

General Comments:

First, we want to recognize the staff's harmonization and simplification efforts in the 45 day notice; the flexibility is very much appreciated. Some further comments and corrections follow below.

There are multiple roll-out provisions in several appendices, parts, and subparts. Even with the suggested changes below, there may still be some unintended early rollouts of the 1065 / 1066 requirements. To avoid these situations, ARB may want to consider some higher level guidance reinforcing these rollout provision's to insure harmonization with Tier 3. Tier 3 did something similar in Part 86.1801-12 (a) and Part 600.111-08's introduction.

Additionally, and most importantly, LEV 3 and Tier 3 test procedures will continue to evolve over time due to the technical complexity of vehicles and this LEV 3 & Tier 3 emissions testing. Unintended errors and omissions will occur which will need to be quickly resolved. For example, future CFR changes would create new revision dates for some of the Tier 3 citations in the LEV 3 rule. To address this evolution of test procedures, we highly recommend ARB provide some mechanism to quickly resolve issues then implement solutions.

Leviii14isor – Statement of Reasons

VI

10. Ethanol retention checks for Sealed Housings for Evaporative Determination (SHEDs):

"As such, staff believes it is still necessary to require SHED retention checks with ethanol regardless of how the ethanol component of the sample is accounted for (adjustment factor or direct measurement)."

Comment: Burdensome, not harmonized with EPA.

§ 86.117-96 "Ethanol retention checks may be performed instead of methanol retention checks. Alcohol retentions may be omitted if no alcohol - fueled vehicles will be tested in the evaporative enclosure."

§ 86.117-96 (c), "The methanol retention check must be performed only upon initial installation and after major maintenance, consistent with good engineering judgment.

Leviii14isorappb – 2015⁺ Criteria & 2017⁺ GHG

Part I – GENERAL PROVISIONS FOR CERTIFICATION AND IN-USE VERIFICATION OF EMISSIONS

B. Definitions, Acronyms and Abbreviations

"Highway Test Procedures" means the Federal Test Procedure as set forth in Subpart B, 40 CFR §1066.840 ~~Part 86~~, as modified in Part II of these test procedures, except that emissions shall be measured using the Highway Driving Schedule as set forth in Part II, Section F.

Comment: "Subpart B", unclear if this is referring to Part 1066 or Part 600, since 1066.840 is actually in Subpart I. Highway test procedure guidance is in Part 600, subpart B.

“...§1066.840 Part 86, as modified in Part II of these test procedures...”

Comment (Roll-out Issue): Industry needs additional rollout provisions like that specified in Tier3’s §600.111-08.

Suggest modifying the above wording to:

“Highway Test Procedures means the Federal Test Procedure as set forth in **600** Subpart B or CFR §1066.840 as modified in Part II of these test procedures with the migration provisions of §600.111-08 introduction.”

D. §86.1810 General standards;

1.10 NMOG Factors:

D.1.10: Some inconsistent language. Part I, D.1.10 specifies you “**must**” use the NMOG factors specified in this part (ex, 1.10 for FTP & 1.03 for HWY & SFTP) for California fuels. However in Part II, C. “40 CFR Part 1066 – Vehicle-Testing Procedures”, C.2.1 (which specifies ARB 100.3 fuels), when coupled with Part II. C.7 “NMOG Determination”, says “A manufacturer **may** use the conversion factors in sections D.1.10 and D.2.7.5 **as alternatives** to those set forth in this section **§1066.635**.”

Comment: The two requirements (above) are inconsistent; we recommend harmonizing with Tier 3 NMOG factors & equations. Additionally “leviii14isorappd” requires 1066.635.

With respect to fuel harmonization / reciprocity. Don’t see any guidance on testing LEV 3 vehicles with Tier 3 fuels or vice versa, Tier 3 vehicles tested on LEV 3 fuel. These could happen with evaporative exhaust testing. Again we recommend harmonization of NMOG factors & equations per 1066.635 regardless of which fuel is tested.

D.1.10: “For LEV III vehicles and LEV II vehicles that are certified to the SFTP Exhaust Emission Standards in section 1.2 and/or the Highway NMOG + NOx Standard in section E.1.6, using the California Gasoline Fuel Specifications set forth in Part II, section 100.3.1.2, manufacturers must multiply NMHC measurements by an adjustment factor of 1.03 before adding it to the measured NOx emissions and comparing with the NMOG + NOx standard to determine compliance with that standard.”

Comment: This applies to E10 only (section 100.3.1.2); it should be harmonized with 1066.635.

D.1.10: “For LEV III vehicles and LEV II vehicles that are certified using a gasoline fuel that contains an ethanol content greater than that allowed by the California Gasoline Fuel Specifications set forth in Part II, section 100.3.1.2 and less than or equal to 25 percent ethanol, the adjustment factor that must be used to demonstrate compliance with this paragraph is calculated using the following formula:

Adjustment factor = 1.0302 + 0.0071 x volume percent fuel ethanol”

Comments:

(1) Implies this FTP factor would apply for HWY and SFTP. Should be focused on just the FTP.

- (2) No guidance for FTP testing fuels containing ethanol <E10. The adjustment factor equation should be expanded for this range of fuels, again for FTP only.
- (3) The combinations of NMHC to NMOG factors, equations, test cycles, regulations (LEV 3 & Tier 3) and fuels are getting very complex to manage software and logistics wise. This can be **greatly simplified** and **reduce the chance for errors** by just harmonizing with Tier 3 1066.635. With rounding this achieves ARB's desire to essentially retain the 1.10 factor for E10 as follows:

E9.4 → 1.09694 ~ 1.10 (Tier 3 confirm tolerance)

E9.6 → 1.09836 ~ 1.10 (LEV 3 & Tier 3 blend tolerance)

E10.0 → 1.10120 ~ 1.10 (LEV 3 & Tier 3 blend tolerance)

E10.2 → 1.10262 ~ 1.10 (Tier 3 confirm tolerance)

Although rounding the above appears to harmonize LEV 3 & Tier 3 NMOG factors, we **do not** recommend this rounding approach. Tier 3 regulations require carrying all digits forward through the final mass calculations, then rounding of the results; therefore we still will have 2 different processes, factors and equations.

We believe harmonizing LEV 3 with Tier 3 1066.635 (as noted above) greatly simplifies the NMOG calculation process and still achieves ARB's requirement for a 1.10 factor; it reduces the burden for OEM's and agencies alike. It also is a common process whether using LEV 3 or Tier 3 fuels like for evaporative exhaust testing.

E. California Exhaust Emission Standards.

1.4.2: "D.10"

Comment: Correct typo. There is no "D.10" it should be "D.1.10."

1.6 Highway NMOG + NOx Standard.

"(HWFET; 40 CFR ~~§1066.840~~ ~~600-Subpart B~~, which is incorporated herein by reference)"

Comment (Roll-out Issue): Direct reference to Part 1066.840 for HWY w/o Part 600 rollout provisions. Part 1066.840 becomes effective immediately when these regulations are adopted (a switch, not a roll-out). 1066.840 references many other Part 1066 procedures, which in turn reference other 1066 procedures, and so on without the Tier 3 roll out guidance. Industry needs rollout provisions similar to that specified in Tier3's §600.111-08 test procedure introduction as follows:

"This section describes test procedures for the FTP, highway fuel economy test (HFET), US06, SC03, and the cold temperature FTP tests. Perform testing according to test procedures and other requirements contained in this part 600 and in 40 CFR parts 86 and 1066, including the provisions of 40 CFR part 86, subparts B, C, and S. **Manufacturers may certify vehicles based on data collected according to previously published test procedures for model years through 2021.** In addition,

we may approve the use of previously published test procedures for later model years as an alternative procedure under 40 CFR 1066.10(c).
See 40 CFR 86.101 and 86.201 for detailed provisions related to this transition.”

Suggest modifying the above wording to: “HWFET; per the Federal Test Procedure as set forth in **600** Subpart B or CFR §1066.840 as modified in Part II of these test procedures and §600.111-08 introduction”.

G. Procedures for Demonstration of Compliance with Emission Standards

3.4 Highway Fuel Economy Test.

“The exhaust emissions, including non-methane organic gas emissions, shall be measured from all exhaust emission data vehicles tested in accordance with the federal Highway Fuel Economy Test (HWFET; 40 CFR §1066.840, ~~600~~, Subpart B).”

Comment (Roll-out Issue): Same comment as E.1.6 (above). Part 1066.840 becomes effective immediately when these regulations are adopted (a switch, not a roll-out). Part 1066.840 references many other Part 1066 procedures, which in turn reference other 1066 procedures, and so on without the Tier 3 roll out guidance. Industry needs rollout provisions as specified in Tier3 §600.111-08.

Suggest modifying the above wording to “HWFET; per the Federal Test Procedure as set forth in **600** Subpart B or CFR §1066.840 as modified in Part II of these test procedures and §600.111-08 introduction”.

Part II - CALIFORNIA EXHAUST AND PARTICULATE EMISSION TEST PROCEDURES FOR PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM-DUTY VEHICLES

Comment: The California 50°F test procedure doesn’t reference sections like Subpart II, section D; there is no mention of the HWY test and relevant CFR sections.

A. 40 CFR Part 86, Subpart B - Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles and New Light-Duty Trucks and New Otto-Cycle Complete Heavy-Duty Vehicles; Test Procedures.

100.3.1.1 Certification Gasoline Fuel Specifications for LEV II Light-Duty Vehicles and Medium-Duty Vehicles.

Comment: Can use LEV 2 or 3 or Tier 3 fuel. However in the last sentence for evaporative testing, it appears in **error** that Tier 3 fuel is required versus using optional language (“Use of **this** fuel for evaporative emission testing shall be required...”) which follows the previous sentence that references Tier 3 fuel. Was “this fuel” meant to be plural, “these fuels”?

100.3.1.2 Certification Gasoline Fuel Specifications for LEV III Light-Duty Vehicles and Medium-Duty Vehicles.

Comment: Tier 3 fuel is the default fuel for exhaust emissions tests, with LEV 3 fuel being optional (“may use”). However in the last sentence for evaporative testing, LEV 3 fuel is required (“Use of this fuel for evaporative emission testing shall be required...”) follows the previous sentence which references LEV 3 fuel. This appears to conflict with 100.3.1.1. Was “this fuel” meant to be plural, “these fuels”?

California Certification Gasoline Specifications for LEV III Light-Duty Vehicles and Medium-Duty Vehicles – Table

Lists ethanol limits as:

Ethanol 9.6 – 10.0 vol%

Comment: This is the same tolerance as Tier 3 (good), but is too tight a tolerance to maintain from the suppliers analysis to the OEM’s confirmatory analysis (recheck). Doesn’t account for variation in the ASTM procedures plus the possibility the blend was near either the upper or lower limit. To resolve this, Tier 3 utilizes two tolerances, one is a “blend” tolerance at the gas supplier, the other is a “confirmatory” tolerance at the OEM or agency, as follows:

1066.710(b) Table 1:

Ethanol blended volume %; 9.6-10.0; See paragraph (b)(3) of this section.

Ethanol confirmatory⁶ volume %; 9.4-10.2; ASTM D4815 or D5599.

(b)(3) “The ethanol-blended specification in Table 1 of this section is based on the volume % ethanol content of the fuel as determined during blending by the fuel supplier and as stated by the supplier at the time of fuel delivery. Use good engineering judgment to determine the volume % of ethanol based on the volume of each blend stock. We recommend using a flow-based or gravimetric procedure that has an accuracy and repeatability of $\pm 0.1\%$.”

Recommend retaining the current 9.6 – 10.0% ethanol as a blend tolerance, then adding a marginally wider tolerance for confirmatory testing.

B. 40 CFR Part 86, Subpart C - Cold Temperature Test Procedures.

200.1: “California applicability. No change to §86.201, except as follows.

Amend subparagraph 86.201-94(a) as follows: This subpart describes procedures for determining the cold temperature carbon monoxide (CO) emissions from 2015 and later through 2021 model year new passenger cars, light-duty trucks, and medium-duty vehicles (excluding natural gas, diesel-fueled, and zero-emission vehicles).

Comment: There is a known migration issue with 86.201 due to the current cold temperature procedures being deleted in the CFR. This is expected to be corrected in the near future with new rulemaking. In the interim, suggest adding this provision to this section:

“You may follow previously published Tier 2 cold test procedures before MY 2022, or elements of both previous and new, using good engineering judgment...”

C. 40 CFR Part 1066 – Vehicle-Testing Procedures.

7. Subpart G – Calculations.

1066.635 NMOG Determination:

Comments: Some inconsistent language. Part I, D.1.10 specifies you “**must**” use the NMOG factors specified in this part (ex, 1.10 for FTP & 1.03 for HWY & SFTP) for California fuels. However Part II, C. “40 CFR Part 1066 – Vehicle-Testing Procedures”, C.2.1 (which specifies ARB 100.3 fuels) coupled with Part II. C.7 “NMOG Determination”, states “A manufacturer **may** use the conversion factors in sections D.1.10 and D.2.7.5 **as alternatives** to those set forth in this section §1066.635.”

The two requirements are inconsistent. We recommend harmonizing with Tier 3 NMOG factors and equations.

9. Subpart I – Exhaust Emission Test Procedures for Motor Vehicles.

§1066.831 amended as follows: “1. Replace all references to “US06 Highway” with “US06 Bag 2...” (in multiple locations).

Comment: Basically a naming convention change but creates inconsistent descriptors between Tier 3 & LEV 3.

leviii14isorappc – NMOG Procedures 1993 through 2016MY

Part A.5: For CNG vehicles, one still has to multiply the CH₄ mass by the methane RAF (assuming this is still in the exhaust emission regulations) before adding to the NMHC mass; for 2015+ MY vehicles, the (CH₄ mass x methane RAF) is to be added to NMHC mass prior to adding to NO_x mass.

Comment: With the adoption of GHG regulations curtailing CH₄ emissions, do RAFs still need to be comprehended in the LEV 3 regulations?

leviii14isorappd – NMOG Procedures 2017+MY

Part A GENERAL APPLICABILITY AND REQUIREMENTS

General comment: Multiple direct references to CFR Parts 1065 & 1066 without the rollout provisions like that in 86.101. Industry needs this migration path to be harmonized with Tier 3. Suggest a guidance be included in this appendix d, Part A, clarifying this migration path consistent with 86.101. We suggest adding the following guidance to Part A:

“Migration of the 1065 and 1066 test procedures for measuring exhaust emissions from 40 CFR Part 86 to 40 CFR Part 1066 shall be done in accordance with Part II, Subpart A, section 100.1 of the “California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas

Exhaust Emission Standards and Test Procedures for Passenger Cars,
Light-Duty Trucks, and Medium-Duty Vehicles.”

Part A.3: The requirement for CNG cert has changed; it used to be that NMHC by GC was required. Now it is a requirement of NMHC by FID with a provision for alternative methods according to 1066.635.

Comment: If HC speciation is no longer a regulatory requirement, why is it still referenced in this regulation?

Parts C.5.5.1, D.5.3, and E.5.3: Define zero air as having < 1 ppmC HC contamination

Comment: This should be updated to Part 1065.750 requirements with < 50 ppbC HC contamination or better.

Parts D.2.2 and E.2.2: “Tedlar”

Comment: In the 2012 version, Tedlar was removed as an acceptable bag material, but in this ISOR, it’s been added it back as acceptable. Is this intended or is this an error?

Parts D.4.1 and E.4.1: “Tedlar”

Comment: In the 2012 version, Tedlar was allowed only if it did not add contamination, but in this ISOR, Tedlar is added back as one of the standard bag materials (clean or not). Is this intended or is this an error?

Parts D.4.2 and E.4.2: If injecting into the GC with a gas-tight syringe, only Tedlar is allowed for the original bag material.

Comment: This should be changed to allow for Kynar and Solef, as well.

Part E.3.2: “Tedlar”

Comment: Remove the word Tedlar from the phrase “...is stable for at least 24 hours in the Tedlar sampling bags...”

Part G.1.3: “This section addresses emissions, in concentration units, of each test phase. Calculations to use those concentrations to determine NMOG mass emissions for FTP testing are given in 40 CFR Part 1066, Section 1066.935, “NMOG determination.”

Comment: Part 1066.935 should be changed to Part 1066.635.

Part G.2.1: This section states that “Non-methane hydrocarbon weighted mass emissions (NMHCwm) can be determined by either FID or GC,” which directly contradicts the chart in Part A.3. The chart shows NMHC by GC is not an approved method (e.g., “The analyses specified in the table below shall be performed to determine mass emission rates of NMOG...”). Note: the wording used is SHALL.

Comments: Conflicting language needs to be corrected.

Parts G.3.3.1, G.4.3.1, and G.5.3.1: The ARB atomic masses for carbon and hydrogen, respectively, are 12.01115 and 1.00797 grams/mole, while the EPA (as per 1065.1005 (2)(2))

values are 12.0107 and 1.00794 grams/mole. Note: the EPA values are the same as reported by NIST.

Comment: Should be harmonized with Tier 3 and NIST.

leviii14isorappe – Evaporative Procedures 2001+MY

PART I. GENERAL CERTIFICATION REQUIREMENTS FOR EVAPORATIVE EMISSIONS

A. 40 CFR §86.1801-01 Applicability.

1.7: “For instances in this document where an **option** is provided to follow provisions from either Title 40 CFR Part 86 or Title 40 CFR Part 1066, the migration schedule set forth in Title 40 CFR 86.101**(b)** (April 28, 2014) shall apply.”

Comment: 86.101 (a)(8) & (9) are also applicable. The term “option” appears to be referring to a limited number of specific part 1066 references. It is unclear if the general migration path to Part 1066 procedures is covered under is language. The evaporative test procedures refer to many Part 86, subpart B exhaust test procedures which need a migration path to Part 1066.

B. Calibrations

“1. Evaporative emission enclosure calibrations are specified in 40 CFR §86.117-90. For the purposes of this section III.B, methanol shall mean ethanol when testing with ethanol-containing fuel. Methanol measurements may be omitted when methanol-fueled vehicles will not be tested in the evaporative enclosure. Amend 40 CFR §86.117-90 to include an additional section III.B.1.1., to read:”

Comment: §86.117-90 was updated / revised back in the mid 1990’s to §86.117-96, and more recently in Tier 3. Was it ARB’s intention to keep referring to this older version with the proposed LEV 3 rulemaking?

Additionally the ethanol / methanol recovery (or calibration) tolerance in §86.117-90 is $\pm 2\%$, which is not harmonized with Tier 3’s §86.117-96(c)(1)(ix), which specifies a $\pm 5\%$ tolerance. $\pm 2\%$ is not achievable on a routine basis and is burdensome, recommend harmonization with Tier 3.

1.1: “...and methanol retention check...”

1.1.3: “The HC and methanol measurement and retention checks...shall be performed on a monthly basis. (If six consecutive monthly retention checks are successfully completed without corrective action, the following procedure may be determined quarterly thereafter as long as no corrective action is required.”

Comment: Burdensome, not harmonized with EPA.

§ 86.117-96 “Ethanol retention checks may be performed instead of methanol retention checks. Alcohol retentions may be omitted if no alcohol - fueled vehicles will be tested in the evaporative enclosure.”

§ 86.117-96 (c), “The methanol retention check must be performed only upon initial installation and after major maintenance, consistent with good engineering judgment.

1.1.3.5: “Inject into the enclosure a known quantity of propane between 0.5 to 1 ~~2 to 6~~ grams and/or a known quantity of methanol **in gaseous form** between 0.5 to 1 ~~2 to 6~~ grams. ~~For evaporative emission enclosures that will be used for testing motor vehicles certified to the reduced evaporative standards in sections I.E.1.(c) and (d), use a known amount of propane or gaseous methanol between 0.5 to 1.0 grams.”~~

Comment: Delete “...in gaseous form...”. This form of injection is impractical due to the low vapor pressure of pure ethanol and it is not harmonized with EPA evaporative language per 86.117-96 (c)(1)(vii) which states “Inject into the enclosure...grams of pure methanol...The injected quantity may be measured by volume flow or by mass measurement.”. Also ethanol should be identified as well; it is likely done elsewhere in the evaporative regulations.

leviii14isorappf – Refueling Procedures 2001+MY

Subpart B - Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles and New Light-Duty Trucks; Test Procedures

Comment: Refers to several Part 86 subpart B sections but w/o a migration path to Part 1066. Need some provision in the refueling emissions test for this migration path per 86.101. Suggest adding the following guidance to Part B:

“Migration of the 1065 and 1066 test procedures for measuring exhaust emissions from 40 CFR Part 86 to 40 CFR Part 1066 shall be done in accordance with Part II, Subpart A, section 100.1 of the “California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.”

leviii14isorappi – ZEV / Hybrid Procedures 2018+MY

A. Applicability

Effective for 2018+ MY

Comment: Required for 2018+ MY; OEMs also should be allowed the option of adopting these test procedures for earlier model year vehicles including LEV 2. Doing so maintains the harmonization path to Part 1066 and provides quicker migration to the new procedures.

F. Test Procedures for 2018 and Subsequent Model Zero-Emission Vehicles (including Fuel Cell Vehicles and Hybrid Fuel Cell Vehicles) and All 2018 and Subsequent Model Hybrid-Electric Vehicles, Except Off-Vehicle Charge Capable Hybrid Electric Vehicles.

F.: Introduction, “Migration of the test procedures for measuring exhaust emissions from 40 CFR Part 86 to 40 CFR Part 1066 shall be done in accordance with Part II, Subpart A, section 100.1 of

the “California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles,” **unless otherwise noted.**”

Comment: Concern over “...unless otherwise noted.” This phrase appears to override the previous sentence on roll out guidance from Part II, Subpart A. Subpart F has many direct references to Part 1066 with amendments; this creates unintended early shortcuts to Part 1066 procedures. One example is:

8. “To be conducted pursuant to 40 CFR §1066.801”

All of 1066.801 is required for 2018+ MY except for the subsequent written amendments in section 8.

Branching: Additionally, the Part 1066 sections referenced in Subpart F in turn reference many more Part 1065 & 1066 sections which will also be required. These secondary requirements in turn branch out to tertiary requirements, then quaternary references, and so on. Following this branching of requirements, it is not difficult to bring in large sections of Parts 1065 & 1066 for 2018 MY, of which certification testing occurs in 2017 CY, of which vehicle development testing is now. A couple of examples of this branching are:

F.6.3.8: (d) “Follow the exhaust emission measurement procedures specified in **40 CFR §1066.410 through §1066.425...**”

Comment: “40 CFR §1066.410 through §1066.425” brings in at least parts these secondary requirements in:

1066.105, 1066.110, 1066.125, 1066.210, 1066.310, 1066.415, 1066.420,
1066.425, 1066.805, 1066.1010

1065.140, 1065.365, 1066.520, 1065.545, 1066.590, 1065.595, 1065.750

These secondary requirements in turn bring in tertiary requirements, and so on.

F.8.1.3 “Subparagraphs (b)(3)(i) through (e)(2)(iii). [No change]”

Comment: Brings in 1066.110, 1066.610, 1066.410, 1066.415, 1066.420, 1066.425, and all of the diesel heated FID requirements from Part 1065 which in turn brings in a lot of other requirements on analyzer performance, delay times, contamination, leak checks, drift correction, etc.

Suggestion: To remediate this roll-out concern, we suggest that in Section F. Introduction, the phrase “...unless otherwise noted” be modified to make it clear that the roll out provisions of Part II Subpart A guidance to Part 1066 procedures are still in effect. This is somewhat complex since the hybrid procedures now rely on the Part 1066 test (language) plus instructions with ARB revisions.

One solution could be to modify the phrase to “...unless otherwise noted in accordance with the roll-out provisions in Part II, Subpart A.”

F.: 20° & 50°F testing

Comment: No guidance on running 20° & 50°F testing.

F.6.1.3 through F.6.3.6: General note on the number of samples per test.

Comment: The comments below revolve around some conflicting language in several sections, specifically, the amount of diluted sample bags and PM filters needed per test. Some sections say 1 sample per phase; others say 1 sample per UDDS.

Suggest clarifying this by allowing diluted bags or PM filter samples per phase, or UDDS. Secondly for PM (only) also allowing 1 PM filter for the entire test (2 UDDS's) using single filter technology.

F.6.1.3: "A single sample is collected for a full UDDS cycle (cold-start or hot-start)".

Comment: Conflicts with several sections in section 6.3 and subpart G which allow 1 PM filter or diluted sample bag per phase or UDDS. Suggest clarifying this sentence to allow gaseous or PM samples per phase, UDDS, and for PM (only) per test (single filter technology – **important for harmonization with Tier 3** and for conventional vehicles per levi14israpb procedures, Part II, subparts A & C).

F.6.2.4: UDDS preconditioning, "After completing the preconditioning drive, battery state-of-charge ~~shall~~ **may** be set such that the SOC Criterion is satisfied by applying the SOC Net Energy Change Tolerances in section F.9. The battery state-of-charge **may** be set by driving additional UDDS cycles."

Comment: This setting of the SOC should not be allowed if J1711 Appendix C is used. Appendix C is currently not allowed for HEV's but is requested under a separate comment.

F.6.3.1: "The Urban Emission Test consists of a cold-start test and hot-start test as described in section **F.6.1.3.**"

Comment: F.6.1.3 requires "A single sample is collected for a full UDDS cycle (cold-start or hot-start)." This is contrary to 6.3.2 and 6.3.3 which allows 1066.815(b)(1), one filter per phase.

F.6.3.2: Specifies the following PM filter sampling techniques per 1066.815(b).

(b)(1) - 3 or 4 phase FTP with 1 filter/phase. May omit phase 4 filter and substitute phase 2.

Comment: Should limit to traditional 4 phase hybrid testing per 6.3.3 amendments. Again, it conflicts with 6.1.3 & 6.3.1 which requires 1 sample per UDDS, but is ok if 1 filter / phase was intended.

(b)(2) – 4 phase FTP with 1 filter / UDDS

Comment: Ok if 1 filter / UDDS was intended.

(b)(5) – Deleted, does not allow single filter PM testing for a 4 phase FTP, flow weighted.

Comment: Four phase single filter sampling should be allowed. This single filter option is an important new technology that should be allowed for harmonization with Tier 3 and for conventional vehicles per levi14israpb procedures, Part II, subparts A & C.

In support of option (b)(5) above, it should allow flow weighting per(b)(5), calculate flow weighted PM mass per 1066.605(e)(3), then calculate composite PM mass per 1066.820(c)(3).

F.6.3.2: Also requires F.6.5 which is the traditional filter composite equation.

Comment: In support of (b)(5) above (single filter), it should allow 1066.820(c)(3).

F.6.3.3: "Amend subparagraphs (b)(1): You may collect a separate PM sample for transient and **stabilized** portions of the cold-start UDDS and the hot-start UDDS. This **may** be done by sampling with four bags."

Comments: Correct spelling typo from "**stabilized**" to "stabilized." Assume this is intended to require traditional 4 phase testing for hybrids. (Post script, the wording "bag" is not appropriate since this is clearly intended for PM filters by "phase").

Also this conflicts with 6.1.3 & 6.3.1 requiring 1 sample per UDDS, but ok if 1 filter / phase was intended.

F.6.3.5: "Delete subparagraphs (b)(3) through **(b)(5)**."

Comment: Per above suggestions w.r.t. single filter technology, it should allow (b)(5).

F.6.3.6: "Subparagraphs (c) through **(c)(2)**. [No change.]"

Comment: (c)(2) allows 4 bag testing which conflicts with 6.1.3 & 6.3.1 requiring 1 sample per UDDS, but ok if 1 filter / phase was intended.

F.6.3.11: "Subparagraphs **(d)** through (d)(1)(iii). [No change.]"

Comment: Correct typo; "(d)" should be (d)(1)(ii).

F.6.5.2 (1): "Use the following equation for PM measured as described in §1066.815(b)(1) or (2):"

Comment: Does not allow single filter. Single filter is an important new technology for the measurement of low levels of PM. Tier 3 allows this measurement technique; LEV 3 should harmonize with it.

F.7: HWY "To be conducted pursuant to 40 CFR §1066.801."

Comment: No roll-out like that provided in Tier 3 **600.111-08 introduction**. Industry needs this lead time and flexibility to modify test sites to meet the new LEV 3 regulations.

F.8.1.1: "Subparagraphs (a) through (b)(iii)(2)"

Comment: Correct typo; should be (b)(2)

F.8.1.4: "Stop any integrating **deveices** and indicate..."

Comment: Correct spelling typo from **deveices** to devices.

F.9: SOC calculations

Comment: No allowance is made for alternate SOC criteria like that used in J1711 Appendix C or CO2 correction. This will become increasingly important as hybrid technology evolves and should be allowed for CS testing. If Appendix C is used, should not set the SOC before the emissions test per 6.2.4.

G. Test Procedures for 2018 and Subsequent Model Off-Vehicle Charge Capable Hybrid Electric Vehicles.

“Migration of the test procedures for measuring exhaust emissions from 40 CFR Part 86 to 40 CFR Part 1066 shall be done in accordance with Part II, Subpart A, section 100.1 of the “California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles,” **unless otherwise noted.**”

Comment: Same concerns as expressed for Subpart F above, over roll-out provisions and requirements branching.

Suggestion: To remediate this roll-out concern, we suggest that in section G. Introduction, the phrase “...unless otherwise noted” be modified to make it clear that the roll out provisions of Part II Subpart A guidance to Part 1066 procedures are still in effect. This is somewhat complex since the hybrid procedures now rely on the Part 1066 test (language) plus instructions with ARB revisions.

One solution could be to modify the phrase to “...unless otherwise noted in accordance with the roll-out provisions in Part II, Subpart A.”

G.5: “For vehicles that qualify and are tested on the Alternative Urban Charge-Depleting Emission Test in subsection G.5.4.5, the urban worst case NMOG + NOx emissions may be determined for the Alternative Urban Charge-Depleting Emission Test alone. Therefore, a vehicle qualifying for the Alternative Urban Charge-Depleting Emission Test **would not be require to evaluate the urban worst case NMOG + NOx emissions for charge-depleting, charge-sustaining, charge-increasing operations. If available, each driver-selectable mode must still be considered for worst case NMOG + NOx emissions for the Alternative Urban Charge-Depleting Emission Test.**”

Comment: Conflicting requirements. First sentence says we don’t have to test in charge increasing modes; the second sentence says “**...each driver-selectable mode must still be considered for worst case NMOG + NOx emissions...**”

Comment: Correct typo; change “...would not be require...” to “...would not be required...”

G.5.3.2 through G.5.4.2.6: General note on the number of samples per test.

Comment: The comments below revolve around some conflicting language in several sections. Specifically how many diluted sample bags and PM filters are needed per test. Some sections say 1 sample per phase; others say 1 sample per UDDS.

Suggest clarifying this by allowing diluted bags or PM filter samples per phase, or UDDS. Secondly for PM only, allow 1 PM filter for the entire test (2 UDDS's) using single filter technology (**important for harmonization with Tier 3** and for conventional vehicles per levi14isorappb procedures, Part II, subparts A & C).

G.5.3.2 Specifies the following PM filter sampling techniques per 1066.815(b):

(b)(1) - 3 or 4 phase FTP with 1 filter/phase. May omit phase 4 filter and substitute phase 2.

Comment: Should limit to traditional 4 phase hybrid testing. Is the intention to allow 1 PM filter per FTP phase (or bag) which is contrary to Subpart F.? Ok if 1 filter / phase was intended.

(b)(2) – 4 phase FTP with 1 filter / UDDS

Comment: Ok if 1 filter / phase was intended.

(b)(5) – Deleted - does not allow single filter PM testing for a 4 phase FTP, flow weighted.

Comment: Four phase single filter sampling should be allowed. This single filter option is an important new technology that should be allowed like that in Tier 3 for harmonization and for conventional vehicles per levi14isorappb procedures, Part II, Subparts A & C.

In support of option (b)(5) above, it should allow flow weighting per(b)(5), calculate flow weighted PM mass per 1066.605(e)(3) and then calculate composite PM mass per 1066.820(c)(3).

5.3.2 Also requires G.5.6 which is the traditional filter composite equation.

Comment: In support of (b)(5) above should allow 1066.820(c)(3).

G.5.3.3: “Amend subparagraphs (b)(1): You may collect a separate PM sample for transient and **stabilized** portions of the cold-start UDDS and the hot-start UDDS. This **may** be done by sampling with four bags.”

Comments: Correct spelling typo, change “stabilized” to “stabilized.” Assume this is intended to require traditional 4 phase testing for hybrids. (Post script, the wording “bag” is not appropriate since this is clearly intended for PM filters by “phase”).

Again as in 5.3.2, is the intention to allow 1 PM filter per FTP phase (or bag)? **5.3.5:** “Delete subparagraphs (b)(3) through **(b)(5)**.”

Comment: Per above suggestions w.r.t. single filter technology, it should allow (b)(5).

G.5.3.6: “Subparagraphs (c) through **(c)(2)**. [No change.]”

Comment: (c)(2) allows 4 bag testing. Is this the intention? 1 bag / FTP phase. Ok if 1 filter / phase was intended.

G.5.4.2.2 Specifies the following PM filter sampling techniques per 1066.815(b):

(b)(1) - 3 or 4 phase FTP with 1 filter/phase. May omit phase 4 filter and substitute phase 2.

Comment: Should limit to traditional 4 phase hybrid testing. Is the intention to allow 1 PM filter per FTP phase (or bag), which is contrary to subpart F? Ok if 1 filter / phase was intended (b)(5) . Does not allow single filter PM testing for a 4 phase FTP, flow weighted.

Comment: Single filter sampling should be allowed. This single filter option is an important new technology that should be allowed for harmonization with in Tier 3 and for conventional vehicles per levi14isorappb procedures, Part II, Subparts A & C.

In support of option (b)(5) above, it should allow flow weighting per(b)(5), calculate flow weighted PM mass per 1066.605(e)(3), then calculate composite PM mass per 1066.820(c)(3).

5.4.2.2 Also requires G.5.6 which is the traditional filter composite equations.

Comment: In support of (b)(5) above should allow 1066.820(c)(3).

G.5.4.2.3: "Amend subparagraphs (b)(1): You may collect a separate PM sample for transient and **stabilized** portions of the cold-start UDDS and the hot-start UDDS. This **may** be done by sampling with four bags."

Comments: Correct spelling typo, "stabilized." Assume this is intended to require traditional 4 phase testing for hybrids. (Post script, the wording "bag" is not appropriate since this is clearly intended for PM filters by "phase").

(Again) as in 5.4.2.2, is the intention to allow 1 PM filter per FTP phase (or bag), which is contrary to subpart F but ok if 1 filter / phase was intended.**5.4.2.5:** "Delete subparagraphs (b)(3) through **(b)(5)**."

Comment: Per above suggestions w.r.t. single filter technology, should allow (b)(5)

G.5.4.2.6: "Subparagraphs (c) through **(c)(2)**. [No change.]"

Comment: (c)(2) allows 4 bag testing, but ok if 1 filter / phase was intended.

G.5.4.3: "Additional End-of-Test Criteria. If the SOC Net Energy Change Tolerance is not satisfied after the hot-start test in section **G.5.4.2.17**, then the End-of-Test criterion pursuant to 40 CFR §1066.501 may be used with the following revisions:"

Comment: Provisions in 5.4.3.2 should be applicable to CS & CD testing, but G.5.4.2.17 limits this section to CD only. SAE's J1711 3.9.1 was intended for CD testing, and Appendix C for CS testing. Suggest parsing these requirements out by test type.

Also the number 5.4.3 should be changed to reflect it is applicable to CS (5.3) and CD 5.4) testing. 5.4.3 is currently under CD section only.

G.5.4.3.3: "Appendix C of SAE J1711 (June 2010) may be used to correct CO2 emissions, and carbon-related exhaust emissions, but may not be used to correct measured values for criteria pollutant emissions.

Comment: CO2 corrections are really applicable to CS testing, but this subsection is for CD only. See parsing comments in G.5.4.3 above.

G.5.4.5: "...and has an AER/EAER ratio that is equal to or greater than 0.98..."

Comment: This is too tight a tolerance to establish today given the rapidly evolving hybrid technology. Recommend 0.90.

G.5.4.5(vii): "Vehicle charging after testing. Vehicle charging shall begin within three hours after the charge-depleting emission test, and the vehicle shall be charged to the manufacturer specified full state-of-charge. During charging, all applicable requirements in section G.3 must be met, and energy consumption shall be calculated pursuant to the requirements in section G.11.7."

Comment: Delete section G.5.4.5 (vii) as there is no need to recharge the battery in order to calculate EAEREC per G.11.7. If needed this would be calculated using the CD emissions procedures of G.5.4.2.

G.5.5.1.2: "n = hot-start UDDS cycle"

Comment: Correct typo; it should be cycle(s) since there can be more than 1.

How many hot start UDDS cycles are allowed for CD testing? Assuming this is limited to either G.10 $\pm 1\%$ of SOC criteria or G.5.4.3.2 SAE J1711 section 3.9.1, then for a vehicle which achieves CS within 2 UDDS's (1 cold & 1 hot), this criteria could cause a double cold start phenomena which would unfairly penalize a vehicle with low trip emissions (including AER zero emissions modes).

In previous versions of these CD procedures, "n" was optionally allowed to be 2 to help alleviate the double cold start concern as follows:

"If there are no charge depleting hot start cycles, then use the next hot start cycle (after the cold start cycle) in the test sequence for the purpose of determining hot start emissions. For this case (no charge depleting hot start cycle), the manufacturer may optionally add one additional hot start cycle for an n=2."

However this provision was intended for vehicles that achieve charge sustaining operation with only 1 hot start cycle, and does not address the new LEV 3 charge increasing option of 5.4.2.17, nor the allowance for J1711 appendix C where again only 1 hot start cycle may (or would) occur. To this end, we suggest the definition of n be modified as follows:

"n = # of hot-start UDDS cycle(s). The manufacturer may optionally add one additional hot start cycle for a minimum of n=2 for the purposes of determining emissions. ARB will do the same for their testing."

As an alternative, J1711 CD utility factor equations could be used for CD testing.

G.5.6.1.2: "n = hot-start UDDS cycle"

Comment: Same as 5.5.1.2 w.r.t “n”.

G.6: HWY introduction “For the purpose of **demonstrating compliance** with exhaust emission standards, a vehicle **must be tested** in the vehicle operation (i.e., either **charge-depleting**, charge-sustaining, or charge-increasing operation) that represents the worst case highway NMOG + NOx emissions of the engine.”

Comment: This requirement brings in a new regulatory requirement to run a cold start, CD HWY test which was not in the previously published hybrid test procedures, conflicts with 6.1.1, 6.1.2 & 6.1.3, and is not harmonized with Tier 3 emissions regulations. HWY’s have always been a hot start test

G.6: “...and vehicle operation (i.e., charge-depleting, charge-sustaining, charge-increasing) which represents the worst case **urban** NMOG + NOx emissions of the engine. For example, if a vehicle has two driver-selectable modes and charge-depleting, charge-sustaining, and charge-increasing operations, the manufacturer shall determine worst case **urban** emissions of NMOG + NOx by comparing...”

Comment: Correct typo; it should be “highway”.

G.6.1.4.2: HWY testing, “F.9”

Comment: Correct typo; it should be G.10.

G.6.1.5 HWY testing, “Additional End-of-Test Criteria. If the SOC Net Energy Change Tolerance is not satisfied after the hot-start test in section **G.6.4.1.2**, then the End-of-Test criterion pursuant to 40 CFR §1066.501 may be used with the following revisions:”

Comment: Correct typo; “G.6.4.1.2” should be 6.1.4.2.

G.6.1.5: Should also be applicable to CS & CD testing, but G.6.1.4.2 limits this section to **CS** only.

Comment: Suggest modifying to “...G.6.1.2 for CD testing or G.6.1.4.2 for CS testing...”

G.7: “and vehicle operation (i.e., charge-depleting, charge-sustaining, charge-increasing) which represents the worst case **urban** NMOG + NOx emissions of the engine. For example, if a vehicle has two driver-selectable modes and charge-depleting, charge-sustaining, and charge-increasing operations, the manufacturer shall determine worst case **urban** emissions of NMOG + NOx by comparing...”

Comment: Correct typo; it should be “SFTP”.

G.7.1.4: US06 testing, “A valid test shall satisfy the SOC Net Energy Change Tolerances in section G.10 for the US06 cycle with emission sampling.”

Comment: No allowance for J1711 Appendix C, similar to that given for UDDS (5.4.3) or HWY (6.1.5). US06 should have the same provisions as UDDS or HWY, but limited to CS operation.

G.7.2.4: SC03 testing, “A valid test shall satisfy the SOC Net Energy Change Tolerances in section G.10 for the SC03 cycle with emission sampling.”

Comment: No allowance for J1711 Appendix C, similar to that given for UDDS (5.4.3) or HWY (6.1.5). SC03 should have the same provisions as UDDS or HWY, but limited to CS operation.

G.8.1 “To satisfy test requirements for the 50°F emission test, the vehicle shall be tested in the **worst case (NMOG + NOx)** of the urban charge depleting range emission test or urban charge sustaining emission test as defined in section G.5. To satisfy test requirements for the 20°F emission test, the vehicle shall be tested in the **worst case (CO)** of the urban charge depleting emission test or urban charge sustaining emission test as defined in section G.5.”

Comment: Two different criteria, NMOG + NOx for 50°F testing and CO for 20°F testing. This should be consistent with G.5 as NMOG + NOx.

G.5.6.1.2 (1): “Use the following equation for PM measured as described in §1066.815(b)(1) or (2).”

Comment: Does not allow single filter. Single filter is an important new technology for the measurement of low levels of PM. Tier 3 allows this measurement technique, and LEV 3 should harmonize with it.

G. Grouped Comments on Conflicting CI Mode Requirements

CS & CD UDDS General Requirements - with CI mode selected

G.5: “For the purpose of demonstrating compliance with exhaust emission standards, a vehicle must be tested in the vehicle operation (i.e., either charge-depleting, charge-sustaining, or charge-increasing operation) that represents the worst case NMOG + NOx emissions of the engine.”

“Vehicles with more than one driver-selectable mode (e.g., normal mode, economy mode, performance mode, battery charging mode, or any other **operating mode available to the driver**) **for a given charge depleting, or charge sustaining, or charge-increasing operation must be tested in the one driver-selectable mode and vehicle operation** (i.e., charge-depleting, charge-sustaining, charge-increasing) which represents the worst case urban NMOG + NOx emissions of the engine.”

Comment: Above implies for a full charge test, we must select a driver selectable battery charging mode if that is worst case. But B.1 requires “lowest normal level” SOC, but the battery is at full charge?

G.5: “For vehicles that qualify and are tested on the Alternative Urban Charge-Depleting Emission Test in subsection G.5.4.5, the urban worst case NMOG + NOx emissions may be determined for the Alternative Urban Charge-Depleting Emission Test alone. Therefore, a vehicle qualifying for the Alternative Urban Charge-Depleting Emission Test **would not be require to evaluate the urban worst case NMOG + NOx emissions for charge-depleting, charge-sustaining, charge-increasing**

operations. If available, each driver-selectable mode must still be considered for worst case NMOG + NOx emissions for the Alternative Urban Charge-Depleting Emission Test."

Comment: Conflicting requirements, first sentence says OEMs don't have to test in charge increasing modes, but the second sentence says **"...each driver-selectable mode must still be considered for worst case NMOG + NOx emissions"**

Comment: Correct typo; "...would not be require..." **to** "...would not be required..."

CS & CD UDDS Preconditioning - with CI mode selected

G.5.2.1: "The vehicle shall be preconditioned in the driver-selectable mode to be tested and in charge-sustaining operation."

Comment: Non-executable, charge increasing mode selected and vehicle will be at a higher SOC at the end of the prep which conflicts with B.1 "lowest normal level", so will need to set SOC

G. 5.2.5: "For the charge depleting range emission test and the charge sustaining emission test, the preconditioning cycle shall be the UDDS cycle. The vehicle **must be in charge sustaining operation** during the preconditioning drive."

Comment: Non-executable, charge increasing mode selected per G.5.2.1.

CS UDDS - with CI mode selected

5.3.10: Amend subparagraph (d)(1)(i): "Precondition the vehicle as described in section G.5.2. **Initiate the charge-sustaining** cold-start test following the 12 to 36 hour soak period."

Comment: Non-executable, charge increasing mode selected

CD UDDS - with CI mode selected

G.5.4.2.10: Amend subparagraph (d)(1)(i): "Precondition the vehicle as described in section G.5.2. Initiate the **charge-sustaining** cold-start test following the 12 to 36 hour soak period."

Comment: G.5.2 requires the charge increasing button be selected at the preconditioning cycle, but after the preconditioning cycle B.1 requires the SOC to be set to the **lowest normal SOC**, yet G.5.2.8 requires the **SOC to be fully charged** for the subsequent CD test?

G.5.4.2.17: "A valid test shall satisfy the SOC Net Energy Change Tolerances in section G.10. An option is allowed for **PHEVs with charge-increasing operation where a test may be considered valid if the SOC at the end of the hot-start test is higher than the SOC at the beginning of the cold-start test**. If this option is used, then confirmatory and in-use compliance tests shall also be considered valid if the SOC at the end of the hot-start test is higher than the SOC at the beginning of the cold-start test."

Comment: If during a CD test the charge increasing button selected, the batteries won't deplete, the vehicle will just keep running UDDS cycles **till the vehicles runs out of gas, and then the vehicle will start depleting the battery**. This test sequence --run endless UDDS's till the vehicle runs out of gas, then depleting the fully charged battery energy -- is dramatically longer than a

conventional CD test and doesn't make sense. Also can't meet SOC after battery is depleted because the vehicle is out of gas, hence can't start the engine. Very burdensome.

Also in theory one could achieve the SOC criteria w/o depleting the battery, which defeats the purpose of running a CD test to determine AER and EAER.

Alternate CD UDDS - with CI mode selected

G.5.4.5: "A vehicle with an All-Electric Range that is equal to or greater than **four UDDS cycles** and has an **AER/EAER** ratio that is equal to or greater than **0.98** may demonstrate compliance with applicable exhaust emission standards using this section G.5.4.5 in lieu of section G.5.4.2."

Comment: It is unclear how one qualifies for this Alternative CD UDDS test sequence, given the previous language in G.5 on charge increasing modes, specifically to meet this four UDDS AER range and the AER/EAER ratio. Qualifying for this alternative test requires:

- (1) A CD UDDS **emissions** test sequence per G.5.4.1 & 5.4.2. But this CD emissions test is subject to G.5 which states "Vehicles with more than one driver-selectable mode (e.g., normal mode, economy mode, performance mode, battery charging mode, or any other **operating mode available to the driver**) **for a given charge depleting, or charge sustaining, or charge-increasing operation must be tested in the one driver-selectable mode and vehicle operation** (i.e., charge-depleting, charge-sustaining, charge-increasing) which represents the worst case urban NMOG + NOx emissions of the engine". This would imply the CD test would need to be run in charge increasing mode.
- (2) If run in CI mode, the AER distance would be reduced along with the AER/EAER ratio
- (3) Therefore it is likely the vehicle would not qualify for this Alternate CD test sequence.

G.5.4.5 (iii): "The vehicle shall be preconditioned according to section **G.5.2**."

Comment: Requires prep cycle to be run in **charge increasing** mode with subsequently higher SOC, which conflicts with G.5.2 that requires the prep cycle to be "charge sustaining."

CS & CD HWY - with CI mode selected

G.6. General Requirements: "For the purpose of demonstrating compliance with exhaust emission standards, a vehicle **must be tested in the vehicle operation** (i.e., either charge-depleting, charge-sustaining, or **charge-increasing operation**) that represents the worst case highway NMOG + NOx emissions of the engine."

CS HWY - with CI mode selected

G.6.1.4: "The Highway Charge Sustaining Emission Test is conducted **after charge sustaining** operation has been reached."

G.6.1.4.1: Perform the Highway Charge-Sustaining Emission Test...If available, the **driver-selectable mode** to be tested **shall be activated during the preconditioning drive**."

Comment: 6.1.4 & 6.1.4.1 conflict since 6.1.4.1 will be in charge increasing mode.

G.6.1.4.2: “Operate the vehicle over the HFEDS cycle for preconditioning. Allow the vehicle to **idle for 15 seconds (with the vehicle in gear)**, then start a repeat run of the HFEDS cycle and simultaneously start sampling and recording.”

Comment: After running the HWY prep in a charge increasing mode, B-1 Definitions of “Charge-increasing operation” requires setting the SOC “lowest normal level”, but we just ran a prep which set the SOC at a higher level. So in the **15 seconds** between the HWY prep and the HWY emissions test, the vehicles SOC would have to be artificially reduced to this lowest normal level.

How does one decrease a high voltage battery charge, in 15 seconds, while the engine is running and simultaneously trying to increase the battery charge, and also not interfere with the vehicle cooling fan which is operating?

This is **not feasible**, and even if possible would absolutely not be representative of normal vehicle operation and would adversely impact the vehicles control systems right before an official emissions test, due to a sudden battery drain while at idle vehicle the vehicle is trying to maintain a charge increasing mode.

SFTP - with CI mode selected

G.7.1: “Vehicles with more than one driver-selectable mode (e.g., normal mode, economy mode, performance mode, battery charging mode, or any other operating mode available to the driver) for a given charge depleting, charge sustaining, or **charge-increasing** operation must be tested in the one driver-selectable mode and vehicle operation (i.e., charge-depleting, charge-sustaining, charge-increasing) which represents the worst case urban NMOG + NOx emissions of the engine.”

CS US06 - with CI mode selected

G.7.1: “This section G.7.1 shall apply during **charge sustaining** operation.”

G.7.1.2: “If available, the **driver-selectable mode** to be tested **shall be activated during the preconditioning drive**.”

Comment: 7.1 & 7.1.2 conflict when charge increasing mode is selected.

G.7.1.3: Requires 1066.831(b)(4), the 1–2 minute idle between the US06 preconditioning cycle and the US06 emissions test.

Comment: After running the US06 prep in a charge increasing mode, B-1 Definitions of “Charge-increasing operation” requires setting the SOC “lowest normal level”, but we just ran a prep which set the SOC at a higher level. In the **1 - 2 minutes** between the US06 prep and the US06 emissions test, the vehicles SOC would have to be artificially reduced to this lowest normal level.

How does one decrease a high voltage battery charge, in 1 – 2 minutes, while the engine is running and simultaneously trying to increase the battery charge, and also not interfere with the vehicle cooling fan which is operating?

This is **not feasible**, and even if possible would absolutely not be representative of normal vehicle operation and would adversely impact the vehicles control systems right before an

official emissions test, due to a sudden battery drain while at idle vehicle the vehicle is trying to maintain a charge increasing mode.

CS SC03 - with CI mode selected

G.7.2: "The vehicle shall be **preconditioned in the driver-selected operating mode** in which it will be tested and at a **charge-sustaining SOC** level."

G.7.2.2: "If available, the **driver-selectable** mode to be tested shall be activated during the **preconditioning drive**."

Comment: 7.2 charge sustaining preconditioning conflicts with 7.2.2 when charge increasing mode is selected.

G.7.2.3: Requires 1066.835(c)(6), the 9 to 11 minute hot soak between the SC03 preconditioning cycle and the SC03 emissions test.

Comment: After running the SC03 prep in a charge increasing mode, B-1 Definitions of "Charge-increasing operation" requires setting the SOC "lowest normal level", but we just ran a prep which set the SOC at a higher level. So in the **9 - 11 hot soak minutes** between the SC03 prep and the SC03 emissions test, the vehicles SOC would have to be artificially reduced to this lowest normal level.

How does one decrease a high voltage battery charge, in 9 - 11 minutes, while the hood is closed, and also not interfere with the vehicle cooling fan which is operating?

This is **not feasible**, and even if possible would absolutely not be representative of normal vehicle operation and would adversely impact the vehicles control systems right before an official emissions test, due to a sudden battery drain while at idle vehicle the vehicle is trying to maintain a charge increasing mode.

20 & 50°F CS or CD UDDS - with CI mode selected

G.8: "50°F testing shall be conducted pursuant to section G.5 ..." and "20°F testing shall be conducted pursuant to section G.5 ..."

Comment: G.5 brings in **charge increasing** modes to 20 & 50°F testing. This create multiple conflicts for section G.8 for both charge sustaining and charge depleting cold testing just like that detailed for 75°F testing per G.5 above.

G.8.1: "To satisfy test requirements for the 50°F emission test, the vehicle shall be tested in the worst case (NMOG + NOx) of the urban **charge depleting** emission test or urban **charge sustaining** emission test as defined in section G.5. To satisfy test requirements for the 20°F emission test, the vehicle shall be tested in the worst case (CO) of the urban **charge depleting** emission test or urban **charge sustaining** emission test as defined in section G.5. For the 20°F and 50°F emission tests, the vehicle is not required to meet SOC net tolerances."

Comment: Multiple conflicts. What does one do if the worst case NMOG + NOx for 75°F UDDS "charge sustaining" (which it isn't) is with charge increasing mode selected? Likewise for charge depleting 75°F UDDS tests and 20°F CO worst case testing.

What if the 75°F UDDS charge sustaining NMOG + NO_x is the worst case (w/o the charge increasing mode selected), does the reference to G.5 require OEMs to run the vehicle in charge increasing and charge decreasing at cold temperatures? Likewise for charge depleting 75°F UDDS tests and 20°F CO worst case testing. This is directly conflicting with 8.1

leviii14isorappk – Title 13 Changes

2.3: “This section was deleted, as the calculations therein are now contained in 40 CFR Part 1066 section 1066.935.”

Comment: Correct typo; 1066.935 should be 1066.635.