L-42 Surveillance Panel Meeting Minutes

Intertek PSI, Plymouth, MI and Virtual Meeting – Microsoft Teams

May 7, 2025

Attendees: voting members in **bold,** * indicates virtual attendance

N. Ariemma (Lubrizol)
D. Beck (TMC)*
D. Bell (Afton)
T. Bender (Fuchs)
M. Burgman (Fuchs)
B. Campbell (Afton)
M. Caridi (BASF)
J. Carowick (Cummins)
H. Catania (Cummins)
A. Comfort (US Army)
T. Gibson (Dana)
J. Gingerich (Lubrizol)
A. Goyal (BASF)
D. Horvath (Afton)
A. Jackson (Chevron Oronite)
S. Jetter (Exxon Mobil)
A. Lange (Intertek)
D. Mosher (BASF)
C. Mueller (SwRI)
T. Muransky (AAM)
M. Sangpeal (Afton/C)
E. Sattler (US Army)
N. Schaup (LZ)
A. Smith (Infineum)
A. Stone (Afton)*
C. Vander Wal (Daimler Truck)
W. Venhoff (TMC)
R. Warden (Chevron Oronite)
P. Wright (SwRI)
G. Zarins (AAM)

Call to Order

Review of Agenda
The meeting agenda is attached.

Review of Membership
Add to voting member list: Andrew Smith (Infineum)
Camden Vander Wal (Daimler Truck)

A motion was made to approve the above changes to membership.
Motion: R. Warden
Second: N. Schaup
All in favor, no objections, no abstentions.

Approval of Meeting Minutes
Meeting minutes for approval:

- "20250212_SP" → February 12, 2025 – Surveillance Panel Meeting – San Antonio, TX

A motion was made to approve the meeting minutes as presented.
Motion: N. Schaup
Second: C. Mueller
All in favor, no objections, no abstentions.

Action Item Review

Two open action items remain from Feb:

- IAR to investigate installing L-42 axle on their Efficiency T-Rig. No plans to complete in near future. Closed.
- Chevron-Oronite and Afton to propose a borderline-passing 75W oil for a Canadian L-42 validation run.

Next Hardware Batch Order

Randy Fitzpatrick from Dana gave this update on 4/23/25: "Based on incoming material, build date is not scheduled until July."

Prices increased $29.83 per axle due to import tariffs, revised POs required to move forward. All labs have submitted revised POs.

Pilot axles will all be sent to Lubrizol for validation testing.

Next-Gen L-42 Test Hardware

No recent update from Dana on delivery of first prototype. Still expected around same time as next hardware batch.

Afton will test prototype axles on their fired-engine L-42 test stand.

Wheel Speed DAQ Discussion

Discussion about how labs calculate reported wheel speeds continued from the February SP meeting. The committee decided to add 'left and right' before 'wheel speed' in 12.1.2. This specifically defines which channels to use at all required locations.

Equations for maximum, minimum, and average wheel speeds were also defined:

$$Drive\ Side\ Average = \frac{B_{1R} + B_{1L} + B_{2R} + B_{2L} + B_{3R} + B_{3L}}{6}$$

$$Coast\ Side\ Average = \frac{C_{1R} + C_{1L} + C_{2R} + C_{2L} + C_{3R} + C_{3L} + C_{4R} + C_{4L}}{8}$$

$$Drive\ Side\ Minimum = Min[B_{1R}, B_{1L}, B_{2R}, B_{2L}, B_{3R}, B_{3L}]$$

$$Coast\ Side\ Minimum = Min[C_{1R}, C_{1L}, C_{2R}, C_{2L}, C_{3R}, C_{3L}, C_{4R}, C_{4L}]$$

$$Drive\ Side\ Maximum = Max[B_{1R}, B_{1L}, B_{2R}, B_{2L}, B_{3R}, B_{3L}]$$

$$Coast\ Side\ Maximum = Max[C_{1R}, C_{1L}, C_{2R}, C_{2L}, C_{3R}, C_{3L}, C_{4R}, C_{4L}]$$

These will be added to D7542. Labs all agreed to use this method going forward.

A motion was made to add 'left and right' before 'wheel speed' in 12.1.2 and to add equations for wheel speed minimum, maximum, and average. Labs must incorporate the newly defined methods of calculation into their test reports by June 7, 2025.
Motion: N. Schaup
Second: T. Muransky
All in favor, no objections, no abstentions.

Single Reference Test Torque Validity Discussion

Discussion continued from February SP meeting regarding Single Try reference test validity checks. The committee defined a method: The single try reference test Shock Series 1 and 2 Average Coast Side Torque values must be within 15% and 10% (respectively) of the average of the reference sequence in which it will be added to.

Example:

Seq 1 TQ_A, TQ_B, TQ_C must be within 15%(S1) and 10%(S2) of each other
Seq 2 TQ_B, TQ_C, TQ_D must be within 15%(S1) and 10%(S2) of each other
Seq 3 TQ_C, TQ_D, TQ_E must be within 15%(S1) and 10%(S2) of each other
where TQ = Shock Series 1 Average Coast Side Torque

Action Item: W. Venhoff to add validity check for Single Try reference test to TMC protocol. W. Venhoff also to create a table with examples of Reference Sequences to help clarify requirements in D7452.

Action Item: M. Sangpeal to set up conference call to discuss definition of the term 'Single Scan' and adding examples and equations to add clarity to D7452.

Pinion Torque Limits in C1 and C3

Table A8.1 leaves out Pinion Torque Limits in Conditioning 1 and 3.

A motion was made to add a row to Table A8.1 defining Conditioning 1 and 3 Percent Out Pinion Torque limits as 5%.
Motion: W. Venhoff
Second: M. Sangpeal
All in favor, no objections, no abstentions.

L-42-1 Development

Some discussion was had around amending the current D7452 method to add electric test stand variants. The committee ultimately decided that creating a new ASTM test method would be the best path to add electric L-42 testing to the ASTM method database.

ASTM will be contacted to obtain an editable version of D7452. The committee will then begin drafting L-42-1. An ASTM facilitator will then be contacted, who will help create a new test method designation.

Action Item: N. Ariemma to contact ASTM to request an editable version of D7452.

Call for New Reference Oil

A request was made to lubricant suppliers to develop a new high reference oil for L-42 testing. Any interested lubricant supplier can contact the TMC directly. The new oil should produce equivalent performance to TMC 117 without the use of any correction factors.

New/Open Issues

An inquiry was recently made about coated L-42 test gears. D7452 calls out only uncoated gears in section 6.2. There are no plans to add coated gears to the test protocol.

A request was made to add additional axle build specifications (ex. Backlash, Rotating Torque) to D7452. Those specifications are currently called out in the purchase agreement with Dana.

Action Item: M. Sangpeal to set up conference call with test labs and TMC to discuss adding axle build specs to D7452.

Adjournment

A motion was made to adjourn.
Motion: T. Muransky
Second: R. Warden
All in favor, no objections, no abstentions.

Meeting adjourned.

Respectfully submitted,

Matthew A Sangpeal

Matt Sangpeal
L-42 Surveillance Panel Chairman

L-42 Surveillance Panel Meeting

ASTM D7452

Intertek PSI

Plymouth Township, MI

May 7, 2025

9:00 – 10:00 AM EST

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Agenda

- **Call to Order**
- **Agenda**
- **Membership Review & Update**
- **Approval of Meeting Minutes**
  - "20250212 SP" – Southwest Research Institute, San Antonio, TX
- **Action Item Review**
- **Next Hardware Batch Order Update**
- **Next-Gen L-42 Test Hardware Update**
- **Wheel Speed Discussion**
- **Single Calibration Tests**
- **Pinion Torque Limits in C1 and C3**
- **L-42-1 Development Updates**
- **Call for New Reference Oil**
- **New Issues**
- **Adjournment**

L-42 SP Voting Members

- **Steve Jetter:** **Exxon Mobil**
- **Wes Venhoff:** **TMC**
- **Allen Comfort:** **US Army**
- **Arjun Goyal:** **BASF**
- **Troy Muransky:** **AAM**
- **Jessica Carowick:** **Cummins**
- **Matt Sangpeal:** **Afton Chemical (Chair)**
- **Nick Schaup:** **Lubrizol**
- **Anthony Lange:** **Intertek**
- **Caroline Mueller:** **SwRI**
- **Trevor Gibson:** **Dana**
- **Rebecca Warden:** **Chevron-Oronite**

*Add Andrew Smith (Infineum) and
Camden Vander Wal (Daimler Truck)

Approval of Meeting Minutes

SP Meeting Minutes

- "20250212 SP" → February 12, 2025 – Surveillance Panel Meeting - Southwest Research Institute, San Antonio, TX and Virtual Meeting via Microsoft Teams

Motion to Approve Meeting Minutes as they stand.

Action Item Review

- **IAR to investigate installing L-42 axle on their Efficiency T-Rig.**
  - Status: No progress
- **Afton and Chevron-Oronite will propose a borderline-passing 75W oil for a Canadian L-42 validation run.**
  - Status Afton: In-process, data expected by Aug. SP meeting
  - Status Chevron-Oronite: In-process, data expected by Aug. SP meeting
- **M. Sangpeal will set up a meeting with the TMC to begin discussion on writing a new ASTM test method.**
  - Status: Complete (see slides for more info)
- **M. Sangpeal will setup a conference call with labs to discuss adding torque limits to single-try reference tests and editing D7452 to clarify torque limit requirements.**
  - Status: Complete (see slides for more info)
- **M. Sangpeal to set up conference call to discuss editing 12.1.2 to clarify requirements and standardizing speed calculations.**
  - Status: Complete (see slides for more info)
- **TMC will send a request to lubricant suppliers to submit a new reference oil for testing.**
  - Status: Request to be issued today

Next Hardware Batch Order

Update from Dana:

- Randy Fitzpatrick, 4/23/25:
  - “Based on incoming material, build date is not scheduled until July.”

PO Status:

- Revised PO status?
  - Price increase due to import tariffs
  - $29.83 per axle

Pilot Axle Test Facility:

- Lubrizol

Next-Gen L-42 Hardware Update

- **Hardware validation plan:**
  - Approved in Feb. SP meeting
- **Timing for delivery:**
  - Close to next production run (waiting for fresh update from Dana)
- **Prototype testing lab:**
  - Afton
- **Which 75W oil will be tested / who will provide?**
  - Afton or Chevron-Oronite

Wheel Speed Discussion

Conf. Call w/ test labs and TMC on 4.25.25

- Decide on single method to calculate reported wheel speeds
- Propose edit to D7452 to clarify requirement

12.1.2 *Wheel Speeds:*

12.1.2.1 During Conditioning 1, see Fig. A6.11 location (A) and Conditioning 3, see Fig. A6.12 location (D), the reported wheel speeds shall be the average over the steady-state sequence.

12.1.2.2 Referring to Figs. A6.11 and A6.12, during Conditioning 2 or 4, the value of the maximum and minimum single scan conditioning 2 and 4 wheel speeds are located at (B_1-B_3 and C_1-C_4) and (E_1-E_3 and F_1-F_4) respectively. For both conditioning 2 and 4, independently report the maximum, minimum, and average of the single scan maximum speeds and the maximum, minimum, and average of the single scan minimum speeds by including all peaks and valleys not connected to a steady state operating condition phase.

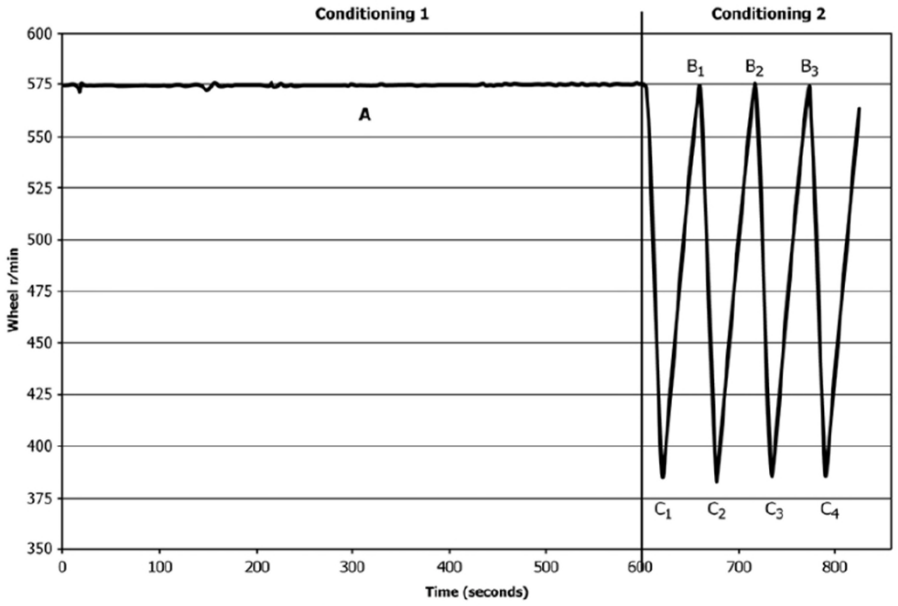

FIG. A6.11 Conditioning 1 & 2—Wheel Speed

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Wheel Speed Discussion (Cont.)

Proposed edit

- Add ‘left and right’ before ‘wheel speeds’ in 12.1.2

12.1.2 Wheel Speeds:

12.1.2.1 During Conditioning 1, see **Fig. A6.11** location (A) and Conditioning 3, see **Fig. A6.12** location (D), the reported left and right wheel speeds shall be the average over the steady-state sequence.

12.1.2.2 Referring to **Figs. A6.11 and A6.12**, during Conditioning 2 or 4, the value of the maximum and minimum single scan conditioning 2 and 4 left and right wheel speeds are located at (B_1-B_3 and C_1-C_4) and (E_1-E_3 and F_1-F_4) respectively. For both conditioning 2 and 4, independently report the maximum, minimum, and average of the single scan maximum speeds and the maximum, minimum, and average of the single scan minimum speeds by including all peaks and valleys not connected to a steady state operating condition phase.

12.1.2.3 Referring to **Fig. A6.13**, during Shock Series 1, the value of the maximum and minimum single scan Shock Series 1 left and right wheel speeds are to be found at locations (G_1-G_5) and (H_1-H_4) respectively. Report the maximum, minimum, and average of the single scan maximum speeds and the maximum, minimum, and average of the single scan minimum speeds by including all peaks and valleys not connected to a steady state operating condition phase.

12.1.2.4 Referring to **Fig. A6.14**, during Shock Series 2, the value of the maximum and minimum single scan Shock Series 2 left and right wheel speeds are to be found at locations (I_1-I_{10}) and (J_1-J_9) respectively. Report the maximum, minimum, and average of the single scan maximum speeds and the maximum, minimum, and average of the single scan minimum speeds by including all peaks and valleys not connected to a steady state operating condition phase.

Wheel Speed Discussion (Cont.)

Calculation Method

- Min, Max, and Avg of both left and right wheel speeds at B_1-B_3 and C_1-C_4

Conditioning 2 Example

$$Drive\ Side\ Average = \frac{B_{1R} + B_{1L} + B_{2R} + B_{2L} + B_{3R} + B_{3L}}{6}$$

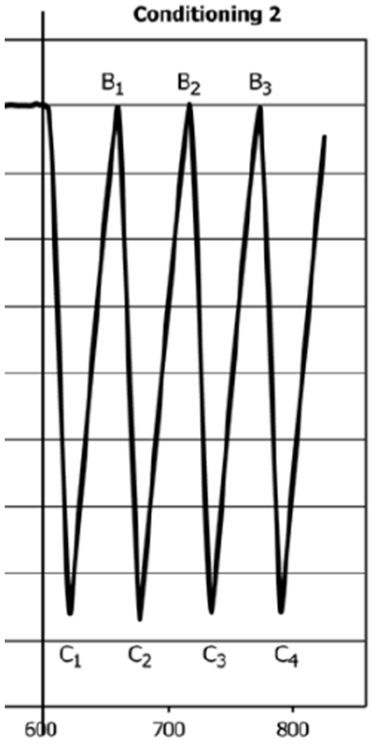
$$Coast\ Side\ Average = \frac{C_{1R} + C_{1L} + C_{2R} + C_{2L} + C_{3R} + C_{3L} + C_{4R} + C_{4L}}{8}$$

$$Drive\ Side\ Minimum = Min[B_{1R}, B_{1L}, B_{2R}, B_{2L}, B_{3R}, B_{3L}]$$

$$Coast\ Side\ Minimum = Min[C_{1R}, C_{1L}, C_{2R}, C_{2L}, C_{3R}, C_{3L}, C_{4R}, C_{4L}]$$

$$Drive\ Side\ Maximum = Max[B_{1R}, B_{1L}, B_{2R}, B_{2L}, B_{3R}, B_{3L}]$$

$$Coast\ Side\ Maximum = Max[C_{1R}, C_{1L}, C_{2R}, C_{2L}, C_{3R}, C_{3L}, C_{4R}, C_{4L}]$$



Motion to Approve Clarifications?

Wheel Speed Discussion (Cont.)

6.7, 6.8, 6.9, and 6.9.1

- All sections are unique and required to fully define requirements

6.7 Torque Meter—Include in the test equipment a torque meter installed in the drive shaft (see Figs. A6.3-A6.5) to measure the torque applied to the pinion. Install a Himmelstein inline torque meter Model numbers MCRT28061T(1-4) or MCRT2661TN(1-4) [9, 10] without a foot mount and a range of 10 000 lb-in. (1130 N·m) shall be installed to measure pinion torque. Additional suffix letters only indicate allowable options.

6.8 Signal Conditioning—Use a Himmelstein Models 701 or 711 strain gage conditioner for signal conditioning. Set the low pass cut-off frequency at 10 Hz.

6.9 Digital Data Acquisition System—System requires capability of measuring a minimum of five channels at sampling frequencies outlined in Section 10.

6.9.1 Do not use hardware or software filtering for the pinion torque channel during data acquisition periods of the test.

'Single Scan'

- Define 'Single Scan' and add to D7452
  - Raw data as defined by 6.9.1

Single Calibration Tests

From Feb. SP meeting:

- Single Calibration Tests
  - Should we have shock series coast side torque operational validity requirements (+/- 15% for SS1 & +/-10% for SS2) based on the averages from the previous, 3-test calibration sequence?

Conf. Call w/test labs and TMC on 4.25.25

Single Calibration Tests (Cont.)

Definition of 'Calibration Sequence'

A8.4 Coast Side Torque Limits

A8.4.1 Non-reference and Discrimination oil test, Shock Series 1 average coast side torque values shall be within ±15 % of the average Shock Series 1 coast side torque value of the average of the three tests from the most recent operationally and statistically valid reference oil calibration sequence for the test to be considered operationally valid. Each test in a calibration sequence is considered operationally valid if the average Shock Series 1 coast side torque values are within ±15 % of the average of the three acceptable calibration sequence tests.

A8.4.2 Non-reference and Discrimination oil test, Shock Series 2 average coast side torque values shall be within ±10 % of the average Shock Series 2 coast side torque value of the average of the three tests from the most recent operationally and statistically valid reference oil calibration sequence for the test to be considered operationally valid. Each test in a calibration sequence is considered operationally valid if the average Shock Series 2 coast side torque values are within ±10 % of the average of the three acceptable calibration sequence tests.

Calibration Sequence 1: Ref A, Ref B, Ref C

Calibration Sequence 2: Ref B, Ref C, Ref D

Calibration Sequence 3: Ref C, Ref D, Ref E

where Ref = Valid Hi Ref Oil Test, RED = Single Test Try

Single Calibration Tests (Cont.)

Shock 1 Candidate Test Torque Limit Example

$$Seq\ 1\ Shock\ 1\ Torque\ Limits = \left(\frac{TQ_A + TQ_B + TQ_C}{3}\right) \pm \left[\left(\frac{TQ_A + TQ_B + TQ_C}{3}\right) * 0.15\right]$$

$$Seq\ 2\ Shock\ 1\ Torque\ Limits = \left(\frac{TQ_B + TQ_C + TQ_D}{3}\right) \pm \left[\left(\frac{TQ_B + TQ_C + TQ_D}{3}\right) * 0.15\right]$$

$$Seq\ 3\ Shock\ 1\ Torque\ Limits = \left(\frac{TQ_C + TQ_D + TQ_E}{3}\right) \pm \left[\left(\frac{TQ_C + TQ_D + TQ_E}{3}\right) * 0.15\right]$$

where TQ = Shock Series 1 Average Coast Side Torque

Current Reference Test Validity Check

- TQ_A, TQ_B, TQ_C must be within 15%(S1) and 10%(S2) of each other
- No check for Single Test Try

Proposed Validity Check

- Seq 1 TQ_A, TQ_B, TQ_C must be within 15%(S1) and 10%(S2) of each other
- Seq 2 TQ_B, TQ_C, TQ_D must be within 15%(S1) and 10%(S2) of each other
- Seq 3 TQ_C, TQ_D, TQ_E must be within 15%(S1) and 10%(S2) of each other

Motion to Approve additional Validity Check?

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Pinion Torque Limits in C1 and C3

- **Table A8.1 leaves out Pinion Torque Limits in Conditioning 1 and 3**
  - Propose to add Pinion Torque row to Table A8.1

TABLE A8.1 Critical Operating Parameter Limits

Parameter	Entire Conditioning Phase Limits	Conditioning Phase 1 Limits	Conditioning Phase 3 Limits
Axle Oil Temperature	5 %	...	...
Axle Speed	...	5 %	5 %

Percent Deviation						
	Entire Conditioning Phase		Conditioning Phase 1		Conditioning Phase 3	
Parameter	Limits	% Out	Limits	% Out	Limits	% Out
Axle Oil Temp.	5.0%	0.0				
Axle r/min			5.0%	0.0	5.0%	0.0
Pinion Torque			5.0%	0.0	5.0%	0.0

Motion to Add Pinion Torque to Table A8.1?

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L-42-1 Development Updates

- **Conf. call w/TMC on 4.24.25 to discuss new procedure**
  - Most of D7452 will remain unchanged
    - Keep all axle speed, torque, and temperature set points
    - Same test phases, Standard and Canadian variants
    - Remove all engine-related and throttle control verbiage / setpoints
  - Propose amending D7452 instead of creating new method
    - Three versions of the L-42 test
      - D7452a = Fired-Engine
      - D7452b = Electric Drive Motor + Eddy Current Dynos
      - D7452c = Electric Drive Motor + Electric Absorbing Motors

Call for New Reference Oil

- **A request is being made to lubricant suppliers to develop a new high reference oil for L-42 testing.**
  - Any interested lubricant supplier can contact the TMC directly
- **The new oil should produce equivalent performance to TMC 117 without the use of any correction factors.**
  - TMC 117 Correction Factors:
    - R: 4 P: 6
  - TMC 117 Targets:
    - Mean: 23 Std. Dev: 5.49
    - Low: 13 High: 32

New Issues

- ?

Motion to Adjourn

Thanks!

L-42 Surveillance Panel Membership/Attendance
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Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
	Aguirre, Nancy	NV	Intertek Automotive Research	Phone:	
			5404 Bandera Rd. San Antonio, TX 78238	E-mail:	nancy.aguirre@intertek.com
NA	Ariemma, Nick	NV	The Lubrizol Corporation	Phone:	
			29400 Lakeland Boulevard Wickliffe, OH 44092	E-mail:	Nick.Ariemma@Lubrizol.com
	Banas, Rob	V	ExxonMobil Product Solutions	Phone:	770-833-5920
			535 Thomas Lane Waleska, GA 30183	E-mail:	rob.a.banas@exxonmobil.com
Virtual	Beck, Dylan	NV	ASTM Test Monitoring Center	Phone:	724-355-1854
			203 Armstrong Drive Freeport, PA 16229	E-mail:	djb@astmtmc.org
DB	Bell, Don	NV	Afton Chemical	Phone:	804-788-6332
			500 Spring St. Richmond, VA 23219	E-mail:	don.bell@aftonchemical.com

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Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
TB	Bender, Tobias	NV	Fuchs Lubricants	Phone:	708-737-1681
			17050 Lathrop Ave Harvey, IL 60426	E-mail:	Tobias. Bender@fuchs.com
MB	Burgman, Maxim	NV	Fuchs Lubricants	Phone:	248-846-3120
			17050 Lathrop Ave Harvey, IL 60426	E-mail:	maxim.burgman@fuchs.com
BC	Campbell, Bob	NV	Afton Chemical	Phone:	804-788-5340
			500 Spring St. Richmond, VA 23219	E-mail:	Bob.Campbell@aftonchemical.com
MC	Caridi, Margaret	NV	BASF	Phone:	914-785-2336
			500 White Plains Rd Tarrytown, NY 10591	E-mail:	margaret.caridi@basf.com
JC	Carowick, Jessica	V	Cummins	Phone:	248-872-3055
			2135 W. Maple Rd Troy, MI 48084	E-mail:	Jessica.Carowick@cummins.com

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Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
HC	Catania, Hailey	NV	Cummins-Meritor	Phone:	248-821-9862
			2135 W. Maple Rd Troy, MI 48084	E-mail:	Hailey.Catania@cummins.com
	Cereghino, Brian	NV	IPAC Inc.	Phone:	
				E-mail:	bcereghino@ipac-inc.com
	Charron, Michael	NV	Southwest Research Institute	Phone:	832-444-2180
			6220 Culebra Rd. San Antonio, TX 78238	E-mail:	michael.charron@swri.org
	Clark, Jeff	NV	ASTM Test Monitoring Center	Phone:	412-365-1032
			203 Armstrong Drive Freeport, PA 16229	E-mail:	jac@astmtmc.org
AC	Comfort, Allen	V	US Army DEVCOM	Phone:	586-282-4225
				E-mail:	allen.s.comfort.civ@army.mil

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Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
	De La Fuente, Hector	NV	Chevron Oronite	Phone:	210-867-8612
				E-mail:	hdelafuente@chevron.com
	Fry, Enia	NV	Daimler Truck	Phone:	313-802-2835
				E-mail:	enia.fry@daimlertruck.com
TG	Gibson, Trevor	V	Dana Incorporated	Phone:	419-386-9783
			3939 Technology Dr Maumee, OH 43537	E-mail:	trevor.gibson@dana.com
JC	Gingerich, Jason	NV	The Lubrizol Corporation	Phone:	440-391-0101
			29400 Lakeland Boulevard Wickliffe, OH 44092	E-mail:	Jason.Gingerich@lubrizol.com
AG	Goyal, Arjun	V	BASF	Phone:	914-785-2083
			500 White Plains Rd Tarrytown, NY 10591	E-mail:	arjun.goyal@basf.com

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Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
	Hahn, Hyeok	NV	Chevron Oronite	Phone:	408-507-2848
				E-mail:	hyeok.hahn@chevron.com
	Haynes, Troy	NV	IPAC Inc.	Phone:	
				E-mail:	thaynes@ipac-inc.com
DH	Horvath, Dan	NV	Afton Chemical	Phone:	248-514-2551
			2000 Town Center, Suite 1160 Southfield, MI 48075	E-mail:	dan.horvath@aftonchemical.com
AJ	Jackson, Alexander	NV	Chevron Oronite	Phone:	510-367-7541
			4502 Centerview, Suite 210 San Antonio, TX 78228	E-mail:	alexmjack@chevron.com
	Jetter, Steve	V	Exxon Mobil	Phone:	848-214-3869
			245 Hickory Corner RD East Windsor, NJ 08520	E-mail:	steven.m.jetter@exxonmobil.com

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Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
	Jordan, Brad	NV	Shell	Phone:	804-516-1238
			2084 Ditchley Rd Kilmarnock, VA 22482	E-mail:	brad.jordan@shell.com
	Joy, Tisha	NV	BASF	Phone:	914-785-2206
				E-mail:	tisha.joy@basf.com
	Kanga, Percy	NV	Exxon Mobil (Retired)	Phone:	
				E-mail:	
	Kostan, Travis	NV	Southwest Research Institute	Phone:	210.522.2407
				E-mail:	travis.kostan@swri.org
	Lange, Anthony	V	Intertek Automotive Research	Phone:	210-634-1103
			5404 Bandera Rd. San Antonio, TX 78238	E-mail:	anthony.lange@intertek.com

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Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
	Morris, Jeanelle	NV	Navistar	Phone:	331-332-1661
			2701 Navistar Dr Lisle, IL 60532	E-mail:	jeanelle.morris@navistar.com
DM	Mosher, Donna	NV	BASF	Phone:	269-217-1715
			100 Park Ave Florham Park, NJ 07932	E-mail:	donna.mosher@basf.com
CM	Mueller, Caroline	V	Southwest Research Institute	Phone:	210-522-2671
			6220 Culebra Rd. San Antonio, TX 78238	E-mail:	caroline.louis@swri.org
TM	Muransky, Troy	V	AAM	Phone:	734-564-8406
			1840 Holbrook Ave Detroit, MI 48212	E-mail:	troy.muransky@aam.com
	Neal, Suzanne	NV	Daimler Trucks/Detroit Diesel	Phone:	
				E-mail:	suzanne.neal@daimler.com

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May 7, 2025

Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
	Portell, Michael	NV	Intertek Automotive Research	Phone:	210-896-8012
			5404 Bandera Rd. San Antonio, TX 78238	E-mail:	michael.portell@intetek.com
MS	Sangpeal, Matt	V/Chair	Afton Chemical	Phone:	804-788-5364
			500 Spring St. Richmond, VA 23219	E-mail:	matt.sangpeal@aftonchemical.com
ES	Sattler, Eric	NV	CCDC-GVSC	Phone:	586-282-2272
			Warren, MI	E-mail:	eric.r.sattler.civ@army.mil
NS	Schaup, Nick	V	The Lubrizol Corporation	Phone:	616-710-2546
			29400 Lakeland Boulevard Wickliffe, OH 44092	E-mail:	Nick.Schaup@Lubrizol.com
	Schweitzer, Addison	NV	Shell	Phone:	346-549-2481
				E-mail:	Addison.Schweitzer@shell.com

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Intertek PSI, Plymouth, MI and Microsoft Teams Virtual Meeting
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Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
	Uy, Dairene	NV	Shell	Phone:	281-544-6781
				E-mail:	dairene.uy@shell.com
CVW	Vander Wal, Camden	NV	Daimler Truck / Detroit Diesel	Phone:	616-431-1836
			13400 Outa Dr West Radford, MI 48239	E-mail:	camden.vander-wal@daimlertruck.com
WV	Venhoff, Wes	V	ASTM Test Monitoring Center	Phone:	
			203 Armstrong Drive Freeport, PA 16229	E-mail:	wnv@astmtmc.org
RW	Warden, Rebecca	V	Chevron Oronite	Phone:	830-865-6771
			4502 Centerview, Suite 210 San Antonio, TX 78228	E-mail:	Rebecca.Warden@chevron.com
PW	Wright, Payton	NV	Southwest Research Institute	Phone:	
			6220 Culebra Rd San Antonio, TX 78238	E-mail:	Payton.Wright@swri.org

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Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
	Yucebilgic, Fatih	NV	Fuchs Lubricants	Phone:	708-539-0252
			17050 Lathrop Ave Harvey, IL 60426	E-mail:	fatih.yucebilgic@fuchs.com
GZ	Zarins, George	NV	AAM	Phone:	586-854-8810
			1840 Holbrook Detroit, MI	E-mail:	george.zarins@aam.com
	Zreik, Khaled	NV	General Motors	Phone:	248-977-9214
			823 Joslyn Ave Pontiac, MI 84340-2925	E-mail:	khaled.zreik@gm.com
	Smith, Andrew		Infineum	Phone:	210-823-8501
				E-mail:	andrew.smith@infineum.com
				Phone:	
				E-mail:	