Sequence VH Surveillance Panel Call
February 22, 2024, Webex

Roll Call:

Afton:	B. Maddock, B. Campbell
Valvoline:	A. Savant
Ford:	M. Deegan, R. Zdrodowski
XOM:	M. Herve, M. Scudiero, P. Rubas
BP:	B. Hochkeppel
Haltermann:	W. Hairston, E. Hennessy, I. Mathur
Infineum:	J. Anthony, T. Dvorak, A. Ritchie (Chair)
Intertek:	A. Lopez, J. Franklin
Lubrizol:	T. Catanese, G. Szappanos
GM:	T. Cushing, B. Cosgrove
OHT:	J. Bowden
Oronite:	J. Martinez, R. Affinito, R. Stockwell
SwRI:	D. Engstrom, T. Kostan, P. Lang, M. Birke
TMC:	R. Grundza
TEI:	D. Lanctot
Shell:	J. Hsu,S.Demel

Chair's Comments

Meeting minutes from 2/6 are posted.

Chair Ritchie started the meeting and outlined the agenda items:

1) Review and approve 2/6 minutes
2) O&H update
3) Results of recent calibration tests
4) Fuel supplier report
5) Old business
7) New business

O&H Update

- The set aside cam bearings based on the recent calibration test results are fit for use and King bearings are being tested in reference tests. (See below).
    - It is expected that the King bearing will be approved for use.
    - There have been no oil pressure issues with either the set aside or King bearings.
- The combined O & H and engine builders' groups are planning to hold an engine build workshop from April 16-17 in San Antonio.
    - The workshop will focus on honing and assembly of the short block.
- The committee members are working to identify and address inventory gaps to make it through the projected duration of GF-7 testing.
- The committee brought two motions forward.

Motion 1: Approve New Gasket Kit Part Numbers

- There is a new part number for the engine gasket kit and some of the individual gasket part numbers have also changed.
- The oil pan gasket locations requiring sealant are the same as the previous oil pan gasket.
- The crankshaft seals are made of the same material.
- It is agreed that the gaskets in the kit do not significantly affect assembly or likely to affect the test results and there is no practical alternative to the new kit.

- SwRI: Motion to amend the VH test procedure to accept this kit part number as an alternative to the part number in the procedure.
    - Afton second.
    - No objections from other VH SP members.
    - Chair: The motion is carried.

Motion 2: Applying Sealant to the Mating Surface between the Cam Bearing Cap and the Cylinder Head

- VH Operations and Hardware (O&H) Committee agreed that applying sealant to the mating surface between the cam bearing cap and the cylinder head should be mandatory for all VH engine builds by all labs.
- TMC:
    - Applying sealant at that location is in the procedure, but it is not clear that is mandatory.
    - Recommends making it mandatory.
    - O&H Committee recommends verbiage from OH meeting be used for the motion.

- Afton: Motion to apply Motorcraft TA-16 or equivalent sealant between cam bearing caps and head.
    - IAR second.
    - Chair: Any objections?
    - No objections raised. Motion carried.

Results of Recent Calibration Tests

- IAR:
    - A test using set aside cam bearings and 931 reference oil posted on LTMS. AES was 1.1 sigma severe.
    - A test is currently being run using King bearings.
- SwRI:
    - A test using set aside cam bearings on 1011 reference oil is posted on LTMS. AES was 1.2 sigma severe.
    - Currently running two reference tests, one with set aside cam bearing and one with King cam bearings.
        - Both test engines have sealant between cam bearing caps and the cylinder head.
- Afton:
    - Scheduled to run a reference test with King cam bearings and sealant between cam bearing caps on March 5, 2024.

Fuel Supplier Report (Presentation attached)

- IAR voiced concern about the fuel batch due to customer complaints starting in Q4 2023.
    - IAR's fuel analysis showed a difference from the Haltermann CofA.
    - IAR brought this issue to the VH SP.
- In response to IAR and the other industry members' concerns about the fuel composition, Haltermann investigated whether or not the fuel batch composition has been changing with the RVP adjustments since the batch was first approved.
    - Haltermann noted that the RVP specification tolerance is very tight.
    - The percent mass of isopentane & butane added for each RVP adjustment is much less than 1% of the tank's total fuel mass.
    - The RVP changes are due more to the leak in the tank's gasket than the high temperatures during the summer.
    - The fuel's distillation profile from the original blend was compared to RVP adjustment samples -5, -10, 12, and -13.
    - The distillation columns show that adding isopentane & butane only affects light ends not the heavier components.
    - Washed and unwashed gums are unchanged from RVP adjustment -5 to -14.
    - Batch 3 (-4) from Lochte is very close to original specs, however, light ends are lower because it was handled more than the samples from the tank.
    - IAR's Batch 13 was analyzed, and it also is comparable.
    - IAR's own distillation results were different than the Haltermann CoA, which caused concern about the fuel's composition.
        - IAR's analysis result was an outlier.
        - The sample was re-analyzed and found to be much closer to the original batch's composition.
- After a thorough investigation Haltermann concludes:
    - The fuel composition has not changed over time with RVP adjustments.
    - IAR's fuel sample analysis was an outlier.
    - The only data that suggests the fuel has changed is fuel dilution is trending higher.
- Haltermann stated that the previous batch lasted for years and had more adjustments than this fuel batch. The RVP adjustments of the previous batch were not tracked as they are for this batch.

- Haltermann: Motion to move fuel to rail cars.
    - No objections from other VH SP members.
    - Chair: The motion is carried.

- The fuel batch will be transferred from the tank to sealed rail cars and blanketed of N2 by mid-March.
- Samples will be taken and analyzed for each lab delivery out of the rail cars.
- Discussions to blend the next batch will be led by contract committee headed by Lochte.

Reference Oil Correlation to Candidates

- There was discussion about the current reference oils not correlating to the candidate oils being tested. Chair offered the following comments,
    - The dexos1 Gen3 standard is difficult to pass because it is at the top of the ratings scale and the reference oils sludge targets are below the dexos1 Gen3 limit.
    - There may need to be a reference oil that passes dexos1 Gen3 for calibration purposes.
    - The discussion was tabled.

New Business

No new business from VH SP.

The next VH SP meeting will be scheduled for mid-March.

Meeting adjourned.

Did the RVP Adjustments to the HF0295 Batch N-000010 change the fuel?

Presented at the VH Sequence Panel call
02/22/2024
Indresh Mathur

Monument Chemical

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Question…

Has the HF0295 batch N-000010 changed since it was approved?

Background:

- Fuel is stored in a floating roof tank.
- Fuel RVP drifts lower with loss of butane and isopentane (the lights).
- Fuel adjustments to bring RVP into specs are typically less than 1.0% of the total fuel in the tank.
- There were abnormal number of fuel adjustments during the past year which have been attributed to leaking floating roof seal and hotter than normal summer temperatures.
- In this presentation test data will be presented on the fuel's composition, distillation profile and gums etc. since it's initial approval.

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Fuel's Distillation profile has not changed…..IAR-13 data appears to be an outlier.

PRODUCT: SVGM2

PRODUCT CODE: HF0295

TEST	METHOD	UNITS	SPEC. MIN	SPEC. TARGET	SPEC. MAX	Batch No.: N-000010-1	N-000010-5	N-000010-10	N-000010-12	N-000010-13	N-000010-13		N-000010-13
						Tank No.: Tk79	Tk79	Tk79	SWRI	SWRI	Intertek	TK79 ADJ	IAR-13
						Date: 10/6/2022	5/8/2023	10/7/2023	2/15/2024	2/15/2024	2/15/2024	2/15/24	
						HS lab data	HS lab data	HS lab data	HS lab data	HS lab data	HS lab data	HS lab data	
						RESULTS	RESULTS	RESULTS	Results	Results	Results	RESULTS	
Distillation - IBP	ASTM D86[2]	°C	22.2		35.0	30.4	31.3	29.7	29.9	29.7	29.2	29.6	29.5
5%		°C				45.5	44.2	44.7	44.9	45.8	46.8	44.5	47.5
10%		°C	48.9		57.2	54.3	53.9	54.1	54.4	55.2	53.0	53.0	56.2
20%		°C				69.4	69.5	69.9	70.4	71.3	68.9	68.4	73
30%		°C				86.1	86.5	86.9	88.1	89.0	86.7	85.9	91.3
40%		°C				100.9	101.7	102.2	103.1	104.1	102.3	102.4	106.5
50%		°C	98.9		115.2	110.1	110.9	111.2	111.7	112.7	111.6	111.8	114.7
60%		°C				117.2	118.0	118.5	118.7	119.8	118.8	118.9	122.1
70%		°C				127.0	127.5	127.8	128.9	130.0	128.5	129.0	134
80%		°C				148.8	150.5	151.0	152.1	153.8	151.3	152.4	160.8
90%		°C	162.8		176.7	173.1	173.7	173.7	173.9	174.5	173.8	174.2	178.6
95%		°C				182.1	183.0	183.0	183.0	183.7	182.5	183.5	197.3
Distillation - EP		°C	196.1		212.8	200.9	202.2	202.3	204.7	202.7	201.6	205.0	203.6
Recovery		vol %		Report		97.5	96.5	96.9				97.6	
Residue		vol %			2.0	1.1	1.1	1.1				1.1	
Loss		vol %		Report		1.4	2.4	2.0				1.3	
Gravity	ASTM D4052[1]	°API	56.5		61.2	57.17	56.8	56.8	56.20	56.30	56.50	56.61	
Specific Gravity	ASTM D4052[1]	---		Report		0.7501	0.7516	0.7514				0.7522	

RVP Adjustment Fuel batch currently in Tank

		After Adjustment	Before Adjustment
Batch No.:		N-000010-13	N-000010-13
Analysis Date:		2/15/2024	2/15/2024
Sample date:		2/14/2024	2/14/2024

TEST	UNITS	SPECIFICATIONS			RESULTS	RESULTS
		MIN	TARGET	MAX	JHL / BV	JHL
Distillation - IBP	°C	22.2		35.0	29.6	30.6
5%	°C		Report		44.5	47.6
10%	°C	48.9		57.2	53.0	57.2
20%	°C				68.4	73.2
30%	°C				85.9	90.4
40%	°C				102.4	104.6
50%	°C	98.9		115.2	111.8	113.2
60%	°C				118.9	120.1
70%	°C				129.0	130.4
80%	°C				152.4	153.7
90%	°C	162.8		176.7	174.2	174.4
95%	°C				183.5	183.4
Distillation - EP	°C	196.1		212.8	205.0	202.3
Recovery	vol %		Report		97.6	97.6
Residue	vol %			2.0	1.1	1.1
Loss	vol %		Report		1.3	1.3
Gravity	°API	56.5		61.2	56.61	55.67
Specific Gravity	---		Report		0.7522	0.7560
Reid Vapor Pressure	kPa	60.7		63.4	62.4	57.8

RVP Adjustment only brings the front end of the distillation to where it was.

Eight RVP Adjustments over 2023 summer/fall.

… does not appear to have changed the hydrocarbon profile of the fuel

N-000010-5
Sample from 05/08/2023.

SUMMARY REPORT

Group Type	Total(Mass%)	Total(Vol%)
Paraffins:	4.679	5.287
I-Paraffins:	40.224	44.250
Olefins:	6.679	7.076
Naphthenes:	3.906	3.820
Aromatics:	40.509	35.258
Total C16+:	0.041	0.035
Total Unknowns:	3.963	4.273

N-000010-5
Sample from 05/23/2023.

SUMMARY REPORT

Group Type	Total(Mass%)	Total(Vol%)
Paraffins:	4.712	5.305
I-Paraffins:	40.120	44.112
Olefins:	6.640	7.036
Naphthenes:	3.978	3.892
Aromatics:	40.433	35.223
Total C16+:	0.046	0.039
Total Unknowns:	4.070	4.392

N-000010-13
Sample from 02/12/2024.

SUMMARY REPORT

Group Type	Total(Mass%)	Total(Vol%)
Paraffins:	3.981	4.416
I-Paraffins:	40.662	44.847
Olefins:	6.246	6.604
Naphthenes:	4.121	4.030
Aromatics:	40.931	35.727
Total C16+:	0.061	0.051
Total Unknowns:	3.998	4.324

Totals by Group Type & Carbon Number (in Mass Percent)

	Paraffins	I-Paraffins	Olefins	Naphthenes	Aromatics	Unknowns	Total
C1	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C3	0.010	0.000	0.000	0.000	0.000	0.000	0.010
C4	0.450	2.442	0.000	0.000	0.000	0.000	2.892
C5	0.991	13.305	0.000	0.263	0.000	0.000	14.558
C6	0.820	2.259	3.134	0.529	0.096	0.000	6.837
C7	0.698	2.141	0.504	0.777	0.000	0.028	4.148
C8	0.516	16.065	2.351	1.474	22.149	1.201	43.756
C9	0.127	1.183	0.065	0.215	11.916	0.079	13.585
C10	0.775	1.838	0.624	0.181	3.884	0.097	7.398
C11	0.077	0.291	0.000	0.000	2.129	1.055	3.552
C12	0.122	0.701	0.000	0.468	0.233	1.304	2.828
C13	0.083	0.000	0.000	0.000	0.103	0.185	0.371
C14	0.009	0.000	0.000	0.000	0.000	0.000	0.009
C15	0.000	0.000	0.000	0.000	0.000	0.014	0.014
Total:	4.679	40.224	6.679	3.906	40.509	3.963	95.996

N-000010-5
Sample from 05/08/2023.

Totals by Group Type & Carbon Number (in Mass Percent)

	Paraffins	I-Paraffins	Olefins	Naphthenes	Aromatics	Unknowns	Total
C1	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C3	0.009	0.000	0.000	0.000	0.000	0.000	0.009
C4	0.124	2.523	0.000	0.000	0.000	0.000	2.647
C5	0.633	14.111	0.000	0.248	0.000	0.000	14.992
C6	0.722	1.877	2.665	0.480	0.086	0.000	5.830
C7	0.684	2.033	0.505	0.763	0.000	0.029	4.013
C8	0.525	16.043	2.365	1.513	21.692	1.148	43.286
C9	0.135	1.258	0.068	0.230	12.373	0.078	14.142
C10	0.816	1.720	0.642	0.386	4.024	0.097	7.685
C11	0.079	0.318	0.000	0.000	2.436	1.188	4.021
C12	0.128	0.781	0.000	0.501	0.198	1.241	2.849
C13	0.111	0.000	0.000	0.000	0.122	0.187	0.421
C14	0.013	0.000	0.000	0.000	0.000	0.000	0.013
C15	0.000	0.000	0.000	0.000	0.000	0.030	0.030
Total:	3.981	40.662	6.246	4.121	40.931	3.998	95.941

No significant difference in Carbon number profile.

N-000010-13
Sample from 02/12/2024.

Washed and un-washed gums have not changed.

Customer Product Description: Various
Location: Deer Park, TX, USA, Deer Park, Texas, United States
Sample Representing: ID: HF0295 LE080755 Submitted Composite
Drawn By: Client

Sample ID: 2024-DRPK-001380-001
Date Sampled: 12-Feb-2024
Date Submitted: 12-Feb-2024
Date Tested: 13-Feb-2024

Method	Property	Result	Units
ASTM D6729	Note:	See Attached.	
[f] ASTM D381	Unwashed Gum Content	2.0	mg/100ml
	Washed Gum Content	1.0	mg/100ml

N-000010-5
Sample from 05/08/2023.

Customer Product Description: Various
Location: Deer Park, TX, USA, Deer Park, Texas, United States
Sample Representing: ID: HF0295 LE251230
Drawn By: Client

Sample ID: 2024-DRPK-001380-002
Date Sampled: 12-Feb-2024
Date Submitted: 12-Feb-2024
Date Tested: 13-Feb-2024

Method	Property	Result	Units
ASTM D6729	Note:	See Attached.	
[f] ASTM D381	Unwashed Gum Content	1.5	mg/100ml
	Washed Gum Content	1.0	mg/100ml

N-000010-5
Sample from 05/23/2023.

Customer Product Description: Various
Location: Deer Park, TX, USA, Deer Park, Texas, United States
Sample Representing: ID: HF0295 MB011203
Drawn By: Client

Sample ID: 2024-DRPK-001380-003
Date Sampled: 12-Feb-2024
Date Submitted: 12-Feb-2024
Date Tested: 13-Feb-2024

Method	Property	Result	Units
ASTM D6729	Note:	See Attached.	
[f] ASTM D381	Unwashed Gum Content	1.5	mg/100ml
	Washed Gum Content	1.0	mg/100ml

N-000010-13
Sample from 02/12/2024.

Reactivity of the fuel as measured by Bromine Number

...degree of unsaturation is comparable.

N-000010-5
Sample from 05/08/2023
10.12

N-000010-5
Sample from 05/23/2023
10.02

N-000010-13
Sample from 02/12/2024.
9.25

Detailed hydrocarbons analysis…fuel fingerprint

- **Detailed hydrocarbons analysis of Batches N-000010-5 and N-000010-13 is also available.**
- **A fingerprint of 143 GC peaks indicates no significant shift in fuel composition**
- **The above data can be shared under confidentiality.**

Plan for resoling frequency of RVP adjustments so that testing can start.

The current fuel tank's floating roof seal is deteriorating needs urgent repairs.

Seal leaks have been the cause of numerous RVP adjustment. This repair can only be done when the tank is emptied.

Our Plan:

- The remaining fuel's RVP will be adjusted will be adjusted resulting in batch **N-00010-14.**
- The **N-00010-14** transloaded into railcars
- When each railcar is filled, they will be pressured with a nitrogen pad which will ensure RVP stability.
- A full slate of analysis of each car will be done as they are filled.
- A retain will be taken and stored for 1 year for each of these cars.
- Before any order/truck is loaded from the rail car, the fuel will be sampled the railcar for RVP, gravity and D86. RVP and gravity and will be adjusted if require before loading any truck.

We are confident that the fuel in an unopened railcar will not change.

Conclusion….

The engine test labs can resume testing…

- **Haltermann Solutions can make the fuel N-000010-14 available within a week.**
- **Customers should not be waiting for the fuel to be transferred to rail cars.**