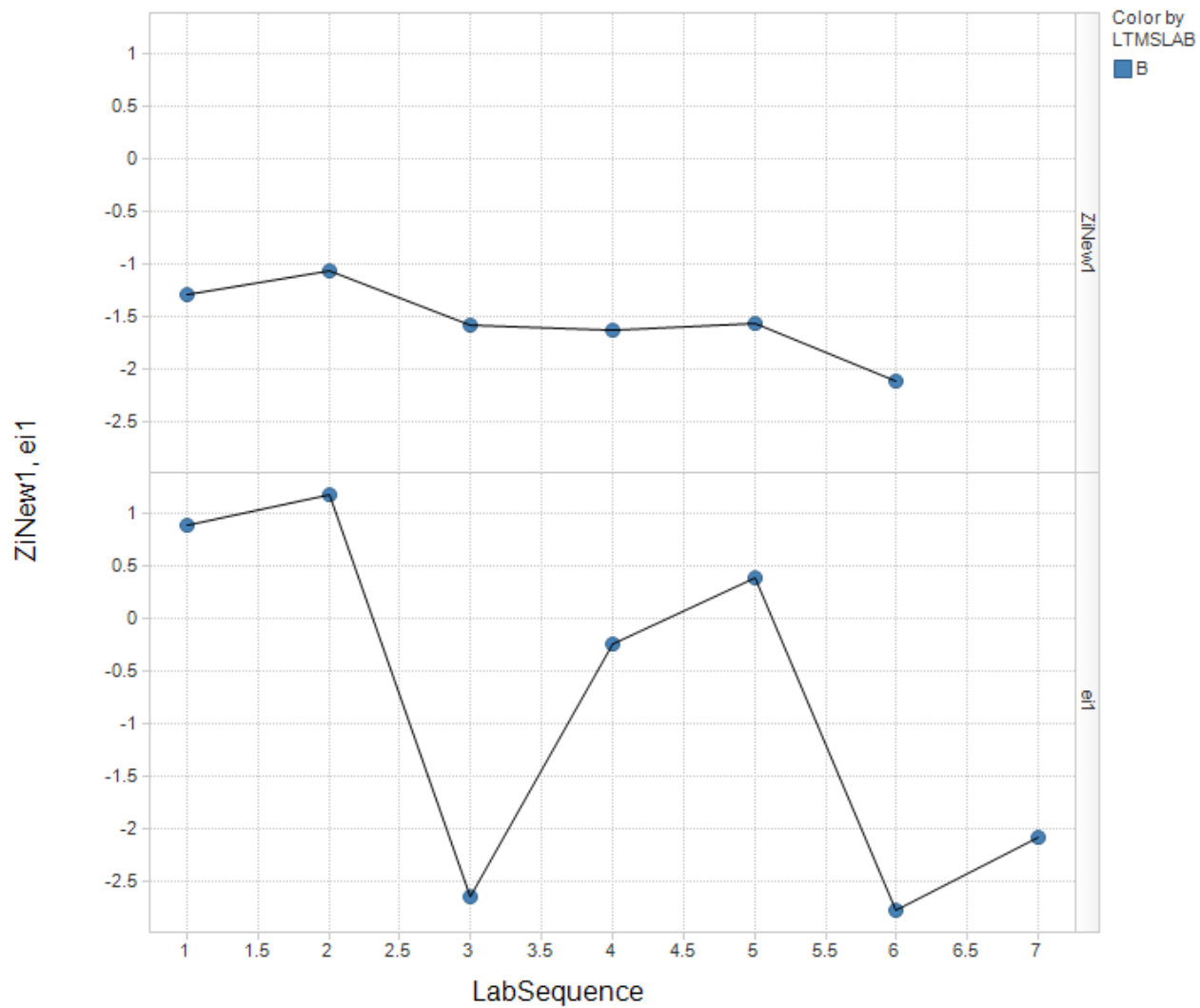


Oronite

Zi and ei charts for TRWL by Lab



Zi and ei charts for TRWL by Lab

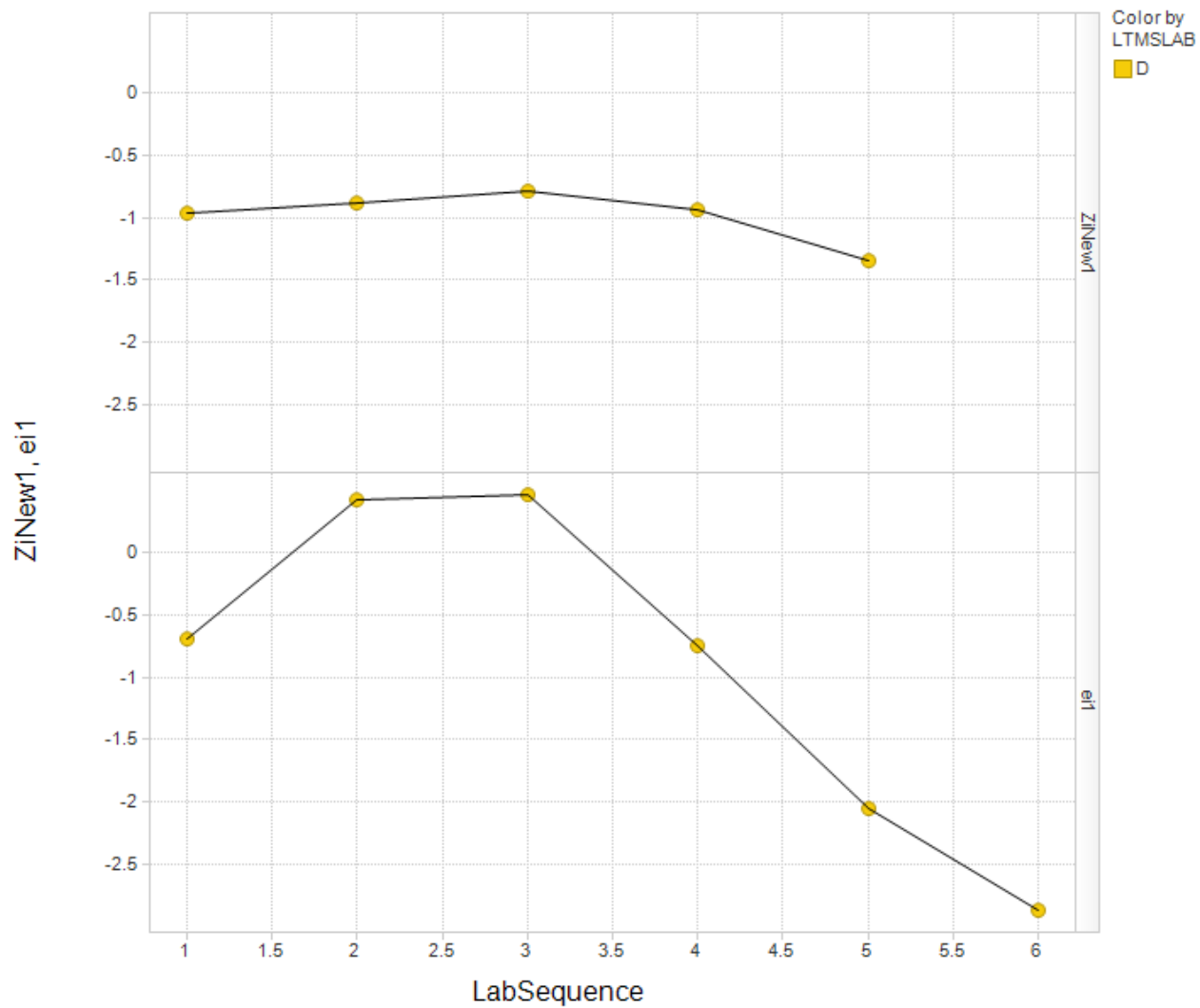


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Zi and ei charts for TRWL by Lab

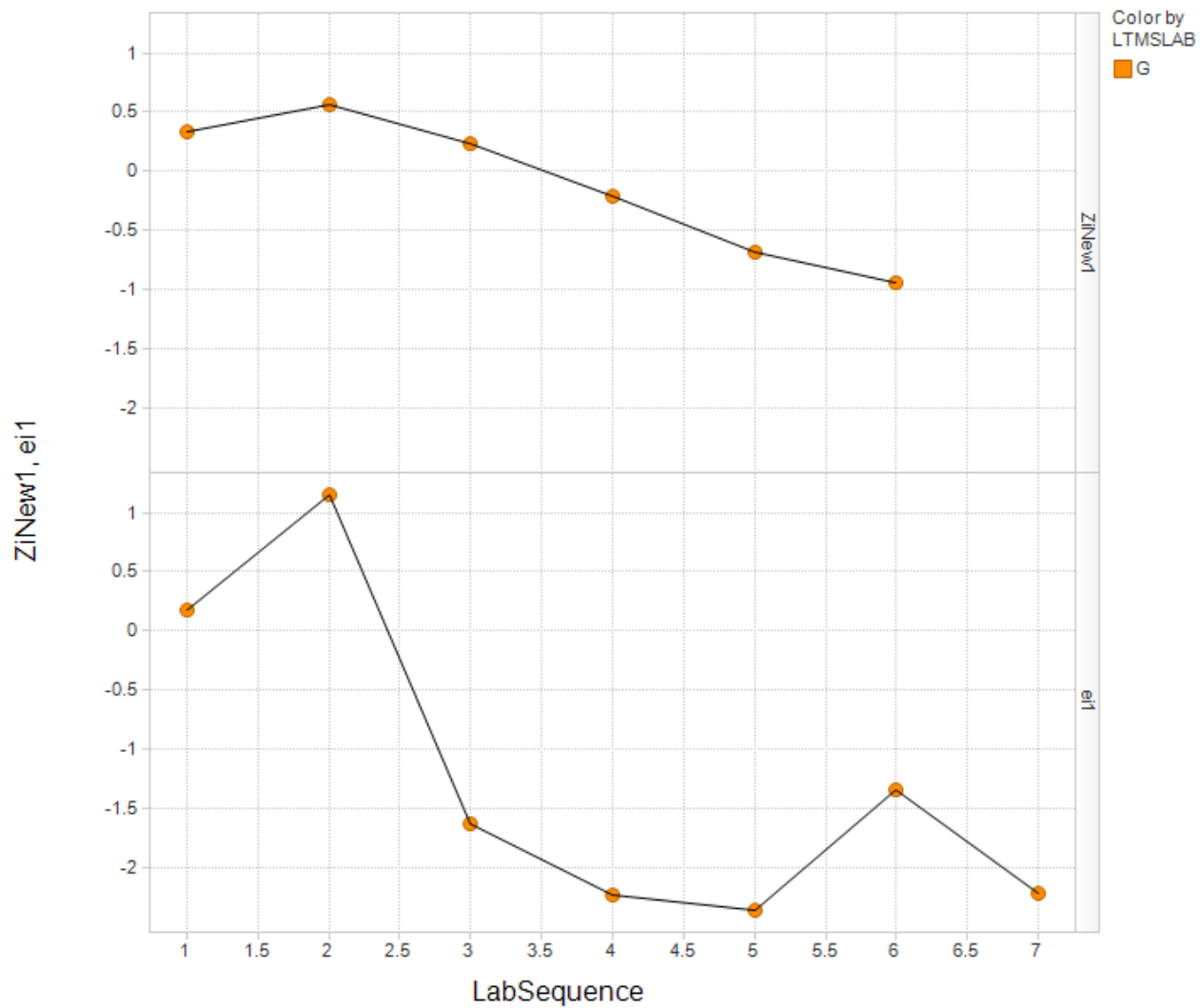


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Zi and ei charts for TRWL by Lab



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ATTACHMENT 10

ISM Crosshead Weight Loss Correction Factor

D. Boese

February 16, 2010

Performance you can rely on.



- CWL correction factors (CFs) were calculated relative to 3 different targets:
 - Initial reference oil target applicable during PC10 limit selection: CF = 1.3 mg
 - Current reference oil target: CF = 1.6 mg
 - Reference oil CWL level up to timeframe of CF: CF = 1.7 mg
- Selection of CF (1.3 mg) relative to initial target is most consistent with revised LTMS currently under development.

Correction Factor Estimation



- There are a number of methods which could be utilized to estimate the correction factor.
- A related question: To what should we correct the result? The following are options.
 - Correct to the initial target applicable during the timeframe when the PC10 limits were decided (CWL target = 4.8 mg).
 - Correct to the current target (5.1 mg).
 - Correct to the level of the reference CWL's prior to the application of the current correction factor.
 - The CWL level was obtained by regressing on Lab (intercept = 5.15 mg)
- The uncorrected CWL for those results to which a correction factor was applied was regressed on Lab.
 - The estimated average uncorrected CWL after removal of lab effect is 3.50 mg (intercept).

Correction Factor Estimation



- Correction factor estimates for each of the three target options follow:
 - Original CWL target: $CF = 1.3 \text{ mg}$ ($4.8 \text{ mg} - 3.5 \text{ mg}$)
 - Current target: $CF = 1.6 \text{ mg}$ ($5.1 \text{ mg} - 3.5 \text{ mg}$)
 - Average CWL prior to CF: $CF = 1.7 \text{ mg}$ ($5.15 \text{ mg} - 3.5 \text{ mg}$)
- Correcting to the initial target is consistent with revised LTMS under development.

Regression Analyses

Regression Models



CWL Model Prior to Correction Factor
(Sept. 1, '04 to July 30, '05)

Term	Coefficient	p-Value
Intercept	5.15	6.5E-06
LTMSLAB[A]	0.88	0.14
LTMSLAB[B]	-1.60	0.05
LTMSLAB[D]	1.22	0.11

Uncorrected CWL Model
(Jan. 31, '06 to Present)

Term	Coefficient	p-Value
Intercept	3.50	2.1E-09
LTMSLAB[A]	0.64	0.26
LTMSLAB[B]	-0.60	0.39
LTMSLAB[C]	0.37	0.66
LTMSLAB[D]	-0.05	0.95



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