Report of Meeting
L-60-1 Surveillance Panel Conference Call
May 10th , 2023

Attendees:

SwRI -	**Mueller**
Lubrizol -	Venhoff, **Schaup**, Drjla, Ariemma
Afton -	**Sangpeal,** Bell
Intertek -	**Lange,** Portell
TMC -	**Beck**
BASF -	**Goyal,** Caridi
Dana -	**Zyski,** Carr
Cummins-Meritor -	LaBond, **Carter**
Army -	Sattler, **Comfort**
AAM -	**Muransky,** Zarins
Navistar -	Morris
Daimler -	Neal
Fuchs -	Bender, Yucebligic

Voting Members in **BOLD**

1.0 Membership Review

2.0 Meeting minutes Approval

- February 9th, 2023, ASTM Meeting #208

Motion #1 → Jason Carter 1st /2nd Wes Venhoff to approve the meeting minutes from the February 9th , 2022, ASTM Meeting. Motion passed unanimously, 11-0-0 (Yes-No-Abstain).

3.0 L-60-1 Severity Task Force action items

- Lubrizol to prep and ship gears and strips
- Labs to preform same experiment but with already shipped oil

4.0 Gear Analysis

- Matt Sangpeal and Nick Schaup to determine date for conference call with Hans-Willi

5.0 Old Business
6.0 Adjourn

Motion #3 → A. Zyski 1st /2nd Allen Comfort to adjourn. Motion passed unanimously, 11-0-0 (Yes-No-Abstain).

Respectfully submitted,

Nicholas Schaup
L-60-1 Surveillance Panel Chairman

D02.B0.03

L-60-1 Surveillance Panel Meeting

05/10/2023

14:00 pm– 15:00 pm

Nick Schaup

Agenda

- Call to Order/Agenda review
- Membership review
- Meeting Minute Approvals
  - Feb. 8th 2023, ASTM Meeting
- L-60-1 Severity Task Force Follow-up
  - 4 run review – LZ Prep
  - Gear analysis update
- Old Business?
- New business
- Adjournment

LRI 209 Surveillance Panel Meetings
L-60-1 Severity Experiment Summary

May 10, 2023

L-60-1 Severity Experiment - Overview

- L-60-1 testing has had an (almost) industry wide severity issue for the past couple of years
- An experiment was previously conducted where Lab D (fewest issues) prepped all of the gears to be run at each of the four labs.
  - The results of this experiment showed all four labs producing passing results.
- A reverse of this experiment was planned where lab B (more extreme issues) would prep the gears for all four labs to run.

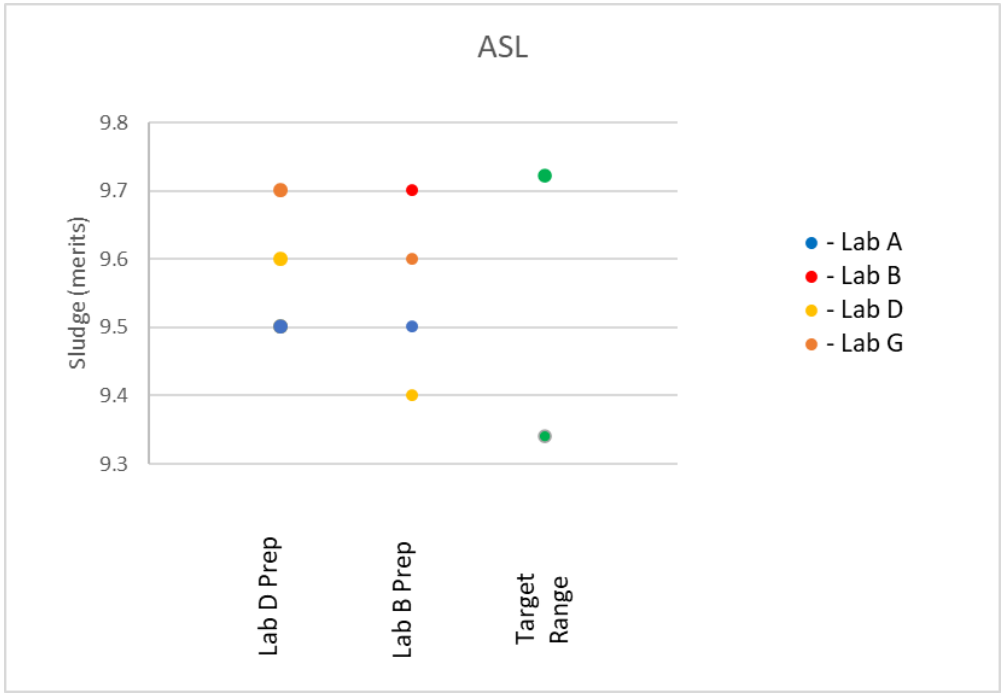
L-60-1 Severity Experiment - Lab D Results

Testkey	Lab	Ind	LTMSDATE	ASL	ACV	TOL	PEN	VISI	RGEARBAT
174334-L601	A	148-1	20220908	9.5	8.4	0.4	0.5	40	06-18-48
174330-L601	D	148-1	20220908	9.6	8.5	0.4	0.4	36	06-18-48
174336-L601	B	148-1	20220908	9.5	7.9	0.4	0.5	37	06-18-48
174332-L601	G	148-1	20220913	9.7	8.3	0.7	0.8	39	06-18-48
		148-1 Targets	*Mean*	*9.532*	*8.306*	*0.257*	*0.387*	*36.966*	
			STD	*0.106*	*0.511*	*0.249*	*0.413*	*7.659*	
		Shewhart Severity Limits	*Upper Limit*	*9.7*	*9.2*	*0.7*	*1.1*	*50.8*	
			Lower Limit	*9.3*	*7.4*	*-0.2*	*-0.4*	*23.2*	

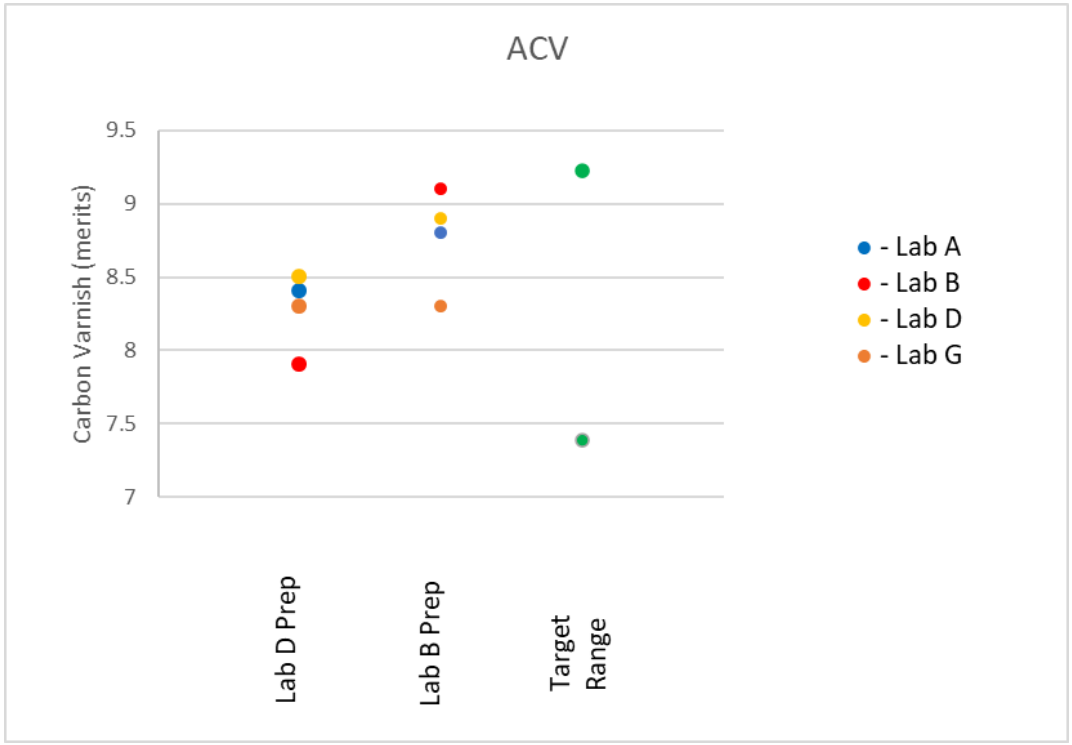
L-60-1 Severity Experiment - Lab B Results

Testkey	Lab	Ind	LTMSDATE	ASL	ACV	TOL	PEN	VISI	RGEARBAT
179366-L601	G	148-1	20230330	9.6	8.3	0.4	0.7	42	06-18-48
179368-L601	D	148-1	20230330	9.4	8.9	0.2	0.3	43	06-18-48
179370-L601	A	148-1	20230330	9.5	8.8	0.3	0.4	42	06-18-48
179365-L601	B	148-1	20230330	9.7	9.1	0.4	0.5	43	06-18-48
		148-1 Targets	*Mean*	*9.532*	*8.306*	*0.257*	*0.387*	*36.966*	
			STD	*0.106*	*0.511*	*0.249*	*0.413*	*7.659*	
		Shewhart Severity Limits	*Upper Limit*	*9.7*	*9.2*	*0.7*	*1.1*	*50.8*	
			Lower Limit	*9.3*	*7.4*	*-0.2*	*-0.4*	*23.2*	

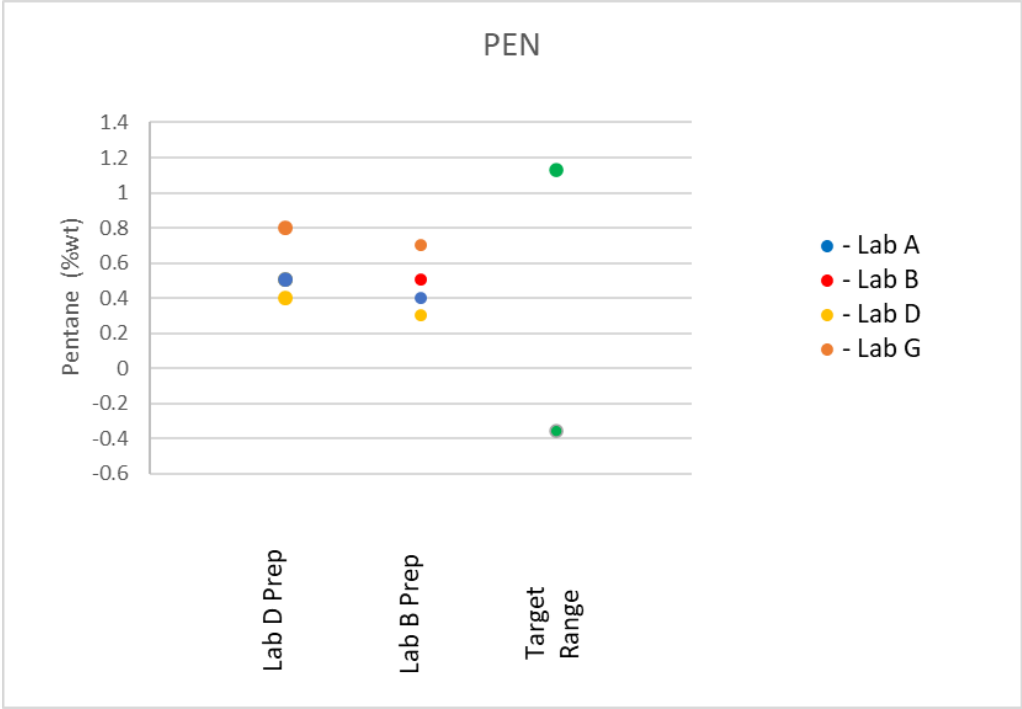
L-60-1 Severity Experiment Plots (ASL)



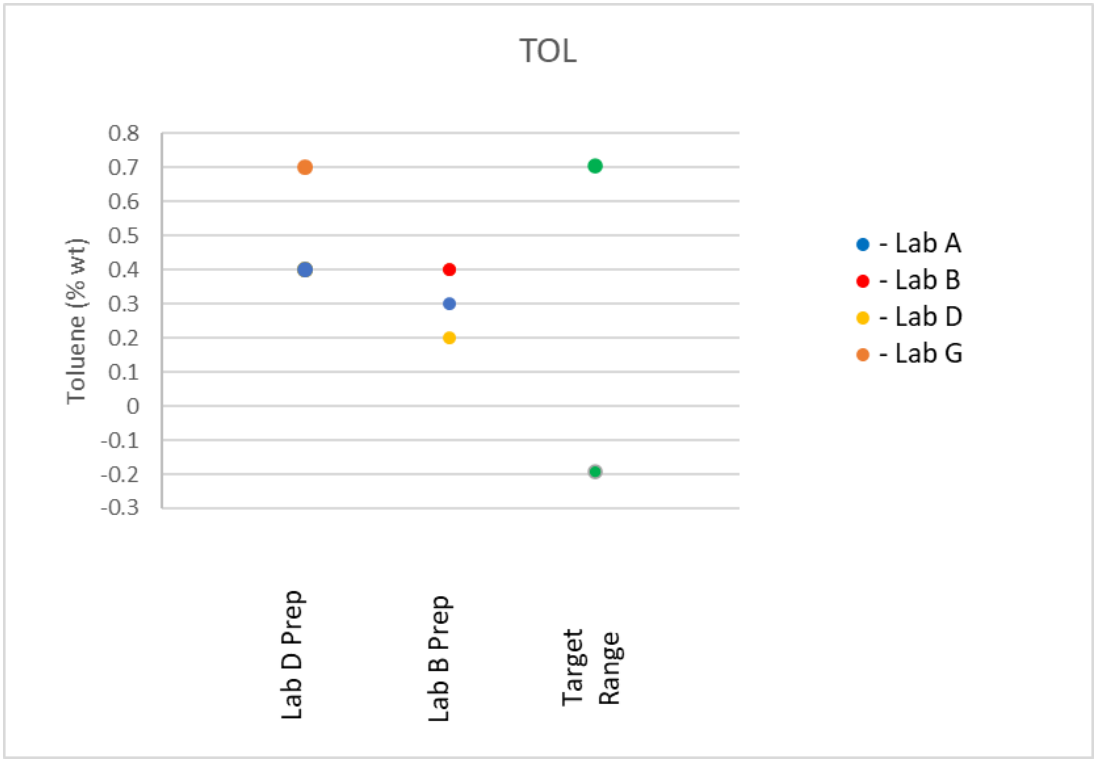
L-60-1 Severity Experiment Plots (ACV)



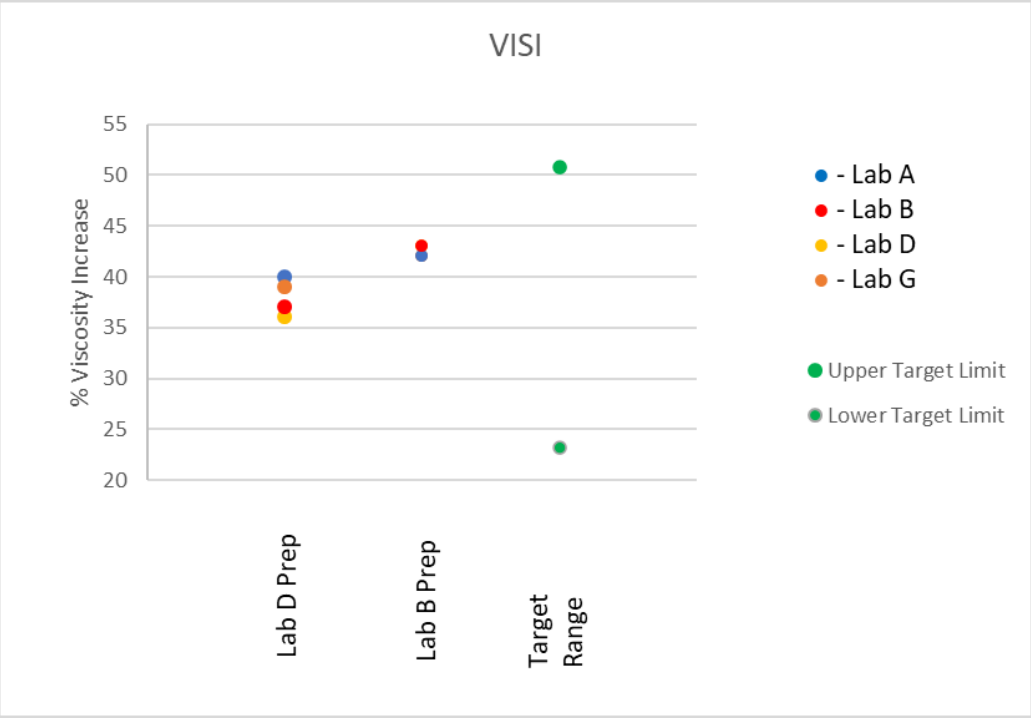
L-60-1 Severity Experiment Plots (PEN)



L-60-1 Severity Experiment Plots (TOL)



L-60-1 Severity Experiment Plots (VISI)



L-60-1 Severity Experiment – Conclusion

- When lab D prepped all of the gears, then all four labs had passing results
  - This is in line with Lab D's historical results
- When Lab B prepped all of the gears, all four labs still have passing results.

L-60-1 Severity Experiment – Next Steps?

- Repeat this experiment with Lab G prepping the gears?
- Await the results of metallurgical analysis?
- Have stats group look at data again now that Lab D has more data with 2018 hardware?

L-60-1: Review of Travis' Summary from Feb 2022

Executive Summary

Average Carbon/Varnish

- Reference oil data historically has been consistently severe of target.
- Though initial testing on 2018 hardware was closer to target, all labs who have switched have seen a shift, and the one lab that hasn't has remained stable, therefore indicating a high likelihood of the new gear batch as the cause of the shift.
- Both reference oils have shifted similarly, providing evidence that candidate behavior is likely also shifted.
- Options:
  1. Correction factor 0.6 merits is recommended for a tests run with the 2018 hardware, in addition to the 0.6 merit correction currently in place, for a total correction of 1.2 merits for tests run on the 2018 hardware.
  2. There are clear differences in precision of ACV across labs, with Lab D running much more precise than other labs. Lab visits are recommended to better understand these differences.
     - Updates to the ACV correction factor may be delayed - pending the findings / conclusions of the lab visits
  3. Do nothing

Average Sludge

- Only 3 data points beyond 2.0 sigma severe, and there is no clear shift at the time of the new hardware introduction.
- It is recommended to continue to monitor this parameter without a correction factor and allow severity adjustments to handle differences in severity.

Membership Review

Allen Comfort	US Army
Amy Zyski	Dana
Arjun Goyal	BASF
Anthony Lange	Intertek
Jason W. Carter	Cummins - Meritor
Dylan Beck	TMC
Nick Schaup	Lubrizol
Matt Sangpeal	Afton
Caroline Louis	SwRI
Rob Banas	ExxonMobil
Troy Muransky	AAM
Rebecca Warden	Oranite

Meeting Minutes Approval

- February 9th, 2023, ASTM Meeting

Old Business

New Business

Adjournment