LDEOC/EOEC SURVEILLANCE PANEL

A LDEOC/EOEC conference call was held on 8-10-21, at 9 am Central Standard Time. The following esteemed members were on the call:

Joe Franklin - Intertek
Mike Birke – SwRI
Doyle Boese – Infineum
Vince Donndelinger - Lubrizol
Robert Stockwell – Oronite
Becky Grinfield – SwRI
Tom Schofield – TMC
Gefei Wu – Valvoline
Kimberly Gutierrez - Intertek
Dennis Gaal – ExxonMobil
Jason Bowden – OHT
Laura Birnbauer – Oronite
Jo Martinez – Oronite

Jason Anderson – PACCAR
Qin Wei - Cummins
Luke Moehling – Caterpillar
Kirstin Rosen – ISP
Tia Sutton – EMA
Shawn Whitacre – Chevron
Heather DeBaun – Navistar
David Lee - Chevron
Barbara Goodrich – John Deere

Robert Stockwell made a presentation (attached), where he suggested instead of applying an industry correction factor of -1.82 to correct for an EOEC nitrile volume swell severity issue, the SP should use the target means from the original 2019 reference oil SL107 round robin. Doing so would only affect reference oil results, and bring the reference data back in control. This was one of the options presented in Doyle Boese's original 2019 statistical analysis of the round robin data for setting reference oil limits. At the time when reference limits were being evaluated, the SP voted to use the means of SL107 round robin adjusted for current industry bias. This is the method also used by the engine test group. The real issue for the current dilemma is, for the approximately the first seven years of the test, nitrile volume swell was undergoing a severity increase, finally settling down and becoming stable in 2009. Because no changes were made to the reference oil limits, the reference data has been running severe for the last 12 years. Since then, there have been two HD categories introduced. Robert pointed out that implementing an ICF would essentially change the category limits since it will be applied to both candidate and reference results. The ICF of -1.82 would result in approximately a 20% change to candidate limits. The EMA members on the call were asked to provide direction on how the SP should proceed. In short, the two options discussed are:

1) Use the ICF. This will affect both candidate and reference data.
2) Adjust the limits for the reference oil only. Candidate data will be unaffected.

The SP will provide the EMA with bullet points for presentation at their next meeting. The EMA will then provide the SP feedback on how to proceed.

There were no other comments, and the meeting adjourned at 10 am.

Chevron Oronite

# EOECN SL107 Targets

Robert Stockwell
August 10, 2021



ADDING UP®

# Background

## Summary of the slide from the July 21, 2021 presentation

- The Engine Oil Elastomer Compatibility Surveillance Panel approved the implementation of an ICF, industry correction factor (-1.82) to the Volume Change results obtained in tests run on Heavy-Duty Nitrile elastomer material on July 1, 2021. An ICF affects all results, calibration and candidate. Oronite expressed concern during the initial discussion but agreed to waive when a 14-day delay before implementation was added to the motion. Oronite voted negative prior to the implementation date, delaying the implementation of the proposal.

- Upon consideration of the data and the circumstances of the proposed change, Oronite will be voting negative for two reasons:
  - CK-4 and FA-4 category started near the middle of a 12-year stable time in the life of this test
  - The limits for Volume Change are: -3, +5 ( before adjustment per ASTM D4485 annex 5) and an ICF of -1.82 is a 23% change to the limits; Oronite views this as changing the API category

Because of this negative, the implementation of the proposed ICF will be delayed until the negative is resolved, voted non-persuasive, or another motion is made to cancel or replace this motion.

# Perspective

- The claim is that we are proposing an ICF to reset the Nitrile volume to the initial target for technical reasons… That is sort of true, but also misleading.

- Reality:
  - We set the SL107 limits after running a round robin in September 2019
  - The first acceptable SL107 calibration test completed in April 2020
  - 112 acceptable calibration tests were completed with SL107 before the first statistical fail in May 2021
  - After 4 statistical fails, three on batch 27 elastomer (NBR-27) – the solution is a significant ICF?
  - There had been 6 statistical fails in the 5-years (60-months) prior to the SL107 OC (calibration test that did not meet the statistical acceptance criteria) result, with 621 acceptable calibration tests in this time span! A fail rate of just under 1%.

  - The test has been stable for a dozen years, lets keep it that way
  - If we need to adjust for nitrile elastomer batch 27 we can (we already adjust every ACM batch)
  - If SL107 needs slightly different acceptance bands that is fine also

# Perspective

- The test has been stable for a dozen years, no severity alarms were tripped and the elastomer has never had a severity adjustment of any sort.

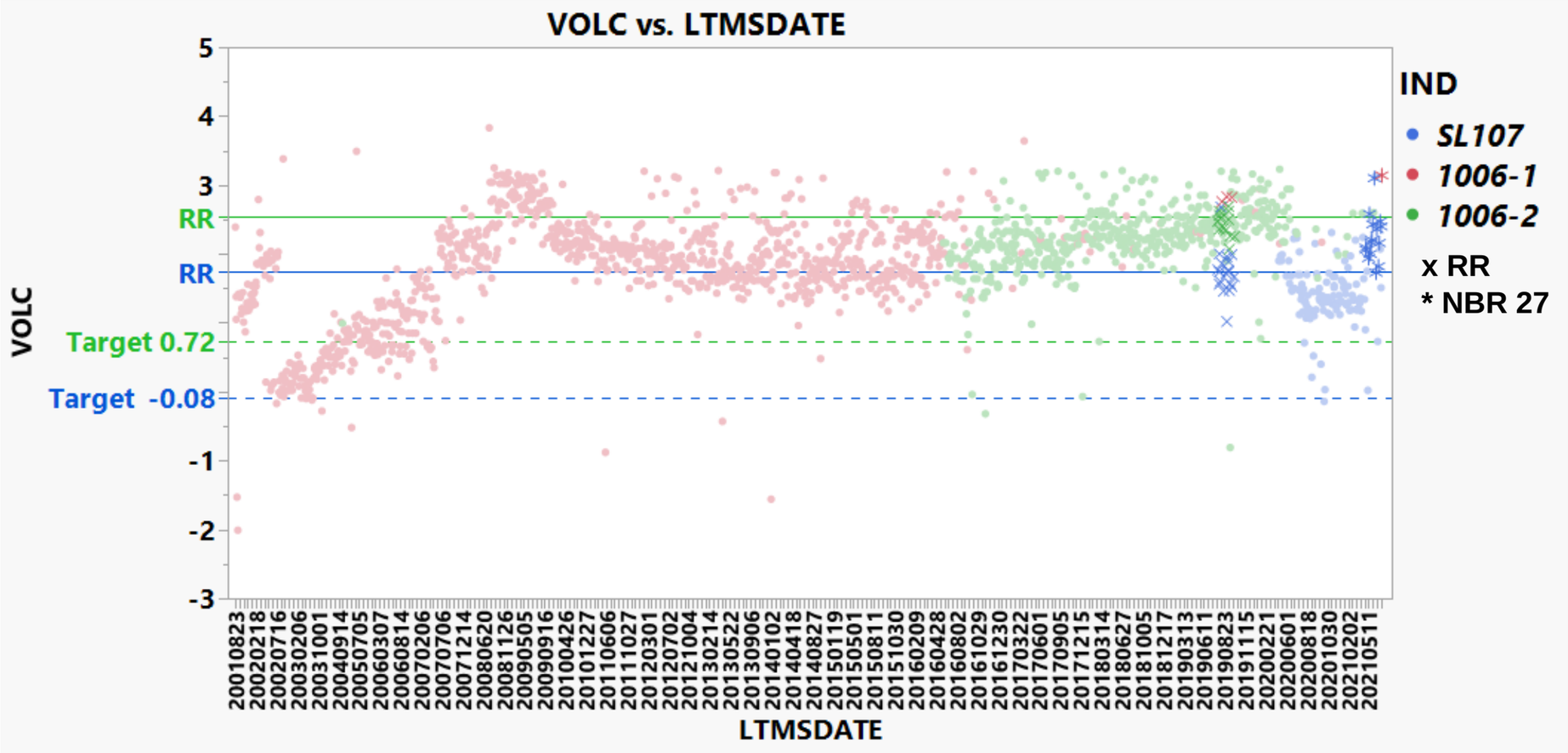
- We normally use ICF to adjust for shifts from a known source like parts or fuel batch changes. I am not sure what the source of variability is that we are correcting for with the proposed -1.82. We see there was a shift long ago, but the source of the shift has not been identified.

- The root cause of this discussion is that a test lab failed 3 calibration tests and wanted to make sure they didn’t fail another one.  That is a fair concern that should be addressed, but not with an ICF.

- Three of the failed calibration tests were on a new batch of elastomer, NBR-27
  - Since this batch seems to exhibit more seal swell than other batches it might make sense to adjust for that
  - It does not make sense to change the API category targets for nitrile volume because of a few failed calibration tests on elastomer batch NBR-27

# Path Forward

## Slide from July 21, 2021 presentation




- VOLC for SL107 was significantly lower than 1006 based on the Round Robin (RR) data
- **This indicates that the performance and probably the behavior of this oil doesn't need to be tied to 1006**

# Path Forward

- **In the original proposal Doyle offered two options.  I think we should choose the option that keeps the test running as it is.**

- Propose SL107 target means for EOECN as reported in Dec 2019 RR data analysis, Option 1 SL107 Targets.

Option 1 SL107 Targets

| Parameter | EOECF | EOECN | EOECP | EOECS | EOECV |
|---|---|---|---|---|---|
| VOLC | 0.48 | 1.74 | 1.76 | 33.54 | 18.83 |
| HARD | 8.76 | 3.11 | 0.80 | -22.19 | -9.01 |
| TENS | -71.56 | -5.80 | 2.89 | -31.46 | -16.57 |
| ELON | -65.71 | -35.07 | -13.37 | -22.00 | -34.43 |
| Parameter | LDEOCA | LDEOCF | LDEOCN | LDEOCP | LDEOCS |
| VOLC | 23.72 | 0.66 | 1.36 | 1.80 | 33.46 |
| HARD | -13.18 | 4.55 | -1.37 | -1.49 | -22.59 |
| TENS | -20.52 | -56.66 | 3.27 | 0.15 | -32.26 |

# Perspective

- No test operates in a vacuum.  SL107 is a DIFFERENT reference oil.  D7216 results are heavily tied to the reference oil and upon the conclusion of the SP decision, the Heavy-Duty Engine Oil Classification Panel will need to meet to further the dialogue on this test.