



COMMITTEE D02 on PETROLEUM PRODUCTS, LIQUID FUELS, AND LUBRICANTS

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LSPI AGING INDUSTRY CONFERENCE CALL

Date: 3 Feb 2022

ATTENDANCE

SWRI	Christine Eickstead, Khaled Rais, Travis Kostan
INTERTEK	Al Lopez, Jason Soto
LUBRIZOL	George Szappanos, John Loop
AFTON	Ben Maddock, Christian Porter
ORONITE	Jo Martinez
INFINEUM	Doyle Boese
TMC	Rich Grundza, Sid Clark
FORD	Mike Deegan, Rob Zdrodowski
NEW MARKET	Todd Dvorak

MEETING:

Reviewed and revised Mike’s checklist (attached).

Reviewed Christine’s checklist for Aging runs.

SP meeting tomorrow. Intention is to inform the group (their permission to proceed is not required).

Doyle – Is there any concern about the effect on the aged oil of sitting for a month? Introducing more variability or bias?

Travis – Aging EOT sample can be compared to LSPI SOT sample.

Christine – not exactly. First LSPI sample is after one hour break-in.

Doyle – Not suggesting we change anything, just trying to understand.

Todd – We will have the date the Aging run EOTs and the LSPI run SOTs so we will be able to track the amount of time between.

Regular testing – We regularly go a month between aging EOT and LSPI SOT (to reference LSPI stand, break-in new LSPI engine, change over stand to different test type, etc.).

Jason – will be a good opportunity to study this – the first aged sample will sit for about a month, the last only a week or two.

No more questions, ready for SP call tomorrow.

Meeting adjourned.

Aged Oil LSPI Matrix Plan – 24 Tests (48 total with LSPI)

Intent:

Develop an Engine Oil Aging Cycle for producing oil aged to 4000 typical vehicle miles that will be run on a Sequence IX LSPI Test.

Engine Oil Aging Procedure for LSPI Testing (See existing modified Sequence X Procedure):

- 2.0l Engine used for each aging test.
 - New or rebuilt engine required for each Aging Procedure (same as scoping tests).
 - Engine to be properly broken-in prior to aging.
 - Engine will use Sequence X fuel and either reference or customer oil for break-in and aging.
 - Each lab will have (2) different Aging Engines, one that is 'New' (Eng #2) and another with approx. '5' (Eng #1) CW tests completed previously.
 - Each lab will have (1) Aging Stand.
 - **Aging cycle will follow Sequence X Stage 2 for 72 hours.**
 - Meet the same Operational Data, QI's.
 - Cycle(s) will be run to produce enough oil to run a full Sequence IX test.

Reference Aged Oils A or B are expected to meet the following proposed targets, based on scoping results: (add full elementals-ICP)

Proposed Aging Factors	Proposed Limits	
	Aged A	Aged B
TBN-D4739	>40%	>60%
TAN-D664	>0.5%	>25%
TGA Soot- D5967 Annex A4	0.3-0.5	0.6-0.8
Oxidation-D7414	>7.5	>8.5
Nitration-D7624	>15	>12.5
Fuel Dilution-D3525	>2.0	>2.0
KV 100C-D445	Stay in Grade	

- Reference Oils are based on GF6 based oils from noted SAE Papers.
 - For PM each lab will measure the before and after aging properties. In addition, a single lab will measure all after aging samples. Two (2) oz. samples taken after each test. One to lab that ran test, and One to Afton.
 - Suctioning of engine and pan, along with draining oil filter will be done to ensure adequate oil for Seq IX test.
- Candidate Oils will be evaluated for same targets but will not be held to targets as they will age differently than the reference oils.

Aged Oil LSPI Matrix Plan – 24 Tests (48 total with LSPI)

Sequence 'IX-Annex A' General Information:

- No Change to Sequence IX except:
 - Flush with **fresh** reference oil prior to fill and run with **Aged** Reference Oil. No suctioning after flush.
 - Provide drain weight after flushes. 20 minutes of drain out of pan.
 - After flush, add aged oil test charge, then one hour break-in, the Test Oil Sample will serve as LSPI Initial Test Sample. 2 Oz Sample to be checked at each lab.
- Sequence IX test run.
 - No changes to test procedure.
 - LSPI Matrix will start on the 1st test after an acceptable reference.
 - Each lab will have a minimum of (1) stand.
- Aged Oil must meet current Sequence IX limits to pass.
 - Average number of events for four iterations:
 - 5 (max)
 - Number of events per iteration:
 - 8 (max)
- Assume BOI/VGRA carries over.
- Intend to review data to for LTMS either include with 'New oil' results or as a separate 'Aged Oil' TMC.
- EOT Oil Samples:
 - Two (2) oz. samples at EOT of test. One to lab that ran test, and One to Afton.

Precision Matrix Status:		Lab B	Lab D	Lab G	
LSPI Stand 1	LSPI Stand 2	LSPI Stand 1	LSPI Stand 1	LSPI Stand 1	LSPI Stand 2
Test 1-Oil A Aged Oil Eng #1	Test 2-Oil B Aged Oil Eng #1	Test 3-Oil A Aged Oil Eng #1	Test 4-Oil B Aged Oil Eng #2	Test 5-Oil A Aged Oil Eng #2	Test 6-Oil B Aged Oil Eng #2
API	API	Ford	Ford	API	API
Test 7-Oil B Aged Oil Eng #2	Test 8-Oil A Aged Oil Eng #2	Test 9-Oil B Aged Oil Eng #2	Test 10-Oil A Aged Oil Eng #1	Test 11-Oil B Aged Oil Eng #1	Test 12-Oil A Aged Oil Eng #1
ASTM	ASTM	ASTM	ASTM	ASTM	Infineum
Test 13-Oil B Aged Oil Eng #1	Test 14-Oil A Aged Oil Eng #1	Test 15-Oil B Aged Oil Eng #1	Test 16-Oil A Aged Oil Eng #2	Test 17-Oil B Aged Oil Eng #2	Test 18-Oil A Aged Oil Eng #2
Oronite	GM	Lab B	Lab D	Oronite	GM
Test 19-Oil A Aged Oil Eng #2	Test 20-Oil B Aged Oil Eng #2	Test 21-Oil A Aged Oil Eng #2	Test 22-Oil B Aged Oil Eng #1	Test 23-Oil A Aged Oil Eng #1	Test 24-Oil B Aged Oil Eng #1
Lab A	Lab A	Lab B	Lab D	Lab G	Lab G

Reference Oils: Oil A=TMC API01, Oil B=TMC API02

Each matrix test will be charged a TMC test review fee.

Agging Factor Sample Plan (Analysis done by Afton)				
Sample Description		# of Samples	Provided By	Funded By
API01 & API02	New Oil	2	TMC	API
Used Oil	EOT of Aging Test	24 total (one/test)	Labs	API
Used Oil	EOT of LSPI	24 total (one/test)	Labs	API