

Sequence VH Task Force | MINUTES

Revision Date 10-07-2016 | Revision 1.0

Relevant Test:	Sequence VH
Note Taker:	Chris Mileti
Meeting Date:	10-05-2016
Lubrizol Attendees:	Mileti, Brys and O'Malley
Comments:	Sequence VH Task Force conference call to discuss prove-out testing at dependent labs.

CONFERENCE CALL:

1. Summary of Test Results:

- a. Al Lopez sent out a summary of the available test results on 10-05-2016 at 12:59PM EST.
- b. **Summary:**

RO 940

VH Hardware	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	6.80	8.02	8.83	7.17	6.88	70.0
IAR 98	6.88	8.50	9.09	8.07	7.36	98.0
Afton	7.28	8.10	8.53	6.99	6.21	80.0
Ashland	6.76	8.89	8.55	7.75	6.89	35.0
IAR 86	6.50	7.84	9.16	8.38	7.80	97.0
LZ	7.12	8.20	8.31	7.82	5.57	95.0
avg	6.89	8.26	8.75	7.70	6.79	79.2

RO 1009

VH Hardware	AES	RAC	AEV	APV	APV 50%	OSC
SWRI	7.19	8.38	9.16	8.82	7.94	80.0
IAR 98	7.3	9.08	9.02	7.7	7.62	35.0
Afton	7.48	9.09	9.00	7.75		50.0
Ashland						
Lubrizol						
avg	7.32	8.85	9.06	8.09	7.78	55.0

RO 1011

VH Hardware	AES	RAC	AEV	APV	APV 50%	OSC
IAR 98	9.24	9.46	9.46	9.02	8.82	1.0

2. Discussion about Data Set:

- a. The AEV parameter was calculated using the traditional APV ratings.
 - i. The traditional APV ratings utilize the entire piston skirt.
- b. An additional column should be added to the table that lists AEV ratings that are calculated using the new piston rating technique.
 - i. The new piston rating technique only measures the top half of the piston skirt.
 - ii. The TMC will need to include this alternate AEV data in its database.
- c. Southwest and Intertek still need to develop a strategy for dealing with the piston skirt striations during the rating process.
- d. **Concerns about Lubrizol's REO940 Prove-Out Test:**
 - i. Lubrizol's test encountered much higher oil consumption than normal.
 1. It hit the maximum oil addition volume (2000g) during the 168HR oil check.
 2. No further oil was added to the engine after that point.
 3. The Lubrizol engine was built approximately 2-months prior to this test.
 - ii. Intertek and Ford are of the opinion that the Lubrizol test should be invalidated due to its high oil consumption.
 - iii. Afton also saw unusually high oil consumption during their REO940 prove-out test.
 1. They were able to remain under the 2000g oil addition limit.
 - iv. The VG test procedure is not entirely clear about the implications of hitting the maximum oil addition volume during a test.
 1. The Lubrizol test should be valid if the procedure is interpreted literally.
 2. However, the group agreed that the literal interpretation of the text probably does not match its intent.
 3. This portion of the Sequence VH procedure should be clarified.
 - v. *Review of oil additions during VH prove-out testing at other labs:*
 1. Intertek had end-of-test oil additions of 1574g and 1171g.
 2. Southwest had an end-of test oil addition of 840g.
 3. Ashland had an end-of-test oil addition of 878g.
 - vi. The group is also concerned that the Lubrizol test had heavier varnish near the top of the piston skirt.
 1. As a result, its APV rating at 50% was significantly more severe than its APV rating at 100%.
 2. Lubrizol agreed to distribute its piston set to the other labs (starting with Intertek) for a rating "round robin".
 - vii. Lubrizol has no objection repeating its REO940 test.
- e. **Discussion about Purpose of Prove-Out Matrix:**
 - i. There was discussion among the group regarding the fundamental purpose of prove-out testing.
 - ii. One philosophy is that prove-out tests are for shakedown purposes.
 1. The goal is to demonstrate that a lab can run the procedure.
 2. There can be some latitude when dealing with operational issues that could impact test validity.
 - iii. The other philosophy is that prove-out tests must have unquestionable validity.
 1. This way they can be applied to the upcoming Precision Matrix if necessary.
- f. **Concerns about Ashland and Afton prove-out tests:**
 - i. The Ashland REO1009 prove-out test and the Afton REO940 prove-out test both had negative quality index values for the oil's outlet temperature.
 - ii. These prove-out tests will need to be repeated as well.

g. TMC Operational Data Review:

- i. TMC has requested that each lab send them operational data (for the controlled parameters) for all tests that will be submitted for the prove-out matrix.
- ii. They will send out a template (with instructions) that the labs can use to organize their data.
- iii. This data must have the correct time stamp (i.e. elapsed time in hours) to account for different sampling rates at each lab.

h. Frustration of Dependent Labs:

- i. Afton, Lubrizol and Ashland expressed frustration that they were not given more time to bring the VH test online.
- ii. Many of the issues that invalidated their prove-out tests could have been eliminated during non-matrix shakedown runs.
- iii. Many of the labs had to reverse modifications that were made to their VH stands earlier in the development of the test (i.e. remove Zeus PCM and associated wiring, remove external water pump with VFD).

i. Oil Temperature Control Problems:

- i. Ashland and Afton had oil temperature control problems with two different oils.
- ii. Both of these labs are currently evaluating ways to heat the process water supply to their oil heat exchangers.
- iii. *Ford comment:*
 1. It is up to each laboratory to determine whether they can achieve the oil temperature set-points with or without a heating system.
- iv. *Ashland comment:*
 1. Their attempt at using a strip heater was unsuccessful.
 2. They are now using an immersion rod heater in their process water supply.
- v. *Lubrizol comment:*
 1. Lubrizol will not have a heating system in place during its next two prove-out tests.

3. October AOAP Meeting:

- a. There was discussion about proceeding with a “ready for matrix” vote at the October AOAP meeting.
 - i. In this case, the matrix would only proceed with Intertek and Southwest.
 - ii. It is unlikely that this vote will pass.
- b. **Related history provided by TMC:**
 - i. GF-3 test development was only performed at the independent labs.
 - ii. The dependent labs become more involved in test development during GF-4 and GF-5.
 - iii. It should be noted that there were more lubricant testing laboratories in the past.
 1. For example, there were (11) laboratories that participated in Sequence VE development.
- c. **New Deadline:**
 - i. Each dependent lab must have its two prove-out tests completed and submitted to the TMC by November 11th.
 - ii. Ford noted that a data review will need to be held prior to this date.
 - iii. The statisticians must be prepared to reorganize the Precision Matrix for less than five labs if necessary.

Action Items	Person responsible	Completion Date

Follow-up Notes/Updates:	Initials	Date Added