ASTM Engine Oil Gelation Test (EOGT) WK86363 Update

EOFT and EOWTT Surveillance Panel Meeting

April 23, 2025

Yong-Li McFarland, Chair

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EOFT and EOWTT Surveillance Panel Membership

21 members

Sarah Fitzgerald, Afton Chemical
Michael Kunselman, KJA Group
Robert Stockwell, Chevron Oronite
Quanchang Li, ExxonMobil
Michael Deegan, Ford
Melissa Chu, Infineum
Angela Willis, Infineum
Joe Franklin, Intertek
Karina Gil, Intertek
Yuliza Rocha, Intertek
Michael Johnscher, ISP
Litchi Xie, Lubrizol Additive (Zhuhai) Co., Ltd.
Victoria Fein, Lubrizol
Jason Bowden, OH Technologies Inc
Greg Miiller, Savant Group
Sean Alston, SGS North America
Jared Cavaliere, SwRI
Becky Grinfield, SwRI
Yong-Li McFarland*, SwRI
John Loop, TMC
Amy Ross, Valvoline

*Chair

New EOGT WK86363, ILS# 1854

- Ford request for a new Engine Oil Gelation Test (EOGT): request to add a new test filterability test to better screen oils for field issues
- Status:
  - Method: 1 draft (Afton method V9.6) uploaded on ASTM Collaboration Area
  - Oils: 11 potential reference oils offered; 17 oils received at TMC
  - Screening Tests and ILS: ILS tests ongoing
  - Timing: ILS tests to be run by April, and test available in August 2025

Agenda:

- 1. ILS status, feedback on EOGT method V9.7 or report form
- 2. Concerns from industry on if EOGT is representative of field issue

Pilot II/ILS Updates 4-23-25

- Afton: completed ILS and submit 4-23-25
- SwRI: completed ILS and submitted already
- Savant: plan to rerun Pilot II, waiting on additional samples from TMC
- Intertek: completed ILS and submit 4-23-25
- Valvoline: completed ILS and submit 4-23-25
- Infineum: completed ILS and submitted already
- Lubrizol: completed ILS and submitted already
- Richful: starting Pilot II, waiting on additional sample arrival from TMC
- No questions or comments on the Method or Report Form

ILS Details

Labs(8)

- **Afton**
- **Infineum**
- **Intertek**
- **Lubrizol**
- Richful
- Savant
- **SwRI**
- **Valvoline**

Samples (7)

- Oil U* (**low** flow): 2 containers
- Oil F (**low** flow): 2 containers
- Oil E (**mid** flow): **not** eligible to be reference oil, 3 containers
- Oil R (**mid** flow): 3 containers
- Oil K (**high** flow): 2 containers
- Oil M (**high** flow): 2 containers
- Oil P (**high** flow): 2 containers

Details

- Each Test is 2 runs, results will be reported as average of 2 runs. A duplicate test is 4 runs. A triplicate test is 6 runs.
- Each lab will run 32 runs for ILS
- Duplicate test will need two 120 mL containers and triplicate test needs three 120 mL containers
- Use procedure EOGT 9.7
- Use industry matrix for run order
- Labs to send completed EOGT ILS Report Form to TMC by **May 1.**
- ASTM to start Research Report

3-6-25 Notes: ILS will start and samples to be shipped out by TMC. Report form and latest procedure will be sent out to all labs in ILS.

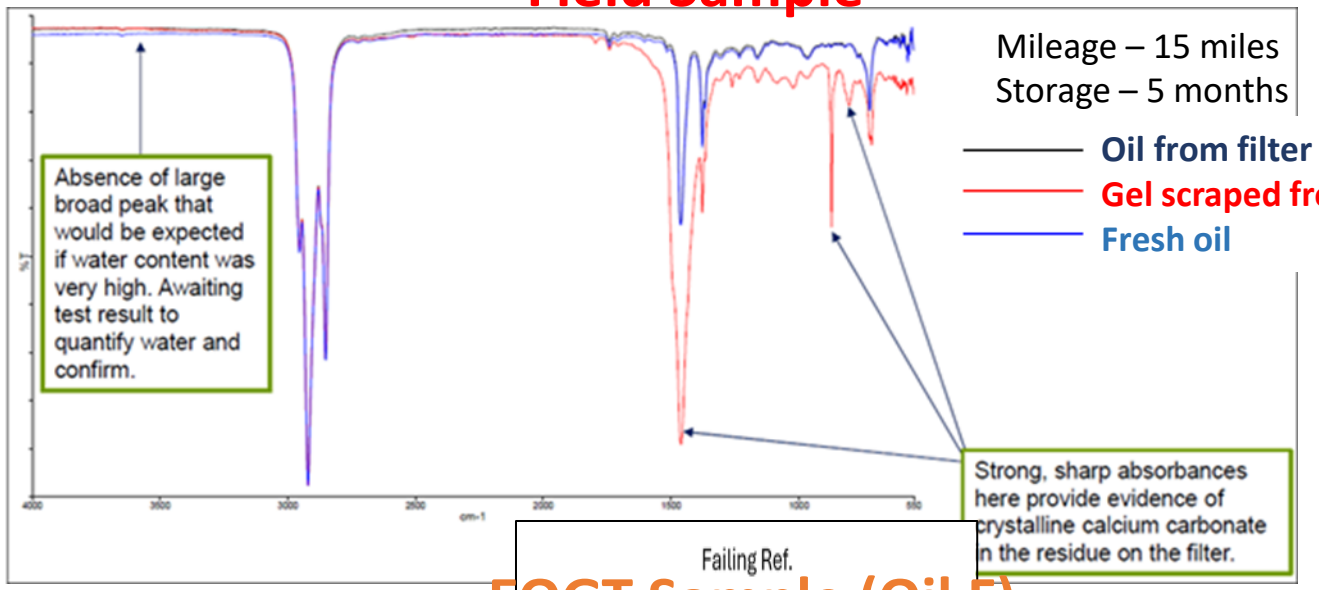
EOGT representative of field issue?

- During Feb 2025 API meetings, multiple questions regarding if the test is representative of the field issue, if gel samples were tested and similar to field samples
- Concern if EOGT test is correlated to original issue
- Gel analysis?
- What is group's response, next steps?
- Ford (Rob, Mike) to provide a response that can be shared with others.

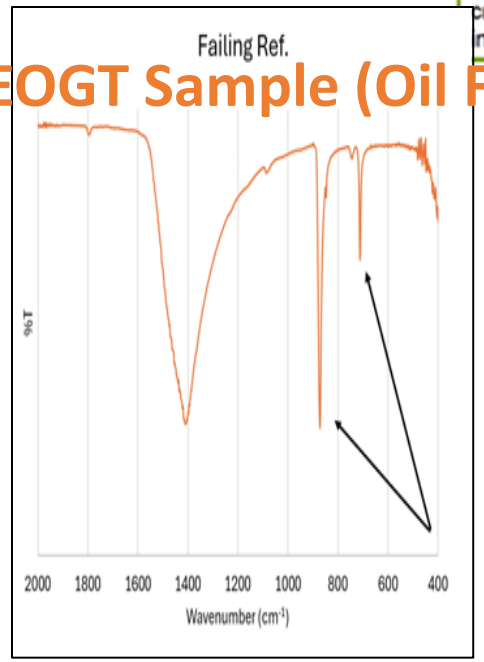
- 3-27-25 Notes: Ford reviewed previous FTIR analysis completed and saw peaks associated with crystalline calcium carbonate which promotes the gelling. EOGT is representative of the field issue. Ford to show FTIR comparison of the field sample and current gelling EOGT sample and current "good" EOGT sample
- Response for AOAP or Lubricants group.
- Ford engine test that ran Oil F and K, but no analytical data collected on samples
- Will FTIR show the calcite?

FTIR Analysis

Field Sample

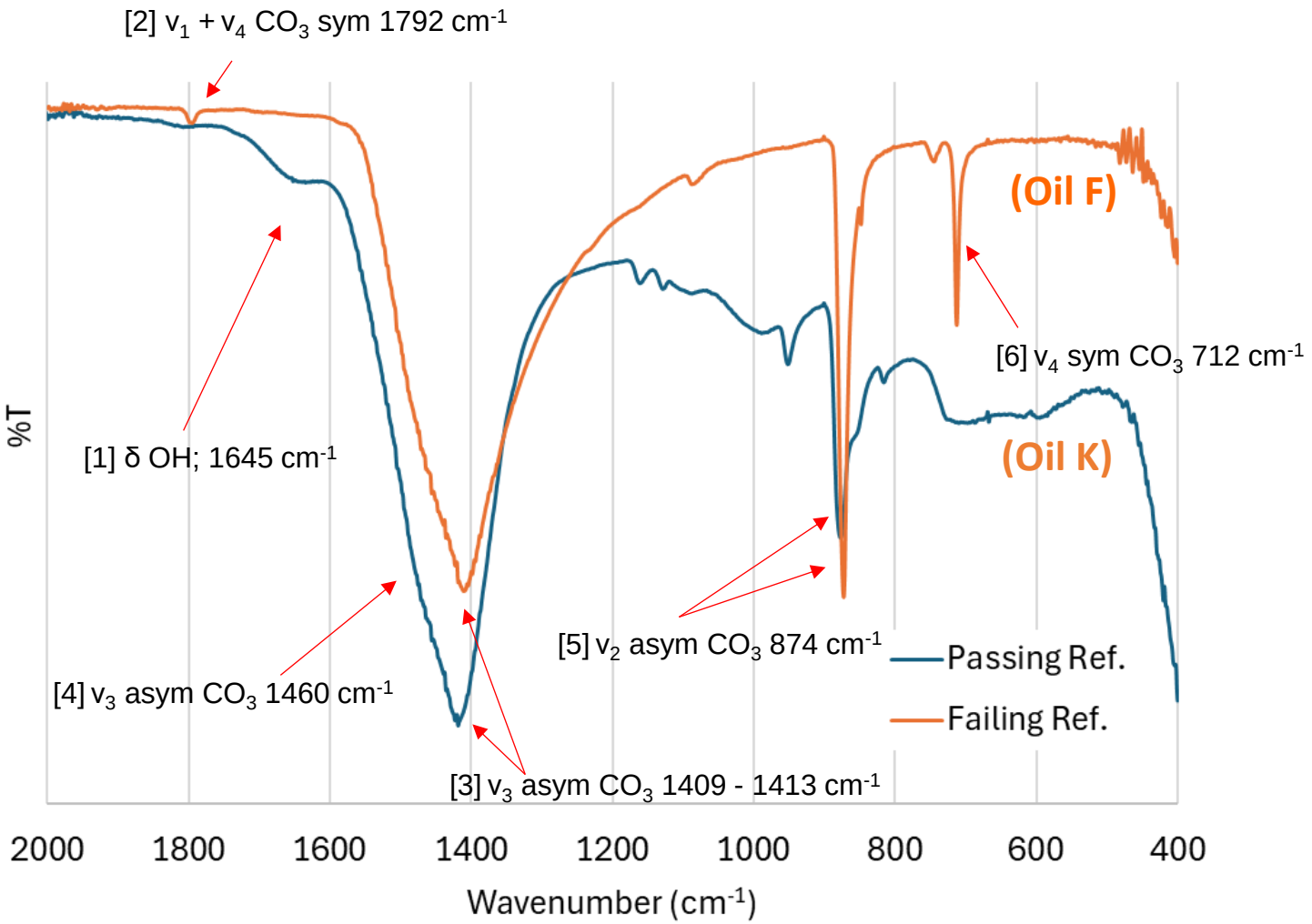


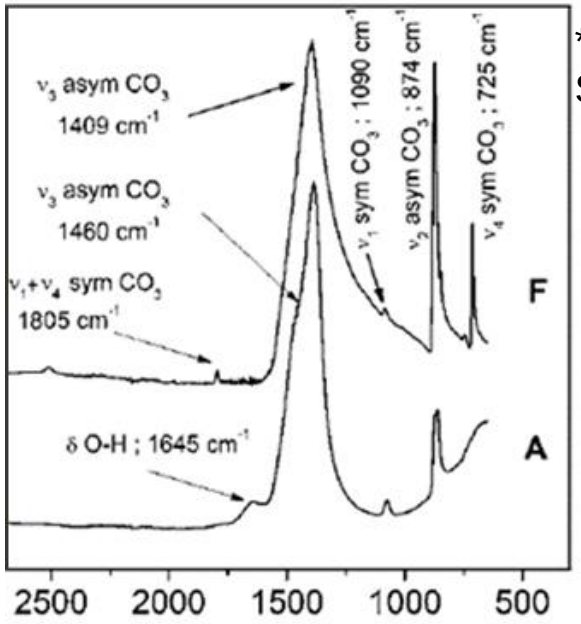
EOGT Sample (Oil F)



- FTIR analysis of gel formed in the field and in EOGT (Oil F) both suggest the formation of crystalline calcium carbonate

Pass-Fail EOGT FTIR Analysis





*Reference Spectra

Amorphous $CaCO_3$ interpretation (Passing)

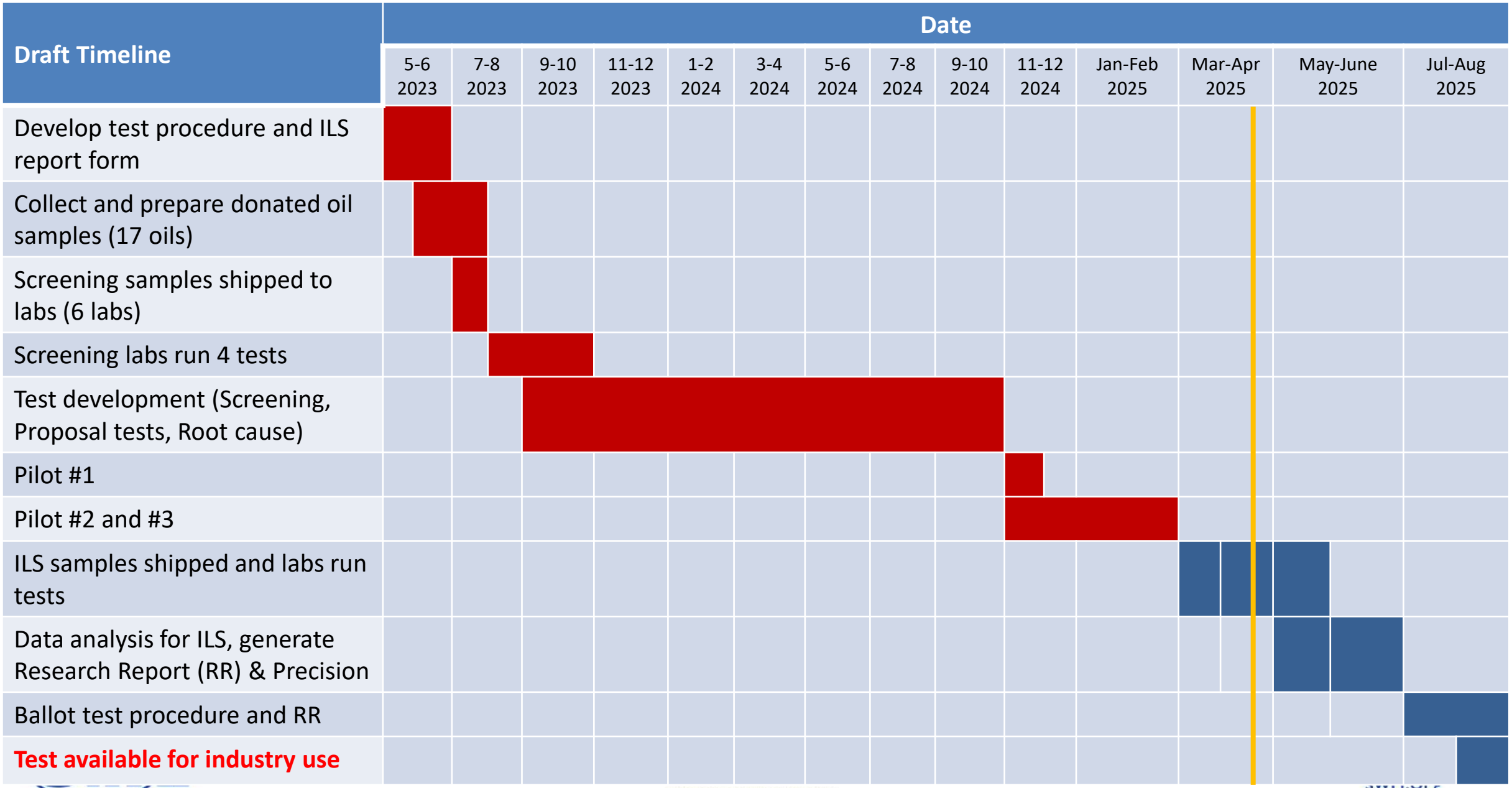
[1] Associated water with amorphous phase
[4] Slight shoulder at 1460 cm^{-1}
[5] Broadened shoulder at out-of-plane 874 cm^{-1}
[6] Absence of 712 cm^{-1} only shown in calcite phase
Note: May have some small amount of vaterite

Crystalline $CaCO_3$ interpretation (Failing)

[1] Absence of associated water with amorphous phase
[4] No shoulder at 1460 cm^{-1}
[5] Sharp peak at out-of-plane 874 cm^{-1}
[6] Sharp peak at 712 cm^{-1} only shown in calcite phase

*Rodriguez-Blanco, J. D., Shaw, S., and Benning, L. G. (2011)The kinetics and mechanisms of amorphous calcium carbonate (ACC) crystallization to calcite, via vaterite.Nanoscale, 3, 265–271.

Draft Timeline – updated Mar 27, 2025



EOFT (D6795) and EOWT (D6794)

- Updated 2025 methods on ASTM website

Action Items and Next Meeting

- Richful and Savant to run Pilot II and send data to Yongli, Jared, and John L
- Statisticians to analyze ILS data from 6 labs
- Jared to show proposed edits to EOGT draft method including edits to Significance section

- Next Meeting: Tue May 13 at 9AM CDT for 1 hr

Thank you for your support!

Participants		
Method Development (11)	Oil Donations (9)	Testing Labs (10)
Afton ExxonMobil Ford Infineum Intertek ISP Lubrizol Oronite Savant SwRI TMC	Afton Ford Infineum Lubrizol OH Technologies (donate filters only) Oronite Subaru TMC (collection, shipping only) Toyota	Afton Infineum Intertek ISP Lubrizol Richful Savant SwRI TMC (monitoring system only) Valvoline