COMMITTEE D02 on PETROLEUM PRODUCTS, LIQUID FUELS, AND LUBRICANTS

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SEQUENCE VI SURVELLANCE PANEL

Date – 08 Feb 2023

ATTENDANCE

SWRI	Dan Engstrom, Christine Eickstead, Pat Lang, Travis Kostan, Mike Lochte
INTERTEK	Adrian Alfonso
LUBRIZOL	Andrew Stevens, George Szappanos, Tony Catanese
AFTON	Bob Campbell, Ben Maddock, Amanda Stone
ORONITE	Robert Stockwell, Ricardo Affinito, Jo Martinez
INFINEUM	Andy Ritchie
TMC	Rich Grundza
GM	Tim Cushing
TOYOTA	
OHT	Jason Bowden
TEI	
FORD	Mike Deegan
VALVOLINE	Amol Savant
HALTERMAN	Ed Hennessey
GAGE PRODUCTS	Jim Carter
HALTERMANN CARLESS	Izabela Gabrel
BP	
EXXONMOBIL	Mike Scudiero
SHELL	Jeff Hsu
IMTS	

1. **Attendance. See table above.**

2. **Approve minutes from 12/15 meeting**
   Motion to approve: Andrew Stevens, Second: Adrian Alfonso
   Motion passes unanimously

3. **New business**
   3.1 BL6 Testing Logistics
       - Test process alignment among labs
       - Targets for completion
       - Any outstanding questions/discussion

Andrew – On receipt of invoice, TMC will pay up to 38k per test. ASTM approved the release of contingency for two potential additional tests if we need them with a caveat that any unused money will be returned to ASTM. The extra money is not a slush fund to run extra tests; just to cover what's needed.
How are we going to approach running these tests? I received some questions about logistics of actually running the tests. Is Paul Rubas on the call?

Mike S. – I'm sitting in for Paul since he couldn't make it. Andrew can go through the notes that Paul sent regarding the test procedure

Andrew – Paul sent an email out to a small group. Paul is working with their automation engineer working to get the program set up in his lab. He has questions on how to do this. IAR uses a single oil tank and changes from BL5 to BL6 throughout the test. Any reason we can't use two separate BL tanks? This would eliminate the need for solvent cleaning. If automated, does it matter if they run BL6?

Adrian – Didn't read email through completely, but noticed that one option is BL6-BL5-BL6-BL5. Historically we have done A-B-B-A, not A-B-A-B. That's a question more for Rich.

Rich – Historically, that's how we've done it. A-B-B-A. Idea is that helps minimize any potential carryover effects. Historically with two labs, we start one lab with A and the other lab with B. As far as multiple tanks, Dan?

Dan – SwRI used two tanks. Similar results between IAR and SwRI, so don't suspect it makes a difference

Rich – I don't have a problem with that, don't think it makes a difference

Adrian – Don't see a problem with either way as long as the program is proven out. It's easier for IAR to use one tank, but no problem with other labs using two tanks.

Andrew – Sounds like we're okay with using one or two tanks, but want to stick with A-B-B-A ?

Adrian – Yes, that sounds right

Rich – Agree, important to maintain that protocol for running

Andrew – Okay to run program with one or two tanks. Just make sure that if you're using one tank that its being cleaned thoroughly.

Rich – I will specify the run order and make sure that they get alternated, and will distribute Excel sheets to labs. Three starting with A, three starting with B

Amol – Which labs are participating?

Andrew – SwRI, IAR, Lubrizol, Afton, Exxon

Amol – Not sure if we were going to participate?

Andy – The intent was to have all labs participate

Rich – I wasn't privy to intent and design and funding questions, but the intent would be to have as many labs as we can to participate. Historically these tests have been done on calibrated stands

Amol – Our stand is currently under calibration. Don't want to burden budget unnecessarily if not looking to have extra run or extra lab

Andy – Amol, you were budgeted for. Can you please advise if you can run?

Amol – I'm indifferent right now. Do you need us to run?

Andrew – The preference is for more runs. We're not confident enough in the original data to proceed with some sort of correction factor; main idea is to generate as much data as we can get and has been budgeted for and funds approved.

Amol – How soon to run?

Andrew – That's the next topic after completing this topic

Amol – As Rich mentioned, this has to be run on a calibrated stand but our stand cal expires near the end of February. Second caveat, I don't think I'll ever run BL6 on my stand. I understand that this is data for the industry.

Andy – It sounds like you might not want to participate.

Amol – After discussion in December, I took my hand back because I don't foresee getting to BL6.

Andy – How much BL5 do you have?

Amol – The way it was asked during the BL5 purchase, we were to forecast to whatever hardware inventory level we have. My oil inventory is on par with hardware inventory. Stretch out to 2027 potentially, enough for the hardware inventory we have.

Andy – If you're not generating BL6 data going forward, it's a bit of a distraction

Amol – I agree with this. 5 labs should be enough.

Travis – Traditionally we've done this on just VIE conditions. Are we going to do this on just VIE and accept this for VIF or try to run VIF conditions as well?

Andrew – I think we agreed that we'll stick with VIE conditions.

Andy – I agree as well. VIF is circling the drain anyway.

Travis – That's fine as long as we all accept that without a run to verify. Part 2: This is typically done on a calibrated engine, but no specification on run number. We expect that FEI changes with run number, but we may want to try to balance due to engine hour correction.

Andrew – We did a straw poll survey of where people were at run number-wise, seemed like a decent mix.

Adrian – The last two data points on BL6 might have been towards end of life of engine at both labs.

Rich – I was going to ask same question Travis – don't know that it makes a difference regarding baseline oil. May end up with everything on EOL engines and may have been an issue. But we want a mix and should be able to see any differences with mix of engine life. Labs should add a comment to spreadsheet with engine hours at start of testing.

Travis – Yes, we need to agree that it's robust enough before we kick this off.

Andrew – Are labs comfortable communicating where in the engine's life they intend to run this testing? It's good to have varying engine life in the study and know when people are intending to do this. Some labs have a tighter timeframe than others for switching over. Is there a date we should be shooting for to have a goal to work towards?

Adrian – If we want to get a mix, we should contact Rich with engines available for this run. Then Rich is the one saying what data he already has. Might delay timeline a little bit though. IAR is one of the labs that has been running low on BL5. SwRI has been very helpful with a drum or two here and there. I understand the need for good data as well; let Rich know and Rich to decide if that's a good fit.

Andrew – If you're okay with the timing on that, Adrian.

Rich – My only concern is the potential sporadic nature with this testing. May get some initial interest in first couple runs. Given 5 tests, we could potentially slot them as 1st, 2nd, 3rd runs. May be able to replicate two run slots.

Adrian – The middle run would be the average of candidates. That would be the best choice to replicate and have two data points on.

Travis – Andy mentioned something that's important to consider. If Amol not going to need any BL6 moving forward, then it's good to not participate in this since he's not using BL6. Is everyone participating in this going to generate BL6 data in the future? The PM was generated with data from some labs that were no longer running tests, could be same situation here if labs aren't going to use BL6.

Rich – All other labs purchased quantities of BL6. One lab will be into it right away, some may be a year away. Everybody did purchase BL6.

Travis – If we have budget for 6 of these runs, can we not reassign one somewhere? Newer run number and later run number?

Andrew – I think we would be better served with more data.

Andy – I think yes, but want to make sure that I check if that's okay.

Rich – Only three run slots, first test is a reference.

Travis – In the VIF, we saw differences between the first and second run. Don't know if we want to see some "first" runs in there if they can't be calibrated

Adrian – We're talking about the first candidate run after reference. For the purpose of the data here, we're required to have calibrated run. So one run out of 4 is unavailable for this testing.

Amol – Most of reference data comes from this data. That's where most of the tests are judged for their reference data. Could run BL comparison right away after break-in and then have stand attempt calibration as a second run.

Adrian – We'd be calibrating on existing BL that has calibrated before. Should be okay to go since it has been approved for use. How do we know if engine is mild or severe if not calibrated?

Travis – Would know from the calibration run after the BL sequence.

Andrew – I would think we would want to match up more with candidates engine-life wise which is after reference compared to doing something way early in the engine's life.

Travis – One might argue that the reference is most important since it generates SAs.

Amol – That's how I see it.

Rich – What do we do with the data if the subsequent reference test fails? Do we assume it's still good?

Adrian – I don't think so.

Rich – I understand the need to see how it performs, but that's not how we've done it in the past so it may convolute whether we're trying to match to previous data sets.

Adrian – Another thing is that this result will be compared to previous BLs, which were introduced sometime later in the life of the engine.

Rich – Previous batches were definitely not introduced on the reference run.

Adrian – Yes, they were on calibrated engine/stand combos.

Travis – This is new territory, and can't be compared in same way to what we've done in the past. I think it makes sense to keep 6 tests and run a couple on first run. We risk that the data's in jeopardy if engine doesn't calibrate. Worst case, we end up with 4 tests instead of 6. I think it's important to capture for this exercise but SP choice.

Rich – Allocation of 6 tests in that scenario – would we allocate 1 or 2 towards that first run? We would do this right after break-in.

Andy – BL6 is different than BL2, but we're moving on from BL2. Don't think the difference is relevant anymore. We've been running BL5 for how many years?

Rich – At least two to three.

Andy – It's been more than that, call it 5 and we'll split the difference. We have money to run tests to evaluate BL6. We have the luxury of better quantifying the difference. Not going to overthink this one. The oil is different but not dramatically different. Quantify BL5 and BL6, redeploy the funds allocated to another exercise. I think we're overthinking this.

Travis – I don't think its accurate to say the difference is not dramatic.

Andy – Maybe a poor choice of words, but probably quantifiable. Need to have best estimate at quantifying.

Rich – We're trying to correct on fuel consumed?

Andrew – We need data to see where we're at and see where to go from there.

Andy – I think this is a good time to speculate. BL6 is less fuel efficient than BL5, so we burn more fuel and candidates are going to be higher. We have to subtract some sort of correction factor.

Adrian – References will fail mild.

Bob – We need to find out what the difference is, then find out how to manage it. Don't think were going to solve that problem today. I have reservations running on Run 1. Wouldn't feel good about doing this then running a reference behind it. If the reference fails, then we won't use the data. Don't want to spend money to generate unusable data.

Amol – Since we have data on runs 2/3/4, we can extrapolate to run 1.

Travis – Maybe we can avoid run 4 as well and stick to runs in the middle. Maybe lack of including run 1 is balanced out by not including run 4.

Rich – That's a good point. May not match data we got relative to BL2, but we know that BL2 is different. Whether we look at run 4 on BL5 I'm not sure. Probably makes sense to wash out ends and see where it is in the middle.

Amol – It sounds like there was another meeting?

Andrew – Yeah, there was. What do people think about that option to use runs 2 and 3?

Amol – It's a good intermediate approach.

Rich – That will give us a nice set of data on both of those.

Ben – We will have BL1, BL2 and BLA data on references. We can draw lines and extrapolate to see if it's a nice even offset or nonlinear.

Adrian – We have a bunch of BLB1 and BLB2 data.

Rich – If we look at BL5 data on BLA.

Bob – And BLB2; we can shape the curve if you want.

Andrew – We can extrapolate and create a curve. If there's a consistent offset then we could theoretically extrapolate that back as well.

Bob – That's a problem that we don't need to solve either, but we have the data available.

Tim Cushing -- Are we conscious of EPA requirements? I know we have limits for GF6 but EPA focuses on something a little different.

Andrew – I'm aware of what the letter is, what's your specific concern?

Tim – It's nice to stay within bounds of that and not have to make any adjustments.

Andrew – What bounds exactly? I know what the letter is but haven't looked at the terminology in quite some time.

Tim – We have the GF5 one in shop. Refers to FEI sum + 0.5% (represents 2 sigma). Not sure what the verbiage is in GF6 guidance.

Bob – If you can the find GF6 one and provide it that would be helpful. But if we get this right, BL6 will be a no-change change. The intention is to make it transparent such that candidates today and candidates last year are treated the same.

Tim – Pass fail limits for GF6 and other lurking limit for manufacturer level.

Stockwell – That shouldn't affect what we're trying to do with the baseline oil.

Andrew – Shared GF6 EPA document.

Tim – Yes, that's what talking about.

Andrew – Which specific section? Don't immediately recall.

Tim – I know there was some concern when we went from VID to VIE and the standard deviation wasn't identical.

Andrew – We want to make sure that what we do with BL is consistent with this letter.

Andrew – Are we going to have Rich work with the labs as things become available or discuss right now?

George – We're ready to start in the next few weeks.

Mike (Exxon) – We will finish referencing next week.
Adrian – We're calibrated in one stand, another stand is running the second candidate, and one is stand running calibration now.

Andrew – So we're probably good to go within the next several weeks, target to do it as soon as possible. How will we report results? Rich will send a spreadsheet to be filled out.

Bob - How will we coordinate run numbers? Labs to call Rich and let him know what slots are available? Need to lay out a matrix? Rich can coordinate behind the scenes with communications from the labs.

Rich – How about, when the first lab is ready to go, I'll schedule a call with remaining 4 labs and work out a timeframe. Rich to lead this effort.

Travis - If it's too much effort/too many delays, we don't have to stick to the runs 2 and 3. Can run a run 4.

Adrian – I can run a run 3 next week to get started. Rich – good plan. (Amol – clarify that we mean run number as the number of runs on the engine, not the number of candidates).

Andrew – So the first run is taken care of. How will we coordinate the rest of the runs? Can we do this in the small lab-only group? Andy – should be the full panel, meet again in two weeks? Rich – yes.

Adrian will go ahead with his run, then the group will meet in two weeks.

3.2 Fuel batch questions

Mike Scudiero – Our main concern is that if there are any alterations, the Halterman would provide a new CoA.

Ed (Halterman) – Are you asking for an entirely new CoA if we bump RVP?

Andrew – That is what we agreed to on the last call. Ed confirmed that that was possible on the last call.

Ed – We do not have an issue with that.

Ben – The other agreement was that a new suffix is added to the batch to denote a change.

Ed – We have been using -#, will confirm.

Andrew – Paul's other concern was that they were expecting a new CoA and they hadn't gotten it yet. Ed will check.

3.3 Coolant flow calibration discussion (see Appendix)

George – Why use water and not 50/50? Probably not an issue if stand has a Coriolis or something similar, but some stands have older system (sharp-edged orifice measuring pressure drop across orifice) which might get the wrong number with a different fluid. Suggestion: (see appendix)

Adrian – Agrees we should be calibrating with operating media. Side note – we've done experimentation, checking with water and 50/50 and haven't seen much of a difference. But we agree with the suggestion.

Andrew – Any concerns with changing?

Stockwell – Will it be harder to calibrate?

Ben – Good observation. Maybe have some allowances for labs to continue to use water unless using sharp-edged orifice?

George – Yes, that is a reasonable solution.

Andrew – So water can be used unless using a sharp-edged orifice, then use 50/50 Dexcool.

Motion:
Volumetric devices shall be calibrated using 50/50 Dexcool, mass-based devices shall be calibrated using water.

Second – Ben

Discussion: Amol – using the coolant would be the most accurate way to measure no matter what device is in use. Adrian – agrees.

Ben – We've been using this procedure for a while, just tightening up the procedure for this one circumstance.

Amol – A sharp-edged orifice isn't that accurate anyway. The error gets washed out in the measurement itself.

Andy – Will this be an IL? Yes. Just bear in mind that the IL has to clear the two-week window. Rich – no, if this isn't controversial, will go ahead and issue it.

Stockwell – Is the device still calibration traceable to NIST? Amol – should be.

Andrew – There will be more discussion that this time slot has. We can finish this at the next meeting.

4. **Next meeting**

5. **Meeting adjourned**