MEETING MINUTES: ROBO SURVEILLANCE PANEL

Meeting: ROBO SP Meeting

Date: February 21, 2019

Location: Skype meeting

Minutes by: Justin Mills – SP Chair

Actions:

1. Tom Schofield to implement new 438-2 limits.
2. Justin Mills and Tom Schofield to track the number of 438-2 runs. Once there are >20 runs, the limits will be recalculated are shared with the SP.
3. Justin Mills to add D7528 housekeeping as topic for next SP meeting.
    a. SP members are encouraged to review method and bring forward any changes that may be necessary.
4. Justin Mills to schedule next SP meeting for Thursday, April 11th – date is tentative. It will be postponed if there is not enough dilute NO2 data available to vote on and there is <20 runs on 438-2.

Membership and Attendance:

Ace Glass	Dave Lawrence
Afton	*Shelia Thompson, Jeff Yang, Todd Dvorak
ASTM TMC	*Tom Schofield
BASF	Mary Dery, Bridgett Rakestraw
Chevron Oronite	Man Hon Tsang, Robert Stockwell
ExxonMobil	Dennis Gaal
Infineum	Andy Richie, Sapna Eticala
Intertek	Joe Franklin, *Matt Schlaff,
Lubrizol	*Mike Faile, *Aimee Shinhearl, Rick Hartman
PetroChina	Li Shaohui , Sun Ruihua, Peng Wang, Xiaogang Li, Xu Li
Evonik Oil Additives	*Justin Mills, Bruce Zweitzig, *Joan Souchik, John Maxwell, Justin Kontra
Vanderbilt Chemicals	Al Filho, Ron Hiza
SwRI	Becky Grinfield, Joe De La Cruz, *Mike Birke, Young-Li McFarland
Valvoline	Amol Savant, Kevin Figgatt, *Steve Lazzara
Koehler Instruments	*Raj Shah, *Vincent Colantuini
Tannas/Savant	Greg Miller, Ted Selby
General Interest	*Alan Flamberg
Guests	None

* Denotes attendance

MEETING MINUTES: ROBO SURVEILLANCE PANEL

Summary:

- Meeting convened at 10:04EST on February 21, 2019
- Agenda accepted by SP without any modifications
- ASTM Antitrust and Recording Policy reviewed
- Membership review and update
  - Justin Kontra added to Evonik membership. Justin Kontra replaced Lizzy Wagoner / Alan Flamberg.
- Meeting minutes from January 10th SP meeting were accepted
  - Motion made by Mike Birke and seconded by Mike Faile
- Actions from the January 10th meeting were reviewed
  - One outstanding action is for SP members to review ASTM D7528-17a and bring forward any changes that may be necessary in the next revision.
- ROBO industry statistics
  - For the first time in recent history the ROBO test is not running mild (mean Δ/s = 0.15); however the precision is slightly worse than target (Pooled s = 0.2750)
  - Unclear how or why the test is running more severe at the moment, as there was no concerted effort to make the test more severe.
- Stats Group update
  - Stats group is very busy supporting Sequence tests and BOI/VGRA – will likely have more time to address ROBO afterward. Justin will continue to follow up with Stats Group.
- Reference oil 438-2
  - To date, 11 runs were donated, but only 10 were operationally valid. SP agreed this was a sufficient amount of data to set temporary limits.
  - The following limits were shared:

TMC 438-2		n	Natural Log Transformed Mean (ln)	Mean in Original Units	s.d. (ln)	95% band in mPa*s, min	95% band in mPa*s, max	95% band (ln), min	95% band (ln), max
Option #1	No bias correction	10	10.4617	34,951	0.2322	22,172	55,094	10.0066	10.9168
Option #2	Average Yi from TMC statistics (Yi = 0.1086)		10.4421	34,273		21,742	54,025	9.9870	10.8972
Option #3	Average Yi from participating labs/units only (Yi = 0.3436)		10.3997	32,850		20,839	52,266	9.9446	10.8548
Current Limits for TMC 438		14	10.2676	28,785	0.2037	19,308	42,912	9.8683	10.6669

  - After some discussion, the surveillance panel agreed that Option #2 was the preferred option. Option #2 included a bias correction – the same procedure was used when we set 434-2 limits. As shown in the above table, the severity adjustment had little impact on the 95% bands, but nevertheless we agreed that it was important to set limits in the same manner as 434-2.
  - Alan Flamberg made a motion to accept Option #2 and it was seconded by Matt Schlaff. A vote was taken – all were in favor and no objections were raised. The motion passed.
  - SP agreed to re-evaluate the limits once >20 runs on 438-2 are conducted.
  - Justin Mills and Tom Schofield will track # of 438-2 runs in ROBO LTMS. Once >20 runs are reached, new limits will be calculated and proposed to SP.
- Update on dilute nitrogen dioxide
  - The dataset for dilute NO2 needs to be further developed before we can proceed to Surveillance Panel vote.
- Method housekeeping
  - Section 9 of the method needs to be updated. Footnote #11 is no longer valid because calibration requirements for ROBO will no longer be a standalone document and will instead be included in TMC's LTMS document. http://www.astmtmc.cmu.edu/ftp/docs/ltms/ltms.pdf
    - In addition it was suggested that we remove the requirements in Section 9 and just reference the LTMS instead for calibration requirements. Otherwise we run the risk of misaligning the calibration requirements in the LTMS and method.
  - All SP members were encouraged to review the ASTM D7528-17a and recommend any additional changes that may be necessary.
  - Method housekeeping will remain an agenda item for the next SP meeting.
- ROBO workshop

  - The idea of hosting another ROBO workshop was briefly discussed. The last workshop was held in October 2015. The overall value of a workshop is unclear. At that workshop there were no significant changes or actions identified to improve ROBO; however there was value in people meeting face to face and sharing best practices. There was no clear consensus on whether or not the effort is justified.
- Next meeting to be scheduled for April 11, 2019. Meeting may be postponed if there is not sufficient data for dilute NO2 to take a vote or if there are not >20 runs to set final limits for 438-2.
- Meeting adjourned

ROBO Surveillance Panel Meeting

February 21, 2019

Justin Mills

Agenda

- Welcome, ASTM statement
- Review membership of SP
- Review and approve minutes from previous meetings (see attachment)
- Review and follow-up on actions from January 10th meeting
- Statistics update – Current statistics for ROBO and Stats group update
- TMC 438-2 – discuss and vote on limits
- Dilute nitrogen dioxide – share data and next steps
- D7528 method housekeeping
- ROBO workshop – is it time to plan for another?
- Additional topics, if any
- Set next meeting

ASTM Antitrust and Recording Policy

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Membership – Updated 10/25/18

Ace Glass	Dave Lawrence
Afton	Shelia Thompson, Jeff Yang, Todd Dvorak
ASTM TMC	Tom Schofield
BASF	Mary Dery, Bridgett Rakestraw
Chevron Oronite	Man Hon Tsang, Robert Stockwell
ExxonMobil	Dennis Gaal
Infineum	Andy Richie, Sapna Eticala
Intertek	Joe Franklin, Matt Schlaff
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SwRI	Becky Grinfield, Joe De La Cruz, Mike Birke, Yong-Li McFarland
Valvoline	Amol Savant, Kevin Figgatt, Steve Lazzara
Koehler Instruments	Raj Shah, Vincent Colantuini
Tannas/Savant	Greg Miiller, Ted Selby
General Interest	Alan Flamberg

Summary of changes:

- None to report

Motion to accept January 10, 2019 meeting minutes

MEETING MINUTES: ROBO SURVEILLANCE PANEL

Meeting: ROBO SP Meeting

Date: January 10, 2109

Location: Skype meeting

Minutes by: Justin Mills – SP Chair

Actions:

1. Justin Mills to add D7528 housekeeping as topic for next SP meeting.
   a. SP members are encouraged to review method and bring forward any changes that may be necessary.
2. Justin Mills to schedule next SP meeting for Thursday, January 10th.

Membership and Attendance:

Ace Glass	Dave Lawrence
Afton	*Shelia Thompson, Jeff Yang, Todd Dvorak
ASTM TMC	*Tom Schofield
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Koehler Instruments	Raj Shah, Vincent Colantuini
Tannas/Savant	*Greg Miller, Ted Selby
General Interest	Alan Flamberg
Guests	None

* Denotes attendance

MEETING MINUTES: ROBO SURVEILLANCE PANEL

Summary:

- Meeting convened at 10:02EST on January 10, 2019
- Agenda accepted by SP without any modifications
- ASTM Antitrust and Recording Policy reviewed
- Membership review and update
  - No changes to report
- Meeting minutes from November 29th SP meeting were accepted
  - Motion made by Shelia Thompson and seconded by Greg Miller
- Actions from the November 29th meeting were reviewed
  - Tom Schofield has shipped 438-2 to Intertek, Evonik, SWRI, and Lubrizol
  - Justin Mills calculated concentration limits for dilute NO2 and presented limits on subsequent slides
  - Tom Schofield has started the workflow to include a footnote for 434-2 in the LTMS. The change will be reflected when the updated version of the LTMS is posted on TMC's website
- Stats Group update
  - Nothing to report.
- Reference oil 438-2
  - TMC has secured a full drum (55 gallons) of 438-2 for ROBO
  - At the last SP meeting, Intertek, SWRI, Evonik, and Lubrizol agreed to donate 438-2 runs for the round robin. TMC has shipped 438-2 samples to each lab.
    - Evonik has completed two runs; however one was declared operationally invalid due to vacuum line failure. Data from the valid run was shared. The MRV was high compared average 438 value, but it is still premature to make any judgements.
    - Lubrizol is running 438-2 this week
    - SwRI and Intertek will start their runs next week
- Dilute nitrogen dioxide limits
  - Justin shared his calculation for concentration limits of NO_2 in air: 1.07% - 1.19%
- Implementation of dilute nitrogen dioxide
  - The likely path forward to implement dilute NO_2 as an alternative to pure NO_2 is the following:
    - Demonstrate equivalence to the SP – Thus far, 2+ runs on each reference oils have been conducted between Intertek and Evonik. Intertek has either completed (or will complete in near future) an additional set of runs on TMC reference oils. Evonik will also generate more data. At this point in time, no other lab is able to provide additional support.
    - Develop a procedure for dilute NO2
    - Approve by SP – Vote at SP meeting
    - Issue information letter allowing use of dilute NO2 as an alternative
    - Ballot the recommended changes at ASTM
  - Lubrizol is currently assessing whether or not they want to implement dilute NO2 – may diminish capacity
  - SwRI reported they are not interested in the dilute alternative due to space and safety constraints.
  - Tom Schofield will set aside (3) 438 at Evonik and Intertek for dilute NO2 equivalency testing
- Calibration requirements
  - Calibration requirements for ROBO test are listed in three places: the D7528 method in Section 9, the ROBO TMC Calibration Requirements, and most recently Section 47 of the LTMS document (The ROBO TMC Calibration previously served as a stand-alone document but it has been incorporated into the LTMS document)
  - Justin Mills shared a proposal to update the TMC calibration requirements to specify three categories for acceptance criteria – New Laboratory/New Test Stand(s), Existing Laboratory/New Test Stand(s), and Existing Laboratory/Existing Test Stand(s). Under the proposed changes, New Laboratory/New Test Stand(s) would be required to demonstrate their stand can successfully run all three (3) current TMC calibration oils within the TMC acceptance bands prior to requesting the double-blind calibration tests. Existing Laboratory/New Test Stand(s) would only be required to run the double-blind calibration. (see attachment for further details)
    - If this change is made to the calibration requirements or LTMS, Section 9 of D7528 would also need to be updated. Regardless of whether or not the calibration requirements change, most labs agreed

ASTM D7528 ROBO SP Meeting January 10, 2019

MEETING MINUTES: ROBO SURVEILLANCE PANEL

that they would run all three (3) current TMC calibration oils prior to pursuing certification as part of their internal due diligence.
  - It was suggested that we reserve time at the next SP meeting to discuss method housekeeping. It was also suggested that for Section 9 of D7528 we reference the LTMS document for calibration requirements to ensure we don't misalign the two documents.
- Reactor clamps from ACE Glass
  - The design ACE Glass's reactor clamps has changed slightly. Most notably the inner diameter is smaller and the pitch angle may have changed. As a result, the clamp may need to be seated at a lower position on the reaction vessel. Operators may need to adjust the clamp position (height) on their lattice structure. It was also noted that the new clamps may have considerable "give" or flex where the two parts of the clamp are fastened/riveted together. After investigation, Justin Mills believes the clamp design change will not impact test operation.
- Next meeting to be scheduled for February 21, 2019.
- Meeting adjourned

ASTM D7528 ROBO SP Meeting January 10, 2019

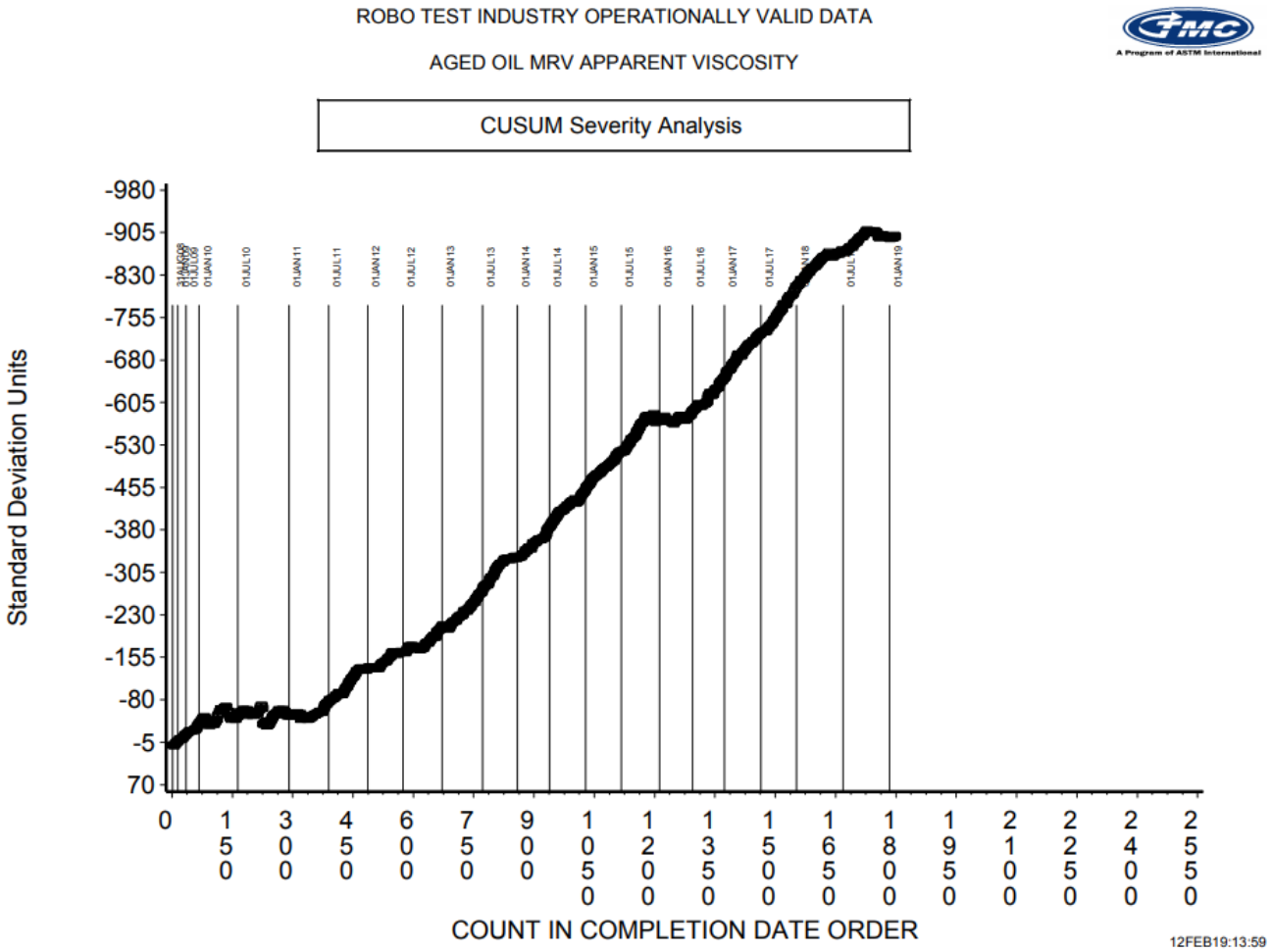
Actions from January 10th meeting

- ☒ Justin Mills to add D7528 housekeeping as topic for next SP meeting.
  - ☐ SP members are encouraged to review method and bring forward any changes that may be necessary.
- ☒ Justin Mills to schedule next SP meeting for Thursday, January 10th.

ROBO Industry Statistics Based Upon LTMS Data Sets through September 30th

Period	N-size	Degrees of Freedom	Pooled s	Mean Δ/s	Comments
Current Targets	49	46	0.1945	------	
10/1/15 through 3/31/16*	92	89	0.4115	-0.10	Period statistics with and without one extreme result included
10/1/15 through 3/31/16*	91	88	0.3661	-0.20	
4/1/16 through 9/30/16	74	71	0.3152	-0.53	
10/1/16 through 3/31/17	78	75	0.2771	-0.91	
4/1/17 through 9/30/17	99	95	0.2220	-0.76	
10/1/17 through 3/31/18**	90	86	0.2376	-0.91	Period statistics with and without seven suspect results from two rigs
10/1/17 through 3/31/18**	83	79	0.2076	-0.74	
4/1/18 through 9/30/18	126	122	0.2184	-0.49	Period statistics with and without one extreme result included
4/1/18 through 9/30/18	125	121	0.1958	-0.53	
10/1/18 through 3/31/19	72	68	0.2750	0.15	

CUSUM severity analysis



ASTM Stats Group Support Update

- Stats group is very busy supporting Sequence tests and BOI/VGRA – will likely have more time to address ROBO afterward.

TMC 438-2 data

IND	APPARATS	TESTKEY	DTCOMP	MRVTEMP	MRVYSEOT	MRV	MRVti	VAL	VOLEOT	PVIS	COM2
~~438-2~~	~~AM 5~~	~~142342-ROBO~~	~~20190104~~	~~-30~~	~~<35~~	~~20900~~	~~9.9475~~	~~LG~~	~~38~~	~~88.7~~	~~COLLAPSE_VACHOSE~~
438-2	AM 4	142341-ROBO	20190104	-30	<35	41100	10.6238	AG	52	147.6	
438-2	AM 3	142343-ROBO	20190111	-30	<35	52900	10.8762	AG	47	173.1	
438-2	B 3	142127-ROBO	20190111	-30	<35	35100	10.466	AG	40	145.6	
438-2	B 4A	142128-ROBO	20190111	-30	<35	31800	10.3672	AG	42	133.8	
438-2	A 11	142005-ROBO	20190112	-30	<35	39700	10.5891	AG	46	156.8	
438-2	B 2	142129-ROBO	20190113	-30	<35	44600	10.7055	AG	34	177.7	
438-2	A 1	142004-ROBO	20190113	-30	<35	26900	10.1999	AG	44	105	
438-2	G 10	142082-ROBO	20190116	-30	<35	28000	10.24	AG	42	124	
438-2	G 3	142083-ROBO	20190116	-30	<35	31600	10.3609	AG	39	141	
438-2	AM 5	142344-ROBO	20190201	-30	<35	26600	10.1887	AG	42	101.7	

- (11) 438-2 samples were run, but only (10) were operationally valid.
- Without additional corrections, the results are as follows:

Natural Log Transformed Mean (ln)	Mean in Original Units	s.d. (ln)	95% band in mPa*s, min	95% band in mPa*s, max
10.4617	34,951	0.2322	22,172	55,094

Statistics with correction factor applied to account for bias

TMC 438-2		n	Natural Log Transformed Mean (ln)	Mean in Original Units	s.d. (ln)	95% band in mPa*s, min	95% band in mPa*s, max	95% band (ln), min	95% band (ln), max
Option #1	No bias correction	10	10.4617	34,951	0.2322	22,172	55,094	10.0066	10.9168
Option #2	Average Yi from TMC statistics (Yi = 0.1086)		10.4421	34,273		21,742	54,025	9.9870	10.8972
Option #3	Average Yi from participating labs/units only (Yi = 0.3436)		10.3997	32,850		20,839	52,266	9.9446	10.8548
Current Limits for TMC 438		14	10.2676	28,785	0.2037	19,308	42,912	9.8683	10.6669

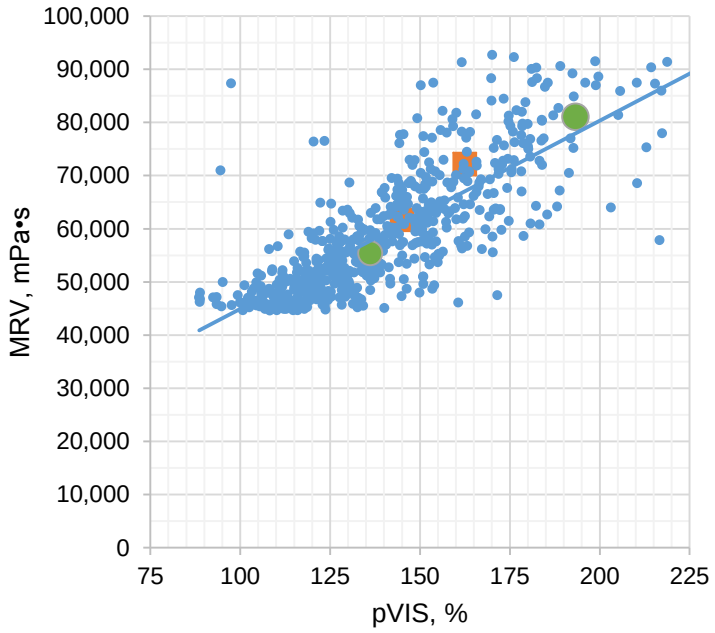
- TMC 438-2 appears to be slightly more severe than TMC 438.
- No outliers were identified in the 438-2 dataset.
- The ROBO test is running severe this test period (2019APR). If we consider all labs, Yi=0.1086, but if we consider just the units that participated in round-robin, Yi=0.3436.
- Applying correction factor has minor impact to overall range; nevertheless we should apply it if we wish to remain consistent with TMC 434-2 limit setting.

Dilute nitrogen dioxide

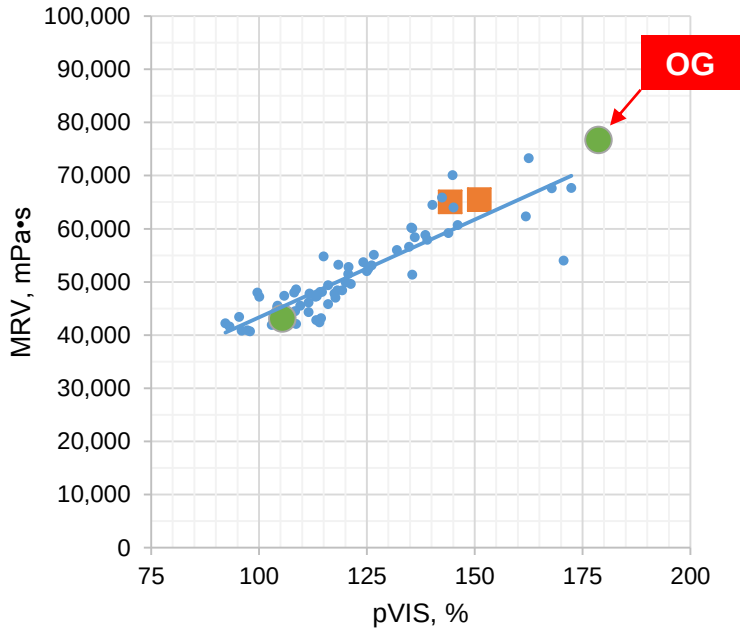
- The likely path forward to implement dilute NO2 as an alternative to pure NO2 is the following:
  - Demonstrate equivalence to the SP – Thus far, 2+ runs on each reference oils have been conducted between Intertek and Evonik. Intertek has either completed (or will complete in near future) an additional set of runs on TMC reference oils. Evonik will also generate more data. At this point in time, no other lab is able to provide additional support.
  - Develop a procedure for dilute NO2
  - Approve by SP – Vote at SP meeting
  - Issue information letter allowing use of dilute NO2 as an alternative
  - Ballot the recommended changes at ASTM

Dilute nitrogen dioxide

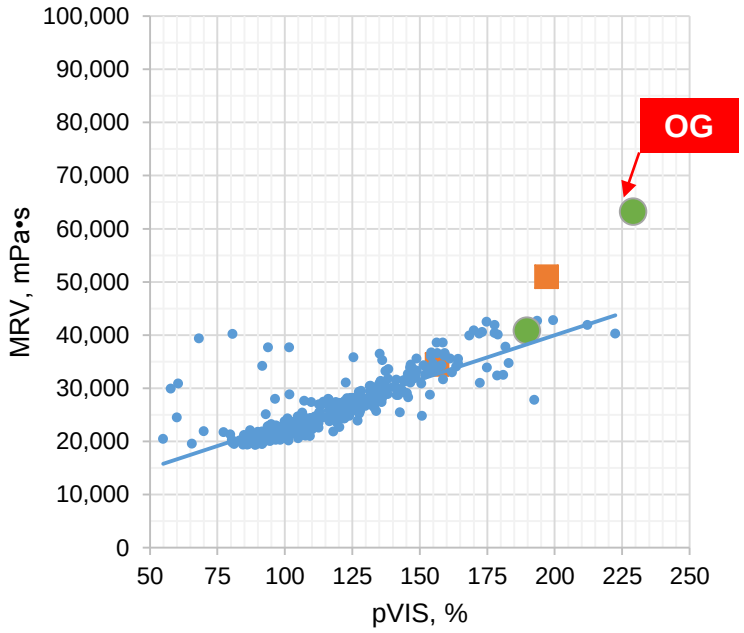
TMC 435-1



TMC 434-2



TMC 438



- Dataset needs to be further developed before we can proceed to Surveillance Panel vote.

Method housekeeping

- 9. New and Existing Test Stand Calibration needs to be updated.
  - ROBO no longer has stand-alone calibration requirements and is now included in LTMS. As such, the reference in the method is no longer valid
  - [11] The ROBO TMC Calibration Requirements document is available at: http://www.astmtmc.cmu.edu/ftp/docs/bench/robo/procedure_and_ils/20170713_ROBO_TMC_Calibration_Requirements.pdf
  - Suggest we also update Section 9 calibration requirements and reference the LTMS for calibration requirements.

www.astmtmc.cmu.edu - /ftp/docs/ltms/

[To Parent Directory]

1/31/2019	4:07 PM	1436421	ltms.pdf
1/31/2019	4:09 PM	143	readme.txt
1/31/2019	4:14 PM	<dir>	ReplacementPages
1/31/2019	4:23 PM	<dir>	RevisionLetters

Method housekeeping

- Additional items?

ROBO workshop

- ILSAC GF-6 is approaching so we can expect to see an increase in ROBOs in the coming months.
- Is it time to have another workshop and share best practices?

Any Additional Topics?

Next Meeting

- Suggestions for next SP meeting?
  - **Thursday, April 11th?**